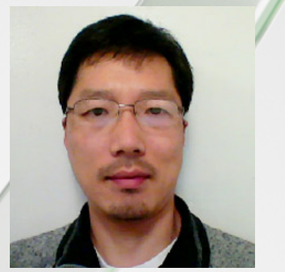
A Magic Button for Optimized Roadway Design

Valentin Koch

Edmundo Herrera



Dong Yang

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Class outline

- Introduction Val, 5 min
- Profile Optimization: Val, 10 min
- Simple Corridor Optimization for Highways: Val, 5 min
- Suitability Maps: Dong video, 5-10 min
- Combining Corridor Optimization and Suitability Maps: Dong video or Val, 5 min
- Advanced Corridor Optimization: Edmundo, 20 min
- Q & A: Edmundo and Val, 5-10 min

Key learning objectives

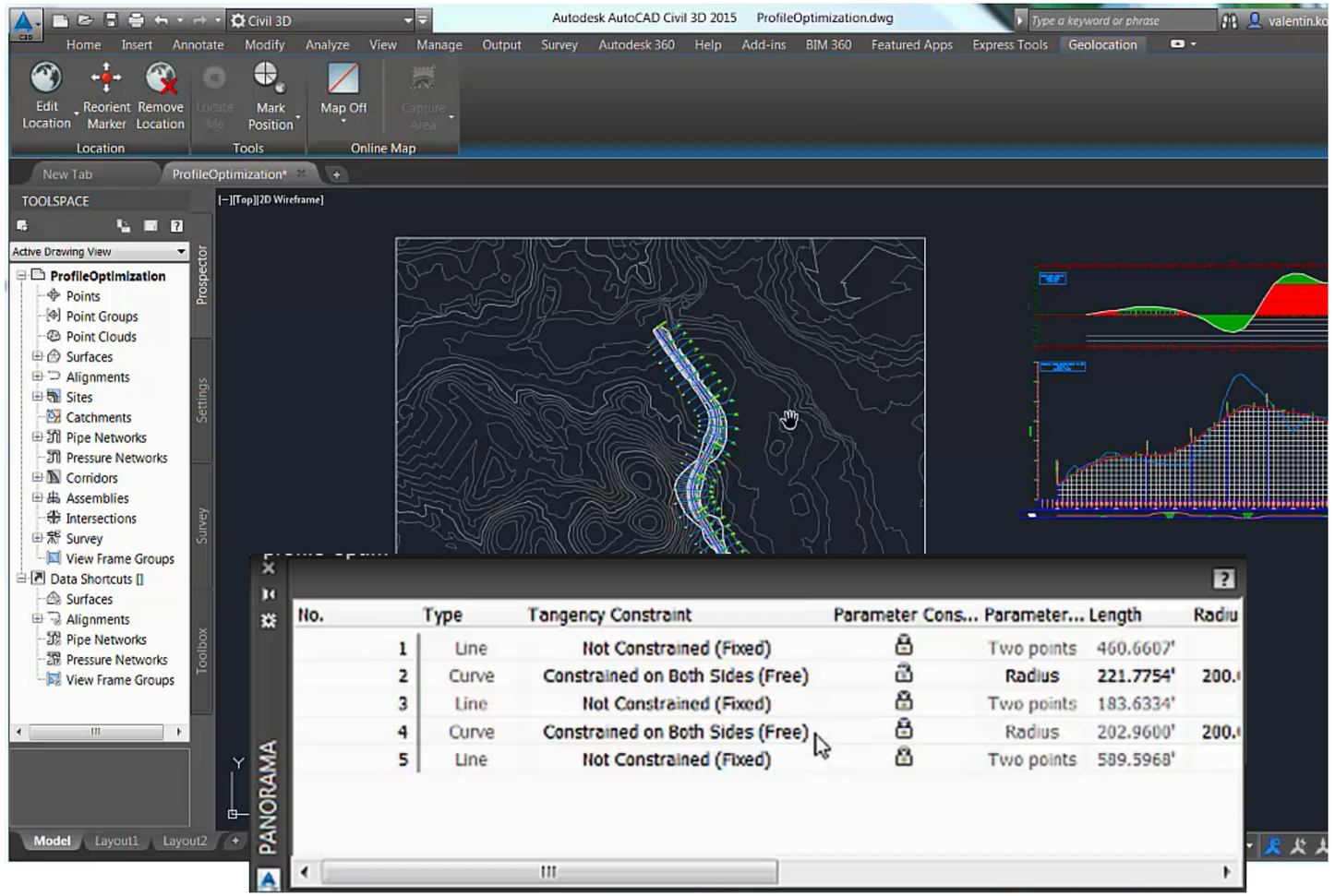
At the end of this class, you will be able to:

- Know when to use Corridor Optimization and Profile Optimization during your project phase
- Choose appropriate settings for each service based on your projects to get desired results
- Evaluate solutions returned by the optimization service
- Prepare your Civil 3D corridor design so as to use Profile Optimization, and compare the optimized result with your original design in Civil 3D
- Set up Suitability Maps and apply such maps in your Corridor Optimization

Introduction

Profile Optimization with InfraWorks

Prepare You Civil3D Road



- Make sure that the surface is big enough
- Add sample lines with distance of 50 ft
- Set correct alignment geometry settings and make it editable – Curve constrained free on both sides

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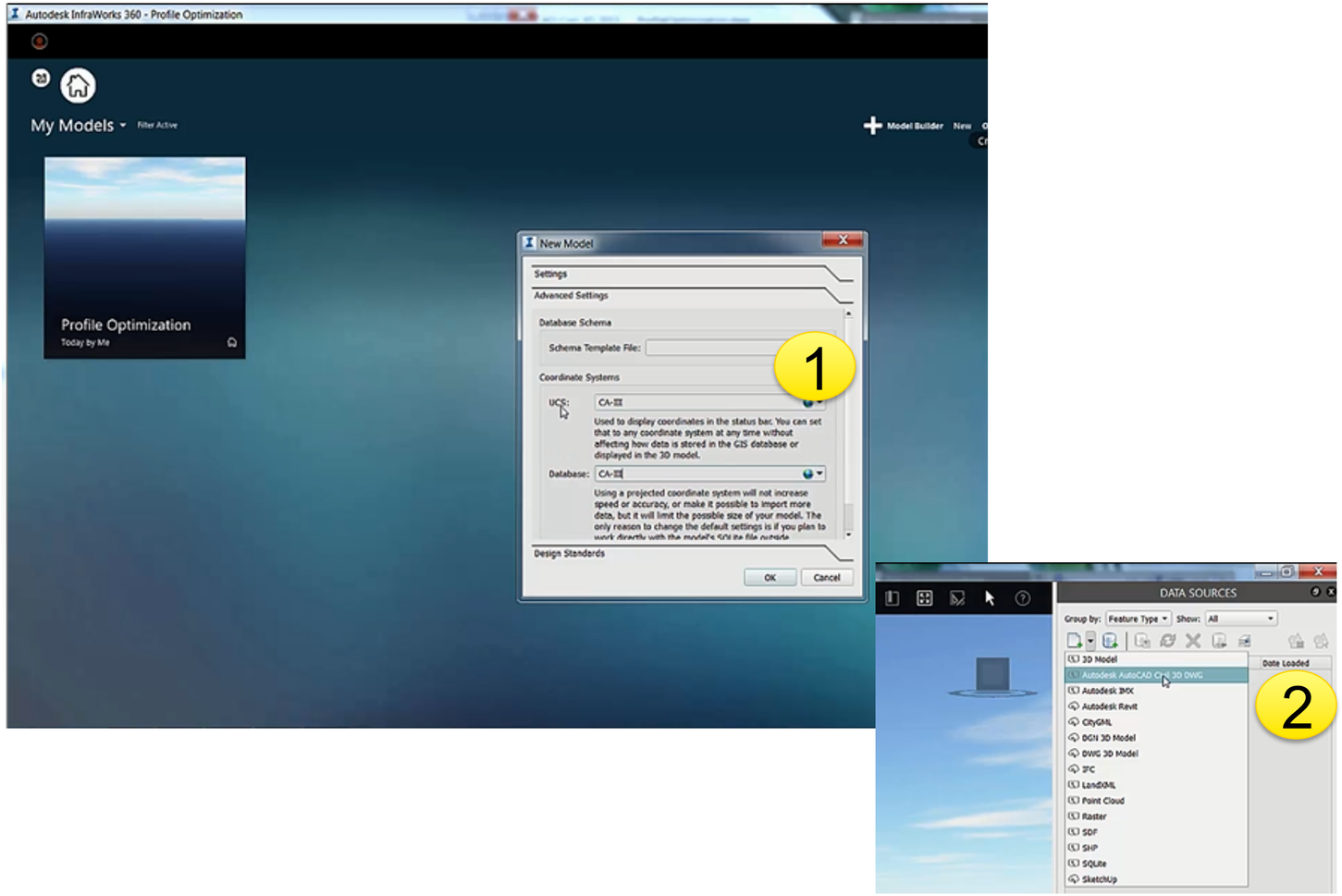
Select the Appropriate CS for New Model



- On the New Model dialog box, select appropriate coordinate system for your project to match the corridor project set in Civil 3D
- Use the Civil 3D DWG import on Data Source to import the drawing data

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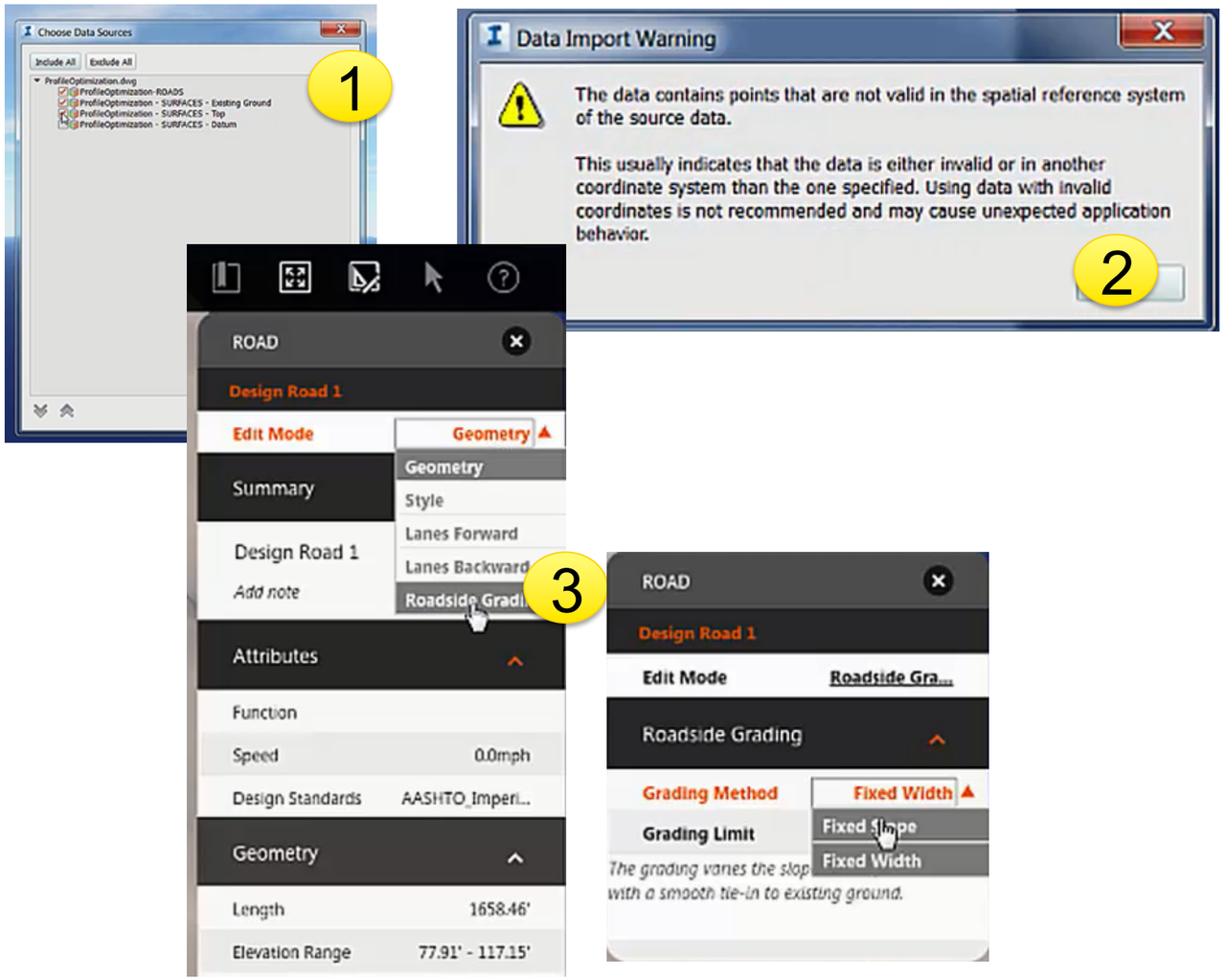
Set Road Settings Consistent to Civil3D



- Select ROADS and existing ground SURFACES only
- Ignore the data import warning
- In the road edit mode, select Roadside Grading and change the method to Fixed Slope
  - Grading Limit: 200 ft
  - Cut Slope: 2:1
  - Fill Slope : 4:1

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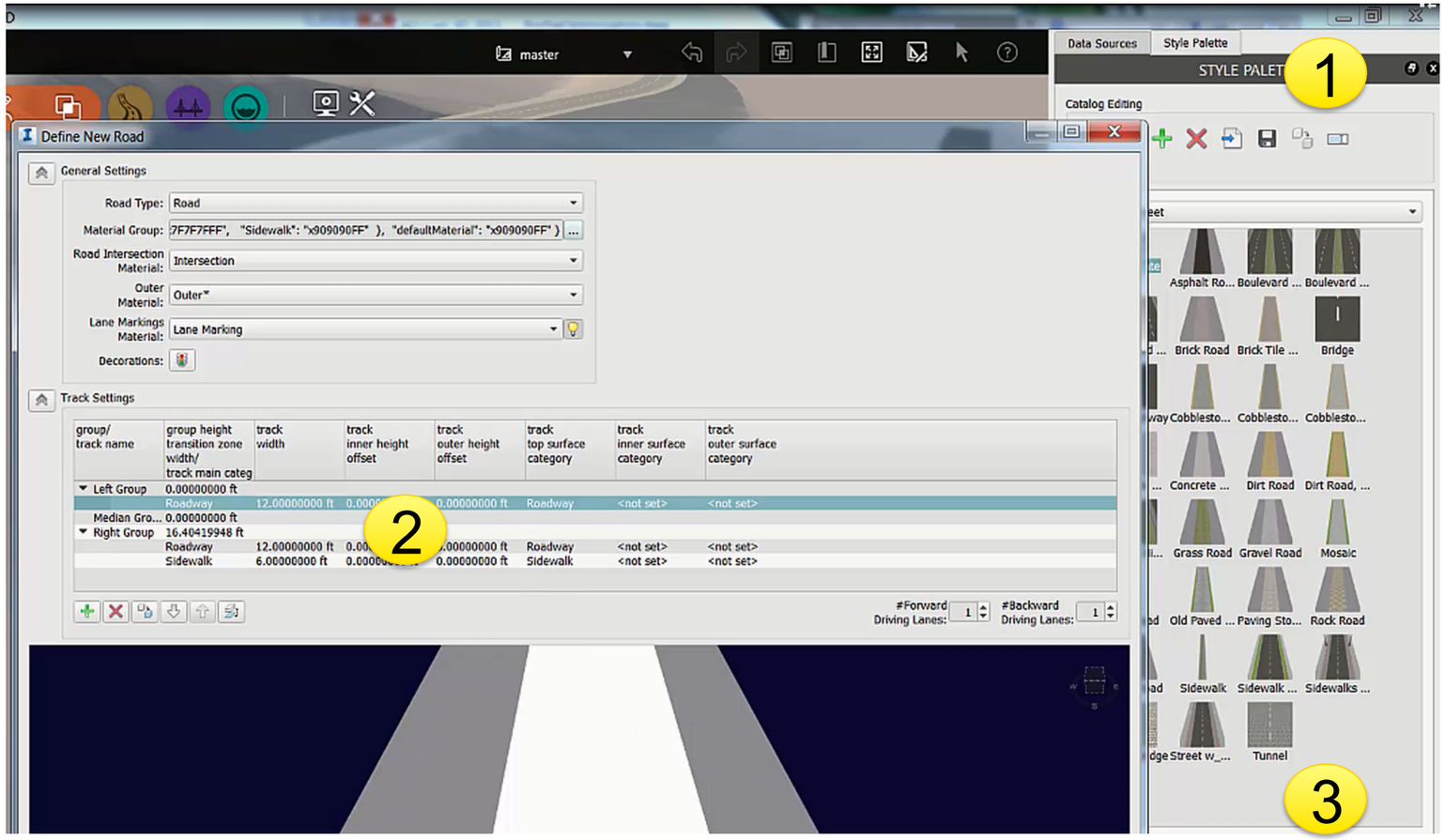
Update Road Style



- Create a new roadway style
- Update the following
  - Roadway track width: 12 ft
  - Sidewalk track wdith: 6 ft
- Add Left Group and set its roadway to 12 ft
- Apply the new style to the imported road on canvas

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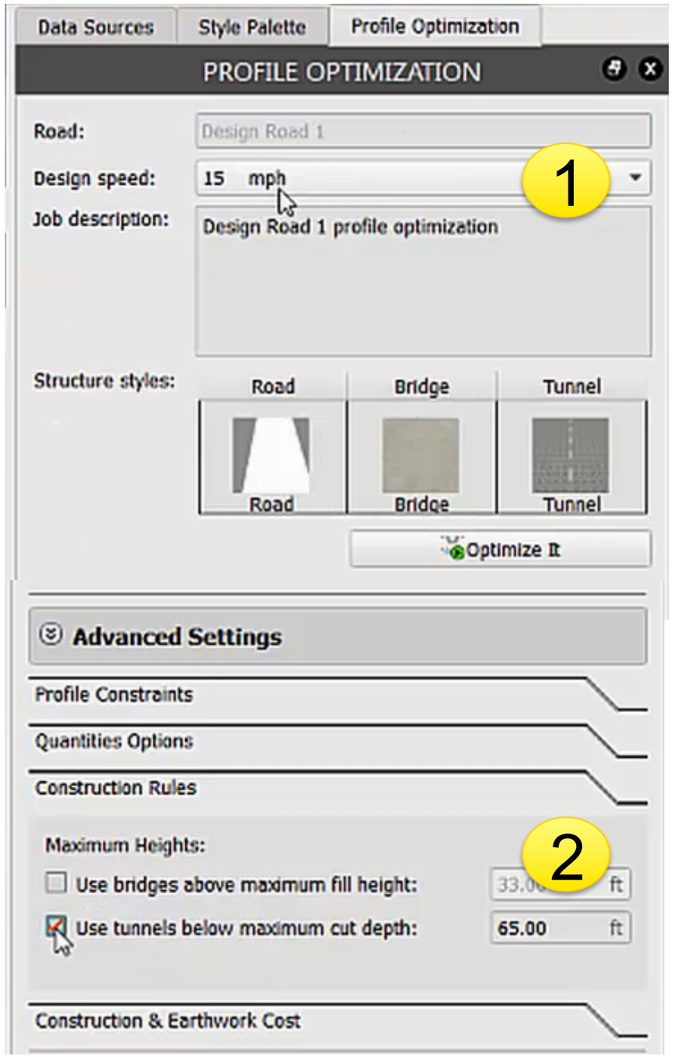
Profile Optimization Setup



- Open **Profile Optimization** from the Roadway Design component toolbar
- Select the road from canvas and set **Design Speed** to 25 mph
- Optionally select bridge or tunnel styles
- Examine Advanced Settings and deselect the Use Bridges/Use tunnels option under **Construction Rules**

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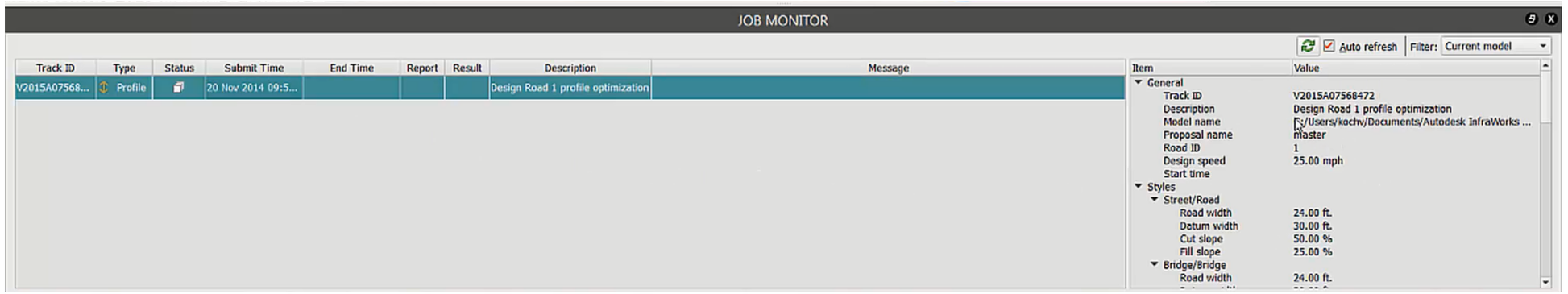
Job Monitor



- On Job Monitor, watch out the job status and result
- Download the PDF report
- Download the result into a new proposal

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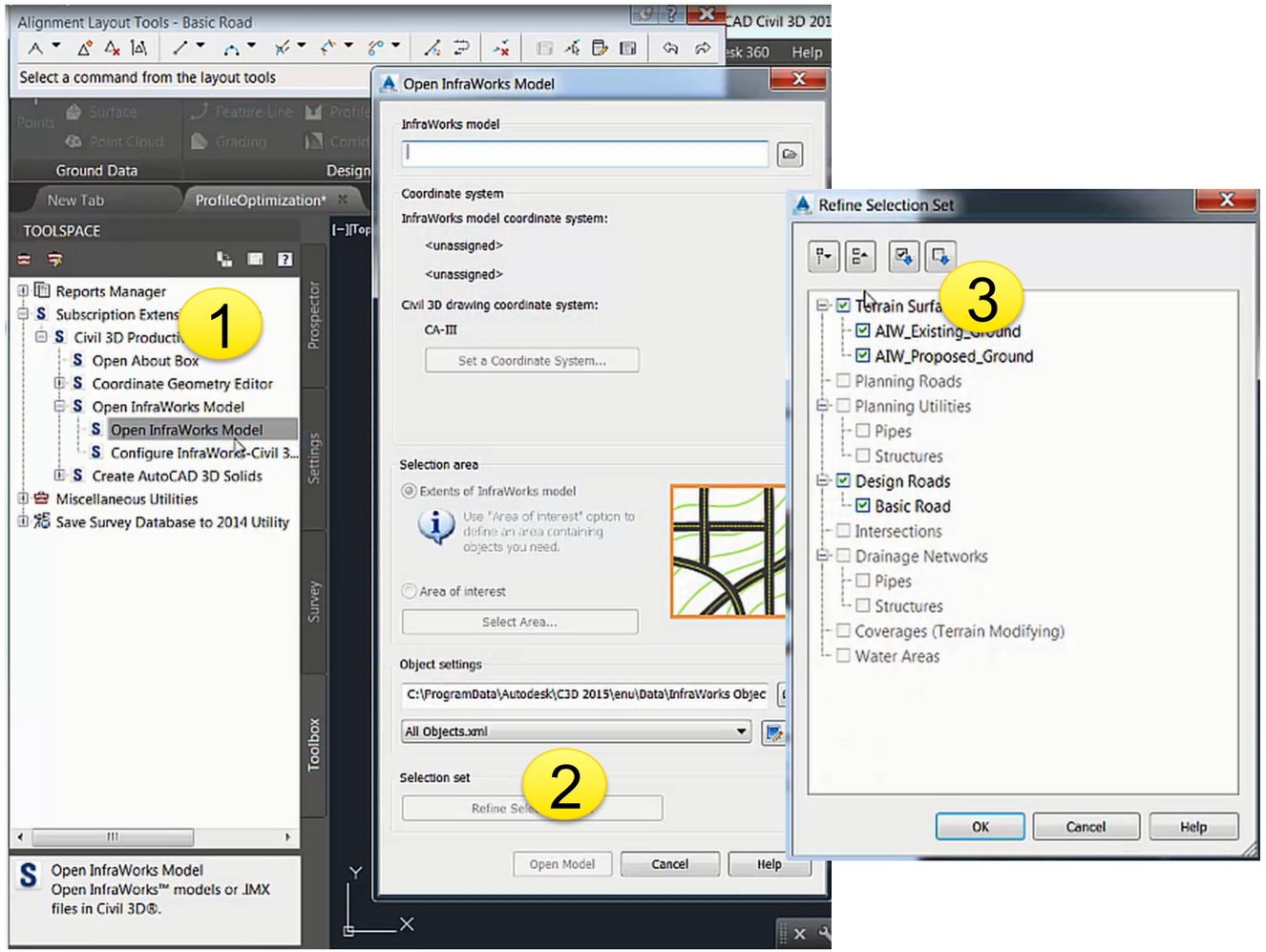
Import in Civil 3D



- On Toolbox, under Subscription Extension Manager > Civil 3D Productivity Pack 1 > Open InfraWorks Model, click **Open InfraWorks Model**
- Click **Refine Selection Set** and uncheck **Terrain Surfaces**

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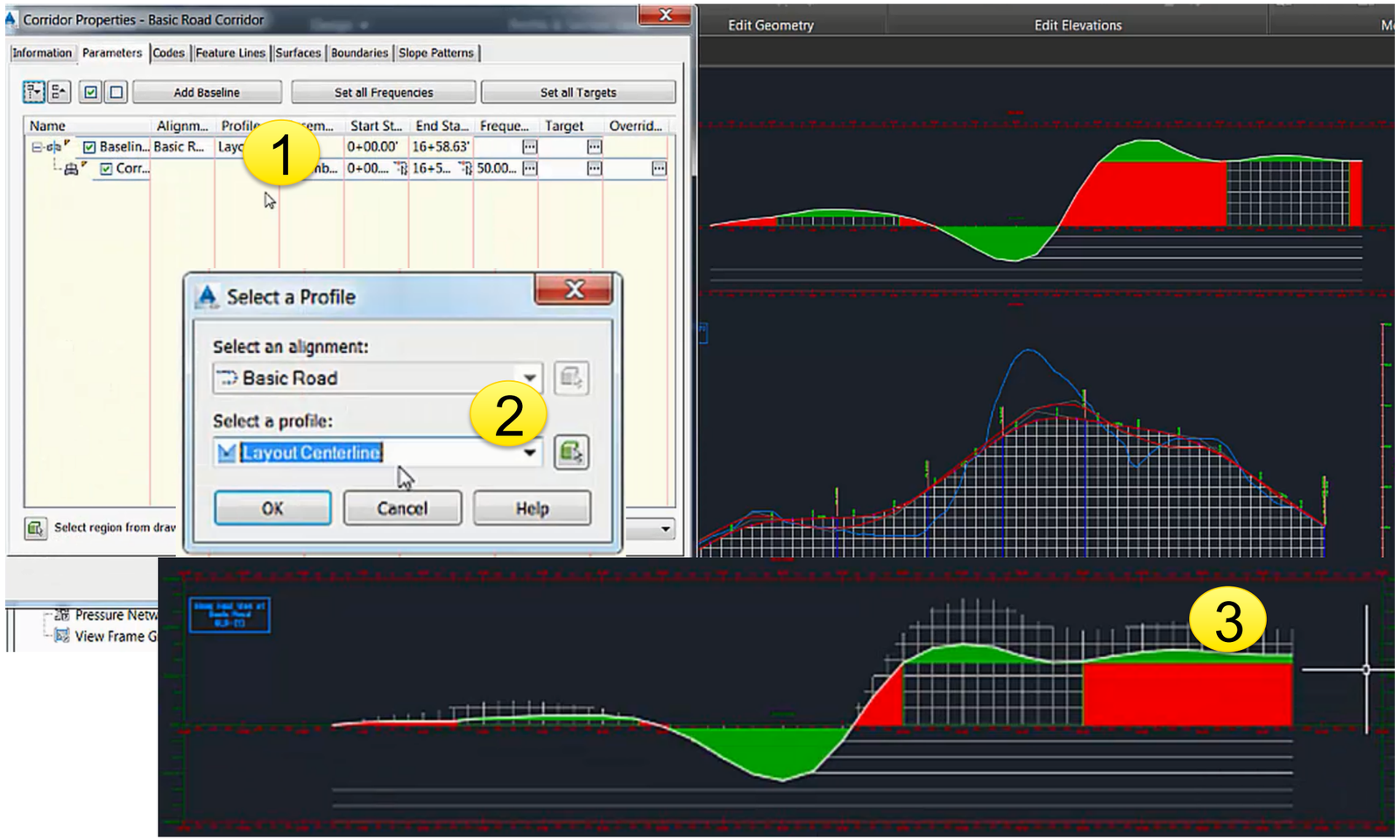
Compare Profile and Mass Haul



- On Prospector, open Properties for the corridor.
- Switch profile to **Basic Road**
- Check the difference in mass haul

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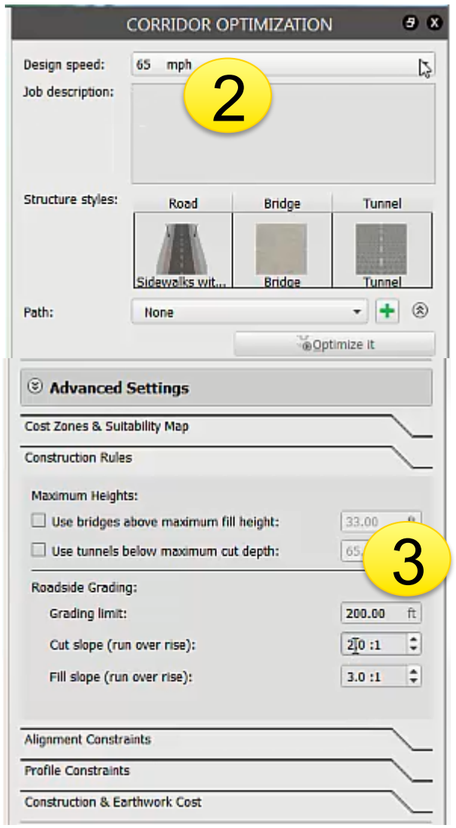
Corridor Optimization for Highways

Corridor Optimization Entry Point and UI



- Open Corridor Optimization
- Set Design Speed to 70 mph
- Draw the intend path on canvas
- Fit the size of project area on canvas
  - Update Advanced Settings
  - No bridges/tunnels
  - Grading limit: 200 ft
  - Cut slope: 2:1

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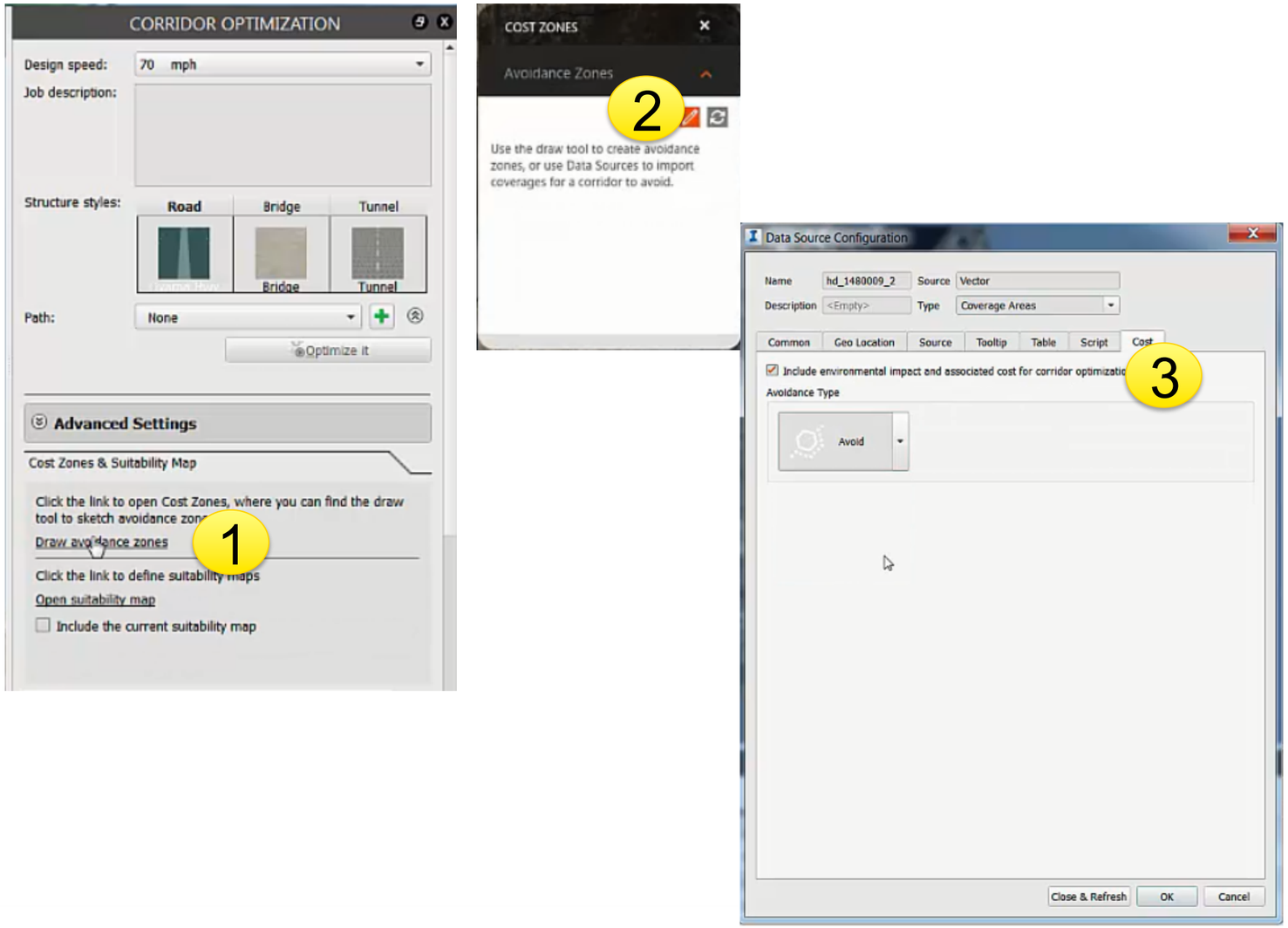
Create and Apply Avoidance Zones



- Select **Draw avoidance zones** under Advanced Settings on Corridor Optimization
- On Cost Zone, use the pencil tool to draw avoidance zones on the model
- Alternatively, you can import GIS data as Coverage and configure its Cost from Normal to Avoid

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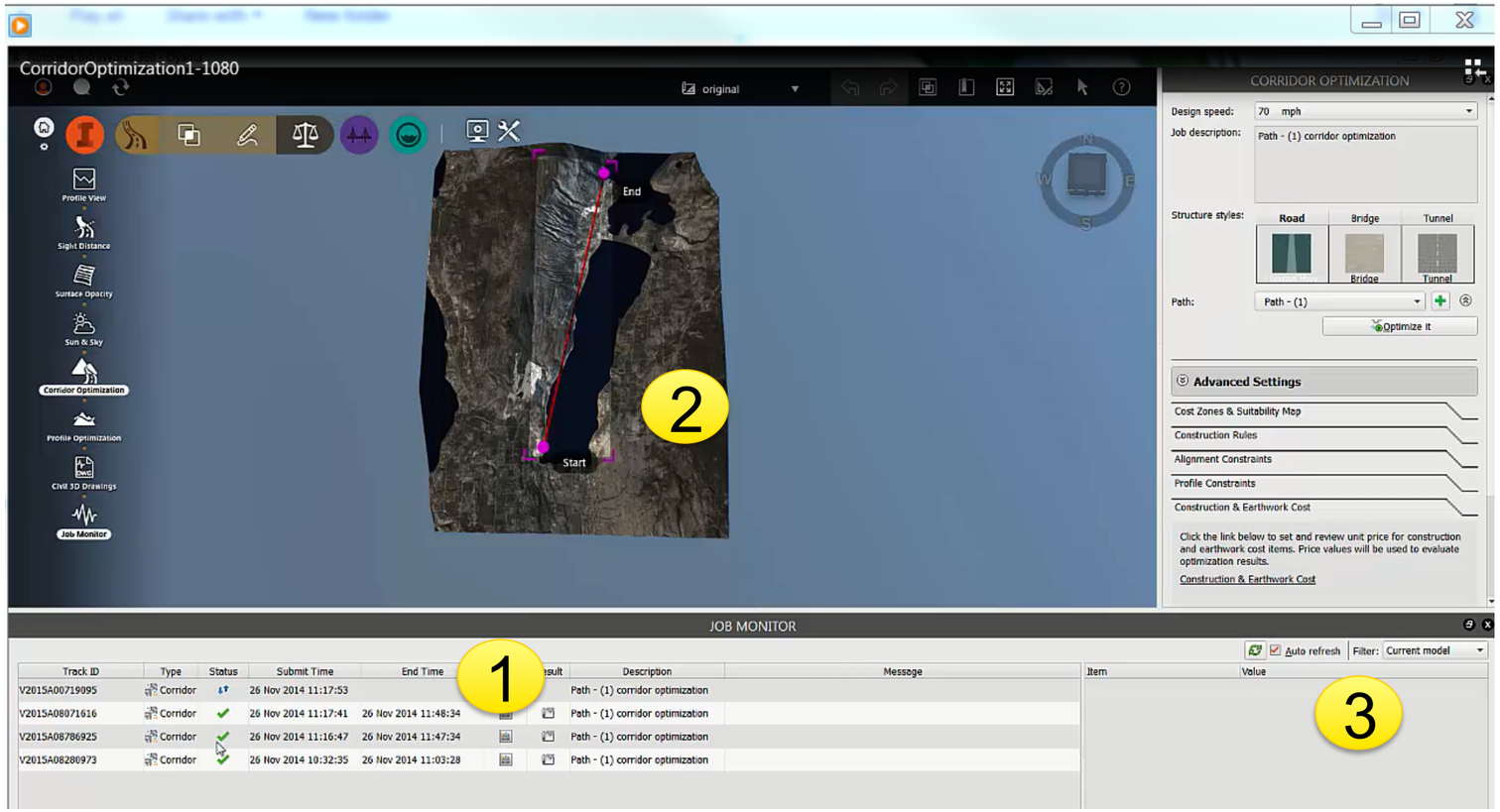
Download Results



- Refresh Job Monitor to see results.
- Review the pdf report
- Download the result into a new proposal
- Create an avoidance zone
  - Manual draw
  - Import as coverage and set Cost to avoidance

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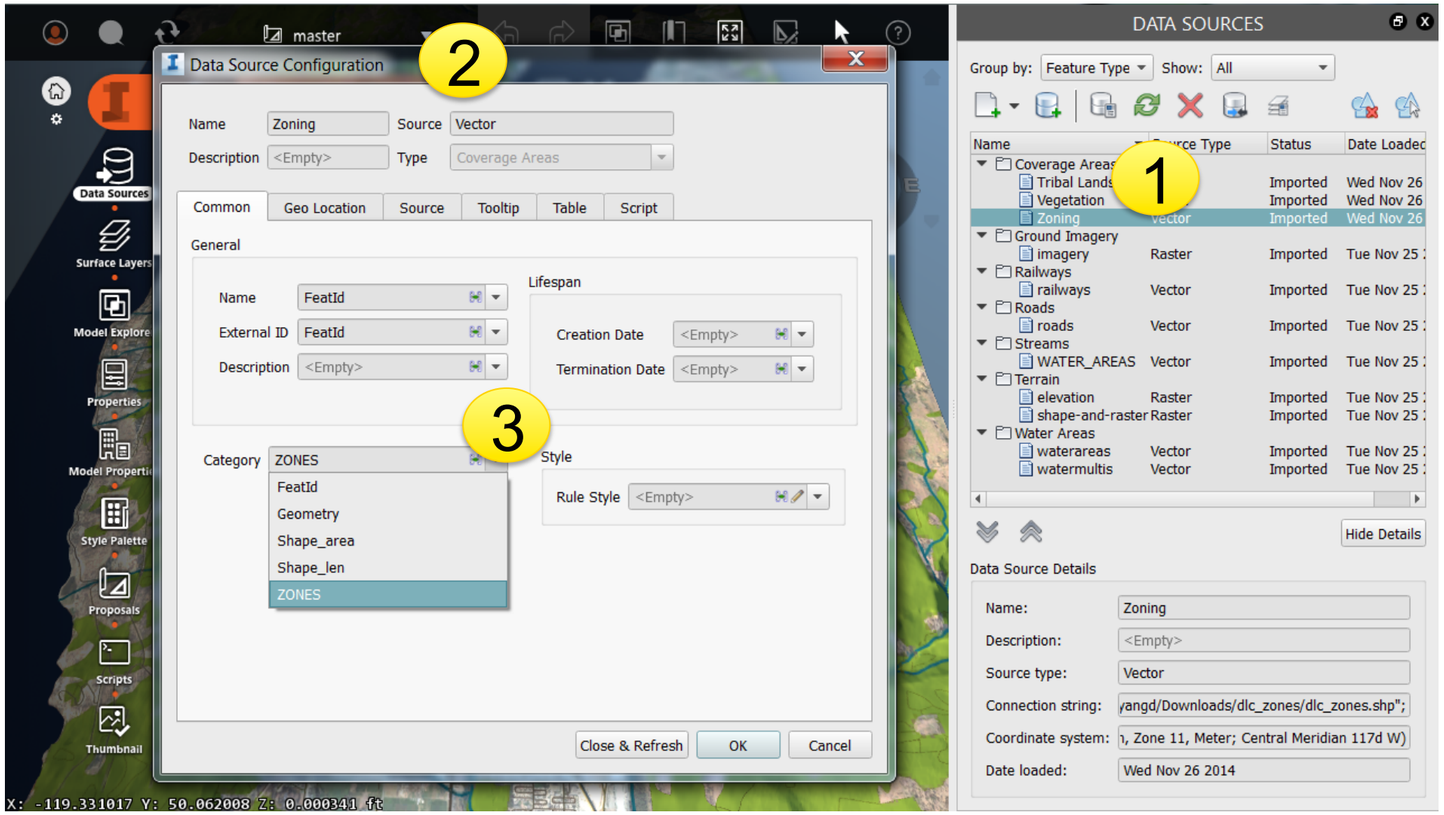
Suitability Maps

Prepare Datasets to be Used



- On InfraWorks **Data Source**, import GIS datasets that contain project sensitive features into appropriate model feature classes
- Open **Data Source Configuration** and map attribute fields to model feature properties

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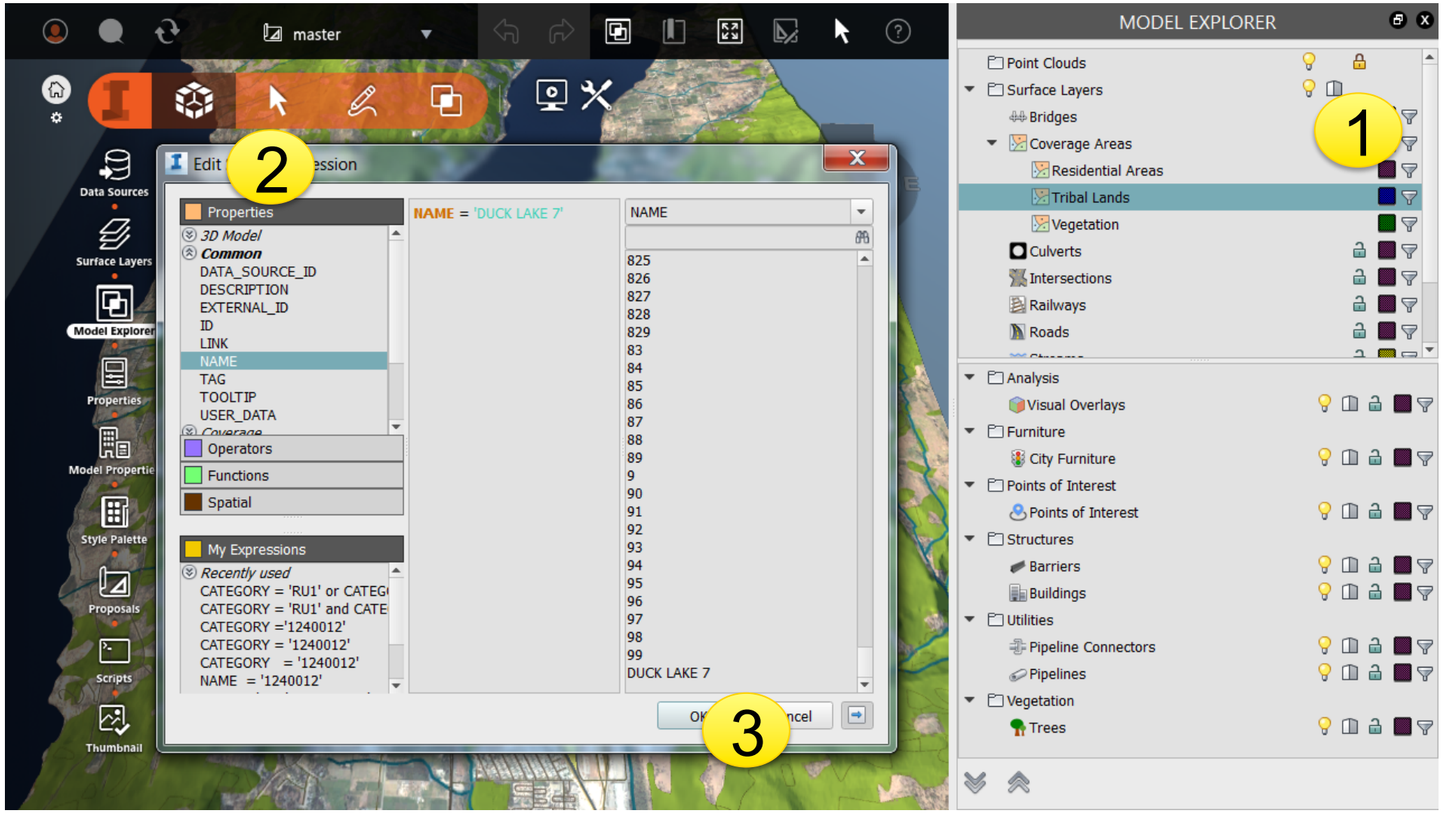
Create Feature Subsets If Needed



- On InfraWorks **Model Explore**, use the Filter tool to create feature subsets that you would like to add to Suitability Map layers and apply layer settings

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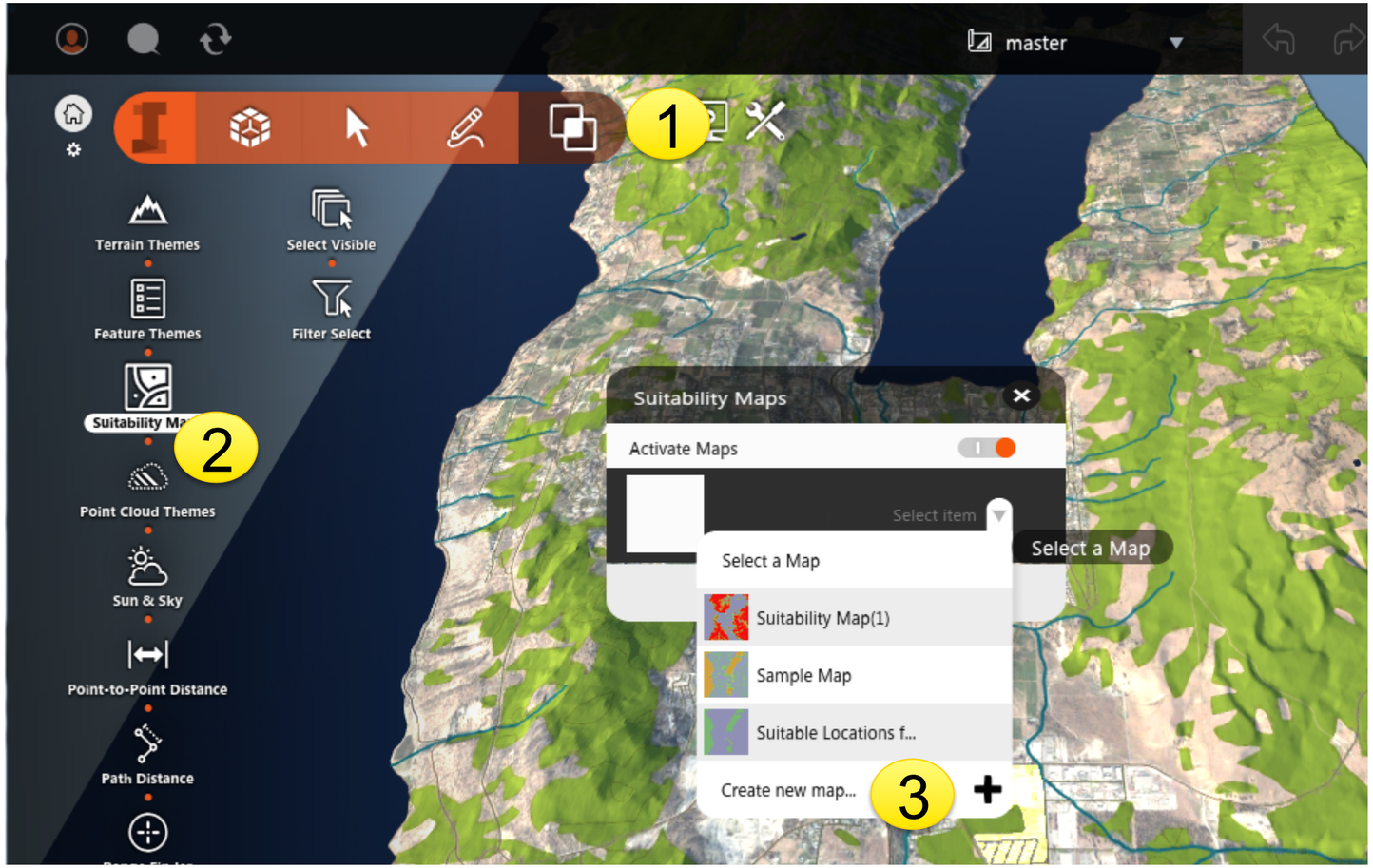
Open the Suitability Maps Panel



- Select the Analysis toolbar
- Click the Suitability Maps button
- On the Suitability Maps panel, select an existing or click the Create new map option

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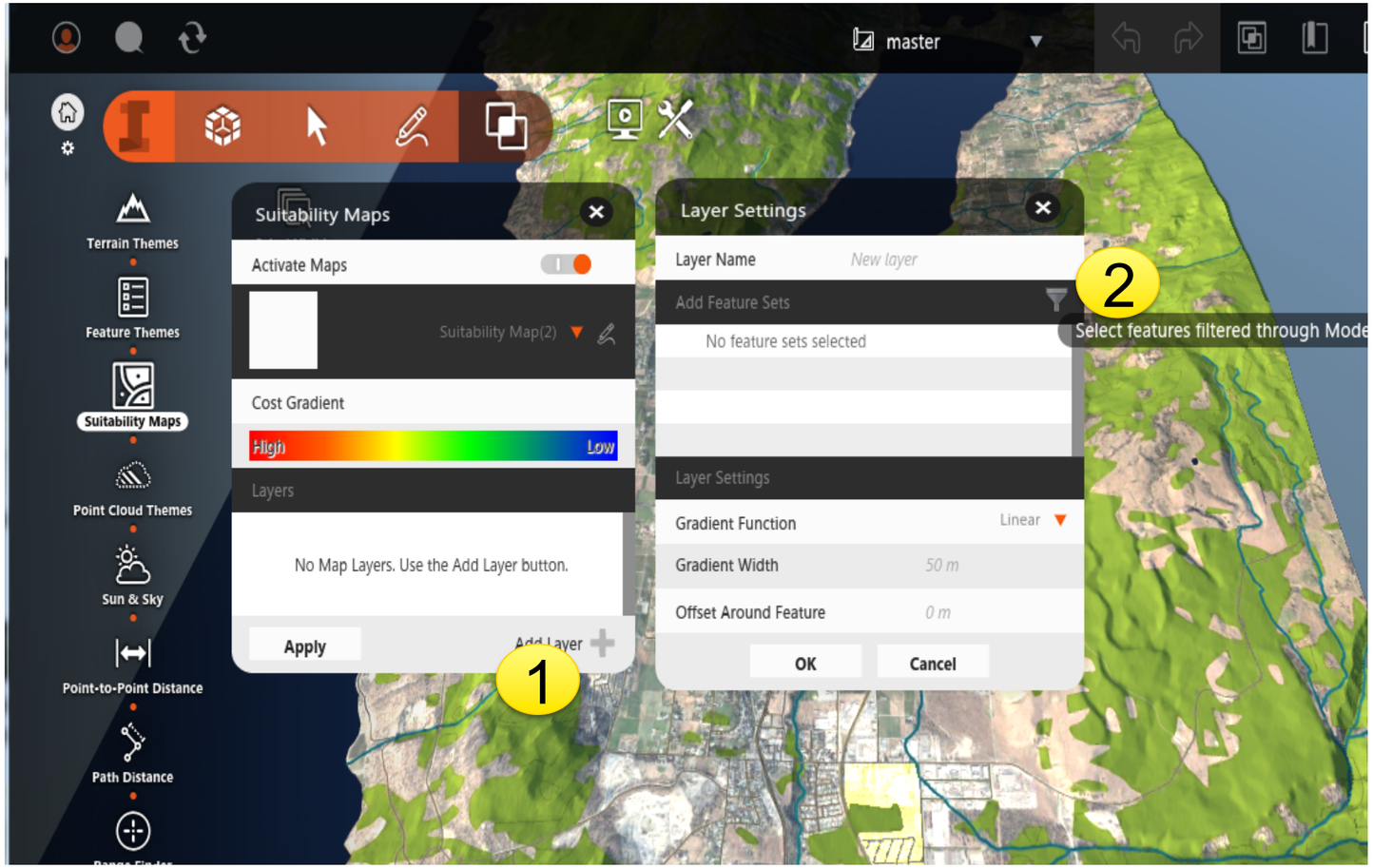
Add Map Layers



- On the Suitability Maps panel, click the Add Layer button
- On the Layer Settings panel, click the filter icon to open Feature Selection
- Pick feature sets or subsets that you'll apply the same layer settings
- Rename the layer (optional)
- Adjust settings (optional)

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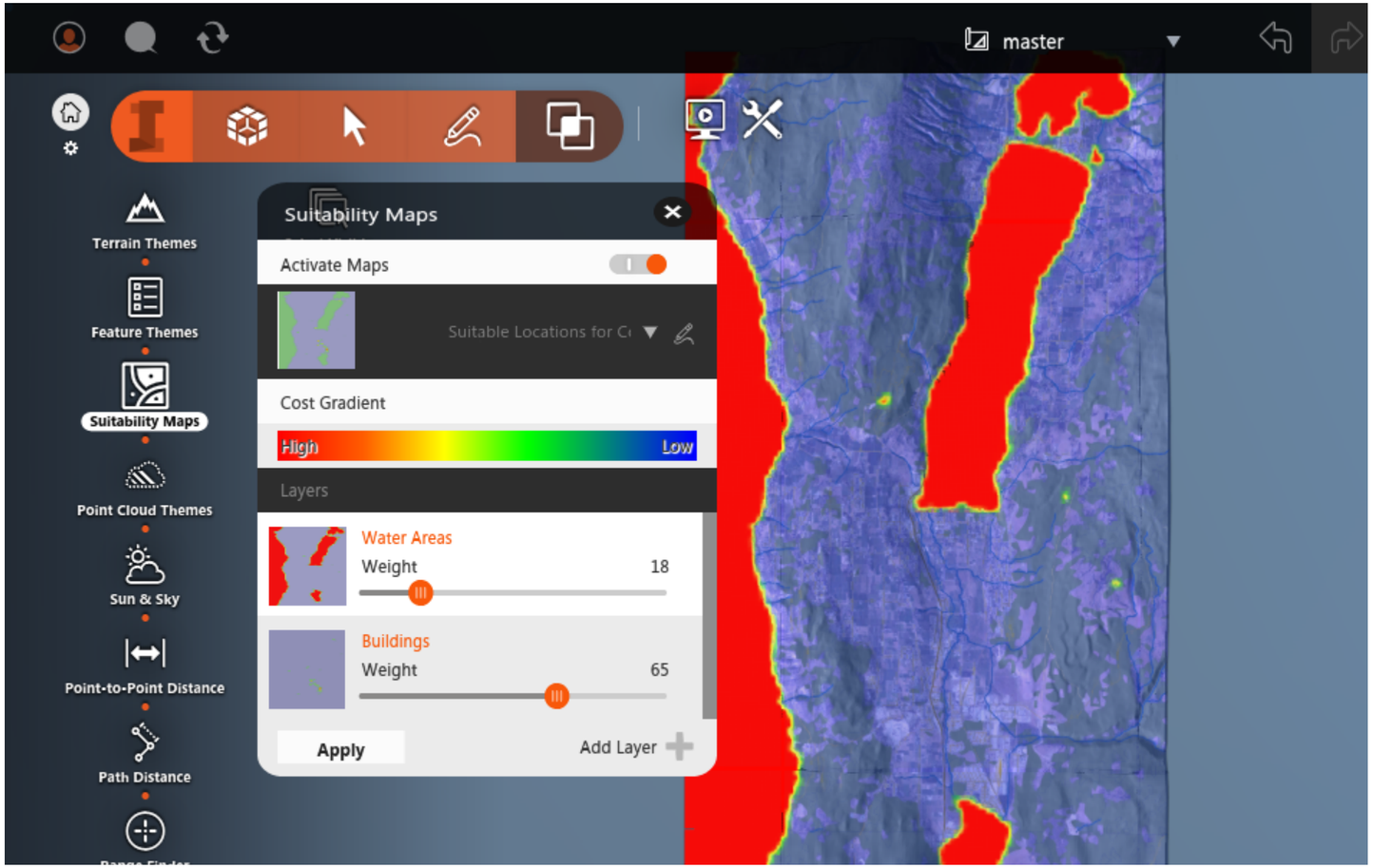
Add Map Layers



- Adjust weights for layers
- Click the Apply button
- You can use the slider button on the top of the panel to turn the visibility of a suitability map on or off

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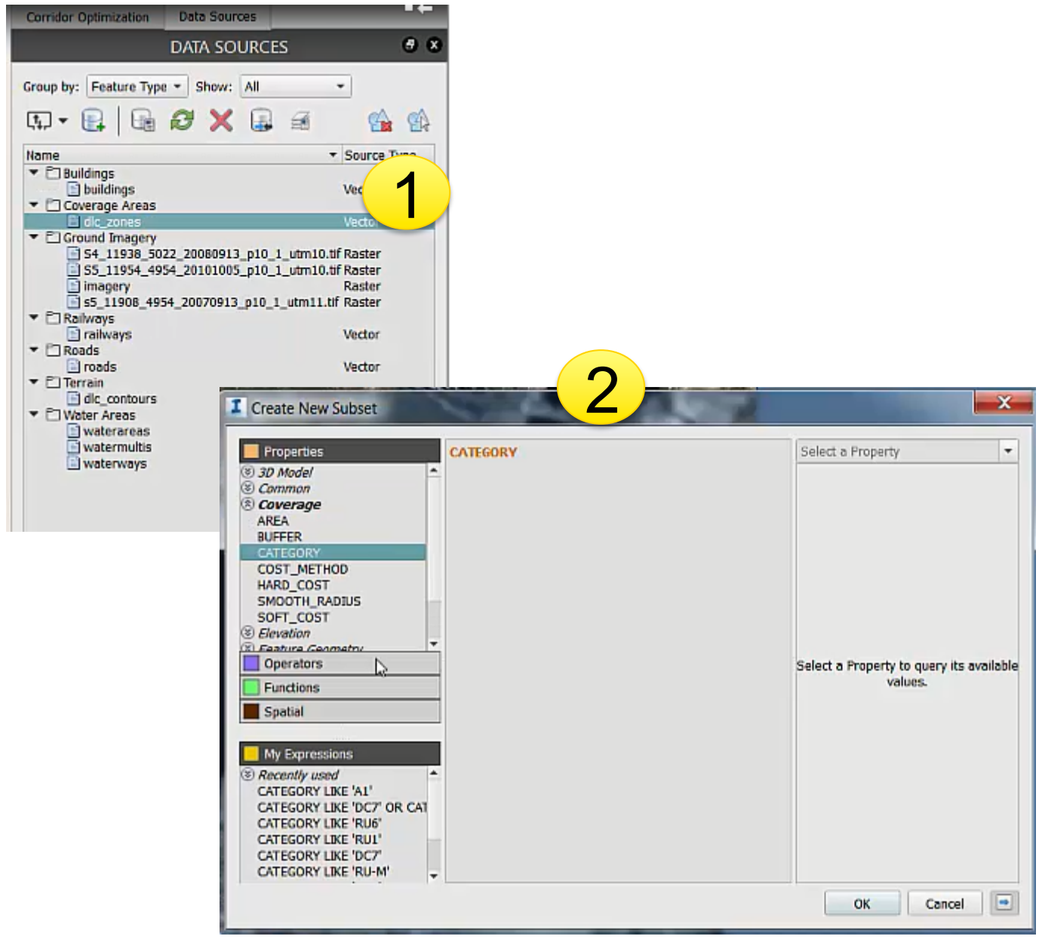
Suitability Maps and Corridor Optimization

Import GIS Data and Create Subsets



- Import GIS data as coverage
- Create subsets under Coverage

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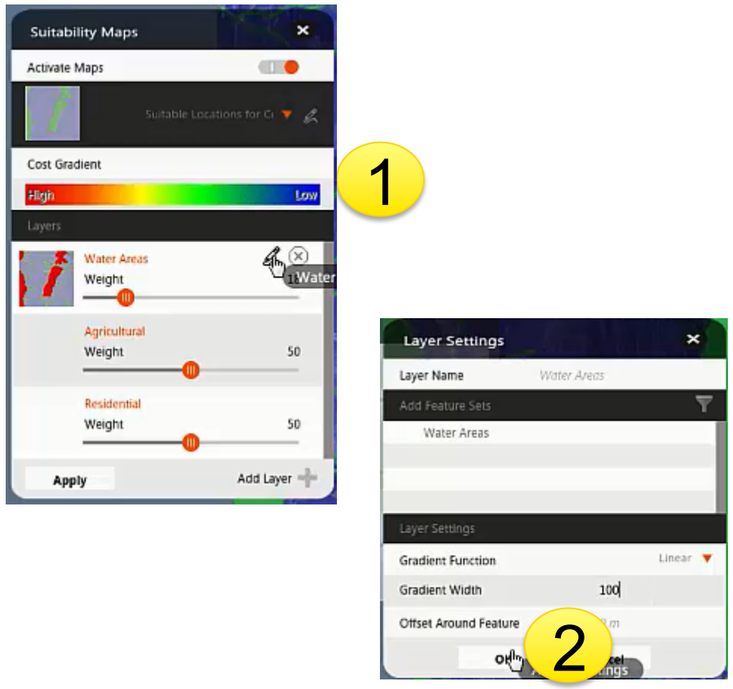
Create a Suitability Map based on Subsets



- Create a suitability map
- Add layers and adjust their weights
  - Water - 60
  - Agricultural - 40
  - Residential - 50
- Apply the settings

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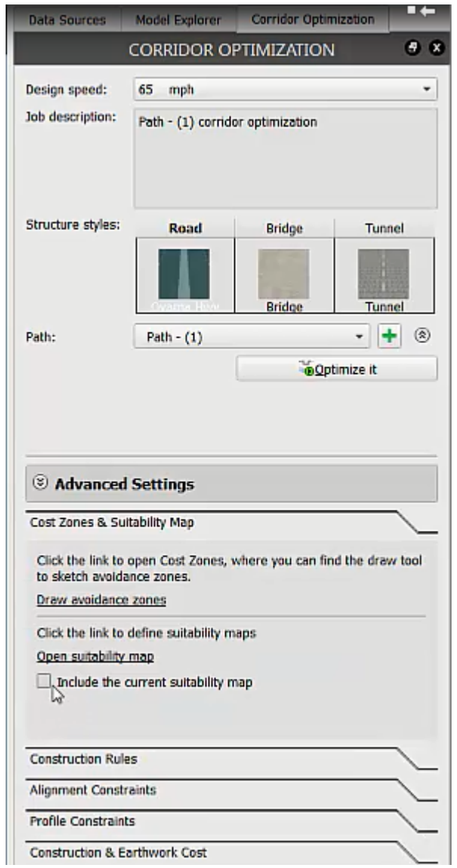
Apply Suitability Map



- Open Corridor Optimization
- On Advanced Settings, under Cost Zones & Suitability Map, check **Include the current suitability map**
- Click **Optimize It**

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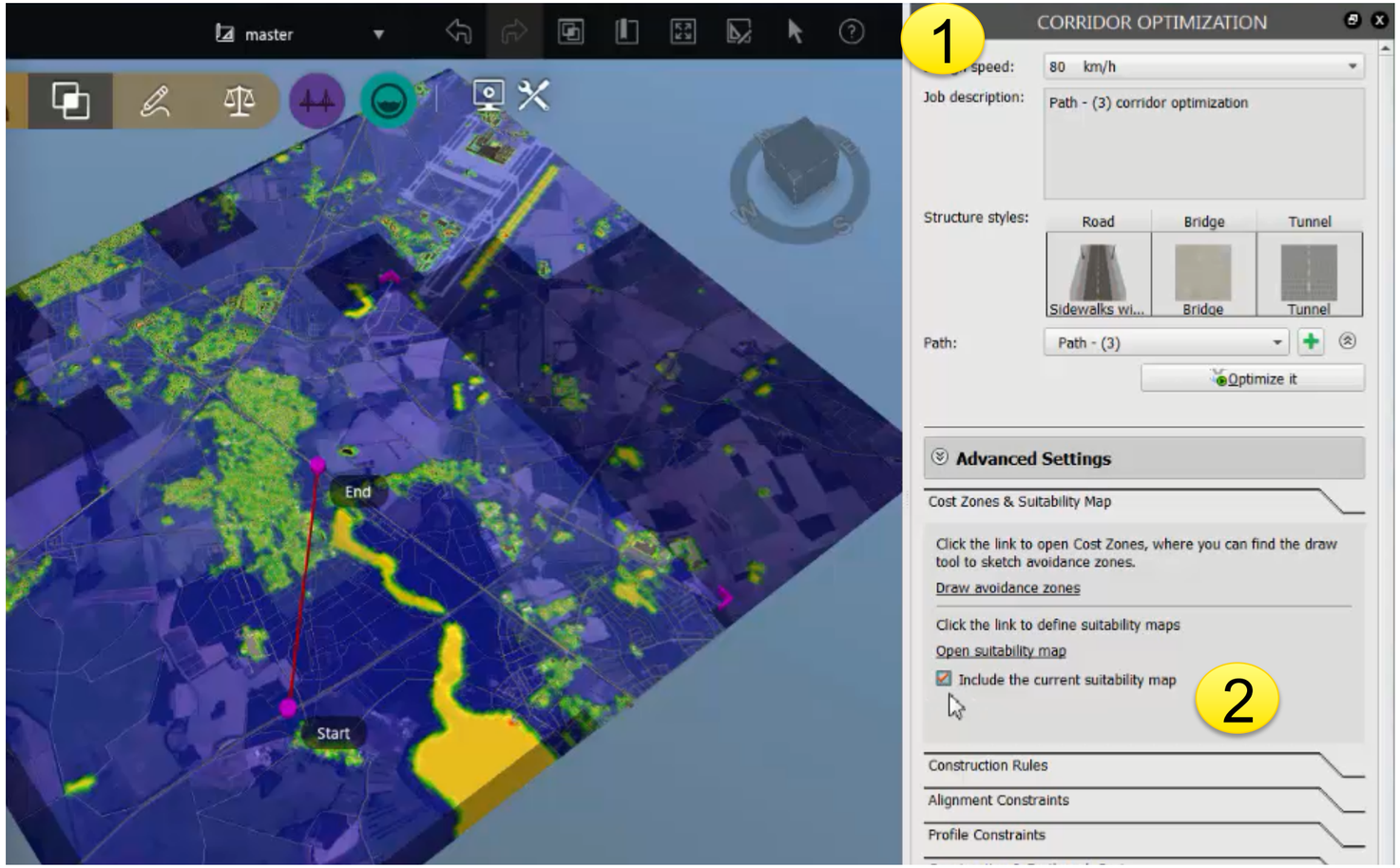
Include Suitability Maps in Corridor Opt



- Open Corridor Optimization
- On **Advanced Settings**, check Include the **current suitability map** option in **Cost Zones & Suitability Map**
- Set up your corridor optimization parameters and setting and submit the job

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Advanced Use of Corridor Optimization

Questions & Answers