Design and Computation Manager

7.1 Introduction

| Objectives	Understand the use of the **D&C Manager** to plot horizontal alignments into MicroStation. Understand the format of the hierarchical database and how to use it. Be able to use the D&C Manager in conjunction with other GEOPAK tools & MicroStation to draw and manipulate elements.
Project Manager	Plan View Design
Road Tool Frame	
Menu Bar Application	GEOPAK Road > Design and Computation Manager GEOPAK Road > Plans Preparation > DP Station Offset GEPAK Road > Plans Preparation > Draw Transition

The **Design and Computation Manager** (D&C Manager) is a tool that allows the user to standardize graphics elements for drafting and pay item quantities.

A hierarchical database is used with the **Design and Computation Manager**. This database stores information concerning functional classification and display preferences for each feature and item used in a MicroStation file. This file is commonly referred to as the **ddb** file (*.ddb).

Categories are used to group and classify the features and items used in creating construction drawings. In the example below, **Road Design** and **Right of Way** are both categories. Categories are represented with a folder icon.

These categories each may contain sub-categories. The sub-categories break down each classification into more specific items. For example, **Traffic** may be broken into several additional categories such as **Existing** and **Proposed**.
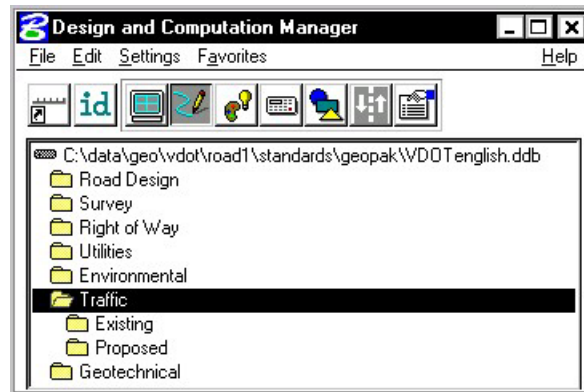
Within a category, the items that are included are designated according to the process that they will be used for (as a drafting item indicated by a paintbrush shown in the following diagram):
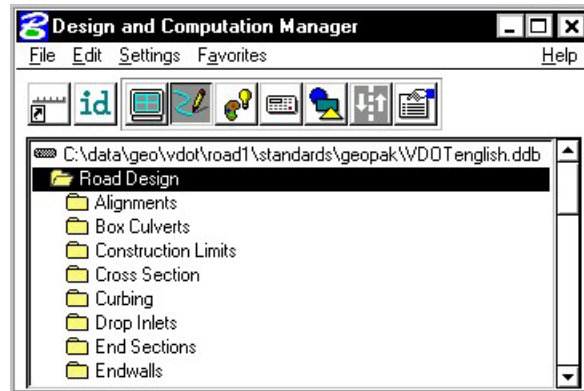
Each entry represents a specific item. The various icons representing the function they will be utilized for can identify items.

	Paintbrush (draw design elements)	
	Calculator (quantities calculations)	
	Report icon (default, pavement design, pavement markings, etc.)	

See calculator icons in diagram below:
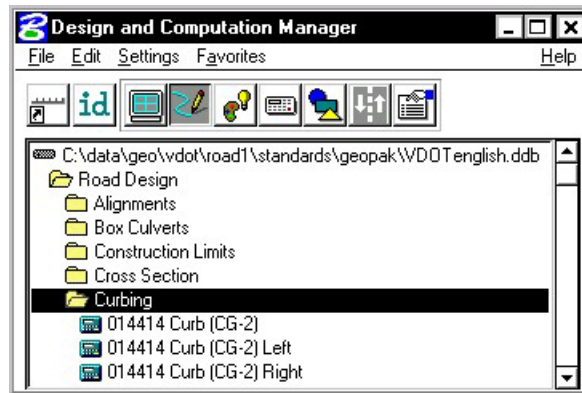
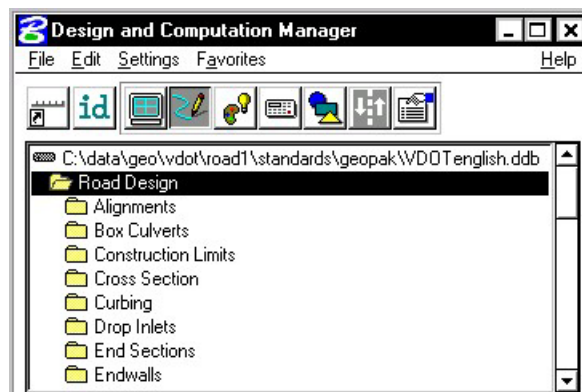The database may also be password protected if desired. This can be used as a security measure to protect the integrity of the database file and ensure its consistent application within an organization.

7.2 Accessing the Design and Computation Manager

When the Design and Computation Manager is accessed, two dialog boxes are displayed.

The main D&C Manager dialog box is composed of two distinct areas:

- Across the top are icons for the various modes. The D&C Manager may be configured to operate in seven different modes: **Display, Design, Set, Compute, Shape, Pavement Marking** and **Preferences.** As various modes are selected, more icons are displayed within this area.
- The **Path box** displays the name of the attached database file and your current position within the database structure. It lists the categories, sub-categories and items available for selection. This hierarchical data structure functions much like a directory. Double clicking enables the user to move up or down within the database.

A second dialog box appears differently depending on the mode of operation. This dialog box enables the user to set other options not available on the main dialog box. The dialog box below appears when you click on the Design Icon.

7.2.1 File Commands

For the GEOPAK designer, the only file command options needed are **Open** and **Exit**. The other commands such as **Save**, **Merge** and **Compress** are used by personnel who maintain the database.

As mentioned previously, the **Password** option may be used to password protect the database so a user would not be able to make changes to it.

7.2.2 Edit Commands

As a designer, the most-used Edit commands will be Find, Identify and Review Item.

Find – This tool will search the database (from your current location) for an item or category. If the database is password protected, all other items will be disabled.

Identify – This tool will allow you to select an element in the design file to identify which item it matches in the database.

Review Item – This tool will allow you to review the settings/symbology for a particular item in the database.
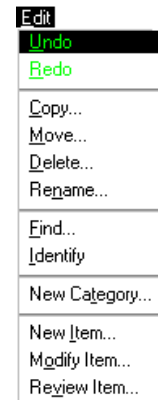
7.2.3 Settings

Display Settings - temporarily changes the display of elements on the screen to one common color, then the user may specify additional elements to be viewed in their original colors. This tool enhances visualization when working on a complex project.

Design Settings - sets the *maximum gap* tolerance and *deduction tolerance* used in computations and the drawing scale for placing cells.

Dialog – This option controls how the level up and level down icons function when clicked when using D&C Manager in toolbox mode.

Criteria Viewer – This toggle is used when a criteria writer is troubleshooting new 3PC.

Hierarchical Paths - This dialog box is utilized to define the path(s) for use in the Symbols option within the D&C Pavement Marking tool.

Computation Units – This dialog box shows the computational units available for the current system - English or Metric.

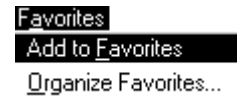**Computation Unknowns** – This will display the file containing all user defined unknowns.

Compute – This dialog box contains fields and options specific to the Compute process.

7.2.4 Favorites

Add to Favorites - saves current D&C Manager path for easy recall in the future.

Organize Favorites – allows the organization of previously saved paths.

7.3 Operational Mode - Design

The Design mode enables the user to draw each roadway element or COGO element (and associated attributes) in the design file based on drafting item parameters.

First, the desired item is highlighted in the main dialog list box, i.e., alignment, edge of pavement, etc.

The **Place Influence** option sets the level, symbology and attribute tags of elements drawn or copied using MicroStation commands. When the **Place Influence** toggle is activated, elements are drawn using the level, symbology and attributes as defined in the GEOPAK database. When **Place Influence** is off, elements are drawn using the active level, symbology and attributes of MicroStation.

The **Draw Cogo Element** button is for drawing COGO elements to a design file. A single click to this button prompts the user for a job number, then opens a dialog box that enables the user to choose a COGO item to draw.

If an alignment, profile or parcel item is chosen, the **Draw Cogo Element** button changes to **Draw Plan and Profile**.
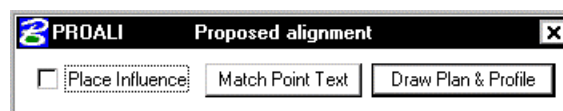
From the secondary dialog box that is opened, click the **Draw Plan & Profile** button to initiate the drawing of COGO elements into the design file. Clicking this button prompts the user for a job number (the coordinate geometry database file wherein the COGO elements are stored), and then opens a

dialog box that enables the user to choose a COGO item to draw. **Do Not** activate the **Place Influence** toggle when using **Draw Plan & Profile**.

> If utilizing the Design & Computation Manager within Project Manager, you are not prompted for a job number since this is associated with the active project.

Eight operations may be accessed from the Plan and Profile Draw dialog box: Points, Lines, Curves, Spirals, Chains, Stationing, Parcels, and Profiles. Each of these operations dynamically changes the dialog box to reflect the selection with the various draw and label features used when placing a COGO element in a graphics file.
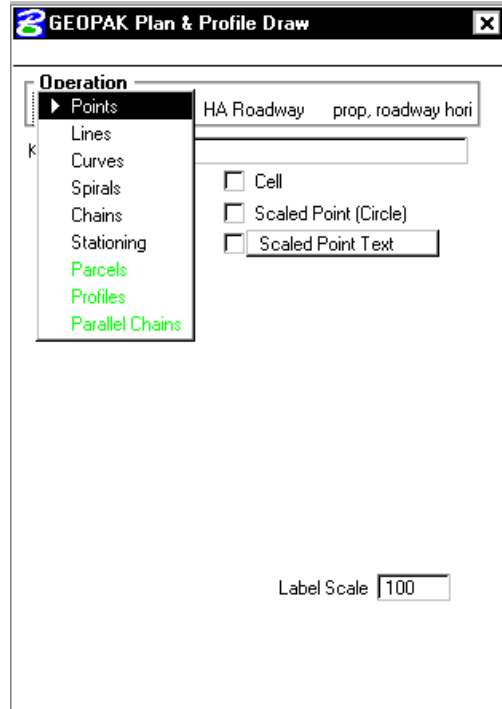
The points and lines dialog boxes have a key-in field that allows the user to specify the names of the COGO elements to be drawn. To use the line operation, the user must use point numbers to specify the ends of the line. The points/lines are drawn immediately after you enter their respective names and press the enter key. To draw more than one point or line, place a dash in-between the point numbers. To draw a line without using consecutive point numbers, use a forward slash (i.e. 10/11).
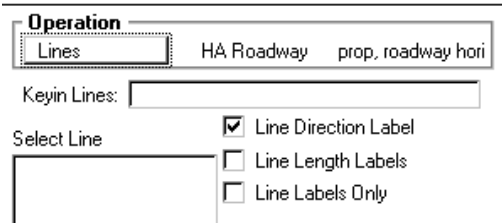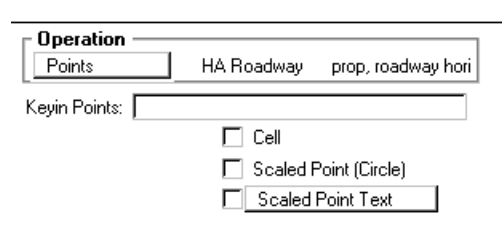
The dialog box settings for curves, spirals, chains, stationing, parcels, and profiles have a list box that display the names of all curves, spirals and chains stored in the active coordinate geometry database file. Highlighting one of the available elements initiates further commands to draw the element into the design file. Each type of item has a list of parameters that can be optionally plotted.
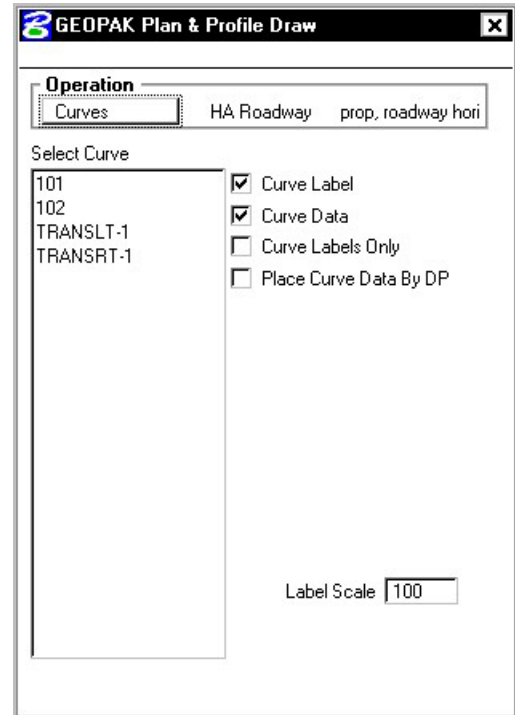
GEOPAK can draw elements to non-active levels. After elements are drawn, it may be necessary to turn on appropriate levels and use the MicroStation fit command to view the elements.

7.4 DP Station/Offset

| Feature / Function	Utilize any station / offset in MicroStation commands requiring a data point.
Tools	Plans Preparation
Menu Bar Application	GEOPAK Road > Plans Preparation > DP Station Offset

The **DP Station/Offset** command works in conjunction with MicroStation commands and the D&C Manager. It can be used as the *data point* for any MicroStation command. **DP Station/Offset** provides precision placement of elements based on a station and offset of a stored chain. Uses for this command include precision placement of elements and window functions.
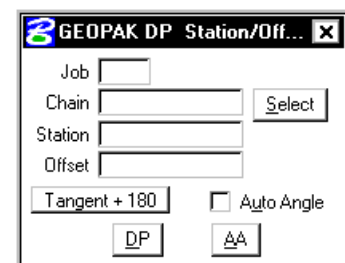
7.5 Draw Transition

Feature / Function	Draw transition based on a two sets of station / offsets.
Tools	**Plans Preparation** [toolbar icons]
Menu Bar Application	GEOPAK Road > Plans Preparation > Draw Transition

The **Draw Transition** tool draws a line/curve based on a beginning station/offset and an ending station/offset relative to a selected chain. Use of this command includes turn lanes, mailbox widening, curve widening and lane transitions.
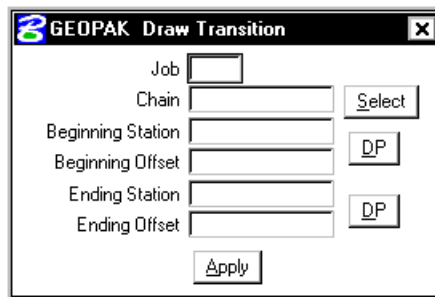
Elements placed with **Draw Transition** have MicroStation element type **curve** when the beginning and ending offsets are different and MicroStation element type **line** and/or **arc** when the beginning and ending offsets are the same.

LAB 7: D&C Manager – Plans Production

7.1 Accessing Design and Computation Manager

Step 1. Execute **C:\data\geo\VDOT\road1\LAB7.EXE**.

Step 2. Open the MicroStation file **c:\data\geo\VDOT\road1\d17682des.dgn**

Step 3. Access **Project Manager**. It should automatically access the Road workflow dialog box since we "remembered" the options in Exercise 2.

Step 4. Select the icon **Plan View Design** button from the **Road Project: 17682.prj** workflow dialog box, which opens the Plan View Design tool box.
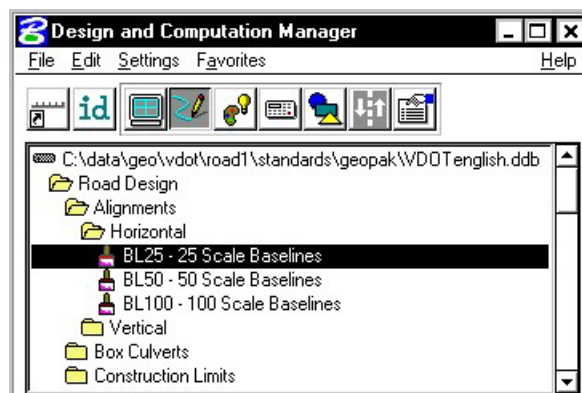

7.2 Drawing Alignments

Step 1. Select the Design and Computation Manager icon (as indicated above) to invoke the Design and Computation Manager shown below. A secondary dialog box will appear to be used in conjunction with the Design and Computation Manager dialog box.
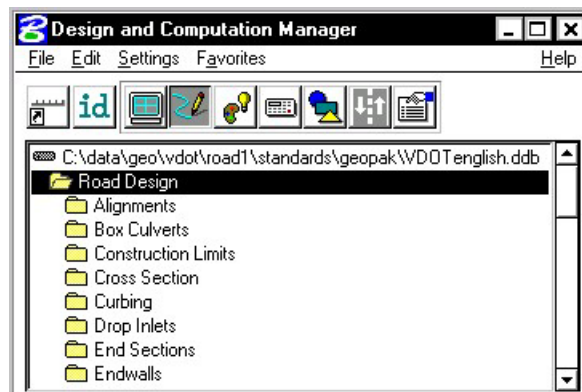
**Step 2.** Select the item shown in the dialog box below.

Step 3. Next, select the **Draw Plan and Profile** button from the secondary dialog box:
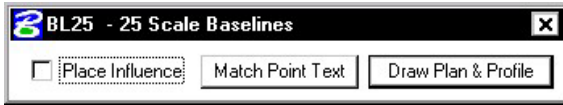
Step 4. Select the **Chains** operation. Each of the chains will be displayed in the list box as shown. Notice that the options that are to be drawn with the chain are already activated. Set the Label Scale to **25**.

Step 5. To draw the chains, click each name in the list box. Only click once!! Each time you ID a chain it will be plotted into the design file.
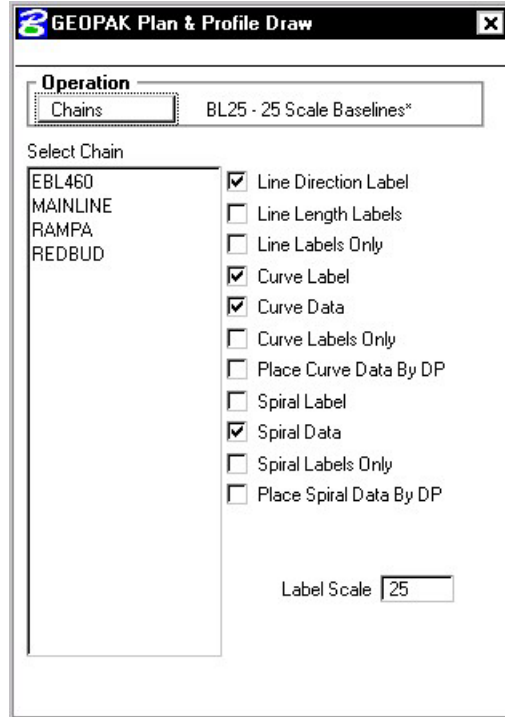
Step 6. Change the Operation to **Stationing** and modify the dialog settings as shown in the image to the right.

Annotate each alignment by clicking the chain names in the list box.

Step 7. Review the results of Steps five and six.

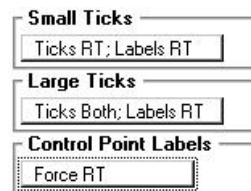**Step 8.** Notice that we are forcing all the labels and tic marks to the left. This looks a little odd for **RAMPA**, so let's change that.

Make sure that **Graphic Group** lock is **ON**, then delete the tic marks and stationing for **RAMPA**.
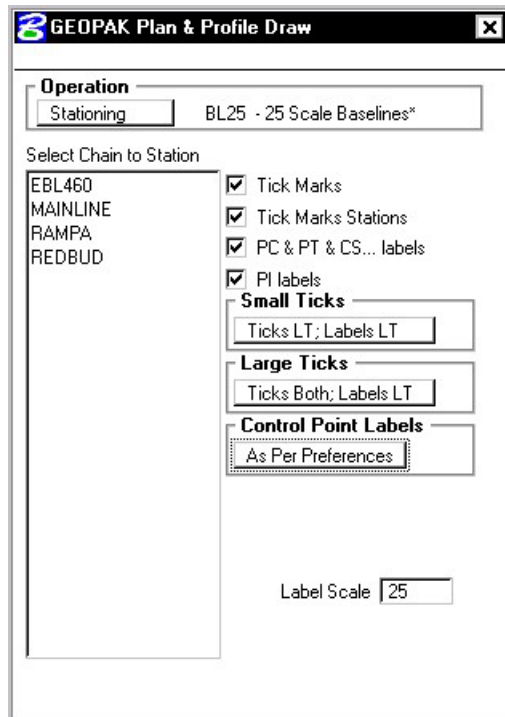
Step 9. Change the options as shown to the right and **re-station RAMPA**.

Step 10. Exit the Plan and Profile Draw dialog box but remain in D&C Manager.

7.3 Drawing Other Plan View Features

We are going to develop roadway features representing the proposed roadway. The roadway is made up of 4 distinct sections:

- 4 lane divided highway with depressed median from **Sta. 200+00** to **Sta. 202+00**. Left side of the roadway will be resurfacing while the right side is new construction.
- 4 lane divided highway with raised median from **Sta. 202+00** to **Sta. 204+25**. Left side of the roadway will be resurfacing while the right side is new construction.
- 4 lane undivided highway from **Sta**. **204+25** to **Sta**. **211+00**.
- 2 Lane highway with Entrances and Exit Ramps from **Sta. 211+00** to **Sta. 220+00.**

To perform these tasks, two specific GEOPAK tools will be utilized: **D&C Manager** to determine element symbology and **Draw Transition** to place the elements between specific pairs of stations and offsets. Because of time constraints, we will not develop the planametrics for the entire project, but just for a select area.

Step 1.   Navigate to the item **Road Design > Pavement > 900344 Edge of Pavement**.

**Step 2.**   Select the item **900344 Edge of Pavement** and then enable **Place Influence**.

Step 3.   If desired, click on the **Switch to Toolbox Mode** (left most icon) icon on D&C Manager.

Step 4.   Open the Draw Transition tool from the **Plan View Design** palette. Fill in the values as shown below then click **Apply**. This will draw the right edge of pavement between the given station range.
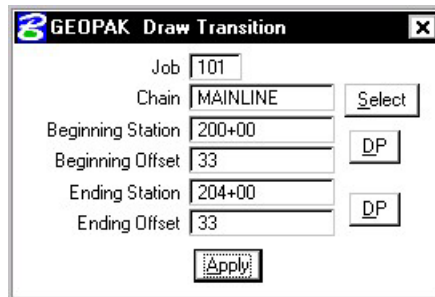
Step 5.   Next, modify the dialog box as shown to draw the edge of pavement transitioning from 204+00 to 205+00.
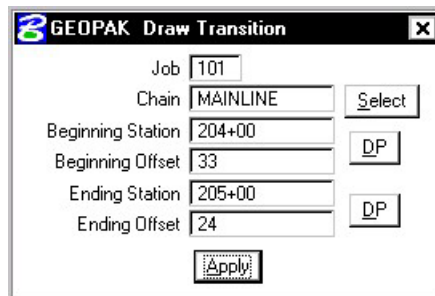
Step 6.   Draw the additional features shown in the following table. Check that the correct feature is selected in D&C Manager before continuing. When completed, disable Place Influence, then close D&C Manager and Draw Transition.

Note: All items shown in the table fall under the category **Road Design.**

Feature	Beg. Station	Beg. Offset	End Station	End Offset
Curbing > 012600 Standard. Comb. Curb & Gutter CG-6	205+00	26.0	211+00	26.0
Walks > 013220 Hydraulic Cement Conc. Sidewalk 4	205+00	28.5	211+00	28.5
Walks > 013220 Hydraulic Cement Conc. Sidewalk 4	205+00	33.5	211+00	33.5
Pavement > 900344 Edge of Pavement	211+00	24.0	212+00	12.0
Pavement > 900344 Edge of Pavement	212+00	12.0	216+00	12.0
Pavement > 900344 Edge of Pavement	216+00	12.0	217+00	24.0
Pavement > 900344 Edge of Pavement	217+00	24.0	218+08.66	24.0
Pavement > 900346 Paved Shoulder	211+00	34.0	212+00	22.0
Pavement > 900346 Paved Shoulder	212+00	22.0	216+00	22.0
Pavement > 900346 Paved Shoulder	216+00	22.0	217+00	34.0
Pavement > 900346 Paved Shoulder	217+00	34.0	218+08.66	34.0

Step 7.   Exit MicroStation.