TRANSPORTATION & STORMWATER SERVICES
RIGHT OF WAY OPERATIONS DIVISION
RIGHT OF WAY IMPROVEMENTS SECTION
PAVEMENT MANAGEMENT
AUDIT 14-12
SEPTEMBER 29, 2015

CITY OF TAMPA

Bob Buckhorn, Mayor **Internal Audit Department**

Christine Glover, Internal Audit Director

September 29, 2015

Honorable Bob Buckhorn
Mayor, City of Tampa
1 City Hall Plaza
Tampa, Florida

RE: Pavement Management, Audit 14-12

Dear Mayor Buckhorn:

Attached is the Internal Audit Department's report on Pavement Management.

Transportation and Stormwater Services has already taken positive actions in response to our recommendations. We thank the management and staff of the Transportation and Stormwater Services Department, the Purchasing Department, Technology and Innovation, the Budget Office, and Fleet Maintenance for their cooperation and assistance during this audit.

Sincerely,

/s/ Christine Glover

Christine Glover
Internal Audit Director

cc: Dennis Rogero, Chief of Staff
Sonya Little, Chief Financial Officer
Brad Baird, Administrator of Public Works and Utility Services
Jean Duncan, Director of Transportation and Stormwater Services
Greg Spearman, Director of Purchasing

306 E. Jackson Street, 5N • Tampa, Florida 33602 • (813) 274-7159 • FAX: (813) 274-5660

TampaGov
www.tampagov.net

TRANSPORTATION & STORMWATER SERVICES
RIGHT OF WAY OPERATIONS DIVISION
RIGHT OF WAY IMPROVEMENTS SECTION
PAVEMENT MANAGEMENT
AUDIT 14-12
SEPTEMBER 29, 2015

/s/ Melinda Jenzarli

Auditor

/s/ Christine Glover

Audit Director

TRANSPORTATION & STORMWATER SERVICES
RIGHT OF WAY OPERATIONS DIVISION
RIGHT OF WAY IMPROVEMENTS SECTION
PAVEMENT MANAGEMENT
AUDIT 14-12

BACKGROUND

During the audit, Public Works and Utility Services was reorganized so that the City's pavement management responsibilities are now under the newly created Transportation and Stormwater Services Department. In addition to pavement management, the department maintains traffic signals, traffic signs, pavement markings, special events, permit inspections, stormwater drainage, and movable bridges.

In FY2014, the City budgeted $8.2 million to preserve its 2,800 paved lane miles of streets. As street maintenance is deferred, more expensive treatments become necessary. Research has shown that it is far less expensive to keep a road in good condition than it is to repair it once it has deteriorated. Recognizing that past funding resulted in deferring maintenance, the Administration increased the FY2015 budget for road resurfacing by $4 million.

The City's street network consists of approximately 17.2 million square yards of asphalt roadway of which 450,000 square yards are resurfaced annually. The City's pavement management program is prioritized by pavement condition, rideability, and input from those charged with governance.

Pavement Condition Index

Good	86-100
Satisfactory	71-85
Fair	56-70
Poor	41-55
Very Poor	26-40
Serious	11-25
Failed	0-10

The Pavement Condition Index (PCI) is a numerical indicator, originally developed by the U.S. Corps of Engineers. The PCI, which rates the surface condition of pavement, was later standardized in American Standard for Testing and Materials (ASTM) D5340, *Standard Test Method for Airport Pavement Condition Index Surveys*. It is based on the distresses measured on the road surface. The City's overall PCI rating is estimated at 47, which places the average condition of the City's roads in the PCI Rating Category of poor. Continuous monitoring of PCI values is used to determine the rate of pavement deteriorations and manage maintenance and repair needs. The City uses MicroPAVER, which was invented by the U.S. Army Center for Public Works, as its pavement management system.

MicroPAVER uses the PCI observed on individual road segments to predict the pavement's life cycle. The software is able to extrapolate current road conditions to future years and recommend maintenance schedules based on the level of funding. It is also able to run scenarios to determine the level of funding required to preserve or improve the current condition of roads.

Some roads may warrant repaving, but may be deferred because another project is planned in the near future (such as a water or sewer line replacement). At the beginning of each planning year, a list of anticipated projects is provided to the City's major departments. Projects that overlap with the planned street maintenance are identified and the timing of any work is planned accordingly.

Source: http://www.tampagov.net/dept_Public_Works/programs_and_services/Street_repairs.asp

STATEMENT OF OBJECTIVES

This audit was conducted in accordance with the Internal Audit Department's FY2014 Audit Agenda. The objectives of this audit were to ensure that:

1. The annual pavement management plan was reasonable and based on current and objective criteria.

2. Performing in-house pavement maintenance was cost effective.

3. Pavement maintenance contracts were adequately monitored and payments were properly approved.

STATEMENT OF SCOPE

The audit period covered pavement management activity that occurred from October 1, 2013, to September 30, 2014. Tests were performed to determine whether the Transportation and Stormwater Services personnel were fulfilling their stated duties and responsibilities in an effective and efficient manner. Original records as well as copies were used as evidence and verified through observation and physical examination.

STATEMENT OF METHODOLOGY

This audit reviewed internal controls related to payment processing. To ensure the pavement management plan was based on current and objective criteria, all inspection data contained in MicroPAVER was analyzed and system calculated PCI values were recalculated for accuracy using historic inspection results and pavement deterioration rates. To ensure that in-house pavement maintenance was cost effective, in-house costs and productivity were analyzed and compared to contractor activity. To ensure pavement maintenance contracts were adequately monitored, all pavement agreements were tested for contractor compliance and in-house inspections were reviewed. To ensure payments were properly approved, 221 invoices were reviewed for authorizing signatures, reconciled to supporting documentation, and recalculated.

Reliance was placed on the data contained in the MicroPAVER application. As there were no major changes or revisions to the MicroPAVER software (there is a plan to go to a cloud-based system in the future) and the application was deemed reliable in the past, the data contained in MicroPAVER was deemed reliable for the purposes of this audit.

STATEMENT OF AUDITING STANDARDS

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain

sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

AUDIT CONCLUSIONS

Based upon the test work performed and the audit findings noted below, we conclude that:

1. Due to the lack of evidence supporting the decision-making process, the current pavement maintenance plan and project prioritization could not be reproduced using existing data and a conclusion could not be reached as to whether the plan was reasonable. Subjective and objective criteria were used to develop the pavement maintenance plan.

2. The cost effectiveness of in-house pavement maintenance could be improved.

3. While pavement maintenance contracts were adequately monitored and payments were properly approved, quality control over contractor performance could be improved.

While the findings discussed below may not, individually or in the aggregate, significantly impair the operations of Transportation and Stormwater Services, they do present risks that can be more effectively controlled.

PAVEMENT MANAGEMENT PLANNING

STATEMENT OF CONDITION: Documentation supporting the 5-Year Pavement Management Plan and the decision-making process of pavement project prioritization needs improvement. Due to the lack of evidence supporting the decision-making process, the plan and project prioritization could not be reproduced using existing data and a conclusion could not be reached as to whether the current plan was reasonable.

CRITERIA: The criteria used for the assessment reportedly includes: the Pavement Condition Index (numerical score determined by analyzing the quantity and severity of pavement distresses), project coordination with other City departments, capital improvement budget, an equitable geographic distribution of projects throughout the City, citizen complaints, and input from those charged with governance. The main purpose of project prioritization is to keep street segments from requiring full reconstruction as it costs four to five times as much than rehabilitation.

CAUSE: Development of the maintenance plan and project prioritization is performed by a committee of pavement maintenance personnel. Documentation supporting the decision-making process is not retained. There may be too much weight given to the subjective criteria used to develop the plan; therefore, the plan is not repeatable or defendable.

EFFECT OF CONDITION: Without an objective pavement management plan, roads needing rehabilitation may deteriorate to a point where full reconstruction is required. Questions as to why one area is chosen over another cannot be defended, which could lead to additional complaints.

RECOMMENDATION 1: Transportation and Stormwater Services should document the methodology and decision-making process used to develop the pavement plan and project prioritization in the Policies and Procedures Manual. Pavement Condition Index reports used to develop the plan should be retained. While the subjective criteria used to develop the plan is unavoidable, it should also be documented and retained. The objective criteria used to develop the plan should be heavily weighted, so that the results are repeatable and defendable.

MANAGEMENT RESPONSE: Agree. Documentation of the methodology and decision-making process used to develop the pavement plan and project prioritization should be included in the Policies and Procedures Manual. Pavement Condition Index reports used to develop the plan should be retained. The objective criteria used to develop the plan should be heavily weighted, so that the results are repeatable and defendable. Standard operating procedures are currently being developed. Training has begun to ensure inspection ratings of pavement conditions will be repeatable and defendable.

UPDATED MANAGEMENT RESPONSE: Documentation of the methodology and decision-making process used to develop the pavement plan and project prioritization is part of the policies and procedures manual. Pavement Condition Index reports used to develop

the plan are kept on file. The objective criteria used to develop the plan results are repeatable and defendable.

PAVEMENT MAINTENANCE PLAN RELIABILITY

STATEMENT OF CONDITION: Pavement condition inspections are not being performed as frequently as recommended by best practices and the prediction model used to develop pavement maintenance plans does not take into account additional factors that affect pavement life.

Of the City's 15,726 street segments, 1,420 (9%) received inspections within the last three years (best practice). 1,787 (11.4%) segments received inspections within the last 3 to 6 years; 9,744 (62%) received inspections within the last 6 to 9 years; and 2,775 (17.6%) received inspections greater than 9 years ago.

The prediction model reduces the PCI by a factor of 3 for each year a segment does not receive an inspection. For example, if a road has a PCI of 100 (good condition), but has not received an inspection in 10 years, the PCI used to develop the maintenance plan is a 70 (satisfactory condition), which factors in 10 years of deterioration.

To demonstrate the effect of using dated inspection data to develop maintenance plans, the following chart details the City's square yards of pavement by PCI categories using the raw data recorded in MicroPAVER (average PCI of 70.3) and the current condition as calculated by the prediction model taking into account the date of last inspection (average PCI of 46.7).

PCI Category	PCI Range	MicroPAVER Raw Data Square Yards	MicroPAVER Raw Data Percentage	Prediction Model Square Yards	Prediction Model Percentage
Good	100 – 86	7,160,043	38.6%	2,632,245	14.2%
Satisfactory	85 – 71	3,860,501	20.8%	2,464,414	13.3%
Fair	70 – 56	1,168,156	6.3%	2,976,912	16.0%
Poor	55 – 41	3,488,163	18.8%	1,956,724	10.5%
Very Poor	40 – 26	1,570,988	8.5%	2,784,518	15.0%
Serious	25 – 11	1,147,776	6.2%	2,110,844	11.4%
Failed	10 – 0	176,952	1.0%	3,646,922	19.6%
Total		18,572,579	100.0%	18,572,579	100.0%

Of the attributes that could be used to develop a pavement plan, the City uses only the pavement maintenance condition as determined by physical inspection. As described above, the predictive model reduces the PCI by a factor of 3 for each year a segment does not receive an inspection; however, all roads do not deteriorate at the same rate. For example, arterial and collector roads experience heavier traffic volumes than local and neighborhood

streets and therefore deteriorate at a faster rate. A higher factor may be more appropriate to estimate their deterioration over time.

CRITERIA: Historical data on pavement condition are used to predict future pavement performance. To develop pavement maintenance plans, prediction modeling uses pavement condition, along with other factors that affect pavement life, such as type of road, traffic patterns, weather, and other factors. The accuracy and reliability of the developed maintenance plans are dependent on the accuracy of recorded pavement condition assessments and how the other attributes are configured in the prediction model.

CAUSE: The current prediction model produces an adequate pavement maintenance plan; however, with more current pavement condition assessments and the use of additional deterioration attributes, the plan would be more accurate, reliable, and defendable.

EFFECT OF CONDITION: The accuracy and reliability of the pavement maintenance plan could be called into question due to the age of data used in the calculations of the predictive model and the use of only one attribute to predict future pavement deterioration.

RECOMMENDATION 2: Transportation and Stormwater Services should develop and document a pavement inspection program that conforms to industry best practices. Additional attributes to estimate future deterioration should be added to the predictive model to improve the accuracy and reliability of the pavement management plan.

MANAGEMENT RESPONSE: Agree. Pavement condition inspections should be performed in compliance with best practices and the prediction model should consider additional factors that affect pavement life such as traffic and truck volumes. A plan has been developed to bring the current database up to date on priority roadways configured with appropriate deterioration factors. The first phase for priority roadway systems is estimated to be complete in one year. Within two years the condition ratings for the entire roadway system should be completed.

UPDATED MANAGEMENT RESPONSE: Pavement condition inspections on priority collector and arterial roadways are complete. Neighborhood streets should be completed by September 2015. The deterioration factors that affect pavement life such as traffic and truck volumes are being established for the prediction model but are not needed at this time with all new data. An overall plan will be established to update the data base on a three-year cycle according to best practices.

IN-HOUSE PAVING PRODUCTIVITY

STATEMENT OF CONDITION: The asphalt paving machine was underutilized during the audit period. The paving machine was purchased in June 2012 for $540,783, which included a 5-year, 7,500 hour extended warranty and maintenance agreement. At the end of five years, the City has the option to sell the machine back to the vendor for $126,000. The paving machine was used on 46% of days available in FY2014 and ran for a total of 721.3 hours. The running hours are significantly less than the 1,500 hours allowable under the paving machine's extended warranty and maintenance agreement.

CRITERIA: Good business practice dictates that the paving machine's usage should be maximized during the warranty period in order to realize a reasonable return on the City's investment. The City's purchase of the asphalt paving machine included an extended warranty and maintenance agreement that capped the maximum running hours at 7,500 hours over the 5-year warranty period.

CAUSE: The milling operation of in-house paving program is performed by a contractor. The in-house paving crew supports this work by transporting the milled asphalt to disposal sites, which reduces the crew's availability to support the operation of the paving machine. During milling operations, the paving machine remains idle.

EFFECT OF CONDITION: By not running the paving machine at its full capabilities, its return on investment is decreased and the paving crew's paving productivity is reduced.

RECOMMENDATION 3: In-house paving productivity should be increased to a point that the paving machine's return on investment is maximized. As the City's agreement with the milling contractor includes a second division of pricing that includes the transportation of the milled asphalt, Transportation and Stormwater Services should consider using the contractor to perform this activity.

MANAGEMENT RESPONSE: Agree. In-house paving productivity should be increased to a point that the paving machine's return on investment is maximized. The contractor will begin to transport the milled asphalt, clean and prepare the milled area for resurfacing at the contracted pricing. The milling contractor has been contacted about the issue and is preparing to ramp-up his business to meet the contractual requirements for transporting millings and roadway preparation for in-house resurfacing, which will increase the amount of resurfacing production time.

Finally, the benefits provided by continuing with a full scale in-house resurfacing program will be reviewed. Current in-house capabilities may better serve the public by redirecting work efforts to a more robust pavement maintenance program. A maintenance program focused on small restoration projects of short roadway segments having numerous, closely spaced potholes and failed patch work; and by improving the work quality and response time to pothole service requests.

UPDATED MANAGEMENT RESPONSE: The in-house paving crews are no longer required to transport millings, prepare and cleanup the milled roadway for in-house resurfacing projects. The milling contractor is now required to meet contractual requirements for those services, which will increase the amount of resurfacing production time and annual hours of use for the paving machine.

The benefits provided by continuing a large production in-house resurfacing program are questionable. Current in-house capabilities may better serve the public by redirecting efforts toward a robust pavement maintenance program focused on small restoration projects of failed roadway segments with numerous, closely spaced potholes and patches; and by improving the work quality and response time on pothole service requests.

The large production asphalt paver should be salvaged to purchase smaller equipment in support of an in-house pavement maintenance program focused on small restoration projects and patching programs. A large percent of the high production resurfacing work is currently out-sourced and could be increased to meet citywide needs at equal or lower costs per roadway lane mile.

APPLICATION RATE OF ASPHALT REJUVENATING AGENT

STATEMENT OF CONDITION: Asphalt rejuvenating agent is an emulsion of high quality petroleum oils and resins. It is designed to penetrate and waterproof the pavement and enhance the road's vitality and plasticity. If adequate penetration results from the application, it will extend the road's useful life and delay future, more costly maintenance.

During FY2014, the contracted application rate for the application of asphalt rejuvenating agent was not met on a consistent basis. There were 47 rejuvenating agent projects completed. The average application rate for the projects was .046 gallons per square yard. Sixteen of the 47 projects met the required application rate; 31 did not. In addition, there was no evidence of application field testing, which determines the proper application rate based on the pavement's absorption capability. Field testing consists of placing a 6-inch ring dike on the pavement and timing the penetration on known applied amounts.

CRITERIA: The agreement for the application of asphalt rejuvenating agent requires an application rate of 0.05 to 0.10 gallons per square yard or as approved by the City following field testing.

CAUSE: Reliance was placed with the contractor to apply the rejuvenating agent at the proper application rate.

EFFECT OF CONDITION: Depending on the condition of the pavement, the absorption and penetration rate will vary, which is why field testing is recommended to determine the proper application rate. At too high an application rate, the rejuvenating agent will not be completely absorbed by the pavement. At too low an application rate, the benefit of application is reduced and the road's useful life will not be extended as long as anticipated.

RECOMMENDATION 4: Transportation and Stormwater Services should perform and document field testing to determine the suitable application rate on a project by project basis and then ensure contractor compliance with that determination.

MANAGEMENT RESPONSE: Agree. The optimum application rate on a project by project basis should be determined and documented by the appropriate inspection and field testing to ensure that the contractor complies with industry standards and application rates. Inspection training will begin immediately and field testing activities should be established within six weeks.

UPDATED MANAGEMENT RESPONSE: The optimum, asphalt emulsion application rate has been determined and documented by the appropriate inspection and field testing to ensure that the contractor complies with industry standards and contracted application rates for the pavement preservation program.

QUALITY CONTROL OF PAVEMENT CONDITION DATA

STATEMENT OF CONDITION: The pavement management program does not include a quality control process to ensure pavement assessment results are accurate and repeatable. Repeatability refers to a comparison of assessment results recorded on the same roadway section by different inspectors. It helps ensure recorded condition assessments are accurate.

CRITERIA: Pavement condition data are the foundation of any pavement management system. The data are used to predict future roadway conditions and determine pavement maintenance requirements.

CAUSE: Quality control inspections are not performed due to a lack of personnel resources. There are three staff members who have the requisite knowledge to perform pavement condition assessments. Two work as a team when performing roadway inspections and the third is assigned to other duties.

EFFECT OF CONDITION: Without reasonable assurance that pavement conditions are being accurately assessed, the resulting pavement maintenance plans may not deliver the most efficient or effective use of City resources.

RECOMMENDATION 5: Transportation and Stormwater Services should implement quality control processes over pavement condition assessments. Specifically, a percentage of roadway sections should be re-inspected to assess accuracy and repeatability. The re-inspection of a percentage of assessments should be adopted as a part of an ongoing quality control program. To help ensure the consistency of inspections, formalized training for those charged with performing the assessments should be considered.

MANAGEMENT RESPONSE: Agree. Pavement condition assessments are key to the program. Training and quality control processes should be established and monitored to ensure objectivity and repeatable results. These program improvements are underway and will continue over the next six months.

UPDATED MANAGEMENT RESPONSE: Training and quality control processes have been established and monitored to ensure objectivity and repeatable results for roadway condition rating inspections.

QUALITY CONTROL OVER CONTRACTOR PERFORMANCE

STATEMENT OF CONDITION: While contracted pavement construction monitoring was determined to be adequate, quality control over contractor performance could be improved.

CRITERIA: The City's pavement construction agreement specifies that all materials and workmanship furnished under the agreement shall conform to applicable requirements of FDOT Standard Specifications for Road & Bridges, 2010 Edition. The purpose of inspecting and testing asphalt pavement construction is to ensure the quality of the materials and work performed meet project requirements and specifications. The City's contract provides the City with right to inspect and test material furnished under the agreement and "the right to reject material and workmanship which are defective or require their correction."

CAUSE: Reliance over quality control of materials furnished under contract was placed with the material manufacturer and contractor.

EFFECT OF CONDITION: Substandard materials and workmanship could lead to decreased useful lives and increased maintenance and construction costs.

RECOMMENDATION 6: A quality control program should be developed to ensure contractor compliance with the material and workmanship specifications detailed in the City's pavement maintenance agreements.

MANAGEMENT RESPONSE: Agree. A quality control program should be developed to ensure contractor compliance with FDOT material and workmanship specifications for asphalt pavement construction activities. Training and documenting standard operating procedures are underway to ensure quality control inspection and field testing for the pavement management program.

UPDATED MANAGEMENT RESPONSE: A quality control program has been developed to ensure contractor compliance with FDOT material and workmanship specifications for asphalt pavement construction activities. Training and documenting standard operating procedures are complete to ensure quality control inspection and field testing for the pavement management program.

BID TABULATION METHODOLOGY

STATEMENT OF CONDITION: The bid tabulation methodology for the award of the Cold Milling of Existing Asphaltic Concrete Roadways agreement allows for the manipulation of pricing in order to be selected as the lowest responsive bidder. To determine the total amount of a bid and the lowest responsive, responsible bidder, the unit prices of various milling activities were simply added together. The activities were not extended by any estimated activity level, which would allow a Bidder to quote artificially low unit prices for line items that the Bidder anticipates to produce no or low activity levels. Another deficiency in the methodology is that the bid request contained thirteen line items of milling activities; however, only two activities were ever utilized.

For this particular bid, three contractors responded to the Request for Proposal. The difference between the total bid (sum of unit prices) of the awarded contractor and its competitors was $1.38 and $2.70. The awarded contractor's pricing for one of the thirteen line items, which was not utilized during the audit period, was lower than both of its competitors by amounts greater than that (differences of $2.75 and $6.25). It should be noted that there was no evidence of any intentional manipulation of the bid process and that for the two milling activities utilized during the audit period, the awarded contractor submitted the lowest unit prices.

CRITERIA: According to the Purchasing Procedures Manual, Section 6.8, Evaluation and Award, one of the five non-inclusive specifications to determine "the lowest responsive, responsible bidder" is that "the Bidder offers the lowest price."

CAUSE: The bid tabulation methodology used in the above instance has been an accepted practice in the past.

EFFECT OF CONDITION: The lowest responsive, responsible bidder may not be selected, resulting in excessive costs paid for contracted activities.

RECOMMENDATION 7: Transportation and Stormwater Services should award Bidders based on the total estimated cost of activities (unit prices multiplied by estimated activity levels) and only request bids for activities anticipated to be used. The Purchasing Department should ensure that the methodology described above is not used to evaluate and determine the lowest responsive, responsible bidder in any of the City's Requests for Proposal.

MANAGEMENT RESPONSE: Agree. Bids should be structured to award based on the total estimated cost of activities (unit prices multiplied by estimated activity levels) and should only request bids for activities anticipated to be used. Any new contracts will be crafted to ensure that the questionable methodology mentioned above will not be used to evaluate and determine the successful bidder in any of the department's future requests for proposals. All new proposals will immediately comply.

PURCHASING RESPONSE: Purchasing agrees with the findings. The Director of Stormwater is reorganizing the Department and will assign this activity to the appropriate staff to research and provide updated information for bidding purposes to Purchasing. The current bid is due to expire in August 2015 and has no renewal options available. Updated information from Stormwater is expected to be received in Purchasing by April 2015. A new bid will be issued soon thereafter to have a new contract in place on or before the expiration of the current contract in August 2015.

UPDATED MANAGEMENT RESPONSE: New contracts have been restructured to award based on the total estimated cost of activities (unit prices multiplied by estimated activity levels) and only for activities that are anticipated to be used.

PAVEMENT PROGRAM GOALS AND OBJECTIVES

STATEMENT OF CONDITION: Pavement management program goals and objectives have not been established. Specifically, the program does not have goals or objectives related to the desired condition of the City's roadways. Currently, the City's overall Pavement Condition Index (PCI) is estimated at 47, which equates to a rating of poor on the index's scale of 0 to 100.

Pavement Condition Index

Good	86-100
Satisfactory	71-85
Fair	56-70
Poor	41-55
Very Poor	26-40
Serious	11-25
Failed	0-10

CRITERIA: Goals are general long-term guidelines that explain what you want to achieve. Objectives define specific and measurable strategies to accomplish or attain the identified goals. Both are key to reaching a desired result.

CAUSE: While adequate funding is a key factor in the ability to maintain overall road condition, the absence of goals and objectives demonstrate a lack of reasonable and proper planning which would ensure proper prioritization of available funding.

EFFECT OF CONDITION: Without goals and objectives, management is unable to measure or quantify its failures, accomplishments, and desired outcomes. Instead of striving to attain or surpass a goal, personnel end up simply responding to crises and events.

RECOMMENDATION 8: With guidance of the City's Administration and considering budgetary constraints, specific, measurable, and obtainable goals and objectives should be developed for the pavement management program. This documentation should facilitate a clearer view of what is required to improve the City's overall road condition and development of long term strategies to improve the Pavement Condition Index.

MANAGEMENT RESPONSE: Agree. Program goals and objectives along with a strategic plan and measurable milestones are paramount to any public works maintenance program. The process has begun and will continue over the next six months.

UPDATED MANAGEMENT RESPONSE: Development of specific and measurable goals and objectives for the pavement management program are currently being established using production data from the asset management/work order system along with industry standards.

POLICIES AND PROCEDURES

STATEMENT OF CONDITION: While there are detailed procedures for recording and uploading the results of pavement assessment inspections and determining planned asphalt rejuvenation maintenance, institutional knowledge is relied on for performing the majority of day-to-day operations in lieu of having documented policies and procedures.

CRITERIA: City Code, Section 2-46, Duties of Departments, requires departments to "create and maintain all records with adequate and proper documentation of the organization, together with the functions, policies, decisions, procedures, and essential transactions, of the department." Policies help ensure uniformity and consistency in decision-making and provide the framework for business planning. Procedures provide clear instructions and guidelines on how to complete tasks and duties and help to eliminate common misunderstandings by identifying job responsibilities. Together they provide a common understanding and agreement on how things should be done.

CAUSE: Personnel with institutional knowledge pass down pavement management processes and procedures via on-the-job training. Taking care of operational needs and completing day-to-day tasks have taken precedence over providing documented guidance to staff and developing an adequate internal control system.

EFFECT OF CONDITION: Without documented policies and procedures, management is unable to ensure processes fundamental to the organization's success are being followed, staff may not fully understand what is expected of them making it difficult to hold them accountable for their actions, and in hazardous activities, the public's and employees' safety could be jeopardized.

RECOMMENDATION 9: Transportation and Stormwater Services should develop and document policies and procedures for the pavement management program, including, but not limited to: personnel responsibilities, pavement maintenance planning, pavement assessment frequency, quality control for pavement condition data collection, contract administration and monitoring, contractor payment approval, maintenance of traffic, and the handling of customer service requests. The resulting Policies and Procedures Manual should be made available to all personnel.

MANAGEMENT RESPONSE: Agree. Detailed procedures are needed along with documentation of inspections. The process has begun and will continue over the next 12 months.

UPDATED MANAGEMENT RESPONSE: Policies and procedures have been developed outlining a quality control program and pavement condition index inspection program. Other policies and procedures addressing the entire resurfacing program are being developed in accordance with the American Public Works Association best practices.

GEOGRAPHICAL INFORMATION SYSTEM DATA

STATEMENT OF CONDITION: The City's geographical information system is not complete. Pavement Management personnel identified nearly 1,900 issues with missing and incomplete data in the City's roadway database, including: 1) missing street segments, turn lanes, cul-de-sacs, and roundabouts, 2) oft alignments, 3) ownership and maintenance authority identifications, and 4) roadway functional classifications.

CRITERIA: An effective pavement management system depends on reliable, accurate, and complete information. Data completeness is only one dimension of data quality. It is an indication of whether or not all the data necessary to meet business information needs are available when required.

CAUSE: Per discussion with pavement management personnel, at some point, it was determined that the missing data was not considered necessary for City operations and later, that there was not a cost benefit to resolving the issues with the data.

EFFECT OF CONDITION: The pavement management application, MicroPAVER, uses roadway segments as the primary identifier for the collection of roadways' physical conditions and characteristics. The collected data is then used to predict the future condition of the City's roadway segments and develop pavement maintenance plans. Missing data can have a significant effect on the conclusions that can be drawn from the data.

RECOMMENDATION 10: Transportation and Stormwater Services should continue to work with the Technology and Innovation Department to resolve the identified issues with the roadway database.

MANAGEMENT RESPONSE: Agree. The pavement management program relies on an accurate roadway GIS map. The City does not currently have a completely accurate map. The T&I Department is currently assisting in updating the GIS roadway map. The process has begun and will continue over the next six months.

UPDATED MANAGEMENT RESPONSE: The T&I Department completed updating the GIS roadway map, which is a critical component in the MicroPAVER database used for the program.