The Launch of COSINE 2010

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Introduction

The Ontario provincial geodetic control database system known as COSINE (COntrol Survey INformation Exchange) has received a major upgrade to the graphics component of the software suite, including COSINE On-Line (the web-based COSINE Retrieval Interface). This represents a significant step forward for COSINE in terms of the accuracy and currency of the map data displayed, as well as the addition of important new map themes or layers. The new map themes or layers that have been added allow the surveying community to better relate the geodetic control to the topography and lot fabric of this province. Because these changes are so significant to COSINE, the new version of COSINE is being referred to as COSINE 2010. COSINE 2010 was launched on the Internet (www.cosine.mnr.gov.on.ca) on Monday, September 13, 2010 with a new look for the COSINE Homepage.

The primary purpose of this article is to provide guidance and assistance to users who are new to COSINE or to users who have yet to make regular use of the new graphical/map-based interface associated with COSINE 2010. This article also attempts to answer some of the recurring questions that have been raised by those making regular use of COSINE 2010 and highlight how some of the approaches to common activities have changed between COSINE 2010 and the previous version.

COSINE 2010 Map Display

The new map display for COSINE 2010 is based upon current provincial mapping at scales of 1:10,000 for southern and central Ontario and 1:20,000 for northern Ontario and is provided via the Land Information Ontario (LIO) Warehouse. This is the current mapping product for the province and is maintained in terms of its currency through an update process. This map-display "back drop" system is provided to a number of other web-based mapping applications such as LIO Make-a-Map, Geographic Names Feature and Extent Map Search Facility, Crown Land Use Policy Atlas, etc. The current provincial mapping used for the map-display "back drop" is provided to the COSINE graphical/map- display user through WMS (Open GIS Consortium - Web Mapping Services) and the IMF (Internet Mapping Framework) Tool-set. Unlike the old graphical/map-display which required use of the AutoDesk Map-Guide® Server on MNR's servers and the AutoDesk Map-Guide® Browser Plug-In (which was only available for Microsoft Internet Explorer®), the new WMS and

IMF based map- display has been tested and is compatible with any of the current major web-browsers such as Microsoft Internet Explorer®, Mozilla FireFox®, Google Chrome®, and Apple Safari®, without any requirement for a plug-in. Without the need for any web-browser plug-in COSINE users can choose whatever web-browser they prefer based upon features, security and performance. It is suggested that COSINE users try different web-browsers to determine which offers the most responsive system for them when using the graphical/map-display in COSINE 2010.

NOTE: In order to achieve the best understanding of how the revised graphical/map-based interface works in COSINE 2010, it is recommended that a current COSINE account holder access COSINE On-Line and log into their account. Then while reading the remainder of this article, they can view the changes and updates on screen while following the discussion in the text that follows.

The inclusion of much more accurate topographic base mapping for use within COSINE 2010 is complemented by the current Ontario Road Network data which provides an accurate and consistent view of Ontario's roads both within and outside municipalities. Additional map layers are also provided to assist the surveyor in locating and relating the geodetic control shown on the map display to the actual landscape on the ground in which the survey will be under-taken. These additional map layers include LandSat 7 Satellite Imagery, Digital Ortho-rectified Photography and the "line-work" for the Ontario Assessment Parcel. Each of these map layers offers the surveyor the opportunity to better understand where and how the horizontal and vertical

New Map Layers in Ontario-wide View from COSINE.

control relates to the topography and lot fabric. It is recommended that the COSINE user only turns on these additional map-layers when zoomed into the actual area of the project to ensure the best possible performance of the COSINE map display.

The functionality from the older version of the map-display in COSINE has been maintained in COSINE 2010, although not necessarily in exactly the same way. On the left of the main map-display are three tabs – Layers, Legend, and Find Location. The Layers Tab shows each of the different themes or map layers that can be displayed, including the horizontal and vertical stations, NAD83-CSRS stations, roads and highways, cities, towns and villages, lakes and large rivers, rivers, counties, townships, railways, Assessment Parcel, LandSat Imagery, and Ortho-rectified Photography. For the horizontal and vertical stations and the NAD83-CSRS stations a small tag appears to the right. These tags toggle station labels on or off for either the horizontal and vertical stations or the NAD83-CSRS stations. These tags or icons are initially greyed-out, meaning that they are disabled. To enable the tag the user must zoom-in to 1:250,000 scale or below for the NAD83-CSRS layer or to 1:125,000 or below for the Horiz + Vert Stns layer and then click on the icon, which will turn from grey to yellow to indicate that it is enabled and then the user must refresh the map by clicking on the "Refresh" button. If the labels will not activate it means that the COSINE user has not zoomed in sufficiently to allow the labels to appear.

The Legend Tab provides an active legend of all the currently active layers. If you are not zoomed in sufficiently to allow a particular layer to be shown, the legend items for that layer will also not be displayed. For instance if you have

New Find Location Tab in the COSINE Ontario-wide View.

stations and will not show the horizontal and vertical orders associated with the horizontal and vertical control stations.

Finally, the Find Location Tab allows COSINE users to zoom into different geographical locations within the province, to a specific control monument, to a specific location in terms of latitude and longitude or UTM coordinates, or to a previously bookmarked location. The Find Location Tab provides the Zoom Go To functionality that occurred within the previous version of COSINE in the tool bar above the map-display.

Another aspect of COSINE 2010 that has changed from the previous version is how geodetic control stations are selected from the graphics/map-display. The previous version of COSINE allowed you to select an individual station by simply clicking on it. In COSINE 2010, an individual station or a list of individual stations is selected by using the box selection tool either once or repeatedly. Once a station is selected, a list is displayed to the left of the map-display showing the one or more stations that have been selected. This list will grow in length as more stations are added by repeated application of the box selection tool or the other selection tools. At any time the user can deselect an individual station or several stations or can deselect all and start the selection process over again. The polygon selection tool shows the polygon line by line as you build it to enclose the stations which the COSINE user wishes to select. To finalize a selection within the closed polygon the user chooses the Select Button to add these stations to the list of stations to be selected. Finally, there is the circle selection feature. The COSINE user can choose a central point for the circle and then the panel to the left will ask the user to select a radius in metres. Once the radius is selected, the COSINE application will draw the circle on screen once the Draw Button to the left of the map-display is clicked. If the COSINE user is satisfied with the circle as shown, then the user can proceed to select those

New Legend Tab in the COSINE Ontario-wide View.

turned off the horizontal and vertical stations to view only the NAD83-CSRS stations, then the Legend Tab will show the different classes (A through E) for the NAD83-CSRS

stations within the circle by clicking on the Select Button which again is to the left of the map-display. The stations within the circle will be highlighted in cyan and will be appended to the list of stations to be retrieved.

There are many other helpful features associated with the graphics windows in COSINE 2010, including zooming to or viewing an area at a particular scale or at a particular map-width in kilometres. The measure distance tool provides the coordinates of the starting point and all subsequent end-points for lines as well as the distances and directions for each subsequent line in series, as well as the summed total distance between all lines as shown on the map-display. In addition, the print tool on the toolbar provides the user the opportunity to title and save a PDF file which can later be printed directly or saved. If station labels are currently shown on screen, then they will be captured and shown on the PDF map produced through this feature as well.

Once you click on the Submit Button at the top of the graphics display page the functionality of COSINE has not changed. However, in order to get the station coordinates and reference sketches, users of COSINE 2010 must ensure to set their web-browser to allow for Pop-Up Windows for the COSINE web-site, otherwise their retrieval will appear to stop once they have clicked on the Submit Button.

COSINE 2010 Non-Graphical Changes

The most significant non-graphical update in COSINE 2010 does not even result in a visible change for users. The COSINE database has been migrated from an ORACLE 9.2® environment to ORACLE 10g®. This will allow for continued stability of the COSINE database and for the possibility of improved performance regarding COSINE database queries for both coordinates and reference sketches, once the list of requested stations is transferred from the graphics interface to the COSINE database.

There are a couple of more minor, but still important changes that were made on the standard COSINE HTML station output form provided on a station basis. The first is that if the station does not have accurate coordinates with respect to the horizontal or vertical datum selected, the numbers after the decimal place will be replaced with **"x"** characters. Stations do not have accurate coordinates with respect to a particular horizontal or vertical datum when:

- the station(s) are unclassified (did not meet the accuracy requirements to be classified as 1st, 2nd, or 3rd Order, for example) with respect to the datum selected for the coordinate retrieval, or
- the station(s) have had their coordinates scaled from a map product in order to allow for their display on the graphical interface (e.g. Benchmarks whose horizontal position has been scaled from a map), or
- the stations(s) have had their coordinates transformed from one datum to another for COSINE publication or display purposes (e.g. NAD83-ORIG stations that do not

have rigorous and accurate NAD83-CSRS coordinates).

The other change to the standard HTML station report page in COSINE 2010 helps the COSINE client who does not have accurate coordinates for a station better identify other datums for which accurate coordinates could be available. **Other horiz data** or **Other vert data** provide lists of datum realizations with respect to which the given station has coordinates or elevations, respectively. Each datum name appears in **bold typeface** to allow it to be easily found in the report.

Things to Remember that have not Changed when using COSINE 2010

There are some important things to remember regarding the use of COSINE which have not changed in the current upgraded version. The default horizontal datum for the Ontario-wide view is still NAD83-ORIG, and the default horizontal datum for the Toronto view is still NAD27. This means that if users wish to retrieve NAD83-CSRS coordinates they need to use the Datum Button at the top of the graphics display and change the default horizontal datum selection for either the Ontario-wide view or the Toronto view to NAD83-CSRS in order to retrieve the coordinates with respect to the datum requested once the Submit Button is clicked.

COSINE users also need to recall that horizontal and vertical control stations in COSINE are displayed only once in the graphical display according to their highest classification or ranking. This means that horizontal control stations that are available in NAD83-CSRS classes ("A" through "E") will be shown as part of the NAD83-CSRS Stations Layer and will <u>not</u> be displayed as a horizontal control station in the Horizontal and Vertical Stations Layer on the graphical/map-based display. There are many NAD83-CSRS stations that also have rigorous NAD83-ORIG coordinates. In order to retrieve all of the possible NAD83-ORIG station coordinates in an area using the graphical/map-based display it is necessary to leave on <u>both</u> the NAD83-CSRS and Horizontal and Vertical Stations Layers and select as appropriate on screen all the horizontal stations in the area of interest as needed. The default horizontal datum is NAD83-ORIG for the Ontario-wide view so unless this has been changed it is then appropriate to click on the Submit Button and complete the retrieval for NAD83-ORIG horizontal stations. It should be noted that while many of the NAD83-CSRS stations that appear as part of the NAD83-CSRS Layer also have rigorous NAD83-ORIG coordinates, NAD83-ORIG stations that appear as part of the Horizontal and Vertical Stations Layer will <u>not</u> have rigorous NAD83-CSRS (or those stations would appear as part of the NAD83-CSRS Layer). If the COSINE client requests NAD83-CSRS coordinates for these NAD83-ORIG stations, the user will receive approximate coordinates which show **"x"** characters after the decimal place.

Part of Standard COSINE HTML Station Report showing an Unclassified Station and Approximate Coordinates with "x" characters after the Decimal Place.

Future Improvements and Enhancements for COSINE 2010

While we have brought significant improvements to the graphical/map-display in COSINE 2010 in terms of the accuracy and currency of the topographic map backdrop, and the additional themes that can be shown, including LandSat 7 Imagery, Digital Ortho-rectified Photography, and the line-work from the Ontario Assessment Parcel, we do realize there have been outages or periods of slow response in terms of the graphical/map-display for COSINE 2010. These outages are not specific to COSINE 2010, but impact all web-based graphical/map-display interfaces incorporated in web-based applications on Ministry of Natural Resources Internet web-sites. In order to ensure that COSINE 2010 and the other MNR map-based web-applications are more robust, monitoring software has just been installed on another computer server to ensure that the map-based displays dependent on WMS and the IMF Tool-set, including COSINE 2010, will be more reliable.

Users of COSINE 2010 are encouraged to plan ahead in completing their retrievals for control survey information as performance may vary at times due to server traffic and load issues associated with the infrastructure providing the map-display component for COSINE 2010. If for some reason the graphical/map-based interface for COSINE is extremely slow or non-functional for a period of time the user may wish to continue the search for control survey information using the textual-interface for COSINE. A selection checkbox for use of the textual-interface only is located on the COSINE 2010 homepage just below either the Ontario-wide or Toronto view buttons. This will allow users to proceed with selection of control stations from COSINE in an area which is independent of the graphical/map-based interface.

If there are any major issues with COSINE 2010, they will be addressed in the **Important Notice** section near the top of the COSINE homepage. COSINE users are also encouraged to refer to the help files which are available for any items shown in blue-underlined text. As well, the **FAQ** button within the Subscriber Options on the COSINE homepage addresses many of the commonly recurring questions related to COSINE 2010. Please do not forget to make use of these built-in user aids incorporated in COSINE 2010. If a user has any further questions or concerns they can be forwarded through email by using the **Feedback Selection** button on the COSINE homepage. The COSINE client wishing to provide feedback or pose a question can address his or her concerns to the COSINE Manager, the COSINE Database Administrator, or the COSINE Web-Master.

We are examining the feasibility of adding the following improvements to the graphical/map-display for COSINE 2010:

• separating the Horizontal and Vertical Stations into separate Layers which the user can of course turn on and off separately on screen as required,

• improving the detail of the geographic feature and place name search under the Find Location Tab by implementing a new Ontario specific detailed search routine, and

• providing a separate Layer for private sector providers of RTK Base Stations which the user could again turn on or off separately on screen as required; only those RTK base station networks that have been reviewed and approved for inclusion in COSINE would be displayed.

Access to COSINE data is free of charge however users must establish their own COSINE user account using the **Application Form** Button on the **Information for Prospective Subscribers** page following the instructions on the COSINE 2010 web-site. Submission of geodetic control projects for inclusion in COSINE is also free of any charges, but offers those who voluntarily comply with provincial specifications many advantages too numerous to list here. The Ontario Specification for GPS Control Surveys is available at http://www.mgs.gov.on.ca/stdprodconsume/groups/content/@mgs/@iandit/documents/resourcelist/stel02_047448.pdf.

For information related to vertical control/digital levelling specifications, or for any other questions related to submission of geodetic control projects for inclusion in COSINE, as well as for any questions or concerns regarding COSINE 2010, please do not hesitate to contact the author.

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