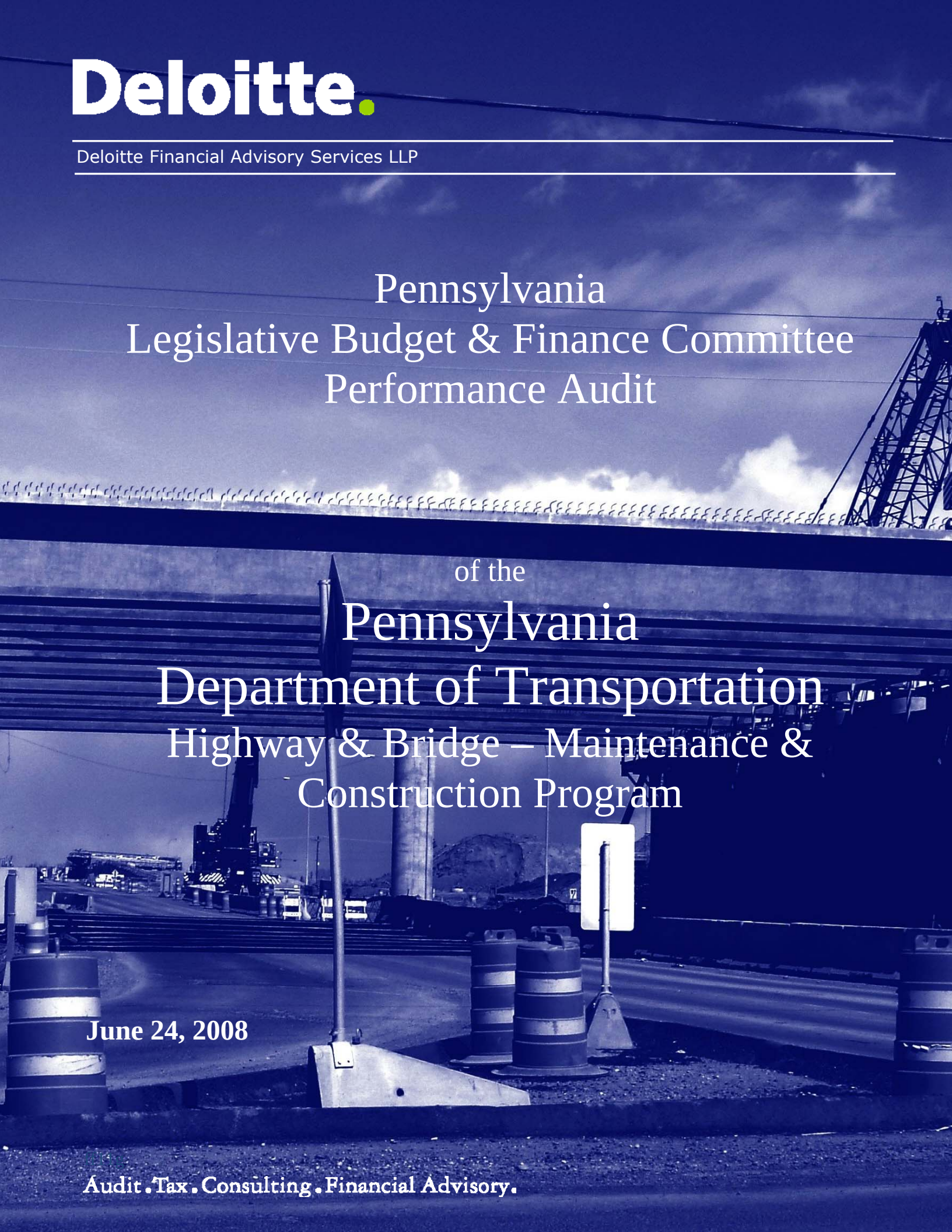

Deloitte.

Deloitte Financial Advisory Services LLP

Pennsylvania Legislative Budget & Finance Committee Performance Audit

of the

Pennsylvania Department of Transportation

Highway & Bridge – Maintenance & Construction Program

June 24, 2008

Audit . Tax . Consulting . Financial Advisory.

Legislative Budget and Finance Committee

A JOINT COMMITTEE OF THE PENNSYLVANIA GENERAL ASSEMBLY

Offices: Room 400 • Finance Building • Harrisburg • Tel: (717) 783-1600
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June 2008

To the Members of the General Assembly:

Act 35 of 1981 directs the Legislative Budget and Finance Committee to conduct a performance audit of the Pennsylvania Department of Transportation every six years.

For this cycle, the Committee decided to focus the study on the Department's highway, road, and bridge construction and maintenance program. Due to the more specialized focus of this audit, the Committee issued a Request for Proposal for assistance in developing the report. In October 2007, the Committee contracted with the firm of Deloitte Financial Advisory Services LLP to conduct this study.

The Deloitte report is contained herein. As with all LB&FC reports, the release of this report should not be construed as an indication that the Committee or its individual Committee members necessarily concur with its findings and recommendations.

Sincerely,

Philip R. Durgin
Executive Director

Table of Contents

Section 1: Executive Summary

The Pennsylvania Vehicle Code, Title 75, Section 9701 Legislative Oversight, directs the Legislative Budget and Finance Committee ("LB&FC") to conduct, or cause to be conducted, a performance audit of the Pennsylvania Department of Transportation ("PennDOT" or "the Department") every six years. Deloitte Financial Advisory Services LLP ("Deloitte FAS") has been retained by the Pennsylvania LB&FC to conduct a *Performance Audit*[1] of PennDOT's Highway and Bridge – Maintenance and Construction Program under a contract executed on October 5, 2007. This assessment does not attempt to evaluate any other areas of PennDOT's operations outside of the Highway and Bridge – Maintenance and Construction Program. The Performance Assessment focused on the efficiency and effectiveness of PennDOT's highway and bridge, maintenance and construction program and identifying the items that were affecting PennDOT's ability to operate in an efficient and effective manner.

Approach Summary

During this Performance Assessment Deloitte FAS interviewed PennDOT personnel, assessed PennDOT policies and procedures, evaluated leading practices and evaluated the current performance measurement system employed by PennDOT's Highway Administration. The Performance Assessment was conducted with a three phased approach which included an initial phase focused on the identification of key issues affecting operations, followed by the development of a work plan to analyze those issues, and finally executing the work plan and investigating the issues that are ultimately effecting PennDOT operations. The work plan includes interviewing key PennDOT personnel at the Central Office and at three of the eleven Engineering District Offices. Section 3.0 of this report provides a description of the process used to select the Engineering District Offices that were included in this assessment. The following map pictorially identifies the Engineering Districts included as part of this assessment.

[1] For the purposes of this document, "audit" is a generic term that means analysis and evaluation of business operations as defined by PennDOT's RFP. This engagement was performed in accordance with the American Institute of Certified Public Accountants ("AICPA") Statement on Standards for Consulting Services. Due to the nature of this engagement, Deloitte FAS was not retained to perform an evaluation of internal controls and procedures, and our services do not constitute an engagement to provide audit, compilation, review, or attestation services as described in the pronouncements on professional standards issued by the AICPA or any successor standards setting body. Therefore, our findings do not result in the expression of an opinion or other form of assurance with respect to PennDOT's internal control systems or financial statements. Had Deloitte FAS performed additional procedures, other matters might have come to our attention that would have been included in this report.

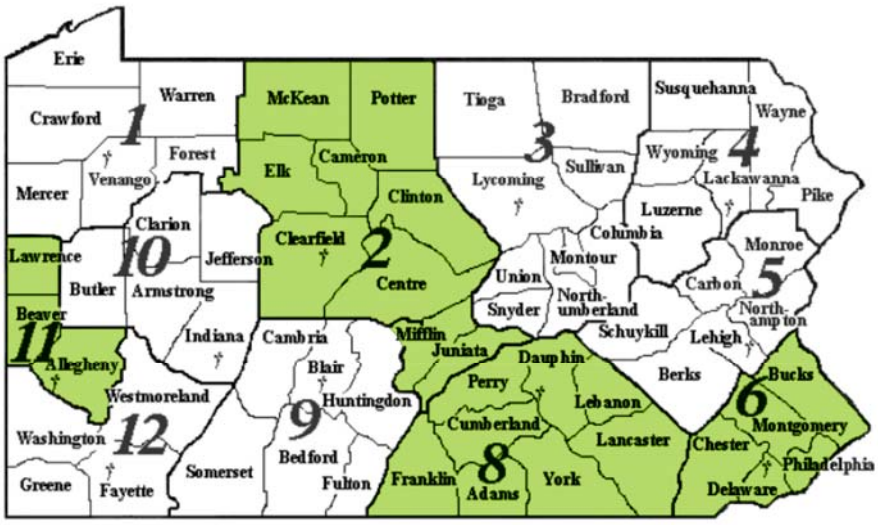

Figure 1 - Selected Districts Included in the Performance Assessment are Highlighted in Green

Key Findings and Recommendations

The information gathered during each phase of the project was analyzed to develop the detailed observations and recommendations included in Sections 4.0 and 5.0 of this report. The findings were categorized into PennDOT's strategic focus areas which include: Safety, Mobility, Management and Productivity and System Preservation. The individual items were then classified into two sections, a top tier and a secondary tier. The top tier (Tier I) findings are items that have a significant impact on the success of PennDOT's highway and bridge, maintenance and construction program. The secondary tier (Tier II) items are important findings but do not have the same level of impact to PennDOT's operations. The following tables provide a high-level description of each key issue identified and recommendations for improvement, however in order to gain a complete understanding of the issues identified, the full report should be read and considered:

Safety

Roadway Operational Safety	Tier II
Key Findings	The safety and inspection of the transportation infrastructure within the Commonwealth is a top priority however the current qualification requirements for bridge inspectors can be increased.
Recommendations	PennDOT should consider increasing the educational and professional requirements of the bridge inspectors that are in the field to include a Registered Professional Engineer.

Work Zone Safety	Tier I
Key Findings	Pennsylvania has taken measures to increase the effectiveness of the work zone safety program across the State. Mainly through the passing of Act 229 to improve the safety of those working on highways and the safety and mobility of the traveling public.
Recommendations	Verify that current policy and procedures for the use of uniformed law enforcement for PennDOT work zones meets the new Federal requirements. In addition, PennDOT should continue to implement and track the performance of the Comprehensive Strategic Highway Safety Improvement Plan.

Mobility

Information Technology and the Highway Administration	Tier I
Key Findings	The transportation industry has seen an increased use and dependence of technology to effectively manage congestion and mobility. PennDOT's Highway Administration Deputate is currently working with the Administration Deputate in an attempt to establish an Information Technology planning process which includes Intelligent Transportation Systems ("ITS").
Recommendations	Verify the status of all Information Technology ("IT") related projects with PennDOT to assess the status of the Federal Funding and modify as required. Complete the current planning process under way and work with the Chief Information Officer to develop and implement an IT strategic plan for Highway Administration needs.

Congestion Relief	Tier II
Key Findings	PennDOT has identified the need to monitor and manage traffic conditions to mitigate congestion. All Engineering Districts have established some level of Traffic Management Centers to monitor the key roadways in their area. To help share uniform and consistent information across the state PennDOT has developed a Road Condition Reporting System that is populated from the Traffic Management Centers.
Recommendations	Examine the use of Regional Traffic Management Centers ("RTMC") to provide 24/7 operations throughout the Commonwealth and establish reporting procedures for each District in the event of operational difficulties. Continue to consider and evaluate the use of High Occupancy Vehicle and High Occupancy Tolling lanes to address heavily traveled corridors.

County Maintenance – Winter Program	Tier II
Key Findings	PennDOT's Engineering Districts have unique challenges in developing and implementing their Winter Maintenance Program. Among the major items affecting the Engineering Districts is difficulty hiring temporary equipment operators and ability to contract for rental equipment and operators.
Recommendations	In an attempt to address the issue of hiring temporary equipment operators, it appears PennDOT has negotiated the ability to pay higher wage rates in the Districts and areas historically challenged with this issue. It is recommended that PennDOT track the effects of the increased wage rates and adjust accordingly so each Engineering District is able to add the required staff to implement their Winter Maintenance Program.

Incident Management / Readiness	Tier I
Key Findings	PennDOT's level of readiness and ability to successfully manage crisis events has come under scrutiny after winter storms impacted the Commonwealth in February 2007. PennDOT has made significant changes in an attempt to improve their readiness and incident management capabilities.
Recommendations	Continue to modify and improve current technology to monitor and track road closure information with the Road Condition Reporting System ("RCRS") and continue to develop both web and telephone based communication systems to share real time information with the traveling public.

Management and Productivity

Increased Use of Design-Build	Tier I
Key Findings	Design-Build is an effective alternative delivery method to Design-Bid-Build for a faster completion and often less expensive project cost. PennDOT has developed guidance for the use of a Design-Build as a potential delivery method for transportation projects within the Commonwealth; however PennDOT has only recently began using Design-Build outside of emergency situations.
Recommendations	Central Office should continue to support and recommend that Design-Build be used for select candidate projects. PennDOT should consider developing a formal program to track the performance of the current projects using Design Build. The program could track the realized benefits or issues that the projects experience and can be used to modify and improve the Design Build program within PennDOT. PennDOT should make certain that they have trained and capable staff responsible for administering design-build projects.

Inconsistent Use of Value Engineering and Constructability Reviews	Tier II
Key Findings	PennDOT has established policy and procedure manuals that define the purpose and methods to conduct Value Engineering and Constructability Reviews for PennDOT projects which is an operational strength of the Department. The number of times these assessments are used and the incorporation of the assessment results can vary by Engineering District.
Recommendations	PennDOT should consider formalizing a representative cast of contributors for Value Engineering and Constructability Reviews. This group should include members of the construction group with a significant focus on the pre-bid schedule development.

Varying Levels of Schedule Expertise	Tier I
Key Findings	PennDOT Engineering Districts have varying level of schedule expertise and the Central Office only has two positions (one position was vacant at the time of this assessment) to support the Engineering Districts. PennDOT relies on consultants to supplement their schedule support staff. Schedule training is offered to PennDOT employees.
Recommendations	PennDOT needs to fill the vacant schedule support position and determine if two schedule support positions are adequate to support the entire state. Each Engineering District should develop or hire a schedule champion to assist that District in their scheduling needs.

Duration of Time Required to Execute Design Services Agreements	Tier I
Key Findings	The considerable time to execute design services contracts (primarily Project Specific Contracts) within the Department has been identified throughout this assessment. For active agreements in 2007 the average duration from advertisement to execution for project specific contracts was 324 days. PennDOT has realized this issue and is assessing different applications to help expedite the process.
Recommendations	PennDOT should consider conducting a thorough assessment of the contract execution process to identify any areas of time reduction. In addition PennDOT should continue to evaluate the use of Mutual Gains Negotiations to expedite the contracting process.

Project Duration and Liquidated Damages	Tier I
Key Findings	PennDOT has established policy that addresses the use of liquidated damages on all transportation projects. In addition to the standard Construction Engineering Liquidated Damages, PennDOT also has Road User Liquidated Damages and Work Zone Liquidated Damages. The use or enforcement of those liquidated damages over the past three calendar years has been very low compared to the number of project with time extensions granted. From 2005 through 2007 less than 6% of the project closed out during that period had liquidated damages assessed.
Recommendations	Consider automating liquidated damages assessment and revising policy on the granting of time extensions to apply a monetary value to the time extension for evaluation. This would allow PennDOT to effectively manage their construction resources and be reimbursed for extending construction resources past the contracted completion date.

Inconsistent Use of Portfolio Managers in each District	Tier II
Key Findings	The identified need for a Portfolio Manager within each of the Engineering Districts is an operational strength. PennDOT has accepted the need for a portfolio management approach to the overall work flow of projects managed by the Department however the role and reporting structure of the Portfolio Manager varies by District.
Recommendations	PennDOT should consider evaluating each of the Engineering Districts and determine the most successful role and reporting structure for the Portfolio Manager position and implement that in each of the Districts. This will allow each of the Engineering Districts to use the position in the most optimal way and receive the maximum benefits from the matrix management organizational structure described in PennDOT's manuals.

The Engineering Construction Management System	Tier II
Key Findings	The Engineering Construction Management System ("ECMS") is an effective tool to manage the project delivery process and is an industry leading practice. PennDOT has continued to improve the system and recently launched an improvement to ECMS. ECMS generates cost savings and operational efficiency in the project development and implementation process by reducing the need for paper work, providing a single interface for project related communication and offering a faster medium of conducting business.
Recommendations	PennDOT should continue to use the system and implement improvements whenever possible.

County Maintenance Operations	Tier I
Key Findings	The number of PennDOT County Maintenance Offices self performing paving work has reduced in recent years with only 30 out of 67 counties reporting cost against that maintenance activity. The Engineering Districts that have all of their counties performing paving activities are resulting in reasonable unit costs.
Recommendations	PennDOT should consider the effects of conducting paving activities with internal resources. A regional approach should be considered to minimize the impacts to each of the individual Counties or Districts.

System Preservation

Grouping of Similar Projects	Tier I
Key Findings	PennDOT is faced with the increasing need to inspect, maintain and repair structurally deficient bridges to provide an assurance for the safety of road users. The grouping of similar bridge projects allows PennDOT to maximize the use of resources and potentially reduce project duration and cost while delivering projects that are critical to the safety of the transportation network.
Recommendations	PennDOT should continue to group similar projects that are in the same geographical area to realize benefits from resource sharing. The Central Office should work closely with the Districts to develop guidelines on the process by which projects are identified and grouped together.

Transportation Asset Management	Tier I
Key Findings	PennDOT has identified the preservation of existing infrastructure as a priority through a "maintenance first" policy. The use of SMART transportation, value engineering initiatives, system improvements and performance metrics allow PennDOT to make the best use of allocated resources and enhance organizational performance.
Recommendations	PennDOT should consider addressing Transportation Asset Management as a strategic program. One individual from the Secretary of Transportation's Office should be responsible to coordinate the program across all appropriate functions within PennDOT. A detailed plan should be developed to assist in the implementation of Asset Management as a strategic program.

Plant Maintenance Issues	Tier II
Key Findings	PennDOT recently implemented SAP Plant Maintenance which offers an interface to integrate PennDOT maintenance management processes with the Commonwealth Enterprise Resource Planning ("ERP") system. The SAP software is an off-the-shelf package making it easier and more cost effective to upgrade when updates are available. The effective implementation of any system is based on the sufficient availability of trained personnel to operate the system efficiently to improve the business functionality of PennDOT maintenance organizations. SAP implementation is a structured role based process which involves assigning specific roles to employees operating the SAP system.
Recommendations	Since it takes a considerable amount of time to have a new person mapped and trained for an SAP role, an alternate set of trained personnel should be available to perform specific SAP roles on a standby basis until the new SAP operator is bought up to speed. PennDOT should also evaluate retaining prior role mapping responsibilities of individuals who transfer to new positions in an acting capacity. This will be helpful to new personnel who assume positions that have been left vacant due to internal transfers.

International Roughness Index	Tier II
Key Findings	PennDOT has been able to reduce the overall percentage of roadways with a poor International Roughness Index ("IRI") rating. The percentage of PennDOT maintained roads rated as excellent and good increased from 47% in 2001 to 60% in 2007 while roads rated as fair and poor decreased from 53% in 2001 to 39% in 2007.
Recommendations	PennDOT should continue to monitor the fluctuations in the percentage of roads with poor IRI ratings within some of the Districts to make sure that ratings of excellent and good roads are being maintained while ratings of poor and fair roads are being improved.

In addition, to the key finding identified above, Deloitte FAS also performed an evaluation of the performance measurement systems used by the Highway Administration to help manage its performance and effect change within the organization. The evaluation focused on the usefulness and accuracy of PennDOT's current use of performance measures as they relate to highway and bridge – maintenance and construction. PennDOT needs to continue with efforts to automate the performance measurement process, identify a true dashboard measurement system that summarizes the top measures that gauge the health and success of the program, and provide greater transparency into the performance measurement system both internally and eventually to the public.

The Executive Summary provides a high-level overview of the common themes and issues arising from the assessment; however, the entire report should be read in order to fully understand Deloitte FAS' observations and recommendations.

Acknowledgements

Deloitte FAS appreciates the cooperation extended by the employees of PennDOT, including personnel at both the Central Office and the Districts. Deloitte FAS was impressed with the knowledge and dedication of the PennDOT staff that were encountered during the course of our engagement. The individuals interviewed and those who provided access to relevant information contributed greatly to the quality of the project and the development of this report. In addition, Deloitte FAS would also like to thank the external PennDOT Business Partners[2] that contributed to this assessment.

[2] PennDOT refers to any external party that interacts with and / or does business with PennDOT as a Consultant, Construction Contractor, Planning Partner, Municipality, or Rail, Port, and Waterway organization as a Business Partner. Each PennDOT Business Partner must register with the Department through the Engineering Construction Management System.

Section 2: Background

Introduction

The Pennsylvania Vehicle Code, Title 75, Section 9701 Legislative Oversight, directs the Legislative Budget and Finance Committee to conduct, or cause to be conducted, a performance audit of the Pennsylvania Department of Transportation every six years.

In response to LB&FC Request for Proposal ("RFP") #2007-1, Deloitte Financial Advisory Services LLP submitted a proposal on August 24, 2007 to assist the LB&FC in conducting the performance audit. Deloitte FAS was retained to conduct the work under a contract with the LB&FC executed on October 5, 2007.

The Commonwealth of Pennsylvania contains an extensive network of transportation infrastructure. PennDOT is charged with the task to oversee and maintain approximately 40,500 miles of roadway and nearly 25,000 bridges in addition to developing and constructing new transportation projects. PennDOT is a decentralized organization with a Central Office located in Harrisburg and Eleven Engineering Districts throughout the Commonwealth. The Central Office develops and maintains policy, provides quality assurance and oversight while the majority of the project development and implementation are performed at the Districts.

The Commonwealth, along with the majority of states in the country, is faced with maintaining an aging infrastructure while attempting to add required new capacity and addressing congestion related issues. PennDOT relies on both federal and State Motor License funding to administer the highway and bridge – maintenance and construction program. The dedicated funding sources have not kept pace with increased construction and commodity prices[3]. This is not a new issue and in 2005 the Governor of Pennsylvania established The Transportation Funding and Reform Commission to examine this crisis effecting the state's highway and bridge system. Deloitte FAS conducted this performance assessment to identify areas that could be improved and or modified to help increase the efficiency or effectiveness of PennDOT's operations despite the funding crisis. The scope of this performance assessment was not intended to solve the current funding crisis or provide overarching solutions to address the aging or dilapidated transportation infrastructure.

The purpose of this assessment is to identify potential improvements to the effectiveness and efficiency of PennDOT's Highway and Bridge – Maintenance and Construction program in order to spend each dollar in the most efficient and economical manner. The scope of our engagement does not include an evaluation of the adequacy of the PennDOT budget or the required budget to maintain the Commonwealth's infrastructure.

Objectives

The LB&FC RFP outlined the overall objectives of the performance audit and explained that prior LB&FC performance audits have included a review of PennDOT's entire program, but the purpose of this audit was to focus on the Department's highway and bridge - construction and maintenance programs, which accounts for approximately 70 percent of the Department's entire budget. The RFP and our contract scope included the following main goals and objectives for conducting the assessment:

[3]As described in the report published by the Pennsylvania Transportation Funding and Reform Commission published in August 2006 entitled: Investing in our Future: Addressing Pennsylvania's Transportation Funding Crisis.

- Determine the usefulness and accuracy of PennDOT's performance measurement system for assessing highway and bridge construction and maintenance needs and activities.
- Assess the effectiveness and efficiency of PennDOT's processes for selecting and managing consultants and contractors with regard to cost, timeliness, and quality of work.
- Assess the effectiveness and efficiency of PennDOT's in-house planning, design, construction and maintenance functions and activities at the State, District and County level.
- Determine the status of recommendations made in the Transportation Funding and Reform Commission report (November 2006) and the Independent Report on the Mid-February 2007 Winter Storm Response (March 2007) pertinent to PennDOT's highway and bridge construction and maintenance programs.

These objectives were used as guidelines by Deloitte FAS for developing each phase of the project and were referenced numerous times during the engagement to verify that the work conducted was aligned with the objectives outlined by the LB&FC.

Section 3: Project Approach

Deloitte FAS established a phased approach to conducting the performance assessment. This phased approach was necessary since PennDOT is a large and complex multi-modal transportation agency responsible for the planning, design, construction, maintenance and operation of the Commonwealth's transportation infrastructure. By establishing the separate phases of work, Deloitte FAS was able to meet with a select number of key stakeholders to assess the critical items effecting PennDOT prior to establishing a detailed work plan and conducting the assessment. The following sections provide an explanation of the work performed for each phase of the engagement.

Phase 1

The initial phase of work included a high level assessment of PennDOT's Highway and Bridge - Construction and Maintenance programs. Deloitte FAS requested and evaluated PennDOT documentation including organizational charts, manuals, policies and procedures, historical data, and other reports. An initial round of interviews was conducted with various individuals. The majority of the interviews were conducted at PennDOT's Central Office; however Deloitte FAS did meet with the District Executive for Engineering District 11-0 in Allegheny County, PA. A complete list of the interviews conducted during the entire engagement is contained in Appendix A of this report. The individuals interviewed during this phase are listed below.

- The Deputy Secretary for Highway Administration
- The Deputy Secretary for Administration
- The Deputy Secretary for Planning
- The Chief Information Officer
- Select District Executive
- Special Assistant to the Deputy Secretary for Highway Administration
- Members of the Legislative Budget and Finance Committee
- Each of the Bureau Directors within the Highway Administration

Based on the documentation assessed and the information gathered during these interviews, Deloitte FAS identified the key areas to be included in the work plan and subsequent detailed analysis.

Phase 2

During the phase 2 assessment Deloitte FAS was able to identify the major areas of concern and key issues effecting PennDOT's Highway and Bridge – Maintenance and Construction Program and align those items with the focus areas provided by the LB&FC in the RFP. That process allowed Deloitte FAS to develop four work streams for the detailed assessment. The focus areas can be summarized into the following:

- Performance measurement system assessment
- Selection and management of consultant and construction contracts
- In house planning, design, construction, and maintenance contracts
- Status of previous report recommendations

To effectively assess the operations of a decentralized organization like PennDOT it is important to understand the role of both the Central Office and the Engineering Districts. This required Deloitte FAS to develop an approach to meet with an appropriate number of individuals in both locations/environments to get an accurate representation of PennDOT's day to day operations. In order to select the Districts, Deloitte FAS evaluated the data requested in phase 1 and established select data points to determine which Districts should be included as part of the performance assessment. The following data points were collected for the three most recent years for each of the Engineering Districts:

- Number of Construction Projects Let
- Total Value of Construction Projects Let
- Number of Work Orders Issued
- Total Value of Work Orders Issued
- Total Value of Consultant Contracts

Based on the information collected for the three year span, Deloitte FAS ranked the Engineering Districts and identified the top three Engineering Districts within each category for each year. This created 9 ranking positions for each of the 5 categories for a total of 45 possible ranking positions as listed in the table below:

Category		Year	Rank 1	2	3
Let Projects	Number	2005	Dauphin	Lycoming	Lehigh
		2006	Lackawanna	Lycoming	Dauphin
		2007	Dauphin	Blair	Fayette
	Value	2005	Montgomery	Allegheny	Indiana
		2006	Allegheny	Montgomery	Dauphin
		2007	Montgomery	Dauphin	Allegheny
Work Orders	Number	2005	Montgomery	Clearfield	Dauphin
		2006	Montgomery	Clearfield	Dauphin
		2007	Dauphin	Clearfield	Montgomery
	Value	2005	Clearfield	Lehigh	Montgomery
		2006	Clearfield	Lehigh	Allegheny
		2007	Clearfield	Montgomery	Lehigh
Consultant Contract Value		2005	Montgomery	Clearfield	Dauphin
		2006	Montgomery	Allegheny	Dauphin
		2007	Montgomery	Fayette	Dauphin

Table 1 - Deloitte FAS Engineering District Selection Process

Deloitte FAS summarized the number of times each District appeared in the top three rankings which resulted in the following summary:

District	Number of Top Three Rankings
6-0 Montgomery	***11***
8-0 Dauphin	***11***
2-0 Clearfield	***7***
11-0 Allegheny	6
5-0 Lehigh	4
3-0 Lycoming	2
4-0 Lackawanna	1
9-0 Blair	1
10-0 Indiana	1
12-0 Fayette	1
1-0 Venango	0

Table 2 - Summary of Engineering District Analysis

Based on the results of this analysis, the top three Engineering Districts (Montgomery, Dauphin and Clearfield) were chosen and included in the work plan. The work plan was submitted to the LB&FC for approval on January 11, 2008.

Phase 3

The work plan was approved by the LB&FC on January 15, 2008 at which time Deloitte FAS began conducting the detailed performance assessment. The following sections summarize the work performed during this period.

Conducted Interviews with Stakeholders

A select list of PennDOT Central Office and Engineering Districts employees and external stakeholders[4] were identified and 92 individuals were interviewed. The majority of the interviews conducted were within Highway Administration; however, Deloitte FAS did meet with individuals within Planning and Administration. Deloitte FAS traveled to each of the three Engineering Districts identified in Phase 2 to meet with several key individuals within each District. The following list outlines the typical positions interviewed at the selected Districts:

- District Executive
- Assistant District Executive – Construction
- Assistant District Executive – Design
- Assistant District Executive – Maintenance
- Design - Portfolio Manager
- Design Section – Select Managers
- Construction - Select Assistant Construction Engineers ("ACE")
- Construction – Select Managers
- Maintenance - Maintenance Program Manager
- Maintenance – Select County Maintenance Managers

[4] External stakeholders refers to PennDOT's Business Partners which includes any external party that interacts with and / or does business with PennDOT as a Consultant, Construction Contractor, Planning Partner, Municipality, or Rail, Port, and Waterway organization. The individual companies and employees interviewed have not been included in this report.

In addition, to PennDOT staff, Deloitte FAS interviewed various external stakeholders and PennDOT Business Partners to provide additional insight into PennDOT's current performance. In order to encourage an honest and open interview, the external stakeholders (i.e. design engineering firms and construction contractors) were informed that that their names and the names of their firms would not be disclosed. Therefore, the external stakeholders are not identified within this report. A complete list of the PennDOT personal interviewed for in conjunction with this assessment is contained in Appendix A of this report.

Assessed Existing Policies, Procedures and Related Documentation

Numerous PennDOT documents were analyzed during the course of this engagement to allow for a detailed assessment of the issues and areas of evaluation. Appendix B contains a comprehensive list of documentation evaluated during this assessment.

Evaluated other State Departments of Transportation and Leading Industry Practices

To better determine PennDOT's performance in certain areas, Deloitte FAS evaluated data from other Departments of Transportation within the United States and transportation agencies in other countries to determine PennDOT's relative peer ranking or to determine the industry leading practices being used by other Departments or agencies in a particular area. This information was assessed on a case by case basis and is referenced within the applicable sections of the report.

Reported Observations and Recommendations

The information gathered during each phase of the project was analyzed to develop the detailed observation and recommendation section of the report. Section 4 – describes each of the significant findings identified during the engagement. The findings were categorized into two sections, a top tier and a secondary tier. The top tier (Tier I) findings are items that have a significant impact on the success of PennDOT's highway and bridge – maintenance and construction program. The secondary tier (Tier II) items are important findings but do not have the same level of critical impact to PennDOT's operations as the Tier I items. Section 4 contains a separate table for each issue evaluated and within each table the following issues are discussed:

- Background / Observations
- Impact
- Operational Strengths/Leading Practices (where applicable)
- Finding / Recommendation for Improvement

The **Background and Observations** section is intended to provide the reader with the conditions associated with the issue or item. Depending on the item, this section could contain historical numbers or data to support the identified issue. This section may also describe how the issue was identified or provide information on the affected parties.

The **Impact** section presents any identified or potential impacts associated with the issue. This includes a description of the issues surrounding the items included in the background section and exploring any related issues or associated impacts to other areas of PennDOT's organization or the Commonwealth.

The **Operational Strength and Leading Practices** section provides a description of what the leading practices are for that specific issue, if any. This section may include an acknowledgment of areas where PennDOT is currently performing an operational strength or an industry leading

practice. Due to the unique nature of some of the items within this assessment, all of the issues may not have an associated operational strength or leading practice.

Finally the **Findings / Recommendation for Improvements Section** provides recommendations for PennDOT to improve the issue identified or a summary of the item if no area of improvement is needed.

Section 5, is dedicated to the analysis of PennDOT's use of performance measures. PennDOT along with other select Departments of Transportation are attempting to use performance measures to help manage its performance and effect change within the organization. This section contains a description of the analysis conducted by Deloitte FAS to assess the usefulness and accuracy of PennDOT's current use of performance measures.

Section 4: Detailed Observations, Findings and Recommendations

The following section describes each of the significant findings identified during the engagement. As previously discussed, the findings were categorized into Tier I and Tier II.

Audit Area: A. Safety	**Issue:** i. Roadway Operational Safety	**Tier:** II

Background / Observation:

Safety in the operation of the transportation infrastructure, including roadways and bridge structures within the Commonwealth of Pennsylvania, is paramount to the effective and efficient use of the system. Currently, PennDOT is responsible for the maintenance and safety inspection for over 22,000[5] bridges in the state. Pennsylvania has the highest number of structurally deficient structures in the country with over 5,800[6] across the state.

The system used to rate bridges across the United States provides an indication of the bridge's overall structural soundness and ability to service the traveling public. The National Bridge Inspection Standards ("NBIS") require inspectors to inspect the Nation's bridges and report bridge conditions in a standardized format. Condition ratings range from zero to nine for each of the major components of the bridge (Deck, Super-Structure, and Sub-Structure). By assigning condition ratings to each component, the standards help PennDOT and the Federal Highway Administration ("FHWA") measure bridge performance, forecast future funding needs, and assesses the maintenance needs for a particular structure. The accuracy of the ratings is important to identifying bridges in need of maintenance and repair.

The inspections are performed at a set frequency. At a minimum, each bridge within Pennsylvania is inspected once every two years with some structures being inspected more frequently. A *Structurally Deficient* rating indicates that the bridge has deterioration to one or more of its major components. A *Functionally Obsolete* rating indicates that the bridge has older features (e.g. road widths and weight limit capacities) compared to more recently built bridges.

PennDOT relies on the use of consultants to assist in the inspection of the bridges across the Commonwealth. PennDOT has issued Publication 238 Part IP, Chapter 2 – Inspection Requirements 2nd Edition which identifies the requirements of the Safety Inspectors conducting the bridge inspections:

> *2.1.3 Qualifications for Safety Inspectors*
>
> *Bridge inspectors and bridge inspection team leaders are to meet the minimum qualifications as described in the National Bridge Inspection Standards (NBIS) §650.307.*

The NBIS requires that, at a minimum, the program manager is required to (i) be a registered Professional Engineer and (ii) successfully complete a Federal Highway Administration (FHWA) approved comprehensive bridge inspection training course. Based on the NBIS definition, a program manager is the individual in charge of the unit that has been assigned or delegated the responsibilities for bridge inspection, reporting, or inventory. The program manager provides overall leadership and is available to the inspection team leaders to provide guidance. The team leaders are in charge of the inspection team and are typically on the ground with the inspectors performing the inspection while the program manager typically is not. The NBIS identifies five ways to qualify as the team lead, they include: (A) meeting the requirements identified above for a program manager, or (B) have five years bridge inspection experience and have successfully completed an FHWA approved comprehensive bridge inspection training course, or (C) be certified as a Level III or IV Bridge Safety Inspector under the National Society of Professional Engineer's program for National Certification in Engineering Technologies and have successfully completed an FHWA approved comprehensive bridge inspection training course, or (D) have all of the following: (i) a bachelor's degree in engineering from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology; (ii) successfully passed the National Council of Examiners for Engineering and Surveying Fundamentals

[5] Data source - FHWA – National Bridge Inventory (NBI) - December 2007
[6] Same as above

Audit Area: A. Safety	**Issue:** i. Roadway Operational Safety	**Tier:** II

of Engineering examination; (iii) two years of bridge inspection experience; and (iv) successfully completed an FHWA approved comprehensive bridge inspection training course, or (E) Have all of the following: (i) nn associate's degree in engineering or engineering technology from a college or university accredited by or determined as substantially equivalent by the Accreditation Board for Engineering and Technology, (ii) four years of bridge inspection experience; and (iii) successfully completed an FHWA approved comprehensive bridge inspection training course.

Impact:

Given the aging of the Nation's infrastructure and the large number of structurally deficient bridges in Pennsylvania, PennDOT should consider modifying its publication to require bridge inspectors and team leads to be registered Professional Engineers similar to the requirement for program managers. This would help reduce some of the concerns regarding the accuracy of the inspections currently being conducted and make it easier and more efficient for PennDOT to track and monitor the qualifications of the bridge safety inspection crew.

A large portion of the bridge inspection is based on a visual inspection of the structure to identify any potential areas of deterioration or reduced section capacity. The primary method employed by bridge inspectors is a visual observation of the structure. Several items can affect the success of the visual inspection; those items include the experience, training and the education of the inspector. PennDOT requires and provides bridge inspection training for the team leads and inspectors; however the results of a visual inspection can vary greatly based on the items identified above. Requiring the inspector to be a registered Professional Engineer would make certain that the current NBIS educational requirements would not only have been met but exceeded. In addition, requiring the position to be held by a registered Professional Engineer will provide PennDOT with a consistent level of professionalism and ethics and could help facilitate a reduction in the variability of the visual inspections.

It would be helpful to have a registered Professional Engineer or even a registered Structural Engineer as part of the field inspection team to provide an accurate assessment at the time of the inspection. The minimum number of years of experience required to become a team lead should also be increased to provide more field experience before leading a team of inspectors.

The modified inspector requirements would have a financial impact on the bridge inspection program but given the age and number of structurally deficient bridges in the state combined with the recent bridge failure in Minnesota[7] and the emergency repair of the deteriorated I-95 support column in Philadelphia, PA, a prudent investment. PennDOT performs a majority of the bridge inspections with some support from consultant inspection teams. PennDOT currently requires the consultant team leads to be registered Professional Engineers. PennDOT estimates that approximately 25 to 30 internally staffed PennDOT bridge inspection teams exist within the Commonwealth. The proposed increased requirements for PennDOT bridge inspection team leads would most likely require an increase to the current pay level for the position from a pay range seven to a pay range nine. Based on the average salary within those pay ranges and the increased overhead for the new engineering positions, it would have an estimated additional salary increase of $18,000 ($65,500 - $47,500) and an estimated overhead increase of $12,000 for the proposed change to a Professional Engineer in the team lead position, PennDOT would be facing an approximate $900,000 (30 Team Leads x $30,000) increase to the bridge inspection program.

Additionally, more costly, changes to the inspection process include the use of continuously monitoring strain gauges and corrosion sensors to gain useful information from remote sensors

[7] On August 1, 2007, a structurally deficient, eight-lane steel truss arch bridge that carried Interstate 35W across the Mississippi River in Minneapolis, Minnesota, collapsed causing the death of 13 motorists.

Audit Area: A. Safety	**Issue:** i. Roadway Operational Safety	**Tier:** II

installed on the structures. This would not only require the cost to procure and install the needed equipment but also the added positions within PennDOT to record and monitor the information.

Operational Strengths/Leading Practices:

Comments received by the FHWA to the Notice of Proposed Rulemaking ("NPRM") on September 9, 2003 identified that some individuals and State Departments of Transportation ("DOT") commented that the NBIS should require that the person performing inspections and reporting on the inspections should be either a civil or structural professional engineer, with a minimum of five years experience in bridge inspection, and have periodic refresher training in latest inspection techniques and technologies.

Other DOTs are currently exceeding the federal requirements, for example the New York State Department of Transportation ("NYSDOT") requires bridge inspection teams to be headed by licensed professional engineers who have undergone specific bridge inspection training.

Findings/Recommendation for Improvements:

PennDOT should consider increasing the required qualifications for the bridge inspectors and team leaders to be registered professional engineers. In addition, PennDOT should work with the FHWA to modify the current qualifications for bridge inspectors within the National Bridge Inspection Policy to require all bridge inspectors and team leads to be registered professional engineers.

Special bridge inspection training should be made available to not only the bridge inspection staff but it should also be provided to all technical (Engineer and Technicians) positions within the organization. A large number of PennDOT's staff work on various types of transportation projects that require them to perform work activities in the field, traveling within the Commonwealth's transportation infrastructure. By training all PennDOT employees on the items used to detect possible structural deficiencies on bridges, PennDOT will have a large network of informed individuals that could identify potential issues with a structure during their travels and notify the bridge division if any issues are observed.

Audit Area: A. Safety	**Issue:** ii. Construction Work Zone Safety	**Tier: I**

Background / Observation:

Safety is a critical concern with any organization and is a top priority with the State Departments of Transportation across the country. The issue of construction work zone safety is paramount to the health of construction personnel and success of PennDOT and has been identified as an area of constant monitoring for continuous improvement. Pennsylvania has taken measures to increase the effectiveness of the work zone safety program across the State. Mainly through the passing of Act 229 in December 2002 to improve the safety of those working on highways and the safety and mobility of the traveling public. Act 229 requires vehicles traveling in work zones to have their headlights on, the erection of signs at the beginning and end of all active work zones, and increased penalties for moving violations in active work zones. Act 229 was signed into law on December 23, 2002 with the provisions going into effect in February and June of 2003. In addition, Pennsylvania has worked to implement a Comprehensive Strategic Highway Safety Improvement Plan ("CSHSIP") targeting the following six vital safety focus areas, (i)Reducing Aggressive Driving, (ii) Reducing Impaired (DUI) Driving, (iii) Increased Seatbelt Usage, (iv) Safety Infrastructure Improvements, (v) Improving the Crash Record System, and (vi) Improving Pedestrian Safety. The following table contains the number of total number of work zone crashes for each calendar year from 2002 through 2006[8]:

Year	Number of Work Zone Crashes
2002	2337
2003	2127
2004	1762
2005	1885
2006	1780

Table 3 - Number of Work Zone Crashes[9]

The number of work zone crashes have been reduced from 2127 in 2003 to 1780 in 2006, an indication that the increased efforts by the Pennsylvania Legislators and PennDOT been successful. A three year average for 2004 through 2006 is 1809 crashes, on average of 318 less crashes than the total number of crashes in 2003. In addition, the number of fatalities in work zones reduced in calendar years 2004 and 2006 with a spike in the number of fatalities in 2005. The following table provides the number of work zone fatalities for each calendar year from 2002 through 2006[10]:

[8] PennDOT Work Zone data not available for calendar year 2007 at the time of the Performance Assessment
[9] Data Source: Summary Report – The State of Highway Safety in Pennsylvania, Fourth Edition – July 2007 prepared by PennDOT – Bureau of Highway Safety and Traffic Engineering
[10] See Above

Audit Area: A. Safety	**Issue:** ii. Construction Work Zone Safety	**Tier: I**

Year	Number of Work Zone Fatalities
2002	27
2003	34
2004	15
2005	30
2006	20

Table 4 – Number of Work Zone Fatalities[11]

A three year average for 2004 through 2006 is 21.6 fatalities, on average 12 less fatalities then those in 2003.

Impact:

It appears that the increased efforts by PennDOT and the passing of ACT 229 may have positively affected the safety of work zones within the Commonwealth. The efforts have resulted in reduced work zone crashes and work zone fatalities even as the number of projects have increased in the most recent years. Even with the reduced number of work zone incidents, PennDOT is continuing to identify ways to decrease the likelihood of highway work zone crashes and fatalities.

Operational Strengths/Leading Practices:

The Federal Highway Administration has supplemented their Final Rule for the Code of Federal Regulations ("CFR") – Part 630 to include a new subpart K to supplement existing regulations that govern work zone safety. A key portion of the section includes conditions for the appropriate use of, and expenditure of funds for uniformed law enforcement officers. The Uniformed Law Enforcement Policy requires each agency to develop a policy to address the use of uniformed law enforcement on Federal highway projects. The intent of the supplement is to reduce the likelihood of injuries and fatalities to the highway construction staff and the traveling public. PennDOT has acknowledged the increased benefits of using uniformed law enforcement officers to reduce the number of work zone incidents.

PennDOT has taken a wide-ranging look at highway safety with several public and private partners to develop the CSHSIP described above. The plan identifies the need to improve work zone safety and the plan includes four strategies and possible performance measures to effectively improve this area:

[11] Data Source: Summary Report – The State of Highway Safety in Pennsylvania, Fourth Edition – July 2007 prepared by PennDOT – Bureau of Highway Safety and Traffic Engineering

Audit Area: A. Safety	**Issue:** ii. Construction Work Zone Safety	**Tier: I**

Suggested Strategies	Possible Performance Measure	Responsible Agencies
Increase / Continue Work Zone Enforcement	• Number of Projects with dedicated work zone enforcement • Number of crashes in work zone	Pennsylvania State Police ("PSP"), Municipal Law Enforcement, PennDOT
Conduct annual work zone safety reviews and implement recommendations of review team	• Number of reviews completed • Number of recommendations implemented	PennDOT, FHWA, Local Municipalities
Implement variable speed limits ("VSL") / technology assisted speed enforcement ("TASE") pilot (NCHRP 3-59) – use these technologies to detect queues and improve traffic flow	• Number of VSL sites deployed in work zones • Number of TASE sites deployed in work zones	Pennsylvania State Police, Municipal Law Enforcement, PennDOT
Add transverse rumble strips within and prior to work zones	• Number of sites improved with transverse rumble strips	PennDOT, Local Municipalities

Table 5 - Improving Work Zone Safety[12]

Findings/Recommendation for Improvements:

The Federal Highway Administration supplemented their regulations to mandate that each state agency establish standard policies and procedures for the role of uniformed law enforcement officers, positive protection measures between workers and motorized traffic, and temporary traffic control devices on construction, maintenance, and utility work zones on Federal Highway projects.

PennDOT has entered into an agreement with the Pennsylvania State Police ("PSP") through various memorandums of understandings to address the use of uniformed law enforcement officers on highway work zones. It appears that the most recent Memorandum of Understanding between PennDOT and the PSP was executed in March of 2003. In addition, PennDOT has developed guidance for PennDOT personnel to use and understand the Memorandum of Understanding between the two Agencies. PennDOT should assess the current Memorandum of Understanding and existing policy and procedures to ensure they meet the additional requirements established by the Federal Highway Administration. In addition, PennDOT should consider expanding the use of the policies and procedures to all active construction, maintenance, and utility work zones, regardless of amount of Federal funding associated with the project.

PennDOT should continue to work with the comprehensive list of stakeholders to implement the strategies identified within the CSHSIP. PennDOT should use the performance measures identified within the plan and report the status of the items.

[12] Source Commonwealth of Pennsylvania- Comprehensive Strategic Highway Safety Improvement Plan, October 2006

Audit Area: B. Mobility	**Issue:** i. Information Technology and the Highway Administration	**Tier: I**

Background / Observation:

The previous LB&FC Performance Audit from 2002 recommended that "PennDOT should aggregate and monitor its IT costs by program on a Department-wide basis. PennDOT now spends well over $100 million a year on IT. As costs escalate, it becomes more important to collect the budgetary information necessary to manage these costs. Currently, such information is only maintained for the Bureau of Information Technology."

PennDOT has adopted the recommendation and is tracking IT costs on a program basis Department wide. The costs for IT have dramatically increased since the previous LB&FC review to over $220 million dollars a year as a result of the inclusion of spending for Intelligent Transportation Systems[13]. According to the U.S. Department of Transportation ("USDOT") "Intelligent transportation systems encompass a broad range of wireless and wire line communications-based information and electronic technologies. When integrated into the transportation system's infrastructure, and in vehicles themselves, these technologies relieve congestion, improve safety and enhance American productivity." As information technology, the inclusion of ITS within the scope of the Bureau of Information Systems ("BIS") and the Chief Information Officer ("CIO") is appropriate, but the addition dramatically increases the responsibility of BIS and the CIO for Highway Administration IT projects.

Recognizing this issue, PennDOT has developed and is in the process of implementing a new IT planning process. The process includes a single IT liaison within each deputate to coordinate the development of a prioritized list of business needs that require IT support for the entire deputate. Prior to this initiative PennDOT developed isolated IT projects within their separate Bureaus or business units.

The following items have been observed:

- The 16 of 76 Roadway Information System ("RWIS") devices that were not operating during the winter storm due to lack of maintenance are being maintained but the future of that technology within PennDOT is uncertain.
- The former Deputy Secretary for Administration mandated that PennDOT's BIS become involved in all ITS projects.
- BHSTE is currently the primary responsible party for ITS within PennDOT
- BHSTE developed a Transportation Systems Operation Plan ("TSOP") that defined a multi-year, multi-project approach to implementing ITS, but the plan has not received wide spread support outside of BHSTE
- BHSTE estimates the cost for implementing the Statewide Key ITS Field Device Deployments project to provide improved situation awareness at over $120 million dollars spread out over four years
- Operations of traffic management centers and ITS devices are typically under the control of the Engineering District Offices usually within their Traffic Division which is typically part of the Maintenance group.
- IT professionals are now actively involved in the planning and procurement of ITS. They are trying to understand the decisions that were made, systems that were deployed and the implications of past and planned decisions.
- BIS is concerned about the quality of the software developed for the Automated Traffic

[13] Information provided on the CIO website.

Audit Area: B. Mobility	**Issue:** i. Information Technology and the Highway Administration	**Tier: I**

Management System ("ATMS") that controls the traffic control centers and communications with ITS devices in the field.

- BIS considers the ATMS to be poorly designed and lacking sufficient documentation.
- BIS has currently stopped deployment of this software system pending a review by BIS. BIS has engaged two separate independent reviews.
- The CIO and BIS do not believe the organizational and business issues related to ITS deployment have been fully addressed. They characterize the ITS approach as being technology oriented without a full understanding of how the information will be used, who will make decisions and what organizations are responsible
- The CIO and BIS raised questions about the long-term operations and maintenance of the ITS devices, a problem identified for other devices within the Witt Report. PennDOT is currently exploring the question of whether the system should be managed internally, outsourced or whether a Public Private Partnership could be a valid option.

Impact:

Considering the importance of IT and ITS to PennDOT, the recent development of a new IT planning process has included some operational impacts. Individuals interviewed for this assessment have experienced delays and some frustration while trying to work through this process. The recent problems experienced by PennDOT are not uncommon and are the result of institutional barriers which have also been experienced by other state DOTs and documented in a recent Strategic Highway Research Study sponsored by the U.S. Congress.

The newly developed IT planning process, if not carefully monitored, can affect the progress and potential Federal funding of current projects. For example the Bureau of Highway Safety and Traffic Engineering ("BHSTE") received a letter from the Federal Highway Administration concerned about the $3.1 million of Federal funding obligated from the Federal ITS Integration Fund for the deployment of the Automated Traffic Management System ("ATMS") from Engineering District 11 to all PennDOT Districts. The letter went on to say, "Continued delay in advancing this project or an eligible substitute activity could jeopardize the availability of funding". Based on information gathered during the interview process, it appears PennDOT has responded to the FHWA explaining the issues encountered with the ATMS.

Operational Strengths/Leading Practices:

The newly appointed involvement of BIS in ITS projects is a leading practice. Most ITS projects reside with the engineering staff and have little IT involvement outside of network communication support.

The organizational issues raised about the ITS program are insightful and reflect a recognition that ITS is more than just the installation of devices or cameras and that the real issue is mobility and transportation operations. Effective transportation operations impacts people, processes and technology.

PennDOT has looked outside of their organization to other state Departments of Transportation to identify leading practices and are working to include those leading practices into their process.

Audit Area: B. Mobility	**Issue:** i. Information Technology and the Highway Administration	**Tier: I**

Findings/Recommendation for Improvements:

PennDOT has struggled with IT planning, development, implementation, and maintenance operations. This has been highlighted by recent events including the finding in the Witt Report around the inoperable RWIS sensors. It appears that one of the overarching issues affecting the PennDOT IT program has been a lack of an overall plan for the department which has allowed IT applications to develop independently within the different Bureaus and Engineering Districts. This has lead to a disjointed approach to addressing IT and ITS needs for the entire Commonwealth. It appears PennDOT has recently identified this issue and is working to improve the process. PennDOT should consider the following:

- The CIO should continue to lead the IT Strategic Planning process at PennDOT and actively assist Highway Administration in their planning efforts so that delays do not occur and make certain that the Highway Administration provides input into the process that supports PennDOT's overall business and technology strategies.
- While the IT planning process is being finalized and implemented the CIO and Highway Administration should monitor and address any projects that are at risk of losing Federal funding.
- As PennDOT continues to refine the IT Planning Process they should also assess the current IT project management organization within BIS. This group will be an important component to the advanced development and implementation of the IT projects resulting from the enterprise wide planning process. Key factors to ensure program management success include establishing and implementing governance, policies, processes, tools, and an organization that delivers projects on time, within reasonable cost benefit expectations, and at an acceptable level of risk.
- Once the IT Planning Process is finalized, PennDOT should consider developing internal documentation that describes the entire process and explains the approval process. This should include a description of the members of the IT Steering Committee and the approval process required by the Office of Administration, Office for Information Technology. This document will help create a greater level of transparency for the IT process.

Audit Area: B. Mobility	**Issue:** ii. Congestion Relief	**Tier: II**

Background / Observation:

Congestion is among the most critical issues affecting the efficiency of our transportation network. Congestion delays the movement of goods and people across the country and impacts quality of life and economic growth. The increased travel time results in lost business hours, higher fuel costs and increased pollution and stress levels. Congestion can be recurring or non-recurring. Recurring congestion occurs at the same place and during the same time every week and is caused by lack of physical capacity or improperly timed traffic signals. Non-recurring congestion occurs when incidents, bottlenecks, work zones, poor signal timing, and adverse weather delays the movement of traffic.

PennDOT has traffic monitoring devices on some roadways that gather real time data. This data allows PennDOT to respond immediately to incidents involving minor accidents, vehicle breakdowns and weather related situations. Congestion is usually addressed through a combination of strategies including ITS deployment, multimodal transportation, investments in additional roadway capacity and congestion pricing.

The USDOT launched a "Congestion Initiative" to Reduce Congestion on America's Transportation Network that relies on innovative and demonstrated options including technology such as congestion pricing and high-speed open road tolling. The primary components of the initiative announced in 2006 by the USDOT include Congestion Relief Programs, Public Private Partnerships, Corridors of the Future, Implementing Technological and Operational Improvements, and Increasing Aviation Capacity[14].

Impact:

The annual cost of congestion rose from $14.9 billion in 1982 to $78.2 billion in 2005 and the travel delay rose from 800 million hours in 1982 to 4.2 billion hours in 2005[15]. It is imperative that congestion is addressed to reduce delays in travel time and increase productivity of the highway system, the traveling public and the businesses transporting goods and services. Major capital investments to mitigate congestion are constrained by time to obtain environmental and right of way clearances and by availability of funding and resources to program the project.

PennDOT must build public awareness of the need to reduce congestion to enhance economic growth and quality of life. PennDOT's increased implementation of ITS tools and installation of fiber optic networks will positively affect the ability to control traffic operations in the future. PennDOT must continue to monitor the changing needs of its transportation network within each Engineering District and across the Commonwealth to prioritize the implementation of tools and approaches on a continual basis to effectively attempt to monitor and control traffic operations across the state and mitigate delays in the transport of people, goods and services.

Operational Strengths / Leading Practices:

PennDOT has established Traffic Management Centers ("TMC") in many of the Engineering Districts. While many of the TMC are currently operated with contracted employees, the long term plan is to operate the TMC using PennDOT employees. The TMC in Engineering District 6-0 operates on a 24/7 basis and receives information from other TMC after normal working hours.

[14] U.S. DOT Congestion Initiative Website, http://www.fightgridlocknow.gov/initiatives.htm

[15] Information based on the *invoice* for the cost of extra time and fuel and total delay in 437 Urban areas within the United States from **The 2007 Urban Mobility Report**, David Schrank and Tim Lomax, Texas Transportation Institute, dated September 2007

Audit Area: B. Mobility	**Issue:** ii. Congestion Relief	**Tier: II**

The traffic management center in District 6-0 generates real time information that is used to constantly monitor the flow of traffic on high volume roadways and facilitate timely responses to traffic incidents. PennDOT Engineering District 6-0 is also working toward regional cooperation in sharing traffic related data with the neighboring states of Delaware and New Jersey to enhance the effectiveness of regional traffic management. Traffic operators in the traffic management centers operate PennDOT's Road Condition Reporting System, (described in the Mobility - Incident Management / Readiness section below). Other technology components used by PennDOT to manage congestion include dynamic message boards, electronic tolling systems and electronic signal devices that can be operated remotely using fiber optic cables. PennDOT is also working toward implementation of a 511 traveler-information program.

Findings/Recommendation for Improvements:

The deployment of ITS systems offers a cost effective approach to monitor and manage traffic conditions to mitigate congestion. PennDOT should consider operating at least three strategically placed Regional Traffic Management Centers ("RTMC") across the State while establishing local TMC in each of the Engineering Districts (if needed). All of the information gathered across the Commonwealth should be linked to the RTMC. This will provide PennDOT the ability to monitor and manage traffic and congestion throughout the State at anyone of the RTMC. Policies and procedures should be established for the reporting functions if one of the TMC faces technical or operational difficulties, its operational capabilities should be automatically assumed by the identified RTMC. All TMC must have staff to monitor real time traffic conditions on a regular basis and ensure faster responses to non-recurring traffic congestion situations. While PennDOT is actively evaluating the future role of ITS coverage to support emergency management procedures and mitigate congestion, the ITS systems have to be operated, improved and maintained effectively to sustain their role in improving the operational efficiency of the road network.

ITS deployment should be prioritized based on statewide needs for control of traffic operations. Some intersections may require cameras to capture constantly recurring traffic violations while a high volume roadway may require traffic flow to be monitored on a regular basis to assist in the timely removal of bottlenecks. The ITS deployment should include arterial and local roads if they carry as much congestion as freeways. PennDOT should be able to remotely control the operation of traffic signals on all major arterials and high volume roadways by expanding the coverage of its existing fiber optic network over time. Each District should participate in a statewide assessment to identify and document the needs of all major roadway systems to enhance safety and reduce delays in traffic flow throughout the state. The assessment should also consider managing access points by installing ramp meters to control the flow of traffic and reduce collisions. This will allow PennDOT to make strategic investments in ITS systems and other approaches to mitigate congestion and maximize the utilization of available funds.

Congestion Pricing has been recognized by the USDOT as an innovative solution to mitigating congestion. The USDOT recently approved nearly $1.2 billion in credit assistance to relieve congestion on the I-495 beltway in Virginia. The 14 mile project includes two new variably priced High Occupancy Toll ("HOT") lanes added to the capital beltway. PennDOT should continue to evaluate the use of High Occupancy Vehicle ("HOV") and HOT lanes on certain sections of high volume freeways and roadways. Alternatively, to reduce the demand for high volume roadways, PennDOT should promote the development and use of alternative transit options such as light rail, bus, bus rapid transit, and commuter rail. Federal funding through the Federal Transit Administration' New Starts Program is available for these types of projects. In addition, other states have supported public transportation with vehicle registration fees from passenger cars and commercial vehicles, casino revenue, and highway / bridge toll and revenue.

Effective coordination should be developed between freeway and arterial roads to develop

Audit Area: B. Mobility	**Issue:** ii. Congestion Relief	**Tier: I I**

integrated approaches to traffic management and to create detours if necessary to facilitate the flow of traffic. ITS systems can be used to generate real time information on traffic conditions in freeways and arterial roads. This information can be posted on a website to inform the travelers on modes of travel and different travel paths available for their trip.

Audit Area: B. Mobility	**Issue:** iii. County Maintenance - Winter Program	**Tier: II**

Background / Observation:

The PennDOT organization is comprised of a Central Office and eleven Engineering Districts. The Engineering Districts are then divided up into geographic / county areas. The majority of the maintenance operations are managed at the Engineering District and County Maintenance Offices. The maintenance budget is determined by the Engineering Districts and County Maintenance Offices based on the needs and actual number of lane miles per Engineering District. (Lane miles are calculated by multiplying the length of highway by the number of travel lanes. For example, a 10 mile road with 2 lanes has 20 lane miles.) Across the Commonwealth PennDOT owns and maintains approximately 90,000 lane miles or approximately 40,500 miles of state administered highway. The annual County and District maintenance budget has to account for the winter maintenance program which can fluctuate from year to year. The winter maintenance program expenditures are related to the severity of the winter weather for that season and therefore the cost can vary accordingly. The Engineering Districts and County Maintenance Offices attempt to develop a realistic budget estimate based on historical expenditures and prior winter weather activity. If a winter season is more mild then planned, unused winter maintenance budgeted funds will be shifted to spring and summer maintenance activities (paving, patching, seal coating, etc.) however if a winter maintenance program requires more funds then planned then those funds will be shifted from the spring and summer maintenance budget.

In recent years, PennDOT has attempted to reduce the cost to perform maintenance operations with the development and implementation of Maintenance Efficiency and Cost Effectiveness Initiative ("MECE"). The overall goal for MECE was to reduce maintenance spending through increased efficiency. The shift to MECE affected PennDOT maintenance operations, especially at the county level by requiring the County Maintenance groups to address the following initiatives[16]:

1. Implement the County Maintenance Measurement Tool ("CMMT")
2. Electronic Winter Materials Management Program
3. Fleet Optimization - Department & Rental Winter Trucks, Agility & Light Vehicles, Other Core Equipment
4. Planning and Scheduling - Budget & Resource Balancing Methodology, Maintenance Manual Chapter 3 Training
5. Update the Managing Highway Maintenance Modules
6. Assess and Improve the Current Maintenance Training Structure
7. Develop a Training Program for Pavement Management Practices
8. Develop and Provide Access to Summary Reports Used to Assess Performance and Efficiency
9. Issue a Revised State Vehicle Assignment Policy
10. Update and Issue Maintenance Staffing Guidelines and Develop a Model County Non-PMO Structure

Given the importance of PennDOT's winter program, each Engineering District and County Maintenance Office must adapt their winter maintenance program, including the modifications required by MECE, to provide the required level of service to the traveling public.

[16] Information obtained from the Maintenance Efficiency & Cost Effectiveness Initiative Presentation prepared by Robert M. Peda, P.E., PennDOT dated October 12, 2004

Audit Area: B. Mobility	**Issue:** iii. County Maintenance - Winter Program	**Tier: II**

PennDOT contracts with local municipalities to clear state roads in their jurisdiction. During the 2006-2007 winter season, PennDOT awarded 740 municipal contracts.

PennDOT's resources for the winter season include: 2,250 trucks, plows and salt spreaders, 527 front end loaders, 112 anti –icing trucks, 15 snow blowers, and 425 mechanics. In addition, some Engineering Districts require that their winter program be augmented with rental trucks and operators. PennDOT awarded approximately 380 rental truck and operator contracts last season.

Impact:

Due to the diverse make up and variation of areas that include everything from metropolitan cities to rural communities across the Commonwealth of Pennsylvania, each Engineering District has unique issues and challenges when developing and implementing their winter maintenance program. Some Engineering Districts have issues hiring temporary staff to operate trucks to clear the snow while other Engineering Districts have difficulty contracting with external contractors to perform winter operations. James Lee Witt Associates, a part of GlobalOptions Group, Inc. issued a report entitled, *Independent Report on the Mid-February 2007 Winter Storm Response for the Commonwealth of Pennsylvania*, dated March 27, 2007 ("Witt Report") that identified this issue and suggested PennDOT add the necessary operators required for winter operations. PennDOT staff have explained that certain areas of the state, in particular Engineering Districts 4, 5, 6, 8 and Allegheny County in Engineering District 11, are unable to compete with trucking companies and private industry to hire and retain equipment operators.

In an attempt to ensure PennDOT had sufficient equipment operators to conduct 24 hour snow removal operations during a winter storm, PennDOT was able to negotiate higher pay scales for portions of the state that traditionally have difficulties filling equipment operator positions.

Operational Strengths/Leading Practices:

Pennsylvania has approximately 88,320 lane miles[17] of roadway and PennDOT had a winter expenditure of $196.7 M[18] for cost associated with all winter service activities in the 2006-2007 season. This equates to PennDOT expending a unit cost of approximately $2,227 / lane mile to remove snow.

This appears relatively high when compared to other states that receive similar winter seasons. Illinois for example, reported snow removal expenditures equal to $86.0 M[19] to maintain approximately 41,833 lane miles. This equates to a unit cost of $2,055 / lane mile for snow removal. Several elements beyond PennDOT's control, such as Pennsylvania being more mountainous than Illinois, could affect the increased cost per lane mile but the example is provided to highlight the potential for cost savings within Pennsylvania.

Findings/Recommendation for Improvements:

PennDOT Maintenance should track the effects of the increased operating wage rates to identify if

[17] Lane mile data from the 16th Annual Report on the Performance of State Highway Systems (1984–2005), Dated June 2007
[18] Information obtained from interview with PennDOT Central Office staff.
[19] Illinois Department of Transportation

Audit Area: B. Mobility	**Issue:** iii. County Maintenance - Winter Program	**Tier: I I**

the recent attempt to address the issue is working and increasing the ability of Engineering Districts to hire equipment operators. It is recommended that PennDOT track the effects of the increased wage rates and adjust accordingly so each Engineering District is able to add the required staff to implement their Winter Maintenance Program.

Audit Area: B. Mobility	**Issue:** iv. Incident Management / Readiness	**Tier: I**

Background / Observation:

Portions of the State of Pennsylvania suffered devastating results due to a winter weather event that took place in February of 2007. In an attempt to evaluate the actions / inactions of the Department during that event the Commonwealth of Pennsylvania authorized an investigation and enlisted the services of a consultant to provide recommendations and areas of improvement for the Commonwealth. The Witt Report has been used by PennDOT to identify and address deficient areas of incident management and winter storm preparedness.

Impact:

Based on the Witt Report findings, PennDOT along with other Pennsylvania State Agencies have made significant changes and improvements to their incident management plan. The following highlights the most notable steps taken by the Department since the Witt Report was issued:

- All PennDOT Senior Management has competed U.S. Homeland Security training on the National Incident Management System ("NIMS") and U.S. Department of Labor - Occupational Safety & Health Administration training on the Incident Command System.
- In addition, Personal Digital Assistants ("PDA") have been assigned to all PennDOT Senior Management to allow for better communication during an event.
- The devices that were not operating during the winter storm have been restored. At the time of this assessment, PennDOT had repaired approximately 90% of the sensors. A portion of the devices are out of service due to construction or reconstruction of that road surface.
- In response to recommendations provided in the Witt Report, *PennDOT should consider relocating the Traffic Control Center to be physically within the State Emergency Operations Center*. Deloitte FAS has been informed during the interview process that this request has been rejected by the Department of General Services until the year 2012 at which time the current State Emergency Operations Center lease is set to expire. The planned new location for the State Emergency Operations Center will house emergency operating space for the Pennsylvania Emergency Management Agency ("PEMA"), Pennsylvania State Police, Pennsylvania Turnpike Authority, and PennDOT's Traffic Control Center.
- The Witt Report also recommended that PennDOT, *consider connecting all weather systems and road condition systems into the State Emergency Operations Center*. It appears that PennDOT has advanced this effort and has installed the software on the computers within the State Emergency Operations Center to share information.
- Winter procedures and winter program preparedness strategy templates were developed and distributed to each of the Engineering Districts.
- To assist in the reliable collection and accurate dissemination of road closures and conditions, PennDOT has developed a Road Condition Reporting System and has identified RCRS as the primary source to allow PennDOT to communicate road closure incidents for the state. The intent is to allow PennDOT to quickly and accurately share information with PennDOT executive leadership (through the use of email and PDA devices described above), the Pennsylvania Emergency Management Agency ("PEMA") and other emergency responders. The system allows PennDOT staff and other State agencies to report road conditions in six common definitions.
- As mentioned in the previous section, PennDOT has increased salaries for temporary winter

Audit Area: B. Mobility	**Issue:** iv. Incident Management / Readiness	**Tier: I**

equipment operators in areas of the state where hiring and retention has been difficult.

- PennDOT has contracted with a weather forecasting service to provide weather updates to each Engineering District at set frequencies.
- PennDOT has developed Incident Command Centers within the Engineering District offices and installed PennDOT, PEMA and State Police incident reporting information at PennDOT's central traffic communications center. PennDOT has worked with PEMA and the State Police to develop integrated emergency management command and control policies.
- Several initiatives have been identified by PennDOT to improve both the short term and long term communication plan with the PennDOT customers, they include:
    - Working on fixing and maintaining the Roadway Weather Information System and the improved sharing of that information with better web based results.
    - Developed an interim traveler information website.
    - Working to develop a web-based (511) traveler information site
    - Working on the development of a telephone based (511) traveler information source.

Operational Strengths / Leading Practices:

Not Applicable

Findings / Recommendation for Improvements:

Continue to develop and improve the systems required to provide real time road closure and detour information to the traveling public.

PennDOT should monitor the performance of each Engineering District's winter program to ensure that each District is operating in accordance with the Statewide objectives and are in compliance with the items identified above.

Audit Area: C. Management & Productivity	**Issue:** i. Increased use of Design - Build	**Tier: I**

Background / Observation:

Given the need to deliver transportation projects in the timeliest and most cost effective manner, PennDOT should consider using all reasonable project delivery methods. Design-Build is one method that PennDOT should continue to consider and encourage its use on applicable projects. It is important to note that Design-Build is not intended to present PennDOT with the "*ultimate solution*" or the "*silver bullet*" to solve every project delivery issue, but if used correctly it can allow PennDOT to decrease project delivery durations and potentially reduce the total cost to deliver transportation projects to the public.

PennDOT has conducted research and developed PennDOT Publication Number 448 Innovative Bidding Toolkit and has published guidance on the development and implementation of Design-Build Projects in PennDOT Publication Number 10A (Design Manual 1A) Chapter 10.5 Innovative Contracting Procedures. These publications provide the PennDOT stakeholders with an overview and background of the contracting methods in addition to detailed considerations to contemplate when identifying a potential Design-Build Project candidate. The publications also identify the items that need to be taken into account by the individuals responsible for the project and the special requirements that need to be considered before electing to use Design-Build.

PennDOT has engaged the use of Design-Build on a limited basis; mostly for the reconstruction of roads and bridges impacted by natural disasters and when the work is required on an emergency basis. Based on information provided during the assessment PennDOT currently has approximately 80 projects in ECMS that have used Design Build or have components of the project that are using Design Build. In addition, PennDOT has used some type of accelerated project delivery method for approximately 40 projects that were released either prior to or outside of ECMS.

Impact:

PennDOT has a large network of existing transportation infrastructure that needs frequent maintenance, renovation, and replacement. The limited funding available to develop new projects and provide the required up keep to the State's existing infrastructure necessitates PennDOT to spend each dollar in the most cost effective manner. As construction material prices continue to increase, projects become more expensive if the construction start date is delayed. PennDOT needs to consider using all methods of project delivery that reduce the project development time and allow projects to proceed into construction.

In addition, PennDOT is faced with the challenge of repairing and/or replacing the large number of structurally deficient structures in the state. To address these structures in a timely manner, PennDOT needs to consider an expanded use of Design-Build in project delivery.

Design-Build provides an opportunity for PennDOT to deliver applicable projects in less time and for less cost than traditional Design-Bid-Build. The United States DOT – Federal Highway Administration established a Special Experimental Project Number 14 – Innovative Contracting, to test and evaluate alternative contracting methods. One of the major items tested was Design-Build. The results of the project identified an average reduction in project duration of 14% and an average reduction to the project's total cost of 3%.[20] That represents a potential savings of $30,000 for every $1,000,000 of project cost and a reduction of 7 weeks for every year of project

[20] Information based on the Design-Build Effectiveness Study as required by TEA-21 Section 1307(f) Final Report Prepared for the USDOT-Federal Highway Administration January 2006

Audit Area: C. Management & Productivity	**Issue:** i. Increased use of Design - Build	**Tier: I**

duration.

Operational Strengths/Leading Practices:

The use of a single source for the design and construction of large capital projects dates back to some of the earliest known major construction projects. Over the past 100 years, the practice of employing one entity to perform the design and construction of a project had fallen out of favor in the United States which led to the use of the Design-Bid-Build approach which continues to be the preferred contracting method for delivering transportation projects by most United States Departments of Transportation.

Early Federal Highway Administration requirements were not favorable towards the procurement methods used by agencies to advertise and award contracts using the Design-Build approach. The Transportation Equity Act for the 21st Century ("TEA-21") led to the Federal Highway Administration publishing a final rule in December 2002 that allowed recipients of the Federal-aid highway program to use Design-Build contracting procedures. Prior to the ruling, the use of Design-Build on federally funded projects was restricted by the Federal Highway Administration, and State and Local laws also affected a Department's ability to use Design-Build procedures.

In August of 2007, the Federal Highway Administration broadened the affective scope and use of Design-Build methods by issuing a final rule mandated by the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users ("SAFETEA-LU") to allow agencies to issue Design-Build request-for-proposal documents, award contracts, and issue notices-to-proceed for preliminary design work prior to the conclusion of the National Environmental Policy Act ("NEPA") process.

Given the Federal Highway Administration acceptance of Design-Build procedures, Departments of Transportation around the nation have begun to embrace the use of Design-Build to expedite the delivery of transportation projects.

Findings/Recommendation for Improvements:

The Federal Highway Administration has accepted the use of Design-Build as a valid method to deliver federally funded transportation projects and PennDOT has performed the preparatory work required to make Design-Build available to the Engineering Districts to use innovative contracting procedures for the successful delivery of projects. The next step is to encourage the use of these procedures for applicable projects. This includes the need for a proactive approach in identifying successful candidate projects with help and guidance from Central Office. PennDOT's focus should be on the use of the Design-Build-Request for Proposal approach to get the contracting entity engaged early on in the project and reduce the advancement of the design by PennDOT.

In order for PennDOT to determine the actual benefits of consistently using Design-Build within their organization, they should consider developing a formal program in which a Central Office Design-Build Committee tracks the performance and progress of the current PennDOT Design Build projects. The Design-Build Committee should work with the Engineering Districts with Design-Build projects to provide support and guidance for advancing the projects. The projects' advancement through the PennDOT Design-Build Program should be tracked, documented and compared to the time and cost of similar projects that are implemented within the traditional Design-Bid-Build approach. This will allow PennDOT to assess how successfully Design-Build can be used and determine an estimate for the number of potential Design Build projects in the future. The Design-Build Committee should help facilitate the sharing of information between the

Audit Area: C. Management & Productivity	**Issue:** i. Increased use of Design - Build	**Tier: I**

Engineering Districts and provide a single point source of contact to quickly address issues as they arise. The results of the program should be documented by the Department to identify the lessons learned from the projects. In addition, the Committee should revisit the policy and procedures used for Design-Build as the program matures in PennDOT to ensure the procedures are used in a consistent manner across the Engineering Districts.

It is important to note that PennDOT needs to ensure that they have trained and capable contracting staff responsible for administering design-build projects and those staff members must be designated for this method of project delivery, including procurement and the contract administration processes. PennDOT needs to evaluate the design specifications used in the traditional Design-Bid-Build approach and monitor the development of more performance based Design-Build specifications.

Audit Area: C. Management & Productivity	**Issue:** ii. Inconsistent use of Value Engineering and Constructability Reviews	**Tier:** II

Background / Observation:

PennDOT has developed policies and procedures to allow design phase value engineering[21] and constructability reviews[22] to be a part of the project development process. PennDOT Publication 10A – Transportation Engineering Procedures, Chapter 9 defines value engineering as the following:

> *"The systematic application of recognized techniques by a multi-disciplined team to identify the function of a product or service, establish a worth for that function, generate alternatives through the use of creative thinking, and provide needed functions to accomplish the original purpose of the project, reliably, and at the lowest life-cycle cost without sacrificing safety, necessary quality, and environmental attributes of the project."*

PennDOT also allows for a construction value engineering evaluation by the contractor. This permits the construction contractor to assess the project plans and specifications, and then recommend any value added changes to the project. This is a good step in the process and a practice that should be encouraged for select projects but is not discussed here. this section refers to the recommended value engineering reviews that are conducted during the design of the project prior to letting.

Publication 10A provides guidelines for the use and application of Value Engineering and Constructability Reviews on projects. The procedures manual accurately define the application requirements as shown below:

> *All projects and programs are possible candidates for Value Engineering review. Generally, Major projects with higher estimated construction costs offer greater opportunities for cost savings. All projects estimated at greater than $1,000,000 should be considered for Value Engineering review. A value engineering review must be performed on all Federal-aid projects on the National Highway System (NHS) with an estimated cost of $20 million or more.*

Appendix H of the PennDOT Publication 10A – Transportation Engineering Procedures continues to expand the suggested use of value engineering by explaining that it is highly recommended that a value engineering review is conducted for all moderately complex (Major) projects with an estimated cost greater than $5 million.

During the course of interviewing project personnel and evaluating project records, the general consensus was that the number of value engineering reviews conducted could be increased. In addition, there appears to be some inconsistencies with the performance of constructability reviews. The involvement of construction personnel in the performance of the constructability reviews appears to vary by District. PennDOT Publication 10A – Transportation Engineering Procedures, Chapter 9 also contains a section that describes the use of constructability reviews:

> *The purpose of a constructability review is to refine a project's design and help the District plan project construction. An important product of a constructability review is a realistic Pre-Bid Schedule. Increased constructability and accurate Pre-Bid Schedules reduce the need for*

[21] Value Engineering is the act of adding value to a project, not simply to reduce costs. Value engineering studies should question project decisions that add cost to a project without improving its overall function. Value engineering studies are made to provide suggestions for reducing the total cost of the project and providing a project of equal or better quality.

[22] Constructability Reviews are conducted at various phases of the project development lifecycle and include an evaluation of the construction phasing and scheduling, an assessment of design alternates and traffic control alternates / alternate routes. Constructability reviews are often performed by seasoned design and construction professionals.

Audit Area: C. Management & Productivity	**Issue:** ii. Inconsistent use of Value Engineering and Constructability Reviews	**Tier: II**

change orders and the possibility of cost overruns. Constructability reviews also help avoid disputes and delays. Constructability reviews should be conducted at various points throughout design development by constructability teams assembled by the District Engineer/Administrator (DE/A) and Project Manager. Members of constructability teams should have a wide range of experience, including construction, design, contract management, traffic control, permitting and scheduling.

PennDOT has developed a formalized Value Engineering/Acceleration Technology Transfer (VE/ACTT) Program to help evaluate the approiratte use of Value Engineering and Constructability Reviews for select key projects.

Impact:

Consistent use of value engineering and constructability reviews within a project development environment helps increase the likelihood of an accurately planned and successfully implemented transportation project.

Operational Strengths/Leading Practices:

The current PennDOT policies and procedures for value engineering and constructability reviews are well defined and provide a valid approach to develop major transportation projects. Having the procedures in place is an operational strength that provides guidance to PennDOT personnel and design consultants. In order to become an industry leading practice, PennDOT needs to increase the use of the reviews for all major projects and have a consistent approach regardless of District for the individuals performing the reviews.

A successful constructability review involves key construction personnel to evaluate the project and have the ability to provide recommendations to improve the construction sequencing and the durations used to establish the pre-bid schedule.

Findings/Recommendation for Improvements:

PennDOT should work to formalize the required staffing for the value engineering and constructability reviews. Each District should work to have PennDOT construction staff participate in the constructability reviews and make sure their comments are included into the pre-bid schedule development. This should provide PennDOT with more realistic project durations and the ability to develop more accurate cost estimates.

Audit Area: C. Management & Productivity	**Issue:** iii. Varying Levels of Schedule Expertise	**Tier: I**

Background / Observation:

The Bureau of Construction and Materials - Contract Management Division is responsible for assisting the Engineering Districts to monitor project progress schedules and provide any type of scheduling support for the Districts. Those services include, the development and update of scheduling procedures, and support in the development of construction schedules to include realistic and achievable durations and completion dates. In addition, the division is also accountable for processing time extensions for projects and responsible for developing and managing construction training. Developing a realistic construction schedule and actively monitoring the contractor's construction schedule are two of the most important aspects to successfully managing a construction project. Construction delays are a major factor in cost overruns for all types of construction.

Based on the information gathered during the performance assessment, the Engineering Districts have varying levels of scheduling expertise and the Contract Management Division within Central Office only has two positions to assist the Engineering Districts with schedule support. During the interview and document evaluation portion of this assessment one of two positions was vacant. The two Central Office positions are responsible for providing support to the entire state. PennDOT uses consultants to supplement the schedule support staff and allows the Engineering Districts to write work orders on a Central Office Open End contract with consulting firms to provide scheduling assistance. Select Engineering Districts use Construction Management ("CM") firms to assist in the management of large construction projects. In most cases the CM firm provides the scheduling support for the projects they are involved with.

PennDOT Publication 10A – Transportation Engineering Procedures, Chapter 10 provides the following instructions for the monitoring of Construction Schedules:

> *Monitoring of the Contractor's schedule begins at Construction Notice-to-Proceed and continues to Construction Close-out, as indicated by Figure 10.4. Monitoring actual progress and comparing it to the Contractor's Baseline Schedule prepares PENNDOT's Inspector in Charge and/or Assistant Construction Engineer (ACE) to, Communicate and resolve project issues with the Contractor and PENNDOT management, properly assess and measure impacts of changes to the schedule and make decisions concerning corrective actions.*
>
> *The Monitor in Construction process recognizes that events will occur that can delay or otherwise impact construction schedules. This process provides a formal and systematic approach to taking corrective actions when necessary. The process uses the schedule as an effective communications tool for PENNDOT and the Contractor. It identifies key decision points in project construction and the responses required of PENNDOT staff and the Contractor.*
>
> *This process promotes teamwork between PENNDOT's Design and Construction staff, while assigning responsibility for construction scheduling to the Contractor. The Contractor is encouraged to provide PENNDOT with a realistic schedule based on available resources.*

The procedures manual also provides a 32 point checklist / flowchart for the individual tasked with monitoring the schedule to follow when conducting a project progress update evaluation.

Impact:

Delays to any construction project increase the cost of the project and ultimately increase the cost to PennDOT and public. The longer a transportation project takes to be completed the longer the

Audit Area: C. Management & Productivity	**Issue:** iii. Varying Levels of Schedule Expertise	**Tier: I**

road users are inconvenienced and potentially delayed in their travel time. The following table highlights the number of PennDOT projects that exceeded their original scheduled duration:

Project Year	Number of Projects with Time Extensions	Total Number of Days Granted per Year
2005	141	8,687
2006	243	20,553
2007	381	41,309

Table 6 - PennDOT Projects that Exceeded the Original Schedule Completion Date

The contractor is responsible for meeting the schedule requirements for the construction of a project based on the size, level of complexity and requirements of the contract. In most cases the contractor is extremely familiar with developing and managing a construction schedule and the contractor will often have a high level of expertise in this area. It is important that PennDOT have a similar level of expertise in schedule monitoring and evaluation. Without that level of scheduling knowledge PennDOT can be taken advantage of and possibly allow the contractor unjustified time extensions or unwarranted modified schedule approvals. Unjustified time extensions will preclude PennDOT from assessing liquidated damages on the contractor for late completion of the project or phases of the project.

Operational Strengths/Leading Practices:

The construction industry realizes the need for schedule expertise to successfully manage and deliver large capital projects. An operational strength of many construction organizations is a centralized pool of scheduling professionals that support the entire company in estimating, bidding, and project management. The centralized function allows for the wealth of scheduling knowledge to be housed within one group and their services are then provided to the rest of the organization. This allows the scheduling staff to work together and collaborate on issues with members of their group and apply that knowledge across the organization.

PennDOT can promote a similar type of operational strength by implementing a schedule champion for each of the Engineering Districts and by encouraging an active communication network between the Central Office schedule support staff and the Engineering District's schedule champions.

Findings/Recommendation for Improvements:

Central Office needs to play an important role in fostering schedule knowledge and expertise within PennDOT. It appears, that PennDOT has recently filled the vacant scheduling position within the Contract Management Division but PennDOT should re-evaluate if the current staff is adequate to provide schedule support and assistance for the entire Commonwealth. Due to the important nature of providing schedule support to the Engineering Districts, PennDOT should consider accelerating the staffing of that position. The use of consultants to augment the PennDOT schedule support staff is an important recognition by PennDOT that they do not have the internal staff to fully support the schedule monitoring and support needs. PennDOT should encourage that each Engineering District identify and support at least one individual to become the schedule champion for that Engineering District. The selected individuals should have completed the PennDOT schedule training including the Critical Path Method - Schedule Monitoring course and also attend any required external training to make certain they have the knowledge and expertise

Audit Area: C. Management & Productivity	**Issue:** iii. Varying Levels of Schedule Expertise	**Tier: I**

to assist with schedule support for that Engineering District. The schedule champion's primary function should be to support the design and construction staff with scheduling questions, concerns and monitoring in their District. By promoting schedule expertise in house, PennDOT can save the cost required to hire external consultants to perform the schedule evaluations.

In addition, PennDOT should track the actual project completion duration to the duration established in the Plans Specifications and Estimate ("PSE") package. This tracked value should not be used to reward or penalize any individuals or divisions with the Department but rather be used to identify any improvements needed in the schedule developing and monitoring process.

Audit Area: C. Management & Productivity	**Issue: i**v. Duration of Time Required to Execute Design Services Agreements	**Tier: I**

Background / Observation:

One of the common issues encountered during this assessment was the extensive amount of time required to execute a contract for services. The main areas of concern relate to the time required to execute an open end agreement and the time required to execute a project specific agreement[23]. To accurately assess this issue Deloitte FAS analyzed data to determine the actual contract duration times from advertisement to execution. To obtain a reasonable sample of contracts, we examined the total number of open end agreements and project specific agreements that were active during the 2007 calendar year. The following table provides a summary of the data sampled:

Contract Type	Number of Active Contracts	Average Duration (Execution Date – Advertisement Date)
Project Specific	107	324 Days
Open End Agreement	247	211 Days

Table 7 - Active Contracts Calendar Year 2007

In evaluating the active contracts in the 2007 calendar year, Deloitte FAS indentified several of the agreements dated a number of years, some as early as 2001. To account for any contracts that had unusually long durations to execute, we grouped the contracts into periods of time to get a better understanding of the time typically required to execute these types of contracts.

Project Specific Agreements

Period of time to Execute	Number of Active Agreement s in CY2007
0-120 days	8
121-240 days	32
241-360 days	33
361-480	20
481 & over	14
Total	107

Table 8 - Duration to Execute Project Specific Contracts

Open End Agreements

Period of time to Execute	Number of Active Agreement s in CY2007
0-120 days	29
121-240 days	151
241-360 days	43
361-480	15
481 & over	9
Total	247

Table 9 - Duration to Execute Open End Contracts

As identified above, 65 (32+33) of the 107 active project specific agreements in 2007 took

[23] The primary contract vehicals used by PennDOT to contract for design, engineering and consultant services is either through an Open End Agreement or a Project Specific Agreement. An Open End Agreement always PennDOT to establish a blanket contract with a firm and then execute work orders against that general contract up to a maximum dollar threshold. PennDOT has a monetary cap on the value of Open End Agreements which requires limited use of this type of contract. Project Specific contracts are develop with a project specific scope.

Audit Area: C. Management & Productivity	**Issue: i**v. Duration of Time Required to Execute Design Services Agreements	**Tier: I**

between 121 and 360 days. That's ~60% of the project specific contracts that required between 24 to 72 weeks to advance from the advertisement of the contract to the execution of the agreement.

The majority of the open end agreements active over the same period of time took between 121 and 240 days to execute. That's 24 to 48 weeks to get an open end agreement in place. The individuals interviewed as part of this assessment (including the external stakeholders such as design engineering firms) described the duration to execute the open end agreement as reasonable and manageable but the required time to execute a project specific agreement as burdensome and much too long.

Impact:

Clearly the longer it takes to execute a contract for the design and development of a transportation project the longer that project will take to get implemented. Therefore any reduction to the time duration to execute these contracts will directly impact the time to get the transportation implemented and benefit the transportation system. The duration to execute an agreement also negatively impacts the external stakeholders that work with PennDOT. It is challenging for engineering and design services firms to adjust staffing levels and juggle resources to meet the variations in timing from the award of a project to the actual execution of the contract and start of work. PennDOT staff interviewed for this assessment identified funding as the primary reason for the delay between the award of a project and the execution of the contract. Contracts are advertised but variations in funding will cause PennDOT staff to delay the actual execution of the contract. The actual time duration between contract award notification to the actual execution of the contract was not available to Deloitte FAS when requested.

Several PennDOT Business Partners expressed concern with the unpredictable nature of negotiating and executing an agreement with PennDOT. The consistent inconsistency has led consultants to increase their estimates to account for the unknown time from the notification of winning a project to the actual execution of the contract and receiving the notice to proceed with the work under a project specific contract. The quantification of cost associated with this issue is difficult to establish and is beyond the scope of this Performance Audit.

Operational Strengths/Leading Practices

The time required to negotiate and execute an open end or project specific contract is dependent on several factors most of which are outside the control of the consultant and some that are outside the control of PennDOT including involvement by the Department of General Services and the Office of Chief Counsel. Several interviewees noted that the negotiation process can be a difficult hurdle to overcome and can often take a long period of time to complete, sometimes resulting in both parties walking away from the process feeling as if the negotiation was unsuccessful.

A method currently being used in the transportation industry is the use of *Mutual Gains Negotiations*. The Florida DOT was one of the first agencies to use this approach and has been using it for several years. The Florida DOT has used this approach to establish a contractual dialog to assist in reaching a fair and reasonable agreement with consulting firms.

PennDOT has joined forces with the American Consulting Engineers Council of Pennsylvania

Audit Area: C. Management & Productivity	**Issue: i**v. Duration of Time Required to Execute Design Services Agreements	**Tier: I**

("ACEC/PA") to explore the possible use of a *Mutual Gains Negotiations* approach for PennDOT consultant agreements. While the potential use of this application is in its infancy, PennDOT appears to recognize this as an issue that needs to be addressed and is actively looking to improve the process and reduce the duration to execute contracts.

The approach places great importance on both parties meeting and agreeing on the project scope and complexity. One of the potential positive impacts of this approach is the use of established ranges of hours for each task associated with the scope of work, so that the consultant and PennDOT have an accepted range of hours for each item prior to any negotiations. PennDOT is working with its industry partner to establish the range of hours for each potential task item. In addition, PennDOT is developing the internal procedures required to govern the process.

Findings/Recommendation for Improvements:

PennDOT should continue to work to reduce the time required to execute contract agreements. It appears that the combined approach between PennDOT and the ACEC/PA is a positive tactic to reducing contract execution timeframes. PennDOT should establish a realistic timeframe to implement this approach and identify a select number of pilot projects to test the approach. PennDOT should consider using the pilot program as an opportunity to fine tune the process and identify any lessons learned before making the option available to the entire Department.

Audit Area: C. Management & Productivity	**Issue:** v. Project Duration and Liquidated Damages	**Tier:** I

Background / Observation:

PennDOT Construction Specification Publication 408 Section 108 – Performance and Progress outlines the methods employed by PennDOT to measure progress and the contractors' performance on a project. The publication also describes the use of time extensions and time reductions on PennDOT projects and outlines the allowable items that warrant a time extension or time reduction. Section 108.7 defines the use of liquidated damages on PennDOT projects. PennDOT has three types of liquidate damages; Construction Engineering Liquidated Damages, Road User Liquidated Damages, and Work Zone Liquidated Damages. The schedule of daily charges for Construction Engineering Liquidated Damages are summarized below in the following table:

Original Contract Amount		Schedule of Daily Charges for Construction Engineering Liquidated Damages
From More Than	To and Including	Per Calendar Day
$ 0	$ 400,000	$ 675
400,000	1,000,000	1,250
1,000,000	5,000,000	1,645
5,000,000	10,000,000	2,630
10,000,000	15,000,000	3,385
15,000,000	15,000,000 and up	4,430

Table 10 – PennDOT Construction Engineering Liquidated Damages

It is important to note that liquidated damages are not a penalty to the contractor or intended to punish a contractor for late completion. The purpose of the Construction Engineering Liquidated Damages provision is to be compensatory to PennDOT for the projects delayed completion. It is important that PennDOT use the applicable type of liquidated damages for the right project and enforce the liquidated damages when a project is delayed.

Due to the nature of construction projects in the transportation industry, project completion dates are not always met and delays are often encountered. PennDOT needs to carefully evaluate each written request and supporting documentation for time extension requests. The following table provides the number of time extensions granted by PennDOT over the past three years for projects that were closed out during that year:

Audit Area: C. Management & Productivity	**Issue:** v. Project Duration and Liquidated Damages	**Tier:** I

Project Year	Number of Projects Closed	Number of Projects with Time Extensions	Percentage of Closed Projects with Approved Time Extensions	Total Number of Days Granted per Year
2005	269	141	52.4%	8,687
2006	447	243	54.4%	20,553
2007	667	381	57.1%	41,309

Table 11 - Time Extensions Granted on PennDOT Projects

As highlighted in the above table over half of the projects closed out within the last three years had approved time extensions granted. The number of days approved in time extensions has increased over the same period of time, partly due to the increased number of projects completed but overall the percentage of projects with time extensions granted has remained relatively constant.

In comparison, the number of projects with liquidated damages assessed has reduced as the number of projects has increased. The following table shows the number of projects with liquidated damages for the same period time:

Project Year	Number of Projects Closed	Number of Projects with Liquidated Damages	Percentage of Closed Projects with Liquidated Damages	Total Number of Days with Liquidated Damages per Year
2005	269	16	5.9%	175
2006	447	18	4.0%	454
2007	667	28	4.2%	712

Table 12 - Liquidated Damages Assessed on PennDOT Projects

Less than six percent of the total number of projects closed out each year had liquidated damages assessed, compared to the 55% of projects that had time extensions approved. During this three year period, PennDOT granted 70,549 days of delay while only assessing Liquidated Damages for 1,341 days.

Impact:

Extending the duration of transportation projects is often an unavoidable fact due to the wide range of potential unknowns that can occur on a project or the uncontrollable events such as weather that can affect the completion date. However, it is important that the Department hold contractors responsible for controllable delays that are incurred on the project. Transportation projects impact the traveling public and the longer the projects take to complete the greater impact they have on the community. In addition, if time-extensions are granted that are not justified, PennDOT is unable to assess Liquidated Damages. For example, if 25% of the 70,549 days between 2005 and 2007 granted by PennDOT were not justified, PennDOT has potentially lost the ability to assess approximately $44 million in Liquidated Damages (70,549 days x 0.25 x $2,500/day average = ~$44 million).

Audit Area: C. Management & Productivity	**Issue:** v. Project Duration and Liquidated Damages	**Tier:** I

Operational Strengths/Leading Practices:

It appears that PennDOT District staff have the ability to assess liquidated damages or issue a time extension to avoid liquidated damages for a project. However this process is not automatic and required project staff to assess the situation on a case by case basis. Some Departments of Transportation within the United States have contract management systems that automatically assess liquidated damages to the contractor on a project once the contractual completion date is exceeded. This allows a clear understanding from both the DOT and the contractor that the liquidated damages in the contract are going to be assessed without an approved time extension. Similarly, the contract management systems employed by other DOTs require a high level of approval for time extensions granted on projects after a majority of the work activities have been completed to reduce the practice of granting time extensions to avoid enforcement of liquidated damages.

Findings/Recommendation for Improvements:

PennDOT should consider automating the process of assessing liquidated damages on a project when the contract time is exceeded. In addition, PennDOT should consider revising the policy on granting time extensions and apply a monetary value to the requested time extension. The time extension request should be reviewed similar to a change order with careful consideration to the methods used by the contractor to calculate the impacted time and reasons for the requested extension.

For example if a contractor requests a 45 day time extension on a $5.1 million project that has the standard Construction Engineering Liquidated Damages, that requested time extension should be valued at a minimum of $118,350 ($2,630 LD per day x 45 days). This type of consideration should be applied in addition to the normal items that are evaluated when considering a change to the project, such as any unanticipated conditions or the impact of the additional work to the critical path of the project timeline. By including the standard Construction Engineering Liquidated Damages into each request for a time extension, PennDOT can effectively manage construction resources and be compensated for extending those resources beyond the contract completion date.

In order to effectively manage this process and carefully evaluate contractors requested time extensions, PennDOT needs to have an experienced scheduling function with the Department. (See *Audit Area C – iii Varying Levels of Schedule Expertise* above for more information)

Audit Area: C. Management & Productivity	**Issue:** vi. Inconsistent use of Portfolio Managers in each District	**Tier:** II

Background / Observation:

During the course of our assessment the Deloitte FAS team had an opportunity to meet with several PennDOT Engineering Districts. Even though PennDOT is a de-centralized organization Deloitte FAS did not anticipate finding the extent of variation that was found in the organizational structure for each of the Districts. This was particularly noticeable with the Portfolio Manager position within the Engineering Districts. It appears that PennDOT's Central Office required each Engineering District to establish a Portfolio Manager but did not provide any requirements for how that position should be structured within the organization. It is our understanding that PennDOT's Central Office allowed each Engineering Districts to determine the best way to implement a Portfolio Manager into their organization and submit the proposed organizational structure to Central Office for approval. This allowed for several different variations of the Portfolio Manager position to be developed. The dissimilarities range from one Engineering District having a single PennDOT employee sharing the responsibilities of Portfolio Manager and Senior Bridge Engineer, to another District that has multiple Portfolio Managers comprised of both in-house PennDOT employees and external consultants.

PennDOT Publication 10A – Transportation Engineering Procedures, Chapter 3 provides the following definition for the Portfolio Manager:

> *The Portfolio Manager directs a staff of Project Managers and oversees the completion of the District's design projects. The Portfolio Manager is responsible for making project assignments, monitoring Project Manager performance, providing guidance, and promoting Project Manager development. A Portfolio Manager must have a thorough understanding of the capabilities and workload of each Project Manager, as well as the complexity and approximate time demands of each project.*
>
> *In matching project assignments to Project Managers, the Portfolio Manager strives to optimize resource allocations and assure predictable, successful project development. The Portfolio Manager considers project size, complexity, priority, and schedule, current and anticipated work loads, and individual Project Manager experience and capabilities.*

The definition provides a clear understanding of the expected role of the Portfolio Manager. The publication continues to provide an optimal organization structure to allow the Portfolio Manager and Project Manager to effectively manage the development of a project. Section 3.7 describes the use of a matrix management organizational structure to manage projects.

Impact:

By not having a full time active Portfolio Manager position or not effectively using the Portfolio Manager position, the Department runs the risk of losing focus on the overall project development and implementation strategy. Without an individual or group of individuals that are responsible for the entire program, project staff can become consumed in project specific needs and tasks and not understand how their project is affecting other projects or other PennDOT resources. An organization with a well defined Portfolio Manager position can operate in a more efficient manner and allow the project development staff to function more effectively.

Operational Strengths / Leading Practices:

Audit Area: C. Management & Productivity	**Issue:** vi. Inconsistent use of Portfolio Managers in each District	**Tier:** II

The identified need and use of a portfolio manager position within the Department is an operational strength that PennDOT should be commended for. It is significant that PennDOT realized the need to have select individuals in a position to manage the project work flow and resources from a portfolio perspective. This allows the Districts to better manage the entire project development program instead of have separate project specific managers competing for resources.

To advance the current operational strength into a potential leading practice, PennDOT should consider determining the most optimal use of the Portfolio Manager and standardizing the implementation of the position throughout all of the Engineering Districts. This will provide consistency in Portfolio Manager position and allow for the maximum benefit from the matrix management organizational structure described in PennDOT Publication 10A. The current PennDOT procedure manuals including PennDOT Publication 10A – Transportation Engineering Procedures are well defined and are a great basis for the successful management of the project development process.

Findings/Recommendation for Improvements:

Several of the Engineering Districts have a well organized structure with defined roles and responsibilities for the Portfolio Manager position within the District. The Portfolio Manager needs to have the ability to effectively manage the following:

- Progress and development of all projects within the District
- Workload of the in-house Project Managers
- The ability to keep design work in house or direct consultant usage
- Approval of alternative project delivery methods for successful candidate projects

To be in the best position to accomplish these measures the Portfolio Manager should report directly to the Assistant District Executive for Design or be at the same level as an Assistant District Executive and report directly to the District Executive. Either way the Project Managers within the design group should report directly to the Portfolio Manager. The Portfolio Manager needs to have accurate and real time information concerning the status of the consultant contracts and open end agreements, so the individual or group of staff maintain this information should report directly to the Portfolio Manager or at least have a dotted line reporting to the position. The Portfolio Manager needs to have enough authority to be able to decide or provide support for a successful candidate project that would benefit from the use of any alternative contracting / delivery method. That can include the use of Design-Build or other contracting methods. Engineering District 2-0 appears to have developed a good working structure for the Portfolio Manager position. For locations that have a work load that dictate multiple portfolio managers, Engineering District 6-0 has implemented four portfolio manager positions two in house and two consultant based positions.

Audit Area: C. Management & Productivity	**Issue:** vii. The Engineering Construction Management System	**Tier:** II

Background / Observation:

The Engineering and Construction Management System ("ECMS") was first described in Vision 2020 as a proposed new way for PennDOT to manage the design and construction process by the year 2020. ECMS was developed as a computer system that would support a re-engineered PennDOT project delivery process. The implementation of ECMS was divided into different sections which cover, (i) Security, (ii) Consultant Agreements (consultant services selection and invoicing), (iii) Contract Management (electronic bidding, bid package presentation), and (iv) Construction (project management and construction management). The ECMS system allows the PennDOT design and construction staff to be connected into one system to manage the major aspects of the project development / implementation process. The same system allows PennDOT Business Partners to access the project information. ECMS allows construction contractors and design consultants the ability to receive electronic notifications and information about potential projects. The system and allows the contractors to electronically bid on selected projects without needing separate systems and the use different technologies. ECMS is also used to submit and manage work orders and payment requests for the majority of the transportation projects.

Impact:

ECMS has had a tremendous impact on the efficiency and effectiveness of the highway construction program. Both internal and external stakeholders have expressed their satisfaction with the system and have identified the following benefits of ECMS:

- A more efficient use of PennDOT resources
- Reduce data entry
- Easier access to more accurate information
- Reduced paperwork during the construction phase
- Reduced expenses required to produce and store documentation
- Ability to use a single scheduling tool (Openplan)
- More efficient project delivery
- More consistent interface between PennDOT and their Business Partners
- Bid information provided to contractors faster and with more uniformity
- Faster payment to the contractors
- Quicker and more routine work order process

Operational Strengths / Leading Practices:

The foresight by PennDOT to re-engineer the project development process and then develop a computer system to allow users to navigate through and manage that process is an industry leading practice. PennDOT has continued to improve ECMS and most recently has introduced ECMS II in an attempt to continuously improve the system.

Audit Area: C. Management & Productivity	**Issue:** vii. The Engineering Construction Management System	**Tier:** II

Findings/Recommendation for Improvements:

PennDOT should continue to use ECMS to manage the project development process and continue to identify and work to implement improvements whenever possible.

Audit Area: C. Management & Productivity	**Issue:** viii. County Maintenance Operations	**Tier: I**

Background / Observation:

The annual Highway Maintenance Program comprises a large portion of the total PennDOT annual budget. The following table provides the annual Highway Maintenance (Appropriation 10582) budget by District for the three most recent years:

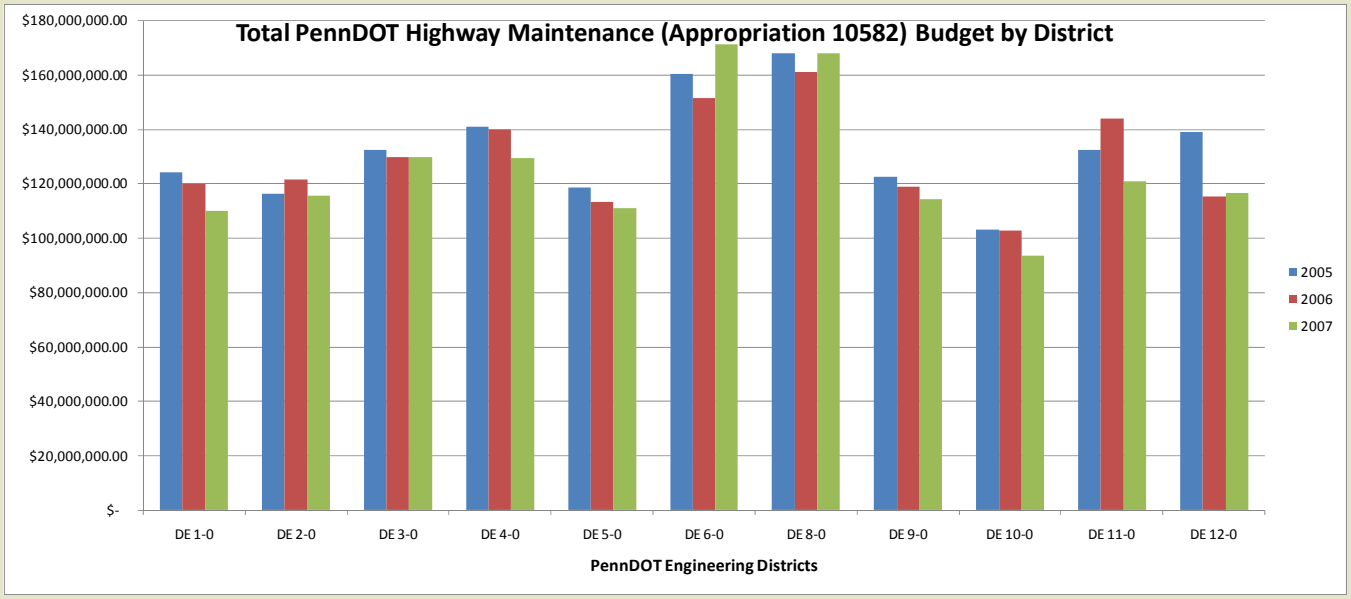

Figure 2 - Total PennDOT Highway Maintenance (Appropriation 10582) Budget Values by District[24]

The budgeted values above are based on both the State and Federal Highway Maintenance Budgeted values for Appropriation Number 10582 and does not account for any maintenance items included in any of the other PennDOT appropriations. Across the state the total Highway Maintenance Budget has decreased by ~3.0% from the 2005 to 2006 budget and again from 2006 to 2007. The Highway Maintenance budget accounts for approximately half of total annual PennDOT budget. The following table outlines the PennDOT Highway Maintenance Budget verses the total PennDOT budget for the same period of time.

Budget Year	Highway Maintenance Budget	Total Budget	Percentage of Total
2007	$ 1,379,627,000.00	$ 2,886,666,197.36	47.8%
2006	$ 1,416,178,772.36	$ 3,193,900,283.19	44.3%
2005	$ 1,455,944,538.52	$ 3,014,852,374.39	48.3%

Table 13 - Total Highway Maintenance Budget Compared to the Total PennDOT Budget

The Federal portion of the Highway Maintenance Appropriation 10582 can vary from year to year based on the type and the number of betterment projects planned and included on the Statewide Transportation Improvement Plan ("STIP"). The state portion of maintenance funding has been

[24] Information provided by PennDOT Bureau of Fiscal Management on December 20, 2007

Audit Area: C. Management & Productivity	**Issue:** viii. County Maintenance Operations	**Tier: I**

fairly consistent over the same period of time with a slight decrease as seen in the table below:

Budget Year	Highway Maintenance Budget	State Portion of Highway Maintenance Budget	Percentage of Total
2007	$ 1,379,627,000.00	$ 1,176,467,000.00	85.3%
2006	$ 1,416,178,772.36	$ 1,180,785,664.16	83.4%
2005	$ 1,455,944,538.52	$ 1,247,764,000.00	85.7%

Table 14 – State Portion of the Total Highway Maintenance Budget

The state portion of the funds associated with Appropriation 10582 is distributed to each county using the Additional State Highway Maintenance Appropriation ("ASHMA") formula. The following tables provides a distribution of the State portion of the Highway Maintenance Budget by District:

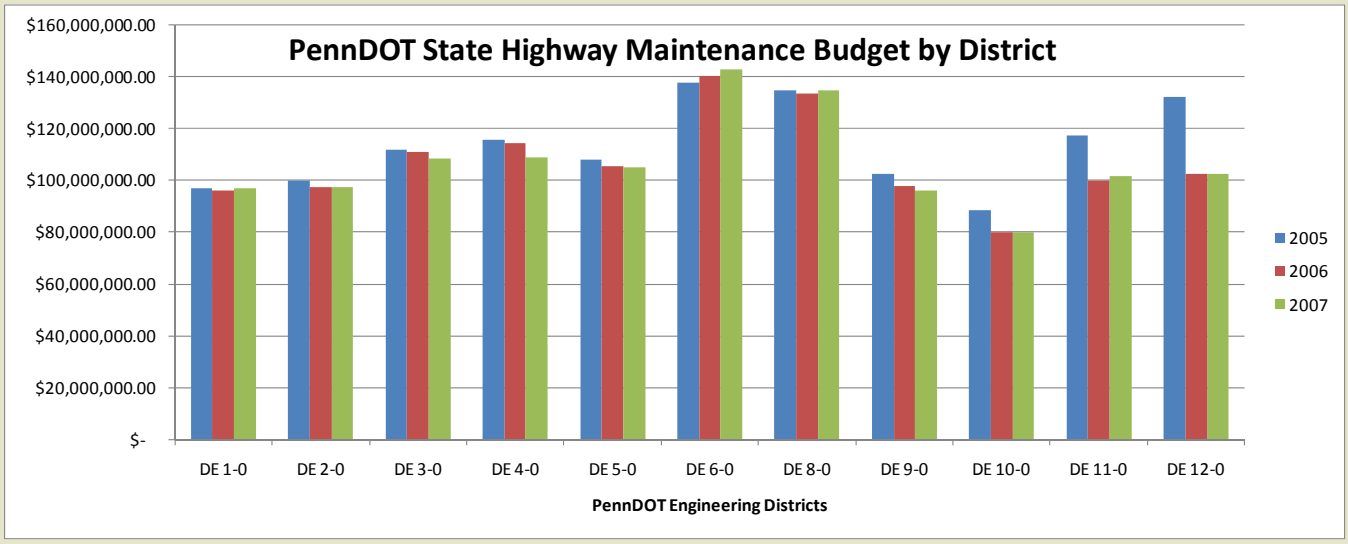

Figure 3 - State portion of PennDOT Highway Maintenance (Appropriation 10582) Budget Values by District

The information assessed indicates that, within recent years, the funding levels for PennDOT's maintenance activities have remained relatively constant or even has decreased in some areas. Over the same period of time construction material and commodity prices have dramatically increased which has affected DOTs across the country in not only the construction of new assets but also in their ability to maintain existing assets. Departments have struggled to conduct maintenance activities within the same budget but with higher material costs. The following chart shows the dramatic increase to the producer price index for asphalt paving mixtures and blocks between 2004 and 2006.

Audit Area: C. Management & Productivity	**Issue:** viii. County Maintenance Operations	**Tier: I**

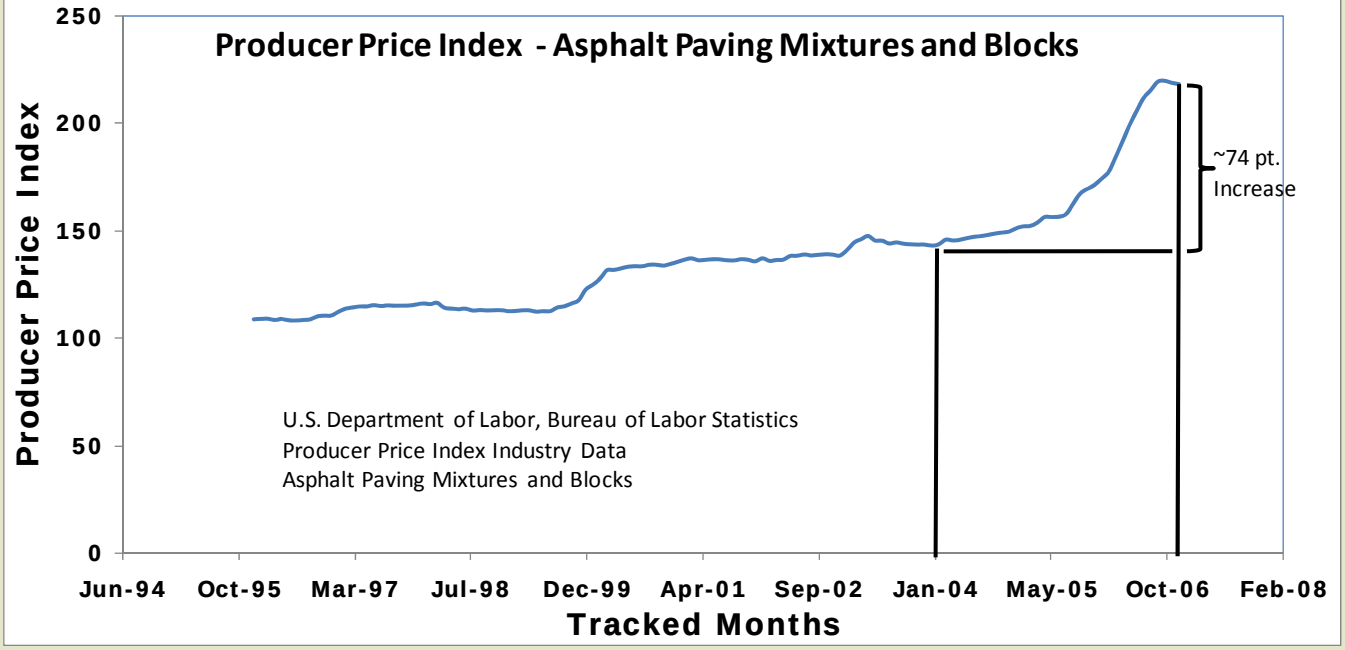

Figure 4 – United States Producer Price index for Asphalt Paving[25]

To assess PennDOT's performance given the conditions identified above, Deloitte FAS identified a method to assess the efficiency and effectiveness of PennDOT's County Maintenance operations understanding that PennDOT is a large organization with eleven Engineering Districts that encompass 67 separate County Maintenance organizations. Deloitte FAS met with and interviewed select County Maintenance personnel within each of the Engineering Districts included as part of this assessment. In order to assess the efficiency and effectiveness of PennDOT's County Maintenance program, Deloitte FAS identified the major maintenance activities conducted by PennDOT's internal resources. Since PennDOT is a decentralized organization each Engineering District or County Maintenance Office can elect to use internal forces to complete the maintenance activities or use external contractors to perform the work. Therefore not all of the counties within the Commonwealth use internal forces for all of the activities assessed. Deloitte FAS selected the top ten maintenance activities (by dollar value) performed by PennDOT staff during the 2006 – 2007 maintenance season. Those same maintenance activities were assessed for the 2005 – 2006 and 2004 – 2005 seasons. The following table provides a summary of the selected maintenance activities:

[25] Data reported by the U.S. Department of Labor, Bureau of Labor Statistics

Audit Area: C. Management & Productivity	**Issue:** viii. County Maintenance Operations	**Tier: I**

Total PennDOT Maintenance Expenditure by Activity

Activity	2004-05	2005-06	2006-07
Snow Removal	$ 109,013,000.00	$ 81,578,000.00	$ 124,913,000.00
Manual Patching	$ 34,372,000.00	$ 30,792,000.00	$ 30,253,000.00
Oil & Chip -- Gallons	$ 18,515,000.00	$ 17,096,000.00	$ 19,733,000.00
Base Repairs	$ 18,866,000.00	$ 19,553,000.00	$ 18,489,000.00
Paving	$ 12,284,000.00	$ 9,349,000.00	$ 16,695,000.00
Brushing	$ 11,253,000.00	$ 15,315,000.00	$ 15,264,000.00
Leveling	$ 11,981,000.00	$ 1,001,000.00	$ 15,074,000.00
Pipe Replacement	$ 11,861,000.00	$ 14,672,000.00	$ 13,578,000.00
Widening	$ 8,389,000.00	$ 11,905,000.00	$ 12,391,000.00
Drainage Maintenance	$ 7,924,000.00	$ 11,297,000.00	$ 12,073,000.00
Subtotal	$ 244,458,000.00	$ 212,558,000.00	$ 278,463,000.00

Table 15 - PennDOT Maintenance Cost by Activity[26]

Winter snow removal operations accounted for the largest expenditure within PennDOT's Maintenance activities. Deloitte FAS evaluated the conditions affecting the winter maintenance program in Audit Area: B – Mobility, Issue: County Maintenance - Winter Program above.

Five of the remaining nine top maintenance activities involve PennDOT's use of petroleum based products for maintenance activities. Paving is a large operation that a number of the County Maintenance Offices have elected to outsource to contractors to perform. Various reasons for outsourcing have been identified by PennDOT maintenance personal during our assessment. For example, several individuals explained that it would cost PennDOT more money to purchase a ton of asphalt compared to the price per ton an external contractor could purchase and install a ton of asphalt. The staff believed that was due to the contractor's ability to purchase large quantities of material and the contractor's ability to install the material at a higher production rate. PennDOT maintenance staff also explained that the large upfront expense for the procurement and continuous cost to maintain the equipment required to perform the paving activities with internal resources was larger than a single County Maintenance Office or even some Engineering Districts could manage.

The maintenance activity data assessed supports the trend of PennDOT County Maintenance Offices reducing their internal paving operations. In 2004, 32 of the 67 counties reported paving costs related to internal maintenance expenditures. Each year thereafter the number of counties reporting internal paving costs reduced by one. In 2007 only 30 of the 67 counties reported internal paving costs. The counties vary across the years but Engineering Districts 3-0 and 8-0 are the only two Districts that have continuously reported internal paving costs for each county within the District. The following tables provide the average cost for Districts 3-0 and 8-0 to conduct paving operation per ton of asphalt by county.

[26] Maintenance Activity and Unit Cost data provided by the Bureau of Maintenance and Operations

Audit Area: C. Management & Productivity	**Issue:** viii. County Maintenance Operations	**Tier:** I

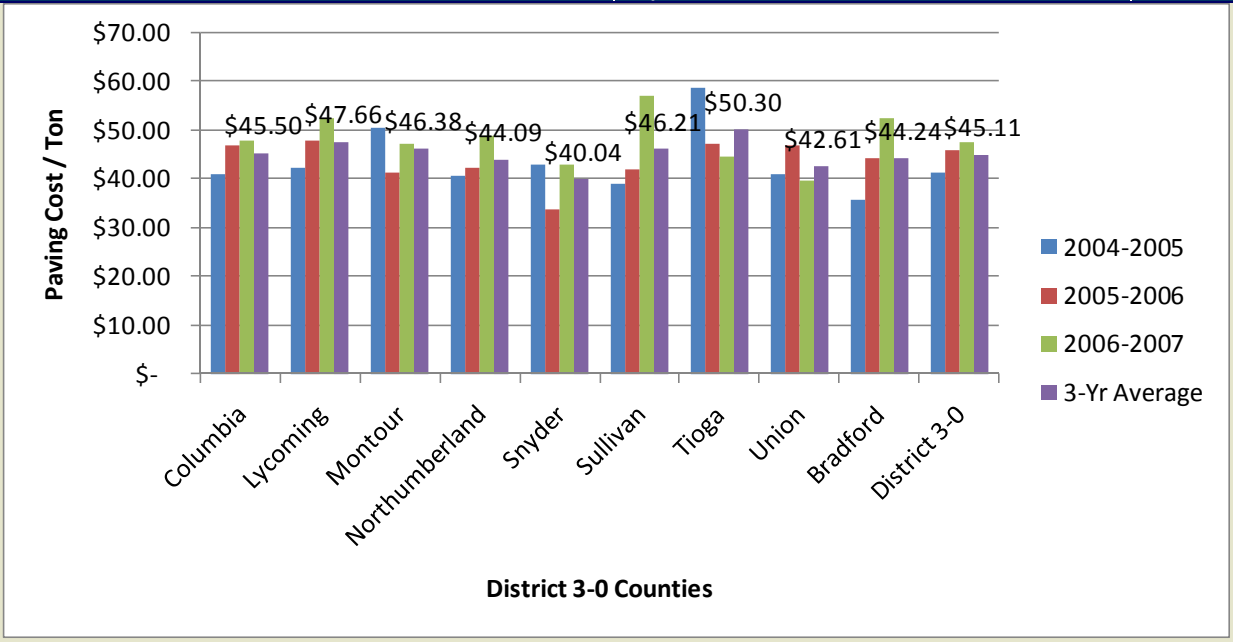

Figure 5 - District 3-0 Average Paving Cost / Ton by County

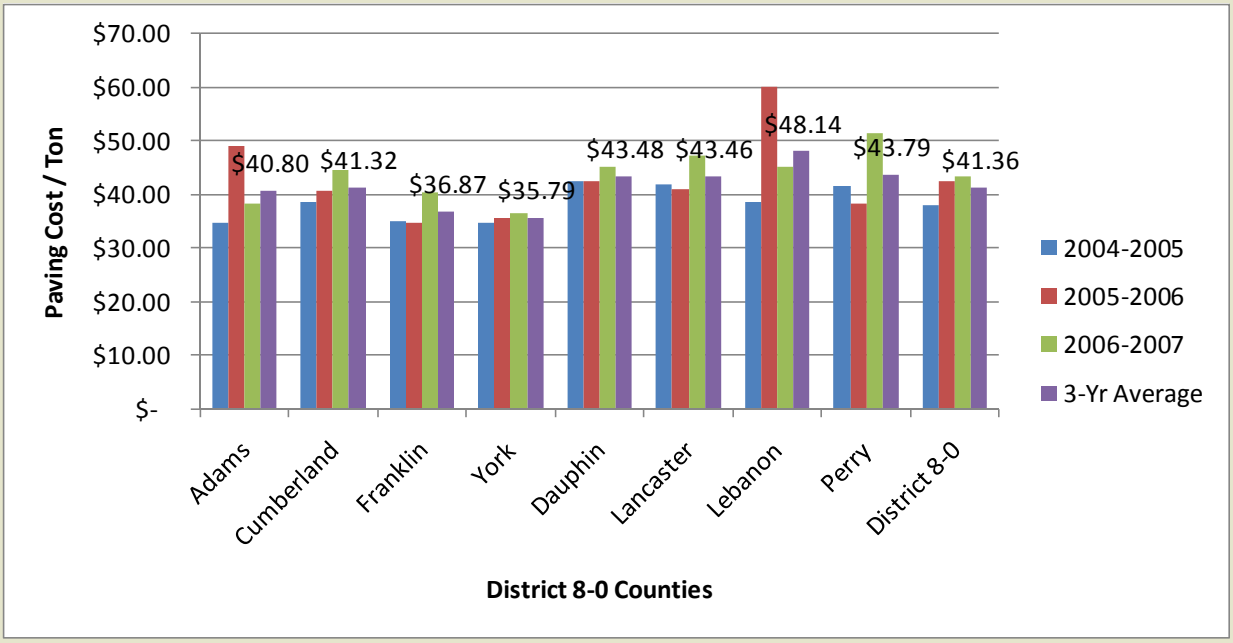

Figure 6 - District 8-0 Average Paving Cost / Ton by County

The previous tables highlight the average unit cost for the three year period assessed for each of the counties within Engineering Districts 3-0 and 8-0. Engineering Districts 3-0 has been able to install paving at an average rate of $45 / ton over the past three years. The average unit cost of installed asphalt paving in District 8-0 is approximately $41 /ton over the same period of time.

During the 2006-07 PennDOT maintenance season, Engineering District 3-0 averaged $47.80 / ton of paving, while Engineering District 8-0 averaged $43.50 / ton compared to the average

Audit Area: C. Management & Productivity	**Issue:** viii. County Maintenance Operations	**Tier: I**

contractors bid price of $57.46 / ton[27] for Bid Item 0409-0492 Superpave Asphalt Mixture Design, HMA Wearing Course. The average contract bid price is based on 61 occurrences within that time period and is an average for the entire state. Contracting bid prices will vary depending on application and location but the bid price is significantly higher than the average unit cost for paving in both Districts 3-0 and 8-0.

Impact:

There appears to be a misconception within PennDOT concerning their ability to self perform paving operations at competitive prices. The unit cost for paving operations varies by County and by Engineering District and not all maintenance units within PennDOT will be able to conduct paving operations for less cost or more efficiently then an external contractor. However, the information assessed highlights that portions of PennDOT can effectively perform paving operations with internal resources. Given the stagnant funding levels and increased cost of construction materials, PennDOT should consider the effects of a bolstered internal paving operation.

Operational Strengths/Leading Practices:

On a national level, the Reason Foundation published the 16th Annual Report on the Performance of State Highway Systems for 1984 -2005, which ranks states across the country in various categories. The Reason Foundation report published in June 2007, ranked Pennsylvania 37th among the 50 states in the cost of maintenance per state controlled mile of roadway. North Dakota ranked 1st with $5,077 of maintenance disbursements per state-controlled mile and New Jersey ranked 50th with $153,845 of maintenance disbursements per state-controlled mile. This comparison used an estimate of $1,214,509,000 for Pennsylvania's 2005 maintenance costs and 43,000 miles of state controlled roadway for a unit cost $28,060 / mile. The report calculated the national average maintenance disbursements per state controlled mile of roadway at $19,615. Therefore based on the analysis documented in the Reason Foundation Report, Pennsylvania is spending $8,445 per state controlled mile more than the national average. When applied to the state controlled roadway miles in Pennsylvania, this equates to $36.3 M in maintenance funds spent above the national average in 2005. The following table provides a graphical representation of a select portion of states within the country:

[27] Data provided from PennDOT's ECMS Item Price History for the period 7/1/2006 through 6/30/2007

Audit Area: C. Management & Productivity	**Issue:** viii. County Maintenance Operations	**Tier: I**

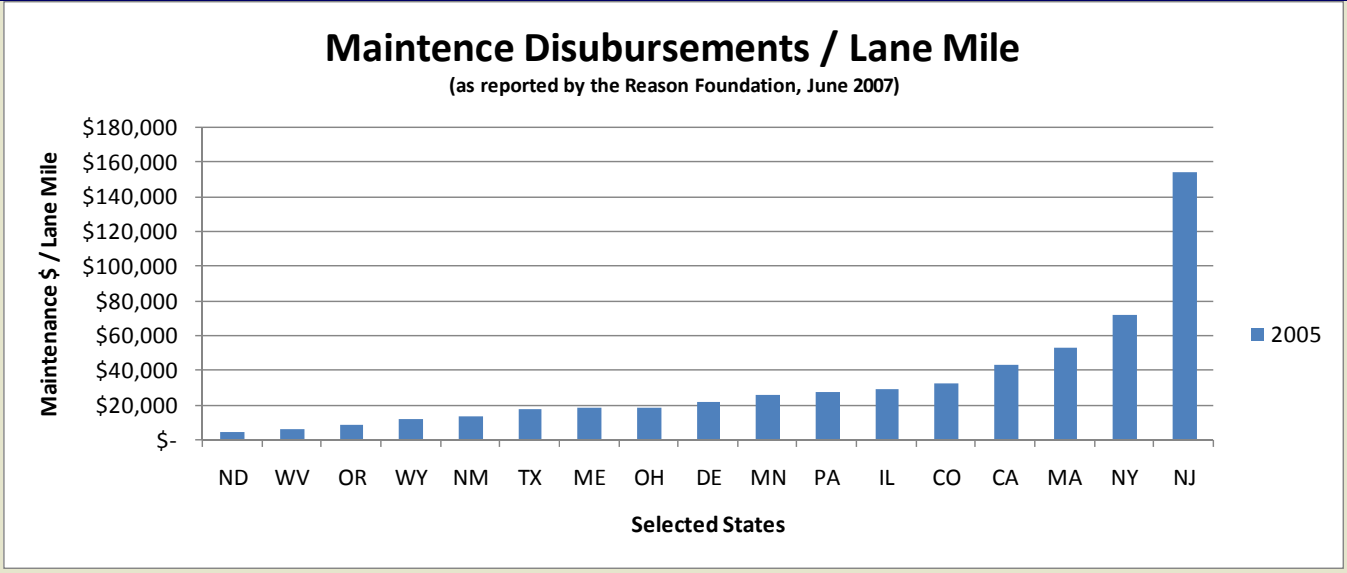

Figure 7 - Maintenance Disbursements Per Lane Mile

The report identified 36 states with lower maintenance disbursements per state controlled mile, West Virginia for example has 34,051 state controlled miles and expended approximately $227,232,000 for a unit cost $6,673 / mile. It is important to note that each state experiences different factors that affect the about of maintenance expenditures required to maintain their roadways. As shown above, PennDOT's snow removal and winter maintenance operations are a major expenditure that some of the other states do not incur. The previous mobility section of this report identified approximately $2,227 / lane mile of expenditures by PennDOT for winter maintenance for the 2006-2007 season. Therefore, it is not possible to compare the highway maintenance programs of other states to PennDOT based on this high level of information but it is important to identify that other states are able to spend less maintenance dollars.

Findings / Recommendation for Improvements:

Based on the information assessed, PennDOT should consider the effects of increased internal paving operations. It is not practical to expect every County Maintenance Office or even every Engineering Districts to develop an internal paving program but perhaps a regional program can be evaluated. This would allow several counties and possibly several Districts to share the required equipment and resources required to self perform paving operations. A thorough analysis would need to be conducted by PennDOT to determine if the upfront cost to procure for the required paving equipment can be recovered by the estimated cost savings by self performing the work.

Audit Area: D. System Preservation	**Issue:** i. Grouping of Similar Projects	**Tier: I**

Background / Observation:

With the heightened awareness to the structurally deficient bridges across the state, PennDOT has identified the need to quickly and effectively repair or replace the structures to reduce the road users inconvenience and potential risks associated with the structurally deficient bridges. Many of the structurally deficient structures are smaller bridge projects compared to the typical roadway projects. Due to the number of deficient structures, the number of projects moving through the project development process will likely increase in the upcoming years. An increased number of projects will result in an increased workload for not only the PennDOT staff but also the staff of the resource agencies that support these projects. The individuals interviewed during this assessment made it clear that the required time to manage a project is not directly proportional to the dollar value of the project. In most cases the project management staff believed that the smaller projects ended up requiring a similar amount or more of their time and resources than that required for larger projects.

One possible solution to the increased number of smaller bridge repair / replacement projects is to group smaller projects into condensed larger projects that occur at several different locations. By grouping projects that are located in the same geographic area, projects that require the same type of repairs, or projects that involve similar structures, PennDOT can increase efficiencies in the project development and contracting process. Some Districts have already attempted to expedite this process by grouping bridge contracts for similar types of bridges or similar types of bridge repairs.

Grouping projects can reduce the number of individual projects that are under a project manager and design teams responsibility. If carefully grouped, PennDOT can combine the design services for several smaller sized projects and advertise them in a single project specific contract. This would allow one consulting firm to advance the projects instead of requiring PennDOT to issue multiple project specific contracts or drawing down multiple open end agreements. This would also allow a single PennDOT or consultant project manager to oversee the design of the bundled group of projects.

The grouped projects can be advertised as a Design-Build contract or advanced within PennDOT for a Design-Bid-Build approach. Under either scenario, PennDOT's administrative efforts will be reduced because this will only require that a single Plans Specifications and Estimate package to be developed and only require a single contract to be advertised, negotiated and awarded.

Grouping projects also creates a potential cost savings for the construction contractor with the ability to receive better material pricing due to the increased quantity of materials for the group of projects. A contractors operating cost can also be reduced due to the efficiencies gained with having the ability to rotate crews of labor from site to site performing the same activities along with the ability to have one management team for multiple projects. Similarly, PennDOT's oversight cost can be reduced by using a crew of construction inspectors to rotate and inspect each of the projects in the group compared to having individual inspection crews for each of the individual projects.

PennDOT has worked to advance select project types (guide rail and surface improvement) by grouping them for efficiencies. As part of the Accelerated Bridge Program, PennDOT initiated a dialogue with the contracting and consulting industries to determine optimum groupings of projects based on project type, size, and geographic location.

Impact:

Audit Area: D. System Preservation	**Issue:** i. Grouping of Similar Projects	**Tier: I**

Grouping like projects can positively impact PennDOT in several ways. Mainly it allows for a more efficient method to repair / replace some of the smaller structural deficient bridges in the Commonwealth. In addition, the projects have the opportunity to be completed faster and at a reduced cost in the design, construction, and oversight phases of the projects.

Operational Strengths/Leading Practices:

Grouping of smaller projects to gain efficiencies is not a new practice or convention. This type of design and construction method is used in the power industry for the replacement or upgrading of transfer and utility stations. Similar contracting approaches are also used in mass transit applications where a single contract will be awarded for the construction / renovation of the transportation stations within the project but a separate contract will be awarded for the guide way and other components of the project.

PennDOT is currently experimenting with grouping projects and have successfully packaged projects of similar nature or projects in the same geographical region.

Findings/Recommendation for Improvements:

PennDOT should continue to group similar projects or projects in the same geographical region to benefit from any potential efficiency that can be gained. The Central Office should work closely with the Engineering Districts to develop guidelines that would assist PennDOT employees in identifying successful candidates for grouping projects and provide reasonable thresholds for the number of projects and size of projects that should be packaged together.

Audit Area: D. System Preservation	**Issue:** ii. Transportation Asset Management	**Tier: I**

Background / Observation:

The Transportation Funding and Reform Commission Report (November 2006) recommended that PennDOT implement a more disciplined asset management approach. Asset Management is widely recognized within the transportation community as an important means for State Departments of Transportation to make the most effective use of their infrastructure investments.

The American Association of State Highway Transportation Officials ("AASHTO") published the Transportation Asset Management Guide in 2002 as part of the National Cooperative Highway Research Program ("NCHRP") Project 20-24(11). PennDOT was a participant in the project. The Transportation Asset Management Guide defines a comprehensive approach to asset management as described in the guide,

> "Asset management can touch nearly every aspect of a transportation agency's business, including planning, engineering, finance, programming, construction, maintenance, and information systems. Asset management should not be viewed, however, as yet another new program, requiring another new bureaucracy. Rather, asset management is a "way of doing business." It brings a particular perspective to how an agency conducts its existing procedures, reaches decisions, and applies its IT capabilities. It suggests principles and techniques to apply in policymaking, planning, project selection, program tradeoffs, program delivery, data gathering, and management system application."

The Transportation Asset Management Guide provides a comprehensive view of transportation asset management and defines the following five major areas that comprise a disciplined and structured asset management approach as shown in the figure below.

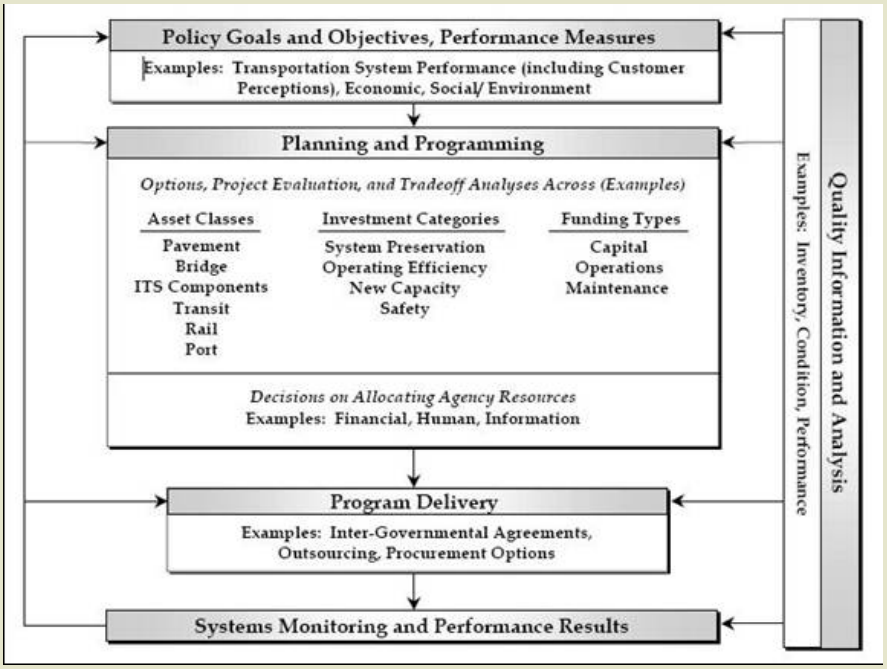

Figure 8 - AASHTO Transportation Asset Management Guide

Using the Transportation Asset Management Guide as a framework for our assessment we evaluated the following five major areas of transportation asset management as they relate to PennDOT:

Audit Area: D. System Preservation	**Issue:** ii. Transportation Asset Management	**Tier: I**

- Policy Goals and Objectives
- Planning and Programming
- Program Delivery
- Quality Information and Analysis
- Systems Monitoring and Performance Results:

Our observations for each area are described below.

Policy Goals and Objectives

This area includes the role of policy formulation in asset management and ways in which policy guidance can benefit from improved asset management;

- PennDOT has emphasized the replacement and rehabilitation of the Commonwealth's structurally deficient bridges and established program goals.
- In addition to bridge rehabilitation and replacement work, PennDOT has a program goal of spending $100 million per year on bridge preservation work that is intended to "keep good bridges good" and enable us to defer the higher cost restoration work.
- Performance metrics exist to track performance in reducing the structurally deficient ("SD") bridges, funding allocations for SD bridges and bridge preservation metrics.
- PennDOT has adopted a SMART transportation approach that emphasizes affordable and context sensitive solutions to local transportation needs to accomplish more projects.
- The Deputy Secretary for Highway Administration and Deputy Secretary for Administration are actively engaged in developing performance metrics and developing executive information as part of their Data Rich Information Poor ("DRIP") initiative.

Planning and Programming

This area focuses on reaching decisions about resource allocation for investments in transportation infrastructure:

- PennDOT is actively engaged with their local planning partners to continuously evaluate and update the local Transportation Improvement Programs for inclusion in the Statewide Transportation Improvement Program.
- PennDOT has developed a Risk Assessment program that utilizes Bridge Management System ("BMS") data to prioritize bridge rehabilitation and replacement candidates. This greatly aids the Districts in programming bridge projects on the Transportation Improvement Program to meet overall Department goals.
- Presently there is a wide variation among Engineering Districts in terms of their Pavement Management Strategies. Currently, there are 53 different pavement strategies used across the Districts[28].
- Highway Administration is developing consistent standards for Pavement Management and treatments.

[28] Based on information provided by the Bureau of Maintenance and Operations

Audit Area: D. System Preservation	**Issue:** ii. Transportation Asset Management	**Tier: I**

- An on-going area of concern is how PennDOT professionals make well informed decision about investing across modes.

Program Delivery

This area looks at options in resource utilization and management methods to deliver programs and services:

- There are well established processes for engineering design and construction project management.
- PennDOT currently uses of PRO-TEAMS[29] to shorten the time frame for bridge design and save engineering dollars on select projects.
- PennDOT uses Value Engineering Accelerated Construction and Technology Transfer workshops for large projects.
- PennDOT has some limited experience with Design-Build to shorten project delivery time and reduce cost. Most projects where Design-Build was implemented were for emergency type projects.
- Depending upon the pavement management strategies planned for the future, maintenance staff might not be able to do all treatments with existing staff and equipment

Quality Information and Analysis

This includes the use of information technology at each stage of asset management, monitoring of asset performance and feedback of this information to improve future decision processes and reporting and communication of key information and results.

- PennDOT has a number of information systems that support asset management.
- The collection of performance metrics is currently not fully automated and requires manual compilation each month.
- Once PennDOT's pavement management strategies are finalized the existing asset management systems may need to be modified to support the new approach.

System Monitoring and Performance

This area covers the continues monitoring of the system to identify improvements:

- PennDOT performs condition monitoring and rating for structures and pavement.
- Condition information is used as an input to the planning process.
- Although performance metrics are in place, there does not appear to be clear linkage between the performance metrics and PennDOT's strategic objectives.
- There are numerous metrics being tracked that do not roll up into higher level strategic measures for executive management (See Section 5 of this report).

Impact:

There has been significant industry discussion about the crisis facing the U.S. transportation infrastructure. The existing funding sources are insufficient to meet the growing needs to maintain

[29] PennDOT term used for experienced panel of design and construction professionals assembled to review a project scope through the development process.

Audit Area: D. System Preservation	**Issue:** ii. Transportation Asset Management	**Tier: I**

or replace the infrastructure on a national level. The Commonwealth is evaluating innovative approaches to provide additional funding. For their part, PennDOT must demonstrate they will make the best use of available and new funding. Asset Management is one such means to provide effective management of the transportation infrastructure. An Asset Management approach allows for variations among the regions based upon their unique circumstances, but it also provides the necessary engineering and management controls to ensure that the most appropriate and effective asset strategies are employed. The lack of a consistent asset management approach across PennDOT means that PennDOT cannot be certain that they are making the optimum use of transportation infrastructure funding.

Operational Strengths / Leading Practices:

PennDOT's leadership has clearly defined the preservation of existing infrastructure as a priority. They have instituted a number of programs such as the SMART transportation approach to make the best use of available resources and meet local needs. They employ value engineering and limited accelerated construction approaches to improve the quality of projects and speed project delivery. Highway Administration leadership is very active in the development and improvement of performance metrics to measure and manage organizational performance. PennDOT actively participates in asset management and performance metric programs at a national level. They have made consistent investments and commitments to information systems to support program delivery and asset management.

Findings / Recommendation for Improvements:

Using the Asset Management Framework as a guide, we found that PennDOT is currently assessing some of the key areas affecting asset management, but overall the efforts seemed fragmented and not well coordinated. For example, different parts of the organization appeared unaware of what other functions were doing and there didn't seem to be an overall plan for Transportation Asset Management. As described in the guide, Transportation Asset Management is a major change that affects people, processes and technology. An effective Transportation Asset Management strategy is critical considering the Commonwealth's need for and expectation of increased funding. PennDOT must be able to ensure the new funding is effectively used.

We recommend that PennDOT address Transportation Asset Management as a strategic program. The program should be run from the Secretary of Transportation office with a single individual responsible for the program across all appropriate functions within PennDOT. As a strategic program a detailed plan should be developed that includes specific goals and objectives, work tasks, timelines, responsibilities and budgets We recommend that PennDOT use the Asset Management Guide or other similar frameworks to help structure the program.

Audit Area: D. System Preservation	**Issue:** iii. Plant Maintenance Issues	**Tier:** II

Background / Observation:

PennDOT's statewide operations span 58 Maintenance Organizations across 67 counties. The plant maintenance system integrates PennDOT maintenance management processes with the Commonwealth Enterprise Resource Planning ("ERP") system. This replaces MORIS[30] functionalities with an SAP solution and provides an interface for customer care with other PennDOT organizations. The objectives of the plant maintenance system include delivering maintenance projects on time and within budget, providing for the efficient management of data, paying employees accurately and on time, addressing legislative, legal and federally mandated issues and implementing a business wide transformation through communications, education and training. SAP was initially implemented to support time and attendance, payroll, procurement and inventory. This led PennDOT to analyze whether SAP can be used to support the functions of MORIS to bring all common business process under one system in support of the Commonwealth strategy. In addition, PennDOT's Financial Management Information System ("FMIS") was replaced with SAP software which led to a significant impact on MORIS since it shared functionality with FMIS.

Impact:

The Plant maintenance system is a quality replacement for the existing MORIS system and improves the business functionality of PennDOT maintenance organizations. The implementation and effective use of any maintenance system relies upon the availability of trained personnel and troubleshooting assistance to operate the system efficiently with minimum impact to maintenance field operations.

Operational Strengths / Leading Practices:

The plant maintenance system is based on SAP, which is an off-the-shelf package used across the world and across the Commonwealth, making it easier and cost effective to deliver upgrades based on leading practice updates on a regular basis. SAP is used by organizations on a global scale and positive feedback on its performance and implementation is available from a large number of users. The transformation from MORIS to plant maintenance is an industry leading practice because it brings all common business processes under one platform and eliminates duplicative and obsolete processes.

Findings / Recommendation for Improvements:

The implementation of SAP involves a structured role based process. Employees are assigned certain roles such as purchaser and requestor to support specific activities within the SAP system. If a person is performing a key role in the operation of the SAP system and gives up that position, it appears to take a considerable amount of time to have a new person mapped to his role and bring the new person up to speed on operating the SAP system. This issue was identified several

[30] MORIS is acronym for PennDOT's previous Maintenance, Operations and Resources Information System.

Audit Area: D. System Preservation	**Issue:** iii. Plant Maintenance Issues	**Tier:** II

times during the assessment. The situation can be mitigated by constantly retaining an alternate set of trained personnel who are authorized to perform the role on a standby basis until a new person is brought up to speed. Alternatively, It would help to have a quick authorization process for new personnel performing SAP roles and provide them with access to online training tools and regularly scheduled classroom training sessions to enable a faster learning curve.

If an active PennDOT employee takes on an acting role in a new position, PennDOT should evaluate whether that individual can be role mapped to the SAP responsibilities in his previous position in addition to those in the acting position. This would be useful to new personnel who assume positions that are left vacant due to internal transfers. In summary, the use of the plant maintenance system requires training and availability of personnel to enter and analyze the data from operations in a cost effective and timely manner.

The ability for plant maintenance to communicate with other specialized systems within PennDOT needs to be assessed in further detail. One issue relates to the transfer of information between PennDOT's Bridge Management System V2 ("BMS2") and Plant Maintenance. The bridge inspection staff input the completion of bridge maintenance priorities into BMS2. The maintenance staff has to then manually input the data on completed maintenance priorities into SAP. The data is reflected on SAP as work orders are closed out by the maintenance personnel. There does not appear to be any communication setup between SAP and BMS2 to transfer information related to status of work activities from BMS2 to SAP. Apart from ensuring that work orders are closed out in a timely fashion to reflect completed work in the SAP system, it is also important for the BMS2 system to be updated regularly to provide up to date information on status of bridge maintenance activities.

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier: I**

Background / Observation:

The Pennsylvania Department of Transportation uses a worldwide standard for measuring pavement smoothness called the International Roughness Index, or IRI. Pavement roughness is defined as the variation in surface elevation that induces vibrations in moving vehicles and is measured on all state highways with specialized vans mounted with lasers. PennDOT has developed a plan to collect IRI ratings for all of the Interstates and other NHS roadways each year, and half of the non-NHS highways each year. Each county has tested each year between 92-100% of the plan each year.

The IRI rating for PennDOT maintained roadways across the State and by district is presented in the following charts.

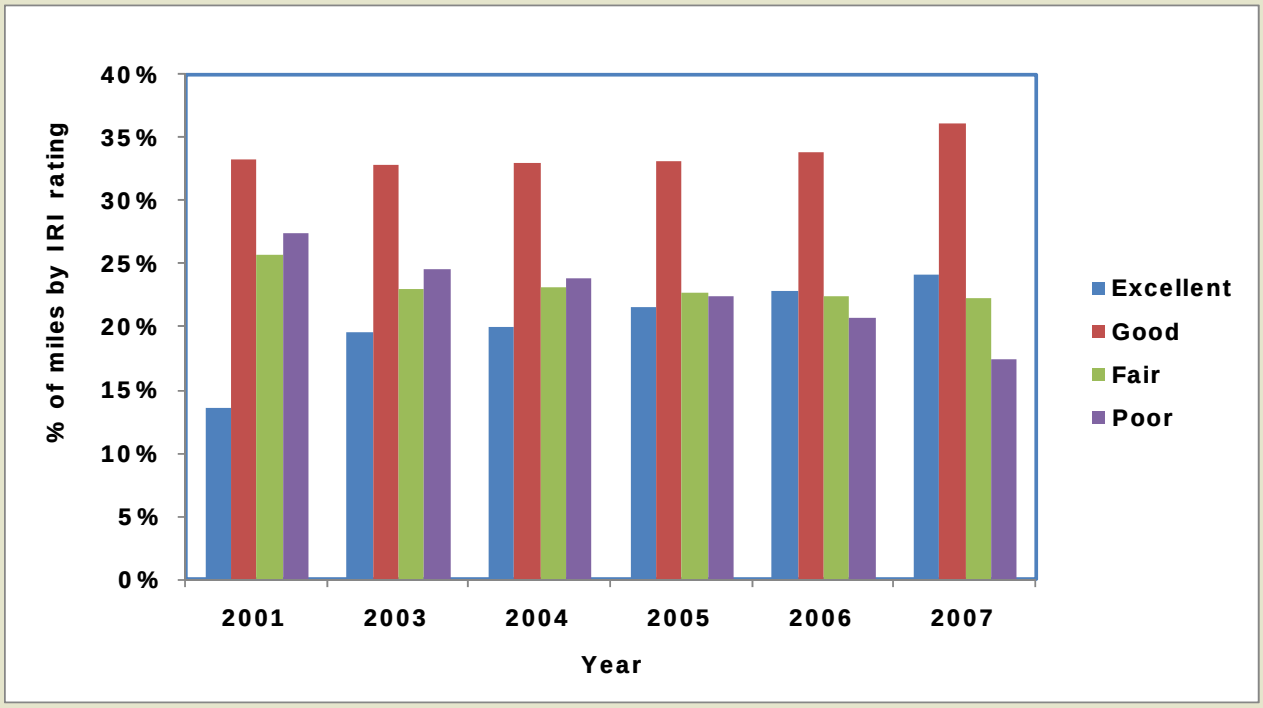

Figure 9 -PennDOT Maintained Roadways by IRI Rating - Statewide

The plot above shows that the percentage of PennDOT maintained roads rated as excellent and good increased from 47% in 2001 to 60% in 2007 while roads rated as fair and poor decreased from 53% in 2001 to 39% in 2007.

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier: I**

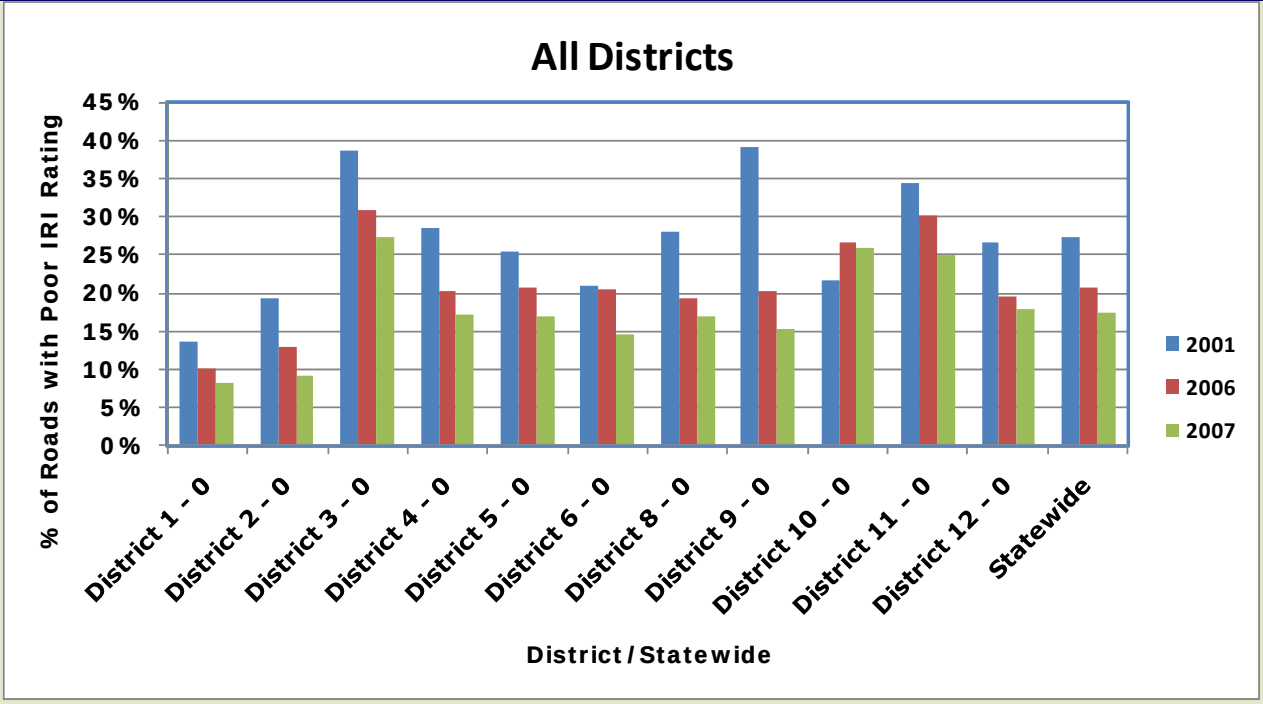

Figure 10 - Percentage of PennDOT Maintained Roads in Poor Condition By District

With an assessment of the IRI data for the Engineering Districts, the percentage of poor roads in all Districts decreased from 2001 to 2007 except for District 10. However from 2001 to 2007, the number of road miles tested in District 10 increased by 46%, compared to a 10.2% average increase of road miles tested statewide for the same period of time. In 2007, District 3 had the highest percentage of poor roads (27.25 percent) and District 1 had the lowest percentage of poor roads (8.16 percent). The percentage of poor roads in 2007 for three Districts (Districts 3, 10 and 11) exceeded 25%. Only two Engineering Districts (Districts 1 and 2) reported less than 10% of poor roads in 2007.

Deloitte FAS considered the IRI for each County within the Commonwealth. The following tables provide a summary of the IRI rating reported by PennDOT for the last year of the previous LB&FC Performance Audit (2001) and compared that rating to the two most recent years (2006 and 2007) for each County within their respective Engineering Districts.

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier:** I

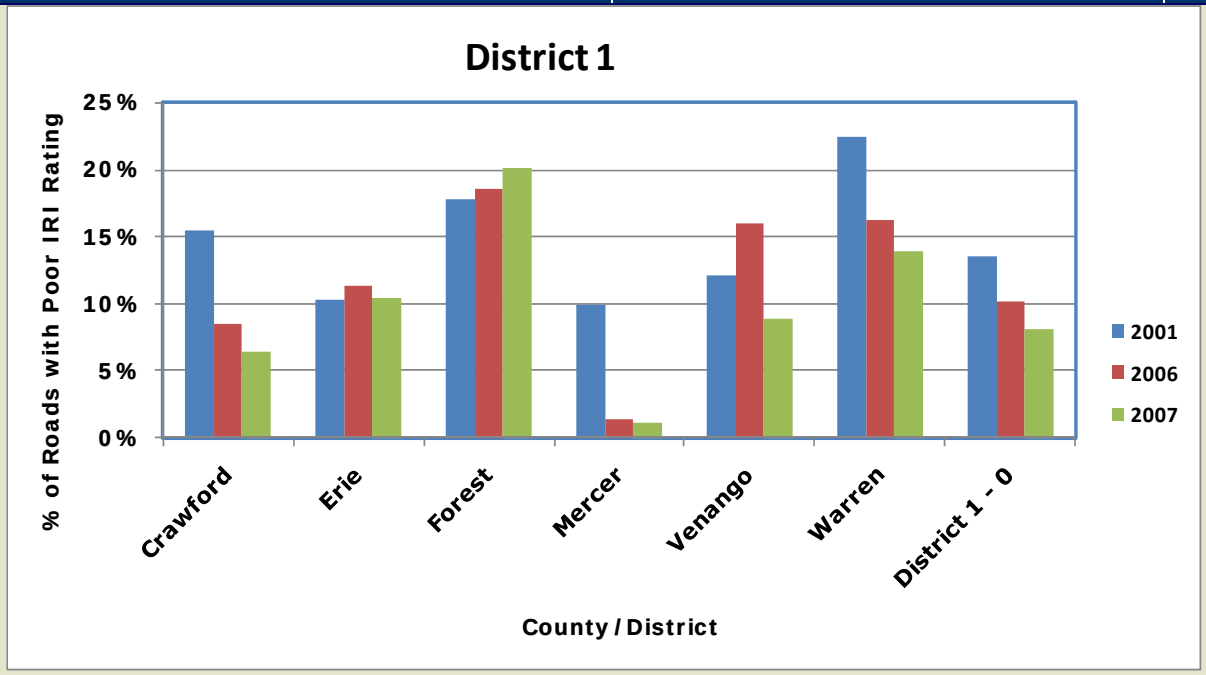

Figure 11 - Percentage of PennDOT Maintained Roads in Poor Condition in District 1-0

The percentage of roads with a poor IRI rating decreased for each County within Engineering District 1-0 except for Erie and Forest. The percentage of poor roads in Erie increased from 10.25% in 2001 to 10.41% in 2007 and percentage of poor roads in Forest increased from 17.79% in 2001 to 20.14% in 2007. Overall the percentage of roads with a poor IRI rating in District 1-0 decreased from 13.58% to 8.16% between 2001 and 2007.

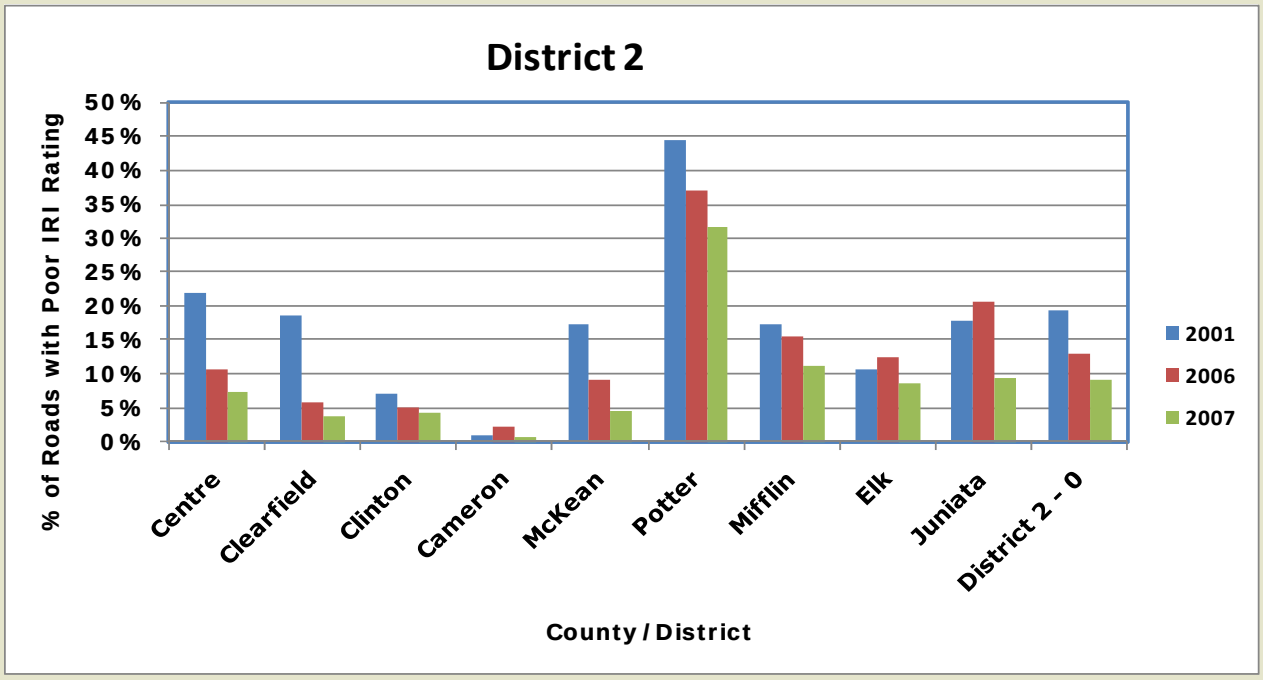

Figure 12 - Percentage of PennDOT Maintained Roads in Poor Condition in District 2-0

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier: I**

The percentage of roads with an IRI rating of poor decreased for each county within District 2-0 from 2001 to 2007. Overall the percentage of roads with a poor IRI in District 2-0 decreased from 19.35% in 2001 to 9.17% in 2007.

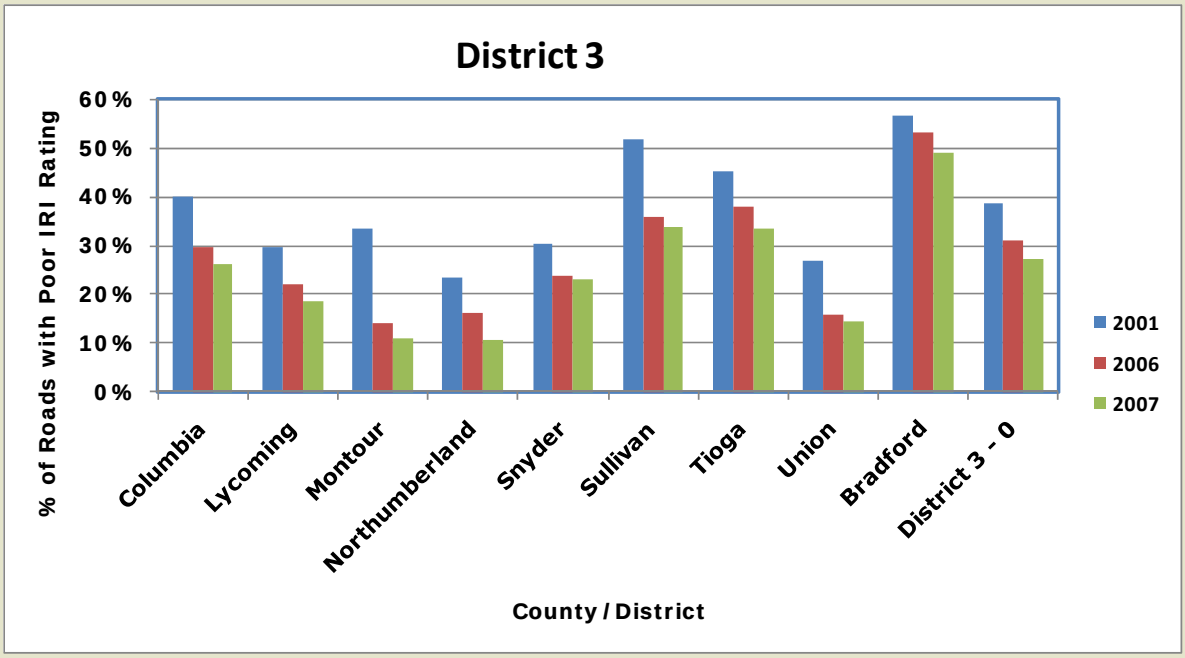

Figure 13 - Percentage of PennDOT Maintained Roads in Poor Condition in District 3-0

The percentage of roads with a poor IRI rating for all of the Counties within District 3-0 decreased from 2001 to 2007. Overall the percentage of roads with a poor IRI in District 3-0 decreased from 38.74% in 2001 to 27.25% in 2007.

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier: I**

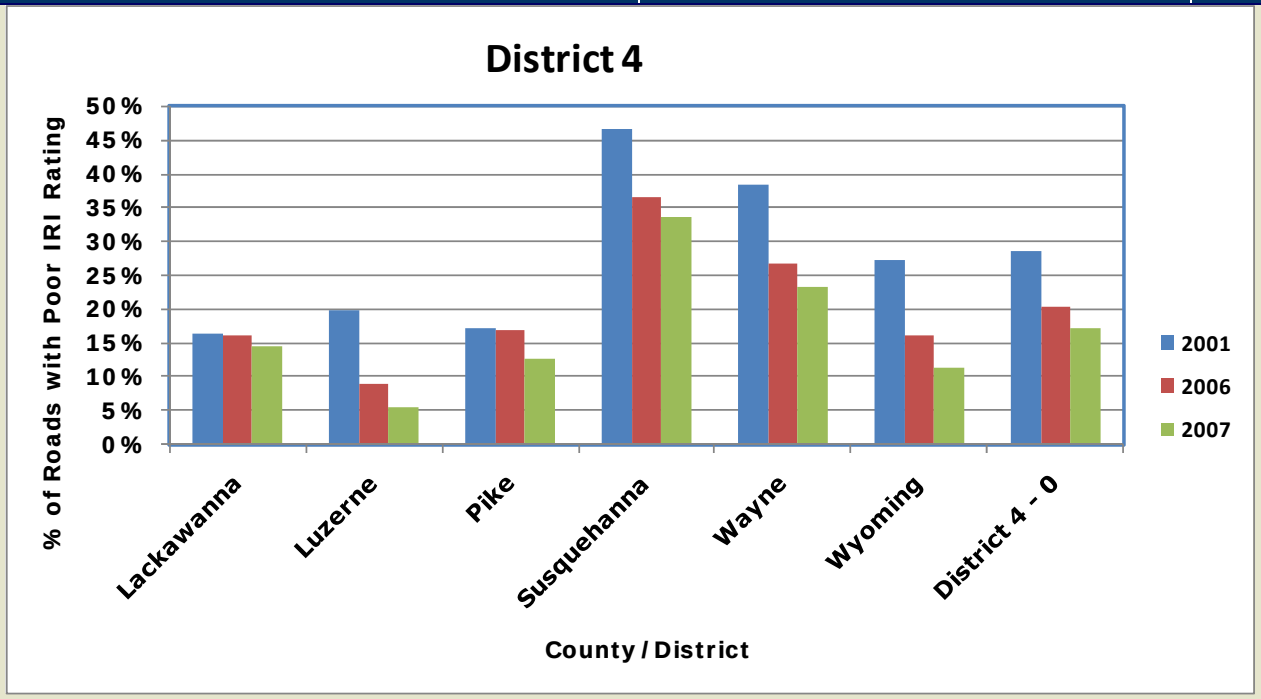

Figure 14 - Percentage of PennDOT Maintained Roads in Poor Condition in District 4

The percentage of roads in District 4-0 with an IRI rating of poor decreased within each County over the 2001 to 2007 time period. Overall the percentage of roads with a poor IRI in District 4-0 decreased from 28.44% in 2001 to 17.15% in 2007.

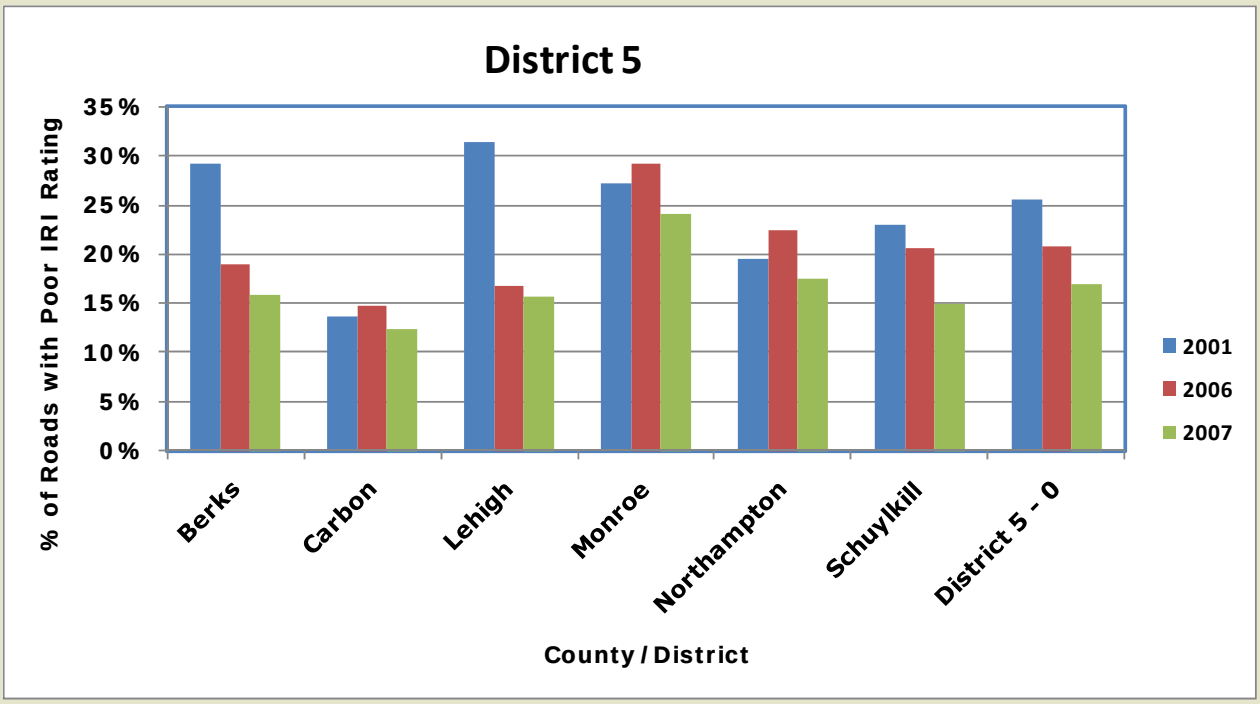

Figure 15 - Percentage of PennDOT Maintained Roads in Poor Condition in District 5-0

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier: I**

The percentage of roads with a poor IRI rating decreased in each of the District 5-0 Counties from 2001 to 2007. Overall the percentage of roads with a poor IRI in District 5-0 decreased from 25.48% in 2001 to 16.92% in 2007.

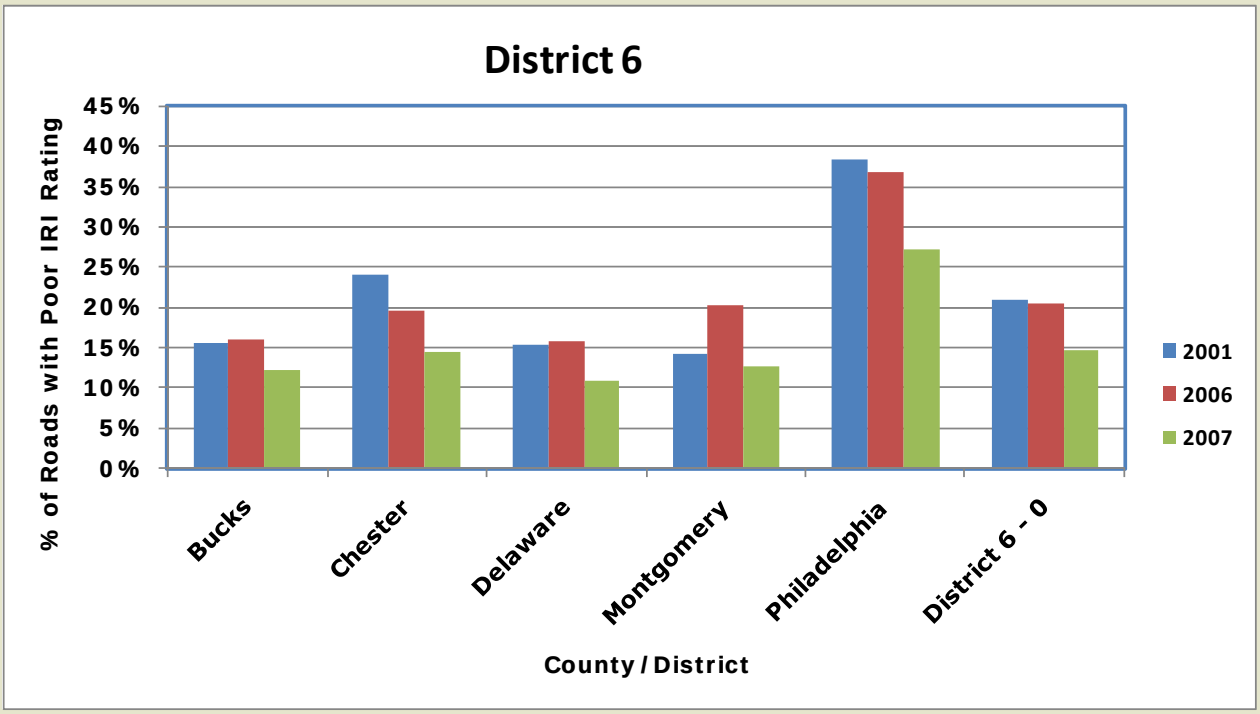

Figure 16 - Percentage of PennDOT Maintained Roads in Poor Condition in District 6-0

The percentage of roads in District 6-0 with a poor IRI rating decreased within each county from 2001 to 2007. Overall the percentage of roads with a poor IRI rating in Engineering District 6-0 decreased from 20.95% in 2001 to 14.6% in 2007.

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier:** I

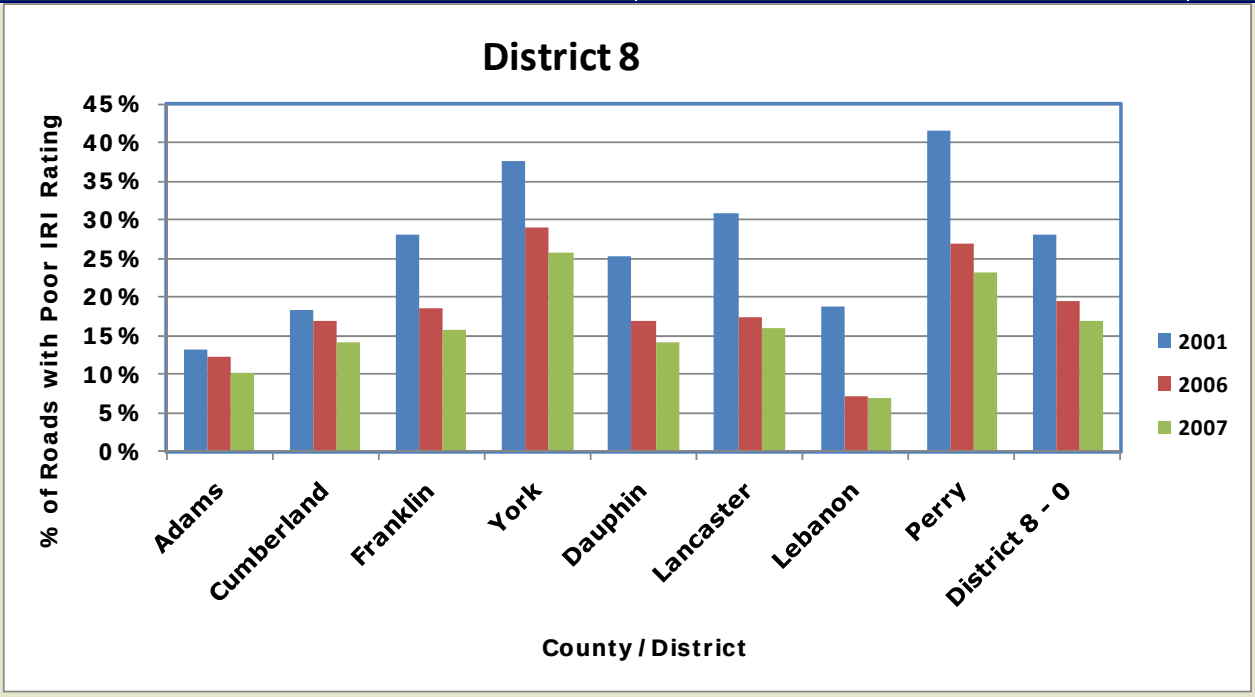

Figure 17 - Percentage of PennDOT Maintained Roads in Poor Condition in District 8-0

The percentage of roads with a poor IRI rating for each of the Counties with District 8-0 decreased from 2001 to 2007. Overall the percentage of roads with a poor IRI rating in District 8-0 decreased from 28.15% in 2001 to 16.94% in 2007.

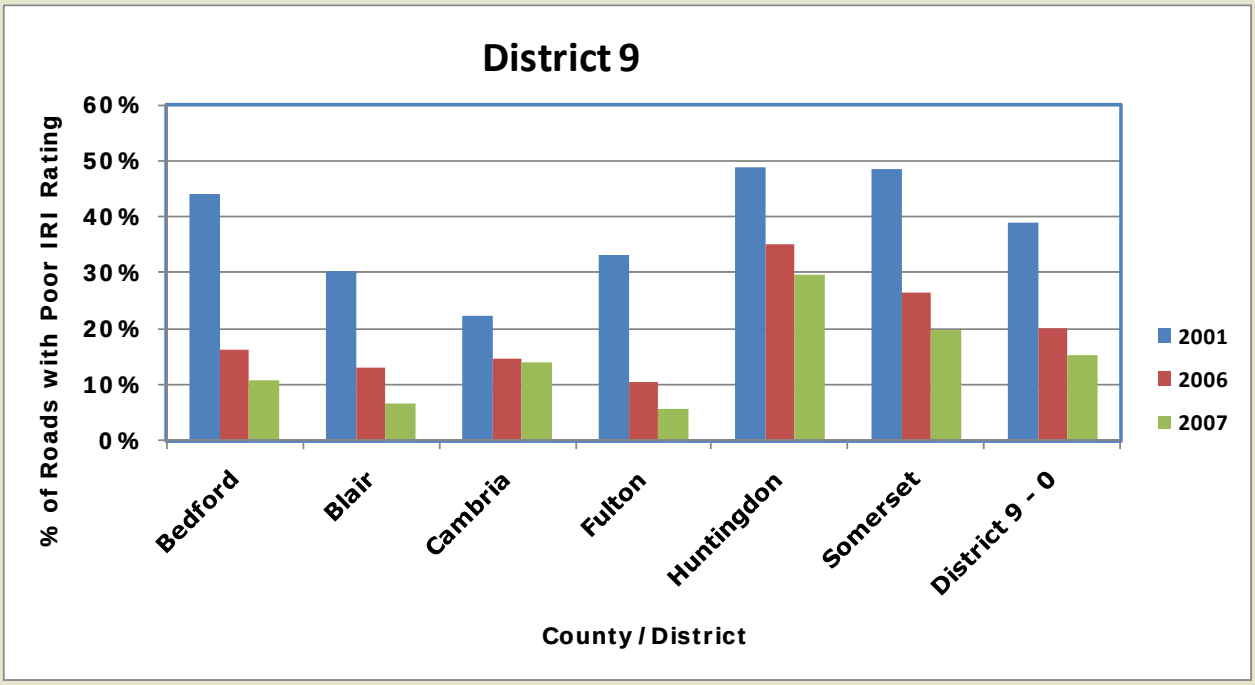

Figure 18 - Percentage of PennDOT Maintained Roads in Poor Condition in District 9-0

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier: I**

The percentage of roads with a poor IRI rating for each County within Engineering District 9-0 decreased from 2001 to 2007. Overall the percentage of roads with a poor IRI rating in District 9-0 decreased from 39.09% in 2001 to 15.22% in 2007.

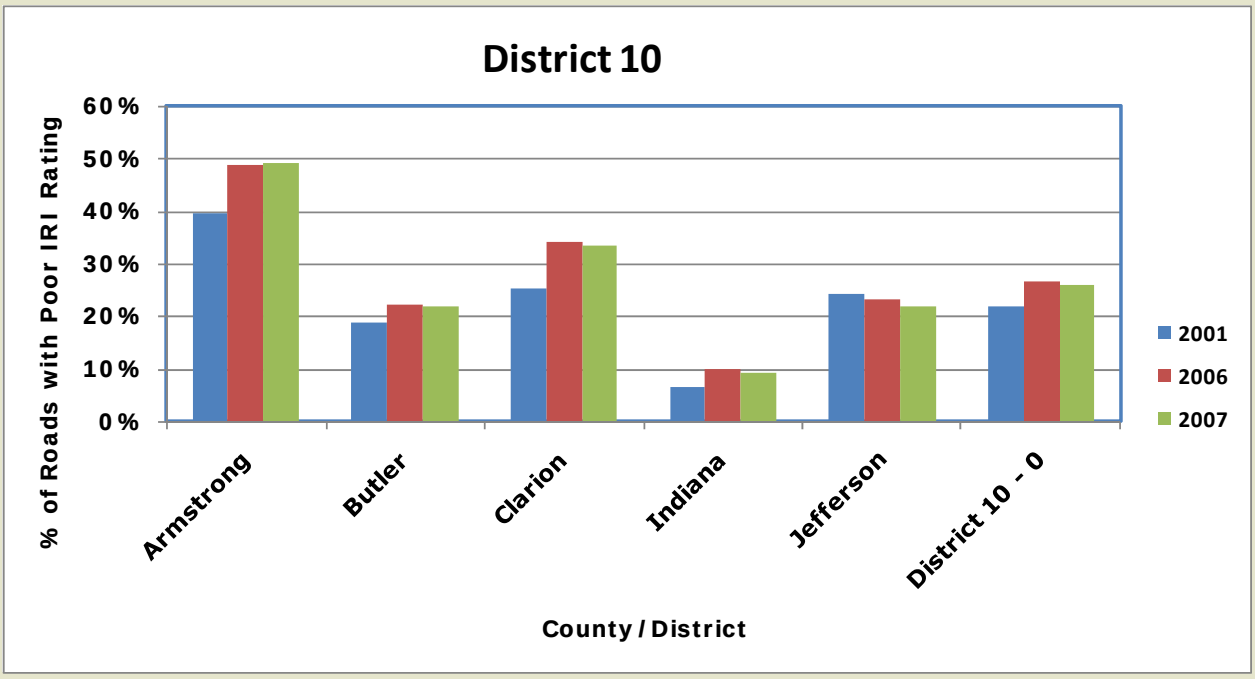

Figure 19 - Percentage of PennDOT Maintained Roads in Poor Condition in District 10

The percentage of roads with a poor IRI rating increased for each County within District 10 from 2001 to 2007 except for Jefferson County. Overall the percentage of poor roads in district 10 increased from 21.72% in 2001 to 25.96% in 2007. As mentioned above the number of road miles tested in District 10 increased by 46%, a significant increase compared to that in other districts.

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier: I**

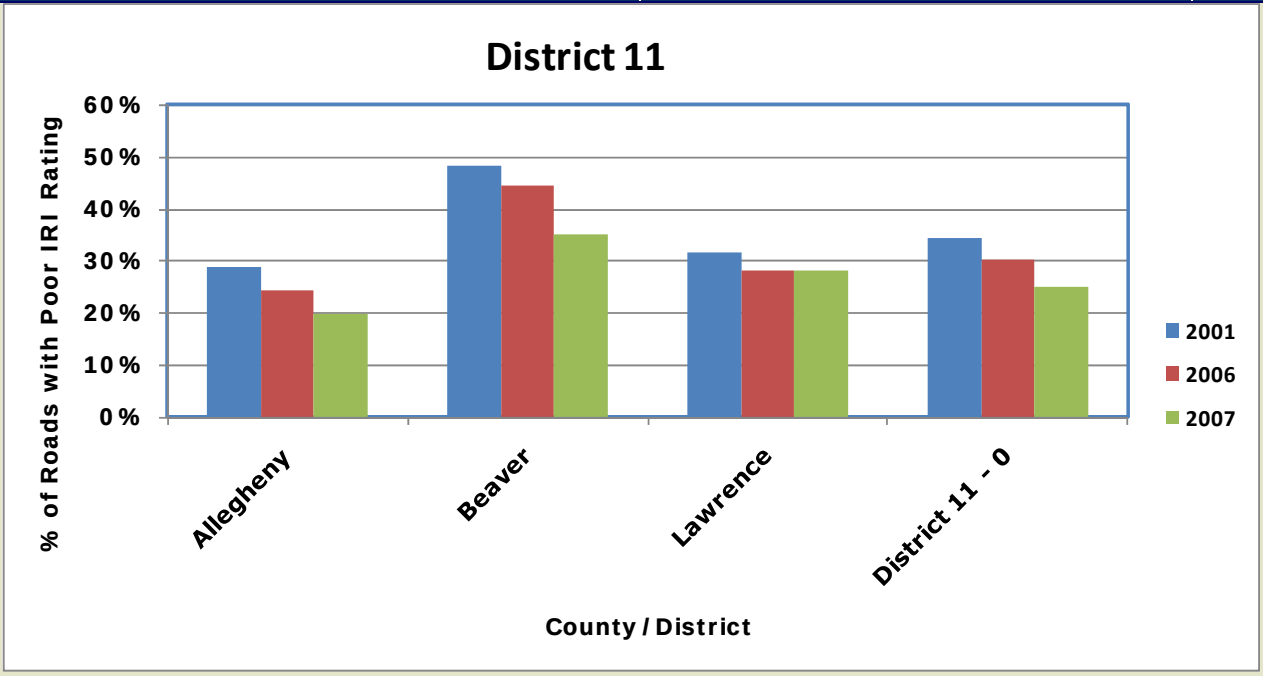

Figure 20 - Percentage of PennDOT Maintained Roads in Poor Condition in District 11-0

The percentage of roads with an IRI rating of poor decreased for each County on Engineering District 11-0 from 2001 to 2007. Overall the percentage of roads with a poor IRI rating in District 11-0 decreased from 34.3% in 2001 to 25.03% in 2007.

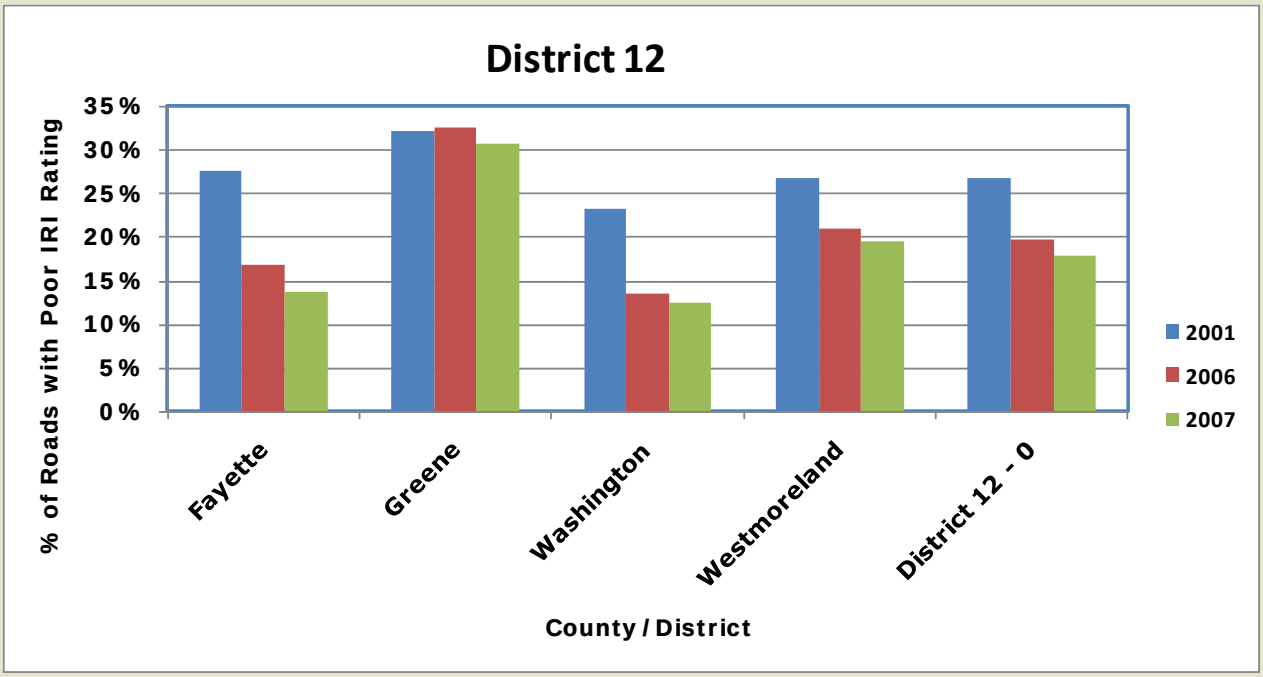

Figure 21 - Percentage of PennDOT Maintained Roads in Poor Condition in District 12-0

The percentage of roads with a poor IRI rating decreased for each of the Counties within District

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier: I**

12-0 from 2001 to 2007. Overall the percentage of roads with a poor IRI rating in District 12 decreased from 26.67% in 2001 to 17.8% in 2007.

Compared to other states, within a 13 state peer group, the ride-ability of Pennsylvania's interstates and principal arterials ranked no better than 4th and no worse than 8th for each of the four classes of roads measured[31]. In 2001, Pennsylvania's ranking ranged from 5th to 9th. The following plots show the comparison for each of the four classes of roads measured.

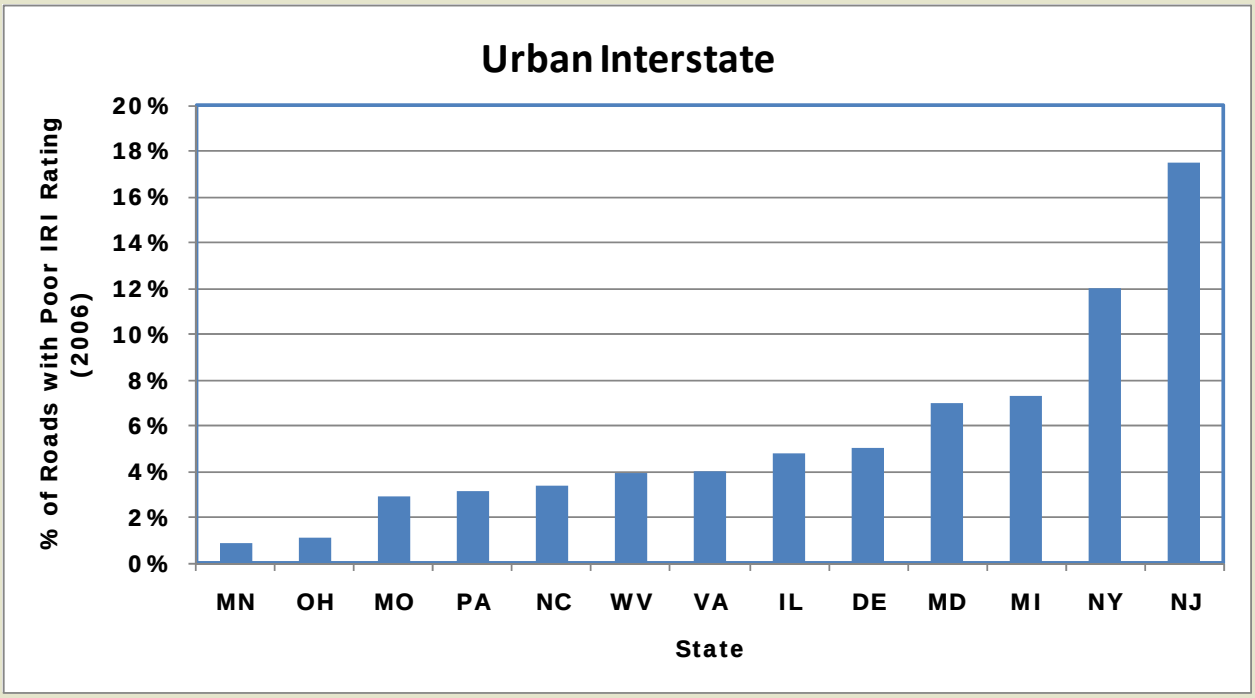

Figure 22 - Pavement Roughness for Urban Interstates Measured for 13 States

[31] Developed from information provided in the **Highway Statistics 2006** Publication from the Office of Highway Policy Information - Federal Highway Administration http://www.fhwa.dot.gov/policy/ohim/hs06/index.htm

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier: I**

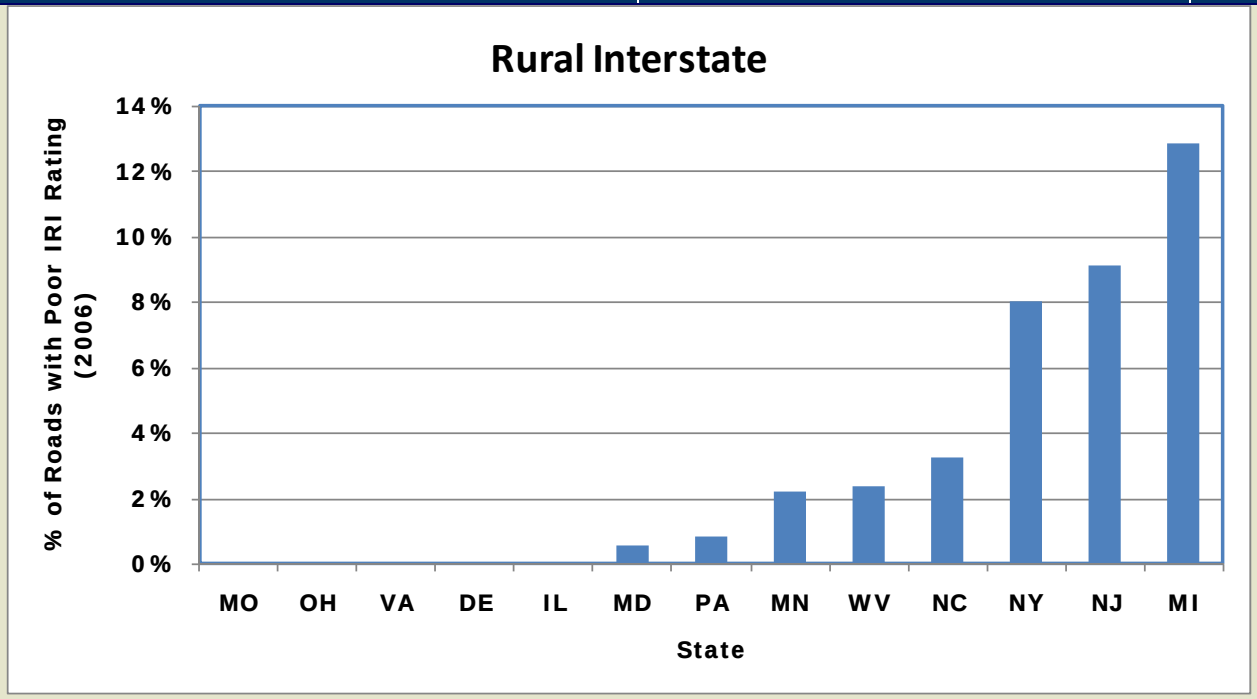

Figure 23 - Pavement Roughness for Rural Interstates Measured Within 13 States

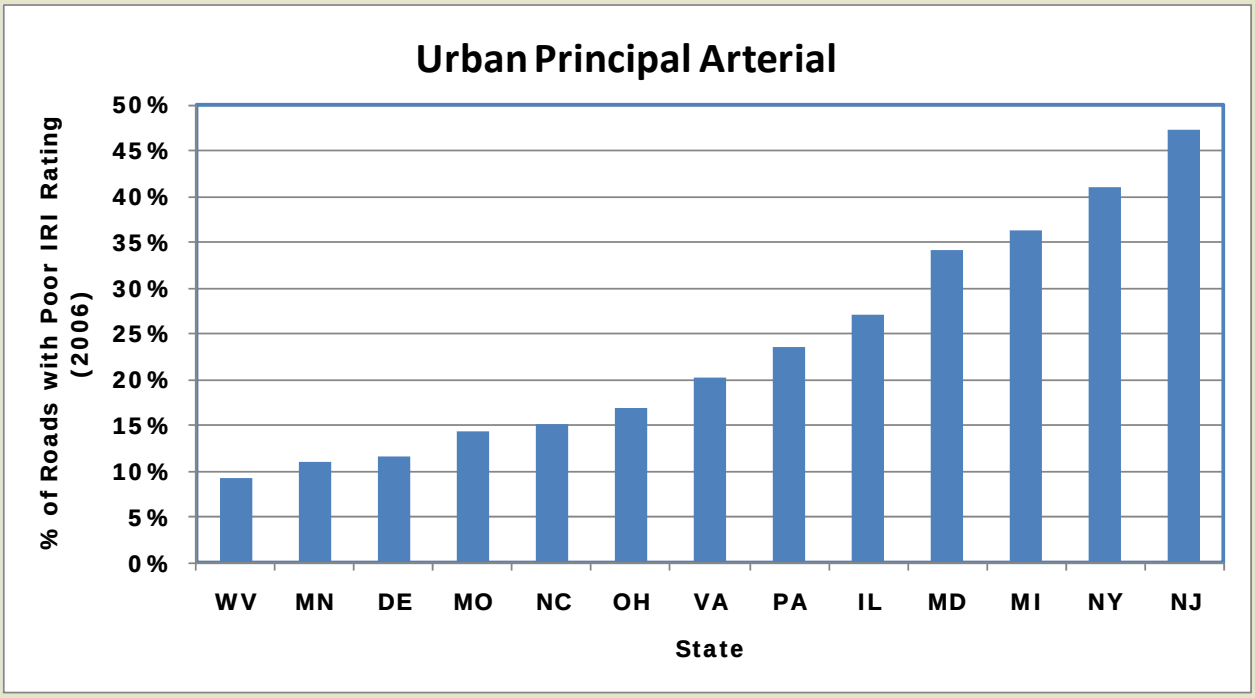

Figure 24 - Pavement Roughness for Urban Principal Arterials Measured in 13 States

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier: I**

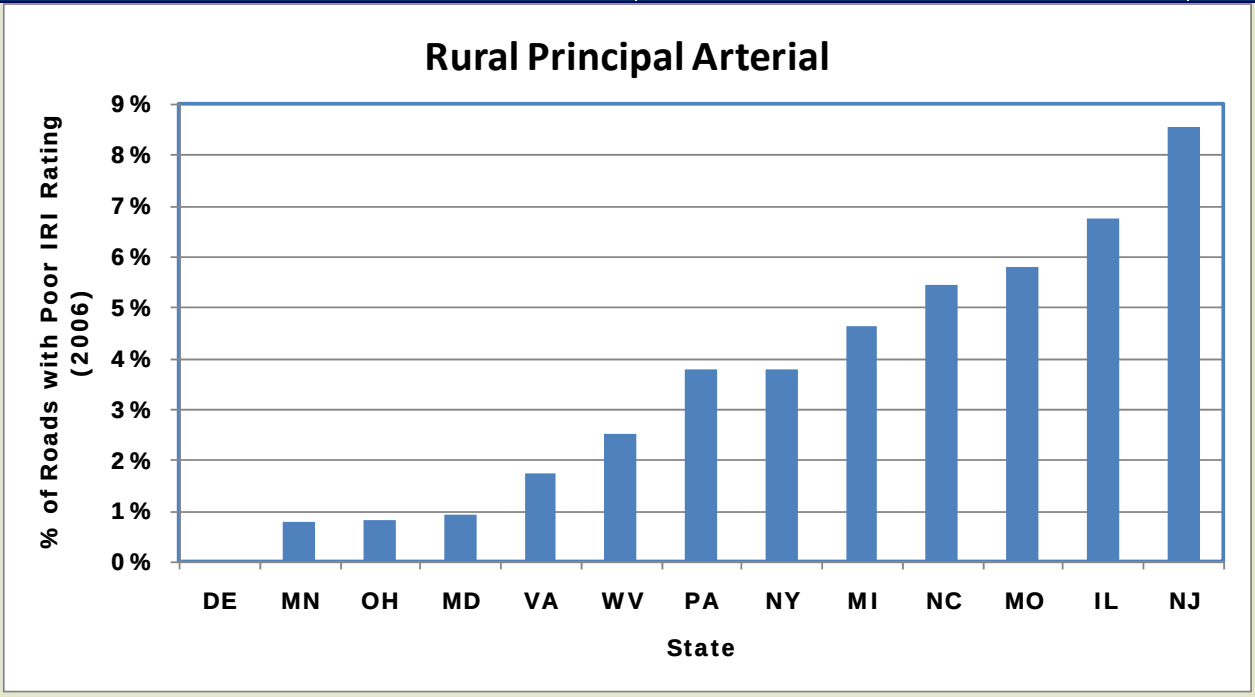

Figure 25 - Pavement Roughness for Urban Principal Arterials Measured in 13 States

Impact:

The FHWA has identified the following advantages to the tracking and reporting of IRI data for agencies within the United States. "The primary advantages of the IRI are[32]:

1. It is a time-stable, reproducible mathematical processing of the known profile.
2. It is broadly representative of the effects of roughness on vehicle response and user's perception over the range of wavelengths of interest, and is thus relevant to the definition of roughness.
3. It is a zero-origin scale consistent with the roughness definition.
4. It is compatible with profile measuring equipment available in the U.S. market.
5. It is independent of section length and amenable to simple averaging.
6. It is consistent with established international standards and able to be related to other roughness measures."

Operational Strengths/Leading Practices:

The IRI is measured for different types of roadways and included as a performance measure in the scorecard. Targets are established for excellent, good and poor and IRI values based on the type and function of roadway. This allows PennDOT to assess pavement conditions on a continual basis

[32] Highway Performance Monitoring System Field Manual for the Continuing Analytical and Statistical Database Appendix E - Measuring Pavement Roughness http://www.fhwa.dot.gov/ohim/hpmsmanl/appe.htm

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier: I**

and ensure that it is included as part of core operational strategy. Based on the results within the assessment detailed above, PennDOT has been able to increase the percentage of roads with an IRI rating of excellent and good while reducing the percentage of roads with an IRI of fair and poor.

Findings/Recommendation for Improvements:

The percentage of roads with a poor IRI rating has reduced statewide from 2001 to 2007. While the percentage decrease in poor roads varies from county to county, the majority of the counties have reported a decrease in the percentage of poor roadway miles from 2001 to 2007. In some counties, the percentage of poor roads has increased from 2001 to 2006. This increase in 2006 is followed by a decrease to below 2001 levels in 2007 or a further increase in 2007. These fluctuations in the percentage of poor roadway miles across the state appear to be due to the percentage of roadway miles tested in each county and the total number of PennDOT maintained roadway miles in each county. The testing sample was over 95% for most of the Engineering Districts in 2007. PennDOT should continue to use the IRI rating as a performance measure for each of the Districts. PennDOT should continue to monitor the fluctuations in the percentage of roads with poor IRI ratings within some of the Districts to make sure that ratings of excellent and good roads are being maintained while ratings of poor and fair roads are being improved.

Section 5: Performance Measurements

Introduction

Performance measurement systems are being used by transportation agencies across the country and are gaining considerable value as technical and administrative indicators of management effectiveness, operational efficiency, and whether strategic goals are being accomplished. Performance measures are being continually evaluated, redeveloped, and refined to increase efficiency and effectiveness of program delivery and operational parameters such as emergency response and roadway information systems. The agencies recognize the need to evaluate performance measurement on a continuous basis to respond to technological advancements and changing political and fiscal scenarios. Criteria for the design of a performance measurement system includes support for decision making capabilities, measurement of life cycle costs and availability of progress related information to the public in a timely manner. Measures should be quantifiable, attainable and consistent with long term policies and initiatives. Each agency is unique and measures need to be tailored to organizational needs and capabilities. One of the most important questions that arise in the implementation of a performance measurement system is whether the set of measures captures data accurately to effectively support the strategic areas of the agencies. PennDOT is currently using a performance measurement system that attempts to measure their overall strategic focus areas that include mobility, safety, system preservation, fiscal management, and maintenance and productivity. The following sections summarize what is currently being measured within PennDOT and the set of performance measures collected and considered for analysis.

It is a common practice when developing performance measurement systems to create 'scorecards' and 'dashboard' reports as a means to monitor and track the status of a wide range of performance measures for review and analysis by management. PennDOT was among the first state departments of transportation to use a scorecard and dashboard to present performance data. The District Executive ("DE") scorecard and DE dashboard are currently used by each of the eleven Engineering Districts within Highway Administration to represent performance information. The performance metrics within the DE dashboard and DE scorecard are focused on efficiency, maintenance, safety, project delivery, mobility and system preservation. Data for each measure is compiled by a designated business owner in the Central Office and reported by the Office of the Deputy Secretary for Highway Administration ("DSO") through a Microsoft Access database.

Each Bureau within Highway Administration uses a spreadsheet to track Bureau specific performance measures. Measures are also tracked through the Pennsylvania Mobility Plan, the FHWA dashboard and the Governor's Office Performance Measures. The Pennsylvania Mobility Plan contains 87 measures that assist in the implementation of the plan and the FHWA dashboard satisfies annual reporting requirements to the Federal Highway Administration. The Governor's office tracks construction and maintenance of highways and bridges on the local, state and national highway systems.

Current PennDOT Performance Measurement Systems

PennDOT has several different measurement systems used to track performance across a variety of functions and operational areas. The following measurement systems have been assessed by Deloitte FAS as they relate to the Performance Assessment of PennDOT's Highway and Bridge – Maintenance and Construction (Refer to Appendix C of this report for a complete listing of each measurement system):

- 1996 LB&FC Measures
- 2002 LB&FC Measures
- DE Dashboard/Scorecard
- Mobility Plan
- Bureau Specific Measures
- FHWA Measures
- County Maintenance Measurement Tool ("CMMT")
- Strategic Environmental Management Program ("SEMP")
- Governor's Measures

DE Dashboard/Scorecard

The DE dashboard and DE scorecard are the primary tools used by PennDOT Highway Administration to monitor the Performance of the Highway and Bridge – Maintenance and Construction program. The data used to compute individual performance measures in the DE dashboard / scorecard is obtained from databases such as BMS, Roadway Management System ("RMS") and PennDOT's SAP Plant Maintenance System[33] that are populated by PennDOT employees on a regular basis. PennDOT uses a traffic signal approach to summarize the performance of each measure, and uses green, yellow and red light designations to represent performance targets for measures within the DE dashboard/scorecard. A green designation indicates that the targets set by the Central Office were achieved and a red designation indicates that the measure was not met. If a performance target has not been achieved, the process requires that steps be taken to understand why the goal was not achieved and improve performance during the next month/quarter to meet the target.

Individuals within the Bureaus and Districts, who are owners of the performance metrics or who have been identified as having some responsibility to meet performance targets, have those performance measures included in their Employee Performance Review ("EPR"). The Districts are ranked as unsatisfactory, satisfactory, commendable or outstanding every year based on a percentage obtained from the number of green, yellow or red indicators in the DE scorecard and dashboard during that year for the District. The DE in each of the eleven PennDOT Districts is evaluated annually based on the District's ranking. The District Executive's responsibility is usually delegated to division chiefs and incorporated in their EPRs and the division chiefs hold their staff accountable to achieve specific results.

The DE dashboard is made up of leading indicators and the DE scorecard consists of lagging indicators. There are several measures that are common to both the DE scorecard and DE dashboard although the DE scorecard is updated on a quarterly basis and the DE dashboard is updated on a monthly basis. The leading dashboard indicators monitor progress monthly to promote a proactive culture toward continuous improvement in processes while measuring progress toward longer term scorecard metrics. Leading indicators are powerful measures to

[33] PennDOT recently replaced their Legacy Maintenance, Operations and Resources Information System ("MORIS") with SAP Plant Maintenance to meet their business needs.

include in a performance dashboard, and require careful consideration when being developed as they support the short-term and long-term targets of lagging indicators. The scorecard is more output and outcome oriented than the dashboard. The DE dashboard and DE scorecard measures are provided in the following table:

DE SCORECARD
➢ H1A: Percent of Bridges that are Structurally Deficient
➢ H1B: Percentage of Dollars Spent on SD Bridges
➢ H2: Annual Bridge Letting Dollars Dedicated to Bridge Preservation
➢ H3-10: Maintain or Increase Riding Quality of Highway Infrastructure
➢ H3: Percentage of segment miles of Interstate with Excellent & Good IRI[34] (<100)
➢ H4: Percentage of segment miles of Interstate with Poor IRI (>150)
➢ H5: Percentage of segment miles of Other National Highway System ("NHS") with Excellent & Good IRI (<120)
➢ H6: Percentage of segment miles of Other NHS with Poor IRI (>170)
➢ H7: Percentage of segment miles of non NHS Average Daily Traffic ("ADT") >2000 with Excellent & Good IRI (<150)
➢ H7A: Percentage of Non-NHS ADT<2000 with Excellent & Good IRI (<170)
➢ H8: Percentage of segment miles of non ADT >2000 with Poor IRI (>195)
➢ H8A: Percentage of Non-NHS ADT<2000 with Poor IRI (>220)
➢ H9: Percentage of Non-NHS segment miles with Inadequate Pavement Width
➢ H10: Percentage of segment miles of Annual Surface Improvement
➢ H11: Improve Scores of CMMT Measures
➢ H11A: Accountability of field staff
➢ H12: Dollar Savings Redirected from Multiple Maintenance Efficiency and Cost Effectiveness ("MECE") Implementation Team Recommendations
➢ H13: Actual vs. Program Management Committee ("PMC") approved Preliminary Engineering and Final Design Phase Costs
➢ H14: Percentage of Construction Dollars Spent on Oversight
➢ H15: Final Project Amount vs. Original Contract Amount
➢ H16: Annual Letting Goal
➢ H19: Annual TE and Local Projects, Annual Home Town Streets, and Annual Safe Routes to School projects Let-Comparison of Committed versus Actual
➢ H26: Engineer's Estimate vs. Contractor Low Bid
➢ H31: Fatality Rate
➢ H32: Number of fatalities
➢ H33: DBE Participation – Design
➢ H34: Number of Dollars obtained for Construction DBE's
➢ H36: Annual Highway Customer Survey Executive Summary for Districts

Table 16 – PennDOT's Current Scorecard Performance Measures

[34] International Roughness Index ("IRI") is a measure of the roadway smoothness used national to indicate the average roughness for that road section

DE DASHBOARD
➢ 01: Complement Filled ➢ 02: Percent Sick Leave ➢ 03: Total District Overtime Costs ➢ 04: Accrued Unbilled Costs ➢ 05: Return On Investment ("ROI") ➢ 06: ASHMA[35] Bridge Allocation ➢ 07: Winter Services ➢ 08: County Budget Monitoring ➢ 09: Percent of Portfolio on Schedule ➢ 10a: Committed Letting Goals by Dollar Value ➢ 10b: Committed Letting Goals by Number ➢ 11a: Committed Bridge Projects Let Dollars On Schedule ➢ 11b: Committed Number of Bridge Projects Let On Schedule ➢ 12: Monitor Bridge Analysis Backlog – 90 Days ➢ 12b: Monitor Bridge Analysis Backlog – 120 Days ➢ 13A: Percentage of Bridges that are Deficient ➢ 13B: Percentage of Dollars Spent on SD Bridges ➢ 14a: Number 0 and 1 Maintenance Priorities for Bridge ➢ 14b: Total Number of 0 and 1 Maintenance Priorities ➢ 15: Average monthly Bituminous Sample Testing Turnaround Time ➢ 16a: DBE Participation – Design ➢ 16b: Percentage of DBE Paid / Committed for on-going projects at least 50% complete ➢ 17: Bid versus Final Amount ➢ 18: Percent of Construction Dollars Spent on Oversight ➢ 19: Surface Improvements – Resurfacing ➢ 20: Surface Improvements – Leveling & Sealing ➢ 21: Surface Improvements –Total Surface Improvement ➢ 22: Surface Improvements – Crack Sealing on 5-Year Cycles ➢ 23a: CCC – Average days to Complete a Pothole Concern ➢ 23b: CCC – All Drainage Concerns ➢ 24: Program 718 – Low Cost Safety Improvement Plan ➢ 25: Diversified Civil Engineering Experience ➢ 26: Engineer's Estimate vs. Contractor Low Bid Amount

Table 17 - PennDOT's Current Dashboard Performance Measures

County Maintenance Measurement Tool

PennDOT has a County Maintenance Measurement Tool, which consists of measures that represent core business functions of county maintenance organizations. The CMMT scoring is based on the total number of points available from each of the individual measures. A score of 0-60% is Unsatisfactory; 61-70% is classified as Needs Improvement followed by Satisfactory, Commendable and Outstanding respectively for every 10 point increase in the range.

[35] ASHMA refers the additional State funds from the highway maintenance appropriation.

Bureau Specific Measures

Each Bureau within PennDOT tracks performance measures in a spreadsheet, which includes the measures in the scorecard and dashboard as well as other Bureau specific measures that promote operational efficiency within the Bureau.

Strategic Environmental Management Program

The Strategic Environmental Management Program ("SEMP") includes goals that measures environmental performance in managing stockpiles, maintenance materials and erosion and sedimentation controls. The implementation of SEMP by various PennDOT Districts has led to the ISO 14001 certification of their maintenance units. PennDOT Engineering District 10 was the first state transportation agency to be ISO 14001 registered in the United States[36]. The SEMP aims to strive for continuous improvement in environmental performance and protect and conserve resources for future generations. Some of the CMMT measures are included in the SEMP.

Mobility Plan

The Pennsylvania Mobility Plan is a statewide long-range transportation plan that sets the direction for transportation investment through 2030. The PA Mobility Plan Implementation Plan contains nearly 90 actions, which are listed in Appendix C of this report. The goals of the mobility plan are:

- "Movement of people and goods safely and securely
- Improve quality of life by linking transportation, land use, economic development, and environmental stewardship
- Develop and sustain quality transportation infrastructure
- Provide mobility for people, goods, and commerce
- Maximize the benefit of transportation investments"

FHWA Measures

A spreadsheet containing a list of measures is maintained by PennDOT to satisfy reporting requirements to the FHWA. Measures are separated by the following areas: Project Delivery, Finance, Infrastructure, Independent Oversight, Safety and Operations. Each measure has an owner associated with it from the Central Office.

Governors Measures

The Governors measures track construction and maintenance of State highways and bridges and the assistance provided to local bridges. The measures also include tracking the condition of State Highways and low cost safety improvements implemented to reduce the number of crash sites across the State. These measures representing the condition of local and state owned highways and bridges are important to the functioning of a transportation system and provide useful information to report on issues of relevance to the public. The measures that indicate new capacity, reconstruction and restoration provide a good snapshot of activities undertaken on a state-wide basis. Information provided to the public on where all the work was performed will lend greater clarity and transparency to the reporting process.

[36] An Environmental Frontrunner, James B. Struzzi II, Public Roads, January/February 2004

Each set of measures is provided in Appendix C of this report. Deloitte FAS evaluated the various performance measurement systems to determine their usefulness and accuracy for assessing PennDOT's highway and bridge construction and maintenance needs and activities.

Current PennDOT Dashboard and Scorecard Trends

Currently PennDOT assesses the trends in scorecard and dashboard performance with the Performance Measurement Database System[37] by generating reports and plotting trend lines using an access database that indicate how individual districts measure up to the targets established in the scorecard and dashboard. The reports are used to rank districts, analyze data, identify areas for improvement and measure how the districts have progressed during the year based on the trends.

The number of green, yellow and red indicators for the scorecard and dashboard measures indicates whether targets have been set at levels that encourage a culture of improvement and are not too easy or overly difficult to achieve. PennDOT does make an effort to analyze the performance results and feedback from the districts and bureau's to ensure that the performance measurement system provides information that is meaningful and correlates well with PennDOT's operations. The current PennDOT Performance Measurement Database was provided to Deloitte FAS for our assessment. The data within the Performance Measurement System is reported monthly for the dashboard measures and quarterly for the scorecard measures. For some of the measures in the scorecard, data is only reported on an annual basis. The table below shows the red, green and yellow indicators for the scorecard measures for the fiscal year 2006 – 2007. Some measures in the scorecard and dashboard have been recently introduced and did not have any data reported for the last fiscal year. These measures are indicated by blank cells in the table below. For each measure, specific targets are set for red, green, and yellow performance and based on the range in which the actual performance is reported; a district is rated red, green or yellow for any particular measure. A red cell indicates that the district did not meet the specified goal for that performance measure. Similarly, yellow cells indicate that performance was reported within the determined range of tolerances to the actual goal and green designates the Districts ability to meet the specified goal.

The following tables summarize the results of PennDOT's recent Performance Measurement results. The first table provides the results of PennDOT's 2006-2007 Scorecard:

[37] PennDOT provided a Microsoft Access database containing performance measurement data from July 2006 to December 2007

2006-2007 PennDOT Annual Scorecard Measure Results											
2006-2007 Annual	**Districts**										
Measure Title	1	2	3	4	5	6	8	9	10	11	12
H1A: Percent of Bridges that are structurally deficient											
H1B: Percentage of Dollars Spent on SD Bridges	No Data Available										
H2: Annual Bridge Letting Dollars Dedicated to Bridge Preservation											
H3: % of segment miles of Interstate with Excellent & Good IRI (<100)											
H4: % of segment miles of Interstate with Poor IRI (>150)											
H5: % of segment miles of Other NHS with Excellent & Good IRI (<120)											
H6: % of segment miles of Other NHS with Poor IRI (>170)											
H7: % of segment miles of non NHS ADT >2000 with Excellent & Good IRI (<150)											
H7A: % of Non-NHS ADT<2000 with Excellent & Good IRI	No Data Available										
H8: % of segment miles of non ADT >2000 with Poor IRI (>195)											
H8A: % of Non-NHS ADT<2000 with Poor IRI	No Data Available										
H9: % of Non-NHS segment miles with Inadequate Pavement Width											
H10: % of segment miles of Annual Surface Improvement											
H11: Improve Scores of CMMT Measures											
H11A: Accountability of field staff											
H12: Dollar Savings Redirected from Multiple MECE Implementation Team Recommendations											
H13: Actual vs. PMC approved Preliminary Engineering and Final Design Phase Costs	No Data Available										
H14: Construction $ Spent on Oversight											
H15: Final Project Amount vs. Original Contract Amount											
H16: Annual Letting Goal											
H19: Annual TE and Local Projects, Annual Home Town Streets, and Annual Safe Routes to School projects Let-Comparison of		No Data Available									

2006-2007 PennDOT Annual Scorecard Measure Results											
2006-2007 Annual	**Districts**										
Measure Title	1	2	3	4	5	6	8	9	10	11	12
Committed versus Actual.											
H26: Engineer's Estimate vs. Contractor Low Bid	No Data Available										
H31: Fatality Rate											
H32: Number of fatalities	No Data Available										
H33: DBE Participation - Design											
H34: # of Dollars obtained for Construction DBE's											
H36: Annual Highway Customer Survey Executive Summary for Districts											

Table 18 - PennDOT 2006-2007 Scorecard Results

The table below shows the red, green and yellow indicators for each of the dashboard measures at the end of the fiscal year 2006 – 2007.

2006-2007 PennDOT Annual Dashboard Measure Results											
YTD 2006 - 2007	**Districts**										
Measure Title	1	2	3	4	5	6	8	9	10	11	12
01 Complement Filled											
02 Percent Sick Leave											
03 Total District Overtime Costs											
04 Accrued Unbilled Costs											
05 Return On Investment (ROI)											
06 ASHMA Bridge Allocation											
07 Winter Services											
08 County Budget Monitoring											
09 Percent of Portfolio on Schedule											
10a Committed Letting Goals by $$											
10b Committed Letting Goals by #											
11a Committed Bridge Projects Let $ On Schedule											
11b Committed Number of Bridge Projects Let On Schedule											
12 Monitor Bridge Analysis Backlog – 90 Days											
12b Monitor Bridge Analysis Backlog – 120 Days	No Data Available										

2006-2007 PennDOT Annual Dashboard Measure Results											
YTD 2006 - 2007	**Districts**										
Measure Title	1	2	3	4	5	6	8	9	10	11	12
13A % of Bridges that are Deficient											
13B Percentage of dollars spent on SD bridges	No Data Available										
14a Number 0 and 1 Maint. Priorities for Bridge											
14b Total Number of 0 and 1 Maintenance Priorities											
15 Average monthly Bituminous Sample Testing Turnaround Time											
16a DBE Participation - Design											
16b Percentage of DBE Paid / Committed for on-going projects at least 50% complete											
17 Bid vs Final Amount											
18 Percent of Construction Dollars Spent on Oversight											
19 Surface Improvements - Resurfacing											
20 Surface Improvements – Leveling & Sealing											
21 Surface Improvements – Total Surface Improvement											
22 Surface Improvements – Crack Sealing on 5-Year Cycles											
23a CCC – Average days to Complete a Pothole Concern											
23b CCC – All Drainage Concerns											
24 Program 718 – Low Cost S.I.P.											
25 Diversified CE Experience											
26 Engineer's Estimate vs. Contractor Low Bid Amount	No Data Available										

Table 19 - PennDOT 2006-2007 Dashboard Annual Results

The red cells indicate the measures for which the performance targets were not achieved at the end of the fiscal year. The performance at the end of the year is based on meeting the quarterly performance goals or monthly performance goals in the scorecard and dashboard. The number of green, red and yellow indicators for each of the measures for all districts is tabulated in Appendix C of this report. Several districts have not achieved the green target at the end of the year for measures such as complement filled, percentage of deficient bridges, committed letting dollars and the fatality rate. All these measures have significant implications to the health of the system.

While the indicators are good source of information for monthly performance, the number of indicators should not be taken as a reflection of year end performance. One red indicator during any particular month or quarter may upset the good performance during the other periods just as one green indicator can reverse many months with performance yellow or red indicators. However, studying the number of red, green or yellow indicators does give us an idea of fluctuations in monthly performance that may call for performance targets that are tailored on a monthly/seasonal basis rather than those that are constant throughout the year.

Based on the Deloitte FAS assessment of the usefulness and accuracy of PennDOT's performance measurement system for assessing highway and bridge construction and maintenance needs and activities, the following items have been identified:

- Given the large number of measures with the current PennDOT Performance Measurement System it is difficult to assess the actual performance of the Engineering Districts and ultimately assess the performance of PennDOT. This highlights the need for a true dashboard view of the Departments performance. (See True Dashboard Readings under the Key Findings Section Below)

- The 2006 – 2007 Scorecard highlights a portion of measures with goals that were not obtained from a majority of Engineering Districts. In particular, H1A - Percent of Bridges that are structurally deficient was red for seven of the eleven districts. The percentage of structurally deficient bridges is a core measure that can be used to assess performance relative to peer state agencies[38]. FHWA has a measure to reduce structurally deficient bridges by 0.5% each year, which is the target set by PennDOT for achieving a green ranking. In addition, there is a need to analyze and assess performance relative to a functional classification of structurally deficient bridges on the local roads, state highways and national highway system since all bridges are not of the same level of importance. Additional goals can be generated based on functional classification or relative importance of bridges to the transportation network. Bridge Project Priority can be calculated based on a set of factors and those bridges requiring immediate attention can be addressed first. Caltrans calculates a Bridge Priority Factor based on a target completion date, bridge condition and facility usage level. PennDOT determines the Federal required sufficiency rating[39] for its bridges ranging from 100 (entirely sufficient) to 0 (entirely insufficient or deficient) that is considered by the federal government for allocation of funds to improve the condition of bridges. PennDOT can develop a similar priority based ranking mechanism to ensure that funds received for bridge maintenance and repair are utilized efficiently for bridges in most need of repair. If a certain bridge repair needs to be urgently completed in a particular year, it should be included in the performance targets for that year.

[38] Measuring Performance among State DOTs, American Association of State Highway and Transportation Officials, March 2006, page 36

[39] Sufficiency Rating is a calculated rating indicating the bridge's sufficiency (or capability). Factors included in the calculation are:

- The structure's adequacy and safety (accounting for 55% and based on inspection data),
- The structure's serviceability and functional obsolescence (accounting for 30% and based on ability of bridge to meet current traffic conditions), and
- How essential the bridge is for public use (accounting for 15%)

Bridges with low sufficiency ratings are eligible for more funds. A Sufficiency Rating 80-100 indicates no eligibility for funding; A sufficiency rating of 50-79 indicates eligibility for costs to rehabilitate or refurbish the bridge; A sufficiency rating of 0-49 indicates eligibility for costs to replace the bridge
(Source: PennDOT – Bridge Inspection Terminology and Sufficiency Ratings)

- In 2007 PennDOT conducted a Bridge Risk Assessment utilizing the data contained within BMS to prioritize bridge work, especially rehabilitation and replacement candidates, which was used in the development of the most recent TIP.

- The 2006 – 2007 Scorecard measure H11A - Accountability of field staff, resulted in ten out of eleven Districts failing to meet the target goals. The measure targets assistant county managers who are to spend a minimum of 50% of their time in the field reviewing operations. Since the assistant county managers spend a lot of their time on the new SAP Plant Maintenance system, it appears, based on the comments we received during our interviews, that they are unable to devote 50% of their time to the field. The measure appears to be difficult to achieve under current conditions and could be temporarily deferred until the maintenance managers familiarize themselves with the SAP plant maintenance system.

- The Department does not have complete control over the fatality rate, but analyzing the fatality rate provides valuable information on crash sites, unsafe intersections and driving violations. One measure that can be included within safety could be a correlation between safety improvement costs and benefits realized due to reduction in crashes, fatalities and injuries. Caltrans calculates a Traffic Safety Index to measure the benefits of reducing the number and cost of collisions with improvements with respect to the cost of improvements. Other safety measures can include commitments to improve a certain number of high frequency crash sites every year and increasing the frequency of bridge inspections.

- Committed letting goals (DE dashboard measures 10A and 10b) are tracked monthly on the dashboard. A project let early can reduce future commitments let and impact performance in terms of "Committed Letting Goals by #" for future months. Conversely, a project let late can shift the focus from future commitments. Committed Letting Goals by number and dollars should be tracked on a cumulative basis on the dashboard.

- For DE Dashboard performance measure 14A (% of completed maintenance items classified as a bridge maintenance category with a priority of 0 or 1), the BMS is not being updated and does not communicate with the SAP system, where payments are made. So the data on 0 or 1 is not being reported correctly. The systems need to be updated as work is completed, and communication should be set up between the systems to track the completed maintenance work effectively. PennDOT has also been effected by problems with the SAP/BMS2 integration due to initial issues in the data conversion from MORIS to SAP which appear to have been addressed.

Key Findings

The following summarizes the key findings associated with the Deloitte FAS assessment of the usefulness and accuracy of PennDOT's performance measurement system for assessing highway and bridge construction and maintenance needs and activities:

Management Tool

Performance measures in some form are used by several State Department's of Transportation. Few states have a well defined performance measurement system that serves as a consistent measure of performance across the organization. PennDOT is among those top tier organizations, which have included performance measurement as a core element of organizational objectives to drive performance and improvement in its operations.

The district executives are evaluated based on the number of red, green and yellow indicators for the dashboard and scorecard measures during the year. Scorecard and dashboard performance is addressed in the DE monthly meetings and components of the scorecard and dashboard system are also built into the individual employee performance reviews. The DE dashboard and scorecard serve as an important tool for the Deputy Secretary's office to assess the performance in the districts. The central office evaluates the content of the scorecard and dashboard performance measurement system on a continual basis with input from the bureau's and districts but there is no formal or structured review of the measurement system.

Certain measures within the scorecard and dashboard have a direct impact on the safety and project delivery process while some others serve to increase the efficiency of the process by improving productivity and saving costs. Given the number of measures and the green, red and yellow indicators in the tables above, it appears difficult to analyze the relative impact of each of the indicators to the performance of PennDOT. Some practices such as creating a true dashboard with core measures, increasing transparency and sharing information with the public would help PennDOT refine its performance measurement system to serve not only as a tool for management to assess limitations and strengths of PennDOT but also as a tool for internal and external stakeholders to understand the usefulness and effectiveness of PennDOT. Some of the changes that PennDOT can consider to its performance measurement system are explained in the following sections.

Automation

The current process to collect and calculate Performance Measurement information is manual and time consuming which also allows for mistakes or miscalculations. PennDOT has developed a Microsoft Access database which allows each designated employee in the Central Office to manually enter the performance measurement data that they are responsible for reporting. This requires a manual search and selection of the data and finally a manual calculation of the performance measure. It is our understanding that PennDOT is in the process of developing technology to assist in the automation of the DE dashboard and scorecard measures. PennDOT should continue to work with BIS to develop an automated performance measurement system that eliminates the manual efforts that are currently taking place.

True Dashboard Readings

PennDOT has an established set of measures within the DE dashboard / scorecard and with some minor adjustments it appears that PennDOT will have a solid foundation to monitor the performance of the highway and bridge – maintenance and construction program. It would benefit PennDOT to perform an assessment to identify the top few performance measures that broadly represent the health and success of their program. Those measures could include safety, cost control, project timing, and infrastructure quality. Specific measures that form the top tier should cover critical needs such as monitoring the reduction in structurally deficient bridges, maximizing the value derived from investments in asset management, increasing the safety of the highway network and ensuring that projects are delivered on time and within budget. PennDOT should then consider aligning the current DE dashboard and scorecard measures to the top indicators and have

the individual measures relate to the single indicator. For example, the Virginia Department of Transportation ("VDOT") has developed an industry leading method to display their programs performance by using seven dashboard gauges. Within the individual dashboard gauge VDOT allows the user to drill down and obtain more detailed measurements or statistics for that area.

As described above, the District Executives are evaluated annually based on rankings obtained from the number of red, green and yellow Performance Measurements in the scorecard during that year. The evaluation does not include additional consideration for the more important measures. This reinforces the need for a true dashboard measurement system or some type of hierarchy within the current measures to indicate the Departments priorities.

Greater Transparency

The Central Office assembles the performance related data. In some cases the Districts are unable to track the source of numbers used to compute the performance data. The process of computing the performance measures can be made more transparent. Until the performance measurement system can be fully automated (see above) Central Office should place the calculations used to populate the performance measurements on a shared drive to provide clarity to the Engineering Districts. In addition, any Crystal Reports[40] used to extract data from other PennDOT systems or databases should be placed on a shared drive so Districts can run the same reports and produce identical data.

After PennDOT fully develops an automated approach to developing the performance measurements PennDOT should consider providing this information to the public. The information will provide an increased level of transparency into PennDOT's operations which is extremely important given the increased pressure for public accountability and the need to maximize limited resources.

Other

Some Districts have quality coordinator positions that work with Central Office on Performance Measures. In some cases the coordinator provides a Dashboard summary to the DE in preparation for the monthly meeting of DE's with the Deputy Secretary. At one point each District had a quality coordinator but it appears some of the Districts have done away with the position. With the automation and web based performance measurement system the Engineering Districts should no longer need an individual to track and report this information to the DE.

The Districts appear to focus on the components and composition of the Performance Measures that receive a yellow and red indicator and do not provide any consideration to green Performance Measurements since green PM's have met the required targets. Districts need to be more aware on what is contributing to their good performance (green PM's) in certain areas as opposed to others (yellow and red PM's) to develop an increased understanding of their strengths and find ways to improve on their weaknesses.

Not all roadways are of the same level of importance for the flow of traffic and measures H3-10 break out the measurement in terms of type of roadway. Under the SAP based M213[41] program, Districts plan their work for the upcoming fiscal year. The planned surface improvement is used as a baseline for calculating the target goals for DE dashboard

[40] Crystal Reports is a business intelligence application used to design and generate reports from a wide range of data sources

[41] PennDOT's M213 Program is a subset of work activities that are designed to maintain or improve roadway surface conditions

measures 19 and 20. The calculation for surface improvement (DE dashboard measure 21) excludes betterments. Betterments are included only quarterly within the calculation for surface improvement (DE scorecard measure H10) in the DE scorecard. The percentage of betterments in surface improvement is expected to decrease in the coming years as maintenance funded betterments are more expensive to perform with the available maintenance funding. Therefore PennDOT should consider the benefits of including betterments in the Performance Measurement approach.

The measure for crack sealing on 5-Year cycles (DE dashboard measure 22) includes only pavement area that is less than five years old with the assumption that all pavements have to be crack sealed within a five year cycle. Within PennDOT, 12,000 miles out of 26,000 system miles are less than five years in the cycle. Those miles greater than five years that require crack sealing are still maintained but not tracked with the mindset that they would probably need more work than just crack sealing. This measure increases the life span of the existing pavement by maintaining it on a regular cycle. The pavements that have not been crack sealed within five years can have a shorter life span and require costlier rework at more frequent intervals.

The dashboard measure to monitor the percentage of bridges that are re-rated in a timely fashion within 90 days and 120 days (DE dashboard measures 12 and 12b) can be combined into one measure that targets re-rating within 90 days or 120 days.

PennDOT should consider implementing the recommendations provided above and continue to evaluate and refine the performance measurement system to address changing needs and scenarios. Some activities satisfy basic needs and have to be tracked in the system, while others can be modified to allow for policy driven improvements. The system should always be open to innovation and performance measurement, and it must be based more on outcome related measures that drive improvements. Some basic operational requirements can be included as lower level measures that are driven by quality assurance items, but the lower level measures should be the basis or build up for the top level Dashboard gauges which focus on performance enhancement goals. Measures driving performance enhancement or much needed system transformation to satisfy growing challenges and technology advancements must be a core element of performance measurement.

Performance Measurements Reported in the 2002 LB&FC Performance Audit of PennDOT

The previous performance audit of PennDOT conducted by the LB&FC in 2002 contained a report on nineteen Highway Administration Performance Measures that provided a summary of PennDOT's performance. A portion of those measures have been updated within the applicable sections of this report. The following items have been updated at the request of the LB&FC:

Size and Average Age of PennDOT's General Equipment Fleet

The information presented in the table below has been provided by PennDOT's Bureau of Maintenance and Operations – Equipment Division. The table provides information for six major types of equipment within the PennDOT Maintenance fleet. Each type of equipment has an identified useful life established by PennDOT and the average actual age for that type of equipment. The average actual age of equipment is below PennDOT's identified useful life for each category. Only a small percentage of the single axle and tandem dump trucks exceed the PennDOT identified useful life, 6.06% and 3.31% respectively.

Equipment Type	Number of Pieces	Useful Life (Years)	Average Actual Age (Years)	Number of Pieces That Exceed the Useful Life	Percentage of Pieces That Exceed the Useful Life
Tandem Dump Trucks	1,419.0	12.0	6.0	47.0	3.31%
Single Axle Dump Trucks	742.0	12.0	6.0	45.0	6.06%
Loader	545.0	15.0	8.0	62.0	11.38%
Grader	178.0	15.0	14.0	94.0	52.81%
Backhoe	156.0	15.0	9.0	24.0	15.38%
Excavator	84.0	12.0	8.0	16.0	19.05%
Track Excavator	49.0	12.0	6.0	5.0	10.20%

Table 20- Number and Age of Selected PennDOT Equipment (2007)

Dollar Amount of Highway Needs

The information presented in the table below has been provided by PennDOT's Bureau of Maintenance and Operations – Roadway Management Division. The table provides information on PennDOT's maintenance needs and the estimated cost to correct the identified deficiencies. The information is assessed by PennDOT in four distinct categories: pavement, shoulder, guiderail, and drainage. The total identified PennDOT highway needs for the four categories have gradually increased from 2002 to 2005. In 2006, the estimated cost for guiderail increased 143.6% from $241,230,572 to $587,791,931. The estimated guiderail cost decreased slightly in 2007 down to $562,129,029. The total estimated PennDOT highway need for 2007 equals $ 2,765,355,393.

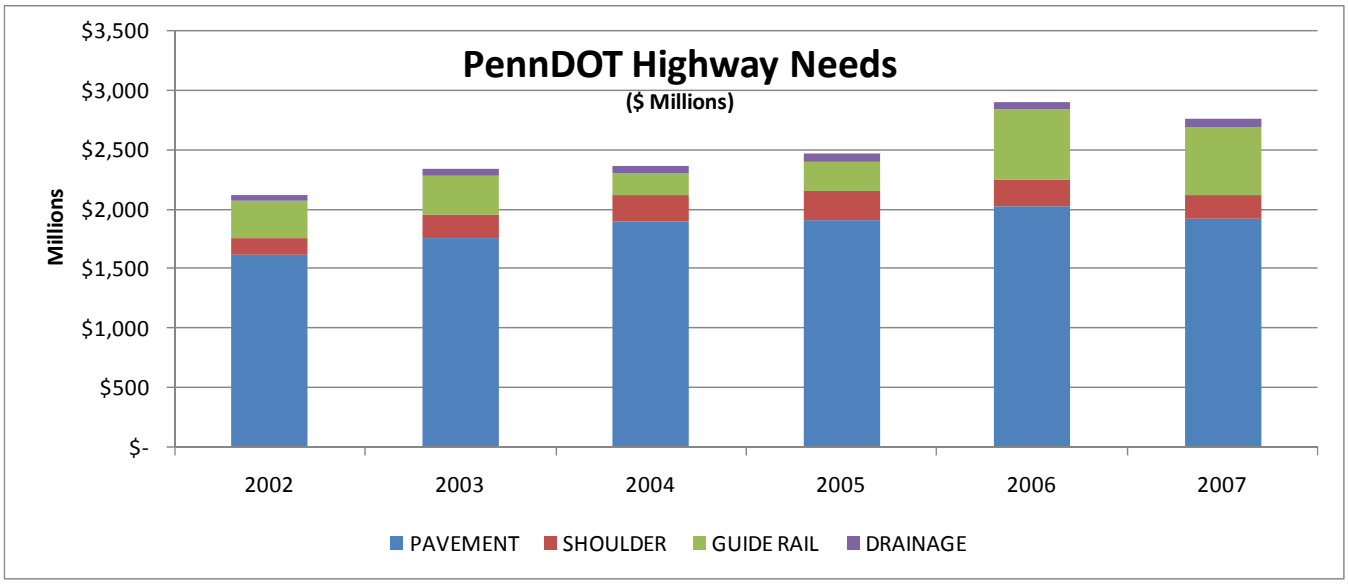

Figure 26 - PennDOT Identified Highway Needs

Lane Miles Receiving Surface Improvements

The information presented below has been provided by PennDOT's Bureau of Maintenance and Operations – Roadway Management Division and shows the lane miles of surface improvement that were planned and achieved by PennDOT for the 2005-2006 and 2006-2007 seasons. The

information is presented in four distinct categories: Betterments[42], Resurfacing[43] & Concrete Pavement Restoration, Leveling & Sealing[44] and Surface Repairs[45]. The total number of lane miles receiving surface improvements has decreased by 6% (386 lane miles) from the 2005-2006 to 2006-2007 seasons. In addition, PennDOT's actual number of lane miles that received surface improvements in 2006-2007 was 18% less than PennDOT's planned number of lane miles.

APPROPRIATION 582 & 818 ACTIVITY	2005-2006			2006-2007			Season Comparison	
	Planned Miles	Actual Miles	Variance Miles	Planned Miles	Actual Miles	Variance Miles	Actual Miles	% of Delta
Betterment	287.80	382.34	94.54	613.30	257.70	(355.60)	124.64	32.60%
Resurfacing & CPR	2,448.00	2,313.60	(134.40)	2,850.20	2,256.80	(593.40)	56.80	2.46%
Leveling & Sealing	3,149.70	3,132.60	(17.10)	3,398.50	2,953.40	(445.10)	179.20	5.72%
Surface Repairs	648.70	599.00	(49.70)	535.40	573.60	38.20	25.40	4.24%
PAVEMENT TOTAL	6,534.20	6,427.54	(106.66)	7,397.40	6,041.50	(1,355.90)	386.04	6.01%

Table 21 - Actual v. Planned Surface Improvements by Lane Mile

Structurally Deficient Bridges

Structurally deficient bridges do not meet the required load carrying and functional standards due to deterioration in their decks, supporting members, or superstructures. They may be posted to only allow reduced vehicle weights to travel on them or be closed to traffic. Over 30% of the local[46] bridges are either posted or structurally deficient. The table below shows the number and percentage of the total local and state[47] bridges that are structurally deficient, closed and posted.

Pennsylvania		
State Bridges	**Number**	**Percent**
Number of Structurally Deficient Bridges	6,023.0	23.78%
Posted Bridges	782.0	3.09%
Closed Bridges	47.0	0.19%
Total State Bridges	25,327.0	
Local Bridges	**Number**	**Percent**
Number of Structurally Deficient Bridges	2,063.0	32.15%
Posted Bridges	1,945.0	30.31%
Closed Bridges	197.0	3.07%
Total Local Bridges	6,416.0	

Table 22 - Percentage of Structurally Deficient, Closed and Posted Bridges in Pennsylvania by Count and Deck Area[48]

[42] Major rehabilitation of highways including structural surface improvements with shoulder updates, guiderail updates, and drainage improvements (Source: 2002 LB&FC Performance Audit – PennDOT)
[43] Resurfacing is the placing of one or more courses on an existing surface (Source: 2002 LB&FC Performance Audit – PennDOT)
[44] Leveling is the application of bituminous material over extended lengths of roadway to correct surface distortions such as irregular cross sections or wheel path rutting. A seal coat is a thin treatment consisting of bituminous material, usually with cover aggregate, applied to a surface course. (Source: 2002 LB&FC Performance Audit – PennDOT)
[45] Mechanized patching operations using plant mix or liquid bituminous and aggregate to maintain riding quality on limited sections of bituminous highway (Source: 2002 LB&FC Performance Audit – PennDOT)
[46] Bridges on the local route system with spans greater than or equal to twenty feet.
[47] Bridges on the State route system with spans greater than or equal to eight feet.
[48] Summary developed from data provided on the PennDOT website for Bridge Information. Data reported by PennDOT on March 28, 2008.

The information in the table above summarizes the current status of the State and Local bridges within the entire Commonwealth. To provide insight into the location of the structurally deficient bridges, Deloitte FAS developed the following table that identifies the percentage of structurally deficient bridges on state routes within each Engineering District compared to the total number of structurally deficient bridges across the state.

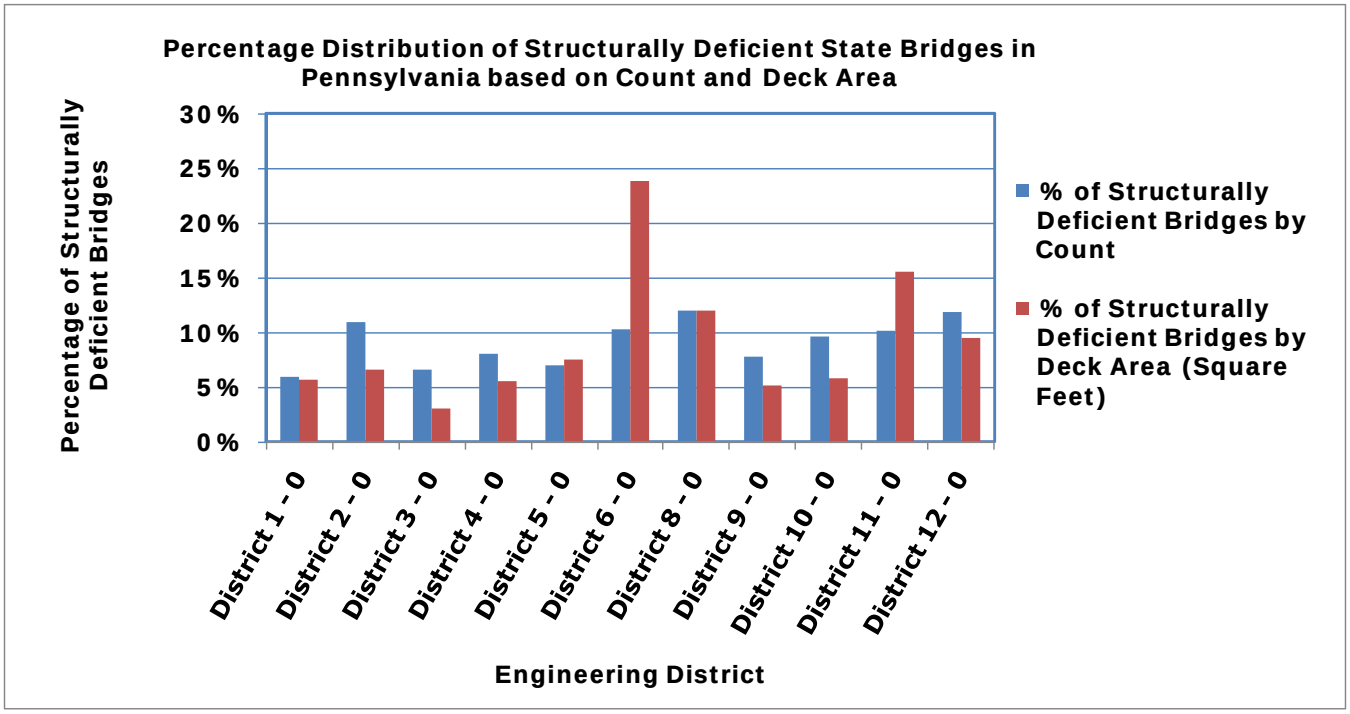

Figure 27 – Percentage of Structurally Deficient State Bridges Based on Count and Deck Area

Deloitte FAS then developed the following table that identifies the percentage of structurally deficient bridges on local routes within each Engineering District compared to the total number of structurally deficient bridges across the state.

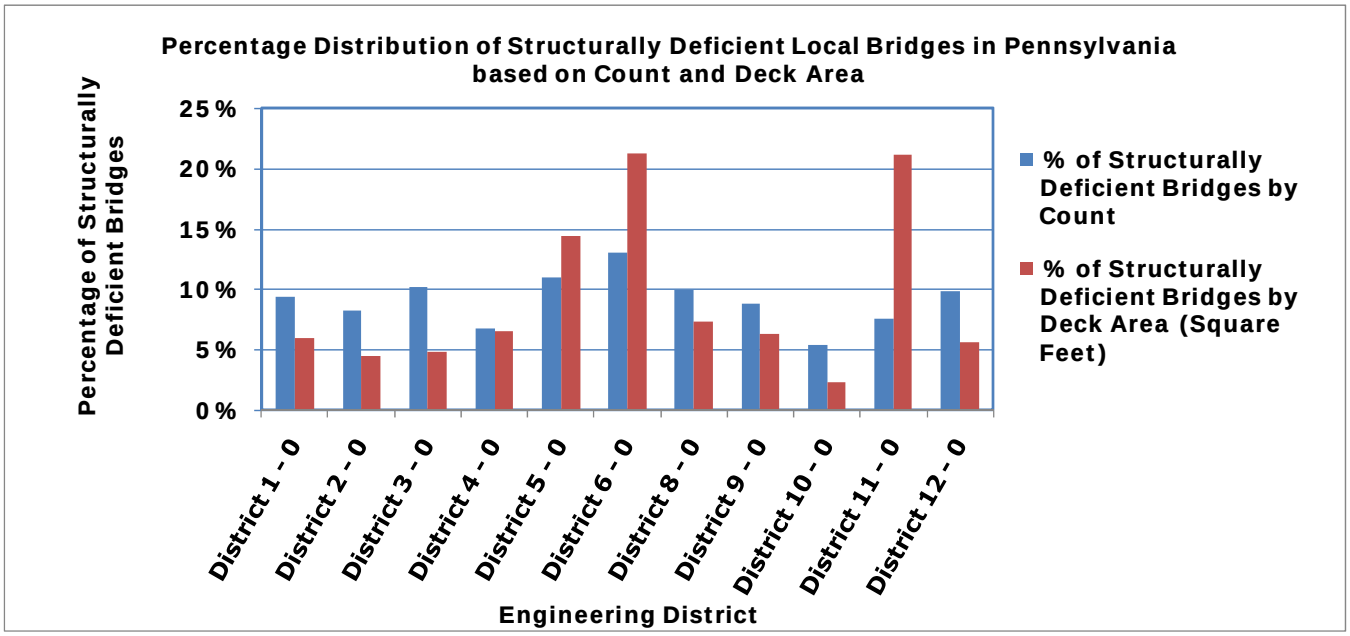

Figure 28 - Percentage of Structurally Deficient Local Bridges Based on Count and Deck Area

PennDOT measures the percentage of structurally deficient bridges as a performance measure on the scorecard. The performance measure calculates the structurally deficient bridge deck area measured in square feet as a percentage of the total bridge deck area in each Engineering District. This measurement assesses the amount of structurally deficient bridge deck area in each District as a percentage of the total structurally deficient deck area in that District. This is an acceptable method when trying to establish goals for each District to reduce their portion of structurally deficient bridges but it does not allow PennDOT to assess which Districts need the most attention. The figures presented above, provide the amount of total structurally deficient deck area and the number of structurally deficient bridges in each district as a percentage of the total structurally deficient deck area and the total number of bridges in the entire State respectively. This allows for the identification of the Engineering Districts that have the greatest need for bridge repair.

Compared to other maintenance activates, PennDOT expends a large sum of money every year for the maintenance and repair of bridges within the Commonwealth. The amount of money spent by PennDOT on state and local structurally deficient bridges is summarized in the following table.

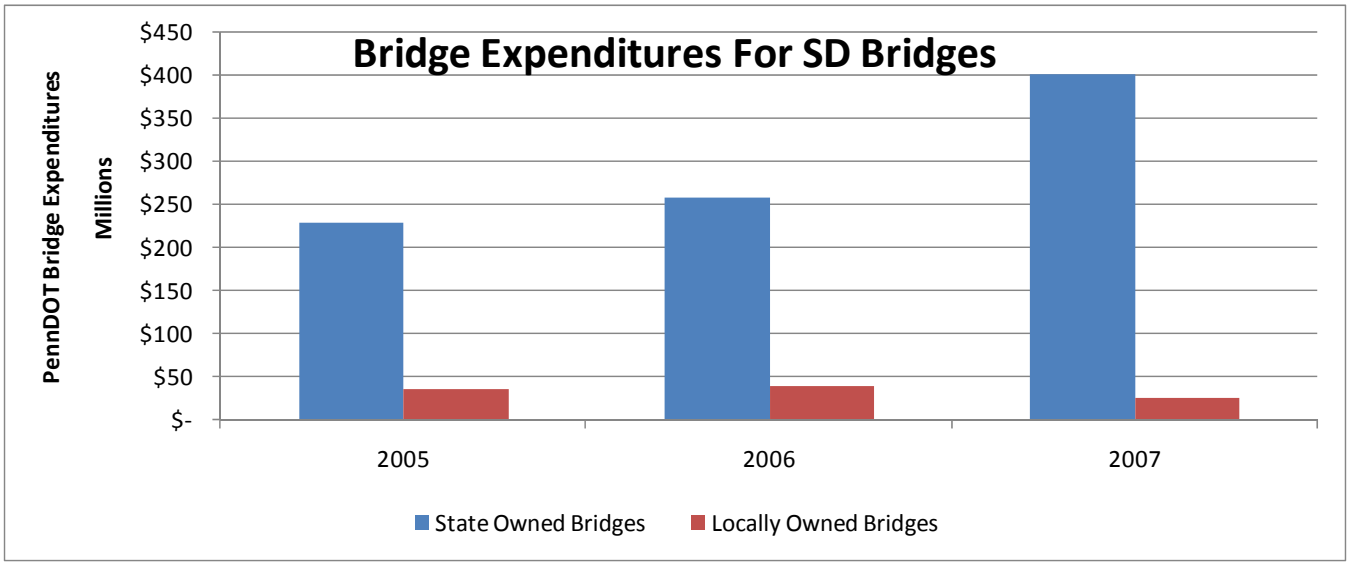

Figure 29 - PennDOT Expenditures for Structurally Deficient Bridges

Compared to other states within the country, Pennsylvania has a large number of bridges that are an essential element of the transportation network. PennDOT's expenditures for structurally deficient bridges have significantly increased from approximately $250 million in 2006 to approximately $400 million in 2007. Deloitte FAS recommends that PennDOT must continue to evaluate bridge needs on a long term basis and utilize funds efficiently to maintain the effectiveness of the transportation system.

Section 6: Conclusion

The information presented in the previous sections provides an evaluation of the Performance Assessment of PennDOT's Highway and Bridge – Maintenance and Construction Program, conducted on behalf of Pennsylvania Legislative Budget and Finance Committee. The assessment was conducted over a period of several months and included an evaluation of the both PennDOT's Central Office and certain Engineering District Offices. In addition, Deloitte FAS met with external stakeholders and PennDOT Business Partners so that the assessment was not limited to the internal views and opinions of PennDOT.

Overall PennDOT's Highway and Bridge – Maintenance and Construction Program is operating in an efficient manner and with the improvement of the items described within this report PennDOT's Highway and Bridge – Maintenance and Construction Program can be significantly improved.

* * *

Deloitte FAS' services were performed in accordance with the American Institute of Certified Public Accountants ("AICPA") Statement on Standards for Consulting Services and do not constitute an engagement to provide audit, compilation, review or attest services as described in the pronouncements or professional standards issued by the AICPA.

Our findings and observations are based upon information provided to Deloitte FAS to date. It is possible that, if additional information is forthcoming, our findings could be materially different.

Appendices

Appendix A: PennDOT Response to Performance Audit

In response to the Performance Audit the Pennsylvania Secretary of Transportation, Mr. Allen D. Beihler, P.E. provided the following:

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
HARRISBURG, PENNSYLVANIA 17120

OFFICE OF
SECRETARY OF TRANSPORTATION

June 19, 2008

Mr. Philip R. Durgin
Executive Director
Legislative Budget and Finance Committee
Finance Building, Room 400
Harrisburg, PA 17120

Dear Mr. Durgin:

Thank you for providing the Department of Transportation with a copy of your June 3, 2008, draft report on the "Performance Audit of the Pennsylvania Department of Transportation Highway and Bridge – Maintenance and Construction Program" pursuant to Act 1981 – 35.

We appreciated working with your consultant, Deloitte Financial Advisory Services LLP, over the past six months regarding this performance audit. This report will assist us in our mission of continuous improvement of the Department's highway operations.

We are encouraged that in this fifth major review of the Department's performance, your report's key findings identify many positive actions that reflect well on the Department. Additionally, we are pleased with the report conclusion that states PennDOT's Highway and Bridge – Maintenance and Construction Program is operating in an efficient manner. I believe we have made great strides in our highway and bridge programs since your last audit in 2002. My staff and I have reviewed the audit recommendations. Enclosed is a brief response to them.

I will be attending the meeting scheduled for June 25, 2008, at 10:00 a.m. in Room 205 in the Ryan Office Building. Mr. Richard Hogg, P.E., Deputy Secretary for Highway Administration, will be accompanying me.

Sincerely,

Allen D. Biehler

Allen D. Biehler, P.E.
Secretary of Transportation

Enclosures

pennsylvania
DEPARTMENT OF TRANSPORTATION

Subject: Response to LBFC Performance Audit
June 19, 2008

Audit Area: A. Safety	**Issue:** i. Roadway Operational Safety	**Tier:** II

Response:

The LB&FC Report references the National Bridge Inspection Standards (NBIS) for personnel qualifications. PennDOT is in full compliance with NBIS criteria, and in many cases, exceeds the criteria when requiring consultant team leaders to be Professional Engineers. The LB&FC recommendation is to exceed the NBIS national standards. PennDOT will have to carefully consider the benefit of making this change, when we are already in compliance and the program is operating effectively.

Audit Area: A. Safety	**Issue:** ii. Construction Work Zone Safety	**Tier:** I

Response:

PennDOT currently provides significant funding for state and local police to work overtime for traffic control on our projects. New federal requirements have been issued addressing the use of uniformed law enforcement, and are contained in FHWA's Final Rule on Temporary Traffic Control Devices, which has an effective date of December 4, 2008. PennDOT will be in compliance with this new FHWA regulation.

Audit Area: B. Mobility	**Issue:** i. Information Technology and Highway Administration	**Tier:** I

Response:

Our Information Technology (IT) unit and Bureau of Highway Safety & Traffic Engineering (BHSTE) staff are jointly responsible for Intelligent Transportation Systems within the Department. Currently, they are collaborating to enhance the Strategic Plan, improve the effectiveness of the technology, and centralize the direction of our ITS initiative.

Audit Area: B. Mobility	**Issue:** ii. Congestion Relief	**Tier:** II

Response:

PennDOT is addressing this recommendation. We are finalizing the IT request to enhance the Roadway Condition Reporting System and we are developing standard operating procedures for the Regional Traffic Management Centers which will define how they operate.

Audit Area: B. Mobility	**Issue:** iii. County Maintenance - Winter Program	**Tier:** II

Response:

The Department is currently working with the Office of Administration to review recruitment methods and wages for both equipment operators and diesel mechanics in preparation for the next winter season. Impacts to current labor agreements will be addressed.

Audit Area: B. Mobility	**Issue:** iv. Incident Management / Readiness	**Tier:** I

Response:

PennDOT is finalizing the plan to enhance the Roadway Condition Reporting System. The 511 traveler information system will provide web and telephone based services to provide congestion information to the public, with a target date of June 2009 for release of the Request for Proposals.

Audit Area: C. Management & Productivity	**Issue:** i. Increased use of Design-Build	**Tier:** I

Response:

The Department utilizes design-build regularly on both emergency projects and non-emergency projects. The extent to which it will be used is critical in supporting the delivery of projects associated with the Governor's bridge initiative. With regards to the recommendations, our design-build program has advanced beyond the level where a pilot is necessary. The projects currently planned for design-build will provide adequate experience to evaluate the best practices associated with this type of project delivery. To date, the Department has utilized design-build on 78 projects in the last 5 years and 34 more are planned for 2008. Additional training for design-build is anticipated for the 3rd quarter of 2008, and pro teams have been active in providing assistance to Districts for over two years. Furthermore, lessons learned from the emergency design-build projects in response to the June 2006 flood projects have been incorporated into updates of our policies and procedures.

Audit Area: C. Management & Productivity	**Issue:** ii. Inconsistent use of Value Engineering and Constructability Reviews	**Tier:** II

Response:

The Department's Value Engineering procedures outlined in our design manual exceed Federal requirements. Additionally, we are using the Value Engineering / Accelerated Construction Technology Transfer (VE/ACTT) concept to further add value to our major projects. The VE/ACTT process blends Value Engineering and Constructability reviews and has been in use since 2004, and has been recently updated and is under review by FHWA. This update should address some of the inconsistencies referenced in the report, but we offer that one of the strengths of the VE and VE/ACTT programs is that they are customized, in terms of content and participants, to meet the needs of the individual projects. To further that benefit, these programs take advantage of the flexibility in our design criteria in order to meet our Smart Transportation and Right-Sizing initiatives as well.

Audit Area: C. Management & Productivity	**Issue:** iii. Varying Levels of Schedule Expertise	**Tier:** I

Response:

We concur with your finding and realize the need for Central Office to play a role in fostering scheduling expertise, and have filled vacant positions in the Bureau of Construction and Materials as mentioned in the report. However, we are placing a greater emphasis on schedule development, expertise through the Bureau of Design and in the design phases of projects in our Districts. It is our contention that our biggest opportunity for cost savings and efficiency improvements lie with the establishment of realistic construction schedules during the design phase of a project, rather than forensically defending a flawed schedule through the claim process during construction.

Audit Area: C. Management & Productivity	**Issue:** iv. Duration of Time Required to Execute Design Services Agreements	**Tier:** I

Response:

We concur with your findings. The recommendations are already being implemented by teams of internal and external stakeholders.

Audit Area: C. Management & Productivity	**Issue:** v. Project Duration and Liquidated Damages	**Tier:** I

Response:
We concur with your findings and recommendations; however, the need for project personnel to make decisions in assessing liquidated damages limits the ability for automation.

Audit Area: C. Management & Productivity	**Issue:** vi. Inconsistent use of portfolio Managers in each District	**Tier:** II

Response:
We concur with your findings and recommendations.

Audit Area: C. Management & Productivity	**Issue:** vii. The Engineering Construction Management System	**Tier:** II

Response:
We concur with your findings and recommendations.

Audit Area: C. Management & Productivity	**Issue:** viii. County Maintenance Operations	**Tier:** I

Response:
The decision to pave with internal resources is only one aspect of an effective overall pavement management process. The pavement management program must have a global perspective on maintenance activities, to ensure we do the right treatment at the right time to extend pavement life and be cost effective. The decision to pave with Department forces must consider a variety of issues such as internal capabilities and turnover, resource locations, contractor availability, weather patterns, etc., in order to make the most cost effective decision to outsource paving operations.

Audit Area: D. System Preservation	**Issue:** i. Grouping of Similar Projects	**Tier:** I

Response:
We concur with your findings and recommendations.

Audit Area: D. System Preservation	**Issue:** ii. Transportation Asset Management	**Tier:** I

Response:

PennDOT agrees wholeheartedly with the concept to do asset management. The Transportation Funding and Reform Commission's 2006 report also recommended a more vigorous asset management program, and we have taken many strides to accomplish that goal. Two systems currently in use, the Bridge Management System 2 and the Roadway Management System, both house all of the data on these two assets, and we are currently exploring American Association of State Highway and Transportation Officials software products to enhance our data collection and decision making. We are also in the process of developing a strategic plan to manage all of our assets, and recently held a strategic planning meeting with our leadership team to prioritize our major focus areas, one of which is asset management. Internal organizational structure to manage this program has yet to be determined, but will likely reside under the auspices of Highway Administration due to the nature of our largest and most valuable assets being our pavements and bridges.

Audit Area: D. System Preservation	**Issue:** iii. Plant Maintenance Issues	**Tier:** II

Response:

Current role mapping is position based, meaning the roles are assigned to a position rather than an individual. Each organization has a primary and a back-up user for each role. The back-up assignment is to allow for continued coverage for short term absences. There are procedures in place to assign roles on a temporary basis to cover long term absences or vacancies. The position based mapping eliminates the need for additional role maintenance actions as vacancies are back filled.

Audit Area: D. System Preservation	**Issue:** iv. International Roughness Index	**Tier:** I

Response:

PennDOT is pleased to state that we have had a sustained positive trend in ride quality on all 4 categories of highways on PennDOT's highway network over the last 10 years.

Audit Area: Performance Measurements

Response:

We concur with your findings and recommendations. The Department has completed the initial development of the Performance Metrics Dashboard (PMD) which is a system similar to the one referenced in the report. Our intent is to continue to expand the capabilities of this system, including a fully automated system. We appreciate the reviewers' recognition of our metrics program and will continue to enhance the system to drive improved performance.

Appendix B: Interviews Conducted

The Deloitte FAS – Capital Projects Consulting Team interviewed the following individuals:

Organization	Unit	Individual	Title
PennDOT	Highway Administration	Richard Hogg	Deputy Secretary
PennDOT	Administration	Rina Cutler	Deputy Secretary
PennDOT	Bureau of Fiscal Management	Tom Colaizzi	Highway Division, Manager
PennDOT	Information Technology Office	Jill Reeder	Chief Information Officer
PennDOT	Bureau of Information Systems	Marty Shortall	Director
PennDOT	District 2	Kevin Kline	District Executive
PennDOT	District 2	Benjamin LaParne	Assistant District Executive ("ADE") Construction
PennDOT	District 2	Karen Michael	Assistant District Executive - Design
PennDOT	District 2	Sharon Hay	Quality Coordinator
PennDOT	District 2	Christopher Sokol	Design – Design Services Engineer, Sr. Civil Engineer, Manager
PennDOT	District 2	James Surkovich	Maintenance - Maintenance Operations Engineer, Sr. Civil Engineer, Manager
PennDOT	District 2	Kim Reese	County Manager - Clearfield County
PennDOT	District 2	Ronald Kelm	Assistant District Executive – Maintenance
PennDOT	District 2	Chris Stotish	Construction - Assistant. Construction Manager
PennDOT	District 2	Kevin Hoover	Design - Contract Management, Senior Civil Engineer, Manager
PennDOT	District 2	Thomas Zurat	Portfolio Manager
PennDOT	District 2	George Prestash	District Bridge Engineer
PennDOT	District 2	Leon Westover	Construction - Labor & Safety Contract Compliance Agent
PennDOT	District 6	Lester Toaso	District Executive
PennDOT	District 6	George Dunheimer	Assistant District Executive Construction
PennDOT	District 6	Charles Davies	Assistant District Executive Design
PennDOT	District 6	Nicholas Martino	Assistant District Executive

Organization	Unit	Individual	Title
			Maintenance
PennDOT	District 6	Louis Belmont	Acting Assistant District Executive – Services
PennDOT	District 6	Scott Fletcher	Acting Assistant District Executive for Services
PennDOT	District 6	Tim Stevenson	Design - Project Management, Senior Civil Engineer, Portfolio Manager
PennDOT	District 6	Lou Porrini	Maintenance - Maintenance Services, Manager
PennDOT	District 6	Emmanuel Anastasiadis	Roadway Closure Management System Operator
PennDOT	District 6	Harold Windisch	Construction - Principal Construction Engineer
PennDOT	District 6	Michael Girman III	Consultant Portfolio Manager
PennDOT	District 6	Bob Eppley	Environmental Manager
PennDOT	District 6	Mary Ann Lang	Utilities Manager
PennDOT	District 8	R. Scott Christie	District Executive
PennDOT	District 8	B.J. Weidman	Assistant Executive – Construction
PennDOT	District 8	M.J. Gillespie	Assistant District Executive Design
PennDOT	District 8	Michael Keiser	Design - Design Engineer
PennDOT	District 8	Steve Dietz	Maintenance - Maintenance Program Manager
PennDOT	Distict 8	Harivadan Parikh	Design - Bridge Engineer
PennDOT	District 8	Randall Staudt	Construction - Construction Services Engineer
PennDOT	District 8	Joseph Palladino	Construction - Assistant Construction Engineer
PennDOT	District 8	C.C. Goodhart	Assistant District Executive – Maintenance
PennDOT	District 8	John Kennedy	Design - Design Portfolio Manager
PennDOT	District 8	Richard Roman	Design - Design Services Engineer
PennDOT	District 8	Doug Frank	Construction - Materials Manager 2
PennDOT	District 8	Marcia Jackson	Construction - Construction Support Services
PennDOT	District 8	Jeff Costanzo	Design - Design Services Unit - Contract Management
PennDOT	District 8	Sharon Okin	Design - Design Services Unit - Environmental
PennDOT	District 8	Karl Wink	Design - Design Services Unit - Utility
PennDOT	District 8	Chuck Enoch	Maintenance - County Maintenance Managers

Organization	Unit	Individual	Title
			Lancaster Co. 8-7
PennDOT	District 11-0	Daniel Cessna	District Executive
PennDOT	District 11-0	William Korenoski	District Fiscal Officer
PennDOT	Bureau of Construction & Materials	David J. Azzato	Acting Director
PennDOT	Bureau of Construction & Materials	J. Pat Gardiner	Contract Management, Division Chief
PennDOT	Bureau of Construction & Materials	James Yee	Contract Management – Contract Administration Manager
PennDOT	Bureau of Construction & Materials	Joseph Robinson	Select Quality Assurance, Division Chief
PennDOT	Bureau of Construction & Materials	Joseph Cribben	Contract Management – Contractor Evaluation and Prequalification, Manager
PennDOT	Bureau of Construction & Materials	Frank Pikitus	Contract Management – Construction Services, Manager
PennDOT	Bureau of Construction & Materials	M. Alaa Azab	Engineering, Technology, & Information, Division Chief
PennDOT	Bureau of Design	Brian J. Thompson	Acting Director
PennDOT	Bureau of Design	Chris Drda	Design Services Division – Consultant Selection Section, Division Chief
PennDOT	Bureau of Design	Scott Vottero	Contract Development & Award Section Chief
PennDOT	Bureau of Design	Brian Hare	Design Services Division Chief
PennDOT	Bureau of Design	Tom Macioce	Bridge Quality Assurance, Division Chief
PennDOT	Bureau of Design	Hal Rogers	Bridge Quality Assurance, Division Chief
PennDOT	Bureau of Design	Dan Stewart	Highway Quality Assurance, Division Chief
PennDOT	Bureau of Design	Kim Mankey	Engineering Computing Management Division, Division Chief
PennDOT	Bureau of Design	Gary Fawver	Environmental Quality Assurance Division, Division Chief
PennDOT	Bureau of Highway Safety & Traffic Engineering	Daryl St. Clair	Acting Director
PennDOT	Bureau of	Steve Koser	IT Manager

Organization	Unit	Individual	Title
	Highway Safety & Traffic Engineering		
PennDOT	Bureau of Highway Safety & Traffic Engineering	Girish Modi	Safety Management Division, Division Chief
PennDOT	Bureau of Highway Safety & Traffic Engineering	Glenn Rowe	Traffic Engineering & Operations Division, Division Chief
PennDOT	Bureau of Maintenance & Operations	James Smith	Acting Director
PennDOT	Bureau of Maintenance & Operations	Bruce Harter	Maintenance Division, Division Chief
PennDOT	Bureau of Maintenance & Operations	J. Michael Long	Roadway Management Division, Division Chief
PennDOT	Deputy Secret. staff	Luke Murren	Coordinator
PennDOT	Deputy Secret. staff	Christine Reilley	Coordinator
PennDOT	Highway Admin	Steve Grimme	Assistant to Deputy Secretary
PennDOT	Legislative Budget and Finance Committee	Randal Mortimore	Analyst
PennDOT	Legislative Budget and Finance Committee	Robert C. Frymoyer	Assistant Chief Analyst
PennDOT	Bureau of Planning and Research	Laine Heltebridle	Transportation Planning, Division Manager
PennDOT	Bureau of Planning and Research	Gaye Liddick	Transportation Planning-Performance Reporting, Section Manager
PennDOT	Center for Program Development and Management	Robin Metz	Transportation Program Development Division, Division Chief
PennDOT	Center for Program Development and Management	Jim Arey	Section Manager
PennDOT	Center for Program	Robert C. Hannigan	Planning and Contract Management Division,

Organization	Unit	Individual	Title
	Development and Management		Division Chief
PennDOT	Planning	James D. Ritzman	Deputy Secretary
External Business Partner	Construction Contractor	Various	Varies
External Business Partner	Design Consultant	Various	Varies

Appendix C: Documents Evaluated

The Deloitte FAS Capital Projects Consulting Team read and analyzed the following documentation:

Document	Organization
Design Manual - Part 1A, Transportation Engineering Procedures (January 2001)	PennDOT
Project Office Manual	PennDOT
Districts Budgets by Appropriation , run date 12-20-07	PennDOT
Pub 51 - Bid Package Preparation Guide - April 2005 Edition	PennDOT
Performance Audit - Pennsylvania Department of Transportation (July 2002)	Pennsylvania Legislative Budget and Finance Committee
Performance Audit - Pennsylvania Department of Transportation (June 1996)	Pennsylvania Legislative Budget and Finance Committee
Chapter 457. Prequalification of Bidders	PennDOT
Stewardship and Oversight Agreement Procedures (July 13, 2007)	PennDOT
County Maintenance Measurement Tool (CMMT) – Guidelines, Criteria (Fiscal Yr 2008 - 2009)	PennDOT
Comprehensive Strategic Highway Safety Improvement Plan (CSHSIP) (Oct. 2006)	PennDOT
Summary Report - The State of Highway Safety in Pennsylvania Fourth Edition - July 2007 BHSTE	PennDOT
HOP Permits Survey Responses (District Surveys - April 2007)	PennDOT
Construction Operation Reviews - Quality Assurance Reporting System (QARS) checklists	PennDOT
Materials Quality Assurance Stewardship Review - July 16, 2007	PennDOT
Construction Operation Review - 05/11/2007 - Bituminous Concrete Pavement (RPS)	PennDOT
Construction Operation Review - 06/12/2007 - Bridge Deck Placement	PennDOT
Construction Operation Review - 08/10/2007 - Pipe Culverts	PennDOT
PennDOT August 29 letter from Department of the Auditor General (September 14, 2007)	PennDOT
PennDOT Highway and Planning Application Inventory	PennDOT
Pennsylvania's 2007 Transportation Program, Adopted by State Transportation Commission Aug. '06	PennDOT
Twelve Year Transportation Program, Adopted by State Transportation Commission Aug. '07	PennDOT
2006 Pennsylvania Traffic Data, Bureau of Planning/Research, Transportation Planning Info. Div.	PennDOT
Pennsylvania Highway Statistics - Bureau of Planning and Research, 2005 Highway Data	PennDOT
Highway Performance Monitoring System - Quality Review 2006	Other

Document	Organization
Estimating Manual - Publication 352, June 2001, Bureau of Design, Contract Management Division	PennDOT
Project Office Manual Publication 2, January 2005 Edition, Change 2 (1/07)	PennDOT
Publication 238 Part IP, Chapter 2 - Inspection Requirements	PennDOT
A Review of Pennsylvania's Homeland Security Program (October 2007)	Other
Design Manual - Part 1A, Transportation Engineering Procedures Publication 10A,(January 2001 Edition)	PennDOT
District Work Order Report for Oct 1 – Dec 31st Time Period	PennDOT
MPMS Consultant Tracking Schedule	PennDOT
Active Projects in Calendar year 2007	PennDOT
District Work Order Reports for 2007 time period	PennDOT
MPMS 3 Liner Report	PennDOT
Bureau of Maintenance & Operations (BOMO) Dashboard	PennDOT
County Maintenance Measurement Tool Guidelines & Criteria	PennDOT
Bureau of Highway Safety & Traffic Engineering (BHSTE) Dashboard 07-08	PennDOT
Bureau of Construction & Materials (BOCM) Dashboard	PennDOT
PennDOT Performance Measures Status Report	PennDOT
SEMP Dashboard July 1 2007 – June 30 2008	PennDOT
Stockpile Environmental QA Information, Aug 2007	PennDOT
Foreman's Quarterly Stockpile Checklist	PennDOT
Compliance Evaluation Report – For Maintenance	PennDOT
Overnight Summary Report July 2007 – Dec 2007	PennDOT
Expected Work Results Report	PennDOT
Bradford Bypass Upgrade Project Phase II Planning	PennDOT
Various Fiscal Charts	PennDOT
SAP Easy Access Data	PennDOT
Surface Improvement – Commonwealth of PA	PennDOT
Maintenance Environmental Permits Tracking Sheet	PennDOT
Program 711 Project Tracking Chart FY 2008	PennDOT
Right of Way Plan Tracking Sheet Report Run Date 1/2008	PennDOT
Utility Job Assignments Report	PennDOT
Open-End Contract Status Reports	PennDOT
Upcoming Work Orders Log Report Run Date 1/30/2008	PennDOT
ECMS Agreement Information	PennDOT
Survey Unit Work Load Tracking Status Log	PennDOT
Submissions Tracking Log– Open 10/1/07 to 1/28/08	PennDOT
Measures for Design Services Unit	PennDOT
2008 Pavement Design Approvals	PennDOT

Document	Organization
Open-End Agreements Report Run Date 1/30/2008	PennDOT
Contract Management Project Timeframes	PennDOT
Various Letting Schedules	PennDOT
Active Projects Report by Project Manager	PennDOT
Various Employee Performance Review	PennDOT
Summary of District 2 Liquid Fuel payments to municipalities	PennDOT
FHWA Stewardship and Oversight Agreement Procedures (Performance Objectives and Measures for FY 2007)	PennDOT
PA Mobility Plan Dashboard	PennDOT
BOD Dashboard and Scorecard	PennDOT
Governor's Highway Performance Measures Spreadsheet	PennDOT
Performance Measures Access Database	PennDOT
Pennsylvania Department of Transportation - Strategic Agenda - July 2004	PennDOT
Executive Summary - PENNSYLVANIA MOBILITY PLAN	PA

Appendix D: Performance Measurements

The following items were considered as part of the Deloitte FAS assessment of PennDOT's Performance Measurement System:

	Dist. 1			Dist. 2			Dist. 3			Dist. 4			Dist. 5			Dist. 6			Dist. 8			Dist. 9			Dist. 10			Dist. 11			Dist. 12		
Measure Title	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y
H1A: Percent of Bridges that are structurally deficient	3	3	0	6	0	0	3	3	0	0	6	0	0	6	0	1	4	1	0	6	0	6	0	0	0	6	0	5	0	1	0	6	0
H1B: Percentage of Dollars Spent on SD Bridges	0	1	0	0	1	0	1	0	0	1	0	0				0	1	0				0	1	0	1	0	0				0	1	0
H2: Annual Bridge Letting Dollars Dedicated to Bridge Preservation	2	1	1	1	2	1	3	3	0	5	1	0	1	5	0	2	4	0	5	1	0	2	4	0	1	5	0	3	1	2	1	4	1
H11A: Accountability of field staff	0	6	0	0	6	0	0	6	0	0	6	0	0	6	0	0	6	0	0	6	0	2	3	1	0	6	0	0	6	0	0	6	0
H14: Construction $ Spent on Oversight	6	0	0	1	5	0	6	0	0	3	0	3	0	4	2	1	2	3	3	2	1	5	0	1	2	1	3	5	1	0	6	0	0
H15: Final Project Amount vs. Original Contract Amount	4	1	1	0	6	0	6	0	0	6	0	0	1	0	5	2	3	0	3	0	3	4	0	2	3	0	2	2	4	0	4	1	1
H16: Annual Letting Goal	5	0	0	3	3	0	4	1	1	2	4	0	4	2	0	3	3	0	2	4	0	3	2	1	4	1	0	3	3	0	4	1	1
H19: Annual TE and Local Projects, Annual Home Town Streets, and Annual Safe Routes to School projects Let-Comparison of Committed versus Actual.	2	0	0	1	0	0	3	0	0	3	0	1	5	0	0	4	0	0	5	0	0	5	0	0	3	1	0	2	1	0	3	0	0
H26: Engineer's Estimate vs. Contractor Low Bid	1	1	0	0	1	0	0	0	2	1	1	0	0	2	0	0	2	0	1	1	0	0	2	0	1	1	0	0	1	1	0	1	1
H33: DBE Participation - Design	3	1	0	3	0	3	2	2	0	5	1	0	6	0	0	5	0	1	6	0	0	2	2	0	4	0	1	5	0	0	5	0	0
H34: # of Dollars obtained for Construction DBE's	5	1	0	5	1	0	0	5	0	4	0	0	5	0	1	5	0	0	5	0	1	6	0	0	3	0	1	3	2	1	5	1	0

The table above shows the number of green (G), yellow (Y) and red (R) indicators for each measure based on the data reported in the access database for each of the quarters from July 2006 to December 2007. Data for the above scorecard measures was reported on a quarterly basis on the scorecard. Data for the other measures included in the scorecard was reported on an annual basis in the access database and is tabulated in Chapter 5 of the report. R, G and Y represent the red, green or yellow indicators based on quarterly performance from July 2006 to December 2007. In computing the number of green, yellow and red indicators, the full year's data or full year performance indicator was not included since the quarterly data contributes to the full year's performance. The blank spaces indicate measures for which no data was reported. Data for some of the measures which have a lower total of reds, greens and yellows was either not applicable for some of the months leading to fewer data points or the measure was just recently introduced leading to a lower number of measurements.

	District 1			District 2			District 3			District 4			District 5			District 6			District 8			District 9			District 10			District 11			District 12		
Measure Title	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y	G	R	Y
01 Complement Filled	3	6	7	8	2	6	10	1	5	3	4	9	2	9	5	0	13	3	1	7	8	12	0	4	5	1	10	1	12	3	4	3	9
02 Percent Sick Leave	11	4	1	0	1	15	4	1	11	0	2	14	0	4	12	1	7	8	1	1	14	8	3	5	11	1	4	14	0	2	2	1	13
03 Total District Overtime Costs	11	2	3	13	2	2	4	5	7	4	5	7	9	3	5	2	3	12	7	7	3	13	2	2	11	3	3	4	3	10	6	5	6
04 Accrued Unbilled Costs	15	3	0	13	5	0	8	7	3	4	13	1	17	1	0	5	11	2	18	0	0	16	2	0	18	0	0	14	3	1	18	0	0
05 Return On Investment (ROI)	8	5	5	6	9	3	15	0	3	13	2	3	14	0	4	16	0	2	8	9	1	10	3	5	14	2	2	18	0	0	8	3	7
06 ASHMA Bridge Allocation	0	18	0	0	18	0	11	3	4	13	4	1	1	16	1	0	18	0	0	17	1	17	0	1	3	15	0	0	18	0	1	17	0
07 Winter Services	12	5	0	11	5	0	13	4	0	14	3	1	13	3	1	12	5	1	12	5	0	17	0	0	11	6	0	17	0	0	15	1	1
08 County Budget Monitoring	18	0	0	13	0	5	12	6	0	18	0	0	18	0	0	18	0	0	16	1	1	18	0	0	18	0	0	13	2	2	12	6	0
09 Percent of Portfolio on Schedule	2	9	1	3	4	5	3	5	4	2	10	0	0	12	0	1	7	4	3	5	4	8	1	3	1	5	6	0	11	1	3	4	5
10a Committed Letting Goals by $$	5	3	0	1	12	0	4	7	1	0	13	0	1	8	0	2	8	0	1	10	2	7	4	0	2	7	1	1	8	1	4	6	0
10b Committed Letting Goals by #	5	3	0	1	12	0	4	8	0	0	13	0	1	9	0	2	8	0	1	12	0	7	4	0	2	8	0	1	9	0	4	6	0
11a Committed Bridge Projects Let $ On Schedule	4	6	0	3	8	0	8	3	0	3	7	0	4	2	0	1	7	0	3	8	0	9	1	1	6	3	1	4	5	0	6	3	0
11b Committed Number of Bridge Projects Let On Schedule	4	6	0	3	8	0	7	2	1	3	7	0	4	2	0	1	7	0	3	8	0	11	1	0	7	4	0	5	5	0	7	3	0
12 Monitor Bridge Analysis Backlog – 90 Days	3	4	0	4	3	0	5	1	1	0	7	0	2	5	0	5	0	2	4	3	0	4	1	2	2	5	0	4	3	0	2	8	0
12b Monitor Bridge Analysis Backlog – 120 Days	3	2	0	4	1	0	5	0	0	1	3	0	4	1	0	2	1	2	5	0	0	5	0	0	3	2	0	2	2	0	2	3	0
13A % of Bridges that are Deficient	10	8	0	18	0	0	11	4	3	0	18	0	0	18	0	1	15	2	0	18	0	16	0	2	18	0	0	12	2	4	18	0	0
13B Percentage of dollars spent on SD bridges	1	1	0	1	1	0	1	0	0	1	0	0	0	0	0	0	1	0	1	1	0	1	1	0	2	0	0	0	0	0	0	1	0
14a Number 0 and 1 Maint. Priorities for Bridge	0	3	13	11	6	0	0	15	2	4	3	10	12	5	0	0	17	0	0	5	12	15	1	1	3	14	0	0	17	0	17	0	0
14b Total Number of 0 and 1 Maintenance Priorities	9	4	5	10	6	2	1	15	2	15	0	2	12	5	1	0	6	12	2	4	12	15	2	1	3	14	1	0	18	0	13	1	4
15 Average monthly Bituminous Sample Testing Turnaround Time	6	5	2	6	6	2	10	1	3	9	2	2	11	1	1	7	7	2	16	0	0	11	2	1	11	1	1	11	2	2	14	1	0
16a DBE Participation - Design	17	0	0	17	0	0	13	1	3	17	0	0	17	0	0	17	0	0	17	0	0	17	0	0	15	0	2	17	0	0	17	0	0
16b Percentage of DBE Paid / Committed for on-going projects at least 50% complete	14	2	2	17	0	0	17	0	0	6	6	5	17	0	0	9	4	4	17	0	0	17	0	0	17	0	0	17	0	0	17	0	0
17 Bid vs Final Amount	13	2	3	1	16	1	18	0	0	15	2	1	7	0	11	5	8	1	9	2	6	11	0	6	6	1	7	6	10	0	11	5	1
18 Percent of Construction Dollars Spent on Oversight	18	0	0	3	15	0	18	0	0	11	1	6	3	10	5	4	8	6	10	6	2	16	0	2	9	6	3	14	2	2	16	0	2
19 Surface Improvements - Resurfacing	10	2	0	0	14	0	12	0	2	9	5	0	8	4	2	3	11	0	7	3	4	14	0	0	9	3	2	13	1	0	3	10	1
20 Surface Improvements – Leveling & Sealing	12	1	1	1	12	1	14	0	0	5	8	1	13	1	0	6	8	0	12	2	0	13	1	0	3	10	1	13	0	1	12	2	0
21 Surface Improvements –Total Surface Improvement	12	1	1	2	6	6	14	0	0	5	9	0	0	9	5	1	13	0	6	6	2	12	1	1	14	0	0	14	0	0	12	2	0
22 Surface Improvements – Crack Sealing on 5-Year Cycles	11	2	0	6	7	0	10	3	0	12	2	0	9	4	0	0	13	0	11	2	0	13	0	0	11	1	1	11	3	0	9	4	0
23a CCC – Average days to Complete a Pothole Concern	16	0	0	17	0	0	14	2	1	15	0	2	15	1	1	16	0	0	17	0	0	10	0	1	14	1	0	13	1	1	14	0	0
23b CCC – All Drainage Concerns	16	0	1	16	0	0	16	0	0	12	1	1	16	0	0	16	0	0	15	1	0	15	0	0	17	0	0	15	0	0	15	0	0
24 Program 718 – Low Cost S.I.P.	4	10	4	10	5	3	17	1	0	15	3	0	5	12	1	5	11	2	8	10	0	5	13	0	2	16	0	6	11	1	8	10	0
25 Diversified CE Experience	10	0	0	10	0	0	10	0	0	6	4	0	10	0	0	9	0	0	11	0	0	10	0	0	10	0	0	10	0	0	9	0	0
26 Engineer's Estimate vs. Contractor Low Bid Amount	1	4	0	3	3	0	3	0	3				3	2	0	1	3	2	2	4	0	2	3	0	1	4	1	0	4	1	1	3	0

The table above shows the number of green (G), yellow (Y) and red (R) indicators for each measure based on the data reported in the access database for each of the months from July 2006 to December 2007. R, G and Y represent the red, green or yellow indicators based on monthly performance from July 2006 to December 2007. In computing the number of green, yellow and red indicators, the full year's data or full year performance indicator was not included since the monthly data contributes to the full year's performance. The blank spaces indicate measures for which no data was reported. Data for some of the measures which have a lower total of reds, greens and yellows was either not applicable for some of the months leading to fewer data points or the measure was just recently introduced leading to a lower number of measurements.

Status	Performance Measure	Description / Definition	GOALS
1996 LB&FC Report	International Roughness Index	The IRI rates pavement roughness using mechanical devices that measure the longitudinal profile of the roadway surface. PennDOT measures the interstates every year; 50 percent of other PennDOT roads are also evaluated each year using IRI. The 1995 figures, therefore, are based 50 percent on 1994 data and 50 percent on 1995 data.	No stated goals
1996 LB&FC Report	Overall Pavement Index	The OPI index combines several measures in to an overall measure of pavement quality. The four components of the OPI index are as follows: a Ride Index (based on International Roughness Index Measurements), a structural index (based on structural distress indicators), a Surface Distress Index (based on surface problem indicators), and a Safety Index (based on the adverse effect of specific distresses on safety). Prior to CY 1991, all PennDOT-maintained roads were evaluated for the OPI index annually. Beginning in 1991, PennDOT began evaluating 50 percent of the roads each year. The 1995 figures, therefore, are based 50 percent on 1994 data and 50 percent on 1995 data. (OPI data is not available for other states.)	No stated goals
1996 LB&FC Report	Dollar Amount of Highway Needs	As required by Act 1980-68, PennDOT biennially surveys its highways to assess maintenance needs and the estimated cost to correct the identified deficiencies. This analysis is done through PennDOT's Systematic Technique to Analyze and Manage Pennsylvania Pavements (STAMPP). The	No stated goal

Status	Performance Measure	Description / Definition	GOALS
		STAMPP system dientifies 33 categories of improvements, including pavement, shoulder, guiderail, and drainage needs. Treatments range from routine maintenance to major reconstruction.	
1996 LB&FC Report	Highway Maintenance Expenditures; Highway Maintenance Expenditures Per Lane Mile	Total expenditures (federal and state funding combined) for highway and bridge maintenance activities on state DOT-maintained highways (including interstates) as reported to FHA, including expenditures for interstates and other state DOT-maintained highways.	No stated goals
1996 LB&FC Report	Lane Miles Receiving Surface Improvements	Surface improvements include New Construction (Interstate and other new construction), Surface Improvement Reconstruction (Interstate PM, Interstate I-4R, Reconstruction), and Surface Improvement Maintenance (Betterments, Resurfacing, Leveling & Sealing, Surface Repair) performed on PennDOT maintained roads.	The data from different years (FY 1989-90, 1990-91, 1991-92, 1992-93, 1993-94, 1994-95) for the "GOAL" and "Actual" for the different types of surface improvements is compiled from PennDOT's Management Objectives Report.
1996 LB&FC Report	Maintenance Cycles	The expected average life of various maintenance treatments	PennDOT has desired cycles for 12 maintenance activities: Betterments, Surface Seals, Leveling, Resurfacing (Bituminous), Concrete Pavement (Rehabilitation), Shoulder Cutting, Pipe Replacement, Joint Sealing, Bridge Deck Cleaning, Bridge Cleaning Sub-Structure (Open Mesh, Other Steel, All

Status	Performance Measure	Description / Definition	GOALS
			Other) The data is compiled from PennDOT Business Plans
1996 LB&FC Report	Size and Average Age of PennDOT's General Equipment Fleet	The number and average age of PennDOT's six major types of equipment. Refurbished equipment is considered as "new" when calculating average age.	The expected life of the six various types of equipment (Dump Truck - Tandem, Dump Truck - Single, Loader, Grader, Backhoe, Excavator) is compiled from information provided by PennDOT's equipment division. PennDOT does not have a stated goal of replacing or refurbishing equipment after it exceeds its expected life.
1996 LB&FC Report	Capital Expenditures; Capital Expenditures Per Lane Mile	Capital Expenditures (as opposed to maintenance expenditures) for PennDOT-maintained highways and bridges (federal and state funding combined) as reported to the Federal Highway Administration. Expenditures include right-of-way acquisition, preliminary and construction engineering, as well as construction costs for new highways, widening, and reconstruction. Lane miles include only roadways maintained by the state department of transportation.	No stated goals
1996 LB&FC Report	Percent of Projects 5 Percent or More Over Original Project Estimate	The percent of PennDOT highway and bridge construction projects that, when completed, were 5 percent or more over the original project estimate.	No stated goal
1996 LB&FC Report	Percent of Projects Completed on Time	The percentage of PennDOT highway and bridge construction projects completed within the original time estimate.	No stated goal
1996 LB&FC Report	Percent of Bridges that are Structurally Deficient or Functionally	Bridges that do not meet load carrying and functional standards are classified as either structurally deficient or functionally obsolete.	No stated goals

Status	Performance Measure	Description / Definition	GOALS
	Obsolete	Structurally deficient bridges are inadequate for existing traffic due to deterioration in their decks, supporting members, or superstructures. They may be posted for reduced vehicle weights or closed to traffic. Functionally obsolete bridges cannot adequately handle current traffic due to too few or too narrow lanes, poorly aligned approaches, or restrictive overhead clearances. This measure includes only bridges over 20 feet in length as reported annually to the FHWA. Information is presented separately for state-owned and locally owned bridges. The information is tabled in the 2002 report based on data provided by PennDOT's Bridge Design Quality Assurance Division for FY 1995 and 2000.	
1996 LB&FC Report	Cost to Improve Deficient Bridges	PennDOT biennially inspects all public bridges over 20 feet in length to identify deficiencies and needed improvements. The PennDOT bridge system estimates costs for each needed improvement to deficient bridges and determines the total cost to correct all identified deficiencies	No stated goal
1996 LB&FC Report	Number and Cost of Bridge Projects Completed	The number and cost of new construction, replacement and rehabilitation projects for public bridges greater than 8 feet in length completed between FY 1989-90 and FY 1994-95. Replacement is building a new bridge to replace an existing bridge; rehabilitation involves major structural repairs to an existing bridge	No stated goals

Status	Performance Measure	Description / Definition	GOALS
1996 LB&FC Report	Number of Bridges Inspected	Number of state bridges eight feet or longer in length inspected by PennDOT	PennDOT Scheduled and Actual Inspections every year from FY89-90 to FY94-95 are shown in a table developed from Item 15 of PennDOT's District Management Summary Report
1996 LB&FC Report	Federal and State Highway Expenditures	Total federal and state expenditures for highway administration, maintenance and construction for PennDOT-maintained highways	No stated goals
1996 LB&FC Report	Actual Construction and Maintenance Contract Costs as a Percent of Original Contract Bid	Final costs for all completed construction and maintenance contracts as a percent of the original contract bid	No stated goals
1996 LB&FC Report	Volume to Service Flow Ratio	This ratio shows the relationship of traffic flow to roadway capacity. The FHWA considers a highway to be congested when the volume to service flow ratio exceeds 0.8 meaning that the road is at 80% or more of its capacity at peak traffic hours.	No stated goal
1996 LB&FC Report	Fatalities and Injuries Per 100 Million Vehicle Miles Traveled	Traffic fatalities are accident victims, including pedestrians, who die within 30 days of the accident. Injury data includes drivers, passengers, and pedestrians injured as a direct result of a motor vehicle accident. Virtually all fatalities involve speeding, not wearing a seatbelt, and/or alcohol.	Reduce state fatality rate per 100 million vehicle miles traveled to less than 1.5 by 1997 and to less then 1.4 by the year 2000. (PennDOT does not have stated goals for years prior to 1997.)

Status	Performance Measure	Description / Definition	GOALS
1996 LB&FC Report	Truck-Related Fatalities	Truck-related fatalities and deaths resulting from accidents involving at least one heavy truck. Light trucks such as jeeps, pickup trucks, tow trucks and vans are not included in this definition.	No stated goals
1996 LB&FC Report	MCSAP Inspections, Trucks Removed from Service, and Fines Levied	PennDOT administers Pennsylvania's federally funded MCSAP program and, along with the Pennsylvania State Police (PSP) and the Public Utility Commission (PUC), inspects trucks for safety violations. Roadside safety inspections are conducted by trained, uniformed safety inspectors to check if commercial vehicles and drivers are operating consistent with established state and federal safety standards. Unsafe trucks are removed from service until repaired, and the operators are subject to fines.	No stated goals.
1996 LB&FC Report	Hazardous Materials Spills (This measure does not totally capture all spills. It captures those that are a result of a reportable traffic accident. Spills, such as those instances when a truck begins to leak without having been involved in an accident, will not be known).	Number of accidents and spills in Pennsylvania involving heavy trucks transporting hazardous materials	No stated goals

Status	Performance Measure	Description / Definition	GOALS
1996 LB&FC Report	Roads Turned Back to Local Governments and Monies Expended	In 1980 the commonwealth owned and maintained more than 45,000 miles of highway. It was determined that certain highways (approximately 12,100 miles) could be better maintained at the local level than at the state level. Act 1981-81 simplified the mechanism for turning back roads to municipalities and Act 1983-32 dedicated funding to the program from the Motor License Fund which provides an annual maintenance payment to municipalities of $2,500 per mile for turned back roads and also pays restoration costs prior to their transfer.	Return the remaining 8,000 miles of functionally-local roads to municipalities.
1996 LB&FC Report	Ratio of Pennsylvania's Federal Highway Trust Fund Apportionments to Payments in to the Fund	Pennsylvania receives money for surface transportation from the Federal Highway Trust Fund, which is funded through various excise taxes. Ratios over 1 indicate that Pennsylvania receives more from the Fund than it pays into it. The figures exclude apportionments and payments for mass transit because these apportionments are not consistently identified in the federal statistics used for this measure.	No stated goal.
1996 LB&FC Report	Continuous Quality Improvement (CQI) Teams, Employees Trained, and Reported Net Savings	CQI is an organizational management philosophy that seeks to create a Department culture committed to customer-driven improvement. CQI emphasizes strategic planning, training in the use of quality tools and techniques, employee involvement and customer satisfaction. Net savings are determined by calculating the difference between the costs under the old process versus the new process. Savings are	Number of Teams: No stated goals. Number of Employees Trained: For most of the period reviewed in this audit, PennDOT has two goals: (a) provide CQI overview training to 95 percent of all employees by the end of 1995; and (b) train 50 percent of all employees in at least one course in the CQI

Status	Performance Measure	Description / Definition	GOALS
		not, however, adjusted to reflect training and employee meeting costs supporting this effort.	curriculum by the end of 1996 and train 80 percent by the year 2000. Documented CQI Process Net Savings: No stated goals.
1996 LB&FC Report	Percentage of Minority and Female Employees	The number and percentage of minority and female employees	PennDOT's goal for minority and female employees was 5.38 percent and 10.98 percent, respectively, of filled positions at pay grade 05 and above. PennDOT's goal for all minority employees was 8.4% of its workforce.
1996 LB&FC Report	State and Federal Contract Dollars Awarded or Committed to Minority (MBE), Female (WBE), or Disadvantaged Business Enterprises (DBE) Minority and Female Work Hours as Percent of Total Construction Contractor Work Hours (Includes both construction and betterment projects	The percentage of state dollars awarded by PennDOT to minority business enterprises (MBE) and to women business enterprises (WBE). The federal government requires PennDOT to track federal funds to disadvantaged business enterprises (DBEs), which may be either MBEs or WBEs.	The minimum participation level (MPL) through FY 1994-95 for state project dollars contracted with MBEs and WBEs was 8 percent and 2 percent, respectively. PennDOT's MPL for federal project dollars contracted with DBEs is 10 percent of all contracted federal project dollars. For FY 1995-96 PennDOT lowered its MBE MPL to 7 percent; WBE and DBE MPLs remained the same. The MPLs for minority (effective July 1993) and female (effective July 1992) work hours as a percentage of total construction contract work hours were 9.1 percent and 6.9 percent,

Status	Performance Measure	Description / Definition	GOALS
			respectively. FY 1995-96 goals for minority work hours were lowered to 8.5 percent, but remained the same for female work hours.
1996 LB&FC Report	Percent of Key DGS Commodity Contracts Processed on Time	The percent of the 50 DGS commodity contracts of particular interest to PennDOT (such as salt, paint, tires, and pipe) that are processed on time. Although this is more a measure of DGS performance (DGS is responsible to execute these contracts), it is included here because of its impact on PennDOT operations.	To have finalized 91% of the key commodity contracts (46 of the 50) by the scheduled contract effective date.
1996 LB&FC Report	Days to process service purchase contracts and purchase requisitions	The processing time in calendar days (CD) for service purchase contracts (SPCs) from the date received by PennDOT's Bureau of Office Services to the date approved by the Comptroller. Purchase requisition (PR) processing time, until July 1, 1995, was measured from the date initiated by a PennDOT employee to the date DGS mailed the approved purchase order to the vendor. Typical service purchase contracts include roadside vegetation management, mowing, roadside rest maintenance, refuse pick-up, and electrical services. Purchase requisitions are used for commodities (such as trucks, graders, and commuter equipment) over $5,000 ($10,000 as of January 1996) that are not on a DGS contract.	PennDOT's service purchase contract average processing time goal is 30 calendar days. The goal for purchase requisitions is 105 calendar days.

The measures from the 2002 LB&FC audit related to PennDOT's activities are listed in the following table:

Status	Performance Measure	Description / Definition	GOALS
2002 LB&FC Report	International Roughness Index	Measurement of longitudinal profile of the roadway surface. PennDOT measures the interstate and non-interstate NHS (National Highway System) routes every year; 50 percent of non-NHS routes are also evaluated each year using IRI. Therefore, data is collected for the entire system every two years.	No stated goals
2002 LB&FC Report	Maintenance Cycles	Expected average useful life of maintenance treatments and the interval of time that maintenance activities should be scheduled	PennDOT has desired cycles for 12 maintenance activities: Betterments, Surface Seals, Leveling, Resurfacing (Bituminous), Concrete Pavement (Rehabilitation), Shoulder Cutting, Pipe Replacement, Joint Sealing, Bridge Deck Cleaning, Bridge Cleaning Sub-Structure (Open Mesh, Other Steel, All Other)
2002 LB&FC Report	Highway Maintenance Expenditures; Highway Maintenance Expenditures Per Lane Mile	Total expenditures (federal and state funding combined) for highway and bridge maintenance activities on state DOT-maintained highways (including interstates) as reported to FHA, including expenditures for interstates and other state DOT-maintained highways	No stated goals

Status	Performance Measure	Description / Definition	GOALS
2002 LB&FC Report	Dollar Amount of Highway Needs	PennDOT surveys its highways to assess maintenance needs and the estimated cost to correct the identified deficiencies through the systematic technique to analyze and manager Pennsylvania pavements (STAMPP). The STAMPP roadway management system is an annual survey of all PennDOT-maintained roads to assess the condition of pavement, shoulders, drainage, and guiderails. A series of computer programs then assigns a treatment strategy to each roadway segment and estimates the cost of treatment. Treatments range from routine maintenance to major reconstruction.	No stated goals
2002 LB&FC Report	Lane Miles Receiving Surface Improvements	Surface improvements include New Construction (Interstate and other new construction), Surface Improvement Reconstruction (Interstate PM, Interstate I-4R, Reconstruction), and Surface Improvement Maintenance (Betterments, Resurfacing, Leveling & Sealing, Surface Repair) performed on PennDOT maintained roads	The PennDOT Bureau of Maintenance and Operations and Statistical Digest provides data from different years (FY 1995-96, 1996-97, 1997-98, 1998-99, 1999-00, 2000-01) for the "GOAL" and "Actual" for the different types of surface improvements
2002 LB&FC Report	Size and Average Age of PennDOT's General Equipment Fleet	Number and Average age of PennDOT's six major types of equipment. Refurbished equipment is considered "new" when calculating average age	Expected life of six various types of equipment as per the statistical digest. PennDOT does not have a stated goal of replacing or refurbishing equipment after it exceeds its expected life.

Status	Performance Measure	Description / Definition	GOALS
2002 LB&FC Report	Capital Expenditures; Capital Expenditures Per Lane Mile	Capital Expenditures (as opposed to maintenance expenditures) for PennDOT-maintained highways and bridges (federal and state funding combined) as reported to the Federal Highway Administration. Expenditures include right-of-way acquisition, preliminary and construction engineering, as well as construction costs for the new highways, widening, and reconstruction. Lane miles include only roadways maintained by the state department of transportation.	No stated goals
2002 LB&FC Report	The number and percentage of minority and female employees	The number and percentage of minority and female employees	PennDOT's combined goal for minority and female employees ranged from 8.5 percent to 8.9 percent from FY 1995-96 through FY 1999-00. The Department's goals were based on the number or percent of employable persons in the civilian labor force as evidenced by the 1990 census. For FY 2000-01 the availability of female and minority employees is compared to the current workforce in five job groups. Availability for females ranges from 14 percent to 66 percent, and availability for minorities ranges from 6 percent to 13 percent.
2002 LB&FC Report	Percent of Projects 5 Percent or More Over Original Project-Estimate	Percent of PennDOT highway and bridge construction projects that, when completed, were 5 percent or more than the original project cost	No stated goal
2002 LB&FC Report	Percent of Projects Completed on Time	Percentage of highway and bridge construction projects completed within the original time estimate	No stated goal

Status	Performance Measure	Description / Definition	GOALS
2002 LB&FC Report	Actual Construction and Maintenance Contract Costs as a Percent of Original Contract Bid	Final costs for all completed construction and maintenance contracts as a percent of the original contract bid	No stated goals
2002 LB&FC Report	Number and Cost of Bridge Projects Completed	The number and cost of new construction, replacement and rehabilitation projects for public bridges greater than 8 feet in length completed between FY 1995-96 and FY 2000-01. Replacement is building a new bridge to replace an existing bridge; rehabilitation involves major structural repairs to an existing bridge.	No stated goals
2002 LB&FC Report	Cost to Improve Deficient Bridges	PennDOT biennially inspects all public bridges over 20 feet in length to identify deficiencies and needed improvements. The PennDOT bridge system estimates costs for each needed improvement to deficient bridges and determines the total cost to correct all identified deficiencies.	No stated goals
2002 LB&FC Report	Percent of Bridges that are Structurally Deficient or Functionally Obsolete	These are bridges that do not meet load carrying and functional standards are classified either as structurally deficient or functionally obsolete. This measure includes bridges only over 20 feet in length as reported annually to FHWA. The information is tabled in the 2002 report based on data provided by PennDOT's Bridge Design Quality Assurance Division for FY 1995 and 2000.	No stated goals
2002 LB&FC Report	No of Bridges Inspected	Number of state bridges eight feet or longer in length inspected by PennDOT	PennDOT Scheduled Inspections for FY95-96 and FY96-97 are shown in a table based on information provided by the Bridge Quality Assurance Division and Actual Inspections are shown annually from FY95-96 to FY00-01

Status	Performance Measure	Description / Definition	GOALS
2002 LB&FC Report	Fatalities and Injuries Per 100 Million Vehicle Miles Traveled	Traffic fatalities are accident victims, including pedestrians, who die within 30 days of the accident. Injury data includes drivers, passengers, and pedestrians injured as a direct result of a motor vehicle accident. Virtually all fatalities involve speeding, not wearing a seatbelt, and/or alcohol.	Reduce state fatality rate 10% by 2004 or 2% annually over five years beginning 2000
2002 LB&FC Report	Truck-Related Fatalities	Truck-related fatalities and deaths resulting from accidents involving atleast one heavy truck. Light trucks such as jeeps, pickup trucks, tow trucks and vans are not included in this definition.	No stated goals
2002 LB&FC Report	MCSAP Inspections, Trucks Removed from Service, and Fines Levied	PennDOT administers Pennsylvania's federally funded MCSAP program and, along with the Pennsylvania State Police (PSP) and the Public Utility Commission (PUC), inspects trucks for safety violations. Roadside safety inspections are conducted by trained, uniformed safety inspectors to determine if commercial vehicles and drivers are operating consistent with established state and federal safety standards. Unsafe trucks are removed from service until repaired, and the operators are subject to fines.	No stated goals
2002 LB&FC Report	Hazardous Materials Spills (This measure does not totally capture all spills. It captures those that are a result of a reportable traffic accident. Spills, such as those instances when a truck begins to leak without having been involved	Number of accidents and spills in Pennsylvania involving heavy trucks transporting hazardous materials	No stated goals

Status	Performance Measure	Description / Definition	GOALS
	in an accident, will not be known.		
2002 LB&FC Report	Volume to Service Flow Ratio	This ratio shows the relationship of traffic flow to roadway capacity. The FHWA considers a highway to be congested when the volume to service flow ratio exceeds 0.8 meaning that the road is at 80% or more of its capacity at peak traffic hours.	No stated goals
2002 LB&FC Report	Roads Turned Back to Local Governments and Monies Expended	Act 1981-81 simplified the process of transferring state-owned, functionally local roads to municipalities. Act 1983-32 required PennDOT to identify functionally local roads and designate them for transfer and created a dedicated fund, the State Highway Transfer Restoration Restricted Account, within the Motor License Fund to pay the costs of restoring roads prior to their transfer. Act 1984-148 provides for annual maintenance payments of $2,500 per mile to participating municipalities.	To transfer approximately 12,000 miles of functionally local roads to municipalities for future maintenance

Status	Performance Measure	Description / Definition	GOALS
2002 LB&FC Report	Partner Agreements and Work Plans	PennDOT created the Agility Center, now located in the Bureau of Municipal Services, in 1997 to form partnerships with local governments and other publicly-funded organizations as a means of sharing resources. Agility projects have focused primarily on highway maintenance, but PennDOT encourages its partners to propose other exchanges. Agility agreements set the stage for the development of work plans to carry out specific projects. Once PennDOT or one of its partners incurs expenses for an agreed-upon activity, the other party must reciprocate by performing services at an equivalent cost. Redirected savings indicate the shared value of the project. PennDOT county offices and partners maintain records of such values to indicate that no funds have been diverted from the Motor License Fund to pay any local government.	No stated goals
2002 LB&FC Report	Administrative Expenses as a Percentage of Total Expenses	Administrative costs are the general expenses of administering a state or local highway program, ncluding general overhead, engineering, and research costs that are not assignable to specific road projects. They also include expenses associated with highway planning and research, highway litigation and highway publications.	No stated goal

Status	Performance Measure	Description / Definition	GOALS
2002 LB&FC Report	Ratio of Pennsylvania's Federal Highway Trust Fund Apportionments to Payments in to the Fund	Pennsylvania receives money for surface transportation from the Federal Highway Trust Fund, which is funded through various excise taxes. Ratios over 1 indicate that Pennsylvania receives more from the Fund than it pays into it. The figures exclude apportionments and payments for mass transfer because these apportionments are not consistently identified in the federal statistics used for this measure.	No stated goal
2002 LB&FC Report	Continuous Quality Improvement (CQI)	Organizational management philosophy that seeks to create a Department culture committed to customer-driven improvement. The measure records cost savings that arise from various re-engineering projects, employee innovations, or process improvement projects. It emphasizes strategic planning, training in the use of quality tools and techniques, employee involvement, and customer satisfaction. The Department calculates savings using both tangible and non-tangible methods. Savings are not, however, adjusted to reflect training adn employee meeting costs supporting this effort.	No stated goals
2002 LB&FC Report	Percentage of Minority and Female Employees	The number and percentage of minority and female employees	PennDOT's combined goal for minority and female employees ranged from 8.5% to 8.9% from FY 1995-96 through FY 1999-00. The Department's goals were based on the number or percent of employable persons in the civilian labor force as evidenced by the 1990 census. For FY 2000-01 the availability of female and minority employees is compared to the current

Status	Performance Measure	Description / Definition	GOALS
			work force in five job groups. Availability for females ranges from 14 percent to 66 percent, and availability for minorities ranges from 6 percent to 13 percent.
2002 LB&FC Report	State and Federal Contract Dollars Awarded or Committed to Minority (MBE), Female (WBE), or Disadvantaged Business Enterprises (DBE)	Percentage of State dollars committed by PennDOT contractors MBE and to WBE. Federal government requires PennDOT to track federal funds committed/awarded to DBEs.	The overall Miminum Participation Level (MPL) through FY 2000-01 for state project dollars committed to MBEs and WBEs was 7% and 2%, respectively. PennDOT's overall DBE goal for federal project dollars committed to DBEs was 10% of all contracted federal project dollars until FFY 1999. The goal was revised in FFYs 2000 and 2001 to 11.2% and 7.51%, respectively.
2002 LB&FC Report	Minority and Female Work Hours as Percent of Total Construction Contractor Work Hours		The MPL for minority and female work hours as a percentage of total construction contractor work hours (construction and betterment projects) were 8.5% and 6.9%, respectively. FY 2000-01 goals for minority work hours were lowered to 8%, but remained the same for female work hours.

Status	Performance Measure	Description / Definition	GOALS
2002 LB&FC Report	Percent of Critical DGS Maintenance Supply Contracts Processed on Time	The top 17 critical DGS maintenance supply contracts of particular interest to PennDOT (such as salt, paint, tires, and pipe) that are processed on time. Prior to 1999-00, PennDOT measured the 50 DGS commodities contracts of greatest interest to PennDOT. Although this is more a measure of DGS performance (DGS is responsible to execute these contracts), it is included here because of its impact on PennDOT operations.	To have finalized 100% of the 17 critical maintenance supply contracts by the scheduled contract effective date
2002 LB&FC Report	Days to process service purchase contracts and purchase requisitions	The processing time in calendar days for service purchase contracts (roadside vegetation management, mowing, refuse pick-up etc.) from the date received by PennDOT's Office of Chief Counsel to its approval date. Purchase requisition processing time is measured from the date PennDOT submits the purchase order to DGS to the date DGS mails the approved purchase order to the vendor. Typical service purchase contracts include roadside vegetation management, mowing, roadside rest maintenance, refuse pick-up, and electrical services. Purchase requisitions are used for supplies (such as trucks, graders, and computer equipment) over $20,000 that are not on a DGS contract.	PennDOT's service purchase contract average processing time goal is 28 calendar days. The goal for purchase requisitions is an average of 90 calendar days.

The following measures are included in the DE Scorecard:

	Measure Title	Definition	Targets
Current DE Scorecard	H1A: Percent of Bridges that are structurally deficient	This metric is a leading indicator for the bridge program. It is important to ensure safe bridges and to ensure that the bridge program money is focused where it is needed.	Red: < 0.3% reduction Yellow: ≥0.3% - <0.5% Green: ≥0.5% per year
Current DE Scorecard	H1B: Percentage of Dollars Spent on SD Bridges	This metric will measure the amount of Bridge Improvement dollars let that is directed to improving SD bridges. Data will be displayed cumulatively. To ensure this SD reduction goal, at least 85% of bridge improvement spending is to be directed to SD bridge improvements. This metric does not include bridge preservation dollars.	Red: < 80% of Improvement $ Yellow: ≥80% and <85% of Improvement $ Green: ≥ 85% of Improvement $
Current DE Scorecard	H2: Annual Bridge Letting Dollars Dedicated to Bridge Preservation	Construction dollars that are directed toward bridge preservation projects annually. This metric includes both state and locally-owned bridge preservation projects.	Red: ≤ $3 Million Annually Yellow: $3 Million to < $6 Million annually Green: ≥ 6 Million Annually
Current DE Scorecard	H3-10: Maintain or Increase Riding Quality of Highway Infrastructure	Metrics H3 through H8 track pavement improvement by measuring the percentage of miles with Excellent and Good IRI values and with poor IRI values, for the Interstate, Other NHS, and non-NHS with ADT greater than or equal to 2000 networks. Additionally, system improvement is tracked by metrics H9 and H10 as a percentage of miles. The goals for each metric were defined by each District as part of their Business Planning. For Inadequate Pavement Width, the goal is either that defined in the District Business Plan or a 10% reduction from the	Red: < 80% Yellow: ≥80% - < 90% Green: ≥ 90%

	Measure Title	Definition	Targets
		previous year's actual value, whichever is less.	
Current DE Scorecard	H11: Improve Scores of CMMT Measures	This metric tracks the improvement of scores for 2 selected CMMT measures for each county	Red: <85% Yellow: 85% - 95% Green: >95%
Current DE Scorecard	H11A: Accountability of field staff	This metric tracks the percentage of time maintenance management staff is in the field reviewing operations. Assistant County Managers are to spend a minimum of 50% of their time in the field.	Red: <45% Yellow: 45% - 50% Green: >50%
Current DE Scorecard	H12: Dollar Savings Redirected from Multiple MECE Implementation Team Recommendations	This metric tracks the dollars which are redirected to other maintenance activities as a result of cost savings due to implementation of MECE recommendations	Red: <85% Yellow: 85% - 95% Green: >95%
Current DE Scorecard	H13: Actual vs. PMC approved Preliminary Engineering and Final Design Phase Costs	This metric compares the approved Preliminary Engineering (PE) and Final Design (FD) estimates completed at the time of the scoping field view to the PE and FD actual costs. The goal is to have accurate initial estimates so that project is put on the program with a realistic estimate	Red: > 25% increase Yellow: > 15% and ≤ 25% increase Green: ≤ 15% increase
Current DE Scorecard	H14: Construction $ Spent on Oversight	This metric compares Construction Phase 7 and 8 expenditures not directly charged to a Maintenance Contract (i.e. oversight costs) to the total construction phase expenditures.	Red: > 10.3% increase Yellow: > 9.3% and ≤ 10.3% increase Green: ≤ 9.3%

	Measure Title	Definition	Targets
Current DE Scorecard	H15: Final Project Amount vs. Original Contract Amount	This metric compares the final project amount to the original project amount.	Red: ≥ ±5% increase Yellow: > ±3% and < ±5% increase Green: ± 3%
Current DE Scorecard	H16: Annual Letting Goal	This metric measures the overall letting goal. Lettings consist of projects let through C.O., the District and the local municipalities. Quarterly Values are cumulative as year progresses.	Red: < 90% Yellow: ≥ 90% - < 95% increase Green: ≥ 95%
Current DE Scorecard	H19: Annual TE and Local Projects, Annual Home Town Streets, and Annual Safe Routes to School projects Let-Comparison of Committed versus Actual.	This metric compares the number of non - state owned road, bridge, and transportation enhancement projects plus the number of Hometown Street and Safe Routes to School projects meeting targeted letting year. The goal is to have an accurate project development schedule. District TE Coordinators are charged with leading District fundability/constructability reviews for all applications prior to approval.	Red: < 80% Yellow: ≥ 80% - < 90% increase Green: ≥ 90%
Current DE Scorecard	H26: Engineer's Estimate vs. Contractor Low Bid	Accurate engineer's estimates are important to establishing the basis for key project decisions. This metric evaluates the accuracy of the estimates by comparing the engineer's estimate to the contractor low bid within 3%. The goal is to reduce the number of bid justifications.	Red: ≥ ±6% increase Yellow: > ±3% and < ±6% increase Green: ± 3%
Current DE Scorecard	H31: Fatality Rate	Fatal crashes per 100M vehicle miles traveled	Red: ≥ the 5-Year baseline rate Yellow: > 95% and < 100% of the 5-year baseline rate Green: ≤ 95% of the 5-Year baseline rate

	Measure Title	Definition	Targets
Current DE Scorecard	H32: Number of fatalities	Actual number of Highway Deaths on state and local roads	Red: ≥ the number of fatalities which correspond to the rate goal in H31 Yellow: < the number of fatalities which correspond to the rate goal in H31 Green: ≤ the number of fatalities corresponding to 95% of the rate goal in H31
Current DE Scorecard	H33: DBE Participation - Design	To reach 100% of the DBE goal	Red: <90% Yellow: ≥90% to <100% Green: ≥100%
Current DE Scorecard	H34: # of Dollars obtained for Construction DBE's	Compares what the prime contractor committed to what was actually paid to the DBE firm(s) for projects finalized	Red: <7.3% Yellow: 7.3% to <7.9% Green: ≥7.9%
Current DE Scorecard	H36: Annual Highway Customer Survey Executive Summary for Districts	Obtain a rating of PennDOT's performance in designing, constructing and maintaining Interstates, Traffic Routes and Secondary Roads. The goal is to achieve an acceptable customer service level.	Red: <.02% Yellow: ≥.02% to <.05% Green: ≥.05%

The following measures are included in the DE Dashboard:

	Measure Title	Definition	Targets
Current DE Dashboard	01: Complement Filled	The number of all approved complement positions in each District against all the actual number of PennDOT employees (i.e. filled positions) in the Districts.	Red: ≤ 95% Yellow: >95% and <98% Green: ≥ 98%
Current DE Dashboard	02: Percent Sick Leave	Total Sick Leave Usage Hours utilized by all employees of each District. Calculated against total employment hours.	Red: ≥ 3.5% Yellow: >3.0% and <3.5% Green: ≤ 3.0%
Current DE Dashboard	03: Total District Overtime Costs	Total budgeted amounts for the Fiscal Year for each District. Calculated from the data of actual monies spent for overtime expenses against actual overall payroll expenses.	Red: ≥ 10% Yellow: >5% and <10% Green: ≤ 5%

	Measure Title	Definition	Targets
Current DE Dashboard	04: Accrued Unbilled Costs	This metric tracks expenditures eligible for federal reimbursement against the federal agreement amount. The goal is to maximize state cash flow through timely federal reimbursement of eligible expenditures	Red: ≥ 100% Yellow: >90% and <100% Green: ≤ 90%
Current DE Dashboard	05: Return On Investment (ROI)	This metric compares how much County Budget funds are being expended on Roadway and Bridge activities (i.e. ROI activities) to total expenditures. The goal is to spend as much money on ROI activities as possible by closely monitoring expenditures to other activities (NON-ROI) and minimizing overhead expenditure.	Red: ≤ 75% Yellow: >75% and <78% Green: ≥ 78%
Current DE Dashboard	06: ASHMA Bridge Allocation	This metric compares Maintenance Appropriation (Fund 10582) Bridge expenditures and commitments to the ASHMA Bridge allocations. The goal is to ensure that funding being spent on Bridges compares favorably to funding allocated to Bridges in the budget formula.	Red: ≤ 70% Yellow: >70% and < 80% Green: ≥ 80%
Current DE Dashboard	07: Winter Services	This metric tracks the cumulative year-to-date expenditures that each district has incurred in their winter services budget.	Red: ≥ 10% Yellow: 5% - 10% Green: ≤ 5%
Current DE Dashboard	08: County Budget Monitoring	This metric monitors the status of county maintenance budgets (appropriation 10582).	Red: >5% of Average 3 year history Yellow: 0% - 5% of Average 3 year history Green: ≤ of Average 3 year history

	Measure Title	Definition	Targets
Current DE Dashboard	09: Percent of Portfolio on Schedule	This metric illustrates how many design projects are currently meeting their original baseline schedule. The goal is to let as many design projects on the originally committed let date as possible.	Red: ≤ 60% Yellow: > 60% and < 80% Green: ≥ 80%
Current DE Dashboard	10a: Committed Letting Goals by $$	All committed construction projects let by the Central Office during the measurement period (Monthly).	Red: ≤ 95% Yellow: >95% and <100% Green: ≥100%
Current DE Dashboard	10b: Committed Letting Goals by #	Statewide letting goals are committed by number of projects for each calendar year. This metric compares the committed letting schedule to the actual letting schedule.	Red: ≤ 95% Yellow: >95% and < 100% Green: ≥100%
Current DE Dashboard	11a: Committed Bridge Projects Let $ On Schedule	The $ of bridge projects that are let on schedule. This metric compares the committed bridge letting schedule to the actual bridge letting schedule and is important to show that PennDOT can deliver bridge projects to meet Department's annual bridge goals.	Red: ≤80% Yellow: > 80 to < 90% Green: ≥90%
Current DE Dashboard	11b: Committed Number of Bridge Projects Let On Schedule	The number of bridge projects that are let on schedule.	Red: ≤80% Yellow: >80 to <90% Green: ≥90%
Current DE Dashboard	12: Monitor Bridge Analysis Backlog – 90 Days	The percentage of NBIS bridges requiring re-rating that are re-rated in a timely fashion – in this case, 90 days.	Red: ≤ 95% Yellow: 95% to 100% Green: ≥100%
Current DE Dashboard	12b: Monitor Bridge Analysis Backlog – 120 Days	The percentage of NBIS bridges requiring re-rating that are re-rated in a timely fashion – in this case, 120 days.	Red: ≤ 98% Yellow: 98% to 100% Green: ≥100%

	Measure Title	Definition	Targets
Current DE Dashboard	13A: % of Bridges that are Deficient	This metric is a leading indicator for the bridge program. It is important to ensure safe bridges and to ensure that the bridge program money is focused where it is needed.	Red: ≤ 0.3% reduction Yellow: >0.3% and <0.5% reduction Green: ≥0.5% reduction
Current DE Dashboard	13B: Percentage of Dollars Spent on SD Bridges	This metric will measure the amount of Bridge Improvement dollars let that is directed to improving SD bridges. Data will be displayed cumulatively. To ensure this SD reduction goal, at least 85% of bridge improvement spending is to be directed to SD bridge improvements. This metric does not include bridge preservation dollars.	Red: < 80% of Improvement $ Yellow: ≥80% and <85% of Improvement $ Green: ≥ 85% of Improvement $
Current DE Dashboard	14a: Number 0 and 1 Maint. Priorities for Bridge	This metric calculates the percentage of completed maintenance items classified as a Bridge Maintenance category and with a priority of 0 or 1.	Red: ≤ 5% Yellow: >5% to <10% Green: ≥ 10%
Current DE Dashboard	14b: Total Number of 0 and 1 Maintenance Priorities	This metric calculates the percentage of completed maintenance items for all maintenance categories with a priority of 0 or 1. The percentage is based on the total number of 0 and 1 priorities outstanding on July 1st.	Red: ≤ 2% Yellow: >2% to <5% Green: ≥ 5%
Current DE Dashboard	15: Average monthly Bituminous Sample Testing Turnaround Time	This metric provides the average monthly Bituminous Sample Testing Turnaround Time in calendar days. It is the average calendar days between the bituminous sample collection date and the sample test report release date in the Construction and Materials Management System (CAMMS) for specific bituminous sample test reports released during the	Red: ≥ 21 calendar days Yellow: > 19 and < 21 calendar days Green: ≤ 19 calendar days

	Measure Title	Definition	Targets
		month.	
Current DE Dashboard	16a: DBE Participation - Design	This metric compares the percentage of money paid to DBE consultants vs. the DBE goal for each contract (ECMS projects only). The goal is to reach 100% of the DBE payment goal for each contract.	Red: ≤ 90% Yellow: >90% and < 100% Green: ≥ 100%
Current DE Dashboard	16b: Percentage of DBE Paid / Committed for on-going projects at least 50% complete	This metric compares what the prime contractor promised (committed) to what was actually paid to the DBE firm(s) for on-going projects. The Highway Construction goal is set in the bid package. The commitment is what the Contractor commits to in their response. Commitments can be revised through the life of the project.	Red: < 68% Yellow: ≥68% and <75% Green: ≥75%
Current DE Dashboard	17: Bid vs Final Amount	Compares the final project amount to the original contract amount.	Red: ≥±5% Yellow: >±3% and <±5% Green: ± 3%
Current DE Dashboard	18: Percent of Construction Dollars Spent on Oversight	This metric compares Construction Phase 7 and 8 expenditures not directly charged to a Maintenance Contract (i.e. oversight costs) to the total construction phase expenditures.	Red: ≥ 10.3% Yellow: >9.3 and < 10.3% Green: ≤ 9.3%
Current DE Dashboard	19: Surface Improvements - Resurfacing	This metric tracks the miles of resurfacing completed throughout the fiscal year, and measures completed mileage versus planned mileage, and versus monthly targets.	Red: ≤ 80% Yellow: > 80% and < 90% Green: > 90%
Current DE Dashboard	20: Surface Improvements – Leveling & Sealing	This metric tracks the miles of leveling and sealing completed throughout the fiscal year, and measures completed mileage versus planned mileage, and versus monthly targets.	Red: ≤ 80% Yellow: > 80% and < 90% Green: > 90%

	Measure Title	Definition	Targets
Current DE Dashboard	21: Surface Improvements – Total Surface Improvement	This metric tracks the miles of surface improvement completed throughout the fiscal year, and measures completed mileage versus total system mileage, and versus monthly targets.	Red: ≤ 80% Yellow: > 80% and < 90% Green: > 90%
Current DE Dashboard	22: Surface Improvements – Crack Sealing on 5-Year Cycles	This metric tracks the miles with crack sealing completed throughout the fiscal year, and measures completed mileage versus all pavements on the resurfacing network (high level bituminous) with a surface no more than five years old, and versus monthly targets.	Red: ≤ 80% Yellow: > 80% and < 90% Green: > 90%
Current DE Dashboard	23a: CCC – Average days to Complete a Pothole Concern	This metric determines the average time taken to complete all pothole concerns, from submission of a concern to completion of repair.	Red: >12calendar days Yellow: >10 and <12 calendar days Green: ≤10 calendar days
Current DE Dashboard	23b: CCC – All Drainage Concerns	This metric determines the average number of calendar days taken to schedule all drainage concerns, from submission of a concern to scheduling of repair.	Red: >25calendar days Yellow: >20 and < 25 calendar days Green: ≤20 calendar days
Current DE Dashboard	24: Program 718 – Low Cost S.I.P.	This metric compares the percent of the annual Fund 10583 Program 718 budget committed and expended to date against a monthly target (percent of the annual budget committed or expended).	Red: ≤ 75% of monthly target Yellow: >75% and < 90% of monthly target Green: ≥ 90% of monthly target
Current DE Dashboard	25: Diversified CE Experience	The ratio of pay range 9 and above Civil Engineers with 2 or more years of work experience in another Administrative Area other than the area they are currently located.	Not Defined
Current DE Dashboard	26: Engineer's Estimate vs. Contractor Low Bid Amount	Accurate engineer's estimates are important to establishing the basis for key project decisions. This metric evaluates the accuracy of the estimates by comparing the	Red: > 50% Yellow: >50% and < 70% Green: ≥ 70%

	Measure Title	Definition	Targets
		engineer's estimate to the contractor low bid within 10%. The goal is to reduce the number of bid justifications.	

The following measures are included in the Mobility Plan:

PA Mobility Plan Implementation Plan	Objective 1A: Reduce the number of fatalities and crashes.	
PA Mobility Plan Implementation Plan	1. Establish teams to identify and implement actions for each CSHSIP priority safety focus area.	BHSTE
PA Mobility Plan Implementation Plan	2. Support the enactment of a primary seatbelt law for Pennsylvania.	PennDOT Legislative Office
PA Mobility Plan Implementation Plan	3. Support legislation to allow the use of ITS for traffic law enforcement.	PennDOT Legislative Office
PA Mobility Plan Implementation Plan	4. Expand accident data-sharing.	BHSTE
PA Mobility Plan Implementation Plan	5. Partner to expand driver improvement programs for senior citizens and younger drivers.	Office of Safety Administration
PA Mobility Plan Implementation Plan	6. Improve motorcycle safety through partnerships and programs that reduce crashes.	Office of Safety Administration
PA Mobility Plan Implementation Plan	7. Reduce the number of at-grade crossings and improve the safety of existing crossings.	BOD
PA Mobility Plan Implementation Plan	Objective 1B: Ensure the uninterrupted operation of vital transportation services.	
PA Mobility Plan Implementation Plan	8. Support the PA OHS and the PSP to secure high-risk transportation facilities.	BHSTE
PA Mobility Plan Implementation Plan	9. Support the development of evacuation procedures for persons with disabilities, the poor, and seniors with limited mobility options.	BHSTE

PA Mobility Plan Implementation Plan	10. Ensure that transportation communication systems are linked with emergency responder systems.	PA Office of Administration
PA Mobility Plan Implementation Plan	11. Participate in emergency drills and tabletop exercises.	PEMA
PA Mobility Plan Implementation Plan	12. Maximize data-sharing for transportation system emergency response and incident management.	PEMA
PA Mobility Plan Implementation Plan	13. Implement the federally-mandated REAL ID Act to improve the driver license issuance process.	Office of Safety Administration
PA Mobility Plan Implementation Plan	Objective 2A: Direct resources to support economic and community development.	
PA Mobility Plan Implementation Plan	14. Increase the applied understanding of economic development among transportation professionals.	Office of Planning
PA Mobility Plan Implementation Plan	15. Investigate a Location-Efficient Mortgage (LEM) program with other state agencies.	Policy Office
PA Mobility Plan Implementation Plan	16. Promote consideration of public transit and other modes as part of local review of proposed developments.	Office of Highway Administration
PA Mobility Plan Implementation Plan	17. Develop a public-private PA rail freight economic development strategy.	Office Aviation and Rail Frieght
PA Mobility Plan Implementation Plan	18. Evaluate changing the MPC to improve the integration of transportation and land use planning.	CPDM

PA Mobility Plan Implementation Plan	19. Investigate ways to expedite the HOP process for industrial and business park development.	BHSTE
PA Mobility Plan Implementation Plan	Objective 2B: Integrate land use and transportation planning.	
PA Mobility Plan Implementation Plan	20. Reinforce the Keystone Principles and Criteria through regional LRTPs, county and municipal comprehensive plans, and TIPS.	CPDM
PA Mobility Plan Implementation Plan	21. Develop a Smart Transportation Primer for partners and the general public.	CPDM
PA Mobility Plan Implementation Plan	22. Integrate "congestion" thresholds in the purpose and need definition phase for project development.	BOD
PA Mobility Plan Implementation Plan	23. Develop and promote model ordinances that integrate land use and transportation.	CPDM
PA Mobility Plan Implementation Plan	24. Provide street design and related standards to emphasize right-sizing context-sensitive solutions, and the promotion of non-motorized transportation/related public health benefits.	BOD
PA Mobility Plan Implementation Plan	25. Consider air quality more thoroughly in planning, programming, and system operation.	CPDM
PA Mobility Plan Implementation Plan	26. Consider stormwater management more thoroughly in planning, programming, and project development.	BOD
PA Mobility Plan Implementation Plan	Objective 2C: Preserve natural, historical, and cultural resources.	
PA Mobility Plan Implementation Plan	27. Define strategic conservation areas and methods for their protection in collaboration with DCNR, DEP, and other resource agencies.	BOD
PA Mobility Plan Implementation Plan	28. Incorporate purpose and need in the planning/programming process.	CPDM

PA Mobility Plan Implementation Plan	Objective 2D: Promote energy conservation.	
PA Mobility Plan Implementation Plan	29. Expand the percentage of efficient vehicles in PennDOT's fleet.	BOMO
PA Mobility Plan Implementation Plan	30. Promote public transportation and associated investments as an energy conservation strategy.	Office of Local & Area Transportation
PA Mobility Plan Implementation Plan	31. Increase the share of trips that use transit, carpools, carsharing, telecommuting, and not motorized means of transportation.	BPT
PA Mobility Plan Implementation Plan	32. Reduce emissions from idling trucks in partnership with the trucking industry.	BOS
PA Mobility Plan Implementation Plan	Objective 3A: Advance a program to achieve desired maintenance cycles.	
PA Mobility Plan Implementation Plan	33. Build upon a major bridge rehabilitation initiative for PA.	BOD
PA Mobility Plan Implementation Plan	34. Improve the method of asset data collection and use.	BOMO
PA Mobility Plan Implementation Plan	35. Use infrastructure condition and performance data as a primary basis for prioritizing transportation investments.	Office of Planning
PA Mobility Plan Implementation Plan	36. Develop meaningful condition reporting for all modes, including rail, highway, transit, airports, and water ports.	Office of Highway Administration

PA Mobility Plan Implementation Plan	37. Improve the asset management capabilities of local government.	Office of Highway Administration
PA Mobility Plan Implementation Plan	38. Integrate asset management into existing policies, procedures, programs, and publications.	Office of Highway Administration
PA Mobility Plan Implementation Plan	39. Develop a statewide analytical tool to estimate public transportation capital needs.	BPT
PA Mobility Plan Implementation Plan	40. Expand Municipal Services to local governments.	BMS
PA Mobility Plan Implementation Plan	41. Determine desired maintenance cycles to quantify the funding required to deliver the desired gap closure rate/backlog reduction.	Office of Highway Administration
PA Mobility Plan Implementation Plan	Objective 3B: Accelerate the use of innovative construction techniques, better materials, and improved maintenance practices.	
PA Mobility Plan Implementation Plan	42. Advance the short- and long-term priorities for the development and deployment of cost-effective products and materials.	Executive Committee
PA Mobility Plan Implementation Plan	43. Expand the use of research institutes/colleges to develop innovative design and construction techniques, materials, and maintenance practices.	BPR
PA Mobility Plan Implementation Plan	44. Expand road turn back and streamline procedures for transfer to local ownership.	BMS
PA Mobility Plan Implementation Plan	Objective 4A: Improve connectivity and accessibility throughout the transportation network.	

PA Mobility Plan Implementation Plan	45. Make public transit a viable transportation alternative for more Pennsylvanians.	BPT
PA Mobility Plan Implementation Plan	46. Improve the process for identifying and responding to the needs of the transportation-dependent populations early in the planning and project development process.	CPDM
PA Mobility Plan Implementation Plan	47. Support non-traditional service delivery methods for human/social services transportation.	BPT
PA Mobility Plan Implementation Plan	48. Expand regional (cross-county) transit services.	BPT
PA Mobility Plan Implementation Plan	49. Expand express bus and intercity rail to improve mobility between major population/employment centers.	BPT
PA Mobility Plan Implementation Plan	50. Improve commercial airline service and airport access to better connect Pennsylvania communities with the world.	BOA
PA Mobility Plan Implementation Plan	51. Develop regional Trip Planning Program(s).	BPT
PA Mobility Plan Implementation Plan	52. Provide real-time traveler information and improved way finding to support tourism.	Office of Administration
PA Mobility Plan Implementation Plan	53. Improve access for PwD and seniors at crosswalks including improved signage, pedestrian signals with audible alerts, and improved signal crossing time.	BHSTE
PA Mobility Plan Implementation Plan	54. Implement TSOP-01: Inter-Agency Incident Reporting System.	BHSTE
PA Mobility Plan Implementation Plan	55. Implement TSOP-02: Road Condition Reporting System.	BHSTE
PA Mobility Plan Implementation Plan	56. Plan TSOP-04: Incident Management Traveler Information.	BHSTE

PA Mobility Plan Implementation Plan	57. Implement TSOP-08: TAC Signal Study Implementation.	BHSTE
PA Mobility Plan Implementation Plan	58. Build TSOP-09: State Traffic Management Center (TMC) and regional or District TMCs.	BHSTE
PA Mobility Plan Implementation Plan	59. Plan for TSOP-12: Mobility in Work Zones.	BHSTE
PA Mobility Plan Implementation Plan	60. Investigate TSOP-13: ITS and IT.	BHSTE
PA Mobility Plan Implementation Plan	61. Plan for TSOP-14: Operations Mainstreaming.	BHSTE
PA Mobility Plan Implementation Plan	Objective 4B: Improve transportation system operating efficiency.	
PA Mobility Plan Implementation Plan	62. Determine the feasibility of distanced based and value pricing throughout Pennsylvania.	BFM
PA Mobility Plan Implementation Plan	63. Ensure that appropriate facilities are designed for value pricing.	BOD
PA Mobility Plan Implementation Plan	64. Determine the new and emerging knowledge and skill requirements for the 21st century transportation professional and develop and deploy the relevant operations training programs to satisfy those needs.	Office of Administration
PA Mobility Plan Implementation Plan	65. Explore policy and legislative changes to expand public-private partnerships for financing transportation improvements.	Office of Planning
PA Mobility Plan Implementation Plan	66. Develop a distribution strategy supporting Pennsylvania's ports and the Commonwealth's competitive economic position.	Office of Aviation and Rail Freight

PA Mobility Plan Implementation Plan	67. Expand the Pennsylvania Infrastructure Bank's (PIB) capitalization to leverage funding for public and private investment.	CPDM
PA Mobility Plan Implementation Plan	68. Advance a comprehensive statewide initiative to identify priority goods movement investments, operating improvements, and related partnering opportunities.	Office of Aviation and Rail Frieght
PA Mobility Plan Implementation Plan	69. Expand the use of ITS for improved directional and traffic information.	BHSTE
PA Mobility Plan Implementation Plan	Objective 4C: Improve transportation system reliability.	
PA Mobility Plan Implementation Plan	70. Improve the assessment and data/reporting of reliability for each transportation mode, using appropriate modal indicators and benchmarks.	Executive Committee
PA Mobility Plan Implementation Plan	71. Expand the deployment of roving patrols on facilities that have a high occurrence of incidents.	BHSTE
PA Mobility Plan Implementation Plan	72. Develop a guide for improving incident management.	BHSTE
PA Mobility Plan Implementation Plan	73. Identify intermodal connection deficiencies to water port terminals.	Office of Aviation and Rail Freight
PA Mobility Plan Implementation Plan	74. Advance a state-of-the-art statewide winter maintenance program.	BOMO
PA Mobility Plan Implementation Plan	Objective 5A: Improve transportation investment decision-making.	
PA Mobility Plan Implementation Plan	75. Provide local governments with information on the transprotation planning and programming process.	CPDM
PA Mobility Plan Implementation Plan	76. Strengthen the modal capabilities of PennDOT Districts and planning partners through improved business and planning practices.	Executive Committee

PA Mobility Plan Implementation Plan	Objective 5B: Focus statewide planning and investments on a Core PA Transportation System.	
PA Mobility Plan Implementation Plan	77. Identify and implement the Core PA Transportation System.	Executive Committee
PA Mobility Plan Implementation Plan	Objective 5C: Secure funding to preserve PA's transportation infrastructure and make strategic capacity improvements.	
PA Mobility Plan Implementation Plan	78. Periodically reevaluate transportation funding structure and sufficiency.	Executive Committee
PA Mobility Plan Implementation Plan	79. Establish a future revenue structure and sources in ways that keep pace with inflation.	Executive Committee
PA Mobility Plan Implementation Plan	80. Determine the appropriate value of bonding as a viable and cost effective means for system preservation in the near term.	BFM
PA Mobility Plan Implementation Plan	81. Develop a statewide strategy to obtain the necessary state and local funding match to better pursue New Starts and Small Starts funding for transit projects.	BPT
PA Mobility Plan Implementation Plan	82. Determine a future tolling direction for Pennsylvania transportation facilities.	Executive Committee
PA Mobility Plan Implementation Plan	Objective 5D: Improve project delivery to expedite project development and reduce cost.	
PA Mobility Plan Implementation Plan	83. Implement the Department's Project Delivery Streamlining Initiative action items.	Executive Committee
PA Mobility Plan Implementation Plan	84. Develop better metrics to monitor and quantify project delivery.	Executive Committee
PA Mobility Plan Implementation Plan	85. Implement the Linking Planning and NEPA Action Plan by moving the appropriate NEPA phases earlier into the planning process.	CPDM

PA Mobility Plan Implementation Plan	86. Mainstream right-sizing concepts and principles into the transportation planning and programming process.	CPDM
PA Mobility Plan Implementation Plan	87. Evaluate the benefits of universal stored value card technology and the potential transportation applications.	BPR

The following measures are included in the BHSTE Dashboard:

Bureau of Highway Safety & Traffic Engineering (BHSTE) Dashboard (monthly) 2007-2008			
The following BHSTE measures are included in the Central Office Dashboard			
Item No.	**Business Function**	**Bureau Objective**	**Measure**
1	Signing	Timely Sign Production	% of signs shipped to field within 14 days of request
2	HOP's	Timely processing of utility permits and Bridge Occupancy Licenses	# of permits processed within 10 working days
3	Work Zones	Improve Quality of Work Zone Traffic Control Setups in Field	% of work zone q/a's rated good
4	Crash Cases	Manage cases for processing	Number of cases on hand for processing
5	Risk	Annual Tort payouts at or below 5 year rolling average ($9.8M)	Monthly tort payout (each month is a cumulative measure to that point)
The following BHSTE measures are not included in the Central Office Dashboard			
Item No.	**Business Function**	**Bureau Objective**	**Measure**
8	Tickles	Timely Responses on BHSTE Tickles	# of tickles in, out & balance; # of tickles earlier than due date, by date, past due date
9	Pavement Markings	# of Retro-Readings from Contractors	Goal (88 readings each quarter) vs. Actual Received
10	HOP	Improve consistency HOP administration	# of gaps closed vs. planned to be vs. actual gaps
11	Crash Cases	Timeliness	# days from crash event to database insertions
12	Crash Cases	Efficient Processing of Crash Cases	e-case submission rate; 4 week trend; historic trend
13	LCSIP $'s in millions	Improved safety through systematic installation of low-cost safety improvements	Monthly low-cost SIP spending; spending rate consistent with site deployment rate
14	Risk	DE and RM Coordinator's awareness of Risk Claims	Monthly tort reports provided to Districts
15	Fiscal	Effective management and use of budget	Monthly reports of BHSTE "operations" budget spending
16	Trans. Operations	Effective management and use of budget	Monthly Appro-576 budget spending
17	Bureau Projects	Effective management and use of budget	Monthly Appro-582 budget spending

18	Highway Safety Grants	Expenditure of Grant Funds	Amount of Grant Obligations Expended
19	Improve Crash Data Timeliness	Extension of Crash Data Timeliness Efforts	Monitor Total Budget (Annual budget is divided evenly by quarter for the targets. Dollars shown in hundred-thousands and are cumulative. Actual is total commitments & expenditures.
20	Quality	Crash Data Quality and training Initiative	Monitor Total Budget (Annual budget is divided evenly by quarter for the targets. Dollars shown in hundred-thousands and are cumulative. Actual is total commitments & expenditures.
22	Safety	CDART Development	Monitor Total Budget (Annual budget is divided evenly by quarter for the targets. Dollars shown in hundred-thousands and are cumulative. Actual is total commitments & expenditures.
23	Quality	Local Roads	Monitor Total Budget (Annual budget is divided evenly by quarter for the targets. Dollars shown in hundred-thousands and are cumulative. Actual is total commitments & expenditures.
The following measures are included in all four Bureaus.			
Item No.	**Business Function**	**Bureau Objective**	**Measure**
1	Business Plan Items	Address each business plan item by allotted due date	% of Business plan items complete by due date
2	Administration & Management	Respond to all HA and ECP tickles on time	% of assignments/tickles on time
3	Administration & Management	Monitor Bureau Expenditure	Monitor Total Budget for special programs (Annual budget is divided evenly by month for the targets. Dollars shown in millions and are cumulative. Actual is total commitments & expenditures of A-582, A-580, and A-576 combined.

4	Policy Manuals & Standards	Update Bureau manuals and standards on cycle	All manuals/ publications updated on cycle.
5	Workforce Management	Maintain full Bureau complement	% of Bureau complement filled
6	Policy Manuals & Standards (Note: Input numbers in the Comments column).	Eliminate all SOL's which are more than 2 years old	Elimination of SOLs
Bureau of Highway Safety & Traffic Engineering (BHSTE) Dashboard (quarterly) 2007-2008			
The following BHSTE measures are included in the Central Office Dashboard			
Item No.	**Business Function**	**Bureau Objective**	**Measure**
6	LCSIP # of projects	Improved safety through systematic installation of low-cost safety improvements	Quarterly Low-cost improvements completed vs. quarterly target rate
7	Safety	Comprehensive Coordinator's delivery of soft side programs	Actual vs. planned grant activities
The following measures are included in all four Bureaus			
8	Administration & Management	Review all EPR's within 30 days of quarter end.	Quarterly Employee Performance Reviews (Includes Probationary Reviews)
9	Work Force	Total Number of CE with Diversified Experience Total Number of CE (PR9 and above) %	Diversified Civil Engineers and/or Managers

The following measures are included in Bureau of Construction & Materials Dashboard & Scorecard:

Bureau of Construction & Materials (BOCM) Dashboard (Monthly)		
The following BOCM measures are included in the Central Office Dashboard		
Item No.	**Business Function**	**Measure**
1	Materials Testing	% of tests completed within expected turnaround time
2	Materials Testing	Bituminous Testing sample taking to returning the test results
3	Prequalification of Contractors	% Pre-qualification applications processed within 30 days
4	Maintain Approved Supplier Lists	% PE's completed within pre-established time
The following BOCM measures are not included in the Central Office Dashboard		

9	Materials Testing	% of released samples scanned at dock within 24 hours
10	Quality Inspection	% of fabrication shops reviewed
11	Quality Inspection	% cost of inspection per cost of fabricated product
12	Quality Assurance East & West	% of QA Construction & Materials cum. Monthly reviews completed
13	Quality Assurance East	% of independent assurance cum. Monthly target reviews completed
14	Quality Assurance West	% of independent assurance cum. Monthly target reviews completed
15	QM Support	Avg. time for filling vacancies from 'BOCM OK to proceed' to turnover to HR
16	QM Support	Avg. time to fill vacancies from position posting to acceptance by new emp.
17	IT	% of AS/400 availability
18	Budget Support	% of overtime expenditures compared to 5 year average
The following measures are included in all four Bureaus		
1	Business Plan Items	% of Business plan items complete by due date
2	Administration & Management	% of assignments/tickles on time
3	Administration & Management	Monitor Budget & fiscal for special programs
4	Policy Manuals & Standards	All manuals/ publications updated annually.
5	Workforce Management	% of Complement Filled
6	Policy Manuals & Standards (Note: Input numbers in the Comments column)	Elimination of SOLs
7	Workforce Management	Diversified CE Experience - Pay Range 9 or above
Bureau of Construction & Materials (BOCM) Scorecard (Quarterly)		
The following BOCM measures are included in the Central Office Dashboard		
Item No.	**Business Function**	**Measure**
5	Quality Assurance East	Customer Service Index
6	Quality Assurance West	Customer Service Index
7	Administration & Management	Quarterly Employee Performance Reviews (Includes Probationary Reviews)

The following measures are included in the Bureau of Design Dashboard & Scorecard:

Bureau of Design (BOD) Dashboard		
The following BOD measures are included in the Central Office Dashboard		
Item No.	**Business Function**	**Measure**
1	Project Delivery	% of project submissions approved as per project schedule
2a	Project Letting (Note: Measure is Semi-Annual. Please enter Percentage Values in the appropriate months)	Committed letting goal - projects $ let on schedule
2b	Project Letting (Note: Measure is Semi-Annual. Please enter Percentage Values in the appropriate months)	Committed number letting goal - projects let on schedule
3a	Bridge Letting (Note: Measure is Semi-Annual. Please enter Percentage Values in the appropriate months)	Committed bridge projects $ let on schedule
3b	Bridge Letting (Note: Measure is Semi-Annual. Please enter Percentage Values in the appropriate months)	Committed number of bridge projects let on schedule
4	Policy Manuals & Standards (Note: Input numbers in the Comments column)	Elimination of SOLs
5	Business Plan Items	% of Business plan items complete by due date
6	Administration & Management	% of tickles on time
7a	Implementation of new ECMS II	SPI (Scheduled Performance Index)
7b	Implementation of new ECMS II	CPI (Cost Performance Index)
8	Bridge Inspection	Monthly compliance schedules to Districts
9	Software Update	Release STLRFD, PSLRFD, ABLRFD, BXLRFD, PAPIER & BAR7 on planned cycle

10	Software Update	Release FBLRFD, BPLRFD, SPLRFD, CBA, ARCH, SIGN on planned cycle
11	Scheduled completion of QA reviews of each of the 11 Districts and PA Turnpike inspection programs	Statewide QA Program: All Districts annually
12	% of NHS Bridges which have had either ProTeam or VEACTT sessions held with appropriate parties in attendance	ProTeam/VEACTT: Participate in ProTeam/VEACTT sessions-Now in Place
13	Develop and issue hydrology and hydraulics QA/QC checklists through a Department Strike-Off Letter	H&H Quality: Develop Q/A forms for hydrology and hydraulics by January 31, 2008
14	Provide concurrence to award local let	Number of days to provide concurrence to award & local let.
15	Project Closeouts	Project Closeouts
16	Backlog of Agreements	Backlog of Agreements
17	Market/Letting Analysis	Committed projects missing letting with recovery schedule
18	Coordinate with Districts to determine which projects need to be reviewed at monthly ACMs	Schedule & coordinate Agency Coordination Meetings (ACMs) with the resource agencies consistent with the Department's needs
19	Attend Scoping Field Views (SFV)	Attend scoping field views as requested by the District. If there was a scheduling conflict, attend a supplemental SFV.
20	IDOC Error Resolution	Days - Fiscal Effectiveness; track and measure # of IDOC errors
21	# of filled complement	% of complement
22	Budget	# of programs falling into negative balance
23	Budget	Maintain 0 balance for accrued unbilled costs on federal aid
24	Budget	Generate FV50's within 1 week of Monday Accrued Unbilled Costs Report
25	Administration & Management	Monitor budgets for all approps (cumulative)
26a-g	Metric Reporting	All metrics reported on time

27a-g	Metric Reporting	Metric recovery plan for any metric within Division that is yellow or red
Bureau of Design (BOD) Scorecard		
Item No.	**Business Function**	**Measure**
A1	Project Delivery "Own the Schedule"	% of projects approved with initial submissions
A2-1	Project Delivery "Own the Schedule"	% of projects approved with initial submissions
A2-2	Project Delivery "Own the Schedule"	% of projects approved with initial submissions
A3	Project Delivery "Own the Schedule"	% of NEPA documents approved with initial submissions
A4	Project Delivery "Own the Schedule"	% of projects approved with initial submissions
B1	Project Delivery "Own the Schedule"	Project submission review duration
B3	NEPA Document Reviews	% of NEPA Documents reviewed with project schedule
C1-5	Special Assignments	Completion by assigned due date
D	CE/EA Expert System	X.O Releases as per FHWA Guidelines
E	CE/EA Expert System	Conduct user group meeting
F	Standard Special Provisions Updated	Special Provisions updated quarterly
G	Granting R/W Clearances	Cycle time from receipt of request for clearance from District Office
H	Project Delivery "Own the Schedule"	Average response time to ECMS questions
I	Business Partner Registration Agreement Cycle Time	Calendar Days
J	BOD IT Support	Percentage assigned within 2 hours
K	ECMS Help Desk	Percentage within 1 hour
L	# of classes scheduled per quarter	# of classes per quarter (around 15 classes per month)
L1-2	Inspection	NBIS inspection cycle compliance
M	Policy Manuals & Standards	All manuals/ publications updated annually

N	Administration & Management	Quarterly Employee Performance Reviews (Includes Probationary Reviews)
O	Budget	# of programs meeting quarterly threshold
P	Work Force	Diversified Civil Engineers &/or Managers

The following measures are included in the Bureau of Maintenance & Operations Dashboard & Scorecard:

Bureau of Maintenance & Operations (BOMO) Dashboard		
The following BOMO measures are included in the Central Office Dashboard		
Item No.	**Business Function**	**Measure**
1	Perform Quality Assurance/ Control Reviews	Perform QA evaluations on District programs (cumulative)
2	Performance	Operational QA results
3	Performance	Work zone traffic control QA results
4	Superload Permits	Process Superload Permits within 5 working days
5	Pavement Management	Statewide surface improvements
6	Performance	Statewide cost vs Usage
7	Pavement Design Approval	Provide FHWA approval to Districts on 100% of submissions 5 days prior to PS&E date
8	Customer Service	ccc results
The following BOMO measures are not included in the Central Office Dashboard		
Item No.	**Business Function**	**Measure**
9	Performance	% of Delivery Times Met on PO (Monthly)
10	Collect, analyze, and report Roadway Condition Data	Implement and manage the annual Friction (Skid) Testing Program (Special Requests)
11	Collect, analyze, and report Roadway Condition Data	Implement and manage the annual Structural (FWD) Testing Program (Special Requests)
12	Collect, analyze, and report Roadway Condition Data	Implement and manage the annual New Pavement Roughness (IRI) Testing Program
15	Administration & Management	Probationary Employee Performance Reviews
16	Training	Courses Conducted
17	Contracts on time	
18	Provide Fuel Measures	% of Fixed Sites that Polled (MONTHLY)
19	Provide Fuel Measures	% of fuel trucks that polled (Monthly)
20	Annual Rpts	
The following measures are included in all four Bureaus.		

Item No.	Business Function	Measure
1	Business Plan Items	% of Business plan items
2	Administration & Management	% of assignments/ tickles on time
3	Administration & Management	Monitor BOMO Budget
4	Policy Manuals & Standards	All manuals/ publications updated annually.
5	Workforce Management	% of Complement Filled
Bureau of Maintenance & Operations (BOMO) Scorecard		
The following BOMO measures are included in the Central Office Dashboard		
Item No.	**Business Function**	**Measure**
1	Provide Equipment to Maintain Highways & Bridges	% of Capital Equipment Budget Utilized Within the Quarter (QUARTERLY)
2	Transfer Technology & Information	% of 800 MHZ radios installed(Quarterly) in Districts 1,2,3, & base in Central Office
3	Partner	% of Radio Training/MORIS Radio Database Training Completed (QUARTERLY)
4	Perform Quality Assurance/ Control Reviews	Perform annual 20% QA/QC evaluation on Statewide location referencing information
5	Partner	Perform 2 Statewide Radio Tests Annually - 800 MHz (Semi-Annual)
6	Performance	% P-Card Audits Conducted Per Quarter (QUARTERLY)
7	Administration & Management	Quarterly Employee Performance Reviews (Includes Probationary Reviews)

The following measures are included in the FHWA dashboard (Performance Objectives and Measures for FY 2007):

Activity		Performance Objective	Performance Measure	Comments
Project Delivery	Environment	Efficient Environmental Review Process Developed	Processed developed before next EIS initiated	Present process to FHWA for acceptance
		Reduce median number of months from NOI to ROD	Median number of months reduced from 99 months to 36 months	Rescind NOI's for inactive EIS's and establish time frames for current EIS's
	Innovative Contracting	Conduct VE or VEACTT's on all significant projects. Report Savings	Number of VE or VEACTT's and $ savings for projects > $20M	Savings are tracked quarterly on the Department's server. In addition, reporting of all project cost savings will be generated through automated reporting through MPMS
	STIP*	Increase % of Projects on STIP (originally approved) advanced. Applies to all phases.	% of projects on STIP (originally approved) advanced by year.	This year will focus on establishing baseline data and monitoring practices. Will use results to establish new goal next year. Baseline data = 23% of projects on STIP advanced
	Projects Let	Projects let on schedule	70% construction projects let within scheduled quarter	Data is presented monthly on the DE Dashboard
	Project Schedules	Project schedules developed	Establish project schedules as per current policy	Data is presented monthly on the DE Dashboard
Finance	Inactive Obligations*	Reduce Inactive Obligation Balance	Equal to or less than 2.6 percent of annual Federal TIP funding by District	Meeting scheduled with FHWA to clearly define objective and strategy
Infrastructure	Asset Management	Joint FHWA/PennDOT asset management team established	Asset Management Team formed	Next steps involve the development of a clear strategy with FHWA for implementation
		Plan Developed	Plan developed by Sept 30, 2008	Objective is to reduce structurally deficient deck area to meet national average by 2025.
	Structures	Reduce SF Structurally	Reduce Structurally Deficient deck area	Supports national goal

Activity		Performance Objective	Performance Measure	Comments
		deficient deck	by 0.5% per year	
	Pavement	Improve IRI	57% of VMT on NHS should be on pavements with IRI <=95 inches/mile	Timely closure of IOPs is managed by the HQAD. IOP status will be developed quarterly with appropriate action taken to meet deadlines
Independent Oversight	Independent Oversight Reviews	100% of previous years reviews closed or implementation plan developed	% reviews closed	
Safety	Strategic Highway Safety Plan	SHSP submitted by October 1, 2007	SHSP approved by FHWA	Quarterly status meetings are conducted to assure program is being implemented
	Highway Safety Improvement Program	HSIP implemented	Annual HSIP reports (HSIP, 5% report, RR Grade Crossing) submitted by August	HSIP/Section 148 funds to be used at locations with high crash locations (historic/documented)
	HSIP/Section 148 Funding*	Obligate 75% of HSIP/Section 148 funds authorized in FFY	% of HSIP/Section 148 Projects Advanced	Ultimately, ROPs will direct programming of projects in MPO long range plans and TIPs, and STIP
Operations	Regional Operation Plans	Establish collaborative PennDOT/MPO plans for strategies to improve highway operations	Complete all ROPs Statewide	As of 12/27/07, ROPS are completed for 8 of 9 operations regions. Dist. 9 ROP is in final review, expect completion in January 2008.
	511	Establish traveler information services statewide	Statewide contract for 511 implementation developed	The intent is have 511 contract awarded in FY 2008, and 511 operational by June 2009
* All items reported with a * are to be reported to FHWA by November 15th each year based on State Fiscal Year. All others should be reported by Sept. 15				

The following measures are included in the County Maintenance Measurement Tool (CMMT):

	CMMT Measure	Objective
1	Maintenance Activity Cost Effectiveness	To improve maintenance efficiency and cost effectiveness. To identify best practices through comparative analysis.
2	Annual Work Plan Adherence	To measure the degree of management control over production in the 10 maintenance activities by man-hours from the previous fiscal year.
3	Planning Quality Assurance	To measure the degree of which the planning subsystem is being used (No CMMT Score to be given for FY 07-08)
4	Payroll Quality Assurance	To measure the completion of the Highway Payroll as outlined in Pub 113, the Highway Foreman's Manual
5	Work zone Traffic Control	To assure that Department Force work zones meet the minimum requirements established by regulation, policy, procedure and directive
6	Central Office Quality Assurance	To assure that the quality of work performed in selected activities by Department forces meets the minimum quality standards established by policy, procedure and directive
7	District/County Quality Assurance	To assure that the quality of work performed in selected activities by Department forces meets the minimum quality standards established by Department policy, procedure and directive
8	Fleet Model Adherence	To assure the effective and efficient utilization of all maintenance equipment through the careful planning and tracking of equipment, which results in efficiency, cost containment and accountability
9	Equipment Preventive Maintenance Quality Assurance	To assure all applicable preventive maintenance policies are adhered to and that the Department's fleet is properly maintained, as outlined in the Equipment Manager's Manual Publication 177
10	Shop Compliance Efficiency	To assure all applicable policies and procedures are being adhered to as outlined in the Equipment Manager's Manual Publication 177
11	Winter Operations Efficiency	To provide the correct level of service to achieve cost effectiveness through a winter materials management program
12	Winter Services Training	Not in use for 07-08
13	Winter Preparedness	To assure that a county maintenance organization completes winter preparedness activities
14	Personal Injury, Correction and Management	To identify and implement corrective actions that will lower the Department's disabling injuries by monitoring accident trends and

	CMMT Measure	Objective
		implementing appropriate pro-active measures as outlined in various Bureau of Human Resources policy documents
15	Preventable Fleet Accident, Correction and Management	To identify and implement corrective actions that will lower the Department's fleet accidents by monitoring accident trends and implementing appropriate pro-active measures as outlined in various Bureau of Human Resources policy documents
16	Inventory Control	To assure that appropriate inventory levels & control measures are in place and adhered to
17	Stockpile Quality Assurance	To maintain environmentally safe stockpile areas in compliance with applicable Strategic Environmental Management program (SEMP) requirements
18	Bridge Maintenance Efficiency	To assure bridge cleaning gets completed in accordance with the BOMO guidelines in order to extend the bridge service life, to ensure that county bridge crews are spending 80% or more of their time on bridge maintenance as recommended by BOMO guidelines, and to reduce the backlog of high priority bridge maintenance needs identified by bridge inspectors
19	Reimbursable Activities Report	A. To measure compliance with billing guidelines established in Chapter 14 of the Maintenance Manual B. To measure compliance with repair guidelines established in Chapter 14 of the Maintenance Manual

The following measures are included in the Strategic Environmental Management Program (SEMP)

	Aspects	Organizational Objective	Measure
1	Winter Services	Provide Environmental Awareness training to new employees with SEMP-related job responsibilities as identified on the training matrix	% of identified new employees trained
2	Winter Services	Evaluate effectiveness of SEMP awareness training for full or refresher training	Average Test Score
3	Winter Services	Provide SEMP refresher training per identified employee by county organization	Average # of hours per employee allocated for SEMP training (Y-T-D) based on 777 employees with SRR
4	Highway Maintenance Activities	Provide E&S Control training to all new employees with SEMP-related job responsibilities (SSR) as identified on the training matrix	% of identified new employees trained
5	Highway Maintenance Activities	Evaluate effectiveness of E&S controls full or refresher training	Average Test Score
6	Stockpile & Garage Management	Provide Stockpile and Garage management to all new employees with SEMP-related job responsibilities as identified on the Training Matrix	% of identified new employees trained
7	Stockpile & Garage Management	Evaluate effectiveness of Stockpile & Garage Management full or refresher training	Average Test Score
8	Winter Services	Provide Winter Services training to new employees with SEMP-related job responsibilities as identified on the training matrix	% of identified new employees trained
9	Winter Services	Evaluate effectiveness of Winter Services full or refresher training	Average Test Score
10	Maintaining PPC/SPCC plans and emergency response	Review stockpile PSC/SPCC Plans annually and update as necessary to reflect current conditions and personnel	% of stockpiles reviewed annually
11	Maintaining ASTs and USTs; Controlling pollutant runoff and wastewater discharges to groundwater	Provide effective, well maintained secondary containment for above ground tanks as required by PennDOT policy	% of applicable above ground tanks with effective, well maintained secondary containment
12	Storage, Handling and disposal of environmentally sensitive wastes and wastes; Maintaining	Maintain and operate stockpiles and garages to minimize or prevent environmental incidents/impacts	Average foreman's quarterly checklist score % of deficiencies noted through

	Aspects	Organizational Objective	Measure
	ASTs and USTs; Controlling pollutant runoff and wastewater discharges to groundwater		foreman's checklist that are corrected or have an action plan within quarter
13	Highway Maintenance Activities	Evaluate effectiveness of E&S controls during highway maintenance activities: Ensure proper handling of wasted material	Average E&S QA Score
14	Stockpiles and Garages	District SEMP Stockpile QA Average	Average District SEMP QA Score
15	Highway Maintenance Activities	Recycle used guiderail	$s saved using recycled guide rail
16	Winter Services	CMMT measure 13 - winter preparedness - spreaders calibrated to ensure proper material application rates; Equipment inspected to operating at peak	CMMT Measure 13 Score
17	Highway Maintenance Activities	CMMT measure 9 - Equipment PM QA - Ensure equipment on a preventive maintenance schedule to ensure operating at peak	CMMT Measure 9 Score
18	Winter Services	CMMT measure 11 - Winter operations efficiency to determine correct pounds per snow lane mile per event	CMMT Measure 11 Score
19	Winter Services	CMMT measure 12 - winter services training to ensure proper application rates	CMMT Measure 12 Score NA for 2007-2008
20	Stockpiles and Garages	CMMT measure 17 - Stock pile environmental QA	CMMT Measure 17 Score

The following is a list of Highway and Bridge related measures tracked by the Governor's Office

Governor's Performance Measures
B. State Highway and Bridge Construction/Reconstruction • B.1. Miles of new highway construction • B.2. Miles of interstate reconstruction or restoration • B.3. Miles of non-interstate reconstruction or restoration • B.4. Interstate highway system in good or excellent condition • B.5. Interstate highway system in poor condition • B.6. NHS non-interstate highway system in good or excellent condition • B.7. NHS non-Interstate highway system in poor condition • B.8. Bridges replaced/repaired • B.9. Structurally deficient bridges by deck area • B.10. Variance of final cost of construction versus original contract amount • B.11. Bridges preserved • Int. B.1. Transportation project contracts bid (amounts in millions)
C. State Highway and Bridge Maintenance • C.2. Miles of state maintained highways improved: o C.2.a. Structural restoration o C.2.b. Maintenance resurfacing o C.2.c. Surface repairs • Int.C.1. Low cost safety improvements
D. Local Highway and Bridge Assistance • D.2. Local bridges: o D.2.a. Total (greater than 20 feet) o D.2.b. Brought up to standard through State Bridge Program

Appendix E: Acronym List

The following acronyms were used in the Performance Assessment Report:

Acronym	Definition
AASHTO	American Association of State Highway Transportation Officials
ACE	Assistant Construction Engineer
ACEC/PA	American Consulting Engineers Council of Pennsylvania
ADT	Average Daily Traffic
ASHMA	Additional State funds from the Highway Maintenance Appropriation
ATMS	Automated Traffic Management System
BHSTE	Bureau of Highway Safety and Traffic Engineering
BIS	Bureau of Information Systems
BMS	Bridge Management System
BMS2	Bridge Management System V2
BOCM	Bureau of Construction & Materials
BOMO	Bureau of Maintenance Operations
CAMMS	Construction and Materials Management Systems
CE	Civil Engineer
CFR	Code of Federal Regulations
CIO	Chief Information Officer
CM	Construction Manager
CMMT	County Maintenance Measurement Tool
CSHSIP	Comprehensive Strategic Highway Safety Improvement Plan
DBE	Disadvantaged Business Enterprise
DE	District Executive
DE/A	District Engineer / Administrator
Deloitte FAS	Deloitte Financial Advisory Services
DOT	Department of Transportation
DRIP	Data Rich Information Poor
DSO	Office of the Deputy Secretary for Highway Administration
DUI	Driving Under the Influence
ECMS	Engineering and Construction Management System
EIS	Environmental Impact Statement
EPR	Employee Performance Review
ERP	Enterprise Resource Planning
FD	Final Design
FHWA	Federal Highway Administration
FMIS	Financial Management Information System

Acronym	Definition
HOT	High Occupancy Toll
HOV	High Occupancy Vehicles
HSIP	Highway Safety Improvement Plan
IRI	Internal Roughness Index
IT	Information Technology
ITS	Intelligent Transportation System
LB&FC	Legislative Budget and Finance Committee
MECE	Maintenance Efficiency and Cost Effectiveness
NBIS	National Bridge Inspection Standards
NCEES	National Council of Examiners for Engineering and Surveying
NCHRP	National Cooperative Highway Research Program
NHS	National Highway System
NICET	National Institute for Certification in Engineering Technologies
NIMS	National Incident Management System
NOI	Notice of Intent
NPRM	Notice of Proposed Rulemaking
NYSDOT	New York State Department of Transportation
PDA	Personal Digital Assistant
PE	Preliminary Engineering
PEMA	Pennsylvania Emergency Management Agency
PennDOT	Pennsylvania Department of Transportation
PM	Project Manager
PMC	Program Management Committee
PMO	Program Management Office
PSE	Plans Specifications and Estimate
PSP	Pennsylvania State Police
QARS	Quality Assurance Reporting System
RCRS	Road Condition Reporting System
RFP	Request for Proposal
RMS	Roadway Management System
ROD	Record of Decision
ROI	Return on Investment
RTMC	Regional Traffic Management Center
RWIS	Roadway Information System
SAFETEA-LU	Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users
SD	Structurally Deficient
SEMP	Strategic Environmental Management Program
TASE	Technology Assisted Speed Enforcement

Acronym	Definition
TEA-21	Transportation Equity Act for the 21st Century
TMC	Time Management Center
TSOP	Transportation Systems Operation Plan
USDOT	U.S. Department of Transportation
VEACTTS	Value Engineering / Accelerated Construction Technology Transfer Process
VMT	Vehicle Miles Traveled
VSL	Variable Speed Limits

Appendix F: Structural Overview

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- Deloitte Consulting LLP provides consulting services, including human capital and outsourcing services
- Deloitte Financial Advisory Services LLP provides financial advisory services, consisting of forensic and dispute, reorganization, valuation, and corporate finance services
- Deloitte Tax LLP provides tax services

Each FSS operates as an independent entity with its own governance structure. Each FSS has its own chief executive officer and board of directors.

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