Nevada Department of Transportation

Cost and Benefit Study Associated with Outsourcing Roadway Maintenance Activities

Final Report

February 25, 2011

Presented by

Halcrow, Inc. and

Asset Management Associates

This page left blank intentionally.

Table of Contents

Final Report

This page left blank intentionally.

Acknowledgements

Halcrow would like to thank all of the NDOT staff, the AGC, the Nevada Contractors Union and the contractors that we interviewed and contributed to this report. Rick Nelson, P.E., Asst Executive Director – Operations, Bill Hoffman, P.E., State Maintenance and Operations Engineer, Anita Bush, P.E., Assistant State Maintenance Engineer, and Kent Mayer, P.E., Retired were especially helpful, as well as District Engineers Mary Martini, P.E., Thor Dyson, P.E. and Kevin Lee, P.E. We would also like to thank sub-consultant Asset Management Associates for their candid input.

This page left blank intentionally.

1. Introduction

This study was prompted by NDOT in response to the contracting industry who wanted to perform maintenance work for NDOT. Halcrow was surprised to discover that NDOT is already contracting over 35% of their routine maintenance operation.

2. Background

Halcrow, Inc. was selected by NDOT after reviewing proposals received on November 23, 2009 to perform a "Cost and Benefit Study Associated with Outsourcing Roadway Maintenance Activities". Halcrow is an international civil engineering company and utilized staff with great experience managing highway maintenance in several US state DOT's and other countries as well as managing highway maintenance contract operations in the US and the UK.

3. Project Plan

The project included performing a literature review of existing studies, interviewing stake holders, gathering cost information and developing recommendations. In conjunction with the study, deliverables included five "Technical Memorandums" documenting the findings and recommendations and holding a "workshop" for interested state force and contractor employees to discuss "performance based maintenance contracts".

4. Literature Review

The literature review was an essential part of the project designed to identify previous research by others and best practices. Thirty nine (39) studies, reports and presentations were identified and reviewed. The results identified a number of risk and outsourcing decision factors as well as contracting methodologies and cost comparison analysis methods.

5. Interviews

Imperative to this research were interviews with the districts and sub-districts to discuss cost effectiveness and solicit the District Engineers, District Maintenance Engineers, Maintenance Station Supervisor's and contractors input and opinions. Overall Halcrow performed 44 interviews of state forces and contractors.

6. Cost Study Activities

Initial cost data was gathered from NDOT's Headquarters Maintenance and Financial Management Divisions. Halcrow developed a cost comparison methodology to capture all costs associated with state forces work and the corresponding costs when performing the work in house. These included both direct costs and indirect costs.

7. Decision Factors for Outsourcing

Outsourcing decision factors can be quantitative or qualitative in nature. Apart from cost savings benefits, emphasis should also be given to the qualitative benefits such as quality of service, time savings, risk transfer,

public safety and legal and political factors. A contracting decision matrix was developed by Halcrow for use by NDOT.

8. Recommendations

Transportation Departments that plan to utilize a service delivery model that includes contract maintenance operations find it is important to maintain the flexibility to evaluate the model and adopt a blend that results in the optimal level of service at the most economical price. Quality is achieved and maintained through the proper use of resources, both in-house and contracted, by improving maintenance levels of service through intentional and ongoing process improvement programs, from lessons learned and by applying different, new, and innovative techniques and technologies to routine tasks and assignments. The following are recommendations from the study:

- **a.** Develop performance standards and maintenance rating system.
- **b.** Capture units of work and compare cost on contract and in-house operations in the same units of measurement.
- **c.** Develop financial accounts and reports to capture overhead costs.
- **d.** Develop District contracting processes
- **e.** Utilize a contracting decision matrix.
- **f.** Define routine maintenance definition scope limits versus construction.
- **g.** Package contracts to make them cost effective and attractive to contractors.
- **h.** Design contracts with longer work periods and consider multi-task and multi-year terms.
- **i.** Pilot alternative contract maintenance delivery methods.
- **j.** Use the existing Construction Contract Industry where possible.

9. Conclusion

While we believe NDOT can improve efficiency by contracting, their operations generally produced prices that were very competitive with contractors. Several variables make it difficult to compare maintenace activities and costs from DOTs; prices are very dynamic and fluctuate greatly based upon project size, material type and availability, remoteness, availability of contractors, etc. Various contracting methods are available to be utilized in the best suited sitiuation. A mix of state forces and maintenance contractors provide a healthy combination, requiring state forces to be productive, and utilizing contractor resources as needed to minimize the under-utilization of in-house resources. A cultural change must occur within the Department where contractors are viewed as an extension of the Department and a direct access to specialized equipment and skills. There is a willingness and understanding to work toward a common goal of quality and efficiency for NDOT.

1. Introduction

The Nevada Department of Transportation maintains 5379 center line miles of roadway and 1704 bridges. Historically Nevada DOT performed routine maintenance on their system with state forces, contracting some activities where state resources were insufficient. This study was prompted by NDOT in response to the contracting industry who wanted to perform maintenance work for NDOT. Halcrow was surprised to discover that NDOT is already contracting over 35% of their routine maintenance operation. We were also very impressed with state maintenance managers who were very open to contracts and with contractors who were knowledgeable about maintenance. Performing cost analysis was made difficult by the lack of comparable information and the volatility of prices, especially in light of the current economic situation.

2. Background

Halcrow, Inc. was selected by NDOT after reviewing proposals received on November 23, 2009 to perform a "Cost and Benefit Study Associated with Outsourcing Roadway Maintenance Activities". Halcrow is an international civil engineering company and utilized staff with great experience managing highway maintenance in several US state DOT's and other countries as well as managing highway maintenance contract operations in the US and the UK. Halcrow also utilized Asset Management Associates, a sub-consultant that added staff with DOT experience with the Florida DOT and North Carolina DOT. The project work plan included several key tasks and deliverables, the last of which is a final report. The report is organized consistent with the work plan and tasks outlined in the request for proposals.

a. What is Maintenance? One of the first issues is the lack of knowledge by people outside the DOT about what comprises maintenance. We can use the analogy of maintaining a car. Good car maintenance includes washing the exterior, removing debris from the inside, vacuuming the carpet, changing the oil, rotating the tires, checking the fluids, etc (Routine Maintenance). As the car ages, additional more intensive, (and expensive) maintenance needs to be performed like replacing spark plugs, rebuilding the transmission, replacing lights, getting the valves adjusted, etc (Capital Maintenance).

Maintaining a highway and the rights of way is very similar to maintaining a car and like a car, the older it gets, the more intensive (and expensive) maintenance is required. Maintenance is typically split into "routine maintenance", those activities that are needed and performed on a daily basis or "capital maintenance" which includes work that are larger projects and either prevent deterioration, extend the life of the facility or rehabilitate it.

Routine Maintenance - NDOT has established "task codes" to track the maintenance work they are performing on the roads and roadsides. The work performed and costs are tracked in the Department's Maintenance Management System (MMS) in the following major programs:

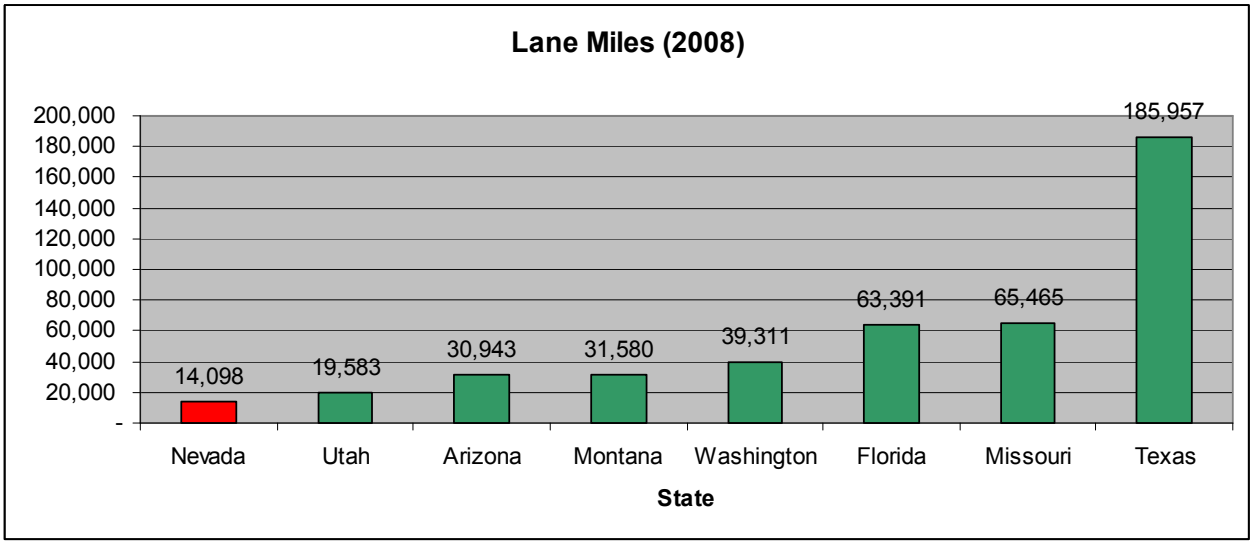
- 100 MMS Administration
- 101 Flexible Pavement Program (Asphalt Pavements)

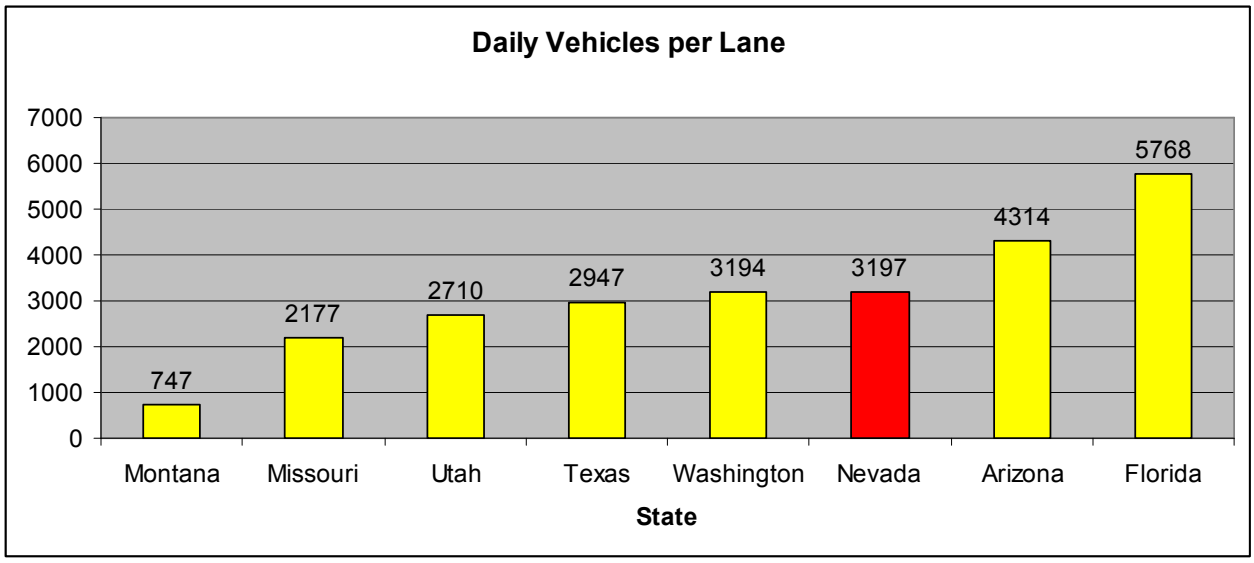
- 111 Rigid Pavement Program (Concrete Pavements)
- 112 Miscellaneous Concrete Repair Program
- 131 Roadside Maintenance Program
- 133 Roadside Cleanup Program
- 134 Maintenance Of Roadside Facilities Program
- 135 Maintenance Of Roadside Appurtenances Program
- 141 Traffic Services Program
- 151 Snow And Ice Control Program
- 161 Structure Maintenance Program
- 9182 Maintenance Of Facilities
- 270 Stockpile Production Program

Capital Maintenance

NDOT's capital maintenance program includes projects to perform preventive and rehabilitation work on the system. Typically these are chip seals, micro surfacing, mill and inlay or cold in place recycling projects.

b. System Size – Halcrow utilized cost information from not only Nevada DOT, but also surrounding state DOT's and others where information was readily available. Maintenance needs are directly proportional to not only the size of the system, but also the amount of traffic using the system. The Measure "Lane Miles" is a good indicator of the size of the system and daily vehicles per lane is a good measure of the demand on the system. As shown on the attached graphs, NDOT system is small, but they have a substantial amount of traffic.





3. Project Plan

The project included performing a literature review of existing studies, interviewing stake holders, gathering cost information and developing recommendations. In conjunction with the study, deliverables included five "Technical Memorandums" documenting the findings and recommendations and holding a "workshop" for interested state force and contractor employees to discuss "performance based maintenance contracts".

4. Literature Review

The literature review was an essential part of the project designed to identify previous research by others and best practices.

a. Literature Search

Transportation research data bases along with internet searches were performed with publications selected that were published after January 1, 2000 to ensure state of the art information. Search criteria included key words:

- Highways
- Maintenance
- Outsourcing
- Contracting
- Privatization
- Make vs. Buy
- Costs
- Levels of Service
- Performance Contracting
- Oversight

b. Literature Review

The literature was reviewed by experienced staff, extracting the following information:

- Outsourcing Decision Factors

- Contracting Methodology/Guidelines
- Cost Data and Cost Effectiveness Information
- How to measure cost effectiveness, comparison matrix

c. Literature Review Results

Thirty nine (39) studies, reports and presentations were identified and reviewed. The results identified a number of risk and outsourcing decision factors as well as contracting methodologies and cost comparison analysis methods. Only two reports included cost comparison information. The following represent some of the findings from the literature search:

i. **Reasons for Contracting –** Most of the research identified the emphasis behind contracting:
   - Reducing costs;
   - Increasing efficiency;
   - Improving quality;
   - Speeding project delivery;
   - Spurring innovation;
   - Enhancing risk management; and
   - Overcoming a lack of expertise.

ii. **Outsourcing Methods –** Typical contracting processes include:
   - Purchase Orders
   - Single Bid Item Contracts
   - Bundled Bid (Multiple Bid Item) Contracts
   - Performance Based Maintenance Contracts
   - Managing Agent Contracts

iii. **Pre-Contract Planning –** The following are just a few of the recommendation that need to be considered before contracting:
   - Require relevant and measurable project experience and financial criteria.
   - Use “Best Value” procurement instead of “Low Bid” for performance based maintenance contracts (May require legislation).
   - Provide reasonable response times; time requirements are directly proportional to the size and complexity of the project.
   - Use a decision matrix.
   - Performance Standard: What should the standards for completeness, reliability, accuracy, timeliness, customer satisfaction, quality and/or cost be?
   - Monitoring Method: How will we determine that success has been achieved?
   - Incentives/Disincentives for Meeting or Not Meeting the Performance Standards: What carrot or stick will best reward good performance or address poor performance?
   - Use “Lessons Learned” from others.
   - Furnish complete and accurate information and data. Providing the contractor with as much information as possible will reduce the costs. Information such as: historical work quantities material suppliers, etc.

- Inventory Assets.
- Use Performance Contracts to maximize the potential and incentives capacity for improved performance while managing the risks of performance shortfalls.
- Share Risks
- Rebidding contracts on a periodic to ensure competitive pressure to innovate and keep costs down.
- Use longer term contracts to encourage life-cycle cost considerations.
- Ensure senior management involvement and support.

iv. **Cost Comparison –** There was very little information in the research about cost comparison methodology. In fact a Louisiana DOT study indicated "Determining a proper cost comparison between the contractor and a public sector agency is one of the most difficult tasks related to the outsourcing decision. As noted in a report issued by the Office of the Legislative Auditor of Louisiana, "state governments are often not equipped to easily assess all the costs of delivering a state service". As indicated later in the report, Halcrow developed a cost comparison methodology that identified both direct and indirect costs of state forces and contractors when attempting to compare costs.

5. Interviews

In order to accurately determine the appropriate activities for which to collect cost and performance data, it was critical to customize our research to fit NDOT's routine maintenance operations. Imperative to this research were interviews with the districts and sub-districts to discuss cost effectiveness and solicit the District Engineers, District Maintenance Engineers, Maintenance Station Supervisor's and contractors input and opinions. Overall Halcrow performed 44 interviews of state forces and contractors.

Interview Summary

During the course of our interviews we observed both differing opinions and commonalities between the contracting community and NDOT staff members. We noted the similarities in their answers to the advantages and disadvantages of contracting maintenance. We thought it was enlightening that both groups listed the advantages to contracting as being efficiency, flexibility, enthusiasm and creativity, but neither group mentioned direct cost as a factor.

Regarding the disadvantages; both groups agreed that NDOT's geographic presence in the state is challenging for contractors to offer instantaneous services that are competitive with NDOT's service in rural areas. NDOT's is concerned that it could lose expertise on certain tasks resulting in contractors having the expertise and artificially raising prices. Contractors believe competition will keep the pricing within market value even if NDOT was not one of the competitors.

Chip seals seem to be the most contentious subject among NDOT staff and the contractor community. The NDOT staff believes that contractors cannot match the quality of service provided by NDOT crews, while the contractors contend that the few chip seal contracts advertised to date were poorly designed with short project availability dates that impacted both quality and price.

The contractors indicated a concern over NDOT performing slope leveling or shoulder widening type of projects. While the widening of unpaved shoulders (shoulder leveling) is a worthy project to establish a safe clear recovery area along major arterial highways, however we believe that shoulder leveling is an activity with prolonged scope requiring extensive manpower and equipment, that may go beyond what is normally defined as routine maintenance; crossing the definition into what many would characterize as a construction related project.

6. Cost Study Activities

a. Cost Data Collection – Initial cost data was gathered from NDOT's Headquarters Maintenance and Financial Management Divisions.

b. Maintenance Management System – We quickly learned there was insufficient cost information within NDOT to perform an adequate analysis. Halcrow also attempted to gather maintenance cost information from states surrounding Nevada. While information was collected from Arizona, Utah, Washington, and Montana DOT's; their maintenance management systems only track state employees' accomplishments and unit costs. While they all contracted to a certain extent, they typically measured contract work differently than their state force accomplishments. Additional maintenance cost data was gathered from Florida and Texas DOT who have systems to measure state forces and contractors accomplishments and costs per unit in the same units.

c. Financial Information – In an attempt to capture indirect costs, NDOT downloaded a file with every financial transaction for the 2009 fiscal year.

d. Cost Comparison Matrix - Halcrow developed a cost comparison methodology to capture all costs associated with state forces work and the corresponding costs when performing the work in house. These included both direct costs and indirect costs.

- Direct costs for this analysis included any costs to a "project". In the case of state employees, direct costs included fully loaded labor rates (including salaries, insurance, retirement, etc), equipment rental rates and material costs. In the case of maintenance contracts, direct costs could include the development of plans, specifications and estimates, bidding the contract, the contractor payment and the contract inspection.
- Indirect costs were those costs that were charged to overhead accounts. In the case of state forces, it includes the cost of the local office overhead, the Sub-District and District Office overhead and overhead associated with the Division Offices in Carson City. In the case of contractors, it also included a portion of the local office overhead, the Sub-District and District Office overhead and the Division Offices in Carson City.

e. Cost Comparison Results

- **Study Activities –** Discussion with contractors and DOT staff indicated contracting major activities would be more feasible because of the quantity of work. Mobilizing into remote parts of the state for

small quantities would not be cost effective. The top 10 NDOT maintenance activities correspond to approximately 80 percent of the total budget.

- **Cost Comparisons -** Getting true comparison of maintenance tasks is an extremely difficult task. Comparing products manufactured in controlled environments to exacting specifications would be simple. While standard work methods can be developed, since every highway is different, the cost of performing the work is different. Most of what NDOT has contracted in the maintenance area is either not performed by NDOT forces (cold in place recycling and micro surfacing) or not easily comparable (janitorial work, rest areas, etc.)
  The following questions have to be considered:

  - Are the tasks/activities the same?
  - Are levels of service or performance requirements the same?
  - Is the cost data from the same year?
  - Do the tasks include only direct costs or do they include all the appropriate overheads?
  - Are the materials the same quality, specification, etc.?
  - Were the projects comparable in size, road classification, traffic control, soil types, weather and other relevant measures?
  - Does the material cost include other associated costs such as stockpiling, hauling, environmental best management practices, etc?

- **Task Comparisons -** Cost information was developed and in a few cases estimated where no good comparison information was available. The FY 2009 results and analysis are as follows:
  - **Chip Seal** – Chip seal was the biggest maintenance expenditure item with direct and indirect charges in the amount of $22,382,953.17. Additionally, NDOT let one maintenance contract in the amount of $1,699,160.00 that was awarded to Intermountain Slurry Seal Inc. Cost comparisons identified NDOT unit costs ranged from $1.61 - $2.80/sy while contract costs including NDOT and TxDOT contracts ranged from $1.90 –$2.33/sy.
  - **Snow and Ice Removal** – NDOT has several task codes for snow and ice work, but the biggest expenditure item is removal of snow and ice with $21,975,981.72 spent in FY 2009. NDOT measured their accomplishments by the hour and their costs ranged from $183.15 - $266.75/hr. Using similar work performed by contractors, Halcrow estimates contract rates for similar work would range between $195 - $235/hr.
  - **Repairing Fill and Cut Slopes –** NDOT spent $6,417,043.69 in 2009 repairing erosion and flattening slopes. Because many of NDOT rural roads are built with no shoulders and steep fill slopes, NDOT is using state forces to flatten the shoulders. NDOT costs ranged from $16.12 - $30.12, while contract costs ranged from $13.53 – $66.12. Cost for this activity is highly dependent upon quantity of work.
  - **Striping –** NDOT spent $5,884,765.20 on line striping with a cost range of $288.34 – $488.92 per mile. Contract costs range from $403.58 - $807.16 per mile.
  - **Debris Removal** – NDOT spent $5,861,861.42 on debris removal with a cost range of $123.74 - $205.12 per cubic yard. Contract costs could be around $100 per cy.
  - **Sweeping –** NDOT spent $4,400,278.75 on pickup broom sweeping with a cost range of $84.43 – $422.08 per cubic yard. Contract costs range from $45.34 - $86.99.

- **Crack filling** – NDOT spent $3,373,283.99 on crack filling at a state forces cost range of $3.11 - $6.23/lb with contract costs ranging from $2.90 - $3.51/lb
- **Scrub Seal** – NDOT spent $2,151,491.26 on scrub seal with a state forces cost range of $1.09 - $ $2.48 per square yard. While other states studied did not perform scrub seals by contract, Halcrow estimates the cost will be around $2.30 based upon chip seal contracts.
- **Repair/Replacement of Traffic Signs** – NDOT spent $1,967,637.73 on traffic signs with an average state forces cost of $14.48 - $32.74 per sq ft. Contract costs range from $16.49 - $128.12/sf.
- **Blading Shoulders** – NDOT spent $1,911,545.25 blading shoulders with an average state cost ranging from $642.29 to $3,143.80 per shoulder mile. Only Florida DOT had contract costs for blading shoulders costing $4,381.63 per shoulder mile.

7. Decision Factors for Outsourcing

Maintenance Contract Analysis Matrix

Activity	See step 1		Location		See step 2			Element Score	Multiplier	Total Score
	Score (See step 3)									
Analysis Factor	-3	-2	-1	0	1	2	3			
Cost above/below State Forces?	>20% Above	>10<20% Above	0-10% Above		0-10% Below	>10 <20% Below	> 20% Below			
	○	●	○	○	○	○	○	-2	5	-10
Availability of Contractors (Anticipated Competition)	Not sure anyone will bid	1 Bidder	2 bidders	3 Bidders	4 Bidders	5 Bidders	6 or more Bidders			
	○	●	○	○	○	○	○	-2	4	-8
Low Equipment Cost Activity	Equipment Cost > $1,000,000	Equipment Cost > $250,000	Equipment Cost > $100,000	Equipment Cost > 50,000	Equipment Cost > $25,000	Equipment Cost> $10,000	Equipment Cost < 10,000			
	○	○	●	○	○	○	○	-1	3	-3
Seasonal Activity	Equipment utilized > 70% of year		Equipment utilized >60% of year		Equipment utilized <60% of year		Equipment utilized < 50%			
	○	○	●	○	○	○	○	-1	5	-5
Remoteness of project	Greater than 200 miles of population area > 50,000	Within 200 Miles of population area > 50,000	Within 150 Miles of population area >50,000	Within 100 Miles of population area > 50,000	Within 50 Miles of population area > 50,000	Within 100 Miles of population area > 250,000	Within 50 Miles of population area > 250,000			
	○	○	●	○	○	○	○	-1	3	-3
Labor Intensity	< 20 > 10% Labor	< 30 > 20% Labor	< 40 > 30% Labor	< 50 > 40% Labor	<60 > 50% Labor	< 70 > 60% labor	> 70% Labor			
	○	○	○	●	○	○	○	0	2	0
Specialized Equipment				Specialized Equipment Not Needed			Complex, Expensive Equipment Needed			
	○	○	○	●	○	○	○	0	5	0
Availability of State Forces to Do Work	State Forces Available			Work could be done with state forces, but other work would be delayed			Work will not get done because of lack of state forces.			
	●	○	○	○	○	○	○	-3	5	-15
Hazardous Locations				Other	Urban Area with ADT over 2,500 per lane		High Speed Metropolitan Location			
	○	○	○	●	○	○	○	0	3	0
Size of Project	< $10,000	> $10,000 < $25,000	> $10,000 < $25,000	> $25,000 < $50,000	> $50,000 < $100,000	> $100,000 < $250,000	> $250,000			
	○	○	○	○	●	○	○	1	2	2
Technical Expertise Needed	Technical Experts available in District.			No Special Technical expertise needed.			Specific Technical Expertise not available in NDOT			
	○	○	○	●	○	○	○	0	5	0
Total Score										-42

Instructions for Use:

Step 1. Identify Maintenance Task or Activity to Analyse
Step 2. Identify Location of Proposed Work.
Step 3. Select a score from -3 to 3 for each Analysis facor by selecting the appropriate button.
Caution: You must score each "Analysis Factor" by selecting one of the columns.
You cannot select more than one score for each Analysis Factor!
Total score greater than "0" indicates an activity that may be appropriate to contract.
Total Score less than "0" indicates an activity that may be more appropriately performed by state forces.

Outsourcing decision factors can be quantitative or qualitative in nature. Apart from cost savings benefits, emphasis should also be given to the qualitative benefits such as quality of service, time savings, risk transfer, public safety and legal and political factors. The contracting decision matrix shown above was developed by Halcrow for use by NDOT.

8. Recommendations

Transportation Departments that plan to utilize a service delivery model that includes contract maintenance operations find it is important to maintain the flexibility to evaluate the model and adopt a blend that results in the optimal level of service at the most economical price. Quality is achieved and maintained through the proper use of resources, both in-house and contracted, by improving maintenance levels of service through intentional and ongoing process improvement programs, from lessons learned and by applying different, new, and innovative techniques and technologies to routine tasks and assignments. The following are recommendations from the study:

a. **Develop performance standards and maintenance rating system**. This would provide a way to compare districts, sub districts and contractors on a level playing field and provide feed back on performance.
b. **Capture units of work and compare cost on contract and in-house operations in the same units of measurement.** A standard report comparing state forces cost per unit versus contractors cost per unit, with all direct and indirect cost included would help managers determine the most effective strategies.
c. **Develop financial accounts and reports to capture overhead costs**. These would be used in the reports in “b” above.
d. **Develop District contracting processes**
    - Three Quote Process <$50,000 – The current $250,000 limit puts the Department and District managers at substantial risk of challenges by contractors not chosen to bid.
    - District/Sub-District Let <$500,000 – This should be an expedited process where district staff could develop, advertize, let to bid and execute contracts within 14-28 days.
    - Emergency Contracts, District Selects 3 contractors to bid. – After certification of the emergency by NDOT Administration, the district should be able to execute contracts and get contractors working within hours of an emergency.
    - State Let, Maintenance Division Process. – Develop a process in the NDOT Maintenance Division for processing state let maintenance contracts from letting through execution.
    - Develop a small business contracting industry – Utilize local small contractors around the state.
    - Train NDOT District Staff – Formal training for the processes developed above in addition to maintenance contract inspection and contract administration.
e. **Utilize a contracting decision matrix.** – Halcrow has developed an electronic decision matrix for assistance in developing the decision to contract activities.
f. **Define routine maintenance definition scope limits versus construction**. - Establish state guidelines and priorities.

g. **Package contracts to make them cost effective and attractive to contractors.** – Utilize contractors for larger projects, combine work, schedule letting in advance of work seasons, etc. to reduce contractor risk and improve contractors prices.
h. **Design contracts with longer work periods and consider multi-task and multi-year terms.** – Allow the contractor time to amortize investments.
i. **Pilot alternative contract maintenance delivery methods.** – Consider developing performance maintenance contracts as outsourcing evolves in Nevada.
j. **Use the existing Construction Contract Industry where possible.** - Perform larger projects for chip seals, shoulder leveling, etc. by contract. Utilize the existing construction contracting industry to perform maintenance work where larger equipment, etc. would reduce unit costs.

9. Conclusion

Halcrow was impressed with both the NDOT staff and the contractors that were interviewed. While we believe NDOT can improve efficiency by contracting, their operations generally produced prices that were very competitive with contractors. Several variables make it difficult to compare maintenace activities and costs from DOTs; prices are very dynamic and fluctuate greatly based upon project size, material type and availability, remoteness, availability of contractors, etc. Various contracting methods are available to be utilized in the best suited sitiuation. A contracting matrix will also aid in making the decision to contract or perform work with state forces.

A mix of state forces and maintenance contractors provide a healthy combination, requiring state forces to be productive, and utilizing contractor resources as needed to minimize the under-utilization of in-house resources. A cultural change must occur within the Department where contractors are viewed as an extension of the Department and a direct access to specialized equipment and skills. There is a willingness and understanding to work toward a common goal of quality and efficiency for NDOT.

1. Introduction

The Nevada Department of Transportation (NDOT) maintains 5379 center line miles of roadway and 1704 bridges. Historically NDOT has performed routine maintenance on their system with state forces, contracting some activities where state resources were insufficient.

a. Reasons for Study. This study was prompted by NDOT in response to the Nevada construction contracting industry who wanted to perform maintenance work for NDOT. Halcrow, Inc. was selected by NDOT after reviewing proposals received on November 23, 2009 to perform a "Cost and Benefit Study Associated with Outsourcing Roadway Maintenance Activities". Halcrow is an international civil engineering company and utilized staff with great experience performing and managing highway maintenance in several US state DOT's and other countries as well as managing highway maintenance contract operations in the US and the UK. Halcrow also utilized Asset Management Associates, a sub-consultant that added staff with DOT experience with the Florida DOT and North Carolina DOT. The project work plan included several key tasks and deliverables, the last of which is a final report. The report is organized consistent with the work plan and tasks outlined in the request for proposals.

b. Initial Observations. Halcrow was surprised to discover that NDOT is already contracting over 35% of their routine maintenance operation. We were also very impressed with state maintenance managers who were very open to contracts and equally impressed with contractors who were knowledgeable about maintenance. Performing cost analysis was made difficult by the lack of comparable information and the volatility of prices, especially in light of the current economic situation.

c. Why Contract? While this is a cost benefit study of outsourcing highway maintenance, the first question that needs to be asked is "why contract"? The US has a long history of civil service staff very effectively self performing work. These benefits could be a vested interest in the product and the system as a whole; innovation and creativity; speed of response; flexibility and adaptability; emergency response; cost; etc. These benefits are very real. Contracts should be used when they produce long term effective benefits to the state in the area of cost savings or increase in level of service.

d. What is Maintenance? One of the first issues is the lack of knowledge by people outside the DOT about what highway maintenance includes. We can use the analogy of maintaining a car. Good car maintenance includes washing the exterior, removing debris

from the inside, vacuuming the carpet, changing the oil, rotating the tires, checking the fluids, etc. (Routine Maintenance) As the car ages, additional more intensive, (and expensive) maintenance needs to be performed like replacing spark plugs, rebuilding the transmission, replacing lights, getting the valves adjusted, etc. (Capital Maintenance)

Maintaining a highway and the rights of way is very similar to maintaining a car and like a car, the older it gets, the more intensive (and expensive) maintenance is required. Maintenance is typically split into "routine maintenance", those activities that are needed and performed on a daily basis and "capital maintenance" which includes work that are larger projects and either prevent deterioration, extend the life of the facility or rehabilitate it.

Routine Maintenance

Routine maintenance is typically defined as work that is needed on a daily basis to repair damage on the highway system and performing operational activities to keep the traveling public moving in a safe and efficient manner. NDOT has established "task codes" to track the maintenance work they are performing on the roads and roadsides. The work performed and costs incurred are tracked in the Department's Maintenance Management System (MMS) in the following major programs:

- 100 MMS Administration
- 101 Flexible Pavement Program (Asphalt Pavements)
  - Includes asphalt pavement tasks such as crack filling, milling, micro surfacing, chip sealing, overlay/inlay, patching, base repairs, etc. (Note: Larger micro surfacing, chip sealing and overlay projects are considered Capital Maintenance.)
- 111 Rigid Pavement Program (Concrete Pavements)
  - Includes concrete pavement tasks temporary patching, permanent patching, joint filling, crack filling, etc.
- 112 Miscellaneous Concrete Repair Program
  - Repair and installation of curbs, sidewalks, wheelchair ramps, concrete boxes, barrier railing, drop inlets, etc
- 131 Roadside Maintenance Program

- Culverts, drop inlets, slotted drains, culvert opening, retention basins, pipe culverts, channels, ditches, fill and cut slopes, shoulders, mowing, chemical weed spray, reseeding, etc.
- 133 Roadside Cleanup Program
- Remove debris, litter barrels storm deposited debris, sweeping, etc.
- 134 Maintenance Of Roadside Facilities Program
- Rest Areas, landscaping, etc.
- 135 Maintenance Of Roadside Appurtenances Program
- Fences, snow fence, glare screen, tortoise fence, cattle guards, etc.
- 141 Traffic Services Program
- Signs, guard rail, attenuators, cable barriers, line striping, raised pavement markers, pavement markings, lighting, patrolling, emergency response, special event traffic control
- 151 Snow And Ice Control Program
- Snow and ice removal, pre-treatment, snow markers
- 161 Structure Maintenance Program
- Bridges, tunnels, retaining walls, sound walls, sweep structures, graffiti removal
- 182 Maintenance Of Facilities
- Yard work.
- 270 Stockpile Production Program
- Aggregate production, premix production, mixing salt and sand, hauling materials, salt brine/anti icing chemical production, purchasing

Capital Maintenance

Capital maintenance is defined as work that will extend the life of the asset. While routine maintenance does little to inhibit deterioration of the asset, capital maintenance slows down the deterioration or improves the condition of the asset. NDOT's capital maintenance program includes projects to perform preventive and rehabilitation work on the system. Typically these are chip seals, micro surfacing, asphalt overlays, mill and inlay or cold in place recycling projects for the pavement.

d. Benchmarking of NDOT's Assets. To get a good understanding of Nevada DOT's system, Halcrow compared a number of assets and unit of measures to other

states. Some unit of measures allow for more detail, and therefore more accurate, comparison than others.

Length of System (CLM) - This is typically measured in the number of miles of the system measured along the centerline of the roadway, typically called "Centerline Miles". It does not, however, give an indication of how many lanes wide the road is, therefore; it is not a good measure to compare to other states.

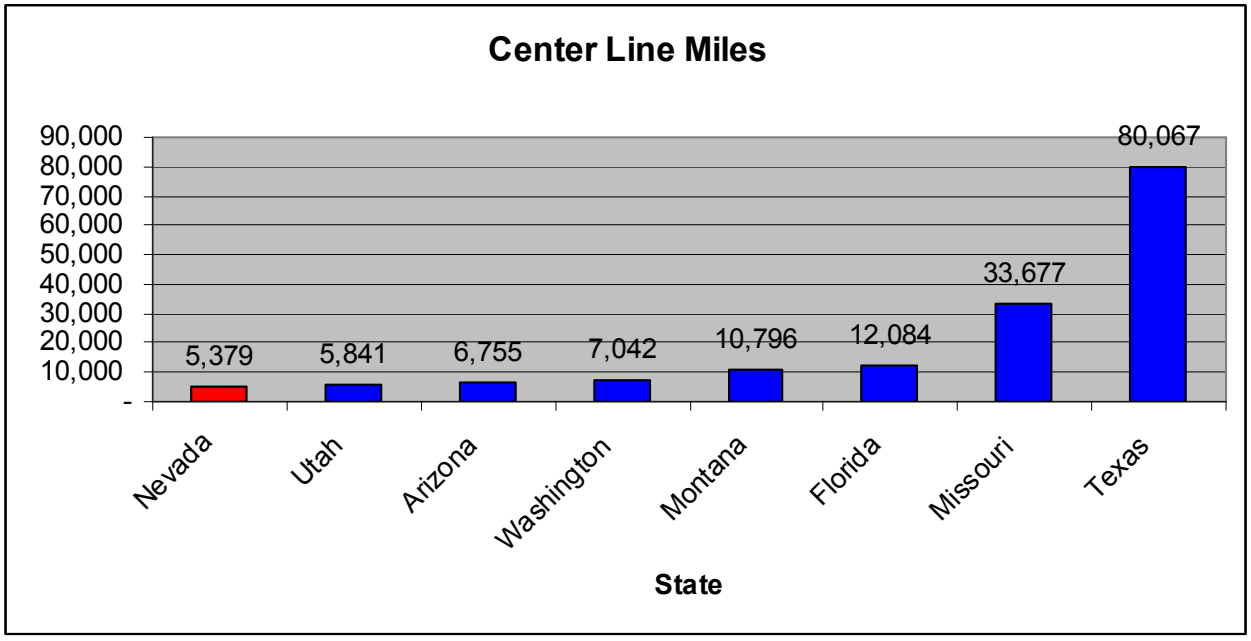


Figure 1 Center Line Miles

Lane Miles (LM) - Lane miles is the length of the system as shown above multiplied by the number of lanes. For instance, if a particular road is a two lane road and is 10 centerline miles long, it includes 20 lane miles (one lane each direction). If it was four lanes wide, it would be 40 lane miles. This is a relatively good measure although it does not include the shoulder width. Another problem with this measure is nothing is known about the width of each lane, although most lanes in the US are 12 ft. wide. Some may be as narrow as 10.5 feet or as wide as 14.

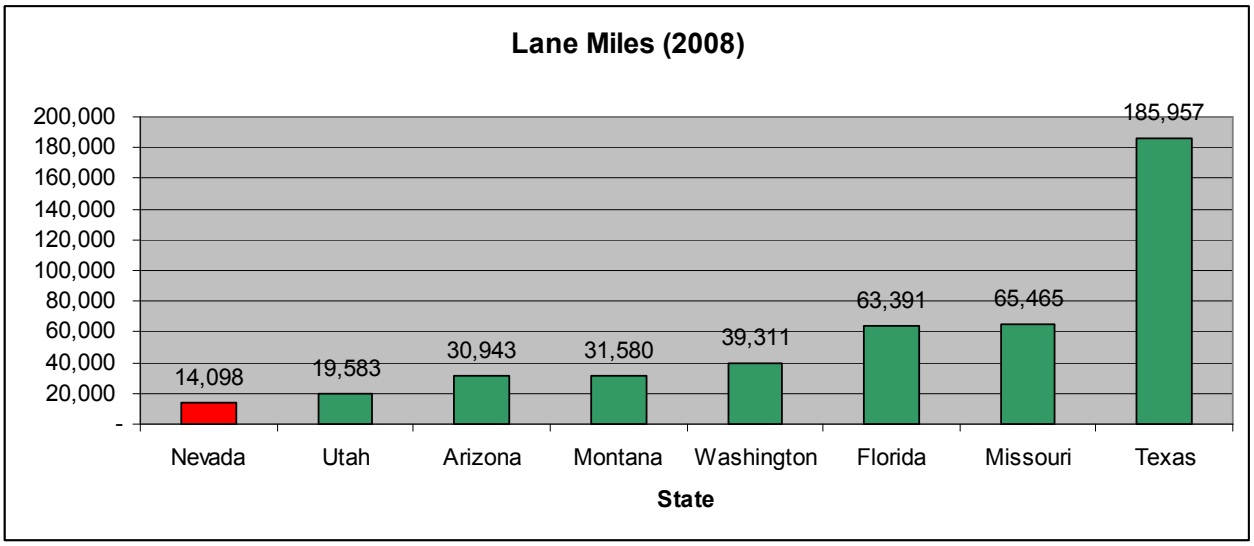


Figure 2 Lane Miles

Area - Area can be used to measure the amount of pavement or bridge deck and is an excellent way to compare assets, however it is not often known for pavement. Bridge inventory systems typically do include bridge deck area.

Daily Vehicle Miles (DVM) - A good indication of the amount of traffic on a roadway or roadway system is DVM. This is calculated by placing vehicle counters at intervals along the roadway and then multiplying the average traffic over a section of roadway by the length. So for example, if two counters were placed 10 miles apart, the first one counted 2400 vehicles over a 24 hour period and the second one counted 2600 vehicles over the same period, the average (2500 vehicles) traveled over the 10 mile section resulting in 25,000 vehicle miles per day. Again, while a good measure, it does not tell you how many lanes the vehicles were traveling over.

Vehicles per Lane (VPL) - By dividing the DVM by the number of lane miles traveled over, the number of vehicles per lane per day can be determined. This is basically a measure of congestion and is a good way to compare one system to another.

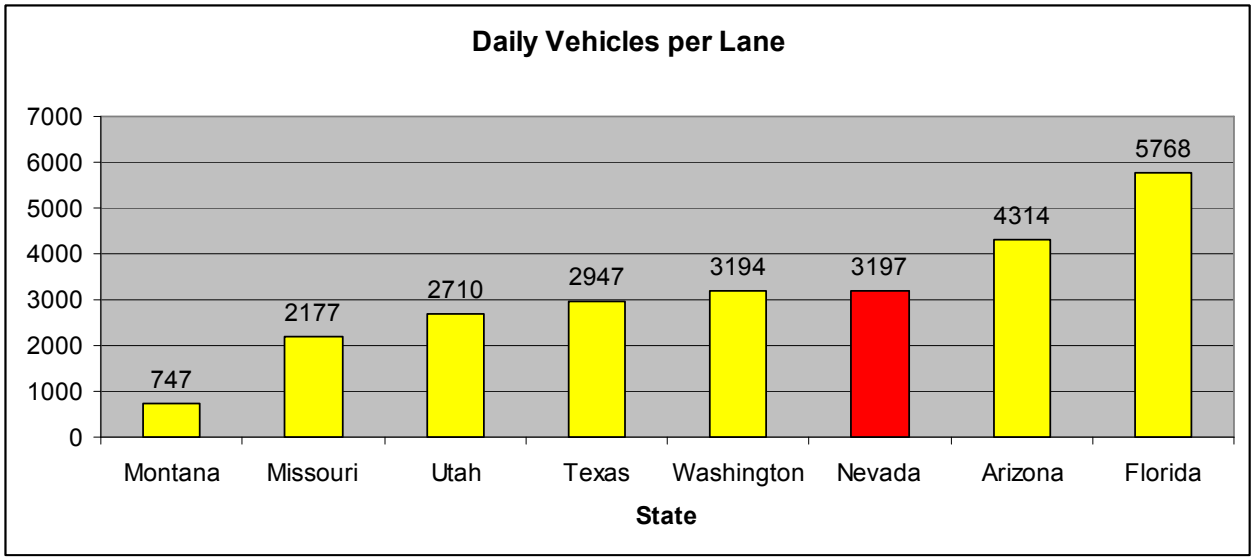


Figure 3 Daily Vehicle per Lane

e. Other Factors That Affect Maintenance. A few of the other factors that affect maintenance are soil types, terrain and precipitation. As shown on the maps below, Nevada is a diverse state with some extreme differences. It is generally a rural state with some concentrated population densities. While the state is generally dry, there are areas where substantial snow and rainfall generate a higher level of work for maintenance in the tasks of snow and ice removal, siltation, repair of damage and removal of debris attributed to flooding. See **Appendix A** for a comparison of other states.

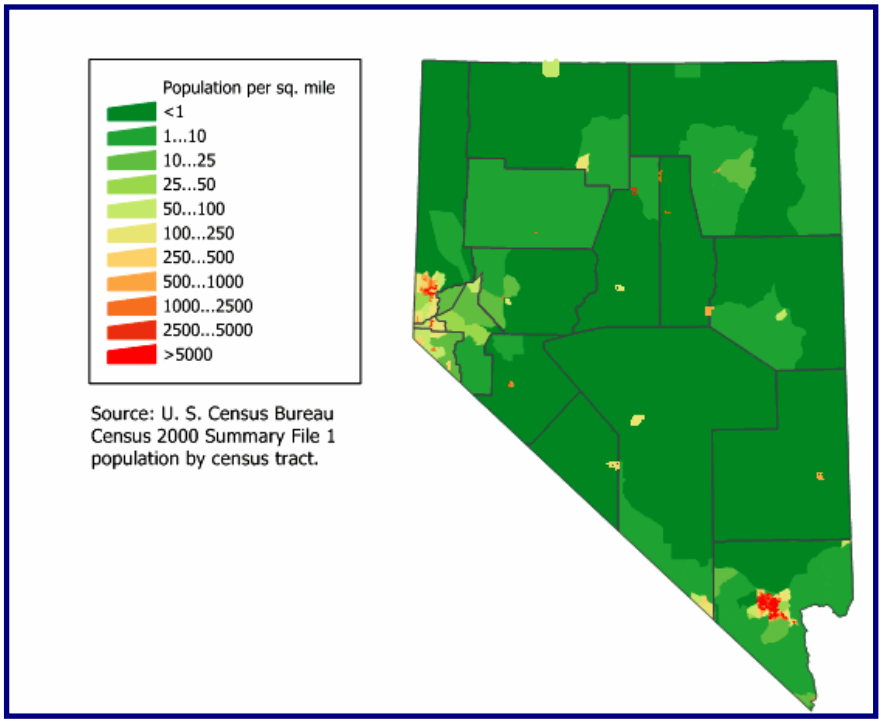


Figure 4 Population Density

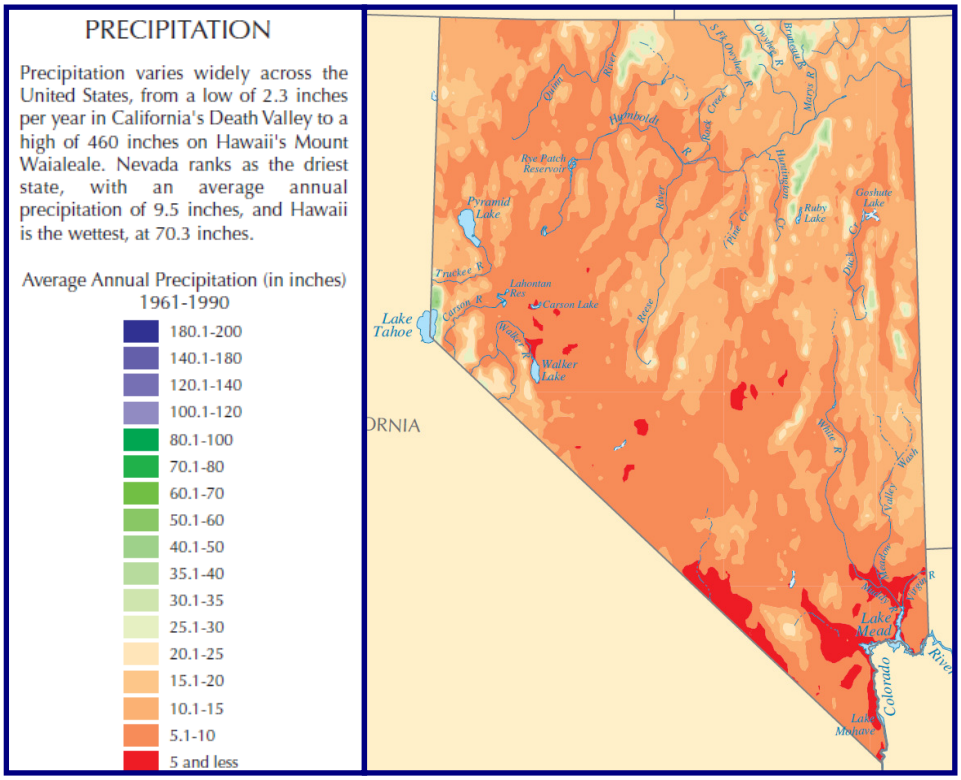


Figure 5 Precipitation

Figure 6 Soil Types

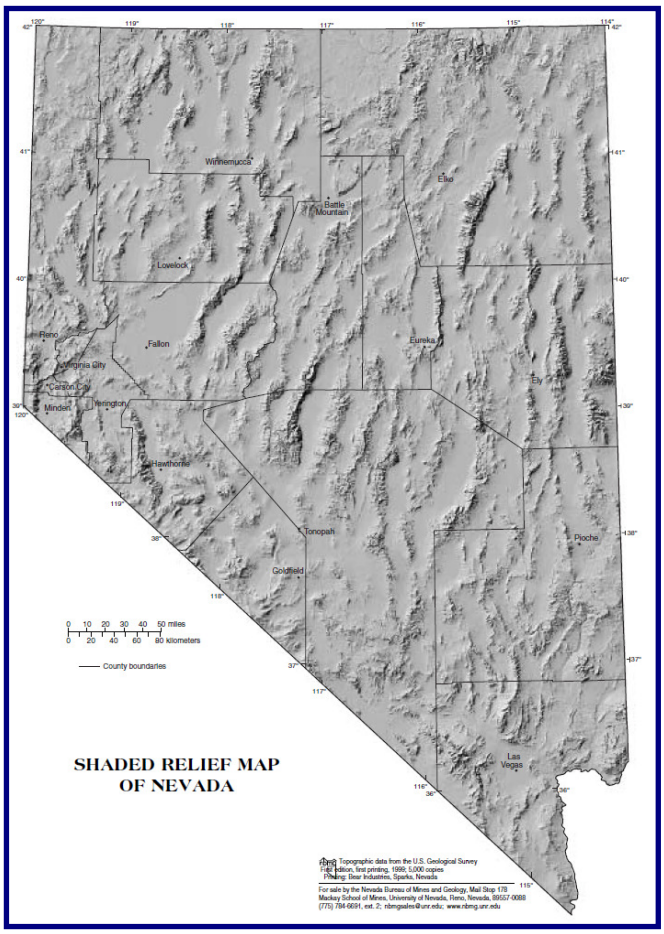


Figure 7 Terrain

f. Comparison of the NDOT Districts. NDOT has three main Districts with headquarters located in Las Vegas (District 1), Reno/Sparks (District 2) and Elko (District 3).

District 1 includes not only the metropolitan area of Las Vegas, it also includes extremely diverse terrain from deserts to mountainous. District 1 includes a Sub-District in Tonopah.

District 2 includes the highly populated Reno/Carson City/South Lake Tahoe areas as well as mountains and deserts. District 2 has no Sub-Districts.

District 3 is extremely rural with small populated areas, mountains and desert. There are two Sub-Districts in District 3, Winnemucca and Ely.

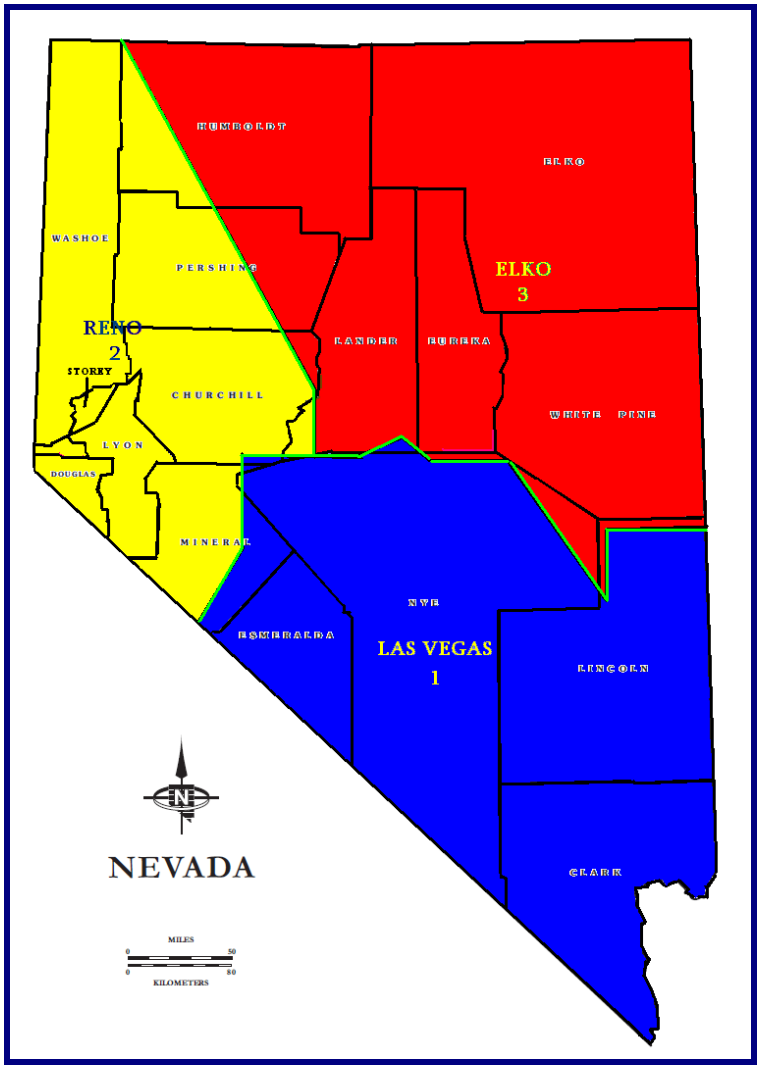
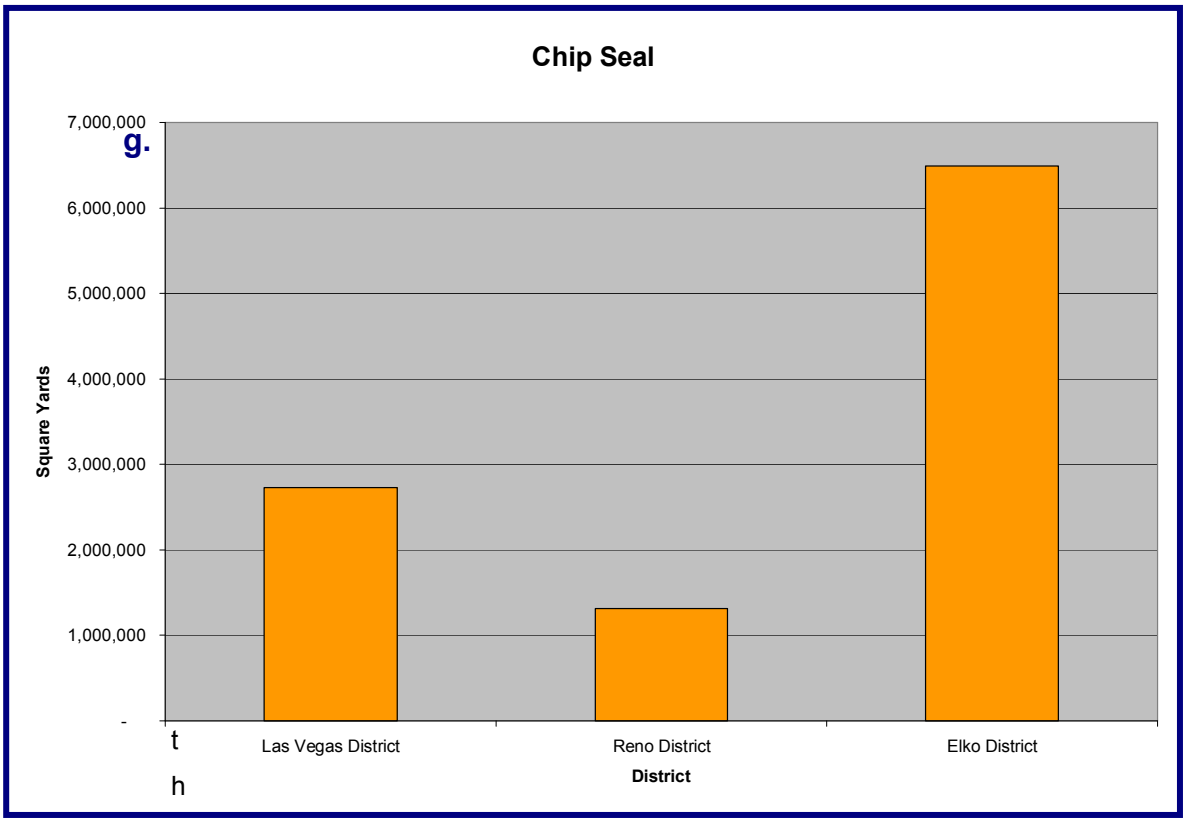


Figure 8 NDOT District Boundaries

g. District Work Programs. The differences in the Districts result in different priorities and work programs. In urban and metro areas, highways include more guard rails, signs and lighting and frequently have curb and gutter roads and median barriers requiring sweeping. The following graphs show work performed in FY 2009 and the differences in the districts. While this represents actual work in 2009 and is representative of the different needs in the districts, those needs will fluctuate from one year to the next based upon priority, weather, traffic demands and deterioration of the roads and bridges in each district. These graphs do show the differences between the metropolitan Las Vegas are that has more sweeping and litter removal needs, where the rural Elko area spends more of their time performing chip seals (pavement resurfacing typically used on lower volume roads). These graphs also show the need for more snow and ice removal in the Western and Northern parts of the state.

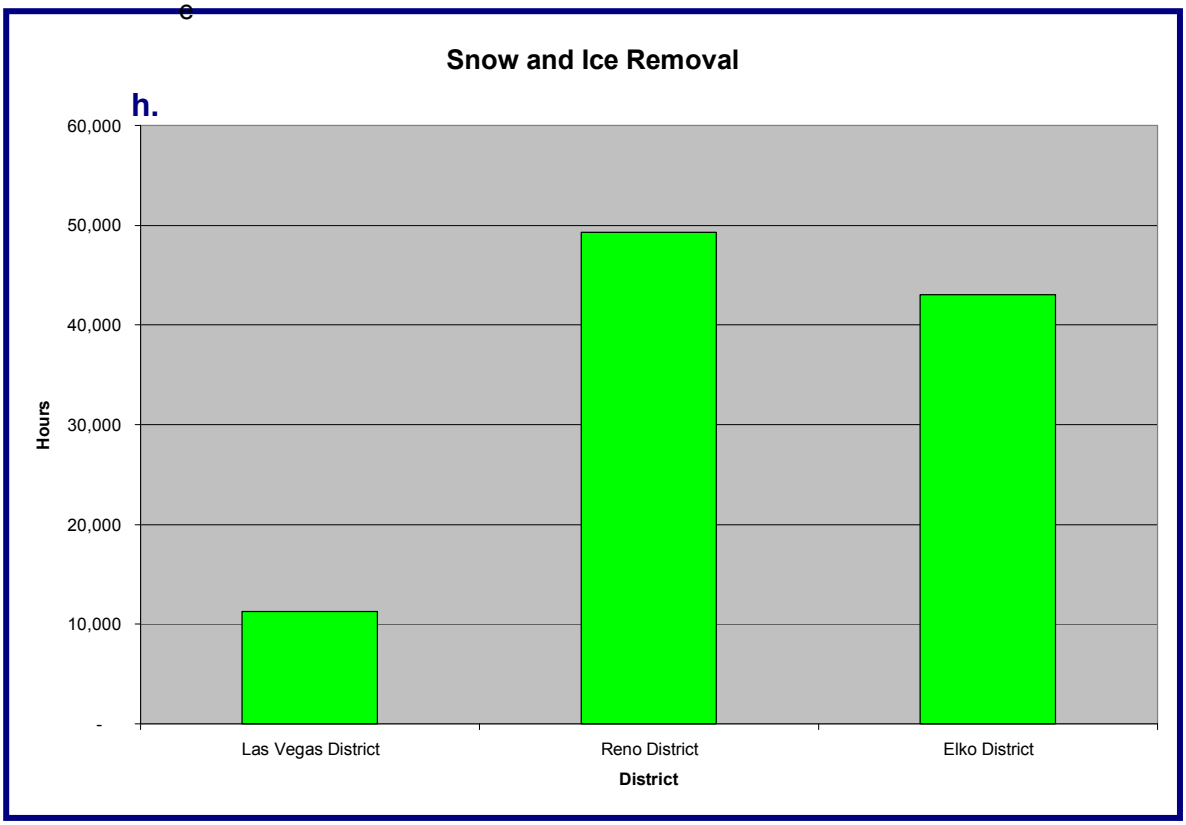

Chip Seal
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
-
Square Yards
Las Vegas District
Reno District
Elko District
District

g.

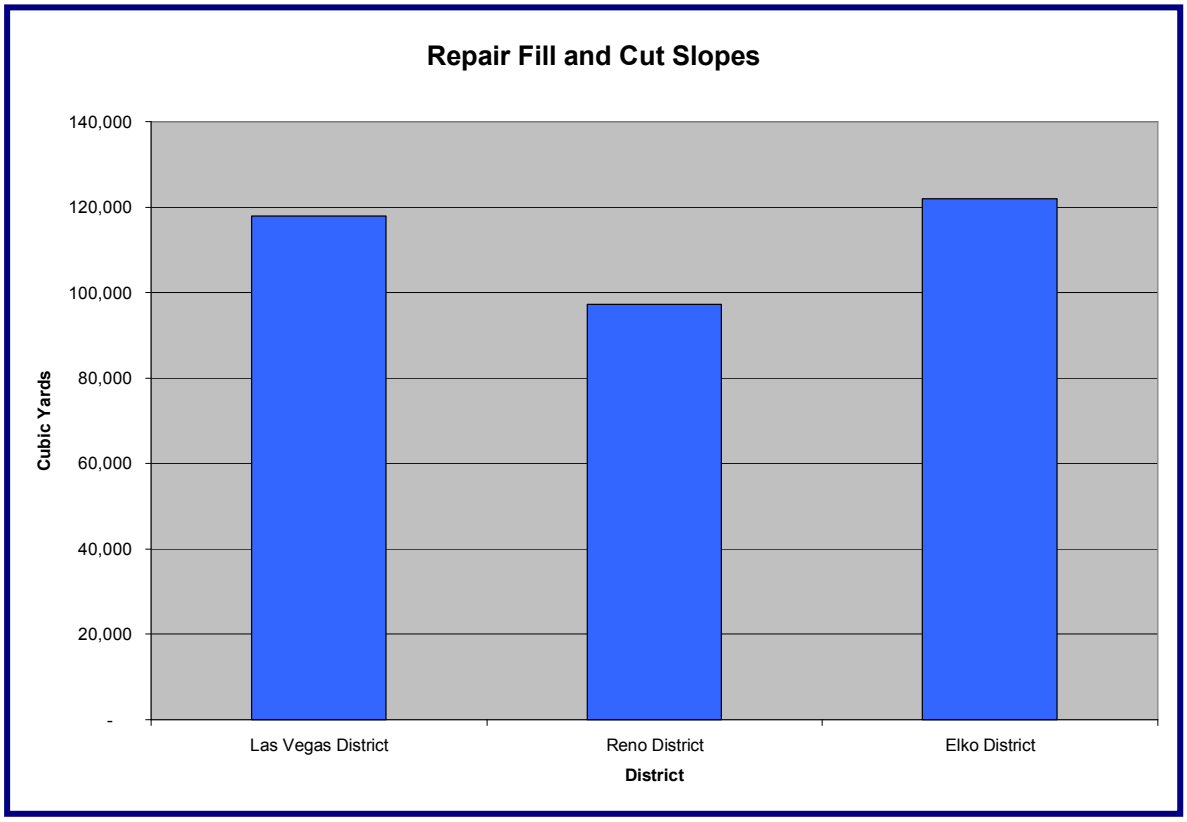
t

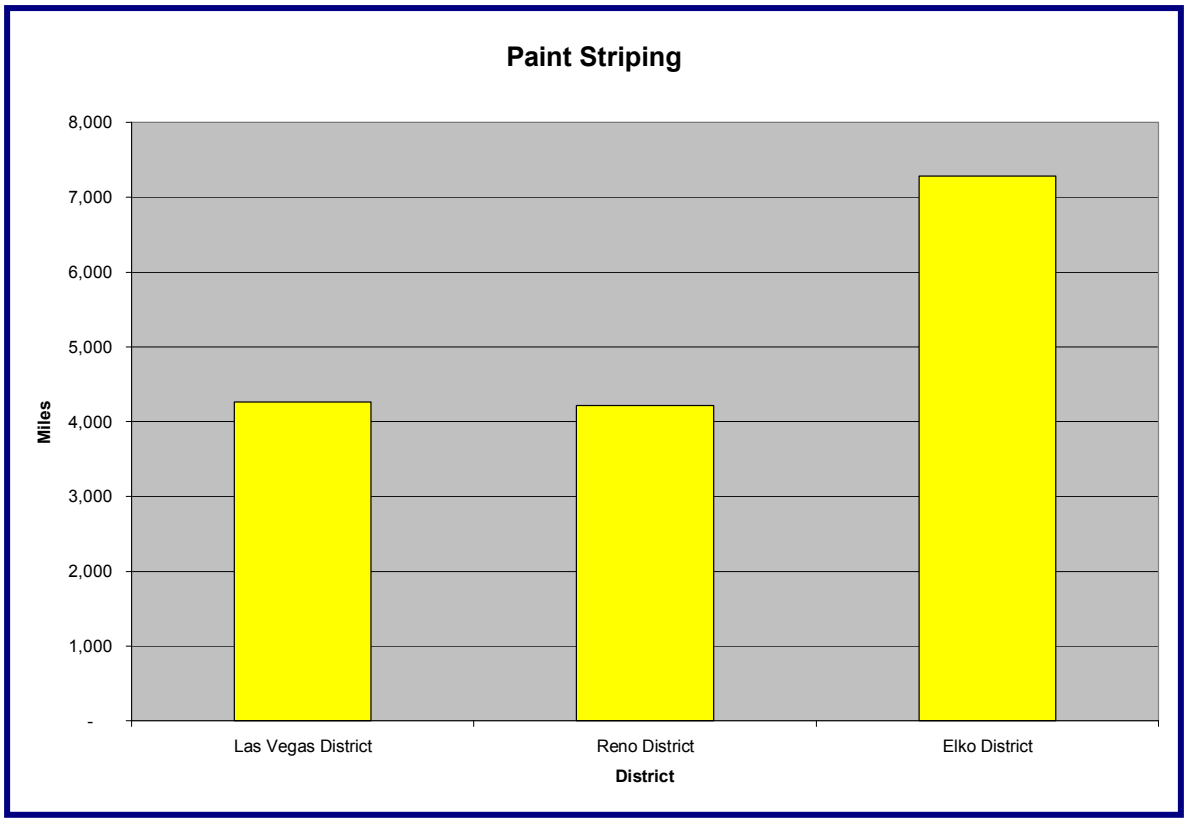
h

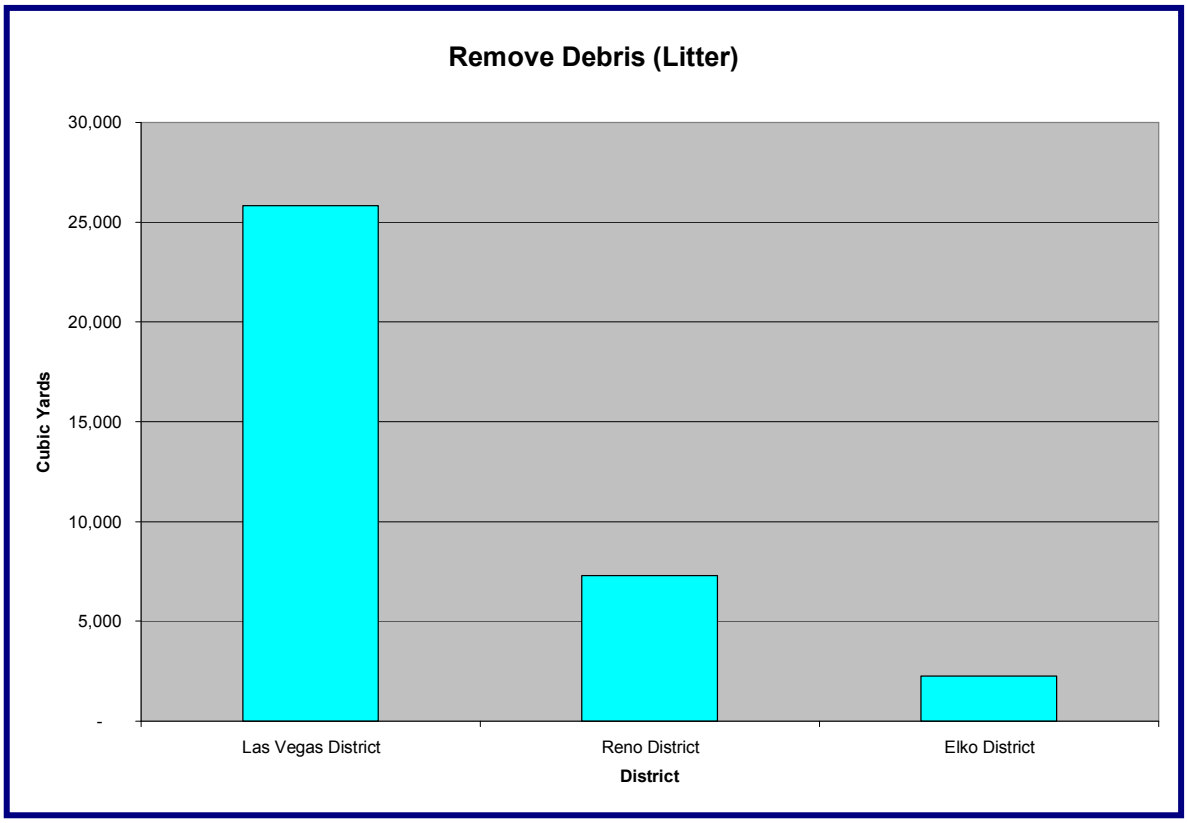
e

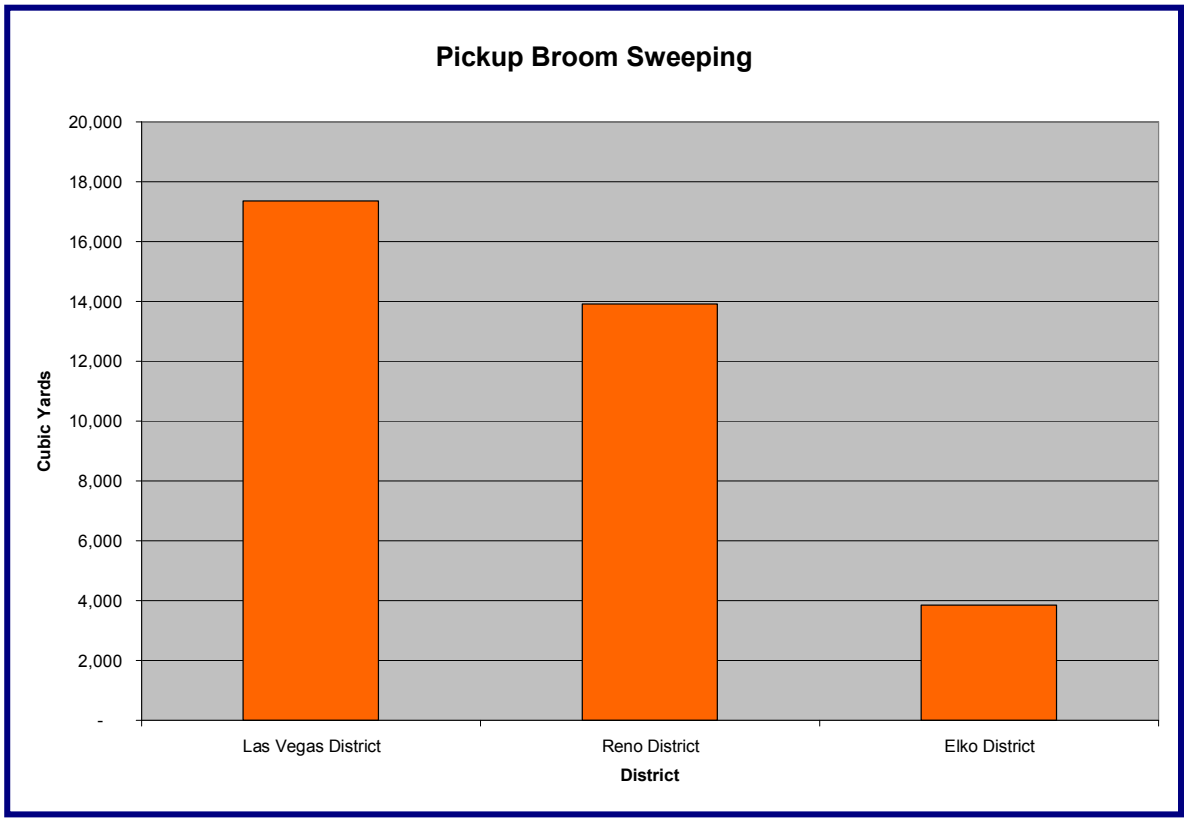

Snow and Ice Removal
60,000
50,000
40,000
30,000
20,000
10,000
-
Hours
Las Vegas District
Reno District
Elko District
District

h.


Repair Fill and Cut Slopes
140,000
120,000
100,000
80,000
60,000
40,000
20,000
-
Cubic Yards
Las Vegas District
Reno District
Elko District
District


Paint Striping
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
-
Miles
Las Vegas District
Reno District
Elko District
District


Remove Debris (Litter)
30,000
25,000
20,000
15,000
10,000
5,000
-
Cubic Yards
Las Vegas District
Reno District
Elko District
District


Pickup Broom Sweeping
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-
Cubic Yards
Las Vegas District
Reno District
Elko District
District

2. Interviews.

In order to accurately establish the appropriate activities for which to collect cost and performance data, it was crucial to customize our research to fit NDOT's routine maintenance operations. Imperative to this research were interviews with the districts and sub-districts to discuss cost effectiveness and solicit the District Engineer, District Maintenance Engineer and Maintenance Station Supervisors' input and opinions. We were encouraged by the DOT employees' open and forthright opinions, and their willingness to share their ideas. We also engaged the contractor community and other industry representatives to solicit their comments, opinions and suggestions. See **Appendix B** for a list of NDOT staff and contractors that were interviewed for the study and a summary of the questions and responses. Halcrow conducted multiple personal meetings with NDOT managers, contractors and industry representatives. With the exception of two teleconference interviews, all 28 meetings were in person and conducted between February 16th and May 14th 2010. We interviewed a total of 44 individuals representing NDOT, nine contractors and two representatives of the AGC. All three districts were represented, as well as executive management from the central offices in Carson City, including the Executive Director, Chief Accounting and the Administrative Services office. Below are our impressions and a summary of those interviews.

a. Interview Summary.

During the course of our interviews we observed both differing opinions and commonalities between the contracting community and NDOT staff member. We noted the similarities in their answers to the advantages and disadvantages of contracting maintenance. We thought it was enlightening that both groups listed the advantages to contracting as being efficient, flexible, motivated and creative, but neither group mentioned direct cost as a factor. Although lower cost is a function of efficiency, there was little emphasis on comparing the carrying cost of maintaining NDOT's fleet of equipment and staff to utilizing contract resources on an as-needed basis. Regarding the disadvantages; both groups agreed that NDOT's geographic presence in the state is challenging for contractors to offer instantaneous services that are competitive with NDOT's service in rural areas. NDOT's is concerned that it could lose expertise on certain tasks resulting in contractors having the expertise and artificially raising prices. Contractors believe competition will keep the pricing within market value even if NDOT was not one of the competitors.

b. Chip Seals. Chip seals seem to be the most contentious subject among NDOT staff member and the contractor community. The NDOT staff member believes that contractors cannot match the quality provided by NDOT crews, while the contractors contend that the few chip seal contracts advertised to date were poorly designed with short project availability dates that impacted both quality and price.

Chip seals seem to be the most contentious subject among NDOT staff member and the contractor community

Shoulder leveling is an activity with prolonged scope requiring extensive manpower and equipment, and may go beyond what is normally defined as routine maintenance…

c. Slope Flattening. Another item of contention was the widening of unpaved shoulders. While the widening of unpaved shoulders is a worthy project to establish a safe clear recovery area along major arterial highways; it is an activity with prolonged scope requiring extensive manpower and equipment, and may go beyond what is normally defined as routine maintenance; crossing the definition to what many would characterize as a construction project. Prolonged scopes tie up in-house forces that could be utilized on routine maintenance needs requiring instantaneous responses. It may also add unseen costs by mobilizing and de-mobilizing in-house resources over a prolonged period, whereas a contractor would mobilize once and complete the project in a continuous uninterrupted manner as defined by his contract.

d. Contract Processing. Another item that came up in the interviews was utilizing the Administrative Services Division as the sole entity to process maintenance contracts. With every contract funneled to one office, it creates a bottleneck in the process, frustrating district managers, contractors and the Administrative Services Division. Both groups commented they would like to see a more efficient process where the districts have more direct control over the letting and execution of maintenance contracts. In our interview with Administrative Services, it was evident that the staff members were overwhelmed by their workload and stressed by the demands. Early judgments from our interviews indicate there are efficiencies that can be achieved with adjustments in contracting process, contract decision matrices, organizational structure of maintenance and establishing a partnering culture among NDOT staff and the private sector.

3. Literature Review

A required task in the project was to perform a literature review to identify previous research reports or presentations that have been performed by others. Halcrow utilized a methodical process including developing search criteria to identify the research and review criteria to extract appropriate information out of the reports identified.

a. Search Criteria. The literature search was essential to identify previous research by others and to identify best practices. To get current information, we decided to use publications from January 1, 2000 or after. We developed search criteria, which were used to comb through various selected websites and databases, in order to narrow our findings to relevant publications. The following key words were used:

- Highways
- Maintenance
- Outsourcing
- Contracting
- Privatization
- Make vs. Buy
- Costs
- Levels of Service
- Performance Contracting
- Oversight

b. Review Criteria. Once the search criteria were developed and implemented the next step was to determine review criteria to use while performing the literature review. The main project tasks included outsourcing decision factors, contracting methodologies, the development of cost comparisons and cost comparison matrices, so we utilized those to develop the review criteria:

- Outsourcing Decision Factors
- Contracting Methodology/Guidelines
- Cost Effectiveness Information
- How to measure cost effectiveness, comparison matrix

c. Literature Review Analysis. There are a large number of published reports, papers, articles and presentations on outsourcing highway maintenance. In general, they discuss outsourcing decision factors and guidelines for contracting. Many included general statements on cost savings. A few reports included some activity costing, especially one done for the South Carolina DOT. There are several that included some fairly good discussion on cost comparison methodologies. 39 reports or presentations were reviewed.

i. **Outsourcing Decision Factors** - Outsourcing decision factors are items or issues to consider before making the decision to outsource. Typically factors usually involve cost or costs savings, however, many other factors are important to consider. Sixteen factors were identified in the literature search. (See Appendix C, Section 3a, Page 86)

ii. **Outsourcing Methodology/Guidelines** - After the decision has been made to outsource, the outsourcing methods have to be determined. Information was extracted out of the literature on the different types of contracts that have been utilized by highway agencies, as well as recommended items to include in the contract documents. Frequently the type of contract utilized depends upon the government's statutory authority. Five different types of contracting methods are defined. Over forty different recommendations or guidelines are included and categorized into major and sub categories. (See Appendix C, Section 3b, Page 87)

iii. **Cost Comparison** - The literature search resulted in very little information about cost comparisons. However, NCHRP 14-18 Determining Highway Maintenance Costs is a project that is looking at cost comparisons between different states and contractors. Unfortunately the report is not published at this date. There are a number of reports that included general statements about costs.

iv. **Cost Comparison Methodology** - A few reports reviewed included some information about the comparison of costs between government workers and private contractors. Generally most indicated performing accurate fair comparisons were difficult. A number of reports included contracting decision making tools.

v. **Report Summaries -** A number of reports were very good and a summary of the ones that best relate to the study are included as **Appendix C.**

d. Contracting Statutes in Nevada. Halcrow performed an analysis of existing Nevada statutes that control contracting processes.

- Title 35 Chapter 408 – Is known as the "Highway and Roads Law" The following sections are discussed and changes are recommended:
  - 323 Provides directions when improvements may be made in the case of an emergency, either with state employees or contractors; **NDOT could use this statute to contract for defined "emergencies".**
  - 327 Provides requirements for advertisement contracts for bids;
  - 333 Provides requirements for contractor prequalification, experience and financial ability;

- 337 Provides for Bid Bonds or other security to ensure contracts are executed by contractors;
- 343 Provides a procedure for receiving bids and awarding contracts to the lowest responsible bidder; **NDOT could accept bids at the Districts if indicated in the advertisement. This statute would need to be modified to make a selection based upon qualifications of the contractor if desired for performance based maintenance contracts;**
- 346 Provides for the payment of a monetary incentive for early completion;
- 347 Provides a process for execution of contract in name of State by the Chair of the Board;
  Halcrow recommends this statute be revised to allow for award and execution of contracts up to $500,000 by the District Engineer within parameters established by the Board. This will require statutory change;
- 357 Provides requirements for payment and performance bonds in the amount of 100% of the contract amount and insurance for successful bidders. **Halcrow recommends authorizing NDOT to accept bonds in the amount of the first two years contractor payment for maintenance contracts with time periods longer than two years. (Needed to ensure good competition for performance based maintenance contracts so contractor's bond capacity is not exceeded). This will require statutory change;**
- 367 Provides a one quote process for contracts less than $50,000 and a three quote process for projects not exceeding $250,000; **NDOT was developing this new provision while the study was underway.**
- 383 Provides for partial payments and a 5% amount retained to ensure completion of the work.

e. Conclusions. Substantial information exists in literature reports analyzed. Halcrow utilized the information contained in these reports to guide the collection of cost data, the formation of a comparison matrix, the selection of appropriate contracting decision factors and the development of recommended procedures for

making informed decisions about the most appropriate methods of maintaining the Nevada DOT highway network.

4. Cost Study Activities

a. Cost Data

Halcrow has collected significant maintenance cost information from NDOT MMS System, NDOT Financial System, NDOT contract bid tabulations, and from Utah, Arizona, Montana, Washington, Missouri, Texas and Florida DOT's. While the cost information from other states is relevant, their accounting methodology is different and it was difficult to determine if the task codes were similar or if costs include direct costs and overhead. Halcrow also realizes that costs are very dynamic and are a factor of the economy, remote location of work, availability of contractors, shortage of materials, amount of work performed, etc.

b. Comparison Matrix Methodology

A true comparison must consider the total costs of performing an activity. Total costs should include direct costs of performing the work and the indirect or overhead costs associated with those direct costs. In government operations there are also frequently unavoidable costs, costs that are difficult to quantify and may for example include maintaining a government office in a remote location that may not be needed for maintenance purposes, but is needed to satisfy political needs. Note all of the cost numbers in the report are from FY 2009.

c. Cost Comparison

The cost of maintaining highways is comprised of multiple components including:

Direct Costs

Direct costs for both maintenance state forces and contracts were determined. Direct costs are those that can be directly associated with an activity or contract. NDOT provided Halcrow state force cost data consisting of the direct labor including agency fringe benefits (vacation and sick leave, pensions, workers compensation insurance, unemployment insurance, health and life insurance, Medicare, etc.), materials (including the cost of the material as purchased, cost of specification writing, advertising for bids, bid award evaluations, storage, building usage, warehousing staff, etc.) and equipment charges (agency equipment rental rate, maintenance of equipment, fuel and oil costs, shop building costs and utilities, etc.). These costs were compiled by utilizing reports from MMS providing quantities, total expenditures for each activity to include labor (excluding fringe benefits), equipment and materials. Materials included in MMS are based on an average cost and were adjusted to reflect true costs for the fiscal year.

Maintenance Contract direct costs include the contractors bid price for performing maintenance work. If the state furnished any materials, equipment, material storage area, yard, etc., these are also direct costs of contracting. These costs include Maintenance Division Contracts, District Contracts, Sub District and Maintenance Station Contracts for everything done on the roadway, roadside, facilities, and

Indirect Costs

Indirect costs for both maintenance state forces and contracts include State, Division, District, Sub District, and Maintenance Station management staff, office, office supplies and other charges not chargeable to an activity or project work on the roadways. These costs were determined by NDOT, estimating the employee hours dedicated to maintenance activities. For example, overhead costs of the maintenance station including the office, supervisor, office manager, etc., are estimated by the percentage of time staff spent on maintenance related activities, which was then applied to the monies spent in the fiscal year. The overhead costs for other offices, as mentioned above, were determined in the same fashion. However, the overhead for the Human Resources Division was separated by the number of staff in maintenance vs. construction to determine the percentage that applied to maintenance. Maintenance contract overhead costs of advertizing, letting to bid and awarding maintenance contracts were estimated. The time of performing quality control inspections of maintenance contractors is also estimated.

d. Comparing Maintenance Activities

As indicated previously there was minimal data in NDOT to compare state force activities to contractors. Halcrow did gather data from other states; however each state has differences in how they account for maintenance. The following questions were analyzed:

i. Are the tasks/activities the same?

Activities from data provided in each state were compared to NDOT's task codes. As much as possible, activities that were similar were used for comparison. Some states have more refined task codes and some activities had to be combined to match up with NDOT's task descriptions. In addition, states frequently measure tasks differently and where possible, we converted the units to match the unit of measures in NDOT's MMS. The descriptions of the activities used in the comparisons were reviewed for consistency. Those included in the comparison were found to be relatively comparable to MMS activities.

ii. Are levels of service or performance requirements the same?

Since NDOT does not have quality standards to determine the Level of Service (LOS) being provided by in-house forces, there was no way to determine if NDOT's quality is the same as other DOT's or contractors where cost information was available. Contractors' work and

materials quality are controlled by specifications and typically the work is inspected and materials tested. In our interviews, we asked if materials used in NDOT maintenance operations were tested. Typically they are, but in some cases, NDOT hires a contractor to produce materials from NDOT quarries; therefore, the quality is related to the contractor's production and methods.

iii. Is the cost data from the same year?

Although the fiscal years vary, cost data from FY 2009 was used for all comparisons.

iv. Do the tasks include only direct costs or do they include all the appropriate overheads?

While NDOT MMS does not include overhead, NDOT performed an analysis of all indirect employee labor, fringe benefits, MMS direct costs, and adjustments for actual materials costs, providing Halcrow total unit costs for MMS activities. Arizona and Texas Data also include the appropriate indirect costs.

v. Does the information consists of solely state force costs, or is it inclusive of contractor payments?

One of the biggest obstacles in comparing state force costs to contractors is the lack of contract costs captured in the states' maintenance management systems. Very few states have had the incentive to compare costs. While state forces typically measure "accomplishments" in items measured by work performed; contracts are typically bid out by materials used. For example, state forces measure the number of lane miles or square yards of chip seal performed; contract chip seal is typically bid by the gallon or ton of asphalt used and the number of tons or cubic yards of aggregate used. Application rates have to be determined or assumed to convert to the same units as state forces. It appears Texas is one of the few states that track state forces and contracted work in the same units.

vi. Are the materials the same quality, specification, etc.?

Another issue about comparing cost numbers is the lack of information about the materials that go into the projects. While we determined NDOT basically uses the same materials in state forces maintenance as their contractors; it was outside of the scope of the project to determine material quality or specifications used in other states. Here in lies one of the major variables for cost comparison with other states.

vii. Were the projects comparable in size, road classification, traffic control requirements and other relevant measures?

Project size, road classification, traffic control requirements, etc. are difficult to determine. In maintenance, just like construction, the cost of an activity is directly related to the quantity of work performed. Remoteness of the project affects haul distances and production, also

greatly impacting cost. While it was not feasible to look at the maintenance cost information on a project basis, Halcrow did compare price per unit to quantities of work performed.

viii. Does the material cost include other associated costs such as stockpiling, hauling, environmental best management practices, etc?

Material cost not only includes the original purchase price, but also includes hauling and stockpiling costs. NDOT owns a number of quarries across the state and when cost effective, allows contractors to manufacture their own chip seal or other materials. They have developed task codes to capture all manufacturing, hauling and stockpiling costs and when the materials are used on the road, all costs are included in the material cost per unit.

ix. Did the work meet quality requirements or did it fail prematurely and need to be redone?

We determined that work rarely failed and had to be performed over again.

e. Task Comparisons

Halcrow was requested to analyze at least 10 maintenance tasks. The following items are the highest expenditure tasks in FY 2009:

Table 1

Nevada DOT Top 10 Selected Maintenance Expenditure Items

Rank	TASK No.	Task Description	Unit	State Total Total Cost	State Total Percentage	State Total Cumulative
1	101.05.03	Chip	Square Yards	$22,382,953.17	20.89%	20.89%
2	151.01.01	Snow & Ice Removal	Man Hours	$21,975,981.72	20.51%	41.39%
3	131.06.01	Repair Fill and Cut Slopes	Cubic Yards	$6,417,043.69	5.99%	47.38%
4	141.04.01	Paint Stripe And Solid Lines	Striping Miles	$5,884,765.20	5.49%	52.87%
5	133.01.01	Remove Debris	Cubic Yards	$5,861,861.42	5.47%	58.34%
6	133.05.01	Pickup Broom Sweeping	Cubic Yards	$4,400,278.75	4.11%	62.45%
7	101.07.01	Crackfilling	Lbs. Filler Material	$3,373,283.99	3.15%	65.60%
8	101.05.04	Scrub Seal	Square Yards	$2,151,491.26	2.01%	67.60%
9	141.01.01	Repair / Replacement Of Traffic Signs	Square Feet	$1,967,637.73	1.84%	69.44%
10	131.07.01	Blade Shoulders	Shoulder Miles	$1,911,545.25	1.78%	71.22%

Note: The Top 10 Expenditures in each Sub-District vary substantially and are different than the Statewide top 10 list.

i. Chip Seal - Chip seals represent the most effective pavement maintenance activity available, especially for rural roads. Many states have found contractors to produce cost effective high quality chip seals. The key to developing a good contracting program is

establishing an experienced inspection staff that is empowered to make decisions in the field. The cost effectiveness of the contractors will depend upon how the contract is packaged, location and quantity of work and the timing of the bid and award. Asphalt pavement projects should be advertised and let to bid in the December to March timeframe, allowing for contracts to be awarded and executed long before the paving season, allowing the successful contractor time to develop plans, order and receive materials and schedule equipment and personnel. Another important factor is the development of consistent plans and communications with the contractors on long term decisions concerning chip seal contracting.

As previously discussed, quantities have a major affect on unit prices, the larger the contract quantities for a particular activity, the lower the unit costs. Larger quantities typically allow for lower material prices. The more material purchased, the larger the discount. Costs such as equipment mobilization, permits, minimum insurance requirements, etc. are fixed. The larger the quantity the more these fixed costs can be spread. Larger quantities also allow for greater productivity. Productivity can also be adversely affected by constraints set forth in the contract such as, hours per day, unwarranted specifications, parameters making construction difficult, among a few.

As shown on the chip seal comparison, Figure 9, NDOT forces are very competitive with contractors. Texas contracts over 10,000 lane miles of chip seal annually of their approximately 185,957 lane miles. While NDOT started contracting chip seals in 2009, as they continue to contract, the industry will further develop, resulting in more cost effective prices and higher quality work. In summary, we recommend developing a dedicated chip seal contracting program and estimate NDOT can achieve savings. However we do not recommend NDOT contract all of the chip seal work. As shown on the graphs above, NDOT forces chip seals are very competitive and chip seals are one of the most cost effective maintenance tools available. NDOT needs to maintain the equipment and expertise to perform chip seals in house, performing the smaller projects, strip and spot seals and emergency chip seals as needed. Larger quantities can be achieved by bundling multiple sites into one contract let at the beginning of the paving season and allowing longer availability to complete the project by the end of the season.

NOTE: The graphs in this section are color coded as follows:

- **State Forces – Green Bars**
- **Contractors – Orange Bars**
- **NDOT State Average – Yellow Bar**

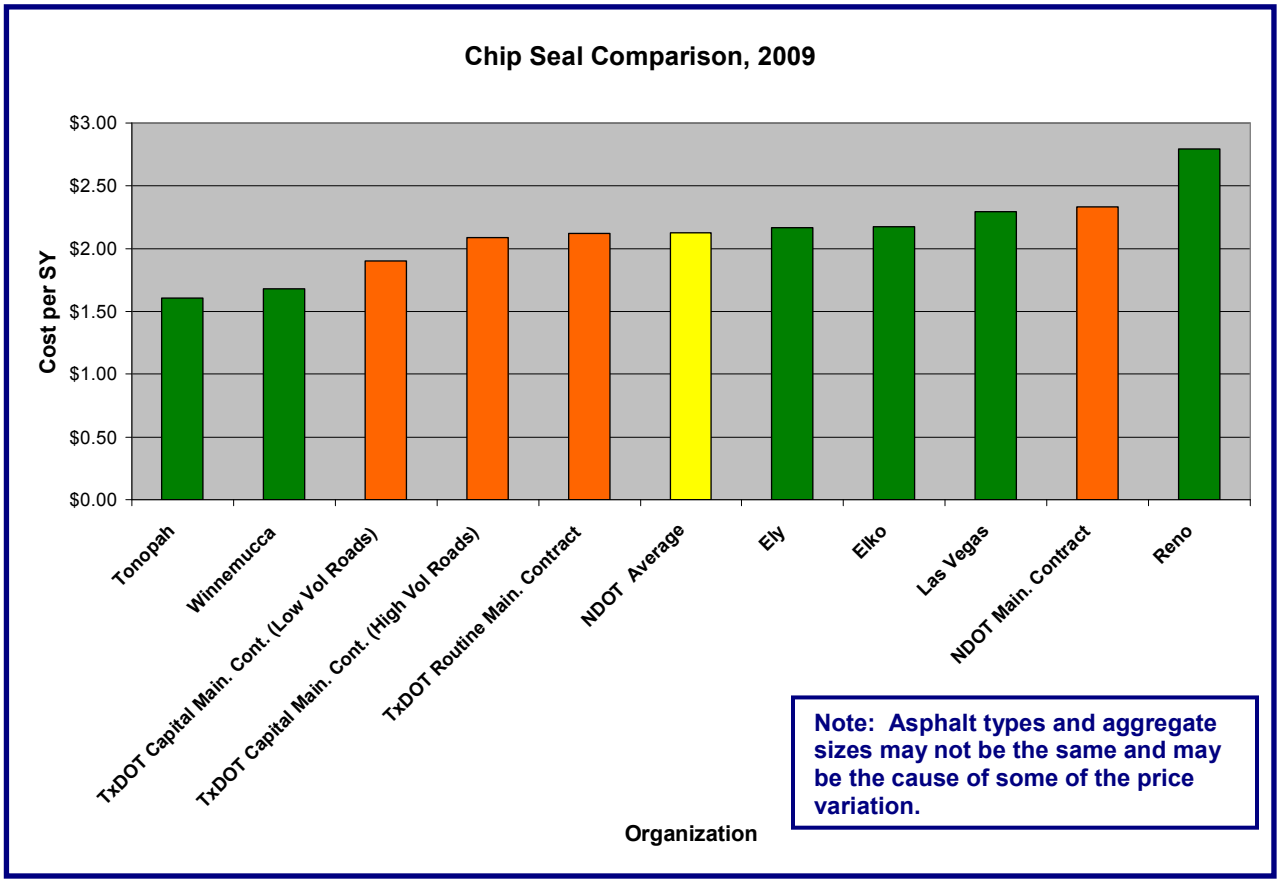


Figure 9 Chip Seal

ii. Snow and Ice Removal – Snow and Ice Removal is a critical activity that requires instantaneous response and availability of equipment and manpower. Response times are crucial and every storm event is different necessitating the need for flexibility in the use of resources. The decision to outsource snow and ice has traditionally been driven by the need for additional resources rather than lower cost. Agencies generally supplement their existing fleet with contractor equipment on a as need basis, and maintain the ability to manage winter maintenance with in-house management. This also enables the DOT to prevent overstaffing during non-winter months. Equipment inventory may be reduced allowing NDOT to utilize equipment year round.

Performance standards for various storm durations should be determined which will dictate associated labor, material and equipment needs. Clear and concise contracts should be developed explaining the scenarios for when a contractor would be used to include notification procedures, to include stand-by operations. It is very important to clearly state

performance standards, timeliness and risk allocation. Contracts are usually let on a per hour basis for each piece of equipment. We estimate that a tandem truck with in-body salt spreader and plow can be leased with operator for $150-$175 per hour with a multi-year contract and a guaranteed seasonal minimum. Adding materials to make it comparable to NDOT's Snow and Ice Task, the costs would be in the $200 - $230/hr range.

A seasonal minimum is necessary to assure contractors they will be able to amortize the capital investment in equipment and assures the department that the equipment will be made available when requested. Seasonal minimum's are often leveraged as an availability fee and commits the contractors' equipment for the winter season. NDOT already hires seasonal workers to assist with snow and ice removal during the winter. We recommend NDOT continue its current practice with a mix of supplementing state forces with contract equipment and manpower on an as-need basis. It is advisable to lock in pricing from contractors for a minimum term (option to renew) commitment before the winter season.

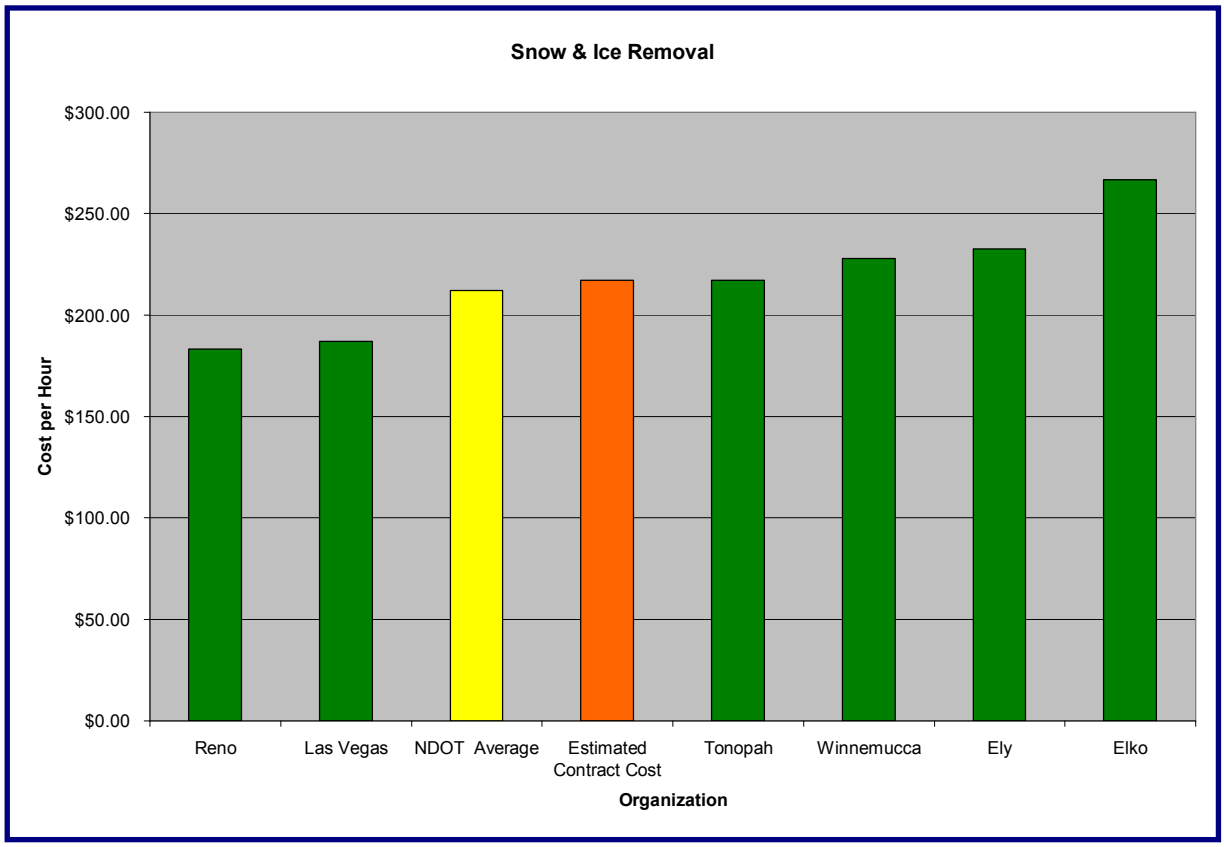


Figure 10 Snow and Ice Removal

iii. Repair Fill and Cut Slopes – Depending on the magnitude of the repair, small repairs should continue to be made with state force crews. Larger more equipment and labor intensive repairs may be better suited for contracting. As shown on the graph on Figure 11, Contract 3409 had large quantities, therefore was more cost effective to contract. Larger, more specialized equipment may be utilized to more efficiently handle repairs. Also state forces can rarely work on a large project for extended periods of time and may be diverted to a short term higher priority project. The costs of mobilizing and de-mobilizing in-house resources over a prolonged period is expensive, whereas a contractor would mobilize once and complete the project in a continuous uninterrupted manner as defined by the contract. Contracting smaller work quantities in sporadic locations would likely yield a much higher cost than state forces.

Halcrow recommends outsourcing the repair of fill and cut slopes to contractors as long as the scope encompasses adequate quantities with flexible availability and completion dates commensurate with the defined project scope.

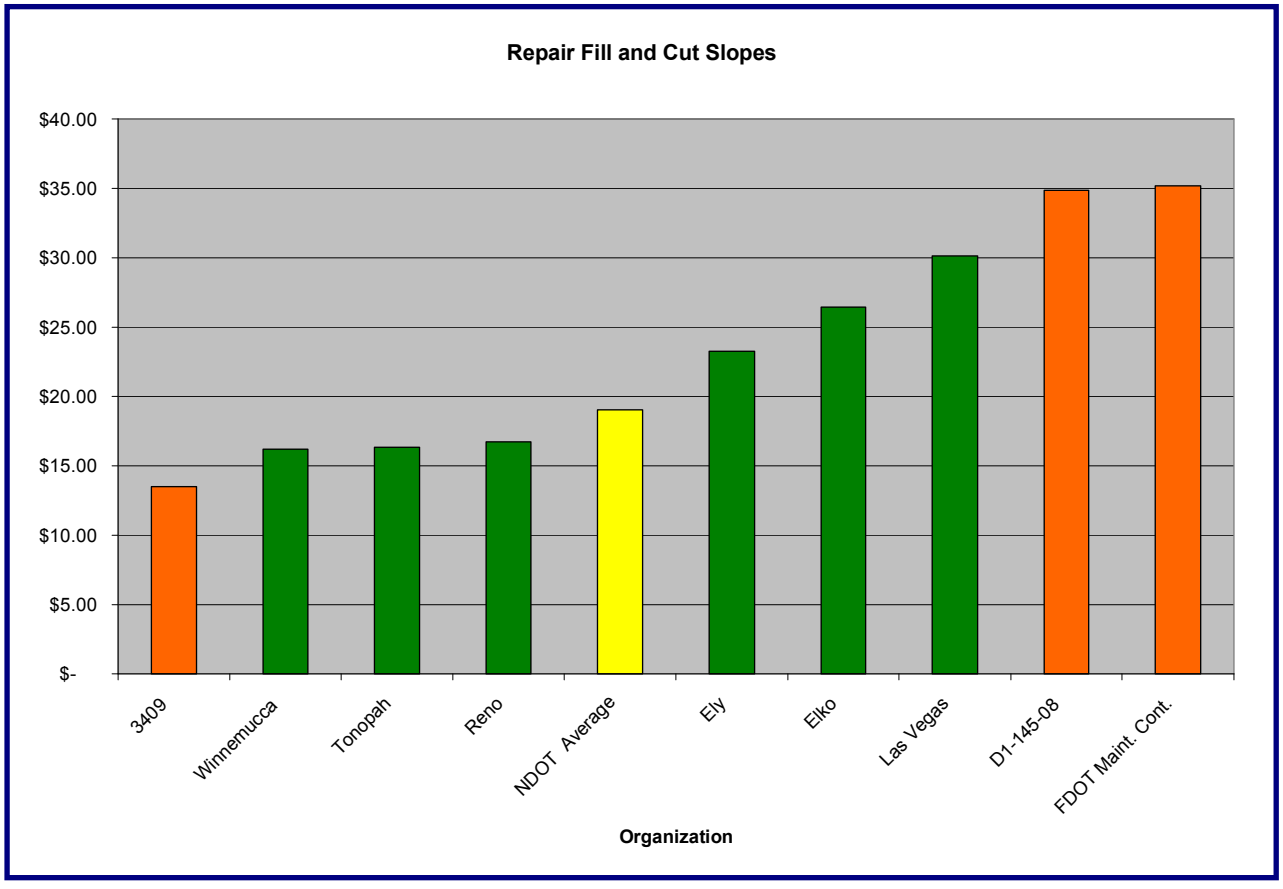


Figure 11 Repair Fill and Cut Slopes

iv. Remove Debris - Debris pickup is defined as removal of roadside litter. This task also includes emergency response to roadway debris in travel lanes that represent a safety hazard. This increases costs because of the traffic control requirement. It is a task that is very labor intensive and can be performed with unskilled workers. However, the costs are very dependent upon quantity of work performed. Although NDOT's cost is higher than the TxDOT contract it is compared with, the remote areas of Nevada and the small quantity of work contributed to the cost. NDOT has done a good job of utilizing prison labor for this task. It is also an activity that is easily contracted freeing up state employees for higher priority tasks that require skilled laborers. As shown on the Debris Removal graph in Figure 12, contracts can be more cost effective and Halcrow recommends continued utilization of prison labor, utilization of handicapped workshops and contracts for the majority of litter pickup. State forces should be utilized to remove large debris off the roadway or roadside while performing their daily patrolling.

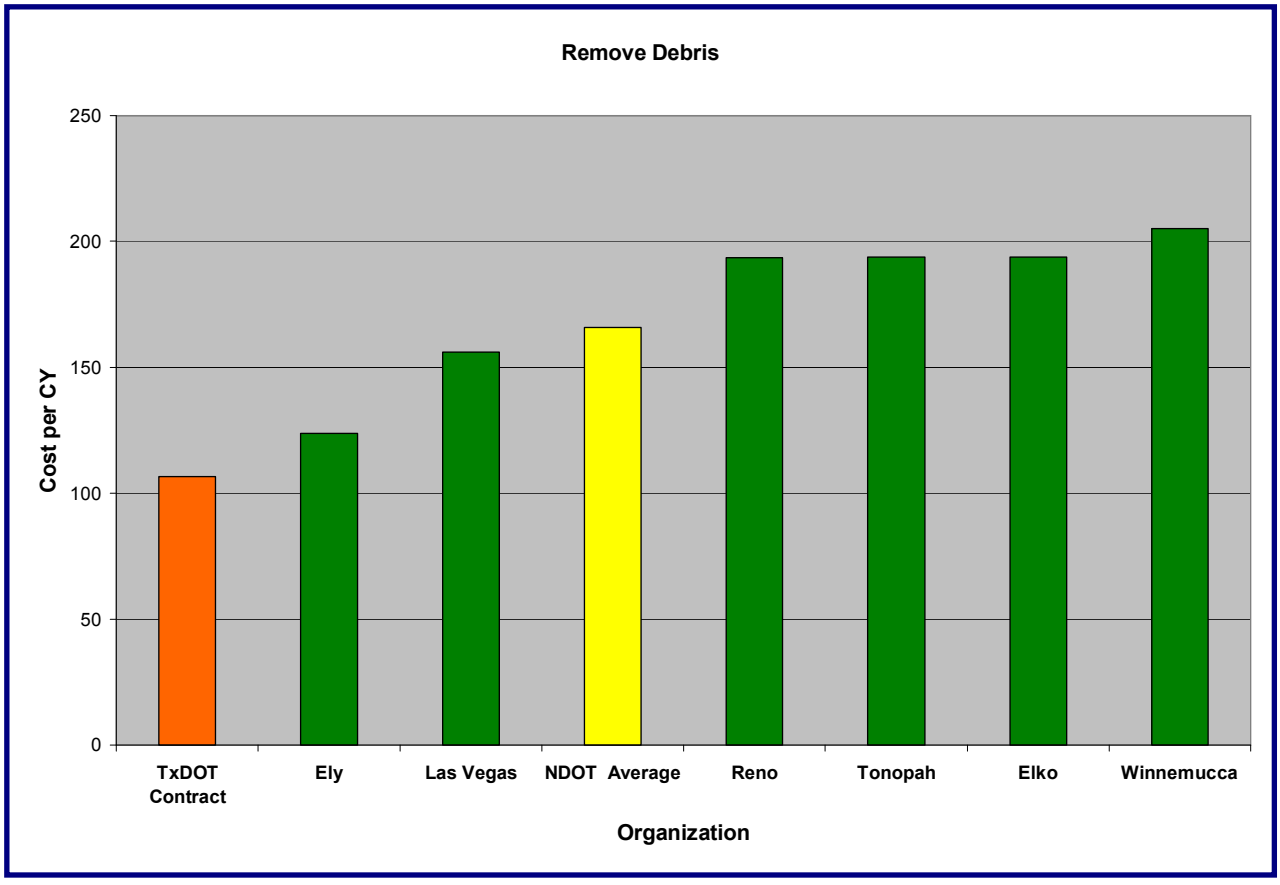


Figure 12 Remove Debris

v. **Crack Filling** – Crack filling is a seasonal and project by project related activity that involves advanced planning, estimated material usage, traffic control, specialized equipment (melter and applicator, hot-air lance, etc). Many DOT's report outsourcing this activity with very competitive pricing and we believe NDOT will experience similar results. As shown in Figure 13, TxDOT contracts "crack sealing" at a rate more cost effective than any NDOT office, however the materials and methods may be different. We have performed an analysis and developed an estimated cost that would indicate that some savings could be achieved by contracting where adequate quantities are advertised on a multi-project basis. Since the equipment costs are relatively small, developing a crack filling industry in Nevada should be possible and good competition could be achieved.

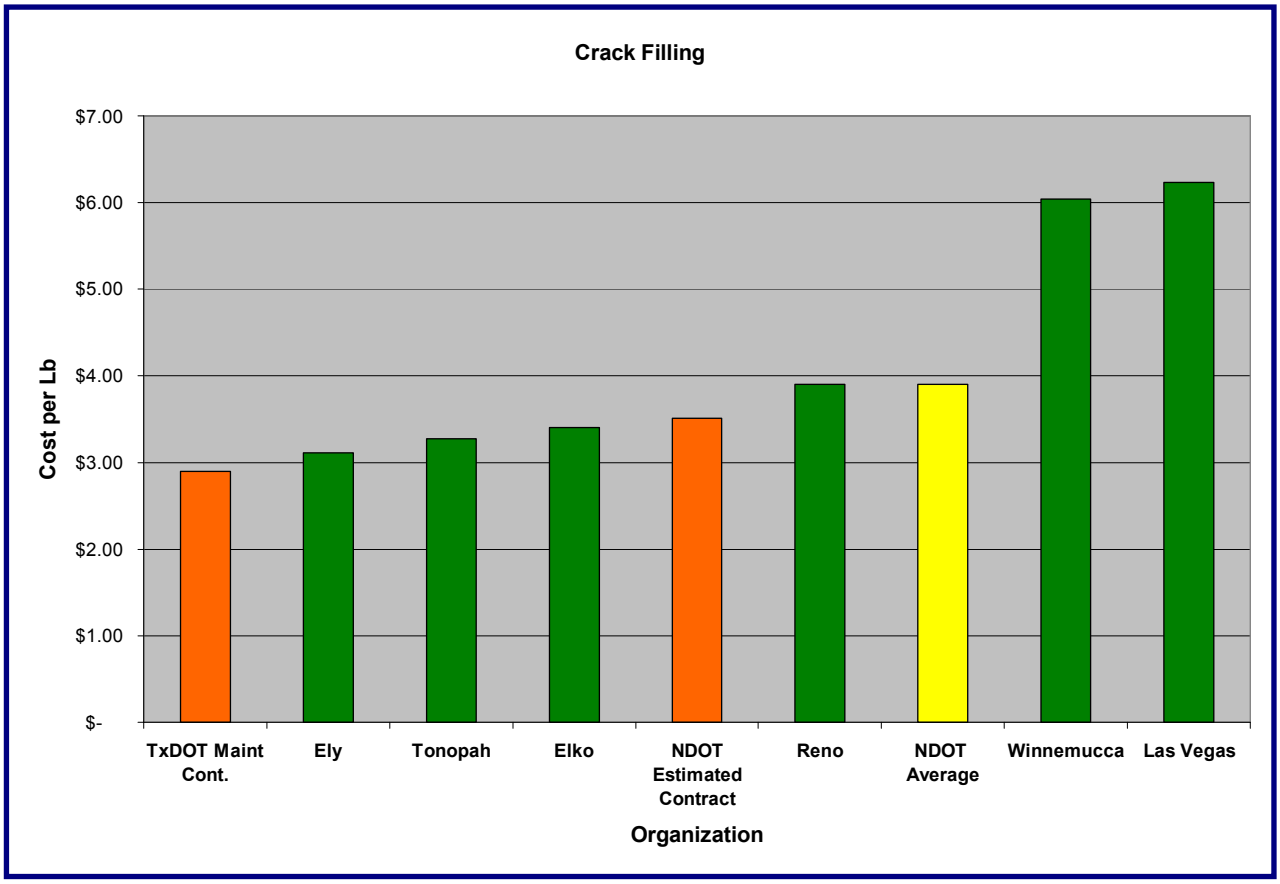


Figure 13 Crack Filling

vi. **Scrub Seal** – Scrub Seal involves spraying liquid asphalt on a cracked pavement, applying aggregate and then dragging a broom over the chips to "Scrub" the aggregate into cracks. It is a task that is not used a lot by most states and since NDOT does not contract it, very little cost information could be found. Considerations for this activity are very similar to chip seal and costs are expected to be similar. Typically smaller aggregate is used resulting in a cost savings on aggregate, but the scrubbing step must be performed and polymerized asphalts are used which are more expensive. Halcrow estimated contract costs at levels similar to chip sealing as shown on Figure 14.

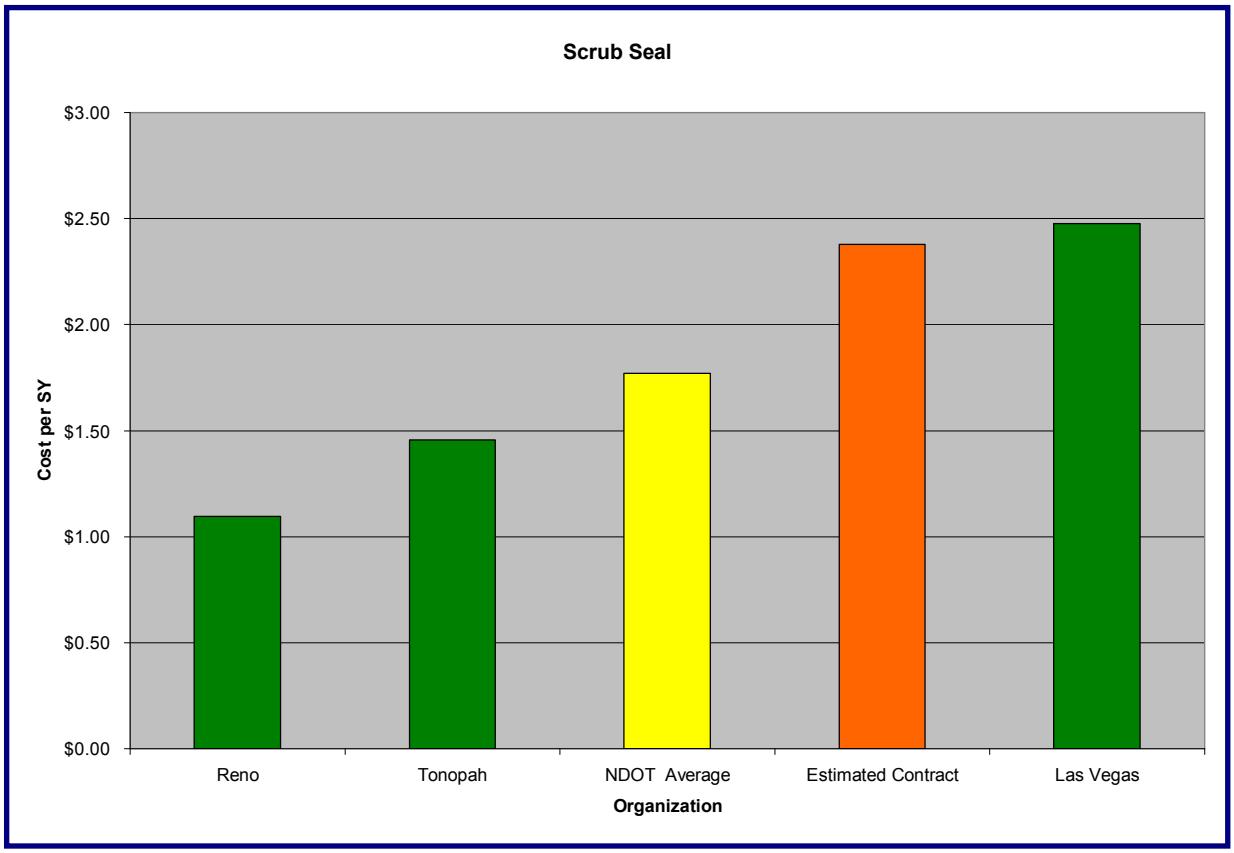


Figure 14 Scrub Seal

vii. Blade Shoulders – Blading shoulders is a task that has multiple meanings. It could involve blading soil up to a new overlay to eliminate the edge drop-off or it could include blading a buildup alongside the roadway caused by dirt falling or washing off of vehicles over time. When associated with a resurfacing project, it should be outsourced in conjunction with the project. As shown on the attached graph in Figure 15, blading high shoulders is very cost effectively performed with state forces and should be continued.

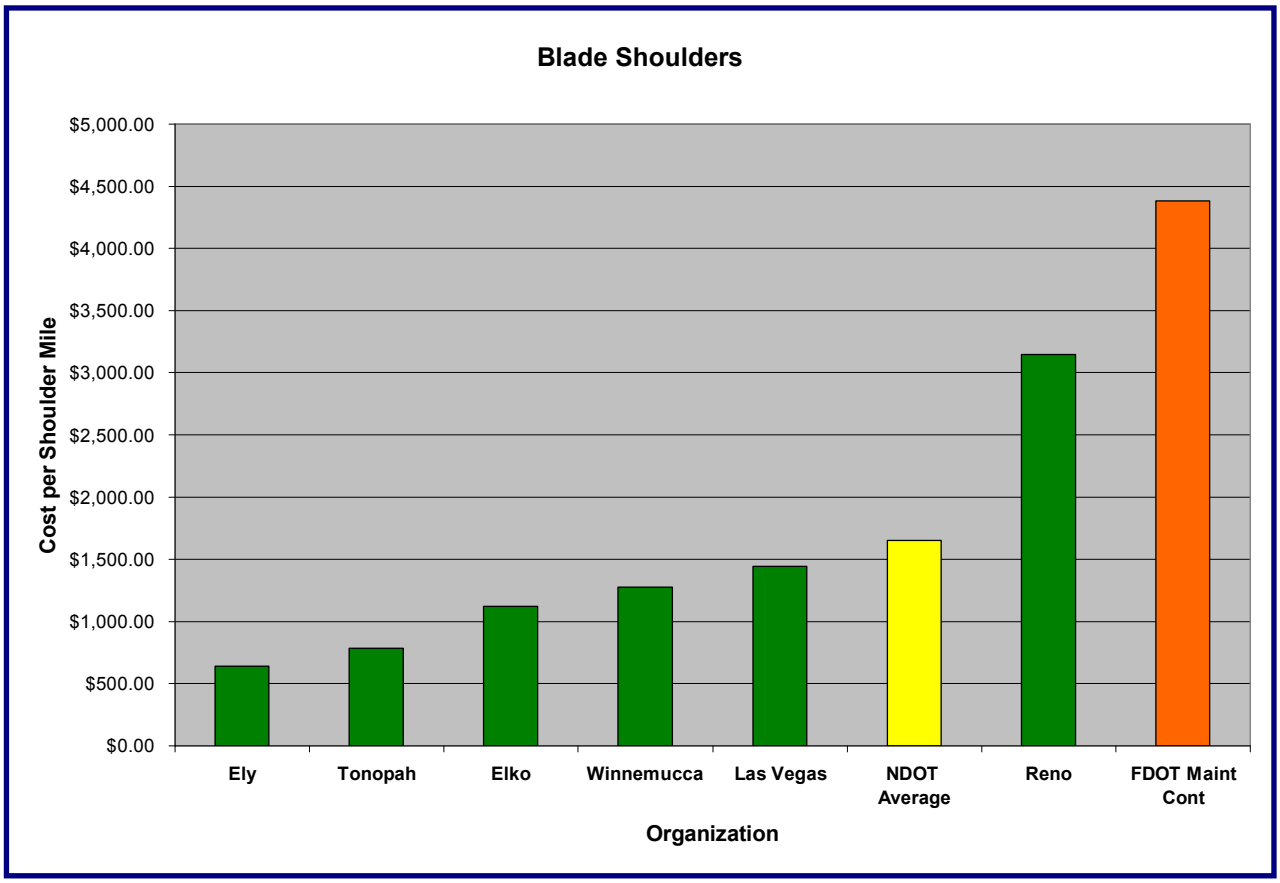


Figure 15 Blade Shoulders

viii. Pickup Sweeping – Sweeping operations require specialized equipment that sweep and pickup debris. This activity is generally limited to high traffic areas where dirt and debris falls off of vehicles and accumulates along curbs, median barriers and bridge rails. It is also used to sweep and pick up aggregate that is placed on the roads or bridges during snow and ice operations. The cost of equipment, fuel, maintenance of traffic equipment and high frequency of breakdowns limits production and is generally an inefficient operation. In addition, it is a slow moving operations and accident potential is high. As shown on Figure 16, several states have contracted sweeping very cost effectively and we recommend NDOT consider sweeping contracts in urban areas.

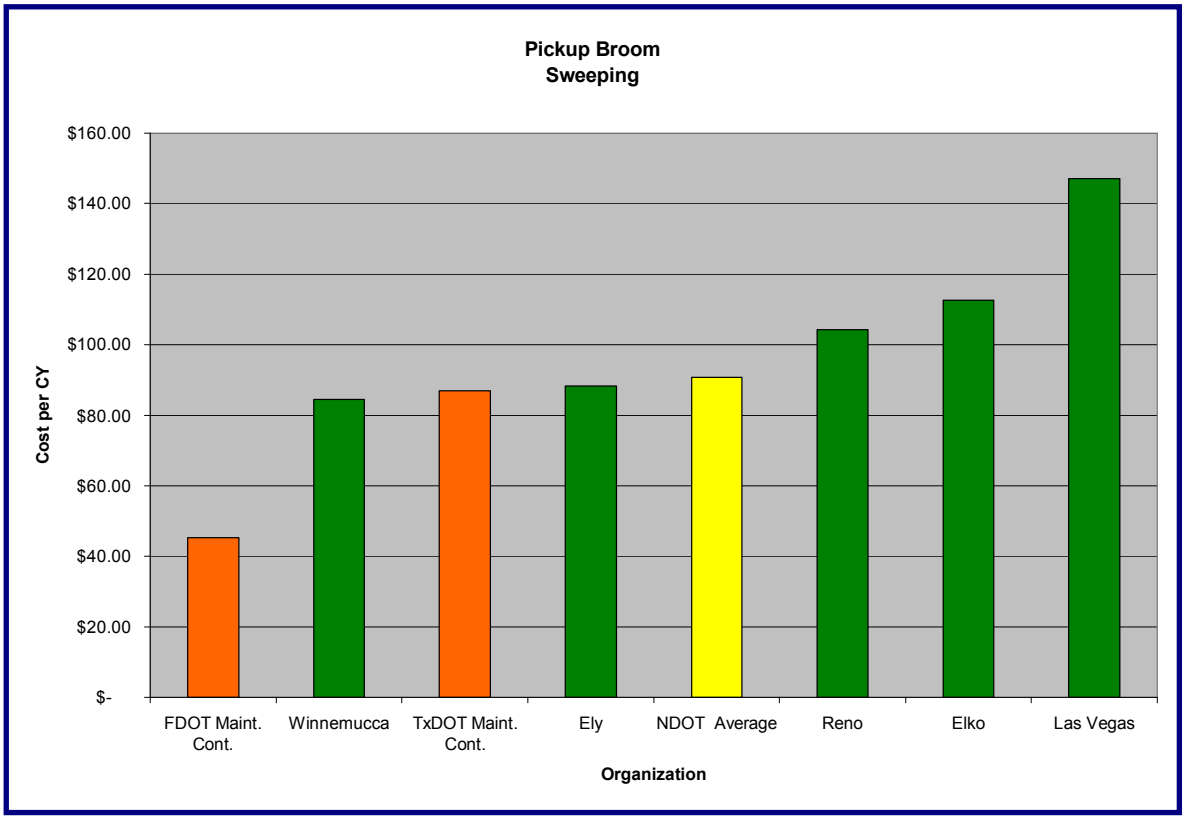


Figure 16 Pickup Broom Sweeping

ix. Fog/Flush Seal - Fog sealing includes spraying diluted emulsified asphalt on a pavement that is weathered or is raveling to rejuvenate the pavement or retain aggregate. As recommended for chip seal, the cost effectiveness of contracting this activity will be totally dependent upon the quantities of work needed. As shown in Figure 17 it can be more cost effectively contracted and Halcrow recommends NDOT contact this task where sufficient quantities will attract adequate competition and therefore, low prices.

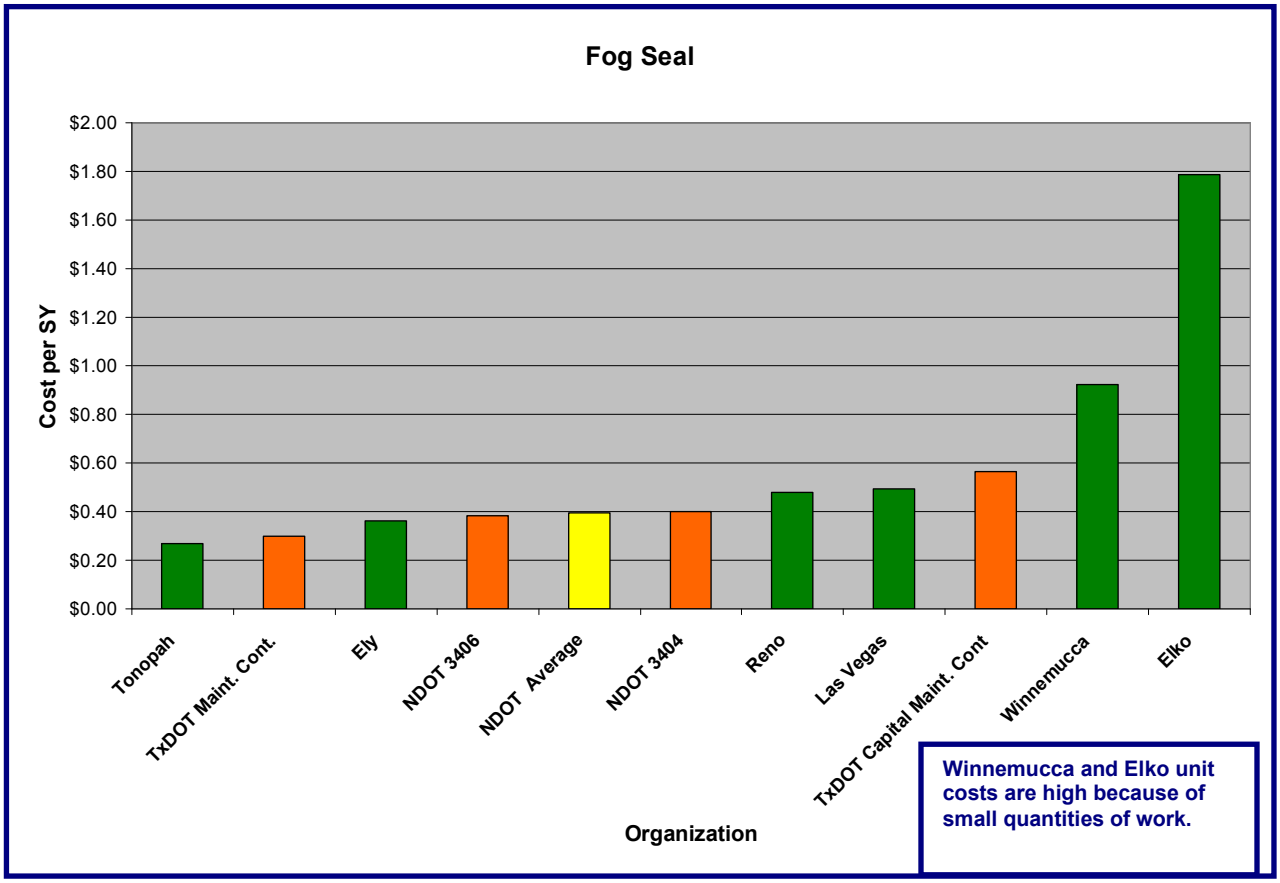


Figure 17 Fog Seal

x. **Paint Stripe and Solid Lines** – Striping is an activity that can be performed on a cyclical basis, combining several projects into one contract, providing large quantities and good production rates. Striping is also seasonal, not allowing for equipment to be utilized year round. Specialized equipment is necessary for striping and also requires extensive maintenance. This activity can be outsourced, requiring minimal in-house management. While Figure 18 would indicate contract costs are high, the contracts included in this analysis are primarily for individual projects. We anticipate large striping contracts that are for a large area over an extended period of time would be cost effective to contract.

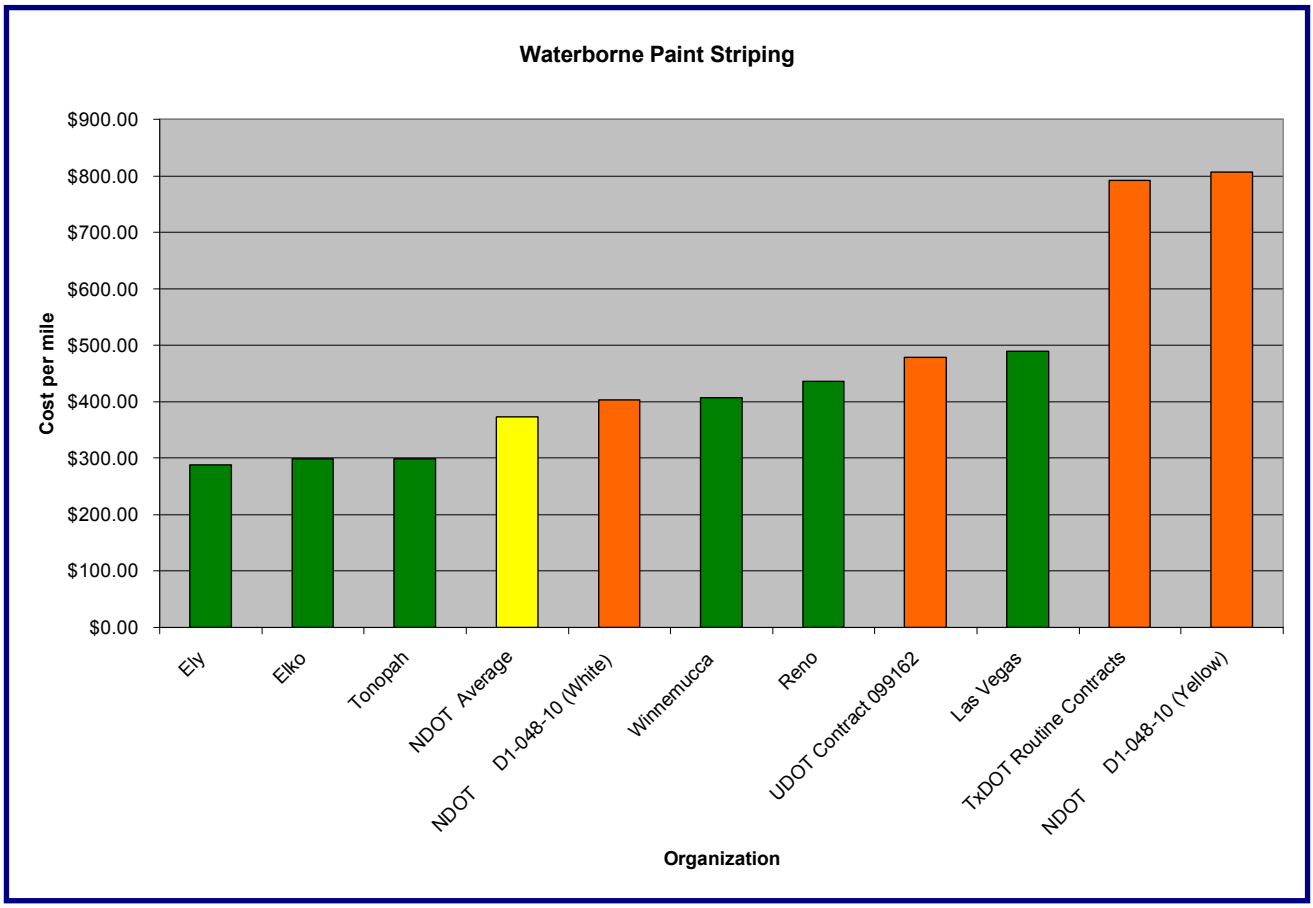


Figure 18 Waterborne Striping

f. Other Issues of Contracting

i. **Skilled Operators –** State forces have developed well trained experienced operators that perform high quality work. In some cases contractors work load does not allow retention of skilled work forces.

ii. **Seasonal Work –** One issue concerning contracting a variety of tasks is the efficient use of state employees. For example, if snow and ice removal is performed with state forces they would need enough work in other seasons to ensure their workload is sufficient. In most of the NDOT interviews, managers indicated they had more work than they had resources to perform. It would be effective to contract those items of work that are not getting accomplished.

iii. **Remote Locations –** A similar discussion can be made concerning very rural locations. It will be necessary to maintain enough staff to respond to snow and ice or other emergencies, therefore; the staff should be utilized to perform the remaining work. The efficient use of the existing employees should not be compromised just to contract a task where local contractors may be available.

5. Contracting Methods

Various methods of maintenance contracting are utilized in industry today. The need for cost and time savings, efficiency, public safety and lack of resources are some factors that contributed to the development of multiple contracting methodologies around the world. The use of a particular method depends upon factors such as the size of the task, level of expertise required, time frame, budget constraints, political influences and contractor availability. The following is a discussion on commonly used traditional contracting methods such as Schedule of Rates, Single and Multiple Bid Item and alternative delivery methods such as Performance Based Maintenance Contracting and Managing Agent Contracts.

a. Schedule of Rates

This method is typically used by government agencies to purchase materials, equipment, supplies or services at standardized rates. Items or services procured using this method are commonly procured to support a government forces project.

b. Single Bid Item

A bid item contract is where a government agency defines the scope, method and expected cost of completion of a piece of work and lets it out as a single contract. Most agencies provide a detailed breakdown of the specifications required which include the materials to be used as well as equipment that may be required to perform the work.

The maintenance contracting industry evolved rapidly as government agencies began outsourcing elements of work that required specialty equipment that were only used seasonally in order to cut costs. Once the contracting industry matured, the government realized even more savings due to the competitive nature of the industry and therefore began to outsource even more activities such as litter pick up, guardrail repair, attenuator repair, sign maintenance, rest area maintenance, picnic area maintenance, tree trimming and landscape maintenance.

c. Multiple Bid Item

This method, also known as “Bundled Bid Item” contracts are very similar to Single Bid Item contracts except for the fact that instead of specifying and letting only one category of maintenance work at a time, the agency combines different types of work to form one contract. Contractors bid for these bundles of work which could include items such as litter picking, mowing and tree trimming as one contract as opposed to bidding for them individually. This reduces the administrative burden of letting and inspecting large number of contracts. As the contracting industry evolved, contractors developed skills in various areas of highway maintenance and are now able to perform various tasks at very competitive prices. In some cases, government agencies let out large bundles of work that may involve the total maintenance of an entire corridor to a single contractor. This brings about efficiencies in terms of administration and management of contracts; however the government organization still had the burden of identifying work, putting in work orders, paying for items of work completed and monitoring the quality of work. This brought about the evolution of a new breed of maintenance contracting called “Performance Contracts” as discussed below.

d. Performance Based Maintenance Contracts (PBMC)

These contracts are dictated by the outcome or solution of a particular maintenance activity rather than the methodology used to achieve that solution. In the performance based approach, the agency is only responsible for specifying performance specifications and developing clear ways to measure the result. A few key benefits of using this method include cost savings through private sector innovation as well as the reduction in the amount of oversight needed by the agency. Another advantage is that these contracts are paid for by

lump sum or monthly payments and not by the amount of work completed which reduces administrative overhead.

Canada, Australia and New Zealand were the pioneers in using performance based contracting for maintenance activities. British Columbia began contracting "fence to fence" maintenance as early as 1988. This method is also predominantly used in the UK, Nordic countries and South America. In the US, DOTs from Florida, Virginia, Texas, Oklahoma, North Carolina and the District of Columbia have used various forms of PBMCs since 1997.

Owners as well as contractors benefit from PBMCs when contracts are longer in tenure. This way, the maintenance contractor can invest in innovative equipment and technologies which can guarantee cost savings in the long run. Contractors can also gain a better understanding of the network and associated patterns of events that would help them make more informed decisions on the nature and timing of maintenance works to be carried out.

When maintenance contracts were first implemented, many countries required the contractor to take over government employees, lease or purchase its equipment and utilize its maintenance yards. Contractors eventually acquired their own equipment and facilities in order to bring about out innovation.

The scope of PBMCs typically does not include major rehabilitation works. In some cases contractors make recommendations to the owner regarding major rehabilitation work that needs to be done and the owner puts out packages to bid for such work.

In order to achieve the required outcome, the agency must establish certain performance standards which are included in the contract. These standards are measured in various different ways. For example, for items such as pothole repair and guardrail repair, more importance is given to the timeliness of the contractor's response where as for repetitive work such as mowing or litter picking, the emphasis is more on the quality of the work. Apart from the performance standards and the agencies' inspection process, most performance contractors are ISO 9000 certified and therefore carry out their own internal auditing procedure. If performance standards are not met, the agency has a number of control mechanisms which is can use such as liquidated damages, and incentive and disincentive payments.

e. Managing Agent Contracts (MAC)

These contracts were designed to further reduce the burden on government agencies with regards to managing and letting performance maintenance contracts. England made the move towards MAC contracts in the late 1990s. It first came about when the Highways Agency hired consultants, known as "Managing Agents" to manage the maintenance contractors. The subsequent generation combined the two into Managing Agent Contracts

which meant that one company or consortium delivered the entire service. Therefore the contractor is now responsible not only for routine and minor repair work but also for identifying major rehabilitation work and the development of schemes. Once a scheme is approved by the Highways Agency, the MAC contractor is responsible for developing plans, letting the contract and managing it till completion.

The MAC contracts are procured through an RFQ/RFP process and were awarded based on quality (70%) and price (30%) with an emphasis on innovation. The three methods of payment are Lump Sum, Cost Reimbursable and Target Price. Lump sum duties include routine, winter and cyclic maintenance. This also includes general management, maintenance of asset records and attendances on the client. Cost reimbursable payments are for scheme development, design and supervision of scheme implementation. Target price is used for rehabilitation works that are under a certain value. MAC contracts are beneficial to government agencies since they bring about innovation as well as reduce costs and provide a one stop shop for maintenance contracting.

f. Performance Based Maintenance Contract Workshop

At the request of NDOT, Halcrow held a Performance Based Maintenance Contract Workshop in Reno Nevada on August 24-25, 2010. Three international speakers, Frank Rizzardo, Emcon, BC, Alan Chambers, Amey,UK and Jan Olander, Swedish Road Administration, gave presentations from their perspective about performance contracting in British Columbia, Canada, the United Kingdom and Sweden. The presentations allowed for attendees to use their imagination on how performance contracts may work in Nevada and provoked a lot of good discussion.

Most performance based maintenance contracts have included most all routine maintenance tasks on a segment of road or all roads within an area. They are typically longer term contracts, allowing contractors time to amortize their equipment and administrative expenses. A number of highway agencies around the world have reported cost savings, not only for the routine and preventive maintenance work, but also in the indirect costs associated with managing the contract and the associated DOT costs like contractor payments. A copy of the proceedings from the workshop is included as **Appendix D.**

6. Decision Factors for Outsourcing

Outsourcing decision factors can be quantitative or qualitative in nature. Apart from cost savings benefits, emphasis should also be given to the qualitative benefits such as quality of service, time savings, risk transfer, public safety and legal and political factors. Many states have conducted various levels of

analysis to best determine what activities should be outsourced and why. From our literature review, we were able to identify studies that have been carried out to help find a solution. The state of Louisiana sanctioned a study in June 2002 titled, *"Designing a Comprehensive Model to Evaluate Outsourcing of Louisiana DOTD Functions and Activities"*, by Donald R. Deis, Edward Watson, and Chester G. Wilmot. The report identifies 10 key states that have developed a method to evaluate their outsourcing needs. Of these, Arizona, Florida, Texas and Pennsylvania seemed to have a more comprehensive model in place to determine go or no go in terms of outsourcing maintenance activities. Other states such as Connecticut, Maryland and North Carolina evaluated outsourcing on an adhoc basis where as some states did not evaluate them at all. An interesting example is Virginia where the decision to outsource was purely political and very little cost analysis had been conducted before hand. British Columbia, Canada had a similar experience where the Premier made the decision to contract out maintenance. In such situations, the cost analysis has been an ongoing process post privatization. A lot can be learned from examining performance and cost savings in these real situations which can be applied to further study. The LDOTD study examines models created by Arizona and Pennsylvania and conducted pilot tests on each. Results showed that the PennDOT model though easier to understand and interpret, omitted some key qualitative factors that the Arizona model did consider. Therefore it was decided that a combination of the two would provide a robust solution and hence they developed a process called Outsourcing Decision Assistance Model (ODAM). The report recommended the use of ODAM to analyze activities but also stated that further analysis should be carried out prior to outsourcing. Another source "Outsourcing Decision Making in Public Organizations: A Proposed Methodology and Initial 1 Analytic results from a DOT – Eger and Samaddar, 2009", attempts to propose an analytical approach to outsourcing decisions. The paper examines areas such as managerial insights to competencies, prioritization based on managerial insights, knowledge transfer or loss, cost and market analysis, and human resource expertise and utilization. The product is a decision support tool that aims to inform decision makers on which activities should be outsourced and which activities should be resourced internally.

Some key factors that have been identified through our research, that state governments have used in their analysis, are as follows:

Core Competencies: Is the activity a core competency of the agency and does it contribute to its overall mission?

Contractor Interest: Are there contractors available to do the work and if so, is the market competitive?

Cost and time: Will cost and time savings be realized by outsourcing?

Risk: Can significant risk be transferred to contractors?

Quality of work: Will quality be enhanced or compromised by outsourcing?

Control: Is agency prepared to take on an oversight role and monitor performance of the contractor effectively?

Organization culture: Will privatization affect the culture of the agency negatively?

Halcrow has developed a Maintenance Contract Analysis Matrix for NDOT which takes into account various factors that have been discussed and assist in making well thought out and documented decisions. A snapshot of the matrix is shown below in Figure 19. Maintenance activities, once identified can be scored based on the 11 categories shown below. If the total score is positive, then that particular activity is suitable for outsourcing and vice versa. Each factor has a multiplier associated with it which is based on the importance or impact of that particular factor on the decision. The Total Score of a particular factor is the product of the Element Score assigned to it and the Multiplier associated with it. The matrix is a decision support tool and can also be used as a method to document decisions. The final decision to outsource must be made after further analysis of all factors involved.

Maintenance Contract Analysis Matrix

Activity	*See step 1*		Location		*See step 2*			Element Score	Multiplier	Total Score
	Score (See step 3)									
Analysis Factor	-3	-2	-1	0	1	2	3			
Cost above/below State Forces?	>20% Above	>10<20% Above	0-10% Above		0-10% Below	>10 <20% Below	> 20% Below			
	○	●	○	○	○	○	○	-2	5	-10
Availability of Contractors (Anticipated Competition)	Not sure anyone will bid	1 Bidder	2 bidders	3 Bidders	4 Bidders	5 Bidders	6 or more Bidders			
	○	●	○	○	○	○	○	-2	4	-8
Low Equipment Cost Activity	Equipment Cost > $1,000,000	Equipment Cost > $250,000	Equipment Cost > $100,000	Equipment Cost > 50,000	Equipment Cost > $25,000	Equipment Cost> $10,000	Equipment Cost < 10,000			
	○	○	●	○	○	○	○	-1	3	-3
Seasonal Activity	Equipment utilized > 70% of year		Equipment utilized >60% of year		Equipment utilized <60% of year		Equipment utilized < 50%			
	○	○	●	○	○	○	○	-1	5	-5
Remoteness of project	Greater than 200 miles of population area > 50,000	Within 200 Miles of population area > 50,000	Within 150 Miles of population area >50,000	Within 100 Miles of population area > 50,000	Within 50 Miles of population area > 50,000	Within 100 Miles of population area > 250,000	Within 50 Miles of population area > 250,000			
	○	○	●	○	○	○	○	-1	3	-3
Labor Intensity	< 20 > 10% Labor	< 30 > 20% Labor	< 40 > 30% Labor	< 50 > 40% Labor	<60 > 50% Labor	< 70 > 60% labor	> 70% Labor			
	○	○	○	●	○	○	○	0	2	0
Specialized Equipment				Specialized Equipment Not Needed			Complex, Expensive Equipment Needed			
	○	○	○	●	○	○	○	0	5	0
Availability of State Forces to Do Work	State Forces Available			Work could be done with state forces, but other work would be delayed			Work will not get done because of lack of state forces.			
	●	○	○	○	○	○	○	-3	5	-15
Hazardous Locations				Other	Urban Area with ADT over 2,500 per lane		High Speed Metropolitan Location			
	○	○	○	●	○	○	○	0	3	0
Size of Project	< $10,000	> $10,000 < $25,000	> $10,000 < $25,000	> $25,000 < $50,000	> $50,000 < $100,000	> $100,000 < $250,000	> $250,000			
	○	○	○	○	●	○	○	1	2	2
Technical Expertise Needed	Technical Experts available in District.			No Special Technical expertise needed.			Specific Technical Expertise not available in NDOT			
	○	○	○	●	○	○	○	0	5	0
Total Score										-42

Instructions for Use:
Step 1. Identify Maintenance Task or Activity to Analyse
Step 2. Identify Location of Proposed Work.
Step 3. Select a score from -3 to 3 for each Analysis facor by selecting the appropriate button.
Caution: You must score each "Analysis Factor" by selecting one of the columns.
You cannot select more than one score for each Analysis Factor!
Total score greater than "0" indicates an activity that may be appropriate to contract.
Total Score less than "0" indicates an activity that may be more appropriately performed by state forces.

Figure 19 Contract Analysis Matrix

The following is a discussion on the various outsourcing decision factors covered in the Maintenance Contract Analysis Matrix for NDOT.

a. Cost

It is more economical to contract out certain activities as opposed to others. This can be analyzed by looking at historical contract vs. in-house costs for a certain activity and comparing the two. If the agency has not contracted that particular task before, data from other states or agencies can be used in some cases to conduct the comparison. However, it is difficult to compare data across states because tasks are categorized differently and in some instances, the units of measurement used are also different.

In the case of NDOT, contract cost data was not sufficient to perform and adequate comparison. NDOT has the MMS capability to capture comparable units of work, but it may require additional field training to ensure contract data is captured in the system. This data will help compare like for like unit costs and identify cost savings, hence informing decisions.

b. Availability of Contractors

In order to contract successfully, there needs to be a sufficient number of capable contractors that would be willing to bid for the work. This would encourage competition amongst contractors and therefore drive down costs. Additionally, in order for a contractor to win more work, they would have to maintain high standards of performance due to the vast number of qualified competitors in the field. Steps can be taken to develop a small business contracting industry by conducting a Contractor Outreach Workshop to enhance the availability and qualifications of small business contractors. The intent is to rapidly increase the local contractor base and establish an array of certified contractors available for each activity. A Contractor Certification and Workshop Program can be developed to increase the number and qualifications of small contractors. Topics can be identified and training offered to contractors in order to increase their qualifications and develop the industry further.

c. Low Equipment Cost Activity

Activities that require a small amount of equipment tend to attract more interest from contractors because it does not cost them much to get into business. These activities are better contracted out since cost savings can be realized due to the highly competitive bidding process. In some instances, the agency may not have resources available to refurbish or purchase new equipment due to budget allocated to other projects, contracting may be a

good alternative in such cases. Contractors may be interested in bidding on contracts that require high investment on equipment if the contract is large and long term.

d. Seasonal Activity

Activities such as snow and ice removal require the use of expensive equipment that is only used in the winter time. NDOT may save by contracting out these activities by not having to maintain and insure equipment that is not being utilized throughout the year.

e. Remoteness of Project

Urban areas such as Reno and Las Vegas will have a lot more contractors as compared to rural areas such as Elko. Contractors may be willing to travel to remote areas depending on the size of the contract. Performance based fence to fence contracts are less affected by the remoteness of project areas since the size and duration of the contracts make them less expensive to mobilize.

f. Labor Intensity

Activities that are more labor intensive are better suited for contracting. Usually labor intensive activities also require less skilled employees. These include items such as litter and debris removal, pothole patching, guardrail repair, crack sealing, rest areas, raised reflective pavement marker installation, etc. NDOT staff frequently has longer service and have become highly skilled. The DOT may not have lower paid employees to perform these labor intensive activities and contractors may be able to perform these activities with less skilled and less costly employees.

g. Specialized equipment

These tasks would utilize equipment that is infrequently used and may be more cost effective to contract or lease the equipment on an as needed basis. NDOT already contracts for asphalt laydown machines. Other tasks that utilize expensive equipment includes striping, inlet vacuuming or bridge inspector snoopers.

h. Availability of State forces to do work

Lack of resources available within the DOT to perform work would definitely warrant contracting out. In some cases, DOT's may have to delay certain activities because resources may be involved in other work that maybe more time sensitive. In such cases state forces must focus on activities that form part of the core competency of the organization and deliver them to a high standard as they may be critical to accomplishing its mission. Contracting can help bridge gaps in resourcing and provide relief to state forces.

i. Hazardous Locations

It may be desirable to contract in high traffic volume areas. Utilizing contractors on metropolitan freeways will reduce potential state force incidents and risks to the state.

j. Size of Project

A key decision factor for outsourcing is size and term of the activity in question. Some activities may not be suitable for outsourcing since they may not attract contractors due to their high risk or low turnover. One way of alleviating this issue is by putting out bids strategically and by awarding multi-year contracts with bundling of services in order to make them more attractive for contractors to bid on. Majority of contractors interviewed in Nevada stated that longer term, and multi-task contracts are desirable. This also reduces the burden from the agencies perspective since they would be dealing with fewer contracts for multiple work activities in a particular area.

Another strategy is to utilize small contractors effectively for certain activities that require little investment in equipment. Activities such as guard rail repair, crack sealing, raised reflective pavement marker installation, sign repair, guide marker replacement etc, can be outsourced as individual contracts since they do not require a lot of investment.

k. Technical Expertise needed

Tasks that require a low level of technical expertise are typically contracted out very successfully due to the minimal level of investment required from contractors and the reduced level of risk. In some cases, specific technical expertise may not be available amongst state-forces and it may be more efficient to contract it out rather than to invest in the development of the expertise in-house. In other cases, the expertise may lie within state forces however the amount of resources needed may not be available. Contractor workshops and training can be considered in this scenario to develop their knowledge base and state forces can take on an oversight role and utilize their knowledge to ensure quality work being delivered. The agency can also benefit from more innovation and efficiency in longer term contracts since this encourages contractors to invest in better equipment and develop their knowledge base.

l. Risk Management

In order to successfully execute a maintenance contract, risks should be analyzed and evaluated qualitatively and quantitatively. It is important that risks are clearly allocated to the responsible party or shared appropriately in the contract. Internal risk workshops can be conducted by the agency to identify risks of contracting out, measure the impact of those risks and develop mitigation strategies. The agency should seek to protect itself from risks

such as contractor failing to complete the work, cost overruns, indemnification, legal exposure, third party damages and service interruptions. These risks can be discussed with the contractor, allocated accordingly and incorporated in the contract. A risk management plan and a process for recording lessons learned could effectively help manage and mitigate risks. The use of best practice techniques from other agencies can also significantly reduce the number of unknowns and exposure to risk. Risks are typically shared between the agency and contractor for unforeseen events such as natural disasters. The inclusion of well-developed performance standards in the contract and control mechanisms in the event of non-compliance can be effective in transferring risk. In addition, Nevada Statutes should be changed to allow for contracts longer than 2 years.

As discussed above in Section 5 Contracting Methods, there are a number of ways maintenance contracts can be let. Once the decision has been made to contract out a particular activity, the agency must decide on the appropriate method to be used to contract it out. This often depends on the size of the contract and the amount of activities in question. As discussed above, smaller activities that require less investment can be packaged as Single Bid Item contracts and let quite cost effectively. Items that can be bundled together can be packaged as Multiple Bid Item contracts in order to make them more attractive to larger contractors and bring about competition. Multi-year / Multi task contracts can provide an “on-call” tool to many routine maintenance tasks. A multi-year contract also allows the department to lock in a price and allows advanced planning and budgeting strategies into the contracting equation.

Alternative delivery methods can also prove to be an effective solution and can sometimes be the deciding factor in the outsourcing decision process. In some circumstances, the decision to use alternative delivery or privatize maintenance can be politically motivated in order to try and limit state spending.

Feedback from NDOT staff shows that there is much room for improvement in the contract administration process. The expertise required to contract successfully is two fold. Firstly the agency needs to be able to efficiently let and process contracts and secondly they should be able to oversee the delivery of the function. An important facilitator in contracting out maintenance is the inclusion of well-defined performance standards in the contract.

7. Recommendations

Transportation Departments that plan to utilize a service delivery model that includes contract maintenance operations find it is important to maintain the flexibility to evaluate the model and adopt a blend that results in the optimal level of service at the most economical price. Quality is achieved and maintained through the

proper use of resources, both in-house and contracted, by improving maintenance levels of service through intentional and ongoing process improvement programs, from lessons learned and by applying different, new, and innovative techniques and technologies to routine tasks and assignments.

There are efficiencies that can be achieved with adjustments in NDOT's current maintenance contracting process. Below we discuss adjustments in the contract decision matrices, authority to execute contracts at the district level, organizational structure of maintenance staff and establishing a partnering culture among NDOT staff and the private sector.

a. Develop maintenance levels of service standards and a maintenance rating system.

Maintenance Rating Programs (MRP) rate the condition of an asset comparing it to a pre-established "maintenance level of service". There are typically two types, a "pass/fail" and a scoring system.

The pass fail system establishes a level of service that is passing and the percentage of the segments rated that are passing is reported. For example, if "culvert maintenance" is being rated and the standard is "75% of the culvert opening is clear", the percentage of the culverts rated that passed the minimum LOS standard would be reported.

The development of maintenance performance standards and an appropriate statewide rating system provide NDOT with a number of management tools necessary to make informed decisions that are critical to managing the transportation asset infrastructure, including decisions to outsource.

The scoring system typically uses a 5-1 score with 5 being "new or like new", all the way to 1 being "failed". A percentage is developed by adding all the actual scores from all of the evaluations and dividing by the maximum potential score. This allows for a 1-100 percentage for each element rated and a combination of the element scores into an overall score. Using the culvert maintenance as an example, a "5" might be 95-100% of the culvert clear, a "4", 80 – 95% clear, a "3", 65 – 80% clear, a "2", 50 – 65% clear and a "1", less than 50% clear. If 100 culverts are rated, the actual scores are added up (assume it totals 398) and divided by a maximum score (100 x 5 = 500). 398/500 = 79.6%.

The development of maintenance levels of service standards and an appropriate statewide rating system provide NDOT with a number of management tools necessary to make informed decisions that are critical to managing the transportation asset

infrastructure, including decisions to outsource. Initially levels of service standards would allow the establishment of statewide priorities. Currently district maintenance managers have no formal priorities, which results in each manager establishing their own. Establishing statewide standards and measuring how each manager is meeting those standards would help to identify areas where they may be providing higher levels of service than necessary, working on inappropriate projects and establishing task areas that are below standards. This information would assist NDOT managers in allocating resources in the most cost effective manner, as well as, deciding to outsource when it is warranted.

…it will be critical for NDOT to capture both in-house operations and contracted work accomplishments using the same units of measurement to facilitate direct comparisons by task.

…NDOT managers will be able to use this data for comparison, which will enable them to make informed decisions on outsourcing a particular task in their region.

Making informed resource decisions to achieve a stable, uniformly maintained system requires an objective evaluation technique for measuring the levels of service (LOS) for highway infrastructure. LOS measures reveal the values and priorities of each manager, drive behavior, inspire compliance and most importantly, promote improvement. These measures also identify specific repairs or operational changes necessary to maintain the system at the desired level of service. This allows managers to direct their efforts toward specific deficiencies in asset features and the flexibility to use the right resources to perform the right work at the right time.

b. Capture accomplishments and compare cost of contract and in-house operations in the same units of measurement

Moving forward, it will be critical for NDOT to capture both in-house operations and contracted work accomplishments using the same units of measurement and quality standards to facilitate direct comparisons by task. NDOT has the MMS capability to capture comparable units of work, but it may require additional field training to insure contract data is accurately captured in the system. Field inspectors will be required to capture the MMS units for work accomplished on contract work, in addition to the pay units. Work crews may need training on capturing appropriate work units for their corresponding tasks. With a compatible unit of measure and quality standard, NDOT managers will be able to use this data for comparison, which will enable them to make informed decisions on outsourcing a particular task in their region.

c. Develop financial accounts and reports to capture overhead costs

Financial Accounts - NDOT should develop accounting codes to capture the direct and indirect costs of developing the plans, specifications and estimates for maintenance contracts, the cost of letting and awarding the contracts, and the costs of inspecting

contracts. This could include developing charge codes for specific projects and all work and costs required to plan, advertize, let to bid, award, execute and administer the project could be charged to the appropriate project. In the case of division or district personnel that perform work on multiple contracts on a daily basis, “clearing account” codes can be developed and the costs that accumulate in the clearing account could be distributed to appropriate projects monthly, based upon the amount of expenditure on each project. Indirect costs such as supervisors, administrative technicians, office costs, etc. could be distributed to district clearing accounts on a monthly basis before the district clearing accounts are distributed to actual projects.

Contract/State Forces Comparison Reports should be developed to capture appropriate direct and indirect costs related to state force and contract maintenance. Finally, a report comparing the total costs per unit for state forces versus maintenance contractors, including all of the indirect and direct cost, should be developed to provide a state force vs. contractor comparison.

The following example may be utilized:

NDOT Maintenance Task Cost Comparison

Organization	Task	Units	State Employee Total Cost	State Employee Accomplishments	State Employee Cost per Unit	Maintenance Contractors Total Cost	Maintenance Contractors Accomplishments	Maintenance Contractors Cost per Unit	Total Cost	Total Accomplishments	Total Cost per Unit
Indirect Costs											
Executive Administration			$$$			$$$					
Divisions			$$$			$$$					
Maintenance Division			$$$			$$$					
Admin. Services Division			$$$			$$$					
District			$$$			$$$					
Sub District			$$$			$$$					
Maintenance Station			$$$			$$$					
Direct Costs											
Maintenance Station			$$$								
Maintenance Contractors						$$$					
Total	xxx	yy	$$$	xxx	$/yy	$$$	zzz	$/yy	$$$	xxx	$/yy

d. Modify District contracting processes

NDOT maintenance managers have indicated that they are not opposed to contracting maintenance, but did express concern with the length of time it took to get a contract to letting, award and execution. Several NDOT managers indicated they would contract more if the process were more expedient. Our interviews indicate there is improvement that can be achieved with adjustments in contracting process and establishing a partnering culture among NDOT staff and the private sector. Both NDOT maintenance managers and contractors agreed the probable advantages to contracting include increased efficiency, greater flexibility, motivation and creativity.

Both NDOT maintenance managers and contractors agreed the probable advantages to contracting include increased efficiency, greater flexibility, motivation and creativity.

For NDOT Maintenance personnel, it was considered difficult to utilize contracts as an efficient vehicle to accomplishing maintenance tasks. The central issue appears to be that Administrative Services is the sole entity to process maintenance contracts. With every contract funneled to one office, it is believed that this creates a bottleneck in the process, and that it causes an increased amount of time to execute contracts for district managers, contractors and the Administrative Services staff. Both groups commented they would like to see a more efficient process where the districts have more direct control over the letting and administration of maintenance contracts. In our interview with Administrative Services, it appears that the workload being processed by the staff is greater than the current resources can reasonably manage on a daily basis.

During our research, NDOT was implementing the “Three Quote” process mandated by Senate Bill 377. While we agree with providing a process for the Districts and even possibly the Sub-Districts to develop, advertise, award and execute contracts up to a certain cost, we do have concerns that limiting quotes from only three selected contractors for work up to $250,000 may cause problems. The process could allow for favoritism and complaints or protests from firms that were not given the opportunity to pursue the work. Halcrow recommends four different maintenance contracting processes:

Three Quote Process - Allow Districts and Sub-Districts to develop, select three bidders from a list of pre-approved bidders, award, execute and administer small contracts up to $50,000. This can be done through a simple purchase order or short form contract process.

District/Sub-District Let - Allow Districts and Sub-Districts to develop, advertise, notify all bidders from a list of pre-approved bidders, award, execute and administer contracts up to $500,000 that meet certain pre-developed criteria. For example the criteria could say:

Number of Bidders	% Over/(Under) Engineers Estimate	Approval Authority	Execution Authority
3 or more	No more than 5% Over	District Engineer	District Engineer
3 or more	More than 5% Over	Assistant Executive Director, Operations	District Engineer
2	No more than 5% Over	Assistant Executive Director, Operations	District Engineer
2	More than 5% Over	Deputy Director, District Operations	Assistant Executive Director, Operations
1	No more than 5% Over	Deputy Director, District Operations	Assistant Executive Director, Operations
1	More than 5% Over	Executive Director	Assistant Executive Director, Operations

Emergency Contracts - Allow Districts and Sub-Districts to develop, select three bidders from a list of pre-approved bidders, award, execute and administer emergency contracts (meeting established definition of emergency) of any amount with approval by NDOT administration. An emergency could be defined as: "Any situation or condition of a designated state highway resulting from a natural or man made cause which poses an imminent threat to life or property of the traveling public or which substantially disrupts the orderly flow of traffic and commerce."

State Let - Subsidize the Administrative Services Division or develop a process in the Maintenance Division to develop, advertise, notify all bidders from a list of pre-approved bidders, award, and execute contracts for major maintenance or statewide activities with a three month turnaround. Revise NRS to allow DOT Executive Director or their designee to execute contracts after award by the Board.

The development of these processes will require additional steps:

i. **Develop a small business contracting industry -** Take steps to establish a partnering relationship with the industry by conducting a Contractor Outreach Workshop to enhance the availability and qualifications of small business contractors. The intent is to rapidly increase the local contractor base and establish an array of certified contractors available for each activity. Many maintenance contractors are small businesses that maintain a very low overhead which translates into further savings. Development of a strong base of contractors, especially small or disadvantaged companies, will allow the agency to perform the work cost effectively while contributing to the local economy.

Take steps to establish a partnering relationship with the industry. Conduct outreach program to enhance the availability of small business contractors.

For firms not already qualified, we recommend that NDOT conduct a Contractor Qualification Program to increase the number of small contractors. NDOT should maintain these and other potential contractors in a database for sorting by specialties, location, performance grade, and other qualifications as required.

Development of a strong base of contractors, especially small or disadvantaged companies, will allow the agency to perform the work cost effectively while contributing to the local economy.

Contractor training will be a continuing process, as NDOT will assist local entrepreneurs in qualifying to participate within this program by conducting training for the following suggested topics:

- Contract Specifications
- Estimating
- Work Zone Safety Procedures
- Traffic Safety and Control (MUTCD)
- Bid Preparation
- Quality Control Procedures

These tasks are currently performed by NDOT on normal construction contractors and NDOT may need additional staff to perform this work for maintenance contractors.

ii. **Train NDOT District Staff** - We recommend that training classes be enhanced or developed and taught for NDOT staff:

(a). District/Sub-District Contract Staff - A course to train district employees to prepare maintenance plans, specifications, estimates, advertise, let, award and execute district let contracts.

(b). Maintenance Inspectors - Historically NDOT has used construction inspectors to inspect maintenance contracts. While this is usually adequate, there are maintenance tasks they are not always familiar with or there may be situations where they are obligated on construction contracts. Train maintenance personnel to inspect maintenance contracts.

It has been Halcrow's experience that it takes multiple contracting cycles to develop contracting to the point where prices are consistent.

Contracting decisions should be strategic in nature and long term contracting plans should be developed and communicated to the contracting community.

e. Utilize a contracting decision matrix; develop a team of NDOT managers to tailor the matrix to NDOT operations.

While the cost effectiveness of performing work by contract is important, it is not the only factor to consider when making contracting decisions. It has been Halcrow's experience that it takes multiple contracting cycles to develop contracting to the point where prices are consistent. For example, when contracting an activity for the first time, contractors determine their prices based upon not only the work prescribed, but also the risks and unknowns. As they become more familiar with the work, learn more about the risks and develop expertise, they will become more cost effective. As they get more experience, they will be able to develop innovations that make themselves more productive and cost effective.

Prices are also very volatile and depend upon quality standards, fuel and material prices, competition, the work site location, amount of contract work available and the economy. The depressed economy in Nevada over the past few years has forced many contractors to bid with very little or no profit to ensure they can retain their best employees. They are trying to survive the economic downturn so they are still in business when the economy improves. Contracting decisions should be strategic in nature and long term contracting plans should be developed and communicated to the contracting community.

Halcrow's experience indicates contractors can be effective on activities that:

- Are Labor Intensive
- Require a low cost of getting into business (very little equipment needed)

- Have good contractor availability (competition drives prices down)
- Require technical expertise not available in the DOT
- Require specialized equipment
- Are seasonal

f. Define routine maintenance definition scope limits versus construction

The widening of unpaved shoulders entails widening fill slopes originally built on steep slopes. To provide for a safe vehicle recovery zone, many of the slopes are widened. While this work definitely improves the roadside safety, it may not be an appropriate use of in-house resources or maintenance funding. It is a project with prolonged scope requiring extensive manpower and equipment, and may go beyond what is normally defined as routine maintenance, crossing into the definition of what many would characterize as a construction project. Prolonged scopes tie up in-house forces that could be utilized on routine maintenance needs requiring instantaneous responses. It may also add unseen costs by mobilizing and de-mobilizing in-house resources over a prolonged period, whereas a contractor would mobilize once and complete the project in a continuous uninterrupted manner as defined by his contract. They could also utilize equipment that is more appropriate to hauling large quantities of fill material long distances. Providing a clear definition of maintenance and the limits of work that can be done with maintenance funding is critical to establishing consistent levels of service across the state.

Prolonged scopes tie up in-house forces that could be utilized on routine maintenance needs requiring instantaneous responses.

…a contractor would mobilize once and complete the project in a continuous uninterrupted manner as defined by his contract.

g. Package contracts to make them cost effective and attractive to contractors

Many owners put together contracts that will "test" a contractor's ability to perform in an efficient manner. This may take the form of requiring higher standards of the contractor than standards provided with state forces, locating work where large mobilization costs are necessary, or developing scopes that are not large enough to provide efficient operations. It could include requiring expensive equipment without communicating long term contracting plans to the contractors.

The goal of the owner should be to utilize contractors in the most cost effective manner. One strategy is to package single activities into small contracts so local "small" organizations could bid on them. Halcrow has seen that activities that require very little equipment investment are good activities to contract. Examples

are activities such as guard rail repair, crack sealing, raised reflective pavement marker installation, sign repair and guide marker replacement. These activities allow for multiple contractors to develop and compete for the work. Another strategy may be to package similar activities together over a large area to provide sufficient quantity of work to attract contractors.

It is important to begin the plan preparation and advertisement of seasonal activities such as chip sealing several months in advance of the earliest available date to begin work.

h. Design contracts with longer work periods and consider multi-task and multi-year terms

It is important to begin the plan preparation, advertisement, letting and award of seasonal activities such as chip sealing several months in advance of the earliest available date to begin work. This will allow for the longest possible work season giving bidders maximum flexibility to efficiently schedule their crews on multiple projects.

Multi-year / multi-task contracts will provide an "on-call" tool to many routine maintenance tasks. It is our experience that this can further reduce administrative costs by combining similar tasks within the same group element (road surface, roadside, traffic, drainage, structures). A multi-year contract allows the department to lock in a price and allows advanced planning and budgeting strategies into the contracting equation.

Under the right circumstances, alternative contracting can provide service delivery to bridge the gap between available resources and the demands on the infrastructure.

i. Pilot alternative contract maintenance delivery methods

Under the right circumstances, alternative contracting can provide service delivery to bridge the gap between available resources and the demands on the infrastructure. Alternative methods discussed include bundled bid contracts or performance based maintenance contracts. Both concepts are designed to deliver services while minimizing administrative costs. They may include total fence to fence scope, or limited to asset element groups such as traffic services (pavement striping, reflective markers, roadside signs, etc

j. Use the existing Construction Contract Industry where possible.

Perform larger projects for chip seals, shoulder leveling, etc. by contract. Utilize the existing construction contracting industry to perform maintenance work where larger equipment, etc. would reduce unit costs.

8. Conclusion

Halcrow was impressed with both the NDOT staff and the contractors that were interviewed. While we believe NDOT can improve efficiency by contracting, their operations generally produced prices that were very competitive with contractors. Several variables make it difficult to compare maintenace activities and costs from DOTs; prices are very dynamic and fluctuate greatly based upon the economy, project size, material type and availability, remoteness, availability of contractors, etc. Various contracting methods are available to be utilized in the best suited sitiuation. A contracting matrix will also aid in making the decision to contract or perform work with state forces.

A mix of state forces and maintenance contractors provide a healthy combination, requiring state forces to be productive, and utilizing contractor resources as needed to minimize the under-utilization of in-house resources. A cultural change must occur within the Department where contractors are viewed as an extension of the Department and a direct access to specialized equipment and skills. There is a willingness and understanding to work toward a common goal of quality and efficiency for NDOT.

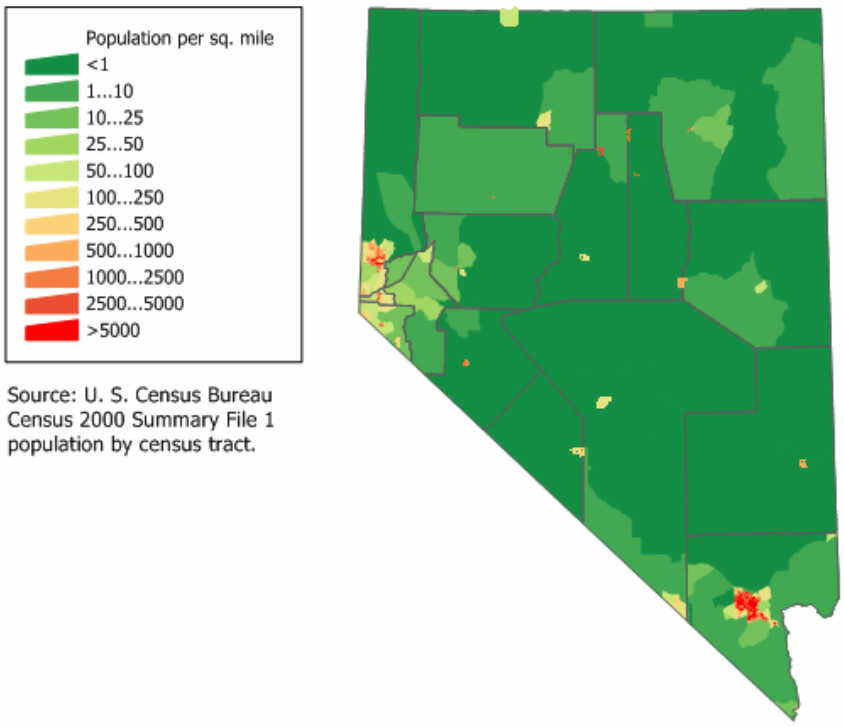
Appendix

A. State Characteristics
B. Interviews
C. Literature Review
D. Workshop Proceedings

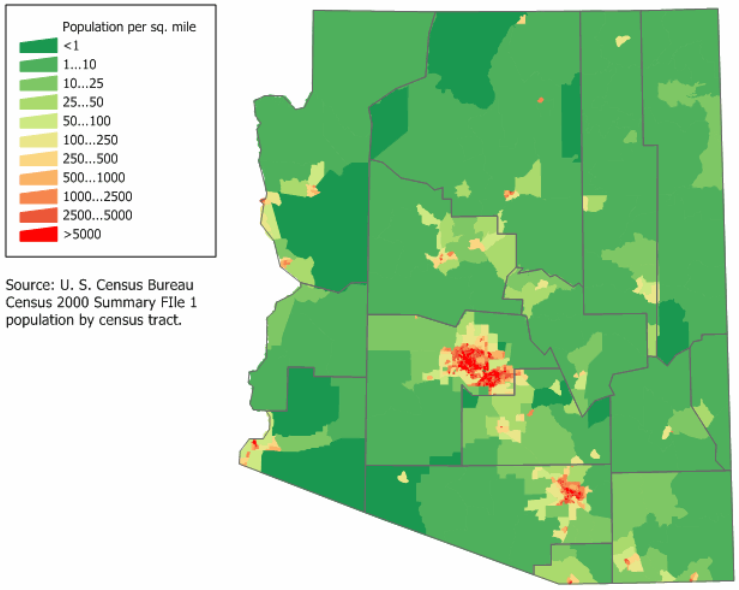
Appendix A

State Characteristics

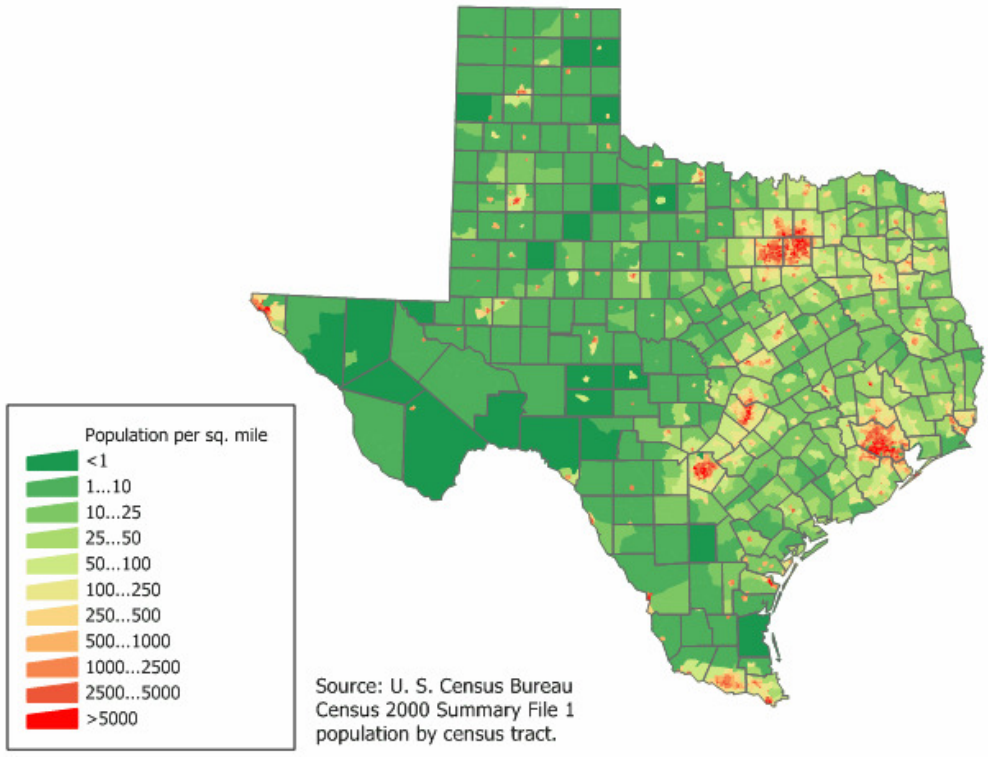
Population Density



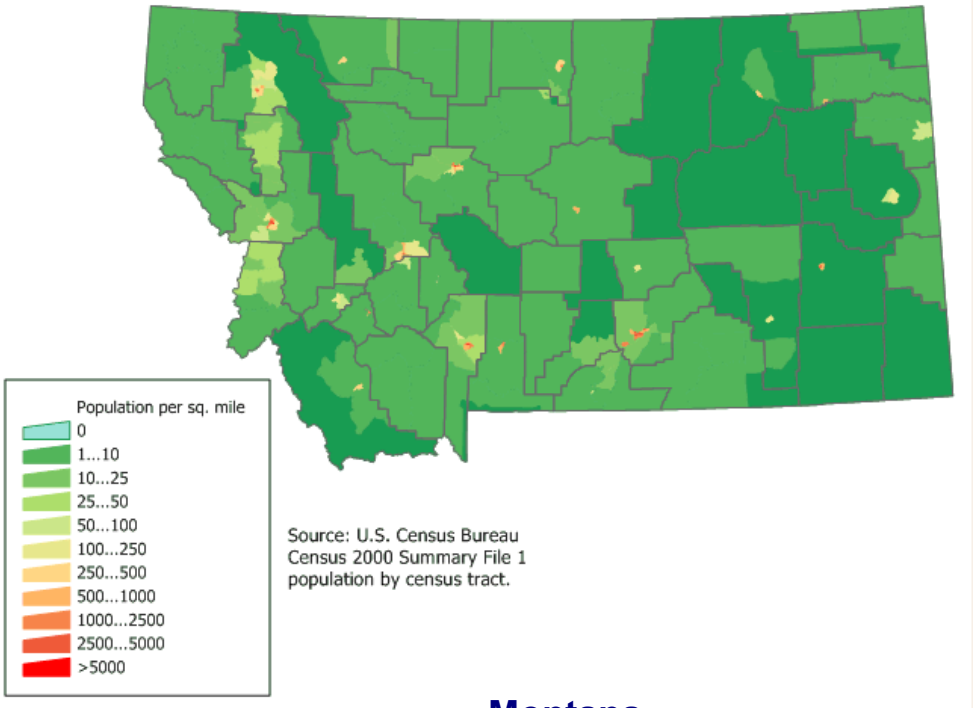
Nevada



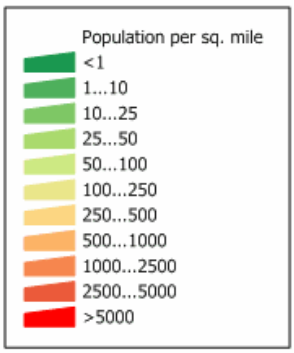
Arizona



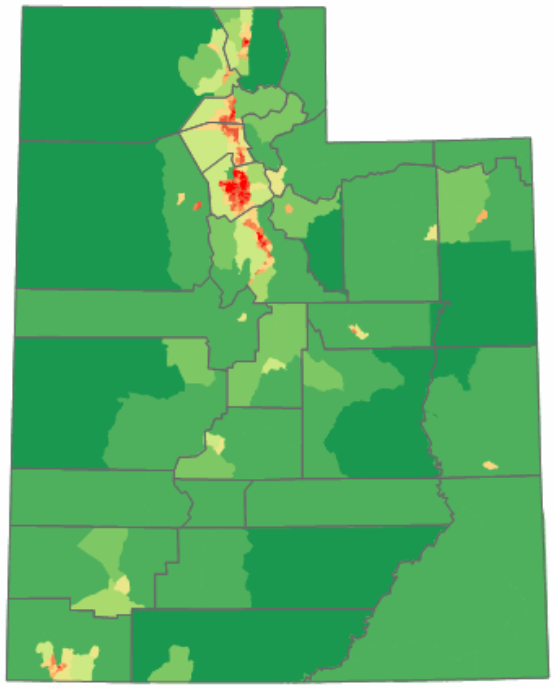
Texas



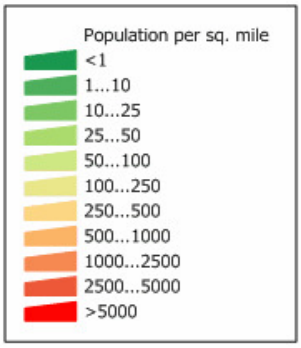
Montana



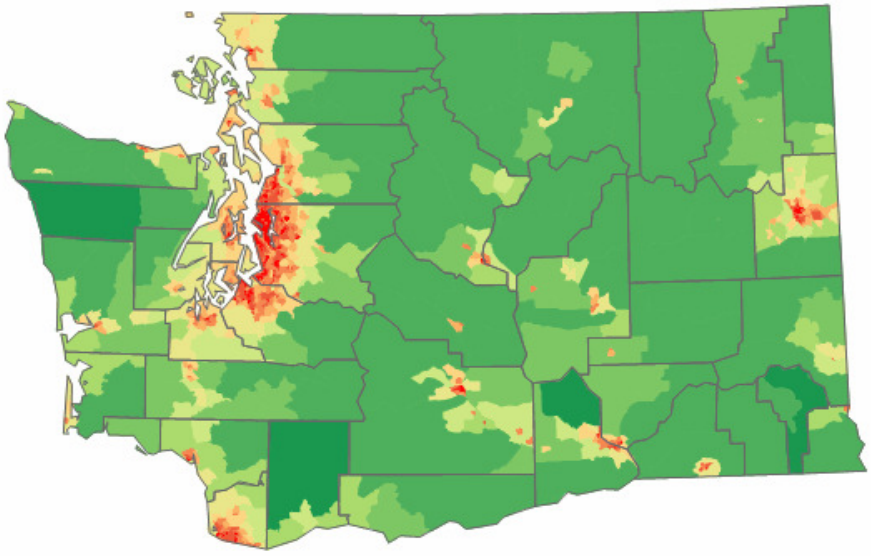
Source: U. S. Census Bureau
Census 2000 Summary File 1
population by census tract.



Utah

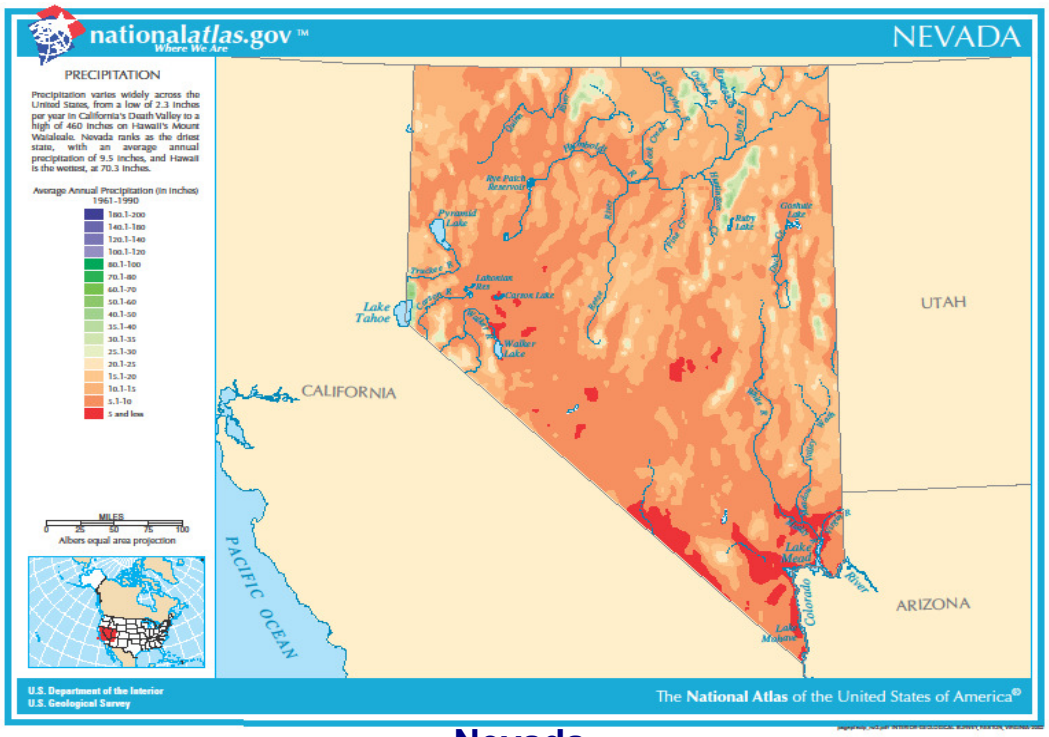


Source: U. S. Census Bureau
Census 2000 Summary File 1
population by census tract.

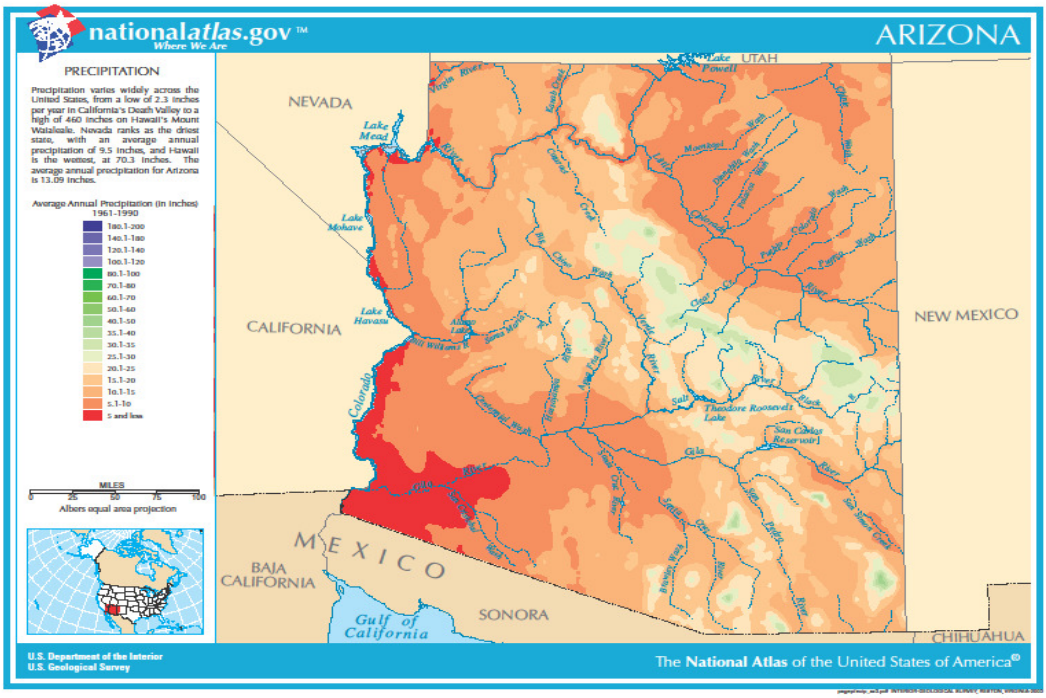


Washington

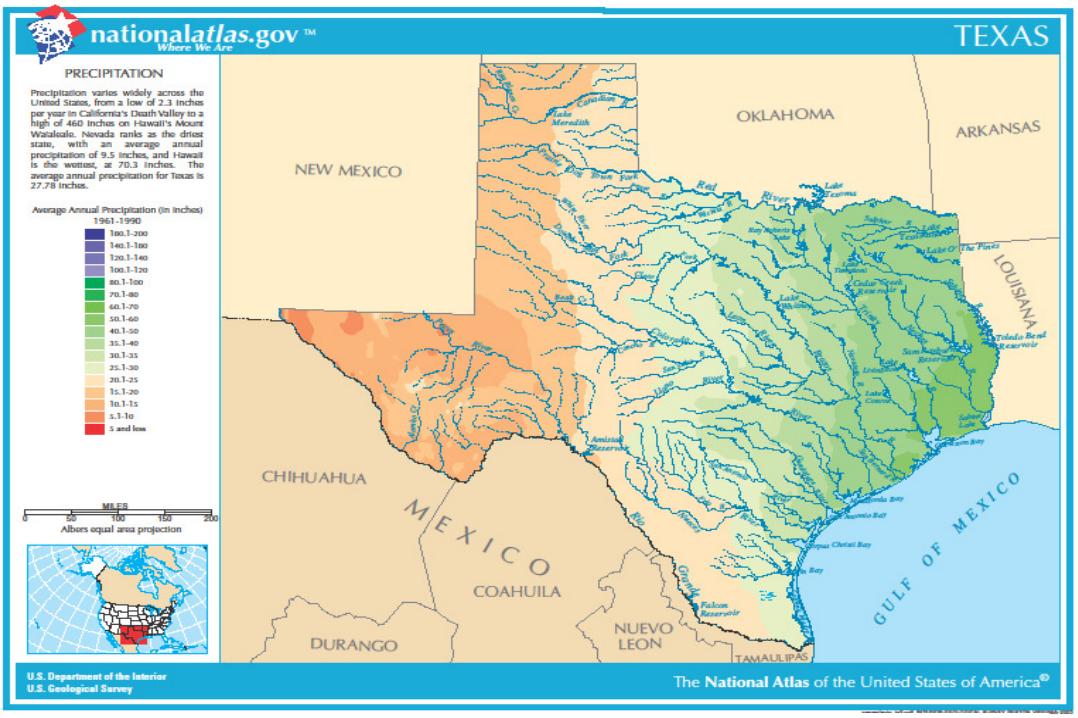
Annual Precipitation



Nevada

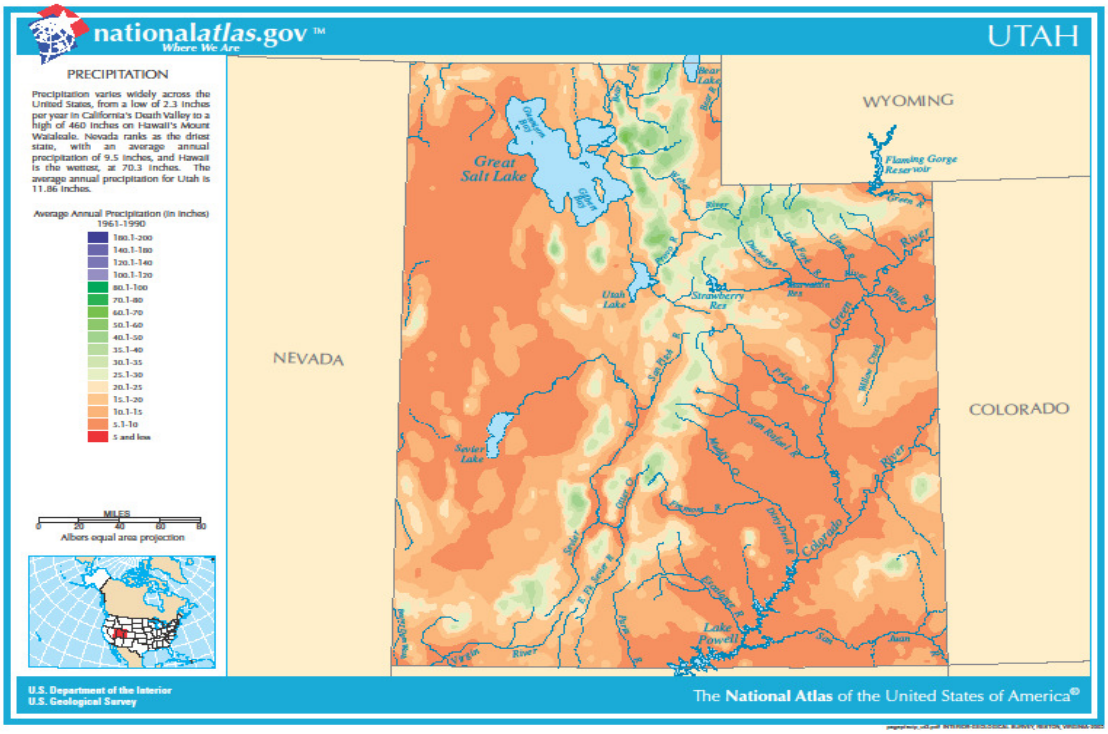


Arizona

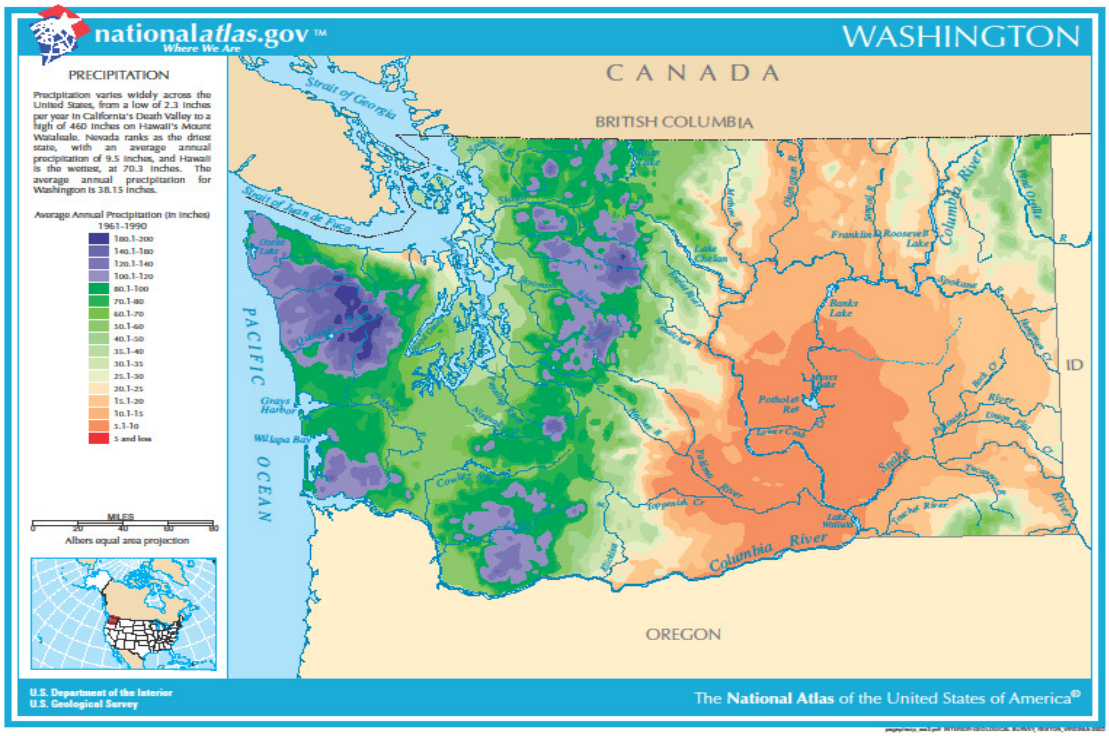


Texas

Montana



Utah



Washington

Appendix B

Interviews

Interviews

Halcrow performed 44 interviews to get NDOT and contractors input. The following people were interviewed:

Date	Purpose	Attendee	Firm	Title
2/16/2010	Interview	John Madole	AGC, Reno	Executive Director
2/16/2010		Buzz Harris	AGC, Reno	Assistant Executive Director
2/16/2010	Interview	Mike Stair	NDOT	Equipment Superintendent
2/16/2010		Catherine Black	NDOT	Auditing Manager
2/16/2010		Rick Nelson	NDOT	Assistant Director – Operations
2/17/2010	Interview	Bill Hoffman	NDOT	Chief Maintenance & Operations Engineer
2/17/2010	Kickoff Meeting	Dave Titzel	NDOT Dist II	Assistant District Engineer
2/17/2010		Darin Tedford	NDOT	Materials Manager
2/17/2010		Richard Daly	Laborers Union	
2/17/2010		Michael Murphy	NDOT Dist III	Assistant District Engineer
2/17/2010		Doug Olsen	Intermountain	
2/17/2010		Thor Dyson	NDOT Dist II	District Engineer
2/17/2010		Alex Faust	SNC	
2/17/2010		Aaron Hites	SNC	
2/17/2010		Dave Olsen	NDOT	Chief Accountant
2/17/2010		Mohamed Rouas	NDOT	Assistant District Engineer
2/17/2010		Mary A. Martini	NDOT	District Engineer
2/17/2010		Mike Stair	NDOT	Equipment Superintendent
2/17/2010		Bill Hoffman	NDOT	Chief Maintenance & Operations Engineer
2/18/2010	Interview	Greg Mindrum	NDOT	Associate Engineer
2/18/2010	Interview	Jeff Dodge	NDOT	Maintenance Management Coordinator
2/18/2010		Randy Cotter	NDOT	Maintenance Management Coordinator
2/18/2010		Woody Abbott	NDOT	Maintenance Management Coordinator
2/18/2010	Interview	Dave Olsen	NDOT	Chief Accountant
2/18/2010		Jenny Hawkins	NDOT	Labor
2/19/2010	Interview	Rick Nelson	NDOT	Assistant Director - Operations

Date	Purpose	Attendee	Firm	Title
3/1/2010	Interview	Mary Martini	NDOT	District Engineer - Las Vegas
3/1/2010		Mohamed Rouas	NDOT	Assistant District Engineer
4/26/2010	Interview	Sean Stewart	Frehner Construction Company	Regional Counsel
4/26/2010		Paddy Murphy	Southern Nevada Paving	General Manager
4/26/2010	Interview	Shane Haycock	Meadow Valley Contractors, Inc	Vice President
4/26/2010		Robert Terril	Meadow Valley Contractors, Inc	President
4/27/2010	Interview	Steve Holloway	AGC, Las Vegas	Executive Vice President
4/27/2010	Interview	Mary Martini	NDOT	District Engineer - Las Vegas
4/27/2010		Mohamed Rouas	NDOT	Assistant District Engineer
4/27/2010	Interview	Rudy Malfabon	NDOT	Deputy Director - District Operations
4/28/2010	Interview	Steve Baer	NDOT	Assistant District Engineer
4/28/2010		Kal Boni	NDOT	Maintenance Manager
4/29/2010	Interview	Christi Thompson	NDOT	Administrative Services Officer
4/29/2010		Melissa Costa	NDOT	Program Officer
4/29/2010	Interview	Bill Hoffman	NDOT	State Maintenance and Operations Engineer
4/29/2010		Anita Bush	NDOT	Assistant State Maintenance Engineer
4/29/2010		Kent Mayer	NDOT	Assistant State Maintenance Engineer (Retired)
4/29/2010	Interview	Marc Thoreson	Intermountain Slurry Seal, Inc	Chief Estimator
4/30/2010	Interview	John Madole	AGC, Reno	Executive Director
4/30/2010	Interview	Robert Fehling	Silverado Excavating	President/General Manager
4/30/2010	Interview	Lance Semenko	Q&D Construction	Senior Vice President
4/30/2010		Mike Douglas	Q&D Construction	Vice President, Estimating
4/30/2010	Interview	Alex Faust	Sierra Nevada Construction, Inc. (SNC)	Pavement Maintenance Manager
4/30/2010		Aaron Hites	Sierra Nevada Construction, Inc. (SNC)	Senior Estimator
5/3/2010	Interview	Thor Dyson	NDOT	District Engineer - Reno
5/3/2010		Dave Titzel	NDOT	Assistant District Engineer - Reno
5/3/2010	Interview	Susan Martinovich	NDOT	Executive Director

Date	Purpose	Attendee	Firm	Title
5/3/2010		Rick Nelson	NDOT	Asst Executive Director - Operations
5/3/2010		Bill Hoffman	NDOT	State Maintenance and Operations Engineer
5/4/2010	Interview	Dave Lindeman	NDOT	Assistant District Engineer - Winnemucca
5/4/2010		Kevin Gallio	NDOT	Maintenance Manager
5/5/2010	Interview	Kevin Lee	NDOT	District Engineer
5/5/2010		Michael Murphy	NDOT	Assistant District Engineer
5/5/2010		Val Nance	NDOT	Maintenance Manager
5/6/2010	Phone Interview	Mason Gorda	Ledcor	Regional Manager
5/14/2010	Phone Interview	Dennis Brooks	NDOT	Maintenance Manager, Ely

Interview Questions and Answers

NDOT Management and District Staff member

Q1. Which area do you have as your maintenance responsibility?
Site Specific answers, but allowed the questionnaire to gauge if existing resources met the demands of the infrastructure.

Q2. How many center line miles, and lane miles do you maintain?
Site Specific, but allowed the questionnaire to gauge the demands of the Districts resources.

Q3. How well maintained are the roads in your area?
Most, if not all, personnel believe they are doing a good job maintaining the system overall, but all admit they lack an objective performance measurement process to quantify their belief. Many routine and preventative maintenance activities are being performed in the remote areas of the state such as; box extension work and shoulder widening to get safety clearance. The urban areas experience a greater challenge to practice a preventative maintenance program on a routine basis. They clean ditches every year.
As per a District Engineer, the MMS is a mystery to the Districts.

Q4. How do you measure the condition of your system?
There is no objective measurement system in place to gauge the condition of the roadway assets. However there is a pavement management system in place that measures IRI, FWD, Cracking Failures, etc. Bridges, on the other hand, are inspected bi-annually as per FHWA guidelines.

Q5. What is your opinion of the resources you maintain to manage your system?

Most managers believe that they have adequate equipment to meet their maintenance needs, but not necessarily enough personnel. They rent some equipment and at least one sub-district borrowed/traded resource equipment with County agencies.

Urban districts feel they have more work than they handle.

"Our workload is such that a lot of things are not getting done, things like graffiti removal, trash pickup, shoulder leveling, bridge repair"

"Needs are always there, but our resources do not meet the need in all areas"

Q6. How many maintenance employees do you oversee? Is this number enough? How many would you need if you did everything with your own forces?

This is a site specific question, but the general feeling was that the managers had enough staff base with the exception of the urban areas where infrastructure and infrastructure performance demand was greatest. Realistically, the urban area managers felt they may not be able to hire the staff levels to meet the needs of the infrastructure. They believed they could bridge that gap by outsourcing selected activities.

One stated that NDOT has had no appetite to increase staff member in the northern part of the state. They went on to remark that all their new DOT staff members have gone to Las Vegas.

Q7. How/ what is your equipment fleet?

Each maintenance area commented they had an adequate fleet for routine maintenance equipment. One staff member critically remarked that it is inherent in NDOTs culture to get the best of everything without taking long term cost considerations.

During the interviews, we asked some maintenance areas about the necessity of their specialized heavy equipment (excavators, paint trucks, etc). Many were willing to rethink their compliment and consider utilization rates with other options. One maintenance area would actively consider turning in a paint truck and contracting pavement striping since the paint truck was often inoperable and was nearly 25 years old.

Q8. What do you currently contract?

Some activities that managers routinely listed are;

Cold-in-place recycling, aggregate productions, micro surface, weed abatement (statewide contract), hazmat cleanup, manufacturing sand, reinforced concrete box extensions. Rock Scaling (Contractor has a snorkel lift with 80 ft reach), rest areas, tree Removal, landscaping, chip seal, machine patching, mill and fill, paving.

One area stated they have seven sweepers, but five have broken down. They are required to sweep snow aggregate within 72 hours and have rented some sweepers to accomplish this.

Another area stated they were glad they got away from the weed sprayers in house because of the exposure to the chemicals.

Q9. How are the contracts inspected?

Maintenance engineering from the central unit does the inspection or they use inspectors from the construction units. They have at times had problems getting inspectors from Resident Engineer's Office, therefore sometimes the maintenance managers have to perform the job.

Q10. What factors would motivate you to pursue outsourcing of maintenance contracts?

Sample of answers:

"Weather dynamics make contracting in remote areas difficult."

"They would like to contract all the work that is not getting done."

"Increased efficiency, using the public's money in the best way possible"

"We could also increase the volume of what we are already contracting"

More than one stated they would contract out striping.
It was suggested by one manager that NDOT should look at non-core activities; sign fabrication, purchasing department, fleet management.

Q11. What potential advantages can you visualize when outsourcing maintenance work?

Sample of answers:
"They (contractors) have specialized equipment; they could be creative, flexible, and quicker in some instances"

Efficiency and motivation were mentioned by more than one as an advantage of the private sector.

Q12. What potential disadvantages can you visualize when outsourcing maintenance work?

Sample of answers:
"Morale is lowered in ranks."
"NDOT could lose expertise."
"Skill sets could be lost."
"We are set up to do chip seals, and take a lot of pride in the quality of our chip seals. Contractors don't understand what it takes to do a good chip seal. We have done two contracts for chip seals in the past and neither one turned out very well. They lost a lot of rock."
Most staff members perceive they should not contract 100% because they would lose expertise and the prices would go up. One area stated that they would consider contracting trash pickup, landscaping, graffiti, drainage cleaning, under-drains, and shoulder widening/slope flattening.
One manager stated he would like to see a better relationship between the state forces and contractors. But he noted that when the economy was good; they could not get contractors to bid on projects.

Q13. What activities would you consider outsourcing?

Sample of answers:
One manager stated that they would consider outsourcing shoulder leveling. "We don't have the equipment to haul large quantities of materials. I could see us hiring a contractor that is supplying 6 cy loader, big dozer and haul trucks."
"I would like to contract guardrail repair activities, NDOT did a statewide contract for guardrail repair, but it came out of Reno and it cost a lot of money to get them out to outlying areas."
During our interview we suggested they mix contracts with state forces, ie. use contractors for traffic control, or visa-versa. This suggestion was received positively.
One manager openly questioned whether the rehabilitating of state equipment with state employees was a good use of resource, or efficient use. "Shouldn't we contract non-core items such as this?"
More than one manager commented that they would contract out striping.

Q14. How would you attract contractors to bid on your work?

Sample of answers: *"Just place it out to bid"* was the only comment we received.
Note: Many had not given thought that they might have to compile a strategy to attract contractors. Most believed contractors would just show up if NDOT advertised.

Q15. Would training for NDOT Employees be necessary when outsourcing maintenance?

Sample of answers:
"Yes, maintenance inspectors need to be trained and reclassification of positions would be needed."

Q16. Would you consider comprehensive long-term maintenance contracts?

General comments on Performance Contracts: *"Need multi-year, but most are out of state contractors which may not benefit local contractors at all. If agency has a good performance monitoring system in place it can work, but not until then."*

Another manager stated: *"NDOT is not ready to let go of means and methods. NDOT is used to controlling the work and it would take a change of the culture to accept a performance measure oversight role."*

"A major issue is getting time commitments out of the Admin Services group for district contracts. We need an expedited process. We have developed a 3 quote process, but we still have to go through Administrative Services Office"

One manager stated that he would use a Performance Contract if they were contracting a whole corridor.

Contractors and Industry Representatives

Q1. What types of work do you currently perform?

Contractor specific answers, but allowed the interviewer to gauge the contractor's perspective.

The various answers included:

Paving, hot mix, milling, earthwork, bridge.

Some were heavy civil engineering companies and worked on grading, drainage, bridge rehabilitation work and emergency response contracts.

Others have operations such as asphalt batching plants in Arizona, and guardrail repairs in Utah.

One performed chip seals on private work and with a local county that was bid on unit SY cost.

Other works include- slurry, striping, crack seal, asphalt repair, minor excavation, drainage work, concrete work, guide post repair, underground utilities maintenance, box culvert extension, etc

One interview was with a company that had a chip seal contract from NDOT; their perspective was the contract process was too slow. One contract was let as late as August and the contractor stated NDOT didn't even start process until June. He noted that California as well as Arizon contract chip seals in a better manner.

We specifically asked if the contractor performed snow and ice removal. Some of the answers included:

"We do snow and ice removal work in Colorado, and we would be interested if contracts are multi-year to amortize equipment commitment."

"Our personnel work with NDOT for snow removal during winter as temps."

A couple of companies do some snow removal during winter for private properties.

Q2. What is your annual turnover?

Answers ranged from $5M to $440M per year.

Q3. How should the DOT prequalify maintenance contractors?

Sample of answers:

"License is the only criteria; however bonding does a better job"

"Bonding would weed out some unqualified contractors. Bonding should be a minimum requirement."

"Safety certification, Environment certification"

"ISO certification. Past performance should also count"

"Need similar process to what heavy construction uses, and factor in financial and past performance."

Q4. What types of work would you be interested in bidding on?
Every contractor stated they are interested in all activities if the critical mass is there.
One stated they are interested in sweeping contracts. *"We bid other work in Clark County, as a flood control channels contract."*

Q5. What factors would motivate local contractors to pursue DOT maintenance contracts?
Sample of answers:
"Longer terms, multi task / multi year, however union restrictions on equipment operators restrict our ability for multi-task maintenance crews."
"Consistent, larger contracts; would like to see a bundling of services".
"Multi-year contracts with renewable bonds and escalation clauses are acceptable. Critical mass on maintenance contracts is important and desirable."
"The process is intimidating to small contractors. There is a barrier of entry because of contract administration with wage requirements. NDOT should hold workshops for smaller local contractors."
"The culture here is a competitive culture between NDOT and contractors, instead of a partnership. They (NDOT) need to simplify the process for small contractors, instead they make very hard to enter the market with them."

Q6. What potential advantages can you visualize for local contractors when bidding on DOT maintenance work?
Sample of answers:
"Accountability, we have a bottom line and process for efficiency and utilization. Winter work can allow a distribution of our resources." They further stated they would gear up if demand was there and remained consistent.
One interviewee had a perception of more efficient workers (however it was apparent he used the city as the example of public employee). *"Public employee have a sense of entitlement to their job, private employee gets laid off if he doesn't perform."* He further stated that they develop their employee staff better, and feels they have better people.
"Efficiencies, contractors are motivated to be efficient."….. "Analyze asset utilization and usage. Compare accurate cost."

Q7. What potential disadvantages can you visualize for local contractors when bidding on DOT maintenance work?
Sample of answers:
"NDOTs geographic presence, mobilization isn't as big an issue."
"The state can play by a different set of rules (ie. traffic control, quality, material standards, etc)."
"They (NDOT) have a constant work force, well trained, and a constant revenue source."

Q8. Under what conditions would you consider bidding on comprehensive long term performance contracts?
Sample of answers:
"We would consider bidding, but would need to have a chance to look at NDOT historical data on maintenance."
"Yes, they have some interest."
Other contractors were unfamiliar with performance based contracts and had no comment.

Q9. Would training for local contractors and their employees be necessary when bidding on DOT maintenance contracts? If so, what subject matter and for whom?
Sample of answers:
"No need for activity training. But it may require reorganization of districts as maintenance department needs additional training to administer contracts."

"Good idea to have bidding process training for small business, where they can become comfortable with the contract language and process."

Q10. For Long Term Individual Activity Based Contracts being done by contract, should bid prices be adjusted for fluctuations in costs of materials, fuel, minimum wages, etc. What index should be used to make the adjustments?

Sample of answers:
" It would require an escalation clause for fuel."
"….City contracts are limited to 15% increase if justified."
"….Use oil index and a form of CPI. NDOT has some form of asphalt index."

Q11. What considerations/adjustments/payments to Maintenance Contracts should be considered should events such as earthquakes, floods, massive snow storms etc., occur?

Sample of answers:
"Force majeure language."
One contractor said he used established pricing on emergency response with a local county, and limited his pricing to a geographical area.

Q12. Should pay incentives/disincentives be used when outsourcing? What factors should be considered when developing incentives and disincentives?

Sample of answers:
"We have no objection; there are some early completion incentives clauses in NDOT work now."
Contractors generally liked an incentive clause with an early completion incentive.
One contractor discussed Utah's A + B bidding process.

Q13. What other risks or unknowns would cause you to raise your prices?

Sample of answers:
"Geographic limits, we are more competitive where we have workers and familiar with work."

Q14. Talk about bonding requirements on maintenance contracts.

Sample of answer:
"In favor of bond requirements as a qualifier."
Contractors admit bonding is difficult in this financial climate, but they have no problem with it. They pointed out that local agencies have annual bonds, i.e. Reno/Sparks. This is something to consider for multi-year maintenance contracts.

Q15. Please comment on the aspects of the NDOT contractor selection, contract administration and inspection processes that need improvement. Provide suggestions for improving contract documents and technical specifications if appropriate.

Selected sample of answers:
"NDOT may sometimes play favorites when using the best value system."
"There are incentives in value based contracts."
Paraphrased answer: ... NDOT is slow to convert to changes (change orders) administratively,(ie. retainage is held a long time). It also takes too long to close projects, as it took 2 years to get retainage and balance quantities on one of our projects.
"….Do not like hand writing bids, need an electronic bid process (automated) software for bidding."
"NDOT doesn't follow the rules, inconsistent inspection."
" NDOT tries to do right thing, but they are intimidated by some contractors."…. "They need to be flexible with time to complete and availability of contract."
One contractor stated that he preferred the low bid process, and liked working for NDOT. He liked the present system, but wants an electronic bid process. He is satisfied with the payment process. He

said that retention is limited to $50K *until complete. He has had no problem with inspection from District to District.*
"I have no problem with bid process, however the time line to award is too long."….."The P3 projects seem to be more buddy/buddy with NDOT."…"Sometimes there are vague bid documents, would want NDOT to be more specific."
"Carry the dollars from year to year. Get started on the contract and letting process sooner. ……Construction has good process with inspectors, maintenance has little oversight – maintenance is not technical or objective."
Note: Many contractors have a complaint with the administrative services process much the same as Districts.

General comments

It was mentioned NDOT used to pay $15k per unit to paint trucks yellow, but says they now leave them white which is a good decision by NDOT.
"It's hard for small contractors to grow with NDOT, and they need to look for ways for small contractors to get involved in the bid process. NDOT should analyze why bids are unsuccessful instead of giving up on process."…. "Too often they throw the baby out with the bath water."
There was a mention of the Construction Management at Risk (CMAR) program – it involves an RFQ to short list, then interviews. The contractor – owner – engineer work toward budget and process. Could this process be used for long term performance maintenance contracts?
An industry representative complained; *"Contract specs should be updated, not just added to."*

Appendix C

Literature Review

1. Literature Search

The literature search is critical to identify previous research by others and to identify best practices. We performed research on data bases where transportation research reports are maintained in addition to the internet.

a. Research Sites The following sites were searched:

1. Transportation Research Information Services (TRIS)
   http://ntlsearch.bts.gov/tris/index.do
2. TRB - Research in Progress (RIP)
   http://rip.trb.org/
3. International Transport Research Documentation (ITRD)
   http://www.itrd.org/
4. CSA Engineering Research Database\
   http://www.csa.com/factsheets/engineering-set-c.php
5. National Technical Information System (NTIS)
   http://www.ntis.gov/
6. American Society of Civil Engineers Journals
   http://pubs.asce.org/journals/
7. Performance Based Road Contracts
   http://www.performance-based-road-contracts.com/documents.htm
8. FHWA Publications
   http://www.fhwa.dot.gov/pubstats.html
9. Bureau of Transit Statistics (BTS)
   http://www.bts.gov/external_links/index.html#transportation
10. National Transit Database (NTD)
    http://www.ntdprogram.gov/ntdprogram/
11. PERFORMANCE-BASED MAINTENANCE CONTRACTS - RESULTS FROM HOLLAND/FINLAND STUDY
    www.mnt.ee/bra/conference26/dwn.php?id=55
12. Case Study World Bank; Performance-Based Contracting *for Maintenance. Overview of* Ontario, Canada
    http://www-esd.worldbank.org/pbc_resource_guide/Case-Canada.htm
13. Florida Legislature's Office of Program Policy Analysis and Government Accountability (OPPAGA), Report No. 03-30, 2003 OPPAGA Report 03-30 PDF
14. Google
15. Alta Vista

b. Search Criteria

The search criteria included key words that would produce reports appropriate to our study. We also wanted more recent information, so we limited our search to reports published January 1, 2000 or after. These key words were:

- Highway
- Maintenance
- Outsourcing
- Contracting
- Privatization
- Make vs. Buy
- Costs
- Levels of Service
- Performance Contracting
- Oversight

2. Literature Review

The next step was to determine what criteria to use while performing the literature review. The main project tasks included outsourcing decision factors, contracting methodologies, the development of cost comparisons and cost comparison matrices, so we utilized those to develop the review criteria:

Review Criteria

- Outsourcing Decision Factors
- Contracting Methodology/Guidelines
- Cost Effectiveness Information
- How to measure cost effectiveness, comparison matrix

3. Findings

There are a large number of published reports, papers, articles and presentations on outsourcing highway maintenance. In general, they discuss outsourcing decision factors and guidelines for contracting. Many included general statements on cost savings. A few reports included some activity costing, especially one done for the South Carolina DOT. There are several that included some fairly good discussion on cost comparison methodologies. Further analysis of the research reviewed is discussed below.

a. Outsourcing Decision Factors

Outsourcing decision factors are items or issues to consider before making the decision to outsource. Typically factors usually involve cost or costs savings, however, many other factors are important to consider. Many of the reports and studies we analyzed included the emphasis behind outsourcing or suggestions on factors to consider. The following list of items has been extracted out of the literature:

- Reducing costs,
- Increasing efficiency,
- Improving quality,
- Increase flexibility,
- Speeding project delivery,
- Spurring innovation,
- Enhancing risk management, shifting risk,
- Overcoming a lack of expertise,
- Mere threat of privatization can drive efficiency in the public sector,
- Staff constraints or lack of resources,
- Growth in the highway system,
- Private funding through public private partnerships,
- Lack of specific skills or expertise,
- Meeting a schedule,
- Political direction,
- Ability to respond to emergencies.

According to a Louisiana sanctioned study in June 2002, "*Designing a Comprehensive Model to Evaluate Outsourcing of Louisiana DOTD Functions and Activities*, Donald R. Deis, Edward Watson, and Chester G. Wilmot", ten "key states" had formally evaluated their outsourcing practices: Arizona, Connecticut, Florida, Idaho, Maryland, Michigan, North Carolina, Utah, Virginia, and Washington.

Several more were developing procurement decision tools. They used decision tools developed by Arizona, Pennsylvania and Texas DOT's as the basis for the development of a contracting decision process called the Outsourcing Decision Assistance Model (ODAM). The report recommended the use of ODAM to analyse their activities, but stated "This model provides a systematic approach to identify functions and activities that are viable candidates for outsourcing. The model is not intended to be the final analysis; rather, functions and activities identified for outsourcing by this model should be analyzed further prior to contracting out."

The report, "*Outsourcing Decision Making in Public Organizations: A Proposed Methodology and Initial 1 Analytic Results from a DOT* – Eger and Samaddar 2009", attempts to propose an analytical approach to outsourcing decisions and states: "This paper explores a potential solution to the decision to outsource in public agencies, through a comprehensive, process based evaluation linking DOT goals and managerial insight to competencies, a hierarchical evaluation to indicate a potential priority list based on management insight, a knowledge audit to address knowledge transfer and loss, a traditional cost collection and market analysis, and an evaluation of human resource expertise and utilization. The process leads to an outsourcing decision support tool that evaluates the multi-dimensional implications of outsourcing, allowing for potential functions to be hierarchically listed for outsourcing and informing decision-makers of functions that need resource allocation internally."

b. Outsourcing Methodology/Guidelines

After the decision has been made to outsource, the outsourcing methods have to be determined. Information was extracted out of the literature on the different types of contracts that have been utilized by highway agencies as well as recommended items to include in the contract documents. Frequently the type of contract utilized depends upon the government's statutory authority. They typically have "purchasing" statutes that specify the way materials, supplies and services can be procured. They may have additional "highway improvement" outsourcing authority that specifies how roadway projects such as construction and maintenance must be procured. Requirements for advertizing, size, local let authority, retainage, and bid, performance and payment bonds are identified. The following lists of the different types of contracts are defined:

i. Contract Types -

- **Purchase Orders –** Typically, authority is granted through government purchasing statutes for the purchase of materials, equipment, supplies, or "services". Frequently highway agencies lease equipment or purchase the services of equipment with operators. These are usually used to support a government forces project.

- **Single Bid Item Contracts** – These contracts are defined as using specifications that are "method" or "recipe" type of requirements where the materials, equipment and methods are spelled out. They are paid based upon the number of approved units of work performed. Many government agencies started with single item contracts and paid for the work performed. Items such as roadside mowing, tree trimming, or ditch cleaning allowed for the elimination of equipment that was only used seasonally. A "Maintenance Contractor" industry has to be developed. Government statutory outsourcing requirements frequently require three months or more to get a contract awarded.

Generally items of work that take very little investment in equipment are typically very competitive because it is easy to get into business, therefore; there are many contractors. These include activities such as guard rail repair, attenuator repair, sign repair, litter pickup, rest area maintenance, picnic area maintenance, tree trimming, landscape maintenance, etc. Other activities that take skilled operators are frequently very competitively performed by government employees. Items such as chip seals, milling, overlays, pavement reclaiming, base repairs, etc. require substantial investments in equipment and skilled employees.

- **Bundled Bid Contracts** – Also known as "Multiple Bid Item" contracts. This type of contract also utilizes "method" or "recipe" types of specifications, but includes many different types of maintenance work. As contractors evolve, they developed expertise in many maintenance activities and highway agencies started combining like items into contracts. This reduces the administrative burden of letting to contract and inspecting multitudes of contracts. Some organizations have literally maintained corridors or total areas by letting contracts with multiple bid items and then directing the contractor by writing weekly work orders, paying by the items of work performed according to established prices. The government still had the burden to identify the work; either to provide or inspect materials, approve crews and equipment, and measure the work for quality and payment.

- **Performance Based Maintenance Contracts -** Also known as "Performance Specified Maintenance", "Asset Management", "Total Maintenance", "End Product" or "Area Maintenance" contracts. These contracts utilize specifications that specify the "outcome" desired and not the methods involved to achieve the desired outcome. They are typically paid for by the lump sum or monthly, resulting in minimal oversight by the owner. They allow the contractor the maximum flexibility to utilize materials, methods and equipment that will produce the specified outcome. "Right Sizing" of government in some countries has resulted in highway agencies completely getting out of the maintenance business and establishing contracts for the total maintenance and operation of their assets. Early countries include Canada, Australia and New Zealand. They are also very prevalent in the UK, Nordic and South America countries. In the US, DOT's from Florida, Virginia, Texas, Oklahoma, North Carolina and the District of Columbia have used various forms of Performance Based Maintenance Contracts (PBMC's) since 1997.

Early efforts of Performance Contracts in other countries required contractors to hire government employees, lease or purchase equipment and utilize maintenance yards. The contractors' performance was controlled by the establishment of performance "standards". These outcome standards took the form of timeliness requirement for repairs for items such as pothole repair, guardrail repair, etc, to quality standards for items such as ride, mowing, litter, etc, to schedules for repetitive work like picnic area maintenance, raised reflective pavement markers, etc.

Performance contracts have continued to evolve with second and third generation specifications. Control mechanisms such as liquidated damages, incentive, and disincentive payments have provided the government with the controls needed to ensure minimum levels of service are met. There are substantial benefits to specifying performance driven outcome. The traditional methods of contracting required a substantial effort to measure the quality of materials, inspect quality of methods, equipment and personnel used by the contractor, and measure work performed. Highway agencies had to predict the quantities of work that needed to be performed over the contract period and pay for all work performed. All the risk was on the highway agency and any additional work required to maintain the desirable level of service had to be paid for at the bid price.

If the department established performance-based contracts in certain program areas, such as maintenance, it may be able to reduce the number of employees used to monitor contracts since they would not need to perform as much ongoing review of the contractors' work processes. However, department managers are still assessing what level of contract supervision is appropriate to adequately administer asset management contracts and performance-based contracts. Examples of these results are characterized in Figure 1.

FDOT METHODS COMPARISON 2007	IN-HOUSE	TRADITIONAL MAINTENANCE CONTRACTS	ASSET MANAGEMENT
Annual Maintenance Costs	$173.2 million	$162.1 million	$145.9 million
Percentage Costs Savings	0%	6.4	10%
Number of Contracts	0	980	29
Invoices Processed Annually	0	11,760	348
Annual Contract Lettings/ Renewals	0	950	4
In-house Maintenance Staff	2,967	123	38
In-house Non-maintenance Staff	120	32	2
Performance or Task Oriented	Performance/ Task	Task	Performance

Figure 1 ***Reference FDOT Report 2007***

- **Managing Agent Contracts** - England and a few other countries are taking performance contracts to the next step. England began with "Area Contracts" which were performance maintenance contracts over a certain geographical area. Next they hired management consultants to administer the contracts in those areas. The next generation combined the two into Managing Agent Contracts (MAC's) which could be likened to Design Build and Operate contracts in the construction area. In MAC contracts, a consortium including a management consultant and a number of contractors, procured through an RFQ/RFP process, not only perform the routine and minor repair work, they identify the need for larger preventive maintenance and rehabilitation work and when the projects are approved by the highway agency, the MAC team develops the plans, lets to contract and administers the contract to get the work performed.

ii. **Practices/Recommendations** – Much of the literature, reports and presentations identified have included recommendations. The following practices were identified in the literature search and have been sorted into major categories:

- **Pre-Proposal Planning**

Some of these recommendations are appropriate for bid item and performance contracts, while others are more appropriate for PBMC only.

Bid Item and PBMC

- Require relevant and measurable project experience and financial criteria.

Performance Based Maintenance Contracts

- Use “Best Value” procurement instead of “Low Bid”.
- Use a two step procurement process.
- RFQ – Specify minimum qualifications and use a request for qualifications to weed out non-qualified contractors.
- RFB – Request price proposals from only the qualified contractors.

The private sector should conduct their own R&D as a means of maintaining its own competitiveness and becoming most effective and efficient in producing defined and measured outcomes.

- **Developing the Scope of Services**

Bid Item and PBMC

- Use proper planning and scoping.
- Provide reasonable response times; time requirements are directly proportional to the size and complexity of the project.

Performance Based Maintenance Contracts

- Use a decision matrix.
- Desired Outcomes: What do we want to accomplish as the end result of this contract?
- Required Service: What task must be accomplished to give us the desired result? (Note: Be careful this doesn't become a "how" statement.)
- Performance Standard: What should the standards for completeness, reliability, accuracy, timeliness, customer satisfaction, quality and/or cost be?
- Acceptable Quality Level (AQL): How much error will we accept?
- Monitoring Method: How will we determine that success has been achieved?

- Incentives/Disincentives for Meeting or Not Meeting the Performance Standards: What carrot or stick will best reward good performance or address poor performance?
- Ask: What do I need? When do I need it? How do I know it's good when I get it?
- Use "Lessons Learned" from others.
- Technical knowledge should be transferred and shared as much as possible throughout the entire industry as if it were public knowledge.
- Furnish complete and accurate information and data. Providing the contractor with as much information as possible will reduce the costs. Information such as: historical work quantities material suppliers, etc.
- Inventory Assets.
- Grant good and repeated access for facility tours and information gathering.
- Thoroughly explain innovative standards to bidders.
- Use Performance Contracts to maximize the potential and incentives capacity for improved performance while managing the risks of performance shortfalls.
- Share Risks
- Rebidding contracts on a periodic basis is one way to ensure competitive pressure to innovate and keep costs down.
- Use longer term contracts to encourage life-cycle cost considerations.
- Perform "before and after" "Apples to Apples" comparisons.
- Consider litigation risks and costs.
- Ensure senior management involvement and support.
- Tap multi-disciplinary expertise.
- Define roles and responsibilities.
- Develop rules of conduct.
- Empower team members.
- Identify stakeholders and nurture consensus.

- **Developing the Contract Approach and Terms**
  - Connect the producer to the user-customer, as opposed to the producer simply doing work for the owner-agency (or a contractor representing the owner).
  - Develop clear contractual language that ultimately places the responsibility on the private sector to develop, train and equip its own personnel as well as bear most of the risk associated natural and man made incidents.

- Understand the importance of contractors having an approved emergency operations plan (snow and ice for example), but confine contractual language to measurable outcome-based performance measures with payment for work correlated with measured performance achieved.
- Use contract language that maximizes the opportunity and responsibility for the private sector to prove that they can be responsive, efficient and/or effective in producing maintenance services to the public.
- State specific goals and objectives and have a clear scope of work, while welcoming alternatives and options.
- Choose terms and conditions that use established and understood standards as much as possible.
- Develop exit strategies.
- Include clear performance expectations, evaluation criteria and financial incentives and disincentives.

- **Managing the Contract**

Bid Item and PBMC

- Develop and maintain the knowledge base over the project life.

Performance Based Maintenance Contracts

- "Incentivize" the team: Establish link between program mission and team members' performance.

c. Cost Comparison

The literature search resulted in very little information about cost comparisons. However, *NCHRP 14-18 Determining Highway Maintenance Costs* is a project that is looking at cost comparisons between different states and contractors, but unfortunately the report is not published at this date. It will likely be available before our study is complete.

There are a number of reports that included general statements about costs, as shown on Figure 2.

TABLE 4
COST SAVINGS OF PBMC RELATIVE TO CONVENTIONAL CONTRACTS IN SELECTED COUNTRIES

Country	Cost Savings
Norway	About 20%–40%
Sweden	About 30%
Finland	About 30%–35%
Holland	About 30%–40%
Estonia	20%–40%
England	10% minimum
Australia	10%–40%
New Zealand	About 20%–30%
United States	10%–15%
Ontario, Canada	About 10%
Alberta, Canada	About 20%
British Columbia, Canada	Some, but might be on the order of 10%

Source: P. Pakkala cited in World Bank Transport Note No. TN-27, Sep. 2005.

Figure 2 ***NCHRP Synthesis 389***

Note that this is comparing PBMC to conventional contracting, not state forces. Another report indicates some hypothetical cost savings indicating a 30 - 40 percent reduction in cost, as shown in Figure 3. The assumption that has to be made is that the reported savings is an apples to apples comparison with the same quality and life cycle costs. One report that does have some activity cost comparisons is a report performed by Clemson University for the South Carolina DOT, as shown on Figure 4. Unfortunately it appears to only include direct costs and does not include the costs of contracting, or the overhead of the agency. It also includes qualifiers that the contract and state force projects were not necessarily the same in scope.

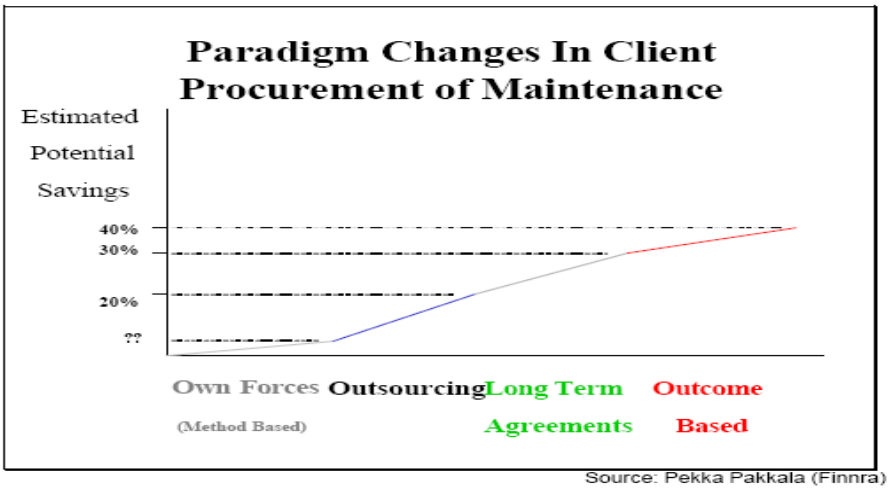


FIGURE 6 Potential Cost Savings from Paradigm Changes

Figure 3 ***Innovative Project Delivery Methods for Infrastructure, P.Pakkala 2002***

Table 8. Comparison of SCDOT in-house and outsourcing costs for Fiscal Year 2003-2004

Maintenance Activity	Unit Of Measure	In-House Unit Cost ($)	Average Outsourcing Unit-Cost ($)	Significantly Different
Drainage Structure	Each	515.67	2,545.84	Yes
Drainage Pipe	LF	39.13	32.62	No
Tree Trimming	SH Mile	201.46	733.69	Yes
Mowing	Acre	23.65	24.29	No
Chip Sealing	SY	0.31	0.77	Yes
Guardrail Installation	LF	34.81	11.88	Yes
Pavement Striping	LF	0.19	0.03	Yes
Raised Pavement Markers	Each	17.28	2.61	Yes
Sign Installation	Each	25.28	35.31	Yes
Full Depth Patching	SY	25.12	33.25	Yes
Bridge Replacement	SQFT	133.49	65.00	Yes

Figure 4 ***SCDOT Study 2004***

d. Cost Comparison Methodology

A few reports reviewed included some information about the comparison of costs between government workers and private contractors. Generally most indicated that performing accurate, fair comparisons were difficult.

NCHRP Synthesis 313, State DOT Outsourcing and Private-Sector Utilization, A Synthesis of Highway Practice, states "Ultimately, little agreement exists on these approaches, nor does any single approach surface as the defining model for this report."

The Louisiana DOT study referenced earlier, "*Designing a Comprehensive Model to Evaluate Outsourcing of Louisiana DOTD Functions and Activities*, Donald R. Deis, Edward Watson, and Chester G. Wilmot", states "Determining a proper cost comparison between the contractor and a public sector agency is one of the most difficult tasks related to the outsourcing decision. As noted in a report issued by the Office of the Legislative Auditor of Louisiana, "state governments are often not equipped to easily assess all the costs of delivering a state service"." It goes on to describe the costs, including public sector "direct" and "indirect" costs and contractor "service" costs.

One of the most comprehensive studies on methodology for comparing costs was a PhD dissertation prepared by Juan Carlos Piñero in 2003. Titled "*A Framework For Monitoring Performance-Based Road Maintenance*". In his report, he indicates "The cost-efficiency evaluation of the framework is probably the most difficult component to understand and calculate." As shown on Figure 5, he lays out a proposed cost comparison procedure.

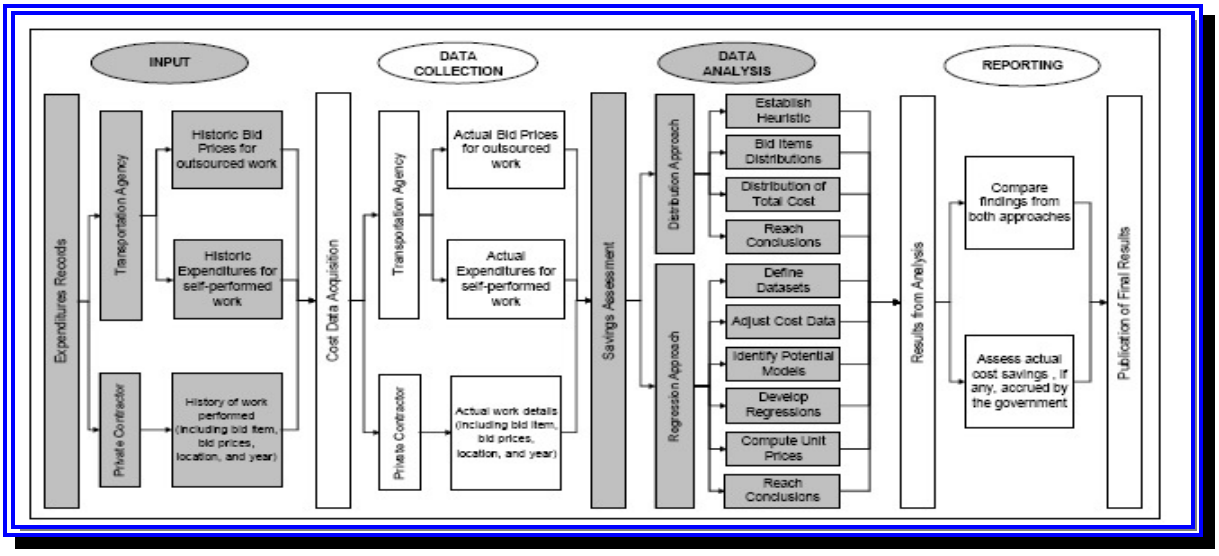


Figure 5 *Juan Carlos Piñero 2003*

Performing cost comparisons requires a complete understanding of all the costs associated with performing the work with government forces and the costs of outsourcing the activity or function. A thorough analysis of the data will identify where good costs exist and where engineering judgment, expert opinion and other methods will be required to fill in gaps in knowledge.

4. Literature Summaries

After reviewing 39 reports, studies and presentations, we have summarized the ones that most relate to this project, as follows:

1. ***Contracting for Road and Highway Maintenance*. The Reason Foundation. Geoffrey F. Segal, Adrian T. Moore, Samuel McCarthy. February 2003.**

   The paper outlines the major reasons for outsourcing explaining that cities, counties, states, and the federal government outsource road and highway maintenance to achieve a number of goals, including:

   - Reducing costs;
   - Increasing efficiency;
   - Improving quality;
   - Speeding project delivery;
   - Spurring innovation;
   - Enhancing risk management; and
   - Overcoming a lack of expertise.

   Each goal included details and provides further explanations for outsourcing. These goals can provide a basis framework in developing a decision matrix for outsourcing. The document further describes the various contract types with examples. These are:

   - Traditional Contracts – For example, Massachusetts outsources to save money and increase services.
   - Performance Based Maintenance Contracts – Examples include FDOT, Australia, New Zealand, VDOT, D.C. and Latin America.
   - Warranty-type Contracts - Examples include Aspen, Colorado and New Mexico.
   - Part 4 of the study dealt with contract structure and included discussions on;
     - Service Approach- Design Build Operate Maintain, and Design Build Finance Operate Maintain
     - Selection Process – RFQ Phase, RFP Phase
     - Alternatives to Low-bid

- Performance Standards or Objectives – gives example of performance criteria
- Risk Sharing
- Labor and Employee Issues
- Accountability and Monitoring
- Term and Payment
- Termination

2. ***NCHRP Synthesis 313 – State DOT Outsourcing and Private-Sector Utilization*. TRB. Tom Warne and Associates, LLC. Thomas R. Warne. 2003.**

The purpose of this report is to quickly and effectively update NCHRP Synthesis 246.

Summary:

The two most common factors influencing the decision to outsource were staff constraints (42%) and specialty skills (29%), which combine for a total of 71%. This outcome is not surprising when compared with information gathered in the narrative responses from the first part of the survey.

Some variations occur among specific activity groups. In all responses, staff constraints were the reason most frequently given for outsourcing. The percentage of activities within each of the activity groups that were influenced toward outsourcing by staff constraints ranged from a low of 31% for Maintenance to a high of 54% for Design. The second most frequently mentioned influence on outsourcing was specialty skills or equipment.

Payment Methods (pg 19) - Unit Price, Lump Sum, Cost Plus, Hourly Rate, Other: The survey results for payment method are found in Table 12. The two most common methods of payment for outsourced services are unit price and lump sum. These two methods combined account for more than 62% of the 495 activities reported on by the states. To a lesser extent, cost plus and hourly rate were also used with a combined frequency of 35%.

For example, in the Maintenance activity group are activities more commonly procured using a low bid method, whose price and payment structure follows the unit price format. In the Design activity group, the most frequently outsourced activities use cost plus, with the exception of design/build, where the payment method is lump sum. This finding reflects that different procurement methods are used in the design/build segment of outsourced activities.

Most commonly outsourced activities and their attributes: The Maintenance activity group includes the following six activities that were mentioned with high frequency: Roadway surface, Roadside, Drainage, Bridges, Traffic signals, and Traffic signs.

A review of the basic characteristics of these activities reveals considerable homogeneity. For example, they all report their expected future level of outsourcing to be about the same as it is

now. All activities are performed by either general contractors or specialty contractors. Their contracts are awarded based on a low bid and they are paid by unit price. Reasons for outsourcing in the Maintenance activity group are specialty skills or equipment and staff constraints.

In several other characteristics these activities did differ from one to another. For example, they are about evenly split on whether or not the potential contractors would be prequalified. The percentage of work outsourced varied from activity to activity, with roadway surface in the 80% to 99% range and drainage, traffic signals, and traffic signs in the 0% to 19% range. The others fell in between these two values. Annual volumes also varied considerably, from drainage, showing a $0 to $99,000 annual amount, to roadway surface, with an amount of more than $10 million.

The following six activities are frequently mentioned in the survey responses with regard to Operations: Pavement markings, Signal installation, Sign installation, ITS, Toll collection, and Traffic information services.

The grouping of ITS (80–99%), toll collection (100%), and traffic information services (100%) represents the activities with the highest percentage outsourced among all the groups in the survey. However, even though the percentage outsourced is high for these three activities, the dollar volumes are relatively low, with the exception of a report on ITS outsourcing from Arizona, where the annual amount reported was in excess of $10 million.

Substantial consistency exists among these six activities in terms of other features. For example, they all use specialty contractors, they all go through a prequalification process, unit price is the method of payment, and the reasons for outsourcing these activities fall into two categories, staff constraints and the need for specialty skills or equipment. In addition, the DOTs anticipate the level of outsourcing in the Operations activity group as remaining approximately the same over the next two years.

3. ***Seven Steps to Performance-Based Services Acquisition*. Department of Commerce and Acquisition Solutions, Inc. 2006.**

One of the most important challenges facing agencies today is the need for widespread adoption of performance-based acquisition to meet mission and program needs. By memorandum, this Administration has set a goal for civilian agencies to apply performance-based acquisition methods on 40 percent (as measured in dollars) of eligible service actions (including contracts, task orders, modifications, and options) over $25,000 in Fiscal Year 2006. The Department of Defense has a goal of 50 percent. Although policies supporting performance-based contracting have been in place for more than 25 years, progress has been slow. The single most important reason for this is that the acquisition community is not the sole owner of the problem, nor can the

acquisition community implement performance-based contracting on its own. The changes made to FAR 37.6 in February 2006 put more of the onus on the program office community - they're the ones with the performance-based budgeting requirement in the President's Management Agenda. Laws, policies, and regulations have dramatically changed the acquisition process into one that must operate with a mission-based and program-based focus. Because of this, many more types of people must play a role in acquisition teams today. In addition to technical and contracting staff, for example, there is "value added" by including those from program and financial offices. These people add fresh perspective, insight, energy, and innovation to the process -- but they may lack some of the rich contractual background and experience that acquisition often requires.

This study has found that performance-based service acquisition offers many benefits. They include:

- Increased likelihood of meeting mission needs
- Focus on intended results, not process
- Better value and enhanced performance
- Less performance risk
- No detailed specification or process description needed
- Contractor flexibility in proposing solution
- Better competition: not just contractors, but solutions
- Contractor buy-in and shared interests
- Shared incentives permit innovation and cost effectiveness
- Less likelihood of a successful protest
- Surveillance: less frequent, more meaningful
- Results documented for Government Performance and Results Act reporting, as by-product of acquisition
- Variety of solutions from which to choose

This guide, geared to the greater acquisition community (especially program offices), breaks down performance-based service acquisition into seven simple steps.

- Establish an integrated solutions team
- Describe the problem that needs solving
- Examine private-sector and public-sector solutions
- Develop a performance work statement (PWS) or statement of objectives (SOO)
- Decide how to measure and manage performance
- Select the right contractor
- Manage performance

The intent is to make the subject of performance-based acquisition accessible and logical for all and shift the paradigm from traditional "acquisition think" into one of collaborative, performance-oriented teamwork with a focus on program performance, improvement, and innovation, not simply contract compliance. Performance-based acquisition offers the potential to dramatically transform the nature of service delivery, and permit the federal government to tap the enormous creative energy and innovative nature of private industry. Stakeholders may include customers, the public, oversight organizations, and members and staff of Congress. It is important for the team to know who the stakeholders are and the nature of their interests, objectives, and possible objections. At a minimum, stakeholders should be consulted and, at times, may participate on the team. In developing the acquisition, the key tools the team should use are consensus and compromise, without losing sight of the three key questions:

What do I need?
When do I need it?
How do I know it's good when I get it?

An analysis of requirements is often, by its nature, a close examination of the status quo; that is, it is often an analysis of process and "how" things are done... exactly the type of detail that is not supposed to be in a Performance Work Statement (PWS). The integrated solutions team needs to identify the essential inputs, processes, and outputs during job analysis. Otherwise, the danger is that contractors will bid back the work breakdown structure, and the agency will have failed to solicit innovative and streamlined approaches from the competitors. The intent is to make the subject of performance-based acquisition accessible and logical for all and to shift the paradigm from traditional "acquisition think" into one of collaborative, performance-oriented teamwork with a focus on program performance, improvement, and innovation, not simply contract compliance. Performance-based acquisition offers the potential to dramatically transform the nature of service delivery, and permit the federal government to tap the enormous creative energy and innovative nature of private industry.

4. ***Evolution of Highway Maintenance Outsourcing in Alberta, Canada*** **Transportation Research Circular and TRB. Lansdord C. Bell, Ryan Dlesk, Nick Bucyk, Moh Lali. July 2006.**

In the early 1990s, the Alberta government, like many other governments, was faced with the growing pressure of increased deficits and debt. Change was required in order to bring both under control and in 1993 the government put forward a new mandate. The delivery of

government services through the private sector was to be considered where it was cost effective and provided good service to the public. As part of the Alberta government's mandate, Alberta Transportation and Utilities (AT&U) decided to outsource the maintenance of the 15,500 km of primary highways within the province.

Outsourcing of highway maintenance activities was not new to AT&U. Prior to 1995 the department had already outsourced maintenance activities such as line painting, mowing, crack filling, and some snowplowing. However, this piecemeal approach to outsourcing was not efficient and did not necessarily meet the department's goal to deliver services by the best and most cost-effective means.

The department was also faced with an aging equipment fleet that was not being fully utilized at all times of the year. A good portion of the snow plow fleet sat idle during the summer months because of the nature of the maintenance work done by the department. Capital costs to replace the fleet were significant and given the financial situation of the province at the time this was not an option. In addition, the public expected the department to provide the same level of maintenance service or higher. This was quite the task considering the department was facing budget cuts from one side and increased costs and expectations from the other. As a result, the department began looking for a new approach to deliver highway maintenance services through the most cost-effective means.

To achieve this goal, AT&U decided to increase its outsourcing activities to include all highway maintenance and routine bridge maintenance services. The department's role was to change from one of doing the work to one of steering the work by setting policy and standards and monitoring and ensuring that the performance standards were met. AT&U's objective was to increase efficiency in its outsourcing programs and it planned to do this by using a competitive bid process, managing standards, monitoring performance, reducing government administration, providing opportunities for innovation and facilitating economic growth within the private sector. Ensuring public safety, preserving the public's investment in transportation infrastructure and contributing to the Alberta Advantage were the department's main goals and managing these became the focus.

When the department outsourced this work, many of the department's staff were asked to accept a new role. Performing the work directly was no longer the responsibility of the department. Their roles were now to set policy, develop standards, order and monitor the work, and ensure work is performed safely and accordingly by the contractor. One of the main objectives of the outsourcing of highway maintenance was to use private sector forces to deliver the same LOSs as the

government forces, but at a reduced cost to the tax payers of Alberta. This objective was achieved by using a competitive bid process, managing by standards and performance, reducing government administration, enhancing opportunities for innovation and facilitating economic growth in the private sector. Another significant factor that contributed to the success has been the strong working relationship the department has with its maintenance contractors. The partnering relationship has drawn on the strengths of both parties involved in roadway and bridge maintenance.

5. ***NCHRP Project 20-24 (61) – Issues and Practice in Performance-Based Maintenance and Operations Contracting.*** **AASHTO, Applied Research Associates, Inc. and PB. Gary L. Hoffman, P.E., Amar Bhajandas, P.E., Jagannath Mallela. January 2010.**

A summary and excerpts from Chapter 6 of the study's conclusion and recommendations follows:

The use of PBMC is growing worldwide. In the United States and Canada, there are a number of examples of PBMC, although it is not the most common approach in most DOTs. While performance-based contracting continues to expand for facilities maintenance and asset- or activity-specific scopes, its use in the fence-to-fence highway corridor maintenance application is limited to a handful of states. The major leaders in the US in this latter application are the Virginia and Florida DOTs. Texas and the District of Columbia DOTs also have applied PBMC on large-scale applications.

In all, 12 of 37 states that responded to a general survey have had some positive experience with PBMC, and an additional 15 are interested in trying this approach or learning more about it. Two states have tried this method or have considered it and have made a decision to not pursue it any further. The remaining respondents expressed no interest in PBMC.

The results of interviews with owner agencies in the US and Canada point to the primary motivating factors for pursuing PBMC as being:

- Augmenting in-house capacity where shortfalls exist.
- Responding to expressions of interest and support from legislative bodies, chief executives, and top management within the agency.
- Reduced costs and improvement in efficiency.
- Desire to raise LOS provided to customers.
- Shifting risk and liability from the state to the private sector.

The literature indicates the potential for cost savings of as much as 15 percent on domestic projects as a primary factor; however, the agencies interviewed were skeptical about the validity of comparisons and the magnitude of savings claimed, although some did agree that there were

savings. Some pointed to the difficulty of making true cost comparison of all direct and indirect expenditures between public and private sector organizations in the absence of a universally acceptable cost comparisons model. They also noted that the scopes of work and levels of performance between contract and in-house work were rarely the same, thus making comparisons questionable. Still another issue is the lack of objective data on the valuation of varying levels of performance to the users.

It is important to recognize that most of the information presented on performance-based maintenance and operations contracting also applies to agencies considering performance-based maintenance using in-house forces. Thirty-three of the thirty-seven states that responded in our survey already have performance standards for in-house maintenance activities, and this information can be used for maintenance accountability and budgeting. Agencies that already are using and tracking performance-based management practices for in-house maintenance forces are best prepared to incorporate PBMC. In comparing costs and benefits of in-house versus outsourced performance-based maintenance, the best comparison is with in-house activities using a performance-based approach, including target service levels, performance metrics, inspection regimes, and incentives/disincentives where possible (recognizing that the form of rewards and penalties for public employees must be different from those that can be included in outsourced contracting). Such side-by-side comparisons of in-house versus outsourced approaches, when performed on a level playing field, encourage engagement by in-house staff and optimization of the mix of in-house and outsourced resources.

The underlying premise of PBMC follows existing trends in surface transportation funding, resource allocation, project development, and operations and maintenance — namely that performance outcomes, rooted in objectivity and rational, analytical processes, and assessed through quantifiable measures of success, help agencies to achieve desired results and be accountable to the traveling public and other stakeholders. The question is what has been learned from PBMC experiences to date and what improvements and refinements are needed to help advance the state of practice. It is with these thoughts in mind that the following recommended actions and considerations are offered:

- Development of awareness and training programs on PBMC concepts for both public and private sector personnel.
- Development of and access to model procurement documents that are updated on a regular basis.
- Engagement of key peer personnel from states with good experience to serve as mentors to other states.

- Development of a generally accepted, systematic methodology for comparing public sector versus private sector costs on an equitable basis.
- Continuous, coordinated efforts on improving performance measures, measurement protocols, performance standards, LOS, and valuation of tradeoffs when raising or lowering standards.
- Continuous improvement through identifying and deploying innovative strategies that have advanced the state of practice in performance-based maintenance applications, whether in-house or by contracting.
- Consideration and application of innovative deployment strategies that have been used for other transportation products/processes to performance-based maintenance.
- Application of performance-based principles and practices to in-house maintenance activities and encouragement of pilot programs with facilities such as rest areas, park and ride lots, and truck inspection stations.

All of these actions are encompassed by the four strategies that emerged from the executive forum and are listed below:

- Establish PBMC as a long-term, sustainable approach.
- Address the impact on employee morale.
- Develop agency guidelines and performance standards.
- Determine actual costs and valuation of performance levels.

6. ***A Framework for Monitoring Performance-Based Road Maintenance*** **- Juan Carlos Piñero. 2003**

The purpose of this research is to develop a conceptual framework to assist road administrators in monitoring performance-based road maintenance. This framework will provide transportation agencies with guidelines based on statistically valid procedures to assess the overall performance in maintaining all the features (i.e., assets) located within the right of way of public roadways at the minimum acceptable performance level. The application of the proposed framework will be illustrated using the new public-private partnership enacted under the Public-Private Transportation Act 1995 (PPTA) between VMS, Inc. (private corporation) and the Virginia Department of Transportation (VDOT- public agency) for the maintenance of a portion of the interstate highway system in the Commonwealth of Virginia (VDOT 2000). However, it is envisioned that the proposed framework can be used to evaluate other performance-based road maintenance initiatives to assure a reliable and comprehensive assessment of the impact in the overall condition of the assets that form part of the roadway system and the cost benefits, if any, accrued by the government.

The framework developed in this study is consistent with existing approaches commonly used by public and private organizations to measure and monitor performance-based work. Criteria such as the ISO 9001:2000, Malcolm Baldrige National Quality Program, and Highway Maintenance Quality Assurance Program served as the platform for defining the proposed framework to monitor PBRM initiatives. The framework emphasizes in monitoring five key areas to comprehensively evaluate PBRM initiatives. These areas or components are:

- Level of Service Effectiveness,
- Cost-Efficiency,
- Timeliness of Response,
- Safety Procedures, and
- Quality of Services.

The procedures adopted in the framework to evaluate each component are based on statistically valid techniques. These procedures are associated to the following four main areas: Input, Data Collection, Data Analysis, and Reporting. The proper implementation of these procedures and techniques will provide reliable assessments of the contractor's performance.

7. ***Outsourcing versus In-house Highway Maintenance: Cost Comparison and Decision Factors Final Report.*** **SCDOT Research Project 653: Maintenance Outsourcing and Clemson University. Ryan J. Dlesk and Lansford C. Bell. April 2006.**

A research project was conducted by Clemson University for the South Carolina Department of Transportation (SCDOT) to examine the relative merits of outsourcing highway maintenance activities as opposed to performing those activities with in-house forces. The project examined the costs associated with maintenance work performed within the state for 20 maintenance-related activities in FY 03-04. The in-house unit costs for activities including drain pipe installation, mowing, sign installation, and full depth patching were found to be about the same as their out-sourcing unit cost. Some activities including drainage structure replacement, guardrail installation, and raised pavement marker installation, were difficult to compare due to project contract differences. Then too, some activities were performed exclusively either by contract or in-house in FY 03-04. The project also included workshops conducted in all seven SCDOT district offices to examine subjective factors that impact local decisions as to whether or not it is appropriate to outsource various maintenance activities. District personnel cited equipment availability, local contractor expertise, SCDOT inspection and contract administration capabilities, seasonal work fluctuations, and the need for immediate SCDOT response to specified problems among their decision factors. Workshop participants also suggested that improvements be made

to standard outsourcing contracts to give them more leverage with respect to specification conformance.

Cost Data Analysis

The primary objective of this research project was to examine the cost of performing maintenance activities with SCDOT forces as opposed to performing them through outsourcing or external contract. It can be concluded from an analysis of available cost data that SCDOT can, in fact, compete with contractors on the basis of unit installed cost for maintenance activities in such categories as drainage pipe installation, mowing, chip sealing, sign installation, and full depth patching. For some maintenance activities the available cost data reflected much higher unit costs for either in-house or outsourced projects. This was due to the fact that the magnitude or scopes of work for the projects in the two categories were dissimilar. For example, drainage structure projects that are let to contract are much more complex, and in-house pavement striping tends to be small template marking projects with minimal linear feet of cost reporting measurement. SCDOT raised pavement marking projects were mostly smaller marking replacement projects which tend to have higher costs per installed marker. Some maintenance activities included in the scope of the research could not be compared on a cost basis because those activities have historically been exclusively let to contract and not performed by SCDOT forces. Cable rail maintenance and rest area maintenance are two such examples.

Non-Cost Related Decision Factors

A secondary objective of this research project was to examine a number of critical non-cost related decision factors. These factors included

- SCDOT personnel and equipment availability.
- The unique expertise of contracting firms.
- The ability of the contractor to provide quality work.
- Contract administration issues.

These decision factors were explored primarily through workshops that were conducted in the seven SCDOT district offices. Professional personnel attending these workshops expressed uniform and strong opinions emphasizing the unique environment within each district and county, and the importance of retaining autonomy with respect to outsourcing decisions at the local level. Workshop participants agreed that cable rail maintenance and rest area maintenance should remain totally outsourced. Mowing, chip sealing, tree trimming, herbicide treatment, and bridge replacement activities should be performed either in-house or through external contract depending on maintenance work loads, availability of SCDOT personnel and equipment,

availability of local contractor personnel and equipment, and the ability of local contractors to execute work acceptable to SCDOT. SCDOT maintenance professionals are, therefore, with apparent justification, strongly opposed to statewide mandates for maintenance outsourcing in any maintenance category areas other than rest area maintenance and cable rail maintenance. A number of other important issues surfaced as part of the district workshop sessions. Equipment utilization polices have in some cases impacted the ability to perform maintenance activities that could and should be performed by SCDOT forces. It was also uniformly suggested that the SCDOT procurement office respond in a more timely manner to field requests. Numerous other suggestions were documented, including the need for improved or revised (to reflect performance) specifications and improved contacting procedures. Suggestions for improved contracting procedures included requirements for maintenance contractor prequalification, contract retainage, and mandatory pre-bid site visits.

8. ***Designing a Comprehensive Model to Evaluate Outsourcing of Louisiana DOTD Functions and Activities*, Donald R. Deis, Edward Watson, and Chester G. Wilmot. June 2002**

Department of Accounting, Department of Information Systems and Decision Sciences, and College of Engineering, Louisiana Transportation Research Center, Department of Civil and Environmental Engineering - Louisiana State University (2002)

The purpose of this project was to develop a systematic, comprehensive approach to evaluate the potential to outsource agency functions and activities. The end product of this project was a PC based software tool to provide a means to evaluate qualitative and cost aspects of contracting out services. Associated with this project, a computer software program called Outsourcing Decision Assistance Model (ODAM) was created to assist management in evaluating alternative modes of service delivery. ODAM incorporates two models to consider: (1) the qualitative issues and (2) the cost issues associated with contracting out. Three functions (rest area maintenance, highway striping, and highway pavement markers) were used to pilot test version 1 of ODAM. The current version of ODAM (Version 2) reflects modifications to the program suggested by the pilot test experience. Specifically, ODAM Version 2 should be used to evaluate functions currently under consideration for outsourcing. ODAM can also be used to evaluate alternative methods of in-house provision. Three types of cost rates are incorporated in ODAM's cost model: (1) civil service wage rates, (2) fringe benefit (payroll additive) rate, and (3) support services rate. Due to the generic design of ODAM, the program may be used by agencies other than LaDOTD. Should that occur, these rates should be adjusted to reflect the cost structure unique to each agency.

The model developed considers both cost and non-cost factors. The qualitative model was developed from a review of models used in other states and from extensive interviews with LaDOTD personnel to elicit their experiences in non-cost factors that have affected outsourcing

decisions in the past and are likely to continue do so in the future. Following this phase, two qualitative models were pilot tested with LaDOTD district and headquarter managers:

- One based on Arizona's Statewide model, and
- One model used by Pennsylvania's DOT.

Both models involve assigning weights (or ratings) to a series of non-cost attributes (e.g., effect on timeliness of service). Although the Arizona model includes a broad range of intuitively appealing non-cost factors it was found to be confusing in meaning and required tedious mathematical computations thereby leading to a lack of consensus among the managers. The Pennsylvania model was considered more straightforward and was somewhat easier to compute but it lacked the contextual richness of the Arizona model. Based on these findings it was decided that a computer-based model accentuating the use of graphics over numerical evaluations would, in essence, combine the strengths of the two models; that is, the breadth of coverage of the Arizona model with the computational ease of the Pennsylvania model.

A cost comparison model, based on that used by Arizona and New Mexico's DOT, was added as a second part of the computer model. The cost model compares estimated outsource costs to two versions of estimated in-house costs– (1) direct in-house costs only and (2) full in-house costs. Direct costs are, in theory, manageable in the short run, while full costs include non controllable costs. Hence, the two cost comparisons are made to gain a broad perspective of the likely benefits of outsourcing.

The final result of the computer model is a graphic display of both the qualitative and quantitative results of the evaluation in terms of three possible outcomes for each phase of the model as follows: (1) in-sourcing recommended, (2) outsourcing recommended, and (3) indeterminate. If both results (i.e., qualitative and quantitative) lead to the same conclusion then the recommended action should be pursued further. Inconsistent results, however, suggest that the model should be rerun, perhaps by additional users. When the analysis recommends outsourcing, a more in-depth analysis of in-house cost and a request for bids from contractors is in order.

It is recommended that the outsourcing model (ODAM) be used to evaluate the potential for functions and activities that are currently under consideration for outsourcing. The testing should be done initially with a group of evaluators to determine whether a consensus can be reached and to provide a structure for discussing the qualitative and cost aspects of the function being evaluated. The model can also be used to evaluate alternative modes of service delivery by the same category of service provider (e.g., to compare two different contractors or two different

approaches to provide the service in-house). To do so, Contractor A could be the in-house provider and Contractor B the private contractor. This model provides a systematic approach to identify functions and activities that are viable candidates for outsourcing. The model is not intended to be the final analysis; rather, functions and activities identified for outsourcing by this model should be analyzed further prior to contracting out.

9. NCHRP 14-18 (Active) DETERMINING HIGHWAY MAINTENANCE COSTS**

OBJECTIVE: The objective of this research is to develop a process for determining an agency's costs associated with performing highway maintenance. The process shall be flexible enough that it can be applied to any specific maintenance activity.
TASKS: Accomplishment of this objective will require at least the following tasks.

PHASE I: (1) Collect and review information relevant to the practices for determining the costs associated with performing highway maintenance activities. This information shall be obtained from a survey of highway agencies, industry, and other organizations; a literature review; and other sources. (2) Identify the cost elements that are required to accurately determine the total cost of any specific highway maintenance activity. These cost elements will include salaries and benefits, materials, equipment, and other relevant cost elements. (3) Based on the information gathered in Task 1, identify and evaluate- with consideration to the cost elements identified in Task 2- the practices and procedures available for determining the costs associated with maintenance activities. Identify innovative practices and procedures that merit further consideration in this research. (4) Prepare an updated, detailed work plan for Task 6 for developing a process for determining all costs associated with specific highway maintenance activities. The process shall be flexible enough that it can be applied to any specific maintenance activity. (5) Prepare an interim report that documents the research performed in Tasks 1, 2, and 3 and includes an updated work plan for Phase II. Following review of the interim report by the NCHRP, the research team will be required to make a presentation to the project panel. Work on Phase II of the project will not begin until the interim report is approved and the Phase II work plan is authorized by the NCHRP.

PHASE II: (6) Execute the Phase II plan approved in Task 5. Based on the results of this work, develop a process for determining the costs associated with performing specific highway maintenance activities. The process shall present a step-by-step procedure, identify all required data, provide guidance for estimating not readily available data, and delineate range of applicability and limitations. (7) Illustrate use of the developed process for selected scenarios covering a range of cost-data availability and maintenance activities. (8) Submit a final report that

documents the entire research effort. The developed process shall be presented as a stand-alone document suitable for consideration and adoption by AASHTO.

Status: Work is progressing on Phase II towards completion.

Product Availability: No products are currently available.

*** Note: This information is located on the TRB website (go to trb.org, then to Projects and enter NCHRP and project 14-18).*

5. Conclusions

Substantial information exists in the literature and research reports analyzed. Halcrow will utilize the information contained in these reports to guide the collection of cost data, the formation of a comparison matrix, the selection of appropriate contracting decision factors and the development of recommended procedures for making informed decisions about the most appropriate methods of maintaining the Nevada DOT highway network.

References

1. *Best Practices of Outsourcing Winter Maintenance Services.* VMS, Inc. Richard Stapp, P.E. and Rodney A. Pletan, P.E. July 2001.

2. *Contracting for Road and Highway Maintenance*. The Reason Foundation. Geoffrey F. Segal, Adrian T. Moore, Samuel McCarthy. February 2003.

3. *NCHRP Synthesis 313 – State DOT Outsourcing and Private-Sector Utilization*. TRB. Tom Warne and Associates, LLC. Thomas R. Warne. 2003.

4. *NCHRP Web Document 59 (Project 20-24[18]): Contractor's Final Report. Outsourcing of State DOT Capital Program Delivery Functions*. TRB. Science Applications International Corporation Transportation Policy and Analysis Center. November 2003.

5. *Make v. Buy: Considerations when outsourcing to reduce cost.* EMS Consulting Group. June 2003.

6. *Performance-based Contracting for Roads in Canada*. The World Bank Group. 2004.

7. *Competitive Contracting for Highway Maintenance: Lessons Learned from National Experience.* Washington Policy Center. Geoffrey F. Segal, Eric Montague. January 2004. (critique of WSDOT report by Nicole Ribreau)

8. *Synopsis of WSDOT's Review of Highway Maintenance "Outsourcing" Experience*. TRB Committee A3C01 Maintenance and Operations Management. Nicole Ribreau. 2004.

9. *Seven Steps to Performance-Based Services Acquisition*. Department of Commerce and Acquisition Solutions, Inc. 2006.

10. *Maintenance Management 2006 – Presentations from the 11th AASHTO-TRB Maintenance Management Conference in South Carolina.* Transportation Research Circular and TRB. Lansdord C. Bell, Ryan Dlesk, Nick Bucyk, Moh Lali. July 2006.

11. *Cutting Costs and Improving Quality through Performance-Based Road Management and Maintenance Contracts – The Latin American and OECD Experiences*. Dr. Gunter Zietlow. February 2008.

12. *Implementation of the Level-of-Service Component of the Performance Measurement Framework for Performance-Based Road Maintenance Contracts*. TRB. Mehmet E. Ozbek, Jesus M. de la Garza, Juan C. Pinero. November 2009.

13. *Innovative Contracting Strategies for Transportation Maintenance Outsourcing.* TRB. Juan Chen, Cindy L. Menches, Nabeel Khwaja. August 2009.

14. *Pavement Maintenance Methods Effect on Reducing Cost and Prolonging the Service Life of Roadway Pavement – A discussion and Case Studies.* TRB. Lorena Gutierrez, Fazil T. Najafi, Ph. D, Harold Boudreau III, E.I. November 2009.

15. *NCHRP Synthesis 389 – Performance-Based Contracting for Maintenance*. TRB and Applied Research Associates/ERES Division. William A. Hyman. 2009.

16. *Privatization – A Seattle League Study*. Nora Leech, Mary Barton, Neal Cholvin, Valerie Cholvin, Lynn Felsinger. September 2009.

17. *Performance Based Contracting: The US versus the World*. TRB. Douglas D. Gransberg, P.E., Eric Scheepbouwer. July 2009.

18. *NCHRP Project 20-24 (61) – Issues and Practice in Performance-Based Maintenance and Operations Contracting.* AASHTO, Applied Research Associates, Inc. and PB. Gary L. Hoffman, P.E., Amar Bhajandas, P.E., Jagannath Mallela. January 2010.

19. *Outsourcing Decision Making in Public Organizations: A Proposed Methodology and Initial Analytic Results from a DOT.* TRB. Robert J. Eger III, Subhashish Samaddar. 2010.

20. *Innovative Project Delivery Methods for Infrastructure – An International Perspective*. Finnish Road Enterprise. Pekka Pakkala. 2003

21. *A Framework For Monitoring Performance-Based Road Maintenance* - Juan Carlos Piñero. 2003

22. *Outsourcing versus In-house Highway Maintenance: Cost Comparison and Decision Factors Final Report.* SCDOT Research Project 653. Clemson University. Ryan J. Dlesk and Lansford C. Bell. April 2006.

23. *a. North Carolina Department of Transportation's Performance-Based Contracting Experience in Charlotte.* Jonathan Arnold, Jennifer Brandenburg, Lonnie Watkins July 2009.
b. *Performance-Based Contracting, Yes or No? - An In-Depth Analysis.* Bob G. Mccullouch Panagiotis Ch. Anastasopoulos 2009

24. *Procedures for Maintenance Contract Performance Measures.* Alberta Transportation. 2010.

25. *Imperatives In Future Road System Management Improved Road Maintenance Productivity - The Australian Case* Malcolm Frost CSR Emoleum Road Services 2001

26. *Designing a Comprehensive Model to Evaluate Outsourcing of Louisiana DOTD Functions and Activities*, Donald R. Deis, Edward Watson, and Chester G. Wilmot. June 2002

27. *Implementing Performance-based Road Management and Maintenance Contracts in Developing Countries - An Instrument of German Technical Cooperation* - Dr. Gunter Zietlow. 2004

28. *Maintaining roads - Experience with output-based contracts in Argentina.* Gerard Liautaud 2004

29. *Introduction to Performance Based Maintenance Contracting*. Association for Management and Operations of Transportation Infrastructure Assets (AMOTIA) 2007

30. *International Overview of Innovative Contracting Practices for Roads.* Pekka A. Pakkala - Finnish Road Administration, Dr. W. Martin de Jong - Delft University of Technology Juha Äijö - Ramboll Finland Oy. 2007

Presentations

31. Performance-Based Contracts – International Experiences. Finnish Road Administration. Pekka Pakkala. April 2005.

32. Challenges and Key Issues in PPP Projects. Finnish Road Administration. Pekka Pakkala. July 2007.

33. Performance-Based Contracting for Maintenance: Overview of Ontario, Canada. NCHRP 20-2(61) Executive Forum. April 2009.

34. International Experience with Performance Based Maintenance Contracts. VicRoads International (Australia).

35. NCHRP 20-24(61) Issues and Practices in Performance-Based Maintenance and Operations Contracting. Multiple Presentations from the Executive Forum. April 2009.

36. Performance Measures for Performance Based Maintenance Contracts. Texas Transportation Institute. Josias Zietsman, Ph.D., P.E.

37. Case Study – Performance-Based Management and Maintenance of Roads in the USA. Roads and Transport Infrastructure Consultant. Cesar Queiroz, Ph. D. February 2008.

38. Performance Based Maintenance Contracting in Texas. Halcrow, Inc. Joe S. Graff, P.E. January 2007.

39. The Road of Excellence – Alberta Maintenance Presentation. Alberta Transportation and Vagverket. January 2010.

Appendix D

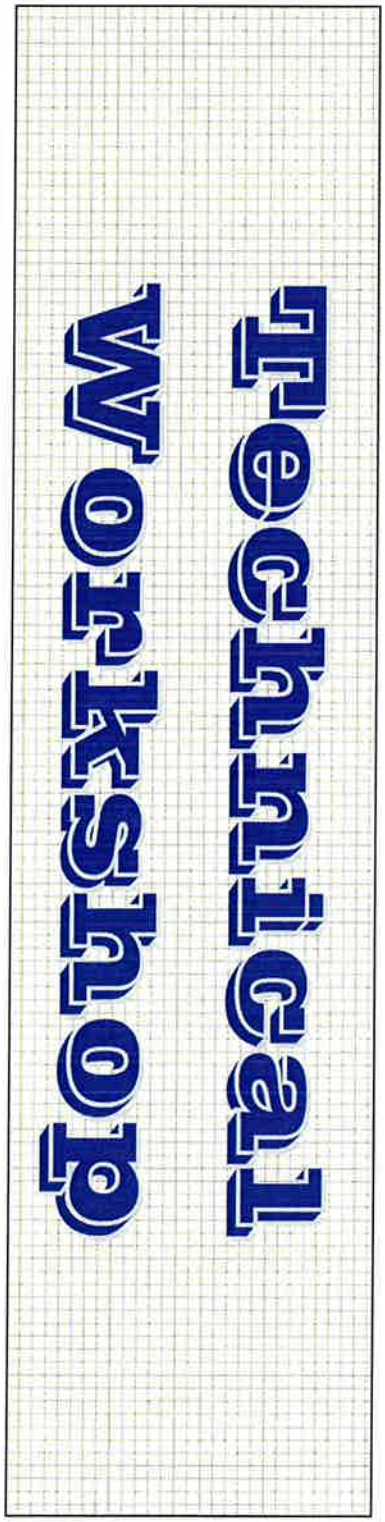
Workshop Proceedings

Appendix D

Workshop Proceedings

Halcrow

NEVADA DOT



NEVADA DOT

Cost and Benefit Study
Associated with Outsourcing Roadway Maintenance Activities

Summary of Technical Workshop on Performance Maintenance Contracts

August 24-25, 2010

by

Halcrow

and

ASSET MANAGEMENT ASSOCIATES LLC

Halcrow

NEVADA DOT

Table of Contents

1.0 INTRODUCTION

The Nevada DOT contracted with Halcrow, Inc. to perform a study titled *"Cost and Benefit Study Associated with Outsourcing Roadway Maintenance Activities"*. In association with this study, NDOT requested the development of a "Performance Maintenance Contract Workshop". The main purpose of the workshop was to educate not only NDOT staff on the use of performance contracts, but also the Nevada contracting industry.

Three international speakers, Frank Rizzardo of Emcon from British Columbia, Canada, Alan Chambers of Amey from the UK and Jan Olander of the Swedish Transport Administration, gave presentations from their perspective about performance maintenance contracting in British Columbia, Canada, the United Kingdom and Sweden. The presentations allowed for attendees to use their imagination on how performance contracts may work in Nevada and provoked a lot of good discussion.

2.0 PRESENTATIONS

2.1 Frank Rizzardo from Emcon, British Columbia, Canada. "Managing and Maintaining Roads in British Columbia by Contract"

- BC started contracting out fence to fence maintenance in 1988. The decision was made by the Premier and there was no transition period.
- In 1988 the private contractor took over all of the owner's labor and maintenance employees.
- Emcon maintains all roads in BC (from freeways to dirt roads)
- Contractors are willing to work in remote areas such as Dease Lake. This is an example of low population density, with successful maintenance contracting.
- The value of maintenance contracts held by us is CAD$350 Million
- Did not use tender, used RFP – combination of value and price.
- First Stage – pass of fail – provide bonding, insurance, experience, and a quality management plan (given points – each point worth $100,000 in the price stage).
- Guided under ISO 9000 principles.
- Second Stage – price.
- Chosen based on combination of the two stages. Then, a lump sum price is awarded.
- Services include: Surface, Drainage, Winter, Roadside, Traffic, Structures, Emergency Response, Inspection and Quality Control

- New expansions can be added onto the contract area without any additional compensation up to 2%
- Risk is shared for unforeseen events
- Methods in place to adjust price and inventory of 10 year period
- Contractor has freedom to choose how to do work, as long as the specifications are met.
- Non-compliance leads to default in specification and loss of money
- Find works, establish plan to repair, complete repairs. Need to prioritize the work, though.
- Area Contractor – respond to stakeholder discussions (loggers, bus drivers, etc). Minimum of twice a year.
- In contract, specifications are routine, then there are extra additional works that are priced (quantify plan)
- In 1988, contactor required to use BC yards and equipment – now use their own equipment/yards.
- Using preventative de-icing saved money and as a result we now use less salt and chemicals. It's better for the environment.
- Major rehab is not included in these contracts. It is bid separately. Even the existing contractor with the 10 year contract will have to bid these items separately.
- Contractor can hire out work, as well.
- There were in-house (DOT) standards, but for letting/contract standards
- How do you handle labor force? Example: Employee plows in winter and does guard fence in the summer.
- Unionized in BC, non-unionized in Alberta
- Paid employee's severance, then get list and hire most of the same state employees (In Alberta)
- In BC, required to be successor employee- required by the union
- How many disputes with owner, etc? Try to resolve at lowest level (on site, foreman, etc)
- The owner has oversight staff called Area Managers who inspect facilities and conduct audits.
- Ministry (owner) has inspectors – better you rate the less they will inspect. Still do all material testing in-house. Mostly for material specifications, which are published annually.
- Paid 1/12 of lump sum (monthly) – Fiscal Year starts November 1st

- 3rd Party – Recoverable maintenance assets – The Crown can claim cost back. Contractor charged with fixing/maintaining and with clean up or accident control. 3rd Party is charged.
- Contractor is responsible for traffic control and incident management

2.2 Alan Chambers from Amey, UK. "Performance Contracting for Road Maintenance in the UK"

- Works for Amey
- Maintains only the trunk roads. Other roads handled by counties and cities

The Owner's Story:

- The Highways Agency (HA) privatized term maintenance and moved to performance contracting
- Prior to privatization (up to late 1980s): Counties acted as agents for the HA. Counties incorporated trunk road maintenance into their maintenance regimes. Most of the work was carried out by the counties' direct labor force.

Privatization – the early years:

- Government directive to privatize or justify efficiency of direct work force. Contracts on traditional basis: Client – HA, Engineer – Maintaining Agent (MA), Contractor – Term Maintenance Contractor (TMC)
- Managing Agent (MA) role often performed by highway consultants (like Halcrow). TMC role often taken by road building contractors. Council teams also bid for the work of MA and TMC.
- Worked on a schedule of rates basis. 10,000s of items to price. MA instructed the TMC and there were 1000's of work orders to manage.

Privatization – Next Stage (to late 1990s)

- Initial piecemeal approach based on counties. Short term contracts (<3 years)
- Created a program to privatize the whole network- created 24 areas, each with a MA and TMC. By 1998 whole network was privatized. It was based on routine maintenance to prescribed frequencies.

Moving towards Performance Contracting:

- HA looked at efficiencies and were influenced by the rest of the world. Why have one company supervising another? Managing Agent Contractor (MAC) was created- one company to deliver complete service. It is self auditing and performance based. The outcome is what's important, not how it's reached?
- Realized that efficient contracts need to be longer and larger. Moved to 5 years plus 2 year extension and 14 areas instead of 24. Initially, did this MAC trial in only 3 areas.

New Procurement Methods (2000-2009)

- Designed to improve service: bids were 70% quality submission and 30% price.
- Emphasis on innovation, procedures for management.
- Each year 2 or 3 areas were let
- Each year contract refined and updated
- By 2008, all areas were MACs

New Type of Contract:

- Three types of work and methods of payment
- Lump Sum Duties: annual payment in 12 monthly installments
- Cost reimbursable items: cost and fee percentage
- Target Price: target cost and pain/gain

Lump Sum duties:

- Routine and cyclic works
- Drain cleaning, inspection and patrols, grass cutting and litter picking
- Incident support units and network control room
- Winter Service – Keep network clear or snow and ice. Provide salt, drivers, systems and make decisions (HA provide vehicles)
- Attendances on Client – reports, customer relations, answering queries
- General management duties
- Asset records and scheme identification

Cost Reimbursable Works:

- Scheme development, All design, supervisions of works carried out by others
- Schemes greater than 500k pounds and less than 5M pounds service provider designs and supervises. HA employs the contractor.
- Sometimes get larger schemes- up to 20M pounds for replacement of bridge deck

- Extra tasks and duties

Target Price Works:

- Schemes less than 500k – Provider's Works
- MAC Contractor (Service Provider) gets as of right
- Target Price
- Price built up from sample scheme in bid
- Pain/gain on target cost

Where we are today:

- 12 areas that are all MAC style contracts. Slightly different depending on age. Now the focus is value
- Want more performance based contracts
- Not after gold service- minimum effective service (what's required by specs)
- HA is now focused on being network operator

Contractor's Story:

- Amey formed in 1920s, in 1950s won contract to supply gravel for M1. Then in early 1990s became private contractor. Approximately 150M pounds turnover.
- Took plunge into contract maintenance. Used schedule of rates (TMC).
- Low risk. Good profit. Reasonable cash flow.
- Started working on MAC contracts. Developed design and asset management skills.
- No longer contractor, now a *"service provider"*.
- Long term contracts. Guaranteed turnover. Controllable levels of risk. Low risk clients (Government).

Performance Contract Examples:

- 14 Area Performance Indicators
- Based on output and outcomes
- Published nationally
- Make temporary repairs good enough to be permanent
- Where schemes are beyond serviceable life, look to develop schemes
- Help client by providing "do minimum" solutions and alternatives.

Service Provider's Approach:

- Question the status quo

- What does the client really want?
- Maintenance and operations friendly solutions
- Proven efficiencies saved 50/50 with the client

Summary:

- Whole new industry
- Ever evolving markets
- Always a new challenge
- Need to be flexible in approach
- Performance contract - no financial penalties
- Cannot afford to upset clients
- It's bee good to me

2.3 Jan Olander, Swedish Transport Administration, Sweden. "Maintenance Contracting from the Owner's Perspective"

- Agency maintains both trunk roads and county roads

Facts about Sweden and STA:

- Responsible for 98,304 km of roads. 62,200 centerline miles
- 22,448km salt roads
- In 1991, Government passed decision that all road O&M works undertaken within STA were to be contracted through competitive bidding
- Activities should be contracted in terms of road functioning (PBC)
- In 1992, SNRA divided into client/contractor organization.
- Since 199 all maintenance works are procured on the open market

Routine Maintenance Package:

- Routine Maintenance contracts are usually on a 3 year basis, with extension of 2 years possible.
- Facilities are owned by the contractor
- All equipment owned by contractor
- Most works are paid by fixed prices
- Some "hard calculated works" are paid by the hour or meter.
- Winter services payments are based on weather data statistics.

- Contractors must be ISO-9000 certified. Have experience in activities they are bidding for. Be established within the contract area.
- Examples of routine maintenance activities in PowerPoint presentation
- Winter maintenance is 65% of all costs

Benefits in Competitive Procurements:

- Cost savings
- Contractors can test their wings and strengthen drive for innovation
- Easier to make demands on operations
- All works, specifications, etc are defined in the Contract
- Creates clear lines between the agent and performer
- Key Performance Indicators (KPI's)
- Service output is easy to review
- Tax payers know where money is going

Disadvantages with Competitive Procurements:

- It ties up financial resources for a long period
- It could be hard and expensive to change levels of standards during the contract period
- R&D on a daily basis has been stalled. In some cases old methods are used. One can lose the administrations know-how, in a long term perspective.

Forms of payment:

- Table in the presentation
- A bonus system is used for environmentally friendly machinery

Results of Competitive Procurements:

- Cost savings of up to **20% has been proven**
- You get what you order- no more, no less. It's more likely you will get the lowest acceptable standard stipulated in the contract
- Road administration employees have decreased from 10,000 to 2,500.

3.0 ROUNDTABLE DISCUSSION

3.1 Concerns or difficulties for Emcon in rural areas.

- Want Senior Management to go to areas during bids – can be hard to persuade them to do so.
- Usually assume staff from existing contractor (acquire local staff).
- Equipment isn't an issue- matter of ordering it and moving it.

3.2 Requirements and benefits of assuming staff.

- BC – From day one, 1988, they assumed staff. (Have to provide successor ship and same wages/benefits)
- . BC – Government implemented an early retirement incentive and a lot of public employees retired.
- "Succesorship" clauses are part of the terms and conditions of the contract in BC
- Contractors spend more money training and developing staff as compared to public agencies
- UK – same concerns: moving senior staff, etc
- UK – TUPE – Transfer of Undertakings (Protection of Employee) Regulations 2006
- UK – HA currently does not have any technical staff, only administrative and managerial.
- Sweden – Public employees went from 12,000 to 2,500

3.3 Training of staff better than training from the government?

- BC – Spend more on staff at lower level. If spending equals payback then we do it.
- UK – Yes; good record of putting own staff in supervisor role. Look within, first.

3.4 Resources – Advantages and Disadvantages of ownership of equipment?

- BC – all equipment and facilities are owned by the contractor. This helps them innovate and try new equipment as required
- BC – Benefit because you can improve and upgrade at will. Owning equipment/yards/pits doesn't guarantee winning the contract.
- UK – HA provide winter maintenance, didn't use to supply all of them – just the motorways – but now they supply them all. Contractors disappointed because they felt they could purchase at lower cost than the government.

- UK – Contractors are paid to maintain equipment. It costs the HA a lot to maintain and supply all equipment
- UK – Very few areas where contracts are re-won. Don't win because you become too knowledgeable; start to price risks, etc. in bid.
- Amey maintains fleets that's provided by HA and are reimbursed at cost. Used to be a schedule of rates that were set.

3.5 When Sweden privatized what happen with the equipment and facilities?

- The contractors had to buy them from the government

3.6 With long term contractors, how is escalation accounted for?

- BC – Contract with The Crown has annual price indexing
- Amey – no price indexing

3.7 Is the appropriate level of risk assignment considered in contracts?

- Sweden – Have used fixed prices (5 year contract) – contract should be longer for this, but they wanted to keep it competitive. Most risks are shared.
- UK – Use lump sum. All risk is on the contractor. Pay what it costs, no risk for contractors.
- BC – Stakeholder points affects contractors bonus and this is a risk that they take on

3.8 Are public surveys issued?

- Sweden – Ad-hoc surveys and meetings
- BC and UK – No official surveys but they do hold stakeholder meetings

3.9 Metrics – Does the contractor use the same as the owner? What metrics do you not like?

- UK – Yes they have the same, but also have separate metrics from the HA that are used internally. For example, cost vs. time reliability- this is a horrible measurement by the HA. Also, rolling 12 month averages- only need one fault to ruin an entire year average.
- BC – Audits – limited thinking. Owner needs to educate stakeholders. This took 5 years because the contractor couldn't do it themselves (seen as bias).
- BC – Audits – condition of infrastructure & activities by owner. Owner conducts audits on 2km sections of the roadway

3.10 Travel time, traffic flow, level of service, etc?

- UK – HA measured themselves in traffic flow. HA bonus is affected by this.
- BC – pushed to complete works at night. In PPP work, all have demerits, bonuses, incentives/disincentives, etc.
- UK – use payment mechanisms – others like milling, etc, become schemes that are priced separately from the works stated in the contract. Only risk is what is included in the lump sum (Category 1 defects).
- Sweden – Have efficient traffic control systems. Contractors have many innovative methods to manage traffic e.g. Installing temporary bridges overnight

3.11 Self assessment and ISO 9000? How does this work?

- BC – ISO 9000 leaves a paper trail that is fully auditable. It is audited by the owner, eventually.
- UK – Audited by BSI, HA (consultant), internally in the office, internally by head office.

3.12 Permit regulations?

- BC – Contractors handle permits to do with utilities etc. and act as inspectors
- Sweden – Owner handles all permitting. Contractor inspects
- UK – Contractors coordinate with utility companies etc. on behalf of the HA and inspect all the works

3.13 Incentives not in the contract that you would like to see?

- BC – get compensated for being above the specification level, otherwise performance is only going to be as good as the minimum required.
- Like the idea of scheme by scheme based work.
- UK – In payment mechanism, any savings are shared with the HA. In the current economy, we are looking at savings over a better level of service.
- Short answer, no, the existing contract is good at the moment.
- Sweden – Lot of penalties and fines and no incentives. This is not a good way because road users don't get anything back. Owner makes money but not stakeholders.

3.14 How did the decrease in government employees happen?

- BC – this wasn't over night. A gradual process. Contract employees have been cut in half from 1988 to today.

3.15 How does technology and innovation factor into the contract?

- UK – Up to contactor ultimately.
- BC – For innovation, get to keep any savings from innovation… From 1988 to present, better shoulders, earlier and faster response to pot hole repair, many new tools. Don't assume any one innovation is a fix all solution. Tow plow is a good example.

3.16 Explain the relationship between contracting road maintenance and maintaining ITS, communications equipment, etc?

- UK – HA manages separate contracts for these.
- Sweden – Contracted out with special contractor
- BC – Separate contracts for maintenance of equipment.

3.17 Maintaining Structures

- BC: Inspection done by the contractor. Any deficiencies are taken care of by the contractor as defined in the contract. If the repair is outside the terms of the contract then the contractor advises the owner about it. The owner then bids out a separate contract for the task. Bridge inspectors have specific qualifications.
- Sweden: Big assets are taken care of and inspected by public
- UK: Maintenance and inspection is the responsibility of the contractor. Bigger rehab works are done as separate schemes.

3.18 Final words of advice for NDOT

- BC – Item of fairness, don't dilute yourself of what Level of Service you are providing so you don't have too high of expectations and ultimately disappointment when contractors do the work.
- Sweden – Contractor didn't talk to each other in the beginning. Be open minded.
- UK – Owners- don't ask for too much initially. This will make the cost and risk increase and will be reflected in the bids. Contractors – don't be scared to try this. Don't miss out, otherwise contractors from other states and countries will.

4.0 BREAKOUT DISCUSSION

4.1 Nevada DOT's Perspective

Why are we having this meeting?

- Owners: NDOT does contract out some maintenance already.
- Bill Hoffman: We outsource a high percentage of work already.

Two ways to look at contracting

- Activity based (e.g. cleaning drains)
- Total contract maintenance. We do a lot of activity based but there are only a few states that do total maintenance contracting. There is no commitment that we are going to do a total maintenance contract.

What is the definition of contracting?

- Joe Graff: a portion or service to do with a task such as chip seal when contracted out is not considered a "contract". A contract is a comprehensive service such as laying down a chip seal in a given area.
- Concerns: some states have done it but not to the extent that other countries have such as the UK, Sweden and Canada.
- Question for Frank: Did you do a pilot?
    - No, we didn't know it was coming.
- Emcon: Made a profit the first year, loss the second and third year. Privately held company. 50% of the company is employee owned.
- Quality Management plan: make sure it is embedded in the contract once it is under effect.

General Concerns

- If we go to contracting we will have to lay off people.
- Are we in the informational stage or are we going to go forward with this?
- Labor unions and AGC were not too keen on total contract maintenance.
- If contractors were going to use our people then why do they want to go ahead with this?
- Are we going to lose our jobs or will be picked up by the contractor?

- Contractors are going to put their people to work first before the state employees, because state employees are not union workers. Contractors have union workers.
- Will the contractors default?
- How do you categorize a maintenance worker in terms of union definitions?
- Unions have never allowed crossover (teamster, labor and operator)
- Prevailing wage requirements
- RFP's had weighted analysis that included quality but Nevada currently is low bid and design build. Do we have the contracting means under Nevada statutes to do fence to fence maintenance contracting?
- Something would have to be put in place to reassign all state employees to ensure they are productive. What mechanism will there be to allocate people to contractor or to other areas if they did not want to go work for the contractor.
- We will have to give up something if we take the contract route. What will the argument be to show benefits?
- It's been very difficult in the district level to get small contracts out to do paving jobs, ITS jobs etc. Things just don't happen at the snap of a finger.

Possible solutions/mitigations

- Contractors are not used to doing a lot of maintenance specific work and will be better off making the transition by employing state people. They don't have specific maintenance expertise. (concerns over losing jobs)
- Some states do a two step process: prequalification and then bid submission (quality management)
- We tell the legislators that we need to improve our LOS and we can do this under contracting but not lose any employees (concerns over losing jobs)

Transition Issues

Challenges:

- What changes internally do we need to make to be ready for the transition?
- We need to double the admin services so we can get contracts out faster.
- Do we hire experts to help us with the transition?
- Should we lease our equipment? How do you prioritize how to use this?
- Will the contractors be able to afford the equipment in this economic climate?
- We want to develop our own economy by employing our own people. Not involve foreign contractors

- How long do we make these contracts? How do you account for maintenance payments when part of the highway is closed for rehab or major maintenance work?
- We need to borrow a lesson from other states that have gone into design build. Other states have set up a separate agency to deal with design build. Maybe we need to set up a separate agency to deal with outsourcing these maintenance contracts. Use people from the existing organization.
- Currently district engineers have more flexibility when it comes to crews, equipment and have access to these state-wide. State forces used for emergency response in the event of emergencies not to do with roads as well

Solutions/Mitigation:

- Frank: They put on an information session for the contracting community to tell them what their expectations are. They had established service levels.
- You should sell building assets.
- No contractor will have all the equipment available.
- Better idea to sell to contractors. (equipment)
- Contractors will be able to get loans for equipment because it is tied to a contract.
- P3 contracts and private investors (concern over equipment affordability)
- No foreign contractor can bring resources and take the maintenance contract. (concern over losing state jobs)
- Continuity of employee is one of the key ways a contractor can benefit from maintenance contracts. (concern over losing jobs)
- Build operate transfer maintain contract in Canada: Per kilometer per day price for winter and summer maintenance to make up for time the highway is taken away for rehab work.
- In BC emergency response team gets paid over and above the contract if the response is not to do with roadway incidents such as forest fires, etc. (emergency response)
- Owner: Why can't we take the middle ground and improve our processes so that we get to play with the same rule as a total maintenance contractor
- Owner: If we were given the same incentives and flexibility to provide the level of service without the convoluted process we go through right now, we might be able to achieve the same level of efficiency as a total maintenance contractor.

Public outreach:

- BC: Contractor has no PR team but they make it a point to inform the owner and educate the stakeholders on innovations and efficiencies that they are making. This helps with their ratings during audits. They do respond and make changes based on stakeholder input. Owners don't typically attend stakeholder meetings.
- Sweden: Have ad-hoc stakeholder meetings but they are now doing more and more customer relation surveys. The meetings are conducted by the owner and contractors jointly.

Benefits of Contracting

- Contractors don't have to go through the convoluted processes that state employees.
- Transfer of risks.
- Longer maintenance contracts bring more innovation and contractors are more likely to invest in better equipment.
- The move to total maintenance contracting is low risk since the method is tried and tested by many countries and the feedback is positive.
- Most of the employees are retained.

Questions for Frank and Jan

- Who maintains asset inventory and how is it updated?
  - BC: Owner provides list to contractor at the beginning of contract and the contractor maintains all items on the list and updates their own list. The owner maintains and updated the asset inventory.
- Is there a maintenance management system and how is it updated and reported? Is there an automated process to report to traffic management centers?
  - Sweden: Data is sent wirelessly
  - BC: Data is posted on a website and it only deal with interstates. Contractors have to update this three times a date. Don't have automatic systems other than the cameras and these are also up on the website. A 1-800 number is provided to the public so that they can get info on other roads. Radio system, no TV. Ministry owns the radio system and it leased it out to the contractor. Channels need to be permitted in all operating areas.

Closing Comments

- The longer the maintenance contract, the better the service would be. What is the most efficient contract period?
  - Frank: 10 years is ideal. 5 year minimum
- How do contractors position themselves to start bidding on this work?
  - Educate them and have open communication.

Summary

Immediate Challenges

- Will state law allow us to go ahead with fence to fence maintenance contracting?
- Wage rates/compensation?
- Labor continuity
- Legal instruments to contract (not low bid but quality plan-based)
- What to do with employees and assets?

Motivation

- A labor union bill at the last legislative session influenced the decision to perform a study on the benefits of contracting out maintenance work
- Are we in the information gathering stage or are we going to go forward with this?
- We are going to get a new Governor and this might affect the decision of whether we contract out maintenance
- There has been no indication that we are going to take this route but we have made a commitment to contract out more maintenance projects
- Total maintenance contracts seem to work well in other countries
- If the economy wasn't bad, would we still be discussing this? And would the AGC still want more work from us?

Resources: Manpower, Materials & Equipment

- If we go to contracting we will have to lay off people.
- If contractors were going to use our people then why do they want to go ahead with this?
- Contractors are going to put their people to work first before the state employees because state employees are not union workers. Contractors have union workers.
- How do you categorize a maintenance worker in terms of union definitions?
- Unions have never allowed crossover (teamster, labor and operator)

- Prevailing wage requirements
- Employee and labor strike issues with contracting
- Processes would have to be put in place to reassign all state employees to contract positions. What mechanism will there be to allocate state people to contractor forces or to other areas if they did not want to go work for the contractor.
- Should we lease our equipment?
- Will the contractors be able to afford the equipment in this economic climate?
- We want to develop our own economy by employing our own people. Not involve foreign contractors

Performance Measures: Contract monitoring, incentives, disincentives

- Maintenance RFP's in the UK and BC have weighted analyses that include quality requirements but Nevada currently is low bid and design build
- Quality management plan essential for this purpose and it should be built into the contract
- Owner can take maintenance responsibility back from a contractor at the end of a contract period by not renewing a contract if it feels like it is not getting the expected efficiencies
- Who maintains the asset inventory and what happens when a new asset is added?

Provision of Service: Dealing with the public, responsiveness, extra work, major repairs

- Does the contractor hire a PR team to showcase their innovations?
- Do stakeholders invest or buy products for the contractors for their own strategic benefit (i.e. Transportation from mining or oil companies)
- Is it possible for maintenance contractors to work for other agencies, municipalities and stakeholders?

Risk assignment: liability, uncertainty regarding weather and accelerated deterioration

- How will limited liability and sovereign immunity affect how contractors bid for total maintenance contracts?
- Funding issues: State vs. Federal funding. How will contracting out a portion of our roads affect our funding situation to maintain the rest of the network?

Transition issues: considerations that must be made in transiting to contract maintenance

- What changes internally do we need to make to be ready for the transition?

- We need to double the admin services so we can get contracts out faster
- Do we hire experts to help us with the transition?

4.2 Contractor's Perspective

- John Madole (AGC) expressed disappointment that not more contractors attended the workshop.

Resources – Equipment, materials, utilities.

- Starts with legislation. Will take time for changes to take place
- NDOT has more equipment then any other contractor in the state
- One concern is NDOT staff- what to do with them?
- Does NDOT have their own stockpiles, etc? No, NDOT buys materials from private vendors.

Acceptable to lay off NDOT staff and contractors hire these employees?

- Intent is not to put NDOT staff out of work. This would be a gradual process.
- NDOT staff will move from current role to a more managerial role. They will gain new skills, such as people management.
- Pro: NDOT staff will likely make more money. NDOT staff will keep pensions, if eligible, and receive a comparable salary from contractor.
- Legislation – everyone is afraid of the unknown. Will we really save money?
- Opportunity to take one pilot district and use it to compare to existing method of maintenance. Otherwise it's just opinions being pushed.

Liability issue needs to be addressed.

- Will current liability be acceptable? No, there will need to be limit restrictions to this.
- Can't see insurers taking on this magnitude of liability.
- In Nevada, there is a very active trial attorney business. This could be an issue down the road.
- BC: Take on 80% of insurance costs.

NDOT moving to contracting could create wage issues.

- There will be an increased cost to NDOT? On the other hand, delivering a better level of service then before is a good thing regardless of higher wages.

- In rural areas, NDOT likely to keep positions (i.e. Alamo).
- Same with equipment, easy to move around within a 100 mile radius. This wouldn't be much different to routine maintenance.
- Moving equipment is easier then running multiple equipment stations. The Contract will need to reflect costs for transporting equipment.
- Construction Centers and Sports facilities – same promises... it will save money, etc. Without hard data there is no evidence this will work.
- It will take years to figure out a base case to compare to contractor maintenance.
- Different circumstances in the UK. With longer contracts, you're more liable for innovation, etc. More effort is put into this because there is more time for reward.
- Start with shorter contracts to learn before you jump into long term contracts.

Contractor's thoughts

- Would like a clause in the contract that the contractor needs a local presence, otherwise the work will come from elsewhere.
- Want to lease facilities. Selling the facilities would created limited competition at the end of the contract.
- Alberta did this, but did eventually sell their facilities.
- NASA/Military facilities are on 3-5 year operational leases. This could be a good model for NDOT.
- We will lose innovation if nothing changes. There will not be innovation if NDOT does not change or give. This won't be NDOT call; it will be legislation's decision.
- The first model will not be perfect, but legislation needs to be on board.
- Needs to be written in the contract that we will rent out equipment and sell extra, but know that if things go poorly there's a backup plan.
- Legislation wouldn't mind liquidating Millions of dollars.
- For state- need to consider personnel management. Also, total package to employ someone, including pension, PTO, sick leave, insurance, etc.
- NDOT will not be cheated monetarily, but their mentality will have to change.

Performance Measures

- Contract Monitoring – internal and external audits.
- Amey: No financial penalties imposed. There are in P3 (DBFO) contracting
- When there are penalties or disincentives you need to price these in the bid.

- With winter maintenance, there is too much liability to not do a good job.
- Response times? NDOT winter maintenance has done this for a long time, can the contractors? "Be careful what you wish for."
- "If you want to affect performance you do it with carrots, not sticks."
- Track history and how NDOT operates. This needs to be understood before contractors can take over. Needs more discussion or talk about this.
- Owner usually defines operation specifications or measures.
- One big point was going from winter to summer maintenance (especially in terms of equipment) – same winter/summer utilization?
- 1st step needs to be big and meaningful, but not too big or challenging where it is overwhelming.
- Next, NDOT has moved its knowledge and staff and NDOT takes on a more advisory role.
- The more risk the potential for innovation.
- With response times, give contractors a list of tasks and what is required. Need parameters for specific tasks- easier than response time. Response time is very dynamic and a poor measurement.
- Ultimately, contractor takes on the risk. Excuses, such as "not enough snow plows," etc. will not be acceptable.
- Regulatory issues – environmental permits, environmental groups, Tahoe issues, etc.
- Public needs to understand you can only get one: greater level of service or cost effectiveness.
- Contractors should be made aware from NDOT what the DOT would projects the DOT would like to be done, regardless of constraints, budget, etc. This would allow contractors to come up with innovative methods to perhaps complete these tasks the DOT can not.
- NDOT needs to figure out what it wants, what it demands/expects and what is reasonable to expect before it contracts work.
- Competitors – if you are located there and have equipment that will limit competition.
- Regardless of $5k to $25k limits, there are force accounts to deal with this (additional works). There are already standard unit prices. Without changing things, these systems are already in place.
- There needs to be something in the contract for the supplier. Otherwise there may not be enough materials for the work

- Lifecycle Maintenance – 5 to 10 year contracts are not long enough. 30 to 40 year contracts allow more innovation and knowledge of the network.
- Need specifications that focus solely on the outcome. This will promote innovations to achieve outcome. Contractors need "wiggle room" for innovations. If all constraints are put in place, then only the minimum required will be done.

Who receives the contract savings?

- In a true P3, contractor and owner share the rewards. This happens on long term contracts and promotes innovation
- Amey: Do you share increased cost on new schemes? No, contractor asks for more money. If owner approves then yes you get money to works. As for innovation, Amey doesn't get as much out of it as the owner does.
- Other way to do it is a trial period, where the contractor guarantees works for a certain duration.
- If owner does not like contractor's price on schemes, the owner can put it out to bid separately.
- The bigger the change the harder it is to make. Needs some level of "buy in" then you can evolve and expand.
- Both need to understand the big picture first in order to figure out how to get there.
- Needs to be a big enough step change so it is noticeable and worthwhile.
- Weather: winter and drainage. In the UK, flooding from river isn't a liability but flooding due to drainage issues is.
- Alternative is the Swedish model. Some kind of weather index
- Otherwise it is a risk that needs to be priced in bids.
- The Contractors would like to see current contracts NDOT uses.
- Sovereign liability needs to be addressed
- Pilot program in a small county is the most logical step.
- Workers Compensation Department went through this 12 years ago and through a TUPE-like system 50% of the government workforce went to work for the contractor. It was a successful example that this can be done.

5.0 SUMMARY

The workshop was an excellent tool to discuss issues and concerns from both the DOT and the contractors' perspective. The presentations of performance maintenance contractors and owners from other countries introduced both the NDOT staff and the Nevada Contractors to a potential maintenance contracting strategy not totally understood.

While performance contracting was discussed, there was no commitment made by the DOT to develop performance contracts.

Appendix 6.1 – Workshop Agenda

Halcrow

NEVADA DOT

Halcrow **Contract Maintenance Workshop**
August 24-25, 2010
Silver Legacy, Reno, Nevada
NEVADA DOT

Tuesday, August 24, 2010

7:00 AM - Contential Breakfast	
8:00 AM - Welcome, Opening Remarks	Rick Nelson (NDOT)
8:30 AM - Introductions and Meeting Format	Joe Graff (Halcrow)
9:00 AM - Managing and Maintaining Roads in British Columbia by Contract	Frank Rizzardo (Emcon, BC)
9:40 AM - Break	
10:10 AM - Performance Contracting for Road Maintenance in the United Kingdom	Alan Chambers (Amey,UK)
10:50 AM - Maintenance Contracting from the Owners Perspective	Jan Olander (Swedish Road Administration)
11:30 AM - Lunch	
1:00 PM - Roundtable Discussion	Rick Nelson (NDOT)
3:00 PM - Break	
3:30 PM - Breakout sessions	Owners facilitated by Bill Hoffman (NDOT), Contractors facilitated by John Madole (AGC)
5:30 PM - Reception	

Wednesday, August 25, 2010

7:00 AM - contential breakfast	
8:00 AM - Continue Beakout Sessions and summarize points	Bill Hoffman (NDOT), John Madole (AGC)
10:00 AM - Break	
10:30 AM - Reconviene joint session and report out group breakout results	Bill Hoffman (NDOT)
11:30 AM - Summary of workshop and conviene	Joe Graff (Halcrow)

Accommodations for workshop participants are available at the Silver Legacy Hotel/Casino in Reno, NV. Call the Reservations Department at 1-800-687-8733 and use group code NDOT810. Cost for workshop attendees is $45.00 plus applicable fees. Each registrant must arrange lodging. Rooms will be held until 7/31/10.

Appendix 6.2 – Attendees

010 Maintenance Contractors Workshop **REGISTRATION LIST**

Updated: **23/08/2010** **Indicates Speaker/Moderator**

Name	Agency	Address	City, State, Zip	Phone	E-mail
Baer, Steve	Nevada DOT	805 Erie Main	Tonopah, NV 89049	775-482-2303	sbaer@dot.state.nv.us
Belz, Jeanette	J.K. Belz & Associates	10580 N. McCarran Blvd #115-222	Reno, NV 89503	775-329-0119	jb@jkbelz.com
Boni, Kal	Nevada DOT	805 Erie Main	Tonopah, NV 89049	775-482-2377	kboni@dot.state.nv.us
Brooks, Dennis	Nevada DOT	1401 E. Aultman St.	Ely, NV 89301	775-289-1704	gbrooks@dot.state.nv.us
Bush, Anita	Nevada DOT	1263 S. Stewart St.	Carson City, NV 89712	775-888-7856	abush@dot.state.nv.us
Chambers, Alan	Amey, UK				alan.chambers@amey.co.uk
Cotter, Randy	Nevada DOT	1263 S. Stewart St.	Carson City, NV 89712	775-888-7858	rcotter@dot.state.nv.us
Daly, Richard "Skip"	Laborers Union	169570 Reactor Way	Reno, NV 89502	775-772-6534	liuna169@scbglobal.net
Dodge, Jeff	Nevada DOT	131 Hot Springs Rd.	Carson City, NV 89801	775-888-7855	jdodge@dot.state.nv.us
Dyson, Thor	Nevada DOT	310 Galletti Way	Sparks, NV 89431	775-834-8300	tdyson@dot.state.nv.us
Edgington, Ruedy	HDR Engineering	9805 Double R Blvd. Ste. 101	Reno, NV 89521	775-337-4704	ruedy.edgington@hdrinc.com
Elicegui, Mark	Nevada DOT	1263 S. Stewart St.	Carson City, NV 89712	775-888-7540	melicegui@dot.state.nv.us
Fipps, Michael	Nevada DOT	310 Galletti Way	Sparks, NV 89431	775-575-7973	mfipps@dot.state.nv.us
Fuess, Michael	Nevada DOT	310 Galletti Way	Sparks, NV 89431	775-834-8300	mfuess@dot.state.nv.us
Graff, Joe	Halcrow, Inc.	3737 Executive Center Dr. Ste 255	Austin, TX 78731	512-501-4977	jgraff@halcrow.com
Groso, Larry	Frehner Construction Co., Inc.	522 Osino Unit No. 8	Elko, NV 89801	775-753-9512	larry.groso@aggregate-us.com
Hanson, Josh	Halcrow, Inc.	3737 Executive Center Dr. Ste 255	Austin, TX 78731	512-501-4977	hansonj@halcrow.com
Hassoun, Sam	Global Leadership Alliance	3095 Beacon Blvd	West Sacramento, CA 95691	916-374-0455	
Hoffman, Bill	Nevada DOT	1263 S. Stewart St.	Carson City, NV 89712	775-888-7050	whoffman@dot.state.nv.us
Hunt, Gregory	Ergon Asphalt & Emulsions	3901 West Ponderosa Way	Las Vegas, NV 89118	702-235-7347	Gregory.Hunt@ergon.com
Isaman, Gary	Frehner Construction Co., Inc.	522 Osino Unit No. 8	Elko, NV 89801	775-753-9512	gary.isaman@aggregate-us.com
Kaiser, Reid	Nevada DOT	1263 S. Stewart St.	Carson City, NV 89712	775-888-7785	rkaiser@dot.state.nv.us
Lee, Kevin	Nevada DOT	1951 Idaho St.	Elko, NV 89801	775-777-2700	klee@dot.state.nv.us
Madole, John	AGC	5400 Mill Street	Reno, NV 89502	775-329-6116	johnm@nevadaagc.org
Maher, Michele	Nevada DOT	1263 S. Stewart St.	Carson City, NV 89712	775-888-7737	mmaher@dot.state.nv.us
Malfabon, Rudy	Nevada DOT	123 E. Washington Ave.	Las Vegas, NV 89101	702-385-6506	rmalfabon@dot.state.nv.us
Martini, Mary	Nevada DOT	123 E. Washington Ave.	Las Vegas, NV 89101	702-385-6501	mmartini@dot.state.nv.us
Martinovich, Susan	Nevada DOT	123 E. Washington Ave.	Las Vegas, NV 89101	770-888-7440	smartinovich@dot.state.nv.us
Marty, Todd	Nevada DOT	123 E. Washington Ave.	Las Vegas, NV 89101	702-667-4535	tmarty@dot.state.nv.us
Maurer, Gayle	Nevada DOT	1263 S. Stewart St.	Carson City, NV 89712	775-888-7252	gmaurer@dot.state.nv.us
Mayhew, Gary	Ledcor Construction	901 N. Green Valley Pkwy Ste 100	Henderson, NV 89074	702-320-8203	gary.mayhew@ledcor.com
Morse, Derek	CH2M Hill	50 West Liberty Street, Ste 205	Reno, NV 89509	775-329-7300	Derek.Morse@CH2M.com
Murphy, Michael	Nevada DOT	1951 Idaho St.	Elko, NV 89801	775-777-2700	mmurphy@dot.state.nv.us

2010 Maintenance Contractors Workshop REGISTRATION LIST

Updated: 23/08/2010 Indicates Speaker/Moderator

Name	Agency	Address	City, State, Zip	Phone	E-mail
Nance, Val	Nevada DOT	1951 Idaho St.	Elko, NV 89801	775-777-2700	vnance@dot.state.nv.us
Nelson, Rick	Nevada DOT	1263 S. Stewart St.	Carson City, NV 89712	775-888-7440	rnelson@dot.state.nv.us
Olander, Jan	Swedish Road Administration				jan.olander@vv.se
Olsen, Doug	Intermountain	1250 Glendale Ave	Sparks, NV 89431	775-690-4713	doug.olsen@gcinc.com
Oomer, Naushad	Halcrow, Inc.	3737 Executive Center Dr. Ste 255	Austin, TX 78731	512-501-4977	oomern@halcrow.com
Rawlins, Scott	Nevada DOT	123 E. Washington Ave.	Las Vegas, NV 89101	770-888-7440	srawlins@dot.state.nv.us
Rich, Michael	Q&D Construction	1050 S. 21st St.	Sparks, NV 89431	775-786-2677	mrich@qdconstruction.com
Rizzardo, Frank	Emcon Services, Inc.				emcon1@emconservices.org
Rouas, Mohamed	Nevada DOT	123 E. Washington Ave.	Las Vegas, NV 89101	702-385-6503	mrouas@dot.state.nv.us
Sangster, Dave	Nevada DOT	123 E. Washington Ave.	Las Vegas, NV 89101	702-667-4556	dsangster@dot.state.nv.us
Stair, Michael	Nevada DOT	310 Galletti Way	Sparks, NV 89431	775-834-8400	mstair@dot.state.nv.us
Stracener, Michelle	Halcrow, Inc.	3737 Executive Center Dr. Ste 255	Austin, TX 78731	512-501-4977	stracenerm@halcrow.com
Tedford, Darin	Nevada DOT	1263 S. Stewart St.	Carson City, NV 89712	775-888-7784	dtedford@dot.state.nv.us
Thomas, Alan	Jacobs Engineering Group	7160 Bermuda Rd, Ste 200	Las Vegas, NV 89119	702-938-5400	Alan.thomas@jacobs.com
Titzel, Dave	Nevada DOT	310 Galletti Way	Sparks, NV 89431	775-834-8303	dtitzel@dot.state.nv.us
Tsiforas, Bill	Jacobs Engineering Group	7160 Bermuda Rd, Ste 200	Las Vegas, NV 89119	702-938-5400	William.tsiforas@jacobs.com
Wellman, Bill	Las Vegas Paving	4420 S. Decatur	Las Vegas, NV 89103	702-251-5800	ungrgrd@aol.com
Williams, Steve	Nevada DOT	310 Galletti Way	Sparks, NV 89431	775-888-7969	swilliams@dot.state.nv.us
Wolf, Andreas	Ledcor Construction	901 N. Green Valley Pkwy Ste 100	Henderson, NV 89074	702-281-6825	andreas.wolf@ledcor.com

Appendix 6.3 – Presentations

Appendix 6.3.1 – Frank Rizzardo, Emcon, BC "Managing and Maintaining Roads in British Columbia by Contract"

Contracted Highway Maintenance

The British Columbia Experience

1988-Present

Frank Rizzardo ,A.Sc.T.GSM

Contracted Maintenance

Provinces that have outsourced contracted highway maintenance in Canada

British Columbia

Alberta

Ontario

Some P3 projects in Quebec and the Maritimes

British Columbia

Twenty Eight service areas

84,415 lane Km of Highway in Summer

83,053 lane km in Winter

Quality Plan by Contractor

Management standards

ISO standards that provide requirements or give guidance on **good management practice** are among the best known of ISO's offering.

Mtce Specifications include

Surface Maintenance

Drainage Maintenance

Winter Maintenance

Roadside Maintenance

Traffic Maintenance

Structure Maintenance

Emergency Maintenance

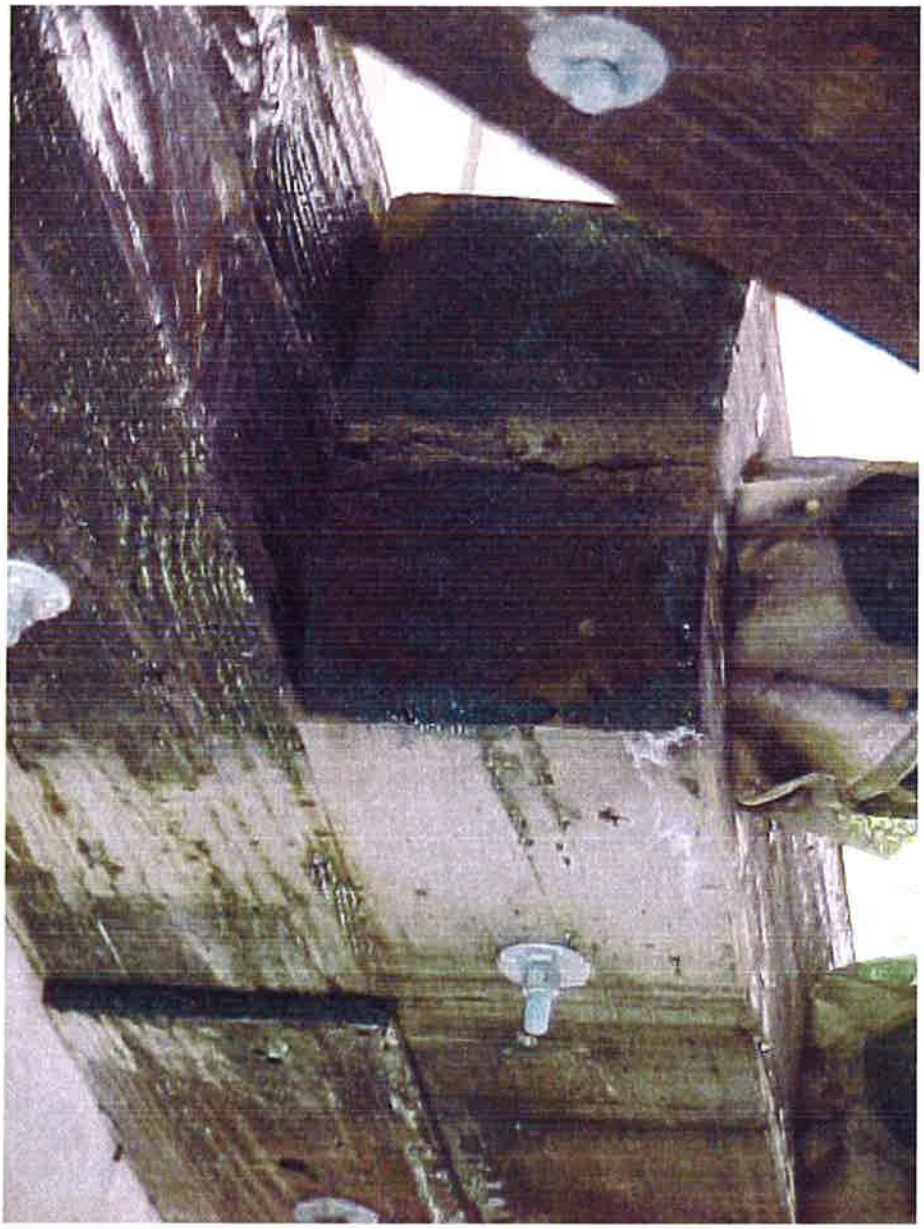
Inspection

Quality Control

Drive BC hwy cam locations

Highway Camera

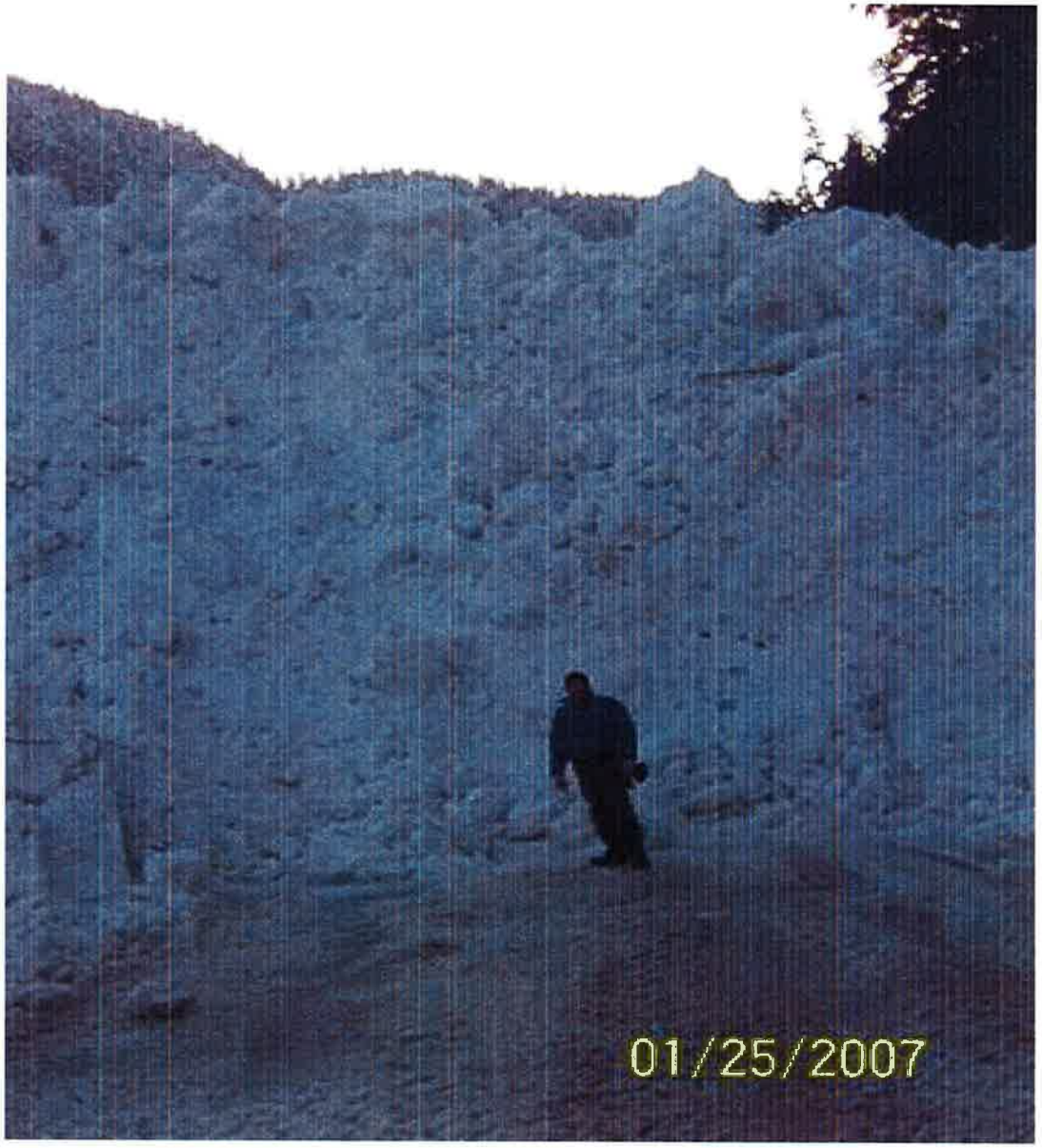
This one is not a routine activity



Pile cap replacement , a quantified plan item

Pavement Overlay an Quantified Plan Item

Wooden log wall replacement –a negotiated item


01/25/2007

A new four lane highway and the resultant rock slide from a cut that was not cleaned up properly

Debris .Torrent

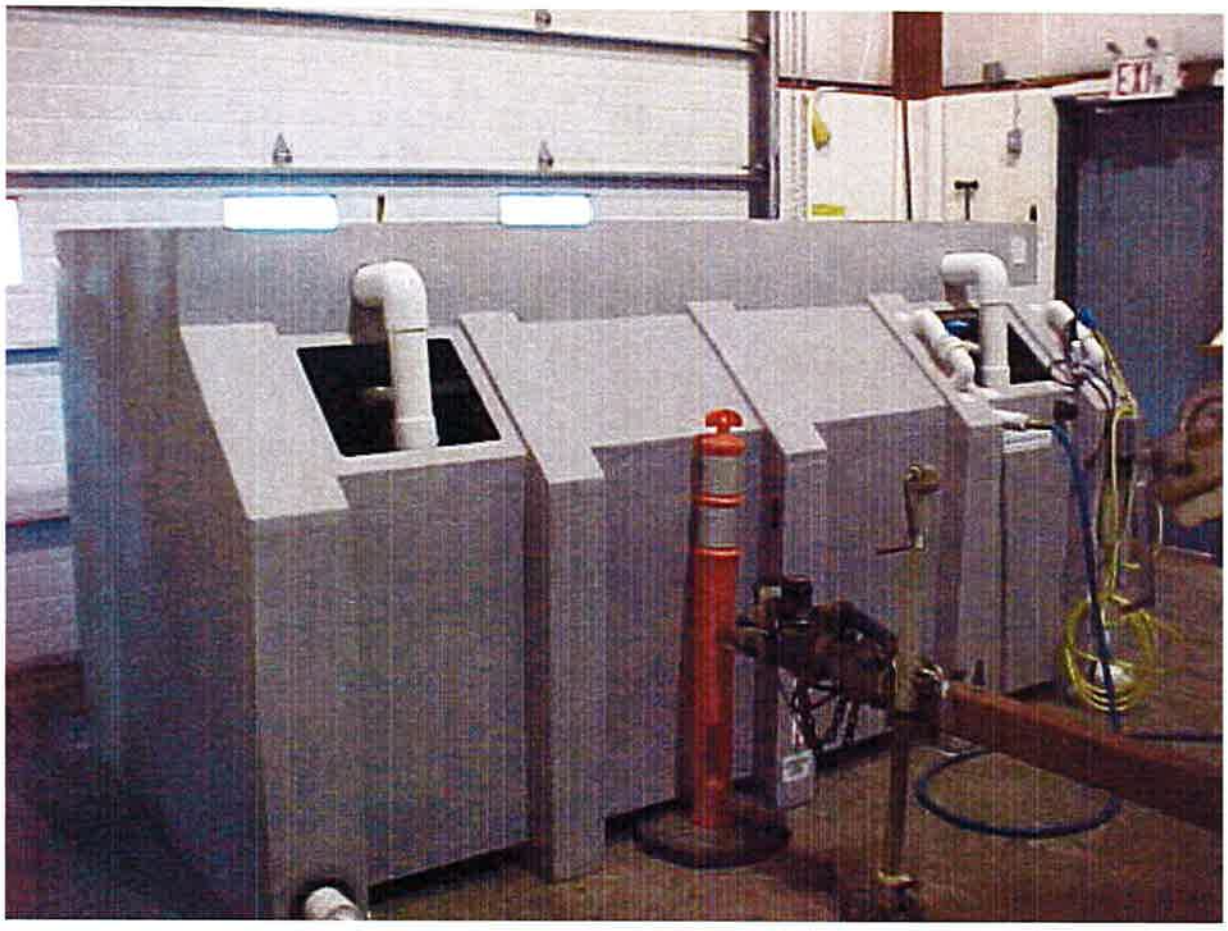
Debris Torrent clean up

Debris Torrent before Trash rack installed

An enhacement Project , a negotiated price for unspecified work


ANTI-ICING
KEEP BACK
15 Metres

Brine Truck Narrow drip application


EXIT


BACK
BACK

Tow plow

//www.youtube.com/watch?v=0KBRQPk5sd4


WCM
WEST COAST
MACHINERY
105
ICE BREAKER


S472E

Equipment repair


CAT

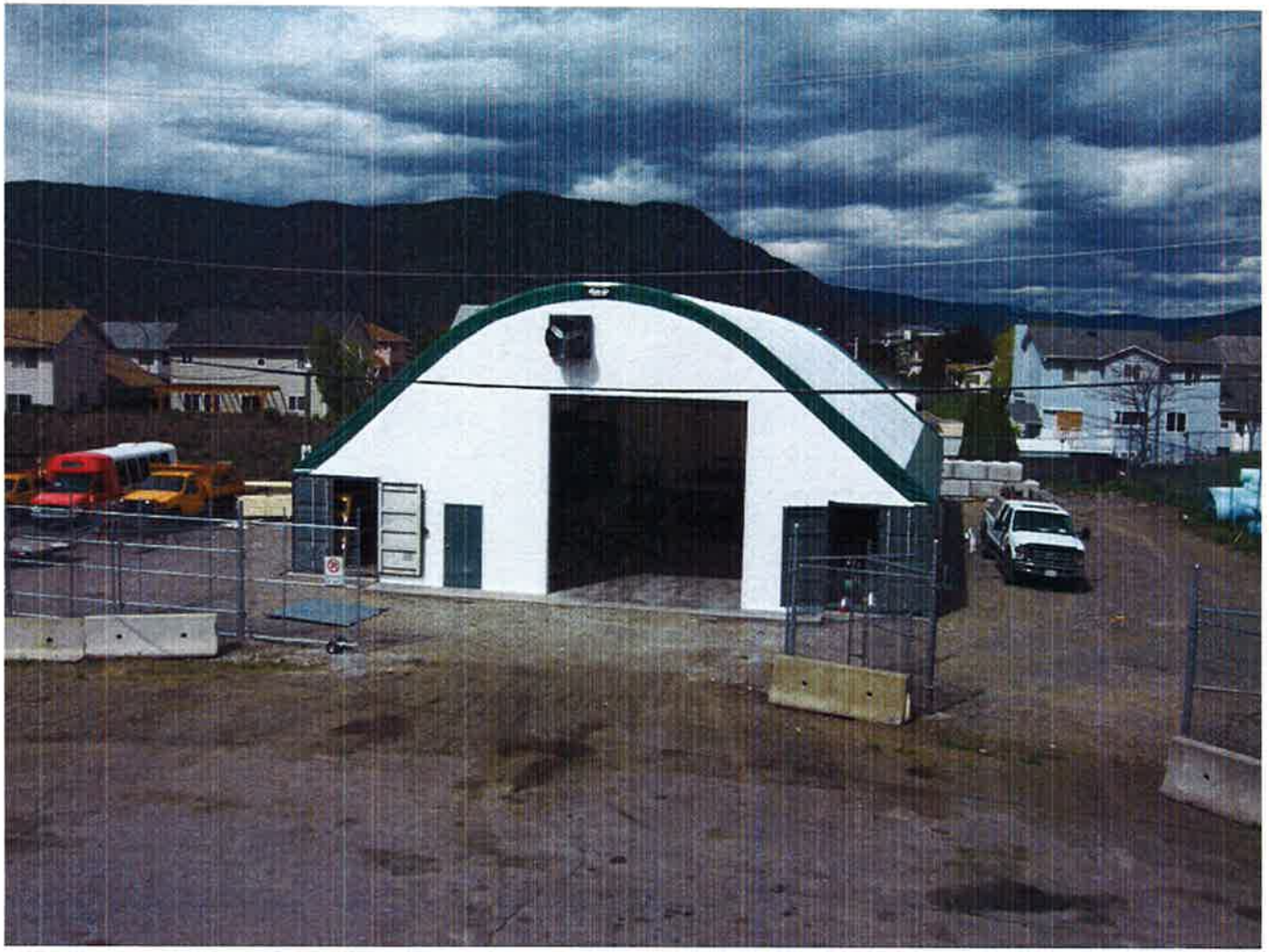

CAT


2009/11/27 11:11


2009/11/27 11:13


EMCON
SERVICES INC.
2009/11/27 12:04

Low volume –low use yard



Questions

Thank you

Appendix 6.3.2 – Alan Chambers, Amey,UK "Performance Contracting for Road Maintenance in the United Kingdom"

Performance Contracting for Road Maintenance in the United Kingdom

Alan Chambers

Delivery Manager, HA Area 9

24 August 2010

Contents

1. The Owner's Story

How the Highways Agency (HA) privatised term maintenance and moved to performance contracting

The Owner's Story

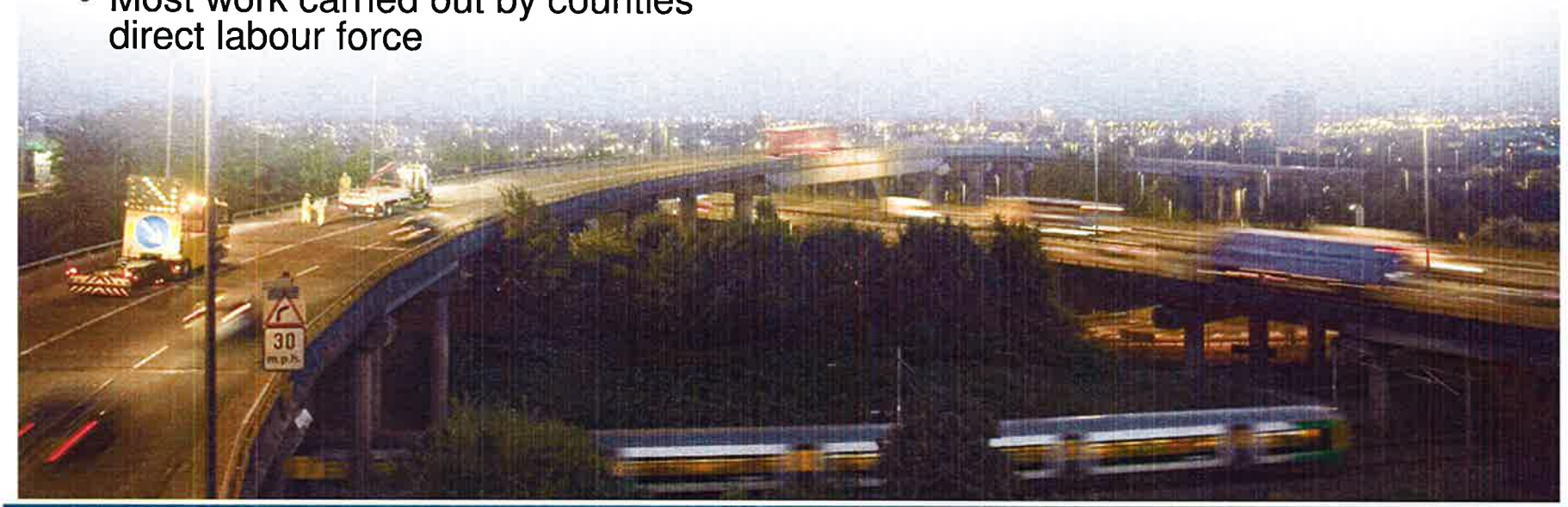
Definitions

- **Trunk Roads**
  - Strategic Highways
  - National importance
  - Central government funded
  - Other roads funded and managed by counties
- **Highways Agency (HA)**
  - Executive Agency of Department for Transport
  - Responsible for trunk roads in England
  - Separate agencies for roads in Wales, Scotland and Northern Ireland
  - All taken slightly different paths to privatisation

The Owner's Story

Before privatisation (up to late 1980s)

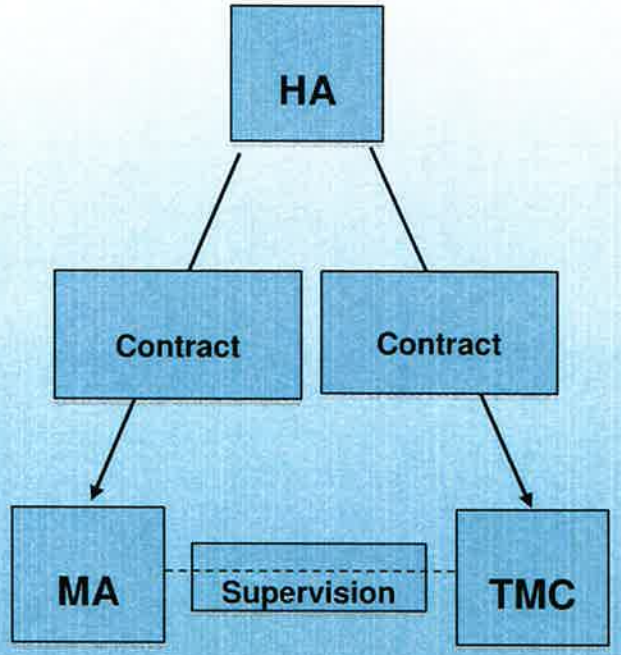
- Counties as agents for HA
- HA focussed on road building
- Counties incorporated trunk roads into their maintenance regimes
- Most work carried out by counties' direct labour force
- HA did not have full visibility of how money spent
- HA realised they needed to focus more on maintenance



The Owner's Story

Privatisation – the early years

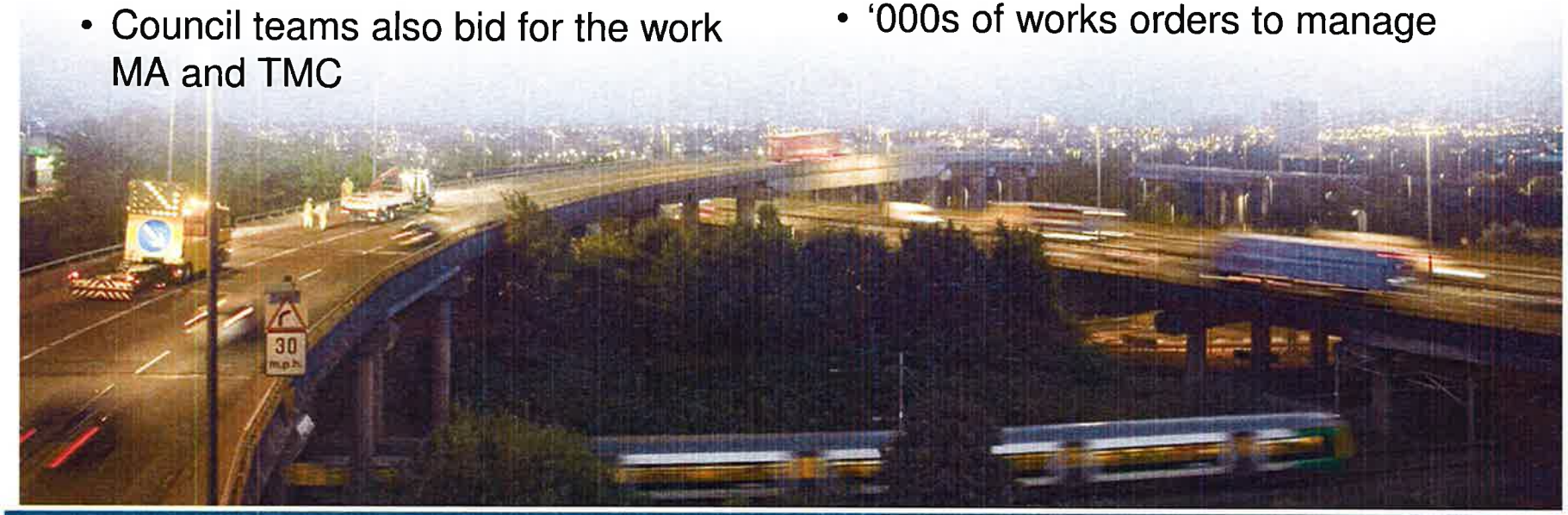
- Government directive to privatise or justify efficiency of direct work force
- Whilst counties starting to outsource HA looked to split away their services
- Contracts on a traditional basis (Victorian model)
- Client = HA
- Engineer = Maintaining Agent (MA)
- Contractor = Term Maintenance Contractor (TMC)



The Owner's Story

Privatisation – the early years

- MA role often taken by highway design consultants eg Halcrow
- TMC role often taken by road building contractors
- Council teams also bid for the work MA and TMC
- Work on schedule of rates
- 10,000s of items to price
- MA instructed TMC
- '000s of works orders to manage



The Owner's Story

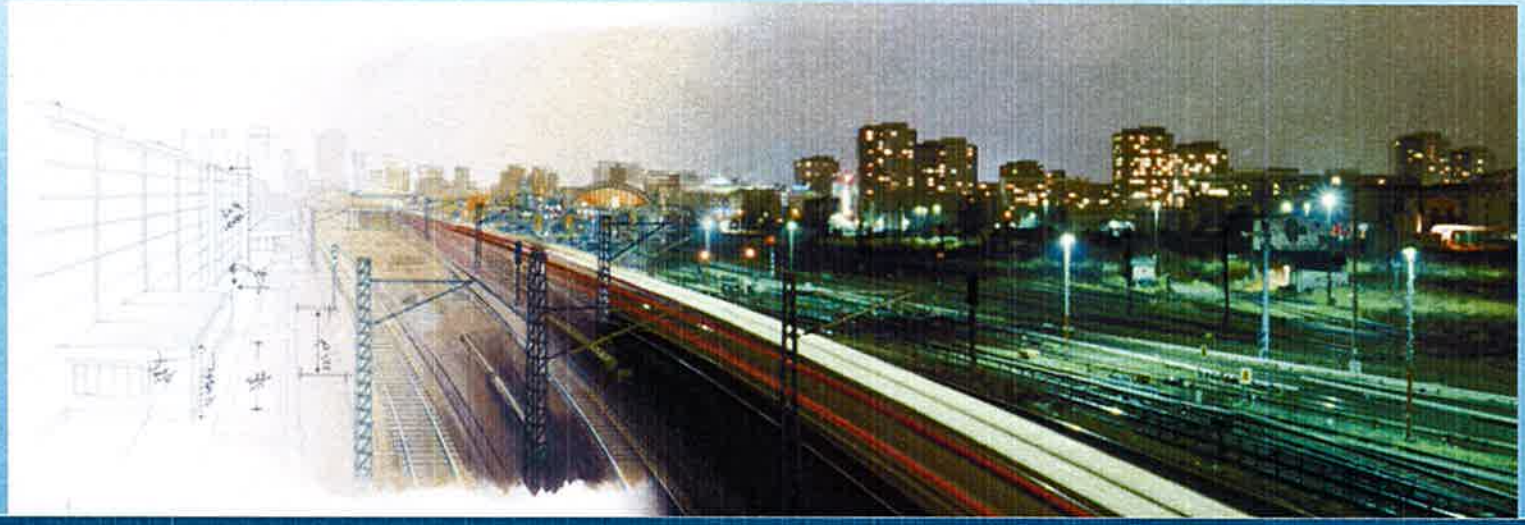
Privatisation – the next stage (to late 1990s)

- Initial piecemeal approach based on counties
- Short-term contracts < 3years
- Programme to privatise whole network
- 24 areas
- All with MA and TMC
- By 1998 all privatised
- Routine maintenance to prescribed frequencies

The Owner's Story

The move to performance contracting

- HA looking for efficiencies
- Influenced by rest of world
- Why have one company supervising another?
- Birth of Managing Agent Contractor (MAC)
- One company to deliver complete service
- Self auditing
- Needs to be performance based
- Outcome not output specification



The Owner's Story

The move to performance contracting

- For efficiencies to be realised need:
  - Longer contracts
  - Larger contracts
- Move to:
  - 5 years + 2 years of extensions
  - Reduce from 24 to 14 areas
- Initial trial in three areas of MAC concept

The Owner's Story

New procurement methods (2000 -2009)

- Designed to improve service
  - 70% quality submission
  - 30% price
- Emphasis on innovation
- Emphasis on procedures for management
- Each year two or three areas let
- Each year contract refined and updated
- By 2008 all areas are MACs

The Owner's Story

The new type of contract

- Three types of work and methods of payment

1. Lump Sum Duties
   - Annual payment / 12 monthly instalments
2. Cost reimbursable items
   - Costs + fee percentage
3. Target Price
   - Target cost + pain/gain

The Owner's Story

Lump Sum Duties

- Routine & cyclic works
  - Drain cleaning, inspections and patrols, grass cutting, litter picking
  - Incident support units, network control room
- Winter service
  - Keep network clear of snow & ice. Provide salt, drivers, systems and make decisions (HA provide vehicles)
- Attendances on Client – reports, customer relations, answering queries
- General management duties
- Asset records and scheme identification

The Owner's Story

Cost Reimbursable Works

- Scheme development
- All design
- Supervision of works carried out by others
  - Schemes <£500k and >£5M service provider designs and supervises. HA employs the contractor
  - Sometimes get larger schemes e.g. up to £20M for replacement bridge decks
- Extra tasks and duties

The Owner's Story

Target Price Works

- Schemes < 500K – Provider's Works
- MAC Contractor (Service Provider) gets as of right
- Target Price
  - Price built up from sample schemes in bid
  - Pain/gain on target cost

The Owner's Story

Where we are today

- 12 areas numbered 1 to 14
- All MAC style contracts
- Slightly different depending on age
- Now a focus on value
- Want more performance based
- Not after gold service
- Minimum effective service
- HA now focussed on being network operator

The Contractor's Story

How Amey became involved

- Company was founded by William Amey in 1920
- 1950s won a major contract to supply gravel for M1
- Early 1990s
- Privately owned civil engineering contractor
- Approx £150M turnover
- HA asked Amey to price early TMC
- Industry not showing much interest
- Yet another recession
- Government's promised "Roads for Prosperity " programme not materialising

The Contractor's Story

How Amey became involved

- Amey sceptical
- Not our traditional work
- Wanted to keep client happy
- Took the plunge
- Schedule of rates - TMC
- Low risk
- Good profit
- Reasonable cash flow

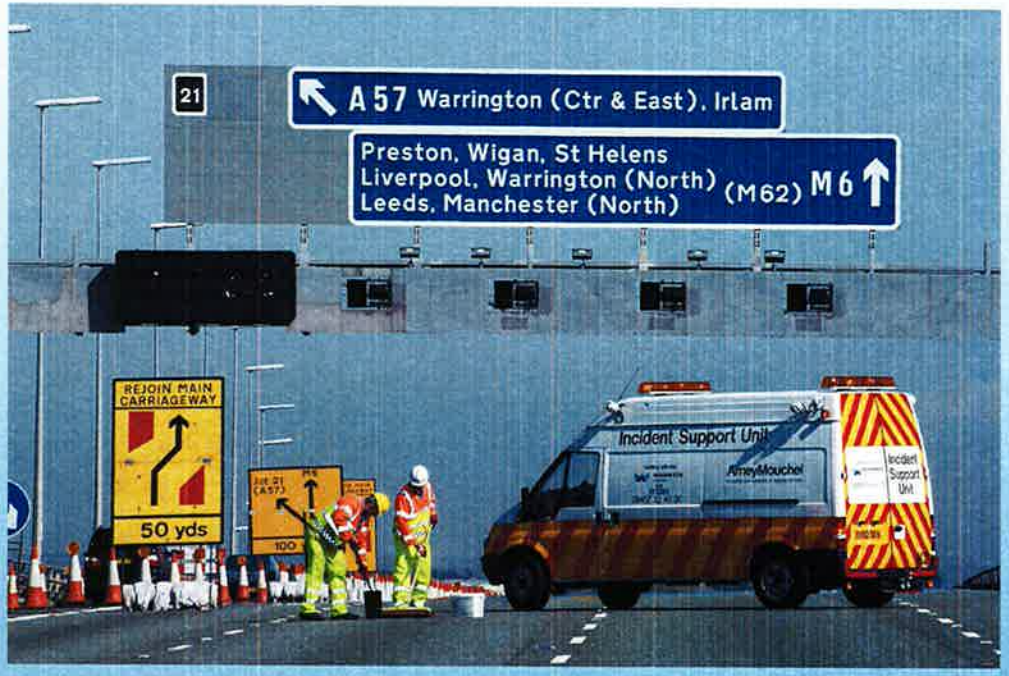
The Contractor's Story

Change in company direction

- Built up portfolio of contracts
- Local government (county) highways
- Guaranteed turnover
- Continued with civil engineering contracting
- Changed focus of company
- Rail maintenance
- Facilities management

The Contractor's Story

The MAC contract



- HA introduced MAC contract
- Amey needed MA expertise
- Joint venture with Mouchel
- AmeyMouchel born
- Very successful
- 30% of market
- Developed design and asset management skills
- Acquired known consultancy practice

The Contractor's Story

End-to-end service provider

- Now bid and run contracts as Amey
- No longer in civil engineering contracting
- No longer a contractor but now a *service provider*
- End-to-end capability
- Expanded into running schools via PPP/PFI
- Facilities management and back office functions e.g. HA and Whitehall
- 11,000 employees
- £1.5Billion turnover

Service is our passion. People, our strength

The Contractor's Story

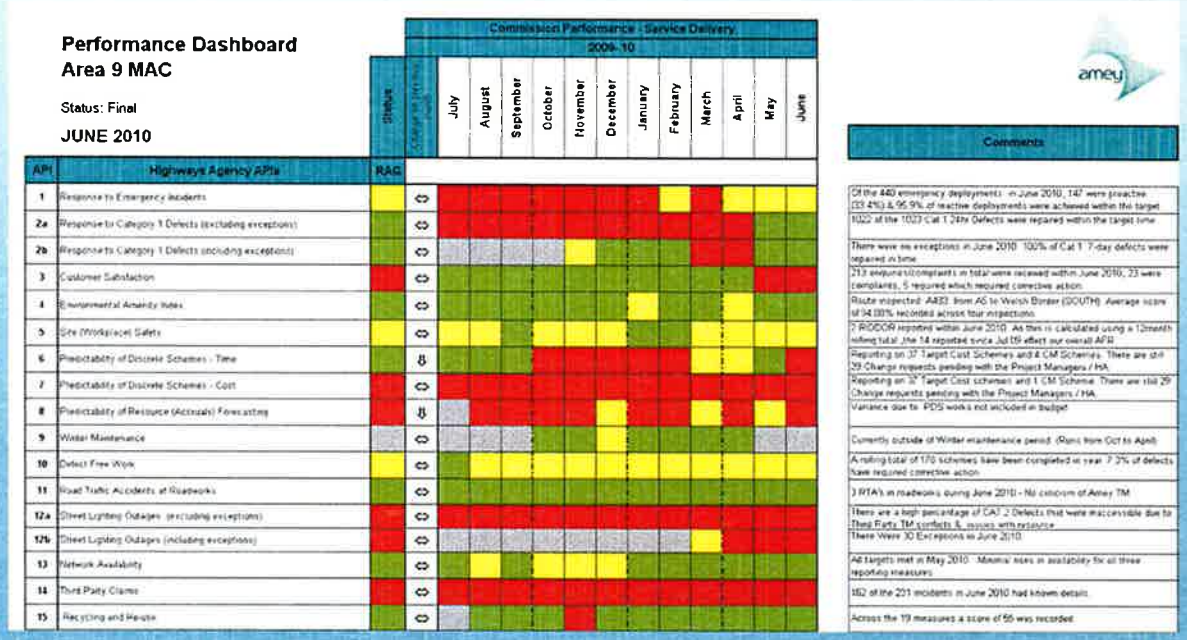
End-to-end service provider

- Long-term contracts
- Guaranteed turnover
- Controllable levels of risk
- Low risk clients - Government bodies
- Less susceptible to peaks and troughs

The Performance Contract

A few examples

- 14 Area Performance Indicators
- Based on Outputs and Outcomes from Network Management Manual of Routine of Winter Service Code
- Published nationally



Performance Dashboard
Area 9 MAC

Status: Final

JUNE 2010

Commission Performance - Service Delivery
2009-10

API	Highways Agency APIs	RAG	Status	July	August	September	October	November	December	January	February	March	April	May	June
1	Response to Emergency Incidents		⇔												
2a	Response to Category 1 Defects (excluding exceptions)		⇔												
2b	Response to Category 1 Defects (including exceptions)		⇔												
3	Customer Satisfaction		⇔												
4	Environmental Amenity Index		⇔												
5	Site (Workplace) Safety		⇔												
6	Predictability of Discrete Schemes - Time		⇩												
7	Predictability of Discrete Schemes - Cost		⇔												
8	Predictability of Resource (Accruals) Forecasting		⇩												
9	Winter Maintenance		⇔												
10	Defect Free Work		⇔												
11	Road Traffic Accidents at Roadworks		⇔												
12a	Street Lighting Outages (excluding exceptions)		⇔												
12b	Street Lighting Outages (including exceptions)		⇔												
13	Network Availability		⇔												
14	Third Party Claims		⇔												
15	Recycling and Reuse		⇔												

Comments
Of the 440 emergency deployments in June 2010, 147 were proactive (33.4%) & 96.9% of reactive deployments were achieved within the target
1022 of the 1023 Cat 1 24hr Defects were repaired within the target time
There were no exceptions in June 2010. 100% of Cat 1 7-day defects were repaired in time
212 enquiries/complaints in total were received within June 2010, 23 were complaints, 5 required which required corrective action
Route inspected: A483 from A5 to Welsh Border (SOUTH). Average score of 94.00% recorded across four inspections
2 RIDDOR reported within June 2010. As this is calculated using a 12month rolling total ,the 14 reported since Jul 09 effect our overall APII
Reporting on 37 Target Cost Schemes and 4 CM Schemes. There are still 29 Change requests pending with the Project Managers / HA
Reporting on 37 Target Cost schemes and 1 CM Scheme. There are still 29 Change requests pending with the Project Managers / HA
Variance due to PDS works not included in budget
Currently outside of Winter maintenance period. (Runs from Oct to April)
A rolling total of 170 schemes have been completed in year. 7.2% of defects have required corrective action
3 RTA's in roadworks during June 2010 - No criticism of Amey TM
There are a high percentage of CAT 2 Defects that were inaccessible due to Third Party TM conflicts & issues with resource
There Were 30 Exceptions in June 2010
All targets met in May 2010. Maximal rises in availability for all three reporting measures
162 of the 221 incidents in June 2010 had known details
Across the 19 measures a score of 55 was recorded

The Performance Contract – A few examples

Specification

Winter maintenance

- Outcome
  - No ice to form on Network
  - No delays or accidents due to severe weather *as far as practicable*
- Output
  - Routes 2 hours gate to gate
  - 3 drivers available per route
  - Clear snow within 2 - 12 hours

The Performance Contract

The service provider's approach

Winter Maintenance

- High profile – reputation risk
- Performance figures straight to Minister for Transport
- Highest priority
- Even though lump sum
- Too scared to fail
- "White Friday"

The Performance Contract

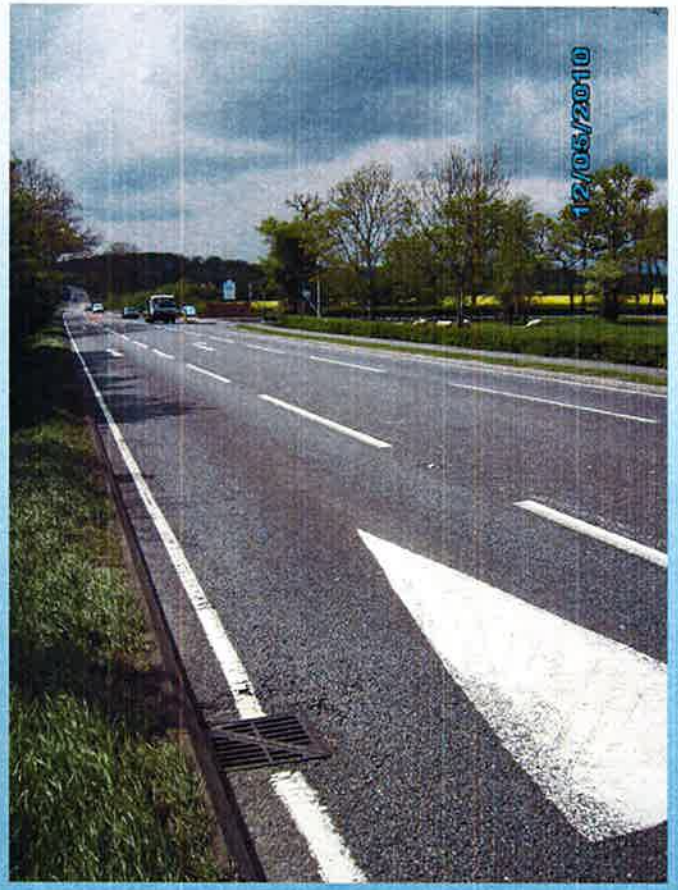
Specification

Drainage

- Outcome
  - No flooding
- Output
  - All drains to be inspected and jetted every 10 years

The Performance Contract

The service provider's approach



Drainage

- Carry out 10 year inspections
- Clean gullies/ catchpits based on intelligence from earlier maintenance
- Used to clean annually
- Now target areas where needed

The Performance Contract

Specification

Street Lighting

- Output
  - Repair category 1 defects within 24 hours
  - Preventative maintenance – bulk change and clean every 3 years

The Performance Contract

The service provider's approach

Street Lighting

- Do as required
- Suggest alternative lamps

The Performance Contract

Specification

Pavements

- Outcome
  - Meet specified safety, ride quality and skid resistance
- Output
  - Repair category 1 defects within 2 hours – temporary 28 days permanent
  - Category 2 repairs into a scheme and fix in 6 months
  - Others - monitor

The Performance Contract

The service provider's approach

Pavements

- Make temporary repairs good enough to be permanent
- Where beyond serviceable life look to develop schemes
- Help client by providing "do minimum" solutions and alternatives

The Performance Contract

The service provider's approach

General

- Question the status quo
- What does the client really want
- Maintenance and operations friendly solutions
- Proven efficiencies saved 50/50 with client

My Story

From civil engineering project manager to service delivery manager

- Graduated in civil engineering
- Went into contracting
  - Roads, bridges, airports, military buildings, sea defences
- Worked way up to project manager
- Enjoyed the "buzz" from construction
- Away from home
- Unpredictable lifestyle
- Missing family grow up

My Story

From civil engineering project manager to service delivery manager

- After 19 years - wanted a change
- Contracts manager heading up new maintenance business
- Made the move
- Still ended up working away from home for a few years
- Life now more stable
- New challenge
  - Develop people skills
  - More about people than machines
- Rewarding 12 years – brought me here

Summary

- Whole new industry
- Ever evolving markets
- Always a new challenge
- Need to be flexible in approach
- Performance contract – no financial penalties
- High stakes – long-term contracts – guaranteed turnover
- Cannot afford to upset clients
- It's been good to me

TUPE

- Transfer of Undertakings (Protection of Employment) Regulations 2006
- Regulations designed to protect the rights of employees in a transfer situation, i.e. same Terms and Conditions with continuity of employment.
- Applies to all relevant transfers including service provision changes where services are outsourced, 'insourced' or assigned to a new contractor.
- Employees' occupational pension schemes do not transfer under TUPE. However, if the previous employer provided a pension scheme then the new employer has to provide some sort of pension arrangement to a certain minimum standard.

Thank you and any questions?

Alan Chambers

alan.chambers@amey.co.uk

Appendix 6.3.3 – Jan Olander, Swedish Transport Administration "Maintenance Contracting from the Owners Perspective"

NDOT Contract Maintenance Workshop, Aug 24-25, 2010

TRAFIKVERKET
SWEDISH TRANSPORT ADMINISTRATION

Contract Maintenance - the Swedish Way

Jan Ölander
Senior Adviser

Swedish Transport Administration (STA)

- Some facts about Sweden and STA
- Background
- Routine Maintenance Package
- Benefits in Competitive Procurements
- Operating requirements
- Forms of payment
- Are there disadvantage with Competitive Procurements
- Results of Competitive Procurements


N
© 2009 Europa Technologies
© 2009 Tele Atlas
Data U.S. Navy
Image © 2009 TerraMetrics
54°33'05.91" N 22°30'03.79" O
©2009 Google
Visningshöjd 2512.37 mile

STA is responsible for 98 304 km roads = 62 200 miles centrelines.

22 448 km salt roads, AADT more than 2 000

All rural roads of public interest

Main streets in urban areas for through traffic

Outsourcing road operation in Sweden

1991, the Swedish Government passed a decision that all road operation and maintenance works undertaken within the state road transportation network were to be contracted through competitive bidding.

SNRA decided that maintenance and operations activities should, as far as possible, be contracted in terms of road functioning (Performance-Based Contracting).

1992, SNRA was divided into a client / contractor organization. It was stipulated that the contracting arm of the organization was to function like a private contractor, i.e., that it was to be subject to competitive terms on the open market and required to show a profit for its owner.

Since 1999 are all maintenance works procured on the open market

:e Package

- S
- Winter servic
  weather data

Routine Maintenance Package, cont.

Contractors must:

- be certified by ISO-9000 quality assurance system.
- have good experience of road operations and maintenance works
- prove that they have good knowledge of (educated in) traffic safety, environment, safe work zones.
- Be established within the contract area.

Routine Maintenance Package

GENERAL

- STA INSTRUCTIONS
- MONITORING
- VERIFICATION
- DEFECTIVE CONDITIONS
- RESTRICTIONS
- ACCESSIBILITY
- THEFT AND VANDALISM
- ENVIRONMENT
- ROAD SAFETY

WINTER SEVICE

- ACCESS AND MOBILITY
- SNOW STAKES

PAVED ROADS

- ACCESS AND MOBILITY
- DIFFERENCES IN LEVEL
- ALLIGATOR CRACKS, RAVELLING OR OXIDIZED ASPHALT
- DRAINAGE
- SLOPES
- CRACKS, HOLES, VEGETATION AND BUMPS IN THE ROAD
- FRICTION
- EDGE STRIP
- DRAIN COVERS
- OBSTACLE CLEARANCE
- RE-ROUTING TRAFFIC
- DITCH CLEARING
- DIFFERENCES IN LEVEL
- REPLACEMENT OF ROAD CULVERTS
- SEALING
- COMMENT / PLANNING / REMEDIAL ACTION INVENTORY
- SEDIMENTATION BASINS

Routine Maintenance Package, cont.

GRAVEL ROADS

- ACCESS AND MOBILITY
- EVENNESS, COHESION AND CROSSFALL
- DRAINAGE
- SLOPES
- OBSTACLE CLEARANCE
- RE-ROUTING TRAFFIC
- DITCH CLEARING
- REPLACEMENT OF ROAD CULVERTS
- COMMENT / PLANNING / REMEDIAL ACTION INVENTORY
- GRAVEL RECYCLING
- RE-GRAVELLING

ROADSIDE FACILITIES

- ACCESSIBILITY / SERVICE

BRIDGES

- ACCESS AND MOBILITY, AND BRIDGES IN GENERAL
- DRAINAGE SYSTEM
- EXPANSION JOINTS
- PARAPETS
- SURFACING
- BRIDGE DECK
- SLOPES AND EMBANKMENT ENDS
- EDGE BEAMS
- INSPECTION AND DOCUMENTATION
- PARAPET REPLACEMENT
- REPLACEMENT OF PARAPET ENDS

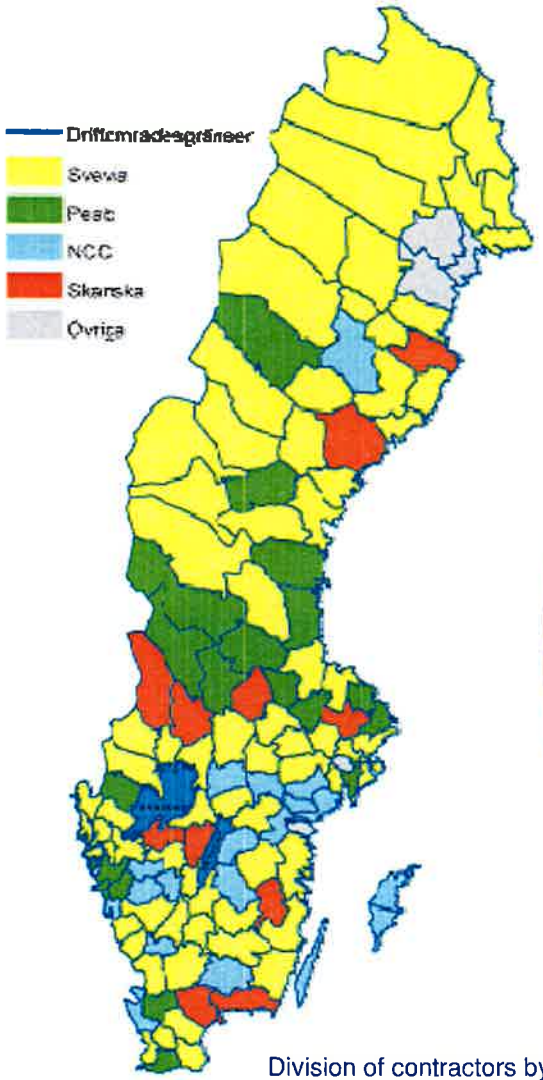
Routine Maintenance Package, cont.

ROADSIDE AREAS

- IMMEDIATE SURROUNDINGS
- OFFICIAL PERMITS
- CHECKING AND CONTROL
- UNOBSTRUCTED WIDTH
- SIGHT DISTANCE
- FREE SPACE
- CLEANED RIGHT-OF-WAY
- CARE OF LANDSCAPED AREAS
- CLEARANCE / MOWING

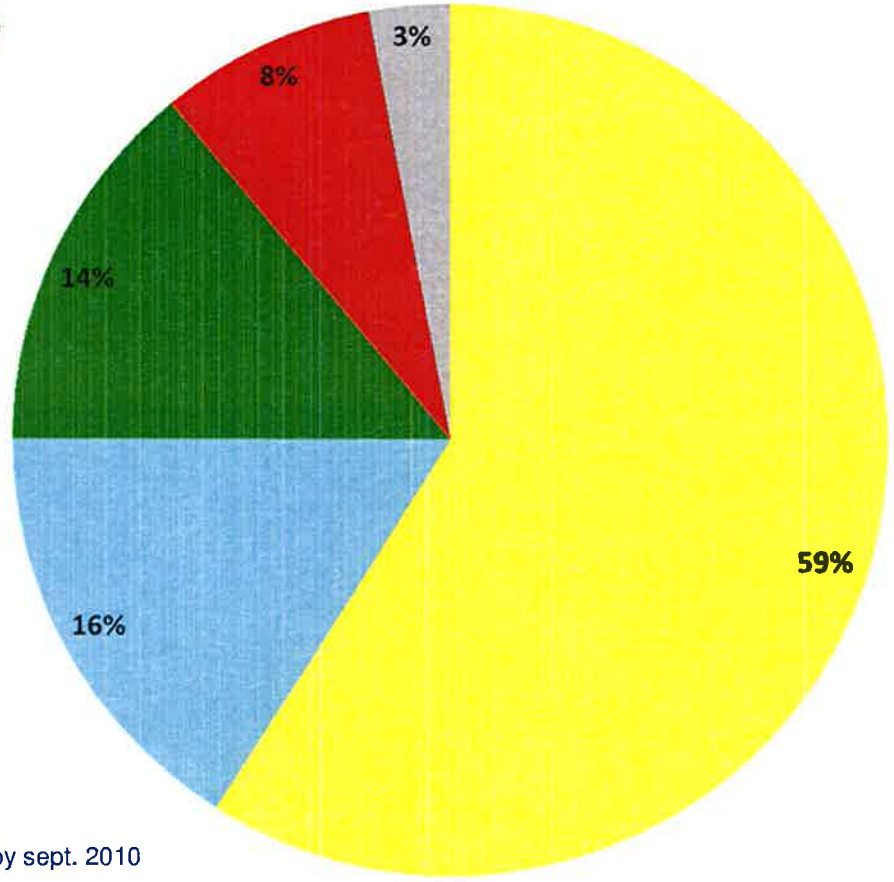
ROAD FURNITURE

- GUARD RAILS
- WILDLIFE FENCES
- NOISE BARRIERS
- KERBS
- ROAD SIGNS AND OTHER TRAFFIC CONTROL DEVICES
- GUIDE AND DELINEATOR POSTS, RELECTORS
- TRAFFIC SIGNALS
- LIGHTING
- SUPPLEMENTING OR CHANGING ROAD SIGNS
- GUIDE POSTS



Division of contractors by sept. 2010

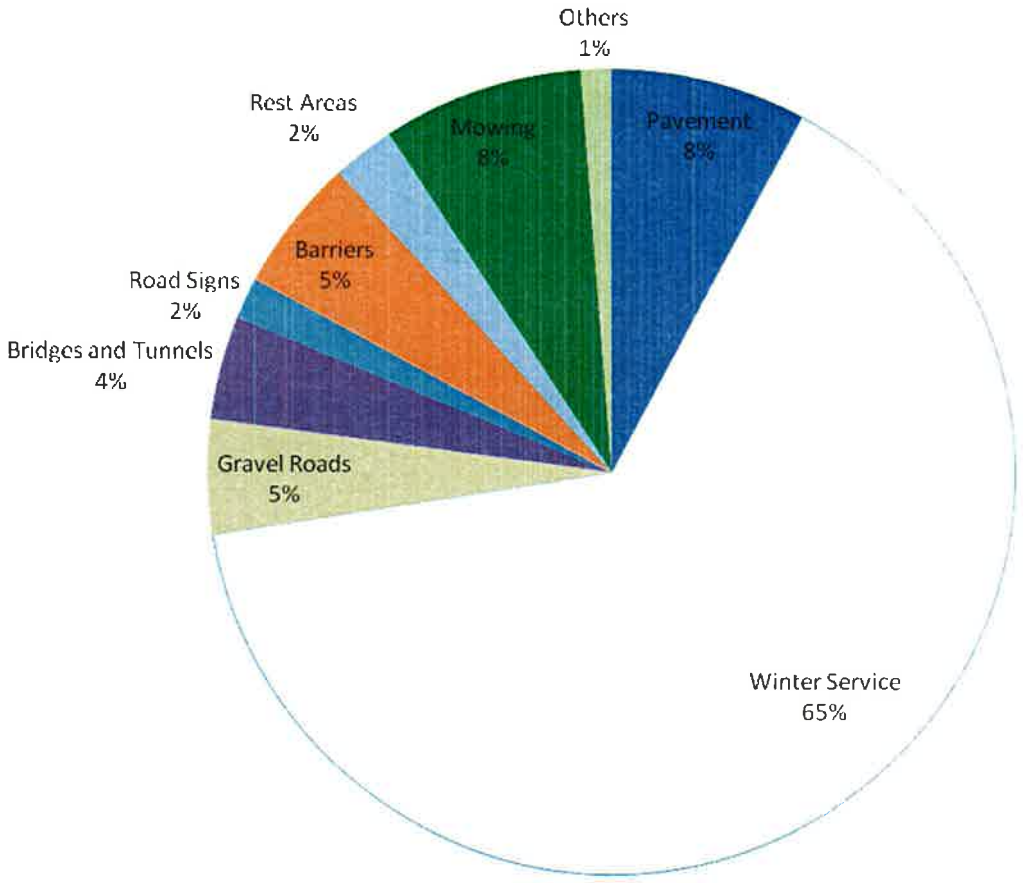
Division of contractors by sept. 2010
by contracts in percent



Svevia NCC Peab Skanska Övriga

Allocation of costs

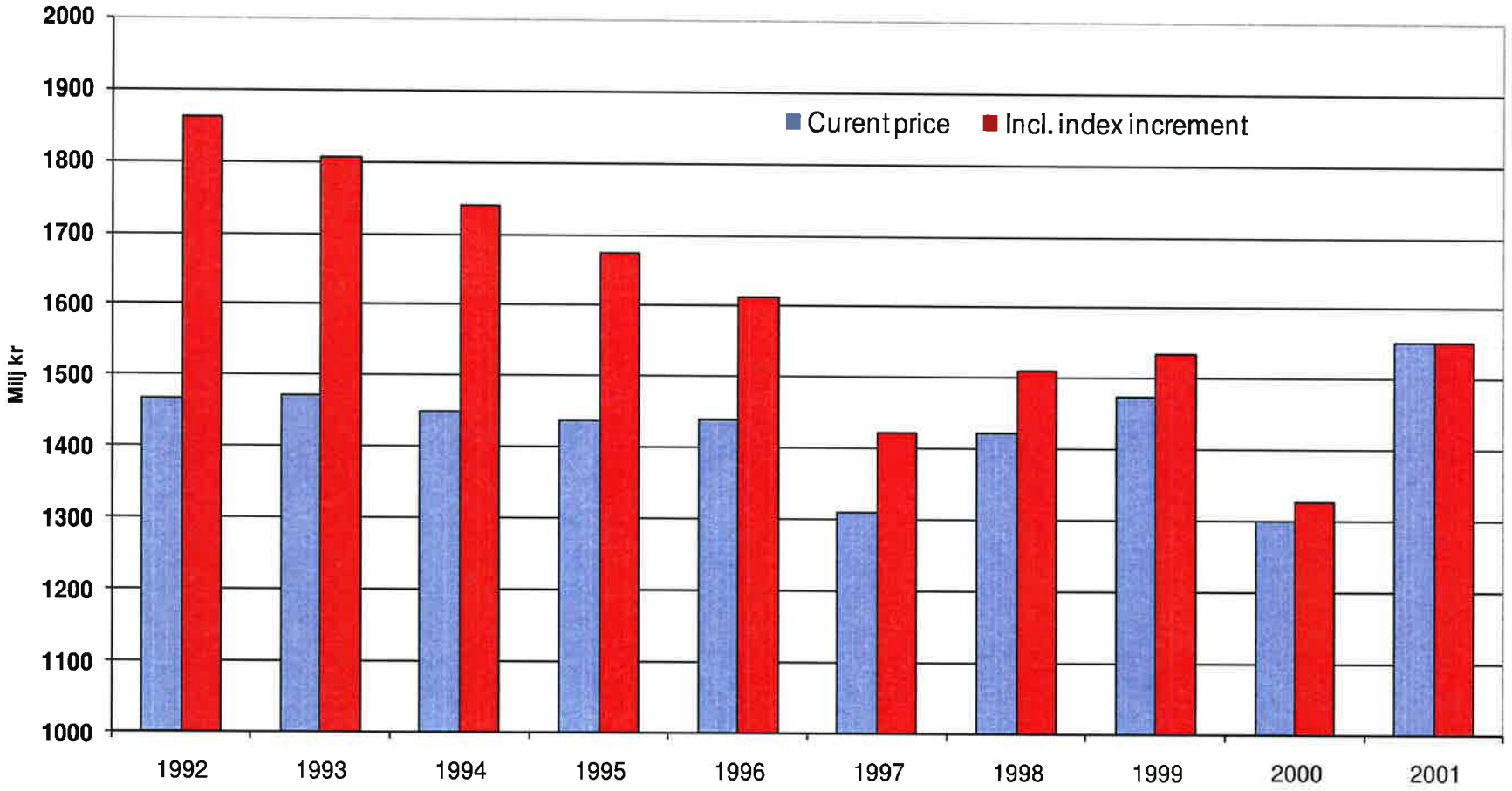
mean for whole country



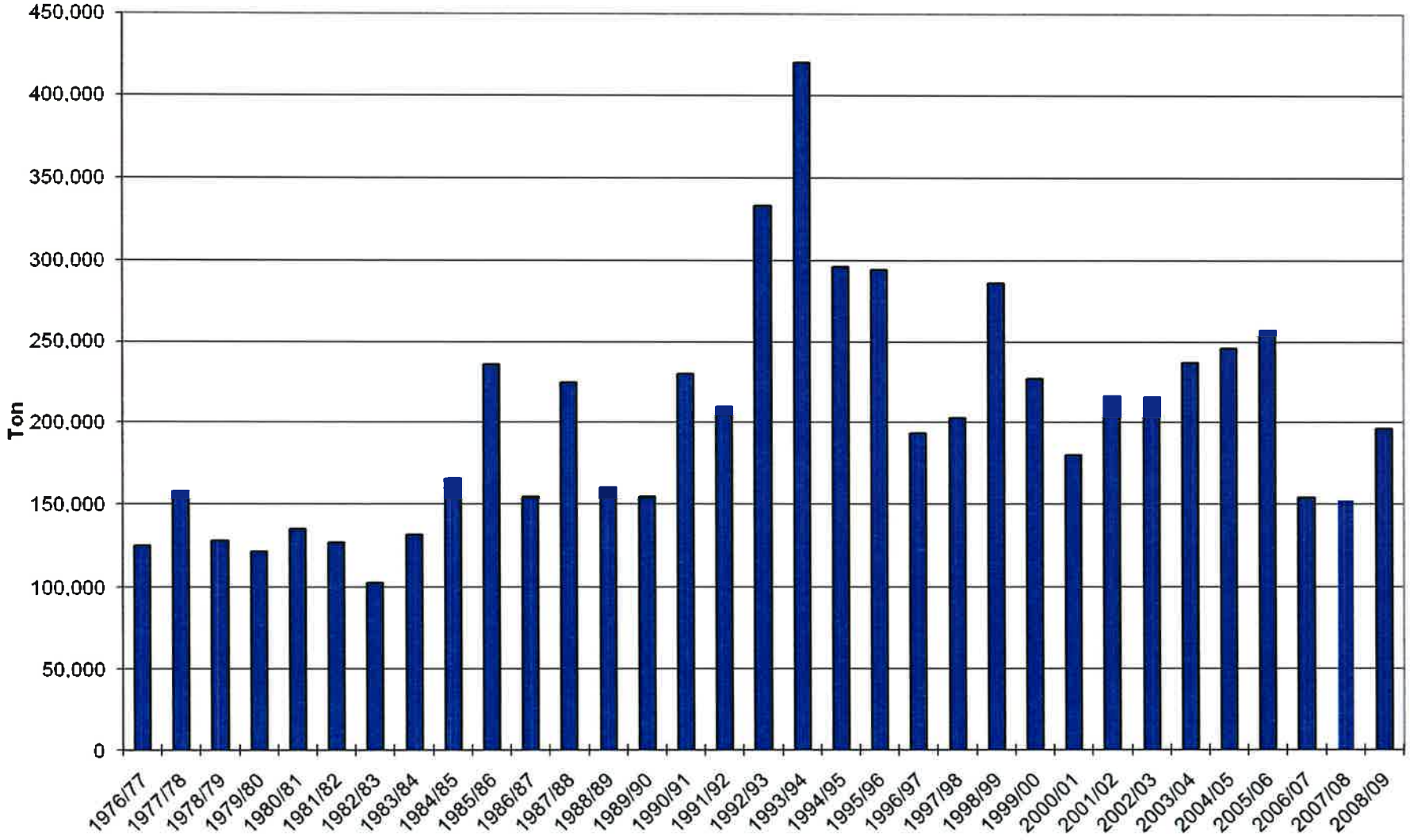
Benefits in Competitive Procurements

- Cost savings.
- But, dynamics of the market opening has more to offer than just cost savings. Contractors may be able to test their wings and strengthened the drive for innovation.
- In some cases easier to make demand on operations.
- All works are, time limits etc., are specified in a contract.
- Creates a clear line between agent and performer.
- Service output that is easy to quality review.
- Key Performance Indicators.
- Taxpayers knows were there money goes.

Used expenses in Winter Road Maintenance 1992 - 2001

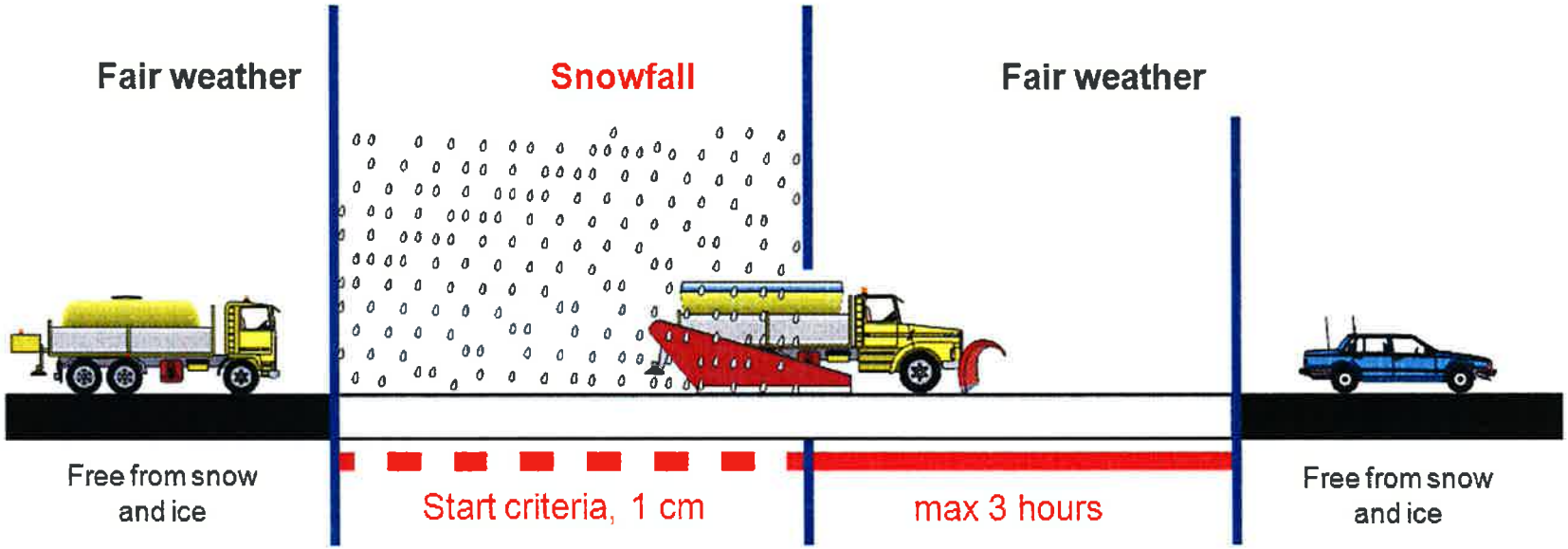


Salt consumption, A-roads



Leves of service

Summary of requirements and permitted average snow depth
Standard class 2, road surface warmer than 21°F



Forms of payment

Pavement (potholes + minor adjustments)	Fixed price/year + unit price (hour and ton)
Winter Service	Fixed price + weather occasions
Gravel Roads	Fixed price/year
Bridges and Tunnels (cleaning and inspection)	Fixed price/year
Barriers (repair)	Unit price (hour and length)
Road Signs (replacement and new)	Unit price
Rest Areas (cleaning and mowing)	Fixed price/year
Mowing	Fixed price/year

Forms of payment, cont.

- Winter Service payment is divided in a fixed part and a unit-price payment based on weather data statistics.
- The fixed part mirrors the contractors costs for staff standby and investments in facilities and equipments.
- The a unit-price payment is based on occasions divided in slippery roads forecast (anti-icing), frost events (de-icing), snow storm and drifting snow. Each occasion is 4 hours.
- The occasions are trigged from RWIS and Swedish Meteorological and Hydrological Institute (SMHI). 735 RWIS + 200 SMHI measuring points = 935 points all over Sweden.

Other payments

- a bonus system used for environmentally friendly machinery divided into three classes depending on different socio-economic costs for various particles and emissions.

Are there disadvantage with Competitive Procurements

- It ties up financial resources fo
- It could be hard (expensive) to during the contract period.
- R&D on a daily basis has stall are used.
- One can loose the adminis perspective.

Results of Competitive Procurements

- Cost savings up till 20 % has been proven.
- We have got what we ordered, not more, not less. It is more likely that one will get the lowest acceptable standard stipulated in the contract.
- Within winter service, this is revealed by the fact that we have obtained a more even standard on the national trunk road network, while motorists have felt that the standard has deteriorated on the low volume road network.
- Road administrations employees has decreased from 10 000 to 2 500.

Thank you for your attention.

Questions?

jan.olander@trafikverket.se