Office of the City Auditor

CONSENT CALENDAR
October 13, 2009

To: Honorable Mayor and Members of the City Council

From: Ann-Marie Hogan, City Auditor

Subject: Audit: Utilization of Public Works Sewer Staff Can Be Improved

RECOMMENDATION

Request the City Manager report back by April 2010 (and every six months thereafter) regarding the implementation status of each recommendation in the attached audit report until all recommendations have been reported implemented.

SUMMARY

The Auditor's Office conducted a performance audit to determine if City sewer crew work was adequately planned, efficiently performed, and properly recorded. Approximately 20 City employees in the Public Works Sanitary Sewer Maintenance Unit work on the City's 388 miles of public sewer lines. Users of the City's sanitary sewers pay a sewer service charge on their water bills.

This audit was carefully planned to focus on areas most likely to yield cost-effective recommendations for improving service delivery and reducing costs and risks. Public Works management helped refine our risk assessment. They posed questions about maintenance scheduling, the work order system, supervision, and benchmarks that they hoped the auditor would be able to research and provide assistance and recommendations to resolve. This report provides such recommendations.(Findings 2,5,7,8,9,10,11,13) It also explains how to reduce the number of sewer spills, improve sewer Dig and Repair crew efficiency, and improve worker safety.(Finding 1,2,4,6,12)

On April 7 and 8, 2009 (two weeks after our audit findings were presented to Public Work) the U.S. Environmental Protection Agency (EPA) inspected the City's Sewer Program. Public Works management will provide City Council with information about this inspection at the October 13, 2009 Council meeting. Their report is titled "Sanitary Sewer System – Inspection and Administrative Order by the U.S. Environmental Protection Agency".

FISCAL IMPACTS OF RECOMMENDATION

Projected recurring annual savings to the Sanitary Sewer Fund total $270,000. Implementing our recommendations should also reduce spills, reducing pollution of the Bay and damage to property, and reduce the risk of fines and other pay outs.

- The audit recommends that the sewer dig crew increase their efficiency by the equivalent of one crewmember, estimated to be a savings of up to approximately $100,000 annually.

- If implementation of our other recommendations increases the efficiency and effectiveness of the sewer crews by 10% in fiscal year 2010, conservatively estimated, this would have a value of $170,000.

Action on our findings should result in resources currently dedicated to responding to emergencies being re-directed to preventing them. This will be a substantial additional benefit to the City and the larger community.

CONTACT PERSON

Ann-Marie Hogan, City Auditor, (510) 981-6750

Attachment:

1. Audit: Utilization of Public Works Sewer Staff Can Be Improved

City of Berkeley

Audit: Utilization of Public Works Sewer Staff Can Be Improved

Prepared by:

Ann-Marie Hogan, City Auditor, CIA, CGAP
Teresa Berkeley-Simmons, Audit Manager, CIA, CGAP
Frank Marietti, Senior Auditor, CIA, CGAP, CFE

Presented to Council on October 13, 2009

2180 Milvia Street, Berkeley, CA 94704♦ Tel.: (510) 981-6750 ♦ Fax: (510) 981-6760

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I. EXECUTIVE SUMMARY

Audit Objective: Determine if City sewer crew work was adequately planned, efficiently performed, and properly recorded.

Berkeley has a high number of sanitary sewer spills. 20% are repeat spills that can be prevented.

Berkeley has too many sewer spills and many of them are preventable.[1] Twenty percent were repeat spills[2]. The City's high spill rate, and especially its high repeat rate, indicates that improvements in planning and performance are needed.

Public Works (PW) needs to more effectively plan sewer line maintenance to reduce the risk of sanitary sewer overflows and fines, and improve productivity:

- Improve efforts to identify and clear sanitary sewer lines of roots, grease, and debris, the sources of the City's sewer overflows.(Findings 1,2)
- Use closed circuit televisions (CCTV) to timely identify the cause of spills. (Finding 1)
- Improve dig and repair crew performance by as much as 25%, or one employee, with better planning and organizing. (Finding 4)

Prioritize cleaning lines with roots, grease and debris blockage.

Better monitoring and improved supervision can help management target problems:

- Use benchmarks to monitor sewer crew effectiveness. Management was unaware that average sewer line cleaning using machine rodding[3] was 59% below the benchmark. (Finding 5)
- Use CCTV to check work for quality assurance. (Finding 7)
- Prioritize safety. A backhoe was used to excavate before utility lines were uncovered, a safety hazard. (Finding 6). When cars were detoured, safety was not always a priority. (Finding 6)

Better planning and monitoring, new methods, and technical training will improve efficiency and effectiveness.

Better technical training and use of new sewer dig and repair methods can improve staff efficiency and effectiveness.

- Provide additional technical training and certification opportunities to supervisors. (Finding 13)
- Use more effective methods and materials, such as pipe bursting, to replace pipes (trenchless method) and a foam chemical (instead of liquid), to deter root growth in sewer lines. (Findings 4, 12)

Public Works management needs to make sure safety procedures are followed.

1 Berkeley has more spills per mile of sewer line than most other waste water service providers, according to the 2006 American Water Works Association survey.

2 See Finding 1 for details.

3 Machine Rodding - Flexible steel rods with attached rotating blade cutters are inserted into the sewer line and used to cut out roots and other debris.

II. BACKGROUND

Strategy For Audit Selection

Public Works (PW) was selected for audit as part of the City Auditor's annual risk assessment. In the summer of 2008, the Auditor met with the City Manager and the Director of Public Works to determine which area of Public Works could benefit from a targeted performance audit. In August of 2008, the auditors met with the Deputy Director of Public Works. He identified questions about the work order system, sewer maintenance, supervision, and benchmarks that he hoped the auditor would be able to research and provide assistance and recommendations to resolve.

Approximately 20 field employees maintain the City's public sewer system.

U.S. Environmental Protection Agency Inspection (EPA)

On April 7 and 8, 2009 (two weeks after the auditors shared their findings with PW management) the EPA conducted an inspection of the City of Berkeley's collection system to assess the asset management practices being implemented by the City. For more information about this inspection, and inspection results, see the report titled **Sanitary Sewer System – Inspection and Administrative Order by the U.S. Environmental Protection Agency.** Public Works will submit this report to City Council on October 13, 2009, the same date as our audit report.

Sewer service funds can only be used to operate, maintain, and replace the public sewer.

Berkeley's Sewer System

The City's sanitary sewer system transports wastewater from washing machines, toilets, sinks, and similar fixtures to a wastewater treatment plant in Oakland. Approximately 20 City employees perform the sewer maintenance work. The adopted fiscal year 2009 budget for the Sanitary Sewer Maintenance Unit was $3,675,399.

The City maintains 388 miles of public sewer lines.

Users of Berkeley's sanitary sewers pay a sewer service charge which is included on their water bill. These sewer funds should only be used to operate, maintain, rehabilitate, and improve the City's sanitary sewers[4]. The PW Department is responsible for the construction, maintenance, and operation of the City's sewer systems. The City has approximately 258 miles of public sanitary sewer mains and 130 miles of public sewer laterals[5]. PW reports that they clean all the City sewer lines approximately every 3 to 6 years.

4 Berkeley Municipal Code (BMC) Chapter 17.04

5 City owned lower lateral sewer lines run from the curb to the sewer main to the public right of way.

61% of the pubic sewer lines have been rehabilitated since 1987.

61% of Sewer Lines Have Been Replaced or Upgraded

PW reported that from 1987 through March 2009 the City replaced, rehabilitated, and upgraded 61% of its 388 miles of sewer system. This is largely the result of a 1986 cease and desist order issued by the California Regional Water Quality Control Board (RWQCB). It required seven East Bay cities, including the City of Berkeley, to eliminate sewer overflow conditions, increase sewer capacity, and upgrade and replace the components of the aged, deteriorated sewer collection system. Although many sewer lines are new, the destructive effects of root intrusion and blockages caused by grease and debris can impact all lines in the system. A high performing sewer repair and maintenance program is critical to preventing spills.

Sewer Maintenance and Repairs Performed By City Crews

Maintenance and repair tasks routinely performed by the City sewer crews include:

- Investigating sewer blockages and spills (generally in response to calls from the public) and correcting the problem,
- Cleaning all the public sewer lines in Berkeley, and
- Digging out and repairing broken or leaking public sewer lines. (Reconstruction of lines under improvement programs are contracted out. Upper laterals are the responsibility of property owners.)

Requests For Sewer Service

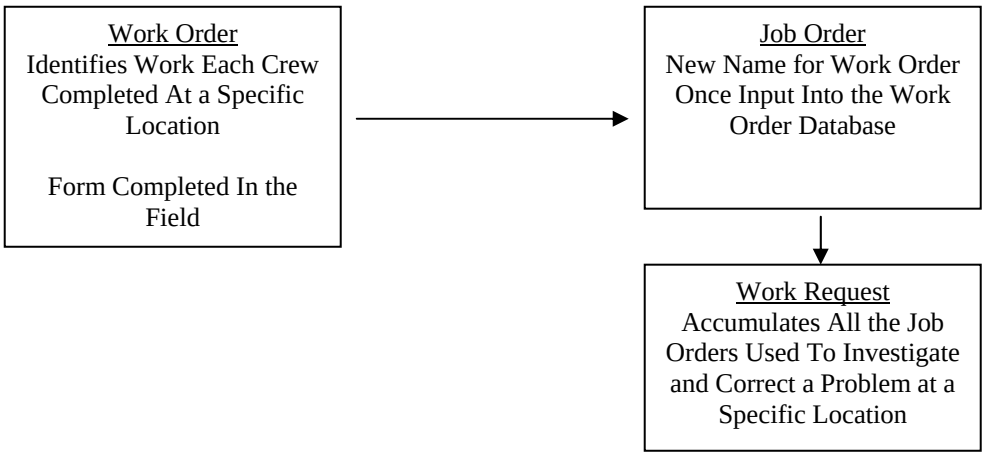
When the Public Works Customer Service Unit (PW CS) receives a call regarding a sewer problem, the call is input into the work order system. Berkeley uses the Work Order/Facilities Management Module (WF Module), part of the SunGard HTE software used for financial management. A service truck crew is sent to the location to investigate. A City of Berkeley Work Request / Complaint Form, (work order) is completed by each crew to document the work they performed and any additional work recommended.

Work Order Database

A PW Supervisor or Senior PW Supervisor reviews completed work orders and then submits them to PW CS staff for input and closeout in the WF Module. In the WF Module, each of the work orders is referred to as a job order. All the job orders for a particular problem at a specific location are assigned the same work request number. PW CS can generate reports that

identify the status of sewer work requests and job orders.

Work Order Database Flowchart



Cleaning the Sewer Lines

The purpose of sewer cleaning is to prevent blockages by removing accumulated material from the sewer.

Methods Used to Clean Sewer Lines	
Machine Jet Flushing	**Truck-mounted machine**. A hose is inserted into the sewer line and high-pressure water removes unwanted materials such as stone, sediment, fat, oil and grease. Jetters can be equipped with root cutters.
Machine Rodding	**Truck-mounted machine.** Flexible steel rods with attached rotating blade cutters are inserted into the sewer line and used to cut out roots and other debris.
Hand Rodding	Rods are pushed into a sewer line, and rotated by hand. A corkscrew blade is used to grab debris so it can be pulled out.

Sewer crews are assigned numbered mapped sections of the City to clean in sequential order. Locations with frequent spills or blockages are placed on follow-up lists, and receive more frequent cleaning.

Sewer Crew Size / Sewer Dig and Repairs

There are usually two to three members in a sewer crew, except for the dig and repair crew. There are usually four members in a dig and repair crew, plus two more for traffic control, if needed. The dig and repair crew digs up and replaces damaged sections of smaller sewer lines. PW Engineering hires outside contractors to perform the larger repairs.

III. FINDINGS AND RECOMMENDATIONS

Finding 1 The City Has a Large Number of Sanitary Sewer Spills

During calendar year 2008 Berkeley had significantly more sanitary sewer overflows (SSOs) per 100 miles of public sewer line than most wastewater service providers participating in the American Water Works Association (AWWA) 2006 Annual Survey. The City's SSOs were due to sewer lines blocked by roots, grease, or debris.

	Berkeley	Wastewater Service Providers – 25% With The Most Sewer Spills[6]
Sanitary Sewer Overflow Rate Per 100 Miles of Public Sewer Line	18.56	14.33

20% of the City's sewer spills are repeat spills.

During 2008 the City reported 73 SSOs to the California Regional Water Quality Control Board, San Francisco Bay Region. It also reported the majority (64%) were caused by roots blocking the line[7]. It should be noted that 1 of the 73 SSOs reported by the City appears to be from a private lateral, and not a City owned public sewer line.

Cause of Berkeley Spills Calendar Year 2008	Count	Percent of Total
Roots in line	47	64%
Grease in line	10	14%
Debris in line	16	22%
Total	73	100%

The high number of spills due to roots indicates the City's root abatement procedures could be more effective. (See Finding 12).

Repeat Sewer Overflows (Spills)

PW was only able to identify the location, and provide specific information, for 67 of the 73 public sewer line SSOs reported to the California Regional Water Quality Control Board during calendar year 2008. PW records indicate 11 of the City's 67 spills were repeat spills. That is,11 locations

6 25% of the wastewater service providers in the 2006 AWWA survey had a score of 14.33 or above.

7 The auditors did not test the reliability of the methods Public Works used to obtain and report their SSO data to the California Regional Water Quality Control Board.

had an SSO during calendar year 2008, and that same year had another SSO at the same address (or the same approximate location). This translates to a 20% repeat spill rate[8]. Repeat spills resulting from a substandard line condition will not occur if the substandard condition is identified and corrected.

One of the main reasons for the high number of repeat spills appears to be that crews are not using a closed circuit television (CCTV) to view the line interior after each spill to determine the cause. In fact, PW representatives said their main line CCTV had not worked for about two years. Representatives stated that the CCTV was budgeted for replacement.

Sewer CCTV inspections are one of the most important sewer maintenance activities according to the February 1999 report "Optimization of Collection System Maintenance Frequencies and System Performance"[9]

Another reason for the high number of repeat spills appears to be that crews do not use structured methods, such as a checklist, to methodically investigate the cause of blockages and spills. Crews in general are asked to use their own judgment regarding the procedures they will perform and the procedures they will recommend other crews perform. The Streets and Sanitation Maintenance Management Manual provides minimal procedural guidance.

City sewer overflows can result in fines, mandated compensation and environmental restoration programs.

City Manager's Response to Finding

Agreed

Recommendations for Public Works and *City Manager's Responses*

1.1 Establish a written procedure for the effective abatement of roots in sewer lines.

Agreed. Public Works is currently developing a written procedure for root abatement. Completion date: March 2010.

8 During calendar year 2008 there were 67 documented SSOs from public sewer lines. Eight of the spills were repeat spills at the exact same street address. An additional 3 repeat spills were within +-5 of the street address numbers of an earlier spill.(8+3)/(67 – (8+3)) = 20%

9 Prepared by the American Society of Civil Engineers, EPA Cooperative Agreement #CX824902-01-0.

1.2 Establish a written policy requiring that CCTV be used to investigate the cause of all sewer spills and blockages generally within 72 hours of the occurrence. If a CCTV is not used, field crew should document the reason why, and the reason should be approved in writing by a supervisor other than the immediate field supervisor. Use the money PW management states is already budgeted to purchase the CCTV(s) needed to implement this recommendation; provide training.

Agreed. Completion date: March 2010.

1.3 Document the chronology of steps that sewer crews should follow to timely identify the fundamental cause of spills and blockages. Procedures should require that the neighboring area of a spill also be investigated to see if the problem exists there as well.

Agreed. Completion date: March 2010.

1.4 Assign crews to clean and maintain sewer lines based on spill risk. Recommendation 2 explains how to obtain this information.

Agreed. This is the cornerstone of the new Sanitary Sewer Maintenance Program. Public Works staff is actively working to modify the existing program. Completion date: January 2011.

1.5 Maintain records that identify each SSO that comprises the total number of SSOs reported to the California Regional Water Quality Control Board annually. Written procedures should identify the steps taken to help ensure SSO data is not lost or misplaced.

Agreed. An updated Sanitary Sewer Overflow Reporting procedure was put into place in May 2008. An updated system for tracking and recording the number and cause of SSOs was put into place in April 2009. A written procedure identifying the steps taken to ensure that SSO data is not lost or misplaced will be promulgated. Partial completion: April 2009. Completion date: October 2010.

Finding 2 Public Works Could Not Identify the Sewer Locations That Have Significant Root, Grease or Debris Problems, the Cause of Almost All Spills

Work Order Database (WF Module)
Staff has not established an effective way to utilize the work order system. Supervisors can't readily identify the sewer locations that have significant root, grease, or debris problems because the work order system was not designed to collect and report spill, blockage, or line condition data by location or line segment. Sewer management indicated that it would be helpful if the following information were accumulated in a form that could be summarized and analyzed:

- Locations of spills and blockages, and their cause (grease, roots, debris, damaged line),
- Condition of sewer lines (grease, roots, debris, damaged line) and the magnitude of the problem, and
- Response time to spills and blockages.

If this information was available, management could better target resources towards locations with the highest risk of spills.[10]

City Manager's Response to Finding

Agreed.

Recommendation for Public Works and Information Technology *and the City Manager's Response*

2. Modify the forms and modify / develop a system to accumulate needed data, such as sewer blockages, spills and line condition. The database should be able to identify the locations most in need of root, grease, or debris maintenance, or line repair. The lines with the greatest spill risk should be maintained first.

Agreed. Public Works Operations established a work order task force in February 2009 to identify how to make better use of the existing Work Order system and develop other simple tracking mechanisms outside of the existing system. Public Works is working with IT staff to evaluate Computerized Work Order Management systems designed to meet the needs of Public Works Agencies and to accurately record and track data for

10 The 2006 "Work Management System Needs Assessment" report by Weston Solutions recommended that the SunGard HTE Work Order / Facilities Management system be replaced "with a single, full-featured Asset Management System". The Information Technology Master Plan for fiscal years 2009 – 2011 states that this recommendation is still being considered, but according to IT staff, replacement is unbudgeted.

linear assets such as public sewer systems using georeferencing[11]. Partial completion (interim measures): January 2010. Completion date: August 2012.

Finding 3 Information Sharing Between Public Works Engineering and Public Works Streets and Sanitation Divisions Can Be Improved

The PW Engineering Division hires contractors to identify the condition of sewer lines and to repair and replace them. However, the PW Streets and Sanitation Division (sewer crew unit's assigned division) representatives stated that their division and the PW Engineering Division did not coordinate and share this data as well as they could.

It appears some of this information, such as the condition of lines identified by contractors using CCTV, is not being used by the Sewer Unit to better plan sewer maintenance work.

City Manager's Response to Finding

Agreed.

Recommendation for Public Works *and the City Manager's Response*

3. Representatives from the Streets and Sanitation Division and Engineering Division should meet at least quarterly to coordinate sewer maintenance and replacements, and to share information.

Agreed. Recent meetings have resulted in an improved exchange of information. Formal documentation of the meetings was established in July 2009. Completion date: July 2009.

Finding 4 Efficiency of the Sewer Dig and Repair Crew Can Be Improved

The equivalent of one of the four members of the dig crew is generally idle.

Dig and repair crew efficiency can be improved in the following areas:

1. Reduced crew idleness,
2. Improved staff coordination, and
3. Use of a newer method to replace sewer lines

<u>Crew Idleness</u>

The PW Performance Guidelines for "Digs and Repairs" calls for only three personnel. Four employees are generally assigned. On December 10 and 11, 2008, the auditors observed dig operations; the equivalent of one crew

11 To georeference something means to define its existence in physical space.

member was almost always idle. The PW Maintenance Superintendent said employee idleness was probably largely due to the job not being well planned and thought a checklist would help.

Crew Coordination

Two of the three dig and repair jobs observed by the auditors appeared to have coordination problems.

On one occasion dig crew members took more than 1 hour to all arrive at the job and begin working.

1. On December 11, 2008, the backhoe operator arrived with the backhoe a ½ hour before the next crewmember. In total, it took approximately 1 hour and 15 minutes from the time the first crew member arrived until the last crew member arrived and the crew began working. The Sewer Maintenance Assistant Supervisor stated that this occurred because he had a meeting and the dump truck operator had to dump a load at the Richmond landfill.

2. On January 29, 2009, the Sewer Maintenance Assistant Supervisor at the dig site said he was not aware the backhoe and dump truck operators would not be part of his morning crew until he was onsite and had called his supervisor.

When crewmember arrival times are not coordinated, idleness and decreased efficiency are much more likely to occur.

Method Used to Replace Sewer Lines

Sewer Unit management is looking into an alternative sewer line replacement method called pipe bursting. Pipe bursting appears to be a widely used sewer replacement method, and according to PW management, is much more cost effective than their current dig and repair method. Although interested in this alternative method, PW has not done a cost benefit analysis to determine if this new method should be adopted.

City Manager's Response to Finding

Agreed.

Recommendations for Public Works *and the City Manager's Responses*

4.1 Management should observe the dig and repair crew in the field and determine if crew idleness can be reduced through better job planning and better staff coordination. As suggested by the Maintenance Superintendent, consider having the Sewer Maintenance Assistant Supervisor use a planning checklist to help ensure crew, tools, materials and supplies are at the job site when needed. Incorporate the checklist into the written policies and procedures.

Agreed. A checklist and procedure has been developed to assist field supervisory staff in properly planning work. Partial completion: August 2009. Completion date: November 2009.

4.2 If implementation of recommendation 4.1 does not greatly reduce dig crew idleness, eliminate one crewmember if feasible. Alternatively, require sewer crewmembers to perform other work in the area, such as storm drain cleaning, when not needed. Also, consider having an employee float between jobs, helping the dig crew when needed.

Agreed. Field supervisors have been instructed since February 2008 to rotate staff and minimize the size of work crews as the job dictates. Use of the Field Audit form will help to document this on-going field supervision activity. Partial completion: February 2008. Completion date: March 2010.

4.3 If some crewmembers have to wait for others before they can work at a scheduled job, crewmembers should be assigned a meaningful temporary job until the crew can proceed to the assigned job and begin work there.

Agreed. Completion date: done.

4.4 Management should observe sewer crews at the beginning of their workday unannounced on occasion to help ensure the crews are arriving on-site timely and starting work timely. These random inspections and their outcomes should be documented.

Agreed. Field Supervisors will use the Field Audit form. Completion date: March 2010.

4.5 Public Works should determine if it is cost effective for the City to adopt the pipe bursting method for repairing / replacing sewer lines. If it is, the equipment and training should be budgeted.

Agreed. Public Works Operations staff has been discussing with Public Works engineering. Completion date: July 2010.

Finding 5 Management Did Not Know Sewer Cleaning Performance Was Significantly Below the Benchmarks

The number of line feet cleaned on average during FY2008 using the machine rodding method and the jet flushing method was significantly below their benchmarks. Also, benchmark numbers were not consistent. It was unclear which numbers should be used to monitor performance.

The PW Sr. Supervisor was surprised machine rodding and jet flushing performance was so far below the benchmarks.

No Summary Performance Data

PW has performance guidelines (benchmarks) for different types of sewer work, including the cleaning of sewer lines. These benchmarks are documented in the Streets and Sanitation Maintenance Management Manual (Maintenance Manual). However, actual summary performance data was not available to compare against these benchmarks. As a result, supervisors could not use the benchmarks to evaluate the sewer crews' performance.

Auditors calculated the actual average daily sewer line footage cleaned by machine rodding crews and by jet flushing crews during fiscal year (FY) 2008 using WF Module[12] data and compared it with the benchmarks. For both machine rodding and jet flushing, sewer crews did not meet benchmarks. The Sr. Supervisor said he was not aware that performance was so far below what he had expected.

Inconsistent Benchmarks

Benchmarks for machine rodding and jet flushing were established by PW management. However, the benchmarks were inconsistent. For example the Maintenance Management Manual documented an established machine rodding benchmark of 3,500 feet per day; however, the Maintenance Superintendent stated that a reasonable benchmark would be 2,500 – 2,700 feet per day. At least one copy of the Manual had an annotation of 1,500 – 2,000 feet per day. Management's expectations are unclear when more than one goal for the same benchmark is used to evaluate staffs' performance.

Machine Rodding

The average footage machine rodded during FY2008 using WF Module data was only 1,435 feet per day per crew, 59% below PW's Maintenance Manual established benchmark of 3,500 feet.

Machine Rodding Benchmark Sources	Daily Footage Cleaned Per Crew
PW Maintenance Manual	3,500
PW Maintenance Superintendent	2,500 – 2,700
Other PW Management	1,500 –2,000
FY 2008 Actual WF Module	**1,435**

12 WF Module sewer data was downloaded into Microsoft Excel and average footage cleaned per eight hour crew day was calculated. Machine Rodding data in the WF Module was tested for reliability using a judgmental sample. Errors, including footage input errors, were identified. However, after these errors were corrected, the recalculated average did not differ significantly.

Jet Flushing

The actual average footage jet flushed during FY2008 was only 2,350 feet per day per crew, 6% - 41% below the benchmark of 2,500 – 4,000 feet established in PW's Maintenance Manual.

Jet Flushing Benchmark Sources	Daily Footage Cleaned Per Crew
PW Maintenance Manual	2,500 – 4,000
PW Sr. Supervisor	3,000
Other PW Management	2,500 – 3,000
FY 2008 Actual WF Module	**2,350**

City Manager's Response to Finding

Agreed.

Recommendations for Public Works *and the City Manager's Responses*

5.1 Establish consistent, agreed upon benchmarks.

Agreed. Public Works staff is using the existing benchmarks as established in the updated Field Operations Manual (updated January 2009) and will investigate the causes of subpar performance. If none exist, the benchmarks will be adjusted as appropriate. Completion date: April 2010.

5.2 Require supervisors to compare benchmarks with actual performance monthly. Significant differences should be investigated and corrective action taken.

Agreed. Problems with the existing Work Order Management System make accurate collection of this data difficult. Interim data collection and recording methods will be evaluated. Completion date: August 2010.

5.3 The PW Supervisor and PW Sr. Supervisor should investigate why machine rodding and jet flushing performance during FY2008 was so far below expectations. Conditions responsible for sub-par performance should be corrected. If none exist, the benchmark should be redefined.

Agreed. Completion date: December 2010.

Recommendation for Public Works and Information Technology *and the City Manager's Response*

5.4 Develop a means to quickly generate historical summary performance data that can be compared with established benchmarks.

Agreed. Public Works and IT are currently exploring interim options. The current Work Order Management System does not allow for ready access of this data. Completion date: October 2010.

Finding 6 Sewer Dig and Repair Crew Did Not Follow Safety Procedures

Unsafe excavating and traffic control practices were observed.

Unsafe excavation and traffic control practices were observed. As a result, there was increased risk of damage to property and injury to sewer crew and the public.

Excavation

1. Before digging up a sewer line using power-operated excavating equipment, crews are required to locate all underground utility lines in the approximate location by excavating with hand tools[13]. At a December 11, 2008, sewer line dig, auditors observed a backhoe being used to excavate before the utility line had been uncovered. If gas lines or other utility lines are damaged by the backhoe, sewer workers are at risk of being injured or killed, and the City may be liable for expensive utility repairs and a civil penalty of up to $50,000. PW management stated that PW did not have any written policies and procedures regarding excavating or operating a backhoe. However, supervisors were aware of the applicable State law.

Traffic Control

2. Flagmen used two-way radios to communicate with each other to direct traffic during a December 11, 2008, dig and repair. One of the two lanes on the two-lane road was closed for the sewer trench. Sewer crew said flagmen were having trouble directing traffic that day because the batteries in their two-way radios were low on power. They also said there were no backup batteries or backup radios.

   Management stated that Streets and Sanitation had a large number of two-way radios and backup batteries, and that it was the responsibility of the assistant supervisor (the supervisor at the dig site) to ensure his crew had all the equipment and tools needed, including two-way radios and backup batteries.

13 California Governmental Code 4216.(a) and 4216.4a

3. At a January 29, 2009, sewer dig, PW sewer staff placed traffic cones in front of a trench, leaving much less of the remaining lane available for traffic. The cars using the partially closed lane were often observed crossing the double yellow centerline into the lane of opposing traffic. This condition increased the risk of a car accident and injury to the sewer crew.

   Sewer crews are required to follow traffic safety guidelines in the Work Area Traffic Control Handbook (WATCH). Section 6, paragraph 3 of WATCH states, "All temporary traffic lanes shall be a minimum of 10 feet in width unless otherwise authorized." [14]

   Section 6, paragraph 3 of WATCH also states, "In addition, temporary traffic lanes shall have a minimum of five feet clearance from open excavations…". It further states "The 5-foot clearance also reduces the sur-charge from traffic loads on the nearest face of the excavation and provides workers with a reasonable space in which to work without the need to step into the adjacent traffic lane."

   At a December 11, 2008, dig, the trench was so close to the cones that at times the backhoe and workers were right up against the traffic cones. A parked car in the opposing lane may have contributed to cars driving closer to the cones, and at times, the workers and their equipment.

City Manager's Response to Finding

Agreed.

Recommendations for Public Works *and the City Manager's Responses*

6.1 Provide sewer crews with written policies and procedures that clearly communicate the safety procedures they are required to follow.

14 The WATCH Handbook (Eighth Edition) was being used by PW. The tenth addition is available.

Agreed. There are current and updated training procedures. Staff has been trained in proper traffic safety. There is not a clear directive to ensure that staff follows the proper safety procedures. Completion date: November 2009.

6.2 Develop a safety checklist for the PW supervisors to use in the field to help them identify unsafe practices. The checklist should help ensure crews comply with WATCH and State laws pertaining to excavation. It should also help ensure that flagmen have the safety equipment they need, including working two-way radios with fully charged batteries and fully charged backup batteries.

Agreed. A safety checklist will be developed specifically for the field supervisor to ensure that proper safety inspection procedures are followed. Completion date: November 2009.

6.3 Consequences for not following safety procedures, including disciplinary action, should be documented in the written policies and procedures and made available to all field staff.

Agreed. Completion date: December 2009.

Finding 7 Supervisory Inspection of Sewer Crew Work Needs to Be More Effective

Supervisory inspection of sewer crew work at the job sites could be more effective.

1. The Sewer Unit PW Supervisor was observed conducting a site visit on December 11, 2008, when safety concerns in Finding 6 (concerns 1 and 2) and one of the crew inefficiencies in Finding 4 (crewmember idleness) were taking place. Corrective action was not taken.

The City of Los Angeles requires all lines after cleaning be at least 95% of their original diameter. Berkeley does not have a similar benchmark.

2. There were no written procedures requiring supervisory inspection and supervisory approval at key points during a sewer job, such as during a dig and repair just prior to the new line being covered. A checklist or other means was not used to document supervisory inspections (what was looked at) and the concerns identified. PW management stated that employee counseling and warnings were documented.

3. Supervisors were not using CCTVs to look into recently cleaned or repaired sewer lines to determine if they had been properly cleaned or repaired. Sewer management said the CCTV, which could look inside the main lines, had not been working for about two years. They said a replacement was budgeted and was in the process of being purchased.

A CCTV for inspecting smaller lateral sewer lines was available, but was not being used to inspect the quality of work being performed. The City of Los Angeles supervisors perform CCTV inspections on a sample of the lines cleaned to ensure cleaning has restored the flow area of the sewer to at least 95% of the pipe diameter. Any sewer that fails the test must be re-cleaned by the crew, and the crew is retrained on the proper procedures. PW's written policies and procedures do not include a similar benchmark. However, the Sanitary Sewer Maintenance Plan, which was approved by Council on April 16, 2009, does.[15]

City Manager's Response to Finding

Agreed.

Recommendations for Public Works *and the City Manager's Responses*

7.1 Implement additional procedures to help improve the effectiveness of field inspections, including the following:

- For dig and repairs, require 30% of the replaced lines be inspected and approved just prior to the trench being covered.
- Require the supervisor performing the field inspection to complete, sign, and date a field inspection checklist (developed by PW management). The checklist should identify everything management wants inspected, the inspection results, and corrective action taken.
- Require the PW Sr. Supervisor to review completed field inspections and get involved if inspections identify significant or reoccurring problems.

Agreed. Completion date: November 2009.

7.2 Require PW Supervisors and Sr. Supervisors to use CCTV to conduct random quality control inspections that determine if the machine rodding crew and jet flushing crews have restored the flow area in the lines to at least 95% of the pipe diameter. Require sewer lines that do not pass this inspection to be re-cleaned by the crew, and ensure that the crew is retrained. For lines that can't be properly cleaned, the reason should be documented, and a determination made if the line should be repaired.

15 The City's Sewer System Management Plan (SSMP) dated April 16, 2009, established the 95% cleaning standard (95% of the original flow area of the pipe) as a goal for the cleaning of gravity sewers.

Agreed. Random inspections are already being implemented. Inspection procedures will be documented and the findings properly recorded and acted upon. Partial completion: July 2009. Completion date: March 2010.

Finding 8 Supervisors Are Not Reviewing Work Orders for Accuracy and Completeness

Supervisors did not review work orders to ensure they were accurate and complete.

Improved supervision means better work from the sewer crews

Review and Approval of Sewer Work Orders

Supervisors reviewed the City work orders completed by sewer crews to determine what work was performed and if additional work was recommended. They did not review work orders to ensure they were accurate and complete, and did not sign them to indicate their approval.

Work orders for three of the four digs observed by the auditors contained inaccuracies, shown in the table below:

Date	Dig and Repair Location	Work Order Inaccuracies Identified
12/10/08	Alcatraz	1) One of the six crewmembers (backhoe operator) worked all day at the location but was not included on the work order 2) Omitted equipment: 1 backhoe, 1 utility truck, 1 compressor, 1 jackhammer
12/11/08	Alcatraz	1) One of six crewmembers (backhoe operator) worked all day at the location but was not included on the work order 2) Omitted equipment: 1 backhoe, 1 utility truck
1/21/09 (1)	Bonita	No inaccuracies identified
1/29/09 (1)	Hopkins	Three crew members did not work all day at this location as reported.(2)

(1) Observation was limited to early morning.
(2) Crew supervisor stated that a dump truck operator and backhoe operator were working at two locations and would be at this location later in the day.

City Manager's Response to Finding

Agreed.

Recommendation for Public Works *and the City Manager's Response*

8. Provide the PW Supervisor and Senior Supervisor with training and written procedures designed to help them locate and correct work order errors and omissions. Supervisors should sign the work orders to document their review and approval.

Agreed. Public Works staff established a Work Order Management Task Force in February 2009. Many forms have been modified to ensure easier collection of needed data. The Work Order Management System will be going through constant updates until the existing system can be replaced. Completion date: November 2009.

Finding 9 25% of Work Orders Were Not in the Work Order Database (WF Module).

PW staff assigned to process City sewer work orders estimated that 25% of the completed FY2008 sewer work orders generated by the crews had not been input into the WF Module. For these work orders, the WF Module will not show the results of the sewer crew visits, such as the number of line feet machine rodded, crew hours worked, etc. A PW CS employee said there was not enough time to input and file all the sewer work orders and that this was an ongoing problem management was aware of. The PW Maintenance Superintendent stated that this condition existed because PW CS staffing had been reduced by two positions, as well as given additional work associated with the City's new 311 telephone system. Problems with work order input by PW CS may have also been made more severe because, according to the Deputy Director of PW, the PW Maintenance Supervisor did not have the time to adequately supervise the PW CS staff. PW CS written policies and procedures do not provide a timeline for the input and filing of work orders.

The usefulness of the sewer database for planning and monitoring has diminished because it is incomplete.

In addition, work can be completed and never recorded because sewer work orders can be initiated and completed outside the WF Module. If the data is incomplete, the usefulness of this information for planning and monitoring sewer activity is diminished.

Finally, a WF Module report shows approximately 5% of the FY2008 sewer job orders in the database had not been closed. Sewer representatives stated that the work associated with these job orders had most likely been completed, but had not been recorded as completed. This indicates that this report was probably not being used for its intended purpose, which is to help identify open work orders so the work can be completed promptly and the work order closed.

City Manager's Response to Finding

Agreed.

Recommendations for Public Works *and the City Manager's Responses*

9.1 Require sewer crews to obtain a work request number and job order number from the WF Module for each work order and to write it on their Work Request / Complaint Forms (work orders) before giving them to their supervisor.

Agreed. Completion date: October 2009.

9.2 Require sewer supervisors to verify each completed work order has a work request number and job order number written on it before approving it and forwarding it to PW Customer Service for input into the work order database.

Agreed. Completion date: October 2009.

9.3 Evaluate the workload and priorities of the clerical staff in PW Customer Service. Ensure staff timely input and file all sewer work orders. Update PW Customer Service written procedures to include a timeline for inputting work order data and filing completed work orders.

Agreed. Public Works Management has been working with the new 311 Customer Services unit on the transition of some job duties since April 2009. Completion date: January 2010.

9.4 Assign a supervisor to follow-up on all open work orders over a week old at least weekly, until completed and closed in the work order database.

Agreed. Completion date: January 2010.

9.5 Allocate a supervisor sufficient time to properly supervise the PW Customer Service Administrative staff.

Agreed. Completion date: January 2010.

Finding 10 Work Order Database Software and Public Works Office Procedures Provide Little Assurance That Work Order Data Will Be Accurately and Consistently Input Into the Work Order Database (WF Module)

Accurate historical sewer data is required to properly plan and schedule work.

WF Module software and PW CS office procedures are ineffective in preventing work order data from being incorrectly or inconsistently input into the WF Module (work order database). Internal control weaknesses identified include the following:

Problems with the SunGard HTE WF Software

- Illogical and unusual input is not prohibited or flagged by module software. No exception reports are available.
    - For example, a sewer line can be reported as having been cleaned using the machine rodding method and the line footage cleaned can erroneously be recorded as having been cleaned by the jet flushing method.
- Work orders can be input and closed without a FUND$ project code (account code).
- The same work orders and job orders can be entered more than once. FY2008 sewer data contained 22 records with a duplicate work order and duplicate job order.
- The same street can be entered into the WF Module differently, and often is. This makes it difficult to summarize activity by street name and street address for use in planning and oversight.

Problems with Procedures

- PW CS written procedures are not comprehensive enough. For example, they do not address:
    - How/when to use the on-call project code and investigation project code. Staff said crew time associated with these codes had not been input consistently.
    - How / when City work orders are to be sent back for corrections.
    - How data input accuracy is to be achieved.

City Manager's Response to Finding

Agreed.

Recommendations for Public Works and InformationTechnology *and the City Manager's Response*

10.1 If cost effective, develop and implement system controls that will help reduce input errors.

Agreed. Public Works and IT staff are currently reviewing existing procedures. Completion date: August 2010.

10.2 If cost effective, develop exception reports that identify errors and inconsistencies so they can be researched and corrected. Errors and inconsistencies identified in these reports should be corrected within an established timeline. Alternatively, if exception reports are not developed, Public Works should assign someone independent of the data entry to review input for obvious errors.

Agreed. Completion date: August 2010.

Recommendation for Public Works *and the City Manager's Response*

10.3 Update Public Works Customer Service written policies and procedures. They should be sufficiently detailed so that a qualified employee not familiar with the task can use them to perform assigned duties as management wants them performed. Include procedures designed to help ensure data is accurately and consistently input into the WF Module.

Agreed. Completion date: April 2010.

Finding 11 Supervisors Did Not Review Locations With a High Number of Sewer Crew Visits to Assess Crew Effectiveness

Sewer supervisors did not have a means to readily identify in the WF Module those locations with higher than average crew activity. A location with a high number of completed City work orders can indicate work was not done properly.

Auditor analysis of FY2008 WF Module sewer data indicated 4% - 5% of the City locations in the Module had six or more completed City work orders. Locations with the highest number of visits were discussed with PW management. In only a few instances did there appear to be a possible concern.

City Manager's Response to Finding

Agreed.

Recommendation for Public Works and Information Technology *and the City Manager's Response*

11. Develop a report that uses WF Module sewer data to identify the City locations with the greatest number of completed sewer work orders. The work orders for these locations, and what they were for, should also be identified. At least semi-annually, a supervisor should review this data to assess crew effectiveness.

Agreed. The Work Order Task Force has already developed a new work order form to address this issue. The data collected will be used to develop procedures for semi-annual reviews. Completion date: October 2010.

Finding 12 A More Effective Foam Solution to Control Roots in the Sewer Lines Is Not Being Used

PW management stated that the chemical used by PW crews to control roots in the sewer lines was only effective where it came in contact with the roots. In some cases they stated that this was a very small portion of the line. As discussed in Finding 1, roots are the main cause of sewer overflows in Berkeley.

Chemicals applied in foam reach the entire diameter of the sewer line.

Chemicals in a foam carrier (similar to saving cream) are available and cover the entire diameter of the sewer line. Foam is more effective at killing and controlling roots and treatments can remain effective for approximately three years. Fewer roots in the sewer lines means less risk of a sewer spill due to lines being blocked or damaged.

City Manager's Response to Finding

Agreed.

Recommendation for Public Works *and City Manager's Response*

12. Consider replacing the current non-foam root control chemical with a foam root control chemical.

Agreed. Public Works staff has been investigating proper methods and developing contract specifications. Completion date: March 2010.

Finding 13 Sewer Supervisors Technical Knowledge Can Be Improved

Supervisors should obtain a collection system maintenance certification.

The sewer unit has not kept current with technical training, such as the types of sewer maintenance available, what worked best when, and the latest types of equipment. For example, the PW Maintenance Superintendent stated that using the sewer CCTV after every spill, in an effort to identify the cause of the spill, was a recommended industry practice not being done in Berkeley. Supervisors with up-to-date technical knowledge about sewer maintenance and repair should be able to provide better guidance and instruction to their staff.

The PW Maintenance Superintendent agreed that a good way for the supervisor job classifications to obtain up-to-date technical knowledge was to obtain a Collection System Maintenance Certification from the California Water Environment Association (CWEA). The certifications offered are designed to test knowledge and abilities required to perform essential duties with minimal acceptable competence.

City Manager's Response to Finding

Agreed.

Recommendation for Public Works *and the City Manager's Response*

13. If funding is available, consider having the Sewer Unit job classifications listed below obtain the following certifications from the California Water Environment Association:

Job Classification	CWEA Collection System Maintenance Certification
Sewer Maintenance Asst. Supervisor	Grade 2
PW Supervisor and PW Sr. Supervisor	Grade 3
PW Maintenance Superintendent	Grade 4

Agreed. Public Works (PW) Senior Supervisors, PW Supervisors and SMAS have already attended some technical sewer maintenance trainings presented by the California Water Environment Association. PW Management has had discussions with other agencies regarding the merits of maintenance certification. PW agrees that the certification program will benefit our sewer maintenance program. Completion date: January 2011.

Finding 14 Sewer Funds Were Inappropriately Used to Pay for a Storm Drain Expense

Sewer crews were checking the barricades at a washed out storm drain located at the Potter Street Freeway ramp almost daily to make sure they were in place. This activity was being charged as a sewer expense, but should have been charged to clean storm water fund 831. Berkeley Municipal Code 17.04 states, "Revenues collected from the users of the City's sanitary sewers shall be reserved for this single purpose and shall not be expended for any other purpose." The PW Senior Supervisor stated that the barricade check was charged to sewer because a sewer crew performed the task.

City Manager's Response to Finding

Agreed. The work documented in the finding consisted of resetting barricades in the interest of protecting public safety. The crew was already in the area, and in an effort to efficiently utilize staff resources, they were directed to perform this work.

Recommendation for Public Works *and the City Manager's Response*

14. Only use sewer funds to pay for sewer operation, maintenance, and replacement expenses in accordance with BMC 17.04. Sewer funds inappropriately used to pay for non-sewer expenses should be returned to the sewer fund.

Agreed. Completion: done.

Finding 15 The Streets and Sanitation Maintenance Management Manual Is Outdated

The Streets Maintenance Management Manual was developed many years ago (appears to be in the mid 1980s), and is based upon a work order system no longer used. The manual identifies how sewer work is to be planned, scheduled, reported, and evaluated. The Deputy Director of PW and the PW Maintenance Superintendent agreed the manual was outdated and that it would not help someone understand the current procedures and systems for planning and recording activities.

City Manager's Response to Finding

Agreed.

Recommendation for Public Works *and the City Manager's Response*

15. Update the Streets Maintenance Management Manual. It should include current policies and procedures regarding how sewer work is to be planned, scheduled, reported, and evaluated.

Agreed. Completion date: December 2010.

IV. FISCAL IMPACT

Implementation of the audit recommendations in this audit report are projected to result in $270,000 annually in increased efficiency and cost savings.

First, the equivalent of one crewmember on the sewer dig and repair crew was almost always idle. (See Finding 4) The cost of a Laborer position on the dig crew with fringe benefits, workers compensation, and overhead, will be approximately $100,000 during fiscal year 2010. If this position becomes fully productive, or is eliminated, the City will either accomplish more work with existing resources or reduce resources needed to accomplish the work.

Secondly, implementation of our other recommendations should increase the efficiency and effectiveness of the sewer crews in a number of ways. If even a 10% increase in productivity during fiscal year 2010 is achieved, conservatively estimated this would have a value of $170,000.

20 Employees Spend 85% of Their Time (Approx.) Maintaining the Sewers	17 FTE
Cost of One Sewer Employee (1)	$100,000 (1)
Cost of 17 Sewer Employees	$1,700,000
Estimated Value of a 10% Productivity Increase	$170,000

(1) Estimated using only the Laborer job classification salary (lowest pay step), including fringe benefits and overhead cost, for FY2010.

Finally, if Public Works implements our recommendations, there will be fewer sewer spills. Staff will be spending less time responding to spills and blockages, and more time performing general sewer maintenance or other activities. Over time, the number of spills will decrease and the condition of the sewer infrastructure will improve. Ultimately, the cost of maintenance will decrease.

V. CONCLUSION

This audit makes many recommendations to help improve the effectiveness and efficiency of the City's sewer maintenance crews and reduce the risk of sanitary sewer overflows. It also makes recommendations to help reduce the risk of sewer crew injury and of costs for underground utility line repairs accidentally damaged by sewer dig crews.

All of the recommendations are important and should be implemented. In our opinion, improvements in two areas can be quickly implemented and should dramatically reduce the number of sanitary sewer spills.

1 Targeting areas where roots are known to be a problem with an effective root abatement program. The root abatement program should include mechanical cleaning and foam chemicals. Since PW reported that more than 60% of the spills during calendar year 2008 were caused by roots, reducing this cause of spills should significantly decrease the number of SSOs annually. (Finding 1,12)

2 Using CCTVs to help identify the fundamental cause of each spill and using this information to timely correct the problem. Since 20% of the spills in 2008 were repeat spills, eliminating most repeat spills will also help significantly decrease the number of SSOs annually. (Finding 1)

The recommendations in this audit should also benefit other units in the PW Streets and Sanitation division. According to PW Streets and Sanitation Division management, other units are using the same work order database, similar procedures, and sometimes even share the same employees. Although the recommendations in this report are for the Sanitary Sewer Maintenance Unit, it appears several will increase the efficiency and effectiveness of other programs in Public Works.

We wish to thank the Director of Public Works, the Director of Information Technology, and their staff for their time, cooperation, and responsiveness during the audit.

Appendix A: Scope and Methodology

The purpose of this performance audit was to determine if City sewer crew work was adequately planned, efficiently performed, and properly recorded. Audit scope was limited to the sewer repair and maintenance work conducted within the City of Berkeley by the City's PW Streets and Sanitation Division work crews. Audit fieldwork started on September 4, 2008 and concluded on February 12, 2009. Some additional data was provided by PW on May 14,15 and 29. The audit period was July 1, 2007, through January 31, 2009.

The audit did not look at alternative automated work order systems which could replace the City's SunGard HTE Work Order / Facilities Maintenance Module. It also did not look at whether the City was complying with State and Federal laws pertaining to wastewater.

The information used to perform this audit was obtained primarily through:

- Conducting a walkthrough of sewer repair and maintenance operations from beginning to end.
- Using data extract and analysis software (ACL and Microsoft Excel software) to compile and analyze FY2008 sewer maintenance and repair data from the City's SunGard HTE Work Order / Facilities Maintenance Module (WF Module).
- Evaluating the design and effectiveness of the information system controls over the WF Module for sewer data. This was primarily accomplished by 1) conducting a walkthrough of data input and data use operations; 2) reviewing written procedures and the data file layout ; 3) interviewing staff knowledgeable about the database; and 4) comparing system data with source documentation.
- Discussions primarily with City staff in the Public Works Streets and Sanitation Division, but also with staff in the Information Technology Department, Public Works Engineering Division, the City Attorney's Office and the Human Resources Department.
- Reviewing written policies and procedures, and sewer related documents and records.
- Reviewing general sewer information from internet sources.
- Observing a City dig and repair crew in the field.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

This performance audit is included in the Auditor's fiscal year 2009 audit plan, which was presented to City Council on June 24, 2008.

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Appendix B: Public Works Accomplishment Letter

PUBLIC WORKS DEPARTMENT
Administration Division

Date: **October 1, 2009**

To: **Phil Kamlarz, City Manager**

From: **Claudette Ford, Director of Public Works**

Subject: **Utilization of Public Works Sewer Staff**

The Public Works Department is committed to its mission of providing quality services to the Berkeley community. Toward this effort, the department hired a Deputy Director in early 2008 and to implement systemic improvements to the operations units. Under his guidance, the division has developed a strategic approach to improve operational readiness and effectiveness.

The sewer program was specifically identified as the area most in need of modernized systems for data collection, work flow monitoring, and performance measurement. Work on many of the recommendations provided in the City Auditor's Report is already underway or has been completed.

Interim program accomplishments include:

- The entire management team for the sewer program is new or promoted to their current positions in 2008. This includes the Deputy Director, PW Maintenance Superintendent, Senior Supervisor and PW Supervisor.
- Completed two month Team Development training.
- Sent sewer staff to technical training from the American Public Works Association and California Water Environment Association.
- Developed goals and objectives to focus limited resources on key areas of concern.
  Example: FY 2009/10 goal for the Streets Division
  Reduce sanitary sewer overflows by 20% from the baseline year of FY 2008/09.
- Operations and Engineering coordinated on the completion of the City of Berkeley Sewer System Management Plan (April 2009).
- Created and implemented new SSO reporting procedures.
- Improved the accuracy of SSO reporting and started tracking SSOs by location and cause.
- Coordinated with engineering to assist with repairs of identified "hot spots".
- Completed spill response drills and Incident Command System training.

2180 Milvia Street, 3rd Floor, Berkeley, CA 94704 • Tel: (510) 981-6300 • TDD: (510) 548-1351
Fax: (510) 981-6320 • Email: publicworks@ci.berkeley.ca.us

- Initiated a Work Order Management Task Force to review existing systems and develop improved methods for work flow monitoring and tracking while utilizing the existing antiquated system.
- Developed GIS maps to assist with creation of new Sewer Maintenance Program.
- Developed improved tracking and documentation of sanitary sewer overflows; including investigation of the underlying cause.
- Developing a prioritized Sewer System Maintenance Program; based on data collected from SSO events, CCTV investigations and engineering records.
- Started review of Asset Management and Computerized Work Order Management Systems with the stated goal of replacing the existing work order system by August 2011.
- Created improved Work Order data collection forms.
- Outfitted and deployed a spill response trailer.
- Completed bid specifications to replace the non-functioning CCTV vehicle.
- Purchased portable CCTV to allow some capabilities while the new vehicle is being constructed.
- Began review of how and where to utilize root foaming agents to control root growth in the sewer lines, and
- Affected the transfer of sewer complaint calls to the 311 Customer Service Center.

The department believes that these improvements put us well on our way to achieving our goal to be more responsible and responsive in our operations programs to both internal and external customers. We expect to continue meeting our strategic planning goals and complete work on the remainder of the audit recommendations.