Earthwork (3-1-2011)

Quick Overview

1. Open c:\rwd\input\earthwk.inp (for x-sections created with GeoPak's Proposed X-Sections)
Or
1a. Open c:\rwd\input\ earthwk-corridor-xs.inp (for x-sections created via DTM's from Roadway Designer)

2. Edit it to meet your job's conditions.

3. Save to your project directory as EWchainame.INP.

4. Run through Process Cross Sections dialog.

Earthwork.inp

```
*********************************************************************************************
EARTHWK.INP
      XSECTION
       earthwork
       vertical search distance = 375.0       /* 0.75 of the Distance Between X-Sections */
         xs dgn =
            existing ground line
                  soil type = exgr
                  mult factor = 1
                  type = line,line_string
                  lvname = 1,XS_X_GROUND
                  co = 2

            proposed finish grade
                  soil type = prgr
                  mult factor = 1
                  type = line
                  lvname = 31,XS_P_FINISHED_GRADE
                  co = 1
                  lc = 0

            proposed undercut
                  soil type = leveling
                  mult factor = 1
                  type = line
                  lvname = 36,XS_P_SUBGRADE_LEVELING
                  co = 9
                  Do not include in mass ordinate

            proposed undercut
```

```
        soil type = pavement
        mult factor = 1
        type = line
        lvname = 35,XS_P_SUBGRADE_PAVEMENT
        co = 6
        Do not include in mass ordinate

proposed undercut
        soil type = granular
        mult factor = 1
        type = line
        lvname = 38,XS_P_SUBGRADE_GRANULAR
        co = 5
        Do not include in mass ordinate

proposed undercut
        soil type = granular_b
        mult factor = 1
        type = line
        lvname = 39,XS_P_SUBGRADE_GRANULAR_B
        co = 4
        Do not include in mass ordinate

proposed undercut
        soil type = select_fill
        mult factor = 1
        type = line
        lvname = 37,XS_P_SUBGRADE_SELECT_FILL
        co = 7
        Do not include in mass ordinate

existing unsuitable material
        soil type = ex_unsuitable
        mult factor = 1
        type = line
        lvname = 50,XS_X_PAVEMENT,XS_X_UNSUITABLE_MATERIAL
        co = 2,4,17

/* excavation limits
        lvname = 53,XS_M_EXCAVATION_LIMITS
        co = 13
        type = line         */

write earthwork shapes
        plot parameters
                lvname = XS_M_SHAPES_EARTHWORK
                lc = bylevel
                wt = bylevel
                co = bylevel
        stratify shape color
```

```
        /* calculate only between excavation limits    */

        COMBINE COMMON EXC + SUBGRADE EXC + SUBSOIL EXC

            /*     skip areas
                        from      to     */

/*-------------------------------------------------------------------+
|    NOTE: Skip areas allow the designer to skip specified Station    |
|          Ranges. The End Area for each x-section in this area is    |
|          calculated, but volume calculations are not performed in   |
|          in the specified ranges. If you have any areas which you   |
|          want the Volume not calculated (Bridges,etc.) Delete the   |
|          COMMENT Symbols above this note and enter specific station |
|          values behind from & to. There is no limit to the number of |
|          Station Ranges.                                            |
+-------------------------------------------------------------------*/

        write column base ascii file =
                                    /* This is the ASCII Text File
                                       which the LAY.INP file looks
                                       at to put the Earthwork Quan-
                                       tities on the X-Sections. */

        column 1 formula = ["prgr", fill, adj vol]
        column 1 number of decimal place = 0
        column 1 total length = 9

        column 2 formula = ["prgr", fill, end ar]
        column 2 number of decimal place = 2
        column 2 total length = 9

        column 3 formula = ["exgr", common exc, end ar] +
                           ["exgr", subgrade exc, end ar] +
                           ["exgr", subsoil exc, end ar]
        column 3 number of decimal place = 2
        column 3 total length = 9

        column 4 formula = ["exgr", common exc, adj vol] +
                           ["exgr", subgrade exc, adj vol] +
                           ["exgr", subsoil exc, adj vol]
        column 4 number of decimal place = 0
        column 4 total length = 9


    process earthwork for baseline =
                    job number =
                    begin station =
                    end station =
*****************************************************************************************
```

NOTE: If you have areas in which you want to skip EW calculations (Bridge area), you need to uncomment the skip areas and input the station ranges.

skip areas
from 131+25 r 1 to 135+25 r 1
from 141+05 r 1 to 145+00 r 1

It is critical that you Skip from a section that has proposed elements to a section that has proposed elements.

NOTE: Rename EARTHWK.INP to EW*.INP, where * is the name of your baseline.

NOTE: The ability to place the Earthwork on the X-Sections has been added. A text file, the name is specified in the EARTHWK.INP File by "WRITE COLUMN BASE ASCII FILE = ", is created when the designer runs the EARTHWK.INP FILE which contains in a Tabular Format:

```
    STATION        FILL          FILL        CUT          CUT
                CU.YDS.       SQ.FT.      SQ.FT.      CU.YDS.
```

When you set your sheets up for plotting with the LAY*.INP File, this Ascii Text File is read and the Quantities it contains are placed on the X-Sections. Note that you have to specify the Name of the Ascii Text File in the LAY*.INP File. A sample of the Ascii Text File is shown below:

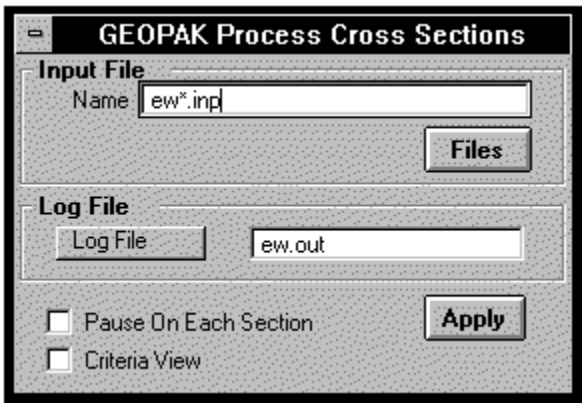
This is the Ascii Column Base File produced by the EARTHWK.INP
file. This file is read when the designer runs the LAY*.INP
File and the Quantities in it are placed on the X-Sections.

```
        000000000 111111111 222222222 333333333 444444444

54+00.00         0    345.70      0.00         0
54+77.50       696    139.56      0.00         0
55+00.00        98     94.81      3.07         1
55+16.00        51     76.23      1.19         1
55+33.50        65    124.94      4.30         2
55+40.00        29    119.63      5.14         1
55+64.00        93     90.66     21.95        12
55+78.50        37     45.47     36.77        16
56+00.00        21      6.66    103.16        56
56+15.00         2      0.86    144.14        69
56+42.50         2      2.90    204.77       178
56+50.00         6     40.22    187.43        54
56+80.00        42     36.15    243.99       240
56+87.50         6      8.52    273.57        72
56+93.00         1      5.41    303.14        59
57+00.00         1      5.04    319.52        81
58+00.00        10      0.11    547.46      1606
59+00.00         0      0.00    745.88      2395
59+77.00        14     10.09    865.59      2298
60+00.00        11     15.24    866.14       738

   ^            ^         ^         ^         ^
   |            |         |         |         |
   |            |         |         |         |
   |
   |        Volumes   End Areas End Areas Volumes
 Station     Fill       Fill      Cut       Cut
          (cu.yds.) (sq.ft.)  (sq.ft.)  (cu.yds.)
```

2. Enter your Working X-SECTION and run your EW*.INP file through APPLICATIONS>GEOPAK ROAD>OTHERCOMPONENTS>PROCESS X-SECTIONS shown below:



Set the toggle in the middle of this box to LOG FILE and enter the name of the file you want your quantities to
be generated in. (By running this Input file through PROCESS X-SECTIONS, you have the ability to interactively correct sections during the run.) This step runs the EARTHWK.INP file and creates the file EW*.OUT which contains END AREAS for each Station and Volumes between stations.

In the earthwork output file,

A) The total "CUT" quantity for each section is found under the heading (EXGR) by EXCAVATION

B) The total "FILL" quantity for each section is found under the heading (PRGR) by FILL.

C) The GRANULAR & GRANULAR_B quantities is found under the headings (GRANULAR) & (GRANULAR_B) by FILL.

D) The Total PAVEMENT quantity is calculated for each x-section. At the present time the different courses are not broken out and the pavement quantities should be computed from the plan view.

E) The Total Unsuitable material is found under the heading EX_UNSUITABLE by COMMON EXC. It is critical to place unsuitable soil layers (Ex Pavement, Muck, Rock, etc.) on your sections prior to running EW.

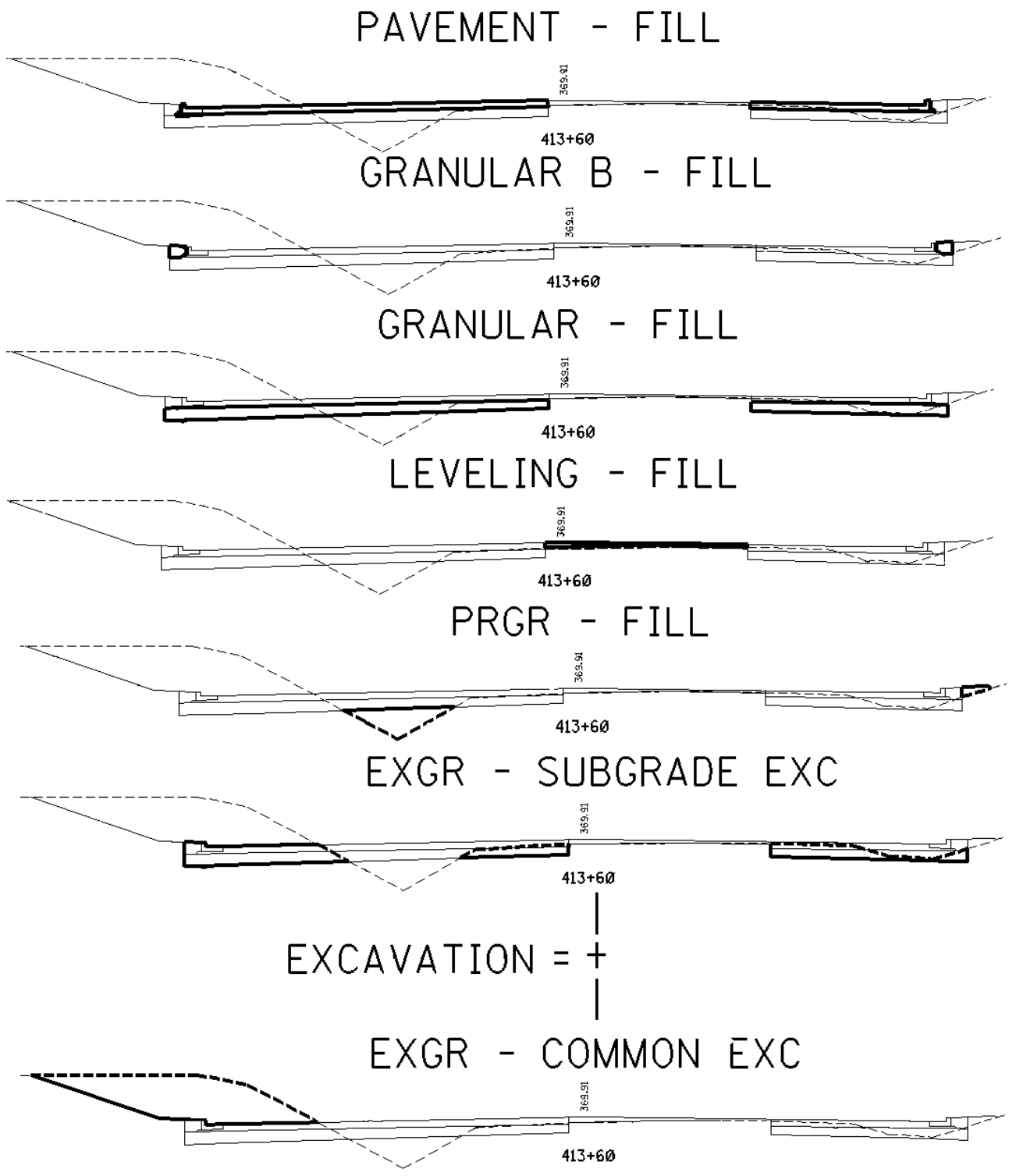
This is an example of an output file:

This example shows volumes of 0 for all types of soil because it was the beginning station. All other stations will show the volume between it and the station before it.
The ADJUSTED VOLUMES are the UNADJUSTED VOLUMES multiplied by the MULTIPLICATION FACTOR.
The MASS ORDINATE is the Accumulation of Cuts & Fills for all Soil Types shown.

```
          Material Name  End Areas  Unadjusted Adjusted   Mult   Mass
Station                             Volumes    Volumes    Factor Ordinate
                         (sq. ft.)  (cu. yd.)  (cu. yd.)
--------- -------------- ---------- ---------- ---------- ------ --------
REGION = 1
  413+60.00 EXGR
```

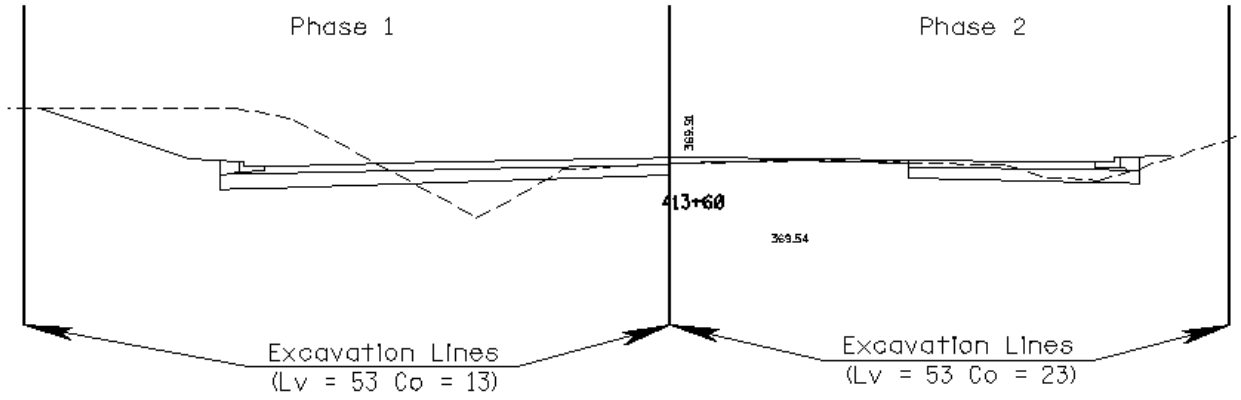
```
             Excavation       171.19          0          0   1.00
                 Fill           0.00          0          0   1.00
0
            PRGR
             Excavation         0.00          0          0   1.00
                 Fill           0.05          0          0   1.00
0
            LEVELING
               Common Exc       0.00          0          0   1.00
                 Fill           6.84          0          0   1.00
0
            GRANULAR
               Common Exc       0.00          0          0   1.00
                 Fill          72.67          0          0   1.00
0
            GRANULAR_B
               Common Exc       0.00          0          0   1.00
                 Fill           4.99          0          0   1.00
0
            PAVEMENT
               Common Exc       0.00          0          0   1.00
                 Fill          44.82          0          0   1.00
0
            EX_UNSUITABLE
               Common Exc      24.00          0          0   1.00
                 Fill           0.00          0          0   1.00
0
```

Below you can see where the End Areas for each material came from.



Splitting Earthwork using Excavation Limits

If the earthwork on your job needs to be broken into phases, see the picture below:



1. Place excavation lines on LV = 53(XS_M_EXCAVATION_LIMITS), CO = 13,23 as shown above.

NOTES:

a) This is just two, four, six, etc. lines which cross each section & designate what area to calculate. If you have two areas to calculate, you need 4 lines, on LV = 53(XS_M_EXCAVATION_LIMITS), CO = 13 & 2 on LV = 53(XS_M_EXCAVATION_LIMITS), CO = 23.

b) These lines can be placed at any angle

c) These lines can be placed by hand or placed with the EXC*.INP file. When this file is run, it looks into the PLAN DGN file and finds the distance from the baseline to the excavation limit line in the PLAN DGN and then places a vertical line on the x-section the same distance measured in the PLAN DGN from the baseline.

2. Once these excavation lines are in place, edit the EARTHWK.INP file and uncomment the statements shown below.

```
/* excavation limits
      lv = 53, XS_M_EXCAVATION_LIMITS
      co = 13
      type = line          */
write earthwork shapes
      plot parameters
            lvname = XS_M_SHAPES_EARTHWORK
            lc = bylevel
```

wt = bylevel
co = bylevel
stratify shape color
/* calculate only between excavation limits */

3. Run *EARTHWK.INP* and then:

a) Copy & rename it

b) Change the COLUMN BASE ASCII file name

c) Change LV = 53(XS_M_SHAPES_EARTHWORK) & CO = 13 to LV = 53(XS_M_SHAPES_EARTHWORK) & CO = 23

d) Run this *EARTHWK.INP* file.

You should now have two complete sets of earthwork.

Earthwork for Detour Roads

For earthwork and templates of detour roads or phased construction, see Corridor Modeling Detour Help or Proposed X-Sections - Detours.