

NATMEC

IMPROVING TRAFFIC DATA COLLECTION, ANALYSIS, AND USE
SEATTLE, WA
JUNE 23, 2010

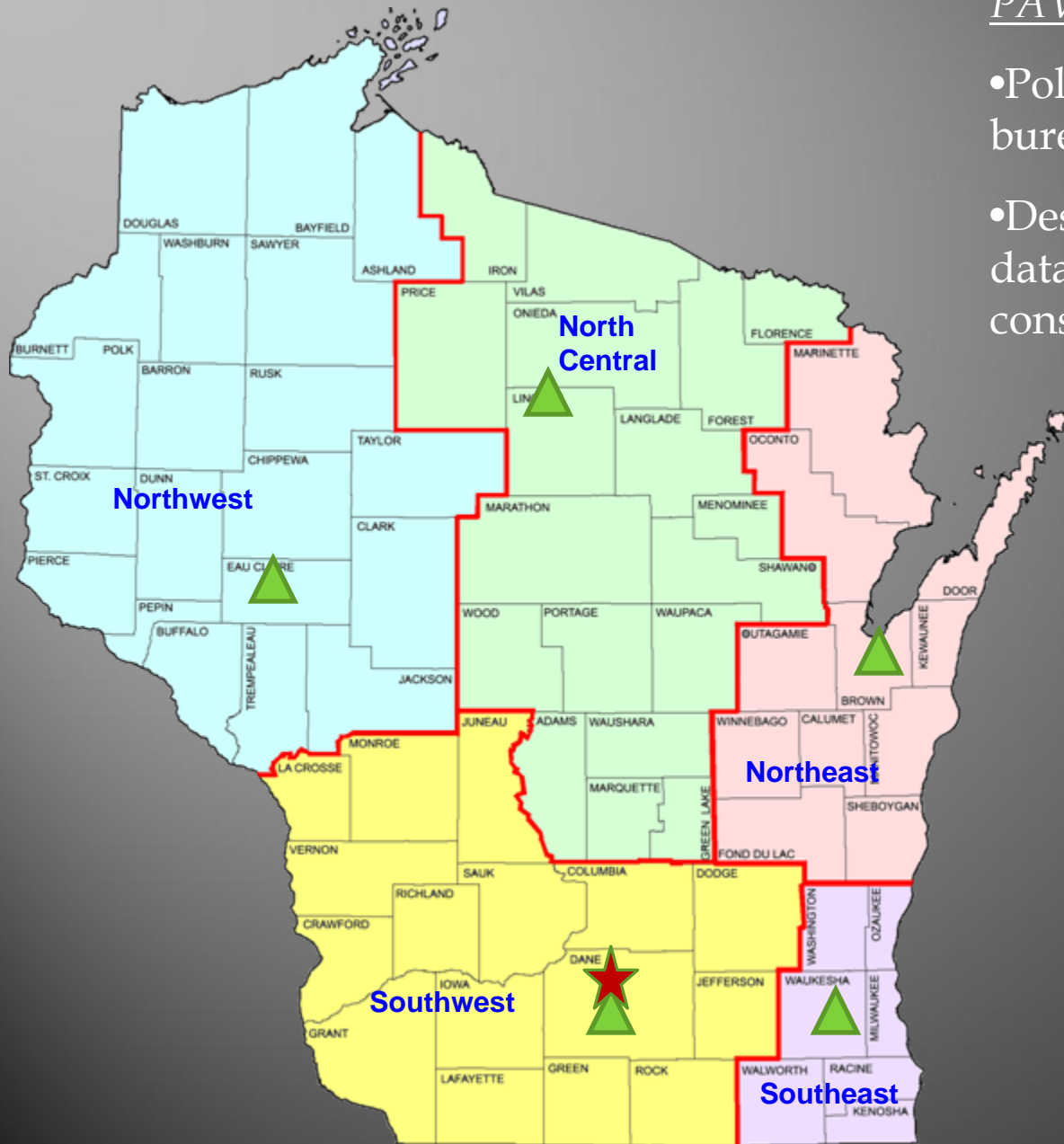
Implementing MEPDG in Wisconsin



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Pavement Structure Engineer
Wisconsin Department of Transportation

PAVEMENT DESIGN

- Policy and guidance in statewide bureau
- Designs (primary users of traffic data) done in regions (or by consultants)



TRAFFIC

- Monitoring and Forecasting in same building, but different sections
- Both in a different division, housed in a building on the opposite side of the city from Pavements

Implementation - Phase I, Traffic

- 2006
- WIMs
 - 15 permanent WIMs
 - 15 portable WIMs
- 43 vehicle classification stations
- Ultimately reviewed data from 21 LTPP sites (14 separate WIMs)

MEPDG Main Input Screen

71880200.dgp - Mechanistic Empirical Pavement Design Guide

File Edit View Tools Help

Project [C:\IDG2002\Projects\WisDOT\Comparison Studies\Rubblize\71880200\71880200.dgp]

- General Information
- Site/Project Identification
- Analysis Parameters

Inputs

- Traffic**
 - Traffic Volume Adjustment Factors
 - Monthly Adjustment
 - Vehicle Class Distribution
 - Hourly Truck Distribution
 - Traffic Growth Factor
 - Axle Load Distribution Factors
 - General Traffic Inputs
 - Number Axles/Truck
 - Axle Configuration
 - Wheelbase
- Climate
- Structure
 - HMA Design Properties
 - Layers
 - Layer 1 - Asphalt concrete
 - Layer 2 - Asphalt concrete
 - Layer 3 - Cold Recycled Asphalt - RAP (includes milling)
 - Layer 4 - Crushed gravel
 - Layer 5 - A-7-6
 - Thermal Cracking

Results

- Input Summary
 - Project
 - Traffic
 - Climatic
 - Design
 - Layer
- Output Summary
- Flexible Summary
 - Layer Modulus
 - AC Modulus (plot)
 - Fatigue Cracking
 - Surface Down Damage (plot)
 - Surface Down Cracking (plot)
 - Bottom Up Damage (plot)
 - Bottom Up Cracking (plot)
 - Thermal Cracking
 - Crack Depth (plot)
 - Thermal (C-h) (plot)
 - Crack Length (plot)
 - Crack Spacing (plot)
 - Rutting
 - Rutting (plot)
 - IRI (plot)

Analysis Status:


Analysis	% Complete
Traffic	100%
Climatic	100%
Thermal Cracking	100%
AC Analysis	100%
Summary	100%

General Project Information:

Parameter	Value
Type	New Flexible
Design Life	18 Years
Climate	C:\IDG2002\Projects\WisDOT\Comparison Stud
Construction Date	9/2009
Traffic Open Date	10/2009

Properties:

Setting	Value
Units	US Customary
Analysis Type	Probabilistic
Output Type	Excel Worksheet
Warnings	Enabled

 Run Analysis

For Help, press F1

NUM

MEPDG Basic Traffic Input Screen

Project [C:\DG2002\Projects\WisDOT\Comparison Studies\Rubblze

General Information
Site/Project Identification
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Instruction Date	9/2009
Effective Date	10/2009

Properties

Property	Value
Designing	US Customary
Analysis Type	Probabilistic
Input Type	Excel Worksheet
Printings	Enabled

Run Analysis

Design Life (years): 18 ...

Opening Date: October, 2009

Initial two-way AADTT: 107 ...

Number of lanes in design direction: 1

Percent of trucks in design direction (%): 50.0

Percent of trucks in design lane (%): 100.0

Operational speed (mph): 55

Traffic Volume Adjustment: Edit

Axle load distribution factor: Edit

General Traffic Inputs: Edit

Import/Export

Traffic Growth: Linear, 2.35% ...

OK Cancel

Traffic Volume Adjustment Factors

Monthly Adjustment |
 Vehicle Class Distribution |
 Hourly Distribution |
 Traffic Growth Factors

Load Monthly Adjustment Factors (MAF)

Level 1: Site Specific - MAF

Level 3: Default MAF

Monthly Adjustment Factors

Month	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13
January	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
February	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
March	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
April	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
May	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
June	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
July	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
August	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
September	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
October	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
November	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
December	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Traffic Volume Adjustment Factors - Monthly Adjustment Factors

- WisDOT does not currently report-out this information. We total by month, but not individual class.
- Default values are recommended at this time.













Honeybee - state insect

Traffic Volume Adjustment Factors

Monthly Adjustment
 Vehicle Class Distribution
 Hourly Distribution
 Traffic Growth Factors

AADTT distribution by vehicle class

Class 4	0.0	
Class 5	38.1	
Class 6	22.2	
Class 7	0.0	
Class 8	17.5	
Class 9	20.6	
Class 10	0.0	
Class 11	0.0	
Class 12	1.6	
Class 13	0.0	
Total	100.0	

Note: AADTT distribution must total 100%.

Load Default Distribution

Level 1: Site Specific Distribution
 Level 2: Regional Distribution
 Level 3: Default Distribution

OK
 Cancel

Traffic Volume Adjustment Factors – Vehicle Class Distribution



Mourning Dove – state symbol of peace

- Traffic forecasters pull information out of TRADAS and combine into our 5 classes.
- Several TTC groups are recommended for WisDOT's use.

TTC (Truck Traffic Classification) Groups

Load Default AADTT

Select general category: Principal Arterials - Interstate and Defense

AADTT distribution for the selected General Category:

* = recommended value

	*	TTC	Bus %	Multi-Trailer %	Single-trailer and Single-unit(SU) Trucks	Vehicle Class	Percent(%)
<input type="checkbox"/>	*	5	(<2%)	(>10%)	Predominately Single-trailer trucks.	Class 4	1.3
<input type="checkbox"/>	*	8	(<2%)	(>10%)	"High percentage of single-trailer truck with some single	Class 5	8.5
<input type="checkbox"/>	*	11	(<2%)	(>10%)	Mixed truck traffic with a higher percentage of single-tr	Class 6	2.8
<input type="checkbox"/>	*	13	(<2%)	(>10%)	Mixed truck traffic with about equal percentages of sing	Class 7	0.3
<input type="checkbox"/>		16	(<2%)	(>10%)	Predominantly single-unit trucks.	Class 8	7.6
<input type="checkbox"/>	*	3	(<2%)	(2 - 10%)	Predominantly single-trailer trucks	Class 9	74
<input type="checkbox"/>		7	(<2%)	(2 - 10%)	Mixed truck traffic with a higher percentage of single-tr	Class 10	1.2
<input type="checkbox"/>		10	(<2%)	(2 - 10%)	Mixed truck traffic with about equal percentages of sing	Class 11	3.4
<input type="checkbox"/>		15	(<2%)	(2 - 10%)	Predominantly single-unit trucks.	Class 12	0.6
<input checked="" type="checkbox"/>	*	1	(>2%)	(<2%)	Predominantly single-trailer trucks	Class 13	0.3
<input type="checkbox"/>	*	2	(>2%)	(<2%)	"Predominantly single-trailer trucks with a low percenta		
<input type="checkbox"/>	*	4	(>2%)	(<2%)	Predominantly single-trailer trucks with a low to modera		
<input type="checkbox"/>		6	(>2%)	(<2%)	Mixed truck traffic with a higher percentage of single-ur		
<input type="checkbox"/>		9	(>2%)	(<2%)	Mixed truck traffic with about equal percentages of sing		
<input type="checkbox"/>		12	(>2%)	(<2%)	Mixed truck traffic with a higher percentage of single-ur		
<input type="checkbox"/>		14	(>2%)	(<2%)	Predominantly single-unit trucks		
<input type="checkbox"/>		17	(>25%)	(<2%)	Mixed truck traffic with about equal single-unit and singl		

OK Cancel

Phase I suggested "The vehicle class distributions at any given LTPP site...could be reasonably matched with...TTC groups 2, 4, 9 or 12."

Phase I Recommendations

Highway Functional Class	Matched TTC Group	Number of Sites	Recommended TTC Group*
Rural Minor Arterial (RMA)	9	1	9, 12
	12	1	
Rural Principal Arterial-Interstate (RPA-I)	2	4	2, 4
	4	3	
Rural Principal Arterial – State Route (RPA-SR)	9	1	9, 12
	12	1	
Rural Principal Arterial – US (RPA-US)	2	3	2, 4
	4	6	
	9	1	
	12	1	
UPA (Urban Principal Arterial)	2	1	2, 4*
	4	1	

* The recommendation was based on a very limited number of LTPP sites. Further verification is needed.

Traffic Volume Adjustment Factors ? X

Monthly Adjustment
 Vehicle Class Distribution
 Hourly Distribution
 Traffic Growth Factors

Hourly truck traffic distribution by period beginning:

Midnight	2.3	Noon	5.9
1:00 am	2.3	1:00 pm	5.9
2:00 am	2.3	2:00 pm	5.9
3:00 am	2.3	3:00 pm	5.9
4:00 am	2.3	4:00 pm	4.6
5:00 am	2.3	5:00 pm	4.6
6:00 am	5.0	6:00 pm	4.6
7:00 am	5.0	7:00 pm	4.6
8:00 am	5.0	8:00 pm	3.1
9:00 am	5.0	9:00 pm	3.1
10:00 am	5.9	10:00 pm	3.1
11:00 am	5.9	11:00 pm	3.1

Note: The hourly distribution must total 100%

Total:

OK
 Cancel

Traffic Volume Adjustment Factors – Hourly Distribution

- At this time we do not have any sites that collect this or a report that presents this information. Could glean with some effort.
- Phase I recommends using defaults.



American Water Spaniel – state dog

Traffic Volume Adjustment Factors

Monthly Adjustment
 Vehicle Class Distribution
 Hourly Distribution
 Traffic Growth Factors

Opening Date:

Design Life (years):

Vehicle-class specific traffic growth

AADTT:

% Traffic Design Direction:

% Traffic Design Lane:

Default Growth Function

No Growth
 Linear Growth
 Compound Growth

Default growth rate (%):

View Growth Plots

Note: Vehicle-class distribution factors are needed to view the effects of traffic growth.

OK
 Cancel

Traffic Volume Adjustment Factors – Traffic Growth Factors



White-tailed deer – state wildlife animal

- Traffic growth function information comes from our traffic forecasters.

Axle Load Distribution Factors



State animal

Axle Load Distribution Factors

Axle Load Distribution

Level 1: Site Specific Export Axle File
 Level 2: Regional
 Level 3: Default Open Axle File

View

Cumulative Distribution
 Distribution View Plot

Axle Types

Single Axle
 Tandem Axle
 Tridem Axle
 Quad Axle

Axle Factors by Axle Type

	Season	Veh. Class	Total	3000	4000	5000	6000	700
	February	4	100.00	1.8	0.96	2.91	3.99	6.8
	February	5	100.00	10.03	13.21	16.41	10.61	9.24
	February	6	100.00	2.47	1.78	3.45	3.95	6.7
	February	7	100.00	2.14	0.55	2.42	2.7	3.21
	February	8	100.00	11.65	5.36	7.83	6.99	7.99
	February	9	100.00	1.74	1.37	2.84	3.53	4.93
	February	10	100.00	3.64	1.24	2.36	3.38	5.18
	February	11	100.00	3.55	2.91	5.19	5.27	6.33
	February	12	100.00	6.68	2.29	4.88	5.87	5.98
	February	13	100.00	8.88	2.67	3.81	5.23	6.04

OK Cancel



Badger – state animal

- Currently don't have a method to generate this information.
- Phase I - use default distributions for most design situations. Specific information should be gathered for critical pavements.

General Traffic Inputs

General Traffic Inputs [?] [X]

Lateral Traffic Wander

Mean wheel location (inches from the lane marking):

Traffic wander standard deviation (in):

Design lane width (ft): (Note: This is not slab width)

Number Axles/Truck Axle Configuration Wheelbase

	Single	Tandem	Tridem	Quad
Class 4	1.62	0.39	0	0
Class 5	2	0	0	0
Class 6	1.02	0.99	0	0
Class 7	1	0.26	0.83	0
Class 8	2.38	0.67	0	0
Class 9	1.13	1.93	0	0
Class 10	1.19	1.09	0.89	0
Class 11	4.29	0.26	0.06	0
Class 12	3.52	1.14	0.06	0
Class 13	2.15	2.13	0.35	0

OK Cancel

Number of Axles per Truck

- Defaults currently recommended

Number Axles/Truck Axle Configuration Wheelbase

Average axle width (edge-to-edge) outside dimensions,ft):

Dual tire spacing (in):

Tire Pressure (psi)

Axle Spacing (in)

Tandem axle:

Tridem axle:

Quad axle:

Axle Configuration

Number Axles/Truck Axle Configuration Wheelbase

Wheelbase distribution information for JPCP top-down cracking. The wheelbase refers to the spacing between the steering and the first device axle of the truck-tractors or heavy single units.

	Short	Medium	Long
Average Axle Spacing (ft)	<input type="text" value="12"/>	<input type="text" value="15"/>	<input type="text" value="18"/>
Percent of trucks (%)	<input type="text" value="33.0"/>	<input type="text" value="33.0"/>	<input type="text" value="34.0"/>

Wheelbase

Status of Implementation in Wisconsin

We plan to implement soon after DARWin M-E becomes available

Have good materials and climate data

Have not thoroughly investigated our traffic data

- Can we use defaults?
- Can we use existing TTCs?
- Which traffic inputs are most sensitive?

Is a more thorough study needed?

How will we analyze our data and get it into the MEPDG?

- Atlas?
- Trafload?
- PrepME?



American Robin –
state bird



Muskellunge – state fish

How will we instruct our pavement designers to use traffic data?

- Will we define which TTCs are appropriate for what roadways?
- Will we sometimes use WIM data?

We will hold off implementation if we feel we're not ready

Thank you



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