CHAPTER 9

TYPICAL DESIGN SCENARIO

The scenario in this Chapter is intended to show typical design sequences, and is only a sample of the broad possibilities for the IGrds user.

NEW CONSTRUCTION PROJECTS - URBAN OR RURAL

This sequence is generally chronological; some steps in the actual process may be omitted or combined. The purpose is to provide a general view of how IGrds can be used for detailed design of such projects.

- Decide on the design standards to be used for the project.

- Decide on units to be used for the project (Metric or Imperial). Import or merge the appropriate master shape file (templates, sideslopes and medians).

- Perform the project survey and establish the DTM and survey "topo" background files using existing survey section processes (use selected units).

- Prepare a dimensioned typical section sketch using the appropriate geometric design standards for the type of facility being designed.

- Establish the primary baseline horizontal alignment using IGrds, referencing the "topo" background file. For most projects, the construction (design) horizontal alignments are coincident with or parallel to the primary baseline. Since this is usually the case, the appropriate geometric design standards must be taken into account regarding design speed, minimum radii, spiral easement requirements, sight distances, etc., when establishing the primary baseline alignment.

- Extract terrain from the displayed 3D DTM file(s) along the primary baseline, and create a cross section file for the primary baseline.

At this point, the primary baseline has been established, the terrain has been extracted from the DTM and transferred to IGrds, the "topo" data exists in the IGrds environment, and the typical section has been established.

- Establish construction (design) horizontal alignment(s) using IGrds. Again, the appropriate geometric design standards must be taken into account when establishing the construction alignment(s). If desired, the automatic curvature generation capabilities within IGrds can be employed.

° Establish the profile grade(s) taking the appropriate design standards into account regarding maximum grades and stopping sight distances. Again, the automatic curvature generation capabilities within IGrds can be employed.

° Establish the IGrds design data for the primary roadways using the typical section sketch and appropriate DOT standards. These design data generally include the following:

- Template(s)
- Superelevation
- Widening as required for sharp horizontal curves
- Medians as required
- Sideslopes

Generally, the template, sideslope and median shapes can be established directly from master shapes, or by modifying the master shapes.

- Use Plan View presentation of Design Data to make sure there are no gaps in the basic design data: template, sideslopes, and medians.

At this point, all of the basic dimensional aspects of the primary design have been defined in the IGrds environment.

° Perform a graphic review of the roadway templates in a plan view using ridgeline display. This will provide a check that the proper number of lanes and shoulders have been defined and that width transitions for turn lanes and tapers are correct.

° Use Design Section Display to complete further graphic review of the design cross sections at selected critical sections, such as centerline structures, road intersections, entrances and deep cut or fill locations.

° Modify templates and shapes as required to accomplish desired design sections at the critical stations analyzed using the Design Section Display and the Design Data Management process.

° Perform IGrds design and preliminary quantity computations using the IGrds design process.

° Display the cross sections on the graphic screen using the XSM process; review the sections.

° Review the design reports and preliminary quantities.

° Display the edges of pavement, ditches, and catch lines, using the horizontal alignment process.

- Lay out the preliminary right-of-way requirements, intersecting alignments, and other geometric features, using the geometry process and the drafting system.

- Iterate the basic design process until satisfied with the basic geometric design and preliminary quantities.

- Display ditch profiles and use vertical geometry to locate special ditch grades needed to ensure proper drainage.

- Lay out bridges using bridge geometry processes (Bridge Division).

- Add any right turn lanes required, using the widening process.

- Establish left turn lanes as required.

- Add erosion control ditches as required.

- Iterate the design process until satisfied with the geometric design and preliminary quantities.

At this point, the basic design geometrics are complete and preliminary quantities have been established. Now it is time to refine the earthwork quantities, finalize right-of-way requirements, and design geometrics.

- Set up earthwork parameters, such as compaction factors, design exceptions, etc.

- Perform IGrds design and quantity computations using the IGrds design process.

- Review and adjust the design (grades, templates, alignments, etc.) until satisfied with the earthwork quantity balance.

- Refine the design geometrics; establish final ROW needs, etc.

- Calculate pay item quantities, summarize and pass quantities to engineering estimate system.

- Plot (hard copy) cross sections.

- Prepare plan and profile sheets using the IGrds automated plan preparation system.

- Locate proposed ROW line and property boundaries.

- Compute ROW taking and remainder areas.

- Prepare ROW plan sheets.

At this point, the design of the project is essentially complete.

EXAMPLE PROJECTS

Included on the release disks are several example design projects with documentation and actual design data. The methodology and processes required to create these projects are described in detail.