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Infraworks 360: Create Your Own Company-Kit

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Learning Objectives

- Learn how to create your own design standards file for road design
- Learn how to create your own design standards for intersection/roundabout design
- Learn how to import your project-specific content in Style Palette
- Share your design standards and custom content with your colleagues

Description

Learn how to customize InfraWorks software. This class will be all about creating your own content in InfraWorks so it matches your project requirements and company standards. After the end of this class, you will be able to create your own design standards file for road design and intersection/roundabout creation. You will learn how to create customized styles and elements for your sketch/design/component roads, and we'll review the workflow for importing custom content in your style palette, such as 3D objects—static or animated—and materials. At the end of the session, we will go through the steps you have to follow to share this custom content and Road Design Standards with your team.

Speakers

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Clas Kristiansen has extensive experience in using and customizing AutoCAD Civil 3D in infrastructure projects. With a background in Civil Engineering and Surveying and over 15 years working experience at three of Sweden's largest engineering companies, he is currently developing the tools and methods of Civil 3D for WSP Sweden: customized tool palettes, templates, tools and multi-parametric subassemblies in Subassembly composer. The focus of his subassemblies is on designing them with built-in functionality for creating transition-areas with profiles, precise datum surfaces and material shapes that facilitate construction. He enjoys spreading knowledge and has experience in teaching classes and webinars in civil engineering and Civil 3D.

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Introduction

InfraWorks comes with an extensive library and multiple options built-in, but you may find it necessary to create and insert your own content in order to meet your projects' needs. This was our task last year in WSP Sweden and we hope with this presentation to share some of our insight with you.

What you should take into consideration

In this class, we will present what you can customize using different tools, based on our experience from working together with Thomas Nilsson (*senior consultant at Augustinkonsult and Symetri*) and Autodesk in order to create the Swedish country specific content and customize InfraWorks for WSP Sweden.


The customization made was for features available in InfraWorks 2017 and InfraWorks 2018.1.

What can you customize?

As InfraWorks collaborates closely with AutoCAD Civil 3D, you can customize objects and settings in both software.

In InfraWorks

In InfraWorks, there are no templates as in AutoCAD Civil 3D, so all customized files should be imported under the installation files:

 C:\ProgramData\Autodesk\<InfraWorks Version>\Resources.

Some of the objects you can customize are:

- Object styles
- Style rules
- Road Design Standards
- Roads components
- Bridge components
- Drainage components
- Scripts

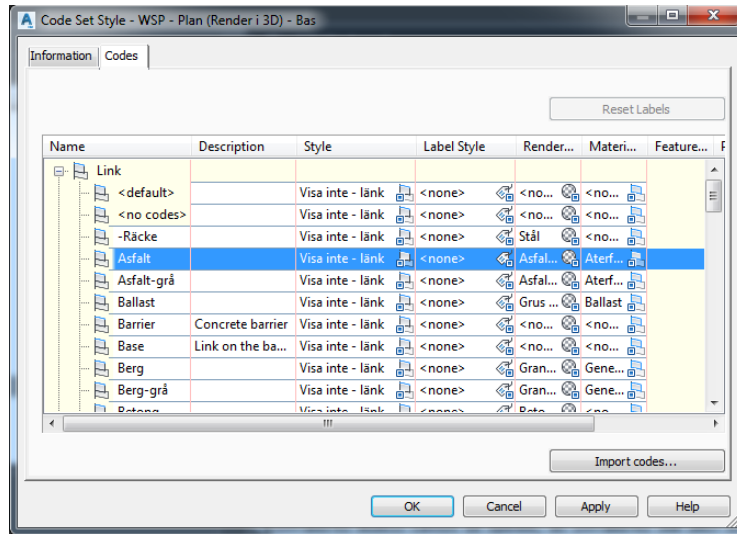


CUSTOM OBJECT STYLES.

In AutoCAD Civil 3D

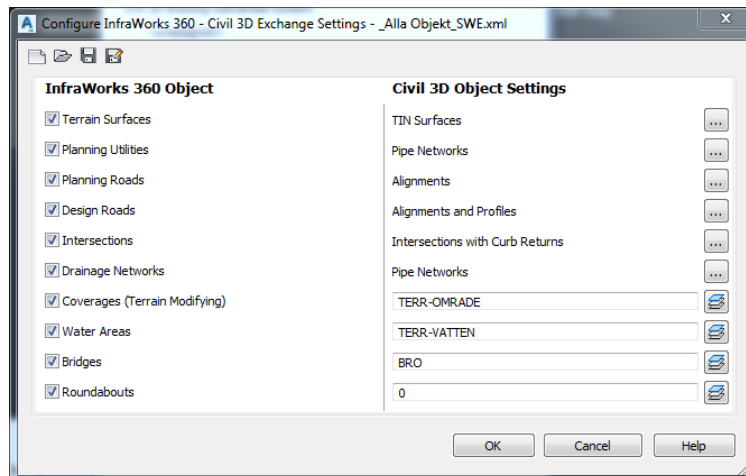
In AutoCAD Civil 3D you can customize:

- CodeSetStyles (for use in Corridors)
 Code Set Styles are used when importing a Corridor from a Civil 3D drawing into InfraWorks (AutoCAD Civil 3D DWG import). According to the render material assigned to the link codes used in the Corridor, you will get the different coverage areas in InfraWorks. You also need to edit the Style Rules for Coverage Areas in InfraWorks. You can find more information in [this screencast](#).



CODE SET STYLE IN CIVIL 3D.

- Configure InfraWorks – Civil 3D Exchange Settings:
 In this xml file, you can define the InfraWorks objects, which will be imported, the Civil 3D Styles that will be applied to the imported objects as well as the Layers and Pipe/ Structure Catalogs.
 The file is saved in Civil 3D, under:
 C:\ProgramData\Autodesk\<C3D Version>\enu\Data\InfraWorks Object Settings\Metric



CONFIGURATION OF INFRAWORKS – CIVIL 3D EXCHANGE SETTINGS IN CIVIL 3D.

Which software can you use?

Depending on the file you want to customize, you can use the following software:

- InfraWorks
- Text editor (e.g. *Notepad++*)
- Infrastructure Parts Editor (*Former Project Kameleon*)
- Inventor
- AutoCAD
- AutoCAD Civil 3D
- Vehicle Tracking

Before customization

Before starting the customization process, you should remember that there are certain factors you should take into consideration:

Regular version updates

InfraWorks is one of the most regularly updated software of Autodesk. This means that you need to check if there is an updated folder structure in the new updates and make sure that the customization files are placed in the correct path after each update.

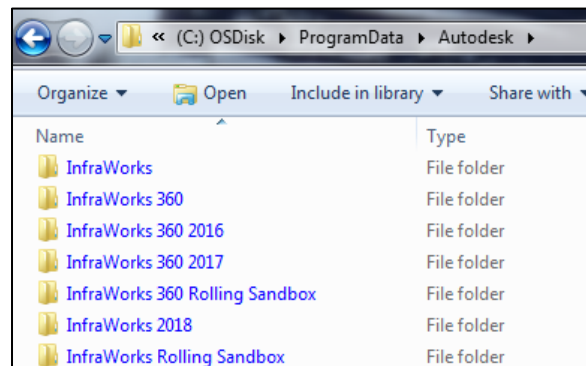
New features

New features are added with every version. These features usually can be customized. Therefore, you need to review these new features and customize them if necessary.

Folder structure

All InfraWorks data files are placed in the “Resources” folder, under ProgramData. However, depending on the version of InfraWorks you are using, you may find this “Resources” folder in different folders.

- InfraWorks 2017 Resources folder is located in InfraWorks 360
- InfraWorks 2018 Resources folder is located in InfraWorks
- Rolling Sandbox 2017 Resources folder is located in InfraWorks 360 Rolling Sandbox
- Rolling Sandbox 2018 Resources folder is located in InfraWorks Rolling Sandbox.




PROGRAMDATA FOLDERS FOR VARIOUS INFRAWORKS VERSIONS

Important note: To facilitate the readers, folder paths will be mentioned from now-on, as follows:

- the Resources folder, instead of:
C:\ProgramData\Autodesk\<InfraWorks Version>\Resources\
will be referred to as:

 ...\

- the cache location for cloud models, instead of:
<Cache location for cloud models>\ModelFolder\<My model.files>\
will be referred to as:

 ...\

Resources

In order to make sure that your Company Kit is compatible with every update of InfraWorks you are making available for your organization, you need to allocate resources in order to check and/or update your standards.

Testing

Remember that all the explanations in this document are brief in relation to their complexity. Any changes you make must be extensively tested and compared to governing documents. Therefore, you must also allocate resources for these extensive tests before changes can be distributed to users.


Customization

Before you start editing standards and styles in InfraWorks, you should create a backup copy of the default "Resources" folder under: C:\ProgramData\Autodesk\<InfraWorks>\. This way, if anything goes wrong during the customization process, you can use the backup.

If you change a value in any part of InfraWorks you must be aware that the any formula using this value might not be the same as in your e.g. country. Therefore it is essential to review all of these equations when making changes to ensure the intended result is achieved.

Create your own Design Standards file for Road design

All files you need to customize are under:

 ...\

A good practice would be to start by copying an existing Design Standard, i.e. one that is close to what you want to create. Start by copying and renaming the respective *.template and *.template.metadata file, e.g. AASHTO_Metric_2011.template. The template file includes all the paths to the files used by the Design Standards, so afterwards you can start editing all mentioned files. Our road design standard is named 2015_VGU_E-2_Metric, which stands for "Vägars och gators utformning" specifications from the Swedish Transport Administration (Trafikverket).

It is important, for future reference, to add comments in the files you are editing, so you know where the values you added are referring. You can add comments after a semicolon (;). In the following example, taken from "2015_VGU_E-2_5_Metric.clp", the text before the semicolon is the value for the driver's eye-height, while all text on the right of the semicolon is a note from where this value comes from in the Swedish standards:

?*driver-eye-height* = 1.1 ; 2015_090_VGU_begrepp_och_grundvarden, 2.3.9.1 Ögonhöjd

2015_VGU_E-2_5_Metric.template

In this file, you will find all the dependencies that actually construct the custom standard. Some of these *.clp files can be customized while others is recommended not to be edited. You can find more information, in the text that follows.

```
{
  "dependencies": [
    "Common/Definitions/Standards_Definitions.clp",
    "DesignStandards/2015_VGU_E-2_5_Definitions.clp",
    "Common/Utilities/Utilities.clp",
    "DesignStandards/AASHTO_2011_CommonRules.clp"
  ],
  "main file": "DesignStandards/2015_VGU_E-2_5_Metric.clp"
}
```

2015_VGU_E-2_5_Metric.template.metadata

In this file, you can edit some generic information about your Road Design Standard, for example GlobalName and LocalDescription.

Common/Definitions/Standards_Definitions.clp

You should not customize this file as it contains all standard classes used in the other Road Design Standard files. It does not include any values for these classes.

DesignStandards/2015_VGU_E-2_5_Definitions.clp

Here you can find definitions used in the main *.clp file (e.g. 2015_VGU_E-2_5_Metric.clp). As an example, the range and the default value of eMax are used in formulas in the main *.clp file, where eMax is the maximum calculated Superelevation rate the entire alignment of the selected road.

Common/Utilities/Utilities.clp

This file is used to find the class instances for interpolation.

DesignStandards/AASHTO_2011_CommonRules.clp

In this file, you can find definitions such as the different function types of roads and eMax values that are *not used yet* (commented out).

DesignStandards/2015_VGU_E-2_5_Metric.clp

This is the main file for the custom design standard. The original files contain comments (added after a semicolon ";") and references to the design standard specifications, e.g. AASHTO. It is recommended to keep this structure and add comments and references to your local design standard specifications.

Here, you can enter the default values for global variables such as "default lane width" and "driver eye height".

Then you can edit the default design speed for various types of design roads in InfraWorks, such as Local and Collector. This can be edited under section "Find default design speed".

In the next part, you can edit the equation for finding the minimum radius. The factors of this formula in AASHTO standard are design speed, side friction factor (as defined in "AASHTO tabular data for various information" in the same file) and eMax (as defined in "AASHTO_2011_Definitions.clp").

For finding the superelevation rate, you can edit the formulas and values in section "Find Super Elevation Rate for Curve". For the Swedish Standards, a fixed value was inserted. For finding the minimum spiral length, we need to take a closer look to:

- Force default spiral length
- Find adjustment factor for super elevation runoff calculation
- Find Super Elevation Runoff Length
- Find Super Elevation Rate for Curve
- Force minimum spiral length to Super Elevation Runoff Length, and
- Find minimum spiral length for curve radius.


The factors are design speed, curve radius and lateral acceleration (as defined in "Force default increase of lateral acceleration to be 0.3" in the same file).

For calculating the maximum spiral length, are used curve radius and maximum lateral offset in the respective formula (pmax, as defined under global variable section in the current file).

You can find additional information in Peter Ingels's presentation from Autodesk University 2015: "[CI10681: Create Your Local Design Rules and Content for InfraWorks 360](#)".

Create your own Design Standards for Intersection design

As with Road design standards, all files you need to customize are under:

 ...\<InfraWorks>\Resources\Standards\Roads\

It will be easier if you start by copying an existing Design Standards, e.g.

Intersection_AASHTO_Metric_2011.template. The template file includes all the paths to the files used by the Design Standards, so afterwards you can start editing all mentioned files.

It is important, for future reference, to add comments in the files you are editing, so you know what the values you added are referring.

Intersection_2004_VGU_Metric.template

In this file, you will find all the dependencies that actually construct the custom standard. Some of these *.clp files can be customized while others are recommended not to be edited.

```
{
  "dependencies": [
    "Common/Definitions/IntersectionStandards_Definitions.clp",
    "Common/Rules/IntersectionDesign_Rules.clp"
  ],
  "main file": "DesignStandards/Intersection_2004_VGU_Metric.clp"
}
```

Common/Definitions/IntersectionStandards_Definitions.clp

This file contains Standard Definitions, such as design vehicles, classes for TurnAtIntersection and RampWidening.

Common/Rules/IntersectionDesign_Rules.clp

Here you can find, among others, rules for Turn lane parameters and Ramp widening parameters.

DesignStandards/Intersection_2004_VGU_Metric.clp

This is the main file of the Intersection design standard. It contains definitions of Design Vehicles and parameters for curves in Curb returns.

Design Vehicles are defined by setting their name and the respective image. In the next section, you can define the Ramp Widening parameters (acceleration and deceleration length) for a series of design speeds of the main road in the intersection.

Afterwards you can set custom minimum radii for all Design Vehicles when you have a curb return of type Simple Curve and Simple Curve with Taper.

In the last section, you can edit the values for calculating the sight triangle length along major road of crossing maneuver at yield intersection.

Create your own Design Standards for Roundabout design

Unlike the rest of the Road Design Standards, the ones for Roundabout are imported from Vehicle Tracking library. This means, that in case you want to customize your Roundabout Design, you need to do it in AutoCAD Civil 3D, and then use that *.atj file in the Roundabout definition.

Roundabout_2012_VGU_Metric.template

This file has all dependencies, which are the Standard Definitions and the Custom Roundabout standard, where the *.atj file and some default values are written.

Common/Definitions/RoundaboutStandards_Definitions.clp

This file should not be customized, as it has global parameter definitions.

DesignStandards/Roundabout_2012_VGU_Metric.clp

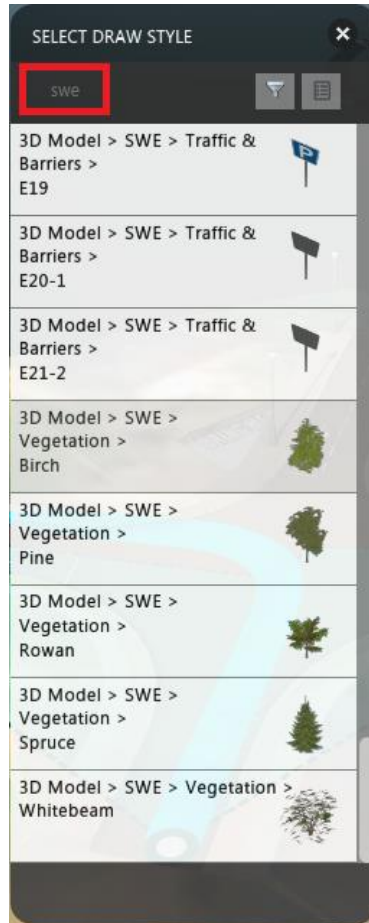
In this file you can specify the custom *.atj file, as created and saved in Vehicle Tracking's "Roundabout Standard Explorer". In there you can customize the Roundel and Arms Geometry, Fastest and Swept Path Analysis, Visibility Analysis, Signage as well as Road Markings.

You can find a full guide for editing roundabout standards [following this link](#).

Import your project-specific content into Style Palette

When you start a design command in InfraWorks you get to select the style you want to use. In the Select Draw Style window, you can search the names of the available styles. This is why it

is advisable to add your custom styles under a distinctly named folder (e.g. SWE), which you can search for later.



TYPE FILTER WORD IN SELECT DRAW WINDOW.

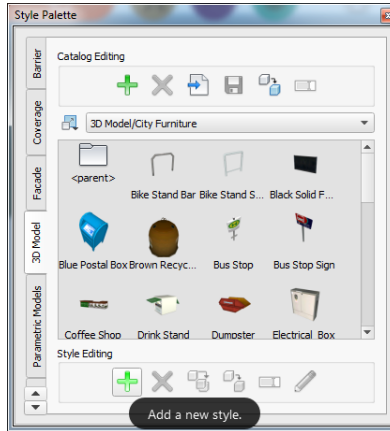
3D Models

3D Models can be used with several design commands. They can be static or animated objects and have one reference point, like AutoCAD blocks. You should keep in mind that custom 3D Models cannot be published in Web Manager but they can be published in BIM360 (currently available only in Rolling Sandbox release).

First, you need to create the custom object in an application such as AutoCAD or 3ds Max and export it in one of the following formats: 3ds, dae, dxf, fbx, obj, sff, svf. For the example described below, the custom object is a box created in AutoCAD with file name “CustomBox.fbx”.

After exporting your custom object, you need to create and open a Test model in InfraWorks and access the Style Palette window. There you need to select the appropriate tab under which the style will be created, e.g. 3D Model. If the custom style will be of a specific category, for example City Furniture, you need to open that folder. In there, you can create the new style by pressing the lower green button “Add a new

style”. In the Define New 3D Model window, you have to select the location where you saved “CustomBox.fbx”. After pressing OK, you can give a name for your Style, e.g. Custom Box.



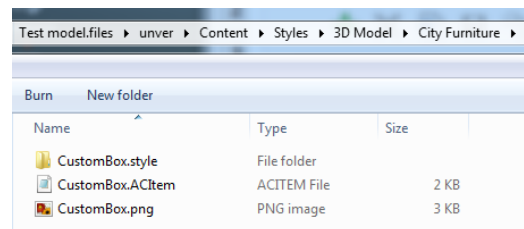
ADD NEW STYLE IN INFRAWORKS STYLE PALETTE.

Next, you have to locate the cache folder of your model:

...\<>Your model.files>\unver\Content\Styles\3D Model\City Furniture

In there you will find three files: CustomBox.style, CustomBox.ACItem and CustomBox.png. You need to copy CustomBox.ACItem and CustomBox.png into

...\<>InfraWorks>\Resources\LocalLibrary\Styles\3D Model\City Furniture



DEFINITION FILES OF CUSTOM 3D MODEL STYLE.

In CustomBox.style there are two files named Model.json and Model.sff. Rename both of them as CustomBox.json and CustomBox.sff and copy them into

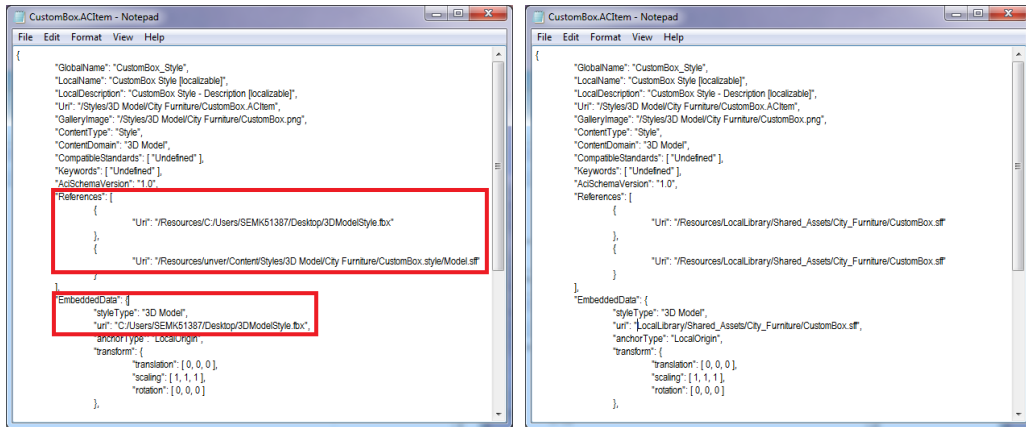
...\<>InfraWorks>\Resources\LocalLibrary\Shared_Assets\City_Furniture

There is a last step before using this new style in all your models; you have to edit CustomBox.ACItem with a text editor. In the ACItem file -under “References”- there are two URI, which you need to replace with the path:

"/Resources/LocalLibrary/Shared_Assets/City_Furniture/CustomBox.sff".

Moreover, under “EmbeddedData” one more URI needs to be replaced with "LocalLibrary/Shared_Assets/City_Furniture/CustomBox.sff".

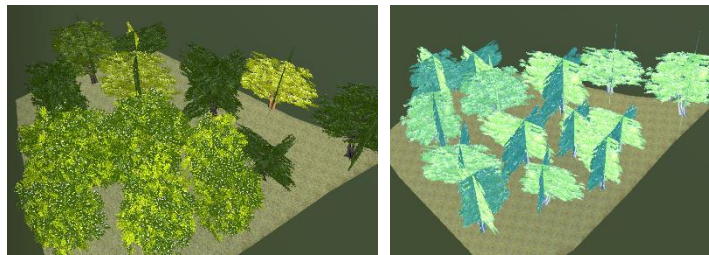
Be careful, the comma (,) after the last URI should remain in place.



ACITEM FILE BEFORE AND AFTER EDITING URI.

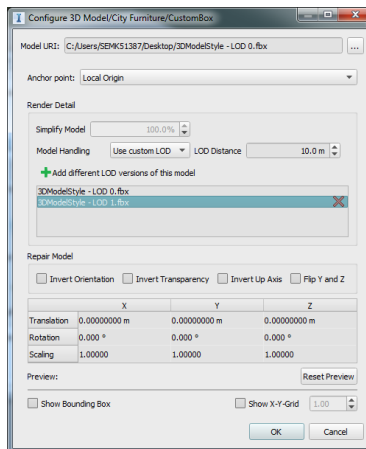
Keep in mind that you should know the origin point of your custom objects so you will be able to define accurately the Anchor point of the new style in the “Configure 3D Model” window.

You can add multiple Level Of Detail (LOD) in your custom 3D Model styles. Doing so, you will be able to see the objects in your model less detailed when you zoom out and more detailed when you zoom in to them.



LOD WHEN ZOOMING IN AND OUT TO A MODEL.

In order to add multiple LOD, you need to select “Use custom LOD” as Model Handling option and then you can add multiple files, representing the different LOD versions of the custom 3D Model.



MULTIPLE LOD IN STYLE CONFIGURATION.

Please note that in order to be able to see the different LOD versions of an object in your model, you need to decrease the Display Detail level in Application Options window (3D Graphics tab) and assign Adaptive LOD in Model Explorer for that specific feature type.

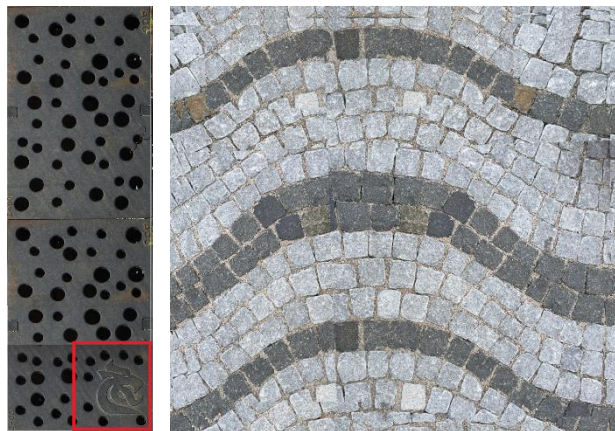
Some additional background as given to us by Haik Lorenz, from Autodesk's Software Development team: Styles in LocalLibrary cannot refer to the original source files -like *.3ds, *.fbx, etc- since those will not be present on user machines. With changing the URI to point to *.sff files, InfraWorks will "disconnect" those parts of the style editing UI, which requires reimporting the source files. Sff files are the only thing InfraWorks needs for displaying styles in the 3D view.

Moreover, you should keep track of the rendering performance. As a rule of thumb, the 3D model should either be simple (<1000 triangles) or provide custom LOD. That means, when creating a style, either set "Direct Display" or "Use custom LOD" as model handling. The built-in "use LOD" automatically computes LOD levels, but it has difficulties with textured 3D models. You will get better results when you provide your own LOD levels (and usually stock models already come with a set of LOD levels). You may find it useful to adjust the LOD distance to the lowest value where the jump from the first to the second LOD level looks acceptable. Avoid "Use dynamic LOD" for styles, since that option is not meant for a large number of objects.

It is recommended not to use excessively large texture maps. Even though InfraWorks supports texture maps as large as 8192 x 8192 pixels, you should limit style models to 1024 x 1024 or smaller (powers of two are preferred over arbitrary values).

Custom materials

It is likely that you will need some additional materials when working with certain types of projects, for example with a certain client.





CUSTOM MATERIAL FROM NORRA KAJEN – ETAPP 4, SUNDSVALL, SWE
(DITCH COVER WITH MUNICIPALITY'S LOGO AND CUSTOM PAVEMENT)

In that case, you will find it helpful to add those material definitions to your library so you can use them anytime. The steps you need to follow are similar to the ones for creating custom 3D Models styles.




INFRAWORKS MODEL FOR NORRA KAJEN – ETAPP 4, SUNDSVALL, SWE

In a Test Model, you can create the new materials under the appropriate category, e.g. Bikepath, using image files (<original image name>). Then, you need to access the cache folder of the model and locate the following folders:


-  ...\<<Your model.files>\unver\Content\Styles\Material\Bikepath
-  ...\<<Your model.files>\Test model.files\unver\Content\Textures

In Bikepath folder, there will be an *.ACItem and a *.png file while in the Textures folder you will find the original image file you used to create this material.

You need to copy the ACItem and png files into:

-  ...\<<InfraWorks>\Resources\LocalLibrary\Styles\Material\Bikepath

Afterwards, you need to copy the original image file from Textures into:

-  ...\<<InfraWorks>\Resources\LocalLibrary\Shared_Assets\<<New folder>

The last step you need to perform is to edit the ACItem file as follows:

Under “References” section, replace the URI with:

“Resources/<New folder>/<original mage name>”

Under “EmbeddedData” section, replace the URI with:

“<New folder>/<original mage name>”

Style Rules

In order to incorporate your custom style rules in the main library of style rules you can Commit (Commit changes of rules of all types into the database) and then copy file "all.rules.json" from the model's cache folder:

-  ...\<<Your model.files>\styles\rules

Into your resources folder:

-  ...\<<InfraWorks>\Resources \styles\rules


With this action, you will actually replace the existing default file. It is advisable to create a copy of the original one and rename it: "all.rules_old.json".

Road Components

In InfraWorks, there are three different types of Roads: Sketch, Design and Component. Sketch and Design roads use Road Styles while Component roads use Assemblies. As there is the option to convert a design road into a component road, it would be useful to have correspondence between the styles of a design road (road style) and the assemblies of a component road.

Custom Assembly: you should create your custom Assembly in an InfraWorks model (while designing a component road) and then you can copy the definition files of the custom assembly (Custom Assembly.ACItem and Custom Assembly.png) from the model's cache folder into your resources folder.

In order to do so, first you need to open an InfraWorks model and add all desired components on a specific station of a component road. Then you can right click and select "Add to Library" and give a name to your Custom Assembly. Afterwards, you need to copy the two files created for that custom assembly from the model's cache folder:

 ...\into your resources folder:

 ...\

Custom Component: In order to create a custom Component, you need to select an existing one (similar to what you want to create) and then copy and edit that definition file using a text editor. The definition files for all existing Components can be found in:

 ...\

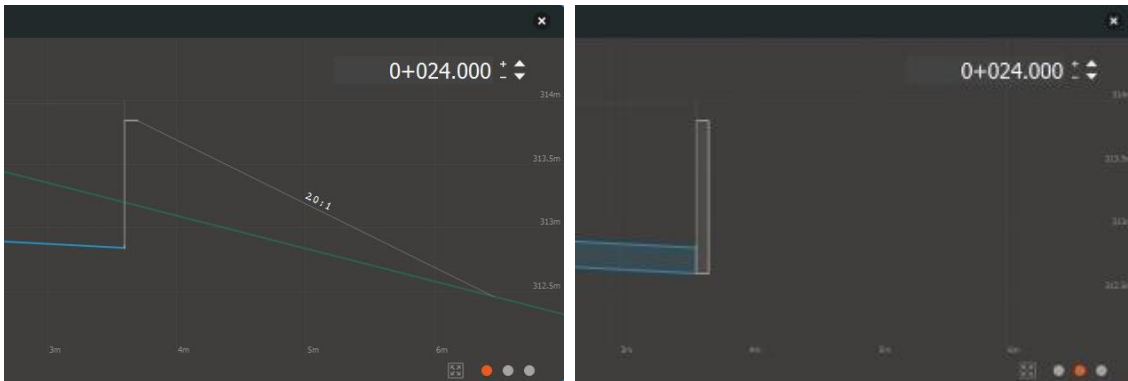
An example of a custom component is a retaining wall. You can create it based on Curb.ACItem. The definition of the Swedish "Stödmur h1.0m SWE.ACItem" is shown below. In this example, the retaining wall has fixed height above ground 1m, a depth below ground 0.2m and a width of 0.1m.

```
{
  "GlobalName": "Stödmur h1.0m SWE",
  "LocalName": "Stödmur h1.0m SWE Style [localizable]",
  "LocalDescription": "Stödmur h1.0m SWE Style - Description [localizable]",
  "Uri": "/Styles/Component/Custom/Stödmur h1.0m SWE.ACItem",
  "GalleryImage": "/Styles/Component/Custom/Stödmur h1.0m SWE.png",
  "ContentType": "Style",
  "ContentDomain": "Component",
  "CompatibleStandards": [ "Undefined" ],
  "Keywords": [ "Undefined" ],
  "AciSchemaVersion": "1.0",
  "References": [
    {
      "Uri": "/Styles/ComponentDefinition/Curb.ACItem"
    }
  ],
}
```

```

"EmbeddedData": {
  "styleType": "Component",
  "name": "Curb",
  "description": "2233542096",
  "category": "definition",
  "tags": "curb",
  "showMarking": true,
  "revision": 0,
  "references": [
    {
      "def": "ComponentDefinition/Curb",
      "paramOverrides": [
        {
          "name": "Depth",
          "value": 1.2
        },
        {
          "name": "Width",
          "value": 0.1
        },
        {
          "name": "DepthBelow",
          "value": 0.2
        }
      ]
    }
  ]
}

```




“STÖDMUR H1.0M” IN CROSS SECTION VIEW. (SUPERELEVATION AND ROAD ASSEMBLY VIEW)


Road Styles

You can create your custom Road Styles in the Style Palette, under "Road" tab. It will be easier to start by copying an existing style close to the one you want to create and then edit it. You can edit the General Settings and Track Settings. In General Settings you

can select the Material Group according to which you will apply materials to your road style, add any 3D Model as Decoration and add a Custom Profile.

In Track Settings you can define the number of lanes for each direction, the type of track (Bikeway, Bridge, Bridge Fence, Curb, Emergency Lane, Greenspace, Roadway, Sidewalk and Tunnel) and the tracks properties like width and height offset. For more information please [refer to the help file](#). When you are finished, you can copy the definition files of the custom road style (Custom RoadStyle.ACItem and Custom RoadStyle.png) from the model's cache folder:

 ...\<Your model.files>\unver\Content\Styles\Street
into your resources folder:


 ...\<InfraWorks>\Resources\LocalLibrary\Styles\Street



ROAD STYLE WITH GREENSPACE AND BIKEWAY.

Parametric parts

In InfraWorks 2018 it is possible to add parametric objects not only as bridge and drainage components, but as road decoration as well. The road decoration can be added along a component road and can be -among others- guardrail, lighting posts and noise barriers. All parametric objects, for bridges and roads, should be of *.ipt or *.iam file type and can be created with Autodesk Inventor. Parametric objects for drainage networks are structures (*inlets and manholes*) as well as culverts and they can be created either in Infrastructures Parts Editor (*former Project Kameleon*) or in Autodesk Inventor. For custom pipelines you need to copy and edit the *.ACItem files in

 ...\<InfraWorks>\Resources\LocalLibrary\Styles\Pipeline.

In order to export your custom parametric objects from Inventor into InfraWorks you need to make sure you have installed the Infrastructure Modeler plugin. You can find more information [in this article from Autodesk Knowledge Network](#).

Parametric Road decoration:

You can create custom decoration and place them along your component roads in InfraWorks, using Autodesk's Inventor. In the following example, we will describe how you can create noise barriers.

In Inventor you can start by selecting a template and then you can create sketches in various planes (planes are located under Origin folder). The sketches will describe your parametric object.

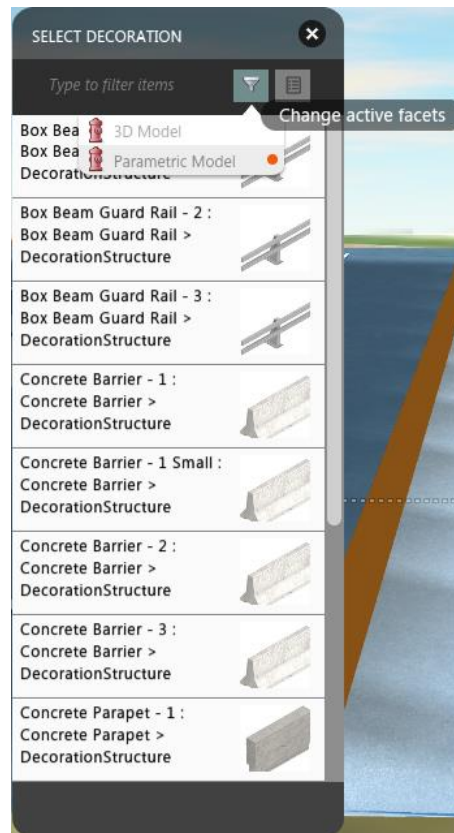
You can start by sketching the plan view of your noise barrier, right click on XY Plane and select New Sketch. Now you can start sketching your object by creating objects, for example, a rectangle. As you are asked to define the dimensions of the rectangle, you can insert parameters as dimensions, e.g. "Length = 1m" and "Width = 10cm". Those parameters can be edited later in InfraWorks. When you are done with the plan view, you can select "Finish Sketch".

In the next step, you need to define the height of the barrier above and below ground. There are various ways to proceed; one of them is to create an extrusion for the foundation of the sound barrier below ground and then create an "Offset from Plane" for the height above the ground.

When you are finished, you can access the parameters table in order to review and modify them by assigning specific names and values. Moreover, you can select which parameters will be exported to InfraWorks, activating the respective Key field. You can export the custom parametric model through Environments tab, where you can select the Infrastructure Part Shape Utilities and then Export Template command.

In InfraWorks, you can add your custom parametric object in Style Palette, in "Parametric Models" tab. While you are configuring the new style, you can edit the available "Part Sizes" as well as the "UI Appearance" (visible/ editable parameters as imported from Inventor).

Be reminded that you can add the parametric models as regular Road decoration. You can see a list of the available parametric models after selecting the filter icon in the "Select Decoration" window. Please note that road decoration is not visible in *Cross Section View*.



FILTERING PARAMETRIC MODELS WHILE ADDING ROAD DECORATION.

[Here is a video from Peter Ingels](#) demonstrating the workflow for creating a parametric lighting post in Inventor for use in InfraWorks.

Bridge Components:

You can create custom bridge components following the workflow of creating parametric noise barriers as described above.

[In this screencast by Andy Manze](#) you can watch the workflow for creating a custom parametric pier foundation.

Drainage Components:

There are three categories of objects you can customize structures (inlets and manholes), culverts and pipelines. Structures and culverts can be customized either in Inventor or in Infrastructures Parts Editor (*former Project Kameleon*) while pipelines can be customized directly in the respective *.ACItem files.

You can access Infrastructures Parts Editor from the design menu of Drainage Networks. In the starting window of the software, you can select either an existing drainage catalog or an InfraWorks model. In order to create a custom structure (Assembly) you have to combine a surface structure, an underground structure and a

grate or cover. You can customize those features in the Structure section. When you are finished with assembling your custom structures, you can Publish them with the respective command and select to export them in a Shared content folder and/ or into a specific Model. Keep in mind that until the day of the presentation, there is no direct link between InfraWorks and Civil 3D custom structures.

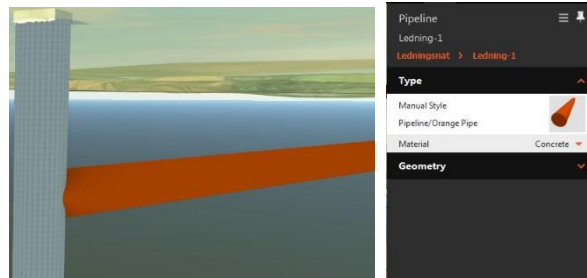
In the same way, you can customize culverts. You can find out more in [this Webcast](#) presented by Charlie Ogden.

If you need to customize your pipelines for drainage networks, you have to access the respective Resources folder:

 ...\<InfraWorks>\Resources\LocalLibrary\Styles\Pipeline

In that folder, you will find the existing definitions, which you can copy and edit in order to create your own.

In InfraWorks, even though you can assign material to pipelines, e.g. concrete, it is not visible in the model, as you can only see the color of the pipeline style.



ORANGE PIPELINE IN INFRAWORKS WITH CONCRETE MATERIAL.

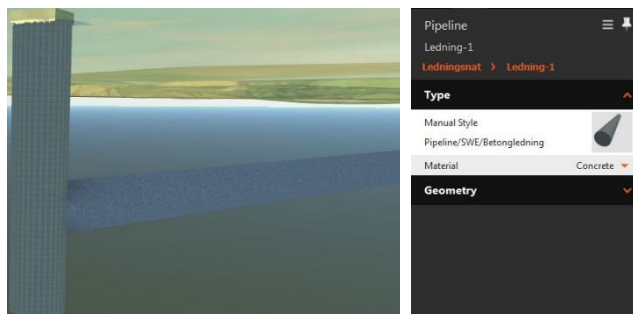
Because of that, we created two additional pipeline definitions so we can visualize the material of the pipes (concrete and PP). Below you can see the definition of the concrete pipeline (Betongledning.ACItem):

```
{
  "GlobalName": "Concrete Pipe_Style",
  "LocalName": "Concrete Pipe Style [localizable]",
  "LocalDescription": "Concrete Pipe Style - Description [localizable]",
  "Uri": "/Styles/Pipeline/Concrete Pipe.ACItem",
  "GalleryImage": "/Styles/Pipeline/Concrete Pipe.png",
  "ContentType": "Style",
  "ContentDomain": "Pipeline",
  "CompatibleStandards": [ "Undefined" ],
  "Keywords": [ "Undefined" ],
  "AciSchemaVersion": "1.0",
  "References": [
    {
      "Uri": "/Styles/Material/Pipe & Pipe Connector/Material -
Concrete.ACItem"
    }
  ],
  "EmbeddedData": {
    "styleType": "Pipeline",
```

```

    "type": "Circle",
    "geometry": {
      "size": [ 0.5, 0.5 ],
      "heightOffset": 0
    },
    "materials": {
      "tube": "Material/Pipe & Pipe Connector/Material - Concrete",
      "cap": ""
    }
  }
}

```



BETONGLEDNING PIPELINE IN INFRAWORKS WITH CONCRETE MATERIAL.

Create a script

In InfraWorks you can use the Script window in order to load and run scripts in your models. With scripts, you can standardize your models, and set workflows that will help your company's users.

You can download the documentation for [Autodesk InfraWorks – JavaScript API, here](#). In this folder, you will find the actual html files of the documentation, which you can open and browse in a web browser as well as Scripting Samples. You can try to use those samples as they are or you can edit them in order to create your own.

In the InfraWorks – JavaScript Documentation you will find a list of all classes, their description and the respective functions that are available. With scripts, you will be able to:

- import, export, modify and delete InfraWorks objects
- utilize Selection Set and custom queries
- create reports, and
- leverage QT Creator for UI files.

In WSP Sweden, we needed to standardize our company's logo placement in our models, so we wrote the following short script:

```

var cfg = adsk.NewModelConfig();
cfg.Name = "New_WSP_Sverige_Model";
cfg.Description = "New model for WSP Sweden";
cfg.CoordSysWkt = "SWEREF-99-TM" //Database

```

```

var uri = app.UserDataFolder + " New model for WSP Sweden ";

```

```
var doc = app.NewDocument(cfg, uri);
var prp = doc.AddProposal("NewProposal");
doc.ActiveProposal = "NewProposal";

var pos = adsk.Vec2d(0.04, 0.05)

    var logo = app.Watermarks.AddWatermark(
        ImageUri = "C:/Users/<Username>/Downloads/Logo
WSP/Logo/PNG/wsp_RGB.png",
        Name = "WSP Logo",
        Position = pos,
        Size = 0.13,
        ImageAnchorType = adsk.Enums.TopLeft,
        Opacity = 0.40);

gc();
```

More sources:

[Webcast August 19th - Scripting for InfraWorks 360](#)

[Webcast October 21st: Scripting in InfraWorks 360 - Part 2](#)

[Introducing the InfraWorks 360 API](#)

[Infraworks 360 REST API – Tech Preview available](#)

After customizing

When you are done with all customizations in InfraWorks, you need to create a folder that will contain all custom styles, standards and rules with the right structure. Then, you can copy this folder into the standard installation folder of the users.

Moreover, you need to create a document describing the process to the users, a list of all available customized properties and objects and the workflow they can follow to use them. This documentation should be regularly revised and/or updated.

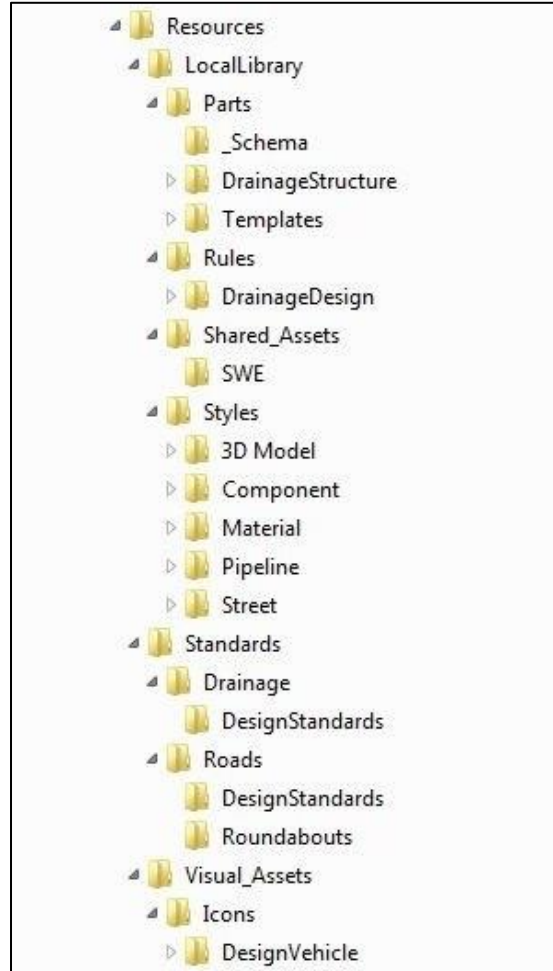
Share your Design Standards and custom content

The folder you will create should follow the same structure as “Resources” folder under: C:\ProgramData\Autodesk\InfraWorks.

The users need do paste and replace the content of your custom “Resources” folder to their own, after installing the software.

It is strongly recommended to create a copy first of the default “Resources” folder -as a backup- and then replace the content.

Below you can find a picture of how our country kit was structured:



FOLDER STRUCTURE OF CUSTOMIZATION FILES.

Create documentation

Equally important to the content of your company kit is the documentation that you will create to accompany it. There should be clear instructions on how the users should copy the files from the company kit into their installation folder, after copying the original Resources folder.

It will be helpful to add information about the customized content and how it can be utilized in the models.

For example, the custom Road design standards should be selected in Model properties.

Depending on which parameters you have customized, the users can later select from various types of Roundabouts, Intersections, Design speeds and Design Vehicles.

In this section, you can add information about how a user can easily locate the custom content of e.g. Assemblies, as he/she can type the name of your specific folder, e.g. SWE in the search field.

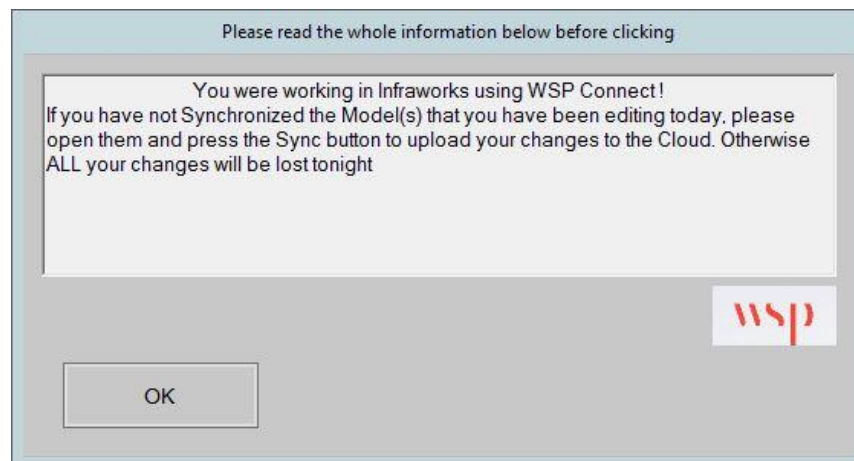
In your documentation, you can also add information about the location of all your custom files, for future use and review. You have to keep in mind that the “Resources” folder path can differ for various versions of the software, so you should mention that in a clear way. E.g.:

- C:\ProgramData\Autodesk\InfraWorks\Resources
- C:\ProgramData\Autodesk\InfraWorks Rolling Sandbox\Resources
- C:\ProgramData\Autodesk\InfraWorks 360\Resources
- C:\ProgramData\Autodesk\InfraWorks 360 Rolling Sandbox\Resources

And yet another customization

In WSP Sweden users can access InfraWorks in two different ways: they can have an installation in their workstations and/ or start InfraWorks in Citrix Environment (WSP Connect). In WSP Connect the cache folder is deleted every day at midnight, therefore it is extremely important for the users to remember to Sync their models before the end of their workday.

In the picture bellow, you can see the message WSP's IT team has created and warns the users to Sync their model before exiting Citrix Environment.



MESSAGE WHEN EXITING INFRAWORKS IN CITRIX ENVIRONMENT.

Please be reminded that the customization presented in this paper, was for features available in InfraWorks 2017 and InfraWorks 2018.1.

List of external links

What can you customize? In Civil 3D:

<https://knowledge.autodesk.com/support/autocad-civil-3d/learn-explore/caas/video/youtube/watch-v-kWA-B9gU2v4.html>

Create your own Design Standards file for Road design:

<http://au.autodesk.com/au-online/classes-on-demand/class-catalog/2015/infraworks/ci10681#chapter=0>

Create your own Design Standards for Roundabout design:

<https://knowledge.autodesk.com/support/vehicle-tracking/learn-explore/caas/CloudHelp/cloudhelp/2018/ENU/Autodesk-VehicleTracking-Help/files/GUID-E085CA48-728E-4FCD-95FD-643D91C3811C-htm.html>

Road Styles:

<https://knowledge.autodesk.com/support/infraworks/learn-explore/caas/CloudHelp/cloudhelp/ENU/InfraWorks-UserHelp/files/GUID-DCD9F1A3-1750-46F7-B062-0A7A11859BAE-htm.html>

Parametric parts:

<https://knowledge.autodesk.com/support/infraworks/learn-explore/caas/CloudHelp/cloudhelp/ENU/InfraWorks-PartsEditor/files/GUID-A957B009-55E4-4FC3-AF1D-2C604228AD00-htm.html>

Parametric Road decoration:

<https://youtu.be/jPnwegG26rw>

Bridge Components:

<https://youtu.be/8Gdpdw5Ltc4>

Drainage Components:

<http://civil-community.autodesk.com/2017/10/oct-18th-webcast-drainage-structure-catalogs-created-infrastructure-parts-editor/>

Create a script:

http://help.autodesk.com.s3.amazonaws.com/sfdcarticles/kA230000000txODCAY/InfraWorks_JS_documentation_html.7z

More sources

<https://www.youtube.com/watch?v=bsl5Q4JK0aE>

<https://www.youtube.com/watch?v=jJdbDKKeRlo>

<http://au.autodesk.com/au-online/classes-on-demand/class-catalog/2014/infraworks/sd6503>

<http://adndevblog.typepad.com/infrastructure/2014/05/infraworks-360-rest-api-tech-preview-available.html>