FEATURE LINE:

Feature line is a kind of a line or an object which we can use as a base line or footprint of grading object. In civil 3d if you want use grading tool you have some kind of base or footprint in your drawing, not matter it’s a closed object or not, but it should be feature lines. So feature lines are special lines which grading commands recognize as a base of the grading.

We can divide feature lines as two types:

1. Non Dynamic feature lines: these feature lines are not dynamically related to base objects, when you can create feature lines from lines, polylines, 3dpolylines and polygons it won’t be related each other’s. If you update base objects elevations or slopes and alignment or direction feature line dose not update automatically. You have to update feature lines manually to match your base objects.

2. Dynamic Feature lines: these are completely dynamic feature lines, when you create feature lines from an alignment by linking to respective profiles, and create feature lines from corridor. If base objects are updates automatically feature lines will updated. Link between feature lines and base objects are also can be removed and re-create as necessary.

Methods of creating Feature lines:

As I said earlier in this article you can create feature lines in many ways. Will see the one by one below with respect to appropriate use of commands.

1. **Create feature line**: on home tab, create design category under ribbon click on feature line drop arrow, and select create feature line option.

   ![Create Feature Line](fig.1)

   By clicking on this automatically you can see a create feature line window see fig.1 or you can use command “DRAWFEATURELINE” it does the same thing. Under this window you can assign the multiple properties to the feature line, like a site name, feature line name, style, layer, and conversion properties.

   Let’s see the use of each option available under create feature line window:

   a. Site: This is a container of whole objects of a property or development such as roads, lots, basins, swales etc. when you doing master development design. I recommend that it’s always better to give appropriate name before you start working on feature lines, alignments and parcels. If you didn’t edit the site name automatically all features will be goes under default civil 3d site 1. You
can edit the current site name or you can create the new site name by click on press down arrow to select to select an action or just click the button,

Choose create new or select an option pick from drawing if any.

b. Name: It defines the identity of feature line if you assign name to feature line. It’s always better to assign a name to each feature line created. You can also assign name to feature after creating feature line and you change the same using property window or using feature line property option by right click or you can use command “FEATURELINEPROPERTIES”. Make sure that name box has check to assign name to the feature line on create feature line window so that you can assign any of the name you wish. You can also edit the name template of feature line by clicking on edit name template option and insert available property field to name.

c. Style: Make sure that style box has checked so that you can assign a style to feature line. By when you assign style to feature line it will contribute a major part in appearance of feature line on profiles, cross section and standard layerization. You can assign any of the styles which is available default styles in civil 3d, if you use these styles automatically your feature line layers, line type appearance will be changed as per the pre created styles by C3d. here you can also create or edit styles of feature line as you need by clicking on down arrow option, here you choose any of the option listed and play as you need. Next to the down arrow option you can see a small box, by clicking on this box you can get a preview of the style on actual drawing.

d. Layer: when you use standard c3d template all feature lines will be created under the specified layer mention on layer field, you can also change this by click on use current layer option or also you can create a user defined layer by clicking on.

e. Conversion option: This feature will be hidden when you create feature line directly using command “DRAWFEATURELINE”, because all you do on screen by live. Conversion options will be used when you create feature line by objects.

Note: If you put the necessary information’s under required property field it will be easy to someone to do work and understand in your absence and also this will be easy to you as well when you are into design using grading tool, because grading tool is only recognize the feature lines and when use this tool it will creates number of feature line automatically under the same site and group. So I always recommend you to name the feature line, assign the appropriate styles and layers to feature line. And don’t forget to name the site, which will be more important than everything!! Because lots of items
inter connected to sites, so it always good to keep different sites for different stage of feature line. With the help of this you can easily differentiate when you need.

I. Under site tab select site or create an appropriate site name if in case of need and name the feature line as it use, for ex. If you are designing a basin, give basin name under site name and if you are creating line for basin bottom name it as basin bottom. So that it would be helpful to further updates on the project in future. Later you can assign the style to feature line and layer as you need and click ok.

II. Than it will ask you to specify start point on your drawing, click on the appropriate location on your drawing, and specify the elevation at start point, again it will ask you to choose second point on screen, here you can also see ‘Arc’ option on command prompt, if you want to create curved feature line you can go with the option.

III. Once you click on screen to locate second, it will ask you enter an elevation by default, here you can also see options like slope, Elevation, Difference & Transition. You can use any of these option to ensure the elevation to your 2\textsuperscript{nd} point. Whichever the option you choose here to assign elevation to your 2\textsuperscript{nd} point that will be with respect to your 1\textsuperscript{st} point.

IV. In order to draw 3\textsuperscript{rd} point along with elevation, again you can see options like ‘Arc’, ‘length’, and ‘undo’. As I said before ‘Arc’ option shall be used to draw curved feature line. By choosing length option you can locate a 3\textsuperscript{rd} point directly on screen (this will be locates on same direction of the 1\textsuperscript{st} & 2\textsuperscript{nd} point). And the option ‘undo’ do the same as like normal undo.
V. Once you locate the 3rd point on your drawing again you have to choose any of the option mentioned on command prompt to assign elevation to located point on screen. Once you done with this automatically you can see one more option ‘close’ along with other options, if you choose close option it will automatically joins to the 1st point, here no need to select any options to provide an elevation to the closing point it will automatically consider the 1st point elevation.

2. **Create feature line from object**: You can also create feature line from an object or convert them into feature line. But the objects must be a Line, 3dpolyline, polyline, arc. When you use this option this will recognize these objects from Xref as well. You can use command “CREATEFEATURELINES” to use this option or you can also find the same on home tab, create design category under ribbon click on feature line drop arrow, and select create feature line option.

   ![Feature Line menu](image)

   It will ask you to choose an option on command prompt, once you select any of the object automatically create feature line window will be appear see **fig.2**, this window will be similar to **fig.1**. With all options, here if you observe carefully Conversion option is not hidden and open to perform the options.

   Let’s see the use of each option available under create feature line window, site name, feature line name and other rest of the options will be same I said earlier.

   a. **Erase existing entities**: If this option is ticked to create feature line object, the base object or selected object will erased completely and no longer available you. So always keep this in your mind that do you want to keep the base object or not before completing the process. And the base object and feature line will not be a dynamically related each other. I mean when base object has changed the shape your feature line will still remain the original shape you have to change manually if in case of need.

   b. **Assign elevations**: this option is more important than among the other options. Because this option is helpful to assign an elevation to feature line. If your base object is has an elevation it’s not required you to tick this option. Because elevations will be automatically assign to feature line from the base object. Else if you want to assign any new elevation toy can tick this option.
c. Weed points: by clicking on these option you can remove the unwanted vertices on the feature line, which will create automatically base on some pre-defined criteria in C3D. You can troll this by ticking this option turn on.

I. Put necessary information on the window as i said earlier.
II. Tick an option erase existing entity if you want to remove the base object which you want to convert into feature line.
III. If your base object has an elevation don’t tick the option assign elevation, or if you want to assign a new elevation, or assign elevation from other source like from surface, and from grading tick the option and click ok. Automatically assign elevation window will be appear See Fig.3
IV. Enter an elevation under the elevation option field, or choose any of the other option if you want to assign an elevation from surface or grading object, and select the respective object from the drawing or list. Tick if you want to insert intermediate grade break points on your feature line and if you don’t want to insert any of them un tick and click ok.

V. Now you have converted object into feature line and assigned elevations. You can change the elevations and geometry of feature line after converting / creating as well.

3. **Create feature from Alignment:** You can also create feature line from an alignment with respect to a profiles. If your alignment don’t has any profiles than also feature line can be create. When you create feature line under this option it will be a dynamically related to the assigned profile. If you have made any changes to profile automatically your feature line will also get update. You can also change the referenced profiles of feature line and weed the feature line vertices. Hence these feature lines are called **Auto feature line.**

   Use command “CREATEFEATURELINEFROMALIGN” o use this option or on home tab, create design category under ribbon click on feature line drop arrow, and select create feature lines from alignment option.

   ![Feature Line](image)

   It will ask you to choose an alignment on drawing, here you can select an alignment from the drawing or select from the alignment list by right clicking on drawing. Once you select the alignment automatically create feature line from alignment window will be appear see fig.4.
Note: as I said earlier rename of site name, feature line name and other information’s can be assign like this see Fig.4. Here I took this snap shot from live project. That feature line is represents the sanitary sewer centerline, I have made the necessary changes as per project requirements.

I. One you feed the necessary information’s on fields, under profile field select the appropriate profile from the drop down list or select from the drawing by clicking on selection tool. 

II. Before click ok make sure that create dynamic link has been checked. If it’s not checked your feature line will not be no longer dynamic, it means if you have update the profile your feature line elevation will not be update automatically and also it’s not possible to recreate the link between profile and feature line. So before proceeding to last step keep this in your mind!!!

III. Once you click ok automatically weed vertices window will be appear see Fig.5.
Choose appropriate options with inputs as per your alignment and profile to remove the unwanted vertices on feature line and click ok.

IV. Select auto feature line, right click, select feature line properties, or click on feature line properties on ribbon. 

Automatically you can see auto feature line property window see [Fig.6], here you can change the profile and change the weed points settings of feature line.
Note: Don’t remove dynamic link between feature line and profiles, because once you removed the link you can re link it.

4. **Create feature from corridor:** You can also create feature line from a corridor object. Since corridor is a road grading and made up with number of feature lines. So you can easily create a feature line from corridor object. To create these feature lines you should have a corridor. When you create feature line under this option it will be a dynamically related to corridor object. If you have made any changes to corridor, automatically your feature line will also get update. Here you can’t change the reference link of feature line with corridor object once you created. But. These feature lines are called **Auto feature line.**

Use command “**CREATEFEATURELINEFROMCORRIDOR**” to use this option or on home tab, create design category under ribbon click on feature line drop arrow, and select create feature lines from corridor option.
It will ask you to choose a feature line in corridor, select any of the feature line or edge in corridor, automatically you can see select feature line window with list of feature line see Fig.7

Select appropriate feature line from the list and click ok, as you click o you can see create feature line from corridor window see Fig.8
I. One you feed the necessary information’s on fields, before click ok make sure that create dynamic link has been checked. If it’s not checked your feature line will not be no longer dynamic, it means if you have update the corridor your feature line elevation will not be update automatically and also it’s not possible to recreate the link between corridor and feature line. So before proceeding to last step keep this in your mind!!!

II. You can remove the dynamic link between corridor and feature line under feature line properties option, also you can weed the points and smooth the feature line under same option see Fig.9.
5. **Create feature from stepped offset:** This option is very much useful to offset the objects with certain distance with elevation difference or slope. You can use this option for 3d polyline, 2d polyline, feature line, auto feature line (for both alignment and corridor), and parcel segment and survey figure.

Use command **OFFSETFEATURE** to use this option or on home tab, create design category under ribbon click on feature line drop arrow, and select create feature lines from stepped offset option.

It will ask you to specify the distance, once you enter the distance which you want to offset it will ask you select object and offset side, as you follow the step it will ask you to specify slope, this
slope will be with respect to the source object. Here you all so choose the other option like grade, elevation & difference. You can assign the any of the elevation to the offset object by choosing and specifying elevation option. Also you can add the ‘n’ number of difference to the offset object by choosing and specifying the difference option. This difference will be with respect to the source object elevation.

Now you understood about feature lines and how to create feature line by different methods. Now let see about the feature line geometry, Feature line elevation editor and how to use this options on feature lines and some tips.

**Feature line Geometry:**
After creating feature also you can change the geometry or shape of the feature line. No matter if feature lines are closed or not closed. Feature line geometry options is a very simple and straightforward tool. This tool also dose the same thing what ACAD Modify tool do, such as Trim, Extend, Fillet, Offset and etc.. As I said earlier feature lines are the special entities so we can’t use ACAD modify commands when working on modifying feature lines. Hence we have to use a C3D commands or can choose the options on screen to edit feature line geometries. Once you select the feature line automatically you can see the new ribbon option on your screen See Fig.10

![Fig.10](image)

Sometimes you may see the Edit geometry and Edit Elevation tabs as you select the feature line and sometimes you may not able to see this options. If the option Edit geometry and Edit Elevations are selected under modify tab than you can see the both individual tab respectively.

You can see these tabs, if it’s not selected you can’t see. So by selecting this options you can on and off these options.

Now let’s see what are the geometry editor options and its respected commands which you use directly to edit the feature line and as well Polylines, 2d polylines, 3d Polylines sometimes Lines as well. Yes this will work on ACAD entity as well.

1. **Insert PI:** You can use this option to insert a new point on feature line. You can insert point in 3 ways after choosing this option. Once you choose this option it will ask you to specify point on your screen to insert a new point, and also you can see *Distance and Increment* options as well. As click on screen it will ask to enter an elevation to the new point. You can enter manually or
you can assign elevation from surface by choosing surface option. You can also use distance option to insert a new point by specifying some distance and you can use increment option to insert ‘n’ number of points between existing PI’s on feature line by specifying an interval.

Command: INSERTFEATUREPI. Using this command you can insert PI’s to feature lines, Auto feature lines corridor, parcel segment, survey figure line, polyline, 2d polyline and 3d polyline.

2. **Delete PI:** This option dose the same as what it says, and its very straight forward. You can use this option to delete PI’s on feature line. Using this option you have to delete PI’s manually. but as you choose this option automatically all PI’s will be highlights on feature line with fade green color and as you move your curser towards to delete PI that point will be automatically turned to dark green color and it represents that you are choosing the point to delete.

Command: DELETEFEATUREPI. Using this command you can remove PI’s for feature line, Auto feature lines corridor, parcel segment, survey figure line, polyline, 2d polyline and 3d polyline.

3. **Break:** You can use this option to break the feature line. Once you choose this option it will ask you to select feature line, as you select feature line you can see cross mark on feature line in Cyan color which indicates the 1st point, and still it will ask you specify 2nd point, as you specify the second point you feature line will be broken with respect from the 1st point you choose. Another method is as you click on break option you can see an another option at command prompt first point, as you choose this option it will ask you to specify 1st point on your feature line, as you click it will ask you to choose 2nd point, and you can see your feature line be breaks between 1st and 2nd point.

Command: BREAKFEATURES. By using this command you can easily break feature line, Auto feature line, Auto corridor feature line, parcel segment and survey figure line. This command will not be works for line, arc, 2d polyline, 3d polyline or polyline. You can use normal ACAD command BREAK to perform this.

4. **Trim:** This command works as a normal ACAD TRIM command. Once you choose this option to trim feature line, you have to choose 2 objects here 1 object must be a feature line.

Command: TRIMFEATURES. Using this command you can trim only feature line, auto feature line, auto corridor feature line, parcel segment & survey figure lines.

5. **Join:** This command works as a normal ACAD JOIN command. Once you choose this option to Join feature line, you have to choose 2 objects join each other, you can choose feature line and polyline or 3d polyline to join. If you select 2d polyline to join with feature line it will be automatically convert as feature line.

Command: JOINFEATURES. Using this command you can join Feature Line, Auto Feature Line, Auto Corridor Feature Line, Parcel Segment, Survey Figure, 3dPolyline, and polyline.

6. **Reverse:** By using this option you can change the drawn order point or reverse the feature line start and end points.

Command: REVERSEFEATURE. By using this command you can swap the 1st and 2nd point of feature line, auto feature line, auto feature corridor feature line, parcel segment, survey figure lines. This command will also works for polyline, 2d polyline, 3d polyline and lines. This command will not works for Arcs and Splines.
7. **Edit Curve**: This option will be use full to modify the curves or delete the curves on feature line. Once you click this option you can see delete option as well on command prompt using this Option you can delete the curves. To edit curves select curve on feature line, you can see edit feature line curve window see **Fig.11**. Using this editor window you can edit the curve adding parameters in to the fields.

You can input the radius directly, also you can pick the radius length on drawing by clicking on selection tool. If you enter wrong inputs under radius field with respect to the current radius it will gives you the error message with suggesting the minimum radius. By clicking on forward and backward arrow you can design or edit the respective other curve as well. Once you done with the editing click on apply ok.

Note: you can also see that how your curve looks with your inputs on screen before you complete the whole procedure just clicking on Apply or Enter, this option will helps you to reedit the curve which will save your time.

Command: **EDITFEATURECURVE**. You can also use command to perform this option. This command will not works for any other ACAD or C3D entities, such as auto feature line, auto feature corridor feature line, parcel segment, survey figure lines. This command will works only for feature line curves.

8. **Fillet**: By using this option you can fillet or add curve to your feature line. Once you click this option automatically it will highlights or shows the PI points where feature line has to be fillet. Also you can see that how your feature line looks that after fillet with respect to the radius what you give. You can see other options as well on command prompt All, Join, Radius. Default radius will be 10ft or 10m, if you click all option your feature line will be get fillet with 10ft or 10m in a single click. Use Join option to join the feature line. And radius option is helps to add the radius.

Command: **FILLETFEATURE**. Using this command you can edit auto feature line, auto feature corridor feature line, parcel segment, survey figure lines and 3d polylines.

9. **Fit Curve**: By using this command you can fit a curve to your feature line. Once you click this option you can see 2 options in command bar to select to fit your curve. By using point’s option you can fit your curve by selecting start and end point. And using options you can set tolerance and minimum number of segments which will be helps to fit your curve.

Command: **FITCURVEFEATURE**. Using this command you can fit a curve to Feature Line, Auto Feature Line, Auto Corridor Feature Line, Parcel Segment, Survey Figure, 2d Polyline, and Polyline.
10. **Smooth:** By using this command you can smooth your feature line and as well as you can Straighten the feature line. Once you click this option you can see Straighten option on command bar, by choosing this option you can straight the curved feature line easily. Command: SMOOTHFEATURE. This command will works only for feature line.

11. **Weed:** By using this command you can remove the unwanted PI’s on feature line. As you click on this option you can see weed vertices window see Fig.12.

   ![Weed Vertices](image)

   Fig.12

Using these weeding factors you can remove the unwanted PI’s on your feature line. And also You can use this options to multiple feature lines at single time by choosing multiple on command bar. Also you can remove the PI’s to feature lines for a length or distance by choosing Partial option on command bar by specifying start and end point. Command: WEEDFEATURES. Using this command you can weed Feature Line, Auto Feature Line, Auto Corridor Feature Line, 3d Polyline, 2dPolyline, and Polyline.

12. **Stepped offset:** This command is works as simple ACAD command OFFSET. I have already told you about stepped offset and how to use this under create feature line type.

**Note:**

1. To use these edit geometry commands or options to modify to feature line when it’s created from alignments or corridors you have to remove the dynamic link.
2. When you use JOIN option to join feature line and non-feature line object such as 2d Polyline or 3d Polyline it will be automatically convert as a feature line and the elevations at joining point will be takes automatically from source feature line and rest of the PI’s should be cross check manually (if elevations are not assigned to non-feature line objects).
3. When you use JOIN option to join 2 feature lines check the sites of the feature lines. If both feature lines are different sites it will takes a source site after join the feature line.
line. So make sure that before you join the feature lines which you have to make source object. (You can also change the sites of feature line from one site to different site by moving or copying option).

**Edit Elevations:**
After creating feature also you can change/assign the elevations to vertex point on Feature line. Also you can add elevation point on feature line without adding vertex point, which keeps your feature line more dynamic in update and easy to work. to edit elevation we have to use a C3D commands or can choose the options on screen to edit feature line elevations. Once you select the feature line automatically you can see the new ribbon option on your screen See **Fig.13**.

![Fig.13](image)

Sometimes you may see the Edit geometry and Edit Elevation tabs as you select the feature line and sometimes you may not able to see this options. If the below options Edit geometry and Edit Elevations are selected under modify tab than you can see the both individual tab respectively.

![Edit Elevations and Edit Geometry Tabs](image)

You can see these tabs, if it’s not selected you can’t see. So by selecting this options you can on and off these options.

Now let’s see what are the elevation edit options and its respected commands which you use directly to edit elevation of the feature line and as well Polylines, 2d polylines, 3d Polylines sometimes Lines as well. Yes this will work on ACAD entity as well.

![Elevation Editor](image)

1. **Elevation Editor:** This is very important tool to edit the feature line elevations and change as well. Once you click this option, automatically panorama window will be opened with grading elevation editor by default see **Fig.14**
As you can see in window there are so many options available, will go one by one I will start with very 1st option which available on top left corner of window. Using this option you can select another feature line to edit. 2nd option is to zoom the current feature line which you are editing. 3rd option is you can to draw a quick profile which is easy to know the elevation difference in graph (profile). 4th option raise / lower the elevation of feature line elevations you can get this option by select and right clicking the feature line. 5th 6th option is again raise & lower the feature line with an increment. 7th option is to set the increment to lower/raiser the elevations, the default increment will be always set to 1 by clicking this option right side incremental will be open to edit, which is hide before. 8th option is to use flatten the feature line by using constants elevation method or constant grade, by clicking this flatten window will be appear. If you choose the constant elevation option automatically all elevation will be flatten with respect to very first elevation of the feature line. If you choose constant grade elevation method automatically grade ahead & grade back will be changed automatically with respect to grade difference between first point & second point. You can use this both options to modify elevations only few points on feature line by selecting point to point on the same window. 9th option is used to add insertion point between the vertex points of feature line. Adding elevation point is very helpful while doing grading using feature line. Elevation point can be added only between the vertex points or elevation points, this option is works only within the feature line/3d polyline, and you can’t use this option to extend the feature line/3d polyline. You can insert elevation point in 2 ways after choosing this option. You can see Distance and Increment options as well. As click on screen it will ask to enter an elevation to the new point. You can enter manually or you can assign elevation from surface by choosing surface option. You can also use distance option to insert a new point by specifying some distance and you can use increment option to insert ‘n’ number of points between existing PI’s on feature line by specifying an interval.

2. **Insert Elevation Point:** You can use this option to insert an elevation point on feature line. This option is more useful when you doing grading. Elevation point can be added only between the vertex points or elevation points, this option is works only within the feature line/3d polyline, and you can’t use this option to extend the feature line/3d polyline. You can insert elevation point in 2 ways after choosing this option. You can see Distance and Increment options as well. As click on screen it will ask to enter an elevation to the new point. You can enter manually or you can assign elevation from surface by choosing surface option. You can also use distance option to insert a new point by specifying some distance and you can use increment option to insert ‘n’ number of points between existing PI’s on feature line by specifying an interval.
Command: INSERTELEVPOINT. Using this command you can insert Elevation point to feature lines, Auto feature lines corridor, parcel segment, survey figure line, polyline, and 3d polyline.

3. **Delete Elevation Point:** This option dose the same as what it says, and it’s very straight forward. You can use this option to delete elevation points on feature line. As you choose this option automatically all PI and Elevation points will be highlights on feature line with fade green color and as you move your curser towards to delete elevation point that point will be automatically turned to dark green color and it represents that you are choosing the point to delete, this is a manually option. Another one is as you choose this option you will find the an option says ALL command prompt, if you choose this option or type A and Enter all elevation points will be removed automatically on the feature line.

Command: DELETEELEVPOINT. Using this command you can remove PI’s for feature line, Auto feature lines corridor, parcel segment, survey figure line. This command will not works with Polyline, 2d polyline and 3d polyline.

4. **Quick Elevation Edit:** by using these option very quickly you change the elevations to PI’s and as well to Elevation point. You can also do this changes with Elevation editor but this option is very helpful to change elevation, grade, and slope on screen very quickly. As you choose this option you will find the two option on command prompt saying Site & Reference. If you choose Site option you can edit the elevation for any feature for selected site. Or you can directly change the elevation of point by clicking on any point on feature line. Not only edit elevation you can also change the slope between any 2 points. If you choose Reference option it will ask you to pick 1st and 2nd second point on feature line as you choose you will find 3 options slopes, elevations, difference using any of these option you can edit the elevation between the points you chosen.

Command: QUICKEDITFEATUREELEVS. This command is only works with feature lines, parcel segments, and survey figures.

5. **Edit Elevations:** This option is very interesting and user friendly and do the multiple task. As you choose this option multiple option on command prompt like Grade, Slope, Insert, and Exit. This option works as like quick elevation edit option but has additional options like Insert, Exit, using this option you can insert new elevation point on the feature line, as you insert new point you can find additional options Previous, Move, Delete. You can Move & Delete the elevation points on feature line by choosing these options from command prompt. Move and Delete options are only works for Elevation points on feature line and will not work for PI’s.

Command: EDITFEATUREELEVS. Using this command you can edit elevations for feature line, Auto feature lines corridor, parcel segment, survey figure line, and 3d polyline.

6. **Set Grade/Slope between Points:** By using this option you can fix the slope/grade between any points not only respective 1st & 2nd point on feature line. The use/function of this option is as same like Quick Elevation Edit.

Command: SETFEATUREGRADE. Using this command you can set slope/grade for feature line, Auto feature lines corridor, parcel segment, survey figure line, and 3d polyline.

7. **Insert High/Low Elevation Point:** This option is useful to mark the break point on feature line where the slope/grades are intersect each other with respect to grade/slope ahead from 1st point and grade/slope back from the end 2nd point. This might be High/Low point its depends on the 1st point & 2nd point elevation. As you choose this option it as you to 1st point & 2nd point enter grade/slope ahead and back respectively.
Command: INSERTFEATUREHIGHLOWPOINT. This command will works for feature line, Auto feature lines corridor, parcel segment, survey figure line, and 3d polyline.

8. **Rise/Lower by Reference**: Using this option you can raise/lower the elevation of any point by slope or difference with respect to the point you chosen and that point is act as a reference point. Command: RAISELOWERFEATURESBYREF. This command will works for feature line, Auto feature lines corridor, parcel segment, survey figure line, and 3d polyline.

9. **Set Elevation by Reference**: Using this option you can fix the elevation of a point with reference of point chosen or also you can insert new elevation point within the feature line limits. You can fix new elevation be difference/slope of reference point. Command: SETFEATUREREFELEV. This command will works for feature line, Auto feature lines corridor, parcel segment, survey figure line, and 3d polyline.

10. **Adjacent Elevation by Reference**: Using this option you can change the elevation of another feature line just in one click. This option is useful when you have parallel feature line which has same elevations all the time. Once you click on this option it will ask you to select reference object 1st and then 2nd object which you like to edit. In one click all elevations of 2nd feature line will be changes. Or also you can modify if required by using options Grad/slope and Difference available on command prompt. Command: ADJACENTFEATUREELEVSBYREF. This command will works for feature line, Auto feature lines corridor, parcel segment, survey figure line, and 3d polyline.

11. **Grade Extension by Reference**: This option is used to extend the feature line by reference point with the slope/grade. Command: FEATUREGRADEEXTENSIONBYREF. This command will works for feature line, Auto feature lines corridor, parcel segment, survey figure line, and 3d polyline.

12. **Elevation from Surface**: This option is very simple and straight forward as I have already explained earlier in this chapter (refer to grading editor window). Command: FEATUREELEVSFROMSURF. This command will works for feature line, Auto feature lines corridor, parcel segment, survey figure line.

13. **Raise/Lower**: This option is very simple and straight forward as I have already explained earlier in this chapter (refer to grading editor window). Command: RAISELOWERFEATURES. This command will works for feature line, Auto feature lines corridor, parcel segment, survey figure line, 3d polyline, 2d polyline and Polyline.

**Note:**

1. To use these Edit Elevations commands or options to modify elevation to feature line when it’s created from alignments or corridors you have to remove the dynamic link.

2. Elevation points on feature will be with circular point like this ⬇️ and on elevation editor window it looks like this ⬇️ (1st point is a PI point & 2nd point is elevation point)

3. You can move the elevation point on feature line between the two PI and Elevation point it will not change the direction of feature line.
Important options on feature line Modify tab:

1. **Add to Surface as Breakline**: You can use this option to add feature line to surface as a break line or you can use this command FEATUREADDBREAKLINE.

2. **Apply Feature Line Names**: You can use this option to assign names to feature line. It’s always good if give names to feature line so that it would be help identify. And more used helpful while doing grading. Command: APPLYFEATURERLINEENAMES.

3. **Apply Feature Line Styles**: You can use this option to assign different styles to feature line. It’s always good if give style to feature line so that it would be help identify. And more used helpful while doing grading. Command: APPLYFEATURERLINESTYLES.

These are the very important information about feature lines rest of the options on ribbon are related to create annotations, tables and quick profile etc. Which is slight straight forward.