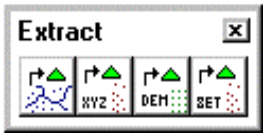
Extract Tools

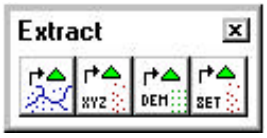
4.1 Overview

Feature / Function	From the Digital Terrain Model main tool frame, invoke a variety of DTM extraction tools.
Tools	

The Extract tools create source-input files for the GEOPAK DTM from MicroStation graphics (Extract) or several types of ASCII files (ASCII). DEM files can also be utilized. These source-input files are the basis for creation of the triangulated models.

Another option utilized during the extraction process is stroking, the process of automatically adding shots to the DTM Input file by interpolating new vertices from linear and curved break lines. A complete discussion of this feature can be found in the previous chapter.

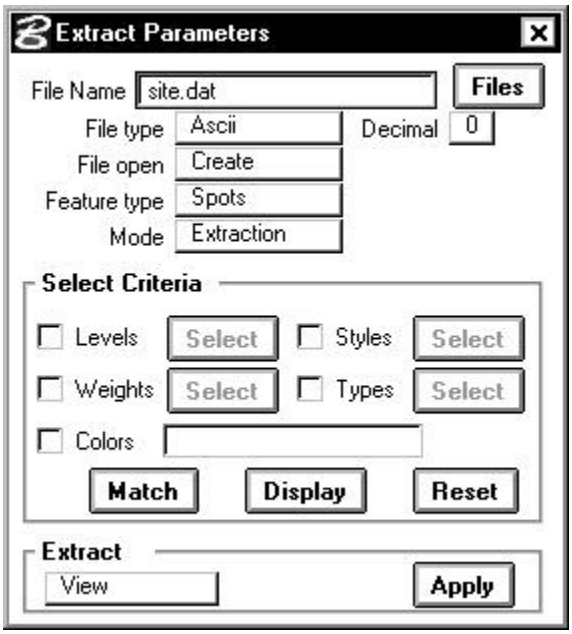
4.2 Extraction of Graphic Elements

Feature / Function	Utilizing graphic data, create a source input file for subsequent DTM model generation.
Tool 	
DTM Menu Bar	Extract > Extract Graphics

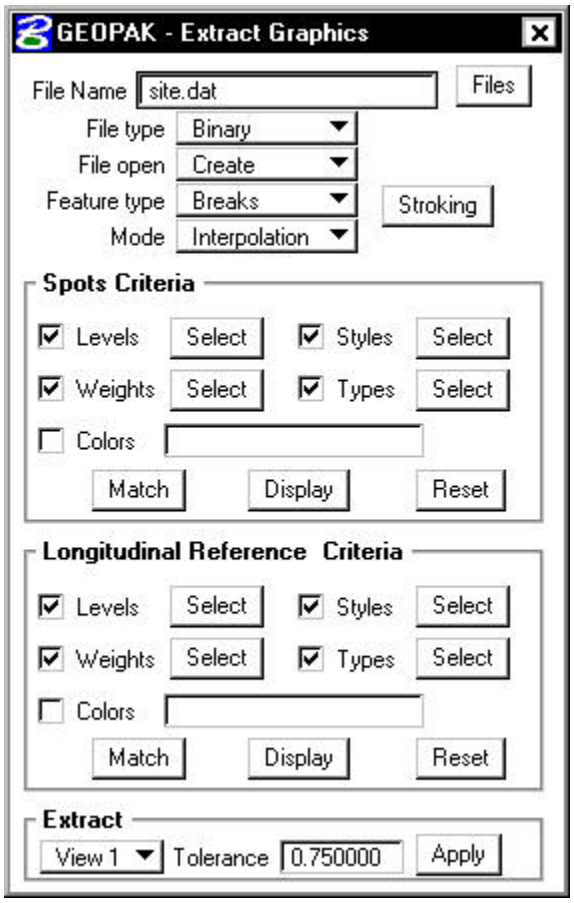
Graphic elements in MicroStation 2D or 3D files can be extracted.

Note: Extraction of elements of specified parameters include all elements visible in the view, with the fence or within a selection set, whether the elements are in the active file or reference files (with locate activated).

A view of the Extract Parameters dialog for the Extraction mode is shown below.



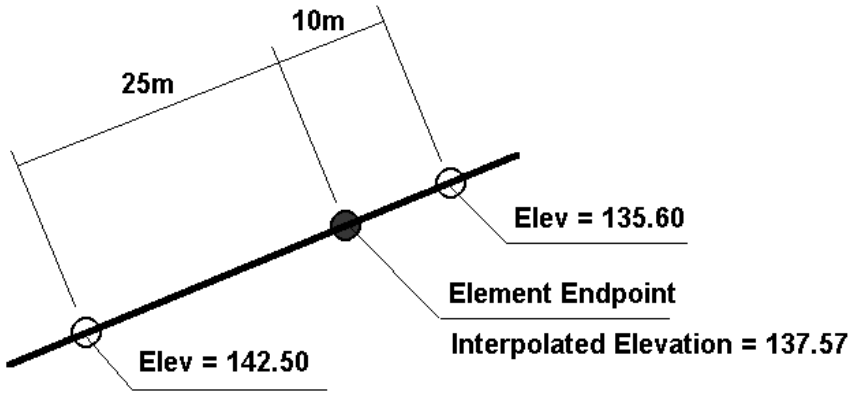
The dialog utilizing the second Mode option, Interpolation, is displayed below.



Whereas the Extraction mode creates a DTM input data file from the coordinate vertices of MicroStation elements, the Interpolation mode must first calculate the elevations for the coordinate vertices of MicroStation elements. The interpolation process is applicable where elevations are not stored with the MicroStation longitudinal reference elements. This occurs when longitudinal reference elements are two-dimensional or three-dimensional, but are all drawn at a common elevation. In both of these topographic mapping instances, the spot elevations determine the elevations along longitudinal reference elements. Therfore, the dialog for the Interpolation mode has two sets of Search Criteria, one for the Longitudinal References and a second for the Spot Elevations.

Spot elevations can be represented by graphical elements or text. For each MicroStation longitudinal reference element, GEOPAK locates the spot elevations nearest to and on either side of the element endpoint. Then, the elevation at the element endpoint is calculated. For example, the example shown below calculates an interpolated elevation of 137.57 from elevations located 10 meters and 25 meters on either side of the element endpoint.

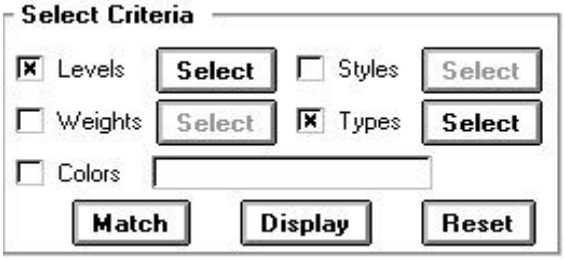
Note: The interpolation mode is only valid for Feature Type Breaks. For contours within a 2D file, the associated elevation must be within the Con Z-range more commonly known as "tagged." Elevations for spot elevations may be determined by textual value (if the origin of the text is the origin of the spot or "tagged" elevations for other element types, i.e., zero length lines or cells.



The resulting input file includes XYZ coordinates for both source spot elevations as well as for interpolated endpoints. Inclusion of the source spot elevations is mandatory since the spot elevation data often reflect important vertical topological features such as the high and low points along the longitudinal reference. Inclusion of interpolated endpoints is mandatory since the endpoints of longitudinal reference elements define changes in the horizontal topological features. These alterations in the horizontal topology determine break lines.

File Name	Name of DAT file to be created.
File Type: **ASCII** **Binary**	The advantage of the binary format is that input data is loaded much quicker when generating the triangulated model since the point and/or break line data can be read much faster from a binary file than from an ASCII file. However, other than reduced loading time, there are no functional differences between the ASCII and binary files. One advantage of the ASCII file format is that the file may be viewed and/or edited with a text editor.
Decimal	Only valid when the ASCII File option is selected, the number of decimal places displayed within the file ranges from zero to six. The binary option defaults to double precision, with no user options.
File Open: **Create** **Append**	The data file used as input to the DTM process can be created as a new file or the extracted data can be appended to the end of an existing data file. When you type the file name or use the **Files** button to access a file, the data file is not actually opened until you establish all entries on the dialog and press the **Apply** button. At that time, GEOPAK creates a new file or opens an existing file depending upon the setting of the **Open** option button.

	If the **Open** option button is set to **Create** and the file already exists, an Alert dialog appears with the message "Overwrite existing <file name>?" when the **Apply** button is pressed. If you press **OK**, the existing file is overwritten. Pressing the **Cancel** button permits you to return to the main Extract dialog and readjust the file name or open mode. If the **Open** option button is set to **Append** and the file does not exist, an Alert dialog appears with the message "Create <file name>?" when the **Apply** button is pressed. Pressing **OK** results in the creation of the specified file. Pressing **Cancel** returns control back to the main Extract dialog.
Feature Types: **Spots** **Breaks** **Contours** **Voids** **Boundary** **Island** **Graphic Triangle** **Drape Void**	**Spots** are points that have no functional relationship to any other point. Random survey shots in open terrain would be an example of random spots. Point elements such as cells, circles, and text strings are typical MicroStation elements used to define spot elevations. Lines, line strings, and other longitudinal elements are equally valid. GEOPAK simply creates a spot elevation for each vertex of each longitudinal element. **Breaks** are used to designate linear features such as edges of pavement, ditch bottoms, ridges, etc. Any longitudinal element may be defined as a break line. Circular arcs are automatically segmented by GEOPAK in a manner consistent with the arc radius. **Contours** are a special feature intended for use if the source MicroStation elements represent digitized or otherwise created contours. Use of this feature insures the integrity of the contour strata in the subsequent DTM. Processing of a DTM with contours classified as spot elevations invariably results in a DTM that, if subsequently contoured, will not match the original extracted contours. **Void** areas are closed shapes to demarcate areas of missing data or obscure areas. No point or break data located within the void area is utilized and no triangles are created inside the void areas. **Boundary** are used to constrain the external boundary of the triangulated model. No triangles are created outside the boundary polygon. In addition, any point data outside the boundary polygon is ignored. A boundary polygon must start and finish with the same point. In addition, the boundary polygon must be continuous within the data file. **Island** - are used to place data within a void, i.e., islands in the middle of rivers, lakes, etc. Graphic triangles - by extracting as triangles, a vertex which is located on several triangles is only extracted once, not once on each triangle. **Drape Void** - A void utilizes the elevations of each vertex, while in the drape void, the element is draped onto the model, thereby ascertaining its elevation from the model, rather than the drape void

	elements. It is then inserted into the model.
Mode Extraction or Interpolation	The Extraction mode determines XYZ data directly from the coordinate values of three-dimensional MicroStation elements. The Interpolation mode, by contrast, derives XYZ data by locating spot elevations on longitudinal MicroStation elements and interpolating. Hence, the Interpolation mode can be applied to both two-dimensional as well as three-dimensional MicroStation files as long as a Z-coordinate reading can be ascertained from the spot elevations.
Stroking	Utilized in the interpolation mode, this shortcut to the Settings > Stroking dialog may be used. Changing the dialog from either location automatically updates the dialog in the other location. For a detailed discussion, refer to the Settings > Stroking documentation.
Search Criteria	 Before extracting MicroStation elements, a description of the desired elements must be defined in terms of element types, levels, colors, weights and styles. Not every extract operation requires the definition of every parameter; only enough parameters to uniquely differentiate the desired element from all other graphical elements in the MicroStation file. For example, if the elements desired for extraction are only present on level 25, then only the level parameter need be defined. To the left of each parameter label is a toggle. If the toggle for any parameter is deactivated, GEOPAK assumes that the full range of settings for this parameter is available. For example, if the **Levels** toggle is deactivated, GEOPAK searches for all levels: levels 1-63. Similarly, a deactivated **Colors** toggle is equivalent to an activated **Colors** toggle and a keyin of **0-253**.
Level, Weight, Styles, Types and Colors	If specific parameter settings are to be considered, the toggle must be activated. Once activated, the associated **Select** button becomes available. Simply toggle on the desired parameter, the press the **Select** button. The Mask dialog is displayed, wherein the desired parameter settings may be identified. You may select as few or as many parameters to identify the desired elements. When the **Cell** option is activated, all cells with the other specified parameters (i.e., level, color, weight) are utilized. However, if the **Cell** option is activated and a cell name is typed into the field to the right of **Cell**, then only the named cell with the other specified parameters is utilized. For example, if level 40 is specified in the Level Mask, and two cells, SPOT and X are located on level 40, and

	no cell name is specified in the cell field, then both cells are extracted. However, if SPOT is typed into the field, then only the SPOT cells are extracted, although other cells are located on level 40. The Text String also has two options: **Origin** and **Content**. When the Text String toggle is activated and the option set to Origin, GEOPAK utilizes the origin of the text as the x,y,z coordinates for extraction. If the Content option is specified, the x,y coordinates are derived from the text origin. However, the z value is not the z value within a 3D file, but the actual value of the text, whether a 2D or 3D file.
Match	The **Match** tool is a method of determining and adding the symbology of elements to be extracted to the Mask dialogs. First, activate the desired toggle(s) to the left of the Search Criteria. Then press the **Match** button. You are prompted to select the desired element. After identifying and accepting the element, its search criteria is added to any criteria whose toggle is activated. In addition, any elements of the specified parameters are highlighted. The **Match** button can be utilized numerous times to select additional elements. The information is appended to the Mask dialogs until the **Reset** button in the dialog is pressed.
Display	Pressing the **Display** button displays all shapes of the current parameters.
Reset	The **Reset** button clears all Mask dialogs, so a new match procedure may commence.
Tolerance (Interpolation mode only) default = 0.75 master units	If a spot elevation is within 0.75 master units of a longitudinal reference, the software projects the spot onto the reference (perpendicular) and uses the elevation to interpolate.
Extract Method: **View 1, 2, .** **Fence** **Complex Chain,** or **Selection Set**	The **View** method extracts every element that is visible in the specified active view and satisfies the selection criteria. This includes elements in both the active as well as reference files if the Locate is activated. Simply set the desired View number before pressing the **Apply** button. The **Fence** method extracts every element that satisfies both the fence criteria as well as the selection criteria defined via the Select Criteria group box. All MicroStation fence options are supported. Place the Fence prior to pressing the **Apply** button. **Complex Chain** - The Select Criteria group box disappears from the dialog, since you identify the elements via the cursor; and no file-wide searches are involved. Also, notice that the **ID Element** button appears adjacent to the Extract method option button. This button initiates the "chaining" of MicroStation elements. The following outlines the sequence of operations associated with the Complex Chain method. **1.** Establish the desired dialog settings.

2. Adjust the Extract method option button to **Complex Chain**.
3. Press the **ID Element** button.
4. Identify and accept the first element that constitutes the beginning of the chain as shown below.

Selection of subsequent elements is identical to the operation of the MicroStation Automatic Create Complex Chain command. Successive connected elements are highlighted one at a time for inclusion or rejection as long as the endpoint of the next element is within a specified tolerance to an endpoint of the current element. The Tolerance is specified on the MicroStation Automatic Create Complex Chain palette. As shown below, after the first element is selected and accepted, the next connected element is highlighted.

If more than a single element is located within tolerance to the next element endpoint, the message "Fork Accept/reject" appears in the MicroStation Command Window. A data point accepts the highlighted element. Pressing the reset cursor button rejects the highlighted element and highlights another one.

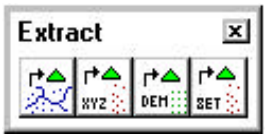
Once the end of the chain is reached or the user presses the reset cursor button when no more connecting elements are available, the identification of component chain elements is complete. At the completion of the selection process, the **Apply** button becomes available. The extraction of elements to a DTM input file commences when the **Apply** button is selected.

Selection Set - This method is identical to the Complex Chain in every aspect other than the actual selection of elements. The Selection Set method employs the MicroStation **Selection Set** tool to identify the element(s) for processing. This method is particularly useful when selecting a single element or a group of disjointed elements few in number. The following outlines the sequence of operations associated with the Selection Set method.

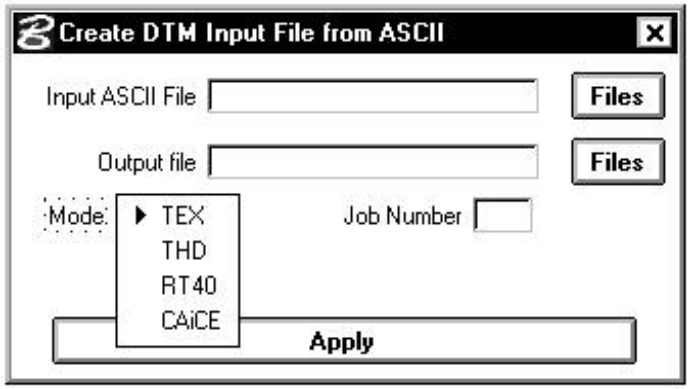
1. Establish the desired dialog settings.
2. Adjust the Extract method option button to **Selection Set**.
3. Press the **ID Element** button.
4. Identify the element(s) comprising the selection set. If more than one element is being selected, the control key on the keyboard must be utilized during the selection process. Each selected

	element can be identified by the small, solid rectangles at each end of the selected elements. **5.** At the completion of the selection process, the **Apply** button becomes available. The extraction of elements to a DTM input file commences when the **Apply** button is selected.
Apply	Commences the extraction procedure. Note that the dialog should be filled in completely, and the Extract mode selected and applicable fence, view, selection set or complex chain identified prior to pressing the **Apply** button.

4.3 Extracting Set Format

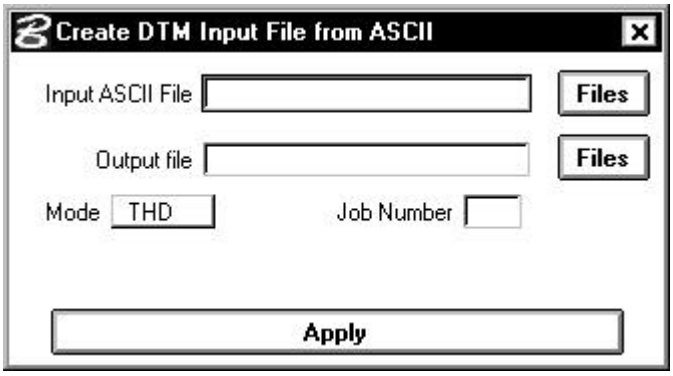
Feature / Function	Utilizing specialized ASCII files generated from other software programs, create a source input file for subsequent DTM model generation.
Tool 	
DTM Menu Bar	Extract > Extract Set Format

The dialog is depicted below.

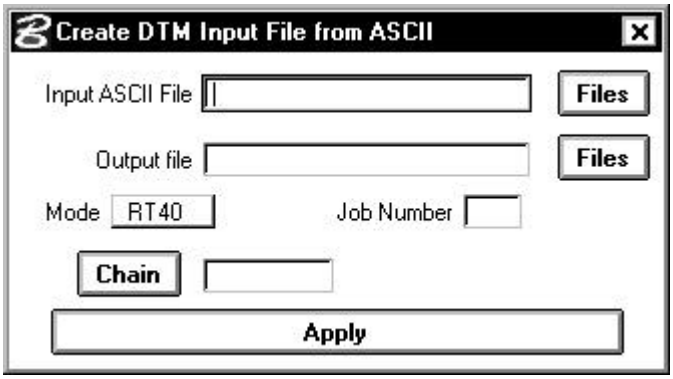


The **Input ASCII File** (in the specified Mode) must be keyed in. In lieu of typing, pressing the **Files** button invokes the File dialog, wherein the desired file may be selected. The **Output File** keyin field requires the name of the DAT file to be created. It may also be selected via the **Files** button. The four supported modes are depicted in the exploded view above. As the mode is selected, the dialog fields change to reflect the selection. Pressing the **Apply** button commences the procedure. As seen above, the **TEX** format requires the GEOPAK

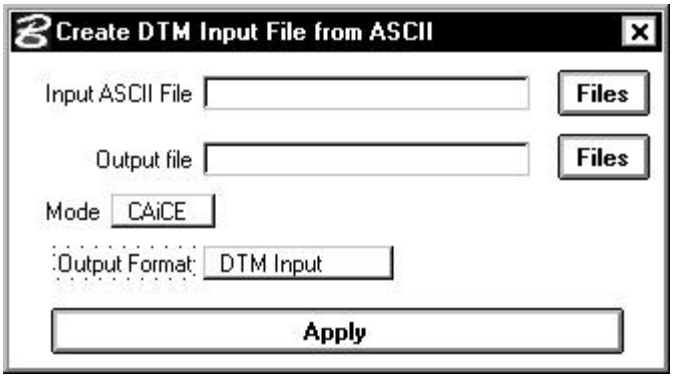
Job Number. The THD mode is depicted in the dialog below. This format also requires the **Job Number.**



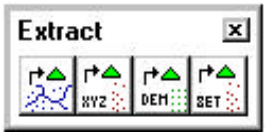
The **RT40** mode is depicted below. In this format, both **Job Number** and **Chain** are required. Pressing the **Chain** button invokes the Chain Selection dialog, wherein the desired chain may be selected.



The **CaiCE** mode is depicted below. In this mode, the **Output Format** is specified as **DTM Input**. No Chain or Job Number is required, simply the **Input** and **Output File** names.



4.4 Extracting ASCII Format

Feature / Function	Utilizing generic ASCII files, create a source input file for subsequent DTM model generation.
Tool 	
DTM Menu Bar	Extract > Extract ASCII

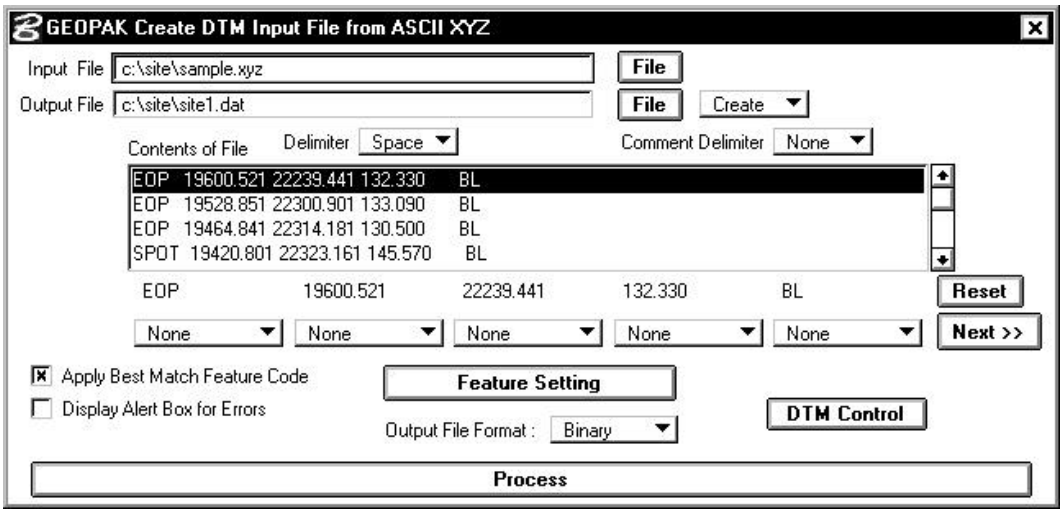
The Extract ASCII Format tool supports most any ASCII file containing reduced survey data or even just XYZ data. DTM input files can be derived from a file containing XYZ data with no point codes. Other features include embedded Linking Codes and Feature Codes, support for linking together shots based upon defined chains, support for comments and support for the situation where the user does not have a "continuation" linking code for each shot but wants these shots connected. These ASCII files need not conform to any particular structure or format other than a requirement that each point entry be restricted to a single row. The ASCII file should not contain more than one point per row. Similarly, multiple rows should not be required to define a single point code.

Within the row containing point code data, virtually no restrictions are placed on the arrangement and separation of survey data. Individual data items (point code, x-coordinate, y-coordinate, z-coordinate, point number) can be arranged in either free form or column formats. In addition, extraneous information may be present in the row and ignored by GEOPAK. Data items in the free form format can be separated by spaces, commas, dashes, etc.

Two steps are required to extract ASCII data:

1) Load the ASCII file.
2) Identify how the data items are arranged.

When the Extract ASCII XYZ tool is invoked, the dialog depicted below is displayed.



4.4.1 Setting up the ASCII File

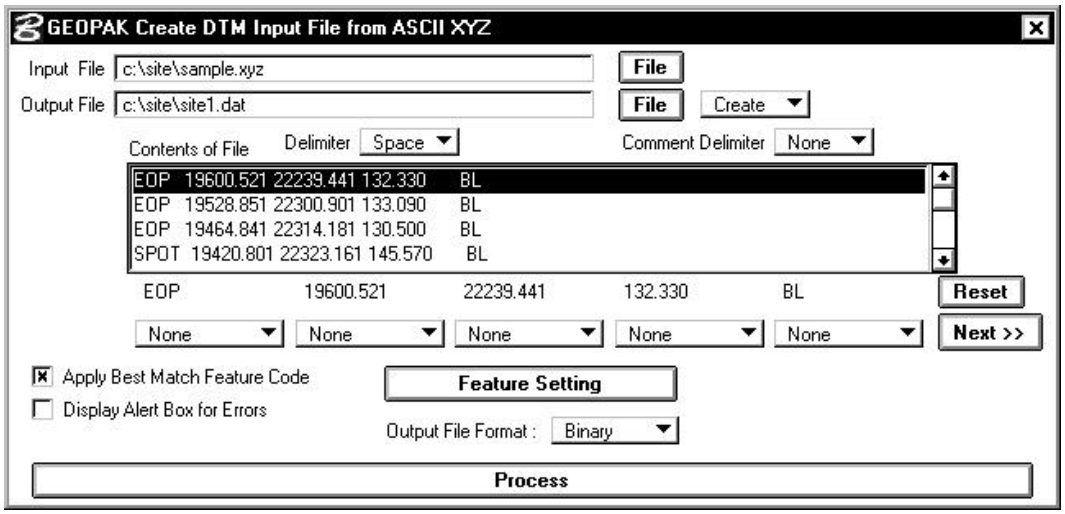
The name of the ASCII file may be typed directly into the input field labeled **File** or may be accessed via the **File** button. Pressing the **File** button invokes the standard MicroStation dialog box used for files retrieval. The ASCII file need not be in the current directory.

Once the survey file is retrieved, the first few lines are displayed in the list box labeled **Contents of File** as depicted in the graphic above.

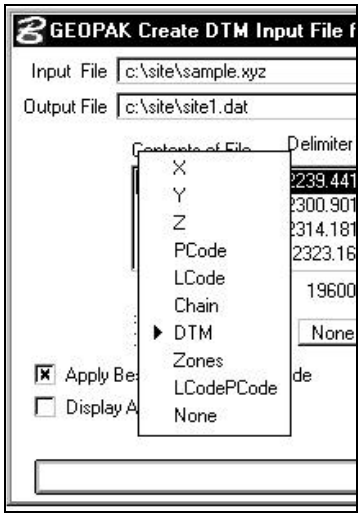
GEOPAK requires the following information for each data point: **Point Code**, **X-coordinate**, **Y-coordinate** and **Z-coordinate**. Other informational items include **Point Number**, **Linking Code**, **Chain**, **DTM**, **Zone**, and combination **Linking Code Point Code.**

The first step in assigning fields is to set the delimiter option button to the correct delimiter separating the free format fields. Various delimiters include the comma, dash, slash, semi-colon and space. If none of these satisfy your needs, you can select the **Other** field. In response to the **Other** selection, GEOPAK prompts for the delimiter character.

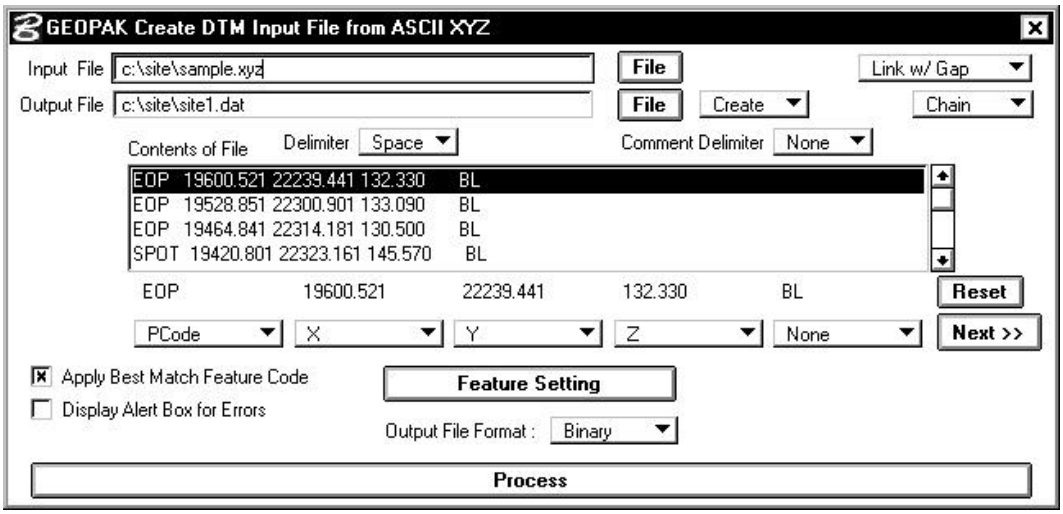
Once the correct delimiter has been specified, the second step is to single click onto a line of data. The individual items fields will appear over the series of option buttons located beneath the list box as shown below.



The third step is to identify the individual fields in the data file as representing either a point code, point number, x-coordinate, y-coordinate or z-coordinate. (An exploded view of the option button is depicted below.)



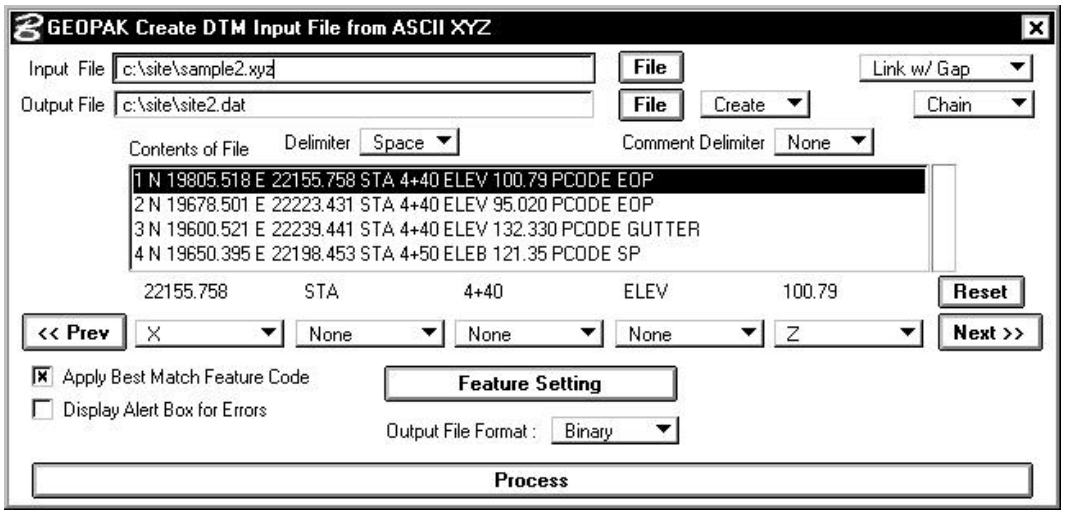
To accomplish this, adjust the option button to correctly identify the function of each associated field from the survey file. For the sample case shown below, the option buttons appear in the following order: Point Code (**PCode**), **X**, **Y**, and **Z**.



Yet, another case might involve a considerable number of extraneous entries in the survey file. The data file depicted below contains eleven separate fields.

```
1 N 19805.518 E 22155.758 STA 4+40 ELEV 100.79 PCode PL(B)
2 N 19678.501 E 22223,431 STA 4+40 ELEV 95.020 PCode PL(B)
3 N 19600.521 E 22239.441 STA 4+40 ELEV 134.330 PCode PL(B)
```

Since the dialog permits the definition of only five fields at a time, we must make use of the **Previous** and **Next** buttons to shift the fields right and left. Prior to pressing the **Next** button, adjust the option buttons to the appropriate settings. The first field represents the point number and, hence, is set to **None**. The next field contains the letter "N" identifying the following coordinate as a northing. Hence, the option button below the "N" is set to **None**. After adjusting the five option buttons and pressing the **Next** button four times, the dialog would appear as shown below. The **X** coordinate has now shifted from the fifth to the first option button. Subsequent assignment of the other four option buttons would be **None** for the station label, station value, and elevation label. The option button below the elevation value would be set to **Z** as shown below.



Pressing the **Next** button two more times would permit the definition of the Point Code (**PCode**).

4.4.2 Informational Codes

GEOPAK requires the following information for each data point: **X-coordinate**, **Y-coordinate** and **Z-coordinate**. Other informational items include **Point Code, Linking Code**, **Chain**, **DTM**, **Zone**, and combination **Linking Code Point Code.**

4.4.2.1 PCode or Feature Code

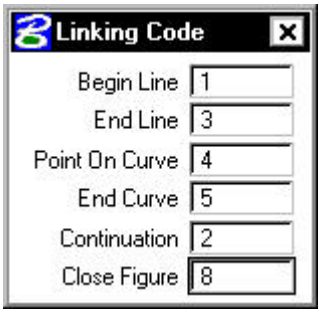
Within the ASCII file, fields designated as PCodes must correlate with Feature Codes defined in the Feature Setting dialog. These codes are used to determine how the data is utilized with the DAT file creation.

4.4.2.2 Linking Code (LCode)

A Linking Code describes how individual spot shots are to be connected. For example, Linking Codes determine if the shots should be connected with lines, line strings, arcs or curve strings. Supported Linking Codes (also referred to as LCode) are listed below:

- Begin Line
- End Line
- Point on Curve
- End Curve
- Continuation
- Close Figure

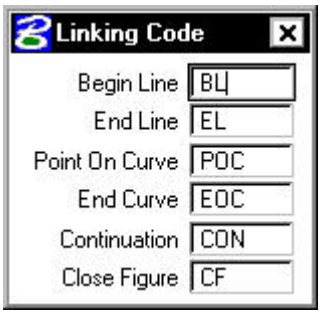
After one of the options is set to **Linking Code**, the **Linking Code** button in the lower right corner is displayed. When pressed, the dialog depicted below appears.



These linking codes instruct the software how to connect various linear features. For example, the first shot of a curb and gutter would be a linking feature of one, based on the Linking Code dialog above. Subsequent shots on the curb and gutter in a tangent section would be twos, if the shots were on curve, the code would be four, etc. Depicted below is a short fragment of data:

```
8  17000.0000 20000.0000 900.0000 MID 1
9  18800.0000 21000.0000 1200.0000 MID 2
10 17399.4338 20336.1088 914.1539 MID 2
11 17426.2252 20545.4905 1234.3531 MID 3
12 17671.0359 20808.7510 1364.5333 MID 1
```

As seen on the dialog below, the user can associate specific character strings, rather than numeric values, with linking operations on the Linking Code dialog.



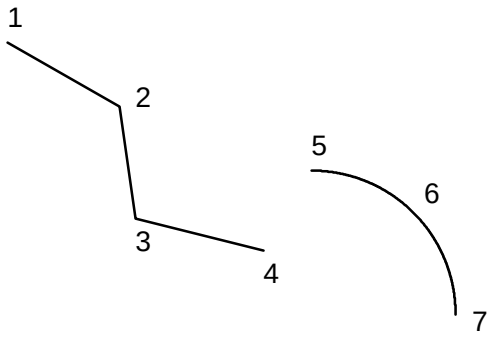
The user has the ability to decide which set of shots should be grouped together as a single chain.

As an example, consider the following set of Linking Codes.

```
1  Begin Line
2  Begin Line
3  Begin Line
4  End Line
5  Point On Curve
```

```
6  Point On Curve
7  Point On Curve
```

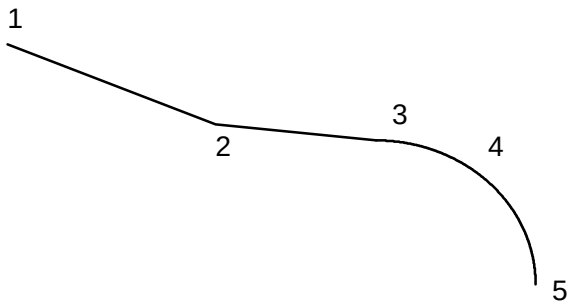
The diagram below depicts how GEOPAK extracts the data in response to this Linking Code sequence:



The spot shots designated as **Begin Line** are connected together until the **End Line** Linking Code is encountered. A circular arc is fit between the three **Point On Curve** shots.

Now consider a similar set of spot shots where no **End Line** Linking Code appears. Rather, a **Begin Line** is immediately followed by a **Point On Curve** shot.

```
1  Begin Line
2  Begin Line
3  Point On Curve
4  Point On Curve
5  Point On Curve
```

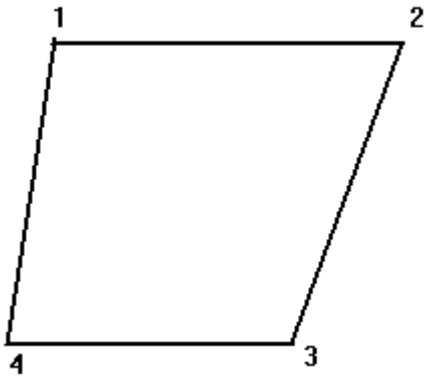


In this instance, GEOPAK draws a line between points two and three; assuming that point three is a continuation of the chain. As before, a circular arc is fit between the **Point On Curve** shots.

GEOPAK also supports a **Close Figure** Linking Code as shown below:

```
1  Begin Line
2  Begin Line
3  Begin Line
```

```
4  Close Figure
```



In this case, the **Close Figure** Linking Code instructs the software to draw a line back to the first point in the chain (Point 1).

It is not mandatory for the user to designate a Linking Code for each shot. GEOPAK also supports the concept a **Continuation** Linking Code. For example, consider a situation where no Chain Name has been defined and chains are created by grouping like PCodes. In the sequence of spot shots, if a Linking Code has been defined for one spot shot, it is not necessary to repeat that Linking Code in a redundant manner for subsequent spot shots. It need only be specified when the Linking Code changes.

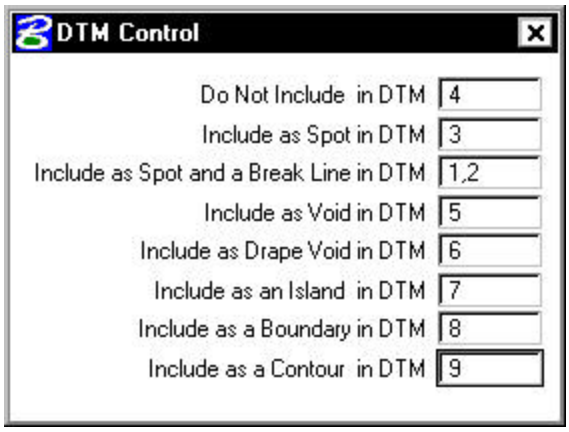
Similarly, if Chain Names are specified, the Linking Code can be defined for one spot shot and not necessarily repeated for subsequent spot shots belonging to the same chain. The subsequent shots will be assigned the same Linking Code as the previous shot on the same chain.

4.4.2.3 Chain

Sometimes the surveyor defines distinct names to designate groups of spot shots that should be connected together in some manner. GEOPAK graphically connects the spot shots with common chain names in the order that they appear in the ASCII files.

4.4.2.4 DTM

Another example of the option buttons is **DTM**. After one of the options is set to **DTM**, the **DTM Control** button in the lower right corner is displayed. When pressed, the dialog depicted below appears.



Eight options are included within the dialog, each having its own Control Code:

- **Do Not Include** - Any data, which has this control code, is not included in the creation on the DTM.
- **Include As Spot** - Any data, which has this control code, includes the shot as a random spot within the DTM.
- **Include As Spot and Break** - This control code includes the data as a spot shot and use its linear feature as a break line.
- **Include As Void** - This control code includes the data as a void.
- **Include As Drape Void** - This control code includes the x,y data as a drape void, and ascertaining the elevations from the model.
- **Include As Island** - This control code includes the data as an island.
- **Include As Boundary** - This control code includes the data as a boundary.
- **Include As Contour** - This control code includes the data as a contour.

A sample fragment of the data file is depicted below.

```
8  17000.0000 20000.0000 900.0000 MID 1
9  18800.0000 21000.0000 1200.0000 MID 2
10 17399.4338 20336.1088 914.1539 TREE 4
11 17426.2252 20545.4905 1234.3531 SPT 3
```

In this case, the **DTM Control** is the last field. Utilizing the information from the dialog above, the first two lines of data would be

included as spots and a break line as the DTM control codes are one and two. The third line of data would be excluded from the DTM as its control code is four. The fourth line would be included as a spot shot as its Control Code is three.

The DTM treatment options can be either 1) associated with the PCode in the Features Setting dialog 2) designated in a field of the ASCII XYZ file or if no Pcode is given, GEOPAK defaults to all spot elevations.

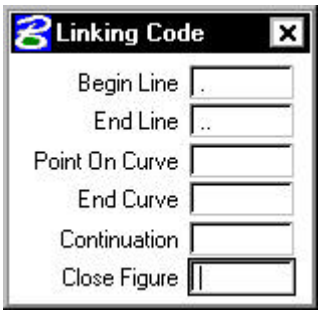
4.4.2.5 Zones

The user is also able to assign a field of the ASCII XYZ file to **Zones**. In this case, each shot would be assigned to a specific DTM zone. When creating the DTM input file, you can designate the zone(s) you wish to include. If desired, you could create separate DTMs for each zone. If there is no zone assignment, GEOPAK will place all shots into Zone 1.

4.4.2.6 Combined Linking Codes and PCodes

Another option is a combination **PCode/Linking Code LCode&PCode** and functions slightly different that the other features. In this mode, the software will decode a given ASCII character string into its Linking Code and PCode components. Since the composition and length of the **LCode&PCode** combination field can vary from spot shot to spot shot, the ASCII field designated as **LCode&PCode** must appear at the end of the line; i.e., after all of the other options such as **X**, **Y** and **Z** have already been defined. The one exception to this rule relates to the **Comments** field, which can appear after the **LCodePcode**, if a Comment delimiter is utilized.

First, when the **LCodePCode** option is selected, and the **Linking Code** button in the lower right corner of the dialog is pressed, the following dialog appears.



In each field, enter the text string utilized for each Linking Code. Note that only those fields utilized in the data must have entries. In our example, we only have **Begin Line** (.) and **End Line** (..) defined as our data has none of the other codes.

Below is a fragment of a sample data file.

```
1000 252825.564 336994.498 100.616000 .101
1001 252835.354 336994.086 100.182000 .101
1002 252841.553 336996.280 99.4940000 ..101.104
1003 252849.420 337004.238 94.5180000 .104
1004 252857.567 337009.067 97.5970000 ..104.101
```

Note that the **LCode&PCode** sequence is at the end of the line. Since the length of the field is variable, and spaces are supported, GEOPAK utilizes all information from the first **LCode&PCode** character onward. Therefore, this option cannot be placed in the middle of the file, for example, before the Z coordinates. It would assume everything to the right would be part of the PCode/Linking Code including the Z coordinates. In the data above, the first line is a begin line (based on the . from the dialog above) for PCode 101. Line two is also a begin line for 101. The third line is an end line for 101 and a begin line for 104. Therefore, these three lines would draw a line from the first line, through the second shot and stop and the third shot. At this point PCode 104 begins a line.

The decoding of the combined **LCode&PCode** is a two step process. First, the user defines a set of Linking Code strings via the Linking Code dialog box. GEOPAK searches for these strings and separates Linking Code strings from the PCodes. For example:

```
… LC1 PCode1 LC2 PCode2
… LC1PCode1LC2PCode2
```

The first Linking Code (`LC1`) is associated with `PCode1` and the second Linking Code (`LC2`) is associated with `PCode2` and so on. GEOPAK attempts to pair the Linking Codes and PCodes from left to right.

```
… LC1 PCode1 PCode2
… LC1PCode1 PCode2
… PCode1LC1PCode2
```

Linking Code (`LC1`) would be applied to those PCodes that are defined in the Feature Setting dialog with the **Linking Code** option selected. GEOPAK references the Feature Setting dialog to determine if Linear Features were defined for `PCode1` and/or `Pcode2.` Hence,

in the example above, if PCode1 was defined with the Linking Code toggle active while PCode2 was defined with the Linking Code toggle not active, then the Linking Code (LC1) would be applied only to PCode1.

4.4.2.7 Comments

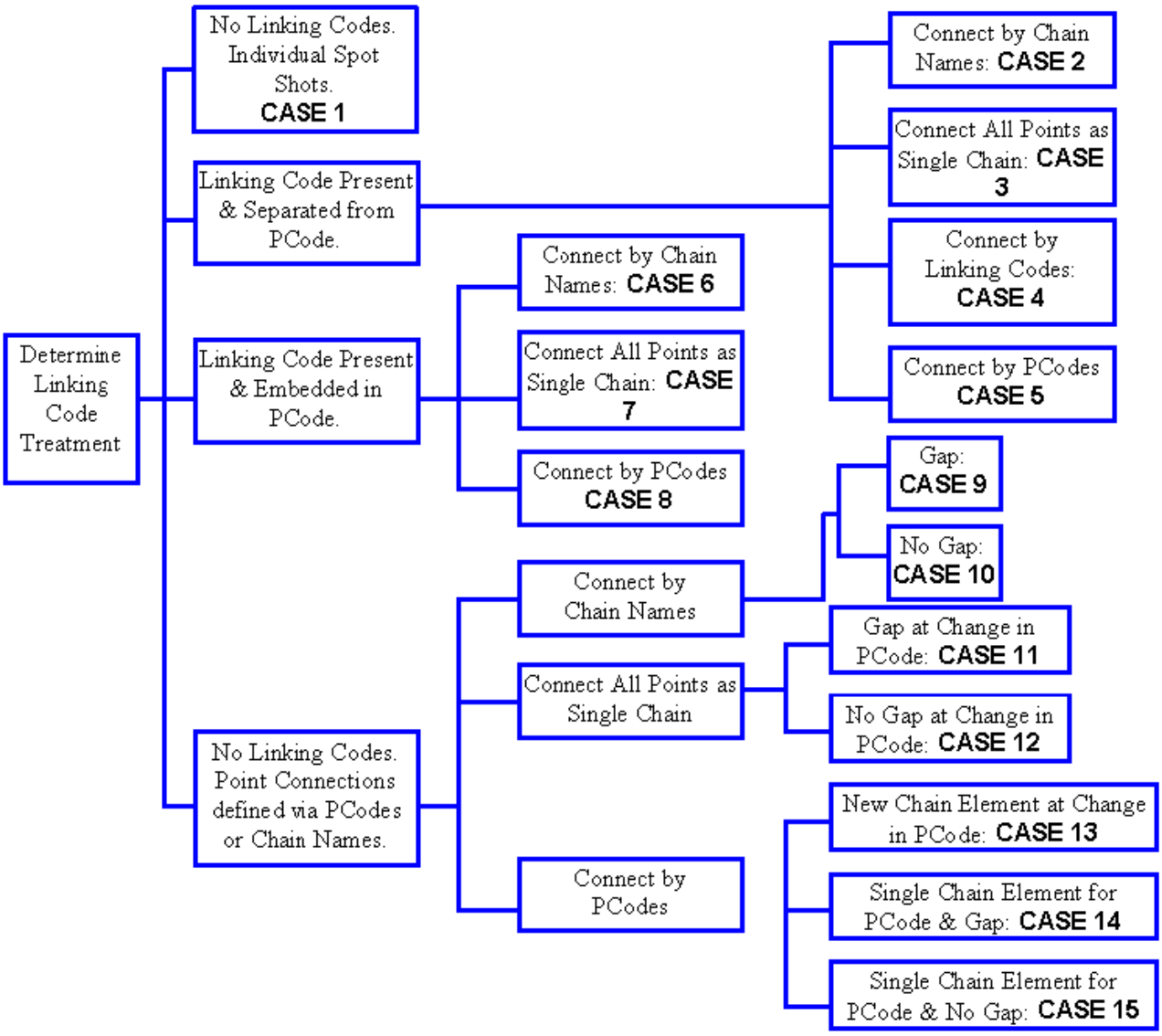
GEOPAK also supports **Comments**. The comment must be preceded by a specific, user defined delimiter. The user can establish this delimiter via the **Comment Delimiter** field contained on the dialog whereupon the various ASCII fields are designated. The only condition is that this delimiter must be different from the primary delimiter used to distinguish between the various ASCII fields Moreover, the Comment Delimiter as well as the content of the comment must be contiguous.

4.4.3 Decision Making Procedures

The graphic on the next page offers a Decision Tree whereby the user can determine the proper settings on the ASCII XYZ dialog for specific data sets. This Decision Tree is organized in terms of specific data set formats. Primary determinants include the following:

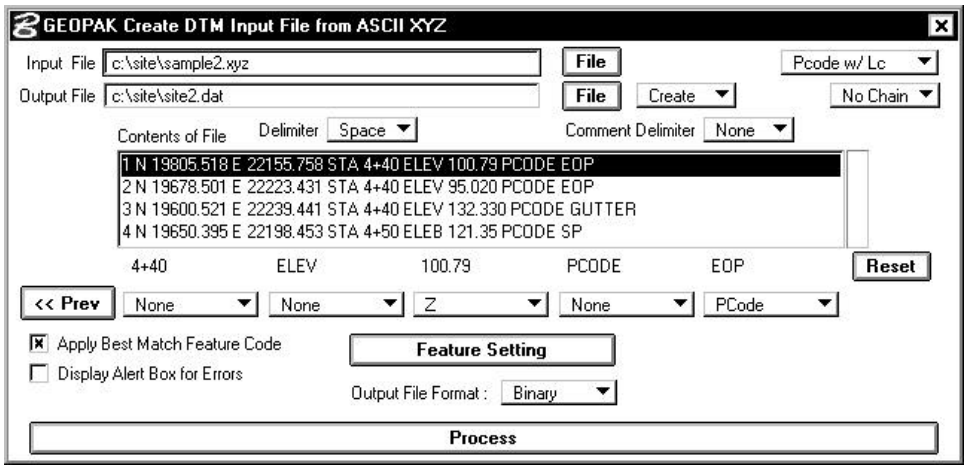
- Presence of Linking Codes
- Designation of Chain Names
- Gaps: Extract connecting geometry between points belonging to the same Chain or PCode but which are not contiguous in the ASCII file.
- No Gaps: Do not extract connecting geometry in instances where points belong to the same Chain or PCode but are not contiguous in the ASCII file.

Subsections following the Decision Tree detail each of the 15 cases.


Determine Linking Code Treatment
No Linking Codes. Individual Spot Shots. CASE 1
Linking Code Present & Separated from PCode.
Linking Code Present & Embedded in PCode.
No Linking Codes. Point Connections defined via PCodes or Chain Names.
Connect by Chain Names: CASE 2
Connect All Points as Single Chain: CASE 3
Connect by Linking Codes: CASE 4
Connect by PCodes CASE 5
Connect by Chain Names: CASE 6
Connect All Points as Single Chain: CASE 7
Connect by PCodes CASE 8
Connect by Chain Names
Connect All Points as Single Chain
Connect by PCodes
Gap: CASE 9
No Gap: CASE 10
Gap at Change in PCode: CASE 11
No Gap at Change in PCode: CASE 12
New Chain Element at Change in PCode: CASE 13
Single Chain Element for PCode & Gap: CASE 14
Single Chain Element for PCode & No Gap: CASE 15

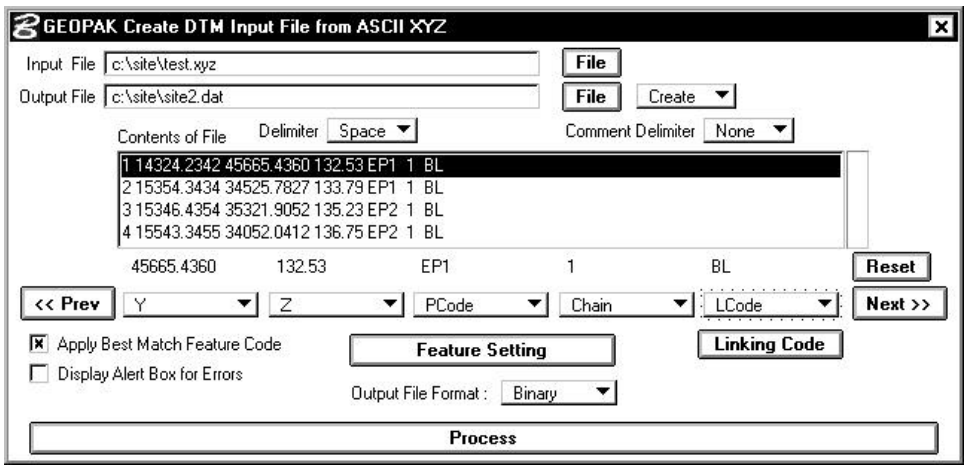
4.4.3.1 Case 1: No Linking Codes. Individual Spot Shots.

This circumstance typically indicates a default condition where PCodes are defined without associated Linking information. In addition, the user should choose the **No Chain** and **PCode w/ Lc** on the dialog as shown below.



4.4.3.2 Case 2: Linking Code Present & Separated from PCode. Connect by Chain Names

In this case, all the XYZ lines that have the same **Chain** name will be connected. The Chain field in the ASCII XYZ file is designated via the **Chain** setting on the row of option buttons located at the bottom of the dialog as shown below.

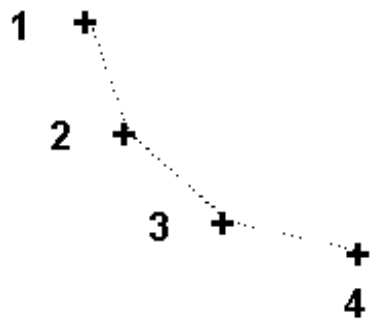


Consider the following example:

```
1 14324.2342 45665.4360 134.53 EP1  1  BL
2 15354.3434 34525.7827 134.79 EP1  1  BL
3 15346.4354 35321.9052 135.23 EP2  1  BL
```

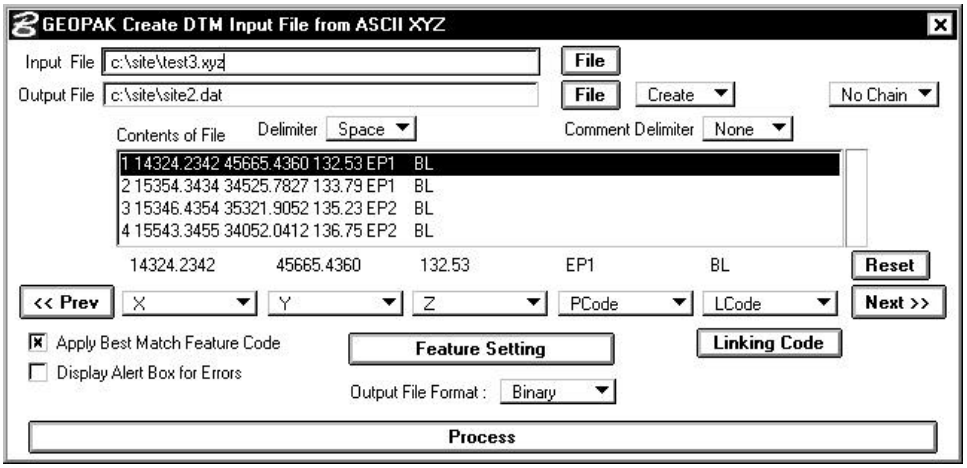
```
4 15544.3455 34054.0412 136.75 EP2  1  BL
```

This results in a single Chain designated as “Chain 1” being drawn between points 1 through 4 as shown below:



4.4.3.3 Case 3: Linking Code Present & Separated from PCode. Connect All Points as Single Chain.

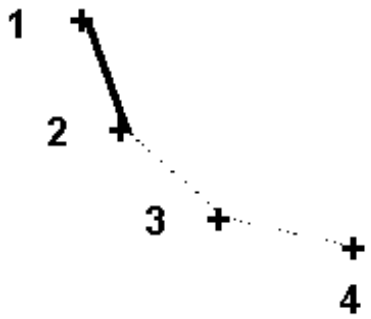
In this case, the ASCII data set does not identify a Chain Name, but it is desireable to connect all the shots within the file as one group. The manner in which the points are connected is determined by a defined Linking Code as shown below:



Consider the following example:

```
1 14324.2342 45665.4360 134.53 EP1    BL
2 15354.3434 34525.7827 134.79 EP1    BL
3 15346.4354 35321.9052 135.23 EP2    BL
4 15544.3455 34054.0412 136.75 EP2    BL
```

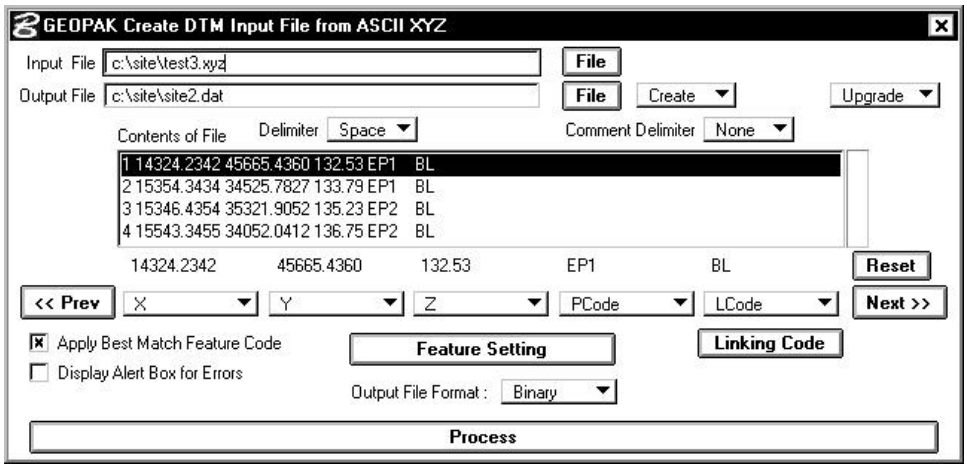
In this case as shown below, all points (1 through 4) will be grouped together under one chain.



4.4.3.4 Case 4: Linking Code Present & Separated from PCode. Connect by Linking Codes.

Consider a survey that contains a large number of spot shots for a single PCode. In this instance, it might be desirable to avoid connecting all spot shots for this single PCode into one huge chain. Rather, the composition of individual chains is controlled completely by Linking Codes. To obtain this result, the user would employ the **Upgrade** feature as shown below.

With the **Upgrade** setting, a new chain is defined whenever the program encounters End Line, End of Curve or Close Figure. The would allows the user have many different chains with only few PCodes.

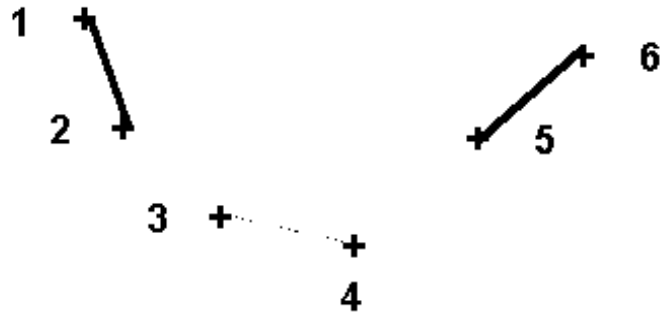


Consider the following example:

```
1 14324.2342 45665.4360 134.53 EP1    BL
2 15354.3434 34525.7827 134.79 EP1    BL
3 15346.4354 35321.9052 135.23 EP2    BL
4 15544.3455 34054.0412 136.75 EP2    BL
5 14394.2456 45647.4820 134.93 EP1    BL
6 15384.3394 33765.7827 134.77 EP1    BL
```

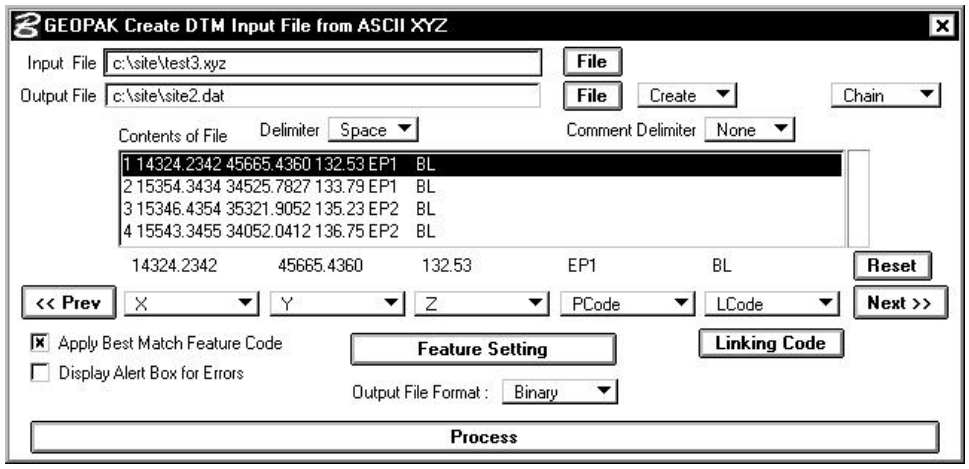
This data would group together points with the same PCode name. Hence, when a terminating Linking Code is encountered, the name of the chain is upgraded as depicted below:

- Chain EP1-1 containing points 1 & 2; extract with EP1.
- Chain EP1-2 containing points 5 & 6; extract with EP1.
- Chain EP2-1 containing points 3 & 4; extract with EP4.



4.4.3.5 Case 5: Linking Code Present & Separated from PCode. Connect by PCodes.

If the ASCII XYZ data does not contain a Chain field, but the user is interested in grouping together data points with the same PCode, this can be accomplished via the dialog settings depicted below:



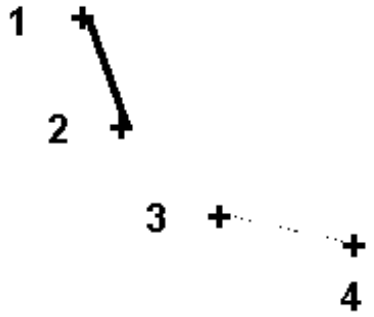
Consider the following example:

```
1 14324.2342 45665.4360 134.53 EP1    BL
2 15354.3434 34525.7827 134.79 EP1    BL
3 15346.4354 35321.9052 135.23 EP2    BL
4 15544.3455 34054.0412 136.75 EP2    BL
```

In this case, all the points that have the same PCode are grouped together as a Chain and the Chain name is identical to the PCode.

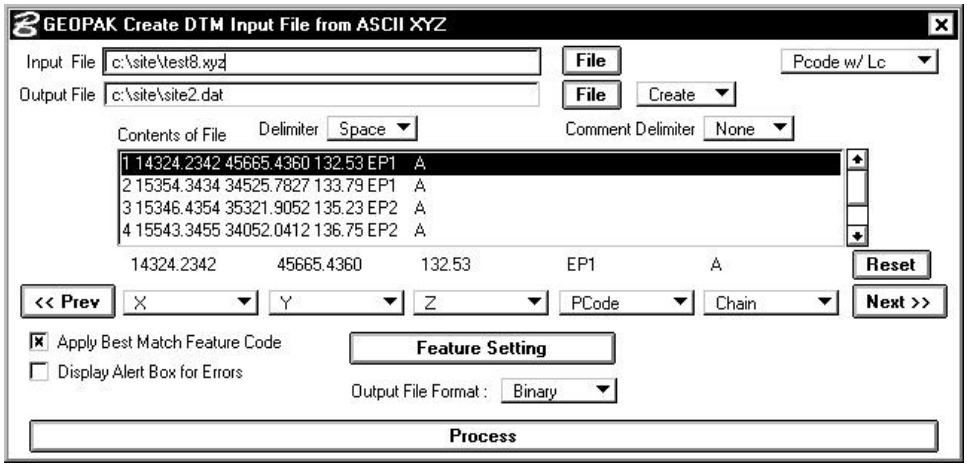
The resultant chains include:

- Chain extracted containing points 1 & 4.
- Chain extracted containing points 3 & 4.



4.4.3.6 Case 6: Linking Code Present & Embedded in PCode. Connect by Chain Names.

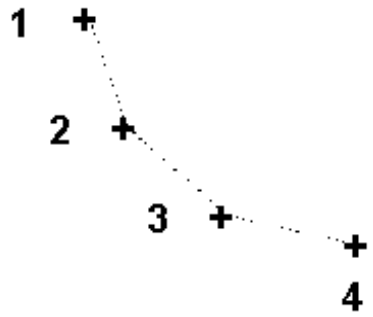
Linking Codes can be embedding within the PCode definitions. First, consider the situation that the Chain is indicated in the ASCII XYZ file as shown below.



The following comprises a sample data set:

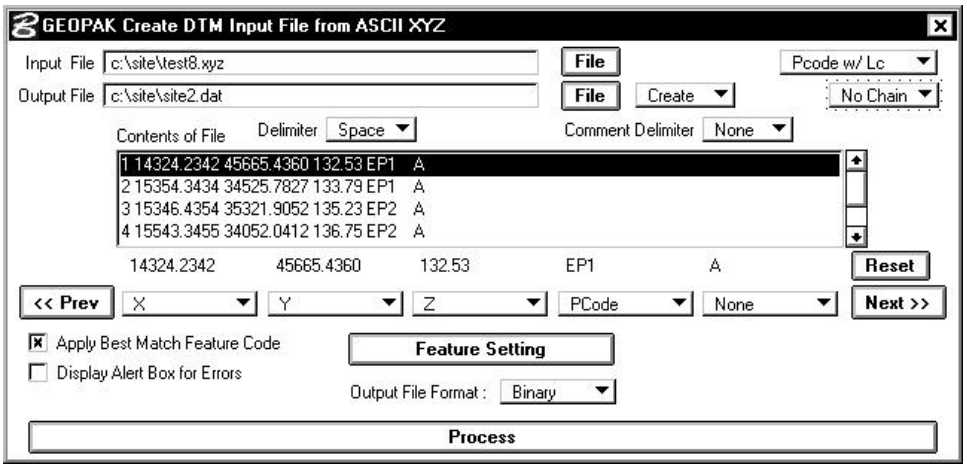
```
1 14324.2342 45665.4360 134.53 EP1    A
2 15354.3434 34525.7827 134.79 EP1    A
3 15346.4354 35321.9052 135.23 EP2    A
4 15544.3455 34054.0412 136.75 EP2    A
```

All the XYZ lines that have the same “Chain Name” will be grouped together. This results in a single Chain designated as “Chain A” being extracted between points 1-4 as shown below. The geometry of the Chain will be determined by Linking Code value embedded into the PCodes “EP1” and “EP4.”



4.4.3.7 Case 7: Linking Code Present & Embedded in PCode. Connect All Points as Single Chain.

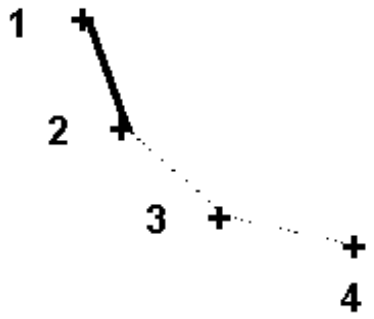
In this case the user does not have any Chain and wants to place all the shots within the file as one group.



Consider the following example:

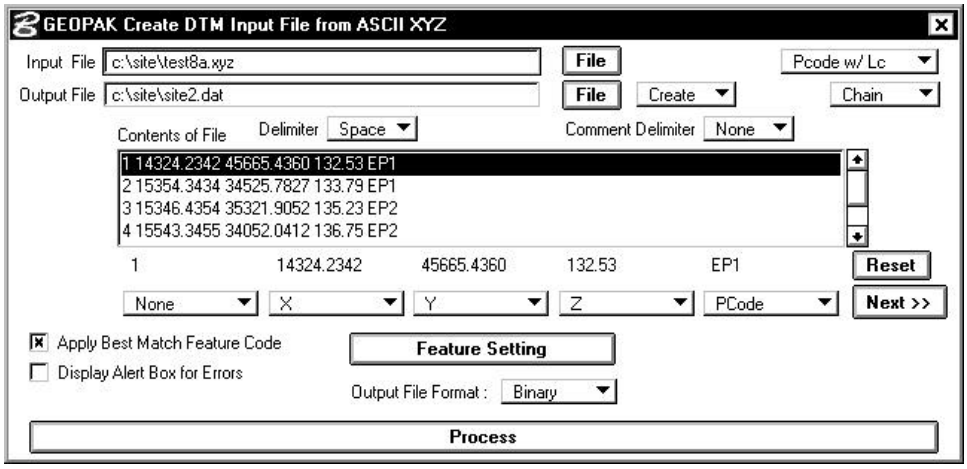
```
1 14324.2342 45665.4360 134.53 EP1    A
2 15354.3434 34525.7827 134.79 EP1    A
3 15346.4354 35321.9052 135.23 EP2    A
4 15544.3455 34054.0412 136.75 EP2    A
```

In this case as shown below, all points (1 through 4) will be grouped together under one chain. The geometry of the Chain will be determined by the Linking Code value embedded into the PCodes.



4.4.3.8 Case 8: Linking Code Present & Embedded in PCode. Connect by PCodes.

If the ASCII XYZ data does not contain a Chain field, but the user is interested in grouping together survey points with the same PCode, this can be accomplished via the dialog settings depicted below:

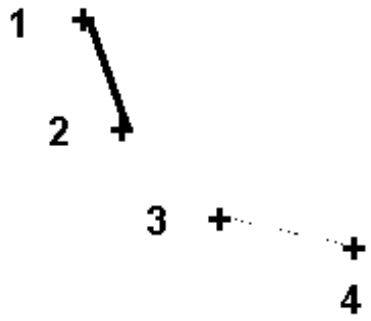


Consider the following example:

```
1 14324.2342 45665.4360 134.53 EP1
2 15354.3434 34525.7827 134.79 EP1
3 15346.4354 35321.9052 135.23 EP2
4 15544.3455 34054.0412 136.75 EP2
```

In this case, all the points that have the same PCode are grouped together as a Chain. The geometry of the Chain will be determined by the Linking Code value embedded into the PCode.

This results in Chain EP1 containing points 1 & 2 as well as Chain EP2 containing points 3 & 4 as shown below.

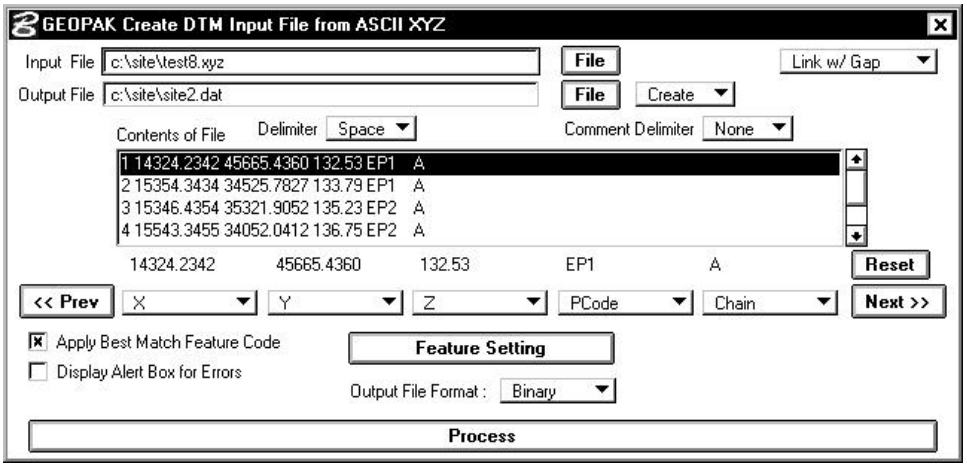


4.4.3.9 Case 9: No Linking Codes. Point Connections defined via Chain Names. Gap.

A user might have an ASCII XYZ file that contains no Linking Code. However, the shots within the file should be connected together as a series of lines/line strings depending on their PCode names or Chain Names. The intent is to connect the points that have the same PCode name and are part of the same Chain. Since there is no indication of Linking Code within our ASCII XYZ file, all our chain alignments will be restricted to lines or line strings.

The user also can define the grouping or chaining of the survey points in many different ways. The user can also decide if he/she would like to introduce a **Gap** between connected elements within a same Chain. In this case, a Gap would be placed if we move from one set of points with same PCode name to another set of points with different PCodes within the same Chain. The following cases will discuss Gap circumstances.

First, we consider the situation where the Chain is indicated in the ASCII XYZ and the user would like to have Gaps between different PCodes. In this case, the PCodes in the Feature Settings dialog should not have their **Linking Code** toggle active.

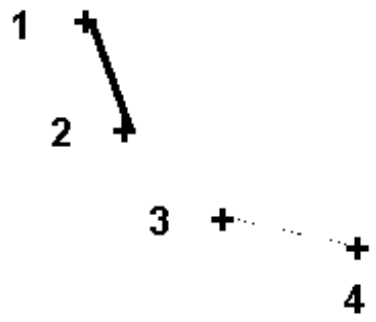


Consider the following example:

```
1 14324.2342 45665.4360 134.53 EP1    A
2 15354.3434 34525.7827 134.79 EP1    A
3 15346.4354 35321.9052 135.23 EP2    A
4 15544.3455 34054.0412 136.75 EP2    A
```

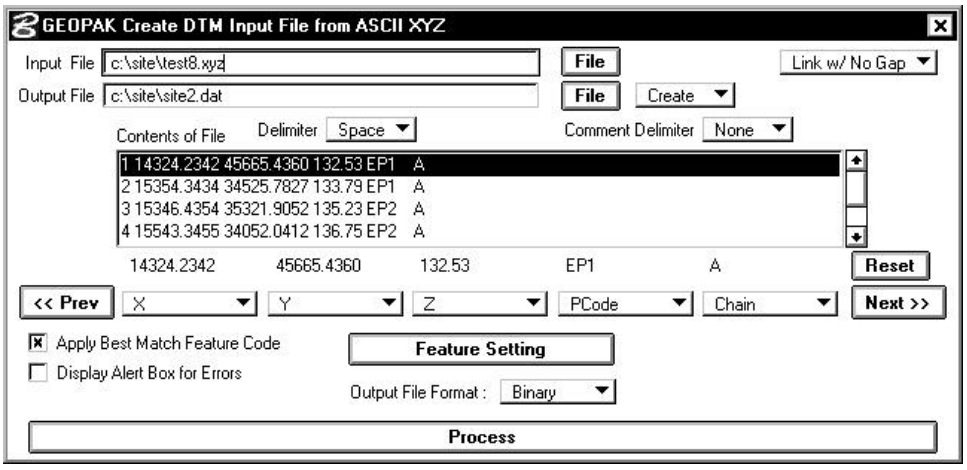
In this case, all the XYZ shots that have the same **Chain Name** are grouped together as a Chain. The Chain Name field assignment will be made via the option buttons located at the bottom of the dialog depicting the ASCII XYZ file. All the points with the same PCode name would be connected together and there would be a gap in the chain between two different PCodes.

The result is shown below. Chain A contains points 1 through 4. However, a line would be drawn only between points 1 & 2 and between points 3 & 4 due to the **Link w/ Gap** designation on the dialog.



4.4.3.10 Case 10: No Linking Codes. Point Connections defined via Chain Names. No Gap.

Let's consider the situation that the Chain is again indicated in the ASCII XYZ, but the user does not want to have **Gaps** between different PCodes. In this case, the PCodes in the Feature Setting dialog should not have their **Linking Code** toggle active.

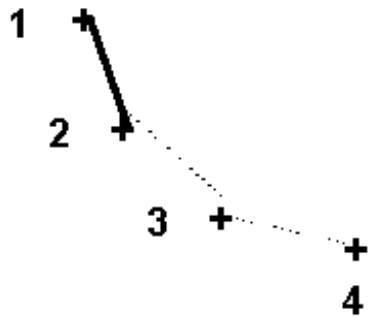


Consider the following example:

```
1 14324.2342 45665.4360 134.53 EP1    A
2 15354.3434 34525.7827 134.79 EP1    A
3 15346.4354 35321.9052 135.23 EP2    A
4 15544.3455 34054.0412 136.75 EP2    A
```

In this case, all the points that have the same PCode are group together as a **Chain** and the Chain name is the same as PCode. All the points with the same PCode would be connected together and there would be a **Link w/ No Gap** in the chain.

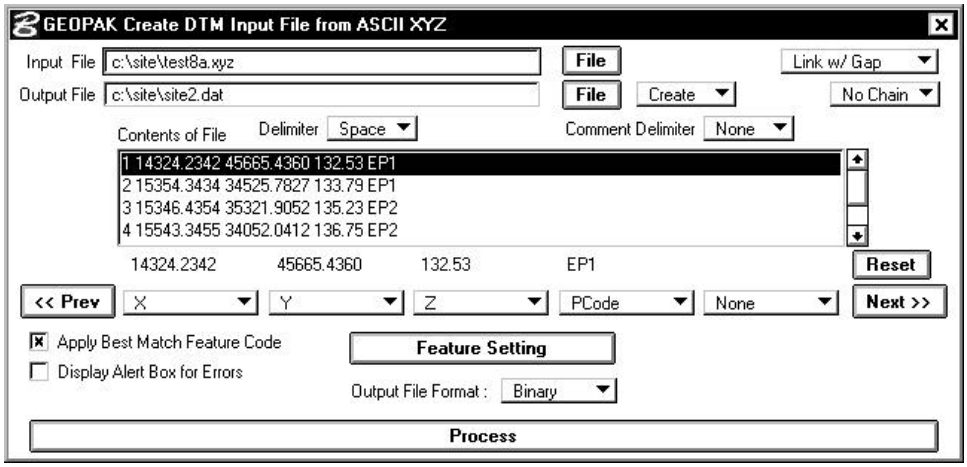
The result is shown below. Chain A is extracted continuously between points 1 through 4 due to the **Link w/ No Gap** designation.



4.4.3.11 Case 11: No Linking Codes. Connect All Points as Single Chain. Gap at Change in PCode.

In this particular case, all the points within the ASCII XYZ file are part of the same Chain as there is no indication of the Chain Name within the ASCII XYZ file. The user should choose the option of **No Chain** and, in accordance with his/her preference, either select the option of

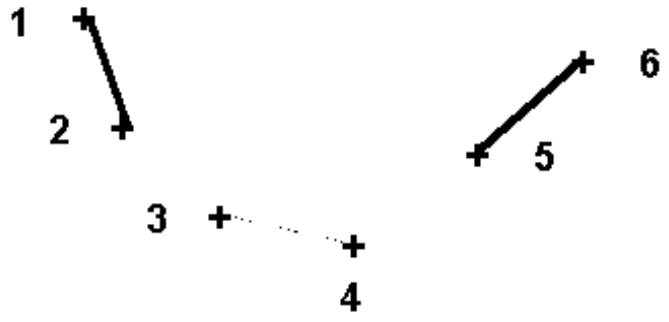
Link w/ Gap or **Link w/ No Gap**. The dialog below is set to **Link w/ Gap**.



Consider the following example:

```
1 14324.2342 45665.4360 134.53 EP1
2 15354.3434 34525.7827 134.79 EP1
3 15346.4354 35321.9052 135.23 EP2
4 15544.3455 34054.0412 136.75 EP2
5 14394.2456 45647.4820 134.93 EP1
6 15384.3394 33765.7827 134.77 EP1
```

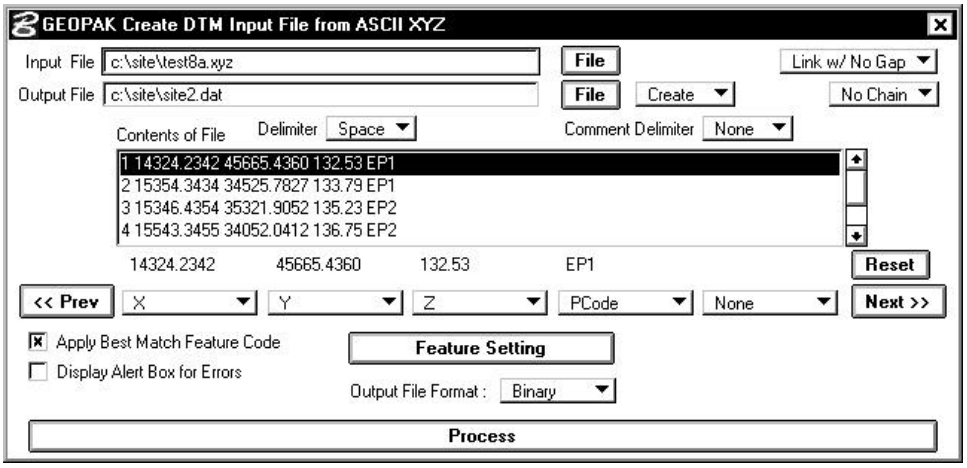
All points are grouped together under one chain and there is a gap between sequential PCodes.



The resulting chain runs continuous within a consistent PCode. Due to the **Link w/ Gap** setting, links are not extracted between successive spot shots with differing PCodes. Hence, line segments are not extracted between points 2 & 3 as well as between points 4 & 5.

4.4.3.12 Case 12: No Linking Codes. Connect All Points as Single Chain. No Gap at Change in PCode.

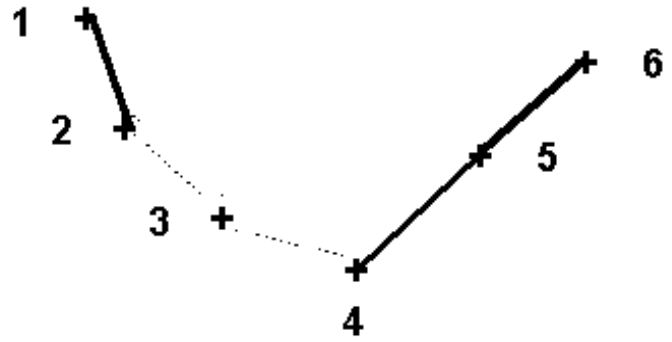
As with the previous case, all the points within the ASCII XYZ file are part of the same Chain as there is no indication of the Chain Name within the ASCII XYZ file. Hence, the user should choose the option of **No Chain**. However, in this instance, it is desirable to connect the entire set of points necessitating the selection of the **Link w/ No Gap** option.



Consider the following example:

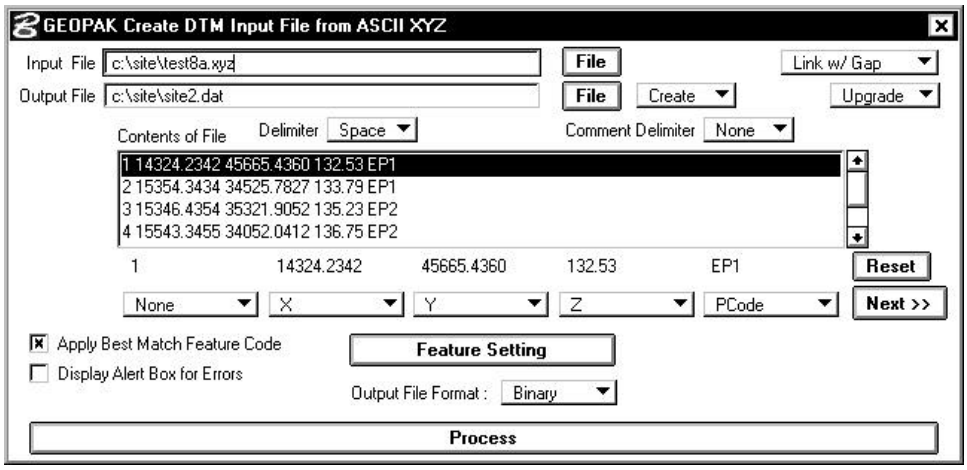
```
1 14324.2342 45665.4360 134.53 EP1
2 15354.3434 34525.7827 134.79 EP1
3 15346.4354 35321.9052 135.23 EP2
4 15544.3455 34054.0412 136.75 EP2
5 14394.2456 45647.4820 134.93 EP1
6 15384.3394 33765.7827 134.77 EP1
```

In this case, all points are connected together without any gaps. The result is a continuous stream of connecting points.



4.4.3.13 Case 13: No Linking Codes. Connect Points by PCodes. New Chain Element at Change in PCode.

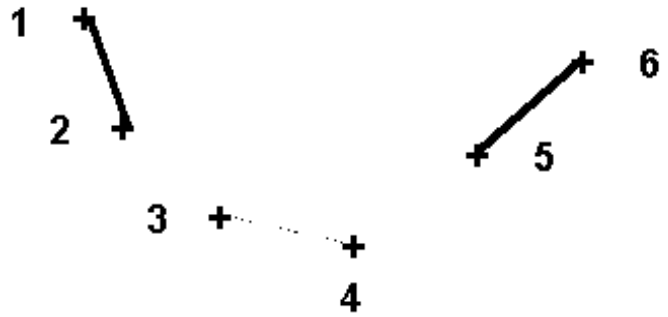
With this case, a new series of connected elements begins at every change in the PCode. It might be desirable to upgrade the name of the chain whenever a new PCode has been encountered. For example, the first series of points associated with the EP1 PCode would be called chain EP1-1. The second series of points associated with the EP1 PCode would be called chain EP1-4. To accomplish these results, we would choose the option of **Upgrade** from chain option button. In this particular instance, we would also choose the option of **Link w/ Gap**.



Consider the following example:

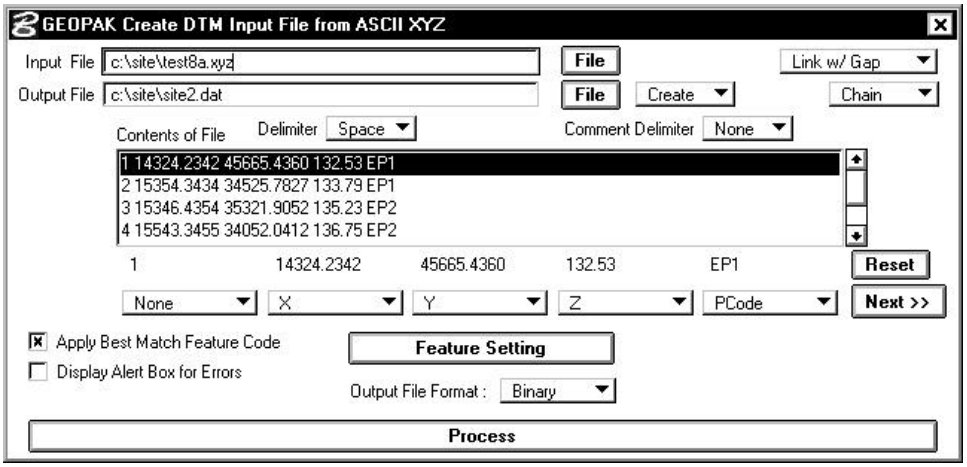
```
1 14324.2342 45665.4360 134.53 EP1
2 15354.3434 34525.7827 134.79 EP1
3 15346.4354 35321.9052 135.23 EP2
4 15544.3455 34054.0412 136.75 EP2
5 14394.2456 45647.4820 134.93 EP1
6 15384.3394 33765.7827 134.77 EP1
```

In this case, points that have the same PCode name would be grouped together.



4.4.3.14 Case 14: No Linking Codes. Connect Points by PCodes. Single Chain Element for PCode. Gap.

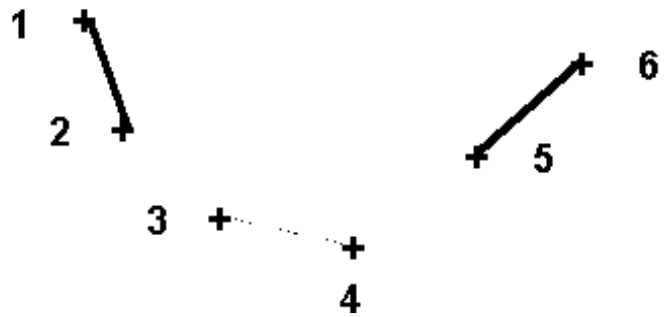
In this case, all the points with the same PCode would be connected together and there would be a **Gap** in the chain if all the shots with the same PCode name are not listed sequentially in the ASCII XYZ file.



Consider the following example:

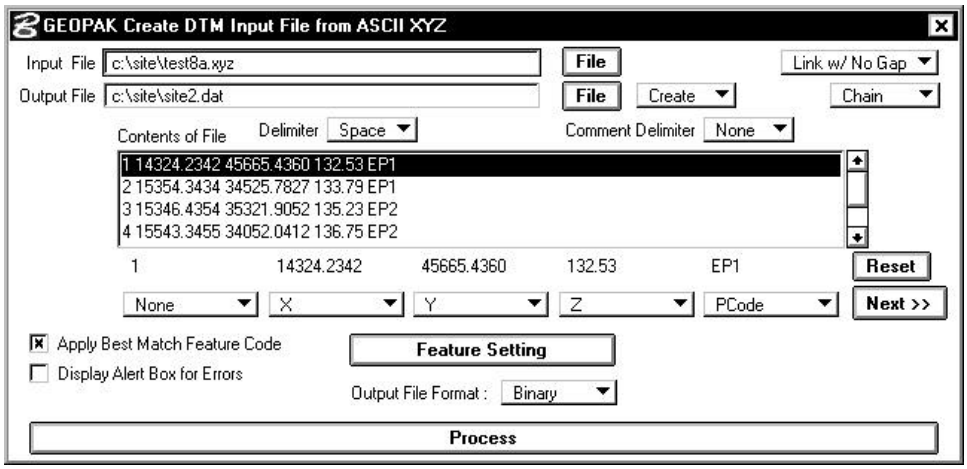
```
1 14324.2342 45665.4360 134.53 EP1
2 15354.3434 34525.7827 134.79 EP1
3 15346.4354 35321.9052 135.23 EP2
4 15544.3455 34054.0412 136.75 EP2
5 14394.2456 45647.4820 134.93 EP1
6 15384.3394 33765.7827 134.77 EP1
```

This dataset would create two chains: Chain EP1 consisting of points 1-2,5-6 and Chain EP2 consisting of points 3-4. The extraction would include a line from 1 to 2 and a line from 5 to 6 with a gap between points 2 and 5. Chain EP2 would extract a line between points 3 and 4.



4.4.3.15 Case 15: No Linking Codes. Connect Points by PCodes. Single Chain Element for PCode. No Gap.

In this case, all the points that have the same PCode are going to be part of the same Chain and the Chain Name will be identical to the PCode name. Moreover, all of the points with the same PCode would be connected together due to the **No Gap** setting.

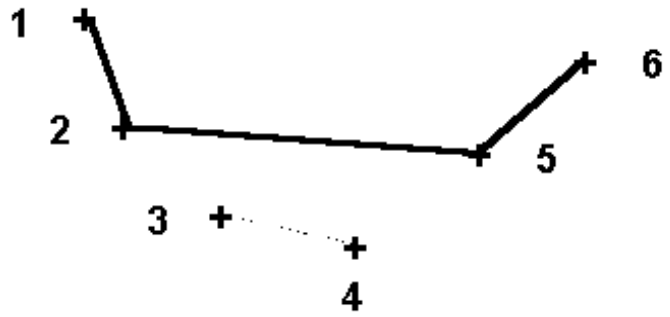


Consider the following dataset:

```
1 14324.2342 45665.4360 134.53 EP1
2 15354.3434 34525.7827 134.79 EP1
3 15346.4354 35321.9052 135.23 EP2
4 15544.3455 34054.0412 136.75 EP2
5 14394.2456 45647.4820 134.93 EP1
6 15384.3394 33765.7827 134.77 EP1
```

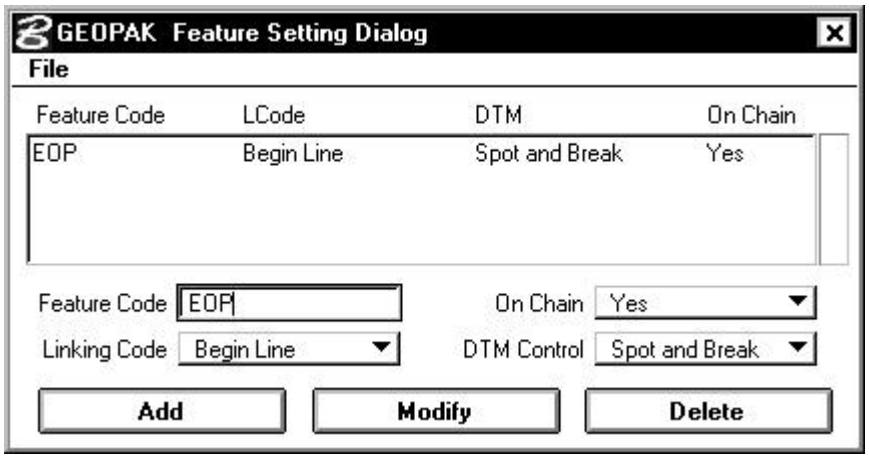
In this case, all the points that have the same PCode are going to be connected together and will be part of the same Chain.

This data set would extract two chains: Chain EP1 consisting of points 1-2,5-6 and Chain EP2 consisting of points 3-4. The extraction would include a line from 1 to 2, a line from 2 to 5 (due to the **Link w/ No Gap** setting), and a line from 5 to 6. Chain EP2 would extract a line between points 3 and 4.



4.4.4 Feature Setting

When the **Feature Setting** button is pressed, the dialog depicted below is displayed.



Standard File commands are supported in the upper left corner of the dialog. These support saving settings for repeated use in subsequent sessions.

The dialog has a list box, plus fields for **Feature Code**, **Linking Code**, **DTM Control**, and **On Chain**. The options within the Feature Setting dialog, combined with the options on the main dialog itself, present a wide variety of options to suit most every need. A prudent review of the various cases is warranted before creating and / or editing the settings. See the previous subsections for a detailed discussion.

4.4.5 Additional Fields

Two toggles are supported in the lower left corner of the dialog:

- **Apply Best Match Feature Code**
- **Display Alert Box for Errors**

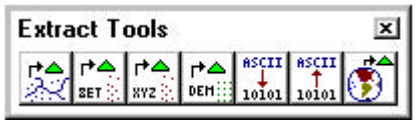
When the **Apply Best Match Feature Code** toggle is active, the best match feature from the Feature Settings dialog is utilized. This option allows placement of one feature in the Feature Settings dialog per item and locates derivatives of that feature in the field. For example, assume that feature 3001 is the EP for Edge of Pavement, but in the field, three different EP's need to be located and chained together. The different EP chains can be located as 30011, 30012 and 30014. During the mapping process, these features will be matched to the EP feature 3001 in the database. Therefore, the user does not have to define multiple EP features in the database.

During processing, if impossible extraction or geometrics are attempted, an error message is displayed on the screen if the **Display Alert Box for Errors** toggle is activated. The error information is always written to the Error Report regardless of the status of this toggle.

Another field in the lower center of the dialog is the **Output File Format**: **Binary** or **ASCII**. Although binary files process faster, there is no other functional difference. The ASCII file can be reviewed via any text editor, while a binary file may not.

To commence processing, press the **Process** bar at the bottom of the dialog. The result of this processing is a GEOPAK DAT file, which subsequently can be utilized to generate a DTM with the Build Triangles tool.

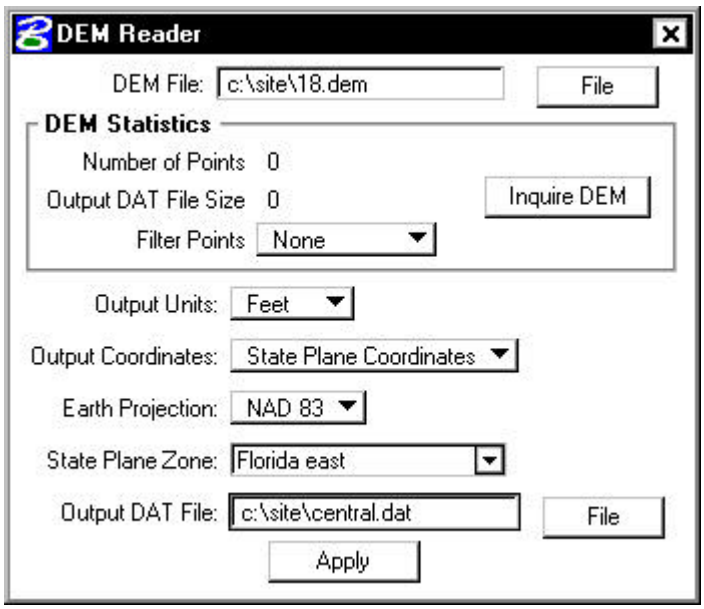
4.5 Extracting DEM Format

Feature / Function	Utilizing specialized Digital Elevation Models (DEM files) generated from other software programs, create a source input file for subsequent DTM model generation.
Tool 	
DTM Menu Bar	Extract > Extract DEM

Another data source utilized by the GEOPAK extract tools is DEM format. "A Digital Elevation Model (DEM), consists of a sampled array of elevations for ground positions that are normally at regularly spaced intervals. The basic elevation model is produced by or for the Defense Mapping Agency (DMA), but is distributed by the USGS, EROS Data Center, in the DEM data record format." A wealth of

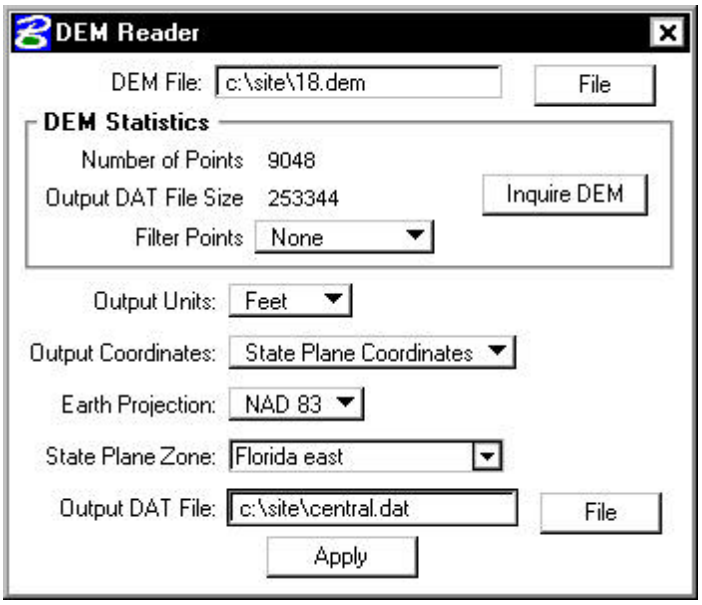
information on DEM formatted data can be obtained from www.usgs.gov. Access the Mapping option.

When the Extract DEM tool is selected, the dialog depicted below is displayed.

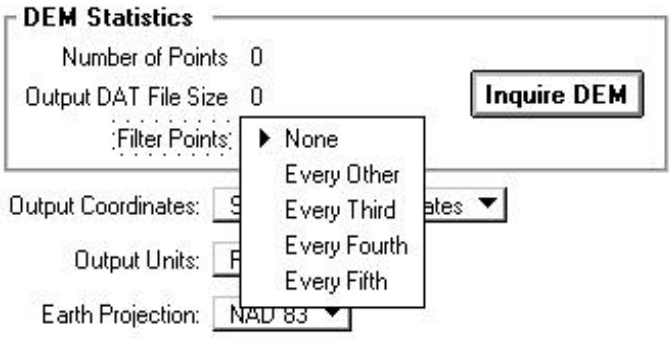


The name of the **DEM File** is keyed into the field at the top of the dialog. In lieu of typing, pressing the **File** button invokes the Open DEM File dialog, wherein the desired file may be selected.

Within the DEM Statistics group box, the display fields are set to zero. Pressing the **Inquire DEM** button, the software scans the DEM file and determines the **Number of Points** and approximates the size of the **Output DAT File**. One sample dialog is depicted below.



The other field in the DEM Statistics is the **Filter Points**. In very large DEM files, the user may choose to filter out some of the grid points, as the density may be too intense. The options are displayed in the exploded view below.

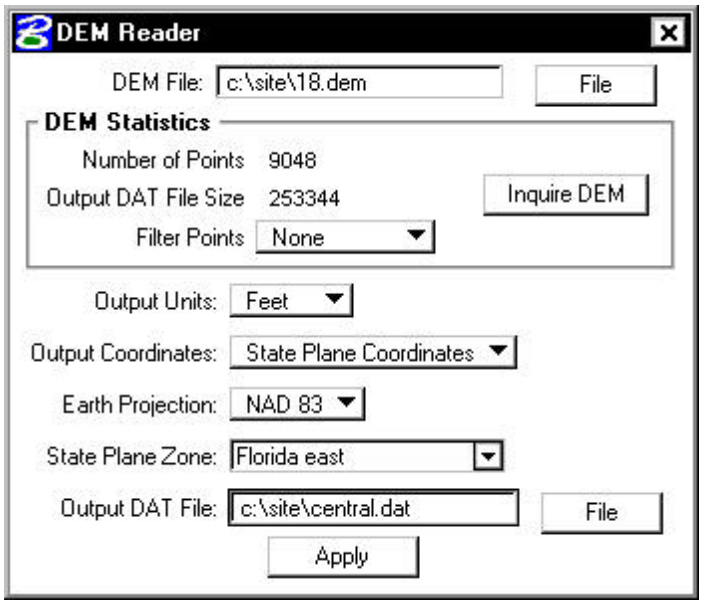


If Every Other option is selected, the Number of Points is divided in half, while the output DAT File Size decreases accordingly. If Every fourth option is selected, the original number of points decreases by 25%.

Two options are supported for Output Coordinates:

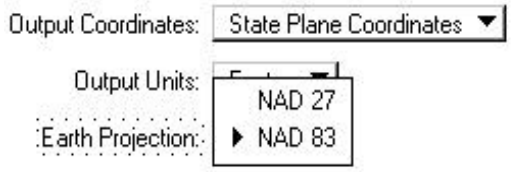
- **State Plane Coordinates**
- **UTM**

A sample dialog utilizing **State Plane Coordinates** is depicted below.

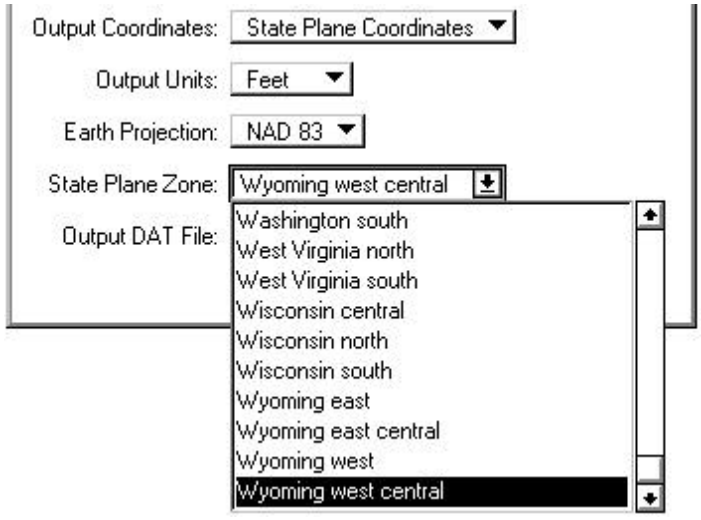


Output Units can be specified in terms of **Feet** or **Meters**.

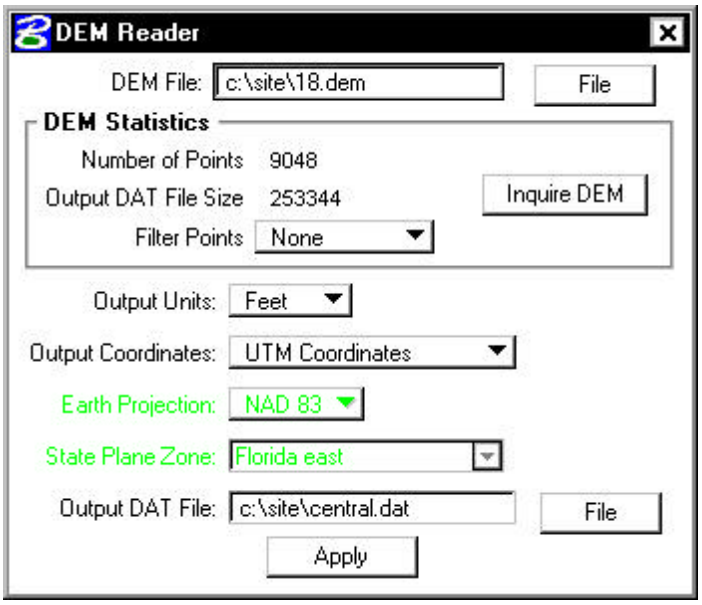
Two **Earth Projections** are supported as depicted in the exploded view below.



The **State Plane Zone** is selected from listing depicted below.



A sample dialog utilizing the **UTM** option is depicted below.



The **Output Units** are still specified in **Feet** or **Meters**. Note, however, that the **Earth Projection** and **State Plane Zone** are ghosted out, as they are not utilized in UTM coordinates.

The last field at the bottom of the dialog is the **Output DAT File** name. In lieu of typing in the name, pressing the **File** button invokes the Save Output File As dialog, wherein the desired path and file may be specified. When the dialog is complete, pressing the **Apply** button commences the procedure. The result of the DEM Reader extraction is a GEOPAK DAT file, which can subsequently be triangulated with the **Build Triangles** tool.

4.6 DAT File Format

When a Binary formatted DAT file is created, the user has no means of reviewing the data outside of GEOPAK. However, when an ASCII formatted file is generated, the file can be viewed, modified, or even created within any ASCII text editor.

Note: If the data is collected or created in the ASCII format described below, no extraction processing is required. The user may skip the extraction and proceed directly to the triangulation procedure.

Data input elements (records) can represent random spot elevations, break lines, voids, contours, or boundary polygons. The type of element is defined by a feature code. Each input record consists of the feature code field, coordinate fields and the elevation field:

- Feature Code (integer value)
- X Coordinate (decimal value)
- Y Coordinate (decimal value)
- Elevation (decimal value)

A sample fragment from the ASCII input file is shown below:

```
1 17381.651 22324.071 391.600
1 17383.071 21997.581 332.850
2 17404.721 21621.311 440.890
3 17405.041 22319.311 382.380
3 17427.411 21907.411 297.200
```

The format in the file is quite simple: a feature code followed by X, Y and Z coordinate values in succession. A single point record occupies each line of the ASCII file. Spaces serve as delimiters between individual fields.

The feature code is mandatory and informs GEOPAK how to interpret the input records. The following are valid feature code values and associated descriptions.

Feature Code	Function
1	Random Spots
2	Start of Break Line
3	Subsequent Point(s) on a Break Line
4	Boundary Polygon Point
5	Start of Contour Line
6	Subsequent Point(s) on a Contour Line
7	Start of a Void
8	Subsequent Point(s) of aVoid
9	Start of an Island
10	Subsequent Point(s) of an Island
13	Start of a Graphic Triangles
14	Subsequent Point(s) of a Triangle
15	Start of a Drape Void
16	Subsequent Point(s) of a Drape Void

Random Spots are points that have no functional relationship to any other point. Random survey shots in open terrain would be an example of random spots.

Break Lines designate linear features such as edges of pavement, ditch bottom, ridges or valleys. The first point in a series of connected break lines has a feature assignment of "2." The second and subsequent points along the break line have a feature code of "3." Break line data must be continuous within the data file.

A **Void** delineates an area of no data or obscured area and is defined in a series of points forming a closed element. The elevations of the void are incorporated into the data file. In addition, the void must be contiguous within the data file.

A **Boundary** Polygon is used to constrain the external boundary of the triangulated model. All points along the boundary polygon are assigned a feature code of "4." A boundary polygon must start and finish with the same point. In addition, the boundary polygon must be continuous within the data file.

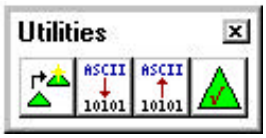
A **Drape Void** delineates an area of no data or obscured area and is defined in a series of points forming a closed element. It differs from a Void in that the elevations of the void elements are not incorporated into the data file. Rather, the void elements are draped onto the model, and model elevations are utilized. The void must be contiguous within the data file.

An **Island** is a closed element completely encompassed within a Void. Random spots, breaks and contour elements may be present within the island.

Graphic Triangles are 3D triangles placed at true elevations.

Since GEOPAK ignores any additional fields past the fourth field (Z Coordinate), extraneous data such as comments or point code information can be included in the data file for reference or use with other software or GEOPAK components.

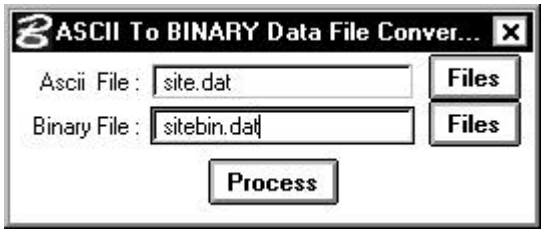
4.7 Conversion Processes

Feature / Function	Utilizing a previously created ASCII DAT file, convert an ASCII DAT file to Binary or apreviously created ASCII DAT file, convert from ASCII to Binary.
Tool 	
DTM Menu Bar	Utilities > ASCII to Binary Utilities > Binary to ASCII

Two conversion processes for DTM Input files (*.dat) are supported. These conversions include:

- ASCII to Binary
- Binary to ASCII

Both procedures are accessed by selecting tools from the Extract tool box or **Utility > Binary to ASCII** or **Utility > ASCII to Binary** from the DTM menu bar. The ASCII to Binary dialog is depicted below:



For both options (ASCII to Binary and Binary to ASCII), the user keys in the name of the data file to be converted. By pressing the **Files** button, the File dialog is invoked wherein the desired file can be selected. In addition, the name of the converted file must also be specified. In order to preserve the integrity of the original data file, a different name for the converted file should be utilized. When the **Process** button is pressed, the software reads the original data file and converts to the desired file format.