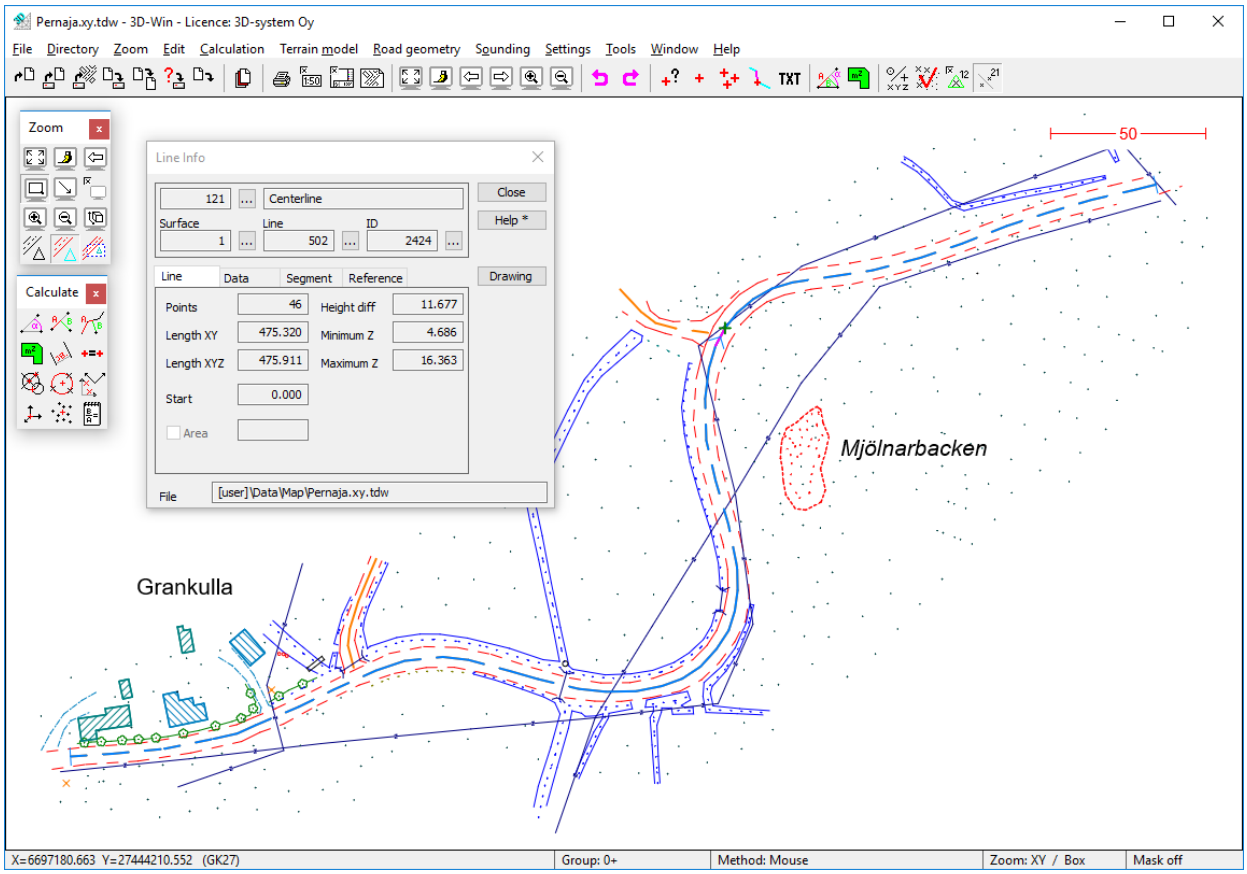
3D-Win

Start-up Guide

Version 6.5



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1 Software Overview

1.1 General

3D-Win is a software for producing and processing field survey data. The program can be installed on standalone computers or in any Windows-based network for more users.

The program makes it possible to simultaneously process several overlaid vector and raster image elements. The appearance of files on the screen follows the user's own coding and symbolics, or by simplifying or highlighting specific items as needed.

In addition to the program's own file format, files can be read and written in several different formats. The most common field measurement formats and the formats of many CAD and GIS systems are supported, as well as ASCII row formats, which can be freely defined by the user. In addition to vector files, raster data, terrain models, road geometry, and sounding data in a variety of formats can be handled.

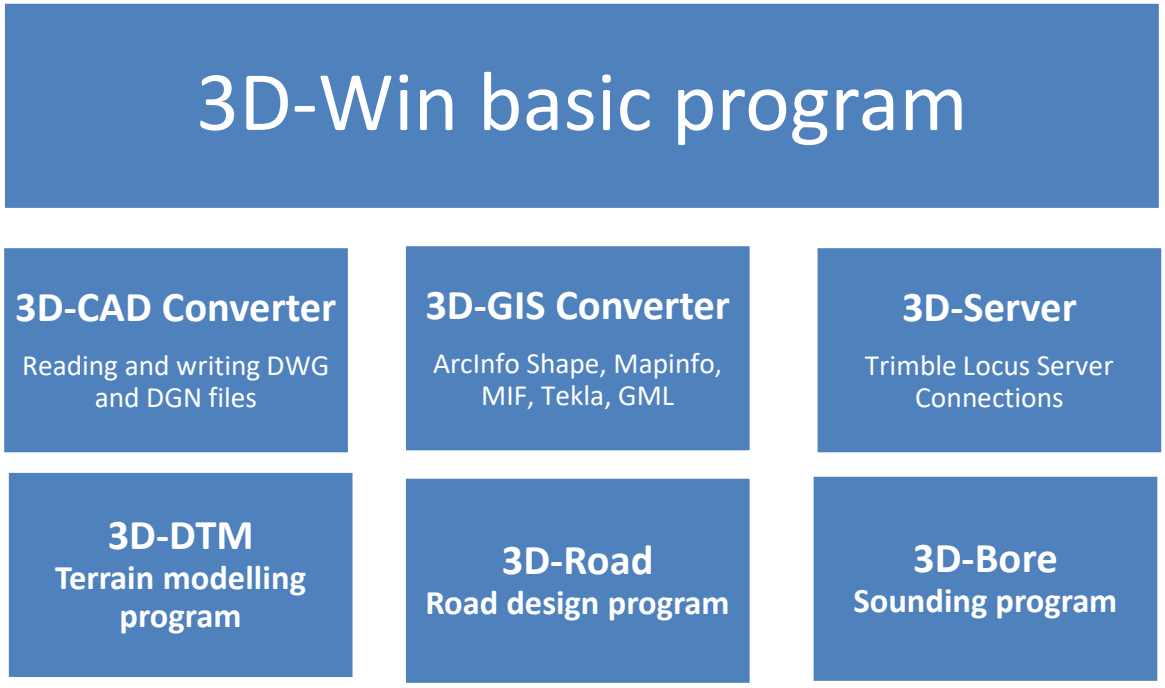
Data can be printed on any Windows-supported printer, either as a map illustration, scaled as necessary, or as printed text list.

Editing data is done graphically and can be done on singular points and lines, on entire file elements, or on active objects selected by different search methods. Efficient methods of coding are available for processing point coding and a practically unlimited number of freely formulated attributes can be saved for the points. Using code conversion tables, coding is easily converted to match systems for different clients.

There are versatile, but easy-to-use methods of calculation. Now it is possible to execute a task with one function instead of five, as before. You yourself define how the calculations are to proceed and how you wish values to appear on the screen and in the result file. Results from the calculations are automatically saved in a text file for printing. Also included are versatile functions for transferring data to the EUREF-FIN coordinate systems and between coordinate systems.

Collection and input of data into the GIS system is an important part of field surveying. By using the 3D-Win program you can read any attribute data, edit or complement given values and send the information back to the GIS system.

The software is modular, making it easy to expand as needed. Below, some of the most common parts of the software are introduced. In addition, some extra special features are available for the software. You can check the features for your software under *Help - About – Rights*.



1.2 Protection

The license to use the software is protected and its use is restricted by the following methods.

Hasp/Sentinel single license security adapter for USB port: The program can be installed on multiple devices, but it only works on the device where the security adapter is attached. The license number and its permissions are written om the security adapter.

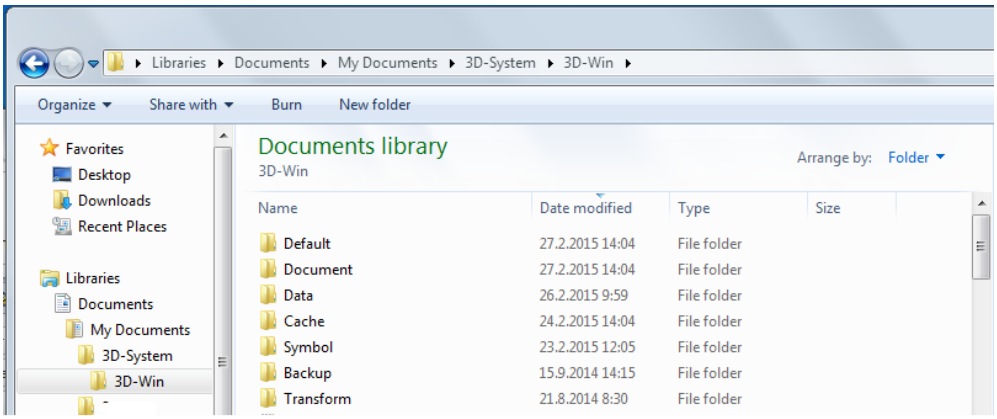
Hasp/Sentinel Network Lock: The server has a security adapter or license service installed that gives users rights and licenses. The software itself can be installed either on the network or locally on the workstations, and users have their own directory where a user's own settings are saved. The maximum number of simultaneous users is programmed in the network lock. If the number of users exceeds the number of licenses, the user who joined the service the last will be shown an error message and a request to try again later. It is possible to borrow a license for a workstation from the license service for a fixed period of time, so a connection to the server is not required to use the software.

1.3 Start-up Guide

This Start-up Guide makes it easy to deploy 3D-Win and familiarize yourself with the software's features. The guide focuses on the basic functions of the software and only shows the most important points. For more information and more detailed instructions, click the **Help** button for each function.

The use of this manual requires (for paths and examples) that the software is installed in the directories required by the installer, and that the sample data is also installed. If this is not the case, please ask the person who performed the installation for more information.

Read this guide in the order it is presented and perform all the requested actions. This ensures that the program works as described in the guide. All examples use the Pernaja.xy.tdw file unless otherwise noted. All sample data can be found in the directory \Files\3D-system\3D-Win\data\map. This and other instructions can be found in the directory My Documents\3D-system\3D-Win\Document.



It is advisable to switch the code file to Code_65.dat (or newer) for the review and training of the start-up guide under *Settings - Codes* or otherwise to ensure that the new configuration is included in the code file you are using. The instruction refers to the [home] and [user] directories that are dependent on the operating system. Usually [home] refers to the *My Documents* directory and [user] to the \3D-system\3D-Win directory below. You can find these easily in the *Settings - Files dialog in the User Directory section.* (See. 7.4).

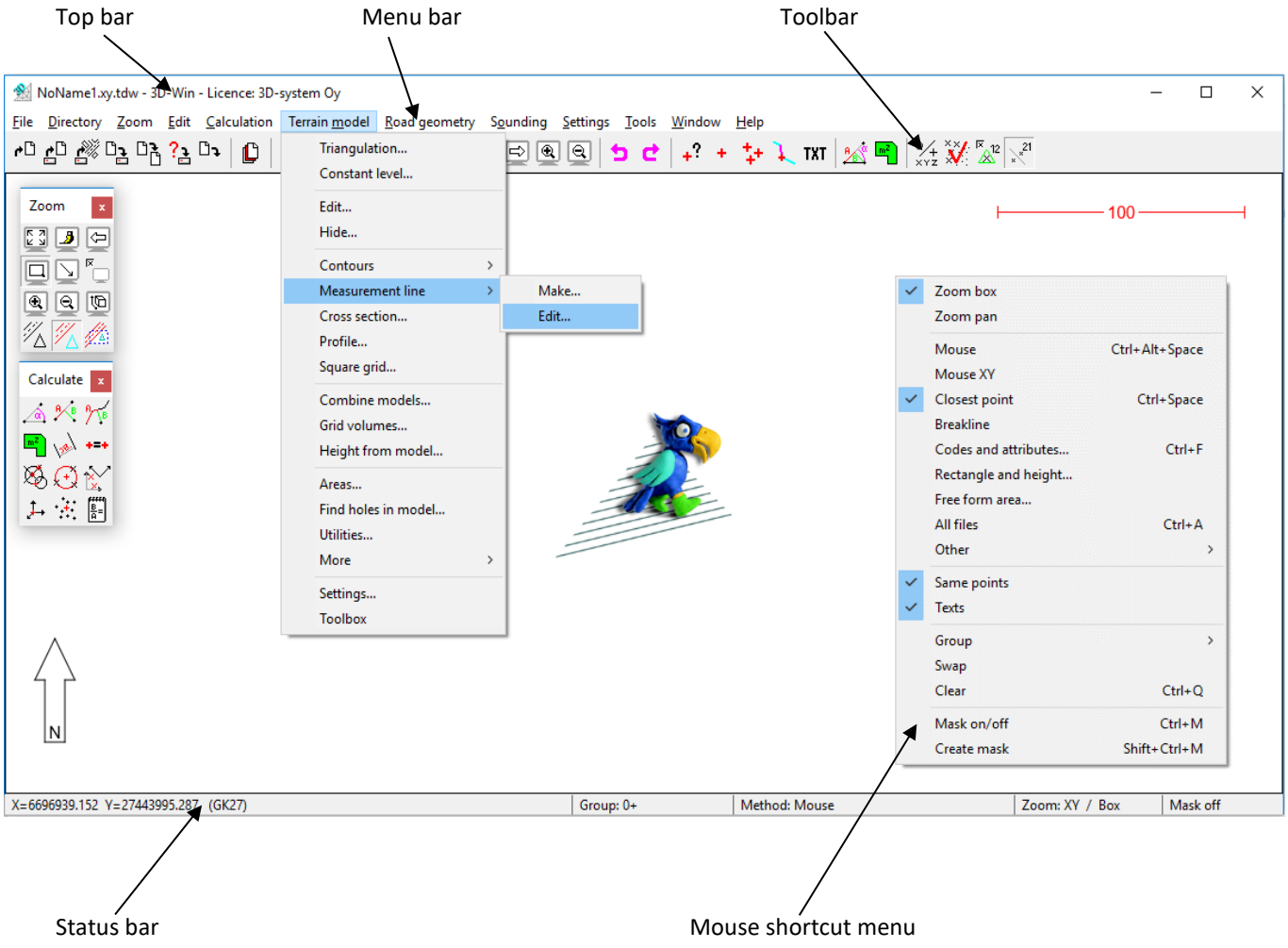
After reading this guide, you will know the basics of the program. For more information on how to use the program, browse through the menus, click on the **Help** button, get information from other operating instructions (Bore, Cad, DTM, Road), from home page materials (such as previous user meeting material), by reading and following our discussion forum, by participating in our training or by calling us.

Our homepage, the Wiki site and our discussion forum can be accessed directly from the **Help** menu. The same menu also contains the **Documents** and the **Version description**, which explains the changes made to the software during the latest version update. These should be read whenever you have a new version or when you use the new software.

1.4 User interface

When you start the program, the screen shown in the picture below will open on your screen. The figure shows explanations of the main window objects as well as the most important tools needed when using the program. These are often referred to later in this manual. The logo in the middle is only visible when there are no files open in the program.

The top bar of the screen tells you the name of the active file and who has been granted access.
On the **menu bar** you can find a pull-down menu with various functions of the program.
The **toolbar** contains frequently used functions as icons.
In the **mouse shortcut menu** (right click mouse button to open) there are more frequently used functions.
The **status bar** contains the coordinates of the mouse cursor and the identified coordinate system of the data, the number of points selected for the group, the number of texts and the status of the group, the search method used, the zoom method, and the mask settings. When the mouse is over the icon or menu command, the status bar displays the name of the function.
To select with keyboard shortcuts (for example, Ctrl+**F**), see the list of shortcuts used by the program on page 47.

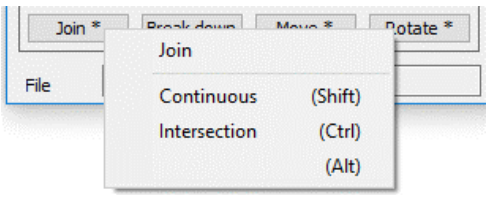


When you move the mouse over an icon, the hint will pop up for a moment next to the icon. The hint text shows the name of the function, the location in the menu, and a shortcut if it has one. In the status bar, the name of the function appears as long as the mouse is over the icon.

In addition, the program has so-called floating tool palettes. Tool palettes are the fastest way to use different functions, and they are pre-grouped according to the set of tasks. Palettes can be displayed in the desired function group menu (the bottom one is Tool Palette). Icons on both the toolbar and tool palette can be selected by the user. The toolbar icons are selected in *Settings - Menu Functions* and for Tool Palette *Settings - Desktop*.

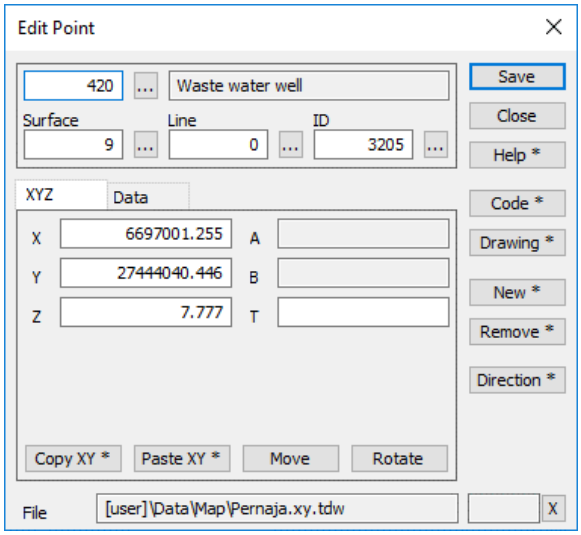
Shortcut menu for function buttons

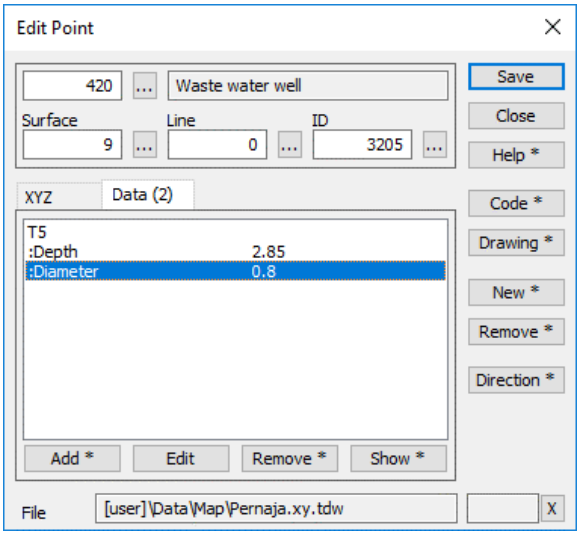
Some buttons have an asterisk (*) to indicate that the Shift, Control, and Alt keys can be used to select different options and to execute the function slightly differently. The shortcut menu is opened with the second mouse button (usually right) or with a long press of a button. This feature works with both tool buttons and dialog buttons. Some functions show additional information about options (e.g. Selected, Copy).

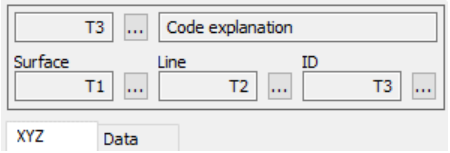


1.5 Code fields

Each point has a number of code fields to determine, e.g. point type and coordinates. In addition, the points may use some attributes or other information related to the point type code. The dialog opens with *Editing - Points - Edit*.







In the dialogs, the fields **T1-T4** and the explanation text of the **T3** code are shown in the code file. Searching for values in the code file lists is done with the browse button next to each field. Attributes are displayed on a separate **Data** tab.

The following rules must be noted when using the program:

A point is a single object that can have 1-4 identifiers and the desired number of attributes.
A **line** always has the same T1, T2, and T3 (i.e. a line runs on the same surface, the same line number, and the same type code). The T4 may be unique at each line point. A line may have its own attributes that belong to the line object, and single point-specific attributes may be saved for each line point.
An area consists of a closing line formed as an area in the **Line Editing** function.

Points can be edited using the **Point Editing** tool (see above) and lines only with the **Line Editing** tools. You can also change the single point details by editing a point. The areas are edited using the Line Editing tools.

T1 (Surface) field is otherwise free, but when using the terrain model, it is read by default as the surface symbol for points and lines.

T2 (Line) is a line number that is normally a continuous number for the lines of that file. The program does not require a number on the line but is able to create lines even if the number is not given or does not exist.

T3 (Point Type Code) specifies the type of object (tree, building, etc.). Based on the type codes, the drawing symbol is also determined according to the given code file (*Settings - Codes*).

T4 (Point ID/number) is usually a point number, but it can be used to store other information.

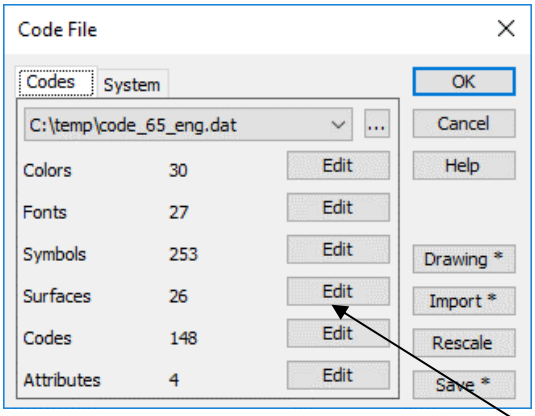
T5 (Additional information field), T6 (Additional information field)

T5 and **T6** are common attributes for all points and lines that were originally used to report point accuracy class and line flow method. However, the use and existence of the fields are currently selectable by the user and displayed on the **Data** tab with other features as needed.

The width of the code fields is free. When you click the browse button next to **T1** or **T3** in the dialog, you will open all the codes or surfaces available in the field in your code file. If you press the Shift key and the browse button at the same time, you will open all the codes in the active element (file). Pressing the Alt key and the **T3** field browse button simultaneously opens a list of codes for all files in the element list. The browse button has a special function for **T2** and **T4** fields. In the **T2** field, you get either an empty field or by clicking again the first free line number, and in **the T4** field you get either number 1 or the first free point number in the active file.

The **Code** button activates copying the type code from another object. The mouse points to the object from which the value is copied. By default, only the code **T3** is copied. Shift+**Code** copies all the code fields and properties from the assigned point.

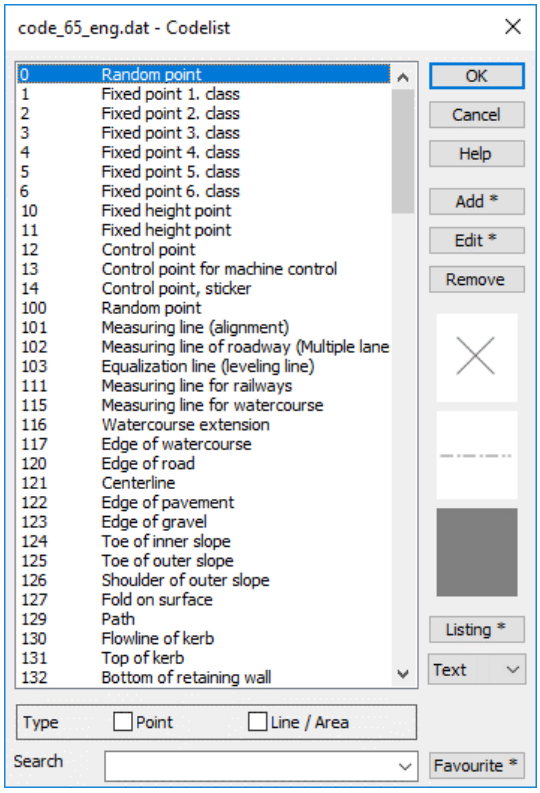
1.6 Code File



The code file (*Settings - Codes*) specifies the colors, text fonts, symbolism for points, lines, and areas as preferred by the user, and, if desired, attribute information for an object. There are several code files available, but only one can be enabled at a time. It is easy for the user to change the code file according to the data and need.

Code_65.dat (or newer) is an example code file that is shared with the software and is not intended to be used as such.

System code library System_65.dat (or newer) is important for the operation of the software and should not be changed or its content altered without a compelling reason. This file determines all the drawing rules that are used by the software by default.



T3 field codes (feature code) are opened by clicking the **Edit** button to the right of the **Codes** text in the code file dialog. The list is arranged according to the code, so that the numeric codes come first in numerical order and then the alphabetical codes in the normal alphabetical order. The list does not allow the same name for the code multiple times.

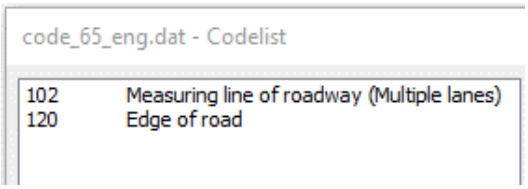
Adding
Adding a new code to the list. If you press Shift+**Add**, the program will copy the selected code information to the new code. If you enter an ID for a new code that is already listed, the program will add it to the list with a different ID by adding an underscore (e.g. 140_).

Edit
Editing the selected code.

Remove
Deleting the selected code.

Listing
You will get a code list as a list for example in Notepad, from which you can easily print it. You can also select other shapes from the drop-down menu for listing, even for tachymeters.

In the **Type** section, only point or line items can be filtered into the list.



At the bottom of the **Search** field, you can search for codes that contain the string you entered. For example, when you enter the word 'road', only the codes in which the word road occurs, either in the code or in the explanatory text, remain in the code list.

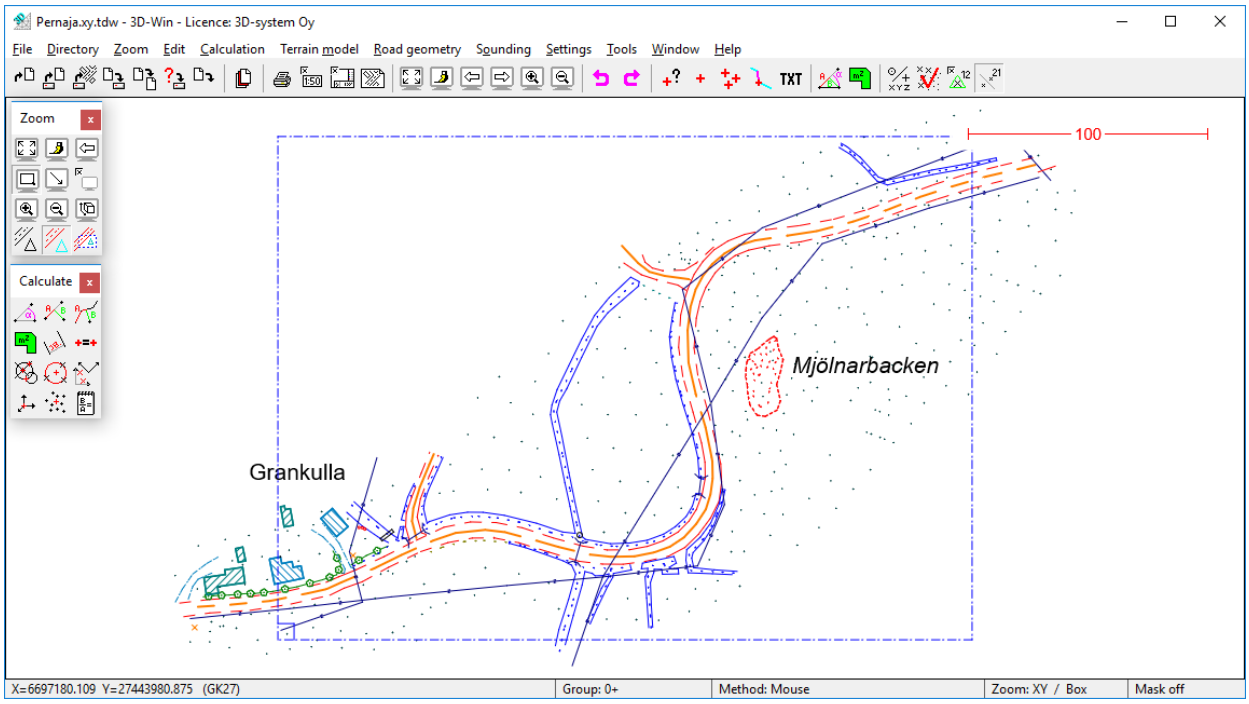
2 File management

2.1 Opening and saving files

The program has the usual **Open**, **Save**, and **Clear** functions. The biggest advantage of the program is the ability to process multiple files simultaneously. You can open multiple files at the same time, like on a light table, where all of them or only those selected are visible at the same time. Each opened file will remain as a separate element until it is possibly merged.

From the menu bar, select *File* - *Open* (Ctrl+**O**) and go to the data directory [home]\3D-system\3D-Win\Data\Map created during the installation of the program. Select the file Pernaja.xy.tdw to open and click **Open** to draw the file on the screen. Note that you can open multiple files at once by holding down the Ctrl or Shift key when selecting files to open.

A new, empty vector file can be created with *File* - *New* (Ctrl+**N**).



If you have made changes to the file and want to save it with changes, choose *File* - *Save* - *Active* (Ctrl+**S**) from the menu bar. The function saves the active file with the same name and does not ask for overwriting.

Similarly, the file can be saved as a new file with the *File* - *Save* - *As.*

If it was a new file or a file read through a format converter, the program will ask for a name for the new file. If there is no suffix given to the file name, the program adds a suffix according to the file type (for example, for a vector file *.xyz.tdw and for a road geometry file *.tg.tdw). Saving does not clear the file from the program memory.

We can delete the active element from the list, i.e. file currently being processed, by using *File – Clear – Active* (Ctrl+ **W**). If changes have been made to the file and have not yet been saved, the program will ask if you want to save the file before clearing.

There are also three other clearing functions available: **All, All Unsaved** and **Selected**. **All** and **Selected** functions will ensure that files can be saved to each edited file separately, but **All unsaved** will only ask for the backup once and clear all the files without saving any changes made. ⇨ Use with caution! **Selected** will delete the selected files in the element list.

2.2 Selection of file elements

File - Elements - Selection (shortcut key F4)

Managing an elementary list and understanding its operation is very important for the smooth and versatile use of the program.

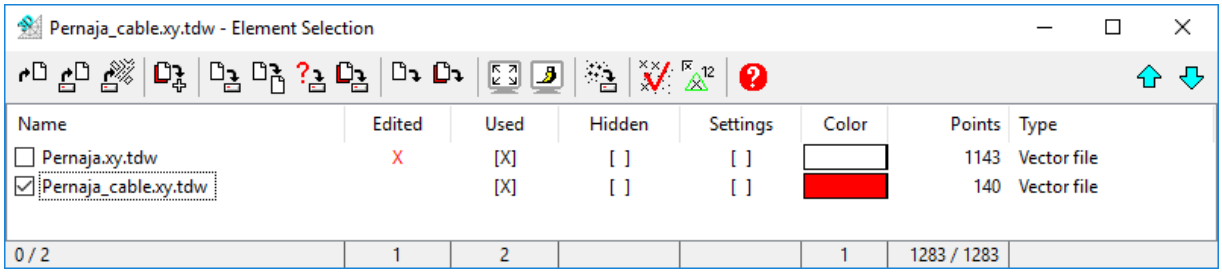
Open Pernaja.xy.tdw and choose *File - Elements - Selection* (or shortcut **F4**). You will see a list of elements that indicates which files are open. In this case, the file Pernaja.xy.tdw appears at the top of the list and is marked as active.

Only one file can be **active** at a time, and a large number of actions will only target this active file. The active file is assigned and selected by a tick in front of the name. For example, if you make new points, lines, or texts, they are always added to the active file.

Also, open the file Pernaja_kaapelit.xy.tdw. Cables are drawn in the picture and two files are now displayed in the element list, the latter of which is active. The most recently opened file or otherwise created (e.g. calculated altitude curves) will always be active. If necessary, you can change the active file by ticking the desired file. The name of the active file is also displayed on the top bar of the program.

The element list is fully scalable. The window itself can be resized by dragging the window corner. You can also change the width of a single column. However, columns cannot be completely removed or hidden, and their order cannot be changed.

The status bar at the bottom shows information about each column. The name column shows the number of selected files and the total number of files. On the columns **Edit**, **Used**, **Hidden**, **Settings**, **and** Columns it is indicated, how many of the files have the current setting on. The **Points** column below shows the number of points displayed and the total number of points.



Use the arrow buttons on the right to move the selected files up and down in the list. The location of the file in the element list determines its drawing order. The bottom file of the element list is always drawn uppermost on the screen. However, raster files are always drawn under vector-type files, regardless of their location in the element list.

In the **Edited** column, the red tick tells if the file has been edited but not yet saved. When a file is saved, the red tick will be removed from the file.

Used tick is to select which file points can be accessed by the mouse or which files the program can use for editing or computing, for example. If the tick is off, the file will appear on the screen, but the points of that element cannot be selected or used. Simultaneously pressing the Ctrl key and **Used** tick on one of the files, you can disable all the other files in the element list or activate by pressing again.

Place the tick of the Pernaja.xy.tdw file as **Hidden** and the program hides the Pernaja.xy.tdw file and only displays the cables. When the file is hidden, it is also disabled. As an exception are triangular networks, which are also hidden in use. If all files are hidden, the screen will appear white. And if the 3D bird logo appears on the screen, there are no files in the element list. Simultaneously pressing the Ctrl key and **Hidden** tick, allows you to hide all the other files or by pressing again, display everything again.

The **Settings** tick shows that the file already has the file-specific settings in use, that is, it does not follow the same **Point view** settings as other files. This way you can, for example, assign a point number only to a specific file to be visible. Double-clicking on the **Settings** tick will open the Point view/File-specific dialog, from which the settings will be selected.

The **Color** box tells you the forced color of the file, i.e. all symbols, lines, and texts are displayed in the selected color. Pressing the Ctrl+**Color** box sets grey on the other files, activates the selected file, and sets the default color for it. The same again, removes these color settings. The selected color for the file will remain in memory until the file in question is deleted.

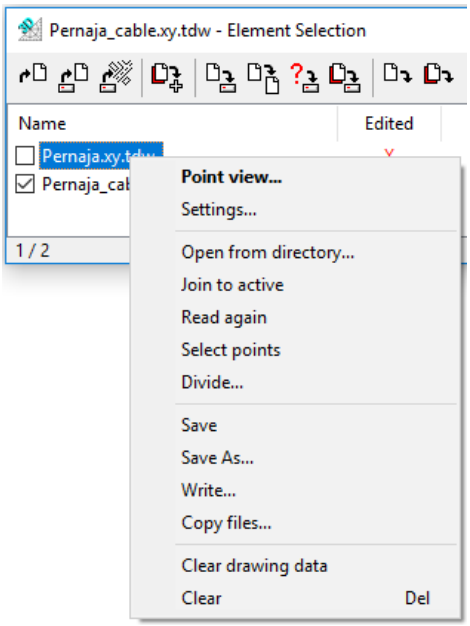
The **Points** column shows the number of points in the files.

The **Type** column indicates the type of file. Different types of files are used in the program.

Vector file (XY)	A map file with normal points, lines, and text.
Observation book (HA)	Queuing or mapping observations, and possibly fixed points.
Raster image	Raster image with location information.
Terrain modelling (MM)	Single-surface triangle grid with folding lines. Also, the surface symbol is displayed.
Sounding file (KR)	File with sounding points.
Route (TG)	Horizontal and vertical geometry of the road and possible road structure parameters.

2.3 Element list functions

You can highlight one or more (Shift+Mouse or Ctrl+Mouse) filenames and target the desired operation to all selected files. When you move your mouse over the highlighted name, you can use the right mouse button to bring down the functions you can target to the selected files.

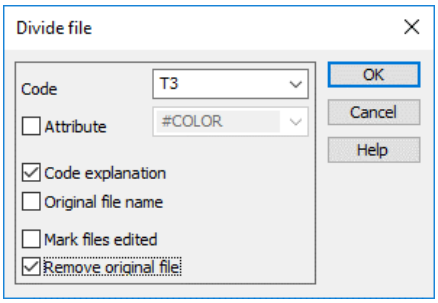


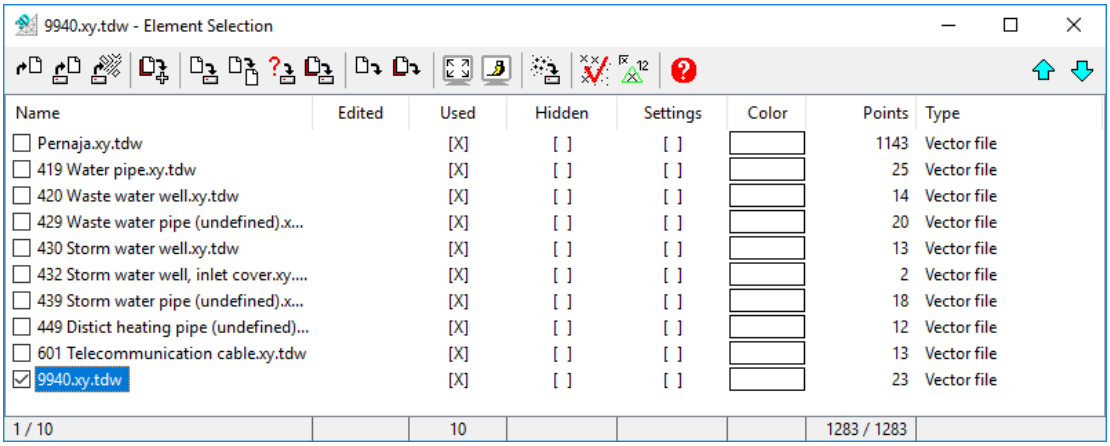
For example, the **Join to Active** feature connects two or more vector files to an active vector element. **Note!** Different file types cannot be joined together.

The **Write** function asks for the format and writes the files in the selected format. If the files are of different types, only those that are of the same type as the active file, are written.

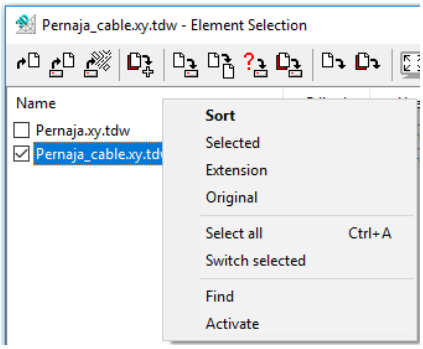
Copy files copies all the files selected in the element list to the selected directory, for example, to a memory stick. Files read from the element list can come from several different directories.

The **Divide** function divides the file according to the code field or attribute given. Each code generates a new file named by the code explanation text in the element list. The original file is not automatically deleted but remains active and can be easily deleted with the **Delete** key. There is the **Remove original file** tick for automatic file deletion.



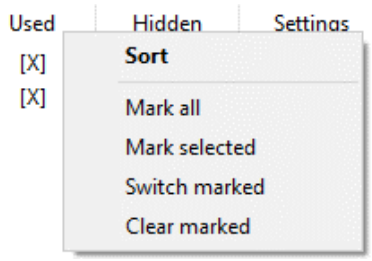


Each column in the element list has its own selection list, which allows you to organize the files according to the values in this column, or to select, change, and clear items from the column selections. The functions can be made visible by clicking the right mouse button while the mouse is on the column bar. Clicking the bar with the mouse arranges the columns by default, such as according to the filename.



Under the **Name** column, use the **Find** function to choose all the files including the search text.

The **Activate** function activates the file where the active point (e.g. last shown with the mouse) belongs.



With a drop-down menu on the **Used**, **Hidden**, and **Settings** columns you can arrange the files in the element list according to the selected attributes (e.g. the files in use on top of the list). Other drop-down menu options control your choices. The **Points** and **Type** columns can be arranged in order of maximum to minimum or by type.

Some special shortcut keys are available in the element list to control it by using the keyboard. One of the most useful shortcut keys is **F4**, which opens and closes the element list.

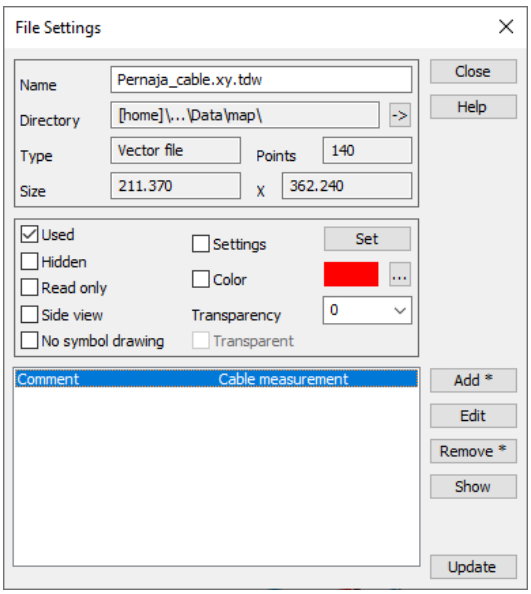
For more information about other shortcut keys, click the **Help** button.

2.4 File element settings

In the element list, select Pernaja_kaapelit.xy.tdw and choose *File - Elements - Settings*. You will see a dialog with information about the active file. You can also open the same dialog from the element selection dialog box by pressing again the **Active** tick at the beginning of the row or right-clicking on the file in the element list and selecting **Settings**.

To change the color used to draw a file, press the browse button next to the color screen.

The color dialog opens and you can choose the color you want. When you press **OK** and refresh the screen, the entire selected file is drawn with the color of your choice. The color list is now marked within the element list, and you can click to select whether the color is on or off. Finally, turn off the color selection.

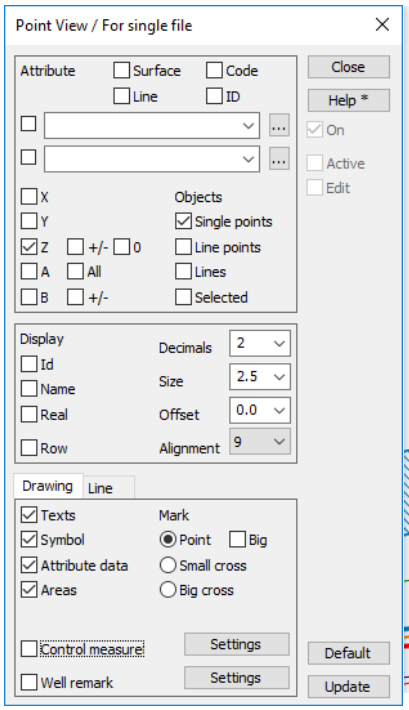


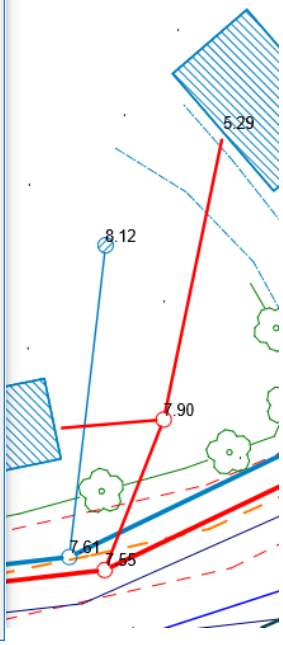
The list view at the bottom of the dialog lists the attributes of the file. Use the **Add**, **Edit**, **Remove**, and **Show** buttons to handle these file-related attributes. For example, the attributes of the file can be used to save the author's name, coordinate system, metering device, date, or other metadata to be retained in the file.

Next, change the way the points in the file are presented so that the Z coordinate is visible for all single points. In the File Settings dialog box, press the **Set** button to open the **file-specific** Point View dialog. You can also double-click the **Settings** in the Element selection window to access this dialog directly.

Place the ticks in the dialog as they appear in the adjacent image and click **Close**. The entire file is now drawn according to the settings you have chosen. You can control the validity of the settings (on/off) in the element list with a tick. The program will remember the settings once you have set them, until the file is cleared.

The point presentation is explained in more detail in section 3.1.

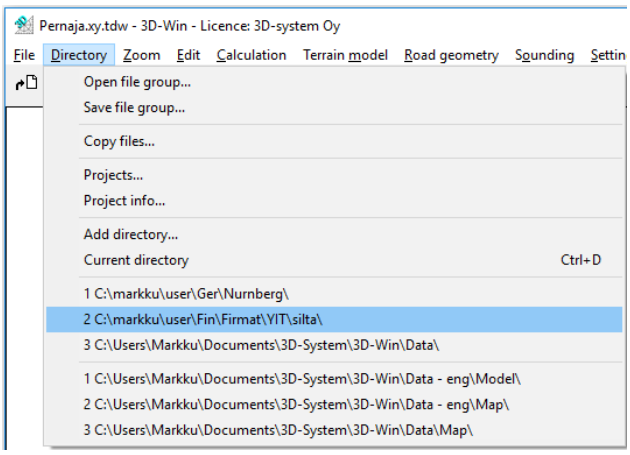




2.5 Directory

The Directory menu remembers the 10 most recently used directories in the same way as the File menu remembers the 10 most recently used files.

When you select a directory from the list, the functions **Open File** and **Save File**, as well as several other file search functions, will be targeted to the selected directory.



You can also save 10 permanent directories to the Directory menu. You can use the **Current Directory** (Ctrl+**D**) or **Add Directory** command to save, so you can browse the list of the desired directory. To remove an obsolete directory from the list, select the row with the Shift key.

The **Copy Files** feature copies all of the files in the element list to the directory you provided, whether they are selected or not. You will also be asked if you want to create a File Group (see below). This is a function that is larger than Copy Files function in the element list.

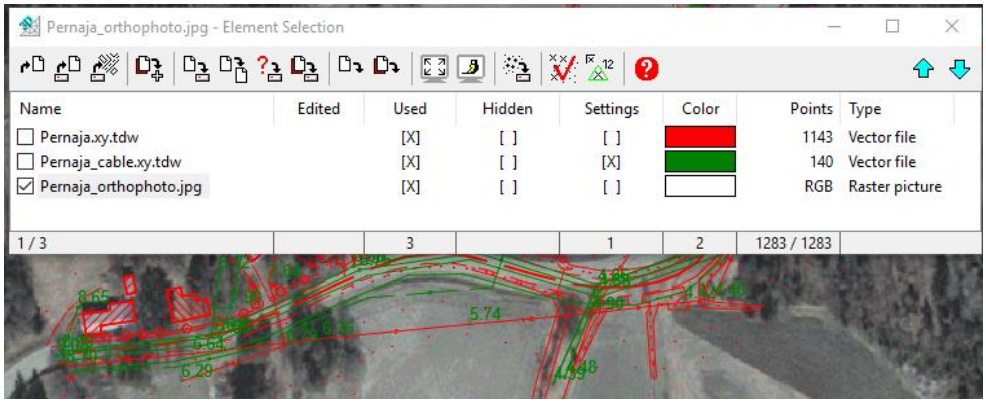
2.6 File Group

Save File Group and Open File Group

The file group can save the entire contents of the element list in one configuration file, i.e. all the files you have read and their locations, as well as the settings you have created for the files (Used, Hidden, Color...) in the element list.

When you open a file group, the program retrieves all files at once in the element list in the same order and with the same settings as when you saved the file group. The file settings are saved in a PJ file. Note that the function does not save the contents of the files, but only the file names (and paths if they differ from the PJ file folder). You will not be able to move (or delete) a file on a disk without saving the PJ file again. Likewise, changes made to files must be saved separately. For example, you can use this feature when you need to read the same files frequently on the screen, or when you want to continue working from where you left off.

Clear all files first *File - Clear – All without saving*. Read Pernaja.xy.tdw, Pernaja_kaapelit.xy.tdw and Pernaja_ortokuva.jpg. Open the element list (**F4**) and set the **Color** column to Pernaja.xy.tdw to red and Pernaja_cable.xy.tdw to green.

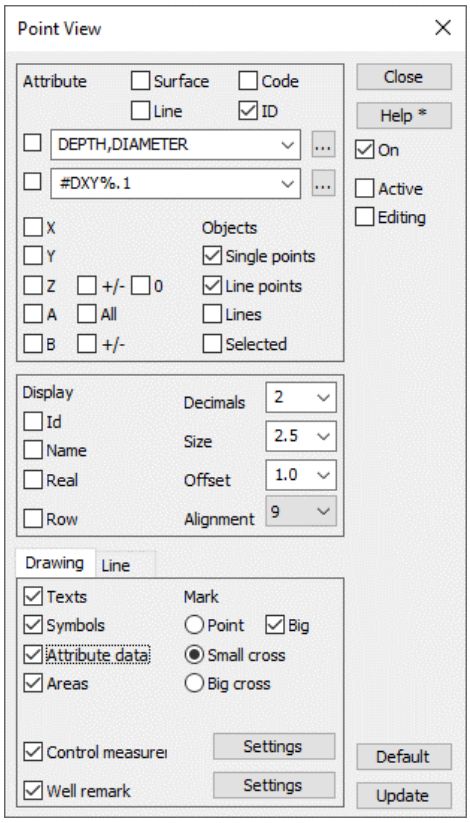


Run *Directory - Save File Group* and name it Exercise.pj Clear all files on the screen and run *Open File Group*. Select the Exercise.pj file. All files appear on the screen as they were when you saved the file group.

3 Settings

3.1 Point View

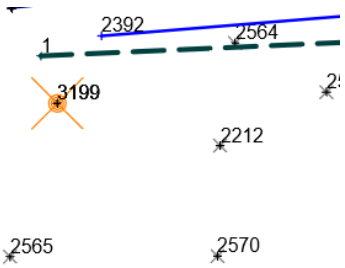
Settings - Point View (Ctrl+K)



The previous paragraph's Point View was file-specific, but with the *Settings - Point View* feature, you can generally determine how points for **all files** (or Active **only**) are displayed on the screen and in the printouts.

Settings can be turned off and back on with this shortcut. Be careful, however, with the **On** and **Selected** ticks, because if **On** is not selected, the settings will not take effect. Likewise, **Selected** will set the settings only for group points.

Set on **Small Cross** and **ID** (Point Number). Now the picture shows a small cross and a point number for all points. If the change does not happen automatically, press the **Update** button.

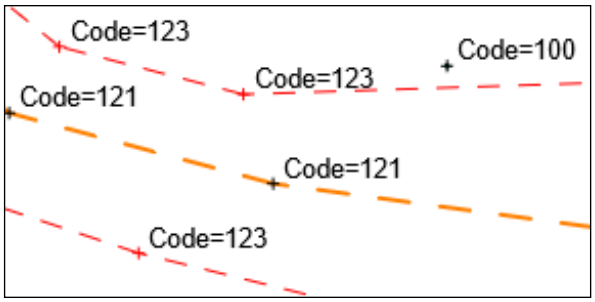


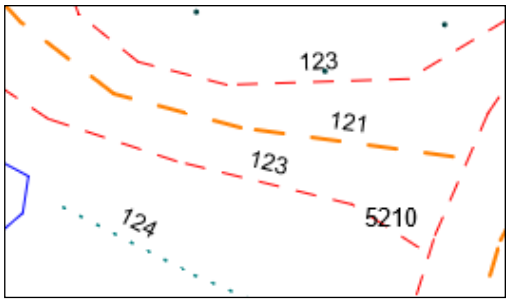
Set on the **Z** tick and remove the **Symbols** tick. In addition to the point number, the image will have a height, but the symbols and line types will be removed.

The **On** tick on the right indicates that the settings are valid.
The **Active** tick will only target the active file.
The Editing tick will only target the selected item for editing.

In the **Property** section, you define what you want to draw from the character fields, properties, macros, or coordinates.

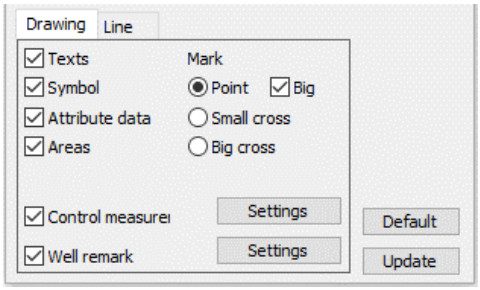
Objects determine whether the desired details are only displayed with points and/or lines or with selected points**.**
The **Lines** option brings the line information to some part of the line on the screen, text aligned with the line.



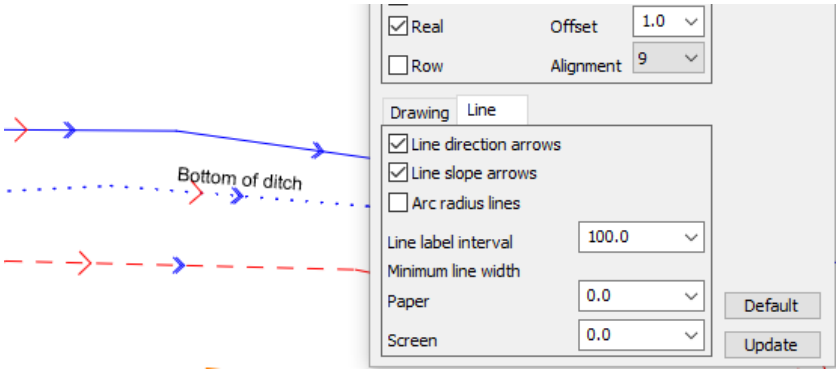


Output Format
The **Id** tick is added according to the field ID (for example, T4 = ___ or Z = ___).
The **Name** tick adds the explanatory text to the **Point Ids** (for example, Surface =, Line =, Code =).
The **Value** tick adds a code explanation text instead of a number (for example, Earth surface, Center line of the road).
The **Row** tick writes the properties in a row, not one below the other.
The number of **Decimals** affects the XYZ coordinates next to the point.
Size determines the size of the text (positive value = on paper in millimetres, negative value = metric value by scale).

The **Drawing** tab selects whether to display text, symbolism, or region coloring/rasterization. For points, you may be asked to highlight the **Big Cross**, for example, to make them stand out from the material better. In addition, you can edit the **Control measurement** and the **Well remark** settings and choose whether they are valid.

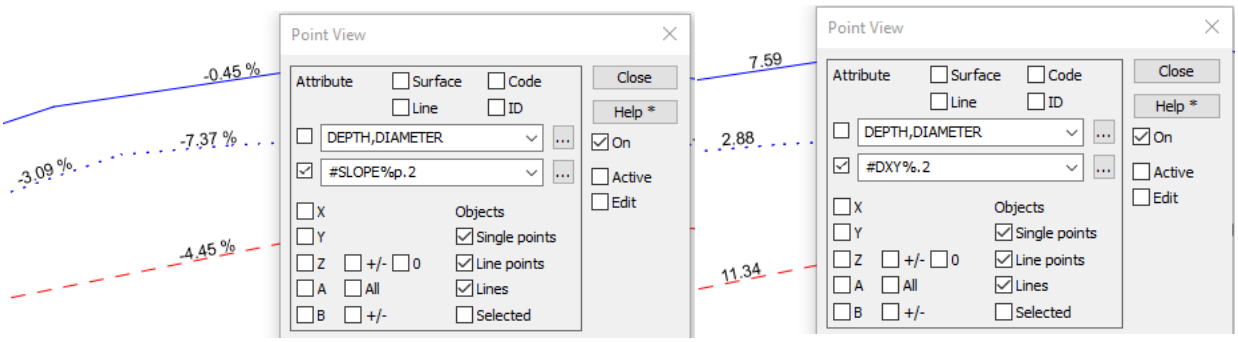


The **Line** tab creates slope arrows (>>) or directional arrows (>) on the lines and displays the possible radius lines.



Macros

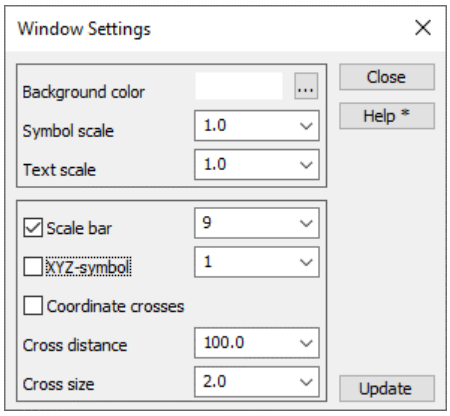
In the **Point View**, the values calculated with the data or searched from the data can be requested with macros. The values can be, for example, the length of the lines, the distances between the points of the line or the slopes, the object colors or sizes. The output format (decimals, degrees/goons) can be easily determined. More information on Wiki page and Help section.



3.2 Window settings

Settings - Window

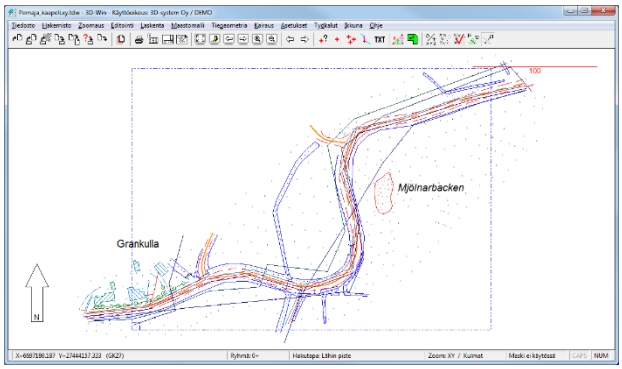
You can configure the overall appearance of the window and display settings for items to be drawn on the screen by using *Settings - Window*.

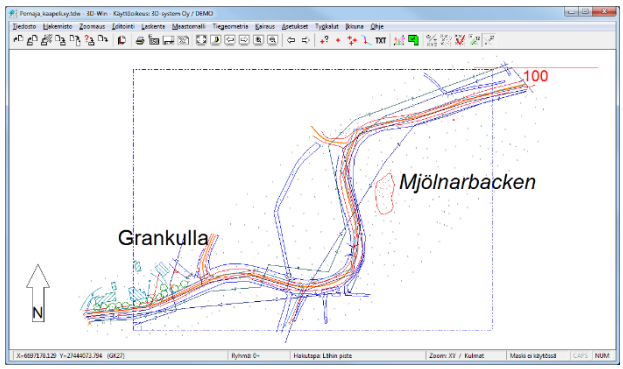


The **background color** determines the background color of the main window and can be changed using the browse button. Other windows (e.g. cross section) have a corresponding setting. With shortcut key **F12**, you can change the white background color to black or vice versa. However, printouts always appear on a white background, regardless of the background color of the display.

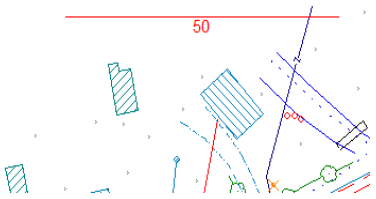
Symbol scale and **Text scale** change the size of symbols or text displayed on the screen by scaling items using these factors. However, this setting does not affect the sizes printed on paper.

Set the **Symbol** and **Text factor** to 2.0 and press **Update**. Now the symbols and texts on the screen are doubled in size. The value may also be 0.5, for example, to reduce the size of the objects. Set the value that suits you.

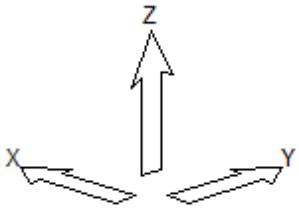




The **scale bar** makes it easier to measure distances on the screen. The length of the bar is automatically scaled to fit the screen, but its position can be changed from the dialog. The scale bar does not print on paper, but it can be attached to the title table (see 7.2).



Coordinate crosses allow coordinate crosses to be drawn on the screen and in printouts. The spacing and size of these can be adjusted in the **Cross space** and **Cross size** dialog sections. The cross space is defined in metres in terrain and the cross size in millimetres on the screen. The coordinate grid is obtained with the zero value in Cross size. Individual coordinate crosses XY values can be captured with the *Editing - Texts - Coordinate Crosses* function.



with

The **XYZ symbol** shows the directions of the coordinate axes that make it easier to see the direction of the image in the 3D view.

3.3 Zooming

You can zoom in and out on the screen in several ways:

- mouse and mouse scrolling
- menu functions
- toolbar buttons
- with keyboard or
- right mouse button shortcut menu.

Below are some examples of zooming and moving, more detailed instructions can be found in the **Help** section.

Box zooming
Hold the left mouse button down and drag the mouse to make a box (at least 1 cm x 1 cm). When you release the mouse button, the area inside the box is zoomed on the screen.

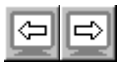
The left mouse button's default function can be selected from the zoom menu to be **Box** or **Pan**.

Pan
Press the Ctrl key on the keyboard and drag the mouse at the same time. Or press the mouse scroll wheel down while dragging the mouse. The image moves with the mouse. You can also move the image using the arrow keys.

Mouse scroll wheel
By scrolling the scroll wheel of a mouse, you reduce or enlarge the image so that the mouse position determines the center of the image. You can also move the image by pressing down and dragging the mouse scroll in the desired direction.

All files
If the image disappears completely, or if you want to restore the entire image, select the function *Zoom – All files* or press the toolbar button or press the **End** key on the keyboard.

The **Previous** and **Next** functions return the previous or next zoom view.



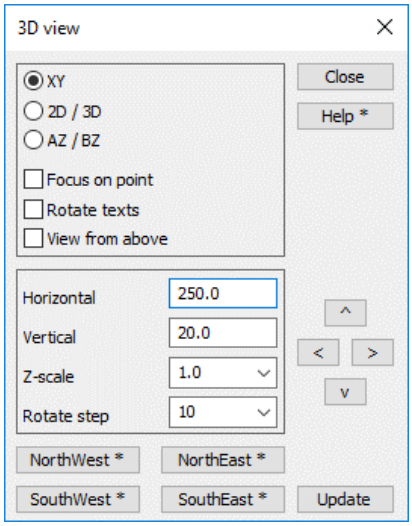
With the **Reduce** and **Enlarge** functions (shortcuts **Page Down** and **Page Up** or **+** and **- keys**), the image can be zoomed in or out step by step with the center point staying in place.

At the beginning of the **Zoom** menu, you can find the functions that define the appearance of the image:
Draft A quick drawing that draws points and lines with reduced symbolism (no text at all).
Screen Normal drawing with text and symbols on the screen always the same size (regardless of zoom).
Paper Preview that displays an image as it will appear on paper or in an image file, meaning that the objects are scaled and drawn according to the size of the screen.

If you want to update the screen, you can do it with *Zoom - Redraw* or press **F5**. General changes made automatically appear on the screen. However, if the number of points exceeds the limit set in the settings, the view must be updated manually. You can change the number of auto-update points in the *Settings - Files* menu. For example, 500 000 points is a good default value.

3D-zoom

You can also view the image in 3D with *Zoom - 3D View* (Alt+ **Ins**). Only Insert (**Ins**) switches directly between the 3D view and the XY view. Set the horizontal and vertical angles you want to view the image on, move the selection to **2D/3D.** In the 3D view, you can rotate the image by pressing the Alt key and then moving the mouse with the left button pressed.



Use the arrow keys on the right side to rotate the image by steps specified in the **Rotation Step** section.

There are also four shortcuts for different viewing directions at the bottom. You can change the name and direction, for example, to the Northeast. First set the desired viewing angles, then press Shift+**NorthEast**. The program asks for a name for the key and saves the changes.

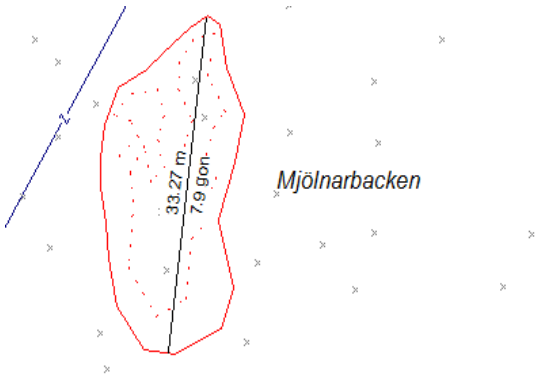
To return to the normal image, select **XY**.

Useful zoom shortcuts:

Alt+ End - centers the image on the active point without changing the scale.
Ctrl+End - zooms the entire active file into the box.
Arrow keys - moves the image in the desired direction. The range of movement is set in the zoom settings.
Alt+ Mouse - continuous moving in 3D view.
Back - previous zoom.

With the **Ctrl** and **Shift** keys, you can slow or speed up the zoom, for example, with the mouse scroll wheel. Hold down the Ctrl key to zoom slower and with the Shift key faster.

Ctrl+Alt+Mouse (AltGr+Mouse) - distance and direction. Keeping the mouse button down, a line is drawn on the display to measure the approximate distance and direction.



Under the *Zoom - Other* menu, you can find more useful view features:

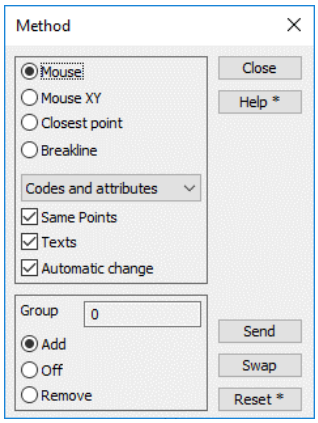
Background Color (**F12**) - changes the background color of the screen between white and black.
Black and White (Shift+**F12**) - switches the view to black and white to improve the output (e.g. for inkjet printer).
Closed Areas (Ctrl+**F12**) - colors areas to improve recognition.
Changing the 3D view (**Ins**) - toggles the 3D view on/off.
Full Screen (F11) – enlarges the active window to full screen.

4 Tools

4.1 Search method and group

Tools - Search method and group

The search method means the way of pointing and selecting points. Use the *Tools - Search method* or the right mouse button shortcut menu to select the search method. The points collected by the various search methods are added by default to the group. A search method is also required when assigning objects to an action.

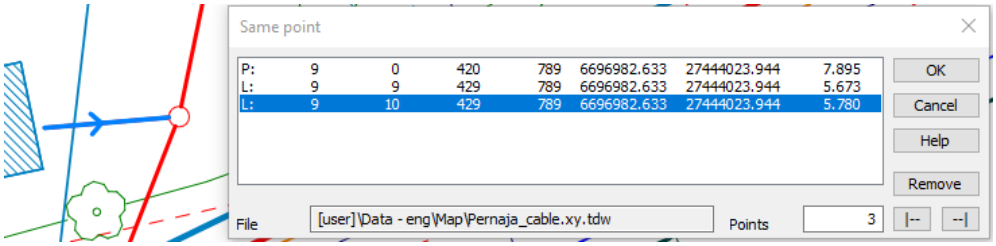


You have access to the following search methods, for example:

- Mouse (sliding for example to move a point: Shift+Mouse)
- Mouse XY
- Nearest point
- Breakline
- Codes and Features (Ctrl+**F**)
- Area
- Rectangle
- Single points / line points
- All (Ctrl+**A**)

Using the **Mouse**, you can select any XY location that the mouse points at on the screen.
Search method **Mouse + XY** retrieves the nearest point, but brings only its coordinates, no identifiers nor attributes, and does not add a point to the group.
Search method **Nearest point** selects the point that is closest to the mouse cursor.
Search method **Breakline** allows you to select all points on a breakline.

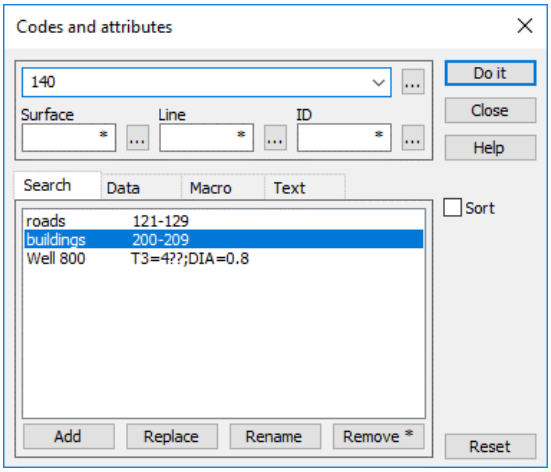
If the **Same points** tick is on and the spot you are pointing at (search method **Nearest point**) has multiple points layered, the program opens a dialog to select the point you want. The selected point, line, or area from the list is colored in the box with a thick blue line.



The **Texts** tick also allows searching for texts.

Automatic switching allows the program to change the search mode automatically when switching between different program functions. For example, Editing a Point use method **Nearest point** and Text Editing use **Mouse**.

In the dialog box, select **Codes and Attributes** (Ctrl+**F**).



In the **T3** dialog that opens, enter code 140 (ditch edge) and press **Run**. The program now searches for all ditch edges and marks them in the box. You can also enter multiple search criteria at the same time.
For example 140-145, 21*, 5**0, >100, <200 or 140,143.
The search can be targeted at one or more fields simultaneously.

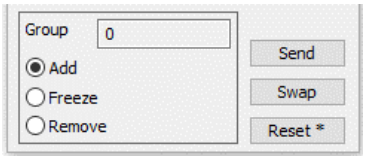
The **Add** button allows you to specify and save your own code groups for which you enter the name and search codes. When you select a row from the list, its search criteria are moved to the **T3** field and you can search. You can also double-click the list row to search immediately.

Group

A group is a function where you can collect the points using different search methods. Different functions can be performed on the points collected to the group through the program. In this case, the selected function does not apply to all points on the screen, but only to the points selected for the group.

The group works by summing, so every search made, adds points to the group by default. It is also possible to collect points first in the group and then remove some of them from the group, using some other search method. If desired, the group can be reset and a new group started from the beginning. You can collect points with search methods only from the files marked with the **Used** tick and not Hidden tick in the element list.

Press **Reset** and the number 0 appears in the box.
The easiest way to reset a group is by using the toolbar icon or the shortcut key (Ctrl+**Q**).



In **Add** mode, the number of points in the group increases and the selected points will have a small black cross on the screen. The last point pointed, the so-called active point, is shown in red. If necessary, you can delete the last incorrect point with Shift+Ctrl+**Q.**

In **Freeze** mode, nothing will happen to the group, even if points or other search functions are used on the screen.

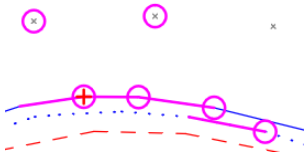
In **Remove** mode, you can reselect the points you have already selected in the group, so that the points you have pointed or otherwise selected will be removed from the group.

Choose the **Nearest point** as the search method (for example, from the right mouse button shortcut menu) and select a few points on the screen. Note that the number of points in the group increases.

When you press **Swap**, all other points except those previously in the group are changed to the group.

The number of points in the group, the status of the group (+ -), the current search method, and the status of the mask are all displayed in the information bar at the bottom of the main window. Note that the group works in the background all the time, even if the dialog is not open.

The shortcut key Ctrl+**H** highlights the points in the group by circling them on the screen. Shift+Ctrl+**H** highlights the points and sections of the selected lines.



The group is used in many of the program functions, such as:

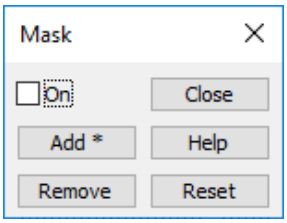
- changing point codes or coordinates (*Edit - Points - Group*)
- coordinate listing of selected points (*Tools - View file*)
- moving points to another element or saving to disk (*Editing - Pick point group*)
- selecting points for mask (*Tools - Mask*)

Managing and understanding the **group** function is important for the smooth running of the program. Always remember to reset the group before you start to collect points.

4.2 Mask

Tools - Mask

You can make a mask from the group points by *Tools - Mask*. The purpose of the mask is to show only the points selected for the mask. You can add or remove points multiple times on the mask. Even if the group is reset, the points already selected will remain in the mask.



To see only the mask points, the **On** tick must be on. If you want to see the entire file again, remove the **On** tick. With the Ctrl+**M** shortcut, the mask can be turned on/off.

The **Add** function adds a new group to the mask. The mask is additive.
The **Remove** function removes the selected point group from the mask.
Ctrl+Shift+M creates a new mask from the points in the group automatically. Any previous mask will be replaced.

5 Editing

The program uses versatile functions for editing points, point sets and lines. When you make corrections or changes to the data, the program monitors the file before the file is deleted, so that the changes are saved to the disk. When you try to close a program or delete a modified file, you are asked if you want to save the changes. Of course, saving can be done separately at any time.

You can edit the points and lines of all files in the element list without activating the file to be edited. However, new points, text, and lines are always saved only in the active file.

Undo and redo

The **Undo** function can be used to undo the previous change. Depending on the case, undo stores only the edited object (point, line, sounding, triangle, etc.) or, for larger operations, the entire file. For the undoing of the entire file, the point limit set in the File settings is used. When the Undo list is full, the oldest operations are removed from the list. However, the possibility of undo does not replace interim storage. Save your work at regular intervals as your work progresses.

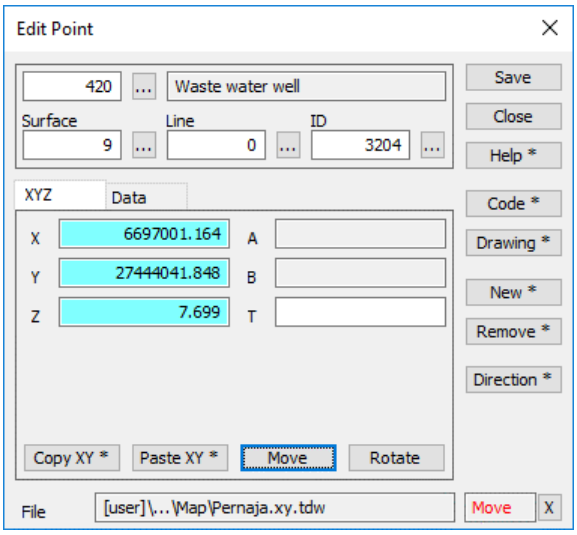
Redo can be used to cancel undo.

Removing any modified file from the element list will reset the Undo list. Likewise, if the number of points to be edited exceeds the limit in the settings and the editing is still accepted, the Undo list is cleared, and undo can no longer be performed. Undoing cannot be performed for all functions. These include, for example, collecting a group, changing settings, or certain file operations (clearing, file merging).

The **Undo** and **Redo** buttons are on the toolbar and their hint texts display the last five operations on a general level (e.g. Edit Line, Add Point). Normal keyboard shortcuts Ctrl+**Z** (Undo) and Ctrl+**Y** (Redo) also work.

Editing dialogs

All **Editing** features have a code (**T3**) and a description of the object in the code above. Below it are the default surface code (**T1**), line number **(**T2) and point identifier (**T4**). Fields have hints that show the field name, value, and explanation when the mouse hovers over them. The browse buttons next to the fields open the code list for searching. When you click the **browse button** in the **T1** or **T3** field, you can select its code from the list. If you press Shift+**Browse**, only the codes or surfaces used in the active element are displayed. The button has a special function for the T2 and T4 fields. In the T2 field you will get either an empty field or the first available line number and in the **T4** field you will get either an empty field or the first available point number.



There is a field in the lower-right corner of the Edit dialogs that reveals the current state of the current point. Editing uses the following modes:

Move - you can move the object with a mouse.
Rotate - you can rotate the object for editing with a mouse.
Add - adds points (lines, profiles) to the object.
Offset – changes the offset of the object (texts).
Radius - changes the radius (lines) of the arc or circle.
Code - retrieves a new code or attributes for the object.
Measurement - calculates measurement values (texts).

Next to the field is the **X** button, which returns the function to its default state.

You can temporarily freeze the functions by pressing Alt+ **X**, so you don't have to close the dialog.

The field whose value the selected function affects is painted blue. You can enter a value in the field and click **Save.** In most functions, you can also give a value by pointing with the mouse. You can slide the mouse by holding down the Shift key while dragging with the mouse, for example, in the Move function.

Attributes

The **Data** tab attributes list shows the attributes. The attribute values are displayed in their own column and by moving with the mouse on top of the attribute, it displays a hint text that shows the attribute ID and value in its entirety. The attributes displayed in the top fields (**T1-T4**) are no longer repeated in the list. The names of the attributes specified in the code file are preceded by a colon. Adding, editing, deleting, and displaying an attribute function with the buttons at the bottom of this tab.

5.1 Point info

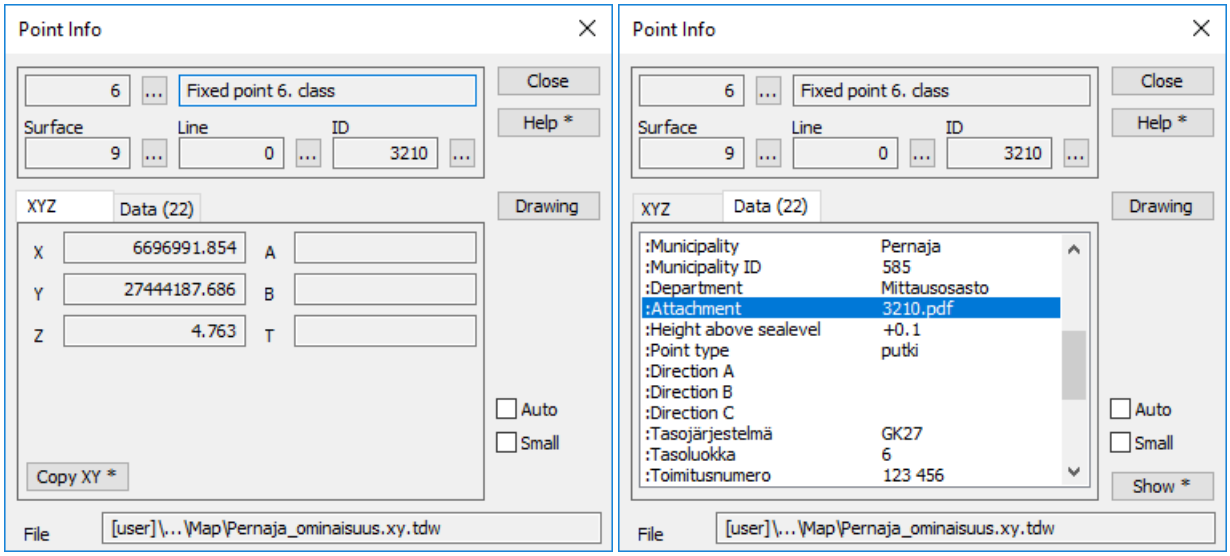
Editing - Points - Info

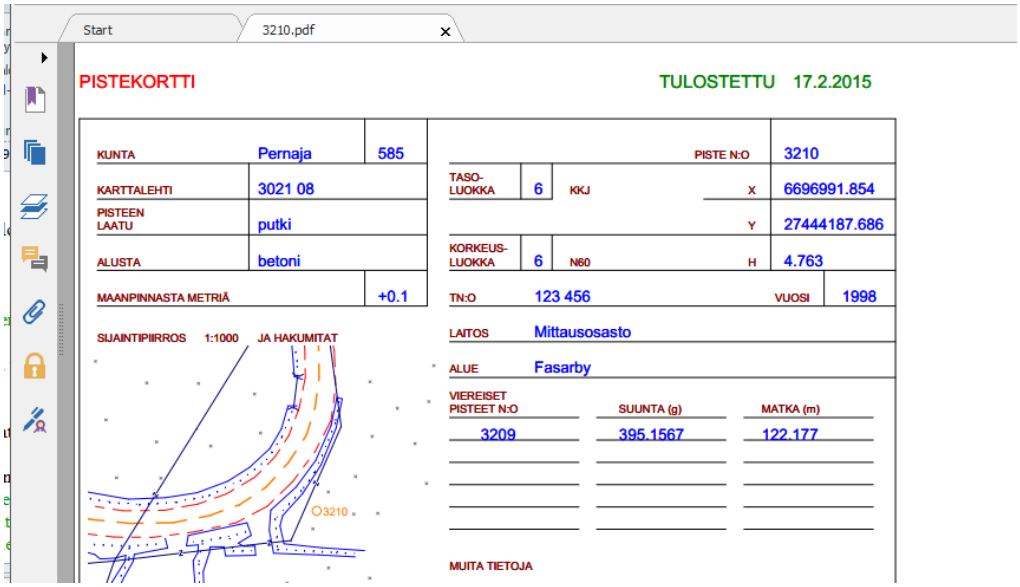
To view information about a point, open *Edit - Points - Info*.

Select the search method **Nearest point** and select a point on the screen. Now the data fields and coordinates of the point closest to the cursor appear in the dialog on the **XYZ** tab. Note that the function also provides information about the points on the lines. When you select another point, the information changes. **Small** and **Auto** options are available on the right side of the dialog. By ticking **Small**, a smaller version of the dialog opens the next time the dialog is opened. By ticking **Auto**, a dialog opens automatically whenever a point is selected.

View

Displays the attachment file for the selected attribute. Image files are displayed in the attachment window and other files in programs, such as Excel or PDF-Reader. With the Shift key, all attachment features of this point are displayed in the attachment window.





5.2 Active object

Editing - Active object (Ctrl+E)

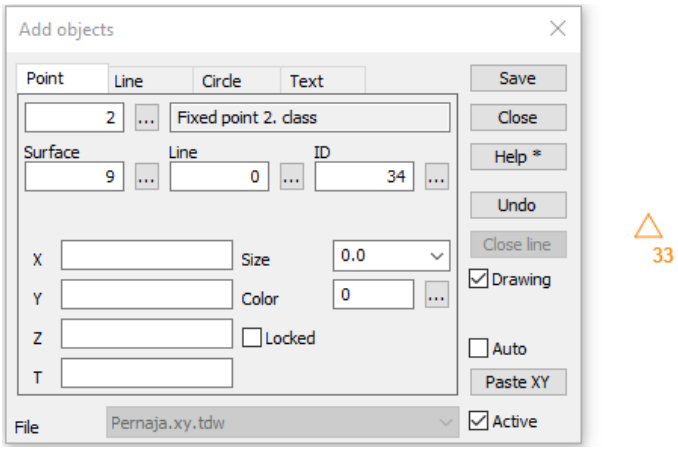
The function automatically selects the edit dialog for the active object. For example, if you have selected a point on the line and press Ctrl+**E**, the **Edit line** feature will appear automatically. Works on points, lines (areas), and texts.

5.3 Add objects

Editing - Add objects

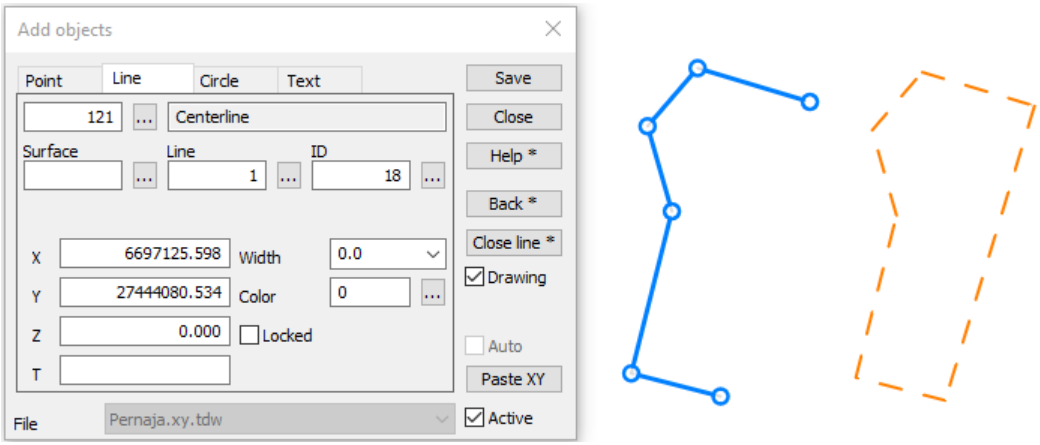
The fastest way to add new objects is to use the **Add objects** feature. It has its own tabs for simple additions to points, lines, circles, and texts. Each tab remembers the last codes assigned to it.

On the **Point** tab, you can show a point by using a search method Mouse, Mouse XY, or Nearest point, or enter the coordinates manually. Enter the codes and press **Save** and the point saves by default to the Active element. If you remove the **Active** tick, you can select any vector file in the element list that saves the new points. When the **Auto** tick is on, the **Save** button does not need to be clicked, but new points are automatically saved after each mouse click.

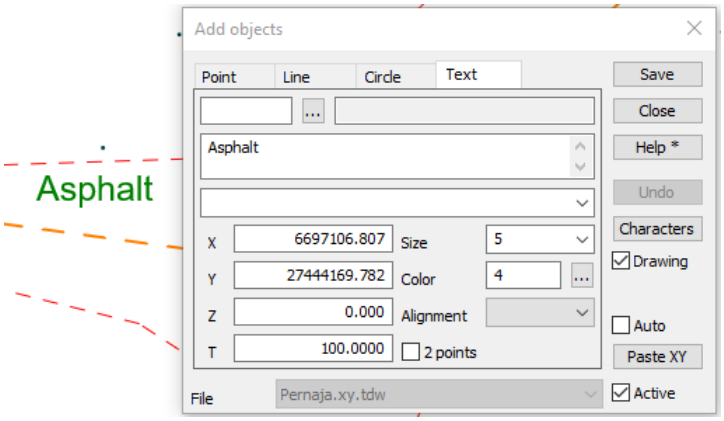


On the **Line** tab, the line is added as above. Note that before saving the line the points on the line cannot be deleted by the **Undo** function but should be deleted using the **Back** button. Shift+**Back** removes the entire pointed line.

When the line is fully assigned, press the **Save** button. You can close the line with the starting point by pressing the **Close line** button. **Close line** will also save the line automatically. The line code symbolism appears only after the line is saved. You cannot use **Auto** to save the line in the line insertion.



On the **Text** tab, you can enter the Text, Size, Color, and at the direction (T field), in which the text is written (100 = horizontal). You can also select the direction of the text by giving it a second point (2-point-check). The **Text** tab allows you to use the **Auto** function instead of the **Save** button. The Characters button is used to access the special characters required; % and so on.



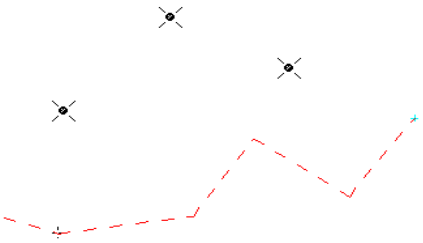
5.4 Point editing

Editing - Points - Edit

Clear all files first by *File - Clear - All without saving*.

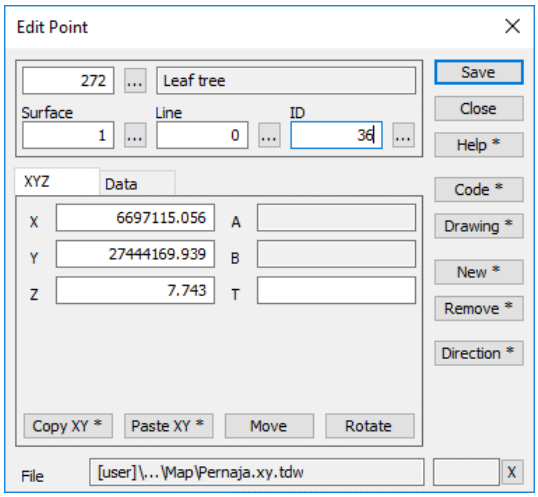
Then, create a new file with *File - New* and enter a name for the file.

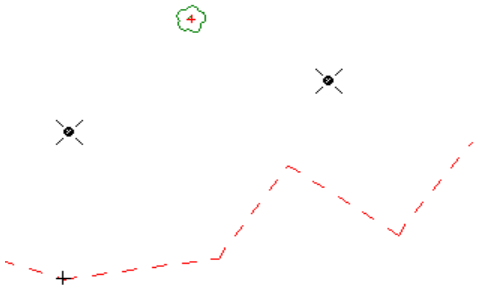
Add points to this new file using the *Editing - Add objects* feature as above. Select the **Point** tab, place the code 232 in the **T3** field (lamp post), select **Mouse** as the search method (for example, from the right mouse button shortcut menu), and then click on the screen a few times and points appear on the screen.



In addition, make a breakline of at least five points on the **Line** tab, and enter the **T3** field code 123 (ditch edge).

Close the previous function and open *Editing - Points - Edit* and change the search method to **Nearest point**. Select some point on the screen with the mouse, so that point information appears in the dialog. Enter a value of 272 (broadleaf tree) in the **T3** field and press **Save** to change the point symbol. You can also move the point position by adding new coordinates manually or pointing the mouse at a new location with the **Move** function.





The **Remove** button deletes the active point.
The **New** button in this dialog allows you to create a new point in the active file.

If you select a line point **using the Edit Point** feature, you can delete a point, change its coordinates, or just change its identifier (**T4**), but not other identifier fields.

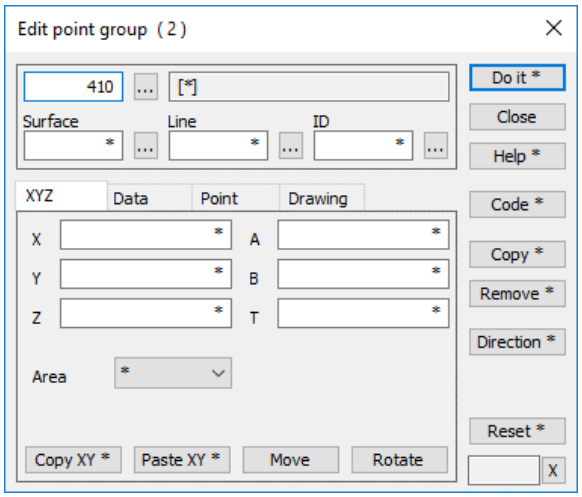
5.5 Point group editing

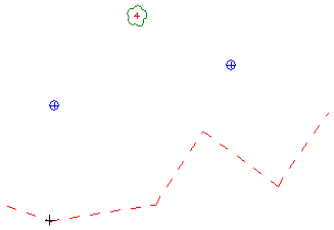
Editing - Points - Group (Ctrl+G)

Editing a point group allows you to change a multiple single point, line point, or line data at one time. The change may target one or more of the identifier fields at the same time. So, for example, you can change the code and surface code for points at the same time.

This example uses the same file that was just created. Reset the group and select **Codes and attributes** (Ctrl+**F**) as the search method. Enter 232 (lamp post) to the field **T3** to add newly created lamp posts to the group.

Now open the *Edit - Points - Group* and set the **T3** field to 410 (water well). When you press **Run**, the code for the points in the group is changed to 410.





To delete all the points in a group at once, click **Remove** or press **Delete** on the keyboard. Before deleting points, a confirmation is required.

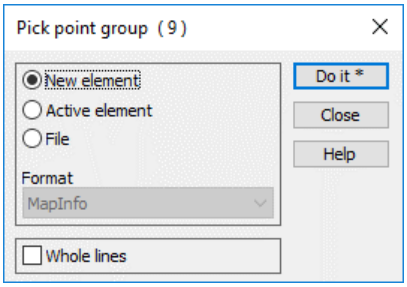
You can also edit the coordinates by entering the desired value directly into the field (for example, Z to 20.00) or using the operations +, -, * and /.
+100 adds one hundred or /1000 divides the value by one thousand. The negative constant value is given in quotation marks "-1.5".

5.6 Pick point group

Editing - Pick point group

The **Pick point group** function allows you to copy the points in a group to a new file, to an active element, or to a file that you want to write in a certain format.

Reset the group first and pick some points for the group using the **Nearest point** search method. Open *Editing - Pick point group*. The top bar of the dialog shows the number of points in the group in parentheses.



The selected points can now be saved in the **New element**, which creates a new file in the element list, asks for a name, and copies the points there.

The **Active element** option copies the points to an existing active file in the element list.

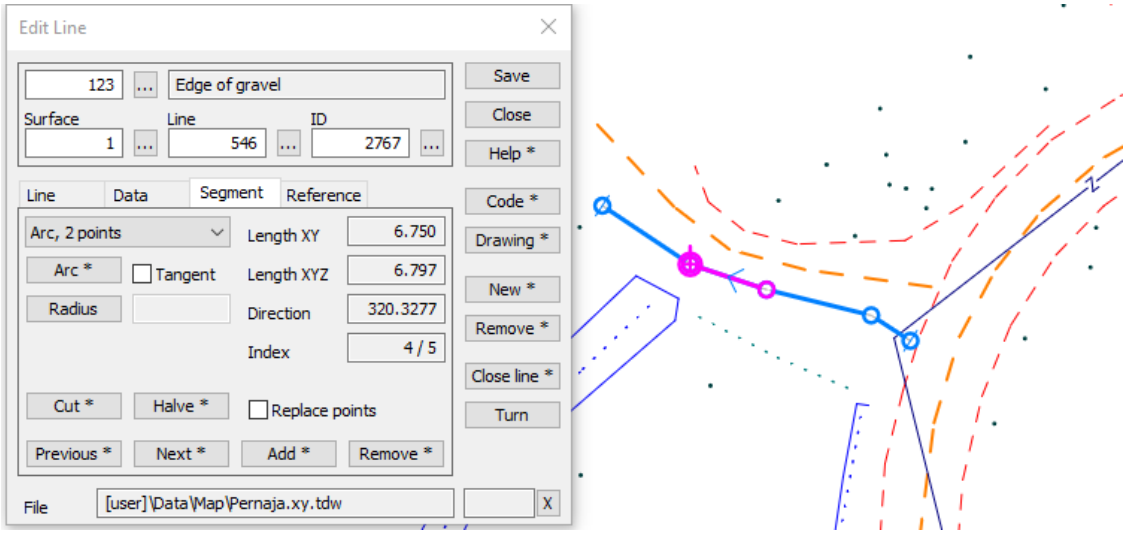
You can also save directly to a file by choosing **File**. In this case, the program will ask for a new file name and the extracted points will be saved in the selected format from the drop-down list. The action does not create a new file in the element list but saves the file directly to the disk.

5.7 Adding and editing lines

Editing - Lines - Edit

In the program, there are two ways to add a line. In the **Add Objects** function above, you can also enter line coordinates manually. The **Edit Line** function uses the points on the screen, or the location is freely selected by showing on the screen with the mouse.

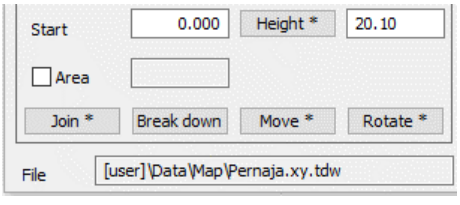
Open function *Editing - Lines - Edit*, press **New** (note that the section tab is activated automatically) and set **Mouse** as the search method. Then click a few points on the screen. Enter 121 as the code. If you accidentally selected a wrong point, you can cancel by using **Undo** (Ctrl+**Z**). When you press **Save**, the line you have drawn will remain on the screen.



Show a newly drawn line, making its color change to blue as a sign of editing. The line shows the direction of travel with an arrow, the space to be edited (for example, in the cutting) with purple and the active point (for example to remove a point) with a green cross and a large circle. In addition, the beginning and end of the line are indicated by a diagonal line.

Set 123 to **T3** and press **Save** to change the appearance of the line.

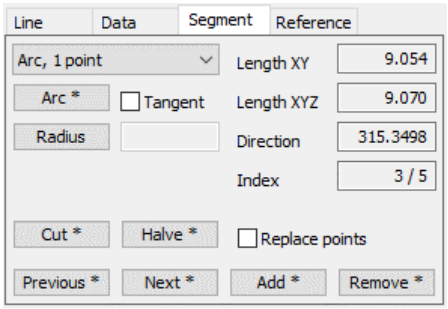
The **Remove** button on the right side of the dialog will delete the entire new line displayed and you can start it from the beginning. It can also be used to delete a line being edited.
The **Turn** button reverses the direction of the line. This does not affect the numbering or coding of the line points.
Close line joins the start and end points. To create an area, tick the **Area** section under the **Line** tab. The surface area will appear to the right of the object.



You can use the **Break down** button on the **Line** tab to change the line into single points. Note that the line does not become single points even if you change **T2** = 0. Use the **Join** button to connect two lines together.

You can use the **Height** button to give the line a constant height or change the height to the original value, e.g. +2.100

Click one of its points to activate one of your lines. Select the **Segment** tab.



The **Previous** and **Next** buttons move the active line segment back or forward. With the Shift key you can move from the first line point to the last.
With the **Cut** button, the line is cut off from the point you have indicated, i.e. the part of the line (purple) you selected is removed from the line. Line fields and attributes are not changed for the beginning of the line.

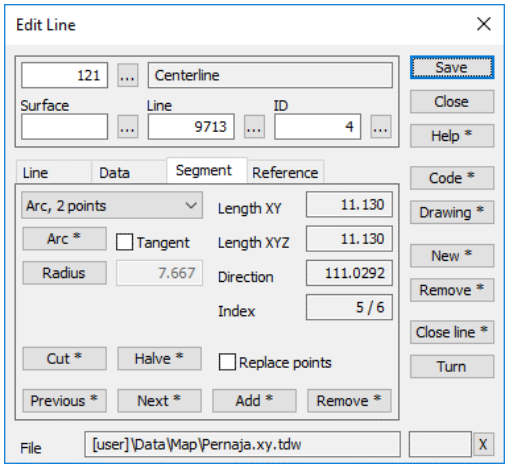
Shift+**Cut** does not clear the gap, but the line is cut off at the indicated point.
The **Halve** button creates a new point midway through the active section; the height is interpolated.
The **Add** button activates point insertion. The following mouse clicks add new points to the active section of the line or to the ends of the line. When selecting already existing points by using the search method **Nearest point**, it is copied to the line by default. The **Replace points** setting deletes the original point. The new line point will automatically become the active point.
The **Remove** button in the **Segment** tab deletes the active point. Shift+**Remove** deletes the point from the line but leaves it as a single point in the file. If the point to be deleted is the beginning or end of the arc, the entire arc is removed. If the point belongs to a circle, the entire circle is removed.

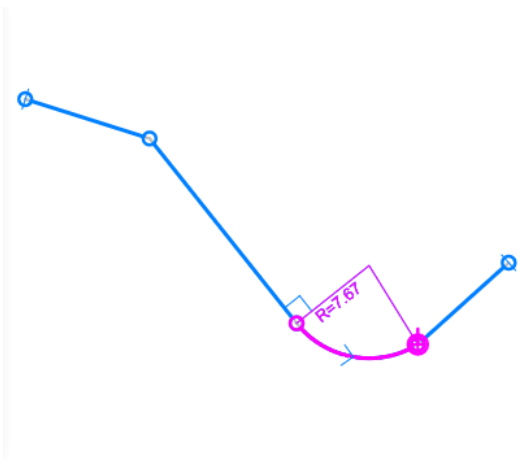
5.8 Adding and editing arcs

In the program, arcs are added in much the same way as lines. Open function *Editing - Lines - Edit*.

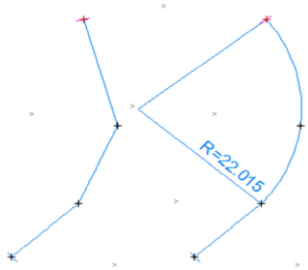
First, add a couple of normal lines as instructed in the previous section and save the lines. You can also use the recently created lines.

The arcs can be created either on the finished line or during the addition of points. To create an arc, first select the part of the line where you want to create the arc and then choose the arc type from the list and click the **Arc** button.





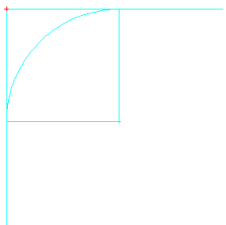
The default size of a single point arc is calculated by the midsection of the shorter side. If the **Tangent** tick is on, the two-point arc always tangents and the second point is moved if necessary.



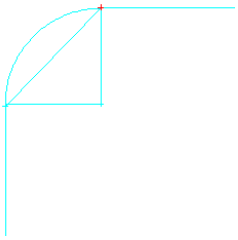
The radius button activates the radius field, after which the mouse can be clicked to indicate a new radius or to enter a value in the field. When changing the radius of an individual arc, the endpoints remain in place. If the radius of the arc as part of the line is changed and Tangent tick in activated, the endpoints will slide in the direction of the line.

The creation of the arc is directed to the active section or, if the line end point is active, to the first/last part. This makes it possible to create arcs when adding points to the beginning or end of the line. In this case, the required points are added to the line before the arc is added.

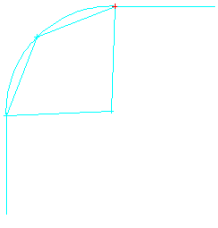
1 point:



2 points:



3 points:

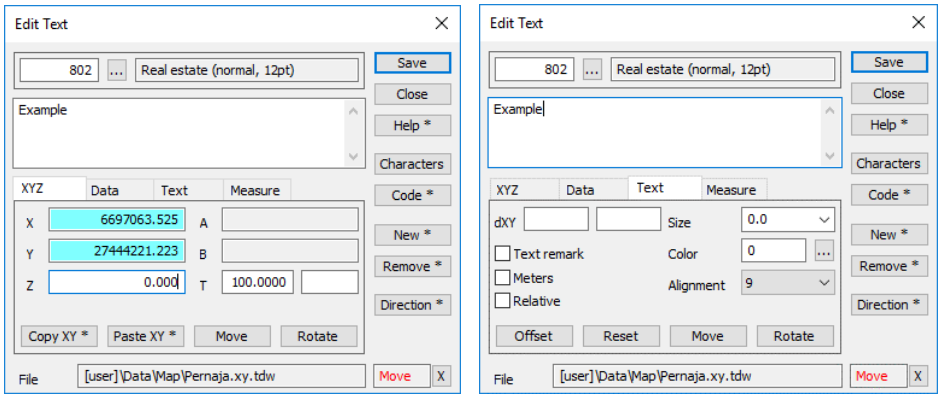


5.9 Adding and editing texts

Editing - Texts - Edit

Please clear the previous files and open Pernaja.xy.tdw.

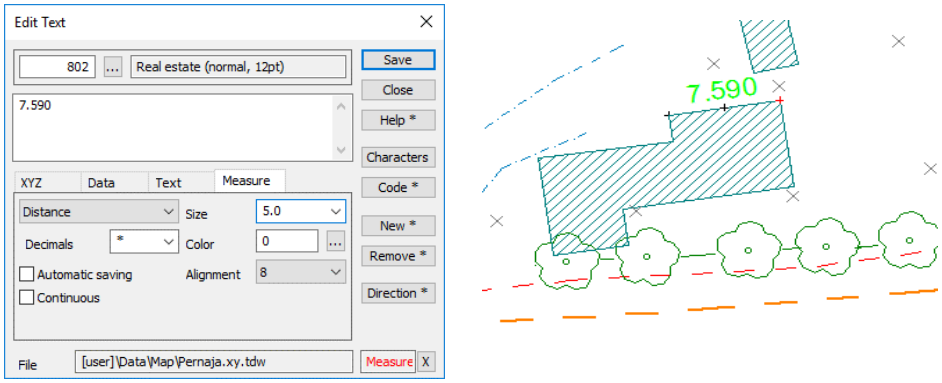
Open function *Editing - Texts - Edit* and select **New** from the dialog. Now, with the mouse, indicate where you want the text and enter the text you want in the text box. You can give the text the desired formatting values from the **Text** tab (**Size, Color, Alignment)**. You can specify the direction of the text by entering the direction in the **T** field on the **XYZ** tab. You can also indicate the direction by clicking the **Rotate** button (mouse click or Shift+Mouse). You can edit the text until you click **Save**, and the text you entered is saved in the active element. To start creating new text, press **New** again.



The text you have already created can be edited by selecting the text on the screen, when the text is selected for editing. The color of the text turns violet and the text attachment point is displayed as a green cross. Change the **Size** field to 7.0 and press **Save**. The **Move** button allows you to move the text position.

You can also add text by copying (for example from Notepad) with Ctrl+**C** and pasting it into the text field of the dialog with Ctrl+**V.** Multi-line text can be typed by pressing **Enter** in the text input field as a line break.

Next, add border and wall dimensions. From the **Measure** tab drop-down menu (which first reads Text)**,** select **Distance**, and then select two adjacent points in the building. Check that the search method is **Nearest point** and not **Mouse** to get the correct coordinates. Note that the display order of the points determines the direction of the text. Change the size and color and click **Save**.



For the whole house, you can get wall measurements at once by selecting the search method **Break line**, from the drop-down menu **Distance**, and by placing the ticks on **Auto save** and **Continuous**. Point to the line and click **Save**. The number of decimal places is selected in the **Decimals** section.

Delete - deletes the selected text.
Characters - opens a selection list with default special characters, such as units. You can add new special characters, standard texts, or import them by adding a text file to the list.

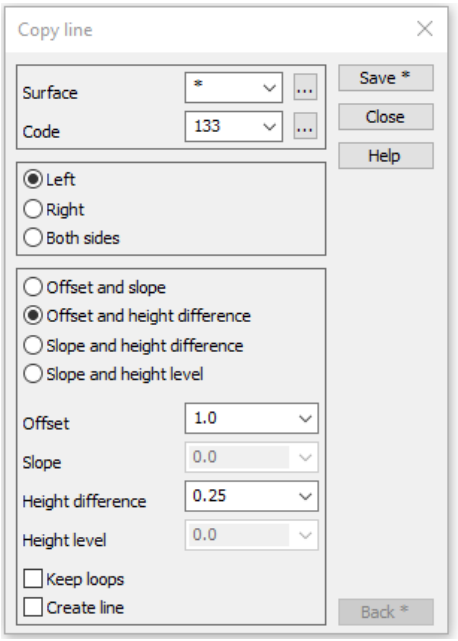
You can also edit several texts at a time. For this, there is a function *Editing - Texts - Group*.

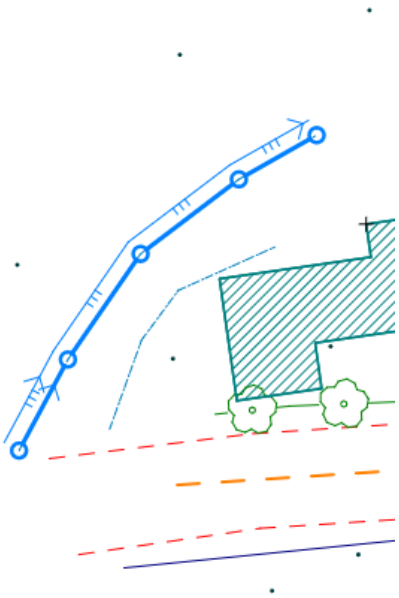
5.10 Copying a line

Editing - Lines - Copy

This function allows you to copy a given line with the desired parameters on either side or both sides of the original line at once. Unlike other dialogs, the new line will only be given a possible surface identifier and type code. The line number is the same as the original line number, and the copied points get the same point numbers as the originals.

Copying can be done in a number of different ways, using the Offset, Slope or Height as a calculation parameter. When the method is selected, the input fields are activated accordingly. The program displays a thinner blue line where the new one is created, according to the given values. Click **Save** to save the line and draw it according to the code entered. If the **Create line** tick is on, a new line can also be shown using other search methods.

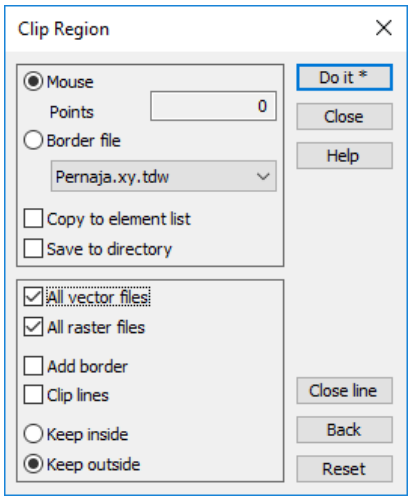


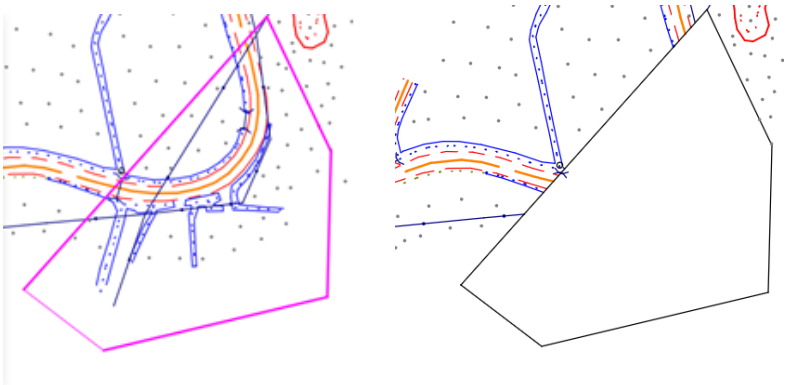


5.11 Clip region

Editing - Clip region or rectangle

Clip region allows you to cut the item as you require. You can display the area with the mouse or by entering a border file in the element list (see Help). You can only cut the Active element or all vector and raster files. You can cut off the inside or outside of the displayed area, plus add a border line to the image.





Inside areas that have been cut can be saved as their own files either in the element list or directly to the hard drive.

6 Calculation

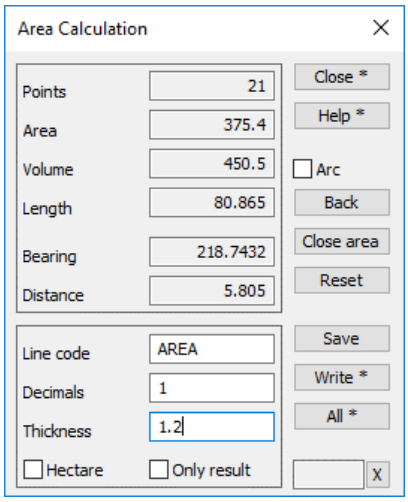
3D-Win offers you very versatile calculation functions. Common to all functions is that the new, calculated points are saved in the active vector element, and the calculation results are saved in the Calc.txt result file in User directory.

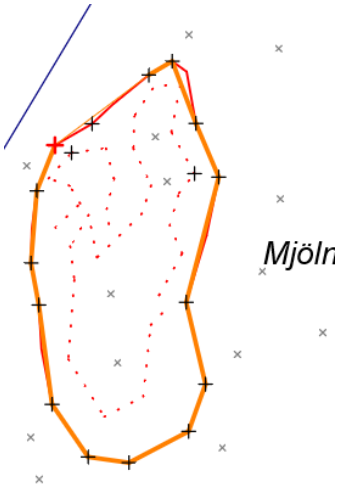
6.1 Area calculation

Calculation - Area

Area calculation can be used to calculate horizontal area. All search methods can be used to select points in the calculation area. The results of the calculation are displayed directly in the dialog and are also saved in the calculation result file.

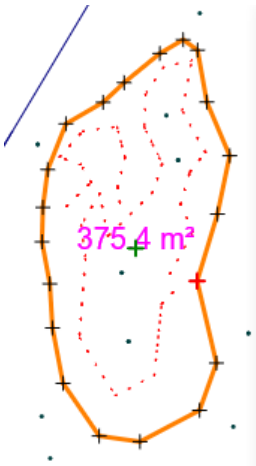
Open function *Calculation - Area* and set as the search method **Nearest Point**. Select points on the screen, so that a line is drawn on the screen to define the area to be calculated. The calculation is done while you are entering the points. Try calculating the hill called Mjölnarbacken and finally **Close area**.

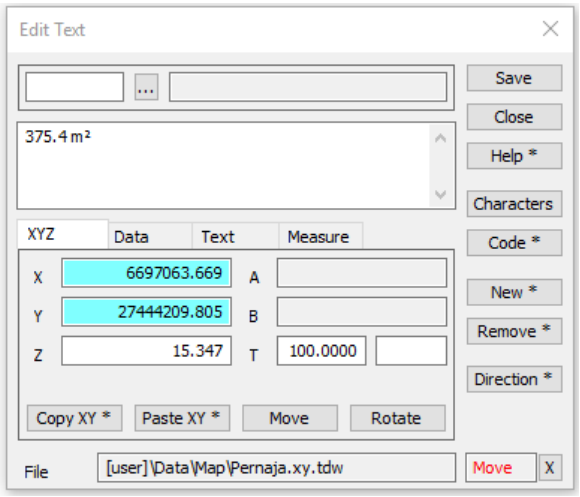




The easiest way to calculate a given area is by selecting the limiting line using the **Breakline** search method.

Now, in the **Write** dialog box, click **Edit text**. The calculated area appears in the center of the area. You can still change the position or size of the text before saving. When you click **Save**, the area is saved as text in the active file.





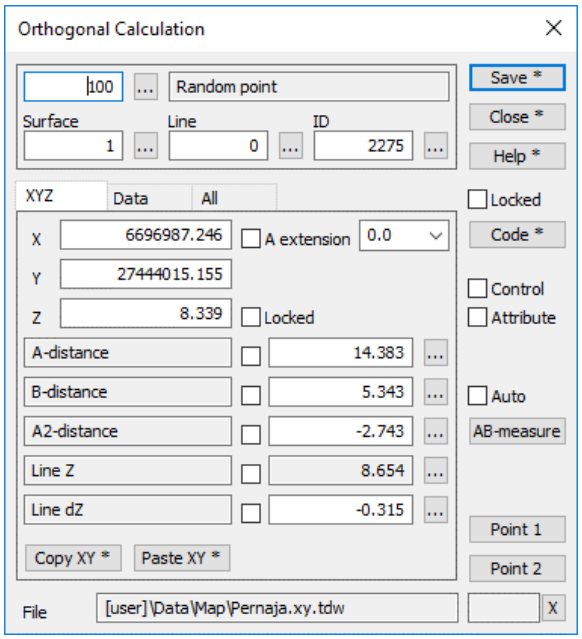
Now close the recent dialogs and go to the function *Calculation - Calculation results - Show* (Ctrl+**T**). Included in the file are, for instance, the coordinates of the points used in the calculation, the total area, and the length of the area circuit.

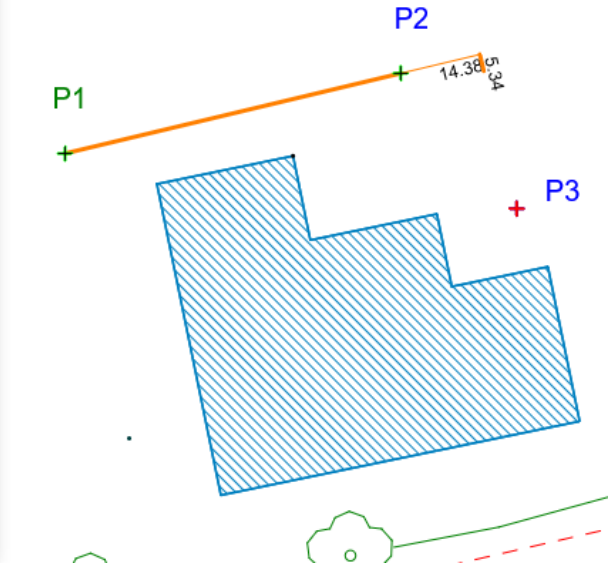
6.2 Orthogonal calculation

Calculation - Orthogonal

Orthogonal calculation can be used to calculate and save new points or to calculate the position of existing points relative to the reference point formed by two points. The results are shown as **A-distance** (horizontal distance in the longitudinal direction of the line) and as **B-distance** (perpendicular to the reference line). The calculation results are also saved in the calculation result file.

Open Rectangular calculation with *Calculation - Orthogonal* and select **Nearest Point** as search method. Now select two points on the screen to form a reference line. Then select a few points around the reference line, where the location of these points is indicated in the dialog, for example, as **A-distance and B-distance**.





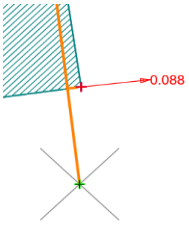
The **A-distance** increases from the first point of the reference line to the other (P1 ⇨ P2) and the **B-distance** increases from the straight line to the right (positive value) and decreases to the left (negative value).

Use the mouse cursor to highlight the value of the **A-distance** reading and enter a new value for the object. Now the function displays a new point on the screen with a blue cross and the new coordinates change in the dialog. Also, try to change other values in the calculation fields. Change the value of the **T3** field to 272, and then click **Save**. New calculated points are saved in the active file according to the codes provided. If you want to create a line with the calculation, you can enter a free line number (for example, with the browse button) in the **T2** field, whereby the new calculated points form a line as you save them.

With the **AB-measure** you can type the A and/or B value as text in the box.

Close the function and see what has been saved in the *Calculation result file (Calculation - Calculation results - View*). The result file stores all the calculation values displayed in the dialog.

The values calculated with **Control** ticked are saved for point as DXYZ control attributes, so that they can be viewed through the control measurement as error vectors.

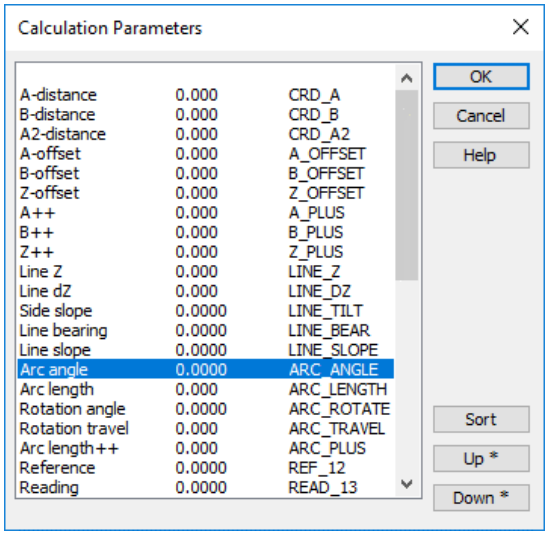


The value of the calculation parameters displayed in the dialog with the **Attribute** tick, are saved at the calculated point in the attribute data. You can take advantage of them, for example, by displaying them through the Point View dialog on the screen, or by typing with Text-format into Excel.

Orthogonal, Polar and **Geodetic calculations** are technically identical functions, but each one remembers the settings you have entered separately.

6.3 Selection of parameters for calculation

Open the **Orthogonal calculation** and click the browse button  after the **A2-distance** and the Calculation Parameters dialog will open.



From the selection list, you can select the parameter in the dialog according to how you want to define new points or to obtain values for the calculation result file. All the parameters in the dialog are therefore interchangeable and the program knows their interdependencies. The order of the parameters in the list is not relevant for the calculation.

On the **All** tab, you can check the value of the calculation at any time, and even if that parameter is not selected on the **XYZ** tab of the calculation dialog, its value is updated to this list.

Some of the parameters selected on the **XYZ** tab will remain grey to indicate that the user cannot enter their own values, but that they are calculated values.

At the end of the row it is indicated in which attribute the calculated values are saved (e.g. DXY_13).

At the top of the list is an empty row that allows you to select an empty field for the dialog and the result file. You can also arrange the values in the list in the order you want, so their values can be checked quickly in the calculation.

The same parameter selection and the **All** tab are in different calculation functions, and it always works the same way. Only the parameters in the lists vary. For more detailed explanation of the parameters, click the **Help** button.

6.4 Internal calculator

In all the calculating fields as well as other numeral fields, a normal calculator is used. After you have given or selected a point and obtained a B value, you can add 10 metres to it by adding a +10 after the current value. On the screen, the point cross moves and the coordinates are updated immediately, but the value of the field itself is updated only when you move the cursor to another field. You can use the +, -, * and / symbols (plus, minus, multiplication and division), but only one operation at a time.

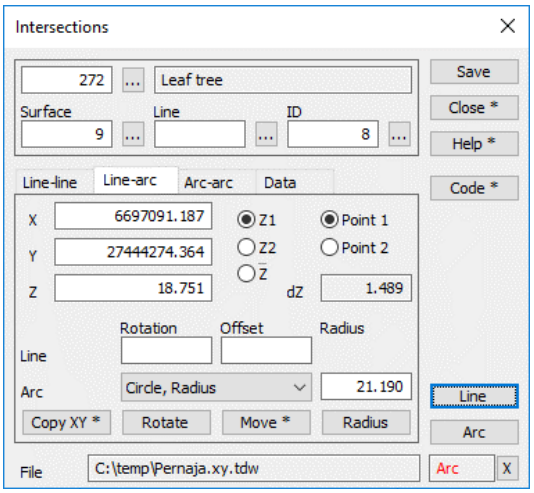
Re-open **Orthogonal calculation** and try the example below.

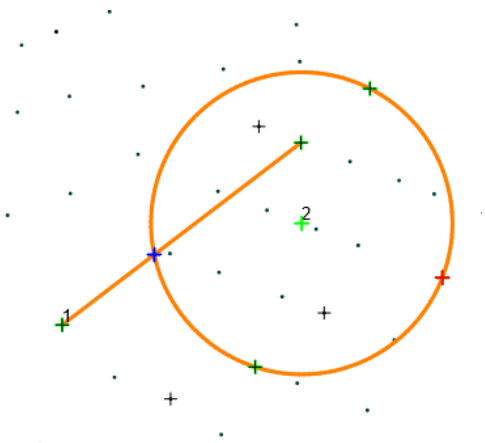
6.5 Intersection

Calculation - Intersections

The **Intersection** function has three basic geodesic functions on its own tabs: straight-straight, straight-arc and arc-arc. These functions have the same rules, and each remembers its own reference points.

Open function *Calculation –Intersections* and select the **Line-arc** tab to calculate the coordinates of the straight and arc intersections. Create two points on the screen using search method **Nearest point** that automatically form a straight line. From the **Arc** drop-down menu, select **Circle, Radius**. Then select one more point at the center of the arc and the other at the circumference of the arc. You can also enter the desired value directly in the **Radius** field even after you enter the center point.





A straight line and a circle are drawn on the screen, and the intersection **Point 1** is displayed with a blue cross. Move the selection to **Point 2** to see and select the second intersection of the elements.

You can still rotate or move the line in one direction before saving by entering values in **Line**. If you want a line with a particular direction, enter **P1** and **P2** at the same starting point and then enter the direction you want in the **Rotation** field.

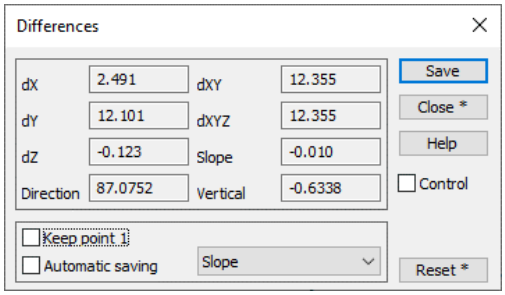
6.6 Differences

Calculation - Differences

Calculation of the differences between two points. After selecting two points, you get the following:

- coordinate difference
- horizontal and diagonal distance
- direction angle
- slope, the presentation format can be selected from the list

The function is continuous, which means that the last two points shown are compared. A line is drawn in the box to indicate the calculated distance. You can also lock the point in the **P1** section **Keep point 1**, where comparisons are always made to this point.



The **Save** button saves the last measured distance in the calculation result file. The saved distance will remain in the box until the function is closed. When the function is closed, the sum of all saved travels is also calculated in the result file.
If **Automatic saving** is selected, all calculated travels are automatically saved to the result file.

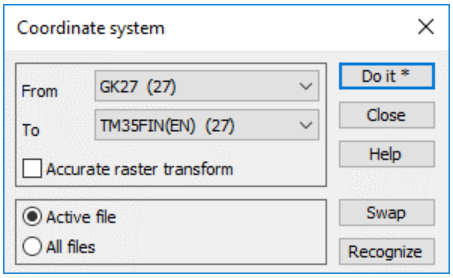
Control tick saves the differences as control attributes for the original points. The arrows are drawn after that according to the control settings.

6.7 Coordinate system

Calculation - Transformations - Coordinate System

The function allows you to change the coordinate systems of the data between KKJ, EUREF-FIN GK and UTM and to make band changes within these systems.

There is also a WGS-84 coordinate system and the results are given only as geographical coordinates.

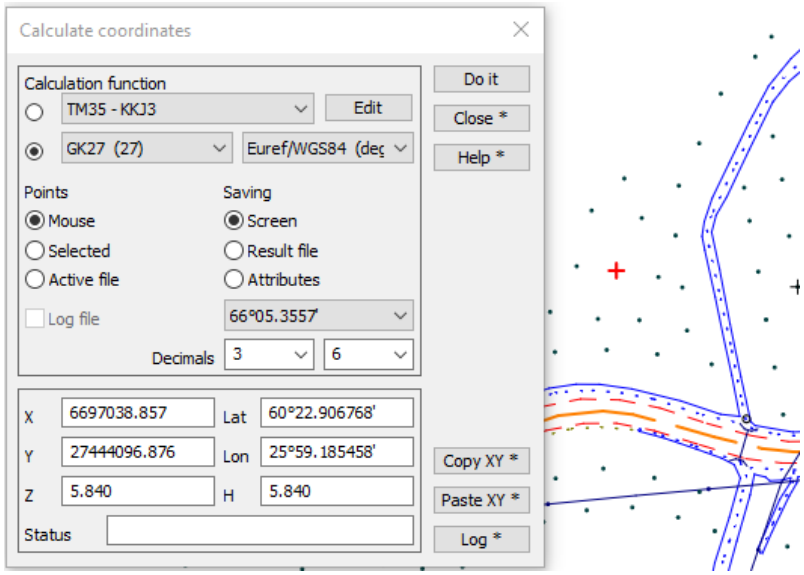


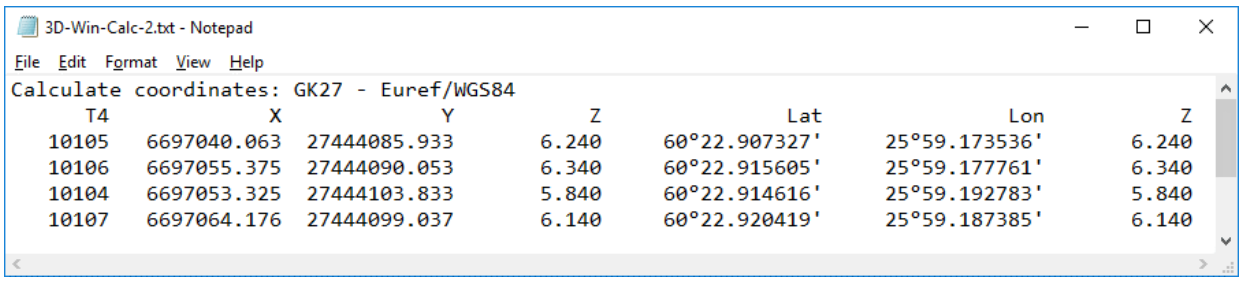
The lists include:

- KKJ0-KKJ5
- GK19-GK31 EUREF-FIN
- TM33-TM37
- TM35FIN
- EUREF/WGS84
- Mercator/WGS84

The **Recognize** button can be used to attempt to identify the coordinate system of an active file using the east coordinate. The function recognizes the WGS84, TM35, KKJ and GK systems with their bands and selects them directly from the **Origin** section.

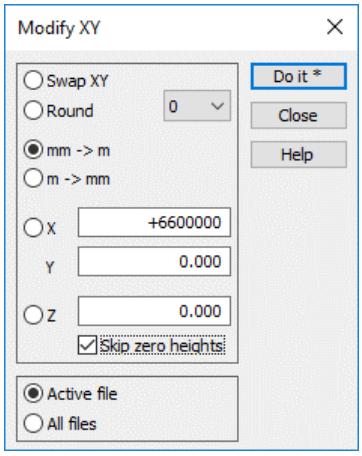
Other more demanding transformations (for example, municipality-specific or elevation transformations) can be made with *Calculation - Transformations - Coordinate Calculation* if necessary. This function also allows you to convert single points to another system or to compose the result writing calculation into a result file.





6.8 Transform XY

Calculation - Transformations - Transform XY



Files from other programs can sometimes be 'wrong way around on the screen' or millimetres are used instead of metres. Format transformations can specify that when loading these, they are automatically changed. An individual transform can be done on the screen with this function, if necessary, in either direction.

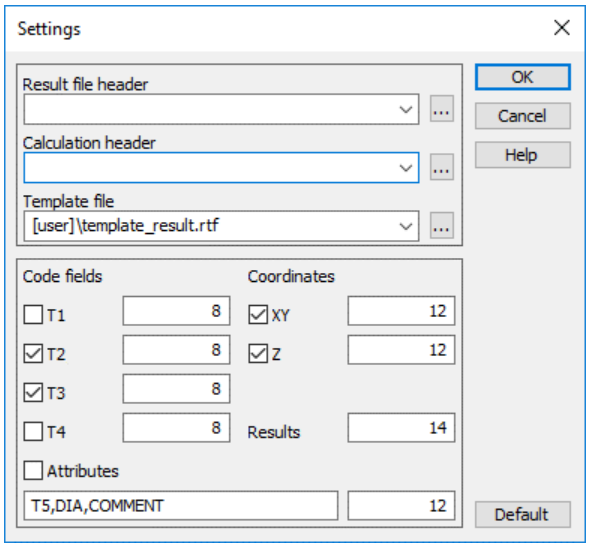
In addition, the number of decimal places in the data can be rounded to the desired number. The desired value can be added to or reduced from the coordinates.

The function can only be performed on the active file or on all files in the element list.

6.9 Calculation results

Calculation – Calculation results - Settings

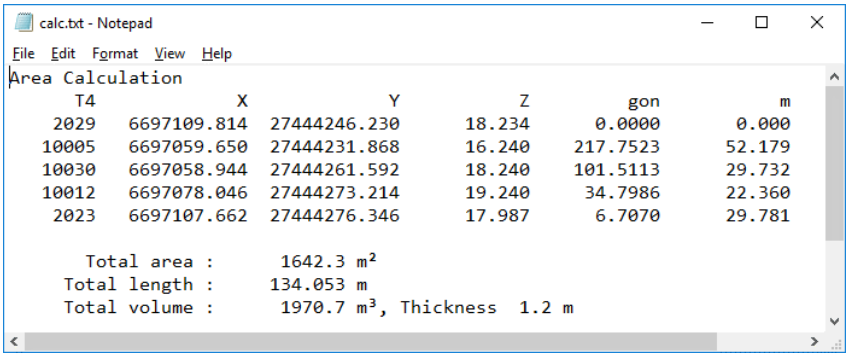
Most calculation functions automatically save the calculation results to the Calc.txt calculation result file. The layout of this result file is freely customizable.



These settings determine which code fields are displayed in the results and how the coordinates are displayed.

The following figure shows some typical settings, where the **T3** and **T4** fields are printed in a column of 8 characters and the XYZ coordinates are printed in 12-character columns.

You will get the results of the completed calculations listed as *Calculation - Calculation results - View* (Ctrl+**T**). Note that results will only be saved in the calculation result file when you close that calculation dialog. You can also view the results of a single calculation function by pressing Shift+**Close**. This will show the results of that function as collected to this point in time.



The Calc.txt result file always resets when the program starts. Remember to save the file with a different name if you want the results to be retained. If necessary, you can clear the result file during the session with *Calculation - Calculation results - Clear.*

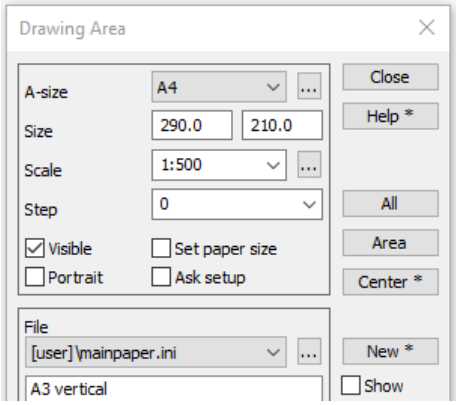
7 Printing

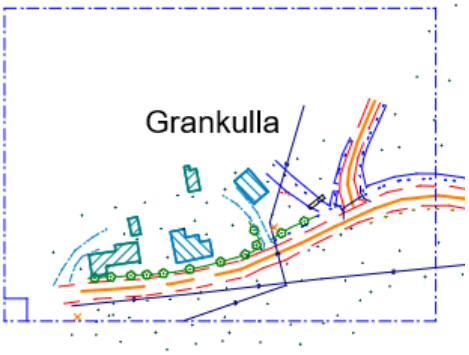
The image can be printed on all printers at the desired scale and paper size. Additionally, the images may include labels used by the company or required for the map. There is no actual preview mode in the program, but by setting **Paper** as drawing mode in the Zoom menu, you will see on the screen before the actual printing, what you will get in the printout and how, for example, the text size is displayed on paper.

7.1 Printout area

File - Printing - Printout area

The printout area determines the size of the image to be printed and gives the scale and orientation of the paper (portrait/landscape). Open file Pernaja.xy.tdw and function *File - Printing - Printout area*. The printable area is shown on the screen with a rectangle formed of a blue dotted line, if the **Visible** tick is on.





Move the mouse cursor over the small square in the lower left corner of the blue rectangle, hold down the left mouse button and drag to get the print area to the desired position on the image.

For example, the **A-size** can be changed from A4 to A3, and a new print area is displayed on the screen. With smaller paper, the print area is reduced accordingly. **Size** can also be given directly in millimetres.

You can change the ratio in **Scale** by selecting it from the list or by typing it directly, for example, 500 (= 1: 500).

The **Step** definition allows you to move the blue screen only by the number of metres given at a time. This is useful, for example, when printing multiple adjacent sheets. This makes it easier to control the printing position.

When you tick **Portrait**, the printable area will be vertical, i.e. portrait.
If the printable area does not appear on the screen, you can reposition it by using the **Center** button.

With the **All** button, the program calculates the largest possible scale that the entire document can fit on.
Use the **Area** button to drag with the mouse the area you want to print.
If desired, the scale can be changed into an even number before printing.
This feature controls multiple pre-set print settings that can be selected from the bottom list.

Once you have positioned the image as you want, you can select the printer and print the image using *File - Printing - Print now*. The icon on the toolbar uses the default printer, which prints the image without asking for any printer settings.

File - Printing - Print (Ctrl+**P**) will normally ask for the printer you are using, and you will be able to change its settings.

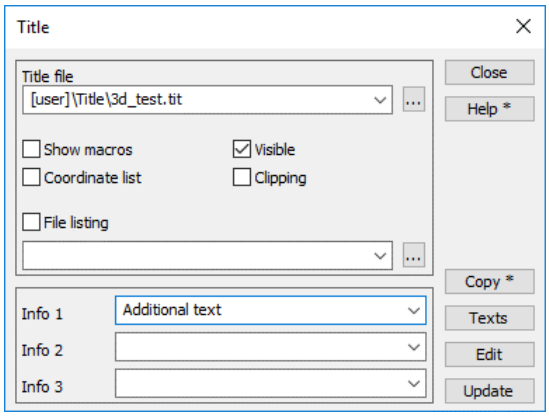
Printing to a PDF is done the same way. You must have a PDF driver installed on your computer and PDF printing will appear as a printer among the other printer devices.

7.2 Title table

File - Printing – Title

It is possible to include labels that can be used, for example, to save company, project, and surveyor information. Also, for example, scale and date can be printed automatically on the label. The label may also include the company logo.

Open function *File – Printing – Title file*. The **Title file** section shows the title file used for drawing. List remembers the 10 most recently used files. By default, labels are retrieved from the [User] directory, but if you press Ctrl+Browser, the label to be used is searched in the current working directory. Click the browse button and select 3d_test.tit. The software installation comes with several sample title files for different purposes that can be customized to suit your needs. For more information on how to make title files and their parameters, see Help.

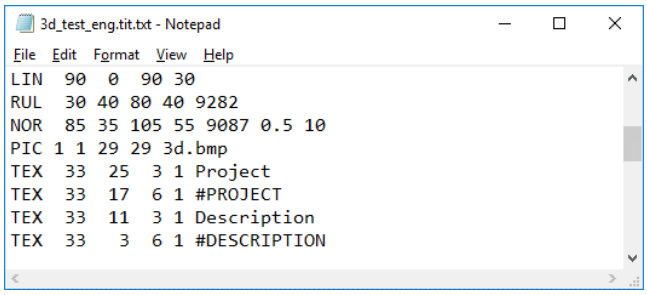


The **Copy** button makes a copy of the title file with another name. The copied title file can be saved to the desired location, after which the copied file appears in the **Title file** section.

With the **Texts** button, the program will re-ask the values that have been marked to be asked from the user.

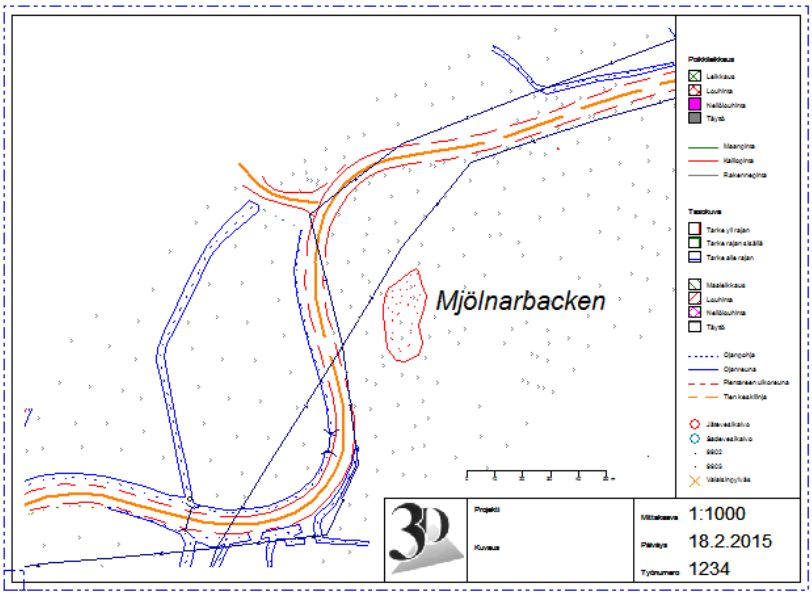
The **Info 1-3** fields are often used to display frequently changing items in the label.

You can correct the title file by pressing the **Edit** button. In this case, a text editor opens (see below), where you can, for example, correct the given text or change its size and position in the title table.



Changes appear when the title file is saved, and the 3D-Win screen is updated with the **F5** button.

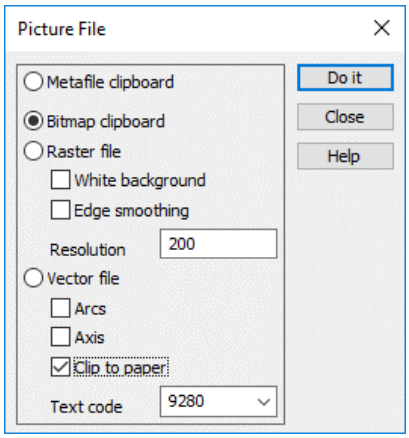
The **Visible** tick must be on to draw the title file on the screen. The **Clipping** tick determines that the image is limited to the area of the title file and is not drawn under the label text. The printout (paper or PDF) is always clipped automatically and the tick does not affect the clipping.



7.3 Picture file

File - Picture file

Use the **Picture file** function (*File - Picture file*) when you want to include, for example, all the information on the screen, such as point numbers, coordinate crosses, and the title table, in a CAD image. A normal formatting change moves only the objects in the active file (points, lines, texts) into the output file, but no additional information drawn by the program on the screen. The picture file takes all the files on the screen (including the terrain models, terrain geometries, and soundings) and writes them into one result file. All items, including triangular networks and road geometry, are converted into break lines. Point numbers, etc. are exported as ordinary text and are no longer attached to the original point.



You can also use the picture file to print a raster image from the print area to a file or clipboard, from which it can be attached, for example, to Word or Excel, normally with the **Paste** command (Ctrl+**V**).

The picture file can also be used to make a raster image at the desired resolution from the screen.

If you select the **Vector file**, you will be asked for the format. All CAD formats and 3D-Win's own file format are usable.

7.4 View file

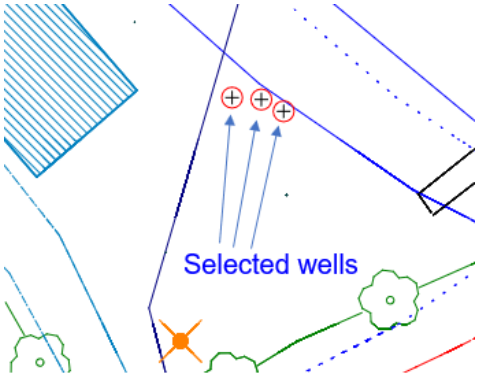
Tools - View file

The function displays in a text editor information about points collected in a group. If no points are selected (in a group), all the points in the active file are displayed. The selected points can also be collected into a group from several files.

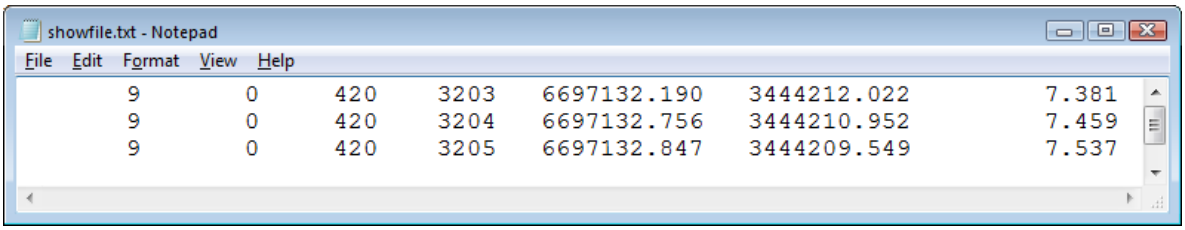
Reset the group and select **Codes and attributes** (for example, from the mouse right click menu or Ctrl+**F**) as the search method.

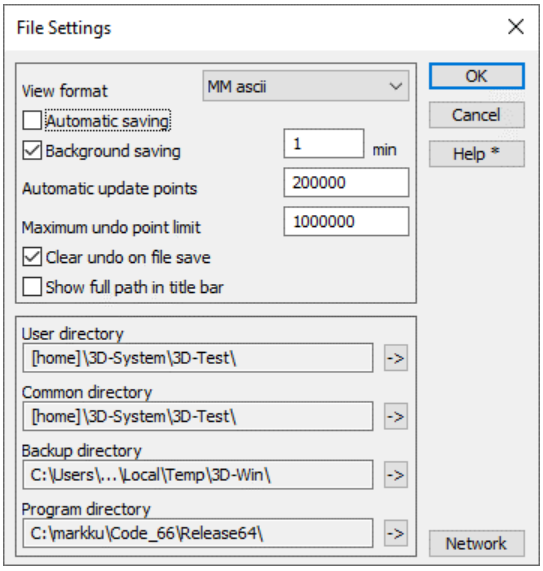
Now find the points in the **T3** field with code 420, where the group of three wastewater wells is selected.

You can see the group points highlighted with the Ctrl+**H** shortcut key.



Open the function *Tools - View file*. The program opens a file in the text editor where the point information is displayed as a list. This file is freely customizable, printable and savable. You can add information, for example, about a company, a surveyor, or a project to the listing. Information can also be copied, using the clipboard, to other programs.





The *Settings* - *Files* function allows you to select the **View format**, i.e. the format in which your selected data is displayed in the **View file** function. If no format is selected, you will be prompted when you open the function. If necessary, press Shift+**View file** to skip the format specified here. This will open the Format list, where you can select the format you want.

Usually, you should specify your own listing format for printing the data. For instructions on creating a format converter, see Chapter 9.

Other settings for this dialog

Background saving
The frequency with which the program backs up your work to the backup directory. In an emergency, the work can be restored from the backup directory.

Automatic update points
Files larger than this will not be automatically updated after each change. The update therefore requires the user to press **F5**. With current devices, the value should be 200,000 points or higher.

Maximum undo point limit
The maximum number of points at which undo is still allowed. The default is 1 million.

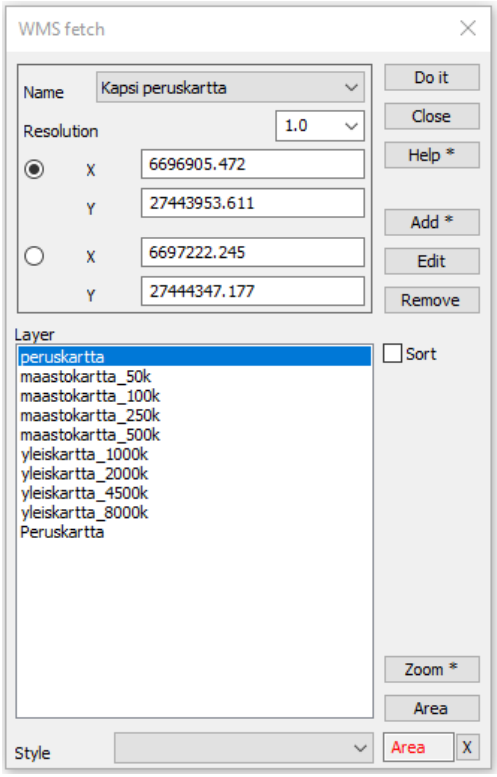
The directories used by the program
Use the Arrow key to browse directly through the directory.

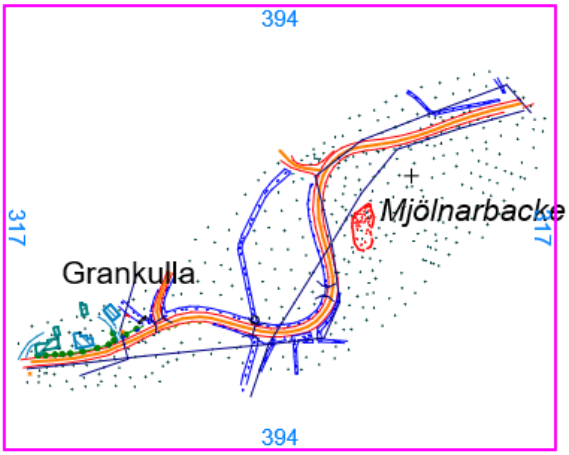
7.5 WMS map services

Tools -Web services – WMS fetch

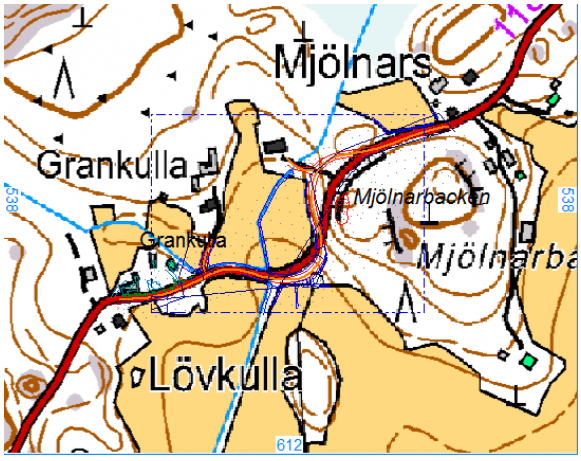
The program supports standard WMS and WMTS web services for raster maps. The program can also read vector-based files from WFS services. An example in the software, is the Kapsi WMS service, which is free and does not require user logins. For other services, you will receive credentials and http addresses from your service provider (National Land Survey Registry, GTK, various municipalities and cities).

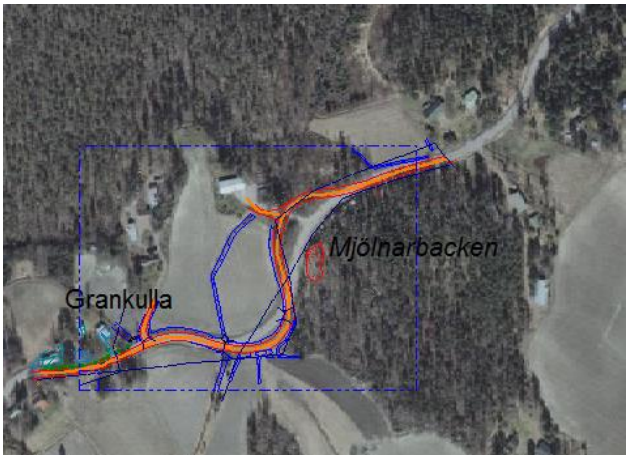
Open Pernaja.xy.tdw and *Tools - Web services - WMS fetch*. From the list, select the **Kapsi peruskartta** (basic map). A box appears showing the area you are searching for. Zoom in to the file and select, by clicking an area of approx. 500 m x 500 m, from around the file (bottom left - right upper corner). From the lower list, select **peruskartta** and press **Run**.





A raster map will appear on the screen and in the element list. If necessary, you can select a new area and perform a new search. From the **Name** list, select the **Kapsi ortokuva** (orthophoto) and from the level list **ortokuva**. Click **Run** to get an aerial view of the same area. Each search made saves the element list with its location information as its own raster element. These can be stored normally for later use.

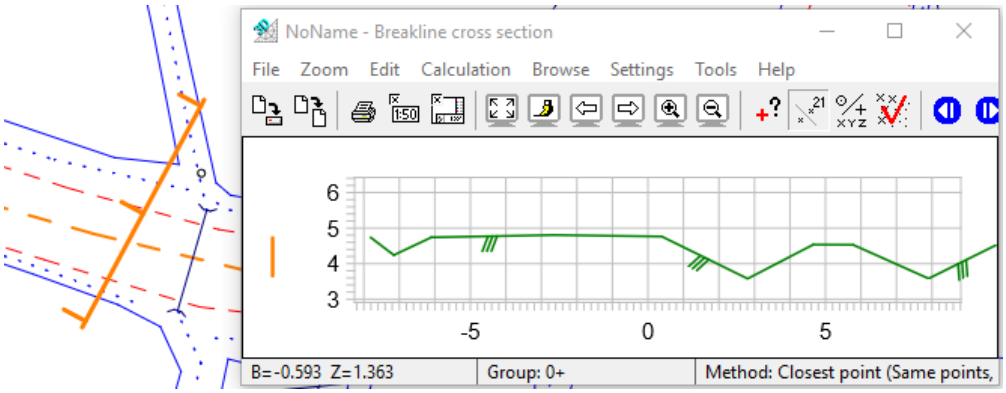




Tools - Web services - WMS browsing automatically retrieves the data you select to the screen area when you move or change the zoom. Therefore, there is no need to select the area separately. Searched files are not saved in browsing.

7.6 Breakline cross section

With the function *Window - Breakline cross section*, you can take a cross section of the desired spot by indicating two points on the screen. For the cross section, there is no need to make a measuring line or triangulate the data. If there is vector data on the screen, the cross sectional surface is formed by calculating the intersection points of the data. Also included are 9-surface points and lines from vector files. Surfaces from different vector files are drawn separately for the intersection. If there are terrain models in the element list, the intersections from them are also calculated. The number of surfaces can be reduced by hiding the material or by removing it from the element list.



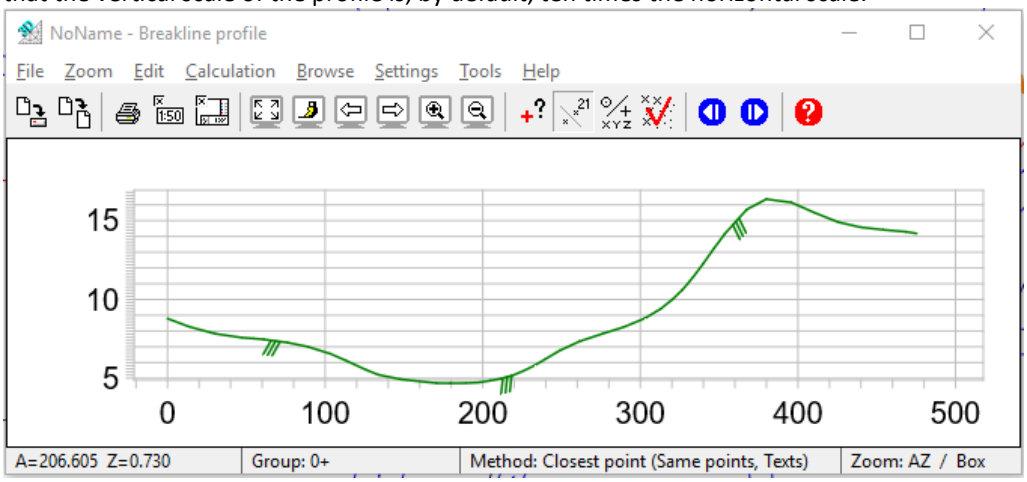
You can get a new cross section at a different point by indicating those two points again. By holding down the Shift key, you can grab your line with the mouse and move it in the desired direction. The width of the line or its direction angle does not change, but you can move it forwards or backwards and laterally. If the road geometry is active in the element list, the line you are displaying is centered on it and the cross section is calculated perpendicular to the road line. The position of the alignment line appears in the image with its own symbol.

The breakline cross sectional window contains functions that can be used to move the intersection to the main window or to save it as a separate cross section file on the disk. The intersection can also be printed and used to calculate, for example, slopes and distances. For more detailed instructions, see the **Cross section window** section or the Help function.

7.7 Breakline profile

You can select any line of your vector data from which the program creates a profile.

Open the *Window - Breakline profile* and select, for example, the center line of the road with the mouse. Note that the vertical scale of the profile is, by default, ten times the horizontal scale.



The breakline profile window contains functions that can be used to move the intersection to the main window or to save it as a separate profile file on the disk. The intersection can also be printed and used to calculate, for example, slopes and distances. For more detailed instructions, see **Profile window** section or the Help function.

8 Formats

The 3D-Win software supports dozens of formats in the field of surveying. When installing the program, certain converters are installed by default, in addition to which the user can add the necessary converters to the list and remove the unnecessary ones.

Converters are divided into six main categories: Vector files, Raster files, Terrain models, Road geometries, Soundings and Observation books. See section 2.2 for details.

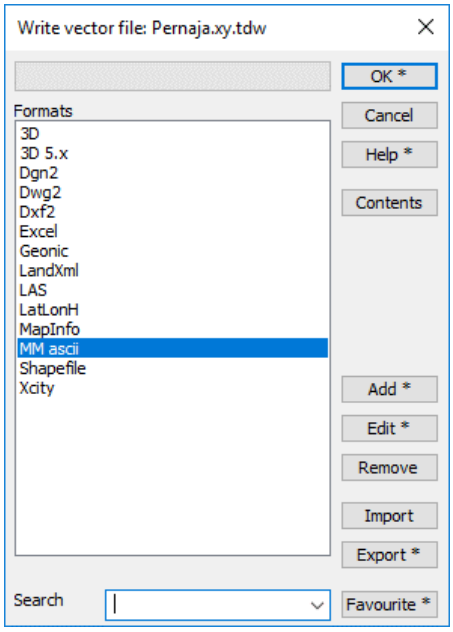
The user may have several converters that write/read in the same format and operate in a slightly different way. In fact, the conversion does not merely interpret the format but at the same time it is possible to change the coding or coordinate system, and different things can be interpreted as attributes.

It should be remembered that, if you want to read the data in the same format after you create a converter, you must add it separately to the reading side as well. Generally, the functions used in the conversion come in contrast to code changes or mathematics.

The program knows, on the basis of the active file when, for example, road geometry or soundings are written, and the format list only displays the formats suitable for the tile type.

8.1 Write in format

Open the file Pernaja.xy.tdw and choose function *File - Formats - Write*.



The list shows the installed converters that can be used to write vector material.

Select the saving format Geonic and click **OK**. The program suggests the name Pernaja.gt, which you can accept by clicking **Save**.

The file is now written and saved in Geonic format on the hard drive. Note that writing in format does not remove the **Edit** tick from the element list, as normal saving does.

With the **Export** and **Import** buttons, you can transfer the selected converter to another user with all the settings.

8.2 Read in format

Clear Pernaja.xy.tdw and launch the function *File - Formats - Vector file.* Select the file format you want to open from the Geonic list and click **OK**. Open the recently saved Pernaja.gt.

If you open a file using *File - Open* function, the program will retrieve the converter that has the same file extension as the file that you want to open. If there are several such converters, the one with the shortest name is selected. 3D-Win's own files are read correctly regardless of the extension without format conversion.

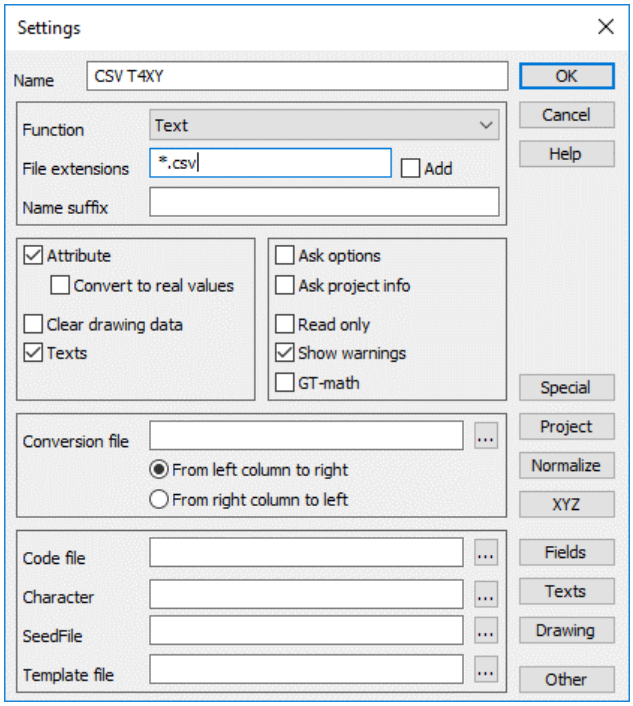
If none of the listed converters finds the file extension, the program opens the vector converter list and you can select the converter to use.

Different types of files should be read with the readers of that file type under *File - Formats*. For example, the dxf entension does not tell if the file has vector data or a terrain model.

8.3 Defining a new format converter

When adding a new converter, it is usually enough to select a **Function** from the list (for example, Dwg2 or Text) and acknowledge with **OK**. Fine-tuning can be done with other options in the Settings dialog. In addition, when you want to make a text file, you must specify the fields to be written and read.

Select the function *File - Formats - Write*. To add a new converter to the list, press **Add** to open the Settings dialog.



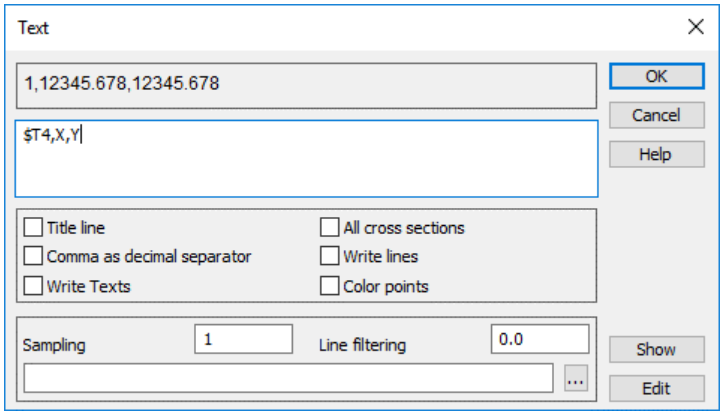
When you select a format from the Function list, the specific file extension and name will automatically appear in the dialog. Only the Text converter must be given a descriptive name and a file extension.

Note that there must not be two converters with the same name on the list.

Select Shift+**Add** to copy the selected converter for editing. If you need a converter temporarily, take a copy of the converter and enter a descriptive name, for example "Dwg2 mm -> m".

Now define a new row format:

- select **Text** from the function list
- and name the converter CSV T4XY
  - The name is free-form and can be edited as desired.
- enter *.csv as the file extension
- specify the fields to be written with the **Other** button



Press the **Other** button to open the converter-specific settings. In the upper field, enter the row $T4,X,Y (note uppercase).

In this case, the created row format used, point number **T4** and the **X** and **Y** coordinate values are separated by a comma. You can also use, for example, a space bar instead of a comma. For more information, click the **Help** button.

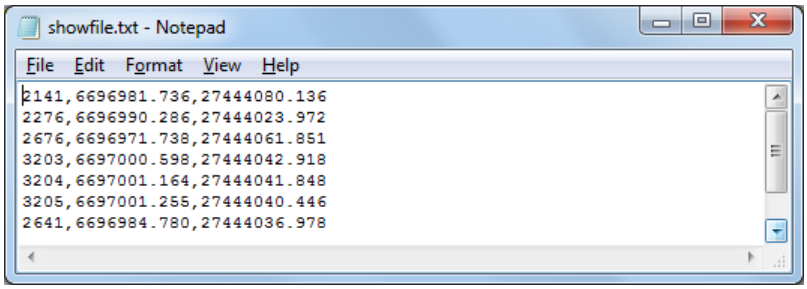
Press **OK** and **OK** once again to add the new converter in the list. When you press **OK**, the program asks where to save the file. Next time, it is enough to click on the desired converter from the list when writing. The converter settings are stored in the User directory Convert.ini file. Take regular backups of this, as well as other settings.

The configuration dialogs have other functions that can be performed during conversion, for example **Read-only**, so that the file cannot be overwritten by the same name.

The **XYZ** button can be used to specify the coordinate settings. For example, you can specify that a file is automatically transformed to another coordinate system when written.

The **Fields** button can be used to change the field value (**T1-T6**) using a code-conversion file, for example from company A code 374 to company B code 3116U. Also, for placing an attribute, for example, in the Z-coordinate or code field value is possible. You can also add default values to the field if they are empty.

Open *Settings* - *Files* to open the File Settings dialog. Select the CSV T4XY you just created to use as the view format. You can easily test a new converter by opening the *Tools* - *View file* that shows (all or selected) points using the given converter. If you have not selected a view format in File Settings, it will be prompted when you open the **View File** function. If necessary, press Shift+**View file** to skip the default view format, and the format you wish to use will always be requested.



With the same instructions, you can also add reader formats.

More detailed instructions on the different formats, their driver files and special features can be found with the **Help** button.

9 3D-Win shortcuts

File

New file	Ctrl+**N**
Open file	Ctrl+**O**
Save active file	Ctrl+**S**
Save as	Ctrl+Alt+ **S**
Save all	Shift+Ctrl+**S**
Clear active	Ctrl+**W**
Clear all without saving	Shift+Ctrl+**W**
Converter log file	Ctrl+**L**
Element selection list	**F4**
Print	Ctrl+**P**
Print now	Shift+Ctrl+**P**
Close program	Alt+ **F4**
Open previously used file from list	Ctrl+**1**…**9**

(e.g. Ctrl+**3** opens the 3 most recently used files)

Editing

Undo	Ctrl+**Z**
Redo	Ctrl+**Y**
Active object	Ctrl+**E**
Edit point group	Ctrl+**G**

Tools

Search method - nearest point	Ctrl+**Space**
Search method – mouse	Ctrl+Alt+ **Space**
Uncheck / Reset group	Ctrl+**Q**
Drawing settings On / Off	Ctrl+**K**
Retrieve the latest search	Shift+Ctrl+**F**
Select all files	Ctrl+**A**
Create mask	Shift+Ctrl+**M**
Mask on / off	Ctrl+**M**

Zooming

Draft	Shift+**Home**
Screen	**Home**
Paper	Alt+ **Home**
Active point	Alt+ **End**
Active file	Ctrl+**End**
All Files	**End**
Previous zoom	**Back**
Next zoom	Shift+**Back**
Clean drawing	**F5**
Enlarge	**PageUp** or **+**
Reduce	**PageDown** or **-**
3D View	Alt+ **Ins**
Changing 3D View	**Ins**
Full screen	**F11**
Background color	**F12**
Black and white	Shift+**F12**
Closed areas	Ctrl+**F12**
Raster lightening	Ctrl+**R**
Background maps	**F7**

Calculation

Show calculation results	Ctrl+**T**
Clear calculation results	Shift+Ctrl+**T**

Window

Attachments	**F9**

Help

Help	**F1**