

CHAPTER 9

CROSS SECTION MODIFICATION PROCESS

Cross Section Modification (XSM)

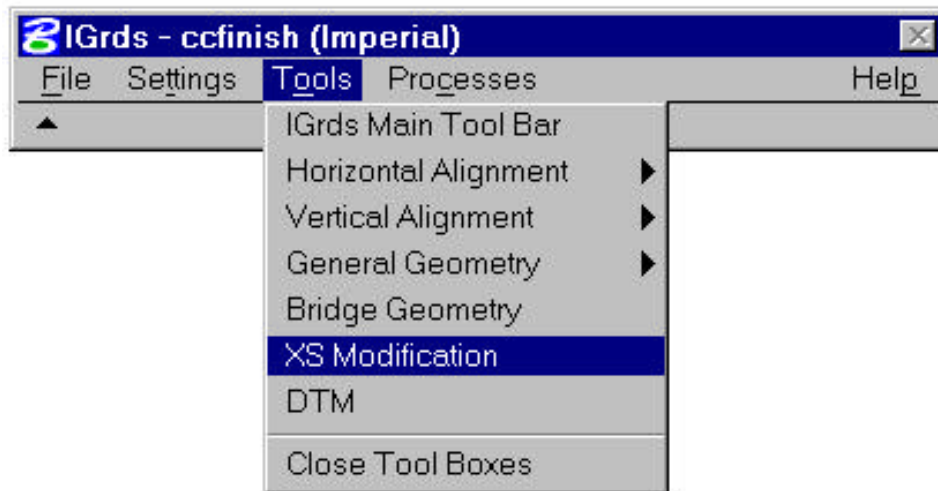
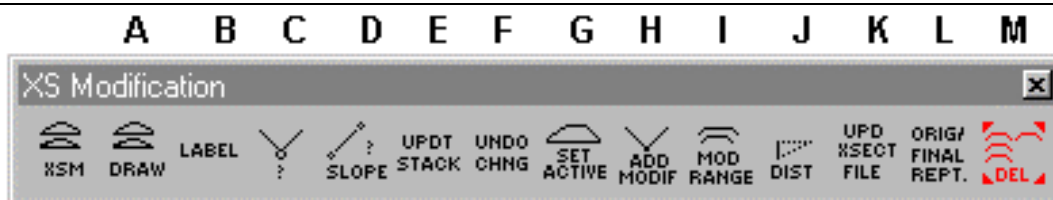


Figure 9-1
Cross Section Modification Process Command Icon Frames



Cross Section Modification Tool Box

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CROSS SECTION MODIFICATION PROCESS

Original/Final Cross Section Modification

The Cross Section Modification (XSM) subsystem of IGrds lets you view and revise original and final cross sections. See Figure 9-2.

Define the baseline roadway (terrain centerline) for all original and final cross section stations displayed. To bring part or all of the original or final cross sections in the Graphics file, display them with the DRAW CROSS SECTIONS command. On the Draw Cross Sections Dialog Box, make sure the Original or Final Cross Sections are checked on. If only Finals are checked on, the graphics display parameters regarding Finals are used. If Originals are checked on, the display parameters for Original XS are used - even if Finals are checked on as well. Changes may be made on a particular original or final cross section after they have been displayed on the screen.

The XSM commands allow you to modify any original or final cross section in a section-by-section, point-by-point manner. Make the desired station the active original or final cross section, and then display it in a larger scale on the screen with the SET ACTIVE CROSS SECTION command. You then add, revise, delete, or identify points on the (active) Original or Final cross section. The changes are automatically saved (default) to a temporary file and the XS stack when another cross section is set active, or the changes can be saved to a temporary file and the XS stack manually by using the UPDATE STACK command. Once all the changes have been completed, save this back to the IGrds working files with the UPDATE CROSS SECTION – IGrds WF command. If a change that has occurred to the stack is unwanted and the UPDATE CROSS SECTION – IGrds WF has not been issued, you can retrieve the cross section(s) in their original state with the UNDO XS MODIFICATION CHANGES command. When a changed original cross section stores in the IGrds Working files, the design cross section is blanked if the change was between the leftmost catch point and rightmost catch point of the design roadways. The design cross sections are not blanked when you modify the final cross sections.

Note: Before using any XSM commands, make sure the graphic group lock is off. If it is not off, you may get erroneous results when you delete, add, or revise a point.

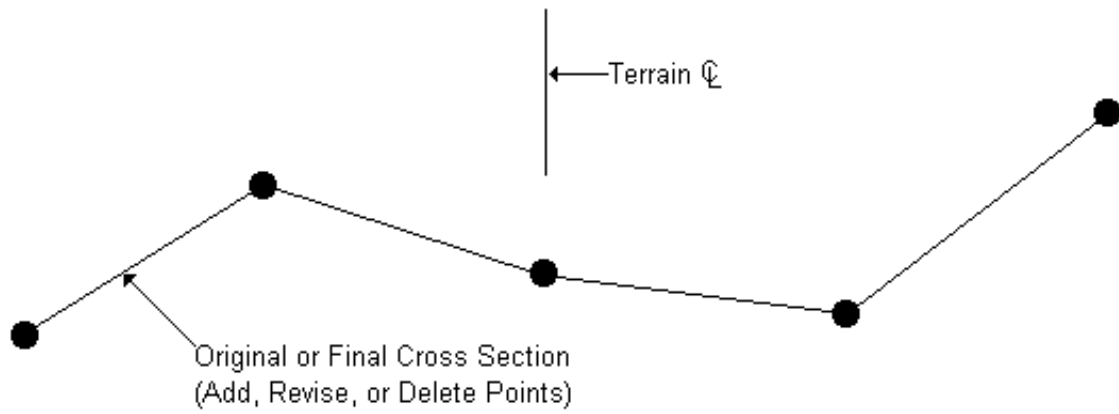


Figure 9-2
Cross Section Modification

Cross Section Modification

The Cross Section Modification (XSM) subsystem of IGrds allows any cross section surface combination to be viewed and/or revised. From all the surfaces that exist, to only the surface in question, the user simply checks the surfaces on or off with the DRAW CROSS SECTIONS dialog box. The SET ACTIVE CROSS SECTION command will display only the surfaces set during the DRAW CROSS SECTIONS command. Select the surface to modify - which sets the active surface, on either dialog box. Graphics display parameters have the following order of precedence:

Final Graphics Display Parameters: Used when only the Final Cross Section Surface is displayed. (PFXyyy variables from the parameter file)

Original Graphics Display Parameters: Used when only Original XS are displayed, even when Final and Original Cross Section Surfaces are displayed (POXyyy variables).

Design Graphics Display Parameters: Used when Subgrade, Finish Grade, Surface Removal, or Template Subcut Cross Sections are displayed (PDXyyy variables).

The XSM commands allow you to modify any surface of a cross section in a section-by-section, point-by-point manner. For example, the SHIFT POINTS ON CROSS SECTION command allows the shift of multiple points at one command.

You select one cross section to work on with the SET ACTIVE CROSS SECTION command. This cross section is the active cross section, and it is displayed on the screen. When the active surface is either Subgrade or Finish Grade design, the keypoints of each roadway are labeled if the keypoint label switch is on. A point symbol appears at each active surface point if the point symbol switch is on. Shoulder points are labeled with an SP, catch points with a CP, median points with an MP, centerline points with a CL, and profile grade points with a PG.

There are a variety of XSM commands to add to revise, delete, or examine the existing points on the active surface of the active cross section. The changes are automatically saved (default) to a temporary file and the XS stack when another cross section is set active, or the changes can be saved to the temporary file and XS stack manually by using the UPDATE STACK command. Once all the changes have been completed, save this back to the IGrds working files with the UPDATE CROSS SECTION – IGrds WF command. If a change that has occurred to the temporary file and XS stack is unwanted and the UPDATE CROSS SECTION – IGrds WF has not been issued, you can retrieve the cross section(s) in their original state with the UNDO XS MODIFICATION CHANGES command. Note that if you are working with both a Finish Grade and Subgrade Surface, that both of these surfaces extend to the catch point. In areas where these surfaces coincide, a change to one surface must be made to the other. If any segments of the Subgrade or Finish Design surfaces were created outside the leftmost catch point or the rightmost catch point of the design cross section, the keypoint for the leftmost catch point or the rightmost catch point will be changed at the time the left stack is updated. Additionally, only changes to the subgrade surface affect earthwork quantities.

IGrds calculates new earthwork end areas for each revised cross section as they transfer to the IGrds Working files. Run Earthwork Design in IG or the AN Option to obtain new earthwork volumes, plot cross sections, and slope stake plots. Remember: Any subsequent design cross section computations (AN Option or Earthwork Design in IG) will overwrite previous XSM changes to the Subgrade, Finish Grade, Surface Removal, and Template Subcut, surfaces.

Redisplay the cross sections with a DRAW CROSS SECTIONS command if you want to make further changes on these cross sections after they have been stored on the IGrds Working files.

Note: Make sure the graphic group lock is off before you use any XSM commands. If it is not off, you may get erroneous results when you delete, add, or revise a point.

XS MODIFICATION MENU



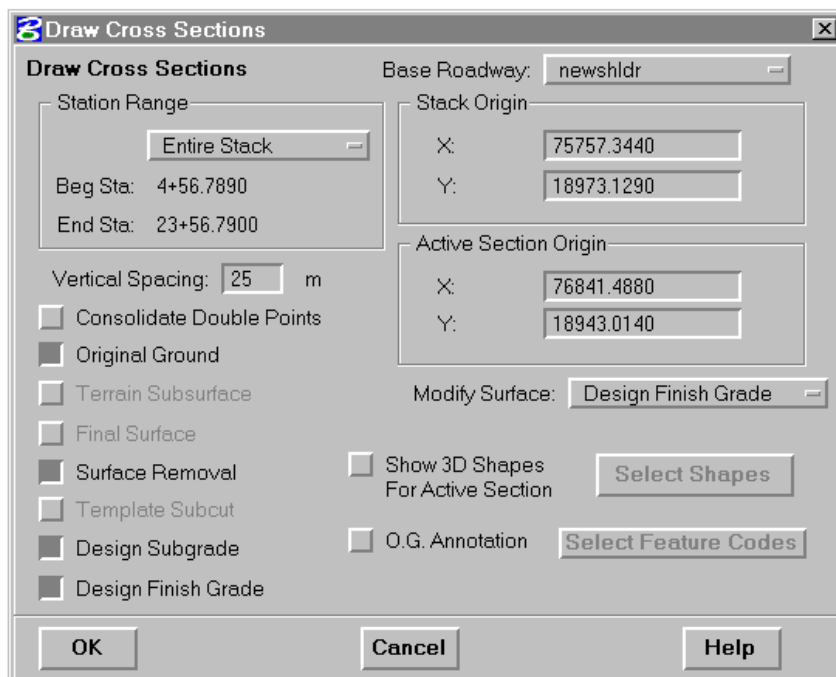
The IGrds XSM menu, pictured at the left, is obtained by selecting XS Modification under Tools found on the IGrds menu bar.

The XSM menu is used to select one of the XSM subsystem commands. These commands are:

- Draw Cross Sections
- Set Active Cross Section
- Labels On/Off
- Identify A Cross Section Point
- Identify A Cross Section Slope
- Identify Distance
- Add Point To Cross Section
- Revise Point On Cross Section
- Shift Points On Cross Section
- Delete Point On Cross Section
- Redefine Subgrade/Finish Grade Keypoints
- Insert Original Ground/Final between Two Points
- Modify Cross Sections By Range Of Stations
- Update Stack
- Update Cross Section On IGrds Working Files
- Undo Changes
- Original Ground Cross Section Report
- Delete Cross Section

All of these commands, and their related menus, are discussed in detail in this chapter.

DRAW CROSS SECTIONS



Selecting the DRAW icon on the XSM menu causes display of the expanded menu shown at the left.

This command brings a cross section, or a range of cross sections, from the IGrds Working files, stores them in the Graphics file, and displays them on the screen. A terrain baseline (baseline roadway) must be defined before the cross sections are drawn.

The first station in the range of cross sections which has original ground (or finals, if

requested) data is the active design cross section. Keypoints are labeled on the active design cross section according to the settings defined in the LABEL command. For a given baseline, the previous cross section stack will be deleted if one exists. Any existing cross section stacks for other baselines will remain.

Base Roadway	The current base roadway is displayed. Click on the field to change the baseline if more than one baseline is present.
Station Range	Select Station Range option. Entire Baseline: <ul style="list-style-type: none">Entire Baseline station values will be displayed. Station/Station: <ul style="list-style-type: none">Enter or select the beginning and/or ending station covering the range of stations to be displayed.

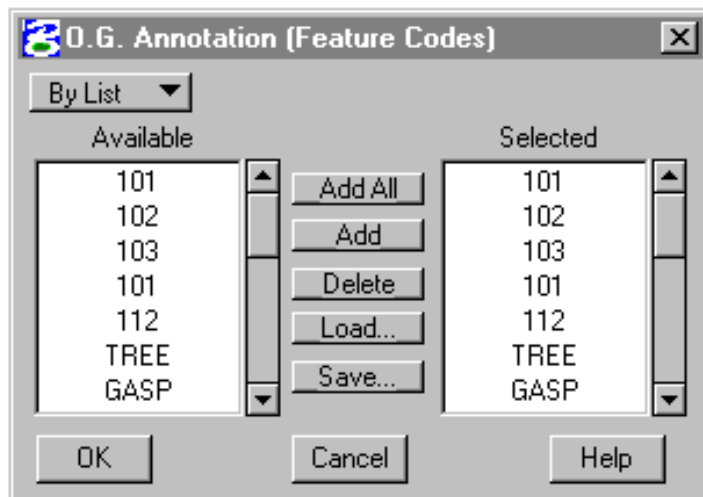
Vertical Spacing	Enter the vertical spacing between cross sections in feet or meters. The spacing may be between 10-200 feet or meters. The default value of 100 is displayed.
Consolidate Double Points	Depress option button to consolidate double points (those that have the same offset and elevation).
Original Ground	Depress option button to display original ground. (Grayed out if none present.)
Terrain Subsurface	Depress option button to display terrain subsurfaces. (Grayed out if none present.)
Final Surface	Depress option button to display final surface. (Grayed out if none present.)
Surface Removal	Depress option button to display surface material removal. (Grayed out if none present.)
Design Subgrade	Depress option button to display Design Subgrade. (Grayed out if none present.)
Finish Grade	Depress option button to display the finish grade line. (Grayed out if not present.)
Modify Surface	<p>Select one of the six surfaces to be modified: (The current surface is displayed.)</p> <ul style="list-style-type: none"> • Design Subgrade Select this option to display the design subgrade and activate its points for possible modification. (Grayed out if not present.) • Design Finish Grade Select this option to display the design finish grade and activate its points for possible modification. (Grayed out if not present.) • Template Subcut Select this option to display the Subcut surface and activate its points for possible modification. (Grayed out if not present.)

	<ul style="list-style-type: none"> • Surface Removal Select this option to display the surface to be removed and activate its points for possible modification. (Grayed out if not present.) • Original Ground Select this option to display the original ground and activate its points for possible modification. (Grayed out if not present.) • Final Surface Select this option to display the final surface and activate its points for possible modification. (Grayed out if not present.)
Stack Origin	Northing and Easting (or X and Y): Enter or select (digitize) the coordinates of the origin of the stack display in the graphics area.
Active Section Origin	Northing and Easting (or X and Y): Enter or select (digitize) the coordinates of the origin of the active section in the graphics area.
O.G. Annotation (Feature Codes)	Push to annotate O.G. surface cross section with available Feature Codes.
Select Feature	Push to select Feature Codes to annotate. See discussion on page 9-12.
Show 3D Shapes	Enable option if selected 3D geometry elements are to be displayed.
Select Shapes	Click option button to select 3D geometry elements. See discussion on page 9-14.
OK	Click to invoke the command with the defined data.
Cancel	Click to exit command with no action.
Help	Click to display help information for this command.

Note: Annotation characteristics are controlled by parameters in the parset file. These characteristics include:

- *Placement above or below surface section line.*
- *Distance from surface section line.*
- *Use of leader lines.*
- *Rotation angle of text labels.*

OG ANNOTATION FEATURE CODES



This dialog box is activated when the Select Feature Codes option button of the or XSM Draw Cross Sections dialog box is clicked. It allows for the annotation of selected feature coded original cross section points.

Feature Selection Options

By List - All feature codes are loaded in the “Available” list box. By default, all feature codes from this list are loaded in the “Selected” List Box. The “Delete” list box option is used to remove unwanted selections (see below).

By Class - All feature code classes are loaded in the Available list box. Selected classes from this list are loaded in the Selected list box.

List Box Options

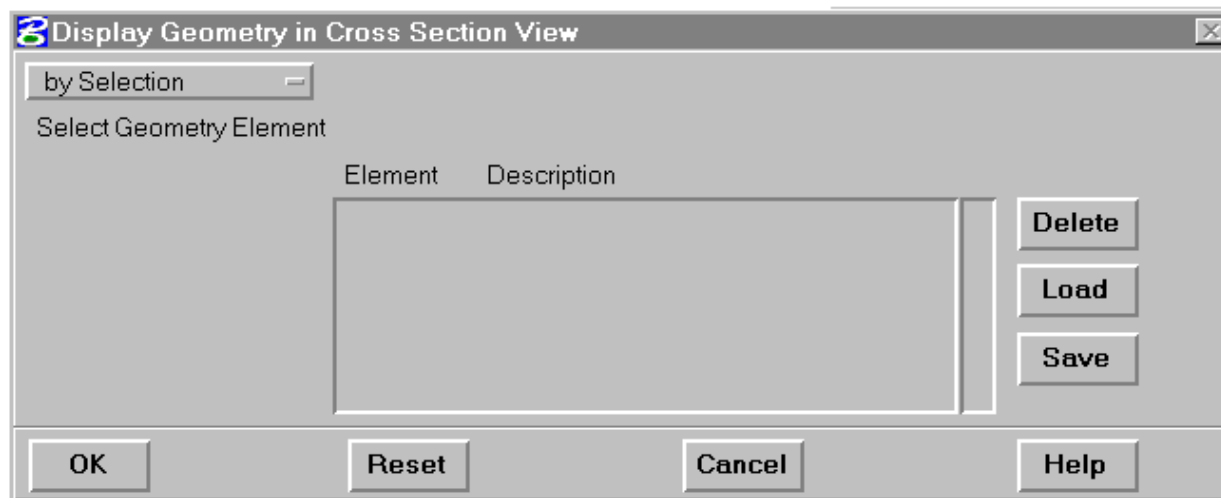
Add All - All feature codes from the Available list are loaded in the Selected list box by clicking the Add All action button. This is done by default when the dialog box is opened.

Add - Select feature codes in the Available list by highlighting, then click the Add action button to load them in the Selected list box.

Delete - Select feature codes in the Selected list box by highlighting, then remove them from the Selected list box by clicking the Delete action button.

Load...	Press this button to display the standard file open dialog to allow loading of previously saved feature codes. The default extension for feature code save files is .tfc. The contents of the .tfc file will be appended to the selected list.
Save...	Press this button to save the contents of the “Selected” list to a .tfc file. A standard file save dialog will appear.
OK	Select OK to set the terrain option and scan line attributes.
Cancel	Select Cancel to exit command without any action.
Help	Display Help for this command.

DISPLAY GEOMETRY IN CROSS SECTION VIEW



This dialog box is activated when the Select Shapes action button is selected on the XSM Draw Cross Section dialog box. It allows for the selection of 3D geometry elements to be projected into the cross section view.

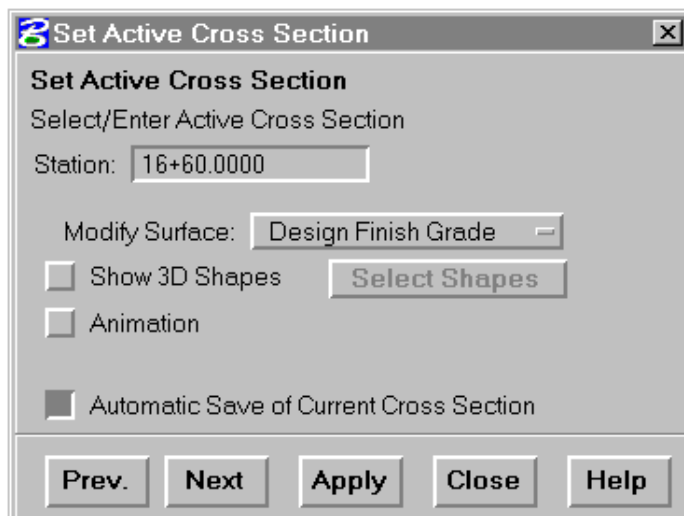
Element Selection Options	<p>By Selection - Point of the element in the graphic area. The element is added to the list box upon confirmation.</p> <p>With Fence Block - Define a rectangular area in the graphic area. All elements within the fence are added to the list box.</p> <p>With Fence Shape - Define an irregular fence in the graphic area. All elements within the fence are added to the list box.</p>
List Box Options	<p>Delete Click to delete the highlighted record from the Selection List.</p> <p>Load Click to load the list box from a saved file. (See Load Geometry Element List from File, page 4-101.)</p> <p>Save Click to save the list box elements to a file. (See Save Geometry Element List to File, page 4-101).</p>

Apply	Click to execute command.
Reset	Click to reset values.
Close	Click to dismiss dialog box.
Help	Click to display help for this command.

SET ACTIVE CROSS SECTION



Selecting the SET ACTIVE icon on the XSM menu causes display of the expanded menu shown at the left.



This command defines the active cross section that will be modified with IGrds cross section modification commands. It displays the design cross section, terrain data, and other subsurface layers that may be requested, if present.

This cross section must have been placed in the Graphics file by the DRAW CROSS SECTIONS command. Keypoints are labeled on the active design cross section according to the settings defined in the LABEL command.

Select/Enter Active Cross Section	Station: Enter or select the station (by clicking on a cross section in the display stack) that is to be the active cross section.
Modify Surface	<p>Select one of the six surfaces to be modified: (The current surface is displayed.)</p> <ul style="list-style-type: none"> • Design Subgrade Select this option to display the design subgrade and activate its points for possible modification. (Grayed out if not present.) • Design Finish Grade Select this option to display the design finish grade and activate its points for possible modification. (Grayed out if not present.)

	<ul style="list-style-type: none"> • Template Subcut Select this option to display the Subcut surface and activate its points for possible modification. (Grayed out if not present.) • Surface Removal Select this option to display the surface to be removed and activate its points for possible modification. (Grayed out if not present.) • Original Ground Select this option to display the original ground and activate its points for possible modification. (Grayed out if not present.) • Final Surface Select this option to display the final surface and activate its points for possible modification. (Grayed out if not present.)
Show 3D Shapes	Enable option if selected 3D geometry elements are to be displayed.
Select Shapes	Click option button to select 3D geometry elements. See discussion on page 9-12.
Animation	Depress toggle button to animate the Set Active Cross Section command. When selected, a timer field will be shown and the Apply push button will change to a Stop push button. Enter the time in seconds to display each cross section. Use the Prev. or Next push button to start the animation process. Use the Stop push button to stop animation. The automatic save of Current Cross Section will be disabled when Animation is selected.

Automatic Save of Current Cross Section	<p>Depress option button (default) to save the current active cross section as displayed and place it in the stack before the new active section requested is displayed.</p> <p>Release the option button to ignore the active section and replace it with the new requested section.</p>
Prev	Click to view the previous cross section in the stack.
Next	Click to view the next cross section in the stack.
Apply	Click to view the cross section at the current station.
Close	Click to exit command with no action.
Help	Click to display help information for this command.

LABELS ON/OFF



Selecting the LABELS ON/OFF icon on the XSM menu causes display of the expanded menu shown at the left.

This command permits users to turn label switches on or off for keypoint labels, point symbols, and ROW/maximum slope line labels. The keypoints on the active temporary cross section are labeled with the roadway designation

and the designated two-letter label for each keypoint (i.e., shoulder points with SP; catch points with CP; centerline points with CL; profile grade points with PG; and median points, points that are catch points between two roadways, with MP).

The point symbol label is set in the Parameter file.

The switch settings take effect the next time the SET ACTIVE CROSS SECTION command or DRAW CROSS SECTIONS command is invoked.

Keypoints	Depress the option button to turn the keypoint label display option on. Release the button to turn the option off.
Point Symbol	Depress the option button to turn the point symbol display option on. Release the button to turn the option off.
ROW/Max Slope Intercept	Depress the option button to turn the ROW/Max Slope display option on. Release the button to turn the option off.
OK	Click to invoke the command with the defined data.
Cancel	Click to disregard the changes and close the dialog box.

ADD POINT TO CROSS SECTION



This command adds a point to the active cross section. Insert the new point between two consecutive points, or outside the first or last point. If a point is added between two consecutive points, the system connects the added point to the points with straight lines. When a point is added before the first or after the last point, the point is connected to the first or last point respectively with a line. IGrds calculates the location of the new point by different combinations of several data types from different reference points.

An added point becomes part of the temporary cross section, and the changed temporary cross section appears as a solid line (or whatever line type you have chosen).

Added points are defined by two-dimensional data types such as horizontal or vertical distances, slope, etc. You select these data types from the IGrds menu. The combination of data types used must be compatible. Valid data type combinations are given in Table 9-1, presented within the Data Types section found later in this chapter.

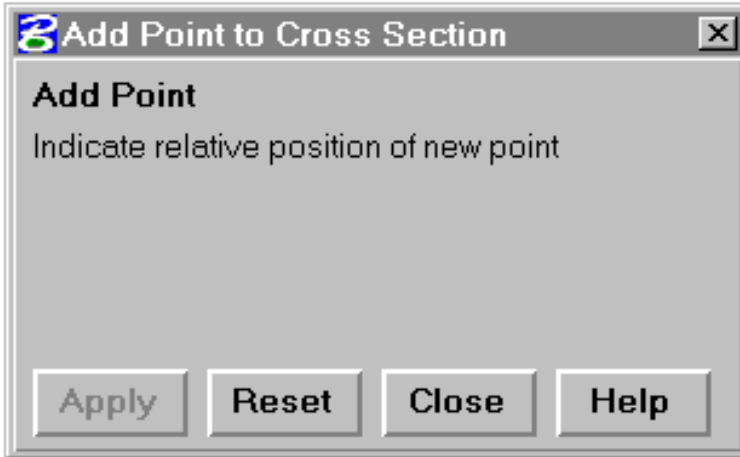
Selecting the ADD/MODIFY icon on the IGrds XSM menu causes the display of the ADD/MOD BY PNT menu from which the user chooses the type of modification to be made. The available options are:

- ADD POINT TO CROSS SECTION
- REVISE POINT ON CROSS SECTION
- REDEFINE KEYPOINT
- SHIFT POINTS ON CROSS SECTION
- INSERT TERRAIN BETWEEN 2 POINTS
- DELETE A CROSS SECTION POINT





Selecting the ADD icon on the Add/Mod menu causes display of the expanded menu shown at the left, and initiates the action of the command.



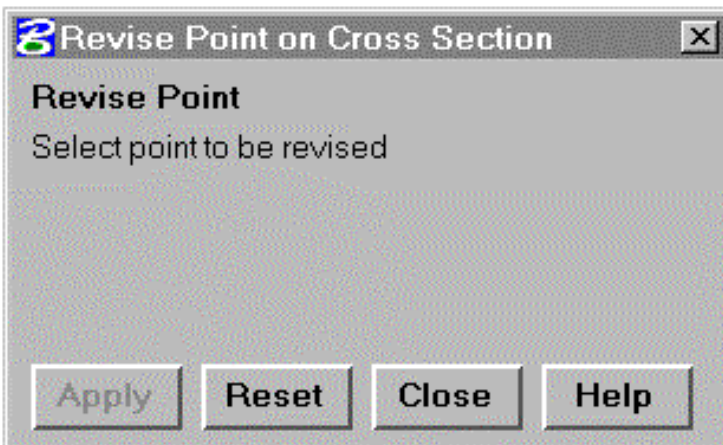
Add Point

Indicate Relative Position of New Point

Digitize a point near the location of the desired new point.



After digitizing the relative position of the new point, the revised menu shown at the left appears.



Choose a new reference point if the default point is not wanted.

Select 1st Data Type or Select Reference Point

Reference Point:

- To change the reference point, digitize the desired point that is to serve as the new reference point. Continue with the following option.

Select 1st Data Type:

- Select one of the twelve allowable options used to locate the new point relative to the reference point. (See Data Types, page 9-41.)

The following revised menu appears after completing the above without closing.

**Select 2nd Data
Type Or Select
Reference Point**

Reference Point:

- To change the reference point, digitize the desired point that is to serve as the new reference point. Continue with the following option.

Select 2nd Data Type:

- Select one of the twelve allowable options used to locate the new point relative to the reference point. (See Data Types, page 9-41.)

After completing the input requirements for the second data type, the menu clears leaving the user with one of the following action options to choose from:

Apply

Click to execute the command and apply the data as entered.

Reset

Click to set the menu back to the beginning condition.

Close

Click to dismiss the dialog box.

Help

Click to display the help information for this command.

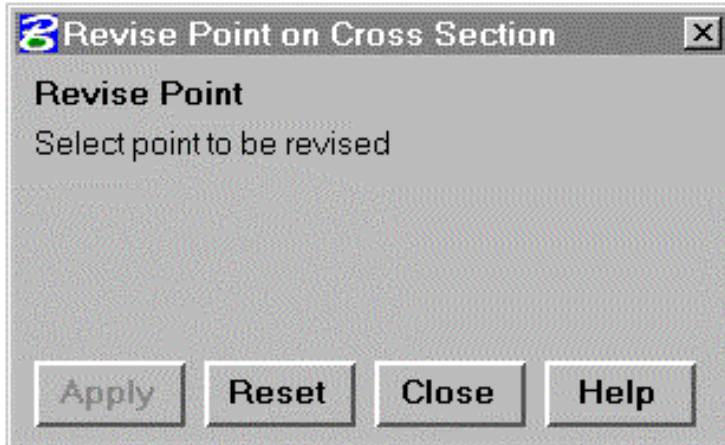
This command is self-repeating, so that after either applying the data or choosing Reset, the command reverts to its initial menu status.

REVISE POINT ON CROSS SECTION



Selecting the REVISE icon on the menu causes display of the expanded menu shown at the left.

This command revises a point on the active cross section. IGrds calculates the revised point by different combinations of several data types from different reference points.



The revised point becomes part of the temporary cross section, and the changed temporary cross section appears as a solid line (or whatever line type you have chosen). You cannot revise the centerline horizontally or the profile grade point vertically. You can revise shoulder points and catch points.

See ADD POINT TO CROSS SECTION command on how a revised point is calculated by data types and reference points. For REVISE POINT ON CROSS SECTION command, the default reference point is the point to be revised. See Figure 9-3.

Revise Point

Select Point to be Revised Select the point on the active cross section that is to be revised.

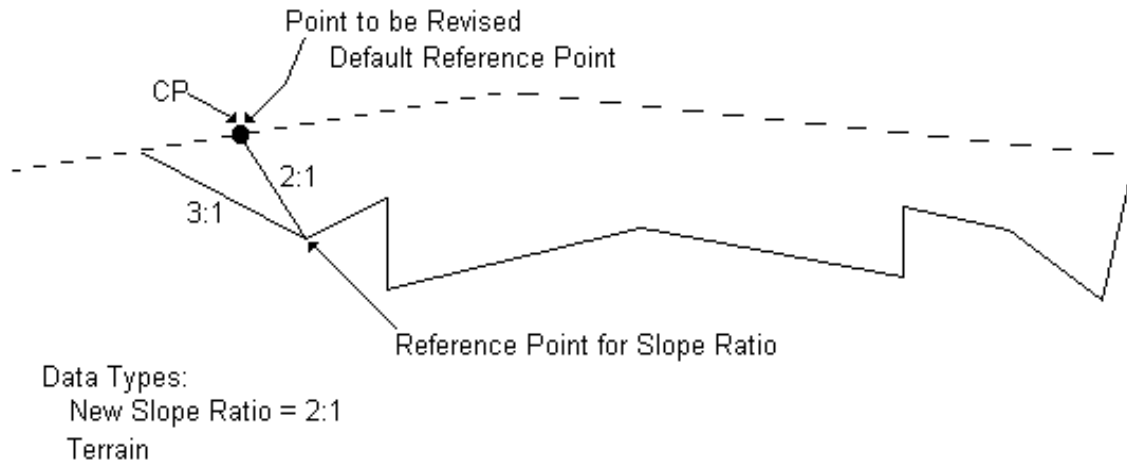
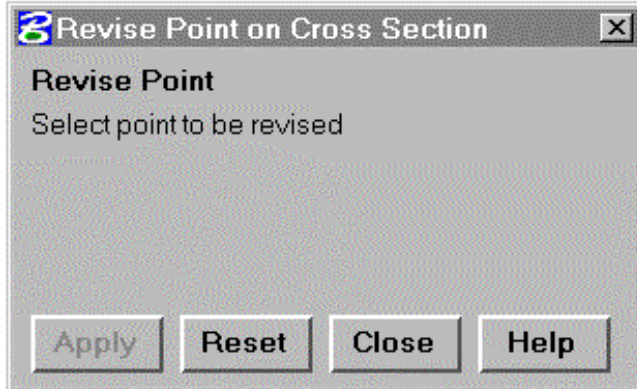


Figure 9-3
Revise Backslope (303)



Selecting a point to be revised causes the Accept/Reject menu shown at left to be displayed.



Accept/Reject

Select the data button to confirm acceptance of the selected point as the one to be revised. (See Note)

Select the reset button on the cursor to reject the selection of the highlighted point. Select another point, or choose another option.

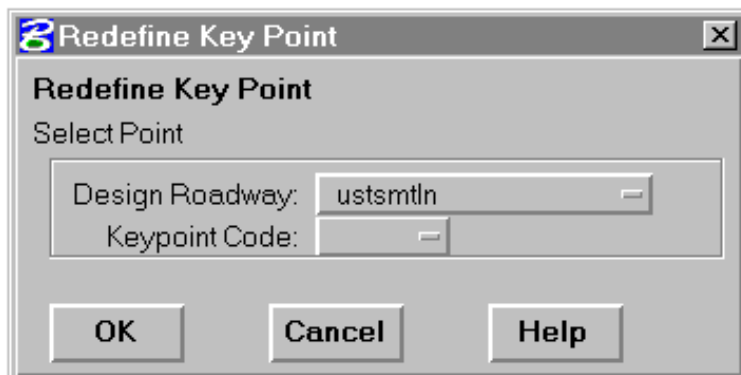
Note:

If the point is selected, the command continues with the same prompting sequences previously defined for the ADD POINT command, beginning at the point of selecting the first data type or reference point. (See page 9-28.) This command is self-repeating.

REDEFINE KEYPOINT



Selecting the REDEFINE KEYPOINT icon on the menu causes display of the expanded menu shown at the left.



This command moves a keypoint (either shoulder point or catch point) from one design point to another point on the temporary design cross section. This can be done only on the active design cross section. You cannot move the centerline or profile grade point. You cannot move a keypoint past another keypoint.

When you move a catch point from one roadway to the catch point of another roadway, it is labeled as a median point (MP).

When you select a median point, use the following criteria to determine which roadway keypoint to move:

- If you select the left side of the keypoint, move the left roadway keypoint.
- If you select the right side of the keypoint, move the right roadway keypoint.

<p>Redefine Keypoint</p> <p>Select Point or Enter Keypoint Code:</p>	<p>Select the existing keypoint (either shoulder point or catch point) to move, or enter the keypoint code. When entering the keypoint code, include the roadway designation, and "L" (left) or "R" (right), and "CP" for catch point, "SP" for shoulder point, or "MP" for median point. Example: ARCP</p>
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Upon selection or entry of the keypoint code, the next prompt is added to the menu:

Select New Key Point Location:	Select the temporary design point that will be the new keypoint.
---------------------------------------	--

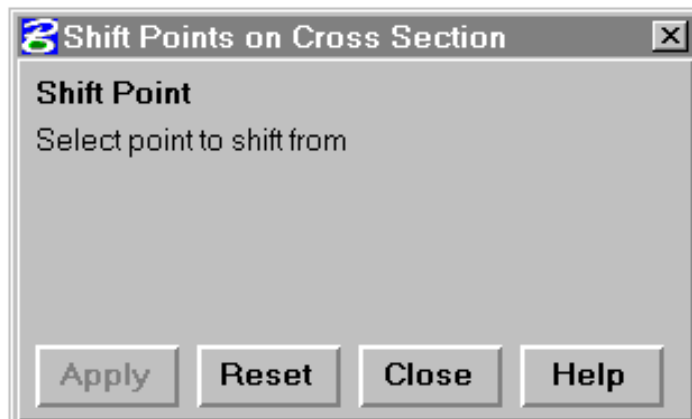
Upon selection of the new keypoint location, the above prompt clears and the user is expected to choose one of the following action prompts:

OK	Click on OK to execute the command as defined by foregoing prompts.
Cancel	Click to exit command with no action.
Help	Click to display help for this command.

SHIFT POINTS ON CROSS SECTION



Selecting the SHIFT POINT icon on the menu causes display of the expanded menu shown at the left.



This command shifts a range of points on the active cross section. The system calculates a new catch point when a left or right shift takes place. The last segment maintains the same slope.

If points shift toward another roadway, no points in the range of shifted points go past the catch point of the other roadway. A vertical line connects the catch point of one roadway with the catch point of the other roadway. Also, if a shift occurs such that the shoulder point of a roadway shifts to the catch point of the other roadway, IGrds

does not allow the shift, and an error message appears.

You cannot revise the centerline horizontally nor the profile grade point vertically. You can revise shoulder points and catch points.

The system uses different combinations of several data types from different reference points to calculate the point shifted to. After IGrds adds the point, the changed temporary cross section appears as a solid line (or whatever line type you have chosen).

See ADD POINT TO CROSS SECTION command on how a shifted-to point is calculated by data types and reference points. For SHIFT POINTS ON CROSS SECTION command, the default reference point is the point to be shifted from.

Shift Point

Select Point to Shift From:	Select the point to shift from on the active cross section.
------------------------------------	---

Selecting a point causes the next prompt to appear:

Accept/Reject	Select the data button to confirm acceptance of the selected point as the shift reference point. (See Note.)
	Select the data button to confirm acceptance of the selected point as the shift reference point. (See Note.)

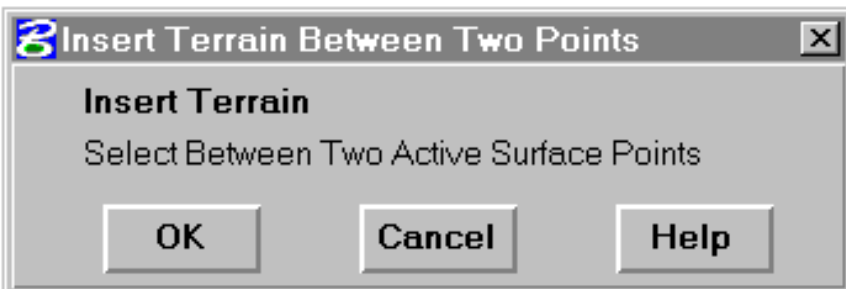
Note:

If the point is selected, the command continues with the same prompting sequence previously defined for the ADD POINT command, beginning at the point of selecting the first data type. (See page 9-12.) This command is self-repeating.

INSERT TERRAIN BETWEEN TWO POINTS



Selecting the INSERT TERRAIN icon on the menu causes display of the expanded menu shown on the left.



This command inserts terrain from the original cross section into the temporary cross section between two points.

EXAMPLE: The slope is increased between two roadways and the catch point is moved closer to its roadway centerline.

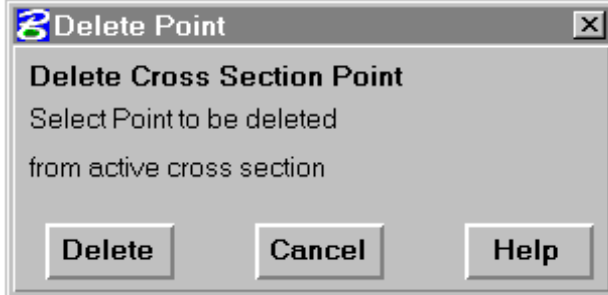
This command brings back the original terrain between the old catch point and the new catch point.

Insert Terrain	
Select Point Between 2 Points:	Select any point between two points on the temporary cross section, and IGrds will insert terrain from the original cross section between them.
OK	Click on OK to execute the command.
Cancel	Click to exit command with no action.
Help	Click to display help for this command.

DELETE A CROSS SECTION POINT



Selecting the DELETE icon on the menu causes display of the expanded menu shown at the left.



This command deletes a point from the active temporary cross section. Keypoints cannot be deleted. The change appears as a solid line (or whatever line type has been chosen) connecting the two remaining points.

Delete Cross Section Point

Select Point to be Deleted: Select the point which will be deleted. (Keypoints cannot be deleted.)

Selecting a point displays the next prompt in the dialog box.

Accept/Reject Select the data button to confirm acceptance of the highlighted point as the one to be deleted. Select an action option next.

Select the reset button on the cursor to reject the selection of the point. Select another point or choose another option.

Select one of the following action options:

Delete Click on this option to delete the chosen point. This action causes display of an Alert menu from which a selection must be made before any further actions can take place.

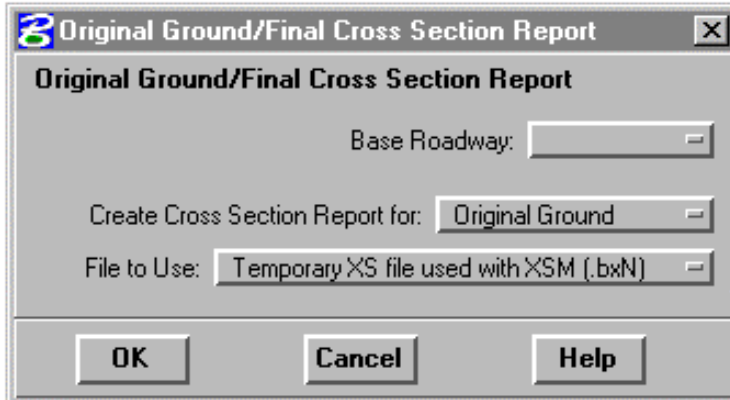
Cancel Click to exit command with no action.

Help Click to display help for this command.

The Alert menu displays the following information:

OK	Press OK to delete point. clicking on this causes the point to be deleted.
Cancel	Click to exit without deleting the point.

ORIGINAL GROUND/FINAL CROSS SECTION REPORT



The original ground/final cross section report creates a report of original ground or final cross sections for the current baseline. For original ground, the report will also include feature codes for each cross section point if present. The report is similar to the RT40 report produced by the AN Option.

Base Roadway	Baseline Roadway to create cross section report from. Active baseline is default.
Create Cross Section Report For:	Original Ground or Final toggle button. Original Ground is default.
File to Use:	Temporary XS file used with XSM (.bxN) or Cross Section file (.xsN) toggle button. Temporary XS file is default.
OK	Press this button to produce the original ground report. The report will be written to the .tmp file.
Cancel	Press this button to exit the command.
Help	Press this button to access on-line help for this command.

Note: If the XSM Cross Section Stack has not been drawn, the Cross Section File (.xsN) should be used.

DELETE CROSS SECTION



This command allows deletion of original ground or final cross sections from the cross section file (.xsN) for the selected baseline. Cross sections can be deleted at a single station, for a range of stations, or all stations. If original ground cross sections are deleted, all Design Data at the same stations is also deleted.

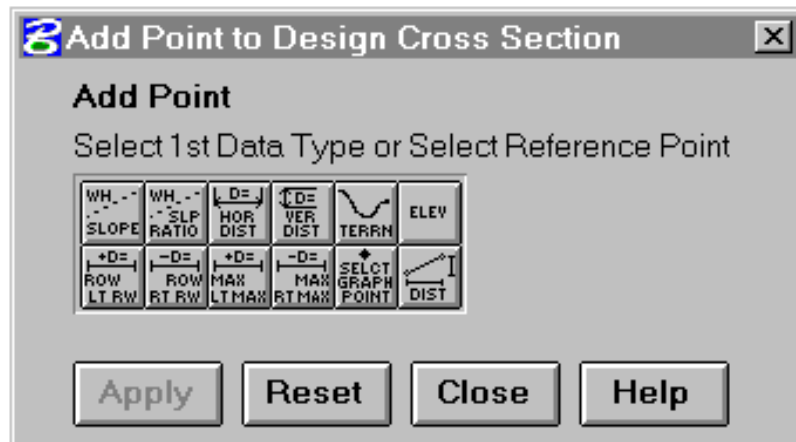
Station Range	Select Station Range option. Enter Baseline: <ul style="list-style-type: none">Entire Baseline station values will be displayed. Station/Station: <ul style="list-style-type: none">Enter the beginning and/or ending station covering the range of stations to be deleted.
Surface	Select Surface option. <ul style="list-style-type: none">Original All Original Ground and Design Data is deleted for the Station Range.Final All Final Data is deleted for the Station Range.
Delete	Click to delete the cross sections.
Cancel	Click to exit the command with no action.
Help	Click to display help for this command.

DATA TYPES

A number of the XSM commands require the adding or moving of design points on the active design cross section. This is generally done by referencing the point to be added or moved, to one or two existing design points on the active design section. Defining where to add or move a point is accomplished through the use of user selectable operators called Data Types. The Data Type operator menu is automatically presented to the user at the time it is required wherever add, revise, or shift point type commands are used.

Each data value has an associated reference point which determines the calculation of the added point. The two reference points may be the same point. The default reference point for both data types is the temporary design point closest to the position located by the cursor when digitizing the relative position of the new point. If a new reference point is selected for the first data type, this new reference point becomes the default reference point for the second data type.

See Figure 9-4.



The Data Type menu consists of twelve option buttons (icons) presented in two rows of six icons each (see illustration above). This menu contains the following Data Type operators: Slope, Slope Ratio, Horizontal Distance, Vertical Distance, Terrain, Elevation, Left ROW Line, Right ROW Line, Left Maximum Slope Line, Right Maximum Slope Line, Graphic Point, and Horizontal/Vertical Distance Between Two Points.

Most of the Data Type operators are used in combination with one another when defining the location of a point. The valid Data Type combinations are presented in the following table, Table 9-1.

	Slope	Slope Ratio	Horz. Dist.	Vert. Dist.	Terrain	Elevation
L/R Row	Y	Y		Y	Y	Y
L/R Max. Slope	Y	Y		Y	Y	Y
Vert. Dist.*	Y	Y	Y			
Terrain	Y	Y	Y			
Elevation	Y	Y	Y			
Slope Ratio	Y	Y				
Horz. Dist.	Y	Y				
Slope	Y					
Graphic						

*Including vertical or horizontal distances between two points.

Table 9-4
Valid Point Data Combinations

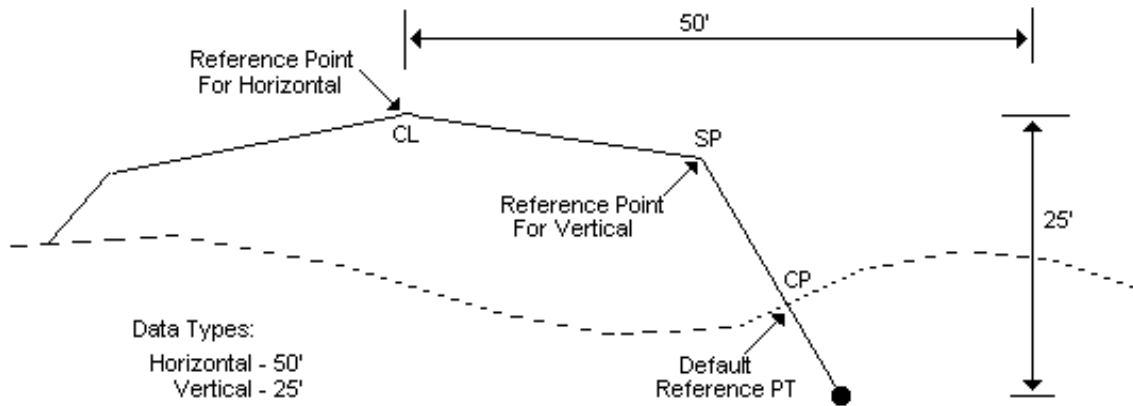


Figure 9-5
Add Ditch Point

SLOPE

When the SLOPE icon is selected, the menu is cleared to display the following prompt:

Select Line or Enter Slope:	Select an existing line on the active design section to accept its slope, or enter the desired slope value.
------------------------------------	---

Note:

Slope is a numeric value of vertical distance divided by horizontal distance (V/H). Slopes extending from the reference point upward to the right are positive, and slopes extending from the reference point downward to the right are negative.

Slopes extending from the reference point upward to the left are negative, and slopes extending from the reference point downward to the left are positive.

Instead of a vertical slope (which you cannot enter), use the horizontal data type.

SLOPE RATIO

When the SLOPE RATIO icon is selected, the menu is cleared to display the following prompt:

Select Line or Enter Slope Ratio:	Select an existing line on the active design section to accept its slope ratio, or enter the desired slope ratio value.
--	---

Note:

Slope ratio is a numeric value of horizontal distance divided by vertical distance (H/V).

Slope ratios extending from the reference point upward to the right are positive, and slope ratios extending from the reference point downward to the right are negative.

Slope ratios extending from the reference point upward to the left are negative, and slope ratios extending from the reference point downward to the left are positive.

Instead of a horizontal slope ratio (which you cannot enter), use the vertical data type.

HORIZONTAL DISTANCE

When the HORIZONTAL DISTANCE icon is selected, the menu is cleared to display the following prompt:

Select Point or Enter Horiz Dist:	Select a point to establish the horizontal distance with respect to the reference point, or enter the desired value.
--	--

Note:

A horizontal distance is positive if to the right of the reference point, and negative if to the left of the reference point.

VERTICAL DISTANCE

When the VERTICAL DISTANCE icon is selected, the menu is cleared to display the following prompt:

Select Point or Enter Vert Dist:	Select a point to establish the vertical distance with respect to the reference point, or enter the desired value.
---	--

Note:

A vertical distance is positive if above the reference point, and negative if below the reference point.

TERRAIN

When the TERRAIN icon is selected, there are no prompts because it requires no data value entry. Data for this Data Type is taken from the terrain data stored in the IGrds Working files.

ELEVATION

When the ELEVATION icon is selected, the menu is cleared to display the following prompt:

Select Point or Enter Elevation	Select a point on the active cross section whose elevation will be used for the required input, or enter the desired elevation value.
--	---

LEFT ROW LINE

When the LEFT ROW LINE icon is selected, the menu is cleared to display the following prompt:

Enter Distance from Left ROW Line:	Enter the horizontal distance from the left ROW line. (A default value of zero is displayed.)
---	---

Note:

Distance is positive if to the right of the left ROW line, and negative if to the left of the left ROW line.

RIGHT ROW LINE

When the RIGHT ROW LINE icon is selected, the menu is cleared to display the following prompt:

Enter Distance from Right ROW line:	Enter the horizontal distance from the right ROW line. (A default value of zero is displayed.)
--	--

Note:

Distance is positive if to the right of the right ROW line, and negative if to the left of the right ROW line.

LEFT MAXIMUM SLOPE LINE

When the LEFT MAXIMUM SLOPE LINE icon is selected, the menu is cleared to display the following prompt:

Enter Distance from Left Max Int:	Enter the horizontal distance from the left maximum slope line. (A default value of zero is displayed.)
--	---

Note:

Distance is positive if to the right of the left maximum slope line, and negative if to the left of the left maximum slope line.

RIGHT MAXIMUM SLOPE LINE

When the RIGHT MAXIMUM SLOPE LINE icon is selected, the menu is cleared to display the following prompt:

Enter Distance from Right Max Int:	Enter the horizontal distance from the right maximum slope line. (A default value of zero is displayed.)
---	--

Note:

Distance is positive if to the right of the right maximum slope line, and negative if to the left of the right maximum slope line.

GRAPHIC POINT

When the GRAPHIC POINT icon is selected, the menu is cleared to display the following prompt:

Select Point	Digitize the location of the point to be used in the current process.
---------------------	---

Note:

When this data type is selected, no second data type is needed.

HORIZONTAL/VERTICAL DISTANCES

When the HORIZONTAL/VERTICAL DISTANCES icon is selected, the menu displays the following new prompt:

Select Horz or Vert Data Type:	Select either the HORIZONTAL or VERTICAL DISTANCE icon from the menu box.
---------------------------------------	---

If the HORIZONTAL DISTANCE command is chosen, the menu displays the following prompt:

Select Point 1	Select the first point of the temporary cross section from which the horizontal distance to the second point is calculated.
-----------------------	---

After selecting the first point, the menu displays the next prompt:

Select Point 2:	Select the second point of the temporary cross section.
------------------------	---

Note:

The horizontal distance from the first point to the second point is positive if right of the first point, and negative if left of the first point.

If the VERTICAL DISTANCE command is chosen, the menu displays the following prompt:

Select Point 1:	Select the first point of the temporary cross section from which the vertical distance to the second point is calculated.
------------------------	---

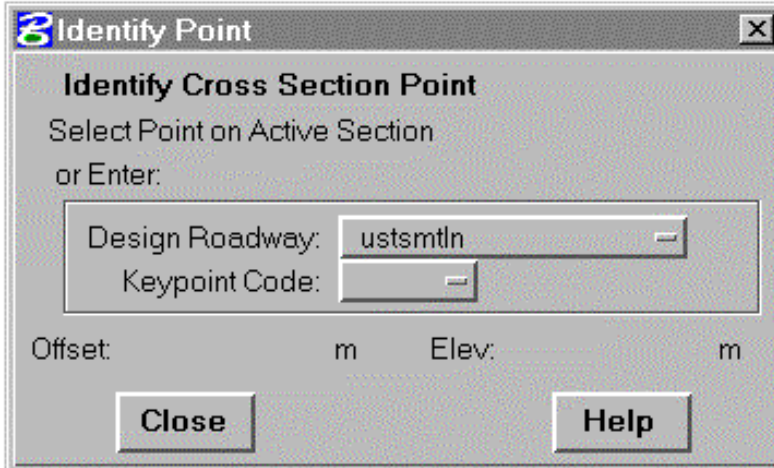
After selecting the first point, the menu displays the next prompt:

Select Point 2:	Select the second point of the temporary cross section.
------------------------	---

Note:

The vertical distance from the first point to the second point is positive if above of the first point, and negative if lower than the first point.

IDENTIFY A CROSS SECTION POINT

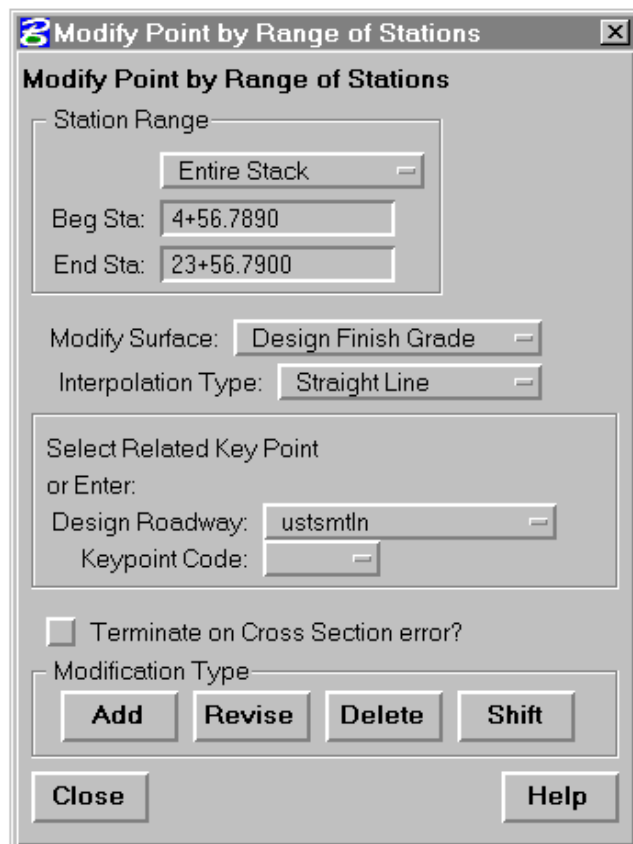


Selecting the ID icon on the XSM menu causes display of the expanded menu shown at the left.

This command displays the offset and elevation of a selected point on the active temporary cross section within the command dialog box.

Select/Enter Keypoint:	Select a keypoint on the active cross section, or enter a keypoint designation code. (Note: When entering a point code, include the roadway name, an "L" (left) or "R" (right) and the point designator for catch point (CP), shoulder point (SP), centerline point (CL), median point (MP) or profile grade point (PG). (Example: BLSP)
Offset:	Displays the offset of the designated point.
Elev:	Displays the elevation of the designated point.
Close	Click to dismiss the dialog box.
Help	Click to display the help information for this command.

MODIFY CROSS SECTIONS BY RANGE OF STATIONS



Selection of the MODIFY RANGE icon on the XSM menu causes display of the expanded menu shown at the left.

This command is used to add, revise, delete, or shift points on the cross sections over a range of stations. The modifications work the same as for single cross sections described earlier in this chapter.

Select the beginning and end stations for the range of cross sections to be modified from the stack of cross sections displayed on the screen. The beginning cross section will then be displayed on the screen as the active cross section. Then select the option to modify by adding, revising, deleting, or shifting points on the cross section. Depending upon option chosen, control will be passed to the ADD POINT TO CROSS SECTION, REVISE POINT ON CROSS SECTION, DELETE A CROSS SECTION POINT, or the SHIFT POINTS ON CROSS SECTION command.

After a single modification has been made with one of these commands, control will be passed back to this command. Repeat the process for the ending station of the range of cross sections to be modified and go through a similar sequence.

The modification may be proportioned by a straight line interpolation (example: ditch transition) or a relative interpolation of adding offset and elevation differences to a specified cross section point at each cross section (example: adding a lane) from the beginning to the ending cross section.

Each cross section within the range is displayed and may be accepted or rejected. The accepted cross sections may be updated to the stack of cross sections on the screen. This command is repeating and another single cross section modification to the same range of cross sections may be made. A report is generated in the temporary report file (.tmp) specifying which cross sections were modified and which were rejected.

Station Range:	<p>Entire Stack: The full range of stations in the current display stack will be displayed.</p> <p>Station/Station: Enter the beginning and ending stations from the current stack that are to be updated. For only one section, enter the station as both the beginning and ending station. Stations can also be entered by graphically picking the desired cross sections in the stack.</p>
Modify Surface	<p>Because Design Keypoints are required for this command to work, only Subgrade and Finish Grade Surfaces are available for selection.</p> <ul style="list-style-type: none"> • Design Subgrade Select this option to display the design subgrade and activate its points for possible modification. • Design Finish Grade Select this option to display the design finish grade and activate its points for possible modification.
Terminate On Cross Section Error	<p>Depress the option button to terminate the command if an error is detected at a cross section.</p> <p>Release the option button to skip over a cross section if an error is detected, and continue processing.</p>

<p>Select Keypoint or Enter Keypoint Code:</p>	<p>Select a keypoint on the active cross section, or enter a keypoint designation code. The selected keypoint determines where the offset is measured from. In the straight line method, the offset is measured from the keypoint. In the relative to a cross section point method, the design point on the modified segment closest to the keypoint is the specified point where the offset and elevation differences are measured from in each cross section.</p> <p>(Note: When entering a point code, include the roadway name, an "L" (left) or "R" (right) and the point designator for catch point (CP), shoulder point (SP), centerline point (CL), median point (MP), or profile grade point (PG). (Example: ARCP)</p>
<p>Interpolation Type:</p>	<p>Select Option</p> <ul style="list-style-type: none"> • Relative - Use this option to interpolate relative to a cross section point at each cross section. • Straight Line - Use this option to interpolate along a straight line.
<p>Modification Type:</p>	<p>Select Option:</p> <ul style="list-style-type: none"> • Add - Select this option to pass control to the Add Point to Cross Section command. • Revise - Select this option to pass control to the Revise Point On Cross Section command.
	<ul style="list-style-type: none"> • Delete - Select this option to pass control to the Delete A Cross Section Point command. • Shift - Select this option to pass control to the Shift Points On Cross Section command.

Close

Click to dismiss the dialog box.

Help

Click to display the help information for this command.

IDENTIFY A CROSS SECTION SLOPE

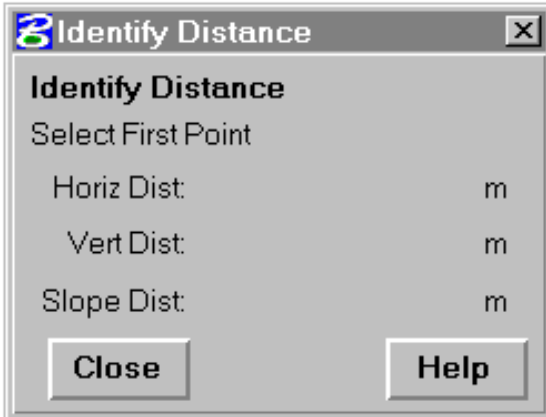


Selection of the ID SLOPE icon on the XSM menu causes display of the expanded menu shown at the left.

This command displays the slope and slope ratio of a selected line on the active temporary cross section. The values are displayed within the command dialog box upon selection.

Select the Segment:	Select a segment on the active cross section.
Slope:	The slope of the segment is displayed upon selection.
Slope Ratio:	The slope ratio of the segment is displayed upon selection.
Close	Click to dismiss the dialog box.
Help	Click to display the help information for this command.

IDENTIFY DISTANCE



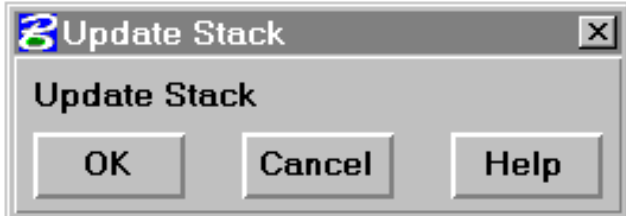
Selection of the ID DISTANCE icon on the XSM menu causes display of the expanded menu shown at the left.

This command displays the horizontal, vertical, and actual distances between any two selected points on the temporary cross section. These values are displayed within the dialog box after selecting the second point.

The vertical distance is positive if the second point is higher than the first point. The horizontal distance is positive if the second point is right of the first point. The actual distance between the two points is always positive. This command is self-repeating.

Select First Point	Select the first point on the active cross section from which the distance is measured.
Select Second Point	Select the second point on the active cross section to which the distance is measured.
Close	Click to dismiss the dialog box.
Help	Click to display the help information for this command.

UPDATE STACK DISPLAY



Selecting the UPDATE STACK DISPLAY icon on the XSM menu causes display of the expanded menu shown at the left.

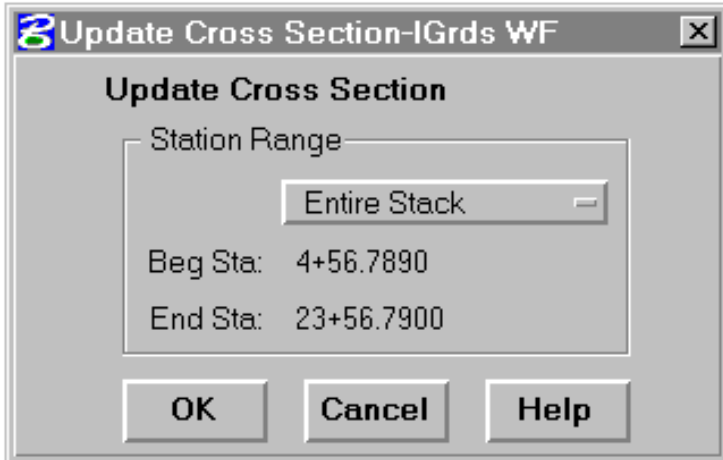
This command takes the active cross section in its current state and stores it in the cross section file, permanently replacing its original

state. It also updates the display of this section in the stack.

There are no prompts.

OK	Click to invoke the command.
Cancel	Click to exit command with no action.

UPDATE CROSS SECTION ON IGrds WORKING FILES



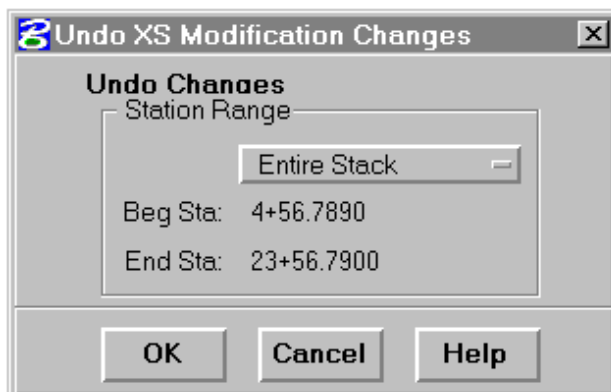
Selection of the UPDATE CROSS SECTION FILES icon on the XSM menu causes display of the expanded menu shown at the left.

This command updates the IGrds Working files with a cross section, a range of cross sections, or all the cross sections from the Graphics file. (These are all the cross sections drawn by the previous DRAW CROSS SECTIONS command.)

This command must be run to update the IGrds Working files with cross sections from the Graphics file. It recalculates the end areas, catch slopes, and cut-fill-median condition codes.

Station Range	<p>Entire Stack: The full range of stations in the current display stack will be displayed.</p> <p>Station/Station: Enter the beginning and ending stations from the current stack that are to be updated. For only one section, enter the station as both the beginning and ending station. Stations can also be entered by graphically picking the desired cross sections in the stack.</p>
OK	Click to invoke the command with the defined data.
Cancel	Click to exit command with no action.
Help	Click to display the help information for this command.

UNDO CHANGES



Selecting the UNDO CHANGES icon on the XSM menu causes display of the expanded menu shown at the left.

This command permits specified cross sections, either singly or in a range, within the current stack, to be changed back to their original condition before any changes were applied.

Station Range	Select Station Range option.
	Entire Stack:
	<ul style="list-style-type: none">• Executing the command with this option causes the entire stack to be updated to its original condition before changes were applied.
	Station/Station:
	<ul style="list-style-type: none">• Executing the command with this option causes all of the cross sections in the range of stations specified to be updated to their original condition before any changes were applied.
	Station:
	<ul style="list-style-type: none">• Executing the command with this option causes the specified cross section to be updated to its original condition before any changes were applied.

Beg Sta:	<p>The beginning station of the current stack is displayed when Entire Stack is selected.</p> <p>Enter the desired beginning station of the range to be "undone", when either Station/Station or Station (for single station) is selected. (The beginning station of the stack is the default value displayed.) Stations can also be entered by graphically picking the desired cross sections in the stack.</p>
End Sta:	<p>The end station of the current stack is displayed when Entire Stack is selected.</p> <p>Enter the desired ending station of the range to be "undone", when Station/Station is selected. (The end station of the current stack is displayed as the default value. There is no display of this field for a single station.) Stations can also be entered by graphically picking the desired cross sections in the stack.</p>
OK	Click to invoke the command with the defined data.
Cancel	Click to exit command with no action.
Help	Click to display the help information for this command.

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