San Diego City Auditor

AUDIT REPORT

PERFORMANCE AUDIT OF THE CITY'S STREET MAINTENANCE FUNCTIONS

THE CITY CAN IMPROVE ITS EFFECTIVENESS IN GATHERING AND UTILIZING STREET CONDITION INFORMATION

October 26, 2009

Office of the City Auditor

Eduardo Luna, CIA, CGFM, City Auditor

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THE CITY OF SAN DIEGO

October 26, 2009

Honorable Mayor, City Council, and Audit Committee Members
City of San Diego, California

Transmitted herewith is an audit report on the City's Street Maintenance Functions. This report is in accordance with City Charter Section 39.2. An Executive Summary is presented on page 1. The Administration's response to our audit recommendations can be found after page 24 of the report.

If you need any further information please let me know. We would like to thank the Department of General Services Street Division staff, as well as representatives from other City departments for their assistance and cooperation during this audit. All of their valuable time and efforts spent on providing us information is greatly appreciated. The audit staff responsible for this audit report is Paul Alberga and Kyle Elser.

Respectfully submitted,

Eduardo Luna
City Auditor

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Table of Contents

Executive Summary

The streets within the City of San Diego (City) are critical public assets that require high levels of resources to construct and maintain. Deferred maintenance needs for streets within the City continue to persist at a relatively high level, and the costs associated with mitigating these needs have greatly increased over the past decade. In response to this, City management has made the maintenance and improvement of City streets a high priority within the City's five-year outlook by allocating unprecedented amounts of resources for this purpose.

During our performance audit of the City's streets maintenance functions, we found weaknesses in the information used by the Department of General Services: Street Division (Street Division) for the purpose of identifying and selecting streets for maintenance activity. These weaknesses include the following:

- The Street Division is reliant on street condition information that is incomplete and provides limited usefulness for effective maintenance decisions.
- Street Division staff does not uniformly update street condition information when maintenance activity is performed.
- The Streets Division has not incorporated a degradation program into its pavement management system that would automatically update street condition information on a periodic basis.

Our audit also revealed that there is significant variation in City streets conditions both geographically and functionally, and that recent efforts by the Street Division to maintain City Streets have focused into two main areas: 1) Significant improvements to major streets, and 2) preventive maintenance of residential streets. However, without formally documented policies and procedures for the identification and selection of streets for maintenance activities, the Street Division cannot guarantee that resources spent on street maintenance activity are being deployed in the most effective and efficient manner.

This report is the first of a three reports that we plan to provide related to the City's street maintenance functions and related internal controls. Within this report we provide four recommendations for the Street Division to improve its operations and information related to street maintenance. The Department of General Services agreed, or partially agreed with all of these recommendations. The department's response to our recommendations, and its corrective action plans, are provided at the end of this report.

Background

The City of San Diego (City) is responsible for the maintenance of approximately 2,800 linear miles of paved street and alleyway surfaces. As shown in Figures 1 and 2 below, this equates to over 21 square miles of paved surface area within the City's jurisdiction[1]. Linear mileage is the common industry measurement unit used to describe the size of street networks. However, pavement area is used throughout this report because it normalizes against width variations amongst streets, and in our opinion, provides more accurate information for maintenance cost purposes since street maintenance costs are mostly derived on a volume basis (e.g. tons of asphalt).

Figure 1

The City of San Diego Maintains Over 21 Square Miles of Street Pavement

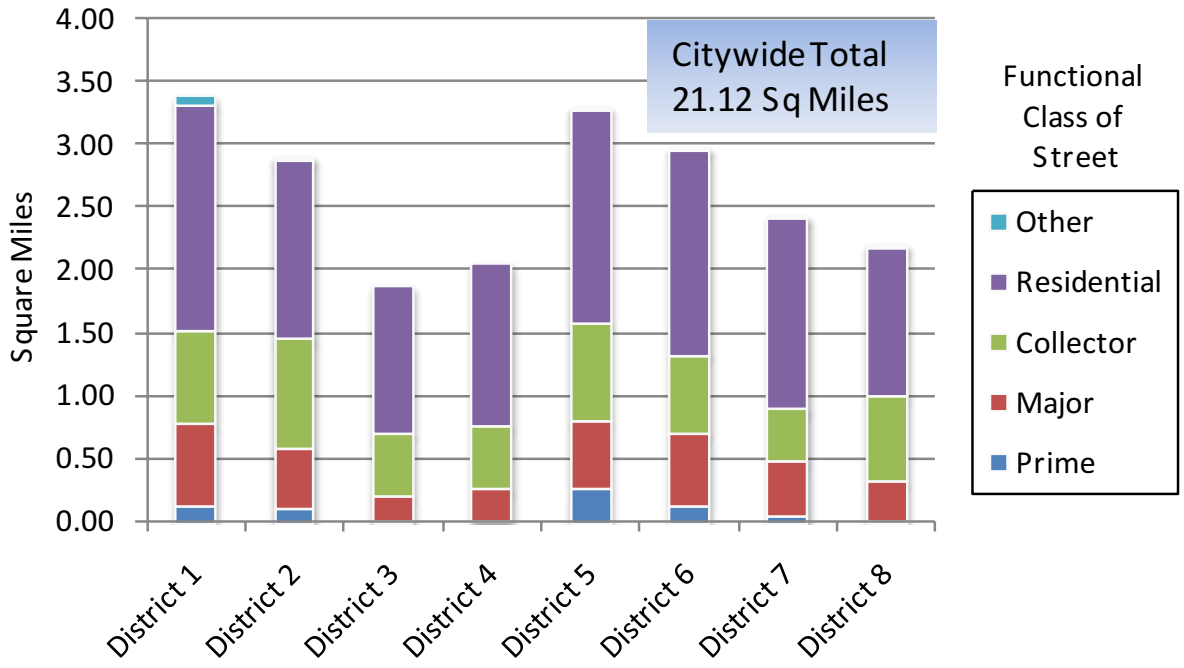
	Street Segments	Linear Distance of Streets (miles)	Pavement Area of Streets (square miles)
District 1	4,220	441	3.38
District 2	5,179	385	2.90
District 3	2,918	240	1.88
District 4	3,196	287	2.06
District 5	4,084	417	3.30
District 6	3,719	383	2.97
District 7	3,344	339	2.43
District 8	2,806	274	2.20
Citywide	**29,466**	**2,766**	**21.12**

Source: **Auditor generated from Department of General Services: Street Division Pavement Management System Data**

[1] City street jurisdiction does not include freeways, interstate highways, private roadways, and other specialized roads and bridges that are owned and maintained by outside entities such as the State of California, private individuals, organizations, or companies.

Figure 2

San Diego City Streets Vary by Geography in Size and Function



Source: **City of San Diego Department of General Services: Street Division Pavement Management System Data as of April 2009**

The City's street network is a major component of the City's infrastructure assets, providing unparalleled public benefit for transportation, commercial, and leisure purposes. Street conditions affect the lives of almost all San Diegans on a daily basis, and therefore, street conditions are a discreet component of the quality of life within the City.

Street Conditions Degrade Over Time

By virtue of its physical nature, each component of the City's street network is inherently subject to deterioration. Street degradation rates are dependent on several factors including the quality of materials used to construct and maintain streets, the underlying structural integrity of the street, effects of permitted and illicit damage, drainage, weathering, and traffic. As streets degrade into poorer conditions maintenance costs become increasingly expensive. Poor street conditions lead to decreased ride quality, higher vehicle maintenance costs, as well as increased dissatisfaction by the general public in the management of the public right-of-way.

The Department of General Services: Street Division Oversees Street Maintenance Operations

The mission of the City's Department of General Services: Street Division (Street Division) is "to provide a safe city street system through effective and efficient maintenance, with an emphasis on exceptional customer service." Due to the high level of geographical and functional diversity of streets within the City, effective and efficient maintenance for the City's street network requires a pragmatic approach along with consistent dedication of public resources. Common ways to increase the useful life of a paved street are to overlay the street with new asphalt (asphalt overlay[2]), or cover the surface of the street with surface treatment (slurry seal[3]). Slurry seal is a preventive maintenance technique that is significantly less expensive than asphalt overlay. Slurry seal does little to improve the foundation of a street, but does extend the useful service life of a street that would otherwise degrade into poor condition.

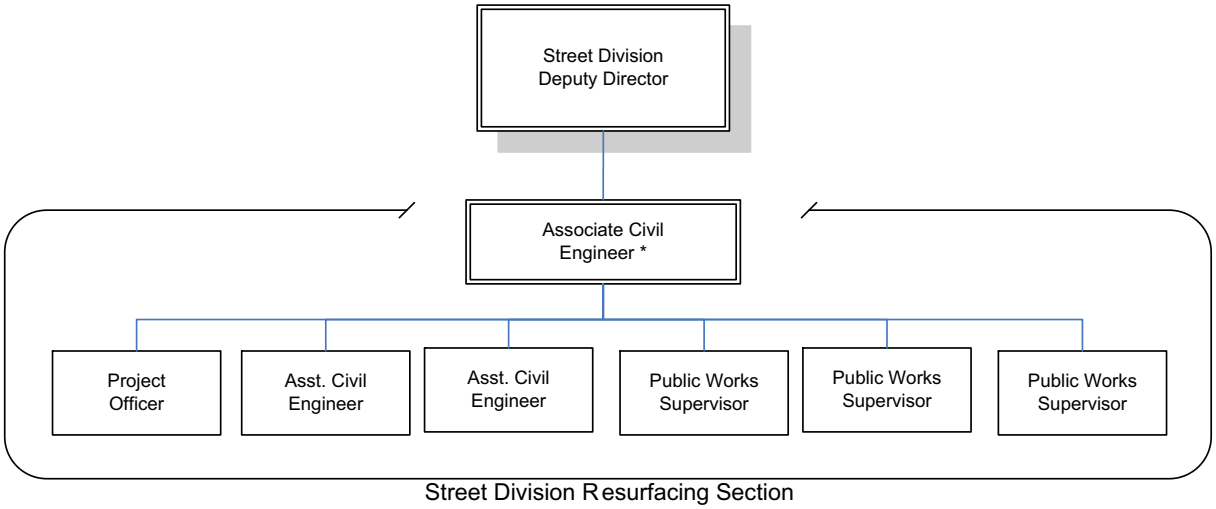
The Resurfacing Section of the Street Division (Resurfacing Section) administers the assessment and street resurfacing functions for the City. The Resurfacing Section is managed by one Associate Civil Engineer that reports directly to the Deputy Director of the Street Division (Deputy Director). As of April 2009, the Resurfacing Section's staff consists of two Assistant Civil Engineers, three Public Works Supervisors, and one Project Officer. An organization chart of the Resurfacing Section is provided in Figure 3.

[2] The useful service life of an asphalt overlaid street is dependent on several factors including traffic, weathering, and the structural integrity of the street sub base. In general, industry experts report that the typical expected service life of asphalt overlay is seven to 10 years when placed in a preventive maintenance mode. According to Street Division staff, the City of San Diego considers the useful life of an asphalt overlaid street to be 20 years as long as preventive maintenance, such as slurry seal, is performed at appropriate intervals.

[3] In general, industry experts report that the expected life of slurry seal is three to five years when placed in a preventive maintenance mode. The Street Division uses an expected service life of seven to 10 years for slurry seal. In San Diego, slurry seal contractors are required to perform milling, paving, and crack sealing on the streets surface prior to treating the surface with slurry seal. These process specifications are meant to maintain structural integrity, maximize useful service life, and improve the smoothness and ride of streets.

Figure 3

The Resurfacing Section of the Street Division Has a Staff of Seven Full-time Employees



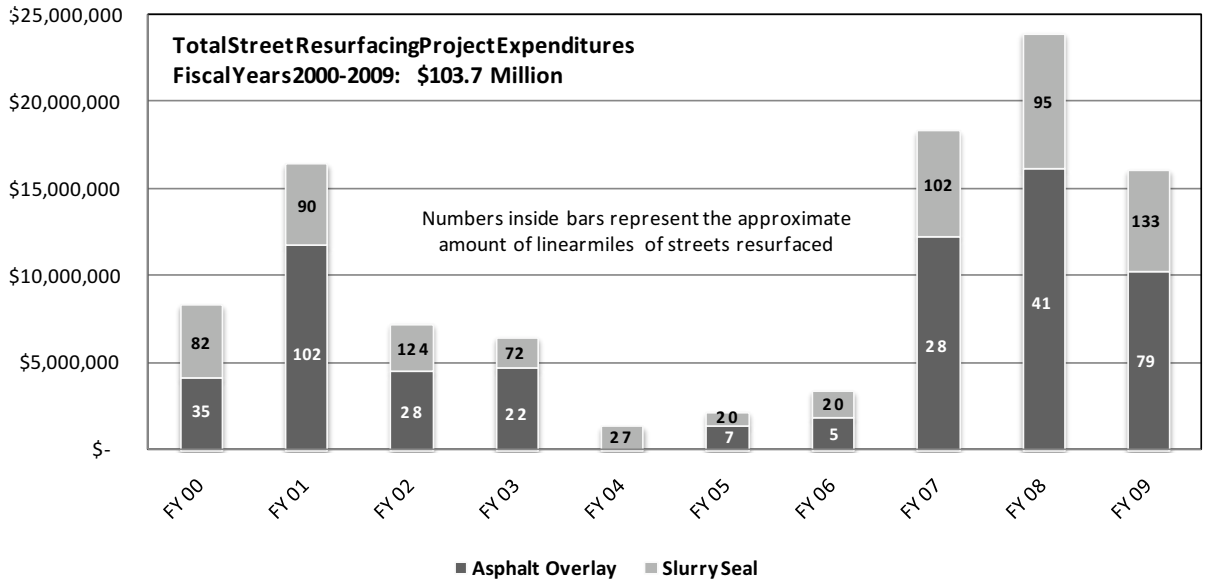
* After serving as the Associate Civil Engineer in charge of the Resurfacing Section for approximately nine years, the former Associate Civil Engineer was promoted and transferred to another department in April 2009. This position was staffed in an acting capacity by the two Assistant Civil Engineers within the section, with an official replacement hired in August 2009.

Source: Department of General Services: Street Division Organizational Charts as of April 2009

To maintain and improve the condition of City streets, the Street Division establishes contracts for citywide slurry seal and asphalt overlay projects. From fiscal year 2000 through 2009 the Street Division has spent over $103 million on resurfacing projects, with over half of this amount spent during fiscal years 2007 through 2009. Figure 4 below provides a summary of street resurfacing contracts awarded by the Street Division for fiscal years 2000 through 2009:

Figure 4

City Expenditures for Street Resurfacing Projects Have Increased Significantly in Recent Years



Source: **City of San Diego Department of General Services: Street Division Contract Archives**

Road Conditions Within the San Diego Region Are Among the Worst in the Nation

In its 2009 report entitled "Rough Roads Ahead," the American Association of State Highway and Transportation Officials (AASHTO) analyzed regional 2007 roadway condition data from the Federal Highway Administration. The report showed that State, County, and City arterial street networks within San Diego and surrounding suburbs were in the seventh worst condition within the nation amongst urban areas with over 500,000 people.

Figure 5

The San Diego Region has the Seventh Highest Share of Roads in Poor Condition

Urban Areas (population 500,000 or more) with highest share of roads in poor condition, 2007*

Urban Area	Percentage of Roads* in Poor Condition
Los Angeles	64
San Jose	61
San Francisco – Oakland	61
Honolulu	61
Concord, CA	54
New York – Newark	54
San Diego	**53**
New Orleans	49
Tulsa	47
Palm Springs – Indio, CA	47
Riverside – San Bernardino, CA	44
Baltimore	44
Sacramento	44
Omaha	41
Oklahoma City	41
San Antonio	38
Mission Viejo, CA	37
Albuquerque	36
Philadelphia	36
Detroit	36

*Includes state, city, and county arterial networks in cities and surrounding suburbs.

Source: **American Association of State Highway and Transportation Officials 2009 Report: "Rough Roads Ahead" [TRIP Analysis of Federal Highway Administration Data]**

Even though the AASHTO report is not specific to most streets within the City's jurisdiction, in our opinion, the information does provide useful comparative insights for financial and operational risks that may impact resource planning by City management.

Nationwide Street Maintenance Costs Are Increasing

The cost of maintaining streets has significantly increased over the past 15 years due to market and inflationary pressures on construction and material costs. In addition, the AASHTO report shows that even though price trends have leveled-off due to the economic downturn, overall purchasing power for street maintenance activities declined 60 percent between 1993 and 2007 and is expected to decline an additional 20 percent through 2015. According to this trend, the City would have to spend approximately twice the amount in 2010 than it spent in 2001 ($16.4 million) to provide the same level of street resurfacing activity.

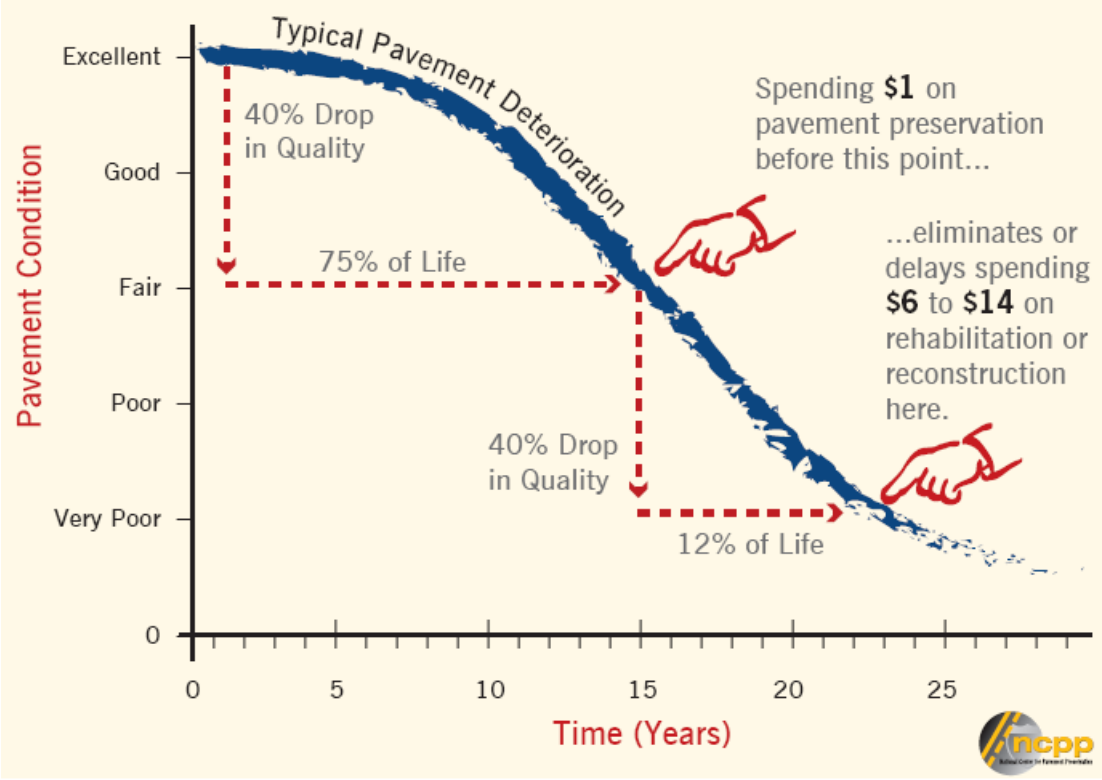
The City Relies on Several Funding Sources for Street Repair

According to a January 2008 Street Division analysis, the cost for the City to maintain streets in their current condition was estimated to be $56 million annually. The analysis further shows that the City's backlog of deferred street maintenance would cost approximately $592 million to eliminate completely. Alternatively, the analysis shows that it would cost $305 million to improve the City's entire street network to an industry acceptable condition, and would require an additional $103 million annually to maintain that condition. If the trend of reduced purchasing power continues for street construction, City streets will become progressively more expensive for the City to maintain at any desired level.

Each year the Street Division receives an allocation of funding for maintenance and repair of City streets through the City's annual budget process. Current revenue sources allocated to the Street Division for the maintenance of City streets consist primarily of several State and City General Fund sources, however, the majority of fiscal year 2009 funding allocated for the maintenance of City streets was derived from the sale of lease revenue bonds. Other significant funding includes State allocated sources consisting of Proposition 1B and Proposition 42 funding, as well as gasoline tax revenue.

Figure 6

Pavement Preservation is Cost Effective



Source: **National Center for Pavement Preservation**

Recent uncertainty in the disposition of State funding sources could impact the Street Division's resource allocation, and could affect recent efforts by the City's Administration to improve street conditions. These fiscal challenges, combined with the potential volatility of construction costs in the future, significantly increase the need for the Street Division to utilize its limited resources in the most effective and efficient manner possible in accomplishing its mission.

Objective, Scope, and Methodology

In November 2008 the City Council approved the City Auditor's Fiscal Year 2009 Audit Work Plan which included a performance audit of the Department of General Services: Street Division (Street Division). The main objective of the audit is to determine if City streets are being effectively and efficiently maintained by the City. During fiscal year 2009 the City Auditor's Fraud, Waste, and Abuse Hotline also received complaints from citizens concerned with the coordination practices of City departments in performing work on and under City streets. Upon initial analysis of information gathered during the scoping phase of our audit, we decided to focus our audit efforts on three major risk areas that the City faces related to street maintenance activity:

1. The effectiveness of the City in gathering and utilizing quality information for street maintenance and oversight activities.

2. The existence and adequacy of internal controls performed by City forces when coordinating work that requires damage of City streets. (i.e. installation and maintenance of water and sewer pipelines, utility undergrounding, and utility service installations)

3. The effectiveness of City management in assuring that the City receives the full value for resources allocated to street resurfacing projects.

This audit report is the first of a series of three reports that the City Auditor is planning to produce related to the evaluation of management practices and internal controls relating to citywide street maintenance. The focus of this report is to provide the City's Audit Committee, City Council, City Administration, and the public with an evaluation of internal controls and the effectiveness of information available to City management for decision-making related to street maintenance. The information provided in this report will be useful for background information and provide a contextual understanding of the succeeding audit reports that will focus on the City's street work coordination and street resurfacing contract management functions.

To accomplish our audit objectives for this audit we performed the following procedures:

- Reviewed pertinent laws, policies and regulations related to street maintenance and coordination activity;
- Gathered and analyzed information related to street conditions produced by industry sources and other jurisdictions;
- Identified, collected, and analyzed financial information, budget documents, and management reports related to the City's street maintenance programs;
- Evaluated current City processes for distributing and deploying street maintenance resources;
- Interviewed management and key staff in charge of maintaining and utilizing information systems related to street maintenance programs;

- Analyzed the quality and effectiveness of street condition information maintained by the City.

We limited the scope of our review to expenditures for street resurfacing activities from fiscal year 2000 through 2009. Budget information for fiscal year 2010 was also reviewed to gain an understanding of current and future expenditures related to street resurfacing. Due to the timing of our audit, we limited our review of information within the Street Division's pavement management system to data that was updated through June 2009, we performed limited testing regarding the reliability of this data due to the limitations discussed within the report.

We evaluated the internal controls related to our audit objectives. Our conclusions on the effectiveness of these controls are detailed within the following audit results.

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

Audit Results

The City's street network is a diverse and complex system of public assets with highly capital-intensive maintenance requirements. During our audit we found that almost half (48 percent) of the street condition information maintained by the Department of General Services' Street Division (Street Division) is outdated because streets were not assessed during the 2007 assessment survey; henceforth limiting the quality and functionality of the information for management purposes. Moreover, Street Division staff did not update street condition information into its management information system upon the completion of street improvement activities. Consequently, in our opinion, the Street Division cannot produce accurate and reliable street condition information for planning, control, and reporting purposes.

In addition, we found that the Street Division does not have a set of formalized written policies and procedures for the identification and prioritization of street maintenance projects. Without the adherence to written policies and procedures for these processes it is difficult for City management to ensure that resources are effectively prioritized and distributed throughout the City. Furthermore, an analysis of recently completed street resurfacing work shows that the Street Division has significantly focused resurfacing resources into two unique categories: preventive maintenance for residential streets, and significant improvements on major and collector streets.

Street Condition Data is Outdated and Provides Limited Usefulness

During our audit we found that street condition information maintained by the Street Division is significantly outdated and provides limited usefulness in providing an accurate reflection of current street conditions. An analysis of information maintained by the Streets Division revealed that approximately half (48 percent) of the street condition data was obtained prior to the most recent assessment survey; henceforth limiting the effectiveness of the Resurfacing Section in utilizing this information during the selection of streets for inclusion into citywide resurfacing contracts. Furthermore, recently gathered street condition information shows significant variation in the condition of City streets. An analysis of this information shows that over 62 percent of the pavement area in the City is below industry acceptable condition, and also that significant geographic and functional variations in street conditions are apparent. Without quality information on street condition, or adequate controls over the selection of streets to be resurfaced, increasing degradation rates and public dissatisfaction are likely to persist.

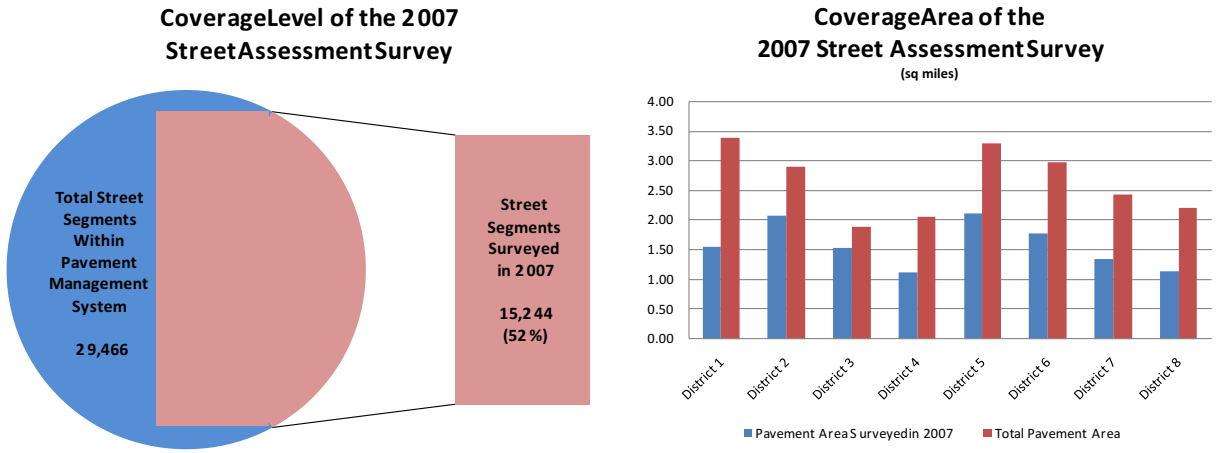
Accurate and reliable information on the condition of any fixed asset is paramount for effective asset management. In order to monitor and track the City's street network, the Street Division utilizes an automated management information system (pavement management system) that provides historical and operational data on City streets. Each street within the City is broken down into individually identifiable components called segments. Segments vary in size, and typically correspond to a specific address range between two cross-streets. (e.g. 100-199 Market Street from 1st Avenue to 2nd Avenue) Each segment contains a unique record of information

that includes the age and condition of the segment, and tracks the date and type of the last significant maintenance activity of each segment. Street Division staff updates operational data[4] when streets are resurfaced or the condition of street segments are reassessed, however, Street Division staff do not update street condition data[5] until a formal field assessment survey is conducted.

The Street Division hires outside consultants to perform formal survey assessments of the condition of City streets. The cost of the survey assessments are factored into the Street Division's budgeted operating expenditures during the annual budget process. According to the Street Division Deputy Director (Deputy Director) street condition assessments require a qualified consultant with prior experience to gather field data, as well as in-house engineering staff to analyze and interpret the data. A consultant hired by the Street Division completed the most recent assessment survey in February 2007. The results of this assessment provided data on 52 percent of streets segments identified within the Street Division's pavement management system, covering 12.7 (1,529 linear miles) of the 21.1 square miles (or 60 percent) of pavement area within the City. A summary of the coverage area provided by the most recent citywide survey is shown in the figure below:

Figure 7

The Most Recent Street Condition Assessment Does Not Provide Complete Information on the Overall Condition of City Streets



Source: **Auditor generated from Department of General Services: Street Division Pavement Management System Data**

[4] Operational data include activity dates, dimensions, and basic identification information such as cross streets and functional class.

[5] The Street Division utilizes an overall condition index (OCI) within the Pavement Management System to monitor and track street conditions.

The Department of General Services: Street Division Could Improve Its Management of Data Related to Street Conditions

Since approximately 1993, the Street Division has been utilizing a management information system (pavement management system) to track and monitor the City's street network. One of the core Resurfacing Section functions is to identify and select streets for inclusion within citywide street resurfacing contracts. Our audit revealed that the Resurfacing Section of the Street Division does not have formalized policies and procedures to identify and select streets for resurfacing. Instead, the Resurfacing Section relies on management information system data, along with the knowledge and experience of staff, to identify and select streets for inclusion into citywide street resurfacing contracts. Due to the significant deferred maintenance backlog of street maintenance needs within the City, the Resurfacing Section process used to identify and select streets for inclusion into resurfacing contracts is a critical control to ensure that limited maintenance resources are effectively deployed. Due to the high costs of street maintenance work, uncertainty in this process could potentially cost the City significantly more over time should street selections or maintenance determinations be inconsistent with an effective policy. Moreover, the absence of written policies and procedures in the identification and prioritization of streets included within citywide resurfacing contracts could lead to inconsistent decision-making; potentially increasing the future costs of street maintenance for streets already below acceptable condition.

Street Division staff use information within the pavement management system to monitor the maintenance needs of City streets, and for selecting streets to include within future street resurfacing contracts. Once the annual budget for street resurfacing projects is established, the Deputy Director directs staff on the amount of resources available for street resurfacing projects. Next, the Resurfacing Section judgmentally selects streets to be resurfaced utilizing the information within the pavement management system and other sources. According to the former Associate Civil Engineer in charge of the Resurfacing Section, these selections are based on several factors: overall condition ratings, traffic volume, and input from the public, City Council, Mayor, and City road repair crews. Street Division staff verifies selections in the field as to the need for recommended repairs.

During our analysis of condition data within the pavement management system, we found that condition data attributed to streets that were not included within the 2007 assessment survey are questionable and do not provide an accurate representation of current street conditions. We determined this by observing significant variances between the entire population of street condition information and data specific to the 2007 survey. Because of this, the Street Division is unable to generate an accurate depiction of current citywide street conditions for all City streets. When we discussed this issue with Street Division staff, we determined that only street condition information produced during the 2007 assessment survey would provide the best representation of current citywide street conditions. However, as noted previously, this information is limited to only 52 percent of the street segments within the City, corresponding to 60 percent of citywide pavement area.

Furthermore, we found that condition ratings within the pavement management system remain static and do not account for degradation or improvements made since the prior assessment. For example, the reduction in the condition rating for a segment due to damage or increased traffic load is not reflected within the pavement management system. Even though the pavement

management system provides the capability to program degradation rates over time into condition ratings, the Street Division has not implemented this functionality. In fact, 44 percent of the segments identified within the pavement management system do not contain a condition rating, or show a condition rating is significantly outdated[6].

By not having street condition data updated within the pavement management system for all streets on a complete and comprehensive basis, the Street Division is reliant on incomplete condition data for a significant amount of streets within the City. According to General Services staff, street condition assessments conducted in 2001, 2003, and 2007 were each based on 55, 48, and 52 percent of City streets respectively, and that these streets were selected for the assessment survey based on average daily traffic information. The Deputy Director informed us that the Street Division fully intends to conduct a complete street condition assessment survey in fiscal year 2011, and that the Street Division plans to request the resources necessary—approximately $600,000—to perform this assessment during the fiscal year 2011 budget process. In our opinion, until a complete survey assessment is performed, the Street Division is reliant on limited condition data to utilize when selecting streets for inclusion into citywide resurfacing contracts or for general reporting purposes.

To improve the quality of information used in the management of City streets, the Street Division should take the following actions:

Recommendations

1. Expedite the performance of a complete citywide street assessment survey prior to the selection of streets for future citywide resurfacing contracts. If resources are not sufficient for this purpose, the Street Division should expedite its budget request so that resources will be available for a complete citywide assessment as soon as practicable. Data obtained from this survey should be analyzed comprehensively prior to the execution of future street resurfacing contracts, and maintained as a baseline for performance metrics when future assessments are performed.

2. Ensure that the condition ratings for recently resurfaced streets are effectively updated within the pavement management system in a timely manner. If the Street Division does not have the staff, resources, or expertise necessary to perform field surveys of street conditions, then the Street Division should establish baseline condition ratings for streets that have been recently resurfaced. (e.g. OCI of 90 for streets that have been recently overlaid with new asphalt) These baseline values should be updated within the pavement management system shortly after the completion of street resurfacing activity.

3. Implement a degradation program into the pavement management system to update street condition ratings on a periodic basis. When formulating this program, major degradation variables such as traffic, drainage, weathering, and functional class should be prescribed for each segment within the pavement management system. If this process cannot be automated, the Street Division should ensure that condition information is manually updated on a regular basis.

[6] We consider an inspection date prior to November 2006 as being significantly outdated.

Street Conditions Vary Significantly by Geography and Functional Class

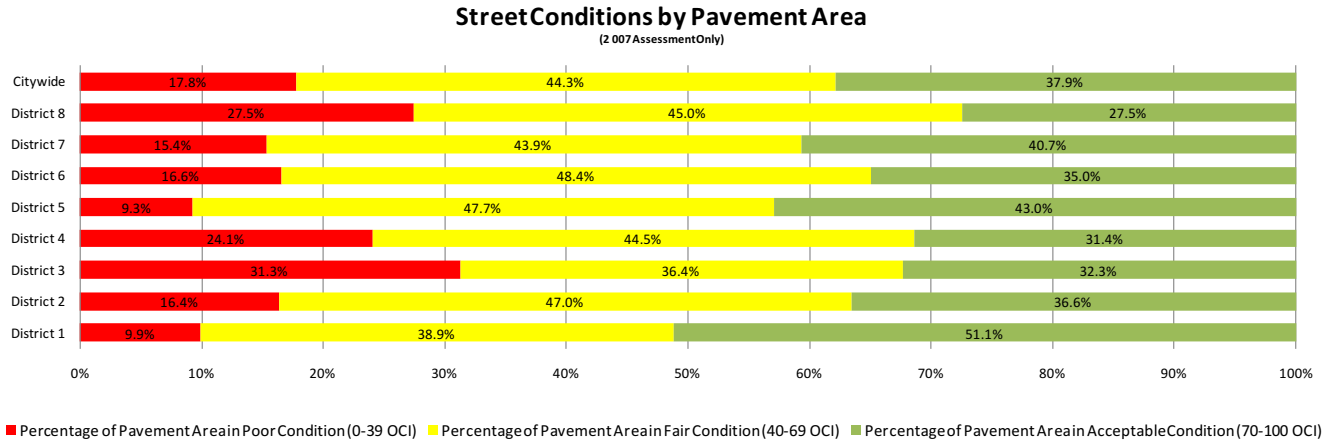
The Street Division measures the condition of City streets by a weighted attribute index called the Overall Condition Index (OCI). The OCI for a street segment is calculated within the pavement management system by formula, using weighted attribute characteristics including drainage, surface distress, structural integrity, and ride quality. OCI values range on a scale of zero to 100, with 100 being the best street condition. For analytical purposes OCI ratings can be segmented into following three categories:

1) Acceptable Condition: 70 - 100 OCI
2) Fair Condition: 40 - 69 OCI
3) Poor Condition: 0 - 39 OCI

The Street Division hired consultants to perform a street assessment survey in 2001, 2003, and 2007. These consultants gathered condition data which the Street Division maintains within its pavement management system. As shown previously in Figures 6 & 7, the most recent assessment survey provided condition data for 52 percent of the street segments identified within the pavement management system. Figure 8 below represents the OCI levels gathered by the Street Division consultant during the most recent street condition assessment survey conducted from November 2006 through February 2007.

Figure 8

The City Has a Significant Amount of Streets in Below Acceptable Condition



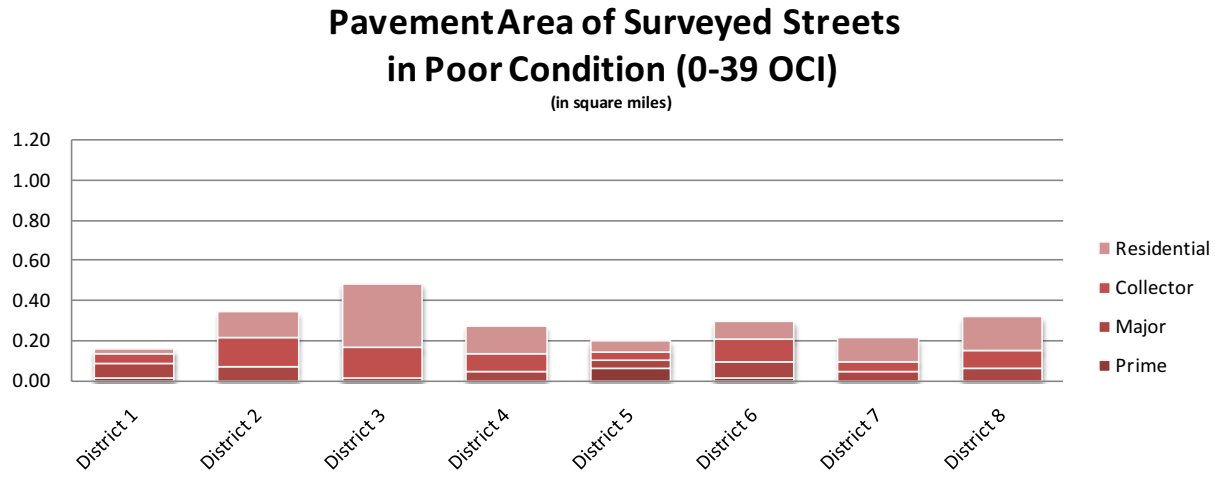
Source: **Auditor generated from Department of General Services: Street Division Pavement Management System, 2007 Street Assessment Survey Data**

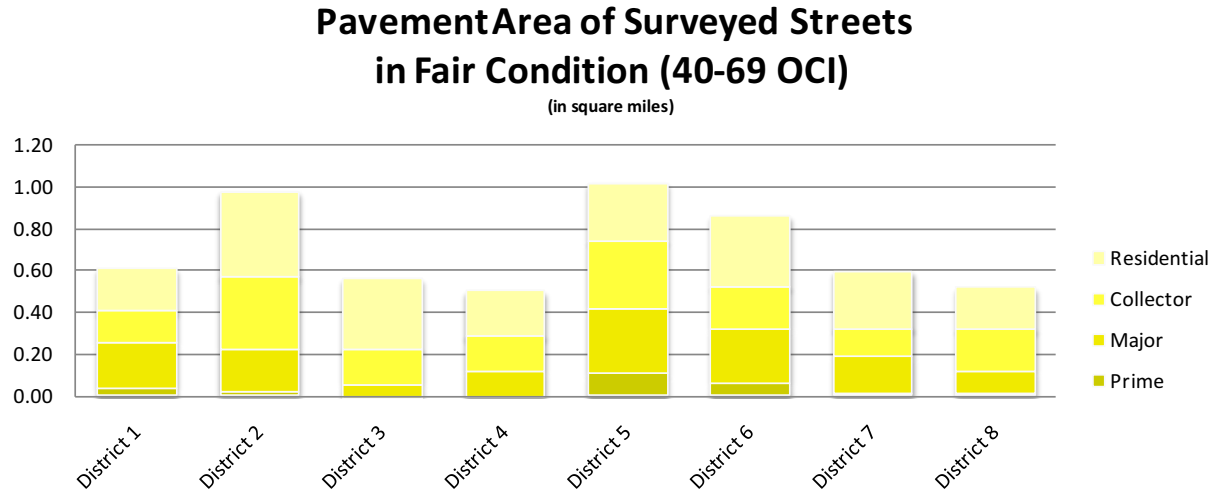
As shown in the figure above, a majority of the streets assessed were in "Fair" or "Poor" condition; with only one district within the City having a majority of streets assessed in "Acceptable" condition (District 1). Further analysis of this data shows significant variations in

the characteristics of streets below acceptable condition. For example, Figures 9, 10, and 11 below show a breakdown of surveyed pavement area by condition and functional class[7]:

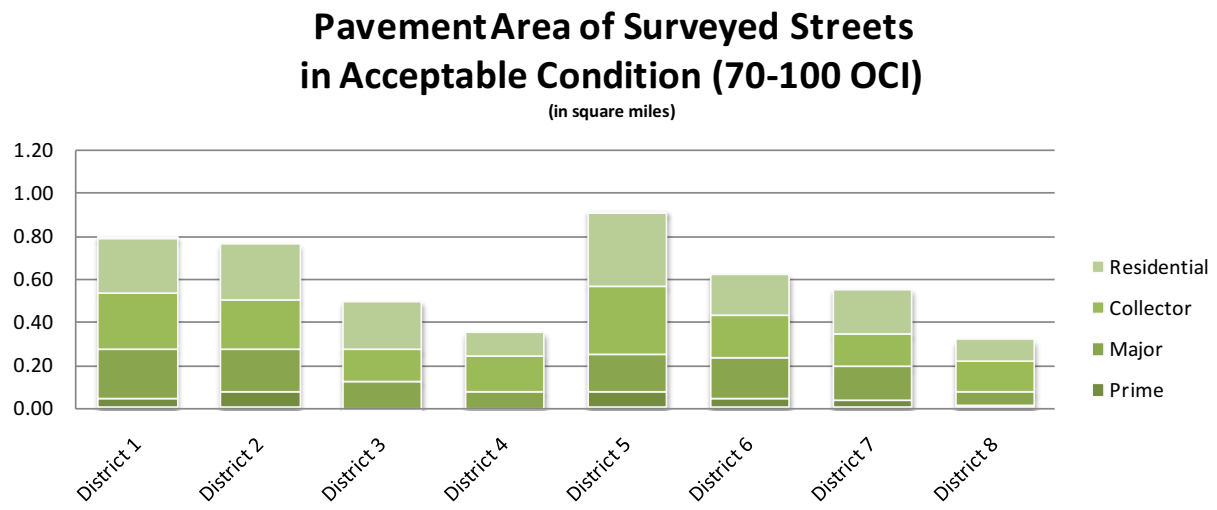
Figures 9, 10, & 11

There is Significant Geographical and Functional Variation in City Street Conditions





[7] Within the pavement management system, street segments are categorized into one of four functional classes: Prime, Major, Collector, and Residential. Functional classes are determined by the City's Planning Department when streets are constructed or redeveloped. See Glossary of Terms for a description of each type of functional class.



Source: **Auditor generated from Department of General Services Pavement Management System Data. [2007 Survey Data]**

As shown in Figures 9 through 11 above, it is apparent that districts with the highest percentage of streets in poor condition, such as District 3 and District 8, also show that residential streets are the majority of pavement area in poor condition within those districts. In contrast, districts with the highest percentage of streets in above industry acceptable condition, such as Districts 1 and 5, show little variation within the functional class distribution of pavement area in poor condition within each district. This information signals that there is disparity in citywide street conditions both geographically and by functional class.

According to the Deputy Director, the Street Division's strategy for reducing the amount of streets in poor condition is to seek the proper level of funding, overlay as many streets in poor conditions as funding allows, slurry seal streets in good condition to prevent deterioration to poor condition, and ensure sewer and water projects are properly resurfaced upon completion[8]. The Deputy Director further stated that based on the City's Five-Year Financial Outlook, and assuming the current level of funding is sustained, the Street Division's goal is to have 75% of the City's street network in acceptable condition within five years. According to the data from the 2007 assessment survey, this goal represents a 37 percent reduction from the assessed level of streets in poor and fair condition. The Deputy Director further stated that until all current resurfacing projects are completed, and an updated assessment survey is performed, that it would be difficult to predict the performance related to this goal.

In a July 2007 response to a San Diego County Grand Jury (Grand Jury) report on the condition of City streets, the Mayor responded that rather than upgrading all of the City streets to "Acceptable" condition, the [City's] goal will be to bring the streets system up to "industry standards." According to the Mayor's response, these standards are an average citywide OCI of 60, with 75 percent of the system in acceptable condition, 20 percent in "Fair" condition, and 5

[8] Assessment of the internal controls related to interdepartmental coordination of street work activity will be addressed within a succeeding report.

percent in "Poor" condition. With the completion of the planned condition assessment of the entire street network in fiscal year 2011, the Street Division would be able to evaluate its progress toward achieving the Mayor's goal. However, until a comprehensive street condition assessment is performed, the Street Division is unable to evaluate this progress. In our opinion, considering that $78.5 million and $16.4 million was allocated for street resurfacing projects in fiscal years 2009 and 2010 respectively, the results of the next street assessment survey are critical for City Management to determine the level of resources required to achieve, and maintain, the Mayor's desired street condition level.

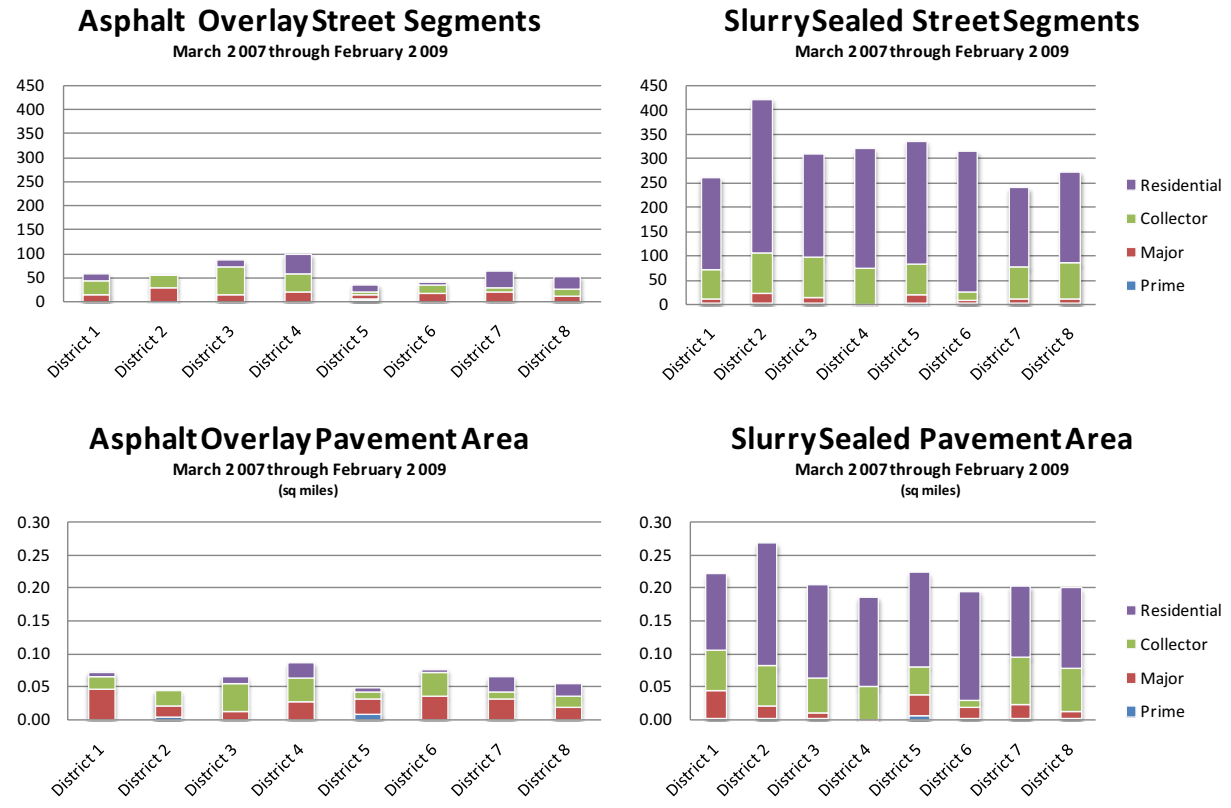
Street Resurfacing Efforts Have Focused On Capital Improvements to Major Streets and the Preventive Maintenance of Residential Streets

In addition to street condition information, the Street Division also maintains operational information within its pavement management system. This information describes each street segment by age, functional class, and also provides detailed information on the most recent resurfacing activity performed. Based on an analysis of street resurfacing activity performed during the two-year period[9] from March 2007 through February 2009, we found that the majority of street segments selected for asphalt overlay contracts are classified as major and collector streets. In comparison, slurry seal contracts have significantly focused on the maintenance of residentially classified streets. Considering the amount of residential pavement area that was assessed in poor condition throughout the City, it appears that the process used by the Street Division to select streets for asphalt overlay or slurry seal contracts has been geared toward streets with higher traffic levels, and by the amount of pavement area in poor condition.

The figures below provide detail behind the amount and classifications of streets that have been overlaid with asphalt or slurry sealed from March 2007 through February 2009. Figures 12 through 15 below show that the Street Division has focused street resurfacing activities into two specific categories since the prior citywide assessment.

[9] This time period represents the two-year period since the completion of the most recent assessment survey which was completed in February 2007.

Figures 12, 13, 14, & 15



Source: **Auditor generated from Department of General Services: Street Division Pavement Management System Data**

According to the Deputy Director, the Street Division does not analyze the data by segments and functional class, however, it is evident that major and collector streets fall more in the need for overlay due to the higher traffic volume and type of traffic utilizing the streets such as buses and trucks. The Deputy Director further stated that the Street Division utilizes consistent prioritization criteria, and uniformly prioritizes streets for repair based on existing data. The selection criteria are documented in all resurfacing documents that are presented to the City Council for approval; however, the Deputy Director recognized that the Street Division will need to work on documenting the formalized criteria for this process.

Based on a sample of street resurfacing contract approval documents presented to the City Council for approval, locations for the Annual Street Maintenance Program are chosen through the use of pavement condition surveys and the City's pavement management system using the following criteria: age, oxidation, cracking, amount of patching, street classifications, average daily traffic, and avoiding conflicts with any planned underground utility work. However, without documented processes in the selection of streets to be resurfaced, it is difficult for City management to hold the Street Division accountable for providing the most effective use of street resurfacing resources.

From the data supporting the analysis above its appears that 0.5 square miles (61 linear miles) of streets have been overlaid, and 1.69 square miles (254 linear miles) of streets have been slurry sealed during the two-year period from March 2007 to February 2009.

Considering that the Street Division is responsible for maintaining over 21 square miles of paved surfaces, and that data from the most recent street condition assessment survey shows that 17.8 percent (2.26 square miles) of the pavement area within the City is in poor condition, at this rate it would take approximately nine years to overlay all surveyed street surfaces that are in poor condition. According to the Deputy Director this rate is correct if you use the overlay rate for the period between March 2007 and February 2009, but indicated that this analysis does not account for a considerable amount of asphalt overlay and slurry seal activity that has occurred since February 2009. The Deputy Director agreed that many streets will continue to degrade into poor condition if no preventive maintenance, such as slurry seal, takes place. However, approximately 100 linear miles of streets were slurry sealed in fiscal year 2009, and approximately 150 linear miles are expected to be slurry sealed in fiscal year 2010.

Recommendations

4. The Street Division should formally document written policies and procedures for the identification and selection for inclusion into citywide street resurfacing contracts. These policies and procedures should be documented with an aim to maximize the effectiveness and efficiency of resources allocated for street resurfacing projects.

   Written policies and procedures should be carefully crafted to ensure objectivity in the identification and selection process; yet also provide flexibility when deviation from the prescribed selection processes is warranted. (i.e. upon completion of a major public works project, or a particular geographic area that has sustained aberrant damage)

Conclusion

The condition of streets is an integral component to the quality of life within the City of San Diego (City). Due to the scale and diversity of streets maintained by the City, effective management of City streets requires significant and consistent dedication of public resources. Street conditions within the City are considered to be in less than acceptable condition. With street maintenance costs increasing over the past decade, it is critical for the City to ensure that the limited resources available for street maintenance activities are used in the most effective and efficient way possible.

Our audit revealed that City street conditions vary both geographically and functionally. In recent history, the City has focused the majority of street resurfacing resources into two distinct categories: 1) Significant improvements to major and collector streets, and 2) preventive maintenance of residential streets. By pursuing this strategy, the costs of maintaining streets could greatly increase over the long term should deferred maintenance needs not be strongly addressed. In addition, our audit revealed that the amount of resources made available for street resurfacing purposes has fluctuated greatly since fiscal year 2000, and has been highly insufficient for overall improvement of street conditions.

Based on the findings of our audit we recommend that City management take steps to improve the information and business processes that it utilizes to manage and maintain City streets. By formally documenting its process for street resurfacing projects, and by improving the quality of information available for decision-making and reporting purposes, the City could improve its oversight and efficiency in managing street repair functions.

Glossary of Terms

Asphalt Overlay: The process of repaving the entire top layer of a street's pavement with new asphalt.

Collector Street: A street that primarily provides movement between residential/collector streets and streets of higher classification and, secondarily, provides access to abutting property. It carries low-to-moderate vehicular movement, low-to-heavy pedestrian movement, moderate-to-heavy bicycle movement, and low-to moderate transit movement.

Major Street: A street that primarily provides a network connecting vehicles and transit to other major streets and primary arterials, and to the freeway system and secondarily providing access to abutting commercial and industrial property. It carries moderate-to-heavy vehicular movement, low-to-high pedestrian and bicycle movements, and moderate-to-high transit movement.

Overall Condition Index (OCI): The measurement index used by the City of San Diego to rate the condition of streets. Ratings range from zero to 100 and are based on weighted attributes such as surface distress, structural integrity, drainage, and ride quality.

OCI Range	**Description**
0-39	"Poor" Condition
40-69	"Fair" Condition
70-100	" Acceptable" Condition

Pavement Area: The paved surface area of a street calculated as the pavement length of the street times the width of the segment's paved surface. (e.g. A street that is 120 feet long with a pavement width of 80 feet would have a pavement area of 9600 square feet)

Primary Arterial (Prime) Street: A street that primarily provides a network connecting vehicles and transit to other primary arterials and to the freeway system. It carries heavy vehicular movement while providing low pedestrian movement and moderate bicycle and transit movements.

Pavement Length: The linear distance of the paved surface of a street.

Residential Street:	A street that provides, primarily, direct access to abutting property. It carries low vehicular movement, low-to-heavy pedestrian movement, and low-to-moderate bicycle movement.
Segment:	A unique section of a street identified by an address range and/or cross streets. Example: 1000 to 1100 Broadway Avenue between 10th Street and 11th Street.
Slurry Seal:	A preventive maintenance technique intended to maximize the useful life of a street by treating paved surface area with a specialized asphalt surface treatment. Prior to application of surface treatment, surface failures are patched and sealed to improve the asphalt surface.

THE CITY OF SAN DIEGO

M E M O R A N D U M

DATE: October 23, 2009

TO: Eduardo Luna, City Auditor

FROM: Mario X. Sierra, Director, General Services Department

SUBJECT: Response to Audit Report - Performance Audit Of The City's Street Maintenance Functions, Part I: The City Can Improve Its Effectiveness In Gathering And Utilizing Street Condition Information", dated October 2009

The General Services Department, Street Division (Street), has reviewed the Audit Report titled "Performance Audit Of The City's Street Maintenance Functions, Part I: The City Can Improve Its Effectiveness In Gathering And Utilizing Street Condition Information", dated October 2009. The report takes a detailed look at the City's street resurfacing program, and provides recommendations that are intended to increase the effectiveness of the program by improving the quality of information and business processes used to manage and maintain City streets. The following comments are in response to the report's findings and recommendations.

FINDING 1 – The Department of General Services: Street Division Could Improve Its Management of Data Related to Street Conditions

Recommendation 1:

Expedite the performance of a complete citywide street assessment survey prior to the selection of streets for future citywide resurfacing contracts. If resources are not sufficient for this purpose, the Street Division should expedite its budget request so that resources will be available for a complete citywide assessment as soon as practicable. Data obtained from this survey should be analyzed comprehensively prior to the execution of future street resurfacing contracts, and maintained as a baseline for performance metrics when future assessments are performed.

Response:

Agree. Condition assessments were conducted during Fiscal Years (FY) 2001, 2003 and 2007. The condition assessments included 55%, 48% and 52% respectively of the City's street network. Streets included in the survey consisted of all streets with an average daily traffic (ADT) count of at least 2500 vehicles. Streets with an ADT lower than 2500 tend to last longer, suffer less pavement distress, and require less maintenance.

Given the level of funding and number of resurfacing contracts scheduled to be completed in FY 2010 and FY 2011, the next condition assessment scheduled for late FY 2011 will be performed after the current contracts are completed in order to ascertain the improvement to the city street network as a result of the additional work funded to address the streets deferred maintenance needs. The FY 2011 condition assessment will include all streets in the City's street network.

Recommendation 2:

Ensure that the condition ratings for recently resurfaced streets are effectively updated within the pavement management system in a timely manner. If the Street Division does not have the staff, resources, or expertise necessary to perform field surveys of street conditions, then the Street Division should establish baseline condition ratings for streets that have been recently resurfaced. (e.g. OCI of 90 for streets that have been recently overlaid with new asphalt). These baseline values should be updated within the pavement management system shortly after the completion of street resurfacing activity.

Response:

Agree. The purpose of the condition assessments is to take a "snapshot" to determine the overall condition of the streets. Streets are assigned an Overall Condition Index (OCI) which is used to determine funding levels needed to address deferred maintenance. Effective immediately, when a street is resurfaced, the OCI will be adjusted to reflect the recently completed work performed on the street.

Recommendation 3:

Implement a degradation program into the pavement management system to update street condition ratings on a periodic basis. When formulating this program, major degradation variables such as traffic, drainage, weathering, and functional class should be prescribed for each segment within the pavement management system. If this process cannot be automated, the Street Division should ensure that condition information is manually updated on a regular basis.

Response:

Partially agree. Implementing this recommendation requires a constant assessment of the variables listed above for over 2,800 miles of streets. The amount of effort and resources needed would be substantial and the benefits would be minimal. Street Division will continue to rely on periodic condition assessments, type of street, age, oxidation, rate of deterioration, average daily vehicle trips, types and size of cracks, number of potholes, maintenance history, drainage issues and the quality of ride. These factors, along with input from Street Division staff, the public, community groups, council offices and a utility conflict check, are most effective in the selection of the streets to be included in the resurfacing program.

FINDING 2 – Street Resurfacing Efforts Have Focused On Capital Improvements to Major Streets and the Preventive Maintenance of Residential Streets

Recommendation 4:

The Street Division should formally document written policies and procedures for the identification and selection for inclusion into citywide street resurfacing contracts. These policies and procedures should be documented with an aim to maximize the effectiveness and efficiency of resources allocated for street resurfacing projects.

Written policies and procedures should be carefully crafted to ensure objectivity in the identification and selection process; yet also provide flexibility when deviation from the prescribed selection processes is warranted. (i.e. upon completion of a major public works project, or a particular geographic area that has sustained aberrant damage)

Response:

Agree. General Services/Street Division will create a formal department instruction outlining the policies and procedures used to identify and select streets for inclusion in the citywide street resurfacing contracts. The department instruction will list the selection factors, and will describe the methodology to ensure funding is allocated in the most efficient and effective manner to maximize the improvements to the street network.

Mario X. Sierra
Director

cc: Jay M. Goldstone, Chief Operating Officer
David Jarrell, Deputy Chief Operating Officer, Public Works
Kyle Elser, Audit Manager
Hasan Yousef, Deputy Director, Street Division

CITY OF SAN DIEGO

MEMORANDUM

Date: November 6, 2009

To: Eduardo Luna, City Auditor

From: Mario X. Sierra, Director, General Services Department

Subject: Supplement response to the Audit Report – Performance Audit Of The City's Street Maintenance Functions, Part 1: The City Can Improve Its Effectiveness In Gathering And Utilizing Street Condition Information", dated October 26, 2009

The original response to the subject Audit Report dated October 23, 2009 focused specifically on the four recommendations presented by the Audit Report. The Audit Report has generated many questions concerning the process and procedures used by Street Division to efficiently and effectively identify and select streets to be included in the City's resurfacing program. The purpose of this memorandum is to provide a response to the audit results and findings included in the Audit Report. The Audit Report identified four areas as weaknesses: 1) Incomplete condition assessment information, 2) Street condition information not uniformly updated, 3) Degradation program not incorporated in pavement management system, and 4) No formal policies and procedures for the identification and selection of streets. Each of these areas will be addressed in turn.

1. Incomplete condition assessment information

The condition assessment completed in FY 2007, included 52% of the City's street system. The City chose to assess this portion of the street system because these streets receive the highest traffic volume. With San Diego's temperate climate, traffic volume is the most significant cause of distress and wear on the street network. The streets chosen for assessment in FY 2007 are those with average daily traffic of at least 2,500 vehicles. Since these streets receive the most traffic, they degrade the fastest and require the most maintenance. Streets that were not included in the FY 2007 condition assessment are residential streets, which tend to last longer, experience less pavement distress, and require less maintenance. We believe that the streets chosen for assessment were the most appropriate and useful for making good decisions regarding the pavement management program. Additionally, the condition assessment performed on our street network represents a best practice for street maintenance, one that is not performed by most cities in the U.S. Cities that do not perform street condition assessments select street for resurfacing based on complaints received and the knowledge of the street maintenance crews.

The Audit Report references a 2009 report entitled "Rough Roads Ahead", issued by the American Association of State Highway and Transportation Officials (AASHTO). The AASHTO Report analyzed 2007 regional roadway condition data from Federal Highway Administration (FHWA). This report grouped federal, state, county and local highways and arterial streets within the San Diego region, and reported the region's street network is in the seventh worst condition within the nation amongst urban areas with a population over 500,000. The Audit Report does not disclose that the AASHTO report was partly based on a study that measured driver reactions to various road conditions to determine what level of road roughness was unacceptable. Additionally, FHWA is unable to identify what percentage or number of streets within the San Diego region were included in the study, or to confirm that any streets within the City of Diego were driven to assess the condition of the streets.

The Audit report discredits the 2007 condition assessment performed by Street Division of 1529 lineal miles of streets, claiming "we found that street condition information maintained by the Street Division is significantly outdated and provides limited usefulness in providing an accurate reflection of current street conditions". However, in reference to the AASHTO Report, the Audit report states "in our opinion, the information does provide useful comparative insights for financial and operational risks that may impact resource planning by City management", even though the Audit Report did not identify a single street within the City of San Diego that was assessed and included in the AASHTO Report.

2. Street condition information not uniformly updated

The purpose of the assessment is to take a snap shot of the City's inventory and identify the condition of the street network. Maintenance activity on streets is occurring constantly. Work in the streets is performed by Street Division, other city departments, private contractors and utility companies including SDG&E, Pacbell, ATT, cable television companies, and a host of telecommunication companies. The level of effort required to uniformly update street condition information when maintenance activity is performed would be extremely time consuming and very costly. The benefit gained by attempting to maintain this level of information is minimal compared to the investment. If condition assessments were conducted less frequently (e.g., every 20-25 years), it would be more important to consistently update the condition information. However, the City plans to perform condition assessments every four years to maintain up-to-date information on the street conditions.

The Audit Report gives the reader a misperception that the condition assessment is the primary factor in identifying and selecting streets to be included in the City's resurfacing program. The condition assessment is one part of a comprehensive process used to identify the annual resurfacing program.

A Pavement Management System (PavementView) is used to keep track of the inventory as well as pertinent data associated with every street in the City, including the street type, age, traffic volume, surface distresses, drainage characteristics and maintenance records. PavementView is an industry standard management tool used to track the lifecycle of streets. Based on funding levels, PavementView is capable of selecting a group of streets which should be resurfaced in order to maximize the impact of the funding and to ensure proper lifecycle work is performed. Street Division conducts a citywide review of other projects in the right-of-way to determine potential impacts to the streets and to minimize utility conflicts. Once the conflicts are identified, Street Division staff visually inspects every mile of every street that is a candidate to be included in the resurfacing program to validate the need for the resurfacing work. For every one mile of street included in the resurfacing program, approximately three miles of streets are visually inspected to select the best candidates for the resurfacing work.

In accordance with our longstanding plan, the next condition assessment of the street network will be funded and completed in FY 11. We believe that it is important to continue with the assessment plan, and to determine an up-to-date Overall Condition Index for the streets reflecting the significant resurfacing work completed over the last three years.

3. Degradation program not incorporated in pavement management system

To incorporate the degradation feature of the pavement management system, Street Division will be required to constantly monitor the 2,800 miles of City streets to determine when variables such as functional class, traffic, drainage, weathering, trenching and maintenance repairs have reached a level to impact the condition rating. The amount of effort, resources and cost would be substantial and the benefits minimal. As mentioned above, if condition assessments were conducted less frequently (e.g., every 20-25 years), it would be more important to consistently update the condition information. However, the City plans to perform condition assessments every four years to maintain up-to-date information on the street conditions.

4. No formal policies and procedures for the identification and selection of streets

Street Division has policies and procedures to effectively and efficiently identify and select streets to include in the City's resurfacing program. Street Division does not currently have the policies and procedures in the form of an Administrative Regulation (AR) or department instruction. However, every street resurfacing contract forwarded to Council for approval contains a brief overview of the process used to identify and select the streets included in the contract. Street Division agrees with the Audit Report's recommendation to develop an AR or department instruction detailing the process and procedures used to select streets for resurfacing work.

Additional Information regarding the Audit Report

The Audit Report uses square miles as the unit of measure for the City's street network. Square miles is not the industry standard customarily used to measure streets. The Audit Report contends that pavement area is used throughout the report because "it normalizes against width variations amongst streets, and in our opinion, provides more accurate information for maintenance cost purposes since street maintenance costs are mostly derived on a volume basis (e.g. tons of asphalt)". "Tons" does not measure volume. "Tons" is a measure of weight.

An analogy is to look at how lease space is measured. A tenant seeking to lease space will commonly identify the total square footage required or available. Using the Audit Report's rationale, the lease space should be measured in cubic feet because it more accurately represents the space. Measuring office space by cubic feet is not the industry standard in the leasing business and would simply create confusion. Although it might not be technically incorrect to use a volumetric measure for office space, it would be meaningless to those in and outside of the leasing industry.

Conclusion

Although I disagree with the Audit Report's results and findings for the reasons mentioned above, the four recommendations identified in the Audit Report are fair and, with proper understanding of the street maintenance operation, will lead to improved efficiencies. The City has maintained streets for over a hundred years and has continually incorporated best practices to improve its comprehensive process to efficiently and effectively identify and select streets for the resurfacing program.

Mario X. Sierra
Director

cc: Honorable Members of the City Council
Members of the Audit Committee
Jay M. Goldstone, Chief Operating Officer
Wally Hill, Assistant Chief Operating Officer
David Jarrell, Deputy Chief Operating Officer
Kyle Elser, Audit Manager
Hasan Yousef, Deputy Director, Street Division