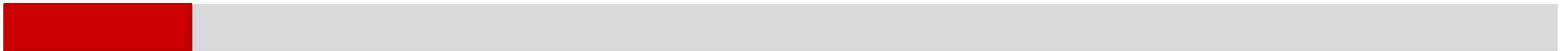


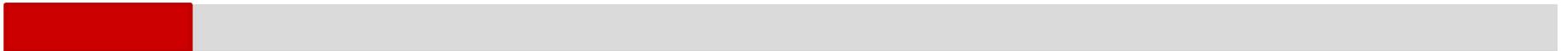


ViaPPS Deliverables as per MoT Specifications



A dark gray right-angled triangle pointing towards the bottom-left corner.

Road Inventory Data



Road Inventory Data – Location Reference Post

Field	Remarks
NH Number	Manually
LRP Name	Manually
Chainage	Manually
Latitude	Through the system
Longitude	Through the system
Survey Date	Through the system
Old NH Number	Manually
Section Code	Manually

Road Inventory Data – Carriageway, Road and Pavement Type

Sensors Used

Z+F Scanner

ViaPhoto

3D Panoramic Photos
(Ladybug)

Applanix LV 220



Point Cloud Data For Carriageway and Road



3D Panoramic View for Carriageway and Road Type

Output Expected – Carriageway Type

Divided

Undivided

Output Expected – Road Type

1 / 2 / 4 / 6 Lane

Intermediate Lane

Output Expected – Pavement Type

Asphalt

Cement Concrete

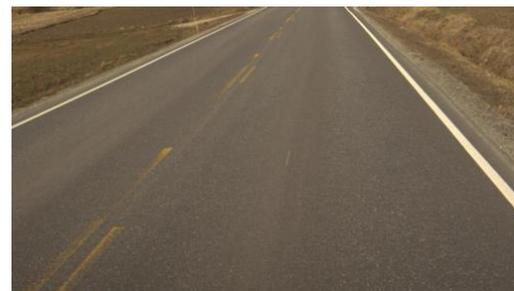
Deliverables

Point Cloud Data

Photographs in image format



Pavement Type – Concrete



Pavement Type – Asphalt

Road Inventory Data – Pavement Width, Shoulder Type and Width

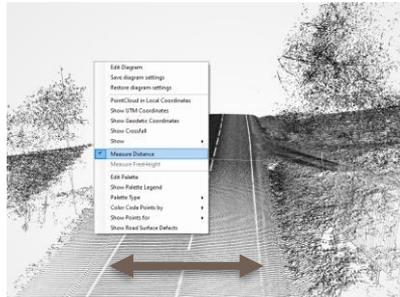
Sensors Used

Z+F Scanner

ViaPhoto

3D Panoramic Photos (Ladybug)

Applanix LV 220



Pavement Width on Point Cloud data in ViaPPS Desktop



Shoulder Type – Paved

Output Expected – Pavement Width

Width In Meters

Output Expected – Shoulder Type

None

Paved

Gravel

Earth

Output Expected – Shoulder Width

Width In Meters

Deliverables

Point Cloud Data

Photographs in image format



Pavement Width Measurement



Measures Shoulder Width in ViaPPS Desktop

Road Inventory Data – Topography, Cross Section and Drain Type

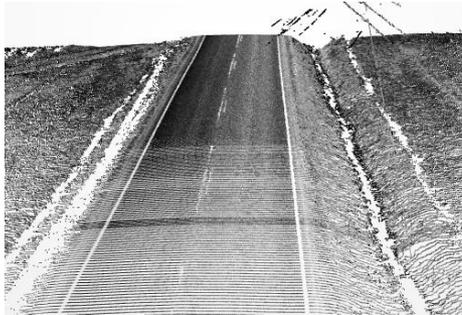
Sensors Used

Z+F Scanner

ViaPhoto

3D Panoramic
Photos
(Ladybug)

Applanix LV 220



Topography – Flat



Topography – Hilly

Deliverables

Point Cloud
Data

Photographs in
image format



Road Profile / Cross
Section



Drain Type

Output Expected – Topography

Flat

Rolling

Hilly

Output Expected – Cross Section Types

Cut / Fill

Cut and Fill

Level

Output Expected – Drain Type

Open Unlined

Open Lined

Covered Line

No drain

Road Inventory Data – Median Opening, Right of Way and Pavement Composition

Sensors Used

Z+F Scanner

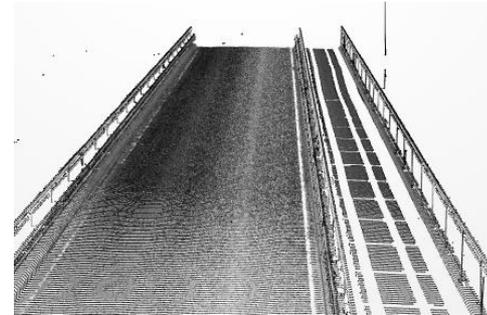
ViaPhoto

3D Panoramic Photos
(Ladybug)

Applanix LV 220



Median Types



Median Types

Output Expected – Media Opening

Raised / Depressed

Barrier

None

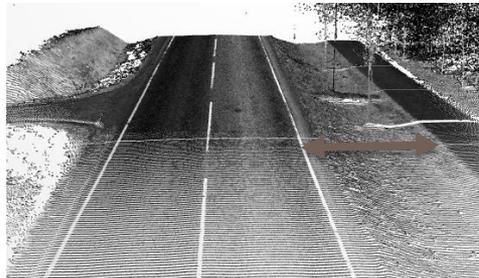
Output Expected – Right of Way

ROW width in meters

Deliverables

Point Cloud Data

Photographs in image format



Right of Way – Width



Pavement Composition

Output Expected – Pavement Composition

Pavement Type

Pavement Thickness

Year of Construction

Latitude – Longitude

Road Inventory Data – Carriageway Furniture, Wayside Amenities, Land Use

Sensors Used

- Z+F Scanner
- ViaPhoto
- 3D Panoramic Photos (Ladybug)
- Applanix LV 220



Carriageway Furniture



Wayside Amenities

Output Expected – Carriageway Furniture

- Crash Barriers
- Sign / Street Lights
- Kms Stone

Output Expected – Wayside Amenities

- Bus Shelters / Culverts / Toll plaza
- Restaurant / Rest Rooms / Toilets etc

Output Expected – Landuse

- Residential / Commercial
- Industrial / Agriculture
- Water Bodies
- Mixed

Deliverables

- Point Cloud Data
- Photographs in image format



Carriageway Furnitures



Landuse

A dark gray triangle pointing downwards, located in the top-left corner of the slide.

Road Condition Data



Visual Condition

Sensors Used

Z+F Scanner

ViaPhoto

3D Panoramic Photos (Ladybug)

Applanix LV 220

Velodyne Sensors (optional)

Pavement Facing Camera (Optional)

Point Cloud Data

Photographs in image format



Point Cloud Data



3D Panoramic View I



3D Panoramic View II



View From ViaPhoto

Visual Condition Data- Raveling

Sensors Used

Z+F Scanner

ViaPhoto

3D Panoramic Photos
(Ladybug)

Applanix LV 220

Velodyne
Sensors
(optional)

Pavement
Facing Camera
(Optional)

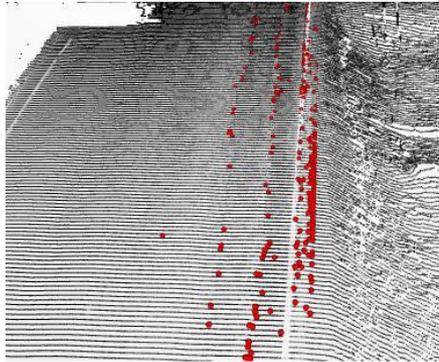
Deliverables

Point Cloud
Data

Photographs in
image format

Homogeneity
Diagrams

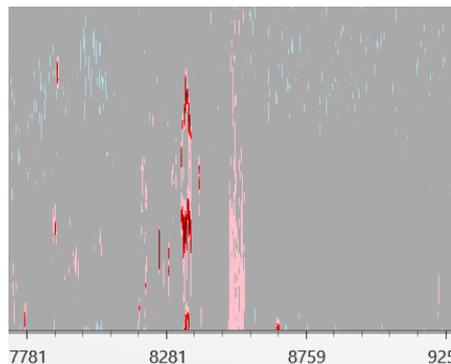
ViaPPS Desktop
Algorithms



Point Cloud Data



3D Panoramic
View



Homogeneity



ViaPhoto

Output Expected

Very Poor
>30%

Poor (11-30%)

Fair (6-10%)

Good (1-5%)

Very Good (0%)

Visual Condition Data- Potholes

Sensors Used

Z+F Scanner

ViaPhoto

3D Panoramic
Photos
(Ladybug)

Applanix LV 220

Velodyne
Sensors
(optional)

Pavement
Facing Camera
(Optional)

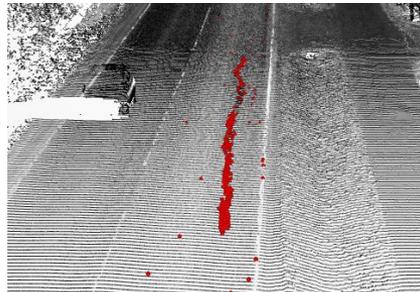
Deliverables

Point Cloud
Data

Photographs in
image format

Homogeneity
Diagrams

ViaPPS Desktop
Algorithms



Point Cloud Data



3D Panoramic
View

Output Expected

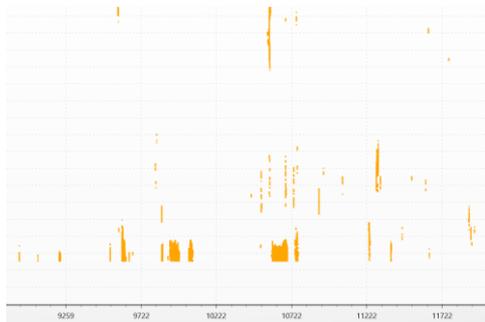
Very Poor (> 5)

Poor (3-5)

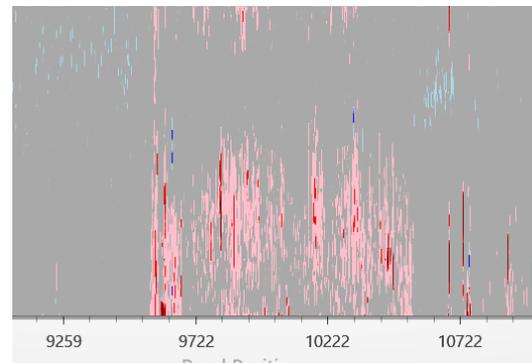
Fair (2)

Good (1)

Very Good (0)



Surface Defects



Homogeneity

Visual Condition Data- Edge Break

Sensors Used

Z+F Scanner

ViaPhoto

3D Panoramic Photos (Ladybug)

Applanix LV 220

Velodyne Sensors (optional)

Pavement Facing Camera (Optional)

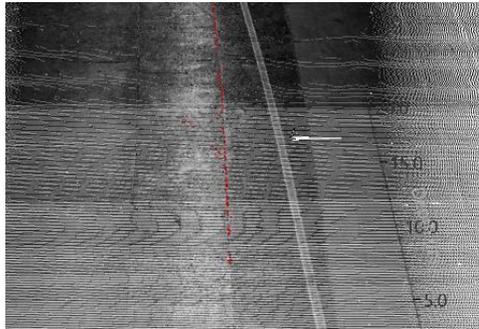
Deliverables

Point Cloud Data

Photographs in image format

Homogeneity Diagrams

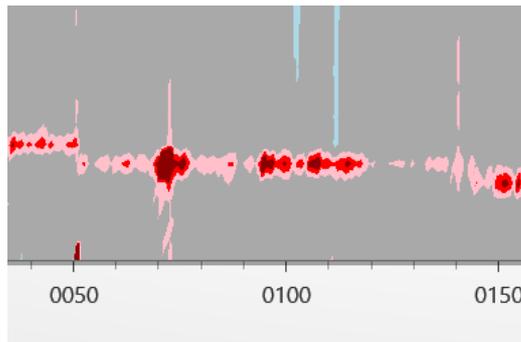
ViaPPS Desktop Algorithms



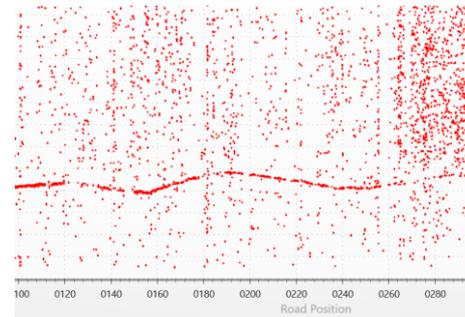
Point Cloud Data



3D Panoramic View



Homogeneity



Road Defects

Output Expected

Very Poor (> 5 sq.m)

Poor (1-5 sq.m)

Fair (0.5-1 sq.m)

Good (0-0.5 sq.m)

Very Good (0 sq.m)

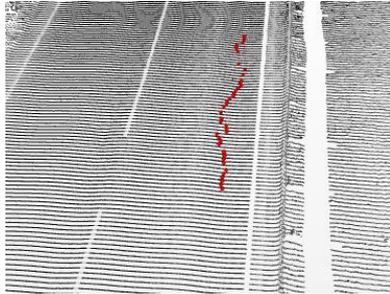
Visual Condition Data- Cracking

Sensors Used

- Z+F Scanner
- ViaPhoto
- 3D Panoramic Photos (Ladybug)
- Applanix LV 220
- Velodyne Sensors (optional)
- Pavement Facing Camera (Optional)

Deliverables

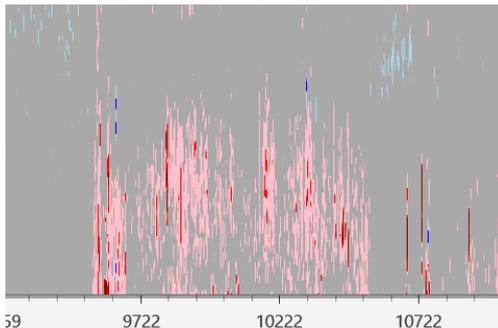
- Point Cloud Data
- Photographs in image format
- Homogeneity Diagrams
- ViaPPS Desktop Algorithms



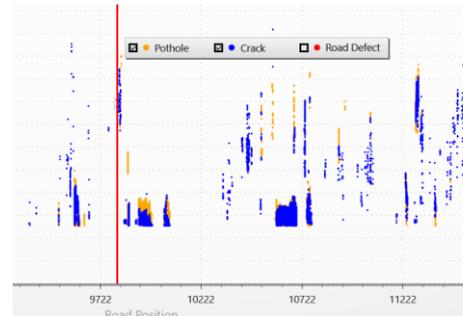
Point Cloud Data



3D Panoramic View



Homogeneity



Road Defects

Output Expected

- Very Poor >30%
- Poor (21-30%)
- Fair (10-20%)
- Good (1-10%)
- Very Good (<1%)

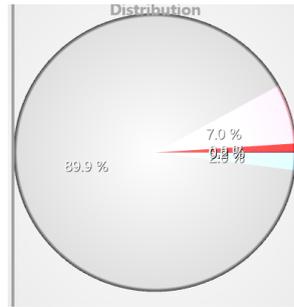
Visual Condition Data- Disintegration

Sensors Used

- Z+F Scanner
- ViaPhoto
- 3D Panoramic Photos (Ladybug)
- Applanix LV 220
- Velodyne Sensors (optional)
- Pavement Facing Camera (Optional)

Output Expected

- Very Poor (>50%)
- Poor (20-50%)
- Fair (10-20%)
- Good (1-10%)
- Very Good (<1%)



Distribution based on Deviation



3D Panoramic View



Homogeneity With Standard Deviation

Deliverables

- Point Cloud Data
- Photographs in image format
- Homogeneity Diagrams
- ViaPPS Desktop Algorithms

Visual Condition Data- Depression

Sensors Used

Z+F Scanner

ViaPhoto

3D Panoramic
Photos
(Ladybug)

Applanix LV 220

Velodyne
Sensors
(optional)

Pavement
Facing Camera
(Optional)

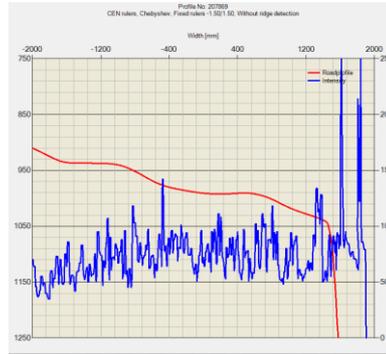
Deliverables

Point Cloud
Data

Photographs in
image format

Homogeneity
Diagrams

ViaPPS Desktop
Algorithms



Road Profile
(Transverse)



3D Panoramic
View

Output Expected

Very Poor >5%

Poor (3-5%)

Fair (1-2%)

Good (0-1%)

Very Good (0)



Longitudinal Profile

Visual Condition Data- Bleeding

Sensors Used

- Z+F Scanner
- ViaPhoto
- 3D Panoramic Photos (Ladybug)
- Applanix LV 220
- Velodyne Sensors (optional)
- Pavement Facing Camera (Optional)

Deliverables

- Point Cloud Data
- Photographs in image format
- Homogeneity Diagrams
- ViaPPS Desktop Algorithms



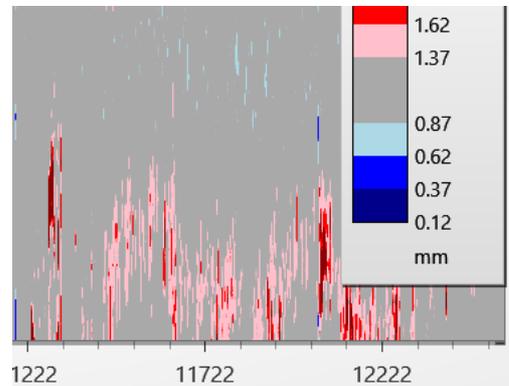
Point Cloud Data



3D Panoramic View

Output Expected

- Very Poor > 50%
- Poor (20-50%)
- Fair (10-20%)
- Good (1-10%)
- Very Good (< 1%)



Homogeneity With Standard Deviation

Visual Condition Data- Patching

Sensors Used

- Z+F Scanner
- ViaPhoto
- 3D Panoramic Photos (Ladybug)
- Applanix LV 220
- Velodyne Sensors (optional)
- Pavement Facing Camera (Optional)

Deliverables

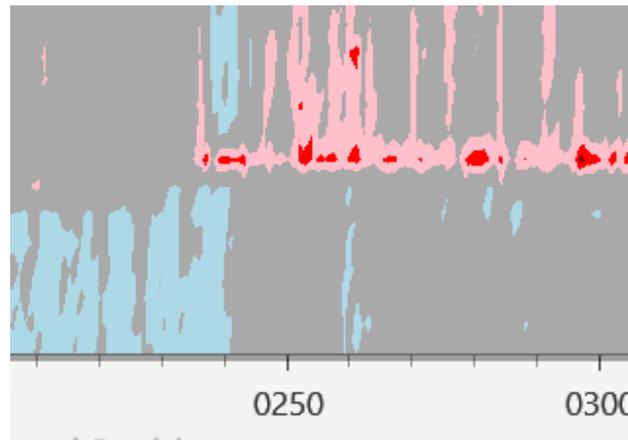
- Point Cloud Data
- Photographs in image format
- Homogeneity Diagrams
- ViaPPS Desktop Algorithms



Point Cloud Data



ViaPhoto



Homogeneity

Output Expected

- Very Poor >30%
- Poor (16-30%)
- Fair (6-15%)
- Good (2-5%)
- Very Good (<2%)

Visual Condition Data- Drain Condition

Sensors Used

- Z+F Scanner
- ViaPhoto
- 3D Panoramic Photos (Ladybug)
- Applanix LV 220
- Velodyne Sensors (optional)
- Pavement Facing Camera (Optional)

Deliverables

- Point Cloud Data
- Photographs in image format
- Homogeneity Diagrams
- ViaPPS Desktop Algorithms



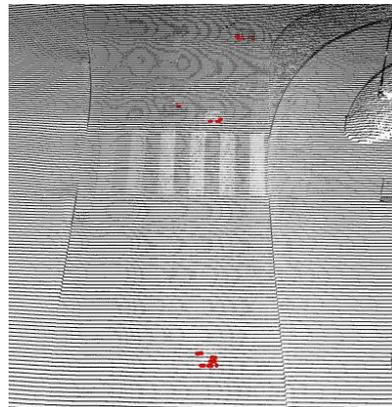
3D Panoramic View



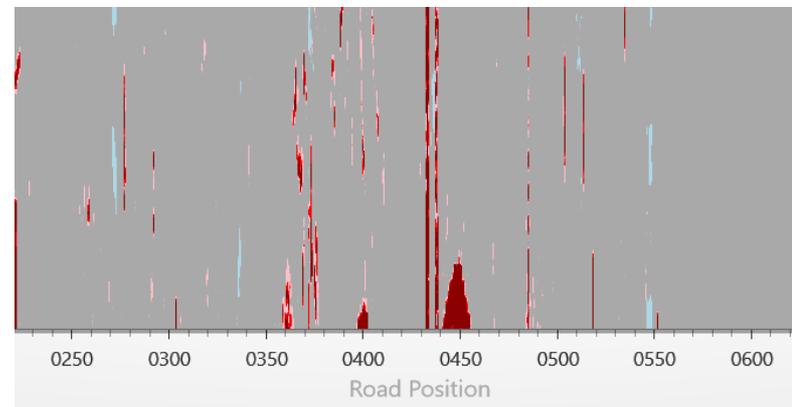
3D Panoramic View

Output Expected

- Poor
- Fair
- Good



Point Cloud Data



Homogeneity



Visual Condition Data- Shoulder Condition

Sensors Used

Z+F Scanner

ViaPhoto

3D Panoramic Photos (Ladybug)

Applanix LV 220

Velodyne Sensors (optional)

Pavement Facing Camera (Optional)

Deliverables

Point Cloud Data

Photographs in image format

Homogeneity Diagrams

ViaPPS Desktop Algorithms



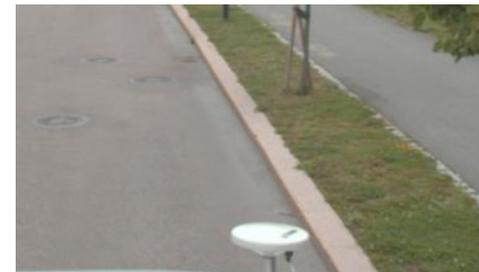
3D Panoramic View



3D Panoramic View



3D Panoramic View



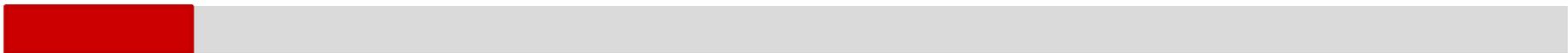
3D Panoramic View

Output Expected

Poor

Fair

Good



Roughness (IRI)

Sensors Used

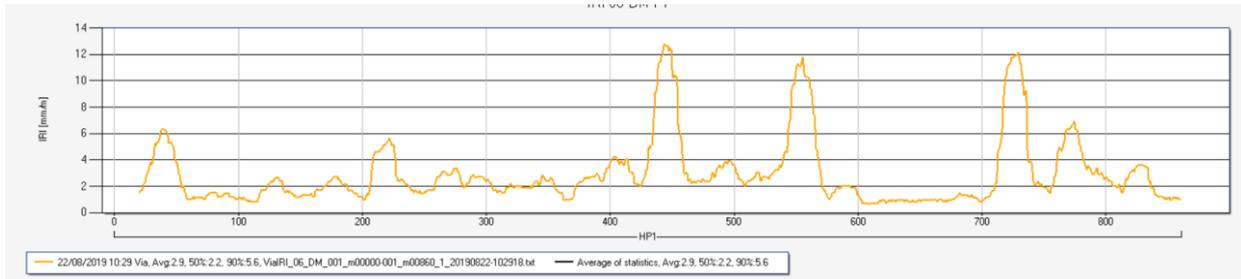
- Z+F Scanner
- Applanix LV 220
- IRI+
- Pavement Facing Camera (Optional)

Deliverables

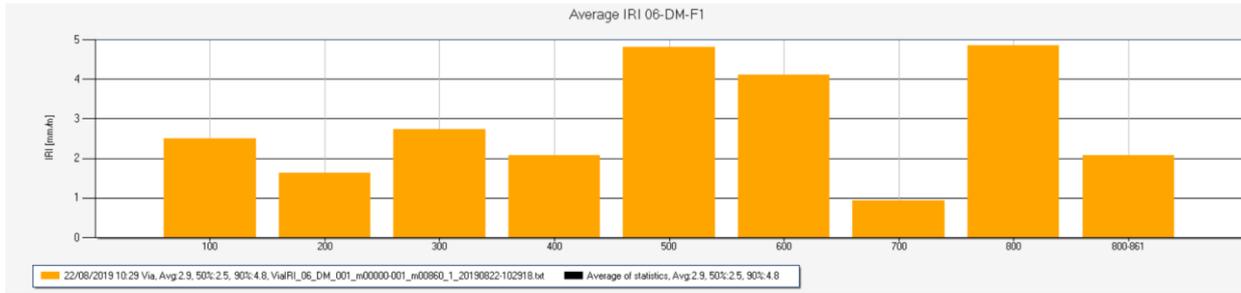
- Point Cloud Data
- Roughness (IRI) and Average IRI over a span
- Mean Profile Depth (MPD) and Average MPD over a span
- Speed of Vehicle

Output Expected

- IRI at Left Wheel
- IRI at Right Wheel
- Average IRI
- Speed
- Latitude / Longitude



Roughness (IRI)



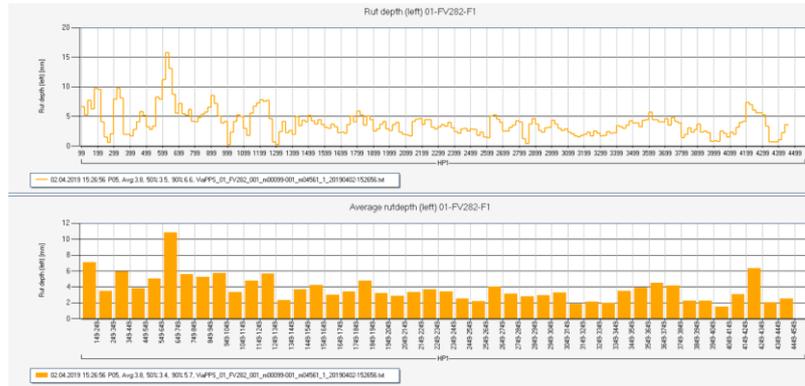
Average Roughness (IRI) over 100m

Rutting

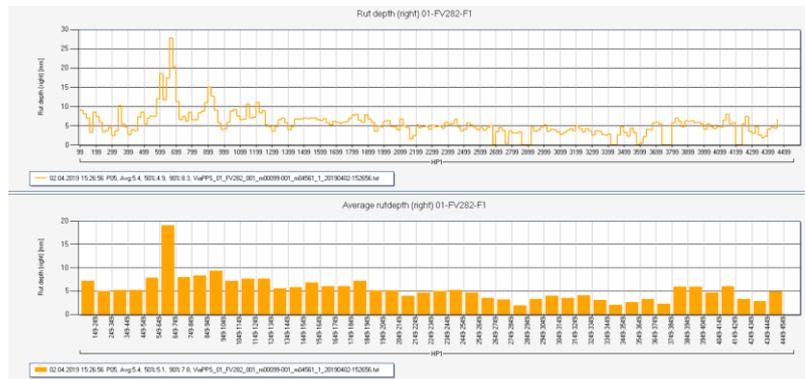
- Sensors Used**
- Z+F Scanner
 - Applanix LV 220
 - IRI+
 - Pavement Facing Camera (Optional)

- Deliverables**
- Point Cloud Data
 - Rut Depth – Right and Average Rut Depth over a span
 - Rut Depth – Right and Average Rut Depth over a span
 - Speed of Vehicle

- Output Expected**
- Rutting Left
 - Rutting Right
 - Rutting Average
 - Speed
 - Latitude / Longitude



Rut Depth and Average Rut Depth on Left

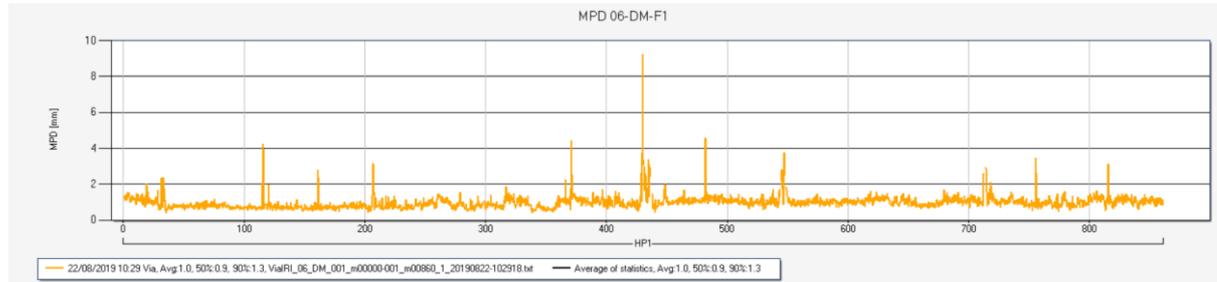


Rut Depth and Average Rut Depth on Right

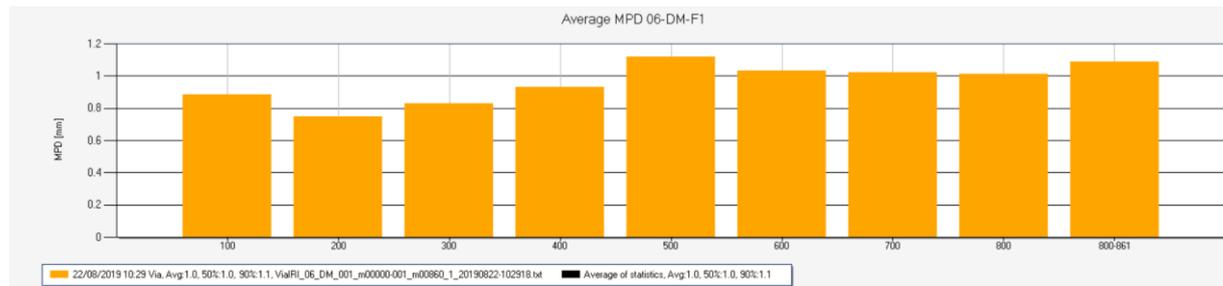
Texture Depth (MPD)

- Sensors Used**
- Z+F Scanner
 - Applanix LV 220
 - IRI+
 - Pavement Facing Camera (Optional)

- Output Expected**
- Texture Depth at Left Wheel
 - Texture Depth at Right Wheel
 - Average Texture Depth
 - Speed
 - Latitude / Longitude



Mean Profile Depth (MPD)



Mean Profile Depth (MPD) over 100m

- Deliverables**
- Point Cloud Data
 - Roughness (IRI) and Average IRI over a span
 - Mean Profile Depth (MPD) and Average MPD over a span
 - Speed of Vehicle



Skid Resistance (Friction)

Deliverables

Speed of Vehicle

Latitude / Longitude

Name / NH No Nomenclature

Friction Coefficient



Single Wheel



Two Wheel

Output Expected

NH / Lane No

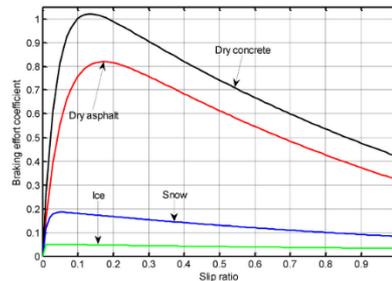
Texture Depth at Right Wheel

Skid Left / Right / Average

Speed

Latitude / Longitude

ViaFriction System



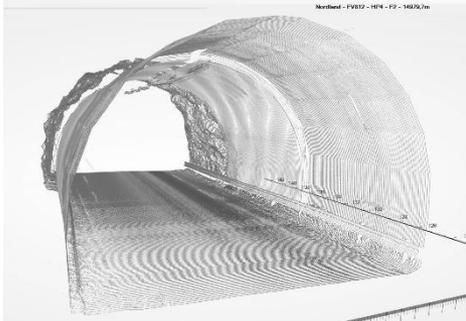
Variable Slip Measurement

A	B	C	D	E	F	G
Id	v_TW [km/h]	TotalDist [m]	Lat [°]	Long [°]	Road [J]	Position [m]
1	0.195	61.212	67.611	21.43554572	79.29001685	Mansar DW1 1068
2	0.369	61.597	67.611	21.43540042	79.28989149	Mansar DW1 1088
3	0.393	61.988	107.611	21.43526159	79.28972097	Mansar DW1 1108
4	0.371	62.494	127.611	21.43512271	79.28960974	Mansar DW1 1128
5	0.404	62.887	147.611	21.43498502	79.28952891	Mansar DW1 1148
6	0.411	63.182	167.611	21.43484509	79.28940884	Mansar DW1 1168
7	0.403	63.298	187.611	21.43470755	79.28929123	Mansar DW1 1188
8	0.474	62.533	207.611	21.43456499	79.28917265	Mansar DW1 1208
9	0.413	66.33	227.611	21.43441583	79.28904676	Mansar DW1 1228
10	0.384	56.907	247.611	21.43427381	79.28892816	Mansar DW1 1248
11	0.406	52.306	267.611	21.43413237	79.2888095	Mansar DW1 1268
12	0.486	46.558	287.611	21.43399011	79.28868958	Mansar DW1 1288
13	0.581	35.999	307.611	21.43384667	79.28856741	Mansar DW1 1308
14	0.585	10.379	327.611	21.4337194	79.28842763	Mansar DW1 1328
15	0.703	13.881	347.611	21.43357815	79.28831071	Mansar DW1 1348
16	0.705	21.105	367.611	21.43343942	79.28819494	Mansar DW1 1368
17	0.668	27.457	387.611	21.43329904	79.28807564	Mansar DW1 1388
18	0.65	33.261	407.611	21.43316242	79.2879548	Mansar DW1 1408
19	0.67	36.978	427.611	21.43302475	79.28783367	Mansar DW1 1428
20	0.589	37.628	447.611	21.43288304	79.28771068	Mansar DW1 1448
21	0.375	40.089	467.611	21.43274268	79.28759358	Mansar DW1 1468
22	0.612	42.162	487.611	21.43260444	79.28747531	Mansar DW1 1488
23	0.559	44.294	507.611	21.43246744	79.2873561	Mansar DW1 1508

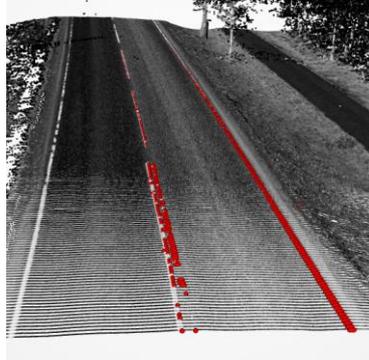
Sample Friction Report

ViaFriction Reports

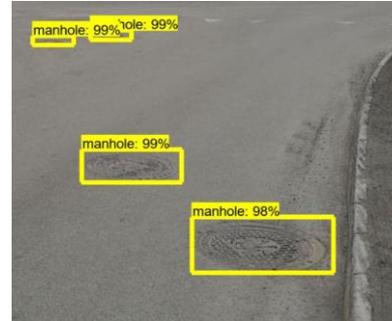
Other Deliverables



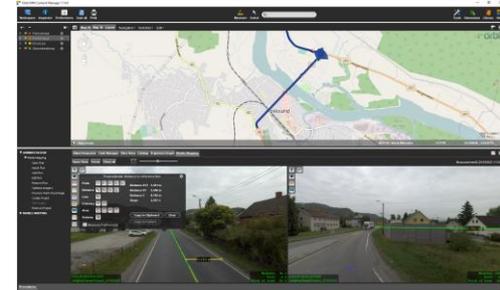
Tunnels With
Different Surfaces



Road Edge &
Markings



Manholes



Export to 3rd party Point
Cloud data software's



