TRANSPORTATION RESEARCH SYNTHESIS

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Gravel Road Management Tools

Introduction

The Local Road Research Board (LRRB) conducted this study to understand the gravel road management needs of Minnesota local agencies. The two main goals were to:

- Determine the needs of local agencies
- Identify what gravel road management tools are currently used/available

This report includes the following:

- Process summary
- Summary of local and national survey findings
- Matrix of existing gravel road management tools used in the U.S.
- Appendix with detailed survey results and interview summaries with software vendors

Process Summary

Two online surveys were conducted to understand how gravel roads are managed in Minnesota and nationally. The first survey was sent to 87 counties and 120 cities in Minnesota to determine if any agencies are currently using a gravel road management tool and to understand if there is a need for gravel road management tools. The second survey was sent to county engineers across the U.S. through the National Association of County Engineers (NACE) to learn what gravel road management tools are used across the nation. The tools reported in the national survey were researched further online and interviews were conducted with the software vendors.

Survey Findings

The following is a high level summary of the findings of both surveys conducted. The detailed survey results are provided in Appendix A and B of this report.

The first survey was completed by 51 local Minnesota agencies and found that:

- 84 percent of local agencies do not currently have a gravel road management tool.
- Of the eight agencies that have a tool:
  - Six were an experienced personnel's judgment
  - One was a county-specific spreadsheet
  - One was a one-page guide to rating gravel roads (refer to Appendix C)
- The top three gravel road management tool needs that respondents identified were:
  - Ability to track condition of gravel roads
  - Define when and how to measure performance
  - Guidance on how to schedule maintenance/prioritize route

The second survey was completed by 15 local agencies nationally. Ninety-five agencies started the survey; however, 80 of the 95 agencies replied that they do not use a gravel road management tool. These agencies did not need to complete the rest of the survey as the remaining questions were specific to gravel road management tools. The survey results found that:

- Nine tools that can be used for gravel road management were identified:
  - Connecting Point
  - County Information Management System (CIMS)
  - Excel Spreadsheets
  - Lucity
  - PASER Manual/PASERWARE
  - PubWorks
  - Road System Management Software 2011 (RSMS11)
  - WinCAMs
  - Work Central (RT Vision)
- The top three main reasons that local agencies decided to use a gravel road management tool were to:
  - Manage costs/budget
  - Track conditions of roads
  - Obtain guidance on how to schedule maintenance/priority routes
- The main data collected using a gravel road management tool is:
  - Maintenance activity (winter and summer)
  - Materials costs
  - Maintenance costs
  - Construction history

Gravel Road Management Tools Summary

Each of the nine tools identified in the national survey, along with a few other tools discovered through online research, were further investigated to get a better understanding of each tools capabilities, limitations and costs. After conducting phone interviews with each of the vendors, it was determined that the following six software tools were appropriate for application in Minnesota:

- County Information Management System (CIMS)
- Lucity
- PubWorks
- Road System Management Software 2011 (RSMS11)
- WinCAMs
- Work Central (RT Vision)

A comparison matrix of these six tools it shown in Table 1. Full details of interviews conducted with each vendor can be found in Appendix C.

Note that the information provided in Table 1 is current as of the date that this report was published. Software programs continually evolve and it is recommended that agencies interested in more information about a gravel road management tool contact the vendor directly.

As mentioned above, it was determined that a few of the tools are not appropriate gravel road management software tools for use in Minnesota for the reasons listed below.

- PASER Manuals – This is not a software tool, but a set of online manuals that help agencies evaluate their roadway surfaces and plan repairs. Common defects are described and illustrated with photos. A surface rating system links type, number and severity of defects with the type of maintenance needed. There is a gravel and seal-coat manual, as well as several other road types. These manuals can be found for free at the Transportation Information Center of the University of Wisconsin-Madison website: http://tic.engr.wisc.edu/Publications.lasso
- PASERWARE – This software was associated with the PASER Manuals, though it has non-overlapping concepts and models. It is no longer supported by the Wisconsin Department of Transportation (WisDOT), as of 2001. Due to this length of unsupported time, the software, while potentially retrievable, would likely only work on Windows XP. Windows is no longer supporting Windows XP as of April 2014, meaning that while the OS is still functional, it does pose security risks to continue to use it. While a few original users may still be using PASERWARE, it has mainly been replaced by WISLR (Wisconsin Information System for Local Roads), which is a web-based PMS application meant only for Wisconsin agencies. For these reasons, there would likely be significant time and cost to re-starting use of PASERWARE, though there is some support for its revival among the original management staff. The benefits of PASERWARE were its simplicity, ease of use, and inexpensive cost. The system was able to plot several different types of models (e.g., theoretical deterioration models) as well as keep track of costs, and give priority rating for maintenance needs. A high priority, for example, would be given to a high-use road needing preventative maintenance; a low priority would be rebuilding a failed, low-use road. The system uses a run-time version of Access for its database. Because of this, it was necessary for users to rename their normal use Access to

distinguish the two programs. This program was created in 1988 by Randy Riehbrandt and at one time had 800 users. The current contact for this software is Stephen T. Pudloski at the University of Wisconsin-Madison's Transportation Information Center.

- Connecting Point – This tool was referenced from the national survey; upon further research, however, it was determined that this company does not have any road-specific software and currently does not operate in Minnesota.
- WISLR, or Wisconsin Information System for Local Roads, is a web-based software that is only available to Wisconsin-based agencies.

Table 1: Gravel Road Management Tools – Software Comparison Matrix

	Software					
	CIMS	**Lucity**	**PubWorks**	**RSMS11**	**WinCams**	**Work Central**
1.0 GENERAL INFORMATION						
1.1 Developer	Diversified Computer Services (DCS)	Lucity	PubWorks: The Software for Public Works	MaineDOT and a consultant	Cascade Software Systems	RT Vision
1.2 Year of Origin	1995	Originated ~1990, Rebranded 2011	1997	Late 80s, then revamped in 2011	Late 80s	2013 – Additional Development Progressing
1.3 Current Version	N/A	N/A	5.8.85	11 (as in 2011)	N/A	N/A
1.4 Gravel Specific, Gravel and Paved, or Gravel, Paved and Other Uses (Sign Management, Sewers, etc.)	Gravel and Other Uses	Gravel, Paved and Other Uses	Gravel, Paved and Other Uses	Gravel and Paved	Gravel, Paved and Other Uses	Gravel and Paved
1.5 What agencies currently use this tool? (reported by vendor)	31 Alabama Counties	74 agencies nation-wide, mostly cities *	202 in USA, 252 in Canada *	159 agencies, mostly in the Northeast *	42 CA Counties; 25 WA Counties; 2 OR Counties; 1 CO County	Working with 4 MN Counties; Expected in next few months
1.6 Closest MN Office	Montgomery, Alabama	Overland Park, Kansas	Western Colorado	Augusta, Maine	Eugene, Oregon	58 East Broadway, Little Falls, MN 56345 Staff in Mpls as well
1.7 Typical Implementation Length	Around 4 weeks, depending on size	Months – depends greatly on data needed*	4-8 Weeks (a very small county may be 3-4 weeks)	As long data entry takes the user*	Small agency: 2-3 months * Large agency 4-6 months*	Couple of Weeks, definitely less than a month
1.8 Contact Information						
1.8.1. Name	Danny Floyd	Joel Knight P.E.*	Bob Guion	Jerry Douglass	Aad Alkemade	Marc Rood
1.8.2. Phone Number	334-260-8453	D.913-732-5800 M.913-488-3984	970-927-3500	207-624-3290	541-343-9160	320-632-0760
1.8.3. Email	dlfloyd@dcs-dcs.com	jknight@lucity.com	Bob@PubWorks.com	Jerry.douglass@maine.gov	aad@csscams.com	sales@rtvision.com
1.8.4. Website	None Maintained	Lucity.com	pubworks.com/	RSMS11.info	csscams.com	rtvision.com

* More information is available in Appendix C under the "Table 1 Supplementary Notes" section of the relevant company's interview summary, corresponding to the index number in the left column.

Table 1: Gravel Road Management Tools – Software Comparison Matrix (continued)

	Software					
	CIMS	**Lucity**	**PubWorks**	**RSMS11**	**WinCams**	**Work Central**
1.0 GENERAL INFORMATION (cont.)						
1.9 What are the primary benefits of this system?						
1.9.1. Ability to track condition of gravel roads	●	●	●	●	●	●
1.9.2. Define when and how to measure performance[1]	●	○	●*	●*	○*	○
1.9.3. Guidance on how to schedule maintenance/ prioritize routes (Condition Ranking)[2]	●*	◐	●*	● (Plus Usage Ranking)	●*	●
1.9.4. GIS Compatibility	●	◐	◐	○* (Expected 6-12 mo.)	○* (Google Maps Only)	●
1.9.5. Track Maintenance (Summer and Winter) Cost	●	◐	●	●	●	●
1.9.6. Ability to determine the cost to upgrade a road (gravel to paved)	●	◐	●	●	●	●
1.9.7. System similar to pavement management tools, but for gravel	●	●	●	●	●	●
1.9.8. Cost/Budgeting	●*	◐	●	●	●	●
1.9.9. Paved/Unpaved	●	●	●	●	●	●
1.9.10. Other	●*	◐*	◐*	○*	◐*	◐*

● Standard – Included in Standard Software Cost

◐ Optional – Available for an Additional Cost

○ Not Available

* More information is available in Appendix C under the "Table 1 Supplementary Notes" section of the relevant company's interview summary, corresponding to the index number in the left column.

[1] The software with "Not Available" for "Define when and how to measure performance" have completely customizable measurement systems. Once the system is set up and measurement scale and criteria defined, it will carry through as a definition to all road networks. The software with "Standard" have some sort of pre-defined measurement criteria or standard, though it is possible to change the pre-defined system.

[2] A condition ranking means that the software is only capable of ranking the streets from best to worst condition. It is not able to take any other factors, such as ADT or the short and long term effects of maintenance into account. Thus, more analysis is require to determine maintenance schedules. A condition and use ranking is one step more comprehensive as it includes the volume of cars using the road in the priority ranking.

Table 1: Gravel Road Management Tools – Software Comparison Matrix (continued)

	Software					
	CIMS	**Lucity**	**PubWorks**	**RSMS11**	**WinCams**	**Work Central**
2.0 COST						
2.1 Initial Cost of Software	$675/month *	$3,000 per Module[1] per simultaneous user *	Asset Module: $2,500 – $7,500* All Modules: $6,500 - $17,500*	$150 * (Trial version available)	Small Agency: ~$1,500 * Large Agency: ~$4,000 *	$99/User/Month
2.2 Initial cost of data conversion, configuration and custom programming[3]	$75/hr *	$100/hr *	$125/hr	N/A *	Small Agency: ~$500 * Large Agency: ~$1,500 *	$3,880
2.3 Training Costs	$150/person/day + any travel costs	1,500/day * + direct expenses	$975/day + travel costs *	◐*	Small Agency: ~$1,870 * Large Agency: ~$3,240 *	
2.4 Annual Technical Support Costs	●	● First Year ◐ 20% of software cost/year	% 20 of software cost *	●	12% of Software Cost *	●
2.5 Miscellaneous Costs						
2.5.1. Tablet Devices	○	◐ ($1,500/Device)	●* (Coming Soon)	○	○	●* Web based (HTML5)

● Standard – Included in Standard Software Cost

◐ Optional – Available for an Additional Cost

○ Not Available

* More information is available in Appendix C under the "Table 1 Supplementary Notes" section of the relevant company's interview summary, corresponding to the index number in the left column.

[1] A Module is a package of software designed for a specific task. For example, Roads Module, Road Analysis Module, Work/Time Card Module, Roadway Signs Module, etc.

[2] Data conversion includes transferring data from excel spreadsheets or other formats into the new software database. Configuration includes cleaning up GIS files into usable formats and creating custom report styles, if needed. Custom Programming includes any other non-standard programming time required, typically for large agencies or agencies with an unusual request.

Table 1: Gravel Road Management Tools – Software Comparison Matrix (continued)

	Software					
	CIMS	**Lucity**	**PubWorks**	**RSMS11**	**WinCams**	**Work Central**
3.0 AVAILABLE MODULES[3]						
3.1 Roads/Streets						
3.1.1. Organizes road name, length, etc., any basic characteristic	●	●	●	●	●	●
3.1.2. Document management[4]	●	●	●	●	●	●
3.2 Road Analysis						
3.2.1. Rate severity of road characteristics	●*	◐	●	●*	●	●
3.2.2. Calculates priority ranking of roads	●	◐	●	●	●	●
3.3 Work Assignment and History						
3.3.1. View previous work on segment	●	◐	●	●	●	◐
3.3.2. Assign future work	○	◐	○	●	●	●
3.3.3. Time card system	◐/○*	◐	●	○	◐	◐
3.3.4. Ability to run cost report based on agency owned (county vs city)	●	◐	●	●	◐	◐
3.4 GIS Link	●	◐	◐	●* (Expected 6-12 mo.)	○* (Google Maps Only)	●
3.5 Additional public works modules such as road signs or sewage systems	●	◐*	●/◐*	○*	◐*	◐

● Standard – Included in Standard Software Cost

◐ Optional – Available for an Additional Cost

○ Not Available

* More information is available in Appendix C under the "Table 1 Supplementary Notes" section of the relevant company's interview summary, corresponding to the index number in the left column.

[3] This is a typical distribution of features to their respective module, but may not represent the exact allocation on every software.

[4] Document Management is the ability to link documents, like pictures, text files, or excel spread sheets, to particular roads (or bridges, etc.).

Table 1: Gravel Road Management Tools – Software Comparison Matrix (continued)

	Software					
	CIMS	**Lucity**	**PubWorks**	**RSMS11**	**WinCams**	**Work Central**
4.0 ACCESS TO DATA						
4.1 What database platform is used?	SQL/Boreland Datebase	SQL * (or Oracle or Access)	SQL	N/A	SQL	SQL
4.2 Can data be exported to excel or text files?	●	●	●	●	●	●
4.3 Is it compatible with Crystal Reports?[5]	●	●	●	●	●	●
4.4 Can reporting be customized?	◐*	◐*	●*	●*	●*	●
4.5 Is there a map input interface?	●	◐	●*	○	○	●
4.6 Can data be accessed wirelessly or via the web?	○*	●*	●* (additional set up)	○	●* (Citizen Requests)	●
4.7 Can multiple users access the data simultaneously?	●	◐	●	●	●	●
5.0 SUPPORT						
5.1 Is technical support available?	●	◐ (Annual Cost)	◐* (Annual Cost)	●*	◐ (Annual Cost)	●
5.2 Are there regular updates to the system?	●*	●*	● (Once a quarter)	●*	●* (Annual Cost)	●
5.3 Does the vendor offer annual workshops?	●*	●*	●*	●	●*	●
5.4 What kind of documentation/instructions come with the tool?	Online Help Info (PDFs)	Online Guides	Online Manuals, Quick Reference Guides	Two PDFs: a field manual and program manual*	Online Help System; PDFs	Online Guides
6.0 Software Operates on "Typical" Office Computer[6]	●	●	●	●	●	●

● Standard – Included in Standard Software Cost

◐ Optional – Available for an Additional Cost

○ Not Available

* More information is available in Appendix C under the "Table 1 Supplementary Notes" section of the relevant company's interview summary, corresponding to the index number in the left column.

[5] Crystal Reports is a common third party report generating software. Originally created in 1991, this software is meant to design and generate reports from a wide variety of data sources.

[6] All of the software listed is only supported on Windows computers, not MACs.

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Appendix A: Minnesota Local Agency - Survey Results

Appendix B: National Local Agencies - Survey Results

Appendix C: Interview Summaries

- CIMS Vendor
- Lucity Vendor
- PubWorks Vendor
- RSMS11 Vendor
- WinCams User
- WinCams Vendor
- Work Central Vendor
- Rating Scale Vendor

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Appendix A:

Minnesota Local Agency - Survey Results

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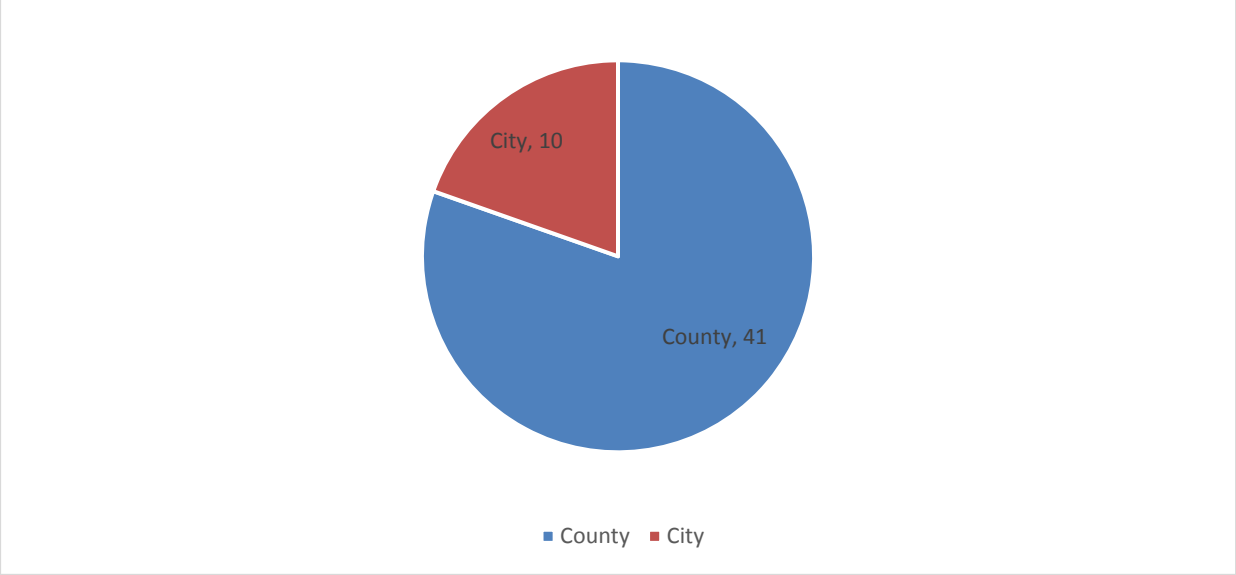
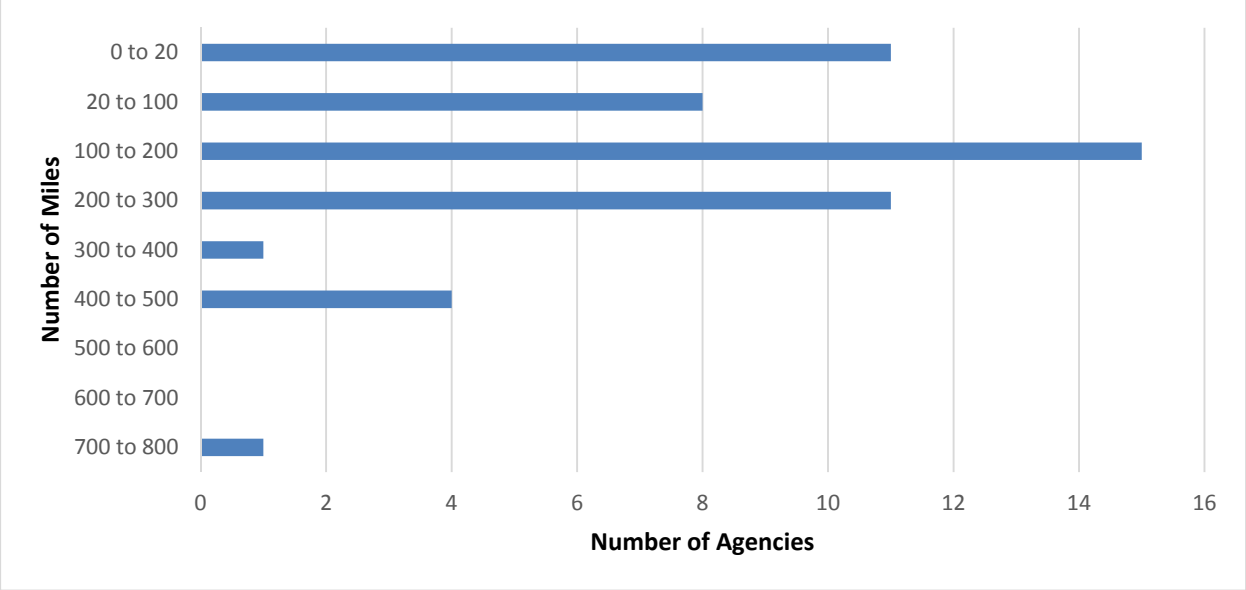
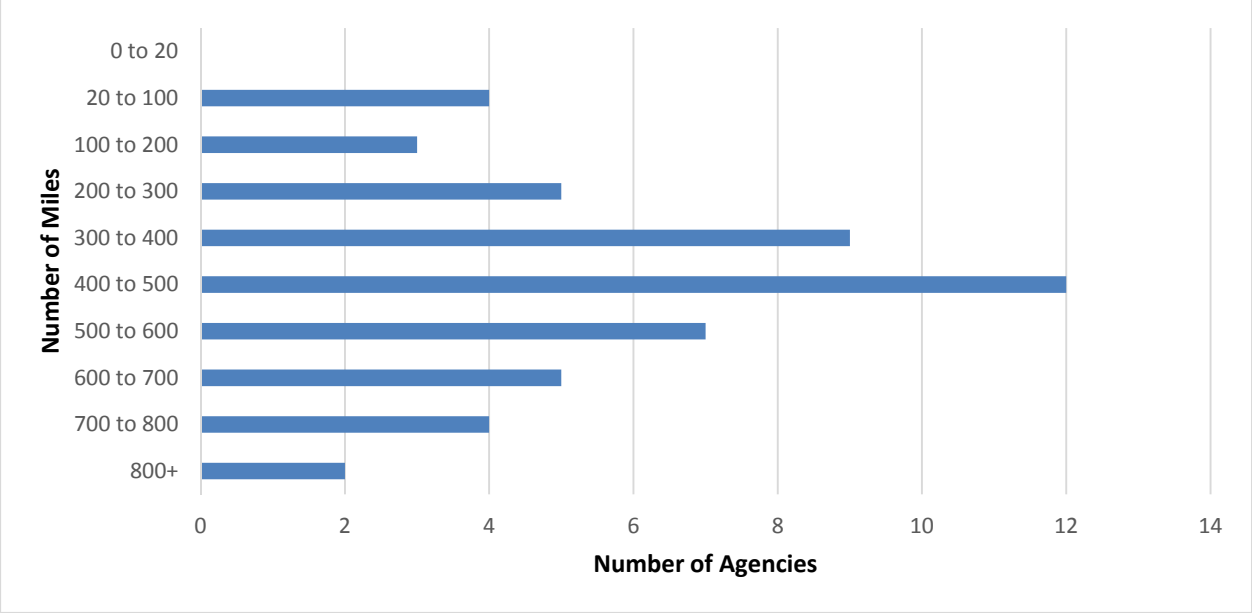
Question 1: What agency do you represent?



Question 2: How many miles of gravel road are in your system?



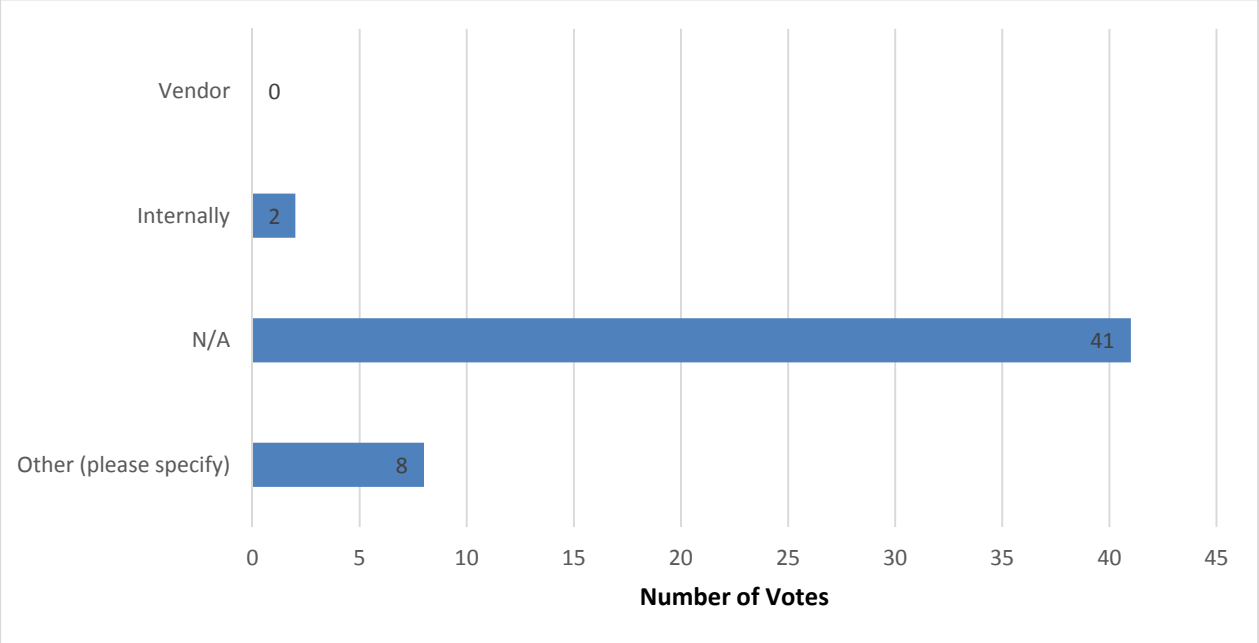
Question 3: How many total miles of road are in your system (include gravel and paved)?



Responses from agencies with 800+ miles:

- 1350 Miles
- 1062 Miles

Question 4: Do you currently use a gravel road management tool? If so, who developed your tool?

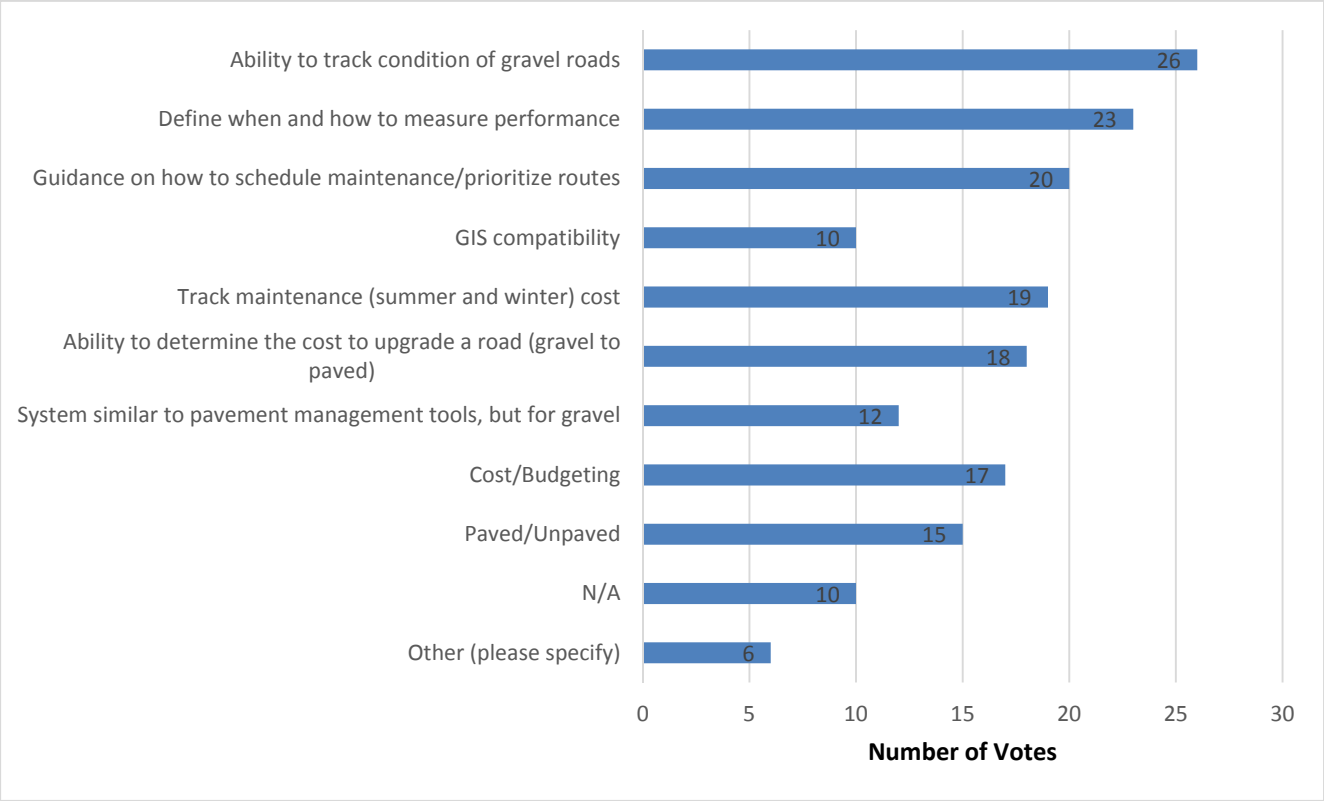


"Other" Responses:

- We do not use a tool
- Staff judgment

- Prioritization of adding gravel to gravel roads is based on a combination of Public input and Maintenance Supervisor judgment
- Blade Operator inventory of Spring conditions
- No current tool
- Maintenance Foreman's knowledge
- annual maps of re-gravel work

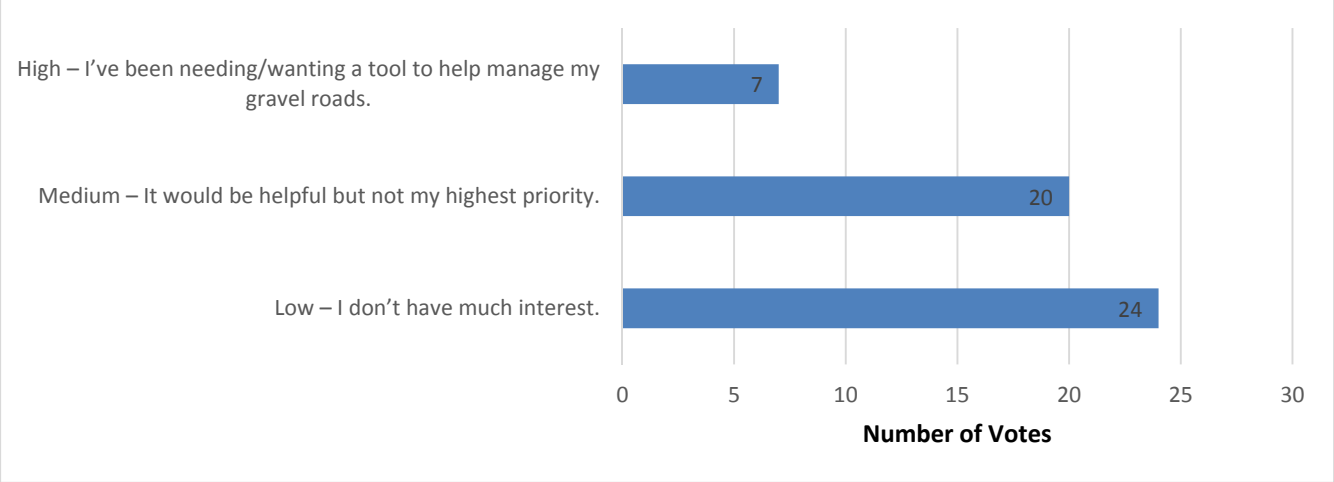
Question 5: What are your needs for gravel road management? (Select all that apply)



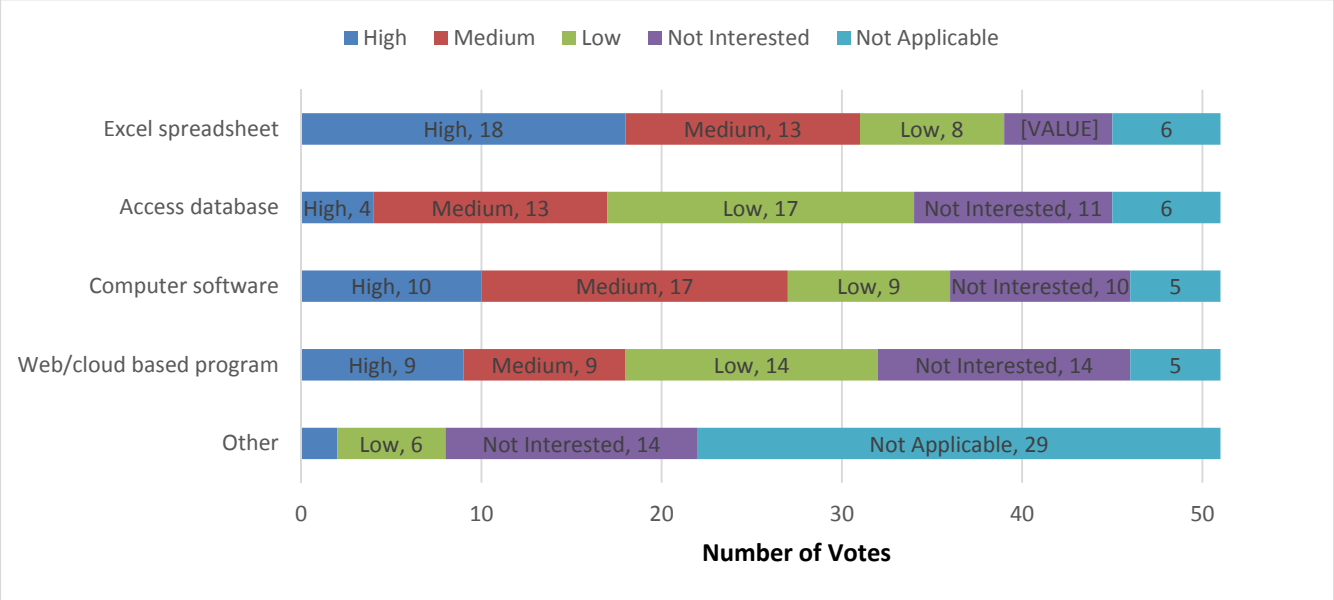
"Other" Responses:

- Gravel loss factors. How does traffic and dust contribute to gravel loss?
- When is it economical to pave a gravel road (certain ADT?).
- Proper depth of gravel, proper crown, and proper shoulders
- HCADT data
- Ability to track when gravel and chloride was placed.
- Dust coating, base one - the relative value of the investment to the re-gravel cost

Question 6: How would you describe your need for a gravel road management tool?



Question 7: What format would you prefer a gravel road management tool be in? (Rank High/Medium/Low or Not Interested)



"Other" Responses:

- GIS Compatible with our current work order system
- It doesn't really matter the type of software just so it is user friendly - easy to operate

Question 8: Please provide any additional comments you have regarding gravel road management tools:

- We want to be able to project the gravel loss on a mile of roadway per year based on a range of traffic volume. What are the biggest contributors to gravel loss - traffic volume, dust, fall and spring snowplowing?
- Any type of management tool would be an asset if it is not cost prohibitive.

- Any research into when it is economical to pave a gravel road would be appreciated. I think there is one study out of South Dakota that was done about 10 years ago, but it seems to be about the only research on the subject. It says that around 200 - 300 ADT is the tipping point. Townships, especially, would like to know this information to help guide their CIPs.
- Something to monitor gravel maintenance costs and road conditions. Equipment time and costs for maintenance, material usage (chlorides, gravel, drain tile, culverts), contract costs, ADT, road condition index (?), road strength, etc.
- Easy to use!
- A gravel management tool would be nice but not a priority.
- Maintenance techniques and public education tools as to what the proper techniques are and why gravel is maintained the way it is done by government agencies.
- I have a good system in place. Stole everything I know from Dakota County! Excel-GIS internal tools. Only thing I really need is the HCADT on all my system!
- Main item would be to track maintenance cost i.e. amount of gravel, blade time etc.
- Meeker County maintains all the Township roads (624 gravel and 160 paved) in the County. The Township relies on the County to make recommendations for improvements.
- It would be nice to track where the high cost maintenance roads (or segments) are, why they are the highest cost, and determine feasible repairs.
- We are very "intimate" with our gravel roads. We have a pretty good idea of their condition, age of gravel and type of stabilization if applicable. Any new tool should be easy and convenient to operate or will just sit on the shelf.
- Lonn says he checks the roads and listens to his blade operators. The blade operators tell him if the road needs some additional maintenance, such as gravel, more or less blading. Lonn monitors all our roads and can see what maintenance needs to be done, including the gravel roads. Many maintenance tasks include items such as reclaiming shoulders, cleaning ditches for drainage, repairs to culverts and driveways. Not sure these additional items would be tracked in a software program. They need personal visual inspection.
- We are trying to eliminate our gravel roads, so a maintenance cost comparison would be helpful
- NA - don't have gravel roads.
- It would be helpful if this tool would be similar to our other asset management tools we currently use.
- Although we do not have any gravel roads on the County highway system, there are approximately 2500 miles of township roads in Otter Tail County with about 95 % of these roads having a gravel surface. I believe there is a great need on the township system for a gravel road management system.
- The above responses reflect the unpredictability of annual gravel road maintenance costs due to weather and the fact most gravel roads are dirt roads with gravel surfacing. We spent $90,000 for resurfacing gravel roads in 2013 and $381,000 in $2010. Same roads, same traffic, different fall, winter, and spring weather. I think some uniform

assessment/evaluation system may have merit in managing a system. But track conditions? The system can go from good to bad in a week, either in the spring or fall. I'm not seeing any realistic correlation to using pavement management systems.

- This may not be our highest priority but is very important
- For my city the mileage of unpaved roads is so low it is not an important issue.
- Variable and changing conditions as well as weather dependent maintenance decisions lessening the interest in a gravel road management tool
- Main issue I see is quantifying when a road should be paved or at least do a surface treatment. Benefit/Cost of blading/re-gravelling vs. paving or doing a surface treatment.
- Not a high priority based on the limited gravel roads we have.
- Don't see the benefit of a management tool.
- This would be more useful for townships.
- We don't have a pavement management tool or software for our paved roads yet

Appendix B:

National Local Agencies - Survey Results

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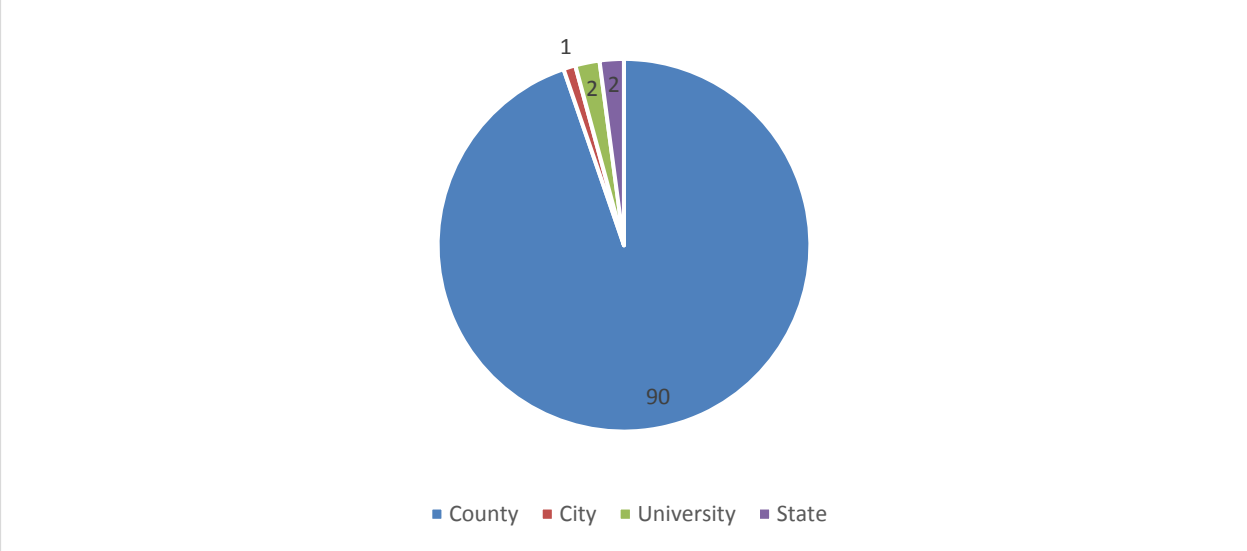
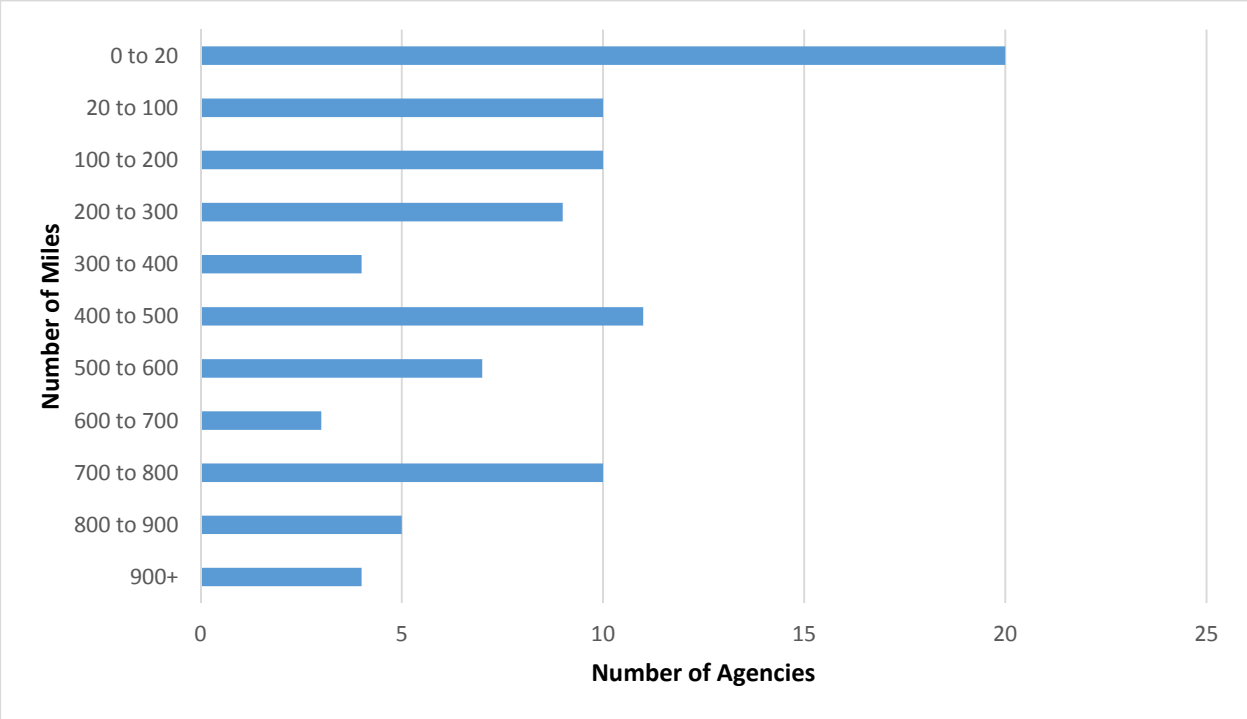
Question 1: What agency do you represent?*



(*Note that in the case of Louisiana, Parishes were counted as counties.)

Question 2: How many miles of gravel road are in your system?



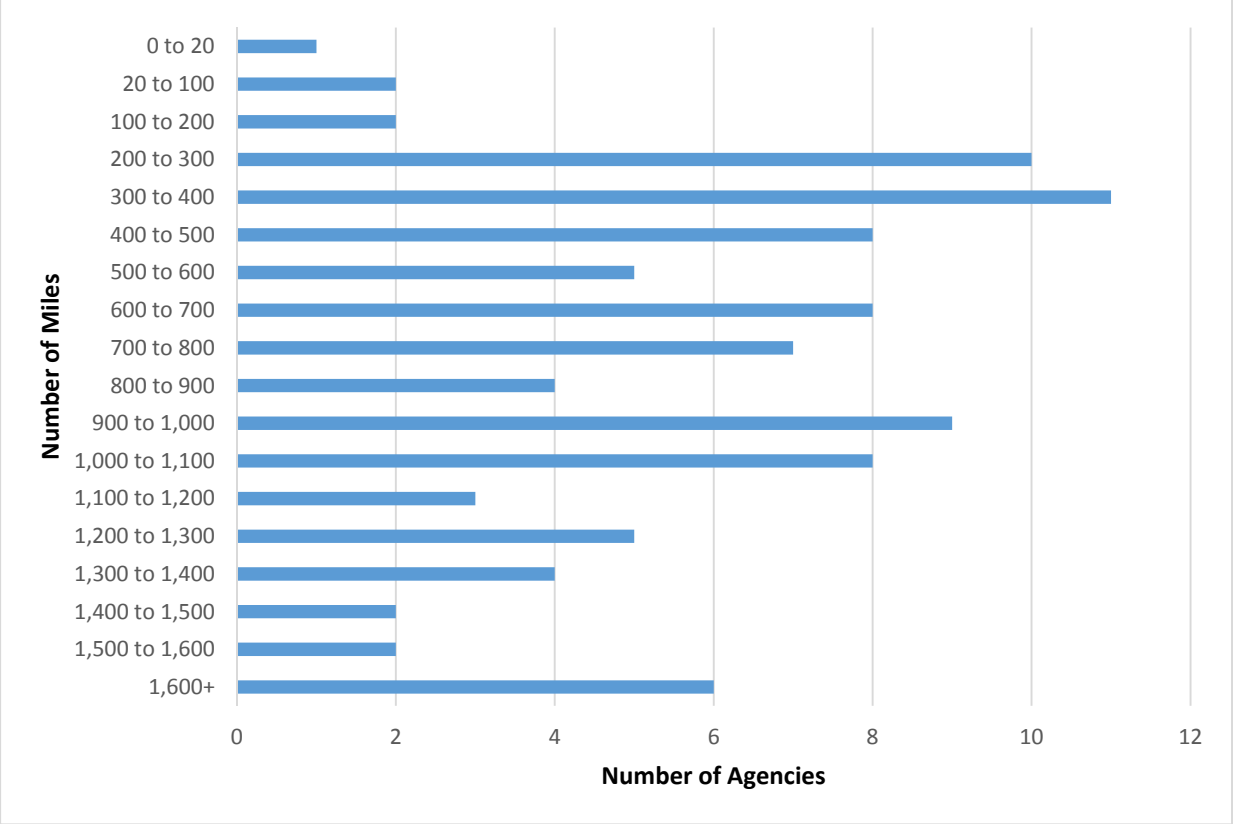
Responses from agencies with 900+ miles:

- 960 miles
- 1050 miles
- 1457 miles
- 1800 miles

Responses regarding Non-Paved, Non-Gravel Roads:

- 162 miles gravel plus 444 miles earth
- 794 gravel plus another 138 miles of dirt roads
- n.a. - LTAP Center ~ 20-30,000 statewide
- 775 miles of crushed stone surfaced road
- Approximately 475 miles of limerock Road in Hernando County
- 214 gravel, 38 Earth
- 440 (+ 131 Min. Maint.)
- 650 miles of mostly native material, minimal actual gravel

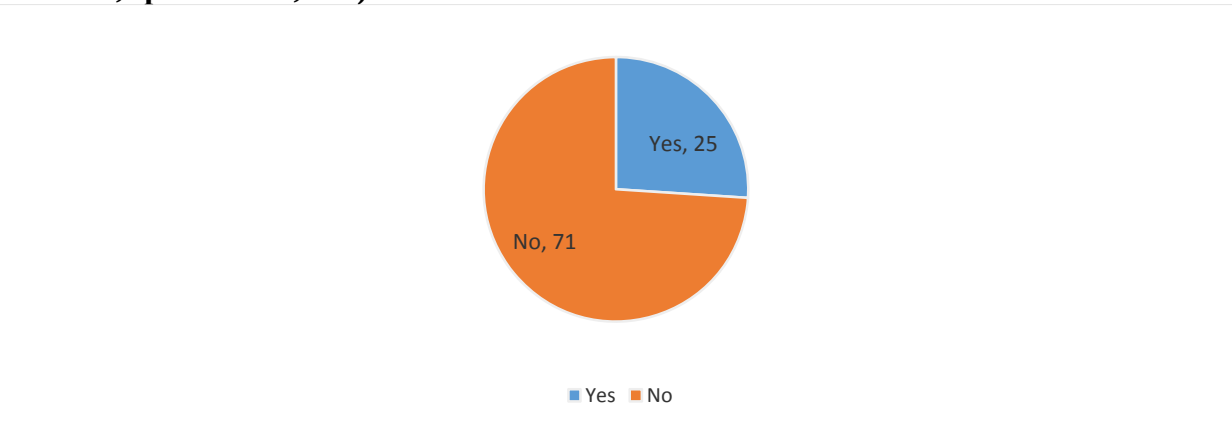
Question 3: How many total miles of road are in your system (include gravel and paved)?



Responses from agencies with 1600+ miles:

- 1646.32 miles
- 1930
- 3,800 miles
- 24,000
- n.a. ~115,000 statewide

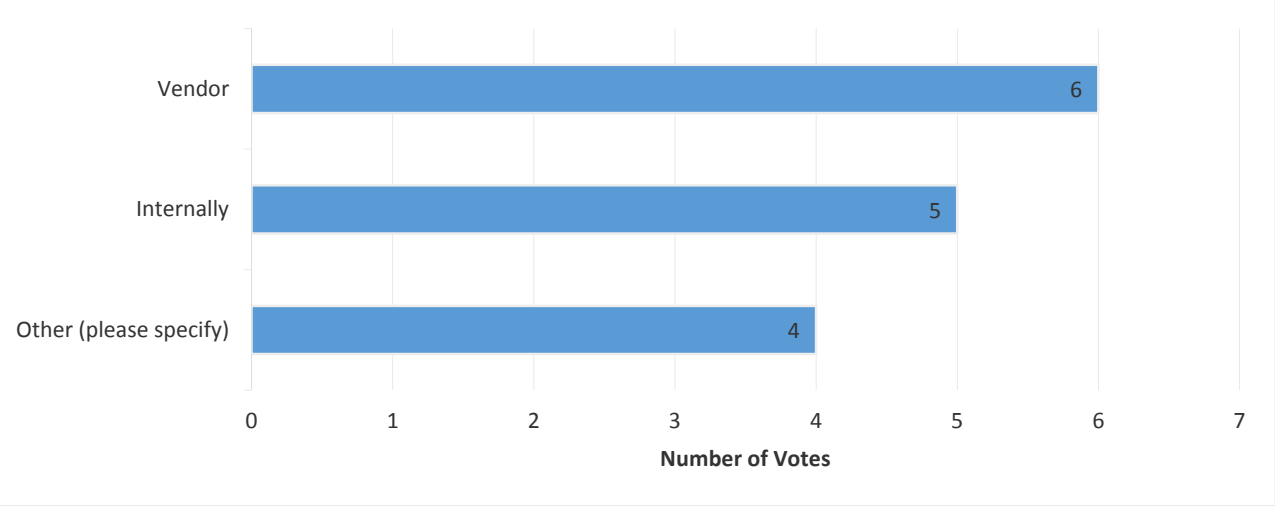
Question 4: Do you have a tool that helps you manage your gravel roads? (Computerized, software, spreadsheet, etc.)



Question 5: Please provide the name of this gravel road management tool.

- WinCams Accounting program
- Road Evaluation Reports Work Order System
- PUBWorks
- In-house using the principles from PASER.
- RSMS11
- CIMS
- Excel and Winncams
- Road Rating & inventory management
- EXCEL spreadsheet to document when we gravel road.
- No name. Just maps in autocadd and spreadsheets. Probably not what you are looking for.
- Connecting Point
- Lucity
- PASER Manual for Gravel Roads
- RoadWorks

Question 6: Who developed your tool?



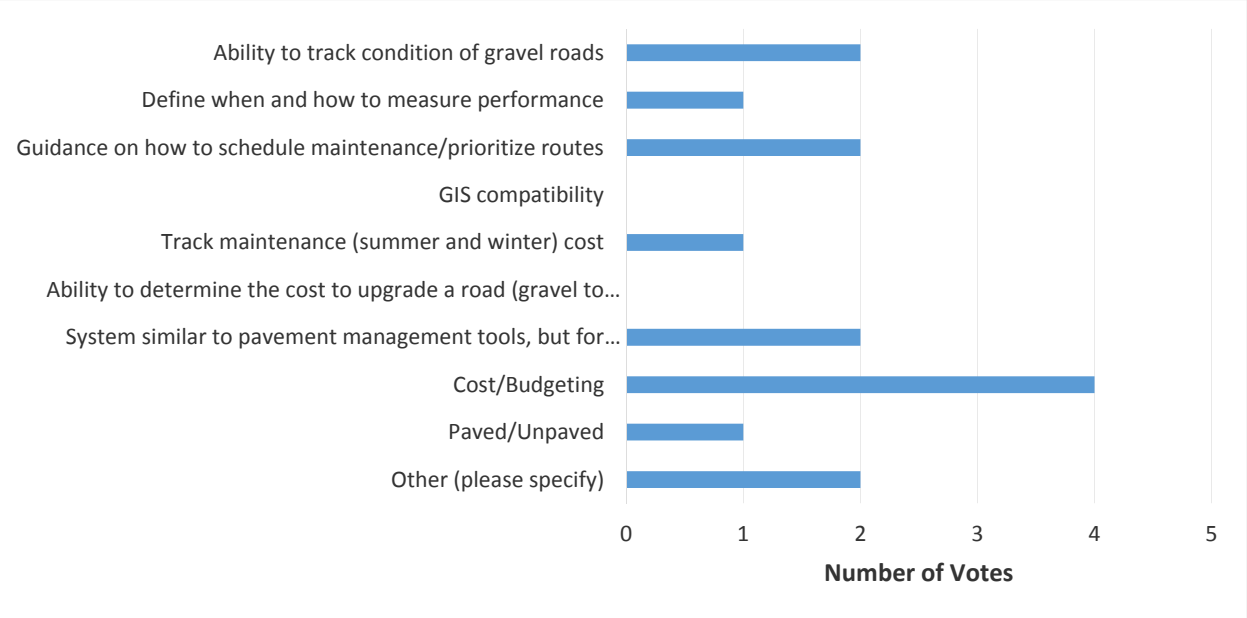
"Other" Responses:

- This LTAP and a private vendor
- Excell county, Winncams Vendor
- Univ. of Wisconsin - Madison

Question 7: When was your gravel road management tool implemented?

- in 2000
- 2000's
- 2002
- 2003
- 2003
- 10 years ago
- 2005
- 2007
- 6 1/2 years ago
- 2011 in Dickinson Created it in 2006 for Oceana County
- 2011
- 2011
- Over the past several years
- 2013

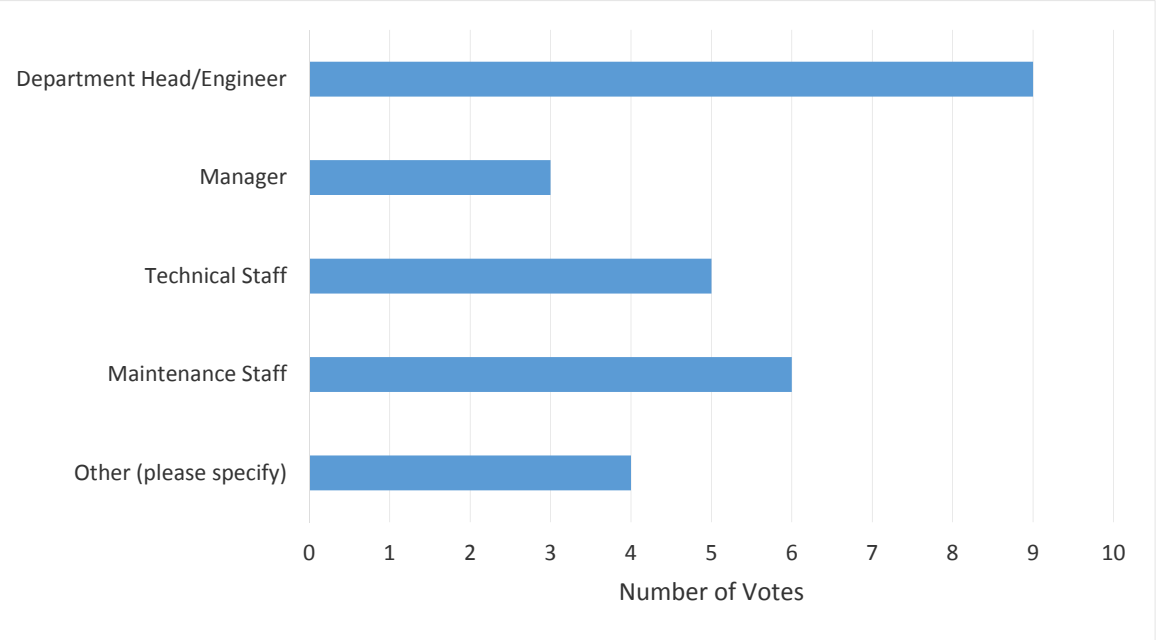
Question 8: What was the main reason for implementing your gravel road management tool (what need were you trying to fulfill)?



"Other" Responses:

- provide updated tool to all of Maine's 492 towns/cities

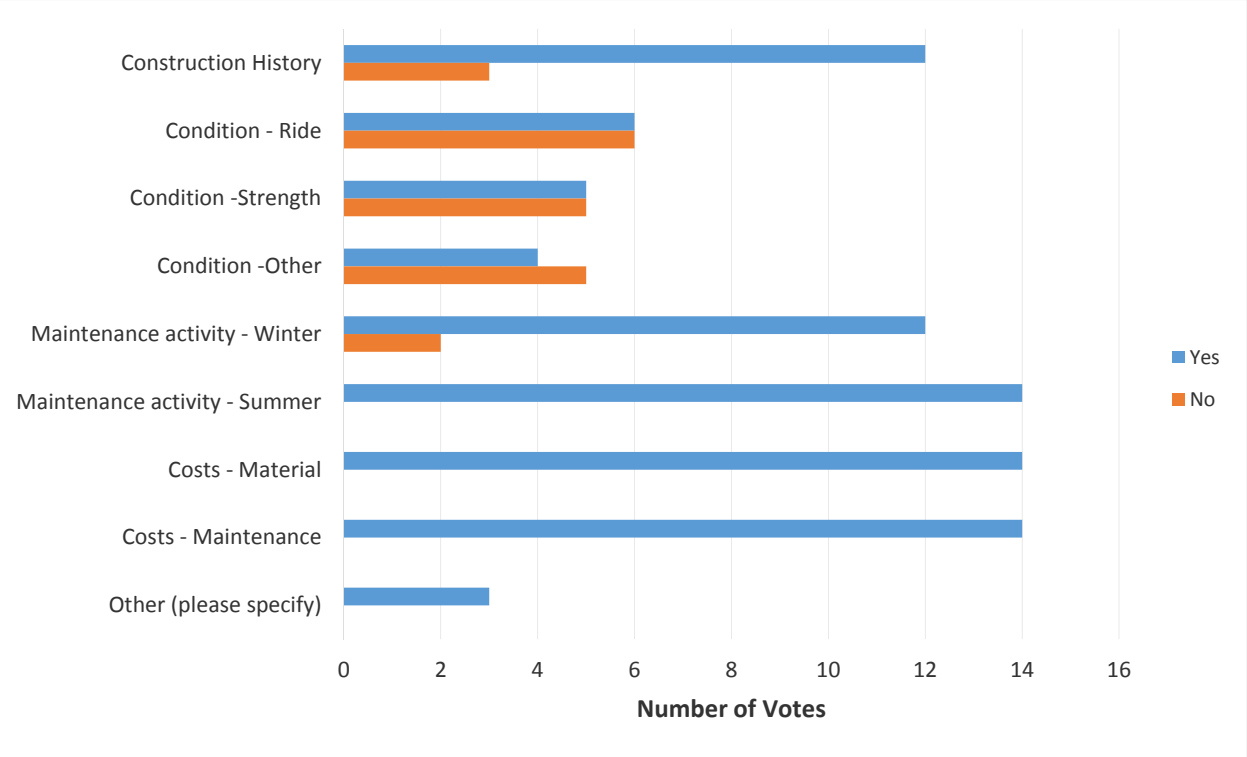
Question 9: Who is the primary user(s) of your gravel road management tool? [Select all that apply]



"Other" Responses:

- Road Supervisors
- towns and cities and counties
- Public Works Coordinator and/or Clerk

Question 10: Do you collect data for each of the following?



"Other" Responses:

- lanes, shape
- The maintenance cost is collected in our accounting system, not part of the maintenance spreadsheet.
- Contract quantities and contract locations

Question 11: What attributes of your gravel road management tool work well?

- Maintenance Management Budgeting and work tracking.
- Tracking Maintenance Costs, conditions of the road etc.
- Tracking cost to maintain county roads and track the history of maintenance activities
- Volume of traffic and year of material application.
- all of them
- System as a whole lets us track maintenance costs which can assist us in prioritizing upgrades to road when resources exist
- Surfacing history, ADT, unit costs
- Relates to work needs on the bigger.
- Help put together which roads are up in the rotation for re-graveling. That's about it.
- drawings; spreadsheets
- We are pleased with all of it.
- Measuring performance
- easiest to use
- Able to track maintenance and material cost.

Question 12: What attributes of your gravel road management tool do not work well or are not available?

- Programming work activities. Planning
- Condition of ditches.
- ride - in mountainous terrain is a useless parameter due to rapidly changing conditions
- Doesn't relate to actual condition that day or amount of gravel.
- What more do you really need? Could do something really elaborate but who would have time and money to maintain it? It does not document problem areas. Does not really need to because the blade operator and maintenance foreman know where they are and they get addressed by spot graveling or improvements made to the road as funding allows.
- reports are not available
- Measuring conditions
- public presentation

Question 13: What lessons did you learn or suggestions do you have if someone were to develop a new gravel road management tool?

- The inclusion of a scheduling/planning module for foremen to plan and track day to day work activities. The inclusion of a scheduling/planning tool for department heads to plan and track countywide capital improvement projects/programs. Better interface with GIS tools, such as maintenance location refinement.

- Tracking the years of material application is the most important followed by volume of traffic.
- "put your money where the traffic is"
- Create your own in house management tools that work for your county etc.
- Some roads are just meant to be 1 lane and don't need to be built big.
- Suggest that there be a place to input trouble spots in the road system.
- Develop a spreadsheet or program
- Must be able to develop and change road management tool as needed.

Question 14: If you are willing to share, what are the general costs associated with developing and maintaining your gravel road management tool? (Ballpark estimate)

Start Up Cost	Maintenance/Updates Cost (Annual
• approx. $2,500 • In-house just time • Minimal • minimal, just inventory • $15,000 • $20,000 • $1,200	• approx. $2,800 • $6,000 per year • $1,200no • $4,000 • $750

Question 15: Is there a tool you used to use but no longer use?

- We used to have an internal budgeting spreadsheet for work standards, and asset allocations, which are now done in
- We are continuing to develop our own sign management tool and a rural addressing tool
- old RSMS

Question 16: Do you have any additional comments you want to share about your gravel road management tool?

- Dust control is also part of it to maintain a proper gradation of material.
- This is an awesome new tool we developed for both paved and gravel roads
- This tool is managed by a vendor but controlled by a user group of 20 plus counties in our state
- Any empirical tool MUST be evaluated by someone with enough practical experience to make the data useful
- Would be happy to share our rating scale for gravels & other non-hard surfaced roads.
- What we have is developed in-house for our road system and wouldn't be applicable elsewhere.
- Our road management tool was developed in order to improve our road maintenance program and create accountability to our Public Works Department.

Appendix C:

Interview Summaries

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CIMS Vendor
Interview Summary

Name of Gravel Road Management Tool:	*CIMS (County Information Management System)* CIMS, or County Information Management System, is an Alabama based software created by former Alabama DOT employee, Danny Floyd, and is managed by him, his daughter, and his daughter in law. While the software was originally designed for the county level, it should work just as well for cities and townships.

1	Is this a software specifically for gravel road maintenance? Or is it part of a more comprehensive management systems (i.e. paved roads, etc.)					
		Gravel roads only	x	Other - **Gravel and Paved Roads**		
2	When was this tool originally developed?					
	1995					
3	Have there been upgrades/new versions? If so, what is the current version?					
	Yes	X	No		Most current version number:	Not Named with Version Numbers
4	What platform/software was the tool designed with? (i.e. excel, access, hard programs, etc.)?					
	Paradox					
5	What are the computer requirements to operate the software?					
	Windows XP, 7, 8, 8.1. Not MACs.					
6	What skills does the user do you recommend the user to have?					
	Basic Computer skills					
7	Is this tool directly usable for all public agencies or does in need to be modified based on the users' materials, maintenance practices, environment, etc.?					
	Currently set up for Alabama, any changes for MN conditions wouldn't be difficult to make					
8	How does an agency acquire this tool (i.e. private company, LTAP center, user group, etc.)?					
	Call us, we can allow you to view our system over the internet via remote access					
9	Provide the general Cost structure (i.e. one time purchase price, user + maintenance fee, etc?)					
	Original Cost			$675/Month, includes all modules and unlimited users		
	Annual Maintenance Fee			Included in $675/Month		
	User Group Fee			N/A		
	Other			$150/person/day for Training, $75/hr for programming rate – Shouldn't need much of that after initial set up		
10	After first purchase, what other costs or activities/data are needed to make the system function?					
	Basic data about roads, employees, equipment, materials, contractors, etc. will need to be collected and entered into CIMS.					
11	How often is data collection required?					
	As often as you find useful					

12	What are the minimum input values to make it usable? (i.e. material type, thickness, age, etc.)		
	Minimum input values include ids/descriptions for various items such as Roads, Materials, Employees, Equipment, etc.		
13	What are other input values that can be added to make it a more robust system?		
	Conditions & Rate information for Roads, Materials, Employees, Equipments, Contractors along with other detail information		
14	What kind of documentation/instructions come with the tool?		
	Instructional PDFs are available online; as well as program manual revised annually for annual conference.		
15	What technical support or user group is available to the user?		
	Phone/email support from 8am to 5pm Central Time.		
16	Can you provide a breakdown of the types of agencies that use your tool (cities, counties, etc.)?		
17	Total number of users	31	
18	Number of Counties	30	
19	Number of Cities	0	
20	Number of Townships	0	
21	Other	1	
22	What are the primary benefits a user would get from using this system?		
	x	Ability to track condition of gravel roads	
	x	Define when and how to measure performance	
	x	Guidance on how to schedule maintenance/prioritize routes	
	x	GIS compatibility	
	x	Track maintenance (summer and winter) cost	
	x	Ability to determine the cost to upgrade a road (gravel to paved)	
	x	System similar to pavement management tools, but for gravel	
	x	Cost/Budgeting	
	x	Paved/Unpaved	
	x	Other, please list: Ability to track additional information related to Signs, Garage Workorders, Maintenance Workorders, Inventory, Projects, Subdivisions, Permits	
23	If a MN agency is interested in learning more about your product, who would they contact?		
	Name	*Danny Floyd*	
	E-mail	*dlfloyd@dcs-dcs.com*	
	Phone	*334-260-8453*	
	Closest MN Office	*Montgomery, Alabama*	

CIMS Supplementary Notes

Table 1 of this report provides a quick overview of the features and capabilities of each of the gravel road management software tools. If additional information that was provided by the vendor, a * was noted in the table directing readers to this section of supplementary notes. The index numbers below correspond with the number in the left column of Table 1.

1.9.3 Guidance on how to schedule maintenance/prioritize routes

A Road Inspection Module is available for users to track road ratings, based on a predefined set of criteria which scores road on a scale from 1—100. Based on this information, users can plan and prioritize maintenance schedules and routes.

1.9.8 Cost/Budgeting:

Cost is calculated based mainly on four subcategories: employee, equipment, material, and contractor costs. This categories can be grouped by road or commission district.

2.1 Initial Cost of Software:

The system is $525/month without a GIS link (GIS link including necessary SQL support is $150/month). This distinction was made for small counties that could not afford the GIS link. This fee includes access to all aspects of the software.

2.2 Initial cost of data conversion, configuration, and custom programming:

The initial cost of data conversion, configuration and custom programming will be based on the rate of $75/hr for CIMS employees. .

3.2.1 Rate severity of road characteristics:

Regarding Road Analysis, many characteristics such as shoulder, drainage, ditches, or signage can be rating on a 1 to 100 scale. New characteristics can be added. Roads can be compared from year to year. For example, a report could be run for roads whose rating has decreased from 2010 to 2013.

3.3.3 Time Card System

While CIMS does not have a traditional time card system, it is capable of tracking employee time. Customization, at a rate of $75/hr, would likely be necessary to implement the user's specific policies.

4.4 Are reports customizable?

Many reports are already available as part of CIMS. If a user needs a custom report, it is possible for that user to use an existing report, alter it, and re-upload it to CIMS to use in the future. In order to do this, the user would need to have the developer version of Crystal Reports to create and/or edit existing reports. In addition, CIMS staff can aid in this process at the programming rate of $75/hr.

4.6 Can data be accessed wirelessly or via the web?

Data cannot be accessed wirelessly, but data can be downloaded from CIMS to a notebook for field use and the new data re-uploaded upon return.

5.2 Are there regular updates to the system?

Updates are distributed throughout the year. The number of updates distributed may range from 7 to 12 depending on the nature and necessity of the items being updated. Updates, information about updates, and instructions for applying updates are distributed to users via email. In addition, DCS personnel are available to assist users in the update process either by phone or remote access.

5.3 Does the vendor offer annual workshops?

An annual 2-day meeting is held each June in Orange Beach, AL (located in Baldwin County), where new updates or changes are addressed. In addition, the users of the software are given the opportunity to discuss potential future changes or additions to the software. CIMS is user driven and intended to evolve as the user's needs evolve.

Miscellaneous Notes:

- It is possible to make certain fields only changeable or only visible by certain users. This is not a default characteristic and must be requested on a field by field basis.
- No county has ever stopped using CIMS once they have started. CIMS started in 1995.
- The software can be fully previewed remotely, which allows the potential user to view CIMS via a computer at the DCS's office.

Lucity Vendor
Interview Summary

Name of Gravel Road Management Tool:	*Lucity* Lucity is a national software company focusing on asset and maintenance management needs for public works departments.

1	Is this a software specifically for gravel road maintenance? Or is it part of a more comprehensive management systems (i.e. paved roads, etc.)						
		Gravel roads only	X	Other **Gravel and Paved Roads and Other Systems**			
2	When was this tool originally developed?						
	Around 1990 or a little before, Lucity has been stand-alone since 2000. There was a rebranding 3 years ago.						
3	Have there been upgrades/new versions? If so, what is the current version?						
	Yes	X	No		Most current version number:		
4	What platform/software was the tool designed with? (i.e. excel, access, hard programs, etc.)?						
	SQL						
5	What are the computer requirements to operate the software?						
	Any Windows Computer						
6	What skills does the user do you recommend the user to have?						
	Suggest some GIS knowledge if you will be using that module, otherwise basic computer skills						
7	Is this tool directly usable for all public agencies or does in need to be modified based on the users' materials, maintenance practices, environment, etc.?						
	Can use out of the box or can customize further, 100s of fields available for customization						
8	How does an agency acquire this tool (i.e. private company, LTAP center, user group, etc.)?						
	Contact Lucity Directly						
9	Provide the general Cost structure (i.e. one time purchase price, user + maintenance fee, etc?)						
	Original Cost				$3,000/Module/Simultaneous User		
	Annual Maintenance Fee				20% of software costs		
	User Group Fee				N/A		
	Other				Data conversion or other programming needs - $100/hr; training - $1,500/day plus expenses; tablet devices - $1,500 per device;		
10	After first purchase, what other costs or activities/data are needed to make the system function?						
	Data collection may be required if the agency doesn't already all the information about their roads						
11	How often is data collection required?						
	As often as the user requires it						
12	What are the minimum input values to make it usable? (i.e. material type, thickness, age, etc.)						
	List of Roads with unique IDs						
13	What are other input values that can be added to make it a more robust system?						
	Ratings of road condition, price rates for maintenance activities						

14	What kind of documentation/instructions come with the tool?		
	Online Guides which are available any time, even without purchase. (http://help.lucity.com/webhelp/portal/#27734.htm) There is also information on their youtube channel (https://www.youtube.com/user/LucityInc/)		
15	What technical support or user group is available to the user?		
	Technical support is through typical phone and email system. There are regional and national conferences with other users of the system.		
16	Can you provide a breakdown of the types of agencies that use your tool (cities, counties, etc.)?		
17	Total number of users	74	
18	Number of Counties	4	
19	Number of Cities	61	
20	Number of Townships	4	
21	Other	5	
22	What are the primary benefits a user would get from using this system?		
	x	Ability to track condition of gravel roads	
		Define when and how to measure performance	
	x	Guidance on how to schedule maintenance/prioritize routes	
	x	GIS compatibility	
	x	Track maintenance (summer and winter) cost	
	x	Ability to determine the cost to upgrade a road (gravel to paved)	
	x	System similar to pavement management tools, but for gravel	
	x	Cost/Budgeting	
	x	Paved/Unpaved	
	x	Other, please list: **See below, 1.7.10**	
23	If a MN agency is interested in learning more about your product, who would they contact?		
	Name	*Joel Knight, P.E. (East Region Manager)*	
	E-mail	*jknight@lucity.com*	
	Phone	*Direct: 913-732-5800* *Mobile: 913-488-3984* *Fax: 913-341-3128**	
	Closest MN Office	*Overland, Kansas (A Suburb of Kansas City)*	

Lucity Supplementary Notes

Table 1 of this report provides a quick overview of the features and capabilities of each of the gravel road management software tools. If additional information that was provided by the vendor, a * was noted in the table directing readers to this section of supplementary notes. The index numbers below correspond with the number in the left column of Table 1.

1.5 What agencies currently use this tool? (Reported by vendor)

There are Lucity users in the following 26 states: AK, AL, AZ, CA, CO, CT, FL, GA, IA, IL, IN, KS, KY, MA, ME, MO, NE, NJ, NM, OH, PA, TX, VA, WA, WI, WY**.**

1.7 Typical Implementation Length:

The implementation length for Lucity varies greatly, depending mostly on what data needs to be gathered (potential field work) and data conversion time. Typically, there are a couple of on-site days to begin implementation, then a period of data collection and conversion with remote connection to Lucity, and then a few days of on-site visits for training and final implementation.

1.8.2 Contact Information – Phone Number:

Joel Knight is the East Regional Manager, handling the East Coast through Minnesota.
D = Direct Phone Line, M = Mobile, F = Fax.
There is also an 800 number for general questions, 1-800-492-2468.

1.9.2 Define when and how to measure performance:

Lucity does not have any pre-set system or guide for when or how to measure performance. The system is flexible to allow the user to set up a rating system for roads, which could then be implemented by less skilled employees for the remainder of the software's use.

1.9.10 Other [Benefits/Features]:

Lucity has three main categories of modules, Asset Management, GIS Solutions, and Work Management. Asset Management includes the Streets & Roads module, as well as a Utilities module, Facilities and Equipment Module, and a Green Spaces Module. GIS Solutions includes their GIS Desktop module, as well as different modules for viewing GIS online or on a tablet computer. Work Management includes Lucity's cost analysis tools, such as their Work Orders module as well as an Inventory Control module. This category also includes a citizen request/complaint module.

A product map of Lucity's modules can be found here:
http://www.lucity.com/pages/productMap

2.1 Initial cost of software:

If two people would use the same module at the same time, that module would need to be bought twice (two "seats"). If two people would use the same module at different times, that module only needs to be purchased once.

2.2 Initial cost of data conversion, configuration, and custom programming:

Lucity's startup cost, including data conversion, configuration, and training, is usually about one half of the total software cost.

2.3 Training Costs:

For Lucitiy, Streets/Roads Module generally take 1-2 days of training. Pavement Analysis Module generally requires an additional full day of training.

4.1 What database platform is used?

While Lucity is capable of running its database on SQL, Oracle, or Access, it is strongly recommended to use SQL.

4.4 Can reporting be customized?

Many reports come standard with the software, including any report custom made for a user in the past. If the user would like to create a brand new report, there is a fee for that based on the time necessary to complete the report template.

4.6 Can data be accessed wirelessly or via the web?

Web interface is free with license purchase, but it counts as a user seat. So, if three seats are purchased for Road Analysis, then anyone using the web interface would use up one of those seat and thus decrease the number of seats available for networked use.

5.2 Are there regular updates to the system?

There are updates released twice a year, typically around February and August. In addition to that, there are two service packs between each of those updates. These updates are included in the annual technical support fee. Users can implement these themselves, or call Lucity technical support to walk them through implementation.

5.3 Does the vendor offer annual workshops?

Lucity conducts two types of annual conferences, a national and a regional conference. Every other year the national meeting is in Kansas City. The opposite year alternates between the west and east coast. Regional user group conferences are located across the country and typically held between February and April. The nearest regional meeting to Minnesota would likely be in Chicago.

PubWorks Vendor
Interview Summary

Name of Gravel Road Management Tool:	*PubWorks* PubWorks is a Colorado based asset management software with road assessment, service requests, work orders, and GIS features.

1	Is this a software specifically for gravel road maintenance? Or is it part of a more comprehensive management systems (i.e. paved roads, etc.)					
		Gravel roads only	x	Other – **PubWorks is a comprehensive Road and Asset management system.**		
2	When was this tool originally developed?					
	1997 and it's been evolving and improving ever since.					
3	Have there been upgrades/new versions? If so, what is the current version?					
	Yes	x	No		Most current version number:	5.8.85
4	What platform/software was the tool designed with? (i.e. excel, access, hard programs, etc.)?					
	Multi-user, client server in MS SQL Server or MS Access.					
5	What are the computer requirements to operate the software?					
	Very much plain vanilla – Windows XP, 7, 8.					
6	What skills does the user do you recommend the user to have?					
	Beginner to intermediate users are very successful with PubWorks because it's user friendly.					
7	Is this tool directly usable for all public agencies or does in need to be modified based on the users' materials, maintenance practices, environment, etc.?					
	PubWorks is "data driven" which means it can be configured to meet the user's needs and goals.					
8	How does an agency acquire this tool (i.e. private company, LTAP center, user group, etc.)?					
	PubWorks can be purchased directly.					
9	Provide the general Cost structure (i.e. one time purchase price, user + maintenance fee, etc?)					
	Original Cost	Prices start at $5,000 for small agencies.				
	Annual Maintenance Fee	Maintenance fees start at $1,000 (i.e.: 20% of software cost).				
	User Group Fee	$0				
	Other	Add-on modules do carry costs – please contact us for details.				
10	After first purchase, what other costs or activities/data are needed to make the system function?					
	A day of training and at minimum creation of a road inventory.					
11	How often is data collection required?					
	As often as the customer requires it.					
12	What are the minimum input values to make it usable? (i.e. material type, thickness, age, etc.)					
	Simply a list of roads. Categorizing roads by surface type would be very beneficial.					
13	What are other input values that can be added to make it a more robust system?					
	Comprehensive roadway attributes, observable conditions, quality index ranges.					
14	What kind of documentation/instructions come with the tool?					

	User guides, quick reference guides and live help desk support.		
15	What technical support or user group is available to the user?		
	We have a professional help desk that operates from 6am to 6pm central time.		
16	Can you provide a breakdown of the types of agencies that use your tool (cities, counties, etc.)?		
17	Total number of users	202 agencies in the USA, 252 in Canada	
18	Number of Counties	85 in the USA	
19	Number of Cities	110 in the USA plus 252 municipalities in Canada	
20	Number of Townships	We don't distinguish between city and township	
21	Other	7 in the USA two of which are National Forests	
22	What are the primary benefits a user would get from using this system?		
	x	Ability to track condition of gravel roads	
		Define when and how to measure performance	
	x	Guidance on how to schedule maintenance/prioritize routes	
	x	GIS compatibility	
	x	Track maintenance (summer and winter) cost	
	x	Ability to determine the cost to upgrade a road (gravel to paved)	
	x	System similar to pavement management tools, but for gravel	
	x	Cost/Budgeting	
	x	Paved/Unpaved	
	x	Other, please list: **Work Orders, Service Request, Fleet Maintenance**	
23	If a MN agency is interested in learning more about your product, who would they contact?		
	Name	*Bob Guion*	
	E-mail	*Bob@PubWorks.com*	
	Phone	*970-927-3500*	
	Closest MN Office	*Western Colorado but **Roseville MN** is a marquee customer of ours.*	

Pubworks Supplementary Notes

Table 1 of this report provides a quick overview of the features and capabilities of each of the gravel road management software tools. If additional information that was provided by the vendor, a * was noted in the table directing readers to this section of supplementary notes. The index numbers below correspond with the number in the left column of Table 1.

1.5 What agencies currently use this tool? (reported by vendor)

PubWorks has 202 customer agencies in USA, including 85 counties, 110 cities, and 2 national forests as well as 252 agencies in Canada. The U.S. agencies are mainly clustered in Colorado, Wyoming, Arizona, and Montana. PubWorks has one marquee customer Roseville, MN.

1.9.2 Define when and how to measure performance:

PubWorks bases their rating scale on the APWA road assessment national standards. This can be altered by the user.

1.9.3 Guidance on how to schedule maintenance/prioritize routes:

Pubworks does have a ranking system of the best to worst roads, as defined by their PCI (Pavement Condition Index, as defined by the APWA). But, this system is insufficient by itself to determine a maintenance schedule, which is affected by many factors such as politics, effectiveness of maintenance both short term and long term, and budget vs cost of varying maintenance activities.

1.9.10 Other [Benefits]:

PubWorks features in addition to asset (Road) management include: Work Orders, Service Request, and Fleet Management.

2.1 Initial Cost of Software:

Agency Size (Employees)	40+	20-39	11-19	5-10	1-4
Asset Management Core	$ 7,500	$ 6,500	$ 4,500	$3,500	$2,500
Service Requests Module	$ 2,500	$ 2,000	$ 1,750	$ 1,500	$ 1,250
Work Orders Module	$ 2,500	$ 2,000	$ 1,750	$ 1,500	$ 1,250
GIS MapViewer Module	$ 5,000	$ 4,000	$ 3,500	$ 2,500	$ 1,500
Total	$ 17,500	$ 14,500	$ 11,500	$ 9,000	$ 6,500

2.3 Training Costs:

Based on the software options selected, installation and training may range from one day to four full days. On-Site, hands-on training, preferably in a classroom setting, is strongly recommended. Cost: $975/day plus reasonable travel costs.

2.4 Annual Technical Support Costs:

Ongoing customer support is provided free of charge for the first six months and at 20% of software costs thereafter.

2.5.1 Tablet Devices:

A mobile version of the Pubworks software is in the final stages of Beta testing. It is expected to be available for mass use by the fall of 2014. It will be available on Android first, and iOS shortly thereafter. The mobile version will not be a comprehensive version of the desktop software, but it will include 6 core functions. They are: service requests, recording work in the field, mapping capability, viewing of all assets, inspection capability, and inventory.

3.5 Additional public works modules such as road signs or sewage systems:

PubWorks has asset management for any public works system (such as sewers or fire hydrants or buses) included with their road asset management system. There are additional modules for Work Orders, Service Requests, and GIS mapping that would be at additional cost.

4.4 Can reporting be customized?

There are over 400 reports available standard with the software. Each one has several selection criteria and points of movement to adapt it to a particular situation.

4.5 Is there a map input interface?

While it is possible to input data directly via the GIS map, it is recommended that this is only done by users appropriately trained in GIS. There is an interface which allows for conditional (non-direct) data entry via a map (meaning that these changes to the database would need to be approved by a GIS savvy person or supervisor before they become finalized) which is recommended. This system requires no knowledge or experience with GIS. It is possible to set administrative privileges so only certain individuals are able to edit particular aspects of the database.

4.6 Can data be accessed wirelessly or via the web?

PubWorks has set up Virtual Private Networks (VPNs) for clients (included in initial set up costs) to allow them to access the software in the field. More recently, PubWorks has also uploaded data to the Cloud, which has allowed for a faster connection. It is possible to then input data in the field even while away from an internet connection. As soon as the device is connected to the internet, it will automatically upload all of its new data to the PubWorks system.

5.1 Is technical support available?

A 1-800 number is available as well as email support and live session chatting. There is no limit to the number of times a user can use these support methods. With the technical support fee also comes a semi-annual phone call from the PubWorks IT.

5.3 Does the vendor offer annual workshops?

PubWorks has annual user group meetings. Recently, the closest to MN has been in Chicago. There are also several webinars throughout year. Generally, two of which will be discussing updates and new releases, and the others rotate topics as need or interest arises. For example, there was recently a Webinar on FEMA Reporting (which is built in) because many agencies in the north east requested it.

RSMS11 Vendor
Interview Summary

Name of Gravel Road Management Tool:	*RSMS11 (by MaineDOT)* RSMS11, or Road System Management Software 2011, is a revamped version of the original RSMS which was created for DOS in the late 80s. It is managed by Jerry Douglass at the Maine DOT and is partially federally funded. RSMS11 does not turn a profit, all funds go back into keeping the project alive. A consultant helped create the program and continues to help with training and the creation of RSMS14, a new version of the program which will include GIS and sign management.

1	Is this a software specifically for gravel road maintenance? Or is it part of a more comprehensive management systems (i.e. paved roads, etc.)					
		Gravel roads only	x	Other **Gravel and Paved Roads**		
2	When was this tool originally developed?					
	Late 80s, but that was DOS, RSMS11 started re-development in 2010 and was ready for release in 2011, hence RSMS*11*.					
3	Have there been upgrades/new versions? If so, what is the current version?					
	Yes	x	No		Most current version number:	11 – See above
4	What platform/software was the tool designed with? (i.e. excel, access, hard programs, etc.)?					
	It is a stand-alone program					
5	What are the computer requirements to operate the software?					
	Windows XP, 7, or 8 and 1GB of memory.					
6	What skills does the user do you recommend the user to have?					
	Basic Computer Skills					
7	Is this tool directly usable for all public agencies or does in need to be modified based on the users' materials, maintenance practices, environment, etc.?					
	Pre-Set cost estimates are for Maine, so you should determine if those need to be re-written for your local					
8	How does an agency acquire this tool (i.e. private company, LTAP center, user group, etc.)?					
	To get started with RSMS11, a potential user would first go to RSMS11.info and download the trial version, which is free and allows 10 trial roads. If the user decides to purchase the system, they would fill out a small form on the website which is emailed directly to Jerry Douglass, the MaineDOT manager of the software. Jerry then sends the user an invoice. When that is paid, a key is emailed to the user to allow them to download the full version from the website. To allow multiple people to access the software, it is recommended that it is downloaded onto a shared server instead of an individual computer. Instructional PDFs are also available on RSMS11.info.					
9	Provide the general Cost structure (i.e. one time purchase price, user + maintenance fee, etc?)					
	Original Cost **(One time fee)**			Public agencies within Maine: $75 Non-Maine public agencies: $150 Consultants: $300		
	Annual Maintenance Fee			N/A		

	User Group Fee		N/A
	Other		
10	After first purchase, what other costs or activities/data are needed to make the system function?		
	Data input – this is by hand data entry of all your system's roads.		
11	How often is data collection required?		
	As often as the agency requires it.		
12	What are the minimum input values to make it usable? (i.e. material type, thickness, age, etc.)		
	Road names and characteristics		
13	What are other input values that can be added to make it a more robust system?		
	Road condition ratings		
14	What kind of documentation/instructions come with the tool?		
	A field manual for road condition rating and a program manual.		
15	What technical support or user group is available to the user?		
	Phone and email		
16	Can you provide a breakdown of the types of agencies that use your tool (cities, counties, etc.)?		
17	Total number of users	159	
18	Number of Counties		
19	Number of Cities		
20	Number of Townships		
21	Other		
22	What are the primary benefits a user would get from using this system?		
	x	Ability to track condition of gravel roads	
	x	Define when and how to measure performance	
	x	Guidance on how to schedule maintenance/prioritize routes	
		GIS compatibility	
	x	Track maintenance (summer and winter) cost	
	x	Ability to determine the cost to upgrade a road (gravel to paved)	
	x	System similar to pavement management tools, but for gravel	
	x	Cost/Budgeting	
	x	Paved/Unpaved	
		Other, please list:	
23	If a MN agency is interested in learning more about your product, who would they contact?		
	Name	*Jerry Douglass*	
	E-mail	*Jerry.douglass@maine.gov*	
	Phone	*207-624-3290*	
	Closest MN Office	*Augustus, Maine*	

RSMS11 Supplementary Notes

Table 1 of this report provides a quick overview of the features and capabilities of each of the gravel road management software tools. If additional information that was provided by the vendor, a * was noted in the table directing readers to this section of supplementary notes. The index numbers below correspond with the number in the left column of Table 1.

1.5 What agencies currently use this tool? (Reported by Vendor)

RSMS11 has been purchased by 159 agencies, mostly at the municipal level. There were 41 in 2011, 67 in 2012, 37 in 2013, and 14 so far in 2014. These include agencies in the following states: Maine, Vermont, Delaware, Massachusetts, New Hampshire, Texas, Pennsylvania, Tennessee, Connecticut, New York, and Mississippi.

1.7 Typical Implementation Length:

RSMS11 does not have any feature to convert an excel spreadsheet or other database into RSMS readable data. All road data must be hand inputted into the system. The only exception to this is if the new user has the old RSMS. Old RSMS data can be uploaded into the new software. Implementation length would then largely consist of the time it takes the user to do this. There are also one day training classes which are typically done in person and may cause some delay because of travel from Maine to Minnesota. Cost of training sessions is detailed in 2.3. Trial use and downloading the software are detailed above in question four of the questionnaire.

1.9.2 Define when and how to measure performance:

RSMS11 comes with a PDF field guide to help rank the condition of the road.

1.9.4 GIS Compatibility:

A new version of RSMS11 is expected to come out in 2014 or early 2015. This version will include some GIS aspects such as mapping roads in different colors to indicate condition. It will not include a query feature. It will include sign management. The price is expected to increase for this version, though the old version will still be available. For Maine agencies the estimated price for the new RSMS is $200 (from $75), for public agencies outside of Maine, $300 (from $150), and for consultants, $500 (from $300). These are only estimates and have not been finalized.

2.2 Initial cost of data conversion, configuration, and custom programming:

See 1.7 – Much of this initial work can be in house.

2.3 Training Costs:

Travel and expenses for training sessions would be billed to the user. Two people would come for training sessions, Jerry Douglass, the Maine DOT employee who manages the system as well as the consultant who helped develop the system. The consultant's time would be billed at his current rate, which you should check directly with him. Jerry Douglass would see if the MaineDOT would allow the travel to be done on their time, in which case his time would be paid for by his normal salary. Otherwise, he would take vacation time and bill a daily rate.

3.2.1 Rate severity of road characteristics:

Priority Ranking is based on the traffic and importance rating of the road. Roads with high traffic (ranked 1-5) or that are otherwise vital in location or route (ranked 1-5) are given high priority ratings (ranked 2-10). The condition rating for each road characteristic, which is not included in the priority ranking, is calculated from the percentage of the road (0, 1-10%, 10-30% or >30%) that experiences that particular type of damage. For example, road 502 has low (1-10% of the road) rutting issues, medium (10-30%) loose aggregate issues, high (>30%) dust issues, and no (0%) road drainage issues. The categories of damage considered for gravel roads are: rock/clay, rutting, loose aggregate, corrugations, potholes, dust, cross section, and roadside drainage.

3.4 GIS Link:

See 1.9.4 – GIS Link is expected to be available in the coming months.

3.5 Additional public works modules such as toad sign or sewage systems:

Sign Management is expected with the next edition of RSMS. This new RSMS is expected to come out in 6-12 months. See 1.7.4.

4.4 Can reporting be customized?

Krystal Reports are used.

5.1 Is technical support available?

Technical support can be found by calling or emailing Jerry Douglass at 207-624-3290 or Jerry.douglass@maine.gov. Occasionally, the problem may require assistance from the consulting developer who helped create RSMS11.

5.2 Are there regular updates to the system?

Users must periodically check the built in updater for new updates. The software, once given permission, can then update itself.

5.4 What kind of documentation/instructions come with the tool?

Two PDFs come with the software and can be downloaded online. Hard copies also come with the training sessions. One is a field manual to assist road inspectors in collecting appropriate data to put into the system. The other is a manual on how to run the program.

WinCams User
Interview Summary

Company/Agency:	*Mason County Public Works*
Name of Gravel Road Management Tool:	*WinCams - Maintenance Management Module*

1	Is this a software specifically for gravel road maintenance? Or is it part of a more comprehensive management systems (i.e. paved roads, etc.)						
		Gravel roads only		X	Other		
2	When was this tool originally developed?						
	We started using the software in 2012						
3	Have there been upgrades/new versions? If so, what is the current version?						
	Yes		No	X	Most current version number:		
4	What platform/software was the tool designed with? (i.e. excel, access, hard programs, etc.)?						
	SQL						
5	What are the computer requirements to operate the software?						
	N/A						
6	What skills does the user do you recommend the user to have?						
	General						
7	Is this tool directly usable for all public agencies or does in need to be modified based on the users' materials, maintenance practices, environment, etc.?						
	It directly usable, but "set up" to meet each agencies needs						
8	How does an agency acquire this tool (i.e. private company, LTAP center, user group, etc.)?						
	Private company						
9	Provide the general Cost structure (i.e. one time purchase price, user + maintenance fee, etc?)						
	Original Cost	N/A					
	Annual Maintenance Fee	N/A					
	User Group Fee	N/A					
	Other	N/A					
10	After first purchase, what other costs or activities/data are needed to make the system function?						
	Inputting road system features & work standards, tracking equipment, labor and material costs						
11	How often is data collection required?						
	daily						
12	What are the minimum input values to make it usable? (i.e. material type, thickness, age, etc.)						
	# of units completed, equip, labor,						
13	What are other input values that can be added to make it a more robust system?						
	MP						
14	What kind of documentation/instructions come with the tool?						
	Depends on purchase agreement/contract						
15	What technical support or user group is available to the user?						
	Depends on purchase agreement/contract						

16	Can you provide a breakdown of the types of agencies that use your tool (cities, counties, etc.)?		
17	Total number of users	N/A	
18	Number of Counties	N/A	
19	Number of Cities	N/A	
20	Number of Townships	N/A	
21	Other	N/A	
22	What are the primary benefits a user would get from using this system?		
		Ability to track condition of gravel roads	
		Define when and how to measure performance	
	X	Guidance on how to schedule maintenance/prioritize routes	
	X	GIS compatibility	
	X	Track maintenance (summer and winter) cost	
		Ability to determine the cost to upgrade a road (gravel to paved)	
		System similar to pavement management tools, but for gravel	
	X	Cost/Budgeting	
	X	Paved/Unpaved	
		Other, please list:	
23	If a MN agency is interested in learning more about your product, who would they contact?		
	Name	*Jennifer Beierle*	
	E-mail	*Jb@co.mason.wa.us*	
	Phone	*360-427-9670 x455*	
	Closest MN Office	*Shelton, WA*	

WinCams Vendor
Interview Summary

Name of Gravel Road Management Tool:	*WinCams* WinCams is a West Coast based cost accounting software made by Cascade Software Systems, a company run by Aad Alkemade.

1	Is this a software specifically for gravel road maintenance? Or is it part of a more comprehensive management systems (i.e. paved roads, etc.)					
		Gravel roads only	x	Other **Gravel and Paved Roads**		
2	When was this tool originally developed?					
	25 Years Ago					
3	Have there been upgrades/new versions? If so, what is the current version?					
	Yes	X	No		Most current version number:	N/A
4	What platform/software was the tool designed with? (i.e. excel, access, hard programs, etc.)?					
	Hard programs; Originally made for DOS in late 80s, since evolved to Windows					
5	What are the computer requirements to operate the software?					
	Windows XP, 7, or 8, not Macs					
6	What skills does the user do you recommend the user to have?					
	Laymans can operate it					
7	Is this tool directly usable for all public agencies or does in need to be modified based on the users' materials, maintenance practices, environment, etc.?					
	It's directly usable, but you may also modify it to be even more specific to your needs					
8	How does an agency acquire this tool (i.e. private company, LTAP center, user group, etc.)?					
	Contact us					
9	Provide the general Cost structure (i.e. one time purchase price, user + maintenance fee, etc?)					
	Original Cost			$3,870 to $8,740 for only roads module $19,970 to $57,200 for complete package (Cost depends on size of agency)		
	Annual Maintenance Fee			10-12% of software fee		
	User Group Fee			N/A		
	Other					
10	After first purchase, what other costs or activities/data are needed to make the system function?					
11	How often is data collection required?					
	As often as the users require it					
12	What are the minimum input values to make it usable? (i.e. material type, thickness, age, etc.)					
	Road listing, basic attributes					
13	What are other input values that can be added to make it a more robust system?					
	Road Damage Ratings – Light/Medium/Severe for percentage of road;					
14	What kind of documentation/instructions come with the tool?					

	Online Help menu similar to Windows Help		
15	What technical support or user group is available to the user?		
	Phone, Wincams staff can remotely connect at request, send patches, Conferences in Fall/October in the West Coast		
16	Can you provide a breakdown of the types of agencies that use your tool (cities, counties, etc.)?		
17	Total number of users	110 (~ 70 use the Road Management Modules)	
18	Number of Counties	70 (that use road module)	
19	Number of Cities	3 (that use road module)	
20	Number of Townships		
21	Other		
22	What are the primary benefits a user would get from using this system?		
	x	Ability to track condition of gravel roads	
	x	Define when and how to measure performance	
	x	Guidance on how to schedule maintenance/prioritize routes	
		GIS compatibility	
	x	Track maintenance (summer and winter) cost	
	x	Ability to determine the cost to upgrade a road (gravel to paved)	
	x	System similar to pavement management tools, but for gravel	
	x	Cost/Budgeting	
	x	Paved/Unpaved	
		Other, please list:	
23	If a MN agency is interested in learning more about your product, who would they contact?		
	Name	*Aad Alkemade*	
	E-mail	*aad@csscams.com*	
	Phone	*541-343-9160*	
	Closest MN Office	*Eugene, Oregon*	

WinCams Supplementary Notes

Table 1 of this report provides a quick overview of the features and capabilities of each of the gravel road management software tools. If additional information that was provided by the vendor, a * was noted in the table directing readers to this section of supplementary notes. The index numbers below correspond with the number in the left column of Table 1.

1.7 Typical Implementation Length:

The estimated time frame for implementation of WinCams is 2-3 Months for small agencies and 4-6 months for large agencies. This reflects previous experience and takes into account the fact that agencies are typically not able to devote 100% of their time to implementation efforts. The time frame can be hastened for deadlines such as the start of a new fiscal year. Some agencies choose to pay for more frequent site visits which can significantly shorten the time frame and ease of transition. The allocation of time is typically as follows:

1.9.3 Guidance on how to schedule maintenance/prioritize routes:

Road analysis is done through Light/Medium/Severe ratings of several road characteristics, along with a percentage of the road that has that rating. For example, County Road 5 has a medium rating for potholes for 25-50% of its length. Percentages can be 0-25%, 25-75%, or >75%. The road then gets a rating from 0 to 100 based on the inputs of several characteristics like potholes, drainage, and cracking. Each characteristic and its severity takes away a certain number of points from 100, creating the ranking.

1.9.4 GIS Compatibility:

Wincams doesn't have any built in GIS, but can export the data for use on an agency's own GIS system. A common unique ID for each road is required. WinCams does link to Google Maps for quick mapping.

1.9.10 Other [Benefits]:

WinCams also offers several other modules at an additional cost. The complete list includes (but is not limited to): Timecards, Material Usage, Cash Receipts, A/R Modules, Payments/Statements, Project Ledger, Billing, Resources (Labor & Equipment, Materials, and Other), Estimates, Bids, and Contracts, Schedules & Tabulations, Bridges, Radio Shop, History, Vehicles & Equipment, Sanitary Sewer, Sign Shop, Manholes, Catch Basins, Transit Module, and Service Requests.

2.1 – 2.4 Cost information:

For the below cost estimates:

- Small agency - population of less than 20,000 to 25,000 people.
- Large agency - population >25,000 and < 250,000 – 300,000 people.
- Extra-large agency - population of greater than 250,000 to 300,000 people
  (Would have a similar cost assessment as large agencies, but potentially with additional charges to cover further work necessitated by the agency's extra-large size)

<u>Road Module Only Cost Estimate:</u> (estimated cost includes the following features):

a. GASB compliant – asset values with depreciation procedures;
b. All County Roads with detailed maintenance activity and costs information organized by Road No;
c. Pavement Condition Index and Maintenance Recommendations;
d. Service Requests / PM Services
e. Routes

- Small agencies: the total cost is estimated to be $3,870 with a $180 annual maintenance fee. This includes $1,500 for the license fee, $250 for interfaces, custom programming, and implementation, $250 for data conversion costs, $1,120 for onsite training and support time (1 days onsite time), and $750 for travel expenses, travel time and per diem.

- Large agencies: the total cost is estimated to be $8,740 with a $480 annual maintenance fee. This includes $4,000 for the license fee, $750 for interfaces, custom programming, and implementation, $750 for data conversion, $2,240 for onsite training and support time (2 days onsite time), and $1,000 for travel expenses, travel time and per diem.

Full Suite Cost Estimate: The estimated cost of the WinCams includes the following features:

a. Timecards (incl. Payroll Interface with Auditor System)
b. Accounts Payable (incl. Voucher Interface with Auditor System)
c. Accounts Receivable
d. Road Materials Inventory
e. Project Ledger
f. Budget Expenditures Ledger
g. Budget Revenues Ledger
h. Fixed Assets
i. Road & Bridge Modules
j. Shop Inventory
k. Vehicles & Equipment System
l. Signs, Pavement Markers
m. Maintenance Management
n. Service Requests / Work Orders

- Small agencies: the total cost is estimated to be $19,970 with a $1,200 annual maintenance fee. This includes $10,000 for the license fee, $250 for data conversion costs, $6,720 for onsite training and support time (6 days onsite time), and $3,000 for travel expenses, travel time and per diem.
- Large agencies: the total cost is estimated to be $57,200 with a $4,200 annual maintenance fee. This includes $35,000 for the license fee, $5,000 for interfaces, custom programming, and implementation, $1,500 for data conversion, $11,200 for onsite training and support time (10 days onsite time), and $4,500 for travel expenses, travel time and per diem.

3.4 See 1.9.4

3.5 Additional Public Works Modules such as Road Signs or Sewage Systems
WinCams also offers several other modules at an additional cost. The complete list is: Administration, Fleet/Motorpool, Sign Shop, Road/Street/Sewer Operations, Engineering, Building Maintenance / Facility Management, and Radio Shop.

4.4 Can reporting be customized?
There is a high level of report customization available standard with WinCams. It is also compatible with Krystal reporting.

4.6 Can data be accessed wirelessly or via the web?
Citizens can report problems (downed sign, etc) online. That form goes directly into Wincams. The citizen can view the status of this maintenance request online through the same website. These "Citizen Requests" are linked to the appropriate road in WinCams.

5.2 Are there regular updates to the system?
There are annual updates to the system that may be implemented locally by the user via an FTP site, or remotely by WinCams staff.

Miscellaneous Notes:
This software has the ability to combine multiple roadways into one “route”. Thus, if a user was trying to find the cost to plow a common route, this could be done very quickly.

Work Central (by RT Vision) Vendor
Interview Summary

Name of Gravel Road Management Tool:	*Work Central* Work Central by RT Vision (Real Time Vision) is a Minnesota, web based software (cell phone, tablet or laptop) that is in the final stages of development. It is a roads based system; other public works and Highway Department systems can be bought separately.

1	Is this a software specifically for gravel road maintenance? Or is it part of a more comprehensive management systems (i.e. paved roads, etc.)						
	X	Gravel roads only	X	Other: Paved Roads, Culverts, Overhead Lighting, Retaining Walls, Signs, Pavement Striping, Guard Rails, etc.			
	Solution is gravel specific but can be incorporated into a more encompassing solution						
2	When was this tool originally developed?						
	2013						
3	Have there been upgrades/new versions? If so, what is the current version?						
	Yes	X	No		Most current version number:	NA	
4	What platform/software was the tool designed with? (i.e. excel, access, hard programs, etc.)?						
	Platform: Linux/Apache/Php/Postgre software: HTML5, Hosted/Hosting Hybrid/On Premise						
5	What are the computer requirements to operate the software?						
	Any device that supports the most common web browsers (including tablets)						
6	What skills does the user do you recommend the user to have?						
	Fairly basic computer skills						
7	Is this tool directly usable for all public agencies or does in need to be modified based on the users' materials, maintenance practices, environment, etc.?						
	The tool itself is modifiable, by the public agency. The agency can add their own specific fields to best fit their needs.						
8	How does an agency acquire this tool (i.e. private company, LTAP center, user group, etc.)?						
	Direct purchase from RT Vision						
9	Provide the general Cost structure (i.e. one time purchase price, user + maintenance fee, etc?)						
	Original Cost				$99/User/Month		
	Annual Maintenance Fee				Included in user fee		
	User Group Fee				None		
	Other				Initial: Training + Implementation + Setup = $3880		
10	After first purchase, what other costs or activities/data are needed to make the system function?						
	Other Activities/Data: 1. If agency wants to utilize a specific GIS source or data 2. The solution has the ability to import data from existing data sources like excel, access, or existing software.						
11	How often is data collection required?						
	As often as the user wishes, there is no requirement.						

12	What are the minimum input values to make it usable? (i.e. material type, thickness, age, etc.)		
	Input values are custom per agency, they choose what they would like to input.		
13	What are other input values that can be added to make it a more robust system?		
	The agency has the ability to add fields as needed via an administration section.		
14	What kind of documentation/instructions come with the tool?		
	Administrative setup documentation provided as needed.		
15	What technical support or user group is available to the user?		
	Tech support available during normal business hours.		
16	Can you provide a breakdown of the types of agencies that use your tool (cities, counties, etc.)?		
17	Total number of users	4 Counties furthering the development. Expected completion in a "few months" (as of April 2014)	
18	Number of Counties	4 (Sherburne, Morrison, Cass, and Pennington Counties)	
19	Number of Cities		
20	Number of Townships		
21	Other		
22	What are the primary benefits a user would get from using this system?		
	X	Ability to track condition of gravel roads	
	X	Define when and how to measure performance	
	X	Guidance on how to schedule maintenance/prioritize routes	
	X	GIS compatibility	
	X	Track maintenance (summer and winter) cost	
	X	Ability to determine the cost to upgrade a road (gravel to paved)	
	X	System similar to pavement management tools, but for gravel	
	X	Cost/Budgeting	
	X	Paved/Unpaved	
	X	Other, please list: very customizable, mobile (use in the field), dynamic reporting, able to import data from existing software/excel/access data sources into the solution.	
23	If a MN agency is interested in learning more about your product, who would they contact?		
	Name	*Marc Rood / Jon Andres*	
	E-mail	*sales@rtvision.com*	
	Phone	*651-528-7004 or 320-632-0760*	
	Closest MN Office	*58 East Broadway, Little Falls, MN 56345*	

Work Central (by RT Vision) Supplementary Notes

Table 1 of this report provides a quick overview of the features and capabilities of each of the gravel road management software tools. If additional information that was provided by the vendor, a * was noted in the table directing readers to this section of supplementary notes. The index numbers below correspond with the number in the left column of Table 1.

1.9.4 GIS Compatibility:

It will be possible to view layers similar to how one would in a GIS viewer, but it will be online overlaid on a mapping service such as MapQuest. It will be possible to view shape files the county has already created via this system as well as create new road drawings.

2.5.1 Tablet Devices:

Since this program uses HTML5, it will be able to automatically re-orient and re-size itself to best fit tablet devices.

3.3.2 Assign Future Work:

Currently in the Culvert Module there are provision to automatically assign repairs and maintenance activities based on culvert status. This technology will be moved to Gravel Road Management

Work Central will be integrated with several other RT Vision modules including time card and maintenance management as planned with our partner Counties.

3.4 GIS Link:

See 1.9.4 – Viewing would be via a web service like MapQuest or direct ESRI shape files.

Miscellaneous Notes:

- It is necessary to get a SSL certificate, which is a very common certificate required for creating the website interfaces for the software. This is a simple and quick process that RT Vision will guide new users through. It costs $50.

Rating Scale Vendor/User
Interview Summary

Name of Gravel Road Management Tool:	*Rating scale by the Dickinson County (Michigan) Road Commission* A 1 page description of process and meaning of gravel road condition rating scale from 0 to 10, see attached.

1	Is this a software specifically for gravel road maintenance? Or is it part of a more comprehensive management systems (i.e. paved roads, etc.)						
		Gravel roads only		x	Other		
2	When was this tool originally developed?						
	2006 & 2007, been modified a few times since						
3	Have there been upgrades/new versions? If so, what is the current version?						
	Yes	x	No		Most current version number:	2012 (added in writing what I did)	
4	What platform/software was the tool designed with? (i.e. excel, access, hard programs, etc.)?						
	Word document						
5	What are the computer requirements to operate the software?						
	None. It is a rating scale						
6	What skills does the user do you recommend the user to have?						
	None needed. Ability to identify an aggregate road is about it. Then read the guidance.						
7	Is this tool directly usable for all public agencies or does in need to be modified based on the users' materials, maintenance practices, environment, etc.?						
	Usable to all						
8	How does an agency acquire this tool (i.e. private company, LTAP center, user group, etc.)?						
	Copy attached.						
9	Provide the general Cost structure (i.e. one time purchase price, user + maintenance fee, etc?)						
	Original Cost	none					
	Annual Maintenance Fee						
	User Group Fee						
	Other						
10	After first purchase, what other costs or activities/data are needed to make the system function?						
	A vehicle to drive the roads and something to record the rating						
11	How often is data collection required?						
	No known requirement, whatever is agency standards						
12	What are the minimum input values to make it usable? (i.e. material type, thickness, age, etc.)						
	Road rating						
13	What are other input values that can be added to make it a more robust system?						
	Measurements of width, thickness, etc.?						
14	What kind of documentation/instructions come with the tool?						
	Word document						
15	What technical support or user group is available to the user?						

	Just me		
16	Can you provide a breakdown of the types of agencies that use your tool (cities, counties, etc.)?		
17	Total number of users		Don't know
18	Number of Counties		Been requested by about 10 counties
19	Number of Cities		None known
20	Number of Townships		None known
21	Other		
22	What are the primary benefits a user would get from using this system?		
	x	Ability to track condition of gravel roads	
	x	Define when and how to measure performance	
	x	Guidance on how to schedule maintenance/prioritize routes	
		GIS compatibility	
		Track maintenance (summer and winter) cost	
	x	Ability to determine the cost to upgrade a road (gravel to paved)	
	x	System similar to pavement management tools, but for gravel	
		Cost/Budgeting	
		Paved/Unpaved	
	x	Other, please list: relates to maintenance needs	
23	If a MN agency is interested in learning more about your product, who would they contact?		
	Name		*Lance Malburg*
	E-mail		*lance@dickinsoncrc.com*
	Phone		*906-774-1588*
	Closest MN Office		*Don't know*

Dickinson County (Michigan) Road Commission
Gravel Road Rating Scale

The following ideas might help simplify the rating of gravel roads, and assist in maintenance. But first we must lay some ground work:

1. Gravel roads are roads with an aggregate surface. Depth not important to determining this surface type
2. Gravel roads are maintained roads and open (not impassible) under normal conditions.
3. The actual surface condition may change daily, based on traffic, weather blading, etc.
4. Any road that may be impassible for extended periods should be considered unimproved earth or graded earth.

Having said that, let's simplify gravel rating to 3 "stable" items, crown, width, and drainage. Everything else can change daily. (Yes, crown can change with a road grader, but a standard underbody on a truck does not change it that much.)

CROWN – Is there proper slope of the driving lanes (3"-6" per 10-12 foot lane), including super in curves?
WIDTH – Judgment call – Is road wide enough for 2 cars to pass? Wide enough for expected traffic & service?
DRAINAGE – Is there an adequate ditch system in place to take water from travel lanes and store or convey it?

With these three items, we can get a scale like this, which I think is very easy to understand and useful for planning and analysis:

10. Excellent – Good crown, adequate width ditches in place & functioning (needs nothing). Ready to pave with minor work (26' shoulder to shoulder minimum 2x10 lanes + 2 x 3' shoulder after paving as a minimum)
8. Good – 75 % like 10. Occasional place with poor crown, or occasional spot with standing water on road, road is ditched & wide enough. (Fix - minor maintenance – spotty birm removal, spotty ditch cleanout)
6. Fair – (A.) All like 10, except too narrow. (Fix – add width)
(B.) Uneven crown, or crown missing over 50% <Variable Cross Slope>. Standing water on 25% to 50% on sides of road after rain <Birm>, ditches mostly exist, but not fully functioning. (Maintenance – grade and shape roadway, remove birm, clean ditch)
4. Poor- (A.) No ditches or failed drainage, less than 50% of segment with proper drainage.
(B.) over 50% of road surface does not drain due to lack of drainage (add ditches, reshape to typical section
2. Failed – Road becomes impassible for short periods of time.
0. Unrated

This takes the daily variation of the surface out. Again, we are not checking quality or depth of gravel, just if there is some apparent.