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WEST VIRGINIA DIVISION OF HIGHWAYS PERFORMANCE AUDIT

Final Report

January 10, 2016

Prepared for the Joint Committee on Government and Highways of the West Virginia Legislature

Deloitte.

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January 10, 2016

Dear Mr. Allred:

Enclosed please find Deloitte & Touché LLP's ("Deloitte") performance audit report (the "Report") in accordance with the terms of the engagement letter dated 14 August 2015 (the "Contract"), which is incorporated by reference to the Report.

The Report is confidential to the Addressees (as defined in the Contract) and is subject to the restrictions on use specified in the Contract. No other party is entitled to rely on the Report for any purpose whatsoever and we accept no responsibility or liability to any party other than the West Virginia Division of Highways ("DOH") in respect of the contents of the Report.

We draw your attention to the section titled "Scope of the Audit" ("Scope") included in the engagement letter in which we refer to the scope of our work, sources of information and the limitations of the work undertaken. Our work was performed in accordance with Generally Accepted Government Auditing Standards ("GAGAS"). Deloitte's Scope, however, does not include an investigation of fraud or audit of financial statements. Pursuant to your direction, we did not assess the overtime practices of DOH. The analysis was completed as of the date of this letter.

The Report to limited information made available to Deloitte by the DOH and other publicly available information sources that Deloitte considered appropriate. We do not have any reason to believe that these sources are not reliable or accurate, but we do not warrant their accuracy, completeness or correctness.

We recognize the critical importance of this project, and that the findings of the audit are intended to drive increased performance and value throughout DOH's core operations. Our Report is organized into five sections. Section 1 is the Executive Summary which includes a preview of Deloitte's approach to the audit, key issues by audit focus area and an introduction of a recommendation for DOH to implement a Business Performance Improvement Program to achieve the operational efficiencies described in Section 2. Deloitte's key findings and observations are discussed in Section 2 and are grouped together in accordance with the six audit scope focus areas.

Of the recommendations included in Section 2, we would like to draw your attention are summarized below:

- Adopt a holistic approach to help DOH maximize operational efficiencies and complete more projects using the same budget allocation.
- Transparency of funding allocations across Districts for operations and Snow Removal and Ice Control ("SRIC") activities can be achieved through better integrated planning.
- Prioritize and active monitoring of project progress can help DOH better be more proactive in utilization of resources and materials.
- Lack of merit-based rewards and performance incentives hinders DOH's ability to attract and retain talent as well as inhibits knowledge sharing across Districts.
- Implement a business performance improvement program ("BPIP") to drive efficiency throughout DOH; key focus areas are integrated planning and risk management.
- Creation of a Joint Steering Committee of diverse stakeholders to sponsor the BPIP and provide oversight to drive results.

Section 3 contains the "Capital Project Reviews" of four (4) recently completed or in-progress DOH projects. Section 4 describes the Business Performance Improvement Plan including recommendations of four (4) discrete projects that DOH can implement to achieve an estimated annual efficiencies between $25M and $50M, approximately 2.5% - 5% of DOH's annual budget. Section 5 contains the Appendices including an acronym list, the interview and documents logs as well as a summary of the findings for each of the 10 DOH Districts and DOH Headquarters.

This Report may not be made available or copied in whole or in part to any person other than the Addressees without the express written permission of Deloitte. Deloitte accepts no responsibility for any reliance that may be placed on the Report should it be used by any other party or for any purpose that has not been expressly agreed by Deloitte. Deloitte's name and this Report may not be referred to in any offering, circular or other document, without our prior written permission.

Sincerely,

Scott Meier
Principal

Acknowledgements

Deloitte appreciates the cooperation extended by the employees of DOH, including personnel at both DOH Headquarters and the District locations. We were impressed with the knowledge and dedication of the DOH 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. The constant coordination effort of the DOH staff during the process was an asset and essential to the success of the engagement directives.

In addition, Deloitte would also like to thank the DOH's external business partners and other stakeholders that contributed to this assessment.

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Capital Project Reviews
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- A performance assessment of four DOH capital projects recently completed or in-progress to further validate our analysis findings.

Business Performance Improvement Plan
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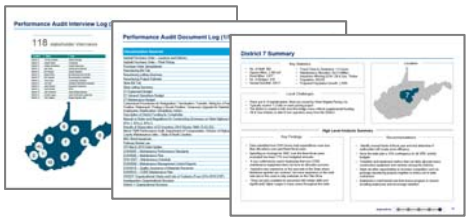
- An overview of the recommended Business Performance Improvement Program to address audit findings and achieve efficiency targets.



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- Performance audit interview and documentation logs and summaries of audit findings and recommendations by District.

1 Executive Summary

The Joint Committee on Government and Finance for the West Virginia Legislature ("Joint Committee") commissioned a performance audit to assess and improve the effectiveness and efficiency of Division of Highways ("DOH")'s core operations

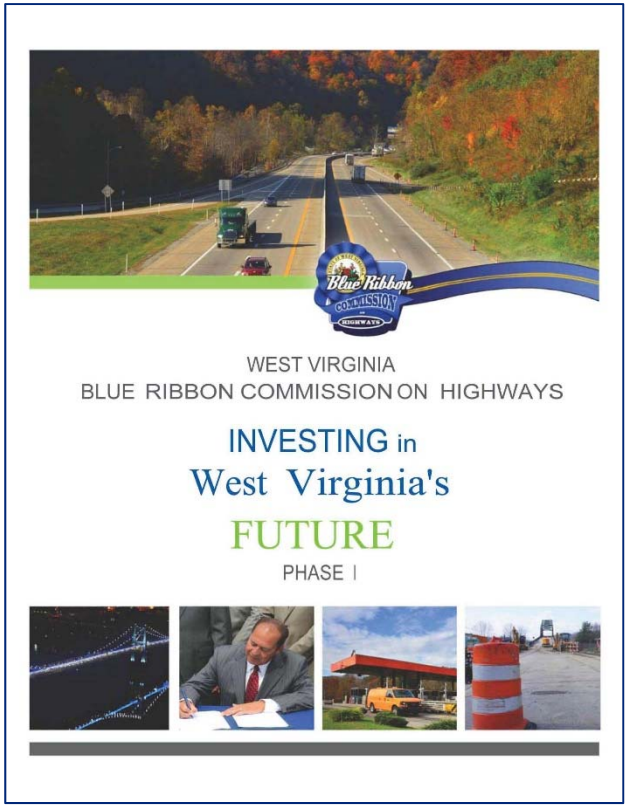
Audit Background

The Joint Committee sought a qualified contractor to perform a performance audit on the West Virginia Division of Highways (DOH) for fiscal years 2013, 2014, and 2015 in accordance with the provisions of § 17-2A-6a of the West Virginia Code.

- DOH is a large transportation organization responsible for the planning, engineering, right-of-ways acquisition, construction, reconstruction, traffic regulation and maintenance of more than 35,000 miles of state roads.
- In order to provide essential transportation services across this vast area, DOH operates as a decentralized organization from 10 District Offices dispersed throughout the state.

In May 2015, the West Virginia Blue Ribbon Commission on Highways ("Commission") published a report describing various issues currently impacting the transportation landscape within the state. A key concern within the report is the culminating results of decreasing State Road Fund revenues combined with deteriorating road and bridge conditions.

The Commission Report concluded that DOH faces substantial annual deficits. Our Report describes efficiencies that have the potential to save DOH up to $25- $50 million annually. Deloitte's recommendations were not intended to supplant the findings and suggestions of the Commission, but rather be used in conjunction with those recommendations to drive maximum efficiency.



Image, language and statistics on this page referenced from the West Virginia Blue Ribbon Commission on Highways May 2015 Report

The Joint Committee identified six audit focus areas to assess the effectiveness and efficiency of DOH's core operations

Audit Objectives

Our contract scope outlined the primary goals of the performance audit including the following objectives for conducting this assessment:

- Verify the extent to which the West Virginia Division of Highways employs an effective and efficient strategy to **fund maintenance activities, construction projects, and daily operating requirements**.

- Assess the effectiveness and efficiency of the West Virginia Division of Highways' **maintenance, construction and reconstruction of roads, bridges and other system assets**.

- Assess the effectiveness and efficiency of the West Virginia Division of Highways' **allocation and use of vehicles and other equipment**.

- Determine the extent the Division of Highways uses **sound procurement practices**.

- Assess the effectiveness, efficiency and economy of the West Virginia Division of Highways' **management of human resources in meeting the Division's mission**.

- Assess the effectiveness and efficiency of the West Virginia Division of Highways' **organizational structure in meeting its mission**.

We performed our audit in accordance with the Generally Accepted Government Auditing Standards ("GAGAS") as established by the Comptroller General of the United States.

DOH is experiencing increased traffic flows, aging infrastructure, and a decline in its annual funding but the percentage of unused funds at end of the fiscal year 2015 is trending upwards.

DOH Company Snapshot (2015)

Overview

- **Headquarters:** Charleston, West Virginia
- **Employees:** 4700+
- **Year Founded:** 1909 (State Road Bureau)
- **Ownership:** State of West Virginia

Regional Trends

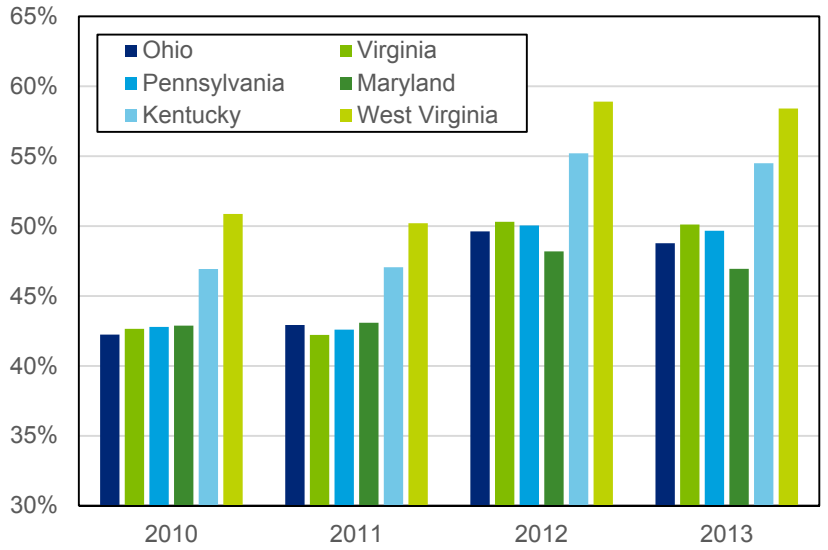
- 2.83% population growth, 2000-2015
- 1.40% projected population growth, 2015-2030
- Oil & Gas industry growth
- 7000+ bridges with average age of 40 years

Project Trends

- 33% of projects were delayed during FY13-15
- 30% annual underspend by bridge department
- 35% of CORE plan monthly management reporting updates are completed on average

Source: Population data, WVU study "Population Trends in WV through 2030", March 2014

Percentage of Total Vehicles That Are Trucks



Source: Google, from Office of Highway Policy Information, FHWA

DOH Asset Base Condition (2015)

6th Largest state maintained U.S. highway system

WV roads that are in either poor or mediocre condition **36%**

35% WV bridges in need of repair or replacement

WV bridges that are functionally deficient **22%**

Source: West Virginia Transportation by the Numbers: Meeting the State's Need for Safe and Efficient Mobility. January 2014.

Financial Summary (2013– 2015)

($ in millions)	Fiscal Year 2013	2014	2015
DOH Funding	$1,168	$1,200	$1,161
Growth %	*-9.9%*	*2.7%*	*-3.4%*
Expenditures	$1,075	$1,123	$1,003
Growth %	*-11.7%*	*4.3%*	*-12.0%*
Unused Funds	$93	$77	$158
Unused %	*8.0%*	*6.4%*	*13.6%*
Federal Funding	$422	$422	$422
Growth %	*1.4%*	*0%*	*0%*

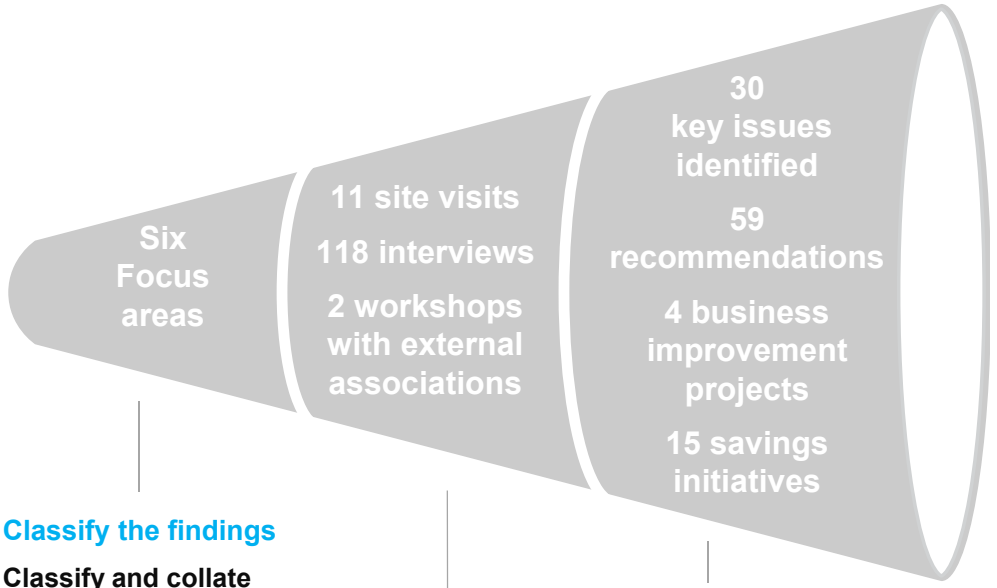
Source: "DOH Exp FY2007-FY2016 (by month).xlsx", provided by R. Musick, DOH Program Director

Our performance audit approach, in accordance with GAGAS, included extensive interviews and data analysis where findings were classified under six audit focus areas

Scope of Audit Focus Areas

- **Funding**
- **Maintenance, Construction & Reconstruction**
- **Vehicles and Equipment**
- **Procurement**
- **Personnel**
- **Organizational Structure**

Issue Identification Process



Classify the findings

Classify and collate

The findings were consolidated into the six audit scope focus areas and an analysis plan was created for each, to prove/disprove the finding and quantify savings opportunities

Understanding the business

Analyzing the information

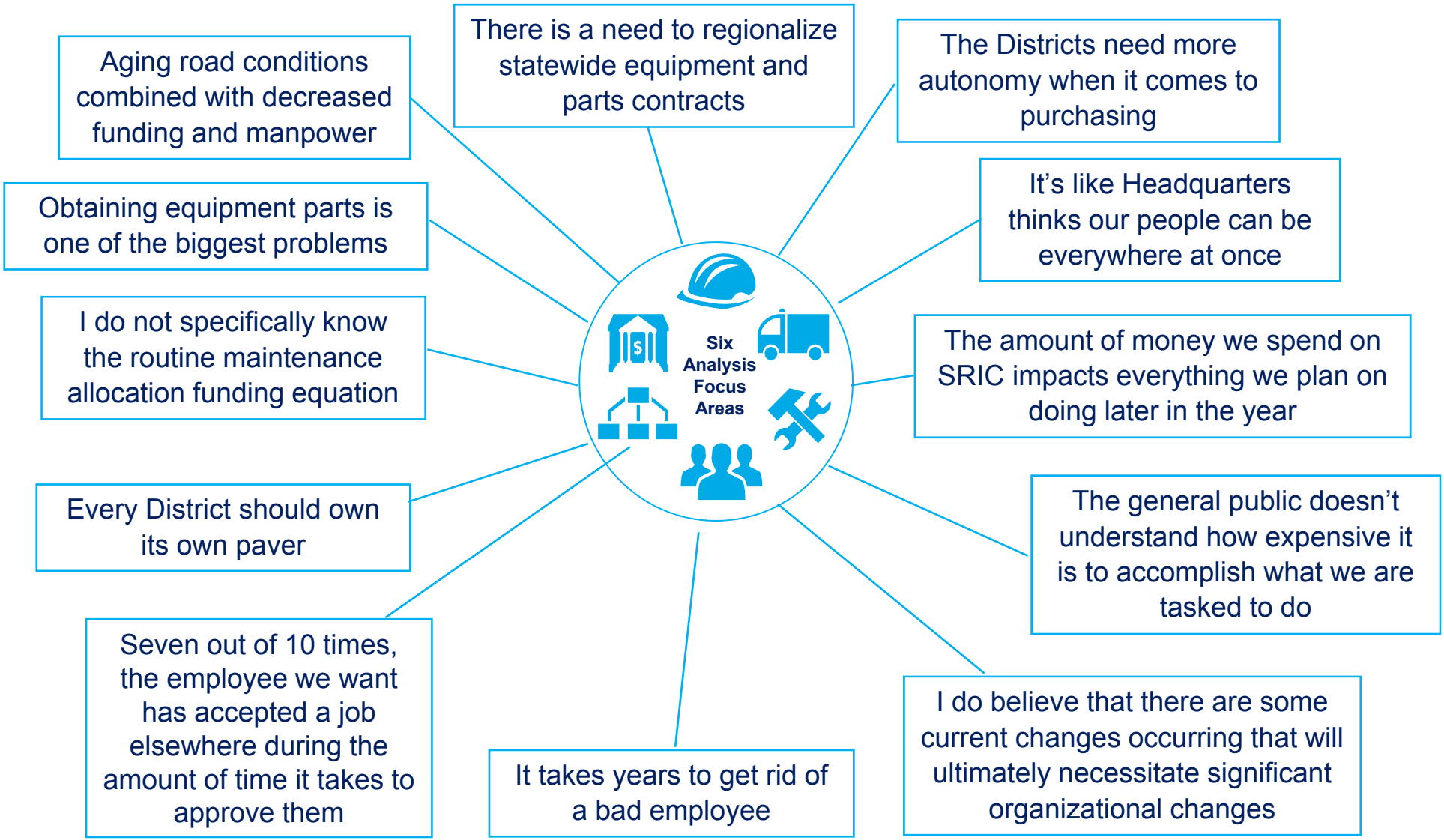
30 key issues were identified from interviews, industry workshops, documentation reviews and data analysis

Getting into the business

Fact finding and getting onto site

Stakeholders throughout the business were engaged to share their ideas and feedback on what was working well, any 'pain points' and improvement opportunities. Two workshops with the **Asphalt Pavement Association of West Virginia** and the **Contractors Association of West Virginia, external stakeholders,** were also held.

A preview into what we heard…



The Districts have historically been treated equally by DOH Head Office, however interviews confirmed that local challenges differ across the state

District 3

- Oil & Gas industry presence – large impact on roads and bridges.
- Understaffed with operators during SRIC season.
- Understaffed with pavement inspectors during summer.

District 6

- Oil & Gas industry presence – large impact on roads and bridges.
- Large travel time to DOH Head Office – feelings of isolation.
- Close proximity to the Ohio River – different geotechnical conditions and asset risk profile.

District 4

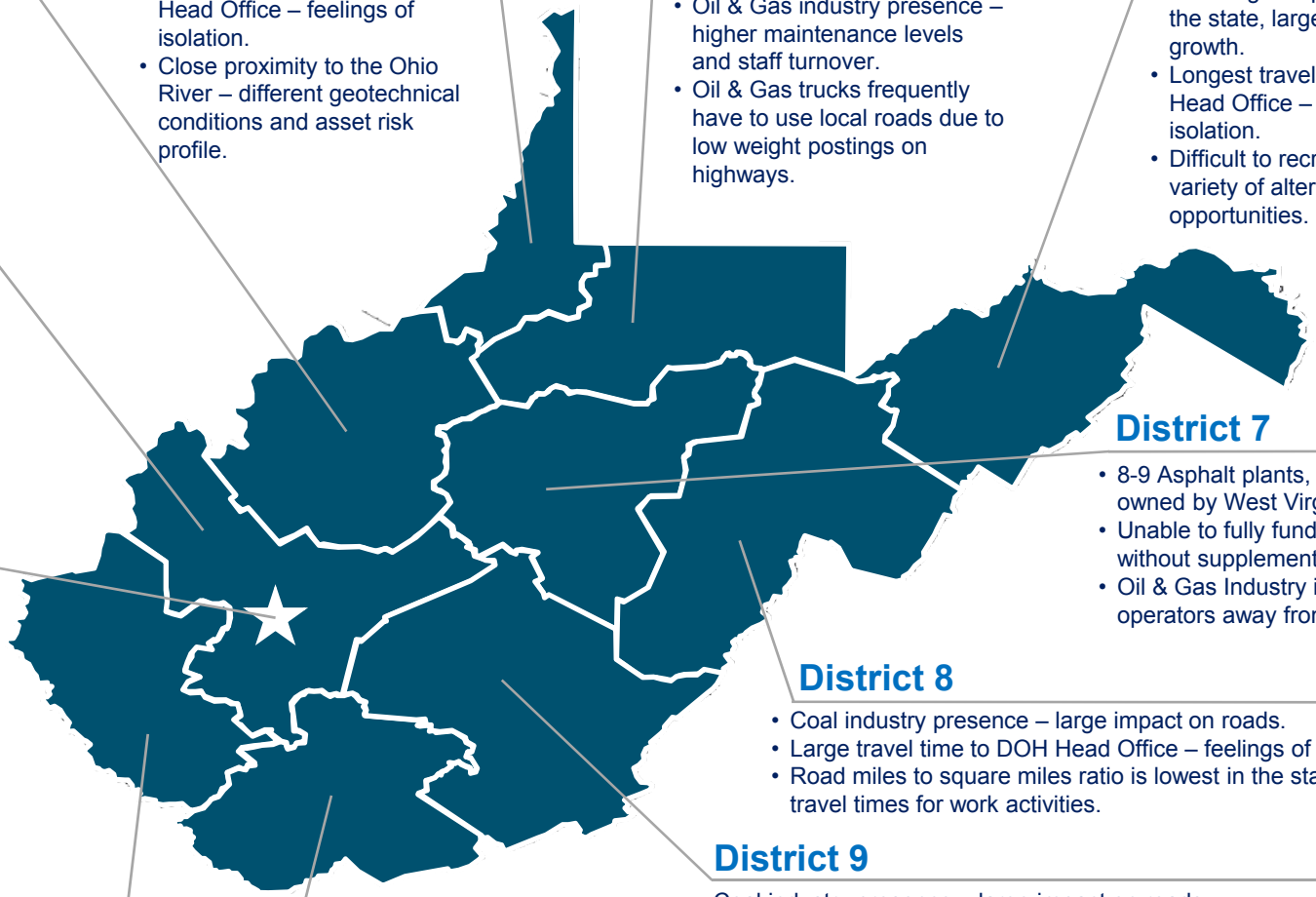
- Second highest population due to presence of major cities – Fairmont, Morgantown, Clarksburg.
- Oil & Gas industry presence – higher maintenance levels and staff turnover.
- Oil & Gas trucks frequently have to use local roads due to low weight postings on highways.

District 5

- Third highest population in the state, largest population growth.
- Longest travel time to DOH Head Office – feelings of isolation.
- Difficult to recruit – large variety of alternative career opportunities.

District 1

- Close proximity to the Capitol – extra scrutiny on performance.
- Highest number of bridges and most bridge deck area.
- Charleston is one of the most densely populated areas in the state.



District 7

- 8-9 Asphalt plants, but most are owned by West Virginia Paving.
- Unable to fully fund the bridge crews without supplemental funding.
- Oil & Gas Industry is able to lure operators away from the District.

Head Office

- Political pressure from outside DOH to make things happen.
- Management team in head office predominantly has a technical background – limited commercial.
- Management team in head office is mainly male – limited diversity.

District 8

- Coal industry presence – large impact on roads.
- Large travel time to DOH Head Office – feelings of isolation.
- Road miles to square miles ratio is lowest in the state – large travel times for work activities.

District 9

- Coal industry presence – large impact on roads.
- Large travel time to DOH Head Office – feelings of isolation.
- Many employees retiring soon and knowledge transfer will be a challenge.

District 2

- Steel industry presence – impact on highways.
- Coal industry has a significant presence aswell.
- Recently experienced 4 natural disasters, including significant flooding events.

District 10

- Presence of Oil & Gas and Coal industries – higher rate of roadway deterioration.
- Large travel time to DOH Head Office – feelings of isolation.
- Industry presence also makes it difficult to predict future population and traffic volumes.

Overview of key issues organized by audit focus area

Funding

1. Maintenance budgets are based on historical allocations rather than any agreed formula.
2. Over the past 3 fiscal years, state-wide DOH expenditures have been less than the allocated annual budget.
3. No implemented cost management process for routine maintenance budgets.
4. No official process in place to monitor program funding.
5. No official process to monitor funding balances on inactive projects.

Maintenance, Construction & Reconstruction

1. The MC&R funding allocation process should consider other operational metrics to address underspend.
2. SRIC funding needs are unpredictable and impact DOH's ability to conduct general maintenance.
3. Outsourced construction projects are often delayed, Maintenance CORE Plan progress is not updated regularly, and VE efforts are not regularly successful.
4. Performance measurement is currently neither a priority nor a standard practice.
5. Lack of project prioritization in STIP and CORE Plans leads to Man Power, Materials, and Effort being inefficiently deployed

Vehicles and Equipment

1. No official allocation process to Districts for vehicles and equipment.
2. It is difficult to monitor rental equipment utilization.
3. Many makes and models of vehicles and equipment exist in the fleet.
4. Procuring equipment parts under statewide purchasing contracts can lead to long down times.
5. Many equipment types display a high level of idle time.

Procurement

1. There are often delays between contract execution and project commencement.
2. Asphalt pricing trends vary depending on region of the state.
3. Procurement cost-benefit analysis during the project development phase is limited regarding low bid vs. best value.
4. The corporate purchasing manual is outdated and low purchasing approval thresholds can cause delays.
5. Statewide supplier contracts may not provide the best value for money.

Personnel

1. Lack of merit-based rewards and competitive salaries hinder the DOH's ability to attract and retain a highly skilled workforce.
2. The hiring processes are too inefficient to effectively fill the DOH's personnel needs.
3. Staff performance management is reactionary and enhancements to the performance management framework are needed.
4. Time collection requires significant manual input and is labor intensive.
5. Training content and quality appear to be sufficient; however, there are several opportunities for improvement in delivery and effectiveness.

Organizational Structure

1. Staffing quotas are not enforced and many Districts and Divisions remain over staffed.
2. DOH can realize greater efficiency through consolidation of key departments.
3. New risk management functions could be introduced or better defined.
4. The standardized org structure could be complimented with standard processes to increase resource sharing.

Funding can be utilized more efficiently through better integrated planning and increased transparency throughout the organization

Funding

Key Issues	Supporting Evidence	Recommendations	Savings
1 – Maintenance budgets are based on historical allocations rather than any agreed formula	• Senior leadership confirmed that no current formula is utilized. • DOH Administrative Operating Procedures ("AOP") state that a computer model should be used to allocate routine maintenance funds between Districts. • Senior leadership also confirmed that no allocation analysis has been performed since 2012.	• Create a fair framework to allocate and distribute routine maintenance funds to each of the Districts and County Organizations. • A baseline maintenance capital plan should be re-examined and revised periodically. • Metrics for the allocation process should be transparent.	6 7 8
2 – Over the past 3 fiscal years, state-wide DOH expenditures have been less than the allocated annual budget	• Data submitted from DOH shows total expenditures were less than allocations over past three fiscal years. • STIP project forecasting is constantly shifting and difficult to maintain. • Contract administration can often bottleneck the vetting process and potentially delay anticipated project milestones.	• Identify unused funds early at fiscal year end and determine if reallocation will create more efficiency. • Promote federal funding programs to ensure all funding sources are being realized. • Integrate project management reporting with budgeting process to allow for robust reforecasts and reallocations.	6 7 8
3 – No implemented cost management process for routine maintenance budgets	• SOP is to reallocate surplus funding for construction projects to the State Road Fund. • Surplus routine maintenance funding can be requested to remain at the District level and reallocated. • Interviews indicated no consequences for departments/districts being over budget, and conversely no incentive to be under budget.	• Allow Districts to automatically maintain surplus maintenance funding. • Consider allowing Districts to retain a small portion of surplus funding on construction projects. • Implement management reporting updates with each District on quarterly basis, discussing risks/opportunities and integrate with budget allocation process.	6 7 8
4 – No official process in place to monitor program funding	• W10A form can be generated to show status of various programmed funds; however this has not been an implemented process. • Unnecessary risk is generated by not constantly monitoring these funds as some federal programs have expiration dates • STIP is difficult to predict as projects are constantly shifting.	• Implement a process to monitor all federal funding programs in terms of percent used, percent remaining, and expiration date. Better usage of the W10A report would be beneficial.	6 7 8
5 – No official process to monitor funding balances on inactive projects	• FHWA guidelines implement a 2% maximum surplus on inactive projects. • No process exists to monitor state surplus funding on inactive projects, however Regional Program Managers will monitor this information.	• Match state funded projects to federal funded projects and allow a 2% maximum funding balance on inactive projects. • Implement a review process to monitor for surplus funding. • Integrate project management/cost management systems and management reporting.	6 7 8

Inefficient spending, variable spending on SRIC activities, and delayed project delivery are key findings in the MC&R focus area

Maintenance & Construction

Key Issues	Supporting Evidence	Recommendations	Savings
1 – The MC&R funding allocation process should consider other operational metrics to address underspend	• The **funding** for bridge maintenance, repair, and reconstruction is, **on average, 30% more than the group has spent in a FY**. • Overall expenditures are 13% below allocations. • Maintenance Formula, as described in AOP, is not being utilized. • 2012 funding criteria does not take into account many critical metrics to consider when maintaining a roadway system.	• Revisit the basis for determining how different organizations/districts are allocated funding. • Improve project performance and execution - better utilize production rates and adjust funding if target rates/goals are not met. • Consider funding factors beyond SRIC quota.	2 6 7
2 – SRIC funding needs are unpredictable and impact DOH's ability to conduct general maintenance	• Spending on Average for SRIC over the three fiscal years evaluated has been 11% over budgeted amounts. • If the winter of FY 13 is removed the average overrun is 19%. • The range over all three fiscal years by district shows a low spend of 29% under budget and a high spend of 43% over budget.	• Remove SRIC funding from the annual maintenance budget so that overrun or underrun amount do not affect plans for other maintenance activities. • Have the state plan a 15% contingency for all SRIC activity budgets.	8 9
3 – Outsourced construction projects are often delayed, Maintenance CORE Plan progress is not updated regularly, and VE efforts are not regularly successful	• After analyzing data submitted by Headquarters, there was found to be an increasing trend of projects being completed after the planned completion date. **On average 33% of projects were delayed during FY 13-15.** • Districts are supposed to submit updated CORE plans to Headquarters. However, as determined through a sampling of submitted updates, only 35% of the updates were completed. • VE was successfully used on 2% of contract projects between FY 13-15.	• Require CORE plan updates to be submitted into OASIS or another progress tracking software rather than have a non-uniform submission and tracking process. • Improve project management and the estimated time to complete projects by studying common activities and benchmarking rates of production achieved.	1 2 3 4
4 – Performance measurement is currently neither a priority nor a standard practice	• OASIS is being implemented with agile assets and other system add-ons to give leadership the ability to analyze the organization. • There are no standard practices or procedures in place to show management how to obtain operational metrics. Example metrics include: % bridges in good repair, % CORE plan complete, VMT. • After interview with DOH OASIS leader it remains unclear how the OASIS system will provide leadership additional insight.	• Create a Dashboard to provide a division wide performance monitoring platform for Headquarters and District management and the general public to use. • The data accumulated and housed with-in Oasis should be automatically fed into the Dashboard being implemented.	1 2 3 4
5 – Lack of project prioritization in STIP and CORE Plans leads to Man Power, Materials, and Effort being inefficiently deployed	• The STIP highlights projects but there is no objective reasoning behind why project are included on the list. • CORE plan projects are required to be spaced out and completed on various schedules; yet with-in the schedules there are no guidelines or processes determining which assets to work on first. • PMBOK and other national PM leaders stress the importance of having a project management framework.	• Institute a formal project prioritization process for both the STIP plan and core plan activities. This tool will incorporate data DOH has and will collect. • Identify ways to utilize TIGER FY2010 Tool. • Implement CORE plans for Bridge activities.	5 6 7 8 9

Regionalizing equipment part purchase orders in relation to Districts will reduce the amount of unnecessary down time

Vehicles & Equipment

Key Issues	Supporting Evidence	Recommendations	Savings
1 – No official allocation process to Districts for vehicles and equipment	• Senior leadership confirmed that non-CORE maintenance equipment does not have an allocation process. • Vehicles and pickup trucks are distributed based on necessity and quota. • Heavy equipment such as excavators, stinger cranes, dozers, and loaders are distributed evenly between the Districts.	• Establish and implement metrics that can fairly allocate heavy construction equipment and vehicles among the Districts that could include budget, road-miles, historical information, and necessity available in 'real time' • Promote sharing of equipment and vehicles between the Districts with improved levels of availability reporting.	12
2 – It is difficult to monitor rental equipment utilization	• Comprehensive equipment utilization reports do not automatically display rental equipment. • Districts have ability to run singular reports that will show idle, down, and chargeable time for rental equipment. • Headquarters recently started monitoring rental equipment timeframes and cost.	• Implement a process for the Districts to track rental equipment and produce reports – this may become a capability of OASIS. • Consider purchasing additional heavy equipment with repetitious rental trends as 70% of rental cost was for two types in 2015.	10 12
3 – Many makes and models of vehicles and equipment exist in the fleet	• Equipment utilization report information has shown that a significant amount of different makes and models of vehicles and equipment exist in the current fleet. • Low-bid quotations are utilized for vehicle and equipment purchase orders.	• Optimize maintenance costs by considering revising the vehicle and equipment purchase order to utilize best value limiting the different makes and models in the fleet. Best value considerations can include location in relation to the District and the reduction of equipment part inventory.	10
4 – Procuring equipment parts under statewide purchasing contracts can lead to long down times	• Achieving economies of scale within equipment part purchase orders is difficult given different makes of equipment • Extended down time can be experienced waiting for parts; time lost can be avoided if standard parts can be locally sourced.	• Consider regionalizing equipment part purchase order with intent of minimizing lead time for orders. Consequently, this will mitigate the risk for unnecessary down time waiting for maintenance parts.	10
5 – Many equipment types display a high level of idle time	• Monthly equipment utilization reports generated by the Districts will display information regarding idle, down, and chargeable time for all equipment • Season equipment for routine maintenance possess high idle rates • Understaffed Districts will also have equipment with high idle rates	• Consider renting non-seasonal equipment that currently display high levels of idle and down time. This could include dozers and chippers • Implement process to monitor idle equipment • Examine why pavers have high idle rates while also accounting for 25% of rental costs.	10 12

There are opportunities to increase efficiency by updating procurement processes currently mandating lowest price to reduce lead times

Procurement

Key Issues	Supporting Evidence	Recommendations	Savings
1 – There are often delays between contract execution and project commencement	• Data from Site Manager shows that the delays often occur between contract execution and project commencement. • Interviews with contractors have confirmed that project .commencement dates have slipped in the past due to delays in obtaining traffic permits. • There are limited quality control reviews being conducted to understand the reasons for project commencement date delays.	• Provide greater QC for time between contract execution and project commencement. • Implement a PMO to reduce potential of delays • Implement a 3rd party project quality control system to mitigate potential for change orders and design flaws.	1 2 3 4
2 – Asphalt pricing trends vary depending on region of the state	• The MLH Consulting Report shows that certain asphalt companies have acquired the majority of plants in certain Districts leaving them as a sole bidder. • Asphalt is less expensive on the east side of the State where limestone quarries are common, but more expensive on the west side due to the costs to ship materials on the Ohio River.	• Consider revisiting “white paper” findings regarding DOH asphalt plant. • Seek out opportunities to increase competition such as packaging multiple resurfacing projects to entice out of state contractors.	10 11
3 – Procurement cost-benefit analysis during the project development phase is limited regarding low bid vs. best value	• There is no formal process for completing a procurement cost-benefit analysis during the project development phase regarding low bid versus best value. • Limited analysis of whether to purchase or lease equipment. • No process in place that determines when to outsource engineering services versus performing in-house.	• Design and implement a procurement cost-benefit analysis process with templates • Provide cost-benefit training at District level prior to HQ approval. • Create more input from Districts prior to HW approval for construction projects.	1 2 3 10
4 – The corporate purchasing manual is outdated and low purchasing approval thresholds can cause delays	• Purchasing procedures are outdated as the cost of materials and equipment have increased since they were developed and purchasing thresholds have remained constant. • No requirement for Districts to complete a contractor evaluation which adds potential of risk for procuring low-quality contractors. • Processing purchase orders through HQ can be time consuming.	• Consider revising the threshold for P-card purchases, including appropriate internal controls, to use “best value option” instead of only relying on low-bid award • Revise purchase order approval process. • Implement post-contract evaluation into contractor prequalification process • Conduct 3rd party spot checks on the quality of bid documents before they go to market.	1 2 3 10
5 – Statewide supplier contracts may not provide the best value for money	• Statewide purchase orders are obtained through low-bid • Unnecessary lead time obtaining equipment materials through statewide contracts resulting in increased costs to the organization • PPP agreements with contractors result in fixed monthly payments based on DOH estimate. If the contractor is lower, they receive higher payments each month than earned value.	• Consider “best-value” alternative approach to statewide contracts such as implementing region-wide supplier contracts to reduce long lead times, particularly in O&M categories. • Focus on improving DOH estimates at outset of PPP procurement to limit instances of overly favorable contract payments post-project execution.	10

Revising key processes and enhancing performance incentives can better attract, retain, and utilize DOH's key assets – their staff

Personnel

Key Issues	Supporting Evidence	Recommendations	Savings
1 – Lack of merit-based rewards and competitive salaries hinder the DOH's ability to attract and retain a highly skilled workforce	• With monetary demands elsewhere in the organization, merit-based raises were removed several years ago. • There are jobs available for personnel with similar skills and significantly higher wages in many areas throughout the state. • As a result, there has been a noticeable increase in turnover and strong competition over available talent.	• Develop a robust performance development plan to capture goals that reflect an employee's individual strengths, career aspirations, and priorities for growth during the year.	15
2 – The hiring processes are too inefficient to effectively fill the DOH's personnel needs	• The DOH's approval process is very thorough and provides a number of checks to ensure that the decision is aligned with all applicable laws. The decision may need up to 13 approvals before the final approval is granted. • It can therefore take several months for an applicant to be approved. During this time, the employee cannot be notified of the pending approval, and may accept a position elsewhere.	• Reduce the amount of approval required for hourly employees, who should not undergo the same level of scrutiny as salaried positions. • Remove wage-based approvals by the state as the DOH does not receive any general revenue funds.	15
3 – Staff performance management is reactionary and enhancements to the performance management framework are needed	• The DOH does an excellent job ensuring that due process is provided for all employees undergoing the disciplinary process; however, this requires a significant amount of time and is typically checked by one person. • Personnel Specialists provide oversight to some Districts and act as the liaison between Headquarters and the Districts; however, they are not involved with disciplinary processes.	• Leverage Personnel Specialists to review requests for discipline and ensure that due process is provided. This will reduce the burden on the final approver at Headquarters. • Enhance the performance management framework by addressing staffing issues proactively.	15
4 – Time collection requires significant manual input and is labor intensive	• The time collection process requires employees to report to their supervisor, who reports to a timekeeper, who then inputs the time into the collection system. This opens DOH up to risk of fraud, and utilizes resources to collect and enter the time that could be otherwise deployed.	• Consider automating the time collection process. Most employees report to a central location each day (field office, vehicle pool, etc.), which would be the best location for the recording station. Mobile devices can alternatively be used to report the time. A centralized reviewer will monitor compliance.	15
5 – Training content and quality is sufficient; however, there are several opportunities for improvement in delivery and effectiveness	• Training is typically provided at centralized locations throughout the state, requiring extensive travel for some District employees. • Training for new software is not always provided in a timely manner, resulting in a loss of knowledge during the time gap. • There is a wealth of experience contained by personnel at each District and Division, but there is not an efficient means of sharing their knowledge, nor storing it for future reference.	• Provide telepresence opportunities to reduce the travel requirements to receive training. • Implement a train-the-trainer program and provide it for key personnel at each District. • Focus operator training on realistic conditions and provide multi-skilling experience. • Consider implementing knowledge sharing forums between Districts and Divisions.	15

The Districts are reasonably aligned to encourage equal distribution of work, but improvements can be made

Organizational Structure

Key Issues	Supporting Evidence	Recommendations	Savings
1 – Staffing quotas are not enforced and many Districts and Divisions remain over staffed	• The DOH revised the personnel quotas in the Spring of 2015 based on historical averages. Many Districts and Divisions had their quotas cut; however, to-date 55% of Districts and 70% of Divisions remain over staffed. • Some Districts are also under-staffed which is resulting in resource capacity limitations and an inability to complete works.	• Review quotas to ensure they are adequate. If they are, punished overstaffed departments as they are not fully utilizing their funds. • Enhance performance management framework to better address gaps and adjust staff utilization as needed.	13
2 – DOH can realize greater efficiency through consolidation of key departments	• The ROW, Permits, Utilities, and Oil & Gas departments perform similar key functions. Each are required to file for, enforce and inspect permits at various sites throughout the districts. ROW is directly under the District Manager, whereas Permits and Oil & Gas are under the Maintenance Engineer, and Utilities are under the Construction Engineer.	• Consider combining each of these departments under ROW to gain greater efficiency. The administrative and inspections skills are comparable, and therefore the personnel can be effectively cross trained to create a deeper pool of administrative services staff and inspectors to pull from.	2 13 14
3 – New risk management functions could be introduced or better defined	• Although the Districts have designated Bridge Inspectors, they are occasionally called from their inspection duties to perform repairs. • Similarly, there is not a designated Data Analytics group to fully utilize the information gathered by DOH's ERP system. • There does not appear to be an enterprise risk management system in place and no formal risk framework or risk processes.	• Clearly define what the Bridge Inspectors are responsible for performing and what their priorities are in terms of utilization. • Create a Data Analytics department to gain insights from the data provided by Oasis. • Implement a risk management system, such as a PMO and enhanced project controls.	1 2 3 5 14
4 – The standardized org structure could be complimented with standard processes to increase resource sharing	• The Administrative Operating Procedures provide general guidelines for how to perform various processes; however, they are not fully detailed, resulting in variances between Districts. This includes Job Posting, Hiring, Retirement processes, etc. • Standardized processes will reduce the learning curve and onboarding time for employees new to the District.	• Create a fully detailed standardized process for all administrative functions similar to those already created by certain Districts. • Select champion Administrative Services Manager(s) to create these processes to ensure they are realistic and sufficient.	2 14 15

Taking a deeper dive into four selected projects provided further examples of various procedural areas in need of DOH improvement

US 35

Budget	🟢
Schedule	🔴
Change Orders	🟢
Processes	🟢
Documentation	🟡
Subcontractors	🟢

Source: C. Lawrence / WV MetroNews

Key Findings

- A lack of funding significantly delayed the completion of the project.
- Public protest resulted in a county official to revise his stance on utilizing tolls to fund the project.
- Project was eventually able to proceed through the use of a PPP.

Corridor H

Budget	🔴
Schedule	🔴
Change Orders	🟡
Processes	🔴
Documentation	🟡
Subcontractors	🟡

Source: C. J. Mahan Construction Company

Key Findings

- Permits were not applied for and obtained in a timely fashion, leading to significant project delays.
- Groundwater contamination and sedimentation resulted in a claim against the DOH.
- Utility delays increased the project cost, and delayed the Notice to Proceed.

Tarico Heights Bridge

Budget	🟢
Schedule	🟢
Change Orders	🟢
Processes	🔴
Documentation	🔴
Subcontractors	🟢

Source: DOH Bridge Inspection Report, Dated 09/30/2014

Key Findings

- The Value Engineering review focused on the upfront savings, rather than weighing the resulting significant lifecycle cost.
- Functionality and aesthetics were most likely directly influenced by the VEP.
- District had little input in the VEP review process when they had the most insight.

Coalfields Expressway

Budget	🔴
Schedule	🟢
Change Orders	🟢
Processes	🟡
Documentation	🟡
Subcontractors	🟢

Source: W. Dayton Whittle / The Register-Herald

Key Findings

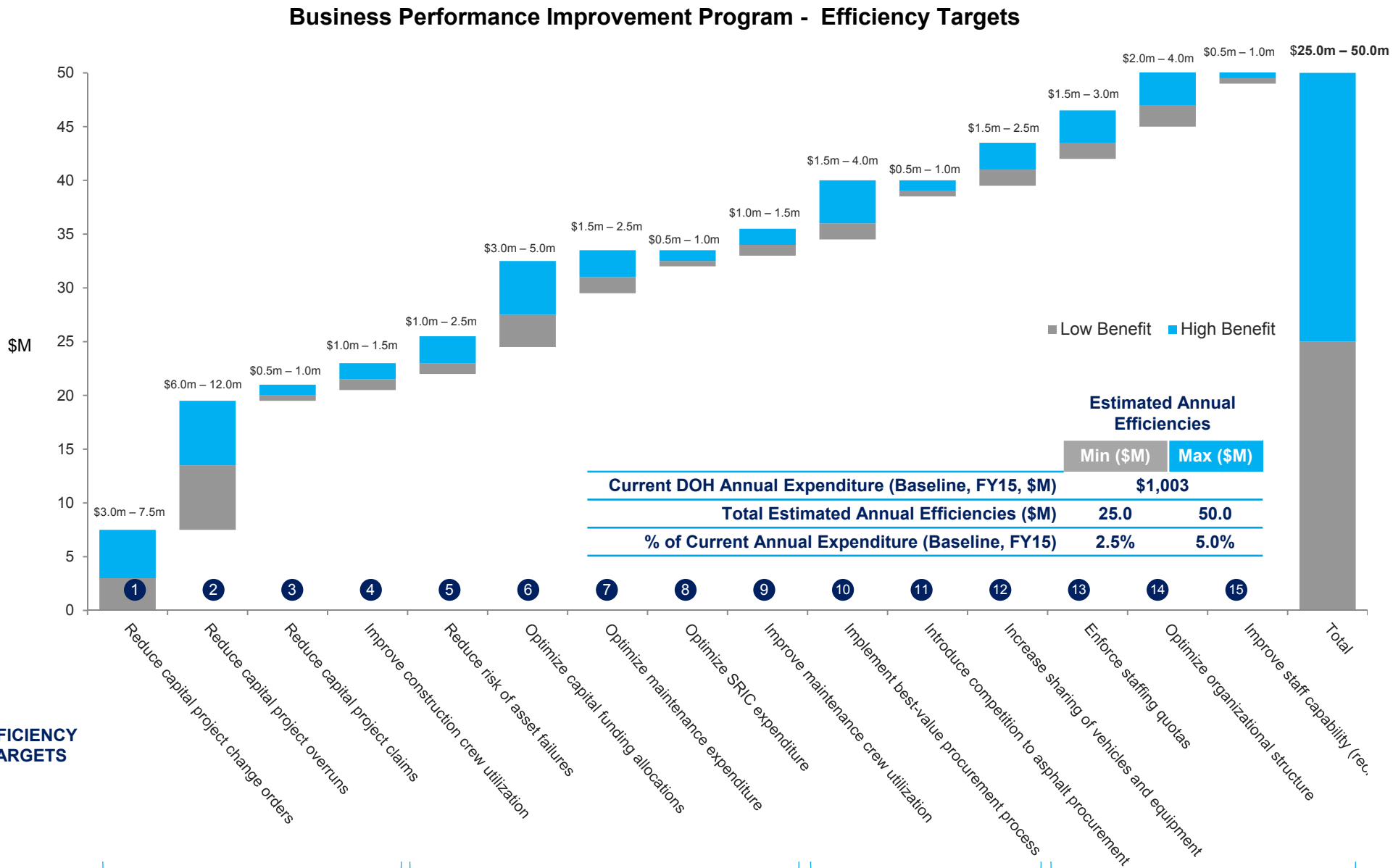
- Potential Coal Synergies may exist by partnering with local coal companies.
- WVDOT generated public involvement early in the project to mitigate potential future public concern
- The contractor's bid on one phase was less than the DOH estimate, resulting in undue risk placed on DOH through the PPP agreement.

We recommend that the DOH create a Joint Steering Committee to drive the implementation of the Business Performance Improvement Program ("BPIP")

Project Name	Project Description*	Issues Addressed	Efficiency Targets	Ease of Implementation	Estimated Annual Efficiencies	
					Min ($M)	Max ($M)
Project #1 – Project Management Office, Framework & Reporting	• Design and implement a Project Management Office (PMO), including standard methodology and templates for the planning and delivery of capital projects • Design and implement a Capital Projects Executive Reporting Dashboard	• No centralized PMO • No standard organization-wide project management methodology and templates • Limited cost-benefit analysis • No business case template • No performance monitoring tool for capital projects	1 Reduce capital project change orders	Medium	3.0	7.5
			2 Reduce capital project overruns	Difficult	6.0	12.0
			3 Reduce capital project claims	Medium	0.5	1.0
			4 Improve construction crew utilization	Easy	1.0	1.5
Project #2 – Asset Analytics & Funding Optimization	• Analyze asset performance data to determine risk factors • Update funding allocation formula to reflect District specific challenges and asset criticality • Utilize updated funding allocation formula to optimize capital project and maintenance programs • Design and implement funding monitoring processes	• Lack of integrated planning • Funding formula is outdated and not utilized • No formal prioritization process for CORE and STIP plans • Limited monitoring of asset performance and subsequent risk exposure • Risk of ageing and failing infrastructure	5 Reduce risk of asset failures	Difficult	1.0	2.5
			6 Optimize capital funding allocations	Difficult	3.0	5.0
			7 Optimize maintenance expenditure	Difficult	1.5	2.5
			8 Optimize SRIC expenditure	Medium	0.5	1.0
			9 Improve maintenance crew utilization	Easy	1.0	1.5
Project #3 – Sourcing & Procurement	• Update procurement processes to include a best-value approach • Introduce more competition • Increasing sharing of vehicles and equipment	• No best-value process • Lack of competition in procurement of asphalt • Limited sharing of vehicles and equipment	10 Implement best-value procurement process	Difficult	1.5	4.0
			11 Introduce competition to asphalt procurement	Medium	0.5	1.0
			12 Increase sharing of vehicles and equipment	Easy	1.5	2.5
Project #4 – Human Capital Improvement	• Organizational structure review • Improve HR processes • Enhance staff performance management framework	• Staffing quotas not enforced • HR processes not effective • Flaws in staff performance management framework • Asset base is growing	13 Enforce staffing quotas	Difficult	1.5	3.0
			14 Optimize organizational structure	Difficult	2.0	4.0
			15 Improve staff capability & performance	Medium	0.5	1.0
			Current DOH Annual Expenditure (Baseline, FY15, $M)		**$1,003**	
			Total Estimated Annual Efficiencies ($M)		**25.0**	**50.0**
			% of Current Annual Expenditure (Baseline, FY15)		**2.5%**	**5.0%**

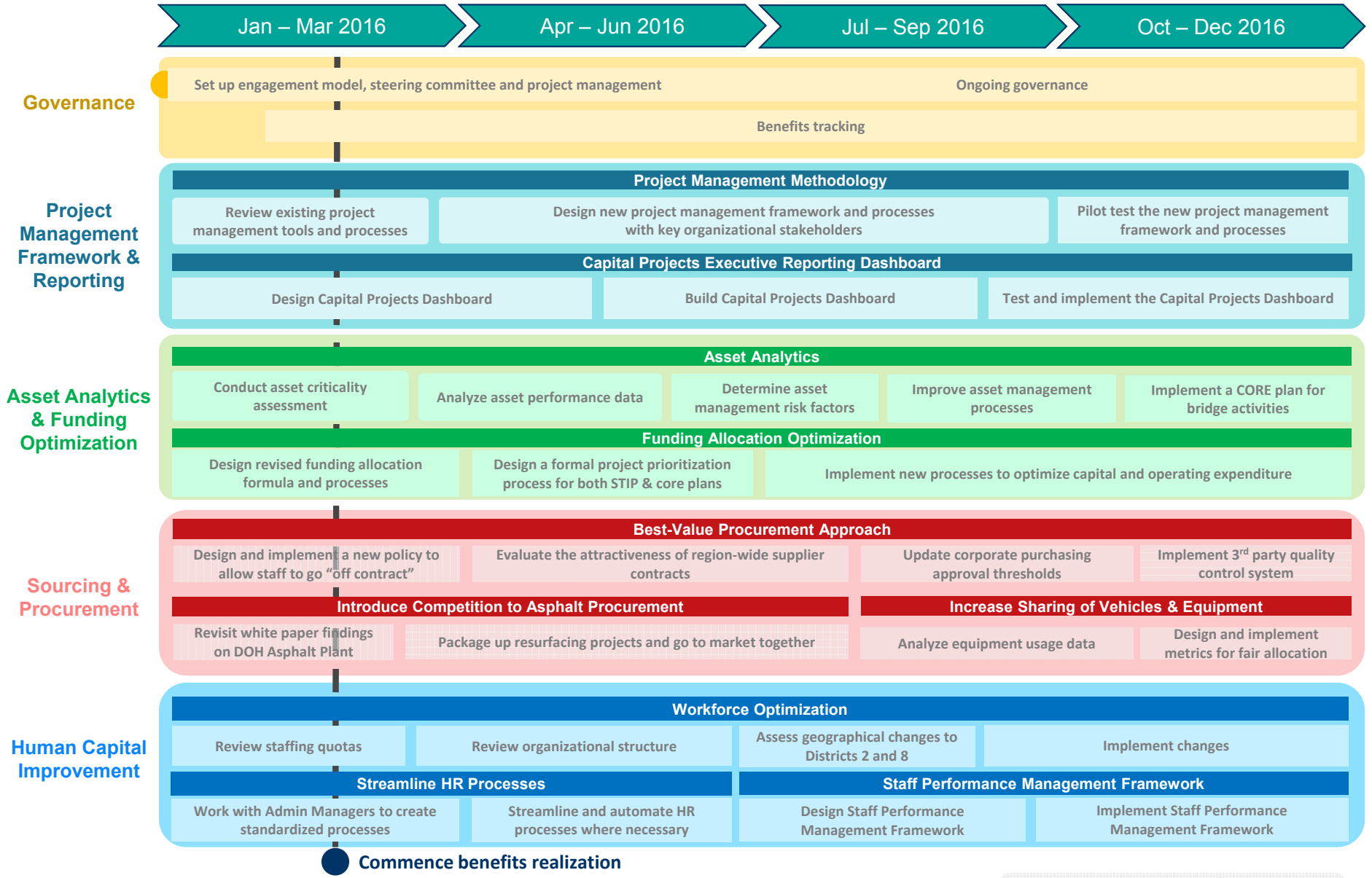
(*) Note: It is assumed that DOH will confirm the availability the proposed sponsors, project managers, and team members for each of the projects. Please refer to the project charters in Section 4, Business Performance Improvement Program of this Report for recommendations for proposed sponsors, project managers and team members.

$25M - $50M in annual efficiency savings have been identified and could be achieved by implementing the 4 proposed business improvement projects



Indicative 1-Year Implementation Timeline

It is recommended that DOH undertake five (5) key workstreams to further validate recommendations and subsequently implement activities to move towards the achievement of the savings estimates



2 Performance Audit Analysis

Funding

Supporting Analysis & Findings:

Verify the extent to which the West Virginia Division of Highways employs an effective and efficient strategy to fund maintenance activities, construction projects, and daily operating requirements.

Maintenance budgets are based on historical allocations rather than any agreed formula and are not based on road miles

Funding

Conflicting Allocation Methodologies

AOP Sect. V, Ch. 4

- "Computer model" was comprised of a series of complex formulas designed to enable the equitable distribution of routine maintenance funds.
- Allocations include Counties, Expressways, District sign shops, District bridge departments, and Traffic engineering Division.
- County organizations were typically 80% of total allocation.
- Allocations based on certain percentage factors for each bucket that are not defined.

2012 Funding Allocation Analysis

- Allocations take into account Counties, Expressways, and District sign shops.
- Analysis and distribution method includes a series of interconnected funding and quota spreadsheets.

Routine Maintenance Funding Allocation Process Issues

Key Findings

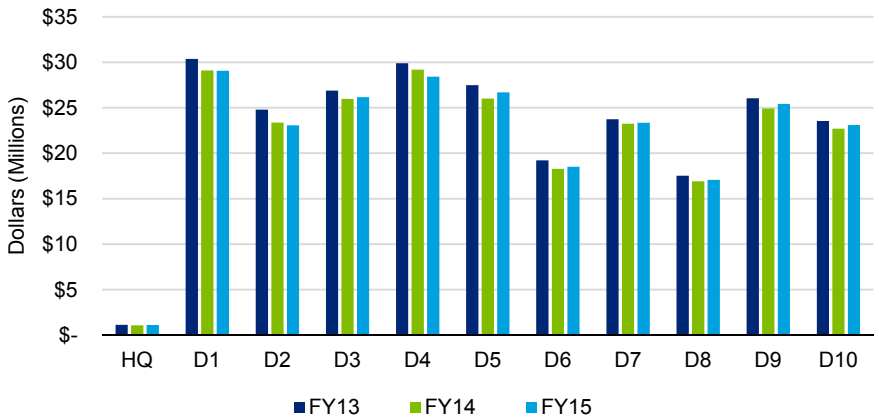
- Allocations are not specifically based on road-miles (see table below). However, this is the perception that the majority of the Districts hold.
- DOH Administrative Operating Procedures (AOP) Section V, Chapter 4, says that a computer model is used to allocate routine maintenance funds between Districts. This was written in 1989 and republished in 2000.
- Senior management conveyed that an analysis was performed in 2012 that does not specifically align with what is described in the AOP.
- No further analysis has been performed since 2012. A 2.2% inflation factor was applied for FY 2016-2018 projections.
- Allocations of routine maintenance funding to Districts are not reflective of local challenges that are being experienced e.g. local environment and industries.

Recommendation

- Create a fair framework to allocate, track, monitor, and distribute routine maintenance funds to each of the Districts and County Organizations. Metrics for the allocation process should be transparent.

District Allocations

Routine Maintenance Allocation Budget by District for FY's 2013, 2014, and 2015.



Data based on the Central Office Programing and Budget Divisions
Source: Ryland Musick, WV DOH Programming Division Director

Road Miles vs. FY13-15 District Funding

Total Road Miles Versus Average Routine Maintenance Allocation by District. Overall road miles to not directly correspond to total allocated budget per District.

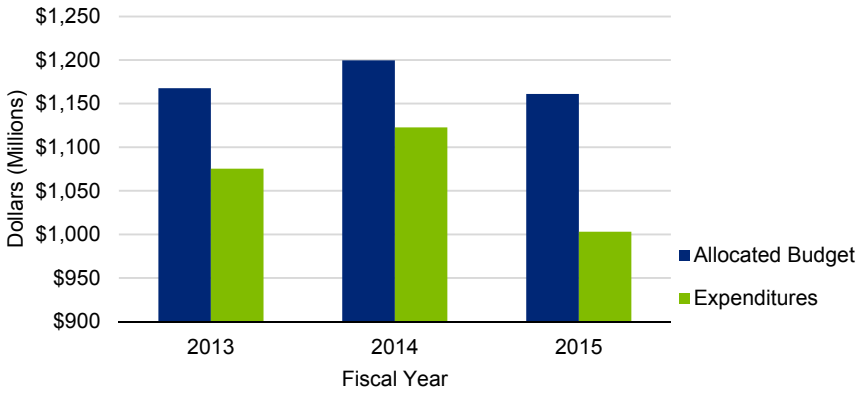
District	Road Miles	Rank	FY13-15 Avg	Rank
1	3,966	3	$ 29,513,580.83	1
2	3,345	7	$ 23,743,435.94	6
3	4,624	2	$ 26,343,269.43	4
4	4,844	1	$ 29,168,133.97	2
5	3,507	5	$ 26,728,871.43	3
6	2,398	10	$ 18,668,755.53	9
7	3,877	4	$ 23,442,173.74	7
8	2,558	9	$ 17,173,007.08	10
9	3,424	6	$ 25,466,131.70	5
10	3,266	8	$ 23,110,708.06	8

Over the past 3 fiscal years, state wide DOH expenditures were not exhausted and less than the allocated annual budget

Funding

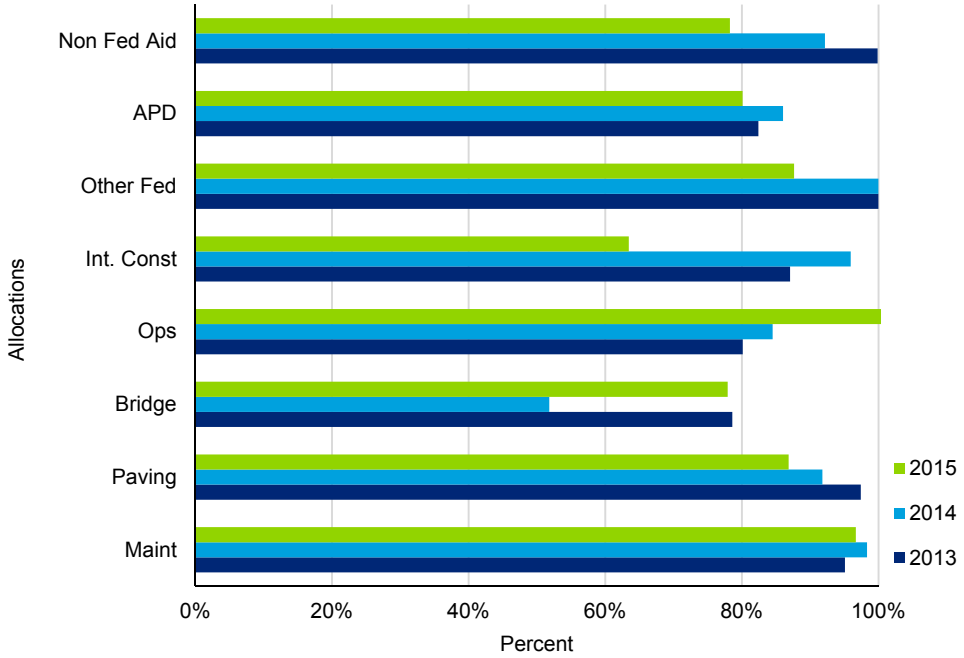
DOH Budget vs. Expenditures

DOH Overall Budget Versus Expenditures for FY's 2013, 2014, and 2015 – DOH Underspent for all three years.



DOH Major Expenditures (%)

DOH Expenditures for Major Allocation Groupings During FY's 2013, 2014, and 2015.



Data based on the Central Office Programing and Budget Divisions
Source: Ryland Musick, DOH Programming Division Director

Expenditures Less Than Allocations

Key Findings

- Data submitted from DOH shows total expenditures were less than allocations over past three fiscal years (8% in 2013, 6.4% in 2014, and 13.6% in 2015).
- Constant fluidity of STIP forecasting due to project schedule changes creates funding projection challenges.
- Contract administration and project programming can often bottleneck the tendering process and potentially delay anticipated project milestones and expenditures.
- No official cost management reporting system in place for monitoring routine maintenance funding allocations to the Districts.

Recommendation

- Identify sources of unused funds at periodic time intervals and determine if reallocation will create more efficiency.
- Promote federal funding programs to ensure all funding sources are being realized.
- Consider revising allocations that are misleading including Federal Stimulus.
- Identify a tangible path to display funding from a revenue source to time and location of expenditure.
- Identify inefficiencies within the contract administration and program management process to mitigate the potential for the delay of earmarked funds during the bid procurement process.
- Improve cost management process and implement reporting system.

There are no major repercussions for Districts that exceed maintenance budget and conversely no incentives to be under-budget or drive efficiency

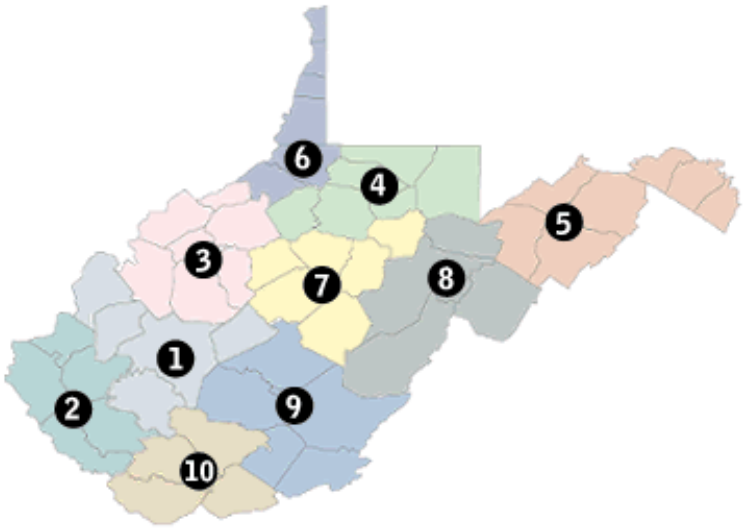
Funding

Annual Plan Maintenance % Over/Under Budget

DOH Routine Maintenance Over/Under Budget for FY's 2013, 2014, and 2015. Data indicates that the Districts have mostly been over budget in recent years.

	FY13	FY14	FY15
HQ	-8%	-9%	-6%
D1	6%	-6%	-8%
D2	8%	-1%	-7%
D3	-3%	-6%	-14%
D4	-1%	-4%	-11%
D5	-2%	-2%	-4%
D6	-7%	-12%	-11%
D7	-1%	-5%	-6%
D8	-2%	-4%	-7%
D9	3%	-3%	-6%
D10	-1%	0%	-1%

Data based on the Central Office Programing and Budget Divisions
Source: Ryland Musick, DOH Programming Division Director



Monitoring Federal Funding

Key Findings

- SOP is to reallocate surplus funding for construction projects to the State Road Fund.
- Surplus routine maintenance funding can be requested to remain at the District level and reallocated.
- No repercussion for Organizations being over budget, and conversely no real incentive to be under budget.

Recommendation

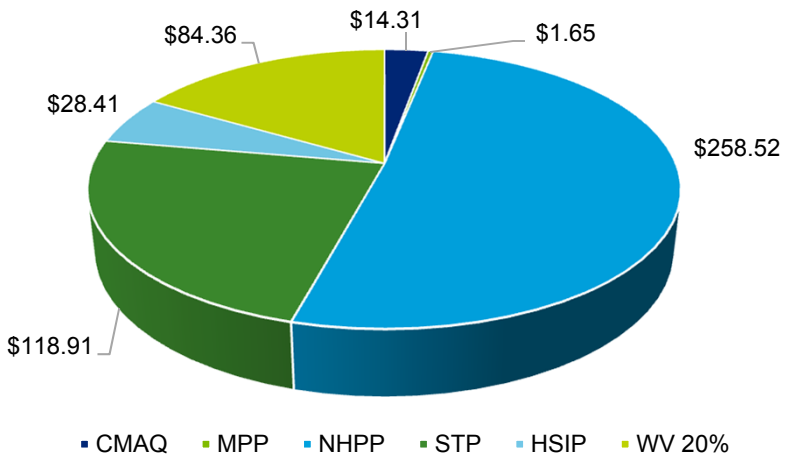
- Revise SOP to allow Districts to automatically maintain surplus funding. Consider allowing Districts to retain a small portion of surplus funding on construction projects and routine maintenance allocations in their location.
- This will also challenge the Districts to adhere to and finish within their allocated budgets.
- Implement and improve reporting to allow HQ and Districts more visibility and allow for more robust maintenance planning.

DOH does not employ an organization-wide tracking mechanism to monitor the management of Federal program funding or the balance of funds from inactive projects

Funding

2015 Federal Funding (Millions)

DOH Federal Funding Breakdown - See Below Table for Acronym References.



Acronym	Federal Core Program Description
CMAQ	Congestion Mitigation and Air Quality Improvement Program
MPP	Metropolitan Planning Program
NHPP	National Highway Performance Program
STP	Surface Transportation Program
HSIP	Highway Safety Improvement Program
WV 20%	West Virginia 20% Match on All Federal Funding

Funding Surplus on Inactive Projects

Key Findings

- FHWA guidelines implement a 2% maximum surplus on inactive projects.
- No process exists to monitor state surplus funding on inactive projects, however Regional Program Managers are monitoring this information.
- The lack of an official monitoring process increases risk for potential loss.

Recommendation

- Match state funded projects to federal funded projects and allow a 2% maximum funding balance on inactive projects to promote consistency among the state.
- Implement a specific review process for Program managers to periodically monitor surplus funding on inactive projects.

Federal Program Funding

Key Findings

- W10A form can be generated to show status of various programmed funds, however this is not a implemented process.
- STIP is difficult to predict as projects are constantly shifting.
- STIP constantly requires adjustments to account for project milestone changes and funding reallocations.

Recommendation

- Implement a process to monitor all federal funding programs in terms of percent used, percent remaining, and expiration date. Better usage of the W10A report would be beneficial.
- Require STIP be reviewed at consistent intervals of time.

Maintenance, Reconstruction & Construction

Supporting Analysis & Findings:

Assess the effectiveness and efficiency of the West Virginia Division of Highways' maintenance, construction and reconstruction of roads, bridges and other system assets.

The MC&R funding allocation process should consider other operational metrics to address underspend

Maintenance & Construction

Allocations are Not Properly Assessed

Key Findings

- The funding model in the 1989 Administrative Operating Procedure and the budgeting effort completed in conjunction with a 2012 Quota Assessment do not consider many relevant operational metrics when determining funding allocations.

Recommendation

- Revisit the basis for determining how different organizations are allocated their funding.
- Additional metrics to be considered include but are not limited to: Annual Average Daily Traffic, Total square feet of bridge deck that is under a posted weight restriction, roughness index of paved roadway.

% Underspend and $ Remaining at FY End

The following table shows the % remaining of initial allocation by activity code area and the corresponding funds left over each fiscal year.

Activity	% Remaining			Allocation Remaining		
	2013	2014	2015	2013	2014	2015
237 - Maintenance	5%	2%	3%	$ 17,421,962	$ 5,948,865	$ 11,789,725
272 - Contract Paving	3%	8%	13%	$ 1,663,261	$ 4,924,327	$ 9,202,138
273 - Bridge	21%	48%	22%	$ 6,420,607	$ 19,274,511	$ 8,165,647
277 - General Ops	20%	15%	-1%	$ 10,932,871	$ 8,647,949	$ -592,175
278 - Interstate Construction	13%	4%	37%	$ 15,530,529	$ 6,164,011	$ 43,864,960
279 - Other Federal Aid	0%	0%	12%	$ 40,956	$ 75,378	$ 45,829,700
280 - AHDS	18%	14%	20%	$ 19,339,304	$ 12,584,558	$ 15,914,389
281 - Non-Federal Aid Construction	0%	8%	22%	$ 24,103	$ 1,412,904	$ 3,696,440

Table shown is derived from data supplied by the Central Office Programing and Budget Divisions

Revisit Funding Levels Annually

Key Findings

- Funding allocations were last assessed in 2012. While staffing quotas are adjusted more frequently.
- Funding inflation increases begin in FY 2016 and is 2.2%.
- Limited adjustments were made to the base funding levels for districts. If any adjustments were made, it was typically to the downside.

Recommendation

- Begin revising the annual allocations on an annual basis.
- Continue providing an inflation increase in funding, but tie it to inflation indexes.

Annual Allocation By District

The following graph shows funding allocation amounts, in millions, for each district by fiscal year.

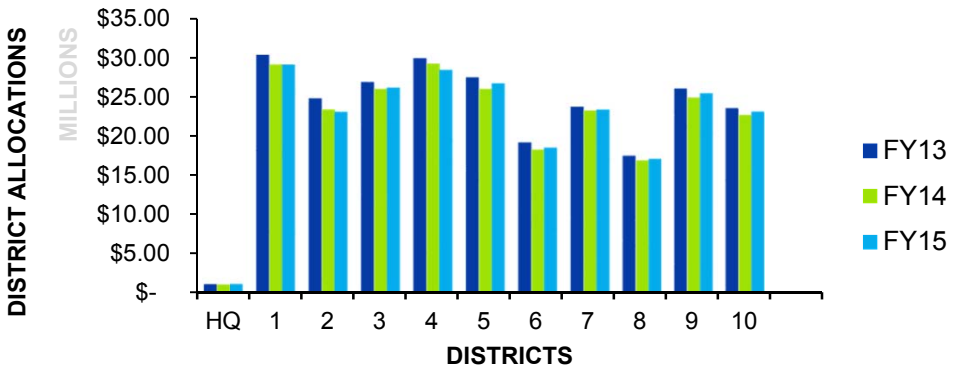


Chart shown is derived from data supplied by the Central Office Programing and Budget Divisions

Snow Removal and Ice Control ("SRIC") funding is unpredictable and impacts on the ability to conduct general maintenance

Maintenance & Construction

Annual SRIC Budget Overruns

Key Findings

- Districts were 11% over budget on SRIC activities during FY 13-15.
- Discounting the mild winter of 2013, Districts were 19% over budget FY 14-15.
- A 15% contingency would represent the mean between these two averages for SRIC over run.

Recommendation

- Have the state allocate funding for SRIC with enough funds remaining to fund a 15% contingency.

Failure to Use All Data Available to Budget

Key Findings

- Currently SRIC funding levels for each district are not evaluated by a formula when the allocation is annually revisited.
- Weather data is available from multiple sources and provides insight into which areas and organization groupings with-in DOH historically need more funding for SRIC activities.

Recommendation

- In addition to road miles and dump trucks, SRIC funding should consider historical weather patterns and historical material usage during SRIC activities
- SRIC funding levels remaining can be computed and reviewed frequently. Allocations can be revised more frequently on an ongoing basis.

% Over or Under SRIC Budget By District By FY

The following graph shows the % over or under run by district, on the SRIC budget line in addition to the average % overrun for.

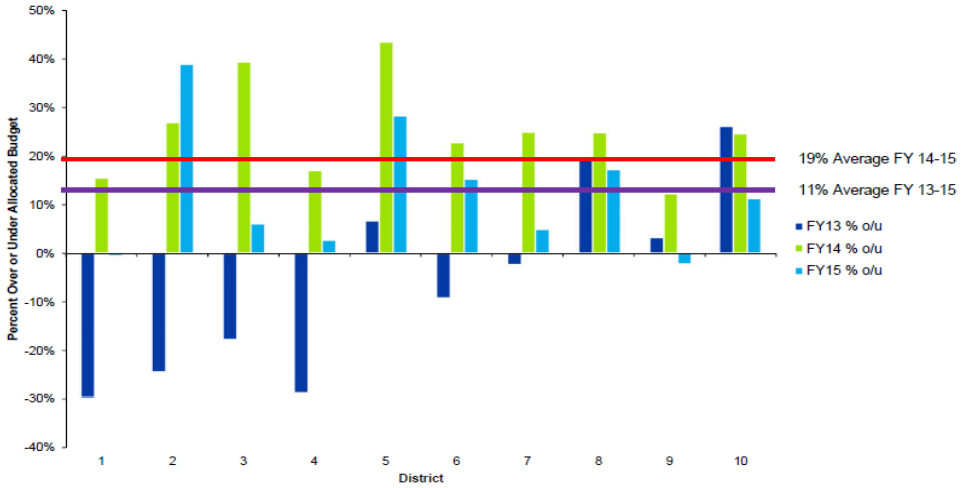


Chart shown is derived from data supplied by the Central Office Programing and Budget Divisions

Impacts of SRIC on Annual Maintenance Plans

Key Findings

- District Managers plan to use less funding than planned during the first half of the fiscal year in order to go into SRIC season with a contingency amount.
- Districts will be required to balance out any overages during SRIC season with funds from other maintenance activities unless the state steps in and provides assistance.

Recommendation

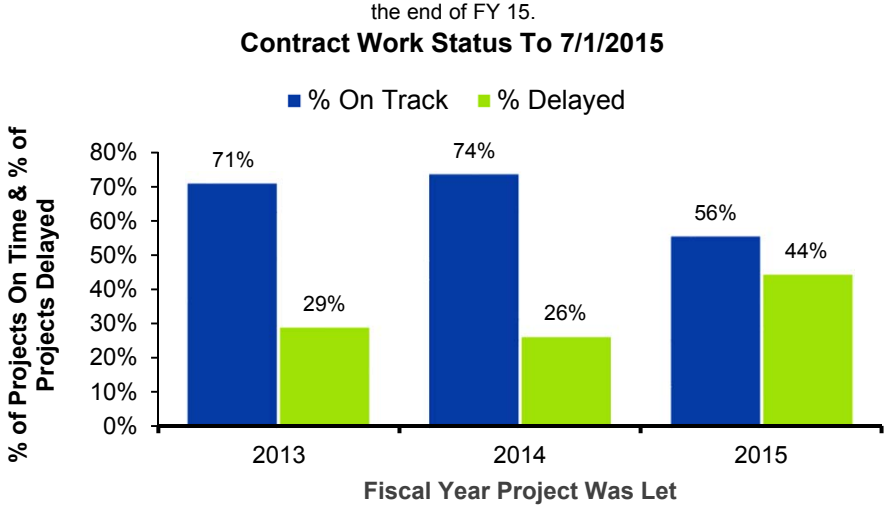
- Consider removing SRIC from the general maintenance allocation funds and create a specific funding pool at the state level.

Outsourced construction projects are often delayed and Maintenance CORE Plan progress is not updated regularly

Maintenance & Construction

Outsourced Construction Projects

This graph shows what percentage of projects let in FY 13 -15 are on track or delayed as of the end of FY 15.



Data Provided by Headquarters Construction Department in Spreadsheet "ITEM 1.xlsx "

Outsourced Construction Projects

Key Findings

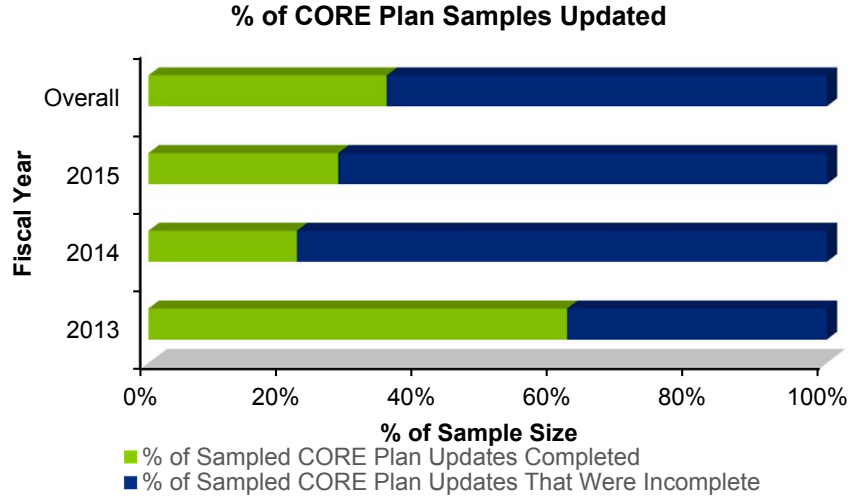
- Headquarters personnel stated a goal of having 88% on-time project schedule compliance.
- Average for three year timeframe was 67% on-time project schedule performance.

Recommendation

- Improve initial construction schedule development by studying common project activities and benchmarking the rates of production achieved.
- Add an early warning reporting system to issue notifications should projects begin to slip from established schedules.
- Schedule performance index should be considered as a part of the key performance index reporting effort.

Maintenance CORE Plans Updates

This graph shows what percentage of the sampled CORE plan updates, by fiscal year, were determined to be completed or incomplete by reviewer.



Data Provided by District Offices and Forwarded by Director of Maintenance Division

Maintenance CORE Plan Updates

Key Findings

- Analysis of a sampling of submitted CORE plan updates showed that an average of 35% of updates were completed (defined as 50% of fields per sheet have a value inputted).
- Two Districts were unable to provide their CORE plan updates upon request.

Recommendation

- Require 100% CORE plan updates to be submitted into OASIS or another progress tracking software on a regular basis.
- Run regular report on system-wide basis which will incorporate the CORE data submitted into a usable progress report.

DOH does not employ a technology based solution to measure project performance for tracking or planning purposes

Maintenance & Construction

Dashboards Provide Performance Insights

Key Findings

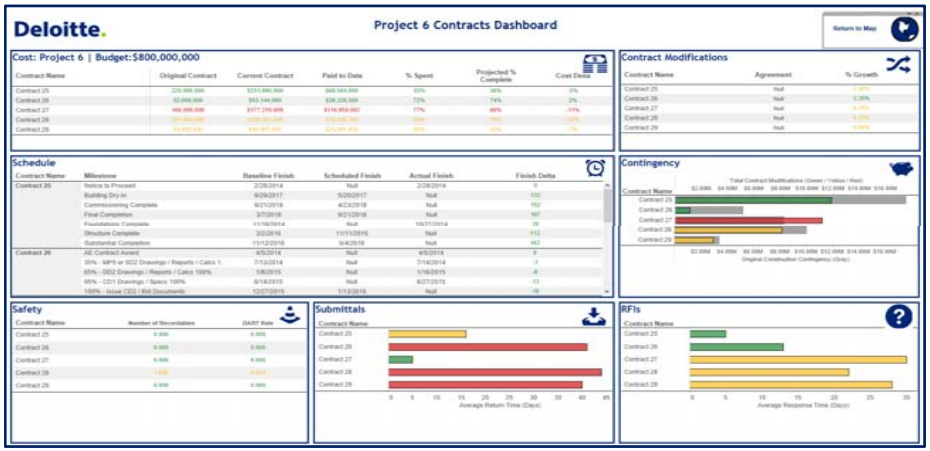
- Operational data capture is a focus of the new OASIS system set to be implemented.
- The Dashboard will compile data collected through Agile Assets, OASIS, Site Manager, and other databases.
- Dashboards are design for both internal decision makers and the general public.
- Management does not have a single platform to use when evaluating the current operating status of the DOH.
- OASIS is designed to bring together many different data sets and run insightful reports.
- Employees feel like the training for OASIS and it's subsystems has been inadequate which may lead to less data being inputted.
- West Virginian resident stakeholders currently do not have an easy way to see into the organization and learn about and monitor the DOH's performance.
- A GIS based snow plow tracking platform, already in development, is a good way to show the public how the DOH is successfully performing their SRIC duties.

Recommendation

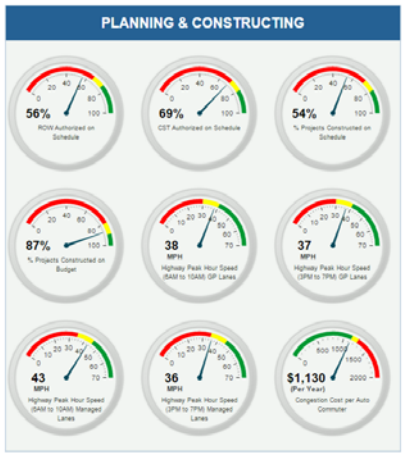
- Create a Dashboard to provide a division wide performance monitoring platform to capture Headquarters and District management sourced data for internal use and the general public to view.

Dashboard Example

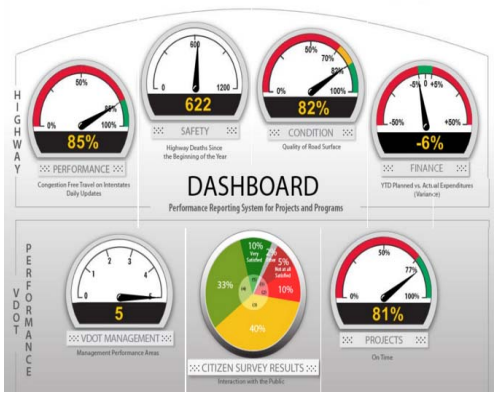
Below are sample interfaces and key performance metrics which should be considered when determining how to develop a dashboard.



- **Commute Delay Time**
- **Accident Data**
- **Construction Costs**
- **Construction Impacts**
- **Environmental costs**
- **AADT**
- **VMT**
- **Traffic Models**



Source: GDOT



Source: VDOT

There is no formal & objective approach to the prioritization of projects, man power, and materials in the STIP or CORE Plans

Maintenance & Construction

Headquarters Project Prioritization

Key Findings

- Currently projects are not objectively prioritized and inserted into the STIP in an order reflecting their relative priority.
- The STIP is also not updated on an annual basis and has been operating on amendments for the last two fiscal years.
- The State managed the STIP even though there have been numerous short term federal transportation bills passed.

Recommendation

- Institute a formal project prioritization process for the STIP plan.
- Establish a uniform methodology that can be distributed to all levels of the DOH.

Previous Use of Developed Project Prioritization Tool

Key Findings

- In 2010, an external consulting firm created a project prioritization tool which generated a prioritization list.
- This tool used some data that DOH was not collecting and is still not collecting.

Recommendation

- Find more ways to utilize prioritization tool created for 2010 TIGER grant application.
- Ensure that OASIS and Agile Assets track relevant roadway statistics for this analysis.

District Prioritization

Key Findings

- CORE plans have published guidelines for how often work should be completed, but no information for how the work should be prioritized amongst similar classifications of infrastructure.
- A District level integrated program schedule for all functional organizations are not created and updated frequently

Recommendation

- Institute formal project prioritization process for all CORE plan activities.
- Include a CORE plan for bridge groups.
- Provide a schedule loaded with cost and resources required to complete in order to most efficiently deploy available forces, equipment, and material.

How to Track and Prioritize Inventory Material

Key Findings

- Inventory is tracked in a mainframe system for district projects and by store keepers.
- Headquarters tracks inventory for construction projects through Site Manager.
- Inventory cannot be entered into the tracking system until a charge shows up onto a bill.
- Inventory controls in OASIS are designed to eliminate the need to keep a manual log of material delivered.
- Store keepers will need extensive computer training when OASIS is implemented.

Recommendation

- Utilize the functions of OASIS to forecast the need for materials used during routine maintenance and systematically maintain those optimal levels.

DOH specifications and environmental permitting activities are not being managed and tracked properly online

Maintenance & Construction

Performance of DOH Specifications

Key Findings

- Current change order management through Site Manager does not track the applicable spec section as a searchable code.
- Details of the change order are incorporated into the summary narrative of the change order.
- Only one Change order has not been approved between FY 13- 15.

Recommendation

- Change orders should be coded by applicable section of spec book to track areas which commonly are cited for a change orders.
- RFIs submitted after the contract is awarded should also be tracked and coded in similar fashion.

Manuals and Guidelines are not Easily Used in the Field

Key Findings

- Currently manuals are not easily accessed through the DOH website.
- Not all manuals are digital text. Some are still scanned versions from early 2000's.
- There are multiple versions of some manuals posted online with several addendums rather than issuing a new version altogether.
- Not all field personnel have access to internet or intranet while on the site.

Recommendation

- Create a central repository for all manuals for DOH and pubic reference.
- Digitize all manuals and guidelines and ensure that field personnel have ways to view and search the specs.
- DOH employees should be trained on how to use and apply all available manuals.

Assignment of Environmental Permitting

Key Findings

- Some district environmental coordinators feel knowledgeable enough to issue more permits than they are allowed to issue for projects by DOH.
- Time and effort levels increase when Headquarters is required to lead the acquisition of certain permits.

Recommendation

- Adjust guidance from Headquarters regarding which permits district personnel can issue to reflect the capabilities of DOH personnel.
- Better define the position of environmental coordinator, and provide a tiered training framework for new hires to complete.
- As tiers of the training are accomplished, the employee should be allowed to issue more permits.

Tracking of Environmental Permitting

Key Findings

- A new database was implemented less than 6 months ago to track pre-construction environmental activities.
- The data from pervious years, kept in an updated word document, is not being uploaded into the database.
- No formal guide states when and how the data inputted should be analyzed.

Recommendation

- Import past data and begin to analyze environmental efforts to identify areas for process improvement and initiate delays.
- Analyze the data being imputed into the new database system for completeness and assess whether or not other fields are required to properly track permitting efforts.

A standard business case template would provide more rigorous project analysis and allow for capital project portfolio optimization

Maintenance & Construction

Adopt FHWA PBES & PCPS Guidelines

Key Findings

- A FHWA study showed that there was a savings, on average, of $2.4 million dollars per bridge that used PBES standards.
- For all bridges in the study, the average savings per liner foot of bridge was $5,020 per linear foot.
- For bridges in the study less than 125 feet in length the overall savings were $0.2 million dollars and averaged $3,400 per linear foot.
- PCPS is a precast pavement system and has an target usable life of 30 years, averaging 15 years after the first repair is required on Superpave mixes.

Recommendation

- DOH should adopt and promote the use of PBES guidelines for all bridge construction to save on cost to deliver projects.
- DOH should investigate the use of PCPS for highway repair & construction projects to increase usable life of new roadways.

Cost-Benefit Analysis Process Needed

Key Findings

- Maintenance projects do not undergo a cost-benefit analysis prior to projects beginning.
- Contract projects are not required to undergo cost benefit analysis.
- FHWA has included the cost-benefit analysis as a key component of the MAP-21 project framework.
- Universities have published papers with detailed formulae and criteria to be included when calculating the full cost-benefit of infrastructure projects.
- There is evidence that other DOTs have incorporated this information into their capital project development processes.

Recommendation

- Implement a standard business case template for projects which are required to go through a formal procurement approval processes.

The Value in Value Engineering

Key Findings

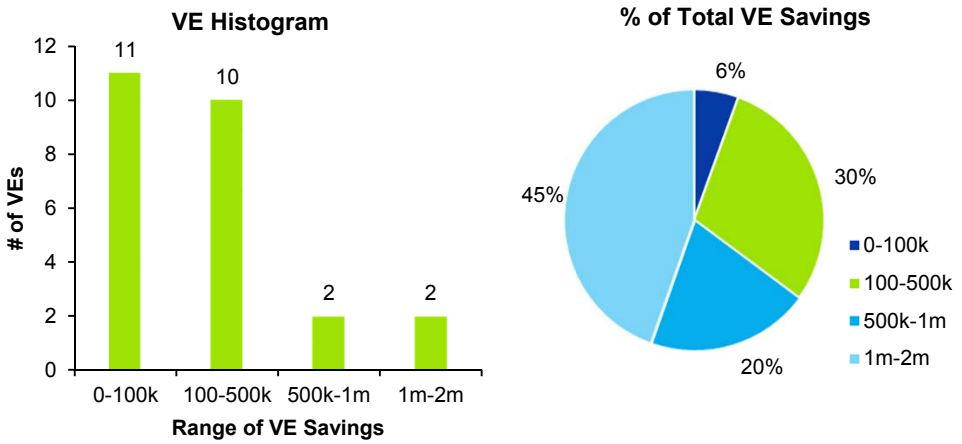
- 25 projects out of 1027 projects contracted between FY 13 -15 implemented a Value Engineering solution. This represents a total of 2% of all projects from FY 13-15.
- Total Savings to the division was $6,433,798.74.
- Benefit analysis is not regularly conducted to show if the proposed savings is outweighed by any future lifecycle costs.

Recommendation

- Reevaluate the Value Engineering process and determine if it can be made more qualitative, transparent, and performed on more projects.

Distribution of Value Engineering Projects

The bar chart below shows the number of Value Engineering Projects by total value of savings realized. The pie chart shows the percentage of total VE savings by the same financial groupings of the bar chart.



Data Provided by Headquarters Construction Department in Spreadsheet "ITEM 2 VE.xlsx"

Vehicles & Equipment

Supporting Analysis & Findings:

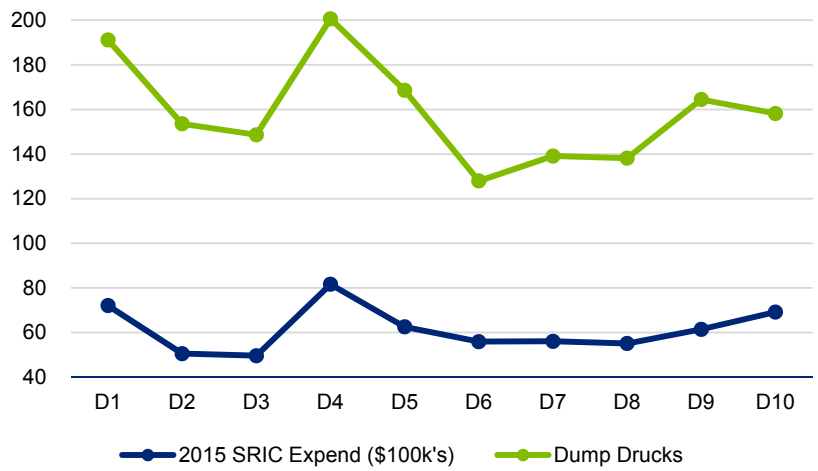
Assess the effectiveness and efficiency of the West Virginia Division of Highways' allocation and use of vehicles and other equipment.

DOH does not employ an official process for the allocation of heavy construction equipment and vehicles and equipment to the Districts

Vehicles & Equipment

2015 SRIC Expenditures vs. No. Dump Trucks

DOH 2015 SRIC Expenditures and Quantity of Dump Trucks Broken Down by District - the graph below shows a correlation between the two.



Data based on the Buckhannon Equipment Division

Heavy Construction Equipment

Key Findings

- Heavy construction equipment such as dozers, excavators, and stinger cranes are allocated evenly across the Districts.
- Routine maintenance equipment is distributed by a combination of historical information and necessity.

Recommendation

- Develop some sort of metric system that can be used to fairly and evenly distribute construction equipment across the Organizations. Metrics for allocation could include budget, road-miles, historical information, and necessity.
- Promote sharing of pooled equipment between the Districts.

Passenger Vehicles and Pickups

Key Findings

- Passenger vehicles and pickup trucks are allocated by need and quota.
- Excess vehicles and pickups are left in “pooling” mode in lieu of idle to reduce internal charge out rates.
- Utilization rates on passenger vehicles and pickups meet DOH requirements although there is an anecdotal perception of high idle percentages.
- Utilization reports not being utilized effectively.

Recommendation

- Promote sharing of pooled vehicles and equipment between the Districts.
- Maintain allocation process based on historical information and necessity until further metrics are developed.
- Implement process for equipment reallocation based on utilization reports.

Vehicles & Equipment vs. FY15 District Funding

DOH Routine Maintenance Allocation Versus Overall Quantity of Equipment per District.

District	FY15 Budget (Million $’s)	Rank	No. of Equip & Vehicles	Rank
1	$ 29.07	1	648	1
2	$ 23.07	8	514	6
3	$ 26.16	4	570	5
4	$ 28.41	2	629	2
5	$ 26.70	3	603	3
6	$ 18.51	9	446	10
7	$ 23.36	6	509	7
8	$ 17.07	10	489	8
9	$ 25.43	5	577	4
10	$ 23.10	7	467	9

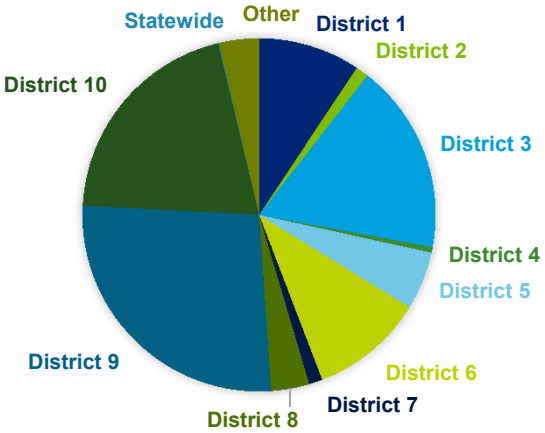
Data based on the Buckhannon Equipment Division and Maintenance Division

It is difficult to monitor rental equipment utilization and some specific equipment types have excessively high rental rates

Vehicles & Equipment

FY15 DOH Rental Costs by Location

DOH Approximate Rental Equipment Costs by District During FY 2015.



Location	Total Rental Costs
District 1	$ 136,108
District 2	$ 17,320
District 3	$ 253,763
District 4	$ 7,280
District 5	$ 77,660
District 6	$ 151,775
District 7	$ 17,900
District 8	$ 50,950
District 9	$ 392,640
District 10	$ 297,879
Statewide	$ 1,233
Other	$ 53,064
Grand Total	**$ 1,457,571**

Data based on the Maintenance Division, Rental Costs are Approximate

Rental Equipment Monitoring

Key Findings

- The comprehensive equipment utilization report does not display rental information.
- Districts have ability to run report for singular pieces of rental equipment only.
- Headquarters began tracking rental equipment in 2015.

Recommendation

- Allow the comprehensive equipment utilization report to display rental information (OASIS may do this).
- Maintain more accurate records of rental costs and lengths for the Districts.
- Leverage utilization reports to drive greater efficiency.

Equipment with High Rental Rates

Key Findings

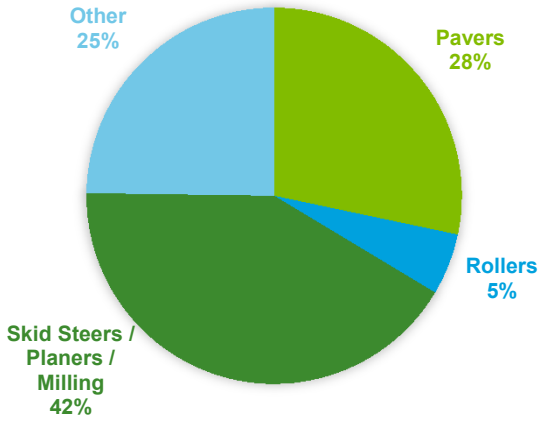
- Specific pieces of equipment display significantly exceed DOH policy and rental trends based on 2015 data, assuming data projects into future.

Recommendation

- Consider purchasing types of rental equipment with repetitious rental trends. Future monitoring recommended in future years as data began being collected in 2015.
- Implement cost benefit analysis for rental versus purchase decision.

FY15 DOH Rental Costs by Equipment Type

DOH Largest Approximate Rental Cost by Equipment During FY 2015.



Equipment	Rental Cost
Pavers	$ 412,600
Rollers	$ 77,074
Skid Steers / Planers / Milling	$ 606,775
Other	$ 361,122
Grand Total	**$ 1,457,571**

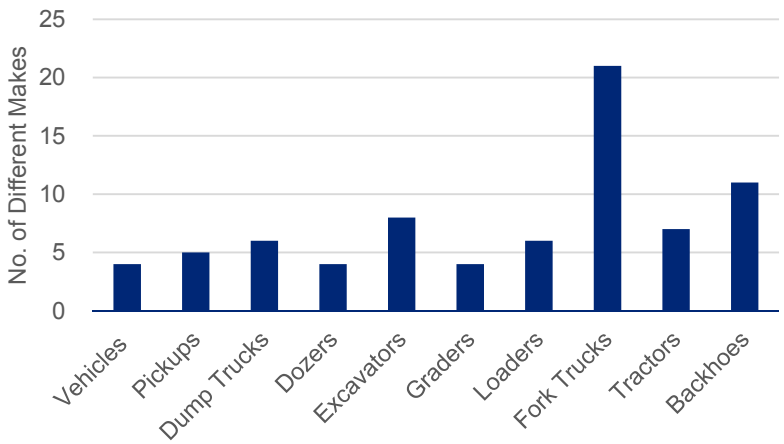
Data based on the Maintenance Division, Rental Costs are Approximate

Limited analysis performed during the procurement process regarding best value versus low bid

Vehicles & Equipment

No. of Makes of Equipment

DOH Equipment Variability by Equipment Type.



Data based on the Buckhannon Equipment Division

Different Makes of Similar Equipment

Key Findings

- Many different makes and models of similar types of equipment exist in the fleet.
- This is due to procurement process utilizing a low-bid methodology and not considering economies of scale.

Recommendation

- Consider implementing a best-value methodology within the equipment procurement process.
- Reducing the makes of different equipment can reduce maintenance inventory and increase repair efficiency.

Consistent Procurement Process

Key Findings

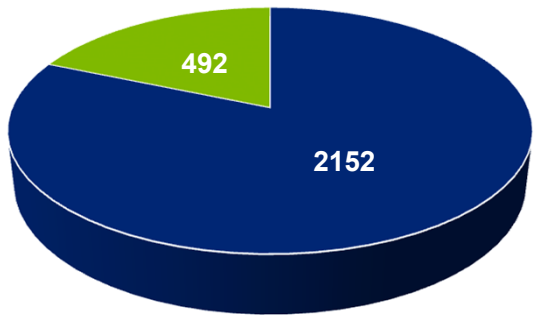
- Vehicles that are one ton or less can be specifically procured through the Equipment Division in Buckhannon or leased through Fleet Management at Headquarters.
- Similarly, disposal of vehicles is dictated by how the vehicle was procured (FM or Buckhannon).
- Replacement metrics are 100k miles and 4 years of age.
- No cost-benefit analysis to determine purchasing vehicles through Buckhannon versus leasing through Fleet Management.

Recommendation

- Determine more consistency with leasing vehicles through Fleet Management or procuring through Buckhannon.

No. of Vehicles (under 1 ton) Procurement

Equipment in DOH - Agency Owned Versus Fleet Management Leases. Majority of DOH equipment is agency owned.



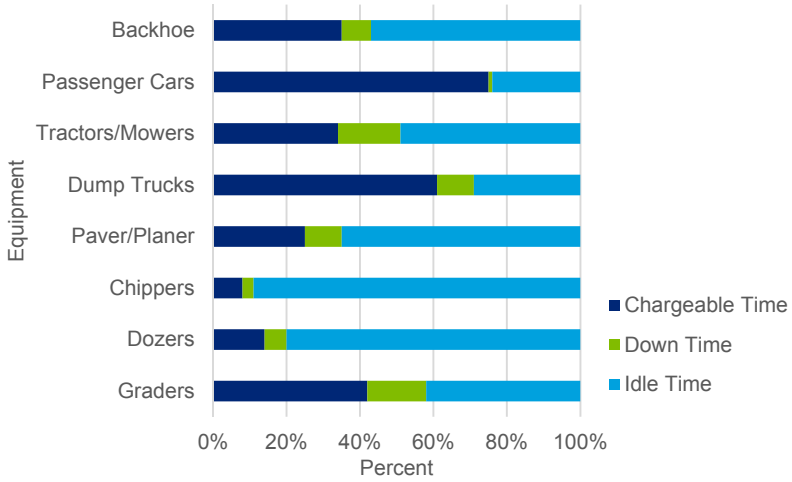
Data based on Information from Fleet Management

Usage data shows high idle time for many equipment types and statewide parts purchasing contracts can lead to long down times

Vehicles & Equipment

YTD Breakdown of Equipment Hours

DOH Idle, Down, and Utilized Equipment Hours for FY 2015 for Major Equipment.



Data based on the Buckhannon Equipment Division

Equipment Idle Time

Key Findings

- Equipment Utilization Report displays idle, down, and chargeable time for all DOH owned equipment.
- Moderate to extreme idle and down hours can be seen for certain equipment.
- Seasonal equipment and under-quota District staffing increase levels of idle time.
- Pavers possess high idle rates while also accounting for 25% of rental costs.

Recommendation

- Consider renting non-seasonal equipment that currently display high levels of idle time including at a minimum, dozers and chippers.
- Examine why pavers have high idle rates while also accounting for 25% of rental costs.
- Reduce idle rates and reallocate equipment accordingly.
- Improve equipment reporting to better monitor idle time.

Consider Outsourcing Maintenance of Fleet Vehicles

Key Findings

- Preventative maintenance for fleet vehicles (passenger vehicles) is handled internally by DOH employees.
- Information received through District interviews conveyed that outsourcing preventative maintenance on vehicles could be beneficial and cost effective.

Recommendation

- Consider service orders for preventative maintenance care of vehicles.
- Outsourcing could be in conjunction with regionalizing procurement of new vehicles.
- Implement a cost-benefit analysis to determine validity of outsourcing preventative maintenance.

Equipment Part Statewide Orders

Key Findings

- Low-bid statewide contracts for equipment parts are inefficient as location of vendor is not always convenient to District locations.
- Materials can often be obtained faster and cheaper at more local establishments to the Districts to avoid unnecessary lead times.

Recommendation

- Consider revising SOP to allow regionalizing equipment part purchase orders to the District locations.
- Obtain District input for which vendors may be best to choose.

Procurement

Supporting Analysis & Findings:

Determine the extent the Division of Highways uses sound procurement practices.

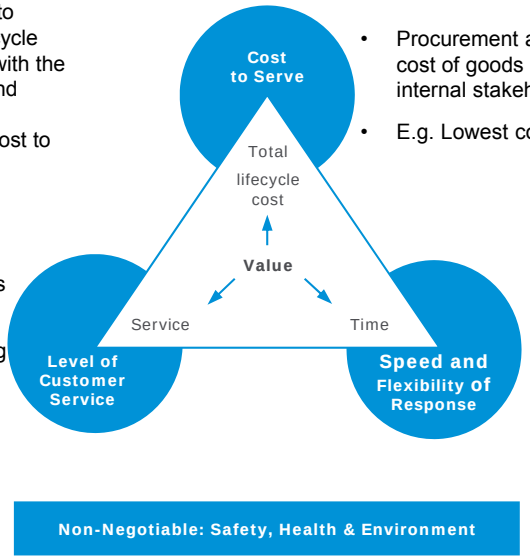
Statewide supplier and other types of procurement contracts may not be providing the best value for money to the DOH

Procurement

Typical Objectives of a Procurement Function

The DOH's procurement function should strive to minimize total lifecycle cost without jeopardizing service levels or time requirements.

- The DOH should aim to compare the total lifecycle cost of all purchases with the corresponding level and speed of service to understand the true 'cost to serve'



- Procurement aims to minimise the total cost of goods and services based on internal stakeholder requirements
- E.g. Lowest cost sourcing of materials

- Procurement aims to provide high quality Procurement Services
- E.g. Contract Structuring, Tendering Advice, Probity Compliance Advice, Contract Negotiation and Strategic Sourcing services to internal stakeholders

- Procurement aims to provide maximum speed of service and response to internal stakeholder requirements
- E.g. Fast vendor set up and preferred status approval, quick requisitioning, ordering and payment processing

Unnecessary Lead Times

Key Findings

- Departments at the District level, equipment specifically, have experienced excessive lead times waiting for maintenance parts.

Recommendation

- Consider the "best-value" of purchase order contracts for the DOH by analyzing factors other than just pricing.
- Regionalize purchase order to ensure that the Districts are able to obtain necessary materials in a reasonable timeframe. This will allow for better planning and timely maintenance.

Off-Contract Vendors

Key Findings

- Districts are able to obtain certain materials cheaper and faster from a local vendor who may not participate in the state-wide contracts.

Recommendation

- Recommendation to streamline the vendor procurement process should be in compliance with the West Virginia Purchasing Regulations.
- Begin tracking cost data for situations where going off contract is valid, including off-contract price versus statewide contract price.

PPP Payment Schedules

Key Findings

- The DOH has successfully used PPP contracts to help fund projects that would otherwise lack funding to proceed.
- The agreements are typically set up such that the Contractor is responsible for gap financing the project above a set monthly payment agreed to with the DOH.
- The monthly payment is based on the DOH estimate.
- In situation where the Contractor's bid is below the DOH estimate, the Contractor is still paid based on the higher monthly rate. This means that their paid-to-date will most likely exceed their earned value, which exposes the DOH to a large number of risks, such as declining performance and increasing change orders.

Recommendation

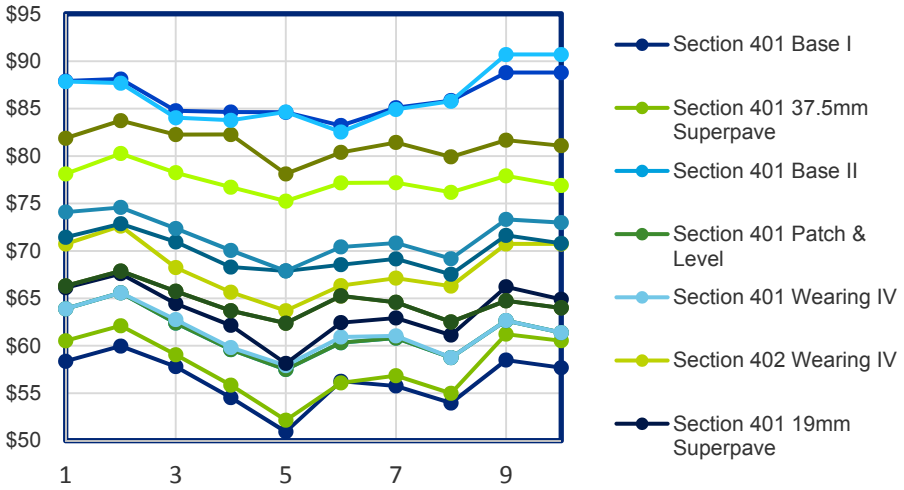
- Change the policy such that the monthly payment is based on the lesser of the DOH estimate or the Contractor's actual contract value. Align payments with performance.
- The DOH may want to increase controls on contracts currently utilizing a PPP to mitigate these risks.

Average asphalt pricing displays variability within state; comparable to regional pricing of neighboring states

Procurement

Average PO Laydown Asphalt Pricing per District for 2015

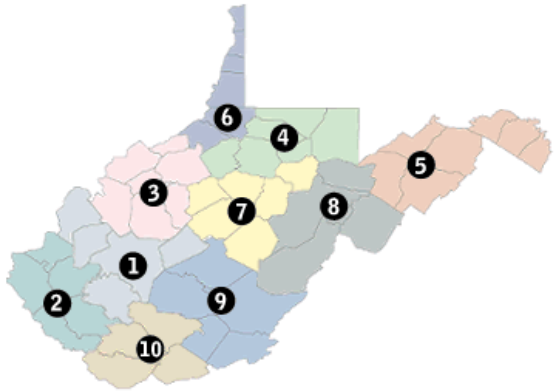
Average Asphalt Pricing From DOH by District for Various Mixes



Source: http://www.transportation.wv.gov/highways/maintenance/Pages/POContractAsphaltPrices.aspx

Average Asphalt Pricing by District per RS Means 2015

Average Asphalt Costs Per RS Means For All District Locations in WV – Higher Costs on NW Side of State



District	Avg Price
1	$ 84.62
2	$ 87.87
3	$ 82.46
4	$ 86.78
5	$ 83.63
6	$ 85.14
7	$ 84.74
8*	N/A
9	$ 81.62
10	$ 80.54

**District 8 location not available within RS Means database*

Asphalt Procurement

Key Findings

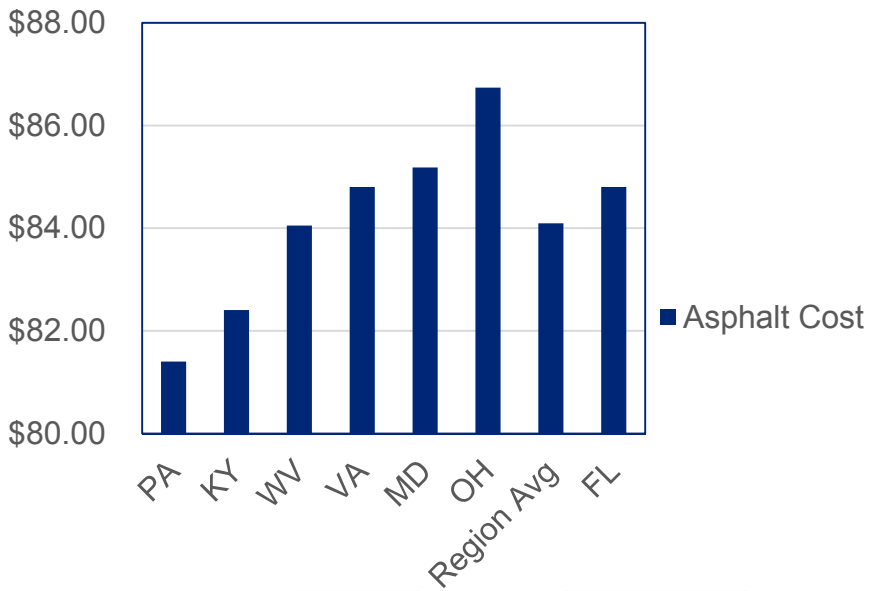
- Asphalt from pricing across the state various due to several factors including proximity to plant locations, existing terrain conditions, and vicinity to aggregate quarries. The costs appear to increase on the north and west side of the State due to additional freight charges along the Ohio River. This is consistent with average pricing per District.
- Substantial asphalt pricing differences from MLH Report (2013) and RS Means (2015).

Recommendation

- Reconsider developing an internal DOH asphalt manufacturing plant(s).
- Analyze asphalt mix designs and specifications with different states in terms of quality and lifespan of finished product.
- Create incentive for new contractors to pursue resurfacing project in WV such as packaging multiple projects together creating larger contracts.

Average Asphalt Pricing By State per RS Means 2015

Average Asphalt Costs per State in the Region and Florida From RS Means



Procurement options and cost-benefit analysis during the project development phase are limited leading to diminished ROI

Procurement

Cost-Benefit Analysis

Key Findings

- There appears to be limited cost-benefit analysis completed that considers the full capital project lifecycle from planning costs, to construction costs and future operational costs.
- There also appears to be limited examples of a cost-benefit analysis conducted related to determining which projects were initially selected for implementation.

Recommendation

- Design and implement a procurement cost-benefit analysis process with templates.
- Provide cost-benefit training at District level prior to HQ approval.
- Create more input from Districts prior to HW approval for construction projects.

Balancing the right number of providers

Description of Situations Involving Too Few, Too Many, or the Correct Amount of Vendors.

Too few	Balance	Too many
▪ Reliance on a single provider ▪ Risk of disruption to services ▪ Low competition for volumes ▪ High switching cost ▪ High economies of scale	Benchmarks: Provisioning 2-5 Fault handling and repair 2-5 Build out 2-10	▪ Interface complexity ▪ High transactional cost ▪ Difficult to develop strategic partnerships ▪ Reduced economies of scale ▪ Limited E2E accountability

DOH currently has too few providers with the utilization of statewide contracts.

Typical maintenance and construction procurement options

Available Procurement Options Utilizing Varying Quantities of Providers.

	In-house	One provider	Two providers	Three or more
✓	• No /low transaction costs • High scope flexibility • Ease to benchmark and change engineer to engineer value chain	• High potential economies of scale • Leverage resources • Few transaction costs, single interface • One strategic partner	• Potential for economies of scale • Market competition • Supply diversity	• Low switching costs • Increased competition • Low market entry barriers • Reduced impact in case of default
✗	• Bear risk of volume • Non-core • Reduced flexibility • Increased complexity to leverage resources	• One dominant market player • Danger of lock in • High change cost	• Some transaction cost • Some variation in service delivery	• Increased transaction cost • Service delivery variation • Reduced potential for economy of scale

The corporate purchasing manual is outdated and low purchasing approval thresholds can cause delays

Procurement

Purchasing Delegations of Authority Issues

Key Findings

- DOH corporate purchasing methodologies and procedures appear to be onerous compared to the requirements of comparable entities.

Recommendation

- A full review should be completed on the DOH Purchasing Manual to review and verify the validity of the currently implemented purchasing processes.
- This should be streamlined and allow one delegation instruction for entire business unit.

Outdated Corporate Purchasing Manual

Key Findings

- Thresholds for purchasing at the District level are outdated as the cost of materials and equipment have increased since the last manual update.
- Processing purchase orders through HQ can be time consuming.

Recommendation

- Update the purchasing manual with input from the Districts to increase efficiencies.
- Recommendation to change thresholds for P-card users is subject to statute. DOH may consider steps to expedite the processing duration for purchase orders in accordance with West Virginia Purchasing Regulations.

Quality Control of Bid Documents

Key Findings

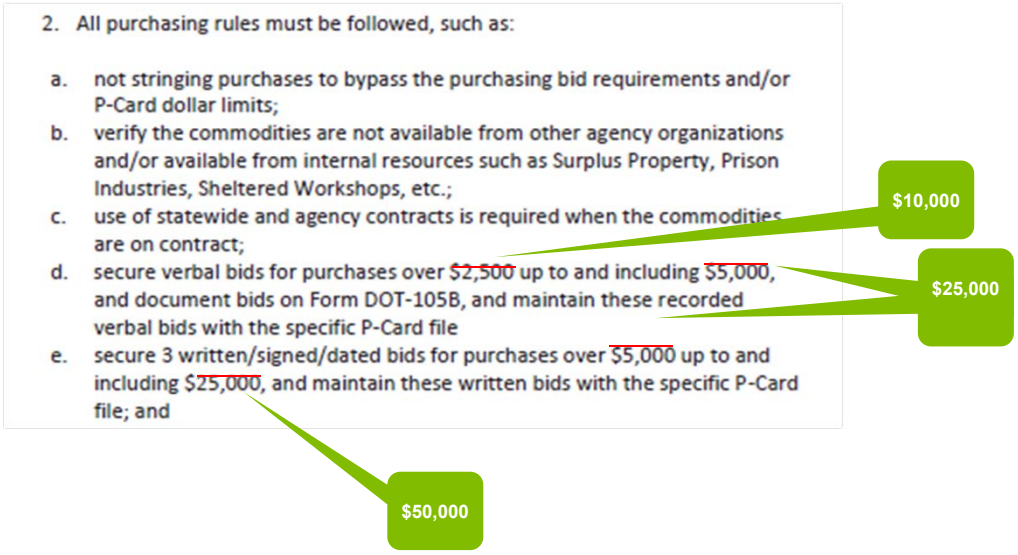
- Bid documents are reviewed internally prior to advertisement on Bidex.
- Most of review work is performed at Headquarters, with a limited amount completed at the District level.

Recommendation

- Conduct 3rd party evaluations of plans, proposals, specifications, and other bid documents.
- Contracting a 3rd party to perform sporadic evaluations will test implemented internal review processes and ensure sufficient reviews are consistently being performed.

Admin Procedures Vol VI, Ch. 5, Pg. 10

Screenshot of the Purchasing Manual Regarding P-card User Thresholds with Suggested Revisions.



Delays often occur between contract execution and project commencement; approximately 31.5% of contracts show delays greater than 28 days

Procurement

Project Commencement Delays

Key Findings

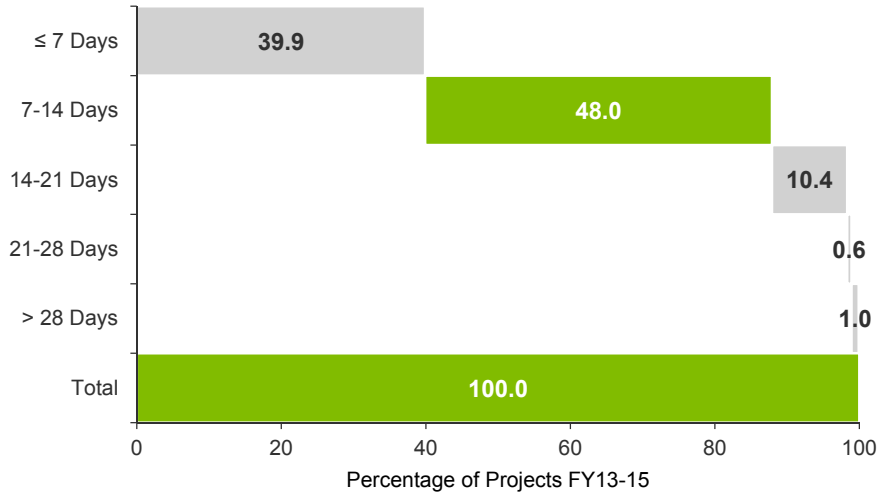
- Data revealed that delays are present between vetting, award, and NTP Dates. 31.5% of these delays are greater than 28 days in duration.
- There are limited quality control reviews being conducted to better understand the specific reasoning for the time delays.
- No PMO or software utilized to help manage schedules.

Recommendation

- Provide oversight process between contract execution and project commencement.
- Implement a third-party quality control system which would get another perspective for reviews and mitigate potential for change orders and design flaws.
- Implement PMO to help mitigate schedule delays.

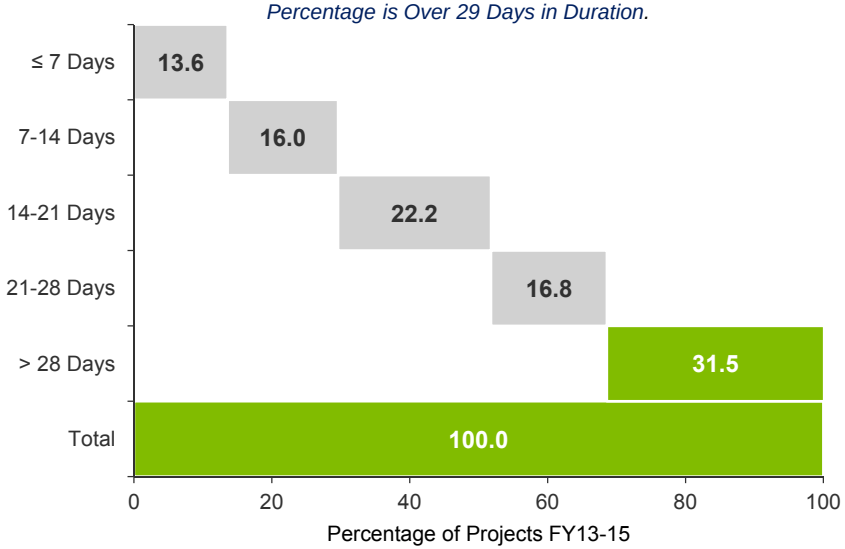
Delay Between Project Letting Date and Award Date

Percentage of Projects Delayed Between Tendering and Award Dates.



Delay Between Contract Award Date and NTP

Percentage of Projects Delayed Between Award and Notice to Proceed Dates – Highest Percentage is Over 29 Days in Duration.



Project Commencement Delays

Key Findings

- Feedback from interviews with WV Contractors Association representatives confirmed that project commencement dates slipped in the past due to permit delays.
- Poor overall project control and scheduling.

Recommendation

- Provide oversight process between contract execution and project commencement.
- Implement a 3rd party quality control system which would get another perspective for reviews and mitigate potential for change orders and design flaws.
- Implement an integrated planning system across all phases of projects.

Personnel

Supporting Analysis & Findings:

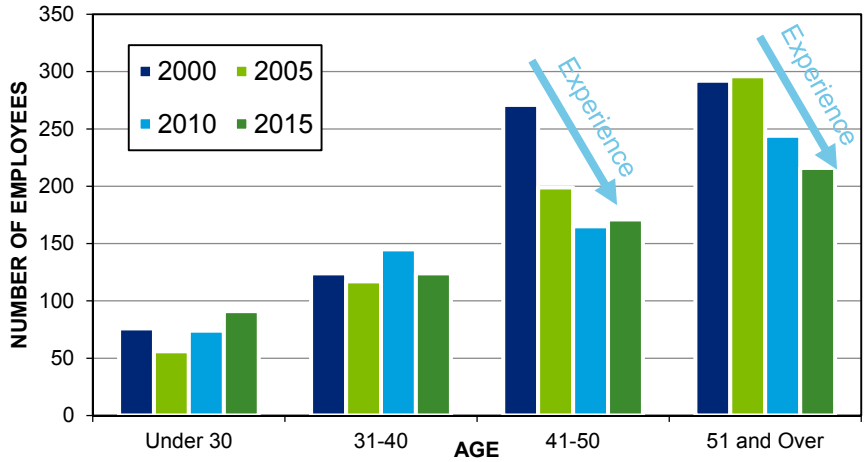
Assess the effectiveness, efficiency and economy of the West Virginia Division of Highways' management of human resources in meeting the Division's mission.

Lack of merit-based rewards hinders the ability to attract and retain talent and there is limited knowledge sharing across the Districts and Divisions

Personnel

Age Demographics – Construction/Materials

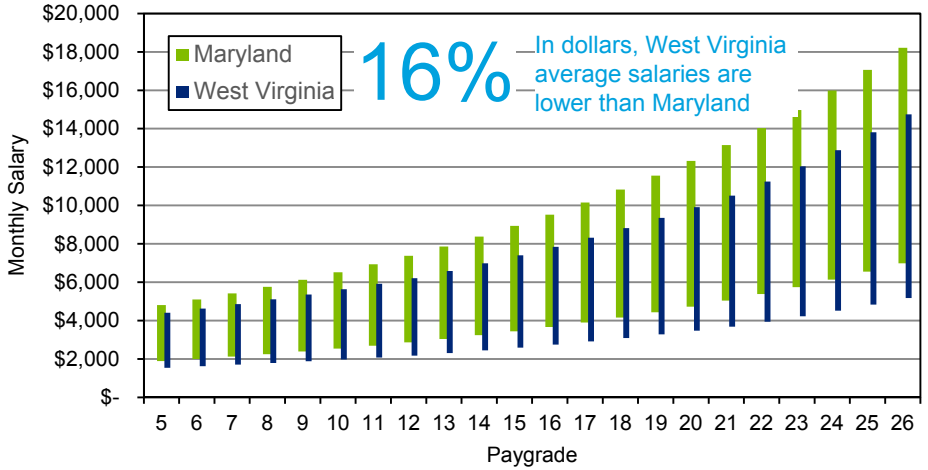
The figure below shows the change in age demographics throughout DOH from 2000 – 2015.



Data from the 10 District Construction Sections, Contract Administration, and Materials Divisions
Source: DOH Contract Administration Division, Filename: staffing levels – turnover.pptx

Salary Comparison

The figure below compares the salary at various paygrades between West Virginia and Maryland.



Filename: WVDOT Administrative Procedures Volume III, Chapter 3; State of Maryland, Standard Salary Schedule

High Amounts of Turnover

Key Findings

- There has been significant amount of turnover throughout the DOH. From 2000 to 2015, the total staff in the construction, contract administration, and materials divisions decreased 21% as illustrated in the adjacent table on the left.
- Turnover is predominately driven by resignations in search of higher salaries, and retirements.
- Jobs cannot be posted until the position is vacated, even if the employee has given extensive notice, thereby limiting the ability to shadow the incumbent.

Recommendation

- Allow Districts and Divisions to post jobs as soon as notice is given, to enable the incumbent to assist with onboarding the new employee
- Increased retention may be achieved through increased compensation, as well as greater opportunities for training or leadership roles.

Lack of Merit-Based Rewards

Key Findings

- The DOH previously offered merit-based raises; however, the raises are no longer provided.
- The Merit Increase Policy is still a part of the DOH Administrative Operating Procedures (Section II, Chapter 9).
- There are no other monetary incentives provided to encourage employees to excel, limiting DOH's ability to achieve efficiency.

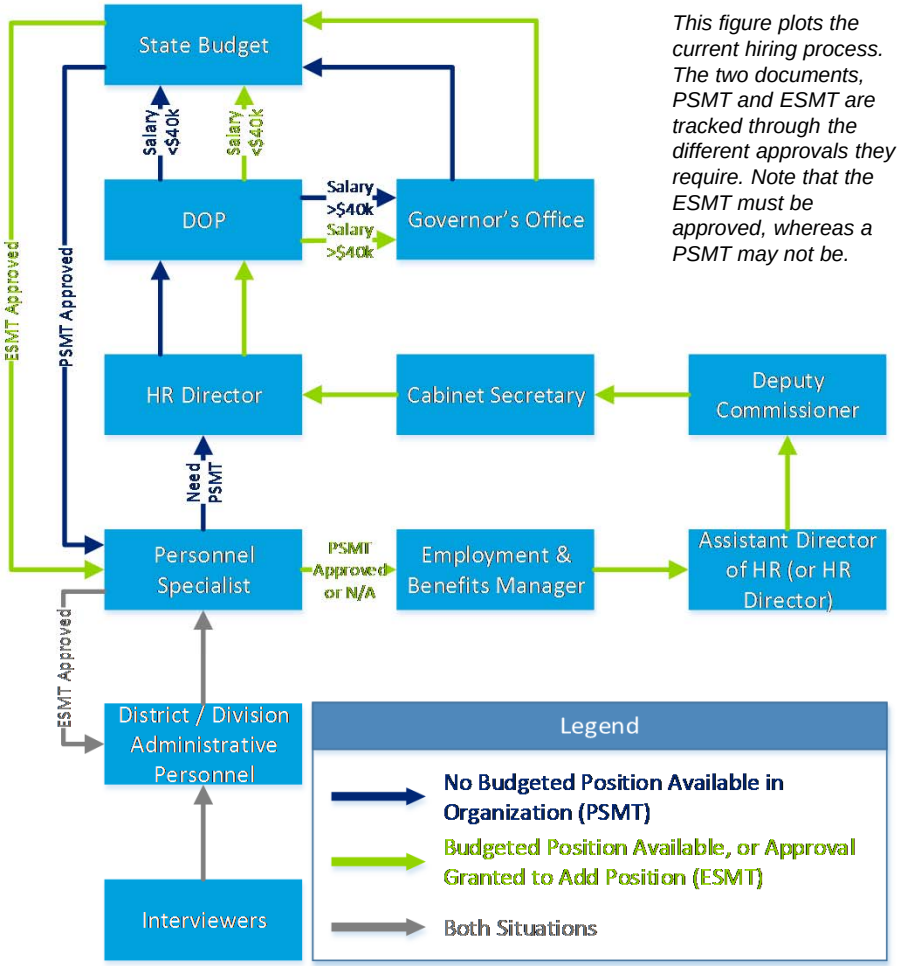
Recommendation

- Develop a robust performance development plan to capture goals that reflect an employee's individual strengths, career aspirations, and priorities for growth during the year.

Approval of new employees can take months, and significantly impacts the DOH's ability to recruit top talent

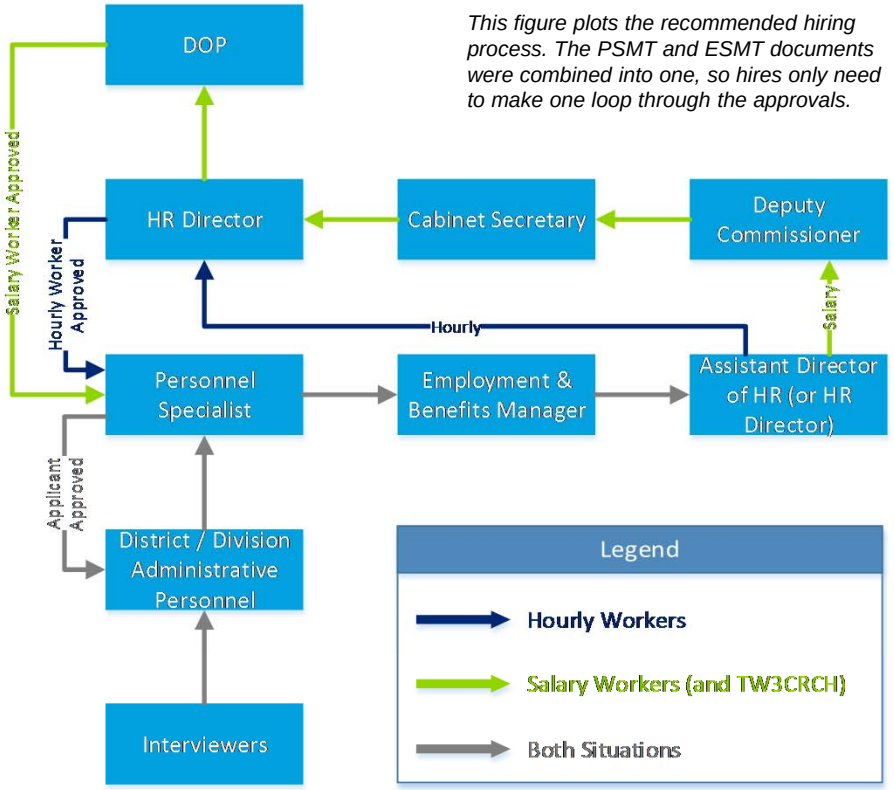
Personnel

Current Hiring Process



This figure plots the current hiring process. The two documents, PSMT and ESMT are tracked through the different approvals they require. Note that the ESMT must be approved, whereas a PSMT may not be.

Recommended Hiring Process



This figure plots the recommended hiring process. The PSMT and ESMT documents were combined into one, so hires only need to make one loop through the approvals.

Key Findings

- Applicants take an excessive amount of time to get approved due to the multitude of steps that are required.
- The State Budget and Governor's Office approve applicants even though the DOH receives no general revenue funds.
- PSMTs and ESMTs require the same approvals, but they are granted separately.

Recommendation

- Simplify the process by combining the PSMTs and ESMTs into one set of approvals.
- Segment the process based on the type of employee who is being approved. Hourly workers should not require the same level of scrutiny or approval as salary workers (with the exception of TW Crew Foremen).
- Remove the State Budget and Governor's Office from all approvals, as the State does not provide DOH with general revenue funding.

The employee disciplinary process is not timely and legal considerations mitigate its effectiveness

Personnel

Disciplinary Process is Too Long

Key Findings

- The disciplinary review process takes 2 weeks on average, which limits the discipline's timeliness and effectiveness.
- Reviews for due process are done by the Employee Relations Coordinator in Headquarters.
- Personnel Specialists currently assist 2 Districts each with the most administrative functions, but not discipline.
- Due to the escalating system for discipline, it can take years to replace an underperforming employee with one who will better serve the organization.

Recommendation

- Utilize the Personnel Specialists to assist with fact-gathering and ensuring due process is provided.
- Final review approval would remain with the Employee Relations Coordinator.

Increase Personnel Specialists' District Presence

Key Findings

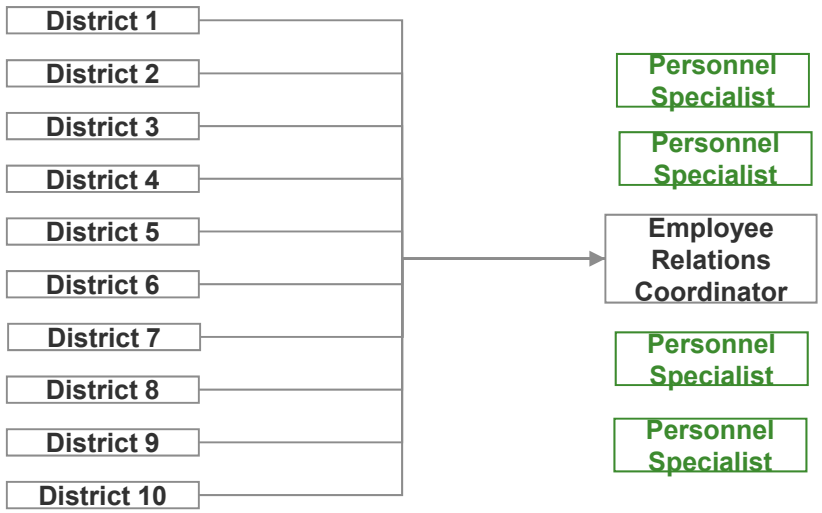
- Personnel Specialists are all based out of the DOH Headquarters; however, some are assigned to Districts that are hours away.
- Large amount of travel time restricts their ability to effectively coordinate with the Districts.
- Personnel Specialists currently act as the primary liaison between Districts and Headquarters for administrative issues.

Recommendation

- Require regular District visits by the Personnel Specialists to foster enhanced engagement. Supplement the requirement by utilizing the telecommuting package recommended on slide 52.

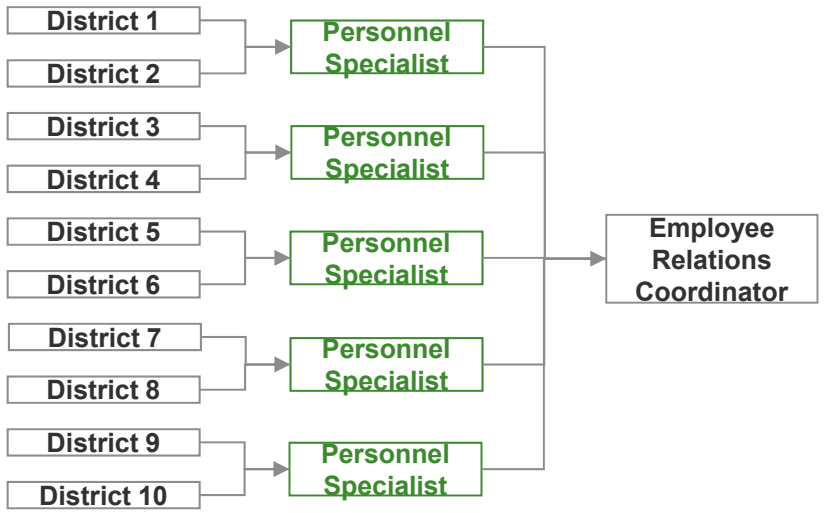
Current Disciplinary Process Flow

The schematic below indicates the current flow of requests for discipline, as well as the non-involvement of Personnel Specialists with the process.



Recommended Disciplinary Process Flow

The schematic below indicates the recommended flow of requests for discipline, which would utilize existing Personnel Specialists.



The time collection process requires significant manual input, is labor intensive, and could be automated to increase utilization

Personnel

Automate the Timekeeping Process

Key Findings

- Timekeepers at the districts collect the time that is reported by workers and crew leaders / supervisors, and input it in to the system.
- Time is reported to them typically on paper, with little controls to verify that the reported time is correct.
- DOH had previously explored the use of an automated system; however, due to the disparate work locations, the project was not pursued.

Recommendation

- Implement an automated timekeeping process for hourly workers.
- Use swipe cards or keytabs at automated collection systems.
- Locate the collection systems at central locations that most employees come in contact with daily, such as district offices, county offices, county substations, vehicle pools, maintenance shops, field office trailers, etc.
- If an employee does not report to one of these areas, a cell phone can be used to the log time and location that employees report to work via an app or text message.
- Automating the process will provide additional insights into employee utilization, reduce potential for fraud, and allow the resources to be eliminated or consolidated

Utilize Mobile Apps for Employees At Distant Sites

The image to the left is representative of a time reporting application currently available for commercial use. DOH can explore other options for commercial technology solutions. The application would allow employees to remotely clock in remotely, and it automatically aggregates the data for effective reporting. No additional resources are necessary for timekeeping purposes.

Source: ExacTime - http://www.buildersshow.com/assets/docs/ibs/presskits/pk_23959_brochure.pdf

Sample Reporting

Bill Owen
Monday, September 12, 2012

Start Jobsite	Start Time	GPS	Activity	Stop Time	GPS	Stop Jobsite	Total
Convention Ctr	7:08 AM	1.4 mi*	Framing	11:01 AM	OK	Convention Ctr	3:53
Convention Ctr	11:01 AM	OK	Travel	11:26 AM	OK	Petco Park	0:25
Petco Park	11:26 AM	OK	Plumbing	12:36 PM	OK	Petco Park	1:10
Petco Park	1:10 AM	OK	Travel	1:33 AM	OK	Westfield Plaza	0:23
Westfield Plaza	1:33 AM	OK	Electrical	3:16 PM	OK	Westfield Plaza	1:43
						Daily Total	7:34

The image to the left is an example of a report generated from a time reporting app currently available for commercial use. It can provide additional insights by tagging each time someone clocks in with their GPS location. This provides assurance that the employee is at the correct work location when they self-report their time.

Source: ExacTime - http://www.exaktime.com/faq/timesummit-reports/

Training content and quality appears to be meet DOH employees needs; however, there are several opportunities for improvement in delivery and effectiveness

Personnel

Commuting Time to Events is Challenging

Key Findings

- Many conferences and meetings are held in Charleston, colleges and universities throughout the state and other venues.
- Due to the size and dispersion of the DOH, every event requires significant travel for some employees.
- Disparate Districts also hampers the inter-district communication and coordination.

Recommendation

- Implement enhanced telecommuting opportunities, such as Cisco Telepresence.
- This requires a stable network for all parties, and may increase IT demands.

Effective Software Training

Key Findings

- Software training is provided to DOH's personnel; however, it is not always timely with the implementation, resulting in a knowledge loss during the gap in time.
- Training is typically structured, which reduces the employees' ability to get true hands-on experiences.
- Available reference material is limited after training is completed.

Recommendation

- Select key personnel at each District, and provide a train-the-trainer program.
- Key personnel will then train their District as needed in a more efficient manner.

Effective Equipment Operator Training

Key Findings

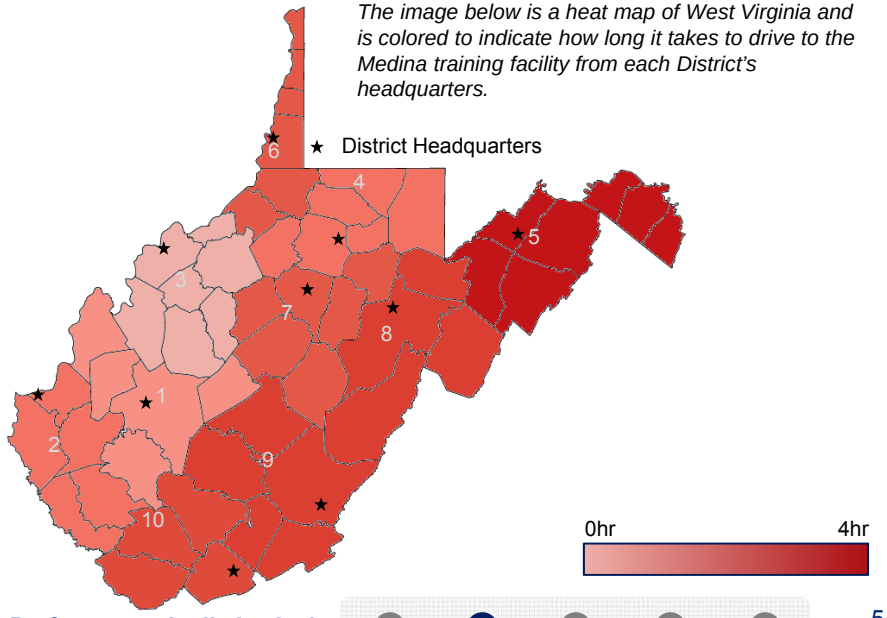
- The DOH utilizes Medina to provide heavy equipment training for their operators.
- The operators can get "in-the-seat" experience; however, it is provided in perfect conditions, rather than realistic conditions.
- There is only one facility available that provides this training, requiring significant travel for some.

Recommendation

- Request a revised training program from Medina. Explore whether their trainers could provide training at the Districts.
- Utilize local retirees for realistic training.

Travel Time to Medina Facility from District HQ

The image below is a heat map of West Virginia and is colored to indicate how long it takes to drive to the Medina training facility from each District's headquarters.



There is limited knowledge sharing across the Districts and Divisions, the use of which would generate significant synergies

Personnel

Limited Knowledge Sharing

Key Findings

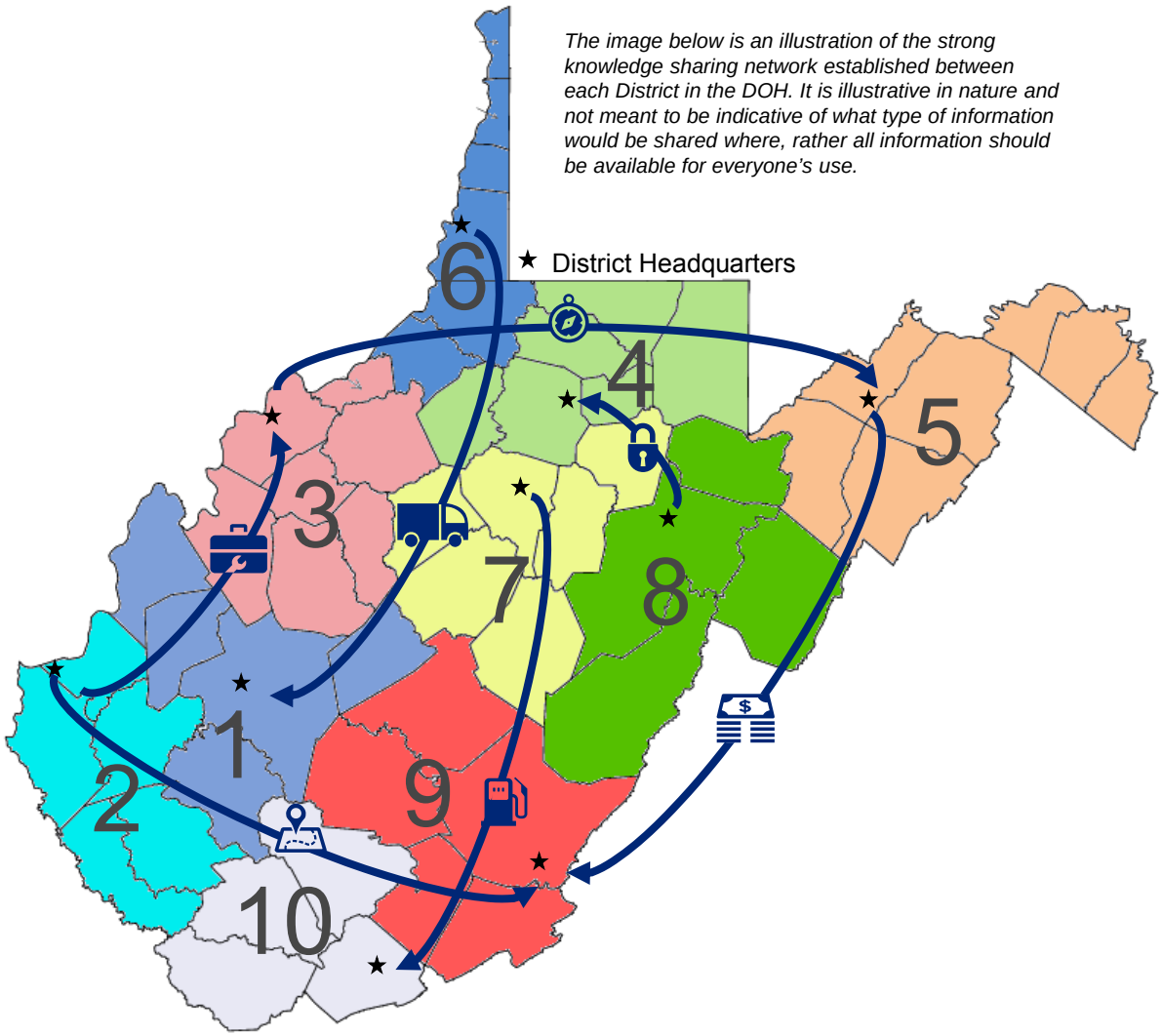
- There is a significant wealth of experience that employees have cultivated throughout their careers.
- Limited methods available to effectively and efficiently share the knowledge between the disparate districts.
- Limited collaboration leads to inter-district operational discrepancies, which cause frustration and confusion by third party vendors. This also prevents the DOH from creating a unified product across the state through which to drive value and performance.
- There does not appear to be any set policies and procedures to inform employees of the means to implement knowledge sharing.

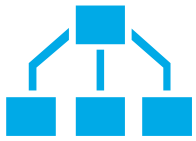
Recommendation

- Implement a knowledge-sharing platform, such as an internal online help forum, which will enable employees to request recommendations as well as present their best practices to their peers.
- A knowledge-sharing platform would also serve as a repository of knowledge as recommendations are shared, which can be referenced in the future.
- Create knowledge sharing policies and procedures, along with employee engagement expectations.

Knowledge Sharing Network

The image below is an illustration of the strong knowledge sharing network established between each District in the DOH. It is illustrative in nature and not meant to be indicative of what type of information would be shared where, rather all information should be available for everyone's use.





Organizational Structure

Supporting Analysis & Findings:

Assess the effectiveness and efficiency of the West Virginia Division of Highways' organizational structure in meeting its mission.

Staffing quotas are not enforced and many Districts and Divisions remain over staffed

Organizational Structure

Many Districts and Divisions Remain Overstaffed

Key Findings

- The quotas were revised in Spring, 2015 based on historical data.
- There are no punishments for remaining over-quota.
- Budgets are impacted by the quotas, therefore being over quota implies more funding is spent on personnel than intended.
- In comparing staffing levels from October 2015 to the staffing quotas, six Districts were overstaffed resulting in an estimated overspend of $2.4– 4.5 Million.

Recommendation

- Review the new quotas to determine if they are accurate based on the current resource demands.
- If they are, provide reprimand and/or incentive to meet the quotas.

Resource Leveling Capabilities are Limited

Key Findings

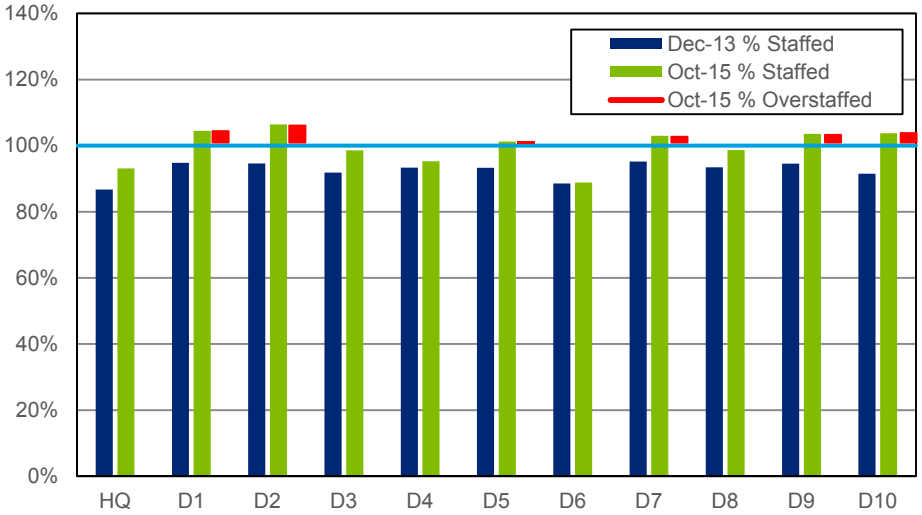
- District and Division managers were recently granted the ability to reallocate their personnel as necessary.
- Many Districts and Divisions are unaware that they have this ability, indicating that the change was not effectively communicated.

Recommendation

- Effectively communicate all procedural changes in a timely manner.
- Provide training to managers regarding how to determine the optimal staffing mix.

Overstaffing Across Districts & Headquarters

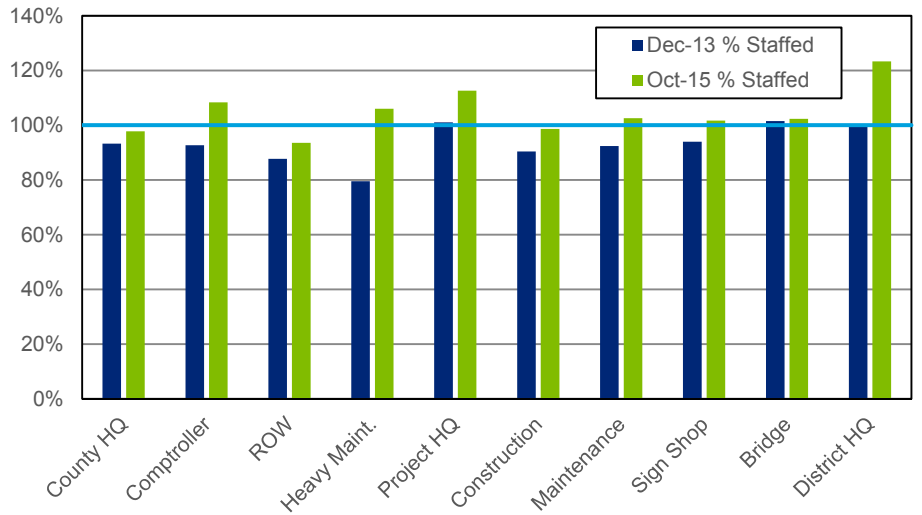
The figure below indicates how fully-staffed each District is. The values are calculated by dividing the actual staffing at that time by the set quota.



Source: Headquarters. Filename: QUOTA PROP1 3 1 2015 HWS GCMQUOTA and HWS EQQUOTA.xlsx

Overstaffing Across Divisions By Position

The figure below indicates how fully-staffed each Division is. The values are calculated by dividing the actual staffing at that time by the set quota.



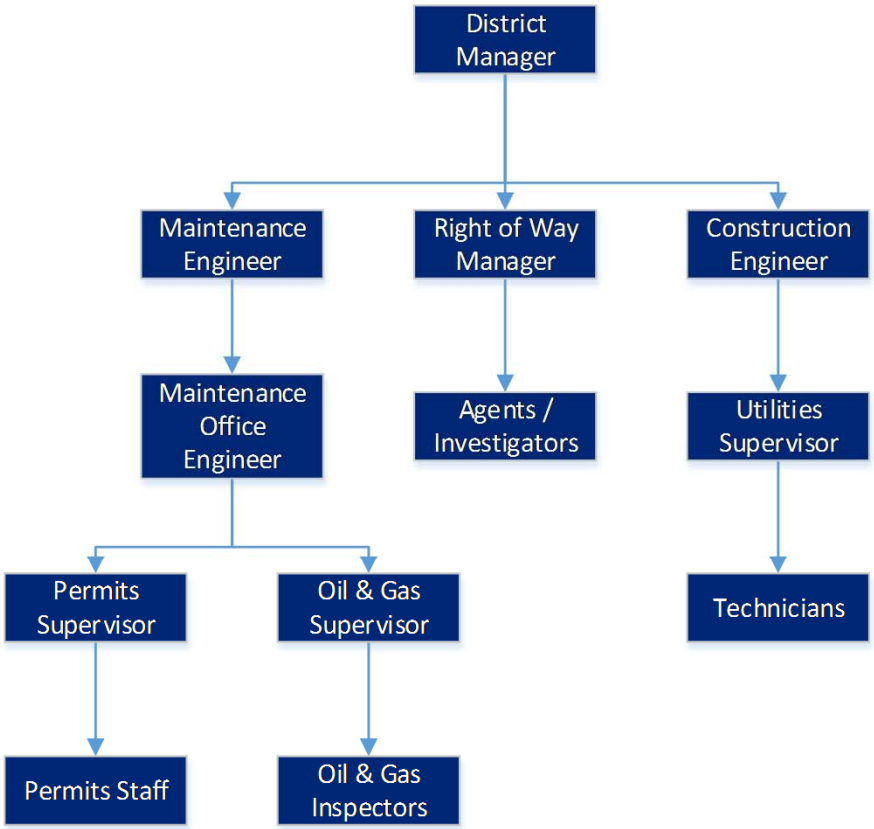
Source: Headquarters. Filename: QUOTA PROP1 3 1 2015 HWS GCMQUOTA and HWS EQQUOTA.xlsx

DOH can realize greater efficiency through consolidation of key departments within the Districts

Organizational Structure

Current Organizational Layout

The chart below shows the current organizational layout that is typical at the Districts. Note that not all Districts have an Oil & Gas department.

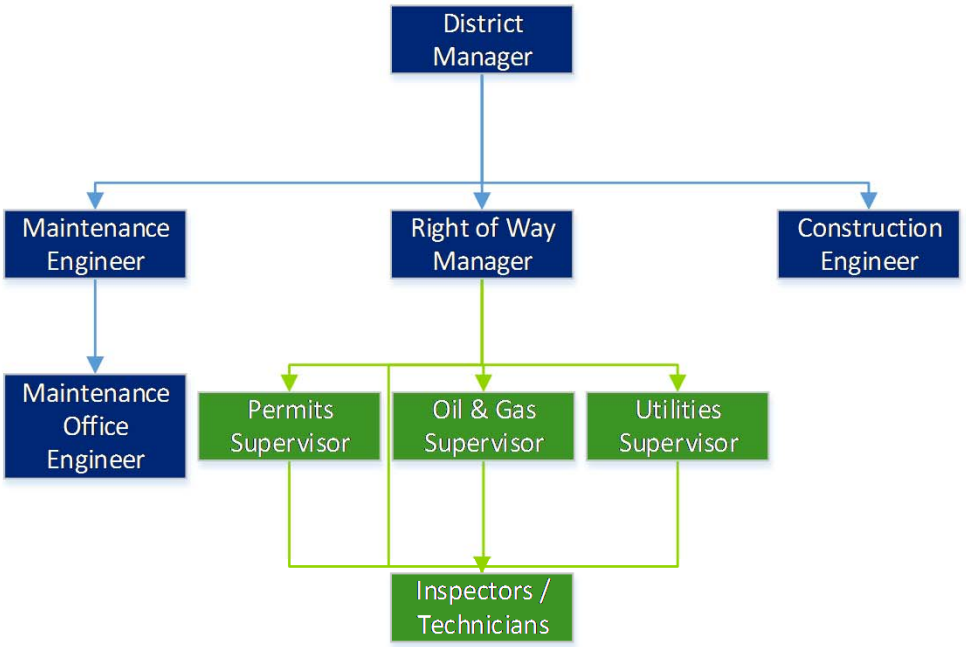


Key Findings

- Districts have separate ROW, Permits, Utilities and Oil & Gas (where applicable).
- Each of these departments is responsible for obtaining permits for various phases of DOH's work.
- Permits Staff, Utilities Staff Technicians, and the Oil & Gas Inspectors are all classified under the Transportation Engineering Technician series.

Recommended Organizational Layout

The chart below shows the recommended organizational layout, with the realigned departments colored green. Note that the inspectors and technicians in the existing layout are consolidated into one department.



Recommendation

- Combine the Permits, Utilities, and Oil & Gas (where applicable) into the ROW department.
- Designate administrators who are responsible for obtaining the permits, which will result in greater efficiency through more specific experience.
- Cross-train inspectors to review each type of permit and create on pool of inspectors from which to pull from.
- Inspectors could be aligned to specific regions within the district, reducing unnecessary travel by multiple inspectors to the same area.
- As a result of the consolidation, 3-5 resources per District may be able to be eliminated.

New risk management functions could be introduced or better defined such as Data Analytics or full-time Field Inspectors

Organizational Structure

Addition of Data Analytics Staff

Key Findings

- Full implementation of OASIS may provide DOH with access to a variety of in-depth data.
- Data could provide deep insight into their operations to produce an integrated, meaningful program view.
- Specialized skills are necessary to utilize the data in combination with the Dashboard recommended in Slide 32. These skills may not already by present within the DOH or aligned to a specific position.

Recommendation

- Add a Data Analytics department that would work in conjunction with the front-end departments and IT. Must be aligned to easily coordinate with the various departments throughout the organization.

Importance of Dedicated Field Inspectors

Key Findings

- Districts have a department dedicated to bridge and field inspections; however, they get called away from inspecting to assist with performing bridge repairs.
- Although it is best practice to cross-train employees where possible, the state of West Virginia's infrastructure requires extensive inspections to be performed to return to a sufficient level.

Recommendation

- Reiterate the necessity of performing inspections to the District managers.
- Prohibit pulling inspectors off their primary duties unless their queue is empty.
- Establish a better quality control program with dedicated inspectors.

Necessity of a PMO

Key Findings

- The DOH handles a wide portfolio of projects that vary greatly from simple, one-month paving to complex, multi-phase highway design and construction.
- Oversight is typically provided at the project level; however, there is little provided for their entire portfolio.
- The lack of centralized oversight leads to varying performance from project-to-project, and District-to-District.

Recommendation

- The DOH should add a PMO to provide oversight across their entire portfolio. They should aggregate the performances of the projects to provide DOH leadership with meaningful insight into their production.
- The PMO will drive consist levels of performance across the different projects.

West Virginia's Assets are Reaching End of Their Useful Life

Amount of West Virginia's roads either in poor or mediocre condition **36%**

35% Bridges in need of repair, improvement, or replacement

Ranking in overall traffic fatalities with 1.78 deaths per 100 million vehicle miles **#2**

22% Functionally obsolete bridges of the over 7,000 on the State Highway

Source: West Virginia Transportation by the Numbers: Meeting the State's Need for Safe and Efficient Mobility. January 2014.

The standardized organizational structure could be complimented with standard processes to increase resource sharing

Organizational Structure

Standardize Repeatable Processes

Key Findings

- The AOP provides general guidelines for how to perform various processes; however, they are not fully detailed, resulting in varying procedures between Districts.
- Standardized processes allow employees from one District to quickly be introduced to another with a minimal learning curve.
- Standardized processes will also reduce the time for new employees to be on boarded as processes will be sufficiently detailed.

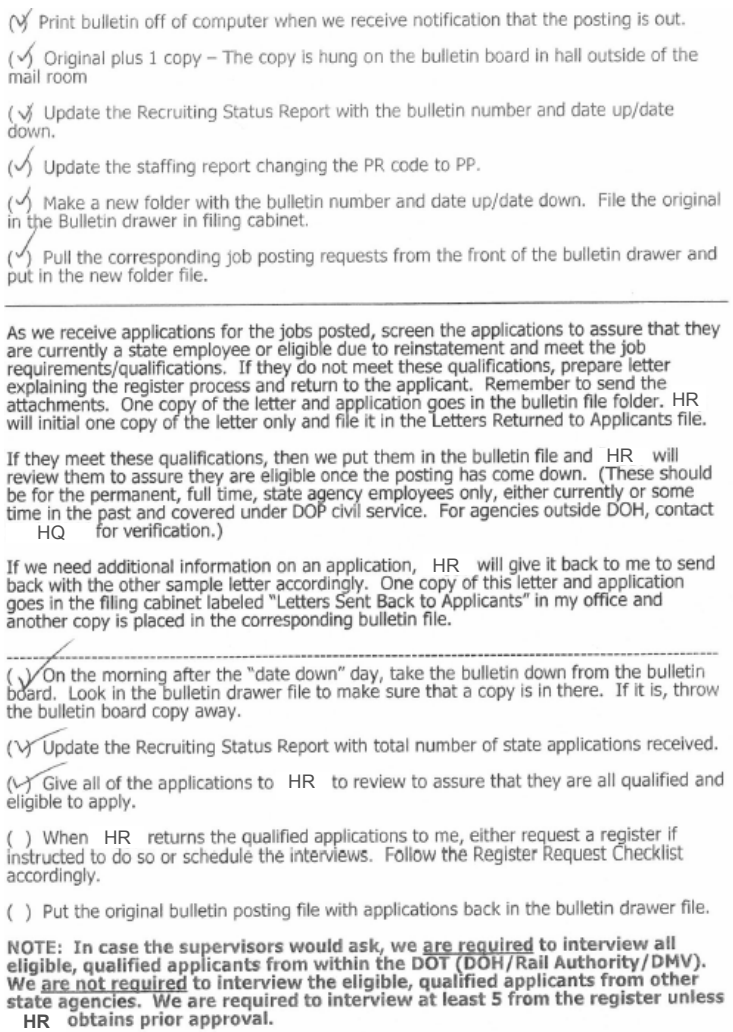
Recommendation

- Create a fully detailed, standardized process for all administrative functions similar to those already created by certain Districts.
- Select Administrative Services Manager(s) to champion the creation of these processes to ensure they are realistic and sufficient.
- Processes can also be used as a quality check to ensure that past procedures were performed according to the stated requirements, and mitigate potential future discovery of gaps.

Note: Names of employees were removed from this list and replaced with their position.

Example Checklist for Bulletin Postings

The form below is an example process that was created by one of the Divisions to walk an employee through all steps necessary to post a position on the Bulletin. Providing this level of detail for all processes and procedures would foster greater understanding and compliance, and reduce discrepancies and errors.



(✓) Print bulletin off of computer when we receive notification that the posting is out.

(✓) Original plus 1 copy – The copy is hung on the bulletin board in hall outside of the mail room

(✓) Update the Recruiting Status Report with the bulletin number and date up/date down.

(✓) Update the staffing report changing the PR code to PP.

(✓) Make a new folder with the bulletin number and date up/date down. File the original in the Bulletin drawer in filing cabinet.

(✓) Pull the corresponding job posting requests from the front of the bulletin drawer and put in the new folder file.

As we receive applications for the jobs posted, screen the applications to assure that they are currently a state employee or eligible due to reinstatement and meet the job requirements/qualifications. If they do not meet these qualifications, prepare letter explaining the register process and return to the applicant. Remember to send the attachments. One copy of the letter and application goes in the bulletin file folder. HR will initial one copy of the letter only and file it in the Letters Returned to Applicants file.

If they meet these qualifications, then we put them in the bulletin file and HR will review them to assure they are eligible once the posting has come down. (These should be for the permanent, full time, state agency employees only, either currently or some time in the past and covered under DOP civil service. For agencies outside DOH, contact HQ for verification.)

If we need additional information on an application, HR will give it back to me to send back with the other sample letter accordingly. One copy of this letter and application goes in the filing cabinet labeled "Letters Sent Back to Applicants" in my office and another copy is placed in the corresponding bulletin file.

(✓) On the morning after the "date down" day, take the bulletin down from the bulletin board. Look in the bulletin drawer file to make sure that a copy is in there. If it is, throw the bulletin board copy away.

(✓) Update the Recruiting Status Report with total number of state applications received.

(✓) Give all of the applications to HR to review to assure that they are all qualified and eligible to apply.

( ) When HR returns the qualified applications to me, either request a register if instructed to do so or schedule the interviews. Follow the Register Request Checklist accordingly.

( ) Put the original bulletin posting file with applications back in the bulletin drawer file.

NOTE: In case the supervisors would ask, we are required to interview all eligible, qualified applicants from within the DOT (DOH/Rail Authority/DMV). We are not required to interview the eligible, qualified applicants from other state agencies. We are required to interview at least 5 from the register unless HR obtains prior approval.

Source: District Administrative Services Manager. Filename: SKM_C454e15092916400.pdf

3 Capital Project Reviews

Approach to Capital Project Reviews

The Approach

- Deloitte selected four(4) recently completed or in-progress DOH projects to perform an assessment of DOH's capital projects.
- Each of the Case Studies analyses consisted of the following steps:
  - Researched the project background using available DOH documentation
  - Met with the key personnel involved with the development of the project
  - Interviewed District Office staff involved with the project
  - Interviewed Regional Office staff involved with the project
  - Interviewed DOH Headquarters Staff involved with the project development
  - Compiled data, analyzed information within and across projects, and developed the findings presented herein
- The projects were selected to provide a sample of projects that were successful, as well as projects that underperformed.

The Projects

- **Successful Projects:**
  - Coalfields Expressway – A major multi-lane expressway connecting the WV Turnpike at Beckley, WV to US 23 at Slate, VA. The Expressway is 65 miles long in WV and 50 miles long in VA. It will replace the use of winding 2-lane roadways and will address poor existing roadway conditions, safety, and economic opportunities. The project was able to avoid many pitfalls present in other major expressway ventures.
- **Underperforming Projects:**
  - US 35 – The remaining 14.6 miles of US 35 that have not been completed, stretching from Buffalo Bridge into Mason County. This project was selected because it was delayed from 2010 to 2015 due to a funding issue.
  - Corridor H – 100 mile stretch of a new 4 lane highway through the Appalachian Mountains that would connect West Virginia to the Eastern Seaboard. This project was selected because planning began in 1965; however, it is not projected to finished until 2035 (or 2020 if a PPP is utilized). Multiple issues caused the delay including funding, permitting, and litigation.
  - Tarico Heights Bridge – A 254' bridge carrying County Route 26 over Mill Creek. The designs were Value Engineered by the contractor and accepted by the DOH; even though the District personnel objected, and are now faced with increased maintenance costs which are not offset by the initial cost savings.

Capital Project Reviews – Summary of key findings

Our analysis of the data on individual projects and comparisons across projects determined that a number of issues challenged most DOH projects.

- Large, multi-phase projects may span many years and are difficult to fully project the necessary financing, which may lead to unforeseen mid-project gaps, causing significant work delays.
- The public holds significant influence over projects and must be satisfied in order to successfully deliver the DOH's projects. Not doing so may lead to changes in various facets of a project plan. The sooner that the public can be brought into a project the better, as the design is more flexible earlier in the project lifecycle. The DOH should consider including public outreach in the overall project schedule.
- State legislation may prohibit certain activities specific to alternative procurement methods that the DOH would otherwise explore when delivering a project. Legislation changes can be made, but may not be done in a timely fashion.
- Project controls may be lacking, leading to noncompliance with project specifications and delays in obtaining pre-project construction permits.
- Utility companies are not officially notified of a project until after it is awarded, which inhibits their ability to respond to project needs in a timely fashion. If utility companies were notified earlier in the process, the potential for these delays could be reduced .
- Revise the language in contracts to shift the risk for EPA and DEP violations to the contractor where possible.
- District personnel typically have the most insight relating to contractor Value Engineering proposals; however, they do not feel as though Headquarters involves them enough during the VE reviews, preventing them from truly participating and voicing their opinions.
- Contractor's VE proposals may present the DOH with significant cost savings; however, these need to be weighed over the project lifecycle. Unless the project was significantly overdesigned, it is unlikely that the design could be reduced without an addition elsewhere or a sacrifice in performance.
- The DOH should consider partnering with industries that stand to realize significant gains once their projects are completed. This can help reduce some of the costs carried by DOH, while gaining synergies with major stakeholders.
- Utilizing an external committee can help the DOH by carrying some of the public outreach burden, and pushing the realization of the expected benefits resulting from successful project completion.
- It appears that there was no centralized project reporting, which limits the oversight and controls that can be provided by Headquarters.

These and other issues are discussed in more detail, along with the associated recommendations for improvement, in the following section.

US 35 Project Review

The US 35 Project can serve as an example of how incomplete project funding can significantly delay projects

Project Overview:	The US 35 project creates a four-lane highway from Teays valley to the Ohio River. The previous two-lane highway had a large amount of truck traffic, which caused serious safety concerns. The DOH completed a large amount of the highway until funding issues put the last 14.6 miles on hold until Governor Tomblin ordered the DOT to expedite the completion of this gap utilizing PPP to fund it.		
Project Budget:	$700,000,000	**Delivery Method:**	Design-Bid-Build, PPP
Project Timeline:	1997 - October 2018	**Delivery Partners:**	Bizzack Construction, LLC, Elmo Greer, Kanawha Stone, Kokosing, Mashuda, Mountaineer, Trumbull Corp

Source: C. Lawrence / WV MetroNews

High Level Assessment

Budget		Last phase was awarded for approximately $75,000,000 less than the DOH had estimated
Schedule		Project was originally planned to complete October 2013, but was delayed five years due to lack of funding
Change Orders		Ability to come in under the original estimated budget indicates there were not significant changes in scope
Processes		Phases appear to have been completed smoothly once contracts were let
Documentation		Project documentation has not been uploaded to ProjectWise for the active phase, and is not in the archive for past phases
Subcontractors		Have not found any examples of poor performance by the Contractors or Subcontractors

Relevant Analysis Focus Areas

Analysis Focus Area	Key Issues	Recommendations
 Funding	The US 35 project was divided into many segments due to the expansive amount of work and financial cost to complete the project.	Utilize a project budget that stretches beyond the typical 5-year project horizon, by using a longer-range capital plan and an IMS.
 Funding	Tolls were originally chosen to fund the last 14.6 mile gap of US 35. However, public outcry forced Mason county to withdraw his support for this plan.	Provide better public education on the benefits of using tolls to fund the critical highway projects. The increased costs to drivers could be outweighed by the savings resulting from a shorter driving time and decreased fuel consumption.
 Funding	Public Private Partnerships were not approved until July 1, 2013 via Senate Bill 190. PPP's enabled DOH to commence work on the last portion of US 35 after the plan to use tolls fell through.	Consider trying to get ahead of any legislative changes that are required to effectively fund projects by lobbying for potential alternate funding sources ahead of time.

Corridor H Project Review

The Corridor H Project can serve as an example of how project claims and specification violations can be detrimental to success

Project Overview:	Corridor H was one of 23 transportation corridors resulting from a push by Congress to stimulate economic growth in rural Appalachia. It was first identified as a potential project in 1965. The project is broken up into 9 segments, and has been wrought with legal issues stemming from environmental problems, which caused substantial delays. The Corridor stretches 130 miles from Weston to the Virginia border, where it will continue to Front Royal.		
Project Budget:	$2.5 Billion	**Delivery Method:**	Design-Bid-Build, Design-Build / PPP
Project Timeline:	1965 – 2035	**Delivery Partners:**	Various including Trumbull Corp. and JF Allen

Source: C. J. Mahan
www.cjmahan.com/static/lostriver.php

High Level Assessment

Budget		Project budget experienced delays due to insufficient funding availability
Schedule		The project is currently 75% complete; however, environmental issues and redesigns have resulted in significant delays
Change Orders		Large Change Orders primarily related to geological / sub-surface conditions, ROW, and swell factors, later negotiated down
Processes		Team did not obtain all permits, particularly ROW and utilities, prior to starting construction, which led to significant delays
Documentation		Few segments have any documentation available on ProjectWise
Subcontractors		Individual contractors performed poorly; however, the overall performance was adequate

Relevant Analysis Focus Areas

Analysis Focus Area	Key Issues	Recommendations
Maintenance, Construction & Reconstruction	Conservationists and environmentalists resisted Federal agents, developers and the business community. Permits were not correctly completed for Corridor H and lead to a delay in DOH's ability to begin work.	Implement improved project controls to ensure that the project is in compliance with all required specifications and ensuring all pre-construction permits are obtained and submitted.
Procurement	Groundwater contamination and sedimentation issues that resulted in a claim with DOH and the contractor.	Ensure that risk for any potential violations is shifted to the contractor by inserting proper plan and/or proposal note language. Regularly update guidance manuals for monitoring E&S controls.
Maintenance, Construction & Reconstruction	Utility delays were encountered and increased the cost of the project and delayed the state's ability to issue the notice to proceed.	Utility delays can be mitigated by notifying utility companies earlier of the work they need to complete. Currently, utility companies are not officially notified until the project is awarded

Tarico Heights Bridge Project Review

The Tarico Heights Bridge Project can serve as an example of how poor value engineering principles can lead to trading low short-term savings for high long-term maintenance costs

Project Overview:	This project replaced an existing bridge that carries County Route 26 over Mill Creek. The replacement is a 2-span structure, approximately 254' long and carries two lanes. The project also included approach work on the North and South side end of the alignment. The project was completed in 2014.		
Project Budget:	$1,986,000	**Delivery Method:**	Design-Bid-Build
Project Timeline:	10/16/2013 – 09/05/2014	**Delivery Partners:**	Triton Construction Co., Inc.

Source: DOH Bridge Inspection Report, Dated 09/30/2014

High Level Assessment

Budget		Projected finished with a slight underrun.
Schedule		Adjusted completion date of 9/5/14 was one week later than originally planned completion date of 8/29/14
Change Orders		Few change orders outside of value engineering proposals.
Processes		The DOH did an inadequate job reviewing the VEP, which resulted in an inferior performance and higher maintenance costs
Documentation		Most reports are not available on ProjectWise
Subcontractors		Subcontractors performed well. The final underrun was worth approximately 1.75% the original contract value.

Relevant Analysis Focus Areas

Analysis Focus Area	Key Issues	Recommendations
 **Procurement**	The proposal to reduce the number of girders from five to 3 resulted in a total savings of $60k; however, this was only looking at the upfront costs by the Contractor. FHWA states that "four girders are generally considered to be the minimum, and five girders are desirable to facitilate future re-decking."	The review board needs to analyze the life cycle costs of any VE proposal to truly understand its impact. Typically, any value engineering will result in a trade off, rather than just a simple reduction in material.
 **Maintenance, Construction & Reconstruction**	The proposal did not include any costs or designs for modifying the design of the deck to account for the greater distance between girders. This likely contributed to the significant longitudinal cracking that quickly developed in the deck.	This is the result of taking away from the superstructure of the bridge, without duly replacing its properties. Unless the bridge was overdesigned, removing or reducing any elements should require an addition elsewhere. In this case, additional steel, or a higher strength concrete mix may have been required.
 **Personnel**	The District felt like it had little input into the VEP review, even though it was their original design, and the maintenance of the final product is their responsibility. Many of the issues the bridge is facing as a result of the VE were predicted by the District.	The DOH should enable the District(s) that are closely tied to the projects to have a voice in the decisions of whether or not to accept a Contractor's VEP. They should also be able to modify and negotiate the changes with the Contractor to ensure they are receiving comparable performance levels.

Coalfields Expressway Project Review

The Coalfields Expressway Project can serve as an example of how the DOH has means available to successfully mitigate the risks inherent with its largest projects

Project Overview:	The Coalfields Expressway will provide a multi-lane expressway, connecting I-64/I-77 (WV Turnpike) at Beckley, WV and US 23 at Slate, VA. The Expressway will drastically improve the connection to southern WV and western VA throughout the Appalachian Mountains, and is expected to be a boon to economic development in the region. There will be approximately 65 miles of the Expressway in WV, and 50 miles in VA. This project was the first in the state to use PPP.		
Project Budget:	Total: $1.0 - $1.5 Billion Mullen Connector: $45.25 M	**Delivery Method:**	Design-Bid-Build, Design-Build / PPP
Project Timeline:	August 2000 – TBD	**Delivery Partners:**	Trumbull Corp. and Bizzack Construction, LLC

Source: W. Dayton Whittle / The Register-Herald

High Level Assessment

Budget	🔴	Based on the PPP agreement, Bizzack will be paid 99% of its contract value by May 2017, when the project is only 62% complete. This may put the DOH at risk of decreasing performance, increased Change Orders, etc.
Schedule	🟢	Mullen Connector is on schedule to finish October 2018 (per October 2015 Schedule Update). Next phases are not let.
Change Orders	🟢	There are no approved change orders to date, per the Payment Applications
Processes	🟡	The lack of an environmental permit has delayed the start of the Mullen Connector; however, the delay is recoverable
Documentation	🟡	Inspections and Quality Control reports are missing from ProjectWise; however, they may still be being completed
Subcontractors	🟢	The Contractor has kept the project on schedule so far without slowdowns for changes

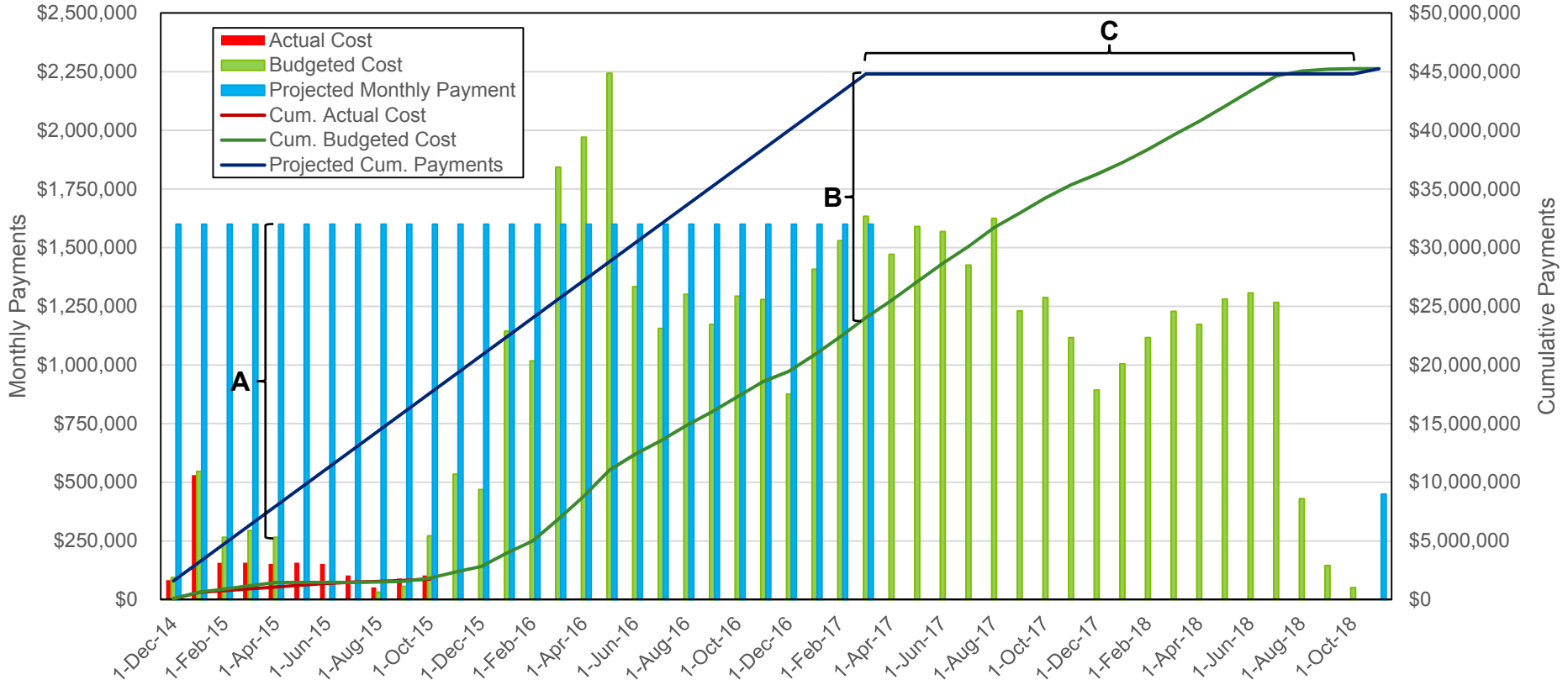
Relevant Analysis Focus Areas

Analysis Focus Area	Key Issues	Recommendations
Procurement	The Virginia Department of Transportation was able to significantly reduce the costs of the project by though Coal Synergies. Their coal partners' larger earth movers are used to prepare the road bed, which allows them to recover additional coal reserves, and saves VDOT 45% of the project cost.	Although, this partnership is contingent on the presence of marketable coal reserves, WVDOT or DOH should explore these types of partnerships. Promises of an accelerated schedule could also help galvanize the relationship when the industries will reap significant benefits from reduced travel times.
Maintenance, Construction & Reconstruction	The WVDOT generated public involvement early in the project and prepared a location study that included an environmental inventory, corridor development, and a cost analysis.	Creating early public involvement in the project can help increase buy-in and reduce the risk of significant push-back that may lead to project delays, such as the opposition to using tolls to help fund US35.
Procurement	The Contractor on Mullen Connector is paid a set $1.6M / month based on the PPP agreement. The Contractor's bid was for $45.25M, which means that after 28 months, they will be 99% paid; however, the schedule is for 45 months.	DOH is at risk of a number of outcomes. Contractor could walk off site, slow down, issue a large amount of change orders, or put fewer or lower performing resources on the job. The DOH should bid the job stating the monthly rate is set based on the lesser of the Contractor's bid and DOH's estimate.

Coalfields Expressway Project Review - Continued

Coalfields Expressway, Mullens Connector Earned Value Analysis

The graph below compares the actual and budgeted costs to the projected actual payments on a monthly and cumulative basis. This highlights the impact of having fixed monthly payments that frequently exceed the actual work completed in that month. Impacts A, B, and C are further explained below.



Source: Actual and Budget Cost from Biz 314113 DOH 0428841R2 CPM Schedule 10-15-15 UD #9 V7.xer. Projected Monthly Payments from Mullen Connector RFP, Exhibit A, Part III, Para C.1.

A: Monthly Payments Discrepancy

- Per the PPP agreement, the DOH pays a flat monthly rate of $1.6M.
- This value is greater than almost all of the Budget Cost monthly values, and has been greater than all Actual Cost through October 2015.

B: Cumulative Payments Discrepancy

- As a result of the discrepancy of the monthly payments, a significant gap will develop between cumulative payments actually made to the contractor, and the value for work actually completed.
- At worst, this gap is over $20.7M, almost $46% of the contract value.

C: Temporal Discrepancy

- Additionally, over a 19 month period, from April 2017 – October 2018, the contractor will not receive any payments against their base contract.
- After the March 2017 payment, the base contract will be 99% paid-out.

4 Business Performance Improvement Plan

The identified business efficiency savings in this Performance Audit are intended to be used in conjunction with the Commission Report's recommendations as an enabler to maximize overall return on investment

DOH Financial Summary (2013– 2015)

($ in millions)	Fiscal Year 2013	2014	2015
DOH Funding	$1,168	$1,200	$1,161
Growth %	*-9.9%*	*2.7%*	*-3.4%*
Expenditures	$1,075	$1,123	$1,003
Growth %	*-11.7%*	*4.3%*	*-12.0%*
Unused Funds	$93	$77	$158
Unused %	*8.0%*	*6.4%*	*13.6%*
Federal Funding	$422	$422	$422
Growth %	*1.4%*	*0%*	*0%*

Source: "DOH Exp FY2007-FY2016 (by month).xlsx", provided by R. Musick, DOH Program Director

Our Report describes efficiencies that have the potential to save DOH up to $25- $50 million annually, allowing the organization to reduce the amount of unused funds each year.

Blue Ribbon Commission Report (May 2015)

Infrastructure Investment

	Current Annual Infrastructure Funding	Annual Increases Recommended by Commission	Total Future Annual Infrastructure Funding
Preservation Projects	**$703 M**	**$750 M**	**$1,453 M**
Expansion Projects	**$60 M**	**$380 M**	**$440 M**
Totals	**$763 M**	**$1,130 M**	**$1,893 M**

Additional Revenue Sources

In summary, the Revenue Committee recommended:
Increase Current Revenue Levels by: $419.8 M / year

Three recurring themes guided the Commission's work and provided the basis for the Commission's recommendations:

- New Sources of Revenue – current State Road Fund revenues are not sufficient to maintain the current system.
- Innovative Financing Methods – traditional highway funding mechanisms cannot provide for future growth.
- Cost Efficiencies – the DOH needs to explore every opportunity to save money and find efficiencies in its operations.

Source: West Virginia Blue Ribbon Commission on Highways May 2015 Report

Deloitte Performance Audit (Dec 2015)

Cost Efficiencies

	Estimated Annual Efficiencies Min ($M)	Max ($M)
Current DOH Annual Expenditure (Baseline, FY15, $M)	**$1,003**	
Total Estimated Annual Efficiencies ($M)	**25.0**	**50.0**
% of Current Annual Expenditure (Baseline, FY15)	**2.5%**	**5.0%**

The outcomes of this Performance Audit are aligned with the Blue Ribbon Commission Report recommendations because the proposed cost efficiency initiatives will allow the DOH to achieve:

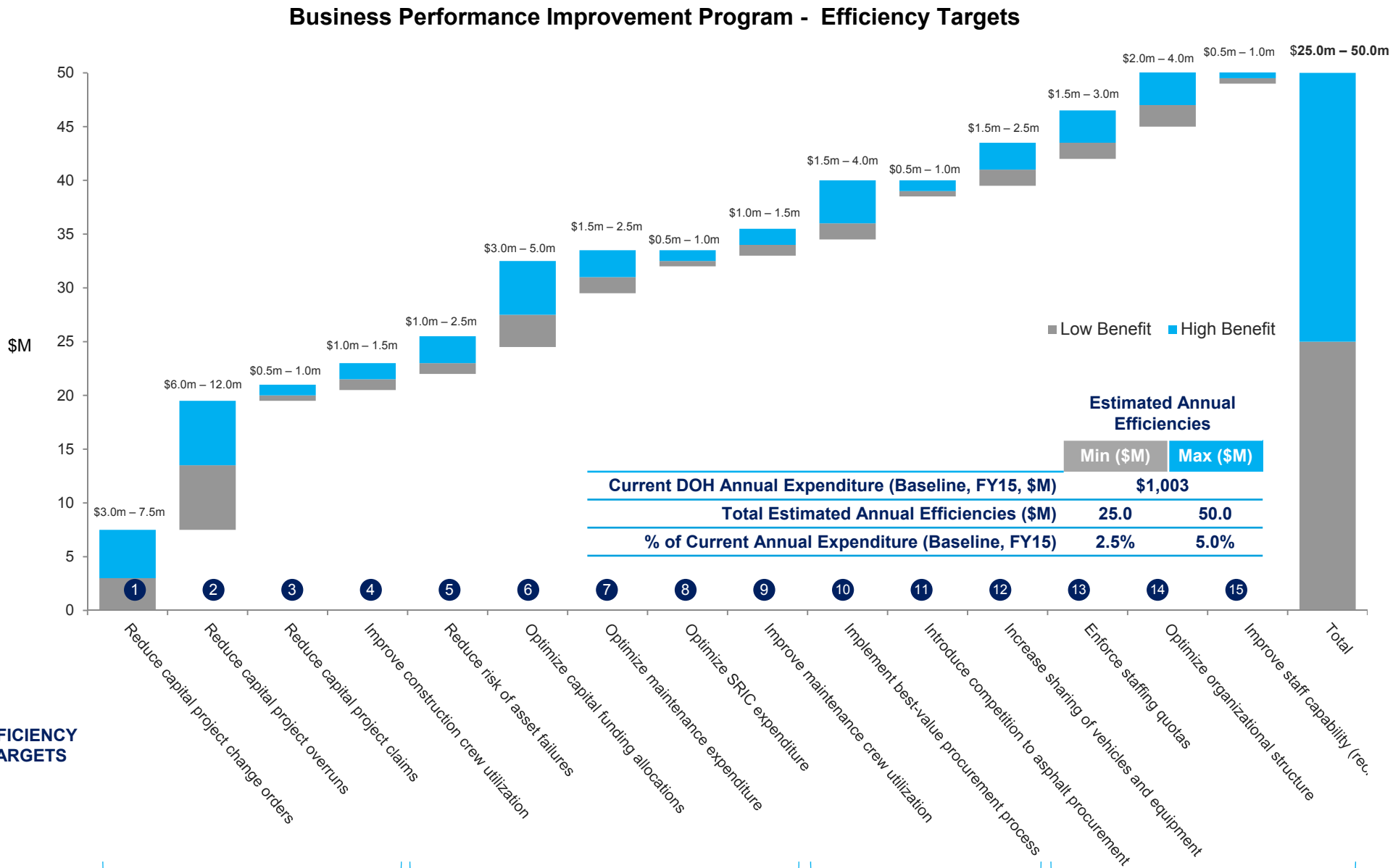
- Streamlined ways of working and higher utilization of funding, creating the ability to complete more construction and maintenance projects every year.
- Stronger project management practices, including cost and schedule control and innovative project procurement methods that consider total return on investment over the capital lifecycle.
- Greater use of technology and data analytics to improve efficiency, reduce operational costs and provide an evidence based approach making investment decisions.
- Prioritized works programs according to the risk in its transportation infrastructure network; considering infrastructure asset condition, criticality and remaining useful lives.
- Increased capability and morale of DOH staff, releasing additional operational productivity benefits.

We recommend that the DOH set up a Joint Steering Committee to drive the implementation of the Business Improvement Performance Program

Project Name	Project Description*	Issues Addressed	Efficiency Targets	Ease of Implementation	Estimated Annual Efficiencies	
					Min ($M)	Max ($M)
Project #1 – Project Management Office, Framework & Reporting	• Design and implement a Project Management Office (PMO), including standard methodology and templates for the planning and delivery of capital projects • Design and implement a Capital Projects Executive Reporting Dashboard	• No centralized PMO • No standard organization-wide project management methodology and templates • Limited cost-benefit analysis • No business case template • No performance monitoring tool for capital projects	1 Reduce capital project change orders	Medium	3.0	7.5
			2 Reduce capital project overruns	Difficult	6.0	12.0
			3 Reduce capital project claims	Medium	0.5	1.0
			4 Improve construction crew utilization	Easy	1.0	1.5
Project #2 – Asset Analytics & Funding Optimization	• Analyze asset performance data to determine risk factors • Update funding allocation formula to reflect District specific challenges and asset criticality • Utilize updated funding allocation formula to optimize capital project and maintenance programs • Design and implement funding monitoring processes	• Lack of integrated planning • Funding formula is outdated and not utilized • No formal prioritization process for CORE and STIP plans • Limited monitoring of asset performance and subsequent risk exposure • Risk of ageing and failing infrastructure	5 Reduce risk of asset failures	Difficult	1.0	2.5
			6 Optimize capital funding allocations	Difficult	3.0	5.0
			7 Optimize maintenance expenditure	Difficult	1.5	2.5
			8 Optimize SRIC expenditure	Medium	0.5	1.0
			9 Improve maintenance crew utilization	Easy	1.0	1.5
Project #3 – Sourcing & Procurement	• Update procurement processes to include a best-value approach • Introduce more competition • Increasing sharing of vehicles and equipment	• No best-value process • Lack of competition in procurement of asphalt • Limited sharing of vehicles and equipment	10 Implement best-value procurement process	Difficult	1.5	4.0
			11 Introduce competition to asphalt procurement	Medium	0.5	1.0
			12 Increase sharing of vehicles and equipment	Easy	1.5	2.5
Project #4 – Human Capital Improvement	• Organizational structure review • Improve HR processes • Enhance staff performance management framework	• Staffing quotas not enforced • HR processes not effective • Flaws in staff performance management framework • Asset base is growing	13 Enforce staffing quotas	Difficult	1.5	3.0
			14 Optimize organizational structure	Difficult	2.0	4.0
			15 Improve staff capability & performance	Medium	0.5	1.0
			Current Annual Expenditure (Baseline, FY15, $M)		**$1,003**	
			Total Estimated Annual Efficiencies ($M)		**25.0**	**50.0**
			% of Current Annual Expenditure (Baseline, FY15)		**2.5%**	**5.0%**

(*) Note: It is assumed that DOH will confirm the availability the proposed sponsors, project managers and team members suggested for each of the projects. Please refer to the project charters on pp. 72-76 for the proposed sponsors, project managers and team members.

$25M - $50M in annual efficiency savings have been identified and could be achieved by implementing the 4 proposed business improvement projects



Project #1 – Project Management Office, Framework & Reporting

Project Description	• Design and implement a Project Management Office (PMO), including standard methodology and templates for the planning and delivery of capital projects. • Design and implement a Capital Projects Executive Reporting Dashboard.
Timeline	12-18 months

Resources Required	• Staff: 3 x Full-Time FTEs. • Functions: Corporate, Design, Construction, Risk, Maintenance, Procurement, IT (Data), Health & Safety.
Expected Benefits	Estimated Annual Efficiencies: Min: $10.5M – Max: $22.0M
Costs To Implement	$$$ - Technology solutions increase complexity and costs, however based on our experience can achieve up to 1% of CAPEX efficiencies

Issue/Description

- No centralized Project Management Office (PMO) or standard, organization-wide project management methodology, processes or templates– reducing the quality of planning and resulting in some projects being completed late and over budget.
- Limited cost-benefit analysis, no business case template – reducing the accuracy of cost estimates and return on investment, making it difficult to assess whether to proceed with a project.
- No capital project analytics tool – limited ability to make quick, informed decisions about a project without real-time, complete project performance data.

Expected outcomes

- Standard Project Management Methodology aligned with industry best practice.
- Reduction in capital project overruns, change orders and claims.
- Increase in construction crew utilization from up-to-date project monitoring.

Interdependencies

- Asset Analytics & Funding Optimization – a new business case template will need to be aligned with plans to prioritize the capital expenditure program.

Recommended Scope

Project Management Methodology

- Detailed review of existing project management tools and processes in different groups across the organization.
- Hold workshops with key capital project personnel to design a new project management framework and processes e.g. budget management, schedule management, change orders, quality management, risks, issues and escalation, reporting.
- Pilot test the new project management framework and processes – train up DOH staff in best practice project management (PMBOK).

Capital Projects Executive Reporting Dashboard

- Create a dashboard to provide a division wide performance monitoring platform for Headquarters and District management and the general public to use.
- Require CORE plan updates to be submitted into OASIS or another progress tracking software rather than have a non-uniform submission and tracking process.
- Improve the estimated time it takes to complete projects by studying common project activities and benchmarking the rates of production achieved.
- Implement a process to monitor all federal funding programs in terms of percent used, percent remaining, and expiration date.
- Implement a review process to monitor for surplus funding.

Efficiency Targets	Ease of Implementation	Rationale	Estimated Annual Efficiencies		Estimate Assumptions
			Min ($M)	Max ($M)	
Reduce capital project change orders	Medium	Some control over outcome	3.0	7.5	• Estimate $3M - $7.5M in change orders from poor planning / year • There were $89.5M in change orders between FY13-15, average of $30M / year • Estimate 10% - 25% reduction from $30M change orders / year = $3M - $7.5M
Reduce capital project overruns	Difficult	Many external factors	6.0	12.0	• Estimate $6M - $12M in unnecessary capital project overruns / year • Capital project portfolio is approximately $485M over 5 years, average $97M / year • Assume delayed projects increases average capital program to $130M / year • Estimate between 5%-10% reduction in administration costs = $6M - $12M / year
Reduce capital project claims	Medium	Some control over outcome	0.5	1.0	• Estimate $0.5M - $1M in contractor claims from poor project management per year • Total claims have recently been negotiated down from $12M to $685,000
Improve construction crew utilization	Easy	Can be influenced easily	1.0	1.5	• Increase utilization from 75% to 80%, 500 construction staff @ avg. $60,000 / year

Project #2 – Asset Analytics & Funding Optimization

Project Description	• Analyze asset performance data to determine risk factors. • Update funding allocation formula to reflect District specific challenges and asset criticality. • Utilize updated funding allocation formula to optimize capital project and maintenance programs. • Design and implement funding monitoring processes.	**Resources Required**	• Staff: 4 x Full-Time FTEs. • Functions: Corporate, Engineering, Operations, Risk, Maintenance, Procurement, Finance, IT, Health & Safety.
		Expected Benefits	Estimated Annual Savings: Min: $7.0M – Max: $12.5M
Timeline	18-24 months	**Costs To Implement**	$$ - Requires significant data analysis and coordination

Issue/Description

- Risk of ageing and failing infrastructure.
- Lack of integrated planning.
- Funding formula is outdated and not utilized.
- No formal prioritization process for CORE and STIP plans.
- Limited monitoring of asset performance and subsequent risk exposure.

Expected outcomes

- Reduction in the risk of failing infrastructure by identifying high risk asset types and geographical areas in the network.
- An updated funding formula that takes into account District specific challenges.
- Application of the funding formula to optimize capital and operating expenditure.

Interdependencies

- Project Management Framework & Reporting – a new business case template will need to be aligned with plans to prioritize the capital expenditure program.

Recommended Scope

Asset Analytics

- Conduct an asset criticality workshop to better understand high risk asset types.
- Analyze asset performance data to determine risk factors in the network.
- Improve asset management processes.
- Implement a CORE plan for bridge activities.

Funding Allocation Optimization

- Create a fair framework to allocate and distribute routing maintenance funds to each of the Districts and County Organizations. Make the allocation process transparent.
- Design and implement a formal project prioritization process for both the STIP plan and core plan activities.
- Identify unused funds and determine if reallocation will create more efficiency.
- Remove SRIC funding from the annual maintenance budget so that overrun or underrun amount do not affect plans for other maintenance activities.
- Have the state plan a 15% contingency for all SRIC activity budgets.
- Identify ways to utilize TIGER FY2010 Tool.

Efficiency Targets	Ease of Implementation	Rationale	Estimated Annual Efficiencies		Estimate Assumptions
			Min ($M)	Max ($M)	
Reduce risk of asset failures	Difficult	Complex analysis required	1.0	2.5	• Additional analysis should be completed as a first step in the asset analytics project to understand the average number of highway and bridge closures / year and average cost per repair that could be reduced using preventative maintenance and rehabilitation measures, rather than replacing whole assets. • Estimate $1M-$2.5M in failed asset closures and repairs / year
Optimize capital funding allocations	Difficult	Large program of work	3.0	5.0	• Wastage is caused when specifications are not enforced, lack of quality inspections and also when the asset being improved is low risk e.g. low traffic • Estimate $3M-$5.0M (3%-5% total CAPEX) in wastage on capital projects / year
Optimize maintenance expenditure	Difficult	Large program of work	1.5	2.5	• Wastage is caused when maintenance activities are at higher frequency than required, are not preventative and performed on low risk assets e.g. low traffic • Estimate $1.5M-$2.5M in wastage on the maintenance program / year
Optimize SRIC expenditure	Medium	SRIC is a discrete program	0.5	1.0	• Estimate $0.5M-$1.0M in SRIC activities not being funded by Federal money that could potentially be funded through FEMA or FHWA programs
Improve maintenance crew utilization	Easy	Can be influenced easily	1.0	1.5	• Increase utilization 75% to 80%, 500 maintenance staff @ avg. $60,000 / year

Project #3 – Sourcing & Procurement Improvement

Project Description	• Update procurement processes to include a best-value approach. • Introduce more competition, particularly in asphalt procurement. • Increasing sharing of vehicles and equipment.	**Resources Required**	• Staff: 2 x Full-Time FTEs. • Functions: Corporate, Engineering, Operations, Risk, Maintenance, Finance, Procurement.
		Expected Benefits	Estimated Annual Savings: Min: $3.5M – Max: $7.5M
Timeline	12 months	**Costs To Implement**	$ - Relatively low cost, mainly process improvement

Issue/Description

- Statewide supplier contracts may not provide the best value for money, particularly in rural areas.
- Competition for asphalt procurement is limited due to the monopolistic nature of the local markets.
- Procurement cost-benefit analysis during the project development phase is limited.
- Some procurement processes can cause delays.
- It is difficult to monitor rental equipment utilization.
- Limited sharing of vehicles and equipment across Districts.

Expected outcomes

- Update procurement processes to include a best-value approach.
- Introduce more competition, particularly in asphalt procurement.
- Increasing sharing of vehicles and equipment.

Interdependencies

- Project Management Framework & Reporting – best-value procurement process can be incorporated into the new Project Management Methodology & Templates

Recommended Scope

Best-Value Procurement Approach

- Implement a new policy to allow staff to go “off contract” for a list of approved reasons.
- Evaluate the attractiveness of region-wide supplier contracts to reduce long lead times, particularly in O&M categories.
- Design and implement a procurement cost-benefit analysis process with templates.
- Update the corporate purchasing manual with streamlined approval thresholds.
- Implement a 3rd party quality control system which would get another perspective for reviews and mitigate potential for change orders and design flaws between contract execution and project commencement.

Introduce Competition to Asphalt Procurement

- Revisit the ‘white paper’ findings regarding opening a DOH asphalt plant.
- Increase competition on asphalt contracts by packaging up and going to market together with all of the resurfacing projects.

Increase Sharing of Vehicles and Equipment

- Implement a process for the Districts to track rental equipment – potentially in OASIS.
- Consider renting non-seasonal equipment displaying high levels of idle and down time.
- Design and implement metrics that can fairly allocate vehicles and equipment.
- Promote sharing of vehicles and equipment between the Districts.

Efficiency Targets	Ease of Implementation	Rationale	Estimated Annual Efficiencies		Estimate Assumptions
			Min ($M)	Max ($M)	
Implement best-value procurement process	Difficult	Complex analysis required, need to compare against state-wide contracts	1.5	4.0	• High level analysis of costs from long lead times completed in District 6 • Estimate $1.5M-$4M in down time from long repair lead times / year
Introduce competition to asphalt procurement	Medium	High effort/time required to package up projects and procure together	0.5	1.0	• Asphalt pricing in other states shows potential reduction of between $0.5M-$1M from introducing competition in the local marketplace • Estimate $0.5M-$1M in payments of inflated asphalt pricing / year
Increase sharing of vehicles and equipment	Easy	Data analysis required, but efficiency gains should be easy to find	1.5	2.5	• Equipment utilization report has confirmed 30%-40% idle and down time / year • Estimate $1.5M-$2.5M in vehicle and heavy construction equipment idle and down time / year

Project #4 – Human Capital Improvement

Project Description	• Organizational structure review. • Improve HR processes – redesign and automate processes where necessary. • Design new staff performance management framework.	**Resources Required**	• Staff: 3 x Full-Time FTEs. • Functions: Corporate, HR, Legal, Finance, Risk, Engineering, Operations, Maintenance.
		Expected Benefits	Estimated Annual Savings: Min: $4.0M – Max: $8.0M
Timeline	18-24 months	**Costs To Implement**	$$ - Highly sensitive, structural changes create complexity

Issue/Description

- Lack of merit-based rewards and competitive salaries hinder the DOH's ability to attract and retain a highly skilled workforce.
- Staff performance management is reactionary and there does not appear to be a formal performance management framework in place.
- Some HR processes are manual and labor intensive e.g. time collection.
- Training delivery could be improved to be more tailored to technical needs.
- Staffing quotas not enforced and many Districts & Divisions remain overstaffed.
- The organizational structure could be revised to realize greater efficiencies.
- The geographical layout of Districts 2 and 8 could be optimized.

Expected outcomes

- Overall head count reduction after balancing quotas between Districts.
- Staff performance management framework.
- More efficient organizational structure and HR processes.

Interdependencies

- Asset Analytics & Funding Optimization – Enforcing staffing quotas and making changes to the organizational structure may impact on availability and morale of construction and maintenance staff.

Recommended Scope

Staff Performance Management Framework

- Design and implement staff performance management framework, including career ladders, promotion incentives, merit-based rewards and performance review process.
- Benchmark organization-wide salaries against industry standard and similar organizations and evaluate whether to adjust compensation to attract and retain talent.

Streamline HR processes

- Workshop with Administrative Managers to create detailed standardized process for all administrative functions similar to those already created by certain Districts.
- Automate the time collection process, review the employee disciplinary process.

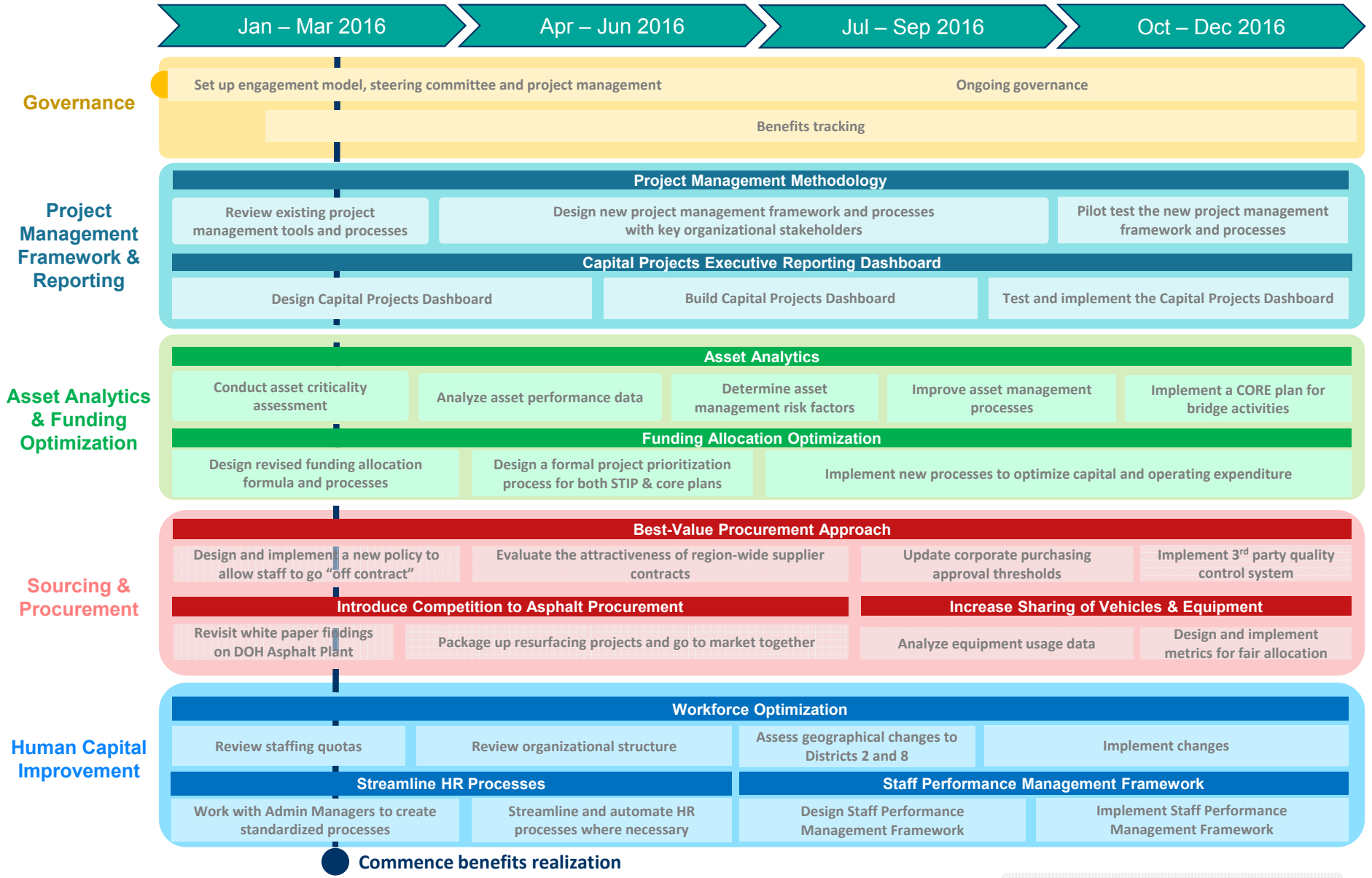
Workforce Optimization

- Review staffing quotas to ensure they are adequate for the duties required and enforce staffing quotas to achieve the right balance of staff across the Districts.
- Review the organizational structure and identify opportunities to consolidate back office departments by multi-skilling staff.
- Evaluate whether to relocate District Headquarters in Districts 2 and 8 to a more central location to achieve efficiencies in District travel time.
- Clearly define what the Bridge Inspectors are responsible for and what their priorities are in terms of utilization.
- Create a Data Analytics department to gain insights from the data provided by OASIS.

Efficiency Targets	Ease of Implementation	Rationale	Estimated Annual Efficiencies		Estimate Assumptions
			Min ($M)	Max ($M)	
Enforce staffing quotas	Difficult	Extensive analysis required, highly sensitive nature, many stakeholders	1.5	3.0	• Revised staffing quotas are based on historical staffing levels over the past 10 years and are not a forward looking estimate to reduce staff from consolidation • Estimate head count reduction from enforcing quotas, 25 staff @ $60,000 / year
Optimize organizational structure	Difficult	Extensive analysis required, highly sensitive nature, many role types	2.0	4.0	• Additional head count reduction from department/role consolidation, 50 staff @ $40,000 / year (lower salary assumed for inspection and admin. staff) • Reductions would consolidate permitting staff and timekeepers in each District
Improve staff capability (recruiting & training)	Medium	High effort required to understand training needs and HR processes	0.5	1.0	• Greatest improvements would be from computer training for admin. staff and commercial/leadership training for middle management. • Estimate $0.5M-$1M in lost productivity from capability and inefficient processes per year.

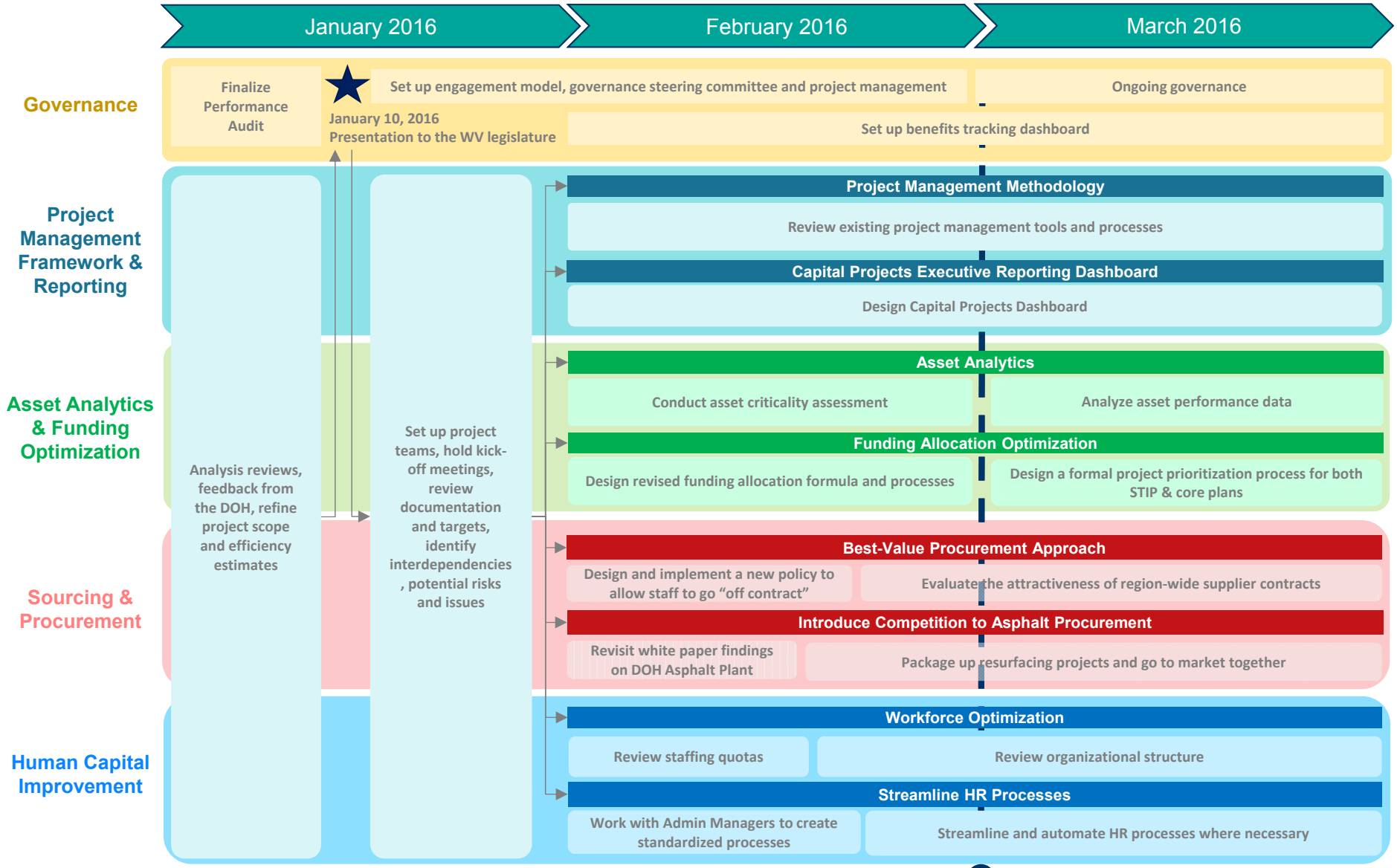
Indicative 1-Year Implementation Timeline

It is recommended that DOH undertake five key streams of work to further validate and then implement activities required to move towards the achievement of the savings estimates.



Indicative 3-month timeline for the first quarter of 2016

To successfully begin the process of improving the effectiveness of DOH and to achieve the identified efficiency targets, a number of key activities are recommended for completion over the next three months.



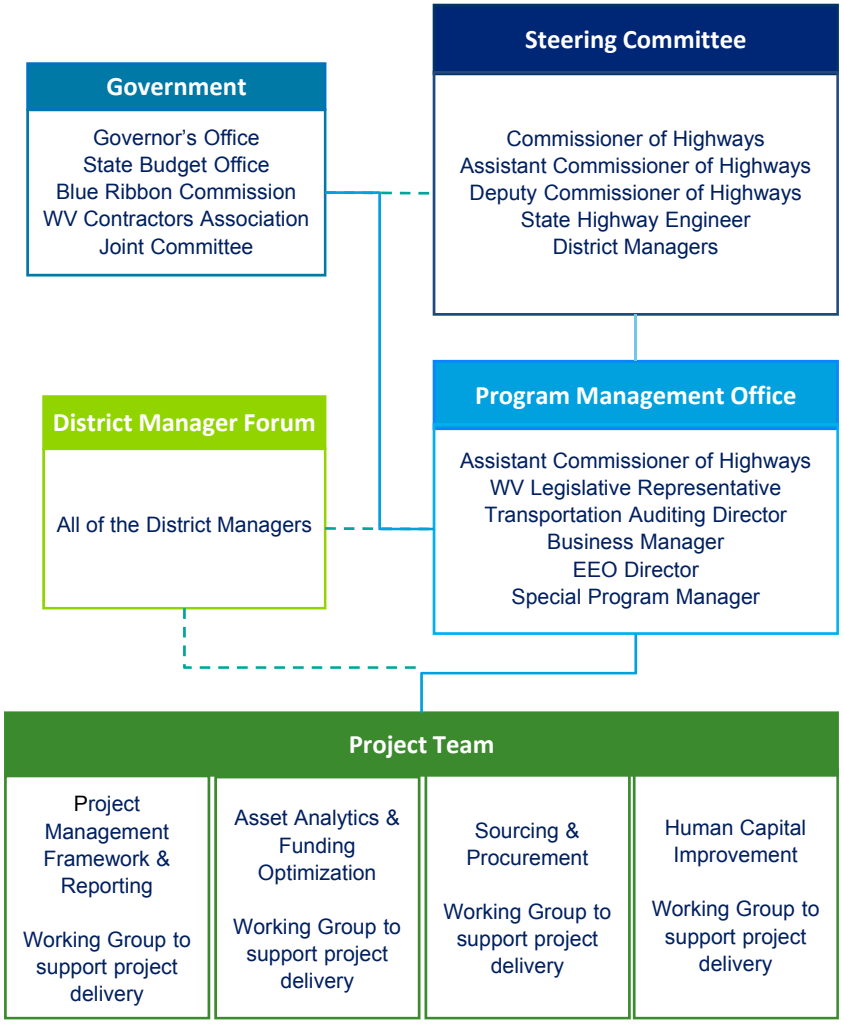
Potential risks and mitigating actions for the implementation phase

A number of risks should be considered and addressed as the project moves into the implementation phase.

Potential Risks	Risk Level	Proposed Mitigating Actions
Lack of support from executive management and/or key organizational stakeholders to pursue the opportunities given the sensitive nature of the implementation program	**High**	Complete detailed stakeholder engagement plan, leveraging key stakeholder input to further quantify and validate the savings potential and priority areas
Business as usual activities are prioritized over implementation project activities by DOH staff members thus impacting progress made and achievement of benefits	**High**	Secure a commitment from DOH staff to dedicate their time to driving the project forward and participating in key working groups
Implementation timeframes are too aggressive, particularly in relation to the initial 6-month phase, thus impacting how quickly implementation and benefits realisation can occur	**Medium**	Prioritize setup of the PMO and working groups (including members of from the Districts) to dedicate focus on this activity and set the program up for success
There may be a lack of funding set aside for DOH to implement technology based solution s that are integral to drive operation efficiencies and sustainable cost savings in the future	**High**	DOH should set aside dedicated funding for technology improvements as part of its annual capital planning process, specifically for implementation of tools that will drive operational efficiencies.
Through more detailed analysis, the savings estimates may fluctuate up and down, particularly as the implementation costs become better understood	**Medium**	Reinforce the assumptions and limitations around the high level nature of the savings estimates completed to date and focus initial efforts in the implementation stream on further detailed analysis and cost benefit assessments to confirm priorities
Lack of coordination from the Districts and Functional Departments may lead to the erosion of estimated benefits	**Medium**	Put in place a robust governance structure with senior stakeholder buy-in from the Districts to drive a coordinated approach. This should be supported by a central function that project manages the implementation program
Should there be a change of government or at the executive management level, this project may not be considered a priority for the new leadership and momentum may be impacted	**Low**	Work with all key senior stakeholders (external and internal) to obtain buy-in and get traction through the initial stages of the implementation program to keep the momentum going on progressing the project

Proposed implementation governance model, roles and responsibilities

We propose that DOH set up the governance model outlined below as the vehicle to execute the recommended business performance improvement program.



Government

- Set the objectives for the program in line with policy
- Help project team liaise with key stakeholders
- Make key decisions, sign-off on major deliverables

Steering Committee

- Accountable for services to be delivered within timing and scope
- Provide leadership & set direction for the program team
- Provide quality assurance and agree the approach taken in the analysis and deliverables

District Manager Forum

- Provide insight on business specific issues & impacts
- Provide staff to work with the PMO to deliver the program
- Provide specific insight on engagement preferences
- Provide quality assurance on the deliverables

Program Management Office

- Provide program management, governance and stakeholder engagement support for the program
- Provide direction to the analysis & development of deliverables
- Track the achievement of benefits

Project Team

- Complete day to day project activities
- Interface with the District Managers, DOH staff and with the PMO
- Research and analyze data
- Prepare deliverables

5 Appendices

Acronym List

- AADT – Annual Average Daily Traffic
- AHDS – Appalachian Highway Development System
- AOP – Administrative Operating Procedures
- BPIP – Business Performance Improvement Program
- DEP – Department of Environmental Protection
- DOH –West Virginia Division of Highways
- E&S – Erosion and Sediment
- E2E – End to End
- EPA – Environmental Protection Agency
- ePM – Enterprise Performance Management
- ERP – Enterprise Resource Planning system
- FHWA – Federal Highway Administration
- FLAP – Federal Lands Access Program
- FY – Fiscal Year
- GIS – Geographic Information System
- HQ – DOH Headquarters (referring to Charleston)
- MAP-21 – Moving Ahead for Progress in the 21st Century Act
- NPDES – National Pollutant Discharge Elimination System
- NTP – Notice to Proceed
- O&M – Operations and Maintenance
- P-Card – Purchasing Card
- PBES – Prefabricated Bridge Element System
- PCPS – Precast Concrete Paving System
- PPP – Public Private Partnership
- QC – Quality Control
- RFP – Request for Proposal
- ROW – Right of Way
- SOP – Standard Operating Procedure
- SRIC – Snow Removal Ice Control
- STIP – Statewide Transportation Improvement Plan
- TIGER – Transportation Investment Generating Economic Recovery
- VE – Value Engineering
- VMT – Vehicle Miles Travelled
- WVDNR – West Virginia Department of Natural Resources
- WVDOT – West Virginia Department of Transportation

Performance Audit Interview Log (1/2)

118 stakeholder interviews

Location	Name	Role
Headquarters	John McBrayer	Deputy Secretary for Administration
Headquarters	Keith Chapman	Business Manager
Headquarters	Greg Bailey	State Highway Engineer
Headquarters	Todd Rumbaugh	Deputy State Highway Engineer - Construction
Headquarters	Jason Boyd	Director for Contract Administration
Headquarters	Ron Smith	Deputy State Highway Engineer - Operations
Headquarters	Ron Stanevich	Director of Materials Control
Headquarters	Angie Moorman	Purchasing
Headquarters	Carla Rotsch	Budget Director
Headquarters	Kathleen Dempsey	Administrative Services
Headquarters	Lora Whitt	Administrative Services
Headquarters	Kenny Yoakum	Director of Fleet Management
Headquarters	Robert Watson	Regional Planning Engineer
Headquarters	Richard Warner	Planning Director
Headquarters	Ryland Musick	Programming Director
District 1	Aaron Gillispie	District Manager
District 1	Travis Knighton	Maintenance Engineer
District 1	Bob Heckert	Comptroller
District 1	Sandy Wanless	Realty Manager
District 1	Bill Dorsey	Permits
District 1	Dave Harpor	Maintenance Assistant
District 1	Chuck Smith	Maintenance Assistant
District 1	Gary Mullins	Construction Engineer
District 1	Tracy Brown	Bridge Engineer
District 1	Manoo Saidi	Traffic Engineer
District 1	Gerald Smith	Equipment Supervisor
District 1	Toni Rogers	Resurfacing Coordinator
District 2	Scott Eplin	District Manager
District 2	Jonathan Clark	Bridge Engineer
District 2	Chris Collins	Construction Engineer
District 2	Steve Runyon	Maintenance Engineer
District 2	Harold Jones	Human Resources
District 2	Barry Hatfield	Design Staff
District 3	Rusty Roten	District Manager
District 3	Tyler Roberts	Environmental Coordinator
District 3	Chris Weekly	Permits
District 3	Lyn Westbrook	ROW
District 3	Scott Kelly	Crew Supervisor
District 3	Chuck Holmes	County Administrator
District 3	Jason Nichols	County Administrator
District 3	Mike Foley	Construction Engineer
District 3	Karen Greenburg	Comptroller
District 3	Howard King	Resurfacing Coordinator
District 3	Susan Fought	Oil and Gas Coordinator
District 3	Jake Bumgarner	Maintenance Engineer
District 3	Cliff Essig	Bridge Engineer
District 3	Dave Smith	Engineer
District 3	Tom Badgett	Maintenance Assistant
District 3	Bart Schumacher	Design Engineer
District 3	Dave Burris	Traffic Engineer
District 3	Wayne Nichols	Equipment Staff
District 3	Debbie Farnsworth	Human Resources

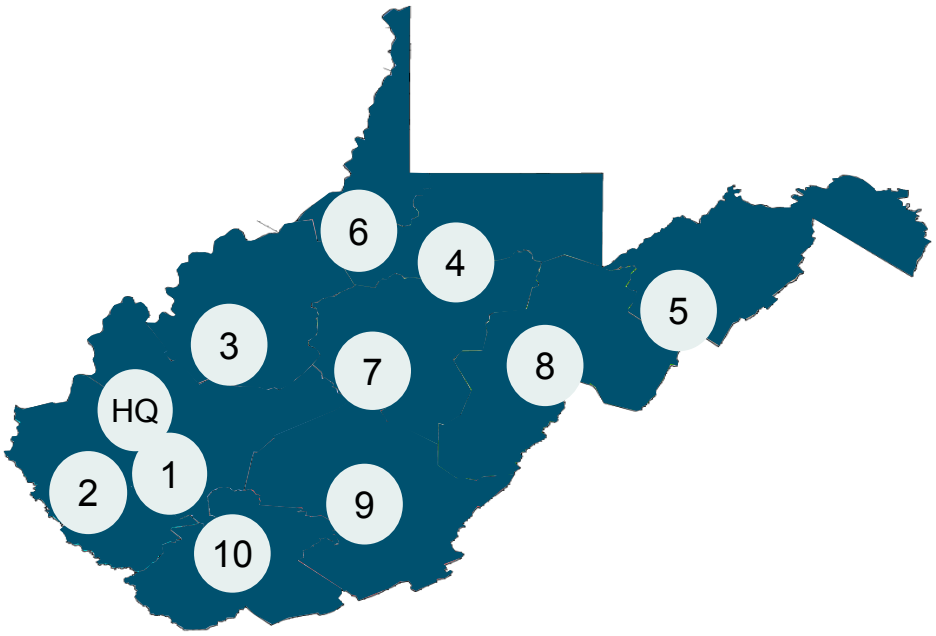
11 site visits

Location	Name	Role
District 4	Ray Urse	District Manager
District 4	Josh Vincent	Design Engineer
District 4	Jason Nelson	Construction Engineer
District 4	J.J. Jordan	Maintenance Engineer
District 4	Randy Harris	Bridge Engineer
District 4	Jim Funk	Comptroller
District 4	Charles Crouse	Equipment Shop Manager
District 4	Ray Tackett	Realty Manager
District 4	Anthony Paletta	Administrative Services Manager
District 5	J. Lee Thorne	District Manager
District 5	Daniel Watts	Construction Engineer
District 5	Leslie Stagger	Administrative Services Manager
District 5	Laranda Baldwin	Comptroller
District 5	Paul Steedman	Bridge Engineer
District 5	Donnie Coby	Corridor H Supervisor
District 5	Bob Pritts	Equipment Supervisor
District 5	Barry Knotts	Maintenance Engineer
District 5	Harold Michael	County Commissioner for Hardy County
District 6	Gus Suwaid	District Manager
District 6	Mandy Crow	Administrative Services Manager
District 6	Pat Gurrera	Bridge Engineer
District 6	Paul Hicks	Maintenance Engineer
District 6	Mike Grahl	Acting Comptroller
District 6	Rob Maury	Equipment Supervisor
District 6	Dave Redd	Heavy Maintenance Supervisor
District 7	Ron Hooton	District Manager
District 7	Peggy Carpenter	Administrative Services Manager
District 7	Chad Boram	Bridge Engineer
District 7	Kip Hall	Construction Engineer
District 7	Roger Sisk	Corridor H Supervisor
District 7	Doug Gould	Design Engineer
District 7	Randy Cunningham	Equipment Shop Supervisor
District 7	Ronald Dean	Equipment Shop Foreman
District 7	Meliss Jordan	Comptroller
District 7	Ronald Smith	Maintenance Engineer
Buckhannon	Travis Raye	Equipment Director
District 8	James Rossi	District Manager
District 8	Tom Collins	Maintenance Engineer
District 8	Steve Schumacher	Construction Engineer
District 8	Ron Klavuhn	Bridge Engineer
District 8	Thomas Karlen	Equipment Supervisor
District 8	Cameron Barkley	Area Construction Supervisor
District 8	Lorren Demotto	Administrative Services Manager
District 9	Steve Cole	District Manager
District 9	Jim Moore	Maintenance Engineer
District 9	Scherry Bostic	Comptroller
District 9	Stewart Lewis	Roadway Design Engineer
District 9	Greg Hylton	Construction Engineer
District 9	Todd Campbell	Acting Equipment Supervisor
District 9	Adrian Lusk	Bridge Engineer
District 9	John Reese	Bridge Design Engineer
District 9	Melinda Gibson	Administrative Services Manager

Performance Audit Interview Log (2/2)

118 stakeholder interviews

Location	Name	Role
District 10	Thomas Camden	District Manager
District 10	Angela Roske	Comptroller
District 10	Kristen Shrewsbury	Human Resources
District 10	Alan Reed	Maintenance Engineer
District 10	Eric Morgan	Design Engineer
District 10	Roger Fisher	Encroachment and Permits
District 10	Erin Gardner	Environmental Coordinator
District 10	Terra Goins	Construction Engineer
District 10	Joe Pack	Assistant Maintenance Engineer
District 10	Jason Blevins	Equipment Supervisor
District 10	Cecil Shrader	ROW
District 10	Josh Anderson	Acting Bridge Engineer
District 10	Howard Leedy	Area Construction Supervisor
District 10	Tony Walters	Bridge Engineer Staff



11 site visits

#	Location	Date	Key Activities
HQ	Charleston, WV	Multiple Visits	Interview Key Personnel Regarding 6 Focus Areas of Performance Audit
1	Charleston, WV	9/8/15 - 9/9/15	
2	Huntington, WV	9/10/15	
3	Parkersburg, WV	9/14/15 - 9/16/15	
4	Clarksburg, WV	10/13/15 - 10/14/15	
5	Burlington, WV	10/19/15 - 10/21/15	
6	Moundsville, WV	10/19/15 - 10/21/15	
7	Weston, WV	9/28/15 - 9/30/15	
8	Elkins, WV	10/13/15 - 10/14/15	
9	Lewisburg, WV	10/5/15 - 10/7/15	
10	Princeton, WV	9/21/15 - 9/23/15	

Performance Audit Document Log (1/5)

Documentation Received	Date Received	Received From
Asphalt Purchase Order – Laydown and Delivery	9/28/2015	District 7
Asphalt Purchase Order – Plant Pickup	9/28/2015	District 7
Purchase Order Spreadsheet	9/28/2015	District 7
Resurfacing Bid Tab	9/28/2015	District 7
Resurfacing Letting Summary	9/28/2015	District 7
Resurfacing Project Estimate	9/28/2015	District 7
Slide Bid Tab	9/28/2015	District 7
Slide Letting Summary	9/28/2015	District 7
D7 Equipment Budget	10/1/2015	District 7
D7 General Operations Budget	10/1/2015	District 7
D7 Maintenance Budget	10/1/2015	District 7
Customized Procedures for Resignation / Termination / Transfer; Hiring for a Posted Position; Retirement; Posting a Vacant Position; Temporary Upgrade for Salaried Employees; Reallocation; Disciplinary Action	10/7/2015	District 7
Description of District Funding by Comptroller	9/9/2015	District 1
Manual on Rules and Regulations for Constructing Driveways on State Highway ROW	9/9/2015	District 1
EPA-1, EPA-2, EPA-3	9/9/2015	District 1
Results of Observation of D3 Inventory 2014 Review SMA-15-02 (03)	9/21/2015	District 3
March 1999 Performance Audit, Department of Transportation, Division of Highways, County Maintenance Units – State of North Carolina	10/7/2015	Online
BRC Bond Issuances	9/2/2015	Online
Parkway Bonds Law	9/2/2015	Online
WV March 2015 Debt Update	3/31/2015	Online
DOH0505 – Maintenance Performance Standards	10/7/2015	Online
DOH0506 – Maintenance Plan	9/2/2015	Online
DOH 0507 – Maintenance Schedule	9/2/2015	Online
DOH0508 – Maintenance Management Control Reports	9/2/2015	Online
DOH0510 – Quality Assurance of Materials Received	9/2/2015	Online
DOH0515 – CORE Maintenance Plan	9/22/2015	Online
WVDOT Organizational Charts and Lists of Contacts (From 2014-2019 STIP)	9/2/2015	Online
Headquarters Organizational Structure	10/27/2015	Headquarters
District 1 Organizational Structure	9/8/2015	District 1

Performance Audit Document Log (2/5)

Documentation Received	Date Received	Received From
District 2 Organizational Structure	9/10/2015	District 2
District 3 Organizational Structure	10/16/2015	District 3
District 4 Organizational Structure	10/13/2015	District 4
District 5 Organizational Structure	10/19/2015	District 5
District 6 Organizational Structure	10/19/2015	District 6
District 7 Organizational Structure	9/28/2015	District 7
District 8 Organizational Structure	10/13/2015	District 8
District 9 Organizational Structure	10/5/2015	District 9
District 10 Organizational Structure	9/21/2015	District 10
Examination of the Existing and Future Staffing Levels of the West Virginia Division of Highways Annual Plan and Equipment Support Organizations (12/15/2005)	9/14/2015	Headquarters
DOH Quota Report	9/14/2015	Headquarters
DOH0206 Disciplinary Procedures	10/7/2015	Online
Job Classifications and Paygrade Schedule	10/6/2015	Online
Organization Numbers	10/6/2015	Online
West Virginia Department of Transportation Workforce Development Executive Summary (2014)	9/16/2015	District 3
Quota Prop1 3 1 2015 HWS GCMQUOTA and HWS EQQUOTA	10/27/2015	Headquarters
DOH0205 – Exit Survey	9/2/2015	Online
DOH0208 – Transfers and Reassignments Ordered by Management	9/2/2015	Online
DOH0209 – Merit Increase Policy	9/2/2015	Online
DOH0214 – Posting and Filling of Job Vacancies	9/2/2015	Online
DOH0216 – Rotation of New Graduate Engineers	9/2/2015	Online
DOH0511 – Materials Purchasing – Contract Administration	9/2/2015	Online
DOH0402 – Administration of Highways' Transportation Vehicles	9/2/2015	Online
DOH0405 – Assignment of Repair Responsibilities	9/2/2015	Online
DOH0408 – Equipment Review Program	9/2/2015	Online
WVOASIS Transportation Asset Inventory (Presented at Planning Conference 10/8/2014)	10/6/2015	Online
WVDOH AOP Section Section V Chapter 4 Maintenance Allocation Subsystem	10/7/2015	Online
WVDOH AOP Sect V Chapter 15 Core Plan	10/7/2015	Online
BRC Financing WV Highways	9/8/2015	Online
BRC Innovative Financing	9/8/2015	Online

Performance Audit Document Log (3/5)

Documentation Received	Date Received	Received From
BRC Transportation Funding	9/8/2015	Online
West Virginia Multi-Model Statewide Transportation Plan	10/15/2015	Online
WV Budget Allocation Legislation 2013	9/16/2015	Online
WV Budget Allocation Legislation 2014	9/16/2015	Online
WV Budget Allocation Legislation 2015	9/16/2015	Online
WVDOH AOP Section V, Chapter 3 Roadway Feature Inventory	10/7/2015	Online
WV Internal Financial Audit 2013	10/7/2015	Online
WV Internal Financial Audit 2014	10/7/2015	Online
WVBRC Final Report 2014	9/16/2015	Online
District 1 Budget	10/31/2015	HQ - Budget Division
Equipment Revolving - FY13-15	10/31/2015	HQ - Budget Division
FY20xx Maintenance Annual Plan Calculation	10/31/2015	HQ - Budget Division
FY2012 Annual Plan Allocations per Road Mile	10/31/2015	HQ - Budget Division
FY 2012 Annual Plan Allocation	10/31/2015	HQ - Budget Division
FY 2012 Proposed Alloc. Vs FY 2011 Allocation	10/31/2015	HQ - Budget Division
FY 2012 Quota Comparison	10/31/2015	HQ - Budget Division
FY 2012 vs FY 2011 Category Comparison	10/31/2015	HQ - Budget Division
FY 2012 vs FY2011 Lane Mileage Comparison	10/31/2015	HQ - Budget Division
Litter Control - FY13-15	10/31/2015	HQ - Budget Division
2014-2019 WV Statewide Transportation Improvement Plan	9/29/2015	Online
WVDOT Administrative Procedures Volume I, Ch 9 Fuel Card Program	9/16/2015	Online
WVDOH AOP Section IV, Ch 2 Administration of Highways Transportation Vehicles	9/8/2015	Online
WVDOH AOP Section IV, Ch 5 Assignment of Repair Responsibilities	9/8/2015	Online
WVDOH AOP Section IV, Ch 8 Equipment Review Program	9/8/2015	Online
WVDOT AP Volume IV Ch 5 Equipment Reporting Requirements	10/7/2015	Online
WVDOT AP Volume IV Ch 4 Equipment Reporting System	10/7/2015	Online
WVDOT AOP Volume IV Ch 7 Preventative Maintenance Program	10/7/2015	Online
Equipment Rental Lease Requests FY2015	10/29/2015	Headquarters
Equipment Rental Lease Requests FY2016	10/29/2015	Headquarters
Equipment Statewide 9-8-15	9/10/2015	Buckhannon

Performance Audit Document Log (4/5)

Documentation Received	Date Received	Received From
WVDOT AP Volume I Ch 5 Personal Vehicle Use In Performance of Official Business	9/16/2015	Online
FY 16 Forecast - actual for FY2015	9/30/2015	Headquarters
Equipment Abbreviations	10/6/2015	Headquarters
Asphalt WVDOT -DOH Special Report on Costs Associated with Construction and Operation of an HMA Production Plant	10/2/2015	Headquarters
DOH Exp FY2007-FY2016 (by month)	10/2/2015	Headquarters
Actove vs. Quota by District	10/2/2015	Headquarters
FY13-15 AnnualPLan	10/15/2015	Headquarters
Statewide Annual Plan Summary (FY 13-15)	10/2/2015	District 7
Sept2015EquipmentUsage	10/8/2015	Buckhannon
098 NOV Response	10/2/2015	Headquarters
109 NOV Response Letter 5-2-12	10/2/2015	Headquarters
185 NOV Response Letter 5-31-15	10/2/2015	Headquarters
2015 08 21 Change Order No. 60 Change Order Report	10/2/2015	Headquarters
250 NOV Response - June 2015	10/2/2015	Headquarters
Change Order No 23	10/2/2015	Headquarters
Consent Order No 7886	10/2/2015	Headquarters
Consent Order No 8121	10/2/2015	Headquarters
NOV Cost Breakdown	10/2/2015	Headquarters
NOV List	10/2/2015	Headquarters
NPDES Permit	10/2/2015	Headquarters
WVNPDES Stormwater Permit - Termination Inspec	10/2/2015	Headquarters
Answers to Questions 2 and 3 from October 2	10/21/2015	Headquarters
WVU Population Trends in West Virginia through 2030	11/4/2015	Online
Construction Contract Award Maual	9/16/2015	Online
rpt_co_approved_by_district_D1-D10	9/16/2015	Headquarters
Maintenance Manual	10/28/2015	Headquarters
Value Engineering Manual	9/3/2015	Online
CPM Schedule Review Manual	11/4/2015	Headquarters
Road and Bridge Standards 2015 update	9/2/2015	Online
Value Engineering Data	10/16/2015	Headquarters

Performance Audit Document Log (5/5)

Documentation Received	Date Received	Received From
D1 Core Plan Data	10/31/2015	Headquarters
D2 Core Plan Data	10/31/2015	Headquarters
D3 Core Plan Data	10/31/2015	Headquarters
D4 Core Plan Data	10/31/2015	Headquarters
D5 Core Plan Data	10/31/2015	Headquarters
D7 Core Plan Data	10/31/2015	Headquarters
D9 Core Plan Data	10/31/2015	Headquarters
q_co_approved_by_district	11/16/2015	Headquarters
Site Manager Custom Reports Administration	10/7/2015	Headquarters
Site Manager Custon Reports Construction	10/7/2015	Headquarters
TRB Circular E-C200 Transportation Asset Management From Plans to Practice	11/3/2015	Online
Emerging Performance Measurement Responses to Changing Political Pressures at State DOTs: A Practitioners' Perspective	11/3/2015	Online
Evaluating Roads as Investments	10/29/2015	Online
Prioritizing Highway Construction: Benefits Analysis	10/28/2015	Online
West Virginia DOH Bridge Design Manual	10/20/2015	Headquarters
West Virginia DOH 2014 Bridge Design Manual Interims	10/20/2015	Headquarters
Design Directives	11/3/2015	Headquarters
Bridge Inspection Manual	9/16/2015	Headquarters
VDOT 2007 Spec Book	10/27/2015	Online
PENNDOT Pavement Policy Manual	10/27/2015	Online
KYDOT Asphalt Specifications	10/26/2015	Online
Erosion and Sediment Control Manual 2004	11/2/2015	Online
Reclaimed Asphalt PAvement in Asphalt Mixtures: State of the Practice	11/8/2015	Online

Head Office and the 10 Districts
Summary of Findings and Recommendations

DOH Headquarters Summary

Key Statistics

- No. of Staff: 783
- Location: Charleston, WV
- 34,608 mi of State Roads
- 6,958 Bridges
- Current Annual Operating Budget: 51,481,000
- No. of Contract Projects (FY13-15): 1,058

Location

Local Challenges

- Political pressure from legislators demanding that things happen quickly
- Top down approach from Head Office wi9th some engagement from the Districts
- Management team in head office predominantly has a technical background (i.e. job description mandates that the employee possess a PE to hold certain levels of upper management
- Management team in head office is mainly male – limited diversity

High Level Analysis Summary

Key Findings

- The routine maintenance funding allocation process is not consistent with language written in the Administrative Operating Procedures
- Overall, the DOH has not used all of its allocations over the past three fiscal years
- The hiring process is often times lengthy in nature and prospective employees will abandon the process due to the excessive time frames
- Reprimanding employees is also a lengthy process
- A disconnect exists between management at Headquarters and management at the District level

Recommendations

- Create and implement a fair framework to allocate routine maintenance funds to the Districts
- Identify where allocations are not being utilized annually and reallocate these funds more appropriately
- Revisit and update the hiring procedures. This would entail reducing the amount of required approvals for prospective employee's applications and would ultimately reduce the overall length of processing time.
- Allow personnel specialists to assist in the reprimand process including helping with fact finding and analysis
- Increase transparency between Headquarters and the Districts to create a more trusting atmosphere and get "buy-in" from all of the Districts and County organizations

District 1 Summary

Key Statistics

- No. of Staff: 487
- Square Miles:2,553 mi^2
- Road Miles:3,966
- No. of Bridges: 997
- Annual Snowfall: 51.1”
- Travel Time to Charleston: 0 Hour
- Maintenance Allocation: $7.4 Million
- Industries Affecting DOH: Oil & Gas, Coal
- Population: 309,252
- Projected Population Growth: -1.35%

Local Challenges

- Because of District’s proximity to DOH headquarters and the WV State Capitol, there is a perception of extra scrutiny of District projects.
- Has both the highest number of bridges and most bridge deck area of all districts.
- Charleston is one of the most densely populated areas with-in West Virginia

Location

High Level Analysis Summary

Key Findings

- As a whole, the funding for bridge maintenance, repair, and reconstruction is, on average, 30% more than the Districts are able to spend in a FY.
- CORE plan projects are required to be spaced out and completed on various schedules yet with-in the schedules there are no guidelines or processes determining which assets to work on first.
- Although the Districts have designated Bridge Inspectors, they are occasionally called away from their inspection duties to perform repairs

Recommendations

- Revisit the basis for determining how different organizations are allocated their funding
- Institute a formal project prioritization process for both the STIP plan and core plan activities. This tool will incorporate data DOH has and will collect.
- Implement a CORE plans for Bridge activities.
- Clearly define what the Bridge Inspectors are responsible for and what their priorities are in terms of utilization

District 2 Summary

Key Statistics

- No. of Staff: 431
- Square Miles: 2,119
- Road Miles: 3,345
- No. of Bridges: 870
- Annual Snowfall: 17.2”
- Travel Time to Charleston: 1 Hour
- Maintenance Allocation: $23.1 Million
- Industries Affecting DOH: Coal, Steel
- Population: 221,508
- Projected Population Growth: -2.74%

Local Challenges

- Steel industry uses highways and roads for major transport.
- Coal industry has a significant presence and may impact capacity changes.
- Had four active disasters at the time of this study, including significant flooding events.
- Requires less ditching than other regions, but still have same CORE requirements.

Location

High Level Analysis Summary

Key Findings

- The Districts act like separate kingdoms. Each of them have different needs based on a variety of factors, but blanket policies are typically created by Headquarters, which may have detrimental impacts on some districts.
- Not much knowledge sharing when people retire. Need better succession planning.
- Successfully partner with District 1 to scale orders of salt.
- May have to go outside set policies to effectively serve the public.
- Received a B on the last procurement audit because policy requires printing multiple pages, even though system is paperless.
- Doing work in-house can cut the cost in half compared with contracting it out.
- Don’t have a point of contact at Headquarters that they can bring necessary projects to, so requests frequently fall on deaf ears.

Recommendations

- Utilize an enhanced knowledge-sharing network to support standardization of processes and reduced District isolation. Ensure that any blanket policies are truly applicable to all Districts. If they are not, then adjust them as needed for the specific Districts.
- Allow jobs to be posted as soon as notice is given, rather than when the position is vacant, so the new employee can actively learn from the incumbent.
- Continue to promote joint orders and look for more opportunities.
- Ensure that all active policies are sensible and up-to-date to avoid unnecessarily punishments.
- Look to perform work in-house whenever possible. Only contract a project out if there is a specialty need or lack of internal capacity.
- Ensure that the Regional Construction Engineers act as the primary liaison between the Districts and Headquarters for engineering-related concerns.

District 3 Summary

Key Statistics

- No. of Staff: 415
- Square Miles: 2,438 mi^2
- Road Miles: 4,624
- No. of Bridges: 744
- Annual Snowfall: 134.1”
- Travel Time to Charleston: 1.25 Hours
- Maintenance Allocation: $4.0 Million
- Industries Affecting DOH: Oil & Gas, Timber
- Population: 160,650
- Projected Population Growth:-1.29%

Location

Local Challenges

- Oil & Gas industry has blossomed and is able to recruit workers from the district.
- Hard to find enough plow operators during SRIC season.
- Summer pavement inspectors are not able to cover every resurfacing project without loaned employees
- Length of time it takes to get an employee hired impacts the ability to bring the new employee onboard

High Level Analysis Summary

Key Findings

- It can take several months for an applicant to be approved. During this time, the employee cannot be notified of the pending approval, and therefore may look for, and accept, a position elsewhere
- The DOH revised the personnel quotas in the Spring of 2015 based on historical averages. Many Districts and Divisions had their quotas cut; however, to-date 55% of Districts and 70% of Divisions remain over staffed.
- Although the Districts have designated Bridge Inspectors, they are occasionally called away from their inspection duties to perform repairs
- No repercussion for Organizations being over budget, and conversely no real incentive to be under budget.
- Spending on Average for SRIC over the three fiscal years evaluated has been 11% over budgeted amounts

Recommendations

- Reduce the amount of approval required for hourly employees, who should not undergo the same level of scrutiny as salaried positions
- The DOH should review the quotas to ensure they are adequate for the duties required. If they are, any overstaffed areas should be punished until they meet the quotas as they are not appropriately using their funds
- Clearly define what the Bridge Inspectors are responsible for and what their priorities are in terms of utilization
- Consider allowing Districts to retain a small portion of surplus funding on construction projects in their location
- Remove SRIC funding from the annual maintenance budget so that over run or underrun amount do not affect plans for other maintenance activities

District 4 Summary

Key Statistics

- No. of Staff: 427
- Square Miles: 2,241
- Road Miles: 4,844
- No. of Bridges: 986
- Annual Snowfall: 36.3”
- Travel Time to Charleston: 1.75 Hours
- Maintenance Allocation: $28.4 Million
- Industries Affecting DOH: Oil & Gas
- Population: 289,559
- Projected Population Growth: 11.39%

Local Challenges

- Second highest population due to presence of major cities – Fairmont, Morgantown, Clarksburg.
- Significant presence of Oil & Gas requires a higher level of maintenance and causes high levels of turnover.
- Oil & Gas trucks frequently have to use local roads due to low weight postings on highways.

Location

High Level Analysis Summary

Key Findings

- No information about why the quota and budgets were cut this year, but were still required to adjust to the new requirements.
- They do not currently have any means to track internal production rate, although construction has some metrics for contractors.
- Contractor’s cost to ditch a mile of road is 3x internal costs; however, typically do not have the necessary resources available.
- Rented a “pothole patcher” which reduced a 9-man crew to 2 men. Costs $4,500 / month to rent, and $60,000 to buy, which equates to a 13.3 month payback period.
- Have an agreement with Oil & Gas to repair damaged roads, but US routes are exempt due to original negotiations with industry.

Recommendations

- The DOH should provide transparency around policy changes, and coordinate changes with Districts to ensure there will not be any unanticipated impacts.
- The DOH should implement internal tracking metrics for various Divisions to ensure they are receiving the expected level of service. If they are not, then further changes need to be made
- Look to perform work in-house whenever possible. Only contract a project out if there is a specialty need or lack of internal capacity.
- Consider purchasing a pothole patcher which has a very short payback period, and will help free up resources to perform other duties.
- Attempt to renegotiate the agreements with Oil & Gas industries to avoid having to pay for all repairs on US routes. Investigate whether increasing the roadway capacities could be used as a bargaining tool.

District 5 Summary

Key Statistics

- No. of Staff: 414
- Square Miles: 2,602
- Road Miles: 3,507
- No. of Bridges: 584
- Annual Snowfall: 33.6”
- Travel Time to Charleston: 3.75 Hours
- Maintenance Allocation: $26.7 Million
- Industries Affecting DOH: Manufacturing
- Population: 263,691
- Projected Population Growth: 29.08%

Location

Local Challenges

- Third highest population in the state.
- Eastern panhandle is relatively detached from the rest of the state.
- Longest travel time to Charleston may contribute to sentiments of isolation.
- Large variety of other opportunities available in the Eastern panhandle, which increases the difficulty to get potential applicants on the register.

High Level Analysis Summary

Key Findings

- Mowers are typically down with the highest frequency.
- Parts contracts restrict their ability to respond quickly to repair needs, when the same parts could be found locally for less money.
- High turnover of design engineers due to noncompetitive salaries offered by the DOH compared to other local industries.
- Most Value Engineering proposals that contractors create are approved, regardless of the opinions held by District Construction or Design department personnel.
- Contractor evaluations are not always used, and they are not evaluated truthfully. Contractors association in the state is strong, which sometimes causes contractors to be less cooperative.
- Previously had a case of fraud where an employee took advantage of the P-cards. The incident was successfully caught and dealt with, but policy changes were only made in the District, not DOH-wide.

Recommendations

- Utilize a “best value” approach to purchases instead of lowest cost.
- Program Oasis such that if a part is available from a local vendor at a lower cost than the contract, it is automatically approved.
- Highlight other benefits of DOH such as hours and PTO. Implement merit-based bonuses to reward high-performers.
- DOH should include the local Construction and Design departments in VE decisions since they have the most intimate knowledge of the project.
- Stress the importance of contractor evaluations internally and to the association. Benefit to the contractors association is it will give them favorable standing with the DOH if they perform well
- Provide a vehicle for the Districts to suggest policy changes for the entire DOH. Implementing a knowledge-sharing platform would also allow this District to share their new procedures to watch for fraud with the other Districts, and potentially avoid future problems.

District 6 Summary

Key Statistics

- No. of Staff: 303
- Square Miles: 1,223 Mi^2
- Road Miles: 2,398 Mi
- No. of Bridges: 461
- Annual Snowfall: 22.7 in
- Travel Time to Charleston: 2.5 Hours
- Maintenance Allocation: $18.5 Million
- Industries Affecting DOH: Oil & Gas, Logging
- Population: 153,734 affecting
- Historical Population Growth: -8.68%

Location

Local Challenges

- The presence of the Oil & Gas industry may have contributed to a higher rate of roadway deterioration due to increased traffic volumes with heavier truck weights
- Oil & Gas industry also makes it difficult to predict future population and traffic volumes
- Significant distance from District office to Charleston contribute to sentiments of isolation
- Geotechnical nature is different because of close proximity to the Ohio River so there is a high risk of deterioration of bridges

High Level Analysis Summary

Key Findings

- Having to source vehicle maintenance parts from Kentucky under the statewide contract, rather than being able to source locally
- Sharing of resources across counties and also with other Districts is encouraged to create efficiencies e.g. redeployment of construction staff to snow removal projects during the winter
- There is a feeling that 80% of weekly issues are out of the District's control because they are from external influences
- There is a massive wall of bridges reaching the end of their useful life in the next 10 years and there is currently a critical shortfall of staff in the bridge maintenance group
- Incidents requiring employee disciplinary actions in the past were identified and escalated according to DOH policy and consequences have typically not resulted in suspension or termination

Recommendations

- Consider regionalizing equipment part purchase order with intent of minimizing lead time for orders. Consequently, this will mitigate the risk for unnecessary down time waiting for maintenance parts
- Continue to promote and look for opportunities to share resources (e.g. staff, equipment, materials) across the counties and with other Districts
- Identify what issues are within your control and try to minimize lost time working to resolve issues outside of your control
- Include a CORE plan for bridges to encourage more preventative maintenance and also minimize disruption to the asset condition monitoring inspection program
- Leverage the Personnel Specialists to review requests for discipline and ensure that due process is provided. This will reduce the amount of time required from the approver at Headquarters, and therefore should result in faster issuance of discipline

District 7 Summary

Key Statistics

- No. of Staff: 380
- Square Miles: 2,456 mi^2
- Road Miles: 3,877
- No. of Bridges: 678
- Annual Snowfall: 259.3”
- Travel Time to Charleston: 1.5 Hours
- Maintenance Allocation: $23.4 Million
- Industries Affecting DOH: Oil & Gas, Timber
- Population: 89,636
- Projected Population Growth: 2.49%

Location

Local Challenges

- There are 8 -9 Asphalt plants. Most are owned by West Virginia Paving, Inc.
- Typically receive 1-2 bids on each paving project
- The district is unable to fully fund the bridge crews without supplemental funding.
- Oil & Gas Industry is able to lure operators away from the District

High Level Analysis Summary

Key Findings

- Data submitted from DOH shows total expenditures were less than allocations over past three fiscal years.
- Spending on Average for SRIC over the three fiscal years evaluated has been 11% over budgeted amounts
- It was confirmed by senior leadership that non-CORE maintenance equipment does not have an allocation process.
- Asphalt is less expensive on the east side of the State where limestone quarries are common, but more expensive on the west side due to the costs to ship materials on the Ohio River
- There are jobs available for personnel with similar skills and significantly higher wages in many areas throughout the state

Recommendations

- Identify unused funds at fiscal year end and determine if reallocation will create more efficiency.
- Have the state plan a 15% contingency for all SRIC activity budgets
- Establish and implement metrics that can fairly allocate heavy construction equipment and vehicles among the Districts
- Seek out other opportunities to Increase competition such as package resurfacing projects together to entice out of state contractors
- Implement a merit-based one-time bonus program to reward excelling employees and encourage retention.

District 8 Summary

Key Statistics

- No. of Staff: 300
- Square Miles: 3,101 Mi^2
- Road Miles: 2,558 Mi
- No. of Bridges: 442
- Annual Snowfall: 70.8 in
- Travel Time to Charleston: 2 Hours
- Maintenance Allocation: $17 million
- Industries Affecting DOH: Coal, Logging
- Population: 52,776
- Projected Population Growth: -0.25%

Location

Local Challenges

- The presence of the coal industry may have contributed to a higher rate of roadway deterioration due to increased traffic volumes with heavier truck weights
- Large distance from head office in Charleston creates feelings of isolation
- Road miles to square miles ratio is lowest in the state creating larger distances and travel times in between construction and maintenance activities and adding more difficulty to manage crews

High Level Analysis Summary

Key Findings

- Exceeding SRIC budget forces the District to reduce the amount of equipment and labor allocated in the CORE plan
- Obtaining equipment parts continues to be an issue where the District often has to travel to Lewisburg to stay on contract
- District 8 sometimes has to wait 4-5 months for parts when the same parts could be purchased more locally off contract
- Experience competitive bidding on asphalt construction and maintenance activities with four contractors established locally
- District managers meet monthly to discuss various issues with personnel from Headquarters including paving operations and HR
- The hiring process is an obstacle with new hires taking as long as 5 months to begin working from the time of interview

Recommendations

- Consider regionalizing equipment part purchase order with intent of minimizing lead time for orders. Consequently, this will mitigate the risk for unnecessary down time waiting for maintenance parts
- Continue to promote communication between District management which will foster a culture of knowledge sharing
- Isolate SRIC activities from the annual maintenance plan allocation. This will allow Districts to fully complete their annual plan despite varying winter weather severity levels and SRIC expenditures.
- Reduce the amount of layers in the hiring process to minimize the length of time required for completion.

District 9 Summary

Key Statistics

- No. of Staff: 408
- Square Miles: 3,188 Mi^2
- Road Miles: 3,424 Mi
- No. of Bridges: 661
- Annual Snowfall: 36.3 in
- Travel Time to Charleston: 2 Hours
- Maintenance Allocation: $25.4 Million
- Industries Affecting DOH: Coal, Logging
- Population: 134,749
- Projected Population Growth: -1.05%

Location

Local Challenges

- The presence of the coal industry has caused a higher rate of roadway deterioration due to increased traffic volumes with heavier truck weights
- Retirement binge in on the horizon and knowledge transfer will be a challenge
- Large distance from head office in Charleston creates feelings of isolation

High Level Analysis Summary

Key Findings

- Closing out construction projects in Site Manager can take between 3-6 months to finalize.
- Certain makes of equipment possess longer lead time lengths for maintenance parts. Specifically, Hyundai loader parts will have substantially long lead time.
- The equipment division in Buckhannon was considering purchasing one paver for each District in 2010, but ended up only purchasing two for the entire state
- Transportation Worker (TW) program was recently implemented and has helped with retention from gas and coal. However, it has now created a wage differential between high-tiered transportation workers and supervisors
- Quota reports that are generated for the Districts and Organizations are often inaccurate and not up to date

Recommendations

- Consider regionalizing equipment part purchase order with intent of minimizing lead time for orders. Consequently, this will mitigate the risk for unnecessary down time waiting for maintenance parts
- Buckhannon and Fleet Management should consider availability of maintenance parts when analyzing equipment purchases
- Reassess the need for additional paver purchases. Based on 2015 rental data, pavers are one of the top two in rental costs for all types of rental equipment across the state
- Establish and maintain accurate quota information at Headquarters
- Consider adopting supervisors of transportation workers into the TW program. The current wage differential will eventually cause morale issues among supervisors that could ultimately affect the potential for turnover

District 10 Summary

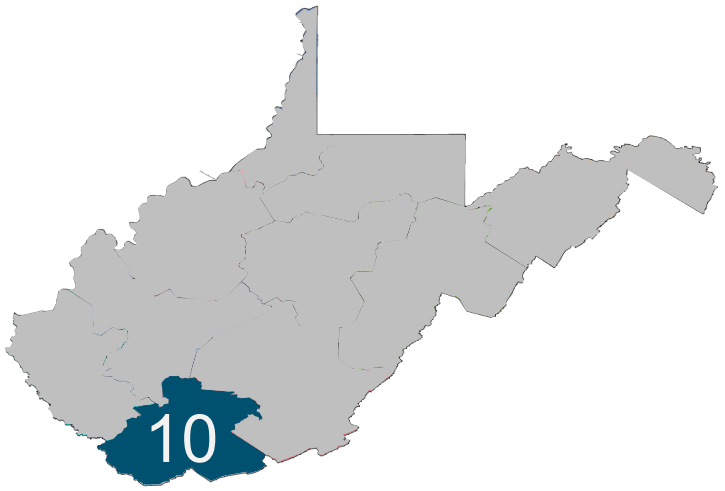
Key Statistics

- No. of Staff: 388
- Square Miles: 2,067 Mi^2
- Road Miles: 3,266
- No. of Bridges: 682
- Annual Snowfall: 27.6 in
- Travel Time to Charleston: 1.5 Hours
- Maintenance Allocation: $23.1 Million
- Industries Affecting DOH: Coal, Logging, Oil & Gas
- Population: 183,962
- Projected Population Growth: -5.78%

Local Challenges

- The presence of the Oil & Gas industry and coal may have contributed to a higher rate of roadway deterioration due to increased traffic volumes with heavier truck weights
- Industry presence also makes it difficult to predict future population and traffic volumes
- Large distance from head office in Charleston creates feelings of isolation

Location



High Level Analysis Summary

Key Findings

- A disconnect exists between Headquarters and the Districts regarding the specifics of how processes function on the District level
- West Virginia paving is typically the only paving contractor available in the District for laydown
- Purchasing governs a lot of what happens at the District level as anything over $25k has to be approved through the Purchasing Division. For example, District 10 has been waiting for approval on a crane for roughly one year
- Not much turnover from oil and gas, rather turnover is originating from employees departing for private consultants and retirement
- Lack of training was provided for the new OASIS software implementation
- Hiring process is excessive and often potential new hires abort the application process due to the substantial amount of time

Recommendations

- Consider regionalizing equipment part purchase order with intent of minimizing lead time for orders. Consequently, this will mitigate the risk for unnecessary down time waiting for maintenance parts
- Revise the thresholds for purchasing to allow for more autonomy at the District level. This will reduce the workload at Headquarters and increase efficiency with the overall process.
- Identify methods for knowledge transfer with regards to employees leaving due to retirement.
- Provide a train the trainer program for software implementation training at the District and County levels
- Maintain direct lines of communication to Headquarters and emphasize knowledge and information sharing to foster efficiency
- Headquarters should simplify the hiring process and reduce the amount of required approvals which will shorten the period of time necessary for completion

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