

Integrating Pavement and Maintenance Management



Taking Pavement Management One Step Further

Maintenance Management System

Considers all maintenance activities - not only those related to surface repairs.

- **Mowing/Weed Control**
- **Ditching**
- **Drainage Structure Repair**
- **Snow and Ice Removal**

Captures all costs associated with each activity (Labor, Equipment, and Materials).



Make Day Cards from 6/20/2003 to 6/20/2003

Work Orders

WO	Start Date	End Date	Hours Worked	Foreman Id	Activity	Expected Quantity	Section	From	To	Comments
5129497	5/21/2003 00	5/21/2003 08	8	STOUGH, EUGENE	F080 MOWER SUPPORT (hours)	8	004KY0121-0	8.689		
5129502	5/21/2003 00	5/21/2003 08	8	GRIFFIN, FLOYD	F210 MOW-TP2-STATE FORCE	19	004KY0121-0	8.689		
5129516	5/21/2003 00	5/21/2003 08	8	SMITH, TALMAGE	F080 MOWER SUPPORT (hours)	8	004KY0358-7.984	15.966		
5129529	5/21/2003 00	5/21/2003 08	8	OVERBY, LINDA	F210 MOW-TP2-STATE FORCES (ac)	16	004KY0358-7.984	15.966		
5131106	5/22/2003 00	5/22/2003 08	8	MORRIS, PHILLIP	N170 CNTY CRW GEN EX (hours)	16	Unknown			
5131286	5/22/2003 00	5/22/2003 08	8	HOOK, BILLY	J070 PVT ENT MAINT (each)	1	004US0060-16	16.937		
5131335	5/22/2003 00	5/22/2003 08	8	STOUGH, EUGENE	F080 MOWER SUPPORT (hours)	8	004KY0286-0	2		
5131350	5/22/2003 00	5/22/2003 08	8	GRIFFIN, FLOYD	F310 MOW-STATE FORCE (acres)	8	004KY0286-0	2		
5131397	5/22/2003 00	5/22/2003 08	8	SMITH, TALMAGE	F080 MOWER SUPPORT (hours)	4	004KY0358-15.966	17.007		

Labor Equipment Material Costs & Accomplishments

Employee Shortlist

Selected	Administrative Unit	Employ
<input checked="" type="checkbox"/>	BALLARD	GIBSON, JASON
<input checked="" type="checkbox"/>	BALLARD	GRIFFIN, FLOYD
<input type="checkbox"/>	BALLARD	HOLT, JOHN
<input type="checkbox"/>	BALLARD	HOOK, BILLY
<input type="checkbox"/>	BALLARD	MORRIS, PHILLIP
<input type="checkbox"/>	BALLARD	OVERBY, LINDA
<input type="checkbox"/>	BALLARD	POLOSKI, KENNETH
<input type="checkbox"/>	BALLARD	RENFROW, JERRY
<input type="checkbox"/>	BALLARD	SMITH, TALMAGE
<input type="checkbox"/>	BALLARD	STOUGH, EUGENE

Assigned Employees

Administrative Unit	Employee Id	Unit Cost
BALLARD	GIBSON, JASO	\$12.78
BALLARD	GRIFFIN, FLOY	\$20.20

Crew List

Crew Id	Foreman Id	Name	Hourly Rate

Labor Daycards


Date of Work	Employee Id	Amount
5/21/2003	GIBSON, JASON	8.00
5/21/2003	GRIFFIN, FLOYD	8.00

Once labor, equipment, and material quantities are obtained, costs can be analyzed by Administrative Unit, Road Section, and Activity.

JON / BALLARD / Work Orders Module / Version 4.3 - [Standard Report Builder]

File Edit Display Rows Database Window Help

Report Setup Report Design Summary



Work Order Information

Ballard County

Costs by Activity and Road Section

6/20/2003

WO	Activity	End Date	Section	Termini	Labor Cost	Equipment Cost	Material Cost	Cost
5043588	A010 SUR-POT HOLE PATCH (tons)	3/20/2003	004KY0473	009-015	\$242	\$77	\$32	\$351
4794195	F080 MDWER SUPPORT (hours)	8/21/2002	004KY0473	010-012	\$53	\$16	\$	\$69
4995932	A010 SUR-POT HOLE PATCH (tons)	2/12/2003	004KY0473	009-015	\$817	\$97	\$64	\$978
4796500	F080 MDWER SUPPORT (hours)	8/21/2002	004KY0473	012-014	\$106	\$32	\$	\$138
4947536	B990 MISC SHR MAINT (hours)	12/27/2002	004KY0473	009-015	\$196	\$41	\$	\$237
4779326	A010 SUR-POT HOLE PATCH (tons)	8/21/2002	004KY0473	009-015	\$354	\$79	\$32	\$465
4962991	A010 SUR-POT HOLE PATCH (tons)	1/29/2003	004KY0473	009-015	\$265	\$85	\$64	\$415
4760334	A010 SUR-POT HOLE PATCH (tons)	7/30/2002	004KY0473	009-014	\$304	\$66	\$128	\$498
4893124	F310 MDW-STATE FORCE (acres)	11/27/2002	004KY0473	009-010	\$476	\$242	\$	\$718
4825928	A010 SUR-POT HOLE PATCH (tons)	10/1/2002	004KY0473	009-015	\$238	\$102	\$160	\$500
4947601	M140 EMR REPAIRS ST RDS (hours)	12/27/2002	004KY0473	014-015	\$57	\$7	\$	\$64
4946174	M140 EMR REPAIRS ST RDS (hours)	12/27/2002	004KY0473	009-015	\$38	\$6	\$	\$44
4893116	F080 MDWER SUPPORT (hours)	11/27/2002	004KY0473	009-010	\$112	\$32	\$	\$144
4903365	F080 MDWER SUPPORT (hours)	11/27/2002	004KY0473	013-015	\$112	\$68	\$	\$180
4903372	F310 MDW-STATE FORCE (acres)	11/27/2002	004KY0473	013-015	\$476	\$440	\$	\$916
4901508	F310 MDW-STATE FORCE (acres)	11/27/2002	004KY0473	011-013	\$359	\$418	\$	\$777
4721335	F050 SLOPE MOWING (miles)	7/18/2002	004KY0473	009-015	\$434	\$151	\$	\$585
4794227	F310 MDW-STATE FORCE (acres)	8/21/2002	004KY0473	010-012	\$180	\$120	\$	\$300
5029082	A010 SUR-POT HOLE PATCH (tons)	3/10/2003	004KY0473	009-015	\$210	\$60	\$64	\$334
5049125	J070 PVT ENT MAINT (each)	3/20/2003	004KY0473	014-015	\$156	\$85	\$204	\$444

Row 205 from 758;

Q: Why do we perform maintenance work?

A: To correct or prevent defects.



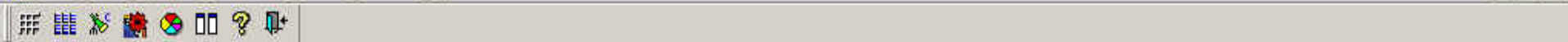
Indices

Index	Index Name	Definition Style	User Update	Date Update
2	KYTC	Weight	LEN	12/20/2001 12:55
1	Appearance	Weight	RANDY	6/11/2003 16:18:3

Assets Impact

Defect	Weight
Appearance	0.03
Attenuators	0.03
Barrier	0.03
Bumps	0.03
Curb	0.04
Ditches	0.04
Drain	0.04
Fencing	0.03
Guardrail Damage	0.04
Guardrail Height	0.03
Guide Sign	0.02
Guide Sign Assembly	0.02
Pavement Drop	0.05
Potholes	0.05
Rideability	0.1
Rutting	0.03
Shoulder Dropoff	0.04
Shoulder Height	0.04
Shoulder Potholes	0.03
Vertical Clearance	0.03
Visual Obstruction	0.05
Warning Sign	0.05
Warning Sign Assembly	0.05

Weighting is set for each defect.



Label	Activity Name	Unit
A020 MACHINE PATCH	A020 MACHINE PATCH	tons
A030 SURF-ABNORM REP	A030 SURF-ABNORM REP	tons
A040 SURF-REPAIR PCC	A040 SURF-REPAIR PCC	sq. ft.
A050 SURFACE-SPOT SEAL COAT	A050 SURFACE-SPOT SEAL COAT	tons
A070 JT-CRK SEAL OF PCC	A070 JT-CRK SEAL OF PCC	linear foot
A080 SEAL PVMT-SHDL JT	A080 SEAL PVMT-SHDL JT	linear foot
A100 MT RR PROT DEVICES	A100 MT RR PROT DEVICES	none
A110 SURF-TB MAINT	A110 SURF-TB MAINT	Ln. Mile
A120 SURF-PATCH TB MAIN	A120 SURF-PATCH TB MAIN	tons
A140 TOTAL CONTRA PATCH	A140 TOTAL CONTRA PATCH	tons
A150 VENDOR AIDED PATCH	A150 VENDOR AIDED PATCH	tons
A440 MUDJACKING	A440 MUDJACKING	tons
A710 MILLING-STATE MACH	A710 MILLING-STATE MACH	sq. ft.
A880 BIT COLD MIX PREPARATION	A880 BIT COLD MIX PREPARATION	tons

Maintenance Defects for A020 MACHINE PATCH			
Defect	Proportion	User Update	Date Update
Appearance	15 %	JON	6/20/2003 16:31:21
Potholes	25 %	JON	6/20/2003 16:31:16
Rideability	55 %	JON	6/20/2003 16:31:14
Rutting	5 %	JON	6/20/2003 16:31:18
Total:	100%		

By relating activities to defects, costs required to fix defects can be determined.

What's next?

**Determine prevalence of each defect
across the system. (Defect Inventory)**

Maintenance Rating Program

Random sections across the state are inspected for defects twice each year.

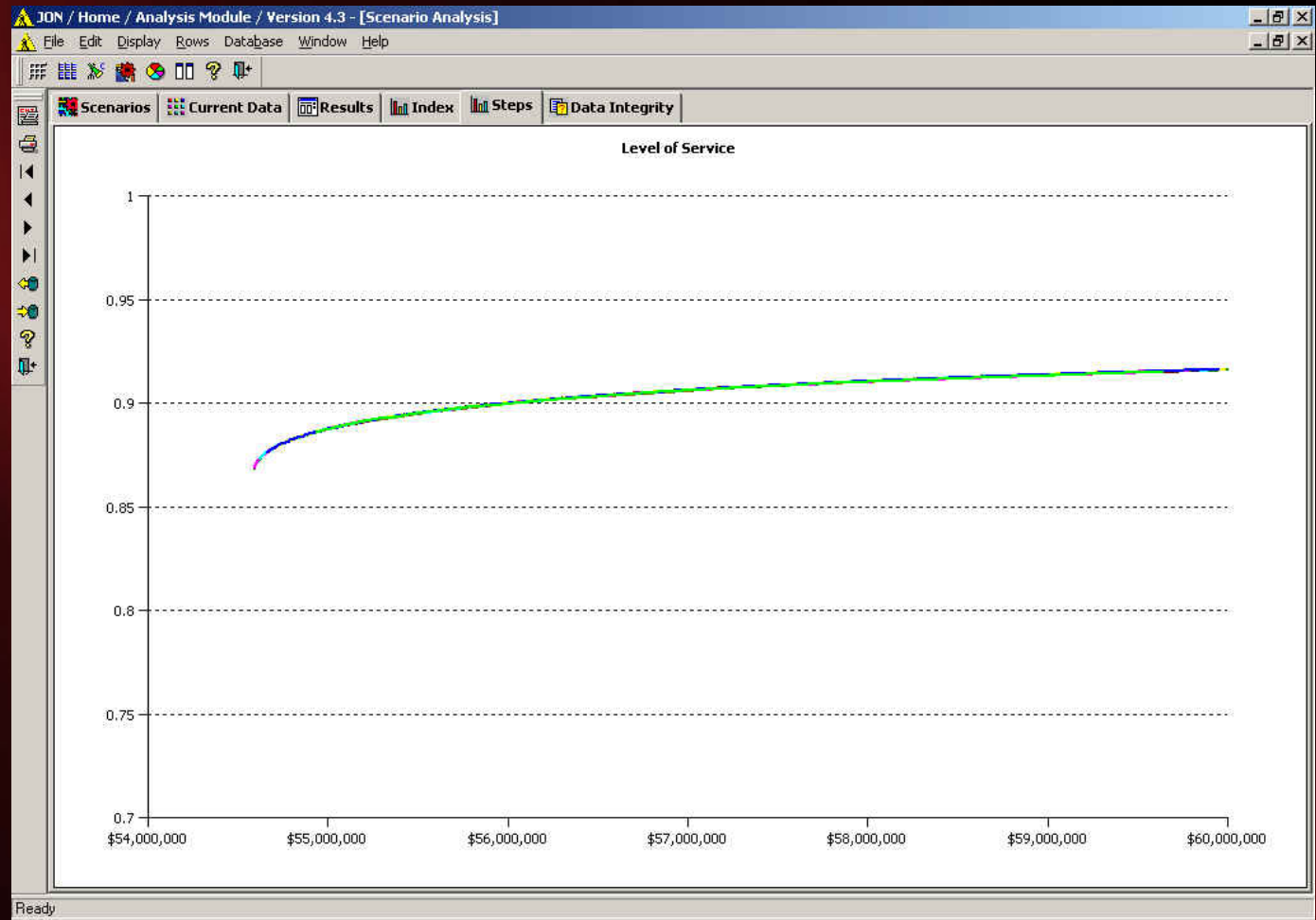
Data collected is used to determine a passing rate or “Level of Service” for each defect.

Making a Budget Plan

After Defect Inventory and Costs are determined, a plan can be made to best allocate money to different activities.

Owner Analysis	Functional Class	Defect	Total Element	Routine Maintenance Cost	% Failed	Desire %	Budget	Delta cost
District 06	RS - Rural secondary	Potholes	102	\$78,951.98	52%	30%	\$199,573.06	\$120,621.08
District 08	Other NHS	Shoulder Potholes	92	\$20,721.85	52%	20%	\$89,794.70	\$69,072.85
District 02	Other SP-SS	Ditches	90	\$172,802.77	51%	30%	\$419,663.88	\$246,861.11
District 09	Other NHS	Ditches	51	\$19,300.85	51%	30%	\$46,873.49	\$27,572.64
District 02	Other SP-SS	Bumps	2	\$5,215.41	50%	20%	\$20,861.64	\$15,646.23
District 02	RS - Rural secondary	Curb	2	\$3,205.70	50%	40%	\$4,808.54	\$1,602.85
District 03	RS - Rural secondary	Curb	2	\$4,352.74	50%	40%	\$6,529.12	\$2,176.37
District 04	Other SP-SS	Attenuators	12	\$1,246.02	50%	30%	\$2,907.38	\$1,661.36
District 05	Other NHS	Curb	12	\$8,187.98	50%	20%	\$32,751.91	\$24,563.93
District 05	RS - Rural secondary	Curb	4	\$11,390.58	50%	40%	\$17,085.87	\$5,695.29
District 09	RS - Rural secondary	Curb	2	\$16,471.52	50%	40%	\$24,707.28	\$8,235.76
District 10	RS - Rural secondary	Guardrail Damage	2	\$13,732.67	50%	20%	\$54,930.67	\$41,198.00
District 10	RS - Rural secondary	Rideability	69	\$9,279.47	50%	20%	\$37,117.87	\$27,838.41
District 12	Other SP-SS	Shoulder Dropoff	98	\$1,725.74	50%	20%	\$6,902.97	\$5,177.22
District 12	RS - Rural secondary	Bumps	2	\$139.11	50%	20%	\$556.45	\$417.34
District 05	Interstates/Expressways	Ditches	92	\$428.74	49%	20%	\$1,647.69	\$1,218.96
District 06	RS - Rural secondary	Ditches	98	\$26,319.15	49%	20%	\$101,148.09	\$74,828.94
District 09	Other SP-SS	Ditches	91	\$134,863.57	49%	20%	\$518,299.19	\$383,435.63
District 01	RS - Rural secondary	Vertical Clearance	106	\$87,133.04	48%	40%	\$120,645.75	\$33,512.71
District 09	Interstates/Expressways	Ditches	96	\$35,037.04	48%	30%	\$75,464.39	\$40,427.35
District 02	Other SP-SS	Potholes	102	\$228,296.73	47%	20%	\$809,807.27	\$581,510.54
District 05	Other SP-SS	Ditches	83	\$128,731.92	47%	30%	\$266,369.82	\$137,637.90
District 06	RS - Rural secondary	Vertical Clearance	102	\$1,370,855.36	47%	40%	\$1,823,496.28	\$452,640.92
District 09	Other NHS	Curb	15	\$9,095.22	47%	40%	\$12,098.36	\$3,003.14
District 10	Other NHS	Guardrail Height	86	\$1,190.27	47%	40%	\$1,583.28	\$393.01
District 01	Other SP-SS	Shoulder Dropoff	104	\$15,218.64	46%	20%	\$51,856.09	\$36,637.46
District 05	Interstates/Expressways	Shoulder Potholes	104	\$7,179.11	46%	30%	\$14,269.59	\$7,090.48

**Level of Service
can be
estimated
based on a
given budget.**



Finally...

- **Life cycle costs can be included in analysis**
- **Better treatment decisions can be made**
- **Preventative Maintenance can be defended**