

TerraScan New Features

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Setup: Executable Files into C:\Program Files



- Setup **Folder choice** has options:
 - Default c:\terra64 – install all files to c:\terra64
 - Default 'Program Files' – executables into c:\Program Files\Terrasolid, rest into c:\terra64
 - Freely selectable folders – you choose folder for executables and folder for settings files
- When executables are in separate folder, applications find settings files using:
 1. Environment variables if defined
 2. Using c:\Program Files\Terrasolid\settings_path.txt if no environment variables

A screenshot of the "Terra Setup" installation window. The window has a blue title bar with the text "Terra Setup" and a close button. The main content area is white and contains the following sections:

- Welcome to Terra Setup. This will install Terra Applications on your computer.**
- Enter directory where MicroStation is installed:** A text box labeled "MicroStation:" contains the path "C:\ms64\MicroStation" and a "Browse..." button to its right.
- Terra installation folders:** A dropdown menu labeled "Folder choice:" is set to "Default 'Program Files'". Below it are two text boxes: "Executables:" with the path "C:\Program Files\Terrasolid" and "Settings:" with the path "c:\terra64". Each text box has a "Browse..." button to its right.
- Select applications to install:** A list of nine checkboxes, each followed by an application name: TerraMatch CE 022.001, TerraMatch UAV CE 022.001, TerraPhoto Lite CE 022.001, TerraModeler CE 022.001, TerraModeler UAV CE 022.001, TerraScan Lite CE 022.001, TerraPhoto CE 022.001, TerraPhoto UAV CE 022.001, and TerraModeler Lite CE 022.001. TerraScan CE 022.001 and TerraScan UAV CE 022.001 are also listed.
- At the bottom, there are "OK" and "Cancel" buttons.

Setup: Public Function Header Files



- Setup installs three C header files as documentation for public functions:
 - `\terra64\include\public_classification.h` – classification public functions
 - `\terra64\include\public_functions.h` – general public functions
 - `\terra64\include\public_types.h` – data types used

New Point Weight Settings in Display Mode

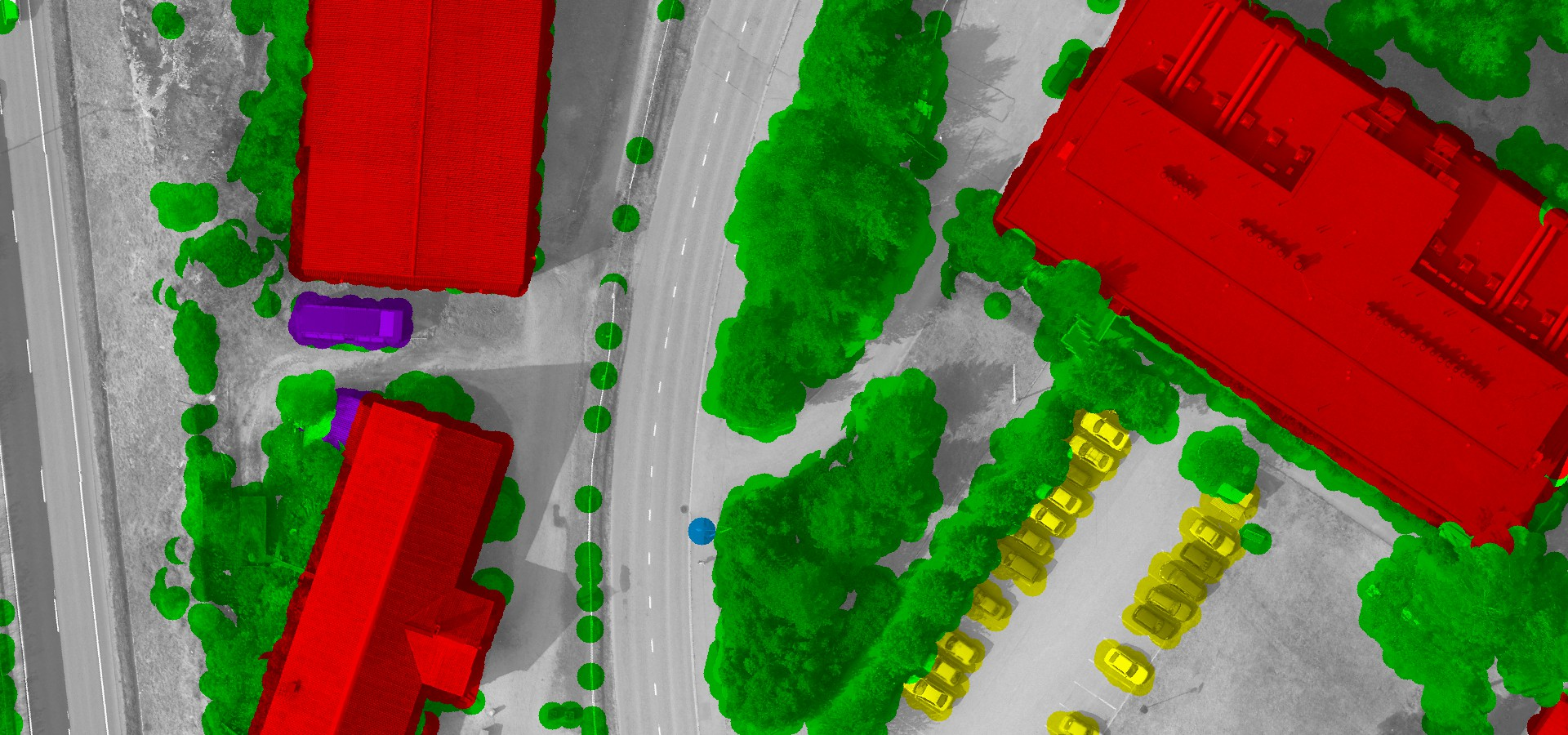


- **Relative** gives a point weight which changes based on zoom level
 - Thin weight when zoomed out far
 - Thick weight when zoomed in close
 - You specify point display size as a ratio of point spacing in loaded point cloud
- **Smooth fill** gives a smoothed display – good for viewing surfaces with intensity or color
- You specify smoothing radius as a ratio of point spacing in loaded point cloud

Color by 'Image color'



Color by 'Class + image'



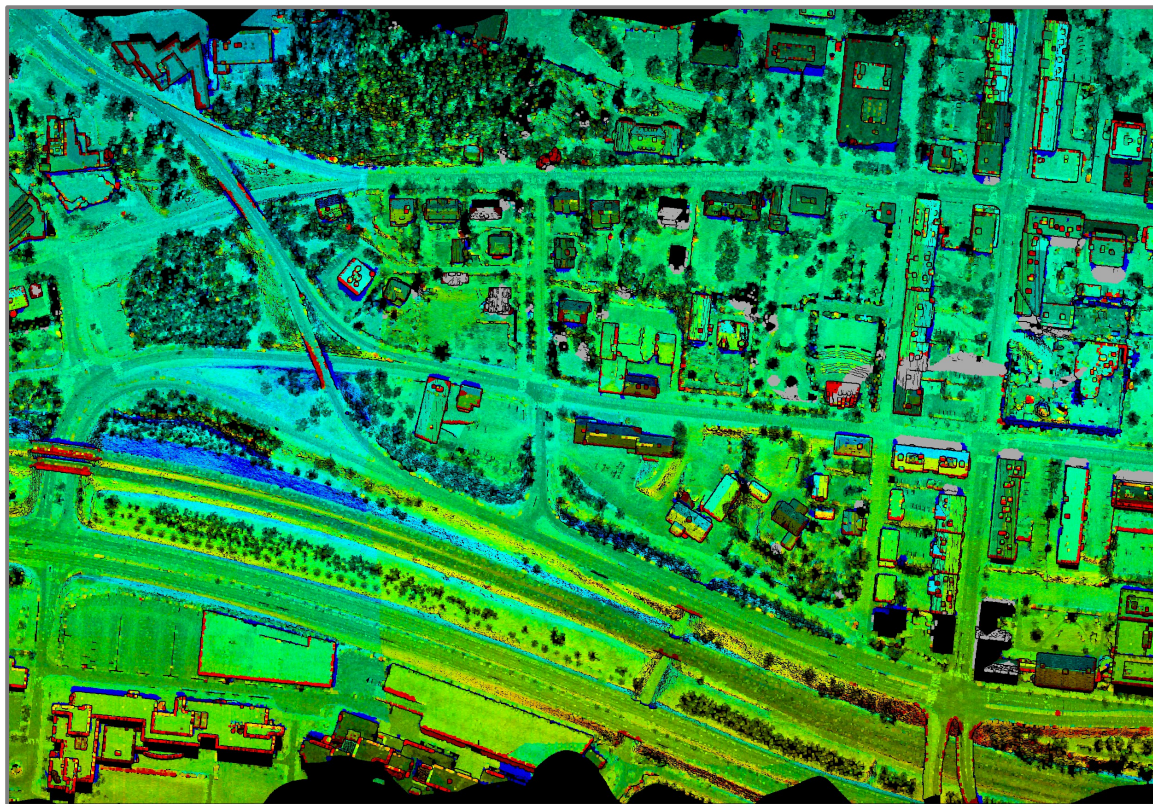
'Image color' & 'Class + image' Coloring Modes



- Preparation steps:
 - Open mission and load image list in TerraPhoto
 - Extract color from images storing image number (points get color and image number)
 - (Optional) Compute normal vectors
- TerraScan will draw points into view as 3D discs (=ellipses)
- TerraPhoto colors each pixel from images
- TerraPhoto keeps raw images in cache
- **Image Cache / Max size in Photo Settings / Memory usage** needs to be big enough
- First screen update is slow as software needs to read raw images

'Distance + intensity' Coloring Mode

- Distance gives color, intensity gives brightness



Reflectance & Amplitude Support in Coloring Modes



- **Class+intensity, Distance+intensity, Line+intensity, Time+intensity, Group+intensity, Normal+intensity** and **Color+intensity** coloring modes can use reflectance or amplitude if no intensity available
- Attribute use order: intensity, reflectance, amplitude, color

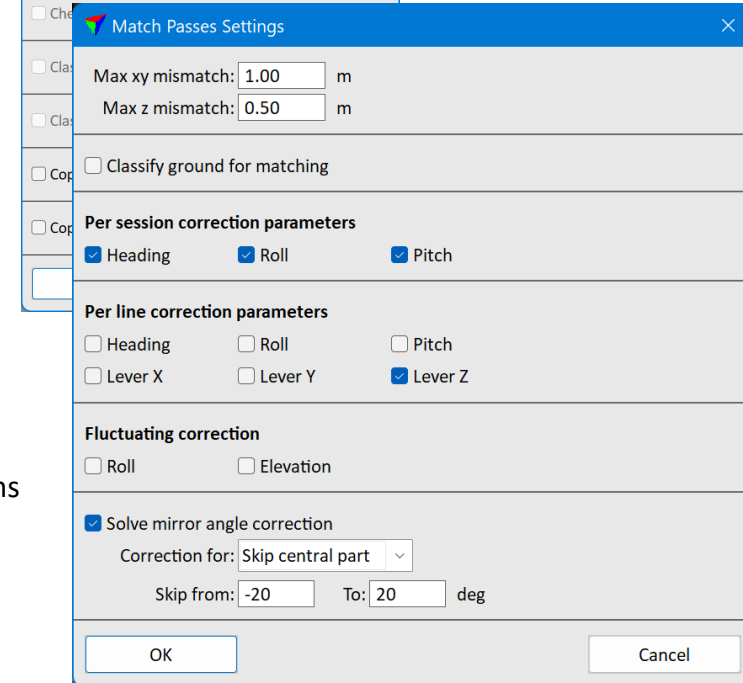
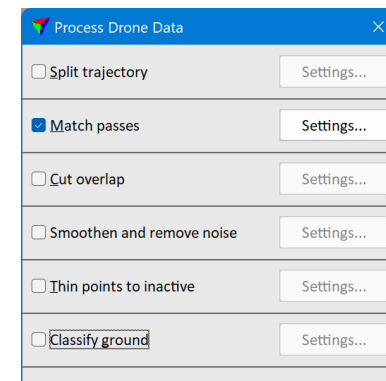
Various Improvements



- Multiple source classes in **Classify / Low points**
- **Scan angle unit** setting in user defined point file format definition (degree or LAS 1.4 steps)
- User trajectory file formats support rotation as quaternion values
- **Scan Settings** has color and weight settings for **Classify Using Brush** circle
- Maximum number of attachment in one tower cross arm increased from 12 to 20
- Projection system change runs faster when reading points in or importing into a project
- Distance coloring scheme has setting for how to color points with no distance value
- **Classify by Echo** can classify points which have zero as echo number or as echo count
- Better bounding circle routine in **Draw Polygons**
- Setup installs ASPRS standard list of point classes as `\terra64\tscan\asprs.ptc`
- Scan angle field unit setting in user point file format definition (unit can be degree or integer units as defined in LAS 1.4 file format)

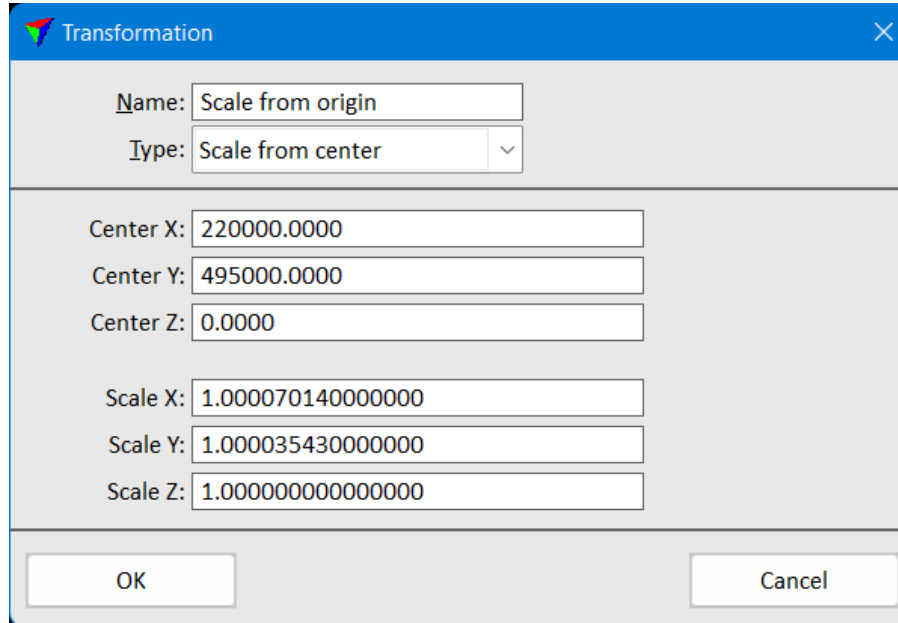
Match Passes in Process Drone Data

- Step in TerraScan **Process Drone Data** tool
- Runs automatic matching of flight passes to each other
- Requires TerraMatch or TerraMatch UAV license to run
- Collects tie line observations for three different correction levels:
 - Heading + roll + pitch per flight session (=trajectory group)
 - Heading + roll + pitch + x + y + z per line
 - Fluctuating roll + z
- Solves and applies **Mirror Angle** correction curve
- Saves matching report, tie line and correction files:
 - matching_report.txt
 - tielines_start.til, tielines_per_session_done.til, tielines_per_line_done.til, tielines_fluctuating_done.til
 - 01_per_session_hrp.tms, 02_per_line_z.tms, 03_fluct_z.tms, 04_mirror_angle.tms



New Transformation Type

- **Scale from center** applies a scale factor to points relative to a given center point



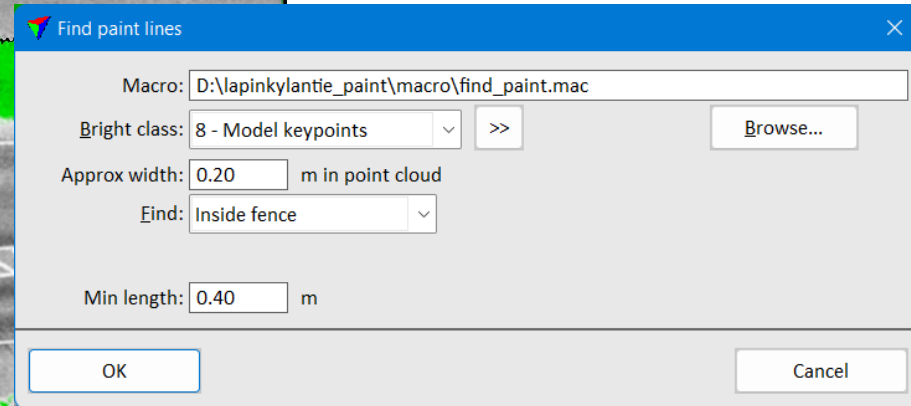
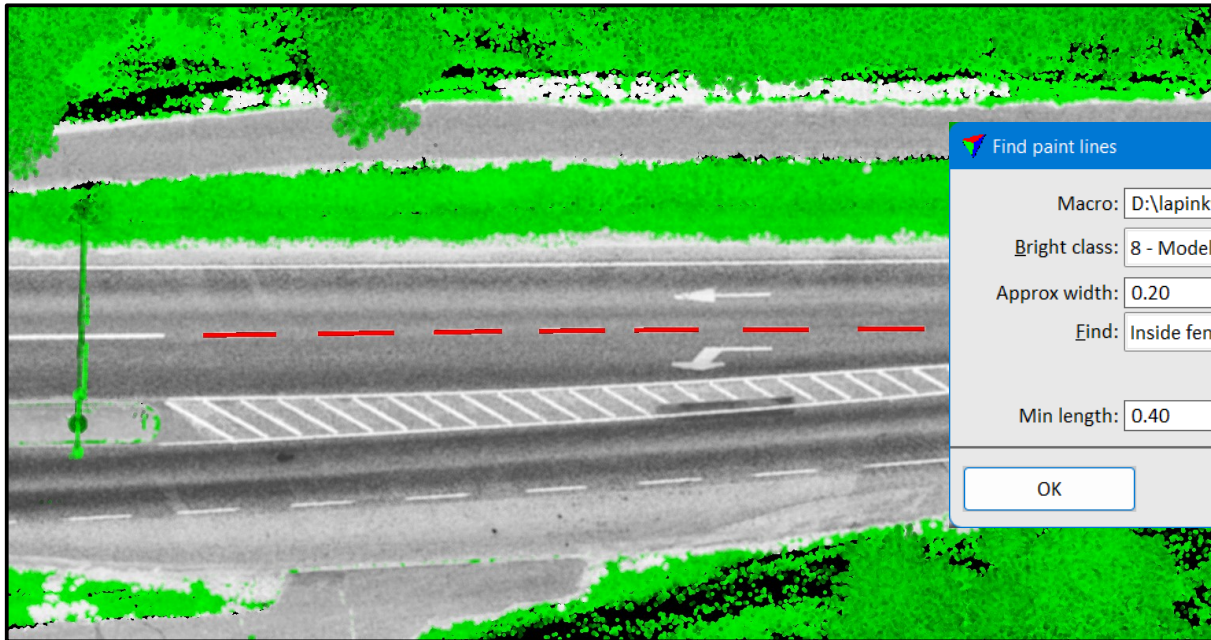
The image shows a software dialog box titled "Transformation" with a close button (X) in the top right corner. The dialog contains several input fields for configuring a transformation:

- Name:** A text input field containing "Scale from origin".
- Type:** A dropdown menu currently set to "Scale from center".
- Center X:** A text input field containing "220000.0000".
- Center Y:** A text input field containing "495000.0000".
- Center Z:** A text input field containing "0.0000".
- Scale X:** A text input field containing "1.0000701400000000".
- Scale Y:** A text input field containing "1.0000354300000000".
- Scale Z:** A text input field containing "1.0000000000000000".

At the bottom of the dialog, there are two buttons: "OK" on the left and "Cancel" on the right.

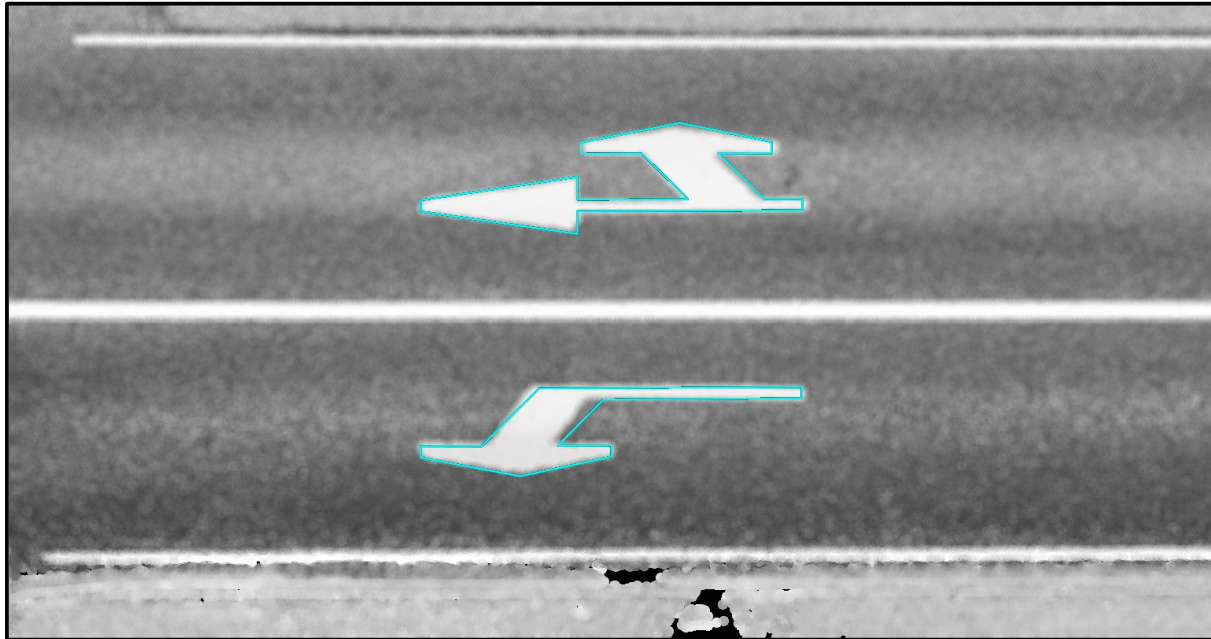
Find Paint Lines

- Finds paint lines from loaded points
- You typically need to have a processing macro which classifies high intensity points road level points to a specific class
- Macro will be executed on a temporary copy of points – loaded points not modified



Place Paint Marking

- Places a paint marking such as turn arrow manually using standard polygons
- Can use point cloud or Modeler TIN to get elevation for vertices
- Define paint markings in **Scan Settings** and **Road Paint Markings / Paint markings** category



Place Paint Marking

Group: Arrows slow speed

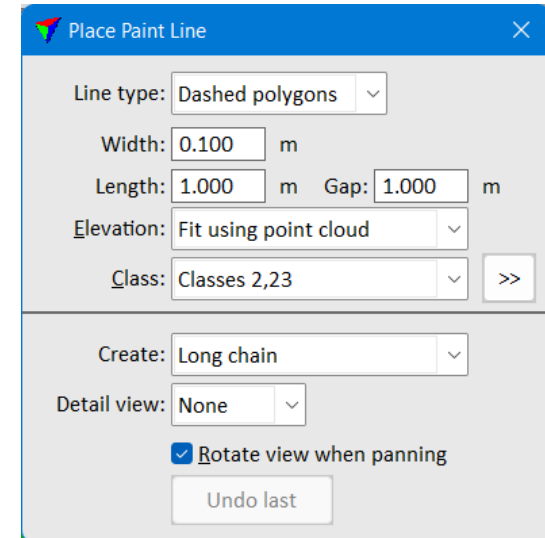
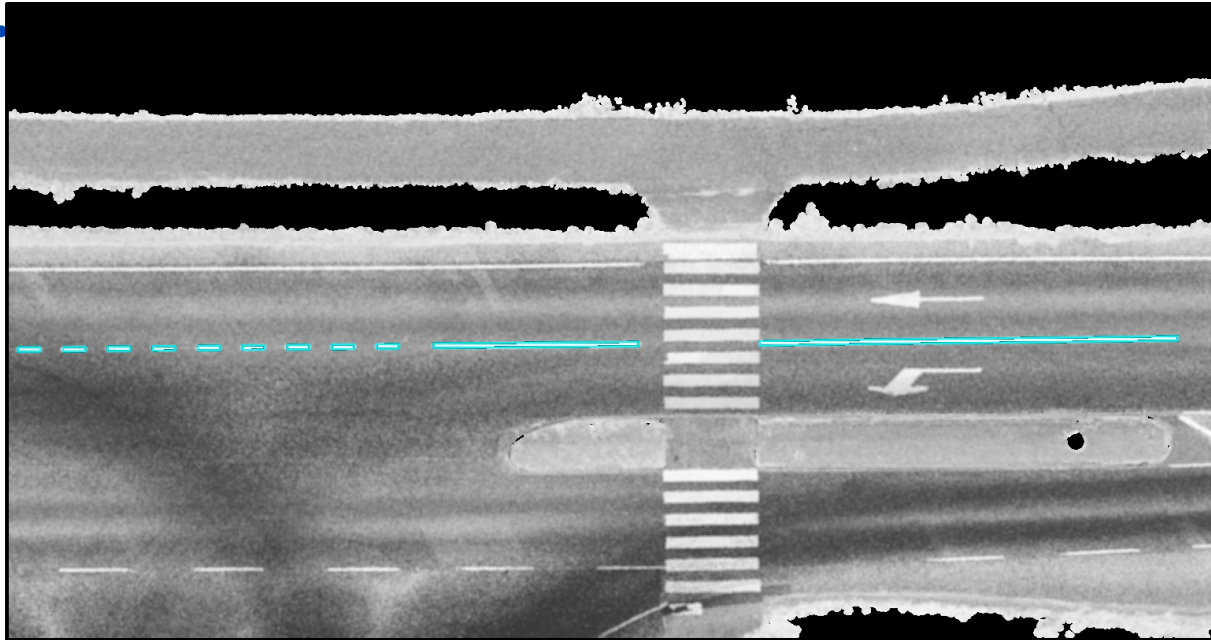
Marking: Choose with mouse click

Elevation: Fit using point cloud

Class: Classes 2,23

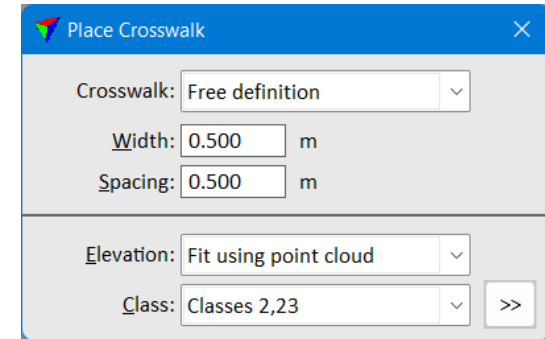
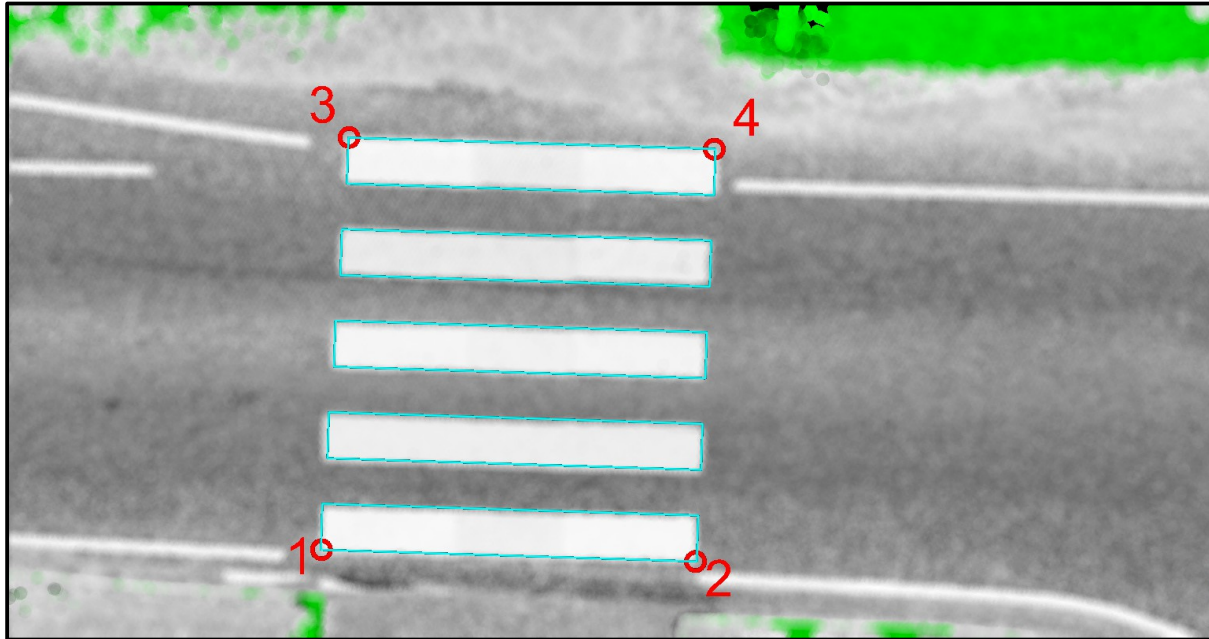
Place Paint Line

- Places a paint line manually or converts selected centerline vectors into paint polygons
 - Centerline – creates line or line string result
 - Continuous polygon – creates one polygon
 - Dashed polygons – creates one or multiple dashed polygons



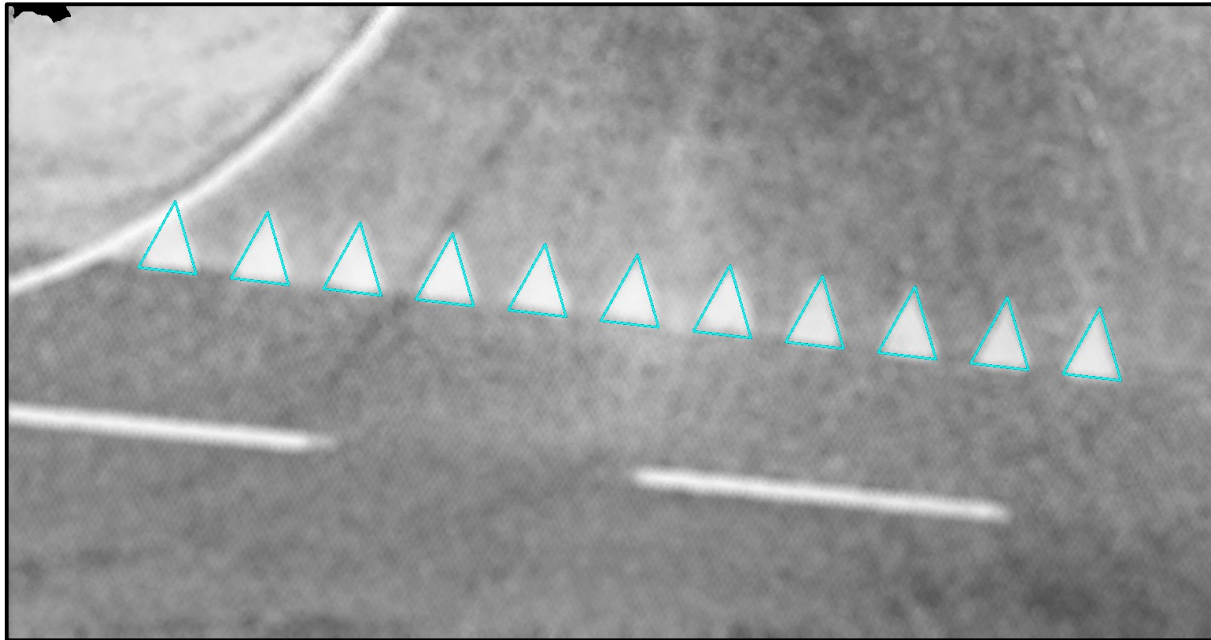
Place Crosswalk

- Places a number of rectangle polygons at crosswalk manually
- Can use point cloud or Modeler TIN to get elevation for vertices
- Define crosswalk types in **Scan Settings** and **Road Paint Markings / Crosswalks** category



Place Paint Symbol Row

- Places a row of triangles or rectangles manually
- Can use point cloud to get elevation for vertices



Place Paint Symbol Row

Symbol: Triangle

Width: 0.500 m

Height: 0.600 m

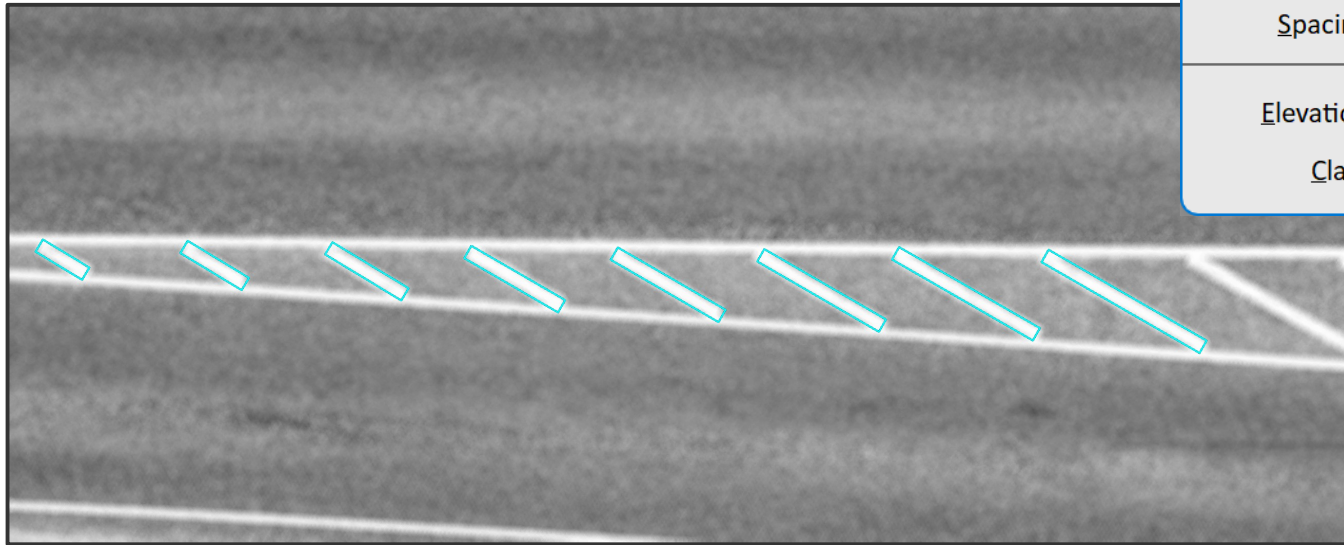
Spacing: 0.300 m


Elevation: Fit using point cloud

Class: Classes 2-3 >>

Place Paint Stripes

- Places a row of paint line polygons
- Can use point cloud to get elevation for vertices



 Place Paint Stripes ✕

Width: m

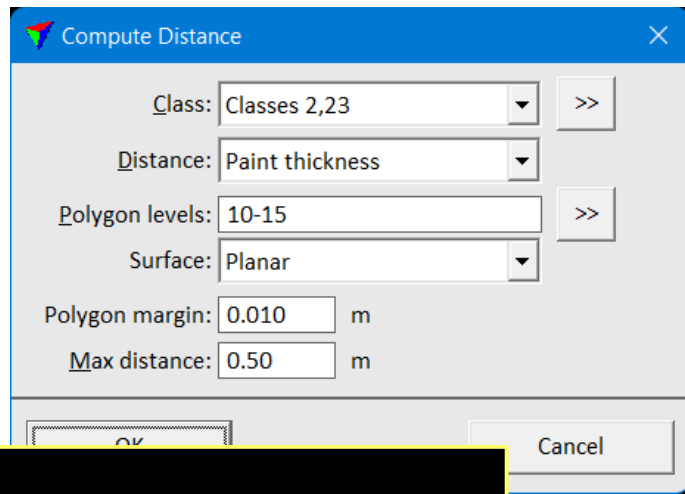
Spacing: m

Elevation: ▾

Class: ▾

Compute Distance & Paint Thickness

- Computes value for points inside polygons on given levels
- Fits a plane or a second degree surface to points outside polygon
- Points get height from fitted surface as distance value



Compute Distance

Class: Classes 2,23 >>

Distance: Paint thickness

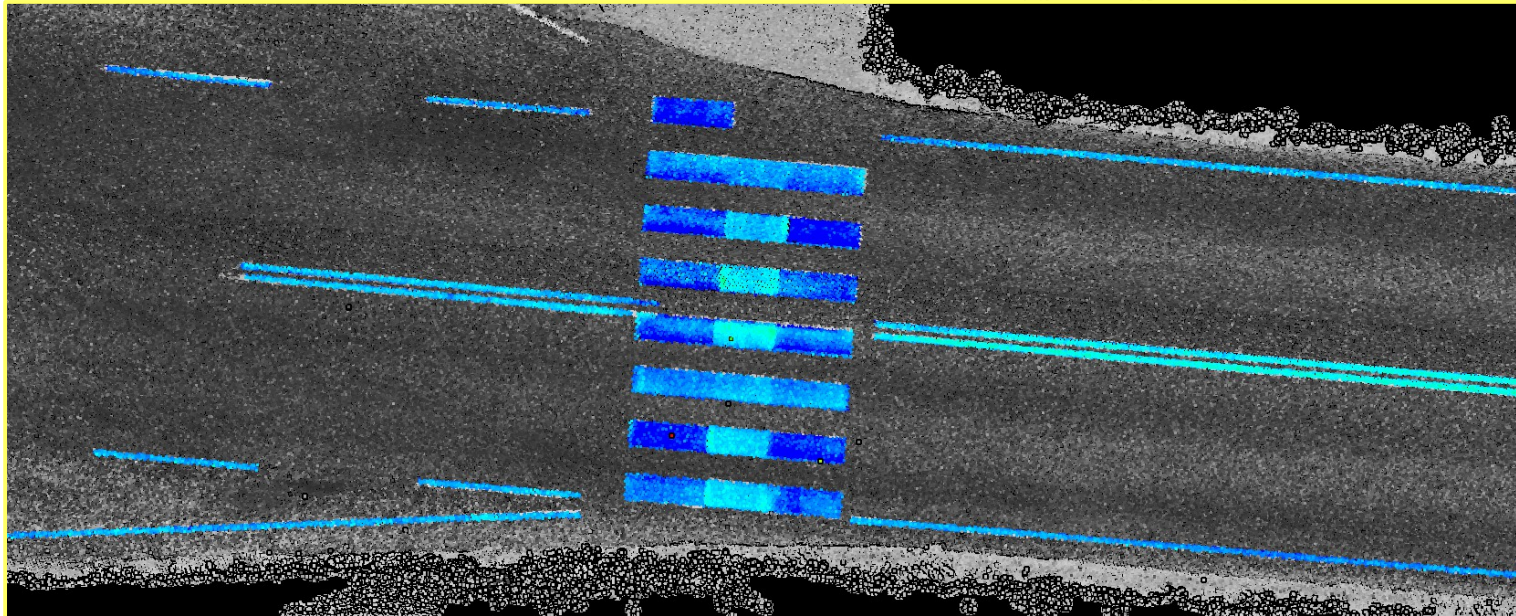
Polygon levels: 10-15 >>

Surface: Planar

Polygon margin: 0.010 m

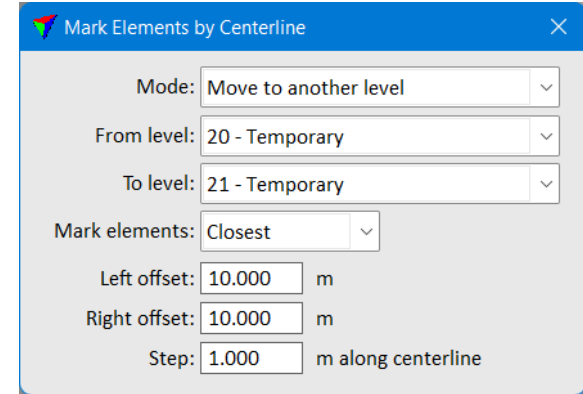
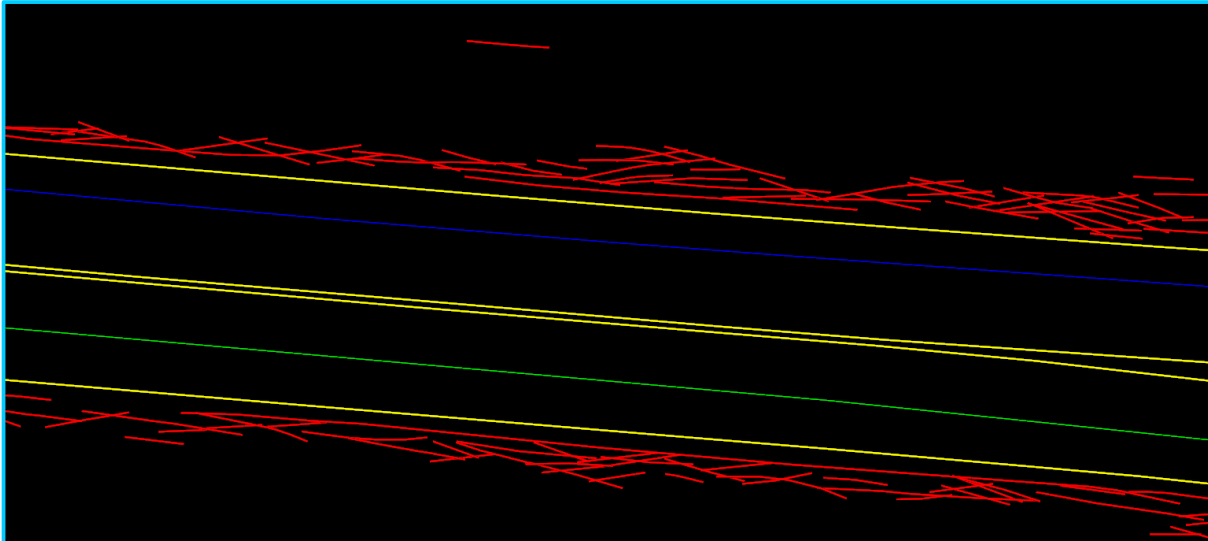
Max distance: 0.50 m

OK Cancel



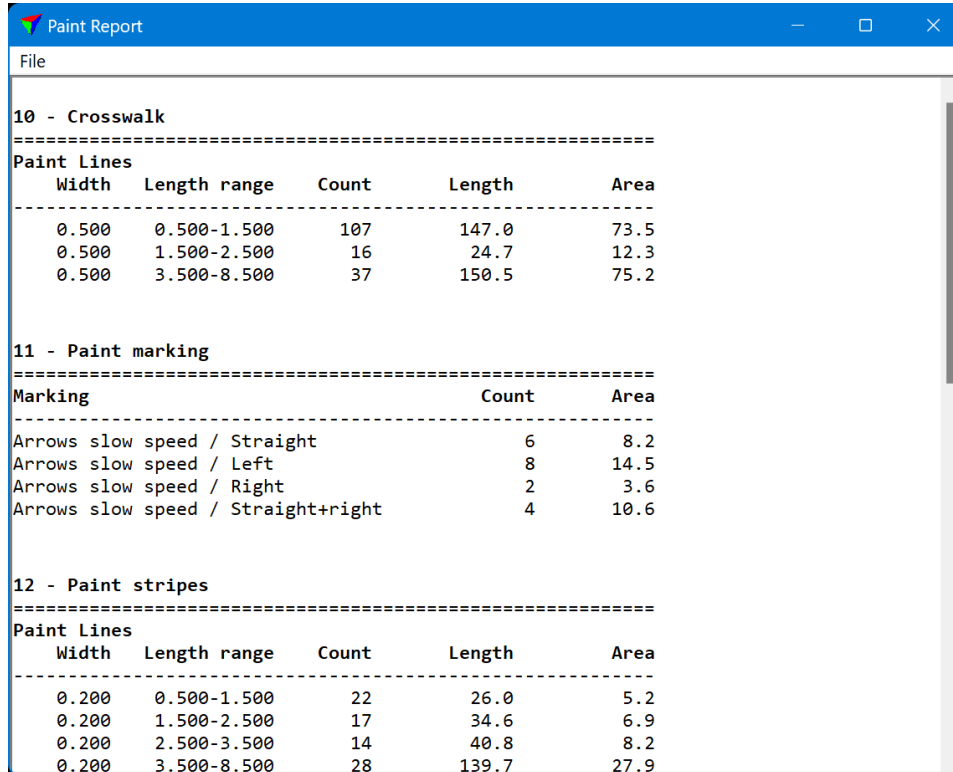
Mark Elements by Centerline

- Marks (=moves to another level) linear elements close enough or closest to selected centerline elements
- Good for marking vector elements which are:
 - Close enough to a centerline of a feature such as road
 - Or closest to a centerline of a feature



Output Paint Report

- Writes a summary report on selected paint marking and paint line polygons



Paint Report

File

10 - Crosswalk

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Paint Lines

Width	Length range	Count	Length	Area
0.500	0.500-1.500	107	147.0	73.5
0.500	1.500-2.500	16	24.7	12.3
0.500	3.500-8.500	37	150.5	75.2

11 - Paint marking

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Marking

Marking	Count	Area
Arrows slow speed / Straight	6	8.2
Arrows slow speed / Left	8	14.5
Arrows slow speed / Right	2	3.6
Arrows slow speed / Straight+right	4	10.6

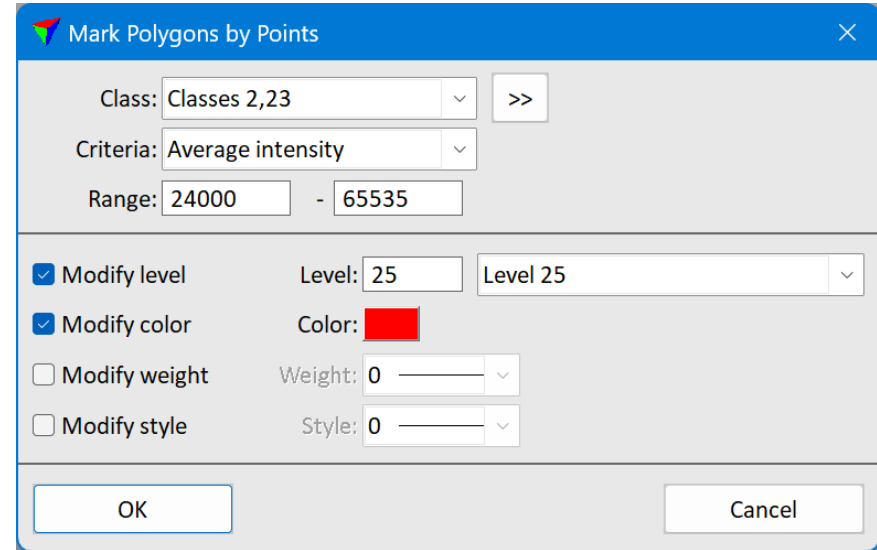
12 - Paint stripes

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Paint Lines

Width	Length range	Count	Length	Area
0.200	0.500-1.500	22	26.0	5.2
0.200	1.500-2.500	17	34.6	6.9
0.200	2.500-3.500	14	40.8	8.2
0.200	3.500-8.500	28	139.7	27.9

Mark Polygons by Points

- Marks selected polygons by statistics from points inside each polygon
 - Presence of points (=points in specific class inside polygon)
 - Point density
 - Average amplitude
 - Average brightness (=color brightness)
 - Average intensity
 - Average reflectance
 - Smallest distance
 - Average distance
 - Biggest distance
- This can mark paint polygons by:
 - Paint brightness (Average intensity)
 - Paint thickness (Average distance)



The screenshot shows a software dialog box titled "Mark Polygons by Points". It contains several configuration options:

- Class:** A dropdown menu set to "Classes 2,23" with a right-pointing arrow button.
- Criteria:** A dropdown menu set to "Average intensity".
- Range:** Two input fields containing "24000" and "65535" separated by a minus sign.
- Modify level:** A checked checkbox, a "Level:" input field with "25", and a dropdown menu showing "Level 25".
- Modify color:** A checked checkbox, a "Color:" label, and a red color swatch.
- Modify weight:** An unchecked checkbox, a "Weight:" label, and a dropdown menu set to "0".
- Modify style:** An unchecked checkbox, a "Style:" label, and a dropdown menu set to "0".

At the bottom of the dialog are "OK" and "Cancel" buttons.

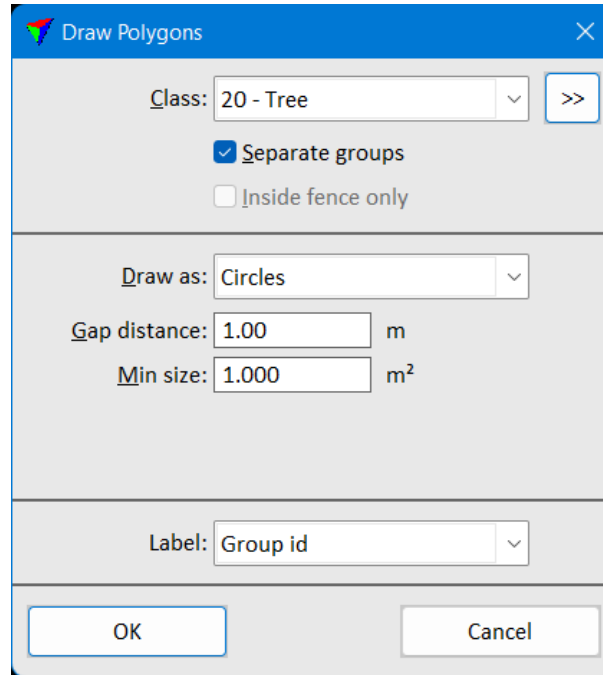
Find Wires Improvement



- **Find Wires** was originally written for high density mobile data and required a good number of hits on the wire with short spacing
- **Find Wires** now works with airborne data – requires consistent pattern of hits on the wire

Draw Polygons Improvements

- Better bounding circle routine
- Can draw label: **Polygon number** or **Group id**



The screenshot shows a dialog box titled "Draw Polygons" with a close button (X) in the top right corner. The dialog is divided into several sections:

- Class:** A dropdown menu showing "20 - Tree" and a button with ">>" next to it.
- Separate groups:** A checked checkbox.
- Inside fence only:** An unchecked checkbox.
- Draw as:** A dropdown menu showing "Circles".
- Gap distance:** A text input field containing "1.00" followed by "m".
- Min size:** A text input field containing "1.000" followed by "m²".
- Label:** A dropdown menu showing "Group id".

At the bottom of the dialog are two buttons: "OK" and "Cancel".

Classify Top Surface

- Classifies highest points
- Main uses:
 - Classify top of forest canopy for DSM output or orthophoto production
 - Classify top surface for true ortho production: ground + roofs + bridges

Classify Top Surface

From classes

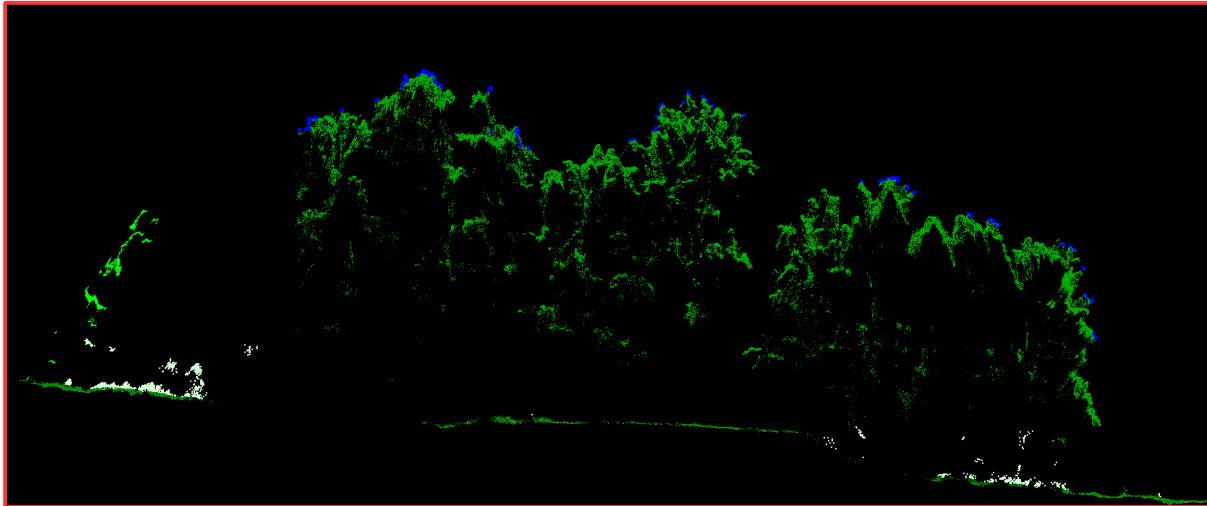
Ground: >> Spacing: m

Roof: >> Spacing: m

Vegetation: >> Spacing: m

To class:

Inside fence only



Geoid Model Support

- Support for Latvian geoid model LV14
- Support for Brazilian geoid model HGEOHNOR2020
- Support for Korean geoid model KNGEOID18 (geoid file not part of setup package)
- Support for Canadian geoid model CGVD2013



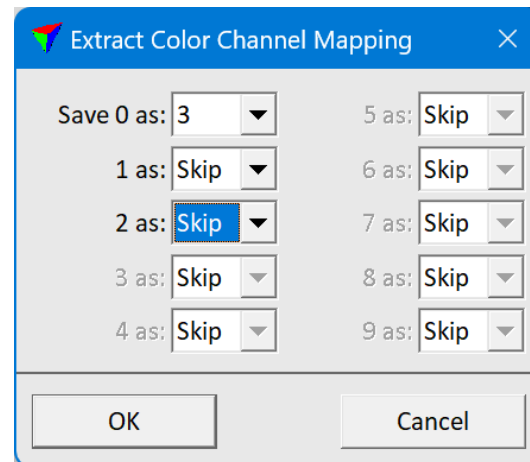
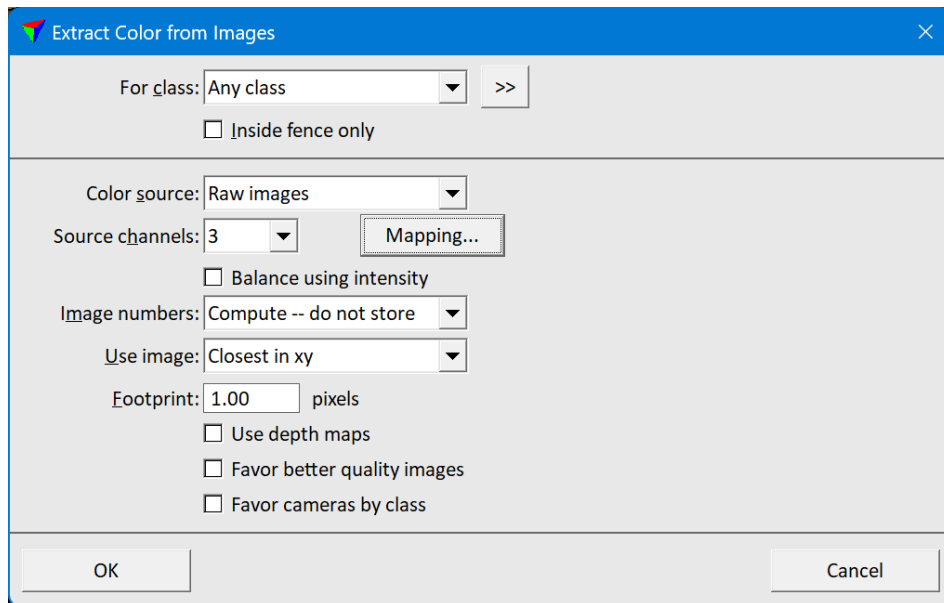
Manage Trajectories Improvements

- **View positions** shows travel speed at each position.
- **Tools / Draw into design** can color trajectories by travel speed
- **Convert time** shows conversion result for first time stamp
- **View / Sort** can sort trajectories by duration



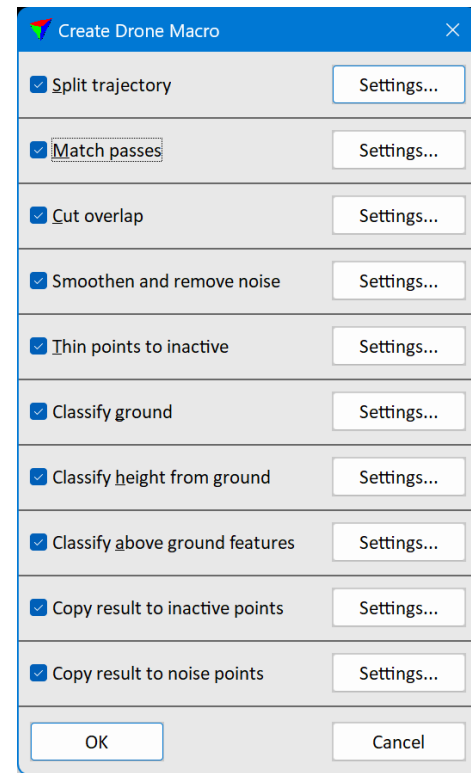
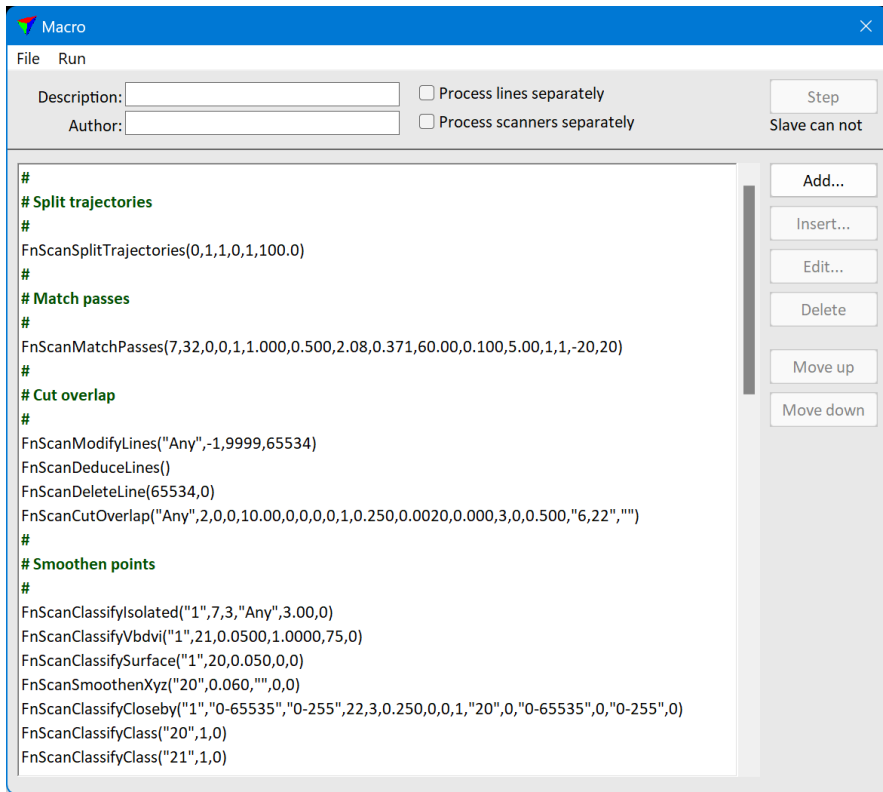
Extract Color & Channel Mapping

- Channel mapping makes it possible to extract RGB channels from one set of images and NIR channel from another set of images
 - Get channels 0, 1 and 2 from RGB
 - Get channel 3 from NIR



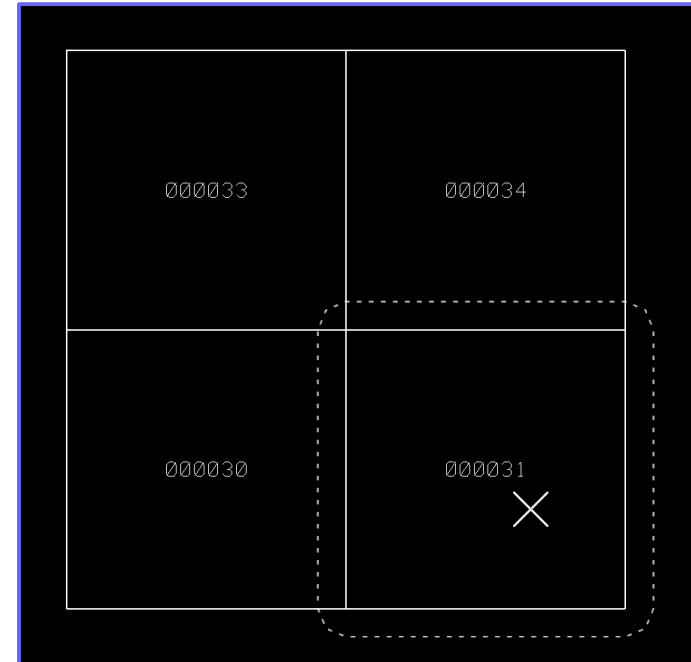
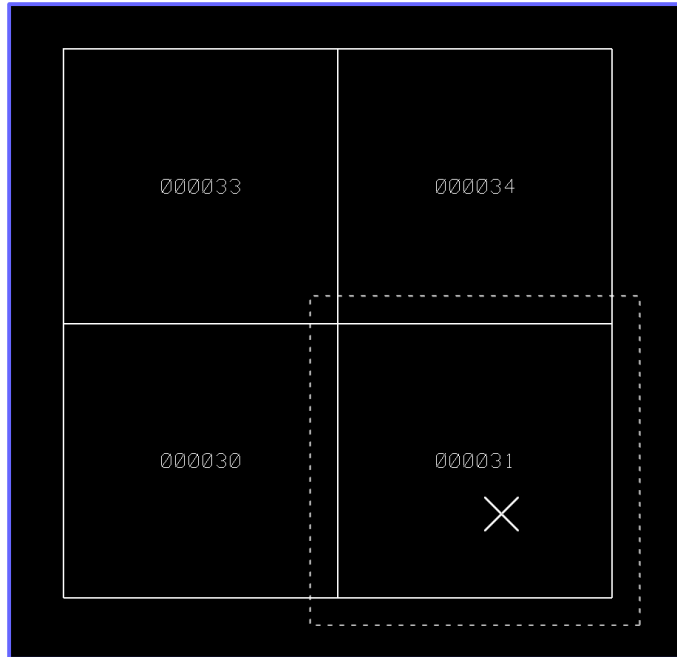
Wizard / Create Drone Macro

- Creates a macro for selected drone processing Wizard steps
- Makes it easier to modify processing steps



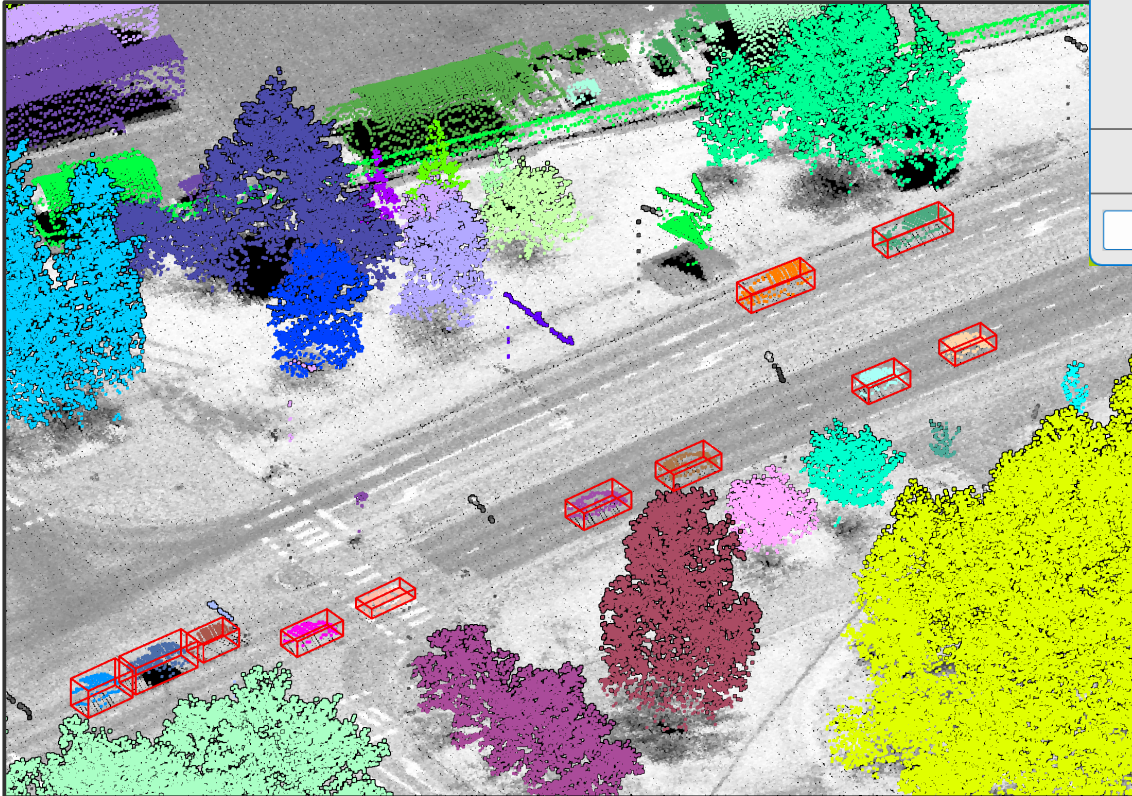
Neighbour Area Choice in Define Project

- **Neighbour area** setting in project information defines the shape of area for neighbouring points:
 - **Sharp corners** will use sharp corner polygon
 - **Rounded corners** will use rounded polygon



Draw Polygons and Bounding Box

- **Draw Polygons** has **Bounding boxes** option in **Draw as** field
- Draws 3D bounding box as cell element with 6 polygons



Draw Polygons [Close]

Class: 17 - Car [Dropdown] [Next]

Separate groups
 Inside fence only

Draw as: Bounding boxes [Dropdown]

Gap distance: 1.00 m
Min size: 0.100 m²

Label: No label [Dropdown]

[OK] [Cancel]

Longitude/Latitude and Geocentric Output



- **Save As** menu command from main window can save **WGS84 lon/lat** or **WGS84 geocentric**
 - Available when active projection system is specified
- **Output points** macro step has support for **WGS84 lon/lat** and **WGS** geocentric output

A screenshot of a software dialog box titled "Save points". The dialog has a blue header bar with a close button (X) on the right. The main area is light gray and contains several settings:

- "Save class:" with a dropdown menu showing "Any class" and a ">>" button to its right.
- "Points:" with a dropdown menu showing "All points".
- "Line:" with a dropdown menu showing "All flightlines".
- "Format:" with a dropdown menu showing "LAS 1.2" and an "Attributes..." button to its right.
- "Transform:" with a dropdown menu showing "WGS84 lon & lat".
- An unchecked checkbox labeled "Inside fence only".

At the bottom of the dialog, there are two buttons: "OK" on the left and "Cancel" on the right.

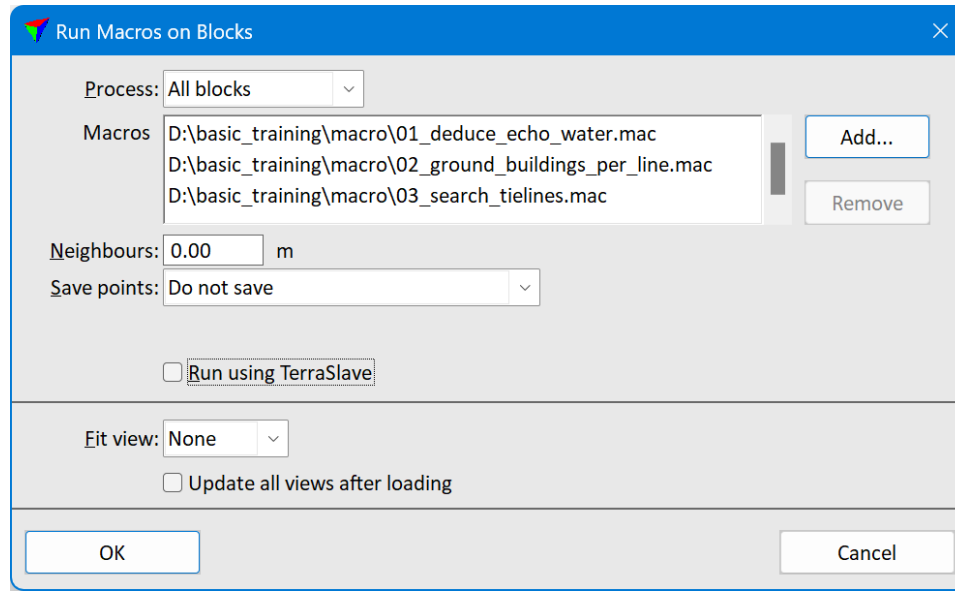
New Drone Project and Process Drone Data



- Support for new systems:
 - YellowScan Explorer
 - YellowScan Mapper
 - YellowScan Mapper+
 - YellowScan Surveyor Ultra
 - YellowScan Voyager
 - YellowScan Vx15
 - YellowScan Vx20
 - AlphaAir 450

Run Multiple Macros on Project

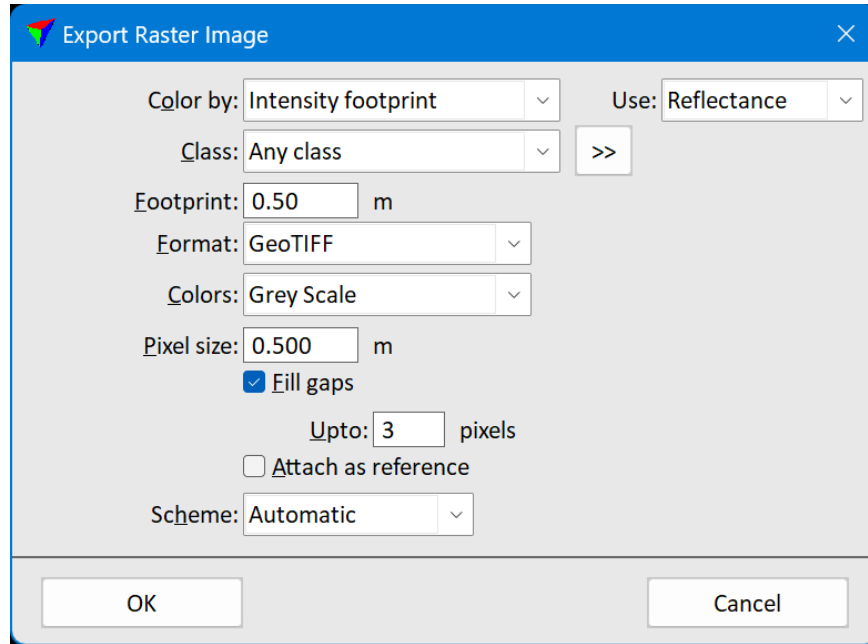
- You can select multiple macros to run on a project
- Needed to automate matching:
 - One classifies ground (has **Process flightlines separately** on)
 - Another macro searches tie lines
- No need to save points – need to save tie lines only



Raster Image Output Improvements



- **Output / Export raster image** menu command and **Tools / Export raster images** from project window can produce rasters with normal coloring
- **Output / Export raster image** menu command and **Tools / Export raster images** from project window can produce rasters with reflectance or amplitude based coloring



Label Catenary Height Improvements

- Can label multiple wires if you select wires before you start the tool
- Option to control if reported distance should be 3D distance or vertical difference



Tools for Vectorizing Walls

- New tools for creating building footprint polygons or polygons+lines for wall locations
- Source point cloud should have some hits walls:
 - UAV laser data
 - UAV photogrammetric
 - Airborne laser data
 - Mobile laser data

