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M-PET.NET's Use by Department's of Transportation

Over the past several years, Four Winds Group (FWG) has had the privilege of working with several state and county departments of transportation to implement our M-PET.NET Maintenance Management System in a variety of situations. One scenario we've witnessed time and time again, however, is an attempt to utilize a financial/payroll type system to "track" maintenance; a process sorely lacking the information required by the maintenance engineer, maintenance supervisor and even the workers in the field. They want and need to know the backlog, the priorities and the resources, such as labor, equipment, and materials that will be required to complete their work. They need the ability to schedule their workload as they see fit and then evaluate this schedule against known resources. We've listened to these user requirements and have adapted the M-PET.NET application to track maintenance activities for all types of highway operations. We recognize that many of our processes/functions can be purchased as separate applications from a multitude of vendors, but M-PET.NET has combined them into a single management system where the primary focus is on the maintenance department and the personnel that perform the work. This document will highlight M-PET.NET's capabilities and functions for transportation departments, with the focus on the following:

- **Sign Management**
- **Asset Management**
- **Maintenance Scheduling – Resource Management**
- **Job Tracking**
- **Third Party Damages**
- **Maintenance Productivity**
- **Daily Time Card Process**
- **Construction Inspection**
- **Inventory Management**
- **Sharing Data with Other Systems**

Sign Management – One of the more critical issues facing any city, county or state DOT is the monitoring and maintaining of the signs within their jurisdiction. With the federal compliance requirements that are currently in place, it is important to have an automated management tool capable of tracking these assets as well as their requirements. M-PET.NET utilizes an asset type to differentiate signs from other assets. This offers a unique approach to sign management that provides both individual sign details as well as a simple way to manage sign replacements. This also allows for some distinctive functionality in the reporting module.

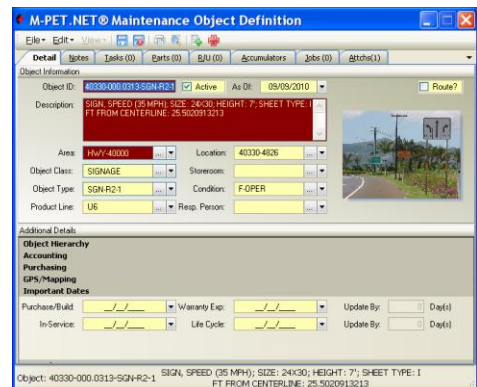
M-PET.NET Sign Inventory Report

Only Signs With Object Type ID(s): SGN-B-REG

ID:	Hwy:	MP:	Dir:
S583-R1-1-A	N/A	0.0000	N/A
Desc: "Stop" W 4537' At Kuhio Hwy.			
In-Service/Replacement: 1/1/1999 Purchase: N/A Warranty Expires: N/A Life Cycle: N/A			
S583-R1-2-A	N/A	0.0000	N/A
Desc: "Yield" E 5014' At Kuhio Hwy.			
In-Service/Replacement: N/A Purchase: N/A Warranty Expires: N/A Life Cycle: N/A			
S583-R2-1A(25)B	N/A	0.0000	N/A
Desc: "Speed Limit 25" W 4484' Kuhio Hwy.			
In-Service/Replacement: 1/1/1993 Purchase: N/A Warranty Expires: N/A Life Cycle: N/A			
S583-R2-1A(25)A	N/A	0.0000	N/A
Desc: "Speed Limit 25" E 5174' Kuhio Hwy.			
In-Service/Replacement: 1/1/1993 Purchase: N/A Warranty Expires: N/A Life Cycle: N/A			
S583-R1-1-B	N/A	0.0000	N/A
Desc: "Stop" W 0106' Mile Marker "2"			
In-Service/Replacement: N/A Purchase: N/A Warranty Expires: N/A Life Cycle: N/A			
S583-R1-1-C	N/A	0.0000	N/A
Desc: "Stop" Mile Marker "3"			
In-Service/Replacement: 1/1/1999 Purchase: N/A Warranty Expires: N/A Life Cycle: N/A			
S583-R2-1(25)A	N/A	0.0000	N/A
Desc: "Speed Limit 25" E 0898' Mile Marker "2"			
In-Service/Replacement: 6/1/1987 Purchase: N/A Warranty Expires: N/A Life Cycle: N/A			
P050-NOPARK-A	N/A	0.0000	N/A
Desc: "No Parking-Diagonal Markings" W 0053' Aulima Rd.			
In-Service/Replacement: N/A Purchase: N/A Warranty Expires: N/A Life Cycle: N/A			
P050-R2-2(A)	N/A	0.0000	N/A
Desc: "Begin State Hwy." E 0106' Kuhio Hwy.			
In-Service/Replacement: N/A Purchase: N/A Warranty Expires: N/A Life Cycle: N/A			
P050-R2-2-A	N/A	0.0000	N/A
Desc: No Left Turn (Picture) W 0211' Kuhio Hwy.			
In-Service/Replacement: 11/1/1981 Purchase: N/A Warranty Expires: N/A Life Cycle: N/A			
P050-R2-2E-A	N/A	0.0000	N/A
Desc: "No Left Turn" W 0211' Kuhio Hwy.			
In-Service/Replacement: 11/1/1981 Purchase: N/A Warranty Expires: N/A Life Cycle: N/A			

Asset Management – Besides signs, a highway or transportation system is comprised of numerous components such as guardrails, signals, bridges, drains and culverts, along with the highway sections themselves. Two key points for tracking an asset are; *What* is it? and *Where* is it? M-PET.NET provides a way to easily monitor these two points and combine this information into maintenance actions, as required, based on multiple factors. These factors can be frequency based (scheduled maintenance), an inspection, an accident or even a catastrophic event, such as an earthquake or major storm. With M-PET.NET, you know how many assets you are responsible for, what their valuation is, as well as their specific life cycle timeframes, maintenance requirements and history. Some of the key location information provides for:

- Hwy Route:** Highway number or name
- Mile Post:** Mile marker on highway
- Direction:** User Defined. Used Increasing/Decreasing depending on + or – feet from centerline data provided by client.
- Easting/Northing:** Location coordinates used by some agencies
- GPS:** Three (3) axis coordinates



Maintenance Scheduling – One important aspect that is often overlooked is the need for forward thinking when it comes to scheduling work. Some clients believe they cannot schedule adequately because they are not sure which crew members might show up from day to day. Regardless of the specific circumstances, planning a work schedule establishes goals to help emphasize the need to accomplish work in a reasonable time. It also acts as a measurement parameter to ensure maintenance personnel remain accountable for achieving the end result; getting the most out of the available resources. With M-PET.NET, simply putting a start date on a job will ensure that it will be visible on the calendar schedule.

The screenshot displays the M-PET.NET Job Schedule application. The interface is divided into several functional areas:

- Filtering Options:** Located on the left, it includes sections for Jobs (Job Type: ALL, View Status: OPEN, Issued Status: BOTH), Maintenance Objects (Obj. ID, Desc, Area ID, Type ID, Location ID), and Personnel (Group ID, Labor Class ID, Supervisor ID, Crew ID, Request By ID, Route To ID, Posted By ID).
- Calendar (867):** A central grid showing the months of January, February, and March 2011. The current date is Monday, January 10th.
- Job List:** A list of tasks on the right side of the calendar, including:
 - N/A 651071(1); AMS-1 - Vehicle 2 Month Service
 - N/A 651187(1); BMS-I - K41 Weekly Hwy Facilities Maint
 - PM11284(1); EO-I - Trash & Litter Pickup
 - N/A 650850(1); HVCEM-1 - Vehicle 2 Month Service
 - N/A 650969(1); - Sweeper 2-week Inspection
 - N/A 651196(1); - K41 - Labor Wagon Overtime
 - N/A 651081(1); HVCEM-1 - Vehicle 200 Hour Service
 - N/A 651284(1); HCMS-II - LITTER REMOVAL
 - N/A 651286(1); HCMS-II - Ext Mowing Operations
 - N/A 651292(1); HCMS-II - MOWING OPERATIONS2
 - N/A 651289(1); HCMS-II - MOWING OPERATIONS3
 - N/A 651306(1); - Contra Flow Overtime
 - PM11279(1); - K41 - Labor Wagon Overtime
 - PM11280(1); HCMS-II - MOWING OPERATIONS2
 - PM11278(1); - DEPLOY SPEED MONITOR(S)
 - PM11188(1); HCMS-II - Herbicide Operations
 - N/A 651214(1); - K41 - Labor Wagon Overtime
 - PM11283(1); HCMS-II - LITTER REMOVAL
 - PM11281(1); - MOWING OPERATIONS
 - PM11282(1); HCMS-II - Ext Mowing Operations
- Resource Allocation:** A panel on the right showing labor allocation details. It includes a table for Labor Allocation:

Laborclass ID	Total Hrs.
AMS-1	0.00
BMS-I	0.00
BMW-II	1.25
EO-I	4.00

 Below this, it shows a summary for Username 22814 with a Total Hrs. of 4.00. It also includes a table for Job ID allocation:

Job ID	Total Hrs.	Date
PM11284	4.00	01/10

 Further down, it shows allocations for usernames RCANALES (8.00) and SCOFFMAN (16.00), and a table for Job ID allocation:

Job ID	Total Hrs.	Date
PM11188	8.00	01/10
PM11188	8.00	01/10

Job Tracking – The M-PET.NET system contains two database cornerstones. One addressed above is the asset and management of that asset. The other is job tracking that focuses all maintenance actions and activities into separate job transactions. Sometimes a job can be referred to as a temporary cost center. As illustrated in the graphic below, the job record contains all the necessary elements to capture the costs of the job; labor, materials, equipment, along with estimated dates, a job description, detailed notes and attachments to help document every aspect. A DOT has to track jobs for both defined assets, (signs, bridges, culverts, guard rails, etc.) as well as roadway sections, highway shoulders and median areas. M-PET.NET is able to track all this work and in fact, provides a means to report on quantities of work in this area, which we call maintenance productivity. See the section entitled *Maintenance Productivity* for further information. Along with the GPS data identified for the maintenance asset, a job can also be assigned a unique set of GPS coordinates. This data, coupled with the highway route, mile post and direction, helps to pinpoint an exact location.

The screenshot displays the M-PET.NET Job Detail(s) window. The interface includes a menu bar (File, Edit, View) and a toolbar. The main area is divided into several sections:

- Machine Information:** ID: P056-HWYD-5818, Description: Kuhio Hwy; 4.7 Mi; Kolo Rd To Ka Haku Rd (princeville), Area: FAP-056, Location: 23.3-28.0, Asset #: [empty].
- Costs and Metrics:** Length: 0.00, Downtime: 0.00, Production Units: 0.00, U.O.M.: ACRES, Man Hrs: 34.00. Labor Cost: \$ 88.00, Part(s) Cost: \$ 0.00, Equip. Cost: \$ 38.17, Other Cost: \$ 0.00, Per Unit Cost: \$ 0.00. Total Cost: \$ 126.17.
- GPS Data:** X: +0.000000000, Y: +0.000000000, Z: +0.000000000. Run Units: #1: 0.00, #2: 0.00, #3: 0.00.
- Task Details:** Task ID: [empty], Priority: CORRECTIVE, Status: ISSUED, Reason: INSP-DEF, Work Op: 2444, Funding: [empty], Charge To: [empty], Sub Assy: [empty]. Owner: [empty], Work Event: [empty], Primary Labor: HEO, Maint. Group: K01, Shift: [empty], Supervisor: KANA, Hwy. Route: [empty], Mile Post: 0.0000, Direction: [empty]. Start Date: 01/04/2011, Return Within: 0, Completed Date: [empty], Outcome Code: [empty].
- Table:** A table with columns: H, T, A, I, Job ID, #, Step Description, Priority, Status, Requested, Start. Row 1: N, C, M, Y, CM17644, 1, Cut vegation back Kalihiwa..., CORRECTI..., ISSUED, 01/04/2011, 01/04/2.
- Status:** CM17644 Description:none

Third Party Damages – Accidents happen and many times a DOT is faced with the difficult task of quantifying the costs to be billed to the insurance companies for repairing highway assets, (typically guardrails and signs). M-PET.NET provides a method for creating a detailed cost estimate as well as documenting the actual costs associated with the repairs. These details can include the actual personnel, equipment, and material charges, along with police reports, forms and/or photos to document the actual event and associated repair activities. With M-PET.NET, not only can the details of the repair and actual costs be recorded and tracked, but it also provides a means for monitoring the repayment to ensure DOT is getting appropriately reimbursed.

Maintenance Productivity Work Operations – When it comes to employees, a question often posed by management and constituents alike, is what have they accomplished and what are they planning to do next. With M-PET.NET, the answer to these accountability questions is always available in full detail. One common denominator that all DOT's use is the **production units performed**, whether on a time card or individual work order. M-PET.NET utilizes function/work operation codes built from a user defined table that also allows for the association of a **unit of measure** to each of these codes. On the individual work order (or time card), when the actual units performed is entered, it automatically inserts the appropriate unit of measure. With this level of detail, you are able to determine quantities of work performed over any time period as well as the labor/cost distribution to perform these quantities of work.

M-PET.NET Cost Distribution By Work Operation Report
By Date Range
12/1/2010 to 12/31/2010

Work Op ID	Description	Labor Costs	Equipment Costs	Material Costs	Purchases	Totals
2514	VMS/CHANGEABLE SIGN PM	0.0000	0.0000	0.0000	0.0000	0.0000
2515	HIGHWAY ADVISORY RADIO TRANSMITTER & SIGN P.M.	0.0000	0.0000	0.0000	0.0000	0.0000
2516	EXPRESS LANE GATES, SIGNS & BARRIERS PM	0.0000	0.0000	0.0000	0.0000	0.0000
2517	ROADWAY WEATHER INFORMATION STATION P.M.	0.0000	0.0000	0.0000	0.0000	0.0000
2518	DATA STATION SYSTEMS PM	0.0000	0.0000	0.0000	0.0000	0.0000
2519	HUB P.M.	0.0000	0.0000	0.0000	0.0000	0.0000
2520	WEIGH STATIONS - WEIGH IN MOTION & SIGN CONTROL SYSTEMS P.M.	0.0000	0.0000	0.0000	0.0000	0.0000
2521	EMERGENCY PHONE PM	132.8000	0.0000	0.0000	0.0000	132.8000
2522	RADIO REBROADCAST SYSTEM P.M.	0.0000	0.0000	0.0000	0.0000	0.0000
2523	NWR HUB P.M.	0.0000	0.0000	0.0000	0.0000	0.0000
2531	DO NOT USE - INVALID NUMBER - USE 2614 SIGNAL DISPLAY & DETECTION SYSTEM REPAIR	0.0000	0.0000	0.0000	0.0000	0.0000
2532	RAMP METER SYSTEM REPAIR	0.0000	0.0000	0.0000	0.0000	0.0000
2533	CLOSED CIRCUIT TELEVISION REPAIR	0.0000	0.0000	0.0000	0.0000	0.0000
2534	VARIABLE MESSAGE SIGN/CHANGEABLE MESSAGE SIGN REPAIR	0.0000	0.0000	0.0000	0.0000	0.0000
2535	HIGHWAY ADVISORY RADIO TRANSMITTER & SIGN REPAIR	0.0000	0.0000	0.0000	0.0000	0.0000
2536	EXPRESS LN. GATES, SIGNS & BARRIERS REPAIR	0.0000	0.0000	0.0000	0.0000	0.0000
2537	ROADWAY WEATHER INFORMATION STATION REPAIR	0.0000	0.0000	0.0000	0.0000	0.0000

M-PET.NET Cost Distribution By Work Operation Report



Daily Time Card Process – While working with the various DOT's, we have also observed a consistency in how time card information is accumulated. Most time cards incorporate a charge code, function/work operation code, the number and type of hours (OT, Leave, etc.) expended, the equipment utilized and occasionally the materials consumed. Typically, these time cards are then manually entered into the cost accounting or financial system. With the cooperation and support of Hawaii DOT, FWG created a time card function within M-PET.NET called Daily Times. This feature not only incorporates all the facets for day-to-day record keeping that supports the payroll and financial system, but also updates the individual job records with the details of the work accomplished at the same time. Once completed, the output results in not only a form that can be printed and signed, as is typically required by auditors, but the information can also be seamlessly transmitted to the financial system, thus eliminating the need to reenter (as well as the potential for errors). See the section entitled *Sharing Data with Other Systems (Financial)* below for further information.

TIME CARD ID #: 112047		State Highways Department of Transportation					
Group: K41		Date: Wednesday January 05, 2011					
6:00 am to 7:00 am		ADMIN	Paperwork, Hwy 580 , 583 Inspection,UPW section 8 meeting				
<u>Emp. ID</u>	<u>Labor - Employee</u>	<u>V-S-Other</u>	<u>T/A Position</u> <u>Hours</u>				
MDIAS	DIAS, MICHAEL	N/A	N/A 2.00				
SHERNANDO	HERNANDO, SAMUEL	Leave, Vacation	8.00				
GNOBREGA	NOBREGA, GILBERT	N/A	N/A 2.00				
DRAPOZO	RAPOZO, DEREK	N/A	N/A 0.00				
RSAKAMOTO	SAKAMOTO, RYAN S	N/A	N/A 2.00				
7:00 am to 11:00 am		ADMIN	Continue working on bridge rails.				
<u>Emp. ID</u>	<u>Labor - Employee</u>	<u>V-S-Other</u>	<u>T/A Position</u> <u>Hours</u>				
RSAKAMOTO	SAKAMOTO, RYAN S	N/A	N/A 6.00				
11:00 am to 3:30 pm		CM17651	REMOVE , RELOCATE EXISTING SIGNS PER WOW ENG-INVESTIGATION.				
<u>Emp. ID</u>	<u>Labor - Employee</u>	<u>V-S-Other</u>	<u>T/A Position</u> <u>Hours</u>				
MDIAS	DIAS, MICHAEL	N/A	N/A 6.00				
GNOBREGA	NOBREGA, GILBERT	N/A	N/A 6.00				
Total Crew Hours Worked:			32.00				
<u>Equipment</u>	<u>Job ID</u>	<u>Begin Mi / Hr.</u>	<u>End Mi / Hr.</u>	<u>Used Mi / Hr.</u>	<u>Hours Used</u>	<u>Area ID</u>	<u>Account #</u>
9881-219		42,965.00	43,003.00	38.00	0.00	5801	2710
9881-217	CM17651	67,283.00	67,316.00	33.00	0.00	5816	2453
Work Summary:							
			<u>Time Arrive</u>	<u>Time Dep.</u>	<u>Area ID</u>	<u>Account #</u>	
ADMIN	Paperwork, Hwy 580 , 583 inspection,UPW section 8 meeting		6:00:00 am	7:00:00 am	5801	2710	
ADMIN	Continue working on bridge rails		7:00:00 am	11:00:00 am	5803	2751	
CM17651	REMOVE , RELOCATE EXISTING SIGNS PER WOW ENG-INVESTIGATION.		11:00:00 am	3:30:00 pm	5816	2453	
_____ Supervisor				_____ Reviewed By			

Construction Inspection – A function that ties engineering information to maintenance was created, again with the support and cooperation of Hawaii DOT. This feature supports the day-to-day inspection processes required by the governing agency that acts as a follow-up on contractors to ensure their progress payments are adequately documented. Each report includes the ability to record infinite job site details, along with unlimited attachments (photos, documents, etc.) to document the activities for any given day.

DOT 4-499 (HWY-KC 5/10)	
Department of Transportation HIGHWAYS DIVISION State of Hawaii	
PROJECT DIARY 100435	
Date: Tuesday, December 28, 2010	Weather
Project #: 56A-02-05	X SUNNY
KUHIO HWY INTER IMP AT EHA ST	Condition: WORKABLE
Engineer/Insp: AKAMA, ROGER	
BMP: No BMP's Installed Yet	
Def. Noted: N/A	

645.0100

Traffic Control

UOM: N/A	From MM: 0.00	To MM: 0.00	Start Time: 12:05 PM	Stop Time: 2:00 PM
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Station Location:

<u>Personnel</u> Alan Nonaka - Mech. Bert Kaauwai - Leadman	<u>Equipment</u> 2 - Utility Pickup Trucks
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Pay Item Notes
Advisory Sign on the Hilo Hattie side of the project is behind the Traffic Signal Pole. Also the flange posts are facing the wrong direction for both Advisory Signs.

Inventory Management – It's essential to document the materials used to ensure accurate job costing information and critical, if the materials includes chemicals, such as herbicides. M-PET.NET provides a comprehensive materials management system for tracking inventory; from requisition, to purchase order, to receiving, to updating/tracking quantities on-hand, to the use of materials on specific work orders.

Sharing Data with Other Systems (Financial) – A key aspect of the M-PET.NET system is the open architecture of the database. This allows for easy, seamless exchanges of data with other systems that either needs M-PET.NET data for their transactions, or to update the M-PET.NET database with specific data elements. FWG recommends the use of a middle-tier interface approach that limits the interaction and protects the security and integrity of all databases involved in the data exchange. In some cases where the target system is older or not a direct SQL-compliant server, such as the AS400, an export/import process is utilized. Some of the areas where FWG has current interfaces are:

- **Cost Accounting – Cost distribution from Time card and Work Order**
- **Bridge Preservation / Engineering – Repair list items and**
- **Payroll – Time card**
- **Fiscal**