EXHIBIT NO. 1

23
11-28-06

City of Alexandria, Virginia

MEMORANDUM

DATE: NOVEMBER 22, 2006

TO: THE HONORABLE MAYOR AND MEMBERS OF CITY COUNCIL

FROM: JAMES K. HARTMANN, CITY MANAGER

SUBJECT: IMPLEMENTATION OF THE EFFICIENCY AND BEST PRACTICES STUDY OF THE TRANSPORTATION AND ENVIRONMENTAL SERVICES DEPARTMENT

ISSUE: Implementation of the efficiency and best practices study of the Transportation and Environmental Services Department (T&ES).

RECOMMENDATION: That City Council receive this implementation plan of the efficiency and best practices study of the Transportation and Environmental Services Department (T&ES) and schedule it for discussion at a future Council work session.

DISCUSSION: This is one of two reports undertaken and completed in response to Council's request to conduct reviews of City departments. Contained in this implementation plan is a comprehensive review including findings and recommendations for the Transportation and Environmental Services Department (T&ES). T&ES volunteered to have its department studied. The consulting firm that conducted this study is Matrix Consulting Group, a firm with broad national experience conducting these types of studies.

The purpose of all of the efficiency and best practices studies is to evaluate the efficiency and effectiveness of certain functions within City departments and how City practices relate to industry best practices. This will be accomplished through the use of an external consultant who will examine City departments' operational policies and procedures, organizational structure, span of control, lines of authority, staffing, workloads, budget, outputs, and department service levels. As we told Council at the November 4, 2006 Council Retreat, we are reviewing and improving departments' workload and performance measures, and benchmarking the results to comparable jurisdictions and industry standards.

As part of this departmental review process and other management improvement efforts, I established a special advisory group. This group, which is composed of highly experienced individuals in the field of public and private sector management, has reviewed the draft and provided me with feedback on the reports. The comments and suggestions from this group have been very valuable and they will continue to be used throughout this entire process.

The scope of the T&ES study included the Maintenance Division, the Engineering and Design Division, and the Construction and Inspection Division. The study did not include the Solid Waste Division, Environmental Quality Division, Transit, or the Transportation Division. Many of the areas that were not covered in this study had either been recently studied or will be studied in the near future. A study was previously completed of the solid waste division resulting in route efficiencies and contracting out curbside recycling.

Given the enormity and complexity of the T&ES Department, we decided to study the department in two phases. T&ES will need time and resources to implement the recommendations from the first phase. The next phase of T&ES will be studied in 2008.

Implementation Plan (Attachment 2): This attachment contains all of the 90 recommendations made by Matrix Consulting Group. Accompanying each of the recommendations are comments from T&ES (in italics). There are also cost savings and/or expenditures associated with each of the recommendations.

Of the 90 recommendations proposed by the consultant, T&ES agrees with and will begin implementing 65 of them, many of which promise immediate cost-saving on process efficiencies. There are 23 additional recommendations that will need to be studied further before we decide to implement them and two recommendations in which alternative cost savings are proposed. We believe the City's priorities often equal or exceed those of comparators, and our recommendations are not to change a practice in a number of cases.

The one area of the report in which there was a substantial difference in approach between the consultant and T&ES involves the use of contractors to do preventive maintenance work on the fire hydrants and sewer systems. The consultant recommended that all preventive maintenance work be brought in-house and completed by T&ES crews. In the 1980s a decision was made to outsource regular maintenance and instead to have the T&ES crews do scheduled repair work and respond to emergencies such as: flooding, major erosion within stream courses, snow and ice emergencies, special event support, etc. Due to the unpredictable nature of this work, a contractor has been used to do regular maintenance on the sewer system, uninterrupted by other short-term responsibilities. Doing so avoids maintenance deferrals and backlogs, which will ensure that the City avoids costly future repairs on systems that have not been properly maintained.

Although T&ES does not believe the preventive maintenance contracts should be eliminated, I have asked staff to revise the contracts to ensure that work is being done by the job (i.e. number

of hydrants maintained) not by the hour. It is undetermined at this point how much savings will result, but we are confident that some savings will be realized through better contract provisions.

With respect to proposed fee changes, we have found that some of our fees are somewhat low compared to other jurisdictions. Thus we will be recommending fee increases in several areas.

FISCAL IMPACT: The recommendations proposed to be implemented will result in savings, increased user fees, and service enhancements. There would be at least $965,700 realized in annual savings and increased user fees through the implementation of these 65 recommendations. A fiscal impact table is included in Attachment 1. Below are summaries of the savings and user fee increases:

- Annual savings total at least $296,700 and include the following:
  - Pave streets to 1 inch thickness instead of 2 inch (recommendation #18)
  - Eliminate Assistant Superintendent for Sewers (#20)
  - Eliminate one Rod and Chain Operator (#60)
  - Eliminate one Inspector II (#80)
- User fee increases would add additional revenue of approximately $669,000 annually if Council decides to implement them. The increases would include:
  - Fire hydrant maintenance fees (#41)
  - Private fire hydrant maintenance fees (#40)
  - Right of way permit fees (#50)
  - Pavement restoration fees (#54)

Of the 63 recommendations that T&ES recommends implementing, some have cost implications. These cost serve as an investment in technology and people and will improve efficiency or increase services. There are "one-time" expenses (which reoccur about every five years) and on-going/annual expenses. The one-time expenses total $593,000 of which $233,000 has already been funded) and are listed below:

- Purchase a maintenance management system and handheld devices (#11, #12)
- Develop an annual maintenance work plan (#10)
- Implement a pavement management system (#16)
- Obtain a scanner for plats (#58)
- Use laptops for all inspections (#85)

The annual operating costs associated with the recommendations that can be quantified total $276,859 and include the following:

- License fee for maintenance management system (#11)
- Additional civil engineer III (#75)
- Upgrade of one civil engineer (#76)
- Additional inspector III (#81)

These investments in both technology and people will result in higher levels of efficiency and service enhancements.

All of these recommendations are listed in detail in Attachment 2 and are fully explained in the consultant's report.

Cost Savings and Expenditure Table (Attachment 1): This Attachment contains all of the cost implications for all of the 90 recommendations.

ATTACHMENTS:
Attachment 1. Cost Savings/Expenditure Table
Attachment 2. T&ES Implementation Plan
Attachment 3. Management Study of the Transportation and Environmental Services Department

STAFF:
Rich Baier, Director, Transportation and Environmental Services
Michele Evans, Deputy City Manager
Mark Jinks, Deputy City Manager
Bruce Johnson, Director, Office of Management and Budget
Derek Argust, Organization Development Coordinator

Attachment 1

Attachment 1: Cost Savings/Expenditure Table

T&ES Efficiency/Best Practices Study
Implementation Recommendations

Annual Operating Savings and User Fees

		Consultant Report	Staff Recommendation
18	Pave streets to 1 inch thickness instead of 2 inch	N/A	115,000
20	Eliminate Assistant Superintendent for Sewers	76,200	76,200
30	Eliminate sewer cleaning contract	210,900	TBD
33	Eliminate fire hydrant maintenance contract	154,700	TBD
35	Eliminate catch basin/drain inlet cleaning contract	218,700	TBD
40	Update private fire hydrant maintenance fees	TBD	TBD
41	Include fire hydrant maintenance in utility billings	158,200	158,200
50	Double permit fees	261,000	261,000
54	Develop pavement restoration fees	250,000	250,000
59	Eliminate Land Survey Analyst	88,000	0
60	Eliminate Rod & Chain Operator	51,700	51,700
80	Eliminate one Inspector II	53,600	53,600
89	Surplus thermoplastic truck	15,000	0
	TOTAL Operating Savings and User Fees	$1,538,000	$965,700*

** Does not include savings to be determined*

One-time Capital Costs (non-periodic)

		Consultant Report	Staff Recommendation**
10	Develop annual maintenance work plan	Not identified	175,000*
11	Maintenance management system	150,000	282,000
12	Handheld devices	Not identified	50,000
16	Pavement management system	1,050	25,000
32	Replace sewer cleaning truck	180,000	0
34	Reassign staff to fire hydrant maintenance	25,000	0
37	Acquire catch basin/drain inlet cleaning truck	180,000	0
58	Scan plats	15,000	15,000
85	Implement laptops for all inspections	20,000	46,500
	TOTAL One-Time Capital Costs	$571,050	$593,500

** Not identified in the study*

*** Reflects post-study staff cost re-estimates including implementation costs.*

Annual Operating Costs

		Consultant Report	Staff Recommendation**
11	Maintenance management system	Not identified	30,000
12	Handheld devices	Not identified	TBD
37	Acquire catch basin/drain inlet cleaning truck	32,000	0
44	Increase Civil Engineer salary ranges	94,000	TBD
75	Authorize additional Civil Engineer III	115,100	114,745
76	Upgrade one Civil Engineer	Not identified	34,214
81	Authorize additional Inspector III	97,900	97,900
90	Contract out pavement marking	Not identified	TBD
	TOTAL Annual Operating Costs	$339,000	$276,859*
	* *Does not include costs to be determined* ** *Reflects post-study staff cost re-estimates including implementation costs.*		

Attachment 2: T&ES Implementation Plan

Department of Transportation and Environmental Services
Implementation Plan

Employee Survey Recommendations			
Recommendation	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/ (Saving)**
1. The manager of the Engineering and Design Division should meet with the development review staff of the Division to discuss the proposed recommendations contained within this report that address the streamlining and enhanced management of the permit process, permit documents, and permit information management process. *T&ES Comment: Agrees with recommendation. Implementation will be on going.*	Engineering Division Chief, Maintenance Division Chief, Division Chief – Construction and Inspection	On-going	$0
2. The manager of the Engineering and Design Division should elicit input from the development review staff of the Division regarding opportunities for further improvements in the permit process, permit documents, and permit information management process. *T&ES Comment: Agrees with recommendation. Implementation will be on going.*	Engineering Division Chief	On-going	$0
3. The managers of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division of the Transportation and Environmental Services Department should meet to discuss career advancement issues and develop a strategy to address the issue. *T&ES Comment: Agrees with recommendation. Implementation will be on going. Per Matrix report, Department recommends that civil engineer (CE) series salary ranges be increased to meet comparator jurisdictions. Personnel to undertake study.*	Personnel, Engineering Division Chief, Maintenance Division Chief, Division Chief – Construction and Inspection	On-going	$0

Attachment 2

4. The managers of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division of the Transportation and Environmental Services Department should work with the employees of their divisions to address these issues. *TES Comment: Agrees with recommendation. Implementation will be on going.*	Engineering Division Chief, Maintenance Division Chief, Division Chief – Construction and Inspection	On-going	$0
5. The managers of the Human Resources Department should meet with the employees of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division to discuss the City's compensation philosophy and the process used for the City's compensation survey. *T&ES Comment: Agrees with recommendation. Implementation will be on going.*	Human Resources Director, Engineering Division Chief, Maintenance Division Chief, Division Chief – Construction and Inspection	On-going	$0
6. The managers of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division of the Transportation and Environmental Services Department should meet with their employees to discuss their equipment and facility needs and develop strategies to address these needs. *T&ES Comment: Agrees with recommendation. T&ES new facility will address this need. T&ES facility to be moved into in Fall 2007.*	Engineering Division Chief, Maintenance Division Chief, Division Chief – Construction and Inspection	On-going	$0

Maintenance Division
The Maintenance Division should enhance its maintenance management systems: *T&ES Comment. There has been $150,000 budgeted in the IT plan for purchasing a commercial off-the-shelf (COTS), maintenance management system. T&ES has identified an additional $132,000 available for data gathering and other assistance from a consultant in implementing this system.*

7. The Division should define the primary work activities and their units of measure in the maintenance and repair of streets, and sanitary and storm water sewers. *T&ES Comment: Agrees with recommendation. Being addressed under "Measuring for Results Initiative". On-going.*	Maintenance Division Chief	On-going. Measuring for Results Initiative	$0
8. The Division should define the levels of service to be provided in the maintenance and repair of streets, and sanitary and storm water sewers. *T&ES Comment: Agrees with recommendation. In progress.*	Maintenance Division Chief	In progress Measuring for Results Initiative	$0
9. The Division should develop performance standards for the primary work activities that it performs in the maintenance and repair of streets, and sanitary and storm water sewers. *T&ES Comment: Agrees with recommendation.*	Maintenance Division Chief	Measuring for Results Initiative	$0
10. The Division should develop an annual work plan each year that estimates the kind and amount of work to be done in the next fiscal year in the maintenance and repair of streets, and sanitary and storm water sewers. *T&ES Comment: Agrees with recommendation. Can be addressed through the funding of an Annual Infrastructure report – cost $175,000. It can also be addressed under the "Managing for Results Initiative." On-going.*	Maintenance Division Chief	FY 2008	$175,000
11. The Division should utilize a COTS maintenance management system to compare actual versus planned performance and costs. *T&ES Comment: Agrees with recommendation. Process will begin in December to select a consultant to assist with implementation. Purchase of a COTS system and implementation will total $282,000.*	Maintenance Division Chief	In progress	$282,000 in one-time capital outlay

12. Handheld devices should be utilized to report the actual work accomplished within the COTS maintenance management system. *T&ES Comment: Agrees with recommendation. Completion dependent on future funding. Use of handheld devices in conjunction with the maintenance management system will result in great efficiencies, although this change in how T&ES manages its activities will require extensive training and workforce adaptation. IT support resources to be determined. Will need to conduct extensive training in the field for successful implementation.*	Maintenance Division Chief	Dependent on completion of number 11	$50,000 in one-time capital outlay + training cost (TBD) + support costs
13. The Maintenance Division should work with VDOT to obtain acceptance of a COTS maintenance management system for reporting expenses and obtaining reimbursement. *T&ES Comment: Agrees with recommendation.*	Maintenance Division Chief	Included on completion of number 11	$0
14. The Department should conduct a comprehensive asset inventory of streets and sanitary and storm water sewers. *T&ES Comment: Agrees with recommendation. This recommendation goes hand-in-hand with the maintenance management system, and staff needs to conduct a comprehensive inventory as part of implementing a maintenance management system. Some of this work has been completed, such as a mapping of sanitary and storm sewers, but other structures, such as fire hydrants and catch basins, have not been inventoried. T&ES also plans to capture infrastructure that is beyond the scope of the Matrix study, such as traffic signals and signage.*	Maintenance Division Chief	Dependant on number 11, as well as CIP funding	TBD
The City of Alexandria should improve its pavement management program: *T&ES Comment: This recommendation goes hand-in-hand with the maintenance management system, and staff will conduct a comprehensive inventory as part of implementing a maintenance management system. Some of this work has been completed, such as a mapping of sanitary and storm sewers, but other structures, such as fire hydrants and catch basins, have not been inventoried. T&ES also plans to capture infrastructure that is beyond the scope of the Matrix study, such as traffic signals and signage.*			
15. Responsibility for the pavement management program should be assigned to the Engineering and Design Division. *T&ES Comment: Agrees with recommendation. Maintenance should work closely with Engineering and Design to set up a prioritized program for all street conditions for reconstructions as well as repaving.*	Engineering Division Chief	Pending approval and hiring of CE III position	$0

16. The City of Alexandria should purchase and fully utilize a pavement management system to provide a systematic approach to the repair and maintenance of the City's roads. *T&ES Comment: Agrees with recommendation. T&ES estimated costs $25,000 plus training.*	Engineering Division Chief	Also pending approval and hiring of CE III position	$25,000 in one-time outlay for software.
17. The City should evaluate the pavement condition of its streets on a three-year cycle, with 33% of the streets being evaluated each year. *T&ES Comment: Agrees with recommendation.*	Engineering Division Chief	Ongoing within six months of hiring CE III	$0
18. The Transportation and Environmental Services Department should expand the set of non-structural overlays that it utilizes for preventive maintenance of the City's streets beyond overlay to include slurry seal and micro-surfacing. *T&ES Comment: T&ES proposes an alternative solution. T&ES has an alternative recommendation to expand the types of non-structural overlays currently in use. T&ES recommends continuing to use the current pavement replacement standards, placing two inches of structural pavement on our arterial street, but reducing the thickness from two inches to one inch on local streets in order to reduce the costs of repaving. The annual cost of paving depends on the number of local and arterial streets paved each year. Arterial streets are usually multilane and account for approximately 70 percent of annual paving costs. Average annual savings would be approximately $115,000 by applying one inch of structural pavement on local streets rather than two inches.*	Engineering Division Chief	N/A	($115,000)
19. The Transportation and Environmental Services Department should develop strategies to assure the effective use and application of these alternative non-structural overlays. *T&ES Comment. T&ES proposes an alternative solution. See Number 18 for explanation.*	Engineering Division Chief	N/A	$0

The plan of organization for the maintenance division should be streamlined, and responsibility for construction inspection clarified. *T&ES Comment: The Matrix study recommends that the Inspector II position in the Streets Section responsible for managing paving and curb and gutter work be transferred to the Construction and Inspection Division. While T&ES recognizes the similarity of some of the inspection and construction management duties that are shared by the Maintenance and Construction and Inspection Divisions, T&ES disagrees that this responsibility can be transferred with one position. The Inspector II position responsible for these operations utilizes many other resources in the Maintenance Division to fulfill these operations, such as the traffic control set up and advance maintenance work. Assigning this responsibility to another division may hamper the departments' ability to efficiently manage these tasks. T&ES recognizes that there may be efficiencies that can be found by coordinating these responsibilities and wishes to further study this option before agreeing to implement the recommendation. This further study will also examine construction management of the sewer-relining program.*			
20. The Assistant Superintendent position for the Sewer Section in the Maintenance Division should be eliminated. *T&ES Comment: Agrees with recommendation. The Assistant Superintendent of Streets position has been eliminated. The duties associated with this position include deploying personnel and materials to the field for carrying out repairs, and managing field projects that are less extensive than capital projects, but that nonetheless require a strong technical background. Examples of projects recently managed by the existing Assistant Superintendent position include utility relocations, changing grade on sidewalks to complement paving projects, and handicap access retrofits, and these responsibilities will be included in the responsibilities of the Superintendent of Streets position.*	Transportation and Environmental Services Director	Completed	($76,200)
21. The Inspector II position in the Streets Section responsible for managing contractors responsible for street overlay and overlay preparation, and for sidewalk, curb and gutter, and driveway apron replacement should be transferred to the Construction and Inspection Division. *T&ES Comment: Recommends further study. Because our paving program requires additional Maintenance Division personnel to adjust manholes, provide signing, and provide notification to citizens of utility work. Additionally, this position is supervises the pothole patch crews. Moving this position would add to the workload in the Construction and Inspection Division without adding the required support resources. We would like to further study this recommendation to see if there are efficiencies that could be gained from reorganizing positions in the Maintenance Division, but we feel that this recommendation will actually decrease efficiency and increase workload.*	Transportation and Environmental Services Director	Requires further study	$0

22. The Engineering and Design Division should be assigned the responsibility for preparation of the plans, specifications, and estimates for all sewer-relining projects, including those currently managed by the Sewer Section. The Construction and Inspection Division should be responsible for managing and inspecting the construction for all sewer relining projects to assure adherence to the plans, specifications, and estimates, including those including those currently managed by the Sewer Section. *T&ES Comment: Recommends further study. Because there are no cost savings associated with the recommendation, we would like to study this recommendation further to see if there are efficiencies that could be gained from moving sewer relining projects from the Maintenance Division into the Construction and Inspection Division. The current organization allows the Inspector II to take on additional maintenance functions, such as snow removal and answering sewer backup complaints. This recommendation is also dependent on the approval of adding a Civil Engineer III position to the Engineering Division.*	Transportation and Environmental Services Director	Pending approval of CE III position.	$0

Crew sizes utilized by the maintenance division are too large in some instances, insufficient resources are allocated to pavement maintenance, and some services should be in-sourced.

T&ES Comments: There are several factors that make Alexandria's storm and sanitary sewer maintenance needs unique. First, catch basin cleaning is included in the Nine Minimum Controls portion of our mandated Virginia Pollution Discharge Elimination System permit. Additionally, the restaurant and tourism industries create burdens on the sewer system due to grease being deposited into the sewer system, as well as excessive debris being deposited in catch basins in the Old Town area. While there is adequate staff to perform ongoing repairs of our sewers, catch basins, and fire hydrants, staff is not available to perform comprehensive maintenance programs for these structures.

In the Old Town area, our contractor flushes sewers and several siphons on a weekly basis in order to prevent backups caused by grease accumulations, and our contractor also completely overhauls and paints more than 600 fire hydrants per year Citywide. There are two four-person crews that perform sewer repairs, channel maintenance, and catch basin, manhole, and hydrant repairs, but the Department does not agree that those resources are adequate to carry out the comprehensive maintenance programs that we have outsourced. In addition to the $385,000 that Matrix estimates in equipment costs to bring these maintenance programs in-house, T&ES disagrees with the estimated savings in contractual costs due to increased personnel costs that would result by following this recommendation. While T&ES believes that contracting out those services is in the City of Alexandria's best interest, the City Manager has requested that the contract be restructured to achieve additional cost efficiencies.

23. The pothole patching crew should be reduced to a two-person crew. *T&ES Comment: Agrees with recommendation. The location and type of work to be completed drives the size of the crew that is deployed. For a patching job on a residential street, a two-person crew is suitable. However, if the work is to be done on an arterial street, traffic control and the size of the job determine the appropriate crew size, which will be greater than a two-person crew.*	Maintenance Division Chief	Ongoing	$0

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24. Assign the floating operator – yard debris removal to pavement maintenance and allocate one (1) of the four (4) staff currently assigned to the utility crew to pavement maintenance. *T&ES Comment: Agrees with recommendation. There is a need for weekly yard debris removal, but this person could be deployed for some portion of the week to street maintenance. Again, the amount of time that this person spends in each role will be determined as the need for yard cleanup fluctuates due to factors such as storms and floods.*	Maintenance Division Chief	Ongoing	$0
25. The Maintenance Division should improve the level of street maintenance service by consistently assigning six staff to pavement maintenance including pothole patching, skin patching, and base repair. Note: Matrix is recommending three two-person crews. *T&ES Comment: Agrees with recommendation.*	Maintenance Division Chief	Ongoing	$0
26. The sewer construction and repair crews should be reduced to a crew size of four for each crew. *T&ES Comment: Agrees with recommendation. This recommendation is consistent with T&ES' current staffing levels. In the 1980's a decision was made to outsource regular maintenance and to instead have the crews do scheduled repair work and respond to emergencies such as: flooding, major erosion within stream course, snow and ice emergencies, special event support, etc. Due to the unpredictable nature of this work, it is imperative that the contractor does the regular maintenance.* *There are 15 staff members in the Sewer Maintenance Section, including a superintendent, an assistant superintendent, two four person maintenance crews (each comprised of a labor supervisor, a heavy equipment operator, an equipment operator II, and a laborer II), a two-person CCTV crew, a two-person flushing crew, and an inspector. The two maintenance crews perform construction and repairs on hydrants, sanitary sewers, and storm sewers, and the CCTV and flushing crews inspect and clean blockages from sewer mains, as well as inspecting laterals. During the winter months, the employees in the Sewer Maintenance Section assist with snow removal efforts.*	Maintenance Division Chief	N/A	$0
27. Two staff from the sewer construction and repair crews should be reallocated to catch basin and drain inlet cleaning. ***T&ES Comment: Recommends further study. The level of service will decrease if City employees do this work, and there are concerns that this will decrease T&ES' ability to react quickly to citizen complaints. Please refer to the answer to Item 26 regarding the City's approach to contractual maintenance. The report does not take into consideration that the City would have to purchase equipment to move this activity in-house. In a time of increasing taxes and fees, complaints about reductions in service will follow. While T&ES believes that contracting out these services is in the City of Alexandria's best interest, the City manager has requested that the contracts be restructured to achieve cost efficiencies.***	Maintenance Division Chief	N/A	$0

28. The Maintenance Division should reduce the level of service for sewer cleaning to a two-year cycle. *T&ES Comment: Reevaluate after the implementation of a Fats, Oil, and Grease (FOG) program. Since there is no fats, oil, and greases (FOG) program in place at this time, which contributes to clogged pipes in the Old Town area of the City, the cleaning cycle should not be decreased. There are siphon structures in the combined sewer area, which need frequent cleaning. Cutting back on the frequency of our flushing program could result in sewer backups, combined sewer overflows, and other reportable events. The report recommended contracting the sewer cleaning work, but T&ES believes that it is important to continue this work with City employees so the ability to react to sewer issues can be addressed on an immediate basis. By contracting the flushing program, we would have no guarantee that problems would be addressed in a timely manner if they occurred outside of business hours. However, this recommendation should be re-evaluated after implementation of a FOG program.*	Maintenance Division Chief	N/A	$0
29. Trouble spots should be cleaned more frequently than once every two years. *T&ES Comment: Agrees with recommendation. This is the current practice. See comments as identified in recommendation 28.*	Maintenance Division Chief	N/A	$0
30. The contract for sewer cleaning should be eliminated. *T&ES Comment: Recommends further study. However, T&ES does believe that some efficiencies may be achieved by reviewing, and changing where appropriate, contract language regarding crew sizes and material specifications.*	Maintenance Division Chief	N/A	Cost savings TBD based on re-structured contract
31. The in-house sewer cleaning crew should provide the ongoing sewer cleaning services on a two-year cycle and also respond to emergencies such as sewer backups. *T&ES Comment: Recommends further study. Please refer to the response to Item 30.*	Maintenance Division Chief	N/A	$0
32. The City should replace the existing sewer cleaning truck with a jet vactor in fiscal year 2006-07. *T&ES Comment: Recommends further study. Again, this recommendation is part of the proposal to eliminate contractual sewer cleaning work. Please refer to the response to Item 30. Implementing this recommendation would cost $180,000 in one-time capital outlay.*	Maintenance Division Chief	N/A	$0
33. The contract for fire hydrant maintenance should be eliminated. *T&ES Comment: Recommends further study. T&ES agrees that efficiencies may be achieved by reviewing and changing where appropriate, contract language on crew sizes and work production.*	Maintenance Division Chief	N/A	Cost savings TBD based on re-structured contract

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34. One staff should be reassigned to fire hydrant maintenance as a one-person crew and an additional pickup truck acquired for this one-person crew. *T&ES Comment: Recommends further study. T&ES estimates $25,000 for capital outlay and $3,500 in annual associated costs associated with this recommendation. Please refer to the response to Item 33 about changing contract language.*	Maintenance Division Chief	N/A	$0
35. The contract for catch basin and drain inlet cleaning should be eliminated. *T&ES Comment: Recommends further study. Please refer to the response to Item 30.*	Maintenance Division Chief	N/A	$0
36. Two staff should be reassigned to catch basin and drain inlet cleaning. *T&ES Comment: Recommends further study. Again, this is part of the City's strategy regarding work that is contracted; please refer to the response to Item 30. This recommendation does not take into account the level of flooding that occurs in the City due to weather events, and also due to the extensive tree canopy that causes backups and flooding due to leaves.*	Maintenance Division Chief	N/A	$0
37. The City should acquire a jet vactor in fiscal year 2006-07 to enable the in-sourcing of this service. *T&ES Comment: Recommends further study. Please refer to response to Item 30. This recommendation does not take into account the level of flooding that occurs in the City due to weather events, and also due to the extensive tree canopy that causes backups and flooding due to leaves.*	Maintenance Division Chief	N/A	Same as recommendation 32
38. The Maintenance Division should preventively maintain catch basins and drain inlets on an annual basis and 6% of the storm water mains should be cleaned annually. *T&ES Comment: Recommends further study. Please refer to response to Item 30. This recommendation does not take into account the level of flooding that occurs in the City due to weather events, and also due to the extensive tree canopy that causes backups and flooding due to leaves.*	Maintenance Division Chief	N/A	$0
39. The sanitary sewer revenues and expenditures should be budgeted as an enterprise fund. *T&ES Comment: Agrees with this recommendation. A sanitary sewer special revenue fund was created in the context of the FY 2006 revised and FY 2007 approved budget cycle.*	Transportation and Environmental Services Director	July 2006	$0

40. The Maintenance Division should update the fees for maintenance and repair of privately owned fire hydrants. *T&ES Comment: Agrees with recommendation. T&ES will work with OMB to identify resources to study this issue further to assure that the fee will fully cover the cost of maintaining private fire hydrants. Staff will implement recommended fee increases on a sequential basis, beginning in FY 2008 with those most easily analyzed and implemented.*	Maintenance Division Chief	FY 2008	To Be Determined
41. The City should include the costs of publicly maintained fire hydrant maintenance and repair in the City's utility billing. *T&ES Comment: Agrees with recommendation. T&ES will work with OMB to identify resources to study this issue further to assure that the fee will fully cover the cost of maintaining public fire hydrants. Staff will implement recommended fee increases on a sequential basis, beginning in FY 2008 with those most easily analyzed and implemented. In checking with surrounding jurisdictions, it appears that fire hydrant maintenance is not charged as a separate line item on customers' water bills but is included in determining the overall rate that is charged.*	Transportation and Environmental Services Director	October 2006 – December 2006	$158,200 in annual revenue
42. The two positions allocated to sewer CCTV inspection should be allocated to other functions such as sewer main flushing or catch basin and drain inlet cleaning, and utilized to televise sewer lateral backups or sewer mains on an as needed basis. *T&ES Comment: T&ES agrees with reducing the number of inspections that we perform for new development; however, the consultant recommendation results in a dramatic decrease of emergency sewer service, which would negatively impact businesses and residents.* *Currently, the City is responsible for inspecting all new public sewers prior to acceptance. T&ES recommends that this responsibility be given to the private developers, and the TV tapes be handed over to the City for review. This would relieve the workload on our current staff. This proposal would also expedite the infrastructure acceptance process for private developers, who are often waiting for the TV crew to be available to perform their inspections. This proposal could be implemented within a year.* *The City's CCTV truck was unable to work 101 days this year due to necessary repairs to the camera and truck. The camera is over 7 years old and replacement parts are difficult to find. While our CCTV crew was unable to work, TES had to contract the work to a private firm and TES personnel on the CCTV crew worked with other sewer and street crews.*	Maintenance Division Chief	N/A	$0

43. The City should develop and install a Fats, Oil, and Grease (FOG) program. *T&ES Comment: Agrees with recommendation. Since grease is the number one cause of blockages and sanitary sewer blockages, Alexandria should establish a Fats, Oils and Grease (FOG) program. The primary goal of a FOG program is to:* • *Reduce the number of grease-related sanitary sewer blockages; and* • *Reduce the claim costs associated with grease related blockages* *Recommend hiring a consultant to study further to determine how to implement and how to bill restaurants since the cost of a FOG program would be paid by the restaurant industry. The responsibility for implementing such a program would be shared by T&ES and the Health Department.*	Transportation and Environmental Services Director and/or Health Department	January 2007 – March 2007	TBD-will be impacted by fees

Engineering and Design Division			
44. The salary ranges for the Civil Engineer II, Civil Engineer III, and Civil Engineer IV classifications should be increased. *T&ES Comment: Agrees with recommendation. T&ES plans to work with OMB and Personnel to develop revised pay plans for Civil Engineers II, III, and IV in order to attract the skill sets that we need in our Engineering and Design Division.*	OMB/Personnel	FY 2007/2008	TBD
45. The responsibility for building permit plan checking should be reassigned from the Construction and Inspection Division to the Engineering and Design Division. *T&ES Comment: Study further. Although the plan review process was revised recently, there are still efficiencies that could be achieved. Since this change would not represent a cost savings to the City, T&ES suggests that the development review process across all divisions continues to be evaluated in terms of options for restructuring the staff involved in this process.* ***At the same time that staff is looking at internal processes, T&ES is working with the departments of Code Enforcement and Planning and Zoning to streamline the process for review of building permits. The process is anticipated to take 18 to 24 months, due in part to the leadership change in the directors of those departments that T&ES will need to coordinate with to accomplish a more efficient process.***	City Engineer	On going	$0
46. A Civil Engineer IV should be assigned responsibility for managing the staff assigned to development review within the Engineering and Design Division, including the Supervising Administrative Officer, Civil Engineer III, and Site Plan Coordinator.	City Engineer	N/A	$0

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T&ES Comment: Recommends further study. Matrix makes several recommendations for restructuring our process for development and permit review. These recommendations include moving the Engineering Aides from the Construction and Inspection Division to the Engineering Division. *While it is true that some of the permits reviewed by the Engineering Aides are building permits related to the development process, over half are T&ES permits associated with construction or building permits that are not associated with development plans. The report recommends moving the new Civil Engineer IV position from Construction and Inspection and downgrading the position to an Engineering Aide II. This position is anticipated to assist with field construction troubleshooting, managing construction capital projects, and review of complex permits. This position provides better level of service to the community in the Construction and Inspection Division, and that a Civil Engineer IV level is required to provide these services. The ability of an Engineering Aide II to deal with project and site engineers and architects is more limited than a Civil Engineer IV.* *Other recommendations in the Matrix study address reorganizing the Engineering and Design and Construction and Inspection Divisions with regard to how they process development plans. While the report raises good suggestions for creating some efficiencies, a complete reorganization, as outlined in the study, may create other problems in how these plans are processed. Because the City has a strict policy for processing site plans, including review times and processing protocols, we believe a drastic restructuring would be problematic without further study. T&ES will continue to evaluate its process for processing site plans, including our internal and external coordination, in an effort to implement further efficiencies, but do not agree with the restructuring outlined in the Matrix study* *In addition, the department has recommended to the Small Business Task Force to streamline efforts dedicated to review "basic permits" with a "Permit by Certification" program. This program could certify professionals to prepare and submit basic plot plans and deck permits, etc., which are then promptly approved by staff. Such a streamlined program mirrors other jurisdictions, as well as the onsite permitting efforts already underway by T&ES within the City.*			
47. The responsibility for plan checking Preliminary Plan Review and Final Plan Review applications, and Concept and Completeness Determination applications, for the Transportation and Environmental Services Department should be consolidated within the Engineering and Design Division with the exception of the Transportation Division. *T&ES Comment: Recommends further study. In this section, the Matrix study recommends further reorganization of how the department reviews and processes development plans. During the past six*	Transportation and Environmental Services Director	N/A	$0

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years, T&ES has made adjustments in its development review process, in coordination with the departments of Planning & Zoning, Code Enforcement, and Recreation, Parks & Cultural Activities, to address efficiencies in the development process. These process modifications were part of an outreach effort with the development community, business and residential communities to both create efficiencies in the process and ensure safeguards for protecting the interests of the citizens. There are opportunities to limit the amount of routing of plans that occurs within the department through training and better communication efforts. However, a comprehensive restructuring does not seem appropriate in the short term, but should be studied over the long term.			
48. The Site Plan Coordinator position should be modified to a Civil Engineer III. *T&ES Comment. Recommends further study. We disagree with the recommendation for a reorganization of our plan review processes, but will continue to see process efficiencies.*	Transportation and Environmental Services Director	N/A	$0
49. The Divisions in the Transportation and Environmental Services Department that are assigned responsibility for development review should be required to use Permit Plan to record their comments and conditions regarding development review applications. *T&ES Comment: Agrees with recommendation.*	Transportation and Environmental Services Director	Pending training in Permit Plan for appropriate staff	$0
The fees charged by the permits section for right of way and utility cut permits should be increased to enable the city to recover its costs. *T&ES Comment: These fees should be revised upwards. Staff plans to complete further analysis and look at the fees of comparator jurisdictions. T&ES would propose to develop new fees over the next 11 months, and to recommend any fee changes in the context of FY 2008 budget preparation.*			
50. The Transportation and Environmental Services Department should double its fees for right-of-way permits, dumpster permits, crane permits, sidewalk closures, utility cut/excavation permits, reserved parking permits, and other permits. *T&ES Comment: Agrees with recommendation. T&ES will work with OMB to identify resources to study this issue further to assure that the fee will fully cover the cost of its various fees. Staff will implement recommended fee increases on a sequential basis, beginning in FY 2008 with those most easily analyzed and implemented.*	City Engineer and OMB	FY 2008	$261,000 in additional annual revenue
51. The Transportation and Environmental Services Department should increase its fees for right-of-way permits, dumpster permits, crane permits, sidewalk closures, utility cut/excavation permits, reserved parking permits, and other permits issued by the Permitting Section by a cost of living adjustment on an annual basis. *T&ES Comment: Agrees with recommendation. Please refer to the response to Item 50.*	City Engineer and OMB	FY 2008	$0

52. The Transportation and Environmental Services Department should work with the Information Technology Services Department to modify Permit Plan to enhance its functionality of use for the Permit Section. *T&ES Comment: Agrees with recommendation. Because the recommendation needs to be coordinated among T&ES, Information Technology Services, and Code Enforcement, it may take two years to implement.*	Transportation and Environmental Services Director, Code Enforcement, ITS	TBD	TBD
53. The development services within the Engineering and Design Division should be budgeted as a cost center. *T&ES Comment: Agrees with recommendation. As part of the activity-based budget that is currently being formulated by T&ES for FY 2008, staff is implementing this recommendation, not only in Engineering and Design, but also in the Transportation, Transit Services, and Environmental Quality Divisions. In addition to coordinating information within T&ES, the department will also be able to coordinate with external agencies for a comprehensive look at development review services.*	T&ES Admin Services Division Chief, Management and Budget Director	TBD	$0
The Transportation and Environmental Services Department should charge a pavement restoration fee for utility cuts.			
54. The Transportation and Environmental Services Department should develop and impose a pavement restoration fee upon utilities making and benefiting from excavations in public streets, including the City's sewer utility. *T&ES Comment: Agrees with recommendation. A number of municipalities across the country have initiated a pavement restoration fee, in addition to the permit fee for the actual street cut. The concept behind a restoration fee is that the utility will contribute to the costs of the expedited pavement schedule that will be necessary because of compromised street conditions, which have been paid for with taxpayers' dollars.* *T&ES staff will research what neighboring jurisdictions are charging for this fee. Currently T&ES issues a surcharge for utility cuts that are made within five years of resurfacing to address this issue.* *This fee could be considered in combination with the street cut permitting fee.*	Transportation and Environmental Services Director and OMB	TBD	$250,000 in additional annual revenue
55. Funds that are collected as pavement restoration fees should be expended for the rehabilitation and resurfacing of streets, and deposited in a special revenue fund established for that purpose. The funds deposited in the special revenue fund should include interdepartmental budget transfers for City sewer operations utility cuts, and fund transfers at the time of construction contract award for City sewer capital improvement projects.	T&ES Director & Management and Budget Director	TBD	$0

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T&ES Comment. Agrees with recommendation. See number 54.			
56. The Transportation and Environmental Services Department should require utility companies to submit five-year plans for major facility installation to coordinate excavations with the City's resurfacing and the recommended slurry seal program. *T&ES Comment. Agrees with recommendation. Any mandate requirements will need to be addressed as part of the negotiated franchise agreements with the private utility companies. T&ES will investigate these as options as the agreements are renegotiated. T&ES will continue to request that the utilities submit five-year plans on a voluntary basis.*	Transportation and Environmental Services Director	Ongoing	$0
57. The Transportation and Environmental Services Department should provide an incentive for joint trenching when two or more utility excavators trench by processing a permit as one application saving the utility company costs for permit, plan check, and inspection fees. *T&ES Comment. Agrees with recommendation. These requirements will need to be addressed as part of the negotiated franchise agreements with the private utility companies. T&ES will investigate these as options as the agreements are renegotiated.*	Transportation and Environmental Services Director	Ongoing	$0

There are opportunities to improve the efficiency and operations of the land survey section.

T&ES Comment: There is potential for achieving some efficiency within this section, T&ES agrees with some but not all of the specific recommendations that were made for the Survey Section.

T&ES agrees with the recommendation that plat maps should be scanned to allow electronic access to these plans.

T&ES does not agree with the recommendation to eliminate a land survey analyst position. In Alexandria, all responsibilities for right-of-way acquisition and analysis for the city fall within the Survey Section. In addition to overseeing and supporting the two survey crews, performing research for all of the survey activities and responding to requests for information, the land survey analysts support the Chief of Surveys in land acquisition, reviewing plats and deeds for private development projects, researching all requests for property ownership verification and supporting the city's participation in the National Flood Insurance Program. The Land Survey analysts also process all of the electronic data collected in the field by the survey crews. These processed data are provided to the Engineering staff in a format that is prepared for advanced design. This creates an efficiency in design because the Engineering staff no longer has to perform this processing.

T&ES partially agrees with the recommendation to reduce three-person survey crews to two-person crews. Three-person crews are essential for traffic control while the crews are working in the streets. In addition, with a three-person crew, the party chief is able to perform the calculations necessary for the survey layout while the other two-crew members are collecting the data. This minimizes the down-time of the crews between tasks while the calculations are being made. However, T&ES is willing to eliminate one Rod and Chain Operator position, allowing the flexibility for one two-person crew and one three-person crew.

58. The Transportation and Environmental Services Department should scan the City's plat maps to enable electronic access to plats. *T&ES Comment. Agrees with recommendation. We are one of the first departments to participate in the City-wide document imaging project, which will improve document access and also improve the work environment in the Engineering Division's offices in City Hall.*	Transportation and Environmental Services Director	TBD	$15,000 in one-time capital outlay
59. One of the two Land Survey Analyst positions should be eliminated through attrition. *T&ES Comment: Recommends further study. T&ES is willing to eliminate one Rod and Chain Operator position (please refer to the response to Item 60), but cannot support eliminating two positions in the Survey Section. An analysis of the cost of in-house versus contracted survey work shows that contracted work is approximately twice the cost of using City employees. Eliminating the positions as recommended in the study would make the City much more reliant on outside assistance at a higher cost. Additionally, the land survey analysts provide processing of survey data collected in the field by the City's survey crews. Eliminating this position would shift this work to the engineering staff, slowing down their ability to design projects within budgeted time frames. While eliminating the Land Survey Analyst is not recommended at this time, after this section has some experience with the elimination of the position in #60 below, this recommendation will be re-studied.*	Transportation and Environmental Services Director	N/A	$0
60. Eliminate one Rod and Chain Operator position through attrition. *T&ES Comment. Agrees with recommendation, although there are staffing concerns when employees are on leave.*	Transportation and Environmental Services Director	Through attrition	($51,700) annually in salary and fringe benefits
61. The productivity of the survey crews should be enhanced. *T&ES Comment: Agrees with recommendation. The Chief of Surveys and Division Chief of Engineering have already begun to enhance the programming and management of the section.*	Transportation and Environmental Services Director	Ongoing	$0
62. The Chief of Surveys should be responsible for formally planning and scheduling the work of the two survey crews on a bi-weekly basis. *T&ES Comment. Agrees with recommendation.*	Transportation and Environmental Services Director	January 2007	$0

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63. The Chief of Surveys should develop a plan to conduct surveys to document the locations and inventory of the City's infrastructure such as catch basins, drain inlets, manholes, etc., based on the time available (i.e., time not dedicated to completing requests for surveys). *T&ES Comment. Agrees with recommendation.*	Transportation and Environmental Services Director	Ongoing	$0
64. The roles and responsibilities of the staff of the Engineering and Design Division and the Construction and Inspection Division for management of capital improvement projects should be clarified in a policy and procedure. *T&ES Comment: Agrees with recommendation. The issue underlying this clarification is the appropriate staff level to manage the current workload. As mentioned previously, staff is going to be working through pay issues for our engineering positions so that T&ES is able to attract employees and achieve adequate staffing levels.*	Transportation and Environmental Services Director	Ongoing	$0
Management of capital projects should be improved. *T&ES agrees with this recommendation and plans to implement an adaptation of this recommendation. Staff has begun creating a project management manual to include most of the recommendations in the section. Due to the workload concerns caused by the shortage of staff in the Engineering and Design Division, the staff has not had the ability to fully develop this manual. It is expected that T&ES can move forward with this as the vacant positions are filled and new employees are trained, and a manual should be in place in 12 to 24 months. T&ES and OMB are also evaluating how these recommendations could be implemented sooner with the assistance of an outside consultant.*			
65. A design authorization form should be completed by the Civil Engineer III assigned as project manager before the commencement of design for each capital improvement project. *T&ES Comment. Agrees with recommendation. T&ES would like to adapt this recommendation to best meet its processes and needs.*	City Engineer	December 2007	$0
66. The Capital Projects Division should develop cost of construction guidelines to document resource requirements for the design and inspection of capital projects. *T&ES Comment. Agrees with recommendation. T&ES would like to adapt this recommendation to best meet its processes and needs.*	City Engineer	December 2008	$0
67. The information provided by the monthly capital project status report should be expanded. *T&ES Comment. Agrees with recommendation. T&ES would like to adapt this recommendation to best meet its processes and needs.*	City Engineer	Ongoing	$0

68. The Engineering and Design Division and the Construction and Inspection Divisions should utilize the existing Kronos Timekeeping and Performance Accounting systems software to track the costs associated with the design and inspection of capital projects. Access to the information contained within the system should be provided on the City's Intranet. *T&ES Comment. Agrees with recommendation. T&ES will work with the ITS Department and OMB to implement this suggestion and identify resources to do so if necessary.*	ITS Director	TBD	$0
69. A final report should be prepared for capital projects upon completion of construction and acceptance of the improvements. *T&ES Comment. Agrees with recommendation.*	City Engineer	December 2007	$0
70. Billability targets should be established for staff of the Engineering and Design Division and Construction and Inspection Division. *T&ES Comment. Agrees with recommendation.*	City Engineer	December 2008	$0
71. The Engineering and Design Division and the Construction and Inspection Division should develop a 24-month bar chart schedule for the design and construction of all capital projects, and update that chart monthly. *T&ES Comment. Agrees with recommendation.*	City Engineer	June 2008	$0
72. A design report should be completed for each capital project when the design is no more than 10% complete. *T&ES Comment. Agrees with recommendation.*	City Engineer	December 2007	$0
73. The Engineering and Design Division should implement a consulting engineer evaluation system and utilize this system as part of the final project close-out. *T&ES Comment. Agrees with recommendation.*	City Engineer	December 2007	$0
74. The Engineering and Design Division should develop a project management manual and train all Civil Engineer III's (project managers) in its use and application. *T&ES Comment. Agrees with recommendation.*	City Engineer	December 2008	$0

An additional Civil Engineer III should be authorized for the Engineering and Design Division and one of the three Civil Engineer I/II positions upgraded to Civil Engineer III. *T&ES Comment: Agrees with recommendation.*			
75. An additional Civil Engineer III position should be authorized as a project manager for the Engineering and Design Division. *T&ES Comment: Agrees with recommendation.*	Transportation and Environmental Services Director	Pending Approval	$114,745
76. Through attrition, one of the three (3) Civil Engineer I/II's should be upgraded to Civil Engineer III's. *T&ES Comment: Agrees with recommendation.*	Transportation and Environmental Services Director	Pending Approval	$34,214
Chapter 7 – Construction and Inspection Division **Responsibility for construction inspection of transportation and environmental services department capital improvement projects should be centralized within the construction and inspection division.** *T&ES Comment. The following comments are for recommendations #77-80. While improved coordination can be achieved in the paving and sewer inspection functions within the department, there are concerns about implementing all of the recommendations in this area. As discussed in the recommendations for the Maintenance Division, T&ES supports giving the Engineering and Design Division a more direct role in the pavement management and sewer relining functions. As part of this reorganization, staff will look at responsibilities for inspection between the Maintenance and Construction and Inspection Divisions. The recommendation to simply move the Inspector II positions for these functions to the Construction and Inspection Divisions is not acceptable. The Inspector II position supervises pothole patching throughout the year, which is not a Construction and Inspection function. Both of the inspector positions also access the resources of many others within the Maintenance Division to assist with traffic control, sewer cleaning, and other ancillary functions to these operations. An evaluation of these operations will take all of these into account.* *Staff will evaluate internally whether the responsibility for Miss Utility locates should be transferred to the Construction and Inspection Division. Currently, the staff and resources for performing this function are located within the Maintenance Division, with staff who also performs other functions.* *The recommendation to eliminate one Inspector II position is being addressed with the following recommendation, from Page 151.*			
77. The Inspector II position in the Streets Section responsible for managing contractors responsible for street overlay and overlay preparation, and for sidewalk, curb and gutter, and driveway apron replacement should be transferred to the Construction and Inspection Division. *T&ES Comment: Recommends further study. See above explanation and response to Item 21.*	Division Chief – Construction and Inspection	Requires Further Study	$0

78. The Inspector II in the Sewer Section responsible for managing the contract for sewer relining and the MISS Utility Locates should be transferred to the Construction and Inspection Division. *T&ES Comment: Recommends further study. See above explanation and response to Item 22.*	Division Chief – Construction and Inspection	Requires Further Study	$0
79. The Construction and Inspection Division should assume responsibility for MISS Utility Locates. *T&ES Comment: Recommends further study. See above explanation.*	Division Chief – Construction and Inspection	Requires Further Study	$0
80. A Transportation and Environmental Services Inspector II position should be eliminated through attrition. *T&ES Comment: Agrees with recommendation.*	Division Chief – Construction and Inspection	Pending Approval	($53,600)
The span of control for the transportation and environmental services inspector III should be reduced. *T&ES Comment: There is currently one Inspector II position vacant, and will be requesting an upgrade to this position when it is advertised in the near future. This will divide the responsibility for managing 13 inspectors and their projects in the field. This also addresses the previous recommendation to eliminate one Inspector II position.*			
81. An additional Transportation and Environmental Services Inspector III position should be authorized. *T&ES Comment: Agrees with recommendation. Please refer to the response to Item 80.*	Division Chief – Construction and Inspection	Pending Approval	$97,900
82. The Transportation and Environmental Services Inspector III should assume a lead worker role by assuming responsibility for inspection of smaller construction projects. *T&ES Comment: Agrees with recommendation.*	Division Chief – Construction and Inspection	Ongoing	$0
83. All inspection personnel should be trained in, and required to complete, daily diaries of work activities including sites visited, time spent on site, inspections conducted, materials tested, etc. *T&ES Comment. Agrees with recommendation and it has been implemented. Each inspector has been supplied with a daily log and instructions for completing their diaries.*	Division Chief – C&I	Ongoing	$0
84. The Division Chief or Inspector III should develop a standard weekly site report format for use by Inspectors. All Inspectors should be trained on the format and required to utilize the report when reporting weekly activities. *T&ES Comment: Agrees with recommendation. Have implemented a standardized weekly report.*	Division Chief – C&I	Complete	$0

85. The Division should develop a plan for the implementation of laptop computers for all construction inspections. *T&ES Comment. Agrees with recommendation. IT manages the wireless mobility projects. T&ES estimates the cost for this initiative to be $46,500.*	Director of ITS	February 2007	$46,500 in one-time capital outlay
86. The standards for materials testing conducted by Inspectors and contractors should be clearly outlined and documented in a formal City policy. The standards should be reviewed as part of each pre-construction meeting, and included as part of all construction contracts. Inspectors should receive periodic training on conducting materials testing. *T&ES Comment. Recommends further study. T&ES does not agree with the recommendation for concrete testing because most concrete structures are pre-cast, as opposed to cast-in-place. Staff believes that random quality control is adequate, given the small quantities of in situ poured concrete that are installed, and believe that the implementation of this recommendations will unnecessarily consume needed employee resources. T&ES does agree with the standards documentation, construction contracts and training recommendations and will be studying these areas further to determine how best to implement.*	Division Chief – C&I	N/A	$0 Cost of equipment not included in report
Given current development workload (Spring 2006), Transportation and Environmental Services Inspector II's are underutilized.			
87. The Construction and Inspection Division should utilize the Development Plan Status monthly reports issued by the Site Plan Coordinator to monitor their development-related workload. *T&ES Comment: Agrees with recommendation.*	Division Chief – Construction and Inspection	Ongoing	$0
88. The Construction and Inspection Division should delay filling over hire positions until workload rends begin to increase indicating that the Division's workload would soon exceed capacity. *T&ES Comment: Recommends further study. While some of these overhire positions have remained vacant due to difficulty in attracting qualified candidates, the current development workload, coupled with T&ES' capital projects, necessitate the positions currently assigned to the division. These positions are non-discretionary; they are required to support development. Two inspectors are permanently assigned to the East Eisenhower area and two are permanently assigned to Potomac Yard. These assignments are through agreements with developers and are not funded by the City budget. In addition, one Inspector II position will be eliminated (upgrading it to an Inspector III position) based on a previous Matrix recommendation. T&ES cannot support eliminating additional inspector positions at this time, but workloads will continue to be reviewed to determine appropriate future staffing level.*	Division Chief – Construction and Inspection	N/A	$0

Chapter 8 – Analysis of Pavement Marking			
89. The thermoplastic truck assigned to the Transportation Division should be surplused or the City should recycle the truck body. *T&ES Comment: Agrees with recommendation.*	Division Chief – Transportation	October 2006	$0
90. The City should issue a request for bids for pavement markings. *T&ES Comment: Agrees with recommendation.*	Division Chief – Transportation	October 2006	$300,000

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Attachment 3

Management Study of the Transportation and Environmental Services Department

CITY OF ALEXANDRIA, VIRGINIA

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October 2, 2006

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1. INTRODUCTION AND EXECUTIVE SUMMARY

1. INTRODUCTION AND EXECUTIVE SUMMARY

In the fall of 2004 following a year long effort, the City Council formally adopted a Strategic Plan outlining its vision of the City of Alexandria in the year 2015. The Strategic Plan was developed after seeking substantial community input that included two community meetings, a public hearing and a series of Council work sessions. The Strategic Plan clearly states the vision, mission, and goals of the City Council regarding how the City Government should function and address community issues. The City Council's Vision is: *"Alexandria 2015 is a vibrant, diverse, historic and beautiful City with unique neighborhoods and multiple urban villages where we take pride in our great community."* The adopted Mission Statement is: *"Alexandria City government is financially sustainable, provides excellent services that are valued by its customers, and engages the entire community as it plans for the future."*

Unlike some communities where strategic planning and vision setting occur, the City of Alexandria has undertaken significant effort to implement and integrate into the organization efforts that will work toward the achievement of the goals and mission approved by the City Council. The FY 2006 and FY 2007 City budgets were developed, organized, and presented in a manner that outlined how the money being budgeted would address the approved goals and/or improve progress toward achieving the goals. The City administration is focusing its efforts on improving the services delivered to its citizens and strengthening the measurement of the services provided.

This is accomplished through a four-pronged approach:

- Conducting departmental performance audits that examine operational policies and procedures, review and improve workload and performance indicators, and benchmark services against comparable communities and industry standards.

- Identifying performance measures to be utilized in evaluating the progress of Strategic Plan goals, objectives and actions.

- Continuing to review and refine performance measurements for individual departments. In addition, to undertaking this internally, the City of Alexandria in conjunction with the Council of Governments, International City/County Management Association, and other local governments in Virginia, have formed a regional performance measurement and benchmarking consortium.

- Undertaking re-engineering of the processes throughout City operations with a focus on becoming more efficient and improving customer service.

These efforts will enable the City to continue the provision of services in a highly efficient and effective manner while maintaining the costs of these services at a sustainable level over the long term.

1. DESCRIPTION OF STUDY METHODOLOGY.

The management study of the Transportation and Environmental Services Department evaluated the efficiency and effectiveness of the Maintenance Division, Engineering and Design Division, and the Construction and Inspection Division.

The study developed performance benchmarks for ongoing evaluation and future service level decision-making. This was accomplished by examining the departments' operational policies and procedures, organizational structure, span of control, lines of authority, staffing, workloads, budget, outputs, and departmental service levels. This study also involved reviewing and improving the departments' workload and performance measure sets, and benchmarking the results to comparative jurisdictions and industry standards. The scope of services for the management study included the following:

- To analyze service levels, workload, output, and staffing for the three divisions;
- To evaluate all programs and services offered in terms of necessity, efficiency, staffing, funding, and responsiveness to resident needs;
- To examine allocated personnel, equipment, and other resources to assess proper workload distribution;
- To examine service standards and performance measurements for each department;
- To identify and compare other local governments as benchmarks to compare service delivery systems, policies, and programs to each department;
- To provide an analysis of each department's optimal organizational structure, including spans of control, lines of authority, and fiscal accountability for each department;
- To develop projections of immediate and long term savings in capital or operating costs resulting from implementing this study and efficiency recommendations or returns on investment (ROI); and
- To develop plans to execute recommendations (including timelines and identification of responsible parties) to be incorporated into the next annual budgeting cycle.

The project team utilized a fact-based approach to the development of its findings, conclusions, and recommendations.

2. POSITIVE FEATURES.

By its very nature, a study like this one tends to focus on the negative in identifying and evaluating improvement opportunities. Before addressing those opportunities, it is important to note that the study identified a number of significant positive features about the Transportation and Environmental Services Department. For example, the American Public Works Association recently accredited the Transportation and Environmental Services Department. The Department is one of thirty-six public works departments in the United States that have been accredited and one of three in

Virginia (the other two are Newport News and Richmond). Other positive features are noted below.

(1) Asset Management

- The Maintenance Division is in the process of creating a GIS-based inventory of its sewer mains.

- The Maintenance Division has a number of services dedicated to preventive maintenance, including sewer televising, sewer relining, fire hydrant maintenance, etc.

- An effective process is utilized for pothole patching, including square cutting the pothole, tacking the pothole, use of hot mix, and rolling the hot mix. In the winter, the crew uses UPM cold mix.

(2) Management Systems

- The Maintenance Division is in the process of developing a Request for Proposal for acquisition and installation of a commercial-off-the-shelf maintenance management information system.

- The Maintenance Division is in the process of cross-training all personnel in its core areas.

- The Maintenance Division provides staff with driver and operator training, including CDL training and snowplow rodeo training.

- A project manager is assigned to each CIP project by the Engineering and Design Division to oversee the completion of design work, inspection activities, and construction management. Project Managers maintain responsibility for capital projects from concept to completion. Following completion of design work, day to day responsibility for the project oversight rests with the Construction Inspector who involves the Project Manager as needed on items other than minor changes.

- The Construction and Inspection Division staff reviews proposed CIP plans and specifications at 90% completion. Additional design reviews are only conducted if a staff member requests or when staff identifies a significant deviation from original scope. Construction Inspectors are involved beginning in the second round of site plan review.

- The Engineering and Design Division has the authority to award contracts for design work up to $200,000 to consulting engineers that have been pre-qualified through the competitive process.

- Permit Plan – the automated permit tracking and issuance information system – is utilized for the issuance of permits, tracking the status of permits, providing a comprehensive database of permits approved, and ensuring consistency with established standards.

(3) Cost Recovery

- The City has conducted an analysis of the costs of maintenance and repair of the sewer collection system, and has adopted a plan to fully recover these costs by increasing rates over the next several years.

- The Maintenance Division has developed a system for documenting and tracking VDOT reimbursements.

(4) Cost Effective Service Delivery

- Alexandria is utilizing both laser and GPS technology for land surveying work activities.

- Transportation and Environmental Services Inspectors are responsible for reviewing accuracy and quantities on paperwork filed by contractors for progress payments. Transportation and Environmental Services Inspectors approve pay requests and forward to appropriate administrative staff for processing.

- Transportation and Environmental Services Inspectors review all materials test results performed by third parties (if not actually done by City personnel). Construction Inspectors have discretion to require testing to verify compliance with contract terms.

- Newly constructed storm water collection mains are videotaped prior to acceptance, and newly constructed sanitary sewer mains are vacuum tested, flushed, and videotaped.

- Transportation and Environmental Services Inspectors conduct final inspections of construction projects, including development of a punch list of clean up items for the contractor. Construction Inspectors utilize initial plans and as-built documentation for conducting checks.

- Transportation and Environmental Services Inspectors verify that proper trenching and excavation procedures are complied with for utility cuts, including restoration to appropriate standards.

There are clearly a number of positive aspects to the staffing, operations, and management of the Transportation and Environmental Services Department.

3. SIX-POINT AGENDA FOR CHANGE.

The assessment of the Transportation and Environmental Services Department identified over 80 recommendations for improvement that the Matrix Consulting Group believes should provide the basis for change in the Transportation and Environmental Services Department in the coming years. These recommendations fall into six major improvement areas including:

- Management systems;
- Administrative and management structure;
- Asset management;
- Reengineering development services;
- Cost effective service delivery; and
- Cost recovery.

These major points in the improvement agenda are briefly summarized below.

(1) Management Systems

The driving force behind any high performing organization is clear policy direction and the management systems that communicate and translate policy into action. Overall, managers and supervisors have little information with which to make key service delivery and budgetary decisions. The Transportation and Environmental Services Department faces a number of challenges to use its resources more efficiently and effectively, and more importantly, to redirect resources and invest in maintenance

and preservation of the City's infrastructure. The Department is limited in its ability to address these challenges as a result of the lack of management systems. The management of the Transportation and Environmental Services Department needs to enhance the management systems within the Department through such tools as:

- Acquire and install a commercial-off-the-shelf maintenance management information system for City infrastructure; and
- Enhance the management of the Capital Improvement Program.

The Transportation and Environmental Services Department should employ these management systems to make the department a place where performance centered around goals serves to drive its operations.

(2) Administrative and Management Structure

The management of the Transportation and Environmental Services Department is charged with ensuring the efficient and effective delivery of infrastructure preservation and maintenance services to the residents of Alexandria. There is an opportunity to streamline the reporting structure of the Department. The Matrix Consulting Group is recommending that the Department adopt a new organizational structure for the Maintenance Division, the Engineering and Design Division, and the Construction and Inspection Division. The major changes in the plan of organization are presented below.

- The Assistant Superintendent position in the Maintenance Division should be eliminated.
- The development services function in the Engineering Design Division should be consolidated under a Civil Engineer IV.
- The responsibility for construction inspection of the Transportation and Environmental Services Department capital improvement program projects should be centralized within the Construction and Inspection Division. Two Inspector II positions should be transferred from the Maintenance Division to the

Construction and Inspection Division, and the responsibility for MISS utility locates should be transferred from the Maintenance Division to the Construction and Inspection Division. A Transportation and Environmental Services Inspector II position should be eliminated.

- The span of control for the Transportation and Environmental Services Inspector III position in the Construction and Inspection Division should be reduced. A second Transportation and Environmental Services Inspector III position should be authorized.

Implementation of the plan of organization for the Engineering and Design Division is contingent on adjusting upward the salary ranges for Civil Engineer II, Civil Engineer III, and Civil Engineer IV classifications. The Division has been unable to fill the Civil Engineer IV position. Other civil engineer classifications in the Division have endured significant turnover. A comparison of the salary for these three classifications with other surrounding local governments indicates the salary ranges are not competitive.

(3) Asset Management

Alexandria taxpayers have a significant investment in streets, sidewalks, sewer collection systems, and storm water collection systems. Preserving these assets prolongs their useful life and reduces the long-term maintenance and rehabilitation costs. This is the primary objective of asset management. The Transportation and Environmental Services Department should take a number of steps to enhance its asset management practices as portrayed below.

- The Maintenance Division should conduct a comprehensive inventory of the assets that it is responsible for.

- The City should improve its pavement management program including development and installation of strategies for the preventive maintenance of the City's street system, acquisition of a pavement management system such as American Public Works Association's MicroPAVER, evaluation of the pavement

condition of the City's streets on a three-year cycle with one-third of the streets evaluated each year, expansion of the non-structural overlays, and consistently allocating staff of the Maintenance Division to pothole patching, base repair, skin patching, and crack sealing.

Money is tighter and the competition for limited financial resources is intense. Local governments with effective asset management systems have consistently found that they are able to optimize their available funds. These local governments literally get more work done with their limited funds while improving the overall condition of their assets.

(4) Reengineer Development Review Processes

The Transportation and Environmental Services Department is a key participant in the development review process for the City of Alexandria. A number of its divisions review and plan check development plans, including the Engineering and Design Division, Environmental Quality Division, Construction and Inspection Division, Maintenance Division, Solid Waste Division, Transportation Division, and Transit Division. The timely review by the Department of development plans and the efficient use of its staff necessitate that the Department transform the way it does its business and reengineer these development review processes. Opportunities to reengineer these processes are presented below.

- The Construction and Inspection Division should not plan check building permit plans; this responsibility should be assigned to the Engineering and Design Division.

- The extent of routing of development plans to divisions within the Transportation and Environmental Services Department should be reduced. The responsibility for plan checking development plans on behalf of the Department should be consolidated within the Engineering and Design Division and the Transportation Division. The Engineering and Design Division should plan check development plans on behalf of Environmental Quality Division, Construction and Inspection

Division, Maintenance Division, Solid Waste Division, and Transit Division utilizing checklists and standard conditions developed by these divisions.

- The Divisions within the Transportation and Environmental Services Department involved in the development review process should be required to utilize Permit Plan to input their comments and conditions of approval regarding development plans.

- The Transportation and Environmental Services Department should work with the Information Technology Services Department to enhance the functionality of the Permit Plan software and enable its use for issuance of permits by the Permits Section.

The development review processes utilized by the Department can be streamlined to enhance the efficiency of its staff, and the timeliness of its services.

(5) Cost Effective Service Delivery

The Transportation and Environmental Services Department faces a number of challenges including fiscal limitations and aging infrastructure. The effective response of the Department to these challenges requires that the Department transform the way it does its business. The Department should reduce its costs and enhance its productivity, performance, and service levels by redesigning and reengineering the way services are delivered. These opportunities are presented in the paragraphs below.

- Crew sizes should be reduced within the Maintenance Division, staff resources reallocated, and sewer cleaning, fire hydrant and storm water maintenance services in-sourced.

- The Maintenance Division should reduce the level of service for sanitary sewer closed circuit television inspection.

- The City should adopt a fee-based Fat, Oils, and Grease Program (FOG).

- The efficiency and operations of the Survey Section should be improved.

- An additional Civil Engineer III position should be authorized for the Engineering and Design Division, and one of the Civil Engineer I/II positions upgraded to Civil Engineer III through attrition.

- The Construction and Inspection Division should delay filling over hire positions until workload trends increase, indicating that the Division's workload would exceed capacity.

- The thermoplastic truck assigned to Transportation should be sold, and not replaced.

- The City should issue a request for bids for pavement marking.

The Department should leverage these opportunities to enhance the cost effectiveness of its service delivery.

(6) Cost Recovery

The Transportation and Environmental Services Department provides a number of services for specific customers. In evaluating how the costs for these services should be allocated, the City should evaluate the community-wide versus specific benefit of these services. In a number of instances, the Department provides services that are of a specific benefit that should be fully recovered through user fees. This includes the following:

- The Maintenance Division should update its fees for the maintenance of privately-owned fire hydrants;

- The costs of maintaining publicly-owned fire hydrants should be included in the City's utility billing;

- The fees charged by the Permits Section for right-of-way and for utility cut permits should be increased to enable full cost recovery; and

- The Department should charge a pavement restoration fee for utility cuts.

In addition, the costs of the services, and the department that provides the selected benefit, should be distinctly identified in the City's financial system to enable the department to readily monitor cost recovery. The City should establish an enterprise

fund for sanitary sewer maintenance. The Engineering and Design Division should establish its development review services and staffing in a separate cost center.

* * * * * *

The ten highest priority recommendations, from the project team's perspective, are identified in the paragraphs below.

- The Maintenance Division should acquire and install a commercial-off-the-shelf maintenance management system;
- The Maintenance Division should conduct a comprehensive inventory of its assets;
- The City should improve its pavement management program, including development and installation of strategies for the preventive maintenance of the City's street system, acquisition of a pavement management system such as the American Public Works Association's MicroPAVER, evaluation of the pavement condition of the City's streets on a three-year cycle with one-third of the streets evaluated each year, expansion of the use of non-structural overlays, and consistently allocating staff of the Maintenance Division to pothole patching, base repair, skin patching, and crack sealing;
- Crew sizes should be reduced within the Maintenance Division, staff resources reallocated, and sewer cleaning, fire hydrant and storm water maintenance services in-sourced;
- The costs of maintaining publicly-owned fire hydrants should be included in the City's utility billing;
- The salary ranges for the Civil Engineer II, Civil Engineer III, and Civil Engineer IV should be increased to a level that is competitive with the City's peers;
- The fees charged by the Permits Section for right-of-way and for utility cut permits should be increased to enable full cost recovery;
- The Transportation and Environmental Services Department should charge a pavement restoration fee for utility cuts;
- The management of the Capital Improvement Program should be enhanced by the Engineering and Design division; and
- An additional Civil Engineer III position should be authorized for the Engineering

and Design Division, and one of the Civil Engineer I/II positions upgraded to Civil Engineer III through attrition.

The Department is already one of only thirty-six public works departments that are accredited by the American Public Works Association. Implementation of these recommendations will further enhance the Department's financial, workload, and managerial capacity.

4. EXECUTIVE SUMMARY

The Matrix Consulting Group has prepared this summary of the recommendations contained in the attached report. This summary is presented in the table below.

Chapter 3 – Employee Survey				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
61	1. The manager of the Engineering and Design Division should meet with the development review staff of the Division to discuss the proposed recommendations contained within this report that address the streamlining and enhanced management of the permit process, permit documents, and permit information management process.	Engineering Division Chief, Maintenance Division Chief, Division Chief – Construction and Inspection	October 2006 – December 2006	$0
61	2. The manager of the Engineering and Design Division should elicit input from the development review staff of the Division regarding opportunities for further improvements in the permit process, permit documents, and permit information management process.	Engineering Division Chief	October 2006 – December 2006	$0

Chapter 3 – Employee Survey (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
62	3. The managers of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division of the Transportation and Environmental Services Department should meet to discuss career advancement issues and develop a strategy to address the issue.	Engineering Division Chief, Maintenance Division Chief, Division Chief – Construction and Inspection	October 2006 – December 2006	$0
62	4. The managers of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division of the Transportation and Environmental Services Department should work with the employees of their divisions to address these issues.	Engineering Division Chief, Maintenance Division Chief, Division Chief – Construction and Inspection	October 2006 – December 2006	$0
64	5. The managers of the Human Resources Department should meet with the employees of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division to discuss the City's compensation philosophy and the process used for the City's compensation survey.	Human Resources Director, Engineering Division Chief, Maintenance Division Chief, Division Chief – Construction and Inspection	October 2006 – December 2006	$0
64	6. The managers of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division of the Transportation and Environmental Services Department should meet with their employees to discuss their equipment and facility needs and develop strategies to address these needs.	Engineering Division Chief, Maintenance Division Chief, Division Chief – Construction and Inspection	October 2006 – December 2006	$0

Chapter 5 – Maintenance Division				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
81	The Maintenance Division should enhance its maintenance management systems.			
83	7. The Division should define the primary work activities and their units of measure in the maintenance and repair of streets, and sanitary and storm water sewers.	Maintenance Division Chief	October 2006 – December 2006	$0
84	8. The Division should define the levels of service to be provided in the maintenance and repair of streets, and sanitary and storm water sewers.	Maintenance Division Chief	October 2006 – December 2006	$0
84	9. The Division should develop performance standards for the primary work activities that it performs in the maintenance and repair of streets, and sanitary and storm water sewers.	Maintenance Division Chief	October 2006 – December 2006	$0
85	10. The Division should develop an annual work plan each year that estimates the kind and amount of work to be done in the next fiscal year in the maintenance and repair of streets, and sanitary and storm water sewers.	Maintenance Division Chief	October 2006 – December 2006	$0
87	11. The Division should utilize a COTS maintenance management system to compare actual versus planned performance and costs.	Maintenance Division Chief	October 2006 – December 2006	$150,000 in one-time capital outlay and $30,000 in ongoing licensing costs
93	12. Handheld devices should be utilized to report the actual work accomplished within the COTS maintenance management system.	Maintenance Division Chief	October 2006 – December 2006	$50,000 in one-time capital outlay

Chapter 5 – Maintenance Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
94	13. The Maintenance Division should work with VDOT to obtain acceptance of a COTS maintenance management system for reporting expenses and obtaining reimbursement.	Maintenance Division Chief	October 2006 – December 2006	$0
95	14. The Department should conduct a comprehensive asset inventory of streets and sanitary and storm water sewers.	Maintenance Division Chief	October 2006 – December 2006	$0
98	The City of Alexandria should improve its pavement management program.			
99	15. Responsibility for the pavement management program should be assigned to the Engineering and Design Division.	Engineering Division Chief	October 2006 - December 2006	$0
100	16. The City of Alexandria should purchase and fully utilize a pavement management system to provide a systematic approach to the repair and maintenance of the City's roads.	Engineering Division Chief	October 2006 - December 2006	$1,050 in one-time outlay for software
102	17. The City should evaluate the pavement condition of its streets on a three-year cycle, with 33% of the streets being evaluated each year.	Engineering Division Chief	October 2006 - December 2006	$0
103	18. The Transportation and Environmental Services Department should expand the set of non-structural overlays that it utilizes for preventive maintenance of the City's streets beyond overlay to include slurry seal and micro-surfacing.	Engineering Division Chief	October 2006 - December 2006	$0

Chapter 5 – Maintenance Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
103	19. The Transportation and Environmental Services Department should develop strategies to assure the effective use and application of these alternative non-structural overlays.	Engineering Division Chief	October 2006 - December 2006	$0
105	The plan of organization for the maintenance division should be streamlined, and responsibility for construction inspection clarified.			
105	20. The Assistant Superintendent position for the Sewer Section in the Maintenance Division should be eliminated.	Transportation and Environmental Services Director	October 2006 – December 2006	($76,200)
105	21. The Inspector II position in the Streets Section responsible for managing contractors responsible for street overlay and overlay preparation, and for sidewalk, curb and gutter, and driveway apron replacement should be transferred to the Construction and Inspection Division.	Transportation and Environmental Services Director	October 2006 – December 2006	$0
105	22. The Engineering and Design Division should be assigned the responsibility for preparation of the plans, specifications, and estimates for all sewer relining projects, including those currently managed by the Sewer Section. The Construction and Inspection Division should be responsible for managing and inspecting the construction for all sewer relining projects to assure adherence to the plans, specifications, and estimates, including those including those currently managed by the Sewer Section.	Transportation and Environmental Services Director	October 2006 – December 2006	$0

Chapter 5 – Maintenance Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
107	Crew sizes utilized by the maintenance division are too large in some instances, insufficient resources are allocated to pavement maintenance, and some services should be in-sourced.			
108	23. The pothole patching crew should be reduced to a two-person crew.	Maintenance Division Chief	October 2006 – December 2006	$0
108	24. Assign the floating operator – yard debris removal to pavement maintenance and allocate one (1) of the four (4) staff currently assigned to the utility crew to pavement maintenance.	Maintenance Division Chief	October 2006 – December 2006	$0
108	25. The Maintenance Division should improve the level of street maintenance service by consistently assigning six staff to pavement maintenance including pothole patching, skin patching, and base repair.	Maintenance Division Chief	October 2006 – December 2006	$0
110	26. The sewer construction and repair crews should be reduced to a crew size of four for each crew.	Maintenance Division Chief	October 2006 – December 2006	$0
110	27. Two staff from the sewer construction and repair crews should be reallocated to catch basin and drain inlet cleaning.	Maintenance Division Chief	October 2006 – December 2006	$0
111	28. The Maintenance Division should reduce the level of service for sewer cleaning to a two-year cycle.	Maintenance Division Chief	October 2006 – December 2006	$0
111	29. Trouble spots should be cleaned more frequently than once every two years.	Maintenance Division Chief	October 2006 – December 2006	$0
112	30. The contract for sewer cleaning should be eliminated.	Maintenance Division Chief	October 2006 – December 2006	($210,900)

Chapter 5 – Maintenance Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
112	31. The in-house sewer cleaning crew should provide the ongoing sewer cleaning services on a two-year cycle and also respond to emergencies such as sewer backups.	Maintenance Division Chief	October 2006 – December 2006	$0
112	32. The City should replace the existing sewer cleaning truck with a jet vactor in fiscal year 2006-07.	Maintenance Division Chief	October 2006 – December 2006	$180,000 in one-time capital outlay
115	33. The contract for fire hydrant maintenance should be eliminated.	Maintenance Division Chief	October 2006 – December 2006	($158,200)
115	34. One staff should be reassigned to fire hydrant maintenance as a one-person crew and an additional pickup truck acquired for this one-person crew.	Maintenance Division Chief	October 2006 – December 2006	$18,000 in one-time capital outlay and $3,500 in annual operating, maintenance, and replacement costs.
117	35. The contract for catch basin and drain inlet cleaning should be eliminated.	Maintenance Division Chief	October 2006 – December 2006	($250,670)
117	36. Two staff should be reassigned to catch basin and drain inlet cleaning.	Maintenance Division Chief	October 2006 – December 2006	$0
117	37. The City should acquire a jet vactor in fiscal year 2006-07 to enable the in-sourcing of this service.	Maintenance Division Chief	October 2006 – December 2006	$180,000 in one-time capital outlay, and $32,000 in annual operating, maintenance, and replacement costs.
117	38. The Maintenance Division should preventively maintain catch basins and drain inlets on an annual basis and 6% of the storm water mains should be cleaned annually.	Maintenance Division Chief	October 2006 – December 2006	$0
120	39. The sanitary sewer revenues and expenditures should be budgeted as an enterprise fund.	Transportation and Environmental Services Director	July 2006	$0

Chapter 5 – Maintenance Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
121	40. The Maintenance Division should update the fees for maintenance and repair of privately owned fire hydrants.	Maintenance Division Chief	October 2006 – December 2006	To Be Determined
121	41. The City should include the costs of fire hydrant maintenance and repair in the City's utility billing.	Transportation and Environmental Services Director	October 2006 – December 2006	$158,200 in annual revenue
122	42. The two positions allocated to sewer CCTV inspection should be allocated to other functions such as sewer main flushing or catch basin and drain inlet cleaning, and utilized to televise sewer lateral backups or sewer mains on an as needed basis.	Maintenance Division Chief	October 2006 – December 2006	$0
123	43. The City should develop and install a FOG program.	Transportation and Environmental Services Director	January 2007 – March 2007	$0
Chapter 6 – Engineering and Design Division				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
125	44. The salary ranges for the Civil Engineer II, Civil Engineer III, and Civil Engineer IV classifications should be increased.	City Engineer	October 2006 – December 2006	$94,000 in salaries and fringe benefits at the top step
128	45. The responsibility for building permit plan checking should be reassigned from the Construction and Inspection Division to the Engineering and Design Division.	City Engineer	October 2006 – December 2006	$0
128	46. A Civil Engineer IV should be assigned responsibility for managing the staff assigned to development review within the Engineering and Design Division, including the Supervising Administrative Officer, Civil Engineer III, and Site Plan Coordinator.	City Engineer	October 2006 – December 2006	$0

Chapter 6 – Engineering and Design Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
130	The extent of routing of development plans to divisions within the transportation and environmental services department should be reduced.			
130	47. The responsibility for plan checking Preliminary Plan Review and Final Plan Review applications, and Concept and Completeness Determination applications, for the Transportation and Environmental Services Department should be consolidated within the Engineering and Design Division with the exception of the Transportation Division.	Transportation and Environmental Services Director	October 2006 – December 2006	$0
130	48. The Site Plan Coordinator position should be modified to a Civil Engineer III.	Transportation and Environmental Services Director	October 2006 – December 2006	$15,000 in salaries and fringe benefits
132	49. The Divisions in the Transportation and Environmental Services Department that are assigned responsibility for development review should be required to use Permit Plan to record their comments and conditions regarding development review applications.	Transportation and Environmental Services Director	October 2006 – December 2006	$0
133	The fees charged by the permits section for right of way and utility cut permits should be increased to enable the city to recover its costs.			
133	50. The Transportation and Environmental Services Department should double its fees for right-of-way permits, dumpster permits, crane permits, sidewalk closures, utility cut/excavation permits, reserved parking permits, and other permits.	City Engineer	January 2007	$250,000 in additional annual revenue

Chapter 6 – Engineering and Design Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
133	51. The Transportation and Environmental Services Department should increase its fees for right-of-way permits, dumpster permits, crane permits, sidewalk closures, utility cut/excavation permits, reserved parking permits, and other permits issued by the Permitting Section by a cost of living adjustment on an annual basis.	City Engineer	January 2007	$15,000 annually
134	52. The Transportation and Environmental Services Department should work with the Information Technology Services Department to modify Permit Plan to enhance its functionality of use for the Permit Section.	Transportation and Environmental Services Director	City Engineer	$0
134	53. The development services within the Engineering and Design Division should be budgeted as a cost center.	Management and Budget Director	January 2007	$0
137	The Transportation and Environmental Services Department should charge a pavement restoration fee for utility cuts.			
137	54. The Transportation and Environmental Services Department should develop and impose a pavement restoration fee upon utilities making and benefiting from excavations in public streets, including the City's sewer utility.	Transportation and Environmental Services Director	July 2007	$250,000 in additional annual revenue

Chapter 6 – Engineering and Design Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
137	55. Funds that are collected as pavement restoration fees should be expended for the rehabilitation and resurfacing of streets, and deposited in a special revenue fund established for that purpose. The funds deposited in the special revenue fund should include interdepartmental budget transfers for City sewer operations utility cuts, and fund transfers at the time of construction contract award for City sewer capital improvement projects.	Management and Budget Director	July 2007	$0
137	56. The Transportation and Environmental Services Department should require utility companies to submit five-year plans for major facility installation to coordinate excavations with the City's resurfacing and the recommended slurry seal program.	Transportation and Environmental Services Director	January 2007	$0
137	57. The Transportation and Environmental Services Department should provide an incentive for joint trenching when two or more utility excavators trench by processing a permit as one application saving the utility company costs for permit, plan check, and inspection fees.	Transportation and Environmental Services Director	January 2007	$0
139	There are opportunities to improve the efficiency and operations of the land survey section.			
141	58. The Transportation and Environmental Services Department should scan the City's plat maps to enable electronic access to plats.	Transportation and Environmental Services Director	January 2007	$15,000 in one-time capital outlay

Chapter 6 – Engineering and Design Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
142	59. One of the two Land Survey Analyst positions should be eliminated through attrition.	Transportation and Environmental Services Director	January 2007	($88,000) annually in salary and fringe benefits
144	60. Eliminate one Rod and Chain Operator position through attrition.	Transportation and Environmental Services Director	January 2007	($51,700) annually in salary and fringe benefits
146	61. The productivity of the survey crews should be enhanced.	Transportation and Environmental Services Director	January 2007	$0
146	62. The Chief of Surveys should be responsible for formally planning and scheduling the work of the two survey crews on a bi-weekly basis.	Transportation and Environmental Services Director	January 2007	$0
146	63. The Chief of Surveys should develop a plan to conduct surveys to document the locations and inventory of the City's infrastructure such as catch basins, drain inlets, manholes, etc., based on the time available (i.e., time not dedicated to completing requests for surveys).	Transportation and Environmental Services Director	January 2007	$0
147	64. The roles and responsibilities of the staff of the Engineering and Design Division and the Construction and Inspection Division for management of capital improvement projects should be clarified in a policy and procedure.	Transportation and Environmental Services Director	January 2007	$0
152	Management of capital projects should be improved.			
154	65. A design authorization form should be completed by the Civil Engineer III assigned as project manager before the commencement of design for each capital improvement project.	City Engineer	January 2007	$0

Chapter 6 – Engineering and Design Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
156	66. The Capital Projects Division should develop cost of construction guidelines to document resource requirements for the design and inspection of capital projects.	City Engineer	January 2007	$0
159	67. The information provided by the monthly capital project status report should be expanded.	City Engineer	January 2007	$0
160	68. The Engineering and Design Division and the Construction and Inspection Divisions should utilize the existing Kronos Timekeeping and Performance Accounting systems software to track the costs associated with the design and inspection of capital projects. Access to the information contained within the system should be provided on the City's Intranet.	City Engineer	January 2007	$0
161	69. A final report should be prepared for capital projects upon completion of construction and acceptance of the improvements.	City Engineer	January 2007	$0
162	70. Billability targets should be established for staff of the Engineering and Design Division and Construction and Inspection Division.	City Engineer	January 2007	$0
163	71. The Engineering and Design Division and the Construction and Inspection Division should develop a 24-month bar chart schedule for the design and construction of all capital projects, and update that chart monthly.	City Engineer	January 2007	$0

Chapter 6 – Engineering and Design Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
163	72. A design report should be completed for each capital project when the design is no more than 10% complete.	City Engineer	January 2007	$0
165	73. The Engineering and Design Division should implement an consulting engineer evaluation system and utilize this system as part of the final project close-out.	City Engineer	January 2007	$0
166	74. The Engineering and Design Division should develop a project management manual and train all Civil Engineer III's (project managers) in its use and application.	City Engineer	January 2007	$0
167	An additional Civil Engineer III should be authorized for the Engineering and Design Division and one of the three Civil Engineer I/II positions upgraded to Civil Engineer III.			
167	75. An additional Civil Engineer III position should be authorized as a project manager for the Engineering and Design Division.	Transportation and Environmental Services Director	January 2007	$125,000
167	76. Through attrition, one of the three (3) Civil Engineer I/II's should be upgraded to Civil Engineer III.	Transportation and Environmental Services Director	January 2007	$25,000

Chapter 7 – Construction and Inspection Division				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
169	Responsibility for construction inspection of transportation and environmental services department capital improvement projects should be centralized within the construction and inspection division.			
169	77. The Inspector II position in the Streets Section responsible for managing contractors responsible for street overlay and overlay preparation, and for sidewalk, curb and gutter, and driveway apron replacement should be transferred to the Construction and Inspection Division.	Division Chief – Construction and Inspection	October 2006 – December 2006	$0
169	78. The Inspector II in the Sewer Section responsible for managing the contract for sewer relining and the MISS Utility Locates should be transferred to the Construction and Inspection Division.	Division Chief – Construction and Inspection	October 2006 – December 2006	$0
169	79. The Construction and Inspection Division should assume responsibility for MISS Utility Locates.	Division Chief – Construction and Inspection	October 2006 – December 2006	$0
169	80. A Transportation and Environmental Services Inspector II position should be eliminated through attrition.	Division Chief – Construction and Inspection	October 2006 – December 2006	($53,600)
171	The span of control for the transportation and environmental services inspector III should be reduced.			
171	81. An additional Transportation and Environmental Services Inspector III position should be authorized.	Division Chief – Construction and Inspection	October 2006 – December 2006	$97,900

Chapter 7 – Construction and Inspection Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
171	82. The Transportation and Environmental Services Inspector III should assume a lead worker role by assuming responsibility for inspection of smaller construction projects.	Division Chief – Construction and Inspection	October 2006 – December 2006	$0
173	83. All inspection personnel should be trained in, and required to complete, daily diaries of work activities including sites visited, time spent on site, inspections conducted, materials tested, etc.	Division Chief – Transportation	October 2006 – December 2006	$0
174	84. The Division Chief or Inspector III should develop a standard weekly site report format for use by Inspectors. All Inspectors should be trained on the format and required to utilize the report when reporting weekly activities.	Division Chief – Transportation	October 2006 – December 2006	$0
175	85. The Division should develop a plan for the implementation of laptop computers for all construction inspections.	Division Chief – Transportation	October 2006 – December 2006	$20,000 in one-time capital outlay
176	86. The standards for materials testing conducted by Inspectors and contractors should be clearly outlined and documented in a formal City policy. The standards should be reviewed as part of each pre-construction meeting, and included as part of all construction contracts. Inspectors should receive periodic training on conducting materials testing.	Division Chief – Transportation	October 2006	$0
178	Given current development workload (Spring 2006), Transportation and Environmental Services Inspector II's are underutilized.			

Chapter 7 – Construction and Inspection Division (Cont'd)				
Page #	**Recommendation**	**Responsibility for Implementation**	**Timeframe for Completion**	**Annual Cost Increase/(Saving)**
178	87. The Construction and Inspection Division should utilize the Development Plan Status monthly reports issued by the Site Plan Coordinator to monitor their development-related workload.	Division Chief – Construction and Inspection	October 2006 – December 2006	$0
178	88. The Construction and Inspection Division should delay filling over hire positions until workload trends begin to increase indicating that the Division's workload would soon exceed capacity.	Division Chief – Construction and Inspection	October 2006 – December 2006	$0
Chapter 8 – Analysis of Pavement Marking				
186	89. The thermoplastic truck assigned to the Transportation Division should be surplused or the City should recycle the truck body.	Division Chief – Transportation	October 2006	($15,000)
187	90. The City should issue a request for bids for pavement markings.	Division Chief – Transportation	October 2006	To Be Determined

2. PROFILE

2. PROFILE

This chapter presents a descriptive profile of three divisions: Construction and Inspection, Engineering and Design, and Maintenance. The profile includes:

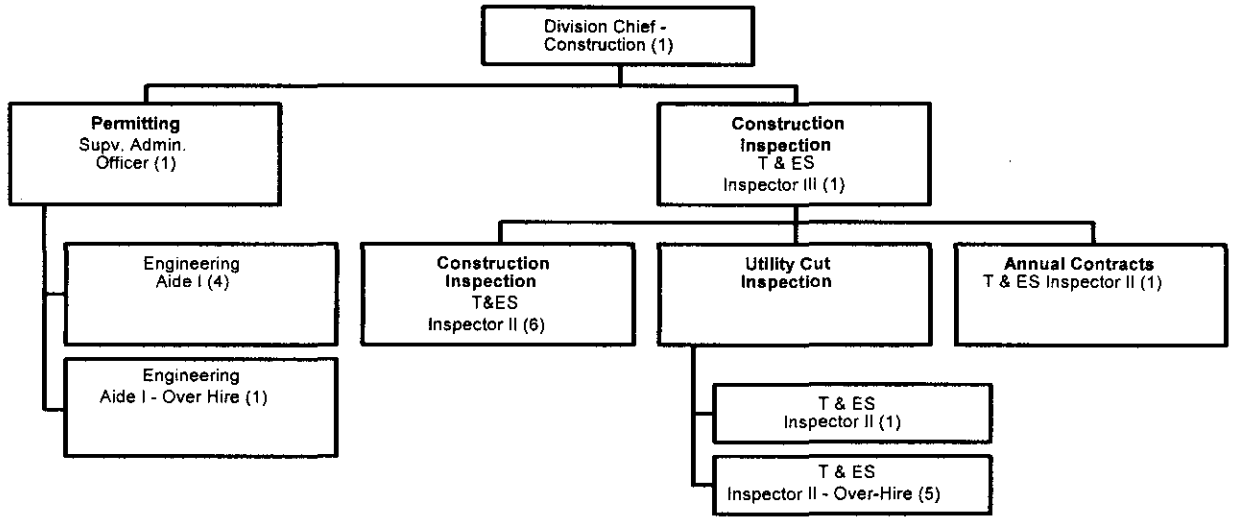
- The plan of organization for these divisions;
- The authorized staffing and budgets for these divisions;
- The goals and objectives for these divisions;
- The roles and responsibilities of the staff assigned to these divisions; and
- The workload for these divisions, where available.

The material within this chapter is based upon interviews and data collected by the Matrix Consulting Group.

1. THE CONSTRUCTION AND INSPECTION DIVISION IS AUTHORIZED 15 POSITIONS, EXCLUDING OVER HIRE POSITIONS.

The Construction and Inspection Division manages the construction management and inspection of capital improvement projects and administers contracts for curb, gutter and sidewalk repairs. This Division also administers and coordinates utility work within public rights-of-way, inspects all bonded development work, and enforces the soil erosion control ordinance. The Division issues excavation permits, reserved parking permits, miscellaneous public works permits and checks building permits for compliance with departmental standards and specifications.

The chart, which follows, presents the current organization of the Construction and Inspection Division.

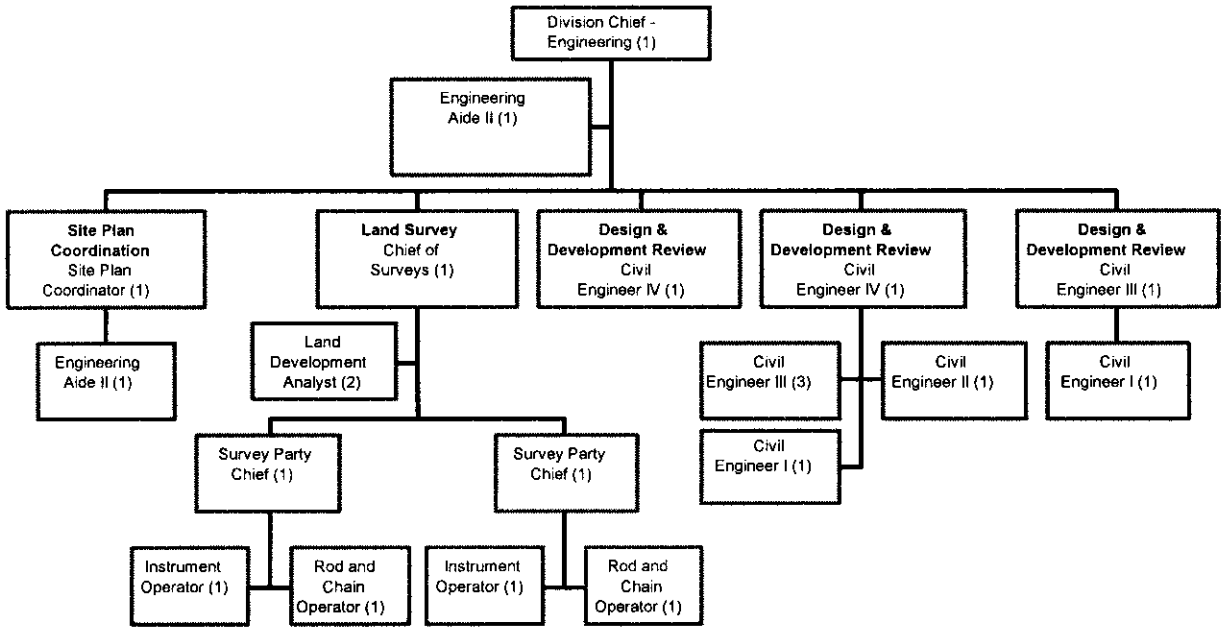


As shown in the chart above, the Construction and Inspection Division has fifteen authorized positions, as well as six over hire positions. The roles and responsibilities of the staff assigned to the Construction and Inspection Division and the workload of the Division are presented in the first exhibit at the end of this chapter.

2. THE ENGINEERING AND DESIGN DIVISION IS AUTHORIZED 22 POSITIONS.

The Engineering and Design Division is responsible for the design of capital improvement projects, review of State capital improvement projects that affect Alexandria, and plan checking of site plans to ensure that the proposed construction is in compliance with the City's engineering standards and policies. This Division is also responsible for administering the State-mandated Chesapeake Bay Preservation Ordinance, design and construction surveys, maintaining engineering records, and administering the street lighting program. This Division conducts the federally mandated bridge inspection program. The Engineering and Design Division is authorized 22 staff.

The chart, which follows, presents the current organization of the Engineering and Design Division.



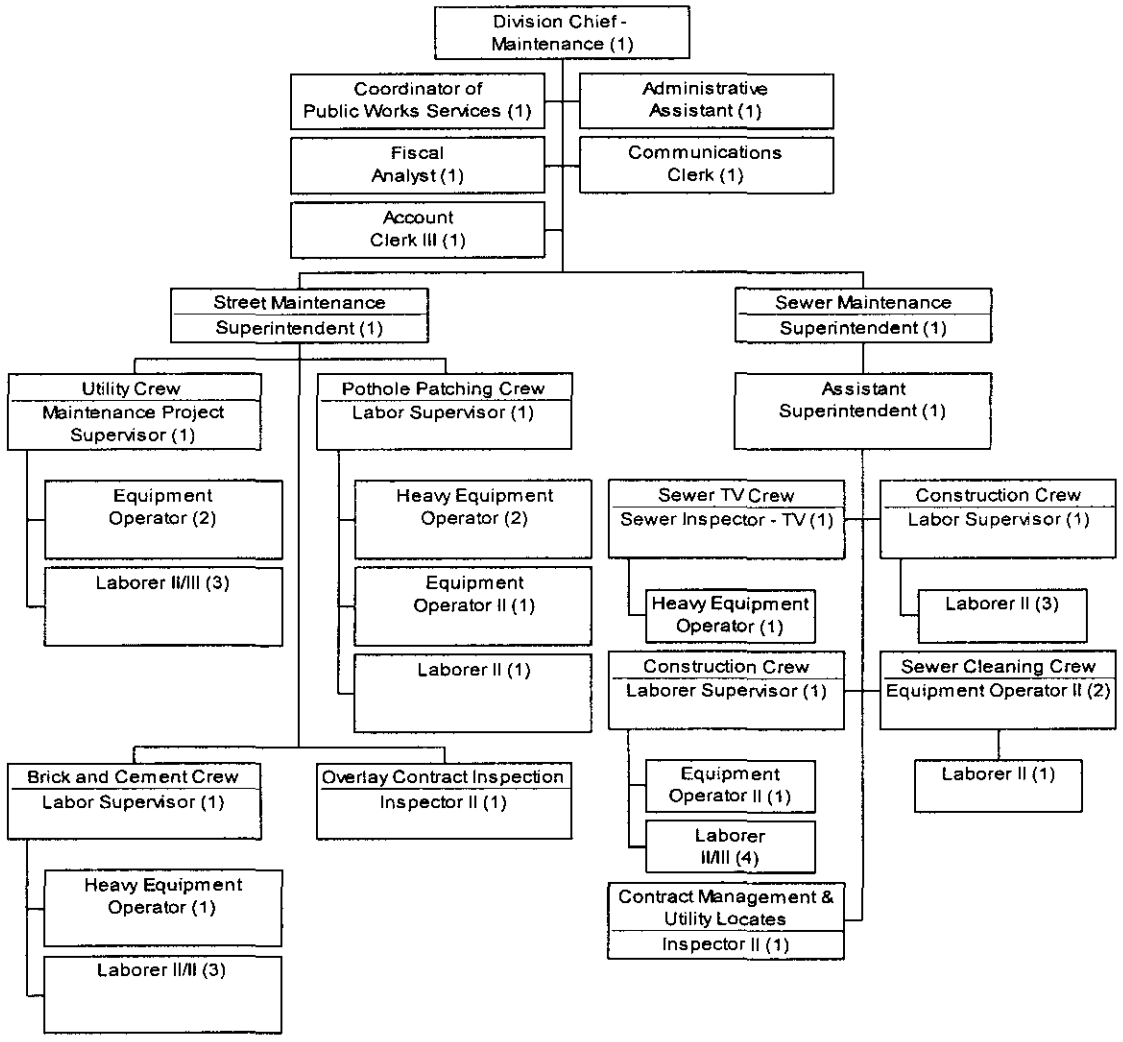
As shown in the chart above, the Engineering and Design Division has 22 authorized positions. The roles and responsibilities of the staff assigned to the Engineering and Design Division and the workload of the Division are presented in the second exhibit at the end of this chapter.

3. THE MAINTENANCE DIVISION IS AUTHORIZED 42 POSITIONS.

The Maintenance Division provides maintenance and repairs for all City sewers, streets, sidewalks and fire hydrants; maintains stream beds, weirs and stream banks; maintains drainage tunnels, box culverts and storm water pollution removal facilities; maintains bridges; and provides and manages snow removal and flood control services. This Division coordinates with other City departments and other divisions within the Transportation and Environmental Services Department to respond to weather-related emergencies such as snow removal, rain, floods, high winds and hurricanes, and assists in emergency management and clean-up.

The chart, which follows, presents the current plan of organization for the three sections within the Maintenance Division: Administration, Street Construction and Maintenance, and Sewer and Storm Drain Construction and Maintenance.

Maintenance Division



As shown in the chart above, the Maintenance Division has 42 authorized positions. It should be noted that the Division is in the process of cross-training staff,

meaning that crew assignments are fluid and are changing during the course of this study. Additionally, project and job requirements will require the re-allocation of personnel depending on size, location and completion targets.

The roles and responsibilities of the staff assigned to the Maintenance Division and the workload of the Division are presented in the third exhibit at the end of this chapter.

The fourth and final exhibit for this chapter presents a sample of daily attendance sheets from the Maintenance Division. Staff in the Division are responsible for logging the work order number, work activity type, staff assigned to each work order and total hours spent on each work order for each staff person. The exhibit presents a summary of the Maintenance Division's field crews based on a sample of 23 workdays. Approximately 55% of work hours in this sample (e.g., 2,301.5 hours) did **not** have a specified work activity and therefore were not included in the exhibit. The exhibit presents the allocation of work hours for work orders that had specified work activities.

Exhibit 1 – Roles, Responsibilities and Workload of the Construction and Inspection Division

1. Roles and Responsibilities of the Construction and Inspection Division

Function	Staffing By Classification		Roles and Responsibilities
Administration	Division Chief, Construction	1.0	• Responsible for the management and direction of the Construction and Inspection Division. • Responsible for all administrative needs of the Department, including staffing, scheduling and budget development. • Oversees Permitting and Construction Inspections functions of the T&ES Department. • Provides technical assistance and/or policy or procedures interpretation for permit and inspection staff. • Coordinates work activities with other T&ES Divisions, other City Departments, and outside Agencies.
Permitting	Supv. Admin. Officer	1.0	• Responsible for the supervision and management of the Permitting function of the Construction and Inspection Division including Engineering Aides. • Handles supply ordering for the entire Division. • Processes vouchers for payments including those approved by Inspectors on various construction projects. • Oversees permit issuance for all T&ES permits.

Function	Staffing By Classification		Roles and Responsibilities
Permitting (Cont'd)	Engineering Aide I Engineering Aide I (over hire)	3.0 2.0	• Receives, reviews and processes T&ES permit applications. • Issues right-of-way permits. Reviews applications for completeness for other permits including verifying information from plats and other sources. • Prepares payment vouchers and purchase orders. • Maintain data regarding drainage, topography, sewer laterals and marine clays. • Staff counter to assist public in filing permit applications and / or answer questions regarding permit requirements/procedures. • Collect payments for permit fees, issue receipts, and reconcile funds daily. Take funds to Treasury daily for deposit. • Provide supporting documents, including plats and other information, along with Permit Applications to Division Chief for review and approval of certain permits. • Assist in maintaining files for construction projects. • Process occupancy permits following Inspector sign off on ticket. Enter Inspector approval and issue permit. • Maintain daily log of utility cuts occurring. • One Eng. Aide assigned to off-site office (Carlyle) to handle permits for that project. • Engineering Aides work from 8:00 a.m. to 5:00 p.m.
Inspections	Inspector III	1.0	• Responsible for the supervision, evaluation, and work assignment of Inspector II positions. • Supervises the functional areas of Site Inspections, Utility Inspections, and Annual Contracts. • Coordinates work activities required of his assigned Inspectors in performing work for other Divisions / Departments, including Traffic, Maintenance, GSA. • Monitors work activities of Inspectors for sufficiency and appropriateness. • Serves as resource for Inspectors on complex or difficult issues related to the performance of their duties. • Ensures that staff are appropriately trained and have necessary equipment/supplies to perform duties.

Function	Staffing By Classification		Roles and Responsibilities
Inspections (Cont'd)	Inspector II Inspector I	8.0 2.0	• Manage and inspect all capital improvement projects for which the Department is responsible through all phases of construction. Conduct all inspections related to exterior of project including site preparation, construction, and soil and erosion control. • Inspects all bonded development work. • Enforces the soil erosion control ordinance. • Perform or review documentation provided by third party testing agency regarding concrete cylinder/air entrapment testing for construction projects. • Inspectors work Mondays through Fridays from 7:00 AM to 3:30 PM. • Inspectors are assigned regionally throughout the City in one of five geographic areas, as well as task specific (e.g., construction zones, utility cuts). • Maintain files on each construction project that includes all correspondence, cut sheets, project revisions, inspections conducted, findings, stop work order (if applicable), tickets issued, etc. • Maintain daily diaries of inspections and complete weekly report summarizing work activities.
	Inspector II Inspector II (over hire)	2.0 5.0	• Function as construction project managers. • Coordinates utility work within public rights-of-ways. • Inspectors work Mondays through Fridays from 7:00 AM to 3:30 PM.
	Inspector II	1.0	• Administers the annual contracts for curb, gutter and sidewalk repairs. • Inspectors work Mondays through Fridays from 7:00 AM to 3:30 PM.

2. Workload of the Construction and Inspection Division.

The table, which follows, presents a summary of the workloads and services levels for the Construction and Inspection Division.

Function	Description of Services	Workload and Service Levels
Permitting	• Accepts, reviews and processes all applications for T&ES permits including ROW permits, hauling, excavation, street closures, emergency vehicle easements, and parking. • Issues a variety of T&ES permits. • Provide support and assistance to Inspectors.	• In calendar year 2004, the Permit Section collected $251,119 in revenue for the permits issued by this section. • In calendar year 2004,the Section issued 1,393 permits. This includes the following: – 777 permits that the Section labels "permit fees" that include right-of-way permits, dumpster permits, crane permits, sidewalk closures, etc. These are not excavation permits. – 416 utility cut/excavation permits. – 113 reserved parking permits. – 87 other types of permits
Inspections	• Provide inspections of all capital improvement projects. • Inspects all utility cuts. • Inspects all public improvements performed by private developers.	

Exhibit 2 – Roles, Responsibilities and Workload of the Engineering and Design Division

1. Roles and Responsibilities of the Engineering and Design Division.

Function	Staffing By Classification		Roles and Responsibilities
Administration	Division Chief	1.0	• Responsible for the management and direction of the Engineering and Design Division. • Responsible for all administrative needs of the Division, including staffing, scheduling and budget development. • Supervises the Engineering, Design, Capital Project Management, and Survey functions of the T&ES Department. • Provides information and coordinates with private developers. • Provides technical assistance and/or policy or procedures interpretation for staff as needed. • Coordinates work activities with other T&ES Divisions, other City Departments, and outside Agencies. • Responsible for resolving work conflicts and determining priority of work assignments.
	Engineering Aide II	1.0	• Provides administrative support to the Division Chief.
Design and Development Review	Civil Engineer IV	2.0	• Provides supervision and direction to staff assigned to this Division. • Responsible for complex design projects, as well as site plan reviews as necessary. • Reviews and monitors projects with the Division Chief and another Civil Engineer III. • One Civil Engineer IV position is vacant and has been vacant for approximately one year. The Department is in the process of filling this position, which, once filled, would change the reporting relationships, depicted in the organization chart on the previous page.

Function	Staffing By Classification		Roles and Responsibilities
Design and Development Review (Cont'd)	Civil Engineer III	4.0	• Provides engineering design activities for capital improvement projects. • Receives design projects from Construction and Inspection as well as Maintenance. • Reviews site plans for private projects to ensure they meet City and State standards. • Perform site plan reviews as necessary. Currently, the Division has tried to centralize the responsibility for site plan reviews with two staff.
	Civil Engineer II	1.0	• Provides engineering design activities for capital improvement projects, as well as small projects identified by the public, Maintenance and / or Construction and Inspection. • As necessary, performs site reviews.
	Civil Engineer I	2.0	• Provides engineering and design activities for Department projects. • Provides support to other Civil Engineers in the Division.
	Site Plan Coordinator	1.0	• Provides coordination of T&ES review of site plans submitted to City, including tracking of timeframes for comment submission. • Distributes plans received from Planning & Zoning to appropriate Department staff, receives back comments regarding conditions for approval, compiles comments, and forwards to Planning & Zoning. • Oversees bonding program for construction projects, including erosion and sediment control bonds, performance bonding, and maintenance bonding. • Determines amount and collects fees for Sewer Connection charges, trash can fees (new developments), and street cleaning fees. Deposits collected fees with City Treasury. Processes fee return on street cleaning fees, if no work performed by City during project. • Researches and answers general questions from the public and city staff regarding property ownership, ROW locations, easements, etc. • Interfaces with homeowners associations and other groups. • Maintains as-built files/plans.
	Engineering Aide II	1.0	• Assists in processing of site plans submitted by developers, including routing to appropriate personnel for review. • Maintains files related to construction projects including plans, maps, site plans, right of way plans, subdivision plats, easement plats, and similar documents. • Assists in compilation of Department comments regarding development projects. • Assists in the processing of performance and maintenance bonds documentation.

Function	Staffing By Classification		Roles and Responsibilities
Land Survey	Chief of Surveys	1.0	• Manages the staff and activities of the survey section. • Reviews subdivision plats and site plans to assure the survey data is accurate and easements are accurately depicted. • Researchs land ownership for other departments (title searches, boundaries, easements, etc.). • Downloads data collected by the two survey crews, adds data from existing databases, and routes the information to the party that requested the data.
	Land Survey Analyst	2.0	• Responsible for the receipt and processing of all land survey requests. • Assigns survey work orders / service requests to the survey crews. • Conducts preliminary research for jobs. • Manages the City's Community Rating System for flood insurance purposes. • Maintains the Alley Book, a list of alleys in the City and their owners (e.g., public or private).
	Survey Party Chief	2.0	• Leads survey crews, including managing and directing staff. • Conducts design and construction survey work for CIP projects, as well as other City projects. • Responsible for ensuring service requests are completed in a timely manner and that data are accurate. • As needed, reviews private survey work. • Responsible for development on City controls and maintenance of database.
	Instrument Operator	2.0	• Serves as a member of the Survey Crew. • Operates instruments as instructed by the Survey Party Chief.
	Rod and Chain Operator	2.0	• Serves as a member of the Survey Crew. • Operates equipment as instructed by the Survey Party Chief.

2. Workload of the Engineering and Design Division.

The table, which follows, presents a summary of the workloads and services levels for the Engineering and Design Division.

<table>
<tr><th>Function</th><th>Description of Services</th><th>Workload and Service Levels</th></tr>
<tr><td>Engineering Design and Review</td><td>• Responsible for the design of City construction projects.
• Responsible for site plan review for private development occurring in the City.</td><td>• The Engineering and Design Division identified twenty-one active capital projects as being under design at the present time.

• The design is 50% or more complete for fourteen of these twenty-one (21) projects. The design for sixteen (16) of these twenty-one (21) projects is being completed by consulting engineers.</td></tr>
<tr><td>Land Survey</td><td>• Responsible for providing land survey for City projects.
• Responsible for the National Flood Insurance Program, interface with FEMA, etc.
• Responsible for creation of City monuments / controls and maintenance of database.</td><td>• The table, which follows, presents the number of land survey requests for service for the previous five calendar years. The project team is evaluating the magnitude of the workload underlying these trends.
<table>
<tr><th colspan="6">Number of Requests for Service for Land Survey</th></tr>
<tr><th>Month</th><th>2000</th><th>2001</th><th>2002</th><th>2003</th><th>2004</th></tr>
<tr><td>January</td><td>9</td><td>7</td><td>6</td><td>8</td><td>3</td></tr>
<tr><td>February</td><td>7</td><td>11</td><td>7</td><td>6</td><td>0</td></tr>
<tr><td>March</td><td>18</td><td>4</td><td>9</td><td>5</td><td>6</td></tr>
<tr><td>April</td><td>5</td><td>12</td><td>2</td><td>14</td><td>8</td></tr>
<tr><td>May</td><td>10</td><td>4</td><td>6</td><td>13</td><td>10</td></tr>
<tr><td>June</td><td>10</td><td>5</td><td>6</td><td>9</td><td>9</td></tr>
<tr><td>July</td><td>7</td><td>7</td><td>1</td><td>8</td><td>11</td></tr>
<tr><td>August</td><td>8</td><td>7</td><td>17</td><td>9</td><td>12</td></tr>
<tr><td>September</td><td>8</td><td>7</td><td>6</td><td>5</td><td>2</td></tr>
<tr><td>October</td><td>6</td><td>4</td><td>7</td><td>6</td><td>8</td></tr>
<tr><td>November</td><td>4</td><td>14</td><td>2</td><td>3</td><td>5</td></tr>
<tr><td>December</td><td>5</td><td>5</td><td>6</td><td>8</td><td>7</td></tr>
<tr><td>Total</td><td>97</td><td>87</td><td>75</td><td>94</td><td>81</td></tr>
<tr><td>% Change</td><td>–</td><td>-11%</td><td>-16%</td><td>20%</td><td>-16%</td></tr>
</table></td></tr>
</table>

Exhibit 3 – Roles, Responsibilities and Workload of the Maintenance Division

1. Roles and Responsibilities of the Maintenance Division.

Function	Staffing By Classification		Roles and Responsibilities
Administration	Division Chief	1.0	• Responsible for the management and direction of the Maintenance Division. • Responsible for all administrative needs of the Division, including staffing, scheduling and budget development. • Oversees Street and Alley pavement and repair; Curb, gutter, and sidewalk repair and replacement; brick maintenance; sewer televising and repair; storm water line maintenance; and ROW infrastructure (poles, fences, guardrails) maintenance functions of the T&ES Department. • Responsible for emergency planning and preparedness for natural disasters, snow and ice and other emergencies and support to other departments in the City. • Provides technical assistance and/or policy or procedures interpretation for staff. • Coordinates work activities with other T &ES Divisions, other City departments, and outside agencies. • Responsible for resolving work conflicts and determining priority of work assignments.
	Coordinator of Public Works Services	1.0	• Supervises the maintenance of the buildings and the grounds at the T&ES yard at 133 S. Quaker Lane, including contractors for plumbing, janitorial, etc. • Orders materials and supplies for the Maintenance Division including salt, sand, and liquid calcium. • CDL drug test coordinator for the Maintenance Division. • Shift supervisor for the day shift for snow removal, coordinating snow removal operations, tracking the snow storm, coordinating snow removal training for equipment operators, including the snow rodeo.

Function	Staffing By Classification		Roles and Responsibilities
Administration (Cont'd)	Fiscal Analyst	1.0	• Collects data from daily time sheets, enters it into a Microsoft Access database, and reports the data necessary to obtain reimbursement for street maintenance by VDOT. • Responsible for the daily tracking of expenditures for the maintenance and solid waste divisions; responsible for assisting in the budget preparation for the maintenance and solid waste divisions. • In FY 2005, the City received $5,481,428 in reimbursement from VDOT for street maintenance. This includes streets, storm drains, construction inspection, engineering, street sweeping, traffic engineering and operations, and snow removal.
	Administrative Assistant	1.0	• Provides administrative and clerical support to the Division Chief and the Deputy Director, including maintaining their calendars, time sheets, etc. • Responsible for Departmental human resources duties, including coordinating personnel requisition packs, scheduling interviews and test appointments, preparing all hiring documents, tracking and distributing performance evaluation packets, etc. • Responsible for travel arrangements for the Department managers. • Responsible for some elements of procurement, including the Safety Shoe program.
	Account Clerk III	1.0	• Responsible for time and attendance reporting for the Maintenance Division. This includes daily tracking and data entry into the Kronos System (automated payroll) for all staff on an exception basis. • Maintains a separate hardcopy of leave time usage for the Division for each employee. This data is also maintained in the Kronos System. • Responsible for creating purchasing requisitions and / or payment vouchers for materials and supplies as directed by the Division Chief. • Responsible for issuing and tracking internal Division requisitions that enable supervisors to purchase materials off of existing purchase orders / accounts. • Maintains an Excel database of records and account balances. • Responsible for tracking and processing FEMA billings / reimbursement for snow and rain emergencies.

Function	Staffing By Classification		Roles and Responsibilities
Administration (Cont'd)	Communications Clerk	1.0	• Responsible for answering phones and processing service requests, as well as dispatching crews in the field as needed. • Maintains paper and electronic copies of maintenance work orders as necessary. • Conducts background information searches from existing data bases for maintenance activities.
Street Construction and Maintenance			
Administration	Superintendent	1.0	• Responsible for the management and administration of the Streets Construction and Maintenance Section, including planning, budgeting, directing, and coordinating all operations of the Section. • Develops and oversees performance against operating budget. • Assigns jobs and plans and schedules the work of the crews. • Responds to service requests from the public. • Receives and approves invoices for the purchase of materials and supplies.
Street Overlay Inspection	Inspector II	1.0	• Responsible for managing and directing contractors responsible for patching and paving work for the City, and for sidewalk, curb and gutter, and driveway apron replacement. This includes tracking daily activities, prioritizing and assigning work, and monitoring costs. The contract for street overlay amounts to approximately $1.4 million, the contract for overlay preparation amounts to approximately $0.4 million, and the contract for concrete replacement amounts to $0.5 million. • Responsible for the development of the City's five-year paving plan, including informal inspection of streets, prioritization of paving needs and development of a Streets List for Council approval. • During winter months, this position provides support to the Division with respect to snow removal and is responsible for plowing one district. • This position supervises an Equipment Operator, who provides assistance with respect to job set up and monitoring of the contract crews.
Utility Crew	Maintenance Project Supervisor Equipment Operator Laborer III Laborer II	1.0 2.0 2.0 1.0	• This Crew is responsible for handling all special projects as assigned by the Superintendent (e.g., installation of guardrails, etc.). • This Crew provides assistance to other Street Construction and Maintenance crews as assigned by the Superintendent.

Function	Staffing By Classification		Roles and Responsibilities
Pothole Patching Crew	Laborer Supervisor Heavy Equipment Operator Equipment Operator II	1.0 2.0 1.0	• Patch potholes within one workday of the service request. • Will repack the sub-base as necessary, square cut, clean out the pothole, apply tack coat, shovel hot mix in the pothole, and uses a vibratory roller or tamper plate to compact the asphalt. • Will typically utilize 4 tons of asphalt a day to patch potholes. • Use UPM cold mix in the winter.
Brick & Cement Crew	Laborer Supervisor Heavy Equipment Operator Laborer III Laborer II	1.0 1.0 2.0 1.0	• Currently, this Crew is staffed with (1) Laborer Supervisor, (1) Heavy Equipment Operator, (2) Laborer III's, and (2) Laborer II's. • Receives daily assignment from the Superintendent. Depending on job size, this Crew will separate into two crews. • Responsible for the maintenance and repair of brick and cement sidewalks in the City. • The Laborer Supervisor will identify preventive maintenance needs as the Crew performs work throughout the City. This list is then completed when the Crew does not have work orders / service requests to complete.
Sewer and Storm Drain Maintenance			
Administration	Superintendent	1.0	• Responsible for the management and administration of the Sewer and Storm Drain Construction and Maintenance Section including planning, budgeting, directing, and coordinating all operations of the Section. • Develops and oversees performance against operating budget. • Assigns jobs and plans and schedules the work of the crews. • Receives and approves invoices for the purchase of materials and supplies for the Section. • Responds to requests from Transportation and Environmental Services administration, City Council, other City agencies and from the public.
	Assistant Superintendent	1.0	• Provides the day-to-day supervision of the crews assigned to sewer maintenance, storm drain maintenance, TV inspection, and construction and repair. • Responds to service requests from the public.

Function	Staffing By Classification		Roles and Responsibilities
Sewer TV Crew	TV Inspector Laborer II	1.0 1.0	• Currently, this Crew is staffed with (1) TV Inspector and (1) Laborer. • Responsible for inspecting all sewer / sanitary mains in the City to identify maintenance and repair needs in the sewer system. • This Crew inspects mains in small sections and has a Flush Truck, which follows the TV Crew and flushes mains as directed by the Superintendent. • Responds to calls for service to investigate complaints or disputes (e.g., private property or City responsibility).
Construction and Repair Crew	Laborer Supervisor Laborer II	1.0 3.0	• Currently, this Crew is staffed with (1) Laborer Supervisor, (2) Heavy Equipment Operator, and (1) Laborer II. • Responsible for the repair of catch basins, sewer mains, and fire hydrants. • Receives assignments daily from the Superintendent. • Maintains a list of problem areas in the City (e.g., during rain falls, etc.) and, when not completing service request, will repair problem areas. • Responsible for the repair of fire hydrants. Service requests generated by the contractor responsible for maintenance.
Construction and Repair Crew	Laborer Supervisor Heavy Equip Operator Equipment Operator II Laborer III Laborer II	1.0 1.0 1.0 2.0 2.0	• Responsible for the repair of sewer lines and fire hydrants. • The TV Crew provides service requests, as a result of the televising of lines. • Crew will dig and repair lines as necessary. • Also provides assistance on catch basin / inlet repairs when needed.
Contract Inspection and MISS Utility Locates	Inspector I	1.0	• Manages the contractual maintenance of fire hydrants, sewer mains, and catch basins. • These three contracts amount to approximately $455,000 annually. • Conducts MISS Utility locates – approximately 4 to 5 per day. • Manages the contract for sewer relining. Contracts amount to approximately $300,000 to $400,000 annually.

Function	Staffing By Classification		Roles and Responsibilities
Sewer Cleaning Crew	Equipment Operator II	3.0	• Currently, this Crew has (1) Equipment Operator II assigned. • Responsible for flushing the sewer mains. • Follows the TV Crew and provides support at the request of the TV Inspector. • Responds to requests for service as needed.

2. Workload of the Maintenance Division

Function	Description of Services	Workload and Service Levels
Administration	• Responsible for the overall direction and management of the Division. • Provides administrative and financial support to Operations.	• The table, which follows, presents the procurement activities for which the Account Clerk III was responsible.

Fiscal Year	No. of Intra-Divisional Requisitions	No. of Purchase Requisition
2003	128	15
2004	90	12
2005	101	21
2006 (YTD)	N / A	16

• The Account Clerk III receives and processes approximately 300 invoices each month.

<table>
<tr><th>Function</th><th>Description of Services</th><th>Workload and Service Levels</th></tr>
<tr><td>Utility Crew</td><td>• Performs special projects as directed by Division managers.</td><td>• The project team sampled one week of time and attendance sheets for the Maintenance Division. This data is presented in the last exhibit in this chapter.
• The table, which follows, shows for the same week, the average number of staff assigned to this crew as well as the distribution of crew sizes.
<table><tr><th></th><th>Number</th></tr><tr><td>Average Crew Size</td><td>3.5</td></tr><tr><td>Minimum</td><td>1.0</td></tr><tr><td>Maximum</td><td>6.0</td></tr><tr><td>Percentile</td><td></td></tr><tr><td>25%</td><td>2.8</td></tr><tr><td>50%</td><td>4.0</td></tr><tr><td>75%</td><td>4.0</td></tr><tr><td>100%</td><td>6.0</td></tr></table></td></tr>
<tr><td>Pothole Patching Crew</td><td>• Responsible for patching potholes.</td><td>• The project team sampled one week of time and attendance sheets for the Maintenance Division. This data is presented in the last exhibit in this chapter.
• The table, which follows, shows for the same week, the average number of staff assigned to this crew as well as the distribution of crew sizes.
<table><tr><th></th><th>Number</th></tr><tr><td>Average Crew Size</td><td>6.0</td></tr><tr><td>Minimum</td><td>6.0</td></tr><tr><td>Maximum</td><td>6.0</td></tr><tr><td>Percentile</td><td></td></tr><tr><td>25%</td><td>6.0</td></tr><tr><td>50%</td><td>6.0</td></tr><tr><td>75%</td><td>6.0</td></tr><tr><td>100%</td><td>6.0</td></tr></table></td></tr>
</table>

<table>
<tr><th>Function</th><th>Description of Services</th><th>Workload and Service Levels</th></tr>
<tr><td>Brick Cement Crew</td><td>• Responsible for the repair of brick and cement sidewalks in the City.</td><td>• The project team sampled one week of time and attendance sheets for the Maintenance Division. This data is presented in the last exhibit in this chapter.
• The table, which follows, shows for the same week, the average number of staff assigned to this crew as well as the distribution of crew sizes.
<table>
<tr><th></th><th>Number</th></tr>
<tr><td>Average Crew Size</td><td>3.2</td></tr>
<tr><td>Minimum</td><td>1.0</td></tr>
<tr><td>Maximum</td><td>6.0</td></tr>
<tr><td>Percentile</td><td></td></tr>
<tr><td>25%</td><td>1.0</td></tr>
<tr><td>50%</td><td>2.0</td></tr>
<tr><td>75%</td><td>6.0</td></tr>
<tr><td>100%</td><td>6.0</td></tr>
</table></td></tr>
<tr><td>Sewer TV Crew</td><td>• Responsible for the inspection of sewer lines in the City.</td><td>• The project team sampled one week of time and attendance sheets for the Maintenance Division. This data is presented in the last exhibit in this chapter.
• The table, which follows, shows for the same week, the average number of staff assigned to this crew as well as the distribution of crew sizes.
<table>
<tr><th></th><th>Number</th></tr>
<tr><td>Average Crew Size</td><td>3.2</td></tr>
<tr><td>Minimum</td><td>1.0</td></tr>
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<tr><td>25%</td><td>1.0</td></tr>
<tr><td>50%</td><td>2.0</td></tr>
<tr><td>75%</td><td>6.0</td></tr>
<tr><td>100%</td><td>6.0</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Function</th><th>Description of Services</th><th>Workload and Service Levels</th></tr>
<tr><td>Construction and Repair Crew</td><td>• Responsible for the repair of sewer lines, catch basins, and fire hydrants.</td><td>• The project team sampled one week of time and attendance sheets for the Maintenance Division. This data is presented in the last exhibit in this chapter.

• The table, which follows, shows for the same week, the average number of staff assigned to this crew as well as the distribution of crew sizes.

<table>
<tr><th></th><th>Crew (1)</th><th>Crew (2)</th></tr>
<tr><td>Average Crew Size</td><td>7.6</td><td>5.0</td></tr>
<tr><td>Minimum</td><td>2.0</td><td>4.0</td></tr>
<tr><td>Maximum</td><td>15.0</td><td>6.0</td></tr>
<tr><td>Percentile</td><td></td><td></td></tr>
<tr><td>25%</td><td>4.0</td><td>4.5</td></tr>
<tr><td>50%</td><td>5.0</td><td>5.0</td></tr>
<tr><td>75%</td><td>12.0</td><td>5.5</td></tr>
<tr><td>100%</td><td>15.0</td><td>6.0</td></tr>
</table>
</td></tr>
</table>

Function	Description of Services	Workload and Service Levels
Inspection		• The project team sampled one week of time and attendance sheets for staff assigned to Maintenance Division. The table, which follows, shows the allocation of staff hours by job type for Inspectors.

Inspection - Contracts	Number of Hours	Percentage of Hours
Drainage Inspection	30.5	60%
Unknown	20	40%
Total	**50.5**	**100%**

Inspection - Paving	Number of Hours	Percentage of Hours
Asphalt Patch - MT. Vernon	5	8%
Paving - No Parking Signs	4	6%
Paving Maintenance - Other	56	86%
Total	**65**	**100%**

• The table, which follows, shows for the same week, the average number of staff assigned to this crew as well as the distribution of crew sizes.

	Contract	Paving
Average Crew Size	1.5	1.8
Minimum	1.0	1.0
Maximum	3.0	4.0
Percentile		
25%	1.0	1.0
50%	1.0	2.0
75%	1.8	2.0
100%	3.0	4.0

<table>
<tr><th>Function</th><th>Description of Services</th><th>Workload and Service Levels</th></tr>
<tr><td>Cleaning Crew</td><td>• Responsible for flushing sewer lines.</td><td>• The project team sampled one week of time and attendance sheets for the Maintenance Division. This data is presented in the last exhibit in this chapter.

• The table, which follows, shows for the same week, the average number of staff assigned to this crew as well as the distribution of crew sizes.

<table>
<tr><th></th><th>Number</th></tr>
<tr><td>Average Crew Size</td><td>1.2</td></tr>
<tr><td>Minimum</td><td>1.0</td></tr>
<tr><td>Maximum</td><td>2.0</td></tr>
<tr><td>Percentile</td><td></td></tr>
<tr><td>25%</td><td>1.0</td></tr>
<tr><td>50%</td><td>1.0</td></tr>
<tr><td>75%</td><td>1.0</td></tr>
<tr><td>100%</td><td>2.0</td></tr>
</table>
</td></tr>
</table>

Exhibit 4 – Analysis of Time and Attendance Data

The Matrix Consulting Group collected a sample of daily attendance sheets from the Maintenance Division. Staff in the Division are responsible for logging the work order number, work activity type, staff assigned to each work order and total hours spent on each work order for each staff person. The table, which follows, presents a summary of the Maintenance Division's field crews based on a sample of 23 workdays. Approximately 55% of work hours in this sample (e.g., 2,301.5 hours) did not have a specified work activity and therefore were not included in the table below. The table below presents the work hours for work orders that had specified work activities.

Work Activity	Total Hours (Based on Sample)	% of Hours
Alleys / Parking Lots	4.0	0%
Asphalt Overlay	24.0	2%
Asphalt Overlay - Newton	24.0	2%
Asphalt Patch	86.0	8%
Asphalt Patch - MT. Vernon	5.0	0%
Brick Sidewalk Repair	183.5	18%
Building Maintenance / Supplies	24.0	2%
Bus Shelter Maintenance	8.0	1%
Clean / Repair Equipment / Tools	9.0	1%
Clean / Reshape Ditch	42.0	4%
Concrete Sidewalk Repair	5.0	0%
Creek / Channel Maintenance	4.0	0%
Drainage Inspection	30.5	3%
Drainage Maintenance - Other	22.0	2%
Emergency Need - Other	40.0	4%
Equipment Downtime	20.0	2%
Expendable Supplies	5.0	0%
Fire Hydrant Maintenance	3.0	0%
Hauling Debris / Dump	41.0	4%
Manhole Cover Maintenance	45.0	4%
Miscellaneous - Other	23.0	2%
Other	28.0	3%
Paving - No Parking Signs	8.0	1%
Paving Maintenance - Other	162.5	16%
Pothole Hot / Cold Patch	32.0	3%
Repair / Clean Inlet / Catch Basin	38.0	4%
Repair / Clean Sanitary Sewer	50.0	5%
Repair Clean Storm Pipes	32.0	3%
Roadside Maintenance - Other	24.0	2%
Shoulder Maintenance	24.0	2%
Total	**1,046.5**	**100%**

3. EMPLOYEE SURVEY

3. EMPLOYEE SURVEY

As part of the management study of the Construction and Inspection, Engineering Design, and Maintenance Divisions of the Transportation and Environmental Services Department, the Matrix Consulting Group conducted a confidential employee survey. This chapter of the report summarizes the results of the employee survey.

1. A SURVEY WAS DISTRIBUTED TO EMPLOYEES IN THE CONSTRUCTION AND INSPECTION, ENGINEERING AND DESIGN, AND MAINTENANCE DIVISIONS.

The survey was distributed to 78 employees with a response rate of 76%. While the employee survey was confidential, employees were asked to identify their current assignment. The table below presents the results.

Current Assignment	Number of Respondents	% of Total Respondents
Construction and Inspection	11	19%
Engineering and Design	18	31%
Maintenance	28	47%
Unspecified	2	3%
Total	**59**	**100%**

The survey was prepared by the Matrix Consulting Group and contained two sections.

- The first section was a multiple choice section designed to cover a wide range of topics about the management, organization, and operation of the development process while minimizing the employees' time and effort in completing this survey. Employees were asked to respond to 33 statements by selecting "no response," "strongly agree," "agree," "neutral," "disagree," and "strongly disagree."

- The second section consisted of two open-ended questions. These questions provided the opportunity for employees to identify the key strengths and opportunities for improvement for the Divisions. The questions were designed to

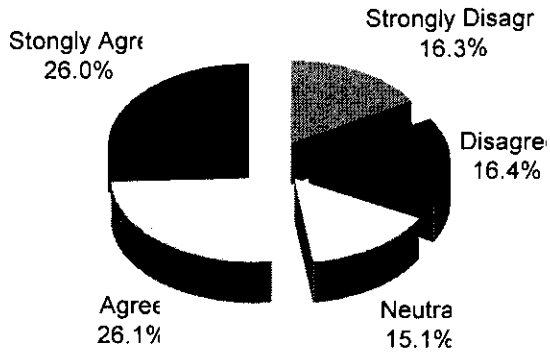
create opportunities for employees to offer their candid assessment of their Divisions, and to make suggestions for improvements, if needed.

The following sections provide a discussion of the results.

(1) Employees Cited a Number of Positive Aspects as Well as a Number of Opportunities of Improvement.

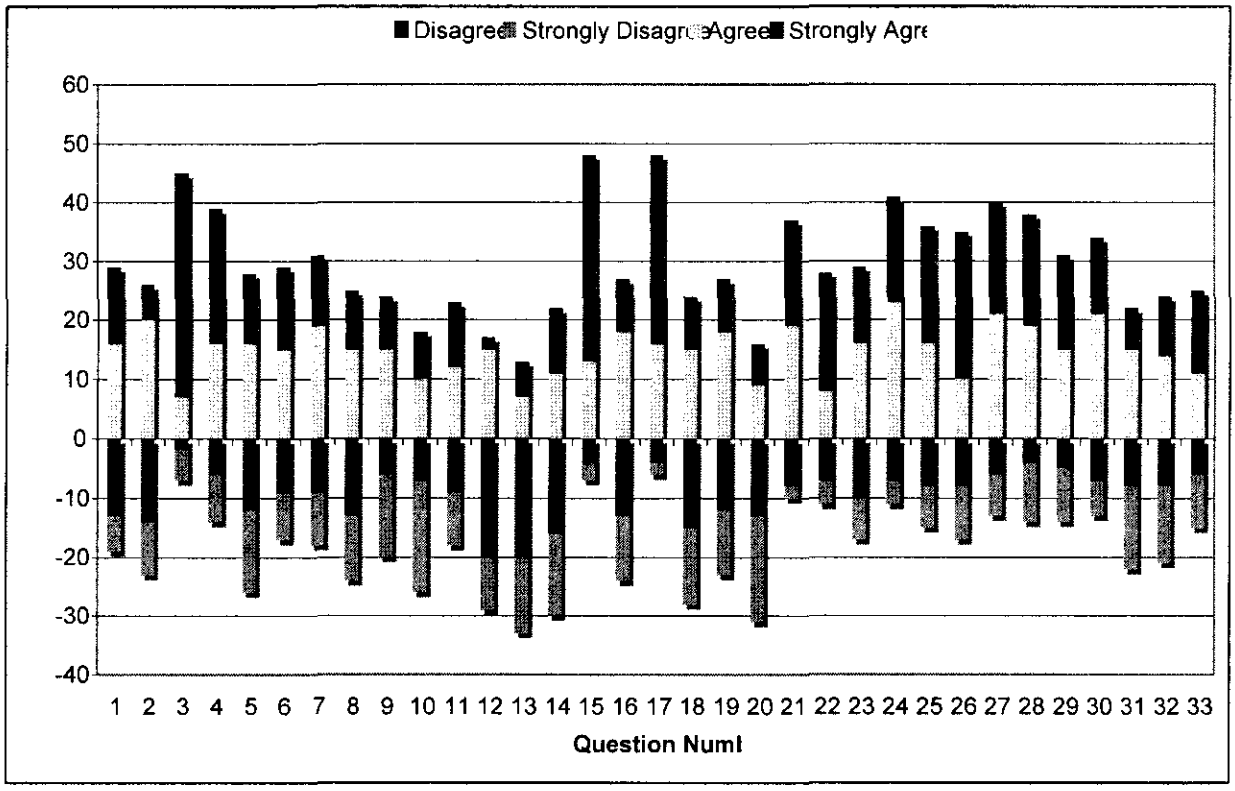
In reviewing the responses to the quantitative responses to the first section of the employee questionnaire, it is important to look at the pattern of responses for the entire group versus individual responses.

The chart below summarizes the overall distribution of responses to statements to which employees were asked to select a response. It should be noted that the chart does not include responses were the employees selected "no response" or did not make a selection.



The response pattern for all statements in the first section of the employee survey indicates employees had mixed opinions. Respondents agreed with 52.1% of the statements (either "agree" or "strongly agree), disagreed with 32.7% of the statements (either "disagree" or "strongly disagree"), or were neutral about 15.1% of the statements.

To gain a more detailed sense of the responses from the first section of the employee survey, it is useful to look in more detail at the statements that elicited the strongest positive and negative responses. The chart, found below, plots the actual number of responses in which employees agreed or disagreed for each statement. Question numbers are shown along the bottom of the chart. Neutral responses are excluded.



The chart, above, presents the responses for each statement provided in the first section of the employee survey. The statements that respondents agreed with (e.g., "agree" and "strongly agree") are plotted **above** the X-axis. The statements that respondents disagreed with (e.g., "disagree" and "strongly disagree") are plotted **below** the X-axis. The chart provides an overall visual representation of the response to each

statement. It allows statements that respondents strongly agreed with or disagreed with to be singled out. Those statements are highlighted below.

(2) Respondents Strongly Agreed with Thirteen of the Thirty-Three Statements.

There were thirteen questions that respondents clearly agreed with (defined as at least 50% of respondents selecting "agree" or "strongly agree" in response to the questions). These thirteen questions are presented below.

- Question #3 (77%): I receive an annual performance evaluation.
- Question #4 (66%): I get enough feedback from my supervisor about my performance to know if I am performing up to their expectations.
- Question #7 (53%): The goals and objectives of my Division are clearly communicated to me.
- Question #15 (81%): My Division provides a high level of service to the residents of Alexandria.
- Question #17 (81%): Staff in our Division work hard in the delivery of services to the residents of Alexandria.
- Question #21 (63%): The overall quality of work being done in my Division is high.
- Question #24 (70%): The employees in my Division are dedicated to meeting customer expectations.
- Question #25 (61%): My supervisor empowers me to make decisions concerning my work.
- Question #26 (60%): I feel that I am valued as a member of my Division.
- Question #27 (68%): My current work assignments enable me to apply and practice my knowledge and skills.
- Question #28 (64%): My Division is a good place to work.
- Question #29 (53%): In the past year, I have had adequate training to develop the skills I need to perform my job well.

- Question #30 (58%): The working relationships between the different divisions in the Department are generally good.

Respondents to the employee survey provided positive responses for almost 40% of the questions.

(3) Respondents Strongly Disagreed with Four Statements.

There were four questions that respondents clearly disagreed with (defined as at least 50% of respondents selecting "disagree" or "strongly disagree" in response to the questions). These four questions are presented below.

- Question #12 (50%): My Division has the administrative support it needs to accomplish its goals and objectives efficiently and effectively.
- Question #13 (56%): My Division is frequently in a crisis mode due to workload that exceeds staff resources.
- Question #14 (51%): In my Division, at present, staffing is adequate for the workloads we handle.
- Question #20 (52%): Opportunities exist in the Department for career advancement.

The disagreement with question #13 is actually a positive response. Respondents disagreed that their division was frequently in a crisis mode due to workload that exceeded staff resources.

2. RESPONDENTS WERE ASKED TO IDENTIFY KEY STRENGTHS AND OPPORTUNITIES FOR IMPROVEMENT.

Employees were asked to identify key strengths and opportunities for improvements. The Matrix Consulting Group reviewed each survey for responses to the open-ended questions. Key themes identified by respondents are presented in the points below.

(1) Many Respondents Commented Positively on Employee Relations, Workload, Overall Work Conditions, and Work Environment.

A number of positive comments were received regarding employee relations, workload, overall work conditions and work environment. The following comments are a representative sample.

- "Employee relations are very good."
- "Work load is adequate and evenly shared by similar level employees"
- "Have a supportive and dedicated boss and director. Boss is very approachable and appreciative of work efforts."
- "I enjoy the work that I do."
- "Good working conditions: people, office facilities, location."
- "I like the variety of work – not doing the same thing over and over."
- "The best thing about working in my Division is my job, because I like what I do."
- "We have mutual respect for fellow employees."
- "The benefits are good."
- "I enjoy working with the public and providing customer service."
- "I like that our workday starts early (6:30 AM) and finishes early (3:00 PM). I am able to get to the doctor, dentist, or other errands without taking off work."
- "Friendly environment with public and co-workers."
- "I feel that my expertise and skills are valued and that I am given latitude to apply professional judgment."
- "There is a good spirit of cooperation amongst the Division."
- "I enjoy the work and I like the people."
- "I like the variety of work, challenges, and staff."
- "Immediate supervisor is not a micromanager – he lets you do your job. I am allowed to work without interference."

- "Morale among employees in our Division is good."
- "Good computers and software."
- "There are very good training opportunities. Training/continued education is encouraged and embraced."
- "I enjoy being involved with changes to the City and actually seeing the results of my efforts taking shape."

(2) Many Respondents Indicated That the Permit Process, Permit Documents, and Permit Information Management Process Needed to Be Improved.

A number of comments were received regarding the permit process, planning documents, and information management. The following comments are a representative sample.

- "Permit process is not too user friendly. No sample details/graphics showing required details."
- "T&ES staff needs sample details/best detailed drainage plans and maintenance of traffic plan to refer to."
- "Access to more information to better serve City residents and contractors doing work in the City. Access to ARCMAP software rather than just ARCEXPLORER."
- "Implement the project tracking system."
- "Establish a project-based system for management and filing."
- "I need more information about work in the field. This would be helpful when issuing permits. Sometimes decisions are made regarding work being done and it is not related to office staff."
- "Need improved data and information management, including plan tracking system."
- "Need to get all Divisions and agencies to utilize permit tracking system."
- "Would like to see less dependence on paper files."

- "Would like a better system for keeping records. Records are in so many different places."

- "Would like to quit having to change software. As soon as we get proficient with one, we have to start all over."

- "Data imaging is needed for the amount of paperwork we handle."

- "Additional ready information/data like maps and computer files, programs, and references."

Recommendation #1: The manager of the Engineering and Design Division should meet with the development review staff of the Division to discuss the proposed recommendations contained within this report that address the streamlining and enhanced management of the permit process, permit documents, and permit information management process.

Recommendation #2: The manager of the Engineering and Design Division should elicit input from the development review staff of the Division regarding opportunities for further improvements in the permit process, permit documents, and permit information management process.

(3) Many Respondents Indicated That Advancement Opportunities, and the Promotion Process Could Be Improved.

A number of comments were received regarding the availability of advancement opportunities, the promotion selection process, and the perceived existence of favoritism. The following comments are a representative sample.

- "Persons who are not qualified to do the work should be spotted immediately and questioned."

- "Opportunities for career advancement are not clear."

- "Career advancement is a problem. This refers to the entire department. Career advancement opportunities are far and few. Most open positions are given to outside individuals turning down inside employees."

- "Need implementation of career ladders for more positions."

- "Improved upper management relations as it relates to employees and tasks."

- "Less political correctness in decision making and policies."

- "More opportunities for advancement and pay scale increases."
- "Career advancement and promotion opportunities are low."
- "Staff morale is low – more attention needs to be given by management in this area. If as much attention was given as given to 'seen or visible' projects, that would be great."
- "More reward for employees who are capable and hardworking instead of contracting out many services."
- "More in house promotions."
- "Be fair with all employees in all stages if there are opportunities."
- "Show too much favoritism in hiring friends."
- "Better hiring practices, less underhandedness, and no favoritism."
- "Not much career advancement opportunities for certain positions. To move up, I probably need to get out of department."

Opportunities for career advancement, or the lack of these opportunities, can do much to discourage employees. The respondents from the Engineering Division and the Engineering and Design Division believed that this was more of an issue than did the Construction and Inspection Division. However, the managers of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division of the Transportation and Environmental Services Department should meet to discuss career advancement issues and develop a strategy to address the issue. It would also be useful for these managers to work with employees of their divisions to address these issues.

Recommendation #3: The managers of the Construction and Inspection Division, the Engineering and Design Division, and the `Maintenance Division of the Transportation and Environmental Services Department should meet to discuss career advancement issues and develop a strategy to address these issues.

Recommendation #4: The managers of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division of the Transportation and Environmental Services Department should work with the employees of their divisions to address these issues.

(4) Many Respondents Indicated that Compensation Was Not Competitive.

A number of comments were received regarding compensation. The following comments are a representative sample.

- "More pay."
- "Take a good look at the pay scale for employees."
- "Salary analysis is needed as compared to area, other jurisdictions, and the private sector."
- "More competitive with the pay and amount of work each employee is doing."

Recommendation #5: The managers of the Human Resources Department should meet with the employees of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division to discuss the City's compensation philosophy and the process used for the City's compensation survey.

(5) Many Respondents Indicated that the Equipment Available for Their Positions and Office Space Could Be Improved.

A number of comments were received regarding equipment and office space. The following comments are a representative sample.

- "Need to get all engineering and surveying staff together in one office."
- "Could use more office space for files. Need file space."
- "Need the right equipment to work with."
- "Better technology is needed."
- "Ordering of work clothes and safety equipment in a more timely fashion."
- "Would like a city vehicle assigned to divisions that are not in City Hall."

- "We need to be able to get office and field supplies in a timely manner to do the job efficiently."
- "Tools and equipment needed for the job must be available on time."
- "Scheduled replacement of older equipment."

Recommendation #6: The managers of the Construction and Inspection Division, the Engineering and Design Division, and the Maintenance Division of the Transportation and Environmental Services Department should meet with their employees to discuss their equipment and facility needs, and develop strategies to address these needs.

3. THE PERSPECTIVES REGARDING OPPORTUNITIES FOR IMPROVEMENT DIFFERED IN THE THREE DIVISIONS.

The responses to the employee survey were broken out by division and analyzed to determine the differences. In reviewing these survey responses, it should be noted that responses to these questions were coded as follows:

- Strongly disagree – 1;
- Somewhat disagree – 2;
- Neither agree or disagree - 3;
- Somewhat agree - 4; and
- Strongly agree - 5.

The table below presents these responses by division

Comparison of Reponses by Division

Question	Construction & Inspection	Engineering & Design	Maintenance	Unspecified
1 – Organizational structure	4.09	3.44	2.82	4.00
2 – Policies and procedures	3.55	2.61	2.85	4.00
3 – Annual performance evaluations	4.80	4.72	3.67	5.00
4 – Feedback from supervisor	4.09	4.11	3.19	4.50
5 – Communication timely?	3.27	3.33	2.64	3.50
6 – Guidance from supervisor	3.55	3.61	2.92	4.50
7 – Goals and objectives clear	3.80	3.61	2.78	4.50

Question	Construction & Inspection	Engineering & Design	Maintenance	Unspecified
8 – Efficient operation	3.82	3.17	2.46	4.00
9 – Disciplinary process	4.18	3.33	2.19	4.00
10 – Promotional process	3.55	2.78	2.12	4.00
11 – Appropriate contracting	3.45	3.28	2.85	3.50
12 – Administrative support	3.00	2.72	2.42	3.50
13 – Frequently in crisis?	2.36	3.17	2.26	1.50
14 – Adequate staffing	3.82	2.83	2.26	4.50
15 – High service level	4.36	4.56	4.04	4.00
16 – Balanced workload	4.00	3.00	2.56	4.00
17 – Staff works hard	4.73	4.17	4.07	4.50
18 – Tools and equipment	3.36	3.56	2.19	3.00
19 – Opportunities to improve skills	4.00	3.44	2.37	3.00
20 – Career advancement opportunities	3.45	2.28	2.36	2.00
21 – High quality of work	4.73	3.78	3.35	3.50
22 – Quality of fleet	4.40	4.11	2.80	5.00
23 – Performance expectations	3.83	3.44	3.00	3.50
24 – Customer service level	4.73	3.94	3.24	4.00
25 – Empowered	4.18	4.06	3.04	3.50
26 – Valued team member	3.91	4.28	3.00	3.50
27 – Challenging work	4.55	4.00	3.12	3.50
28 – Good place to work	4.45	4.17	2.77	4.00
29 – Training	4.18	4.00	2.69	4.00
30 – Relations between divisions	3.45	4.12	3.16	3.00
31 – Open to new ideas	3.64	3.47	2.12	3.00
32 – Respected and appreciated	3.09	3.47	2.64	3.00
33 – Right number of supervisors	3.73	3.71	2.80	3.00

The sections below analyze the variations for each of these divisions.

(1) Responses by Employees of the Maintenance Division Indicated a Stronger Desire for Improvement Than the Other Two Divisions.

Overall, the respondents to the employee survey in the Maintenance Division indicated a greater desire for improvement than the Construction and Inspection Division or the Engineering and Design Division.

The respondents in the Maintenance Division strongly disagreed or disagreed with twenty-two of the thirty-three questions or 67% of the total number of questions in the employee survey (defined as those questions with a response of 2.99 or lower). The five questions that received the strongest ratings in terms of desire for improvement

included questions #10 (promotional process), #18 (tools and equipment), #31 (open to new ideas), #9 (disciplinary process), and #14 (adequacy of staffing).

The respondents strongly agreed or agreed with two questions: #15 (my division provides a high level of service) and #17 (staff in our Division work hard). In addition, the respondents strongly disagreed that the Division frequently operated in a crisis mode due to workload that exceeds staff resources. The following points provide a brief sample of the open-ended comments provided by respondents in the Division.

- "[The Maintenance Division needs] more people on the job site to work with."
- "Better communication, planning and facility."
- "Managers and supervisors need to support employees to move up."
- "Workers need to get along with each other."
- "Better promotional process."
- "More internal promotions according to work experience and seniority."
- "There should be someone onsite to whom grievances can be taken without fear of retaliation for speaking up."
- "Put laborers on the Safety Committee."

(2) Responses from the Construction and Inspection Division Were Positive.

Overall, the respondents from the Construction and Inspection Division provided more positive responses than the other two Divisions.

The respondents in the Construction and Inspection Division strongly agreed or agreed with fifteen or 46% of the questions (defined as those questions with a response of 4.00 or higher). The five questions that received the highest extent of agreement by respondents in this Division included question #3 (performance evaluations), #17 (staff

in our Division work hard), #21 (quality of work performed by the Division), #24 (staff in the Division are dedicated to meeting customer expectations), and #27 (my current work assignments enable me to apply and practice my knowledge and skills). There were not any responses that strongly indicated a desire for improvement (defined as those questions with a response of 2.99 or lower).

(3) Responses from the Engineering and Design Division Were Neutral in Comparison to the Other Two Divisions.

Overall, the respondents from the Engineering and Design Division were neutral in comparison to the other two Divisions.

The respondents in Engineering and Design Division strongly agreed or agreed with eleven questions (defined as those questions with a response of 4.00 or higher). The five questions that received the highest extent of agreement by respondents in this Division included question #3 (annual performance evaluations), #15 (my division provides a high level of service), #17 (staff in our Division work hard), #26 (I feel I am valued as member of my division), and #28 (my division is a good place to work).

Conversely, the respondents from the Division disagreed or strongly disagreed with five questions. These include question #2 (my division has clear, well documented policies and procedures), #10 (the promotional process is fair), #12 (my division has the administrative support it needs), #14 (at present, staffing is adequate for the workloads we handle), and #20 (opportunities exist for career advancement).

4. BEST PRACTICES ANALYSIS

4. BEST PRACTICES ANALYSIS

This chapter presents the findings regarding the application of best practices to the three divisions: Maintenance, Construction and Inspection, and Engineering and Design. The best practices have been derived from the consulting team's collective experience and professional associations such as the American Public Works Association, and identify strengths as well as improvement opportunities. These best practices are presented in the appendix.

1. MAINTENANCE DIVISION.

There are a number of positive aspects to the management of the Maintenance Division. These positive aspects are presented below.

- The Division outsources the following functions: road reconstruction, fire hydrant maintenance, sewer main relining / replacements, and catch basin replacement.
- The City is in the process of creating a GIS-based inventory of its sewer and sanitary lines.
- The Division is in the process of cross training all line personnel in its core areas.
- The Division has a number of services dedicated to preventive maintenance, including sewer televising, sewer relining, fire hydrant maintenance, etc.
- An effective process is utilized for pothole patching, including square cutting the pothole, tacking the pothole, use of hot mix, and rolling the hot mix. In the winter, the crew uses UPM cold mix.
- The Division has a program to ensure compliance with CDL requirements.
- The Division provides staff with driver and operator training including CDL training and snowplow rodeo training.
- The City has conducted an analysis of the costs of maintenance and repair of the sewer collection system, and adopted a plan to fully recover these costs by increasing rates over the next several years.

- The Division participates in a one-call center for underground utility service alerts. An Inspector I responds to utility locate requests.

- The Maintenance Division has developed a system for documenting and tracking VDOT reimbursements.

There are opportunities for improvement, however, which are presented below.

- There is a one over one relationship in the Sewer and Storm Drain Construction and Maintenance Section with the Superintendent supervising the Assistant Superintendent.

- The Division does not have a complete and accurate inventory of the infrastructure. The City is in the process of cataloging the infrastructure and capturing the data on its geographic information system, but only for the sewer collection system.

- The Division does not have a commercial off-the-shelf maintenance management system. This significantly impedes the ability of departmental management to plan and schedule the work of its maintenance staff, plan the delivery of services, and hold supervisors accountable for the cost effective delivery of services.

- The Division lacks a geographic information system that provides information and records on maintenance and repair of the infrastructure, linked to this commercial off-the-shelf maintenance management system.

- The Division has not formally defined levels of service for preventive maintenance and repair of the infrastructure.

- The Division does not have an annual maintenance calendar.

- The Division lacks a formal weekly or bi-weekly work planning and scheduling system to schedule the work of the staff. Division supervisors make daily work assignments for crews.

- The service request system is limited. All work activities are not documented in the service request system and the system is not utilized to capture all relevant information (e.g., activities, staff hours, productivity, etc.). As noted in the profile, while staff in the Division are responsible for logging the work order number, work activity type, staff assigned to each work order and total hours spent on each work order for each staff person, the sample by the Matrix Consulting Group found that approximately 55% of work hours in the sample (e.g., 2,301.5 hours) did not have a specified work activity.

- The Division does not have a formal management reporting system. Performance data are not presented to managers and decision makers on an ongoing basis.

- Data are not kept with respect to turnaround times for work orders, including pothole patching.

- The Division does not have formal, written quality and productivity standards for maintenance of street, sewer, sidewalk and storm water infrastructure.

- The Maintenance Division does not have a formal sidewalk inspection program that proactively identifies repair and replacement needs in a systematic way.

- The extent of preventive maintenance of the City's infrastructure does not meet best management practices. For example:

  - Deep patching of streets is not performed on an ongoing basis except for street overlay projects;

  - Skin patching is not performed on an ongoing basis except for street overlay projects;

  - Streets are not crack sealed on an ongoing basis;

  - Data are not available on the inspection cycle of sewer mains by the sewer television crew;

  - The frequency of cleaning of sewer mains appears to exceed reasonable service level guidelines for this work activity;

  - The Division does not have a formal systematic process for inspecting and assessing sewer manholes; and

  - The frequency of fire hydrant maintenance is not in accordance with American Water Works Association standards.

- Crew sizes in many instances are larger than appropriate. A 3 to 4-person crew is utilized for pothole patching, for example.

- An enterprise fund is not in place for the maintenance and repair of the sewer collection system.

- The process for preparing VDOT claims is extremely labor intensive.

- The Division does not fully recover its costs for preventive maintenance of fire hydrants.

The strengths of the Maintenance Division provide a sound basis to address these opportunities for improvement.

2. ENGINEERING AND DESIGN DIVISION.

There are a number of positive aspects to the management of the Engineering and Design Division. These positive aspects are presented below.

- The City of Alexandria utilizes a six-year Capital Improvement Program (CIP) for planning and funding capital improvements and projects. The plan is presented to and adopted by the City Council with the first year of the plan being incorporated into the annual budget.

- The CIP document identifies the priority of the project in one of three categories (Essential, Very Desirable, and Desirable). Each project lists detailed information regarding the project scope and purpose, and estimates the useful life of the project.

- The ratio of supervisory and support ratios in the Engineering Design Division are in line with accepted levels. There are six primary supervisory personnel and sixteen line employees. The Division Chief directly supervises six individuals.

- Projects in excess of certain thresholds are contracted out for completion of design work. Certain types of activities (such as bridge projects) are contracted out to firms with special expertise.

- Preliminary project scoping and cost estimates are developed for budgeting purposes prior to the commencement of design work.

- Final reports are developed for each capital project that is completed.

- A project manager is assigned to each CIP project to oversee the completion of design work, inspection activities, and construction management. Project Managers maintain responsibility for capital projects from concept to completion. Following completion of design work, day to day responsibility for the project oversight rests with the Construction Inspector who involves the Project Manager as needed on items other than minor changes.

- Standard design criteria have been established and are utilized as part of project design review.

- The Construction and Inspection Division staff reviews proposed CIP plans, and specifications at 90% completion. Additional design reviews are only conducted if a staff member requests or when staff identifies a significant deviation from original scope. Construction Inspectors are involved beginning in the second round of site plan review.

- Engineering and Design Division staff has the authority to approve change orders to projects. The Construction and Inspection Chief and Division Chief review change orders as necessary.

- The Department utilizes a Request for Quotations process to identify consulting engineers of record based upon their qualifications for CIP design consultant selection. Engineers of record are categorized according to their specialty.

- An annual Request for Quotations solicitation is used to develop an on-call list of pre-approved consultants.

- Capital projects are designed on an AutoCad system.

- The Engineering and Design Division has the authority to award contracts for design work up to $200,000 to engineers of record that have been pre-qualified through the competitive process.

- Alexandria is utilizing both laser and GPS technology for survey work.

- Permit Plan – the automated permit tracking and issuance information system – is utilized for the issuance of permits, tracking the status of permits, providing a comprehensive database of permits approved, and ensuring consistency with established standards. Field inspectors have access to Permit Plan in their remote office.

- Engineering and Design Division staff have the authority to approve routine engineering development applications and permits that are submitted where no deviation from existing standards exist.

- The Site Plan Coordinator is responsible for securing and compiling comments from all staff within the established review period.

- Conditions of approval are standardized and are directly related to the implementation of approved standards and regulations.

- Extensive checklists and submission requirement guides have been developed for use in reviewing submissions to ensure consistency and completeness of conducted reviews. Separate checklists have been developed for functional

areas, and include Erosion and Sediment Control, Environmental Issues, Storm Drainage, Storm water Management, Sanitary Sewer, Street Design and Lighting, and General Requirements.

- The City of Alexandria utilizes a comprehensive inter-departmental development review committee involving staff from Engineering, Design, Planning, Fire, Environmental Services, and Traffic. The committee meets to discuss applications and ensure that issues and concerns are shared and addressed prior to permit issuance.

There are opportunities for improvement, however. These opportunities are presented below.

- A five-year paving plan for management of the reconstruction and resurfacing of the City's streets is not prepared; the Maintenance Division is responsible for management of the reconstruction and resurfacing of the City's streets.

- The capital projects in the first year of the five-year capital improvement program do not identify the staff requirements necessary for implementation of approved projects.

- Staffing decisions for design and inspection of capital projects are not based upon cost of construction guidelines or other standards that would identify the necessary staff resources needed for design and/or inspection work during project implementation.

- No formally adopted clear outsourcing strategy has been established that identifies the internal core competencies available for handling adopted projects. Project size is utilized as basis for contracting out rather than the nature of the work.

- No staff utilization (or billability) targets have been established for staff design of capital improvement projects. Time allocation by project is not tracked using a project accounting system or monitored consistently to determine staff workload.

- Capital projects are not tracked through the use of Gantt charts or other scheduling mechanisms to monitor or track anticipated future workloads.

- Engineering and Design Division staff do not prepare, on a consistent basis or in a standard format, capital improvement project status reports. Reports are generally developed ad hoc to address issues that arise.

- Periodic reports for scheduled projects are not presented to customers of the Engineering and Design Division to provide status updates or identify project issues/problem.

- The Engineering and Design Division does not initially prepare a capital improvement project scoping and cost estimates. Project scoping and cost estimates provided by operating departments often require revision following commencement of design work.

- A comprehensive project cost accounting system is not utilized for capital projects that cover staff hours necessary for the design and inspection of capital projects. Planned versus actual staff hours are not tracked.

- Project managers do not have access to information from an automated financial management system to monitor costs for design and inspection work.

- A project management procedures manual has not been developed for capital project management and construction management.

- Consulting engineers utilized for the design of a capital project are not rated on the quality, accuracy, or timeliness of their work following completion of projects.

- Other than a comprehensive sanitary sewer infiltration and inflow report, utility master plans have not been completed for storm water and sanitary sewer systems.

- A formal pavement management system has been developed and installed to preserve the City's pavement. Determinations regarding annual pavement programs are based upon the recommendation of the Maintenance Division Chief. A pavement condition inspection process has not been implemented.

- The land surveying crew size is three employees, which is greater than the industry standard of two surveyors (for digital/laser surveying).

- Permit Plan – the automated permit issuance and tracking information system – is not available on the Internet for submission of minor permit applications such as encroachment permits. All departments and divisions involved in the issuance of permits do not directly enter information into Permit Plan. Field inspectors do not have field access to the Permit Plan data via handheld devices to enable field checking of permit information.

- The one-stop shop is only available on Wednesday for small permits.

- A monthly report is not generated reporting actual vs. planned performance against engineering development review cycle time objectives to determine compliance with established cycle times.

- While the ability exists for all comments to be submitted on Permit Plan, some comments are still received in hard/electronic copy and are compiled and entered into Permit Plan by the Site Plan Coordinator.

- Up-to-date standard specifications are not available for engineering development review.

- Existing fees associated with engineering development review do not recover the full costs. The City of Alexandria previously conducted a comprehensive user fee study in 2002. As part of this study, estimates were developed regarding the fees necessary to recover development review services. Policy decisions were made not to seek 100% cost recovery for these services.

- Engineering development review is not assigned to a separate cost center in the operating budget to enable the isolation of costs associated with this service. Revenues associated with the provision of engineering development review services are not allocated to the Engineering Division, but rather to a catch-all general fund revenue account.

The strengths of the Engineering and Design Division provide a sound basis to address these opportunities for improvement.

3. CONSTRUCTION AND INSPECTION DIVISION

There are a number of positive aspects to the management of the Construction and Inspection Division. These positive aspects are presented below.

- The ratio for most of the management and supervisory personnel is appropriate with two direct reports to the Division Chief and five Engineering Aides reporting to the Supervising Admin. Officer.

- Pre-construction conferences are held on larger capital projects with the prime contractor and relevant subcontractors.

- Construction Inspectors are responsible for reviewing accuracy and quantities on paperwork filed by contractors for progress payments. Inspectors approve pay requests and forward to appropriate administrative staff for processing.

- Construction Inspectors are involved in reviewing initial requests for change orders. Larger requests are discussed with the Division Chief of Construction and Inspection and/or the City Engineer.

- Construction Inspectors review all materials test results performed by third parties (if not actually done by City personnel). Construction Inspectors have discretion to require testing to verify compliance with contract terms.

- Construction Inspectors review all materials test results performed by third parties.

- Construction Inspectors have the ability to conduct air entrapment tests as needed. Construction Inspectors review plant certifications regarding concrete.

- Contractors performing annual asphalt contracts are overseen in accordance with contract specifications by an inspector in the Maintenance Division.

- Construction Inspectors have available equipment to take asphalt temperature readings.

- Construction Inspectors review asphalt tickets for compliance with necessary information including when and where material is applied.

- All newly constructed storm water collection mains are videotaped prior to acceptance.

- Prior to acceptance by the City, all new sanitary sewer mains are vacuum tested, flushed, and videotaped.

- Construction Inspectors conduct final inspections of construction projects including development of a punch list for each project of clean up items for the contractor. Construction Inspectors utilize initial plans and as-built documentation for conducting checks.

- Contractors provide as-built documentation to the City on all projects.

- The City of Alexandria maintains two types of bonds on developer construction projects – performance and maintenance bonds. Construction Inspectors are involved in the determination of substantial compliance prior to the reduction of the performance bond to a maintenance bond. The Site Plan Coordinator maintains a listing of development projects including information on the type of bond being held, the project status and percentage of completion, and the expiration date to track performance bonds. Maintenance bonds are required for two years following project completion. Final inspections must occur prior to the release of performance and maintenance bonds. Construction Inspectors are

responsible for ensuring contractor compliance with correction of punch list items.

- Construction Inspectors verify that proper trenching and excavation procedures are complied with for utility cuts including restoration to appropriate standards. For a period of one year following permanent restoration, the entity that performed the utility cut is responsible for the City's cost of correcting any settlement that occurs.

- Current policy prohibits utility cuts on recently resurfaced streets, alleys, or sidewalks within a five-year period following improvement except following a payment of surcharge. The surcharge is in addition to the normal permit fee and is set at 75% of the usual fee if the surface was improved in the last two years and 50% if the improvement was in the last five years. If the excavation or opening is in excess of 50 feet in length in a paved street that has been surfaced within the preceding five (5) years, the surcharge shall be an amount sufficient to resurface the street full width for the entire length of the opening.

- Construction Inspectors are responsible for verifying contractor compliance with National Pollutant Discharge Elimination System Best Management Practices and the City's storm water run-off control requirements on behalf of the Environmental Quality Division.

There are opportunities for improvement, however. These opportunities are presented below.

- The Maintenance Division is responsible for managing contractors responsible for patching and paving work for the City, for sidewalk, curb and gutter, and driveway apron replacement and for sewer relining.

- The number of direct reports to the Construction Inspector III totals fourteen individuals covering three functional areas. This span of control is excessive.

- No automated or hand-held devices are available for use by Construction Inspectors. Permit Plan supports such devices and they are utilized by other City Departments (for example, Code Enforcement).

- Reports on Construction Inspector activity are completed only weekly and the format varies from Inspector to Inspector. Construction Inspectors do not utilize daily dairies to track all activities performed or note all actions relative to project activities.

- On many projects, material testing is conducted by a third party firm hired by the contractor. Testing is generally scheduled by the contractor.

- Concrete cylinders are not taken for all catch basins or other specialty structures. Cylinders are taken only on larger concrete pours/projects such as high-rise work. (Usually when a batch of concrete is ordered on a job site it is specified to be of a specific compressive strength – 4000 psi, for instance. When the concrete comes to the job site in a ready-mix truck, the contractor places some of the batch in cylinders. These cylinders are cured and tested by compression until they are crushed. This gives the City the compressive strength for that batch of concrete. The City can then compare that value to the design value used to make sure that the structure was constructed properly).

- No fixed standards are established for the testing of asphalt. Construction Inspectors utilize their discretion in determining when testing should be required.

- Utility cut fees have not been established in addition to the permit fees.

- Fee levels related to utility cuts are not periodically reviewed to ensure they are sufficient to cover costs.

The strengths of the Construction and Inspection Division provide a sound basis to address these opportunities for improvement.

5. ANALYSIS OF THE MAINTENANCE DIVISION

5. ANALYSIS OF THE MAINTENANCE DIVISION

This chapter presents an analysis of the Maintenance Division. The Maintenance Division faces a number of challenges, some of which are presented below.

- **Increasing competition for the City's financial resources.** Investments in field operations will have to compete with other more visible public demands such as increasing requirements for public safety resources. This will increase the demands on management to increase the cost effective use of existing resources.

- **Urbanization.** Even in a built-out City such as Alexandria, there will be growth in traffic that will place pressure on the City's transportation system. City streets carrying much higher volumes than anticipated wear out more quickly, suffer from traffic congestion, and may present safety hazards. In addition, urbanization will place pressure on the Maintenance Division to enhance the maintenance of streets.

- **Aging Infrastructure.** The City of Alexandria is a historic city with a historic infrastructure. The age of this infrastructure increases demands for infrastructure preservation funding.

- **Technological Change.** Technological change presents challenges and opportunities directly to the City. Management technologies, for example, will become increasingly sophisticated.

- **Availability of Skilled Human Resources.** Complex organizations such as the City are increasingly dependent on skilled employees, contractors, and consultants who can implement and use advanced technologies and methods. The market for skilled people is tight and the government will be pressed to match compensation and other rewards offered by the private sector.

- **Regulatory Compliance.** This trend will place an increasing burden on municipal financial resources as unfunded mandates. The requirements of the National Pollutant Discharge Elimination System have increased the costs to the Maintenance Division for the maintenance and inspection of the storm water collection system.

- **Clear strategic focus.** Facing a more volatile environment, management will have to strengthen its commitment to those core services for which it is best suited and shed those that others can do more cost effectively.

The recommendations that follow are designed to enable the Maintenance Division to respond effectively to these challenges.

1. THE MAINTENANCE DIVISION SHOULD ENHANCE ITS MAINTENANCE MANAGEMENT SYSTEMS.

Maintenance management is basically a management-by-objective approach to planning, organizing, directing and controlling work. This approach has two primary goals: increased productivity and control of levels of service.

The benefits of increased productivity are obvious: either the same work will be accomplished at less cost, or more work will be accomplished for the same cost, with work quality remaining constant.

The benefits of effective service-level control are not so obvious. Maintenance managers typically think in terms of increased performance, about considering the impacts on *the* quantities *of* work accomplished. For example if productivity of pothole patching is doubled, does that mean that twice as much pothole patching should be done? Or should the resources be released for some other kind *of* work? How much work should be performed – and what service levels should be attained – activity, by activity? The point is that increased productivity is superficial if no effort has been made to identify *how* much is to be done and to control that level of service.

How can productivity be increased? And, what has to be done to control service levels? That is the focus of maintenance management systems.

The Transportation and Environmental Services Department should develop and install a maintenance management system to enable the identification of the services provided (e.g., sanitary sewer main preventive maintenance), the levels of service (e.g.,

sanitary sewer mains are cleaned once every three years), the outputs of each of these services (e.g., the linear feet of sanitary sewer mains cleaned), and the costs of those service in terms of the total cost and the cost per unit of output. This system should be utilized not only for staff of the Division, but also for contractors that are providing maintenance of the City's assets, such as sanitary sewer cleaning. These contractors act as extensions of the Maintenance Division workforce and should be required to report their accomplishments in the same manner as the staff of the Division.

This maintenance management system needs to be installed within all divisions of the Transportation and Environmental Services Department that are responsible for maintaining the City's infrastructure, and not just the Maintenance Division. The components of a successful maintenance management system are presented below.

- **Asset Inventory**. An asset inventory needs to exist in some basic format in every organization that effectively manages the maintenance of these assets. Keeping this asset inventory information up-to-date, accessible and understandable is the challenge of inventory management.

- **Work Management.** Work management includes all the activities involved in maintaining assets at a predefined condition level. While a work management system can't replace the judgments of individuals responsible for these tasks, the system can recommend maintenance actions. Effective work management predicts and tracks the costs of labor, equipment and materials needed for maintenance and budget planning, and monitors the performance of actions taken.

- **Service Request Management.** As a starting point for many of the work orders, service requests provide access to information such as citizen requests, work order generation, and caller history. The ability to track requests provides the Department with the ability to keep better track of their data and in turn improve service.

- **GIS Integration** Linking a database and geographic information systems (GIS) provides more options to analyze asset information.

  - A GIS can display asset symbols on a map with links to their

corresponding database records. The GIS provides the ability to analyze data based on geographic information, allowing patterns to emerge on a map that may not be as obvious in rows and columns of data.

- Asset information can be shared in a visual format that is often better understood by others including city councils and the public.

- Finding asset location is faster and easier with the help of a map.

A commercial off-the-shelf (COTS) maintenance management system should be acquired and installed by the Department in this next fiscal year. However, there are a number of steps that need to be accomplished before the automated maintenance management system can be effectively utilized. These steps are presented below.

(1) A Complete Inventory of Work Activities Performed by the Maintenance Division Needs to Be Defined.

The managers and supervisors in the Maintenance Division should define the work activities performed by their staff. The managers and supervisors need only assure that all of the primary work activities (i.e., pothole patching, sidewalk repair, televising sanitary sewer mains, etc.) that consume the majority of staff work hours are defined. This would include all forms of leave. All 2,080 staff hours for each employee should be included within the system. The work activities need to be carefully defined to assure that the same terminology is used for the work performed by staff. Each of these work activities should define the unit of measure. Examples of work activities and units of measure are provided below.

Work Activity	Unit of Measure
Pothole patching	Tons of asphalt
Base repair	Square Yards
Skin patching	Square Yards
Snow removal	Number of routes
Sanitary sewer televising	Linear feet of sewer

Recommendation #7: The Division should define the primary work activities and their units of measure in the maintenance and repair of streets, and sanitary and storm water sewers.

(2) Define the Levels of Service to Be Provided.

Levels of service should vary depending on the type of facility, intensity of use, and local standards. For the purposes of maintenance management, service levels must be specific. Examples of specific service-level standards are:

- Digout and rebase shall be performed when the asphalt surface becomes badly cracked and does not adhere to the base (surface failure) or where there is evidence of base failure (such as rolling, pumping, etc.); and
- Crack and joint sealing shall be performed whenever cracks in asphalt reach 1/4-inch to 2 inches in width.

Some judgment, of course, may be needed in applying these standards, but they do provide specific and useful guidelines – in terms of what maintenance should be performed and what maintenance should be deferred. These standards are useful in determining the amount of work needed to attain desired levels of service. In some cases, these standards will also need to be expressed as quantitative standards as well. For example, sanitary sewer mains shall be inspected on a 15-year cycle.

Recommendation #8: The Division should define the levels of service to be provided in the maintenance and repair of streets, and sanitary and storm water sewers.

(3) Performance Standards Need to Be Developed.

Performance standards are formally established criteria for determining the need for work, required quality of work, the resources necessary to achieve quality and expected rate of productivity, etc. Maintenance standards should be developed for each maintenance activity. Each standard should include at least six components:

- A brief description of the specific work involved;
- The frequency with which the work should be performed (or the level of service);
- The crew size required for the job;
- The equipment, material, and tools needed;
- The performance expectations for each job or average daily productivity; and
- The recommended procedures for completing the job.

A sample performance standard for fire hydrant maintenance is presented in the exhibit following this page.

Recommendation #9: The Division should develop performance standards for the primary work activities that it performs in the maintenance and repair of streets, and sanitary and storm water sewers.

(4) An Annual Work Plan Needs to Be Developed.

An annual work plan needs to be developed within a commercial off-the-shelf (COTS) maintenance management system that will not only guide the Maintenance Division in prioritizing and performing specific tasks, but will provide managers and supervisors with a document to hold their staff accountable for results. The annual work plan estimates the kind and amount of work to be done in the next fiscal year. The managers and supervisors should prepare the annual work plans as part of the budgetary preparation process. The development of an annual work program takes into consideration two major questions:

- What amount of work is needed to provide the desired levels of service to the public?
- What required levels of staff, equipment, and materials will be needed to provide that level of service and at what cost?

MAINTENANCE PERFORMANCE STANDARD

ACTIVITY NO:	ACTIVITY NAME:	DATE:
101	Fire Hydrant Maintenance	Jan 06

ACTIVITY DESCRIPTION:
Fire hydrant maintenance in accordance with AWWA Manual M17 including the inspection, testing, cleaning, repairs, and adjustments made to the fire hydrants.

PERFORMANCE CRITERIA:
PRIORITY SERVICE
Preventative maintenance activity to be scheduled.
SCHEDULED MAINTENANCE
Fire hydrant inspection and maintenance shall be performed once annually.

TYPICAL CREW SIZE:
1 Person

WORK METHOD:

- Observe condition of fire hydrant.
- Clear debris and obstructions.
- Observe condition of nozzles and caps.
- Check for main valve leakage.
- Cycle open and shut the hydrant. Note ease of operation. Check for leakage at flanges, around outlet nozzles, at packing and seals, and around operating stem.
- Flush water to clear old and stagnant water from lateral line.
- Clean nozzle and cap threads.
- Lubricate nozzle and cap threads with non-sticking lubricant.
- Tighten caps hand tight plus 1/8 turn.
- Cycle open and close the auxiliary valve.
- Any condition that cannot be repaired easily during routine inspection should be recorded in the inspection report. The problem should also be reported for action to the Supervisor.

EQUIPMENT:

Hand tools	1 Pickup Truck

MATERIAL:

Lubricant	

PRODUCTION STANDARDS:

Unit of measurement:	Fire Hydrants
Average daily production:	12
Staff hours per work unit:	0.5

The annual work program is prepared once a year and serves as a planning document that established objectives for the coming fiscal year in terms of the specific work activities to be performed, the service levels to be provided, and the allocation of staff in the provision of these services.

The process for development of this annual work plan, outlined in the exhibit following this page, will fundamentally change the focus of managers and supervisors in the Maintenance Division from their current roles of day-to-day supervision to that of management of resources in order to ensure conformance with the annual work plans. As the exhibit indicates, the Maintenance Division should establish service levels for each of the work activities and services they provide. Further, once these targeted service levels are established, with staffing, the Maintenance Division should report on the planned and accomplished work on a monthly and annual basis using the automated maintenance management system. A sample of an annual work program is presented in the second exhibit following this page. It presents a partial annual work program for the Maintenance Division.

Recommendation #10: The Division should develop an annual work plan each year that estimates the kind and amount of work to be done in the next fiscal year in the maintenance and repair of streets, and sanitary and storm water sewers.

(5) A Monthly Performance Report Should Be Generated Comparing Planned Versus Actual Performance and Costs.

A sample monthly report is presented in the third exhibit following this page. The monthly report should be generated by the COTS automated maintenance management system. It should be designed to enable:

- A comparison of planned versus actual staff hours per work activity for the previous month and year-to-date for each work activity;

Management Requirements for the Development of an Annual Work Plan

Component in the Development of the Annual Plan	Requirement	Responsibility
Identification of Information Sources and Needs	• The Division should analyze the sources of information available in its determination of feasible service level targets. These include the daily activity sheets generated by each crew. • Work activities should be re-evaluated and re-designed to ensure consistent and accurate capture of data.	• Although this step should be initiated by the managers, it should involve, initially, the first-line supervisors as well.
Analysis of Historical Trends in Services Provided	• The Division should determine the levels of service which have been provided in previous years in order to proceed to the next step in the process, which is the determination of appropriate "targeted" service levels commensurate with the resources available. • This analysis should result in a historical listing of inputs as well as outputs for each service or activity. Examples include numbers of person-hours expended by work task, such as pothole patching, sewer main televising, etc. • This analysis will require a thorough review of the Division's monthly activity reports in order to extract person-hour data by activity.	• Although the analysis may be delegated to first-line supervisors, the effort should be initiated by the managers in the Division. The Fiscal Analyst should provide analytical assistance. • The Division Chief should be consulted in the process to ensure that proposed service levels are appropriate.

Component in the Development of the Annual Plan	Requirement	Responsibility
Service Level Needs Analysis	• After the development and presentation of the raw data regarding historical trends, this trend data should be matched against available resources to determine the feasible targeted service levels for each activity. Input factors such as optimal crew sizes, required work, probable numbers of citizen requests based on population growth, equipment availability, and others will be utilized in this determination. • The result of this step will be a definition of feasible service levels for each activity type, as well as a priority listing of activities that are most critical for the Division to accomplish. This definition represents the foundation for future analyses that will focus upon the acceptability of the defined service levels, and the resulting refinement of resources needed, or alternatively, the need to reallocate existing resources to higher-priority activities.	• Division Chief and Superintendents • First-line supervisors • The Division Chief should provide input into the process to ensure that priorities for work accomplishment are in accordance with departmental expectations.
Identification of Personnel and Equipment Resources Needed to Accomplish Targeted Service Levels	• This step will be the natural result of the preceding step. The Division may, after analyzing historical trends and available staff and equipment resources, find that there is a mismatch between feasible and desired service levels. Refinements will be made, and will lead to the next step, which is the development of budgetary needs commensurate with the targeted service levels.	• Division Chief and Superintendents • First-line supervisors

Component in the Development of the Annual Plan	Requirement	Responsibility
Development of Program Budgets	• This step represents the relatively mechanical process of developing program budgets for each of the activities provided by the Division. It is important to note that this step should entail a routine examination of the feasibility of outsourcing specific functions, either due to the relative cost of in-house performance, or to the inability to accomplish certain tasks, defined in the work plan, with existing resources. • The development of the Division budget is the result of an analysis of the work activities and service levels, and not the projected inflation of expenses for the Division as a whole, based on the previous year's expenditures.	• Superintendents and first-line supervisors will be responsible for the determination of budgetary requirements for each of their assigned areas of responsibility. • The Division Chief should be responsible for guiding the process, and for assembling and presenting the final budget package. The Division Chief will also be responsible for making decisions regarding budgetary reductions, additions or reallocations between sections within the Division prior to the development of the final package.
Activity Monitoring and Reporting	• Once service level objectives have been defined, with budgets established for each activity, each Superintendent and first-line supervisor should receive weekly and monthly reports regarding work accomplished, work planned, and any resulting variations from the plan. • Variances from the plan must be documented, with a narrative explaining the impact to accomplish the overall performance targets. • Corrective actions must be defined. These may take the form of budget transfers, deferral of planned work, or outsourcing of planned activities.	• The Superintendents should be responsible for monitoring of budgets and work accomplishment according to plan, for each of their assigned areas. • Monthly meetings with the Division Chief should be planned. These meetings should focus on variances from plans, and the corrective actions necessary.
Management of Resources	• The reporting of time, activities and expenditures should not be a strictly reactive function. Refinements must be made to the allocation of resources as it becomes clear that problems have surfaced. Examples of problems that may legitimately cause deviations from original plans may include weather related problems, unforeseen employee absences or turnover, or cost/labor issues with contractors.	• Superintendents should monitor these issues daily and make refinements.

Sample Annual Work Program for Maintenance Operations

Work Activity	Quantity	Inventory Unit	Effort Level	Work Quantity	Work Unit	ADP	Crew Days	Crew Size	Labor Days	Labor $	Equip. $	Material $	Total $
Program: 07 - Administration													
Vacation	2,200	Labor Hour	1	2,200	Labor Hour	24	91.7	3	275	$68,750	$0	$0	$68,750
Other Time Off	800	Labor Hour	1	800	Labor Hour	32	25	4	100	$25,000	$0	$0	$25,000
Sick	800	Labor Hour	1	800	Labor Hour	28.5	28.1	3.6	101.1	$25,263	$0	$0	$25,263
Meetings /Training	850	Labor Hour	1	850	Labor Hour	30	28.3	3.7	104.8	$26,208	$1,784	$0	$27,992
Program Totals									***580.9***	***$145,221***	***$1,784***	***$0***	***$147,005***
Program: 08 - Pavement Maintenance													
Pothole Patching	420	Lane Mile	0.6	252	Tons	2.8	90	2	180	$45,000	$19,008	$19,548	$83,556
Remove/ Replace Base	420	Lane Mile	6	2,520	Sq. Yds	62.5	40.3	3	121	$30,240	$13,862	$10,777	$54,879
Skin Patching	420	Lane Mile	55	23,100	Sq. Yds	218	106	3	317.9	$79,472	$59,315	$52,830	$191,617
Crack Sealing	420	Lane Mile	5	2,100	Lbs. Sealant	350	6	3	18	$4,500	$3,586	$1,775	$9,861
Program Totals									***636.8***	***$159,212***	***$95,771***	***$84,930***	***$339,913***

SAMPLE PERFORMANCE REPORT

Year-to-Date Work Progress Report for Maintenance Operations
Period: July 1, 2006 – July 30, 2006

Work Activity	Labor Days		Amount of Work		Total Cost		Productivity	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
Program: 08 – Pavement Maintenance								
Pothole Patching	15	18	42 tons	40 tons	$6,963	$7,862	2.8 tons per crew day	2.4 tons per day
Remove/ Replace Base	10	26	210 Sq. Yds.	456 Sq. Yds.	$4,573	$9,602	62 ½ Sq. Yds. Per crew day	68 ½ Sq. Yds. Per crew day

- A comparison of actual versus planned work output (miles of curbs swept by street sweepers) per month and year-to-date for each work activity;
- A unit cost analysis that compares the planned versus actual unit costs for each work activity per month and year-to-date; and
- A comparison of actual productivity (work output per staff hour) versus the expected productivity as stated in the performance standards.

The intent of the monthly performance report is to report actual accomplishments against the annual work plan.

Recommendation #11: The Division should utilize a COTS maintenance management system to compare actual versus planned performance and costs.

(6) Handheld Devices Should Be Utilized to Report the Work Accomplished Within the COTS Maintenance Management System.

Tracking the work accomplished is another important part of an effective maintenance management system. This is unfortunately, a time intensive task given the number of staff involved. Handheld devices can, however, diminish the time and resources required.

With handheld devices, the maintenance staff of the Division can become mobile, and paperless. This will ensure the ability to manage work orders and other data electronically and synchronize on demand or automatically on a periodic basis via a wireless network. If the handheld device has scanning capability, the bar coding function could increase accuracy and productivity even further by scanning bar codes on building equipment or to scan labor, material and equipment codes to eliminate manual data entry. Other features and functionality of these handheld devices include the following:

- Download/upload assigned work orders with priority;

- Track the time worked on an assignment using an automatic start and stop feature;
- Transfer completed work order information (comments, labor, material, other charges) to the COTS database directly from the handheld device;
- Update lookup data on the handheld device;
- Create new inventory records for areas and equipment on the handheld device, and transfer this data directly to the COTS database;
- Create new work orders from the handheld device while performing facility inspections;
- Conduct inventories and update the parts records from the handheld device directly to the COTS database;
- Issue parts and upload all data from the handheld device at the end of the day;
- Increase efficiency and accuracy utilizing bar coding technology that quickly scans bar codes representing physical assets;
- Display preventive maintenance task sheets on the handheld device; and
- Use a detailed preventive maintenance checklist and record the results directly on the handheld device.

When considering hardware options that can increase system efficiency, wireless technology is an area to consider.

Recommendation #12: Handheld devices should be utilized to report the actual work accomplished within the COTS maintenance management system.

(7) The Maintenance Division Should Work with VDOT to Obtain Acceptance of a COTS Maintenance Management System for Cost Recovery of Street Maintenance Costs.

Under the Byrd Act of 1932, counties and cities were relieved of responsibility for the maintenance and repair of secondary roads. The City has chosen to continue to be responsible for the maintenance and repair of its roads, with funding allocations or

reimbursement by VDOT. This reimbursement is significant; it amounts to $5,481,000 in fiscal year 2006. This includes streets, storm drains, construction inspection, engineering, street sweeping, traffic engineering and operations, and snow removal.

However, the process of obtaining reimbursement is not easy. A Fiscal Analyst in the Maintenance Division dedicates an estimated 90% of her time to collecting data from daily time sheets, entering the data into a Microsoft Access database, and reporting the data necessary to obtain reimbursement for street maintenance by VDOT. The Division should work with VDOT to obtain acceptance of a COTS maintenance management system to reduce the difficulty of collecting and reporting this data.

Recommendation #13: The Maintenance Division should work with VDOT to obtain acceptance of a COTS maintenance management system for reporting expenses and obtaining reimbursement.

2. THE DIVISION SHOULD CONDUCT A COMPREHENSIVE INVENTORY OF ITS ASSETS.

Currently, the Division does not have comprehensive asset information. This limits the Department's ability to effectively and efficiently manage the maintenance, renewal, and rehabilitation of streets and sanitary and storm water sewers.

Effective asset management requires a complete and accurate inventory of the streets and sanitary and storm water sewers. There are a number of reasons why this asset information is important in the cost effective life cycle management of these assets.

- **The Department, over the past several years, has been asked to do more with fewer resources**. New assets are being constructed without additional staff and service and supply budgets (in terms of additional resources for these additional assets). This places more importance on the need to have comprehensive asset data to prioritize and manage maintenance and repair activities and resources.

- **A comprehensive asset inventory will provide better information for the Mayor and City Council to make informed resource allocation decisions**. The Mayor and City Council, with a comprehensive asset inventory, can make sounder decisions regarding how tax dollars should be used, particularly as it concerns funding for renewal and rehabilitation of existing assets versus the construction of new assets.

- **The assets of the Department have deteriorated**. The State of the Infrastructure report, prepared for the Transportation and Environmental Services Department in 2001, reported that 10% of the City's roadways were in poor to very poor condition.

- **Governmental accounting standards are requiring enhanced and more consistent inventory information**. GASB 34 is a relatively new action that requires enhanced and more consistent information on infrastructure assets than has been required in the past. Local governments require better asset inventory data to meet these standards.

- **COTS computerized maintenance management systems rely on comprehensive asset inventory data**. With the technological advances in recent years, tools are now available to create an effective asset management system. These systems no longer require large investments of resources or a lengthy education process. These tools can be made accessible to nearly all employees and the public. Automating the once manual system of managing assets does more than increase the speed and efficiency of the process; it also ensures that the maintenance and repair of these assets are more effectively managed.

While it will not be easy, the Division should develop a comprehensive inventory of its assets. To develop this comprehensive inventory, the Division should take the following steps:

- **Identify the objectives of the COTS maintenance management system including how the asset inventory data will be utilized to maintain and repair these assets**. Understanding how the asset inventory data will be utilized is necessary to identify the data to collect. Data could initially be utilized to establish a preventive and corrective maintenance program. Not all data needs to be collected initially. Some may be essential to the initial phase of the COTS maintenance management system, while others, such as current replacement value, can be collected during later phases. It is unrealistic to expect that all objectives of the COTS maintenance management system will be achieved at once. The Division should start with the most important data and expand the data

within the system over time.

- **Identify sources of pertinent data.** Once the required data for the COTS maintenance management system is defined, the Division must determine how to obtain the data and how it will be entered into the new system. Necessary data is currently in paper records or must be documented and collected.

- **Determine who will collect and enter the initial asset inventory**. The collection of data is time intensive and costly. Data collection is typically collected in-house or through outsourcing. Evaluating the merits of these two options lies primarily with the costs associated with each. Using current personnel who are not devoted specifically to data collection will take them away from present duties. On the other hand, outsourcing requires that the cost be incorporated into the asset management budget.

- **Assign responsibility for updating the asset inventory data**. The time and expense of collecting this asset inventory data will be wasted unless the inventory is kept current. The responsibility for updating this asset inventory needs to be clearly assigned.

- **Consider how the information will be collected and transferred to the COTS maintenance management system**. Consider if new forms should be created or if the information should be collected using handheld electronic devices.

- **Document specific asset inventory data to be collected as well as the quality control procedures.** In addition to identifying the data entry and collection staff, determine how this data will be quality controlled. Data validation must ensure accuracy, and identify inconsistencies and potential problems, particularly during the early stages of the data collection.

- **Establish a timeline for data collection and a project manager responsible for managing data collection**. The Division should develop a schedule for data collection and clearly assign responsibility to the two Superintendents for managing this process. These two Superintendents should be teamed with staff from the Engineering and Design Division to facilitate this data collection.

- **Before beginning the initial asset inventory, install and familiarize the data collection team with software and hardware tools, the required data and data collection and entry procedures**. Training should be provided to all team members. Since the initial inventory will involve manual data collection, the Department should develop electronic forms using PDA's to gather the information in the field.

- **Conduct a pilot program.** Completing a pilot program is an important part of making sure the asset inventory data collection meets needs and expectations.

The assets selected for the pilot program should represent the assets as a whole and be limited in size. Once pilot program data is in the system, both the data and the process should be reviewed and quality controlled. Based upon the findings of the pilot project, the Division should revisit the timeframe for collecting the asset inventory data.

Recommendation #14: The Department should conduct a comprehensive asset inventory of streets and sanitary and storm water sewers.

3. THE CITY OF ALEXANDRIA SHOULD IMPROVE ITS PAVEMENT MANAGEMENT PROGRAM.

The Matrix Consulting Group reviewed the City of Alexandria's pavement management program. The points, which follow, present a brief discussion of the current program.

- An Inspector I is assigned to the Maintenance Division and is responsible for developing an annual list of streets which should be reconstructed and / or repaved.
- The Inspector I conducts a visual inspection of roads and develops a non-prioritized list of suggested streets.
- This list is then reviewed by Division managers and submitted to the City Council who determines which streets will be repaved and / or reconstructed.
- Data are not reviewed or made available to decision makers with respect to:
  - General condition of the road and / or street segment;
  - Review of service requests for specific roadways and / or segments;
  - Historical data for specific roadways and / or segments (including age, repair work, traffic / usage, etc.); and
  - Prioritization of services needs of specific roadways.

The sections, which follow, provide a discussion of the recommendations relating to the City's pavement management program.

(1) Responsibility for the Pavement Management Program Should Be Assigned to the Engineering and Design Division.

Currently, the Maintenance Division has one Construction inspector I position that is responsible for the City's pavement management program. This position develops a list each year of potential pavement projects. City management and the City Council then prioritize projects.

The City should acquire an off-the-shelf pavement management software system. Furthermore, the City needs to initiate the routine, ongoing evaluation of the pavement condition of its streets. Both of these recommendations will be discussed later in this section. However, the responsibility for managing the infrastructure preservation program for the City's streets would best rest with the Engineering and Design Division. As the Engineering and Design Division is responsible for management of capital projects relating to the City's infrastructure, the pavement management program should be transferred to the Engineering and Design Division to improve coordination of capital projects. Maintenance personnel or contractors should be responsible for collecting field data, including conducting pavement condition assessments. Data should be provided to the Engineering and Design Division to update the pavement management system and to determine and prioritize capital projects for roads. The Maintenance and Engineering and Design Divisions must coordinate this program.

Recommendation #15: Responsibility for the pavement management program should be assigned to the Engineering and Design Division.

(2) The Transportation and Environmental Services Department Should Purchase and Fully Utilize a Pavement Management Software Program.

The City of Alexandria should develop a more systematic and data based approach to the identification of its needs for preventive maintenance. The City of Alexandria should acquire a pavement management software program.

A pavement management software program is designed to enable the City to utilize a systematic, objective, and consistent approach to evaluate existing and future pavement condition of the City's streets, and a means to help the City manage the pavement maintenance expenditures cost-effectively. A pavement management software program uses a pavement rating system, called a pavement condition index, as the basis from which current and future pavement preventive maintenance needs can be evaluated. Based upon the pavement condition evaluation, multiple budget and maintenance scenarios can be run using the software to determine the most cost-effective solution for the City in terms of expenditures for slurry seal, conventional and rubber overlay, and reconstruction.

A pavement management system consists of three major components:

- A system to regularly collect pavement condition data;
- A computer database to sort and store the collected data (e.g., American Public Works Association's MicroPAVER); and
- An analysis of repair or preservation strategies and suggestions of cost-effective approaches to maintain pavement conditions.

Implementation of the pavement management software will require the City of Alexandria to take the following steps:

- **Data collection and pavement network definition**. This data collection would include the construction records for the street system. Much of this work has

already been completed by Maintenance Operations. This data includes the age, surfacing thicknesses, and surfacing types for all sections. Good age data is essential to the performance of computerized pavement management models that generally rely on age as the basis for performance prediction curves.

- **Pavement condition assessment.** This step involves visually inspecting the pavement based on set procedures to establish the pavement condition index for the pavement.

- **Pavement condition prediction**. This step involves utilizing the pavement management software to calculate the current pavement condition as well as predicting what the future pavement condition will be through the use of a family of performance prediction curves.

- **Formulation of maintenance policies**. This step involves the development of treatment alternatives (i.e., slurry seal, microsurfacing, overlay, etc.), and the development of "trigger scores" for each surface treatment alternative. A trigger score is the set of conditions as defined by the condition indices, the performance curves, and any other pertinent data items under which a particular treatment would be feasible. For example, streets with a pavement condition index of 40 or less (out of a possible 100) would be a trigger score for reconstruction.

- **Budget formulation and scenario development**. In this step, multiple budget and maintenance scenarios would be developed that would model the amount of money that can be spent in any particular year of the analysis and its impact on the pavement condition index. The model uses the allocated money to optimize the pavement condition index. That is, a single strategy is selected for each of the analysis sections based on the overall benefit to the street system as a whole and on the available money.

The output from the pavement management software is a list of candidate streets with the appropriate surface treatment based on the input parameters, the input condition data, and the input budget. These candidate streets can be provided to the Office of Management and Budget as input to the six-year capital improvement program.

The pavement management system needs continual updating and improvement in the form of adjustments to the performance curves, updated treatment costs, and

changes in the condition indices. In addition to the list of recommended candidate streets, recommendations must be made as to overall funding levels required to meet the pavement preservation goals of the City. Running the model with a variety of budget scenarios would accomplish this.

The cost of publicly developed software, such as the American Public Works Association's MicroPAVER, approximates $1,050 in one-time capital outlay for member organizations.

Recommendation #16: The City of Alexandria should purchase and fully utilize a pavement management system to provide a systematic approach to the repair and maintenance of the City's roads.

(3) The Transportation and Environmental Services Department Should Utilize a Mix of Engineers and Staff from the Maintenance Division to Evaluate Pavement Condition and Identify the Pavement Condition Indices.

The condition of the City's street system should be evaluated over a three-year cycle using two two-person crews. A two-person crew should be capable of evaluating the condition of two to three centerline miles of streets each day. Approximately two to three staff months will be required each year to evaluate the condition of the pavement. In addition, the City should retain a consultant to provide initial training to these staff. A mix of engineers from the Engineering and Design Division and staff from the Maintenance Division should be trained to conduct these pavement evaluations, and then be utilized each year to assess one-third of the City's street system.

It is recommended that the City utilize the pavement condition evaluation methodology developed by the American Public Works Association MicroPAVER. MicroPAVER's Pavement Condition Index (PCI) methodology recently received the American Society for Testing and Materials' (ASTM) standard D6433-99. MicroPAVER

is the only pavement management system to have received an ASTM standard designation. Standard D6433-99 is the only pavement rating methodology recognized for rating streets and parking lot pavements.

Recommendation #17: The City should evaluate the pavement condition of its streets on a three-year cycle, with 33% of the streets being evaluated each year.

(4) The Transportation and Environmental Services Department Should Expand the Amount of Non-Structural Overlays That It Uses as Preventive Maintenance for the City's Streets.

When used properly as preventive maintenance, non-structural overlays prevent future cracking by delaying the aging process of the pavement. They can also correct minor flaws such as rutting, raveling, minor cracks, and reduced pavement friction. Certain products, because of their structure, can only be used on low volume traffic roads and the friction aggregate requirements for these treatments reflect this limitation. At present, the City relies on overlays.

The Department should consider a wider range of preventive maintenance than overlay. Arlington County, for example, uses slurry seal as does VDOT, Chesterfield County, and Henrico County. The wider range of preventive maintenance that should be considered by the Department is presented below.

- **Slurry Seal**. Quick-set slurry is a mixture of asphalt emulsion, aggregate, mineral filler and water. The slurry is continuously mixed and applied to the pavement in a single lift with specialized equipment. There are two aggregate gradations that the Department should consider: Type II and Type III. No compaction is required for quick-set slurry, but the emulsion must be allowed to cure before opening to traffic, usually 2-3 hours. Quick-set slurry will seal the pavement, reducing oxidation and weathering of the surface. The reduction in oxidation will allow the pavement to remain resilient to fatigue and low temperature cracking. Minor surface distresses such as raveling may also be corrected or prevented. The expected surface life for quick-set slurry is 3 to 5 years. Type II should be used for low volume traffic streets. Type III should be used for streets with higher

levels of distress. Generally, slurry seal is approximately 30% of the cost of a one-inch overlay.

- **Micro-surfacing**. Micro-surfacing is a mixture of polymer-modified asphalt emulsion, aggregate, mineral filler, and water, that has a slurry consistency during mixing and application. The micro-surfacing is continuously mixed and applied with specialized equipment. There are two mix types available based on aggregate gradation: Type II micro-surfacing and Type III micro-surfacing. Micro-surfacing overlays are always applied in two passes. No compaction is required, however, the emulsion must be allowed to cure before traffic is applied. Micro-surfacing will accept traffic within 1 hour after application under most conditions. Micro-surfacing will seal the pavement, reducing oxidation and weathering of the surface. Minor surface distresses such as raveling may also be prevented or corrected. The expected surface life for micro-surfacing is 5 to 7 years. It can be used for high volume traffic streets.

In expanding the types of non-structural overlays utilized, the Department should develop strategies to assure the effective use of these alternatives. Important points to note include the following:

- The alternative treatment approaches should consider the different traffic volume, with lower volume streets receiving longer cycles between surface treatments (e.g., slurry seal) and pavement overlays;
- The Department should notify the community prior to the project, and emphasis should be placed on traffic control during the course of the project;
- During the course of the project, after project completion, and throughout the contractor's guarantee period, staff from the Construction and Inspection Division should ensure the contract specifications are met;
- These alternative strategies should only be utilized on sound pavements or else an alternative treatment like asphalt rubber seal should be applied before the slurry seal; and
- The cycle chosen needs to be grounded upon the development of strategies that are tied to the pavement condition index for the street.

Recommendation #18: The Transportation and Environmental Services Department should expand the set of non-structural overlays that it utilizes for preventive maintenance of the City's streets beyond overlay to include slurry seal and micro-surfacing.

Recommendation #19: The Transportation and Environmental Services Department should develop strategies to assure the effective use and application of these alternative non-structural overlays.

4. THE PLAN OF ORGANIZATION FOR THE MAINTENANCE DIVISION SHOULD BE STREAMLINED, AND RESPONSIBILITY FOR CONSTRUCTION INSPECTION CLARIFIED.

In evaluating the plan of organization and the management systems of the Maintenance Division, the project team utilized a number of principles for organizational structure. These principles are presented in the paragraphs below.

- **The Division is organized on a 'form follows function' basis** with a clear, distinct and comprehensive sense of purpose or mission for each section.
- **The organizational structure fosters accountability.** The organizational structure fosters accountability among management and supervisory staff.
- **The plan of organization enhances communication and coordination.** The number of handoffs/exchanges required among different sections providing service to the public is minimized. The structure enhances shared knowledge and understanding among sections.
- **Staff resources are utilized efficiently**. The plan of organization minimizes administrative overhead.
- **The potential of human capital is enabled**. The plan of organization enhances career development opportunities, training and recruitment and retention.
- **The span of control for any manager or supervisor does not exceed the number which can be feasibly and effectively supervised**. The trend is to widen span of control.
- **The number of layers of management does not result in a tall, narrow configuration for the Division**. Organizations with many layers are associated with centralized decision-making. Flatter organizations tend to have decentralized decision-making with authority for making decisions given to the front-line employees.

The project team identified a number of positive aspects to the current plan of organization of the Maintenance Division. For example, the Division is broken into two

sections, each with a Superintendent. Each Superintendent is responsible for a separate infrastructure – one for streets and the other for sanitary and storm sewers.

However, there are also opportunities for improvement.

- **The Sewer Maintenance Section has a one-over-one management structure**. The Superintendent supervises an Assistant Superintendent who, in turn, supervises four crews and an Inspector II. The Assistant Superintendent has substantial non-supervisory duties. These include deploying personnel and materials to the field for carrying out repairs, and managing field projects that are less extensive than capital projects, but require a strong technical background. Examples of projects recently managed by the existing Assistant Superintendent position include utility relocations, changing grade on sidewalks to complement paving projects, and handicap access retrofits. However, the span of control for the two Superintendents is not extensive. Each is responsible for managing five crews. The Assistant Superintendent position should be eliminated. The annual cost savings generated by the elimination of this position would approximate $76,200. These salary and benefit costs are based on actual costs presented in the City's Position Summary Report for 2007.

- **The Street Section is responsible for street overlay construction inspection and management.** An Inspector II is responsible for managing and directing contractors responsible for patching and paving work, and for sidewalk, curb and gutter, and driveway apron replacement. This includes tracking daily activities, prioritizes and assigning work, and monitoring costs. The contract for street overlay amounts to approximately $1.4 million; the contract for overlay preparation amounts to approximately $0.4 million; the contract for concrete replacement amounts to $0.5 million. The amount of construction contracts – $1.9 million – is insufficient to warrant a full-time Inspector II. The Inspector II is also responsible for the development of the City's five-year paving plan, including informal inspection of streets, prioritization of paving needs and development of a Streets list for Council approval. As noted previously, this responsibility should be transferred to the Engineering and Design Division. The Inspector II position should be transferred to the Construction and Inspection Division, and utilized to provide inspection services for street overlay and other capital projects.

- **The Sewer Section is responsible for sewer relining projects**. Currently, the Inspector II in the Sewer Section is responsible for managing the contract for sewer relining. Contracts amount to approximately $300,000 to $400,000 annually. The Engineering and Design Division is also responsible for managing the design of other sewer relining projects in addition to the Maintenance Division. The Engineering and Design Division should be assigned the responsibility for preparation of the plans, specifications, and estimates for all sewer relining projects, including those currently managed by the Sewer Section.

The Division has the capacity, with the additional staffing recommended within this report, to prepare the plans, specifications, and estimates for all sewer relining projects. The Construction and Inspection Division should be responsible for managing and inspecting the construction of these sewer relining projects to assure adherence to the plans, specifications, and estimates, including those currently managed by the Sewer Section. The Division has the capacity to conduct the inspection of these projects.

Recommendation #20: The Assistant Superintendent position for the Sewer Section in the Maintenance Division should be eliminated.

Recommendation #21: The Inspector II position in the Streets Section responsible for managing contractors responsible for street overlay and overlay preparation, and for sidewalk, curb and gutter, and driveway apron replacement should be transferred to the Construction and Inspection Division.

Recommendation #22: The Engineering and Design Division should be assigned the responsibility for preparation of the plans, specifications, and estimates for all sewer relining projects, including those currently managed by the Sewer Section. The Construction and Inspection Division should be responsible for managing and inspecting the construction for all sewer relining projects to assure adherence to the plans, specifications, and estimates, including those including those currently managed by the Sewer Section.

5. CREW SIZES UTILIZED BY THE MAINTENANCE DIVISION ARE TOO LARGE IN SOME INSTANCES, INSUFFICIENT RESOURCES ARE ALLOCATED TO PAVEMENT MAINTENANCE, AND SOME SERVICES SHOULD BE IN-SOURCED.

The Matrix Consulting Group reviewed the current operations of the Maintenance Division, including allocation of staff hours, the mix of in-house and contracted services and the crew sizes utilized to perform the work activities provided with in-house staff. The points, which follow, provide a summary of the Maintenance Division services.

- The Maintenance Division reported in its March 15, 2006 response to the draft Management Study that it assigned staff to the following crews using the crew sizes noted in the table below.

Crew Type	Crew Size
Street Construction and Maintenance	
Utility Crew	4
Pothole Patching Crew*	4
Brick and Cement Crew	4
Brick and Cement Crew	3
Floating Operator – Yard Debris Removal	1
Sewer and Storm Drain Construction and Maintenance	
Sewer TV Crew	2
Construction and Repair	4
Construction and Repair	4
Sewer Cleaning Crew	2

* Including the Heavy Equipment Operator assigned as debris removal, asphalt pickup, patching

It should be noted that the crew sizes reported by the Maintenance Division identify twenty-eight staff and the Division is authorized thirty staff at the levels of Labor Supervisor, Laborer, Sewer TV Inspector, Equipment Operator and Heavy Equipment Operator.

- The crew sizes reported by the Division differ in some instances from that reported on the Division's own time sheets. This is based upon an analysis of a 23-work day sample of daily attendance sheets from the Maintenance Division.

- The table presumes that these crews are dispatched each day for the work activities noted above, excluding inclement weather.

- The Maintenance Division contracts for services for fire hydrant maintenance, sewer mains and catch basin cleaning, and street overlay.

The sections, which follow, provide a discussion of the Maintenance Division resource allocation.

(1) The Maintenance Division Should Increase the Consistent Allocation of Staff to Pavement Maintenance.

The Matrix Consulting Group collected a sample of daily attendance sheets from the Maintenance Division. Staff in the Division are responsible for logging the work order number, work activity type, staff assigned to each work order and total hours spent on each work order for each staff person. The analysis was based upon a sample of 23 workdays. Approximately 55% of work hours in this sample (e.g., 2,301.5 hours)

did not have a specified work activity. However, the amount of work hours recorded for overlay, patching, pothole patching, and pavement maintenance during this 23 work day sample amounted to 333.5 staff hours or an average of a little less than two staff each day during this sample period. This is one-third the amount of staff days that should be allocated to pavement maintenance by the Division on an ongoing basis.

The Division should allocate six staff to pavement maintenance to preventively maintain and repair the City's streets including pothole patching, skin patching and base repair. The estimated annual workload for pothole patching, skin patching, and base repair is presented in the table below.

Activity Name	Inventory Measure	Units	Annual Quantity		Annual Work Quantity	Average Daily Prod.	Crew Days	Crew Size	Staff Days
			Per Inventory	Unit					
Pothole Patching	2-lane miles	550	Tons Mix	1	550	2.8	196.4	2	392.8
Skin Patching	2-lane miles	550	Square Yards	40	22,000	110	200.0	4	800.0
Base Repair	2-lane miles	550	Square Yards	6.9	3,795	65	58.3	4	233.5
TOTAL									1,426.4

Important points to note concerning the data contained within the exhibit are presented below.

- There are an estimated 392 staff days required for pothole patching. This work activity should use a 2-person crew, and not the 6-person crew currently utilized by the City. This activity would need to be performed 10 months a year or two crews would need to be utilized.
- There are an estimated 800 staff days required for skin patching. This work activity should use a 4-person crew. This activity would need to be performed 10 months a year or two crews would need to be utilized.
- There are an estimated 233 staff days required for base repair. This work would be performed using a 4-person crew.

The Division should reduce the pothole patching crew from four assigned full-time equivalent staff to two, and utilize four staff for base repair and skin patching. This would require the allocation of the staff assigned as the floating operator – yard debris removal to pavement maintenance and the allocation of one (1) of the four (4) staff assigned to the utility crew (which is responsible for handling special projects as assigned by the Superintendent such as installation of guardrails) to pavement maintenance.

Recommendation #23: The pothole patching crew should be reduced to a two-person crew.

Recommendation #24: Assign the floating operator – yard debris removal to pavement maintenance and allocate one (1) of the four (4) staff currently assigned to the utility crew to pavement maintenance.

Recommendation #25: The Maintenance Division should improve the level of street maintenance service by consistently assigning six staff to pavement maintenance including pothole patching, skin patching, and base repair.

(2) The Crew Size for the Two Sewer Construction and Repair Crews Should Be Reduced to Four.

The Matrix Consulting Group sampled daily attendance sheets from the Maintenance Division. Staff in the Division are responsible for logging the work order number, work activity type, staff assigned to each work order and total hours spent on each work order for each staff person. The table below presents a summary of the Maintenance Division's two sewer construction and repair crews based on a sample of 23 workdays. Approximately 55% of work hours in this sample (e.g., 2,301.5 hours) did not have a specified work activity and therefore were not included in the table. The table presents the allocation of work hours for work orders that had specified work activities.

	Crew (1)	Crew (2)
Average Crew Size	7.6	5.0
Minimum	2.0	4.0
Maximum	15.0	6.0
Percentile		
25%	4.0	4.5
50%	5.0	5.0
75%	12.0	5.5
100%	15.0	6.0

Important points to note regarding the data contained in the table are presented below.

- Crew number 1 had an average crew size of 7.6 staff during this 23-day sample. However, at the median, the average crew size was 5 staff.
- Crew number 2 had an average crew size of 5 staff during this 23-day sample. However, at the median, the average crew size was 5 staff.

These crew sizes are larger than appropriate. The project team recommends a crew size of four for each of these sewer construction and repair crews.

Recommendation #26: The sewer construction and repair crews should be reduced to a crew size of four for each crew.

Recommendation #27: Two staff from the sewer construction and repair crews should be reallocated to catch basin and drain inlet cleaning.

(3) The Sewer Cleaning Level of Service Should Be Reduced.

The Maintenance Division contracts for jet sewer cleaning.

The Matrix Consulting Group reviewed information provided by the Superintendent of Construction and Maintenance (Sewers) with respect to the level of service provided via this contract for sewer cleaning. The table, which follows, presents the estimated miles of sewers cleaned for each year under the contract.

Year	Miles of Sewer Cleaned	Cycle (Years)
2003	104	2.12
2004	190	1.16
2005	159	1.40

As noted in previous sections of this report, the City of Alexandria does not have a complete and accurate inventory of the City's infrastructure, including miles of sewer lines. With that said, the City estimates there are 220 miles of sewer lines. The best management practice for cleaning sewer mains is a two to three-year cycle (recognizing areas such as the downtown will require more frequent cleaning to address problems with restaurant-produced grease and other unique challenges). This level of service should equate to not more than 110 miles of sewer mains cleaned per year. As shown in the above table, the City of Alexandria has a higher level of service than that suggested by best management practices. The City in the last two years utilized a 1.26-year cycle of sewer cleaning; in other words, the sewer mains were being cleaned every 1.26-years. The level of service should be reduced.

Recommendation #28: The Maintenance Division should reduce the level of service for sewer cleaning to a two-year cycle.

Recommendation #29: Trouble spots should be cleaned more frequently than once every two years.

(4) The Contract for Sewer Cleaning Should Be Terminated and the Existing Sewer Cleaning Crew Dedicated to Routine Ongoing Sewer Cleaning and Response to Sewer Backups.

The Maintenance Division reports that it assigns two full-time equivalent staff assigned to the in-house sewer cleaning crew, including: an Equipment Operator II and a Laborer II. The points, which follow, provide a brief discussion of the sewer cleaning program.

- There are two full-time staff assigned to the sewer cleaning crew.

- Because of cross training and the elimination of one piece of equipment, there is one person currently assigned to the flusher truck who is responsible for the sewer cleaning program.

- The sewer cleaning crew coordinates work activities with the televising crew. As it currently works, the sewer cleaning crew follows the televising crew and cleans sewer mains at the request of the televising crew. Additional work is generated through the service request process (e.g., City sewer blockage occurring, etc.)

- The City has a high level of service for sewer cleaning. This is currently performed on a 1.26 year cycle.

In addition, the City contracts for sewer cleaning. There are a number of problems with this contract. These problems are presented below.

- A three-person crew is being utilized. This is a large crew size for this work activity. The norm is a two-person crew.

- The contract provides for payment by the labor hour. The contractor is not paid per unit such as per linear foot of sewer main cleaned.

The contract should be terminated and the existing sewer cleaning crew should assume responsibility for this service. The level of service for sewer cleaning should be reduced with respect to preventive maintenance (e.g., jetting of the sewer lines), and should include requirements to coordinate these services with the sewer televising crew. One crew, consisting of two staff, will be more than sufficient to deliver this level of service as indicated in the table below.

Activity Name	Inventory Measure	Units	Level of Service	AWQ	ADP	Crew Days	Crew Size	Staff Days
Sewer Main Cleaning	Miles	220	0.5	110	0.66	166.67	2	333.33
Clean obstructions in sewer main	Obstructions	75	1	75	4	18.75	2	37.5

Important points to note regarding the table are presented below.

- The City has an estimated 220 miles of sewer mains.

- The proposed level of service for cleaning these mains is once every two years.
- Given this level of service, the City would need to clean 110 miles of sewer mains annually.
- The crew should be able to clean, on average, 3,500 linear feet of sewer mains a day or 0.66 miles of main. This is actually less than the linear feet of sewers cleaned by the contractor for a sample reviewed by the project team.
- This would require 166.67 crew days annually to deliver this level of service.
- With a crew size of two, a total of 333 staff days would be required or the equivalent of 1.44 staff years.
- In addition, the City would need approximately 37 staff days to clean sewer obstructions.

With the allocation of two existing full-time staff to sewer cleaning, there should be sufficient capacity to deliver this level of service, respond to emergencies (sewer backups), and enable the elimination of the provision of this service by private contractor. However, the existing sewer cleaning truck will need to be replaced in fiscal year 2006-07. The cost for replacing this truck with a jet vactor, the type of truck that should be utilized for the provision of this service, would approximate $180,000. This truck should be replaced on a ten-year schedule.

The annual cost for providing this service contractually is $210,900 based upon purchase orders for 2005. This cost would be eliminated with the insourcing of this service. Since the recommendation would result with existing staff – the existing sewer cleaning crew - absorbing this responsibility and existing equipment (albeit replaced in the next fiscal year), the cost savings to the City would approximate $210,900 annually .

Recommendation #30: The contract for sewer cleaning should be eliminated.

Recommendation #31: The in-house sewer cleaning crew should provide the ongoing sewer cleaning services on a two-year cycle and also respond to emergencies such as sewer backups.

Recommendation #32: The City should replace the existing sewer cleaning truck with a jet vactor in fiscal year 2006-07.

(5) The Contract for Fire Hydrant Maintenance Should Be Terminated and Existing Staff Dedicated to Routine Ongoing Fire Hydrant Maintenance.

The Maintenance Division contracts for fire hydrant maintenance. This maintenance includes the overhaul of the hydrant, breaking it down, changing the washer, greasing the hydrant, checking internal parts, and doing a flow test to make sure the hydrant is working correctly, and painting the hydrant. There are a number of problems with this contract. These problems are presented below.

- A three-person crew is being utilized. This is a large crew size for this work activity. The norm is a one to a two-person crew.
- The contract provides for payment by the labor hour. The contractor is not paid per unit such as per fire hydrant preventively maintained.
- In most cases, it appears this crew is doing nothing more than painting and greasing the fire hydrant. This does not require a 3-person or a 2-person crew.
- The contractor indicated that only 368 fire hydrants were repaired or maintained in 2005. If the estimate by the Maintenance Division is correct, that the City has 3,000 fire hydrants, this would result in an eight (8) year cycle for preventive maintenance. This would not to meet the requirements of the American Water Works Association.

The contract should be terminated and the Maintenance Division should assume responsibility for the provision of this service with existing staff. The level of service for fire hydrant maintenance should be an annual preventive maintenance to meet the requirements of the American Water Works Association. Virginia American Water, the City's private water company, has an annual fire hydrant maintenance (and flushing)

program. One crew, consisting of one staff, will be more than sufficient to deliver this level of service as indicated in the table below.

Activity Name	Inventory Measure	Units	Level of Service	AWQ	ADP	Crew Days	Crew Size	Staff Days
Fire Hydrant Maintenance	Hydrants	3,000	1	3,000	12	250	1	250

Important points to note regarding the table are presented below.

- Inventory data regarding the number of fire hydrants was not available. The project team estimated the number of fire hydrants based upon its experience with other water utilities, but subsequently increased this inventory by a factor of three based upon input from the Maintenance Division. The project team utilized this data, but has little confidence in its accuracy. An actual count of fire hydrants needs to be developed to determine the workload associated with preventive maintenance and repair of fire hydrants.

- The level of service proposed was to preventively maintain these fire hydrants once a year. This involves painting the fire hydrant, opening and closing the operating nut, opening and closing the hydrant checking for ease of operation and flushing foreign material, opening and closing the fire hydrant distribution valve, lubricating the threads of outlet-nozzle caps and the operating nut, etc.

- With that level of service, an estimated 3,000 fire hydrants would need to be preventively maintained each year.

- A one-person crew size should be utilized for preventive maintenance of fire hydrants.

- The average daily productivity of this crew should approximate 12 hydrants per day. This approximates the number of fire hydrants maintained by the contractor for a sample reviewed by the project team. The contractor was maintaining 11.5 hydrants per day.

- A total of 250 crew days would be required.

With the reallocation of the third staff from the sewer cleaning crew to fire hydrant maintenance, there should be more than sufficient capacity to deliver this level of service, and enable the elimination of the provision of this service by a contractor. However, a pickup truck with a crane will be required to enable this service to be in-

sourced. The cost for this type of truck would approximate $25,000. This truck should be replaced on a ten-year schedule.

The annual cost for providing this service contractually is $158,200 based upon purchase orders for 2005. This cost would be almost eliminated with the in-sourcing of this service. Since the recommendation would be based upon the reallocation of existing staff, but would require a new pickup truck with associated replacement, operating and maintenance costs, the cost savings to the City would approximate $154,700 annually.

Recommendation #33: The contract for fire hydrant maintenance should be eliminated.

Recommendation #34: One staff should be reassigned to fire hydrant maintenance as a one-person crew and an additional pickup truck acquired for the one-person crew.

(6) The Contract for Storm water Main Cleaning, Catch Basin and Drain Inlet Cleaning Should Be Terminated and Existing Staff Dedicated to Routine Ongoing Storm water Main, Catch Basin and Drain Inlet Maintenance.

The Maintenance Division contracts to clean drain inlets and catch basins. There are a number of problems with this contract. These problems are presented below.

- A three-person crew is being utilized. This is a large crew size for this work activity. The norm is a two-person crew.
- The contract provides for payment by the labor hour. The contractor is not paid per unit such as per catch basin or drain inlet cleaned or linear foot of storm water main cleaned.

In 2005, the contractor reported that 6,930 drain inlets were cleaned, 1,696 catch basins were cleaned, and 69,300 storm water mains were cleaned.

The City should have approximately 3,100 catch basins and drain inlets based upon the project team's experience. This would suggest that the contractor is cleaning

these drain inlets and catch basins almost three times annually. The contractor, like other cities such as Norfolk and Portsmouth, is not cleaning 10% of the storm water main system annually; the contractor appears to be cleaning these mains on a seventeen (17) year cycle. These other cities focus on problem areas for their storm water mains.

The contract should be terminated and the Maintenance Division should assume responsibility for the provision of this service with existing staff. The level of service for catch basin and drain inlet maintenance should be an annual preventive maintenance. One crew, consisting of two staff, will be more than sufficient to deliver this level of service as indicated in the table below.

Activity Name	Inventory Measure	Units	Level of Service	AWQ	ADP	Crew Days	Crew Size	Staff Days
Catch Basin and drain inlet cleaning	Catch basins and drain inlets	3,100	1	3,100	20	155	2	310
Storm water main cleaning	Miles	220	0.06	13	0.66	20	2	40

Important points to note regarding the table include the following:

- Inventory data regarding the number of catch basins and drain inlets was not available. The project team estimated the number of catch basins and drain inlets based upon its experience with other cities. The Division provided their estimate regarding the miles of storm water mains: 330. This would indicate that the City has 50% more miles of storm water mains than sewer mains. The project team did not view this as likely and used the same miles for storm water mains as sanitary sewer mains. An actual count of the miles of storm water mains, catch basins and drain inlets needs to be developed to determine the workload associated with preventive maintenance and repair of this infrastructure.

- The level of service proposed was to preventively maintain these catch basins and drain inlets once a year. The level of service proposed for cleaning storm water mains was 6% of the system each year. This reflects the level of service provided by the contractor in 2005 for storm water main cleaning, and the level of service provided by other neighboring Virginia cities. Some storm water catch

basins may need to be cleaned more often than once a year; others could be inspected only for debris and not cleaned, if there is insufficient debris. An increasing number of agencies are using a two-person crew to inspect catch basins and drain inlets using a pickup truck and manually cleaning these basins and inlets. A jet vactor is utilized only if the basin or inlet contains five (5) cubic yards of material.

- With that level of service, an estimated 3,100 catch basins and drain inlets would need to be preventively maintained each year, and 13 miles of storm water mains.
- A two-person crew size should be utilized for both work activities.
- The average daily productivity of this crew should approximate 20 catch basins and drain inlets per day, and 0.66 miles of storm water mains. This number of catch basins and drain inlets cleaned is less than that of the contractor for a sample reviewed by the project team.
- A total of 510 crew days would be required. A full-time crew of 2-staff would be required.
- The City would need to acquire a second jet vactor to provide this service. The cost would approximate $180,000 annually, and a ten-year replacement schedule should be utilized.

The annual cost for the contractor providing this service is $250,670 based upon purchase orders for 2005. This cost would be almost eliminated with the in-sourcing of this service. The recommendation would be based upon the reallocation of existing staff, and the acquisition of additional equipment – the jet vactor. The cost of the jet vactor should approximate $18,000 in replacement costs annually and the operating and maintenance costs to approximate $14,000 annually. The annual cost savings to the City would approximate $218,700 annually.

The cleaning of storm water mains, basins and inlets are part of the City's National Pollutant Discharge Elimination (NPDES) permit; any changes would need to be accomplished in conjunction with the permit.

Recommendation #35: The contract for catch basin and drain inlet cleaning should be eliminated.

Recommendation #36: Two staff should be reassigned to catch basin and drain inlet cleaning.

Recommendation #37: The City should acquire a jet vactor in fiscal year 2006-07 to enable the in-sourcing of this service.

Recommendation #38: The Maintenance Division should preventively maintain catch basins and drain inlets on an annual basis and 6% of the storm water mains should be cleaned annually.

6. THE CITY SHOULD ESTABLISH AN ENTERPRISE FUND FOR SANITARY SEWER MAINTENANCE.

GAAP requires state and local governments to use the enterprise fund to account for "business-type activities" – activities similar to those found in the private sector. Business-type activities include services primarily funded through user charges such as sanitary sewer maintenance and repair.

NCGA Statement 1 defines the purpose of enterprise funds as:

"...to account for operations (a) that are financed and operated in a manner similar to private business enterprises — where the intent of the governing body is that the costs (expenses, including depreciation) of providing goods or services to the general public on a continuing basis be financed or recovered primarily through users charges; or (b) where the governing body has decided that periodic determination of revenues earned, expenses incurred, and/or net income is appropriate for capital maintenance, public policy, management control, accountability, or other purposes."

State and local governments should use an enterprise fund to account for its activities when the criteria of either (a) or (b) are met. In most cases, the City should use enterprise funds because their activities closely resemble the characteristic described in (a) above. Moreover, it is important to note that the total cost of the activity does not have to be paid for by the user charges.

The City charges user fees for sanitary sewer maintenance, repair, and rehabilitation. The user fee revenue that was budgeted in fiscal year 2006 amounted to $2,900,000. This is a significant amount of revenue: 6% of total citywide revenues.

Recommendation #39: The sanitary sewer revenues and expenditures should be budgeted as an enterprise fund.

7. THE MAINTENANCE DIVISION SHOULD UPDATE ITS FEES FOR THE MAINTENANCE OF PRIVATELY-OWNED FIRE HYDRANTS.

The Maintenance Division provides ongoing maintenance of privately-owned fire hydrants. The City charges $140 for each hydrant including $105 to overhaul the hydrant, break it down, change the washer, grease the hydrant, check internal parts, and do a flow test to make sure the hydrant is working correctly, and $35 to paint the hydrant.

The Maintenance Division should document the unit costs for the maintenance and repair of fire hydrants and update the fees for maintenance of privately-owned fire hydrants. The update should include the costs of departmental and Citywide overhead.

Recommendation #40: The Maintenance Division should update the fees for maintenance and repair of privately-owned fire hydrants.

8. THE COSTS OF MAINTAINING PUBLICLY-OWNED FIRE HYDRANTS SHOULD BE INCLUDED IN THE CITY'S UTILITY BILLING.

It is a prevailing practice in cities that own water utilities to assign responsibility for maintenance and repair of fire hydrants to that water utility. This is the case in Newport News, for example, and in Norfolk. While the City does not own its water utility, it has developed a cooperative relationship with that utility to bill local residents and businesses for the costs of the maintenance and repair of the sanitary sewer collection

system. The City should expand the scope of this billing to include the costs of fire hydrant maintenance and repair.

Recommendation #41: The City should include the costs of fire hydrant maintenance and repair in the City's utility billing.

9. THE MAINTENANCE DIVISION SHOULD REDUCE THE LEVEL OF SERVICE FOR SEWER CCTV INSPECTION SERVICES.

At present, the Maintenance Division provides sewer inspection services using CCTV truck (#4328) and a two-person crew. Currently, this crew is staffed with (1) TV Inspector and (1) Laborer. These two staff are responsible for inspecting all sewer/ sanitary mains in the City to identify maintenance and repair needs in the sewer system. This crew inspects mains in small sections, and also responds to calls for service to investigate complaints or disputes (e.g., private property or City responsibility).

In addition, the crew responds to sewer main backup complaints to televise the main and lateral and identify whether the City or the homeowner is responsible the backup. In 2005, the crew responded to 89 such complaints; it responded to 62 complaints in 2004 and 150 in 2003.

The City has made great strides to rehabilitate the sewer main system over the past several years, with additional improvements planned. There is insufficient ongoing workload demand to warrant a full-time sewer CCTV crew on a year-round basis. The crew should be capable of televising 2,000 to 3,000 linear feet of sewer mains on a daily basis. A sampling of 13 other sewer utilities in a number of different states indicates that these utilities typically televise 3.4% of their sewer mains annually. The range in these 13 sewer utilities was from a low of 0.4% to a high of 38%. The median was 2.2%. For the Maintenance Division to meet that median, it would need to televise 25,555 linear

feet of sewer mains annually. This represents an annual workload of approximately 10 crew days (in addition to the responses to backup complaints). This is insufficient workload to warrant the full-time assignment of two staff to this function on a year-round basis. The two positions should be allocated to other functions such as sewer main flushing or catch basin and drain inlet cleaning, and utilized to televise sewer lateral backups or sewer mains on an as needed basis and to televise those mains that indicate, through main backups, that additional repairs or slip lining may be necessary.

Recommendation #42: The two positions allocated to sewer CCTV inspection should be allocated to other functions such as sewer main flushing or catch basin and drain inlet cleaning, and utilized to televise sewer lateral backups or sewer mains on an as needed basis.

10. THE CITY SHOULD DEVELOP A FEE-BASED FOG PROGRAM.

Since grease is the number one cause of blockages and sanitary sewer blockages, cities are giving top priority to establishing a Fats, Oils and Grease (FOG) program. The primary goal of a FOG program is to:

- Reduce the number of grease-related sanitary sewer blockages; and
- Reduce the claim costs associated with grease related blockages.

The elements of an effective FOG program include the following:

- **Data collection** - This step includes obtaining and analyzing data. Some key pieces of information include the likely sources (single-family residence, multi-family dwelling, food producing facility, combination, etc.) of the FOG, addresses of the structures, and mainline segments and the number of grease-related stoppages in the past 3 years.
- **Working collaboratively with various stakeholders** - It is extremely important to involve stakeholders when developing a FOG program to ensure a sound and fair program is being developed and implemented. In addition, the City should discuss the program with and solicit comments from the various jurisdictions in the area that are also responsible for FOG programs, and those stakeholders that may be impacted by the implementation of this program (e.g. food producing

facilities, associations, etc.).

- **Developing educational materials for residential and commercial customers** - Educational materials should be developed to help educate residents and food producing facilities. The City should meet with the Virginia Restaurant Association. The City should solicit their comments.

- **Targeting outreach efforts to problem (high-risk) areas** - By targeting the high-risk areas within the collection system, the City will focus resources on the sewer users that are causing the problems. This approach will allow the City to use its financial resources more cost-effectively and educate the users that are having a direct impact on the sewer system.

- **Amending the Sewer Ordinance, as appropriate** – The Sewer Ordinance should be reviewed and amended as necessary to ensure the FOG program requirements are easy to find, read, use and can be enforced when needed.

- **Developing a loan program to assist food producing facilities to install grease removal devices** - This step should result in a low-interest loan program option available to existing food-producing facilities to help finance the installation of a grease interceptor.

- **FOG Inspection.** The City should inspect food-producing facilities not less than once a year to verify compliance with the requirements of the FOG program. This would include verification that the food producing facility has contracted for removal of grease, the date of last service, the pumping frequency, the maintenance of records by the facility regarding service, that the grease interceptor does not contain greater than 1/3 the depth in grease accumulation, that the grease interceptor is cleaned and maintained regularly, etc.

- **Fee-Based program**. This should be a fee-based program. The cost of its administration should be recovered through annual fees that food producing facilities are required to obtain from the Health Department.

Recommendation #43: The City should develop and install a FOG program.

6. ANALYSIS OF THE ENGINEERING AND DESIGN DIVISION

6. ANALYSIS OF THE ENGINEERING AND DESIGN DIVISION

The Engineering and Design Division faces a number of challenges. These include the inability to recruit registered civil engineers, a significant increase in the Capital Improvement Program without an associated increase in the staffing necessary to provide effective project management services, and a fragmented organizational approach to development review services. The recommendations contained within this chapter are designed to address these challenges.

1. THE SALARY RANGES FOR THE CIVIL ENGINEER II, III, AND IV CLASSIFICATIONS SHOULD BE INCREASED.

The Engineering and Design Division has encountered significant problems filling vacant positions in the Civil Engineering series. One position – a Civil Engineer IV – has been vacant for more than a year despite numerous attempts to fill the position, numerous recruitments, and the expenditure of $15,324 for advertising. This problem results, in part, from a competitive job market for professional engineers. It also results, in part, from the compensation philosophy adopted by the City.

In May of 1997, the City adopted a compensation philosophy statement. The statement is intended to provide a broad framework for the City Council, management, employees and the citizens in order to understand and guide decisions that affect pay. The intent of the compensation philosophy was to maintain a competitive compensation program in order to attract, retain, and motivate qualified employees. To that end, the following principles govern compensation programs:

- Pay programs are intended to be competitive at a minimum with the average pay of comparator organizations in the primary labor market. The primary labor market is currently defined as the Counties of Arlington, Fairfax, Prince William, Montgomery and Prince George's.

- In order to accomplish this objective, the salaries of representative benchmark classes for all occupational groups are compared to the minimum and maximum salaries, with a focus on the mid-point, of the comparator jurisdictions.

- In determining Alexandria's market competitiveness, a market ratio was developed. Alexandria's relationship to the market is shown as the market ratio falls below or rises above 100%. Job classes with a market ratio of less than 90% are considered to be below the market.

As a result of this compensation philosophy, if the City's salary is 90% of the market, it was considered competitive. This has significant and negative ramifications for the competitive position of the professional engineering series in the market place. The result of the most recent compensation survey is presented in the table below. The Civil Engineer II was one of the benchmark classifications included in the compensation survey.

Agency	Class Title	Minimum	Midpoint	Maximum
Montgomery	Engineer III	$48,747	$65,616	$82,485
Prince William	Engineer II	$46,787	$60,824	$74,860
Fairfax	Engineer II	$44,849	$59,798	$74,748
Arlington	Engineer III	$44,111	$58,520	$72,929
Prince George	Engineer II	$40,653	$56,155	$71,656
Alexandria	Civil Engineer II	$42,952	$56,213	$69,473

In this case, the salary for the Civil Engineer II in Alexandria is at 92.2% of the average at the salary maximum, but the City's salary is also dead last in comparison to its peers. The situation is much the same for the other classifications in the professional engineering series, but does become even worse as the career ladder progresses. The table below presents a comparison of the salaries for the entire professional engineering series between Arlington and Fairfax County (which was 3rd out of these

six public agencies in the benchmark comparison for Civil Engineer II presented in the previous table).

	Fairfax		Alexandria		Difference	
Classification	**Minimum**	**Maximum**	**Minimum**	**Maximum**	**Minimum**	**Maximum**
Civil Engineer I	$38,247	$63,745	$37,841	$62,615	-1.06%	-1.77%
Civil Engineer II	$46,225	$77,042	$43,810	$72,492	-5.22%	-5.91%
Civil Engineer III	$53,227	$88,712	$48,924	$79,911	-8.08%	-9.92%
Civil Engineer IV	$62,556	$104,260	$53,241	$88,096	-14.89%	-15.50%

Important points to note regarding the data presented in the table are presented below.

- The Civil Engineer I classification would appear to be comparable with Fairfax County, with only a 1% to 2% variation.
- The salary of the Civil Engineer II would appear to be less competitive than Fairfax County being 5% to 6% less. At the maximum, the annual salary is $4,550 less than Fairfax County.
- The salary of Civil Engineer III is even more out of step with Fairfax County being 8% to 10% less. At the maximum, the annual salary is $8,801 less than Fairfax County.
- The salary of the Civil Engineer IV is significantly out of step with Fairfax County being 15% to 16% less. At the maximum, the annual salary for the Civil Engineer IV is $16,164 less.

These salaries become progressively less competitive with the marketplace, reflecting compaction between the classifications, particularly between Civil Engineer III and Civil Engineer II, and between Civil Engineer IV and Civil Engineer III.

The salary ranges should be adjusted for the Civil Engineer II, Civil Engineer III, and the Civil Engineer IV classifications to place the City in a more competitive position with Fairfax and Prince William Counties.

Recommendation #44: The salary ranges for the Civil Engineer II, Civil Engineer III, and Civil Engineer IV classifications should be increased.

2. THE CONSTRUCTION AND INSPECTION DIVISION SHOULD NOT PLAN CHECK BUILDING PERMIT PLANS; THIS RESPONSIBILITY SHOULD BE ASSIGNED TO THE ENGINEERING AND DESIGN DIVISION.

At present, the Construction and Inspection Division is plan checking building permit plans. This is an unusual practice. This is typically assigned to the engineering staff dedicated to development review for the Engineering and Design Division. While inspectors are skilled in evaluating construction plans for conformance with the Design and Construction Standards, this assignment interferes with their primary goal of construction inspection of capital improvement projects and developer constructed public improvements to assure adherence with the Design and Construction Standards. Plan checking of building permit plans by the inspectors will always be an "as time permits" responsibility for these inspectors, which interferes with the City's goal of timely processing of building permit applications.

Recommendation 45: The responsibility for building permit plan checking should be reassigned from the Construction and Inspection Division to the Engineering and Design Division.

3. DEVELOPMENT SERVICE FUNCTIONS WITHIN THE ENGINEERING AND DESIGN DIVISION AND THE CONSTRUCTION AND INSPECTION DIVISION, SHOULD BE CONSOLIDATED UNDER A CIVIL ENGINEER IV.

There are a number of staff within the Engineering and Design Division and the Construction and Inspection Division that are dedicated to development services. This staff includes the following:

- **A Site Plan Coordinator provides coordination of Transportation and Environmental Services Department review of site plans.** This includes tracking of timeframes for comment submission, distributing plans received from Planning & Zoning to appropriate department staff, receiving back comments regarding conditions for approval, compiling comments, and forwarding these comments to Planning & Zoning. The Site Plan Coordinator supervises an Engineering Aide II responsible for assisting in the processing of site plans

submitted by developers, including the routing to appropriate personnel for review, maintaining files related to development projects, assisting in compilation of department comments regarding development projects, etc. The Site Plan Coordinator reports to the Division Chief – Engineering.

- **A Supervising Administrative Officer supervises the issuance of a variety of engineering permits**. The Supervising Administrative Officer supervises four Engineering Aides; one of these Engineering Aides is assigned to the Carlyle project and is located off-site. This section will be opening another off-site office for the Potomac Yard project that would include an additional Engineering Aide. The section issued 1,393 permits in calendar year 2004. This included the following:

  - 777 permits that the section labels "permit fees" that include right-of-way permits, dumpster permits, crane permits, sidewalk closures, etc.;
  - 416 utility cut/excavation permits;
  - 113 reserved parking permits; and
  - 87 other types of permits.

  The Supervising Administrative Officer reports to the Division Chief – Construction and Inspection.

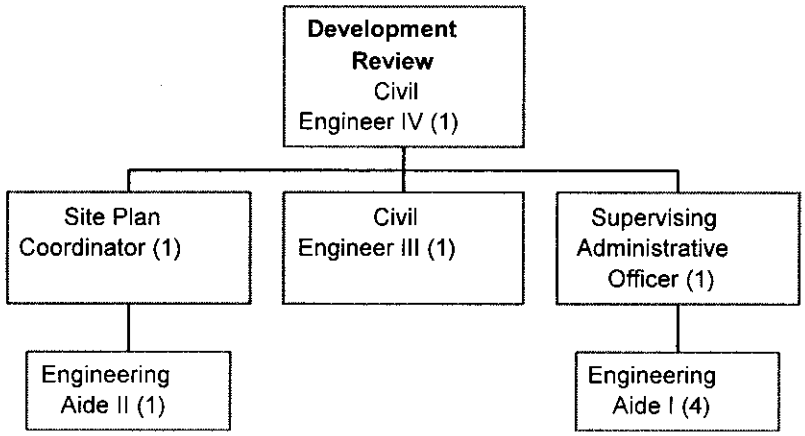
- **A Civil Engineer III provides development review plan checking services.** This position reports to a Civil Engineer IV, and the incumbent of the position, when it was filled, worked part-time although the position is budgeted as a full-time position. This position is responsible for the development review of concept and completeness determinations, preliminary plan reviews, and final plan reviews on behalf of the Engineering and Design Division. This position reports to a Civil Engineer IV within the Engineering and Design Division (the Civil Engineer IV position that is filled).

- **A Civil Engineer IV in the Construction and Inspection Division**. This position was identified in May 2005 as one of many positions that should be added to address the unprecedented amount of new development anticipated in the City over the next 5-10 years. These positions are requested to ensure that new development is reviewed and processed in a timely manner and that a high level of quality of development is achieved. This position, if authorized, should not be assigned to the Construction and Inspection Division, but rather the Engineering and Design Division. This position, if authorized, should not be authorized as a Civil Engineer IV, but rather as an Engineering Aide II with responsibility for plan checking building permit plans to assure adherence to the

Design and Construction Standards adopted by the Engineering and Design Division.

All of these functions and positions should report to a Civil Engineer IV. This position is vacant. Once the salary range for this classification is adjusted, the City should recruit and fill the position of Civil Engineer IV. The position should manage all of the development review services for the Engineering and Design Division. The position should report to the Division Chief – Engineering.

The proposed plan of organization for this section is presented below.



Recommendation #46: A Civil Engineer IV should be assigned responsibility for managing the staff assigned to development review within the Engineering and Design Division, including the Supervising Administrative Officer, Civil Engineer III, and Site Plan Coordinator.

4. THE EXTENT OF ROUTING OF DEVELOPMENT PLANS TO DIVISIONS WITHIN THE TRANSPORTATION AND ENVIRONMENTAL SERVICES DEPARTMENT SHOULD BE REDUCED.

At present, the Site Plan Coordinator within the Engineering and Design Division routes plans to other divisions within the Transportation and Environmental Services Department for plan checking. For the Concept and Completeness Determination, this appears to include only the Engineering and Design Division and the Environmental

Quality Division. For the Preliminary Plan Review and the Final Plan Review, this includes all of the Divisions within the Transportation and Environmental Services Department, including the Engineering and Design Division, Environmental Quality Division, the Construction and Inspection Division, the Maintenance Division, the Solid Waste Division, the Transportation Division, and the Transit Division.

The variety of divisions that plan check these plans and applications introduces a complexity to these processes and real problems with being able to meet timelines for plan check of these permits. The problem is further compounded because most of the divisions to whom these plans are being routed are not located in City Hall.

The Transportation and Environmental Services Department should take steps to reduce the complexity of this process by enhancing the engineering capacity within the Engineering and Design Division to plan check these applications from a broader perspective than just that division alone. Rather, the Division should assume the role for plan checking these plans for all of the divisions with the exception of the Transportation Division. Enhancing this capacity should be accomplished through the following measures:

- The position currently filled by the Site Plan Coordinator should be modified to a Civil Engineer III;
- That would provide two Civil Engineer III's and each of these two positions should be trained by the divisions within the Department (with the exception of the Transportation Division) regarding the standard conditions of approval that these divisions utilize and these divisions should mentor these two Civil Engineer III's for several months in the plan checking of these applications on their behalf;
- The two Civil Engineer III's should assume responsibility for plan checking Preliminary Plan Review and the Final Plan Review applications and Concept and Completeness Determination applications on behalf of the Engineering and Design Division, the Environmental Quality Division, the Construction and

Inspection Division, the Maintenance Division, the Solid Waste Division, the Transportation Division, and the Transit Division.

Recommendation #47: The responsibility for plan checking Preliminary Plan Review and Final Plan Review applications, and Concept and Completeness Determination applications, for the Transportation and Environmental Services Department should be consolidated within the Engineering and Design Division with the exception of the Transportation Division

Recommendation #48: The Site Plan Coordinator position should be modified to a Civil Engineer III.

5. ALL OF THE DIVISIONS WITHIN THE TRANSPORTATION AND ENVIRONMENTAL SERVICES DEPARTMENT SHOULD UTILIZE PERMIT PLAN TO RECORD THEIR COMMENTS AND CONDITIONS OF APPROVAL.

At present, the Site Plan Coordinator is primarily responsible for compiling all comments from the various divisions in the Transportation and Environmental Services Department into a comprehensive approach. Comments could be compiled using Permit Plan software, but few divisions are doing so. If Permit Plan software were utilized, the Site Plan Coordinator would only need to edit prior to sending to the Planning and Zoning Department.

A key component in the application of Permit Plan is the full and complete use of the automated workflow components of the system by all divisions in the Transportation and Environmental Services Department. Workflow tools allow the Department to automate its routing, comment, and condition of approval processes.

At present, not all divisions within the Transportation and Environmental Department enter their comments and conditions of approval into Permit Plan. Rather, the Site Plan Coordinator compiles the comments and conditions received from these divisions in memos.

Recommendation #49: The Divisions in the Transportation and Environmental Services Department that are assigned responsibility for development review should be required to use Permit Plan to record their comments and conditions regarding development review applications.

6. THE FEES CHARGED BY THE PERMITS SECTION FOR RIGHT OF WAY AND UTILITY CUT PERMITS SHOULD BE INCREASED TO ENABLE THE CITY TO RECOVER ITS COSTS.

As noted previously, the section issued 1,393 permits in calendar year 2004. This included the following:

- 777 permits that the section labels "permit fees" that include right-of-way permits, dumpster permits, crane permits, sidewalk closures, etc.;
- 416 utility cut/excavation permits;
- 113 reserved parking permits; and
- 87 other types of permits.

In calendar year 2004, the Permit Section collected $251,119 in revenue for the permits issued by this section.

These fees should be doubled. These fees are not recovering the Permits Division's direct costs nor the indirect departmental and citywide costs. The table below presents the direct costs for providing these services.

Position Title	Annual Salary and Benefit Cost
Supervising Administrative Officer	$80,001
Engineering Aide I (4)	$246,529
T&ES Inspector	$83,055
Total:	**$409,585**

As the table indicates, the direct costs for providing these permit services, including the T&ES Inspector responsible for utility cut inspections, but excluding the over hire Engineering Aide I, amounts to $409,585. The costs of departmental overhead and the citywide overhead, in the project team's experience, typically are not less than

25% of direct costs; the project team has experienced much higher overhead rates. The application of the 25% indirect rate would result in the allocation of $102,396 in departmental and citywide overhead costs. The direct and indirect costs to provide these permitted services approximate $511,981. For the Department to recover these costs, it would need to double its fees for right-of-way permits, dumpster permits, crane permits, sidewalk closures, utility cut/excavation permits, reserved parking permits, and other permits issued by the Permitting Section in the Transportation and Environmental Services Department.

Recommendation #50: The Transportation and Environmental Services Department should double its fees for right-of-way permits, dumpster permits, crane permits, sidewalk closures, utility cut/excavation permits, reserved parking permits, and other permits issued by the Permitting Section.

Recommendation #51: The Transportation and Environmental Services Department should increase its fees for right-of-way permits, dumpster permits, crane permits, sidewalk closures, utility cut/excavation permits, reserved parking permits, and other permits issued by the Permitting Section by a cost of living adjustment on an annual basis.

7. THE TRANSPORTATION AND ENVIRONMENTAL SERVICES DEPARTMENT SHOULD WORK WITH THE INFORMATION TECHNOLOGY SERVICES DEPARTMENT TO ENHANCE THE FUNCTIONALITY OF THE PERMIT PLAN SOFTWARE TO ENHANCE ITS USE FOR ISSUANCE OF PERMITS BY THE PERMIT SECTION.

The Transportation and Environmental Services Department was one of last departments in the City to implement the Permit Plan system. As a consequence, the system apparently ran out of permits. The Permit Section has had to create a workaround where many permits are entered as "T&ES Permit" rather than specifically individually. Soil & Erosion Control permits are not on Permit Plan. In addition, the Permits Section may not be taking full advantage the Permit Plan system abilities due to

manner in which they set up forms, which prevents detailed tracking by permit type since many are combined together.

In addition, another workaround the Permit Section has developed on the software relates to addresses for permits. Permit Plan requires a specific address (street name and number) for all permits. For permits that aren't physically occurring at a specific address, the Permit Section has created a numbering system. This sometimes creates problems in locating permits issued or tracking permits.

Recommendation #52: The Transportation and Environmental Services Department should work with the Information Technology Services Department to modify Permit Plan to enhance its functionality of use for the Permit Section.

8. THE SERVICES WITHIN THE ENGINEERING AND DESIGN DIVISION THAT PROVIDE DEVELOPMENT REVIEW SERVICES SHOULD BE ESTABLISHED AS A DISTINCT COST CENTER IN THE CITY'S OPERATING BUDGET.

Measuring the cost of government services – or activity-based costing – is useful for a variety of purposes, including performance measurement and setting user fees to recover the costs of providing services.

The National Advisory Council on State and Local Budgeting acknowledged the importance of measuring the cost of government services in two of its recommended practices: developing a policy on cost recovery through fees and charges (4.2) and assessing how a service could be alternatively provided more efficiently (6.1). The Government Finance Officers Association (GFOA) recommends that governments calculate the full cost of the different services they provide.

By determining the true cost of services, it is possible to compare programs and the cost recovery. Under the current budget system, departments are unable to determine the true costs of their services, including those departments that provide

services to a select group of customers such as development review.

The use of activity-based costing would require the documentation of costs in a specific cost center along with the related performance measures (past, current, and projected), and the revenues generated by these activities. The experience of a number of cities has demonstrated the value of this tool. Activity-based costing is an essential element in the management of development services in the Engineering and Design Division because it can provide previously unknown data on the cost of these activities (such as the general fund is subsidizing the provision of these services). This data can illuminate the public debate on these fees. The process for developing activity-based costing for development services is presented below.

- **Develop goals and objectives for the development service cost center**. This should be based on a clear understanding of the levels of service that development services in the Engineering and Design Division are supposed to be addressing.

- **Develop strategies to achieve these goals and objectives**. This includes a needs assessment and the development of a specific set of strategies for producing outputs necessary for achieving those goals and objectives. This could include, for example, more effective use of Permit Plan by all the divisions within the Transportation and Environmental Services Department.

- **Develop meaningful performance measures**. This involves working with the front-line staff and customers to come up with meaningful measures aimed at judging progress (or lack thereof) in meeting goals and objectives. A full set of measures also will include data on activities (the type and amount of work being done) and on costs and revenues. This would include the development of input, output, efficiency, service quality, and outcome indicators to track the extent to which program and activity goals and objectives and desired outcomes are being achieved.

- **Budgeting at the cost center level for development services**. This involves budgeting expenditures and revenues in the development services cost center.

- **Collecting and using the data to manage work processes**. This involves using data from Permit Plan, for example, to assess the data and regularly

monitoring them for indications of the extent to which goals and objectives are being achieved and how efficiently and effectively programs are operating. The results of these continuing assessments are then used at the operational level to make adjustments to programs and services, spending and fees.

- **Reporting results.** This involves communicating a comprehensive set of clear, decipherable performance measures. Reporting generally involves communicating the extent to which development services goals and objectives are being achieved with performance measurement information to assist in assessing the efficiency and effectiveness of the program

Recommendation #53: The development services within the Engineering and Design Division should be budgeted as a cost center.

9. THE TRANSPORTATION AND ENVIRONMENTAL SERVICES DEPARTMENT SHOULD CHARGE A PAVEMENT RESTORATION FEE FOR UTILITY CUTS.

Public rights-of-way are essential to the economical vitality of the city. The City of Alexandria grants utility and telecommunication companies reasonable access to the public right-of-way to provide services to the community. However, in order for utility and telecommunications companies to maintain or upgrade their services, they need to access the pavement structure and this, in turn, affects pavement performance. The impact of utility company activity on pavement performance has been a concern of public agencies for many years. The taxpayers should be entitled to compensation for the use of the valuable transportation assets they have diligently maintained and operated for the function of moving vehicles and pedestrians through, into, and around our communities.

In cities such as the City of Alexandria, hundreds of utility cuts are made every year. These cuts are made to install, inspect or repair buried facilities. Public agencies and the utility companies have each sponsored engineering investigations to determine the impact of utility cuts on pavement performance. Until recently, most studies focused

on the effects of backfill type and in-place density on potential surface settlement. Few studies investigated the impacts of utility cuts on the frequency of maintenance and rehabilitation activities and the costs associated with these activities.

Interest in the impact of utility cuts on roadway performance has increased in the last ten years. Findings from studies funded by utility companies and public agencies are often contradictory. The results of studies conducted by public agencies show that the presence of utility cuts lower measured pavement condition scores (indexes) compared to pavements of the same age with no utility cuts. The link between the presence of utility cuts and accelerated pavement deterioration is clear. The process of opening the trench causes sagging or slumping of the trench sides as the lateral support of the soil is removed. The degree of sagging is determined in part by the soil type, moisture content of the soil, and depth of the trench. Quantifying the extent of sagging is very complex, but regardless of the extent, the adjacent pavement is adversely affected.

This zone of weakened pavement adjacent to the utility cut can fail more rapidly than other parts of the pavement. This can be observed in the field by the presence of fatigue (alligator) cracking occurring around the edges of the cut, or spalling around the cut edges. In addition, the introduction of cuts is much like the introduction of cracks on the pavement. If improperly sealed, water intrusion can occur, resulting in loss of fine materials from the underlying base and sub-grade and consequently, loss of pavement strength. This can occur even with the best patching or backfill practices if the edges of the cut are not properly sealed. The more cuts on a pavement, the higher the possibility of water intrusion and subsequent loss of strength. Studies show that trenching

operations reduce pavement strength in a zone from 3 to 6 feet on either side of the centerline of the trench. By implication, these zones of weaker pavement require more costly rehabilitation and maintenance activity.

The Transportation and Environmental Services Department should take a number of actions to address this problem. This should include charging a pavement restoration fee for utility cuts. This fee would generate approximately $250,000 in revenue annually.

Recommendation #54: The Transportation and Environmental Services Department should develop and impose a pavement restoration fee upon utilities making and benefiting from excavations in public streets, including the City's sewer utility.

Recommendation #55: Funds that are collected as pavement restoration fees should be expended for the rehabilitation and resurfacing of streets, and deposited in a special revenue fund established for that purpose. The funds deposited in the special revenue fund should include interdepartmental budget transfers for City sewer operations utility cuts, and fund transfers at the time of construction contract award for City sewer capital improvement projects.

Recommendation #56: The Transportation and Environmental Services Department should require utility companies to submit five-year plans for major facility installation to coordinate excavations with the City's resurfacing and the recommended slurry seal program.

Recommendation #57: The Transportation and Environmental Services Department should provide an incentive for joint trenching when two or more utility excavators trench by processing a permit as one application saving the utility company costs for permit, plan check, and inspection fees.

10. THERE ARE OPPORTUNITIES TO IMPROVE THE EFFICIENCY AND OPERATIONS OF THE LAND SURVEY SECTION.

The Land Survey Section is responsible for providing land survey data for the engineering design and construction services. In addition to performing survey work,

this Section maintains monuments / control points in the City and, as necessary, reviews private survey work. This Section is staffed with the following:

- A Chief of Surveys;
- Two Land Survey Analysts;
- Two Survey Party Chiefs;
- Two Instrument Operators; and
- Two Rod and Chain Operators.

The Land Survey Section operates two three-person crews. Additionally, each Land Survey Analyst provides support to the survey crews, including conducting research and obtaining maps for the survey crews. The table, which follows, presents a summary of the number of survey requests received and processed by the Land Survey Section.

Number of Requests for Service for Land Survey					
Month	**2000**	**2001**	**2002**	**2003**	**2004**
January	9	7	6	8	3
February	7	11	7	6	0
March	18	4	9	5	6
April	5	12	2	14	8
May	10	4	6	13	10
June	10	5	6	9	9
July	7	7	1	8	11
August	8	7	17	9	12
September	8	7	6	5	2
October	6	4	7	6	8
November	4	14	2	3	5
December	5	5	6	8	7
Total	**97**	**87**	**75**	**94**	**81**
% Change	**–**	**-11%**	**-16%**	**20%**	**-16%**

While this table is not indicative of the total demand on staff hours, it does present the overall volume of survey requests received and processed by the Land Survey Section.

The sections, which follow, provide a discussion of the opportunities for improvement in the Land Survey Section.

(1) The Engineering and Design Division Should Scan Plat Maps to Allow for Electronic Access of Plans.

Currently, the Transportation and Environmental Services Department does not have an online mapping system that would enable the land survey crews to retrieve plat maps electronically. Instead, the Land Survey Section utilizes the two land survey analysts to retrieve plat maps for each assignment.

The Transportation and Environmental Services Department should scan the plats to enable the land survey crews and other City staff to access plats online, print these plats at their office, and to utilize these plats in the field.

Scanning is a process whereby plats are passed through a drum-like electronic scanner to capture an entire sheet of features with the output creating a raster image of the map. The raster image is registered or oriented to the coordinate system desired and software is utilized to convert lines, text or symbols to a vector format. Scanning data is faster than manual digitizing, especially for maps with a lot of line work, but the maps must be carefully prepared. Scanners are extremely sensitive to any marks, lines or text that are not part of the map coverage.

Wide format scanners range in price and quality. On average, wide format scanners range in price from $10,000 to upwards of $20,000. However, the Transportation and Environmental Services Department should be able to acquire a scanning device and its supporting stand for $15,000.

Recommendation #58: The Transportation and Environmental Services Department should scan the City's plat maps to enable electronic access to plats on the City's network.

(2) Once Plats Are Available on the City's Network, a Land Analyst Position Should Be Eliminated.

There are two Land Analyst authorized for the Land Survey Section. The table, which follows, presents a summary of the key work activities of the chief of surveys and land survey analysts.

Chief of Surveys	Land Survey Analysts
• Manages the staff and activities of the Survey Section. • Reviews and processes subdivision plats, easement plats, site plans and deeds for private developments to assure the survey data is accurate and the easements are accurately depicted. • Responsible for acquisition of easements and right-of-way for City-initiated projects. Includes deed research, preparation of deeds and plats, negotiations with property owners and recording of legal documents. • Researches and answers general questions from the public and City staff regarding property ownership, right-of-way locations, easements, encroachments and flood hazard information. • Responsible for the receipt and processing of survey requests and routing of the information to the requesting party.	• Assists with processing of survey requests. • Assigns survey jobs to field crews and maintains records of completed jobs. • Conducts preliminary research for jobs. • Downloads survey data and adds property line / ownership information to completed field survey. • Prepares design data for construction stakeout and uploads information for field crews. • Assists with review and processing of subdivision and easement plats for private development. • Prepares right-of-way and easement plats for City-initiated projects. • Manages City's participation in the Community Rating System and National Flood Insurance Program. • Maintains the Alley Book, a list of alley ownership and history. • Maintains database of benchmarks and control monuments. • Researches and answers general questions from the public and City staff regarding property ownership, right-of-way locations, easements, encroachments and flood hazard information. • Provides presentation graphics and GIS information for proposed projects relating to public right-of-way and infrastructure facilities.

The Matrix Consulting Group contacted other municipal agencies to determine the regional best practice with respect to land survey analyst staffing. The table, which follows, provides a brief summary of the comparative information.

Comparative Information	Alexandria	Fairfax County	Montgomery County	Prince William County
Total Staff	9.0	20.0	5.0	2.0
Number of Crews	2.0	4.0	1.0	1.0
Crew Size	3.0	3.0	2.0	2.0
Number of Analyst / Technicians FTEs	2.0	5.0	2.0	0.0

The points, below, provide a brief discussion of the comparative information.

- The project team contacted three local governments and collected data regarding their land survey services.

- Prince William County has two full-time equivalent staff assigned to their Land Survey Section. Staff are responsible for all related survey work, including conducting research, field survey work, and performing the computations.

- With the exception of Prince William County, all other surveyed agencies have varying levels of support. For example:

  - Fairfax County has three senior survey analysts and two research technicians that provide support to the survey crews.

  - Montgomery County, on the other hand, has two survey technicians that conduct deed research and the land survey crews are responsible for computations.

- As discussed, the City of Alexandria has two land survey analysts that are primarily responsible for providing support to survey projects, including conducting researching, collecting and distributing documents needed for jobs and computations.

The Transportation and Environmental Services Department should eliminate one of the two Land Survey Analyst positions through attrition. This would reduce salary and fringe benefit costs by approximately $88,000 per year. This represents the midpoint of the current salary and benefit costs for the land survey analyst position (i.e., the average of the current salary and benefits of the two land survey analysts).

Given the workload of the section, the Chief of Surveys and the Survey Party Chief can absorb some of remaining workload. The table, which follows, presents the distribution of key work assignments.

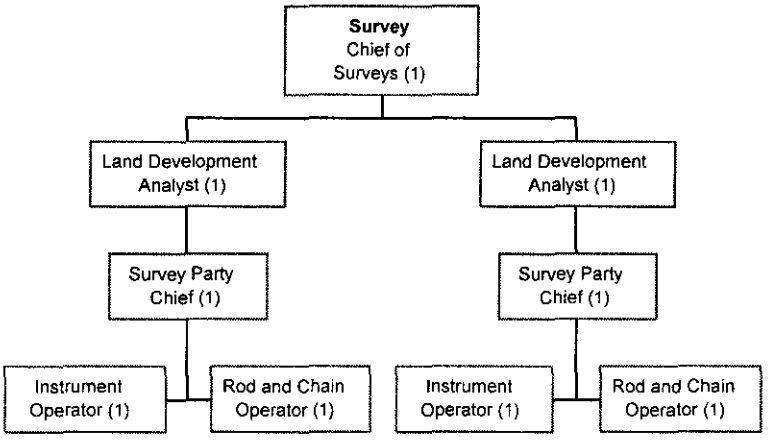
Chief of Surveys	Land Survey Analyst	Survey Party Chief
• Continue with current responsibilities. • Receive and process all survey requests with direct assignment to survey crews. • Process subdivision and easement plats for private development. • Provides assistance to the public as needed.	• Continue with current responsibilities, including: – Conduct preliminary research for assignments, as needed. – Manage City's CRS and National Flood Insurance Program. – Conduct and maintain alley data. – Provides assistance to land survey crews as needed (i.e., for more complex and / or time consuming projects).	• Continue with current responsibilities. • Retrieve and print electronic copies of plats. • Enter computations and send to Engineering and Design. • When possible prepare design data for construction stakeouts. • Maintain records of all survey jobs and submit to Chief of Surveys weekly for review.

The remaining Land Survey Analyst position should continue to provide support and assistance to the land survey crews and the Chief of Surveys. The Chief of Surveys and the survey crews' roles should be expanded to absorb some of the workload resulting from the elimination of one of the two Land Survey Analyst positions, such as processing and providing the Engineering and Design Division with the data directly.

Recommendation #59: One of the two Land Survey Analyst positions should be eliminated through attrition.

(3) The Size of the Survey Party Crews Should Be Reduced.

The Land Survey Section operates two three-person land survey crews. The project team collected comparative information from other municipalities. The table, which follows, presents the organization of the Land Survey Section.



The points, which follow, discuss the practices in other agencies (Fairfax County, Montgomery County and Prince William County).

- Most land survey crews utilized total station technology. One agency utilized GPS technology as well.
- Two of the three surveyed agencies utilized two-person crews, which was adequate to successfully complete survey jobs.
- One agency utilized three-person crews. The third person assisted with traffic safety.
- Currently, the City of Alexandria's two survey crews operate with different equipment. One crew has access to GPS technology that enable that crew to work from the side of the street and avoid entering the street.

In addition to the benchmark of two-person crews, the utilization of modern equipment, such as total station (i.e., laser technology), means that the staffing requirements for fieldwork are reduced. Rather than have two three-person crews, the Land Survey Section should do the following:

- Standardize the equipment among the two crews to enable crews to work from the side of the street, eliminating the safety issues relating to staff working in the streets.
- Eliminate a Rod and Chain Operator position through attrition.

- Utilize the remaining Rod and Chain Operator to serve as a floater between the two survey crews to provide coverage for leave time usage and assist on large projects.

Based on the average salary and benefit costs for currently filled positions, this is a net savings of $51,700.

Recommendation #60: Eliminate one Rod and Chain Operator position through attrition.

(4) The Productivity of the Survey Crews Should Be Enhanced.

There are opportunities to improve the utilization of the two Land Survey Crews. As noted, the Land Survey Section maintains data with respect to the number of survey requests received and completed by the Unit.

Year	Number of Survey Requests
2000	97
2001	87
2002	75
2003	94
2004	81
Five Year Average	**86.8**

Over the previous five years, the land survey crews had an average of 86 land survey requests on an annual basis. Each crew should be available for survey activities approximately 230 days a year; the Section has approximately 460 days per year available. This means that the survey crews require an average of approximately 5 days to complete each survey request. Based on a review of surveys completed, the majority of surveys take an average of one day or less to complete. This indicates that there is sufficient time available for survey crews to conduct other work assignments.

The points, which follow, provide a discussion of the improvement opportunities with respect to the survey crews:

- As the Section manager, the Chief of Surveys should be responsible for tracking the performance of the survey crews. This should include:
  - Date of receipt;
  - Requested completion time;
  - Date of assignment;
  - Priority level (e.g., completion priority, high, medium, low and associated turnaround target times); and
  - Completion date.
- The Chief of Surveys should formally plan and schedule the work of these two crews on a bi-weekly basis.
- In addition to completing requests for surveys, the survey crews should:
  - Verify monuments on a systematic and periodic basis; and
  - Conduct surveys to document the locations and inventory of the City's infrastructure such as catch basins, drain inlets, manholes, etc.
- The Chief of Surveys should be responsible for establishing a work plan for the land survey crews to verify monuments, and to conduct surveys to document the locations and inventory of the City's infrastructure such as catch basins, drain inlets, manholes, etc. based on the time available (i.e., time not dedicated to completing requests for surveys).

Recommendation #61: The productivity of the survey crews should be enhanced.

Recommendation #62: The Chief of Surveys should be responsible for formally planning and scheduling the work of the two survey crews on a bi-weekly basis.

Recommendation #63: The Chief of Surveys should develop a plan to conduct surveys to document the locations and inventory of the City's infrastructure such as catch basins, drain inlets, manholes, etc., based on the time available (i.e., time not dedicated to completing requests for surveys).

11. THE ROLES AND RESPONSIBILITIES FOR MANAGEMENT OF CAPITAL IMPROVEMENT PROGRAM NEEDS TO BE CLARIFIED.

The responsibility for managing the streets, sanitary sewer, and storm water collection system capital projects has been clearly defined as belonging to the Engineering and Design Division. However, the expectations associated with the management of the projects should be clarified. These requirements are described in the text below and in the exhibit following this page.

- **Planning and Organizing the Capital Improvement Program**. Planning of the capital projects is essential to the completion of these projects on schedule and within budget. Key requirements include: the definition of each capital improvement project through the completion of a design authorization form including project budget; preparation of a detailed schedule for each project; preparation of a two-year Gantt chart schedule for the Capital Improvement Program assigned to the Engineering and Design Division; projection of staffing requirements; and the "leveling" of these staffing requirements to assure work does not exceed staff capacity.

- **Project Monitoring and Reporting.** The project manager (Civil Engineer III) should be required to assess and report the financial and scheduling status of each project on a monthly basis. The project manager should report meaningful information in these status reports. Variances from the planned budget and schedule should be reported via this report as well.

- **Management of Capital Improvement Program Resources.** Management of the Capital Improvement Program process is as much concerned with keeping the project moving after it has started as it is with planning. Management of resources proceeds directly out of the variances identified in the monitoring and reporting phase, and the project manager is concerned with correcting these variances. Key system requirements include defining within the monthly report the steps that need to be taken to restore projects back to schedule, and alerting top management when projects will not be completed on schedule.

MANAGEMENT REQUIREMENTS FOR CAPITAL PROJECTS

Component of the Capital Improvement Process	Requirement	Responsibility
Planning and Organizing the CIP Upon Mayor and Council Approval	Preparation of a design authorization form for each CIP project to define the financing, description, scope, design considerations, and the necessary coordination with outside agencies (e.g., VDOT, etc.). This process should also include an indication of whether an environmental assessment and right of way is required, as well as a determination of staffing requirements based on application of percent of construction guidelines, or others as developed by the Division.	Project Managers (Civil Engineer III's)
	Preparation of a network schedule using Microsoft Project for each project, including duration time for each task, and earliest and latest start and finish times.	
	Preparation of bar chart schedules for the entire CIP for a 2-year period showing projected timing of planned projects by major project component (e.g., design, bid, award, construction, etc.).	Civil Engineer IV, Division Chiefs for Engineering and Construction and Inspection
	Projection of staffing requirements to handle planned, prioritized projects for next fiscal year, including workload loading on a monthly basis.	
	Leveling of resources to enable the development of schedules based on available staffing.	
Project Monitoring and Reporting	Reporting via the time accounting system of actual staff-hours by skill level and position type on CIP projects to provide the basis for: • Monitoring of staff and contractor performance against guidelines during each phase of the process. • Monitoring actual versus projected staff needs. • Development of a database to utilize in refining project workload estimates. Time accounting system includes an hourly rate that accounts for indirect time and division-wide overhead.	Project Managers (Civil Engineer III's), Inspectors
	Reporting of the project status on a monthly basis, including status of staff hours planned vs. actual.	Project Managers
	Reporting of financial status of each project showing expenditures to-date versus the plan.	Civil Engineer IV, Division Chiefs for Engineering and Construction and Inspection

Component of the Capital Improvement Process	Requirement	Responsibility
Management of the CIP Project Resources	Recommending within the monthly status report steps that can be taken to enable completion of projects on schedule.	Civil Engineer IV, Division Chiefs for Engineering and Construction and Inspection
	Communication to top management, within the monthly status report, of CIP projects that will not be completed on schedule and within budget, along with estimated completion dates for each of these projects.	Civil Engineer IV, Division Chiefs for Engineering and Construction and Inspection

Although the specific duties and responsibilities are defined in the exhibit, general goals and objectives for the managers and supervisors within the Engineering and Design Division and the Construction and Inspection Division are presented in the dot points following the exhibit.

- The Division Chief – Engineering, the Division Chief – Construction and Inspection, and their management and supervisory team should be held accountable for delivering capital improvement program projects on schedule and within budget, and for managing the Capital Improvement Program process, including planning and scoping of all capital improvement projects and keeping clients informed regarding their projects on a routine ongoing basis. The Civil Engineer III's, however, should be held accountable for the effectiveness of the day-to-day delivery of capital projects on time and on budget.

- The Civil Engineer III's within the Engineering and Design Division should be held accountable for the effectiveness of the project management of capital projects to which they have been assigned – both design and during construction. Further, they should be held accountable for monitoring the planned versus actual schedule and budget for their assigned projects, including:

  - Implementing initiatives to accomplish capital improvement program projects on schedule and within budget;

  - Working with management to define and secure the staff resources needed for the project;

  - Assuring that all project plans and schedules are defined as part of the planning and scoping of a capital project prior to commencement of design;

  - Monitoring and reporting progress and problems in meeting capital project plans and schedules; and

  - Managing and coordinating interfaces between various staff of the Division and other divisions in the Transportation and Environmental Services Department.

  The Civil Engineer III's should be responsible for managing the capital improvement project from the beginning of the project to its final construction and acceptance and should fulfill the responsibilities listed above. This is the concept of cradle-to-grave project.

- The Engineering and Design Division should be responsible for planning and scoping of the capital improvement project. This would be accomplished through a design authorization form as noted within the next recommendation.

The day-to-day responsibility for managing capital projects needs to be pushed down to the Civil Engineer III's within the Engineering and Design Division. All of the responsibility should not lie with the Civil Engineer IV in the Engineering and Design Division that is responsible for capital improvement program management.

Recommendation #64: The roles and responsibilities of the staff of the Engineering and Design Division and the Construction and Inspection Division for management of capital improvement projects should be clarified in a policy and procedure.

12. MANAGEMENT OF CAPITAL PROJECTS SHOULD BE IMPROVED.

The Matrix Consulting Group identified several project management principles that should be applied to each phase of the capital improvement project. These standards include the following eight steps that comprise the core project management process:

- Preparation of a project budget;
- Definition of the project, including its scope, staff resources required, project costs, and project priority;
- Establishment of plans and schedules for each capital improvement project to determine what tasks are to be performed internally and by private contractors, as well as the start, end and milestone dates;
- Monitoring and reporting the progress against each element of the schedule for each project;
- Maintenance of the financial control systems necessary to ensure timely reports on current expenditures of funds for each line item of the project;
- Development of a system to alert top management to cost, schedule, legal and other difficulties, and unusual circumstances encountered during the course of the project;

- Management of the staff and consulting resources involved in the project in order to adjust to changes in priorities and project mixes as well as to enable completion of the project on schedule and within budget; and

- Management and coordination of the interfaces needed to complete the project.

Underlying all of these principals is management accountability within the Engineering and Design Division to ensure it is accomplished on schedule and within budget.

The review of the practices utilized by the Engineering and Design Division has identified a number of issues associated with how well the Division applies these eight capital project management principals. These issues are presented in the following paragraphs.

- Staffing requirements for capital improvement projects have not been fully defined.

- Costs of construction guidelines are not utilized to determine the design, inspection and construction management staffing requirements for capital improvement projects.

- Staffing resources are not leveled to fit the design, construction inspection, and construction management workload to the available staff resources.

- A time accounting system is not utilized to record the allocation of staff hours for the design, construction inspection, and construction management by the staff of the Engineering and Design Division or the Construction and Inspection Division.

- Utilization targets have not been set for engineering staff for the design, inspection and construction management of capital improvement projects (what proportion of their time should be charged to capital projects versus training, leave, administration, etc.).

- The monthly capital improvement program status reports generated do not provide important information regarding capital projects.

- Capital projects are not fully scoped before commencement of design.
- Feedback mechanisms (e.g., final reports) have not been developed for quality assurance purposes.
- Mechanisms are not routinely employed to maintain effective communication with clients.

A number of steps need to be taken by the Engineering and Design Division and the Construction and Inspection Division to improve the management of capital projects. These recommended steps are presented below.

(1) A Design Authorization Form Should Be Completed Before Commencement of Design.

Design of a project should not be initiated until the resources required (staff hours, consulting engineers, and construction funding) for completing the project have been identified using the design authorization form. The design authorization form should include the components enumerated below.

- The project title including the phase of the project, if relevant.
- A general project description, including a narrative summary description of the project, specific physical improvements included, the location of the project, and the relationship to master plans.
- The capital project number (as noted in the six-year capital improvement program).
- The financing and the cost, including the source of funds, and the appropriation status.
- A budget covering the project management or design staffing, survey staffing, construction inspection staffing, appropriate consultants, property acquisition, utility relocation, etc., by major expenditure component.
- The responsibility for completing the various components of the capital project, including the following:
  - Design by in-house staff or by consulting engineer;

- Construction inspection by in-house staff or by consulting engineer;
- Design survey and construction staking by in-house staff or consulting engineer;
- Environmental assessment required;
- Right-of-way acquisition required and, if so, the number of parcels and their locations and assessor parcel numbers;
- Utilities that need to be relocated, problems with relocation and timing issues; and
- Other key responsibilities that need to be assigned and/or accomplished.

- The extent of coordination necessary, listing the inter-agency coordination by division, department, or outside agency with whom coordination will be required in the design and construction of the capital project, the nature of the coordination, and the key contacts;
- The preliminary schedule for completing the design and construction of the capital project, including the schedule for design, bid package preparation, advertise/award, right-of-way acquisition, environmental impact reports, and construction; and including the dates of important events such as approval of the award of construction contract by the City Council;
- A document control procedure and record-keeping system including contract documents;
- A change order procedure that includes a documented, systematic approach to the handling of construction change orders;
- Organizational structures, management skills, and staffing levels required throughout the design and construction phase, including the estimated staffing required in terms of person hours required for design and construction inspection utilizing the cost of construction guidelines;
- Quality control and quality assurance functions, procedures, and responsibilities for design and construction;
- Materials testing policies and procedures;
- Design and construction reporting requirements, including cost and schedule control procedures;

- Design considerations or issues related to the capital project such as complexities of the design; and

- Community relations and public information requirements, including public hearings or meetings and how the public will be informed and involved in the preliminary design and informed about the progress of the design and construction.

A design authorization form should be completed before commencement of design. It should be reviewed with the client department prior to the commencement of design.

Recommendation #65: A design authorization form should be completed by the Civil Engineer III assigned as project manager before the commencement of design for each capital improvement project.

(2) Costs of Construction Guidelines Should Be Utilized to Document Resource Requirements for the Design and Inspection of Capital Improvement Projects.

The exhibit that follows this page presents an example of guidelines for the design and inspection of capital improvement projects as a percentage of construction. These guidelines have been developed based upon data developed by the American Society of Civil Engineers (ASCE) in their publication entitled, *Consulting Engineering: A Guide for the Engagement of Engineering Services*. The ASCE stated that the percentage of construction cost "has been widely used for determining the compensation of consulting engineers on assignments where the principal responsibility is the design of various works, and the preparation of drawings, specifications, and other contract documents as necessary." The following points should be noted concerning this cost of construction guideline.

- Two different levels of complexity are noted: average and above average. An above average level of complexity should be based upon the need to deal with

other agencies (e.g., VDOT), the design complexities of the project, or problems with planning and construction determining the compensation of consulting engineers on assignments where the principal responsibility is the design of various works, and the preparation of drawings, specifications, and other contract documents as necessary.

- These guidelines are customized to fit the different types of construction jobs such as street construction, street reconstruction, sanitary sewer, etc.

- These guidelines were developed to fit the different types of work activities in each capital project. These include planning and scoping, design development, design survey, design administration, construction survey, construction inspection, construction management, and project closure.

- The guidelines are expressed as a percentage of construction (e.g., the cost of staffing as a percentage of construction). To determine the number of staff hours required, divide the cost of the work activity based upon the cost of construction guidelines by the current hourly cost of a consulting engineer for engineering work activities. Use of the hourly cost for a consulting engineer will level the playing field and ensure that the City's staff are every bit as productive and held as accountable as consulting engineers.

- The guidelines identify resource requirements for each work activity associated with a project. These include design development, design survey, design administration, etc.

- If a consulting engineer is accomplishing the design, the project manager in the Engineering and Design Division would utilize the guideline for design administration, and not design development.

- The Civil Engineer III's within the Division should utilize these guidelines to determine the staffing requirements for each project in terms of person hours required for design and construction inspection utilizing the cost of construction guidelines.

- The Division Chief – Engineering and the Division Chief – Construction and Inspection should customize these costs of construction guidelines. The cost of construction guidelines should not be blindly utilized. These guidelines are just guidelines. The guidelines will need to be adjusted to local circumstances.

Recommendation #66: The Capital Projects Division should develop cost of construction guidelines to document resource requirements for the design and inspection of capital projects.

Allocation of Staff Resources for Design and Inspection as a Median Percentage of Net Construction Costs

Type of Project	Street Construction				Street Reconstruction				Wastewater/Storm water			
Level of Complexity	Above Average		Average		Above Average		Average		Above Average		Average	
Construction Cost (+/-)	$0.25 million	$1 million	$0.25 million	$1 million	$0.25 million	$1 million	$0.25 million	$1 million	$0.25 million	$1 million	$0.25 million	$1 million
Planning and Scoping	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Design Development	10%	8%	9%	7%	13%	11%	10%	8%	9%	8%	8%	6%
Design Survey	1 ½%	1%	1 ½%	1%	1 ½%	1%	1%	½%	1%	½%	1%	½%
Design Administration	2%	2%	1 ½%	1 ½%	2%	2%	1 ½%	1 ½%	1½%	1½%	1 ½%	1 ½%
Construction Survey	3%	2 ½%	2 ½%	2%	2%	1 ½%	1 ½%	1%	2½%	2%	2½%	2%
Construction Inspection	5%	5%	4%	4%	5%	5%	4%	4%	4%	4%	4%	4%
Construction Management	3%	3%	2%	2%	3%	3%	1 ½%	1 ½%	3%	3%	2%	2%
Project Closure	0.4%	0.1%	0.4%	0.1%	0.4%	0.1%	0.4%	0.1%	0.4%	0.1%	0.4%	0.1%
Total	25.4%	22.1%	21.4%	18.1%	27.4%	24.1%	20.4%	17.1%	21.9%	19.6%	19.9%	16.6%

(3) Modify the Monthly Capital Project Status Report.

The current reports that are developed are without sufficient detail for certain important managerial decisions to be made. These reports are not routinely provided to clients (other departments) so that the current status of projects is known. With the additional information developed and gathered as a result of the recommendations contained in the previous section, more comprehensive and useful project reports can be developed. The Engineering and Design Division should modify the monthly status report that it currently publishes.

The monthly report should be expanded and the following information should be included in this status report.

- The capital project number (based upon the number assigned in the six-year capital improvement program);
- The capital project name;
- The project manager or construction inspector assigned to the project (or the consulting engineer);
- A comparison of actual project costs to date versus planned, including:
  - Design budget;
  - Design expenditures to date, separately identifying staff expenditures from consulting expenditures;
  - Construction management expenditures to date, separately identifying contract administration, construction inspection, and consulting engineering expenses;
  - Construction cost as budgeted; and
  - Current construction cost as estimated by the project manager responsible for construction management.

These project costs should be based upon a fully loaded hourly rate that includes indirect costs.

- A comparison of actual project schedule to-date versus planned, including:
  - The date the design was scheduled to begin and actually begun;
  - The date the design was scheduled to finish and actually finished;
  - The date the City Council was scheduled to award a contract for the construction versus the actual (or new estimated date);
  - The date the construction was scheduled to begin and actually begun; and
  - The date the construction was scheduled to finish and actually finished.
  - The current status of the capital project, containing explanations such as 30% design complete.

This should be a simple report. The report should be published monthly, online on the Internet. After e-mail distribution of this status report, it should be the basis of a monthly meeting by the Civil Engineer III's (project managers), Civil Engineer IV, Division Chief – Engineering, and Division Chief – Construction and Inspection, and the City Engineer.

Recommendation #67: The information provided by the monthly capital project status report should be expanded.

(4) The Engineering and Design Division Should Utilize the Financial and Payroll Systems to Track the Costs Associated with Design, Inspection and Construction of Capital Projects.

The City's financial and payroll systems are capable of payroll time reporting which changes by project or task. This would enable the Engineering and Design Division and the Construction and Inspection Division to track the salary and benefit costs by project or task worked by an employee in either of these two Divisions on any given day. It would require some modification at the timekeeper level, but the existing

Kronos Timekeeping and Performance Accounting systems software can (and does already in certain circumstances) handle such a requirement. This would avoid having to buy a separate software system as well as maintain the project and task data in the City's financial system (which are also online for City staff review and analysis).

The information that these two Divisions should maintain within the City's financial system should include:

- Project account number;
- Funds control, including the budget for the project, source of funds, etc.;
- Purchase orders approved and pending, including account numbers;
- Contracts, amendments, and change orders, including the dates and the amounts;
- Key dates within the project, such as award of contract;
- Invoice payments, including the dates of the payments;
- Project close-out.

Access to the information contained within this system should be provided on the City's Intranet.

Recommendation #68: The Engineering and Design Division and the Construction and Inspection Divisions should utilize the existing Kronos Timekeeping and Performance Accounting systems software to track the costs associated with the design and inspection of capital projects. Access to the information contained within the system should be provided on the City's Intranet.

(5) A Final Report Should Be Prepared Upon Completion of a Capital Project.

Without a formal analysis and distribution for review, the mistakes and weaknesses of one project will almost certainly be repeated on others. The final report should focus on analyzing the good and bad aspects of the completed project,

transmitting that information to the staff of the Engineering and Design Division, and providing a convenient summary of the project.

At the completion of the project, the project manager assigned to the project should complete a final report, including:

- Project name, project number, and a description of the project. Construction costs – planned versus actual with an identification of all of the change orders and the reasons for those change orders;
- The staff hours allocated to the project – planned versus actual;
- The schedule for completion of the project – planned versus actual, including whether drawings, specifications, schedules, and cost estimates were prepared consistently according to schedule;
- The design costs for the project – planned and actual, including cost per sheet;
- Construction management costs – planned versus actual;
- Whether as-built plans have been completed;
- Comments and discussion regarding the project as necessary, including unusual conditions encountered during the project such as contractor deficiency, quantity difference, scope change, etc.

This report should be circulated to the Civil Engineer III's (project managers), Civil Engineer IV, Division Chief – Engineering, and Division Chief – Construction and Inspection, and the City Engineer. After distribution of this status report, it should be the basis of a meeting with the client department.

Recommendation #69: A final report should be prepared for capital projects upon completion of construction and acceptance of the improvements.

(6) "Billability" Targets Should Be Established for the Engineering and Design Division and Construction and Inspection Division Staff.

To assure the staff of the Engineering and Design Division is efficiently utilized, the Division Chief – Engineering and the Division Chief – Construction and Inspection

should set billability targets for staff, including the civil engineers and the inspectors. These targets would represent that proportion of their work time that these staff would be billable to projects.

The project accounting system should be utilized to monitor the performance of these staff against these targets.

Recommendation #70: Billability targets should be established for staff of the Engineering and Design Division and Construction and Inspection Division.

(7) Maintain a Summarized Twenty-Four Month Bar Chart Schedule for All of the Capital Projects That Will Be Designed and Inspected by the Engineering and Design Division and the Construction and Inspection Division.

This schedule should portray start and finish dates for each capital project by simple activity descriptions for design, bid package preparation, advertise/award, right-of-way acquisition, environmental assessment, and construction. This schedule should be prepared for all capital projects that will be assigned to the Engineering and Design Division or the Construction and Inspection Division during the next twenty-four months.

This bar chart should be updated on a monthly basis using Microsoft Project.

Recommendation #71: The Engineering and Design Division and the Construction and Inspection Division should develop a 24-month bar chart schedule for the design and construction of all capital projects, and update that chart monthly.

(8) A Design Report Should Be Completed When the Design Is No More Than 10% Complete.

The Civil Engineer III (project manager) assigned to the capital project should be responsible for preparing a design report (project evaluation and alternatives study). If a consulting engineer is completing the design of the project, then the consulting engineer would prepare this design report.

The design report should be prepared when the design is not more than 10% complete. The purpose of the design report is to serve as a preliminary design review to enable the project manager to review and approve the proposed design approach. More specifically, the design report should:

- Briefly identify the capital project and describe the project.
- Provide a background to the project including project history, whether the project has any outside support or opposition, and whether any commitments regarding the project have been made.
- Define the problem the capital project is intended to solve and the alternatives considered that could possibly solve all or a portion of the problem.
- Outline the detailed scope of the project and the reasoning behind the selection of the alternative utilized for the design and other engineering decisions.
- Outline in detail the design criteria used for the capital project and the rationale for those criteria.
- Set forth the detailed construction costs for the capital project based upon a detailed review of expected problems and the completion of 10% design, and the sources of funding.

Upon completion of the design report, the Civil Engineer III (project manager) assigned to the project should schedule a preliminary design review meeting. The Civil Engineer III's (project managers), Civil Engineer IV, Division Chief – Engineering, and Division Chief – Construction and Inspection, and the City Engineer should attend this meeting.

At this meeting, the Civil Engineer III's (project managers) assigned to the project should briefly review the project, the alternatives selected, the selected alternative and why this alternative was selected, the design and construction cost estimate, special

problems not resolved, the project schedule, and the staffing requirements (or consulting engineer) needed to complete the design and construction management.

Recommendation #72: A design report should be completed for each capital project when the design is no more than 10% complete.

(9) A Rating System Should Be Developed and Utilized to Evaluate the Performance of Each Consulting Engineer Utilized on City Construction Projects.

The Engineering and Design Division utilizes a Request for Qualifications process to qualify consulting engineers on an annual basis to provide consulting engineering and design on select capital improvement projects. Projects are assigned to the consulting engineer based upon the Division's determination of need and expertise. An informal review of the consulting engineer's performance is made at the completion of the project to determine if it was satisfactory, but a formal evaluation mechanism is not in place. If performance is deemed unsatisfactory, that particular consulting engineer will not be utilized on future projects.

The Engineering and Design Division should develop a formal evaluation mechanism that rates each consulting engineer's performance as part of the close-out of each construction project. The consulting engineer's performance should be evaluated on factors such as:

- Ability to complete the project on schedule;
- Ability to complete the project within the established budget;
- Whether as-built documentation is provided and is accurate and thorough;
- Timeliness of communications to staff, including periodic status reports and early identification of potential issues that would impact the projects completion on time or within budget;

- Ability of engineer of record to perform the assigned duties within the budget agreed upon for professional services fees; and
- Quality of documentation provided on projects.

A simple rating scale should be applied to each factor rated, such as exceeded expectations, met expectations, and below expectations. An overall rating should be applied. Any consulting engineer's performance that receives an overall rating of below expectations should not be utilized for future projects.

Recommendation #73: The Engineering and Design Division should implement an consulting engineer evaluation system and utilize this system as part of the final project close-out.

(10) A Project Management Manual Should Be Developed, and Staff Should Be Trained in Its Application.

At the present time, a project management manual is not in place within the Engineering and Design Division. A project management manual is designed to provide guidance and policies to those individuals assigned to oversee capital projects and assist them in the performance of their duties. A project management manual should address the following duties of the project manager:

- Planning the work;
- Estimating resources;
- Organizing the work;
- Acquiring resources (personnel and materials);
- Assigning tasks;
- Directing activities;
- Controlling project execution;
- Reporting progress; and

- Project close-out.

Each of these sections should include a detailed expectation of the Civil Engineer III's (project managers) for this task and any applicable policies and procedures. The value of a project management manual is not only to provide a resource for project managers to review established policies and procedures; but it assists in ensuring consistency by the Civil Engineer III's (project manager). Additionally, it is a useful educational tool for employees and those clients who are working with the Civil Engineer III's (project managers) on a capital project.

Recommendation #74: The Engineering and Design Division should develop a project management manual and train all Civil Engineer III's (project managers) in its use and application.

13. AN ADDITIONAL CIVIL ENGINEER III SHOULD BE AUTHORIZED FOR THE ENGINEERING AND DESIGN DIVISION AND ONE OF THE THREE CIVIL ENGINEER I/II POSITIONS UPGRADED TO CIVIL ENGINEER III.

The project team analyzed the design workload for the Engineering and Design Division as of March 31, 2006. Important points to note regarding the workload of the Division are presented below.

- The Engineering and Design Division identified twenty-one active capital projects as being under design at the present time. This excludes projects under construction since the Division does not utilize a cradle to grave project management approach; the Division hands off the project to the Construction and Design Division once the design is completed.

- These twenty-one projects include Eisenhower Avenue, King/Beauregard grade separation, Duke Street Flyover, Eisenhower Trail, King and West Street, Bridge Repairs and Maintenance, Slaters Lane Railroad Crossing, Old Town Undergrounding, Forest/Hickory Groves, Diagonal Road, Monroe Nelson Alley, Holmes Run Sewer, Taylor Run, Braddock West storm sewer, Edsall Road storm sewer, Wilkes Street Tunnel, Duke Street Pedestrian Bridge, Cameron Run bike trail, Francis Hammond culverts, Arlandria – various projects, King/Beauregard Intersection, and Traffic calming – various projects.

- The design is 50% or more complete for fourteen of these twenty-one (21) projects.

- The design for sixteen (16) of these twenty-one (21) projects is being completed by consulting engineers.

- The total staff hour requirements for the twenty-one capital projects amounts to four hundred thirty one (431) staff hours per month or almost four staff.

- The Engineering and Design Division is allocated four (4) staff at the levels of Civil Engineer III that can function as project managers for consulting design. The Division also is allocated three (3) Civil Engineer I/II's, but these positions are too inexperienced to function as project managers. The positions are utilized to assist the Civil Engineer III's and design small capital projects.

- In addition to these twenty-one (21) capital projects, there are a number of engineering studies – such as the Lower King Street Flood Mitigation, combined sewers modeling, sewer mapping, etc. There are five (5) of these studies ongoing at present. Environmental Quality is managing one of these studies – the combined sewer modeling. A Civil Engineer III in the Engineering and Design Division manages the other four studies.

- In addition to these studies and capital projects, there are a number of citizen requests to which the Division must respond, such as storm water drainage analysis. These are estimated to require approximately 0.25 full-time equivalent staff. The Civil Engineer I/II's are ideally suited to these projects.

- Given the range, complexity, and depth of these projects and the number of studies and capital projects, an additional Civil Engineer III position would be warranted.

- In addition, through attrition, one of the three (3) Civil Engineer I/II's should be upgraded to Civil Engineer III. Given the Division's reliance on consulting engineers for design, there is insufficient workload to warrant these three (3) positions. One of these three positions could be more effectively utilized as a project manager; this would require reclassification of this position to Civil Engineer III when one of these three (3) positions becomes vacant.

Recommendation #75: An additional Civil Engineer III position should be authorized as a project manager for the Engineering and Design Division.

Recommendation #76: Through attrition, one of the three (3) Civil Engineer I/II's should be upgraded to Civil Engineer III.

7. ANALYSIS OF THE CONSTRUCTION AND INSPECTION DIVISION

7. ANALYSIS OF THE CONSTRUCTION AND INSPECTION DIVISION

This chapter presents an analysis of the overall organization, management, and operations of the Construction and Inspection Division. The Construction and Inspection Division is responsible for construction management and inspection of capital improvement projects and administers contracts for curb, gutter and sidewalk repairs. The Division is also responsible for the administration and coordination of all utility work conducted within public rights-of-way, inspections on all bonded development work, and enforcing the soil erosion control ordinance.

1. RESPONSIBILITY FOR CONSTRUCTION INSPECTION OF TRANSPORTATION AND ENVIRONMENTAL SERVICES DEPARTMENT CAPITAL IMPROVEMENT PROJECTS SHOULD BE CENTRALIZED WITHIN THE CONSTRUCTION AND INSPECTION DIVISION.

The Construction and Inspection Division is one of two divisions within the Transportation and Environmental Services Department that is responsible for the construction inspection of the Department's capital improvement projects. The other division is the Maintenance Division. The role of the Maintenance Division in conducting construction inspection is summarized below.

- **The Street Section is responsible for street overlay construction inspection and management.** An Inspector II in the Streets Section is responsible for managing and directing contractors responsible for patching and paving work, and for sidewalk, curb and gutter, and driveway apron replacement. This includes tracking daily activities, prioritizing and assigning work, and monitoring costs. The contract for street overlay amounts to approximately $1.4 million; the contract for overlay preparation amounts to approximately $0.4 million; and the contract for concrete replacement amounts to $0.5 million. The amount of construction contracts – $2.3 million – is insufficient to warrant a full-time Inspector II. The Inspector II is also responsible for the development of the City's five-year paving plan including informal inspection of streets, prioritization of paving needs and

development of a Streets list for repaving for Council approval. As noted previously, this responsibility should be transferred to the Engineering and Design Division. The Inspector II position should be transferred to the Construction and Inspection Division.

- **The Sewer Section is responsible for sewer relining projects**. Currently, the Inspector II in the Sewer Section is responsible for managing the contract for sewer relining. Contracts amount to approximately $300,000 to $400,000 annually. The Engineering and Design Division is also responsible for managing the design of other sewer relining projects. The Engineering and Design Division should be assigned the responsibility for preparation of the plans, specifications, and estimates for all sewer relining projects, including those currently managed by the Sewer Section. The Construction and Inspection Division should be responsible for managing and inspecting the construction of these sewer relining projects to assure adherence to the plans, specifications, and estimates including those including those currently managed by the Sewer Section.

The Construction and Inspection Division already assigns an Inspector II to the administration of the annual contracts for curb, gutter and sidewalk repairs. The reallocation of responsibilities for sewer relining projects and for street overlay and construction management is a logical extension of these responsibilities.

In addition, the two Inspector II positions in the Maintenance Division are underutilized from the standpoint of construction inspection. These two positions manage the annual construction of $2,700,000. This amounts to annual construction workload amounting to approximately 1,350 to 1,500 hours or approximately one full-time position. The reallocation of these two positions to the Construction and Inspection Division, therefore, should enable the elimination of one of the over hire positions. The annual cost savings from the elimination of a Transportation and Environmental Services Inspector II position would approximate $53,600 at the bottom step of the salary range.

Recommendation #77: The Inspector II position in the Streets Section responsible for managing contractors responsible for street overlay and overlay preparation,

and for sidewalk, curb and gutter, and driveway apron replacement should be transferred to the Construction and Inspection Division.

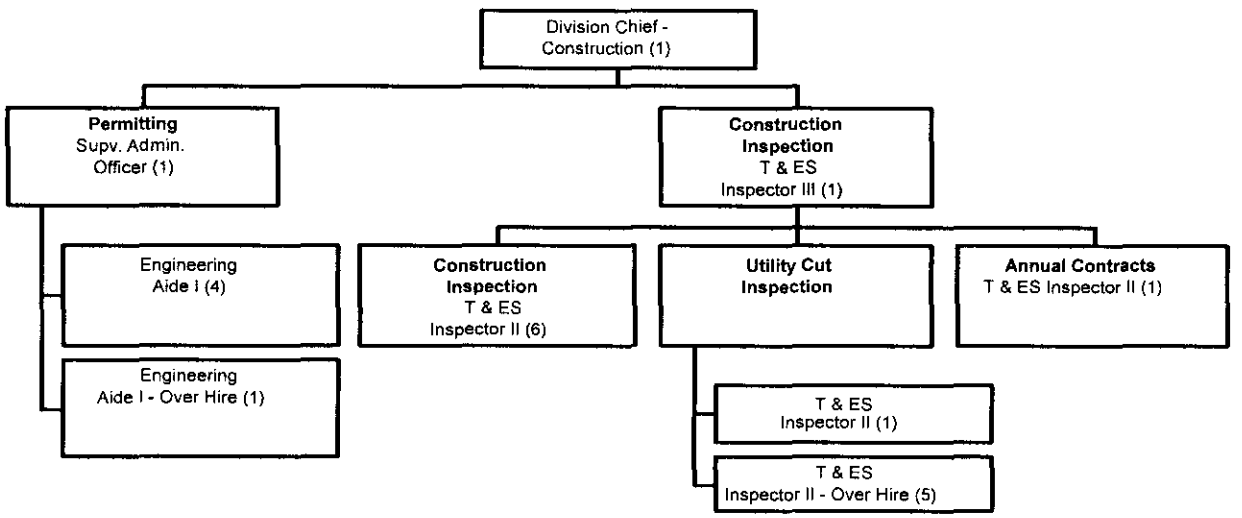
Recommendation #78: The Inspector II in the Sewer Section responsible for managing the contract for sewer relining and the MISS Utility Locates should be transferred to the Construction and Inspection Division.

Recommendation #79: The Construction and Inspection Division should assume responsibility for MISS Utility Locates.

Recommendation #80: A Transportation and Environmental Services Inspector II position should be eliminated through attrition.

2. THE SPAN OF CONTROL FOR THE TRANSPORTATION AND ENVIRONMENTAL SERVICES INSPECTOR III SHOULD BE REDUCED.

The chart, which follows, presents the current organization of the Construction and Inspection Division. As shown in the chart, the Construction and Inspection Division has fifteen authorized positions, as well as six over hire positions, and the span of control for the Transportation and Environmental Services Inspector III amounts to thirteen (13) Transportation and Environmental Services Inspectors.



The Transportation and Environmental Services Inspector III fulfills a number of important roles, including the following:

- Supervise, evaluate and assign work to thirteen Inspector II positions.
- Supervise the functional areas of Site Inspections, Utility Inspections, and Annual Contracts.
- Coordinate the work activities required of his assigned Inspectors in performing work for other divisions/departments, including Traffic, Maintenance, GSA.
- Monitor the work activities of Inspectors for sufficiency and appropriateness.
- Serve as a resource for Inspectors on complex or difficult issues related to the performance of their duties.
- Ensure that staff are appropriately trained and have necessary equipment/supplies to perform duties.

Over the next several years, the City will experience several projects, such as the Potomac Yard, that will result in the construction of large developer-constructed public improvements. The City will also experience several large capital improvement projects such as Eisenhower Avenue. The quality of the inspection of these projects and the quality of the supervision of these inspectors is critical. The span of control for the Transportation and Environmental Services Inspector III inhibits his ability to provide effective supervision. An additional Transportation and Environmental Services Inspector III position should be authorized, but both of these positions should function as lead workers assuming responsibility for inspection of smaller construction projects of MISS Utility Locates.

The additional annual cost for the Transportation and Environmental Services Inspector III approximates $97,900 annually in salary and fringe benefits at the top step of the salary range.

Recommendation #81: An additional Transportation and Environmental Services Inspector III position should be authorized.

Recommendation #82: The Transportation and Environmental Services Inspector III should assume a lead worker role by assuming responsibility for inspection of smaller construction projects.

3. INSPECTION STAFF SHOULD MAINTAIN DAILY DIARIES OF WORK ACTIVITIES.

A prevailing practice in the construction inspection profession is the utilization of daily diaries to document work activities in the field, including sites visited, inspections conducted, materials tested, approvals given, issues identified, etc. The project team's interviews with staff identified that while most Inspectors are making use of daily diaries, they were not being consistently maintained by every Inspector nor utilized in a consistent manner.

The necessity to keep accurate and timely records cannot be overemphasized. Field notes and records serve as justification for monthly pay estimates, documents for resolution of project issues or Contractor claims, and a means of providing project information to City staff associated with the project. It also could be the basis for sanctions against Contractors who fail to perform.

The Inspectors should complete daily Inspector's Reports through the use of standard forms on the City's network. The Inspectors should complete this standard form each day for each of the jobs that they inspect. The daily report should document project activities compiled from diaries kept in the field. This includes the purpose of the inspection, the work completed, the work in progress, the construction activities observed, the work zone safety observed, the logging of contract quantities performed by the Contractor on any given day, with the items, stations, quantities, and special

conditions accurately and duly recorded, the upcoming work, materials testing conducted that day, etc.

Recommendation #83: All inspection personnel should be trained in, and required to complete, daily diaries of work activities including sites visited, time spent on site, inspections conducted, materials tested, etc.

4. A CONSISTENT WEEKLY REPORTING FORMAT NEEDS TO BE DEVELOPED FOR CONSTRUCTION INSPECTORS.

All Inspectors assigned to the Construction and Inspection Division are currently required to prepare a weekly report for submission to the Division Chief which outlines major work activities on each assigned project during the preceding week. While a weekly site report format has been developed, Inspectors have not been required to utilize it. The Inspectors are free to utilize whatever format they choose in submitting this information with some utilizing the form and others providing alternative formats. This results in the Division Chief receiving reports in not only a variety of formats, but containing significantly different levels of detail. Additionally, those Inspectors utilizing the existing format did not always completely fill out the items contained on the form.

For example, inspection reports reviewed by the project team varied from a one page weekly report that summarized activities for the entire week with one entry for each project to a five-page report that detailed for each project, by day, the activities related to that project. The reports also varied in the manner of completion – handwritten versus typed. Without regard to the manner of completion, the reports varied considerably in the level of detail provided and were not consistent in the information contained within them.

The Division Chief or the Inspector III should develop a standard weekly report that outlines the information that should be reported. This information should include at a minimum the following items:

- Project Name;
- Contractor Name;
- Date visited and length of time spent on site;
- Summary of work performed on the project by date, including inspections conducted, discussions held with contractors, materials testing performed, etc.;
- Indication of whether work was completed in conformance to the approved plan and/or the City's minimum standards; and
- A description of any deficiencies noted and the action taken by the Inspector.

Reports should be signed by the Inspectors and submitted at the end of each week to the Division Chief.

Recommendation #84: The Division Chief or Inspector III should develop a standard weekly site report format for use by Inspectors. All Inspectors should be trained on the format and required to utilize the report when reporting weekly activities.

5. INSPECTORS SHOULD BE PROVIDED WITH WIRELESS DEVICES FOR ENTRY OF INSPECTION RESULTS.

The City's existing permitting system, Permit Plan, is capable of supporting remote access through laptop computers and this capacity is being utilized by other department's that also utilize the system. The Transportation and Environmental Services Department should develop a plan to provide laptop computers to each of the construction inspectors with access to the information contained within Permits Plus. The availability of laptops in the field would improve productivity in several ways, including:

- Enabling Inspectors to view permit information online rather than having to either return to their field office or call the Permits Section for information;
- Allowing Inspectors to view, notate, and approve permits from the field;
- Entering information, notations and comments related to site visits, inspections conducted, deficiencies noted, etc. for specific projects directly in Permit Plan; and
- Completing weekly reports in the field as the work is performed.

The system can be implemented in one of two methods – either with wireless access in the field for real-time interaction with the software or by requiring syncing with the main system daily for data transfer. Permit Plan has the capability for the system to be implemented either through wireless access that provides both real-time information and immediate access to all information or through daily syncing of the systems where information is updated daily. Real-time updating and access clearly provides for greater usability and functionality of the system for both field and office personnel, but also comes with a greater cost and technological investment. At a minimum the City should implement the system so that Inspectors sync their individual computers with the main system daily at their field office.

Recommendation #85: The Division should develop a plan for the implementation of laptop computers for all construction inspections.

6. POLICIES AND PROCEDURES RELATED TO MATERIALS TESTING SHOULD BE UPDATED.

The best practices developed by the American Public Works Association include the development of a written policy for materials testing to assure that materials that are incorporated into the construction project meet the accepted standards. The best

practice indicates that by establishing a standard for testing, the agency assures that a minimum number of tests will be performed to comply with specifications.

At the present time, the standards related to required materials testing are not contained within a single document. While Inspectors are responsible for overseeing the materials testing that occurs on a project, generally through third party independent labs, the specific requirements of when and how much testing required is not defined.

A set of standard material testing guidelines should be developed for all projects and included as part of Inspector training, pre-construction meetings, and all construction contracts.

Typical standards found in the industry include the following:

- Asphalt samples taken every two hours of continuous paving to measure gradation and oil content. On intermittent paving operations, samples should be conducted every 200 tons of asphalt applied.
- For continuous paving, asphalt coring shall be done for each lane every five hundred feet. For T-Top paving, cores shall be taken every one thousand feet. For intermittent paving, cores shall be taken at the discretion of the Inspector.
- Asphalt temperature shall be taken regularly during the paving process. This temperature reading will be taken behind the laydown machine screed. The station and location of these readings will then be entered into the Inspector's Daily Report.
- Asphalt tickets shall be designated by lane, station, and date.

Standards expected of contractors should be clearly outlined in all construction contracts with clearly outlined documentation requirements that will be provided to the Inspector.

Recommendation #86: The standards for materials testing conducted by Inspectors and contractors should be clearly outlined and documented in a formal City policy. The standards should be reviewed as part of each pre-

construction meeting, and included as part of all construction contracts. Inspectors should receive periodic training on conducting materials testing.

7. GIVEN CURRENT DEVELOPMENT WORKLOAD, TRANSPORTATION AND ENVIRONMENTAL SERVICES INSPECTOR II'S ARE UNDERUTILIZED.

The exhibit, that follows, presents a snapshot of development workload for the Construction and Inspection Division for February 2006. Important points to note concerning the table are presented below.

- This data is based upon the Transportation and Environmental Services Department development plan status report for February 2006. This report identifies the projects, the percentage completion, and the bonded value of the construction.

- The Construction and Inspection Division currently assigns six Transportation and Environmental Services Inspector II's to construction inspection of private site development. Five of these Inspectors allocate an estimated 90% of their available work hours to inspection of private site development. A sixth inspector allocates an estimated 50% of his time to inspection of private site development.

- Given this allocation of staff, a total of 8,250 hours should be available for construction inspection of private site development.

- In February 2006, there was approximately $10.3 million of bonded improvements that required construction inspection. This include a number of large projects, including Potomac Greens with a remaining construction value of $2.8 million, Monarch (Hennage) with a remaining construction vale of $1.3 million, and Potomac Yard Infrastructure with a remaining construction vale of $1.4 million.

- The workload demand presented by these projects – based upon a snapshot in February 2006 – represents approximately 6,800 staff hours on an annual basis.

- This workload was developed using cost of construction guidelines presented in the previous chapter, the hourly labor cost associated with the provision of construction inspection and construction management services, and the percentage of the project that was completed In February 2006. For example, the Post at Carlyle was 40% complete in terms of construction in February 2006. The construction cost, based upon the performance bond, was $292,115. Construction inspection and management costs should proximate 6% of construction costs. The costs of construction inspection and management were estimated at $90 per hour based upon the City's consulting contracts. This

project should require approximately four weeks of construction inspection staff hours to complete.

- This overall assessment would indicate that the current level of staffing is underutilized – in February 2006 - given the current level of workload. The capacity exceeds workload demand by approximately one staff year.

This workload can readily change with the construction season, but it indicates that there is capacity to absorb additional inspection workload without the addition of staff. The Construction and Inspection Division should utilize these monthly reports issued by the Site Plan Coordinator to monitor their workload. The Division should delay filling over hire positions until workload trends begin to increase indicating that the Division's workload will soon exceed capacity.

Recommendation #87: The Construction and Inspection Division should utilize the Development Plan Status monthly reports issued by the Site Plan Coordinator to monitor their development-related workload.

Recommendation #88: The Construction and Inspection Division should delay filling over hire positions until workload trends begin to increase indicating that the Division's workload would soon exceed capacity.

Construction Inspection Workload

Sit/DSP #	Project Name	% Complete	Bond Amount	Construction Workload
94-024	Townes at Cameron Pike	100%	N.A.	
94-030	Stonegate B-Hamptons	100%	N.A.	
95-001	Edsall Road Townhouses	100%	N.A.	
95-026	MVA Townhouses	98%	$72,453	$1,449
96-002	Ford's Landing	100%	N.A.	
96-003	Park Center Apt., Phase III	100%	N.A.	
96-007	Cameron Station Channel	100%	N.A.	
96-012	Cameron Station Phase Ii	99%	$800,000	$8,000
96-013	Old Town Village	100%	N.A.	
96-015	Gadsby Court	100%	N.A.	
96-019	Cameron Station Pond	100%	N.A.	
96-022	Cameron Station Phase I	99%	$1,000,000	$10,000
96-029	Portner's Landing	100%	N.A.	
96-032	Cameron Station Phase III	99%	$300,000	$3,000
96-034	Stonegate C - Highpoint	100%	N.A.	
96-036	Alexandria Toyota	90%	$543,370	$54,337
97-005	Chicken Out	100%	N.A.	
97-010	King's Cloister	100%	N.A.	
97-011	CVS Pharmacy	100%	N.A.	
97-016	Potomac Yard Sanitary Sewer	100%	N.A.	
97-033	Fairview Development	100%	N.A.	
98-002	Waste-To-Energy Facility	100%	N.A.	
98-003	Saul Center	98%	$166,860	$3,337
98-004	LDS Church Parking	100%	N.A.	
98-007	Hampton Inn	100%	N.A.	
98-015	Dartmouth Place	100%	N.A.	
98-017	Lloyd Estates	100%	N.A.	
98-019	Eisenhower Self Storage	100%	N.A.	
98-028	Ellsworth/Howell Building	100%	N.A.	
98-030	Fayette Apartments/Hotel	100%	N.A.	
99-001	Metzger Site	99%	$71,071	$711
99-004	Potomac Club II	100%	N.A.	
99-005	Cameron Station Phase V	99%	$493,688	$4,937
99-008	CVS Pharmacy	100%	N.A.	
99-012	Stonebridge Office Building			
99-016	Alex Tech Center VII	100%	N.A.	
99-018	Hunting Creek Apartments	100%	N.A.	
99-019	Seminary Towers/Hills	99%	$80,612	$806
99-033	Wilkes Corner	100%	N.A.	
99-035	Coca-Cola Distributor	100%	N.A.	
99-041	FedEx Center	100%	N.A.	
99-043	Sunnyside II	100%	N.A.	
99-044	Towns of Sara	90%	$10,000	$1,000
99-045	Towns of Joseph	90%	$5,000	$500
99-048	Episcopal High School Dorm	100%	N.A.	

Sit/DSP #	Project Name	% Complete	Bond Amount	Construction Workload
99-049	Bush Hill Apartments	100%	N.A.	
99-050	Jeferson at Mill Apartments	100%	N.A.	
99-061	S.H.R.M. Building	95%	$55,840	$2,792
99-062	Alexan Apartments	100%	N.A.	
99-064	Episcopal High School Fine Arts	100%	N.A.	
00-001	EYA Townhouses	100%	N.A.	
00-005	Ashton Manor	100%	N.A.	
00-006	Wales Alley	98%	$5,000	$100
00-008	Old Town Crescent	100%	N.A.	
00-009	Arlandria Shopping	100%	N.A.	
00-013	Wastewater Facility	100%	N.A.	
00-021	Braddock Lofts	98%	$50,000	$1,000
00-022	Battery Heights	100%	N.A.	
00-024	Backyard Boats	100%	N.A.	
00-028	Hoffman Town Center	100%	N.A.	
00-034	Hoffman Inter. Parking	100%	N.A.	
00-039	Restaurant Depot	100%	N.A.	
00-040	Carlyle Crescent	100%	N.A.	
00-044	Hammond School	100%	N.A.	
00-046	Lyles Crouch School	100%	N.A.	
00-048	Marriott Residence Inn	100%	N.A.	
00-049	St. Stephens/St. Agnes	100%	N.A.	
00-051	West Street Office Building	75%	$56,869	$14,217
00-054	PTO Carlyle	100%	N.A.	
01-001	Liberty Row	95%	$149,540	$7,477
01-003	The Post at Carlyle	40%	$292,115	$175,269
01-006	1229 King Street O.B.	95%	$26,852	$1,343
01-007	Lindsay Motors	100%	N.A.	
01-011	Seminary Towers Center	99%	$21,100	$211
01-012	Episcopal High School	100%	N.A.	
01-014	Northampton Place Phase I	100%	N.A.	
	Northampton Place Phase II	15%	$133,116	$113,149
01-019	Garrett's Mill	100%	N.A.	
01-020	Alex Hospital	100%	N.A.	
02-001	Preston Condo/Townhouses	85%	$130,020	$19,503
02-002	Mill Race	100%	N.A.	
02-005	Ford Nature Center	100%	N.A.	
02-006	Old Presb. Meeting House	100%	N.A.	
02-009	Duke Street Mixed Use	70%	$174,400	$52,320
02-011	Potamoc Yard - Haul Road	5%	$14,821	$14,080
	Arlington Co At Route 1	0%	$13,880	$13,880
	Landbay M & K Multi-Purpose Field	10%	$59,645	$53,681
02-014	Carlyle Place	100%	N.A.	
02-016	Public Safety Center	100%	N.A.	
02-022	Tuscany at Landmark	5%	$156,515	$148,689
02-024	Durant Recreation Center	100%	N.A.	
02-026	Potomac Greens	25%	$3,746,468	$2,809,851
02-028	Potomac Plaza	90%	$404,262	$40,426

Sit/DSP #	Project Name	% Complete	Bond Amount	Construction Workload
02-029	Samuel Madden Site	95%	$737,100	$36,855
02-036	Mercedes Benz of Alexandria	100%	N.A.	
	Mark Center	100%	N.A.	
	54th Storm Pipe	50%	$10,000	$5,000
02-041	DSF/Long	100%	N.A.	
02-043	Postmasters Site	100%	N.A.	
02-044	T.C. Williams High School	33%		
02-045	Minnie Howard School	100%	N.A.	
02-048	Quaker Ridge	20%	$261,090	$208,872
02-049	Pickett's Ridgte Phase I	90%	$25,981	$2,598
02-050	Alexandria Toyota Addition	35%	$543,370	$353,191
03-002	Pedestrian Concourse	100%	N.A.	
03-004	1008 Wythe Street	95%	$13,544	$677
03-005	Episcopal High School Science Center	100%	N.A.	
03-006	Maury School Addition	100%	N.A.	
03-007	Cooper Dawson	100%	N.A.	
03-010	Carlyle Block G	35%	$110,919	$72,097
03-013	Glebe Road Townhouses	5%	$106,944	$101,597
03-016	Duncan Library Addition	95%	N.A.	
03-017	Cameron Station Phase VII	50%	$192,618	$96,309
03-018	Cameron Station Phase VI	40%	$515,165	$309,099
03-019	Monarch (Hennage)	10%	$1,442,036	$1,297,832
03-020	WRIT Development	15%	$182,895	$155,461
03-023	Carlyle Block E	0%	$73,895	$73,895
03-026	Lynne House	100%	N.A.	
03-030	Virginia Theological Seminary Housing	100%	N.A.	
03-035	Duncan Library Addition	95%	N.A.	
03-036	Pickett's Ridge Phase II	5%	$21,262	$20,199
03-038	Crown Station		N.A.	
03-039	Pentagon Federal Credit Union	95%	$113,431	$5,672
03-041	Carlyle Block F	5%	$166,950	$158,603
03-042	Quaker Village		N.A.	
04-001	Prescott Condo	2%	$198,526	$194,555
04-005	Oak Grove	33%	$740,521	$496,149
04-009	Holmes Run 72" Sanitary	95%	$3,450,000	$172,500
04-012	St.Pierre Properties	0%	$48,265	$48,265
04-013	General Washington Club	1%	$160,673	$159,066
04-014	Jamestown Village	50%	$47,334	$23,667
04-015	Beasley Square		N.A.	
04-019	Fairchild Townhouses	35%	$109,200	$70,980
04-020	A.H.R.A. Housing	95%	N.A.	
04-021	A.H.R.A. Housing	80%	N.A.	
04-022	A.H.R.A. Housing	80%	N.A.	
04-025	Fox Chase Shopping Center	30%	$517,178	$362,025
04-044	Potomac Yard Master Storm water		N.A.	

Sit/DSP #	Project Name	% Complete	Bond Amount	Construction Workload
04-045	Potomac Yard Infrastructure	5%	$1,482,515	$1,408,389
04-048	Potomac Yard Land Bay H		N.A.	
05-004	Fayette Plaza Residential Retail		N.A.	
05-005	Mill Race Bid I Phase IV	5%	$412,248	$391,636
05-0200	Mill race Bid II	5%	$580,234	$551,222
				$10,332,475

8. ANALYSIS OF PAVEMENT MARKING

8. ANALYSIS OF PAVEMENT MARKING

The scope of the management study of the Transportation and Environmental Services Department was expanded to include the analysis of pavement marking. This evaluation is intended to focus on alternatives to replacement of the $175,000 paint truck for street striping or pavement marking. The replacement of this vehicle was scheduled for fiscal year 2006-07; the vehicle was originally placed in service in 1994.

1. THE TRANSPORTATION DIVISION IS RESPONSIBLE FOR MANAGING THE PAVEMENT MARKING PROGRAM.

The Transportation Division provides and maintains a comprehensive Citywide traffic signal system, including the traffic computer system linking many of the City's signaled intersections. The Transportation Division also provides and maintains a roadway signing network and pavement marking program; maintains City parking meters and collects meter revenues; and operates the vehicle impounding facility. The Division implements traffic calming and other traffic initiatives to improve pedestrian and vehicular safety in City neighborhoods.

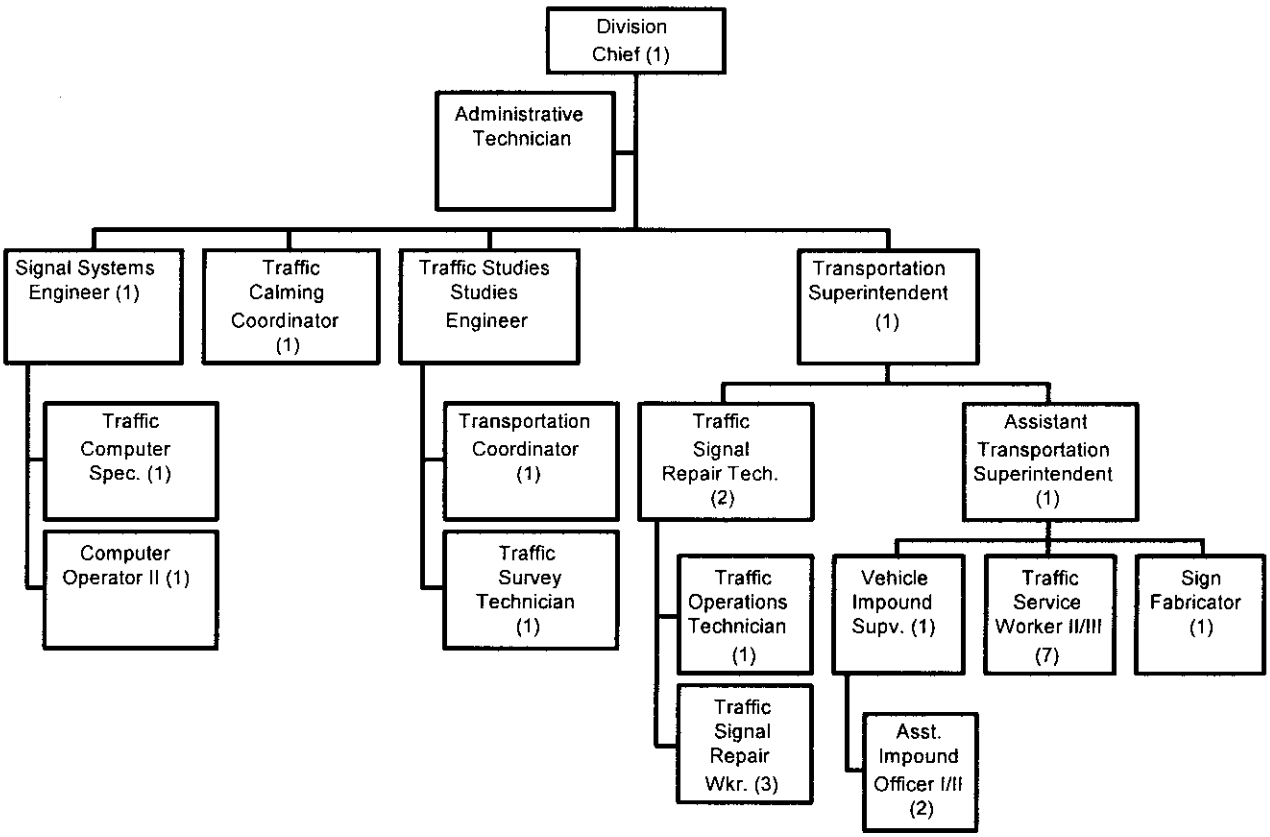
The Division is authorized twenty-eight (28) staff. This staff is assigned to programs as described in the paragraphs below.

- Three (3) staff are assigned to signal systems engineering, including the traffic computer system linking many of the City's signaled intersections.
- Three (3) staff are assigned to traffic studies.
- One (1) staff is assigned as the traffic calming coordinator.
- Six (6) staff are assigned to maintenance and repair of the traffic signals.
- Twelve (12) staff are assigned to traffic sign maintenance, pavement marking maintenance, and the operation of the vehicle impound lot. Of these twelve (12)

staff, three (3) staff are assigned to the operation of the vehicle impound lot, and eight (8) staff to traffic sign maintenance and pavement marking, and one (1) staff manages these twelve (12) staff.

- Three (3) staff are assigned to administration.

The plan of organization is presented below. This reflects the authorized, but not necessarily filled, positions.



2. THE TRANSPORTATION DIVISION IS RESPONSIBLE FOR THE MAINTENANCE OF 186.7 MILES OF PAVEMENT MARKING.

The Transportation Division has not developed an inventory of the infrastructure that it is responsible for maintaining. To document the inventory of pavement markings, the GIS Division utilized its maps. The pavement marking inventory developed as a result of this effort is portrayed below.

- Single Solid White: 16.4 lane miles
- Single Solid Yellow: 0.9 lane miles
- Single Dashed White: 98 lane miles
- Solid Dashed Yellow: 2.4 lane miles
- Double Solid Yellow: 69 lane miles

Overall, the City has 17.3 lane miles of single solid pavement markings, either white or yellow, 100.4 miles of single dashed pavement markings, either white or yellow, and 69 miles of double solid yellow pavement markings.

3. THE TRANSPORTATION DIVISION ESTIMATES THAT IT ALLOCATES APPROXIMATELY 150 STAFF DAYS ANNUALLY TO PAINTING OF THE PAVEMENT MARKINGS.

The Transportation Division estimated that it allocated five staff for a period of six weeks to painting of pavement markings. This is the equivalent of 150 staff days annually to this effort.

4. THE THERMOPLASTIC TRUCK SHOULD BE ELIMINATED.

The Transportation Division previously applied their own thermoplastic for pavement legends such as crosswalks. The Division now utilizes contractors to provide this service.

The thermoplastic truck has not been utilized for two and one-half (2-1/2) years. The odometer reading in February 2006 was 2,272 miles. The Transportation Division indicated that it no longer needed the truck, and that it could be surplused or that the City should recycle the truck body.

Recommendation #89: The thermoplastic truck assigned to the Transportation Division should be surplused or the City should recycle the truck body.

5. THE CITY SHOULD SEEK BIDS FOR ANNUAL PAINTING OF PAVEMENT MARKINGS.

The Transportation Division utilizes the $175,000 paint truck for street striping or pavement marking. However, the Division only utilizes this vehicle for six (6) weeks in the fiscal year or 12% of the year. The remainder of the fiscal year, it is largely unutilized. The replacement of this vehicle was scheduled for fiscal year 2006-07; the vehicle was originally placed in service in 1994. The annual replacement cost for this equipment approximates $15,000.

Montgomery County, Maryland contracts for pavement marking with a firm based in Dumfries, Virginia. The County uses a different approach than Alexandria for pavement markings, using thermoplastic as well as paint. The County only utilizes a limited amount of paint annually for its pavement markings – a little less than twenty (20) miles annually. The cost to the County for these services is $10,900 annually. The total contract amounts to $287,675 annually. The County allocates larger funding for thermoplastic.

Utilizing the unit costs contained within this contract indicates that the costs to the City for outsourcing this service would approximate $98,600 to $118,300 annually. However, discussions with the contractor indicated that the volume of work involved in Alexandria would generate a lower unit price than the bid for Montgomery County.

The unit prices would have to decrease significantly to warrant the outsourcing of pavement markings and the surplusing of the street striping vehicle. However, it would be worthwhile to issue a request for bids and test the marketplace and determine

whether the unit price would decrease significantly with the volume of work in Alexandria.

Recommendation #90: The City should issue a request for bids for pavement markings.

APPENDIX – BEST MANAGEMENT PRACTICES

APPENDIX – BEST MANAGEMENT PRACTICES

1. Engineering Design

Best Management Practice	Strengths	Opportunities for Improvement
The engineering and design services provided by the City of Alexandria are centralized to capture economies of scale.		The Capital Projects Division, General Services Department, is responsible for providing construction management for building maintenance, repair, and renovation projects (and coordinating telecommunications programs; managing City utility usage; overseeing contractor operation of City parking facilities; and monitoring building leases). The Maintenance Division is responsible for preparation of the five year paving plan and for management of the reconstruction and resurfacing of streets.
A six-year capital improvement program has been developed by Alexandria and adopted by the City Council.	The City of Alexandria utilizes a six-year capital improvement program for planning and funding capital improvements and projects. The plan is presented to and adopted by the City Council.	
The six-year capital improvement program for the Capital Projects Management Division clearly identifies the goals, priorities, and expected outcomes of the program.	CIP document identifies priority of project in one of three categories (Essential, Very Desirable, and Desirable). Each project lists detailed information regarding the project scope and purpose and estimates the useful life of the project.	The CIP document does not correlate each project with adopted goals of the City; however, a summary narrative in the introduction does provide an overview of the total funds allocated to specific goals such as achieving excellence in public schools, More consistent/detailed data regarding the impact of each capital project on operations would be beneficial.

1. Engineering Design (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
The ratio of supervisory and support positions to line employees is reasonable.	The ratio of supervisory and support ratios in the Engineering Design Division are in line with accepted levels. There are six primary supervisory personnel and sixteen line employees. The Division Chief directly supervises six individuals.	
Staffing requirements for all of the capital projects in the first year of the five-year capital improvement program have been identified.		CIP projects do not identify the staff requirements necessary for implementation of approved projects.
Staffing for design and inspection of capital projects is based upon cost of construction guidelines.		Staffing decisions are not based upon cost of construction guidelines or other standards that would identify the necessary staff resources needed for design and/or inspection work during project implementation.
The Division has a clear outsourcing strategy that focuses on core competencies and the continuity of the workload.	Projects in excess of certain thresholds are contracted out for completion of design work. Certain types of activities (such as bridge projects) are contracted out to firms with special expertise.	No formally adopted policy has been established that identifies the internal core competencies available for handling adopted projects. Project size is utilized as basis for contracting out rather than the nature of the work.
Billability targets have been set for engineering staff for the design of capital improvement projects and management monitors their success in meeting these guidelines.		No staff utilization (or billability) targets have been established for staff. Time allocation by project is not tracked or monitored consistently to determine staff workload.

1. Engineering Design (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
A Gantt chart schedule has been developed for capital improvement projects for a two to three year period.		Capital projects are not tracked through the use of Gantt charts or other scheduling mechanisms to monitor or track future anticipated workloads.
There are clear, easily read capital improvement program project status reports that match the level of detail needed by the expected audience.		Capital improvement project status reports are not developed by Design Staff on a consistent basis or in a standard format. Reports are generally developed ad hoc to address issues that arise.
The customers receive quarterly updates that contain status, schedule, task/time assessments, budget update, program update, potential problems, and critical issues.		No periodic reports for scheduled projects are presented to customers of the Design Division to provide status updates or identify project issues/problem.
Capital projects are scoped and cost estimates developed before the commencement of design.	Preliminary project scoping and cost estimates are developed for budgeting purposes prior to the commencement of design work.	Not all project scoping and cost estimates are initially prepared by the Engineering Design Division. Project scoping and cost estimates provided by operating departments often require revision following commencement of design work.
A project cost accounting system is utilized to enable comparisons of planned versus actual staff hours for the design and inspection of capital projects.		No comprehensive project cost accounting system is utilized for capital projects that cover staff hours necessary for the design and inspection of capital projects. Planned versus actual staff hours are not tracked.

1. Engineering Design (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
Project managers have access to the automated financial management system to monitor the actual versus planned design, inspection, and construction costs for capital projects.		Project managers do not have available information from an automated financial management system to monitor costs for in-house design and inspection work. Construction costs are monitored through the financial system enabling comparison of projected and actual construction costs. On capital projects where design work is contracted out, project managers have the ability to gather information necessary to compare planned versus actual design costs.
Quality control and evaluation mechanisms (e.g., final report) have been developed at the completion of capital improvement projects to enhance learning and correction of problems.	Final reports are developed for each capital project that is completed.	No systematic process is in place requiring periodic review of final reports for a "lessons learned" analysis or identification of problems that should be corrected on future projects.
A project manager is assigned to the management of the design, construction inspection, and construction management of capital improvement projects.	A project manager is assigned to each CIP project to oversee the completion of design work, inspection activities, and construction management.	
Project managers are responsible for capital improvement projects from cradle to grave, with the authority, expertise, and responsibility to keep capital projects within budget and on schedule for project development, design, construction inspection, construction management, and close-out.	Project Managers maintain responsibility for capital projects from concept to completion. Following completion of design work, day-to-day responsibility for the project oversight rests with the Construction Inspector who involves the Project Manager as needed on items other than minor changes.	

1. Engineering Design (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
Standard design criteria (such as minimum grades for pipelines, maximum manhole spacing, etc.) have been established in writing.	Standard design criteria have been established and are utilized as part of project design review.	Standard design criteria are currently under review.
A project management procedures manual has been developed for capital project management and construction management.		No manual exists outlining accepted project management approaches or guidelines.
Capital project management procedures are disseminated to customers.		Since no procedures manual currently exists, procedures have not been disseminated to customers.
An automated project management system has been acquired, and all of the engineering staff have been trained in and utilize the system.		No project management system is utilized, other than excel spreadsheets, outlining current project status. Project management forms outlining schedule and costs for each phase of the project (planning/study, design, permitting, ROW acquisition, bidding, construction and close-out) are under development.
30%/60%/90% reviews of the design of capital improvement projects are conducted by Inspectors.	Routine design reviews are being conducted at 90% completion of design work. Additional design reviews are only conducted if a staff member requests or when staff identifies a significant deviation from original scope. Construction Inspectors are involved beginning in the second round of site plan review.	

1. Engineering Design (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
Change order authority has been appropriately delegated to the City Engineer and the T&ES Director.	T&ES staff has authority to approve change orders to projects. Change orders are reviewed by Construction and Inspection Chief and Division Chief as necessary.	
A change order contingency is set-aside at the start of a project.		Not all projects contain a contingency amount to address change orders that may arise during construction. Inclusion of change order contingency varies depending upon size of project.
The design consultant selection is qualification based.	The Department utilizes a RFQ process to identify engineers of record based upon their qualifications. Engineers of records are categorized according to their specialty.	
An annual RFQ solicitation is used to develop an on-call list of pre-approved consultants.	The RFQ solicitation is completed annually. The process for 2006 is currently being conducted.	
Design of capital projects are accomplished on a 2D CAD system.	Capital projects are designed on an AutoCad system.	
Authority has been delegated to the T&ES Director to approve low dollar consultant and construction contracts.	The T&ES Department has the authority to award contracts for design work up to $200,000 to engineers of record that have been prequalified through the competitive process.	

1. Engineering Design (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
A consultant rating system is utilized that identifies and evaluates the quality of consultant performance.		Consultants/engineers of record placed on the pre-qualified listing are not rated on the quality, accuracy, or timeliness of their work following completion of projects. Staff maintains discretion not to utilize engineer of record if prior work was not at a satisfactory level.
Utility master plans have been prepared for the storm water and sanitary sewer collection systems.		Other than a comprehensive I&I report, utility master plans have not been completed for storm water and sanitary sewer systems.
A formal pavement management system has been developed and installed to preserve the City's pavement		Determinations regarding annual pavement programs are based upon the professional recommendation of the Maintenance Division Chief. No comprehensive road evaluation or rating process has been implemented. The Department does not have a formal pavement management system for planning and estimating future workloads based upon current street conditions.
Approximately 1% to 2% of storm water and sewer collection mains are replaced or relined annually.		Sufficient information is not yet available to determine whether the City meets this benchmark.
The City maintains permanent monuments and benchmarks to establish horizontal and vertical positions.	The survey crews maintain permanent survey monuments and benchmarks.	

1. Engineering Design (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
Appropriate crew sizes are utilized for land surveying in support of design and construction.		The land surveying crew size is three employees, which is greater than the industry standard of two surveyors (for digital/laser surveying) or one surveyor (GPS surveying).
Efficient global positioning, digital and laser technology is utilized for land surveying.	Alexandria is utilizing both laser and GPS technology for survey work.	

2. Engineering Development Review

Best Management Practice	Strengths	Opportunities for Improvement
Permit Plan is utilized to (1) accept and issue engineering permits; (2) assure the status of each permit submittal is visible during the plan check process; (3) manage the processing time for engineering permits; (4) provide a database of engineering permits; (5) enable all of the departments/divisions involved in the engineering development review process to enter and retrieve data; and (6) facilitate customer service through access to the internet to enable customers to submit routine engineering permit requests.	Permit Plan is utilized for the issuance of permits, tracking the status of permits, providing a comprehensive database of permits approved, and ensuring consistency with established standards. Field inspectors have access to Permit Plan in their remote office.	Permit Plan is not available through the Internet for customer submission of permit applications. All departments and divisions involved in the issuance of permits do not directly enter information into Permit Plan. Field inspectors do not have field access to the Permit Plan data via handheld devices to enable field checking of permit information.
A one-stop shop exists for submittal of all of the City's development review plan applications; engineering applications are submitted at the City's permit center. Engineering staff is available at the City's permit center.	A one-stop shop process is utilized as part of the development review process. Engineering Aides staff the permit counter to provide assistance to those filing permits.	The one-stop shop is only available on Wednesday for small permits. It is available only in Codes.
The extent of development review applications deemed incomplete by the Engineering and Design Division after the initial application review is no more than 25% to 33%.	The Department utilizes a completeness review check as part of the development review process.	Sufficient data not yet compiled to assess this practice.
Engineering development review applications are checked at the counter upon submittal for initial completeness and rejected if missing basic items.	Initial applications for development review are received by the Planning Department. Initial review for completeness is part of the development review process as a formal completeness check. Individual departments review the application for completeness and accuracy of submitted plans.	

2. Engineering Development Review (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
Cycle time objectives for the processing of the development review applications by the Engineering and Design Division have been established.	Current cycle time objective is to review all applications received, and is established Citywide. This ranges from four weeks (for initial submission) to two weeks (final reviews).	Review time for Design staff is frequently more than the allowed cycle time objective due to the time it takes for plans to be disseminated from the Planning Department following receipt.
A monthly report is generated reporting actual vs. planned performance against these cycle time objectives.		No reporting mechanism is in place to determine compliance with established cycle times. However, failure to complete reviews within established time periods may result in application being processed absent review by the applicable department.
Decision-making authority has been delegated to Engineering for the approval of low exposure/low impact engineering application and permits.	Engineering and Permitting staff have the authority to approve routine applications and permits that are submitted where no deviation from existing standards exist.	
Engineering permits are processed using a concurrent process. Permit applications are distributed simultaneously to all of the departments/divisions for plan review.	Permit review is done concurrently with applications distributed for review to necessary staff members. The Site Plan Coordinator is responsible for securing and compiling comments from all staff within the established review period.	

2. Engineering Development Review (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
Engineering utilizes a case management system to manage the length of calendar time required for processing of engineering permits. The system includes (1) cycle time objectives for the length of time for completion of processing; (2) collection of actual processing time using the automated permitting system to enable a comparison to these targets, and (3) the exercise of authority by Engineering with the other departments/divisions to resolve delays in completion of plan checks.	To a limited extent, Permit Plan is utilized for tracking outstanding permit reviews and plan checks.	An excel spreadsheet is utilized as the primary method of tracking outstanding requests for plan reviews. While the ability exists for all comments to be submitted on Permit Plan, some comments are still received in hard/electronic copy and are compiled and entered into Permit Plan by the Site Plan Coordinator. All comments entered directly into Permit Plan by employees are marked draft until review by the Site Plan Coordinator who finalizes all T&ES Comments prior to submission to the Planning Department. No tracking or comparison of actual time versus cycle time objectives is conducted.
Up-to-date standard specifications are available that are easy for staff to interpret and understand, including an index to make sections of the standard specifications easy to locate.		Staff has identified the need to review, update, and restructure the standard specifications to increase consistency of application and ease of use.
The standard specifications are reasonable and do not impose unreasonable development requirements.	Specifications were developed to ensure applications meet applicable codes and regulations regarding development standards and design and safety standards adopted by the City.	
The conditions of approval utilized by Engineering are practical.	Conditions of approval are standardized and are directly related to the implementation of approved standards and regulations.	

2. Engineering Development Review (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
Engineering and Design fully recovers the costs of development reviews, including direct and indirect costs.		Full costs of development review do not appear to be covered by existing fees associated with plan review. Sufficient tracking of staff time has not occurred that would enable detailed review of actual direct costs associated with the process.
The City annually conducts a cost of service analysis to update the costs of providing development review services and update the fees.		No annual cost of service analysis is conducted. A comprehensive user fee study for the Planning and Zoning Department was previously conducted in 2002 by the Mercer Group for the City of Alexandria. As part of this study, estimates were developed regarding the annual costs of T&ES development review services. Policy decisions were made not to seek 100% cost recovery for these services.
Engineering permit processing checklists have been developed for the various types of submittals to enable the staff to focus their attention on the relevant aspects of permit application and assure uniformity among staff. These checklists are available on the Division's website.	Extensive checklists and submission requirement guides have been developed for use in reviewing submissions to ensure consistency and completeness of conducted reviews. Separate checklists have been developed for functional areas and include Erosion and Sediment Control, Environmental Issues, Storm Drainage, Storm Water Management, Sanitary Sewer, Street Design and Lighting, and General Requirements.	

2. Engineering Development Review (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
GIS is readily available to engineering development staff to facilitate the analysis of permit applications.	Engineering development staff have access to the City's GIS for use in review of applications.	
An inter-departmental development review committee is utilized to coordinate the review and consideration by staff of the development review permit applications.	The City of Alexandria utilizes a comprehensive inter-departmental development review committee involving staff from Engineering, Design, Planning, Fire, Environmental Services, and Traffic. The committee meets to discuss applications and ensure that issues and concerns are shared and addressed prior to permit issuance.	
The level of staffing for processing of engineering permit applications is commensurate with workload.	Staffing has been adjusted in recent years to increase the staff assigned to processing permit applications based upon increased development activities.	Detailed review of staff time spent on permit application processing has not occurred.
A positive approach to customer service is utilized through such approaches as:		
• Desk-level counters with chairs for both staff and the customer;		Desk level counters with chairs for both staff and the customer are not available.

2. Engineering Development Review (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
• The provision of easy-to-understand and attractive application guides to the engineering development review process	Checklists for individuals submitting site plans for the City of Alexandria have been developed that clearly outline what information and documents are required for a complete permit application. The checklists provide detailed information regarding the minimum information requirements that must be addressed as part of the submission. The checklists also outline additional information that may be required depending upon the nature and location of the project.	
• The use of a periodic newsletter to keep developers appraised of changes to the standard specifications, staff, etc; and		Changes to the standard specifications are not distributed via newsletter to the development community.
• The use of customer surveys to assess the satisfaction of customers.		No customer surveys have been employed to assess customer satisfaction with the current service level.
Proffers are utilized to offset the impact of rezoning development on the City's infrastructure.	The Departments actively utilize proffers to minimize the impact of developments upon the City's services and infrastructure.	
The City's survey records are available to the public on the internet.		Survey records are not available to the public on the internet.

3. Construction and Inspection

Best Management Practice	Strengths	Opportunities for Improvement
The construction and inspection services provided by the City of Alexandria are centralized to capture economies of scale.		The Maintenance Division is responsible for managing contractors responsible for patching and paving work for the City, for sidewalk, curb and gutter, and driveway apron replacement and for sewer relining.
The ratio of management, supervisory and support positions to line employees is reasonable.	The ratio for most of the management and supervisory personnel is appropriate with two direct reports to the Division Chief and five Engineering Aides reporting to the Supervising Admin. Officer.	The number of direct reports to the Construction Inspector III totals fourteen individuals covering three functional areas.
Inspectors utilize automated input devices to record inspection results or display inspection history while in the field.		No automated or hand-held devices are available for use by the field Inspectors. The current permitting software is capable of handling such devices and they are utilized by other City Departments (for example, Code Enforcement).
Staffing for inspection of capital projects and private development projects are based upon cost of construction guidelines		While staffing levels are tied, in certain locations, to construction activity (for example – Carlyle), it is not tied to cost of construction guidelines.
A pre-construction conference is conducted at the beginning of each capital project construction contract. The prime contractor, pertinent subcontractors, the project manager, and inspector attend this conference.	Pre-construction conferences are held on larger capital projects with the prime contractor and relevant subcontractors.	

3. Construction and Inspection (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
The inspectors are responsible for checking and verifying the contractor's application for progress payment, and forwarding a recommendation of approved pay request to the project manager for payment.	Inspectors are responsible for reviewing accuracy and quantities on paperwork filed by contractors for progress payments. Inspectors approve pay requests and forward to appropriate administrative staff for processing.	
Inspectors make the initial analysis of change order requests for capital projects.	Inspectors are involved in reviewing initial requests for change orders. Larger requests are discussed with Division Chief of C& I and/or the City Engineer.	
The inspectors maintain a personal project diary, prepare daily reports, and keep accurate records of change orders, correspondence, progress payments, shop drawings, project mix designs, material tests, samples and approved traffic control plans.	Some construction inspectors maintain daily project diary of activities related to assigned projects including inspections, interactions with contractor, and material tests conducted (if applicable). Inspectors maintain project files containing correspondence, progress payments, drawings, materials tests, and approved traffic control plans.	Reports on Inspector activity are completed weekly but the format varies from Inspector to Inspector. Comprehensive use of daily dairies is not performed to track all activities performed by the Inspector or note all actions relative to project activities.
The inspectors verify the adequacy of construction survey and staking to ensure the work is correct including reviewing a sample of survey notes for grading, measurement of pay quantities, etc.	Construction Inspectors are responsible for verifying the adequacy of construction survey and staking. Several Inspectors are qualified as surveyors and assume this role as requested for verification. Inspectors review file documentation regarding grading and quantities.	

3. Construction and Inspection (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
The Inspectors schedule all testing with the contracted materials testing firm under current contract with the City and review the results of these tests.	Inspectors review all materials test results performed by third parties (if not actually done by City personnel). Inspector has discretion to require testing to verify compliance with contract terms.	On many projects, material testing is conducted by a third party firm hired by contractor. Testing generally scheduled by contractor.
All materials are covered by adequate quality control and acceptance tests in accordance with the contract's schedule of test requirements. These tests include:		
• Concrete cylinders shall be taken for each catch basin and specialty structure. Concrete tickets shall be identified by location and station.	Inspectors have ability to conduct air entrapment tests as needed. Inspectors review plant certifications regarding concrete.	Concrete cylinders are not taken for all catch basins or other specialty structures. Cylinders taken only on larger concrete pours/projects such as high-rise work.
• Asphalt samples for gradation and oil content shall be taken every two hours of continuous paving. For T-Top and intermittent paving, samples shall be taken a minimum of every 200 tons.	Contractors performing annual asphalt contracts are overseen in accordance with contract specifications by Inspector in Maintenance Division.	No fixed standards are established for the testing of asphalt. Inspectors utilize their discretion in determining when testing should be required.
• For continuous paving, asphalt coring shall be done for each lane every five hundred feet. For T-Top paving, cores shall be taken every one thousand feet. For intermittent paving, cores shall be taken at the discretion of the Inspector.	Inspectors may review documentation from the plant to determine how long material has been on the truck.	No fixed standards are established for the testing of asphalt. Inspectors utilize their discretion in determining when testing should be required.

3. Construction and Inspection (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
• Asphalt temperature is taken regularly during the paving process. This temperature reading is taken behind the laydown machine screed. The station and location of these readings are then entered into the Inspector's Daily Report.	Inspectors have available equipment to take asphalt temperature readings.	No fixed standards are established for the testing of asphalt. Inspectors utilize their discretion in determining when testing should be required.
• Asphalt tickets shall be designated by lane, station, and date.	Inspectors review tickets for compliance with necessary information including when and where material is applied.	
Newly constructed storm water mains are required to be videotaped before acceptance;	All newly constructed storm water mains are videotaped prior to acceptance.	
Newly constructed sanitary sewer mains are required to be air tested, flushed and cleaned, and videotaped.	Prior to acceptance by the City, all new sanitary sewer mains are subjected to vacuum test, flushing, and videotaping.	
The contractors furnish product data, mix designs, shop drawings, material certificates and samples in sufficient detail to show complete compliance with all specified requirements.	Inspectors monitor contractor compliance with specified requirements through review and verification of products utilized, drawings, material certificates and testing documentation.	

3. Construction and Inspection (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
The Inspectors and project manager or development engineer make the final walk through of the project to develop a punch list of clean up items for the contractor.	Inspectors conduct final inspection including development of a punch list for each project. Inspectors utilize initial plans and as-built documentation for conducting checks.	
After completion of the project, the contractor is required to complete as-built drawings.	Contractors provide as-built documentation to the City on all projects.	
The Inspectors are given a copy of all approved submittals and shop drawings. During the construction phase, the Inspector verifies the products delivered to the project matches the approved submittals.	Inspectors verify quantity and quality of materials utilized as part of their approval process for progress payments. Verification includes crosschecking supplied documentation against contract requirements and drawings.	
The Inspectors are required to develop communication plans for the public for capital projects including the provision of notices to the public living in the project area regarding the project.	Construction Inspectors require most communication plans to be handled by the contractor. The Inspector may require certain communication documents depending upon the nature of the project and it's location. Information is provided to residents and neighborhood associations. Smaller projects generally are not subject to this requirement.	

3. Construction and Inspection (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
Inspectors track warranty requirements and start and completion dates.	The City of Alexandria maintains two types of bonds on construction projects – performance and maintenance bonds. Construction Inspectors are involved in the determination of substantial compliance prior to the reduction of the performance bond to a maintenance bond. Performance bonds are tracked by the Site Plan Coordinator who maintains a listing of projects, including information on the type of bond being held, the project status and % of completion, and the expiration date. Maintenance bonds are required for two years following project completion.	
Nine months after substantial completion, the inspectors contact all applicable City Departments notifying them that the warranty period is expiring and any outstanding deficiencies should be reported.	Final inspections must occur prior to the release of performance and maintenance bonds. Construction Inspectors are responsible for ensuring contractor compliance with correction of punch list items.	
The Construction and Inspection Division posts their construction inspection standards on their website (such as maintenance of approved plans and city standard specifications on the job site, approval for changes to plans in the field, development of as-built plans, etc.).		Construction standards are not available on the City of Alexandria's website.

3. Construction and Inspection (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
The Construction and Inspection Division uses best practices for utility cuts including:		
• The adoption of utility cut fees in addition to right-of-way permit fees to be utilized for resurfacing of streets;	The City of Alexandria charges a $50 inspection fee in addition to the permit fee on all utility cuts. The City also charges actual and administrative costs for restoration work undertaken by the City when contractors fail to comply.	Utility cut fees have not been established in addition to the permit fees. Fee levels related to utility cuts are not periodically reviewed to ensure they are sufficient to cover costs.
• The requirement for a T-trench cut;	There is a requirement for a T-trench cut	
• The requirement for proper excavation backfill, compaction techniques, sufficient thickness of asphalt, and sealing of cut edges; and	Construction Inspectors verify that proper trenching and excavation procedures are complied with including restoration to appropriate standards. For a period of one year following permanent restoration, the entity who performed the utility cut is responsible for the City's cost of correcting any settlement that occurs.	

3. Construction and Inspection (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
• A moratorium on excavation of newly renovated or resurfaced City streets for 3 years after acceptance of a newly constructed street or renovated / resurfaced street.	Current policy prohibits excavation on recently resurfaced streets, alleys, or sidewalks within a five-year period following improvement except following a payment of surcharge. The surcharge is in addition to the normal permit fee and is set at 75% of the usual fee if the surface was improved in the last two years and 50% if the improvement was in the last five years. If the excavation or opening is in excess of 50 feet in length in a paved street which has been surfaced within the preceding five (5) years, the surcharge shall be an amount sufficient to resurface the street full width for the entire length of the opening.	The existing fee structure for excavation work on renovated or resurfaced streets has not been periodically reviewed to ensure that City costs are covered.
Inspectors assure compliance with NPDES requirements and City-adopted best management practices to mitigate the impacts of construction on storm water quality.	Inspectors are responsible for verifying contractor compliance with NPDES and the City's storm water run-off control requirements on behalf of the Environmental Quality Division.	

4. Maintenance

Best Management Practice	Strengths	Opportunities for Improvement
The ratio of managerial, supervisory and support positions to line employees is reasonable.	There are ten supervisors and managers in the Maintenance Division. This includes the Division Chief, Superintendents, Assistant Superintendent, and Labor Supervisors. This is a ratio of 1 to 4.3 line employees.	There is a one over one relationship in the Sewer and Storm Drain Construction and Maintenance Section with the Superintendent supervising the Assistant Superintendent.
The inventory of the infrastructure to be maintained has been documented and kept up-to-date.		The Division does not have a complete and accurate inventory of the infrastructure. The City is in the process of cataloging the infrastructure and capturing the data on its geographic information system.
A user-friendly commercial off-the-shelf CMMS is utilized that is easily accessible by management and supervisory staff to record maintenance activities, manage the maintenance program, and evaluate the value and costs of each maintenance activity.	The Division utilizes a service request system that enables partial tracking and documentation of requests for service from the public and other City departments.	The Divisions does not have a commercial off-the-shelf maintenance management system.
Levels of service have been developed that defines the frequency with which maintenance tasks are to be performed.		The Division has not formally defined levels of service.
An annual maintenance calendar has been developed that identifies when seasonal tasks will be performed		The Division does not have an annual maintenance calendar.

4. Maintenance (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
The Division has identified the maintenance activities and staff hours required to maintain the infrastructure using the inventory information, levels of service, and annual maintenance calendar.		The Division has not developed a formal needs assessment and plan with respect to staff hours, maintenance activities and resources needed to maintain the infrastructure.
Work orders are used to record all maintenance activities and staff hours.	The Division has a service request system. Staff is able to use this system to document service requests.	The service request system is limited. All work activities are not documented in the service request system and the system is not utilized to capture all relevant information (e.g., activities, staff hours, productivity, etc.).
A formal work planning and scheduling system is utilized to schedule the work of the staff.		Division superintendents make daily work assignments for crews.
Work accomplishments, performance, and expenditures are reported on an ongoing basis.		The Division does not have a formal, management reporting system. Data are not presented to managers and decision makers on an ongoing basis.
Quality standards have been developed for the maintenance of street, sewer, sidewalk, and storm water infrastructure.		The Division does not have formal, written quality standards for maintenance of street, sewer, sidewalk and storm water infrastructure.
The Division has a clear outsourcing strategy that focuses on core competencies and service improvements.	The Division outsources the following functions: road reconstruction, fire hydrant maintenance, sewer main relining / replacements, and catch basin replacement.	

4. Maintenance (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
An up-to-date computerized geographic information system is available that provides records of the components of the infrastructure system directly on laptops and/or maps.	The City is in the process of creating a GIS-based inventory of its sewer and sanitary lines.	The Division does not have a geographic information system that provides information and records on the infrastructure.
Staff is cross-trained in the delivery of services.	The Division is in the process of cross training all line personnel in its core areas.	
The focus of the division is clearly on the preventive maintenance of the street, sewer, storm water, and sidewalk infrastructure.	The Division has a number of services dedicated to preventive maintenance, including sewer televising, sewer relining, fire hydrant maintenance, etc.	The lack of an infrastructure inventory impedes the assessment of the adequacy of preventive maintenance.
A sidewalk inspection and repair program is in place that includes: • A systematic inspection of sidewalks once every three to five years to identify tripping hazards; • Temporary patches of the tripping hazards within thirty days of hazard identification; and • Use of sidewalk replacement or grinding to eliminate tripping hazards.		The Maintenance Division does not have a formal sidewalk inspection program that proactively identifies repair and replacement needs in a systematic way.
Potholes are patched within one workday of receipt of the complaint.		Data are not kept with respect to turnaround times for work orders, including pothole patching.

4. Maintenance (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
Potholes are patched using a process of square-cutting the pothole, tacking the pothole, use of hot mix, and rolling the hot mix.	An effective process is utilized for pothole patching, including square-cutting the pothole, tacking the pothole, use of hot mix, and rolling the hot mix. In the winter, the crew uses UPM cold mix.	
Deep patching of streets is performed on an ongoing basis when base and pavement repair is required (structural failures).		Deep patching of streets is not performed on an ongoing basis.
Skin patching is performed on an ongoing basis to address raveling, rutting, and depressions or distortions.		Skin patching is not performed on an ongoing basis.
Streets are crack sealed on an ongoing basis to mitigate the penetration of water into the street base.		Streets are not crack sealed on an ongoing basis.
Storm water catch basins, box culverts, and drainpipes are cleaned on a two to three-year cycle.	The Maintenance Division has staff which are responsible for cleaning catch basins, etc.	Data are not available on frequency of maintenance.
Sewer mains are cleaned on a two-year cycle.		Data are not available on frequency of maintenance.
Sewer mains are televised on ten-year schedule to detect I/I and identify repair and reconstruction requirements.	The Division has a TV Crew that is responsible for viewing all sewer mains to ensure there are no blockages and / or repair needs.	Data are not available on the inspection cycle of sewer mains.

4. Maintenance (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
Sewer manholes are inspected and assessed on a routine ongoing basis, and grouted to address I/I.		The Division does not have a formal systematic process for inspecting and assessing sewer manholes.
The division has implemented a FOG program.	The Health Department or Codes is responsible for the FOG program.	The extent and range of FOG services provided by the Health Department is unknown.
The Division has a proactive program to upgrade or replace sewer trouble spots and sewer mains that are cleaned on a monthly cycle.		The Division does not have a formal, proactive program to upgrade or replace sewer trouble spots or sewer mains.
Fire hydrants are preventively maintained annually (e.g., lubricate threads, replace missing caps, operate valves, etc.).	The Division contracts out preventive maintenance of fire hydrants.	The frequency of fire hydrant maintenance is not in accordance with AWWA standards.
The division fully recovers its costs for preventive maintenance of private fire hydrants.		The Division does not fully recover its costs for preventive maintenance of fire hydrants.
The Division responds to 90% of its non-emergency work orders within 2 workdays and 100% of its emergency work orders within one workday.		Data were not available to analyze response times.
The average daily productivity of the crews meets accepted standards.		Data are not tracked to measure productivity of crews.
The crew sizes utilized for maintenance are appropriate to the work performed.		Crew sizes in many instances are larger than appropriate. A 5-person crew is utilized for pothole patching, for example.

4. Maintenance (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
A formal process exists for ensuring compliance with State and Federal commercial driver license requirements.	The Division has a program to ensure compliance with CDL requirements.	
A formal program exists for driver and operator training in general and for problem drivers.	The Division provides staff with driver and operator training, including CDL training and snowplow rodeo training.	
An enterprise fund is in place for the maintenance and repair of the sewer collection system.	The City has conducted an analysis of the costs of maintenance and repair of the sewer collection system, and adopted a plan to fully recover these costs by increasing rates over the next several years.	An enterprise fund is not in place for the maintenance and repair of the sewer collection system.
User fees for the sewer collection system are evaluated and adjusted annually.	The City has conducted an analysis of the costs of maintenance and repair of the sewer collection system, and adopted a plan to fully recover these costs by increasing rates over the next several years.	
The Division participates in a one-call center for the location of underground utilities before excavation, and responds to notices of proposed excavations in a timely manner to mark the location of City-owned utilities.	The Division participates in a one-call center. An Inspector I responds to utility locate requests.	
A formal, written snow and ice control plan has been developed, and staff are trained annually in the loading and spreading of ice control materials and in snow plowing.	The Division has a formal, written plan for snow and ice control.	

4. Maintenance (Cont'd)

Best Management Practice	Strengths	Opportunities for Improvement
An efficient process is utilized to prepare claims for reimbursement for maintenance costs from VDOT.	The Maintenance Division has developed a system for documenting and tracking VDOT reimbursements.	The process for preparing claims is extremely labor intensive.