Bentley MicroStation Workshop

2017 FLUG Spring Training Event

439 - Traffic Animations

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Bentley Institute

Practice Workbook

This workbook is designed for use in Live instructor-led training and for OnDemand selfstudy.
The explanations and demonstrations are provided by the instructor in the classroom, or in the OnDemand eLectures of this course available on the Bentley LEARN Server (*learn.bentley.com*).

This practice workbook is formatted for on-screen viewing using a PDF reader.
It is also available as a PDF document in the dataset for this course.

Traffic Simulations

This workbook contains exercises to help you learn how to create a traffic simulation animation.

TRNC01389-1/0001

Description and Objectives

Course Description

You have your roadway modeled and it is looking good. The next logical step in the visualization process is to add striping and a few trees and then animate vehicles along the roadway. You will start with enhancing the elements that represent your roads, then you will add vehicles to your animation. You will also add lanes of traffic and attach intelligence to the vehicles so that they enter and exit those lanes as they would in real life. Your will add animation cameras to the vehicles for a driver's view of the roadway system. Finally, you will render content such as rocks and trees to add another dimension of reality to your animation.

Skills Taught

- Use the Stencil tools to stencil new 3D mesh geometry
- Use the Create Vehicle Set tool to create a library of cars and trucks to use with the Script Single Lane traffic tool
- Create a DGNLib so that every instance will have access to a shared Vehicle Set library
- Use the Lane tools to add animated cars to the interchange model, change their speed, link exit and entrance lanes to the main lanes, and add vehicles to lanes
- Use the Create Camera Attached to Vehicle tool to attach an animation camera to a vehicle of your choice and view the animation from a driver's perspective relative to that particular vehicle
- Add render ready content to an existing scene
- Use DisplaySets to limit or isolate what is visible in a view or to the camera

Stencil by Reference

In this section, you will use a referenced 2D drawing to stencil pavement markings on to the highway. Because this 3D model has bridges and lanes of traffic crossing over one another, the stenciling process will be done in two steps. The lower areas will be stenciled first with the bridge level off and then the higher areas will be stenciled with the bridge level on.

The Stencil tool is used to create renderable mesh geometry and place it on top of the underlying geometry. The tool creates a temporary depth map mesh based on the geometry that is displayed at the time the tool is used. You can also use the tool with a display set. This allows the geometry created to span across levels or references depending on what is visible at the time you select the tool.

The stenciled geometry is placed in a new model within the current DGN and is automatically referenced into the current model. This allows you to easily detach the markings, edit the results or reprocess.

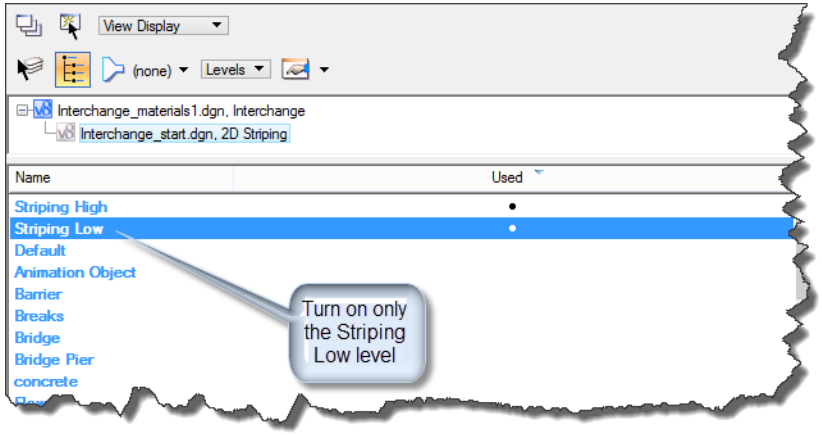
1. Open **Interchange_start.dgn**, then click on the **Reference** icon in the Primary tools to open the *References* dialog.

2. In the *References* dialog click on the **Attach References** icon to open the *Attach Reference* dialog. Browse for and select the current model **Interchange_start.dgn**.
3. In the *Reference Attachment Settings* dialog set the following:
    - *Model*: **2D Striping**
    - **Coincident**
    - Click **OK** button to attach the reference file

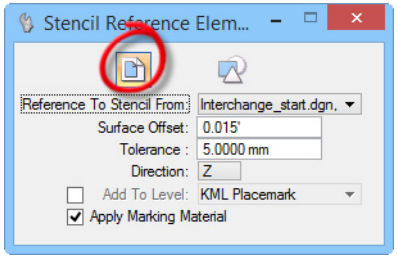
Note: The stencil tool works by creating a depth mesh in memory. For the tool to work quickly and efficiently, you should turn off levels that are not receiving a stencil. This can be done using levels or DisplaySets.

4. Open the *Saved Views* dialog and attach the Saved View road surface to View 1.

5. Open the *Level Display*, select the **Interchange_start.dgn, 2D Striping** reference model and turn off all but *Striping Low* level in View 1.

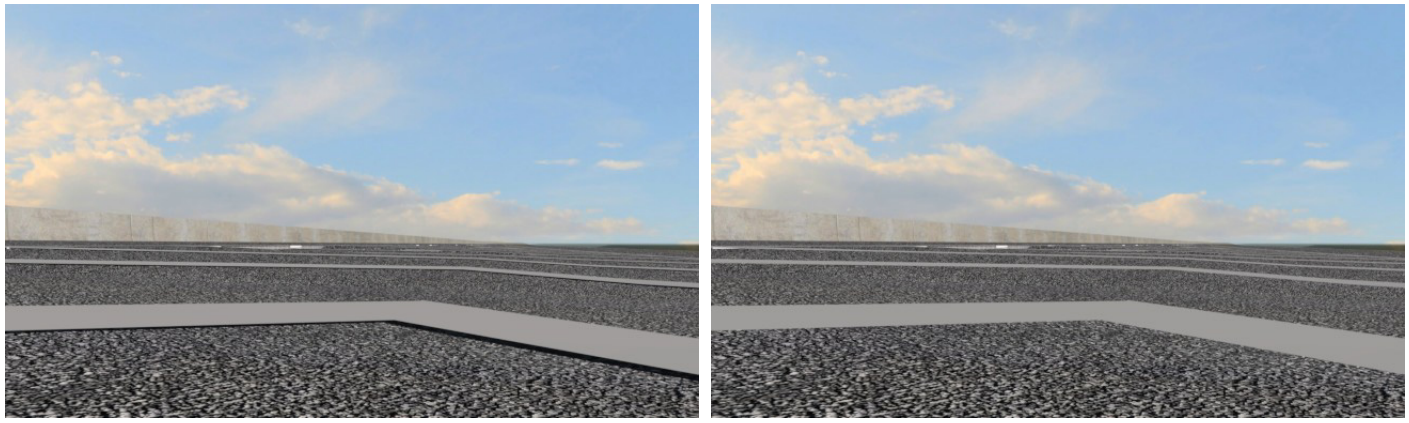


6. From the *Visualization* task pane click on the *Stencil* tool.
7. In the *Stencil Reference Element* settings dialog set the following:
   - *Reference to Stencil From*: **Interchange_Start.dgn, 2D Striping**
   - *Surface Offset*: **0.015'**
   - *Tolerance*: **5.0000mm**
   - *Direction*: **Z**
   - Check **Apply Marking Material**



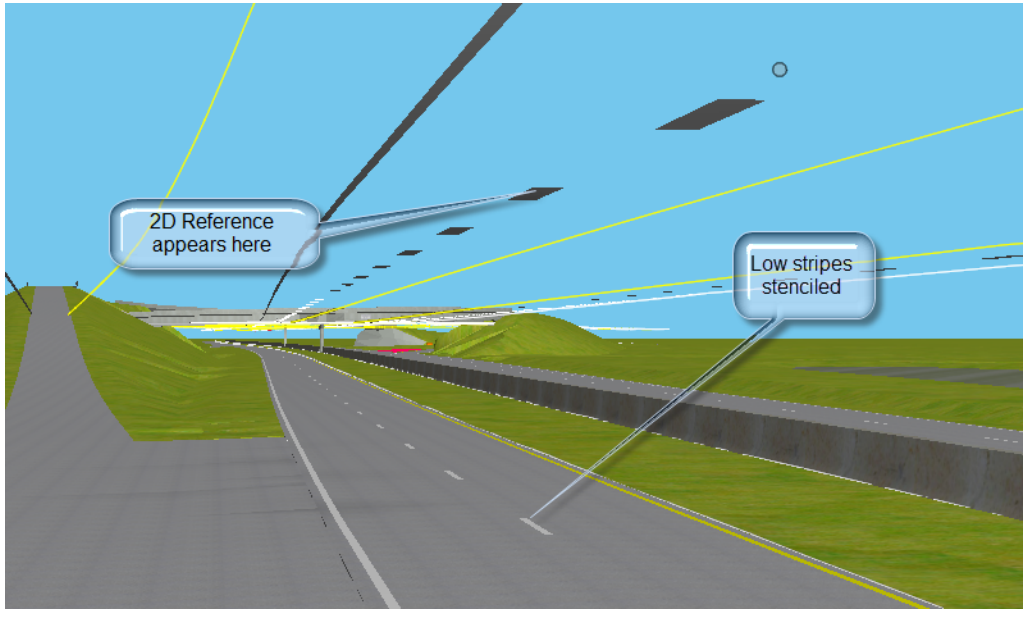
Note: If you choose to Apply a marking material, the software automatically assigns a marking material suitable for a striping material that has high diffuse value (will appear bright) and uses the element color for its color (yellow stripes will be yellow and white stripes will appear white). This material will also have shadow casting turned off, so that the striping material that is slightly offset from the surface does appear to be

floating above the surface. If a visible shadow were to be seen the striping could appear to float above the surface; however with shadow casting disabled for the striping material this will not be perceptible in the rendering.



Left image shows stripe with shadow and the right image with no shadow

8. Enter a data point in View 1 to start the tool.



You can now see that the lower striping has been stenciled on top of roadway surface

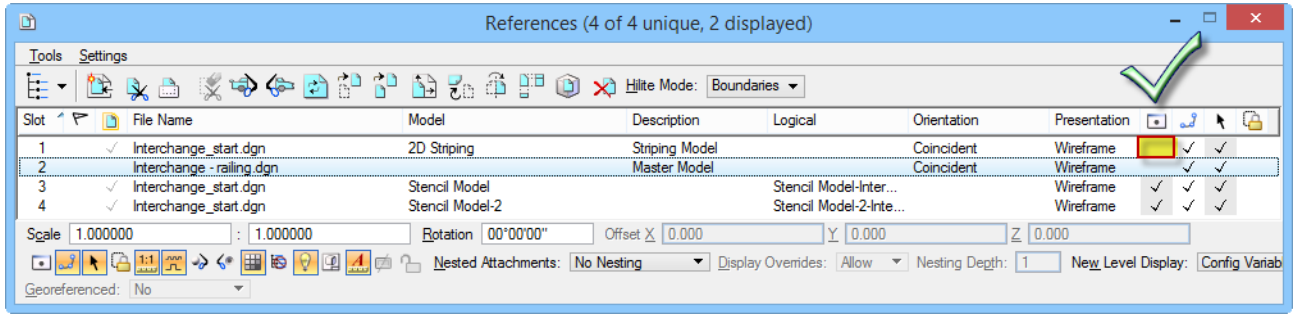
9. Open the *Saved Views* dialog and attach the Saved View road and bridges to View 1.

   The saved view that you just attached has the bridge level on to receive the high level striping.

10. Open the *Level Display*, select the **Interchange_start.dgn, 2D Striping model** and turn off all but *Striping High* level in View 1.

11. Enter a data point in View 1 to start the processing and to create the striping.

12. Open the *References* dialog and either turn off the display of the 2D Striping model or detach it.



Note: As you can see in the *Reference* dialog the *Stencil* tool has created new mesh geometry during the processing but it also placed the new geometry into a reference file and automatically attached it at the same time. If you made errors in your stenciling job and you want to make changes, you can simply delete the stencil model and try again.

Stencil from Selected Elements

You can also use the *Stencil* tool to create renderable meshes by selection elements within the design file. Included with MicroStation V8i Select Series 3 is a cell library of useful stencils. This library is located in your workspace\system\cell folder.

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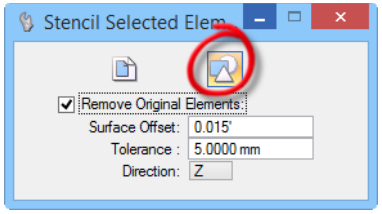
1. Continuing with **Interchange_start.dgn**, attach the Saved View **stencil gore** to View 1.
2. Open the *Level Display* dialog and turn off the striping high and striping low in the referenced stencil models for View 1.
3. Make **Gore** the Active Level.

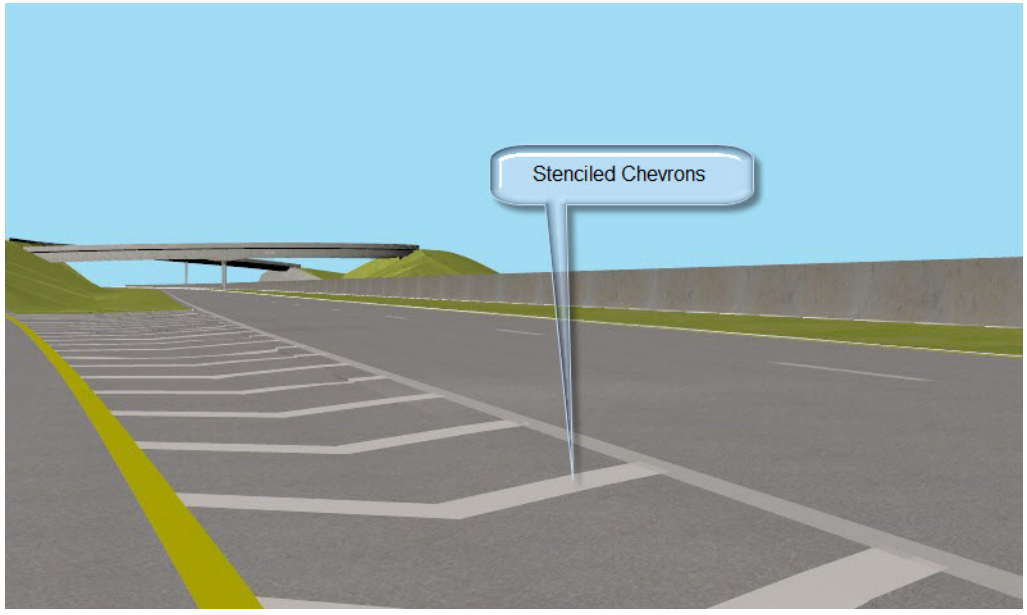
4. Use the *Element Selector* tool to select the chevrons in View 1.

5. From the *Visualization* task pane click on the *Stencil* tool.
6. In the *Stencil Reference Element* settings dialog set the following:
   - Check **Remove Original Elements**

- *Surface Offset*: **0.015’**
- *Tolerance*: **5.0000mm**
- *Direction*: **Z**

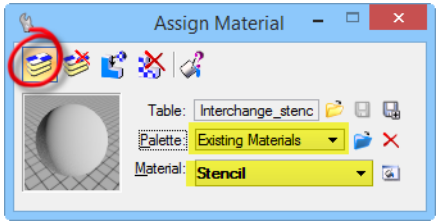


7. Enter a data point in View 1 to start the stencil processing.



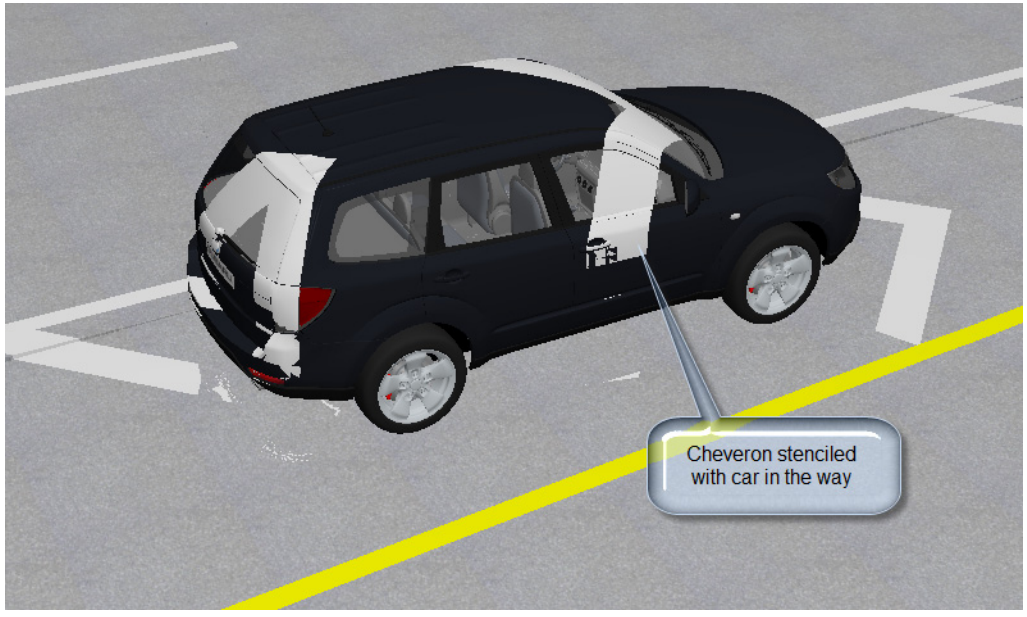
As you can see the chevrons appear just 0.15 feet above the roadway mesh. To prevent them from appearing to float you will need to assign a non shadow casting material to the Gore level color 0.

8. From the *Visualization* task pane click on the **Apply Material** icon.



9. With mode set to **Assign** set the *Palette* to **Existing Materials** and the *Material* to **Stencil**. Select one of the chevrons in View 2 and enter a a second data point to accept the assignment.

Note: Remember to limit what is seen in the view where the stencil tool is being used. If you have a car model in the roadway when you use the tool you could very well end up with an unwanted racing stripe on that vehicle. Vehicles left in the roadway striping area will get striped as well if the geometry being stenciled crosses over them, and you can expect to see paint on the vehicle.

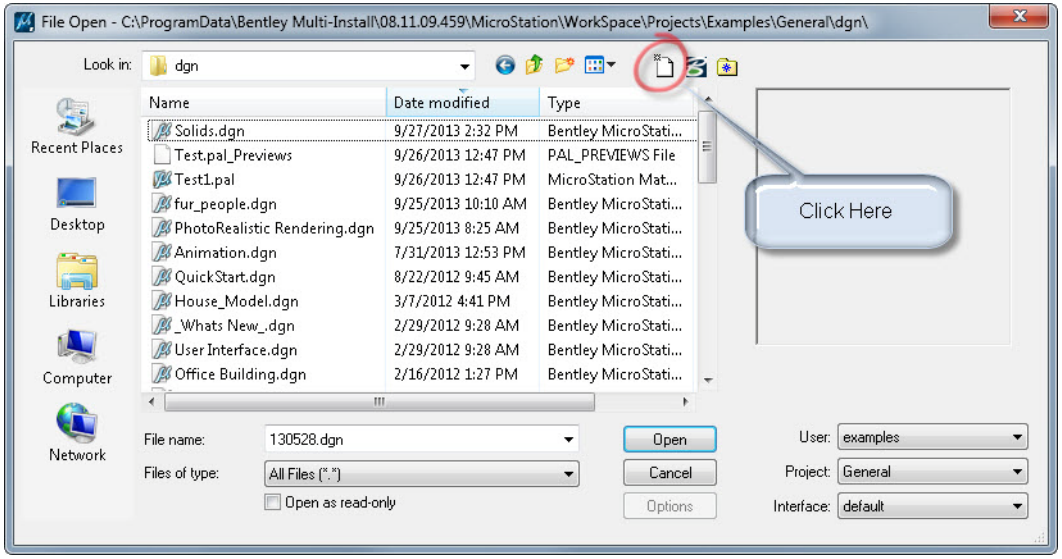


Example where stencil is applied with vehicle in the way

Creating a DGNLib

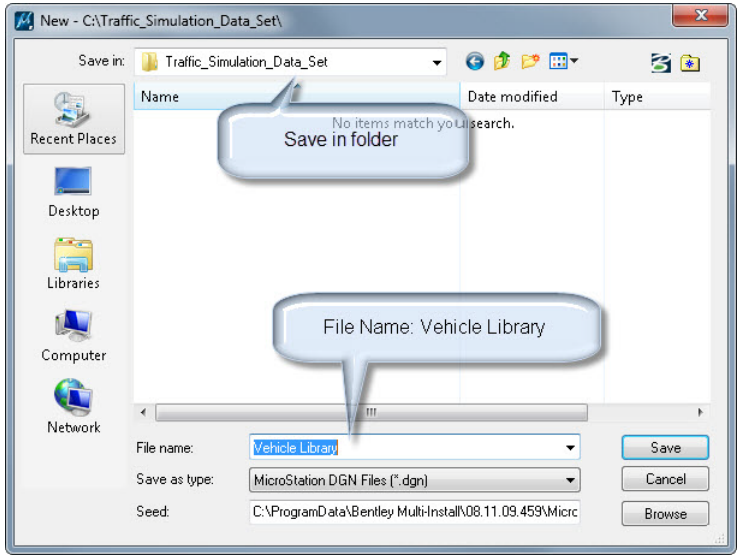
In this section you learn how to create a new 3D DGN file. You will not be doing any modeling but just using the DGN file as a container to store the Vehicle Sets or libraries that can then be available to every instance of MicroStation.

1. Open MicroStation and click on the **New File** icon.

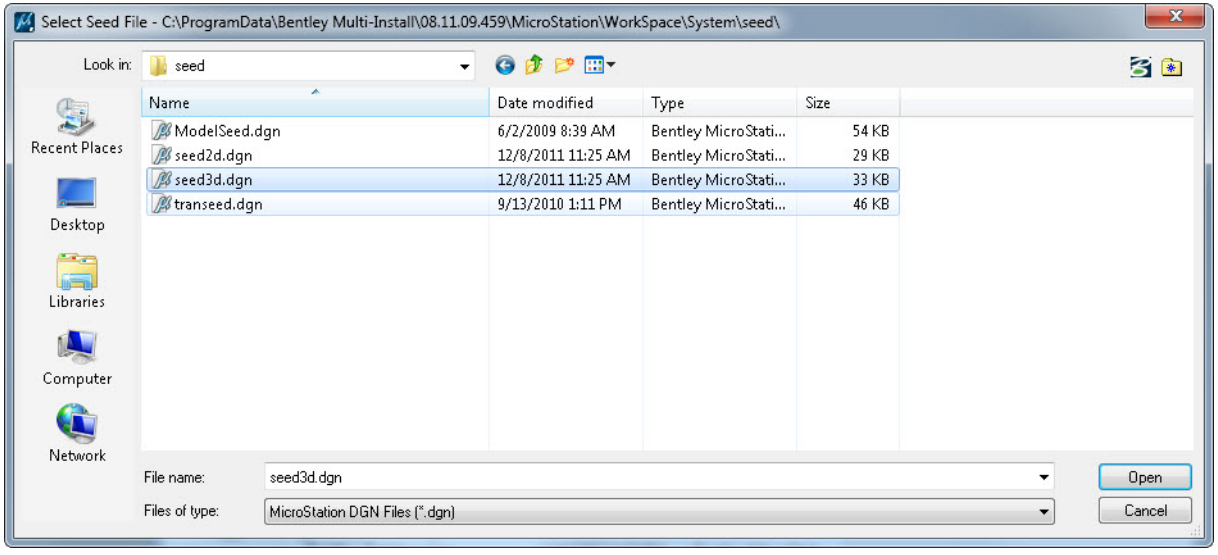


2. In the *New File* dialog, select a folder to create the new DGN file and enter Vehicle Library for the name.

The file can be created anywhere you like. It will be moved to a folder later.



3. Click on the **Browse** button in the *New File* dialog to open the *Select Seed File* dialog. Navigate to your ..\workspace\system\seed folder and choose **seed3d.dgn**, then click **Open**.



4. In the *New File* dialog click on the **Save** button to create the new 3D design file.

Create Vehicle Set

Now that you have created an empty DGN file you can use it to create and store information that you want to share and that will always be available. You can create your Vehicle Sets in this file and save them. Once you have them created and saved you can simply change the file extension to dgnlib and move it to a folder where the system searched for DGN libraries. The next time your start up MicroStation the library or libraries that you have created will be available every time you open a file using this workspace.

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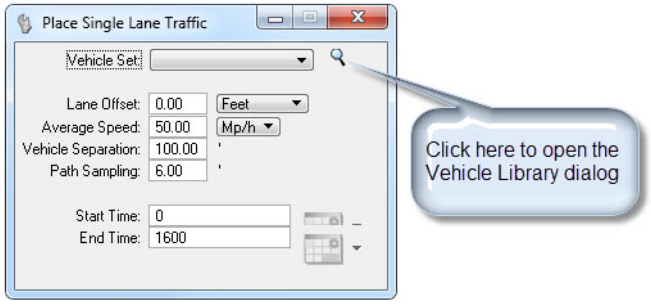
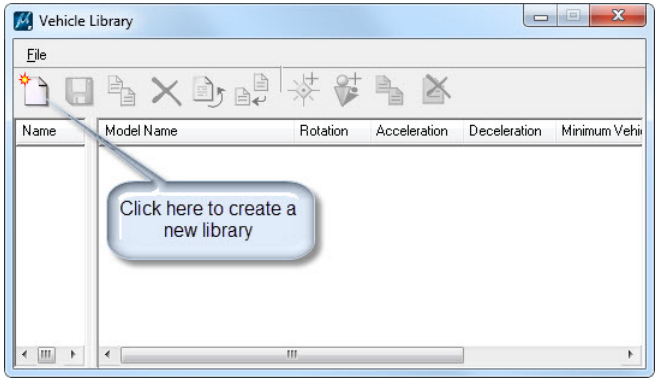
1. Open the **Vehicle Library.dgn** that you just created.
2. In the *Animation Task* panel select the *Script Single Lane Traffic* tool

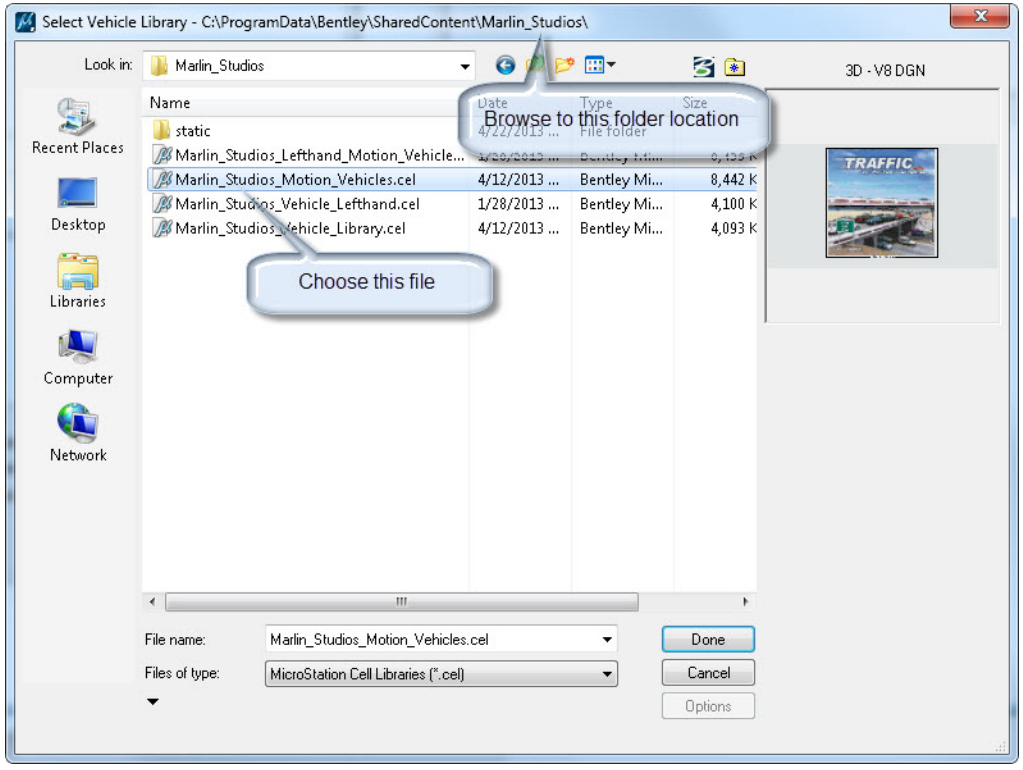


3. Click on the **Browse** icon to open the *Vehicle Library* dialog.

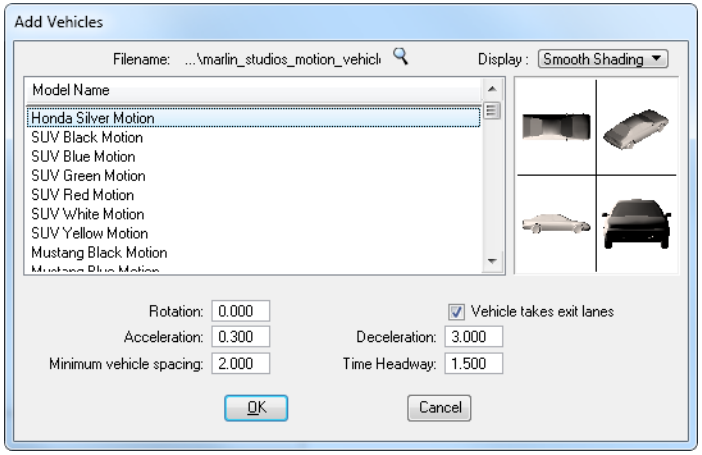


4. Enter **Cars** for the *Library* name.
5. Click on the **Add vehicles from (cel, dgn,dgnlib)** icon. The *Add Vehicles* dialog appears.

6. Click on the **Browse** icon in the *Add Vehicles* dialog. The *Select Vehicle Library* dialog appears.



7. Browse to C:\ProgramData\Bentley\SharedContent\Marlin_Studios and double click on **Marlin_Studios_Motion_Vehicles.cel** to choose this file. The *Add Vehicles* dialog appears.



You will need SELECTseries 3 version 08.11.09.459 or later installed to have this library. If you don't have this version installed you can choose the **Marlin_Studios.cel** library instead.

Note: The motion libraries have people in the cars and trucks and the textures for the wheels all have radial blurs so that they will appear to be spinning. The non motion libraries have static wheels and no people, these are intended to be used as parked vehicles.

8. Click and drag select all of the cars in the *Add Vehicles* dialog but do not select the trucks. Click **OK**.

   The following is an explanation of the settings:

   Rotation: This is the angle to rotate the contents of the model such that the vehicle is facing in the positive x direction. Typically if the model should be located such that the origin is at the center of the vehicle on the same plane as the bottom of the wheels.

   Vehicle takes exit lanes: When checked the vehicles will randomly take exit lanes for large semi tractor trailer rigs you should turn this off because these vehicles do not articulate and could look bad especially on tight turns.

   Acceleration: Vehicle acceleration in m/s2 a typical value for a car is 0.3 and 0.25 for a truck.

   Deceleration: Vehicle deceleration in m/s2 a typical value for a car is 3.0 and 2.0 for a truck.

Minimum Vehicle Spacing: This is the minimum allowed spacing between vehicles. When a vehicle slows down because it cannot join an entrance lane then the vehicle behind it will also slow down. If the vehicle comes to a stop then this value represents the distance maintained between them.

Time Headway: This is the safety time in seconds between vehicles in a traffic system. Typically this varies between 0.8 and 2.0. More careful drivers will have a larger time headway. This also means the traffic system can support less volume.

9. Click on the **Save** icon to save this library.

10. From the *Vehicle Library* dialog click on the **Create New** icon and change the **Untitled-1** name to **Trucks**.

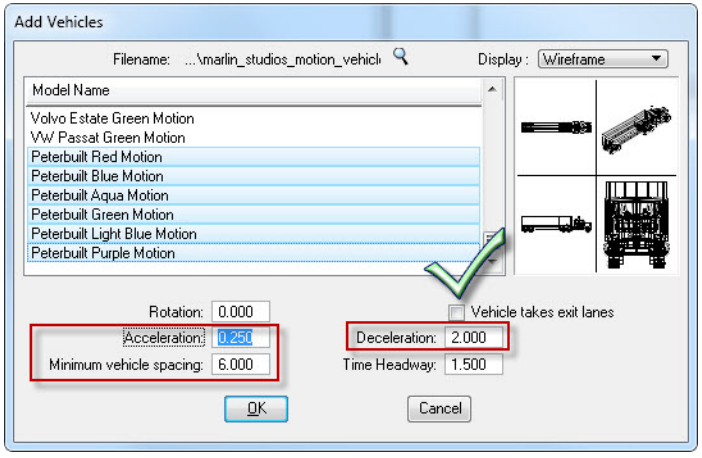
11. Click on the **Add vehicles from (cel, dgn,dgnlib)** icon. The *Add Vehicles* dialog appears.
12. Click on the **Browse** icon in the *Add Vehicles* dialog. The *Select Vehicle Library* dialog appears.
13. Browse to C:\ProgramData\Bentley\SharedContent\Marlin_Studios and double click on **Marlin_Studios_Motion_Vehicles.cel** to choose this file. The *Add Vehicles* dialog appears.
14. Click and drag select all of the Peterbuilt truck models in the *Add Vehicles* dialog but do not select the cars and set the following:

    Vehicle takes exit lane: **Disable**

    Acceleration: **0.250**

    Minimum vehicle spacing: **6.0**

    Deceleration: **2.000**



15. Click **OK** to add the trucks to the library.

16. Click on the **Save** icon to save this library and exit MicroStation.
17. Using File Explorer rename the **Vehicle Library.dgn** to **Vehicle Library.dgnlib** and move or copy it to your workspace\system\dgnlib folder.

Scripting Single Lane Traffic

In order to animate the vehicles along the road or highway a series of paths need to be defined for the vehicles to follow. These paths are used by the animator for calculating the points on the road surface that the vehicles move along. Therefore they don't need to be accurately placed on the road surface. In most cases anywhere above the road surface is suitable. You can even reference in a 2D layout file with the path information and then use this as a basis for the lane paths. In the case where a single lane goes under a bridge and then curves around and crosses itself, as for example a clover leaf highway exit the lane, then a 3D path should be defined such that it is above the correct part road surface as the road curves around and back over itself.

There are two tools for adding lane information to the traffic simulator. These are:

Script Single Lane Traffic

Script Multi-Lane Traffic

The *Place Single Lane of Traffic* tool is used when there is a single lane center line element defined per roadway lane. This tool will place and animate a single lane of vehicles along this path.

The *Place Multiple Lanes of Traffic* tool will allow multiple lanes of traffic to be defined using a single path or alignment.

In the image below, the yellow lines are used for defining single lanes of traffic along the roadway and the red line is used for defining multiple lanes of traffic. Once the lanes have been set up they can then be linked together so that vehicles can join and leave from one lane to another and they can also overtake based on their differing velocities.

The operation of this tool is to place a set of vehicles along the lane defined by the parameters and add a script entry to the animator for animating the vehicles. The tool uses data point entry to select the lane, define the direction of vehicle travel and to preview the vehicles on the road. This allows you to see the vehicle spacing which can be adjusted prior to accepting the settings.

1. From the class data sets open **Interchange.dgn**. Make **Level Road Surface** the active level and in View 1 turn off all other levels except for the Bridge, Lanes and Vehicles. You may optionally just attach the saved view Script Lanes to View 1.

Note: When you use the Script Lane tools a depth mesh is created in memory so that the positions and orientation of all the vehicles can be computed. You should always limit the geometry visible in the view where you place them to just those elements that will receive the vehicles. This can be achieved by using levels or DisplaySets. Failing to do this could result in MicroStation running out of memory and possibly crashing. In addition, if you limit what is visible to just the geometry that will receive the vehicles, then the tool will work much faster. The *Populate Contents* tool works the same way, so when adding trees and other content to your scene you should once again limit the visible geometry to just the elements that will actually be receiving the content.

2. Select the *Script Single Lane Traffic* tool.
3. Set the Settings as follows:
   - *Vehicle Set*: **Cars**
   - *Lane Offset*: **0.00**
   - *Average Speed*: **60 Mp/h**
   - *Vehicle Separation*: **225**
   - *Path Sample*: **6**
   - *Start Time*: **0**
   - *End Time*: **1500**

   You are setting the speed for the lane and the vehicle separation. The smaller the separation, the more vehicles you will have on the lane. If you prefer to use KPH and Meters, set the *Average Speed* to **105KPH**, *Vehicle Separation* to **61** meters and *Path Sample* to **2** meters.

   Lane Offset - If the path for the vehicles to travel down is not in the center of the lane then this value allows you to set the distance from the lane path element to the center of the lane. The option button allows the choice of the units to use.

   Average Speed - This the average speed of the vehicles in this lane as expressed in the units defined in the option button next to it.

   Vehicle Separation - This is the distance between adjacent vehicles in the same lane.

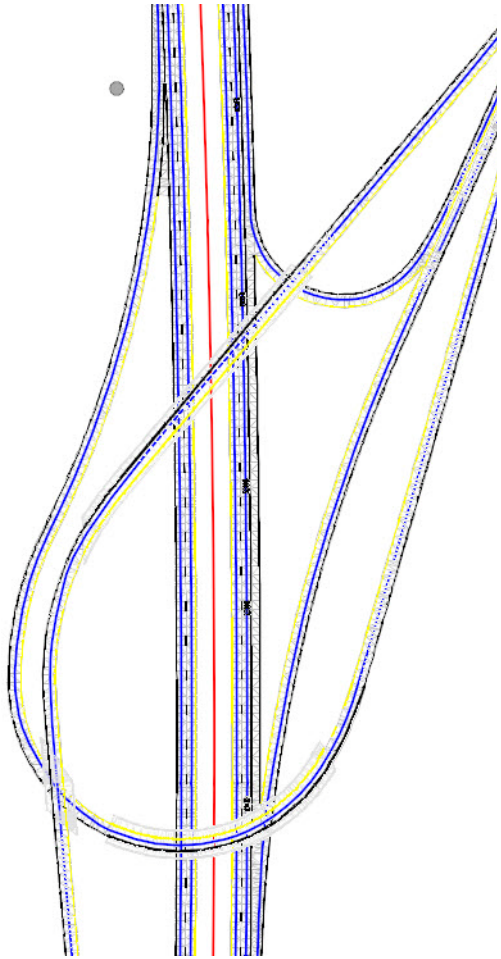
   Path Sampling - This is the sampling distance along the lane path element that the road surface information is calculated at. A value of 2 meters or 6 feet is usually sufficient for smooth highways. If the road surface contains speed bumps then a lower value should be used.

Start time - This is the animation script entry start time, expressed in the current animation scripts time code.

End Time - This is the animation script entry end time, expressed in the current animation scripts time code.

4. In View 1 (Top View) select the right lane as seen in the figure below. Position your cursor to give it a traffic flow toward the top (the direction arrow should be red) and accept. Make sure you don't select the exit lane - you don’t want to be exiting at 65 miles per hour.

   You can see the vehicles show up in the right lane at the spacing that you have set in the dialog. If you wanted to change the separation you could do this after the vehicles appear and prior to accepting by just changing the value

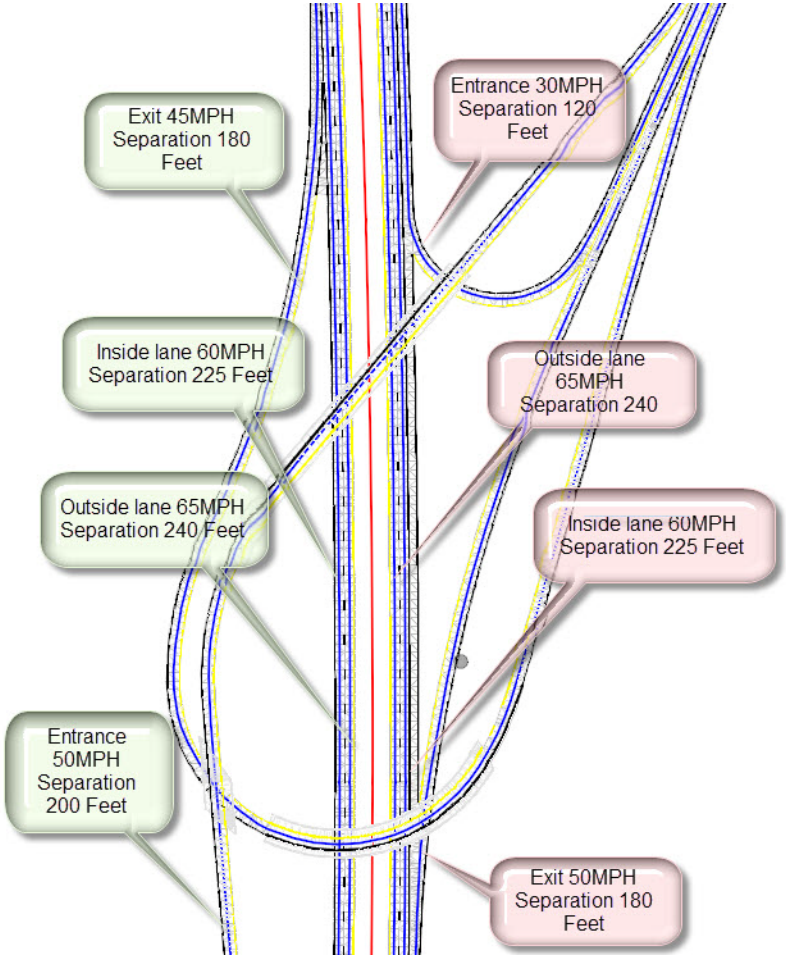


5. Select that same tool except change the settings to:

Average Speed: **50MPH** or **80KPH**

Vehicle Separation: **180 Feet** or **55 Meters**

6. Select the exit lane as shown (lower right) and give it a traffic flow toward top of screen (red indicator arrow) and accept.



7. Using the layout shown above, script the other lanes with the speed and separations shown. If you prefer to use Metric system you can use the following conversions:

   - Multiply MPH by 1.6 to get approximate velocity in KPH

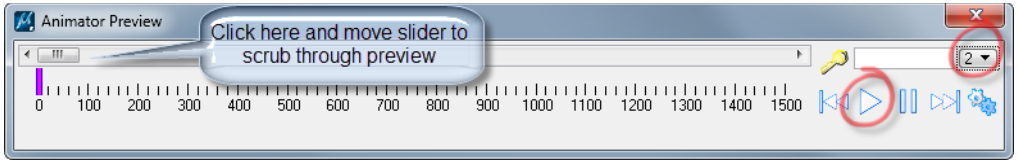
- Multiply Feet by 0.3 to get approximate distance in Meters

In the interchange layout (provided you are scripting for right hand drive) all of the lanes on the right will require that the direction indicator be red and the ones on the left will be toward bottom of the screen and appear in green.

For left hand drive vehicles just reverse the direction when scripting the lane.

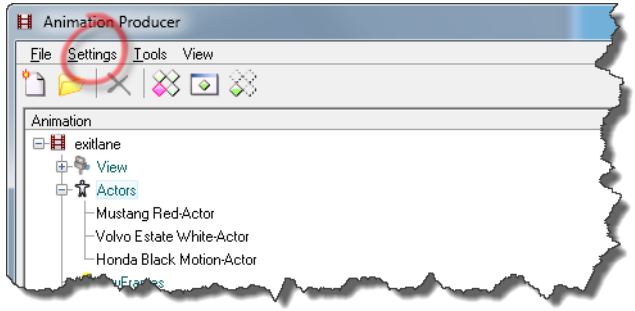
Hint: If you by mistake have a lane with traffic flowing in the opposite direction than what you intended, you can use the Delete Lane tool to delete the lane and then script it again with the vehicles going in the direction that you need.

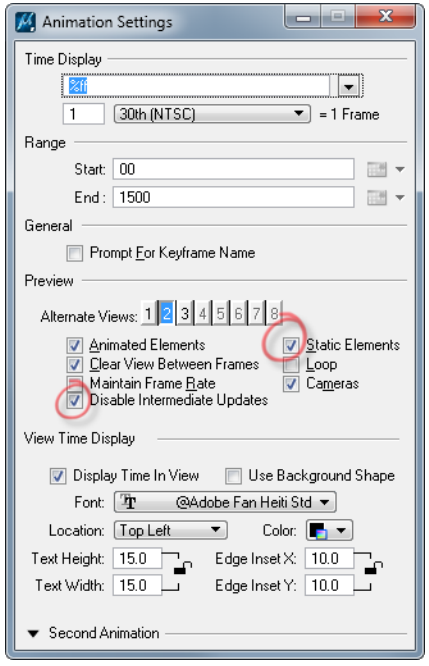
8. Use the *Animation Preview* tool to preview the animation in View 2.



To stop a preview, simply enter a reset by right clicking in any view.

9. From the *Animation* task pane click on the **Animation Producer** icon to open the *Animation Producer* dialog, then click on **Settings** and choose **General**.





10. In the *Animation Settings* dialog make sure that **Disable Intermediate Updates** is checked. You will typically want this item checked as it will make for smoother previews.

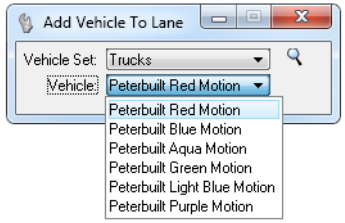
11. In the *Animation Settings* disable the **Static Elements**.

12. Use the *Animation Preview* tool to preview the animation in View 1 Top View. Now you can see only the cars (animated elements) as seen in the preview. This is a good way to check the animation to make sure everything is flowing as expects.

Add Vehicle to Lane

In this exercise you will use the *Add Vehicle to Lane* tool to add a few additional large semi-tractor rigs to the interchange model.

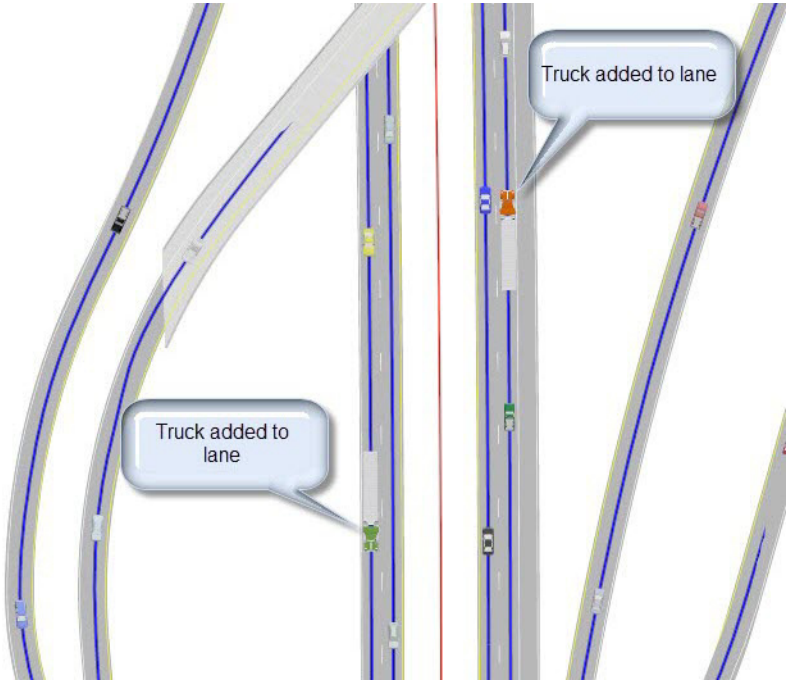
1. Continuing with **Interchange.dgn**, click on the *Add Vehicle to Lane* tool. The *Add Vehicle to Lane* dialog appears.
2. In the *Vehicle Set* drop down choose **Trucks** and in the *Vehicle* drop down choose **Peterbuilt Red Motion**.



   You can see that the prompt for the tool says **Add Vehicle To Lane > Identify Lane Center Line**.

3. Pick one of you main lanes in View 1 and enter a data point to identify the lane, then another data point to accept the lane. The truck appears and you can move the truck forward and back on the lane centerline by moving your cursor to position the vehicle.
4. Enter a data point to accept the position of the newly added vehicle.

5. Repeat the steps to add another truck to you simulation.



Create Camera Attached to Vehicle

Now that you have your traffic animating down the highway you may want to see the roadway from the vantage point of one of the vehicles. This is very simple to setup using the *Create Camera Attached to Vehicle* tool.

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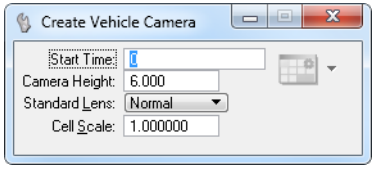
1. Continuing in **Interchange.dgn**, fit View 1, then window in on the roadway at the bottom of the view where the main highway begins.
2. Click on the *Create Vehicle Camera* tool and set as shown below.



Start Time: **0**

Camera Height: **6.0**

Standard Lens: **Normal**

Cell Scale: **1.0**

3. Enter a data point on the first car you see in the Northbound outside lane, then another data point to accept this vehicle.
4. Click on the *Animator Preview* tool and preview the animation in View 2.

   You can see in the preview that you are moving down the highway with the car that you chose at a height of 6’ above the highway.

Hint: You should always use a Normal lens when creating vehicle cameras. The Normal lens viewing angle is near that of human vision and you want to see what a person would see, so don’t use Wide Angle or Telephoto lens for this camera.

This course is intended to show you how to setup a traffic simulation and not how to setup lighting, environments, materials or to add addition photo-realistic content. Addition training related to this topics can be found on the Bentley LEARN Server (learn.bentley.com).

Example of a rendered frame using interchange data set with additional content, environment and lighting

When you previewed the animation did you notice how the cars appear out of nowhere at the beginning of the exit and entrance lanes?

Linking Lanes

In this exercise you will use the lane linking tools to setup your roadway's network such that the vehicles randomly take exits off the main lanes and enter the main lanes as well as introduce the possibility for random overtaking maneuvers.

This is because the traffic repeats and the cars are recycled and used again. What you really want to happen is for the cars to move from the main lane to the exit and entrance lanes. For this to work you will need to link the exit lanes and entrance lanes to the main lane.

Once a set of lanes has been created it is possible to create a road network by linking lanes together and defining the types of lanes in the file. The tools needed for linking the lanes are described below.

Exit Lanes - These are lanes which vehicles can change to in order to leave a main carriageway. This tool links two lanes together. Following the prompts you will first be asked to select the lane which is the lane entering the carriage way. Then you will be prompted to identify the main carriageway. Once accepted the cars will move from one lane to the other.

Entrance Lanes - These are lanes which vehicles can change from to join a main carriageway. This tool links an exit lane to a main carriage way lane. Following the prompts you will first be asked to select the lane which is the lane exiting the carriage way. Then you will be prompted to identify the main carriageway.

Outside Lane - This is a lane which is closer to the central reservation of a road than the lane you are currently in. This lane links two single lanes together such that the first is the outside lane and the second is the inside lane. (**Note**: if you use the *Place Multi Lane Traffic* tool then inside and outside lanes are automatically calculated)

Inside Lane - This is a lane which is further away from the central reservation of a road than the lane you are currently in. This lane links two single lanes together such that the first selected is the inside lane and the second is the outside lane. (Note: if you use the *Place Multi Lane Traffic* tool then inside and outside lanes are automatically calculated)

Show Lane Links - When selecting a lane this tool will draw the links this lane has to other lanes in the views. Using the icon on the tool will zoom the active view to the area where the linking occurs.

Delete Lane Link - This tool will delete individual links from lanes. Firstly identify the lane to delete the link. Now identify the transient which represents the link to be deleted. You can use the zoom icon on the tool settings to animate the active view between the links for a given lane.

1. Continuing with **Interchange.dgn**, click on the *Link Exit Lane* tool, it will prompt you to select the exit lane first and then the main lane. Click on the exit lane, then click on the main lane, then accept with a data point to complete the lane linking.

2. Repeat the steps for the other exit lane.

3. Using same procedure use the *Link Entrance Lane* tool to link the two entrance lanes to the main lane.

4. Use the *Link Inside Lane* tool to link the inside lanes to the outside lanes. Enter a data point on the inside lane, then a data point on the outside lane, and then one more data point to accept.

   You will need to use the tool twice once for North bound traffic and once for South bound traffic. Once you have done this the vehicles will randomly change lanes to overtake slower cars.

   Note: You could have accomplished the same thing by using the *Link Outside Lane* tool, the difference being that you pick the outside lane first and inside lane second both.When the scripting is done using the *Script Multi-Lane*, tool there is no need to link the inside lane to the outside because the steps used with this tool predetermines the lane order.

5. Select the **Animation Preview** box, change the active view to view 1 and run the preview.

   The vehicles should now enter and exit by changing lanes, rather than appearing out of nowhere and you may see some cars changing lanes on the main highway.

Hint: Even though the vehicles are randomly placed from the library, you may occasionally have two or more identical cars in a row. You can use MicroStation's *Place Cell* tool to open the cell library then make one or the other cars of your choice (a red mustang for example) the active cell. Now use the *Cell Replace Single* tool to change the car or truck for the new vehicle without losing your script.

Creating Populate Content Libraries of Rocks and Trees for Your Scene

In this section you will learn to create Populate Contents libraries for rocks and trees.

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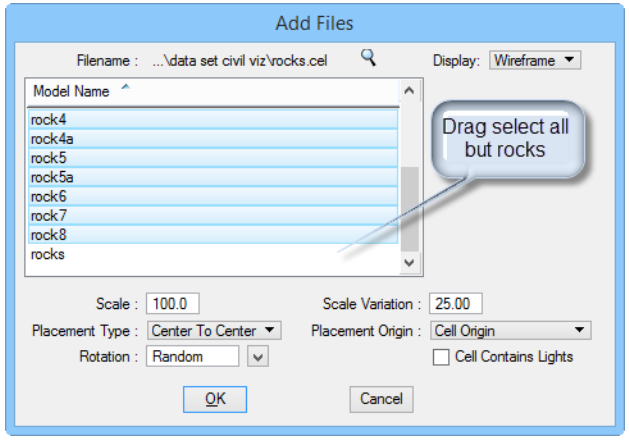
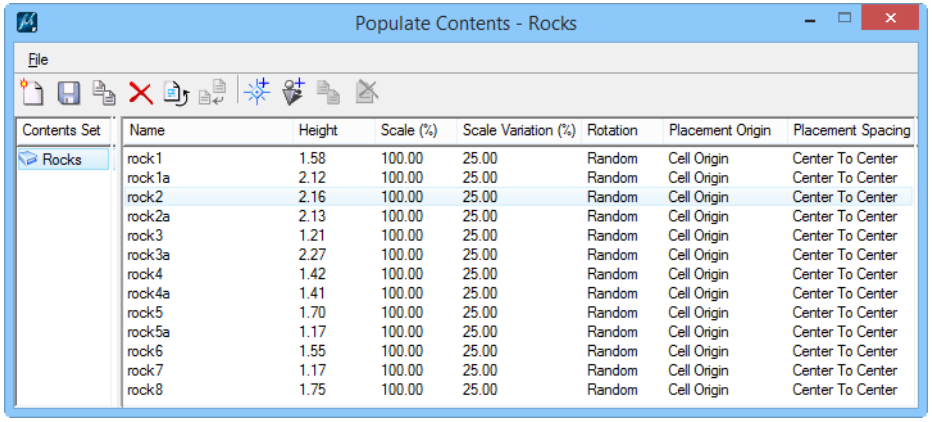
1. Open **Interchange_Add_Content.dgn** from the course data set provided.
2. Click on the *Populate* tool in the *Visualization* task pane to open the *Populate* tool settings dialog.
3. Click on the **Browse** icon on the *Populate* tool settings dialog to open the *Populate Contents* dialog. This is where you create your libraries that are used by the *Populate* tool.
4. From the *Populate Contents* dialog click on the **New** icon to create a new library. Change the name from **Untitled-1** to **Rocks**.
5. From the *Populate Contents* dialog click on the **Add Files** icon to open the *Add Files* dialog.
6. From the *Add Files* dialog click on the **Browse** icon and navigate to your data set folder and select **rocks.cel**.
7. Drag-select all but the value **rocks** and click **OK**.



8. From the *Add Files* dialog set the following:
   - *Scale*: **100**
   - *Scale Variation*: **25**
   - *Rotation*: **Random**

Note: Typically you will want trees and rocks to vary in both scale and rotation when placed by the *Populate* tool.

9. Click the **Save** icon on the *Populate Contents* dialog to save the **rocks** content library.

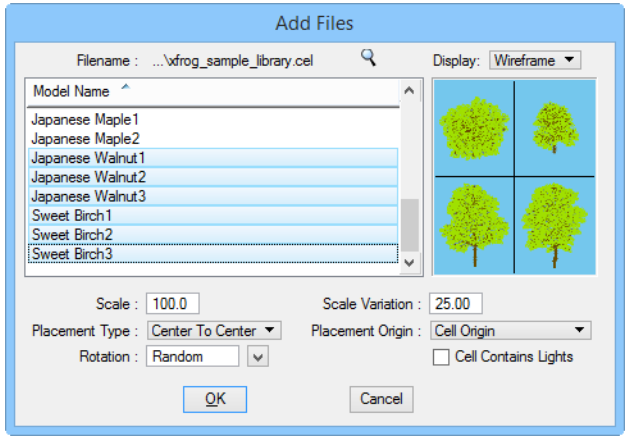


10. From the *Populate Contents* dialog click on the **New** icon to create a new library. Change the name from **Untitled-1** to **Trees**.

11. From the *Populate Contents* dialog click on the **Add File** icon to open the *Add Files* dialog.

12. Click the **Browse** icon to open the *Select Item Library* dialog. For Windows Vista or later, navigate to C:\ProgramData\Bentley\SharedContent\Xfrog_Samples. For Windows XP, navigate to C:\Application Data\Bentley\SharedContent\Xfrog_Samples. Then, choose **Xfrog_Sample_Library.cel**.

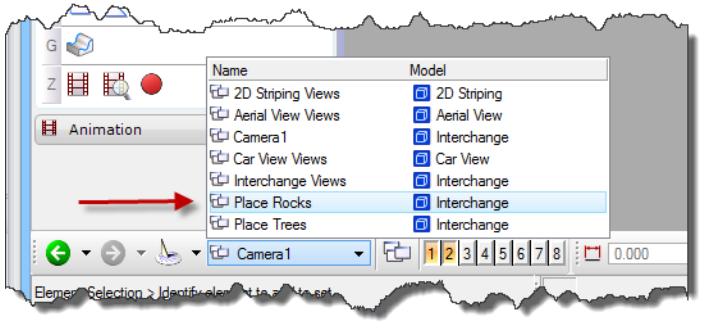
13. From the *Add Files* dialog Ctrl + click or drag + select to add the **Sweet Birch** and **Japanese Walnut** trees to the library and click **OK**.



14. From the Add Files dialog set the following:
    - *Scale*: **100**
    - *Scale Variation*: **25**
    - *Rotation*: **Random**

15. Click the **Save** icon on the *Populate Contents* dialog to save the *Trees* content library.
16. In the lower left hand corner of the MicroStation window change the View Group from Camera1 to Place Rocks.

    The Place Rocks view group has two views open and the levels are set up for efficiently placing rocks on the terrain.



Limiting the Visible Geometry Using Named Groups and DisplaySets

In this section you will learn how to limit the geometry visible in a view. This is especially useful when you are using the *Populate* tool. You can easily create a DisplaySet by right clicking and choosing **DisplaySet Set** from the right click menu. This will take all the current geometry selected and create a DisplaySet using that geometry. You can also add and subtract elements using the right click menu.

Named Groups can be used to save a selection sets so that you can easily recall a saved selection and use it to define a DisplaySet.

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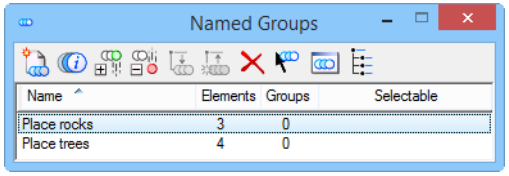
1. Continuing with **Interchange Add Content.dgn**, from MicroStation main menu choose **Utilities > Named Groups** to open the *Named Groups* dialog



2. In the *Named Groups* dialog select **Place Rocks**.

3. In the *Named Groups* dialog click on the **Select Elements in Named Group** icon.

   This selects the elements that were defined by Place Rocks selection set.

4. In the *Named Groups* dialog click on the **Set DisplaySets** icon from **Selected Named Groups** icon.

   This action applies the DisplaySet using the elements defined by Named Group and applies it to any views that have the DisplaySet View Attribute enabled.

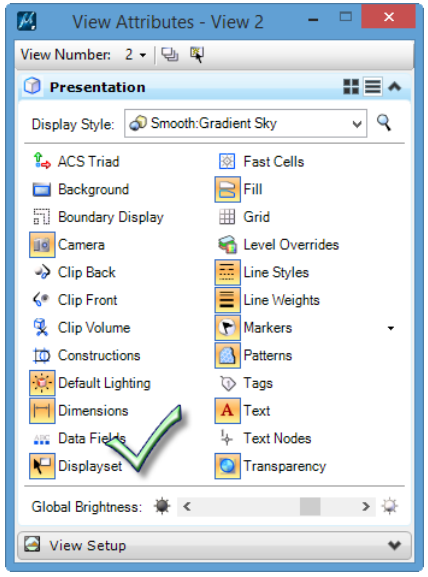
5. Enter an additional data point in a view to clear the selection so that the element are not highlighted.

   Note: To add or remove elements from and existing Named Group, select the geometry that you want to add or remove and click on the + - icons in the Named Group tool box and enter a data point in a view.

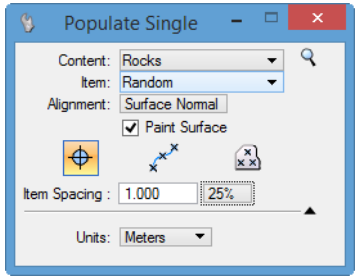
Adding Rocks Using Populate Tool

In this section you will be adding the Rocks and Trees using the Populate Content libraries that you created in a previous exercise.

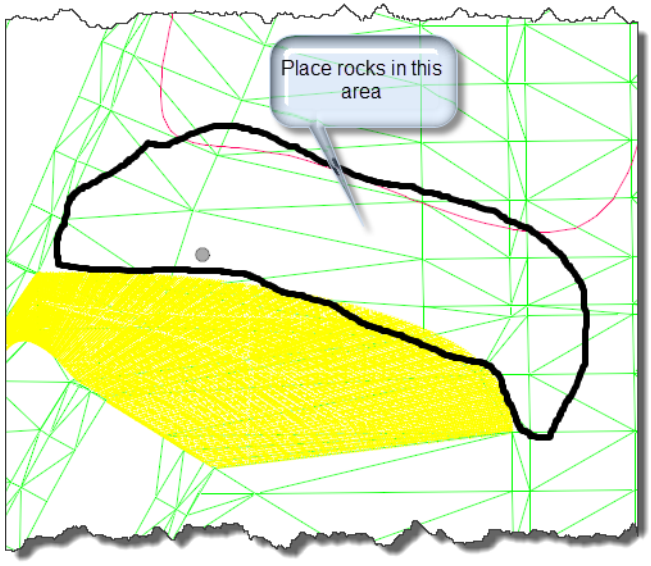
1. Continue with **Interchange_Add_Content.dgn**. Notice that View 1 has a reduced amount of elements visible while the camera view, View 2 does not. This is because the View Attribute for DisplaySets is not enabled in View 2 but it is enabled for Views 1.



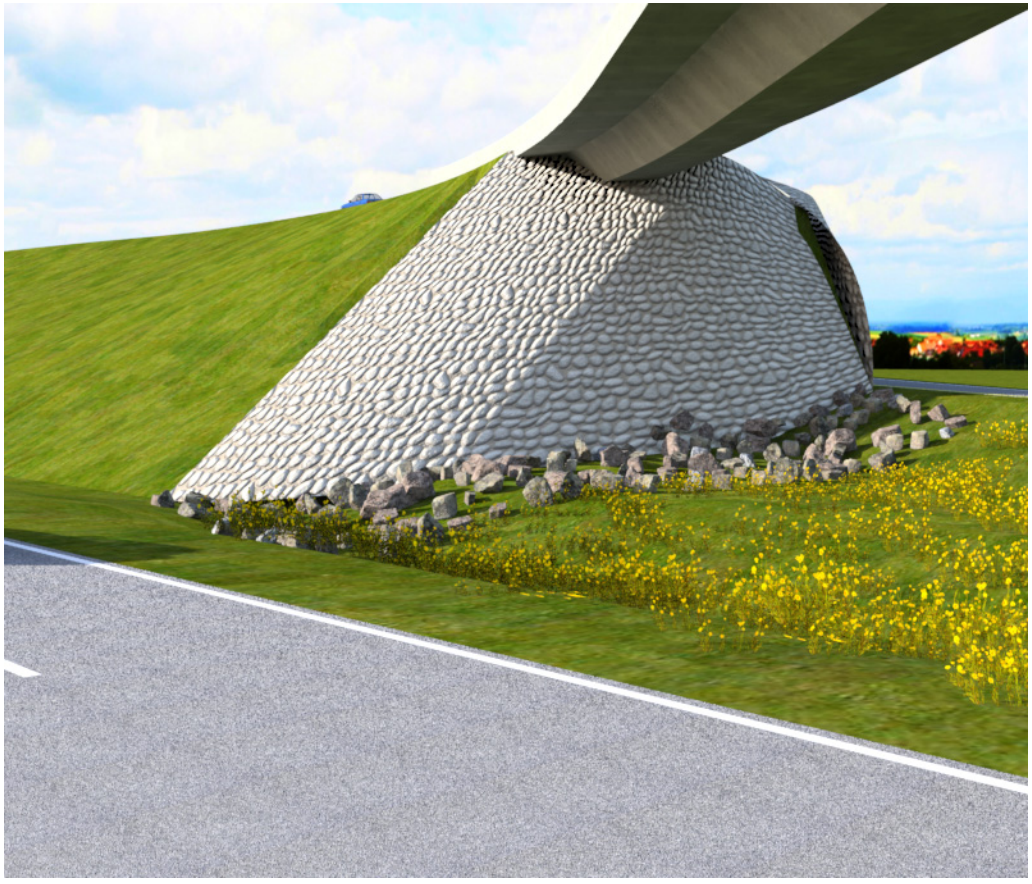
2. Click on the *Populate* tool if not already open and set the following:
   - *Content*: **Rocks**
   - *Item*: **Random**
   - Enable **Paint Surface**
   - *Alignment*: **Surface Normal**
   - *Item Spacing*: **1 (25%)**
   - *Units*: **Meters**



3. In the top view enter a data point where you want to start painting in the 3D rocks. Pick a point along the edge embankment and as you move your cursor a rock will be placed when you move between 0.75 and 1.25 meters. Continue to paint rocks between the embankment the yellow mesh seen in View 1 and the red colored element in the same view.



Note: If you had moved your cursor beyond the visible geometry where the roadway would be (the level is not part of our DisplaySet) you might have heard a ding. This would just indicate that there is no underlying surface to drop a rock on.



Luxology rendering using Exterior Good, Morning light setup and Sky Sphere for Environment

Adding Trees using the Populate Tool

1. In the lower left hand corner of the MicroStation window change the View Group from Place Rocks to Place Trees.
2. From MicroStation main menu choose **Utilities > Named Groups** to open the *Named Groups* dialog.
3. In the *Named Groups* dialog select **Place Trees**.

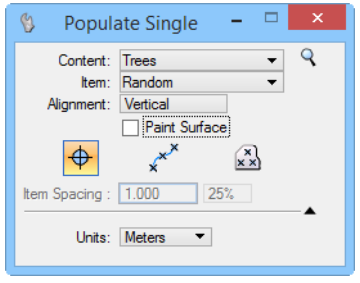
4. In the *Named Groups* dialog click on the **Select Elements in Named Group** icon.

   This selects the elements that were defined in the Place Trees selection set.

5. In the *Named Groups* dialog click on the **Set DisplaySets** icon from **Selected Named Groups** icon.

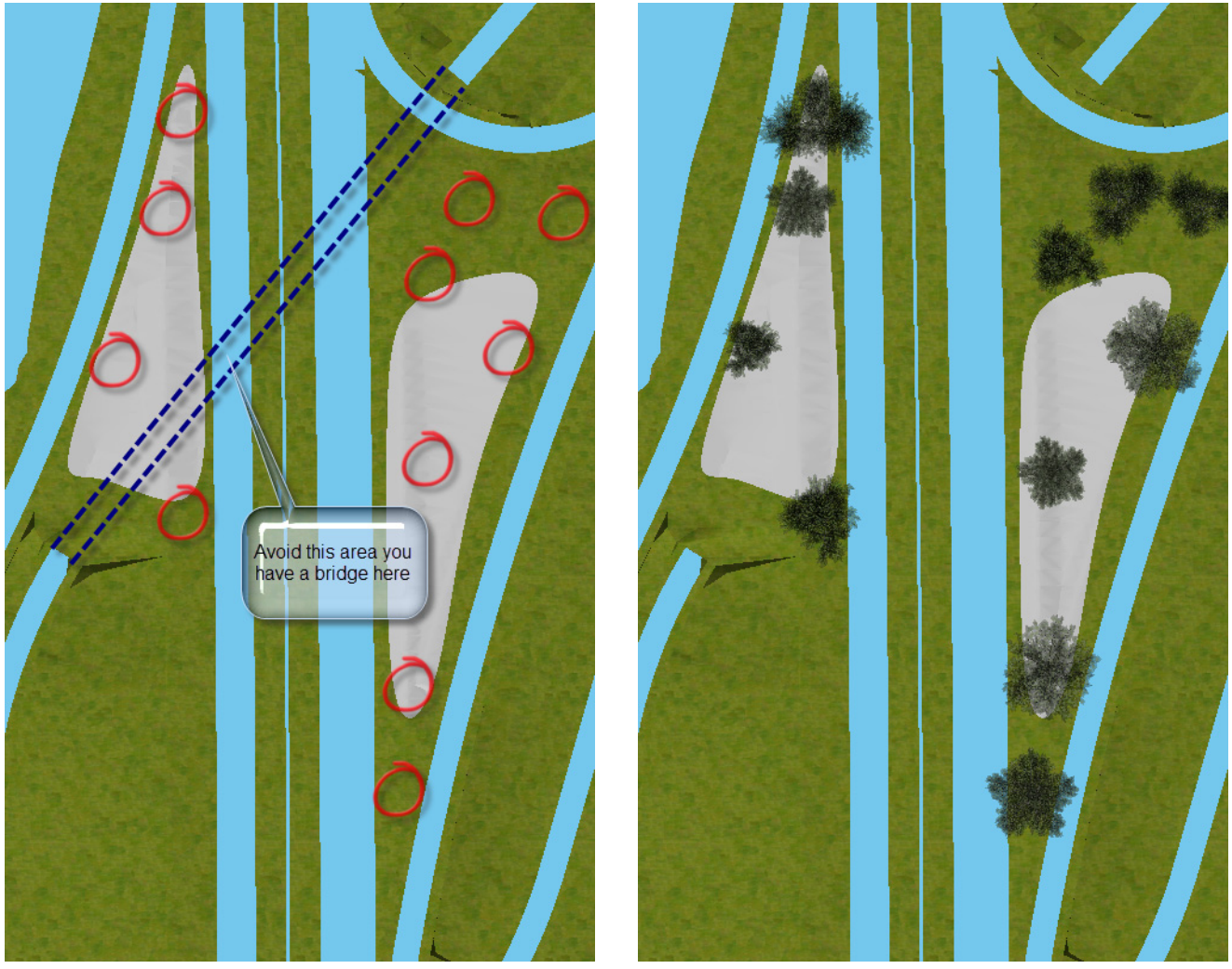
   This action applies the DisplaySet using the elements defined by the Named Group and applies them to any views that have the DisplaySet View Attribute enabled. This reduces the geometry in View 1 which will be used to place the trees. This action will speed up the performance, had you skipped this step then you likely would have a whole lot of rocks from the previous exercise included in the depth mesh calculation.
6. Change the active level from Default to Trees. This will make sure the trees being placed are on the Tree level.

7. Continue with the *Populate Tool*. Make the following changes:
   - *Content*: **Trees**
   - *Item*: **Random**
   - Uncheck **Paint Surface**
   - *Alignment*: **Vertical**



When you placed the rocks you used alignment Normal, meaning that the rocks landed based on the normal (slope) from the surface that they fell on. That works fine for rocks and vehicles, but for people and trees they should generally be aligned to a vertical position when on a slope.

8. In the top view (View 1), place a few trees in and around the white mesh areas but not too close to where the roadway would be. Also, avoid the area where the bridge would be (see the following images).



Before and after placing trees in the Top View

9. Enter a Shift + right click and select **DisplaySet Clear** to clear the current DisplaySet.

Luxology Render of View 2 after placing rocks, and trees

Don't worry if your trees don't match the ones shown here. You could do this exercise over and over again and you should always get something a little different when using random size and rotation when placing them.

Hint: If want to use a particular species, change the option from random and pick the tree you want to use instead.