Meeting Minutes: TPF-5 (334) Veta Enhancements & Technology Exchange (Meeting No. 9)

Date: August 29, 2018
Minutes prepared by: Rebecca Embacher
Location: Skype

Attendance

Pooled Fund State Contacts:

Participated	State	State Contact
☒	Alaska	Richard Giessel
☐	Alaska	Dan Gettman
☒	California	Ragu Thangavelautham
☐	California	Chuck Suszko
☐	California	Blair Anderson
☐	Connecticut	Dave Howley
☐	Connecticut	John Henault
☐	Georgia	John Martin
☒	Illinois	Brian Hill
☐	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
☒	New York	Michael Heim
☐	Ohio	Craig Landefeld
☒	Ohio	Adam Au
☒	Oregon	Larry Illg
☒	Oregon	Mike Stennett
☐	Pennsylvania	Dan Clark
☒	Pennsylvania	Sheri Little
☐	Tennessee	Matt Chandler
☐	Tennessee	Brian Egan

Additional State Attendees: None

FHWA:

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

The Transtec Group:

Participated	Contact
☒	George Chang
☒	Jason Dick

Decisions Made

- None

Action items

- Transtec and MnDOT | Update Veta wish list and send out to pooled fund participants.
- Pooled Fund Participants | Review Veta wish list and send Jason Dick and/or Rebecca any additional items desired to be added.
- Pooled Fund Participants | After additional items added, review updated wish list and select top priorities.
- Rebecca Embacher | Provide pooled fund participants with flow chart of how Minnesota currently creates Veta Projects.
- Rebecca Embacher | Invite Wisconsin and Michigan NRRA members to sit in meetings as friend of pooled fund.

Agenda

- National Road Research Alliance (NRRA) – Intelligent Construction Team (ICT)
- FHWA CFR637 – Construction Inspection and Approval
- Pooled Fund Participants and Budget

- Amendment 1 Update
- Veta Enhancement Demonstration

Next Meeting

Date: TBD
Time: TBD
Location: Skype
Agenda items: Finalize scope of work for amendment number 2.

Meeting Notes

National Road Research Alliance (NRRA) – Intelligent Construction Team

Update provided by Bill Stone. See attached slides.

- NRRA has the following teams
    - Executive Committee
    - Tech Transfer
    - Flexible
    - Rigid
    - Geotechnical
    - Preventative Maintenance
    - Intelligent Construction Technologies (New Team)
- Participants
    - Current Agency Members: 6 States | California, Illinois, Minnesota, Michigan, Missouri, Wisconsin
    - Associate Members: contractors, consultants, manufacturers, equipment suppliers, academia, associations
- Discussed work being completed by NRRA (e.g., research studies, field test sections, technology transfer – summary reports, training, and more).
- Discussed the new team that has been recently created (NRRA – Intelligent Construction Technologies (ICT)), along with the missions statement, goals, current team members and future efforts.

- Discussed needs to ensure collaboration between NRRA and Veta pooled fund as there is overlap between this pooled fund and the NRRA technology transfer and NRRA intelligent construction technologies team.

- Asked if pooled fund participants would be okay with Wisconsin and Michigan sitting in on these pooled fund meetings to help ensure transparencies (as a friend). No concerns were voiced. Consequently, these 2 states will be invited to future meetings. Appropriate contacts will need to be determined.

- Request that NRRA – Technology Transfer develop some sort of chat room to help facilitate information sharing and discussions.

FHWA CFR637 – Construction Inspection and Approval

Update provided by Curt Turgeon. See attached slides.

- Per discussions from FHWA reviews, states are currently non-compliant with the CFR637 when using monetary price adjustments associated with the IC and PMTP technologies.

- States need to start verifying any measurements collected by contractors that monetary price adjustments are associated to with respect to the IC and PMTP technologies. For instance, temperature measurements from the PMTP method, pass count, temperature and/or stiffness measurements from the IC method.

- No state currently has a verification method in place.

- Verification steps will need to be developed and approved by the FHWA.

- Conference call with vendors on September 12th to let them know of discussions that are currently taking place.

- This will be a main agenda item at the ICT-ETG meeting on October 10th. Requesting FHWA provide guidance on their expectations and that ETG develops a roadmap for development and deployment of verification methods with these technologies. Methods must be simple and minimal to no effects on the industry.

- General comments:

    - Richard Giessel: could one mount another PMTP system on the contractor's paver to capture independent measurements?

    - Dale Peabody: Is it possible to use a handheld device to test the mat temperatures? How would that work with sub-meter accuracy coordinate readings that are now available with the current vendor?

    - Zoeb Zavery: State calibrates the systems?

- George Chang: The direct download of data from Vendor's cloud storage to Veta will mitigate some concerns about possible fraudulent activity associated with exported files.

Pooled Fund Participants and Budget

Update provided by Rebecca Embacher, Jason Dick and George Chang. See attached slides.

- 13 states participating at the time of this meeting.
- NDDOT and Tennessee considering joining. (Please note that Tennessee has now joined the pooled fund.)
- As of 8/27/18, currently have $271,786.46 available for spending on future enhancements.
- Some states have still not transferred money yet for this year.
- Current contract with Transtec expires on March 31, 2019. There is enough budget to start working on the next amendment such that it is in place by the current contract expiration date.
- An updated wish list will be sent out to pooled fund participants to review and provide back feedback on any additional wish list items that are desired to be added. These items will be compiled and added to the list. The list will then be resent out to participants to choose their top 10 priorities. These priorities will then be combined and participants will meet again via skype to trim down the list based on budget and consensus of the final top priorities.
- Discussed the percent of work completed on the Task B items.
- See slides for details on Veta features.
- Discussed meeting frequencies and whether folks would like future meetings to be automatically scheduled on a set schedule. There was no interest in a fixed schedule. Still prefer a flexible schedule based on when updates are needed.

Veta Enhancement Demonstration

Provided by Rebecca Embacher.

- Per requests from the last meeting, a live demonstration of the latest Veta features was provided.
- The live demonstration included the following items:
  - How to create a new project.
  - How to directly download data from the vendor's cloud storage.
  - How to use the MnDOT template in the filter group manager.

This is recommended to be used by all due to the automation associated with this template. The automation reduces the amount of time required to create Veta projects by more than 90%. It also reduces the complexity for making projects. This template will be made generic as part of a task in the current contract, however, this work has not been completed at this time. Therefore, it is recommended that states trick the current options to work in their state for now.

- How to create a filter group for a given data lot.
- How to use a LandXML file to create a location filter using stations and offsets.
- How to do a quick review of a final, completed Veta project using the report feature for exporting data lot filter group settings.
- Showed quality control charts.
- Showed how to analyze PMTP data using the thermal segregation index and where these sublot results are located.
- Answered general questions.

TPF-5 (334) On-Line Meeting #9

Rebecca Embacher | Advanced Materials and Technology Engineer

August 29, 2018

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

Meeting Agenda

- National Road Research Alliance (NRRA) – Intelligent Construction Team (ICT)
- FHWA CFR637 – Construction Inspection and Approval
- Pooled Fund Participants and Budget
- Amendment 1 Update
- Veta Enhancement Demonstration

DEPARTMENT OF TRANSPORTATION

NRRA
National Road Research Alliance

http://www.dot.state.mn.us/mnroad/nrra/index.html

National Road Research Alliance (NRRA) - Intelligent Construction Team (ICT)

Bill Stone

Agency & Associate Members

- Agency Membership
  - $150,000 / Year – states receiving more than Minnesota SPR Dollar ($13.5M/year)
  - $75,000 / Year – states receiving less than Minnesota SPR Dollar
  - SPR Dollar Table - http://www.dot.state.mn.us/mnroad/nrra/membership/index.html
- Associate Membership
  - $2,000 / Year
  - Academic institutions, private companies and associations

NRRA ICT Team | Mission Statement

ICT includes innovative technologies for:

- planning
- design
- construction
- real-time quality control/monitoring
- management for the lifecycle of infrastructure construction

Activities include:

- short-term & long-term research
- field evaluation and/or demonstration of current and emerging technologies
- partnering with industry to assist with development and deployment of technologies
- creation of tools and resources to assist with deployment efforts
- technology transfer among NRRA partners
- specification development
- providing input to the technology transfer team on what should be marketed

NRRA ICT Team | Goals

- Identification of gaps of current construction practices and technologies
- Evaluation of recent research and emerging ICT
- Construction of test sections, or identification of locations/projects, that can be used to validate (or further develop) a given ICT
- Information sharing (e.g., lessons learned, best practices, etc.)
- Advancement of ICT and data analysis methods
- Creation of tools and resources to assist with deployment and training efforts
- Development and refinement of ICT-related standards

NRRA ICT Team | Members

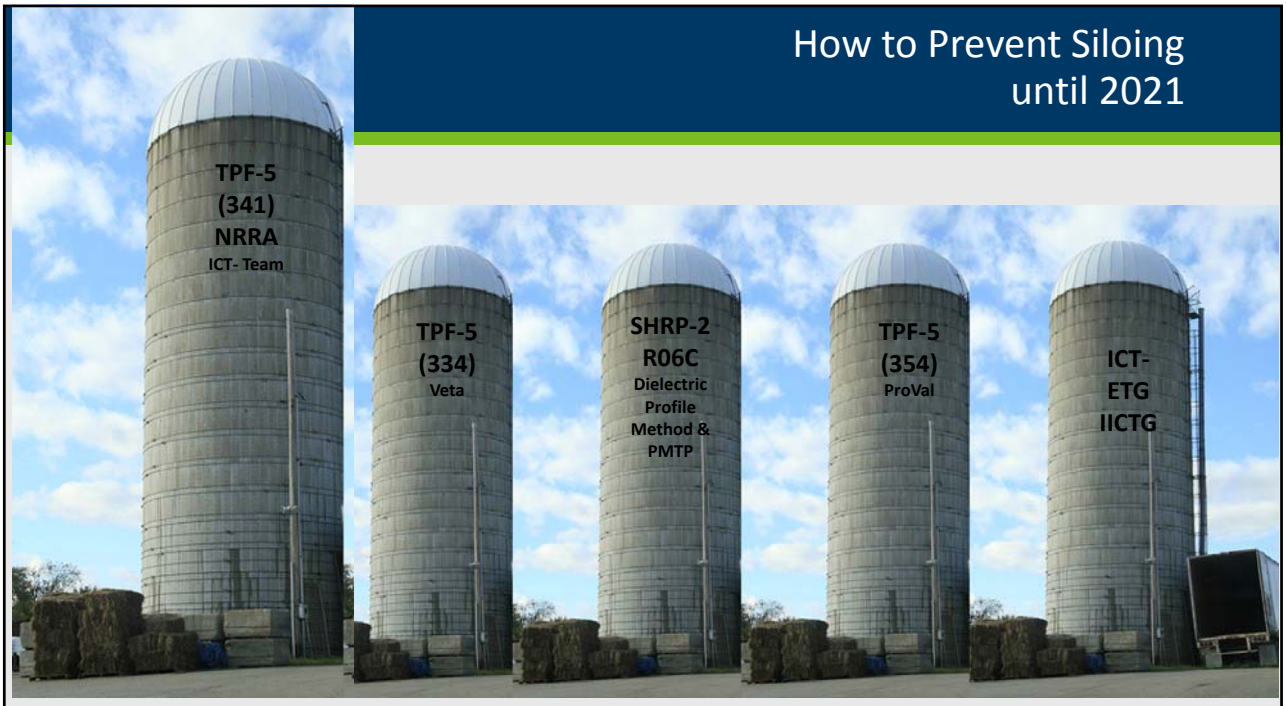
- equipment manufacturers and vendors
- highway construction contractors
- federal and state agencies
- researchers and academia
- consultants

Current NRRA ICT Team Members

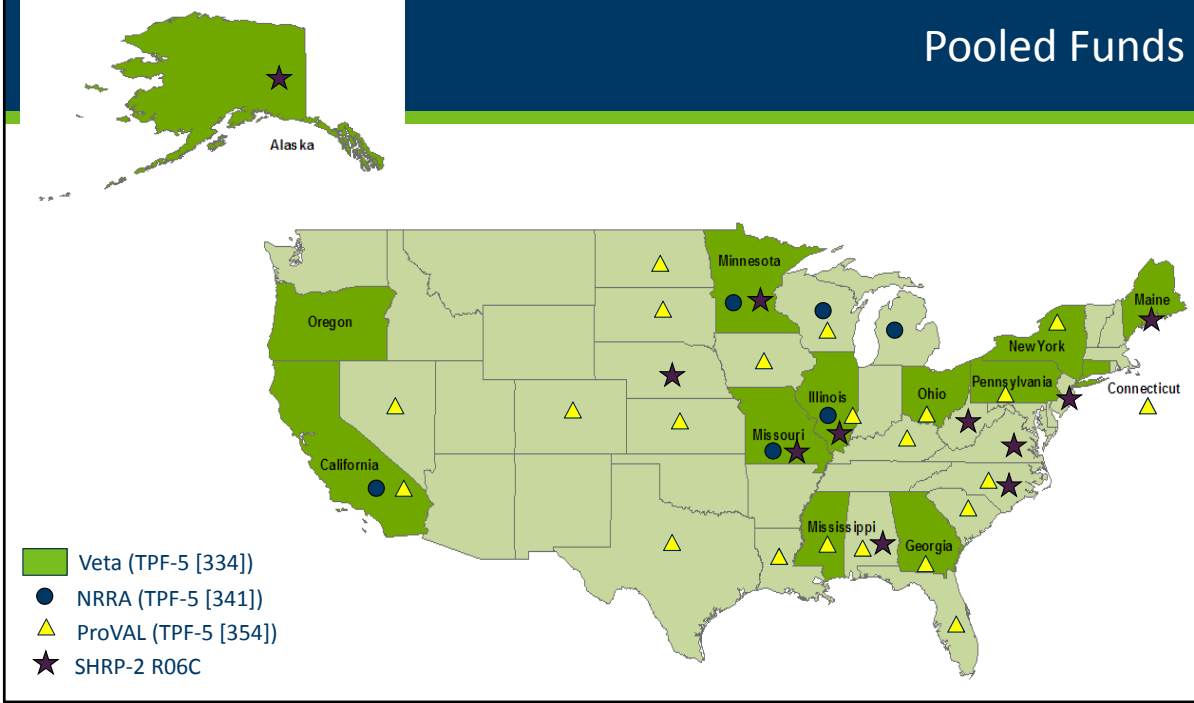
- Agency Members
  - Caltrans, Deepak Maskey
  - Caltrans, Ragu Thangavelautham
  - Illinois – Brian Hill
  - Minnesota – Rebecca Embacher
  - Missouri – Bill Stone
- Associate Members
  - Brad Adams – Leica Geosystems (in process to join)
  - Brandon Brever – Minnesota Asphalt Paving Association
  - George Chang – The Transtec Group
  - Erv Dukatz – Mathy Construction
  - Ken Maser – Infrasense
  - Roger Roberts – GSSI (in process to join)

Team is still growing . . .

How to Prevent Siloing until 2021



Pooled Funds



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FHWA CFR637 – Construction Inspection and Approval

Curt Turgeon

Monetary Price Adjustments

- Affects deployment of intelligent construction technologies such as intelligent compaction, paver mounted thermal profiling.
- Requires states to randomly, independently verify collected measurements.
- Example: PMTP
  - Independent measurements of mat temperatures throughout day
  - Challenges: Comparing independent measurement with PMTP measurement
    - Immediate measurement behind trailing edge of paver screed
    - Current available PMTP is sub-meter accuracy
    - Coordinates of independent verification location
    - Veta enhancement needed

What Now?

- Meetings:
  - NRRA-ICT Team
    - September 6, 2018
    - Add need to ideascale for possible funding of solution (https://mndot-lrrb.ideascale.com/a/ideas/recent/campaign-filter/byids/campaigns/61069/stage/unspecified)
  - ICT-ETG Industry Members
    - September 12
    - Discuss:
      - What is CFR637?
      - What are expectations?
      - Who does this affect & what next?

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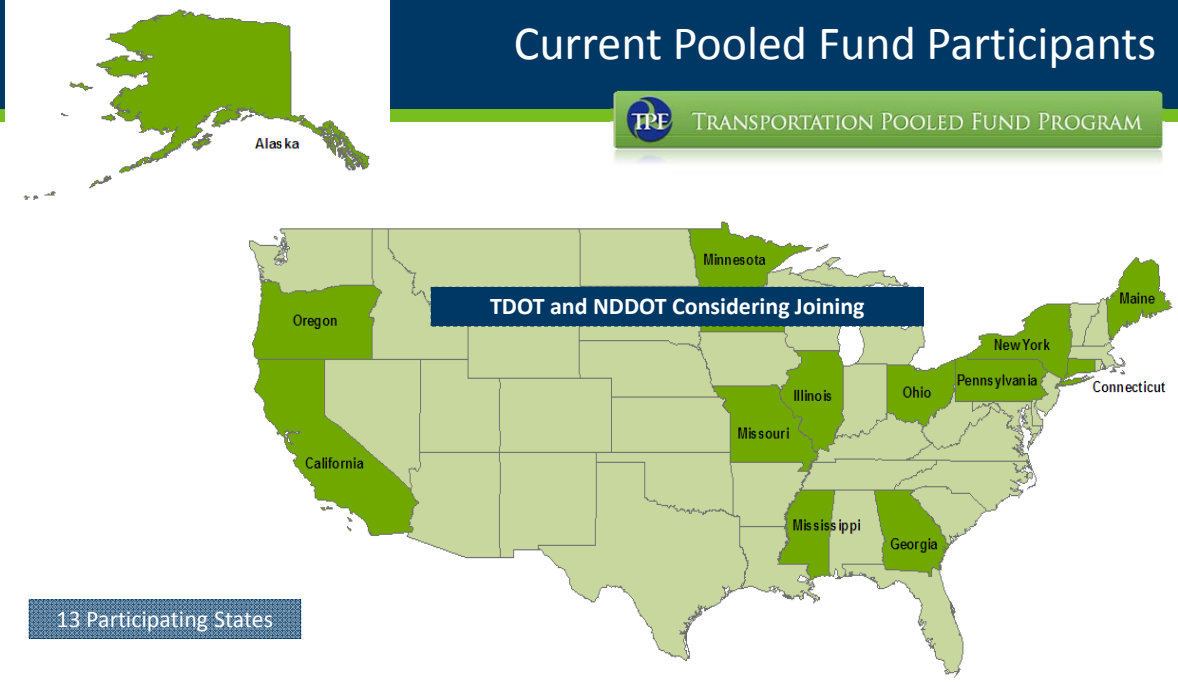
Pooled Fund Participants and Budget

Rebecca Embacher

Current Pooled Fund Participants

TRANSPORTATION POOLED FUND PROGRAM



13 Participating States

SPR Budget Summary

Expenditures:	Encumbrances	Actual Paid	
Transtec Group, Inc.	451,189.94	280,466.45	
September 25-28, 2017 IC Technology Conference (Catering)	643.47	643.47	
September 25-28, 2017 IC Technology Conference (Hotel, Meals & Incidentals)	10,980.13	10,980.13	
Enhancement to the Intelligent Construction Data Management System (Veta) and Implementation	0.00		
FHWA & DOT Registration (includes 4-hour ICDM-Veta Workshop) Minneapolis, MN 09/26/2017	4,400.00	4,400.00	
Totals:	467,213.54	296,490.05	467,213.54

8/27/2018

Available Balance: $271,786.46

Pool Fund through 2020

SP&R Fund Transfer Report

Waiting on funds from:

- California - $25,000
- Georgia - $25,000
- Maine - $17,500

Description	Total
Total Committed	$739,000
Total Received	$671,500
Total Encumbrances	$467,213.54
Current Total Available for Spending:	$204,286.46

Action Item

Review Current Wish List Items

↓

Send Additional Items (R. Embacher or J. Dick)

↓

Update Wish List

↓

Reduce Down to Top Priorities

↓

Finalize Priorities – Develop Scope of Work

Current contract expires March 31, 2019

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Amendment 1 Update

Jason Dick

Task	Hours Budget	Hours Accrued This Period	Total Hours Accrued To Date	% of Budget Hours Used
1	7	8	9	10
B.1: Data Management: Store/Export Original Alignment Files	232	9	91	39.2%
B.2: Data Management: Import/Export Data	210	8	82	39.2%
B.3: Data Management: Add Station Support	400	16	157	39.2%
B.4: Mapping: Display Multiple Maps	166	7	65	39.2%
B.5: Mapping: Enhance the Ruler	20	1	8	39.2%
B.6: Mapping: Load Different Types of Data	558	23	219	39.2%
B.7: Filtering: Sublot Filters	85	3	33	39.2%
B.8: Filtering: Filter Group Manager	182	7	71	39.2%
B.9: Filtering: Custom Lifts	66	3	26	39.2%
B.10: Filtering: Crop Exclusion Filters	25	1	10	39.2%
B.11: Analyses: Creation of Override Filter Groups	107	4	42	39.2%
B.12: Analyses: Calculate Impacts Per Foot	47	1	18	39.2%
Subtotal	2098	84	822	39.2%
Total (A+B):	3356	84	2080	

Tasks B
% of Budget Hours Used

Invoiced through July 31, 2018

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Veta Enhancement Demonstration

Veta Project Creation Workflow
New Project

http://www.dot.state.mn.us/materials/amt/icdocs/Veta%20Project%20Creation%20Workflow-Legal%2008.22.18.pdf

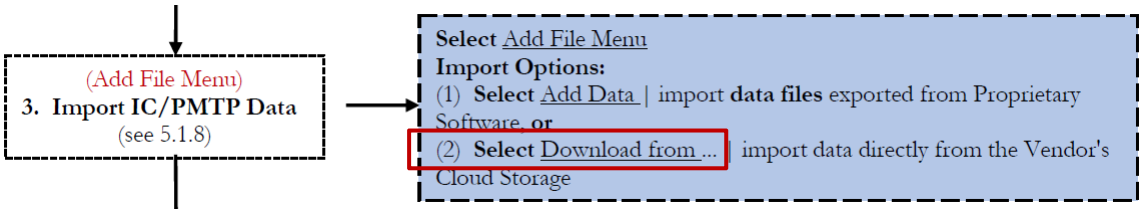
(New Project Menu)
1. Create New Veta Project
(see 5.1.3)

Select New Project Menu
Select coordinate system that the data was collected using.
(GPS or Minnesota Counties)
Select country from the Minnesota County Zone dropdown menu
Select Location Unit for data collected in county coordinates
(US Survey Feet or Meters).

Save project
Standardized Veta File Naming Conventions
SP2345-67 TH75 **IC** | Table 2016-10 (IC)
SP4567-89 TH75 **PMTP** | Table 2016-7 (PMTP)

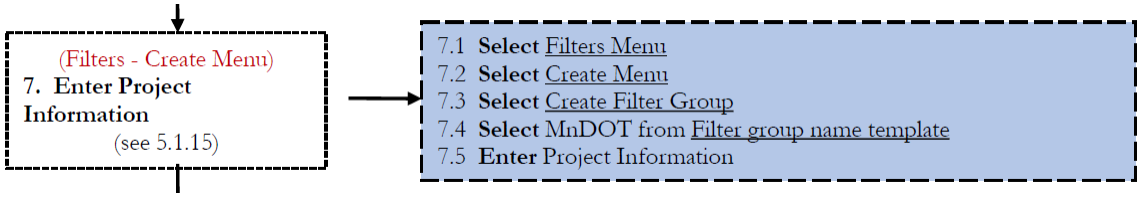
Live Demo: Create New Project

Veta Project Creation Workflow
Direct Download



Live Demo: PMTP Method – Moba Download
IC Method – Topcon Download

Veta Project Creation Workflow
Filter Group Manager | Project Information



Live Demo (IC Data): Reminder of Filter Group Manager – MnDOT Template

Veta Project Creation Workflow
Filter Group Manager | Data Lot

(Filter - Create Menu)
8. Create Filter Group for Data Lot
(see 5.1.15)

It is recommended to review the data by selecting the given file in the Data Files Menu to verify centerline offsets for the given paving day and to assist with determining whether the data lot extends through an exception prior to entering data lot information.
8.1 **Select** Filters Menu
8.2 **Select** Create Menu
8.3 **Select** Create Filter Group
8.4 **Enter** daily information for creation of Filter Group for given data lot.

Live Demo (IC Data): Creation of Data Lot

Location Filter | LandXML

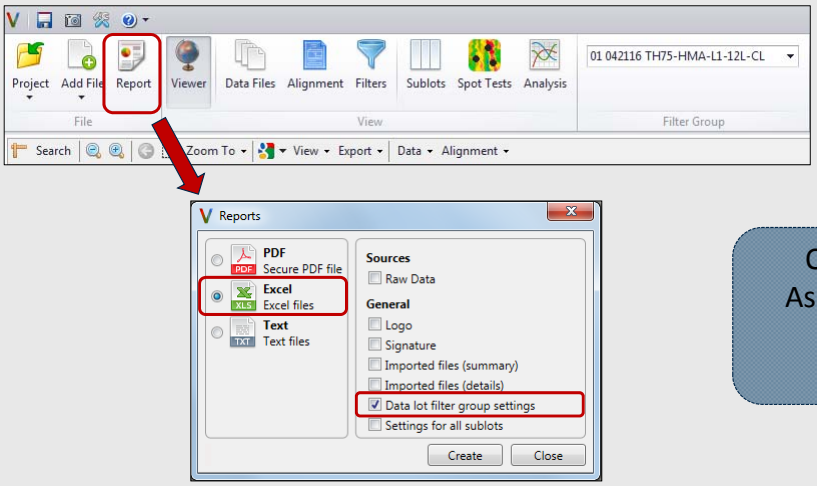
Live Demo (IC Data): Location Filter

(Operation Filters)
10. Review Operation Filters
(see 5.1.15)

IC Method
10.1 **Imported File Name** | Select all files.
10.2 **Machine ID** | Select all rollers.
10.3 **Data Lot Name** | Select corresponding data lot.
10.4 **Time Filter** | Select specific date.
10.5 **Location Filter** |
10.5.a Method 1 (Complex Shapes - *kmz file)
Source | Use a Portion of an Alignment Drawing
Select | Alignment File, Alignment & Line
Start & End Limits | Use northing and easting from rover coordinates
10.5.b Method 2 (Offsets - *XML file)
Source | Offset
Select | Alignment File, Alignment, & Line
Offsets |
Start Offset is the **left** edge (line) of triming polygon
Stop Offset is the **right** edge (line) of triming polygon
Use Stations | Enter start and stop station information in the direction of increasing stationing. Stationing typically increases from South to North and West to East. Consequently, the start station would typically be the southern or western most station.

PMTP Method

Filter Group Settings Export



Quality Control/Quality Assurance of Veta Projects

Data Filters

Operation Filters

- Thermal Segregation Index – location of values
- Quality Control Charts

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Thank you again!

Rebecca Embacher

rebecca.embacher@state.mn.us

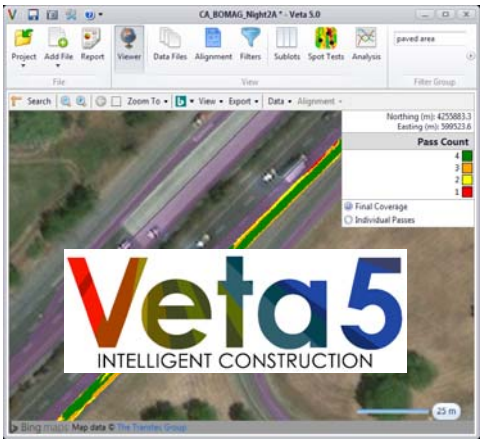
651-366-5525

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

Veta 5.X Features

Veta 5
INTELLIGENT CONSTRUCTION

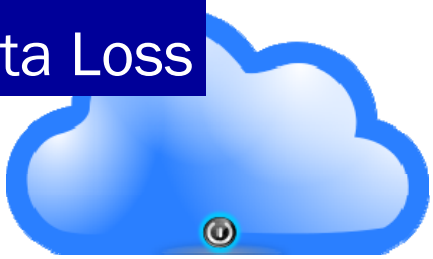
Many Systems ONE SOFTWARE



Veta 5.0 Features

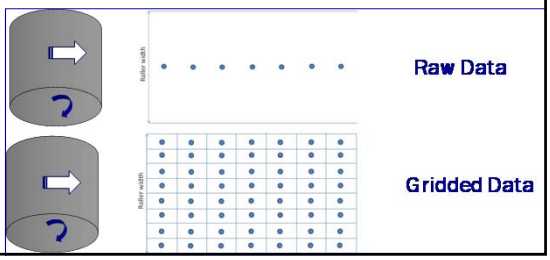
Data Import

Save Time
Avoid Data Loss

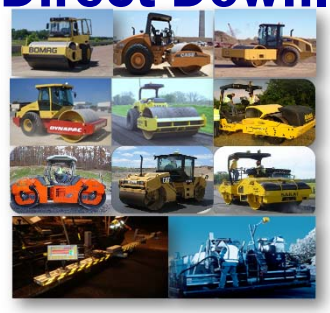


- Direct Download from Cloud
  - MOBA thermal profile data
  - TOPCON raw ungridded IC data

- Import Raw Ungridded Data
  - Veta 5.0- : BOMAG and Old SiteVision Office IC data
  - Veta 5.0 : TOPCON IC Data
  - Maximum flexibility for analysis



Direct Download from Cloud to Veta



IC/PMTP data

Automatic
Wireless
Transmission

Manually
"Push"

Project and Machines IDs
setup

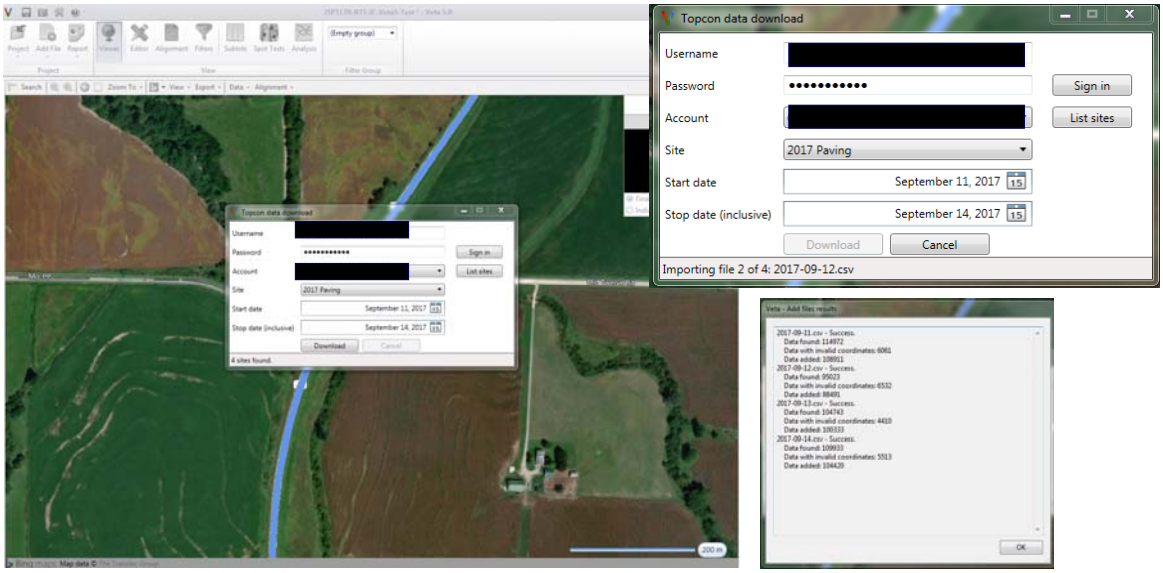
Vendor's
cloud Server

Ungridded
or gridded
data files

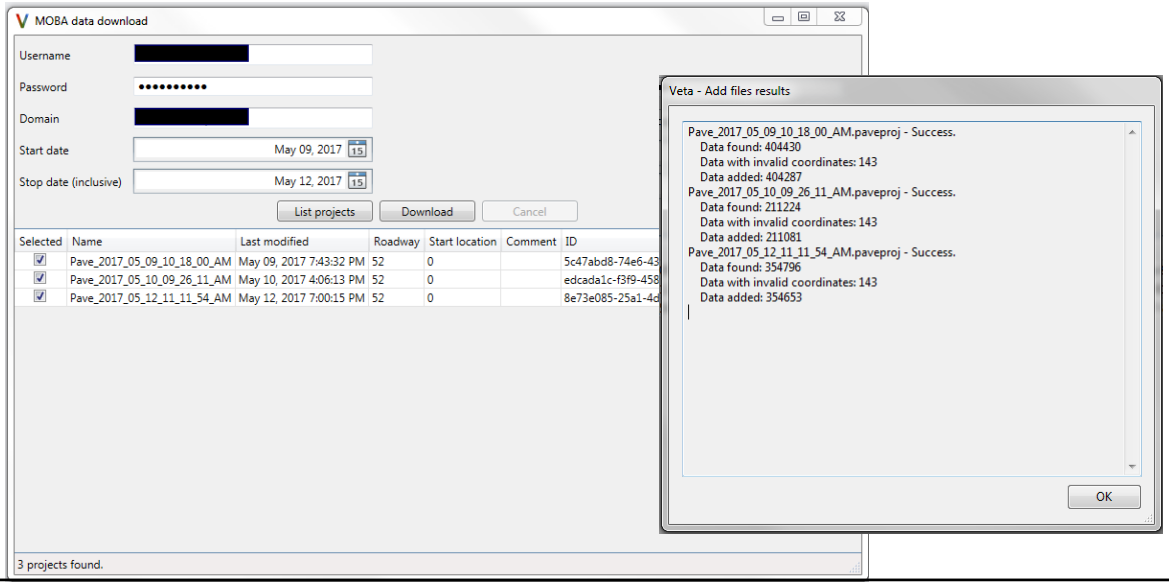
Storage
time

user
log-in for
access

Example Direct Download - TOPCON

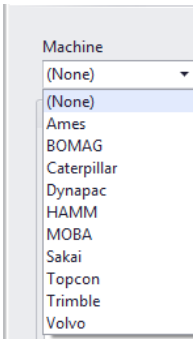


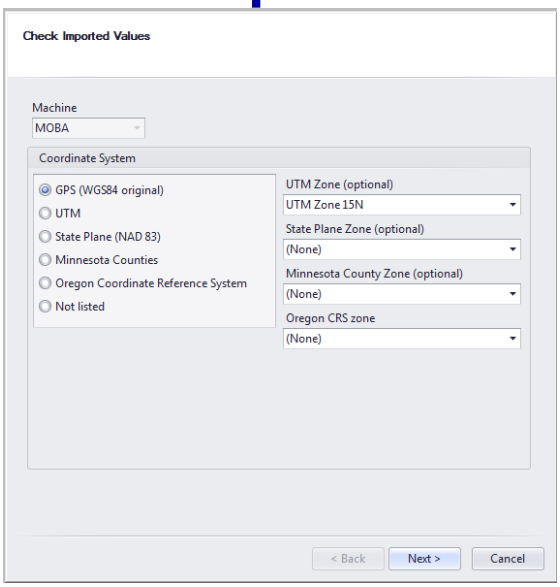
Direct download – MOBA PAVE-IR



Re-Designed Data Import Wizard

List of Machines





Data Import

- Re-processing of All-Passes Data
  - Passes are recounted.
  - Final-coverage data may be different in some cases.
  - The maximum pass count is limited to 20.

RECOUNT

- Limits of Imported Files
  - The limit of 100 files is lifted.

Map – Filters - Sublots

- Map

Fix: At most zoom levels, correct the display of edges of IC data map.

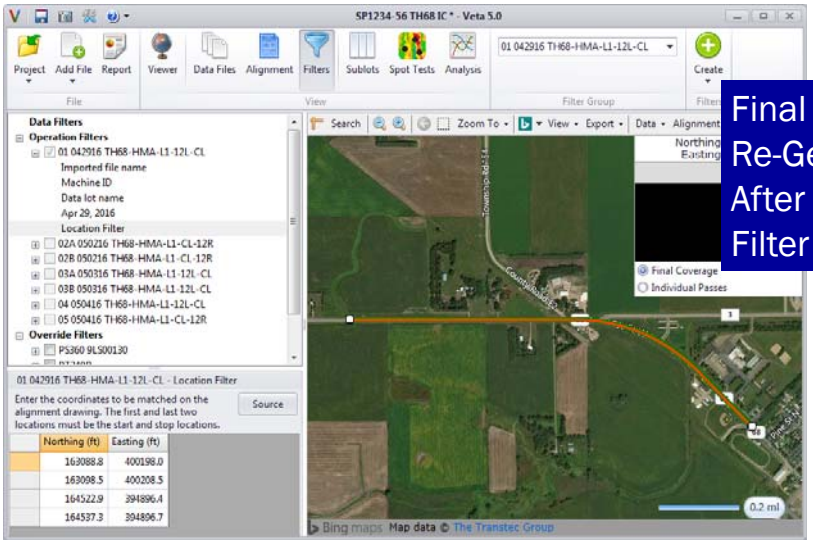
- Filters

New: Add cold central plant recycling (CCPR) as a material for the MnDOT template.

- Sublots

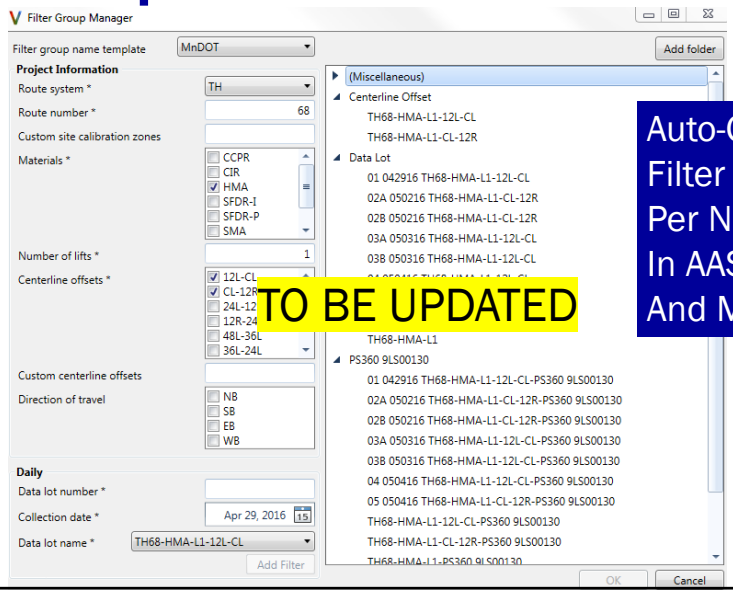
Fix: Clear the sublots after changing the start or stop locations without using the map.

Re-Designed Filters



Final Coverage Re-Generated After Each Filter Application

Filter Group Generator



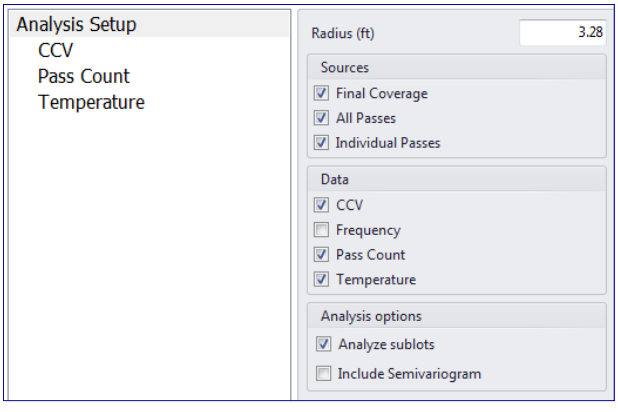
TO BE UPDATED

Auto-Generated
Filter Groups
Per Naming Convention
In AASHTO PP81
And MnDOT specs

Analysis

Flexible Analysis Options

- New: Choose items to analyze.
- New: List Cumulative Specification lower-left of screen for easy reference.
- New: Add a table for paver stops.
- Change: Specifications and setup have been rearranged to improve usability.



Analysis (Cont'd)

- Fix: Add Speed Analysis for sublots analyses.
- Fix: Fix the crashes when an Operation Filter did not match any data.
- Fix: Allow negative numbers in Specification Values.
- Fix: Exclude Transverse Semi-variogram table when the Semi-variogram analysis is not selected.

THE TRANSTEC GROUP

Analysis (Cont'd)

- Fix the crashes when the current filter group is deleted while viewing analysis results.
- Fix the crashes during sublot thermal differential analysis when there was not enough data (< 2 points).
- Fix the crashes when one of the analyses failed.

THE TRANSTEC GROUP

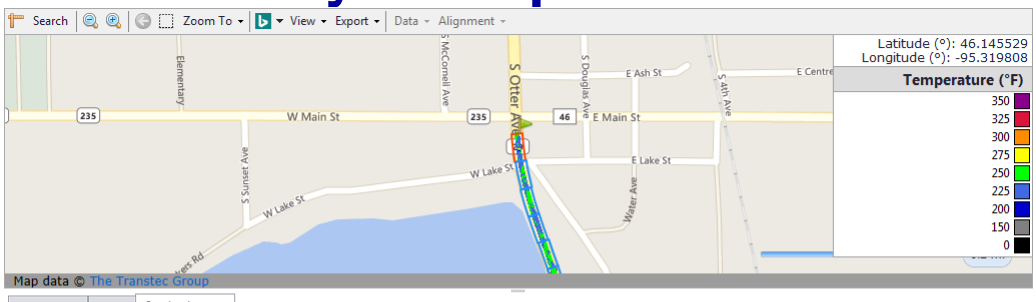
New Temperature Segregation Index (TSI)

Semivariogram Index Specification

☑ Use semivariogram target		Std. Dev. contribution (%)	50	TSV Index contribution (%)	50
TSI moderate start	30	Std. Dev. moderate start (°F)	4.5	TSV Index moderate start	10
TSI severe start	70	Std. Dev. severe start (°F)	9.0	TSV Index severe start	25
Moderate: At least 30 and less than 70. Severe: At least 70.		Moderate: At least 4.5 and less than 9.0 °F. Severe: At least 9.0 °F.		Moderate: At least 10 and less than 25. Severe: At least 25.	

Improved Segregation Index

New TSI Analysis Outputs



Distribution | Mean | Semivariogram

Statistic	Low	Low (%)	Moderate	Moderate (%)	Severe	Severe (%)	Last sublot Length (ft)	Last sublot Thermal Segregation Category
Standard Deviation	23	20.0	89	77.4	3	2.6	160.2	Low
Transverse Semivariogram Index	112	97.4	2	1.7	1	0.9	160.2	Low
Thermal Segregation Index	103	89.6	12	10.4	0	0.0	160.2	Low

Start distance (ft)	Length (ft)	Standard Deviation (°F)	Std. Dev. Category	TSV Index	TSV Index Category	Thermal Segregation Index	Thermal Segregation Category
0	150	8.91	Moderate	26.2	Severe	68.3	Moderate
150	150	5.96	Moderate	0.0	Low	22.2	Low
300	150	5.83	Moderate	0.0	Low	21.7	Low
450	150	3.85	Low	6.9	Low	23.6	Low
600	150	6.48	Moderate	11.7	Moderate	39.8	Moderate
750	150	5.59	Moderate	2.6	Low	24.3	Low

Temperature Segregation Index (TSI)

$$TSI = \begin{cases} c \times TSI_{StDev} + (100 - c) \times TSI_{TSV}, TSI < 100 \\ 100 \qquad\qquad\qquad\qquad\qquad\qquad\quad , TSI \geq 100 \end{cases}$$

where

$$TSI_{StDev} = 0.77 \times \frac{StDev}{StDev_{SevereStart}}$$

$$TSI_{TSV} = 0.77 \times \frac{TSV}{TSV_{SevereStart}}$$

$c = \%\ contribution\ of TSI_{StDev} to\ TSI,$
typical value = 50

Report Features

Versatile Reports

- New: Cumulative specification is now listed in the PDF report for easy reference.
- New: Add feature to allow choosing of what items to report.
- New: Add ability to include a logo and signature line in a report.
- Fix: Add Semivariogram charts in the PDF report.

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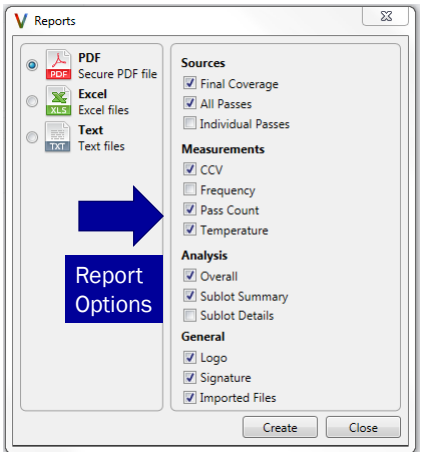
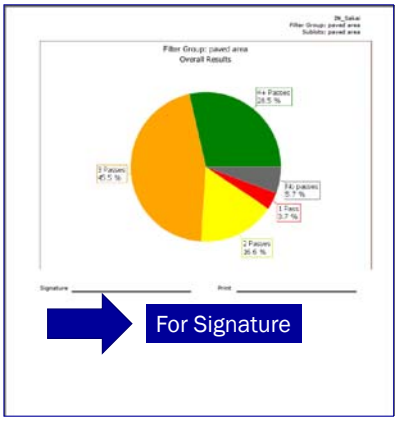
Report Features





Other Changes

Small Changes Big Impacts

- New: Add a button to clear temporary files.
- New: Add ability to recover project files if file saving after a crash.
- Change: For an existing project, the files won't be saved unless users explicitly save them.
- Performance Improvements. Allow to handle HUGE Project Files!

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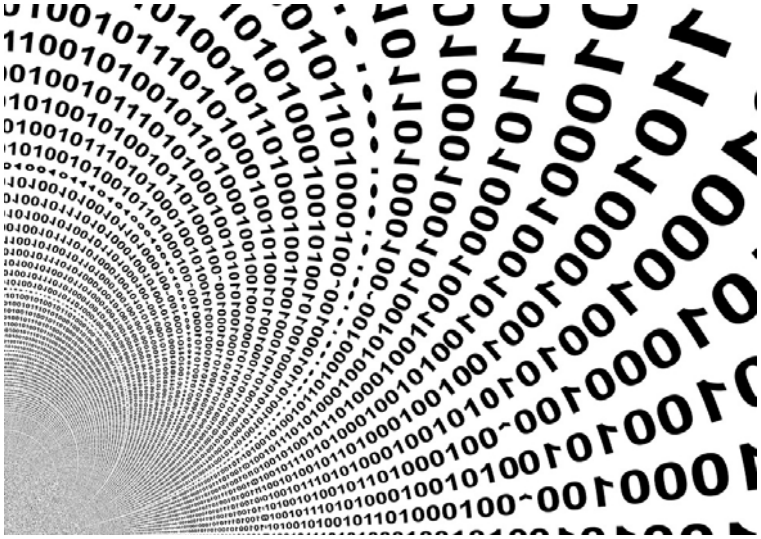
Veta 5 Performance Enhancements



Change
Files I/O
Management

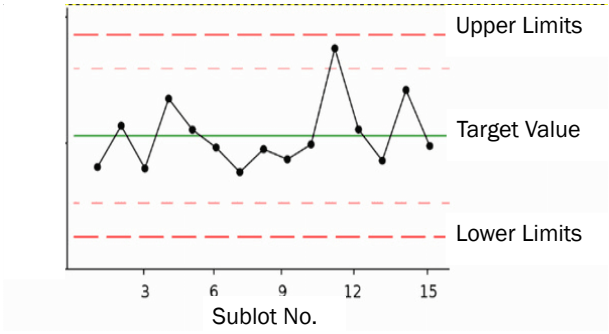
FASTER for
EVERY FUNCTION!

Veta 5.1 Features

Import MOBA Compaction Assist IC Retrofit (MCA-3000) Files

Veta 5.1+ Features

Mean Pass number, Temperature, etc.



Quality Control Charts

Offset lines to form new alignment

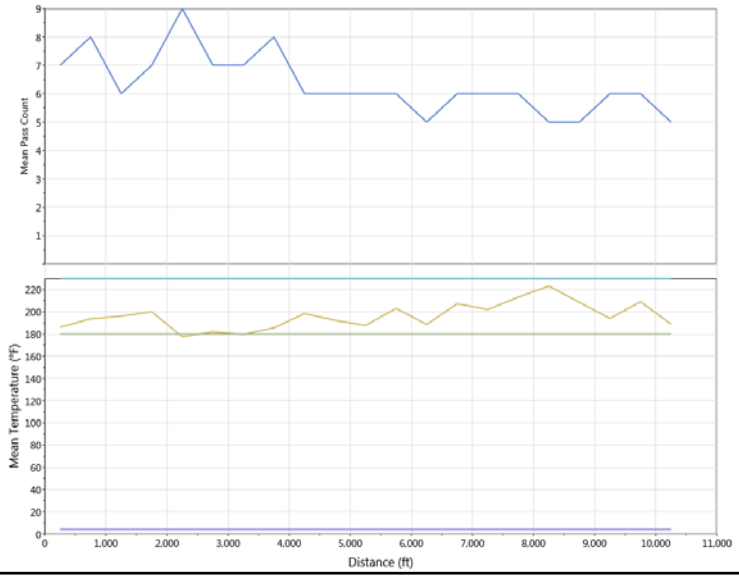
Example QC Charts (Passes, Temperature)

Quality control thresholds

Use quality control thresholds

Minimum (°F)	>	180.0
Maximum (°F)	<	230.0

Data must be > 180.0 °F and < 230.0 °F.



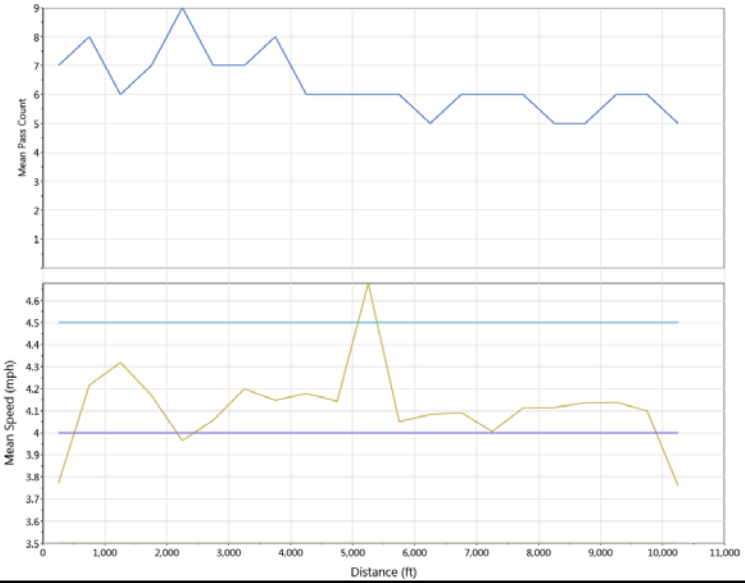
Example QC Charts (Passes, Speed)

Quality control thresholds

Use quality control thresholds

Minimum (mph)	>	3.5
Maximum (mph)	<	4.5

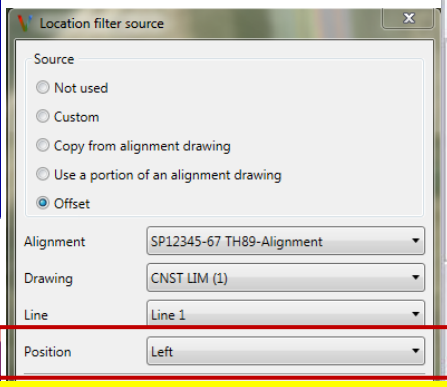
Data must be > 3.5 mph and < 4.5 mph.



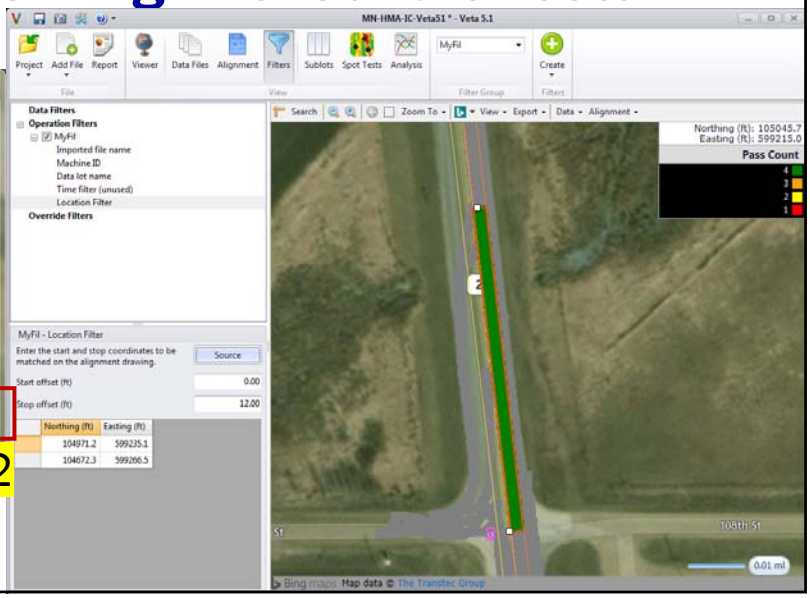
New Location Filter

- Added a new location filter that be created using only one line from an alignment and offsets.
- For example, 12 to 24 feet from the centerline. This allows the use of alignments that do not have all lanes defined.

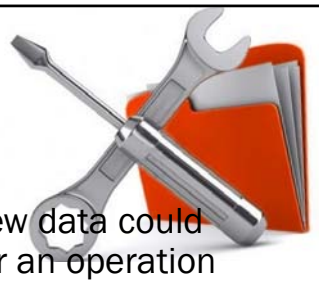
Define Area with Alignment and Offsets



REMOVED IN VETA 5.2



Fixes



- Import: Adding a data file that did not contain any new data could cause a crash when viewing “Imported file name” for an operation filter.
- Sublot: Changing most of the values did not clear the sublots.

New Report Features

- Created a new report that lists all filter settings for data lot filter groups.
- This provides an easier way to check for filter groups that may not have the correct settings.

Filter Group: 20170424-IC

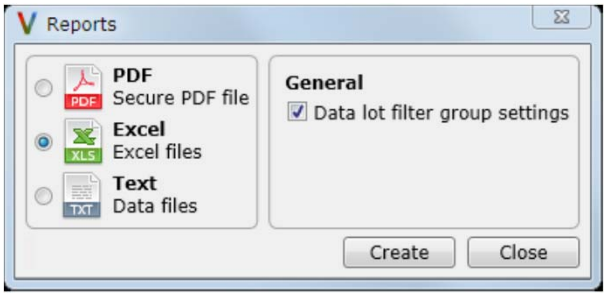
Operation Filter: 20170424-IC
  Location Filter (Custom)
  Imported file name = J1P1234-2017042
  Machine ID = CB64 304 RTK
  Data lot name = CAT1 042417, CAT1 42

Sublots: 20170424-IC
  Longitudinal length (ft): 500

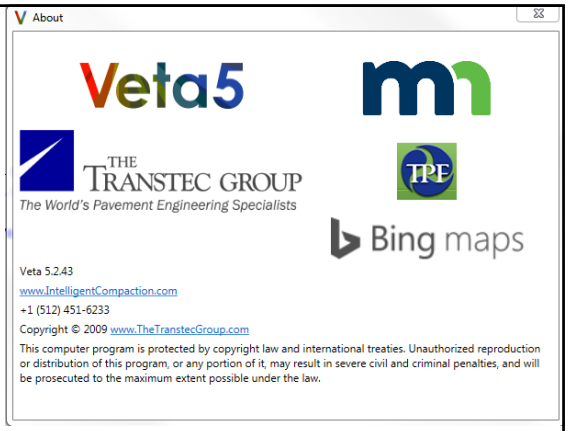
Pass Count
  70% of data must be >= 4.

Changed Report Features

- The screen now attempts to only show the options that are applicable and will disable the “Create” button if the selected options will not produce a report.
- Note there are still some rare scenarios that will not create a report, but these should only be scenarios that are not practical.



Veta 5.2 Features



Veta 5.2 New Features

- LandXML Support for Alignment Files
- AASHTO ICT Standard (TDS) File Support
  - First implementation: Trimble Thermal Profiler Data
- Import of MOBA IC Files
- Import of Leica IC files
- The Data Import Code has been Re-Written
- Many Behind-the-Scene Enhancements

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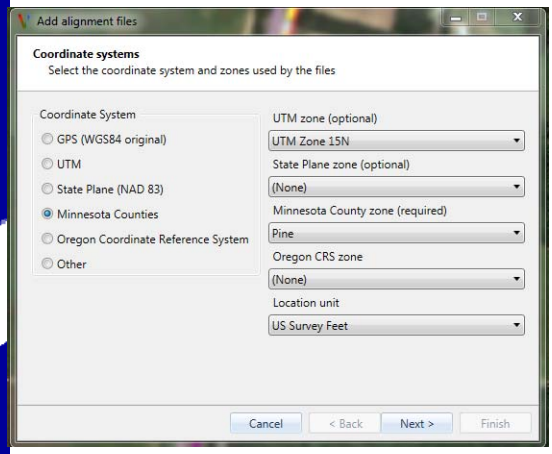
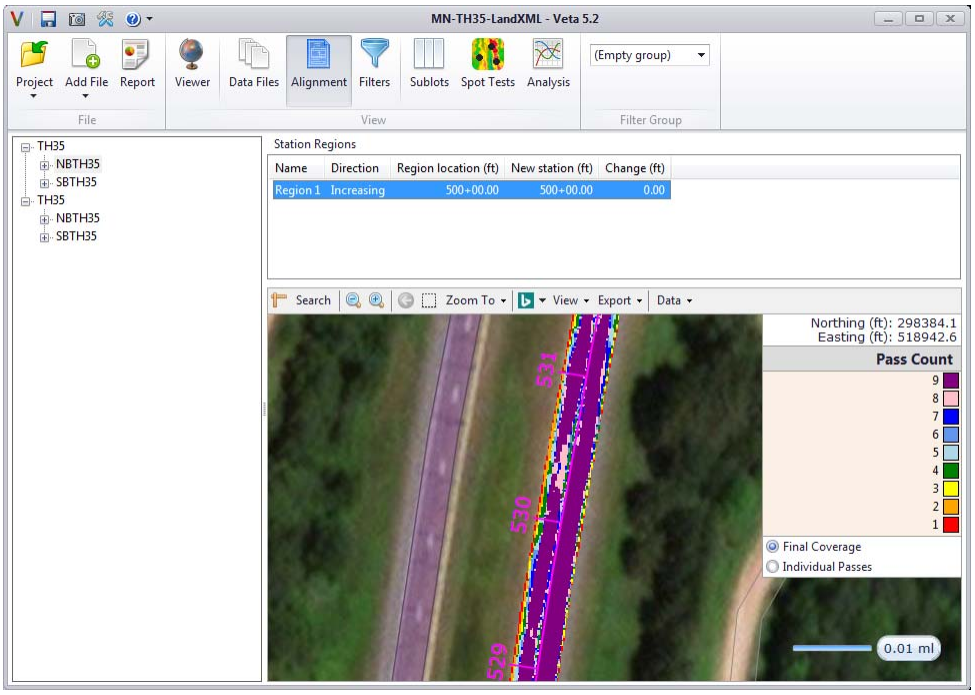
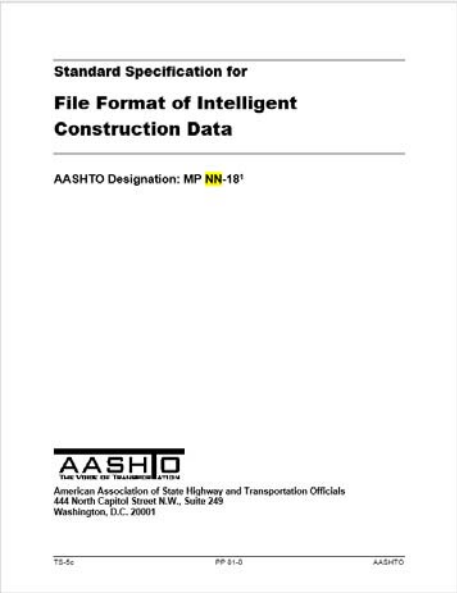
Alignment in LandXML Format



Vector Format – Scalable – Equations for Stationing



AASHTO Intelligent Construction Data File Format



Standard Specification for

File Format of Intelligent Construction Data

AASHTO Designation: MP NN-18[1]

AASHTO

American Association of State Highway and Transportation Officials
444 North Capitol Street N.W., Suite 249
Washington, D.C. 20001

TS-5c PP 81-0 AASHTO

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

AASHTO

THE VOICE OF TRANSPORTATION

File Format Type and Extension

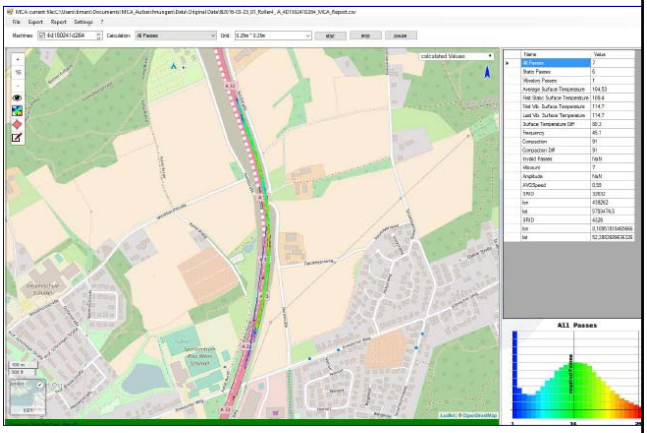
- Binary format for data
  - Performance
  - Space conservation
  - Protection against casual modification
- Text format for Metadata (data descriptions)
  - Easier for parsing and interpretation
- File name extension
  - “TDS” (Tagged Data Storage)

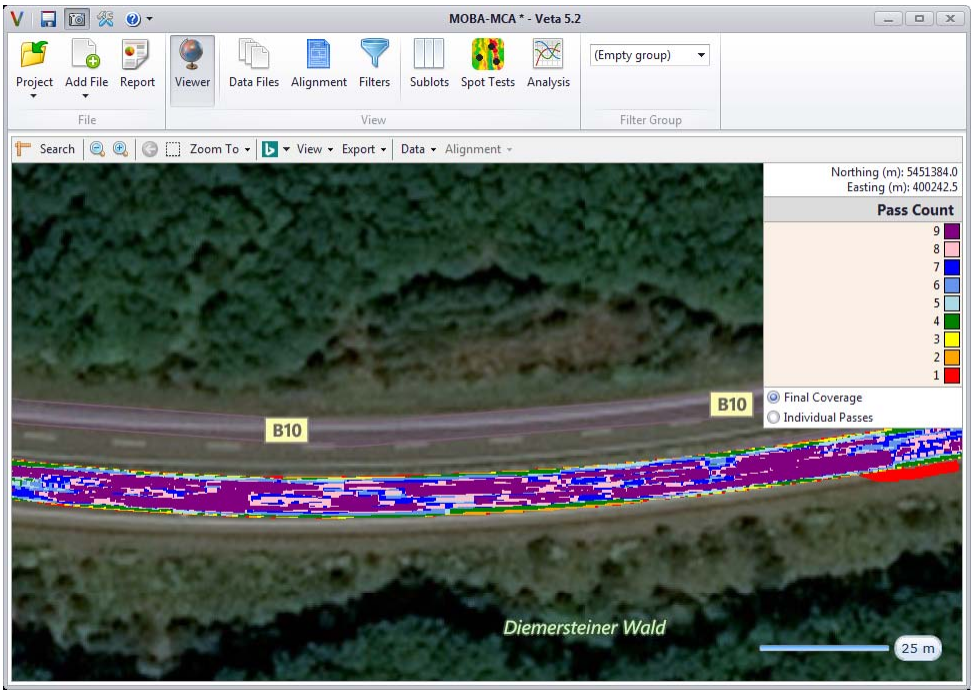
Trimble TDS Thermal Profiles

Not Actual Data

MOBA MCA3000 Retrofit IC Data *.csv

MOBA MCA3000 IC Display and Software

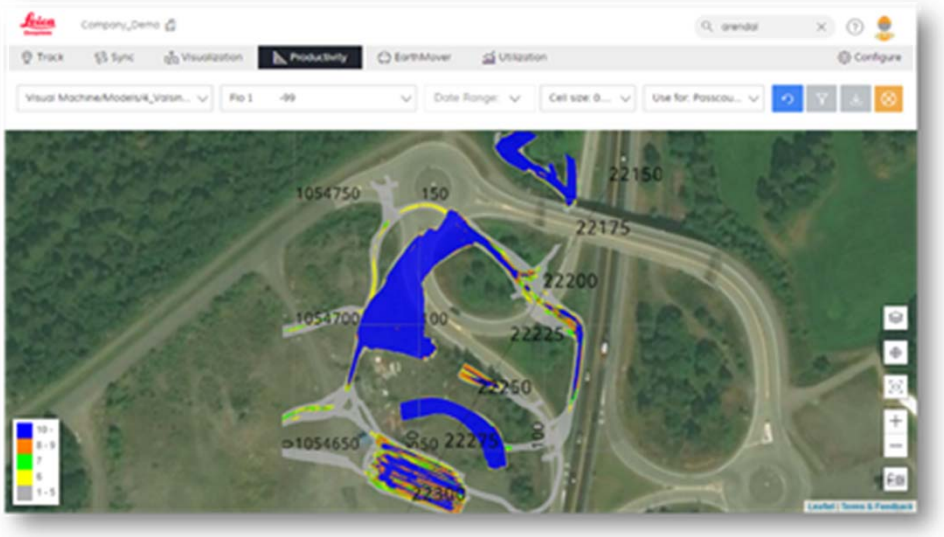


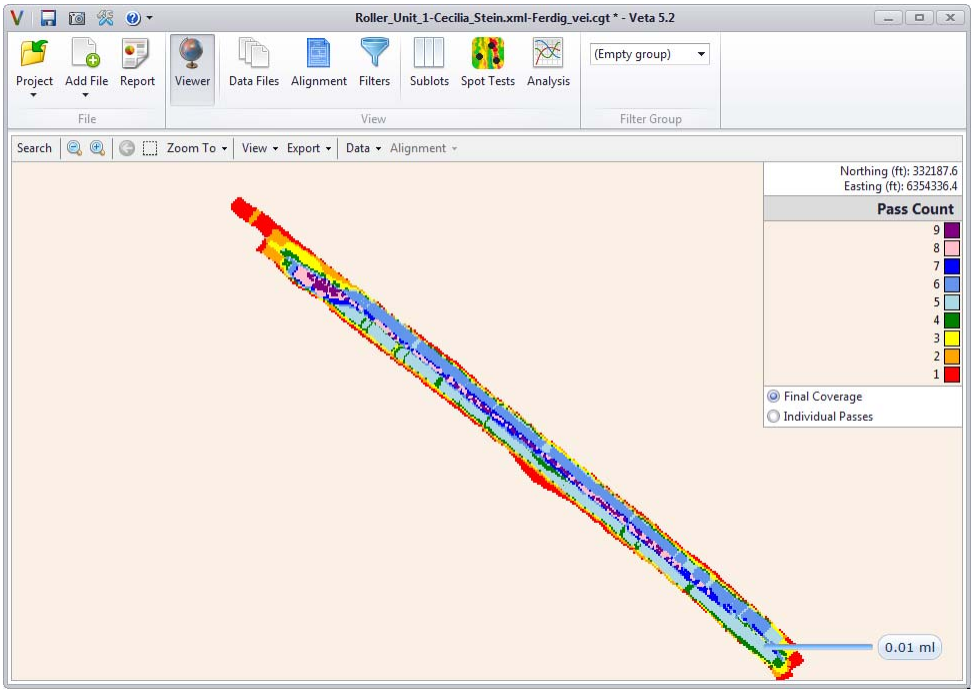


Leica CGT IC Retrofit Data – *.gz

CGT Data Files in Compressed GZ Format

Leica IC Software





Veta 6.0 Features

Planned Veta 6.0 New Features

- Display of Multiple Maps
- Load Different Types of Data into one Veta Project
- Filter Group Manager Enhancements
- Many Other Usability-Enhancement Features

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