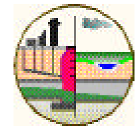
The CEDRA Corporation's

COMMAND OF THE MONTH

A monthly information bulletin July 2006

FEATURED COMMAND

Generation Of Sewer Profile Plot Sheets



> ***Command Of The Month bulletin***
>
> *This month's issue presents an example of how to generate a storm water sewer profile, superimpose it upon the combined existing ground and design roadway profile, and produce annotated profile sheets ready for printing.*

Application Description

In the November 2005 issue of this bulletin we addressed the process of how to assemble plan and profile sheets for printing, while in the December issue of that same year we discussed the extraction of the original ground profile for a roadway project, and the preparation of its annotated plot. This month's issue addresses the generation of the overall profile of a storm water sewer profile, the division of the overall profile into drawing sheets, and the mass generation of said drawing sheets if any changes have been made to the sewer.

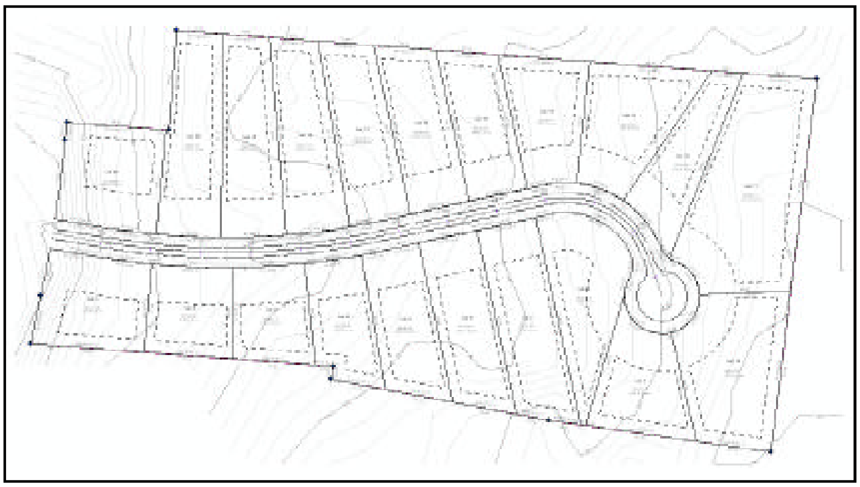


Figure 1 - Plan View Of The Project To Be Used As An Example

To demonstrate the attainment of the above objective, we will use as an example a land development project (see Figure 1) comprised of 21 lots along a dead end street with a cul-de-sac. The automatic geometric subdivision of the project's overall parcel into said 21 lots, the design of the street and the preparation of the annotated plan and profile views could be accomplished with the CEDRA-AVland software, while the design of the storm water system could be done with the CEDRA-AVsand software.

Since the aim of this month's bulletin is to demonstrate the preparation of sewer profile sheets, and not the design procedure of the sewer, we will assume that the subject storm sewer is an existing one, and its geographic position has been determined and introduced into the database. The sewer's layout is depicted in Figure 2, and it is comprised of seven manholes, one end section acting as an outlet structure, and four pairs of curb and gutter inlets at the indicated manholes.

The CEDRA Solution

To produce the sewer profile, we must have a sewer model in CERA-AVsand format. If the subject sewer was a new one, the design of which has been done with CEDRA-AVsand, then the steps presented in The CEDRA-AVsand Model section can be skipped, since they would have already been performed. Under this case, the reader can proceed

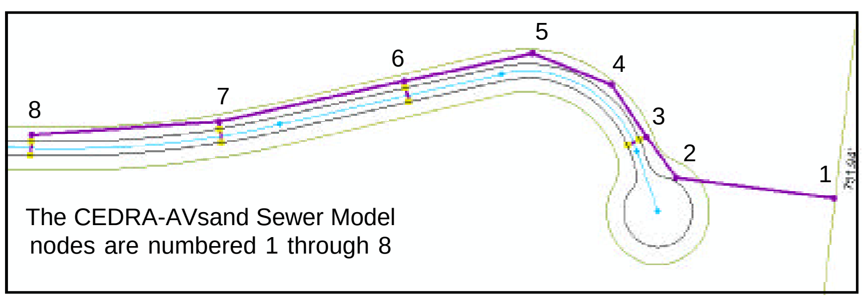


Figure 2 - Storm Water System Layout

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to the Stationing The Sewer section. The discussion under The CEDRA-AVsand Model section describes the process of creating a model from scratch.

Generally speaking, the steps in creating a sewer profile include:

- The geometric definition of the sewer, or the development of the CEDRA-AVsand model.
- The stationing and development of the sewer profile.
- The cutting up (breaking or dividing) the sewer profile into multiple profile sheets.
- The superimposition of the original ground, proposed roadway (if a new design), and/or any other profile.

The CEDRA-AVsand Model

In creating the CEDRA-AVsand sewer model, we will use certain tools within the *CEDRA-AVsand-Tools* toolbar shown in Figure 3.

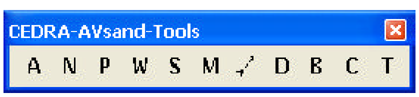

Figure 3 - The CEDRA-AVsand Toolbar

(a) The Service Area

The first step in creating the CEDRA-AVsand model, is to define a service area. This is a polygon that contains the physical extent of the subject sewer and load contribution areas.

Since for the purpose of this example we assume that the sewer has already been designed, we will create a polygon that encompasses the overall project site.

1. **Click** at the A *Define service Areas* tool in the *CEDRA-AVsand-Tools* toolbar, and then **click** at the corners of an imaginary rectangle proceeding in a clockwise direction, which encloses the site, until you come to the last corner, at which point, you should double-click to: (a) terminate the definition, (b) create the polygon, and (c) display the input dialog box of Figure 4.

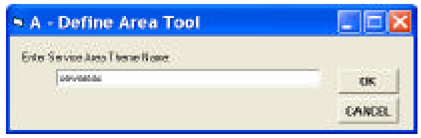

Figure 4 - Service Area Layer Name

2. **Click** at the **OK** button to accept the default **sewareas** name to be assigned to the layer which is to contain the service area.

   The label **sewareas** has been introduced at the top of the Table Of Contents area of ArcMap (TOC), and the multi-input dialog box of Figure 5 is now displayed.

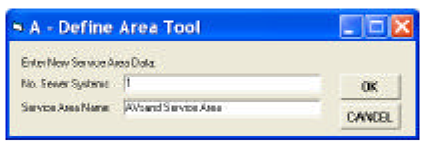

Figure 5 - Service Area Identification

3. **Click** at the **OK** button to accept the default number and name of the service area.

(b) The Sewer Nodes

Our next task is to introduce in the CEDRA-AVsand model the various nodes of the sewer system. This includes manholes, inlets, end sections, and any other structures.

In general, a sewer node is any point at which the sewer's conveyance nature changes, or is interrupted.

4. **Click** at the N *Define Nodes* tool in the *CEDRA-AVsand-Tools* toolbar, and then **click** at the **downstream** most node (end section at the east end of the project, node 1 in Figure 2) to display the dialog box of Figure 6.

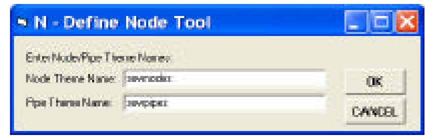

Figure 6
Names Of The Node And Pipe Layer

Note that in introducing nodes into the model, a specific order or sequence is *not* necessary.

5. **Click** at the **OK** button to accept the default layer names for the themes (layers) that will contain the sewer nodes and pipes.

   The labels of the layers **sewnodes** and **sewpipes** have been introduced at the top of the TOC, and the multi-input dialog box of Figure 7 is now displayed.

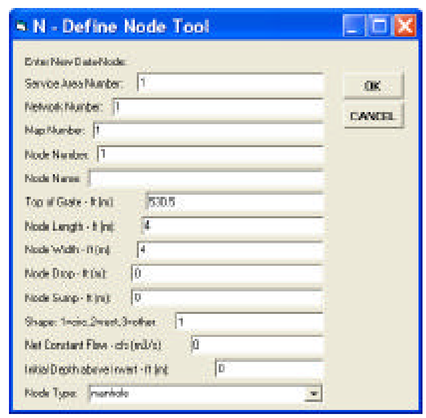

Figure 7- Node Population Dialog Box

6. **Enter 530.50** in the *Top of Grate - ft (m):* data field, **accept** all other default data, and then **click** at the **OK** button to introduce the node into the model.

7. **Click** successively at each of the remaining nodes, in an upstream direction (east to west or nodes 2, 3, 4, 5, 6, 7 and 8). After each click at a node, **enter** in the *Top of Grate - ft (m):* data field the values listed below, **accept** all other default values, and **click** at the **OK** button to establish the model node.

   535.18
   534..07

536.16
537.98
539.63
543.78
548.53

NOTE that the last entered top of grate elevation is remembered.

We will forgo the introduction of the eight curb inlets for the sake of brevity.

(c) The Sewer Pipes

Having defined the sewer model nodes, our next task is to introduce in the CEDRA-AVsand model the various pipes of the sewer that connect the nodes which were established above. It is noted that in the CEDRA-AVsand model, pipes must be defined from their downstream end towards their upstream end, and they must be introduced sequentially from the outflow pipe in an upstream direction, because that is the way sewers are constructed.

8. **Click** at the **P** *Define Pipes* tool in the *CEDRA-AVsand-Tools* toolbar, and then **click** at the **downstream** end of the downstream most node (end section at the east end of the project, node 1), **click** at that node **again** (note that as you now drag the mouse a black line moves along with it), and then **double-click** at the **upstream** end of the pipe (node 2). The multi-input dialog box of Figure 8 is displayed.

9. **Enter the following data in the indicated data fields:**
   1 in the *Strip Id:*,
   528.00 *Downstream Invert - ft (m):*
   528.65 *Upstream Invert - ft (m):*
   30 *Height - in (mm):*
   30 *Width- in (mm):*
   accept all other default data, and then **click** at the **OK** button to introduce the pipe into the model.

NOTE that:

- The *Pipe Id:* and the *Pipe Length - ft (m):* data fields are automatically updated by the program. The user, however, can overwrite the default values if desired.

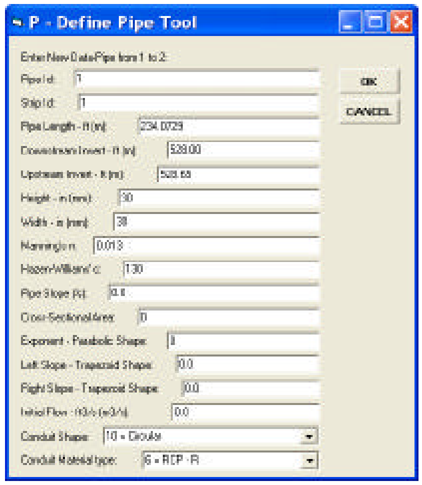

Figure 8
Pipe Population Dialog Box

- The last entered value in the *Strip Id:* data field is remembered. A strip is defined as a string of connecting pipes from downstream to upstream. The downstream end of a strip may connect to another strip at a common manhole (node).

- The last entered value in both the *Height - in (mm):* and in the *Width - in (mm):* data fields is remembered. For a circular pipe, the height and width should be the same. If the two values are not the same, then the height value will control. Thus it is possible for a circular pipe to enter its diameter in the *Height - in (mm):* data field, and 0.00 in the *Width - in (mm):* data field.

- The choice list of the *Conduit Shape:* data field contains 44 conduit shapes, with circular being the default.

10. **Click** at the **downstream** end of the next pipe to be defined (node 2), **click** at that node **again** (note that as you now drag the mouse a black line moves along with it), and then **double-click** at the **upstream** end of the pipe (node 3). The multi-input dialog box of Figure 8 is displayed.

11. **Enter the following data in the indicated data fields:**
    528.65 *Downstream Invert - ft (m):*
    529.30 *Upstream Invert - ft (m):*
    accept all other default data, and then **click** at the **OK** button to introduce the pipe into the model.

12. **Click** at the **downstream** end of the next pipe to be defined (node 3), **click** at that node **again** (note that as you now drag the mouse a black line moves along with it), and then **double-click** at the **upstream** end of the pipe (node 4). The multi-input dialog box of Figure 8 is displayed.

13. **Enter the following data in the indicated data fields:**
    529.80 *Downstream Invert - ft (m):*
    531.74 *Upstream Invert - ft (m):*
    24 *Height - in (mm):*
    24 *Width- in (mm):*
    accept all other default data, and then **click** at the **OK** button to introduce the pipe into the model.

14. **Click** at the **downstream** end of the next pipe to be defined (node 4), **click** at that node **again** (note that as you now drag the mouse a black line moves along with it), and then **double-click** at the **upstream** end of the pipe (node 5). The multi-input dialog box of Figure 8 is displayed.

15. **Enter the following data in the indicated data fields:**
    531.74 *Downstream Invert - ft (m):*
    533.24 *Upstream Invert - ft (m):*
    accept all other default data, and then **click** at the **OK** button to introduce the pipe into the model.

16. **Click** at the **downstream** end of the next pipe to be defined (node 5), **click** at that node **again** (note that as you now drag the mouse a black line moves along with it), and then **double-click** at the **upstream** end of the pipe (node 6). The multi-input dialog box of Figure 8 is displayed.

17. **Enter the following data in the indicated data fields:**
533.34 *Downstream Invert - ft (m):*
534.97 *Upstream Invert - ft (m):*
accept all other default data, and then **click** at the **OK** button to introduce the pipe into the model.

18. **Click** at the **downstream** end of the next pipe to be defined (node 6), **click** at that node **again** (note that as you now drag the mouse a black line moves along with it), and then **double-click** at the **upstream** end of the pipe (node 7). The multi-input dialog box of Figure 8 is displayed.

19. **Enter the following data in the indicated data fields:**
535.07 *Downstream Invert - ft (m):*
538.97 *Upstream Invert - ft (m):*
accept all other default data, and then **click** at the **OK** button to introduce the pipe into the model.

20. **Click** at the **downstream** end of the next pipe to be defined (node 7), **click** at that node **again** (note that as you now drag the mouse a black line moves along with it), and then **double-click** at the **upstream** end of the pipe (node 8). The multi-input dialog box of Figure 8 is displayed.

21. **Enter the following data in the indicated data fields:**
539.57 *Downstream Invert - ft (m):*
544.77 *Upstream Invert - ft (m):*
18 *Height - in (mm):*
18 *Width- in (mm):*
accept all other default data, and then **click** at the **OK** button to introduce the pipe into the model.

(d) Editing the Sewer Model

Being human, it is prudent to check the nodes and pipes for any input errors. To check for any potential or obvious errors, the user can: (a) use native ArcMap functionality to open the *sewnodes* and/or *sewpipes* tables, and make any necessary modifications, or (b) use CEDRA-AVsand functionality as described in the steps below.

22. **Click** at the [M] *Modify Model (Node/Pipe) Attributes* tool in the *CEDRA-AVsand-Tools* toolbar to edit either pipes or nodes.

23. **Click** on top of the label of the **sewpipes** layer in the TOC, to denote that pipes are to be edited.

24. **Click** on top of any pipe in the view to select it, and display the multi-input dialog box of Figure 9.

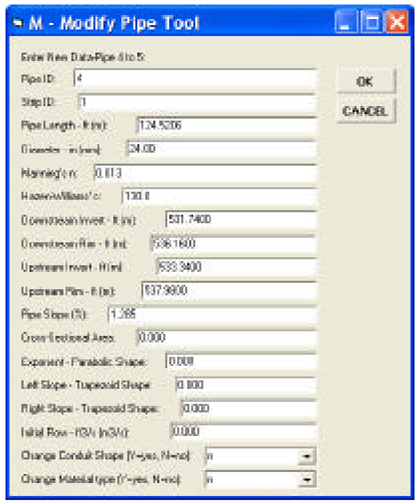

Figure 9 - Pipe Editing Dialog Box

25. **Peruse** the multi-input dialog box, and correct any erroneous entries. It should be noted that this table contains, in addition to the pipe input data, the top of rim elevations that were entered for the upstream and downstream nodes of the selected pipe. Correcting any elevation of the selected pipe will be reflected in the adjacent pipe, and associated node.

26. **Click** at the **OK** button when all corrections for the selected pipe have been made.

When all corrections to the pipes have been made, we may proceed to check the nodes. Since the subject work of this example concerns only the location and top of rim elevations of the nodes, the nodes need not be checked, if corrections to the top of rim elevations were made during the pipe editing phase above.

However, for the sake of demonstration we will check one node to describe the process and the attributes presented to the user for editing. Note that the [M] tool is still active from the prior editing.

27. **Click** on top of the label of the **sewnodes** layer in the TOC, to denote that nodes are to be edited.

28. **Click** on top of any node in the view to select it, and display the multi-input dialog box of Figure 10.

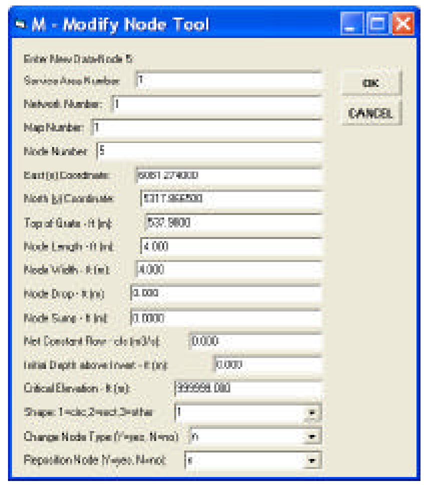

Figure 10 - Node Editing Dialog Box

29. **Peruse** the multi-input dialog box, and correct any erroneous entries. Correcting any elevation of the selected node will be reflected in the adjacent pipes.

30. **Click** at the **OK** button when all corrections for the selected node have been made.

This concludes the development of the geometry of the sewer model. Had the subject example sewer been designed by CEDRA-AVsand, the above sewer information would have been available.

We are now ready to proceed with the generation of the sewer profile.

Stationing The Sewer

In creating a sewer profile, it may be desired to assign station values to the sewer model nodes prior to actually creating the profile. The reason for this is that when a node is created it is not assigned a station value. As such, when a profile is created the starting station of the profile will be zero.

To assign station values to sewer model nodes in an automated fashion, we will use the [Compute Stationing] command which is located in the second menu combo box (see Figure 11) of the *CEDRA-AVsand-Menus* menu combo box bar (see Figure 12). In using this command there are three ways to assign station values to the sewer model nodes within a sewer strip:

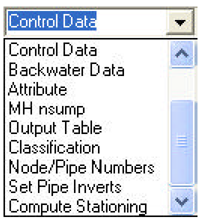

Figure 11
Second Menu Combo Box Of CEDRA-AVsand

- From downstream to upstream; this is the most common.

- From upstream to downstream.

- With reference to an alignment, such as that of a roadway, in which case each sewer node is projected on said alignment, and the station and offset values are computed and stored in the sewer node attribute table. For this method of stationing, the user must have access to *CEDRA-AVland.*

For our subject problem we will use the first of the above methods. Thus:

1. **Click** at the **second combo box** of Figure 12, and **select** the **Compute Stationing** command to display the dialog box of Figure 13.

Figure 13
Sewer Stationing dialog Box

2. **Enter 1** in the *Service Area:* and in the *Strip Id:* data fields (in this example we only have one of each).

3. **Enter 1000** in the *Start Station - ft (m) - Omit the +:* data field denoting a starting station of 10+00 (the + sign is omitted). Regarding this data entry, note the following:
   - As will be seen below, sewer profiles may be stationed either from downstream to upstream, or from upstream to downstream.

   - Depending on how the profile is to be stationed, the starting station value will be applied either to the downstream or upstream most node.

4. **Scroll** down in the *Station Computation mode:* data field and **select** the **Linear** option. Regarding this data field, note the following:
   - The *Linear* option denotes stationing from downstream to upstream. Note that this is the direction in which the strip was defined.

   - The *Linear - Reverse Direction* option denotes stationing from upstream to downstream, which is the reverse of how the strip should have been defined.

   - The *Alignment Projection* option denotes the use of alignment stations and offsets therefrom. This option will be included in this data field only if an alignment has been imported from CEDRA-AVland.

Figure 12 - The CEDRA-AVsand-Menus Menu Combo Box Bar

5. **Click** at the **OK** button to begin the generation and assignment of the station values to the nodes within the specified strip.

   Under the *Linear* and *Linear - Reverse Direction* options, the geometric length of the pipe is used to compute the stationing values.

NOTE that the *Horizontal Alignment ID Number:* data field pertains to the third option of the *Station Computation mode:* data field, and is included in the dialog box only if CEDRA-AVland is available to the user

Creating The Overall Sewer Profile

Having stationed the sewer alignment, we are now ready to develop its profile. For this, we will use certain commands of the CEDRA-AVsand-Menus menu combo box of Figure 12, and we will:

- Create the profile of the entire sewer strip along with a profile grid;

- Modify the profile grid and then reposition the profile within the grid; and finally;

- Cut the sewer profile and grid into individual sheets.

In perusing the commands of Figure 14, we see commands which pertain to profiles. The [Profile] command generates the profile of a sewer strip along with a grid, while the [Profile using Stationing] command enables the user to reposition the sewer profile using the station value assigned to a node. The [Profile on Profile] command superimposes one profile upon another profile.

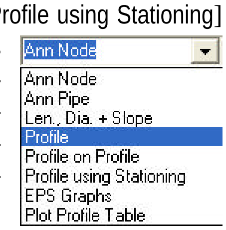

Figure 14
Fourth Menu Combo Box Of CEDRA-AVland

1. **Click** at the **fourth** menu combo box of the *CEDRA-AVsand-Menus* menu combo box bar (see Figure 12), and **select** the **Profile** command (see Figure 14) to display the dialog box of Figure 15.

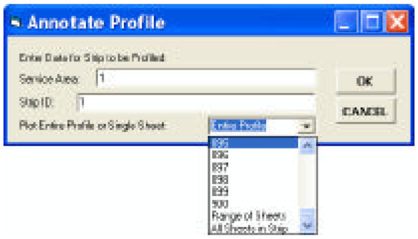

Figure 15
Profile Generation Dialog Box

Note that the first two data fields contain the information that was entered in the dialog box of Figure 13. The values of these two data fields would be the same because we have only one service area and one strip. If there were more than one of each, the user could station all strips in all service areas, and then invoke the [Profile] command, and select the strip to be profiled.

2. **Enter 1** in the first and second data fields as the service area and strip identification (we only have one of each in this example).

3. **Click** at the **OK** button to accept the default **Entire Profile** option in the third data field (scroll down in this data field, to see the available options), and display the multi-input dialog box of Figure 16 for defining the profile grid.

4. **Peruse** the default values in the various data fields, and particularly those of the station and datum data fields.

5. **Enter** the data listed below in the indicated data fields:
   - **900** *Start Station:* (omit the + station sign)
     This value does not have to, but it might be desirable to be the next lower full station. Note that the starting station

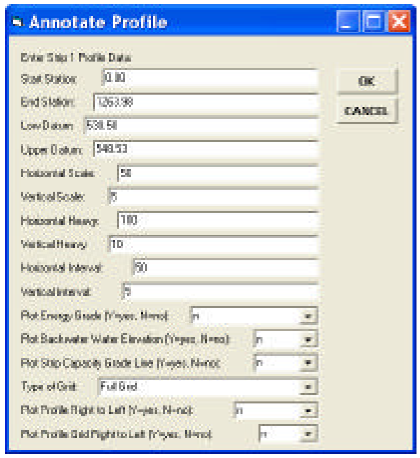

Figure 16
Profile Grid Definition Dialog Box

     value was previously set to be 1000 (10+00).
   - **2300** *End Station:* (omit the + station sign)
     This value does not have to, but it might be desirable to be the next higher full station.
   - **525** *Low Datum:*
     This value does not have to, but it might be desirable to be the next lower multiple of the vertical (elevation) interval.
   - **555** *Upper Datum:*
     This value does not have to, but it might be desirable to be the next higher multiple of the vertical (elevation) interval.
   - **50** *Horizontal Interval:*
     This value denotes the frequency of vertical grid lines.
   - **2** *Vertical Interval:*
     This value denotes the frequency of horizontal grid lines.

   Accept all other defaults, noting the following comments for the indicated data fields.
   - *Horizontal Scale:* and *Vertical Scale:* The scales are expressed in feet per inch for the US Customary system (1” = 50’ and 1” = 5’), and meters per meter for the SI (1:100 and 1:5).
   - *Horizontal Heavy:* (100’) and *Vertical Heavy:* (5’). These values should be a full multiple of the horizontal and vertical intervals respectively.
   - *Plot Energy Grade:*
     Plot Backwater Elevation:
     Plot Strip Capacity Grade Line:
     These Yes/No data fields should be set to No since we have not performed any of the indicated analyses.
   - *Type of Grid:* The choice list of this data field contains the available grid types.
   - *Plot Profile Right to Left:*
     Plot Profile Grid Right to Left:
     These Yes/No data fields enable the user to plot the profile from left to right, or right to left, both in the same or opposite direction.

6. **Click** at the **OK** button to proceed with the development of the profile, which is placed in a data frame at the bottom of the TOC. The name of the data frame, containing the profile, follows the naming convention *Profile of Strip X*, where *X* denotes the strip number entered in Step 2 above.

   Now let us take a look at what we have created.

7. **Right-click** at the label of the new data frame **Profile of Strip 1** in the TOC, and then **select** the *Activate* command to display the profile.

8. **Use** the *Zoom In*, *Pan* and *Go Back To Previous Extent* tools to zoom-in and pan about the profile, and then return to the original extent. In doing so, we note the following issues with the profile that need attention:
   - In order to match the layout of the sewer in the plan view, the profile should be reversed to progress from right to left.

- Station values are shown without their + sign.

- The starting station of the sewer is 10+00, but it is shown to be at station 9+00.

- The elevation heavy grid lines are on the 5’ and not on the 10’ values.

Now let us go back and take care of these revisions to the profile.

9. **Right-click** at the label of the **Layers** data frame at the top of the TOC, and then **select** the *Activate* command to return to the original plan view.

10. **Click** at the **fourth** menu combo box of the *CEDRA-AVsand-Menus* menu combo box bar (see Figure 12), and **select** the **Profile** command (see Figure 14) to display the dialog box of Figure 15. The previously made entries and selections are remembered.

11. **Click** at the **OK** button to display the multi-input dialog box of Figure 16 for defining the profile grid. The previously made entries and selections are remembered.

12. **Enter** the data listed below in the indicated data fields:

- **520** *Low Datum:*
  The position of the heavy lines is measured from the low datum.

- **560** *Upper Datum:*

13. **Scroll** down in the *Type of Grid:* choice data field , and **select** the **Full Grid w/Full Roadway Stations** option to display the + station sign along the bottom of the grid.

14. **Scroll** down in each of the *Plot Profile Right to Left:* and *Plot Profile Grid Right to Left:* choice data fields, and **select** the **y** option to plot the profile from right to left.

15. **Click** at the **OK** button to proceed with the development of the profile. As stated earlier, the profile will be placed in a data frame, labeled *Profile of Strip 1*. Since this data frame exists, the query box of Figure 17 will be displayed.

16. **Click** at the **Yes** button to create the new profile, which is to replace the current (the last created) profile.

Figure 17
Query To Replace Last Created Profile

Clicking at the No button will display an information message box that the command has been aborted. In this case click at the OK button to acknowledge and continue.

As a result of performing Step 16, the profile has been created and stored in the *Profile of Strip 1* data frame. Before we take another look at it, we have to reposition the profile within the grid. Remember that:

- The sewer profile starts at station 10+00,

- The profile grid starts at station 9+00, and

- The [Profile] command always positions the start of the profile at the start of the grid.

- The [Profile using Stationing] command enables the user to reposition a profile using the node station values.

17. **Click** at the **fourth** menu combo box of the *CEDRA-AVsand-Menus* menu combo box bar (see Figure 12), and **select** the **Profile using Stationing** command (see Figure 14) to display the dialog box of Figure 18, which is similar to that of Figure 15, with the exception that a fourth (choice) data field has been added. The previously made entries and selections are remembered.

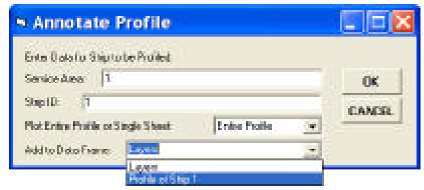

Figure 18
Profile Generation Dialog Box Of The [Profile using Stationing] Command

18. **Scroll** down in the *Add to Data Frame:* data field, **select** the **Profile of Strip 1** option, and then **click** at the **OK** button to display the multi-input dialog box of Figure 16 for defining the profile grid. The previously made entries and selections are remembered.

The query box of Figure 17 is displayed.

19. **Click** at the **Yes** button to create the new profile, which is to replace the current (the last created) profile, or click at the No button to abort the command, and acknowledge the abortion by clicking at the OK button of the information box.

After a few seconds the profile is created and stored in the *Profile of Strip 1* data frame (see Figure 19). Using the node station values the profile has been shifted to the left for proper alignment. Let us now take a look at the revised profile.

20. **Right-click** at the label of the new data frame **Profile of Strip 1** in the TOC, and then select the *Activate* command to display the profile.

21. **Use** the  *Zoom In,*  *Pan* and  *Go Back To Previous Extent* tools to zoom-in and pan about the profile, and then return to the original extent. In doing so, we note that our previous concerns have been addressed to our satisfaction.

22. **Right-click** at the label of the **Layers** data frame at the top of the TOC, and then **select** the *Activate* command to return to the original plan view.

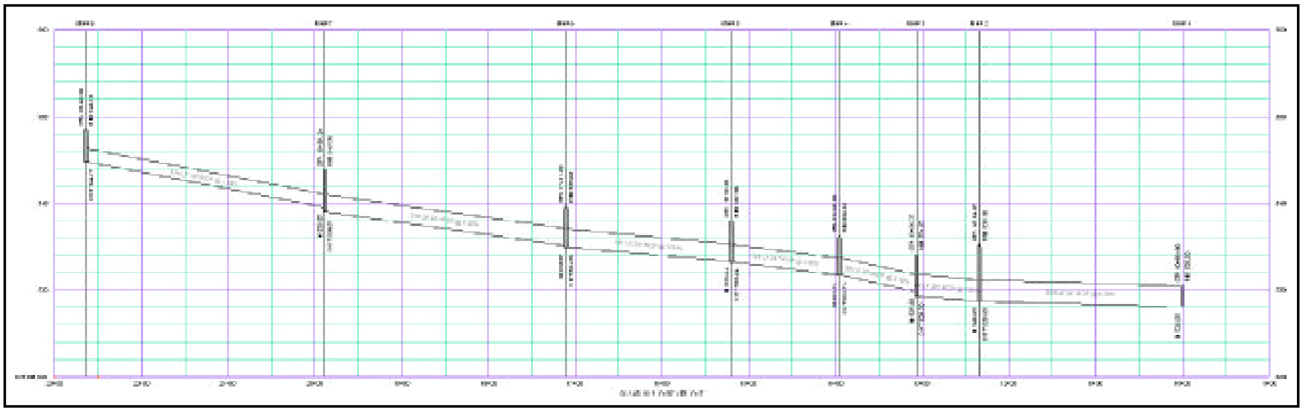

Figure 19 - Overall Sewer Profile

Cutting Out Of The Drawing Sheets

As most engineers are aware, the majority of sewer profiles do not fit for display within the confines of one standard engineering drawing sheet. Therefore they have to be broken down into two or more sheets. We are about to demonstrate how this can be done. Before proceeding with the sheet cut out process, it is recommended that the user:

- Reviews the overall profile, and plan view;
- Account for the physical size of the drawing sheet and horizontal and vertical scales to be used; and
- Determine the location (points) where the overall profile is to be cut out, and the low and upper datum limits.

For the sake of this exercise, let us assume that the desired point to break the overall profile is at station 16+00.

1. **Click** at the **fourth** menu combo box of the *CEDRA-AVsand-Menus* menu combo box bar (see Figure 12), and **select** the **Profile** command (see Figure 14) to display the dialog box of Figure 15. The previously made entries and selections are remembered.

2. **Accept** the defaults of the first and second data fields for the service area and strip identification.

3. **Scroll** down the *Plot Entire Profile or Single Sheet:* data field, **select** the **1** option, and **click** at the **OK** button to display the multi-input dialog box of Figure 20.

Note that the dialog box of Figure 20 is similar to that of Figure 16, with the sole exception of a new data field at the bottom of the dialog box.

4. In this modified dialog box:

- **Enter 550** in the new *Upper Datum:* data field to reduce the height of sheet 1;
- **Enter 1600** in the *End Station:* data field (the upper station limit of the first drawing sheet), and **accept** all default values.

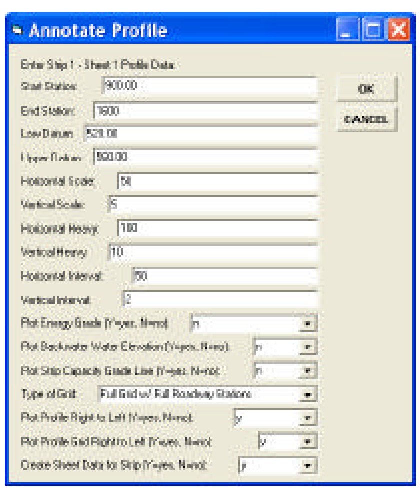

Figure 20
Profile Generation Dialog Box
With Sheet Clip Limits

5. **Scroll** down the new *Create Sheet Data for Strip (Y=yes, N-no):* data field, **select** the **y** option, and then **click** at the **OK** button to display the query box of Figure 17.

The program will now proceed to cut out sheet 1 of the overall profile and generate profile clip data for all of the sheets comprising the profile, which in our case is two. When sheet 1 has been cut out, a box with the message:

2 Profile Clip Sheet records have been created for Sewer Strip 1

is displayed.

6. **Click** at the **OK** button to acknowledge.

Now let us review one item. During the sheet cut out process the program develops a table called *PROFILEClipData*. This table contains one record per cut out sheet, and is populated depending upon the selected option in the new *Create Sheet Data for Strip (Y=yes, N-no):* data field of Figure 20.

- If a negative response is selected, a single record is added to the table for the specific cut out sheet being processed.
- If a positive response is selected, the program computes the station span between the start and end stations of the first cut out sheet, and applies it to the rest of the overall pro-

file, with the last sheet containing whatever is left over. A record is then added to the table for how ever many cut out sheets are computed.

7. **Click** at the **Source** tag in the TOC, **scroll** to the **PROFILEClipData** label (this is the name of the above said table), **right-click** thereon, and **select** the **Open** command to open the table. You will notice that this table contains most all of the profile grid attributes.

8. **Close** the **table** by clicking the X button in the upper right corner.

9. **Click** at the **Display** tag in the TOC, **scroll** to return to the original TOC.

10. **Click** at the **fourth** menu combo box of the *CEDRA-AVsand-Menus* menu combo box bar (see Figure 12), and **select** the **Profile using Stationing** command to display the dialog box of Figure 21.

11. In the dialog box of Figure 21:
    - **Accept** the defaults of the **first two** data fields;
    - **Scroll** down in the *Plot Entire profile or Single Sheet:* data field, and **select** the **1** option;

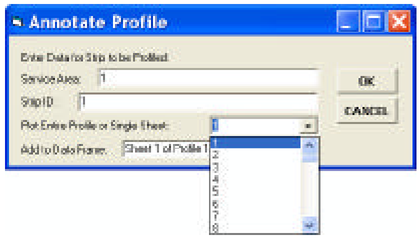

Figure 21
Selection Of The Sheet To Be Cut-Out

    - **Scroll** down in the *Add to Data Frame:* data field, and **select** the **Sheet 1 of Profile 1** option; and
    - **Click** at the **OK** button to display the modified dialog of Figure 20.

12. In the dialog of Figure 20:
    - **Make** certain that the displayed default in the new *Create Sheet Data for Strip (Y=yes, N-no):* data field is the **n** option. If not, select it.
    - **Accept** all other default values.
    - **Click** at the **OK** button to display the query box of Figure 17.

13. **Click** at the **Yes** button to create the new profile, which is to replace the current (the last created) profile, or click at the No button to abort the command, and acknowledge the abortion by clicking at the OK button of the information box.

    The program will now proceed to reposition the sewer profile within sheet 1 of the overall profile.

14. **Scroll** down to the bottom of the TOC where you will see the data frame labeled **Sheet 1 of Profile 1**.

15. **Right-click** at the label of the new data frame **Sheet 1 of Profile 1**, and **select** the *Activate* command to display the profile of the first sheet (see Figure 22).

16. **Right-click** at the label of the **Layers** data frame at the top of the TOC, and then **select** the *Activate* command to return to the original plan view.

We will next cut out the second sheet of the overall profile.

17. **Click** at the **fourth** menu combo box of the *CEDRA-AVsand-Menus* menu combo box bar (see Figure 12), and **select** the **Profile** command (see Figure 14) to display the dialog box of Figure 15. The previously made entries and selections are remembered.

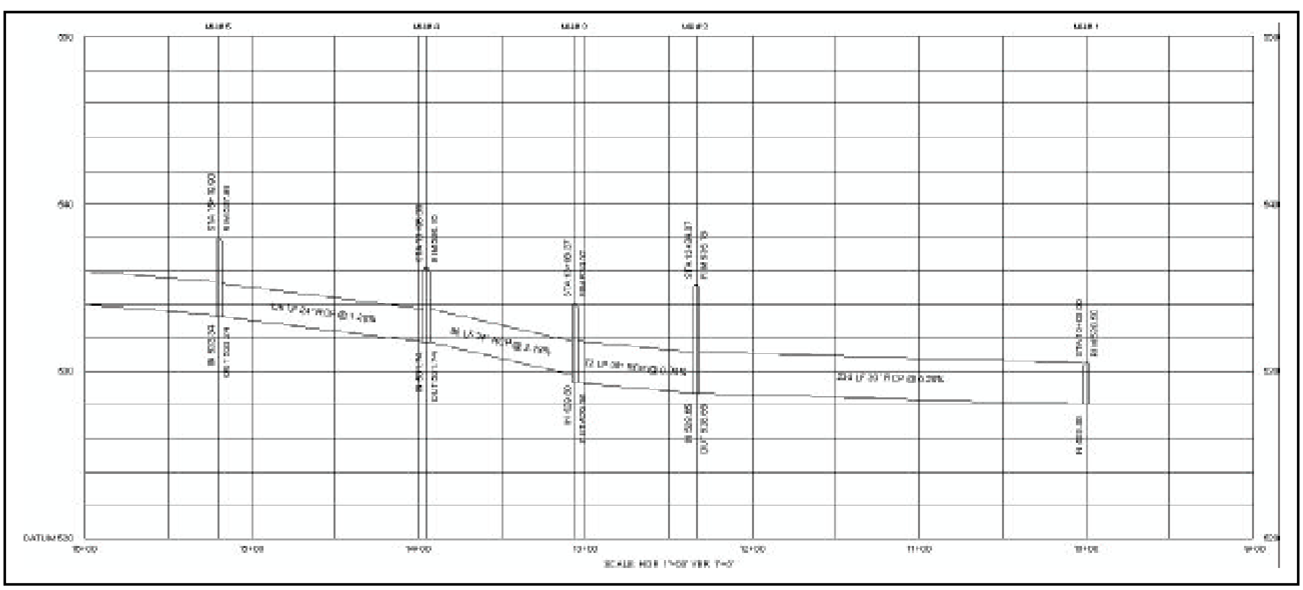

Figure 22 - Profile Of Cut out Sheet 1

18. **Accept** the defaults of the first and second data fields for the service area and strip identification.

19. **Scroll** down the *Plot Entire Profile or Single Sheet:* data field, **select** the **2** option, and **click** at the **OK** button to display the multi-input dialog box of Figure 20.

20. In this dialog box we will modify the grid datums:
- **Enter 530** in the new *Low Datum:* data field;
- **Enter 560** in the new *Upper Datum:* data field; and
- **Click** at the **OK** button to display the query box of Figure 17

21. **Click** at the **Yes** button to create the new profile, which is to replace the current (the last created) profile, or click at the No button to abort the command, and acknowledge the abortion by clicking at the OK button of the information box.

22. **Repeat** the preceding **Steps 10** to **16** with the following exceptions:
- In **Step 11 selec**t the **2** option in the *Plot Entire profile or Single Sheet:* data field.
- In **Step 11 select** the **Sheet 2 of Profile 1** option in the *Add to Data Frame:* data field.
- In **Step 14** and **Step 15** substitute **Sheet 2 of Profile 1** for **Sheet 1 of Profile 1**. See Figure 23.

Sewer Modification And Profile Regeneration

Since sewer design is an iterative process, a profile may have to be generated two, or more times. The location of manholes may change, manholes may be added or deleted, and inverts may change. For the sake of simplicity for this exercise, we will assume that changes have been made, and they have properly been reflected in the population of the model by use of the M tool of the CEDRA-AVsand-Tools toolbar.

The following steps demonstrate how multiple cut out sheets can be produced.

1. **Click** at the **fourth** menu combo box of the *CEDRA-AVsand-Menus* menu combo box bar (see Figure 12), and **select** the **Profile** command (see Figure 14) to display the dialog box of Figure 15. The previously made entries and selections are remembered.

2. **Accept** the defaults of the first and second data fields for the service area and strip identification.

3. **Scroll** down the *Plot Entire Profile or Single Sheet:* data field, **select** the **Range of Sheets** option, and **click** at the **OK** button to display the multi-input dialog box of Figure 24.

4. **Enter 1** in the *Start Sheet ID:* data field, **enter 2** in the *End Sheet ID:* data field, and **click** at the **OK** button. If there were to be 8 drawing sheets, we would have entered 8, instead of 2, in the second data field.

The program will now proceed to cut out the number of sheets.

5. **Click** at the **fourth** menu combo box of the *CEDRA-AVsand-Menus* menu combo box bar (see Figure 12), and **select** the **Profile using Stationing** command to display the dialog box of Figure 21.

6. In the dialog box of Figure 21:
- **Accept** the defaults of the **first two** data fields;
- **Scroll** down in the *Plot Entire profile or Single Sheet:*

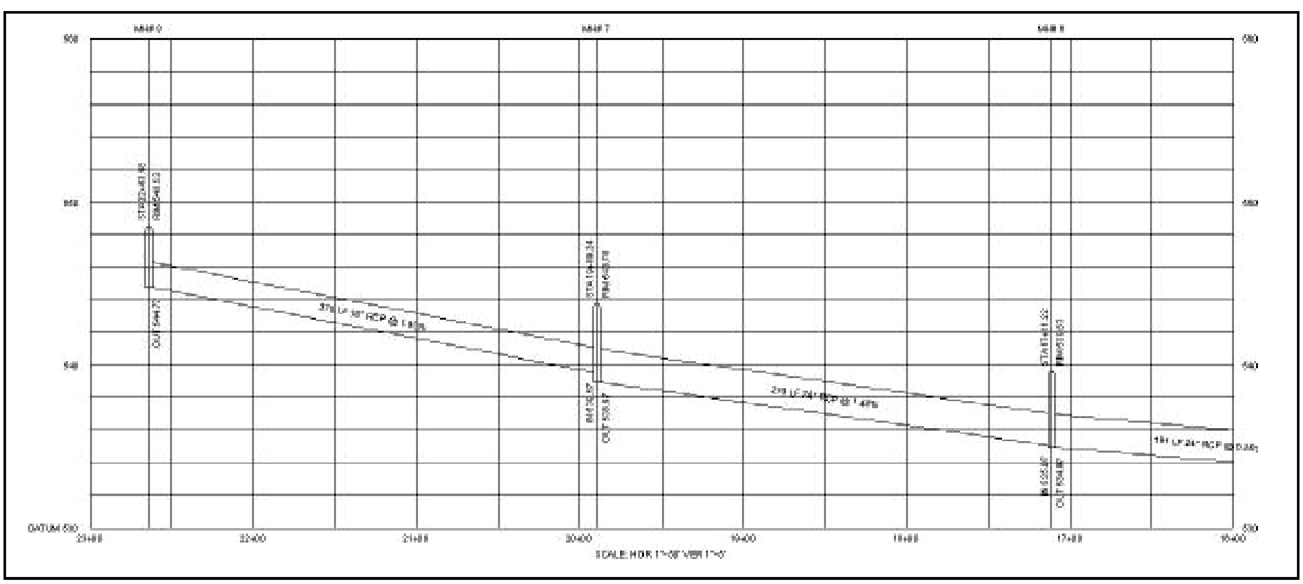

Figure 23 - Profile Of Cut out Sheet 2

data field, and **select** the **Range of Sheets** option;

- **Scroll** down in the *Add to Data Frame:* data field, and **select** the **Sheet 1 of Profile 1** option; and

- **Click** at the **OK** button to display the modified dialog of Figure 24.

Figure 24 - Range Of Drawing Sheets

7. **Enter 1** in the *Start Sheet ID:* data field, **enter 2** in the *End Sheet ID:* data field, and **click** at the **OK** button. If there were to be 8 drawing sheets, we would have entered 8, instead of 2, in the second data field.

   The program will now proceed to cut out the number of sheets, in our example two. Due to the naming convention used by the program, the [Profile using Stationing] command knows which data frame the cut out profile is to be added to.

   Once all of the sheets have been cut out, the program will return the map to its last display.

8. **Scroll** down to the bottom of the TOC, **right-click** at the label of the data frame **Sheet 1 of Profile 1**, and **select** the *Activate* command to display the profile of the first sheet (see Figure 22).

9. **Scroll** down to the bottom of the TOC, **right-click** at the label of the data frame **Sheet 2 of Profile 1**, and **select** the *Activate* command to display the profile of the second sheet (see Figure 23).

10. **Right-click** at the label of the **Layers** data frame at the top of the TOC, and then **select** the *Activate* command to return to the original plan view.

Summary

This month we have demonstrated: (a) the procedure for creating the overall profile of a storm water system, (b) how to cut the overall profile into individual drawing sheets, and (c) how to mass regenerate said sheets when changes to the sewer are made which affect its profile.

Although the generation of the profile of a storm water system was demonstrated, the generation of the profile of a wastewater or combined sewer system would be for all intents and purposes identical to the methodology described in this bulletin.

Similar to the said methodology would be the development of the profile of a water main. The basic difference would be that instead of developing the water main profile from within CEDRA-AVsand, it would be developed from within CEDRA-AVwater.

If it is desirable to superimpose the original ground profile, it can be: (a) drafted by use of any of the available tools in the CEDRA Tools Palette or (b) if a table of Station and Elevation values were available, the [Plot Profile Table] command could be used.

Using the CEDRA-AVland software in conjunction with the alignment of the sewer, the original ground profile could be extracted from an available TIN or set of contours. In this scenario, the sewer's center line, rather than that of a roadway, would constitute the alignment along which the ground profile would be extracted.

The profile extracted from the above process would be stored in a dBase file following the ogX_pro naming convention, where X denotes the horizontal alignment number. The [Plot Profile Table] command within CEDRA-AVsand or CEDRA-AVland could then be used to plot this profile, superimposing it upon the sewer profile, which was created using CEDRA-AVsand.

Such a combined sewer and existing ground profile could then be combined with the plan view of the overall development, to which the sewer has been added, to produce plan and profile (P&P) sheets. The CEDRA-AVland methodology for producing P&P drawings was addressed in the November 2005 issue of the Command Of The Month bulletin.

If you have a request for Command Of The Month, feel free to phone, fax or e-mail your request to The CEDRA Corporation.