Annotating Drainage in Plans and Profiles

InRoads Storm & Sanitary is used at ODOT for drainage design, but is difficult to use as a drafting tool and is not configurable to meet contract plans CAD drafting requirements. This workflow will show how to use InRoads and InRoads Storm & Sanitary to display and annotate drainage networks and structure information. Manual drafting methods are necessary to produce the plan and profile sheets.

The workflow requires running InRoads and having the drainage database (.sdb) loaded. The Product Add-In of InRoads Storm & Sanitary is required to display the drainage network in a profile window, but all other display and annotation of drainage is performed with regular InRoads commands.

Civil Preferences
Preference sets configured for ODOT are all found in ODOT’s civil.xin, stored in the user configuration (\USERCFG\InRoads). The ODOT preference set should be used for all drainage view and drainage profile commands. CulvertFeaturesOnlyInPlan preference should be used to annotate surface features in a plan view and the CulvertFeaturesOnlyInProfile preference should be used to annotate surface features in a profile window. Preference usage will be illustrated below.

Viewing the Drainage Network in Plan View
Even if not actually running Storm & Sanitary, it is possible to view drainage networks and structures in plan view. The ODOT preference set has been configured to display drainage objects that are typically displayed in contract plans and to use the symbology that is normally used for contract plans. Pipe and culvert center lines will be drawn and cells will be placed to locate manholes and inlets. The drainage preferences have not been configured to work with annotation scale, however. The text and cells placed with the View Drainage tools will display the correct size for 1”=100’ contract plans only. You should place your drainage annotations in a separate model to avoid adding annotation scale where it is not necessary. The annotated drainage network will not respond to annotation scale when referenced into a model with a different drawing scale.

1. Create a 2D model for Plan View graphics.
2. Use the InRoads command Drainage>View>Drainage.... The ODOT preference is already configured to display plan view graphics of drainage structures from the loaded network.
Annotating the Drainage Network in Plan View

Preferences for annotation have been created to match ODOT CAD standards for drafting, but the pipes must exist as features in a DTM, you will need to create this DTM. The same DTM of the pipes will be used to annotate the pipes in profile as well. After creating the DTM, you will annotate the features using the CulvertFeaturesOnlyInPlan preference.

Pipe DTM for Annotations

1. Create a 3D model and use the InRoads command Drainage>View>Drainage... to display 3D graphics of drainage structures from the loaded network.
2. Make a selection set of just the pipes and culverts. This can be accomplished by using Select All and then deselecting Cell, so that only Line element types are selected.

3. Create a new surface in InRoads and run the InRoads File>Import>Surface... command filled out as below, and accept the elements in the selection set when prompted.
4. Use **Surface>Feature>Feature Properties...** to set the pipe size in the **Description** field. A space and a hyphen at the end of the pipe size will assist with the annotation later.

![Feature Properties window]

5. Lock the triangulation in the **Surface Properties** and then save the surface – you will need it later for profiles.

**Annotate Pipe Features in 2D Plan View**

1. Change models back to the 2D Plan View.
2. Run InRoads **Surface>View Surface>Annotate Feature...** command and load the **CulvertFeaturesOnlyInPlan** preference.

![Annotate Feature window]
3. On the Annotate Feature dialog, Main tab, select all of the pipes in the Features: window and click [Apply]. The pipe size and center-to-center slope length is annotated on the pipe features using the ODOT standard font, size, and precision. The Description is already checked on to annotate for Line Segments in the CulvertFeaturesOnlyInPlan preference, which is why it was important to put descriptions on the features in the DTM!
Annotating the Drainage Network in Profile
Preferences for profile annotation have been created to match ODOT CAD standards for drafting, but the pipes must exist as features in a DTM. The same DTM of the pipe features created earlier will be used to annotate the pipes in profile. After creating the profile and displaying the drainage network in the profile using the ODOT preference (two separate steps), the features will be annotated using the CulvertFeaturesOnlyInProfile preference.

1. Create a 2D model for displaying the Profile and load **InRoads Storm & Sanitary**. Storm & Sanitary provides a Source option of Network on the Create Profile dialog. InRoads Storm & Sanitary may be loaded as a Product Add-In.

2. Run the InRoads command **Evaluation>Profile>Create Profile**. Note that the add-in provides the Network option on the Source leaf of the dialog.
3. Set up the **Create Profile** dialog to display the existing and design surface lines. Click [Apply] to create **Windows and Data** for the roadway alignment. The roadway profile along the alignment is displayed before the drainage network. Leave the **Create Profile** dialog open for the next step.

4. A drafter will need to see where the network is in the profile, so use the **Create Profile** dialog and the ODOT preference. On the **Source** leaf, select the **Network** option and the **Drainage Network Reference of Existing Profile**. Fill in the **From:** and **To:** fields with structure IDs from the drainage database. When you click [Apply] and select the profile, the network should be displayed. These graphics are not what are required for plans – but are there for drainage design and so that a drafter can locate structure locations.

Note - There is a known issue where network branches may interrupt the display of the entire network – so if only a portion of the network displays, you will have to display each pipe run (inlet to inlet or manhole to manhole, or maybe just an individual pipe by naming that pipe in both the **To** and **From** fields) separately, changing the **From** and **To** structure IDs until you have displayed the entire network.
5. Now, use **Evaluation>Profile>Update Profile...** to display **Projected Features** from the Pipe DTM – this will draw the pipe flow lines. There’s no preference button on this command – it uses the style (and symbology) that was assigned to the feature when you imported it into the DTM.
6. Run **Evaluation>Profile>Annotate Feature in Profile...**, using the **CulvertFeaturesOnlyInProfile** preference, to display the pipe size and length information in the profile window. A drafter will move this information for clarity. The pipe or culvert ID is annotated in the text nodes at each end of the pipe as a drafting aid; that information will ultimately be removed.
7. **Evaluation>Profile>Annotate Drainage Profile**..., with the ODOT preference, can be used to annotate manholes and inlets to get that information into the profile for a drafter to edit. Uncheck the Pipe Symbology on this dialog, though, to avoid displaying the “design” information about the pipe. There is no way to select only one structure to annotate; this command annotates every structure in the drainage database. The annotation for each structure is a separate text node, which will aid a drafter in editing and moving data for clarity. The structure ID is annotated in the text node as a drafting aid; that information will ultimately be removed.
8. Cells indicating the location of existing *(ExtgInlet)* or proposed *(ConstInlet)* inlets and manholes will need to be manually placed and stretched in the profile by the drafter. The same cell is used for manholes as is used for inlets. Both the existing and construct cells are provided on the *ODOT>Roadway* task in the *Profiles* group.

9. The drafter now edits all of this information into the format required by the *ODOT Contract Plans Manual* or the *ODOT Contract Plans Development Guide*. The underlying drainage network shares a level with other information, so the thin, black lines showing the outline of the drainage network will need to be deleted as part of the finish drafting. Most text nodes will need to have extraneous information removed and be positioned for readability. Cells will need to be positioned correctly and stretched such that the top of rim is close to the design elevation in the profile. If arrows are necessary to attach notes to line work, use *Leader Bent (Fixed)* on the *ODOT>Roadway>General* task in the *General Arrows* group; choose *Roadway Arrow* when prompted.