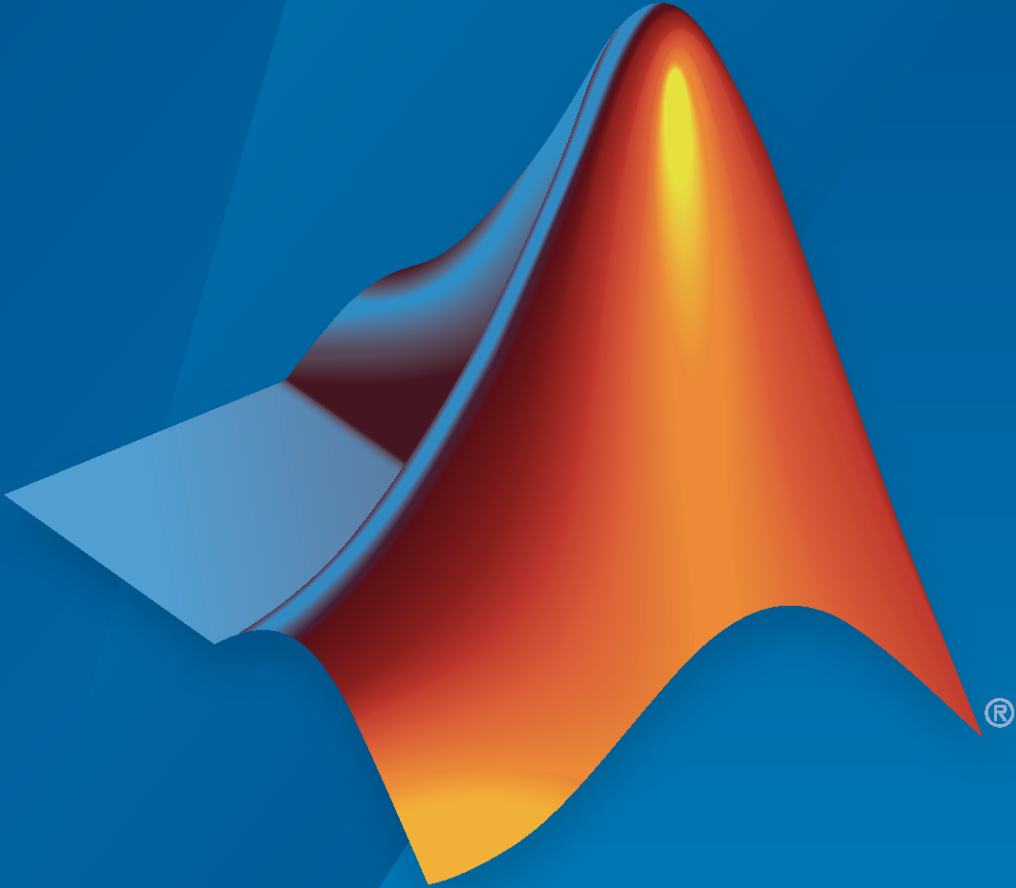


RoadRunner Release Notes



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RoadRunner Release Notes

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Programmatic API: Import and export scenes from the command line or from languages such as Python or C++	1-2
Custom HD Map Formats: Import custom data into RoadRunner	1-3
RoadRunner Asset Library Additions: Populate scenes with additional US and German traffic signs, Japanese traffic signs, and additional props and buildings	1-4
U.S. Signs	1-4
German and Japanese Signs	1-4
Extrusions	1-5
Props	1-6
Buildings	1-7
OpenDRIVE 1.5 and ASAM OpenDRIVE 1.6 Support: Import and export scenes using newly supported formats	1-8
Scene Metadata: Add metadata to describe scene elements	1-8
SD Map Import: Build roads from imported Zenrin Japan Map API 3.0 (Itsumo NAVI API 3.0) SD data	1-9
TomTom HD Map Import: Build scenes from imported TomTom HD maps (requires RoadRunner Scene Builder)	1-11
ASAM OpenCRG Support: Import and export road surface data using ASAM OpenCRG files	1-14
HD Map Route Creation and Build: Build routes from TomTom HD Map and HERE HD Live Map data (requires RoadRunner Scene Builder)	1-14
STL Import and Export: Import and export scenes using STL file format	1-15
Selection Tool: Select roads and props in a scene as a group	1-15
Scene Templates: Create scene asset templates from existing and selected scenes	1-15
Translation Manipulators: Move objects precisely in x-, y-, and z-directions	1-16

Lane Tool: Reverse lane travel direction	1-16
---	-------------

R2021a

Custom Level of Detail: Customize level of detail in exported scenes to improve simulation performance	2-2
Road Superelevation Tool: Manipulate banking angle along roads	2-3
Custom Export Configurations: Specify customized combinations of file formats and scene data to export	2-4
Quality Checks: Identify additional issues to fix in your scenes using built-in validation rules (requires RoadRunner Scene Builder)	2-4
HERE Localization Data: Import signs, poles, and barriers from HERE HD Live Map (requires RoadRunner Scene Builder)	2-4
Improved Cross-Sections: Create more accurate road cross-sections that are compatible with OpenDRIVE importing and exporting	2-5
Sidewalk Height Tool: Modify sidewalk and curb heights	2-5
Light Source Parameters: Import and export parameters for controlling traffic lights and streetlights	2-6

R2020b

RoadRunner Scene Builder: Automatically generate 3D road models from HD maps	3-2
Road Speed Limits Tool: Set varying speed limits along roads	3-2
Bridge Span Creation: Fix bridge spans formed on elevated roads	3-2
Project Props to Terrain: Align prop curves with the surface terrain	3-2

R2020a+

RoadRunner Editor: Interactive editor to model roads and 3D environments	4-2
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Intersections: Design complex intersections featuring merges, splits, and traffic circles	4-2
Surface Damage: Add detailed road surfaces with lane markings, stencils, and custom graphics	4-2
RoadRunner Asset Library: Library of prebuilt professionally created assets	4-2
Customize Road Signs: Combine text and graphics to build custom signs	4-2
Traffic Signals: Edit signal phases and timing with the integrated signal timeline and interactive controls	4-2
GIS Import: Import aerial imagery, elevation data, lidar point clouds, and road maps to accurately represent physical locations in RoadRunner	4-2
OpenDRIVE Import and Export: Import and export road networks using OpenDRIVE format	4-2
Export to Apollo	4-2
Export to Universal Scene Description (USD)	4-3
Export for Metamoto simulations	4-3
Import from OpenDRIVE improved	4-3
Export to OpenDRIVE improved	4-3
Improved support for GIS assets	4-3
Vector-type scaling	4-3

R2021b

Version: 1.3

New Features

Bug Fixes

Programmatic API: Import and export scenes from the command line or from languages such as Python or C++

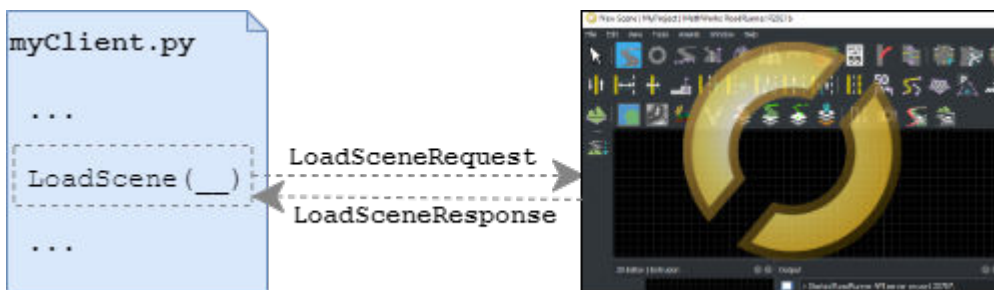
Use the RoadRunner API service to control the RoadRunner UI programmatically. Using this API service, you can:

- Create, load, and save RoadRunner scenes and projects.
- Import ASAM OpenDRIVE® files into scenes.
- Export scenes to one of the file formats that RoadRunner supports, such as ASAM OpenDRIVE, USD, or Filmbox.

To get started using this API service, see these examples:

- “Convert RoadRunner Scenes Between Formats Programmatically”
- “Export Multiple RoadRunner Scenes Programmatically”

This API service is built using the open-source gRPC® framework. Using this framework, you can use remote procedure call (RPC) methods to control RoadRunner in Python®, C++, or any other programming language supported by gRPC. This figure shows a sample call from a Python client application to load a RoadRunner scene.



For more details on the APIs, see “Control RoadRunner Programmatically Using gRPC APIs”.

The API service provides these RPC methods.

RPC Method	Description
NewProject	Create new RoadRunner project
LoadProject	Load RoadRunner project
SaveProject	Save RoadRunner project
NewScene	Create new RoadRunner scene
LoadScene	Load RoadRunner scene
SaveScene	Save RoadRunner scene
Export	Export RoadRunner scene
Import	Import file into RoadRunner scene
Exit	Exit RoadRunner application

Each RoadRunner installation includes a set of language-neutral protocol buffer (protobuf) files that define the schema for the API service. This table shows the protobuf files for the service.

Protobuf File	Description
roadrunner_service.proto	RoadRunner service protobuf schema
roadrunner_service_messages.proto	RoadRunner service messages protobuf schema
import_settings.proto	Import settings protobuf schema
export_settings.proto	Export settings protobuf schema
geometry.proto	Scene geometry protobuf schema

You can compile these protobuf files to generate the API code in various programming languages. For more details, see “Compile Protocol Buffers for RoadRunner APIs”. Then, you can write language-specific clients that call the generated API code. For sample clients, see these examples:

- “Create Python Client for Controlling RoadRunner Programmatically”
- “Create C++ Client for Controlling RoadRunner Programmatically”

Custom HD Map Formats: Import custom data into RoadRunner

Convert custom data into the RoadRunner HD Map data model and import your data into RoadRunner. Each RoadRunner installation includes a set of language-neutral protocol buffer (protobuf) files that define the schema for the RoadRunner HD Map data model. This table shows the protobuf files for this data model.

Protobuf File	Description
hd_map_header.proto	RoadRunner HD Map header message
hd_map.proto	RoadRunner HD Map message
hd_lanes.proto	Lane representation messages for RoadRunner HD Map
hd_lane_markings.proto	Lane marking representation messages for RoadRunner HD Map
hd_junctions.proto	Junction representation messages for RoadRunner HD Map
common_attributes.proto	Common attributes for RoadRunner HD Map
geometry.proto	Scene geometry protobuf schema

Use Python, C++, or any other programming language supported by protocol buffers to generate RoadRunner HD Map files from custom data. For an example using C++, see “Import Custom Data Using RoadRunner HD Map”.

Using the **Scene Builder Tool**, you can build a scene after importing a RoadRunner HD Map file. You can then edit and export the scene to supported file formats, such as ASAM OpenDRIVE, USD, or Filmbox. Use of the **Scene Builder Tool** requires a RoadRunner Scene Builder license.

RoadRunner Asset Library Additions: Populate scenes with additional US and German traffic signs, Japanese traffic signs, and additional props and buildings

The “RoadRunner Asset Library Add-On” now includes hundreds of new assets. If you include the RoadRunner Asset Library assets in your project, these assets appear in folders within the **Library Browser**.

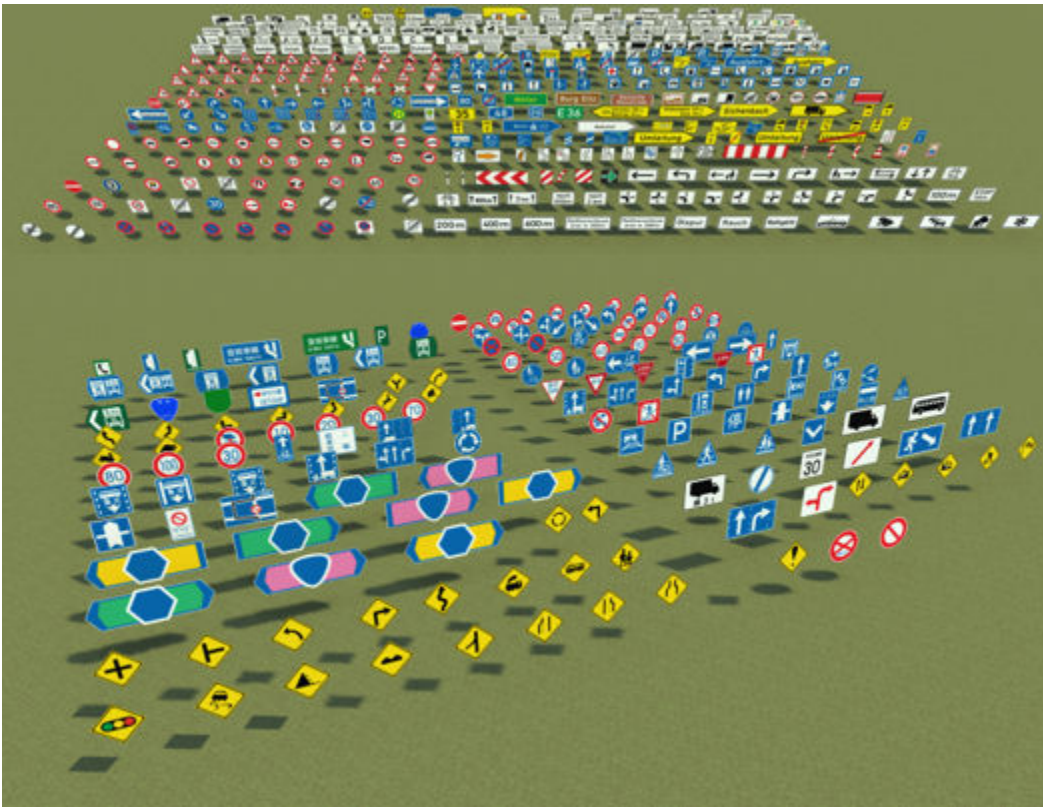
U.S. Signs

New US signs include emergency signs, school signs, and warning signs. These signs have been organized into subfolders within the Signs folder of the **Library Browser**.



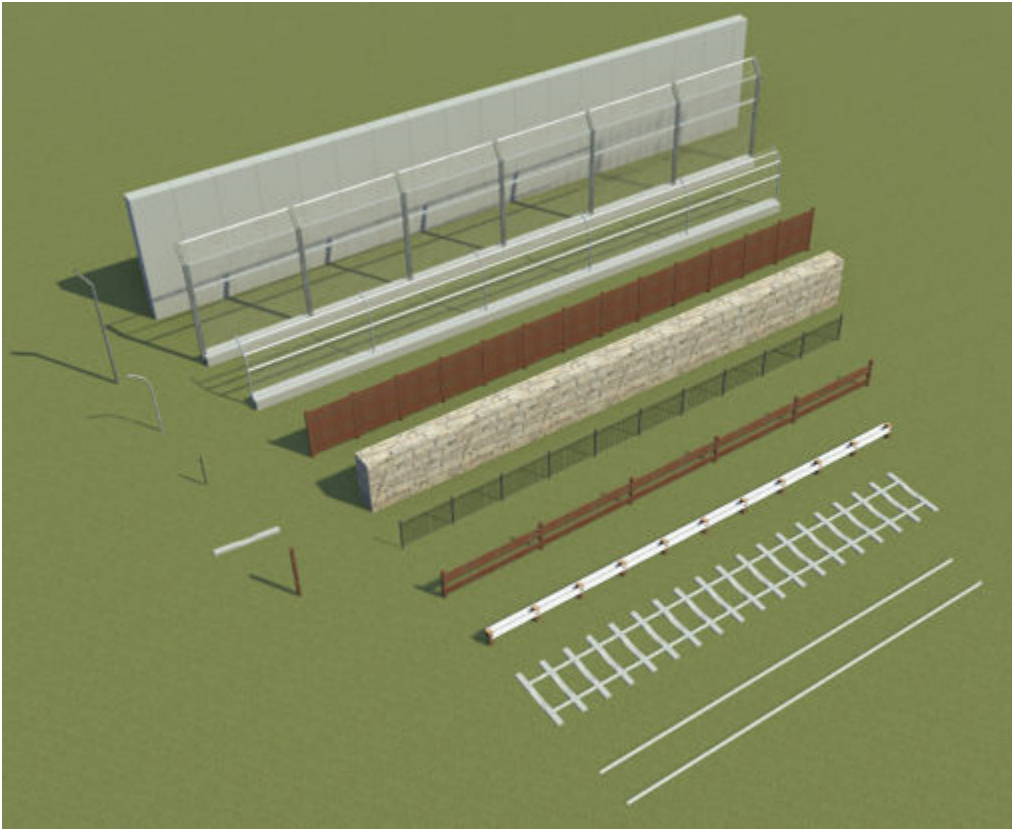
German and Japanese Signs

The Signs folder of the **Library Browser** includes new German traffic signs added to the Germany subfolder and a new Japan subfolder for Japanese traffic signs.



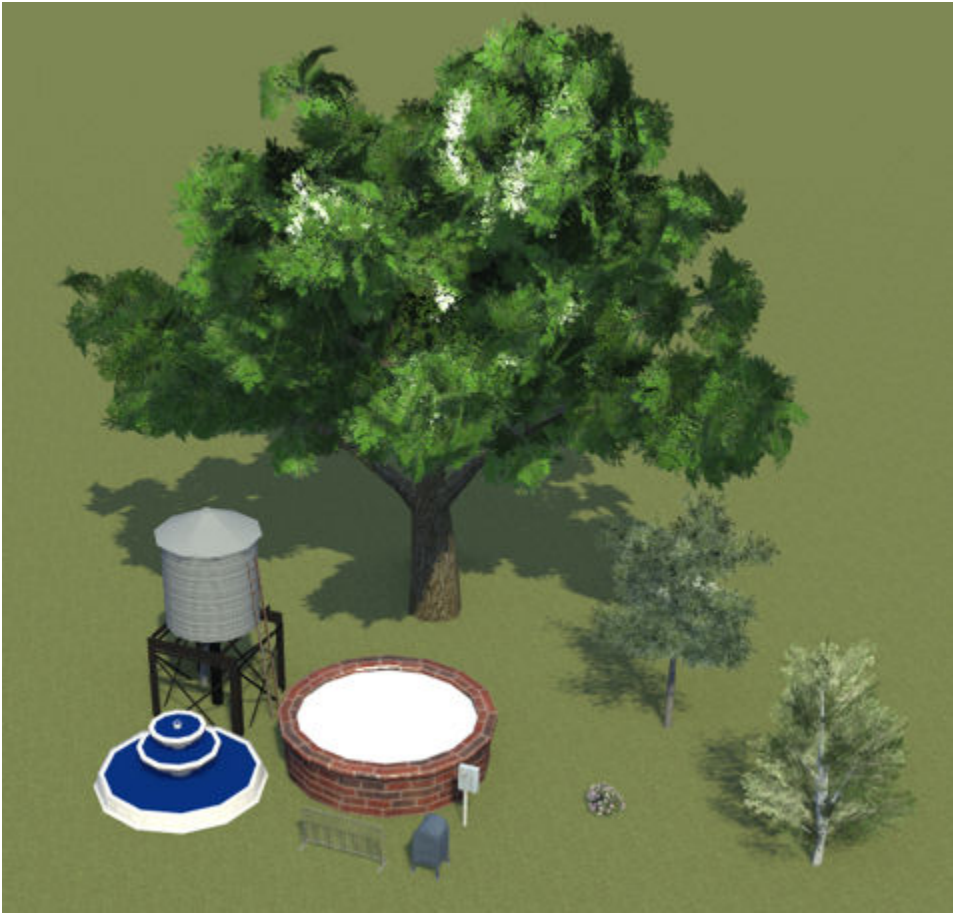
Extrusions

The **Library Browser** includes additional extrusion assets and their associated guardrail props and textures.



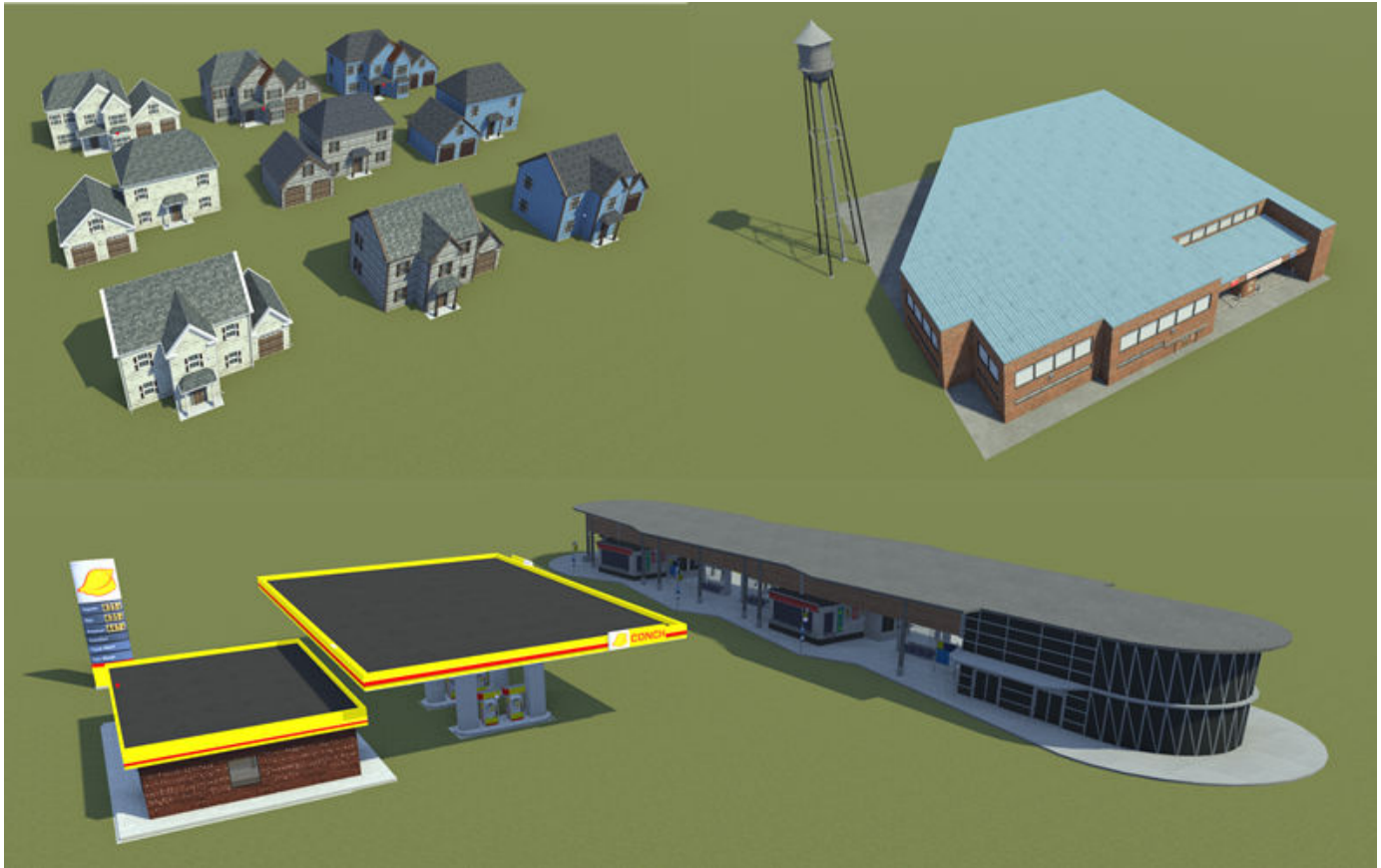
Props

The **Library Browser** includes additional environment and vegetation props. Additional levels of detail have also been added to existing props.



Buildings

The **Library Browser** includes additional buildings, such as homes in residential areas, a gas station, a bus depot, and a school.



OpenDRIVE 1.5 and ASAM OpenDRIVE 1.6 Support: Import and export scenes using newly supported formats

You can now use RoadRunner to:

- Import scenes from OpenDRIVE® 1.5 and ASAM OpenDRIVE 1.6 files and convert them into RoadRunner scenes.
- Export RoadRunner scenes to OpenDRIVE 1.5 and ASAM OpenDRIVE 1.6 files.

For information about the import and export capabilities, and limitations, see “Importing ASAM OpenDRIVE Files” and “Export to ASAM OpenDRIVE”.

Scene Metadata: Add metadata to describe scene elements

RoadRunner now enables you to add metadata to describe the elements in a RoadRunner scene. You can also use the metadata to set the value of ASAM OpenDRIVE attributes when you export the scene to ASAM OpenDRIVE.

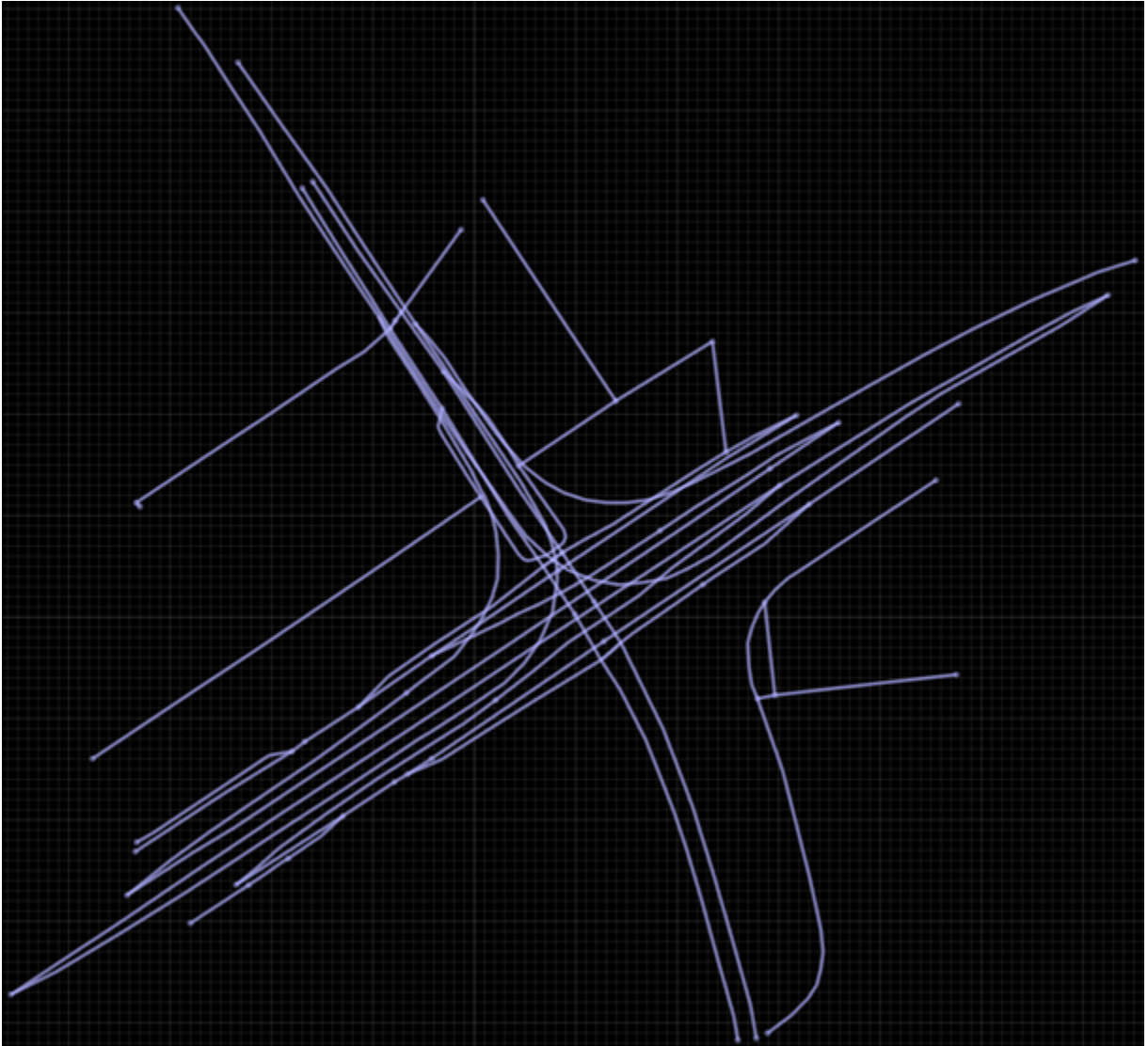
For details about how to add metadata, see “Add Metadata to RoadRunner Scene Elements”.

For an example of using metadata to set ASAM OpenDRIVE attributes, see “Set ASAM OpenDRIVE Attributes Using Metadata”.

SD Map Import: Build roads from imported Zenrin Japan Map API 3.0 (Itsumo NAVI API 3.0) SD data

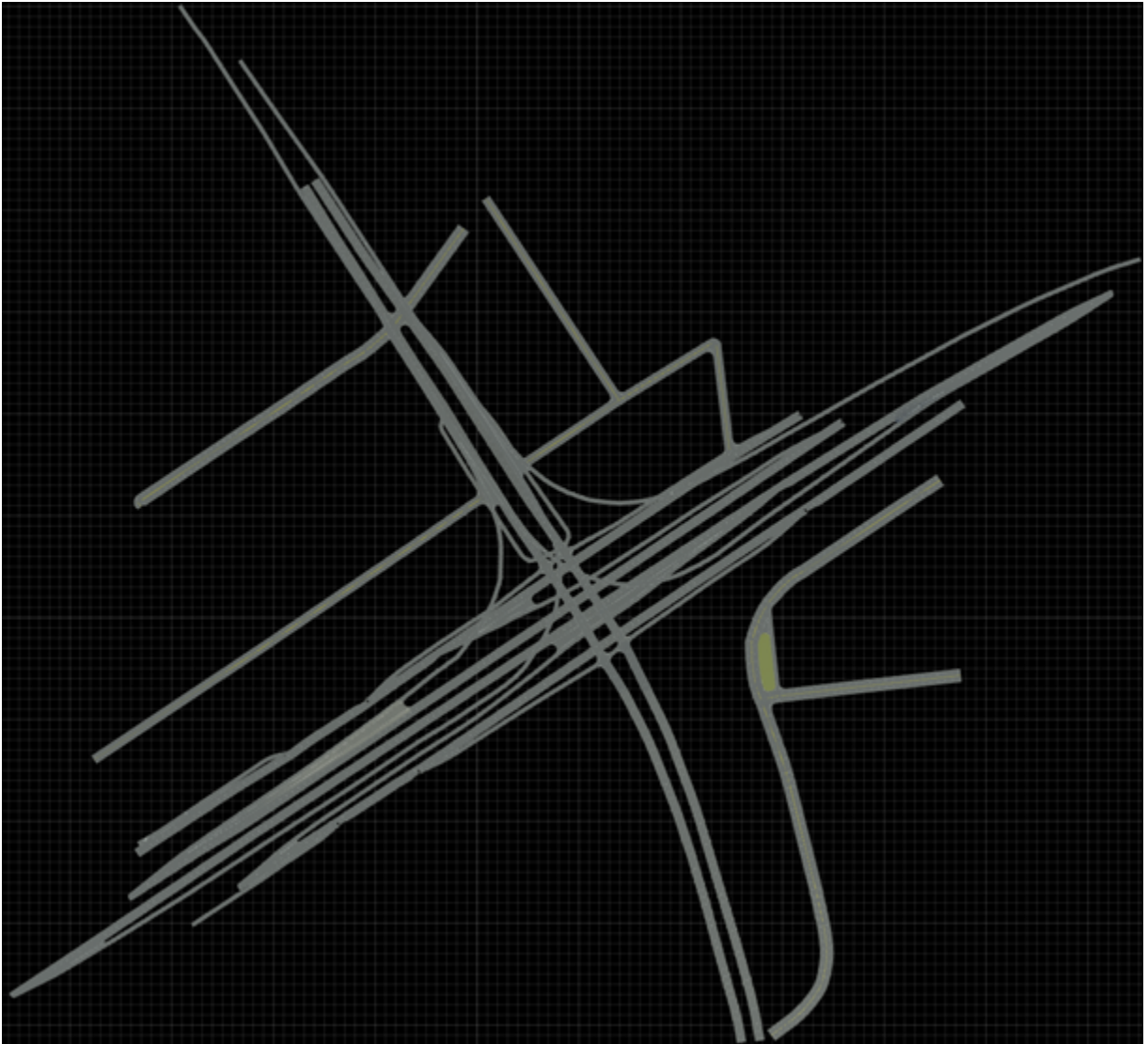
You can now import Zenrin Japan Map API 3.0 (Itsumo NAVI API 3.0) ¹ data and build roads using the **SD Map Viewer Tool**.

This figure shows imported roads in the SD format.

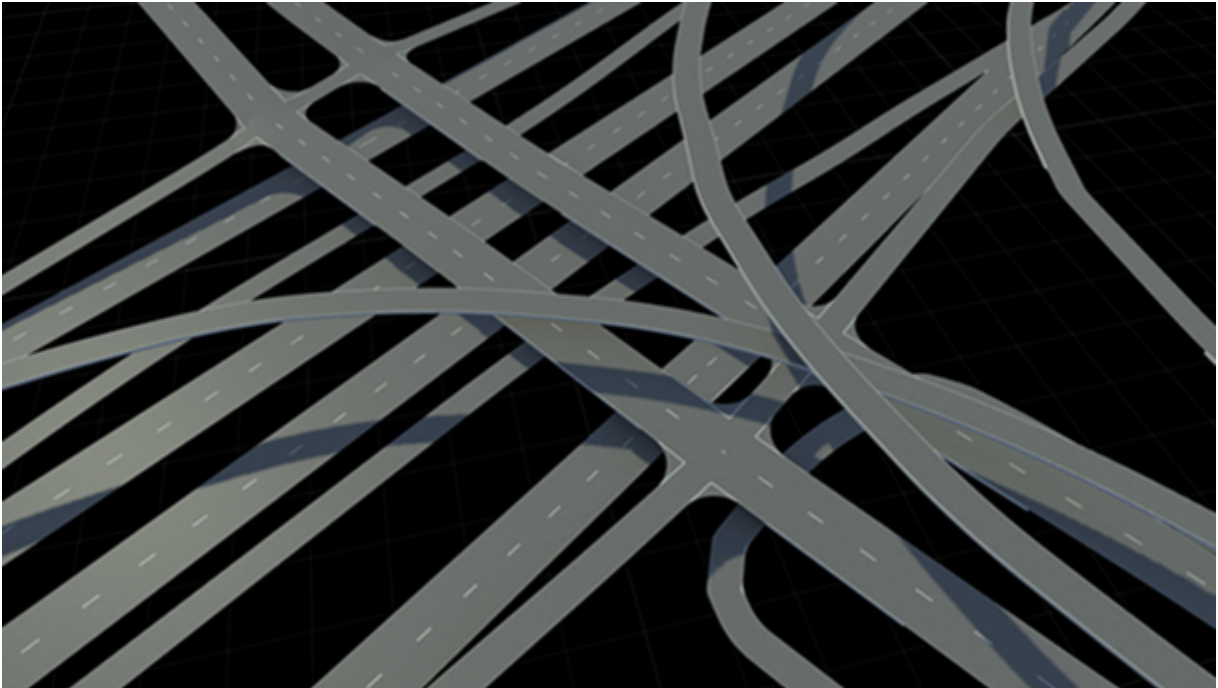


This figure shows a scene built from this imported data.

1. To gain access to the Zenrin Japan Map API 3.0 (Itsumo NAVI API 3.0) service and get the required credentials (a client ID and secret key), you must enter into a separate agreement with ZENRIN DataCom CO., LTD.



This figure shows a close-up of the built roads. The scene includes overpasses where the elevation information is available in the imported Zenrin Japan Map API 3.0 (Itsumo NAVI API 3.0) SD data.

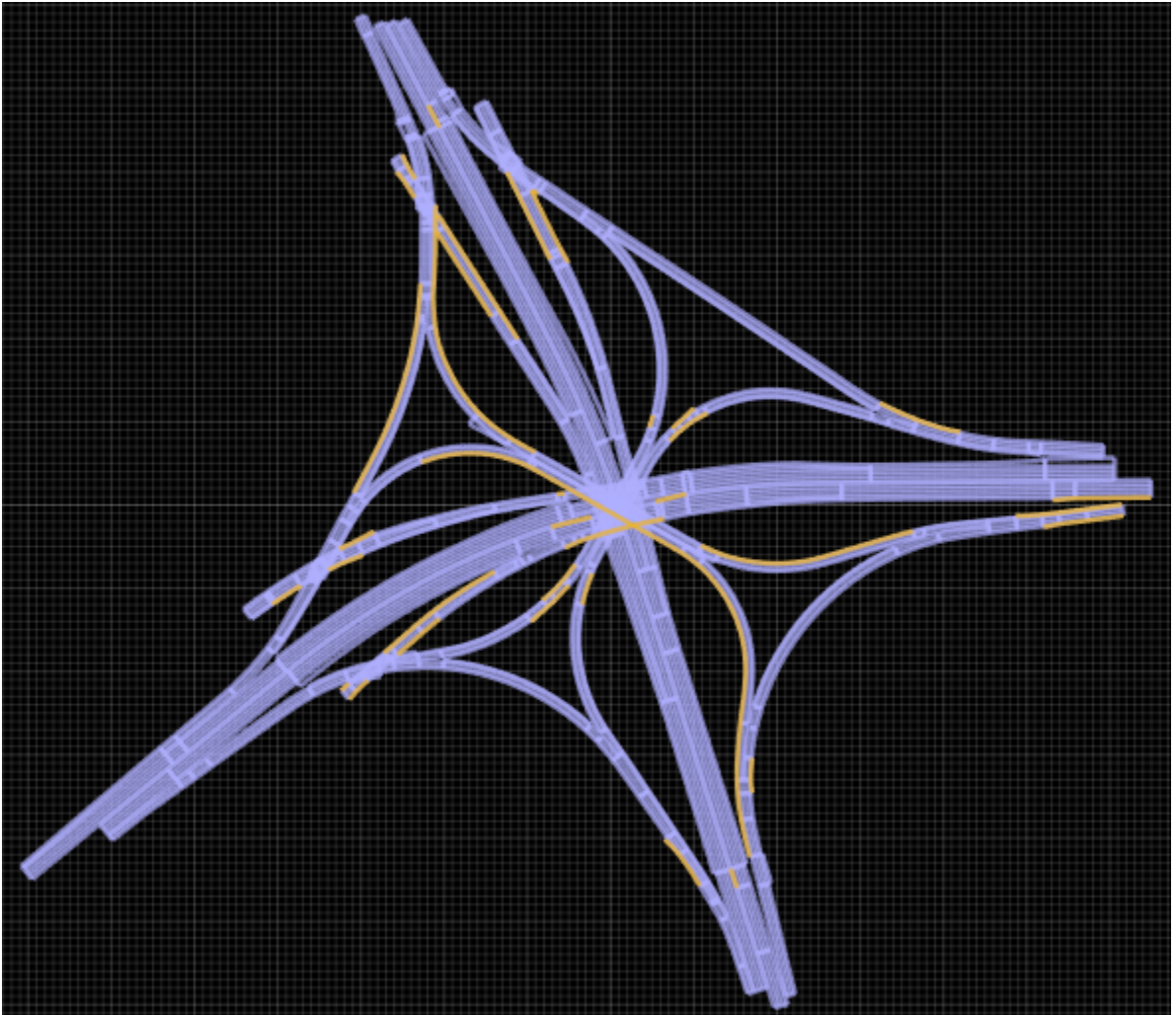


For an example of building roads by using Zenrin Japan Map API 3.0 (Itsumo NAVI API 3.0) data, see “Build Roads by Using Zenrin Japan Map API 3.0 (Itsumo NAVI API 3.0) Data”.

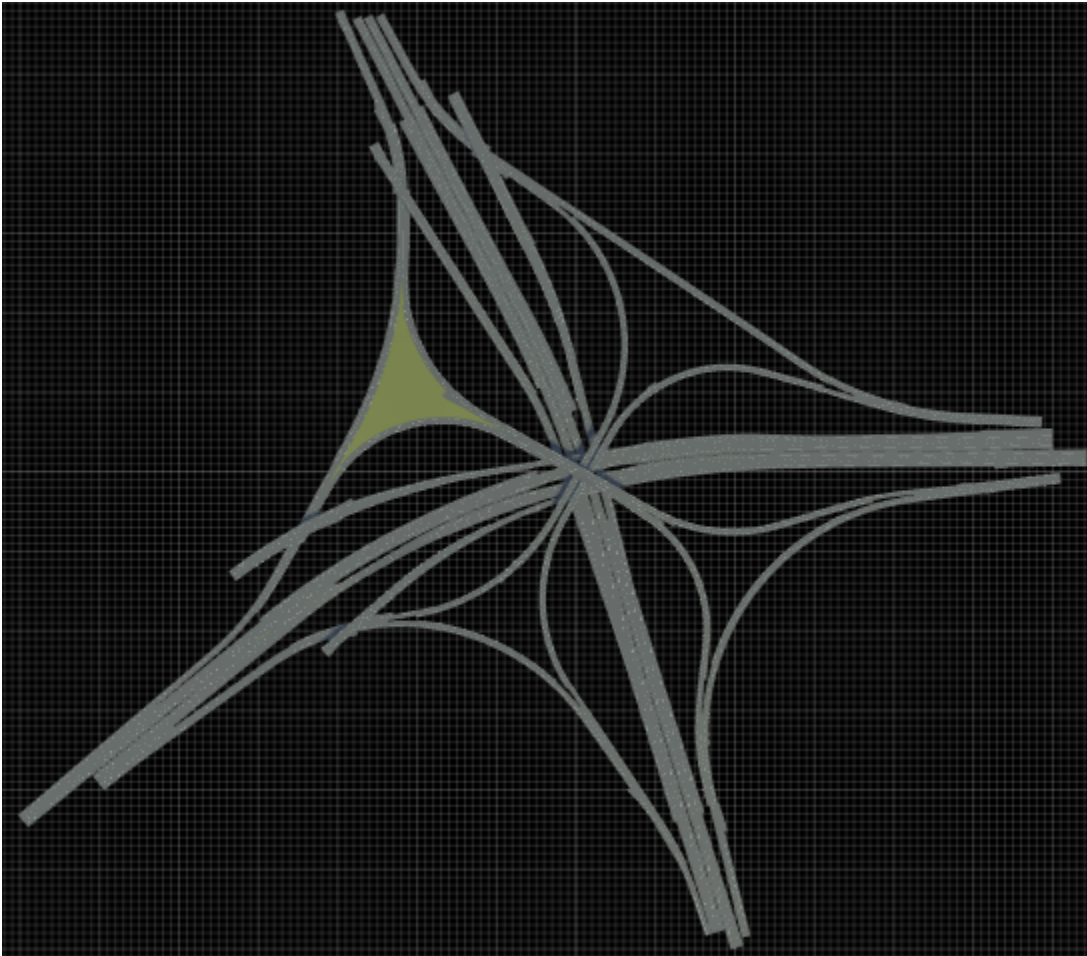
TomTom HD Map Import: Build scenes from imported TomTom HD maps (requires RoadRunner Scene Builder)

RoadRunner Scene Builder supports a pair of TomTom HD Map data formats: Avro (Format Specification Version 1.2.0.0 and Schema Version 1.1) and GeoPackage. Use RoadRunner Scene Builder to import road networks, road markings, barriers, and traffic signs from TomTom HD Map data.

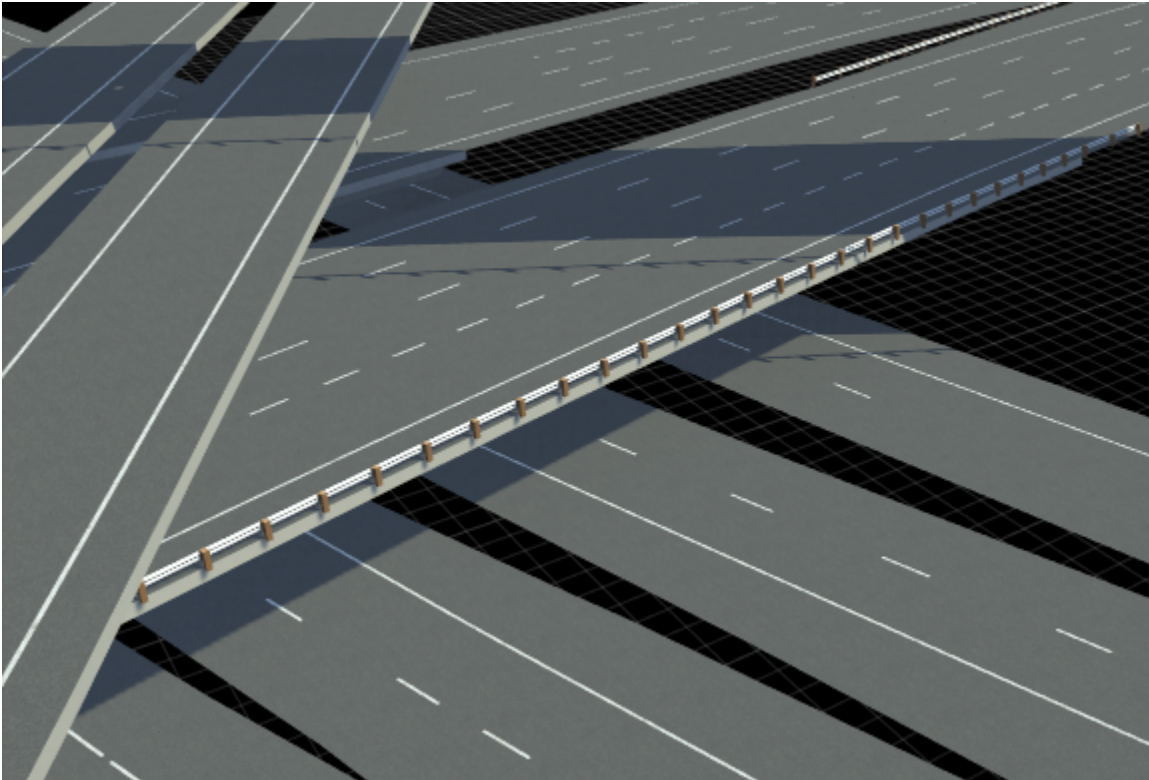
This figure shows a preview of the imported TomTom data.



This figure shows a scene built from that data.



This figure shows a close-up of the built data. The scene includes overpasses, and scene objects such as guardrails.



For an example of building a scene from TomTom data, see “Build Scenes Using TomTom HD Map Data”.

You can also customize which assets RoadRunner uses to display imported data. For more details, see “Configure Assets for Imported TomTom HD Map Data”.

Edit the imported roads using RoadRunner and export the results to supported simulation and game engine formats.

Use of the **Scene Builder Tool** requires a RoadRunner Scene Builder license.

ASAM OpenCRG Support: Import and export road surface data using ASAM OpenCRG files

You can now import road surface data from ASAM OpenCRG® V1.2.0 file into a RoadRunner scene. Use the **Road CRG Tool** to assign the specified data to a road segment in the scene and visualize road surface variations using a colormap. For more details, see “Importing ASAM OpenCRG Files”.

You can also link and export road surface data using an ASAM OpenDRIVE file. For more details, see “Export to ASAM OpenCRG”.

HD Map Route Creation and Build: Build routes from TomTom HD Map and HERE HD Live Map data (requires RoadRunner Scene Builder)

The **Scene Builder Tool** now allows you to create routes, and select the roads and objects around those routes to build them. For more details on creating routes for HD Map data, see “Create

Routes”. Including the selective roads and objects along the created routes reduces the build time. Previously, the **Scene Builder Tool** supported only roads and scene objects, with no option to define the routes to build. For more details on scene building options, see “Build Scenes Using TomTom HD Map Data” and “Build Scenes Using HERE HD Live Map Data”.

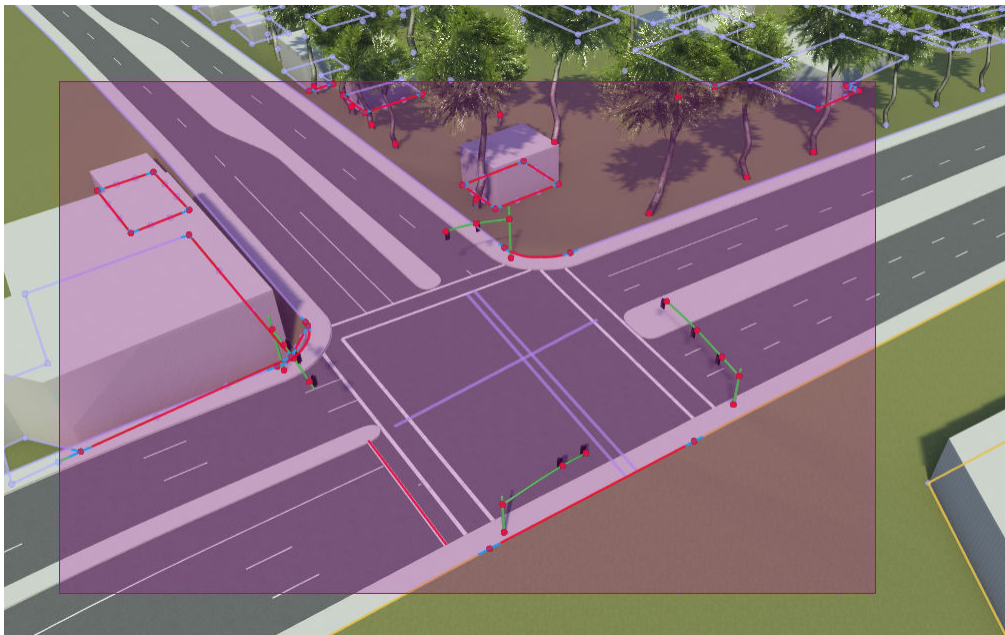
Building scenes using the **Scene Builder Tool** requires a RoadRunner Scene Builder license.

STL Import and Export: Import and export scenes using STL file format

Now you can import STL files into RoadRunner to create assets or scenes. You can also export road scenes to the binary STL format. For more details, see “Export to STL”.

Selection Tool: Select roads and props in a scene as a group

Use the **Selection Tool** to select roads and props in a scene as a group.

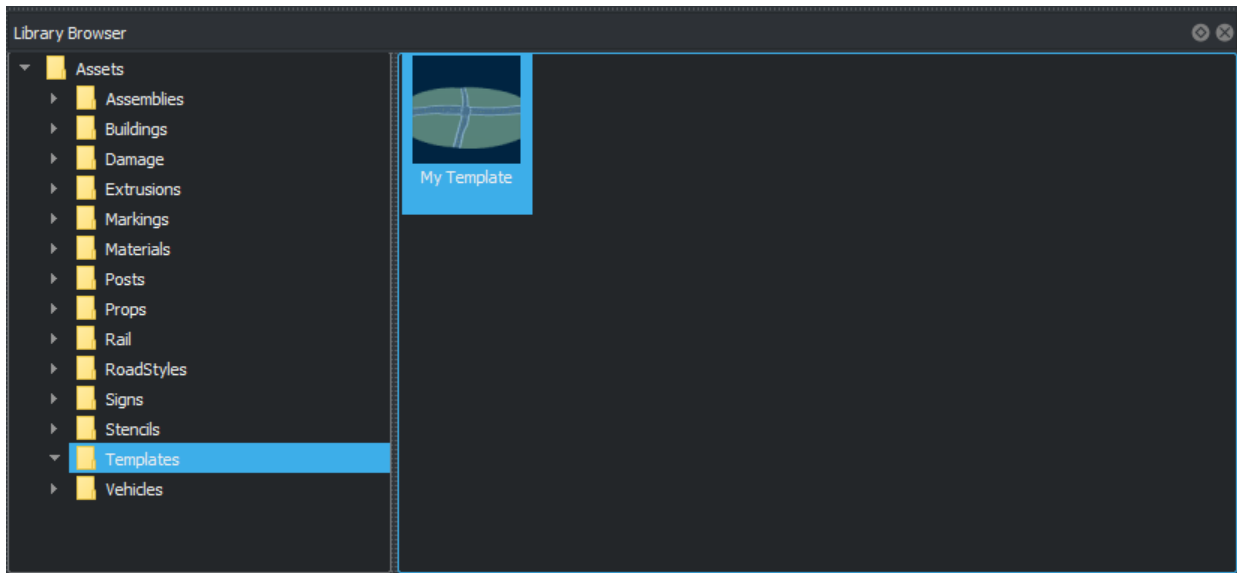


Once you have selected an object, you can:

- Move the object group using the translation manipulators.
- Duplicate the object group using copy (**Ctrl+C**) and paste (**Ctrl+V**).
- Save the selected object group as a scene asset.

Scene Templates: Create scene asset templates from existing and selected scenes

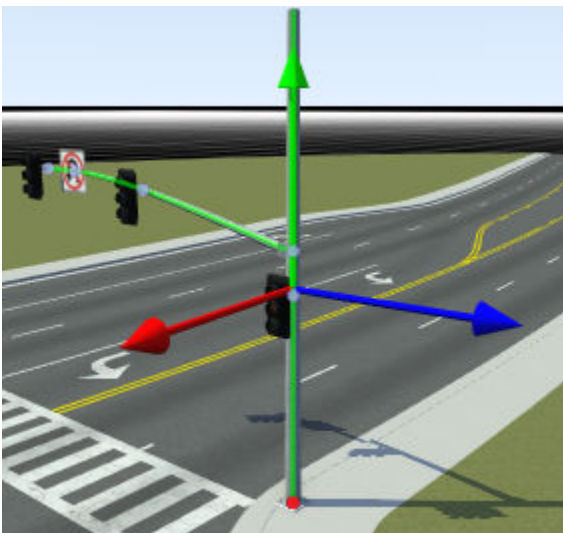
Create scene assets, which are collections of roads, intersections, props, and other 3D objects, and add them to the **Library Browser**. Add scene assets to a project to quickly build up a complex environments.



From the **Assets** menu, select **Assets > New > Scene Template** to add the current scene, or selected objects in the scene, as a template asset into a folder in the **Library Browser** of the current project.

Translation Manipulators: Move objects precisely in x-, y-, and z-directions

From the **Tools** menu, select **Translate** to show translation manipulators for selected objects. Use these manipulators to precisely translate objects in a selected direction.



Lane Tool: Reverse lane travel direction

Use the **Lane Tool** to reverse the travel direction of the selected lanes.

You can select a lane or lanes and change the travel direction from forward to backward or backward to forward. This option does not affect bidirectional and undirected lanes.

R2021a

Version: 1.2

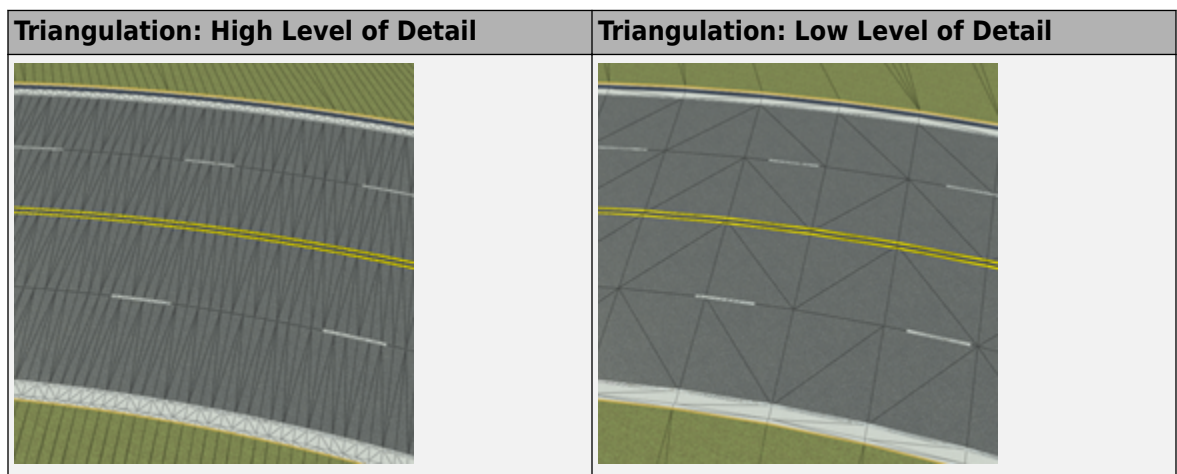
New Features

Bug Fixes

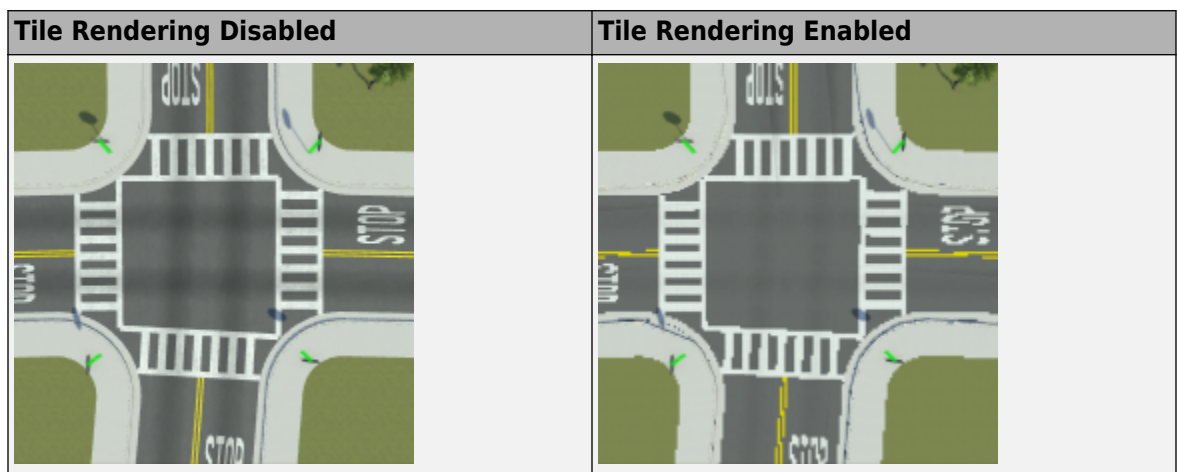
Custom Level of Detail: Customize level of detail in exported scenes to improve simulation performance

You can now customize the level of detail (LOD) used to render scenes that you export to simulators. To access LOD settings, from the **Tools** menu, select **LOD Settings**. Using these settings, you can reduce the level of detail at distances away from the simulator camera, where the reduction in scene quality is acceptable. These modifications can improve simulation performance substantially. Export of LODs is supported for FBX® files only. For more information on customizing levels of detail, see *Customize Levels of Detail in Exported Scenes*. Examples of the changes you can make at these distances away from the camera include:

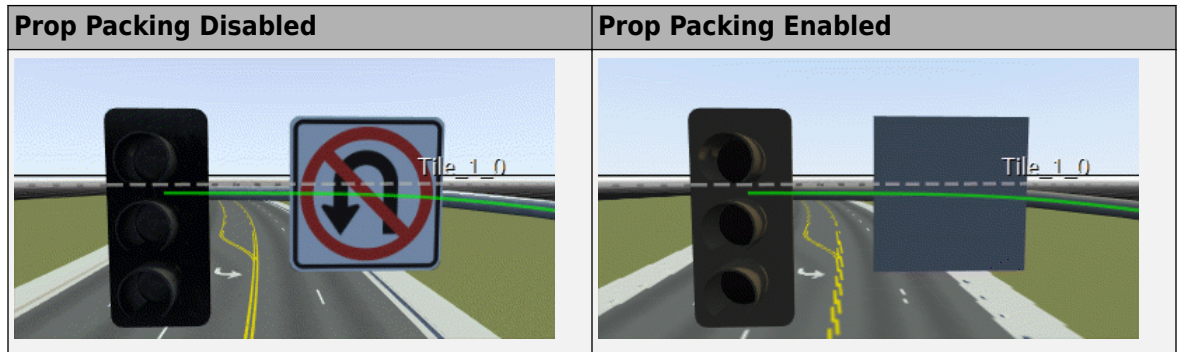
- Reduce the amount of triangulation by modifying settings such as the positional tolerance. These images show varying amounts of triangulation at different LODs.



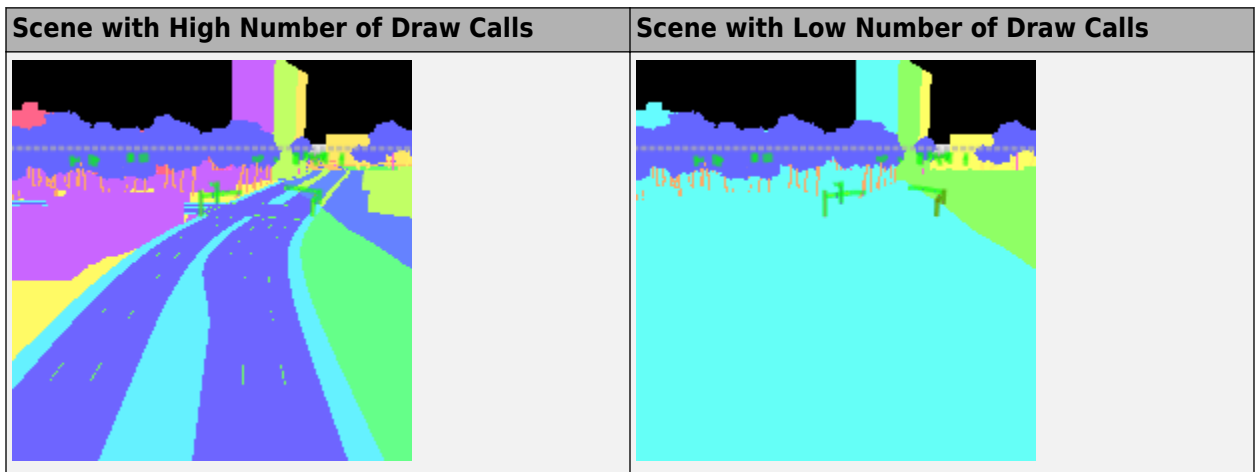
- Flatten tiles containing roads and ground terrain into single texture images by selecting the **Overhead Tile Rendering** option. These images show the difference in tile rendering at varying LODs.



- Combine, or pack, props in a tile into a single prop model by selecting the **Pack Props** option. Prop packing reduces the number of textures needed to render props, at the expense of visual quality.



To verify that scene performance improves as you reduce the level of detail, you can visualize how many draw calls the target simulators need to make to render the props. To view the draw calls, on the **View** menu, select **Draw Calls**. These images show the difference in draw calls for a scene with varying levels of detail. Each color represents a separate draw call.



Road Superelevation Tool: Manipulate banking angle along roads

Use the **Road Superelevation Tool** to control the superelevation (slope and banking angle) along the entire length of a road.



RoadRunner also supports the import of superelevation data from HERE HD Live Map by using the **Scene Builder Tool** (requires RoadRunner Scene Builder).

Custom Export Configurations: Specify customized combinations of file formats and scene data to export

In RoadRunner projects, you can now specify an XML file that enables the exporting of custom formats. For example, you can specify a combination of file formats not available in the **File** menu, under **Export**. You can also customize the type of data to export for each file format. For more details, see Export Custom Formats.

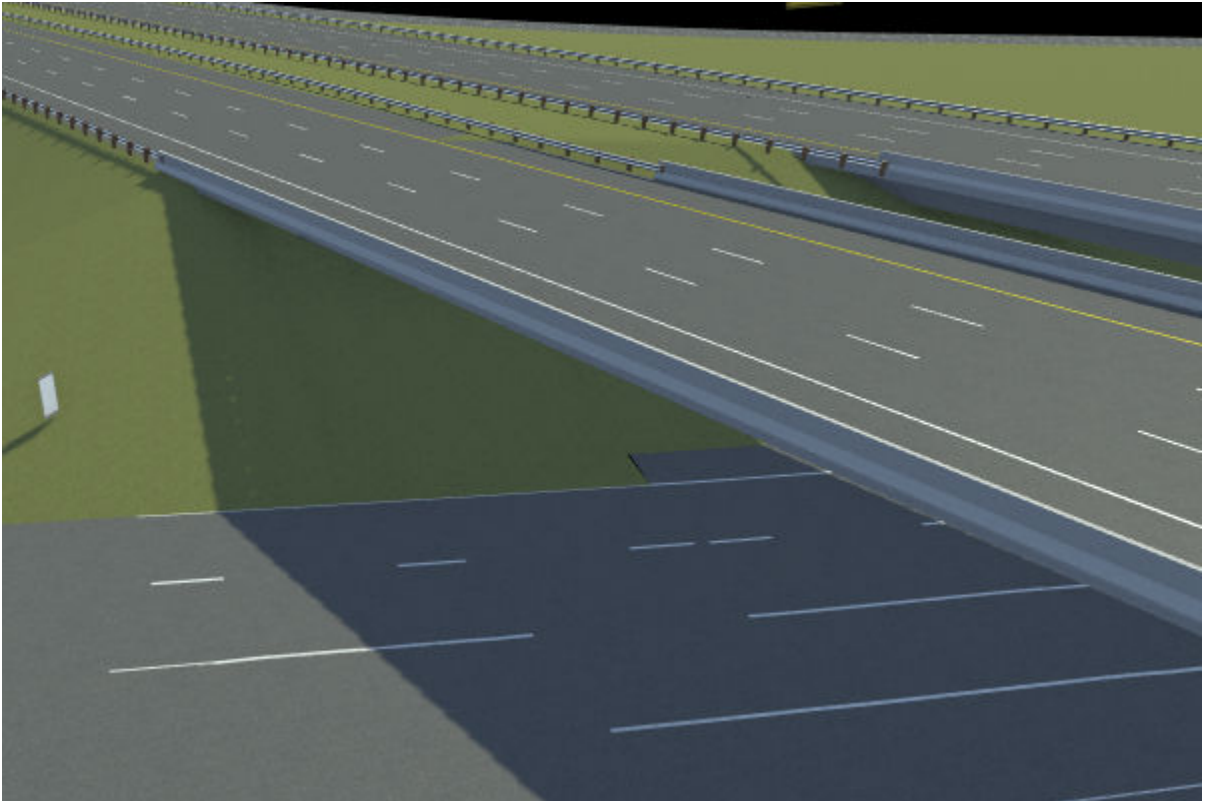
Quality Checks: Identify additional issues to fix in your scenes using built-in validation rules (requires RoadRunner Scene Builder)

The **Scene Builder Tool** now checks for quality issues in built scenes, including substantial changes in elevation and lane boundaries that intersect with each other. These issues are displayed in the **Output** window after you build the scene. Use these checks to identify whether these issues are present in the source data from which you are importing.

Use of the **Scene Builder Tool** requires a RoadRunner Scene Builder license.

HERE Localization Data: Import signs, poles, and barriers from HERE HD Live Map (requires RoadRunner Scene Builder)

The **Scene Builder Tool** can now import signs, poles, and barriers from the HERE HD Live Map service. Previously, the tool imported only road networks.



You can use this scene data as landmarks when simulating localization algorithms. For an example of building a scene that contains this data, see [Build Scenes by Using HERE HD Live Map Data](#).

You can also customize what assets RoadRunner uses to display imported data. For more details, see [Configure Assets to Use for Imported HERE HD Live Map Data](#).

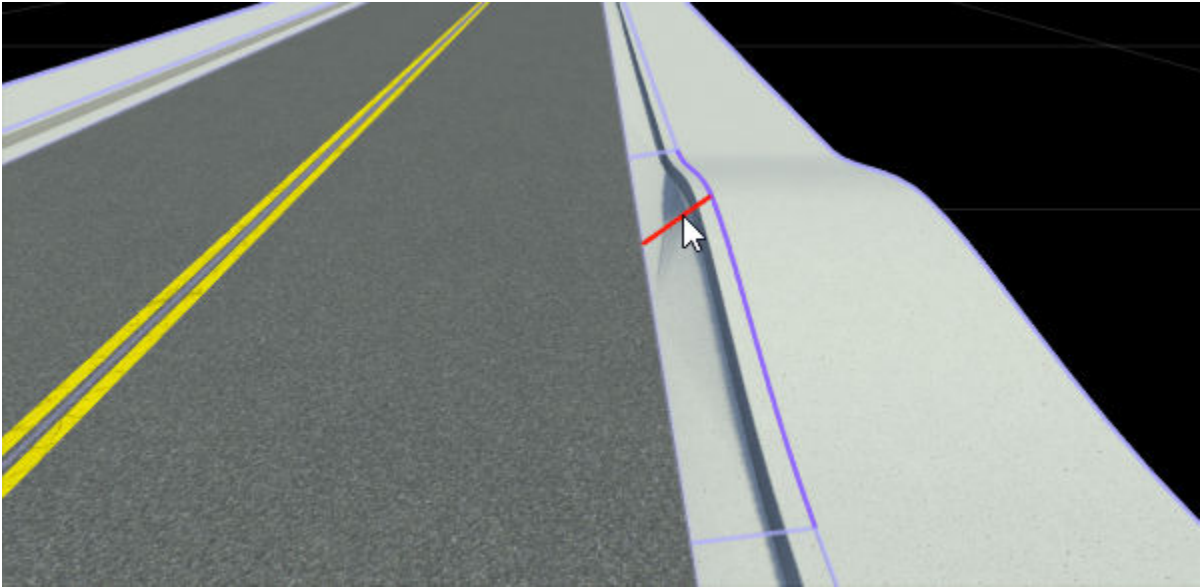
Use of the **Scene Builder Tool** requires a RoadRunner Scene Builder license.

Improved Cross-Sections: Create more accurate road cross-sections that are compatible with OpenDRIVE importing and exporting

RoadRunner now models road cross-sections more accurately. The increased accuracy enables you to import roads with complex cross-sections from OpenDRIVE. To manipulate these cross-sections, use the **Cross Section Tool**. You can then export these roads back to OpenDRIVE or to another simulator.

Sidewalk Height Tool: Modify sidewalk and curb heights

Use the **Sidewalk Height Tool** to modify the heights of sidewalks and curbs along a road. You can modify sidewalk heights along the entire length of a road or at arbitrary points along a road.



Light Source Parameters: Import and export parameters for controlling traffic lights and streetlights

When you import FBX file assets containing light sources, RoadRunner now imports the parameters that control the lighting effects. RoadRunner also exports this light data, enabling you to control lighting effects such as brightness or color in the exported scenes. For more details on exporting FBX files, see [Export to FBX](#).

R2020b

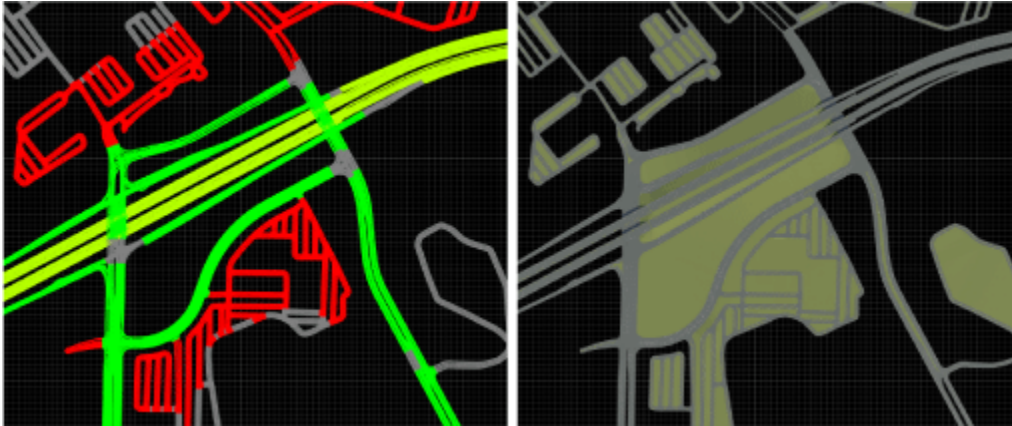
Version: 1.1

New Features

Bug Fixes

RoadRunner Scene Builder: Automatically generate 3D road models from HD maps

Use RoadRunner Scene Builder to import roads from HERE HD Live Map data.



Edit the imported roads using RoadRunner and export the results to supported simulation and game engine formats.

Road Speed Limits Tool: Set varying speed limits along roads

Use the Road Speed Limits Tool to set varying speed limits along sections of a road. When you export your scene to a simulator, you can use these values to test whether vehicles drive the set speed limits.

Bridge Span Creation: Fix bridge spans formed on elevated roads

In the Road Construction Tool, use the **Auto Assign Bridges** button to form bridge spans along elevated roads. Use this tool to fix bridges in scenes where one road is elevated above another road.

Project Props to Terrain: Align prop curves with the surface terrain

In the Prop Curve Tool, use the **Project to Terrain** option to align props and extrusions with the surface terrain rather than with the curve that you create. When you create prop curves, this option is selected by default.

R2020a+

Version: 1.0

New Features

RoadRunner Editor: Interactive editor to model roads and 3D environments

For details, see User Interface.

Intersections: Design complex intersections featuring merges, splits, and traffic circles

For details, see Road Plan Tool.

Surface Damage: Add detailed road surfaces with lane markings, stencils, and custom graphics

For details, see Surface Tool.

RoadRunner Asset Library: Library of prebuilt professionally created assets

For details, see RoadRunner Asset Library.

Customize Road Signs: Combine text and graphics to build custom signs

For details, see Sign Tool.

Traffic Signals: Edit signal phases and timing with the integrated signal timeline and interactive controls

For details, see Signal Tool.

GIS Import: Import aerial imagery, elevation data, lidar point clouds, and road maps to accurately represent physical locations in RoadRunner

For details, see GIS Data Resources for RoadRunner.

OpenDRIVE Import and Export: Import and export road networks using OpenDRIVE format

For details, see Importing OpenDRIVE Files and Exporting to OpenDRIVE.

Export to Apollo

RoadRunner can export road scenes to Baidu Apollo® formats. You can export to Apollo 3.0 and 5.0 XML formats and Apollo 5.0 binary format.

For details, see [Exporting to Apollo](#).

Export to Universal Scene Description (USD)

You can now export road scenes to USD. For details, see [Exporting to USD](#).

Export for Metamoto simulations

You can now export road scenes for use in Metamoto[®] simulations. For details, see [Exporting to Metamoto](#).

Import from OpenDRIVE improved

Importing OpenDRIVE files is now faster.

Additionally, you can now import:

- Larger OpenDRIVE files
- Road types
- Speed limits
- Multiple road segments as one continuous lane
- Nonnumeric IDs
- Object types

For details, see [Importing OpenDRIVE Files](#).

Export to OpenDRIVE improved

When exporting to OpenDRIVE, you can now export:

- Speed limits
- `laneSection` entries for the same RoadRunner road
- Object types
- U-turns

For details, see [Exporting to OpenDRIVE](#).

Improved support for GIS assets

RoadRunner can now import geographic information system (GIS) data with earth-centric projection information.

For GIS import information, see [Importing GIS Data in RoadRunner](#).

Vector-type scaling

Dragging the **Scale** label on vector types scales all axes uniformly.

