Meeting Minutes: TPF-5 (334) Veta Enhancements & Technology Exchange (Meeting No. 7)

Date: September 25, 2017
Minutes prepared by: Rebecca Embacher
Location: MnROAD Facility (Minnesota) and WebEx

Attendance

Pooled Fund State Contacts:

Participated	State	State Contact
☒	Alaska	Richard Giessel
☐	California	Ebi Fini
☐	California	Chuck Suszko
☒	California	Blair Anderson
☒	Connecticut	Dave Howley
☒	Georgia	John Martin
☒	Maine	Ulrich Amoussou-Guenou
☐	Maine	Dale Peabody
☒	Maine	Casey Nash
☒	Minnesota	Rebecca Embacher
☒	Minnesota	Curt Turgeon
☒	Mississippi	Alex Middleton
☒	Missouri	Bill Stone
☐	Missouri	Dan Oesch
☒	New York	Zoeb Zavery
☐	Oregon	Chris Harris
☒	Oregon	Larry Illg
☐	Oregon	Mike Stennett
☒	Pennsylvania	Dan Clark
☒	Pennsylvania	Sheri Little
☐	Tennessee	Matt Chandler (non-voting member)
☐	Texas	Jimmy Si (non-voting member)

FHWA:

Participated	Contact
☐	Michael Arasteh
☐	Steven Cooper
☒	Richard Duval
☒	Kevin Kliethermes

☐	Antonio Nieves

The Transtec Group:

Participated	Contact
☒	George Chang
☒	Jason Dick

Decisions Made

- Phase II scope of work (i.e., Veta enhancement tasks) finalized.
- Approved moving forward with AASHTO provisional for standardized file format of intelligent construction data.
- Approved import and export of data using the standard file format in Veta. Work to be completed under Phase II.
- Approved standardized naming convention of data lots. Standardized naming convention will also be reflected in Veta through Phase II. MnDOT's current template will be modified to work with other state material type acronyms and route designations.

Action items

- Transtec and MnDOT | Finalized Phase II hours and budget and submit paper work for contract amendment. Amendment will contain a time extension and total contract dollar amount change (increase) resulting from additional tasks.
- Transtec and MnDOT | Work with IC-PMTP ETG for creation of an AASHTO provisional for standardized file format of intelligent construction data.
- All | Continue to brainstorm possible dashboard items for quick, near, real-time identification of workmanship issues for both the paver mounted thermal profile and intelligent compaction method.

Agenda

- IC-PMTP ETG Discussion Items
    - Standardized Lot Naming Convention
    - Standardized Intelligent Construction Data Format
- Phase I Update
- Working Session – Phase II Task Finalization
- Working Session – "How to Better Use IC and PMTP Data to Identify Workmanship Issues" – Dashboards

- MnROAD Tour

Next Meeting

Date: TBD
Time: TBD
Location: WebEx
Agenda items: TBD

Meeting Notes

Standardized Data Lot Naming Convention

See attached slides. Participants discussed the need for all states to start using a standardized lot naming convention and the resulting automation that occurs within Veta when doing so. AASHTO PP-80 and PP-81 now contain language detailing how to establish data lots using this standardization. These updated provisions will be published later this year.

Veta currently has a Filter Group Manager template, created for MnDOT, that contains the framework for standardized data lot naming and the resulting automation. It is recommended that states use this template until a generic version is created that is reflective of a given states route designations and material type acronyms.

Pooled fund participants agreed to move forward with this standardized data lot naming convention. Additionally, a task was approved, for inclusion in phase II, to modify MnDOT's current template for use by other states.

Standardized Intelligent Construction Data Format

See attached slides. Participants agreed to move forward with creation of an AASHTO standard data/file format for intelligent construction data. Additionally, a task was approved, for inclusion in phase II, to import and export of data using the standard file format in Veta. MnDOT and Transtec will work with IC-PMTP ETG for development of provisional. Goal is to have provision ready to submit to the AASHTO Committee by Spring 2018.

Phase I Update

J. Dick provided update on Phase I. See attached slides for tabular listing of tasks and percent completion of each task.

Working Session – Phase II Task Finalization

$196,496 available for phase II work. Participants finalized scope of work to move forward in contract. The following tasks were moved forward by pooled fund participants:

Category	Task Description
Data Management	Import and export of data using the standard file format
Mapping	Display multiple maps on the same screen and a mini overview map.
Mapping	Enhance the ruler to measure multiple segment lengths. Show running length as cursor is moved.
Mapping	Part 1: Load different types of data into one Veta project to allow for multiple map viewing (e.g., IC, PMTP and Ride data in one Veta project).
Filtering	Sublot Filters: Lock filters to ensure that the user does not unassociate them with the given filter group. Still allow user to delete sublot filter if needed.
Filtering	Filter Group Manager - add ability for each state to create project information lists (i.e., route system, materials, centerline offsets) such that the lists work for each state. Lists can be exported/imported.
Filtering	Custom Lifts
Filtering	Crop exclusion filters to match location filter boundaries to prevent under-calculation of coverage.
Analyses	Creation of Override Filter Groups (Keep - automated creation of machine ID overrides)
Analyses	Calculate impacts per foot based on vibratory frequency and roller speed.

MnDOT and Transtec group will work on amendment to add these tasks to the current contract.

Working Session – "How to Better Use IC and PMTP Data to Identify Workmanship Issues" – Dashboards

Discussed the need to incorporate dashboards into Veta to allow for real-time identification of workmanship issues and/or potential concerns. The following dashboards were discussed (see attached slides for further details):

- Thermal Segregation vs. Lot / Sublot (over time)
- Identification of non-uniform rolling patterns
- Monitoring compaction mode
- Overall coverage vs. time
- Longitudinal joint coverage
- Hourly diagnostics

Round Robin Update

Alaska – Rolling density meter (RDM) important for QA. Require sand seal in areas where there are low dielectric constant values obtained from RDM measurements. Contractor used joint heater to help ensure adequate compaction at longitudinal joints and higher dielectric constant values. 93 to 95 percent correlation with RDM and cores. 82 percent correlation with nuclear gauge.

California – Veta training is needed to help with real-time support during construction efforts. Need to address gaps in deployment of Veta with respect to reports, spot tests and some other features.

Missouri – FHWA grant money is essential to increase and speed up deployment efforts.

Pennsylvania – Concern over resources to support deployment and what is the cost benefit to use the technology.

Oregon – YouTube videos have been created to illustrate Veta simulations. It is important to have debriefing meetings / partnership with industry. Monetary price adjustments are needed to help inforce contractors to follow specifications.

FHWA – Working on gap in funding.

TPF-5 (334) WebEx Meeting #7

Rebecca Embacher | Advanced Materials and Technology Engineer

September 25, 2017| TPF-5 (334) | MnROAD Facility and WebEx

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AMT Website | http://www.dot.state.mn.us/materials/amt/index.html

Meeting Agenda

- Opening Remarks
- IC-PMTP ETG Discussion Items
- Phase I Update
- Working Session – Phase II Task Finalization
- Working Session – Identification of Workmanship Issues / Dashboards
- Closing Items / Action Items
- MnROAD Tour

Welcome

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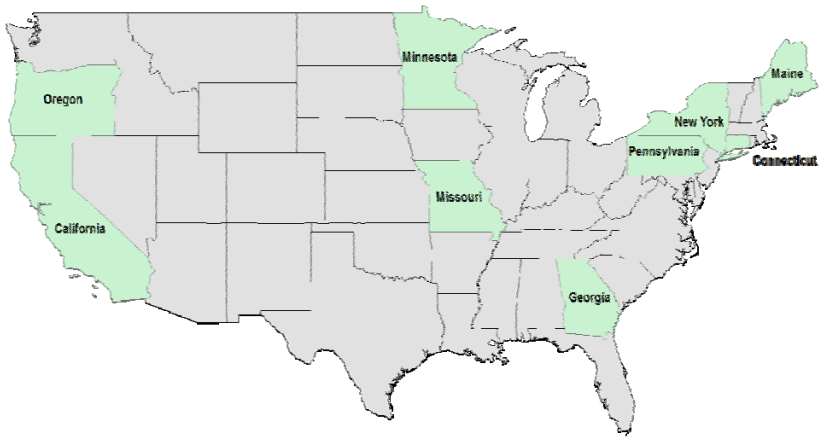
Opening Remarks / Introductions

Current Pooled Fund Participants

TPF TRANSPORTATION POOLED FUND PROGRAM

Non-Voting Members

- Tennessee
- Texas



State	Received	Date Received
Alaska	$20,000	*FY2017 Still being authorized*
California	$25,000 $25,000	3/21/16 1/10/17
Connecticut	$10,000 $10,000	6/6/16 2/27/17
Georgia	$25,000 $25,000	2/27/17 08/21/17
Maine	$17,500	2/27/17
Minnesota	$50,000 $50,000	2/10/16 2/13/17
Mississippi	$25,000	2/27/17
Missouri	$25,000 $25,000	3/21/16 2/27/17
New York	$4,000	*FY2017 Still being authorized*
Oregon	$25,000	1/10/17
Pennsylvania	$10,000 $25,000	2/10/16 8/30/16

Budget Summary

Total Commitments (TPF Website)	$	651,500
Total Funds Received to Date	$	396,500
Phase I	$	(170,004)
Estimated IICTG Travel Expenses	$	(30,000)
Available Funds	$	196,496
Phase I Contract - Billing to Date	$	(97,336)

Extended to pool fund to 2020

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IC-PMTP ETG Discussion Items

Standardized Intelligent Construction Data Format

Recommend Standardization

- AASHTO Provisional
  - Standard Specification for File Format of Intelligent Construction Data
    - File Format Requirements
    - Data Block Requirements
    - Future requirement warehouse for all intelligent construction systems that use Veta
- AASHTO PP80 (PMTP) & AASHTO PP81 (IC)
  - Reference AASHTO File Format Specification
    - Required File Format
    - List minimum required data blocks

What Next?

TPF-5 (334) July 27, 2017 Meeting:
Voted Yes to Data/File format standardization

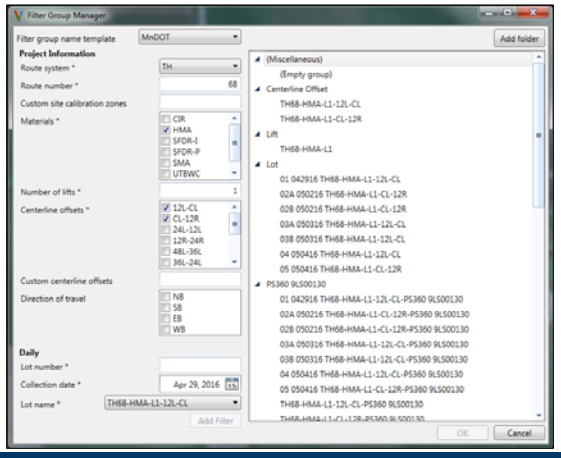
Creation of AASHTO Standard Specification for File Format of Intelligent Construction Data

Modify Veta to import, map and analyze data present in the standardized format (Phase II)

Task	Due Date
1st Review	November 1, 2017
1st Review Modifications	December 1, 2017
2nd Review	January 15, 2018
2nd Review Modifications	February 1, 2018
Final Draft Review	March 1, 2018
Modifications & Submittal to AASHTO Committee	**March 30, 2018**

Current Import Loaders

- Continue to be supported through Veta
- Vendor Changes to File Structures, etc.
  → Vendor financially responsible for Veta Modifications



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IC-PMTP ETG Discussion Items

Standardized Lot Naming Convention

Lot Establishment

AASHTO PP 080 (PMTP) | 3.5.1.1
AASHTO PP 081 (IC) | 5.6.1.1 | Table 7

Lot Establishment Criterion						
Specification	Description	All Measurements Passes per:				
		Day	Material Type	Lift	Centerline Offsets / Lane	Direction of Travel
Asphalt Applications	Undivided Highway	√	√	√	√	…
	Divided Highway					√
Cold In Place Recycling and Reclamation	Undivided Highway	…				…
	Divided Highway					√
Embankment	Undivided Highway				…	…
	Divided Highway				…	√

*** The centerline offsets reflect the cumulative paving width of both pavers for cases with echelon paving and use of one or more instrumented rollers that compact behind <u>both</u> pavers.**

AASHTO PP 080 (PMTP) | 3.5.1.2 | Table 4
AASHTO PP 081 (IC) | 5.6.1.2 | Table 8

Lot Standardized Naming Convention

Distinctly identify the lots using standard format.

Standardized Format*	Definition
ROUTE-MATL-L#-XXX-XXX	Undivided Highways (e.g., TH12-HMA-L1-CL-12R)
ROUTE-MATL-L#-XXX-XXX-DT	Divided Highways (e.g., TH12-HMA-L1-CL-12R-NB)
*Add an additional designation behind route for instances where more than one site calibration is needed within the project limits (e.g., TH12**N**-HMA-L1-12L-CL, TH12**S**-HMA-L1-12L-CL)	

Examples of Lot Establishments:
AASHTO PP 080 (PMTP) – Appendix X2
AASHTO PP 081 (IC) – Appendix X5

AASHTO PP 080 (PMTP) | 3.5.1.2 | Tables 4 & 5
AASHTO PP 081 (IC) | 5.6.1.2 | Table 8 & 9

Route Designation

ROUTE-MATL-L# -XXX-XXX

Replace ROUTE with name (or acronym) of the roadway (e.g., TH12, Emerald).

Acronym or Short Form	Full Name or Meaning
CR	County Road
CSAH	County State Aid Highway
MS	Municipal Street
MSAS	Municipal State Aid Street
TH	Trunk Highway

AASHTO PP 080 (PMTP) | 3.5.1.2 | Tables 4 & 5
AASHTO PP 081 (IC) | 5.6.1.2 | Table 8 & 9

Material / Surface Type

ROUTE-**MATL**-L# -XXX-XXX

Replace MATL with acronym (or name) of material to be compacted / paved.

Acronym or Short Form	Specification	Full Name or Meaning
SFDR-P	2215	SFDR - Pulverization
SFDR-I		SFDR – Mixing/Injecting
CIR	2331	Cold In-Place Recycling
UTBWC	2353	Ultrathin Bonded Wearing Course
HMA	2360	Hot Mix Asphalt
WMA		Warm Mix Asphalt
SMA	2365	Stone Matrix Asphalt

AASHTO PP 080 (PMTP) | 3.5.1.2 | Tables 4 & 5
AASHTO PP 081 (IC) | 5.6.1.2 | Table 8 & 9

Lift Number

ROUTE-MATL-**L#** -XXX-XXX

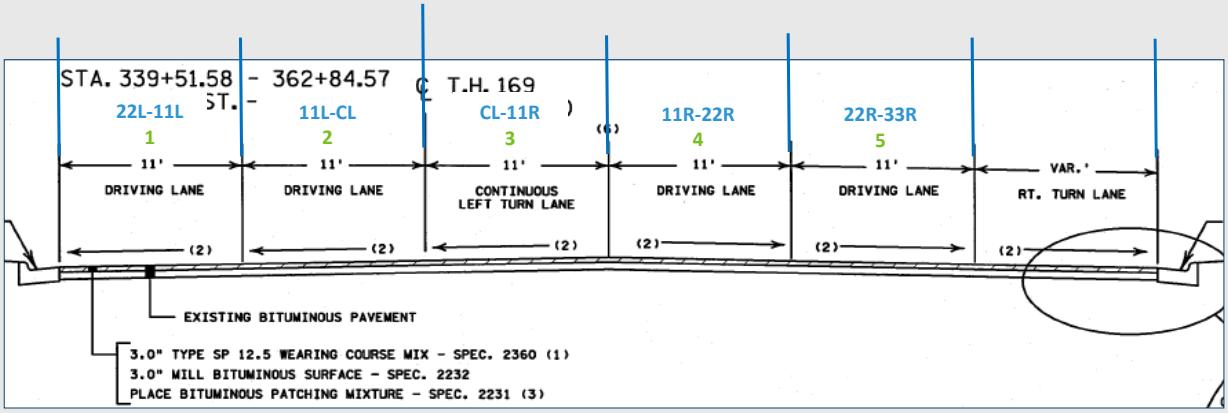
Acronym or Short Form	Full Name or Meaning
L1	Lift 1
L2	Lift 2
L3	Lift 3
…	…
Ln	Lift n

AASHTO PP 080 (PMTP) | 3.5.1.2 | Tables 4 & 5
AASHTO PP 081 (IC) | 5.6.1.2 | Table 8 & 9

Centerline Offset / Lane Number

ROUTE-MATL-L# -**XXX-XXX**

Location of the left and right edge of the production area with respect to the centerline, or lane number.



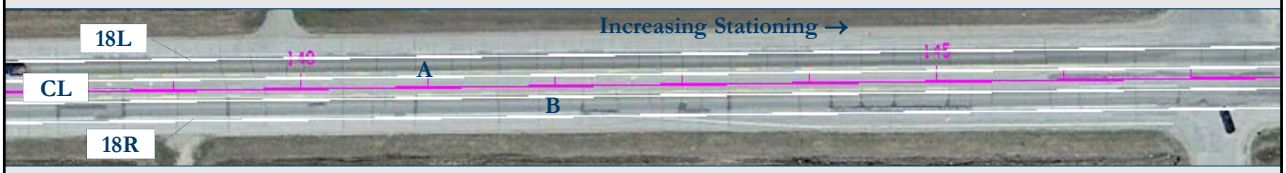
AASHTO PP 080 (PMTP) | 3.5.1.2 | Tables 4 & 5
AASHTO PP 081 (IC) | 5.6.1.2 | Table 8 & 9

Direction of Travel (Divided Highways Only)

ROUTE-MATL-L# -XXX-XXX-**DT**

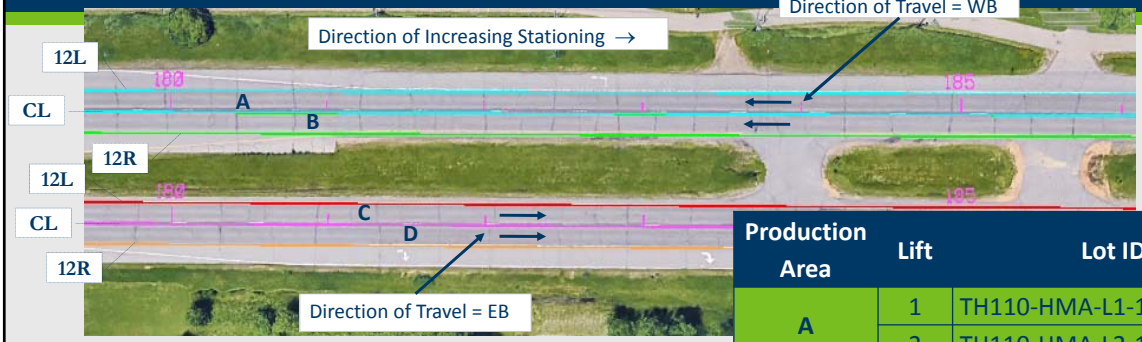
Acronym or Short Form	Full Name or Meaning
NB	North Bound
SB	South Bound
EB	East Bound
WB	West Bound

Example of lot establishment
Undivided Highway, Auxiliary Lane, 18-ft HMA Paving



Production Area	Lift	Lot ID
A	1	TH12-HMA-L1-18L-CL
	2	TH12-HMA-L2-18L-CL
B	1	TH12-HMA-L1-CL-18R
	2	TH12-HMA-L2-CL-18R

Example of lot establishment
Divided Highway, 12-ft HMA Paving



Production Area	Lift	Lot ID
A	1	TH110-HMA-L1-12L-CL-WB
	2	TH110-HMA-L2-12L-CL-WB
B	1	TH110-HMA-L1-CL-12R-WB
	2	TH110-HMA-L2-CL-12R-WB
C	1	TH110-HMA-L1-12L-CL-EB
	2	TH110-HMA-L2-12L-CL-EB
D	1	TH110-HMA-L1-CL-12R-EB
	2	TH110-HMA-L2-CL-12R-EB

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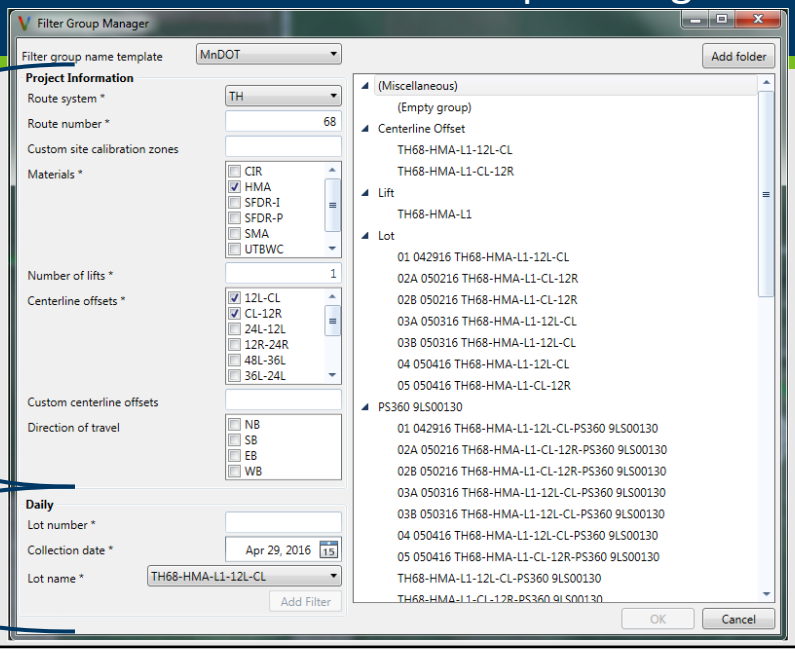
Filter Groups

Filter groups are made up of operation, data and override filters to query the data to the desired requirements for viewing and analyses.

Filter Group Manager

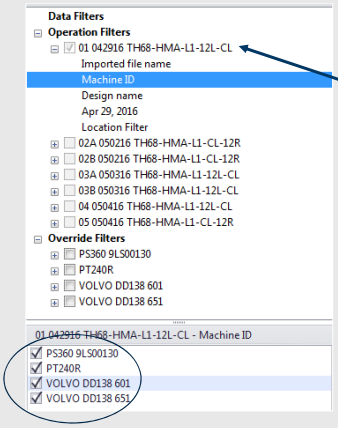
AASHTO Standardized Lot Naming Convention

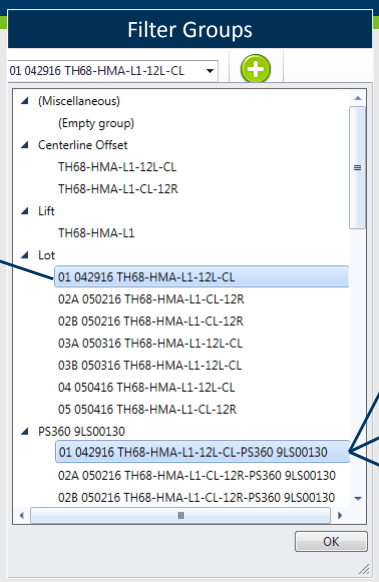
Create filter groups per daily lots.



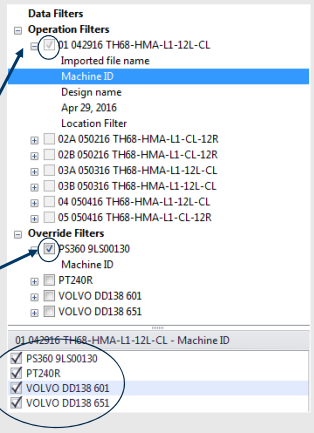
Automated Creation of Additional Filter Groups
Veta 4.3

Operation Filters Automatically Created for **ALL** Machines

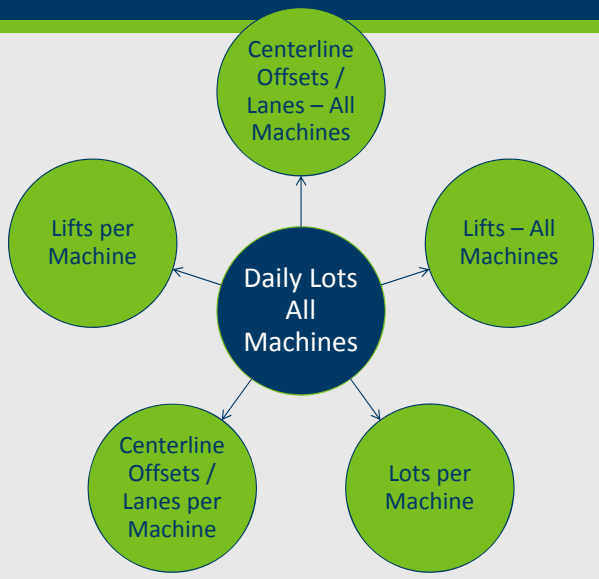




Override Filter to view/analyze by given Machine



Automated Creation of Additional Filter Groups
Veta 4.3



Phase I - Update

Phase I Contract

MNDOT_DOCS-#
-v1-EXECUTED_CC

Contract Task No.	Description	Code	Task	Estimated % Complete
A.1	Reporting	F-06	Customized reports (select which items to report, include logos, signatures, etc)	5
A.2	Data Management	A-11	Automatic download of field data from Trimble & Moba (other vendors are not ready or have not provided needed information). Includes architecture improvements to enhance performance.	90
A.3	Filtering	C-02	Allow user to create location filter by entering offsets from a given line in the alignment file (e.g., 12 ft right of centerline (CL), 12 ft left of LC, etc.)	0
A.4	Analyses	E-09	Option to choose what to analyze (final coverage, all passes, individual passes; temperature, ICMV, frequency, etc)	0
~~A.5~~	~~Spot Tests~~	~~D-01~~	~~Spot tests manager (add/remove/change test types, define units, include specification requirements, and define legend for spot test values)~~	…
~~A.6~~	~~Mapping~~	~~B-01~~	~~Display multiple maps on the same screen and a mini overview map.~~	…
A.7	Data Management	A-12	Recalculate pass counts when using All Passes data from multiple machines.	80
A.8	Mapping	VII-01	Add map-based, user-accessible data (map clicks can show underlying data (IC, PAVE-IR, ProVAL, Test Roller).	100
A.9	Analyses	VII-09	Tabular listing of filter and operation/data filters query settings (sensors included, temps used, date, file, etc.) This might provide an easy way of performing a QA review of the project.	0
A.10	Analyses	VII-04	Quality Control Chart (e.g., Box Whisker of temperature vs. time, temp. vs. speed, pass count vs. time, pass count vs. time, speed vs. amplitude, speed vs. freq .etc.)	0
A.11	Reporting	VII-09	Tabular listing of filter and operation/data filters query settings (sensors included, temps used, date, file, etc.) This might provide an easy way of performing a QA review of the project.	0
A.12			Bug Repairs	…
A.13	Data Management		Automatic download of field data from TopCon SiteLink.	90

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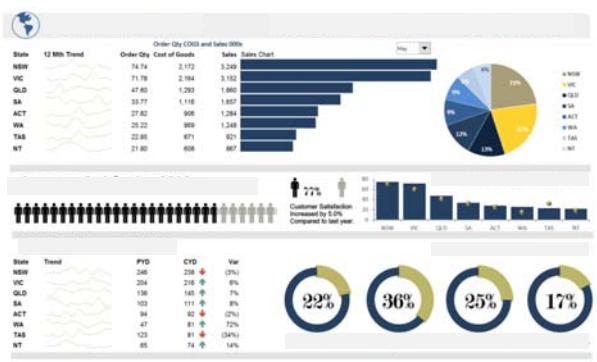
Working Session – Phase II Task Finalization

Phase II Tasks

TPF-5 (334) First
und Selection Phas

ICDM_Veta_Maste
:_Categorized 09.0



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Working Session – Dashboards

"How to Better Use IC and PMTP Data to Identify Workmanship Issues"

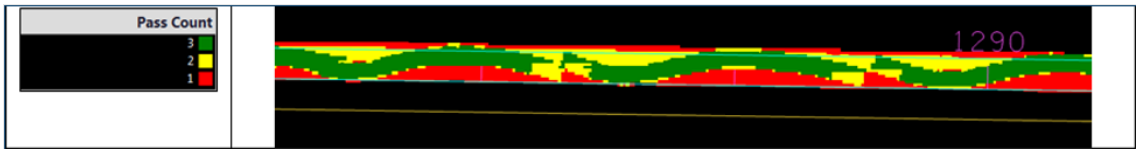
Paver Mounted Thermal Profiling Dashboard

- Thermal Segregation Statistics appear to do a satisfactory job as a dashboard for workmanship issues.
- Machine Working – Percent Coverage
- Thoughts?

Intelligent Compaction Dashboard

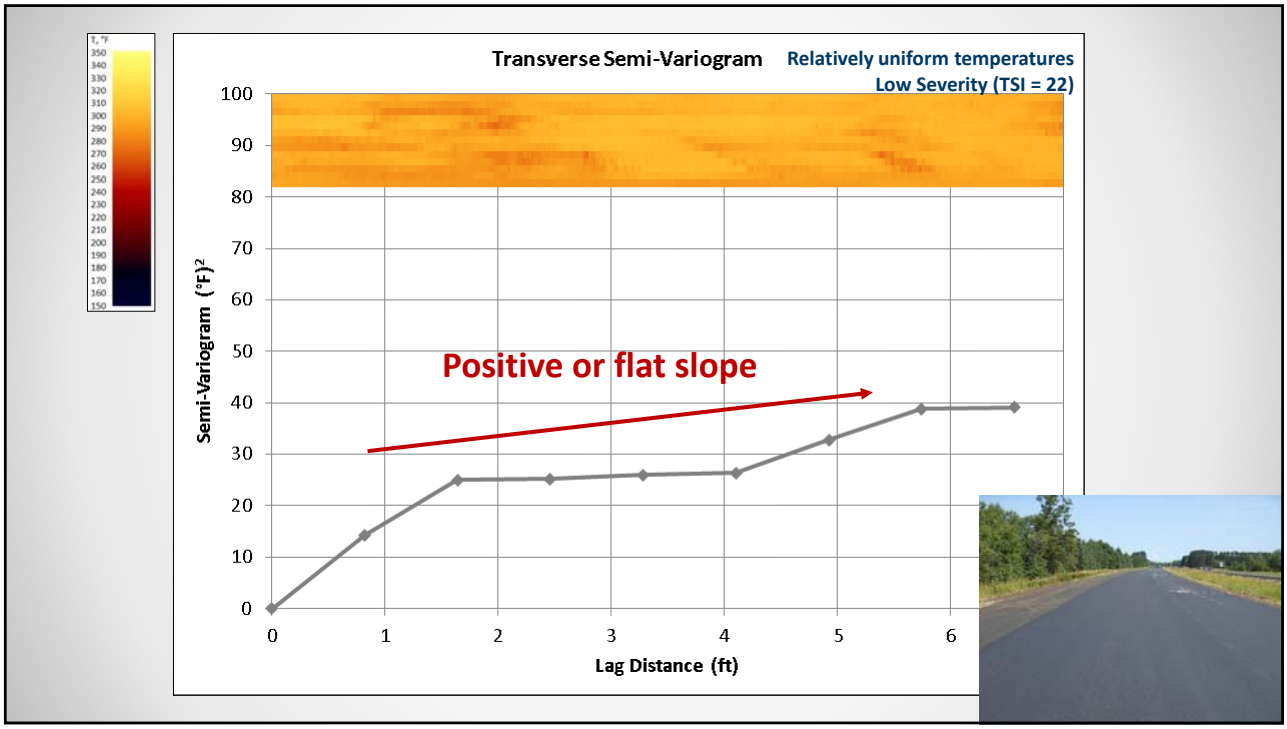
Desperately Needed

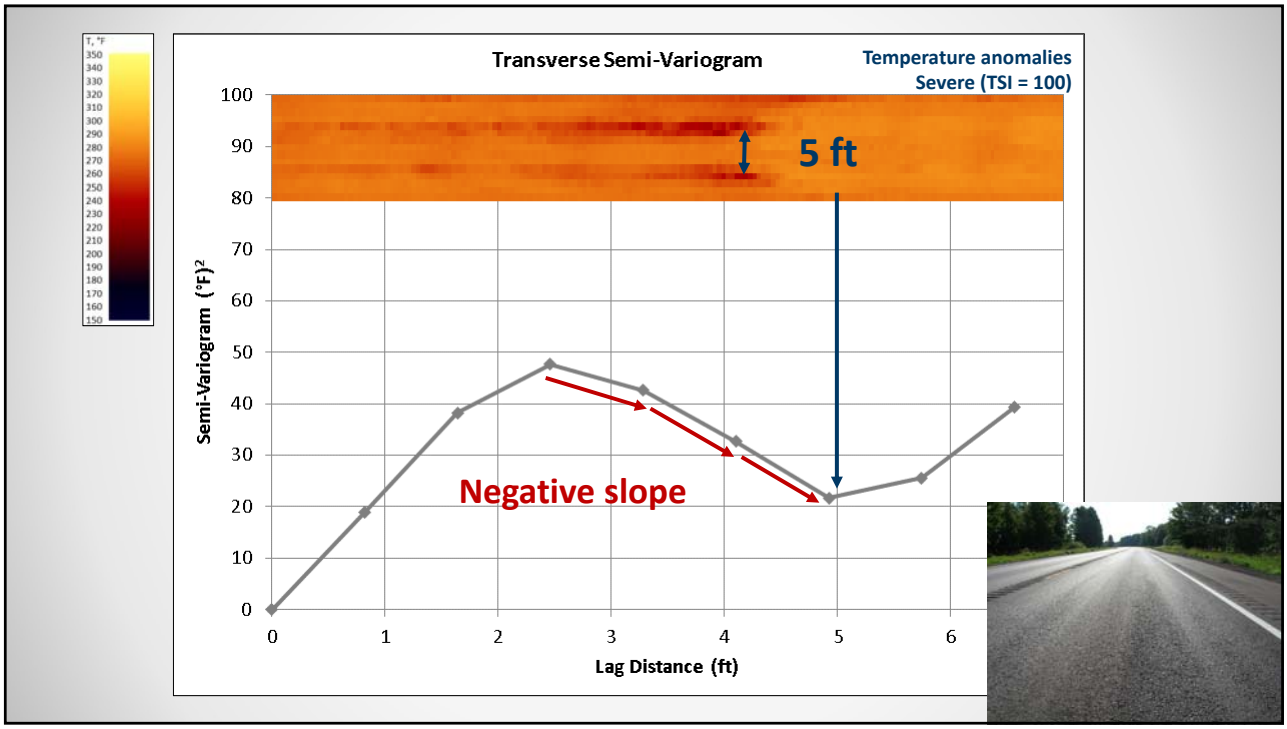
Dashboard 1
Non-Uniform Rolling Patterns



Diagnostic: All Machine IDs and Per Machine ID

- Sublot Variance
- Transverse Semivariogram





Standard Deviation Examples PMTP Data

Standard Deviation = 3.2 °F

Standard Deviation = 6.0 °F

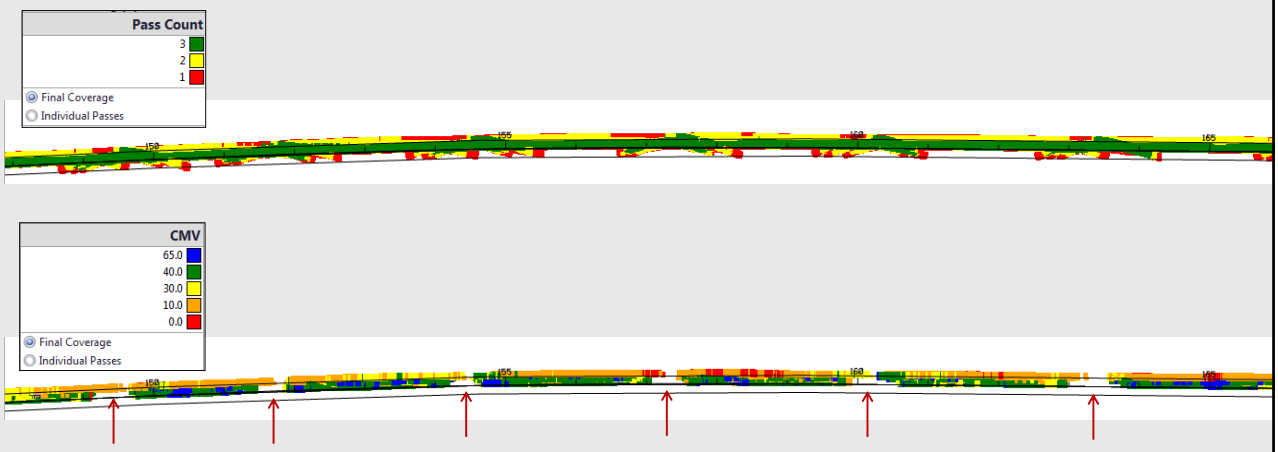
Standard Deviation = 9.9 °F

Low

Moderate

Severe

Dashboard 2
Monitoring Compaction Mode



Dashboard 2
Compaction Mode

Diagnostic: All Machine IDs

- Percent Coverage
  - Vibration = On
  - Temperature ≥ 220F
  - Passes ≥ 2?
- Size Area?

Dashboard 3
Overall Coverage

Diagnostic: All Machines and Per Machine ID

- Percentage of Sublots ≥ Requirement (Pass)
- Percentage of Sublots < Requirement (Fail)
- Pie Chart and Table

Dashboard 4
Longitudinal Joint Coverage

- Diagnostic: All Machines and Per Machine ID
- Percentage of Sublots ≥ Requirement (Pass)
- Percentage of Sublots < Requirement (Fail)
- Width to evaluate:
- 0 to 1 ft? 0 to 2 ft? Typical grids 18 in or less.
- Pie Chart and Table

Dashboard 5
Hourly Diagnostics

Phase I | Task A.10

- Quality Control Charts
  - (Box Whisker of temperature vs. time, temp. vs. speed, pass count vs. time, pass count vs. time, speed vs. amplitude, speed vs. freq .etc.)

Dashboards

What Else?

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Closing Items / Action Items

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Thank you again!

Rebecca Embacher

rebecca.embacher@state.mn.us

651-366-5525

AMT Website | http://www.dot.state.mn.us/materials/amt/index.html