

VIRGINIA DEPARTMENT OF TRANSPORTATION

# LOCATION AND DESIGN DIVISION

## INSTRUCTIONAL AND INFORMATIONAL MEMORANDUM

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|---|---|
| GENERAL SUBJECT:<br>PROJECT DESIGN USING<br>COMPUTER DATA | NUMBER:<br>IIM-LD-118.4   |
| SPECIFIC SUBJECT:<br>CREATING IG & GEOPAK REPORTS         | DATE:<br>FEBRUARY 20, 2007  |
|   | SUPERSEDES:<br>IIM-LD-118.3   |
| DIVISION ADMINISTRATOR APPROVAL:                          | Mohammad Mirshahi, P.E.<br>State Location and Design Engineer<br>Approved February 20, 2007 |

Changes are shaded.

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### CURRENT REVISION

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- This memorandum was revised to clarify instructions for IGrds and GEOPAK projects.
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### EFFECTIVE DATE

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- This memorandum is effective on all projects upon receipt.
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### CROSS SECTIONS

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- Computer Plotted Cross Sections are:
    - produced in the preliminary stage of plan development.
    - updated when changes are made in the project design.
    - retained by the designer.
    - produced at each major milestone in the project development process following Project Scoping.
  - The designer will provide prints of updated cross sections as necessary.

**For IGrds projects:**

- Earthwork quantities are only needed on cross sections when manual adjustments have been made. In these situations the quantities need to be shown on prints distributed for **Construction Review for Final Submission**.

**For GEOPAK projects:**

- **Earthwork Quantities are required.**
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**ROADWAY DESIGN LISTINGS**

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- The designer will produce Roadway Design Listings (and Computer Plotted Cross Sections when applicable) at each major milestone in the project development process following Project Scoping.
- It is preferable that electronic files be utilized rather than printed copies of listings.
- When projects with computer earthwork quantities are developed it may be necessary to provide listings to other divisions.
- Designers should create these listings several days prior to the scheduled date of each development stage of the project.
- Plotted cross sections of the design data are available upon request from the designer at any stage of project development.
- Computer input data must be reviewed, and revised if necessary, to ascertain that the desired exact limits of the project are coded before the production of the listings is made.
- Earthwork Quantities List is to include sub-grade computations.

**For IGrds projects:**

- Earthwork Quantities List is not to be provided on projects that are utilizing only manually adjusted cross sections.
- When computer listings are provided a cover sheet for the Volume Computations Report (Earthwork Quantities List) must contain the following information:

**NOTE:**

Earthwork quantities have not been adjusted at “odd plus” at beginning, or end of project, and/or at bridge locations. Quantities shown on cross-sections and summaries have been adjusted and will govern.

- UPC Number
- IGrds Working File Name
- Sequence numbers
- Project Description
- Designer’s name, room number and telephone number

**For GEOPAK projects:**

- Earthwork Quantities will be shown on cross-sections.
- When computer listings are provided a cover sheet for the Volume Computations Report (Earthwork Quantities List) must contain the following information:

**NOTE:**

Earthwork quantities have not been adjusted at “odd plus” at beginning, or end of project, and/or at bridge locations. Quantities shown on cross-sections and summaries have been adjusted and will govern.

- UPC Number
- Project Description
- Designer’s name, room number and telephone number

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**REVIEW OF ROADWAY DESIGN LISTINGS**

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**For IGrds projects:**

Design Cross Section Listing items to review:

- Project Numbers
- Beginning and end stations of the project
- Equalities
- Template separator locations, if any
- Rock slope and benching locations, if any
- Bridge locations
- Exceptions/Gaps in stationing
- Station omissions
- Determine that finished grade elevations agree with elevations as shown on plans

### Superelevation (Spot check each curve)

Spot check baseline elevations of proposed finished grade design to insure that proper depth and method of trenching has been used.

- Volume Computations Report (Earthwork Quantities List) items to review:
  - Project Numbers
  - Ensure that the earthwork quantities cover the same termini shown for the Design Listing, and that these limits are correct.
  - Equalities
  - Bridge locations and spill areas
  - Exceptions/Gaps in stationing
  - Station omissions
  - Compactions factors
  - Earth slope round-off
- When the Designer has reviewed the listings and determined them to be correct, distribution is to be made in accordance with the Roadway Design Listing print distribution requirements.

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## MANUALLY ADJUSTED CROSS SECTIONS (IGrds Projects only)

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- Manually adjusted computer plotted cross sections for projects should be held to a minimum. All changes should be incorporated into the Design Listings when possible and revised listings and cross sections provided. When a project has manual changes, the computer plotted cross sections will be manually adjusted to reflect any applicable change in design or earthwork. The following notes will be shown on all applicable listings as well as on the GENERAL NOTES SHEET:

### **Note:**

Manual adjustments have been made on the computer plotted cross-sections. The applicable listings do not reflect the corrections and/or additions.

or

Manual modifications to design cross-sections have been made with the IGrds DXM process; therefore the earthwork design process should not be run against these working files.

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## CREATING GEOPAK REPORTS

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- See Chapter 21 of the VDOT Road 1 Training Manual, available at: [http://www.extranet.vdot.state.va.us/locdes/GEOPAK/r1vdot\\_print.pdf](http://www.extranet.vdot.state.va.us/locdes/GEOPAK/r1vdot_print.pdf) .

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## CREATING IG REPORTS

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- Design reports generated by IGrds should be provided by the Engineer with construction plans upon advertisement.
- The title, index and cover sheets are all word document files. The designer\engineer should fill in project information in the space provided.
- The following reports can be produced using IGrds (printed from “Textpad”):  
Horizontal Alignment List, Alignment Relation List (Horizontal Position Calculation), Profile Grade List, Grade and Superelevation List, Design Cross Section List, Earthwork Quantities List, Toe of Slope List, Stake Detail List, Slope Stake List, and Right of Way Stakeout List. Below are instructions on producing the above IGrds reports:
- **Horizontal Alignment List**
  - Click on Tools—Horizontal Alignment—Horizontal Alignments
  - Click on Reports
  - The Horizontal Alignment List is created in a “.tmp” file for the Roadway designated. The file should be renamed “same as working file ali.doc”.
  - A Horizontal Alignment List should be created for the mainline and each connection.
- **Alignment Relation List**
  - A horizontal alignment relation list can be created in the “.lis” file by clicking on Horizontal Position Calculation when running the earthwork process. Use the cut and paste technique to create the Alignment Relation List file.  
or
  - It can be created in a “.tmp” file by doing the following:
    - Click on Processes-Horizontal Position
    - Verify Correct Roadway
    - Click OK.
  - The Alignment Relation List file should be named “same as working file hpc.doc”.
  - An Alignment Relation List should be created for the mainline and each connection.

- **Profile Grade List**
  - There are two reports that should be included in the Profile grade List. One is created in the “.lis” file when running the earthwork process. The second is created using the Vertical Alignment Report command.
  - Click on Tools—Vertical Alignment—Vertical Alignments
  - Click on Report (Create Vertical Alignment Report).
  - Use the cut and paste technique to incorporate the two files into one.
  - The file should be named “same as working file pgl.doc”.
  - A Profile Grade List should be created for the mainline and each connection.
  
- **Grade and Super List**
  - A Grade and Super List can be created with the following commands:
  - Click on Processes—Design Data Manager—Grade and Super Report
  - Verify Design Roadway
  - Key in station increment
  - Verify/key in transition divisions
  - The report is created in an “.tmp” file. It should be renamed “same as working file g&s.doc”.
  - A Grade and Super List should be created for the mainline and each connection.
  
- **Design Cross Section List**
  - The design cross section list is created in the “.lis” file when the earthwork process is run by clicking the toggle on for Desc X-sect List. Use the cut and paste technique to create a separate text file for the design cross section list. The file should be named “same as working file dxs.doc”.
  - A Design Cross Section List should be created for the mainline and each connection.
  
- **Earthwork Quantities List (Volume Computations)**
  - The earthwork quantities list file is created in the “.lis” file when the earthwork process is run by clicking the toggle on for Volume Computations. Use the cut and paste technique to create a separate text file for the earthwork quantities list.
  - The file should be named “same as working file vcr.doc”.
  - An Earthwork Quantities List should be created for the mainline and each connection.

## **Toe of Slope List (Construction Limits)**

- The Toe of Slope list file is created in the “.lis” file when the earthwork process is run by clicking the toggle on for Toe of Slope. Use the cut and paste technique to create a separate text file for the toe of slope list.
- The file should be named “same as working file tos.doc”.
- A Toe of Slope List should be created for the mainline and each connection.

### **• Staking Detail List**

- The Staking Detail List file is created in the “.lis” file when the earthwork process is run by clicking the toggle on for Staking Detail. Use the cut and paste technique to create a separate text file for the staking detail list.
- The file should be named “same as working file sdl.doc”.
- A Staking Detail List should be created for the mainline and each connection.

### **• Slope Stake List**

- The slope stake list file is created in the “.lis” file when the earthwork process is run by clicking on the toggle on for Slope Stake List. Use the cut and paste technique to create a separate text file for the slope stake list.
- The file should be named “same as working file ssl.doc”.
- A Slope Stake List should be created for the mainline and each connection.

### **• Right of Way Stakeout List**

- In order to create a report using the right of way stakeout command, IGrds chain(s) must be created from the left-proposed right of way graphics and the right proposed right of way graphics in the design file.
- The right of way list can then be created with the following commands:
  - Click on Tools—General Geometry—Complex Curves
  - Click on Right of Way Stakeout
  - Select chain for left right of way and right of way.
  - Key in staking interval.
  - The Right of Way Stakeout List is created in a “.tmp” file.

The file should be renamed “same as working file rws.doc”.

A Right of Way Stakeout List should be created for the mainline and each connection.

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## ROADWAY DESIGN DISTRIBUTION FOR ADVERTISEMENT

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- The Earthwork Quantities List (\*.lis file), is to accompany plans submitted to the Plan Coordination Section at second submission and must be a clear copy suitable for reproduction.
- A cover sheet must be prepared by the designer showing the title "EARTHWORK QUANTITIES" and the complete project number.
- The Earthwork Quantities List, along with the plan assembly, will be retained by the Plan Coordination Section until needed for making prints. Do not submit Design Cross Section Listing (IGrds designs) to the Plan Coordination Section.
- The Designer's name, District/Central Office, phone number and the available IGrds listings will be shown on the General Notes Sheet in the roadway plans.
- The Project Engineer will request IGrds/GEOPAK listings for construction staking from the Designer.
- Two copies of each listing are required (1 set for the Inspector and 1 set for the Contractor).

### For IGrds projects:

- The following information should be shown on a cover sheet for the computer listings submitted to the Project Engineer:

Project No. \_\_\_\_\_  
Contract No. \_\_\_\_\_  
IGrds Working File Name \_\_\_\_\_  
Advertisement Date \_\_\_\_\_  
Designer's Name \_\_\_\_\_  
Designer's Telephone No. \_\_\_\_\_  
PPMS Number \_\_\_\_\_

### For GEOPAK projects:

- The following information should be shown on a cover sheet for the computer listings submitted to the Project Engineer:

Project No. \_\_\_\_\_  
Contract No. \_\_\_\_\_  
Advertisement Date \_\_\_\_\_  
Designer's Name \_\_\_\_\_  
Designer's Telephone No. \_\_\_\_\_  
PPMS Number \_\_\_\_\_



For IGrds project:

Roadway Design Listings to distribute for Construction Staking:

| DISTRIBUTION                       | IGrds Lists  | INSTRUCTIONS   |
|------------------------------------|--|--|
| DISTRICT<br>CONTRACT<br>TECHNICIAN | Alignment List<br>Horiz. Position Calculation<br>Profile Grade Listing and Grade &<br>Super Report*<br>Design Cross Section Listing **<br>Construction Staking<br>Reports ** | DATA TO BE FURNISHED FOR<br>EACH BASELINE (MAINLINE,<br>CONNECTION, RAMPS, ETC.)<br><br>REVIEW ALL LISTINGS FOR<br>ACCURACY BEFORE<br>DISTRIBUTION |

\* **NOTE:** GRADE LISTINGS (IGRDS) ARE NOT REQUIRED ON URBAN PROJECTS WITH CURB AND GUTTER WHEN ELEVATIONS ARE FURNISHED AT 10 METERS (25 FEET) INTERVALS ALONG THE CONSTRUCTION BASELINE AND THE LEFT AND RIGHT CURB AND GUTTER FLOW LINES.

\*\* **NOTE:** DESIGN CROSS SECTION LISTINGS AND CONSTRUCTION STAKING REPORTS ARE NOT TO BE PROVIDED ON PROJECTS THAT ARE UTILIZING ONLY MANUAL CROSS SECTION.

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## EXAMPLES OF IGRDS REPORTS

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- Following are examples of various IGRDS Reports. However, every project is unique and reports may differ from those shown.

HORIZONTAL ALIGNMENT PROCESS IDENTIFICATION

\*\*\*METRIC\*\*\*  
 HORIZONTAL ALIGNMENT LIST  
 FOR ROADWAY C  
 COMMENTS -

COMPUTATIONS BASED ON ARC DEFINITION

| P. I. | STATION | POINT       | TL= | TS=      | LS=             | LC=    | CD=       | TD= | PI/PI=       | PI/PI=       | NORTH (Y) | EAST (X) |
|-------|---------|-------------|-----|----------|-----------------|--------|-----------|-----|--------------|--------------|-----------|----------|
| 0     | 2       | 99+94.2400  | POT | 672.0994 | S 83 59 13.87 E | PI/PI= | 787.5829  | M   | 1094015.0500 | 3534013.9200 |           |          |
| 0     | 4       | 106+66.3394 | TS  | 115.4835 | TD= 60/31/54.2  |        |           |     | 1093944.6470 | 3534682.3219 |           |          |
| 0     | 4       | 107+26.3394 | SC  | 60.0000  | SD= 11/48/39.7  |        |           |     | 1093942.4763 | 3534742.1693 |           |          |
| 0     | 4       | 107+81.8229 | PI  | 93.7506  | CD= 36/54/34.9  | RAD    | 145.5313L |     | 1093932.5500 | 3534797.1700 |           |          |
| 0     | 4       | 108+20.0900 | CS  | 60.0000  | SD= 11/48/39.7  |        |           |     | 1093980.3236 | 3534826.1751 |           |          |
| 0     | 4       | 108+80.0900 | ST  | 115.4835 |                 |        |           |     | 1094026.5890 | 3534864.2006 |           |          |
| 0     | 5       | 109+92.8344 | PC  | 112.7443 | N 35 28 51.91 E | PI/PI= | 255.3950  | M   |              |              |           |          |
| 0     | 5       | 110+20.0016 | PI  | 27.1672  | TD= 3/39/40.6   |        |           |     | 1094118.3975 | 3534929.6412 |           |          |
| 0     | 5       | 110+47.1503 | PT  | 54.3159  | CD= 3/39/40.6   | RAD    | 850.0000R |     | 1094140.5200 | 3534945.4100 |           |          |
| 0     | 6       | 112+67.5256 | PC  | 27.1672  |                 |        |           |     | 1094161.5904 | 3534962.5593 |           |          |
| 0     | 6       | 112+67.5256 | PT  | 220.3753 | N 39 8 32.46 E  | PI/PI= | 247.5425  | M   |              |              |           |          |
| 0     | 6       | 112+67.5256 | PI  | .0000    | TD= 0/56/34.0   |        |           |     | 1094332.5090 | 3535101.6710 |           |          |
| 0     | 6       | 112+67.5256 | PT  | .0000    | CD= 0/56/34.0   | RAD    | .0000R    |     | 1094332.5090 | 3535101.6710 |           |          |
| 0     | 8       | 117+78.1635 | TS  | .0000    |                 |        |           |     | 1094332.5090 | 3535101.6710 |           |          |
| 0     | 8       | 118+38.1635 | SC  | 510.6379 | N 40 5 6.45 E   | PI/PI= | 657.9617  | M   |              |              |           |          |
| 0     | 8       | 119+25.4873 | PI  | 147.3238 | TD= 53/40/32.8  |        |           |     | 1094723.1922 | 3535430.4835 |           |          |
| 0     | 8       | 120+26.3007 | PT  | 60.0000  | SD= 7/22/54.9   |        |           |     | 1094767.3641 | 3535471.0241 |           |          |
| 0     | 10      | 120+26.3011 | PC  | 188.1372 | CD= 46/17/37.8  | RAD    | 232.8489R |     | 1094835.9080 | 3535525.3490 |           |          |
| 0     | 10      | 120+26.3011 | PC  | 118.6128 |                 |        |           |     | 1094828.1278 | 3535643.7064 |           |          |
| 0     | 10      | 120+26.3011 | PC  | .0004    | S 86 14 20.79 E | PI/PI= | 195.7836  | M   |              |              |           |          |
| 0     | 10      | 120+26.3011 | PC  | 77.1704  | TD= 27/32/39.7  |        |           |     | 1094828.1278 | 3535643.7068 |           |          |

AASHTO, INC. METRIC R98.0

AASHTO, INC. METRIC R98.0  
ROADWAY DESIGN SYSTEM \*\*\* EARTHWORK \*\*\* PAGE 36

HORIZONTAL POSITION CALCULATION IDENTIFICATION

| BASELINE STATION (RDWY C ) | OFFSET RDWY ) | OFFSET STATION | ALIGNMENT RELATION LIST | BASELINE COORDINATES | OFFSET ROADWAY COORDINATES |              |               |              |
|----------------------------|---------------|----------------|-------------------------|----------------------|----------------------------|--------------|---------------|--------------|
|                            |               |                | OFFSET DISTANCE (M)     | SKEW ANGLE (DMS)     | NORTH (Y) (M)              | EAST (X) (M) | NORTH (Y) (M) | EAST (X) (M) |
| 99+94.24                   | C             | 99+94.2400     | .00L L 0 0              | 0F 1094015.0500      | 3534013.9200               | 1094015.0500 | 3534013.9200  |              |
| 100+00.00                  | C             | 100+00.0000    | .00R L 0 0              | 0F 1094014.4466      | 3534019.6483               | 1094014.4466 | 3534019.6483  |              |
| 100+20.00                  | C             | 100+20.0000    | .00R L 0 0              | 0F 1094012.3516      | 3534039.5383               | 1094012.3516 | 3534039.5383  |              |
| 100+40.00                  | C             | 100+40.0000    | .00L L 0 0              | 0F 1094010.2566      | 3534059.4283               | 1094010.2566 | 3534059.4283  |              |
| 100+60.00                  | C             | 100+60.0000    | .00L L 0 0              | 0F 1094008.1616      | 3534079.3182               | 1094008.1616 | 3534079.3182  |              |
| 100+80.00                  | C             | 100+80.0000    | .00L L 0 0              | 0F 1094006.0666      | 3534099.2082               | 1094006.0666 | 3534099.2082  |              |
| 101+00.00                  | C             | 101+00.0000    | .00L L 0 0              | 0F 1094003.9715      | 3534119.0982               | 1094003.9715 | 3534119.0982  |              |
| 101+20.00                  | C             | 101+20.0000    | .00L L 0 0              | 0F 1094001.8765      | 3534138.9881               | 1094001.8765 | 3534138.9881  |              |
| 101+40.00                  | C             | 101+40.0000    | .00R L 0 0              | 0F 1093999.7815      | 3534158.8781               | 1093999.7815 | 3534158.8781  |              |
| 101+60.00                  | C             | 101+60.0000    | .00L L 0 0              | 0F 1093997.6865      | 3534178.7681               | 1093997.6865 | 3534178.7681  |              |
| 101+80.00                  | C             | 101+80.0000    | .00R L 0 0              | 0F 1093995.5915      | 3534198.6580               | 1093995.5915 | 3534198.6580  |              |
| 102+00.00                  | C             | 102+00.0000    | .00R L 0 0              | 0F 1093993.4965      | 3534218.5480               | 1093993.4965 | 3534218.5480  |              |
| 102+20.00                  | C             | 102+20.0000    | .00L L 0 0              | 0F 1093991.4014      | 3534238.4380               | 1093991.4014 | 3534238.4380  |              |
| 102+40.00                  | C             | 102+40.0000    | .00L L 0 0              | 0F 1093989.3064      | 3534258.3280               | 1093989.3064 | 3534258.3280  |              |
| 102+60.00                  | C             | 102+60.0000    | .00L L 0 0              | 0F 1093987.2114      | 3534278.2179               | 1093987.2114 | 3534278.2179  |              |
| 102+80.00                  | C             | 102+80.0000    | .00L L 0 0              | 0F 1093985.1164      | 3534298.1079               | 1093985.1164 | 3534298.1079  |              |
| 103+00.00                  | C             | 103+00.0000    | .00L L 0 0              | 0F 1093983.0214      | 3534317.9979               | 1093983.0214 | 3534317.9979  |              |
| 103+20.00                  | C             | 103+20.0000    | .00L L 0 0              | 0F 1093980.9264      | 3534337.8878               | 1093980.9264 | 3534337.8878  |              |

\*\*\*METRIC\*\*\*

\*\*\* EARTHWORK \*\*\*

COMMENTS -

dppms#1000.tos

AASHTO, INC. METRIC R98.0 PAGE 1 A  
 ROADWAY DESIGN SYSTEM \*\*\* EARTHWORK \*\*\*  
 Mar 22, 2000

AUXILIARY REPORT  
 IDENTIFICATION 12494

\*\*\*METRIC\*\*\* COMMENTS -

TOE OF SLOPE PLOT

SCALE: 1 CM = 40 METRES

| STATION   | RIGHT SS |       | LEFT SS |      |
|-----------|----------|-------|---------|------|
|           | C/F      | DIST  | DIST    | C/F  |
| 117+00.00 | 1.43     | 9.77  | 8.31    | .71  |
| 117+20.00 | 1.44     | 9.78  | 8.60    | .85  |
| 117+40.00 | 1.13     | 9.17  | 8.61    | .85  |
| 117+60.00 | .58      | 8.07  | 7.82    | .45  |
| 117+78.16 | .06      | 7.02  | 7.14    | .12  |
| 117+80.00 | .02      | 6.94  | 7.06    | .07  |
| 117+84.16 | .30      | 5.73  | 6.07    | .47  |
| 117+90.16 | .40      | 6.00  | 6.32    | .57  |
| 117+96.16 | .45      | 6.13  | 6.44    | .60  |
| 118+00.00 | .44      | 6.15  | 6.57    | .66  |
| 118+02.16 | .46      | 6.21  | 6.63    | .67  |
| 118+08.16 | .54      | 6.40  | 6.78    | .73  |
| 118+14.16 | .43      | 6.22  | 7.08    | .85  |
| 118+20.00 | .12      | 7.47  | 7.50    | 1.04 |
| 118+20.16 | .14      | 7.48  | 7.51    | 1.05 |
| 118+26.16 | .16      | 7.58  | 8.08    | 1.31 |
| 118+32.16 | .91      | 7.33  | 8.15    | 1.32 |
| 118+38.16 | .22      | 6.00  | 8.73    | 1.59 |
| 118+40.00 | .21      | 5.98  | 8.75    | 1.60 |
| 118+60.00 | .05      | 7.46  | 6.73    | .59  |
| 118+80.00 | .06      | 7.47  | 7.48    | .06  |
| 119+00.00 | .21      | 7.77  | 7.82    | .23  |
| 119+20.00 | .60      | 8.56  | 9.43    | 1.04 |
| 119+40.00 | 1.24     | 9.83  | 11.69   | 2.17 |
| 119+60.00 | 1.38     | 10.10 | 10.96   | 1.81 |
| 119+66.30 | 1.36     | 10.06 | 10.47   | 1.56 |
| 119+72.30 | 1.23     | 9.78  | 9.90    | 1.30 |
| 119+78.30 | 1.05     | 9.35  | 9.67    | 1.20 |
| 119+80.00 | 1.02     | 9.29  | 10.01   | 1.38 |

GRADE AND SUPERELEVATION REPORT  
ROADWAY C

| Station<br>(m) | Event  | Fin. Grade<br>Elevation<br>(m) | Grade<br>(%) | Elevation<br>Correction<br>(m) | Cross Slopes<br>Left1<br>(%) | Right1<br>(%) | Widening<br>Left1<br>(m) | Right1<br>(m) |
|----------------|--------|--------------------------------|--------------|--------------------------------|------------------------------|---------------|--------------------------|---------------|
| 117+00.00      | BEGN   | 132.166                        | -1.5584      | 0.000                          | -0.0200                      | -0.0200       | 0.000                    | 0.000         |
| 117+15.00      | VPT    | 131.909                        | -1.8588      | 0.000                          | -0.0200                      | -0.0200       | 0.000                    | 0.000         |
| 117+20.00      | EVEN   | 131.816                        | -1.8588      | 0.000                          | -0.0200                      | -0.0200       | 0.000                    | 0.000         |
| 117+40.00      | EVEN   | 131.445                        | -1.8588      | 0.000                          | -0.0200                      | -0.0200       | 0.000                    | 0.000         |
| 117+60.00      | EVEN   | 131.073                        | -1.8588      | 0.000                          | -0.0200                      | -0.0200       | 0.000                    | 0.000         |
| 117+63.16      | CRWNRN | 131.014                        | -1.8588      | 0.000                          | -0.0200                      | -0.0200       | 0.000                    | 0.000         |
| 117+78.16      | TRNBEG | 130.735                        | -1.8588      | 0.000                          | 0.0000                       | -0.0200       | 0.000                    | 0.000         |
| 117+78.16      | ODDPLS | 130.735                        | -1.8588      | 0.000                          | 0.0000                       | -0.0200       | 0.000                    | 0.000         |
| 117+78.16      | PS     | 130.735                        | -1.8588      | 0.000                          | 0.0000                       | -0.0200       | 0.000                    | 0.000         |
| 117+80.00      | EVEN   | 130.701                        | -1.8588      | 0.000                          | 0.0025                       | -0.0200       | 0.014                    | 0.014         |
| 117+84.16      | ODDPLS | 130.624                        | -1.8588      | 0.000                          | 0.0080                       | -0.0200       | 0.045                    | 0.045         |
| 117+84.16      | TRAN   | 130.624                        | -1.8588      | 0.000                          | 0.0080                       | -0.0200       | 0.045                    | 0.045         |
| 117+90.16      | TRAN   | 130.512                        | -1.8588      | 0.000                          | 0.0160                       | -0.0200       | 0.090                    | 0.090         |
| 117+90.16      | ODDPLS | 130.512                        | -1.8588      | 0.000                          | 0.0160                       | -0.0200       | 0.090                    | 0.090         |
| 117+90.16      | TRAN   | 130.512                        | -1.8588      | 0.000                          | 0.0160                       | -0.0200       | 0.090                    | 0.090         |
| 117+96.16      | ODDPLS | 130.401                        | -1.8588      | 0.000                          | 0.0240                       | -0.0240       | 0.135                    | 0.135         |
| 117+96.16      | TRAN   | 130.401                        | -1.8588      | 0.000                          | 0.0240                       | -0.0240       | 0.135                    | 0.135         |
| 118+00.00      | EVEN   | 130.329                        | -1.8588      | 0.000                          | 0.0291                       | -0.0291       | 0.164                    | 0.164         |
| 118+00.00      | VPC    | 130.329                        | -1.8588      | 0.000                          | 0.0291                       | -0.0291       | 0.164                    | 0.164         |
| 118+02.16      | TRAN   | 130.290                        | -1.7944      | 0.000                          | 0.0320                       | -0.0320       | 0.180                    | 0.180         |
| 118+02.16      | ODDPLS | 130.290                        | -1.7944      | 0.000                          | 0.0320                       | -0.0320       | 0.180                    | 0.180         |
| 118+02.16      | TRAN   | 130.290                        | -1.7944      | 0.000                          | 0.0320                       | -0.0320       | 0.180                    | 0.180         |
| 118+08.16      | TRAN   | 130.188                        | -1.6153      | 0.000                          | 0.0400                       | -0.0400       | 0.225                    | 0.225         |
| 118+08.16      | ODDPLS | 130.188                        | -1.6153      | 0.000                          | 0.0400                       | -0.0400       | 0.225                    | 0.225         |
| 118+08.16      | TRAN   | 130.188                        | -1.6153      | 0.000                          | 0.0400                       | -0.0400       | 0.225                    | 0.225         |
| 118+14.16      | TRAN   | 130.096                        | -1.4363      | 0.000                          | 0.0480                       | -0.0480       | 0.270                    | 0.270         |
| 118+14.16      | ODDPLS | 130.096                        | -1.4363      | 0.000                          | 0.0480                       | -0.0480       | 0.270                    | 0.270         |
| 118+14.16      | TRAN   | 130.096                        | -1.4363      | 0.000                          | 0.0480                       | -0.0480       | 0.270                    | 0.270         |
| 118+20.00      | EVEN   | 130.017                        | -1.2621      | 0.000                          | 0.0558                       | -0.0558       | 0.314                    | 0.314         |
| 118+20.16      | TRAN   | 130.015                        | -1.2573      | 0.000                          | 0.0560                       | -0.0560       | 0.315                    | 0.315         |
| 118+26.16      | TRAN   | 129.945                        | -1.0783      | 0.000                          | 0.0640                       | -0.0640       | 0.360                    | 0.360         |
| 118+26.16      | ODDPLS | 129.945                        | -1.0783      | 0.000                          | 0.0640                       | -0.0640       | 0.360                    | 0.360         |
| 118+26.16      | TRAN   | 129.945                        | -1.0783      | 0.000                          | 0.0640                       | -0.0640       | 0.360                    | 0.360         |
| 118+32.16      | ODDPLS | 129.886                        | -0.8992      | 0.000                          | 0.0720                       | -0.0720       | 0.405                    | 0.405         |
| 118+32.16      | TRAN   | 129.886                        | -0.8992      | 0.000                          | 0.0720                       | -0.0720       | 0.405                    | 0.405         |
| 118+38.16      | TRNEND | 129.837                        | -0.7202      | 0.000                          | 0.0800                       | -0.0800       | 0.450                    | 0.450         |
| 118+38.16      | ODDPLS | 129.837                        | -0.7202      | 0.000                          | 0.0800                       | -0.0800       | 0.450                    | 0.450         |
| 118+38.16      | TRNEND | 129.837                        | -0.7202      | 0.000                          | 0.0800                       | -0.0800       | 0.450                    | 0.450         |

CHANGE OF GRADE (sag curve):

Station = 118+50.00 VPI Elevation = 129.40 m Algebraic difference = 2.9838 %  
Curve Length = 100.0000 m K Value = 33.51

CHANGE OF GRADE (crest curve):

Station = 120+10.00 VPI Elevation = 131.20 m Algebraic difference = -2.7188 %  
Curve Length = 220.0000 m K Value = 80.92  
Stopping sight distance (.15 m object) = 181 m  
Crossover decision sight distance (1.3 m object) = 284 m

CHANGE OF GRADE (sag curve):

Station = 121+70.00 VPI Elevation = 128.65 m Algebraic difference = 2.2114 %  
Curve Length = 70.0000 m K Value = 31.65

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STAKING DETAIL REPORT

| STATION   | TEMP | SUPER RATE | SLOPE | C/F | DIST   | SS ELEV | DITCH BOT. ELEV | ADJ. GRD. ELEV | DITCH BOT. ELEV | SS ELEV | DIST   | C/F    |
|-----------|------|------------|-------|-----|--------|---------|-----------------|----------------|-----------------|---------|--------|--------|
| 117+00.00 | C    | NCR        | 2.00  | C   | 8.31L  | 132.28  | 131.57          | 131.79         | 131.57          | 133.00  | 9.77R  | C 1.43 |
| 117+20.00 | C    | NCR        | 2.00  | C   | 8.60L  | 132.07  | 131.22          | 131.44         | 131.22          | 132.66  | 9.78R  | C 1.44 |
| 117+40.00 | C    | NCR        | 2.00  | C   | 8.61L  | 131.70  | 130.85          | 131.06         | 130.85          | 131.98  | 9.17R  | C 1.13 |
| 117+60.00 | C    | NCR        | 2.00  | C   | 7.82L  | 130.93  | 130.48          | 130.69         | 130.48          | 131.06  | 8.07R  | C .58  |
| 117+78.16 | C    | NCR        | 2.00  | C   | 7.14L  | 130.33  | 130.21          | 130.36         | 130.14          | 130.20  | 7.02R  | C .06  |
| 117+80.00 | C    | .0025R     | 2.00  | C   | 7.06L  | 130.26  | 130.19          | 130.32         | 130.10          | 130.12  | 6.94R  | C .02  |
| 117+84.16 | C    | .0080R     | -2.00 | F   | 6.07L  | 130.11  | .00             | 130.24         | .00             | 130.18  | 5.73R  | F .30  |
| 117+90.16 | C    | .0160R     | -2.00 | F   | 6.32L  | 129.93  | .00             | 130.13         | .00             | 129.96  | 6.00R  | F .40  |
| 117+96.16 | C    | .0240R     | -2.00 | F   | 6.44L  | 129.82  | .00             | 130.02         | .00             | 129.79  | 6.13R  | F .45  |
| 118+00.00 | C    | .0291R     | -2.00 | F   | 6.57L  | 129.72  | .00             | 129.95         | .00             | 129.70  | 6.15R  | F .44  |
| 118+02.16 | C    | .0320R     | -2.00 | F   | 6.63L  | 129.68  | .00             | 129.91         | .00             | 129.63  | 6.21R  | F .46  |
| 118+08.16 | C    | .0400R     | -2.00 | F   | 6.78L  | 129.57  | .00             | 129.81         | .00             | 129.42  | 6.40R  | F .54  |
| 118+14.16 | C    | .0480R     | -2.00 | F   | 7.08L  | 129.40  | .00             | 129.72         | .00             | 129.41  | 6.22R  | F .43  |
| 118+20.00 | C    | .0558R     | -2.00 | F   | 7.50L  | 129.17  | .00             | 129.64         | 129.27          | 129.39  | 7.47R  | C .12  |
| 118+20.16 | C    | .0560R     | -2.00 | F   | 7.51L  | 129.16  | .00             | 129.64         | 129.26          | 129.40  | 7.48R  | C .14  |
| 118+26.16 | C    | .0640R     | -2.00 | F   | 8.08L  | 128.88  | .00             | 129.57         | 129.15          | 129.31  | 7.58R  | C .16  |
| 118+32.16 | C    | .0720R     | -2.00 | F   | 8.15L  | 128.86  | .00             | 129.51         | .00             | 128.58  | 7.33R  | F .91  |
| 118+38.16 | C    | .0800R     | -2.00 | F   | 8.73L  | 128.59  | .00             | 129.46         | .00             | 129.17  | 6.00R  | F .22  |
| 118+40.00 | C    | .0800R     | -2.00 | F   | 8.75L  | 128.56  | .00             | 129.44         | .00             | 129.17  | 5.98R  | F .21  |
| 118+60.00 | C    | .0800R     | -2.00 | F   | 6.73L  | 129.50  | .00             | 129.37         | 128.86          | 128.91  | 7.46R  | C .05  |
| 118+80.00 | C    | .0800R     | 2.00  | C   | 7.48L  | 129.75  | 129.69          | 129.42         | 128.90          | 128.96  | 7.77R  | C .06  |
| 119+00.00 | C    | .0800R     | 2.00  | C   | 7.82L  | 130.08  | 129.85          | 129.58         | 129.07          | 129.28  | 7.77R  | C .21  |
| 119+20.00 | C    | .0800R     | 2.00  | C   | 9.43L  | 131.09  | 130.05          | 129.78         | 129.27          | 129.87  | 8.56R  | C .60  |
| 119+40.00 | C    | .0800R     | 2.00  | C   | 11.69L | 132.37  | 130.20          | 129.93         | 129.42          | 130.66  | 9.83R  | C 1.24 |
| 119+60.00 | C    | .0800R     | 2.00  | C   | 10.96L | 132.11  | 130.30          | 130.04         | 129.52          | 130.90  | 10.10R | C 1.38 |
| 119+66.30 | C    | .0800R     | 2.00  | C   | 10.47L | 131.89  | 130.33          | 130.06         | 129.54          | 130.90  | 10.06R | C 1.36 |
| 119+72.30 | C    | .0721R     | 2.00  | C   | 9.90L  | 131.59  | 130.29          | 130.07         | 129.61          | 130.84  | 9.78R  | C 1.23 |
| 119+78.30 | C    | .0642R     | 2.00  | C   | 9.67L  | 131.46  | 130.26          | 130.08         | 129.66          | 130.71  | 9.35R  | C 1.05 |
| 119+80.00 | C    | .0620R     | 2.00  | C   | 10.01L | 131.63  | 130.25          | 130.09         | 129.68          | 130.70  | 9.29R  | C 1.02 |
| 119+84.30 | C    | .0564R     | 2.00  | C   | 10.40L | 131.81  | 130.22          | 130.09         | 129.72          | 130.72  | 9.22R  | C 1.00 |
| 119+90.30 | C    | .0485R     | 2.00  | C   | 10.04L | 131.62  | 130.18          | 130.09         | 129.76          | 130.76  | 9.18R  | C 1.00 |
| 119+96.30 | C    | .0406R     | 2.00  | C   | 8.81L  | 130.98  | 130.13          | 130.09         | 129.79          | 130.76  | 9.07R  | C .97  |
| 120+00.00 | C    | .0357R     | 2.00  | C   | 8.21L  | 130.66  | 130.10          | 130.09         | 129.81          | 130.78  | 9.04R  | C .97  |
| 120+02.30 | C    | .0327R     | 2.00  | C   | 8.06L  | 130.58  | 130.08          | 130.09         | 129.82          | 130.79  | 9.02R  | C .97  |

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LEFT SLOPE STAKE LISTING RIGHT SLOPE STAKE

|   |        |        |        |        |        |        |   |        |
|---|--------|--------|--------|--------|--------|--------|---|--------|
| C | .71    | LSP    |        | CPG    |        | RSP    | C | 1.43   |
| Ø | 1.41   | -4.67% | VERT   | -2.12% | -3.45% | VERT   | Ø | 2.87   |
| S | 1.99:1 | 132.09 | 131.71 | 131.79 | 131.71 | 132.09 | S | 2.01:1 |
|   |        | 5.10L  | 3.60L  | .00L   | 3.30R  | 3.59R  |   | 5.10R  |

|        |         |        |        |
|--------|---------|--------|--------|
| LCP    | LHP     | RHP    | RCP    |
|        | -25.00% |        |        |
| 132.28 | 131.57  | 131.57 | 132.00 |
| 8.31L  | 6.90L   | 6.90R  | 9.77R  |

|     |              |      |              |    |   |
|-----|--------------|------|--------------|----|---|
| * C | 117+00.00 ** | ** C | 117+00.00 ** | ** | * |
|-----|--------------|------|--------------|----|---|

|   |        |        |        |        |        |        |   |        |
|---|--------|--------|--------|--------|--------|--------|---|--------|
| C | .85    | LSP    |        | CPG    |        | RSP    | C | 1.44   |
| Ø | 1.70   | -4.67% | VERT   | -2.12% | -3.45% | VERT   | Ø | 2.88   |
| S | 2.00:1 | 131.67 | 131.74 | 131.44 | 131.37 | 131.74 | S | 2.00:1 |
|   |        | 5.10L  | 3.60L  | .00L   | 3.30R  | 3.59R  |   | 5.10R  |

|        |         |        |        |
|--------|---------|--------|--------|
| LCP    | LHP     | RHP    | RCP    |
|        | -25.00% |        |        |
| 132.07 | 131.22  | 131.22 | 132.66 |
| 8.60L  | 6.90L   | 6.90R  | 9.78R  |

|     |              |      |              |    |   |
|-----|--------------|------|--------------|----|---|
| * C | 117+20.00 ** | ** C | 117+20.00 ** | ** | * |
|-----|--------------|------|--------------|----|---|

|   |        |        |        |        |        |        |   |        |
|---|--------|--------|--------|--------|--------|--------|---|--------|
| C | .85    | LSP    |        | CPG    |        | RSP    | C | 1.13   |
| Ø | 1.71   | -4.67% | VERT   | -1.82% | -3.45% | VERT   | Ø | 2.27   |
| S | 2.01:1 | 131.30 | 131.37 | 131.06 | 131.00 | 131.37 | S | 2.01:1 |
|   |        | 5.10L  | 3.60L  | .00L   | 3.30R  | 3.59R  |   | 5.10R  |

|        |         |        |        |
|--------|---------|--------|--------|
| LCP    | LHP     | RHP    | RCP    |
|        | -25.00% |        |        |
| 131.70 | 130.85  | 130.85 | 131.98 |
| 8.61L  | 6.90L   | 6.90R  | 9.17R  |

EARTHWORK QUANTITIES CALCULATION PROCESS  
 IDENTIFICATION

ROADWAY DESIGN SYSTEM \*\*\* EARTHWORK \*\*\*  
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\*\*\*METRIC\*\*\*  
 COMMENTS -

EARTHWORK QUANTITIES LIST FOR ROADWAYS C

| ASELINE<br>TATION<br>NUMBER | PRISM<br>SHRINK/<br>SWELL<br>FACTOR | STATION<br>CUT<br>( M2 ) | STATION<br>CUT<br>( M3 ) | ADJUSTED<br>STATION<br>CUT<br>( M3 ) | STATION<br>FILL<br>( M2 ) | STATION<br>FILL<br>( M3 ) | ADJUSTED<br>STATION<br>FILL<br>( M3 ) | ***** ADDED QUANTITIES ***** |                           |                |                            | MASS<br>ORDINATE<br>( M3 ) |     |
|-----------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------------------|---------------------------|---------------------------|---------------------------------------|------------------------------|---------------------------|----------------|----------------------------|----------------------------|-----|
|                             |                                     |                          |                          |                                      |                           |                           |                                       | CUT<br>( M3 )                | ADJUSTED<br>CUT<br>( M3 ) | FILL<br>( M3 ) | ADJUSTED<br>FILL<br>( M3 ) |                            |     |
| 17+00.00                    | 1.0000                              | 10.28                    | 0                        | 0                                    | .00                       | 0                         | 0                                     | 0                            | 0                         | 0              | 0                          | 0                          | 0   |
| 17+20.00                    | 1.0000                              | 11.01                    | 213                      | 213                                  | .00                       | 0                         | 0                                     | 0                            | 0                         | 0              | 0                          | 0                          | 213 |
| 17+40.00                    | 1.0000                              | 7.96                     | 190                      | 190                                  | .00                       | 0                         | 0                                     | 0                            | 0                         | 0              | 0                          | 0                          | 403 |
| 17+60.00                    | 1.0000                              | 3.34                     | 113                      | 113                                  | .07                       | 1                         | 1                                     | 0                            | 0                         | 0              | 0                          | 0                          | 515 |
| 17+78.16                    | 1.0000                              | .30                      | 33                       | 33                                   | 1.50                      | 14                        | 14                                    | 0                            | 0                         | 0              | 0                          | 0                          | 534 |
| 17+80.00                    | 1.0000                              | .23                      | 0                        | 0                                    | 1.81                      | 3                         | 3                                     | 0                            | 0                         | 0              | 0                          | 0                          | 531 |
| 17+84.16                    | 1.0000                              | .09                      | 1                        | 1                                    | 2.16                      | 8                         | 8                                     | 0                            | 0                         | 0              | 0                          | 0                          | 524 |

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|           |        |      |     |     |     |    |    |   |   |   |   |   |      |
|-----------|--------|------|-----|-----|-----|----|----|---|---|---|---|---|------|
| 122+40.00 | 1.0000 | 2.37 | 28  | 28  | .14 | 22 | 22 | 0 | 0 | 0 | 0 | 0 | 3564 |
| 122+60.00 | 1.0000 | 5.34 | 77  | 77  | .00 | 1  | 1  | 0 | 0 | 0 | 0 | 0 | 3640 |
| 122+80.00 | 1.0000 | 7.08 | 124 | 124 | .00 | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 3764 |
| 123+00.00 | 1.0000 | 5.33 | 124 | 124 | .09 | 1  | 1  | 0 | 0 | 0 | 0 | 0 | 3887 |

M3 FROM BALANCE 4657. 770. 0. 0.

EARTHWORK QUANTITIES CALCULATION PROCESS  
 IDENTIFICATION

ROADWAY DESIGN SYSTEM \*\*\* EARTHWORK \*\*\*  
 Mar 27, 2000

\*\*\*METRIC\*\*\*  
 COMMENTS -

EARTHWORK QUANTITIES LIST FOR ROADWAYS C

UNADJUSTED PROJECT TOTALS

| TOTAL<br>CUT<br>(M3) | TOTAL<br>FILL<br>(M3) | ADDED QUANTITIES<br>TOTAL<br>CUT<br>(M3) | ADDED QUANTITIES<br>TOTAL<br>FILL<br>(M3) |
|----------------------|-----------------------|--|---|
|----------------------|-----------------------|--|---|

dppms#1000.

\*\*\* EARTHWORK QUANTITIES SUMMARY \*\*\*

| STATION TO | STATION   | UNCLASSIFIED<br>EXCAVATION<br>M3 | COMPACTED<br>EMBANKMENT<br>M3 | HAUL<br>M3-KM | REMARKS   |
|------------|-----------|----------------------------------|-------------------------------|---------------|---|
| 117+00.00  | 123+00.00 | 4657                             | 770                           | 1072          | EXCAVATION INCLUDES 0 M3 FOR MDC INCLUDING SHRI<br>COMPACTED EMBANKMENT INCLUDES 0 M3 FOR MDC<br>0 M3 FOR TOPSOIL (STORING) |
| TOTALS     |           | 4657                             | 770                           | 1072          |   |



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ROADWAY DESIGN SYSTEM \*\*\* EARTHWORK \*\*\*  
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| STATION NUMBER            | BASELINE C |          |          |            | DESIGN CROSS-SECTION LIST |          |            |          | POINT CODE | ELEV (M) | DIST (M) | POINT CODE | ELEV (M) | DIST (M) |
|---------------------------|------------|----------|----------|------------|---------------------------|----------|------------|----------|------------|----------|----------|------------|----------|----------|
|                           | POINT CODE | ELEV (M) | DIST (M) | POINT CODE | ELEV (M)                  | DIST (M) | POINT CODE | ELEV (M) |            |          |          |            |          |          |
| 117+00.00<br>Finish Grade | CLD2       | 132.280  | 8.310L   | CLD1       | 131.570                   | 6.900L   | CLC3       | 132.020  | 5.100L     |          |          |            |          |          |
|                           | CLC2       | 132.090  | 3.600L   | CLC1       | 132.100                   | 3.300L   | CCLP       | 132.170  | .000       |          |          |            |          |          |
|                           | CRC1       | 132.100  | 3.300R   | CRC2       | 132.090                   | 3.600R   | CRC3       | 132.020  | 5.100R     |          |          |            |          |          |
|                           | CRD1       | 131.570  | 6.900R   | CRD2       | 133.000                   | 9.770R   |            |          |            |          |          |            |          |          |
| 117+00.00<br>Subgrade     | CLD2       | 132.280  | 8.310L   | CLD1       | 131.570                   | 6.900L   | CLC4       | 132.020  | 5.100L     |          |          |            |          |          |
|                           | CLC3       | 132.090  | 3.600L   | CLC2       | 131.710                   | 3.590L   | CLC1       | 131.720  | 3.300L     |          |          |            |          |          |
|                           | CCLP       | 131.790  | .000     | CRC1       | 131.720                   | 3.300R   | CRC2       | 131.710  | 3.590R     |          |          |            |          |          |
|                           | CRC3       | 132.090  | 3.600R   | CRC4       | 132.020                   | 5.100R   | CRD1       | 131.570  | 6.900R     |          |          |            |          |          |
| CRD2                      | 133.000    | 9.770R   |          |            |                           |          |            |          |            |          |          |            |          |          |
| 117+20.00<br>Finish Grade | CLD2       | 132.070  | 8.600L   | CLD1       | 131.220                   | 6.900L   | CLC3       | 131.670  | 5.100L     |          |          |            |          |          |
|                           | CLC2       | 131.740  | 3.600L   | CLC1       | 131.750                   | 3.300L   | CCLP       | 131.820  | .000       |          |          |            |          |          |
|                           | CRC1       | 131.750  | 3.300R   | CRC2       | 131.740                   | 3.600R   | CRC3       | 131.670  | 5.100R     |          |          |            |          |          |
|                           | CRD1       | 131.220  | 6.900R   | CRD2       | 132.660                   | 9.780R   |            |          |            |          |          |            |          |          |
| 117+20.00<br>Subgrade     | CLD2       | 132.070  | 8.600L   | CLD1       | 131.220                   | 6.900L   | CLC4       | 131.670  | 5.100L     |          |          |            |          |          |
|                           | CLC3       | 131.740  | 3.600L   | CLC2       | 131.360                   | 3.590L   | CLC1       | 131.370  | 3.300L     |          |          |            |          |          |
|                           | CCLP       | 131.440  | .000     | CRC1       | 131.370                   | 3.300R   | CRC2       | 131.360  | 3.590R     |          |          |            |          |          |
|                           | CRC3       | 131.740  | 3.600R   | CRC4       | 131.670                   | 5.100R   | CRD1       | 131.220  | 6.900R     |          |          |            |          |          |
| CRD2                      | 132.660    | 9.780R   |          |            |                           |          |            |          |            |          |          |            |          |          |
| 117+40.00<br>Finish Grade | CLD2       | 131.700  | 8.610L   | CLD1       | 130.850                   | 6.900L   | CLC3       | 131.300  | 5.100L     |          |          |            |          |          |
|                           | CLC2       | 131.370  | 3.600L   | CLC1       | 131.380                   | 3.300L   | CCLP       | 131.440  | .000       |          |          |            |          |          |
|                           | CRC1       | 131.380  | 3.300R   | CRC2       | 131.370                   | 3.600R   | CRC3       | 131.300  | 5.100R     |          |          |            |          |          |
|                           | CRD1       | 130.850  | 6.900R   | CRD2       | 131.980                   | 9.170R   |            |          |            |          |          |            |          |          |
| 117+40.00<br>Subgrade     | CLD2       | 131.700  | 8.610L   | CLD1       | 130.850                   | 6.900L   | CLC4       | 131.300  | 5.100L     |          |          |            |          |          |
|                           | CLC3       | 131.370  | 3.600L   | CLC2       | 130.990                   | 3.590L   | CLC1       | 131.000  | 3.300L     |          |          |            |          |          |
|                           | CCLP       | 131.060  | .000     | CRC1       | 131.000                   | 3.300R   | CRC2       | 130.990  | 3.590R     |          |          |            |          |          |
|                           | CRC3       | 131.370  | 3.600R   | CRC4       | 131.300                   | 5.100R   | CRD1       | 130.850  | 6.900R     |          |          |            |          |          |
| CRD2                      | 131.980    | 9.170R   |          |            |                           |          |            |          |            |          |          |            |          |          |
| 117+60.00<br>Finish Grade | CLD2       | 130.930  | 7.820L   | CLD1       | 130.480                   | 6.900L   | CLC3       | 130.930  | 5.100L     |          |          |            |          |          |
|                           | CLC2       | 131.000  | 3.600L   | CLC1       | 131.010                   | 3.300L   | CCLP       | 131.070  | .000       |          |          |            |          |          |

\*\*\*METRIC\*\*\*  
DESIGN CROSS-SECTION LIST  
\*\*\*METRIC\*\*\*

COMMENTS -

dppms#1000.rws

AASHTO, INC. COMMON R 98.0  
 INTERACTIVE GRAPHICS ROADWAY DESIGN SYSTEM  
 GENERAL GEOMETRY PROCESS

PAGE 1

Apr 07, 2000

| POINT | LEFT R. O. W. STAKING FOR ROADWAY C |             | POINT OUTSIDE CHAIN | NORTH FEET | EAST FEET   |
|-------|-------------------------------------|-------------|---------------------|------------|-------------|
|       | STATION FEET                        | OFFSET FEET |                     |            |             |
| 0     | 99+94.24                            | -10.000     | 1093965.498         |            |             |
| 2896  | 105+62.23                           | -10.000     | 1093955.780         |            | 3534579.831 |
| 2897  | 106+55.00                           | -12.000     | 1093953.837         |            | 3534672.092 |
| 2898  | 107+00.00                           | -12.001     | 1093953.948         |            | 3534716.340 |
| 2899  | 107+20.00                           | -14.001     | 1093958.227         |            | 3534735.131 |
| 2900  | 107+40.00                           | -11.001     | 1093960.100         |            | 3534752.961 |
| 2901  | 107+60.00                           | -10.001     | 1093966.424         |            | 3534771.377 |
| 2902  | 108+20.09                           | -10.001     | 1093987.673         |            | 3534788.837 |
| 2903  | 108+48.00                           | -10.001     | 1094007.108         |            | 3534819.392 |
| 2904  | 108+80.09                           | -10.001     | 1094032.394         |            | 3534837.280 |
| 2905  | 109+60.00                           | -10.001     | 1094097.465         |            | 3534856.057 |
| 2906  | 109+80.00                           | -11.001     | 1094114.332         |            | 3534902.439 |
| 2907  | 109+92.83                           | -11.001     | 1094124.783         |            | 3534913.234 |
| 2908  | 109+94.24                           | -11.001     | 1094125.942         |            | 3534920.683 |
| 2909  | 110+47.15                           | -11.001     | 1094168.535         |            | 3534921.510 |
| 2910  | 112+00.00                           | -13.001     | 1094287.082         |            | 3534954.027 |
| 2911  | 112+20.00                           | -13.001     | 1094303.856         |            | 3535050.514 |
| 2912  | 112+80.00                           | -11.000     | 1094350.425         |            | 3535061.587 |
| 2913  | 113+00.00                           | -11.000     | 1094364.438         |            | 3535099.757 |
| 2914  | 113+40.00                           | -12.000     | 1094395.042         |            | 3535114.166 |
| 2915  | 113+64.00                           | -11.001     | 1094414.048         |            | 3535139.923 |
| 2916  | 113+80.00                           | -11.001     | 1094425.646         |            | 3535154.612 |
| 2917  | 114+60.00                           | -10.001     | 1094486.853         |            | 3535165.680 |
| 2918  | 114+80.00                           | -9.815      | 1094501.511         |            | 3535217.194 |
| 2919  | 115+20.03                           | -13.001     | 1094532.016         |            | 3535230.837 |
| 2920  | 115+40.00                           | -10.001     | 1094549.348         |            | 3535256.754 |
| 2921  | 115+60.00                           | -10.001     | 1094562.718         |            | 3535267.177 |
| 2922  | 117+78.16                           | -10.001     | 1094729.632         |            | 3535282.351 |
| 2923  | 118+20.00                           | -12.000     | 1094761.532         |            | 3535422.832 |
| 2924  | 118+40.00                           |             | 1094777.507         |            | 3535450.847 |
| 2925  |                                     |             |                     |            | 3535464.340 |

dppms#1000.pgl

AASHTO, INC. METRIC R98.0 ROADWAY DESIGN SYSTEM \*\*\* EARTHWORK \*\*\* PAGE 1

Mar 22, 2000

AUXILIARY REPORT PROCESS IDENTIFICATION 12494

\*\*\*METRIC\*\*\* COMMENTS -  
PROFILE GRADE LISTING

| BASELINE STATION | OFFSET STATION | OFFSET RDWY | DESCRIPTION | GRADE ELEVATION | GRADE   | TANGENT ELEVATION | SHIFT | WIDENING LEFT | WIDENING RIGHT |
|------------------|----------------|-------------|-------------|-----------------|---------|-------------------|-------|---------------|----------------|
| 117+00.00        | 117+00.00      | C           |             | 132.166         | -1.8588 | 132.188           | .00   | .00           | .00            |
| 117+20.00        | 117+20.00      | C           |             | 131.816         | -1.8588 | 131.816           | .00   | .00           | .00            |
| 117+40.00        | 117+40.00      | C           |             | 131.445         | -1.8588 | 131.445           | .00   | .00           | .00            |
| 117+60.00        | 117+60.00      | C           |             | 131.073         | -1.8588 | 131.073           | .00   | .00           | .00            |
| 117+78.16        | 117+78.16      | C           | PS          | 130.735         | -1.8588 | 130.735           | .00   | .00           | .00            |
| 117+80.00        | 117+80.00      | C           |             | 130.701         | -1.8588 | 130.701           | .00   | .01           | .01            |
| 117+84.16        | 117+84.16      | C           |             | 130.624         | -1.8588 | 130.624           | .00   | .05           | .05            |
| 117+90.16        | 117+90.16      | C           |             | 130.512         | -1.8588 | 130.512           | .00   | .09           | .09            |
| 117+96.16        | 117+96.16      | C           |             | 130.401         | -1.8588 | 130.401           | .00   | .14           | .14            |
| 118+00.00        | 118+00.00      | C           | VPC         | 130.329         | -1.8588 | 130.329           | .00   | .16           | .16            |
| 118+02.16        | 118+02.16      | C           |             | 130.290         | -1.8588 | 130.289           | .00   | .18           | .18            |
| 118+08.16        | 118+08.16      | C           |             | 130.188         | -1.8588 | 130.178           | .00   | .22           | .22            |
| 118+14.16        | 118+14.16      | C           |             | 130.096         | -1.8588 | 130.066           | .00   | .27           | .27            |
| 118+20.00        | 118+20.00      | C           |             | 130.017         | -1.8588 | 129.958           | .00   | .31           | .31            |
| 118+20.16        | 118+20.16      | C           |             | 130.015         | -1.8588 | 129.955           | .00   | .31           | .31            |
| 118+26.16        | 118+26.16      | C           |             | 129.945         | -1.8588 | 129.843           | .00   | .36           | .36            |
| 118+32.16        | 118+32.16      | C           |             | 129.886         | -1.8588 | 129.732           | .00   | .41           | .41            |
| 118+38.16        | 118+38.16      | C           | WIDE        | 129.837         | -1.8588 | 129.620           | .00   | .45           | .45            |
| 118+40.00        | 118+40.00      | C           |             | 129.825         | -1.8588 | 129.586           | .00   | .45           | .45            |
| 118+60.00        | 118+60.00      | C           |             | 129.751         | 1.1250  | 129.512           | .00   | .45           | .45            |
| 118+80.00        | 118+80.00      | C           | VPT         | 129.797         | 1.1250  | 129.738           | .00   | .45           | .45            |
| 119+00.00        | 119+00.00      | C           |             | 129.962         | 1.1250  | 129.962           | .00   | .45           | .45            |
| 119+20.00        | 119+20.00      | C           |             | 130.163         | 1.1250  | 130.188           | .00   | .45           | .45            |
| 119+40.00        | 119+40.00      | C           |             | 130.314         | 1.1250  | 130.413           | .00   | .45           | .45            |
| 119+60.00        | 119+60.00      | C           |             | 130.415         | 1.1250  | 130.637           | .00   | .45           | .45            |
| 119+66.30        | 119+66.30      | C           |             | 130.437         | 1.1250  | 130.708           | .00   | .45           | .45            |
| 119+72.30        | 119+72.30      | C           | WIDE        | 130.453         | 1.1250  | 130.776           | .00   | .41           | .41            |
| 119+78.30        | 119+78.30      | C           |             | 130.465         | 1.1250  | 130.843           | .00   | .36           | .36            |
| 119+80.00        | 119+80.00      | C           |             | 130.467         | 1.1250  | 130.863           | .00   | .35           | .35            |
| 119+84.30        | 119+84.30      | C           |             | 130.472         | 1.1250  | 130.911           | .00   | .31           | .31            |
| 119+90.30        | 119+90.30      | C           |             | 130.475         | 1.1250  | 130.978           | .00   | .27           | .27            |
| 119+96.30        | 119+96.30      | C           |             | 130.473         | 1.1250  | 131.046           | .00   | .22           | .22            |
| 120+00.00        | 120+00.00      | C           |             | 130.470         | 1.1250  | 131.087           | .00   | .20           | .20            |
| 120+02.30        | 120+02.30      | C           |             | 130.467         | 1.1250  | 131.113           | .00   | .18           | .18            |
| 120+08.30        | 120+08.30      | C           |             | 130.456         | 1.1250  | 131.181           | .00   | .14           | .14            |

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## CREATING GEOPAK REPORTS

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Instructions for creating GEOPAK Reports are in Chapter 21 of the VDOT Road 1 Training Manual, available at: [http://www.extranet.vdot.state.va.us/locdes/GEOPAK/r1vdot\\_print.pdf](http://www.extranet.vdot.state.va.us/locdes/GEOPAK/r1vdot_print.pdf)

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## GEOPAK ROADWAY DESIGN LISTINGS TO DISTRIBUTE FOR CONSTRUCTION STAKING

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| DISTRIBUTION                       | GEOPAK LISTINGS   | INSTRUCTIONS   |
|------------------------------------|---|--|
| DISTRICT<br>CONTRACT<br>TECHNICIAN | Horizontal Alignment Report<br>Vertical Alignment Report<br>Alignment Relations Report (Layout Offsets)<br>Design Cross Section Listing (XS Report)<br>Earthwork Computations Report<br>Grade Listing<br>Grade and Superelevation Report<br>Slope Stake Listing<br>Staking Detail Report<br>Right of Way Report<br>Seeding Report | DATA TO BE FURNISHED FOR<br>EACH BASELINE (MAINLINE,<br>CONNECTION, RAMPS, ETC.)<br><br>REVIEW ALL LISTINGS FOR<br>ACCURACY BEFORE<br>DISTRIBUTION |

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## EXAMPLES OF GEOPAK REPORTS

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- Following are examples of various GEOPAK Reports. However, every project is unique and reports may differ from those shown.

**Sample Horizontal Alignment Report  
(Main Line)**

Copyright: (c) 2004 Bentley Systems, Incorporated. All rights reserved.

Project: 19023

Subject:

Job No. 101 Operator: BB

Date: Wednesday December 20, 2006 9:19 am

SYSTEM FIX 4 ASEC 2 BEAR PRI 0 NOR NE STA 2 FILE: 'TEST'

\* 1 DESCRIBE CHAIN 101-A

Chain 101-A contains:

D7 D8

Beginning chain 101-A description

=====

Point D7            N    278,805.4800 E    3,870,299.6320 Sta    10+00.00

Course from D7 to D8 N 27° 30' 38.54" W Dist 2,076.9997

Point D8            N    280,647.6220 E    3,869,340.2360 Sta    30+77.00

=====

Ending chain 101-A description

**Sample Horizontal Alignment Report  
(Ramp)**

Copyright: (c) 2004 Bentley Systems, Incorporated. All rights reserved.

Project: 19023

Subject:

Job No. 101 Operator: BB

Date: Wednesday December 20, 2006 10:26 am

SYSTEM FIX 4 ASEC 2 BEAR PRI 0 NOR NE STA 2 FILE: 'TEST'

\* 1 DESCRIBE CHAIN RAMP2

Chain RAMP2 contains:

4009 CUR RAMP2-1 CUR RAMP2-2 4010

Beginning chain RAMP2 description

=====  
Point 4009 N 279,670.3635 E 3,870,089.3563 Sta 30+00.00

Course from 4009 to PC RAMP2-1 S 63° 26' 47.71" W Dist 33.0444

Curve Data

\*-----\*

Curve RAMP2-1

P.I. Station 31+02.48 N 279,624.5534 E 3,869,997.6897

Delta = 49° 06' 02.34" (RT)

Degree = 37° 41' 40.53"

Tangent = 69.4317

Length = 130.2591

Radius = 152.0000

External = 15.1070

Long Chord = 126.3097

Mid. Ord. = 13.7413

P.C. Station 30+33.04 N 279,655.5916 E 3,870,059.7976

P.T. Station 31+63.30 N 279,651.1766 E 3,869,933.5651

C.C. N 279,791.5583 E 3,869,991.8487

Back = S 63° 26' 47.71" W

Ahead = N 67° 27' 09.95" W

Chord Bear = S 87° 59' 48.88" W

Curve Data

\*-----\*

Curve RAMP2-2

P.I. Station 31+91.29 N 279,661.9064 E 3,869,907.7215

Delta = 39° 56' 35.34" (RT)

Degree = 74° 24' 36.41"

Tangent = 27.9824

Length = 53.6797

Radius = 77.0000

External = 4.9269

Long Chord = 52.5993

Mid. Ord. = 4.6306

P.C. Station 31+63.30 N 279,651.1766 E 3,869,933.5651

P.T. Station 32+16.98 N 279,686.7249 E 3,869,894.7965

C.C. N 279,722.2910 E 3,869,963.0903

Back = N 67° 27' 09.95" W

Ahead = N 27° 30' 34.61" W

Chord Bear = N 47° 28' 52.28" W

Course from PT RAMP2-2 to 4010 N 27° 30' 34.61" W Dist 31.4020

Point 4010 N 279,714.5764 E 3,869,880.2920 Sta 32+48.39

=====  
Ending chain RAMP2 description

**Sample Vertical Alignment Report  
(Main Line)**

Copyright: (c) 2004 Bentley Systems, Incorporated. All rights reserved.

Project: 19023

Subject:

Job No. 101 Operator: BB

Date: Wednesday December 20, 2006 1:30 pm

SYSTEM FIX 4 ASEC 2 BEAR PRI 0 NOR NE STA 2 FILE: 'TEST'

\* 1 PRINT PROFILE NBEOPR1

Beginning profile NBEOPR1 description:

```
=====
```

|        | STATION  | ELEV    | GRADE   | TOTAL L | BACK L | AHEAD L |
|--------|----------|---------|---------|---------|--------|---------|
| VPI 1  | 11+75.00 | 34.8762 |         |         |        |         |
| VPI 2  | 12+00.00 | 34.8517 | -0.0979 |         |        |         |
| VPI 3  | 12+25.00 | 34.8284 | -0.0934 |         |        |         |
| VPI 4  | 12+50.00 | 34.8063 | -0.0883 |         |        |         |
| VPI 5  | 12+75.00 | 34.7506 | -0.2230 |         |        |         |
| VPI 6  | 13+00.00 | 34.7075 | -0.1725 |         |        |         |
| VPI 7  | 13+25.00 | 34.6361 | -0.2855 |         |        |         |
| VPI 8  | 13+50.00 | 34.5559 | -0.3209 |         |        |         |
| VPI 9  | 13+75.00 | 34.4976 | -0.2332 |         |        |         |
| VPI 10 | 14+00.00 | 34.4799 | -0.0707 |         |        |         |
| VPI 11 | 14+25.00 | 34.4365 | -0.1735 |         |        |         |
| VPI 12 | 14+50.00 | 34.3131 | -0.4936 |         |        |         |
| VPI 13 | 14+75.00 | 34.2070 | -0.4246 |         |        |         |
| VPI 14 | 15+00.00 | 34.1121 | -0.3796 |         |        |         |
| VPI 15 | 15+25.00 | 34.0121 | -0.4000 |         |        |         |
| VPI 16 | 15+50.00 | 33.9660 | -0.1843 |         |        |         |
| VPI 17 | 15+75.00 | 33.8939 | -0.2882 |         |        |         |
| VPI 18 | 16+00.00 | 33.8610 | -0.1318 |         |        |         |
| VPI 19 | 16+25.00 | 33.8457 | -0.0613 |         |        |         |

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```

Ending profile NBEOPR1 description

**Sample Vertical Alignment Report  
(Ramp)**

Copyright: (c) 2004 Bentley Systems, Incorporated. All rights reserved.

Project: 19023

Subject:

Job No. 101 Operator: BB

Date: Wednesday December 20, 2006 1:52 pm

SYSTEM FIX 4 ASEC 2 BEAR PRI 0 NOR NE STA 2 FILE: 'TEST9'

\* 1 PRINT PROFILE RAMP1PROP

Beginning profile RAMP1PROP description:

=====

|           | STATION  | ELEV    | GRADE   | TOTAL L  | BACK L  | AHEAD L |
|-----------|----------|---------|---------|----------|---------|---------|
| VPI 1     | 20+74.44 | 33.8400 |         |          |         |         |
| VPI 2     | 21+00.00 | 33.7900 | -0.1956 |          |         |         |
| VPI 3     | 21+25.00 | 33.7000 | -0.3600 |          |         |         |
| VPI 4     | 21+39.00 | 33.6100 | -0.6429 |          |         |         |
| VPI 5     | 21+46.20 | 33.5174 | -1.2857 |          |         |         |
| VPC       | 21+60.12 | 33.2105 | -2.2050 | K = 26.8 |         |         |
| VPI 6     | 21+89.62 | 32.5600 |         | 59.0000  | 29.5000 | 29.5000 |
| Low Point | 22+19.11 | 32.5601 |         |          |         |         |
| VPT       | 22+19.12 | 32.5601 | 0.0004  |          |         |         |
| VPI 7     | 22+64.67 | 32.5603 | 0.0004  |          |         |         |

=====

Ending profile RAMP1PROP description



**Sample Alignment Relations Report**

Copyright: (c) 2004 Bentley Systems, Incorporated. All rights reserved.  
 Project: gerld2  
 Subject: test  
 Job No. 010 Operator: GM  
 Date: Tuesday January 30, 2007 11:57 am

SYSTEM FIX 4 ASEC 2 BEAR PRI 0 RED NE STA 2 FILE: 'EBWBR'

\* 1 LAY OFF CHA 010-EB\_50 CHA 010-WB\_50 EVEN 50 78+00.00 99+37.95

| STATION ON<br>010-EB_50 | OFFSET DIST<br>010-WB_50 | STATION ON<br>010-WB_50 | SKEW ANGLE<br>AT INTERSECTION |
|-------------------------|--------------------------|-------------------------|-------------------------------|
| 78+00.00                | -92.2234                 | 369+01.65               | -2° 52' 31.52                 |
| 78+50.00                | -89.3264                 | 369+56.39               | -3° 11' 26.76                 |
| 79+00.00                | -86.1406                 | 370+10.99               | -3° 29' 51.99                 |
| 79+50.00                | -82.6768                 | 370+65.44               | -3° 47' 44.32                 |
| 80+00.00                | -78.9467                 | 371+19.72               | -4° 05' 00.89                 |
| 80+50.00                | -74.9627                 | 371+73.82               | -4° 21' 38.98                 |
| 81+00.00                | -70.8371                 | 372+24.18               | -4° 44' 29.01                 |
| 81+50.00                | -66.6900                 | 372+74.36               | -4° 44' 29.01                 |
| 82+00.00                | -62.5429                 | 373+24.53               | -4° 44' 29.01                 |
| 82+50.00                | -58.3958                 | 373+74.70               | -4° 44' 29.01                 |
| 83+00.00                | -54.2487                 | 374+24.87               | -4° 44' 29.01                 |
| 83+50.00                | -50.2894                 | 374+75.03               | -3° 36' 37.95                 |
| 84+00.00                | -48.4394                 | 375+25.07               | -0° 37' 38.85                 |
| 84+50.00                | -48.2744                 | 375+73.02               | -0° 12' 02.27                 |
| 85+00.00                | -48.0665                 | 376+20.55               | -0° 18' 02.24                 |
| 85+50.00                | -47.7758                 | 376+68.10               | -0° 23' 59.37                 |
| 86+00.00                | -47.4030                 | 377+15.66               | -0° 29' 52.74                 |
| 86+50.00                | -46.9491                 | 377+63.25               | -0° 35' 41.41                 |
| 87+00.00                | -46.4151                 | 378+10.86               | -0° 41' 24.47                 |
| 87+50.00                | -45.8022                 | 378+58.50               | -0° 47' 01.03                 |
| 88+00.00                | -45.1120                 | 379+06.18               | -0° 52' 30.20                 |
| 88+50.00                | -44.3460                 | 379+53.90               | -0° 57' 51.13                 |
| 89+00.00                | -43.8068                 | 380+02.82               | -0° 00' 00.16                 |
| 89+50.00                | -43.8068                 | 380+52.82               | -0° 00' 00.16                 |
| 90+00.00                | -43.8069                 | 381+02.82               | -0° 00' 00.16                 |
| 90+50.00                | -43.8069                 | 381+52.82               | -0° 00' 00.16                 |
| 91+00.00                | -43.8069                 | 382+02.82               | -0° 00' 00.16                 |
| 91+50.00                | -43.8070                 | 382+52.82               | -0° 00' 00.16                 |
| 92+00.00                | -43.8070                 | 383+02.82               | -0° 00' 00.16                 |
| 92+50.00                | -43.8071                 | 383+52.82               | -0° 00' 00.16                 |
| 93+00.00                | -43.8071                 | 384+02.82               | -0° 00' 00.16                 |
| 93+50.00                | -43.8071                 | 384+52.82               | -0° 00' 00.16                 |
| 94+00.00                | -43.8072                 | 385+02.82               | -0° 00' 00.16                 |
| 94+50.00                | -43.8072                 | 385+52.82               | -0° 00' 00.16                 |
| 95+00.00                | -43.8072                 | 386+02.82               | -0° 00' 00.16                 |
| 95+50.00                | -43.8073                 | 386+52.82               | -0° 00' 00.16                 |
| 96+00.00                | -43.8073                 | 387+02.82               | -0° 00' 00.16                 |
| 96+50.00                | -43.8074                 | 387+52.82               | -0° 00' 00.16                 |
| 97+00.00                | -43.8074                 | 388+02.82               | -0° 00' 00.16                 |
| 97+50.00                | -43.8074                 | 388+52.82               | -0° 00' 00.16                 |
| 98+00.00                | intersection not found   |                         |                               |
| 98+50.00                | intersection not found   |                         |                               |
| 99+00.00                | intersection not found   |                         |                               |



\*\*This report includes cut/fill quantities for Ramp #2 (Right-turn lane #2/WB-Thimble Shoals Boulevard onto Jefferson Ave.).\*\*

**Sample Detailed Earthwork Computations Report**

```
Input File: ewkprj.inp
Output File: earth4.doc
1 1 1
1 2 2
1 3 3 Earthwork
1 4 4
1 5 5 tolerance = 0.075000
1 6 6
1 7 7 vertical search distance = 500.000000
1 8 8
1 9 9 xs dgn = C:\documents\cfms_local\77019\d77019\earthworkshapes4.dgn
1 10 10
1 11 11 Proposed Finish Grade
1 12 12 soil type = dirt
1 13 13 roadway exc mult factor = 1.000000
1 14 14 subsoil exc mult factor = 1.000000
1 15 15 fill mult factor = 1.000000
1 16 16 type = line, line_string
1 17 17 lv = 2-13
1 18 18 lc = 0-6
1 19 19 wt = 0-15
1 20 20 co = 0-255
1 21 21
1 22 22 Existing Ground Line
1 23 23 soil type = dirt
1 24 24 roadway exc mult factor = 1.000000
1 25 25 subsoil exc mult factor = 1.000000
1 26 26 fill mult factor = 1.000000
1 27 27 type = line
1 28 28 lv = 1
1 29 29 lc = 2
1 30 30 wt = 5
1 31 31 co = 1
1 32 32
1 33 33 Excavation Limit
1 34 34 type = line
1 35 35 lv = 25
1 36 36 lc = 0
1 37 37 wt = 0
1 38 38 co = 55
1 39 39
1 40 40 Skip Areas
1 41 41 from 30+00.00 R 1 to 30+00.00 R 1
1 42 42 from 32+48.39 R 1 to 32+48.39 R 1
1 43 43
1 44 44 Write Earthwork Shapes
1 45 45 plot param
1 46 46 lv = 50
1 47 47 lvname = Level 50
1 48 48 co = 1
1 49 49 wt = 0
1 50 50 lc = 0
1 51 51 Stratify Shape Color
1 52 52
1 53 53 combine common exc + subgrade exc + subsoil exc
1 54 54
1 55 55 Add Accumulated Unadjusted Volume Column
1 56 56
1 57 57 End Area Decimal Places = 1
1 58 58
1 59 59 Process Earthwork for Baseline = RAMP2
1 60 60 job number = 101
1 61 61
1 62 62 beg sta = 30+00.00 R 1
1 63 63 end sta = 32+48.39 R 1
0 0 64 END_OF_FILE
```

**Sample Grade Listing**

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Project: 19023

Subject:

Job No. 101 Operator: BB

Date: Wednesday December 20, 2006 2:47 pm

SYSTEM FIX 4 ASEC 2 BEAR PRI 0 NOR NE STA 2 FILE: 'TEST3'

\* 1 Elevation Profile NBEOPL1 Even 25 11+75.00 To 17+25.00

|                  |   |  |
|------------------|---|--|
| Elev at 11+75.00 | = | 35.6833, grade = -0.2124, On tang betw 1 & 2   |
| Elev at 12+00.00 | = | 35.6302, grade = -0.2124, On tang betw 1 & 2   |
| Elev at 12+25.00 | = | 35.5723, grade = -0.2318, On tang betw 2 & 3   |
| Elev at 12+50.00 | = | 35.5410, grade = -0.1249, On tang betw 3 & 4   |
| Elev at 12+75.00 | = | 35.5047, grade = -0.1454, On tang betw 4 & 5   |
| Elev at 13+00.00 | = | 35.4598, grade = -0.1793, On tang betw 5 & 6   |
| Elev at 13+25.00 | = | 35.3801, grade = -0.3189, On tang betw 6 & 7   |
| Elev at 13+50.00 | = | 35.2848, grade = -0.3812, On tang betw 7 & 8   |
| Elev at 13+75.00 | = | 35.2632, grade = -0.0863, On tang betw 8 & 9   |
| Elev at 14+00.00 | = | 35.2207, grade = -0.1699, On tang betw 9 & 10  |
| Elev at 14+25.00 | = | 35.1707, grade = -0.2001, On tang betw 10 & 11 |
| Elev at 14+50.00 | = | 35.1507, grade = -0.0799, On tang betw 11 & 12 |
| Elev at 14+75.00 | = | 35.1159, grade = -0.1393, On tang betw 12 & 13 |
| Elev at 15+00.00 | = | 35.0925, grade = -0.0936, On tang betw 13 & 14 |
| Elev at 15+25.00 | = | 35.0848, grade = -0.0309, On tang betw 14 & 15 |
| Elev at 15+50.00 | = | 35.0385, grade = -0.1850, On tang betw 15 & 16 |
| Elev at 15+75.00 | = | 35.0097, grade = -0.1153, On tang betw 16 & 17 |
| Elev at 16+00.00 | = | 34.9505, grade = -0.2367, On tang betw 17 & 18 |
| Elev at 16+25.00 | = | 34.9028, grade = -0.1910, On tang betw 18 & 19 |
| Elev at 16+50.00 | = | 34.8903, grade = -0.0497, On tang betw 19 & 20 |
| Elev at 16+75.00 | = | 34.9059, grade = 0.0623, On tang betw 20 & 21  |
| Elev at 17+00.00 | = | 34.9275, grade = 0.0863, On tang betw 21 & 22  |
| Elev at 17+25.00 | = | 34.9225, grade = -0.0199, On tang betw 22 & 23 |

**Sample Grade and Superelevation Report**

January 04, 2007

Runway Ave.

| Cross Slopes |          | Fin. Grade |         |           |         |         |         |         |         |
|--------------|----------|------------|---------|-----------|---------|---------|---------|---------|---------|
| Offset       |          | Station    | Event   | Elevation | Grade   | Left1   | Left2   | Left3   | Left4   |
| Left5        | Left6    | Left7      | Left8   | Right1    | Right2  | Right3  | Right4  | Right5  | Right6  |
| Left1        | Left2    | Left3      | Left4   | Left5     | Left6   | Left7   | Left8   | Left9   | Left10  |
| Right1       | Right2   | Right3     | Right4  | Right5    | Right6  | Right7  | Right8  | Right9  | Right10 |
| (ft)         | (ft)     | (ft)       | (ft)    | (%)       | (ft/ft) | (ft/ft) | (ft/ft) | (ft/ft) | (ft/ft) |
| (ft/ft)      | (ft/ft)  | (ft/ft)    | (ft/ft) | (ft/ft)   | (ft/ft) | (ft/ft) | (ft/ft) | (ft/ft) | (ft/ft) |
| (ft)         | (ft)     | (ft)       | (ft)    | (ft)      | (ft)    | (ft)    | (ft)    | (ft)    | (ft)    |
| (ft)         | (ft)     | (ft)       | (ft)    | (ft)      | (ft)    | (ft)    | (ft)    | (ft)    | (ft)    |
|              | 11+33.00 | XS         | 34.887  | -0.0080   | 0.0276  | 0.0134  | -0.0337 |         |         |
| 0.0089       |          |            |         | 5.372     | 5.960   | 49.034  |         |         |         |
|              | 11+50.00 | XS         | 34.949  | 0.0459    | 0.0276  | 0.0270  | -0.0337 |         |         |
| 0.0157       |          |            |         |           | 3.354   | 3.938   | 49.033  |         |         |
|              | 17+75.00 | XS         | 34.230  | 0.0047    | 0.0224  | -0.0218 | -0.0515 | -0.0126 |         |
| 0.0220       |          | 11.489     | 12.098  | 12.662    | 25.248  | 25.633  | 58.133  |         |         |
|              | 18+00.00 | XS         | 34.306  | 0.0049    | 0.0224  | -0.0003 | -0.0242 | -0.0126 |         |
| 0.0224       |          |            |         |           |         |         | 8.542   | 9.142   |         |
|              | 18+25.00 | XS         | 34.429  | 0.0049    | 0.0224  | 0.0576  | 0.0130  | -0.0128 |         |
| 0.0224       |          |            |         |           |         |         | 5.595   | 5.944   |         |
|              | 18+50.00 | XS         | 34.470  | 0.0008    | 0.0224  | 0.0576  | 0.0313  | -0.0128 |         |
| 0.0256       |          |            |         | 2.648     | 3.144   | 3.744   | 25.751  | 26.840  |         |
|              | 27+25.00 | XS         | 36.162  | -0.0048   | 0.0227  | -0.0317 | -0.0355 | -0.0562 |         |
| 0.0223       |          |            | 12.474  | 13.288    | 25.014  | 25.949  | 27.421  | 28.839  |         |
|              | 27+50.00 | XS         | 36.192  | 0.0026    | 0.0227  | 0.0108  | 0.0100  | -0.0605 |         |
| 0.0249       |          |            |         |           |         | 11.030  | 11.485  | 11.932  |         |
|              | 27+75.00 | XS         | 36.237  | 0.0010    | 0.0227  | 0.0108  | 0.0100  | -0.0091 |         |
| 0.0234       | 9.587    | 10.330     | 11.061  | 11.714    | 59.965  |         |         |         |         |

## Sample Slope Stake Listing

January 04, 2007

LEFT  
 SLOPE  
 STAKE

SLOPE STAKE LISTING

Finish Grade      \*\* THIMBLE      10+47.93 \*\*

Finish Grade      \*\* THIMBLE      10+50.00 \*\*

Finish Grade      \*\* THIMBLE      10+75.00 \*\*

Finish Grade      \*\* THIMBLE      11+00.00 \*\*

|   |         |        |        |          |        |           |        |          |        |        |   |         |
|---|---------|--------|--------|----------|--------|-----------|--------|----------|--------|--------|---|---------|
| F | 32.71   |        | LSP    | REOP     | RHP    | THIMBLEPG | LHP    | LEOP     |        |        | F | 32.71   |
| @ | 34.51   | -8.33% | -2.00% | -100.00% | 96.04% |           | 2.26%  | -100.00% | -2.00% | -8.33% | @ | 34.51   |
| S | -1.05:1 | 32.71  | 33.38  | 33.88    | 33.40  |           | 33.66  | 33.16    | 32.63  | 32.47  | S | -1.05:1 |
|   |         | 34.51L | 1.00L  | 0.50L    | 0.00   |           | 11.50R | 12.00R   | 38.27R | 40.27R |   |         |

|  |  |  |         |        |
|--|--|--|---------|--------|
|  |  |  | RHP     | ESR    |
|  |  |  | 100.00% | 2.00%  |
|  |  |  | 32.97   | 33.20  |
|  |  |  | 40.77R  | 52.28R |
|  |  |  |         | 31.96  |
|  |  |  |         | 54.76R |

Finish Grade      \*\* THIMBLE      12+00.00 \*\*

|   |         |        |        |          |           |       |        |          |        |        |      |         |
|---|---------|--------|--------|----------|-----------|-------|--------|----------|--------|--------|------|---------|
| F | 0.19    |        | REOP   | RHP      | THIMBLEPG | LHP   | LEOP   |          |        | F      | 0.19 |         |
| @ | 0.38    | -8.33% | -2.00% | -100.00% | 96.04%    |       | 2.26%  | -100.00% | -2.00% | -8.33% | @    | 0.38    |
| S | -2.00:1 | 32.36  | 32.52  | 33.39    | 33.89     | 33.41 | 33.67  | 33.17    | 32.67  | 32.50  | S    | -2.00:1 |
|   |         | 46.27L | 44.27L | 1.00L    | 0.50L     | 0.00  | 11.50R | 12.00R   | 36.94R | 38.94R |      |         |

|  |  |        |        |         |         |
|--|--|--------|--------|---------|---------|
|  |  | LCP    | LHP    | RHP     | ESR     |
|  |  |        | 2.00%  | 100.00% |         |
|  |  | 32.90  | 33.09  | 32.86   |         |
|  |  | 58.82L | 58.44L | 46.77L  |         |
|  |  |        |        |         | 100.00% |
|  |  |        |        |         | 2.00%   |
|  |  |        |        |         | 33.00   |
|  |  |        |        |         | 33.23   |
|  |  |        |        |         | 31.91   |
|  |  |        |        |         | 53.60R  |

Finish Grade      \*\* THIMBLE      12+25.00 \*\*

|   |         |        |        |          |           |       |        |          |        |        |       |         |
|---|---------|--------|--------|----------|-----------|-------|--------|----------|--------|--------|-------|---------|
| F | 32.96   |        | REOP   | RHP      | THIMBLEPG | LHP   | LEOP   |          |        | F      | 32.96 |         |
| @ | 42.36   | -8.33% | -2.00% | -100.00% | 96.04%    |       | 2.26%  | -100.00% | -2.00% | -8.33% | @     | 42.36   |
| S | -1.29:1 | 32.46  | 32.62  | 33.40    | 33.90     | 33.42 | 33.68  | 33.18    | 32.71  | 32.54  | S     | -1.29:1 |
|   |         | 41.86L | 39.86L | 1.00L    | 0.50L     | 0.00  | 11.50R | 12.00R   | 35.62R | 37.62R |       |         |

|  |  |  |         |        |
|--|--|--|---------|--------|
|  |  |  | RHP     | ESR    |
|  |  |  | 100.00% | 2.00%  |
|  |  |  | 32.96   | 33.04  |
|  |  |  | 42.36L  | 49.64R |
|  |  |  |         | 31.90  |
|  |  |  |         | 52.38R |

Finish Grade      \*\* THIMBLE      12+50.00 \*\*

|   |       |        |        |        |        |           |        |      |  |   |       |
|---|-------|--------|--------|--------|--------|-----------|--------|------|--|---|-------|
| F | 32.68 |        | LSP    | REOP   | RHP    | THIMBLEPG | LHP    | LEOP |  | F | 32.68 |
|   |       | 49.00L | 38.00L | 37.50L | 35.50L |           | 52.30R |      |  |   |       |

LCP

33.13

49.38L

Finish Grade      \*\* THIMBLE      14+00.00 \*\*

Finish Grade      \*\* THIMBLE      14+25.00 \*\*

Finish Grade      \*\* THIMBLE      14+50.00 \*\*



**Sample Right of Way Report  
(Ramp)**

January 04, 2007

LEFT R. O. W. STAKING FOR ROADWAY RAMP1

| POINT | STATION<br>FEET | OFFSET<br>FEET | NORTH<br>FEET | EAST<br>FEET |
|-------|-----------------|----------------|---------------|--------------|
| 0     | 22+56.02        | 404.1419       | 279876.1151   | 3869815.3070 |
| 1     | 22+57.74        | 401.4601       | 279883.0377   | 3869828.6142 |
| 2     | 22+59.12        | 486.6998       | 279959.5064   | 3869788.8162 |
| 3     | 22+59.12        | 596.2280       | 280048.8234   | 3869725.4214 |
| 4     | 22+60.34        | 594.3447       | 280055.7488   | 3869738.7270 |
| 5     | 20+00.00        | 20.9893        | 279334.7801   | 3870114.1570 |
| 6     | 20+25.00        | 20.9828        | 279356.9503   | 3870102.6035 |
| 7     | 20+50.00        | 20.9762        | 279379.1205   | 3870091.0500 |
| 8     | 20+74.45        | 20.9698        | 279400.8065   | 3870079.7488 |
| 9     | 20+75.00        | 20.9692        | 279401.2578   | 3870079.5136 |
| 10    | 21+00.00        | 19.9760        | 279421.9714   | 3870068.7192 |
| 11    | 21+04.76        | 19.5705        | 279425.9421   | 3870066.6500 |
| 12    | 21+15.98        | 18.2324        | 279434.7221   | 3870062.0744 |
| 13    | 21+25.00        | 22.5544        | 279443.4127   | 3870064.0865 |
| 14    | 21+50.00        | 31.1015        | 279465.0777   | 3870069.1024 |
| 15    | 21+75.00        | 35.6286        | 279484.5417   | 3870073.6088 |
| 16    | 21+98.54        | 36.8378        | 279502.0065   | 3870077.6523 |
| 17    | 22+00.00        | 37.0244        | 279503.0292   | 3870078.0979 |
| 18    | 22+25.00        | 38.5433        | 279520.2588   | 3870085.6057 |
| 19    | 22+33.33        | 38.3595        | 279525.9564   | 3870088.0885 |
| 20    | 22+50.00        | 37.3082        | 279530.4392   | 3870090.0419 |
| 21    | 22+56.02        | 36.4683        | 279532.2930   | 3870090.8496 |
| 22    | 22+57.74        | 36.1708        | 279532.8614   | 3870091.0973 |
| 23    | 22+59.12        | 35.9110        | 279533.3328   | 3870091.3028 |
| 24    | 22+60.34        | 35.6648        | 279533.7617   | 3870091.4897 |
| 25    | 22+64.68        | 34.6472        | 279535.3973   | 3870092.2024 |
| 26    | 22+75.00        | 26.7862        | 279547.4476   | 3870097.4533 |
| 27    | 22+90.38        | 15.3094        | 279565.0419   | 3870105.1201 |



# Sample Seeding Report

Page# 1

SEEDING REPORT

NUMBER OF LEFT CUT SLOPES TO BE BYPASSED = 0  
 NUMBER OF LEFT FILL SLOPES TO BE BYPASSED = 0  
 NUMBER OF RIGHT CUT SLOPES TO BE BYPASSED = 0  
 NUMBER OF RIGHT FILL SLOPES TO BE BYPASSED = 0  
 ROUNDING DISTANCE FROM CUT SLOPE STAKE = 0.00 Ft  
 MAXIMUM ALLOWABLE SLOPE FOR SEEDING/SODDING = \*\*\*\*  
 ADDITIONAL SEEDING LEFT SIDE = 0.00 Ft  
 ADDITIONAL SEEDING RIGHT SIDE = 0.00 Ft  
 ADDITIONAL SEEDING IN CUT = 0.00 Ft  
 ADDITIONAL SEEDING IN FILL = 0.00 Ft  
 SUBTOTALS EVERY 500.0000 Ft BEGINNING AT STATION 10+00.00 R 1 METHOD INCR  
 SCALING FACTOR = 1.00000 WITH LABEL [ SF ]

| STATION<br>SF     | SLOPE DISTANCE |       | AVERAGE SLOPE DIST |       | A R E A |     | SF  | SUBTOTAL A R E A |    |
|-------------------|----------------|-------|--------------------|-------|---------|-----|-----|------------------|----|
|                   | LT             | RT    | LT                 | RT    | LT      | RT  |     | BOTH             | LT |
| BOTH              | (TOTAL)        |       |                    |       |         |     |     |                  |    |
| 10+47.93 R 1<br>0 | 0.37           | 0.00  |                    |       |         |     |     | 0                | 0  |
|                   | ( 0.37)        |       | 0.33               | 0.00  | 1       | 0   | 1   |                  |    |
| 10+50.00 R 1      | 0.28           | 0.00  |                    |       |         |     |     |                  |    |
|                   | ( 0.28)        |       | 0.45               | 5.14  | 11      | 129 | 140 |                  |    |
| 10+75.00 R 1      | 0.62           | 10.27 |                    |       |         |     |     |                  |    |
|                   | ( 10.89)       |       | 0.72               | 11.45 | 18      | 286 | 304 |                  |    |
| 11+00.00 R 1      | 0.81           | 12.62 |                    |       |         |     |     |                  |    |
|                   | ( 13.43)       |       | 0.72               | 12.38 | 18      | 310 | 328 |                  |    |
| 11+25.00 R 1      | 0.62           | 12.13 |                    |       |         |     |     |                  |    |
|                   | ( 12.75)       |       | 1.00               | 12.22 | 25      | 306 | 331 |                  |    |
| 11+50.00 R 1      | 1.38           | 12.30 |                    |       |         |     |     |                  |    |
|                   | ( 13.68)       |       | 1.38               | 16.34 | 35      | 409 | 444 |                  |    |
| 11+75.00 R 1      | 1.39           | 20.38 |                    |       |         |     |     |                  |    |
|                   | ( 21.77)       |       | 1.11               | 20.58 | 28      | 515 | 543 |                  |    |
| 12+00.00 R 1      | 0.82           | 20.78 |                    |       |         |     |     |                  |    |
|                   | ( 21.60)       |       | 4.17               | 20.88 | 104     | 522 | 626 |                  |    |
| 12+25.00 R 1      | 7.52           | 20.97 |                    |       |         |     |     |                  |    |
|                   | ( 28.49)       |       | 7.84               | 20.49 | 196     | 512 | 708 |                  |    |
| 12+50.00 R 1      | 8.15           | 20.02 |                    |       |         |     |     |                  |    |

Page# 2

SEEDING REPORT

| STATION<br>SF          | SLOPE DISTANCE              |                              | AVERAGE SLOPE DIST          |       | A R E A |     | SF  | SUBTOTAL A R E A |      |
|------------------------|-----------------------------|------------------------------|-----------------------------|-------|---------|-----|-----|------------------|------|
|                        | LT                          | RT                           | LT                          | RT    | LT      | RT  |     | BOTH             | LT   |
| BOTH                   | (TOTAL)                     |                              |                             |       |         |     |     |                  |      |
|                        | ( 28.17)                    |                              | 4.75                        | 20.45 | 119     | 511 | 630 |                  |      |
| 12+75.00 R 1           | 1.35                        | 20.88                        |                             |       |         |     |     |                  |      |
|                        | ( 22.23)                    |                              | 3.17                        | 18.71 | 79      | 468 | 547 |                  |      |
| 13+00.00 R 1           | 4.99                        | 16.54                        |                             |       |         |     |     |                  |      |
|                        | ( 21.53)                    |                              | 10.60                       | 13.87 | 265     | 347 | 612 |                  |      |
| 13+25.00 R 1           | 16.21                       | 11.20                        |                             |       |         |     |     |                  |      |
|                        | ( 27.41)                    |                              | 17.26                       | 10.46 | 432     | 262 | 694 |                  |      |
| 13+50.00 R 1           | 18.31                       | 9.71                         |                             |       |         |     |     |                  |      |
|                        | ( 28.02)                    |                              | 18.38                       | 10.29 | 459     | 257 | 716 |                  |      |
| 13+75.00 R 1           | 18.44                       | 10.86                        |                             |       |         |     |     |                  |      |
|                        | ( 29.30)                    |                              | 17.16                       | 10.25 | 429     | 256 | 685 |                  |      |
| 14+00.00 R 1           | 15.87                       | 9.63                         |                             |       |         |     |     |                  |      |
|                        | ( 25.50)                    |                              | 10.35                       | 6.23  | 259     | 156 | 415 |                  |      |
| 14+25.00 R 1           | 4.83                        | 2.83                         |                             |       |         |     |     |                  |      |
|                        | ( 7.66)                     |                              | 2.42                        | 1.50  | 61      | 38  | 99  |                  |      |
| 14+50.00 R 1<br>7818   | 0.00                        | 0.16                         |                             |       |         |     |     | 2539             | 5284 |
|                        | ( 0.16)                     |                              |                             |       |         |     |     |                  |      |
| TOTAL<br>SF=<br>ACRES= | LEFT<br>2539.0000<br>0.0583 | RIGHT<br>5284.0000<br>0.1213 | BOTH<br>7818.0000<br>0.1795 |       |         |     |     |                  |      |