Specification Requirements

- Provide one IC roller per paver
- Provide on-site training for contractor and agency
- Provide manufacturer representative for IC support
- Provide Veda files to agency
- Operations Criteria
  - 95% meet optimum passes
  - 70% meet target ICMV values (HMV)
- 10% deduction from item 401 when IC is not functioning properly

KNIK CONSTRUCTION

Background on HAMM Rollers

- Front drum vibratory
- Rear drum oscillatory
- Two amplitude settings
- Two frequency settings

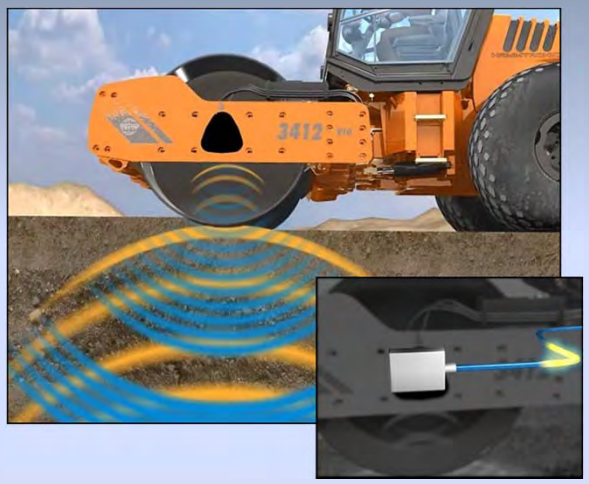
KNIK CONSTRUCTION

Background on IC

- Measures and records
  - Temperature
  - Stiffness/modulus
  - Pass count
  - Roller speed
  - Roller frequency
  - Roller amplitude

KNIK CONSTRUCTION

Accelerometer Based Measurement



KNIK CONSTRUCTION

ICMV?

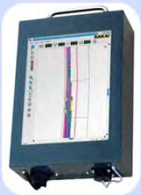
Ammann
k_b

Caterpillar/Trimble
CMV, MDP

HAMM/Wirtgen
HMV

Bomag
E_{VIB}

Dynapac
CMV



Sakai
CCV

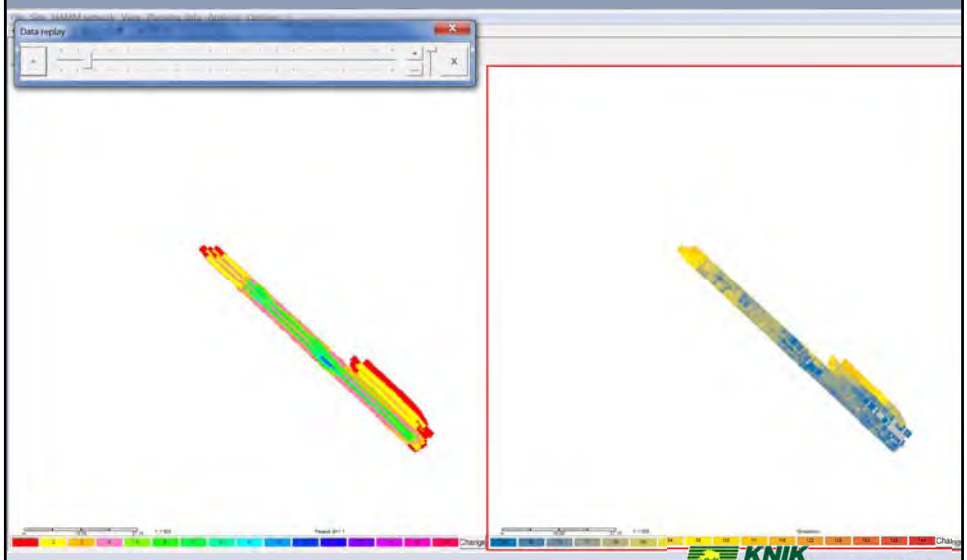
Compaction index or stiffness/modulus?

KNIK CONSTRUCTION

Temperature Sensor and GPS

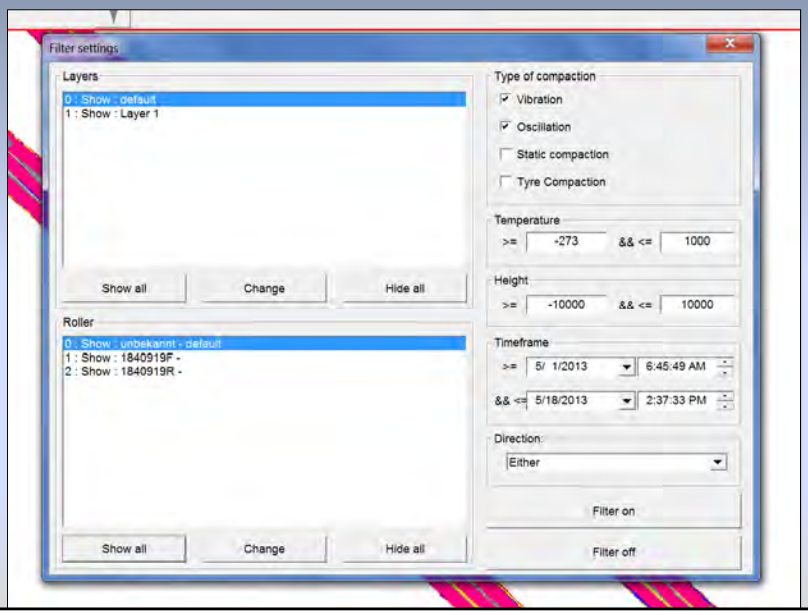
KNIK CONSTRUCTION

HAMM Software

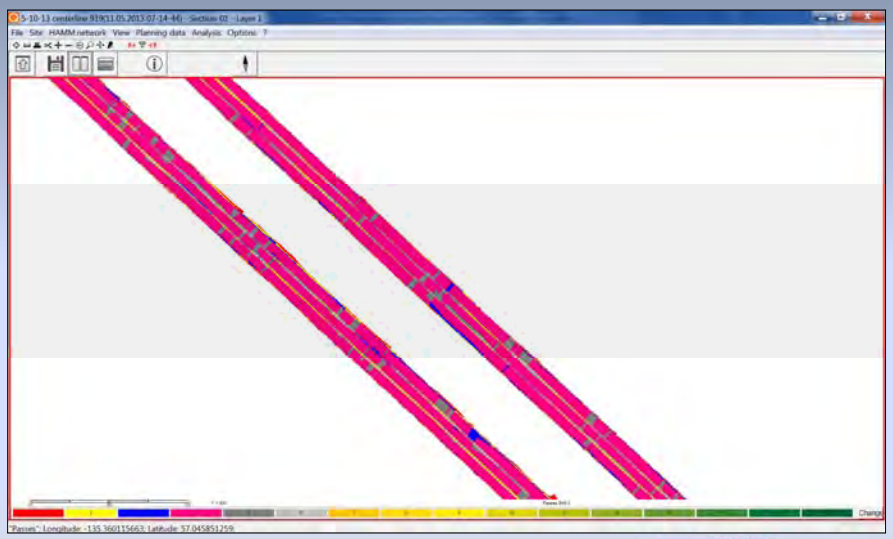


KNIK CONSTRUCTION

HAMM Software



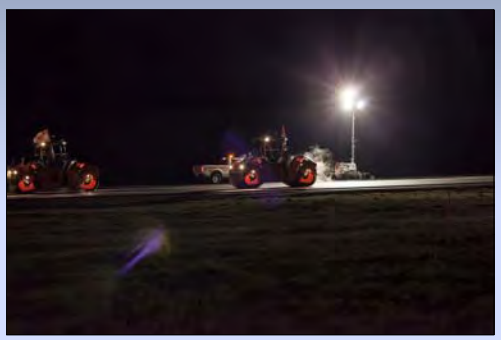
HAMM Software



KNIK CONSTRUCTION

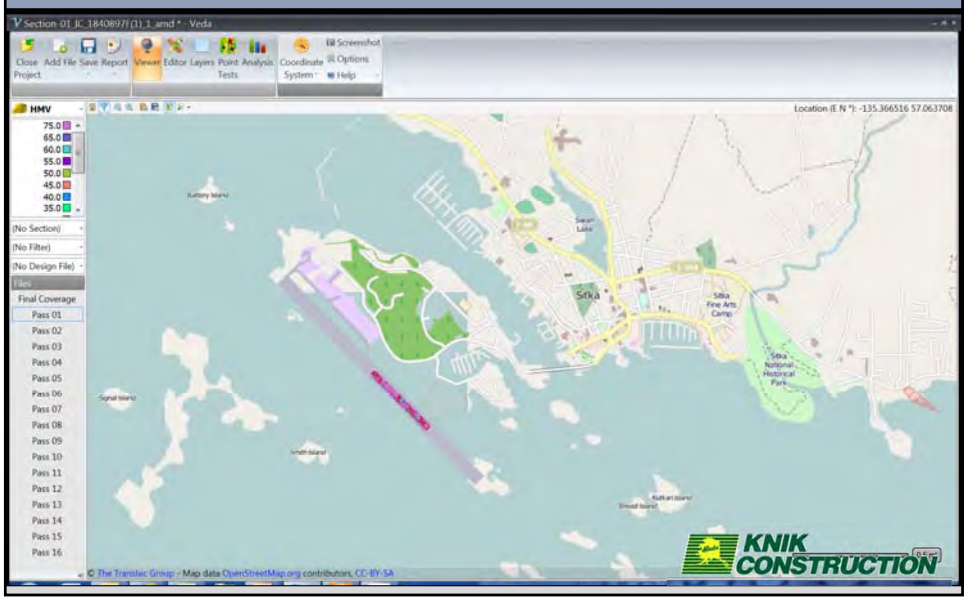
HAMM Software

- HAMM Software Limitations
  - Passes are not viewed individually
  - Limited analysis
  - Maps are time consuming to import

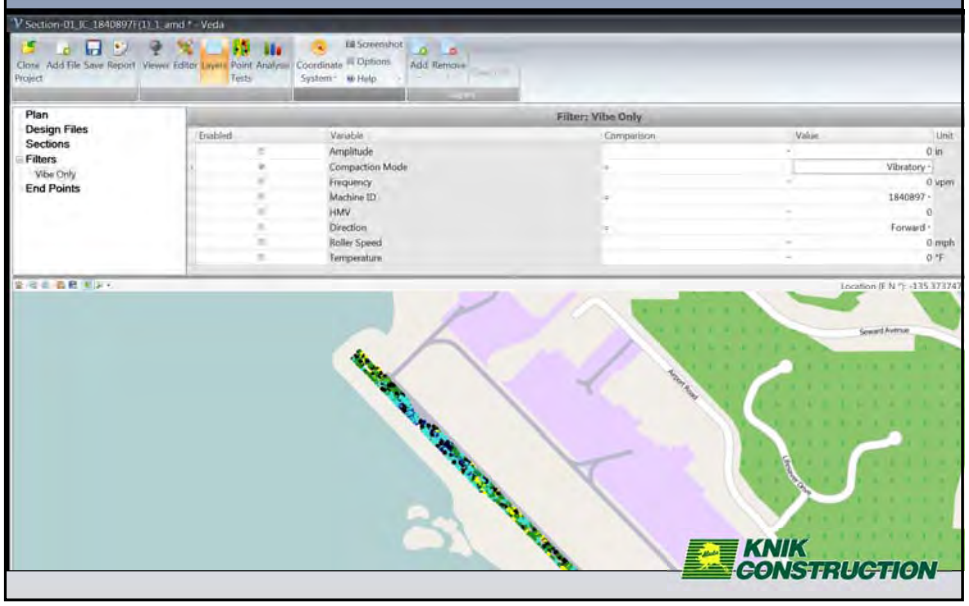


KNIK CONSTRUCTION

Veda Software



Veda Software



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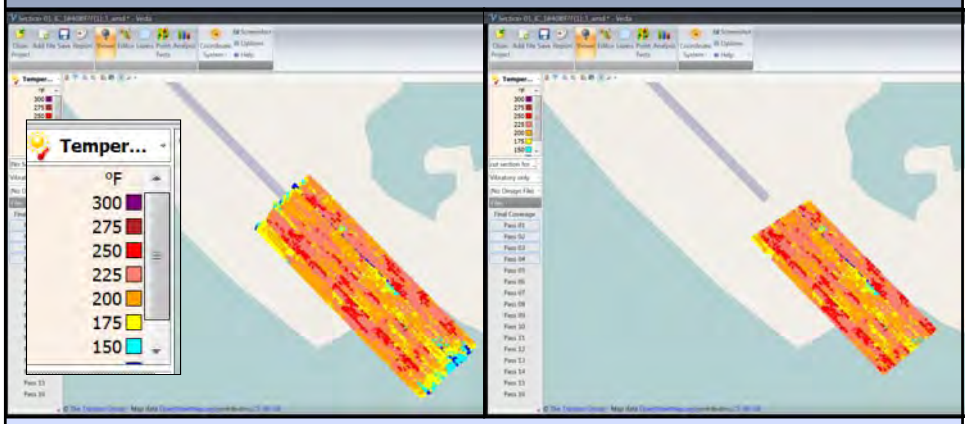
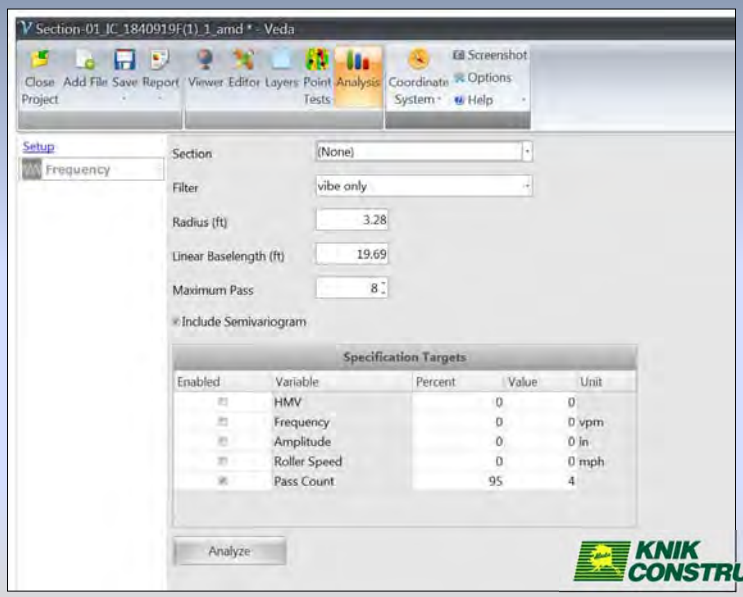


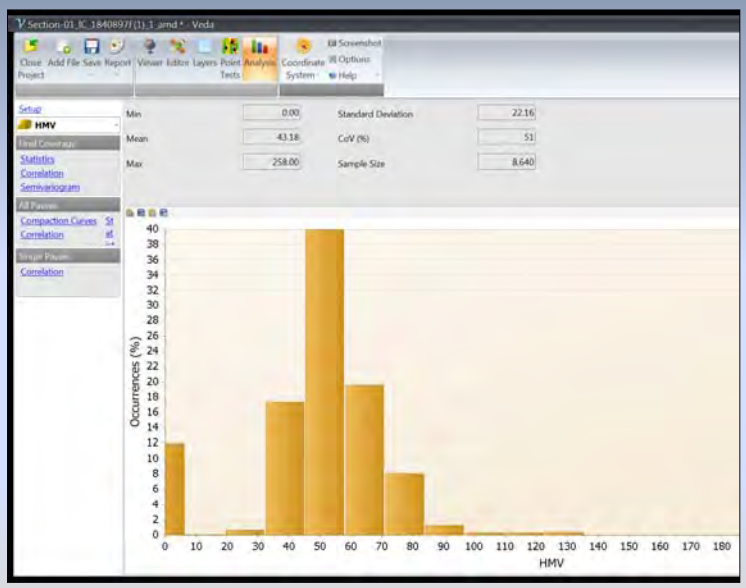
KNIK CONSTRUCTION

Veda Software



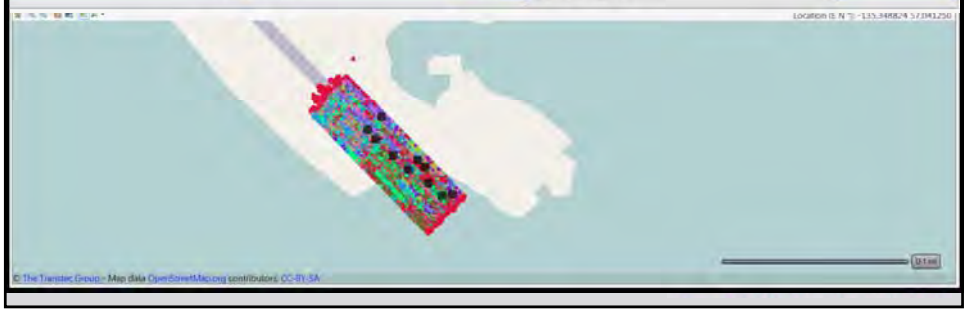
KNIK CONSTRUCTION

Veda Software

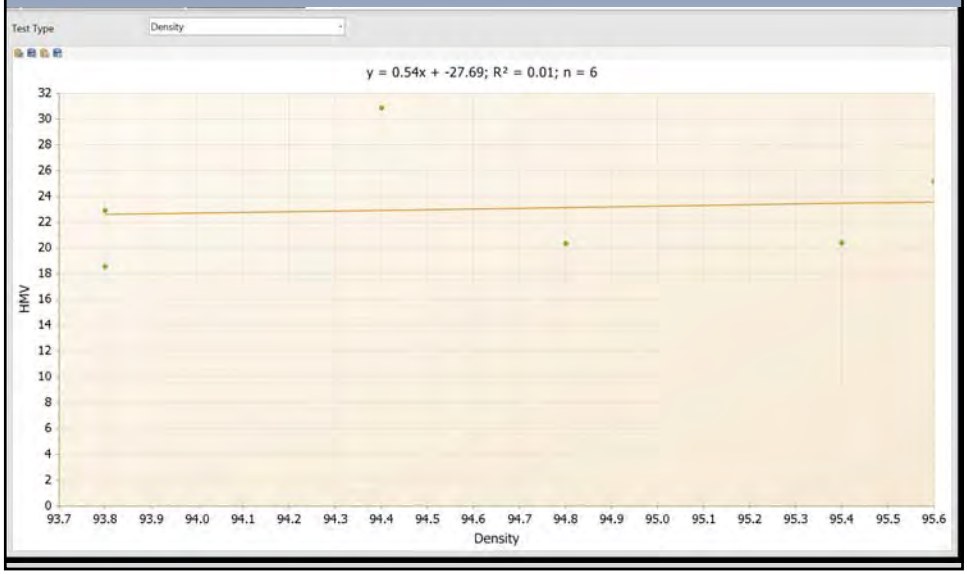


Veda Software

Longitude	Latitude	Test Type	Value
-135.34856402	57.03996541	Density	96
-135.34875742	57.04006883	Density	93.8
-135.34881743	57.0401936	Density	94.8
-135.34891876	57.04024574	Density	95.4
-135.34905207	57.04017343	Density	93.8
-135.34952175	57.04040784	Density	95.6
-135.34964057	57.04048317	Density	94.4
-135.34927679	57.04028158	Density - Cores	97
-135.34943646	57.04058318	Density - Cores	96
-135.34841593	57.03997826	Density - Cores	97



Veda Software



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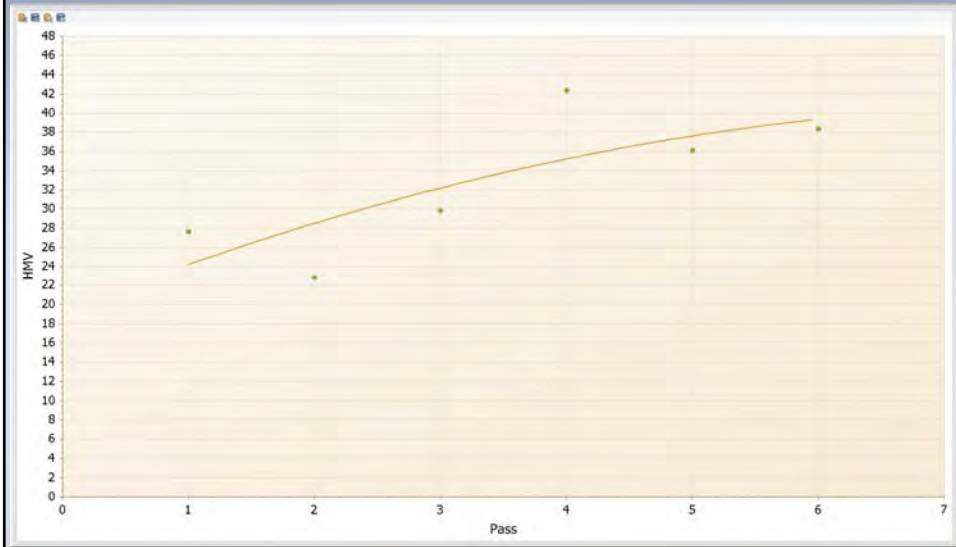
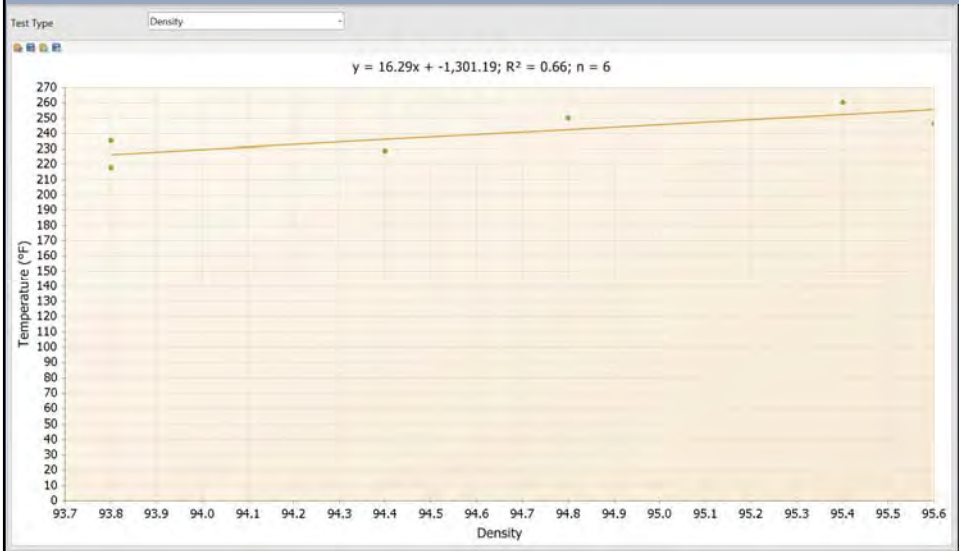


Veda Software



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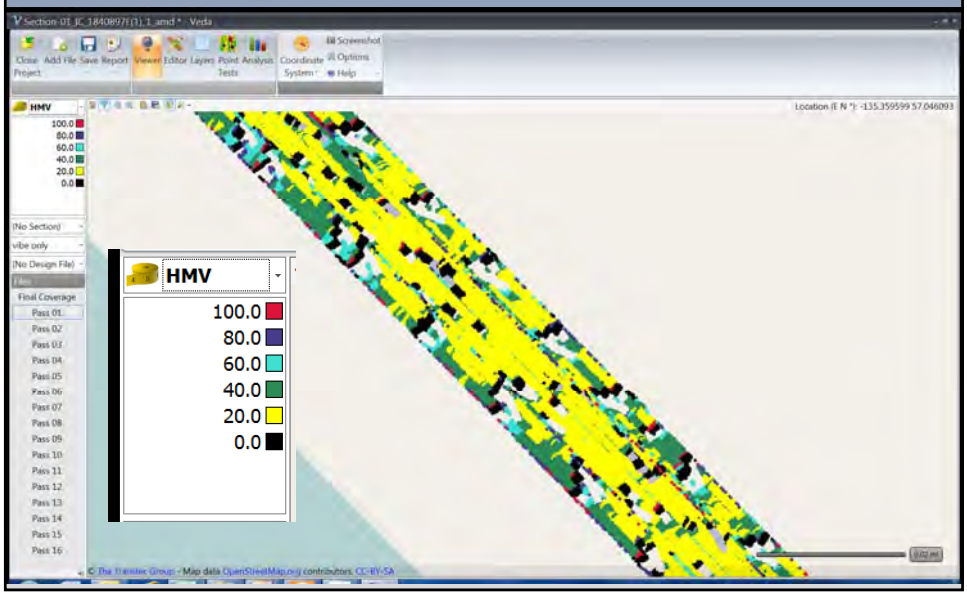

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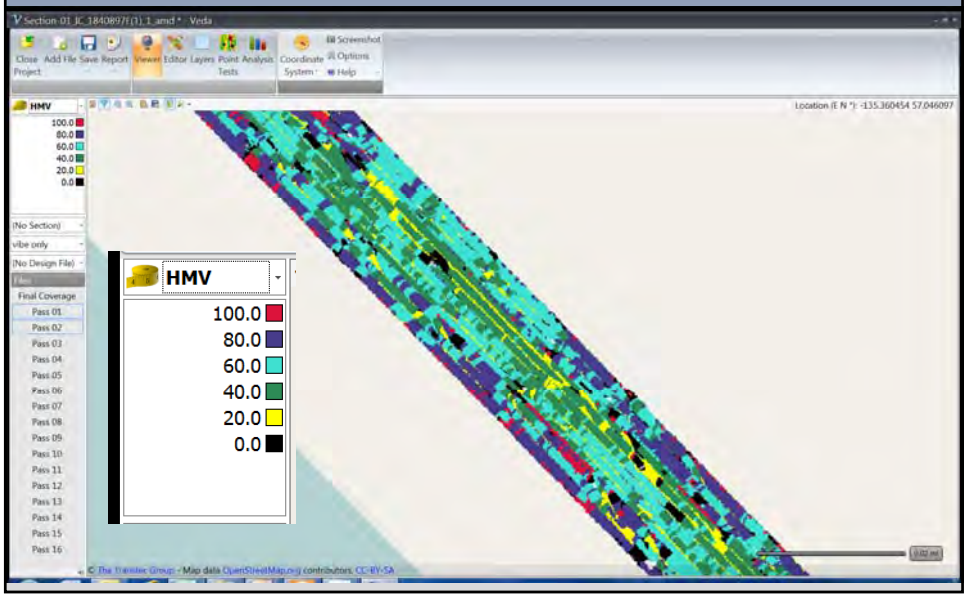

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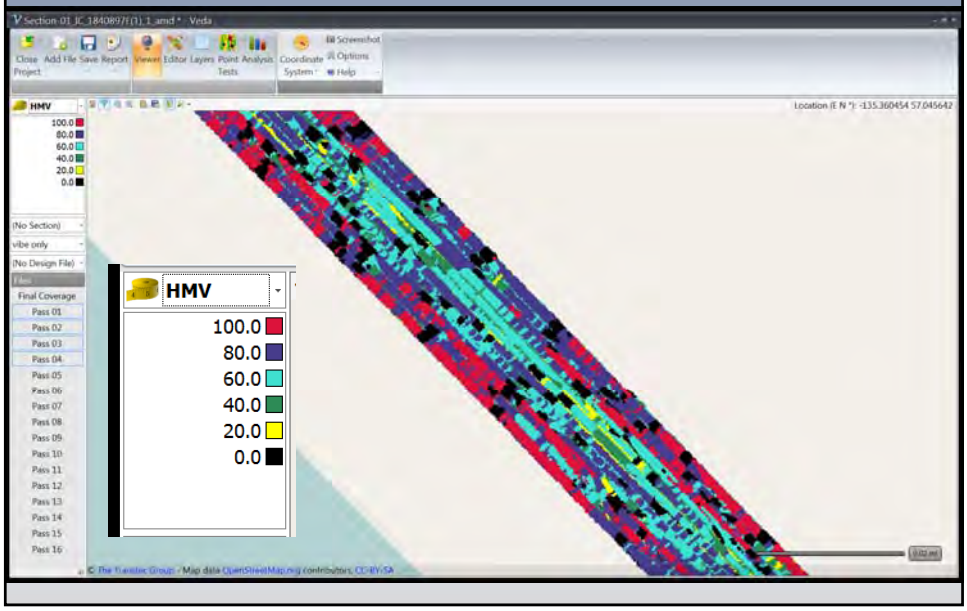

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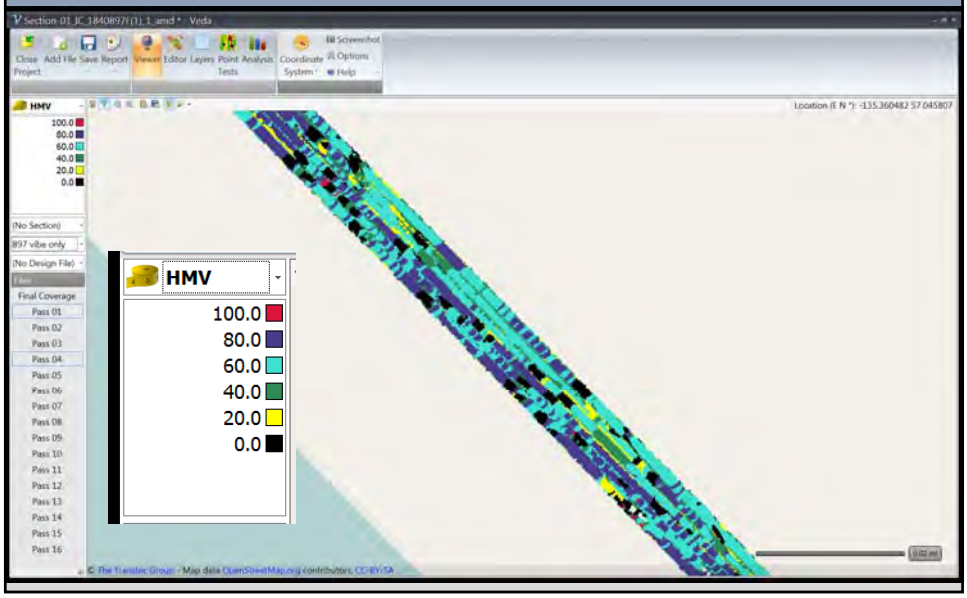

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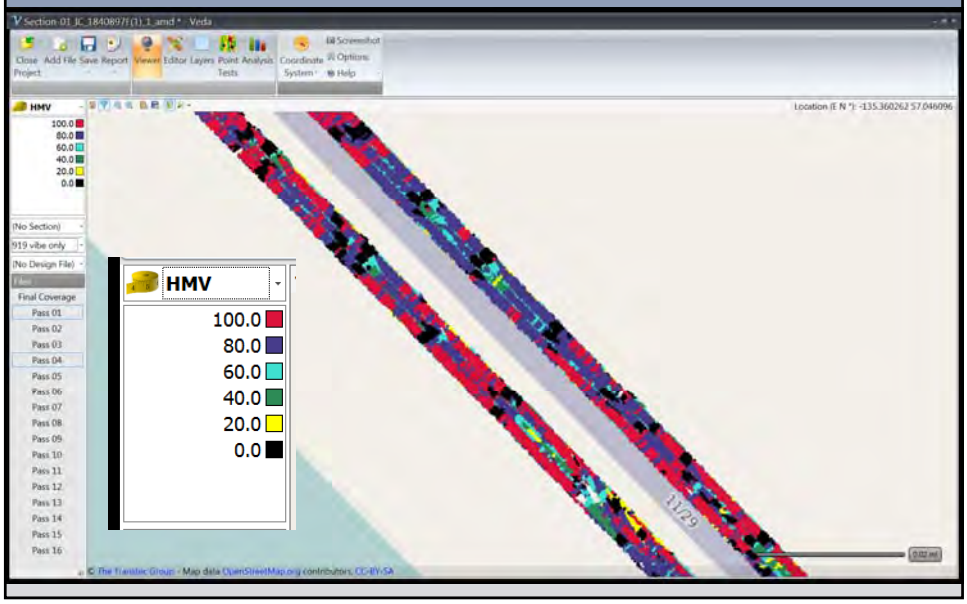

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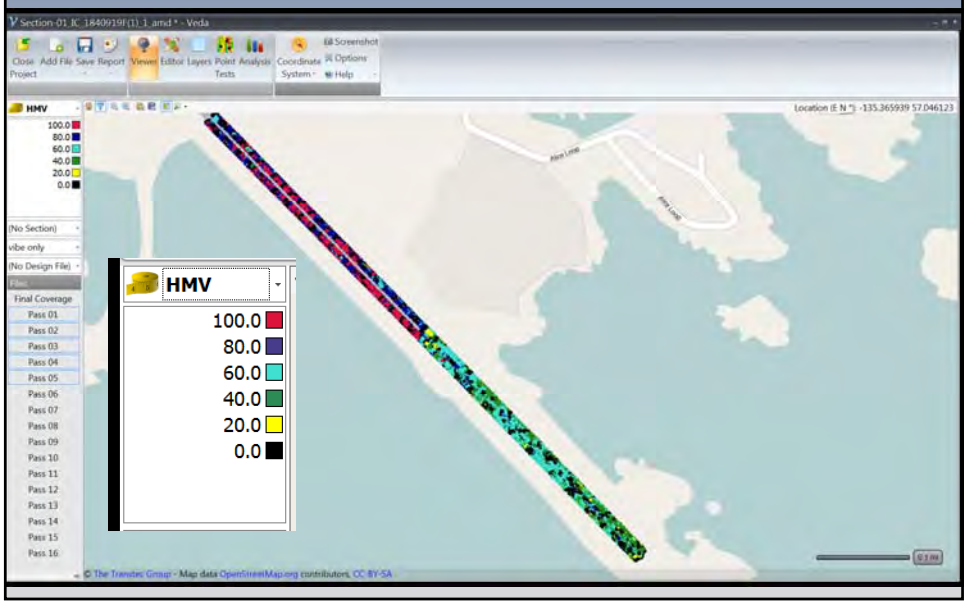

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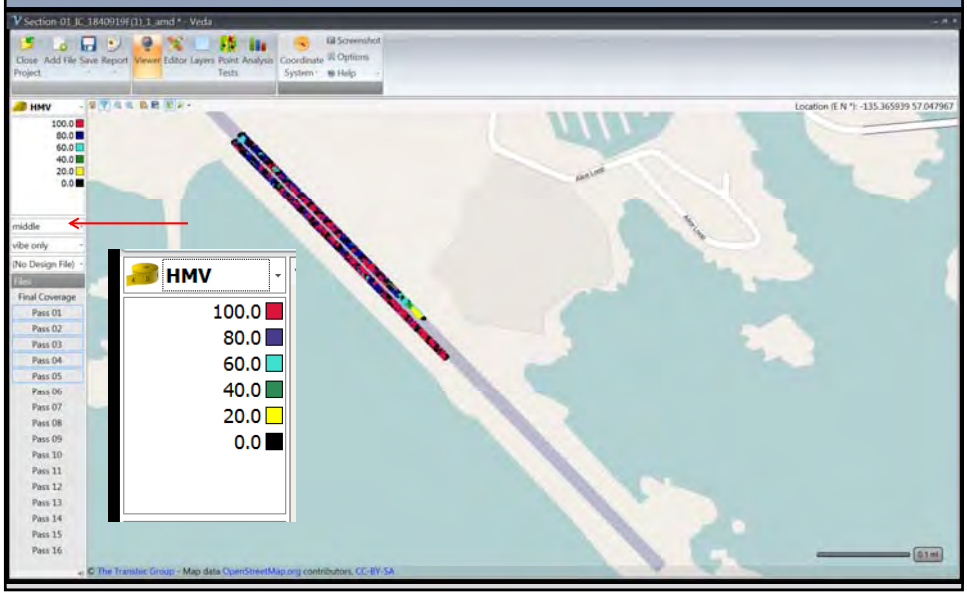
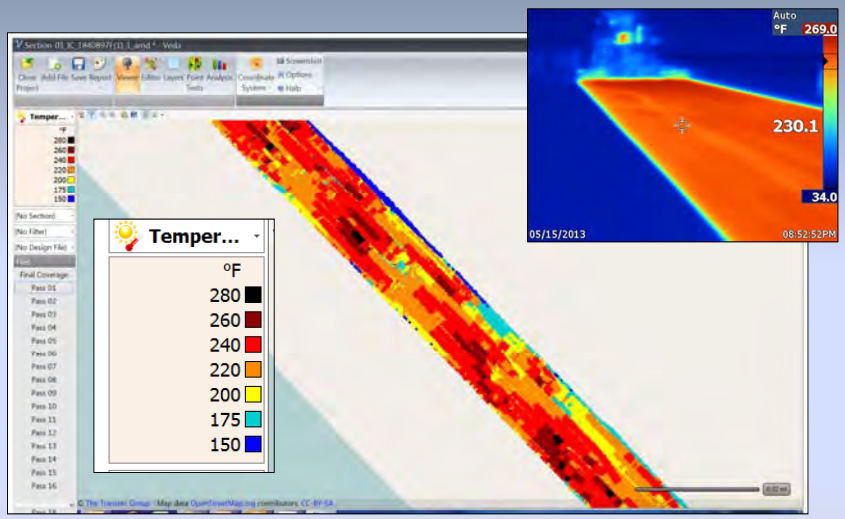


Veda Software HMV Comparison

Property	"End"	"Middle"
Frequency - vpm	3000	2400, 3000
Amplitude - in	0.034	0.019
Speed - mph	2.8-3.8	2.2-3.6
Temperature – degrees F	190-230	190-230
HMV	60-80	60-115
Average Mat Density - %	96	96

KNIK CONSTRUCTION

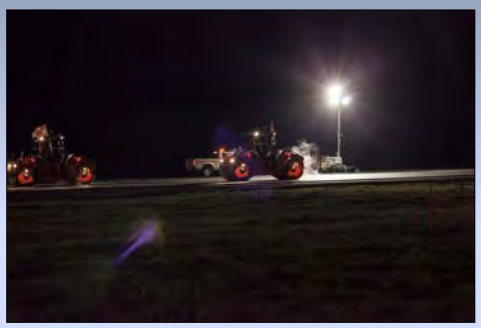
Veda Software



KNIK CONSTRUCTION

Veda Recap

- Map background
- View individual passes
- View roller settings
- Quick analysis



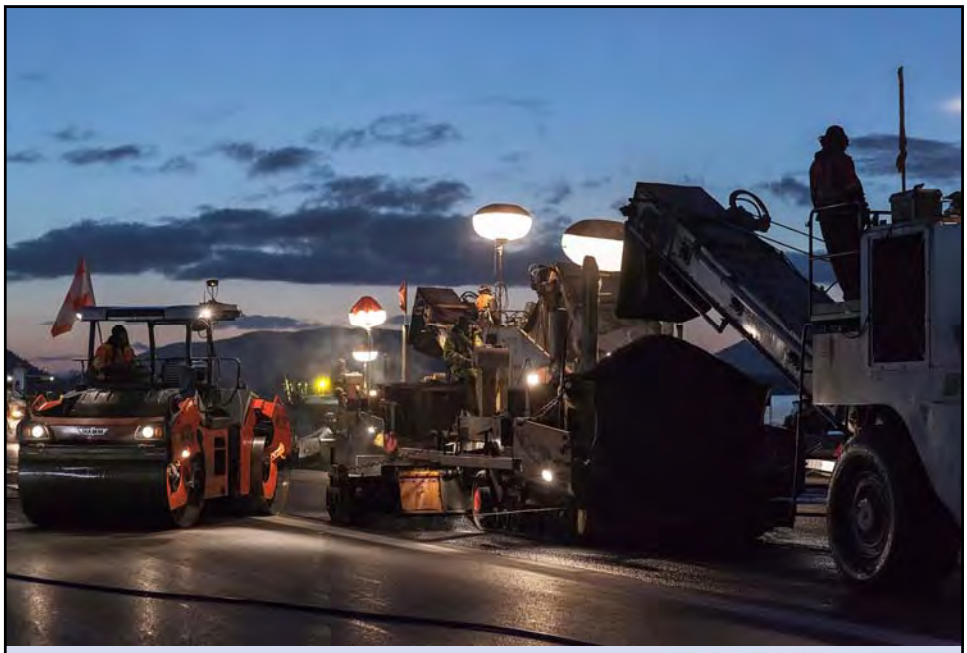
Who should analyze? Agency or contractor??

KNIK CONSTRUCTION

IC Strengths and Limitations

- Strength
  - Real time data useful – particularly for night paving
  - Records everything for troubleshooting (if required)
  - Helps with density consistency
  - Verifies 100% coverage
- Limitation
  - Does not predict density – ICMV and density do not correlate
  - Lots of room for error in data analysis

KNIK CONSTRUCTION



KNIK CONSTRUCTION