

6 Survey

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6.1 POINT NUMBERING CONVENTIONS

Following are the point numbers reserved for different areas of design. Use these point numbers when storing information in Geopak, to facilitate the process of sending coordinates to the field. Not all of the coordinates listed are being provided at this time. See the CADD specialist in your area for appropriate procedures.

Information needed by the Survey crew from the Design Areas:

Tentative GEOPAK POINT NUMBERING assignments:

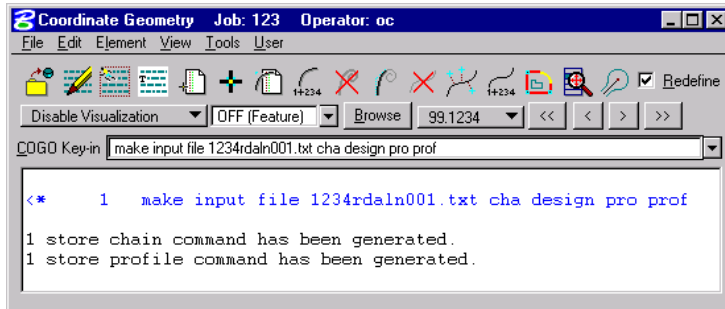
Min. req. pnt. Count per area:		Proposed range
2000	Cad. Survey (Current 1-999)	1-1999
1000	Road Design (confirm w/RD)	2000-2999
4000	R/W	3000-6999
1000	Placeholder for Traffic	7000-7999
1000	Placeholder for HYD	8000-8999
1000	Placeholder for Bridge	9000-9999
10,000	R/W parcels	10,000-19,999
1000	Placeholder for GEOTECH	20,000-20,999
5000	Placeholder for ENVIRO.	21,000-25,999
	Unused placeholder	26,000-49,999
250,000	Pre-Survey (includes Constr.)	50,000-99,999

This only affects areas utilizing GEOPAK to store points; placeholders represent potential future usage.

Other points, such as signs, geometric coordinates and utilities may also be added. These items will be tested with the new data collectors to determine which coordinates prove to be more useful in electronic format.

6.2 Road Design Procedures

6.2.1 Horizontal and Vertical Alignments



The horizontal and vertical information is exported directly from Geopak Cogo using the Make Input command.

Export only the final design alignment and final profile.

Command syntax:

```
make input file <file name> cha <chain name> pro <profile name>
```

Example file 1234rdaln001.txt shown below:

```
$ Job Name: 123
$
$ -- COGO CHAIN COMMANDS -- generated by pattern: DESIGN
$
$ Chain DESIGN
STO CUR C2 PC N 265956.4397511270 E 409862.1191245705 DB 96.0608488368 D 5.7295779513 DEL -7.0400310070
STA PC 733.3986724103
STO SPI C2B DB 97.7797222222 TS N 265963.9664763815 E 409802.5955123077 LS -60.0000000000 ANG -1.7188733854
STATS 673.3986724103
STO SPI C2A CS N 265950.9961048204 E 409984.7928443831 DB 89.0208178298 LS 60.0000000000 ANG -1.7188733854
STACS 856.2703929249
STO CUR C3 PC N 265989.9739457080 E 410830.5589100147 DB 88.2568741030
D 3.8197186342 DEL 2.4193073496 STA PC 1702.9404791326
STO SPI C3B DB 87.3019444444 TS N 265987.8978478641 E 410780.6026482451 LS 50.0000000000 ANG 0.9549296586
STATS 1652.9404791326
STO SPI C3A CS N 265990.5636174428 E 410893.8887779519 DB 90.6761814526 LS -50.0000000000 ANG 0.9549296586
STACS 1766.2777974339
STO POI 10 N 266033.1795000000 E 409133.6252000000 STA 0.0000000000 DESCRIPTION "CH TS 6+73.40"
STO POI 50 N 265961.1660612706 E 411936.0116381415 STA 2808.8165692708
STO CUR C1 PC N 266030.8909180311 E 409275.7550179175 DB 90.9225000000 D 8.1851113590 DEL 6.8572222222
STA PC 142.1482421583
STO CHA DESIGN 10 CUR C1 SCS C2 SCS C3 50 AS IS
$
$ Job Name: 123
$
$ -- PROFILE COMMANDS -- generated by pattern: PROF
$
STORE PROFILE PROF
VPI 1 S 10.0000000000 E 1158.2000000000
VPI 2 S 200.0000000000 E 1158.3900000000 L 300.0000000000
VPI 3 S 650.0000000000 E 1153.4400000000 L 400.0000000000
VPI 4 S 1150.0000000000 E 1155.0900000000 L 400.0000000000
VPI 5 S 2400.0000000000 E 1150.3400000000 L 400.0000000000
VPI 6 S 2800.0000000000 E 1151.1400000000
END PROFILE
$
```

If alignment information for approaches, detours, frontage roads, etc. is being included in the plans, separate files need to be generated for each one. Examples of the file names would be 1234rdaln0a1.txt, 1234rdaln0d1.txt, as appropriate.

6.2.2 Surface Information

Step 1- The following cross sections are required to generate accurate surface information (critical cross sections):

- 1) horizontal control points
- 2) superelevation transitions
- 3) begin and end of every widening transition
- 4) begin and end of curb and/or sidewalk sections with sections 0.1 meters from this to show the limits of the sections without the curb/sidewalk

To accomplish this, place pattern lines and cut cross sections at these critical points. This can be done with the Draw Pattern Lines dialog. See *Geopak 2001 Class And User Manual* Chapter 27.

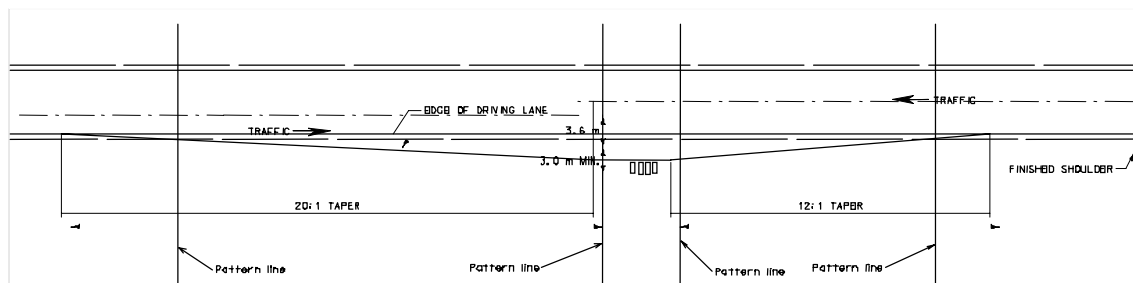
Transition cross sections can be added after the preliminary phases of the project. So, it is recommended that any criteria or input files used to generate surfacing be saved for future use.

Step 2 – Create a critical cross section report.

To create a critical cross section report see *Geopak 2001 Class And User Manual* Chapter 29.7 Critical Cross section report.

Note, in some cases the first and last pattern line could be a 15-meter pattern line and a horizontal control point. There may be two pattern lines at the same station; one of the pattern lines will need to be deleted.

Example:



Where pattern lines are needed for mailbox turnout widening.

Option: if there are pattern lines within 5 meters of each other, the designer has the option to delete the 15-meter pattern line if they wish.

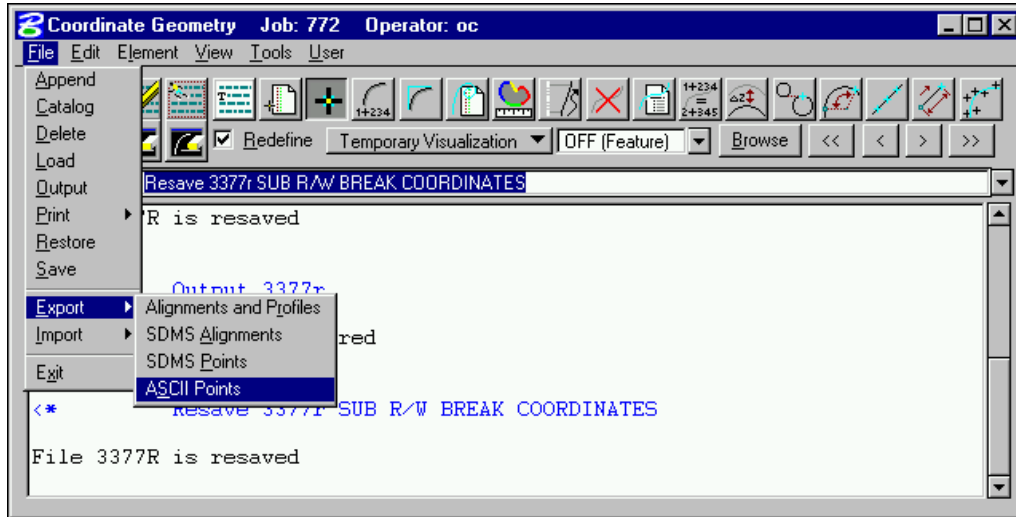
6.3 Right of Way Procedures

6.3.1 Right of Way Breaks coordinates

Creating the R/W Baseline ASCII file

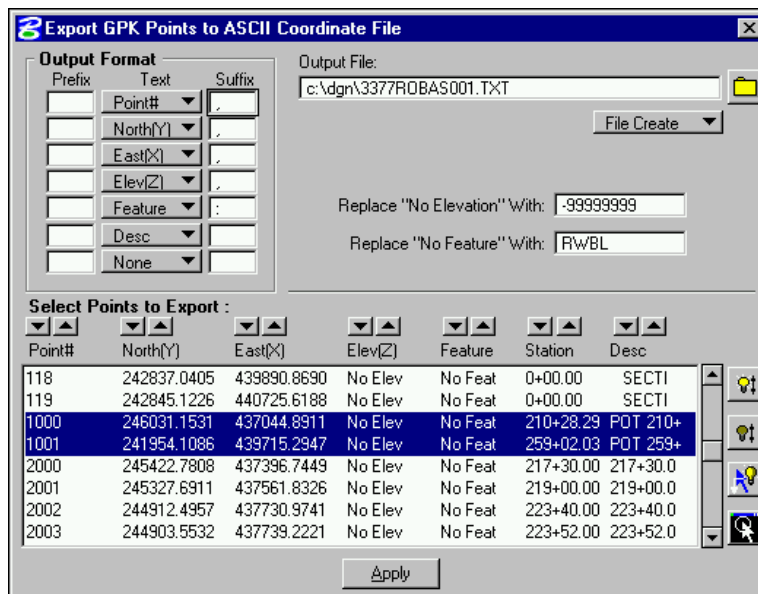
An ASCII file needs to be created for the R/W Baseline Coordinates

In Coordinate Geometry, click on **File => Export => ASCII Points** (see Figure 44)



(Figure 44)

A new dialog box called Export GPK Points to ASCII Coordinate File will be displayed (see Figure 45). This dialog box now needs to be filled in to match Figure 45



(Figure 45)

In the **Output Format** area, enter the following

The order of the **Text** should follow the **order shown** in Figure 45

All of the *Prefix* boxes should be left **blank**

In the *Suffix* boxes

A **comma** should be entered after Point#, North(Y), East(X), and Elev(Z)

A **colon** should be entered after the Feature

Leave the *Suffix* box after Desc **blank**

In the *Output File:* box, enter **c:\dgn\####ROBAS001.TXT**

Use the button **File Create**

In the *Replace “No Elevation” With:* box, enter **-99999999**

In the *Replace “No Feature” With:* box, enter **RWBL**

In the **Select Points to Export:** box, highlight all of the R/W Baseline point numbers (i.e. 1000 and 1001) (see Figure 45)

Click on **Apply**

A message will be displayed stating that the ASCII file has been created.

This ASCII file is in the correct format for the field survey crews – no editing is necessary

Creating the R/W Break Coordinate ASCII file

Follow all of the steps in 3.1, **except:**

In the *Output File:* box, enter **c:\dgn\####ROBRK001.TXT**

In the *Replace “No Feature” With:* box, enter **RWBK**

In the **Select Points to Export:** box, highlight all of the R/W Break Coordinate point numbers (i.e. 2000 thru 2020)

Click on **Apply**

A message will be displayed stating that the ASCII file has been created.

This ASCII file is in the correct format for the field survey crews – no editing is necessary

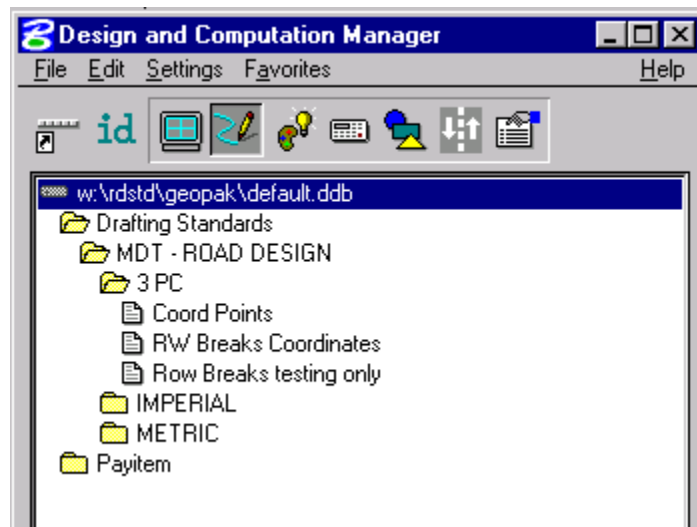
Example of file **####ROBRK001.TXT**

```
2000,33128.5389,41464.7196,-99999999,RWBK:320+00.00 25.00 RT
2001,33126.8255,42145.6574,-99999999,RWBK:326+80.94 25.00 RT
2002,33127.7023,42206.8941,-99999999,RWBK:327+40.94 25.00 RT
2003,33194.8253,42145.8285,-99999999,RWBK:326+80.94 43.00 LT
2004,33195.6256,42203.6670,-99999999,RWBK:327+40.94 43.00 LT
2005,33189.5808,42240.8163,-99999999,RWBK:327+80.00 34.00 LT
```

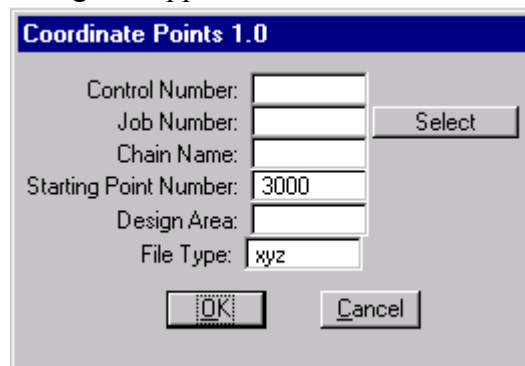
6.4 Bridge Procedures

6.4.1 Coordinate points for Riprap layout

1. Open the project general layout file and do a SAVE AS with the classification code of RRL. Zoom into the view where the plan view is referenced in at the true coordinates and bearing. (ORIENT)
2. Turn off levels 1 and 2, object lines and text, to clarify the view. Leave on the contour lines and riprap elements (levels 3 and 4).
3. Zoom into Bent No.1 riprap.
4. Activate Geopak
5. Select **Applications>Geopak Road>Design & Computation Manager**
6. Change the directory tree to look as shown below:

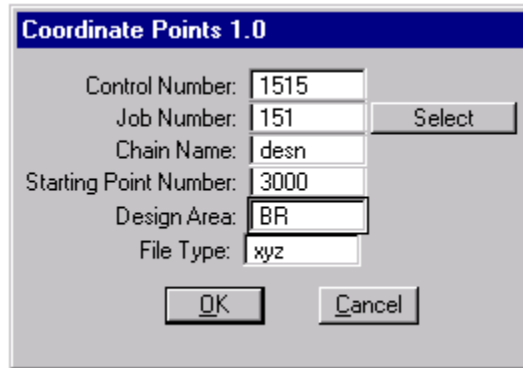


7. Double click on **Coord Points**.
8. The following dialog box appears.

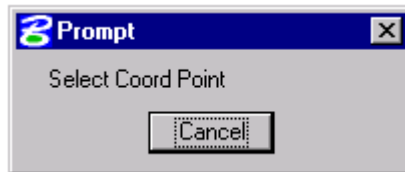


9. Fill in the information as below:

Control Number: 4 digit (1515)
 Job Number: 3 digit GPK file number (151)
 Chain Name: Name of the design chain used (desn)
 Design Area: BR (needs to be capitalized)
 File Type: XYZ

10. Select **OK**

11. The following dialog appears:



12. Select data points on key points of the riprap in numerical order (see item 20 on page 3 of this document for hints on key points). As you place data points, a circle with a number 3000, 3001, etc. will be placed for each point. As you place these points in the cadd file, the coordinates, station and offset for each data point is stored in an XYZ file.

13. Continue to select points on the next bent riprap until all points have been selected.

14. Select **Cancel** when finished.

15. When you cancel, a text file (1515brxyz001) with the control number, area and file type will be created and put in the C:\dgn directory.

16. Open the text file. It will look similar as shown below.

```
3000,758776.1714,469973.8238, -99999999,riprap:14+18.94 8.86 LT
3001, 758776.9971, 469975.3555, -99999999, riprap:14+18.94 10.60 LT
3002, 758778.8488, 469972.8355, -99999999, riprap:14+21.77 9.26 LT
3003, 758779.0800, 469970.5861, -99999999, riprap:14+23.04 7.39 LT
```


If you know approximately, what the elevation will be at each point, edit the -999999 field to the elevation, similar as shown below:

Bent No. 1 example:

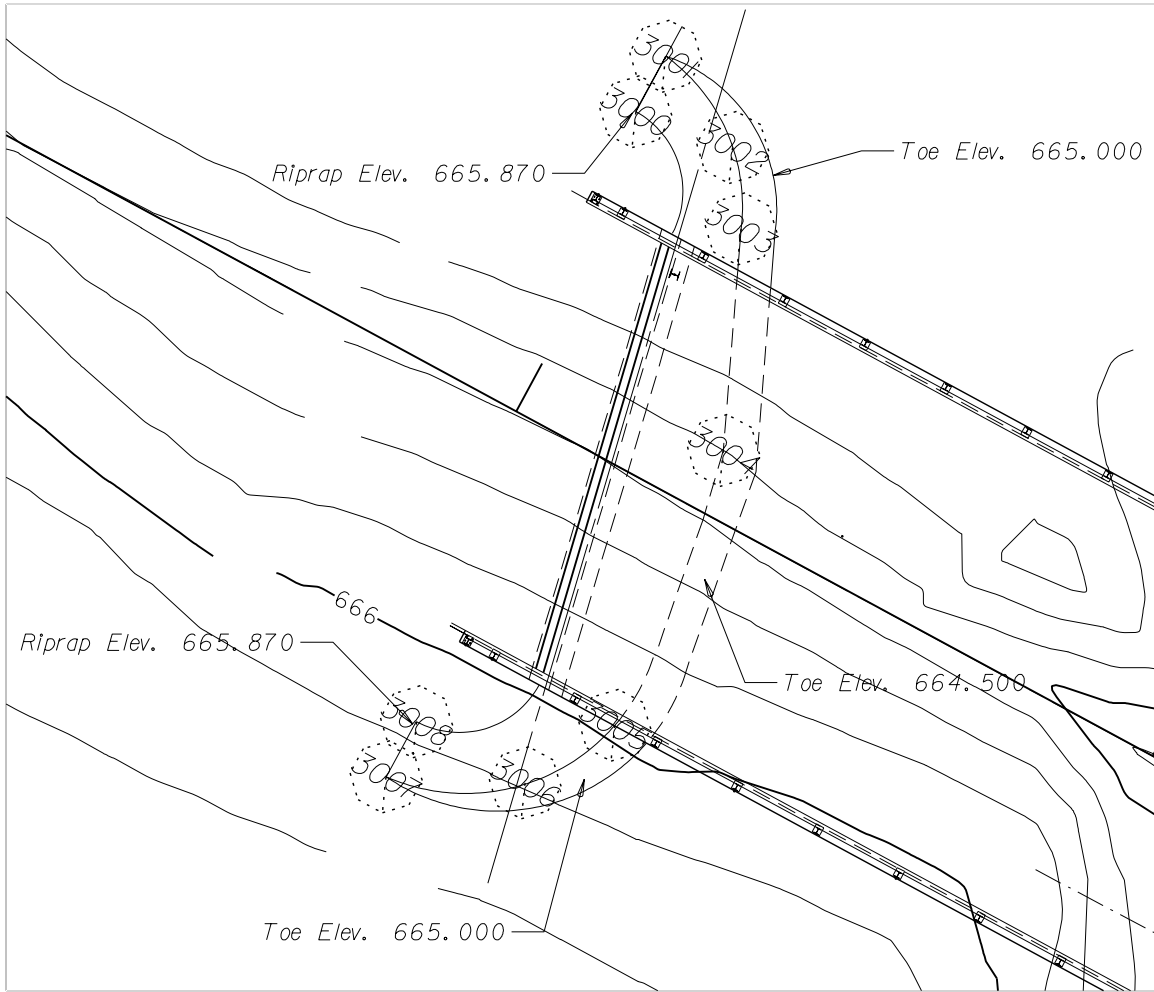
3000,758776.1714,469973.8238, 665.870,riprap:14+18.94 8.86 LT
 3001,758776.9971,469975.3555, 665.000,riprap:14+18.94 10.60 LT
 3002,758778.8488,469972.8355, 665.000,riprap:14+21.77 9.26 LT
 3003,758779.0800,469970.5861, 664.500,riprap:14+23.04 7.39 LT

17. Place a fence around the orientation view and the plan view at the same time. Select the fence mode **Void-Clip** and **Delete** everything outside of the fence. This will make the file smaller for the field to download. Do a Window Area to include both riprap layouts (Bent No. 1 & 3) in the view. Compress the design file and Save Settings.
18. Create a readme.txt file explaining about the file(s) and how to use them.
19. Store the following files on the Document Management System (DMS):
 - readme.txt
 - design file (1515brrrl001.dgn)
 - XYZ coordinate file (1515BRXYZ001)
20. What are key riprap points? Key riprap points are points of the riprap that would be the most useful when placing riprap. Most points should be the back of key points, since survey crews can refer to the section views for more information.

Examples are:

- 3 points of an arc (back of key)
- midpoint under the structure
- end points on square end layouts (top and bottom of slopes)
- start and end points on top of the riprap (off of the wing)

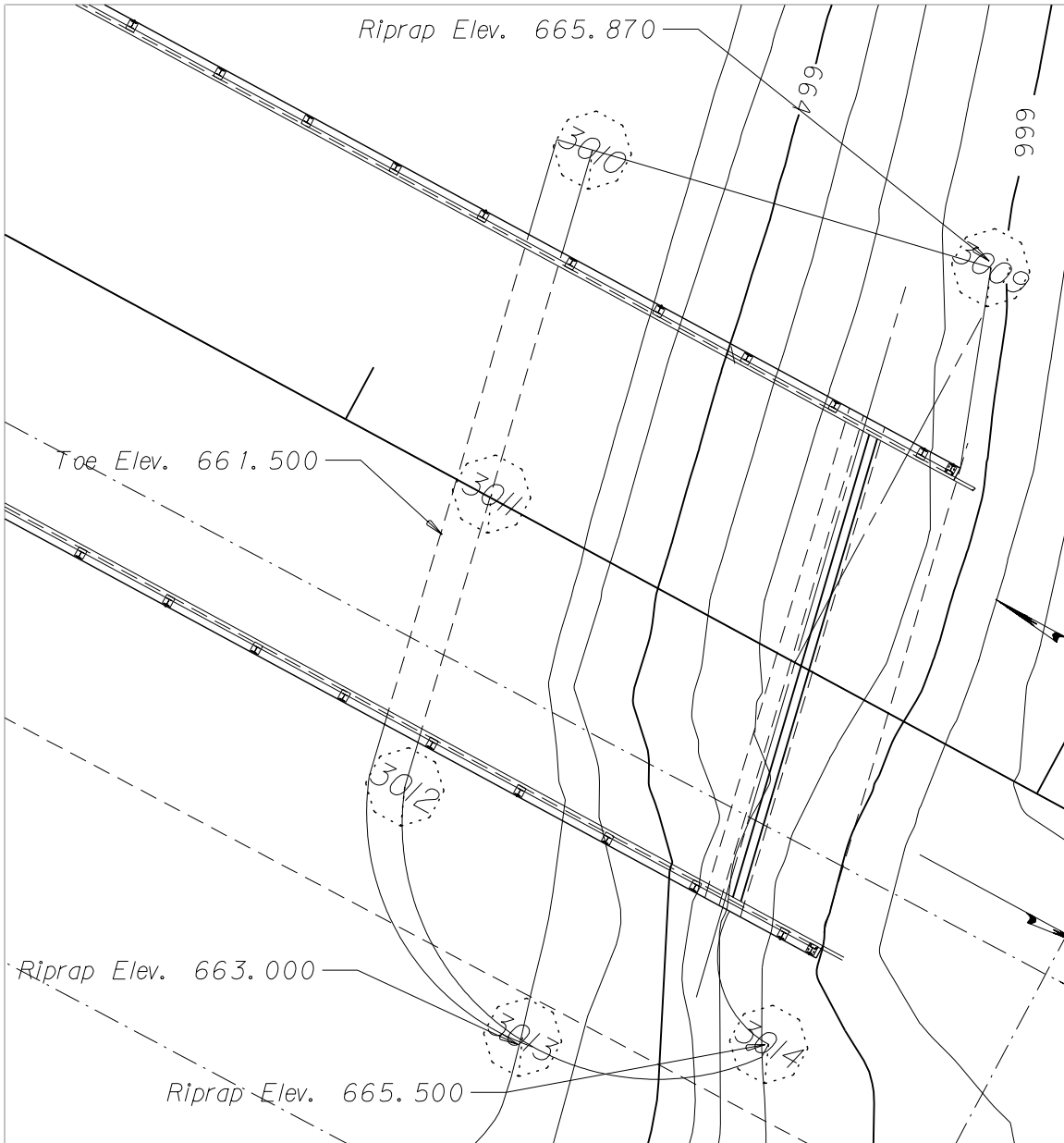
The following pages show some examples.



c:\dgn\1515BRrri001.dgn 01/22/02 10:53:38

Bent No. 1 example:

3000,758776.1714,469973.8238, 665.870,riprap:14+18.94 8.86 LT
 3001,758776.9971,469975.3555, 665.000,riprap:14+18.94 10.60 LT
 3002,758778.8488,469972.8355, 665.000,riprap:14+21.77 9.26 LT
 3003,758779.0800,469970.5861, 664.500,riprap:14+23.04 7.39 LT
 3004,758778.5922,469964.4651, 664.500,riprap:14+25.53 1.78 LT
 3005,758775.5902,469956.8682, 664.500,riprap:14+26.50 6.33 RT
 3006,758773.1102,469955.2777, 665.000,riprap:14+25.08 8.91 RT
 3007,758769.2679,469955.4418, 665.000,riprap:14+21.62 10.60 RT
 3008,758770.1090,469956.9652, 665.870,riprap:14+21.63 8.86 RT



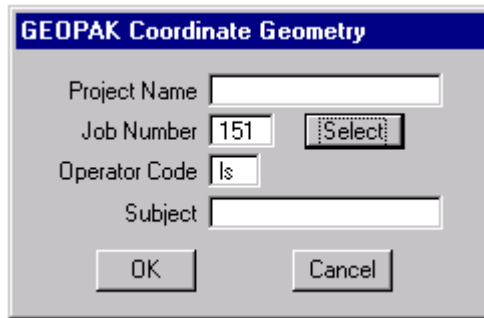
c:\dgm\1515BRrri001.dgn 01/22/02 10:54:10

Bent No. 3 example:

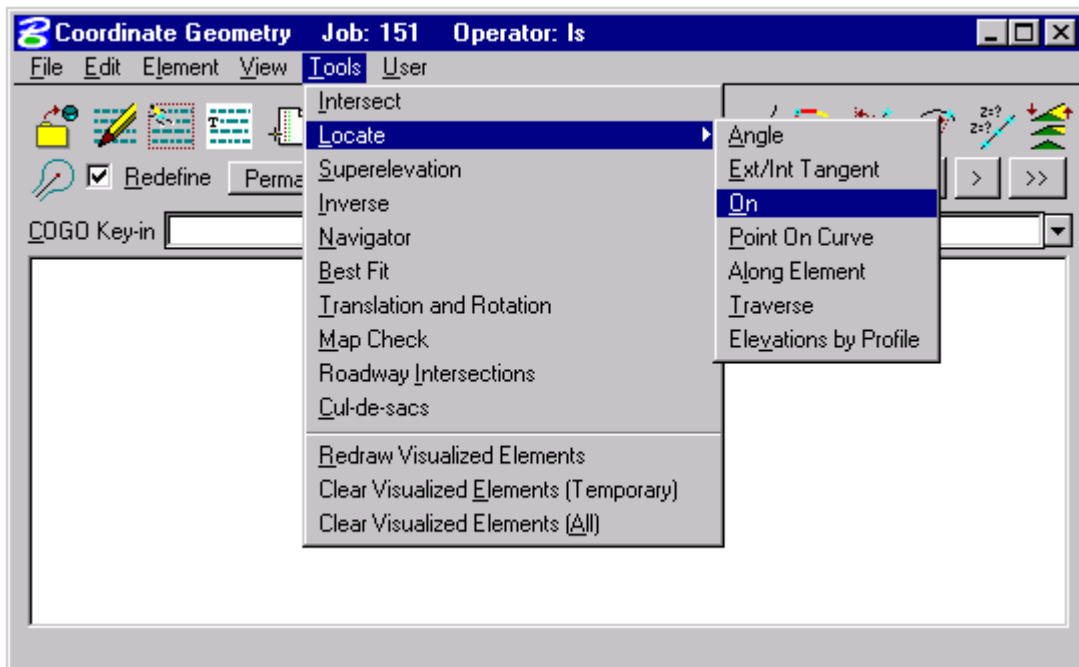
- 3009,758824.4590,469950.3553, 665.870,riprap:14+72.58 11.20 LT
- 3010,758814.3231,469953.3433, 661.500,riprap:14+62.24 9.00 LT
- 3011,758811.7594,469944.5995, 661.500,riprap:14+64.15 0.09 LT
- 3012,758809.5510,469937.1547, 661.500,riprap:14+65.75 7.50 RT
- 3013,758811.1420,469931.9713, 663.000,riprap:14+69.62 11.31 RT
- 3014,758818.8094,469930.6059, 665.500,riprap:14+77.01 8.86 RT

6.4.2 Bridge end station coordinates

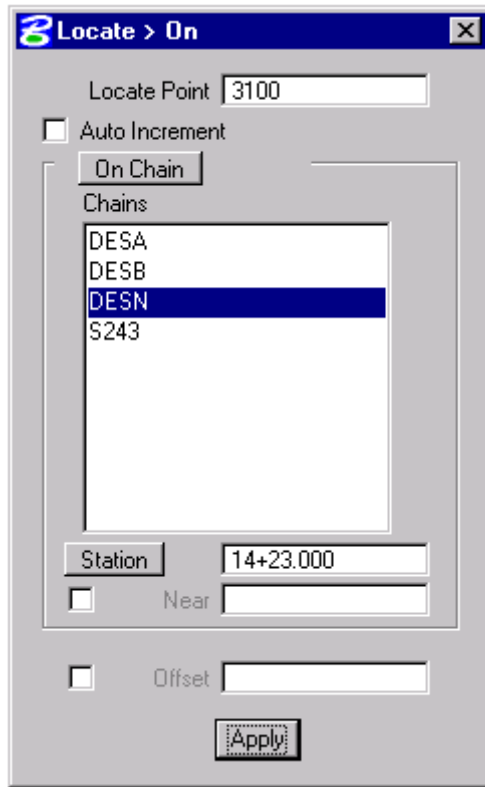
1. Select **Applications>Geopak Road>Geometry>Coordinate Geometry**



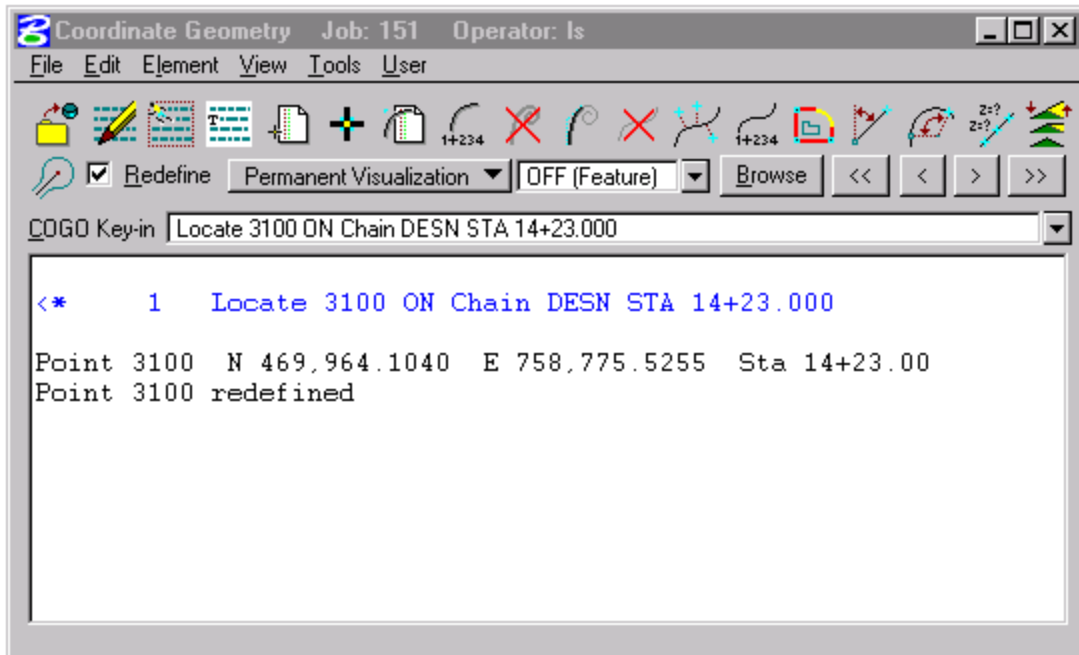
2. Fill in the Job Number (3 digit GPK file name) and Operator Code (your initials). Select OK.
3. Select **Tools>Locate>On**



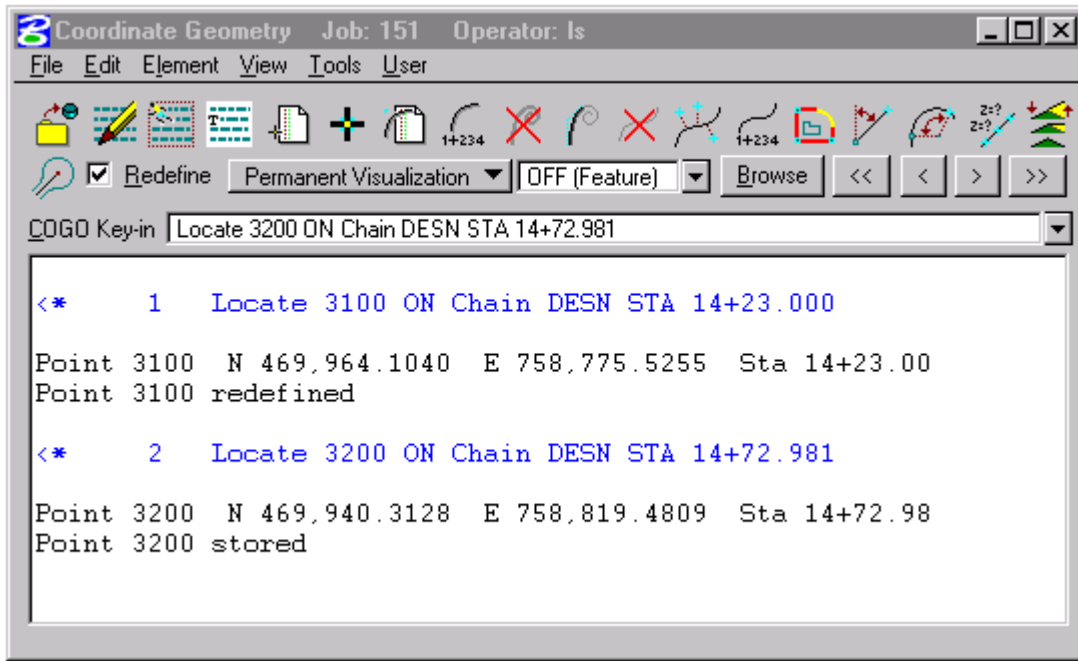
4. Select the option to **On Chain**. Select the chain name that Road Design used for the final alignment (DESN). Type in the point number of 3100 in the **Locate Point** field. Make sure the option of **Station** is set. Fill in Bent No. 1 station from the Bridge Plans (14+23.00). Select Apply.



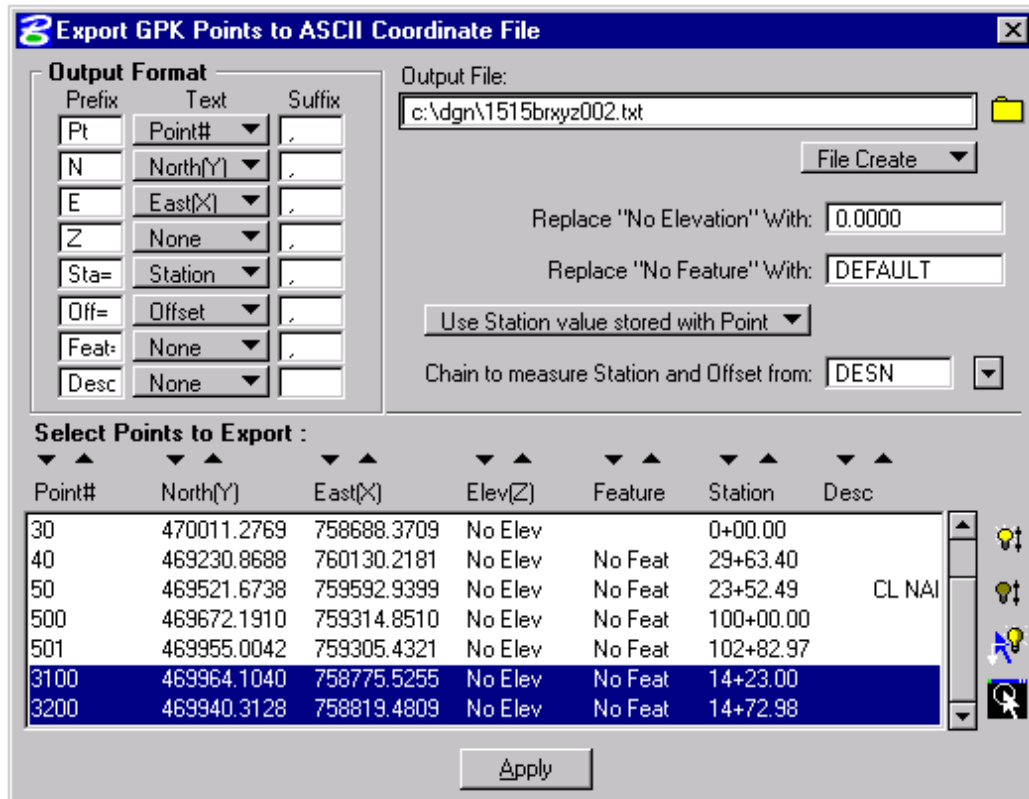
- The following information will appear in the Coordinate Geometry box as shown below.



- Change the point number to 3200. Type in the station for the last bent of the bridge (14+72.981). Select Apply. Similar information should be in the coordinate geometry box.



7. Select **File>Export>ASCII Points**



8. Change the **Output Format** to match what is shown on the previous page. This can be done by clicking and holding down the down arrows in the middle column. (Change the Z, Feature and Description to None)
9. Fill in the **Output File** name in the new file format: #####brxyz002.txt. Make sure you use the number 002 in the name.

10. Scroll down and highlight the rows 3100 and 3200 in the box, using the shift or ctrl key to highlight both.
11. Change the chain name in the 'Chain to measure Station and offset from': to the design chain. (DESN for this example)
12. Select Apply. Select Ok.
13. Open the text file just created. The output should look similar to as shown below.


```
Pt 3100,N 469964.1040,E 758775.5255,Sta=14+23.00,Off=0.0000,  
Pt 3200,N 469940.3128,E 758819.4809,Sta=14+72.98,Off=0.0000,
```
14. Include this file in the readme.txt file with the riprap files.
15. Store this file on DMS.