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**Description:**

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This 3PC criteria file is used to create the raw data files in CSV format for the paving grades and blue top books, as well as draw the paving grades into a plan view file. This criteria file analyzes the design cross sections to gather this information, so these reports are created at increments where design cross sections are present. This criteria file is designed to process a divided roadway that has two sets of shape clusters and will run in an Imperial or Metric dataset.

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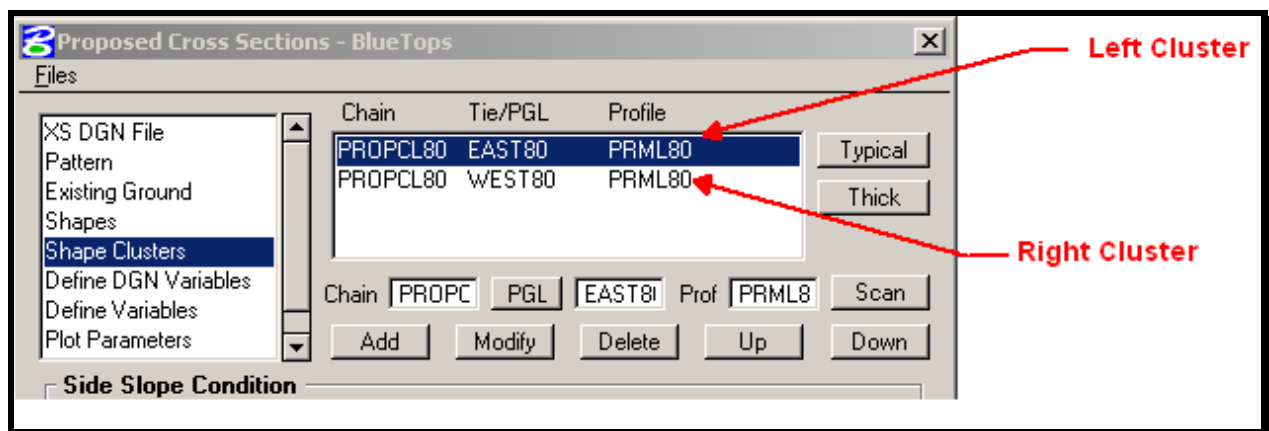
**Processing Logic:**

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This section will explain the general logic used by the criteria file for gathering the data. The user is going to be required to define some search parameters for the criteria file (For a detailed list, see the **Define DGN Variables** section). The criteria file will then search the cross sections for the elements defined by the user to report back the information required to create the paving grades and blue top books.

This criteria file will be set up through **Project Manager- Proposed Cross Sections**. The criteria file is designed to run on a divided roadway, which will require two shape clusters. This criteria file will utilize the shape clusters themselves to locate and mark the PGL and to define the area to search for design file elements that represent the pavement and subgrade, as opposed to the **Pgrade\_BlueTop Undivided** typical section which runs shapeless and searches the entire limits of the existing ground for elements to create the reports. To set the typical up, the user should “Apply to Left Roadway” on the left cluster and “Apply to Right Roadway” on the right cluster as illustrated in **Figure 1**. The typical section generator will set the typical up to run by including the criteria file “pgrade\_d.x” on the left side of each cluster.

**Figure 1- Example of Shape Cluster Configuration**



The first item the criteria file is going to look for is the pavement. If pavement is found, the criteria file will analyze it, and report back the following points (see **Figure 2** and **Figure 3** for graphical representation). These points will be reported on in the raw data file, as well as placed

graphically into a plan view file for the purpose of creating pavement grade sheets. The points that are labeled can also be plotted into the cross section file (on level “XS Text Debug”), which will allow for the user to visually check what points were labeled and check for errors.

- 1) **LtEOP**- Left edge of pavement.
- 2) **CL**- Centerline point (if the pavement element falls within the design chain).
- 3) **RtEOP**- Right edge of pavement.
- 4) **FOC**- Face of Curb.
- 5) **BOC**- Back of Curb.
- 6) **JL**- Joint lines defined by graphical location in plan view.
- 7) **BR**- Break point in pavement slope that does not fall on one of the above mentioned points.
- 8) **PGL**- Profile Grade Line location for each cluster.

Figure 2- Example of Pavement Grade Points, Cross Section File

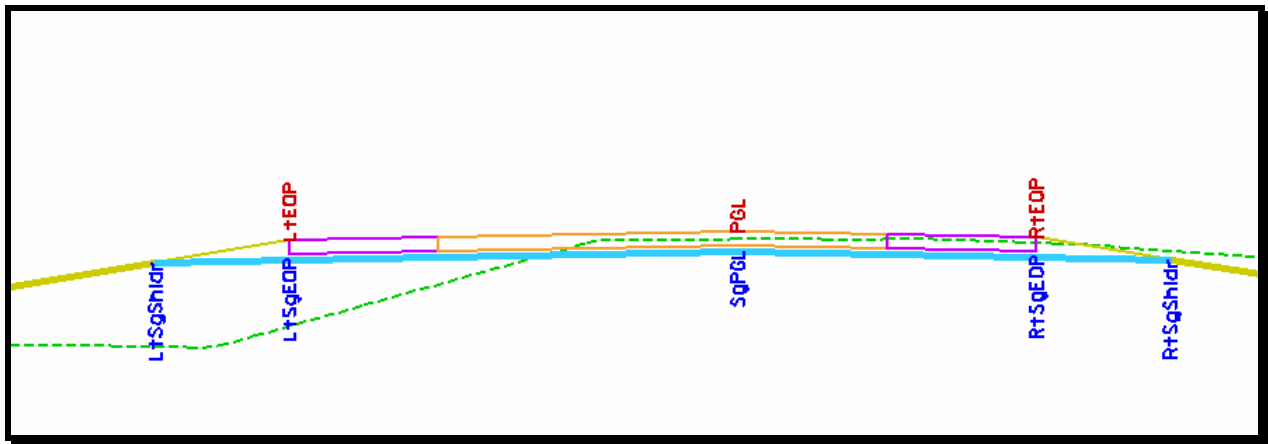


Figure 3- Example of Pavement Grade Points, Plan View File



The second item that the criteria file is going to report back on is the subgrade line. This line will be analyzed as the blue top grading line, and the following points will be reported back on (See **Figure 2** for graphical representation). These points will be reported on in the raw data file, as well as placed graphically into the cross section file upon request from the user for the purpose of error checking (on level “XS Text Debug”).

- 1) **LtSgShldr**- Left subgrade shoulder.
- 2) **LtSgEOP**- Left subgrade edge of pavement.
- 3) **CL**- Centerline point (if the subgrade element falls within the design chain).
- 4) **RtSgEOP**- Right subgrade edge of pavement.
- 5) **RtSgShldr**- Right subgrade shoulder.
- 6) **BR**- Break point in subgrade slope that does not fall on one of the above mentioned points.
- 7) **PGL**- Subgrade elevation at PGL location.

Information extracted at each one of these points (pavement and subgrade) will be as follows:

- 1) Cross Section Chain Name
- 2) Cross Section Stationing
- 3) X,Y Coordinates of Cross Section Chain
- 4) Design Chain Name
- 5) Design Chain Stationing
- 6) X,Y Coordinates of Design Chain
- 7) Roadway (Left or Right)
- 8) Code (point name)
- 9) Offset
- 10) Elevation
- 11) X,Y Coordinates of Point

This information will be extracted to a CSV file that will be placed in your working directory (as defined by Project Manager). It will be named in the following format: a\_pavegrd.csv or a\_bluetop.csv, where “a” is the cross section chain. The Report Generator located on the Engineering Application Menu then accesses the raw data files. This generator will create the reports that will be sent to the district field personnel upon their request.

This criteria file will first find the PGL of the active shape cluster and report back on this point. It then searches for elements (pavement and/or subgrade depending on the users request) at this location. If none is found, a warning message will be issued into the cross section file stating “Problem with Pavement (or Subgrade) on this section”. This message will also be reported into the CSV file. If an element is found, the extent of the continuous elements will be traced to find the left and right edge points, with all other critical points marked as necessary according to the circumstances encountered (see **Figure 2**).

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### Define DGN Variables:

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Upon setting up the proposed cross section run, there will be a number of **Define DGN Variables** for the user to define. These variables will display a default symbology, but the user will need to verify that this is correct for their cross sections. Also, a design file will need to be defined by utilizing the search and navigate capabilities provided within the proposed cross section run. A list of these variables follows.

#### **Top of Pavement:**

The criteria is going to use this symbology to calculate the required pavement grade information. The endpoints will be marked as the Right and Left EOP points, with breaks, joint lines and PGL points marked as encountered. If grades are desired for the surfaced shoulders, be sure to include the symbology in this variable. The variable will default as follows:

"Top of Pavement" dgn = xs.dgn; lvname = "XS Pavement Top"

#### **Subgrade:**

The criteria will use this symbology to calculate the required blue top data. The endpoints of the joined elements will be the left and right shoulder points, with all other points calculated between these points (see the Process Logic section for details). The variable will default as follows:

"Subgrade" dgn = xs.dgn; lvname = "XS Grading"; co=5

#### **Top of Curb:**

This is the symbology that defines the top and face of curb in cross section view. When this is encountered, criteria is going to search for the back of curb symbology. If this is encountered, criteria will report back by adding a point to the raw data file called **FOC** to represent the face of curb point. The variable will default as follows:

"Top of Curb" dgn = xs.dgn; lvname = "XS Curb Top"

#### **XS Back of Curb:**

This is the symbology representing the back of curb in the cross section file. If criteria finds face of curb, it will search for this symbology. If it finds it, it will project a point to this location at pavement slope, and report back a **BOC** point to represent the back of curb point. The variable will default as follows:

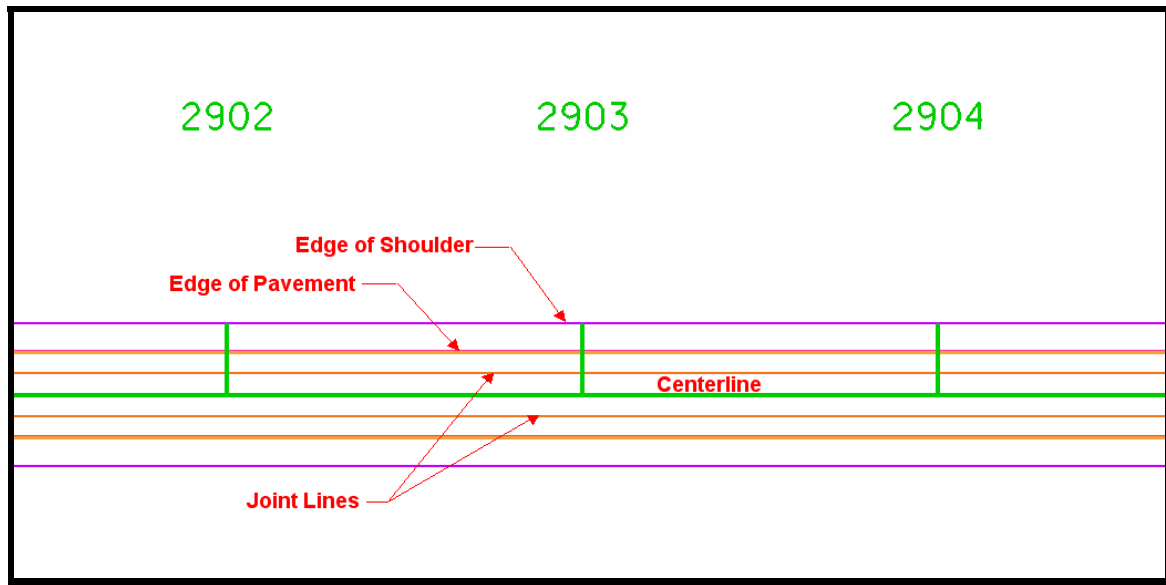
"XS Back of Curb" dgn = xs.dgn; lvname = "XS Curb Bottom"

#### **Joint Lines:**

Joint lines allow the designer to force paving grades (graphically and in the CSV file) based on plan view elements. If data is desired at locations other than the critical points, a graphical element drawn into the plan view pattern file will force criteria to extract data at that location (See **Figure 4** for an example). \*(These are drawn into the pattern file, however they are NOT pattern lines, matching pattern lines will cause the application to "lock up") The variable will default as follows:

"Joint Lines" dgn = pat.dgn; lvname = "RD Joint Lines"

Figure 4- Example of Joint Lines in Plan View

**Milling Line:**

If the section is in a resurfacing area a milling line will be present (NDOR resurfacing criteria always draws the milling line whether a milling depth is specified or not). Criteria labels the Bluetop points differently if a milling line is encountered, while the pavement points are not affected. The variable will default as follows:

"milling line"    dgn = xs.dgn; lvname = "XS Milling"

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**Define Variables:**

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**Plan View Scale:**

This criteria file will draw the pavement grade and tic mark information into a plan view file. The user is required to define the plan view plotting scale in order to set up the correct text size. In addition to this, the scale also signals to criteria whether or not the sections being processed are Imperial or Metric units. If the plan view scale is < 100, then the cross sections are Imperial. If the value is > or equal to 100, the cross sections are Metric. Always check this variable and verify that the scale is valid. The variable will default as follows:

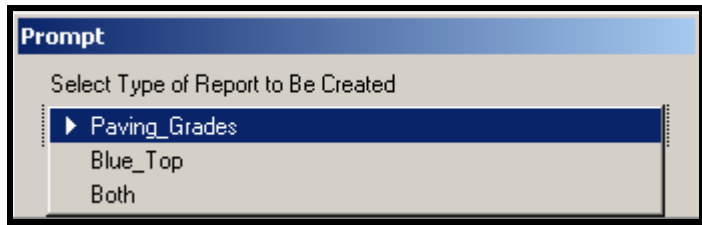
"Plan View Scale" 20

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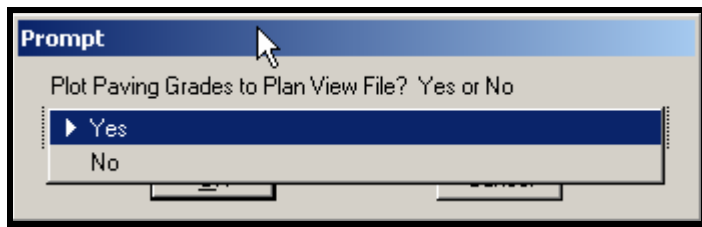
**Prompts Issued When Processing:**

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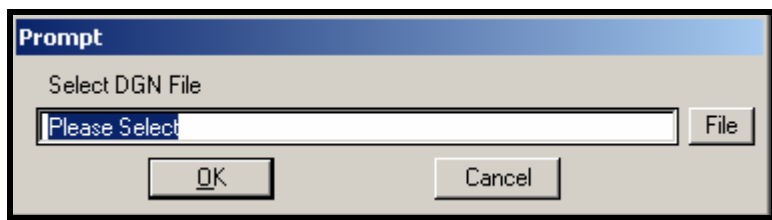
After the typical section is set up and all variables have been defined, the user will **Run** the proposed cross section. The first thing the user will encounter is a number of prompts issued by the 3PC application. The following information will display and explain each of the prompts.

**Prompt -1**

**Prompt-1** will affect the report generation. The user has the option of selecting **Paving\_Grades**, **Blue\_top** or **Both**. If the sole purpose is to get pavement grades drawn to plan view, then the user must select **Paving\_Grades** or **Both**. By default, this criteria file is going to create a CSV file based on the data it extracts from the design cross sections. This file will be named based on the cross section chain name. If multiple files are going to be created from the same cross sections, the user will need to rename the existing CSV files to avoid having it be overwritten by future processing of the run.

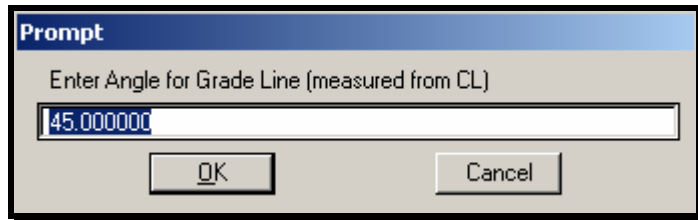
**Prompt -2**

**Prompt-2** will determine whether or not the Pavement Grades will get plotted graphically into a plan view file. This is normally done for the purpose of creating Pavement Grade plan sheets. The symbologies of these grades are set up according to the drafting standards.

**Prompt -3**

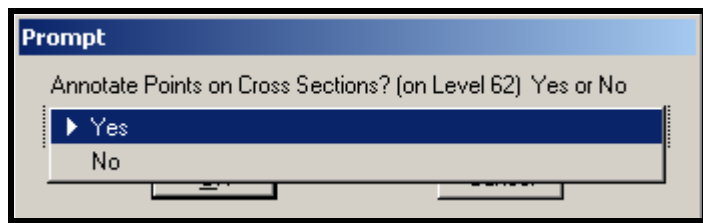
**Prompt-3** will be present if the user elects to have the Pavement Grades plotted to a plan view file. Utilize the **File** button next to the key-in field to allow for selecting the file from an Explorer hierarchy. Once the file is chosen, **Prompt-4** will activate.

#### Prompt -4



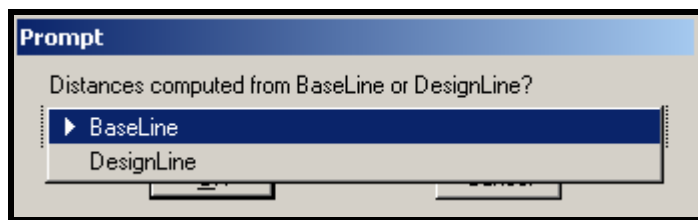
By default the angle that the grades will be plotted into the plan view file (based off of the centerline) is going to be 45 degrees. The user has control over this angle if another value is desired.

#### Prompt-5



**Prompt-5** dictates whether or not text will be plotted into the cross section file to represent the points that are extracted. This text will be placed on Level 62, which allows for the user to easily delete the text after reviewing it. I recommend plotting this text into the cross section file based on the fact that it gives a visual representation of what has been created in the CSV file, and subsequently in the pavement grade plan view file. This will allow the user to review the information graphically and provide an easy way to error check. See **Figure 1- Page 2** and **Figure 3- Page 3** for an example of what this text will look like in the cross section file. The justification point of the text is the actual location of the point that was reported on.

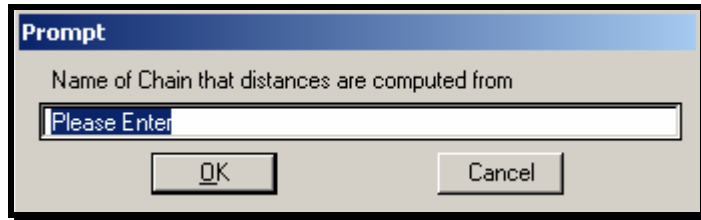
#### Prompt-6



**Prompt-6** will allow the user to define what chain the offsets will be calculated from. The **BaseLine** option will calculate offsets from the cross section chain. If the **DesignLine** option is

selected, the user will be required to key-in the chain that the offsets are calculated from (see **Prompt-7**).

**Prompt- 7**



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**Error Messages:**

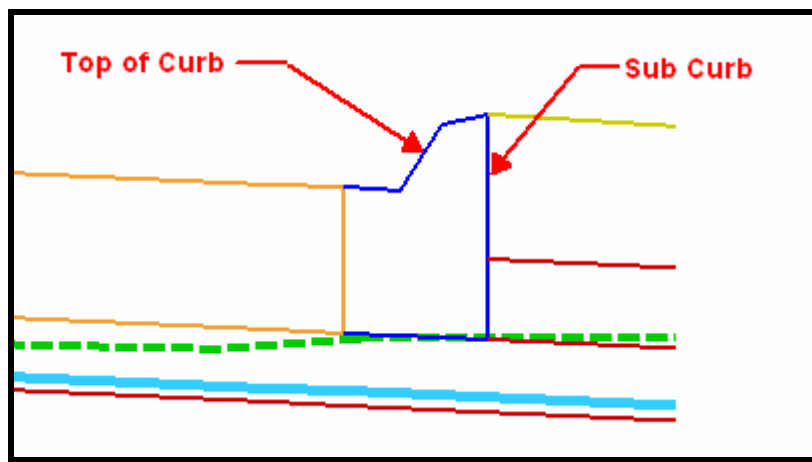
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The criteria making up this typical section will issue a number of warning messages in either the cross section file, or the CSV file. If these messages are in the cross section file, they are placed on level “XS Text Warning”. The following list contains the error messages and reasons they are encountered.

**Could not find BOC in cross section file**

This message occurs when criteria finds “top of curb” symbology with no adjoining “xs back of curb” symbology. Check the symbology of the curbs in these areas. NDOR criteria builds curb as illustrated in **Figure 6**.

**Figure 6- Curb Symbology in Cross Section View**



**Problem with Top of Pavement on this Cross Section**

Check the pavement on these cross sections. Possible errors are multiple pavement lines of the same symbology, or no elements representing pavement.



**Problem with Subgrade on this Cross Section**

Check the subgrade on these cross sections. Possible errors are multiple subgrade lines of the same symbology, or no elements representing pavement.

**Divided Road with Points Marked from Left Roadway**

This message gets issued into the CSV file when a divided roadway is processed that has no gap in either the pavement or subgrade between the two PGL points. In this case, all of the pavement points and/or subgrade points are marked from the left shape cluster. This is not a user error, just a message displayed into the CSV file for the report generator.