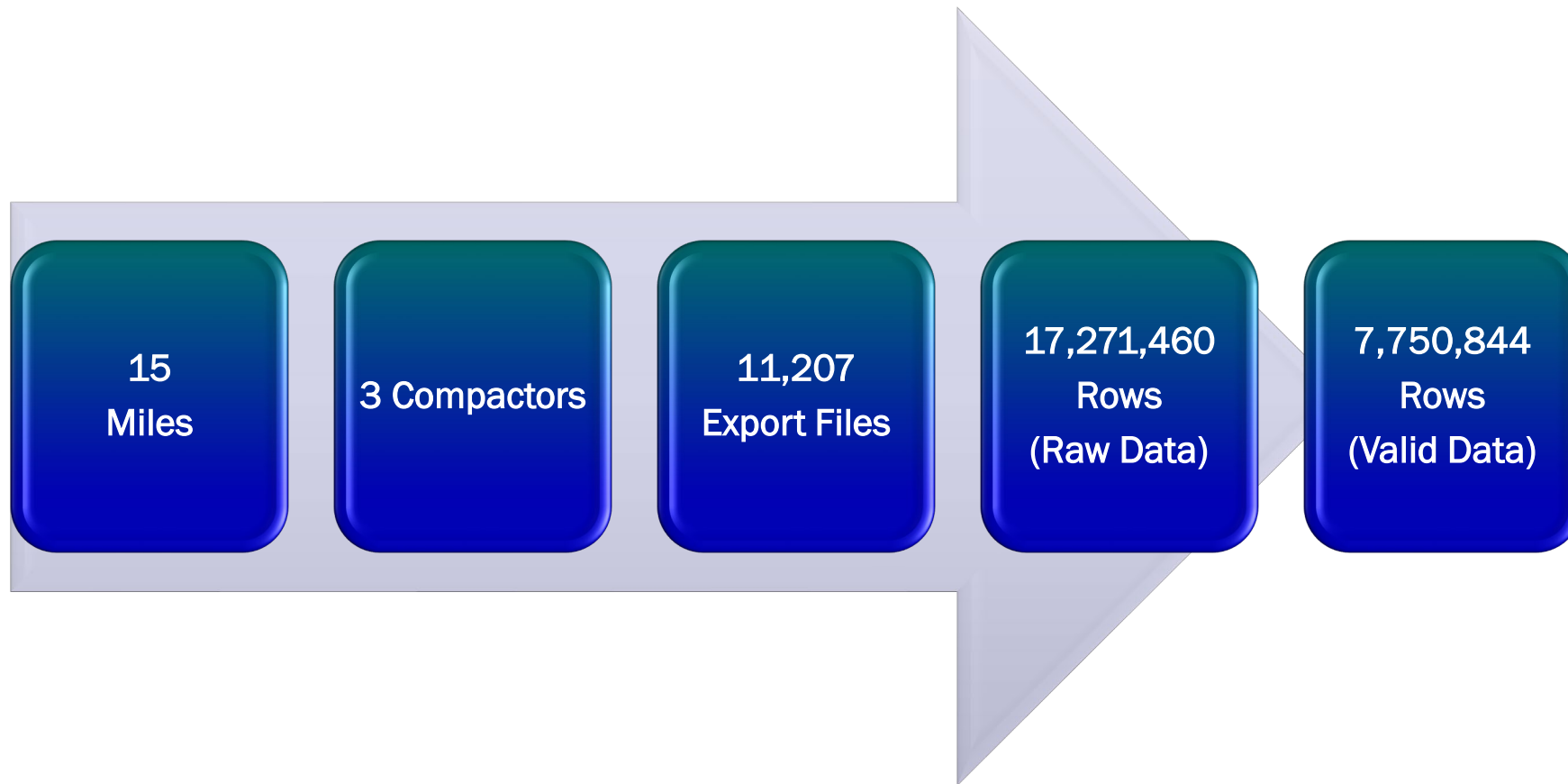


# Introduction to Veta

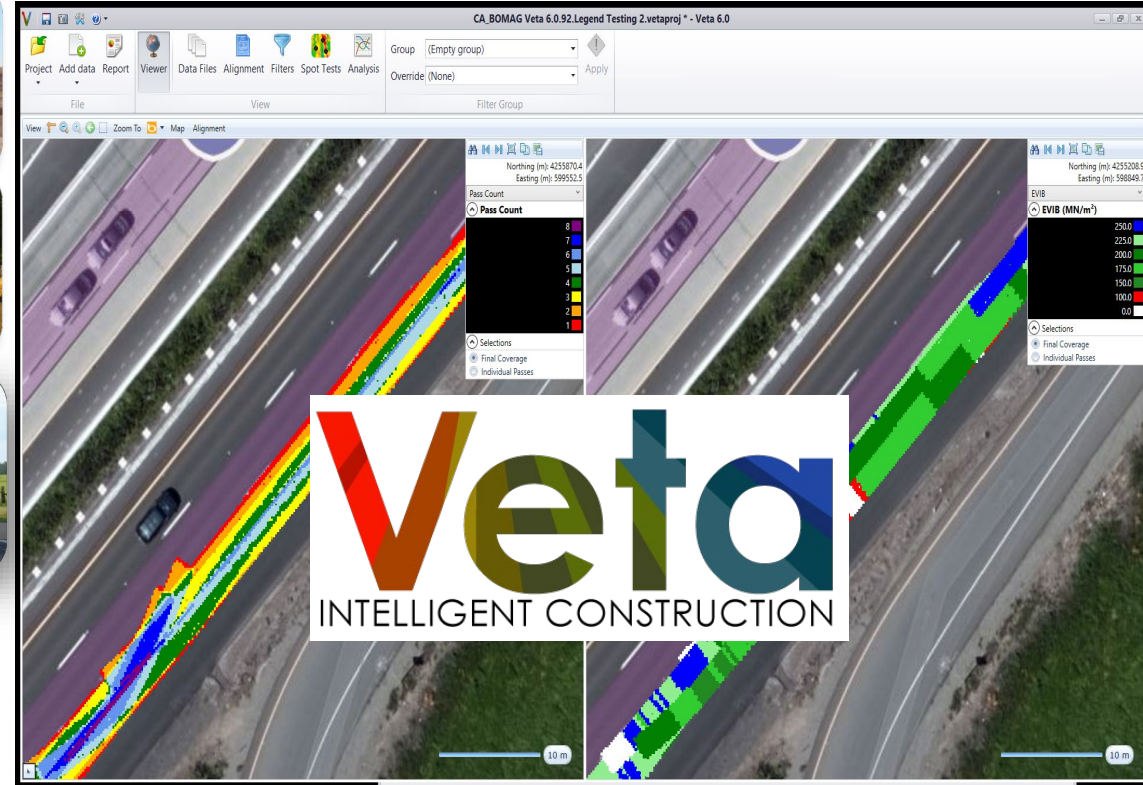
# Instrumented Rolling Train



# Massive IC Data







# What is Veta

- Intelligent Construction Data Management (ICDM)
- Funded by MnDOT and TPF Study
- IP co-own by MnDOT and Transtec Group
- Standard Post-processing Tool for geospatial data

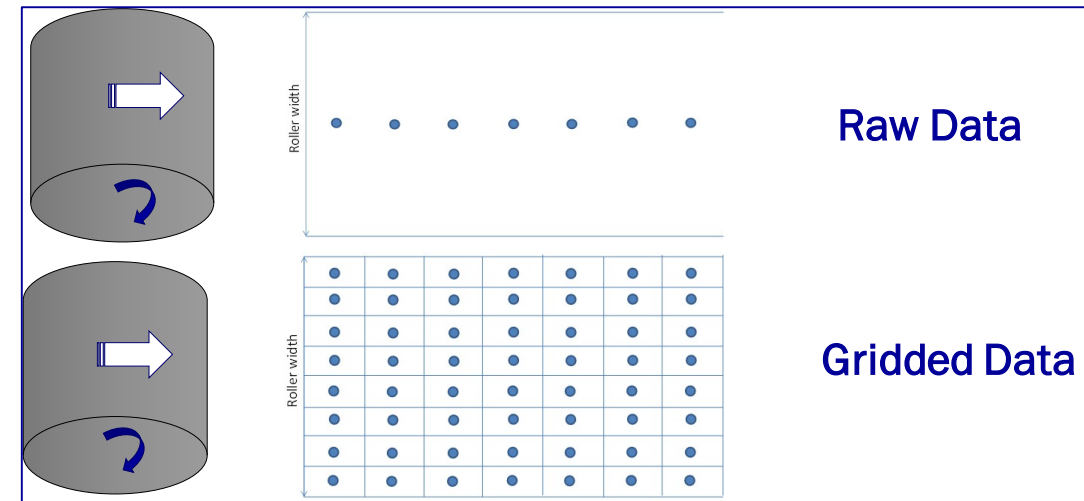
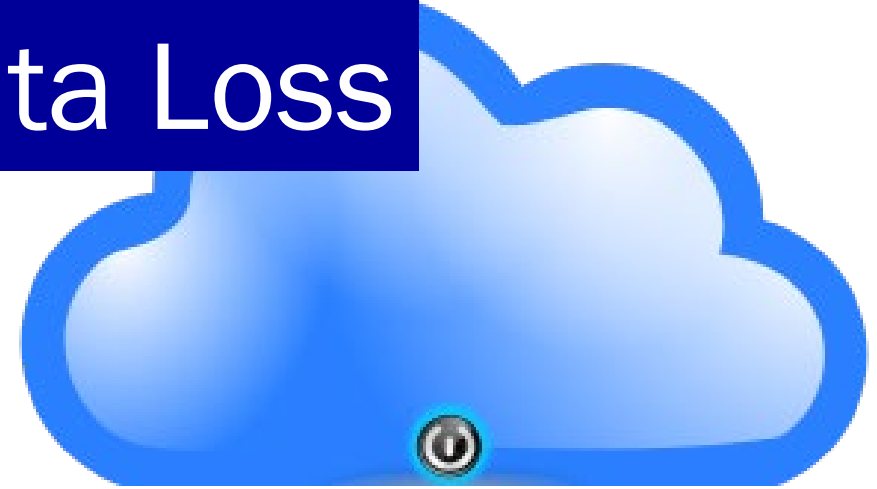
# Why Using Veta

- Critical for Standardization
- Robust and Powerful for Data Management
- Included in IC Specs
  - FHWA
  - AASHTO
  - Many States IC specs
- ICDM and Veta Pooled Fund Study
- Public domain – Free

# 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



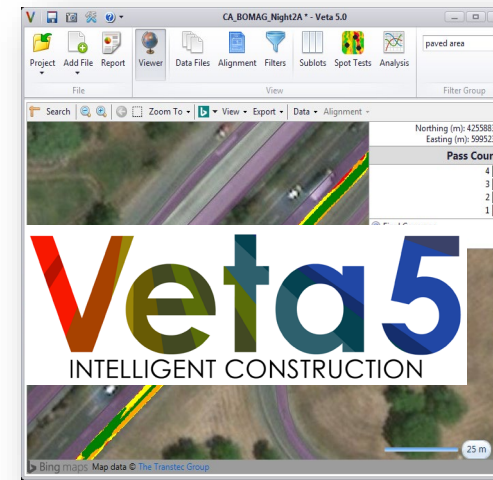
Manually  
"Push"

Project and Machines IDs  
setup



Ungridded  
or gridded  
data files

Storage  
time



user  
log-in for  
access





# Direct Download - TOPCON

**Topcon data download**

Username: [Redacted]  
Password: [Redacted]  
Account: [Redacted]  
Site: 2017 Paving  
Start date: September 11, 2017  
Stop date (inclusive): September 14, 2017  
Buttons: Sign in, List sites, Download, Cancel  
Status: 4 sites found.

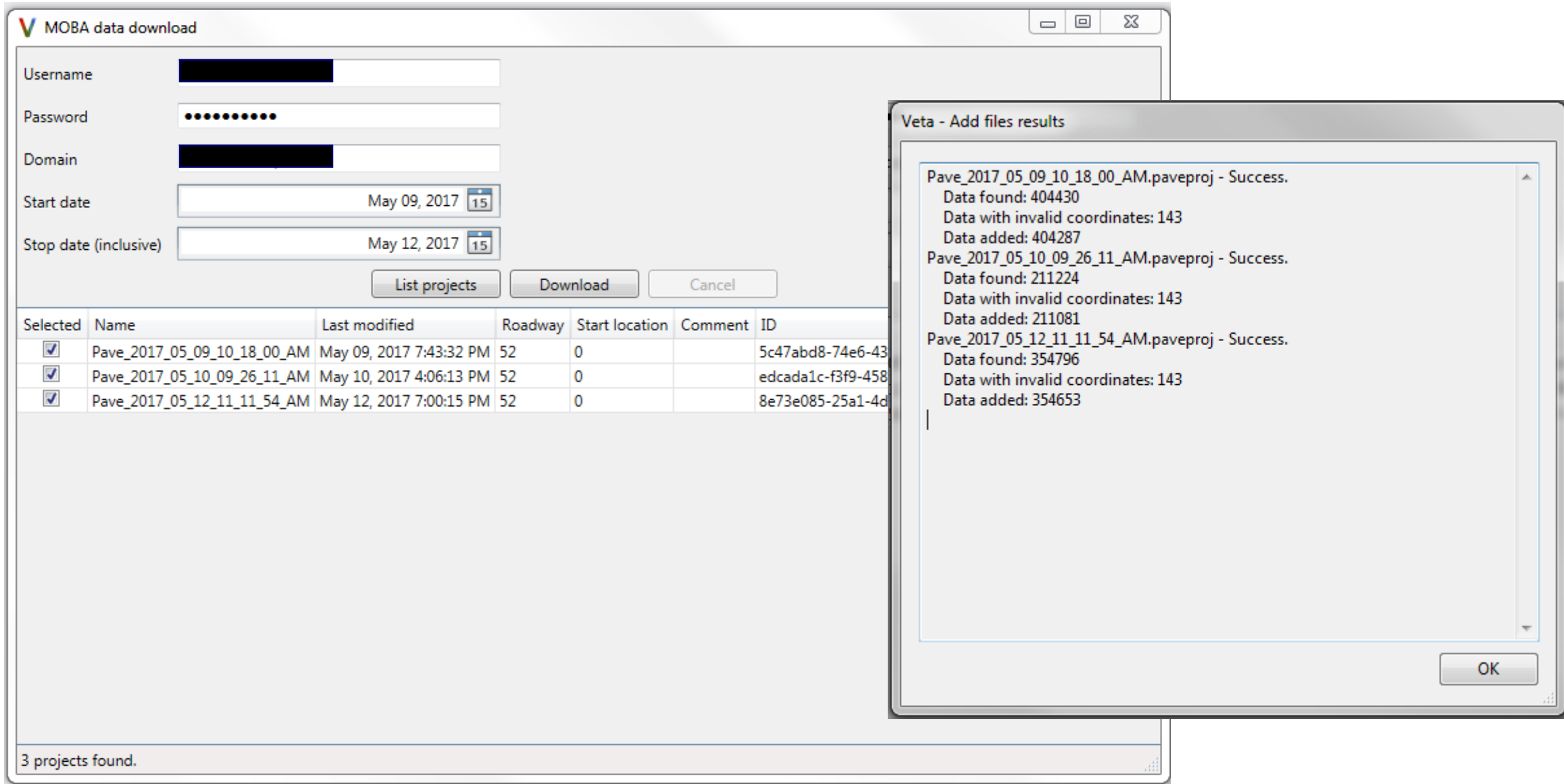
**Topcon data download**

Username: [Redacted]  
Password: [Redacted]  
Account: [Redacted]  
Site: 2017 Paving  
Start date: September 11, 2017  
Stop date (inclusive): September 14, 2017  
Buttons: Download, Cancel  
Status: Importing file 2 of 4: 2017-09-12.csv

**Veta - Add files results**

- 2017-09-11.csv - Success.  
Data found: 114972  
Data with invalid coordinates: 6061  
Data added: 108911
- 2017-09-12.csv - Success.  
Data found: 95023  
Data with invalid coordinates: 6532  
Data added: 88491
- 2017-09-13.csv - Success.  
Data found: 104743  
Data with invalid coordinates: 4410  
Data added: 100333
- 2017-09-14.csv - Success.  
Data found: 109933  
Data with invalid coordinates: 5513  
Data added: 104420

# Direct download – MOBA PAVE-IR



The image shows a screenshot of a web application interface for downloading MOBA data. The main window, titled "MOBA data download", contains a login form with fields for Username, Password, and Domain. Below these are date pickers for "Start date" (May 09, 2017) and "Stop date (inclusive)" (May 12, 2017). There are three buttons: "List projects", "Download", and "Cancel". A table lists three projects, all of which are selected. The table has columns: Selected, Name, Last modified, Roadway, Start location, Comment, and ID. At the bottom of the window, it says "3 projects found."

Overlaid on the right is a smaller dialog box titled "Veta - Add files results". It contains a text area with the following results:

- Pave\_2017\_05\_09\_10\_18\_00\_AM.paveproj - Success.  
Data found: 404430  
Data with invalid coordinates: 143  
Data added: 404287
- Pave\_2017\_05\_10\_09\_26\_11\_AM.paveproj - Success.  
Data found: 211224  
Data with invalid coordinates: 143  
Data added: 211081
- Pave\_2017\_05\_12\_11\_11\_54\_AM.paveproj - Success.  
Data found: 354796  
Data with invalid coordinates: 143  
Data added: 354653

The dialog box has an "OK" button at the bottom right.

Selected	Name	Last modified	Roadway	Start location	Comment	ID
<input checked="" type="checkbox"/>	Pave_2017_05_09_10_18_00_AM	May 09, 2017 7:43:32 PM	52	0		5c47abd8-74e6-43
<input checked="" type="checkbox"/>	Pave_2017_05_10_09_26_11_AM	May 10, 2017 4:06:13 PM	52	0		edcada1c-f3f9-458
<input checked="" type="checkbox"/>	Pave_2017_05_12_11_11_54_AM	May 12, 2017 7:00:15 PM	52	0		8e73e085-25a1-4d

# Data Import Wizard

## List of Machines

Machine

(None) ▼

(None)

Ames

BOMAG

Caterpillar

Dynapac

HAMM

MOBA

Sakai

Topcon

Trimble

Volvo

Check Imported Values

Machine

MOBA ▼

Coordinate System

☒ GPS (WGS84 original)

☐ UTM

☐ State Plane (NAD 83)

☐ Minnesota Counties

☐ Oregon Coordinate Reference System

☐ Not listed

UTM Zone (optional)

UTM Zone 15N ▼

State Plane Zone (optional)

(None) ▼

Minnesota County Zone (optional)

(None) ▼

Oregon CRS zone

(None) ▼

< Back Next > Cancel

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

**RECOUNT**

# Map – Filters - Sublots

- Map

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

- Filters

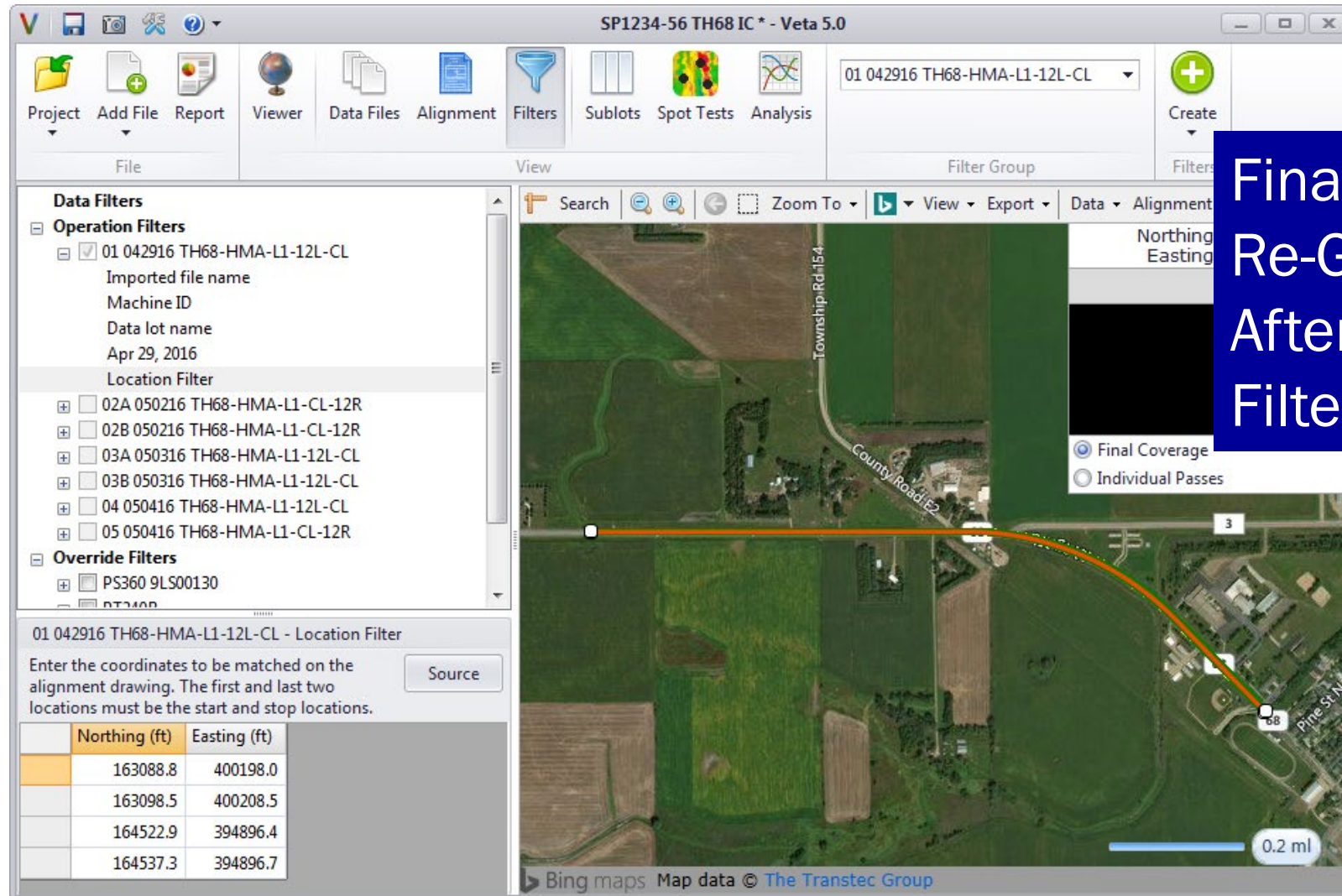
New: Add cold central plant recycling (CCPR) as a material for the MnDOT template.

- Sublots

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



# Filters



Final Coverage  
Re-Generated  
After Each  
Filter Application

# Filter Group Generator

**Filter Group Manager**

Filter group name template: MnDOT

**Project Information**

Route system \*: TH

Route number \*: 68

Custom site calibration zones:

Materials \*  
☐ CCPR  
☐ CIR  
☒ HMA  
☐ SFDR-I  
☐ SFDR-P  
☐ SMA

Number of lifts \*: 1

Centerline offsets \*  
☒ 12L-CL  
☒ CL-12R  
☐ 24L-12L  
☐ 12R-24R  
☐ 48L-36L  
☐ 36L-24L

Custom centerline offsets:

Direction of travel  
☐ NB  
☐ SB  
☐ EB  
☐ WB

**Daily**

Data lot number \*:

Collection date \*: Apr 29, 2016

Data lot name \*: TH68-HMA-L1-12L-CL

Add Filter

**Filter Groups**

- (Miscellaneous)
- Centerline Offset
  - TH68-HMA-L1-12L-CL
  - TH68-HMA-L1-CL-12R
- Data Lot
  - 01 042916 TH68-HMA-L1-12L-CL
  - 02A 050216 TH68-HMA-L1-CL-12R
  - 02B 050216 TH68-HMA-L1-CL-12R
  - 03A 050316 TH68-HMA-L1-12L-CL
  - 03B 050316 TH68-HMA-L1-12L-CL
  - 04 050416 TH68-HMA-L1-12L-CL
  - 05 050416 TH68-HMA-L1-CL-12R
- Lift
  - TH68-HMA-L1
- PS360 9LS00130
  - 01 042916 TH68-HMA-L1-12L-CL-PS360 9LS00130
  - 02A 050216 TH68-HMA-L1-CL-12R-PS360 9LS00130
  - 02B 050216 TH68-HMA-L1-CL-12R-PS360 9LS00130
  - 03A 050316 TH68-HMA-L1-12L-CL-PS360 9LS00130
  - 03B 050316 TH68-HMA-L1-12L-CL-PS360 9LS00130
  - 04 050416 TH68-HMA-L1-12L-CL-PS360 9LS00130
  - 05 050416 TH68-HMA-L1-CL-12R-PS360 9LS00130
  - TH68-HMA-L1-12L-CL-PS360 9LS00130
  - TH68-HMA-L1-CL-12R-PS360 9LS00130
  - TH68-HMA-L1-PS360 9LS00130

OK Cancel

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.

The screenshot displays the 'Analysis Setup' dialog box, which is divided into two main sections. The left section, titled 'Analysis Setup', contains a list of items to analyze: 'CCV', 'Pass Count', and 'Temperature'. The right section contains three sub-sections: 'Radius (ft)' with a value of 3.28, 'Sources' with three checked options ('Final Coverage', 'All Passes', and 'Individual Passes'), 'Data' with four options ('CCV' checked, 'Frequency' unchecked, 'Pass Count' checked, and 'Temperature' checked), and 'Analysis options' with two options ('Analyze sublots' checked and 'Include Semivariogram' unchecked).

Analysis Setup	
CCV	<input checked="" type="checkbox"/>
Pass Count	<input checked="" type="checkbox"/>
Temperature	<input checked="" type="checkbox"/>

Radius (ft)	
3.28	

Sources	
<input checked="" type="checkbox"/> Final Coverage	
<input checked="" type="checkbox"/> All Passes	
<input checked="" type="checkbox"/> Individual Passes	

Data	
<input checked="" type="checkbox"/> CCV	
<input type="checkbox"/> Frequency	
<input checked="" type="checkbox"/> Pass Count	
<input checked="" type="checkbox"/> Temperature	

Analysis options	
<input checked="" type="checkbox"/> Analyze sublots	
<input type="checkbox"/> Include Semivariogram	

# 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.



# Analysis (Cont'd)

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



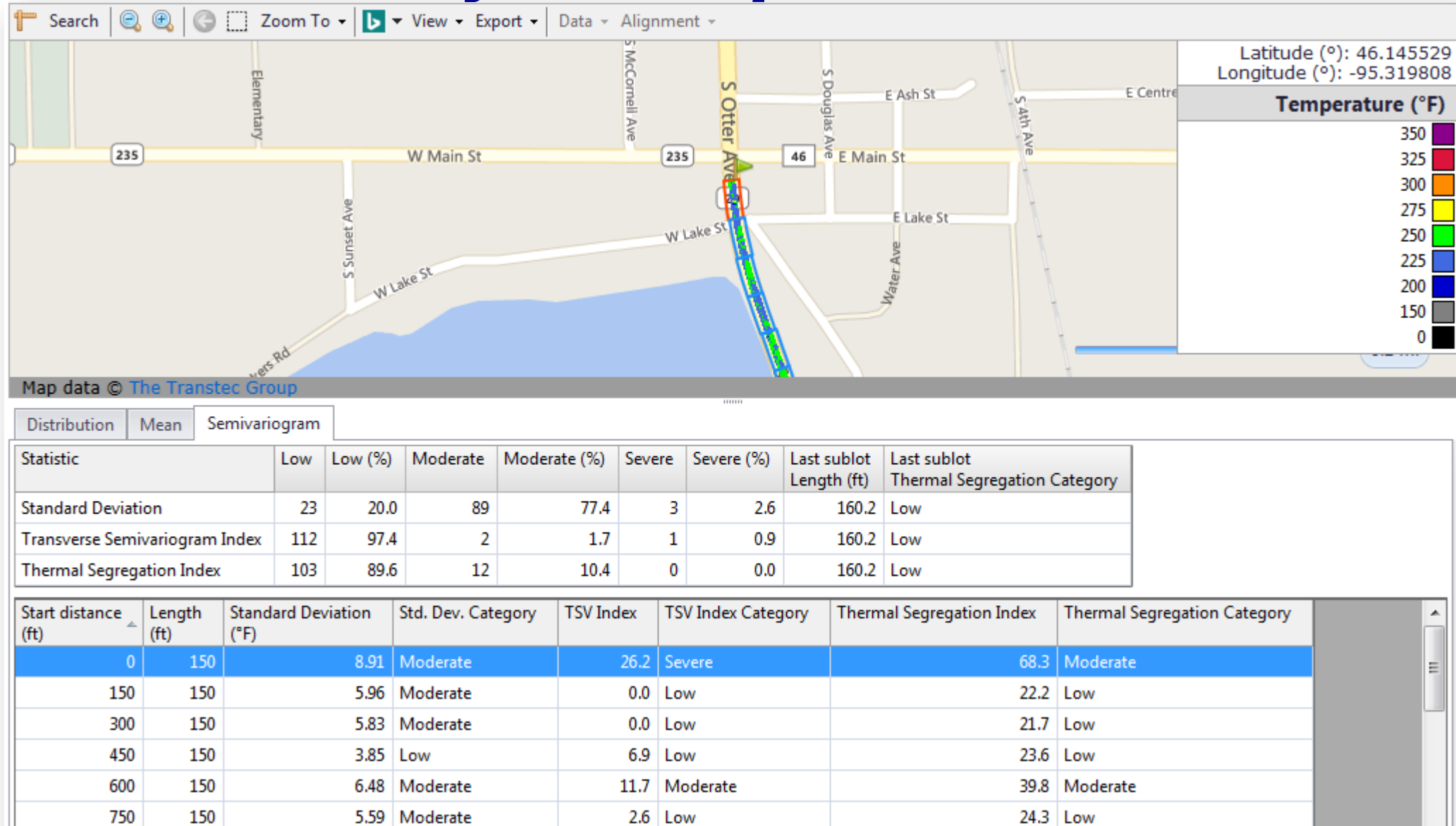


# New Temperature Segregation Index (TSI)

Semivariogram Index Specification					
<input checked="" type="checkbox"/> Use semivariogram target		Std. Dev. contribution (%)	<input type="text" value="50"/>	TSV Index contribution (%)	<input type="text" value="50"/>
TSI moderate start	<input type="text" value="30"/>	Std. Dev. moderate start (°F)	<input type="text" value="4.5"/>	TSV Index moderate start	<input type="text" value="10"/>
TSI severe start	<input type="text" value="70"/>	Std. Dev. severe start (°F)	<input type="text" value="9.0"/>	TSV Index severe start	<input type="text" value="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



# 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.

# Report Features



**V Reports**

**PDF**  
Secure PDF file

**Excel**  
Excel files

**Text**  
Text files

**Sources**

- ☒ Final Coverage
- ☒ All Passes
- ☐ Individual Passes

**Measurements**

- ☒ CCV
- ☐ Frequency
- ☒ Pass Count
- ☒ Temperature

**Analysis**

- ☒ Overall
- ☒ Sublot Summary
- ☐ Sublot Details

**General**

- ☒ Logo
- ☒ Signature
- ☒ Imported Files

**Create** **Close**



**VETA**

IN\_Sakai  
Filter Group: paved area  
Sublots: paved area

**Project Information**

Name	Value
Machine	Sakai
Selected coordinate system	UTM Zone 16N
Available coordinate systems	GPS (WGS84 original) UTM Zone 16N

**Imported Files**

**Summary**

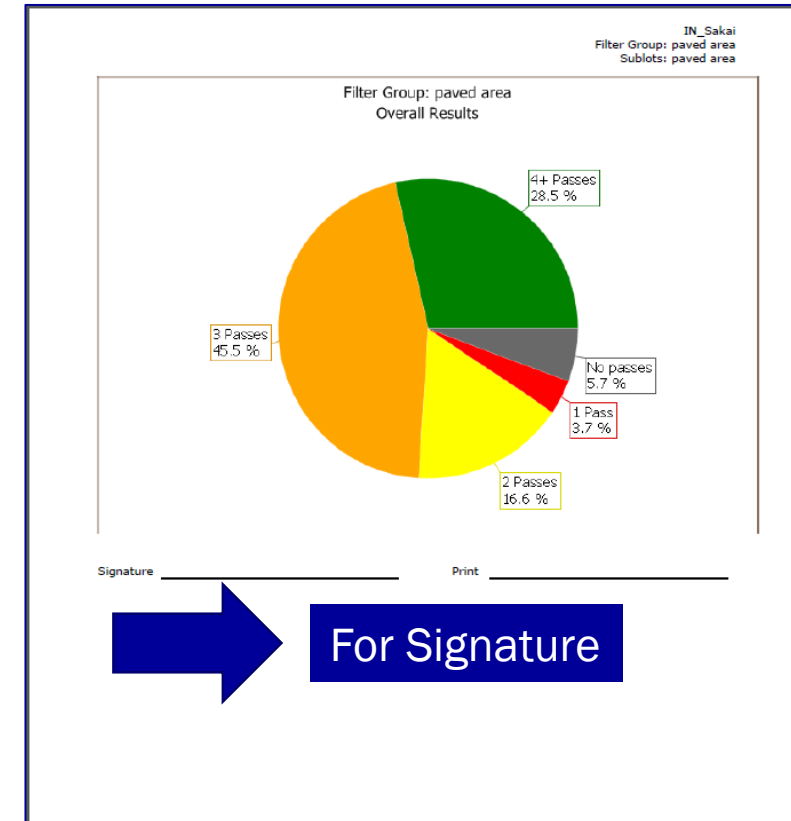
Name	Source	Size (KB)	Time Imported	Data Found	Invalid Coordinates	Duplicates	Added
IN_TB04_2.pln	Manual	23,260	Jan 31, 2018 1:39 PM	154,733	0	0	154,733

IN\_TB04\_2.pln

**Original File Information**

FLAG=1  
GLOBAL=1  
Created Date and Time=20090918102540  
Constructed Date and Time=  
TIMES=1  
ID=2000000001  
Name=Area01  
U\_U\_I\_D=289b9fef-4d36-4763-b509-142ec520635e  
Layer=1  
Status=4  
Configuration Number=1  
Range=500495.838,4479666.501,0.000 501086.990,4479639.470,0.000 501402.600,4479634.990,0.000 501661.440,4479632.742,0.000 501669.840,4479632.669,0.000 501949.460,4479630.240,0.000 502873.482,4479620.607,0.000 502873.482,4479643.955,0.000 501961.280,4479653.690,0.000 501669.840,4479660.898,0.000 501661.440,4479661.106,0.000 500875.290,4479680.550,0.000 500448.150,4479706.560,0.000 499962.690,4479782.310,0.000 499570.199,4479880.277,0.000 497488.378,4480463.732,0.000 497378.725,4480494.464,0.000 497367.390,4480460.848,0.000 498749.206,4480073.577,0.000 499650.850,4479821.390,0.000 499807.170,4479780.730,0.000 500086.160,4479721.950,0.000 500356.180,4479680.620,0.000 500492.820,4479666.653,0.000 500495.838,4479666.501,0.000  
Required Layer Thickness=0.300  
Required CCV=10.000  
Required Frequency=8.000  
Date of Creation=2009/09/18 10:25:40  
Start Date=2009/09/18 06:00  
End Date=  
Geographic Coordinate System=WGS84  
Geoidal Height=0.0  
Plane Rectangular Coordinates=UTM zone 16N (NAD83)  
XY=1  
ORIGINX=447367.3750  
ORIGINY=4429620.5000  
MESHANGLE=0.000  
MESHSIZE=0.300  
UNIT=0  
HOSOUmode=1

8.50 x 11.00 in  
Veta 5.0.44  
Page 1 of 4  
Feb 01, 2018 12:16:10 PM



## 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!

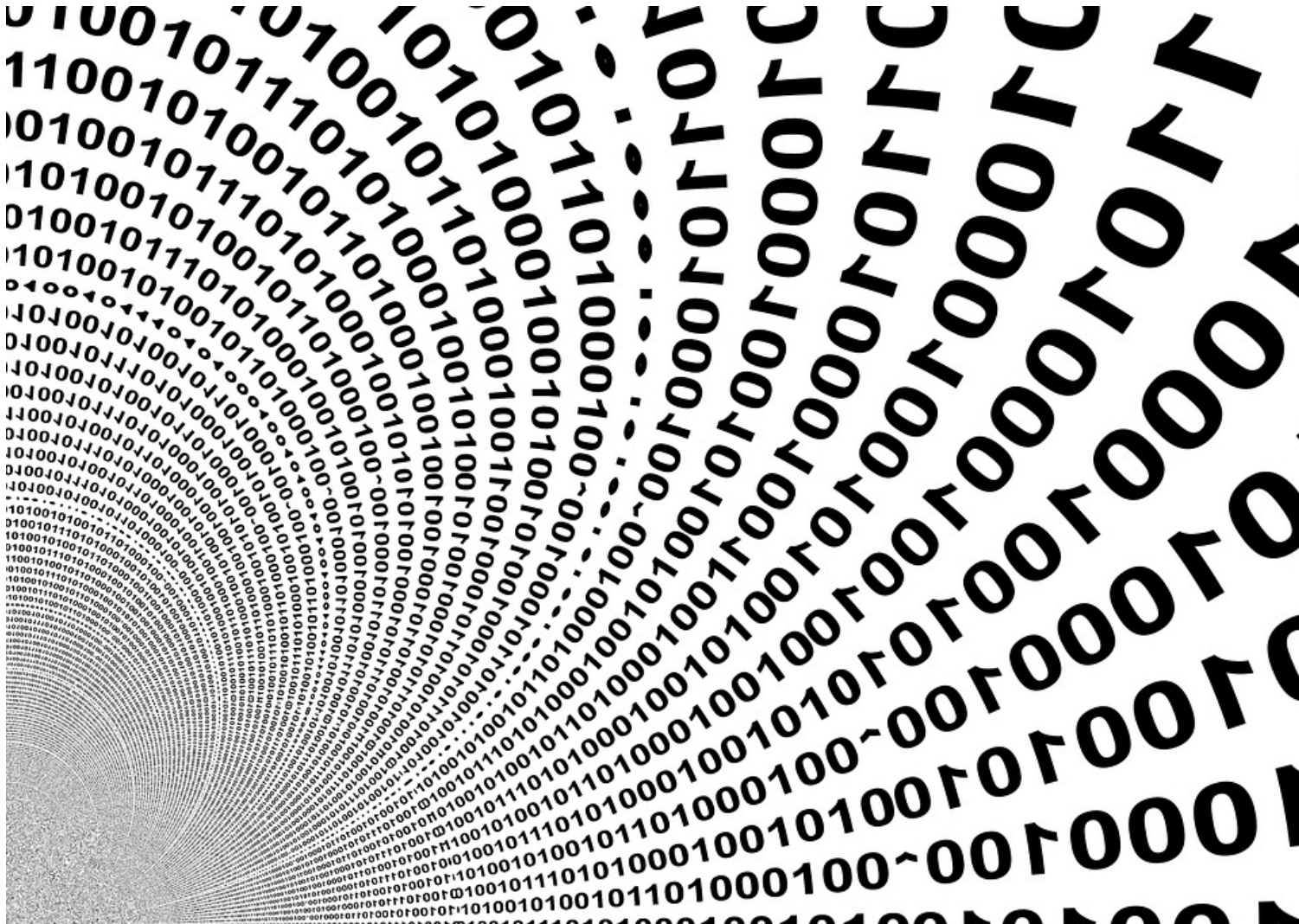




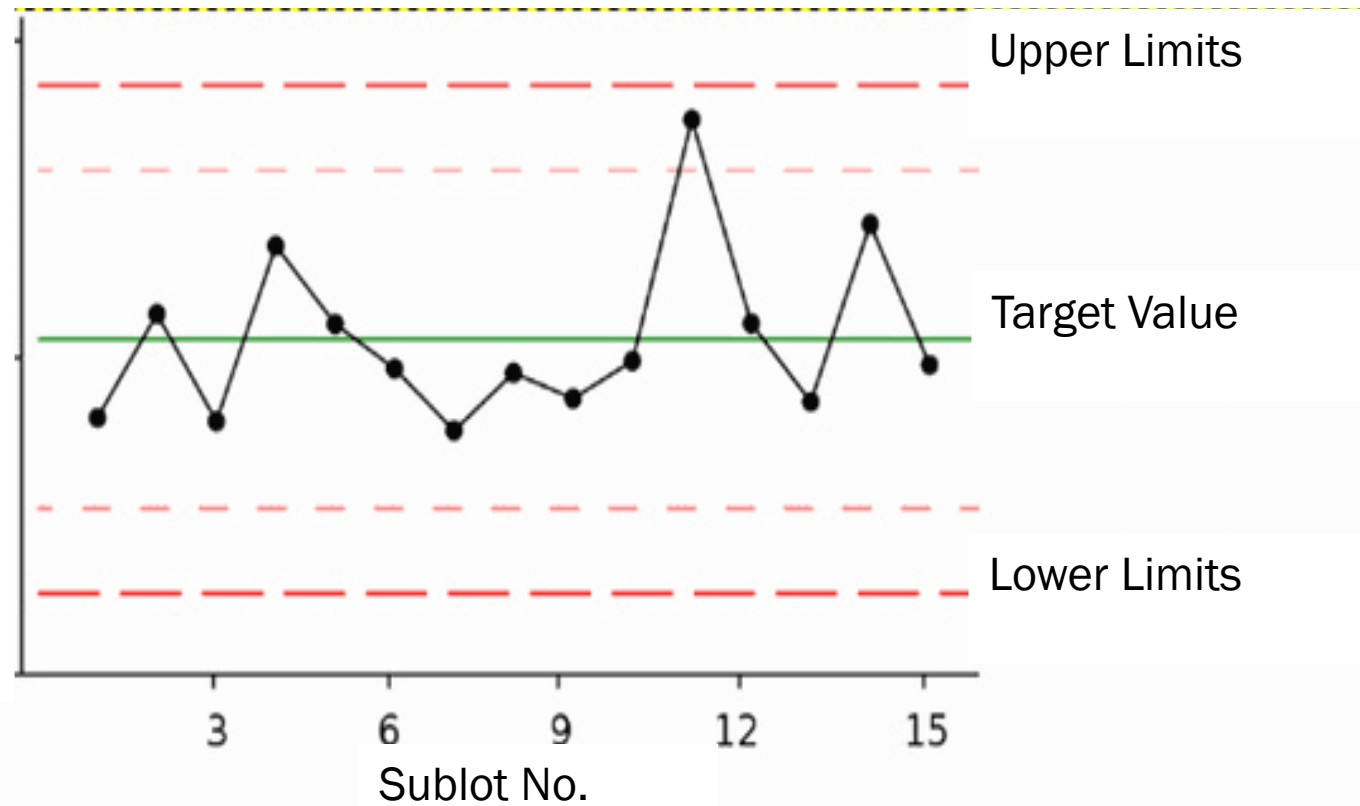
# Veta 5 Performance Enhancements

Change  
Files I/O  
Management

**FASTER for  
EVERY FUNCTION!**



# Quality Control Charts



# Quality Control Charts (Passes, Temp)

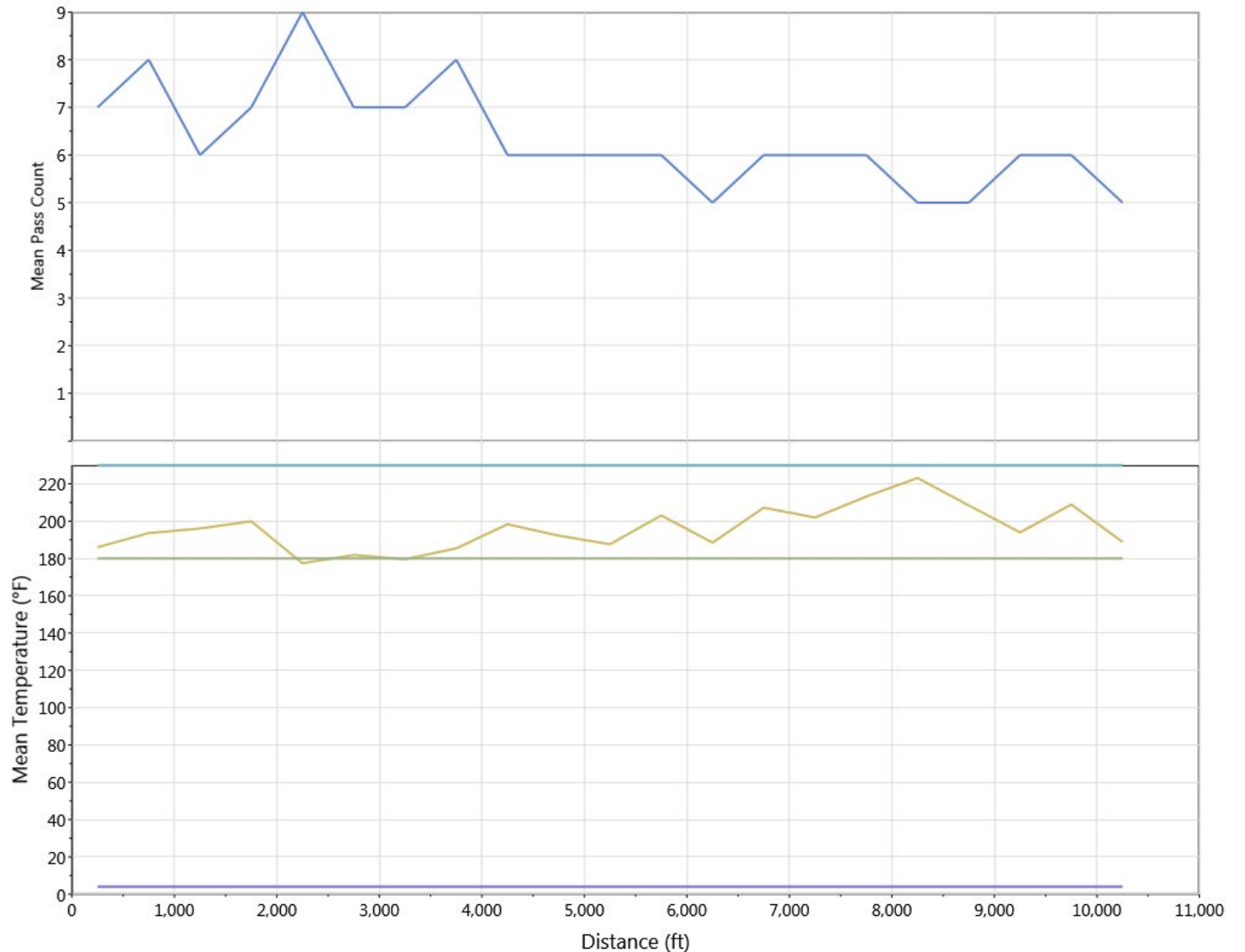
Quality control thresholds

☒ Use quality control thresholds

Minimum (°F) >

Maximum (°F) <

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



# Quality Control Charts (Passes, Speed)

Quality control thresholds

☒ Use quality control thresholds

Minimum (mph) >

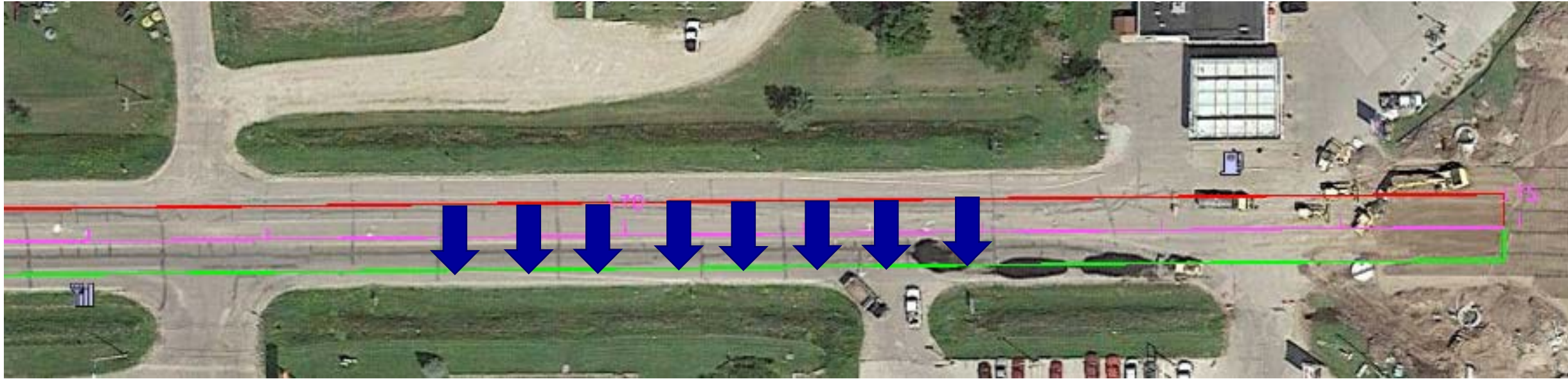
Maximum (mph) <

Data must be > 3.5 mph and < 4.5 mph.





# Offset Alignment to Create Boundary





# Define Area with Alignment and Offsets

The screenshot displays the Veta 5.1 software interface. On the left, the 'Location filter source' dialog is open, showing the 'Offset' option selected under the 'Source' section. The 'Alignment' is set to 'SP12345-67 TH89-Alignment', 'Drawing' to 'CNST LIM (1)', 'Line' to 'Line 1', and 'Position' to 'Left'. Below this, the 'MyFil - Location Filter' dialog is open, showing the 'Source' button and input fields for 'Start offset (ft)' (0.00) and 'Stop offset (ft)' (12.00). A table of coordinates is also visible:

	Northing (ft)	Easting (ft)
	104971.2	599235.1
	104672.3	599266.5

The main window shows a map view with a green highlighted area along a road alignment. The map includes a 'Pass Count' legend with values 1 through 4, and a scale bar indicating 0.01 miles. The map data is attributed to Bing maps and The Transtec Group.