

Kokusai Kogyo Co., Ltd.

Ver.001

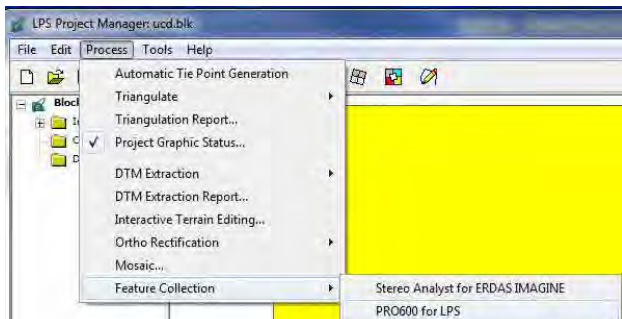
**Digital Mapping Manual (PRO600 Operation)**

JICA Study Team (Kokusai Kogyo)  
May, 2012

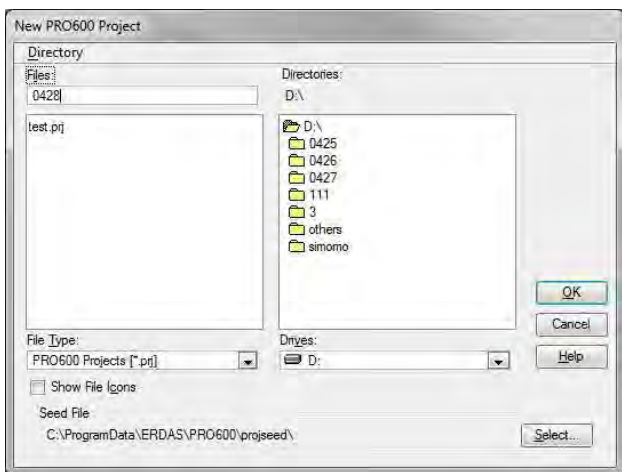
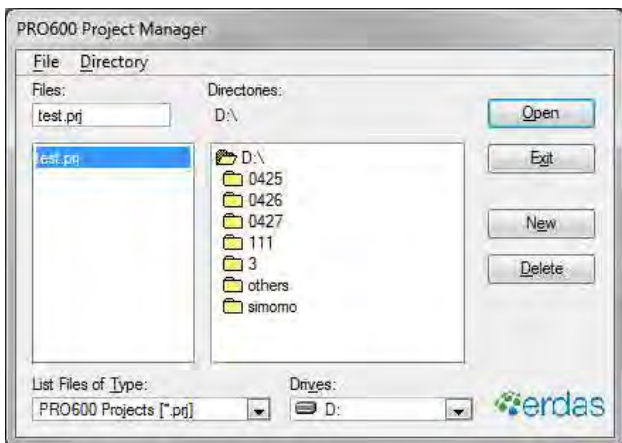
# 1. PRO600

## 1.1. Starting of PRO600

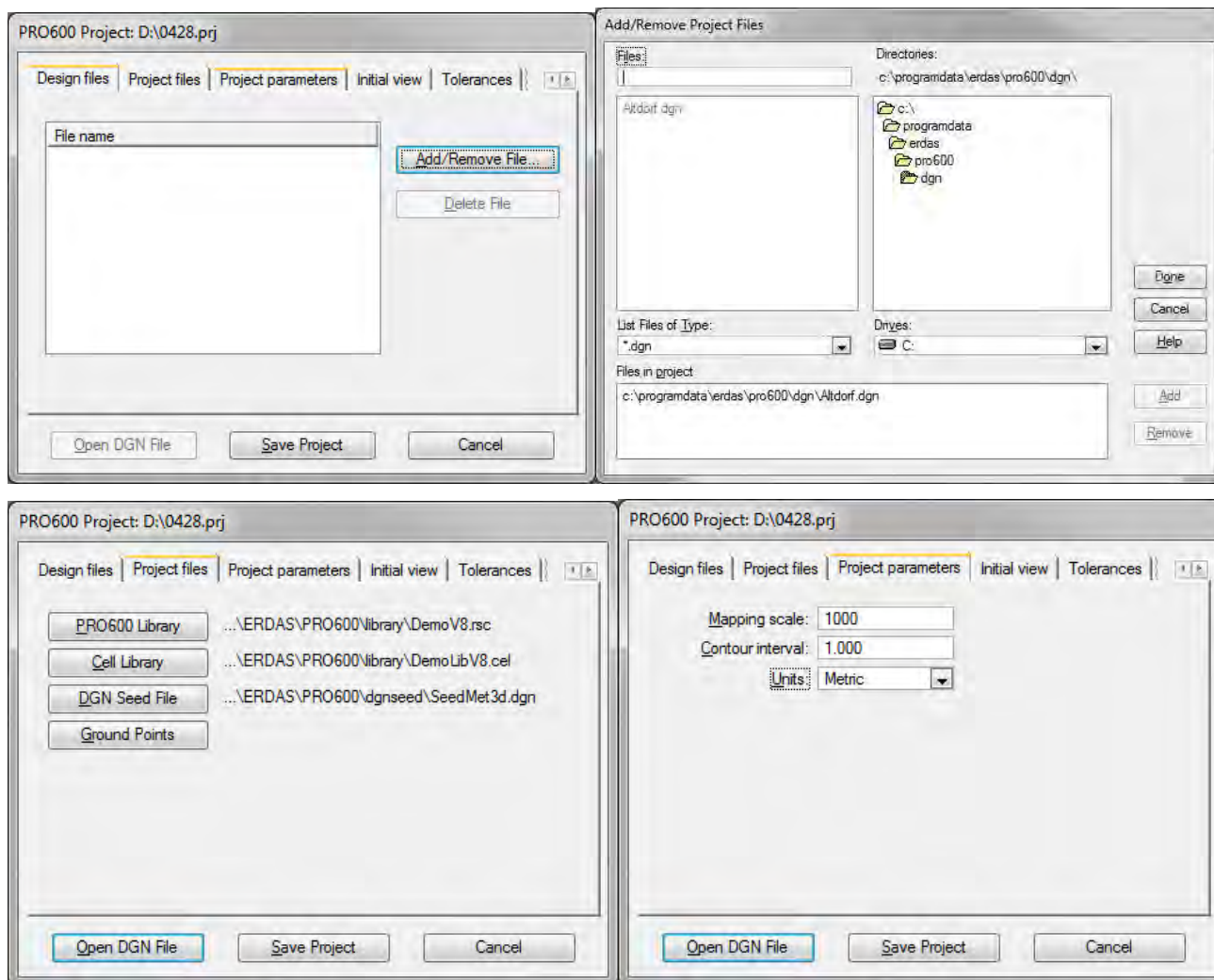
PRO600 is started from LPS menu, or clicks the start menu of "PRO600forLPS" and starts PRO600.



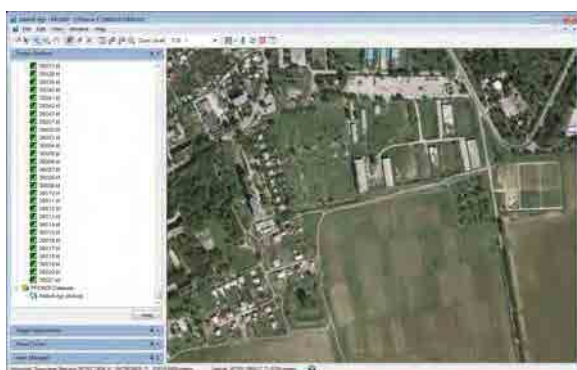
Click "New" and inputs a project name.



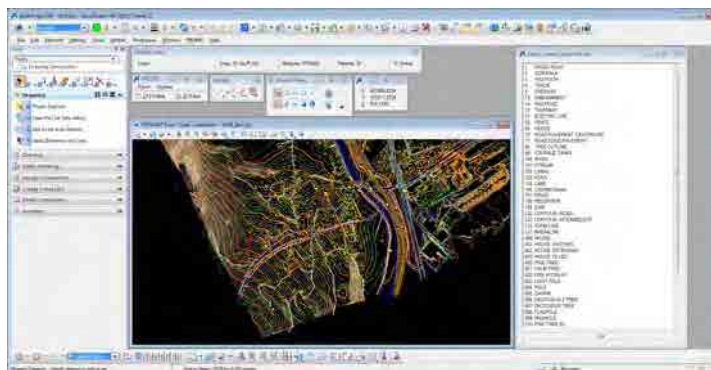
A setup for the whole project is displayed. "Mapping scale", "Contour interval", etc. are set up. A CELL library and the DGN file should use the specified file.



“Save project” and PRO600 starts by an “Open Dgn file”.



Left display

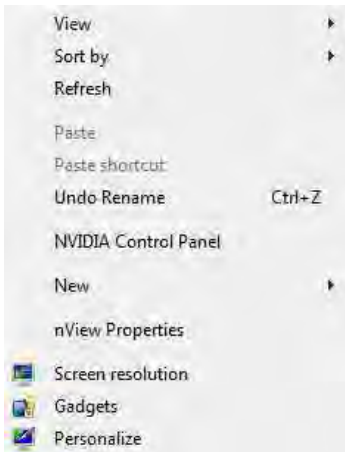


Right display

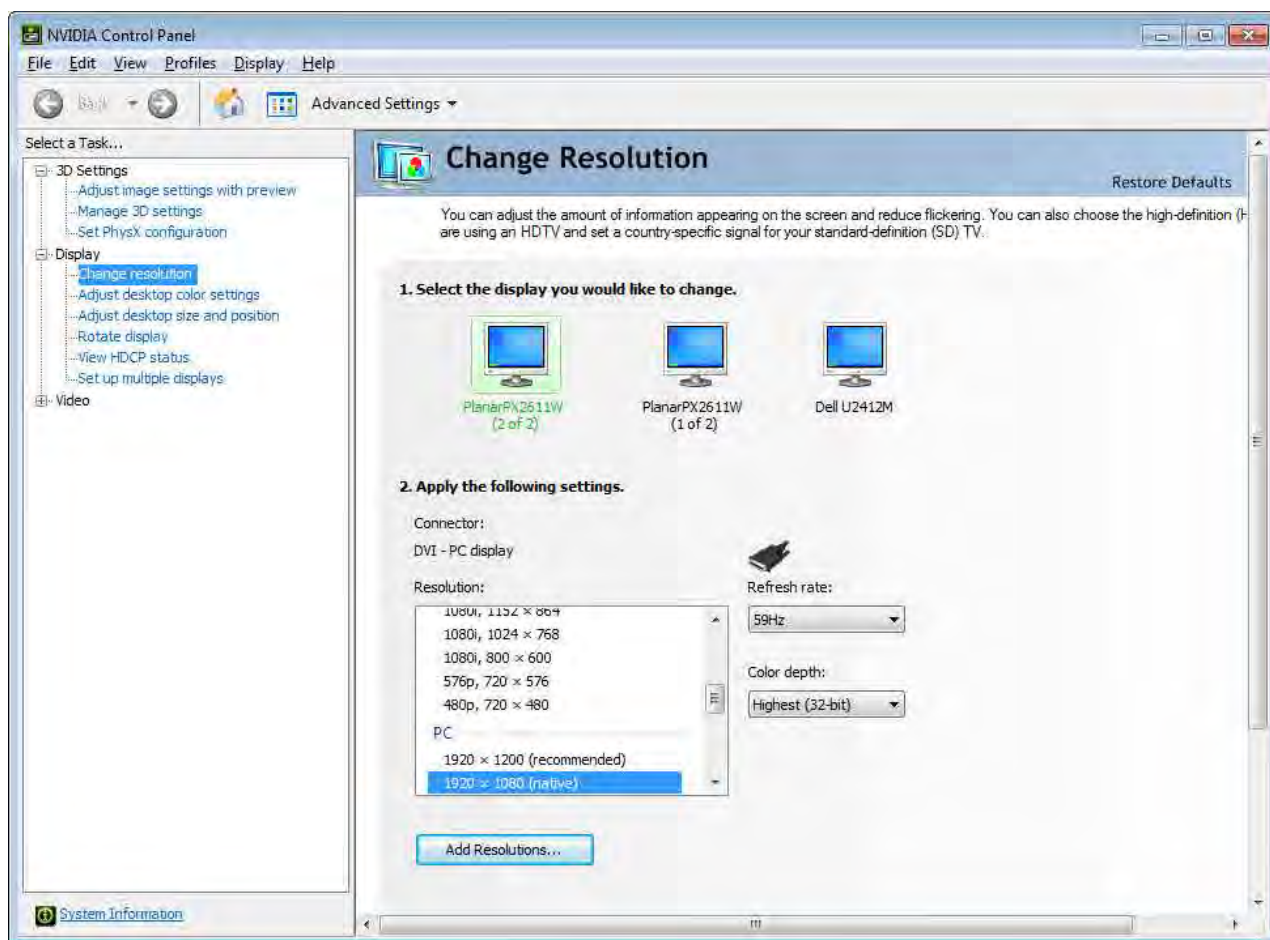
## 1.2. Setting PRO600

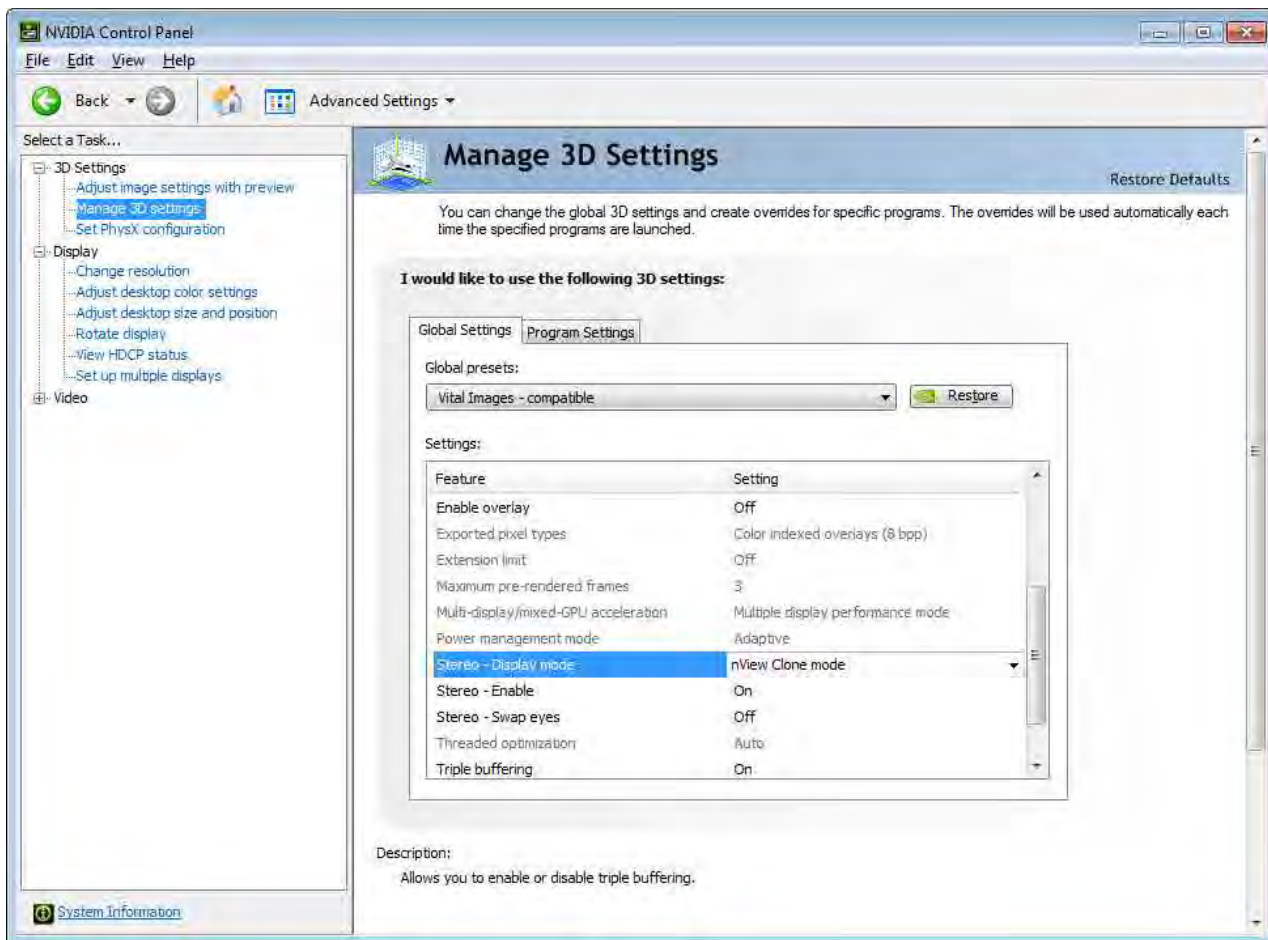
### 1. Setting Display

Please click the right button of a mouse on a display.

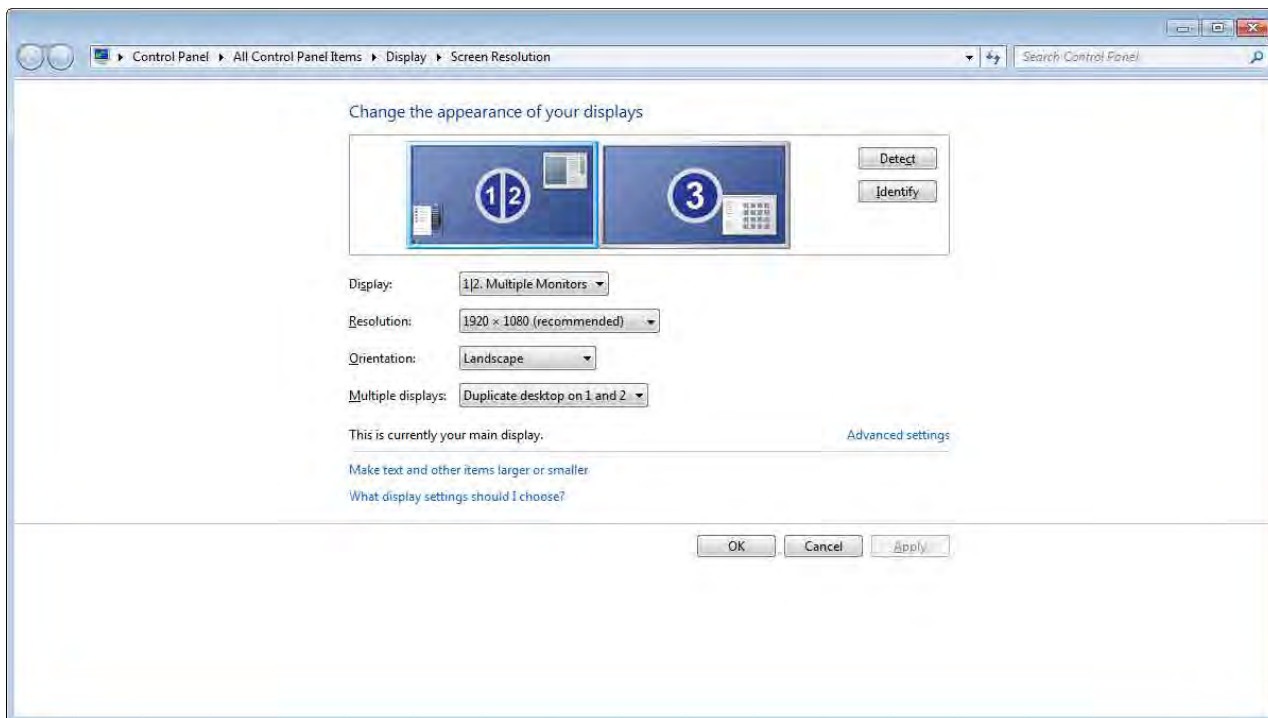


Select "NVIDIA Control Panel" and please set up as follows.



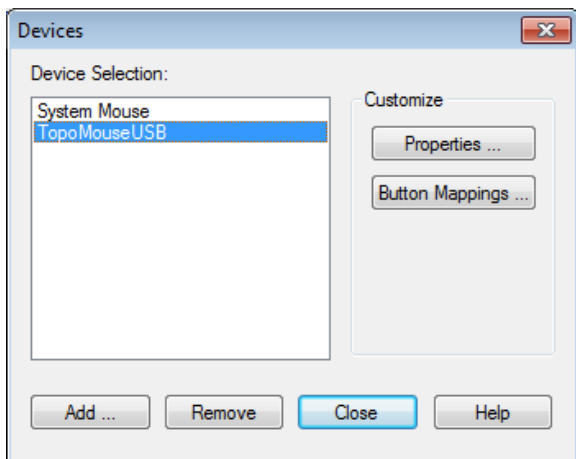


Select "Screen resolution" and please set up as follows.

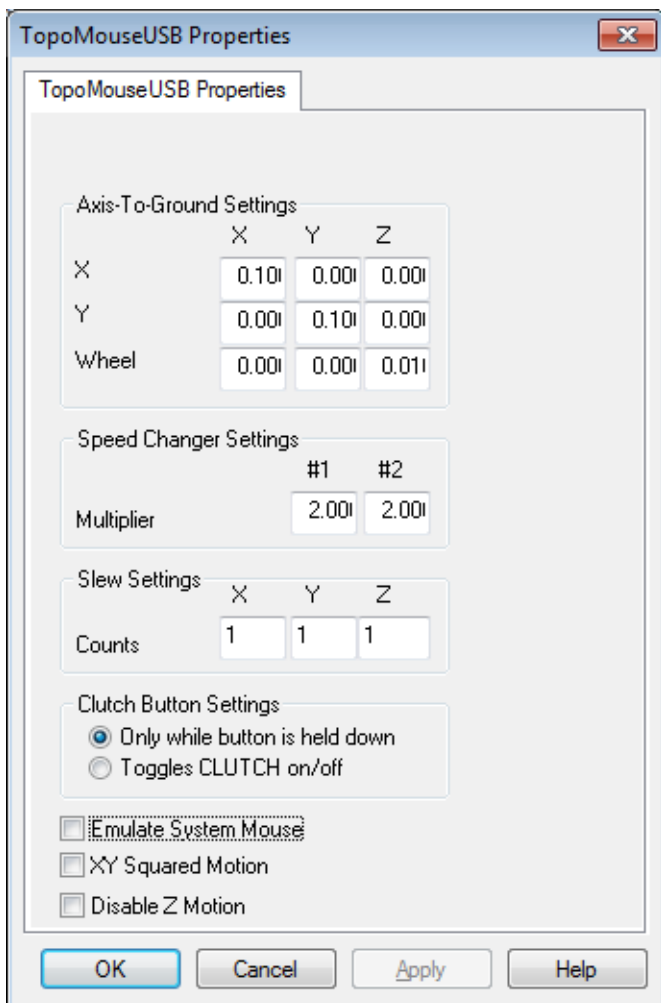


2. Setting devices

Edit > devices

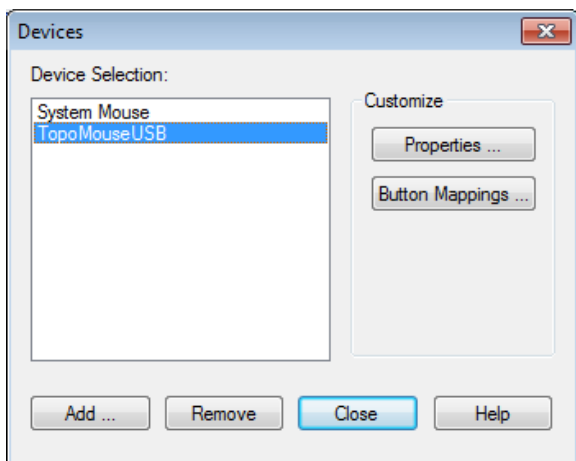


Select "TopoMouseUSB" and "Click Properties". Please set up as follows.

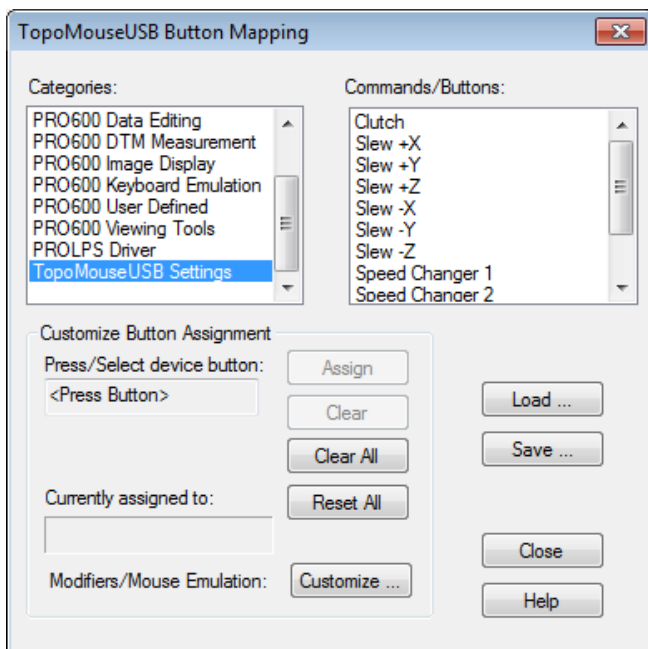




Edit > devices



Select "TopoMouseUSB" and "Click Button Mapping". You can check the function of each button.



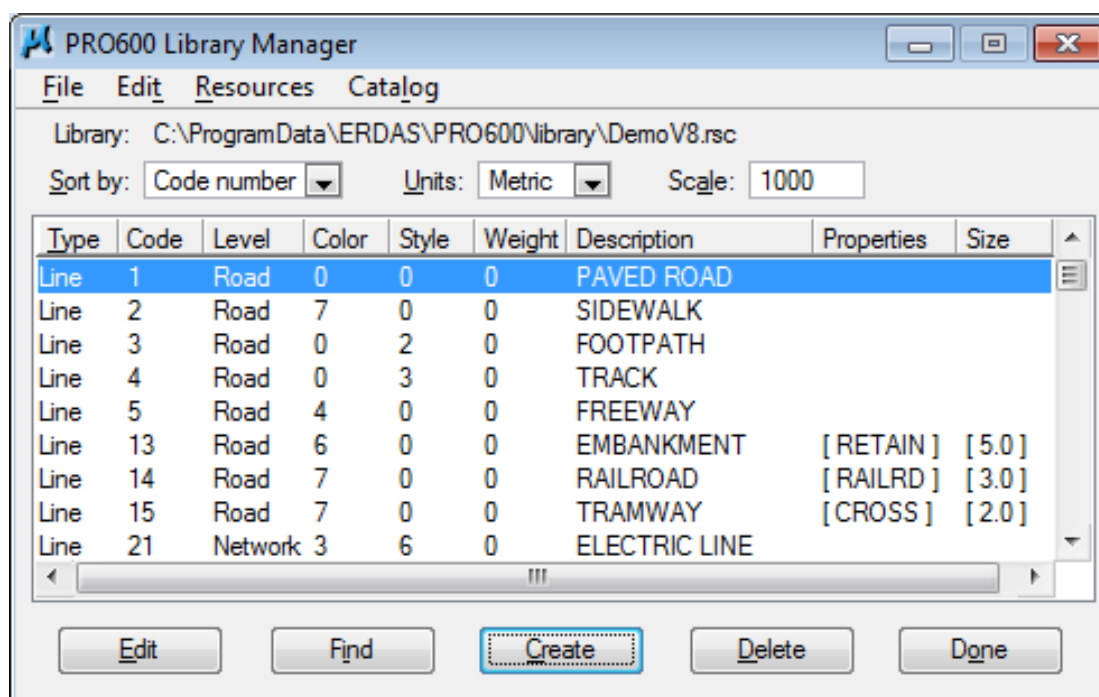
### 3. Setting work environment

Before beginning plotting with PRO600, it is necessary to create the work environment of PRO600. It is the three following points to set up.

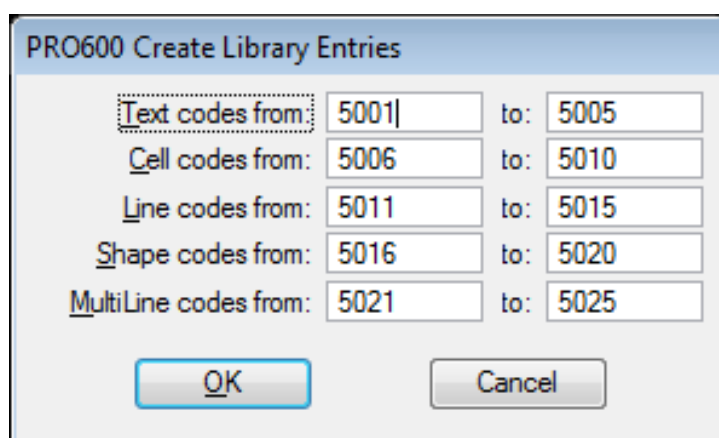
- ① Creation of a feature list.
- ② Determination of combination, such as a feature, a layer, a color, line width, line style
- ③ A setup of PRO600

- ① Creation of a feature list.

PRO600>Library>OPEN

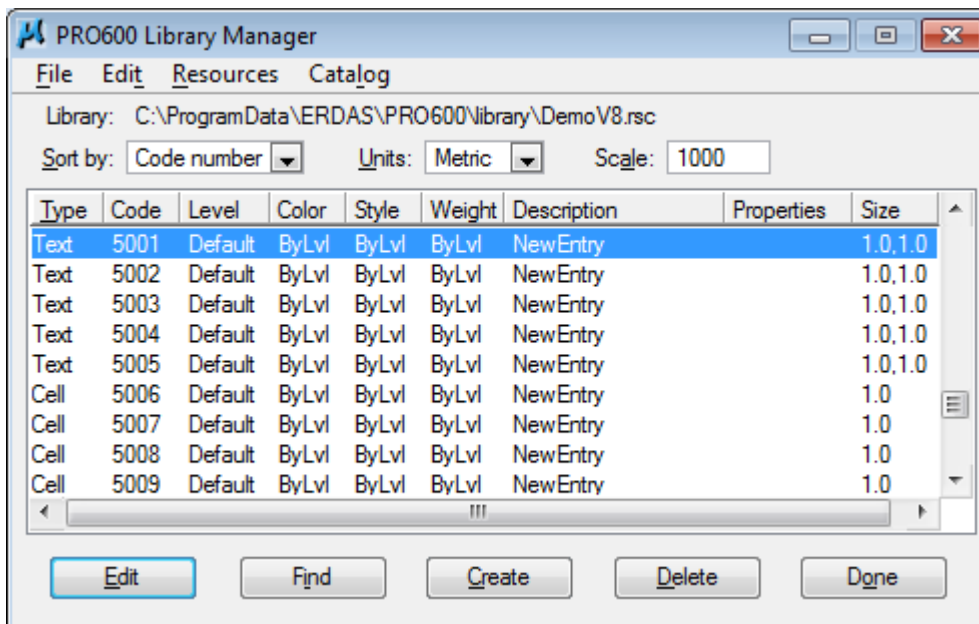


Click "Create" and input the code number according to the data type of feature.

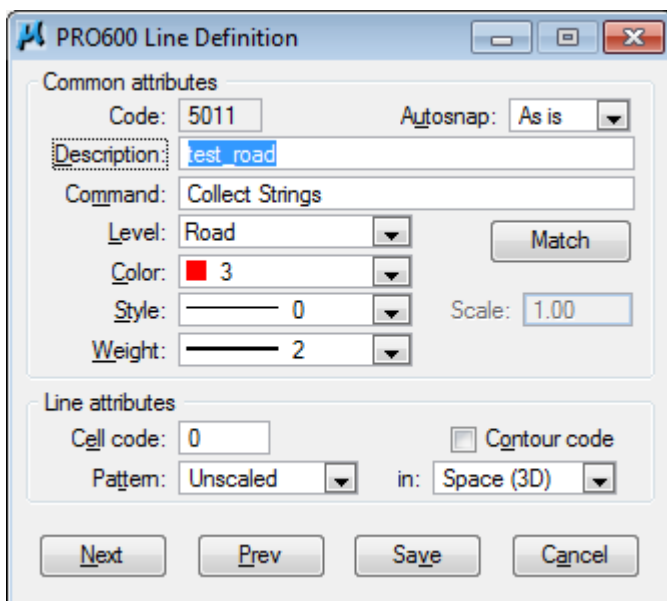




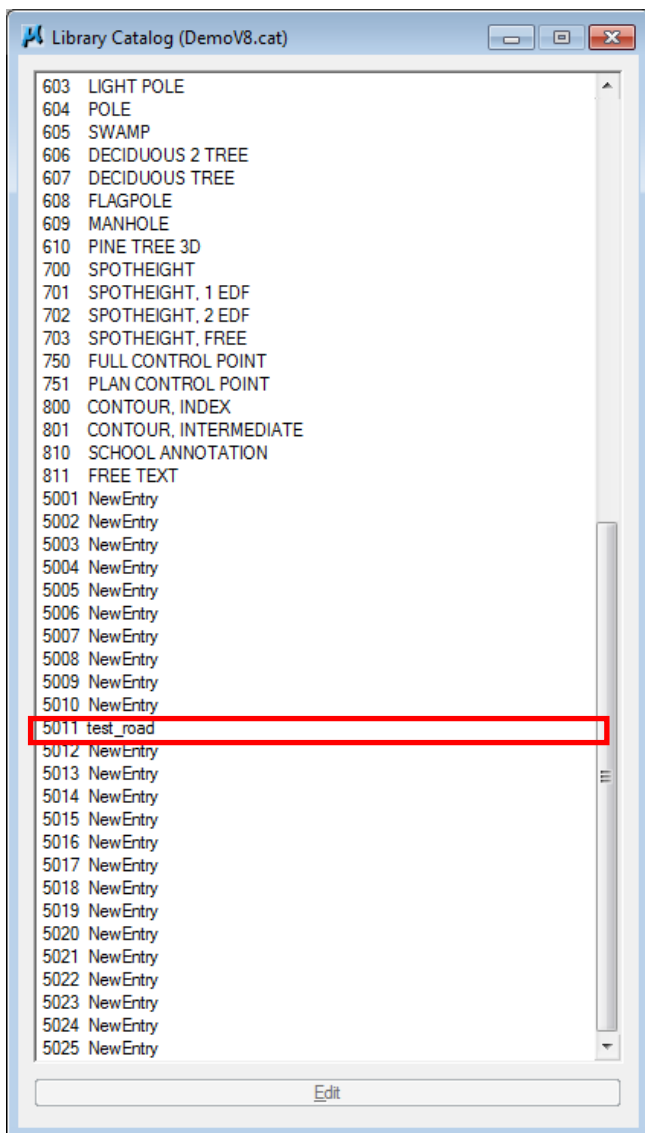
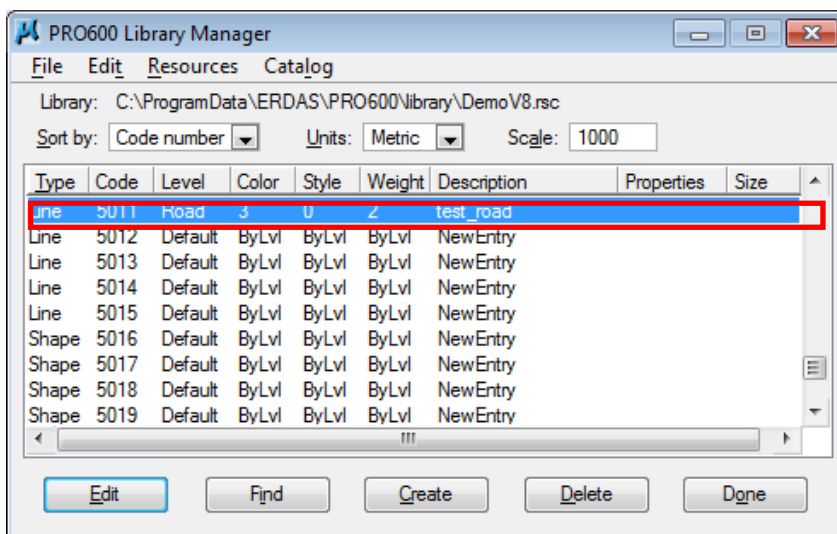
② Determination of combination, such as a feature, a layer, a color, line width, line style



Double-click the code to edit. "Symbol definition" is displayed. It sets up as follows.



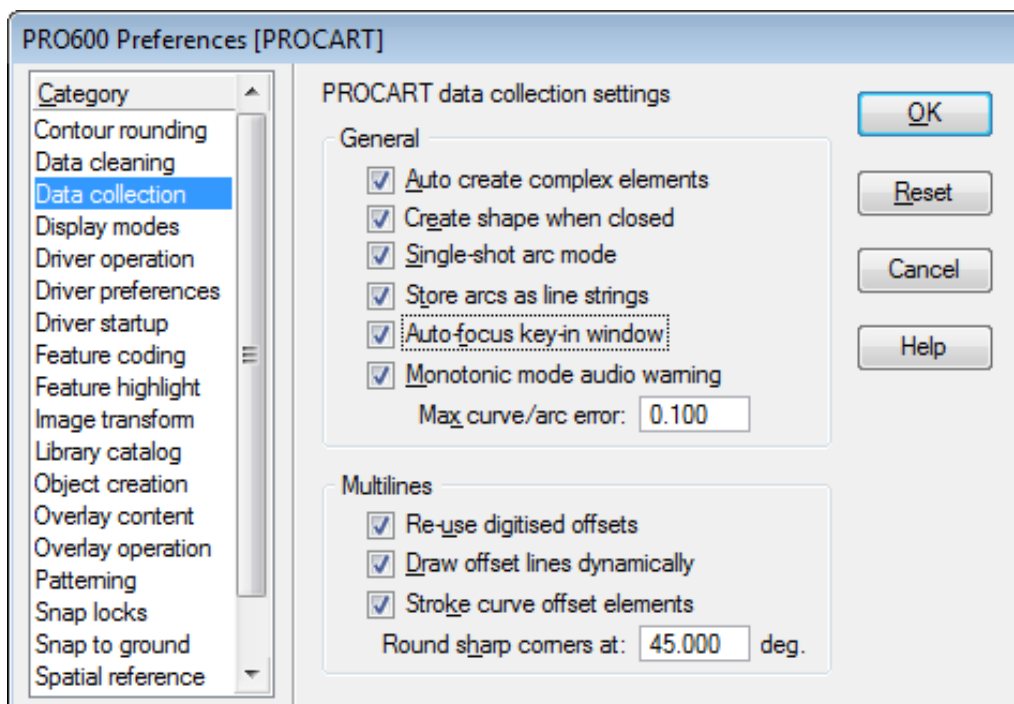
The display of “Library Manager” and “Library Catalog” changes as follows.



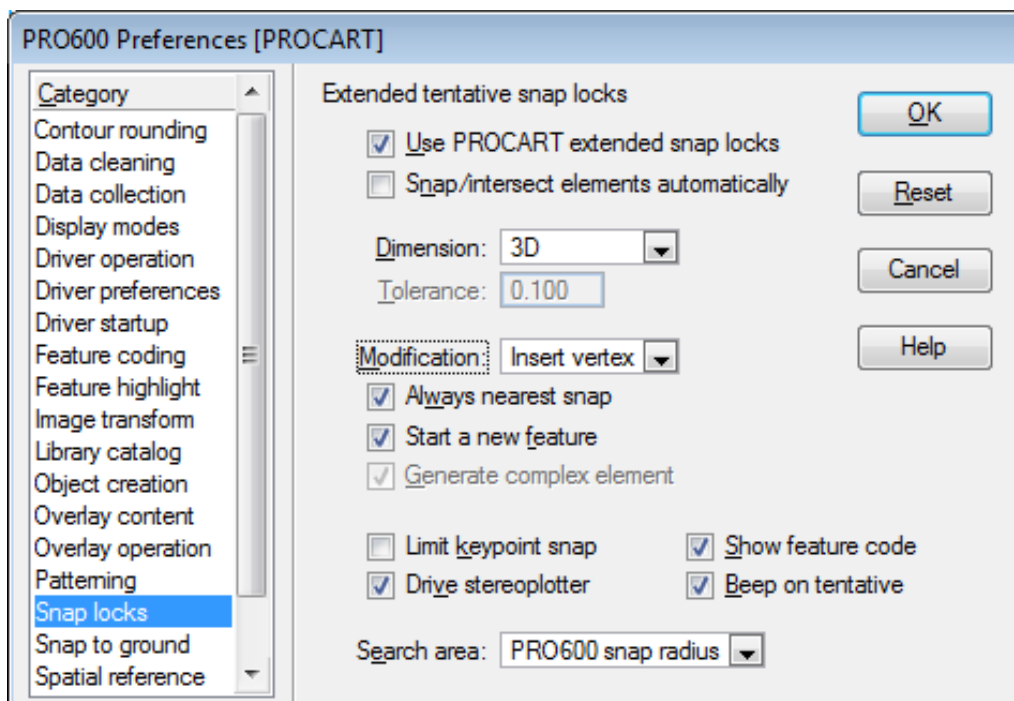
③ A setup of PRO600

PRO600 > Settings

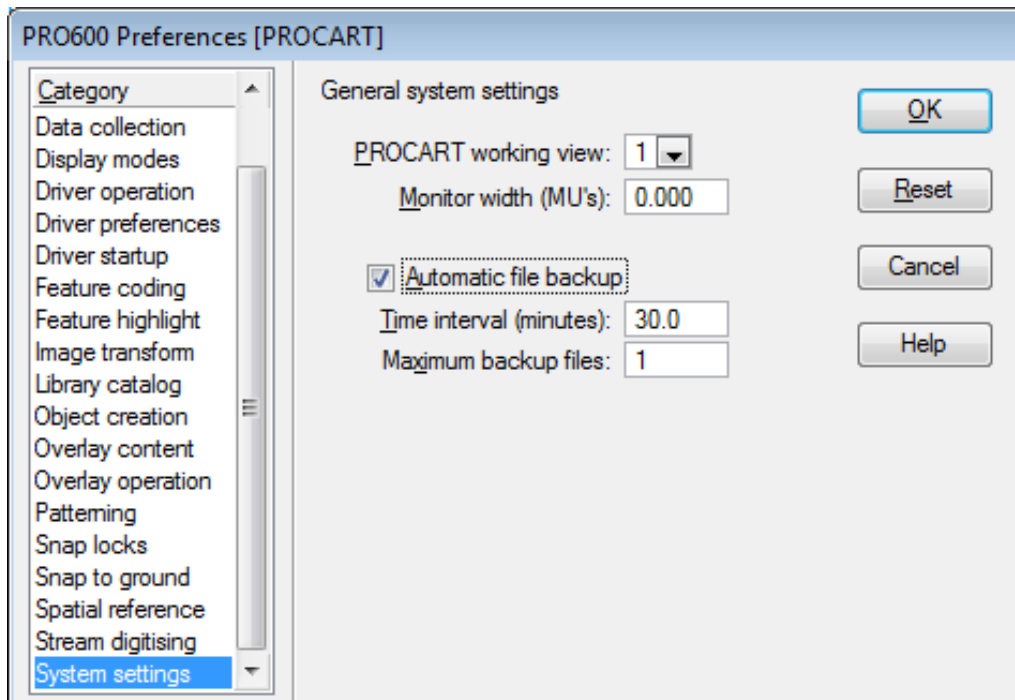
The data type of the DGN data created is set up.



The method of a snap is set up.



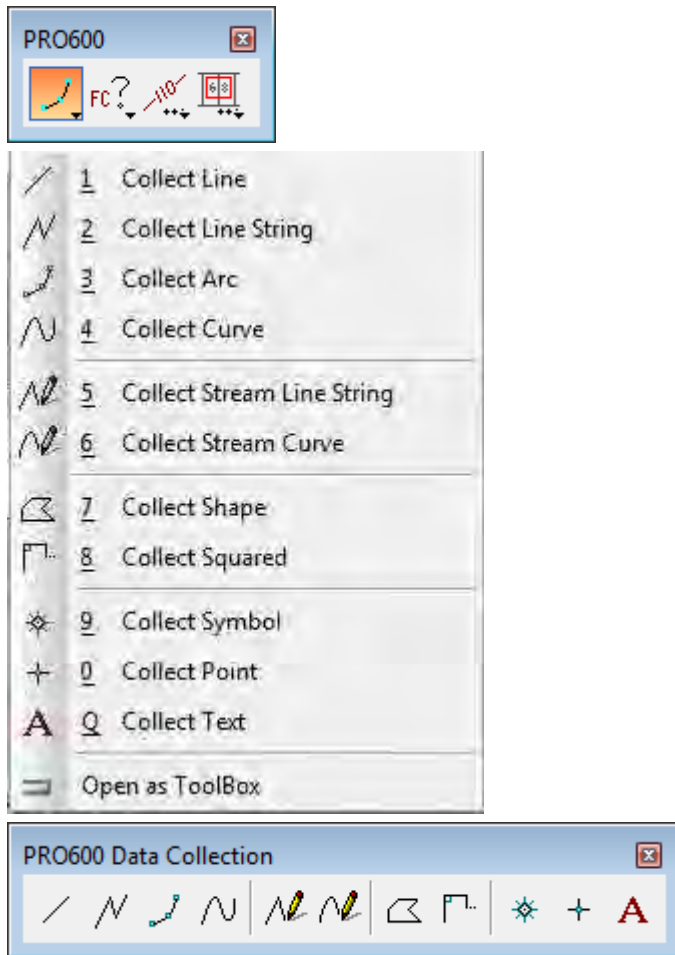
Turn on “Automatic file backup”. It help you when an abnormal end is carried out.



### 1.3. Feature collection with PRO600

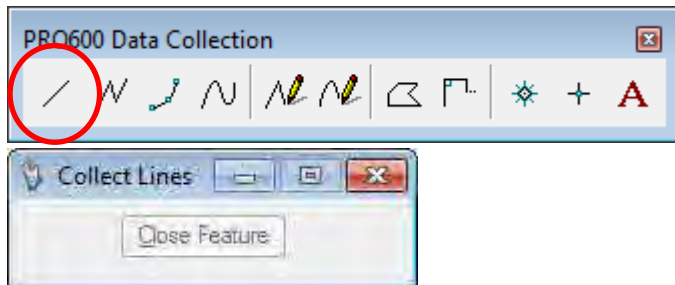
A function typical about feature collecting is introduced to below.

PRO600 > Tool > main



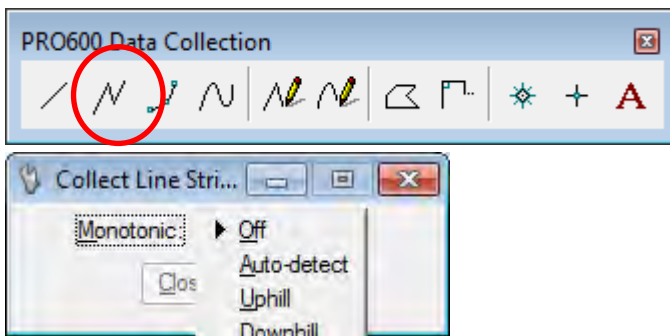
#### 1. Collect Lines

One line is inputted. The inputted line is created for every neighborhood and turns into a continuous line as "Complex Chain".



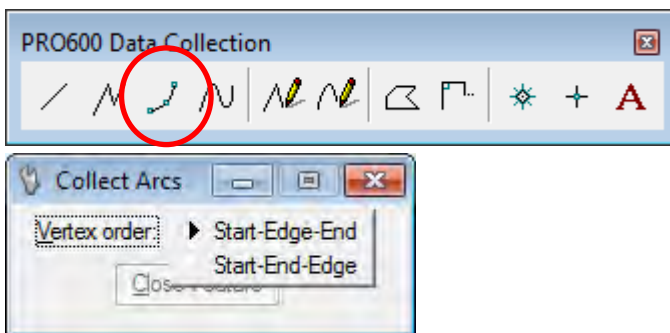
2. Collect Line Strings

A continuation line is inputted. Adjustment of height is possible as an option.



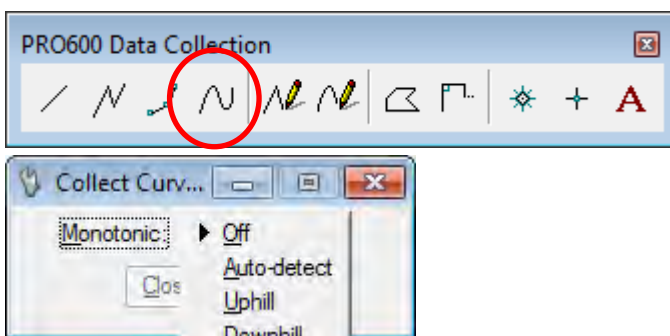
3. Collect Arcs

An arc is inputted. It specifies by three points.



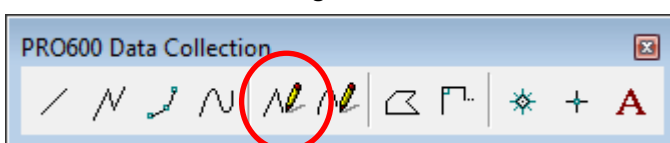
4. Collect Curves

A line is inputted using a curve. This function is not usually used.



5. Collect Lines Stream

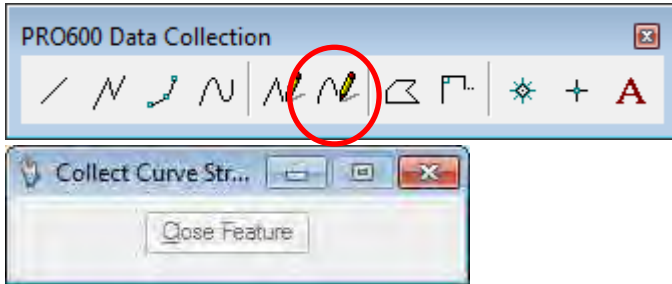
A line is inputted arranging the vertex automatically at the interval and angle which were specified. This function is used for contour line drawing.





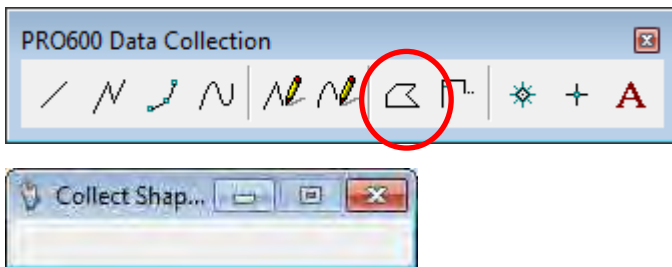
6. Collect Stream Curve

This function is not usually used.



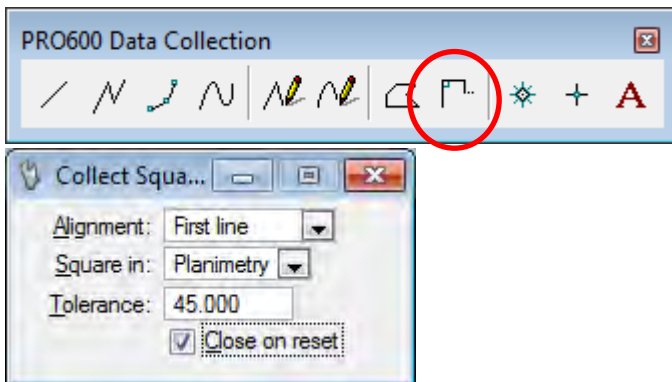
7. Collect Shapes

Shape data is acquired.



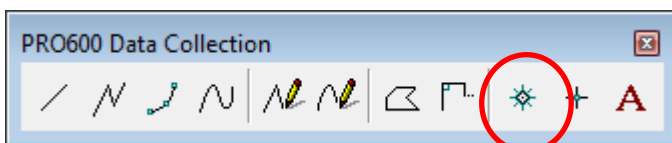
8. Collect Squared

Squared data is inputted.



9. Collect Symbols

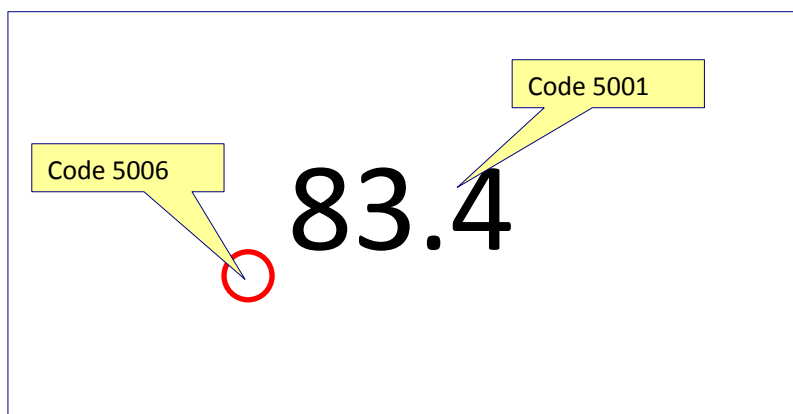
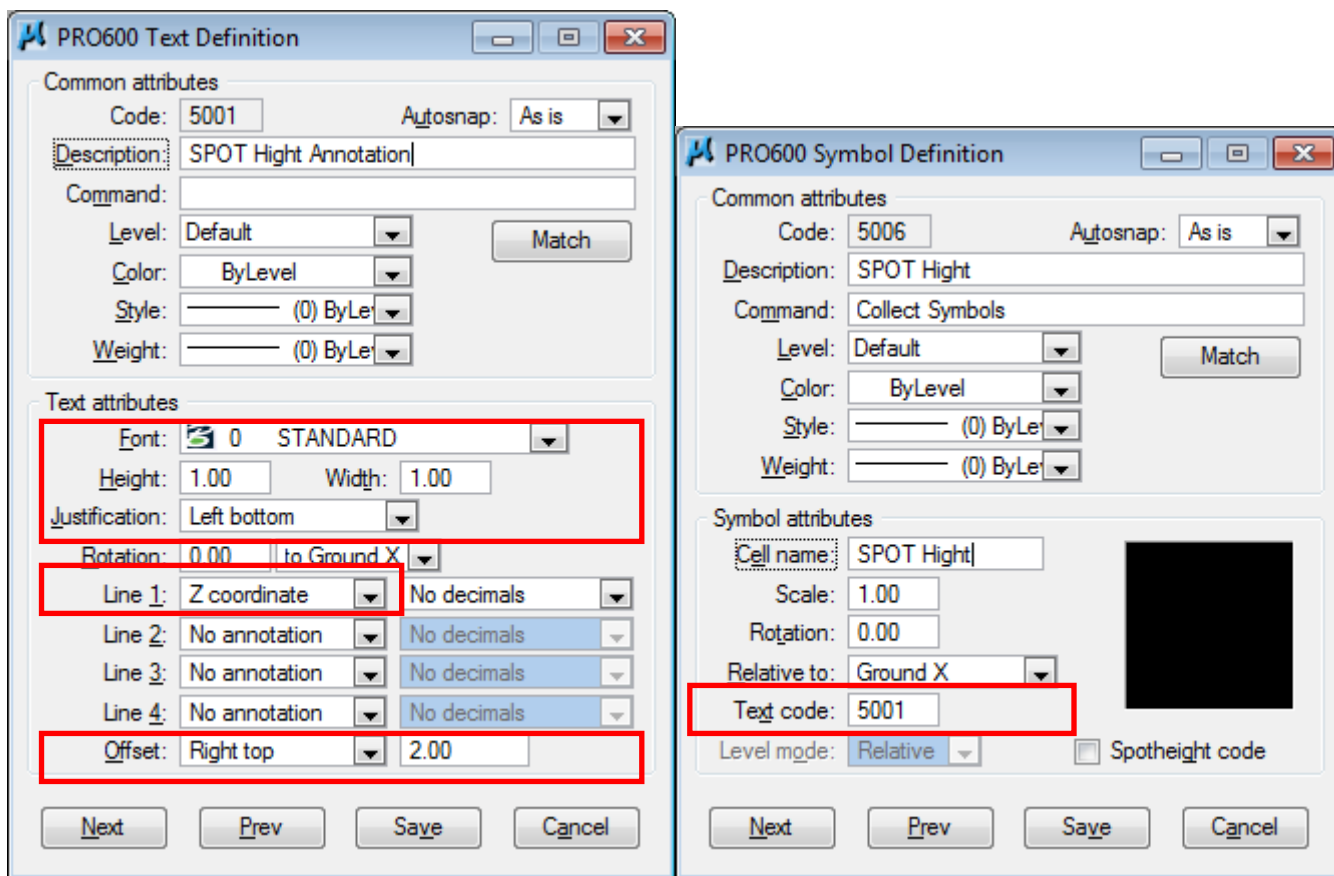
A symbol is arranged.





10. Place "Spot Height"

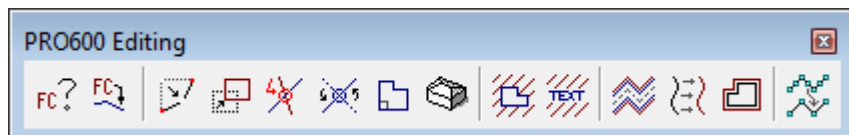
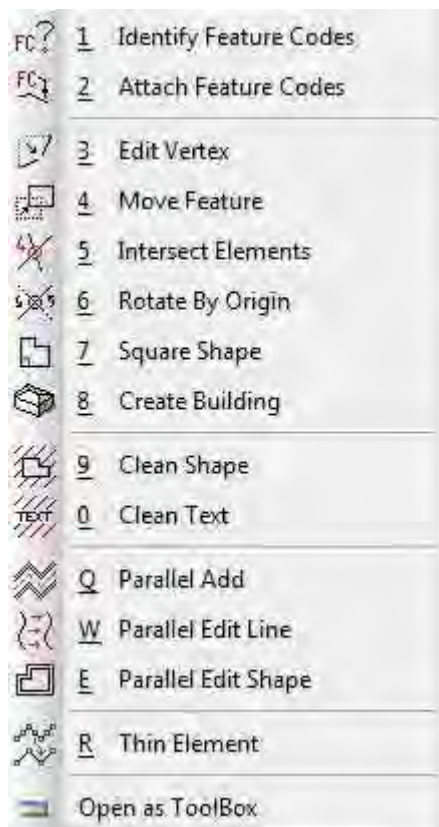
To place "Spot Height" with text, please set up as follows.



## 1.4. Feature Editing with PRO600

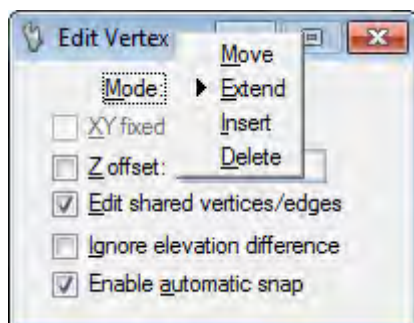
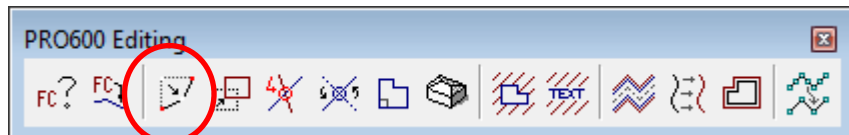
A function typical about feature editing is introduced to below.

PRO600 > Tool > Editing



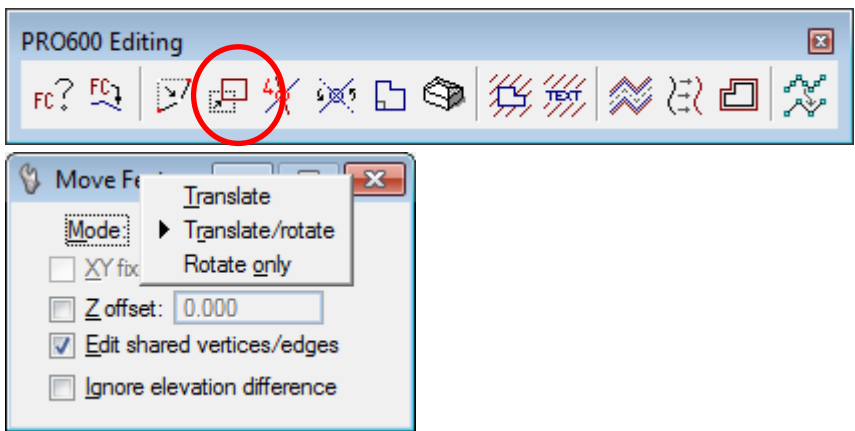
### 1. Edit Vertex

The vertex of a line or a shape is edited.



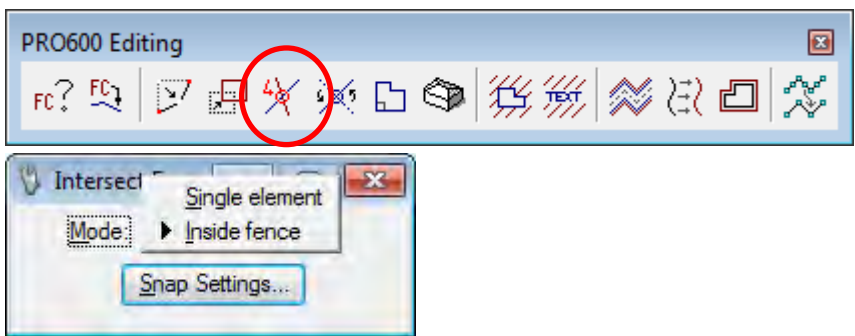
2. Move Feature

An element is moved.



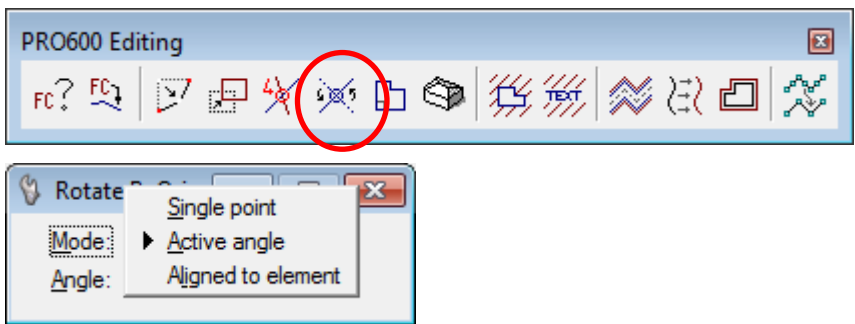
3. Intersect Elements

The vertex is created to the crossing element.



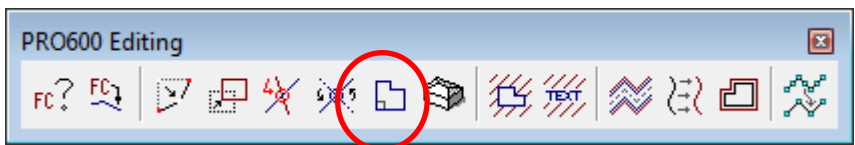
4. Rotate by Origin

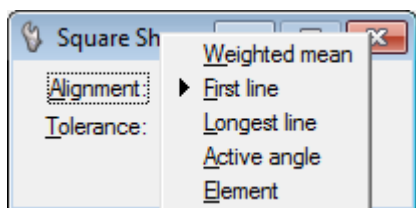
An element is rotated.



5. Square Shape

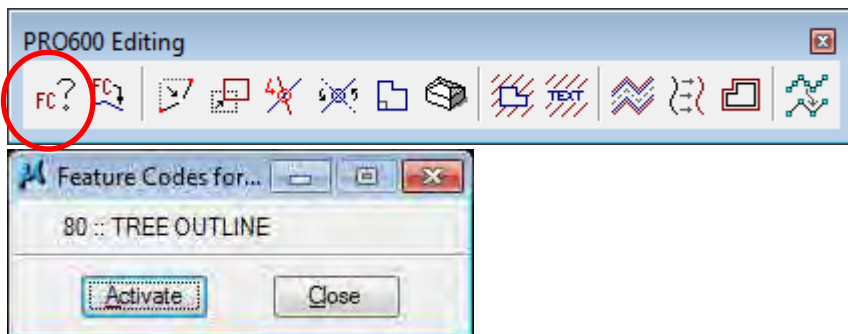
An element is rectified right-angled.





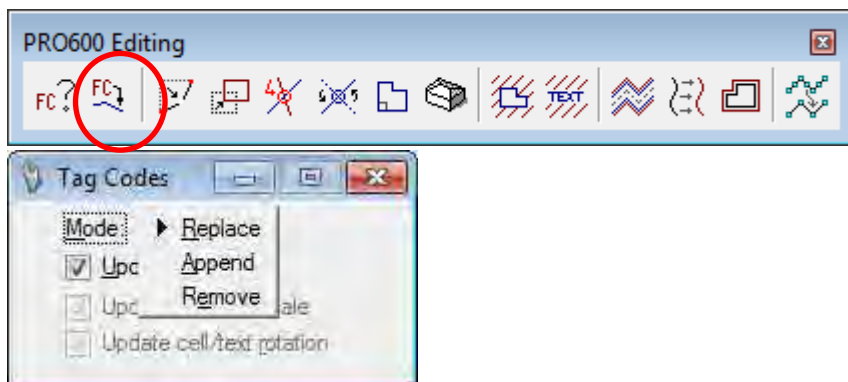
6. Identify Feature Codes

The code and feature name is displayed.



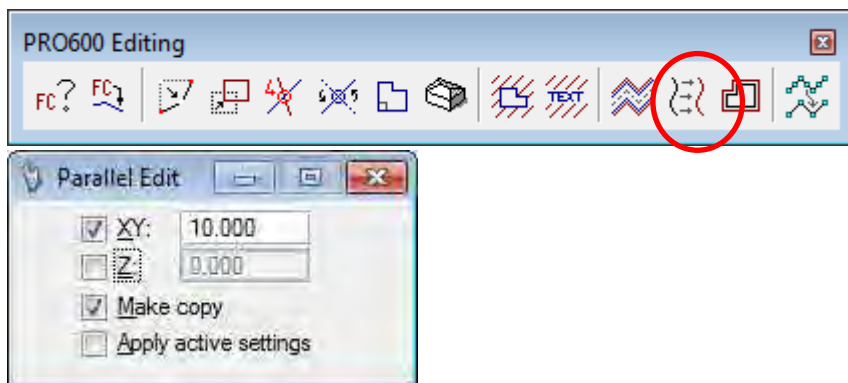
7. Attach Feature Codes

The specified element is changed into another code.

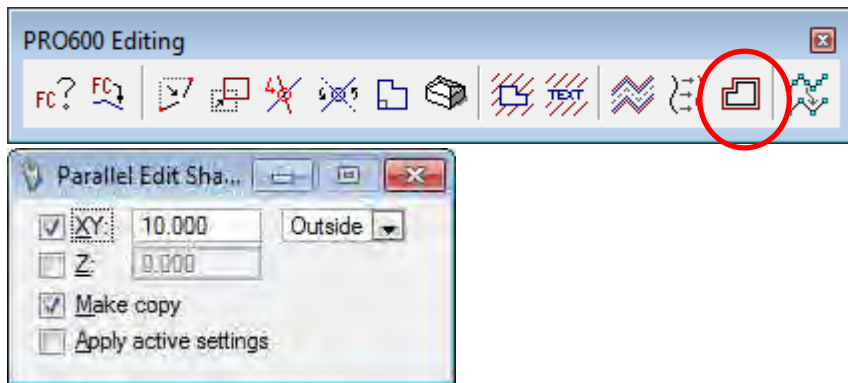


8. Parallel Edit

An element is moved / copied in parallel.

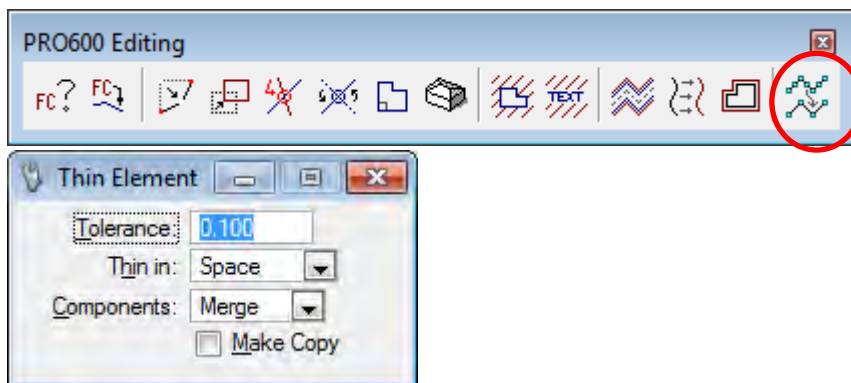


9. Parallel Edit Shape



10. Thin Element

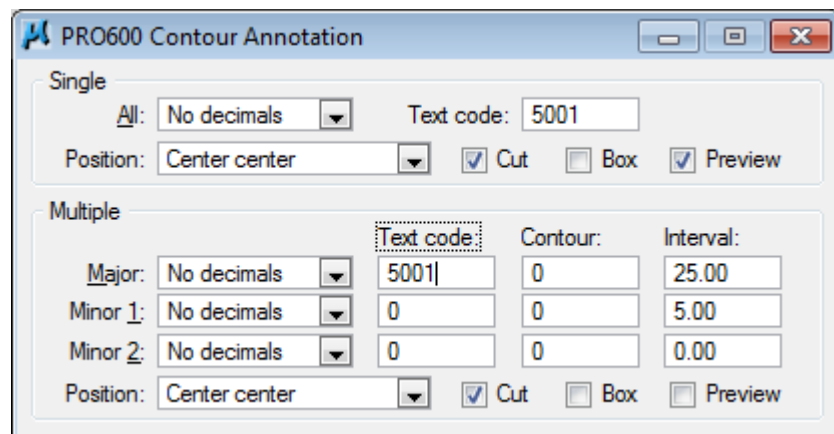
A polygon can be reduced and expanded in parallel.



11. Contour Annotation

Annotation of altitude are arranged to a contour line.

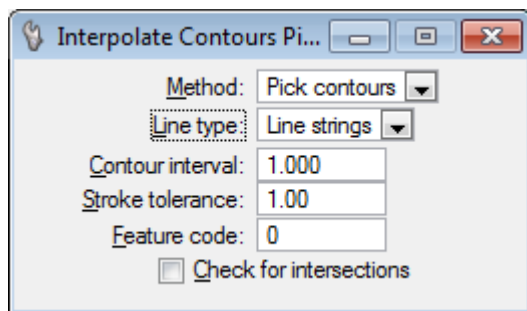
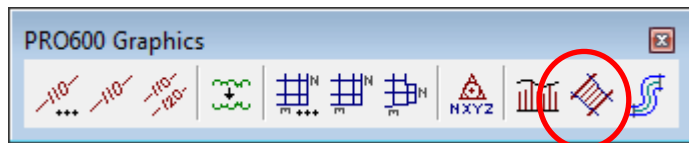
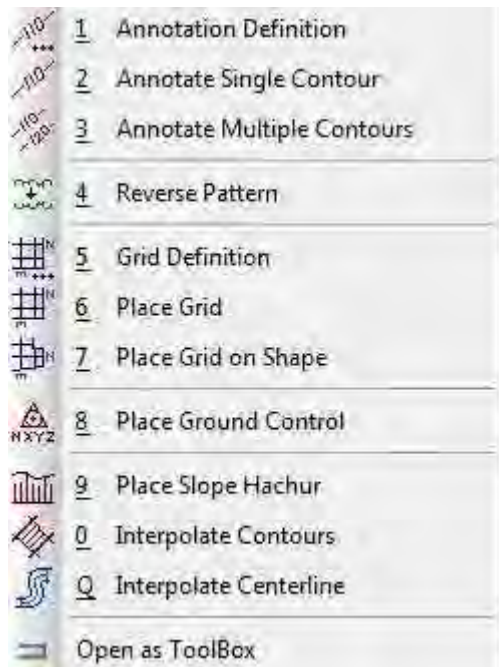
PRO600 > Presentation > contour annotation



### 12. Interpolate Contours Pick

Major contour is automatically created from Index contour.

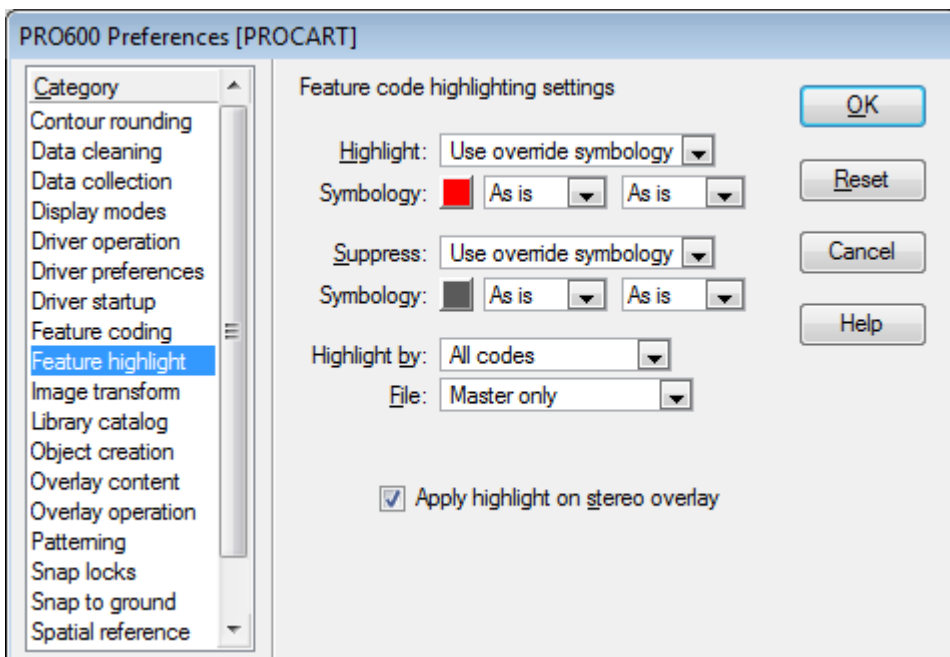
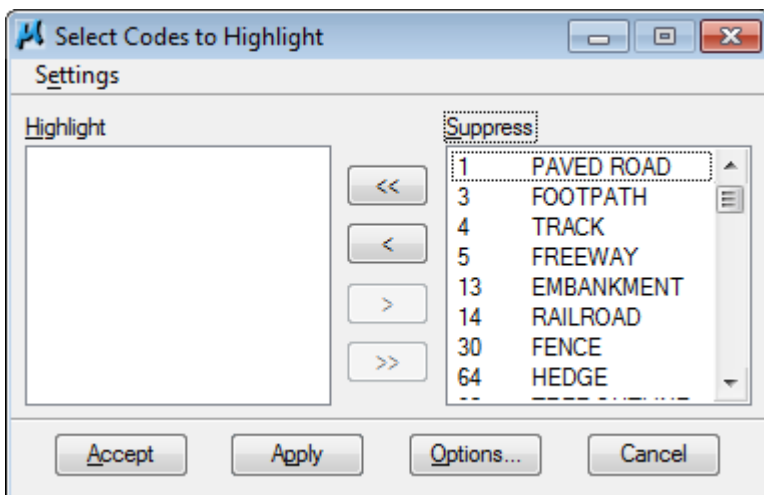
PRO600 > Tools > Graphics



### 13. Select Code to Highlight

A specific element is highlighted.

PRO600 > Tools > Display





14. Toggle Node Display

A part with a node is displayed.



15. Toggle Vertex Display

The vertex of an element is displayed. Node is displayed in red.



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**Aero Triangulation Manual (LPS Operation for Alos)**

JICA Study Team (Kokusai Kogyo)

May, 2012

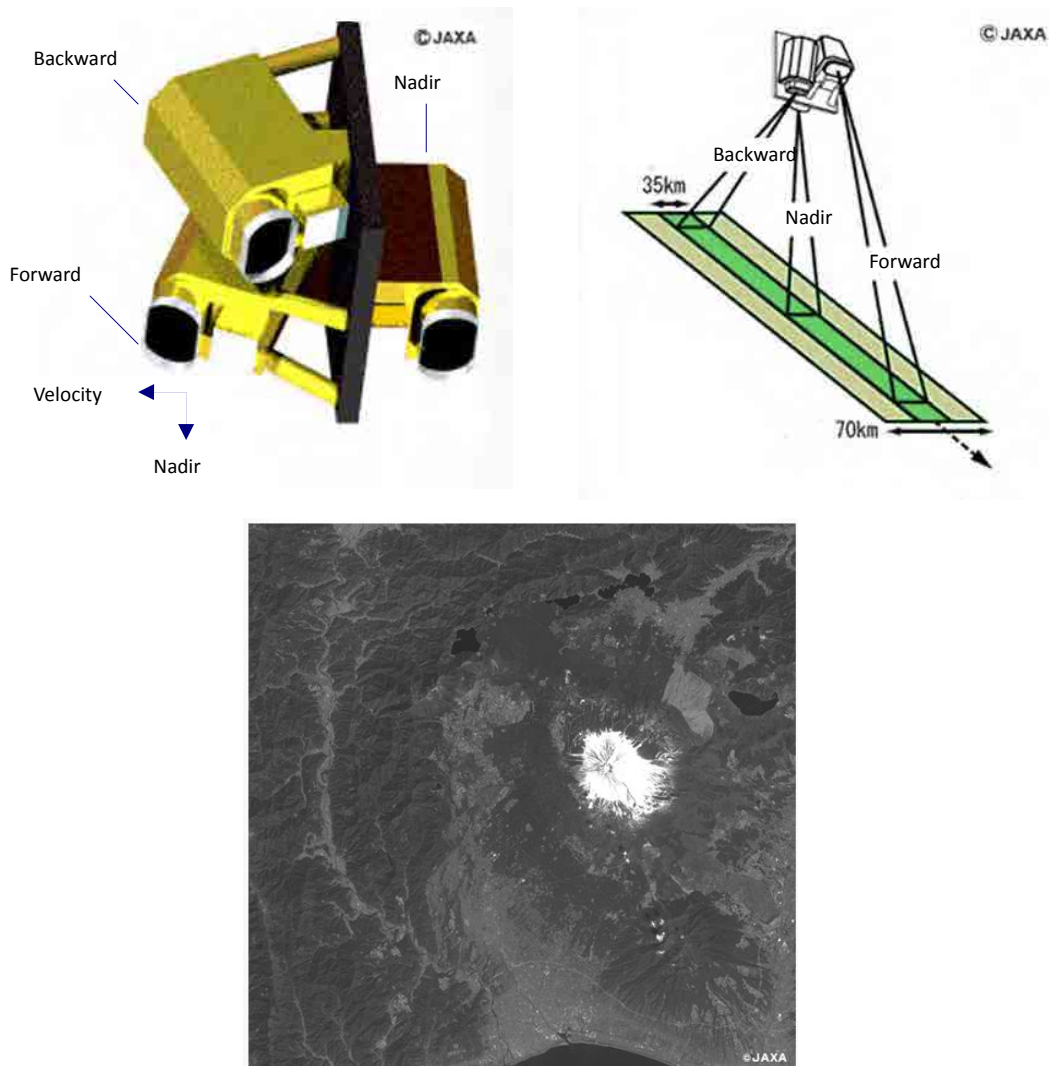
## 1. Alos

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### 1.1. Alos

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ALOS was launched 2006 by JAXA and is a satellite with an Optical and Radar payload. There are two optical sensors on board, PRISM and AVNIR-2. PRISM (Panchromatic Remote-sensing Instrument for Stereo Mapping) has 2.5m Panchromatic band and stereo mapping capabilities enabling the derivation of DEMs, ortho images and as a Pan-Sharpening tool for AVNIR-2.



### 1.2. RPC (Rational Polynomial Coefficient) file

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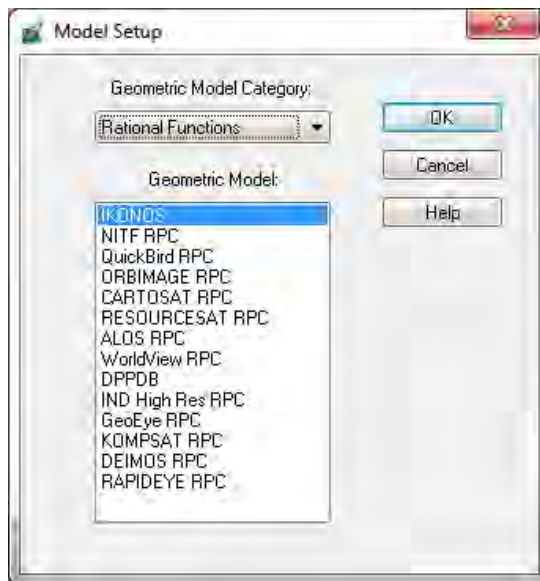
Rational Polynomial Coefficient (RCP) file contains a conversion equation that relates image coordinates calculated from a sensor model and ground coordinates. RPC can provide the coordinate information about a satellite imagery without Ground Control Point (GCP).

## 2. Import Alos images to LPS

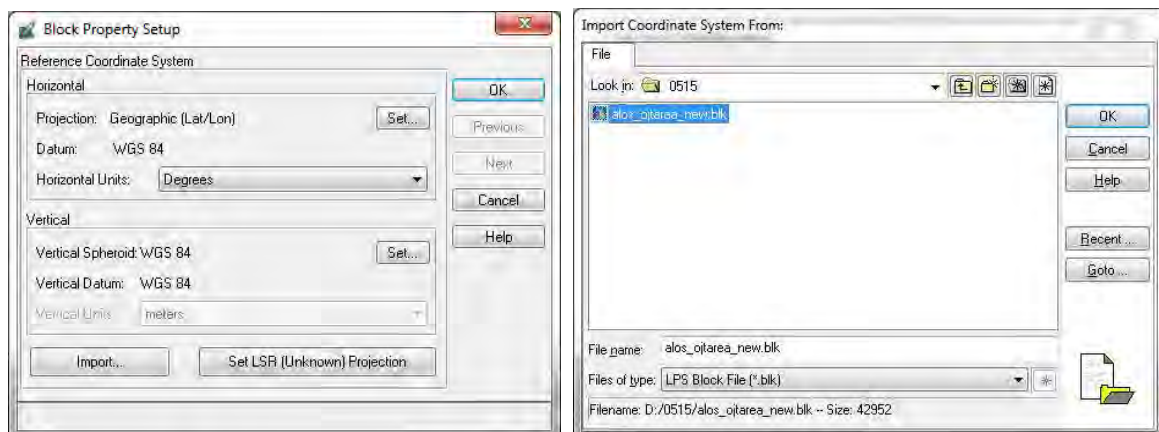
### 2.1. Import Alos images to LPS

#### 1. Create Block file

- 1) File > New
- 2) Select "Rational Functions"
- 3) In this case, select "IKONOS" and click "OK".

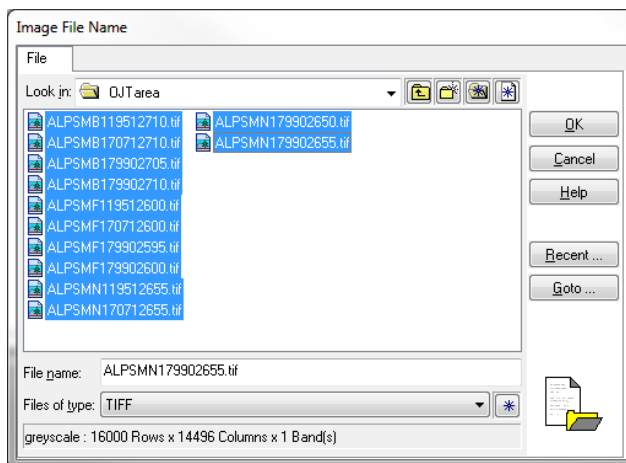


- 4) Click "Import" and select .blk file.

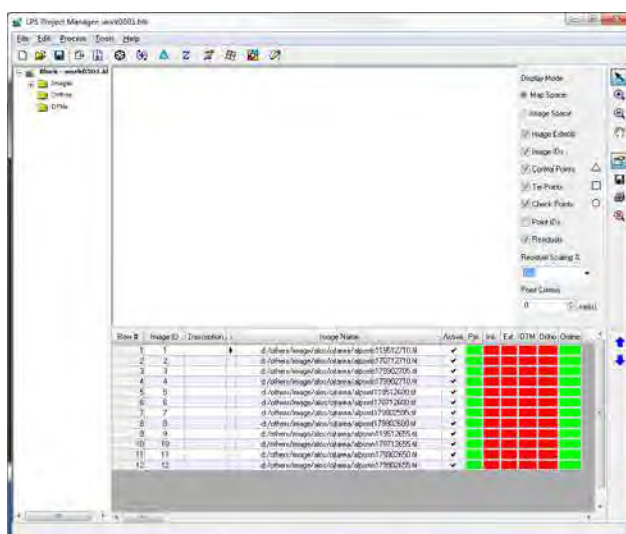




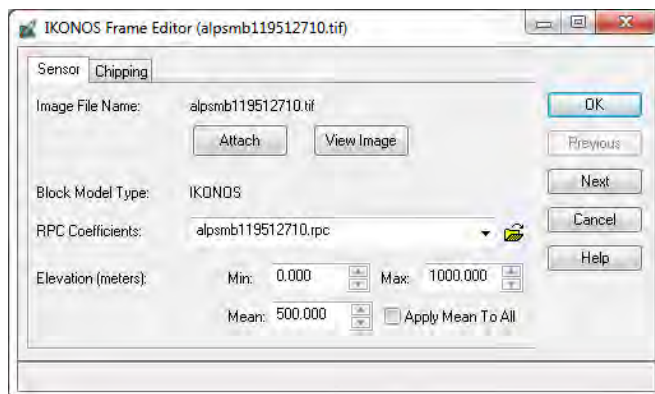
- 5) Check parameters, and click "OK".
- 6) Select > Edit > Add Frame.




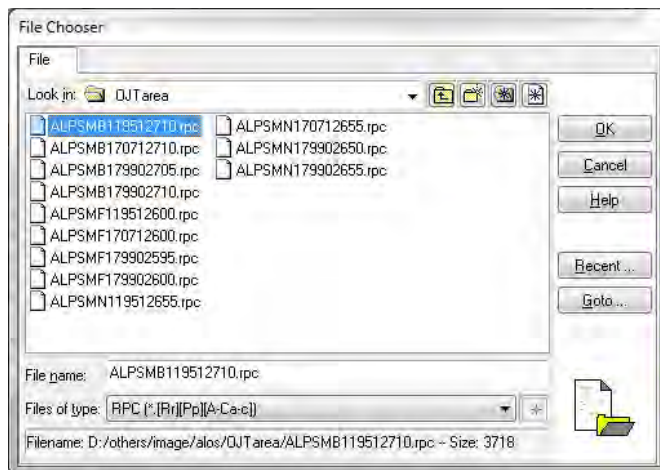
- 7) Select all images and click "OK".



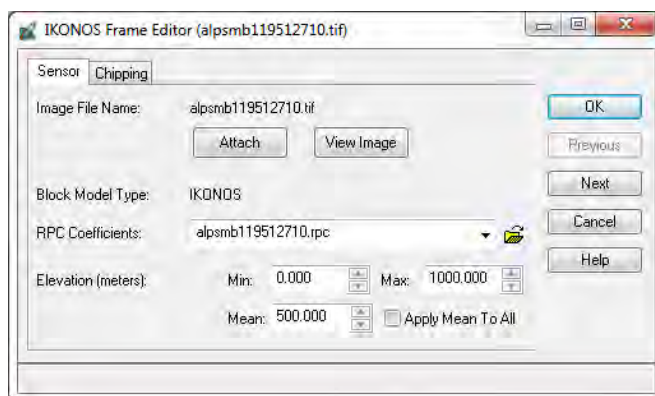
8) Select Edit > Frame Editor.



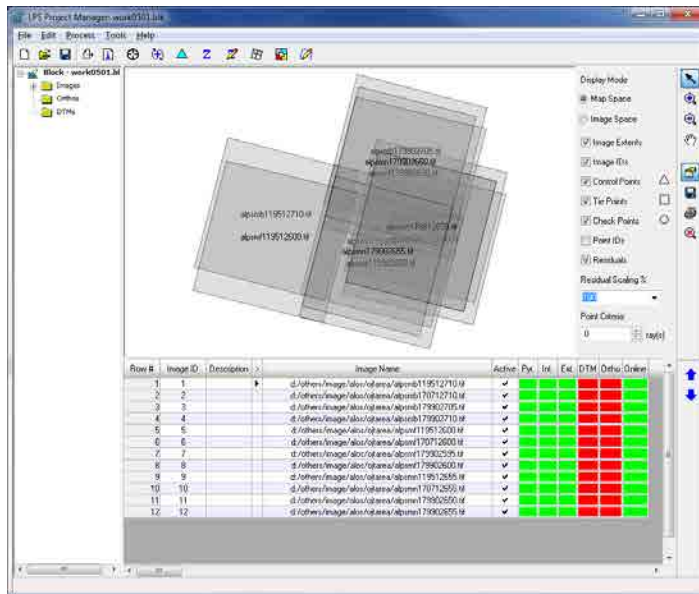
9) Click  and select .rpc files.



10) Click "OK".



11) Click "NEXT". And repeat this process.

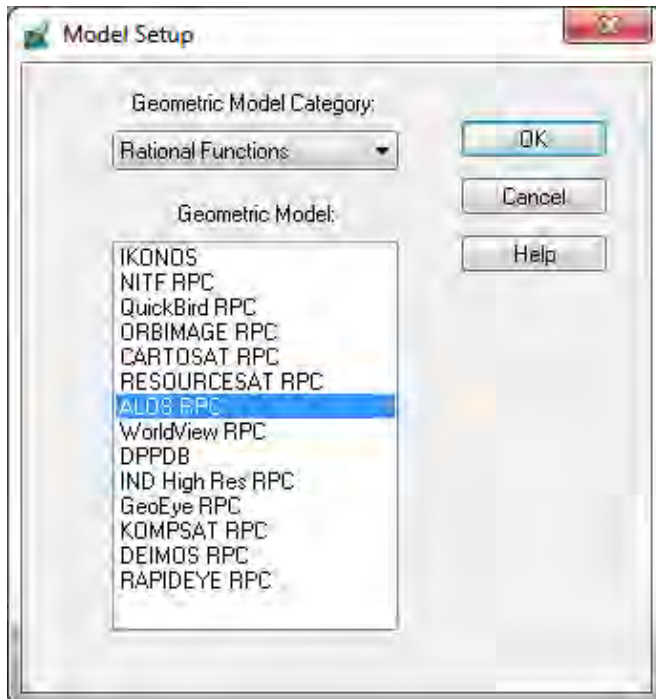




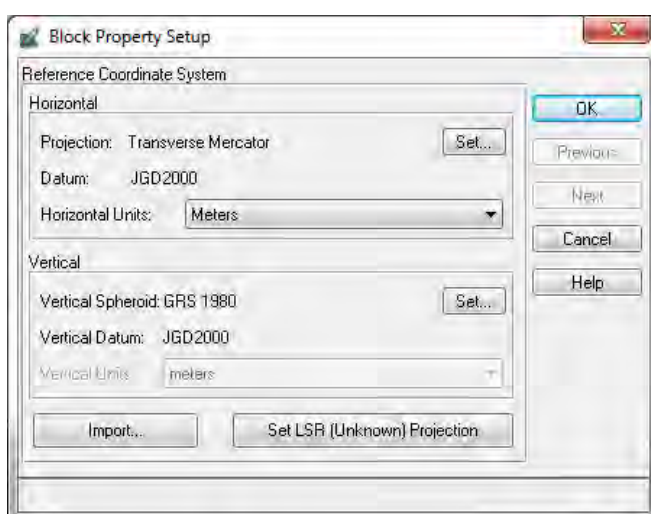
### 3. Aerial Triangulation

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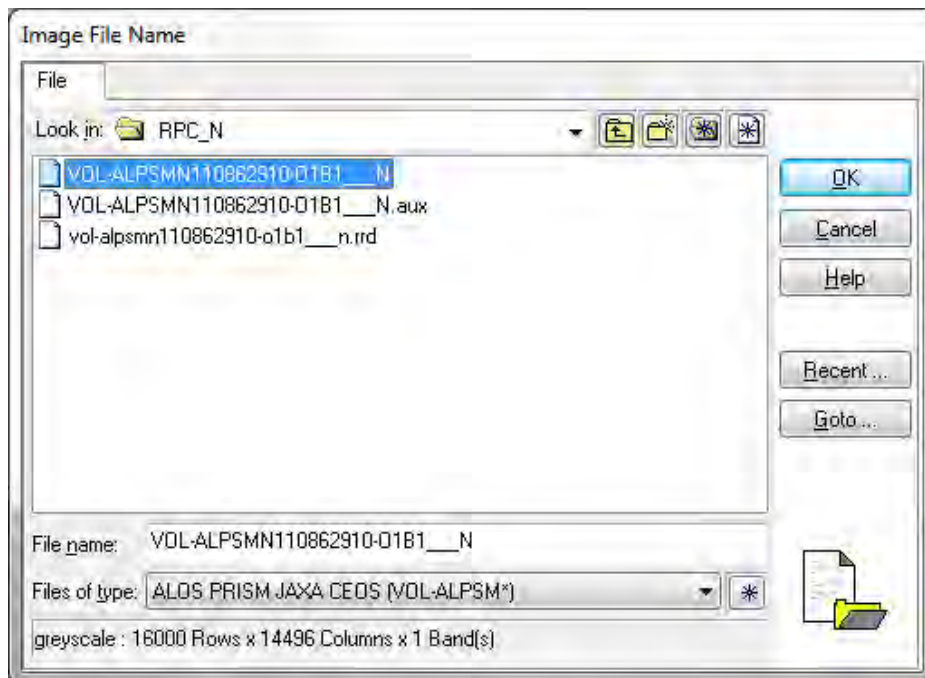
1. Create Block file
  - 1) File > New
  - 2) Select "Rational Functions"
  - 3) Select "ALOS RPC" and click "OK".



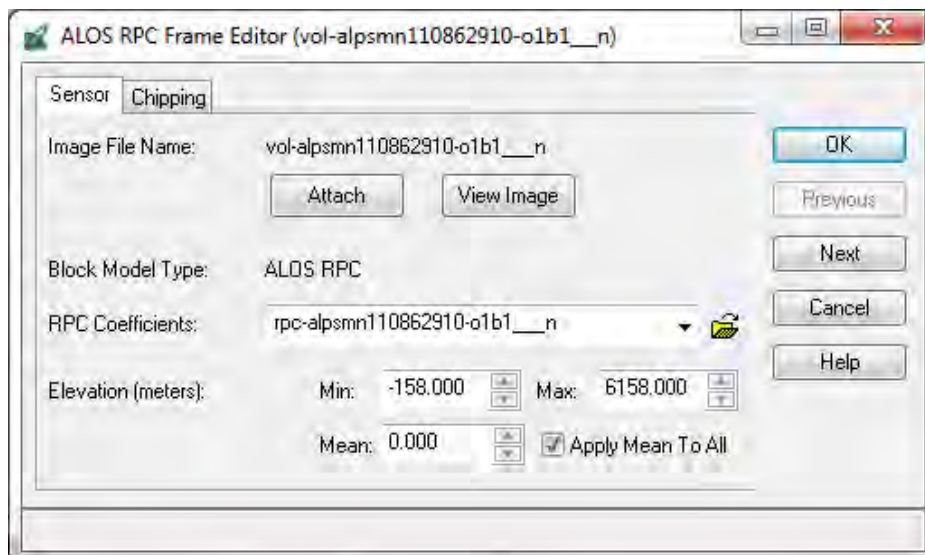
- 4) Set "Reference Coordinate System " and "Vertical" as bellow.



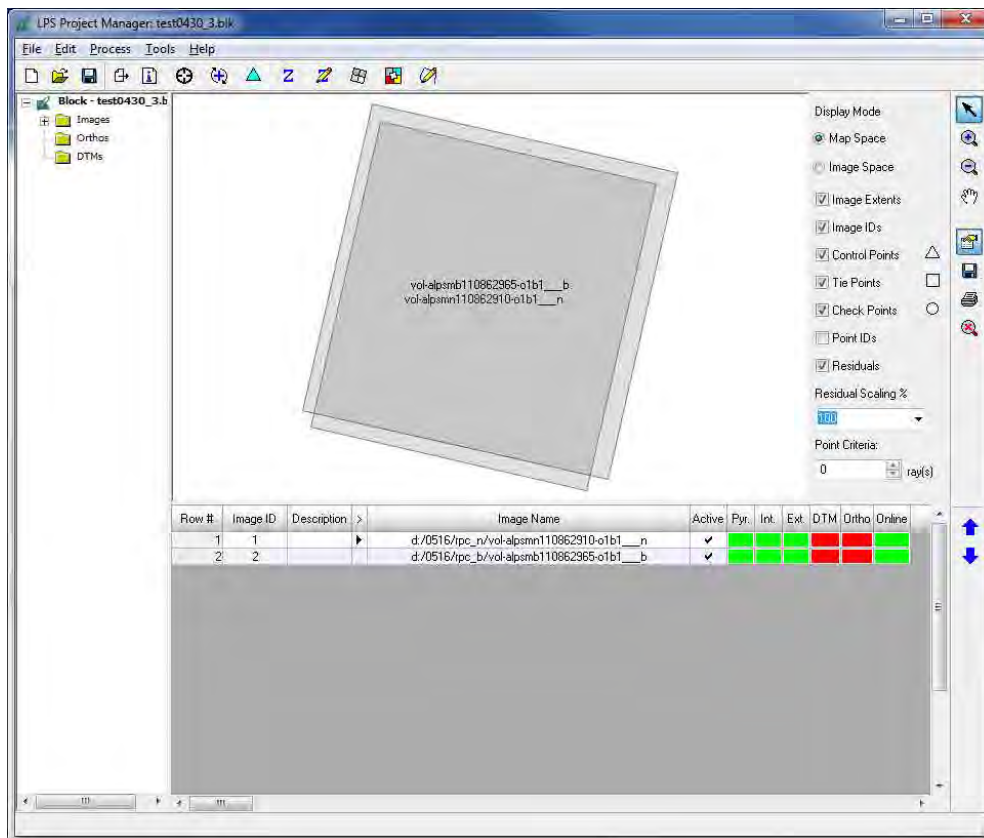
- 5) Select Edit > ADD Frame
- 6) “Files of type” : ALOS PRISM JAXA CEOS (VOLALPSM\*)
- 7) Select “VOL-ALPSM...” and click “OK”



- 8) Select Edit > Frame Editor  
 PRC file is loaded automatically, input Mean value (in this case “0”).

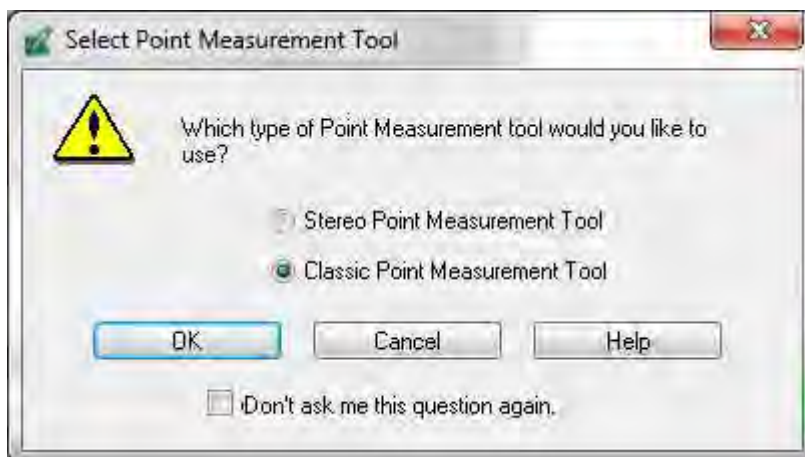


- 9) Click “ Next” and repeat this process.

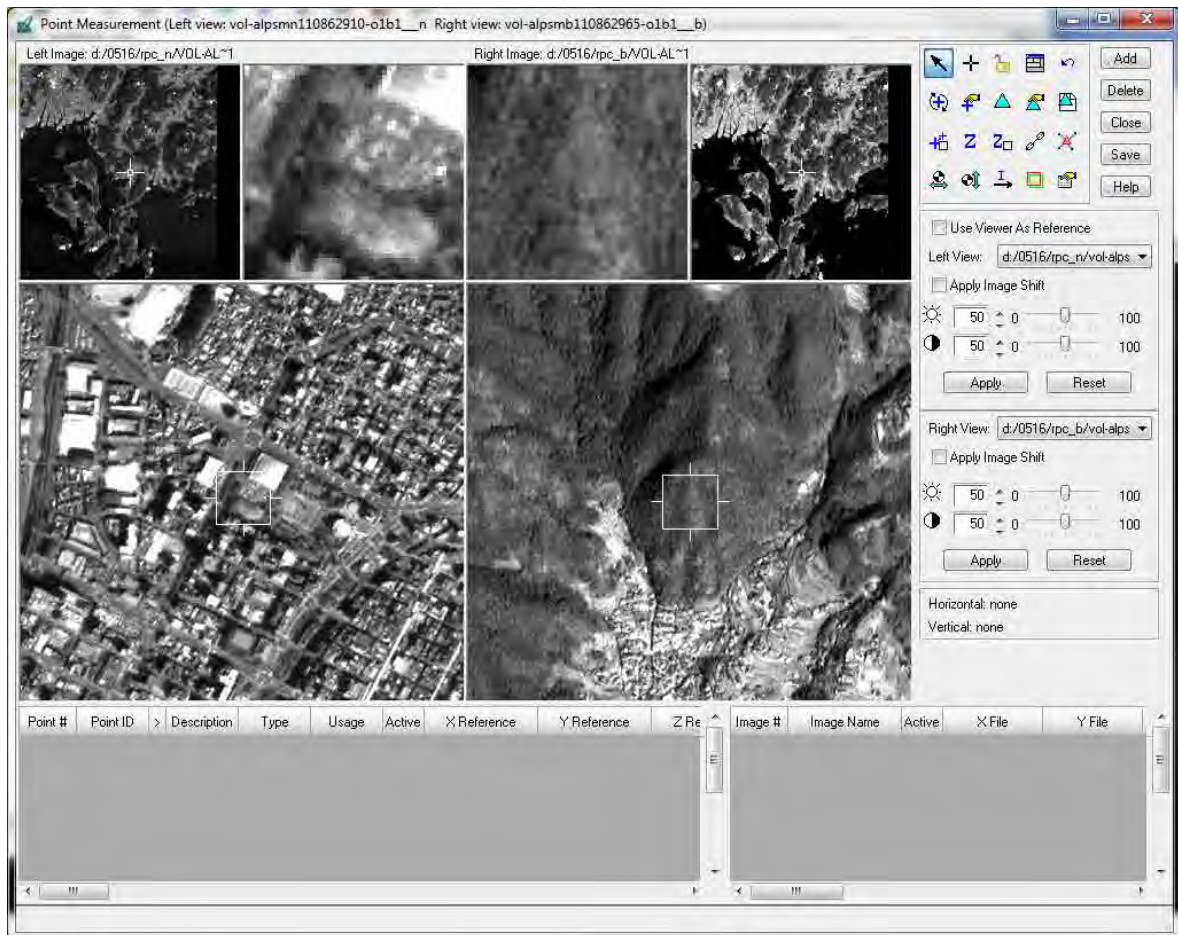


## 2. Orientation


- 1) Select Edit > Point Measurement



- 2) Select "Classic" and click "OK"

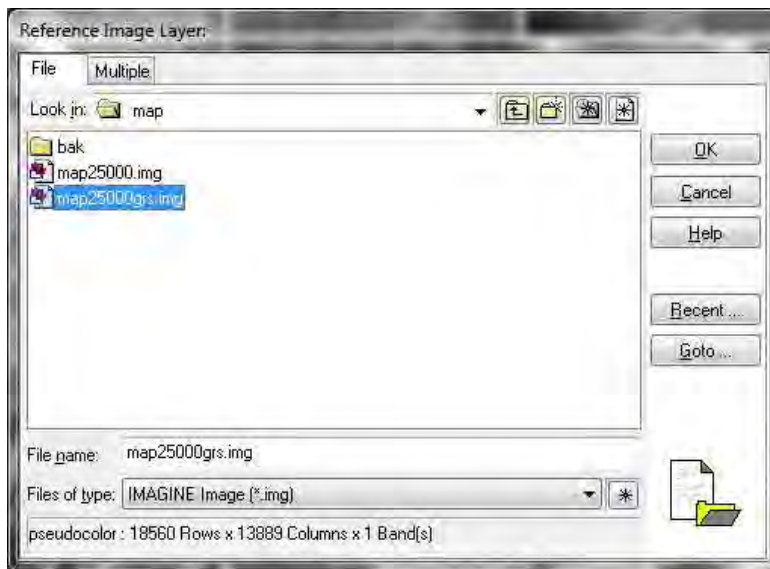


Here, we get GCP data from exist map. Of cause it is possible to import GCP data as text file.

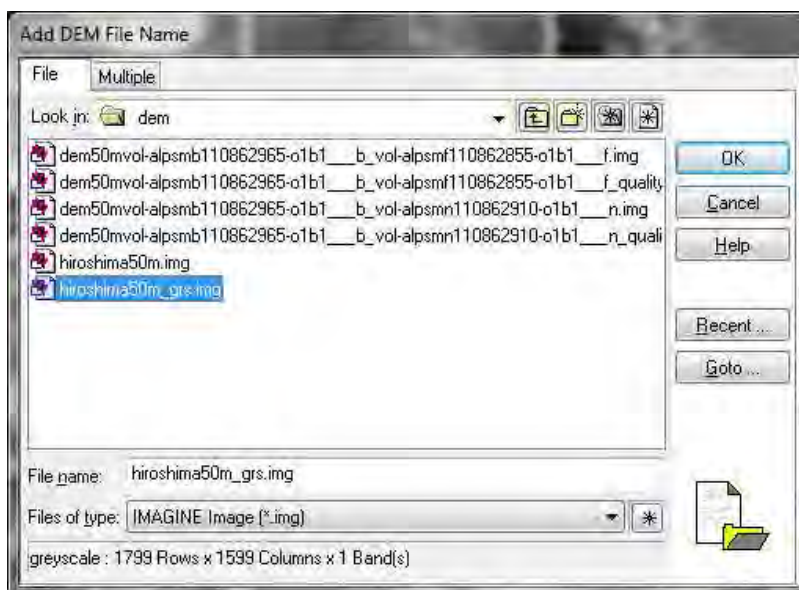
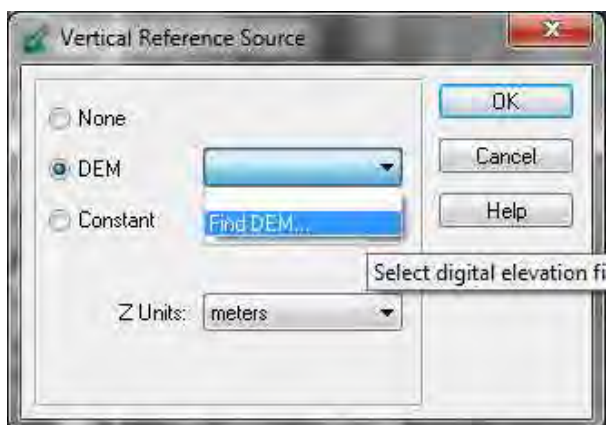
- 3) Click “” icon and select “Image Layer”.



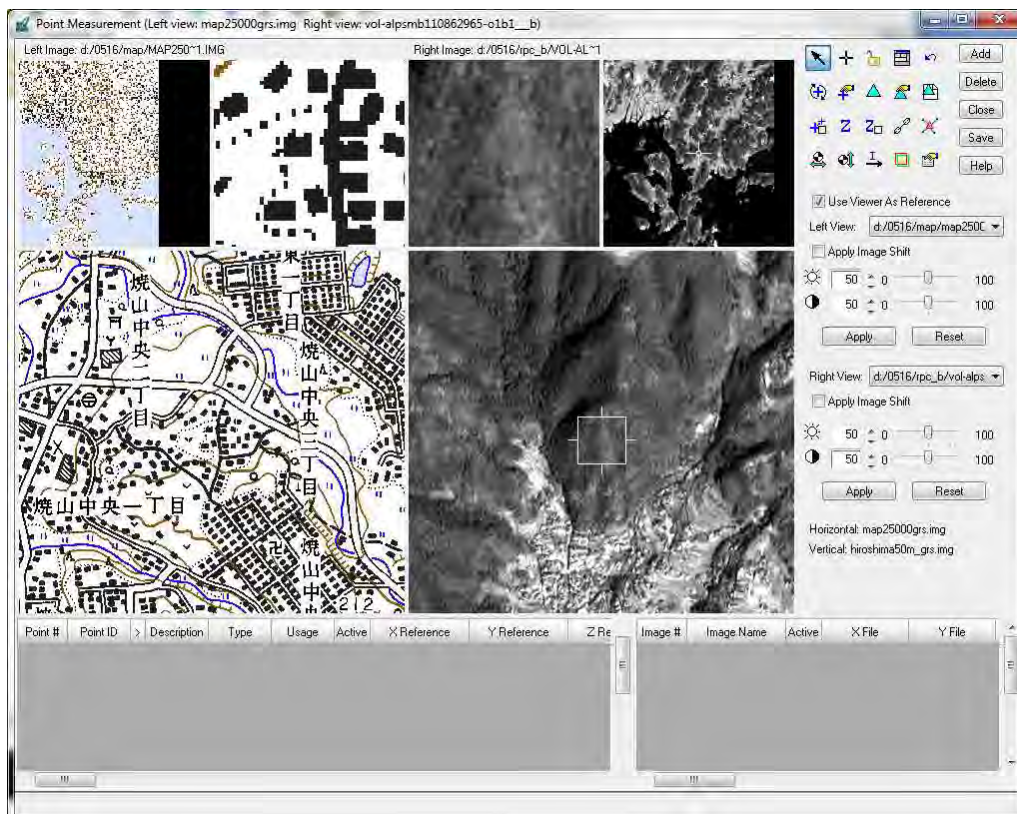
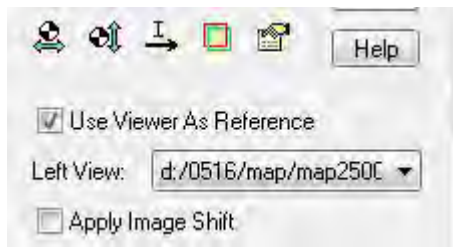




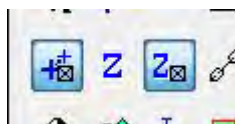
4) Click “” icon and dem data.



5) Select "Use Viewer As Reference".

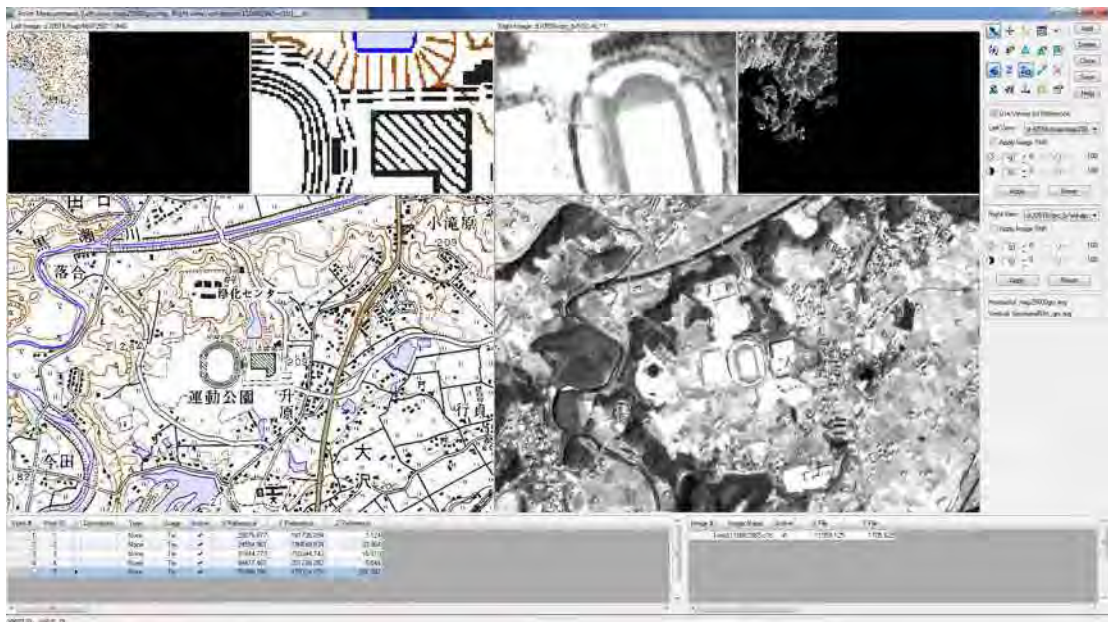


6) Click icons as bellow.



- 7) Click "Add" button.
- 8) Click "+" icon.
- 9) Select GCP1 on left image.
- 10) Click "+" icon.
- 11) Select GCP1 on right image.
- 12) Click "Add" button.
- 13) Click "+" icon.
- 14) Select GCP2 on left image.
- 15) Click "+" icon.
- 16) Select GCP2 on right image.

Repeat this process as many time as the number of GCPs.



- 17) Select left image.



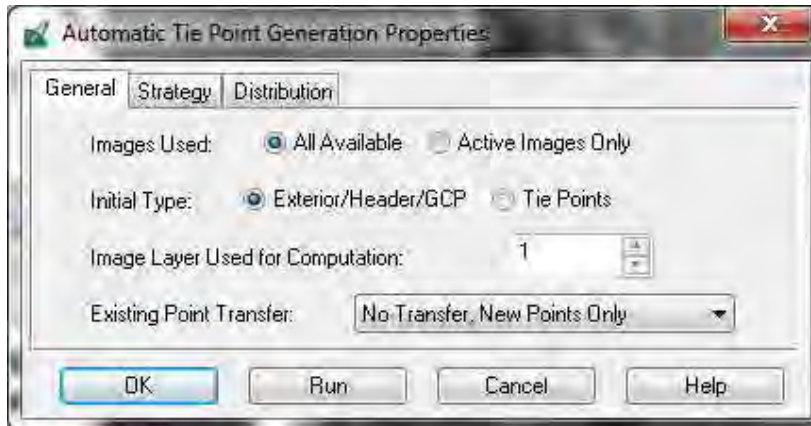
Repeat this process as many time as the number of images.



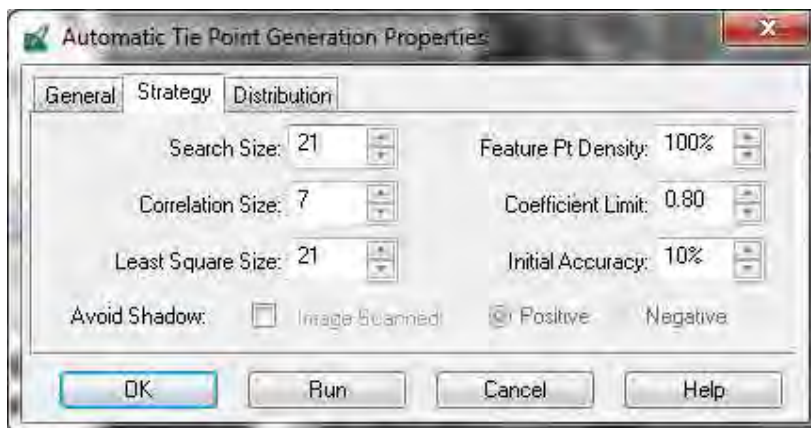
### 3. Automatic Tie Point Generation

1) Click “” icon

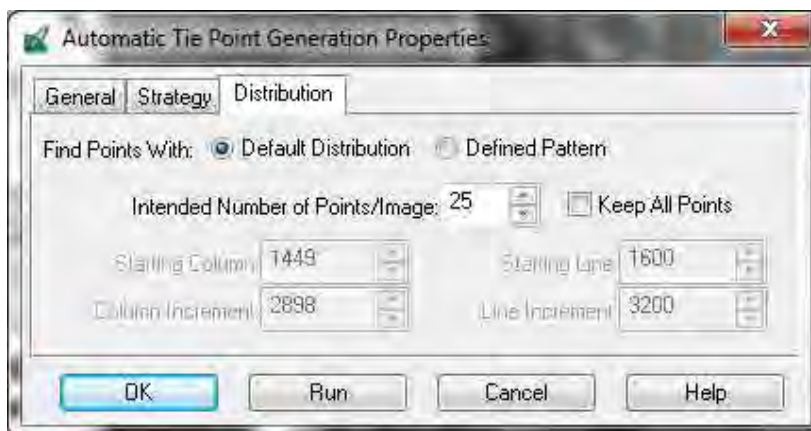
2) Select “General” tab.



3) Select “Strategy” tab.

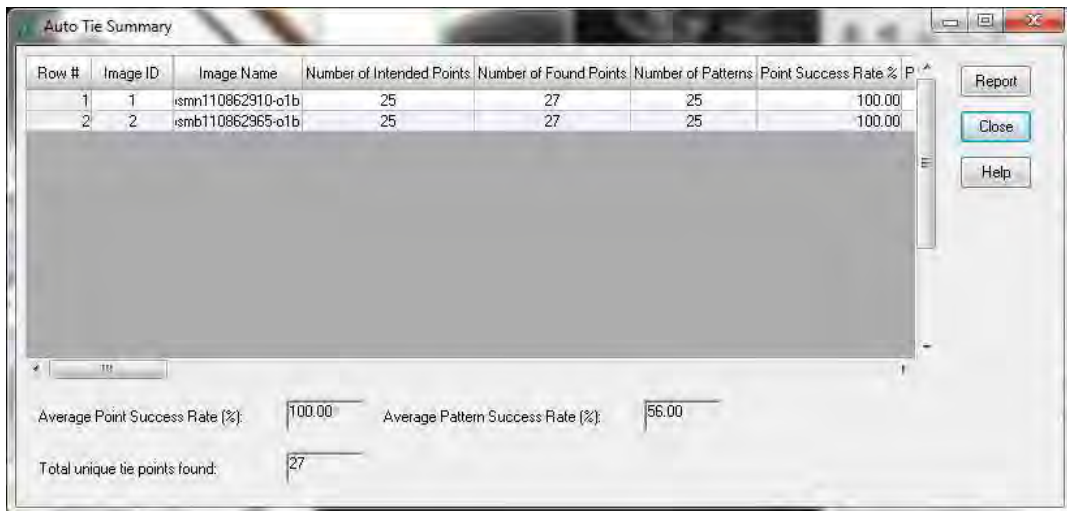
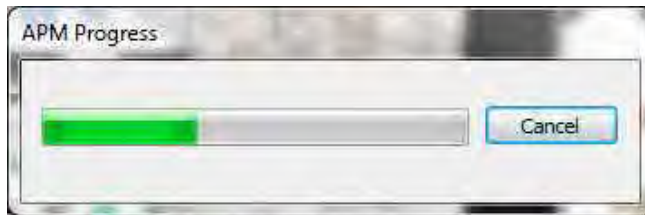


4) Select “Distribution” tab.





- 5) Click "Run".



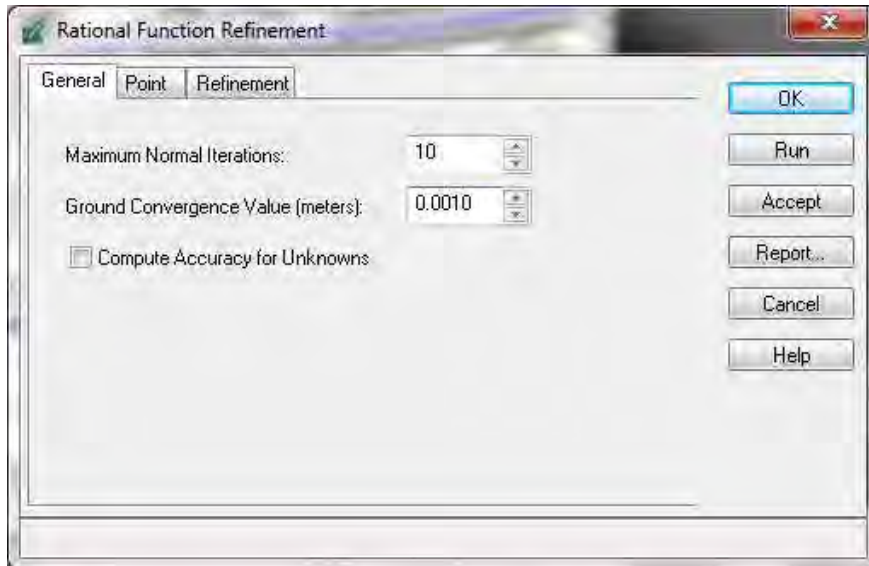
- 6) Click "Close".  
 7) Change "Type" and "Usge".

Point #	Point ID	Description	Type	Usage	Active	X Reference	Y Reference	Z Reference
1	1		Full	Control	✓	29076.677	-181726.094	3.124
2	2		Full	Control	✓	24584.961	-196648.834	33.904
3	3		Full	Control	✓	31844.773	-210344.743	16.819
4	4		Full	Control	✓	48471.461	-201228.292	5.044
5	5		Full	Control	✓	51808.789	-179324.579	201.087
6	6		None	Tie	✓			
7	7		None	Tie	✓			
8	8		None	Tie	✓			

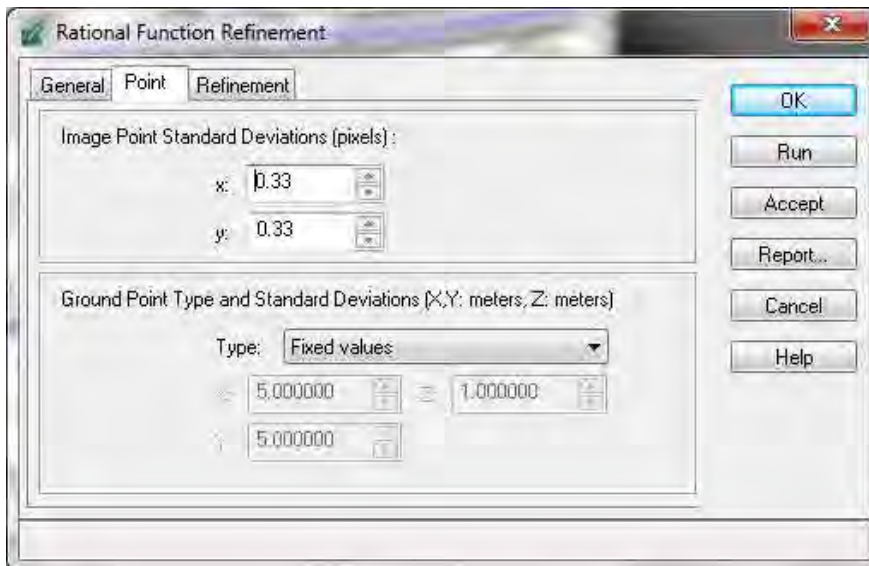
4. Automatic Tie Point Generation

8) Click “” icon

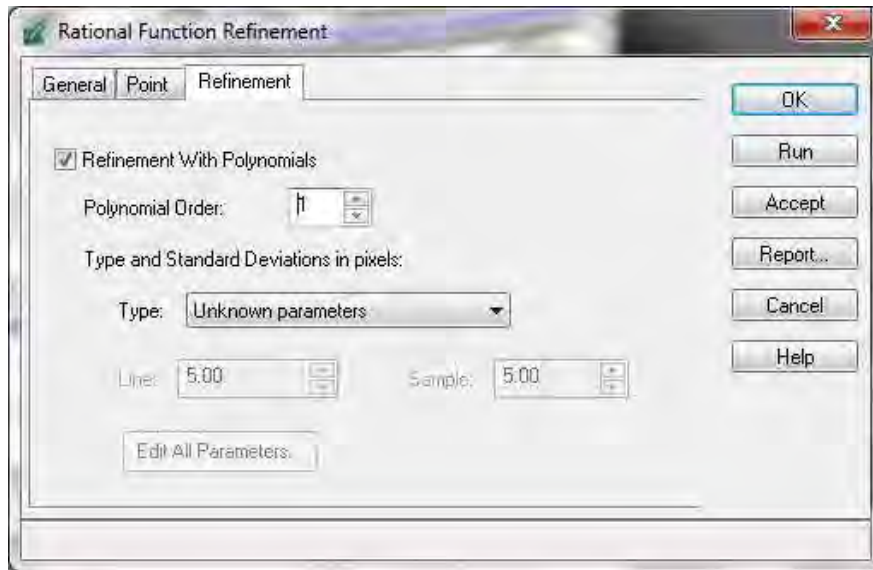
9) Select “General” tab.



10) Select “Point” tab.



11) Select "Point" tab.



12) Click "Run"

13) Click "Report" and check the result.

Kokusai Kogyo Co., Ltd.

Ver.002

**Digital Mapping Manual (MicroStation Basic Operation)**

JICA Study Team (Kokusai Kogyo)

May, 2012

## 1. MicroStation Basic Operation

---

### 1.1. Start and Quit

---

1. Start : Begin with the existing files “.dgn” or Files > open.
2. Shut down : Files > exit

### 1.2. Mouse managing

---

1. left click : data button (D) accept, input selection
2. right click : restart button (R)reject, restart
3. click both buttons at the same time : tentative bottom (T) tentative coordinate selection

### 1.3. File setting

---

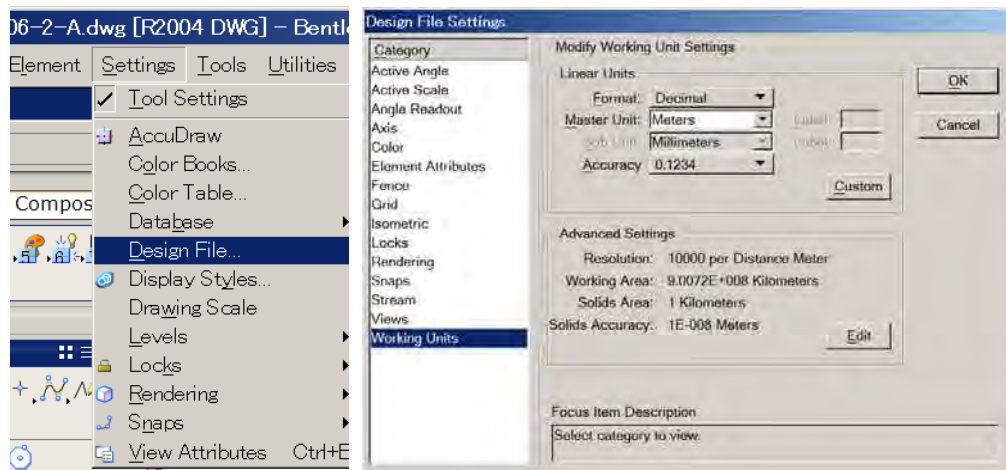
1. Create “New” dgn files

- 1) File > new
- 2) Select “seedfile”

There are 2 dimensional and 3 dimensional “.dgn” files ,the dimensions are determined according to the used file.

2. “working unit”

“ working unit ” is defined according to each project (Setting > design file > working unit)



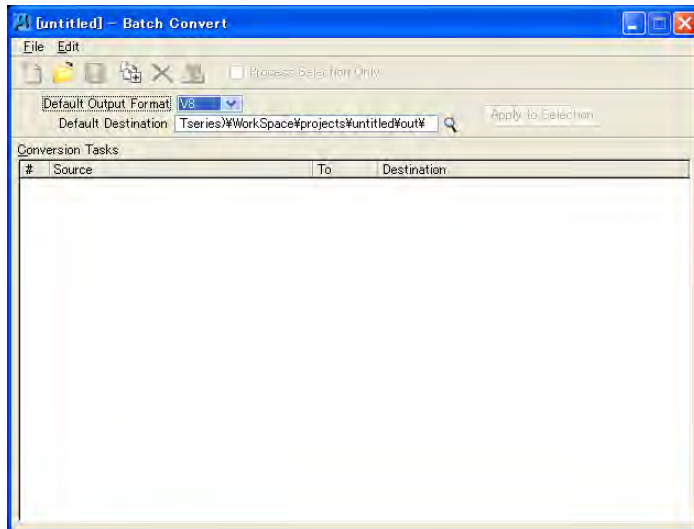
3. save settings

file > save > save settings

## 1.4. Import and Export

---

1. file > export/import
2. Utilities > Batch converter

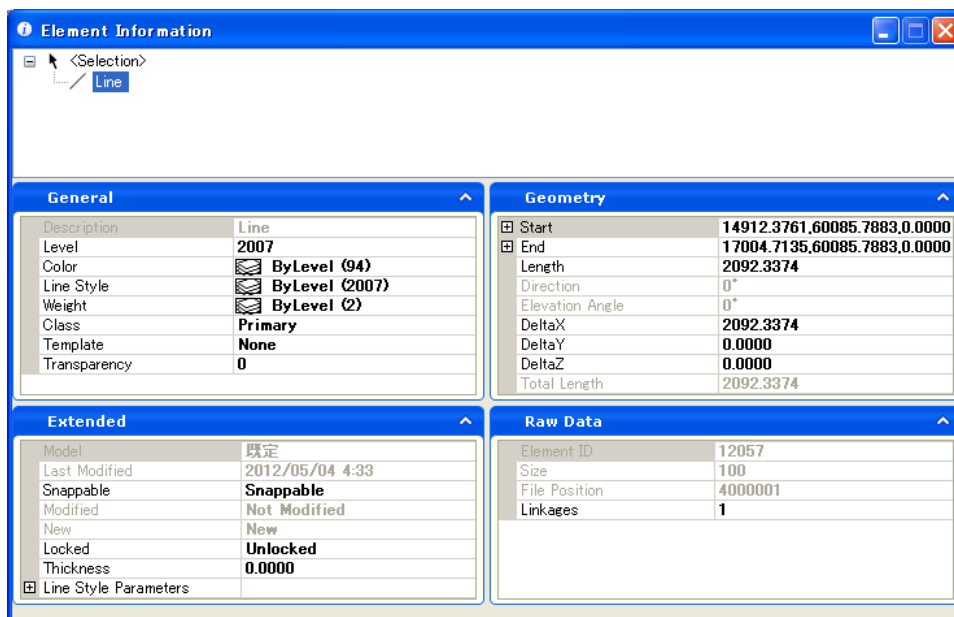


## 1.5. View control



## 1.6. Element Attributes (Element Information)

### 1. Element > information



## 1.7. Snap



## 1.8. Element type

1. Line
2. LineStrings
3. Text
4. cell
5. Circle
6. Arc
7. Shape
8. Complex-shape ...and so on

## 1.9. Precise input

---

1. Accu Draw
2. Key in : "xy=" "dx=" "az=" ...and so on

## 1.10. Key-ins

---

1. View manipulation
  - OF= Turn off levels by number
  - ON= Turn on levels by number
2. Set element attributes
  - LV= Active level
  - CO= Active color
  - LC= Active line style
  - WT= Active line weight
3. Precision input
  - XY= <x,y,z> from origin along design files axes
  - DI= <distance, direction> from last data or tentative point relative to view axes
  - DL= <Dx, Dy, Dz> from last data or tentative point in design coordinates
  - DX= <Dx, Dy, Dz> from last data or tentative point in view coordinates
  - AX= Distance from Auxiliary Coordinate System (ACS) origin
  - AD= Distance from last data or tentative point in ACS coordinates
4. File management
  - RD= Open design file
  - XD= Open design file with active design's view configuration
  - RC= Attach cell library
  - RF= Attach reference file
  - DR= Displays contents of a text file
5. 3D modeling
  - DP= Set the display depth from 0.0 of view's z-axis
  - DD= Distance to move display depth from current values
  - AZ= Set the active depth from 0.0 of the view's z-axis
  - DZ= Distance to move active depth from current value



## 1.11. Editing commands

---

1. Modify



2. Manipulate



3. Change attribute



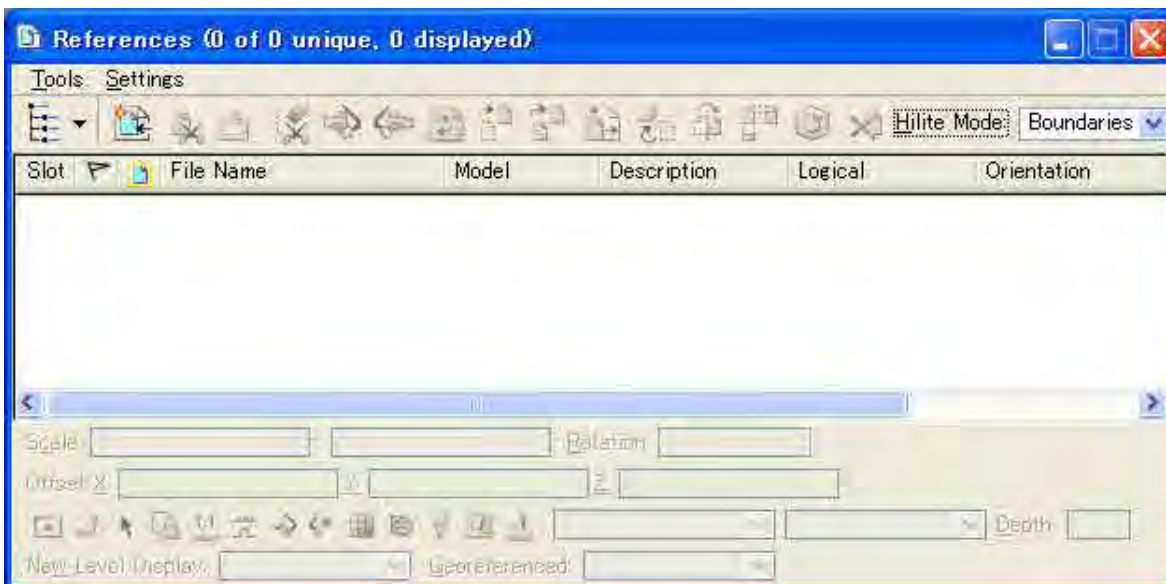
4. Fence ...and so on



## 1.12. Reference files

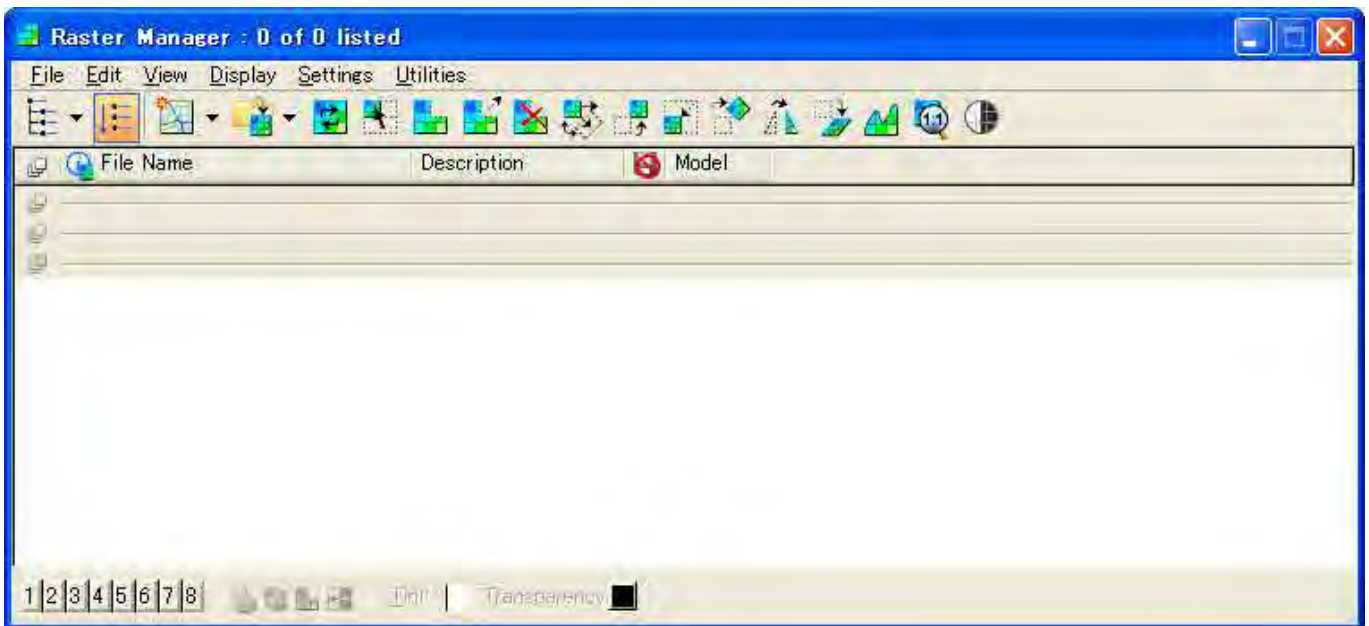
---

1. file > references

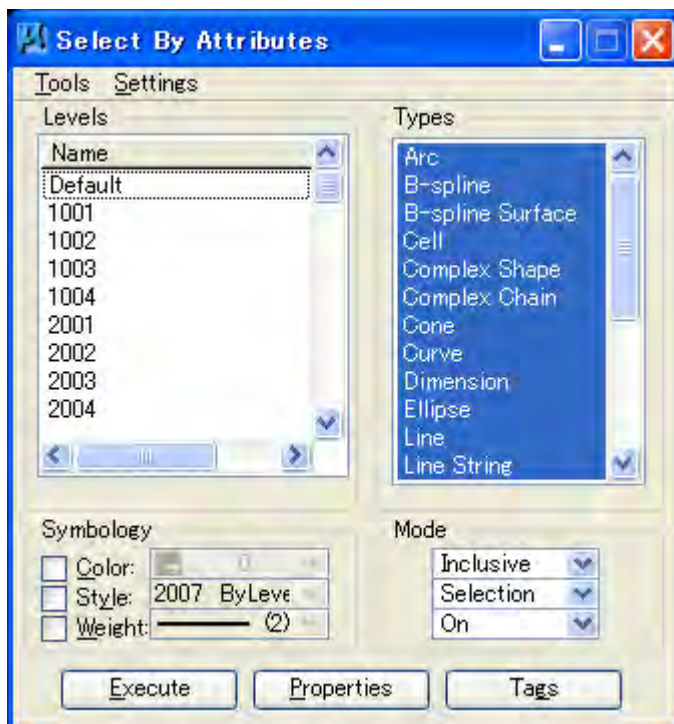


### 1.13. Raster Control

1. file > Raster Manager

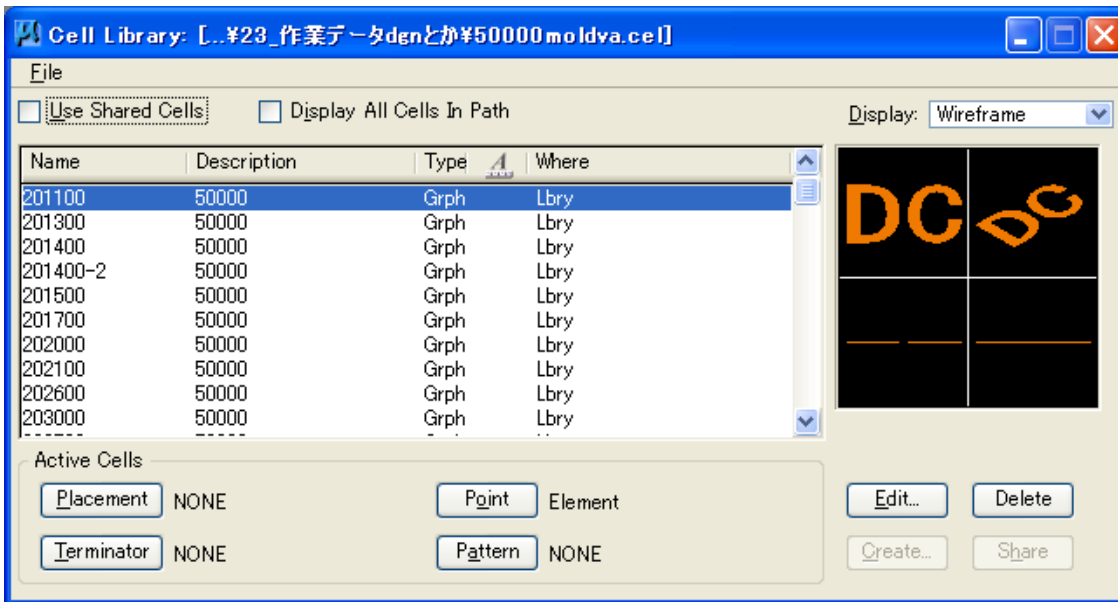


### 1.14. Select elements by attribute



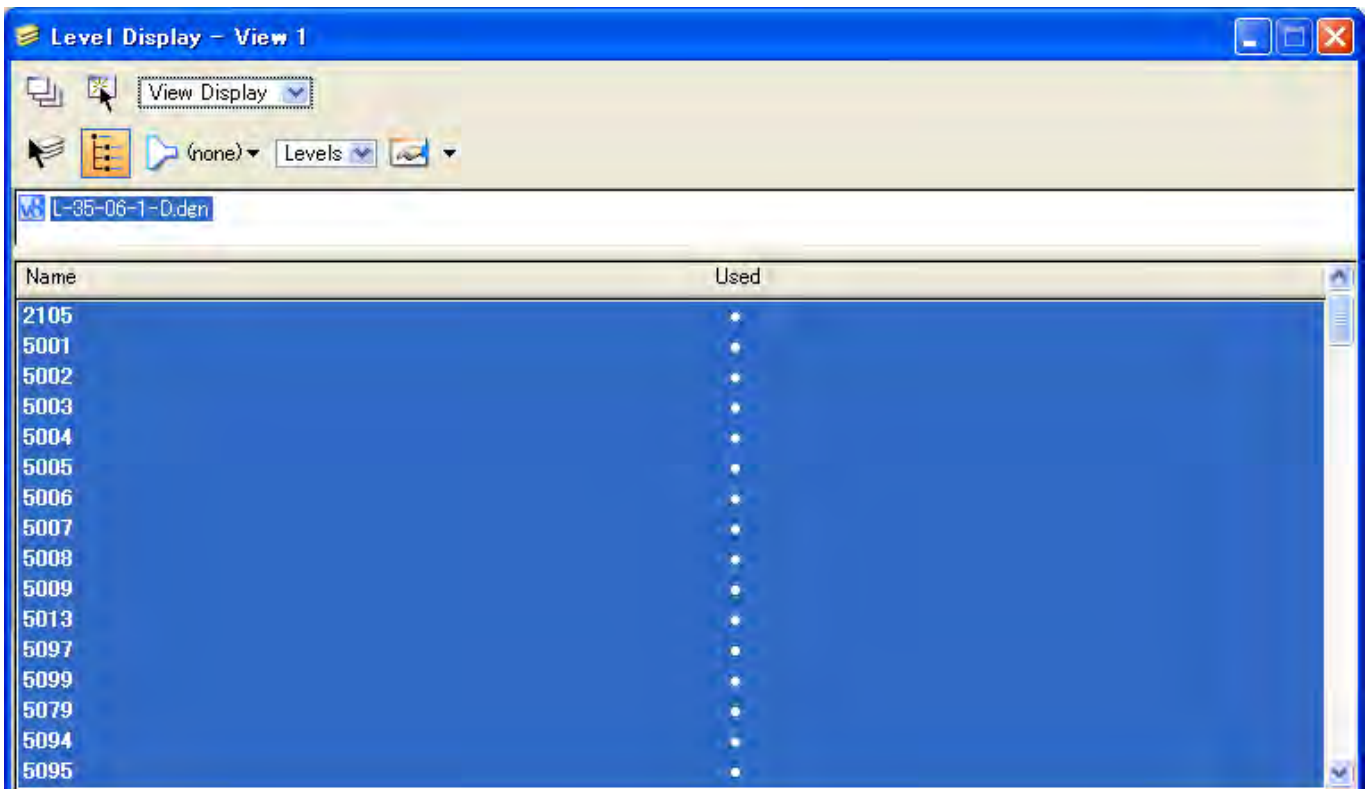
## 1.15. “Cell” location

1. Element > cells

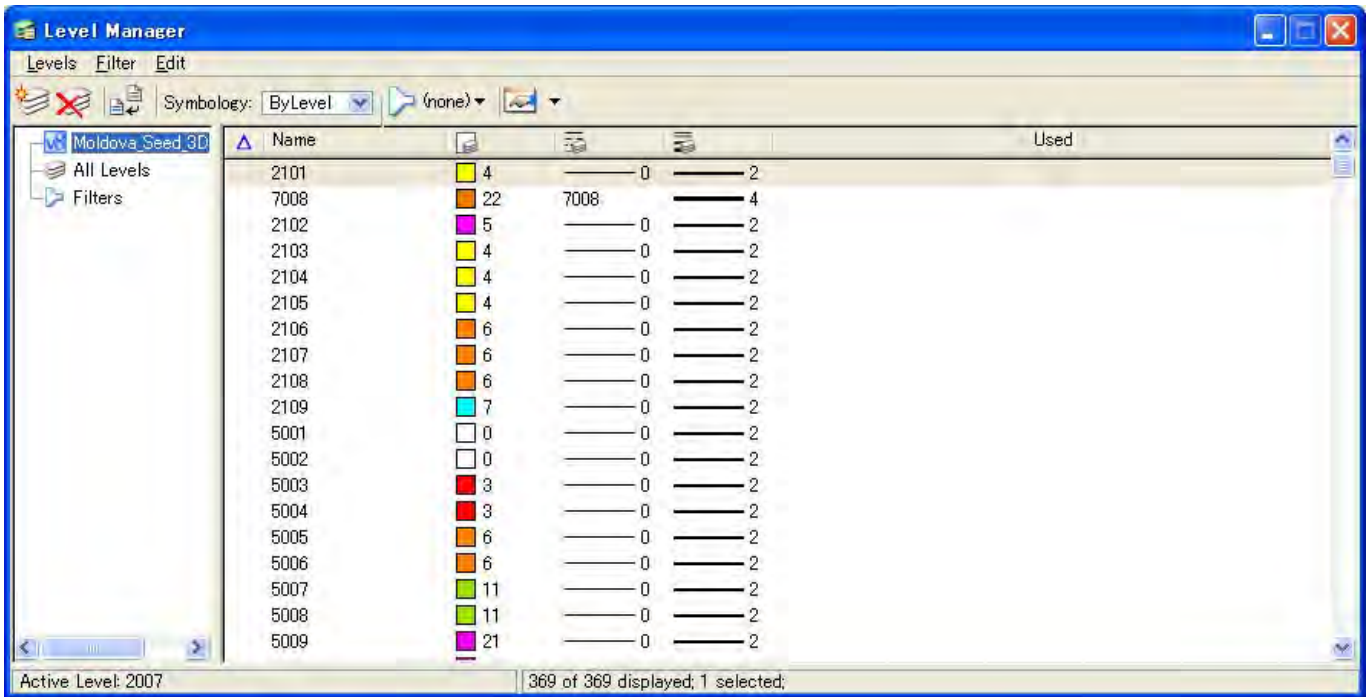


## 1.16. Layer and Layer manipulation

1. Setting > levels > Display



2. Setting > levels > manager



## 2. “Cell” and “Custom line”

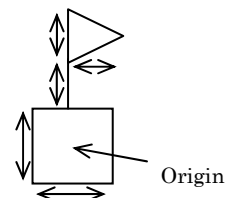
### 2.1. Cell

In “MicroStation” positioning elements called “Cell” represents cartographic symbols. The “Cells” are stored in the library called “Cell Library”, which is different to the design files. Here we explain the method to elaborate such cell library.

4. Symbol form definition

5. Create “Cell Library”

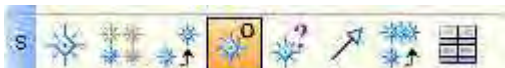
- 1) To form a new “Cell Library” select “Element”>”Cells”, “File”>”New” and
- 2) Input the name of the “Cell Library” on the display dialogue.



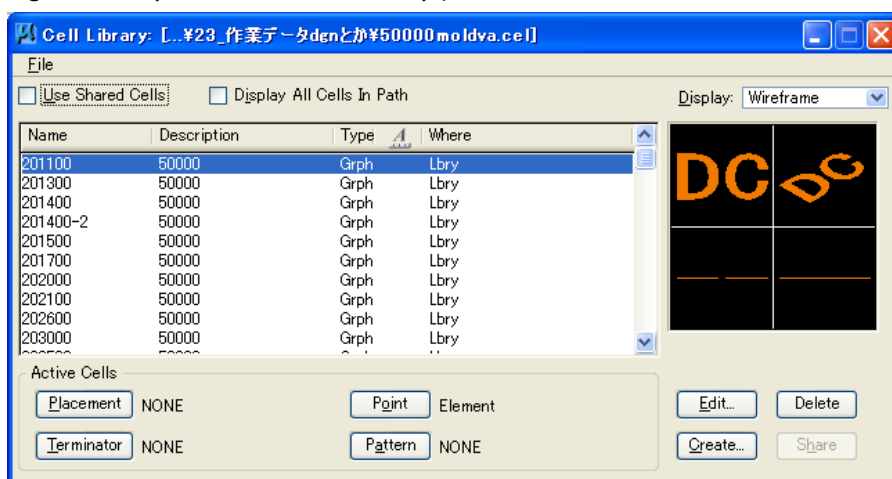
6. Symbol plotting in “design files”

7. Register the plotted symbols at the cell library.

- 1) Frame the symbols
- 2) Assure the positioning of the symbol indicating its central point (Click the following icon).



3) Register the symbols at the cell library (Click the “Create” button in the following dialog).



## 2.2. Custom Line

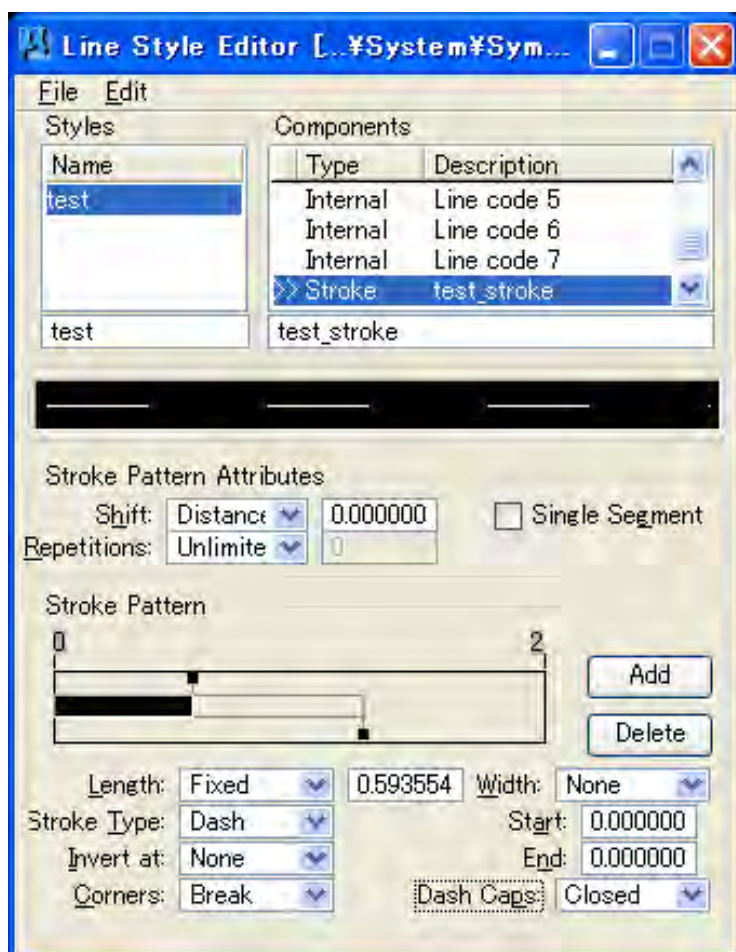
In “MicroStation” all the elements have the style line attribute (“Style”). As own the programming styles registering the continuing line, dotted line, etc. Besides these, there are “measured lines” to plot complicated lines. Numerous styles show the measurement availability for omission, which are stored in the file “.rsc”.

The “.rsc”file is usually located in

“C:¥Documents and Settings¥All Users¥Application Data  
¥Bentley¥MicroStation V8i (SELECTseries)¥WorkSpace¥System¥Symb”.

Here we explain the method to create and register “Custom line”.

1. Open the “line Style Editor”.
  - 1) Element > Linstyles > edit
  - 2) File > New
2. Open the “line Style Editor”.
  - 1) Edit > Create > name
  - 2) Edit > Create > stroke pattern Here the space and stripe of the line is adjusted.
  - 3) Edit > Link
  - 4) File > save

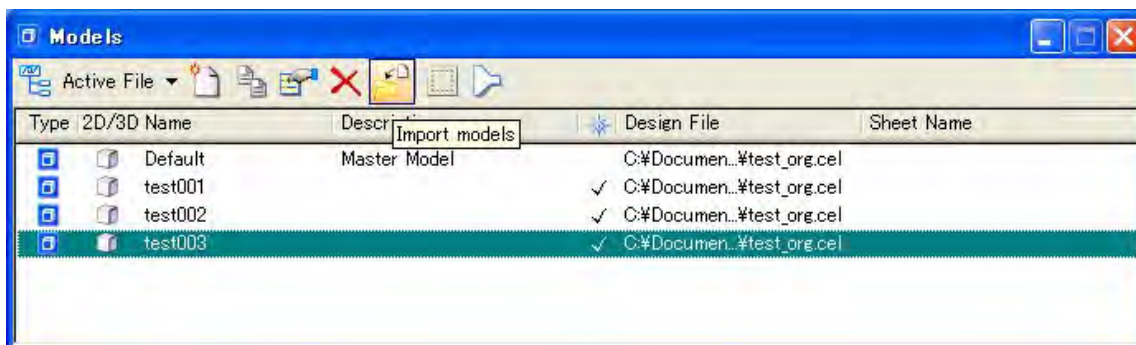




## 2.3. Merge Cell Libraries

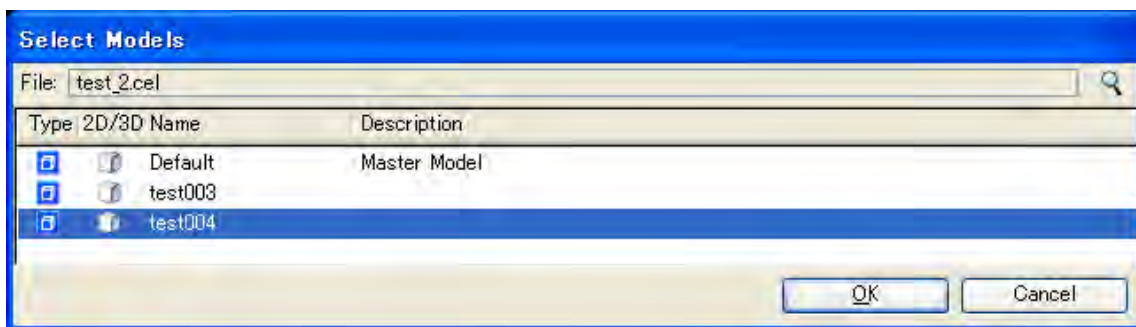
1. Open the cell library file in MicrostationV8i.

- 1) File > models (MicrostationV8i menu)
- 2) Click “import models”

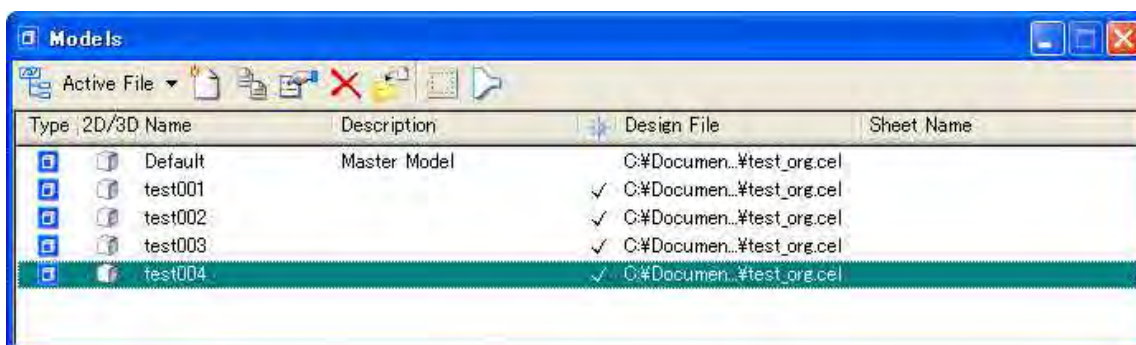


3) Select another cell library file.

4) Select Cell and click “OK”.



5) The new cell was added to the original cell library.



Kokusai Kogyo Co., Ltd.

Ver.001

**Digital Mapping Manual (DTM - ORTHO)**

JICA Study Team (Kokusai Kogyo)  
May, 2012



## 1. DTM

---

### 1.1. Start ATE

---

1. Process > DTM Extraction > Classic ATE or Click “Z” button.

### 1.2. Setting

---

1. OUTPUT FILE : “LPS\_TE” for editing DEM data.
2. OUTPUT form : “Single DTM Mosaic”
3. Cell Size :
4. Use Adaptive ATE : on

### 1.3. Setting in detail

---

1. Click “Advanced Properties”
2. Select “General ” tab
  - 1) Create Contour Map:
  - 2) Remove Contours Shower Than:
  - 3) Create DTM Point Status Output Image : on
  - 4) Reduce DTM Correlation Area by : 5-10%
  - 5) Trim the DTM Border by : 5%
3. Select “Image Pair ” tab

It is possible to exclude image.
4. Select “Area selection ” tab

Area is set up manually such as a lake, to except.
5. Select “Accuracy ” tab
  - 1) Click “Use User Defined Points”
  - 2) Import GCP data.
6. Select “Seed Data ” tab
  - 1) If you have DEM datas for referring, click “Add External File” and import them.

### 1.4. Execute

---

1. Click “Run”

### 1.5. Checking the result

---

1. After the process, check “ACCURACY INFORMATION”.

## **1.6. Import DEM (if required)**

---

1. Select Tools > Terrain Prep Tool.
2. Select Edit > AddDTM
3. Select Process > merge

## 2. Ortho Mosaic

---

### 2.1. Start MosaicPro

---

1. Click "Mosaic" icon.
2. Select "DTM files" and click "OK".
3. Select "Compute Active Area" and click "OK".

### 2.2. Display Image

---

1. Click "Vis" column.



2. Click icon and image data is displayed.

### 2.3. Setting resampling method

---



1. Click icon.
2. Select "Cubic Convolution" and click "Apply".

### 2.4. Create and check Seamline

---



1. Click icon.
2. Select "Weighted Seamline" and click "OK".
3. Select View > Set Maximum Number of Display.
4. Max Rasters : 2

### 2.5. Edit the Seamline

---



1. Click icon.
2. Left click on mouse and edit the seamline.

### 2.6. Feathering and Smoothing


---



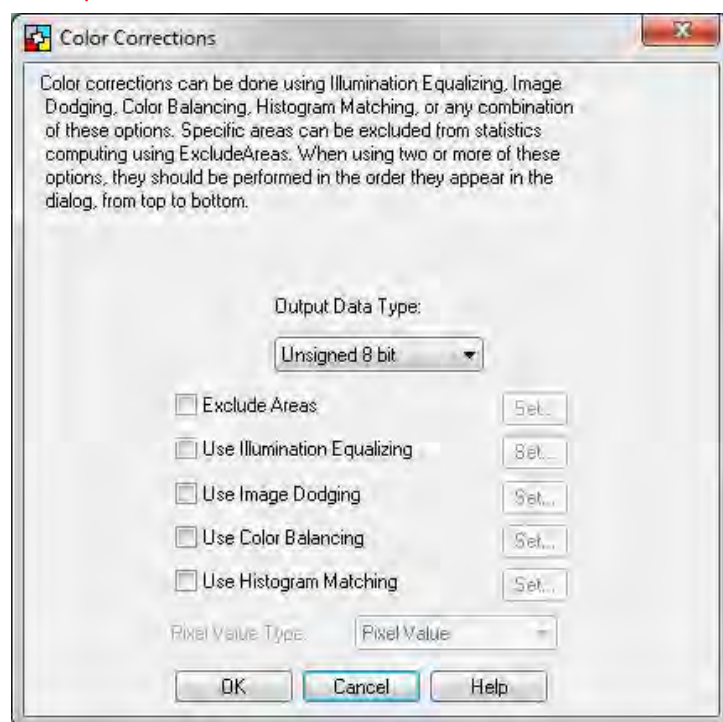
1. Click icon.
2. Input distance and method.
3. Click "OK".

## 2.7. Correct Images (if required)

---

1. Click  icon.
2. The Color Corrections dialog opens.

When using two or more of these options, they should be performed in the order they appear in the dialog, from top to bottom.



3. Check the box for “Exclude Areas” and click “Set”. The Set Exclude Areas dialog opens.
  - 1) The overview shows the full extent of the image, and the detail view allows you to zoom in on specific areas to create AOIs (Area of Interest) to be excluded from the Color Balancing process. Use the link cursor to isolate AOIs.
  - 2) The first image is displayed in the viewers. Left-hold your mouse and drag the link cursor to the dark body of water in the upper left of the center of the image. In the Detail View, the area is magnified so you can create specific AOIs to exclude from the Color Correction process.
  - 3) Click the Create Polygon AOI icon.
  - 4) Your cursor becomes a crosshair when inside a view. Use the Detail View to create polygons around (for example) the dark water bodies.
  - 5) When you have finished, use the link cursor to identify any other areas in the image that need to be excluded such as other dark bodies of water, isolated bright urban areas, or bright areas of sun glint.
  - 6) Create a polygon around each of the areas you wish to exclude from Color Balancing, and click Apply.
  - 7) Use the arrow keys or the drop down box to select the next image. Continue identifying AOIs to exclude through all images. Click Apply after excluding areas in each image. Click Close in the Set Exclude Areas dialog when finished.

4. Check the box for "Use Illumination Equalizing" and click "Set". Illumination Equalizing dialog opens.
  - 1) You can change parameters to suit your purpose.
  - 2) Click Preview to view the image after applying Illumination Equalizing. The image appears in the right Image Preview section of the dialog.
  - 3) Click OK to accept the Illumination Equalizing.
  - 4) Click "OK" in the Set Color Balancing dialog.
5. Check the box for "Use Image Dodging" and click "Set". The Mosaic Image Dodging dialog opens.
  - 1) Choose Manual Color Manipulation and click Set.
  - 2) Look under "Statistics Collection" at "Grid Size", "Skip Factor X", "Skip Factor Y", and "Pyramid Level". You can change these numbers to suit your purpose.
  - 3) Click Preview to view the image after applying Image Dodging. The image appears in the Dodge Image Preview section of the dialog.
  - 4) Click OK to accept the dodged image.
  - 5) Click "OK" in the Set Color Balancing dialog.
6. Check the box for "Use Color Balancing" and click "Set". The Set Color Balancing Method dialog opens.
  - 1) Choose Manual Color Manipulation and click Set.
  - 2) The first image displays. If the image did not need color balancing, you could skip it, and use the Arrow Keys or the dropdown menu in the top left corner to choose another image.
  - 3) Under Display Setting, make sure RGB is selected.
  - 4) Choose the surface method you want to use in order to color balance the image. You may choose from Parabolic, Conic, Linear, or Exponential. Unless you are using Linear as your surface method, you can click Common center for all layers in order to use the same center point in each layer of the image.
  - 5) Click Compute Current and click Preview. The preview viewer displays the color balanced image.
  - 6) Click Accept after previewing the color balanced image to accept it for mosaicking.
  - 7) Repeat these steps for all images, and click "Close" in the Mosaic Color Balancing dialog.
  - 8) Click "OK" in the Set Color Balancing dialog.
7. Check the box for "Use Histogram Matching" and click "Set". The Histogram Matching dialog opens.
  - 5) Select the Matching Method :
  - 6) Choose the Histogram Type :
  - 7) Check if you want to use an external reference :
  - 8) Click "OK".

## 2.8. Setting output

---



1. Click icon.
2. Select the method of area definition.
3. Input Cell size.
4. Click "OK".

## 2.9. Preview

---



1. Click icon.
2. Select the area.
3. Select Process > Preview > Mosaic for Window.
4. To close the window , select Process > Delete the Preview Mosaic Window.

## 2.10. MOSAIC

---



1. Click icon.
2. Select "File " tab
  - 1) Input "File name". :
3. Select "Output Options " tab
  - 1) "Stats Igonore Value" : 0
4. Click "OK"

## 2.11. Define the Map Sheets (EARDAS IMAGINE)

---

1. Display the Image data on viewer.
2. Start "Map Series Tool"
3. Select Edit > Create Custom Maps > From Rectanglar Grid
4. Click "Set Projection" and input the Datum information and click "OK".
5. Input "Map Sheet Extant" :
6. Click "OK".



7. Click icon.
8. File > Save As

## 2.12. Output TIFF Image (EARDAS IMAGINE)

---

1. Select toolbox > Mosaic > MosaicExpress
2. Select "Input" tab.
  - 1) Open the .img file
3. Select "Output Tiles" tab.
  - 1) Select "User Defined Tiles" and open .msh file
4. Select "Output" tab.
  - 1) "Produce Mosaic Images" : ON
  - 2) Click "Options" and "Write World File" : ON
  - 3) Input "Root Name" :
5. Select "Finish" .

## Digital Compilation



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# MicroStation Basic Operation

---

2012/04/20

## The Basic Operation manual of MicroStation

**Purpose:** For understanding about “Digital plotting”, “Digital compilation” and “Symbolization”, it is necessary to manipulate the “MicroStation” basically. This document mentions elementary operations

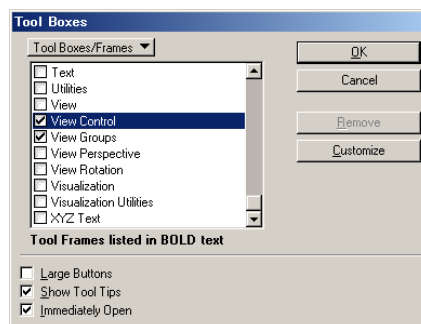
### <Operations>

#### 1. View Control

At first; from menu bar/ click Tools/ from pull down/ Tool Boxes. Or Ctrl+T short cut key



Then Tool boxes window will appear, and it is able to select many of tool bar. This time chose View Control. At any time it can call any tool bar, when if it need.



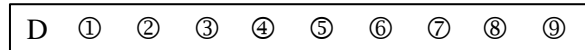


A	① ② ③ ④ ⑤ ⑥ ⑦ ⑧
B	① ②
C	① ② ③ ④ ⑤

ID	Command Name	Contents	Action
A	① Update View	After modification, Update the result of modification.	Click “Left” on the window
	② Zoom In	Increase the magnification of a view.	Click “Left” on the window
	③ Zoom Out	Decrease the magnification of a view.	Click “Left” on the window
	④ Window Area	Define the showing area in the window.	Click “Left” at the Upper left of the area and Click “Left” at the Lower right
	⑤ Fit View	Show all data and fit into the View.	No need to Click
	⑥ Rotate View	Change 3D view and defined isometric projection view	No need to Click or drag mouse at isometric view
	⑦ Pan View	Move the center of view	Click “Left” and move cursor on Clicking left
	⑧ “See Help”	Pass	
B	① View Previous	Undo	
	② View Next	Redo	
C	“See Help”	Passer	

Notice: “See Help” means Go to “Help”-> “Tool Index” and Type “View Control” into “Index” Tag.

## 2. Drawing

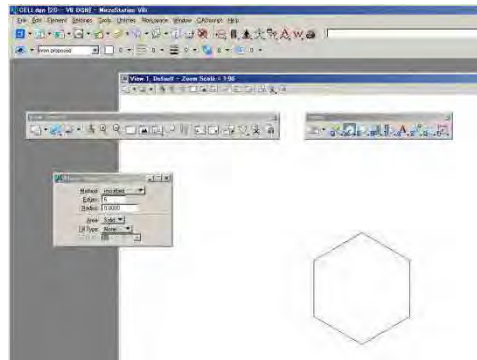


ID	Command Name	Contents	Action
<b>D</b>	① Place Smart line	Draw a line (start and end point), a line string (more then 3 segments)	Click “Left” on each point until last point and “Right”
	② Place Block	Draw a block(Rectangle)	Click “Left” at the Upper left of the area and Click “Left” at the Lower right
		Draw a shape(Polygon)	Click “Left” on each point until last point and Click “Close Element”
	③ Place Circle	Draw a circle	Select method or enter numeric of diameter, radius
	④ Hatch Area	Place hatch	Select method, set hatch appearance in toolbox
	⑤ Attach Tags	<b>“See Help”</b>	
	⑥ Place Text	Place Text (Annotation, Comment, etc)	Type text into the “Text Editor” and Click “Left” on the point in the Window
	⑦ Place active Cell	Place Cell “ attached Sell library” or its active cell	Choose certain cell, click on view where might be placed
	⑧ Measure Distance	Measure the distance between 2 points.	Click “Left” on each point from 1 <sup>st</sup> point and 2 <sup>nd</sup> point, then see “Measure Distance” window.
⑨ Dimension Element	<b>“See Help”</b>		

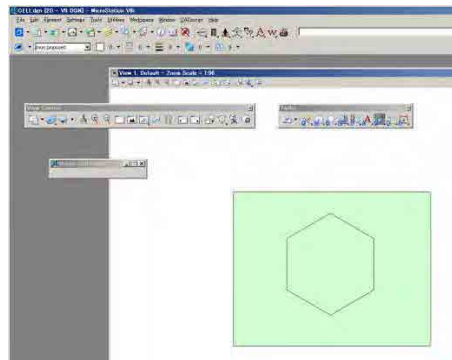
Notice:”See Help” means Go to “Help”-> “Tool Index” and Type “Task, navigation in dialog box” into “Index” Tag.

## 2-1 About cell making

- i. For example, draw one element such as polygon or etc.



- ii. Place fence as enclosing the element

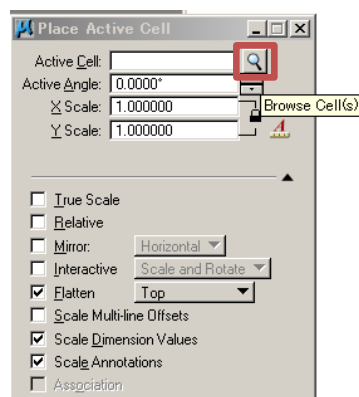


- iii. Open cell library.

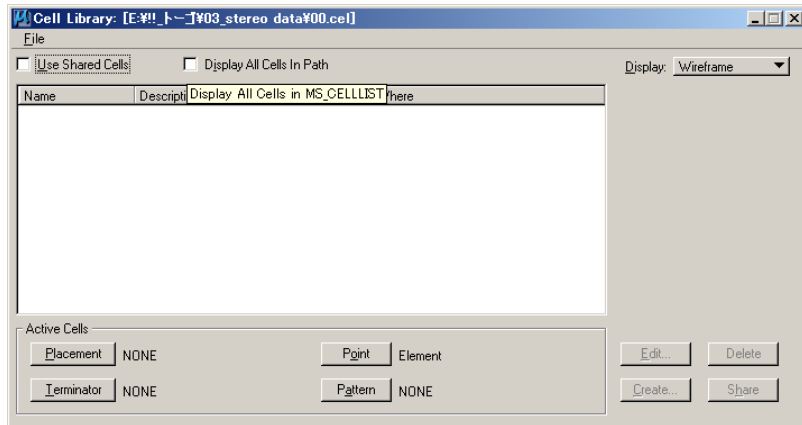
- Click left Place Active Cell icon



- Click Place Active Cell window's right button



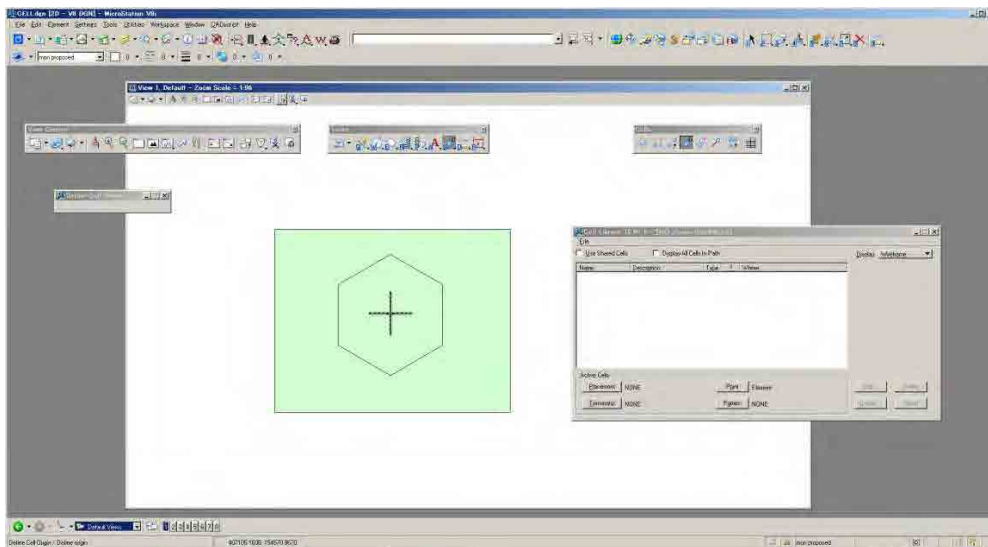
➤ **Cell library window will open**



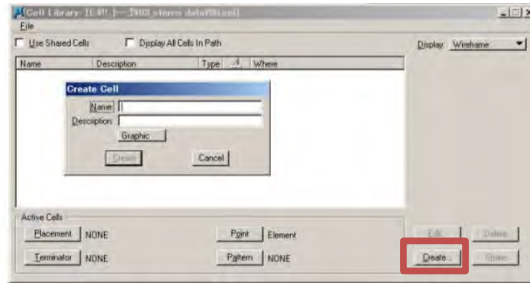
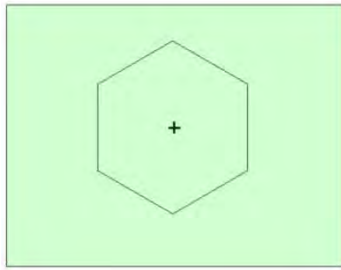
➤ **Identify the cell**



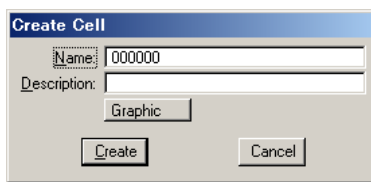
Return to the Cells tool bar, Click Define Cell Origin, then tentative click in the center of element which is defined as cell's original point. In this time it should be defined carefully with snap operation.



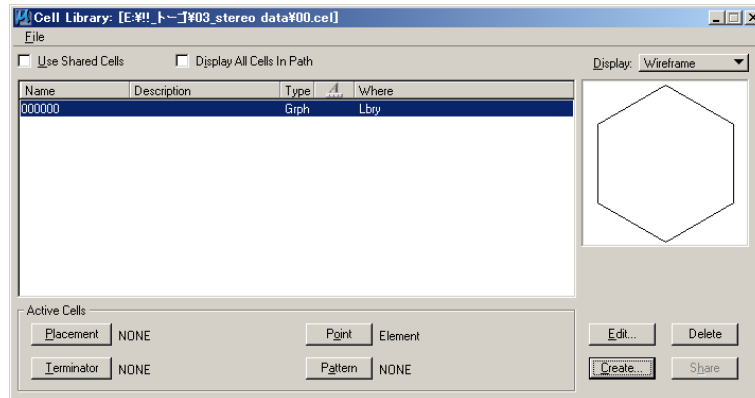
➤ **Create new cell**



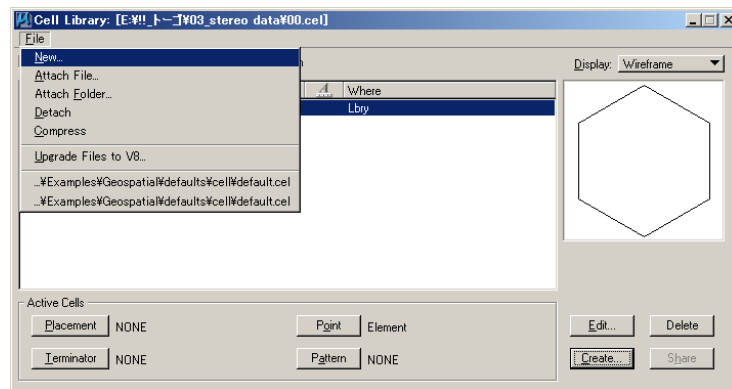
After defined center of cell, click Create then Create Cell window will appear.



For example, Cell name enter “000000”



Now, created “00000” cell in Cell Library. The Cell Library can set many cell in order to create sell file for users needs or each project requirement. It should be saved in such as project folder. Click File from cell Library menu bar/ then new/ enter name and set directory





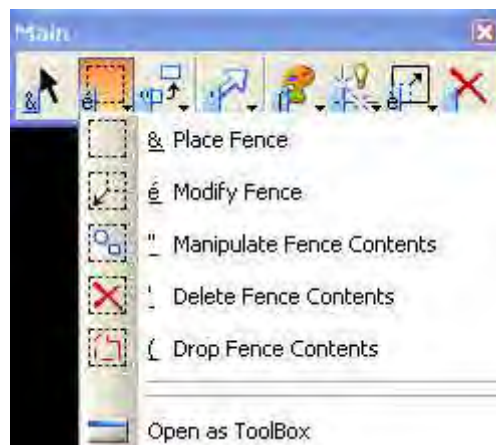
### 3. Modifying



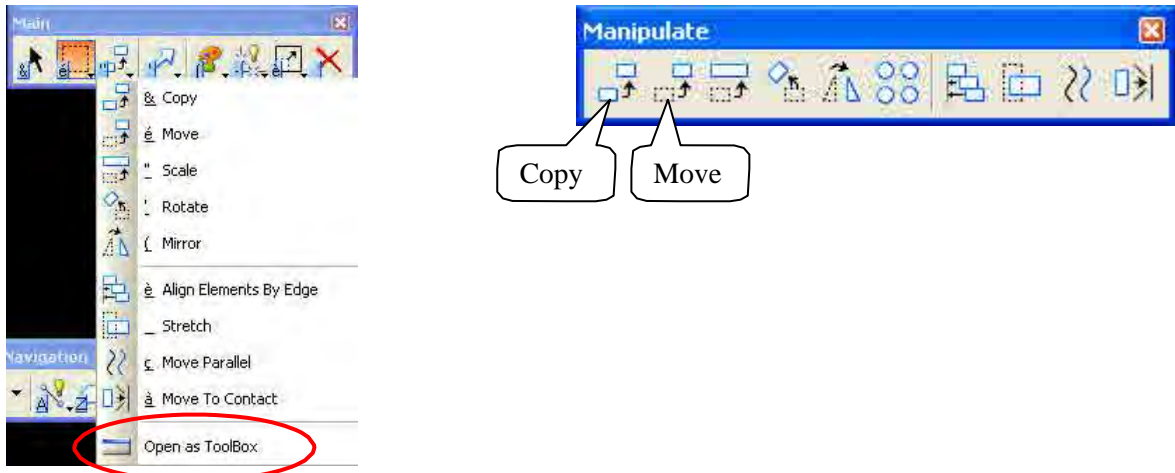
ID	Command Name	Contents	Action	
E	①	Element Selection	Select elements (one by one). Click “Left” on an objective Element (Use “Ctrl” for Plural).	
	②	Fence	Define area for Selection and Process. Click “Left” at the Upper left of the area and Click “Left” at the Lower right	
	③	Manipulate	“See Chapter3.2”	
	④	View Control	“See Chapter 1”	
	⑤	Change Attribute	“See Chapter3.2”	
	⑥	Groups	“See Help”	
	⑦	Modify	“See Chapter3.3”	
	⑧	Delete Element	Delete Element (one by one). Click “Left” on a objective Element	

Notice:”See Help” means Go to “Help”-> “Tool Index” and Type “main” into “Index” Tag.

#### 3.1 Select (Element and Fence)



### 3.2 Copy and Move

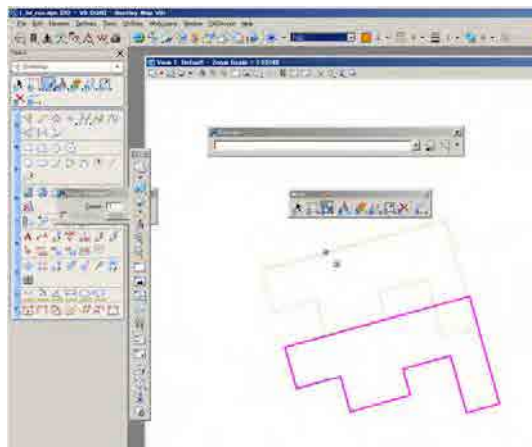


### 3.3 Another way of Copy (duplicate element)

- i. Select element by using Manipulate from Main tool bar



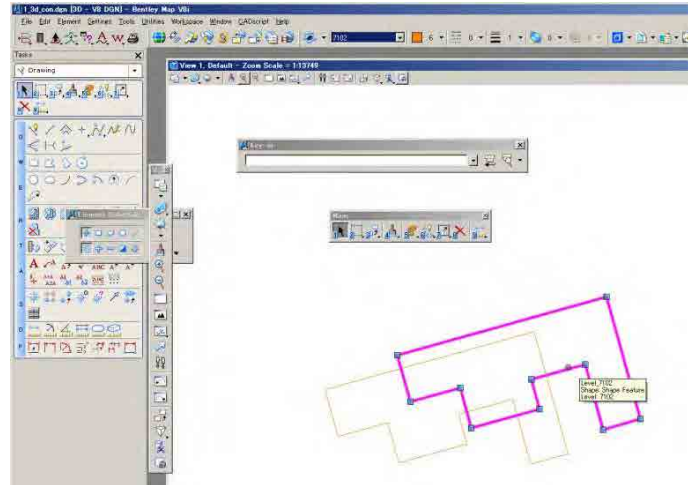
- ii. Then dragging into Key-in window



- iii. After dragging enter dl=0 then press Enter

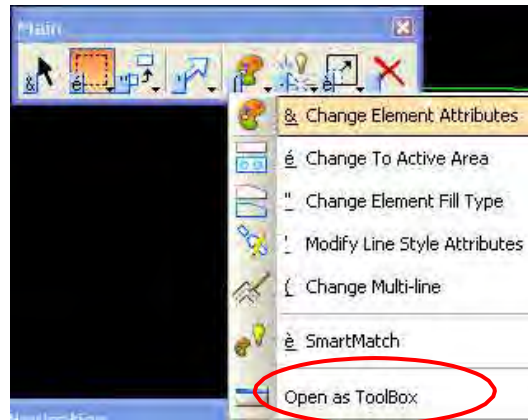


- iv. Click right button (resolve), for example select element, then dragging it can define a duplicated element.

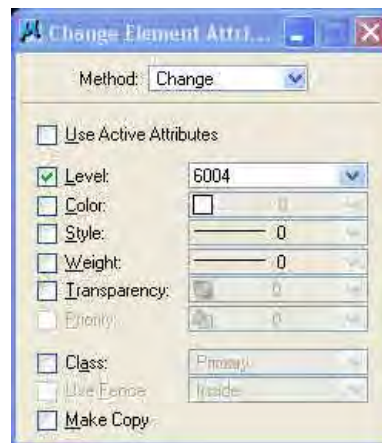


- v. This duplication method can efficiently use when copy from attached reference file by using enclosed fence.
- vi. In case of copy whole attached reference file from reference window, it would be better to use « merge into master » command.

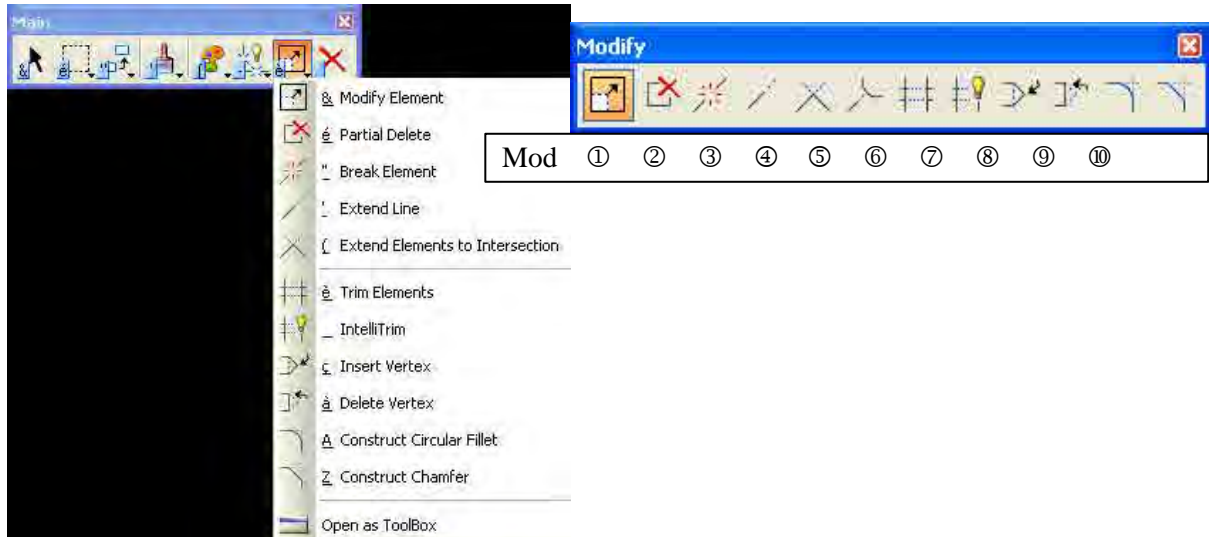
### 3.4 Attribute



Checked attribute will change.

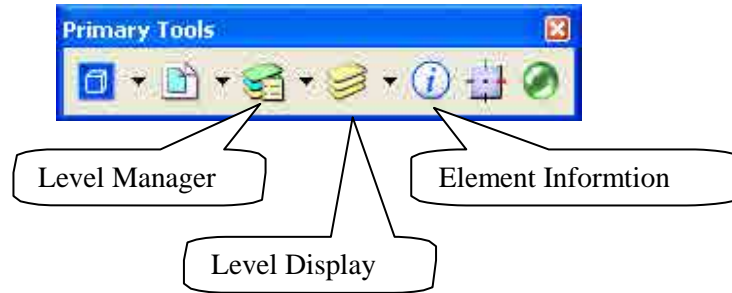


### 3.5 Modify (Extend, Trim, Delete etc)

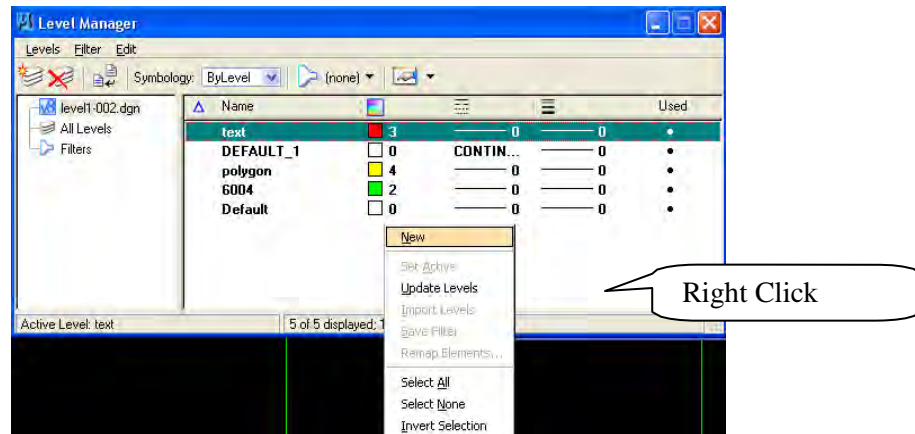


ID	Command Name	Contents	Action	
<b>Mod</b>	①	Modify Element Move a segment of Element.	Click “Left” on an element and move.	
	②	Partial Delete	Delete a section of an element. Click “Left” at the start point and Click “Left” at the last point.	
	③	Break Element	<b>Segment an element into several parts.</b>	Click “Left” at the point should be divided.
	④	Extend line	<b>Extend a line to optional point.</b>	Click “Left” on an element and Click “Left” at the point to be extended.
	⑤	Extend element to intersection	<b>Extend two lines to the cross point.</b>	Click “Left” on an element and Click “Left” on another.
	⑥	Extend element to intersection	<b>Extend a line to the cross point.</b>	Click “Left” on an element to be extended and Click “Left” on the other.
	⑦	Trim elements	<b>Delete element overshoot (One by One)</b>	Click “Left” on the border element and then Click “Left” on overshoot part.
	⑧	Intelli Trim	<b>Delete element overshoot (using line)</b>	Click “Left” on the border element and then Draw line on overshoot part.
	⑨	Insert Vertex	<b>Add new vertex into an element</b>	Click “Left” at the point to be inserted
	⑩	Delete Vertex	<b>Delete vertex</b>	Click “Left” at the vertex to be deleted

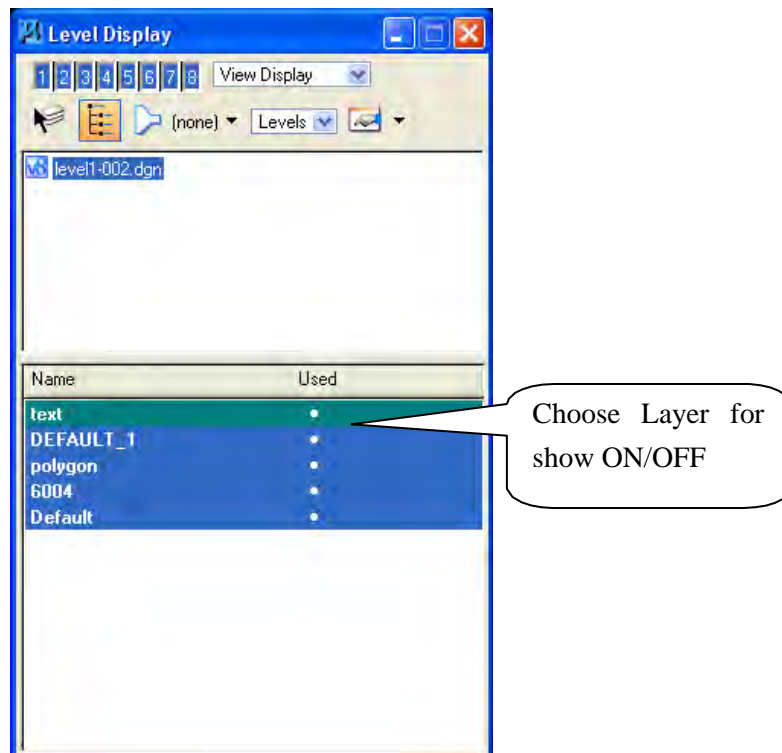
#### 4. Layer and Layer manipulation



##### 4.1 Level Manager

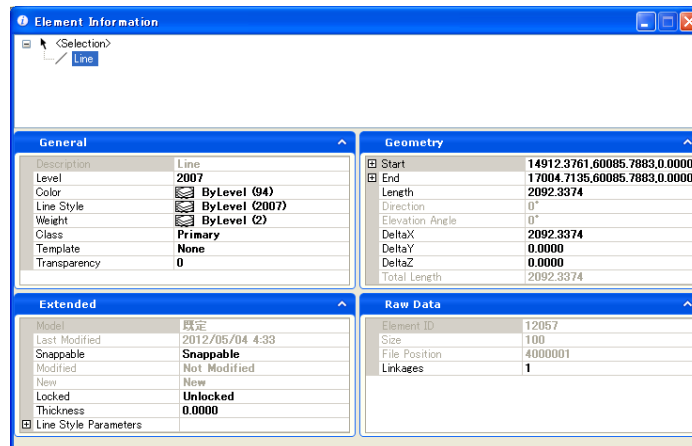


##### 4.2 Level Display



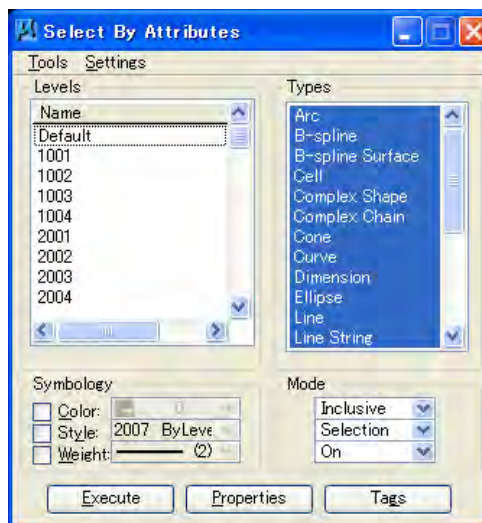
### 4.3 Element Information (Element Attributes)

- Element / information



- Element type (generally used)
  1. Line
  2. Line Strings
  3. Text
  4. Cell
  5. Circle
  6. Arc
  7. Shape
  8. Complex-shape ...and so on

### 4.4 Select elements by attribute

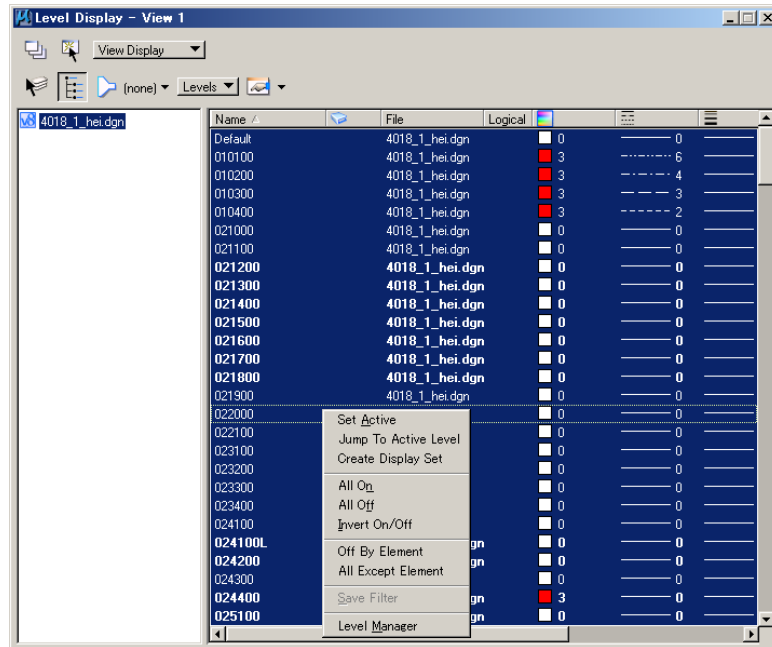


It can multiply elect element by element attributes which are by layer, elements types, color, or so on.

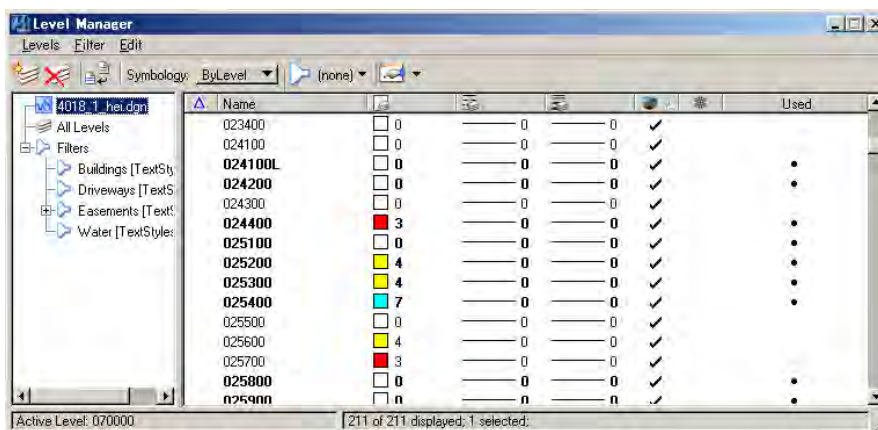


## 4.5 Level Filter

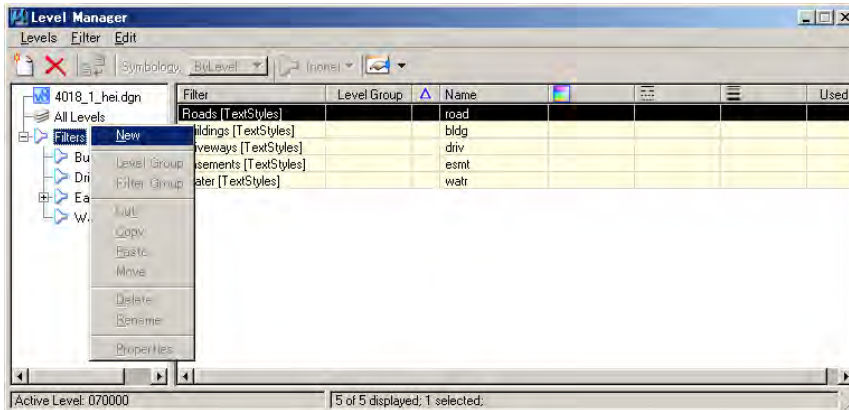
It can save level settings as named layer states. It can restore setting from other setting or temporarily setting or setting which is based on efficient working.



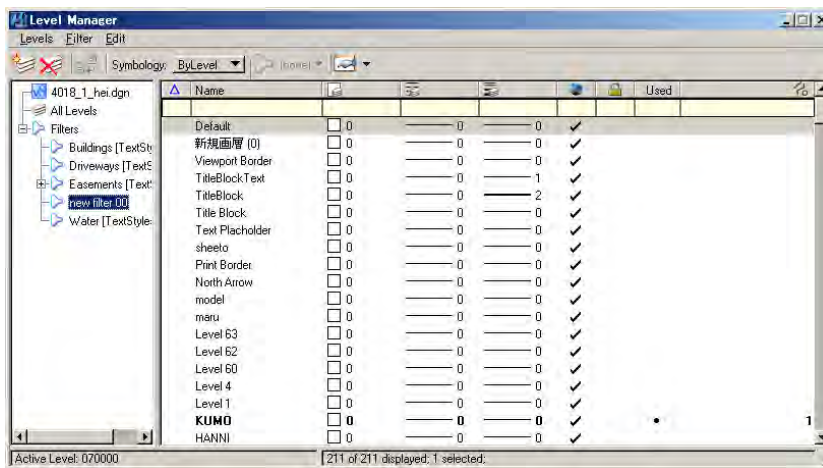
Right click on the layer display window/ select Level Manager. Level Manager will appear.



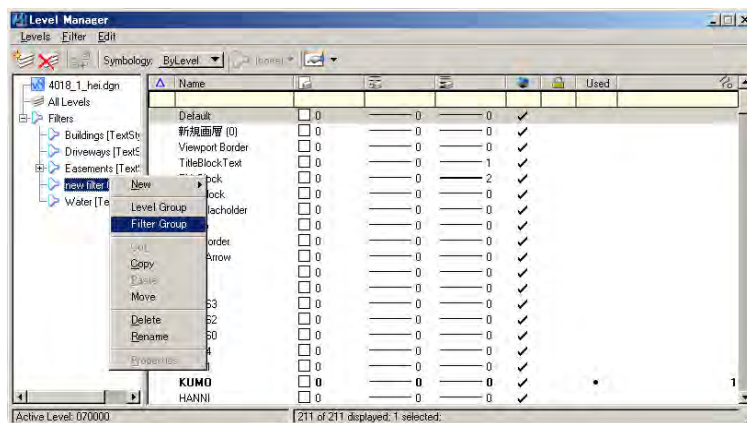
Click Filters/ then right click on filter/ select new/



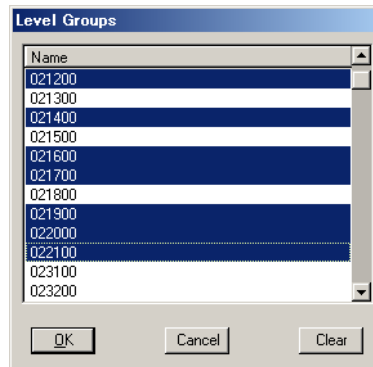
Enter new filter name example “new filter 00”



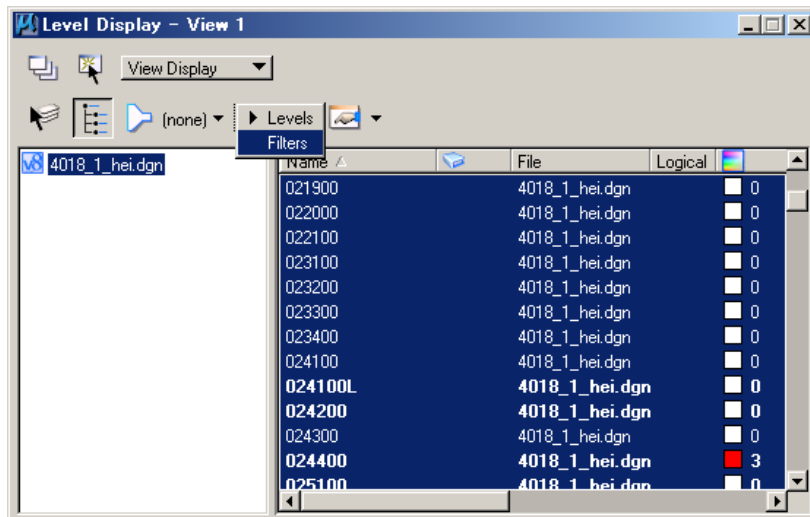
Right click on new filter/ then select level group



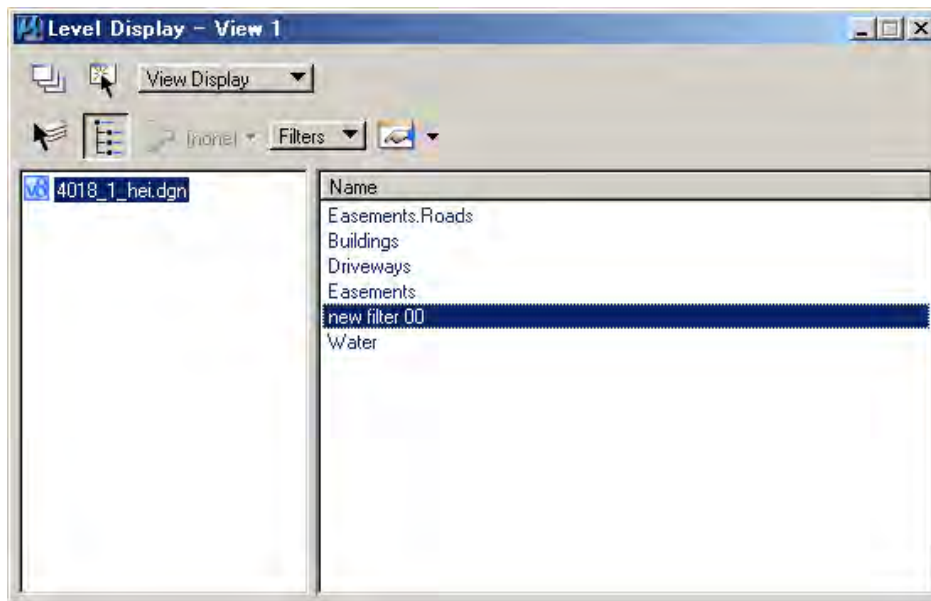
Select setting layer which are as on purpose of purpose



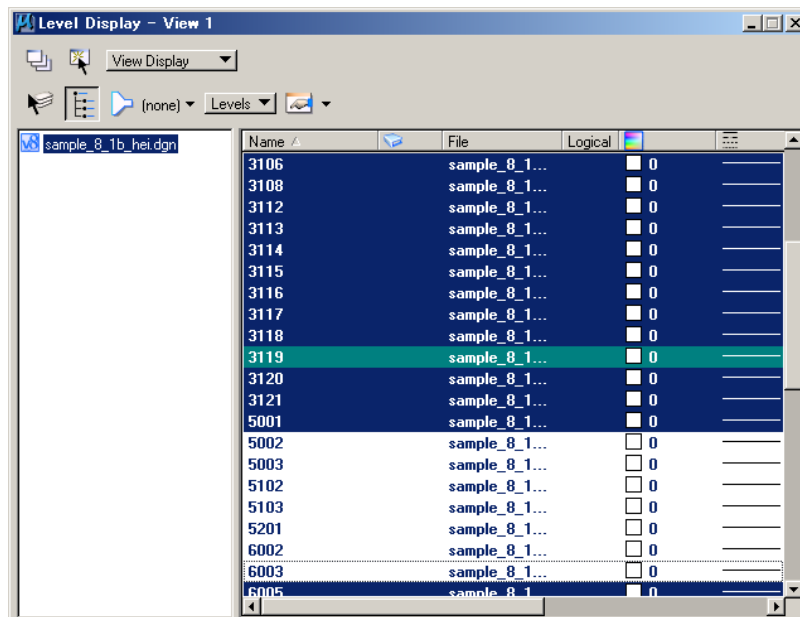
Select Filters from Level pull down menu



Select Filters in list of name, for example new filter 00. Then main window will be restored as selected levels at once.



When return to original level setting, turn on all level in the level display or beforehand set filter as all level “on”



Turn on all layers on Level Display

## 5. Raster Control

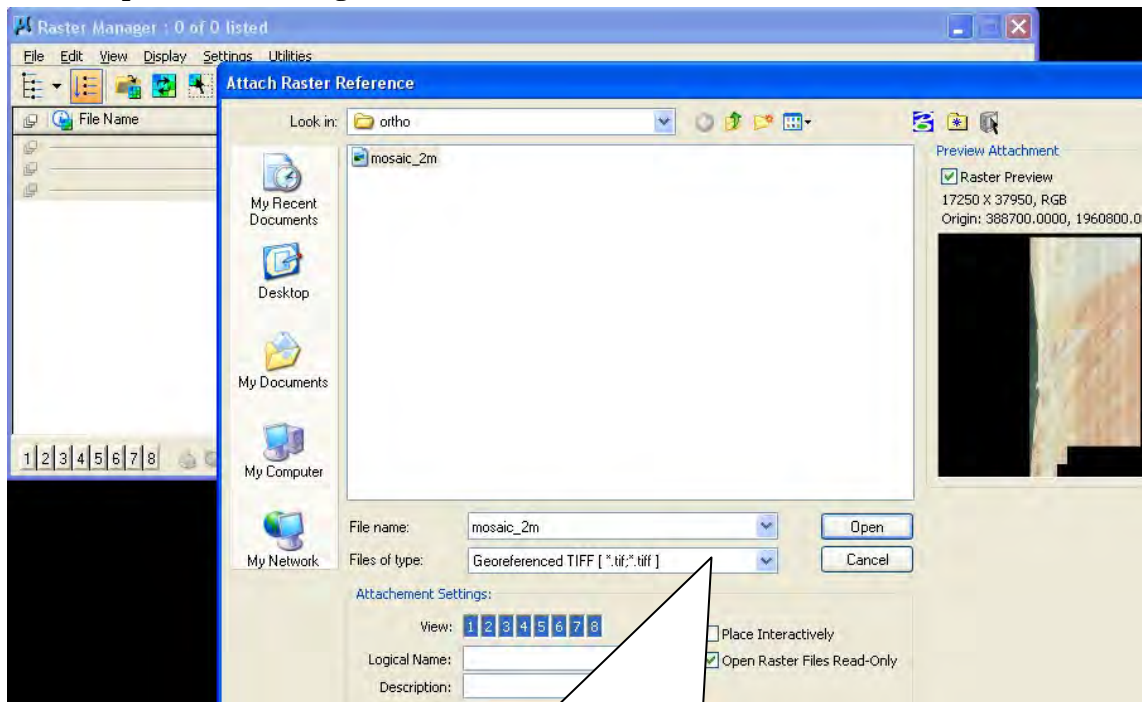
Open Raster Control tool  
Tools->Raster->main



Raster Manager

### 5.1 <Insert an Image>

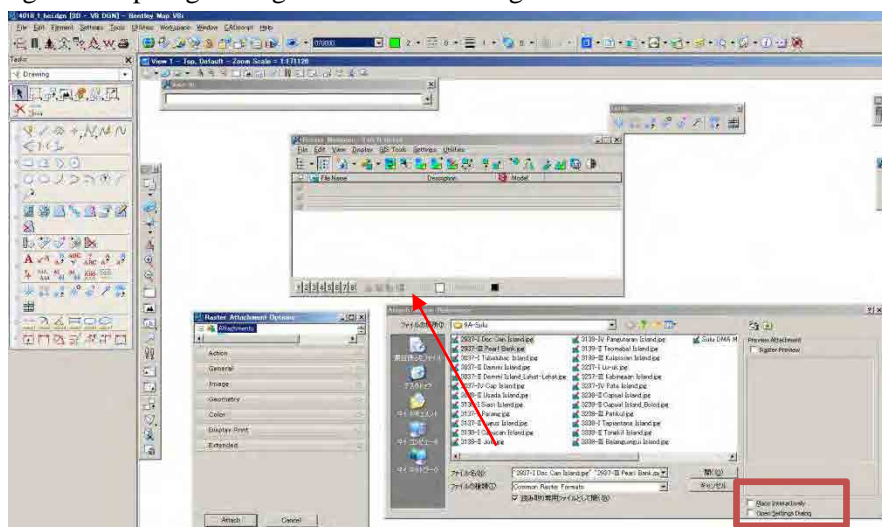
Open Raster manager ->File ->Attach



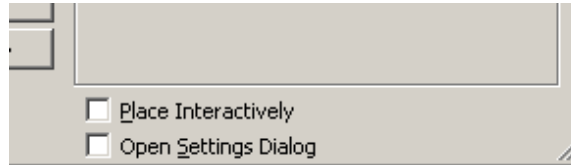
In case the Image has a coordinate: check off

### 5.2 <Other method of insert an Image>

Drag and drop target image into Raster Manager

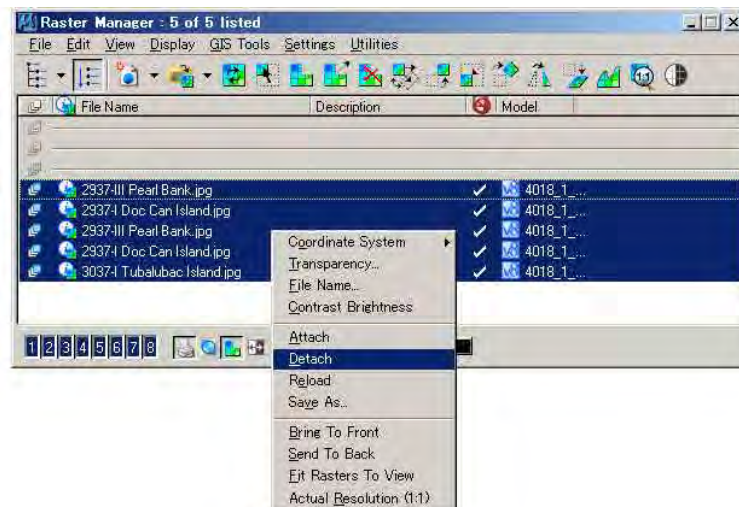


In case of the image has georeference, Check box might be out both.



### 5.3 <Detach the Image>

File ->Detach or right click the detachable image in raster manager/ from pull down menu detach



### 5.4 <Batch image convert> File ->Detach

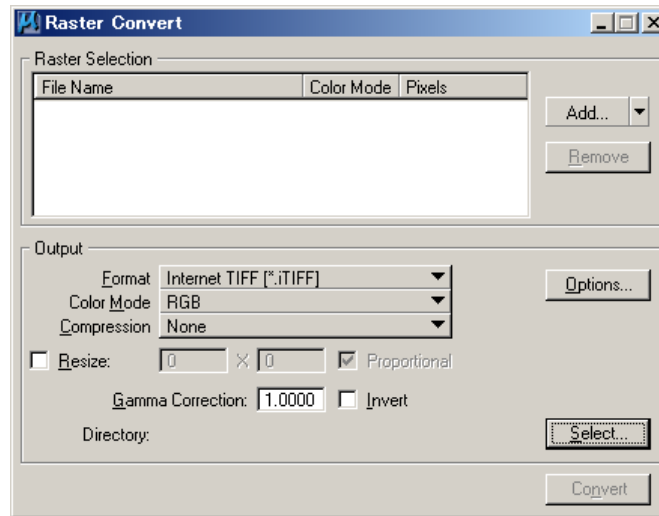
File ->batch convert



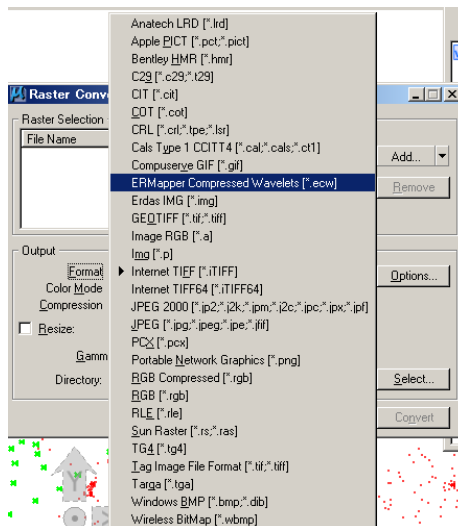
Raster Manager can be converted image format with batch processing, these format which are in generally used.

From batch convert, “Raster convert” window will paper.

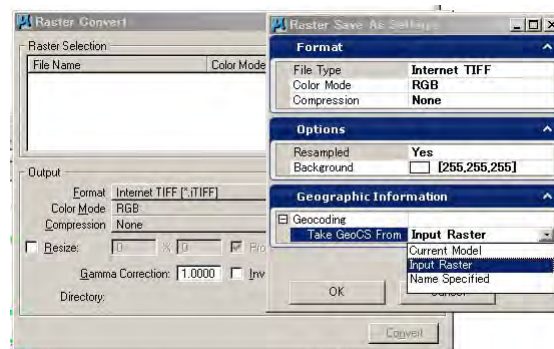
- Click “Add...” button, it is selected the several image file from target directory



- Select convert format from the pull down menu

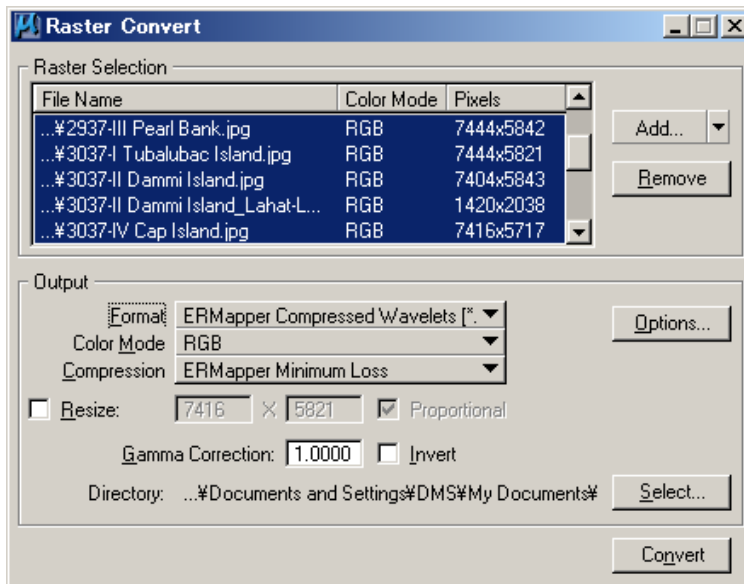


- Click option, it can select raster georeference file and its name, description..





- Select directory for converted images
- Then click “Convert”

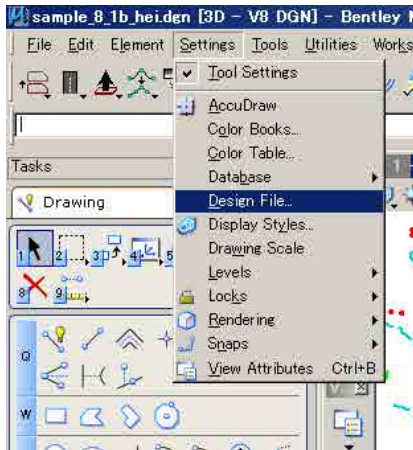


- ✓ It may takes a while time why depend on image volume.

## 6. Save setting, Compress

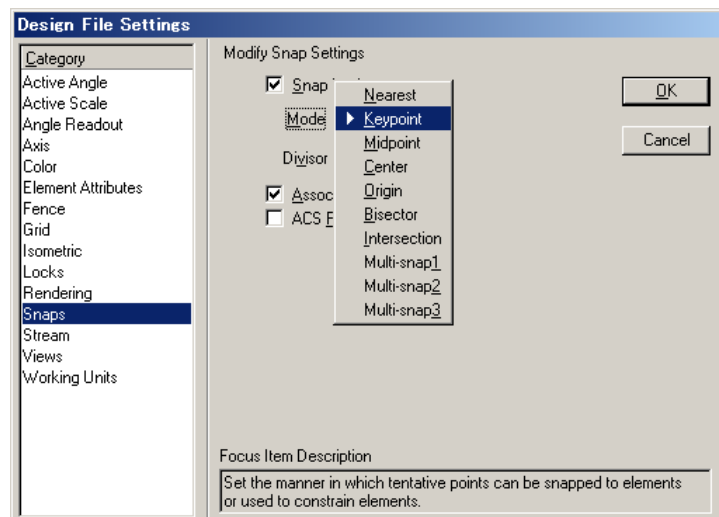
6.1 Save setting; on the starting working, the DGN working file must be set at least following then “Save setting”

i. Form menu bar / Settings /pull down menu Design File



ii. Design file Settings window will appear, it can set basic DGN file settings which are able to be available for fitting each DGN file; however it can set many categories. Minimally, it should be set Snaps, Working Units, and grids if it needs.

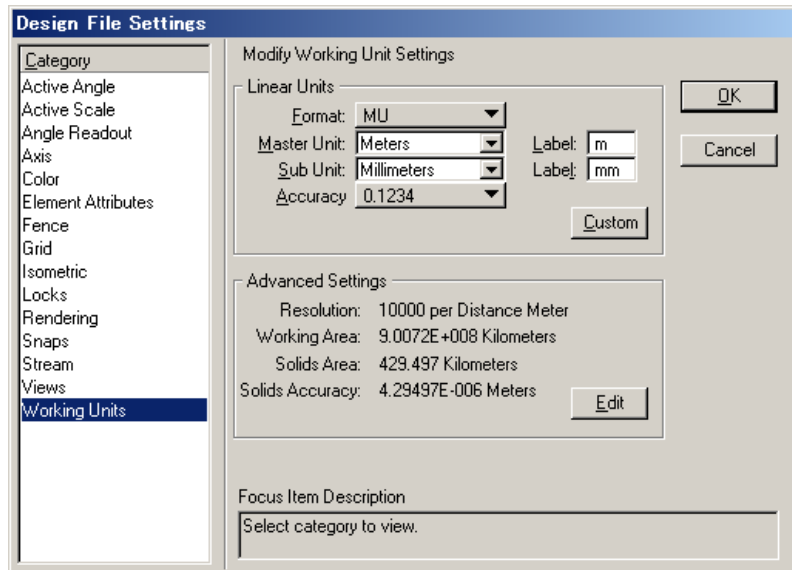
➤ Snaps; “Mode” might be “Key point”, “Divisor” value 1.



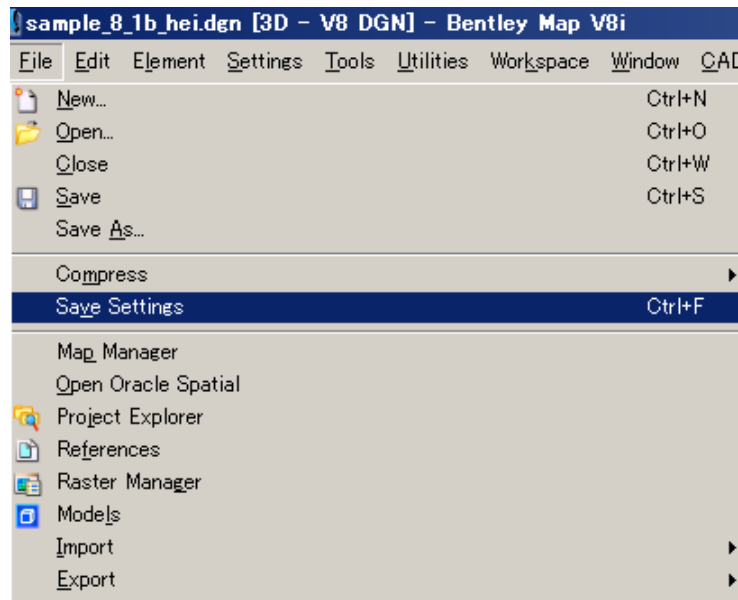
✓ If it needs temporarily to change another mode in during operation, it can change snap mode from “Snap Mode tool” box.



- Working Unit; Format might be “MU”, Mater Unit is Meters, Sub Unit is Millimeters, Accuracy is 0.1234 or more, it is depending on the specification.



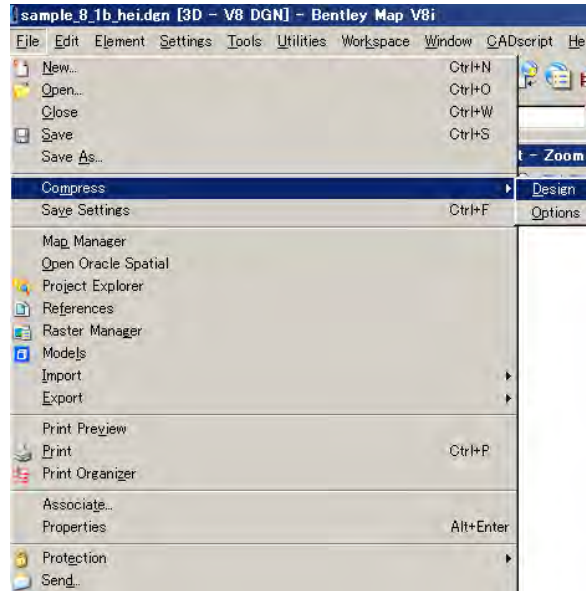
- iii. After setting the DGN file, it can be saved DGN file on disk and these DGN file setting shall be save the setting. From menu bar File/ from pull down/ Save Setting.



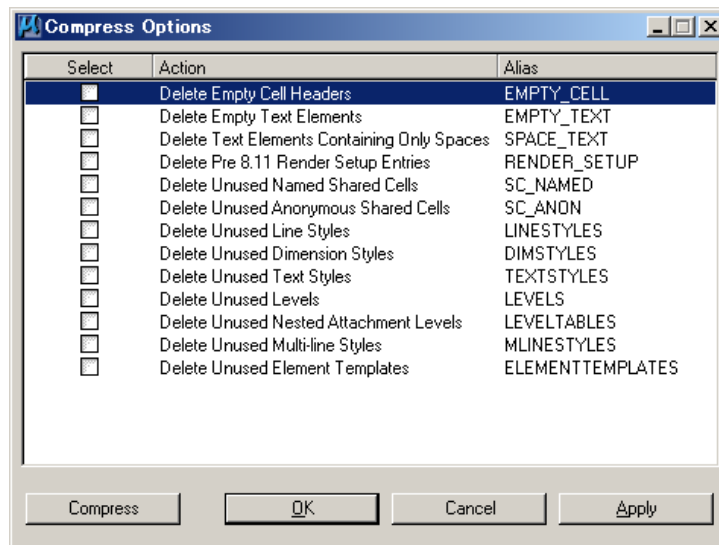
- When changed desk top appearance such as toolboxes its arrangements can save setting. Before close the working DGN file, it should be saved setting; it would be made better to become a habit such as Save setting

7. Compress; reduces the file size of working DGN, it must be clear the UNDO data, if it needs other unused recourses it might be select the delectable recourse from option setting.

➤ File/ Compress/ pull down Design

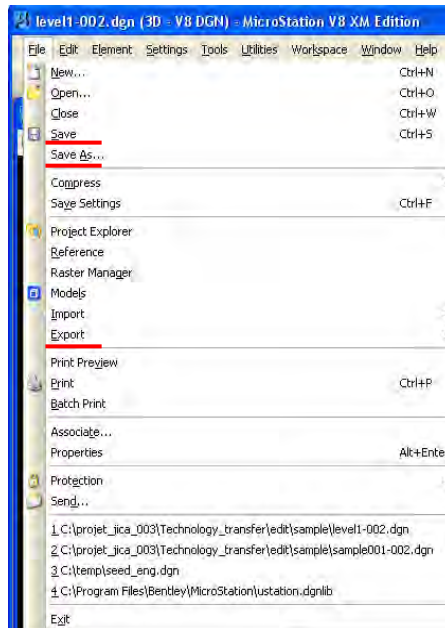


➤ File/ Compress/ pull down Option

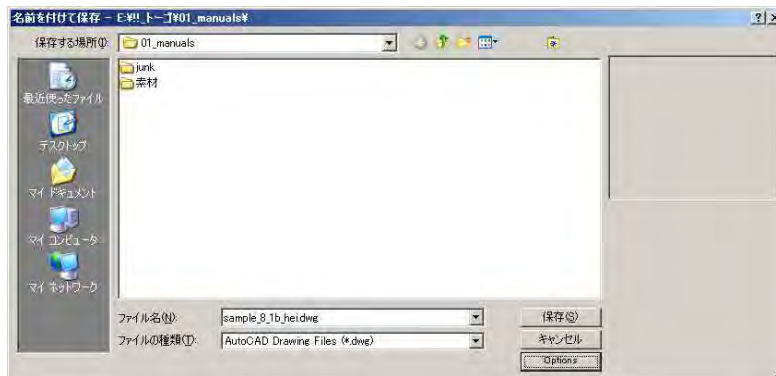


- ✓ Check “√” in left box, the Action will be done same at the “Compress”  
Usually it unnecessary to select these actions, it might be needed at the time of all completion working.
- ✓ After changing options might be done “save setting” again, then compress design.

## 8. Save, Export



- It can save as other CAD format such as DWG, DNG(v7) . in case of save as DWG format it might be needed to change “option” setting and “save setting” from menu bar.



- ✓ File/ Save as DWG, DXF/ click Option, “save as DWG/DXF Option window will appear, then click “Entity Mapping” and then change the value as following.

Entity Mapping	
Planar LineStrings	Polyline
Nonplanar LineStrings	Polyline (Flattened)
Flat Solids and Surfaces	Polyface Mesh
Curved Solids and Surfaces	Polyface Mesh
Curves and B-Spline Curves	Polyline

- ✓ then click next “Filled element”

Filled Elements	
3 or 4 Sided Polygons	Polyline
5 or more sided Polygons	Polyline
Complex Shapes	Polyline
⊕ 2D Unfilled Elements	
⊕ 3D Unfilled Elements	

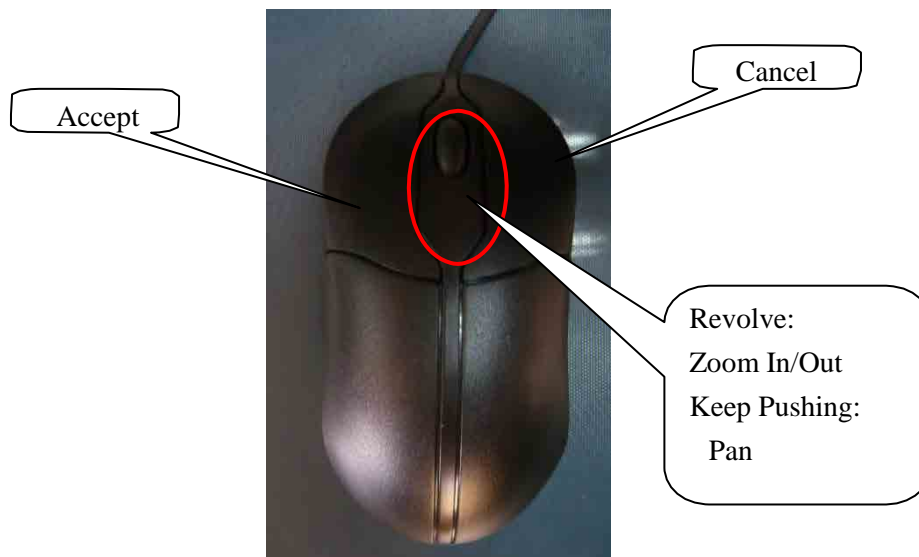
- ✓ then click next “2D unfilled Elements

2D Unfilled Elements	
3 or 4 Sided Polygons	Polyline
5 or more sided Polygons	Polyline
Complex Shapes	Polyline
Grouped Holes	"Region" Entity

- ✓ then click next “3D unfilled Elements

3D Unfilled Elements	
3 or 4 Sided Polygons	Polyline
5 or more sided Polygons	Polyline
Complex Shapes	Polyline
Grouped Holes	"Region" Entity

## 9. Mouse Control



- Mouse managing
  - ✓ **left click** : data button (D) accept, input selection
  - ✓ **right click** : restart button (R)reject, restart
  - ✓ **click both buttons at the same time** : tentative bottom (T) tentative coordinate selection

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**Bentley  
Microstation Map  
Basic topology  
cleanup operation**

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2012/04/20



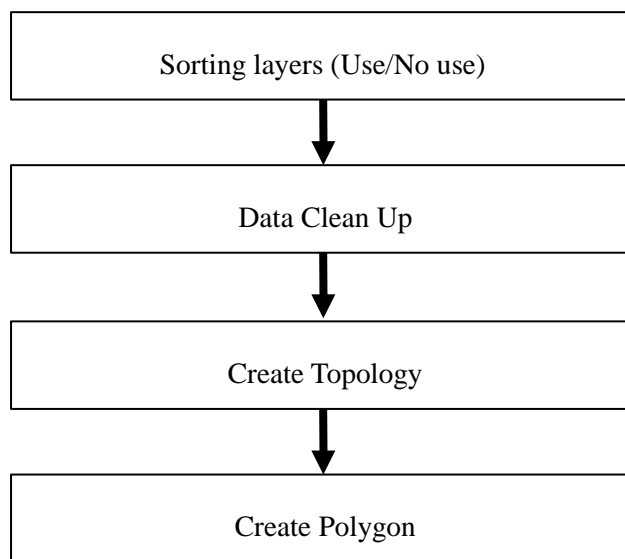
## Instruction for editing of data

### 1. Objective

The objective of editing data is creating **point, line, and polygon** data for Cartography. As for creating polygons, "Data cleaning" (Delete short elements, Delete Duplications, Fix Gaps and Dangles) and "Create Topology" are required.

### 2. Work flow

The flow in this work is following.



- ✓ Sorting layers; the unused layer for polygon should be distinguished by using cad function freeze, display off, setting into other new layer or save to other file such as temporary data which should be merged after polygon creation.

### 3. Type of Data

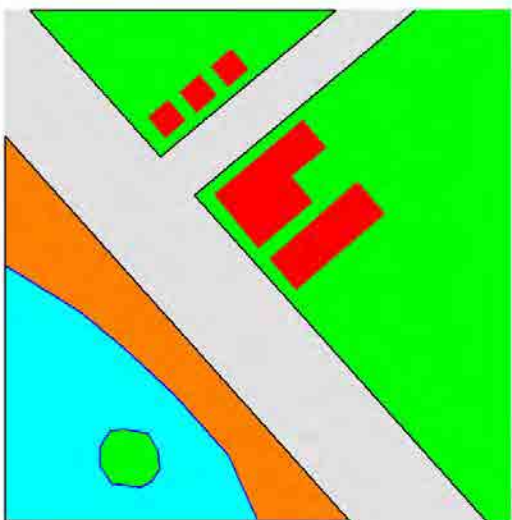
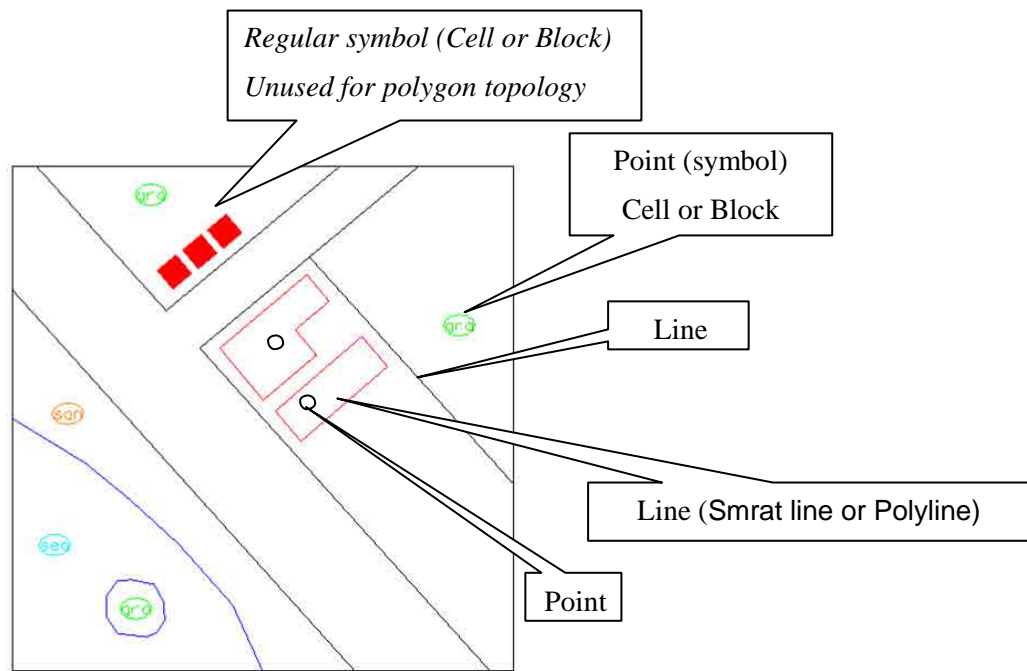
#### 3-1 Type of data

There are 4 types of elements in the topographic data as follow.

Type of data		Explanation	Examples in this project
1	Point Symbol	No length No width Cell(symbol)	GCP point, regular buildings, regular prominent features which are hospital, factory, school, port, mine, bridge, water source, reservoir, well etc.
2	Poly line	With length	road, railroad, single line river, contour, etc.

		No width	
3	Polygon	With length With width	dwelling area, sea, double line river, vegetation, etc.
4	Text	Characters	administrative name, prominent features its explanation, etc.

3-2 The theory of polygon creation by using "Point" and "Smrat line or Polyline "



after poygon creation, the poygon area can fiil in color or hatching such as representation.

**On the polygon creation, text, point (symbol), cell (symbol) are able to deal as a centroid of cirtain boundary.**

**One cirtain polygon must has a centroid its inside is basic rule of polygon topology.**

### 3-3 About each data type

To know the classification of data type, See “SYMBOLES DE LA CARTE TOPOGRAPHIQUE DU TOGO (ECHELLE 1:50000)”.

- ✓ When referencing the specification, it shall be use the latest version.

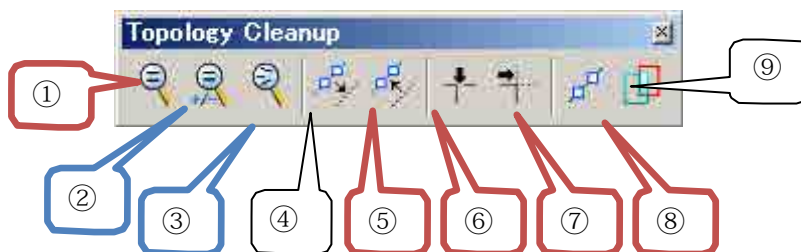
## 4. Data Cleaning

### 4-1 “Data cleaning” Tool usage

Open “BENTLAY MAP” then select “Geospatial “from pull down, and then “Topology Cleanup”



In the tool bar



- ① **Find duplicate linear elements**
- ② *Find similar linear elements*
  - *Automatically removing similar liner element might make gaps, dangles line.*
- ③ *Find line network fragments*
  - *When tolerance value setting is large number, the result must be increased.*
- ④ *Thin linear elements: remove thin object less than tolerance---remove vertex---filtering?*
- ⑤ **Segment linear elements:** Segmentation---Break

➤ Usually setting mode should be “Element”.

⑥ **Find gaps**

➤ *When the mode selected “All repair “under large numeric tolerance value setting is large number, the result might be created unexceptional elements.*

⑦ **Find dangles**

⑧ **Connect line work**

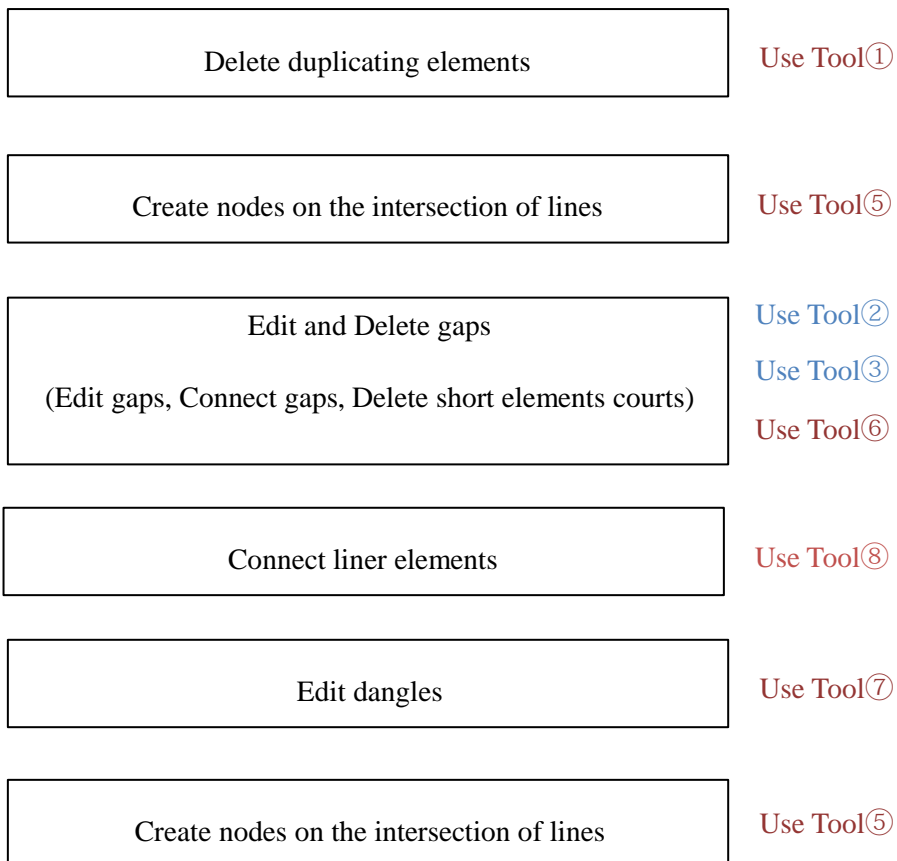
➤ *Use for non-elevation line features only, when the contour line connected it must be lose its elevation value.*

➤ *When connecting liner elements shall be done layer by layer, if 2 or more layers connected at once the result must be created failure element.*

⑨ **Find slivers**

➤ *The Sliver polygons error can detect in polygon topology creation procedure also.*

#### 4-1 The Workflow of “Data Cleaning”



**Notice:** The elements should be enclosed by Fence before the Tool running.

Some of the data cleaning function should be set tolerance value more than “0” in order to exactly find error of elements however if it was set large value the result might be detected normal elements as error.

The tolerance value should be selected by depending map scale. In case of large scale map the tolerance value can be small number, the other hand small scale maps the number must be increased. Furthermore decision of the number should be taken consider in line data condition which is interval and angle of vertex.

#### 4-2 Sample tolerance value of small scale map as 1/50 000

- These actions are directly edited element. In accordance with the situation, it is necessary to save backup data before “Data cleaning”.
- These Tolerance are as one kind of sample, actually true value cannot fix so far. It must be required to alternate the value by satiation of elements, map scale, its specification and so on.

#### ① **Find duplicate linear elements**

It can no more be detected than a just overlapped element.

#### ② ***Find similar linear elements***

Approximately between 0.1mm to 1mm on the map; as 5m to 50m on the ground, it is including “0” also. The value “0” can no more detect than a just overlapped element. As for percent value is 0.1% up to or more, however the value increasing might be decrease error.

#### ③ ***Find line network fragments***

Approximately between 0.01mm to 1mm on the map; as 0.5m to 50m on the ground, it is including “0” also. The value “0” cannot find any error however the large value setting might be increased error of normal element. As for this value should be depended vertex interval of stereo plotting line condition.

#### ④ ***Thin linear elements***

Normally it is not applicable, when the liner elements has inappropriate situation such as zigzag like with too much vertex, poor digitized or vectorlization line.

#### ⑤ **Segment linear elements**

Generally the value should be “0”, mode is “elements”

#### ⑥ **Find gaps**

The tolerance value should not be “0”, approximately between 0.01mm to 1mm on the map; as 0.5m to 50m on the ground, it is including “0” also. The value “0” cannot find any error however the large value setting might be increased error of normal

element. As for this value should be depended vertex interval of stereo plotting line condition.

⑦ **Find dangles**

The tolerance value should not be “0”, approximately between 0.01mm to 10mm on the map; as 0.5m to 500m on the ground. In case of value “0” cannot find any error however the large value setting might be increased error of normal element. As for this value should be depended vertex interval of stereo plotting line condition.

⑧ **Connect continuous line work**

No apply value

⑨ **Find slivers**

The value which is ratio of length to width might be depending on liner elements situation. It is necessary to closely examine however it might be able to be detected by other function.

**Notice:** when used tolerance value, it shall be checked and edited with eye observation.

If the elements are applied to auto repair, delete, merge it will be brought to failure results.


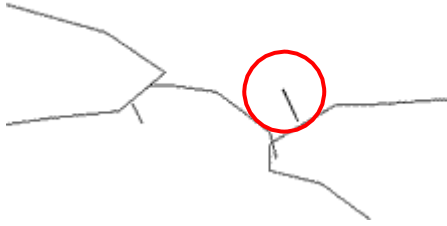
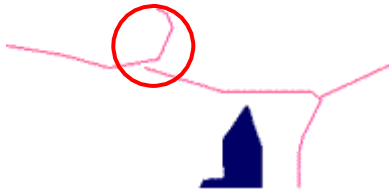

4-3 Order of Topology clean up actions

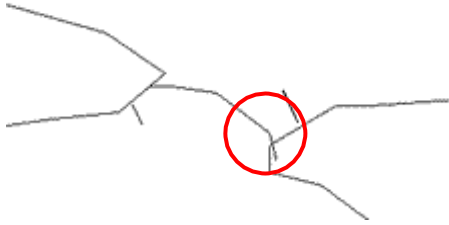
- The order of cleanup actions can produce different results. Specify the order by moving cleanup actions up or down in the list. The action at the top of the list is performed first.
- Errors should be fixed before a topology creation. The following table indicates data errors that should be considered when you are creating a network or polygon topology.
- *Point topologies do not usually require cleanup.*

Error	Network Topology	Polygon Topology
<b>duplicate linear elements</b>	Must remove	Must remove
<b>line network fragments</b>	Check for validity (over, under pass) Can remove	Can remove

<b>Segment linear elements</b>	Must remove	Must remove
<b>Find gaps</b>	Must remove	Must remove
<b>Connect line work</b>	Can remove	Can remove
<b>Find dangles</b>	Check for validity. Can remove	Must remove
<b>Thin linear elements</b>	Can apply	Can apply
<b>Segment linear elements</b>	Must remove After applied <b>Connect line work</b>	Must remove After applied <b>Connect line work</b>

<Appendix>

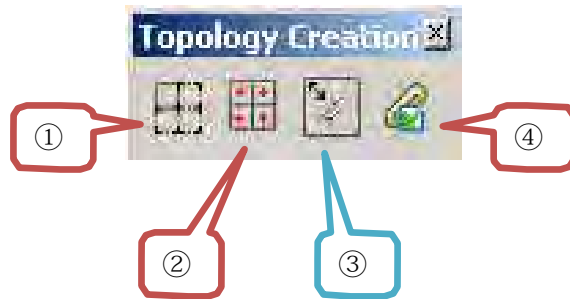
Classification	Figure	Remarks
Duplication		There are some lines on the same position.
Short Elements (Include 0 length)		Use tolerance setting for the map scale.
Gap		Use t tolerance setting for the map scale.
		Use t tolerance setting for the map scale.

Classification	Figure	Remarks
Dangle	 A diagram showing a network of lines. A red circle highlights a specific feature where a line segment is connected to the main network at only one end, representing a dangle.	Use t tolerance setting for the map scale.



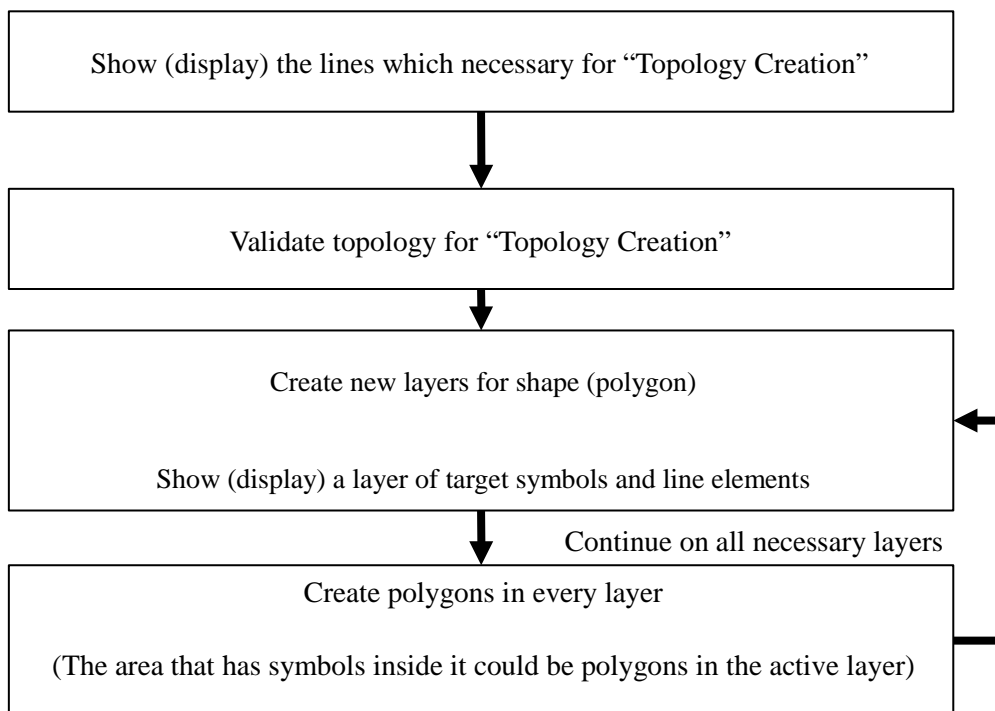
## 5. Create Topology

Open tool boxes “Topology Cleanup” and “Topology Creation”.



1. **Create shape elements from boundaries and centroids**
2. **Create centroids from other elements**
3. *Associate linkages*
4. **Validate topology**

Work flow of “Topology Creation” concept



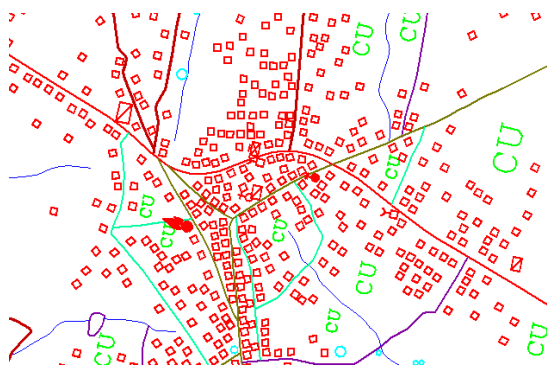
**Notice:** The object elements should be enclosed by Fence before the Tool running.

## I. Show (display) the lines which necessary for “Topology Creation

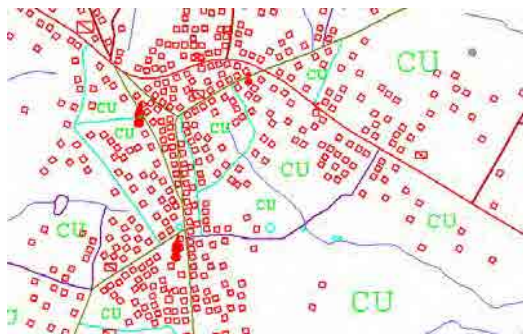
### 1. Rotate cell to right angle

Cells which are not required angle such as vegetation, school, hospital, other remarkable point symbols etc. should be rotated right angle “90 degree” from bottom neat line.

- ✓ Action: Select cells by using attribute selection then change their attribute of angle to “0” degree in “Elements information window.”
  - House symbols and the cell need rotation shall not be rotated right angle.



**Fig 1 rotated cells**

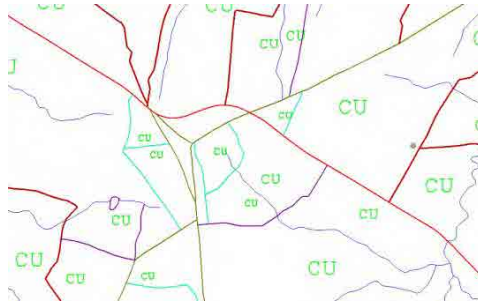


**Fig 2 after rotation**

### 2. Turn off the unnecessary layer for “Topology Creation”

Cells and any elements such as school, hospital, and other remarkable point symbols etc., line elements which are unnecessary for shape (polygon) creation must be turned off its layer.

- ✓ Action: display off in “Level Display “window or click on target element by using “Change level”.
- ✓ Other: create “layer filter” for “Topology Creation” before working, it can reset display status at once.



**Fig 3 after display off layer status**

## II. Validate topology for “Topology Creation”

1. Make layer for validations text in “Level Manager” then the layer change to active one.
2. Set appropriate text size for validations such as 25m-50m or any for fit map scale.
3. Check again that shaped elements must be dropped and all elements elevation value must be “0” m.
4. Set fence as enclose the element
5. Click “Validate Topology” icon

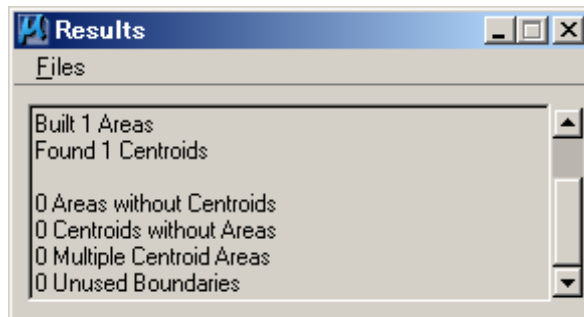


**Fig 4**

6. Retouch elements according to result of validation error code

Code	Meaning
multA	the centroid has multiple associated Areas
multC	the polygon has multiple associated Centroids
noA	the centroid has no associated Area
noC	the polygon has no associated Centroid
unuB	“unused” Boundary element (not used to close a polygon)

7. Repeat “5” to “6” up to completion of no detected.



**Fig 5 non detection of error**

**III. Create new layers for shape (polygon) and show (display) a layer of target symbols and line elements**

1. Create new layers for each shape (polygon) elements such as \*\*\*\*poly, \*\*\*\*f whatever then it must be set active layer.
2. Show only a target centroid layer and all line elements layers. If two or more centroid layer is showing the polygons must be created as mixed into a target layer.
3. The theory is one centroid layer must be fit on one polygon layer.
  - ✓ Action: layer "On, Off", Create new layer by using "Level manger"
  - ✓ Place fence, Create shape.

**IV. Create polygons in every layer (The area that has symbols inside it could be polygons in the active layer)**

- Work "III "is repeated up to completion.

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# POLYGON MAKING

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Usage of Bentley  
MapV8i

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2012/07/30

## A-Polygon making (using Bentley MapV8i)

### 1. Purpose

From these lines, cells elements to

Fig 1

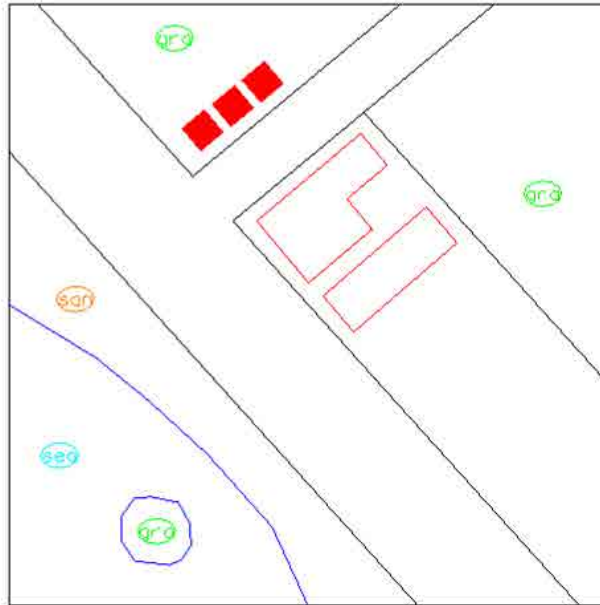
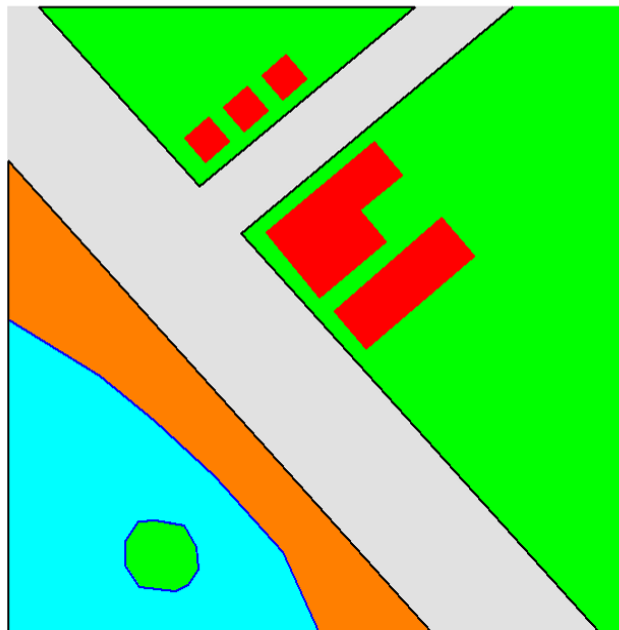


Fig 2

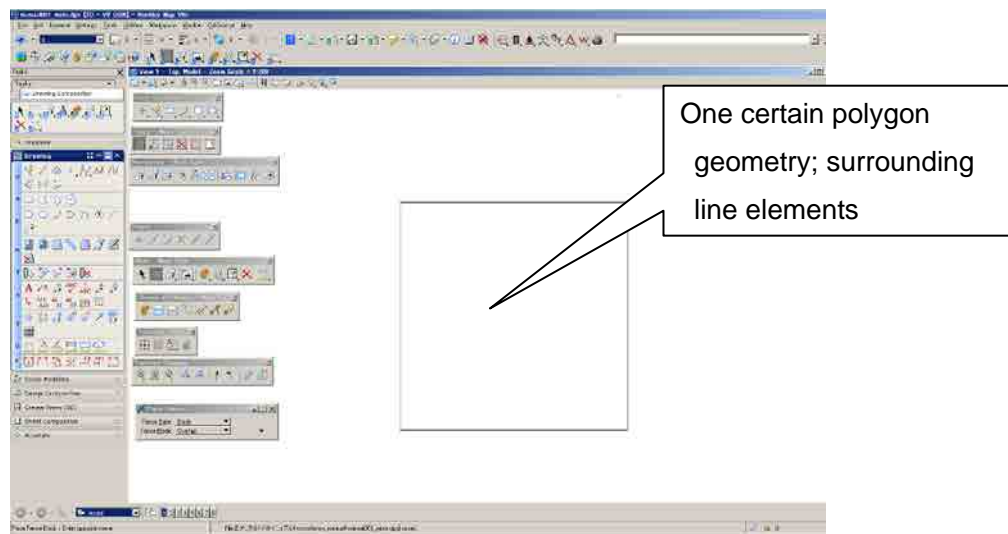
To result each polygons creation



### 2. How to make polygon – Basic –

- i. When making polygon, it is needed geometry which is surrounding line geometry (line) and a cell or a point is placed into the enclosed line geometry. This cell or point situation is called Centroid.

**Fig 3**



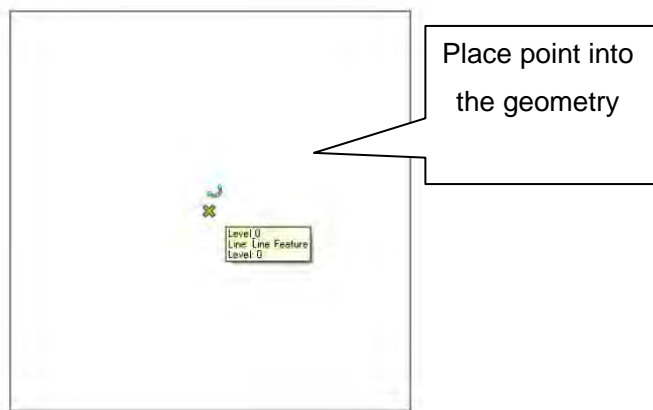
**Fig 4**

- ii. Click "Place Active Point" from Base Geometry tool bar



**Fig 5**

- iii. Click the inside of the enclosed line geometry then place a point.



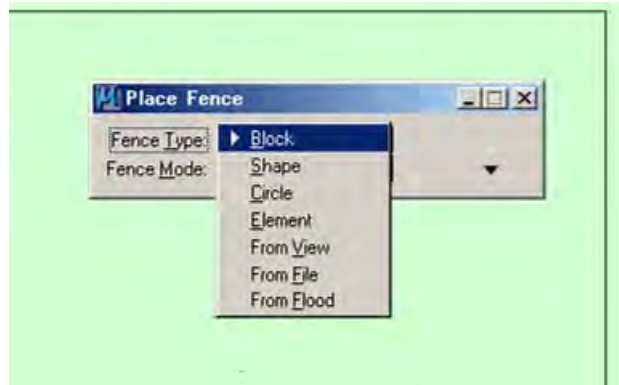
**Fig 6**

- iv. Click "Place Fence" from Fence- Main Task tool bar



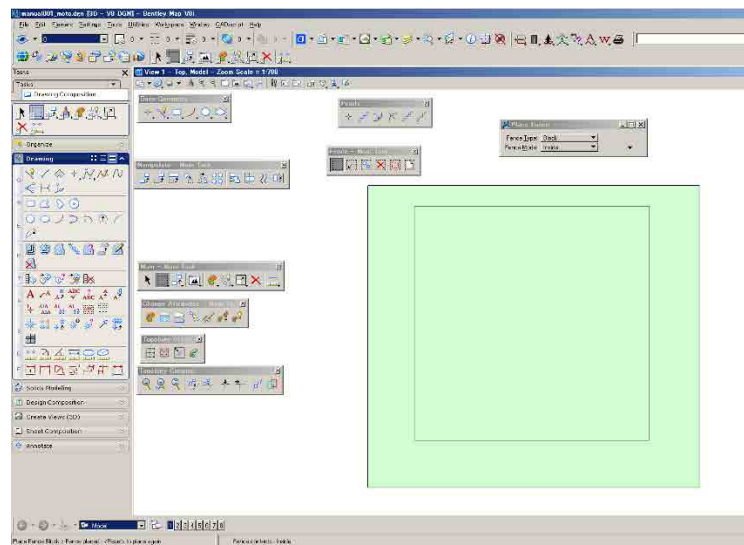
**Fig 7**

- v. Select "Fence Type to Block" then Select "Fence Mode to Inside " from "Place Fence" pull down menu



**Fig 8**

- vi. Place "Fence" as enclosing line geometry



**Fig 9**

- vii. Tools from menu bar>Geo Spatial>Topology Creation then select "Topology Creation"





**Fig 10**

viii. "Topology Creation" will open



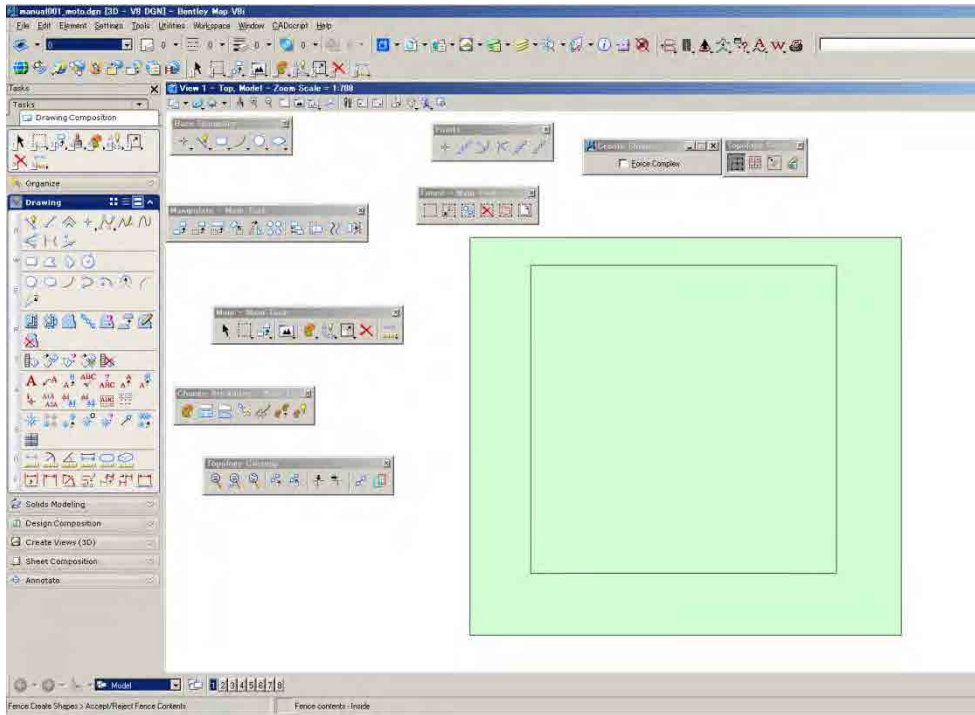
**Fig 11**

ix. Click "Create Shapes"



**Fig 12**

x. Then Click in working window (Accept)

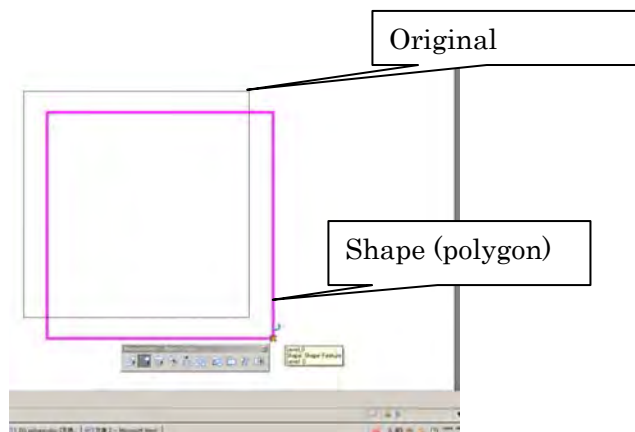


**Fig 13**

➤ When it has created polygon, it will be shown as “Created 1 shapes” in bottom message window. The polygon is called “shape” in the Microstation. The Shape (polygon) is coincident original line geometry, although it is apparently invisible element. Actually it selects the shape and slightly moves anywhere. Certainly you can see the created shape (polygon)



**Fig 14**



### 3. Challenge a bit complicated one

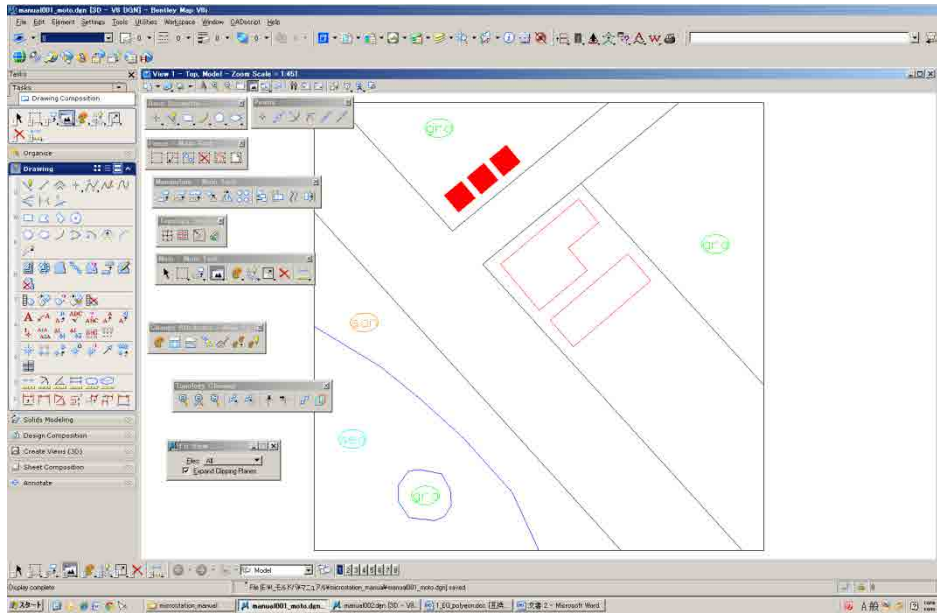
- The work flowing
  1. Line features Z value (elevation) change entirely “0”m.
  2. Beak crossing lines
  3. Place “Centroid” in the enclosed line (Area) which will be created polygon

4. Check and retouch polygon topology in order to create shape.
5. Polygon creation (shape)

➤ The elements Z value (elevation) change entirely “0”m. In case of the data has elevation value, it might not be able to be completely done topology creation and data cleaning work. As the first, before starting work, the elevation attribute of elements are set to “0”m.

**Fig 15**

Let's open manual001.dgn



### 3-1 Active Z setting

**Fig 16**

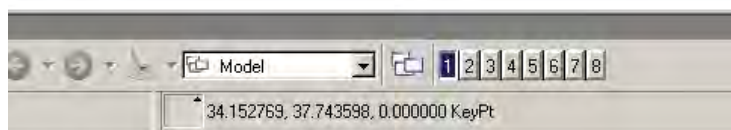
Enter “AZ=0” in “Key in” window, then “tentative click” in the working window. After that “active Z” setting, the file basement elevation will be “0”m.



- ✓ In case of checking the “active Z”, “tentative click” in the working window it will be shown the X, Y, Z coordination number in bottom message window by “tentative click” in the working window.

**Fig 17**

When “tentative click” in the working window, the value 0.000000 is telling file basement changed “0”m.

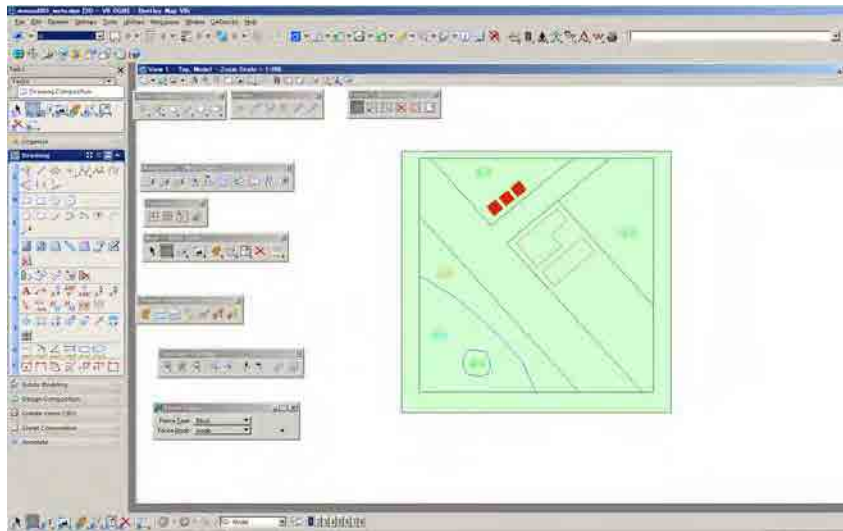


### 3-2 Chang Z value to “0”m

“Place Fence” > Fence Type select “Block “> Fence Mode select “Inside”

**Fig 18**

Place fence as window... in dragging



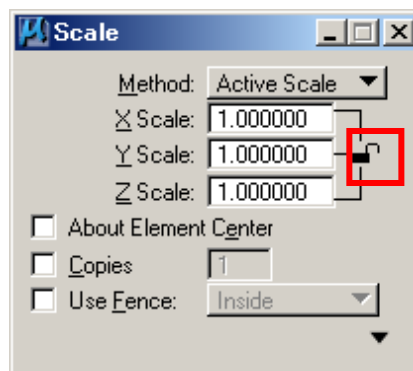
**Fig 19**

After placed fence, select “scale” from Main-Main Task



**Fig 20**

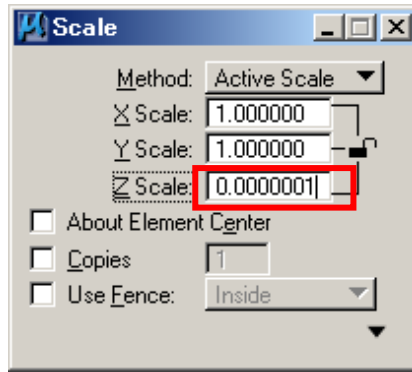
Setting the scale value X, Y, Z window, in this case it needs to change Z value, click unlock key mark



**Fig 21**

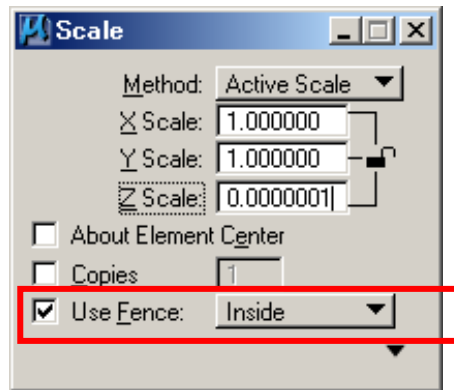
Change Z Scale value as 0.00000001, and then press return.

\*If it is not entered more than the number of below X, Y decimal point, it cannot set 0.000000 unless it finally puts in 1.



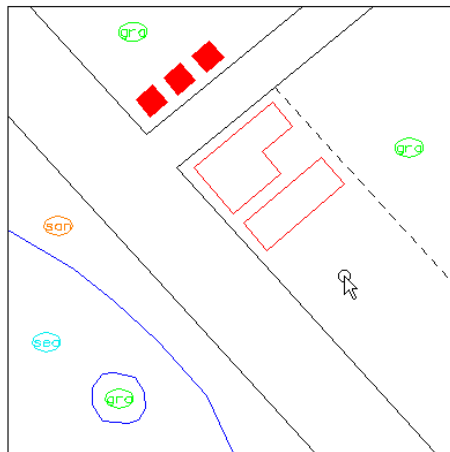
**Fig 22**

Put check mark "Use Fence" checkbox



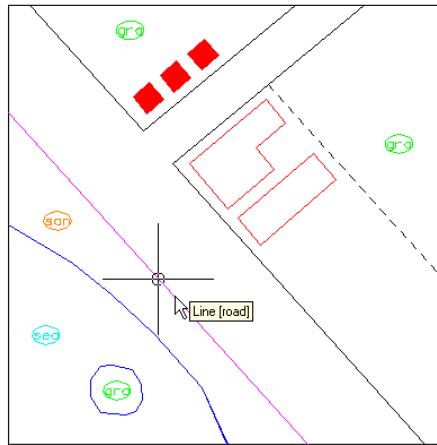
**Fig 23**

Click "left button" (accept), wait a bit then Click "right button" (reject)



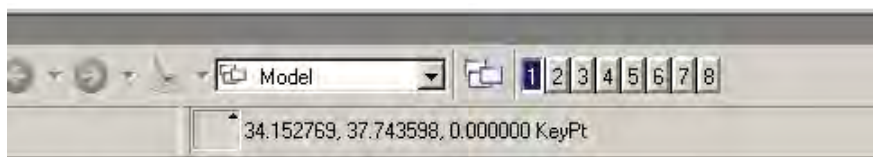
**Fig 24**

"Tentative click" (press both button) at any object, Z value will be shown in the bottom message window



**Fig 25**

Check X, Y, Z coordination number; it is a success! Now the value is 0.000000.

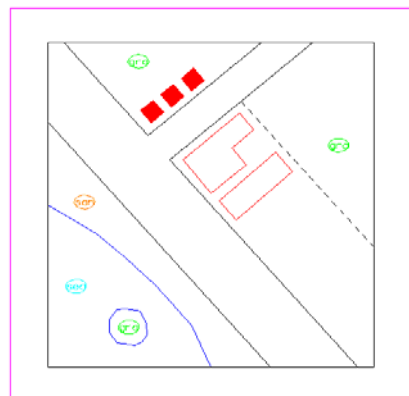


### 3-3 Beak crossing lines

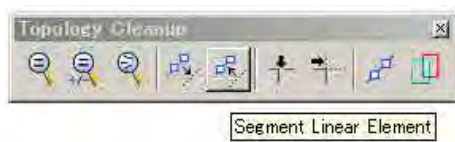
- The line breaks off at the Intersection or the contacting points

**Fig 26**

In the same procedure, enclose all element Click "Place Fence" > Fence Type select "Block " > Fence Mode select "Inside"

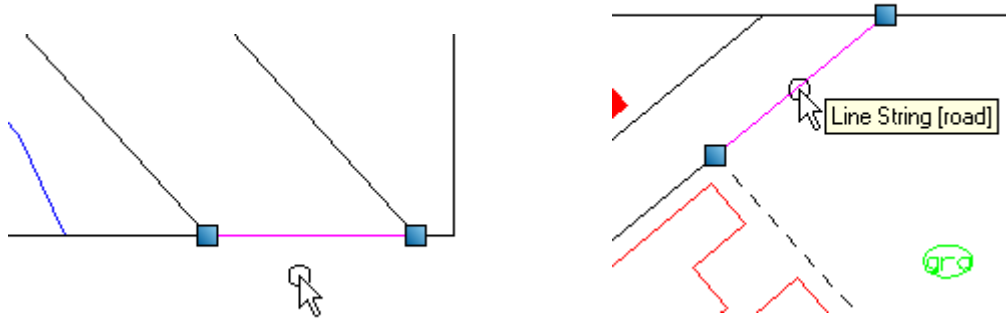


Place fence as window... with dragging'



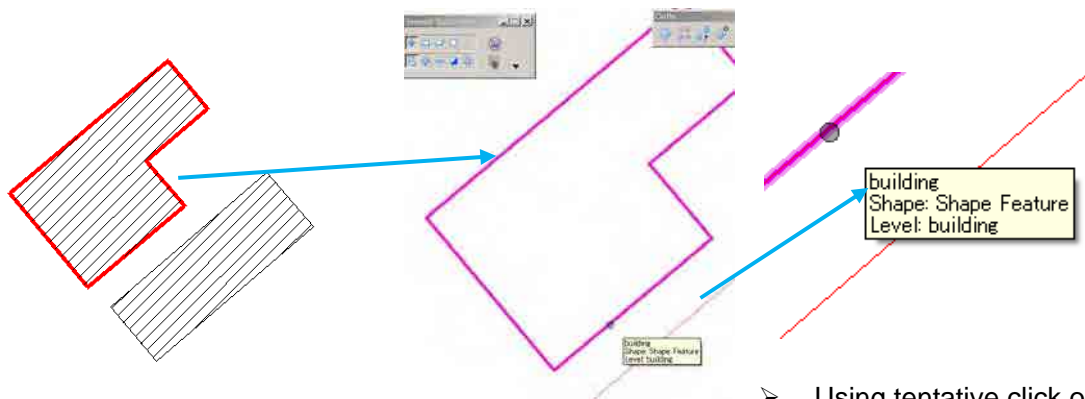
- i. "Tools " from menu bar> Geo Spatial> Topology Cleanup, select "Segment Linear Element" then click in the fence.
- ii. After accept the command, selected lines are break between intersection and to other one or contacting point. Thus, it is O.K. the lines are beaked.

Fig 27



- iii. Next, the object which is already shape is also dropped into "line string". These shape objects are mostly scale size building or small islands which were drawn with closing during stereo plotting. Since it is already shape--*it might be OK itself*—however if "fig 29" is as, if scale size building has been remaining "Shape object" it will be troubled variously.

Fig 28



➤ Using tentative click on element or

to bring selector near element, it can see what is element attribute/  
Above "fig 29" element is "shape" element.

As for ground feature under the lower part in sample data; *island in open water area* will be created as doughnuts polygon. Therefore the shape objects have to be dropped into line object before topology creation.

Fig 29



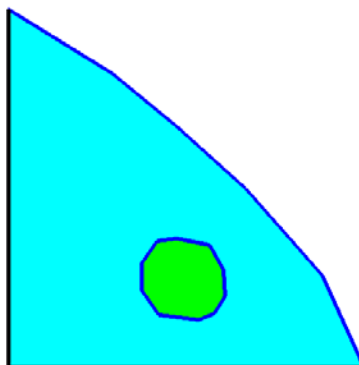




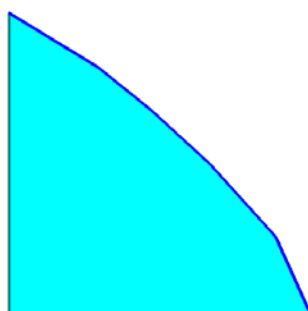
- For example, the open water area has “sea” cell (symbol) is the sea, the island has “Gra” cell.

In this sample data, island area is shape element now, -----

- i. It needs to create doughnuts polygon like this----



- ii. However it will become like this (the doughnut part is not made) because island is still shape element.



- Before polygon topology creation, the shape elements shall be dropped.

### 3-4 Drop shape object

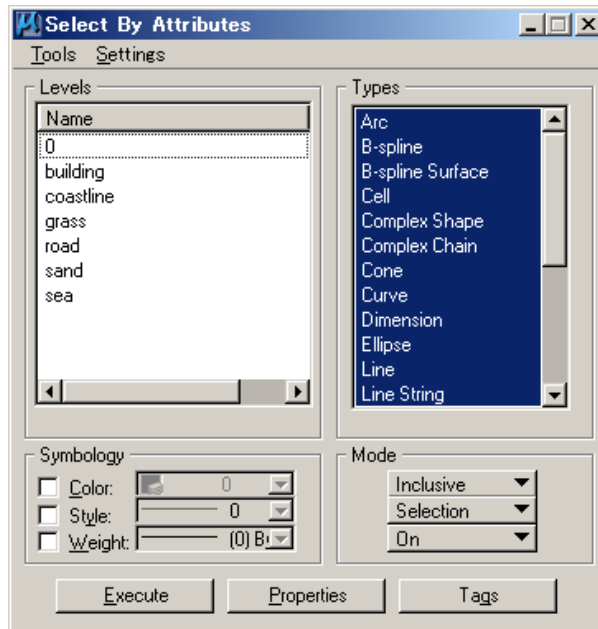
Select only shape elements in working file.

Tools from menu bar> Edit > Select by Attributes

#### Fig 30

Open “Select By Attributes”



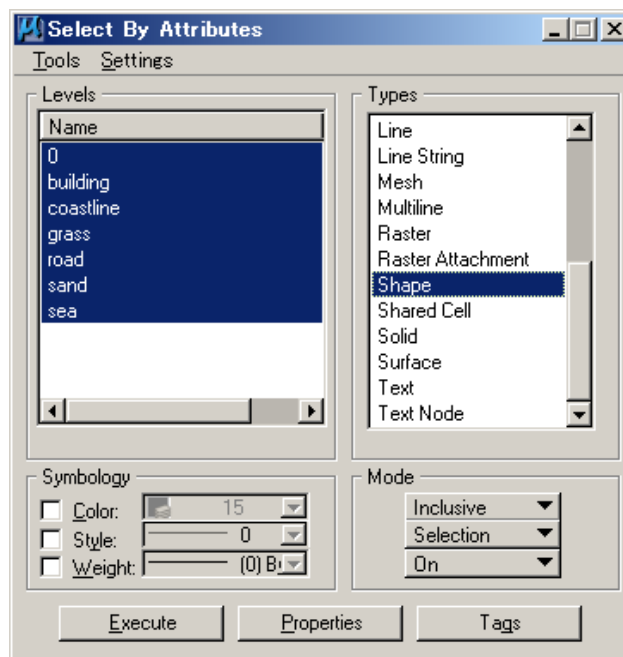


**Fig 31**

Select all names of Levels in the left window, Select type of “Shape” in the right window.

Then click “Execute” after that it will be selected only shape object in this data.

- Level selection status is not always same; it might be changed by case by case and selection purpose.



**Fig 32**

Select “Drop Element” from Main-Main Task drop Element



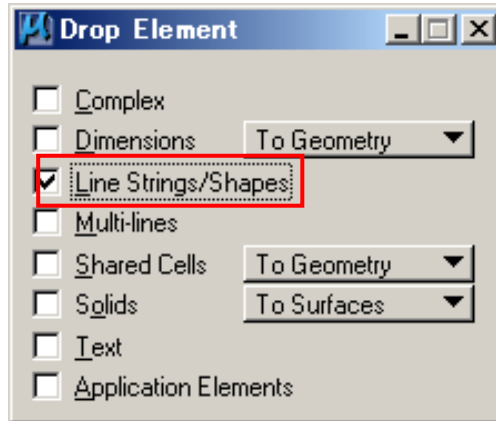
**Fig 33**

Drop Element will appear

By a default, there is no check mark despite Line Strings/Shapes.

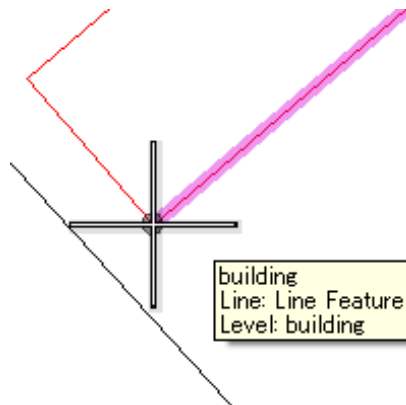
A check is put in box. Then clicks in the work window and elements will be dropped

Above building and island coast line are changed each segmented line.



**Fig 34**

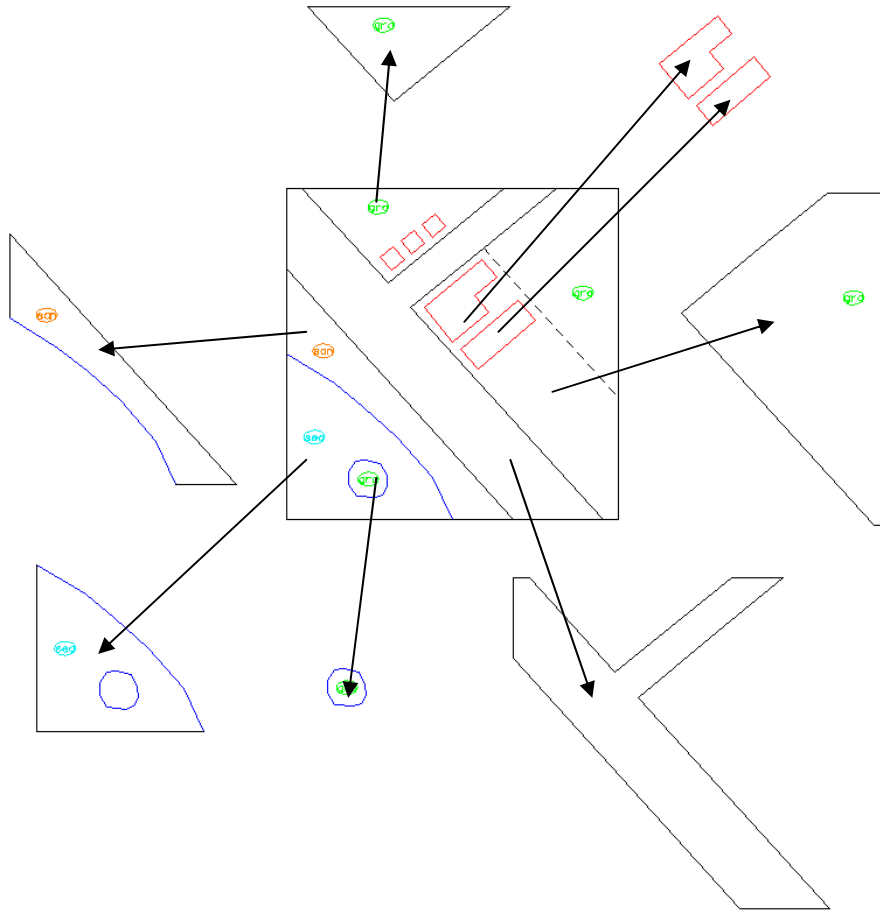
After dropped shape element, tentative click on the dropped element will be shown element attribute which is became line elements.



### 3-5 Place Centroid

**Fig 35**

The purpose is finally to create such as following below “Shape “elements.  
One “shape” object must have one “centroid”



**Fig 36**

From menu bar Settings > Level > Display select Level Display then it will be opened the Level Display widow. Or short cut key “clothe”. To be placed point (centroid), double click on “road\_point” layer. It will be turned green hi-light to “active level”.

Name	Num	Color
0	0	0
building_line	4	3
coast_line	2	1
Default	0	0
grass_point	5	2
road_line	3	0
road_point	1	0
sand_point	6	6
sea_point	7	15

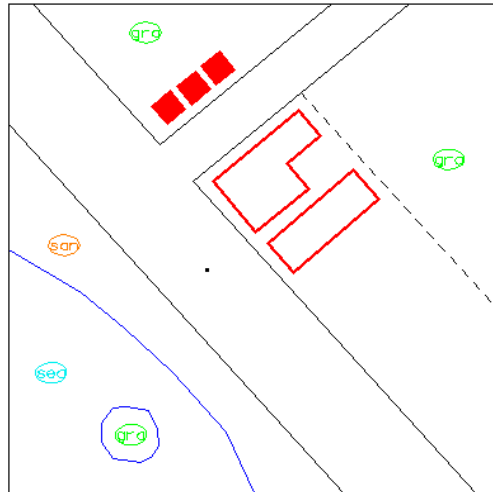
**Fig 37**

Select "Place Active Point" Click it is placed point into any inside of road.



**Fig 38**

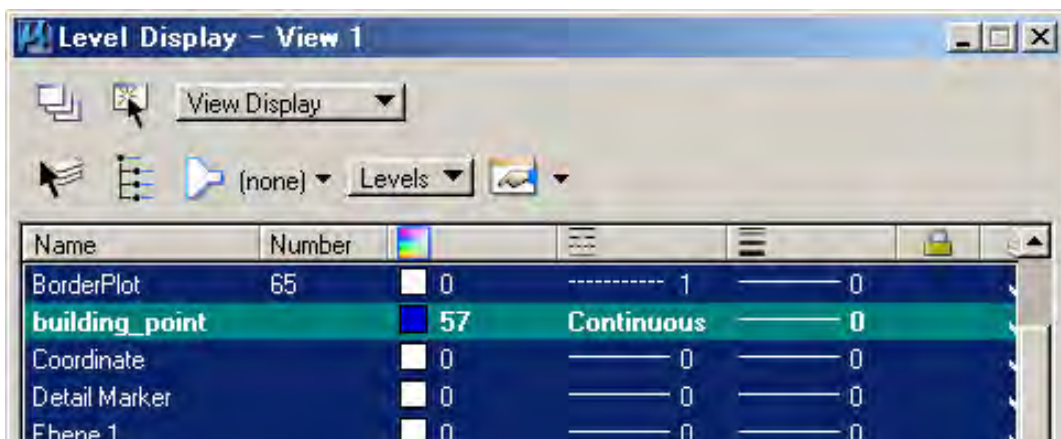
For example, this point is as centroid for road shape (polygon)



- In case of few numbers objects, it can place point one by one. When the file has many of topology elements, it can automatically process. In case of these scale size building can use automatic process.

**Fig 39**

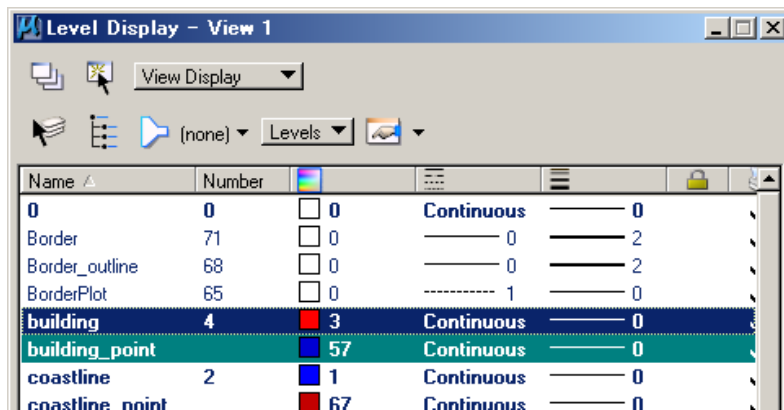
The building features are drawn in building\_line level however point is as centroid should be place into building\_point level.



**Fig 40**

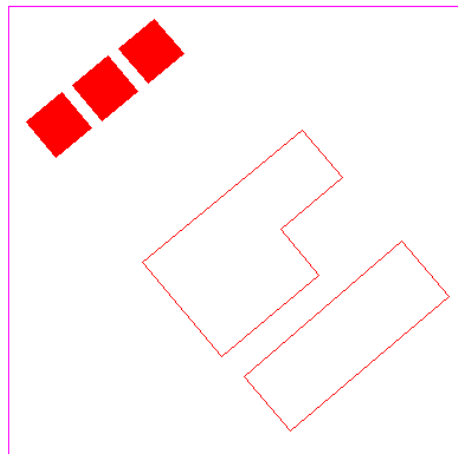
Turn off other level then turn on only the building layer.

The small building symbols are also accommodating in the same level however they can be left. The centroid to be made from now will be created into enclosed line string objects which will be shape element.



**Fig 41**

Enclose all elements by fence without having to worry about.



**Fig 42**

Next select "Create Centroids"



**Fig 43**

"Create Centroids" dialogue window will open.

Change "Mode" to Boundary

Change "Type" to Zero Length Line

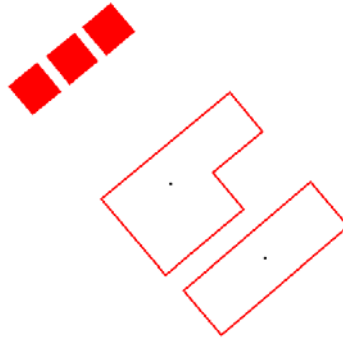


- \*Although Zero length line (the line is exactly coinciding starting point to end point) is called “point” in Microstation.

**Fig 44**

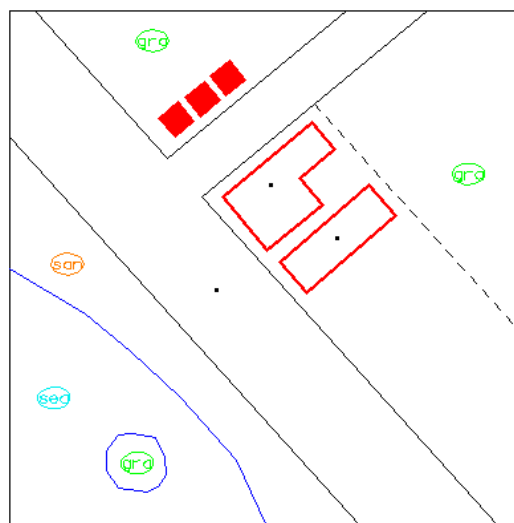
Click in the working window

The point (centroid) was made. Upper left symbol buildings (cell) are not made point inside it here.



**Fig 45**

The data looks like below. So fur

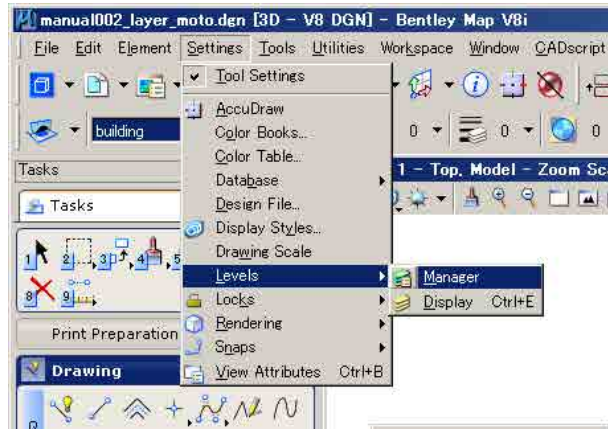


#### 4. Check and retouch polygon topology

Check and retouch polygon topology work must be required.

**Fig 46**

Create new level which for the check result (mark) will be written. Settings> Level> Manager, then open Level Manager. Or right button click on the Level display then select Level Manager from pull down.



**Fig 47**

Click “New Level”, make new level.



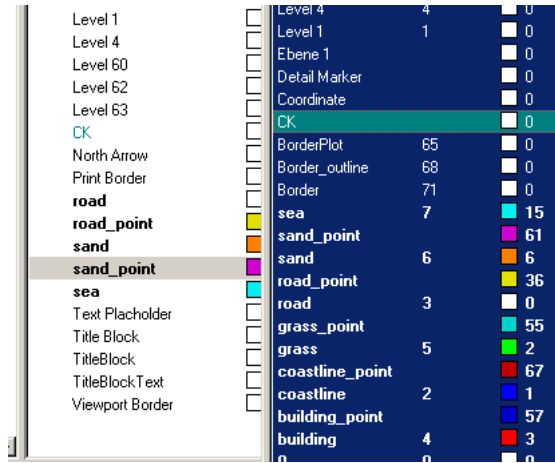
**Fig 48**

Change the name New Level(0) to as enter “CK” ( level name might be as you like)  
 Then close Level Manager, double click level “CK” on the Level Display it be active level.  
 Level Manager might be closed or left.

Detail Marker	<input type="checkbox"/>	0	0	0	✓
Ebene 1	<input type="checkbox"/>	0	0	0	✓
<b>grass</b>	<input checked="" type="checkbox"/>	2	<b>Continuous</b>	0	✓
<b>grass_point</b>	<input checked="" type="checkbox"/>	55	<b>Continuous</b>	0	✓
Level 1	<input type="checkbox"/>	0	0	0	✓
Level 4	<input type="checkbox"/>	0	0	0	✓
Level 60	<input type="checkbox"/>	0	0	0	✓
Level 62	<input type="checkbox"/>	0	0	0	✓
Level 63	<input type="checkbox"/>	0	0	0	✓
<b>New Level (0)</b>	<input checked="" type="checkbox"/>	0	<b>Continuous</b>	0	✓
North Arrow	<input type="checkbox"/>	0	0	0	✓
Print Border	<input type="checkbox"/>	0	0	0	✓
<b>road</b>	<input type="checkbox"/>	0	<b>Continuous</b>	0	✓

**Fig 49**

Then, check all elements as one trial.  
 Enclose all elements “Place Fence”



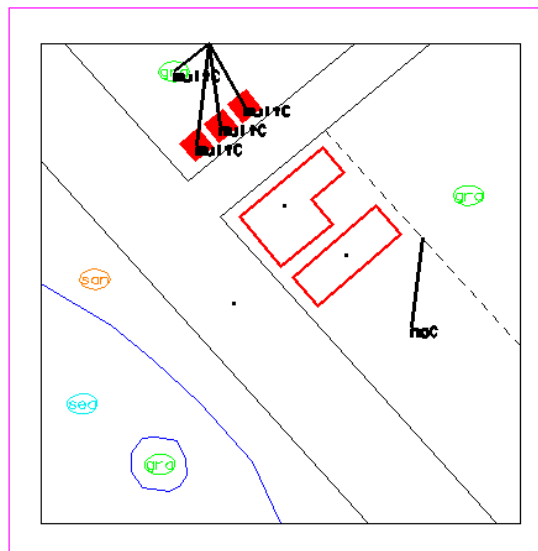
**Fig 50**

Select "Validate Topology" from Topology creation, click in the working window.



**Fig 51**

Select "Validate Topology" from Topology creation, click in the working window.

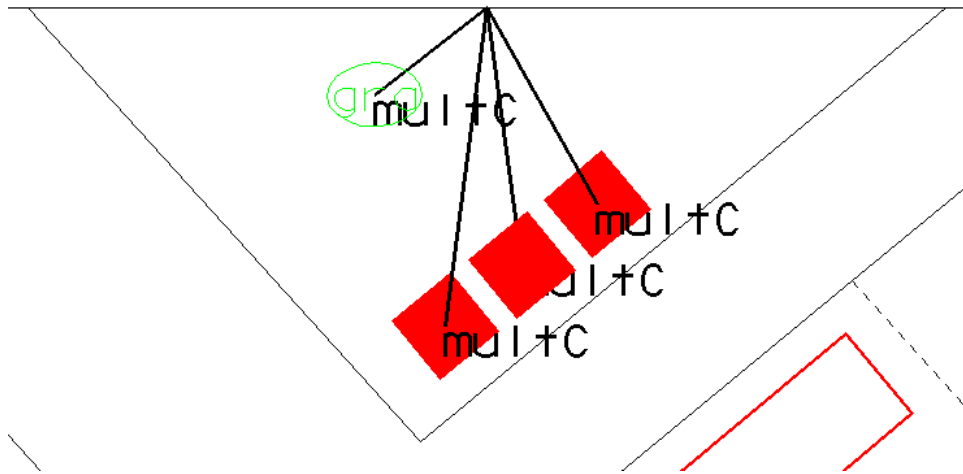


**Fig 52**

It might be such like error marks are written in level Ck.

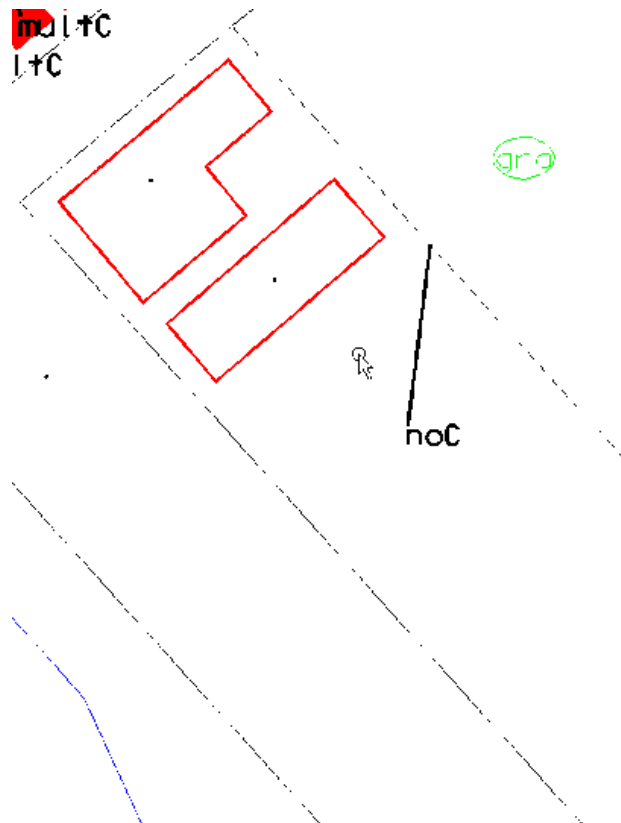
For example, it is error "multC" made two or more "Centroids" (cell) were in the area which has a triangle here.





**Fig 53**

This "noC" is...It is showing "noC" that the area has not contained any "centroid".



There are kinds of error other than the above-sample error.

\*Following below list.

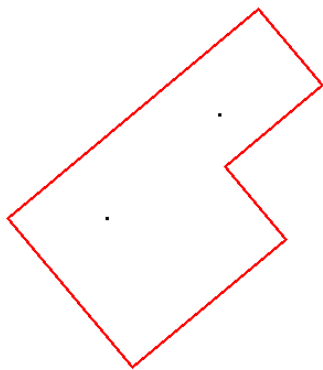
Fig 54

Code	Meaning
multA	the centroid has multiple associated Areas
multC	the polygon has multiple associated Centroids
noA	the centroid has no associated Area
noC	the polygon has no associated Centroid
unuB	"unused" Boundary element (not used to close a polygon)

- ✓ **multA:** There is nothing not much.
- ✓ **multC:** it will be many as errors. There is two or more "centroid" in the area. Show sample

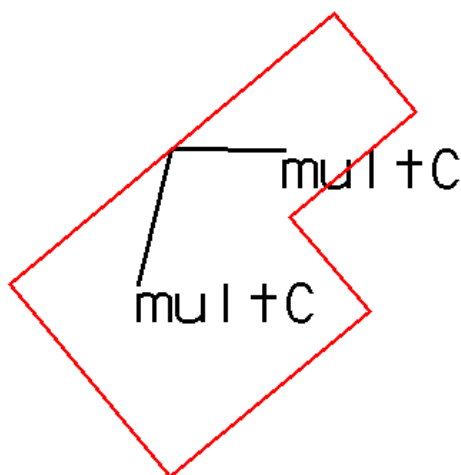
as following

Fig 55



\*In this case, tow centroid are in the area.

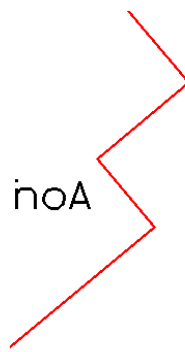
Fig 56



The error mark is such like "multC"

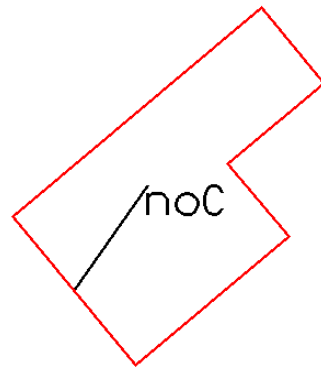
Fig 57

- ✓ **noA:** When it marks line inside feature which the area is incomplete, it will have to enclose for the "centroid"



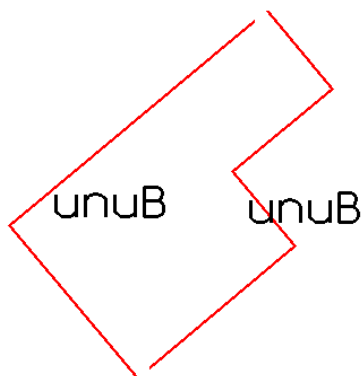
**Fig 58**

✓ **noC:** When there is not any "centroid" into the area.



**Fig 59**

✓ **unuB:** It comes out to incomplete boundaries line which is not consisted any polygon



**Fig 60**

✓ It is such a pattern that it is often.

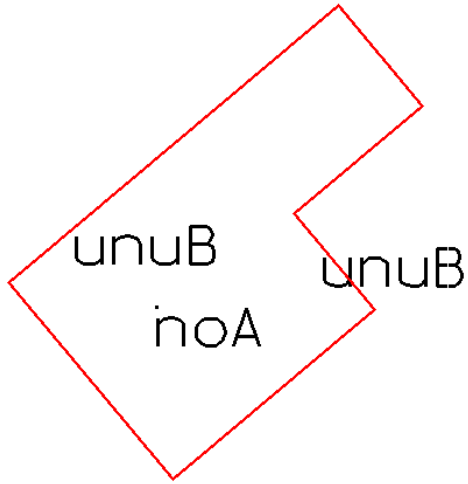


Fig 61

✓ Although, the line and centroid also seems to be completed apparently----

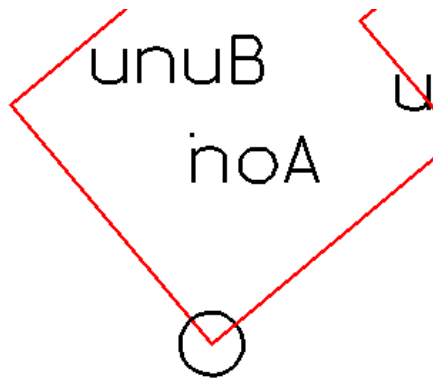
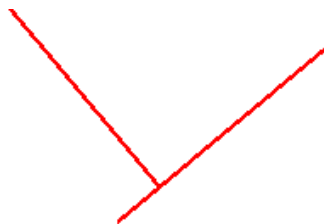


Fig 62

✓ If the portion of a circle is zoom in....

Being such as this....However it will be detected such like error from finished data cleaning data.



## B-Create Polygon

### 1. Then trial, Let's actually create polygon

1-1 First trial is; Create building polygon from scale size building line.

1-2 The level (layer) which for creates shape must be as each map object item

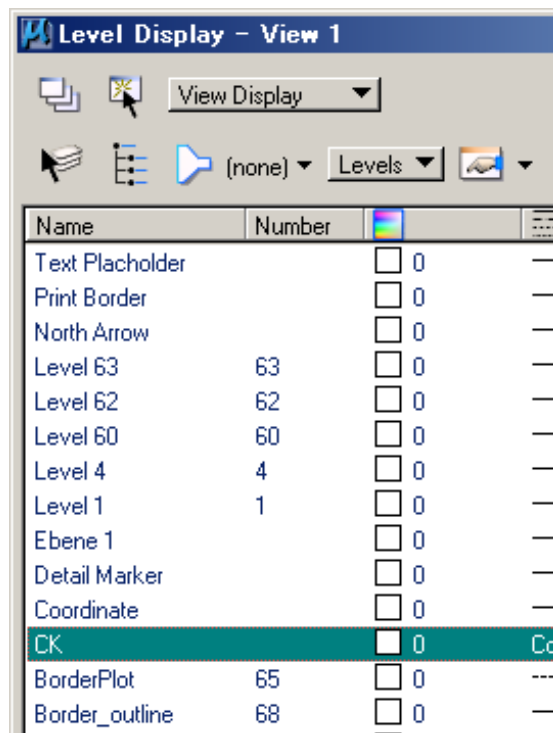
1-3 In order to make shape to the corresponding layer, it is displayed only the layer of a (line), (point), (poly);  
(Here, they are building\_line, building\_point and building\_poly).

1-4 It checks first. "Level CK" turn to active layer.

1-5 Error result will be written into "Level CK"

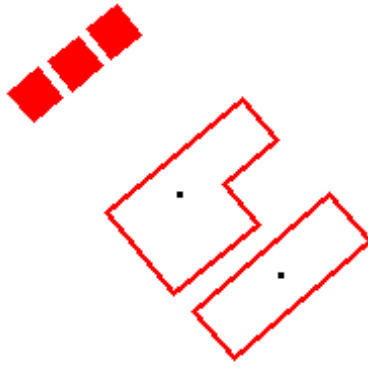
1-6 In this case, other level are turn off displaying. (Only target layer is displayed.)

**Fig 63**



**Fig 64**

➤ It thinks in the working window as such like view. 1-6 other levels are turned off displaying. (Only the layer required for work is displayed.)

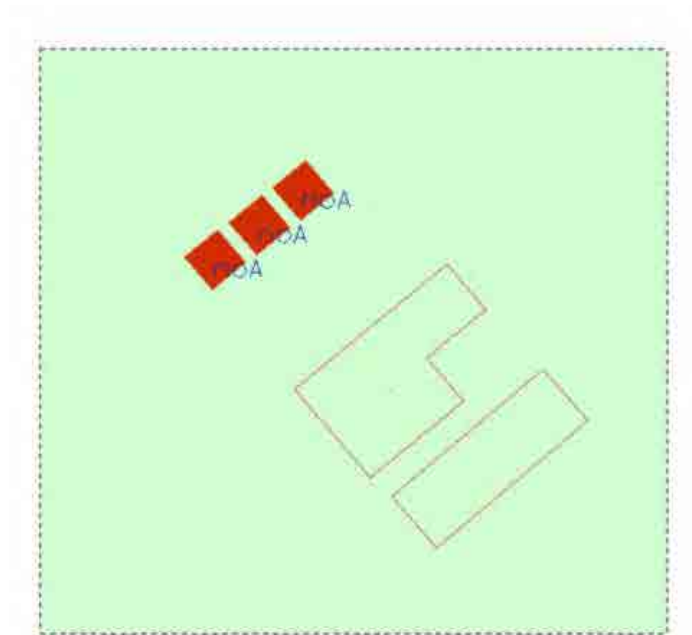


**1-1 Go to check.**

“Place Fence” select “Validate Topology” then click in the working window

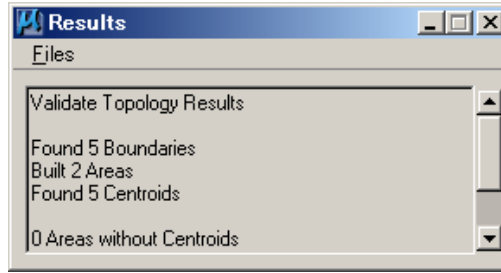
**Fig 65**

In this case “noA” will be nothing to be features because of the cell element itself. Delete “noA” directly. As for this case “nothing to do any” , “unnecessry to do any”, “not need to retouch” are called as “OK error”.



**Fig 66**

The three building symbol (cell) are detected “noA” as error which as centroid has not its boundaries. After “Validate Topology” error marks will be placed at the features and Results window is shown detail of error information

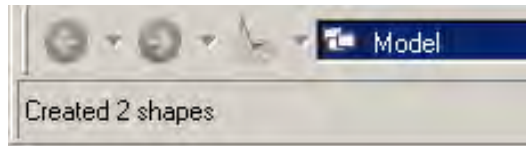


**1-2 Go to create polygon (shape)**

- Change active level to building\_poly, the place fence, next as following...
- Select "Create Shapes" from Topology Create tool box, then click in the working window

**Fig 67**

When after created polygon, it is shown as "Created 2 shapes" in bottom message window.



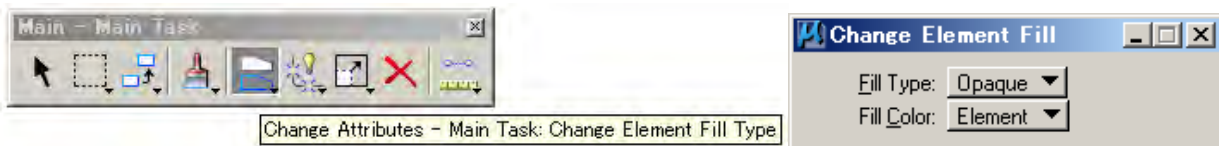
**Fig 68**

Display only building\_poly level,

Detail Marker		<input type="checkbox"/>	0
Coordinate		<input type="checkbox"/>	0
CK		<input type="checkbox"/>	0
<b>building_poly</b>		<input checked="" type="checkbox"/>	<b>38</b>
BorderPlot	65	<input type="checkbox"/>	0
Border_outline	68	<input type="checkbox"/>	0
...	71	<input type="checkbox"/>	0

**Fig 69**

Change elements fill type to opaque



**Fig 70**

- Try to fill shape in color. Select the shape as enclose with cursor.
- Select from Change Attributes – Main Task > select Change Element to Active Fill Type



**Fig 71**

By a default, since Fill Type is none, it changes into Opaque. Although Fill Color can also be chosen, it is as ByLevel here.



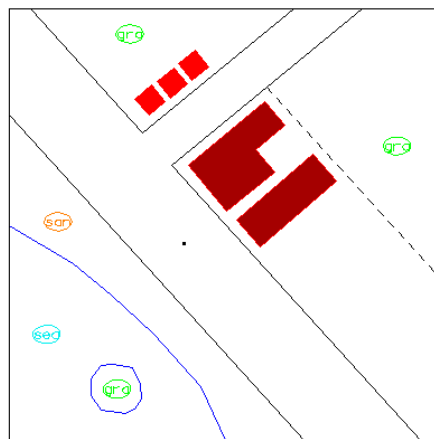
**Fig 72**

The shape (polygon) is filling color which is by level's setting then display all.



**Fig 73**

It is such like so far....

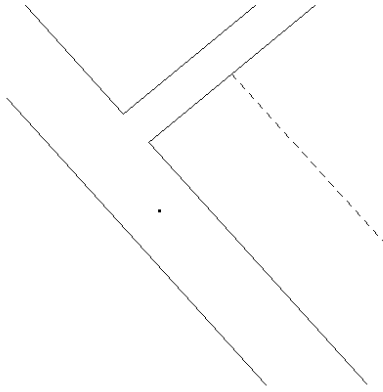


**1-3 Next, create road polygon(shape)**

**Fig 74**

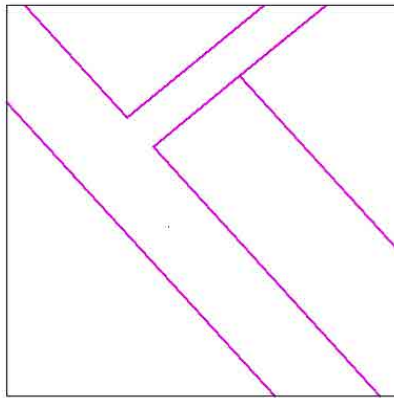
If only display road related level when as building polygon making...





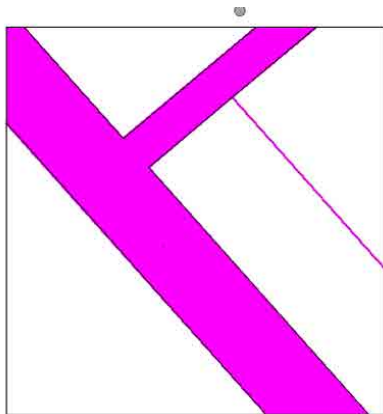
**Fig 75**

It will become like this...It have to be enclose the road by using outside line (neat line) Turn on neat line level



**Fig 76**

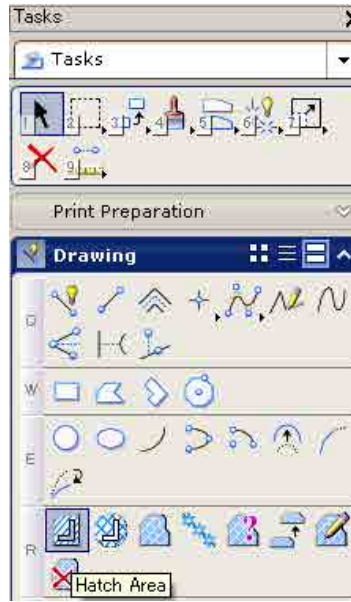
- i. Enclose window "Place fence", select create shape. Filling color same as building polygon creation.



**Fig 77**

Use hatch in the shape

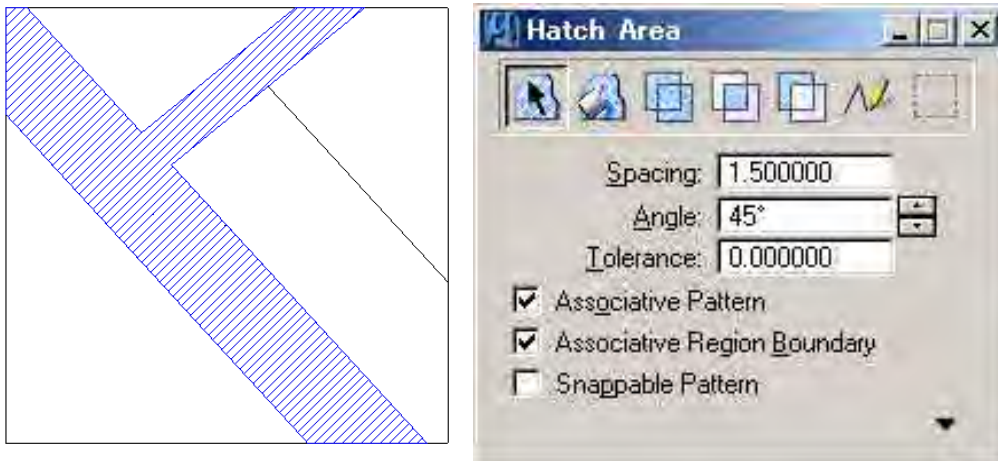
From "Task">Drawing>most left side icon in R window in "Tasks">Hatch area



**Fig 78**

Hatch setting, in this case

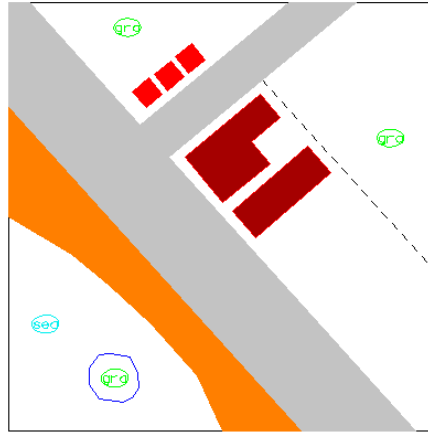
Spacing 1.5, angle 45 Then click on target element, it will be hatched.



**1-4 Try to create sand polygon (shape)**

**Fig 79**

Make level "sand\_poly" for sand shape (polygon)

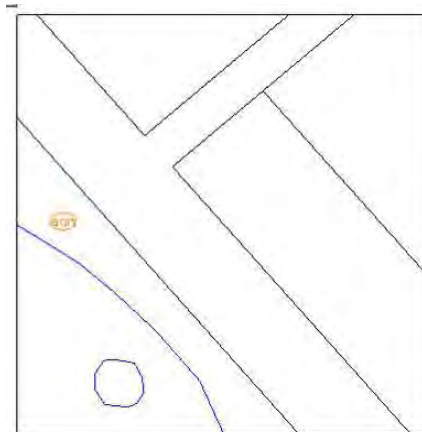


**Fig 80**

Turn on “sand level”, the sand level has only symbol (cell).



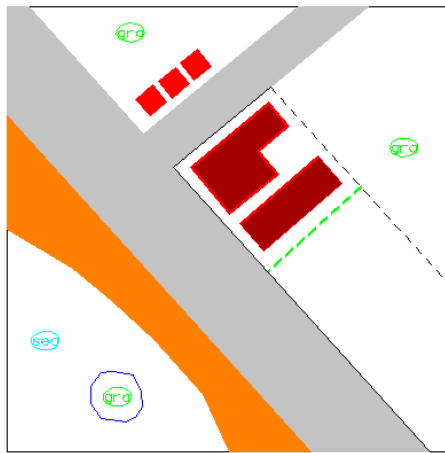
- i. Turn on other level which are consisting the sand boundary.
- ii. “Place fence”, select create shape same as other’s created
- iii. After making polygon, filling color or non filling if it need.



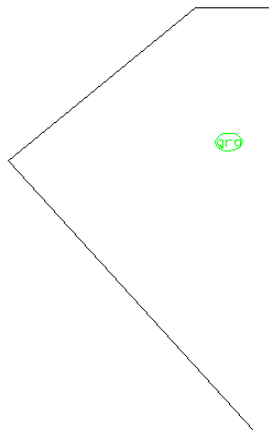
**1-5 Next, try to create grass\_polygon (shape)**

- How to make is same, however there are partly with attention.

In the chapter 4 Check and retouch polygon topology when it was first checking (validate topology).

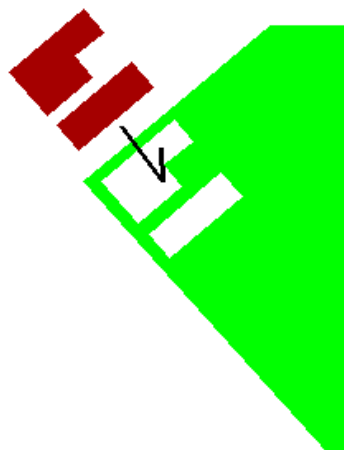


- It needs to draw vegetation line or some feature's line, if in case.



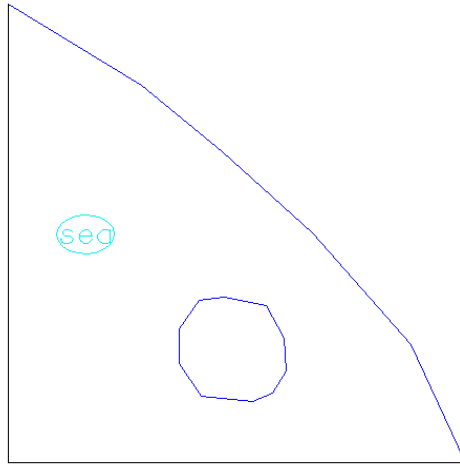
- If this upper area is as grass vegetation, it needs to check one more thing.

The grass vegetation will be required doughnut shape which should be extracted scale size building shape before creating polygon.

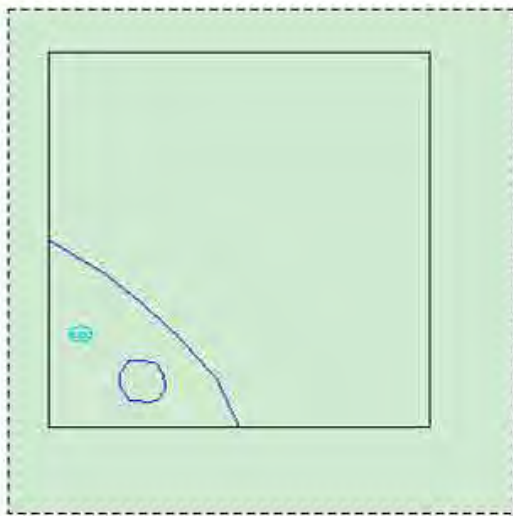


#### 1-6 The last is sea\_poly

- Although it is doughnut –like shape,



- Turn on “sea level” and neat line level. “Place fence”, select create shape



- Polygon complete .Fill in color

