

## APPENDIX L

### METRIC/IMPERIAL CONVERSION UTILITY

The purpose of this conversion utility is to convert the design data within IGrds working files from metric units to imperial units and vice versa. The conversion utility is a standalone Windows utility (much like the current AN procedure), rather than a MDL application within MicroStation. The process is launched from an icon within the IGrds group. The following paragraphs describe this conversion utility in more detail. See the Systems Manual for a description of the configuration table.

#### User Interface

As mentioned above, the conversion utility is a Windows application. The look and feel of the interface is very similar to other IGrds dialog boxes, especially the current AN process dialog box. See the User Manual, Chapter 10. The user is able to enter the working file name or search for existing files using a Browse button. The process detects whether the selected working files are metric or imperial and presents a proposed name for the converted files by appending an “i” or “m” to the name as appropriate. The user is presented with default values from the process configuration file discussed below and described in detail in the Systems Manual. Essentially, the user can convert the files, if the defaults are acceptable, by clicking the Apply button. If the user wants to revise some of the defaults, then this can be accomplished by editing the default values in various dialog boxes that can be displayed from the master dialog box.

#### Configuration Table

The conversion process is driven by a configuration table (*miconfig.tbl*) that contains various scale factors, translation and rotation factors, and equivalence tables. This file is in the \Custom directory and can be edited as required by the various agencies. It is modeled after the design criteria table (*ha.tbl*). See the Systems Manual.

#### File Types That Are Converted

Most IGrds design data files are converted. These include the configuration (*.ini*) file, the horizontal alignment (*.hal*) file, the design data (*.dda*) file, the shape (*.dtb*) file, and the geometry (*.geo*) file. The geometry description (*.dsc*) file does not need to be converted as it is unitless. Working file types that are not converted include the following: the status (*.ion*) file(s), the cross section (*.xsn*) file(s), the cross section feature code (*.fcn*) file(s), the cross section modification (*.bxn*) file(s), the bridge geometry (*.bri*) file, and the drainage (*.drn*) file. Likewise, none of the report file types, including extensions *.tmp*, *.lis*, *.lst*, *.err*, *.r*, are converted nor are the miscellaneous file types, including extensions *.apf*, *.clp*, *.srv*, *.imp*, and *.pav*. Also, the automated plan preparation group (*.grp*) files are not converted.

Any MicroStation design files used as reference files or as a DTM source need to be converted using the same factors. The original or base design file should not be converted. A new design file should be created and attached to the converted working files. Then the relevant (converted) IGrds data should be displayed into this design file.

The release stamp within the working files is maintained from the base files to the converted files. For example, if the files are stamped “99”, then the converted files will also be stamped “99”. Files are not automatically upgraded to “2000” files.

A log file is generated as the files are converted. The log file contains the relevant information concerning the conversion including the conversion parameters used, the equivalent design speeds, the stationing, etc. It also contains information alerting the user to any unusual occurrences in the conversion process.

### **Conversion Methodology**

Generally, all coordinates (N, E or X, Y), lengths (distance, radii, etc.), and elevations within the IGrds horizontal alignment and geometry files are “hard” converted from the base system to the target system using the appropriate transformation algorithms. “Hard” conversion implies that the converted values are exact, whereas “soft” conversion implies that the converted values are chosen from equivalent values in the other system. For example, lane widths of 3.6m for metric units become 12 feet which is the generally accepted equivalent in imperial units. Soft conversions are handled by equivalency tables within the configuration file. The following paragraphs discuss the methodology used for each data type.

**IGrds Configuration (.ini) File** – The IGrds configuration file is converted to the appropriate units by substituting the appropriate values from the correct master configuration files (metric or imperial). Switches such as which standards to use are copied from the base configuration file to the converted file.

**Geometry (.geo) File** – As mentioned above, coordinate values, elevations, lengths, radii, angles and directions are hard converted. Shapes attached to linear geometry elements are soft converted using equivalency tables. Feature codes attached to geometry elements are unaffected as equivalent metric/imperial feature code tables are provided.

**Horizontal Alignment (.hal) File** – As mentioned above, PI coordinates, curve radii, spiral and curve lengths are hard converted so that the exact alignment configuration is maintained. Begin stations can be the same as the base alignment or entered by the user. Likewise, equation stations can be the same as the base alignment or automatically computed based on the calculated station in the target unit system. In any case, an equivalent station process is constructed so that all other station related design data (vertical alignment, template locations, etc.) can be converted on the fly between the base and target units. The design criteria for each alignment is soft converted using a design speed equivalency table within the conversion configuration file. Baseline and design roadway associations are maintained.

**Design Data (.dda) File** – Design data, including vertical alignments, is alignment and stationing related. The stationing is converted using the equivalent stationing process discussed above. Small increments are maintained. For example, if the base units are metric, then stationing can be reported to the nearest thousandth (.001). Within imperial unit projects, the station granularity for design data is hundredths (.01). Without care, it is possible to lose small increments when converting from metric to imperial. The conversion process detects these small differences and maintains them in the converted stationing. Generally, widths and depths within the design data are soft converted using equivalency tables. It should be noted that when doing soft conversion, if a value is not in the equivalency table, then it is hard converted and rounded appropriately.

**Shape Data (.dtb) File** – Shape data, i.e., templates, side slopes and medians, are generally soft converted using equivalency tables. Slope ratios are maintained. Within templates, if slope data is in inches/feet, then it is converted to percent. Within side slopes, the vertical distance of the last variable slope is maintained as is or converted to 999, as appropriate. Dummy segments are maintained as described in design data stationing, above.

**Support Files** – Support files, such as parameter files, cell files, etc., are associated within IGrds working files. As part of the conversion process the appropriate support files are associated with the converted files. For example, if the base files were associated with the parset.hm (hundredth precision, metric) parameter file than the converted files will be associated with the parset.hi (hundredths precision, imperial) parameter file. No local parameter files (local.par) are converted.

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