



Winter Maintenance Report

FY 2011

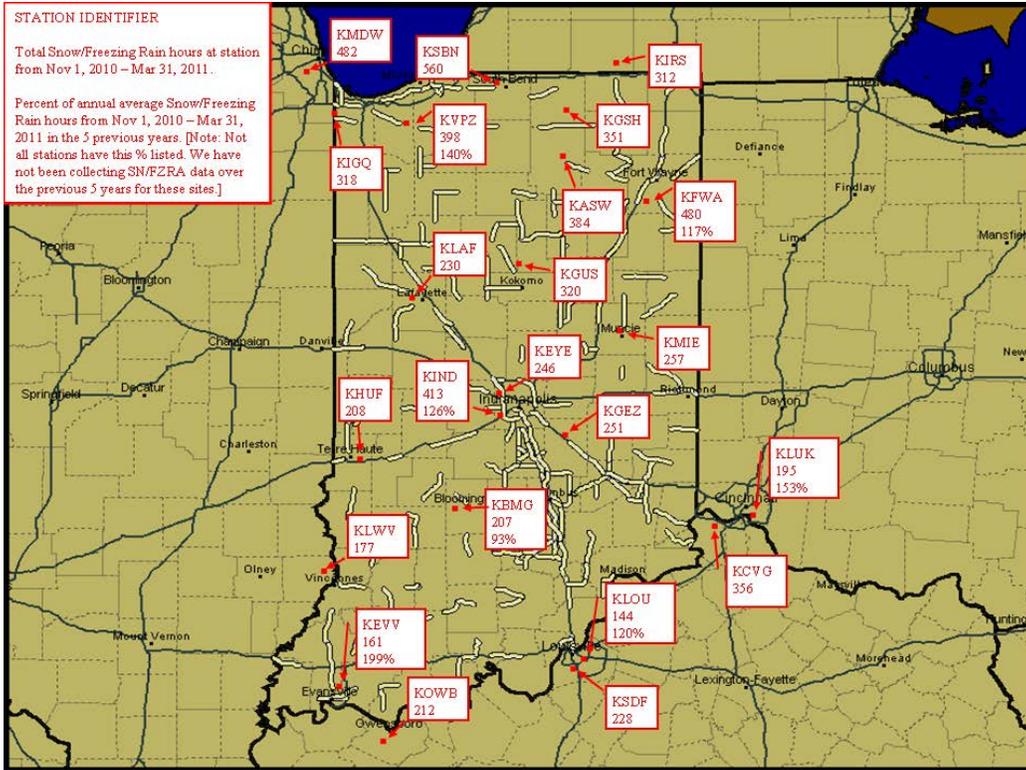


INTRODUCTION

Snow and ice removal is the number one winter priority for INDOT. This report will summarize the winter of fiscal year (FY) 2011 with comparisons to the past two years in critical areas along with some other comparisons. We continue to search for the best methods for tracking and comparing costs, material usage, man hours, weather hours and other data that is beneficial in lowering costs and improving service. Some of the key issues this winter were: 1) identifying accurate methods to measure winter intensity and statewide performance. 2) route reduction in all Districts 3) refurbishing snow and ice equipment expanding equipment life cycles 4) the use of liquids as a de-icer as an effort to lower salt usage and increase efficiency.

WINTER SEVERITY

Each winter is different and this makes comparisons difficult. There are several variables that can impact the costs and performance of fighting a storm. Some of these variables include precipitation type, precipitation rate, pavement and air temperatures, wind speeds, traffic volumes, and pavement conditions. Because of all of the variables involved, comparisons between individual storms, as well as winter seasons, can be difficult. For the past few years, INDOT has used observed hours of snow and freezing rain as a metric for winter severity. This has commonly been referred to as *weather hours*. This information is supplied to by our weather forecasting service, Meridian Environmental Technologies, Inc., on a monthly basis. It is recognized that weather hours is not a perfect measure of severity, but it is a fairly simple and easily obtained metric, and to date, a better method of determining winter severity has not been found. Initially, only five reporting sites were available to collect weather hours (Evansville, Cincinnati, Indianapolis, Valparaiso, and Fort Wayne). This was problematic as these sites only provided weather hours for their specific location and were not necessarily indicative of the weather received across the entirety of a District; local weather patterns like lake effect snow were often not captured. In addition, some locations seemed to report unusually higher weather hours than other sites. Over the past few years, several more observation sites have become available. In an effort to improve this metric, several more sites were added in FY 11 to try to obtain a more representative sample of weather hours in each District. Figure 1 below shows the available observation sites and their corresponding FY 11 weather hours. Unfortunately, to make historical comparisons, we must continue to use the five initial sites. We recognize that this is not the most accurate method of determining performance, however since we don't have historical data on all sites, we are forced to use only these five sites for these comparisons. Therefore all historical comparisons in this report include only the weather hours in the five initial weather hours observation sites. Because we will have data for FY 11 for all sites, historical comparisons can begin to be made for all sites in FY 12. Using the data from the five original observation sites, the FY 11 winter had about 8% fewer weather hours than that of FY 12 which would indicate that it was slightly less severe.



Annual Weather Hours per District

Fiscal Year	FY 09	FY 10	FY 11	Variation from FY 09 to FY 10	Variation from FY10 to FY 11
Crawfordsville	327	504	413	+ 54 %	- 18 %
Fort Wayne	481	522	480	+ 9 %	- 8 %
Greenfield	327	504	413	+ 54 %	- 18 %
LaPorte	391	352	398	- 11 %	+ 13 %
Seymour	127	213	195	+ 68 %	- 8 %
Vincennes	67	137	161	+ 104 %	+ 18 %
Total Annual Weather Hours	1,719	2,232	2,060	+ 30 %	- 8 %

Percentage price for FY 10 verses FY 11 are shown in the following table.

DISTRICT	FY10 Price/Ton Loaded	FY11 Price/Ton Loaded	% Increase
Crawfordsville	\$73.67	\$62.00	- 19 %
Fort Wayne	\$67.64	\$61.50	- 10 %
Greenfield	\$65.00	\$62.42	- 04 %
LaPorte	\$61.42	\$55.98	- 10 %
Seymour	\$63.35	\$56.99	- 11 %
Vincennes	\$63.50	\$59.34	- 07 %
Average	\$65.76	\$59.71	- 10 %

Salt Usage

FISCAL YEAR	FY 09	FY 10	FY 11	Variation from FY 09 to FY 10	Variation from FY10 to FY 11
Crawfordsville	41,057	55,390	48,157	+ 35 %	- 15 %
Fort Wayne	70,321	67,107	69,202	- 05 %	+ 03 %
Greenfield	59,644	66,809	63,173	+ 12 %	- 06 %
Laporte	87,897	85,316	86,591	- 10 %	+ 01 %
Seymour	39,531	43,533	41,513	+ 10 %	- 05 %
Vincennes	25,846	39,177	32,594	+ 52 %	- 20 %
Salt Usage (tons)	324,296	357,332	341,230	+ 10 %	- 05 %
Salt Usage per Weather hour	189	160	211	- 18 %	+ 32 %

FUEL

Diesel Fuel Usage:

Diesel fuel usage has demonstrated the same downward trend as labor and material usage. Although diesel fuel for snow and ice removal is not separated from other INDOT usage, the bulk of diesel fuel usage during the winter is for snow and ice removal, more so in the north than in the south. The following table shows gallons of diesel fuel used from November through March for the past 3 winters and usage per winter weather hour.

Diesel Fuel Usage by District

FISCAL YEAR	FY 09	FY 10	FY 11
Crawfordsville	235,428	254,455	247,923
Fort Wayne	301,249	288,480	302,470
Greenfield	313,083	347,598	325,060
Laporte	367,287	382,000	385,937
Seymour	215,260	232,465	228,929
Vincennes	151,755	173,094	129,581
Diesel Fuel Usage (gallons)	1,584,062	1,678,092	1,619,900
Diesel Fuel Usage per weather hour	922	752	1003
Weather hour (gallons/hour)			

Miles per Gallon per District with 3 Year Average

DISTRICT	FY 09	FY 10	FY 11	Variation from FY 09 to FY 10	Variation from FY10 to FY 11
Crawfordsville	3.09	4.18	3.92	+ 35 %	- 07 %
Fort Wayne	4.07	4.19	4.22	+ 03 %	+ 01 %
Greenfield	3.35	4.30	3.87	+ 28 %	- 11 %
LaPorte	4.51	4.66	4.37	+ 03 %	- 07 %
Seymour	2.85	3.18	3.20	+ 12 %	+ 01 %
Vincennes	2.73	3.43	3.73	+ 26 %	+ 09 %
Averages	3.43	3.99	3.89	+ 18 %	- 03 %

Gallons per Weather Hour per District

DISTRICT	FY 09	FY 10	FY 11
Crawfordsville	720	505	1102
Fort Wayne	628	579	800
Greenfield	957	690	1321
LaPorte	939	1085	928
Seymour	1695	1091	1301
Vincennes	2265	1263	745
Averages	1201	867	1033

LABOR

District Man-hours per Fiscal Year

Fiscal Year	FY 09	FY 10	FY 11	Variation from FY 09 to FY 10	Variation from FY10 to FY 11
Crawfordsville	47,435	55,401	52,019	+ 17 %	- 07 %
Fort Wayne	73,433	65,640	69,049	- 12 %	+ 05 %
Greenfield	74,557	84,783	73,208	+ 14 %	- 16 %
LaPorte	100,393	98,010	91,634	- 02 %	- 07 %
Seymour	50,455	49,314	48,295	- 02 %	- 02 %
Vincennes	32,386	34,386	27,494	+ 06 %	- 25 %
Total man-hours	378,657	387,533	361,699	- 02 %	- 07 %

Man-hours per Weather hour

District	FY 09	FY 10	FY 11	Variation from FY 09 to FY 10	Variation from FY10 to FY 11
Crawfordsville	145	110	231	- 32 %	+ 110 %
Fort Wayne	153	126	183	- 21 %	+ 45 %
Greenfield	228	168	298	- 36 %	+ 77 %
LaPorte	257	278	220	+ 08 %	- 26 %
Seymour	397	232	274	- 71 %	+ 18 %
Vincennes	483	251	158	- 92 %	- 59 %
Total Hours	277	194	227	- 43 %	+ 17 %

EQUIPMENT



General:

The primary vehicle INDOT uses for snow and ice removal is a dump truck. INDOT uses single axle and tandem axle dump trucks. All winter equipment is inspected each fall to ensure it is in good operating condition. Ground speed control units are calibrated to ensure accurate recording of material usage. All problems are identified and addressed prior to the start of winter. In addition, a spring assessment is performed to identify candidates for replacement and refurbishment and to identify needed parts for off season repairs. We refurbished 55 trucks and 16 loaders prior to winter, as well as added 62 new trucks and 7 new loaders to the fleet.

SNOW ROUTE REDUCTION

In FY 10 INDOT utilized 1,029 snow routes. The fleet size for dump trucks are based on the number of snow routes in each District. Manpower cuts, budget cuts and increasing lane miles required changes to the current fleet sizes. During FY 09 and FY 10, Ft Wayne District performed a review of their snow routes and reduced their total routes by approximately 9% or 15 routes. All other Districts reviewed their routes with a goal of decreasing snow routes by 10%. The INDOT Division of Management Information Systems (MIS) is assisted some of the Districts with a computerized route design program. All the Districts using various methods of reduction went from the 1,029 routes to 922 routes with minimal ill effect in service. The chart below will illustrate the current lane miles serviced per District and the average route length.

AVERAGE SNOW ROUTE LENGTH

District	FY10 Routes	Service Miles	Average Length	FY 11 Routes	Average Length	Variation from FY10 to FY 11
Crawfordsville	154	5,066	33 lm	145	35 lm	- 06 %
Fort Wayne	167	4944	30 lm	143	35 lm	- 17 %
Greenfield	199	5301	27 lm	167	30 lm	- 19 %
LaPorte	180	5587	31 lm	173	32 lm	- 04 %
Seymour	171	4906	29 lm	148	33 lm	- 16 %
Vincennes	158	4735	30 lm	137	35 lm	- 15 %
Totals	1029	30,539	30 lm (avg)	922	33 lm	- 12 %

Technologies

MDSS

MDSS helped increase the focus on winter efficiency that led to a significant decrease in cost in FY 08. MDSS the Maintenance Decision Support System provided by Meridian Environmental entered into the third year of statewide implementation. Although the implementation of MDSS had shown a decrease in FY 08 of materials and man-hours we had hoped the trend would continue. The data and recommendations from MDSS are advertised to help lower and maintain the emphasis on reducing costs by providing data and recommendations to help make call outs

and shut down at the most efficient time, help select effective and efficient application rates, and help determine when to start and stop applications. This system has not performed as well as expected over the past three winters, but it has proven to be a tool that requires the consideration of different options intended to lead to decisions that offer the most benefit to INDOT's operations, it does not necessarily recommend the best application rates or methods. We are at a critical point of deciding if the information provided is worth the cost and effort involved in using this system.

IWAPI

We noted last year and understood that with the implementation of any research project, we would have problems and we did particularly with Automated Vehicle Locator (AVL) equipment. The goal was to improve equipment reliability. Efforts were also made with Meridian Environmental Technologies, Inc. to develop scenario based training for INDOT users. The goal was to improve user understanding and use of the data provided by the system. Again we have continued to have numerous issues and down time with the IWAPI units. INDOT must decide if they will continue to pay a vendor to develop a product that does not perform as they had advertised.

FACILITIES

New Construction:

New for FY 11 INDOT added a salt building in Sullivan and will open a new unit in July of 2011. A new salt building was completed in December of 2010 at the Alexandria Unit. Completed in April of 2011 we have a new salt building in the Michigan City Unit and will have a new unit in July 2011. INDOT has received national awards and attention for their salt storage practices. Total salt capacity by District plus 5 year averages are shown in the following table.

Salt Storage Capacity in Tons

DISTRICT	Salt Storage Capacity (Tons)	Five Year Average Use FY 05-FY 09 (Tons)	Capacity Needed to Meet 5 Year Average
Crawfordsville	51,068	55,650	4,582
Fort Wayne	56,600	76,898	20,298
Greenfield	70,068	80,042	9,974
LaPorte	93,900	91,246	Over 2654
Seymour	55,500	55,778	278

Vincennes	53,818	32,195	Over 21,623
Total	380,954	391,809	10,855

FUTURE

There have been studies done by Clear Roads which indicate in the final report significant savings in the use of liquid routes. The Laporte District has experimented using brine as the sole treatment on routes and early studies indicate that this could produce cost savings in several ways such as less salt usage, less time reducing fuel and man hours as indicated in the Clear Roads report. This upcoming winter we will utilize more routes using this method and will begin data collection that will enable us to do a cost comparison.

Weather Stations:

Currently we are researching the possibility of using mini weather stations at each sub District. We are checking for cost and the ability to collect and record data. It appears that units are available at a cost ranging around \$1500 per unit. If we had a weather station at each sub district and maintenance unit then we would have more reliable data that would reflect our actual cost per weather event. These weather stations could also be utilized by the NWS and Meridian to enhance the weather predictions across our state.

Summary

INDOT faces many challenges in addressing snow and ice removal. Winters vary and the unknown requires planning and preparing for the worst case scenario. INDOT has addressed declining revenues by placing greater emphasis on reducing all costs. The use of *weather hours* was implemented to provide a measurement of performance and provide comparisons that take into consideration the types of changing weather. Revisions continue to improve this performance measure. INDOT continues to look for alternative equipment to reduce costs. In addition, other cost saving methods such as centralized identification and purchase of repair parts was implemented. As a result of these efforts, the total cost per weather hour continues to show a downward trend. A concerted effort by INDOT employees has resulted in getting the job done by improving efficiency and effectiveness regardless of the challenges presented.



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Appendix A

Three Year Material Usage by Subdistrict



Appendix A -
Anti-Icing De-Icing Ct



Appendix B - Five
Year Average Snow F



Appendix C -
CWR032311.pdf



Appendix D -
SIMR030611-031211.



Winter Operations
Cost Analysis - FY201



Winter Operations
Comparisons - FY201