Report from the City Auditor

AUDIT OF STREET MAINTENANCE

OFFICE OF THE CITY AUDITOR

MARCH 2006

City of Palo Alto

Office of the City Auditor

March 21, 2006

Honorable City Council
Attn: Finance Committee
Palo Alto, California

AUDIT OF STREET MAINTENANCE

Palo Alto has a $28.7 million backlog in street repair, and less than half of residents rate street maintenance good or excellent. The annual street maintenance budget is inadequate to both address the backlog and stay current with recommended preventive maintenance. The backlog is extensive.

This is not a new problem. Staff has previously reported that the annual street maintenance budget was insufficient to repair all the streets with poor pavement conditions in a timely manner, resulting in a backlog of streets. According to staff, the streets that were postponed and needed repair would worsen with time, resulting in increased maintenance costs, and reducing the average street life.

We recommend that Public Works and ASD develop and propose a long-term street resurfacing-reconstruction plan and funding strategy. Potential alternatives for increased funding include increasing the street cut fee to account for construction cost inflation, and consideration of roadway impact fees. However, even doubling current fee levels would only generate about $580,000 per year, so these alternatives alone are not likely to be sufficient to address the problem. Postponing current maintenance in order to address the backlog would compound the problem. In an era of limited staffing and financial resources, addressing the backlog will not be easy. These are tough policy choices that need to be brought forward to the City Council.

Street cuts exacerbate the problem. Coordination of surface and sub-surface street work is a staff priority, and the Municipal Code requires coordination of major street excavations. Nonetheless, the City continues to receive complaints about the coordination of street work, and streets are repeatedly cut and re-cut. Many street cuts are the unavoidable results of emergency repairs and private development. However, our review indicated that Public Works and Utility projects routinely collide. This is due, in part, to the differing missions and objectives of the departments and divisions in the City. Quarterly project coordination meetings have facilitated coordination of capital projects between various divisions, but coordination of capital projects and day-to-day operations can be improved.

In our opinion, a sole authority over street cuts is needed, and City departments (currently exempt from needing to obtain permits) should be required to obtain street opening permits. We further recommend the City consider imposing a 5-year moratorium on cutting newly paved streets with appropriate exceptions, and consider requiring resurfacing at least one lane width

from a cut on a newly resurfaced street. We also recommend all divisions that cut City streets use GIS to coordinate their projects and summarize work completed in a timely manner, and that Public Works consider dividing the City into geographic zones to facilitate coordination of surface and sub-surface projects.

Stricter controls over street cuts and repair standards are needed. In our opinion, the limited budget and backlog mandates that the City closely coordinate any street cuts to ensure the life of the streets are preserved and the City's limited resources are not wasted. Enforcement is needed to ensure that metal plates are not left on streets unnecessarily, and more stringent standards for backfill and street restoration work are needed to ensure the quality of street restorations. We recommend consideration be given to centralizing street restoration resources including crews and equipment in the Public Works Department. We also recommend broader authority for roadway inspections should be given to Public Works inspectors. Improvements are also needed to coordinate and properly administer street cut fees.

Finally, improvements are needed in the pavement management system to ensure the accuracy of data, proper assignment of priorities, budget optimization, and comparability with regional data. Palo Alto may be able to obtain grant funding to upgrade to MTC's StreetSaver software.

Our report includes a total of 21 recommendations to improve the street maintenance program. I will present this report to the Finance Committee on March 21th. Staff has reviewed the information in this report and the City Manager's response is attached.

We thank the staff in the Public Works, Utilities, and Administrative Services Departments for their assistance during our review.

Respectfully submitted,

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INTRODUCTION

In accordance with the City Auditor's Fiscal Year 2005-06 Work Plan, the City Auditor's Office has completed an audit of the City's street maintenance program. The objective of the audit was to review the criteria for prioritizing street repairs and to determine how well sub-surface work is coordinated.

Our audit was conducted between May 2005 and February 2006 in accordance with government auditing standards. The City Auditor's Office would like to thank the Public Works, Utilities, and Administrative Services Departments for their assistance during our audit; and also the City contractors, residents, the cities of Burlingame, Daly City, Mountain View, and Sunnyvale, and the Metropolitan Transportation Commission (MTC) who provided input during our review.

Background

The City of Palo Alto (City) is responsible for construction, maintenance, and management of over 197 linear miles (or 463 lane miles) of City streets. The resurfacing and reconstruction of the City streets is a priority in the City's infrastructure management plan and the CityWorks initiative. The City's annual street maintenance program is intended to improve the integrity and service life of the streets by providing for annual resurfacing, slurry seal, crack seal, and reconstruction of streets.

The City is also responsible for construction, maintenance, and management of storm drains, sewers, gas mains, water mains, and electrical lines that run under the City's streets. Coordination of underground projects is a priority to the City Council, staff, and residents.

Organization and staffing

The mission of the Public Works Department is *"to provide efficient, cost effective construction, maintenance, and management of Palo Alto streets, sidewalks, parking lots, buildings and other public facilities; to provide appropriate maintenance, replacement and utility line clearing of City trees; and to ensure timely support to other City departments in the area of engineering services."*

The mission of the Public Works streets program is to *"develop and maintain the structural integrity and ride quality so as to maximize the effective life of the pavement and traffic control clarity of streets, and to facilitate the safe and orderly flow of vehicles, bicycles, and pedestrians."* The streets program includes 2 full-time equivalent staff (FTE) in the Public Works Engineering Division, and about 6 FTE assigned to street maintenance in the Public Works Operations and Refuse Division.

Public Works Engineering

The Public Works Engineering Division is responsible for the annual street maintenance project and contracts for street resurfacing, reconstruction, and preventive maintenance that are funded through the City's Capital Improvement Program. The Engineering Division plans, coordinates, and implements the street resurfacing and reconstruction programs under the guidance of the Assistant Director of Public Works. A senior engineer and an engineering technician in the Engineering Division select which streets will be resurfaced; issue requests for bids; select and award contracts to street contractors; oversee the resurfacing work performed on the City streets; and maintain a database of street conditions.[1] An inspector from the Engineering Division is responsible for inspecting street work.

Public Works Operations

The Public Works Operations and Refuse Division is responsible for on-going street maintenance including skin and pothole patching, base repair, crack filling and sealing, pot and chuck hole repairs, sidewalk and curb repairs, gutter repairs, and traffic control. The Division repairs about 2,900 potholes each year. A Manager of Maintenance Operations oversees the sidewalk, storm drain, and street operations sections.

Utilities Engineering

The Utilities Department Engineering Division oversees the Utilities' capital improvement program including $21.6 million in capital replacement and rehabilitation projects in FY 2004-05. The infrastructure projects involved replacing deteriorated or aging facilities such as gas, water and sewer lines that are near or at the end of their life expectancy. The capital projects include over $9.8 million for electric projects, $3.6 million for gas projects, $4.9 million for water projects, and $3.3 million for wastewater collection projects. The Utilities Engineering Division staff plans, designs, and coordinates the infrastructure projects, solicits bids, selects and awards contracts, and monitors the work performed by contractors related to the electric, gas, water, and wastewater projects. The Utility projects often involve sub-surface work that result in street cuts and affect the condition of streets.

Utilities Operations

The Utilities Department Operations Divisions for water, gas, wastewater (WGW), and for electric operations are responsible for the daily maintenance and operation of these utilities, including handling residential and commercial customer requests, emergencies, and unplanned service requests. The 24 hours a day, 7 days a week operations often involve unplanned street cuts and urgent responses related to emergencies and legal requirements for correcting failures such as gas leaks.

[1] These staff are also responsible for engineering and managing projects related to sidewalks, bike ways, pedestrian paths, and other projects as assigned.

Others

Private contractors and non-City utilities, such as telephone and cable companies, also cut the City streets. Their projects may be related to new developments such as homes or businesses, planned projects, or urgent responses to emergencies. They are required to obtain street work permits before cutting the streets, or the next business day in case of emergency (Municipal Code section 12.08.10).

Program funding

Exhibit 1 shows expenditures for the street maintenance program over the last 7 years. Over the past 5 years, the City has received about $5.8 million in grants designated for street resurfacing.[2]

EXHIBIT 1: Street Program Expenditures (FY 1998-99 through 2004-05)
(in millions)

	Operating expenditures	Capital expenditures	Total
FY 1998-99	$3.8	$1.2	$5.0
FY 1999-00	$3.8	$3.6	$7.4
FY 2000-01	$3.8	$1.6	$5.4
FY 2001-02	$4.0	$3.7	$7.7
FY 2002-03	$3.9	$3.0	$6.9
FY 2003-04	$1.9	$3.8	$5.7
FY 2004-05	$2.0	$3.3	$5.3

Source: Service Efforts and Accomplishments Reports and FY 2004-05 Adopted Operating Budget

Public Works Engineering estimates about 8 lane miles of asphalt concrete paving, and approximately 8 lane miles of slurry sealing are done each year. According to the department, street program capital expenditures also fund repair and replacement of sidewalks, curbs and gutters, and valley gutters that are needed to improve street drainage and prevent erosion of the street base. Exhibit 2 shows planned Capital Improvement Program (CIP) expenses and offsetting revenue from the Street Improvement Fund, Utility Users Tax, and the Infrastructure Reserve.

[2] Most of these funds are distributed through the Bay Area's Metropolitan Transportation Commission (MTC). The Federal, State, and Local Transportation Grants Awarded to the City of Palo Alto (FY 2001-02 through 2005-06) totaled almost $10.8 million as follows: $2.7 million (FY 2001-02); $2.86 million (FY 2002-03); $2.2 million (FY 2003-04); $2 million (FY 2004-05); and $1.1 million (FY 2005-06). Of that $10.8 million, about $5.8 million was designated for street resurfacing.

EXHIBIT 2: Projected Street Maintenance Capital Improvement Project (FY 2005-06 through 2009-10)

	FY 2005-06	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	TOTAL
Source of Funds						
Street Improvement Fund	$1,070,000	$1,070,000	$1,070,000	$1,070,000	$1,070,000	$5,350,000
UUT transfer	$600,000	$600,000	$600,000	$600,000	$600,000	$3,000,000
Infrastructure reserve	$476,965	$275,000	$425,000	$425,000	$275,000	$1,876,965
TOTAL	$2,146,965	$1,945,000	$2,095,000	$2,095,000	$1,945,000	$10,226,965
Use of Funds						
Design Costs	$50,000	$50,000	$50,000	$50,000	$50,000	$250,000
Construction costs	$1,895,000	$1,895,000	$2,045,000	$2,045,000	$1,895,000	$9,775,000
Other	$201,965					$201,965
TOTAL	$2,146,965	$1,945,000	$2,095,000	$2,095,000	$1,945,000	$10,226,965

Source: Adopted Capital Budget PE-86070 (FY 2005-07)

Street cut fees

In September 2003, the City Council approved fees for excavating City-owned streets. The fees are collected through street opening permits imposed on non-City utilities and private developers; and interdepartmental budget transfers from the City's Utilities Department for operations and maintenance work and capital improvement projects.

Municipal Code Section 12.10.010 outlines the purpose of the street cut fee:

> *"Excavations in paved streets owned and maintained by the city degrade and shorten the life of the surface of the streets, and this degradation increases the frequency and cost to the public of necessary resurfacing, maintenance, and repair. It is appropriate that entities responsible for excavating into the city's rights-of-way bear this burden rather than the taxpayers of the city. In addition, establishment of a street cut fee will create an incentive for coordination of efforts in excavating the streets to install, repair and replace sub-surface facilities and utilities."*

Street cut fees are estimated to bring in about $579,000 in FY 2005-06 and are used to fund a portion of the General Fund transfer to the Capital Projects Fund for infrastructure projects.

Types of street damage

Public Works Engineering Division staff and/or consultants visually inspect the pavement surface to assess the condition of the street and the type of damage that exists. The types of possible damages that may occur are listed below.

EXHIBIT 3: Common asphalt pavement damage conditions

Ravelling	Progressive loss of pavement material from the surface. Raveling may be moderate, which exposes large aggregates, or severe, which results in loss of large aggregates and leaves a very rough surface texture.
Rutting	Wheel path channels caused by traffic compaction or displacing unstable materials. Minor rutting can be repaired with street overlays.
Settling	Poor compaction may cause street settling. Patching may provide a temporary repair, but a permanent correction usually involves the removal of the unsuitable sub-surface material and reconstruction of the street.
Transverse cracking	Transverse cracking is a crack at right angles to the street's center line. If not properly sealed and maintained, secondary or multiple cracks may develop parallel to the initial crack. Ravelling and erosion may further deteriorate the cracked edges. To prevent water intrusion and further damage, the cracks have to be sealed if they are more than ¼ inch wide.
Reflective cracking	Cracks in the overlay may reflect the cracked pattern in the underlying pavement, and are difficult to prevent and correct. Thick overlays or reconstruction are usually required to correct the problem.
Alligator cracking	Alligator cracks are interconnected cracks caused by the traffic loads, the failure of the surface, and/or an inadequate base. To repair the cracks, localized excavation of the area is needed or the base and surface may be replaced. Large, cracked areas may require reconstruction and/or improved drainage.
Patches	Patches are used to repair the original surface with new asphalt. Patches may result from pavement defects or utility excavations. The existence of patches with cracking, settlement or distortions indicate the underlying causes still remain and may require reconstruction of the street, if extensive patching does not resolve the problem.
Pothole	Potholes are holes or loss of pavement materials caused by traffic loading, fatigue, inadequate street strength, or poor drainage. Potholes are repaired by excavating or rebuilding the localized area. Reconstruction may be required if the defects are extensive. A small pothole may occur where the street has broken away, but large, isolated potholes may indicate base failures. Pavement failure, poor subgrade soils, or bad drainage may cause multiple potholes.

Source: Transportation Information Center (University of Wisconsin – Madison)

Types of street resurfacing and reconstruction

Depending on the condition of the street to be resurfaced, repaired, or reconstructed, the City may use any one of the following techniques. According to the University of Wisconsin – Madison and the California Transportation Division of Maintenance, moisture and poor pavement drainage are significant factors in pavement deterioration – thus the emphasis on sealing.

EXHIBIT 4: Types of Street Resurfacing and Reconstruction Techniques

Crack Seal	After the street cracks have been cleaned with a high-pressure air hose, heated, liquefied rubber asphalt is applied to fill cracks on street surfaces. This low cost method protects the street base and prolongs the street lifespan by preventing water from penetrating the street surface and intruding into the base material.
Slurry Seal	After the failed sections of the pavement base are repaired and all surface cracks are sealed, a thin layer of a latex modified emulsion composed of oil, fine gravels, and black volcanic sand is applied to the entire street surface. This seal prevents street deterioration and extends the life of the street.
Cape Seal	This maintenance technique requires two consecutive days to complete. After the failed sections of the street are repaired, a polymer modified asphalt emulsion in conjunction with ¼ inch fine aggregate chips is applied. Then the street is slurry sealed after curing for 24 hours. The cape seal adds structural integrity while preventing water from penetrating the road surface. Crack filling is not done because the thick emulsion layer fills the cracks.
Asphalt Overlay	The work is performed in several stages. After failed sections of the pavement base is removed or repaired, for PCC streets, the asphalt concrete is milled or ground for crack sealing; a durable membrane is used to bridge all the large joints in the concrete; a 3/8 inch asphalt concrete layer is placed to level the road; a reinforced fabric called a Petromat is placed; and a final asphalt overlay is laid. A modified method is used for streets classified as Class II aggregate base streets, 1 and ½ inch of asphalt concrete is removed from the roadway by grinding along the pavement edge; a reinforced fabric is placed; and the final asphalt overlay is applied.
Portland Cement Concrete (PCC) repair or replacement	The repair or replacement of PCC base failures involves no asphalt concrete. Although PCC streets have the longest lifespan, these are also the most expensive streets to repair or replace. PCC streets compose about 10% of the City's streets.
Reconstruction or 3.5-inch asphalt concrete removal and replacement	For this method, 3.5 inches of asphalt concrete is removed and the entire street surface is replaced.
Iron raising	On newly paved streets, a jack hammer is used to open the area around all manholes and valves. The opening is filled with concrete mortar to strengthen the surrounding pavement and to set the manholes and valves level with the new pavement.

Source: City of Palo Alto Public Works website.

PMMS and GIS database systems

The Public Works Engineering project managers use the Public Works Pavement Maintenance and Management System (PMMS) to collect and analyze data for City streets; to update pavement attributes such as raveling, alligator cracking, block cracking, and other street conditions; to prioritize streets; to decide which streets to resurface; and the type of resurfacing to be applied. PMMS tracks street condition by segment or block. The project managers state the PMMS

system allows them to develop, save, and recall different pavement scenarios in assigning priorities to street segments. The PMMS data is supposed to be updated every two years through a bi-annual street survey.

The PMMS system is integrated with the City's Geographic Information System (GIS)[3] which serves over 300 users; provides maps, property, utility, and infrastructure information; and supports several other systems including the Police Computer Aided Dispatch System, and the Records Management System.

Scope and Methodology

To address the audit objectives, we reviewed the Palo Alto Municipal Code; City Manager Reports (CMRs) related to the streets programs; and reviewed reports, laws, rules, and regulations issued by federal, state, Palo Alto and other city governments. We reviewed budget documents related to the street programs; flowcharted City planning and coordination processes; interviewed City staff involved with the streets programs; and communicated with residents and contractors. We analyzed and tested databases used to plan and manage the street programs, checked the accuracy of the Public Works PMMS and GIS databases, and sampled street cut permits issued by the City's Development Center.

We requested a list of streets that were worked on during FY 2004-05, and matched that list to streets that were reported to have been resurfaced between 2000 and 2005. We inspected all 42 of the streets that matched both parameters, added 3 more streets, and examined 16 streets that were the subject of citizen complaints. We did not attempt to assess citywide street conditions or the allocation of street maintenance funds.

We visited the nearby cities of Burlingame, Daly City, Mountain View, and Sunnyvale and compared their policies, procedures, and practices with Palo Alto's street operations and processes. We also selected a sample of 61 streets and visually inspected the City streets.

We reviewed street cut fees and revenues, identified the databases and systems used by Public Works and other departments, and examined the coordination efforts among Public Works, Utilities, and other divisions that are involved in cutting City streets. We quantified the City's backlog of streets that needed resurfacing, reviewed the City's prioritization process, and checked for potential savings in the streets programs.

The Public Works Engineering Division reported they were updating the PMMS database prior to the audit and continued to update the data throughout the audit. Our tests of the database during the audit showed the database contained some

[3] GIS is a general viewing and querying application with some analysis capabilities and is intended to meet the most common local government geographical information needs. GIS allows users to zoom to a location by address, cross street, named place, block book extent, utility grid, or parcel number. Maps and reports can be modified to display selected features and attributes.

erroneous and incomplete records. We deleted those records and used the remaining data to analyze, quantify and evaluate the performance of the City's street program.

THE PAVEMENT MANAGEMENT SYSTEM SHOWS A $28.7 MILLION BACKLOG IN STREET REPAIR

The pavement management system shows a $28.7 million backlog in street repair. Maintenance is past due on many street segments, and less than half of residents rate street repair good or excellent.

Preventive maintenance is critically important to extending the life of streets and reducing the costs of maintaining streets by preserving the underlying structural integrity of street pavement. Studies by the University of Wisconsin – Madison and the California Transportation Division of Maintenance show that timely preventive maintenance can save money over the life of the street and is less costly than the rehabilitation or reconstruction of streets.

Our analysis of the City's database shows City streets are not receiving preventive maintenance within recommended timeframes, and that there is a substantial backlog of street repair and reconstruction. The current funding level is inadequate to eliminate the backlog and service City streets within the suggested time frames. At current spending levels, the backlog may not be eliminated for as long as 15 years.

This is not a new problem. In 2003, staff reported (CMR:429:03) that the annual street maintenance budget was insufficient to repair all the streets with poor pavement conditions in a timely manner and would create a backlog of streets. According to staff then, the streets that were postponed and needed repair would worsen with time, resulting in increased maintenance costs, and reducing the average street life.

Importance of preventive maintenance

The useful life of a street depends on many factors, but studies by the California Transportation (Caltrans) Division of Maintenance, MTC, and other entities have shown the life of pavement can be extended for the least cost by treating and maintaining streets in good condition with slurry seals or other resurfacing types.

According to the above experts, $1 spent on appropriately timed preventive maintenance, can save $6-$8 in reconstruction costs later on. As shown in Exhibit 5, seals and overlays are far less expensive than either asphalt or concrete base reconstruction or replacement.

EXHIBIT 5: Estimated Street Resurfacing Costs

TREATMENT TYPE	COST	USEFUL LIFE
Crack seal	$0.20 per linear foot	2 to 5 years
Slurry seal	$0.30 per square foot	5 to 7 years
Cape seal	$0.60 per square foot	7 years
Asphalt overlay	$4.00 per square foot	10 to 20 years
Total street reconstruction	$10.00 per square foot	15 to 25 years
Concrete slab replacement	$20.00 per square foot	25 years

Source: Compiled by City Auditor's Office from data provided by Public Works Engineering Division, other cities, and the University of Wisconsin

Maintenance is past due on many street segments

During our review, we found many examples of the effects of delayed street maintenance.

EXHIBIT 6: Cowper (between Hawthorne and Everett) showing street deterioration[4]

Source: City Auditor's Office

According to the latest information in the City's PMMS[5] database, 771 out of 2,157 street segments, or blocks, are overdue for maintenance and repair. Exhibit 7 shows the estimated maintenance backlog as of February 2006.

[4] According to the PMMS database, the condition of this street is "poor" (PCI = 26). The database indicates that the street was overlaid in 1954; the last surface treatment was in 1982. Estimated remediation cost $87,754.

[5] Public Works Engineering updated the PPMS database during our audit.

EXHIBIT 7: Estimated Maintenance Backlog (as of February 2006)

Rehabilitation/maintenance required	Number of street segments	Estimated cost in millions (2005 dollars)
Asphalt overlay on PCC (100% of surface; 20% slab replacement)	264 blocks	$21.1
PCC slab replacement (20%-30% of surface)	108 blocks	2.1
Resurfacing (100% of surface)	109 blocks	3.0
Partial resurfacing (10% of surface)	32 blocks	0.4
Slurry seal (100% of surface)	196 blocks	0.8
Cape seal (100% of surface)	62 blocks	1.3
SUBTOTAL	**771 blocks**	**$28.7**
No work required at this time	1,386 blocks	$0
TOTAL	**2,157 blocks**	**$28.7**

Source: Public Works Department

We believe this estimate of the backlog is conservative. It appears that at least some of the 1,386 street segments that are shown as "no work required at this time" in PMMS are well beyond their estimated service life (for example, preventive slurry sealing is recommended every 5 to 7 years for asphalt streets) and are clearly in need of repair as shown in Exhibit 8.

EXHIBIT 8: Street deterioration resulting from multiple street cuts (Ramona at Washington)[6]

Source: Office of the City Auditor

[6] The PMS database rates the condition of this street segment as "poor" (PCI=30). The database shows the street was last treated in 2002. This segment is not included in the backlog calculation.

Less than half of residents rate street repair good or excellent

Street maintenance receives lower satisfaction scores from residents than other City services. In 2005, responding to a question about the quality of street repair services, only 48% of residents rated street repair good or excellent. This placed Palo Alto in the 58th percentile compared to other jurisdictions (80th out of 190 jurisdictions surveyed).[7]

During our review, we also received complaints about the condition of Palo Alto streets, and our physical observations of the City streets confirm that while many streets are in good condition, many others are in poor condition.[8] The photo below, submitted by a Palo Alto resident, shows a new patch over an old patch and the large chunks of crumbling concrete that was not repaved.

EXHIBIT 9: Lowell (between Emerson and Bryant)[9]

Source: Moira Jacobs, Palo Alto resident

[7] Service Efforts and Accomplishments 2004-05 (February 2006)

[8] Results of our physical inspections are shown in Appendices 2 and 3

[9] The PMMS database shows this street segment was last resurfaced in1972 and, after 33 years, has a street condition of poor (PCI score of 14). This segment is included in the backlog calculation (estimated remediation cost $67,657).

Annual street maintenance budget is inadequate to address the backlog

As shown in Exhibit 1, the City currently spends $2 to $4 million per year on street operations and $1.2 to $3.8 million on capital expenditures. The Public Works Department is trying to maximize the use of its annual street maintenance budget by

- Reducing costs by grouping street repairs into larger projects by type, and
- Reducing the cost of materials by purchasing raw material in bulk.

In spite of these efforts, the current budget may not be sufficient to eliminate the backlog in the near future. According to preliminary estimates by Public Works, it could take 10 to 15 years to eliminate the backlog at current rates of spending.

Some streets need to be reconstructed. In some areas, asphalt streets were built to outdated county standards and do not have a firm enough base to handle modern traffic loads. Heavy garbage/recycling vehicles and buses impact street conditions.[10] In addition, Palo Alto faces special challenges with its old Portland cement concrete (PCC) streets. Some PCC streets are at the end of their useful life and need to be replaced. Some PCC streets were overlaid with asphalt sometime in the 1960's. The problem is that asphalt doesn't stick well to cement (see Exhibit 10), but once placed, is difficult to completely remove.

EXHIBIT 10: Typical asphalt over PCC deterioration found on some Palo Alto streets (Bryant at Coleridge)[11]

Source: City Auditor's Office

[10] These types of vehicles are exempt from the gross vehicle weight limits on City streets.

[11] The PMMS database lists the condition of this street as "poor" (PCI=42). The date of last surface treatment was 1986. This segment is included in the backlog calculation (estimated remediation cost $83,754).

Some streets have cracks in the overlay that reflect the crack patterns in the underlying PCC street and potholes appear where the overlay has broken away. Thicker overlays may work in some cases. In other cases, where the roadway base is still sound, the Public Works staff is exploring the feasibility of using engineered paving mats, asphalt-rubber, grinding down the PCC base, and other solutions.

RECOMMENDATION #1: Public Works and ASD should develop and propose a long-term resurfacing-reconstruction plan and funding strategy to address the street maintenance backlog.

Funding alternatives to address the maintenance backlog

The backlog has built up over many years. As cited above, Public Works is stretching maintenance and capital dollars to address the backlog. In addition, this report contains a number of additional recommendations to improve the efficiency and effectiveness of the City's street maintenance program including better coordination of Public Works and Utilities capital and operating programs, stricter controls over street cuts that degrade the quality of the streets, and improved prioritization of street maintenance. Nonetheless, additional funding may be necessary.

Construction cost inflation

Municipal Code section 12.10.020 provides that the amount of the street cut fee *"shall be set from time to time by resolution, and shall not exceed the reasonable cost necessary to mitigate the degradation to the public streets... Funds collected as street cut fees shall only be expended for the rehabilitation and resurfacing of the public right-of-way."*

The amount of the street cut fee was set in September 2003. Over the last two years, the producer price index for highway and street construction increased by 29% (over the last ten years, the increase has been 48%).[12]

RECOMMENDATION #2: Public Works and ASD should propose annual increases in the City's street cut fees to account for construction cost inflation.

Roadway impact fees

Neighboring jurisdictions charge roadway impact fees to mitigate for the damage caused by refuse haulers, heavy dirt hauling trucks, and construction.

In August 2004, Los Altos Hills commissioned Matrix Consulting Group to study the impact of construction vehicles and refuse trucks on roadway maintenance and construction costs. The study reported construction vehicles contributed

[12] U.S. Department of Labor Bureau of Labor Statistics (www.bls.gov)

21% and refuse vehicles contributed 10% to the cost of repairing and maintaining City streets. The roadway impact fees became effective in November 2004.

In October 2004, Menlo Park reported the damage caused by vehicles increased significantly with the size and weight of the vehicles and that construction vehicles contributed significantly to the cost of maintaining residential streets. The city's consultant (DKS Associates) compared the pavement conditions of streets and reported average streets with significant building permit activity deteriorated 13.1% more than streets without building permit activity. To recover the construction related deterioration of the streets, the city approved a new building construction impact fee of 0.58% and imposed an additional franchise fee of 5.8% on its garbage collection services provider. Menlo Park's proposal was based on the precedents established by 7 other entities, including Atherton, Larkspur, San Rafael, Sausalito, and the counties of San Mateo and Marin.

In March 2005, to recover the cost for roadway maintenance and repair related to damages caused by construction, excavation and hauling, the Town of Atherton (1) increased its road impact fee from 0.5% of the permit value of new construction to 0.71% of the project valuation for all construction projects and (2) began charging a surcharge of $22 per cubic yard for earth excavated and hauled to or from a residential construction site.

RECOMMENDATION #3: Public Works and ASD should consider implementing roadway impact fees to mitigate for damage caused to streets by heavy refuse and construction equipment.

Effect of multiple street cuts

The ordinance establishing the street cut fee found that *"the potential for damage to the pavement is magnified when a street is subject to multiple excavations after the street is surfaced or resurfaced."* As shown in the photo below and in exhibits 11 and 12, we confirmed that multiple street cuts were causing the streets to deteriorate.

EXHIBIT 11: Patchwork of street cuts on Lowell Avenue[13]
(between Emerson and Alma)

Source: Office of the City Auditor

Palo Alto used studies done by other jurisdictions when studying how to set its street cut fees. Although higher fees may be warranted because of the large number and degrading effect of multiple streets cuts, Palo Alto would need to perform an impact and cost study of the damage before increasing street cut fees.

Street cut fees as an incentive for coordination

As cited in the implementing ordinance, *"regulating excavations in City streets will help reduce disruption of and interference with public use of the streets, help prevent premature degradation, and maintain the safe condition of the streets and protect the public health, safety and welfare."* The City presently charges $10 a square foot for streets in excellent condition, which are usually newly resurfaced streets; $7.50 a square foot for streets in good condition; and $2.50 to $5 a square foot for streets in poor to fair condition. The fees decrease commensurate with the condition of the street

According to City engineers, the fees have served as an incentive to coordinate their efforts. However, given the number of street cuts that we observed in newly paved streets (see Appendices 2 and 3) and the City's potential costs to repair those cuts, the City should consider further increasing fees to reimburse the City

[13] The PMMS database rates the condition of this street segment as "poor" (PCI=49) and lists the date of last surface treatment as 1972. This segment is included in the backlog calculation (estimated remediation cost $65,968).

for damages caused to newly paved streets, and as an incentive to reduce the number of street cuts in newly paved streets.

RECOMMENDATION #4: The Public Works Director should perform a study of the impact of street cuts on City streets and quantify the costs of repairing damages caused by multiple street cuts.

RECOMMENDATION #5: Based on the study results, the Public Works Director should propose increasing street cut fees to fully recover the projected cost of repairing damages to the structural integrity of streets; recover and repair the damages caused by multiple cuts; fully recover the higher costs of restoring recently resurfaced streets; and mitigate the damages to newly paved streets.

BETTER COORDINATION AND OVERSIGHT OF STREET SURFACE AND SUB-SURFACE PROGRAMS ARE NEEDED

Coordination of surface and sub-surface street work is a staff priority, and the Municipal Code requires coordination of major street excavations. Nonetheless, our audit indicated that Public Works and Utility projects routinely collide. This is due, in part, to the differing missions and objectives of the departments and divisions. Other conflicts are the unavoidable results of emergency repairs and unplanned customer requests. Quarterly project coordination meetings have facilitated coordination of capital projects between various divisions; however, we still find conflicts between capital projects. We also found conflicts in day-to-day operations – many of them due to private development. Because databases and information systems differ, it was sometimes hard to tell the difference.

The Municipal Code requires coordination of major street excavations

The Municipal Code (Chapter 12.10.010) establishes street cut fees to create an incentive for coordinating street excavations related to installing, repairing, and replacing sub-surface facilities and utilities. The Municipal Code (Chapter 12.10.060) further states that whenever two or more parties have proposed a major excavation in the same block during a five-year period, they shall meet and confer regarding whether it is feasible to conduct a joint operation. If feasible to conduct a joint operation, a single contractor shall be selected.

Despite the quarterly project coordinator meetings and other initiatives, our audit indicated improvements are still needed in coordinating the Public Works and Utility projects. Inadequate coordination has resulted in streets being repeatedly cut after they were repaved. Some streets were cut within weeks of being resurfaced.

In our opinion, these deficiencies occurred because: (1) there is a substantial amount of underground infrastructure repair and replacement work that is on-going, (2) there is a substantial amount of private construction that may require moving or replacing utility lines in the street, (3) including the Transportation Division, there are at least 9 divisions in 3 City departments plus outside entities (such as telecommunications providers and private contractors) that cut streets (see Appendix 1), and (4) their different operating philosophies and coordination processes, databases and information systems, and planning, emergency and complaint processes did not facilitate coordination or cooperation.

The City receives complaints about the coordination of street work

During our review several local residents expressed concerns about the City streets to the City Auditor. Some of these complaints include:

- In November 2004, a resident complained that a 2 block long trench was dug right down the middle of Guinda Street soon after it was repaved.

- In July 2005, another resident reported that a contractor forgot to finish a manhole cover on Channing Avenue. In a subsequent July 2005 communication, the same resident complained about "teeth jarring and tire bumping" streets such as Guinda, Lytton, Seale, Hamilton, Tasso, Fulton, Waverley, Harriet, Channing, High, and the streets north of the Oregon Expressway. The resident reported that 3 streets – Newell (between Embarcadero and Channing), Louis (between Oregon Expressway and Embarcadero), and Alester were dug up by the Utilities Department shortly after the roads were resurfaced. The resident predicted the same thing would happen to Walter Hays Drive shortly after it was slurry sealed. In October 2005, the resident reported Walter Hays was slurry sealed on October 14 and October 17 and, on October 28, the street was dug up and covered with steel plates. Our physical inspection of the street confirmed that 5 cuts were made in the newly resurfaced street.

- Two other residents complained and provided photos of the street conditions on Lowell, Emerson, Bryant, and Tennyson.

During our physical inspection of the City streets, we investigated a total of 16 of the 40 specific complaints that we received. The results of our physical inspection of those complaints are shown in Appendix 3. For example,

- Park Boulevard between Grant and Oregon Expressway looked like a jigsaw. We counted at least 16 cuts and trenches, including long, diagonal, and street-wide trenches. There were also trenches over trenches. Park Boulevard (between Northern California and Oregon Expressway) had at least 47 street cuts, including the above 16 cuts. As shown in Exhibit 12, there were so many cuts that we could only estimate the number of street cuts.

EXHIBIT 12: Jigsaw of street cuts on Park Boulevard (between Sherman and Grant)[14]

Source: Office of the City Auditor

A City Contractor Has Also Expressed Concerns

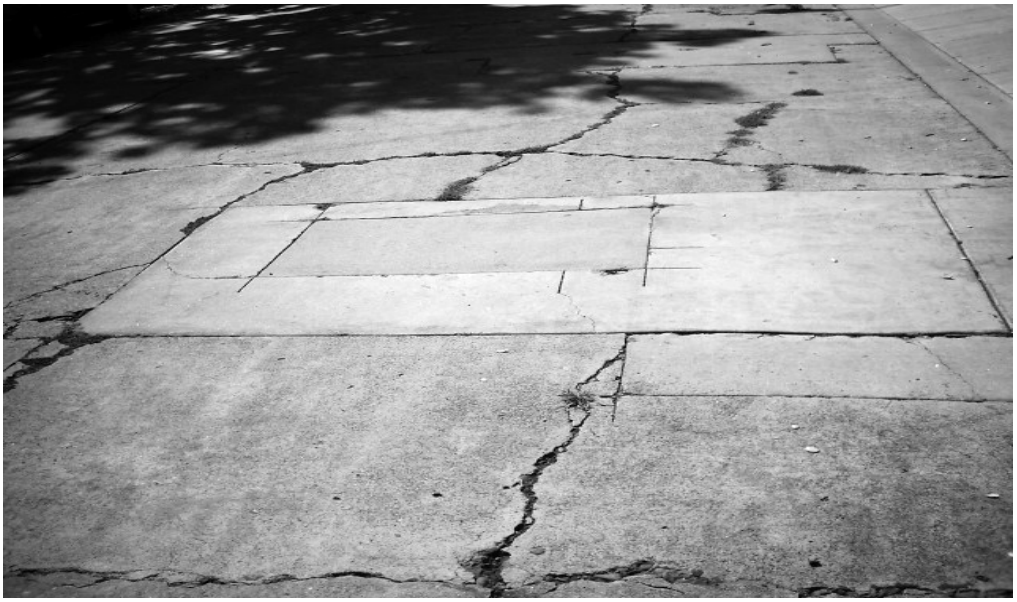
As part of our review we requested comments from the City's contractors. One responded that *"all city departments need to be on the same page with regards to the different projects going on, scheduling, and installing utilities prior to replacing or resurfacing streets".*

Streets are repeatedly cut and re-cut

According to CMR:429:03, trenching and multiple excavations degraded the City streets and, regardless of the quality of the trench restoration, contribute to the deterioration of the pavement, including cracking, structural damage, water intrusion at the street cut, and undermining of the subsoil.

[14] The PMMS database rates the condition of this street segment as "poor" (PCI=44). The date of last surface treatment was 1965. This segment is included in the backlog calculation (estimated remediation cost $3,280).

EXHIBIT 13: Street cuts upon street cuts found on some Palo Alto streets



Source: Office of the City Auditor

However, in spite of a Public Works Department policy not to cut streets within 5 years of resurfacing, and in spite of the street cut fees and quarterly project coordination meetings, street cuts remain a problem.

Streets have been cut within five years of being resurfaced

During our audit, we physically inspected a total of 61 City streets, including 42 streets that had been resurfaced between 2000 and 2005.[15] We counted a total of 530 street cuts, or an average of 8.69 cuts per street. Some of the streets were so badly cut and re-cut that we could not determine the exact number of street cuts. Examples of our inspections are detailed below:

Streets resurfaced in 2004

- Rosewood Drive was overlaid in 2004 and had 28 cuts, 1 unfilled hole, and 169 street markings that were not removed.
- Four other streets overlaid in 2004 had 1 cut (Amaranta Court)[16], 5 cuts (San Jude)[17], 3 cuts (Higgins Place), and 2 cuts (Moana Court).

[15] 8 of the 9 City divisions involved in street work were asked to list the streets they worked on in FY 2004-05. The lists of streets were compared with the PMMS database of streets resurfaced between 2000 and 2004. A total of 42 streets satisfied the criteria. We added 3 streets that were resurfaced in 2004, 3 more streets from 2005, and 13 streets from a list of over 40 streets that were the subject of citizen complaints. The streets physically inspected totaled 61 streets (42+3+3+13).

[16] This was due to WGW work in April 2004.

[17] There were 3 wastewater repairs in FY 2004-05. The remaining cuts were unidentified.

Streets resurfaced in 2003

- Waverley (from El Verano to Meadow) was slurry sealed in 2003. We counted 11 cuts.[18]

Streets resurfaced in 2002

- Louis Road (from Ames Avenue to Greer Road) was slurry sealed in 2002. We counted at least 18 cuts between Ames Avenue and Greer Road, and noted that the street segment was marked for street cutting in front of the school.

  EXHIBIT 14: Street marked for cutting in front of school on Louis Road (between Ames and Greer)[19]

Source: Office of the City Auditor

- Seale Avenue (from Waverly to Cowper) was overlaid in 2002 and had an estimated 22 cuts, including 1 block long trench, 2 street wide trenches, 8 long and short trenches, 2 long trenches that joined a third trench, 7 cuts at the intersection of Seale and Cowper, and I other cut.

Streets resurfaced in 2001

- Bryant Street (from Northern California to Oregon Expressway) was overlaid in 2001. Although the Public Works Department had a policy of not cutting streets for 5 years, we counted at least 29 cuts in the street segment, including 12 cuts at the intersection of Bryant and Oregon Expressway and 9 cuts at the intersection of Bryant and Northern California.

[18] Two cuts were made in January 2005. The remaining cuts were unidentified.

[19] The PMMS database rates the condition of this street segment as "good" (PCI=93). The date of last surface treatment was 2002.

Streets resurfaced in 2000

- Janice Way (from Greer Road to Greer Road) was slurry sealed in 2000 and had at least 26 cuts (excluding the manhole patches). Stanford Avenue (from Ash to Birch) was slurry sealed in 2000. Although some of the cuts were barely visible, we counted at least 25 cuts in the one block street segment.

Streets have been cut within weeks of being resurfaced

During our physical inspection, we found some streets were cut or were soon to be cut only a few weeks after they were repaved. For example,

- Walnut Street (from Walter Hays to Stanley) was resurfaced in early October 2005. Within weeks, the Utilities Operations/WGW division marked the new asphalt for cutting with USA markings. After residents complained, Public Works proactively stopped the cut and directed Utilities to find other means to fix the underlying problem. The picture below shows the actual markings on the newly paved street.

  EXHIBIT15: Newly repaved Walnut Street marked for cutting 4 weeks after repaving (between Stanley and Walter Hays)[20]

Source: Office of the City Auditor

- Greer Road at Colonial Lane. During our physical inspection of the City streets, we discovered the newly resurfaced Greer Street at Colonial had been cut. The cut occurred before the new pavement was repainted with street divider lines. Public Works was not aware of the street cut until we informed them.

[20] The PMMS database rates the condition of this street segment as "excellent" (PCI=100). The date of last surface treatment was 2005. No remediation required.

One reason is that underground infrastructure is being repaired and replaced at a rapid pace

The City's Utilities services have substantial assets beneath City streets. As part of its capital improvement program over the 5 years ended June 2004, the Utility Department undergrounded 5 miles of electric lines, replaced 28 miles of gas mains, replaced 15 miles of water mains, and replaced 17 miles of sewer lines. Using improved techniques like boring and pipe bursting, Utilities has avoided some trenching of City streets. However, these types of projects require some cutting of the street, and safety standards require that underground gas and electric lines, and underground water and electric lines, be separated by specific distances – the pipes cannot be laid in the same trench.

In addition, Utilities conducts routine and emergency repairs and replacements. These types of operational activities include replacing an obstructed sewer lateral, replacing a broken pipe valve, and replacing a lateral damaged by a contractor. Federal and State regulations require specific response times for emergency and life threatening situations. For example, dangerous gas leaks must be repaired promptly, while less critical gas leaks must be repaired within 12 to 15 months.

Furthermore, private construction activity in Palo Alto (as measured by the over 3,000 building permit applications and over 3,000 building permits) has remained high over the last 5 years. Depending on the design and type of construction, City crews from Utilities Operations may be required to cut streets as they change out or move underground services to the construction site. The Division reports there were 440 unplanned water, gas, and wastewater projects in FY 2004-05, and that most of the projects were in response to customer requests and involved street cuts.

Another reason is that operating objectives, priorities, planning philosophies, and timelines differ among departments

City departments have different missions, objectives, and operating principles regarding street projects.[21] Proper coordination requires that all entities have an understanding of each other's priorities and timelines, have access to the same data, and that planning results are shared.

- The focus for **Public Works Engineering** is the street maintenance capital program. The division develops rolling 5-year plans based on calendar years (because of the seasonality of street work). Plans are adjusted to accommodate the plans of other divisions as shown in the Project Coordinator/GIS system. Each calendar year, a list of streets is issued and distributed to inform other divisions which streets will be resurfaced and resolve conflicts. Public Works Engineering conducts quarterly cross-departmental project coordinator meetings, and has taken responsibility for

[21] Additional information about the various divisions is shown in Appendix 1.

printing the conflict map and list from the Project Coordinator software application that is the basis for discussion at the quarterly meetings.

- On the other hand, the focus for **Utilities Engineering/Electrical** is underground electric, cable, and telephone lines. The staff attends quarterly project coordinator meetings, but the division does not proactively coordinate its long-term plans with other divisions unless Public Works Engineering has pointed out a conflict.

- The focus for **Utilities Engineering/WGW** is water, gas, and wastewater capital projects. The operating philosophy is to resolve conflicts in order to minimize the street cuts, but that WGW street cuts cannot be avoided. The division attends quarterly project coordinator meetings, but plans generally are not proactively discussed with other divisions unless Public Works Engineering points out a conflict.

- The **Public Works Operations** division is responsible for on-going street maintenance, such as skin and pothole patching, base repair, crack filling and sealing, pot and chuck hole repairs, sidewalk and curb repairs, gutter repairs, and traffic control. The Public Works Operations division conducts an annual survey of the City streets, and generates a list of work to be done. The Operations division does not have access to current information about the Utilities divisions work plans, and its work plans and results are not shared with them. In June 2005, the Operations Division began attending the quarterly project coordinator meetings.

- The **Utilities Operations/WGW** division handles regular and emergency work orders for repairs and maintenance. While striving to coordinate capital improvement projects, Utility Operations reports that the Operations division will continue to make street excavations on newly resurfaced roads due to operational necessity. Emergencies that arise *"out of situations involving real or potential loss of service, or property, or personal danger"* may result in cuts on newly resurfaced streets. Federal Department of Transportation guidelines require that Utilities responds immediately to identified gas leaks that represent existing or probable hazards to persons or property (Grade 1). In FY 2004-05, there were 9 Grade 1 gas leaks requiring immediate repair.[22] In addition, Utilities Operations reports it will continue to plan and make repairs within 12 months of the reported date and to respond to non-planned calls such as connection services for new houses and developments. The Division agrees that better coordination of non-emergency projects is possible.

  Like Public Works Operations, the Utilities Operations/WGW division plans non-emergency work by the week and does not notify other divisions of those plans. The division reports that their work is not predictable because even an ordinary maintenance work order may escalate into a more complex capital

[22] A total of 123 gas leaks were reported in FY 2004-05, including 9 Grade 1 leaks that represented a hazard that required immediate repair or action; 57 Grade 2 leaks that were considered non-hazardous, but required scheduled repair within 12 to 15 months because the leaks could become a future hazard; and 57 Grade 3 leaks that were non-hazardous and required re-evaluation within 15 months.

project. For example, a crew responding to a complaint on Hillview had to dig up the piping, trench, and install a new line. According to the division, some operations work is coordinated with Public Works Engineering, but most of the operations, emergencies, or street cuts are not coordinated or reported to other divisions. The Division began attending quarterly street project coordination meetings in December 2005.

- The **Utilities Operations/Electric** division is responsible for customer service, dispatching, metering, overhead and underground electric operations, and street lights and substations. The division receives service orders from the Utilities Engineering/Electric division about 2 to 4 weeks before the work is started. The work is scheduled and the plans are not shared with other divisions. Minor work orders and emergency orders are used for electrical breaks, transformer problems, and ordinary maintenance. Other divisions are not notified of the work results. The ordinary and emergency operations are not coordinated with anyone. If streets are cut, the cuts are not reported or coordinated. The Division does not attend quarterly project coordination meetings.

- At the time of our audit, the **Transportation Division** in the Planning and Community Environment Department was coordinating projects with Public Works Engineering, but not with the other divisions we interviewed. In December 2005, the Transportation Division sent a representative to the quarterly project coordination meeting for the first time, and in January 2006, an interdepartmental effort coordinated by Public Works was underway to achieve the aggressive schedule of surface and sub-surface work related to the Charleston-Arastradero Corridor improvements.

Coordination is important and necessary

Excavations in paved streets degrade and shorten the life of the City streets. This degradation increases the frequency and cost to the public for necessary resurfacing, maintenance, and repair. City staff, the California Transportation Department (Caltrans), consultants, and others echo this statement.

Quarterly project coordination meetings

Recognizing the importance of coordination, Public Works and Utilities engineers come together in quarterly project coordination meetings with the goal of completing sub-surface work before a street is repaved. During the audit these meetings were growing in importance as the Public Works Engineering, Public Works Operations, Utilities Engineering, and Utilities Operations divisions were using these meetings to better coordinate their work, and staff from Utilities, Public Works, and ASD were working across departmental lines to address information technology issues.

The initiative has improved cross-departmental communications particularly with regards to capital projects, but an ongoing effort is needed to reduce the number of street cuts; to overcome the different operating objectives, planning

philosophies, and priorities; and to reduce the conflicts and duplication of efforts that currently exist.

Better coordination is needed

Best practices require that managers have timely access to data that is needed to manage their operations. During our audit, neither the Public Works Operations nor the Utilities Operations crews had access to GIS or PMMS data to review, monitor, record, or report the results of their repairs. They did not have access to information about other projects scheduled or the status of streets, and did not coordinate their activities with other divisions. Operational conflicts and inefficiencies resulted. For example:

- At Forest and Webster, Public Works Operations attempted to resolve a water drainage problem. Simultaneously, a Public Works Engineering contractor was working on Webster Street. Public Works Operations could not solve the water drainage problem because the curb, gutter, and street projects were not integrated to complement each other.

- In June 2005, Public Works Operations sent a crew, trucks, and materials out to a City street (Holly Oak) to resurface the street. When the work crew arrived, they discovered Utilities Engineering/Electric crews were boring for electrical lines in the same neighborhood. As a result, the Public Works crew had to cancel their work, return everything to the Maintenance Services Center, and reschedule the work.

- Utilities Electric Operations also reported conflicts in their operations. For example, the Utilities Department planned to use a substation at Fernando and El Camino Real for another year before deciding if the substation should be removed. Public Works Engineering started sidewalk work in the area without consulting the Utilities Department and forced the Utilities Department to change their plans, make last minute decisions, and to divert resources to the project at the last minute.

- Other conflicts reported include City divisions marking and installing traffic loops without coordinating or considering the condition of streets. As a result, the traffic loops had to be removed so streets could be resurfaced, and re-installed after the repaving.

Residents notice as well. In July 2005, a resident complained that the Utilities Department dug up Newell Street about 2 months after a Public Works Operations crew did a crack seal.

RECOMMENDATION #6: The City Manager should require Public Works Operations and Utility WGW and Electric Operations representatives to attend quarterly project coordinator meetings, and discuss upcoming projects.

A sole authority for street cuts is needed and permits should be required

Palo Alto requires permits for any person desiring to do any work within the right-of-way of any City street. This includes, for example, telecommunications companies and their contractors. The Municipal Code designates the City engineer (i.e. the Director of Public Works) as the authority to issue the permits, collect fees for those permits, and to revoke a permit if necessary.

However, Municipal Code section 12.08.030 exempts *"any excavation work under the direction of competent city authorities by employees of the city or by any contractor of the city performing work for and in behalf of the city"* from the requirement to obtain a permit. This includes:

- Public Works Engineering pavement contractors
- Public Works Storm Drain contractors
- Public Works Operations staff
- Transportation Division contractors
- Utilities Engineering Electric contractors
- Utilities Engineering Water contractors
- Utilities Engineering Gas contractors
- Utilities Engineering Wastewater contractors
- Utilities Operations Electric staff
- Utilities Operations Water, Gas, and Wastewater staff

Although quarterly project meetings are held, the focus is on capital projects, not everyone attends the meetings, and follow-up actions have not always ensured that conflicts are resolved. As a result, our review found that City streets had been repeatedly cut within 5 years of being resurfaced, and newly paved streets have been cut within weeks of being repaved.

According to CMR:429:03, Public Works has a policy to not allow trenching in City streets within 5 years of paving, but Public Works has no instrument in place for enforcing this policy. The presence of 9 City divisions who have the authority to cut City streets makes the enforcement of this policy impossible unless a sole authority is in charge.

During our visits to nearby cities, we learned that the cities of Burlingame, Daly City, Mountain View, and Sunnyvale have only one entity in charge of maintaining and restoring streets. Three of these cities have moratoriums or policies on street cuts, and all of them authorize one unit to coordinate and oversee projects related to street cuts. The persons in-charge are able to enforce the moratoriums and City requirements because they have the authority to approve, disapprove, and issue permits related to street cuts.[23]

In our opinion, designating the Public Works Director as the sole authority for all street resurfacings and street cuts, and making street work permits mandatory for

[23] See Appendix 4.

all City departments are necessary steps to ensuring the City's investment in its street infrastructure is protected. Like private contractors, Departments should be required to justify all emergency street cuts to the Public Works Director within 1 business day of the street cut.

RECOMMENDATION #7: The City Manager should require City departments and contractors (including Utilities) to obtain street work permits and the approval of the Public Works Director or his or her designee before cutting any street; require justification of emergency street cuts to the Public Works Director within 1 business day of the street cut; and consider imposing street work permit fees on City Utilities to cover the cost of permitting and inspection (the same as any other entity).

Many cities impose moratoriums on street cutting

During our visits with other jurisdictions we found that Daly City imposes a formal 5-year moratorium on street cuts, Mountain View has an informal 5-year moratorium, and Burlingame has a 3-year policy against cutting residential streets and a 5-year policy for arterials.[24] A previous Public Works Department study found that the City of Cupertino had a 10-year moratorium for overlays; the cities of Berkeley, Concord, Hayward, Los Altos, Menlo Park, Pleasanton, San Jose, and Walnut Creek had 5-year moratoriums for overlays and slurry seals; and Campbell and Redwood City had a 5-year moratorium for overlays only.

In our opinion, moratoriums like those imposed by the cities we visited, with proper exemptions, could help ensure the number of street cuts are reduced.

RECOMMENDATION #8: The City Manager should consider adopting and enforcing a 5-year moratorium on street cuts for newly resurfaced streets (with appropriate exceptions), and consider requiring streets to be resurfaced at least one lane width from a cut on a newly resurfaced street.

Coordination can be improved through information technology and common databases

Proper coordination requires that all entities share the same databases and have the same data for planning and executing their projects. However, as shown below and in Appendix 1, the City divisions involved in street cuts and excavations used different databases and different software systems to plan, coordinate, execute, and record their projects. At the time of our audit:

- Public Works Engineering used the GIS database and its subsystems, including Project Coordinator and the Pavement Maintenance and Management System (PMMS) for planning, scheduling, executing, monitoring, and reporting their street projects. The data was available to anyone with access to the GIS system, but did not appear to be widely

[24] See Appendix 4.

used. For example, Public Works Operations was not aware they could access the information

- Some time ago, the Utilities Engineering/Electric and WGW divisions downloaded GIS information into Auto-CAD, the graphic design software that they use to plan and execute their projects. To date, this information has not been uploaded back into GIS and is not available to other users within the City's GIS system.[25] The divisions manually input their capital improvement program back into Project Coordinator, where that data was available to anyone with access to the GIS system. The Divisions do not use PMMS data when planning their projects.

- The Public Works Operations division relied on SAP, Excel spreadsheets, and paper logs to plan, schedule, implement, and record its projects. The data was not shared with other divisions. In September 2005, the Division learned they could access GIS and the Project Coordinator subsystem.

- Utilities Operations/Electric and WGW used SAP, the legacy Minor Works system, and paper records to plan, schedule, execute, and report its projects. The data was not shared with other divisions. Prior to our audit, the divisions did not use GIS or the Project Coordinator subsystem.

- 3 divisions had data on manual logs that could not be easily shared with the other 5 divisions.

- 2 divisions log and handle complaints, while the other 6 refer complaints to Public Works Engineering if they are unable to resolve the complaints after calling around.

As a result, when complaints or inquiries regarding streets are received, the Utility and Public Works Departments have to call around to obtain the information needed if their files do not contain the necessary data. If their personal knowledge or calls did not produce the information needed, the complaint or inquiry would be referred to the Public Works Department, or the caller was asked to call the Public Works Department.

Importance of a unified GIS

Each of the divisions who work in City streets have different technology and information needs. The City has adopted a GIS platform that accommodates a suite of applications to address these various needs. GIS offers a technology solution to improve coordination of street capital projects and ensure information about annual projects is available to all.

During our audit, the Utilities Engineering, Utilities Operations – WGW, and Public Works Operations divisions initiated efforts to use GIS for their planning and operations. This initiative will require continuous top management emphasis until the unified GIS system is fully implemented by all the divisions.

[25] The City's Information Technology staff developed protocols for integrating the Auto-CAD data back into the GIS, but this has not been accomplished to date.

RECOMMENDATION #9: The City Manager should require all divisions who cut City streets to use GIS to coordinate their projects and summarize work completed in a timely manner.

Establishing geographic zones could help improve coordination and mitigate the "zebra" effect

Recent street resurfacing projects have been scattered geographically around the City. As a result, residents and staff alike talk about "the zebra effect". For example, we found about 150 feet of smoothly paved street on Sequoia (between Madrono and Escobita). The smooth pavement looked out of place in the neighborhood of badly deteriorating streets. Around the corner, Escobita Street is breaking up, has alligator cracks, and is seriously in need of resurfacing. On the West side is Madrono. This street also has alligator cracks, is deteriorating, and needs to be resurfaced.

EXHIBIT 16: Escobita Street at Sequoia[26]

Source: Office of the City Auditor

This also makes it difficult for divisions to plan their work. Some cities use geographic zones to help coordinate work. For example, Daly City has 246 lane miles of streets divided into 7 geographic zones.[27]

[26] The PMMS database rates the condition of this street segment as "poor" (PCI=44), and lists the date of last surface treatment as 1969. This segment is included in the backlog calculation (estimated remediation cost $61,116).

[27] The estimated service life of a protective slurry seal coating is 5 to 7 years.

RECOMMENDATION #10: To facilitate coordination of surface and sub-surface street work, Public Works should consider dividing the City into at least 7 geographic zones with at least a 7-year planning horizon so that other divisions and entities also have a longer planning horizon.

STRICTER CONTROLS OVER STREET CUTS AND STREET REPAIRS ARE NEEDED

In addition to better coordination of the long-term capital program, stricter controls are needed over day-to-day work in the streets. In our opinion, the limited budget and backlog mandates that the City closely coordinate any street cuts to ensure the life of the streets are preserved and the City's limited resources are not wasted. Enforcement is needed to ensure that metal plates are not left on streets unnecessarily, and more stringent standards on street restoration are needed to ensure the quality of street restorations. We recommend consideration be given to centralizing street restoration resources including crews and equipment in the Public Works Department. We also recommend broader authority for roadway inspections should be given to Public Works inspectors, and controls over street work permits and street cut fees should be improved.

Metal Plates were left on streets

The Municipal Code requires permits for work within the public right-of-way and streets (Chapter 12.08.010). Chapter 12.08.060 requires all work to be completed within 30 days from the date of the permit unless the City Engineer extended the time for good cause. Excavation work by City employees and contractors performing work for or in behalf of the City were exempted from these requirements (Chapter 12.08.030).

During our physical examination of the streets in our sample in October 2005, we found 5 sets of metal plates in 4 locations. We were informed that the metal plates belonged to the Utilities Department and private companies and were used to cover street cuts until the projects were completed. We submitted a list of the streets with metal plates and asked the City divisions in the Public Works and Utility Departments to identify who laid the metal plates, when they were laid, and when they would be removed. However,

- The Public Works Department reported they did not use metal plates and referred us to the Utilities Operations Divisions which used metal plates.
- The Utilities Department could provide information on only 2 locations (East Charleston and Middlefield[28], and Bryant at Forest[29]).

[28] *East Charleston and Middlefield:* We observed 4 metal plates (3 plates at East Charleston and Middlefield, and 1 plate on Middlefield and Charleston). According to the Utilities Engineering/WGW division, the metal plates were laid in June or July 2005 after repairs on a gas leak. The metal plates were not removed until the Utilities Engineering division designed a replacement system and the Utilities Operations -WGW division replaced the gas piping 4 months later. Since City employees and contractors working on City projects are exempted from the Municipal Code requirements, the 30 day rule for completing the project could not be enforced. According to Utilities Operations/WGW, it took 4 weekends to remove a total of 26 plates.

[29] *Bryant between Forest and Homer:* We observed 4 metal plates in the road. According to the Utilities Engineering/WGW division, the plates were laid by the telephone company (SBC/PacBell) in May 2005 after a Utility Department contractor cut the telephone lines accidentally while replacing a gas main. The

- None of the City entities we queried could provide answers on the metal plates at 2 locations (Laguna and Shauna[30], and Lowell and Alma[31]).

In November 2005, the Utilities Operations Division surveyed the City to locate, identify, and map the location of all the metal plates on the City streets. Utilities staff reported they identified a total of 141 plates, and were removing the metal plates wherever possible. The initiative is ongoing, and staff reports they are correcting the underlying conditions, patching the streets, and removing the metal plates as quickly as possible. As of December 2005, 81 plates had been removed.

RECOMMENDATION #11: The Public Works Director should modify the standard City contract specifications to require City departments and their contractors who lay a metal or temporary plate over street cuts to remove them in 30 days; impose fees for exceeding the 30 days without the permission of the Public Works Director; and require private contractors to provide a certificate of deposit for the work so that the City can be reimbursed for restoring the street if necessary.

More stringent standards on street restoration are needed

The Public Works Department is responsible for maintenance of street surfaces, and should have the ability to determine and enforce standards and specifications for street repair. During our review, Public Works reported instances of Utility work crews or their contractors removing and not restoring lane lines and traffic legends; damaging and not repairing adjacent street areas or sidewalks; and not finishing work to an acceptable standard. Other problems included not doweling street cuts and adjacent areas to prevent the street from sinking; not returning to repair old street failures; not properly compacting repairs to prevent base failures in the road; and excessive use of metal plates.

As a result of poor quality trench restoration, Public Works Operations and Engineering reports it has sometimes been tasked to re-work street repairs. For example, Public Works Operations reports it had to repair damages at Seale and

plates cover the splice points and will not be removed until the telephone company replaces all of the cabling from Hamilton to Channing on Bryant Street. The Utilities Department could not tell us when the company will apply for a street work permit or when the design and installation will be completed. In our follow-up, we were informed the telephone company had not applied for a street cut permit as required by the Municipal Code. Since a city contractor cut the street, a Public Works extension was not required. Since city employees and contractors working on city projects are exempted from the Municipal Code requirements, the 30-day rule for completing the project could not be enforced. The metal plates have been on the street for over 7 months and will continue to cover the streets regardless of the Municipal Code time limit of 30 days.

[30] *Laguna and Shauna:* We found a metal plate in the road. No one was able to tell us when the plate was laid, the reason the plate was laid, or the date that it will be removed. The plate was removed in December 2005.

[31] *Lowell between Emerson and Alma:* We observed 3 metal plates in the road. No one was able to tell us when the plates were laid, the reason the plates were laid, or the date they will be removed.

Alma streets and at East Meadow and Louis streets that were caused by inadequate compaction by the Utilities contractor after a sewer main was replaced. On Channing, the Public Works Operations staff reported it had to restore the road after the Utilities contractor failed to properly compact and restore the road base. According to Public Works, most of the PCC replacement work on Edgewood and Southwood Drives was due to inadequate trench restoration after WGW CIP projects.

During our audit, a resident reported a safety hazard involving an uneven bike lane on Coleridge (between Cowper and Bryant) that could cause children to fall from their bikes. Over the next 14 days, the complaint was referred by the Transportation division to the Public Works inspector, who referred the problem to Public Works Operations who referred the problem to Utilities Operations. Public Works Operations declined responsibility for fixing the problem that they believed was caused by poor compaction of a Utilities trench. Utilities declined responsibility for fixing the problem that they felt was now the responsibility of Public Works Operations. The complaint was resolved when the Public Works Operations staff corrected the problem at General Fund expense by removing the failed and heaved trench sections and re-grading the street with asphalt.

In our opinion, consideration should be given to centralizing street restoration resources within the Public Works Department, and imposing stricter citywide standards on backfill (e.g. controlled density backfill) and on street restoration (e.g. requiring grinding and T-caps, or full lane-width resurfacing where appropriate).

RECOMMENDATION #12: The City Manager should consider centralizing street restoration resources, including crews and equipment, in the Public Works Department.

RECOMMENDATION #13: The City Manager should require all entities that cut the street to fill and compact cut streets according to strict, uniform specifications set by the Public Works Director.

RECOMMENDATION #14: The City Manager should consider requiring any entity cutting the City streets to make only temporary fills and to prepare the cut for final paving per Public Works engineering specifications, and require the contractor to reimburse the Public Works Department for all final street restorations made by the Department or its contractors.

Broader authority for roadway inspections should be given to Public Works inspectors

The Municipal Code (Chapter 12.08.060) states that the City has to inspect and/or approve all prepared sub-grades and surfaces before any concrete is poured and has to approve all completed work. Based on our physical inspection of the City streets, we concluded improvements are needed in the oversight of contractors. Unless improvements are made, improper streets cuts will continue to deteriorate the City streets by allowing water to invade the road base and the

uneven rides reported by many residents will continue to occur. As shown below, the present inspection process does not work.

The Public Works Director reports that the Public Works Inspector can only advise and does not have the authority to direct Utilities Department contractors or inspectors to comply with his directions. As a result, many of the problems discussed in this report, including uneven street restorations, unsealed cuts, metal plates laying on the street for longer than 30 days, multi-colored PCC streets, and other problems are not resolved through the inspection process.

EXHIBIT 17: Patch work (Wright Place at Starr Circle)[32]

Source: Office of the City Auditor

RECOMMENDATION #15: The City Manager should authorize only Public Works to inspect and accept all street resurfacing work resulting from street cuts, including signing off on any permits involving street cuts.

Controls over street work permits and street cut fees should be improved

Between September 2003 and September 2005, the Development Center issued about 373 street work permits. Public Works staff in the Development Center receive the permit applications; calculate and collect the fees; check for compliance with insurance requirements; and approve and issue the street opening permits. They use the GIS system to confirm the trench fee amount to charge. However, they do not determine whether future projects are planned, or whether other entities are working on the street before issuing the permit. As a result, staff in the Development Center are not utilized to help prevent conflicts in

[32] The PMMS database rates the condition of this street segment as "fair" (PCI=80). The date of last surface treatment was 1995. No remediation is planned.

street work or to encourage cooperation with the current unofficial 5-year moratorium.

Improvements are needed to properly administer street cut fees imposed at the Development Center

Procedures state that a Street Opening Permit is required whenever a contractor or non-government party (such as utility providers and private development projects) works in the City's right-of-way that would result in a break of the street. The permit fee is 5% of the value of the work with a $200 minimum fee. Exhibit 18 shows the adopted street work fees and street cut fees.

EXHIBIT 18: Street Work Permit Fee Schedule (FY 2004-05)

Description	Fee
Construction in the Public right of Way (public or private streets)	$200 minimum, or 5% of contract work
Street Cut Pavement Condition (Based on PMMS)	
• Excellent (PCI= 94-100)	$10.00 per sq ft of trench
• Good (PCI = 81-93)	$7.50 per sq ft of trench
• Fair (PCI=63-80)	$5.00 per sq ft of trench
• Poor (PCI = 0-62)	$2.50 per sq ft of trench
• Service Lateral Connection (per trench)[33]	$600.00

Source: Adopted Municipal Fee Schedule

A sampling of street work permits revealed that street cut fees were not charged in some instances. During our audit, the street cut fee procedures were still in draft form and had not been formally implemented.

RECOMMENDATION #16: The Public Works Director should finalize and formally adopt the street cut fee policy and procedures, and train Public Works staff in the Development Center to properly charge street cut fees.

Administration of exceptions

Municipal Code section 12.10.040 outlines the following exceptions to the street cut fee:

a) Excavations in streets scheduled within one year of the date specified in the Notice to Proceed for the city's annual street maintenance program capital improvement project shall be exempt from the street cut fee. The department of public works shall endeavor to notify public utilities of streets so scheduled.

b) No street cut fee shall be charged for underground utility district projects, utility line relocations necessitated by city-funded street work projects or by street vacations or abandonments.

c) No street cut fee shall be charged with respect to excavation in a sidewalk, driveway, curb, and gutter.

[33] The flat $600 fee per trench was for developers who needed a street opening permit for utility service connections. The fee was based on $10 a square foot and a 60 square feet excavation.

d) No street cut fee shall be charged for emergency work as defined as causing an imminent risk to public health and safety.

Before issuing a street work permit, Public Works staff in the Development Center checks the age of the street in order to calculate street cut fees. However, staff does not check the project coordinator system to determine if the proposed work is within the one year exception. As a result, contractors are not given the one-year exception.

RECOMMENDATION #17: Public Works staff in the Development Center should apply the one year exception when appropriate, and should post or make available to applicants the proposed plan for street work in the coming year.

Improvements are needed to properly administer Utility street cut fees

According to CMR:429:03, the new street cut revenues were originally estimated at approximately $1.4 million per year, with about $1 million paid by the Utilities Department. Actual revenue has been substantially lower. Only $335,393 in street cut fees was collected during FY 2004-05. The fees are estimated to bring in about $579,000 in FY 2005-06. According to staff, the original revenue estimate was based on the adopted capital budget, and did not take into account the Utility Department's new emphasis on boring, rather than trenching.

Of the $335,393 for FY 2004-05, $246,375 in street cut fees due on capital projects was transferred from Utilities to the General Fund based on interdepartmental memos. At the time of our audit, an additional $89,010 had been collected from Utility customers and outside contractors, but only $20,618 had been transferred to the General Fund. We advised the Public Works Department that $68,400 from FY 2004-05 had not been transferred to the General Fund, and action was taken to transfer the funds.

RECOMMENDATION #18: Utilities should establish a process to ensure street cut fees are correctly tracked and remitted to the General Fund.

Street work permit data is not shared

When street work permits are issued, Public Works staff at the Development Center enters some information into Accela and some data into GIS. According to staff, copies of the permits are sent to the Public Works Inspectors who are supposed to check on the contractors to ensure the work is completed in accordance with City requirements, however that information is not forwarded to any of the other divisions who are responsible for street restoration.

Public Works staff at the Development Center were unable to readily give us information about which private companies (such as SBC Communications and COMCAST) had cut streets during emergencies, had applied for permits, or had paid the street cut fees. In part this is because most of the information is tracked on hard copy permit forms, rather than in the Accela system.

The City formerly developed a website called City Trax which was designed to track citywide projects currently in progress or planned. If the project took two weeks or longer to complete, it was supposed to be added to the website and the database was supposed to be made available to the public and others for searching. Since its inception, the website has been deactivated. As a result, a comparable data base is not available to the public or the City staff that tells the status of both City and private projects in the streets.

In our opinion, a database that is accessible to all the entities who work on streets is needed to be able to respond to questions and better coordinate work. Currently Accela and GIS are not integrated, and some street data that has been entered into Accela is not available in GIS.

RECOMMENDATION #19: Public Works should make information on street work permits available to all entities that work on City streets, preferably through GIS.

IMPROVEMENTS ARE NEEDED IN THE CITY'S PAVEMENT MANAGEMENT SYSTEM TO ENSURE THE ACCURACY OF DATA, PROPER ASSIGNMENT OF PRIORITIES, BUDGET OPTIMIZATION, AND COMPARABILITY WITH REGIONAL DATA

The City was an early leader in the development of a pavement management system. Now all jurisdictions are required to have a pavement management system in order to qualify for state and federal funding.

The City uses PMMS to manage its City streets program. The Metropolitan Transportation Commission (MTC)[34], the Bay Area's regional planning authority, uses another pavement management system called StreetSaver to monitor and analyze the streets requirements and performance of Bay Area jurisdictions. MTC developed StreetSaver about 24 years ago to provide standard measures for measuring and comparing Bay Area jurisdictions. According to MTC, 109 jurisdictions in the Bay Area use Streetsaver and only two jurisdictions do not – Walnut Creek and Palo Alto. As a result, MTC reports that it has difficulty comparing Palo Alto's street requirements, performance, and needs with the other 109 jurisdictions in the Bay Area.[35]

The City was an early leader in the development of a pavement management system

The City's Pavement Maintenance Management System (PMMS) was developed by a consultant for the City of Palo Alto. The unique system uses the City's GIS databases to identify the condition of streets, streets that need maintenance, and to systematically schedule the highest priority streets for repairs. The PMMS is used to prioritize streets needing capital improvements.

The PMMS database contains the results of bi-annual City street surveys, the maintenance history for individual streets, original design information, traffic uses, and other data. Using algorithmic formulas, the PMMS rates street condition, calculates "deduct values" (known elsewhere as the Pavement Condition Index), assigns priorities, determines if maintenance is needed, and determines the type of resurfacing appropriate for each street. [36]

[34] MTC was created by the California State Legislature in 1970 and functions as the regional transportation planning agency for developing mass transit, highways, airport, seaport, railroad, bicycle and pedestrian facilities. MTC administers state, federal, and local grants for maintaining and improving transportation and street related projects.

[35] MTC staff report StreetSaver is used to evaluate road conditions, maintenance needs and funding shortfalls at the regional level. Because Palo Alto uses a different system, many of their projections and analyses show Palo Alto as "data not available".

[36] The PMMS database includes the following: a PMMS-ID; GID (geographical id); street segment id; street name; from and to street; year constructed; paving area, length and width; surface and base types; deduct value (the MTC PCI equivalent); priority; pavement condition; trench fee; remediation option and

Improvements are needed to ensure pavement information is current and that designations and priorities are being properly assigned

Databases need maintenance. The Public Works Department's policy has been to conduct biannual surveys of street conditions. Our testing of the PMMS database revealed some errors, some missing data, and that the 2005 street condition survey had not been completed. In addition, some improvements are needed.

Priority scores generated by PMMS were weighted against high traffic streets

Public Works uses PMMS to identify streets whose condition requires maintenance, and to systematically schedule the highest priority repairs. However, we found that the PMMS algorithm places traffic counts in the denominator thereby decreasing (rather than increasing) the priority given to arterials, collectors, and other heavily used streets. This means streets with higher traffic counts were given lower priorities and streets with lower traffic counts received higher priorities for repaving.[37]

It should be noted that before assigning work to be done, Public Works Engineering prints maps of the worst 20% of City streets (as defined by the PCI, or deduct value), visually inspects the streets, looks for conflicts between street resurfacing and Utility projects, adjusts for geographic distribution of the program around the City, adjusts for preventive maintenance, and judgmentally decides which streets should be resurfaced.

Maintenance tables should be reviewed

During our review, the original maintenance options tables for maintenance types, rehabilitation requirements, costs, and service lives were changed without the knowledge, oversight or approval of the Public Works supervisors. As a result, supervisors could not confirm that the new costs and other data in the maintenance options table were valid or accurate.

PCI scores generated by PMMS may not be comparable with other jurisdictions

After physically inspecting the streets, values are assigned for raveling, alligator, block cracking, ride ability, longitudinal and transverse cracking, trench cuts, and rutting. These values are important because they are used to calculate the deduct value (or PCI score) for each street and ultimately for assigning the priority for resurfacing streets.

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cost (square feet X paving area); service life; and maintenance history details such as the year, thickness, cost, and years since the last resurfacing for asphalt overlays, base failures, crack sealing, and slurry sealing. The database does not have any entries for comments or recording utility data related to street cuts and maintenance.

[37] PMMS data shows that 18% of residential streets are currently classified in poor condition, compared to 26% of arterials, and 27% of collector streets.

Break points for each category have been set without ascertaining if the breakpoints are compatible with the MTC ratings used by other entities in the Bay Area, and without review by Public Works supervisors. As a result, MTC staff could not tell us if the deduct values (PCI) scores were valid or comparable to the values reported by other Bay Area entities.

Staff is not cross-trained in the use of PMMS

Discussions with Public Works Engineering and the Administrative Services GIS section indicate that a Public Works senior engineering technician is the sole database administrator for PMMS; the person most proficient in PMMS; and the primary person allowed to access the PMMS database. This employee performs the streets surveys, enters data, decides what data to enter, determines what value to assign streets for the various attributes, establishes the system attributes, sets break points, defines and interprets system data, and sets street selection criteria and parameters.

Any City employee with access to GIS can see PMMS data, but they would need help to define the data to be displayed, know which layer contains the data, and build the data map by overlaying each layer. For instance, based on a request, the technician developed a map of the resurfaced streets over the last 7 years for the Utilities Engineering Electric division. The map was built by mapping the PMMS streets data layer by layer, year by year, for the attributes the Utility Engineering/Electric Division wanted. If the technician leaves the City, no one would have the expertise to maintain or use the PMMS data.

Palo Alto is one of only two cities in the Bay Area that does not use MTC's StreetSaver software

The state government requires cities to have a pavement management system to qualify for roadway funding. MTC has certified that Palo Alto has a pavement management system and Palo Alto is therefore eligible for roadway funding. However, Palo Alto is one of only two cities in the Bay Area that does not use the MTC StreetSaver software.

Furthermore, MTC analysis of PMMS indicates incongruities exist between PMMS and the MTC StreetSaver algorithms. As a result, MTC staff report they cannot integrate the City's data into the MTC regional database or compare the City's data with other cities (Palo Alto shows as "data not available" on MTC reports). They also report that the lack of compatibility makes it more difficult for them to analyze the City's pavement needs.

Beneficial features of StreetSaver

StreetSaver has several beneficial features. It uses statistical sampling to generate PCI scores for streets and for the entire City, quickly generates the results of different scenarios and funding levels, allows customization, and is

compatible with GIS.

StreetSaver uses statistical sampling to generate pavement condition scores

Palo Alto's PMMS requires the Public Works Engineering staff to inspect each and every City block bi-annually for the same criteria used in the MTC software. The City does not perform random sampling. Consequently, the Palo Alto staff will survey 10 blocks and obtain 10 unique deduct values (or PCI scores). In our opinion, Palo Alto's labor intensive survey is enough to overwhelm City staff, and as a result, information in the database falls out-of-date.

The MTC software is based on a bi-annual statistical sampling of street sections. Rather than surveying each of the above 10 blocks individually, the system randomly selects one segment to be surveyed and inspected, and assigns that PCI to all 10 blocks.

MTC routinely provides grants of $20,000 to $25,000 to local jurisdictions to conduct these statistically valid street surveys and update their Streetsaver. MTC has indicated that it is not interested in funding the type of block-by-block survey that Palo Alto uses to update PMMS.

StreetSaver includes budget optimization

The MTC Streetsaver system focuses on preventive maintenance, and optimizing street expenditures so that street dollars are spent in the most economical and efficient way. The MTC system quantifies budget needs and backlogs, and facilitates planning using 'what if' scenarios. It uses mathematical models to optimize the best plans for resurfacing city streets. It facilitates assignment of priorities.

StreetSaver allows customization

According to Public Works, about 1/3 of Palo Alto's streets are PCC based with an asphalt overlay or have PCC surfaces that require special scoring and special treatment because the resurfacing costs for PCC streets are higher, ride-ability is a major focus, and visual appearance is a special consideration.

During our visits to nearby cities (all of whom used StreetSaver), we were told these cities also have PCC surfaced streets and PCC streets with asphalt overlay. Daly City and Sunnyvale, for example, use StreetSaver to analyze and plan their resurfacing work for all their streets, including the PCC based streets. MTC reported their software allows the criteria to be changed and weighted to fit the unique conditions of each city. Sunnyvale expressed less enthusiasm for StreetSaver's ability to handle customization, but, like all the cities visited, reported the MTC Streetsaver allowed them to have a good starting point for selecting, inspecting, and deciding what type of resurfacing was needed for the streets selected.

StreetSaver is compatible with GIS

According to MTC, a number of jurisdictions are using StreetSaver in combination with their GIS systems. We have, however, heard varying reports about how well it is working.

RECOMMENDATION #20: Public Works should consider switching to the MTC Streetsaver system so that Palo Alto data will be compatible with the other cities in the Bay Area. If Public Works decides to keep PMMS, then it should revise the priority-setting algorithm, add a budget optimization component, review maintenance tables, review PCI breakpoints, and establish a process for reviewing future changes to tables and breakpoints.

RECOMMENDATION #21: Public Works should apply for an MTC grant either to upgrade its current PMMS system, or to switch to MTC StreetSaver, integrate StreetSaver into the City's GIS, and conduct a survey of street conditions.

CONCLUSION

Palo Alto has a backlog in street repairs, and the annual street maintenance budget is inadequate to deal with the backlog and stay current with recommended preventive maintenance schedules. Additional funding will be required, but also better coordination and oversight of surface and sub-surface street projects is needed to ensure street dollars are spent as efficiently as possible. Moreover, stricter controls over street cuts are needed. We recommend establishing a sole authority for street cuts, requiring City departments to get street opening permits, and authorizing the Public Works Director to impose stricter standards on street restoration that applies to everyone, including City employees and City contractors, working on City streets. Improvements are also needed to properly administer street cut fees, and to ensure Palo Alto's pavement management system is accurate and effective.

Recommendations

RECOMMENDATION #1: Public Works and ASD should develop and propose a long-term resurfacing-reconstruction plan and funding strategy to address the street maintenance backlog.

RECOMMENDATION #2: Public Works and ASD should propose annual increases in the City's street cut fees to account for construction cost inflation.

RECOMMENDATION #3: Public Works and ASD should consider implementing roadway impact fees to mitigate for damage caused to streets by heavy refuse and construction equipment.

RECOMMENDATION #4: The Public Works Director should perform a study of the impact of street cuts on City streets and quantify the costs of repairing damages caused by multiple street cuts.

RECOMMENDATION #5: Based on the study results, the Public Works Director should propose increasing street cut fees to fully recover the projected cost of repairing damages to the structural integrity of streets; recover and repair the damages caused by multiple cuts; fully recover the higher costs of restoring recently resurfaced streets; and mitigate the damages to newly paved streets.

RECOMMENDATION #6: The City Manager should require Public Works Operations and Utility WGW and Electric Operations representatives to attend quarterly project coordinator meetings, and discuss upcoming projects.

RECOMMENDATION #7: The City Manager should require City departments and contractors (including Utilities) to obtain street work permits and the approval of the Public Works Director or his or her designee before cutting any street; require justification of emergency street cuts to the Public Works Director within 1 business day of the street cut; and consider imposing street work permit fees on

City Utilities to cover the cost of permitting and inspection (the same as any other entity).

RECOMMENDATION #8: The City Manager should consider adopting and enforcing a 5-year moratorium on street cuts for newly resurfaced streets (with appropriate exceptions), and consider requiring streets to be resurfaced at least one lane width from a cut on a newly resurfaced street.

RECOMMENDATION #9: The City Manager should require all divisions who cut City streets to use GIS to coordinate their projects and summarize work completed in a timely manner.

RECOMMENDATION #10: To facilitate coordination of surface and sub-surface street work, Public Works should consider dividing the City into at least 7 geographic zones with at least a 7-year planning horizon so that other divisions and entities also have a longer planning horizon.

RECOMMENDATION #11: The Public Works Director should modify the standard City contract specifications to require City departments and their contractors who lay a metal or temporary plate over street cuts to remove them in 30 days; impose fees for exceeding the 30 days without the permission of the Public Works Director; and require private contractors to provide a certificate of deposit for the work so that the City can be reimbursed for restoring the street if necessary.

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RECOMMENDATION #15: The City Manager should authorize only Public Works to inspect and accept all street resurfacing work resulting from street cuts, including signing off on any permits involving street cuts.

RECOMMENDATION #16: The Public Works Director should finalize and formally adopt the street cut fee policy and procedures, and train Public Works staff in the Development Center to properly charge street cut fees.

RECOMMENDATION #17: Public Works staff in the Development Center should apply the one year exception when appropriate, and should post or make available to applicants the proposed plan for street work in the coming year.

RECOMMENDATION #18: Utilities should establish a process to ensure street cut fees are correctly tracked and remitted to the General Fund.

RECOMMENDATION #19: Public Works should make information on street work permits available to all entities that work on City streets, preferably through GIS.

RECOMMENDATION #20: Public Works should consider switching to the MTC Streetsaver system so that Palo Alto data will be compatible with the other cities in the Bay Area. If Public Works decides to keep PMMS, then it should revise the priority-setting algorithm, add a budget optimization component, review maintenance tables, review PCI breakpoints, and establish a process for reviewing future changes to tables and breakpoints.

RECOMMENDATION #21: Public Works should apply for an MTC grant either to upgrade its current PMMS system, or to switch to MTC StreetSaver, integrate StreetSaver into the City's GIS, and conduct a survey of street conditions.

Public Works Department
Engineering Division

MEMORANDUM

From: Frank Benest, City Manager

By: Glenn S. Roberts, Director, Public Works

Date: March 16, 2006

Subject: Response to 2005 Street Maintenance Audit

RECOMMENDATION #1: Public Works and ASD should develop and propose a long-term resurfacing-reconstruction plan and funding strategy to address the street maintenance backlog.

Staff agrees with this recommendation and has made strides in reducing the backlog by increasing the lane miles maintained per year. The amount of lane miles maintained can vary every year depending on the amount of streets either receiving preventative or resurfacing/reconstruction pavement treatments. Sometimes the number of maintained lane miles is reduced when funds go towards improving street drainage by repairing damaged curb and gutter. The number of maintained lane miles increase when streets receive preventative maintenance such as slurry or cape seals, as less funds are then needed to make curb and gutter repairs. Preventative maintenance slows down deterioration of the streets, allowing staff to stretch dollars and increase lane miles maintained.

Staff aggressively pursues additional federal, state and local funding for street maintenance to enhance the street program capital budget and has been very successful compared to other bay area cities. See Attachment A. This year alone, staff expects Surface Transportation (STP) funds for University Avenue, Embarcadero Road and Page Mill Road totaling an additional $788,000. In addition, staff expects to receive Bicycle Transportation Account (BTA) program funds for Hanover Street and Porter Drive totaling an additional $229,000. Federal, state and gas tax dollars are typically tied to selection criteria with priority on maintaining structural integrity.

RECOMMENDATION #2: Public Works and ASD should propose annual increases in the City's street cut fees to account for construction cost inflation.

Staff agrees with this recommendation, will review construction costs annually and adjust the Municipal Fee Schedule accordingly beginning FY 2006-07.

RECOMMENDATION #3: Public Works and ASD should consider implementing roadway impact fees to mitigate for damage caused to streets by heavy refuse and construction equipment.

Staff agrees with this recommendation and will research ways to implement an impact fee and propose options to consider by the end of the year. We are aware that there is an ongoing effort to analyze the effect of all impact fees assessed by the City and will coordinate with other City departments.

RECOMMENDATION #4: The Public Works Director should perform a study of the impact of street cuts on City streets and quantify the costs of repairing damages caused by multiple street cuts.

Staff believes this issue has previously satisfied by virture of the work that was done at the time the street cut fee was originally implemented. Staff has previously performed a validation of the current street cut fees by comparing trench cut studies performed by other cities such as Santa Ana's Utility Trench Cut Evaluation, the San Mateo Trench Study Report and the City of San Francisco' Regulations for Excavating and Restoring Streets among others. Staff will reassess the studies performed by other comparable agencies and adjust the street cut fee accordingly.

RECOMMENDATION #5: Based on the study results, the Public Works Director should propose increasing street cut fees to fully recover the projected cost of repairing damages to the structural integrity of streets; recover and repair the damages caused by multiple cuts; fully recover the higher costs of restoring recently resurfaced streets; and mitigate the damages to newly paved streets.

Staff already imposes a higher street cut fee for recently resurfaced streets to mitigate the damages to newly paved streets. Staff agrees with the recommendation to consider increasing fees for multiple street cuts created by individual projects and will assess this as noted in recommendation 4. It is important to note that it would not be equitable to charge a higher fee for existing street conditions that have street cuts done in the past.

RECOMMENDATION #6: The City Manager should require Public Works Operations and Utility WGW and Electric Operations representatives to attend quarterly project coordinator meeting, and discuss upcoming projects.

Public Works Operations, Utility WGW and Electric Operations' representatives already attend the quarterly project coordinator meetings.

RECOMMENDATION #7: The City Manager should require City departments and contractors (including Utilities) to obtain street work permits and the approval of the Public Works Director or his or her designee before cutting any street; require justification of emergency street cuts to the Public Works Director within 1 business day of the street cut; and consider imposing street work permit fees on City Utilities to cover the cost of permitting and inspection (the same as any other entity).

Staff agrees with the overall objective to improve coordination, which is addressed in responses to recommendations 6 and 19. Permitting is not the most cost effective or efficient use of resources as most street cuts that occur after the repaving of a street are the result of new utility services and required system repairs to subsurface utilities. The imposition of a permit will not stop the work from occurring. The issuance of a permit will also increase costs for the residents by forcing them to pay additional fees for service and increasing the cost of utilities. Again, the additional procedural processes will not significantly impact the number of street cuts nor will they improve the quality of the street surface. In the last part of the recommendation a proposal is made to charge City Utilities a fee for permitting and inspection of facilities. Currently, Utilities pays the cost of Public Works inspections on CIP and in-house Projects through interdepartmental transfers from the Utility Fund to the General Fund. Staff recommends requiring notification of emergency street cuts on a quarterly basis.

Staff already requires private development contractors to obtain street work permits. Staff recommends requiring notification of emergency street cuts by in-house crews and contractors to the Public Works Director on a quarterly basis instead of within one (1) business day of the street cut as this would be difficult to administer.

RECOMMENDATION #8: The City Manager should consider adopting and enforcing a 5-year moratorium on street cuts for newly resurfaced streets (with appropriate exceptions) - and consider requiring streets to be resurfaced at least one lane width from a cut on a newly resurfaced street.

Staff does not believe that a 5-year moratorium will significantly improve the quality of the pavement in Palo Alto but will consider imposing a penalty for cutting into a newly paved street. Most street cuts that occur after the repaving of a street are the result of private

development requiring new utility services to customers and required system repairs to subsurface utilities. The moratorium will not stop these activities from occurring as the city can not impose a moratorium on private development, telephone companies and other regulated entities. The other cities interviewed do not have comparably sized utility infrastructure work as compared to Palo Alto.

Staff implements progressively higher fees for cuts into newly resurfaced streets. Collecting a fee and resurfacing a street when it is necessary is the easiest and most cost effective way to rectify pavement damage rather than require each project to resurface at least one lane width for a cut on a newly resurfaced street. Also, requiring Utilities to resurface at least one lane width would increase the cost of utility work which would need to be passed on to the rate payers in the form of increased utility rates.

RECOMMENDATION #9: The City Manager should require all divisions who cut city streets to use GIS to coordinate their projects and summarize work completed in a timely manner.

All enterprise and general fund capital projects are currently coordinated in GIS through the Project Coordinator Program and have been entered into the system for the 5-year period that is covered in the proposed budget. The current system works well for the capital program.

However, coordination of on-going maintenance and repairs to the various utility systems is a much more difficult task. This is because maintenance and repair can occur throughout the city and the prioritization of the work is continually changing based on current system needs. There continues to be a need to improve the coordination efforts between the street programs and the operations and maintenance programs. To make significant progress in this area an effort needs to be made to tie the various maintenance programs into the project coordinator program. Staff's goal has been to integrate customized software applications into GIS. This is a complex process because of the number of programs used for system maintenance that would have to be interfaced into the GIS project coordinator. Staff would recommend doing a cost benefit analysis to determine feasibility of integrating these programs.

RECOMMENDATION #10: To facilitate coordination of surface and sub-surface street work, Public Works should consider dividing the City into at least 7 geographic zones with a least a 7-year planning horizon so that other divisions and entities also have a longer planning horizon.

This recommendation would be applicable in a situation where all of the streets were of homogenous state of age, condition, and type of construction. Unfortunately, that is not the case in Palo Alto. The streets vary greatly in these criteria, particularly in type of construction. Palo Alto has a mix of both asphalt and concrete (some of which have been overlaid with asphalt) streets. For asphalt streets, a slurry seal is

applicable as a preventative maintenance measure, in order to keep water from penetrating the pavement. For concrete streets, water is not a primary issue and slurrysealing will not correct its primary issue of ride quality. Given limited resources, streets need to be prioritized on a case-by-case basis to make sure the most appropriate and cost effective type of maintenance treatment is being utilized for that specific street's age, condition and type of construction. This is demonstrated by the information shown in Attachment "D". In Palo Alto, street maintenance activities do not lend themselves to geographic district groupings.

Furthermore, the infrastructure priorities for street paving and utility rehabilitation do not align into geographic zones. Utility infrastructure priorities differ in maintenance and lifecycle replacement needs. Forcing the street maintenance and Utility infrastructure work into geographic zones would add to the required maintenance and infrastructure work scheduled.

RECOMMENDATION #11: The Public Works Director should modify the standard City contract specifications to require city departments and their contractors who lay a metal or temporary plate over street cuts to remove them in 30 days; impose fees for exceeding the 30 days without the permission of the Public Works Director; and require private contractors to provide a certificate of deposit for the work so that the City can be reimbursed for restoring the street if necessary.

Staff agrees with this recommendation, although it is likely to result in higher construction costs for the City. Pavement restoration is usually done when there is enough work for maximum efficiency. If a contractor is required to pave at several different times to comply with the 30-day rule, those additional costs will be passed on to the City and Utility rate payers.

The City already requires a performance bond to ensure the work is completed making a certificate of deposit unnecessary.

RECOMMENDATION #12: The City Manager should consider centralizing street restoration resources, including crews and equipment, in the Public Works Department.

Staff agrees to further review the concept of centralizing street restoration resources though it is important to note that this has been previously considered and rejected due to scheduling and efficiency constraints. Several discussions will need to occur between Utilities Department and Public Works Department to resolve many concerns, which were not pointed out nor discussed in the audit. Coordination between trench restoration (backfilling/compaction) and preparation for trench paving

is critical to make sure resources are not wasted. Street restoration is an important aspect of a utilities project and complications will likely occur when pieces of a project are assigned to other departments.

RECOMMENDATION #13: The City Manager should require all entities that cut the street to fill and compact cut streets according to strict, uniform specifications set by the Public Works Director.

Staff agrees with this and has already provided stricter standards for trench restoration. Staff will issue an update to the Public Works Standard Specifications this year including revised trench standard details requiring improved trench restoration.

RECOMMENDATION #14: The City Manager should consider requiring any entity cutting the City streets to make only temporary fills and to prepare the cut for final paving per Public Works Engineering specifications, and require the contractor to reimburse the Public Works Department for all final street restorations made by the Department or its contractors.

Staff agrees improvements can be made in the quality of the trench restoration with improved specifications and rigorous inspection rather than have Public Works Operation's crews perform the trench restoration work.

The difficulty with requiring temporary fills is that temporary material would need to be removed and replaced with final backfill and paving material. In cases where concrete streets are restored, time is needed for the concrete to harden and a street would have to be barricaded for several days. Minimizing street impacts using a trench plate is typically more effective by reducing street closures and disruption caused by temporary repairs.

Requiring reimbursement from any entity that performs a street cut creates a number of problems, especially with who collects the payment and who is responsible if payment is not made. This adds another layer that is unnecessary if strict, uniform specifications are set.

RECOMMENDATION #15: The City Manager should authorize only Public Works to inspect and accept all street resurfacing work resulting from street cuts, including signing off on any permits involving street cuts.

Staff agrees with this recommendation as Public Works already inspects all street resurfacing work including proper edges of trenches, pavement restoration, and any pavement markings that should be replaced.

RECOMMENDATION #16: The Public Works Director should finalize and formally adopt the street cut fee policy and procedures, and train Public Works staff in the Development Center to properly charge street cut fees.

Staff agrees with this recommendation. Public Works Development Center staff had a few instances where street cut fees were not charged and they are now aware of the correct process and training has already occurred.

RECOMMENDATION #17: Public Works staff in the Development Center should apply the one year exception when appropriate, and should post or make available to applicants the proposed plan for street work in the coming year.

Staff agrees with this recommendation. Public Works Development Center staff was unaware that this requirement existed and that Project Coordinator resides in the GIS to determine when streets are planned for resurfacing. Staff is now aware and training is underway.

RECOMMENDATION #18: Utilities should establish a process to ensure street cuts fees are correctly tracked and remitted to the General Fund.

Staff agrees with this recommendation and has already been in the process of refining the existing procedure.

RECOMMENDATION #19: Public Works should make information on street work permits available to all entities that work on City streets, preferably through GIS.

GIS, Accela and City Trax are tools to track permits however not all staff are using this information/software consistently. Staff will continue its efforts to implement a single tracking system using GIS integrated with Project Coordinator.

RECOMMENDATION #20: Public Works should consider switching to the MTC StreetSaver system so that Palo Alto data will be compatible with the other cities in the Bay Area. If Public Works decides to keep PMMS, then it should revise the priority-setting algorithm, add a budget optimization component, review maintenance tables, review PCI breakpoints, and establish a process for reviewing future changes to tables and breakpoints.

RECOMMENDATION #21: Public Works should apply for an MTC grant either to, upgrade its current PMMS system, or to switch to MTC StreetSaver, integrate StreetSaver into the City's GIS, and conduct a survey of street conditions.

Staff will consider these recommendations and report back at the end of the year with the results of the City's PMMS and MTC's StreetSaver comparison and the appropriate application of MTC grant funds.

As in all pavement management and computer systems, the output of results is only one tool used to determine street selection and does not describe the entire process. This was evident in discussions with other cities. The purpose of this response is to educate and clarify the goals and efforts towards providing the best street quality, minimizing the use of city funds to accomplish street maintenance and staying competitive using the latest technology available.

The goal of the annual street maintenance project is to reduce street deterioration, maintain the structural integrity and ride quality in the most cost effective manner while coordinating with the public and other projects to ensure timely completion.

Description of the Street Maintenance Program, Prioritization Process and Philosophy

Staff evaluates the computer output of the PMMS calculates a pavement condition score (PCI) of the streets based on inspection of the extent of road deterioration such as base failures, raveling and block cracking and prioritizes streets to be maintained. Traffic volume may dictate a fine tuning of priorities as this provides a "safety verses # of users" factor.

For quality control purposes, staff updates the PMMS data after each resurfacing project is complete, obtains annual street condition data from various sources (staff, operations and the public) and performs a visual survey of all streets every two years.

Public Works staff then conducts value engineering and selects streets using a prioritization rational as follows:

- health and safety
- legal and regulatory
- preventative maintenance
- capital replacement/rehabilitation
- compliance with comprehensive plan

- poor ride ability for bicycles
- neighborhood impacts affected by construction and utility work
- packaging # of streets to reduce the cost of construction
- aesthetics/visibility

The current philosophy is to use the most effective treatment at a point in time before the pavement deteriorates further. This philosophy translates into the PMMS as it does not prioritize ride ability concerns or visual appearance of streets in an effort to minimize costs to the City. Value engineering is needed to implement the priorities mentioned above and a formula or program should not be created as it is a qualitative approach.

For several years, the PMMS has been linked to the GIS and only a few pavement systems have begun this integration. The pavement backlog can be reduced by following the philosophy noted above and addressing structural deficiencies first rather than improving aesthetics. For further information please see Attachments B and C.

Federal, State and Local Transportation Grants

Project Number	Project	FY 01-02 Awarded	FY 02-03 Awarded	FY03-04 Awarded	FY 04-05 Awarded	FY04-05 Pending	FY 05-06 Awarded	FY 05-06 Pending	TOTAL
Bicycle Expenditure Plan - VTA	Homer Undercrossing			$1,000,000					
TDA 02336626	Embarcadero Bike Path	$95,510							$95,510
TDA - 02336624	Bike Safety Education	$5,000							$5,000
TDA -02336624	Bike Parking Facilities	$5,200							$5,200
TDA - 03345210	Homer Undercrossing		$200,000						$200,000
TDA -03345211	San Mateo Drive Bike Bridge		$16,567						$16,567
TDA - 03345212	Arastradero Road Bike lanes		$80,324						$80,324
TDA -04355008	Homer Undercrossing			$293,000					$293,000
TDA 04355009	Baffles in California Ave U/P			$15,993					$15,993
TDA -0433010	Midblock Crosswalks			$20,000					$20,000
TDA -05001099	Enhanced Crosswalks				$50,000				$50,000
TDA - tbd	Bicycle Boulevard Project							$75,000	$75,000
									$0
									$0
Caltrans Bicycle Transp Acct	Bikestation Renovation				$83,000				$83,000
Caltrans Bicycle Transp Acct	Hanover/Porter Bike Lanes					$233,000			$233,000
									$0
Caltrans Safe Routes To School	Maybell Avenue Walkway							$123,965	$123,965
									$0
RSTOP	Traffic Signals								$0
CMAQ FY00CM - $2,035,000	Homer Undercrossing								
									$0
STP/TEA - SCL 99016	Homer Undercrossing		$502,000						$502,000
STP SCL050021- Local Streets & Ro	Street Resurfacing				$556,728				$556,728
STP - Local Streets & Roads	Street Resurfacing						$231,990		$231,990
STP - Local Streets & Roads	Street Resurfacing							tbd	
TFCA - 01SC01	Homer Undercrossing	$325,000							

Federal, State and Local Transportation Grants

		FY 01-02	FY 02-03	FY03-04	FY 04-05	FY04-05	FY 05-06	FY 05-06	
Project Number	**Project**	**Awarded**	**Awarded**	**Awarded**	**Awarded**	**Pending**	**Awarded**	**Pending**	**TOTAL**
									$0
TLC - SCL 030004	Homer Undercrossing		$464,000						$464,000
									$0
FTA Section 5309	Intermodal Transit Center		$248,000		$737,000				$985,000
	Intermodal Transit Center					$729,000			$729,000
									$0
									$0
									$0
Measure A/B-$1,251,843 (99/00)	Street Resurfacing								$0
Measure A/B-$1,251,843 (00/01)	Street Resurfacing								$0
									$0
Measure A/B	Street Resurfacing	$ 612,261							$612,261
Measure A/B	Street Resurfacing		$ 490,656						$490,656
									$0
AB2928-$438,395 (00/01)	Street Resurfacing								$0
AB2928	Street Resurfacing	$ 136,311							$136,311
AB2928	Street Resurfacing		$ 259,916						$259,916
AB2928	Street Resurfacing			$ 94,882					$94,882
									$0
SLTPP-SB99	Street Resurfacing			$ 139,908					$139,908
									$0
CML-5100(006)	Traffic Signals	$ 885,000							$885,000
									$0
Prop 42 Local Streets and Roads	Street Resurfacing						$ 271,104		$271,104
									$0
Utility User Tax	Street Resurfacing	$ 600,000	$ 600,000	$ 600,000	$ 600,000		$ 600,000		$3,000,000
									$0
TOTALS		**$2,664,282**	**$2,861,463**	**$2,163,783**	**$2,026,728**	**$962,000**	**$1,103,094**	**$198,965**	**$11,980,315**

Note: items marked in bold were grant awards issued in 99/00 and 00/01; amounts are provide as information and are not included in TOTAL column

The PMMS and GIS database systems

In 1997, the City's Pavement Maintenance Management System (PMMS) database was linked to the City's Geographic Information Systems (GIS) technology enabling easy access to information ranging from manhole locations to pavement conditions, enabling all City departments to use one graphic interface, and allowing for the customization and development of software applications such as Project Coordinator. This combined GIS/software system continually improves as new applications are developed or enhanced to customize the product for the needs of the user.

The City's pavement program is a customized approach to pavement maintenance. The PMMS may be modified to change algorithms, requires data entry based on a visual survey, is user friendly and can be used as a model for other agencies. GIS technology has only begun to be incorporated into street maintenance programs such as MTC's StreetSaver. In addition, StreetSaver is proprietary not allowing for instant customization and the survey required is labor intensive, measuring pavement distresses by hand instead of by visual means. In this innovative climate, customization of street maintenance and associated GIS applications is being constantly developed and improved upon.

Street Maintenance Backlog

Staff's approach to address the backlog is described below.

Currently, the City maintains approximately 37 million square feet of paved public roadway. The latest pavement survey indicated that 36% of the streets need some form of repair due to structural deficiencies. The total cost estimate of this repair is $28.7 million which includes the preventative and pavement restoration backlog, Attachment C.

The present backlog calculated based on structural pavement condition index (PCI) is as follows:

Average PCI score 92 – no work needed – present cost is zero	
Average PCI score 76 – preventative maintenance, 2005 dollars	$2.4 million
Average PCI score 53 – overlay, reconstruction, 2005 dollars	$26.3 million
Total present backlog, 2005 dollars	$28.7 million

This backlog is dependent on numerous factors including but not limited to, the amount of funding received from outside sources and trench fees, weather and traffic conditions affecting pavement deterioration, technology improvements in

pavement maintenance, durability of pavement products, inflationary costs and other economic conditions.

Improving Structural Integrity – will reduce the backlog

Preventative maintenance reduces backlog– annual construction cost ranges from approximately $200,000 to $400,000

Reconstruction reduces backlog – annual construction cost ranges from $1.4 to $1.6 million

Improving Ride Quality – will minimally reduce backlog

Motorists and bicyclists concerned about safety due to rideability create a need to resurface concrete streets. The majority of concrete streets are structurally adequate however do have numerous patches and trenches, and ride rough due to the concrete joints, and uneven patches and trenches - $5.4 million 2006 dollars would need to be spent annually to improve ride quality on concrete based streets (approximately $1.8 million square feet of concrete surfaces resurfaced on a seven year cycle at $3/square feet).

Improving Visual Appearance – will not reduce backlog

Slurry or cape sealing streets in poor condition gives the appearance that the street is restored (visual appearance) but does not address structural problems –$1.3 million 2006 dollars would need to be spent annually to improve visual appearance by slurry sealing on a seven year cycle (approximately 5.3 million square feet at .25 /square foot).

Reprioritizing street maintenance to address rideability and visual appearance of concrete streets as noted in photos provided in this audit report, would change the current philosophy and reduce current funds for the street maintenance program and may increase the backlog.

REHAB TYPES	SF COST PER REHAB TYPE	Average PCI INCLUDED	PREVENTATIVE MAINTENANCE	PAVING AND PCC WORK	# OF CITY BLOCKS	PERCENTAGE OF CITY
NONE	NO WORK REQUIRED AT THIS TIME	92		$ -	1386	64.3%
REHAB I	$ 5.50	43		$ 21,123,217.50	264	12.2%
REHAB H	$ 3.35	48		$ 2,091,773.50	108	5.0%
REHAB A	$ 2.01	53		$ 3,083,327.94	109	5.1%
MAINT C	$ 0.43	76	$ 355,051.00		32	1.5%
REHAB G	$ 0.23	75	$ 767,121.07		196	9.1%
REHAB F	$ 0.81	31	$ 1,274,164.02		62	2.9%
TOTALS	**USING 2005 ACTUALS**		**$ 2,396,336.09**	**$ 26,298,318.94**	**2157**	100.0%
	SUBTRACT 2006 BUDGETED AMOUNT		**$ (630,000.00)**	**$ (1,170,000.00)**		
	SUBTRACT 2006 FUNDS, GRANTS RECEIVED		**$ (229,000.00)**	**$ (788,000.00)**		
			$ 1,537,336.09	**$ 24,340,318.94**		
			TOTAL BACKLOG	$ 25,877,655.03		
	BACKLOG BASED UPON EXISTING CONSTRUCTION BUDGET CONSTRAINT OF $1,800,00.00 PER YEAR					
	25% PREVENTATIVE	$ 450,000.00				
	75% RESURAFACING	$ 1,350,000.00				
		$ 1,800,000.00				

In order to understand the administration's perspective on the responses, it is necessary to review two particular aspects of the street maintenance process – first, street pavement conditions and resultant prioritization criteria, and secondly maintenance techniques and cost effectiveness.

The priority for street maintenance is ranked as follows:

1. preservation of structural integrity
2. maintenance of smooth ride quality
3. visual appearance

The application of the criteria will result in differing types of maintenance treatments dependent on the age, condition, and type of original construction of the street. The single most important factor in preservation of structural integrity is keeping water from penetrating the pavement and weakening the underlying base material. This issue is extremely critical on asphalt streets; it is much less of a factor on concrete streets. Thus, it maybe far more cost effective to slurry seal an asphalt street to prevent water intrusion than to repave a concrete street in order to correct issues of ride quality or visual appearance.

Consideration of the various types of street maintenance techniques, their associated costs, and applicability to differing types of street condition and original construction is also fundamental to the understanding of the street maintenance program. The following table shows a comparison of those techniques and the resultant exponential cost effectiveness benefit of performing preventive maintenance sooner rather than restorative measures later. It is apparent from this data that it is anywhere from 10 to 100 times more cost effective to seal asphalt streets to prevent further deterioration than it is to overlay or reconstruct old concrete streets to improve ride quality or visual appearance.

Thus, it can be seen that, in an environment of limited resources, it is necessary to prioritize both the location and type of treatment on a case-by-case basis in order to develop the most cost effective overall program possible. That philosophy is the underlying principle used to develop Palo Alto's annual street maintenance program and priorities, and is the primary drive behind the preparation of this response.

Comparison of	**Cost and**	**Applicability of Street Maintenance Techniques**		
Street Maintenance Technique	Relative Cost per square foot (order of magnitude)	Cost Ratio to		Applicability to Street Types and Conditions
		Base	Prior	
1. Crack sealing (preventive)	2 cents	-	-	• Asphalt and Concrete streets to keep water from entering at joint and cracks • Preserves structural integrity
2. Slurry Sealing and Cape Sealing (preventive)	20 cents	10	10	• Asphalt streets to restore surface and seal out water • Preserves structural integrity, improves visual appearance
3. Asphalt Overlay and Resurfacing (restorative)	$2.00	100	10	• Asphalt streets to restore surface and restore structural integrity • Concrete streets to restore ride quality and visual appearance on a short term basis • Restores structural integrity, ride quality and visual appearance
4. Reconstruction: remove and replace with all new material (restorative)	$20.00	1000	10	• Both Asphalt and Concrete streets to replace failed pavement • Only means to permanently restore ride quality on old concrete

Appendix 1: Table of differences among City divisions (as of August 2005)

PART 1 OF 2

City Entity	PW-Engineering	Utilities Engineering – Electric	Utilities Engineering – Gas	Utilities Engineering – Water	Utilities Engineering – Wastewater
Roles/ Responsibility	Responsible for the street maintenance capital program (PE-86070); provides for resurfacing, slurry seal, crack seal, and reconstruction of various City streets	Responsible for underground electric, cable, and telephone lines.	Responsible for gas capital projects	Responsible for water capital projects	Responsible for wastewater capital projects
Operations Involve Street Cuts	Yes	Yes	Yes	Yes	Yes
Operating Philosophy	The operating philosophy is to protect streets from being cut within the first 5 years after resurfacing. No cuts within 5 years of resurfacing. Fees imposed for street cuts ($0 - $10 per sq ft).	Minimize trench cuts by cutting only at the node or at the site of the junction box; bore underground (instead of trenching across the street); and focus on the condition of sub-surface electric, cable, and telephone lines. Cut streets, pay street cut fees when required.	Bore under streets, cut streets, pay street cut fees when required. Street cuts cannot be avoided and it will cut newly resurfaced streets	Bore under streets, cut streets, pay street cut fees when required. Street cuts cannot be avoided and it will cut newly resurfaced streets	Bore under streets, cut streets, pay street cut fees when required. Street cuts cannot be avoided and it will cut newly resurfaced streets
Database/ System Used	PMMS/GIS	Auto-CAD	Auto-CAD	Auto-CAD	Auto-CAD
	Project Coordinator/ GIS	Project Coordinator/ GIS	Project Coordinator/ GIS	Project Coordinator/ GIS	Project Coordinator/ GIS
			Minor Works, etc.	Minor Works, etc.	Minor Works, etc.
Coordination	Project Coordinator/ GIS	Project Coordinator/ GIS	Project Coordinator/ GIS	Project Coordinator/ GIS	Project Coordinator/ GIS
	Attends Quarterly Project Coordinator Meeting. Conducts quarterly cross-departmental project coordinator meetings, and has responsibility for identifying project conflicts.	Attends Quarterly Project Coordinator Meeting. Although the staff attends quarterly project coordinator meetings, the division does not coordinate its borings or cuts with other divisions unless Public Works Engineering has pointed out a conflict.	Attends Quarterly Project Coordinator Meeting. Plans generally are not discussed with other divisions unless Public Works Engineering points out a conflict	Attends Quarterly Project Coordinator Meeting. Plans generally are not discussed with other divisions unless Public Works Engineering points out a conflict	Attends Quarterly Project Coordinator Meeting. Plans generally are not discussed with other divisions unless Public Works Engineering points out a conflict
	Informal discussions	Informal discussions	Informal discussions	Informal discussions	Informal discussions
	City website (City Works)	City website (City Works)	City website (City Works)	City website (City Works)	City website (City Works)

City Entity	PW-Engineering	Utilities Engineering – Electric	Utilities Engineering – Gas	Utilities Engineering – Water	Utilities Engineering – Wastewater
	.		Division tries to resolve conflicts in order to minimize street cuts. The conflicts are usually resolved by holding one-on-one discussions among the project engineers; discussion results are not shared with other divisions; and, if another entity were to schedule work on the same street at the same time, this division would not know because a single database does not exist.	Division tries to resolve conflicts in order to minimize street cuts. The conflicts are usually resolved by holding one-on-one discussions among the project engineers; discussion results are not shared with other divisions; and, if another entity were to schedule work on the same street at the same time, this division would not know because a single database does not exist.	Division tries to resolve conflicts in order to minimize street cuts. The conflicts are usually resolved by holding one-on-one discussions among the project engineers; discussion results are not shared with other divisions; and, if another entity were to schedule work on the same street at the same time, this division would not know because a single database does not exist.
Complaints/ Inquiries	Check PMMS/GIS	Check PMMS/GIS	Check PMMS/GIS	Check PMMS/GIS	Check PMMS/GIS
	Check City website	Check City website	Check City website	Check City website	Check City website
	Call around	Call around	Call around	Call around	Call around
Planning	5 Year The division develops rolling 5-year plans based on calendar years; adjusts plans to accommodate the plans of other divisions; and issues each calendar year a list of streets that will be resurfaced.	Develops multi-years plans (5+ years) based on fiscal years (not calendar years); inputs only 5 years of its plans into the Project Coordinator/ GIS system, and only considers projects firm when they're part of the adopted budget. CIP Budget lists projects for next 2 years.	5+ years. CIP Budget lists projects for next 2 years. Projects funded in the City's CIP budget compose its official master plan for the next 2 fiscal years although some plans run to 2017	5 years. CIP Budget lists projects for next 2 years. Projects funded in the City's CIP budget compose its official master plan for the next 2 fiscal years. Overall master plan under development.	5 years. CIP Budget lists projects for next 2 years. Projects funded in the City's CIP budget compose its official master plan for the next 2 fiscal years. Overall master plan pending complete 5-year video inspection of sewer lines.
Public Works Resurfacing Plan	Annual plan lists streets to be resurfaced.	Plans not changed to accommodate Public Works annual plan.	Plans changed based on Public Works annual plan	Plans changed based on Public Works annual plan	Plans changed based on Public Works annual plan
Emergency	No coordination	No coordination	No coordination	No coordination	No coordination

Source: Office of the City Auditor

APPENDIX 1 (CONTINUED)
PART 2 OF 2

City Entity	PW-Operations	Utilities Operations - Electric	Utilities Operations - WGW	Transportation	Private Contractor or Company
Roles/ Responsibility	Responsible for on-going street maintenance, such as skin and pothole patching, base repair, crack filling and sealing, pot and chuck hole repairs, sidewalk and curb repairs, gutter repairs, and traffic control.	Responsible for customer service, dispatching, metering, overhead and underground electric operations, and street lights and substations	Handles ordinary and emergency work orders for repairs and maintenance related to the three utilities and responds to unplanned calls for service that could result in street cuts	Responsible for planning transportation projects such as traffic calming, traffic circles, traffic signals, bikeways, and others projects which result in street cuts. Obtains grants.	Not Applicable
Operations Involve Street Cuts	Yes	Yes	Yes	Yes	Yes
Operating Philosophy	Take care of the work assigned, cut streets, pay street cut fees when required.	Cut streets, pay street cut fees when required.	Cut streets regardless of the age and regardless if it is newly resurfaced, pay street cut fees when required.	Unknown	Bore under streets, cut streets, pay street cut fees when required.
Database/ System Used	SAP	SAP	SAP	Unknown	None
	Paper + Excel spreadsheet	Paper	Paper	Unknown	Check with Public Works or Utilities as required.
		Minor Works. Minor work orders and emergency orders are used for electrical breaks, transformer problems, and ordinary maintenance	Minor Works, etc.		
Coordination	Except for below, no coordination. The division does not have access to current information about the Utilities division's work plans, and its work plans and results are not shared with them.	Except for below, no coordination. Other divisions are not notified of the work scheduled, or the work results. Operations are not coordinated with anyone. If streets are cut, the cuts are not reported or coordinated.	Except for below, no coordination. Some of the operations work is coordinated with Public Works Engineering, but most of the operations, emergencies, or street cuts are not coordinated or reported to other divisions.	Division coordinates projects with Public Works Engineering, but not with the other divisions interviewed. In January 2006, an interdepartmental effort was underway to coordinate the work related to the Charleston-Arastradero Corridor improvements.	None
	In June 2005, the division began attending the quarterly project coordinator meetings.	Division does not attend quarterly project coordinator meetings.	In December 2005, the division staff began attending quarterly project coordinator meetings.	Division sent a representative to the quarterly project coordination meeting for the first time in December 2005.	None
	Informal discussions	Informal discussions	Informal discussions	Informal discussions	None
	City website (City Works)		City website (City Works)		

City Entity	PW-Operations	Utilities Operations - Electric	Utilities Operations - WGW	Transportation	Private Contractor or Company
Complaints/ Inquiries	Log and handle	Unknown	Log and handle	Refer to Public Works or Utilities	Not involved
	Check City website	Unknown	Check City website		Not involved
	Call around. Log complaints, schedule work to be done; complete work order forms; schedule daily, weekly and monthly work; assign work crews, perform the work, and log the results in SAP.	Unknown	Call around. Log complaints, schedule work to be done; complete work order forms; schedule daily, weekly and monthly work; assign work crews, perform the work, and log the results in SAP or Minor Works.		Not involved
Planning	Monthly/Weekly. Plans by the month, week, and day. An annual survey of the City streets also generates a list of work to be done, but the list is not a formal plan.	None. Waits for work orders or service orders from Utilities Engineering – Electric .The division receives service orders about 2 to 4 weeks before the work is started.	Weekly. Division plans by the week; does not notify other divisions of those plans; and work is not always predictable.	Unknown	None
		The work is scheduled and the plans are not shared with other divisions.			
Public Works Resurfacing Plan	Plans changed based on Public Works annual plan	Not aware of Public Works yearly plan.	Not aware of Public Works yearly plan.	Not aware of Public Works yearly plan.	Not aware of Public Works yearly plan.
Emergency	No coordination	No coordination	No coordination	No coordination	No coordination

Source: Office of the City Auditor

Appendix 2: Results of inspections of street segments resurfaced between 2000 and 2004

Sample No.	Utility Ops - WGW Address	Street Name	From	To	Overlay	Slurry	Priority	Comments	# of Street Cuts Found	Other
1	4000	Amaranta Court	Amaranta Ave	End	2004		1933	4000 does not exist. Should be 4130 Amaranta Ct. 1 cut, patch is good & even with street.	1	
2	2220	Bryant St	N. California Ave	Oregon Expressway	2001		0	8 cuts: 1 block long trench along curb + 7 cuts. In addition, 12 cuts at intersection of Bryant & Oregon Expressway + 9 cuts at intersection of Bryant & N. California. Total cuts = 29 cuts.	29	
3	111	Churchill Ave	Alma St	Emerson St		2002	0	9 cuts (1 block long trench + 8 cuts).	9	
4	1312	Clifton Court	Stockton Pl	End		2001	0	Address 1312 does not exist. Checked 3200 Clifton. 1 cut + 23 patches at 3248 Clifton	1	+ 23 patches
5	1325	Cowper St.	Melville Ave.	Kellogg Ave.	2000		0	Good patch. Cowper/Kellogg: good large patch.	9	
6	4139	Frandon Court	Maybell Ave.	End	2001		0	1 cut + 4 scrapes in street. Excellent patch. Patch is smooth and even with street.	1	+ 4 scrapes
7	3077/3095	Greer Rd	Maddux Dr.	Colorado Ave.		2001	83	19 cuts from intersection to 3040 Greer (@100 yards) (6 cuts at Greer/Maddux intersection + 13 cuts between 3040-3095 Greer).	19	
8		Hawthorne Ave	Kipling St	Cowper St	2001		0	Good patch on Hawthorne. Cowper (around the corner) from Hawthorne to Everett. Cowper is deteriorating very badly and has not been fixed.	4	
9	828	Ilima Court	Laguna Ave	End		2003	314	Rough, bare spots.	2	
10	3422	Janice Way	Greer Rd	Greer Rd		2000	186	26 cuts (old ones that show + new cuts, 17 cuts, 2 long trenches, 7 trenches) + 10 manholes.	26	+ 10 manholes
11	335	Kipling St	Everett Ave	Lytton Ave	2001		0	Bad patch	1	
12	3183	Loma Verde Pl	Loma Verde Ave	End	2000		0	1 cut in front of 3159 - 3175 Loma Verde Pl. Cut is smooth and sealed. Cut is in the center of the cul de sac.	1	
13	2194	Louis Road	Ames Ave	Greer Rd		2002	0	3 cuts at 2194 Louis (at N. California and Louis).	3	

Sample No.	Utility Ops - WGW Address	Street Name	From	To	Overlay	Slurry	Priority	Comments	# of Street Cuts Found	Other
14	2194	Louis Road	Ames Ave	Greer Rd		2002	0	18 cuts between Ames & Greer. Street cut markings found in front of school.	18	
15	3075	Louis Rd	Elsinore Drive	Garland Dr		2003	0	8 cuts between Pierre Ct-Elbridge (7 cuts + trench). 3075 Louis not between Elsinore – Garland.	8	
16	3110	Louis Rd	Loma Verde Ave	Ames Ave		2002	0	8 cuts (Clara to Stelling). Trench runs length of street. (3110 Louis Rd is not between Loma Verde & Ames)	8	
17	130/215	Lowell Ave	Emerson St	Bryant St	2004		0	PCC street never resurfaced. 30 cuts (29 cuts on Lowell + 1 block long trench).	30	
18	745	Maplewood Pl	Maplewood Ave	End	2000		0	4 cuts + 1 unfilled hole at 545 Maplewood Pl.	4	+ 1 unfilled hole
19	481	Maureen Ave	Cowper St.	Rambow Dr.		2001	0	1 cut, seams not sealed; new asphalt chewed up.	1	
20	500	Melville Ave	Cowper St	Tasso St	2001		0	500 Melville = good patch, but seams not sealed. 12 cuts (8 cuts/trenches in intersection + 4 cuts in the street) (excludes manholes). Cuts run length of the intersection. Streets look excellent, some good seams, some cuts exposed, some seams showing.	12	
21	465	Melville Ave	Tasso St	Webster St	2001		0	Melville/Tasso: patches flat with street. Melville and Webster: manholes and cuts are level with street and not obvious.	2	
22		Melville Ave	Webster St.	Byron St.	2001		0	Cuts not covered or sealed.	2	
23	939	Moreno Ave	Colonial Lane	Greer Rd	2001		124	8 cuts	8	
24	3850	Mumford Pl	E. Charleston Rd	Ely Pl		2001	0	Between Ely and End (not between E. Charleston and Ely). 2 cuts not sealed. New slurry seal.	2	
25	186	Park Ave	Ash St	Park Blvd	2000		0	Electric utility cut: good patch, but seams are not sealed. Trench is "U" shaped, even with street. New house at 186 Park.	2	
26		Park Blvd	Birch St	Castilleja Ave		2000	32	2 cuts	2	
27	800	Quarry Rd	Arboretum Rd	El Camino Rd	2000		6	32 cuts (24 cuts at intersection of El Camino Real and Quarry for traffic signals + 8 cuts in street)	32	

Sample No.	Utility Ops - WGW Address	Street Name	From	To	Overlay	Slurry	Priority	Comments	# of Street Cuts Found	Other
28		Quarry Rd	Arboretum Rd	Welch Rd	2000		3	Excellent patch at Stanford Shopping Center. Cannot tell if patch is there. Some seams are sealed ; large trench is sealed; trench sealed, smooth, & not noticeable. Others have bad patch, and seams not sealed properly. Total of 8 cuts at intersection (6 cuts at intersection + 2 cuts/trenches at Welch & Quarry).	8	
29	2200	Ramona St	Nevada Ave	Oregon Expressway	2002		0	4 cuts	4	
30		Ramona St	N. California Ave	Nevada Ave	2002		0	0 cuts	0	
31		Ramona St	Washington Ave	N. California Ave	2002		0	8 cuts at intersection of Ramona and Washington. (3 cuts on Ramona + 5 cuts in intersection.)	8	
32	860	San Jude Ave	La Donna St	End	2004		2353	Utilities Operations showed address as 860 San Jude; should be 800 San Jude. 5 cuts. Cuts smooth with street. Alligator cracks exist. Priority is 2353 although this street is in better shape than Miramonte, Madrono, Escobita, and Cowper/Hawthorne.	5	
33	370	Seale Ave	Bryant St	Waverly St	2002		0	11 cuts (9 cuts on Seale, 2 cuts at intersection Seale & Bryant.)	11	
34		Seale Ave	Waverly St.	Cowper St	2002		0	22 cuts (11 cuts on Seale + 4 cuts at intersection of Seale and Waverly + 7 cuts at intersection Seale & Cowper). 1 block long trench, 2 street-wide trenches, 2 long trenches, and 6 long and short cuts on Seale. 2 long trenches join 1 cut in Seale/Waverly intersection + 1 other cut. 7 cuts at intersection Seale/Cowper.	22	
35	345	Sequoia Ave	Madrono Ave	Escobita Ave	2000		0	At 345 Sequoia, the 150' street is nicely paved, but cut shows road deterioration. Around the corner at Escobita, alligator cracks and serious road deterioration exists everywhere. Around the other corner, Madrono shows alligator cracks and 1 cut. Sharp contrast in street conditions.	1	
36	362	Shasta Dr.	Mackay Dr	Nelson Dr		2002	0	3 cuts, edges not even with street	3	

Sample No.	Utility Ops - WGW Address	Street Name	From	To	Overlay	Slurry	Priority	Comments	# of Street Cuts Found	Other
37	363	Stanford Ave	Ash St	Birch St		2000	654	25 cuts in 1 block (includes 2+ bad cuts). Most cuts barely visible. Good and bad cuts affecting road condition, causing street deterioration, and surface to sink. Alligator cracks at Miramonte/Portola.	25	
38	231/251	Stanford Ave	Birch St	Park Blvd	2001		0	8 cuts within 1 short block. 7 excellent patches, even with street, patches not noticeable. 1 cut very visible, patch is fair, and seams not sealed.	8	
39	755	Stone Lane	Ross Rd	End	2002		0	2 cuts + 5 manholes	2	+ 5 manholes
40		Towle Way	Towle Pl	Middlefield		2003	0	10 cuts (1 long trench, 3 short trenches, + 6 cuts at intersection Towle Way and Middlefield.)	10	
41	3157	Waverley St.	El Verano Ave	E. Meadow Dr		2003	34	3157 Waverley is between Loma Verde & Campesino. Street segment & address differ. 4 street long trenches + 11 cuts.	11	+ 4 street long trenches
42	3750	Wright Pl	E. Charleston Rd	Starr King Circle		2001	0	Star King Circle - end (not SKC to E. Charleston). 5 cuts, cuts not even with street surface.	5	
								Subtotal (Cuts found in 42 streets)	**360**	
								Average Cuts per Street	**8.57**	
43		Higgins Place	Colorado Ave.	End	2004		388		3	+water main cover not level with street
44		Moana Court	Miranda Ave.	End	2004		1893		2	
45		Rosewood Dr.	Rosewood Cul-de-sac 1	Rosewood Cul-de-sac 2	2004		401	28 cuts (including 3 cuts about 100 ft long each), 1 hole not filled, and 169 street markings that were not removed	28	+169 street markings + 1 unfilled hole
								Subtotal (Cuts found in 45 streets)	**393**	
								Average Cuts per Street	**8.73**	

Source: Office of the City Auditor

Appendix 3: Results of inspections of street segments identified by resident complaints

Sample No.	Street Name	From	To	Overlay	Slurry	Priority	Comments	No. of St Cuts Found	Other
46	Bryant St.	Forest Ave.	Homer Ave.	Unknown			4 metal plates found. Plates laid in May 2005 by SBC. Removal date is unknown.	-	4 steel plates
47	Cowper St.	Hawthorne Ave.	Lytton Ave.	Unknown			29 cuts found.	29	
48	Cowper St.	Addison Ave.	Lincoln Ave.	2000			Marked for cutting with USA markings.	0	
49	Greer/Colonial Lane			Unknown			Newly resurfaced street cut before center stripes are painted.	-	
50	Laguna Ave./ Shauna Ln.			Unknown			Metal plate in road. Source, date laid, and removal dates are unknown.	-	1 steel plate
51	Los Robles Ave.	Villa Vera	Campesino Ave.	Unknown			Unknown who will level hump on Los Robles.	-	Other
52	Los Robles Ave. /Barron Ave.			Unknown			Unknown who will check the trenches.	-	Other
53	E. Charleston Rd. / Middlefield Rd.				2003		2 sets of metal plates (3 plates at E. Charleston/ Middlefield + 1 plate on Middlefield/Charleston). 4 plates laid in June –July 2005. Removal date is unknown.	-	4 steel plates
54	Louis Rd.	Ames Ave.	Greer Rd	Unknown	2002		Resurfaced street (in front of school) marked for cutting with USA markings.	0	
55	Lowell Ave.	Emerson St.	Alma St.	Unknown			PCC street. Never resurfaced. Found 61 cuts (1 block long trench, 60 cuts) + 3 steel plates at Lowell and Alma. Source, date laid, and removal date for metal plates is unknown.	61	+ 3 steel plates.
56	Park Boulevard	N. California Ave.	Sherman Ave.	Unknown			10 cuts (3 block long trenches, 2 street-wide trenches, 5 other cuts)	10	
57	Park Boulevard	Sherman Ave.	Grant Ave.	Unknown			21 cuts (2 street long trenches + 1 street wide trench on Park + @18 jigsaw cuts & trenches in intersection Park & Grant). The Park/Grant intersection had long trenches, diagonal trenches, street-wide trenches, and trenches on trenches.	21	
58	Park Boulevard	Grant Ave.	Oregon Expressway	Unknown			So many cuts, I could only guess that 16 cuts were made. Cuts included long trenches, diagonal trenches, street wide trenches, and trenches on trenches.	16	

Sample No.	Street Name	From	To	Overlay	Slurry	Priority	Comments	No. of St Cuts Found	Other
59	Walnut Dr.	Walter Hays Dr.	Stanley Way		2005		Resident complaint. Newly re-surfaced street marked for cutting with USA markings. Utility markings indicate Utilities is preparing to cut newly paved street. 2 sections with rough, ground out spots. PCC intersection has pre-existing edges that do not meet and were not graded even. Public Works Engineering stopped Utility Ops from cutting street.	0	
60	Walnut Dr.	Stanley Way	Embarcadero Rd.		2005		Stanley to Embarcadero newly resurfaced. Asphalt is rough and does not match the rest of the newly paved and smooth street due to 2 different treatments.	0	
61	Stanley Way	Walnut Dr.	Walter Hays Dr.		2005		Color of asphalt on the newly resurfaced side streets (Lois Lane and Jordan Pl) do not match the color of the asphalt on Stanley, Walter Hays, and Walnut. The new and old asphalt color tones are different.	0	
							Subtotal (Cuts found in 16 streets)	**137**	
							Average Cuts Per Street	**8.56**	
							Grand Total (Cuts found in 61 streets: 42+3+16)	**530**	
							Average Cuts Per Street	**8.69**	

Source: Office of the City Auditor

APPENDIX 4: Palo Alto resources versus nearby cities (FY 2004-05)

	Palo Alto	Burlingame	Daly City	Mountain View	Sunnyvale
Population	61,200	28,100	103,260	73,100	131,760
Funding	$5.3 million	$1 - $1.4 million	$4.9 million	About $1 million	$4-5 million
Lane Miles	463	152	246	142	284
Funding Per Lane Mile	$11,447	$9,210	$19,918	$7,042	$17,605
Staffing	8 FTE	3.5 FTE	19 FTE	19.3 FTE	25 FTE
Contractors Used	Yes	Yes	Yes	Yes and City crews	Yes and City crews
Backlog	10-15 years[1]	9 years	5 years	Unknown	Unknown
Pavement Backlog FY 2005-06 per MTC data	$28.7	$9.3 million	$17 million[2]	$9.8 million	$51.4 million
City Reimbursed for Paving[3]	No	Yes, reimbursed by non-city entities	No	Yes, reimbursed by non-city entities[3]	Yes, charged to other city departments[3]
Street Cut Fees	Yes	None	None	None	None
Plans	Master plans run 5 years ahead	Plan 5 – 10 years ahead	City divided into 7 zones. 2 year master plan used. Each district is resurfaced every 7 years.	City divided into 14 zones. 1-2 year master plan used. Each street is resurfaced every 7 years.	City divided into 27 sections. Projects planned 5-7 years ahead.
Coordination	Decentralized among 9 City divisions, and City and private contractors. Quarterly project coordinator meetings	Public Works Senior Engineer is in charge of all street, capital, and utility projects.	Street Division oversees all street projects. 2-year plan coordinated with all city departments, public and private utilities before finalized. Weekly meetings held on project schedules.	Public Works Director controls and coordinates street and utilities divisions.	Public Works Director oversees utilities and streets, coordinates all work with other city departments, and coordinates private and public utilities.
Street Cut Policy	No cuts for 5 years (not enforced)	No cuts for 3 years (residential) and 5 years (arterial streets)	A 5 year moratorium on street cuts is enforced through an excavation ordinance.	Unofficial 5 year moratorium on street cuts exists.	Emergency cuts will occur.
Contractor used	City streets paved by multiple contractors	1 contractor does all city paving	1 contractor does all city paving	Contractors do most of the repaving.	1 contractor does all slurry sealing. Cross-trained city crews do everything else.

[1] As of Feb-2006 (Public Works Engineering updated the PMMS database in Feb-2006).

[2] Daly City reports their goal is to achieve a MTC Streetsaver PCI score of 87 in 5 years. The cost of this "backlog" is $46.3 million.

[3] After non-city entities (such as utility companies, private contractors, and companies who do not belong to the city) cut a street, Burlingame and Mountain View will re-surface the street and charge the non-city entity for the resurfacing. In Sunnyvale, the street resurfacing costs are charged to the department responsible for the street cut, for example, the water or waste water departments.

	Palo Alto	Burlingame	Daly City	Mountain View	Sunnyvale
Utilities	Utilities and Public Works are independent and try to coordinate	City controls utilities actions thru permit process.	City controls utilities through permit process	City controls utilities through permit process	City coordinates with utilities
Paving Requirement	Patch street cuts	Restore streets 1 foot beyond the lane	Streets must be repaved 1 lane width. If 3 cuts occur within 50 feet, the street between the cuts must be repaved. Specific engineering standards applied.	Party that cuts street must grind, compact, and make temporary patch 1 foot beyond the street cut. City crew or contractor will apply permanent paving.	Streets resurfaced 1 street width or the entire street.
Role of Inspectors	City inspector and Utility inspectors are independent	City inspectors must approve street work	City inspectors must approve street work	City inspector ensures quality of city streets.	City inspectors approve street work
Potholes Filled	80% in 15 days	24 hour response time	Filled as needed	City policy: “No potholes”. Potholes filled immediately. Repairs made before potholes occur	Pothole turn around time is 3 hours.
Handling of Complaints	Decentralized data and handling	Centralized in public relations company	Community outreach used to brief citizens on plans, solicit volunteers, and involve citizens	Community outreach and plan briefings result in few complaints	Complaint centralized with 2 secretaries
Databases Used	PMMS, GIS, Project Coordinator	MTC Pavement Management Program (Streetsaver)	MTC Pavement Management Program (Streetsaver)	MTC Pavement Management Program (Streetsaver)	MTC Pavement Management Program (Streetsaver)

Source: Office of the City Auditor, other cities, and MTC