

P-2-4: Extracting Existing Drainage and Utilities Features from Survey Data

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Before You Begin

The survey processing should have been completed within the **12345-E-MX-Survey-Topo.dgn** or **12345-Survey.dgn** drawings which should contain all the Survey Features. The **12345-E-MX-Terrain.dgn** should also have been created and contain the Terrain model created from MX or the **12345-Survey.dgn** will contain the Terrain model.

For those who don't *Automatically Save Design* changes, they should **Save** as necessary.

Create the Utility Drawing

Open the **12345-E-Utilities.dgn**. This will be the first Utility drawings that will receive extracted features.

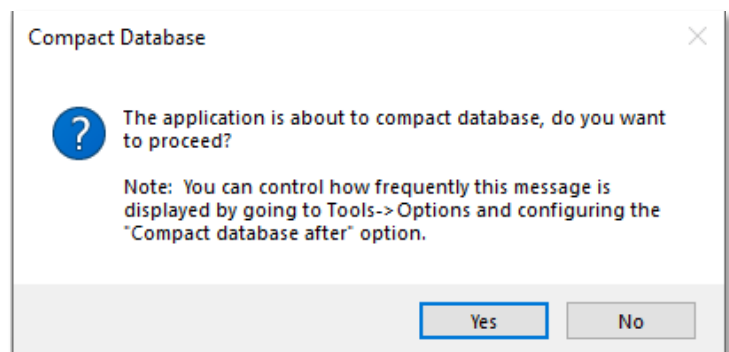
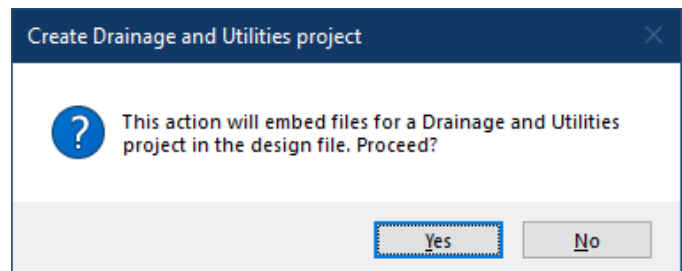
Set the *Default-3D* model/View Active. Attach the *Default-3D* model from the **12345-E-MX-Survey-Topo.dgn** or **12345-Survey.dgn** as a Reference file. Turn off the display of the Survey terrain model if one exists. Issue a **Fit View** and then **Save Settings**.

View both of the *Default* and *Default-3D* models in their own *View* windows. Use the right click menu > **View Control** > **2 Plan view/3D**. In the *Default* model, turn **Off** the display of the *Default-3D* model. Set the *Default-3D* View **Active** and issue a **Fit View** here too. Set the *Default* view **Active** again.

Create the Utility Model

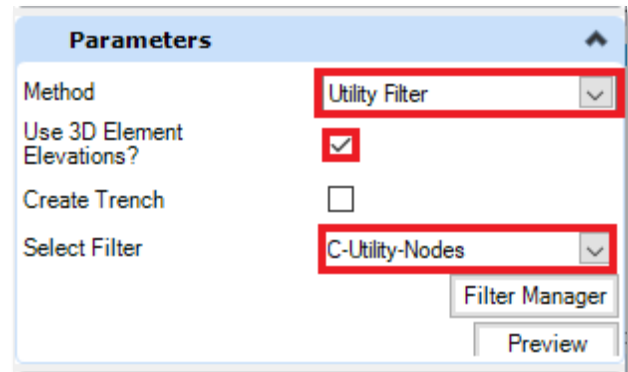
Open the **Drainage and Utilities** workflow. From the *Layout* tab select the **Extract From Graphic** tool. This will only create a **Utility** model the first time it is issued in a new drawing file. We need this so when prompted, click **Yes** to create. Allow time for processing. **Save Settings** and **Save**.

Note that drawings which contain a Utility Model will request to be compressed when opened. There will be a prompt when this happens. It may be displayed behind other boxes.

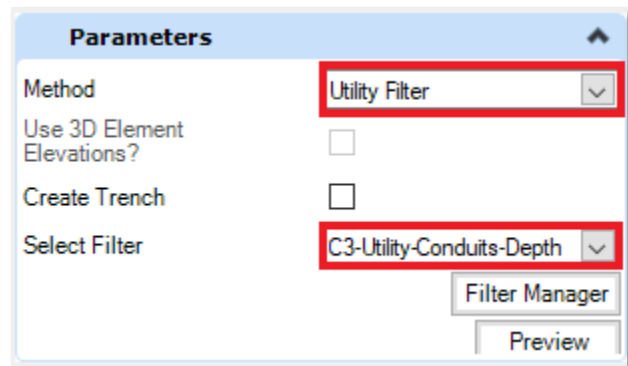


Extract the Point and Utility Features

In the *Default* model of the *12345-E-Utilities* drawing, select the **Extract From Graphic** tool to extract the Point features. Set the *Method* to **Utility Filter**. Set the *Select Filter* to the **C1-Utility-Nodes** *Filter Group* filter (wait) and accept through the prompts to create the *Utility Nodes*. Extraction when using large Filter Groups might take some processing time, so wait for the dialog to say *Select Method* before advancing.



Process another extraction using the **C3-Utility-Conduits-Depth** *Filter Group* filter ****** [See Table Below](#). Accept through the prompts and when prompted to *Create Trench*, select **No**. This second extraction will create the *Utility Conduits with Dummy Nodes*.



Detach the reference files.

Open *Project Explorer* > *OpenRoads Model*. Expand the *dgn*, and expand *Points* > *Not Featurized*. Select multiple features of the same type by holding the control key and left clicking on them in the list. Next in the *Properties Box* change the *Feature Definition* from *No Feature Definition* to the appropriate **Conduit XXX Node** feature.

CN-	=	Node\CommunicationNode\Conduit Comm Node
EN-	=	Node\ElectricalNode\Conduit Elec Node
GN-	=	Node\GasNode\Conduit Gas Node
SN-	=	Node\StormWaterNode\Conduit Drain Node
WWN-	=	Node\WasteWaterNode\Conduit Sewer Node
WN-	=	Node\WaterNode\Conduit Water Node

NOTE: After Extracting from Graphics the *dgn* file should be saved and the session closed before opening another *dgn* file.

Extract the Drainage Features

Open **12345-E-Drainage.dgn**. This will be the second Utility drawing that will receive extracted features.

Set/Open the *Default-3D* model. Attach the *Default-3D* model from the **12345-E-MX-Survey-Topo.dgn** or **12345-Survey.dgn** as a Reference file. Turn off the display of the Survey terrain model if one exists. Issue a **Fit View** and then **Save Settings**.

View both *Default* and *Default-3D* models in their own *View* windows. Use the right click menu > **View Control** > **2 Plan view/3D**. In the *Default* model, turn **Off** the display of the *Default-3D* model. Set the *Default-3D View Active* and issue a **Fit View**. Set the *Default view Active* again.

In the *Default* model/view select the **Extract From Graphic** twice. Once to create the Utility model and then to extract the Drainage features. Set the *Method* to **Utility Filter**. Set the *Select Filter* to the **A1-Drainage-Nodes** group filter. Left Click in the view to accept the selections and extract the Nodes.

Process a second extraction using the **A2-Drainage-Conduits** *Filter Group* filter **** See [Table Below](#)**. Accept through the prompts and when prompted to *Create Trench*, select **No**.

Pipe ends that are not associated to a structure are created with a *Dummy Structure Node*. In order to reduce these unnecessary obtrusions, use *Element Selection* to select **Color 0**. Change the *Feature Definition* to the **Node/StormWaterNode/Conduit Drain Node** definition. This should change the *Dummy Structure Node* to a very small sphere. Clear the *Element Selection* when complete.

Update Null elevation pipe ends

When Survey picks up Drainage pipes in the field, they sometimes take direction shots. These shot's elevations are set to -999 so the ends are ignored in MX. Now that they are extracted into ORD some pipes can be connected. Select a pipe and use the low end's handle to move it to the node of another good pipe end and delete the other stub end. Or after selecting a pipe that does not have an obvious stub to connect to change the low elevation to an assumed elevation. The assumed elevation by plan prep will be an even elevation 20'± feet below the good elevation so that it is in the realm of the project's elevations but will stand out to the design Team as needing attention. The design team should review all drainage pipe with assumed elevation and investigate them thru as-built drawings or field inspection to determine the actual elevation of the assumed pipe ends.

Update the Pipe Feature's Type and Size

The Conduits themselves also need to be updated to the correct size and type. Reference the ETXT and/or the EXF drawings as available. Select each pipe and update the **Feature Definition** (Pipe Type) and the **Feature Description** (Pipe Size) as appropriate. Repeat for each drainage pipe and utility.

In some cases, pipes are actually Box Culverts. In this case select the pipe in the *Default* model so it is displayed in the Properties box. In the *Feature* pane set the *Trench* to **Yes**. This will create a corridor along the pipe that is using the default Trench template. The Template can be changed by selecting the corridor/template drop and changing the Template name to a Box Culvert Template. ParaMetric constraints can be added to modify the size of the culvert.

Follow up work in the Drainage and Utilities Drawing Files

Open and Set the *Default* model active which should then be displayed in the *Properties* box. In the Properties box set the files' Ref Logical to EDR or EUT. Set the Default-3D view active and assign the Ref Logical to EDR-3D, or EUT-3D

Save Settings, Save and do the other dgn.

All of these existing drawings should be referenced into the **Combined.dgn** drawing. Open the **Combined.dgn** drawing file and set the *Default* view Active. Attach the *Default* model *E-MX-Survey-Terrain* or *E-Terrain*, *E-Drainage*, and the *E-Utilities* drawing files. When they are attached the logical names defined in the files should automatically apply to their *Default* attachment. The Logical names in the *Default-3D* model attachments may need to be assigned by hand.

** DRAINAGE AND UTILITY FILTER GROUPS

Individual filters have been grouped to extract with different settings and the elements to be extracted should be considered when using the different groups. Most utility conduits are actually surveyed on the surface picking up flags placed in the field. Therefore, they should be extracted using **C3-Utility-Conduits-Depth**.

FILTER GROUP NAMES	DESCRIPTION
A1-Drainage-Nodes	NODES USING THE ELEMENTS ELEVATION
A2-Drainage-Conduits	CONDUITS USING THE ELEMENTS ELEVATION
A3-Drainage-Nodes-Surface	NODES USING A SURFACE ELEVATION
A4-Drainage-Conduits-Surface	CONDUITS USING A SURFACE-DEPTH ELEVATION
B1-Generic-Nodes	NODES USING THE ELEMENTS ELEVATION
B2-Generic-Nodes-Surface	NODES USING THE SURFACE ELEVATION
C1-Utility-Nodes	NODES USING THE ELEMENTS ELEVATION
C2-Utility-Conduits	CONDUITS USING THE ELEMENTS ELEVATION
C3-Utility-Conduits-Depth	CONDUITS USING THE ELEMENT-DEPTH ELEVATION
C4-Utility-Nodes-Surface	NODES USING A SURFACE ELEVATION
C5-Utility-Conduits-Surface	CONDUITS USING THE SURFACE-DEPTH ELEVATION

UTILITY	DEPTH TO TOP
CATV - CABLE TELEVISION	2.5
ELECTRIC	3
FIRE ALARM	2.5
GAS	3
ITS	3
SEWER	5
SIGNAL CONDUIT	3
STREET LIGHT CONDUIT	2.5
TELEPHONE	2.5
WATER	5

NOTE: Depths in extractions are approximate based on the UAM and should eventually come from Utility Verification Plans. When known the depths can be updated.

Also, any utility under the pavement installed at least in the last 25 years should be 5' below grade or 18" below subgrade whichever is deeper. Each individual profile may need to be redefined in areas under the pavement Complexed together and set active to reflect the utilities actual profile. The Extraction is just a starting point to represent the utilities' location.

Different depth extractions can be done by using the Filter Manager and copying the applicable filter into the active dgn file and then change the depth used in the filter.