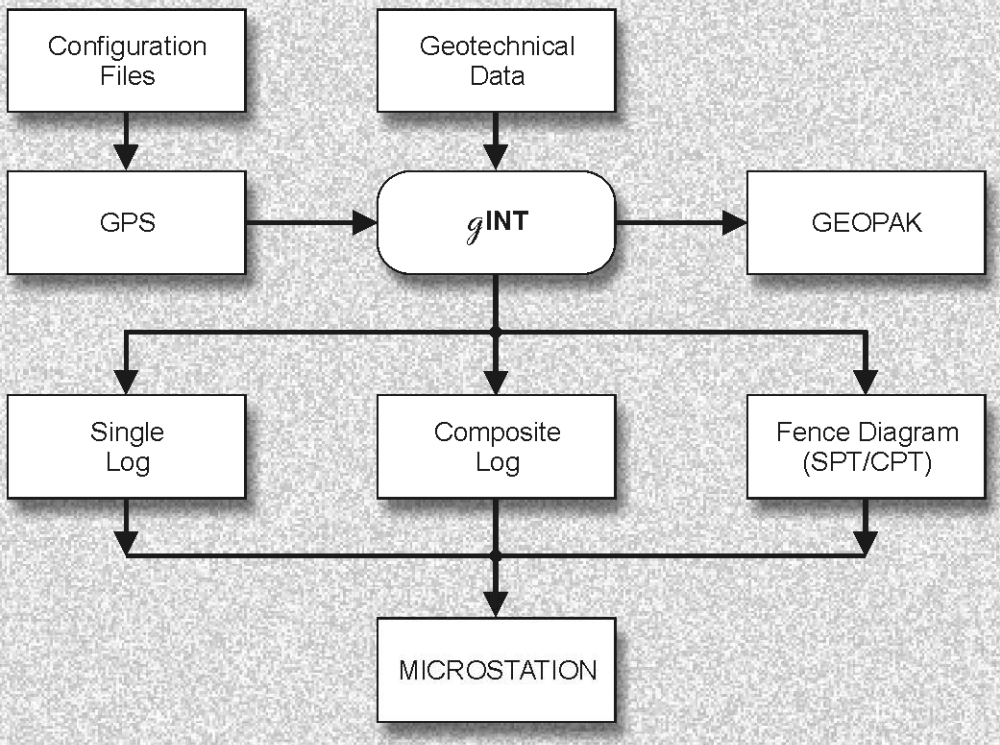
VIRGINIA DEPARTMENT OF TRANSPORTATION
GEOXT, GINT, MICROSTATION
AND GEOPAK INTEGRATOR

Released: January 2006
gINT library version: 081505



VDOT

Table of Contents

1.0 SOFTWARE LIST

The software installer **VDOT.EXE** contains the following files:

VDOT_README.PDF	- this help file
VTRC6.GLB	- VDOT gINT library
VTRC2.GDT	- data entry template for SPT borehole logs
SOIL2.GDT	- data entry template for soil surveys
CPTU2.GDT	- data entry template for CPT logs
SPT_CPT2.GDT	- combined data template for SPT and CPT logs
BOREHOLE_ENGLISH.GCX	- file for converting gINT SPT logs to GEOPAK
BOREHOLE_METRIC.GCX	- file for converting gINT SPT logs to GEOPAK
SOIL_SURVEY_ENGLISH.GCX	- file for converting gINT soil survey logs to GEOPAK
SOIL_SURVEY_METRIC.GCX	- file for converting gINT soil survey logs to GEOPAK
SAMPLE.MDB	- GEOPAK data file template.
VTRC2_ENGLISH2METRIC.GCX	- English to metric units conversion
SOIL2_ENGLISH2METRIC.GCX	- English to metric units conversion
VTRC2_METRIC2ENGLISH.GCX	- metric to English units conversion
SOIL2_METRIC2ENGLISH.GCX	- metric to English units conversion
GPS_VTRCx.GCI	- Trimble GeoXT GPS data to gINT correspondence file
GPS_SOILx.GCI	- Trimble GeoXT GPS data to gINT correspondence file
GPS_CPTUx.GCI	- Trimble GeoXT GPS data to gINT correspondence file
VDOT_CONFIG.TCF	- Trimble GeoXT configuration file
VDOT.DDF	- Trimble GeoXT data dictionary
CURRENT.CSD	- Pathfinder Office coordinate file
MicroStation support files	- as described in Section 7
Geopak support files	- as described in Section 8

2.0 INSTALLATION

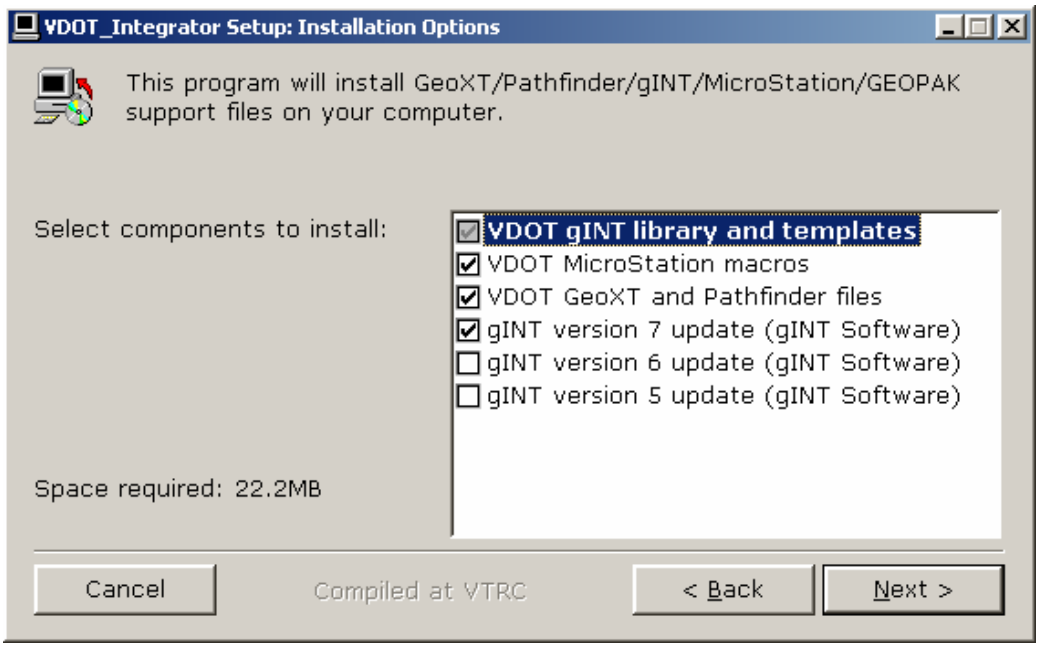
1. Make sure that **gINT**, **MicroStation** and **Pathfinder Office** are **not** running during this installation.

Note: Installation on non-VDOT computers will require a license file to be placed in the **C:\TEMP** folder on the local PC. VDOT consultants can obtain this file by contacting any personnel listed below:

1. District Geologist
2. Derek Whitehouse – 804.328.3170
3. Stanley Hite – 804.328.3108
4. Edward Hoppe – 434.293.1960

2. Double-click on **VDOT.EXE** to begin installation.

The following menu choices will appear:



The first item **"VDOT gINT library and templates"** will be installed by default. It cannot be unchecked. The following two items can be unchecked if their installation is not required. The next three items can be toggled (choose your gINT version). Typical VDOT installation does not require any component selection at this stage.

Click on **Next** to install. The installer automatically moves gINT-related files to the following folders:

GINT version 5:

VTRC6.GLB	C:\Program Files\gintw
GDT, GCX, GCI, MDB files	C:\Program Files\gintw\datatmpl

GINT versions 6 and 7:

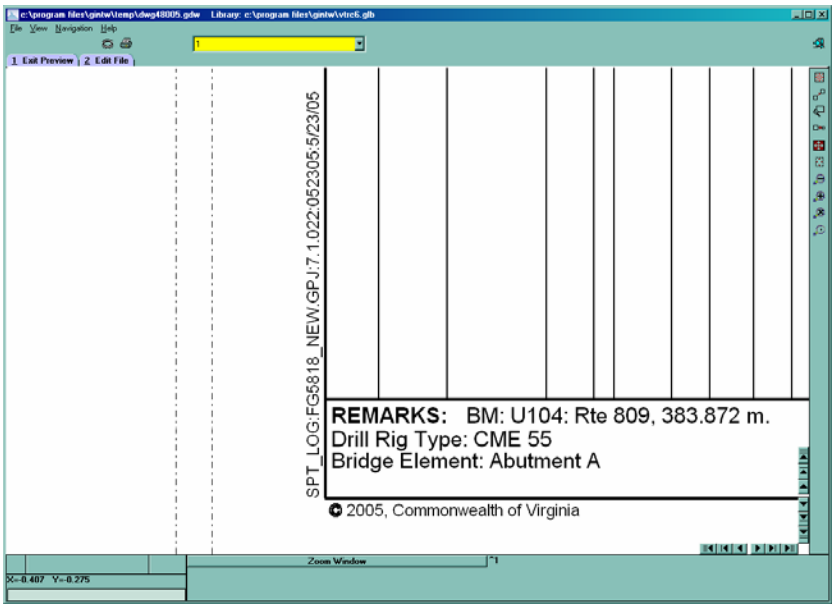
VTRC6.GLB	C:\Program Files\gint
GDT, GCX, GCI, MDB files	C:\Program Files\gint\datatmpl

3. After running the installer, start **gINT** and click on **File -> System Properties -> File Location Defaults**.

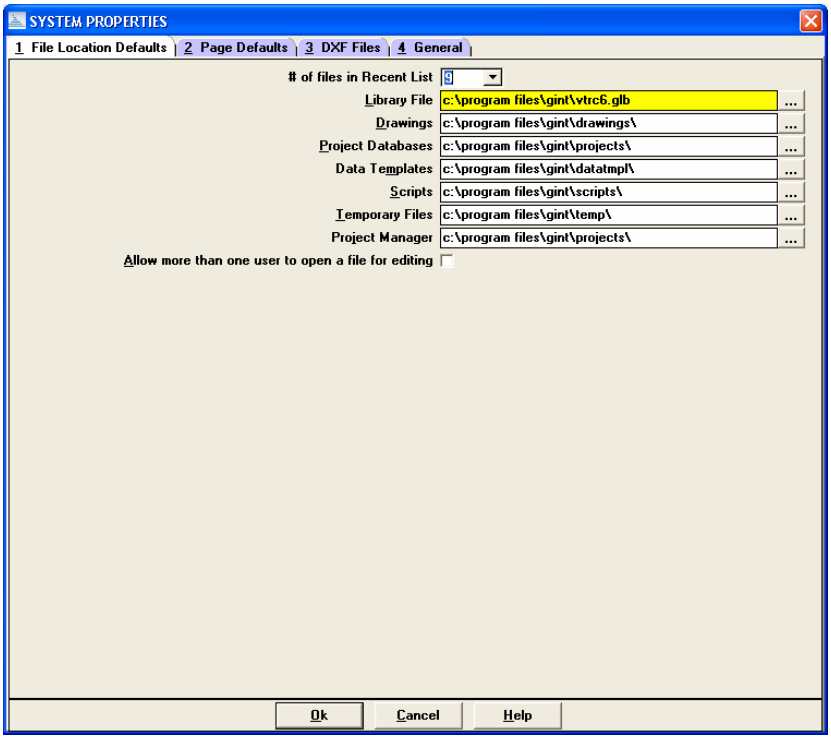
4. Enable the **VTRC6.GLB** library (specify file path). When enabled, this library will print a vertical string at the bottom left of a log output in the following format:

   report_name:project_name:gINT_version:VDOT_gINT_library_version:current_date

   as in the following example:



Typical file location defaults for the local PC should be set as follows:



5. Go to **File -> System Properties -> DXF Files** and check the following settings:
   Arial -> Ht Fac 1 = 0.7 Wid Fac 1 = 0.7
   Solid Fills Output as Solids (checked)
   Point Entities Output as Points
   Multiple Page Output to Separate Files (checked)
   Override Degree Symbol – this field should be blank

6. Go to **File -> System Properties -> General** and check the following settings:
   Unspecified Line Thickness = 0.007
   Unspecified Point Thickness = 0.01
   Default Print Management Option = Print as data sets are completed

7. Go to **Help -> License Level** and make sure that **gINT Professional** is checked.

8. **Do not** merge this library with another gINT library file.

Following the installation, two new icon links will appear on your desktop, as follows:

These new icons will point to the Instructions (this file) and the MicroStation startup in the VDOT Materials environment, respectively. In addition, a new folder named **C:\gINT_materials** will be created on your computer. **Do not** store any of your files in this folder. It will be erased and modified during each subsequent update.

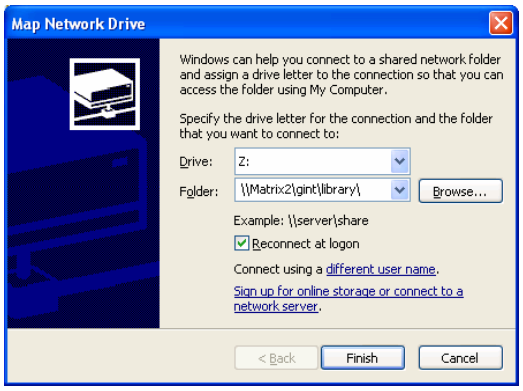
The **VTRC6.GLB** library is currently compatible with **gINT versions 5 through 7**.

2.1 VDOT Network Configuration (for VDOT use only)

VDOT users may select a gINT configuration setup that takes advantage of the statewide network connectivity. This configuration links individual computers running gINT locally with a central file server located at the Central Office Materials Division. Data templates and the library file are accessible as read-only, while project files (gpj) are stored on the server with a read-write access. Advantages of this configuration include easier file management and the ability to have all completed projects accessible at one central location.

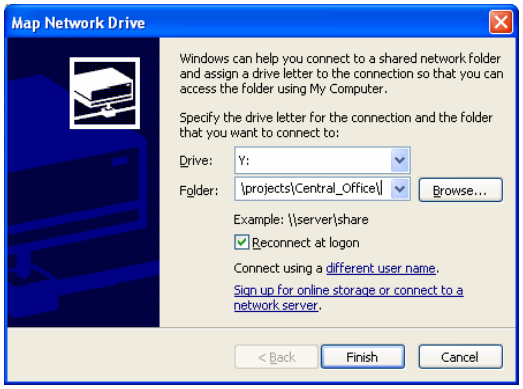
To begin this setup, you will map three network drives on your local PC using the Windows Explorer program. In Windows XP, go to **Windows Explorer -> Tools -> Map Network Drive** and proceed as follows:

1. Input \\Matrix2\gint\library\ in the **Folder** field. Drive letter is assigned automatically.

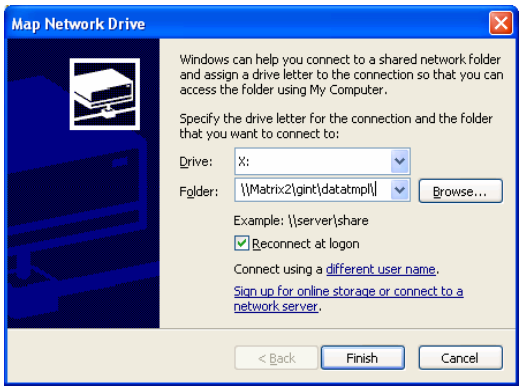


2. Repeat the same procedure to map the gINT project file drive. Copy project file location string applicable to you from a list below and paste it in the **Folder** field.

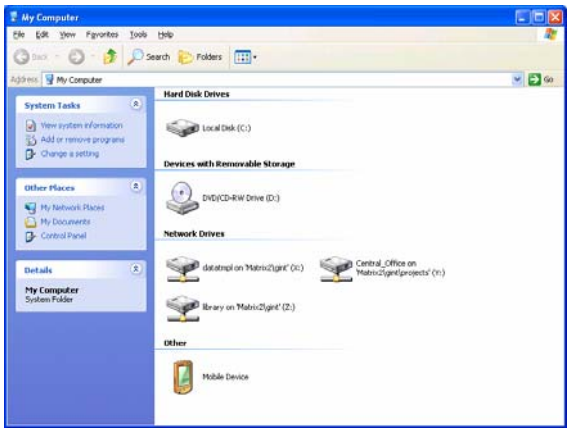
   \\Matrix2\gint\projects\Central_Office\
   \\Matrix2\gint\projects\Bristol\
   \\Matrix2\gint\projects\Culpeper\
   \\Matrix2\gint\projects\Fredericksburg\
   \\Matrix2\gint\projects\Hampton_Roads\
   \\Matrix2\gint\projects\Lynchburg\
   \\Matrix2\gint\projects\Nova\
   \\Matrix2\gint\projects\Richmond\
   \\Matrix2\gint\projects\Salem\
   \\Matrix2\gint\projects\Staunton\



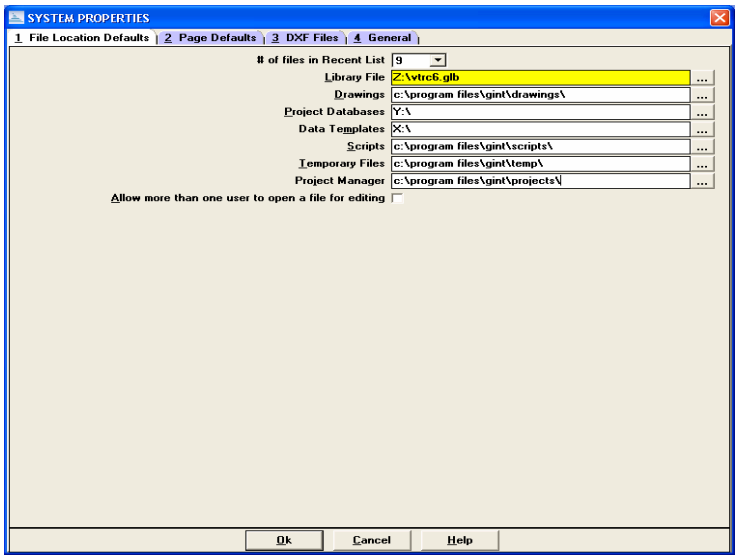
3. Repeat the same procedure to map the data template drive. Enter \\Matrix2\gint\datatmpl\ in the **Folder** field.



Next, click on the **My Computer** icon on your PC to view mapped network drives. In this example, gINT library location was assigned to **Network Drive Z**, project files to **Network Drive Y**, and data templates to **Network Drive X**.



Next, start gINT, go to System Properties -> File Location Defaults and modify Library File, Project Databases, and Data Templates file paths to reflect freshly mapped network drive assignments. In this example, file paths would look as follows:



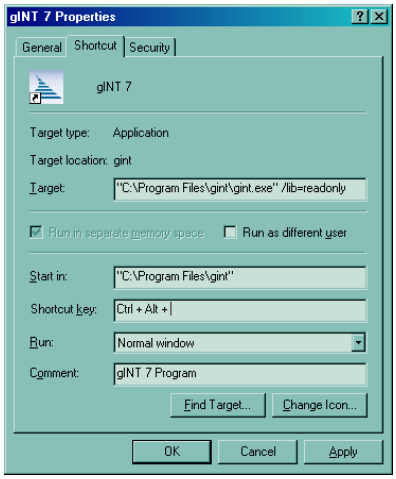
Click on '**OK**' to save new settings and exit gINT.

The next step is to copy the existing project files (gpj) from your local gINT folder to the network drive. Copy all your local gINT project files (gpj) from **C:\Program Files\gint\projects** into the new project file network drive (highlight files and drag across).

The last step is to modify the gINT shortcut.


gINT 7

Highlight the icon and right-click on the **Properties** option (last one on the bottom), then append **/lib=readonly** to the **Target** string, as follows:



3.0 DATA ENTRY

3.1 Templates

Borehole elevation, latitude, and longitude are required fields. They are populated with default values at the start of a new project. **These defaults must be edited**.

When using **VTRC2.GDT** (for borehole logs) and **SOIL2.GDT** (for soil surveys) templates, place **BOH** string in the **DESCRIPTION OF STRATA** field and enter the bottom depth same as the top depth in order to automatically display "Bottom of Hole" label in the output log. Make sure that the **first stratum** starts at **0 depth** when using the **SOIL2.GDT** template.

Soil and rock classification symbols are appended to each stratum description by default. If you do not want these symbols to appear on the log, then place "**y**" in the "**suppress_soil_class_symbol**" user report variable on output.

The **VTRC2.GDT** template has provisions for one extra column of field data and two additional columns of lab data that can appear on the output report. Titles for these columns of data can be either selected from a drop-down list or typed in. Project files created with the previous template (VTRC1.GDT) should be imported (not opened) into the new data structure using the "Database Import" menu item to acquire the latest functionality.

The **SPT_CPT2.GDT** template should not be used for the manual data entry. It is designed for merging databases already constructed with **VTRC2.GDT** (SPT data) and **CPTU2.GDT** (CPT data) templates. Merging is done using **File -> Import/Export -> Import from Database** menu commands. The resulting database allows for a combined SPT and CPT output of fence diagrams.

The **CPTU2.GDT** template should only be used with an input data file (***.cpd**) collected from a CPT rig. The input file can be set up in English or metric units, but in both cases

depth is expressed in meters, at 0.05 m interval. A typical VDOT **cpd** file is formatted as follows:

```
CPT31406-09-04 11:09 baker           English
209+00 57'lt cl 776tc          0165-134-108,c50 3  0  .05  .1  1  2  3  4
  0.05     4.0    0.35     -0.1    0.05
  0.10    12.9    0.59     -0.0    0.05
  0.15    15.9    0.80      0.0    0.05
  0.20    18.7    0.87      0.0    0.05
  0.25    14.4    0.78      0.1    0.05
  0.30    10.4    0.59     -0.1    0.05
```

The process of CPT data pre-processing and entry into gINT is as follows:

1. Collect electronic data file (***.cpd**) from a CPT rig (Hogentogler format).
2. Process **cpd** data file using the **CPTINT** software (verson 5.2 is used at VDOT). (**CPTINT** is available at: http://www.civil.ubc.ca/home/rgc/index.html) Copy CPTINT.INI (make a backup copy of your existing CPINT.INI), CPTu.IDF, METRIC.IDF, and GINT.ODF (modify as required) from the C:\gINT_Materials\CPT folder into your CPTINT program folder and follow these steps:

    - Start **CPTINT.EXE**, enter name, and press ENTER.
    - Highlight ***Input Data File*** and press ENTER.
    - Press ENTER on the highlighted ***Enter File Spec***.
    - Browse to ***DATA*** folder and press ENTER.
    - Scroll to select the **cpd** file, highlight it, and press ENTER.
    - Highlight ***Input Format*** and press ENTER.
    - Scroll to ***Custom Define*** and press ENTER.
    - Scroll to ***IDF file: [get]*** and press ENTER.
    - Press ENTER on the highlighted ***Enter File Spec (*.IDF)***.
    - Go to File Directory and highlight **CPTU.IDF** and press ENTER (if data were acquired in metric, select **METRIC.IDF**).
    - Scroll to ***Return to File Menu*** and press ENTER.
    - Highlight ***Output Data File*** and press ENTER.
    - Type in the name of the intended **.INT** output file (for example, CPT023.INT) and press ENTER.
    - Highlight ***Output Format*** and press ENTER.
    - Scroll to ***Custom Define*** and press ENTER.
    - Scroll to ***[Get]*** and press ENTER.
    - Highlight ***Enter File Spec (*.ODF)*** and press ENTER.
    - Highlight **GINT.ODF** and press ENTER.
    - Scroll to ***Return to File Menu*** and press ENTER.
    - Move along the top menu bar to ***PARAM*** and check/edit settings.
    - Move along the top menu bar to ***RUN*** and use the down-arrow to select ***Begin Execution*** and press ENTER.
    - Repeat all of the above for other CPT soundings.
    - Move along the top menu bar to ***QUIT*** and press ENTER***.***

3. Pre-process for gINT input as follows:

    - Start the **CPT_Data.exe** program.
    - Select ***File -> New*** from the menu bar. The CPT_Data Project Editor window will be displayed.
    - Enter project info for an individual sounding in each box.
    - Click on the ***Select Input File*** box and select the ***.INT** file (for example, CPT023.INT).
    - Click on the ***Enter Borehole*** button.
    - If you have other soundings to enter, then repeat the last three steps.
    - Optional: if you want to indicate dissipation tests, then create a text file (***.TXT**) in the following format:

      Hole# Depth D

      See **dissip_test1.txt** for an example of the file structure. Note that the dissipation test data file contains information for all soundings. This file is entered into the CPT_Data program only once, by clicking on the ***Select Input File*** button associated with the dissipation data section.
    - Upon entering all data, click on the ***Save and Exit*** button.
    - You will find the processed file named **results.csv** in the same folder as the **CPT_Data.exe** program.

4. Import **results.csv** file into gINT as follows:

    - Start **gINT** and click on the *Input* tab.
    - Click on *File -> New Project -> Clone Data Template.*
    - Select **CPTU2.GDT** and click OK.
    - Enter new project name and click OK.
    - Click on *File -> Import/Export -> Import from Text File.*
    - Select **results.csv** and click OK.

You are now ready to process CPT logs using gINT software.

3.2 Borehole Naming Convention

Boreholes shall be named as follows for all VDOT projects:

SB-##	Soil Boring (where ## indicates a number)
HA-##	Hand Auger
TP-##	Test Pit
CH-##	Corehole
MW-##	Monitoring Well
IN-##	Inclinometer
CP-##	Cone Penetrometer

This naming convention is designed to facilitate file conversion into GEOPAK and to make the method of hole advancement universally understood.

3.3 Station and Offset Naming Convention

Boreholes are typically located by station and offset (latitude and longitude should also be established). In GEOPAK, the offset field must be a numeric value only (negative for left offsets and positive for the right ones), which differs from a more descriptive gINT entry. The automated gINT to GEOPAK conversion process will result in a "correct" translation provided that the following convention is adhered to in the gINT data entry–offset field:

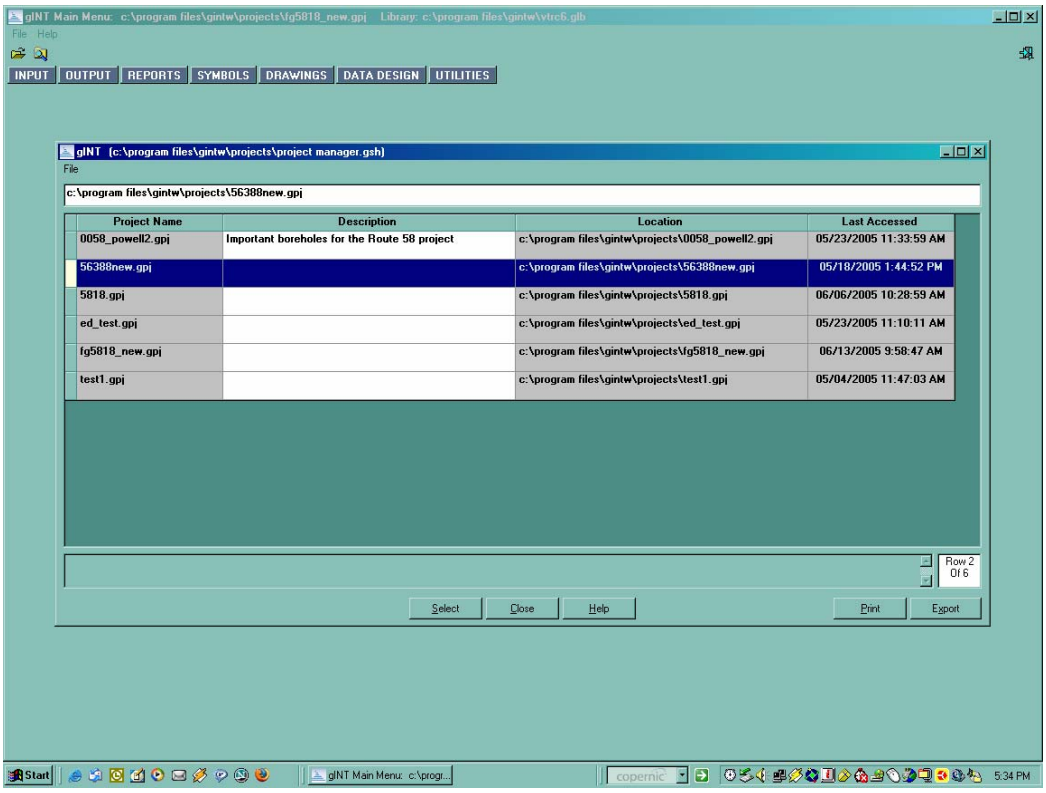
- The numeric value should be followed by a space. **Do not** append any symbols, such as **12'**.
- Include *only* one of these words to denote direction: **left, right, LT, RT**. The case does not matter.

Example: gINT entry for the offset field: **12.5 ft LT of centerline**.
This offset will be automatically translated to a GEOPAK offset of **–12.5**.

The Station entry in gINT should contain chainage only (no additional characters).

3.4 Project Manager

The use of the Project Manager feature, accessible from **File -> Project Manager** menu allows for an efficient project management under gINT. Users are strongly encouraged to fill out the 'Description' field to provide for quick and easy search and retrieval of gINT projects.



4.0 OUTPUT REPORTS

4.1 Report Types

The following gINT output reports are available:

Logs:

SPT_LOG	- Single SPT Borehole Log (VTRC2.GDT structure)
SPT_LOG_COMP	- Composite SPT Borehole Log (VTRC2.GDT structure)
CPT_LOG	- Single CPT Log (CPTU2.GDT structure)
CPT_LOG_COMP	- Composite CPT Log (CPTU2.GDT structure)

Composite logs (*_COMP) are designed for importing to and processing by MicroStation in order to produce project drawings. They contain multiple side-by-side logs. Note that composite logs and fence reports are optimized for output from MicroStation (see Section 7.0). They may not print correctly from gINT.

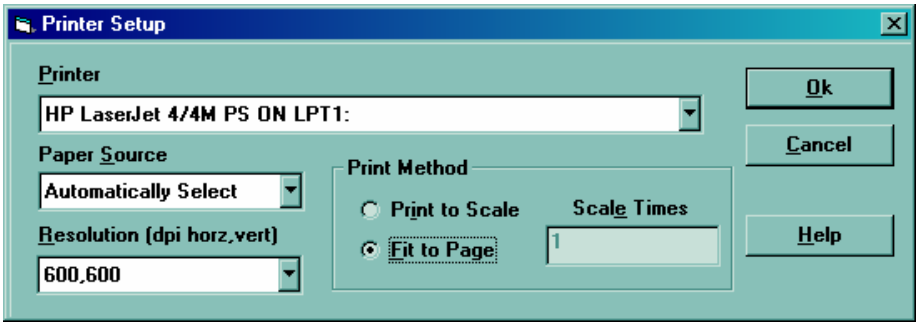
Fences:

SPT_FENCE1	- SPT Fence Diagram (VTRC2.GDT structure)
SPT_FENCE2	- SPT Fence Diagram (VTRC2.GDT structure)
CPT_FENCE	- CPT Fence Diagram (CPTU2.GDT structure)
SPT_CPT_FENCE1	- Combined SPT and CPT Fence (SPT_CPT2.GDT structure)
SPT_CPT_FENCE2	- Combined SPT and CPT Fence (SPT_CPT2.GDT structure)
SPT_CPT_FENCE3	- Combined SPT and CPT Fence (SPT_CPT2.GDT structure)

****** Note that fence reports have an option of displaying the borehole layout in plan view (with the north arrow properly oriented). Enter "**y**" for the runtime variable "**draw_site_map**" at output time.

Grfc Tables:

SOIL_SURVEY	- Soil Survey Report (SOIL2.GDT structure) This report is designed to print on 11x17 pages.
SOIL_SURVEY_1	- Short version of the SOIL_SURVEY report (no lab data) This report is designed to print on 8.5x11 pages, using the "**Fit to Page**" printer option, as follows:



Note various optional runtime user inputs, available when generating reports.
Most of these user inputs are self-explanatory. Here are some additional details:

SPT_LOG and SPT_LOG_COMP reports:

- GW_strata_legend - Enter "y" to place the water symbols within the strata legend column, instead of at the depth/elevation line (default).
- DE_SCALE - Enter "y" to create "Depth Scale" and "Elevation Scale" column headings, instead of "Depth" and "Elevation" (default titles).
- in_line_spt - Enter "y" to plot the blow counts in one horizontal line, instead of stepwise (default).

SPT_FENCE_* reports:

- N - Enter "y" to plot N-values instead of individual blows.
- draw_site_map - Enter "y" to plot a borehole layout.
- fence_location - Heading (description) is displayed at the top.

SPT_CPT_FENCE1,2,3, SPT_FENCE2 and CPT_FENCE reports:

- Lat_Long - Enter "y" to show Latitude and Longitude on the x-axis. (Station and offset are shown by default.)

4.2 Log Depth per Page

The SPT log depth can be controlled in the following ways:

1. Autoscaling. No user input is required, as gINT selects the best fit per page.
2. Modified autoscaling. The first stratum depth is entered as '**0.001**', instead of '**0**'. The resulting log depth is fixed to 40 ft or 12 m per page if the borehole depth is greater than or equal to 40 ft or 12 m. Scaling dependent on the borehole depth is applied when hole depth is less than 40 ft or 12 m.
3. Global override. Specific user entry in the '**Depth Log Page**' field of **INPUT -> PROJECT**. This method selects the same fixed depth per page for all logs. Make sure that the first stratum depth is **not** '**0.001**'.

4. Local override. Specific user entry in the '**Depth Log Page**' field of **INPUT -> BOREHOLE**. This method selects a fixed depth per page for a particular log. Make sure that the first stratum depth is **not** '**0.001**'.

Keep in mind that overriding default values may require adjustments to runtime user inputs, namely **depth_interval**, **elevation_interval**, and **in_line_spt**.

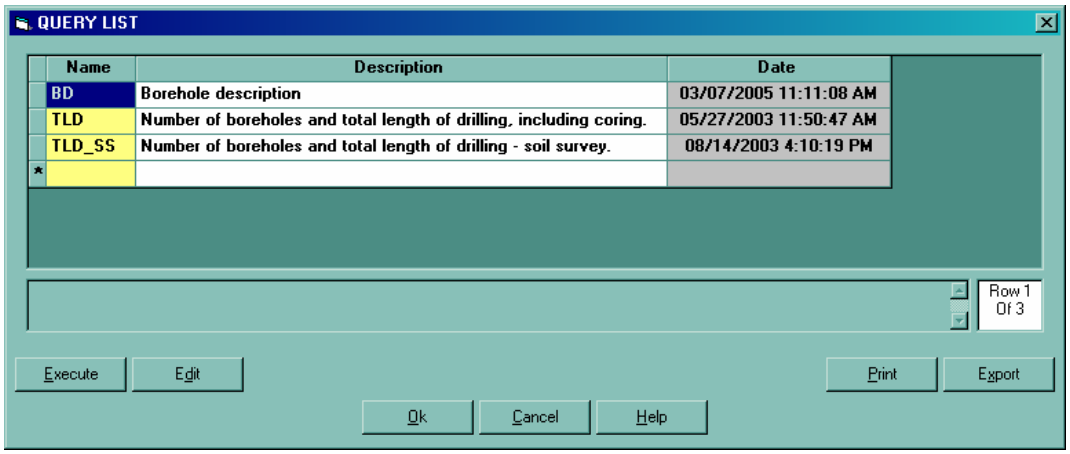
The CPT log depth is set to 100 ft per report page by default, but it can be adjusted on gINT output screen.

5.0 LOG PRINT ORDER

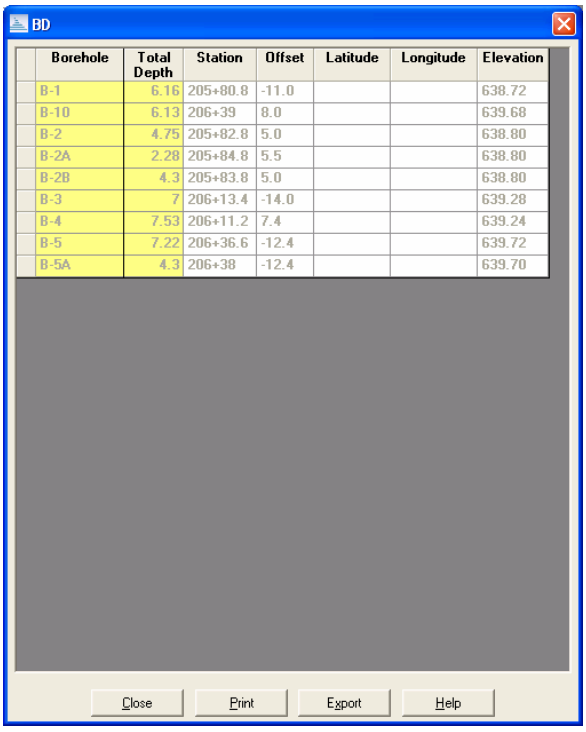
By default, gINT does not print borehole logs in sequential order. If you have logs numbered SB-1 through SB-10, the composite log will result in SB-1, followed by SB-10, then by SB-2. This is often not a preferred order. You can specify the print order by assigning integer values (1, 2, 3, etc.) in the **PrintOrder** field of the **Borehole** data input section (last column). After the print order is assigned, go to Output, specify logs to print out (or view), and left-click on the **Sort 1** field, next to the **FILTER** window. Set the Table to **POINT** and set the **Field** to **PrintOrder**. Click on the **Paste** button above the field list. You will see the string **[POINT].[PrintOrder]** appear in the **Sort 1** field. Now you are ready to print or view the logs in the specified order.

6.0 PROJECT QUERIES

Three database queries are currently available on projects compiled with **VTRC2.GDT** and **SOIL2.GDT** data input templates. They provide a borehole summary info (including location coordinates), as well as an automatic calculation of the total length of drilling, and the total length of coring for the entire project. To access these queries, click on **File> Queries…** while in the Input mode. A Query List table will be displayed as follows:



Select a query and then click on the **Execute** button to run it.



The report generated by a query can be easily exported to a spreadsheet program by clicking on the **Export** button.

7.0 MICROSTATION MACROS

VDOT gINT reports can be converted to MicroStation drawing files (DGN format) in accordance with VDOT drafting standards. This conversion process is accomplished using a set of customized macros that are invoked within MicroStation.

Note: These macros have been tested to work with MicroStation J (version 7) and MicroStation SE. They are not presently compatible with version 8.

VDOT.EXE installs the following MicroStation support files:

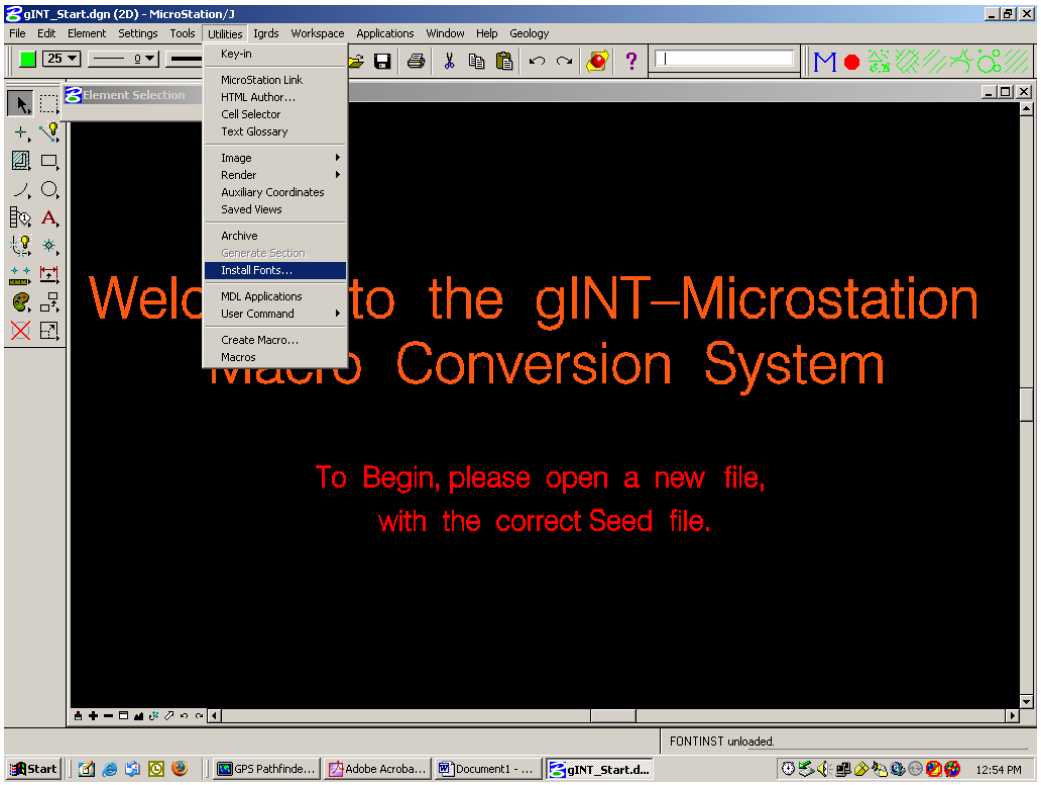
materials.ucf	C:\Program Files\Bentley\Workspace\users
ustn.m01	C:\Program Files\Bentley\Workspace\interfaces\MicroStation\materials
ustn.r01	C:\Program Files\Bentley\Workspace\interfaces\MicroStation\materials
ustn.m02	C:\Program Files\Bentley\Workspace\interfaces\MicroStation\materials
materials.upf	C:\Program Files\Bentley\Workspace\system\data
printer2.plt	C:\Program Files\Bentley\Workspace\standards\plotdrv
printer2.plt	C:\Program Files\Bentley\Workspace\system\plotdrv
GeoPakgINT.cel	C:\gINT_materials
BRSEED.DGN	C:\gINT_materials
MBRSEED.DGN	C:\gINT_materials
materials.cel	C:\gINT_materials
materials.cdx	C:\gINT_materials

cartlib.rsc	C:\gINT_materials
Mdesstrl.rsc.old	C:\gINT_materials
VGISFONT.RSC	C:\gINT_materials
testyle.rsc	C:\gINT_materials
VGISLINE.RSC	C:\gINT_materials
msurv.rsc	C:\gINT_materials
survey.rsc	C:\gINT_materials
font.rsc	C:\gINT_materials
color.tbl	C:\gINT_materials
desstyl.old	C:\gINT_materials
mdesstyl.rsc	C:\gINT_materials
aclstyle.rsc	C:\gINT_materials
desstyl.rsc	C:\gINT_materials
*.ba	C:\gINT_materials
gINT_Start.dgn	C:\gINT_materials
Microstation VDOT Materials.lnk	Desktop shortcut to MicroStation with VDOT environment

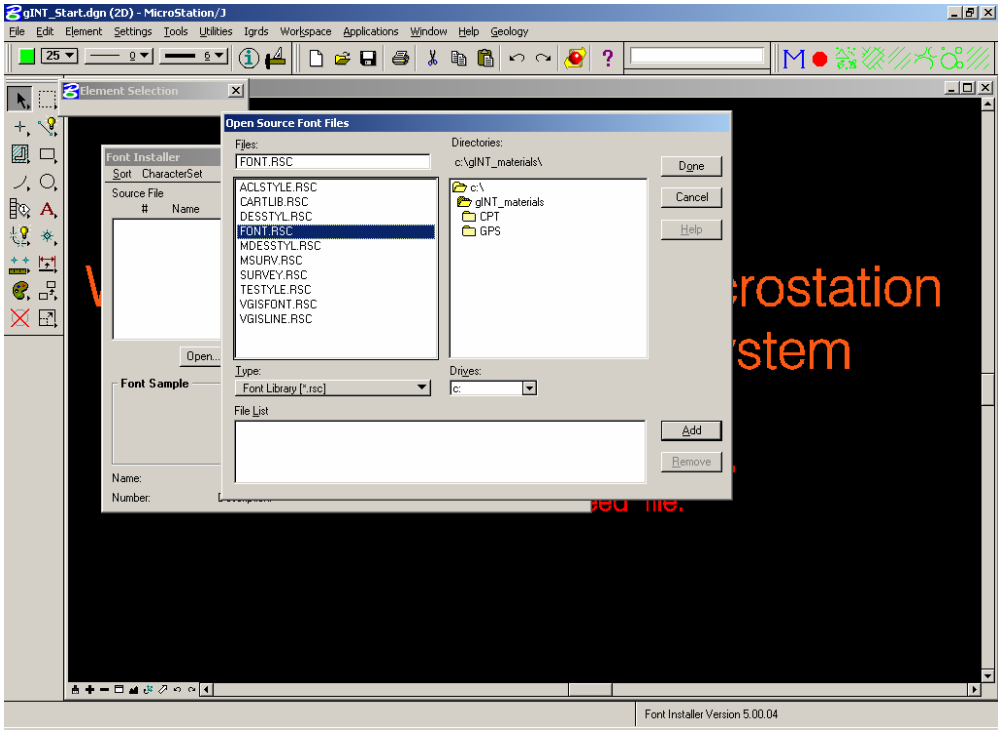
The above destination folders are based on a standard VDOT installation of MicroStation J (version 7). The installer attempts to locate alternate install paths for MicroStation based on your Windows registry settings.

7.1 Font Installation

Start Microstation, go to Utilities, and then click on “Install Fonts.”



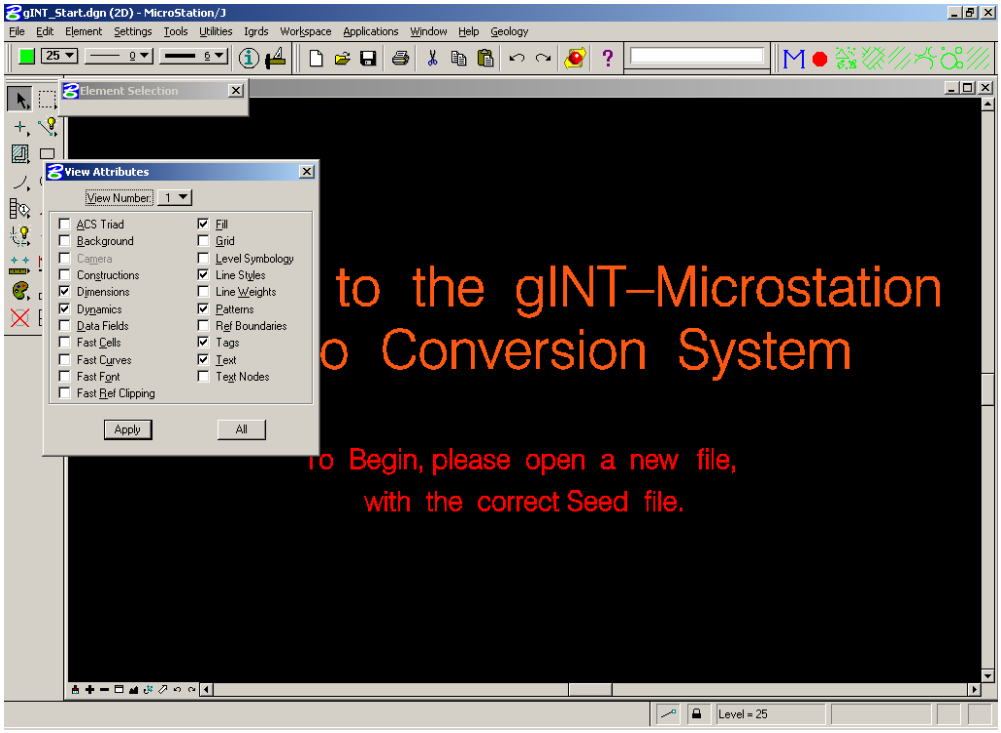
Next, choose the path to the **FONT.RSC** file (C:\gINT_materials), highlight it, click ADD,



and then “Done”. Subsequently, click on “Done.”

7.2 Attributes

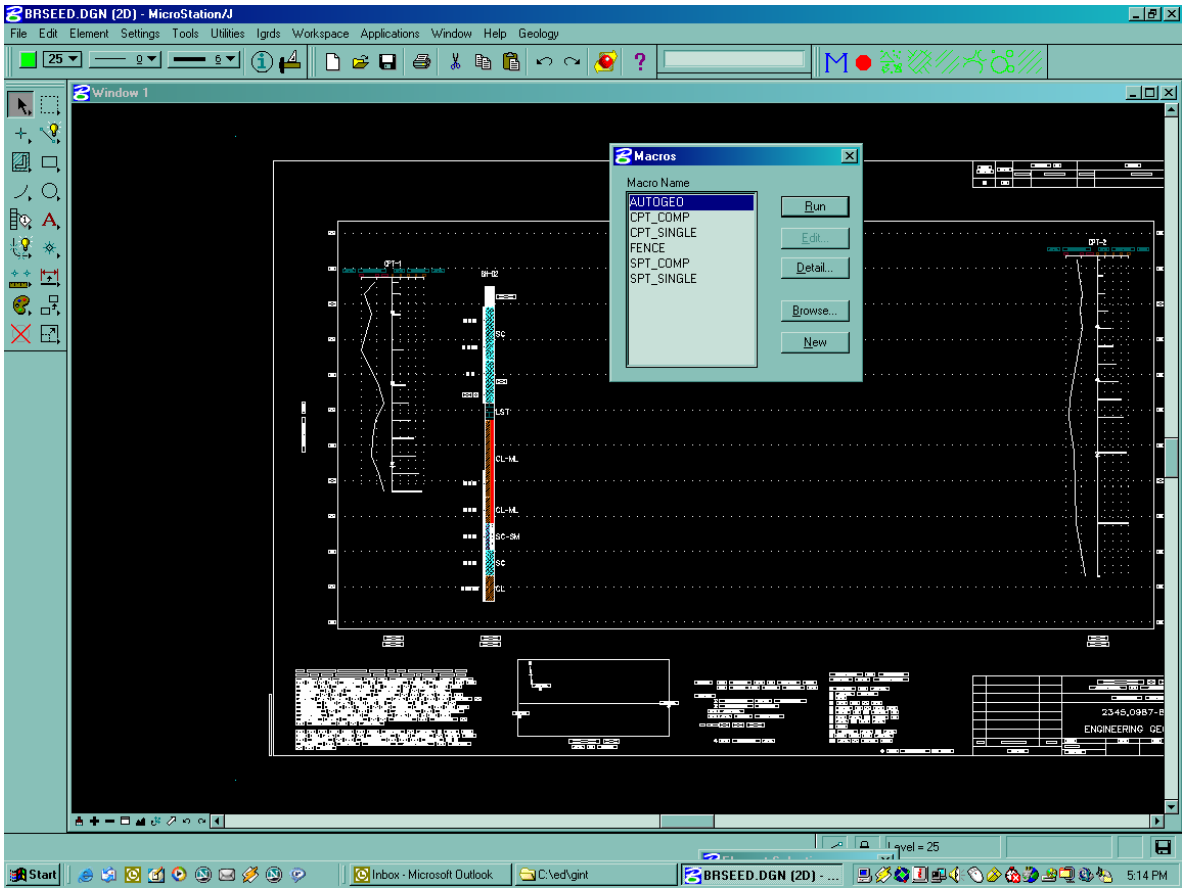
Check **Settings -> View Attributes**. The attributes should be set as follows:



7.3 Conversion

It is **essential** that MicroStation be started in the VDOT Materials environment to enable VDOT-specific environmental variables. This is done by clicking on the following icon on your desktop:

After starting MicroStation, go to **File -> New** and type in a new name. Before you click on the **OK** button, make sure that the seed file specified in the lower part of the dialog window is **brseed.dgn** if the project is done in English units or **mbrseed.dgn** if the project is metric. Select a seed file accordingly. This is extremely important. Next, go to **File -> Import** and click on the DXF file type. Select the DXF file that you previously generated in gINT. After it opens, go to **Utilities -> Macro**, select a macro from the drop-down list, and click on the **Run** button. In most cases, the universal **AUTOGEO** macro will automatically convert any DXF gINT report. Select a specific macro only if AUTOGEO does not work correctly. Sometimes, if the conversion process does not run fully, it helps to run a macro for a second time on the same file.



After running a macro, all line weights and fonts will conform to VDOT standards.

NOTES:

1. "Normal" plot scales may not work properly. There are two ways to compensate for this problem. The first is to enter a new plot scale factor of 0.906. The second method is to input a dimension (only ONE and the rest will be filled in). There have been some problems with sheets rotating; thus, you may have to key in 34.9 (for the first dimension) or just trim the sheets.

2. At the bottom of each gINT composite log there is a field labeled "REMARKS:." This field is bordered to the right by the Page Number block. It is essential that the text following "REMARKS:" not exceed a total length of 93 characters.

3. If you have a direct (local) connection to the plotter/printer, then make sure that the "PRINTER2.PLT" driver is selected when printing your output from MicroStation. Make sure that your line weight setting is off (Settings -> View Attributes -> Line Weights unchecked, then click on "Apply"). The PRINTER2.PLT driver file is **not** used when plotting with the eQuorum system (typical VDOT configuration). It is recommended that you use the eQuorum system for printing/plotting.

For questions regarding the gINT-Microstation Macro installation and operation, contact Keith Weakley at the Staunton District Structure & Bridge Office, (540) 332-9109.

8.0 GEOPAK

gINT project files compiled with **VTRC2.GDT** and **SOIL2.GDT** data input templates can be converted for further processing by GEOPAK. Make sure that your gINT software is updated to version **5.1.076** or higher. Also, make sure that your project files compiled with **VTRC2.GDT** or **SOIL2.GDT** data entry templates contain the **"Auger_Refusal_Depth"** field. This field may be empty, but it **must exist** for the conversion program to function properly. If a given project was set up using an older template, without the "Auger_Refusal_Depth" field, then it must be imported (using **database import** menu item) into the latest template structure (VTRC2.GDT) prior to GEOPAK conversion.

The GEOPAK file conversion process works as follows:

For projects compiled using the **VTRC2.GDT** template:

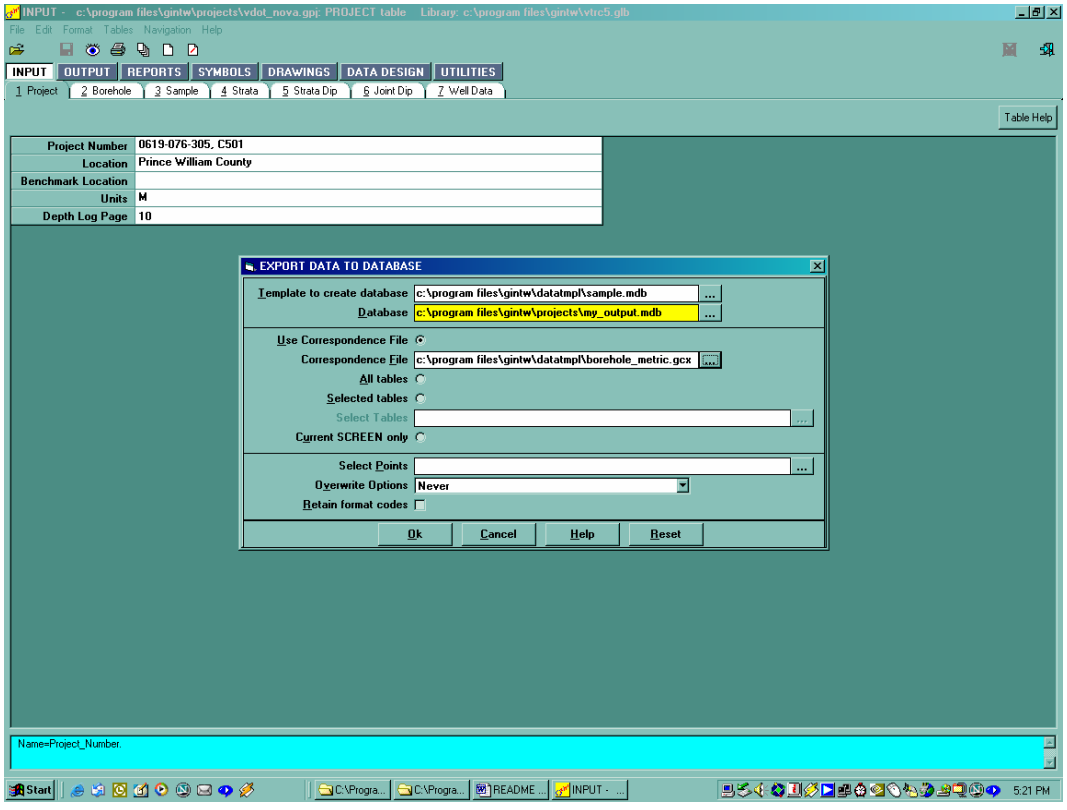
- Open your gINT project file.
- Click on **File -> Import/Export -> Export to Database…**
- Select **SAMPLE.MDB** (select MDB file type first at the bottom) as "Template to create database."
- Assign a name to the yellow "Database" field (select MDB file type first). This will be the name of the converted file for GEOPAK input (note the full directory path).

- Check the **Use Correspondence File** box.
- Select **borehole_english.gcx** as the “Correspondence File” for English units or
- Select **borehole_metric.gcx** as the “Correspondence File” for metric units.
- Click on the **OK** button below.
- A GEOPAK input file will be created in the **MDB** format and placed in the gINT project folder.

Rock data will be displayed as a string, starting with the **RK** label, followed by **REC** and **RQD** values.

For projects compiled using the **SOIL2.GDT** template, the process is essentially the same, except that you select “**soil_survey_english.gcx**” or “**soil_survey_metric.gcx**” as the “Correspondence File.”

Note that several new fields have been added to **VTRC2.GDT** and **SOIL2.GDT** data entry templates for GEOPAK compatibility with gINT. They include **JOBNUMBER**, **CHAINNAME**, and **AUGER_REFUSAL_DEPTH**. These fields are GEOPAK -specific. For proper GEOPAK conversion, make sure that your gINT **“Station”** and “**Offset**” inputs are entered as outlined in Section 3.3.
An example of a conversion process is shown as follows:



Geopak Technical Manual dealing with geotechnical applications can be accessed from your local **C:\gINT_materials** folder, as **GEOPAK.pdf**. This manual was compiled by Bentley for VDOT.

8.1 GEOPAK Cell Library

The cell library – **GeoPakgINT.cel** is automatically installed in your local **C:\gINT_materials** folder. This is the main VDOT cell library file for GEOPAK. It must be accessible to GEOPAK when reading the MDB file. All modifications to the cell library file will be made by the Materials Support Group only.

For questions regarding the GEOPAK Cell Library installation and operation, contact Les Kodger at the Staunton District Materials Office: (540) 332-9890.

9.0 UNIT CONVERSION

GINT project files created in English units with **VTRC2.GDT** and **SOIL2.GDT** data input templates can be converted to metric units using **vtrc2_english2metric.gcx** and **soil2_english2metric.gcx** correspondence files, respectively. Numeric data in **text fields** (such as stratum description) **are also converted**, but the conversion results need to be closely verified for accuracy.

For projects compiled using the **VTRC2.GDT** template:

- Open the existing gINT project file to be converted into metric units.
- Click on **File -> Import/Export -> Export to Database…**
- Select **VTRC2.GDT** as "Template to create database."
- Assign a project name to the yellow "Database" field (with .gpj file type). This will be the name of the new converted file (note the full directory path).
- Check the **Use Correspondence File** box.
- Select **vtrc2_english2metric.gcx** as the "Correspondence File."
- Click on the **OK** button below.

A similar procedure applies to projects compiled using the **SOIL2.GDT** template.

Project files created in metric units with **VTRC2.GDT** and **SOIL2.GDT** data input templates can be converted to English units using **vtrc2_metric2english.gcx** and **soil2_metric2english.gcx** correspondence files, respectively. The conversion process is carried out in a manner similar to one outlined above.

10.0 GPS

This section assumes that the user is familiar with the operation of Trimble GeoXT GPS receiver and GPS Pathfinder Office software, standard issue for VDOT Materials personnel. It should be understood that the position data collected by the GeoXT unit are not of a survey-grade quality. Ground coordinates supplied by Trimble GeoXT are accurate to within 1 meter with post-processing, which is typically adequate for borehole

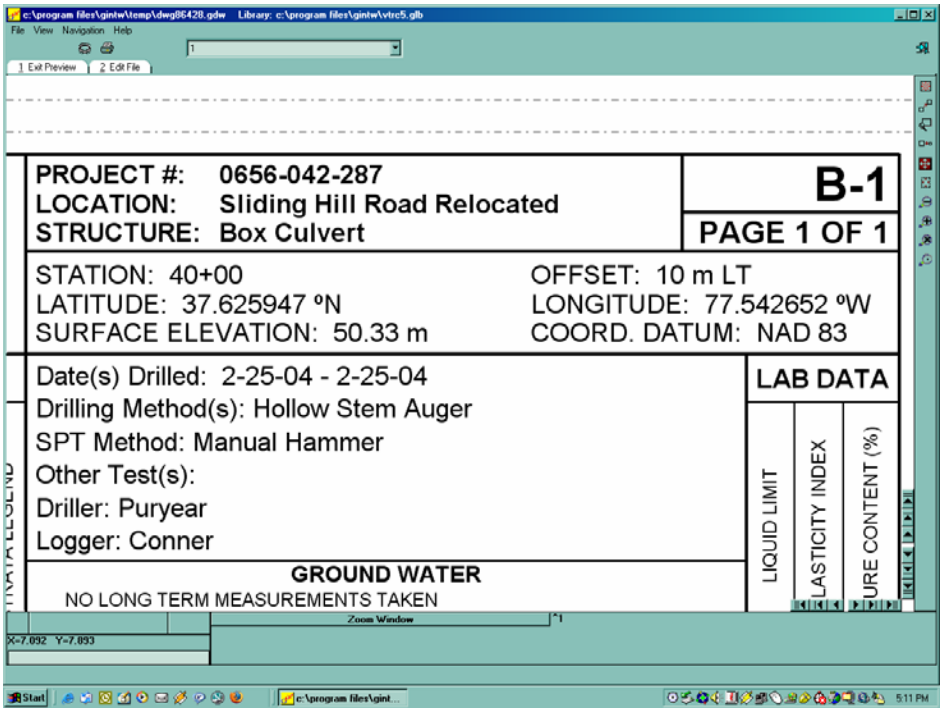
location. Note that the resulting elevations are generally not adequate for borehole data adoption.

Make sure that you have the latest versions of applicable software installed, as follows:

1. Terrasync – download from Trimble website, PPC2003ARMSetup, install to 'Disk'
2. GPS Pathfinder Office – download from Trimble website
3. ActiveSync – download from Microsoft website.

10.1 Coordinates

The coordinates must be entered into a gINT data template as **Latitude** (36 to 40) **and Longitude** (-84 to -75), with the **NAD 1983** datum. These coordinates should originate from a post-processed file (***.cor**), with seven digits past the decimal point and a **negative** value for **Longitude**. VDOT borehole logs will automatically display these coordinates rounded to six places past the decimal, positive longitude, with N and W suffixes for latitude and longitude, respectively, as per the following example:



Two report templates, **SPT_LOG** and **CPT_LOG**, have provisions for alternate entry of **Northing** and **Easting** (these fields are typically left blank to display latitude and longitude). It can be accomplished by typing these coordinates as report variables at runtime. Enter actual values in the following fields: **Northing**, **Easting**, **Coordinate datum**. The coordinates of the remaining log reports can be manually modified after transferring them to MicroStation (in DXF format).

Northing and Easting can be obtained from the Pathfinder Office, by changing the "Coordinate System" settings. Another program that allows the user to convert between various coordinate systems is **Corpscon**. It can be downloaded from:

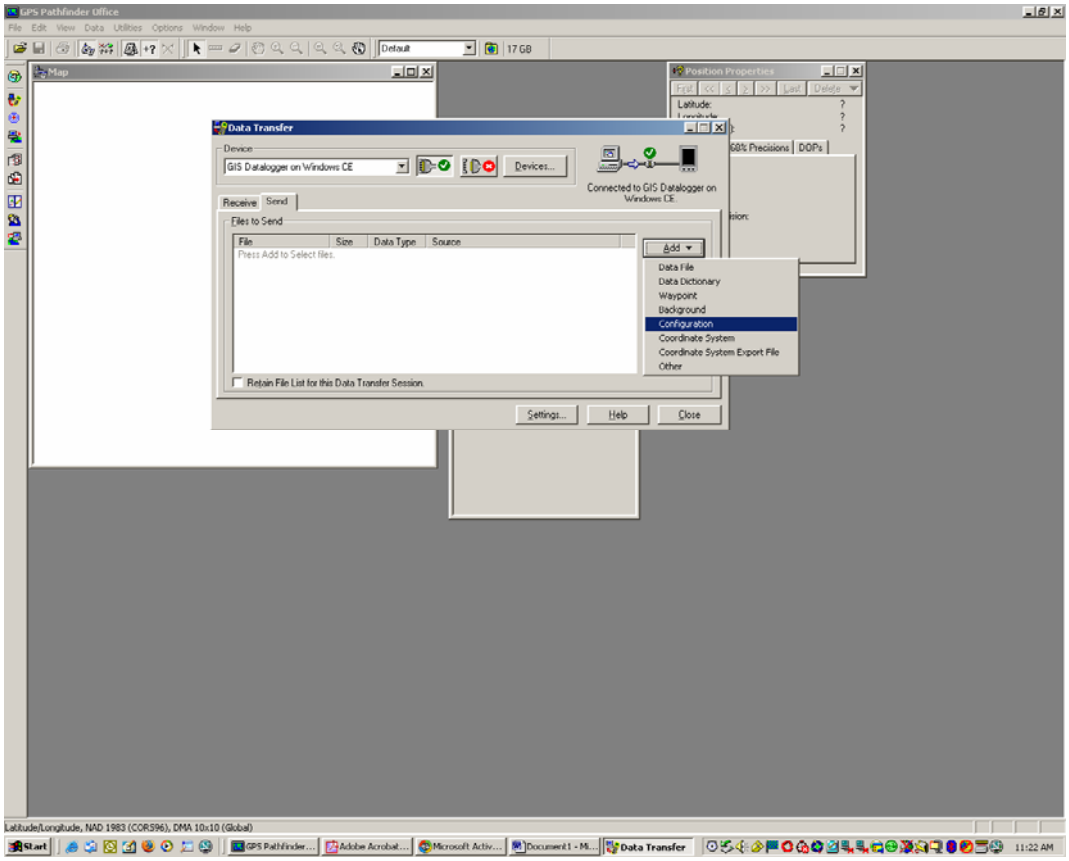
http://crunch.tec.army.mil/software/corpscon/corpscon.html.

10.2 Configuration

VDOT GeoXT configuration (**VDOT_config.tcf**) and dictionary files (**VDOT.ddf**) are installed in **C:\Pfdata** and **C:\Pfdata\TUTORIAL** folders, respectively. Copies of these files are also installed in the **C:\gINT_materials\GPS** folder. VDOT dictionary file contains templates for various boreholes, generic points, lines, and areas.

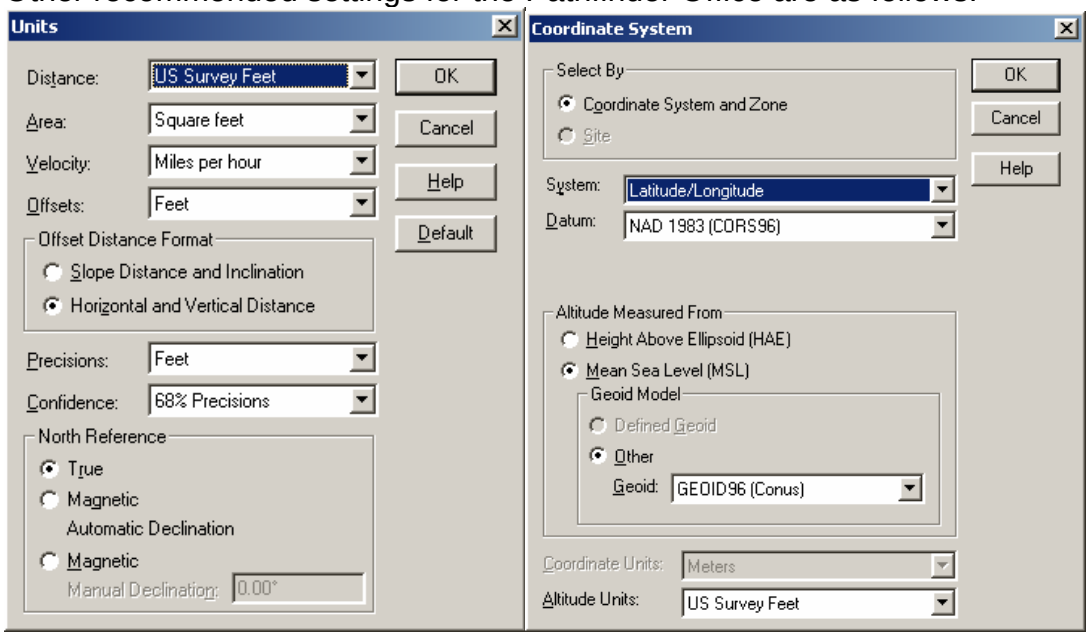
File transfer from your local PC to Trimble GeoXT is performed using the 'Data Transfer' menu option in the Pathfinder Office, as follows:

Go to **Utilities -> Data Transfer -> Send -> Add**

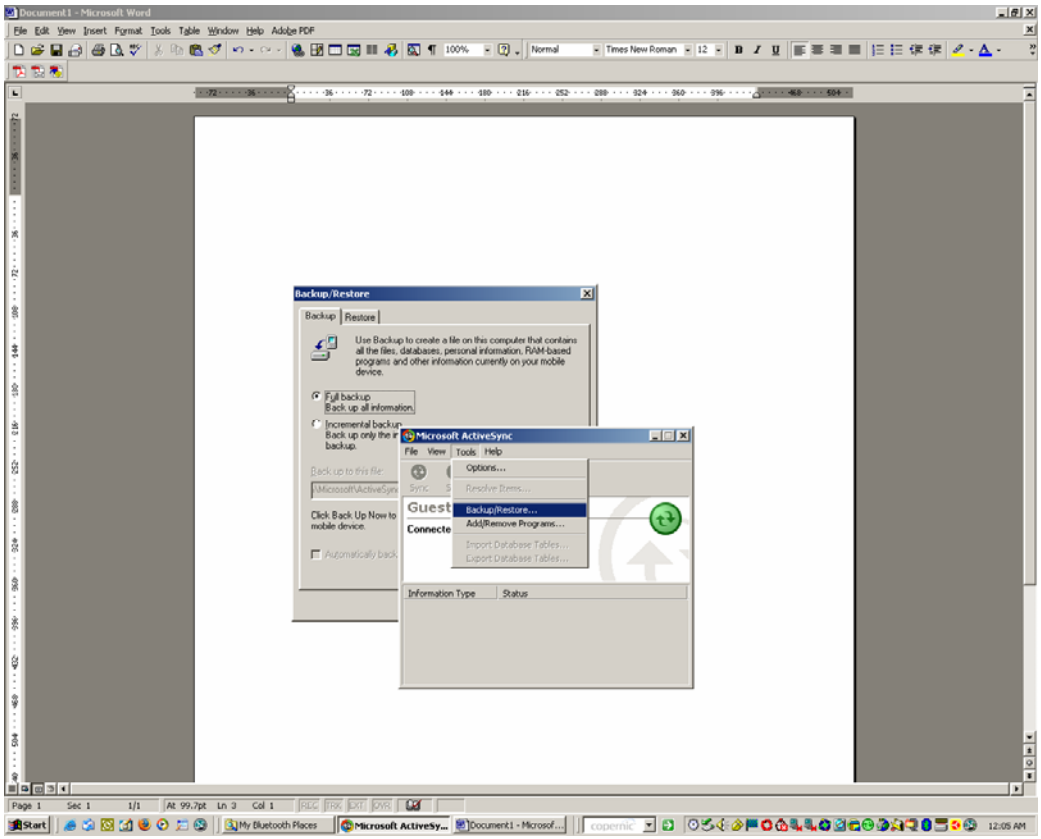


Typically, **PDOP** should be **6.0 max** and **SNR 4.0 min** (SNR is set much higher in the recent release of Terrasync). The '**Velocity Filter**' should be **ON**.

Other recommended settings for the Pathfinder Office are as follows:



Users should regularly back up programs and data present on GeoXT, using the Backup/Restore function (Full backup) available in Microsoft ActiveSync under Tools. This process creates a backup file on a PC connected to GeoXT and allows file restore in case of battery failure.



10.3 Background Images

Virginia background files (topographic quads or aerial photos) can be downloaded from http://fisher.lib.virginia.edu/collections/gis/vagaz/search_by_quad.php.

Typically a zipped package of files is downloaded to a local PC, then unzipped for viewing in GPS Pathfinder and/or subsequently downloaded to GeoXT. When transferring TIF background files to GeoXT, first make sure that the TIF file and the corresponding TFW file reside in the same folder (similarly, a SID file, if selected, should be accompanied by a corresponding SDW file). Then, use "Data Transfer" to mark the TIF file and send it to GeoXT. The location of background files on GeoXT is \Disk\My Documents\TerraSync. Each background file set consists of three files: *.CS, *.TFW, *.TIF. Keep in mind that these files tend to be very large.

Another source for background maps is Maptech's **Terrain Navigator Pro**, available at VDOT through VITA IT support. These maps can be accessed from the VDOT server as follows:

1. Open **Terrain Navigator Pro**.
2. Open the 7.5' quad of your choice.
3. Click on **File.**
4. Click on **Export.** Screen comes up with lots of choices.
5. Under **Projection** - change to **Rectify.**
6. Under **Datum** - Change to **NAD-83.**
7. Click **OK.**
8. Save as **TIF-Arc/info (TFW)**.
9. Open **Pathfinder.**
10. Open your selected project.
11. Click on **File.**
12. Click on **Background.**
13. Click on **Add.**
14. Find your map, highlight, then **Open.**
15. Click **OK** on the message about using the correct coordinate system.
16. The map should now be in your list of available background files.

There is also a Batch Export that you can use to move more than one map at a time from Terrain Navigator Pro. This works about the same as a single map. Your downloaded map's coordinate system must match your project's coordinate system.

You can open only one background file at a time in GeoXT. If some of your collected points extend beyond the limits of the background map, then it will not display. You can, however, open several adjoining background files in the GPS Pathfinder and display data points that straddle adjacent backgrounds.

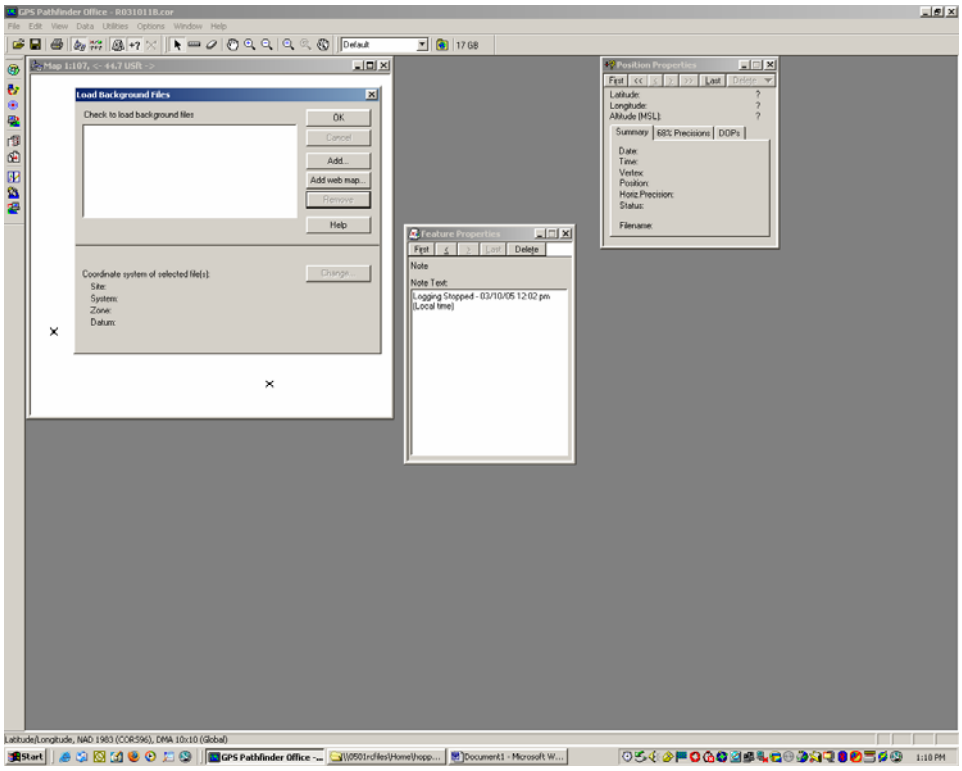
To delete a background file from GeoXT, make sure that it is not currently open by selecting another file or "none" in the "Background file" menu. Then use the File Manager delete option on a background file to be deleted.

When using background files in GeoXT or in GPS Pathfinder Office, it is critical to understand the map projection. In some cases, the background image may be loaded with an incorrectly set datum (for example, NAD 1983 instead of NAD 1927), resulting in inaccurate and misleading representation.

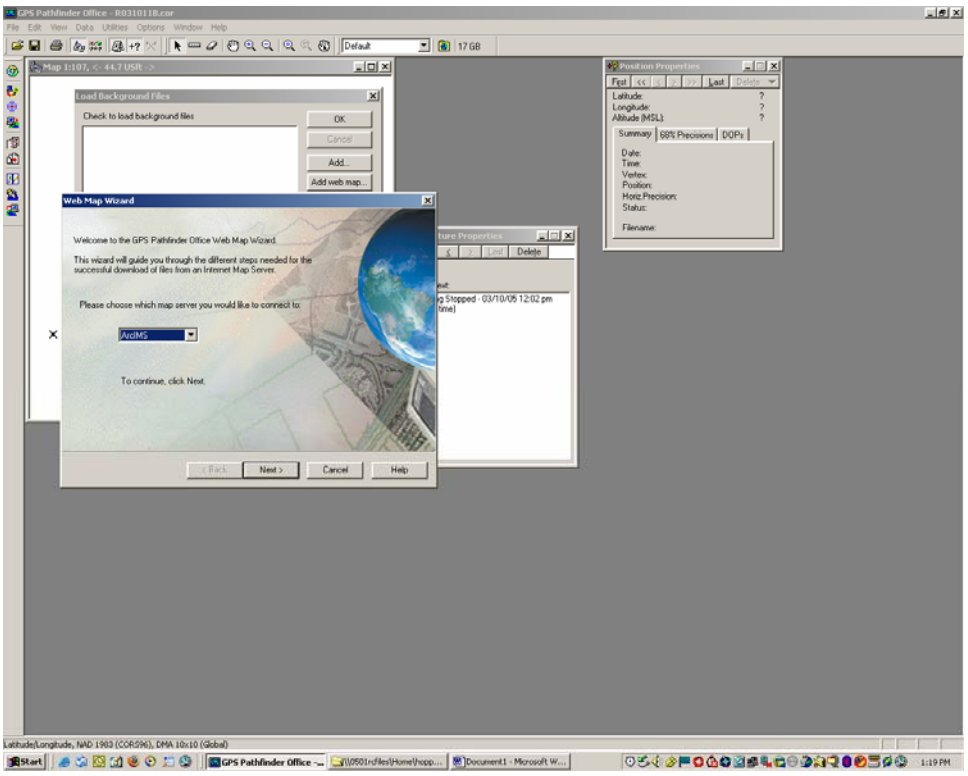
Background images can also be accessed from VDOT ArcIMS map server. This method is particularly suitable for use with the Pathfinder Office software.

The following steps explain how to access the '**roads and jurisdictions**' layer, which is accessible to all Internet users:

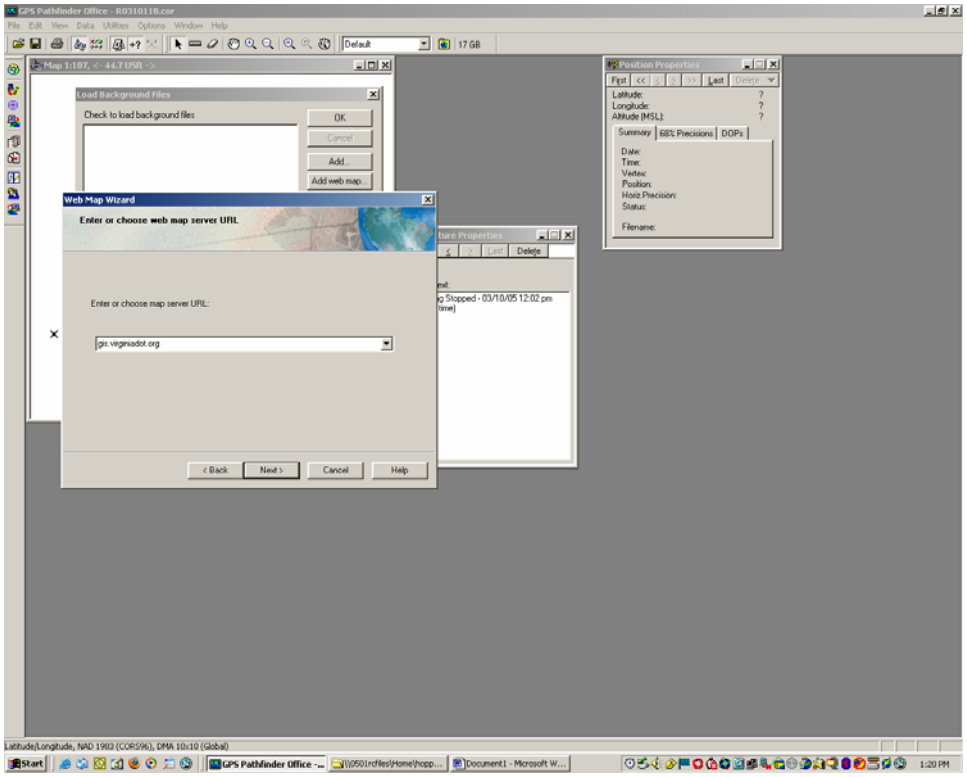
Click on **File -> Background**. The following screen appears:



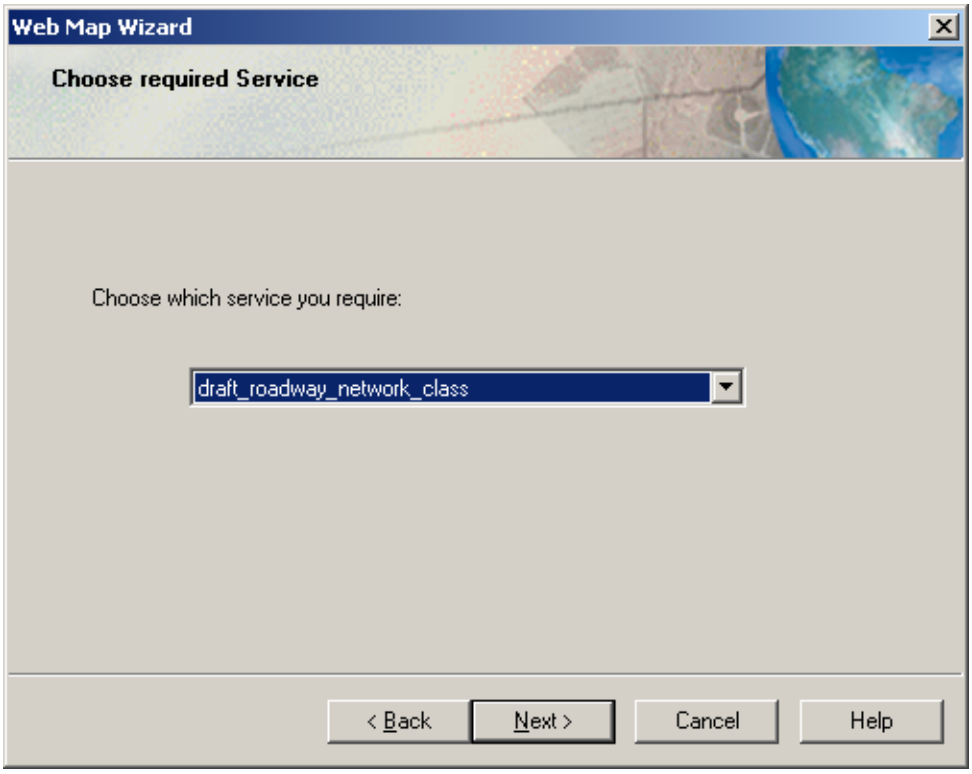
Click on **Add web map**.



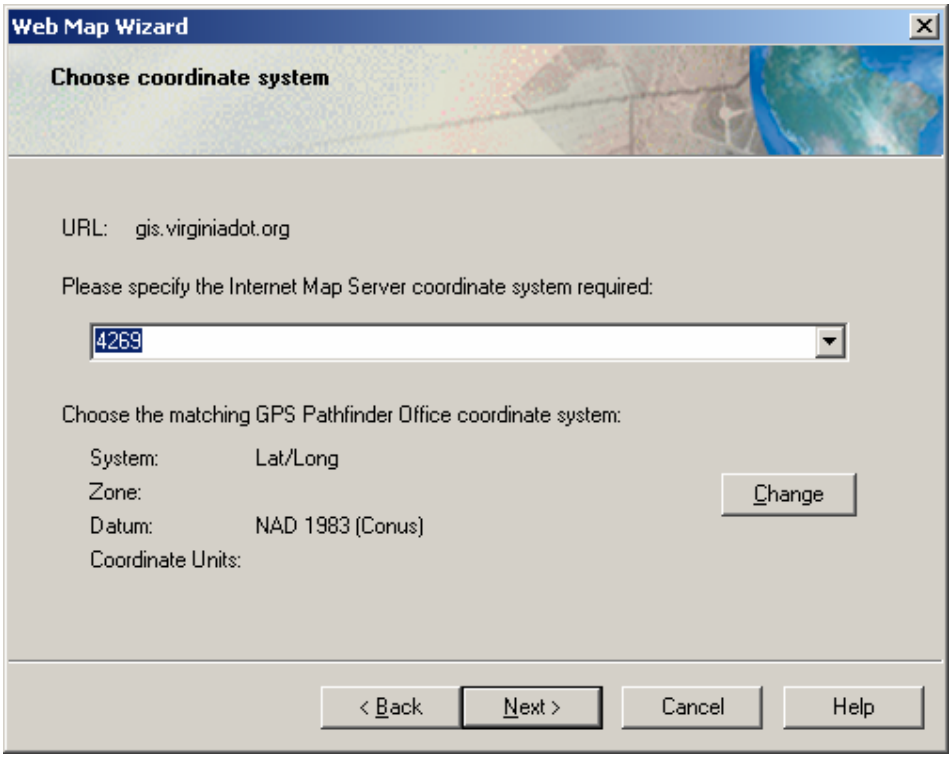
Click on **Next.**



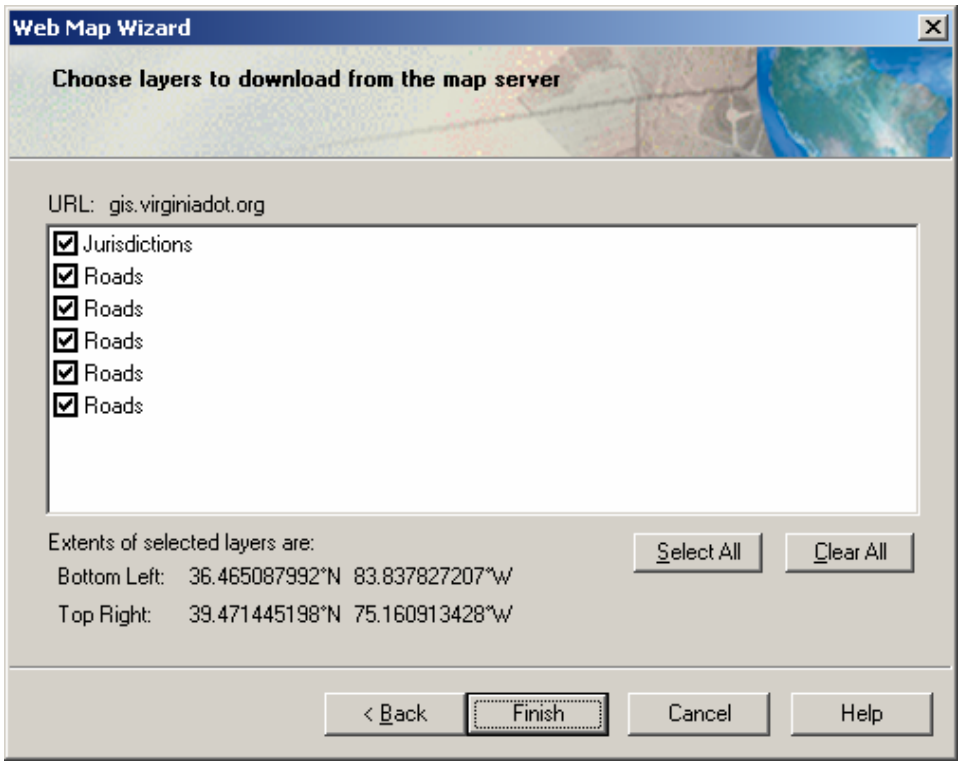
Enter **gis.virginiadot.org** in the pull-down menu and click on **Next**.



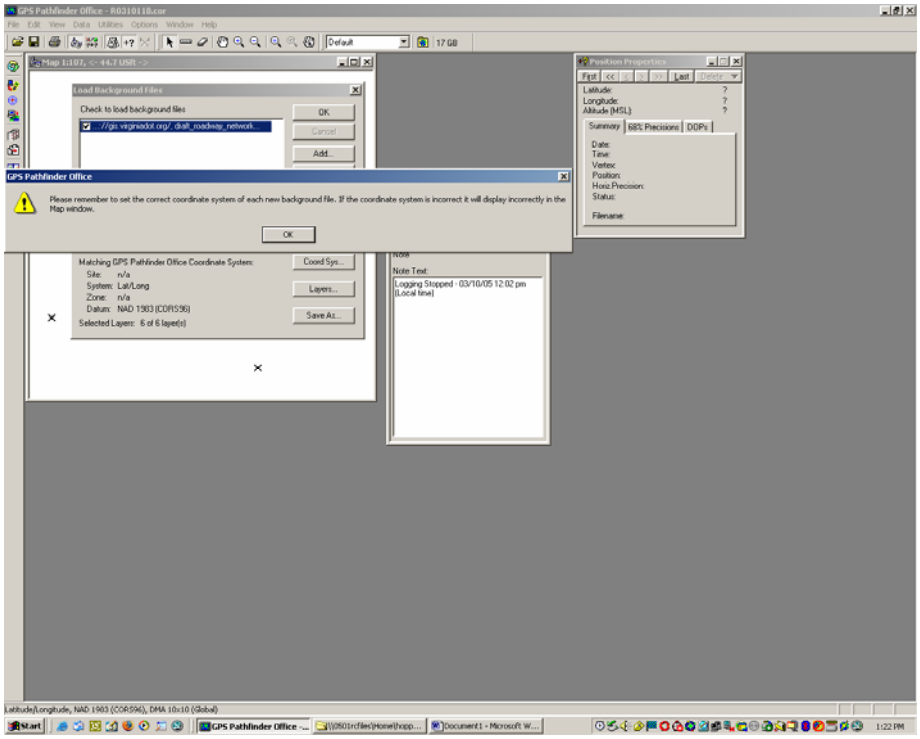
Click on **Next**.



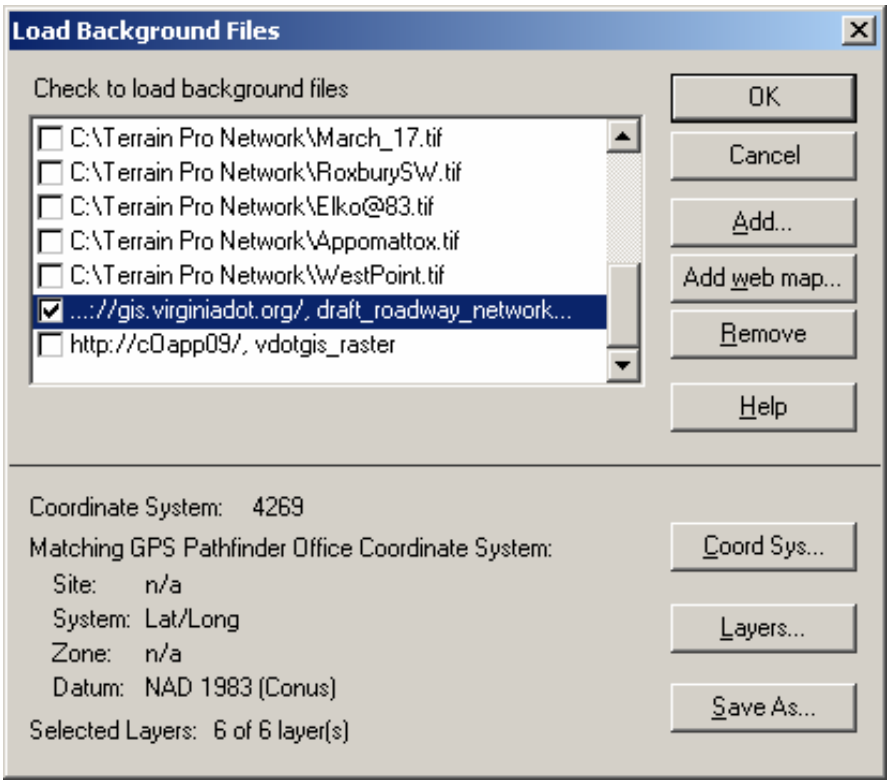
Click on **Next**.



Click on **Finish**.

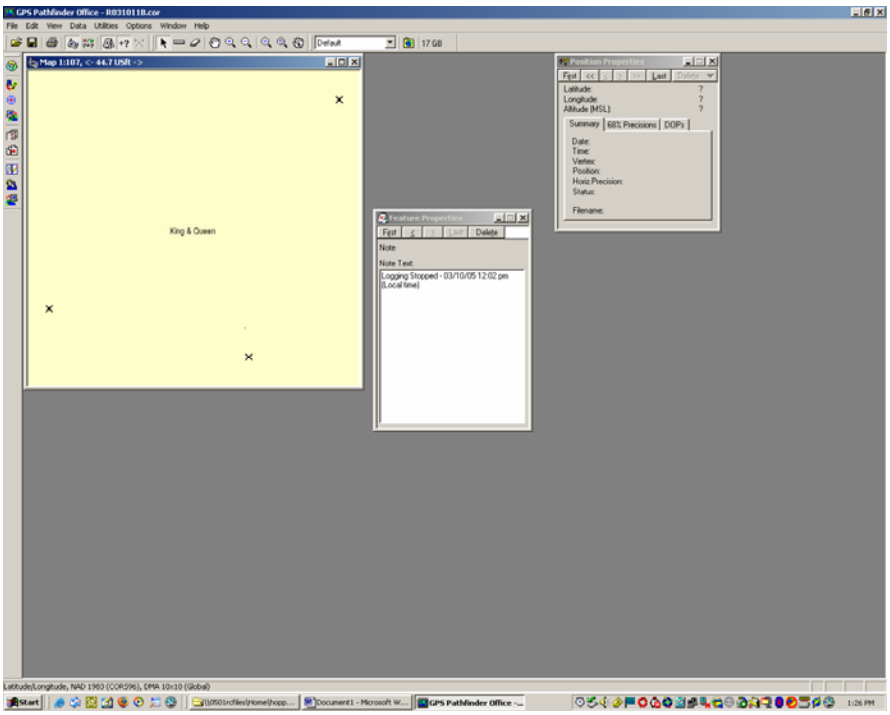


Click on **OK**.

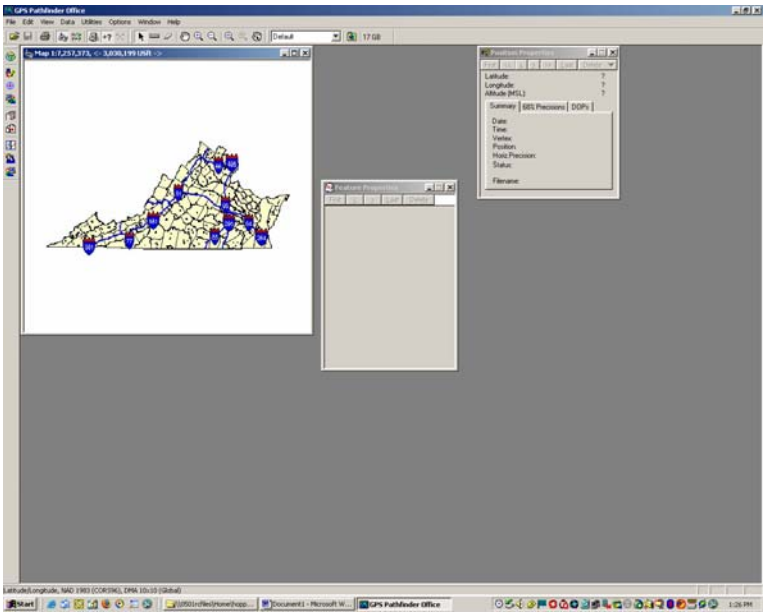


Click on **OK**.

A background map will appear:

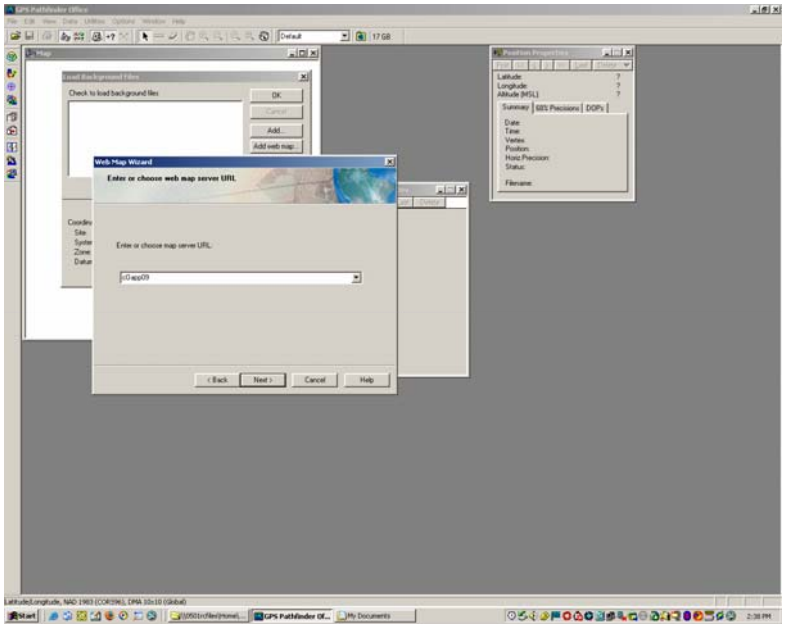


If no GPS file was opened prior to background import, the following background map of Virginia will appear:

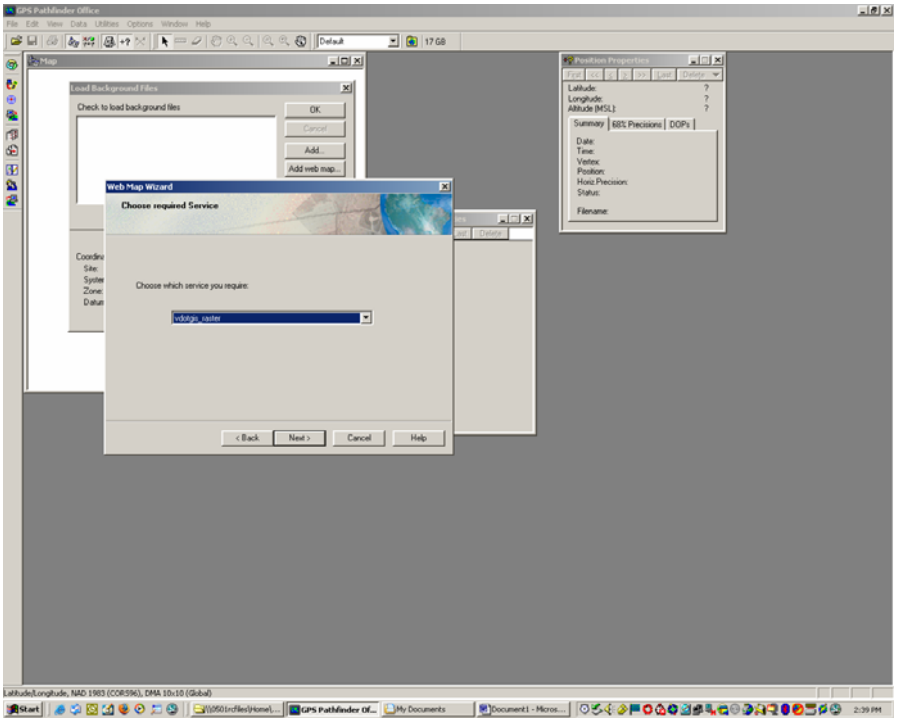


The user can subsequently zoom-in to the location of interest.

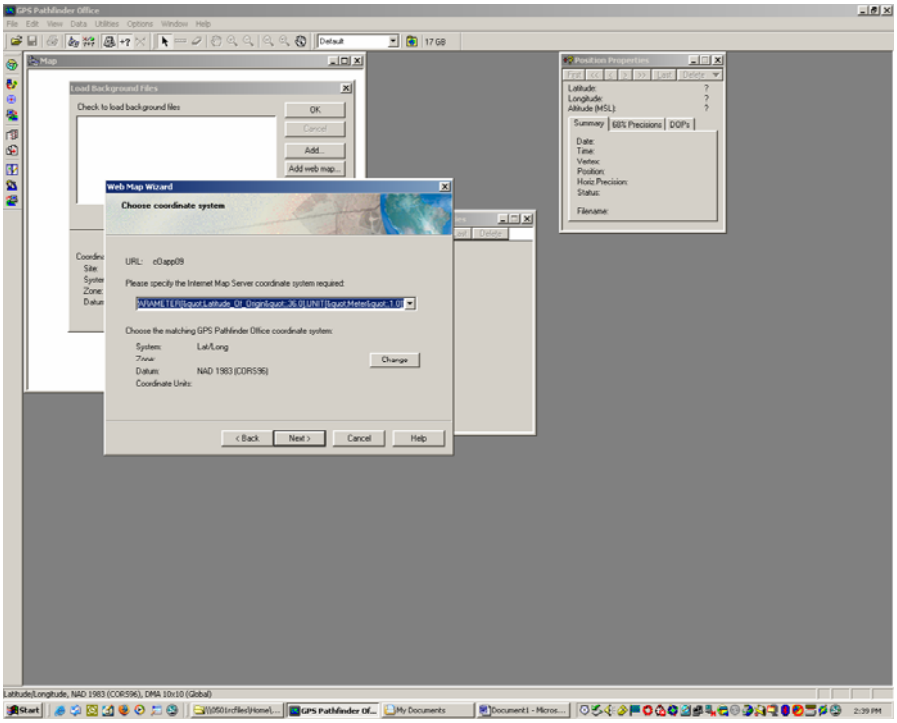
VDOT employees can also access other map server layers (VDOT internal access only), as follows:
Select ArcIMS map server and enter the following URL: COapp09



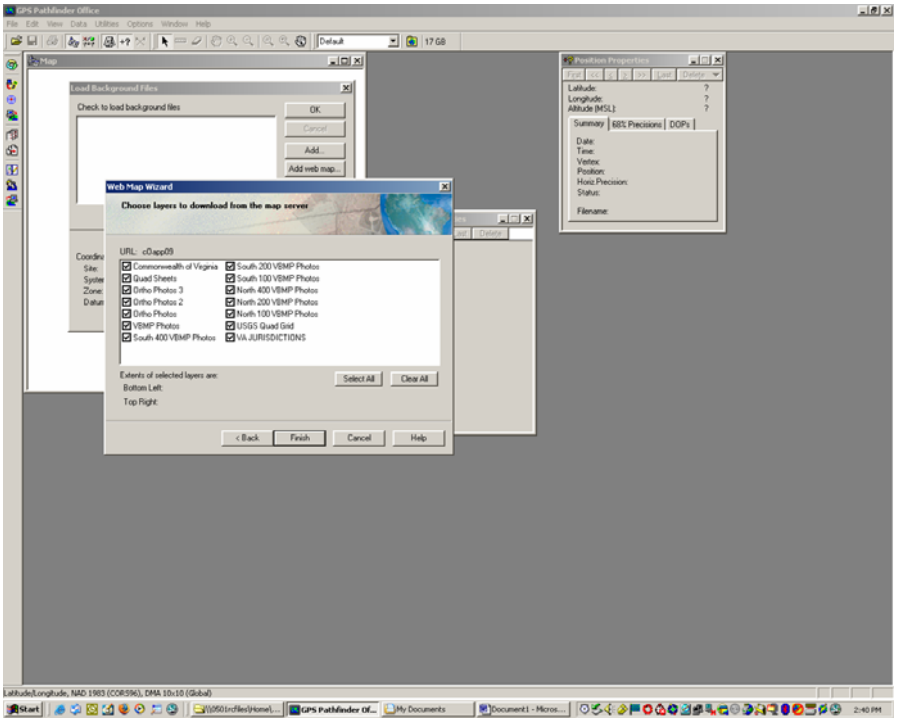
Click on **Next**.



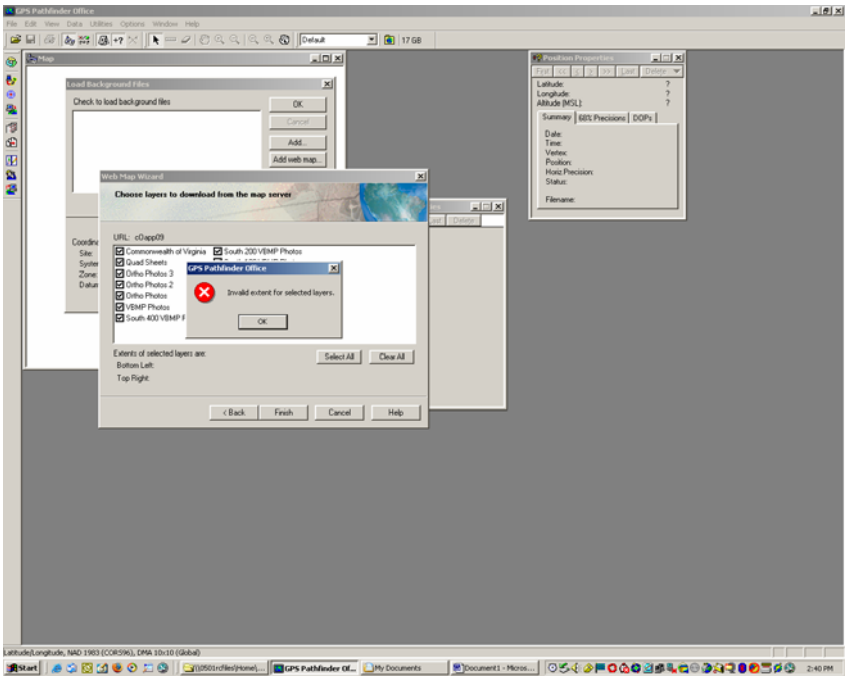
Click on **Next**.



Click on **Next**.



Click on **Clear All** and check one (or more) requested background layer.
Make sure that proper coordinate system is selected. The following message will appear if the coordinate system is not selected properly:



Note: As of August 2005, there are problems with accessing most layers using this method. We are waiting on Trimble to resolve these issues. See Section 10.6.2 for an alternate way of background display.

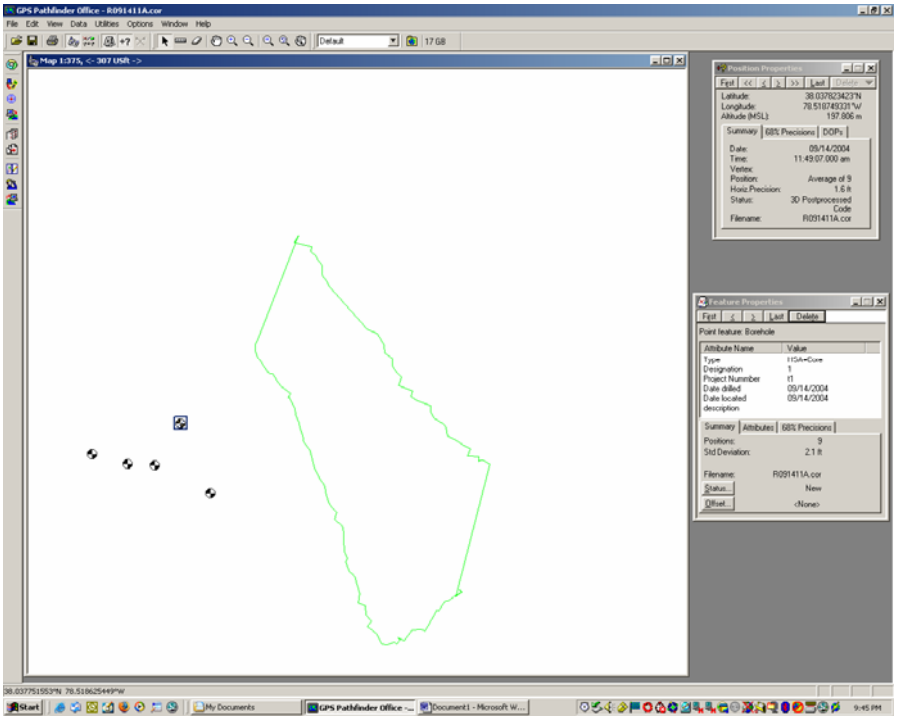
10.4 Differential Correction

All raw GPS data files (***.SSF**) should be differentially corrected using **Pathfinder Office**. In **Utilities -> Differential Corrections -> Base Files -> Internet Search -> New -> Select from the current list** you are provided with a list of base stations in order of proximity. Generally, you want to pick the base station that is at the top of the list or very close to the top. The closer the base station, the better the GPS accuracy. The Integrity Index should be at least in the mid-80s. The resulting file with corrected position coordinates will have a **.COR** extension.

***** IMPORTANT – select a base station referenced to the WGS-84 datum. *****

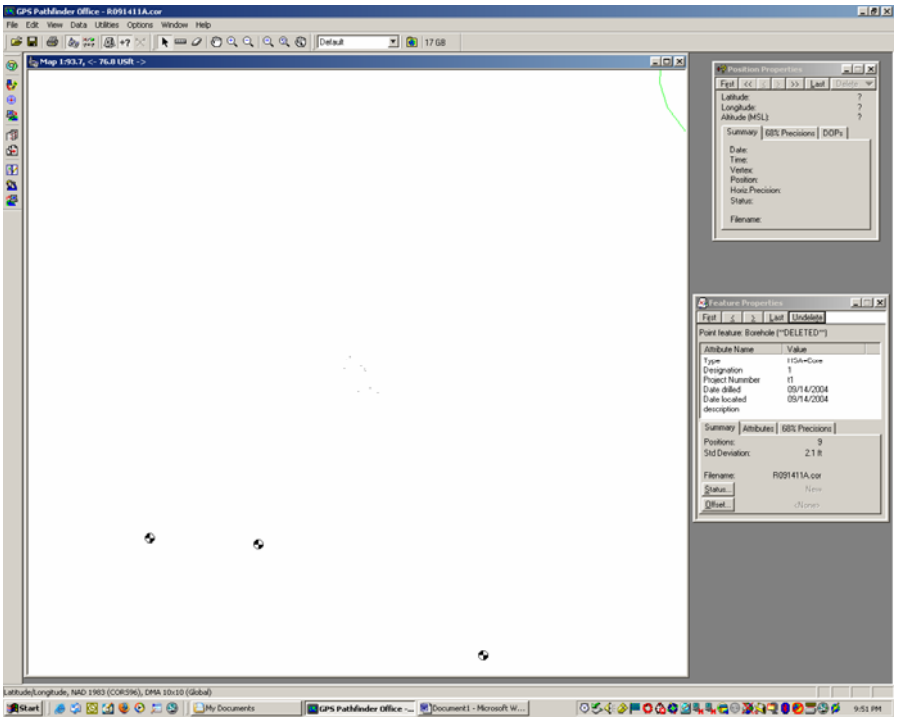
The following steps should be carried out with GPS data:

5. Acquire raw data in GeoXT
6. Transfer data to Pathfinder Office
7. Perform differential correction
8. Manually remove outliers, as follows:

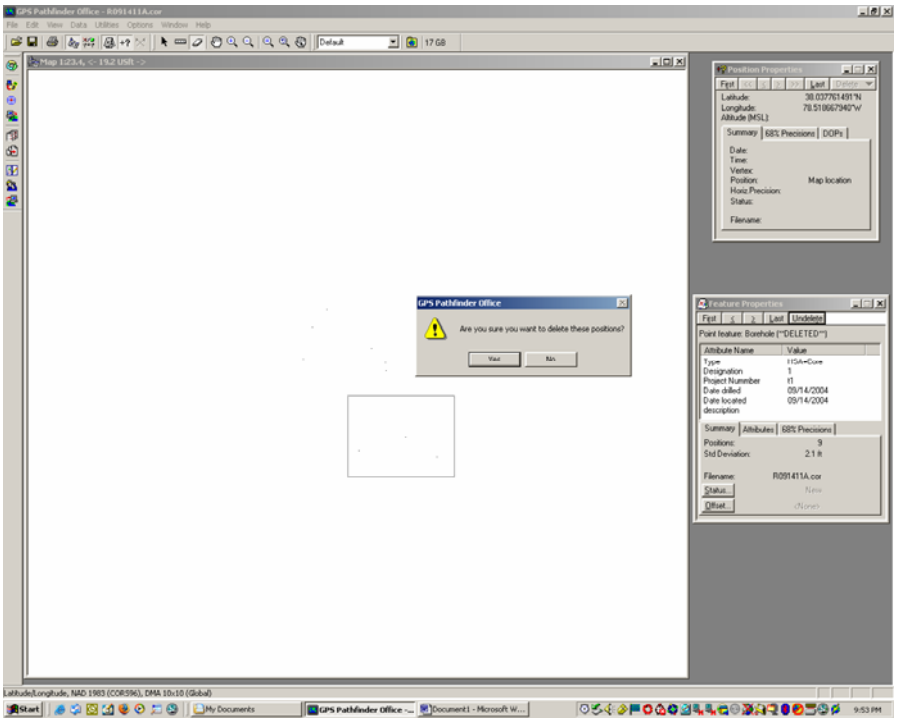


Click on a feature of interest on the Map display, then click on the **Delete** button of the **Feature Properties** window. This operation deletes the feature, but leaves intact

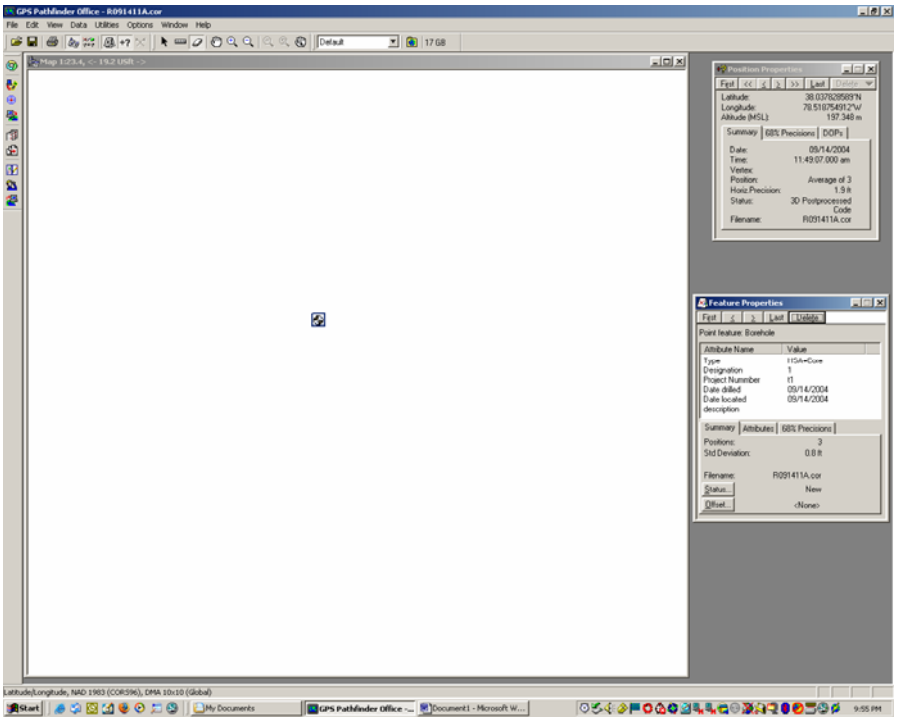
individual points comprising this feature (a **Point** in this example). Zoom into these points, as follows:



Examine all individual points and delete outliers using the eraser icon located in the top bar.



After deleting selective points, go to the **Feature Properties** window and click on the **Undelete** button. Edited point feature appears as follows:



Save the edited file with a **.COR** extension. Use it for export of data to gINT and to GIS applications.

9. Use corrected data with background images, as per section 10.3
10. Export corrected data to other applications, as per section 10.6.

10.5 Map Generation

The following procedure may be used to generate a borehole location map using GPS Pathfinder Office and Adobe Acrobat Professional:

- Start GPS Pathfinder Office.
- Open a corrected (***.cor**) point file.
- Import a background file (topographic quad or aerial image).
- Pan the image so that the area of interest is in the center of the screen.
- Go to File -> Plot Map menu option.
- In the Plot Map menu box:
  - — Check “Plot Border Ticks,” “Plot Lat/Long Border Ticks” (if available), and “Plot Lat/Long Grid.”
  - — Set the scale to some estimated ratio and click on the “Preview” button to see if the resulting cropped image is acceptable.
  - — “Close” the image and keep selecting the scale by trial and error until the resulting image is correct.

- When the scale is set, go back to adjust Grid Interval and Lat/Long Interval.
- If points do not show up, check the Acrobat color setup. Make sure that your points are black.
- Type in a title.
- When the image is finalized, click on the “Setup” button and select “Adobe PDF” as the name of a printer.
- Adjust paper size and orientation if necessary, then click on “OK” to go back to the Plot Map box
- Click on “OK” to generate a compact, report-ready PDF file showing borehole location(s) against a background image.
- To annotate a map, use the ‘**Tools -> Advanced Commenting**’ menu items in Adobe Acrobat or save the image as a postscript file (***.ps**) and then open it for advanced editing in Adobe Photoshop.

Also, see Section 10.6.2.

10.6 Data Export

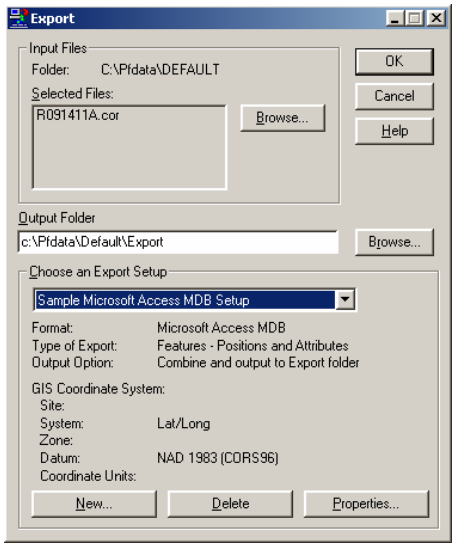
Refer to the Trimble paper on NAD 1983 datum transformation for the background material relevant to this section: NAD83_Datum_Transformation.pdf (available in the **C:\gINT_materials** folder after VDOT.EXE has completed installation).

The NAD 1983 (CORS 96) datum is automatically appended in GPS Pathfinder Office by the installer (file **Current.csd** in C:\Program Files\Common Files\Trimble\GeoData).

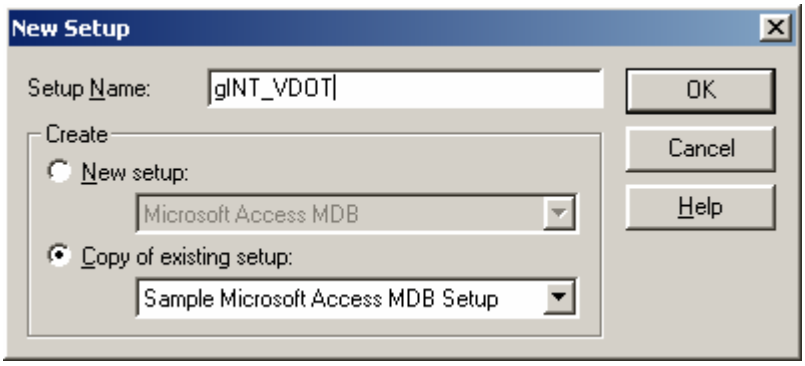
10.6.1 Export to gINT

Additional manual editing is required (only once) to set up correct export filter, as follows:

Go to **Utilities -> Export** and choose ‘**Sample Microsoft Access MDB Setup**’ from a menu drop-down list.

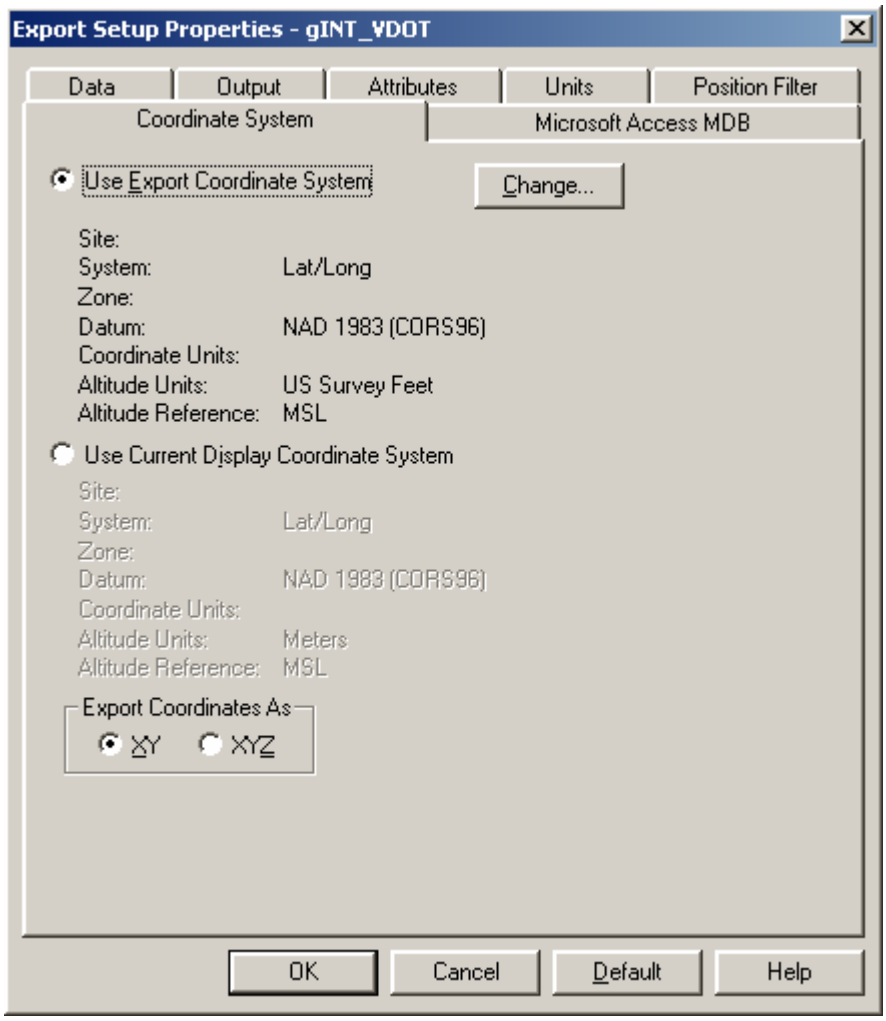


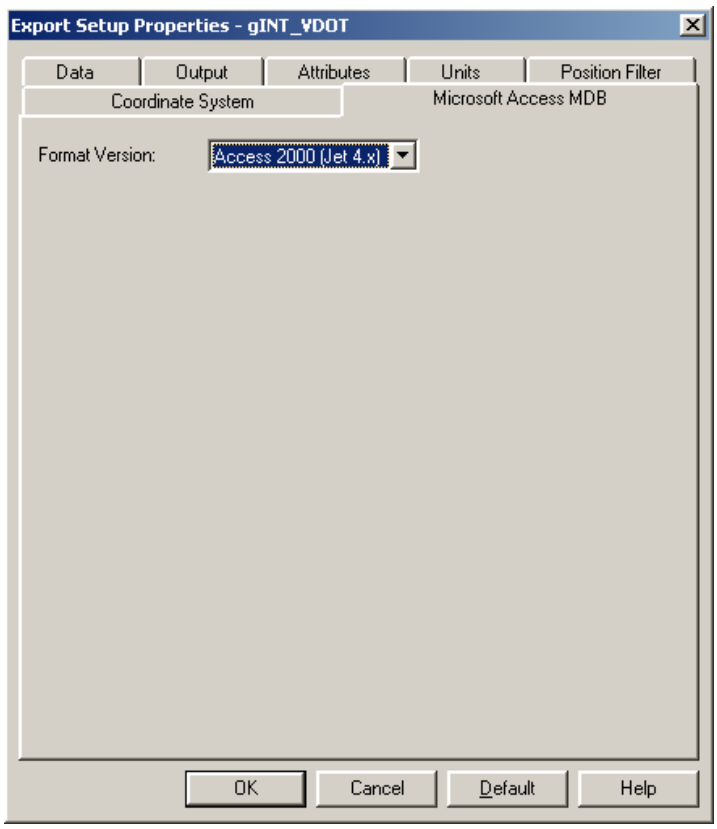
Click on **New.**

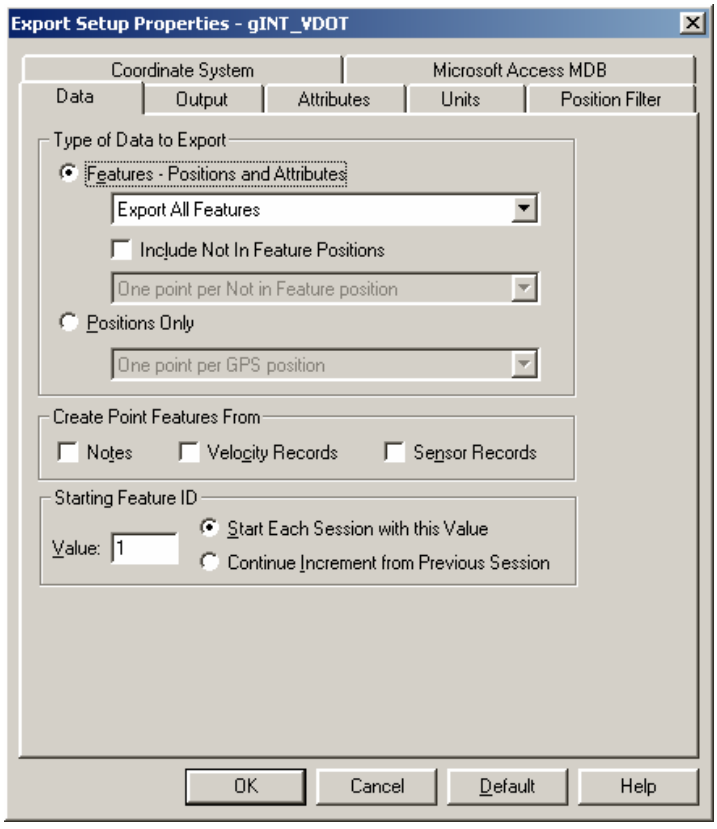


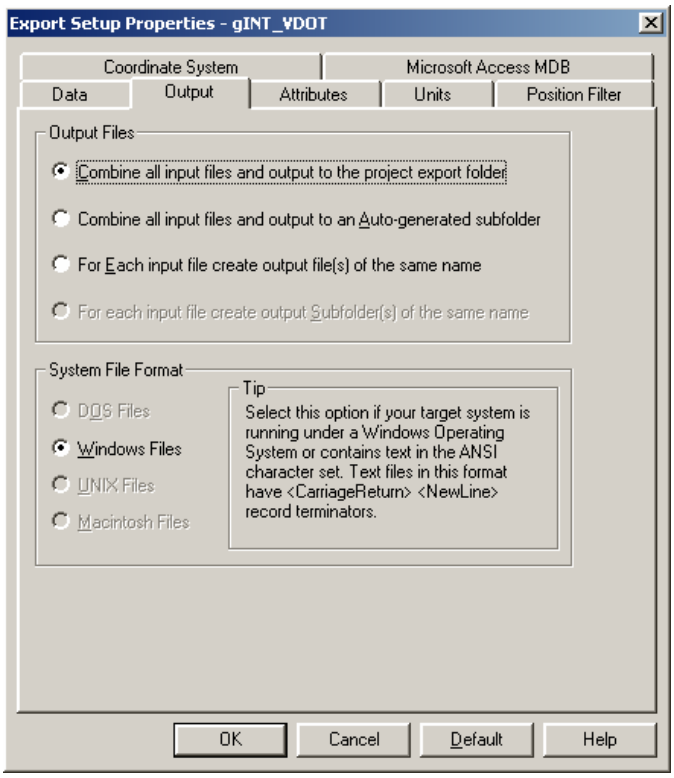
Enter '**gINT_VDOT**' as new Setup Name and click on **OK**.

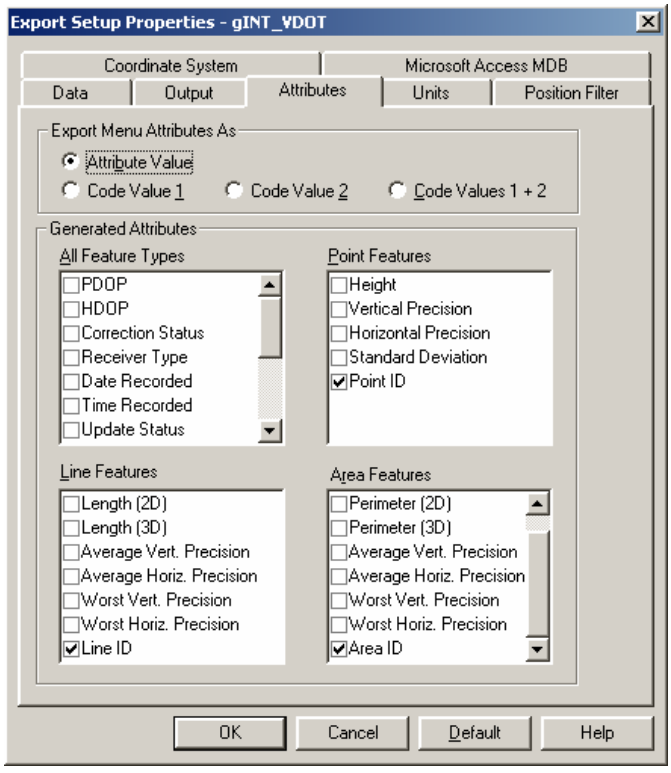
Edit the following settings:

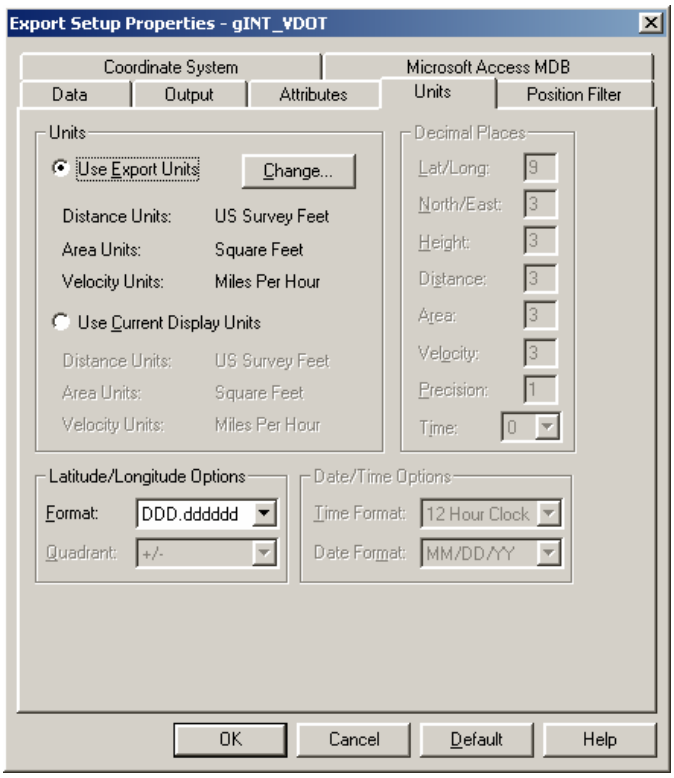



Export Setup Properties - gINT_VDOT
Data
Output
Attributes
Units
Position Filter
Coordinate System
Microsoft Access MDB
Format Version:
Access 2000 (Jet 4.x)
OK
Cancel
Default
Help

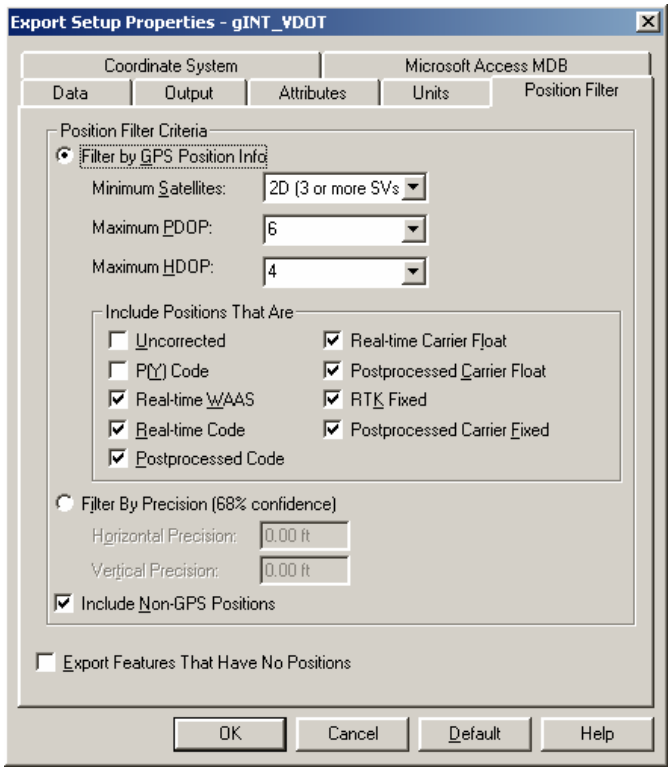

Export Setup Properties - gINT_VDOT
Coordinate System
Microsoft Access MDB
Data
Output
Attributes
Units
Position Filter
Type of Data to Export
Features - Positions and Attributes
Export All Features
Include Not In Feature Positions
One point per Not in Feature position
Positions Only
One point per GPS position
Create Point Features From
Notes
Velocity Records
Sensor Records
Starting Feature ID
Value:
1
Start Each Session with this Value
Continue Increment from Previous Session
OK
Cancel
Default
Help


Export Setup Properties - gINT_VDOT
Coordinate System
Microsoft Access MDB
Data
Output
Attributes
Units
Position Filter
Output Files
Combine all input files and output to the project export folder
Combine all input files and output to an Auto-generated subfolder
For Each input file create output file(s) of the same name
For each input file create output Subfolder(s) of the same name
System File Format
DOS Files
Windows Files
UNIX Files
Macintosh Files
Tip
Select this option if your target system is running under a Windows Operating System or contains text in the ANSI character set. Text files in this format have <CarriageReturn> <NewLine> record terminators.
OK
Cancel
Default
Help


Export Setup Properties - gINT_VDOT
Coordinate System
Microsoft Access MDB
Data
Output
Attributes
Units
Position Filter
Export Menu Attributes As
Attribute Value
Code Value 1
Code Value 2
Code Values 1 + 2
Generated Attributes
All Feature Types
PDOP
HDOP
Correction Status
Receiver Type
Date Recorded
Time Recorded
Update Status
Point Features
Height
Vertical Precision
Horizontal Precision
Standard Deviation
Point ID
Line Features
Length (2D)
Length (3D)
Average Vert. Precision
Average Horiz. Precision
Worst Vert. Precision
Worst Horiz. Precision
Line ID
Area Features
Perimeter (2D)
Perimeter (3D)
Average Vert. Precision
Average Horiz. Precision
Worst Vert. Precision
Worst Horiz. Precision
Area ID
OK
Cancel
Default
Help



Type-in **6** for “Maximum PDOP” and **4** for “Maximum HDOP”



Click on **OK** to save **gINT_VDOT** export settings.

It is important to minimize any manual transcribing of data from a GPS unit into a gINT project file. The following procedure may be used to automatically transfer differentially corrected data, acquired using the '**Borehole**' feature selected from the VDOT dictionary, into a gINT project file (VTRC2.GDT, SOIL2.GDT, and CPTU2.GDT data structures):

- Start Pathfinder Office.
- Make sure that the coordinate system is set to Latitude/Longitude and NAD 1983 (CORS 96) Datum (go to Options -> Coordinate System).
- Open a corrected GPS file.
- Go to **Utilities -> Export**.
- Select '**gINT_VDOT**' in the "Choose an Export Setup" selection box.
- Click on 'OK' to process. The resulting database file will have the same name as the GPS data file, but with an **.mdb** extension. The output folder in the preceding example is C:\Pfdata\Default\Export.
- Start gINT.
- Create a new project file (**New project -> Clone data template**).
- Go to **File -> Import/Export -> Import from Database**. The "Import Data from Database" dialog box is displayed.
- Select a database file (***.mdb**) created as outlined above (select file type first).
- Select a correspondence file – **gps_vtrc2.gci** for **VTRC2.GDT** template, **gps_soil2.gci** for **SOIL2.GDT** template, or **gps_cptu2.gci** for **CPTU2.gdt** template.
- Leave the other selections as they are.
- Click on '**OK**'.

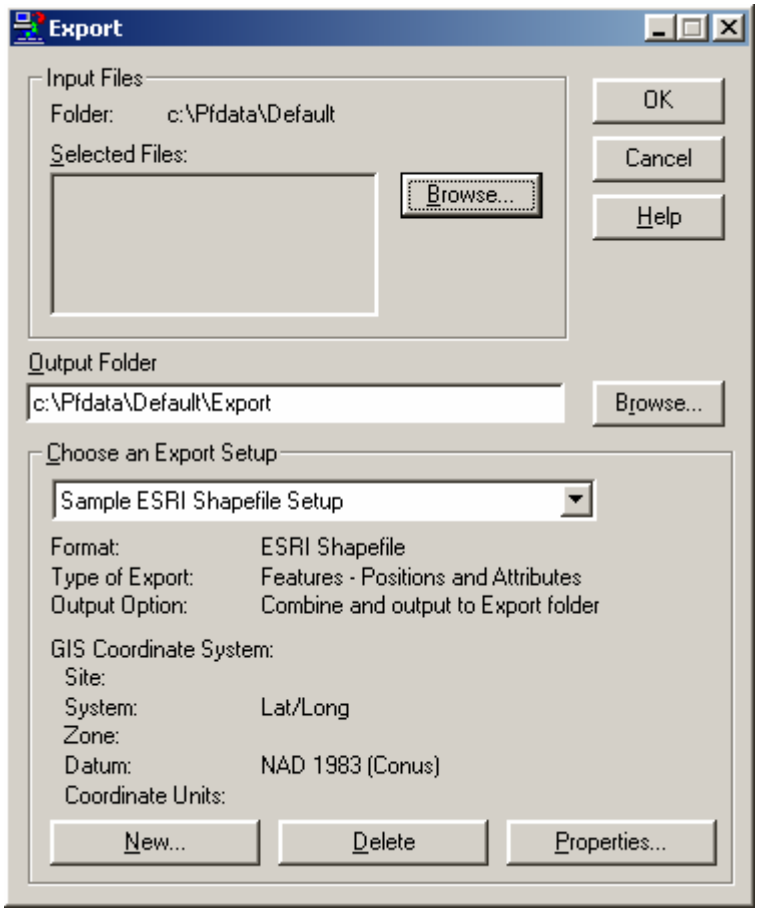
The resulting import process will populate an empty gINT project file with corrected GPS data corresponding to borehole locations. All borehole depths are initially set to "**999**" and elevations to "**99.99**." They must be edited to reflect true values (along with any other data pertaining to boreholes). It is also possible to import GPS data into an already partially populated gINT project file. In this case use **gps_xxxx3.gci** files and change "**Overwrite Options**" from "**Never**" to "**Records**" in the "**Import data from database**" menu box.

10.6.2 Export to ESRI ArcGIS Desktop

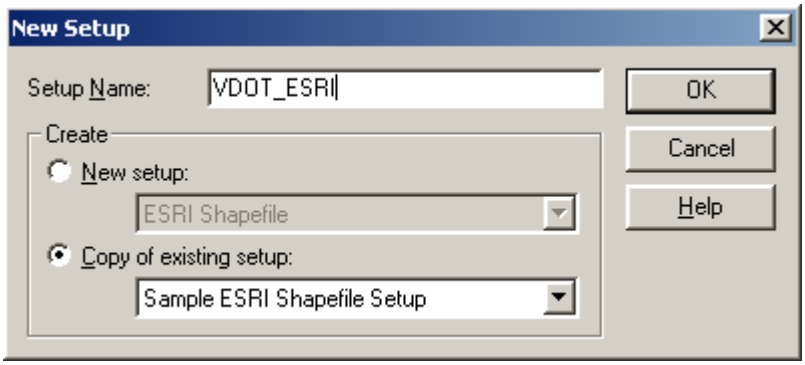
Exporting GPS data from Pathfinder Office to ESRI ArcGIS Desktop allows more flexibility with map generation for reports.

Manual edit is required (only once) to set up correct export filter, as follows:

Go to **Utilities -> Export** and select '**Sample ESRI Shapefile Setup**' from the menu drop-down list.

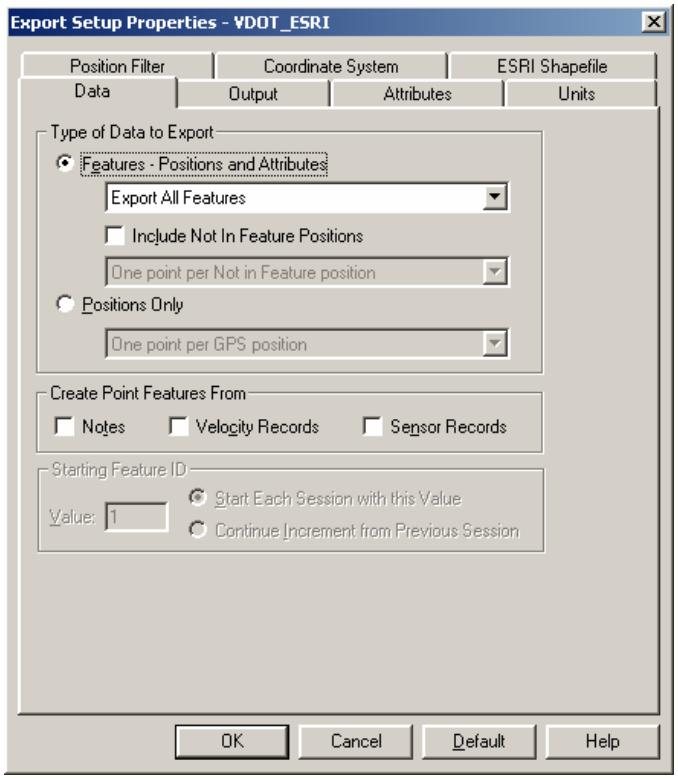


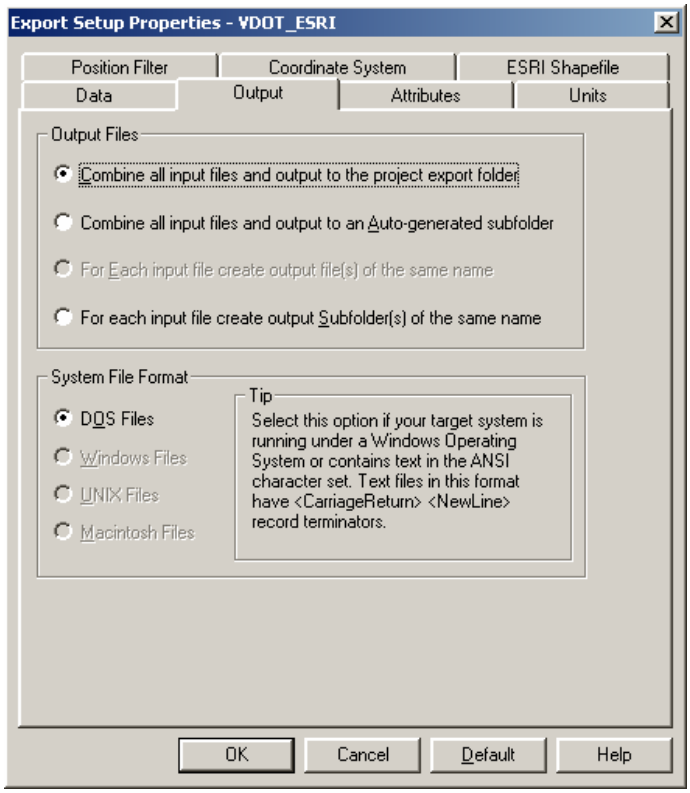
Click on **New…**

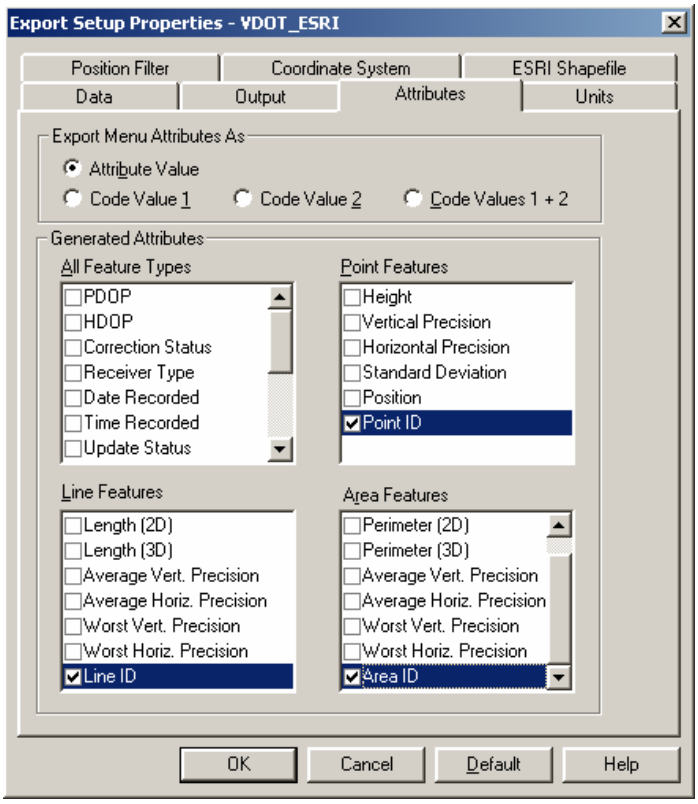


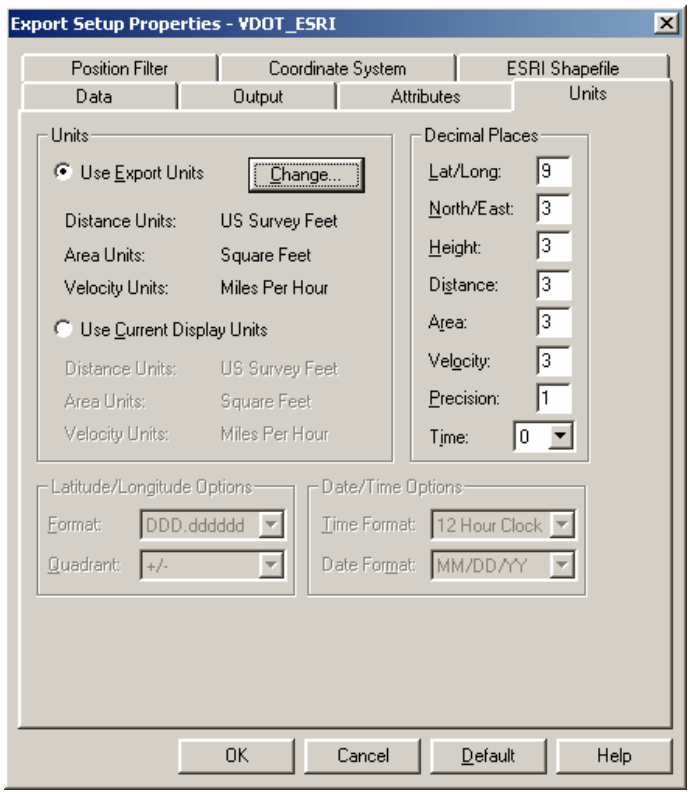
Enter '**VDOT_ESRI**' as new Setup Name and click on **OK.**

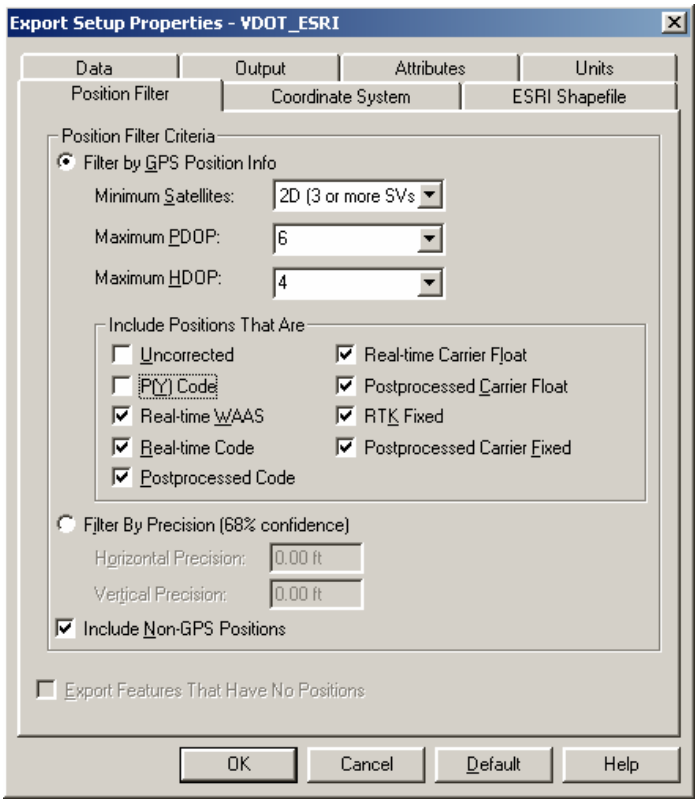
Edit the following settings:

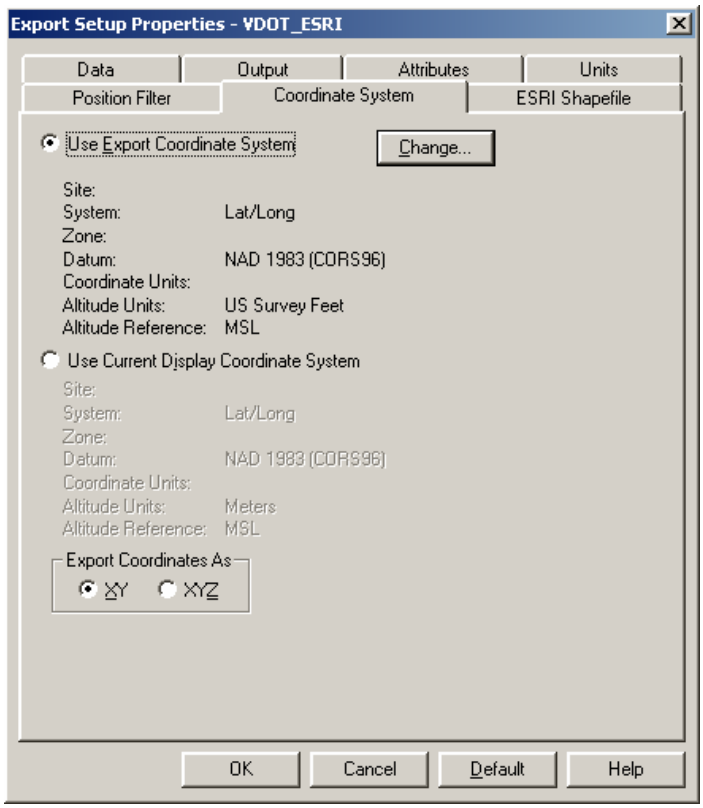


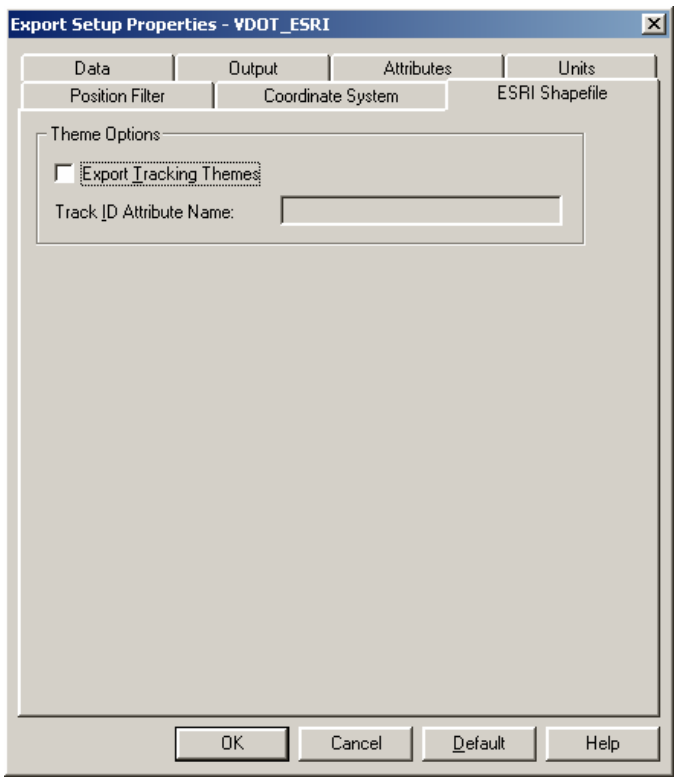



Export Setup Properties - VDOT_ESRI
Position Filter
Coordinate System
ESRI Shapefile
Data
Output
Attributes
Units
Export Menu Attributes As
Attribute Value
Code Value 1
Code Value 2
Code Values 1 + 2
Generated Attributes
All Feature Types
PDOP
HDOP
Correction Status
Receiver Type
Date Recorded
Time Recorded
Update Status
Point Features
Height
Vertical Precision
Horizontal Precision
Standard Deviation
Position
Point ID
Line Features
Length (2D)
Length (3D)
Average Vert. Precision
Average Horiz. Precision
Worst Vert. Precision
Worst Horiz. Precision
Line ID
Area Features
Perimeter (2D)
Perimeter (3D)
Average Vert. Precision
Average Horiz. Precision
Worst Vert. Precision
Worst Horiz. Precision
Area ID
OK
Cancel
Default
Help


Export Setup Properties - VDOT_ESRI
Position Filter
Coordinate System
ESRI Shapefile
Data
Output
Attributes
Units
Units
Use Export Units
Change...
Distance Units: US Survey Feet
Area Units: Square Feet
Velocity Units: Miles Per Hour
Use Current Display Units
Distance Units: US Survey Feet
Area Units: Square Feet
Velocity Units: Miles Per Hour
Decimal Places
Lat/Long: 9
North/East: 3
Height: 3
Distance: 3
Area: 3
Velocity: 3
Precision: 1
Time: 0
Latitude/Longitude Options
Format: DDD.dddddd
Quadrant: +/-
Date/Time Options
Time Format: 12 Hour Clock
Date Format: MM/DD/YY
OK
Cancel
Default
Help

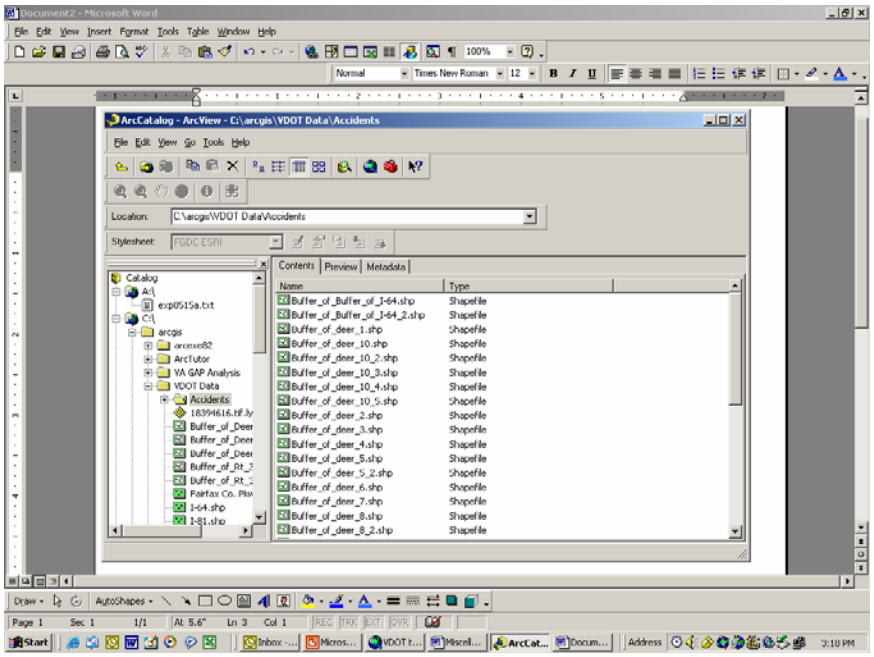

Export Setup Properties - VDOT_ESRI
Data
Output
Attributes
Units
Position Filter
Coordinate System
ESRI Shapefile
Position Filter Criteria
Filter by GPS Position Info
Minimum Satellites:
2D (3 or more SVs
Maximum PDOP:
6
Maximum HDOP:
4
Include Positions That Are
Uncorrected
P(Y) Code
Real-time WAAS
Real-time Code
Postprocessed Code
Real-time Carrier Float
Postprocessed Carrier Float
RTK Fixed
Postprocessed Carrier Fixed
Filter By Precision (68% confidence)
Horizontal Precision:
0.00 ft
Vertical Precision:
0.00 ft
Include Non-GPS Positions
Export Features That Have No Positions
OK
Cancel
Default
Help


Export Setup Properties - VDOT_ESRI
Data
Output
Attributes
Units
Position Filter
Coordinate System
ESRI Shapefile
Use Export Coordinate System
Change...
Site:
System: Lat/Long
Zone:
Datum: NAD 1983 (CORS96)
Coordinate Units:
Altitude Units: US Survey Feet
Altitude Reference: MSL
Use Current Display Coordinate System
Site:
System: Lat/Long
Zone:
Datum: NAD 1983 (CORS96)
Coordinate Units:
Altitude Units: Meters
Altitude Reference: MSL
Export Coordinates As
XY
XYZ
OK
Cancel
Default
Help

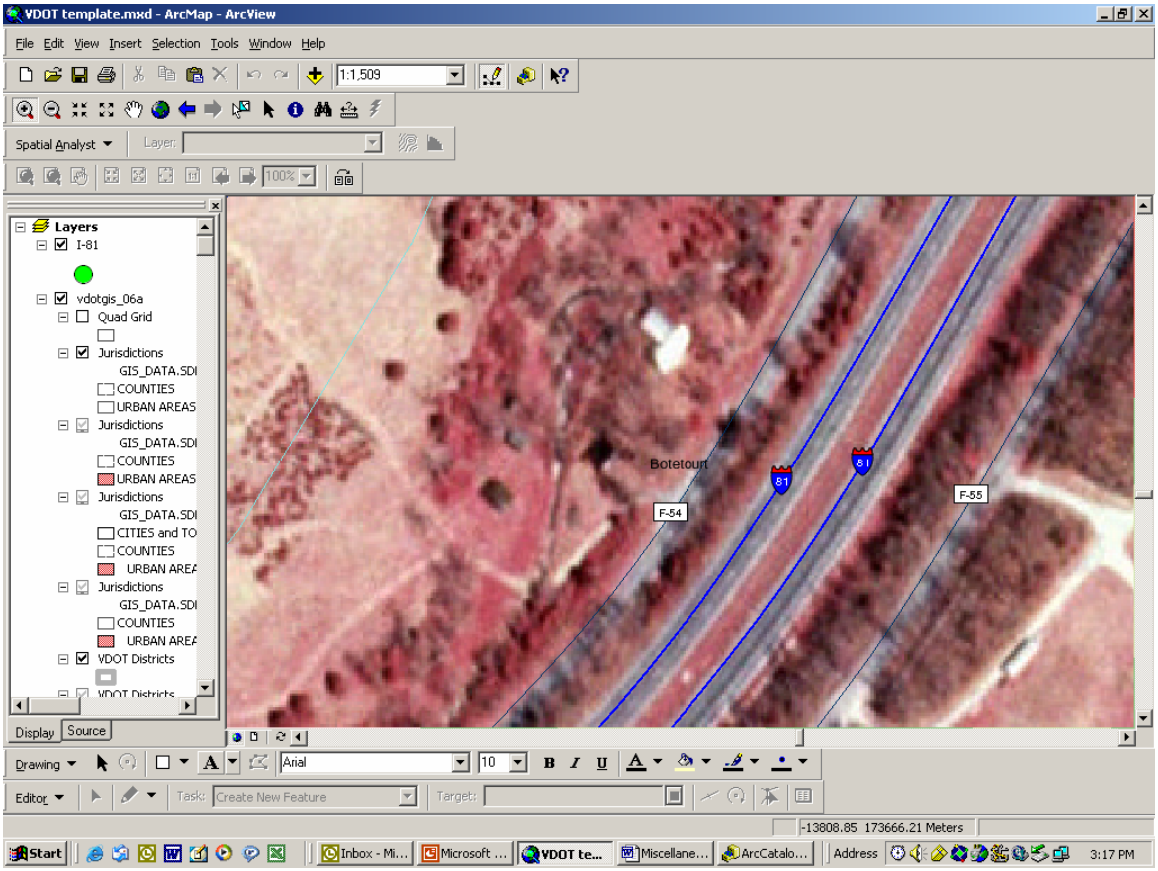


Click on **OK** to save **VDOT_ESRI** export settings.

The use of VDOT_ESRI export filter on a corrected GPS file (*.cor) will result in the creation of three output files: *.shp, *.shx, and .dbf, forming a single layer. These files can be subsequently accessed in ArcGIS through the Add Data command. Specify the relevant shapefile (*.shp), as follows:



Various background maps (layers) can be accessed, as per the following example:



The following steps describe how to access VDOT ArcIMS servers to obtain background maps:

From: Donaldson, Bridget M.
Sent: Monday, May 16, 2005 3:27 PM
To: Hoppe, Edward J.
Subject: GIS Integrator

Hi Ed

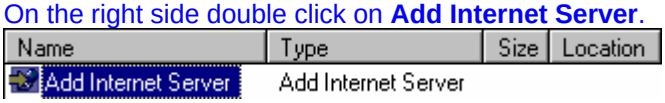
Below is the email on how to access VDOT's GIS data. Choose the newer **vdotgis_06** rather than the **vdotgis_05d** that the instructions mention.

-----Original Message-----
From: CO Data Management GIS
Sent: Friday, March 26, 2004 9:42 AM
To: Donaldson, Bridget M.
Cc: CO Data Management GIS
Subject: RE: question on GIS Integrator

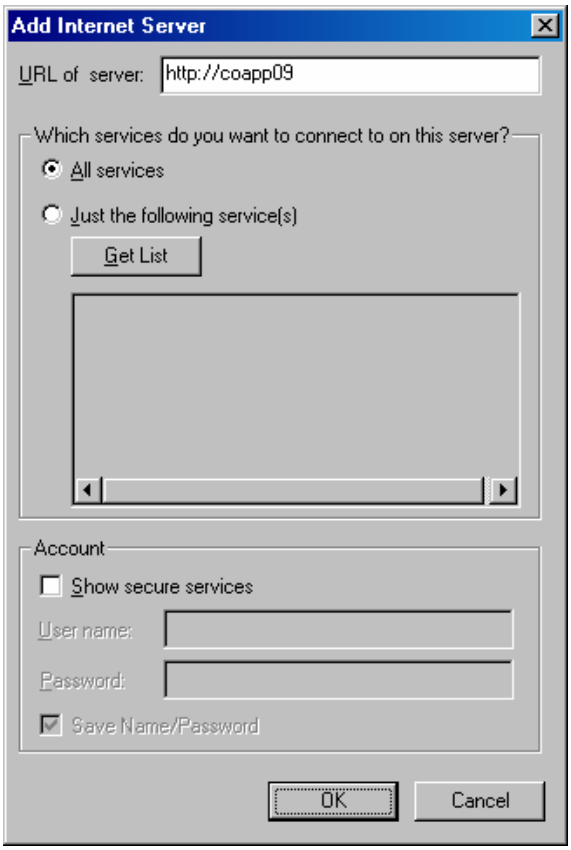
Bridget,
You may connect to this data through our mapservice which servers up the same data through the Integrator.

1. Start ArcCatalog
2. In the Catalog Tree select **Internet Servers**.

3. On the right side double click on **Add Internet Server**.

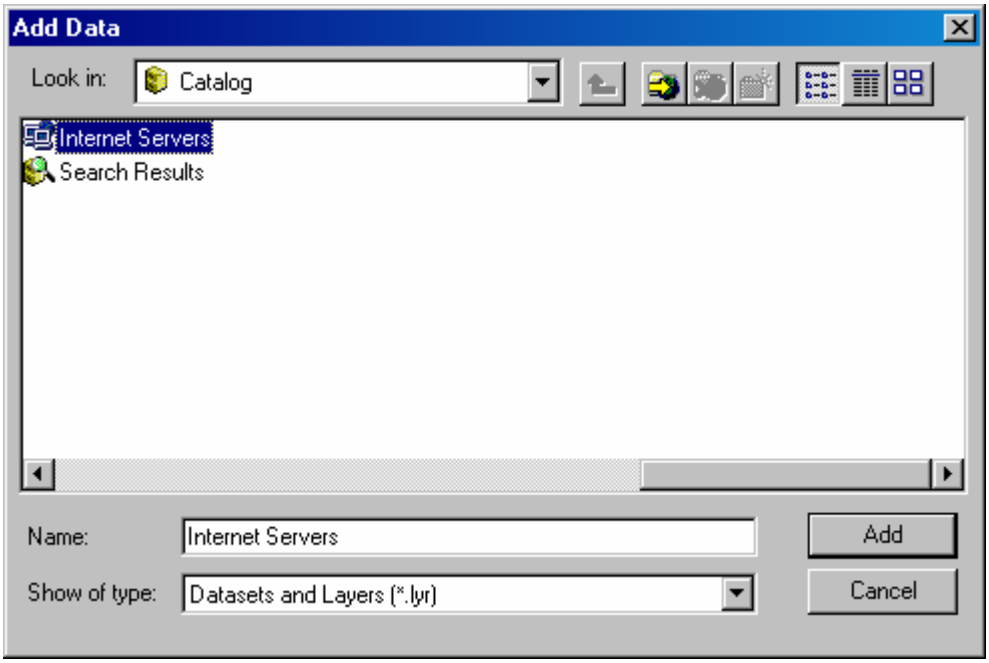


4. This will bring up the **Add Internet Server** window. In the **URL of server** box type **<http://coapp09>** and click **OK**.



5. Then you can startup ArcMAP and add the **vdotgis_05d** ArcIMS mapservice by clicking on the Add

Data  button and double clicking on **Internet Servers** then double clicking on coapp09 and selecting the **vdotgis_05d** ArcIMS mapservice and clicking add.



6. This service is updated every so often so you will have to check back to see if there is a new version out. You will also see a **vdotgis_06** ArcIMS Image Service which will be our next release. But for now just use the **vdotgis_05d** ArcIMS Image Service.

If you have any questions please let me know.

Thanks

Stephen M. Barbie
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GIS Program
Information Technology Applications Division
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Stephen.Barbie@VirginiaDOT.org

11.0 RSS

RSS is a form of XML that offers the convenience of scanning the latest web postings. To get started, you need an RSS-based news reader. A large number are available for free download. They include the following:

Aggie
FeedDemon
Sage plug-in for Firefox web browser
IntraVnews

NetNewsWire
RSS Viewer

You can use the RSS feed to keep up with the updates to **gINT** and **VDOT.EXE**.
The following setup will accomplish this task:

1. Download and install **Firefox** web browser.
   http://www.mozilla.org/

2. Download and install **Sage** (add-on RSS reader).
   Copy and paste this link into your web browser:
https://addons.update.mozilla.org/extensions/moreinfo.php?application=firefox&id=77&vid=1147

3. Open **Sage** under the Tools menu in Firefox (or type **Alt-s**).

4. Go to http://matrix.vtrc.virginia.edu/ginthelp/info.shtml

5. Click on '**Discover Feeds**' icon (magnifying glass) of Sage, then click on the discovered feed, and click on '**Add Feed**'.

This will allow you to detect the latest version of this software package and the latest gINT updates using Firefox web browser.

Last modified on 1/23/2006 by

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Senior Research Scientist
Virginia Transportation Research Council
530 Edgemont Rd.
Charlottesville, VA 22903-2454
