

BEST PRACTICES

OF

OUTSOURCING

WINTER MAINTENANCE

SERVICES



July 1, 2001

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Research Project Sponsored and Funded by:

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Richmond, VA

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This project was initiated and sponsored by VMS, Inc., a privately owned, maintenance systems company based in Richmond, VA, that provides snow removal and other maintenance services for the Virginia DOT, the City of Washington, DC, the Texas DOT, the Oklahoma Turnpike Authority and the Oklahoma DOT. Their project manager was Robert H. Bourdon, P.E. His colleague, Kent Lande, P.E., assisted in critiquing the report.

While this research is being funded privately, the intent of VMS, Inc., from the beginning was to openly share the results of the study with members of the entire winter maintenance community, including the AASHTO Subcommittee of Maintenance and the APWA Subcommittee on Winter Maintenance.

To conduct the survey and compile results, VMS, Inc. retained the services of Mr. Richard Stapp, P.E., retired Wyoming State Construction and Maintenance Engineer and Rodney A. Pletan, P.E., retired Minnesota State Maintenance Engineer. Working as a team, they conducted all of the research and wrote the report.

Over sixty individuals from a wide variety of governmental agencies provided important data and information for this project. Over half of these shared printed documentation. Contributing organizations along with the names of persons contacted are listed in Appendix B.

TABLE OF CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY.....	1
I. INTRODUCTION.....	7
A. Background.....	7
B. Definition of Problem.....	8
II. PROCESS USED FOR THIS STUDY.....	12
A. AASHTO Member State DOTs.....	12
B. Selected Highway Authorities.....	12
C. Snow and Ice Mailing List.....	13
D. Canadian Provinces.....	13
E. Other Selected Countries.....	13
III. OWNER-MANAGER-PRODUCER SCENARIOS.....	14
A. Scenario A - All Work Produced by Owner Public Agency.....	14
B. Scenario B - Some Work Produced by Another Public Agency.....	14
C. Scenario C - Some Work Both Managed and Produced by Another Public Agency.....	15
D. Scenario D - Some Work Produced by Private Company.....	16
E. Scenario E - Some Work Both Managed and Produced by Private Company.....	16
IV. WHAT WAS LEARNED.....	18
A. Inputs, Outputs, Outcomes and Value of Winter Maintenance Services.....	18
B. Importance of Input, Output, Outcome and Value in Specifying Performance Levels.....	19
C. Importance of Input, Output, Outcome and Value in Determining Pay Items.....	23
D. Significance of Owner-Manager-Producer Scenarios.....	28
V. PROGRESSIVE APPROACHES TO OUTSOURCING WINTER MAINTENANCE.....	29
VI. RECOMMENDATIONS FOR FUTURE SURVEYS.....	31
A. Value Of Conducting Survey Again.....	31
B. How Should It Be Done Next Time.....	31
C. When and How Often Should It Be Done.....	31
D. Who Should Do It In The Future.....	31
VII. APPENDICES.....	Appendices Page 1
APPENDIX A: SAMPLE LETTERS REQUESTING INFORMATION.....	Appendices Page 2
APPENDIX B: SUMMARY OF ORGANIZATIONS CONTACTED.....	Appendices Page 6
APPENDIX C: SUMMARY OF METHODS OF PAYMENT.....	Appendices Page 12
APPENDIX D: SAMPLE PROVISIONS OF CONTRACTS.....	Appendices Page 18

EXECUTIVE SUMMARY

I. INTRODUCTION

This project, entitled ***Best Practices of Outsourcing Winter Maintenance Services***, is a response to the need to identify the best, most creative contract language and provisions that are being used by various owner-agencies today in the public sector. The strategy used was simply to take a survey, review the material received from the survey and identify the *best practices* used. Private sector companies producing winter maintenance services were not considered within the scope of this study and, therefore, were not surveyed.

The problem has been identified on behalf of all public and private entities that have a need to learn more about how to better outsource winter maintenance services. The project was funded solely by VMS, Inc., a private maintenance systems firm with their headquarters office in Richmond, VA. VMS Inc. has a contract with the Virginia Department of Transportation to produce and deliver full asset maintenance on a portion of Virginia DOT's road system. In addition, VMS, Inc. has snow removal responsibilities on projects in Washington, DC, Texas and Oklahoma.

Most owner-agencies of public streets and highways in the USA, at least in the northern snow and ice belt states, have traditionally organized themselves with their own in-house systems, equipment and personnel to provide winter maintenance services.

In-house systems, however, currently have their critics. It is becoming commonplace today for public citizens and their elected legislatures, commissioners and councils to insist that governmental entities become more and more accountable and responsive. It is an outgrowth of the trend toward privatization, fueled by the increasingly popular attitude that governmental services could be delivered faster and better if they were produced in the private sector.

So, *who* produces winter maintenance services is under close scrutiny. There is pressure for change. The form and degree of pressure varies from agency-to-agency, from state-to-state and from country-to-country. Some pressures were blatantly direct and come in the form of mandates to outsource all work (like in the province of British Columbia, Canada). Other organizations are dealing with more internally-driven pressure where performance measurement systems are being put in place to make in-house personnel more accountable (like in Minnesota). In many locations, the pressure is more subtle in that maintenance operating budgets are being under funded to the point that outsourcing is the only alternative.

On the other hand, the private sector workforce has developed very little long-term skill and expertise in winter maintenance. The natural pools to draw from are equipment operators who work in the spring, summer and fall on road construction. But these workers, especially those in Snow Belt states, tend to put in long workdays in the summer and build up a lot of overtime when work is available. Accumulated overtime, coupled with eligibility for unemployment benefits though the winter months, is often enough to make very few of them available for winter employment.

With that comes the challenge. The public sector is having to learn how to contract out work they haven't had much experience outsourcing before and the private sector producer is having to learn how to bid on work they haven't had much experience performing before. The challenge is compounded for the private consultant/manager who lacks experience in managing winter maintenance and now has to subcontract the work to that inexperienced private sector producer as a third party.

II. PROCESS USED FOR THIS STUDY

The scope of this project was limited to finding the *best practices* among governmental agencies that outsource winter maintenance services. Information for the project was solicited from several different governmental sources:

- a. State DOT members of AASHTO (American Association of State Highway and Transportation Officials)
- b. Selected Highway Authorities

- c. All subscribers of the Snow and Ice Mailing List (University of Iowa List Serve)
- d. All Canadian Provinces
- e. Selected European Countries

Various means of communication were used including personal letters, personal e-mail messages and a electronically generated mailing over the Snow and Ice Mailing List.

Everybody contacted was asked if they outsourced any winter maintenance services and if so, would they submit a copy of their contract or agreement.

The response was quite good. The survey generated responses from forty of the states, one county, eight cities, three toll and thruway authorities, seven Canadian provinces and two countries. Of the ten states that did not respond, only five of them would be considered snow states, none of which have a reputation of outsourcing any significant amount of winter work.

The project ended up with a total of sixty-one responses. Twenty-seven of the responses included copies of their contract documents. Only seventeen of the sixty-one reported that they did not outsource any winter maintenance to either the private sector or to other local governmental agencies. (Ref. Appendix B)

The good response could be attributed to three things:

- a. The survey had only three simple yes/no questions on a single sheet of paper, which in most cases, could be answered by simply replying with an e-mail message.
- b. The subject is one that is of interest to most of them and will be looking forward to seeing the report.
- c. Many of the persons receiving the question recognized the names of one or both of the team members conducting the survey.

III. SIGNIFICANCE OF OWNER/MANAGER/PRODUCER SCENARIOS

The purpose of addressing and summarizing the various owner/manager/producer scenarios in the report is to point out that winter maintenance contracts are arranged both at the producer level and the manager/administration level and that they involve public-to-public parties as well as public-to-private.

And as the parties involved vary (public vs. private) and the stage of the process vary (administration vs. production), so does the need for and the importance of performance measures and pay items vary.

For example, the contract between the owner-agency and the private management company can be written in terms of **outcomes** a lot easier than the contract between the management company and the subcontractor.

Likewise, a municipal agreement between a state and a city to do routine maintenance on a state highway through that city is different than one with a for-profit contractor to do the same work on the same road.

This survey gathered examples of contracts that are primarily between a governmental agency and a private contractor. Some of the contract language used in government-to-government contracts, like municipal agreements, is perhaps transferable as well. And while the samples received from the Canadian Provinces and Scandinavian countries are perhaps difficult to transfer directly, they do provide many new approaches and ideas, which are transferable.

Unfortunately, this study did not survey private contractors so contract language that prime contractors use to subcontract the actual production work to subcontractors was not gathered. Hopefully what has been learned from contracts written at the public level are at least in part transferable to the private sector as well.

IV. WHAT WAS LEARNED

A. Establishing A Foundation To Analyze Data Received

For purposes of establishing a foundation from which to analyze the data received, the work function is defined as being a process of taking available **inputs** and using them to generate **outputs** that produce **outcomes** that lead to **value** as measured by the customer.

Input → **Output** → **Outcome** → **Value**

In winter maintenance, these terms may be described as follows:

INPUTS are resources like labor hours, equipment hours, material units, etc. and the monies expended for using these resources.

OUTPUTS are accomplishments like lane-miles/kilometers plowed, lane-miles/kilometers sanded, trucks equipped, etc.

OUTCOMES are bareness of pavement, reaction time, friction, reduction in accidents, duration and frequency of closures or chain ups, advance warning time to customers, etc.

VALUE to the customer are issues like comfort, satisfaction, feeling of security, being able to travel when and where one wants to (access), being able to travel at own speed (mobility), advance knowledge of what to expect, etc.

Inputs and **outputs** are quantitative and are things that are generally *counted*. **Outcomes** and **value** are qualitative and are things that need to be *measured*.

At best, **outcomes** selected should be those most able to be correlated with **value**. In other words, an incremental change in **outcome** generates a corresponding incremental change in **value** to the customer.

B. Input/Output/Outcome/Value Performance Measures

While analyzing the material received from the survey, it was noticed that many examples of contract language dealing with performance standards (levels of service) could be aligned with one or more of the management elements of **input**, **output**, **outcome** and **value**. While rare, examples of **outcome**-based levels of service do exist in various forms in contracts reviewed in this project. Most, however, are written at the **input** or **output** level. (Ref. Appendix D)

Input level performance specifications, at best, define how many people must be available, how trucks will be equipped, how many spare trucks are needed, what the minimum carrying capacity shall be, etc.

Output level performance specifications sometimes define methods of performing the work, like the sequence of calling out crews, the proper order of plowing the road, the speed at which plows should travel, the rate chemicals should be applied, the requirement that spreaders be calibrated, etc. They assist in giving the owner-agency some added confidence that a given **output** will be achieved. Specifying that a certain number of miles will be plowed or sanded within a certain number of hours after a storm is even more **output** based.

Outcome level performance specifications reflect results as perceived by the motorist. An example is “The contractor shall schedule his work such that by noon of the day following the end of the storm, three and a half (3 ½) feet of the pavement will be exposed on each side of the centerline” (Ref. Appendix D, item 29, Maine DOT).

A unique example of an **outcome** based performance measurement has been developed by the Minnesota Department of Transportation. The performance standard for Bare Lanes is defined in both photographic and narrative form. Their in-house maintenance crews are measured against a Regain Time standard (time from the end of the event until bare lanes are obtained) for each road classification, i.e., how long it takes them to achieve a given winter maintenance service level of bareness after a storm event is over. (Ref Appendix D, Item 29, MNDOT)

Another example of **outcome** level specifications is from Sweden. Sweden stipulates that their “highest volume road shall be free from snow and ice no later than two hours after the snow has stopped falling if the road surface temperature is above –8 degrees C (18 degrees F). Further, during the period when the snow is actually falling, the depth of snow shall not exceed 2 cm (0.8 in.) and slush depth shall never be more than 1 cm (0.4 in.)”. (Ref: Winter Road Maintenance- The Swedish Way, by Jan Olander, Swedish National Road Administration, a paper presented at TRB Snow and Ice Symposium, Roanoke, VA, Sept 2000).

C. Input/Output/Outcome/Value Pay Items

One of the challenges of writing contracts for outsourcing work is to determine what measure should be used to determine the amount of money the contractor would be paid for the services. Winter maintenance contracts today are written where reimbursement to the contractor is based on consumption of **inputs**, the production of **outputs**, as well as the delivery of **outcomes**. (Ref. Appendix C)

Input based pay items are the most common means of reimbursing contractors for work in the samples reviewed. A typical example is where the contractor reports the number of hours and/or material committed to the job and reimbursement is made at some pre-agreed rate directly based on usage. The unit cost rate may be based on labor hours, equipment hours, or material used. The rate is most often by the hour. **Input** based pay items are related directly to time and usage.

Output based pay items are generally tied to work accomplishment, i.e., units of work performed. Examples include payments made on the basis of the number of miles maintained, the number of storms called out, number of rounds made, etc.

Outcome based pay items typically specify that the contractor will receive a pre-agreed upon lump sum payment for a season to maintain a given section of road or facility. For example, the Alaska Department of Transportation and Public Facilities (AKDOT) pays a contractor to provide full winter (and summer) maintenance for an airport for one full year (Ref. Appendix D, Item 29. Performance Standards Specific to Plowing, AKDOT)

Another good example of an **outcome** based pay item is in the Virginia DOT where they simply call for the contractor to achieve bare pavement within 24 hours after completion of the storm and payment for this service is in lump sum per year (Ref. Appendix D, Item 29. Performance Standards Specific to Plowing, Virginia DOT)

A third example of an **outcome** based pay item is in the City of Kansas City MO contractors get paid lump-sum payments on a route-by-route basis to remove snow from residential streets. The lump sum amount is for one storm. (Ref. Appendix. D, Item 27, Pay Units for Work, City of Kansas City MO)

Several municipal agreements are quasi-examples of being **outcome** based. These are the agreements where a city is paid a certain lump sum of dollars per centerline mile per year to perform all routine maintenance (including winter maintenance) on specified state highway(s) within the city or county limits (Ref. Appendix. D, Item 27, Pay Units for Work, KYTD)

D. Mixing Performance Measures and Pay Items

The vast majority of the winter maintenance service contracts written today are a blend or mix of **input** level pay items with **output** or **outcome** level expectations. For example, a contractor may be required to have his equipment report to work within a specified period of time after being called (**outcome** based work accomplishment) but he is reimbursed for the time the equipment is used plowing snow (**input** based).

E. Assignment of Risk and Outcome Based Pay Items

Most of the contracts reviewed as part of this survey transferred little risk to the contractor. There is, however, evidence that owner-agencies are slowly rewriting contracts to transfer the risks, or at least split more of the risks, onto the private sector contractor. This is becoming more and more possible as the private sector matures and becomes more learned in the art and science of winter maintenance. Other factors contributing to this movement are the trend toward contracting out whole road sections for full winter seasons, the use of multi-year awards and the options to extend contracts beyond the initial contract without re-bidding.

As pay items in winter maintenance service contracts continue to become more **outcome** based, so will the trend be for risk to be transferred from the owner-agency to the contractor/producer. Here again, using the Virginia DOT as an example, their winter maintenance contract is **outcome** based and includes little if any provisions for mobilization, standby, etc. Just so much per year, irrespective of how bad or good the winter might be.

V. SUMMARY OF PROGRESSIVE APPROACHES TO OUTSOURCING WINTER MAINTENANCE SERVICES

A common theme has developed in the course of summarizing the *best practices* of outsourcing winter maintenance services and that is that contracts should be written to include both **outcome** level performance measurements and **outcome** based pay items.

Consistent with that thinking, there are some very “progressive” examples to summarize in this section of the report. They are from Alaska, Maine, Minnesota, Virginia, Kansas City MO, and Sweden.

- The Alaska Department of Transportation and Public Facilities (AKDOT) lets a contract to provide full winter (and summer) maintenance on airports such as the Chenega Bay Airport for one full year. The contract specifies, among other things, that snow removal efforts must begin prior to 2 inches of accumulation, that the snow must be plowed to 20 feet outside the edge of the runway, that snow/frost must be cleaned from lights, sign and threshold panels daily as necessary, etc. The contractor is basically expected to maintain and operate the airport throughout the contract period such that the airport is kept open every day of the year and “to provide that level of service which will insure the safe and convenient use of the airport by the public”. (Ref. Appendix D, Item 29. Performance Standards Specific to Plowing, AKDOT)
- The Maine DOT includes an **outcome** level performance specifications which states that “The contractor shall schedule his work such that by noon of the day following the end of the storm, three and a half (3 ½) feet of the pavement will be exposed on each side of the centerline”. (Ref. Appendix D, item 29, Maine DOT)
- In the Minnesota DOT, their in-house maintenance crews are measured against a Regain Time standard for each road classification, i.e., how long it takes them to achieve a given winter maintenance service level of bareness after a storm event is over. Reports called Snow & Ice Dashboards are produced that include graphs that look like gauges on an automobile dashboard. The arrow shows what range their response time was in. Did it fall in the green range, which is okay, consistent with the performance criteria? On the other hand, did they fall in the low yellow range or the high yellow range, which indicates room for improvement? Or did it fall outside the yellow bands and into the red areas, which means corrective action needs to be taken. These Dashboards can be prepared by individual route section, by route classification, by storm, by crew, by district or any combination. District managers review these reports and, if necessary, make appropriate adjustments, albeit, by reassigning equipment or personnel, adjusting methods or work schedules or enhancing training. District budgets can also be adjusted. (Ref. Appendix D, Item 29. Performance Standards Specific to Plowing, MNDOT)
- The Virginia DOT specifies that the contractor (VMS, Inc.) achieve bare pavement within 24 hours after completion of the storm and payment for this service is in lump sum per year. (Ref. APPENDIX D, Item 29. Performance Standards Specific to Plowing, Virginia DOT)

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- The City of Kansas City MO contractors get paid lump-sum payments on a route-by-route basis to remove snow from residential streets. The lump sum amount is for one storm. (Ref. APPENDIX D, Item 27, Pay Units for Work, City of Kansas City MO)
 - Sweden stipulates that their “highest volume road shall be free from snow and ice no later than two hours after the snow has stopped falling if the road surface temperature is above –8 degrees C (18 degrees F). Further, during the period when the snow is actually falling, the depth of snow shall not exceed 2 cm (0.8 in.) and slush depth shall never be more than 1 cm (0.4 in.)”. (Ref: Winter Road Maintenance- The Swedish Way, by Jan Olander, Swedish National Road Administration, a paper presented at TRB Snow and Ice Symposium, Roanoke, VA, Sept 2000)

A summary of the *best practices* learned from this project are as follows:

- *Best practices* are those that address the fact that the private sector workforce may not yet be fully available and trained, but clear contractual language is included 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 with fluctuating winter weather year to year.
- *Best practices* are those that understand the importance of contractors having an approved Snow And Ice Plan but confine contractual language to measurable outcome-based performance measures with payment for work correlated with measured performance achieved.
- *Best practices* include insisting that everything possible is done to 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).
- *Best practices* are those that generate a strong willingness and desire on the part of the private sector to conduct its own R&D as a means of maintaining its own competitiveness and becoming most effective and efficient in producing defined and measured outcomes.
- *Best practices* are those where producers benefit from proactively responding to RWIS based predictions of road surface conditions and are encouraged to utilize anti-icing and other preventive methodologies to more expediently meet customer expectations.
- *Best practices* seek ways for such advancements in knowledge to be transferred and shared as much as possible throughout the entire industry as if it were public knowledge.
- *Best practice* uses 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 winter maintenance services to the public. After all, if they do not, the owner-agency will ultimately be responsible for initiating corrective action anyway.

I. INTRODUCTION

A. Background

Almost all roads and streets in the USA are in the public domain and therefore under the jurisdiction of various governmental agencies at the federal, state, county or local level. The beginning of the public road system is said to have occurred when the General Assembly of Virginia passed the first road law of the American colonies in 1632. So public owner-agencies have been providing winter maintenance services on these roads for many decades, if not centuries. They have accumulated vast amounts of experience developing work plans and systems, training and equipping personnel and conducting research to find better methods of producing services. Winter maintenance has progressed over the years to become both an art and a science. Through this, many snow fighter organizations have developed into first-class operations and are recognized as such, either locally by their constituents, nationally by their peers, or both. Many are even recognized and respected internationally.

Most owner-agencies of public streets and highways, at least in the northern snow and ice belt states, have traditionally organized themselves with their own in-house systems, equipment and personnel to provide winter maintenance services. For the most part, the private sector has been tapped only during or after an extreme emergency storm. The long-standing belief has been that being self-sufficient and having all systems and resources under one umbrella organization provides the easiest and, therefore, the best chance to meet customer needs, both efficiently and effectively.

But this arrangement has its' critics. It is becoming commonplace today for public citizens and their elected legislatures, commissioners and councils to insist that governmental entities become more and more accountable and responsive. They say it would be better if government were run "more like a private business", where success or failure depends on meeting customer needs in a competitive environment. The premise is that owner-agencies that provide services with 100% in-house forces are simply "governmental monopolies" that do not have to compete for work and, therefore, are very susceptible to inefficiency. The feeling is that government functions cannot possibly be as creative and innovative as they would if they were performed in the profit-motivated private sector. It is an outgrowth of the trend toward privatization, fueled by the increasingly popular attitude that governmental services could be delivered faster and better if they were produced in the private sector.

So, *who* produces winter maintenance services is under close scrutiny. Reactions to the pressure vary from agency-to-agency, from state-to-state and from country-to-country. Some owner-agencies, like Minnesota, are continuing to produce winter maintenance services using in-house forces but are creating a competitive environment by tying budgets to a sophisticated performance measurement system, monitoring progress one year to the next and comparing one production district to the other. Some countries, like the Finnish National Road Administration, have split off their in-house production units into independent cost centers to the end that they compete for jobs against private contractors. Some states, like Virginia, have taken entire sections of roadway and contracted out all of the routine maintenance on that section, including winter maintenance services, to a private contractor/administrator. In some Canadian provinces, like British Columbia, the owner agencies were not even given a chance to run more like a business; they were legislatively ordered get out of the business, and to do so in a very short period of time. Other countries, like New Zealand, have not produced any form of road maintenance services in-house for many years.

These are all examples where there is a clear change of internal policy or a direct mandate from the outside. In some organizations, change is being brought about by something more subtle. Maintenance operating budgets are simply becoming so inadequately funded that outsourcing is the only alternative. This adds meaning to a quote from an article in Better Roads (April 2001, p. 17), which stated: "It's not really a case of *anything you can do, we can do better*. It's more like *anything you don't have time to do, we can do sooner*."

So, membership to the winter maintenance community is clearly changing. Yesterday, the production part of this community was made up almost solely of public employees. Today, the membership is expanding to include private sector producers as well as the private consultant/managers. And in some geographical areas of the world, membership is expanding quite rapidly.

With that comes the challenge. The public sector is having to learn how to contract out work they haven't had much experience outsourcing before and the private sector producer is having to learn how to bid on work they haven't had much experience performing before. The challenge is compounded for the private consultant/manager who lacks experience in managing winter maintenance and now has to subcontract the work to that inexperienced private sector producer as a third party.

B. Definition of Problem

This project, entitled *Best Practices of Outsourcing Winter Maintenance Services*, is a response to the need to identify the best, most creative contract language and provisions that are being used by various owner-agencies today. The strategy used was simply to take a survey, review the material received from the survey and identify the *best practices* used. Admittedly, there are a number private sector management and production companies existing today that manage and/or produce winter maintenance services. For purposes of this study, however, the scope of the project was limited to identifying the *best practices* used by governmental, owner-agencies.

More and more states, counties and cities across the entire USA are, for one reason or another, are either starting to outsource some of their winter maintenance or are expanding the amount they outsource. As such, many are seeking advice from others as to how best to write the contract. One might expect then that it is the owner-agencies that have defined this problem to the point that this study was initiated. But this is not the case. The problem has been identified and is being funded by the private firm of VMS, Inc., Richmond, VA. VMS, Inc. has total asset maintenance contracts with several owner-agencies including the Virginia Department of Transportation, the Texas Department of Transportation, the Oklahoma Department of Transportation, the Oklahoma Turnpike Authority and City of Washington, DC.

But what are "*best*" *practices*? Are they the ones that are most clever? Or are they the most unique? Maybe the best are the ones that use the fewest words. Or, how about those that are the easiest to understand. Not necessarily! The *best practices* are those that best guarantee the delivery of the measurable results intended.

But before trying to identify *best practice* of outsourcing winter maintenance services, it is important to briefly discuss some of the situational circumstances under which winter maintenance contracts are being written today.

For discussion purposes, the issues and circumstances that are germane to this issue can be categorized into three groups:

- a. The private sector (its readiness and capability to produce the work),
- b. The public sector (how it produces work in-house and how that relates to writing contracts to outsource the work)
- c. Technology (the need to advance new technologies into the production of winter maintenance services, whether it be produced in-house or under contract)

a. Private Sector Situation:

The first category of issues needing to be addressed is the circumstances under which the private sector is operating and available today:

- In the big picture, it can be stated that most outsourcing of winter maintenance services in the past has been initiated because of severe emergencies, where the storm's intensity or its duration was deemed to be beyond in-house capability. Because of limited opportunity, the private sector workforce on the whole has developed very little long-term skill and expertise in winter maintenance. Those that have

are localized and few in numbers. Furthermore, what little experience they have had can be classified as “doing exactly what they were told to do and doing it in short assignments that seldom reoccur many times during the season”.

- Without some expectation that a significant amount of work would be available throughout a given winter season and without some assurance that the work will repeat itself winter-to-winter, it is very difficult to develop and maintain a skilled and ready work force. The natural pools to draw from are equipment operators who work in the spring, summer and fall on road construction. But these workers, especially those in Snow Belt states, tend to put in long workdays in the summer and build up a lot of overtime when work is available. Accumulated overtime, coupled with eligibility for unemployment benefits though the winter months, is often enough to make very few of them available for winter employment.
- Furthermore, there has been no incentive for the private sector to make any significant investment in properly designed and efficient equipment. The typical contractors truck is designed for hauling and has a long wheelbase so the payload weight in the box is partially carried by the front axle. Snow plowing trucks require a shorter wheelbase, with most of the payload being carried by the rear axle. Carrying capacity of the front axle needs to be reserved for the weight of the front mounted plow and hitch. Without some guaranteed annual workload, the private sector has no reason to invest, for example, in chemical spreading equipment, especially the anti-icing equipment being used today.

As a result of these readiness issues, some owner-agencies who are beginning to outsource work feel obligated to assume at least partial responsibility to develop a trained and equipped industry in the public sector. Evidence of this shows up in contracts in the form of provisions like guaranteed minimums per season, up-front payments for mobilizing equipment, providing owner-agency owned auxiliary equipment to be mounted on contractors vehicles, minimum show up time, fuel inflation provisions, owner-agency provided training programs, etc.

The challenge is to how to find ways that will develop and maintain a large enough pool of skilled workers in the private sector that will be available throughout the winter. What needs to be done to cause the private sector itself to invest in modern, hi-tech winter maintenance equipment? What size does a contract need to be and how many seasons should one contract cover? What are the chances of long-term contracts creating a monopoly in the private sector? And when the contract expires and is rebid, what happens if the experienced contractor is not awarded the new contract? Are the skills lost?

If maintenance work is to be outsourced, *best practices* are those that create an environment where, at least eventually, the risk and responsibility of developing a stable, properly equipped workforce is carried primarily on the shoulders of the private sector and the contractor, where the free and competitive market establishes the appropriate incentives.

b. Public Sector Situation:

The second issue deals with the readiness of the public sector owner-agencies to outsource winter work:

- While the public sector owner-agencies may already have a pool of skilled workers and an efficient fleet of snow and ice control equipment, few have had much success in developing clear and measurable performance standards suitable for incorporation into formal contracts for outsourcing the work. Up to this point, the need did not appear to very high. Yes, standard levels of services guidelines govern most in-house operations. But few are written or ever used for the purpose of measuring or monitoring actual performance. Instead, the focus is on writing detailed action plans and updating them every year. Action plans spell out work schedules, assigned routes, application rates, etc. Accomplishment is achieved by following the plan, coupled with a high degree of teamwork, close communication between operators and supervision, and continuous flexibility to adjust to an ever-changing winter condition. Budgets are not generally tied directly to performance. What works best is for in-house budgets to be open-ended so that an overrun in snow and ice one winter can be

funded by deferring some spring and summer activities (and vice versa after light winters). Employees are hired with a full-time year-around salary so other work is assigned between storms.

- While the public sector today may not be driven by “contractual” performance measures, neither are they motivated to be drive too fast or drive too slow, put on too much chemical or too little, minimize cutting edge wear, etc. Their pay is not directly related to availability of winter related work like it typically is for private sector plow operators. This can be construed to be both good and bad. But, snow plowing is considered one of the most self satisfying and rewarding activities that a public employee can do and there is a lot of good, positive feedback they get while plowing and sanding. This relationship with the public invigorates their “public service attitude” and generates a phenomenon of self-motivation to not only delight the customer but to do so in a manner where his/her pavement becomes open or bare before other fellow employees does.

Given this, it is somewhat understandable that owner-agencies who are just beginning to outsource winter maintenance work tend to write contracts in “prescription” form, i.e., prescribing specifically the numbers of personnel and/or equipment required, how equipment must be configured, what the minimum call out time is, how routes are to be defined and assigned, what application rates to use, etc. Unfortunately, the importance of having performance measures as opposed to level of service guidelines is becoming clear for the first time among many owner-agencies. For the private sector to show that they are less costly and more efficient, they need to know what is expected of them in terms of results and be allowed flexibility in staffing, equipping and methodologies to achieve that outcome.

So the *best practices* are those that focus attention on outcomes rather than inputs or process and written in such a manner that the private producer is focused on meeting the motorist needs as opposed to simply minimally meeting contract language that focus primarily on procedures, dimensions and quantities.

c. Advancement of New Technologies:

The third category of issues deals with advancing new technologies into the production of winter maintenance service:

- Research and development efforts in the 1990’s have brought about significant technological advancements into the winter maintenance community. The advent of road weather information systems (RWIS) is currently providing most owner-agency managers and operators the confidence level to initiate and practice anti-icing methodologies prior to a storm. Many new chemicals being used today, especially those in liquid form, require more sophisticated distribution systems and additional equipment investments. Technological change is a journey that continues yet today. The ability to measure in real time the pavement temperature, the pavement friction, and the freezing point of salt brine already on the road surface are all technologies that are currently being tested. Moreover, many of today’s highway engineers are being trained to design and locate snow fence, as well as redesign roadway cross-sections and alignment, in an effort to prevent drifting snow to accumulate on the road.
- Contract language that includes pay items that simply covers reimbursement of costs does not breed efficiency. Language that quantitatively measures and monitors work accomplished (such as miles plowed or quantities of salt distributed) does not in itself breed effectiveness. It is becoming universally accepted that being proactive is more cost effective than being reactive. RWIS systems have been installed in basically every state that experiences winter driving conditions. Mobilizing crews before ice is formed is more cost efficient and is more aligned with meeting customer needs than mobilizing the crew after the ice forms. Owner-agency trucks are being retrofitted so they are capable of distributing both liquids and solid chemicals to the end that anti-icing techniques are becoming commonplace in more and more states and counties every year. Unfortunately, the manner in which many “prescription” type winter maintenance contracts are written today, there are built-in disincentives rather than incentives to be proactive. At a conference attended by all of the private contractors producing winter maintenance in New Zealand, for example, the road administration was promoting a more proactive as opposed to a reactive approach to dealing with icy roads. The

audience's response was, at best, skeptical until such time that the existing contract expired and/or was rebid. In part, the contractors' perceived that being proactive (anti-icing) would cut into the amount of workload currently generated in the winter season.

Assume for a moment that all winter maintenance work had been outsourced for the last 10 years. How would the contracts have had to be written in order to generate the same advancements in RWIS and anti-icing that in-house organizations have generated? Who would have financed it? How would it have been financed? What about ownership issues? How could what is learned be transferred to other states and counties? Would patent rights be an issue? If so, who would have owned the patent rights?

Best practices contracts would have had to be written such that the contractor would profit from proactively responding to RWIS based predictions of road surface conditions and therefore be encouraged to utilize anti-icing and other preventive methodologies to more expediently meet customer expectations.

Furthermore, the *best practices* would be contract language that serve as incentives to make investments in research and development and, to the extent possible, have an arrangement that what is learned is shared with peers in order to maximize the benefit to society a whole.

Admittedly, for the private sector to invest in newly developed technologies, it needs to be confident that it will generate some return on the investment. Otherwise, the contractor will view new technology simply as an expense and have reason to refrain from participating.

II. PROCESS USED FOR THIS SURVEY

The scope of this project was limited to finding the *best practices* among governmental agencies that outsource winter maintenance services. Information for the project was solicited from several different governmental sources:

- A. State DOT members of AASHTO (American Association of State Highway and Transportation Officials)
- B. Selected Highway Authorities
- C. All subscribers of the Snow and Ice Mailing List (University of Iowa List Serve)
- D. All Canadian Provinces
- E. Other Selected Countries

A. AASHTO Member State DOTs:

As a means of gathering information from the state DOT members of AASHTO, names were drawn from the AASHTO Reference Book as well as the latest membership list of the AASHTO Subcommittee on Maintenance. Attendance rosters were reviewed of the most recent Subcommittee meeting held in July 2000 in Juneau, Alaska as well as the TRB Snow & Ice Symposium held in Roanoke, VA in September 2000. Noting that some states had more than one active representative at these meetings, one from each state was selected that was felt to be most closely associated with winter maintenance operations. Colleagues known most personally by the researchers were often selected. Individuals with working titles such as state maintenance engineer or maintenance operations engineer were most common.

A letter was prepared in the form of a short, one page questionnaire. (See Appendix A-1) The letter simply introduced the project and its objective and asked three simple “yes” or “no” questions:

- a. Does your department outsource any winter snow and ice control service to either private or other public agencies?
- b. If “yes”, does your department initiate a formal document with them to provide winter maintenance services?
- c. If “yes”, would you please send a copy of the proposed contract or agreement for our review?

The letter stated that they would be gladly reimbursed for their copy or postage costs. They were given a single mailing address for surface mail as well as phone numbers and e-mail addresses to both members of the project team.

This letter was sent two ways: regular surface mail and e-mail.

- a. Surface Mail: For the letters that were sent surface mail, each letter was prepared formally and personally addressed to each individual by name (Appendix A-1).
- b. E-Mail: For those we had e-mail addresses, we sent a short message and attached with it a generic form of the formal letter (Appendix A-2). The message simply explained that the surface letter was in the mail and that if they prefer, they could answer us by e-mail.

Letters were not sent to Hawaii or Puerto Rico because of lack of winter weather. Since the FHWA does not produce winter maintenance services, none of their offices were contacted. The state of Virginia and the District of Columbia were not contacted because they were currently under contracts with the project sponsor (VMS, Inc.) to perform winter maintenance services so their information was already available to the team.

In summary, contacts were made by surface mail to 48 of the state DOTs. Follow up e-mail messages were sent to 44 of them who had known e-mail addresses.

B. Selected Highway Authorities

From the list of Associate Members of AASHTO, four (4) highway authorities were selected to receive the questionnaire. They were each sent personalized letters by surface mail, as shown in Appendix A-1.

Mailings were sent to the following:

Illinois State Toll Highway Authority
Massachusetts Turnpike Authority
New Jersey Turnpike Authority
New York State Thruway Authority

C. Snow and Ice Mailing List

Over 4 years ago, Dr. Wilfrid Nixon with the University of Iowa set up an electronic mailing list (list serve) specially designed for snow and ice enthusiasts around the world to seek answers to questions and to exchange new ideas related to winter maintenance. At the time of this study, about 460 people were subscribed. Initially, the project came out of the TRB Committee on Winter Maintenance (A3C09). It has since become the mailing list for those with e-mail addresses to discuss common issues relative to snow and ice, including activities surrounding the AASHTO Snow and Ice Pooled Fund Program (SICOP).

See Appendix A-3 for a copy of the notice that was sent out.

D. Canadian Provinces

The mailing list for Canadian provinces was developed using the same AASHTO Reference Book, the AASHTO Subcommittee on Maintenance membership lists and conference attendance rosters. One contact from each province was selected and each received the same personalized letter (Appendix A-1). In cases where an e-mail address was known, the letter was also sent as an attachment to an e-mail message (Appendix A-2).

The Ministries of Transportation were contacted in the following Canadian provinces:

Alberta	New Brunswick	Nova Scotia
British Columbia	Newfoundland	Ontario
Manitoba	NW Territories	Saskatchewan

In summary, contacts were made by surface mail to nine (9) Canadian Provinces. Follow up e-mail messages were sent to four (4) of them who had known e-mail addresses.

E. Other Selected Countries

Personal requests for information were sent to selected countries in Europe. Contacts were limited to those countries that were believed to be 1) most active in outsourcing winter maintenance, 2) were progressive in definition of performance measures, 3) would be responsive to a USA request for information, and 4) were apt to have printed information that could be shared in English.

The countries contacted were Sweden, Norway and New Zealand, as was the city of Helsinki, Finland. It was the intention to contact Japan but because it was learned that they were just in the process of benchmarking best practices for outsourcing their own work, it was decided to not pursue them at this time. Sweden, Norway and New Zealand responded.

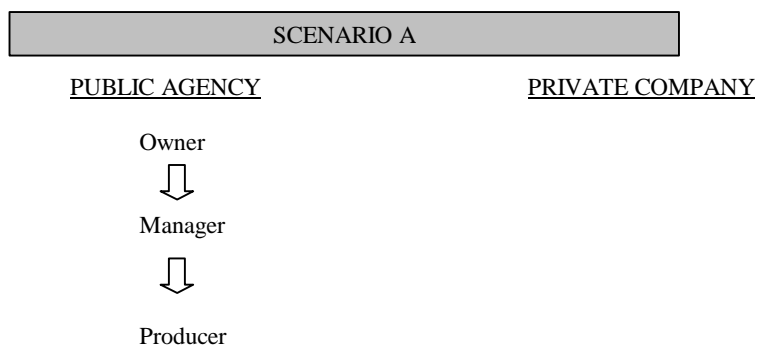
III. OWNER-MANAGER-PRODUCER SCENARIOS

In making the survey for this report, it was found that when it comes to production of winter maintenance services, there are several scenarios present as to who owns the road, who manages the winter maintenance of that road and who produces the winter maintenance services. The different scenarios can be defined as:

- Scenario A - All Work Produced By Owner Public Agency
- Scenario B - Some Work Produced by Another Public Agency
- Scenario C - Some Work Both Managed and Produced by Another Public Agency
- Scenario D - Some Work Produced by Private Company
- Scenario E - Some Work Both Managed and Produced by Private Company

A. Scenario A - All Work Produced By Owner Public Agency

The traditional scenario is that the government owns the public roads, the state DOT, city or county has full-time, publicly-employed managers who develop, implement and administer the winter maintenance plan using full-time, publicly-employed maintenance workers using publicly-owned equipment, dispatched out of publicly-owned facilities. In other words, the owner, the manager and the producer were all within the same governmental organization



Several of the USA State DOTs who responded to the survey stated that they performed all winter maintenance services using only in-house forces and do not contract out work to either other local governmental agencies or to private contractors. Included are:

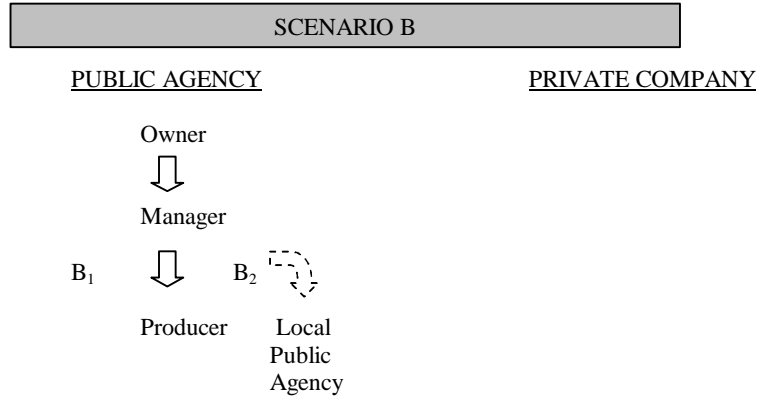
Arkansas	Louisiana	North Dakota
Arizona	Mississippi	Oregon
California	Missouri	Utah
Colorado	Montana	Washington
Kansas	Nevada	West Virginia

Likewise, the Illinois Tollway and the New York Thruway operate similar to this Scenario A.

B. Scenario B – Some Work Produced by Other Public Agencies

While Scenario A is recognized as traditional, it is also common for the owner-agencies to produce some maintenance work in-house (B_1) but enter into winter maintenance service contracts with another local governmental agency to perform some specifically identified reoccurring services or to serve as a back up in case of severe storms or storms of long duration (B_2). Typical are state agencies that have a standing municipal agreement with a local city to perform all routine maintenance (including snow and ice control) on a section of state trunk highway within the city limits. Another example is a state owner-agency having a contract with a

local municipality to perform snow-hauling services from between the traveled roadway and the curb for the section of state truck highway within the municipality. There may also be standing emergency agreements that specify the conditions under which one jurisdiction can or would perform services for the other in case of a winter emergency.



Of the state DOTs that responded to the survey, the following reported that they regularly have agreements with local governmental agencies to perform specific winter maintenance services:

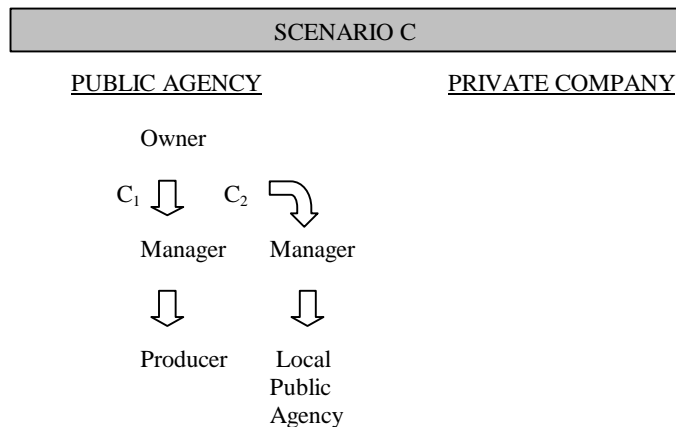
Iowa	Minnesota	Oklahoma
Kentucky	Nebraska	
Maine	North Carolina	

C. Scenario C – Some Work Both Managed and Produced by Another Public Agency

This scenario is practiced most in two states that responded, namely Michigan and Wisconsin.

The Michigan DOT practices three different scenarios, varying from county to county. In some Michigan counties, in-house forces employed by the Michigan DOT maintain the state and interstate roads (C₁). In other counties, the local county or city is under contract to maintain all the state/interstate roads within that jurisdiction for the Michigan DOT (C₂). In others counties, all maintenance services are produced under contract with private contractors (see Scenario F₁ and F₂ below).

In Wisconsin, the State DOT has an annual contract with the respective counties to manage and produce all of the state’s winter maintenance services (C₂). Wisconsin DOT has no in-house maintenance capability to perform common routine maintenance services.



MNDOT, OHDOT and NYDOT also have contracts with cities that follow scenario C₂, but they generally are limited to specific sections of roadway within the city limits.

D. Scenario D – Some Work Produced by Private Company

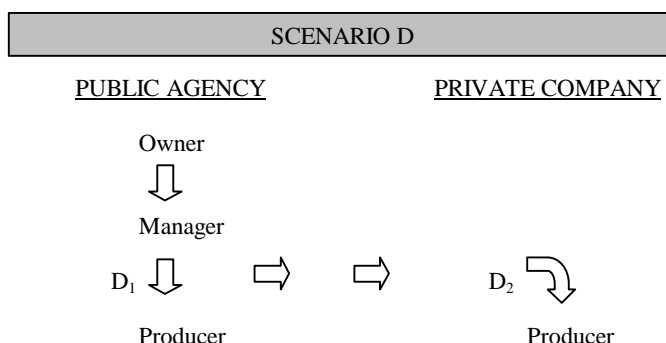
A quite common modification of Scenario A is where the public owner-agency produces maintenance work in-house (D₁) but enters into winter maintenance service contracts with private contractors to supplement and work directly with its own forces performing specific services on a specific section of street or highway (D₂). This could be on a regular on-going basis or only as an emergency back up. Examples of re-occurring maintenance are removing snow from sidewalks, median crossovers, etc. Emergency or back up contracts would be utilized for severe storms, for clean up after storms of long duration or heavy accumulation, etc.

Contracted equipment w/operators are managed, supervised and directed individually by the owner-agency as if they were in-house employees except that when the need is over, they released from duty.

State DOTs reporting that they operate under this Scenario D are:

Arkansas	Massachusetts	South Dakota
Connecticut	Minnesota	Vermont
Idaho	New Hampshire	Wyoming
Kentucky	Oklahoma	
Maryland	Rhode Island	

Likewise, the New Jersey Turnpike Authority operates under this Scenario D.



A slight variation of Scenario D exists in Alaska, South Dakota and Tennessee where defined sections of a highway (or in the case of Alaska, an airport) is contracted out entirely to private contractors but, as described above, the Owner develops the work plan and tells the contractor when to start operations and when to cease.

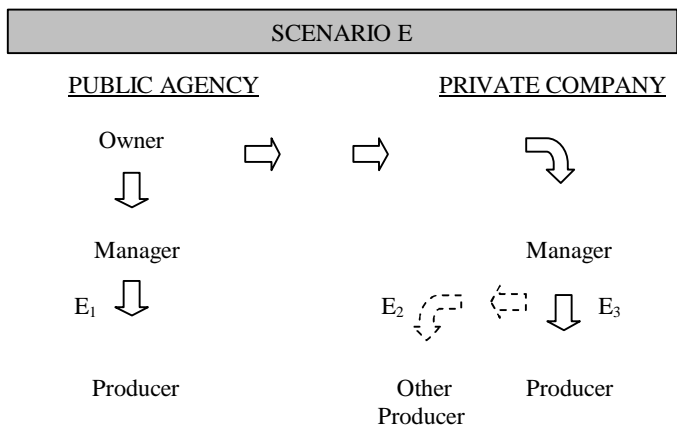
E. Scenario E – Some Work Both Managed and Produced by Private Company

An emerging scenario is where the owner-agency produces some maintenance in-house (E₁) but contracts with privately owned Management Company who is responsible for planning and directing all of the winter maintenance on a specific road section(s) for an entire season. This management company would then be responsible to produce the work according to and approved plan, either by its own forces (E₂) or by subcontracting to another private contractor (E₃) to perform all winter maintenance on a specific road section.

To some degree or another, of the state DOTs that responded to the survey, the following have formal contracts in place with a privately owned management company to plan and direct winter maintenance on at least one section of highway:

Maine	New Mexico	Texas
Michigan	Oklahoma	Virginia

Most of the highways in these states are still maintained by in-house forces.



IV. WHAT WAS LEARNED

A. Inputs, Outputs, Outcomes and Value of Winter Maintenance Services

For purposes of establishing a foundation from which to analyze the data received, the work function is defined as being a process of taking available **inputs** and using them to generate **outputs** that produce **outcomes** that lead to **value** as measured by the customer.

Input → **Output** → **Outcome** → **Value**

In winter maintenance, these terms may be described as follows:

INPUTS are resources like labor hours, equipment hours, material units, etc. and the monies expended for using these resources.

OUTPUTS are accomplishments like lane-miles/kilometers plowed, lane-miles/kilometers sanded, trucks equipped, etc.

OUTCOMES are bareness of pavement, reaction time, friction, reduction in accidents, duration and frequency of closures or chain ups, advance warning time to customers, etc.

VALUE to the customer are issues like comfort, satisfaction, feeling of security, being able to travel when and where one wants to (access), being able to travel at own speed (mobility), advance knowledge of what to expect, etc.

Management systems that managers have had in place for monitoring and measuring road maintenance from an **input-output-outcome-value** perspective have evolved over time. Attention to **inputs** and **outputs** has been popular for over 40 years but interest in measuring and monitoring **outcomes** and **value** is a recent phenomenon.

Prior to the 1960's, the focus of management systems for road maintenance focused primarily on managing **inputs** (how *many* labor, equipment and material resources were consumed and how *many* dollars were expended for the resources used.) Today, most USA State DOT's, as well as most of their counterparts at the local and the international level, have progressed to the point where their maintenance managers have access to systems that measure and monitor **outputs** (how *much* work is produced.) Several of these agencies also have or are in the process of defining ways and means to measure and monitor **outcomes** (how *well* the work was produced.) And some of the more progressive maintenance managers have access to systems that even help them correlate these **outputs** and **outcomes** to **value** received (how *satisfied* did the work make the customer.)

Input data is derived from employee and equipment time sheets and inventory disbursement reporting system. **Output** data is generated from a work accomplishment reporting system. **Outcome** data must be generated by some performance measurement system. **Value** data is generally derived from application of market research techniques.

Inputs and **outputs** are quantitative and are things that are generally *counted*. **Outcomes** and **value** are qualitative and are things that need to be *measured*.

At best, **outcomes** selected are those most able to be correlated with **value**. In other words, an incremental change in **outcome** generates a corresponding incremental change in **value** to the customer.

The ability to gather **inputs-outputs-outcomes-value** data and to incorporate this data into management systems is providing today's road agencies and maintenance producers an expanded means to manage and improve its operation, both in terms of efficiency and effectiveness. For example:

Efficiency is a correlation between **inputs** and **outputs**

Effectiveness is a correlation of **outcomes** with **outputs** and **inputs**

Customer Satisfaction is effected by **inputs**, **outputs** and **outcomes** and most certainly related to both efficiency and effectiveness

B. Importance of Input, Output, Outcome and Value in Specifying Performance Levels

While analyzing the material received from the survey to identify *best practices* of outsourcing winter maintenance services, it was noticed that the many examples of contract language dealing with *levels of service* can be aligned with one or more of the management elements of **input, output, outcome and value**. The same observation was found regarding *pay items* as discussed in the following Section C.

Levels of service requirements in contracts are intended to clearly state what is expected of the contractor. In the competitive business world of manufacturing, level of service requirements are defined in qualitative terms that are based on what is necessary to sell the product to a satisfied end user. Terms like “zero defects” or “guaranteed satisfaction or your money back” are typical goals. Levels of service expectations are clearly at the **value**, if not the **outcome** level.

In the road and bridge construction arena, quality of end products are assured by laboratory testing and specifications that have been researched and developed to the point that if a certain measurable criteria is met, the road or bridge will meet user needs for a prescribed life expectancy of the product. Defined specifications like rideability, smoothness, straightness, brightness, project completion deadlines etc. are all examples of construction **outcomes** that road administrators have determined will give **value** in terms of customer satisfaction. Defined specifications dealing with durability, strength, thickness, etc., are all field engineering and laboratory test measurements that through research have been correlated to service life and safety. Everybody accepts that fact that there are several construction specifications that are written at the **outcome** level that correlate to **value** as measured by the end user customer.

In contracts dealing with winter maintenance, however, there are few examples of levels of service expectations written at **outcome** or **value** level. Most are written at the **input** or **output** level.

a. Input Level Performance Specifications

Some examples, at best, define how many people must be available, how trucks will be equipped, how many spare trucks are needed, what the minimum carrying capacity shall be, etc. These are all important criteria. But these are all examples of specifications written at the **input** level and, in and of themselves, a contractor can minimally meet specifications and not produce the service intended. When **input** level criteria is used, the correlation between defined quantities of **inputs** and quality related **outcomes** that are desirable from an end user perspective is a risk and responsibility retained by the owner, rather than having it passed on to the contractor producing the service.

b. Output Level Performance Specifications

Supplementing **input** requirements with written specifications which define methods of performing the work, like the sequence of calling out crews, the proper order of plowing the road, the plowing speed, application rates of chemical, requiring that spreaders be calibrated, etc, come closer to giving the owner confidence that a given **output** will be achieved. Specifying that a certain number of miles will be plowed or sanded within a certain number of hours after a storm is even more **output** based.

c. Outcome Level Performance Specifications

While they are rare, examples of **outcome**-based levels of service do exist in various forms in contracts reviewed so far. An example is “The contractor shall schedule his work such that by noon of the day following the end of the storm, three and a half (3 ½) feet of the pavement will be exposed on each side of the centerline” (see Appendix D, item 29, Maine DOT).

Outcome based levels of service reflect results as perceived by the motorist. The average motorist clearly has opinions as to how good or bad the winter driving conditions. Their “measuring stick” as to what is good and what is bad, however, is not universally clear. The research that has been done (most notably in Minnesota) suggests that the motorist tends to be satisfied or dissatisfied by 1) how safe they feel while driving and 2) what road conditions they see. There are indications that attitudes toward driving conditions vary with time, i.e. what phase of the storm it is (is it still snowing or not) and how much time has passed since the storm started and/or ended. Evidence also indicates that attitudes are buffered depending on how informed they are of driving conditions before and during their trip.

Market research findings like these are driving several states and countries to pursue new and different ways to measure the quality of winter maintenance services being provided, and to identify measurements that correlate with what the customer feels, what they see and what they expect in terms of recovery time.

What a driver feels deals with the need to have control of the vehicle on the road, especially the ability to accelerate or decelerate at stop signs and the ability to follow curves in the road. The issue is slipperiness, which relates the presence or absence of friction. Friction measurements, as it applies to winter maintenance, were initiated many years ago in certain airports as a means of advising pilots of runway surface conditions in advance of landing airplanes. Norway and Sweden have been leaders in trying to apply friction measurement technology to the highway setting for several years. In the USA, Minnesota, Iowa and Michigan are presently testing friction-measuring devices on their Maintenance Concept Vehicles. Unfortunately, there remains much to be learned as to how to correlate friction measurements to customer satisfaction. The hope is that once the science is fully developed, interest in its application in winter maintenance will increase, leading to increased demand, resulting in reduced equipment costs.

Knowing and understanding that drivers measure road maintenance conditions based on what they see has led the Washington State DOT to utilize photographs of various road and roadside conditions to identify the different levels of service ranging from satisfactory to unsatisfactory. Washington State DOT has used this photograph approach extensively to tie maintenance levels of service to “investment choices” in dealing with their legislature. One of the operational groups covered is snow and ice control.

In a similar manner, the Minnesota DOT uses photographs of various winter road conditions to define their **outcome** based performance measure and to monitor their internal day-to-day operations. MNDOT’s measurements are based on a public survey conducted in 1999 which attempted to identify driver’s comfort and acceptance of six different service levels of snow and ice removal (as depicted photographically to those being surveyed) at various intervals after a snow event. Only two levels had a high level of acceptance with drivers in most scenarios:

1. Bare Pavement - Driving lanes bare with centerline and edge lines showing (See Figure 1)
2. Bare Lanes - Driving lanes bare with centerline and edge lines covered (See Figure 2)

Because there was a relatively high level of satisfaction with both of these levels of service but only a *small* difference between them, the survey clearly suggested that second level (bare lanes) be achieved on all routes prior to removing snow and ice from the centerlines and edge lines.

In Minnesota, snow and ice operations are to begin when conditions, or forecasted conditions, will result in loss of bare lanes. Bare lanes are defined as “the driving lanes will be free of ice and snow between the outer edges of the wheel paths and have no greater than 1inch accumulation on the center of the roadway. Snow and ice removal operations are to continue throughout the event to reach and maintain bare lanes. This should continue as long as adequate visibility permits and reasonable results are obtained. Once bare lanes are obtained and maintained, clean-up operations can be started.”



Figure 1: Bare Pavement



Figure 2: Bare Lanes

MNDOT's operational guideline states that their overall goal is to obtain bare pavement. Their performance measurement, however, is based on bare lanes and is called the Bare Lane Indicator (See Figure 3). The Bare Lane Indicator is defined as the Regain Time required to regain bare lanes after an event ends. MNDOT defines "Regain Time" as the time from the end of the event until bare lanes are obtained. The definition of bare lanes is the same for all routes but the "target" Regain Time is dependent on the classification of roadway. For example, the "target" is to achieve bare lanes in 2-5 hours on 10,000-30,000 AADT urban commuter highways and 4-9 hours on 2,000-10,000 AADT rural commuter highways.

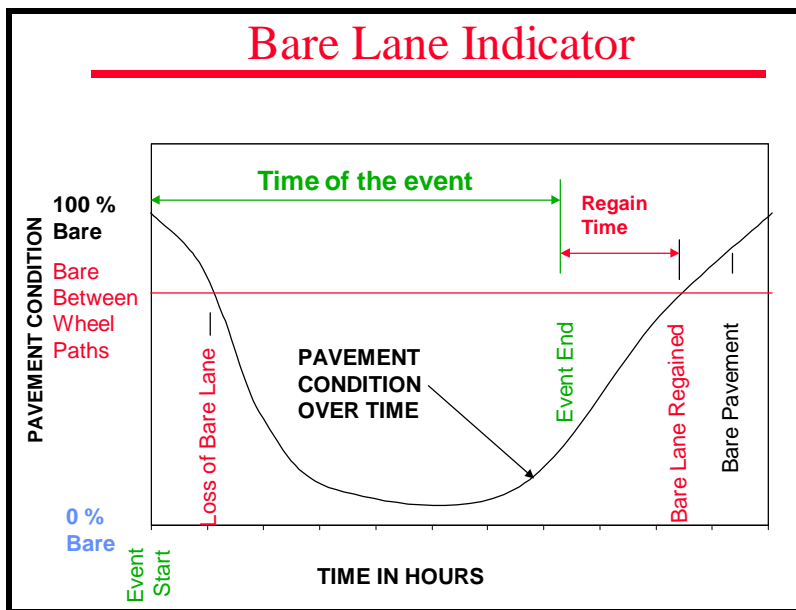


Figure 3: Bare Lane Indicator

Using the photographic and written definition, the Event End and the Bare Pavement Regained date and time are recorded for every storm and on every road segment. In between storms, local supervisors and managers review and analyze the reports and on like sections of roadway during similar storms conditions, comparisons can be made crew to crew, work station to work station and district to district. This could lead to adjustments in staffing, equipment, call out times, response time, etc. MNDOT reports that their **outcome** definition is not only measurable but the using of photographs to help define winter road conditions is both accurate and consistent, enough so that management decisions can be made.

Another unique example of **outcome** level specifications is from Sweden. Sweden stipulates that their "highest volume road shall be free from snow and ice no later than two hours after the snow has stopped falling if the road surface temperature is above -8 degrees C (18 degrees F). Further, during the period when the snow is actually falling, the depth of snow shall not exceed 2 cm (0.8 in.) and slush depth shall never be more than 1 cm (0.4 in.)". (Ref: Winter Road Maintenance- The Swedish Way, by Jan Olander, Swedish National Road Administration, a paper presented at TRB Snow and Ice Symposium, Roanoke, VA, Sept 2000)

Two other parameters that could eventually be incorporated into winter maintenance specifications are travel speed and accidents. Both are measurable and both relate to important customer issues, congestion and safety. The problem is that travel speed and accident rates are affected by several factors besides good or bad winter service levels, making it difficult to use them directly for performance or pay purposes relative to outsourcing

winter maintenance services. On the other hand, the motorist's need to maintain posted travel speeds and their zero tolerance for accidents are clearly **outcomes** that have an important place in the development of goals and strategies for winter maintenance.

In summary, the challenge is continuing for owners and contracted maintenance management companies who subcontract winter maintenance work. The goal needs to be to define **outcomes** that are 1) measurable and 2) correlated to customer satisfaction. Measured **outcomes** correlate with customer satisfaction if in incremental change in **outcome** results in a corresponding change in **value** to the customer (as measured by professional market research). Once success is reached, winter maintenance contract specifications can simply define what the result is to be achieved and let the producer determine how to staff, equip, train, mobilize. Competition will promote efficiency. Being able to define and measure **outcomes** will promote effectiveness.

C. Importance of Input, Output, Outcome and Value in Determining Pay Items

One of the challenges of writing contracts for outsourcing work is to determine what measure should be used to determine the amount of money the contractor would be paid for the services. Winter maintenance contracts are written where reimbursement to the contractor is based on consumption of **inputs**, the production of **outputs**, or the delivery of **outcomes**.

a. Input based Pay Items

The most common means of reimbursing contractors for work, and perhaps the most simple and clean administratively, is the unit cost basis where the contractor reports the number of hours and/or material committed to the job and reimbursement is made at some pre-agreed rate directly based on usage. The unit cost rate may be based on labor hours, equipment hours, or material used. The rate is most often by the hour. **Input** based pay items are related directly to time and usage.

Equipment rates most often include fuel, maintenance and overhead cost but there are exceptions. Sometimes the equipment rate includes the operator, sometimes the operator rate includes all equipment but often operator and equipment rates are completely separate. Sometimes the equipment rate includes accessories like plows, wings, spreaders, chains, etc.: Sometimes these attachments are reimbursed for separately. Sometimes the contractor provides the equipment accessories; sometimes the attachments are provided by the owner-agency.

Sometimes the operator rate included training; sometimes training is paid for extra. Sometimes there is a rate for actually producing work, like plowing and sanding, and a different rate for stand-by, show-up time and downtime. (Ref. Appendix D, Item 13. Equipment Breakdown and Item 38. Standby Pay)

Who orders material, who pays for the material, and who provides storage space also varies. In Tennessee, for example, TN/DOT provides the bulk salt and stores it but the contractor provides the loader and operator to load it. TN/DOT, however, provides an employee to both produce and load liquid salt brine into the contractor's vehicles. (Ref: Appendix D, Item 11. Equipment, TN/DOT)

b. Output Based Pay Items

Some winter maintenance contracts are tied to work accomplishment, i.e., units of work performed. Examples in payments made on the basis of the number of miles maintained, the number of storms called out, number of rounds made, etc.

For example, the Fairbanks North Star Borough in Alaska uses contracts where the pay item for plowing snow is on a per mile/per event basis, irrespective of how many passes it takes. (Note: Events over 12 inches of snow and after 80 inches of accumulated snow per year, the pay item is switched to hourly). Hardpack removal is also paid for by the mile. Sanding is paid for on a per ton of sand placed basis. (Ref. Appendix D, Item 27, Pay Units for Work, Fairbanks North Star Borough, Alaska)

Front-end payments made specifically for winterizing trucks and retrofitting trucks with accessories (slide in boxes, plows, wings, spreaders, communication equipment, etc) are also a form of **output** based pay items. The contractor is not reimbursed directly for the time and effort put in but rather for the contract-defined accomplishment of getting the truck ready for winter work. In fact, mobilization fees may not be related to the amount of effort needed to get the unit ready; it may simply be for a guaranteed minimum payment for a season (Ref. Appendix D, Item 26. Mobilization Payment)

Another form of an **output** based pay item is minimum pay. For example, Fairbanks North Star Borough in Alaska and several others pay the contractor a minimum amount of hours for each laborer responding to a call out. Granted, if the need leads to working beyond the minimum hours this is the same as a **input** based pay item but if not, minimum callout pay is a reimbursement for an accomplishment, i.e. showing up to a work as a result of being called in. Another example is the Kentucky Transportation Department (KYTD) who pays an additional 1-hour rental rate if the equipment reports to work within 1 hour of notification. (Ref. Appendix D, Item 6. Callout Minimum Pay)

c. Outcome Based Pay Items

The best example of an **outcome** based contract is one where the contractor receives a pre-agreed upon lump sum payment for a season to maintain a given section of road or facility.

For example, the Alaska Department of Transportation and Public Facilities (AKDOT) solicits bids for a contractor to provide full winter (and summer) maintenance on airports such as the Chenega Bay Airport for one full year. The contract specifies, among other things, that snow removal efforts must begin prior to 2 inches of accumulation, that the snow must be plowed to 20 feet outside the edge of the runway, that snow/frost must be cleaned from lights, sign and threshold panels daily as necessary, etc. The contractor is basically expected to maintain and operate the airport throughout the contract period such that the airport is kept open every day of the year and “to provide that level of service which will insure the safe and convenient use of the airport by the public”. (Ref. Appendix D, Item 29. Performance Standards Specific to Plowing, AKDOT)

The Virginia DOT cite an **outcome** based specification when they simply call for the contractor to achieve bare pavement within 24 hours after completion of the storm and payment for this service is in lump sum per year. (Ref. Appendix D, Item 29. Performance Standards Specific to Plowing, Virginia DOT)

The City of Kansas City MO takes lump-sum bids from contractors on a route-by-route basis to remove snow from residential streets. Routes are designed in length so that the task can be completed in 12 hours or less. The lump sum amount is for one storm. (Ref. Appendix D, Item 27, Pay Units for Work, City of Kansas City MO)

Some municipal agreements are quasi-examples of being **outcome** based. These are the agreements where a city is paid a certain lump sum of dollars per centerline mile per year to perform all routine maintenance (including winter maintenance) on a state highway(s) within the city limits. The requirement is that the level of service be at least equal to the level of service provided to other city streets. MNDOT has negotiated agreements like this for non-interstate trunk highways with the cities of Minneapolis and St. Paul. The Kentucky Transportation Department has similar agreements with some of their local governmental agencies. (Ref. Appendix D, Item 27, Pay Units for Work, KYTD)

d. Mixing Performance Measures and Pay Items

In summary, while it is becoming more and more common for owner-agencies to define performance levels in contract language at the **output** or **outcome** level, seldom are the pay items tied to anything other than **inputs** for the actual production of winter plowing and sanding services on streets/highways. There are three notable exceptions. The Fairbanks North Star Borough in Alaska is good example of a contract with an **output** based pay item (per mile/per event). The Virginia DOT and the City of Kansas City are the best examples of **outcome** based pay items (lump sum per year and lump sum per storm respectively).

The vast majority of the winter maintenance service contracts written today are a blend or mix of **input** level pay items with **output** or **outcome** level expectations. For example, a contractor may be required to have his equipment report to work within a specified period of time after being called (**outcome** based work accomplishment) but he is reimbursed for the time the equipment is used plowing snow (**input** based).

e. Primary and Secondary Motivators and Incentives with Input Based Pay Items

It is often said, “*We manage what we measure*”. In every contractual agreement, there are built in “primary” motivators and incentives. “Primary” incentives are most often tied to what the pay items are. If we are a snow plow operator and get paid by the *hour*, the primary motivation is to make sure that we show up on time and put in as many good hours as we can. If we get paid by the *pass-mile plowed*, the motivation is to see how fast and efficiently we can make a complete round. If we get paid by the *miles that are maintained or become bare*, our focus is on seeing how fast and efficiently we can be effective. If there is a bonus for *not closing a road* (or a penalty if the road has to be closed), we put extra effort into doing everything necessary to prevent having to close the road.

In other words, “primary” motivator and incentives in winter maintenance service contracts can either be at the **input, output** or **outcome** level.

This is not to say that contracts with **input** based pay items are inherently performed inefficiently. Nor should it be construed that contracts with **output**-based pay items are performed ineffectively or of low quality. In any contractual arrangement, there are always in place “secondary” motivators and incentives dealing with job security, contract extensions, being qualified to bid on future contracts, etc., not to mention pure old employee and company pride that drive quantitative and qualitative issues.

But this raises some questions:

- If the operator and truck is being paid for by the hour, where is the motivation to get the road clear in the shortest possible time?
- If the operator is being paid by the ton of salt distributed, where is the motivation to use the minimal amount needed to get the job done?
- If the contract language specifies application rate, what can an operator do if he know that under a specific situation, he knows that that rate is too high or too low?
- If an operator is being paid by the pass-mile, what motivation is there to not make an extra pass?
- What language would motivate a producer contractor to use down pressure on his plow (causing the blade to wear out faster) if the contractor pays for replacing blades and the owner-agency pays for all chemicals used?

The inherent challenge, then, is to have contracts written in such a way that efficiency and effectiveness are clearly “primary” motivators. The most **direct** way to guarantee a given level of performance is to tie payment of services to a defined and measurable performance **outcome**. To this end, incentive and disincentive clauses are becoming more and more popular today, particularly in the highway construction contracting arena.

Examples of contract language that attempt to **indirectly** achieve an **outcome** level of performance are as follows:

- Define how many trucks and operators are required
- Specifying that trucks shall be a certain size and be equipped with specifically defined plowing and/or spreading equipment
- Specifying minimum call out response time

- Predefining routes
- Specifying specific conditions under which chemicals must be spread, what chemicals must be used and at what rates they must be applied

Every one of the above, as well as others, is very important elements of a winter maintenance plan but they only address the “what” and the “how” of performing winter maintenance work, not the “how well”. But they are very important elements in a good Snow and Ice Plan. The contract itself should: 1) specify, as much as possible, the measurable **outcome** that is to be achieved and, 2) require the contractor to prepare his own Snow & Ice Plan as to what resources will be used and how they will be used to achieve that **outcome**, and 3) require that the contractor Snow and Ice Plan be approved by the owner-agency prior to the contract award. This is the model similar to that used by Virginia DOT. (Ref. Appendix D, Item 29. Performance Standards Specific to Plowing, Virginia DOT)

As previously mentioned in reference to the Minnesota DOT, their in-house maintenance crews are measured against a Regain Time standard for each road classification, i.e., how long it takes them to achieve a given winter maintenance service level of bareness after a storm event is over. Reports called Snow & Ice Dashboards are produced that include graphs that look like gauges on an automobile dashboard. The arrow shows what range their response time was in. Did it fall in the green range, which is okay, consistent with the performance criteria? Or did they fall in the low yellow range or the high yellow range, which indicates room for improvement? Or did it fall outside the yellow bands and into the red areas, which means corrective action needs to be taken. These Dashboards can be prepared by individual route section, by route classification, by storm, by crew, by district or any combination. District managers review these reports and, if necessary, make appropriate adjustments, albeit, by reassigning equipment or personnel, adjusting methods or work schedules or enhancing training. District budgets can also be adjusted. (Ref. Appendix D, Item 29. Performance Standards Specific to Plowing, MNDOT)

While the MNDOT model is only applied to in-house crews (MNDOT does not outsource winter maintenance services per se), it may be an indication of the means by which **outcome** based contracts can and will be written in the future.

f. Year Around vs. Seasonal Employment for Winter Maintenance Services

Another issue regarding **input** based pay items is the issue of the seasonal and sporadic nature of winter maintenance work. Winter maintenance is not something that occurs in eight-hour segments, five days a week. In the public sector, the maintenance workers are part of a larger operation where there is ample work to do between storms. They are given steady employment, irrespective if it snows every day or not. In several DOTs, like MNDOT, for example, today’s *maintenance* workers are actually classified as *transportation* workers who are selected and/or trained to rotate between field maintenance work, office level maintenance work, construction administration, design technician, etc. In other words, if a small storm event occurs and it can be taken care of in say five hours, there are no human relation issues against curtailing the snow and ice operation because the employee would be reassigned to another productive job to fill out his eight hour day.

In the private sector, however, the snow plow truck operator is not generally on a guaranteed eight hour a day cycle. Using the example of a storm being able to be cleaned up in five hours, the private operator would be sent home with only five hours of pay instead of eight. Furthermore, these may be the only five hours of winter maintenance work needed all week.

In fact, in some cases, contractors who seek drivers to perform outsourced winter maintenance services have to compete in a market where many or most of the “construction” workers are eligible to be on unemployment compensations programs during the winter. Why would they turn down unemployment compensation benefits to take on a job that may or may not be steady enough to generate many hours of pay?

What does the private contract do to offset these “social issues” surrounding the availability of a qualified work force to produce winter maintenance work? Oh, he could build some guarantee seasonal income into

his bid but what if the owner-agency allows the in-house staff to bid on the work as well? The playing field is no longer level.

Since only the public sector was invited to submit examples of their contracts, how private contractors subcontract to producer operators was outside the scope of this survey. It is an issue, however, that is appropriate to raise because it often has to be dealt with when outsourcing seasonal work, which winter maintenance is.

g. Assignment of Risk and Outcome Based Pay Items

Most of the contracts reviewed as part of this survey transferred little risk to the contractor. This has a lot to do with the fact that every storm is different and every winter is unpredictable. Owner-agencies know this first hand, all having real life experiences knowing that costs of one winter season can be double or even triple over others. That is why so many of today's contracts include provisions such as a mobilization fee, minimum call out pay, stand by pay, etc. Some owner-agencies even provide the auxiliary equipment. Some have provisions allowing adjustments if energy prices fluctuate outside of a specified window.

There is evidence that owner-agencies are slowly rewriting contracts to transfer the risks, or at least split more of the risks, onto the private sector contractor. This is becoming more and more possible as the private sector matures and becomes more learned in the art and science of winter maintenance. Other factors contributing to this movement are the trend toward contracting out whole road sections for full winter seasons, the use of multi-year awards and the options to extend contracts beyond the initial contract without re-bidding.

As pay items in winter maintenance service contracts continue to become more **outcome** based, so will the trend be for risk to be transferred from the owner-agency to the contractor/producer. Here again, using the Virginia DOT as an example, their winter maintenance contract is **outcome** based and includes little if any provisions for mobilization, standby, etc. Just so much per year, irrespective of how bad or good the winter might be.

h. Research/Continuous Improvement and Input Based Pay Items

Another issue is who pays for research and continuous improvement when winter maintenance services are outsourced...the owner-agency or the contractor producer?

Even if the owner-agency pays for the research, what are the motivations for operators to implement ways to become more efficient if doing so would cut down the number of hours available for work? What would motivate a contractor to develop anti-icing and pretreatment technologies if it meant that prevention techniques reduced the amount of work required to achieve bare pavement? What language would motivate a contractor to use alternative, more environmentally friendly chemicals if the safer chemical costs more than road salt?

Outcome based performance standards and pay items appear to best deal with these issues. Contract language that stipulates what methods are to be used actually end up reducing the incentive for a contractor to be free to develop better methods on his own. Specifying how many trucks that need to be on the road at given time takes away the motivation to seek ways to best balance resources to workload.

Going back to the MNDOT model of performance measures being based on Regain Time, there are no inherent restrictions or inhibitions against finding new chemicals, better techniques or adjusting schedules or allocation of resources. The crews know what they are being measured against, they know when they are doing a good job and they know when they are expected to adjustments and improve.

Related to the issue of research and continuous improvement is the issue of ownership and authorship. In the public sector, what one organization develops is readily transferable to other state and other local governmental agencies. In fact, there are many settings organized by institutions like TRB, AASHTO and APWA were forums are arranged specifically to share and transfer new technology.

In the private sector, however, new and improved techniques and methodologies are often the “competitive edge” that one company has over a company they are competing with. As a result, there are issues of patent rights, copyrights, and other factors that put a cloud of secrecy and non-transferability to them. So what happens if the competitive bidding process leads to an experienced contractor losing a contract to a lesser-experienced, but more price competitive, contractor the next time around? Does this mean that the learning curve starts from scratch again?

While the issue was raised as part of this survey, it was not specifically addressed so there are no answers available to be shared in this report.

D. Significance of Owner/Manager/Producer Scenarios

The purpose of addressing and summarizing the various owner/manager/producer scenarios is to point out that winter maintenance contracts are arranged both at the producer level and the manager/administration level and that they involve public-to-public parties as well as public-to-private.

And as the parties involved vary (public vs. private) and the stage of the process vary (administration vs. production), so does the need for and the importance of performance measures and pay items vary.

For example, the contract between the owner-agency and the private management company in Scenario E can be (and is being) written in terms of **outcomes** a lot easier than the contract between the management company and the subcontractor.

Likewise, a municipal agreement between a state and a city to do routine maintenance on a state highway through that city is different than one with a for-profit contractor to do the same work on the same road.

This survey gathered examples of contracts that are primarily between a governmental agency and a private contractor. Some of the contract language used in government-to-government contracts, like municipal agreements, is perhaps transferable as well. And while the samples received from the Canadian Provinces and Scandinavian countries are perhaps difficult to transfer directly, they do provide many new approaches and ideas, which are transferable.

But since we did not gather contract language that prime contractors use to subcontract the actual production work, there is much less that is directly transferable.

Defining **outcome** type performance level operators with a guaranteed, full-time, year-around employment arrangement is different than when dealing with someone who goes off the payroll when “bare pavement” achieved. This issue has not yet been approached and but it is hoped that some conclusions and recommendations will result.

V. PROGRESSIVE APPROACHES TO OUTSOURCING WINTER MAINTENANCE SERVICES

A common theme has developed in the course of summarizing the *best practices* of outsourcing winter maintenance services and that is that contracts should be written to include both outcome level performance measurements and **outcome** based pay items.

Consistent with that thinking, there are some very “progressive” examples to summarize in this section of the report. They are from Alaska, Maine, Minnesota, Virginia, Kansas City MO, Sweden and some municipal agreements.

- The Alaska Department of Transportation and Public Facilities (AKDOT) has a contract for someone to provide full winter (and summer) maintenance on airports such as the Chenega Bay Airport for one full year. The contract specifies, among other things, that snow removal efforts must begin prior to 2 inches of accumulation, that the snow must be plowed to 20 feet outside the edge of the runway, that snow/frost must be cleaned from lights, sign and threshold panels daily as necessary, etc. The contractor is basically expected to maintain and operate the airport throughout the contract period such that the airport is kept open every day of the year and “to provide that level of service which will insure the safe and convenient use of the airport by the public”. (Ref. Appendix D, Item 29. Performance Standards Specific to Plowing, AKDOT)
- The Maine DOT includes an **Outcome** level performance specifications which states that “The contractor shall schedule his work such that by noon of the day following the end of the storm, three and a half (3 ½) feet of the pavement will be exposed on each side of the centerline”. (Ref. Appendix D, item 29, Maine DOT)
- In the Minnesota DOT, their in-house maintenance crews are measured against a Regain Time standard for each road classification, i.e., how long it takes them to achieve a given winter maintenance service level of bareness after a storm event is over. Reports called Snow & Ice Dashboards are produced that include graphs that look like gauges on an automobile dashboard. The arrow shows what range their response time was in. Did it fall in the green range, which is okay, consistent with the performance criteria? Or did they fall in the low yellow range or the high yellow range, which indicates room for improvement? Or did it fall outside the yellow bands and into the red areas, which means corrective action needs to be taken. These Dashboards can be prepared by individual route section, by route classification, by storm, by crew, by district or any combination. District managers review these reports and, if necessary, make appropriate adjustments, albeit, by reassigning equipment or personnel, adjusting methods or work schedules or enhancing training. District budgets can also be adjusted. (Ref. Appendix D, Item 29. Performance Standards Specific to Plowing, MNDOT)
- The Virginia DOT specifies that the contractor (VMS, Inc.) achieve bare pavement within 24 hours after completion of the storm and payment for this service is in lump sum per year. (Ref. Appendix D, Item 29. Performance Standards Specific to Plowing, Virginia DOT)
- The City of Kansas City MO contractors get paid lump-sum payments on a route-by-route basis to remove snow from residential streets. The lump sum amount is for one storm. (Ref. Appendix D, Item 27, Pay Units for Work, City of Kansas City MO)
- Sweden stipulates that their “highest volume road shall be free from snow and ice no later than two hours after the snow has stopped falling if the road surface temperature is above –8 degrees C (18 degrees F). Further, during the period when the snow is actually falling, the depth of snow shall not exceed 2 cm (0.8 in.) and slush depth shall never be more than 1 cm (0.4 in.)”. (Ref: Winter Road Maintenance- The Swedish Way, by Jan Olander, Swedish National Road administration, a paper presented at TRB Snow and Ice Symposium, Roanoke, VA, Sept 2000).

- Several municipal agreements are quasi-examples of being **outcome** based. These are the agreements where a city is paid a certain lump sum of dollars per centerline mile per year to perform all routine maintenance (including winter maintenance) on a state highway(s) within the city limits. The requirement is that the level of service be at least equal to the level of service provided to other city streets. MNDOT has negotiated agreements like this for non-interstate trunk highways with the cities of Minneapolis and St. Paul. The Kentucky Transportation Department has similar agreements with some of their local governmental agencies. (Ref. Appendix D, Item 27, Pay Units for Work, KYTD)

Winter maintenance is a service, not a product. Products can be sketched out as to shape, dimensioned out as to size, tested out in the laboratory as to strength and durability. Products can be designed and manufactured, tested and reworked, distributed and stocked on the shelf for customers to touch and feel, all before they are put into use. Winter maintenance services are literally delivered and consumed while they are being produced.

Irrespective of *who* administers the work and *who* produces it, owner-agencies are ultimately responsible to see that winter maintenance services are delivered in a manner whereby a safety conscious motorist would be genuinely satisfied, if not delighted, with the level of service provided, both in terms of efficiency and effectiveness. Achieving this involves a multi-faceted approach that takes full advantage of today's technical skill and administrative ability.

So, today's owner-agencies cannot just turn the work over to the private sector. Quality of service may be more difficult to quantify but it is essential that it be quantified.

In summary,

- *Best practices* are those that address the fact that the private sector workforce may not yet be fully available and trained, but clear contractual language is included that ultimately places the responsibility on the private sector to develop, training and equip its own personnel as well as bear most of the risk associated with fluctuating winter weather year to year.
- *Best practices* are those that understand the importance of contractors having an approved Snow And Ice Plan but confine contractual language to measurable outcome-based performance measures with payment for work correlated with measured performance achieved.
- *Best practices* include insisting that everything possible is done to 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).
- *Best practices* are contracts written such that it would be in the producers best interest to proactively respond to RWIS based predictions of road surface conditions and therefore be encouraged to utilize anti-icing and other preventive methodologies to more expediently meet customer expectations.
- *Best practices* are those that generate a strong willingness and desire on the part of the private sector to conduct its own R&D as a means of maintaining its own competitiveness and becoming most effective and efficient in producing defined and measured outcomes.
- *Best practices* seek ways for such advancements in knowledge to be transferred and shared as much as possible throughout the entire industry as if it were public knowledge.
- *Best practice* uses 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 winter maintenance services to the public. After all, if they do not, the owner-agency may well be ultimately responsible for initiating corrective action anyway.

VI. RECOMMENDATIONS FOR FUTURE SURVEYS

A. Value Of Conducting Survey Again

For the last decade or two, winter maintenance has drawn a significant amount of attention and support in the research and development area. Winter maintenance research has benefited significantly by national programs like SHRP, TRB, FHWA Scanning Tours, Lead States, and SICOP. And the movement toward more innovation and change continues.

But this is the first time that any major survey is known to have been taken to identify *Best Practices In Outsourcing Winter Maintenance Services*. It is the first serious attempt to find better ways for incorporating measurable, outcome based performance standards into winter maintenance contracts.

Perhaps what was learned the most is that the winter maintenance has a long ways to go in developing and implementing outcome based performance measurements in winter maintenance contracts. Just as important, however, is the knowledge that at least some owner-agencies are writing specifications at the outcome level. This is very both encouraging and inspiring.

Hopefully, one of the results of this project will be an increased awareness about the need for getting a better handle on how to define performance expectations, how to measure it and how to pay for it. By raising the awareness of these issues, it is expected that there will be a major advancement in this area in the next year or two.

B. How Should It Be Done Next Time

There is nothing complicated about how this survey was taken. In this era of e-mail and electronic mailing lists, it is easy to initiate and carry out a survey. In today's world, there are no longer any compatibility problems with computer software or e-mail. File size and storage space no longer pose a problem of exchanging large data files. What takes time is passing hard copy information around. During this study, most information could be shared in digital form. Next time it should be easier yet.

The next project team may want to evaluate from a different viewpoint. If not, the next project should be able to be accomplished in much less time.

If the project is to be done again, one enhancement to consider, would be go seek input from private consultant/manager/administrators who are subcontracting winter maintenance work to individual or smaller fleet producers. This survey did not seek any information at all from the private sector and as the science and art of maintenance contracts progress, it would be good to try to draw that into the information stream as well.

C. When And How Often Should It Be Done

Assuming that this project inspires attention to the need to develop and implement better practices in outsourcing winter maintenance, it is expected that the learning curve will be quite steep over next couple years. As such, it is reasonable to schedule a re-survey in 2003.

D. Who Should Do It In The Future

This time the project was initiated and sponsored by a firm from the private sector. It is natural to think that this type of survey could be taken on by the AASHTO Subcommittee of Maintenance under the direction of a task force that deals with winter maintenance of performance measures. The project could possibly be scoped down in to the point that it could be done at committee level without having to hire outside help.

VII. APPENDICES

VII. APPENDICES

APPENDIX A: SAMPLE LETTERS REQUESTING INFORMATION.....	Appendices Page 3
1. Sample Letter sent out for Survey.....	Appendices Page 3
2. Sample E-Mail Message Sent Out for Survey.....	Appendices Page 4
3. E-Mail Message Sent on Snow & Ice List.....	Appendices Page 5
APPENDIX B: SUMMARY OF ORGANIZATIONS CONTACTED.....	Appendices Page 6
APPENDIX C: SUMMARY OF METHODS OF PAYMENT.....	Appendices Page 12
APPENDIX D: SAMPLE PROVISIONS OF CONTRACTS.....	Appendices Page 18
1. AVL Equipment.....	Appendices Page 18
2. Blades, Cutting Edges.....	Appendices Page 18
3. Calibration of Chemical Spreaders.....	Appendices Page 18
4. Callout Condition.....	Appendices Page 19
5. Callout Response Time.....	Appendices Page 19
6. Callout Minimum Pay.....	Appendices Page 20
7. Chains, Tire.....	Appendices Page 20
8. Communications Equipment in Hired Vehicles.....	Appendices Page 20
9. Contract Period & Renewal.....	Appendices Page 21
10. Contract Terms & Conditions.....	Appendices Page 21
11. Equipment.....	Appendices Page 21
12. Equipment Assignments.....	Appendices Page 21
13. Equipment Breakdowns (Backups).....	Appendices Page 22
14. Equipment Identification (Decals).....	Appendices Page 22
15. Equipment Specifications.....	Appendices Page 22
16. Equipment-State Owned Accessory.....	Appendices Page 23
17. Fuel Cost Adjustment.....	Appendices Page 23
18. Guaranteed Minimum Payment (Annual, Monthly).....	Appendices Page 23
19. Hourly Equipment Rates.....	Appendices Page 23
20. Hourly Labor Rates.....	Appendices Page 24
21. Levels of Service (see Item 29. Performance Standards).....	Appendices Page 24
22. Materials, Chemicals, Abrasives.....	Appendices Page 24
23. Maximum Hourly Rate.....	Appendices Page 24
24. Meals.....	Appendices Page 24
25. Method of Measurement.....	Appendices Page 25
26. Mobilization Payment (for Retrofit Trucks, etc).....	Appendices Page 25
27. Pay Units for Work (Basis of Payment).....	Appendices Page 26
28. Performance Evaluation.....	Appendices Page 26
29. Performance Standards Specific to Plowing (Requirements, Work Standards).....	Appendices Page 26
30. Performance Standards Specific to Sanding (Requirements, Work Standards).....	Appendices Page 28
31. Performance Standards for Shoulders (Requirements, Work Standards).....	Appendices Page 29
32. Plowing Definition.....	Appendices Page 29
33. Pre-Contract Equipment Inspection.....	Appendices Page 29
34. Pre-Established Pay Items.....	Appendices Page 29
35. Procedures.....	Appendices Page 30
36. Property Damage.....	Appendices Page 30
37. Scope of Work.....	Appendices Page 30
38. Standby Pay.....	Appendices Page 31
39. Sub-Contracting.....	Appendices Page 31
40. Training.....	Appendices Page 31
41. Travel Allowance (Travel Pay).....	Appendices Page 32
42. Types of Contract.....	Appendices Page 32

APPENDIX A-1:

Sample Letter sent out for Survey

November 16, 2000

Jim Barnett
State Maintenance Engineer
Arkansas DOT
PO Box 2261
Little Rock, AR 72203-2261

Dear Jim,

Thanks for taking time to read this correspondence. We hope your winter is going well.

The reason for writing is that the two of us, Rod Pletan (retired State Maintenance Engineer from Minnesota) and Dick Stapp (retired State Construction and Maintenance Engineer from Wyoming), are undertaking a project to summarize Best Practices for Outsourcing Winter Maintenance Services. It is understood that most agencies do virtually all winter snow and ice control in house. On the other hand, several departments outsource at least some of their winter operations depending on the extent and scope of the work.

The purpose of this initial letter is to simply ask a few questions and hopefully you will take time to answer them.

- ?? Does your department outsource any winter snow and ice control services to either private or other public agencies?
- ?? If Ayes, does your department initiate a formal document with them to provide winter maintenance services?
- ?? If Ayes, would you please send a copy of the proposed contract or agreement for our review? We would be happy to pay for the cost of postage or any other expenses associated with forwarding the document. Please mail to Dick Stapp, 1059 Bonita, Laramie WY, 82072.

Thanks for taking time to respond to these few questions. As we proceed with our study and identify the agencies that do outsource at least some portions of snow and control operations, we may return and ask a few more detailed questions as to how these agencies handle more specific aspects of outsourcing snow and ice control services, like pay items and performance measures.

Thanks again and we look forward to hearing from you in the near future. If you have any questions feel free to contact Dick Stapp at 307-745-5202, E-mail: dkstapp@aol.com or Rod Pletan at 651-464-6636, E-mail: rodaud@pmlink.com.

Respectfully,

Dick Stapp
Rod Pletan

APPENDIX A-2:

Sample E-Mail Message Sent Out For Survey

Dear Colleagues,

As noted in the attached letter, Dick Stapp (retired Wyoming State Construction and Maintenance Engineer) and myself (retired Minnesota State Maintenance Engineer) are undertaking a project to summarize "Best Practices for Outsourcing Winter Maintenance Services".

Each of you will be receiving a hard copy of this request in the Mail early next week but Dick and I decided to send it to you via e-mail as well. Our thought was that some of you might prefer to simply reply electronically rather than by letter.

Either way, we want to thank you in advance for your response

Rod & Dick

Attached: First Snow & Ice Letters Generic sent 11 16 00.doc

APPENDIX A-3:

E-Mail Message Sent on Snow & Ice List Serve

Dear Winter Maintenance Colleagues,

Since I retired from MNDOT, I have paired up with Dick Stapp, retired state construction and maintenance engineer from WYDOT, to do a survey to determine best practices in this emerging practice of outsourcing winter maintenance services.

Two weeks ago, we already sent out individual questionnaires to each state and province. But we want to make this blanket request for information to others on this snow-ice mailing list who may also have information to offer.

First of all, we want to find out who besides the states or provinces are outsourcing winter maintenance services. Does your agency outsource? Do you know of some other agency who outsources winter services that may not be on this mailing list? If so, who should we contact (name, address, e-mail, phone number, etc.)?

Once we find out who to contact, we will be following up to determine what kind of formal contract is used and what the provisions of the contract are. We will be particularly interested in things like pay items (by the hour, by the mile, by the season, etc.), mobilization pay, standby pay, show up time, etc. To what extent do contracts guarantee such and such work per year? To what extent is risk transferable? Are any agencies paying producer/contractors for performance measures like bareness of pavement, response time, etc.? Would sample copies of contracts be available to us?

Any direction you might give us will be greatly appreciated. Please contact us directly at

Rod Pletan: E-mail: rodaud@pmlink.com Phone: 651-464-6636,
or
Dick Stapp: E-mail: dkstapp@aol.com Phone: 307-745-5202

Thank you very much.

Rod Pletan

PS. If your state or province did not hear from us directly, please let us know.

APPENDIX B: SUMMARY OF ORGANIZATIONS CONTACTED

Appendix B is a listing of all of the organizations solicited, which ones responded and who the contact person was. It also summarizes the answers to the yes/no questions and indicates who sent in samples of their winter maintenance contracts.

Appendix B Summary of Organizations Contacted

Organization	E-mail sent	Letter Sent	NAME	Title	Responded	Questions			Sample Contract Sent	Comments
						1st	2nd	3rd		
STATES										
AASHTO	Y	Y	Sandy Tucker	Texas Transport Institute	Y	N	N	N		Final report could be posted on AASHTO Innovative Lead State Websites if requested.
AL	Y	Y	John Lorenston	State Maint. Engineer						Did not respond
AK	Y	Y	Trent Mackey	Service Area Engineer	Y	Y	Y	Y	Y	All Maintenance is contracted to the private sector. Contract copies in file.
AZ	Y	Y	Lonnie Hendrix	State Maint. Engineer	Y	N	N	N	N	Arizona does no snow and ice outsourcing
AR	Y	Y	Jim Barrett	State Maint. Engineer	Y	Y	N	N	N	Arkansas hires contractors on an emergency basis for help in snow and ice removal.
CA	Y	Y	Lawrence Orcutt	Program Maintenance Manager	Y	N	N	N	N	At this time, CALTRANS does not outsource any winter work.
CO	Y	Y	Ed Fink	State Maint. Engineer	N	N	N	N	N	Colorado does not outsource Snow and Ice Control Services.
CT	Y	Y	Michael Turano	Transport. Maint. Director	Y	Y	Y	Y	Y	State has always outsourced winter snow and ice control to compliment state forces. See proposal in file.
DE	Y	Y	Charles Lindquist							Did not respond.
FL	Y	Y	Sharon Holmes							Did not respond.
GA	Y	Y	Buddy Gratton							Did not respond.
HI	N	N								Did not send letter or e-mail for obvious reasons.
ID	Y	Y	Dave Jones	State Maint. Engineer	Y	N	N	N	N	Idaho does not outsource any activities to private or governmental agencies.
IL	Y	Y	Joe Hill							Did not respond.
IN	Y	Y	Bill Rinard	Maintenance Field Engineer	Y	N	N	N	N	Indiana does not routinely outsource any winter snow and ice control services. Has rented loaders and graders with operators during times of emergency.
IA	Y	Y	Dennis Burkheimer	Winter Operations Administrator	Y	N	N	N	N	Iowa does not outsource winter snow and ice operations. They do have agreements with cities to plow snow, but none with private industry. They are also doing research concerning friction and freezing point of pavement.
KS	Y	Y	Dean Testa	Operations Engineer	Y	N	N	N	N	Kansas does not outsource any winter maintenance snow and ice activities.
KY	Y	Y	David Cornett	Roadside Environmental Administrator	Y	Y	Y	Y	Y	Kentucky outsources a significant portion of its winter maintenance services. See contracts and specs for details.
LA	Y	Y	Ed McClanahan	Maintenance Supervisor	Y	N	N	N	N	Louisiana does not outsource any winter ice control services in the State. Only two districts have any problems. They had a question on how to store salt.
ME	Y	Y	Brian Pickard	Highway Maint. Engineer	Y	Y	Y	Y	Y	Maine out sources approximately 5% of winter maintenance. See contracts and agreements in file.

Appendix B Summary of Organizations Contacted

Organization	E-mail sent	Letter Sent	NAME	Title	Responded	Questions			Sample Contract Sent	Comments
						1st	2nd	3rd		
MD	Y	Y	Rich Gilmore	Resident Maintenance Engineer	Y	Y	Y	Y	Y	No cover letter sent. Copies of contracts and specs in file.
MA	Y	Y	Gordon Broz	Deputy Chief Engineer	Y	Y	Y	Y	Y	Mass. Initiates contracts with several contractors statewide. See contracts and specs in file.
MI	Y	Y	Calvin Roberts	Engineer of Maintenance	Y	Y	Y	Y	Y	See data for Michigan's snow and ice control contracts in file.
MN	Y	Y	Steve Lund	Office of Maintenance	Y	Y	Y	Y	Y	See data in file for contracts and agreements.
MS	Y	Y	John Vance	State Maint. Engineer.	Y	N	N	N	N	No response received other than "no".
MO	Y	Y	Tim Jackson	Technical Support Engineer	Y	N	N	N	N	Missouri does not outsource any winter snow and ice control services. Are looking to outsource more of their maintenance operations in the future
MT	Y	Y	John Blacker	State Maint. Engineer	Y	N	N	N	N	Tried to do an hourly trial for plow-truck and sander. Bids came in too high and was rejected.
NE	Y	Y	Dale Davorak	State Maint. Engineer	Y	N	N	N	N	Nebraska does not outsource specific snow and ice control services. They do have agreements with cities over 800 population to maintain state highways in their communities.
NV	Y	Y	Frank Taylor	State Maintenance Engineer	Y	N	N	N	N	Nevada does not outsource snow and ice control services.
NH	Y	Y	Steve Gray	State Maintenance Engineer	Y	Y	Y	Y	Y	NH utilizes private trucks (about 48%) to supplement state units. See rental agreement in file.
NJ	Y	Y	Rod Roberson	Asst. Commissioner Operations						Did not respond.
NM	Y	Y	Ernest Archuleta	State Maint. & Traffic Engineer	Y	N	N	N	N	New Mexico does not outsource any winter snow and ice control services. They do have an RFP out for maintenance including snow and ice control.
NY	Y	Y	Edward Fahrenkopf	Director Maintenance Division	Y	Y	Y	Y	Y	New York contracts with municipalities for 19% of there system. See agreements in file.
NC	Y	Y	Lacy Love	State Maint. Engineer	Y	Y	Y	N	N	NC does outsource some western counties with locals to plow and salt roads. They are paid on an hourly basis for time worked.
ND	Y	Y	Jerry Horner	State Maint. Engineer	Y	N	N	N		North Dakota does not outsource any winter maintenance. They may hire support equipment during severe storms.
OH	Y	Y	Keith Swearingen	State Maint. Engineer	Y	Y	Y	N	N	Ohio out sources snow and ice control on Interstate routes in some cities (Akron, Canton, Columbus, Dayton) and Hamilton county. The four cities are for total Maintenance Services.
OK	Y	Y	Kevin Bloss	Asst. State Maintenance Engineer	Y	Y	Y	Y	Y	OK does outsource some of it's winter operations primarily in the Capital parking areas and the City of Stillwater. See service contract in file.
OR	Y	Y	Doug Tindall	State Maint. Engineer	Y	N	N	N	N	Oregon does not outsource snow and ice services.

Appendix B Summary of Organizations Contacted

Organization	E-mail sent	Letter Sent	NAME	Title	Responded	Questions			Sample Contract Sent	Comments
						1st	2nd	3rd		
PA	Y	Y	Donald Wise	Chief, Maint. Division						Did not respond.
RI	Y	Y	John Nickelson	State Maintenance Engineer	Y	Y	Y	N	N	RI. Uses private vendors to provide winter services on a hourly basis. Hire plows/sanders (approx. 70%) during heavy snow operations. Work under control and supervisor of RI supervisor.
SC	Y	Y	Huley Shumpert	State Maint. Engineer						Did not respond.
SD	Y	Y	Norm Humphrey	State Maint. Engineer	Y	Y	Y	Y	Y	SD contracts out snow and ice removal operations in several areas across the state.
TN	Y	Y	Alan Pinson	State Maint. Engineer	Y	Y	Y	Y	Y	Tennessee awarded their first contract just recently. Specification in file.
TX	Y	Y	Zane Webb	State Maint. Engineer.	Y	N	N	N	N	Snow and ice control are all performed with state forces. Do have a section of Total Asset Management under contract to VMS, Inc. at this time.
UT	Y	Y	Tracy Conti	Engineer for Maintenance	Y	N	N	N	N	UT handles all ice and snow control with state forces.
VT	Y	Y	Laurel LaFamboise	Office of Maintenance	Y	Y	Y	Y	Y	VT hires equipment to perform winter maintenance on several smaller areas (welcome centers & rest areas) and some state airports for quicker response.
VA	N	N								Did not send letter or e-mail since VMS, Inc. has a contract for Total Asset Management with Virginia including snow and ice control.
WA	Y	Y	J. Conrad	State Maint. Engineer	Y	N	N	N	N	WA does not outsource any work because State Statue prohibits them from doing so.
WV	Y	Y	Julian Ware	Director Hwy Ops Division	Y	N	N	N	N	WV does not outsource any ice and snow control services.
WI	Y	Y	David Vieth	Director Highway Operations	Y	Y	Y	Y	Y	WI contracts out virtually all State maintenance activities to county Highway Departments. Contracts and agreements in file.
WY	Y	Y	Ken Shultz	State Maint. Engineer	Y	Y	Y	Y	Y	WY has done only very limited snow and ice control contracts and none in recent years. See bid document in file.
COUNTIES										
Eaton County, Michigan	Y	N	Blair Ballou	Road Supervisor	Y	Y	Y	N	N	Eaton county has contracted for the past 3-4 yr. 1158 miles of C/L miles and 650 paved. More detail in letter in file.
CITIES										
Lake Forest, IL	Y	N	Michael Solvestri	Supervisor of Streets	Y	Y	Y	Y	Y	Contracts are paid on an hourly basis. See General Conditions in file.
Kansas City, MO	Y	N	Gary Steinly	Streets Supervisor	Y	Y	Y	Y	Y	Kansas City does outsource residential snow plowing and arterial plowing. See copy of Specs and conditions in file.
Madison, WI	Y	N	Roger Goodwin	Street Superintendent	Y	Y	Y	Y	N	Madison contracts out for snow plowing.

Appendix B Summary of Organizations Contacted

Organization	E-mail sent	Letter Sent	NAME	Title	Responded	Questions			Sample Contract Sent	Comments
						1st	2nd	3rd		
Milwaukee, WI	Y	N	Gene Gibson	Operations Manager	Y	Y	Y	Y	N	Milwaukee outsources 1/3 of there 1400 miles of streets to 100 units.
Minneapolis, MN	Y	N	Mike Kennedy	Street Maintenance Engineer	Y	Y	N	N	Y	Minneapolis does most snow and ice control in house with the exception of motor graders and alley plowing services. See file for details.
Sioux Falls, SD	Y	N	Kevin Smith	Asst. Dir. Pub. Works	Y	Y	Y	N	N	For more information contact Gary Meyer Street Supt. 605-367-7051
Colonie, NY	Y	N	Joe Stockbridge	Div. of Environmental Services	Y	N	N	N	N	City forces undertake all winter maintenance.
Brighton-Rochester, NY	Y	N	Mr. Low		Y	Y	Y	N	N	Outsource sidewalks only.
OTHER										
Iowa State University CTRE/ISU	Y	Y	Bill McCall		Y					Lee Smithson and Bill McCall would like to see friction testing and pavement temperatures be a part of the report.
Meteorologist	Y	Y	Phil Breuser	Professional Meteorologist	Y	N	N	N	N	Information concerning how metrology can assist in handling snow and ice control services.
American West Environmental	Y	N	Jason Mallon		Y	N	N	N	N	Chemical distributor in the Pacific Northwest. Handle a large variety of chemical de-icing and anti-icing agents.
Dartmouth-Hitchcock Medical Center	Y	N	Paul Goudrey	Grounds Supervisor	Y	Y	Y		N	Medical center out sources 2 mile of sidewalks, and 3 mile of roads and parking lots and 5 story parking garage. See data in file.
UNH T-2 Center	Y	N	David Fluharty	Director	Y	N	N	N	N	Sent note asking for input into our project to the PW network.
NY Thruway Authority	Y	N	George Tanner		Y	N	N	N	N	They do have the plaza operators take care of the sidewalk and walkway related matters. Otherwise, they handle snow and ice control in house.
Illinois Tollway	Y	N	John Benda	Manager, Maintenance and Traffic	Y	N	N	N	N	Illinois Tollway used to contract snow removal at the Oases, but discontinued the practice due to poor response and performance by vendors.
Virginia Maintenance Services	Y	N	Mike Kirk	Area Director	Y	Y	Y	Y	Y	VMS, Inc. has a Total Asset Management contract with Virginia DOT and in turn subcontracts work to others.
CANADA										
Alberta	Y	Y			Y	Y	Y	Y	Y	Alberta has a general contract which consists of loading trucks, snowplowing and the application of sand, salt or a sand and salt mixture to roadway surfaces. See specification in the file.
British Columbia	Y	N								No response received.
Manitoba	Y	Y	Vic Weselak	Manager	Y	Y	Y	Y	Y	The majority of winter maintenance is performed in house. They have tendered two contracts. See Construction Order in file.

Appendix B Summary of Organizations Contacted

Organization	E-mail sent	Letter Sent	NAME	Title	Responded	Questions			Sample Contract Sent	Comments
						1st	2nd	3rd		
New Brunswick	Y	Y	Dave Macfarlane	Maintenance Manager	Y	Y	Y	Y	Y	Specification can be found in file. No other data provided.
Newfoundland	Y	N								No response received.
Nova Scotia	Y	Y	Douglas Stewart	Director Op Services	Y	Y	Y	Y	Y	Nova Scotia does outsource winter services such as winter sand trucks and winter supply such as plow gear. See contract documents in file.
Ontario	Y	Y	S.E. Gwartz	Manager Maintenance Office	Y	Y	Y	Y	Y	Private contractor through a public tender process does all winter snow and ice control. Contract documents are in file.
Saskatchewan	Y	Y	Gordon King	Director, Preservation Services	Y	Y	Y	Y	N	Saskatchewan does not outsource much winter work in the southern portion of the Province but does more in the Northern Province. No documents were sent but we could request them by PH: 306-953-3509.
Northwest Territory	Y	Y	Gary Kaulbach		Y					In 1995/96 work in the City of Inuvik was outsourced. Need to contact Public Services Manager at 867-777-2607 for more current information.
<i>INTERNATIONAL</i>										
Finland	Y	N	Helsinki Virtaslolo		N					No response received.
Japan										Are presently making own survey.
New Zealand	Y	N	Alan Burkett	Area Engineer Central Waikato	Y	Y	Y	Y	Y	Transit New Zealand outsources management and production of all maintenance services.
Norway	Y	N	Torgeir Vaa		Y	Y	Y	Y	Y	Norwegian performance reports on file.
Sweden	Y	N	Jan Olander		Y	Y	Y	Y	Y	Sweden contracts for a period of 3 years with an option for more years. A paper with more details can be found in the file.

APPENDIX C: SUMMARY OF METHODS OF PAYMENT

Appendix C is a summary showing which organizations incorporate some of the more common pay items into their winter maintenance contracts.

Appendix C Summary of Methods of Payment

Organization	Payment			Standby Time		Mobilization		Comments
	Hourly	Route	Lane Mile	Yes	No	Yes	No	
STATES								
AASHTO								AASHTO does not do Snow and Ice Control.
AL								No response from Alabama.
AK	Y		Y				N	Did not find any comments on standby time or Mobilization.
AZ								Arizona does not outsource Snow and Ice control Services.
AR	Y							Arkansas has hired contractors on an emergency basis by the hour.
CA								California does not outsource Snow and Ice control Services.
CO								Colorado does not outsource Snow and Ice control Services.
CT	Y			Y			N	Connecticut bids equipment by the hour and guarantees a minimum per unit.
DE								No response from Delaware.
FL								No response from Florida.
GA								No response from Georgia.
HI								Questionnaire not sent to Hawaii.
ID								Idaho does not outsource Snow and Ice control Services.
IL								No response from Illinois.
IN	Y							Indiana does not routinely outsource Snow and Ice control Services. INDOT has rented loaders and graders with operators during times of emergency.
IA								Iowa does not outsource Snow and Ice control Services. They do have agreements with city's to plow snow, however no information was provided on how the cities are paid..
KS								Kansas does not outsource Snow and Ice control Services. On occasions when they have had equipment breakdowns they have rented contractor equipment along with an operator.
KY	Y			Y		Y		Units are paid by the hour. Standby is called "Dedicated Service". Mobilization is called "Retrofitting". Units to have ground-speed controllers for salt application and two way radios.
LA								Louisiana does not outsource Snow and Ice and control Services. Only two districts have any problems with snow and ice and they use bag salt distributed by trucks.
ME	N	Y			No		No	Maine does 95% of Snow and Ice Control with their own forces. 5% is outsourced to private companies by lump sum for certain sections of road.
MD	Y			Y		Y		A "retainer" fee is paid for each unit. Standby time is 50% of the working hourly rate.
MA	Y				No		No	Equipment is guaranteed a minimum of 2 hours once called out

Appendix C Summary of Methods of Payment

Organization	Payment			Standby Time		Mobilization		Comments
	Hourly	Route	Lane Mile	Yes	No	Yes	No	
MI	Y							Michigan pays on a unit cost and shares in a percentage of other expenses incurred by the City, County or contractor.
MN	Y				No		No	Minnesota pays on an hourly basis with no minimum or maximum hours. Expected usage will be 200 hours.
MS								Mississippi does not outsource snow and ice control Services
MO								Missouri does not outsource Snow and Ice control Services
MT	Y/N							Montana does not Outsource Snow and Ice control Services. They did try a trial bid by the hour for plow-truck-sander with a guaranteed monthly minimum for standby. Bids came in to high
ND								
NE								Nebraska Dept of Roads does not outsource specific snow and ice control activities. They do have agreements with cities over 800 population for maintenance including snow removal.
NV								Nevada does not outsource Snow and Ice control Services
NH	Y				No		No	New Hampshire contracts on an hourly rate only
NJ								No response from New Jersey
NM								New Mexico does not outsource Snow and Ice control Services. They do have an RFP out now for "maintenance" which includes snow and ice control responsibilities.
NY	N	Y	No					New York contracts with Municipalities for about 19% of their system on a Lump Sum Agreement
NC	Y							Called out by State Forces and paid an hourly rate.
ND								North Dakota does not outsource any snow and ice control activities. In the past, they have hired specific equipment during and after a bad storm.
OH		Y						Ohio outsources snow and ice control on Interstate Routes in four cities (Akron, Canton, Columbus, and Dayton). They did not state method of payment but would assume it was by route
OK	Y							Oklahoma does outsource some snow and ice control in the Capital Complex area with a Snow and Ice Service Contract
OR								Oregon does not outsource Snow and Ice control Services
PA								Pennsylvania did not respond
RI	Y							Rhode Island supplements their snow operations (approximately 70%) with hourly plows/sand trucks and operators.
SC								South Carolina did not respond
SD	Y			Y		Y		South Dakota does extensive outsourcing of winter maintenance services.

Appendix C Summary of Methods of Payment

Organization	Payment			Standby Time		Mobilization		Comments
	Hourly	Route	Lane Mile	Yes	No	Yes	No	
TN	Y			Y		Y		Tennessee just awarded their first privatized snow removal contract. They pay for most items on an hourly basis and also mobilization and standby fees.
TX								Texas does not outsource Snow and Ice control Services.
UT								Utah does not outsource Snow and Ice control Services.
VT	Y				No		No	Vermont uses standard Maintenance Rental Agreements for private contractors to supply equipment with/without operator.
VA		Y						Questionnaire was not sent to Virginia due to the contract they have with VMS, Inc. for Total Asset Management.
WA								Washington does not outsource Snow and Ice control Services because State Statute does not allow it.
WV								West Virginia does not outsource Snow and Ice control Services.
WI			Y					Wisconsin contracts with 72 of the Wisconsin county highway departments to provide winter maintenance activities on 11,512 center lane miles of state and federal highways. Payment is based on an actual time and material basis. Hourly rates are set for equipment. Work force rates are based on local county labor agreements.
WY								Wyoming primarily does all Ice and Snow control Services with their own forces at this time although in the past some contracts were initiated primarily on an hourly basis. Gate operators with a mobilization fee and guaranteed minimum monthly rate.
COUNTIES								
Eaton County, MI	Y							Pay Units are hours of operation per vehicle with a guarantee of 250 hours per unit per season.
CITIES								
Lake Forest, IL	Y					Y		When contractors bid they have to specify mobilization rates, travel rates, minimums and they are paid on an hourly basis.
Kansas City, MO	N	Y	N			Y		Kansas City contracts snow removal service on Residential streets located throughout the city. Payment is on a lump sum rate for the route. Mobilization is at the rate of 5% of the lump sum bid for plowing the route one time.
Madison, WI	Y			N		N		Madison uses a purchase order to pay for the service. They provide no standby pay, no minimum guarantee of service needed.
Milwaukee, WI	Y			Y				Milwaukee outsources approximately 1/3 of their 1400 miles of streets to 100 units.
Minneapolis, MN	Y							Minneapolis rents equipment but the operators are city employee's.
Sioux Falls, SD								Sioux Falls outsources some of its winter maintenance. Not response on how they handle the process.

Appendix C Summary of Methods of Payment

Organization	Payment			Standby Time		Mobilization		Comments
	Hourly	Route	Lane Mile	Yes	No	Yes	No	
Colonie, NY								Colonie does not outsource Snow and Ice control Services.
Brighton NY								Brighton-Rochester outsource sidewalks only.
OTHER								
Iowa State University CTRE/ISU								Lee Smithson and Bill McCall are focusing on mobile technologies that can measure the effectiveness of road surface friction and the freezing point of the solution the surface of the road.
Meteorologist								Mr. Breuser feels Meteorology can and should be an integral part of snow and ice control by accurate weather forecasting and having real time data for pavement conditions.
American West	NA							American West Environmental is a supplier of chemicals for winter use. They promote chemicals for de-icing and anti-icing, and other activities.
Dartmouth-Hitchcock Medical Center	Y	Y						Dartmouth Hitchcock Medical Center contracts snow removal on a lump sum basis for plowing and surface treatment. Hauling snow after a storm is on an hourly rate for trucks and loaders.
UNH T2 Center								New Hampshire Transfer Technology Center (T-2) passed the original correspondence (questionnaire) on to their contacts soliciting additional comments.
NY Thruway At		Y						New York Thruway Authority has contracts with service area operators to handle sidewalk and walkway related snow and ice matters that is a part of the overall contract.
Illinois Tollway								Illinois Tollway Authority does not outsource Snow and Ice control Services. They do contract for Storm Warning Forecast Services and for maintenance of their Roadway Weather Information System.
VMS, Inc.	Y			Y		Y		Virginia Maintenance Services (VMS, Inc.) subcontracts (2nd Tier) maintenance activities. These activities are part of the Total Asset Management contract with Virginia DOT and includes Snow and Ice control Services.
CANADA								
Alberta	Y			Y				Alberta pays for snow and ice control for the number of actual hours a snowplow truck is engaged in this activity. Availability (Standby Time) will be in days for the time both the snowplow truck and are available to engage in the work.
British Columbia								No response from British Columbia.
Manitoba	Y			Y				Manitoba does the majority of winter maintenance in house. This year the tendered two formal contracts for snow removal. They also use private snow removal equipment (bid hourly) when snow removal demands exceed in-house capacity.
New Brunswick		Y						New Brunswick's contract is a Lump Sum to "provide winter maintenance as necessary on all streets and roads covered by this specific contract".

Appendix C Summary of Methods of Payment

Organization	Payment			Standby Time		Mobilization		Comments
	Hourly	Route	Lane Mile	Yes	No	Yes	No	
Northwest Territory								The City of Inuvik does outsource winter Snow and Ice control Services.
Newfoundland								No response from Newfoundland.
Nova Scotia	Y							Nova Scotia does outsource some Snow and Ice Control although to limited extent.
Ontario	Y	Y	Y			Y		Ontario has a combination of payments. In some areas, they have functional contracts and payment is by the hour, kilometer or the day. In area contracts, payment is included in the lump sum price to include Route's or lane Mile's. Only one region utilizes standby time.
Saskatchewan	Y	Y						Saskatchewan does not outsource winter maintenance work in the southern portion of the Province. In the Northern portion, they have hourly agreements for equipment and operator's and total outsourcing for airports, local roads, winter roads and ice crossings in remote northern communities.
INTERNATIONAL								
Finland								No response from Finland.
Japan								
New Zealand	Y							Transit New Zealand outsources all winter maintenance work to Network Consultants who in turn manage the production of the work. Payment is made on an hourly basis for actual plowing, gritting, etc. Hourly rate bid must include overhead. Weather observation (road patrol) is paid lump sum per month.
Norway		Y						In Norway, counties have different philosophies of pay for winter activities that may include a difference in Traffic and Production. The past two winter's some counties have used a winter index calculated by using a formula based on the actual weather.
Sweden		Y		Y				Sweden solicits bids for certain size contract areas to a company such as SNRA's Construction and Maintenance Company. That company in turn can subcontract to other companies.

APPENDIX D:

SAMPLE PROVISIONS OF CONTRACTS

References in the project report to this Appendix are made to ***Item Number: Name Of Source***. Within an item numbered subject, the sources are listed alphabetically.

Actual quotations from sources are shown in regular type; summaries written by the researcher are shown in italics.

If a quotation includes a (...), this means that whole or partial sentences were left out and not transcribed.

These quotations are taken "out of context" so the reader must take care so as not attempt to interpret them without knowing and understanding fully the context in which they are written. This can best be achieved by acquiring a copy of the entire contract being referenced.

1. **AVL Equipment**

At its discretion, the Department may elect to install AVL (Automatic Vehicle Location) equipment on the Vendors truck in conjunction with the Snow and Ice Removal Program. The purpose of this equipment is to permit the KYTC to monitor the location of the truck unit as it moves along its assigned route, monitor the application of de-icing materials to roadway pavements, evaluate the status of any plowing operations, and serve as a text monitoring device between the truck operator and the base of operations for changes in the route or for notification of emergency situations. (Ref: KYTC)

2. **Blades, Cutting Edges**

Payment for blades and attaching bolts furnished by the State will be paid for by the contractor at a cost of \$45.00 per each blade. (Ref: CTDOT)

No down time will be charged to the Vendor for reasonable replacement time (of blades). However, the Vendor is responsible for furnishing the blade at his cost. Blades will be made of metal. (Ref: KYTC)

The snowplow's moldboard shall at minimum be a 12-foot unit equipped with carbide insert cutting edges. Not allowed are serrated cutting edges or cutting edges with teeth. Mark each moldboard end with an orange flag that is at least 18 inches square. (Ref: SDDOT)

3. **Calibration of Chemical Spreaders**

Vendors providing material spreading equipment to MassHighway shall have this equipment certified as calibrated and the automation operational to Mass Highway specifications. The spreading equipment must also be measured to exact capacity. The equipment must be inspected annually after September 15. Attached is a copy of the Certificate of Certification, Calibration and Spreader Volume, Calculation Sheet and a listing of vendors approved by MassHighway to perform this work...Certification and calibration shall be for dispensing highway deicing salt at

the rate of (A) 240 pounds per lane mile, (B) 480 pounds per two lane mile, (C) 720 pounds per three lane mile and (D) 960 pounds per four lane mile at a speed of 5-35 MPH, consistent with the speed of the vehicle. Tolerance plus or minus 25 pounds. (Ref: *MassHD*)

The spreader may be a slide in, mounted or tailgate unit. Minimum nominal spreader capacity is 5 cubic yards for a two-axle truck and 9 cubic yards for three-axle truck. The spreader must be a variable speed unit capable of consistent application rates. Calibrate the spreader at least once annually before beginning snow and ice control operations. Carry the spreader calibration card in the truck. The Supervisor may require additional calibrations if it appears the required application rates are not being achieved. The Supervisor will provide calibration forms to the Contractor on request. (Ref: *SDDOT*)

4. Callout Condition

The Contractor shall be called out to plow snow by the designated service area commissioner before 12 inches of fresh snow has accumulated. Fresh snow is defined as snow less than 1 week old... This method shall be used only when the total snow fall accumulation for the winter (September 1-April 30) is 80 inches or less, as measured for Fairbanks by the National Weather Service. (Ref: *Fairbanks North Star Borough, Alaska*)

5. Callout Response Time

All snow plowing shall commence within 12 hours from the time the Contractor is called out by the service area unless otherwise arranged with the service area commission. (Ref: *Fairbanks North Star Borough, Alaska*)

Furnish...trucks with...operators...upon a notice of sixty (60) minutes (one hour). Continuous operation may be required by the weather conditions. (Ref: *KYTD*)

Contractor's equipment must be located within a 10 mile radius of the project. Contractor must have supervisory personnel or voice communication equipped vehicles situated so that messages of urgency can reach the plowing or sanding vehicles within a half hour period. (Ref: *MaineDOT*)

If the Contractor is called out during the day, they are allowed 3 hours after notification by the Administration to report to the shop, ready to work. If the Contractor receives notification at night, allowed response time is reduced to 2 hours. Reporting late may be considered a "failure to respond". (Ref: *MDSHA*)

Once a winter event is recognized (the Contractor must define this in their proposal) the Contractor shall have response forces on the effected section of contractor road within one hour. (Ref: *MichDOT CORRIDOR I-69*)

The (Department) maintenance supervisor of the area will determine when plowing of the crossovers is needed. He will then call the successful bidder by phone. Plowing crossovers shall start one hour after being called....A typical call for plowing crossovers would be, but not limited to, an evening snow fall of three inches or more. A MNDOT supervisor would call around 3:00 a.m. for a 4:00 a.m. start on plowing crossovers. All crossovers within the section should be plowed open by 6:00 a.m.. (Ref: *MNDOT, special contract to specifically clean crossovers in 1997-98 but not repeated because of high bids*)

When notified by the Highway Maintenance Supervisor, or his alternative, of the need to report to work, the truck must be loaded with sand and/or chemical, and on the route within 45 minutes of the call. (Ref: *MNDOT*)

Contractor will respond to "call out" and have equipment in operation within two hours of initial call. (Ref: *OKDOT*)

The Contractor will be notified when his equipment and drivers are needed to mobilize and respond. The Contractor will be guaranteed a minimum payment of 4 hours per truck for each call-out. Hourly standby pay will be paid per truck for any time trucks are called out and are directed to be idle. No operational or standby pay will be allowed for truck breakdowns. The Contractor will be provided with a list of approved TNDOT personnel who are authorized to notify the Contractor to mobilize his forces. The Contractor will be expected to respond and be at salt bin sites

loaded with chemicals and ready to initiate snow and ice removal activities within four hours of notification to mobilize. The Contractor's operational time or stand-by time will begin when he arrives at the salt bin sites. (Ref: TNDOT)

Upon receiving notice from the Project Representative to begin work, the unit must be on the road and operating within one hour during daylight and two hours during nighttime hours. (Ref: WYDOT)

The Supervisor must be able to immediately contact the Contractor's contact individual by telephone or cellular telephone 24 hours a day 7 days a week during periods requiring snow and ice control work. Once contacted, this individual will have ½ hour to initiate the Contractor's snow and ice control operations. Upon initiation, the individual will call the Supervisor and advise when each truck left the Contractor's yard, the operator's name and cellular phone number. (Ref: SDDOT)

6. **Callout Minimum Pay (Show up Time)**

The Contractor will be paid a minimum of four (4) hours for each laborer responding to callout. (Ref: Fairbanks North Star Borough, Alaska)

The Department will guarantee a minimum payment of four (4) hours for each truck called out and reporting to work and whose performance is in compliance with the terms and conditions outlined in this contract. If the truck is not utilized for the full four (4) hours, the travel time will be included in the minimum payment. Rental time will be computed to the nearest one-half hour after the minimum four hour guarantee. Additionally, in event of any breakdown within the first four (4) hours, the minimum payment provision WILL NOT BE MADE. (Ref: CTDOT)

A minimum time period of two (2) hours will be guaranteed payment for each truck unit on each call-out. (Ref: KYTD)

An additional 1-hour rental rate will be paid if the equipment arrives within 1 hour of notification and is in working condition. (Ref: MDSHA)

The Contractor will be guaranteed a minimum payment of 4 hours per truck for each call-out. (Ref: TNDOT)

7. **Chains, Tire**

Vendor Responsibilities: ...Furnish tire chains and use them as needed, or as directed by the Department. (Ref: KYTD)

In addition to normal operating equipment, each specially equipped truck shall have tire chains...The use of tire chains is not mandatory. Chains are not usually necessary unless the snow is frozen on the pavement. The Supervisor can order the use of chains anytime conditions indicate they are needed. (Ref: SDDOT)

8. **Communications Equipment in Hired Vehicles**

All operators of hired equipment utilized this winter shall be required to carry either a pager or cellular telephone at all times while the equipment is engaged by MassHighway. These numbers shall be given to MassHighway personnel at the time of inspection and it shall be the responsibility of the hired equipment vendor to notify MassHighway of any change. (Ref: MassHD)

The Contractor will provide his own communication system between supervisor and operators. TNDOT will provide a hand held radio unit for each supervisor to provide communication between the Contractor and the authorized TNDOT representative. (Ref: TNDOT)

Equip each truck with a cellular telephone for communication. In the northwest corner of the State where cellular telephone service is not available, the Contractor and Supervisor shall mutually establish truck communication requirements. (Ref: SDDOT)

9. **Contract Period & Renewal**

The Department will annually renew this Contract for a period of three consecutive years contingent upon receiving appropriate funding. If either party to the Contract desires not to annually extend the Contract, they shall so advise the other party to the Contract in writing sixty (60) days before the date of the end of the Contract. (Ref: SDDOT)

10. **Contract Terms & Conditions**

Researcher's Note: The New York State Department of Transportation has written a report entitled "Municipal-State Agreements for Control of Snow and Ice on State Highways: Terms, Reimbursement Procedures and Documentation". It is almost 120 pages long and includes detailed information that clearly defines the intent and meaning of the provisions of Snow and Ice Agreements between the Department of Transportation and the municipalities in the State of New York. (Ref: NYSDOT)

11. **Equipment**

The Contractor shall provide adequate equipment to do the work. The amount of equipment to be used, but not the type, must be approved by MDOT. The type of equipment proposed for use shall be evaluated with the proposed plan. (Ref: MichDOT CORRIDOR I-69)

The Contractor will supply trucks equipped with snowplow, tailgate spreaders, motor patrols, front-end loaders and operators. The State will supply all granular salt and liquid chemicals required to perform the work. The Contractor will be required to provide the number of trucks specified on Sheets 4 thru 8 below for each snow route suitable for performing any of the work required. The trucks must be suitable to accept and operate any of the equipment required. Salt trucks must be capable of holding a minimum of 10 tons of salt. The State will supply the necessary number of salt brine tanks and spray bars for the Contractor's use on his trucks. The Contractor will be responsible for verifying the truck requirements for brine tank usage and supplying the appropriate trucks if other than salt trucks. No mobilization will be paid separately for brine trucks. (Ref: TNDOT)

The Contractor will be required to supply a suitable front- end loader with operator for loading bulk salt into his trucks at the state's salt bins. The State will provide an employee at each salt bin site for loading salt brine into tanks and pre-wetting granular salt with either salt brine or liquid calcium chloride once the Contractor's trucks are loaded. The State employee will also produce salt brine during the Contractor's activities. (Ref: TNDOT)

When conditions warrant it, the Contractor will be required to supply motor patrols with operators. The same response time will apply to the motor patrol. The motor patrols will be called-out to specific trouble locations anywhere in the three county area. A minimum of one motor patrol per county will be required. (Ref: TNDOT)

On three axle trucks, both rear axles shall be drive axles. (Ref: SDDOT)

12. **Equipment Assignments**

In order that the Department make maximum use of all snow removal equipment at its disposal, the contractor agrees to allow his units to be dispatched to roads other than those stipulated in this contract, but in the same general locality, when conditions are such that snow removal and ice control are not required on the specified roads, but are needed on adjacent roads. Payment will be at the same unit price bid for snow removal and abrasive application. (Ref: WYDOT)

The Contractor also agrees to allow his vehicles to be dispatched to other locations during emergency situations. A separate agreement will be initiated at the time of the occurrence to provide adequate compensation for lodging and miscellaneous expense. Payment for equipment during such emergencies for actual hours worked and for travel time to and from the contractor's shop will be made at the rate bid per hour for the unit. (Ref: WYDOT)

13. Equipment Breakdowns (Backups)

There will be no payment for a truck while laid up during periods of storm activities due to a breakdown. In the event that a contractor's spreader breaks down and the truck is able to plow, the state may elect to utilize the truck for plowing only...at a 50 percent REDUCED HOURLY RATE. (Ref: *CTDOT*)

In the event the Vendor's truck goes out of service for any reason, the operator will notify the (State) base for operations immediately. If the truck is not operational after being out of service for a period of one (1) hour, the truck will be taken out of payment status. The first hour of being out of service will be considered paid time. (Ref: *KYTC*)

It is suggested that the Contractor have the agreed upon equipment plus at least one backup in case of emergency. If the Contractor does not have the minimum required amount of equipment available at any time between October 15th and the agreed upon end date each year, MDOT will supply vehicles of the type we use for winter operations at a cost 3 times the vehicle's normal rental rate. These rates shall be charged by the continuous hour (not hours used) until the Contractor once again has the minimum number of vehicles in operating condition. (Ref: *MichDOT CORRIDOR I-69*)

Contractor must have "backup" equipment available to be in service within 2 hours in the event of a mechanical breakdown. (Ref: *OKDOT*)

The Contractor will be required to supply two backup trucks, fully equipped with operators, for use in the event of truck breakdowns. Full mobilization will be paid for the two backup trucks. The Contractor will be responsible for replacing all damaged equipment that no longer performs its intended function. No additional mobilization will be paid for the replacement of damaged equipment. The same response requirement will apply to backup trucks upon notice to mobilize. (Ref: *TNDOT*)

Should a breakdown occur and the vehicle or equipment becomes inoperable, said vehicle or equipment must be replaced or made serviceable within a period of two (2) hours. Failure to cooperate in placing unit into service shall be cause for cancellation of this contract. (Ref: *WYDOT*)

14. Equipment Identification (Decals)

All Hired Trucks must display the "State Highway Administration Contract Support" decal on both sides of the contracted vehicle(s) (on doors), while performing winter operations with SHA only. State Highway Administrations will provide the first set of signs, one individual sign for each side of the vehicle. Signs provided by SHA must be returned at the end of the winter season, April 15th. If signs are lost, or if Contractor reports for duty without signs, an additional set must be purchased from SHA. This will result in a deduction of the cost of the decals from Contractor's invoice. If Contractor refuses to display or purchase decals, contractor will not be allowed to work until decals are displayed. Decals will remain on Contractor's vehicle throughout the storm until released by SHA representative. It is the responsibility of the Contractor to keep the decal in good condition. (Ref: *MDSHA*)

All hired equipment shall be issued MassHighway decals which shall be permanently affixed to either the driver's side rear window in the case of small plows or the driver's side front (*window*) of the vehicle. Decals mounted on the vehicle shall be clearly visible from the driver's side elevation perpendicular to the side of the vehicle. (Ref: *MassHD*)

All Contractor vehicles used on main line sections of this job must be uniform in color and display the Contractor's logo. The Contractor may not use either white or orange as their paint scheme. A recognized safety color is recommended but not required. (Ref: *MichDOT CORRIDOR I-69*)

15. Equipment Specifications

The Department will not allow the use of equipment registered with "Repair" plates, "Dealer" plates or "Farm" plates. (Ref: *MassHD*)

16. Equipment - State Owned Accessory

Administration owned equipment (plows, spreaders, etc.) will be installed and removed from the Contractor's vehicles by the Administration. This equipment will not be used for work other than work performed under Administration supervision... (Ref: MDSHA)

The weight of the Administration's equipment will be counted as part of the total vehicle weight. The Contractor should reduce their load by the weight of the Administration's equipment (up to approximately 800 lbs.) in order to comply with Maryland Motor Vehicle Law. The Contractor will not be permitted to move over or operate on any road vehicles of weight or dimensions in excess of Maryland Motor Vehicle Law (§24-108) or Administration's regulations. The Contractor will not be compensated for any loss of capacity while carrying the Administration's equipment. (Ref: MDSHA)

17. Fuel Cost Adjustment

Researcher's Note: The SDDOT contract has a special provision that provides for compensation adjustments in cases where the Current Fuel Index (average of previous 4 weeks) is outside of 50% to 150% of the Basic Fuel Index (four week average prior to week of letting). (Ref: SDDOT)

18. Guaranteed Minimum Payment (Annual, Monthly)

Due to the uncertainty of conditions requiring the use of contractor's trucks, contractors will be guaranteed a minimum payment per truck for the season provided that all conditions of the specifications are met throughout the contract period and services are satisfactory to the State. This includes maintaining full insurance coverage throughout the contract period. Satisfactory service is defined as: a vendor being issued not more than one penalty assessment; not submitted Complaint Reports and /or no instances of "Poor" ratings on the Winter Use of Contractors' Trucks, (Maint. 81). In the event that a contractor is called to report to his pre-determined work location and cannot or does not report to work, those monies lost, per hour, will be deducted from the guaranteed minimum offered. In addition, any hours that are to be considered not paid on the Maint. 81 (not paid would mean breakdown hours contractors vehicle is not actively engaged in snow plowing operations, after reporting to his or her work location) will be deducted from that contractors guaranteed minimum per vehicle. Minimum guarantee payment amounts will be determined after the cost for snowplow blades, breakdown hours and penalty hours (if any) are deducted from the appropriate guaranteed payment. The guarantee shall be paid as follows:

\$5000.00 per truck with plow & approved material spreader,
\$3500.00 per truck with plow. (Ref: CTDOT)

The estimated hours shown on the Proposal are estimated for the contract period, and is not a guarantee that these hours will be required under this contract. These hours will be used in determining bid award. (Ref: WYDOT)

The Department agrees to guarantee a minimum of twenty (20) hours of operating time per month for each required unit...no standby pay will be paid. All hours worked will be applied towards the 20 hours of guaranteed time...This includes hauling of abrasives materials from WYDOT storage area to the contractor's storage area. (Ref: WYDOT)

19. Hourly Equipment Rates

Hourly equipment rates include a competent operator, fuel, insurance, equipment, mobilization, demobilization, profit, overhead and any other costs incurred by the Contractor in performing the work. (Ref: Fairbanks North Star Borough, Alaska)

Hourly rates include operator, operable CB radio (on all dump trucks), gas, oil, maintenance of vehicles and incidentals. (Ref: MDSHA)

...with the exception of ..., a \$5.00 per hour bonus for equipment used on or before November 5, ____, will be paid. (Ref: MassHD)

20. Hourly Labor Rates

Hourly labor rates include a competent laborer, travel to and from the work area, small hand and power tools (i.e. shovels, rakes, chain saw, cut off saw, etc.), insurance, profit overhead and any other costs incurred by the Contractor in performing other work. (Ref: Fairbanks North Star Borough, Alaska)

21. Levels of Service (See Item 29. Performance Standards...)**22. Materials, Chemicals, Abrasives**

The State will provide sand and salt for this contract at their _____ lots. The sand and salt provided by the State is to be used only on the contracted route, or other State Department of Transportation maintained roads unless written approval is obtained from the Department's Representative. (Ref: MaineDOT)

If the Contractor intends to provide the sand for the contracted route... The Contractor agrees that the sand stockpiles must be in compliance with all local, state and federal rules, regulation, and statutes. The Contractor's stockpiles of sand will be so located as to permit minimum travel time to critical areas and deadheading for reloading. The maximum distance between sand and salt stockpiles shall be twenty (20) miles. Contractor agrees to have all mixed sand and salt stockpiled by November 1 of each year this contract is in effect, commencing November 1, _____. (Ref: MaineDOT)

The Contractor shall provide a location to store deicer materials. Any storage location used by the contractor must be on an "All Season Road", and must be within two miles of a freeway entrance or exit service by this contract. (Ref: MichDOT CORRIDOR I-69)

The Department agrees to provide abrasives for the contractor's use. The abrasives shall be stockpiled at the contractor's work site at _____ or as specified by the Department. The yard should hold a minimum of 150 tons of material. The Department at its option may elect to haul the abrasives or direct the contractor to haul the abrasives at the contractor's unit hourly bid price. (Ref: WYDOT)

Sanding abrasive and deicing chemicals are available at Department Stockpile sites. Mixtures of sanding abrasive and deicing salt are general available at all sites. Under certain road and weather conditions and/or as instructed by the Supervisor, the Contractor's employee may have to add deicing chemicals to the mixture during the spreader loading operation. (Ref: SDDOT)

23. Maximum Hourly Rate

The state will pay an hourly rate up to the maximums listed for the following:

Operator, truck, plow and chains	\$105.00
Conventional material spreader	35.00
Ground oriented material spreader	10.00 additional (Ref: CTDOT)

Researchers Note: The MassHighway sets maximum hourly rental rates for hired equipment used for snow and ice control operations. There are different rates for plow trucks depending on size (ranging from pickups to ten wheeler), motor grader, spreader plow combination, front end loader, etc. Maximum rates for certain accessories, like power reversing plow on 6-10 wheeler, wing plows and underbody plows are also quoted. Additional premium pay is given for ground oriented chemical spreaders meeting specified criteria and/or for pre-wetting equipment. (Ref. MassHD)

24. Meals

There will be no payment for time out for meals or for the cost of meals. The contractor shall take a meal break of one-half hour when directed by the State's representative. The arrangement as to when meals will be taken shall be controlled by and authorized by the State's representative. (Ref. CTDOT)

25. Method of Measurement

Snow plowing will be measured by the mile and shall include as many passes as necessary to remove all snow according to Plowing Requirements (2.15-2.01). (Ref: *Fairbanks North Star Borough, Alaska*)

The Contractor and commission shall negotiate snow plowing at the hourly rate...whenever either of the following conditions occurs:

- A. The contractor claims more than 12 inches of fresh snow has accumulated and the depth of fresh snow is 12 inches according to records kept by National Weather Service for Fairbanks.
- B. The total snowfall accumulation is more than 80 inches, as measured by National Weather Service for Fairbanks. (Ref: *Fairbanks North Star Borough, Alaska*)

26. Mobilization Payment (for Retrofit Trucks, etc.)

Payment will be made to each contractor for mobilization of equipment at the rate of five (5%) percent of the lump sum bid for plowing the route one time. (Ref: *City of Kansas City, MO for their residential street contract*)

...This is a bid price for an annual payment over a period of five (5) years. a) This applies for the length of the contract. b) This includes all costs to retrofit the truck unit as specified for snow and ice operations. This will include the alteration of the truck unit and the procurement of the designated snow and ice equipment attachment and accessories. These will include the following:

- 1) Two-way radio
- 2) Ground speed control
- 3) Snowplow (specified type) front mounted
- 4) V-box hopper salt spreader
- 5) Liquid chloride dispensing unit to discharge at the salt spreader spinner
- 6) Parts and labor to retrofit and provide adequate hydraulic or electric power systems
- 7) All other items as required in these terms and conditions. (Ref: *KYTD*)

Mobilization unit bid price shall include all costs for retrofitting each truck's hydraulic system (including backup trucks) to accommodate equipment, providing snowplow and bracket, tail gate spreaders, flashing amber hazard beacons or strobe lights and all contractor communications needed per truck. All equipment supplied under mobilization shall become the property of the State upon completion of the contract. (Ref: *TNDOT*)

The Department agrees to pay the contractor a lump sum payment for mobilization as set forth in the accompanying proposal. (Ref: *WYDOT*)

Payment for Annual Mobilization will be made at the contract unit price and is in payment for the work necessary to establish, modify and/or organize the facilities, equipment, and personnel to provide snow and ice control services as per this Contract. Payment for annual Mobilization will take place after Contract award and annually thereafter provided each time before payment the Contractor demonstrates to the Supervisor that the aforementioned annual Mobilization work is accomplished. The lump sum bid and payment for Annual Mobilization may not exceed \$2,000 per year per awarded highway section except that for awarded highway sections where two specifically equipped trucks are required, the lump sum bid and payment for Annual Mobilization may not exceed \$4,000 per year. (Ref: *SDDOT*)

The Supervisor may extend the contract start date by up to forty-five (45) days in the event the Contractor is unable to obtain the required equipment by contract start date. To get the start date extended, the Contractor shall provide to the Supervisor verifiable evidence no less than twenty (20) days before the contract start date that the required equipment is forthcoming. The Supervisor will make arrangements with the Contractor to accomplish the work until the equipment arrives. (Ref: *SDDOT*)

27. Pay Units for Work (Basis of Payment)

The method of payment for snow plowing is by the mile, for sanding it is by the ton, and for hardpack removal, it is by the mile. (Ref: Fairbanks North Star Borough, Alaska)

The Department agrees to pay the County \$_____ per two-lane mile per treatment for snow and ice removal completed by the County on any of the roads listed on Attachment A. *(Ref: Interlocal agreement between KYTD and individual counties in KY)*

Payment will be lump sum rate for the route as established by the Contractor's bid. The proposed bid will be the same for all hours of the day, and all days of the week. *(Ref: City of Kansas City, MO for their residential street contract)*

Payment for authorized plowing time, sanding time, and plowing/sanding time will be made at the respective unit bid price per hour measured to the nearest ¼ hour. Bid price payment is considered full compensation for the operation of the truck to perform plowing/sanding and includes payment for operator, fuel, and all other maintenance cost items necessary for operating the truck and mounted equipment. Payment made will be for the actual hours of time worked. Time will start when the truck leaves the route starting point and time will end when the work operations are complete and the truck starts its return to the Contractors yard. *(Ref: SDDOT)*

...the Supervisor and Contractor shall work together to establish mutually agreeable route starting points and work sequence. A route starting point may be a shop site, highway/MRM location, stockpile site, etc., and may vary based on type of operation. For example, a route starting point for sanding operations may be a stockpile site. *(Ref: SDDOT)*

28. Performance Evaluation

Researcher's Notes: Maryland State Highway Administration (MDSHA) rates each Contractor after he submits a bill for each storm. Performance categories include Reliability, Quality of Work I (related to following SHA policies and guidelines), Quality of Work II (related to need for supervision) and Equipment Condition. If the Contractor receives a C or less in any category for two consecutive storms, the SHA reserves the right to terminate the Contract. Also failing to respond to a callout within required time (3 hours daytime, 2 hours nighttime) is recorded as a deficiency, two of which during a contact period constitute grounds for termination. (See Callout Response Time)

Researcher's Notes: Michigan Dot (MichDOT) in a Total Maintenance Contract they have with a private contractor in around Lansing, they reference a Winter Operations Guide which is a grid that defines what activities should be performed (blade, sand & salt), including application rates, during and after a storm, depending on temperature ranges and whether the temperature is rising and falling. (Ref: MichDOT)

The Contractor shall provide a level of service appropriate under prevailing weather conditions, with a goal of providing a driving surface generally bare of ice and snow. Winter maintenance forces shall perform whatever services are required to provide a wet and reasonably bare pavement. It is intended that this level of service be maintained 24 hours a day, 7 days a week. *(Ref: MichDOT CORRIDOR I-69)*

29. Performance Standards Specific to Plowing (Requirements, Work Standards)

It is the intent of this Contract that the Contractor perform all duties necessary to maintain and operate the _____ Airport during the term of this Contract such that the Airport is kept open 7 days a week, 365 days per year unless an emergency or routine maintenance prevents the airport from being open. To the greatest extent practical, the Contractor is to provide that level of performance which will insure the safe and convenient use of the airport by the public...

The Contractor shall begin snow control efforts at a time no later than when two (2) inches of snow or one half (½) inch of slush has accumulated on the runway or taxiway surfaces. Snow drifts will not be allowed to develop on the airport's aircraft movement areas (inside of edge lights or cones) unless the storm is so severe that

reasonable efforts to remove snow are unsuccessful. At which time, the contractor may cease snow removal operations until the storm subsides to the point where snow removal efforts are effective.

Runway(s) and taxiway(s) shall be plow free of loose snow full width and length. Snow must be plowed until it is a minimum of twenty (20) feet outside the edges of the runway(s). Snow banks will be placed off the edges and not on the threshold/ends of the runway(s).

Apron(s) will be free of loose snow. Snow control on apron(s) will begin after the runway(s) and taxiway(s) have been plowed.

Loose snow must be removed from the threshold markers, runway lights and/or reflectors using caution to avoid damaging or destroying these fixtures. Snow/frost will be cleaned from lights, signs and threshold panels daily as necessary.

After snow control efforts are completed, all equipment will be moved clear of areas where aircraft operate to a point distant enough not to create a hazard to operating aircraft.

When present, slush shall be removed from the runway unless the surface is soft enough for the equipment to cause rutting. During spring breakup or periods of heavy rain; runway, taxiway and apron shoulders and adjacent ditches will be cleared to assist drainage. (Ref. AKDOT contract on state owned airport)

The roadway surface shall be cleared of snow from roadway shoulder to roadway shoulder each time it is plowed. (Ref: Fairbanks North Star Borough, Alaska)

The cleared width shall not be allowed to narrow as consecutive plowings occur. (If the contractor has to push snow berms back during winter to maintain roadway width, this work shall not be paid for.) (Ref: Fairbanks North Star Borough, Alaska)

Where roadways are on sloping terrain and one side of the roadway has a cutbank, all snow shall be plowed to the downhill side of the roadway. (Ref: Fairbanks North Star Borough, Alaska)

Snow berms shall be winged back at road intersection radii to a maximum height of 30 inches measured from roadway centerline. (Ref: Fairbanks North Star Borough, Alaska)

Contractor will commence plowing and sanding operations when snow on the pavement has reached a depth of one-half inch if the snow is wet and one inch if dry. Operations will continue until the highways are cleared of snow to the outside shoulders. During severe storms or drifting, plows will be operated so as to maintain two-way traffic. Immediately after extreme conditions have subsided, snow will be removed to the outside of the shoulders of the highway. (Ref: MaineDOT)

The Contractor will follow the Department's methods and practices of plowing and sanding to ensure continuity of operations between areas of highway maintained by the department and those maintained by the Contractor. Such methods and practices as excessive speed of plows and disregard of mailboxes must be controlled by the Contractor and monitored by the Department. (Ref: MaineDOT)

At such times as the Department's Representative shall direct, the Contractor will remove compacted snow and ice from the highway, insofar as possible, so that 3½ feet of pavement will be exposed on each side of the centerline. If deemed necessary by the Department's Representative, the Contractor may be required to remove all compacted snow and ice on the paved portion of the highway. (Ref: MaineDOT)

Contractor agrees to pay particular attention to the sanding of railroad crossings, hills, curves and intersections, and to apply extra sand and salt at such locations when necessary. Plow blades shall be raised sufficiently at railroad crossings to prevent damages to the rail tracks. Any residue of snow on the tracks shall be removed by hand if necessary. (Ref: MaineDOT)

The Contractor shall schedule his work such that by noon of the day following the end of the storm, three and a half (3½) feet of the pavement will be exposed on each side of the centerline. (Ref: MaineDOT)

MNDOT took a public survey in 1999 attempting to identify driver's comfort and acceptance of six different service levels of snow and ice removal immediately after a snow event and at approximately 9 and 15 hours after the event.

Only two service levels had high level of acceptance with the drivers in most scenarios:

- 1) *Driving lanes bare with centerline and edge lines showing, and*
- 2) *Driving lanes bare with centerline and edge lines covered.*

Furthermore, the public survey revealed that there was only a small difference in driver satisfaction between these two service levels. In other words, once bare pavement between centerline and edge lines is achieved, it does not make much difference if the lines themselves is covered or exposed. This is reflected in M/DOT's guidelines.

In MNDOT, winter maintenance guidelines state "Snow and ice operations begin when conditions, or forecasted conditions, will result in loss of bare lanes. Bare lanes are described as: driving lanes will be free of ice an snow between the outer edges of the wheel paths and have no greater than 1 inch of accumulation on the center of the roadway. Snow and ice removal operations are to continue throughout the event to reach and maintain bare lanes."

" Bare Lane Regain Time (or Regain Time) as the time from the end of the event until bare lanes are obtained. It is also called the Bare Lane Indicator. The Bare Lane description is the same for all routes. The Target Regain Time is dependent on the classification or roadway". This ranges from 1-3 hours on high volume urban interstate (>30,000 ADT), 2-5 hours for 10,000 to 30,000 ADT, 4-9 hours for 2,000 to 10,000 ADT, 6-12 hours for primary routes (800-2000 ADT) and 9-36 hours on secondary routes (under 800 ADT)." It is the operator's responsibility to record the Event End and Bare Lane Regained date and time. The Area Maintenance Engineer will designate and individual to record the Event Start and Loss of Bare Lane date and time." (Ref: MNDOT Draft Maintenance Manual, Snow and Ice Control, 5-791.300, dated 10/26/2000)

Plowing of crossovers shall start one hour after being called. All crossovers shall be plowed open within two hours to a minimum width of 20 feet. (Ref: MNDOT)

Contractor will continue snow removal operation until route conditions meet with the satisfaction of OKDOT personnel in charge of snow removal. (Ref: OKDOT)

Adjust snow plow shoes to allow the cutting edge to be in contact with the surface on a asphalt and concrete surface. Adjust the snow plow shoes to hold the cutting edge off the surface on gravel roads. (Ref: SDDOT)

When plowing snow off of grade separation bridges, reduce speed to prevent throwing snow over bridge rail. Clear snow from grade separation bridges by pushing snow off the end of the bridge and then off the road into the right-of-way. (Ref: SDDOT)

Contractor shall ensure that bare pavement is achieved on roadway(s) 24 hours after completion of the storm. All intersections shall be opened and free of sight distance obstructions, snow is to be pushed back from shoulders and bridges and ramps cleared of snow and ice. (Ref. Virginia DOT, Northern Virginia District, 1996, included in 1999 Edition of AASHTO Guide for Snow and Ice Control, Appendix B-2)

30. Performance Standards Specific to Sanding (Requirements, Work Standards)

The sanding material shall be spread in a uniform layer which covers the entire width of the roadway, shoulder to shoulder, or the entire area of an intersection as directed by the service area commission. The thickness of the layer of sanding material shall be determined by the service area commission. (Ref: Fairbanks North Star Borough, Alaska)

Vendor Responsibilities:...Keep the deicing material flowing, when required, while operating on the assigned route. (Ref: KYTD)

Sanding trucks must be equipped with either tailgate or hopper sanders, which are capable of calibrating the amount of sand/salt spread per mile to ensure evenness of application. When the application of pure salt is required, the Contractor will use its discretion in the amount to be applied. Contractor agrees to comply with the directions of the Department's Representative concerning the application of pure salt. The department estimates that normally salt is applied in the amount of 300 pounds per centerline mile per application. (Ref: MaineDOT)

All trucks loaded with chemicals shall be covered during standby conditions to prevent freezing. (Ref: MDSHA)

Anti-icing. The Contractor will spread salt brine at a rate of 40 gallons per lane mile using state supplied tanks and spray bars. The Contractor may equip dedicated anti-icing trucks as soon as available and park them at TNDOT sites to facilitate his mobilization. (Ref: TNDOT)

De-icing. The Contractor shall be required to spread granular salt at the lane mile application rate directed by the TNDOT representative. The granular salt shall be treated with salt brine at the rate of 16 gallons per ton or liquid calcium chloride at the rate of 8 gallons per ton prior to spreading. (Ref: TNDOT)

Snow Plowing. The Contractor will be required, when directed by the TNDOT representative, to plow snow and ice during the application of salt. The Contractor may also be directed to plow without applying salt. (Ref: TNDOT)

31. Performance Standards for Shoulders (Requirements, Work Standards)

The Contractor shall maintain a white shoulder policy similar to that one now in place within MDOT. Truck loads should be reduced before blading shoulders, and apply only enough blade pressure to remove most of the snow, while leaving a light snow covering. (Ref: MichDOT CORRIDOR I-69)

Accumulations of snow shall be removed from in front of bridge railing and approach guardrail as time permits after a storm. (Ref: MichDOT CORRIDOR I-69)

32. Plowing Definition

Plowing will be defined as the plow metal being in contact with the pavement. (Ref: KYTC)

33. Pre-Contract Equipment Inspection

Required at the time of inspection will be a Photostat copy of the registration and certificate of insurance. The Total Registered Weight indicated on the registration and, if required, the Manufacturer's Specification will be used by MassHighway to correctly categorize your vehicle...During the vehicle inspection at the MassHighway Depot, the equipment vendor shall be responsible for taking two photographs of each unit of equipment supplied. These photographs will be taken from the left rear and right front, shall be angled to show the complete vehicle, and shall clearly depict the vehicle registration plate. The photographs are to be given to the District personnel inspection the vehicle and shall be kept on file by Mass Highway for reference. The inspection procedure is not complete and your agreement cannot be processed until these photographs have been submitted to MassHighway personnel. (Ref: MassHD)

34. Pre-Established Pay Items

Dedicated service: \$2000.00 per year. a) November 1 thru April 15 of each year of the contract. b) This includes the cost of providing one unit for exclusive use at the Department's direction during snow and ice removal operations on an annual basis. Payment will be paid after April 15 of each year of the contract and will be based upon the contractor responding to each and every call-out from the Department. Failure to respond to call-outs in a timely and proper manner may result in a prorated reduction of the payment of this item as a penalty. (Ref: KYTC)

Salting and Plowing Operation: Sixty dollars (\$60.00) per hour. a) November 1 thru April 15 of each year of the Contract. b) This includes all costs for operating a fully operational and equipped snow and ice truck as specified by the contract and the contract administrator. (Ref: KYTD)

Researcher's Notes: MDSHA has established a schedule of hourly rental rates for winter maintenance equipment including single, tandem and tri-axles dump trucks, plus motor graders and loaders. Rates vary depending on truck size, the addition of accessories (plows, sanders, etc.), whether the sander is tailgate or trailing Epoke, and whether the accessories are supplied by the DOT or by the owner. They have three rate schedules that are pre-assigned to

geographical areas depending on “difficulty in getting vendors”. Vendor interested in the prescribed terms apply and are awarded contracts.

Contractor shall receive a one-time \$250.00 retainer fee for each vehicle after passing an equipment inspection and calibration test and attending a winter maintenance meeting. (Ref: MDSHA)

Upon successful completion of this snow contract as determined by the Resident Maintenance Engineer the Contractor will receive a payment of \$250.00. This payment will follow the receipt of all State owned equipment and all outstanding invoices from the Contractor. (Ref: MDSHA)

35. Procedures

Both pre-wetting and anti-icing procedures are acceptable. No deicer will be specified. The Contractor may use any deicer for which they are willing to take environmental responsibility. (Ref: MichDOT CORRIDOR I-69)

36. Property Damage

Contractor agrees to reimburse the Department for the replacement of guard rail, guard rail posts, signs, sign post or guard posts damaged by the Contractor if resulting from the Contractor’s negligence as determined by the Department’s Representative. (Ref: MaineDOT)

The Contractor shall be responsible for all damage to life and property due to their activities or those of their agents or employees, in connection with the services contained in this agreement, it being expressly understood that the Contractor shall indemnify and save harmless the Administration, its members, officers, agents and employees of, from and against all claims, suits, judgments, expenses, actions, damages and costs of every name and description arising out of or resulting from the services contained in this agreement. (Ref: MDSHA)

37. Scope of Work

Municipal-State Snow and Ice Control agreements shall include all activities necessary to control snow and ice, together with the necessary labor, equipment and materials...Activities within the agreements are grouped into two categories: (1) Standard Activities, routinely performed under all municipal agreement and (2) Special Activities, which may or may not be included in a given agreement...

Standard Activities include:

1. Supervision
2. Supervisory Patrolling
3. Radio Watch/Dispatch-General Communication (when approved by the Regional Maintenance Engineer)
4. Preparedness for snow and ice control, including snow and ice markers
5. Plowing snow from the traveled way and/or application of anti-icing or deicing materials
6. Plowing of shoulders, crossovers, turnarounds and gore areas, including removal of snow drifts, using trucks or graders only
7. Treatment of slippery spots, including “black ice”, bridges
8. Removal of “hard pack”
9. Routine “benching”, using plow trucks or graders only

Special Activities include, but not limited to:

1. Snow Fence installation, maintenance, dismantling and storage
2. Removal of snowdrifts that are not on travel lanes, using specialized equipment (e.g., rotary plow) or specialize staff (e.g., maintenance and protection of traffic)
3. Improving roadside snow storage capacity, using rotary plowing or other specialize equipment or staff
4. Removal of snow and ice from around appurtenances, e.g., impact attenuators

5. Opening of culverts and waterways
6. Removal of snow and ice from bridges (other than the travel lanes)
7. Sweeping of the traveled way to remove accumulated winter abrasives

Special Activities often require extensive use of personal and equipment. Therefore, they must be carefully considered before including them in the Operational Plan. Resident Engineers may choose to give municipalities authority to perform specific Special Activities under this Agreement. On the other hand, they may elect to perform Special Activities with State employees, especially those which are personnel intensive. Special Activities not explicitly defined in the Operational Plan shall be considered "Extra Work"... (Ref: *NYSDOT*)

38. Standby Pay

Standby pay will be paid at an hourly rate equal to 50% of the working hourly rate. Standby is defined as the time designated by the Administration, from when the vehicle reports for service until it is placed into snow operations. Standby time is applicable only to single axle and tandem axle dump trucks. All other rented equipment will be paid for at the full hourly rate. (Ref: *MDSHA*)

Standby pay will be 1/2 of the appropriate unit price bid. (Ref: *TNDOT*)

Payment for authorized standby time will be made at the standby unit price per hour measured to the nearest ¼ hour. Authorized standby time includes the Contractor's employee time used to load and unload abrasives and/or deicing chemicals, and the time used to install and remove tire chains. Authorized standby time also includes the time each Contractor's employee spends on ordered standby time. Ordered standby time starts when the Supervisor orders the Contractor to suspend operations and standby. Ordered standby time also starts when the Supervisor decides to delay the start of actual operations after the Contractor's contract individual is notified to commence work and the Contractor's personnel and equipment are at their route start point. Ordered standby time stops when the Supervisor orders the Contractor's personnel and equipment to either resume operations or to stop operations and return to the Contractor's yard. (Ref: *SDDOT*)

During plowing operations, time for lunch breaks, equipment breakdowns, installation of chains, and blade changes will be paid as standby time, though this time shall not exceed two hours in any ten-hour period after plowing begins. (Ref: *SDDOT*)

The Contractor can be ordered to be on standby time. Plowing operations that would become ineffective or unsafe would be reason for an ordered delay. If after being notified to commence work, and the Engineer decides to delay the start of plowing, the Contractor will be paid at the standby rate from the time of arrival at the yard to the time plowing begins or operations are suspended. A minimum of two hours standby time will be allowed if operations are suspended. (Ref: *SDDOT*)

39. Sub-Contracting

The Contractor may not subcontract or otherwise transfer any interest in this Contract without prior approval by the Department. Any work performed by a Subcontractor before approval is at the Contractor's sole risk. All subcontracts of the Contractor, and all lower tier subcontracts, must contain or reference all applicable provisions of the Contract. The Contractor must promptly pay all legitimate subcontractor and supplier claims. The contractor agrees that the Department may retain and deduct monies otherwise due the Contractor in an amount necessary to such claims. (Ref: *MaineDOT*)

40. Training

Vendor Responsibilities: ...Require their operators to attend training instructions presented by the Department. This training will be conducted in conjunction with training for employees of the Department and will be conducted on an annual basis. Payment for this training will be made at a rate of twelve dollars (412.00) per hour... This will be for two operators for each fully equipped snow and ice truck...(Ref: *KYTC*)

TNDOT will provide a training course for the supervisors, truck operators and material handlers to be held at the TNDOT District Office in Johnson City. Compensation for the training time will be paid at the hourly standby pay rate. The training will consist of 8 hours of snow and ice removal procedures and specific snow route reviews. (Ref: TNDOT)

Before beginning operations, the Contactor shall provide employee equipment operation training to familiarize its employees with the equipment and its operation. Before the Contractor begins operations, the Supervisor shall provide training to the Contractor's employees to insure route familiarization.

41. Travel Allowance (Travel Pay)

The travel time allowance will be agreed upon before the truck is hired. The travel time allowance shall be the time from the contractor's garage to the work assignment. Travel time will not be paid for return trip to contractor's garage after release by the state. The travel time allowance will be paid at the set hourly rate designated. Failure to report within the agreed upon travel time allowance will void the minimum guarantee payment of four (4) hours. (Ref: CTDOT)

All rates quoted are for actual operating and/or standby time. No time will be allowed for traveling to and from assigned snow removal routes or designated reporting locations. (Ref: MDSHA)

42. Types of Contracts

Researcher's Note: The NYSDOT has three (3) different types of contracts with municipalities.

- A. *Conventional Municipal Snow and Ice Agreement: Lump sum payment per year for set of defined roadways.*
- B. *Lump Sum Municipal Snow and Ice Agreement: Lump sum payment per year per lane mile for a defined number of lane miles.*
- C. *Indexed Lump Sum Municipal Snow and Ice Agreement: Same as Lump Sum (Item B. above) except that the actual payment "will vary with the intensity and severity of the season. This is determined by the STATE based upon the reported seasonal activity of State forces in the managing residency when compared with the average season activity during the last three years. The minimum seasonal payment after adjustment...shall be 67% of the estimated expenditure as established for the season." (Ref: NYSDOT)*