# REVITalize Bridge Design


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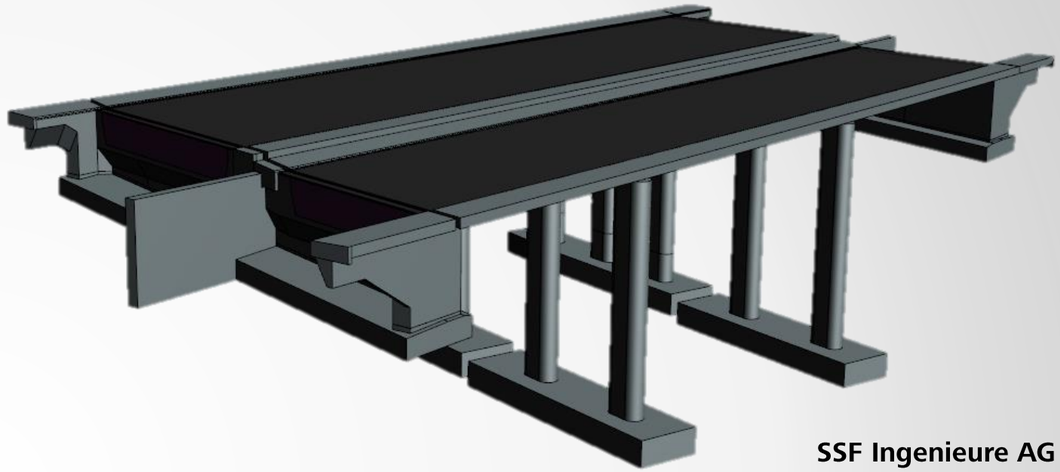
Technical Sales Specialist AEC EMEA
Co-Speaker

# Projects | BW 68 BAB A95 Großweil

## Fast Facts

- Two-lane highway bridge
- CIP T-beam superstructure
- Length ~ 59 m



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# Projects | Viaduto Marginal Pinheiros São Paulo

## Fast Facts

- Fly-over
- CIP T-beam superstructure
- Length ~ 260 m
- Perforated sheet metal cover
- LED illumination

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# Projects | Passarela Marginal Pinheiros São Paulo

## Fast Facts

- Pedestrian bridge
- Steel composite girders
- Length ~ 267 m
- Two bench access ramps

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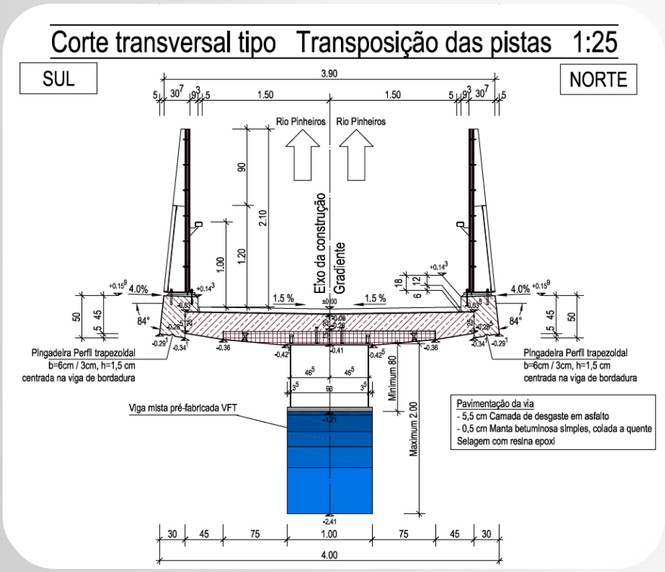



# REVITalize Bridge Design | Class summary

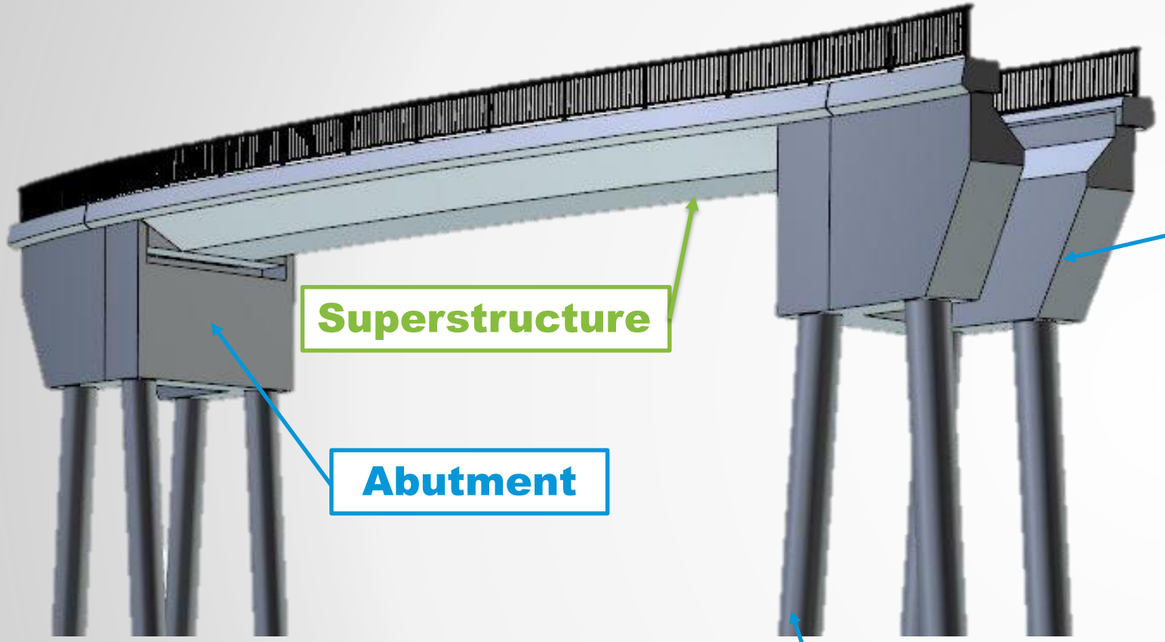
In this class you will learn how to create a detailed bridge model using Revit, Dynamo and AutoCAD Civil 3D.
Upfront there will be a brief introduction about challenges that planners and engineers have to face when creating those very complex shaped projects.
The bridge itself will be a real project that was designed by a German planning office the "old" 2D way and was built in the past.

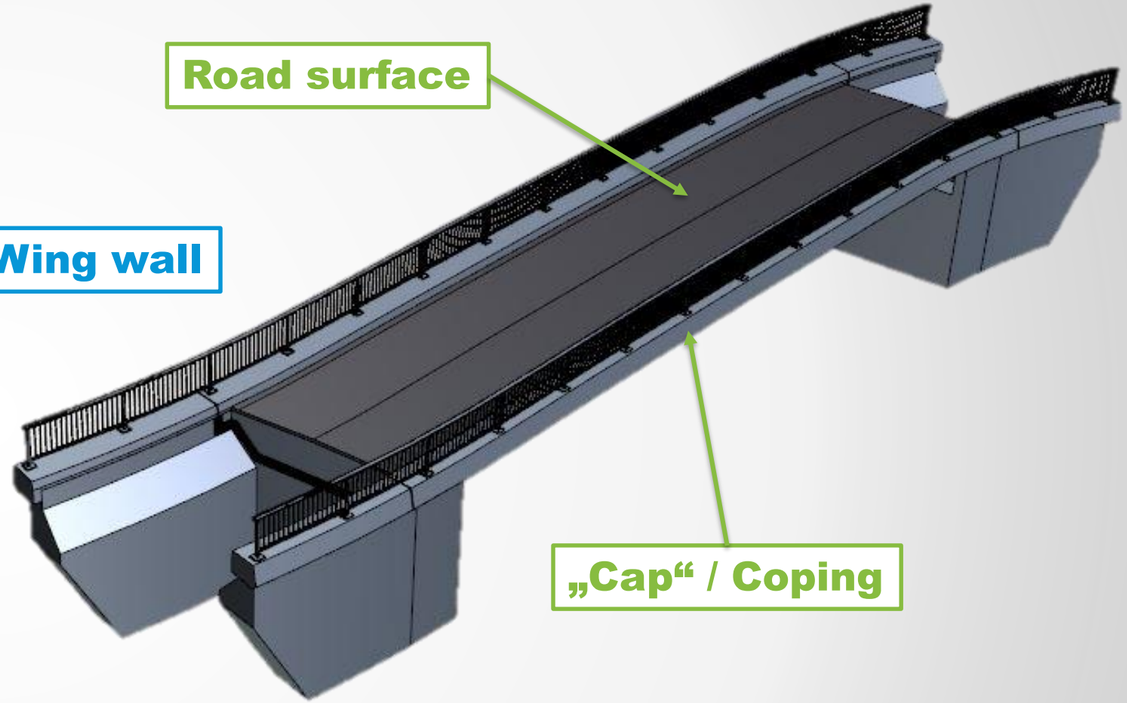
# REVITalize Bridge Design | Key learning objectives

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

- Understand the **challenges of bridge modeling** in general
- Understand how to **import alignment** into Revit using Dynamo
- Understand how to use **adaptive components** for bridge modeling
- Understand how to use **Dynamo** for bridge modeling

# REVITalize Bridge Design | Components of a bridge



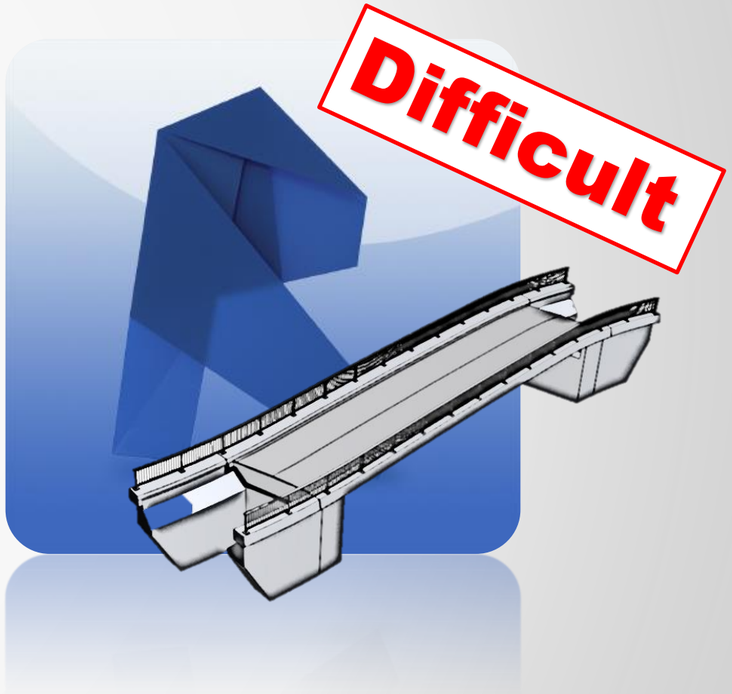

**Superstructure**

**Substructure**

# REVITalize Bridge Design | Why Revit?

## **Customers ask for Revit** also in civil engineering

- Parametric architecture
- Object-orientation
- Sections / volumes / visualization / ...
- BIM functionality
- Possibility for reinforcement
- Possibility for connection with structural analysis



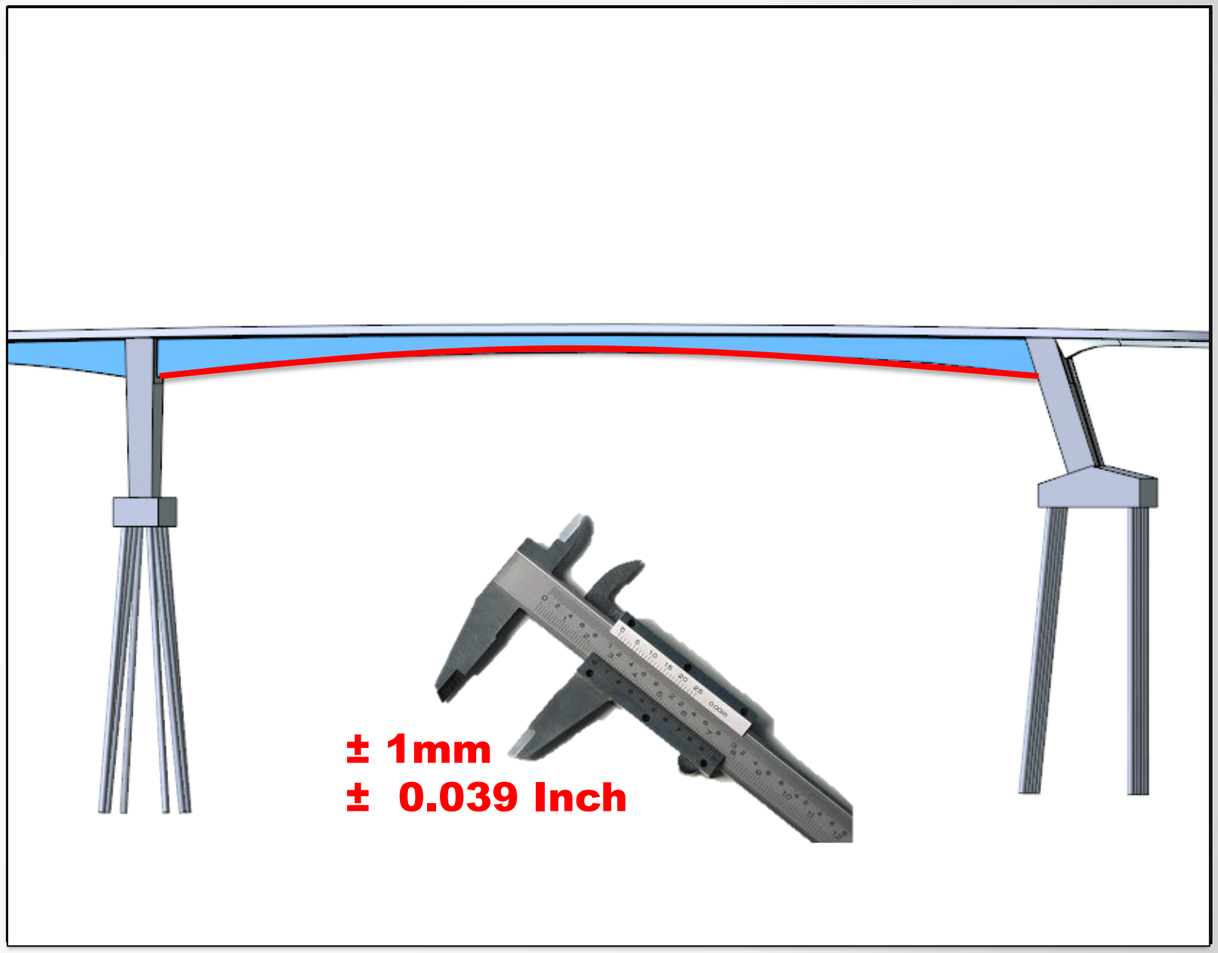
*„Nowadays bridges in Germany won´t be designed due to economic aspects but due to the alignment“...*

SSF do Brasil | Flyover – Viaduto São Paulo, Brasil

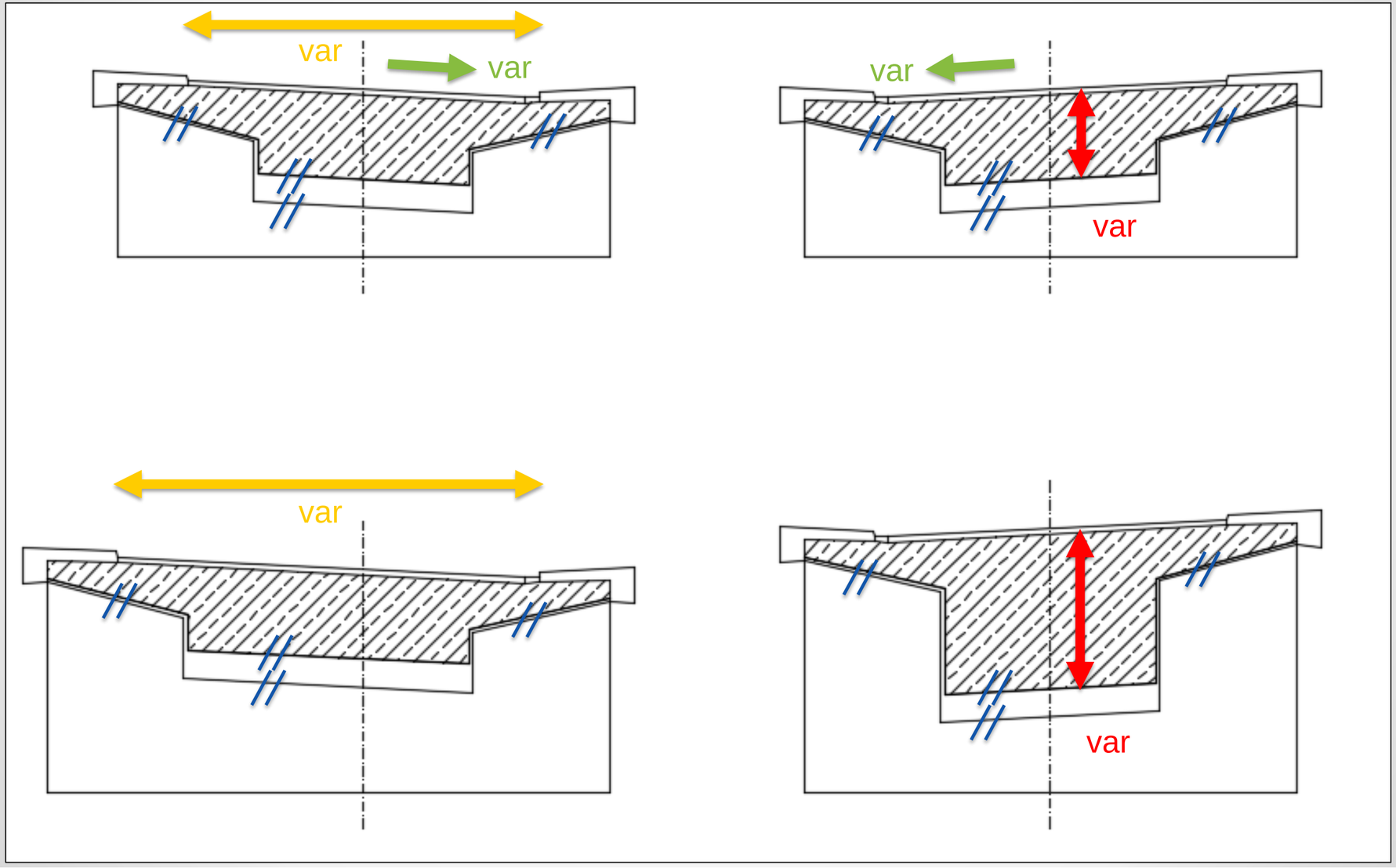
# REVITalize Bridge Design | Key-challenges

## Complex geometry

- Mostly curved alignment
- Widenings / narrowings
- Longitudinal inclination
- Crossfall
- Skewed substructure
- Variable bottom edges



# REVITalize Bridge Design | Key-challenges



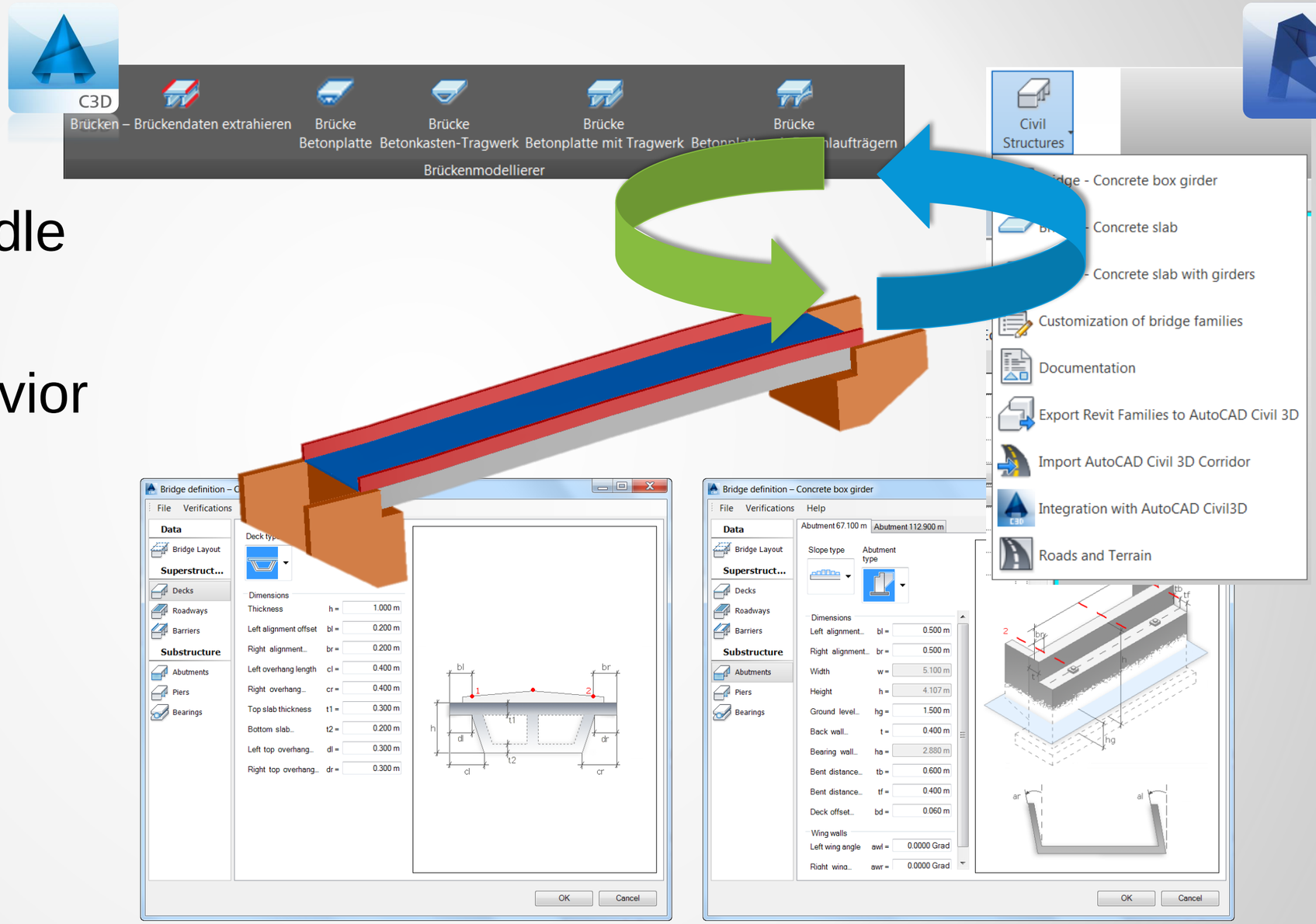
# REVITalize Bridge Design | Bridge Modeler

## Pro

- Very easy to handle
- Very fast
- Associative behavior

## Con

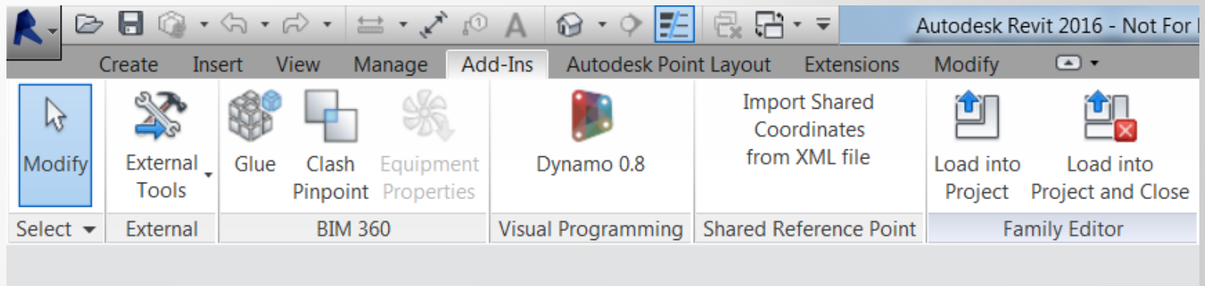
- Too standardized
- Less content
- Not DACH ready



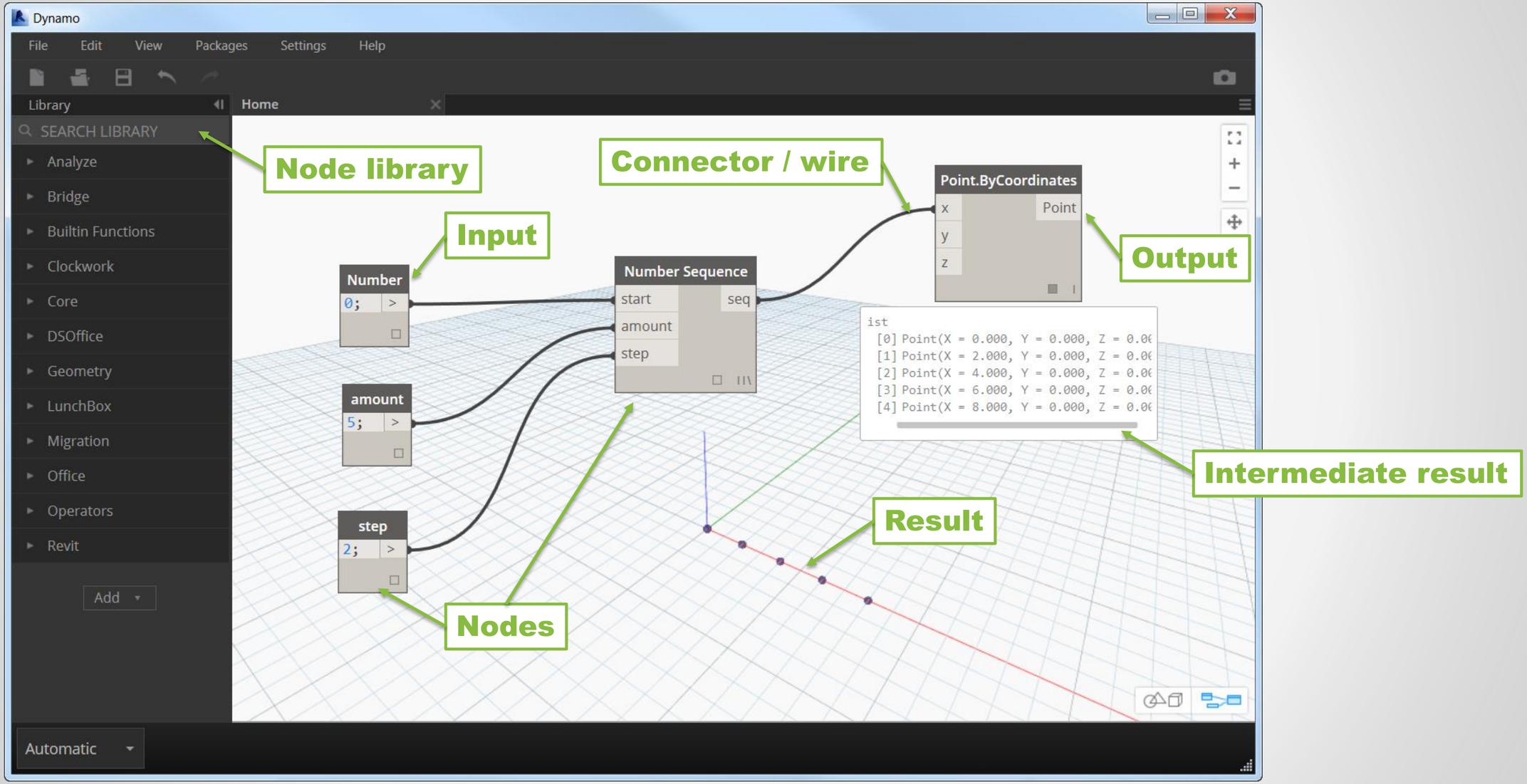
# REVITalize Bridge Design | Dynamo

# REVITalize Bridge Design | Dynamo

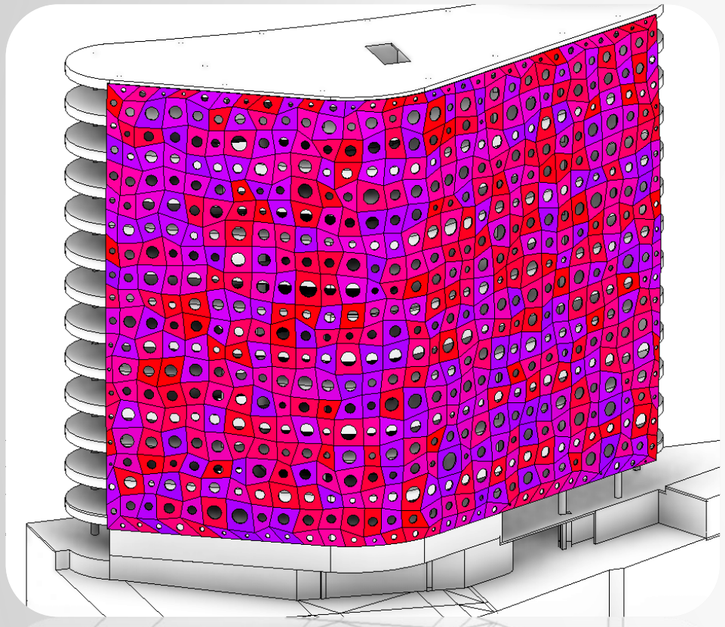
- Generative design
- Visual programming
- No programming skills needed
- Integration with Revit
- Generation of geometry which basically is...
  - ... very time consuming to create
  - ... impossible to create
- Open source

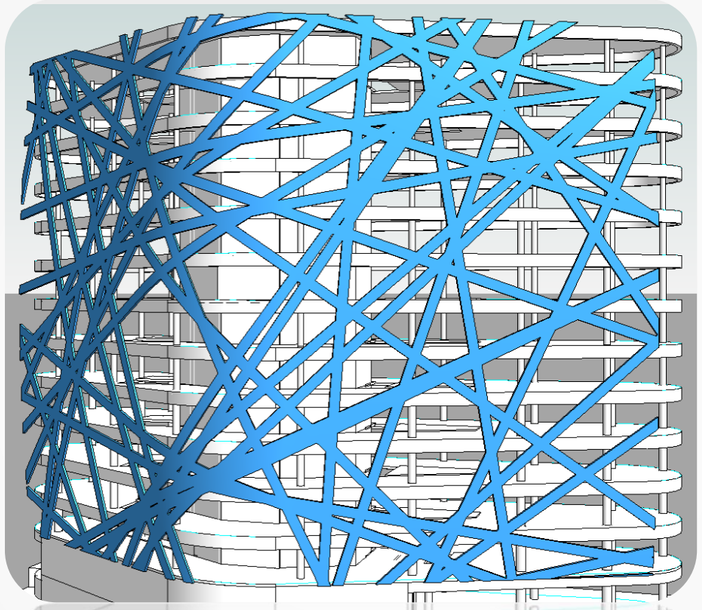


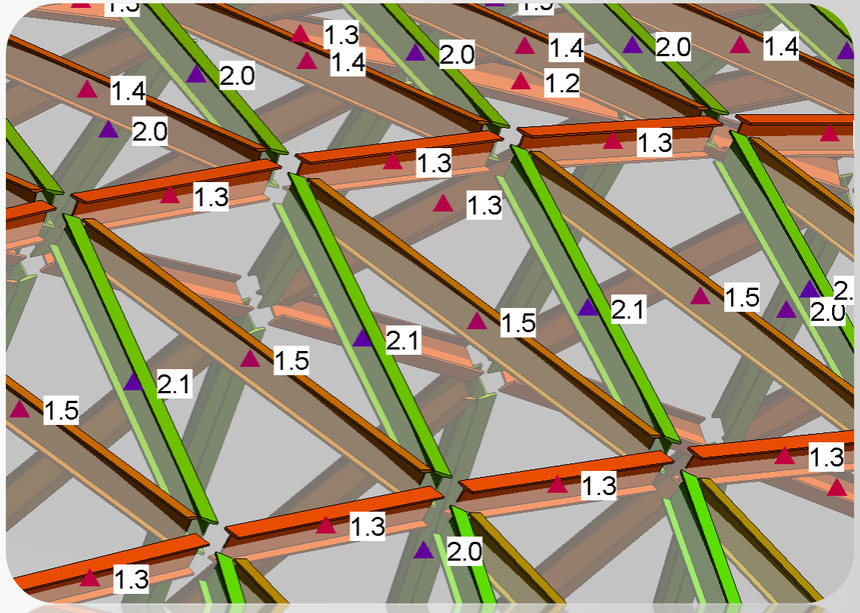
# REVITalize Bridge Design | Dynamo



# REVITalize Bridge Design | Dynamo

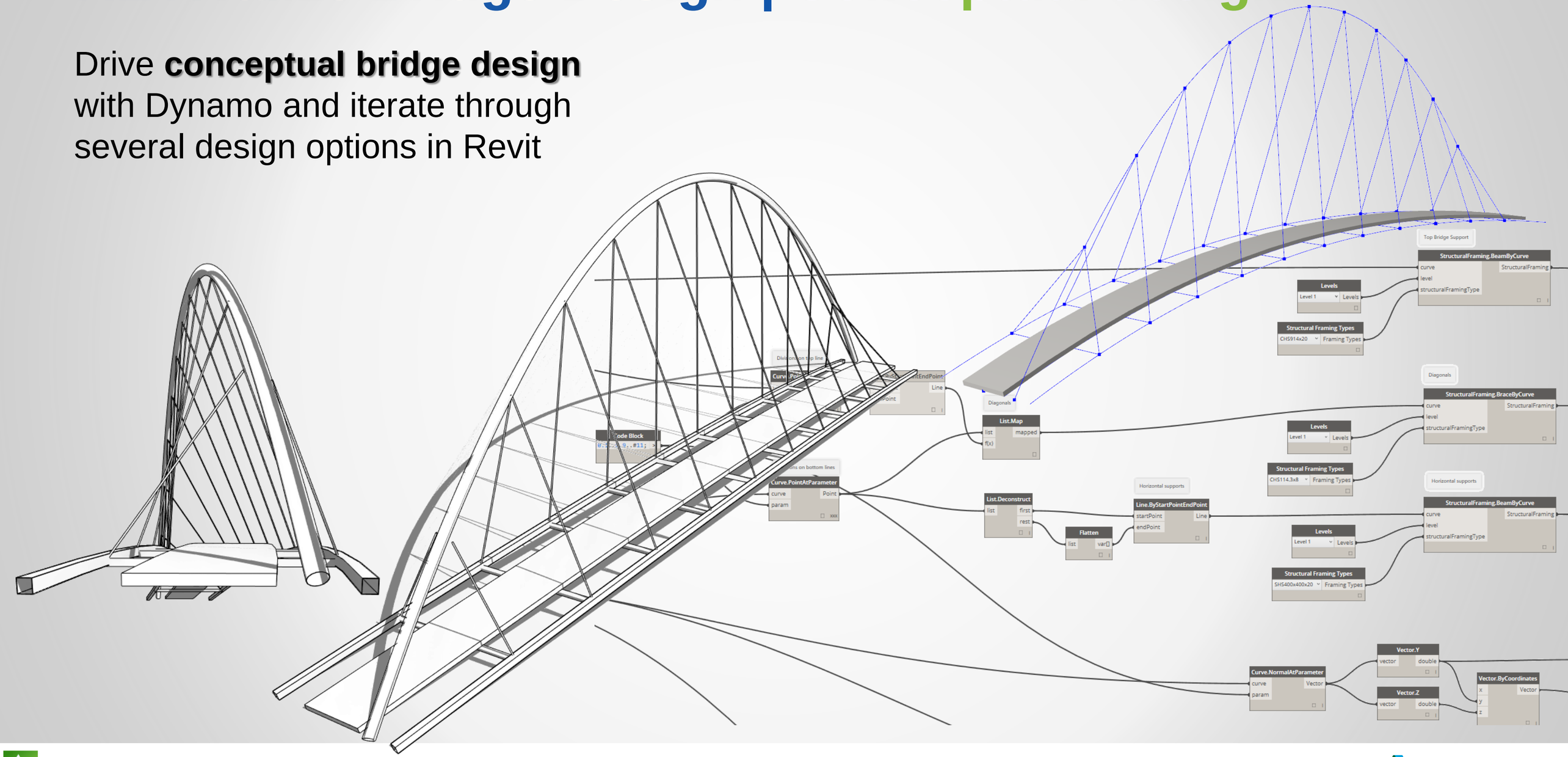






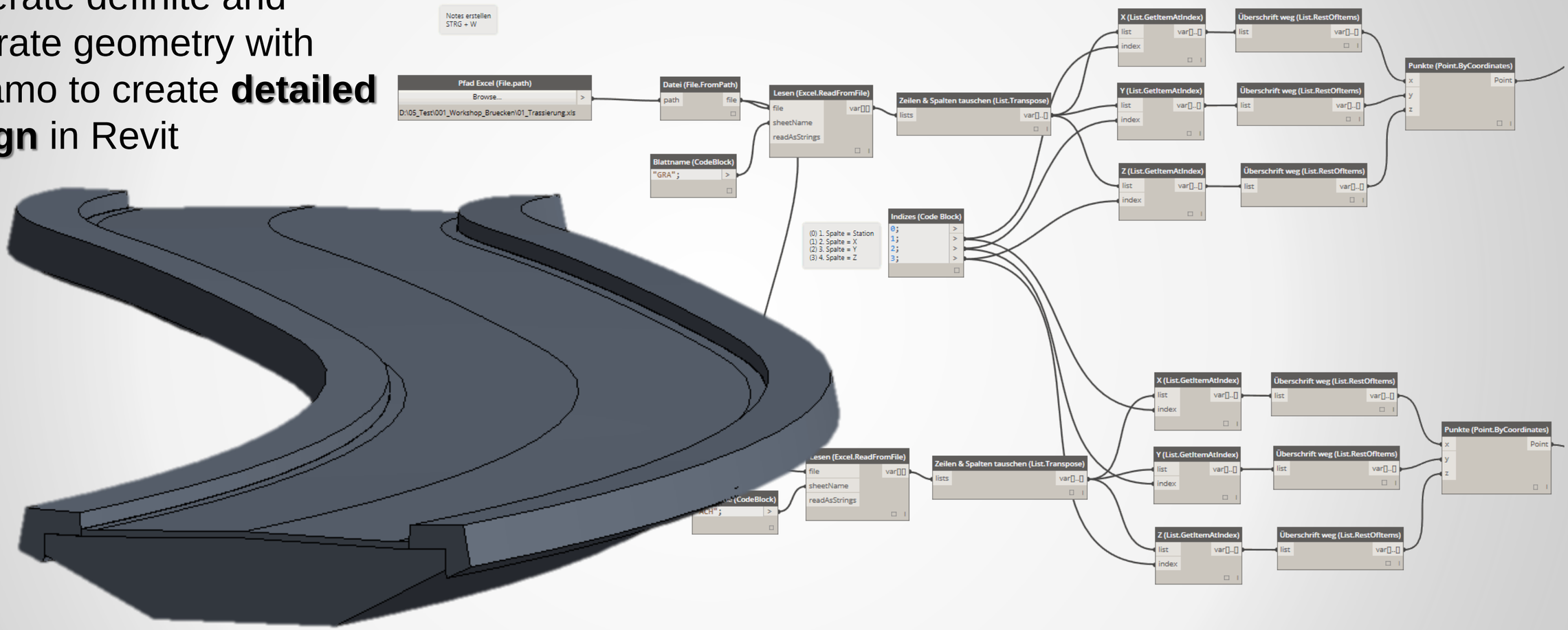
# REVITalize Bridge Design | Conceptual design

Drive **conceptual bridge design** with Dynamo and iterate through several design options in Revit

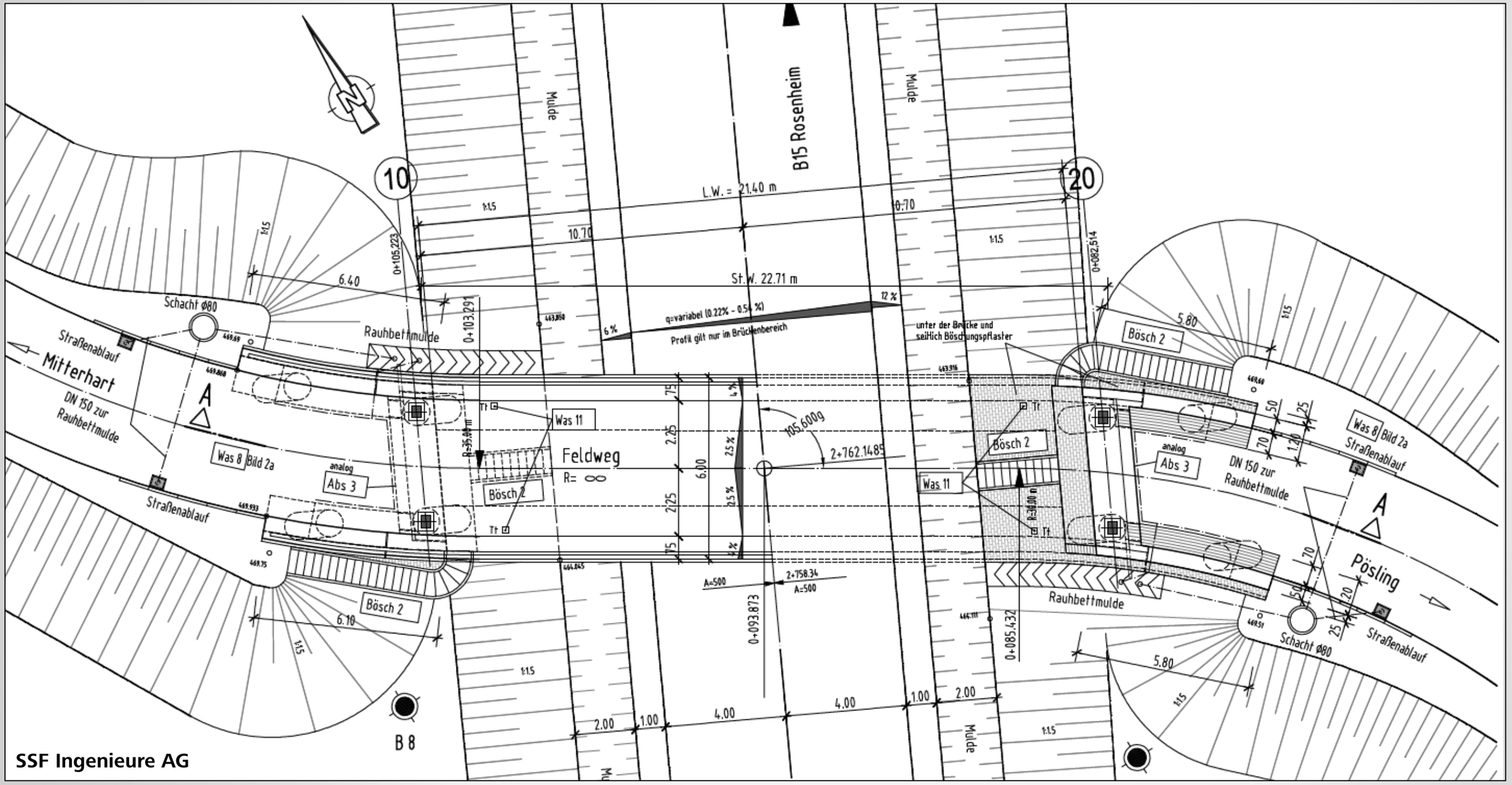


# REVITalize Bridge Design | Detailed design

Generate definite and accurate geometry with Dynamo to create **detailed design** in Revit



# REVITalize Bridge Design | Sample project



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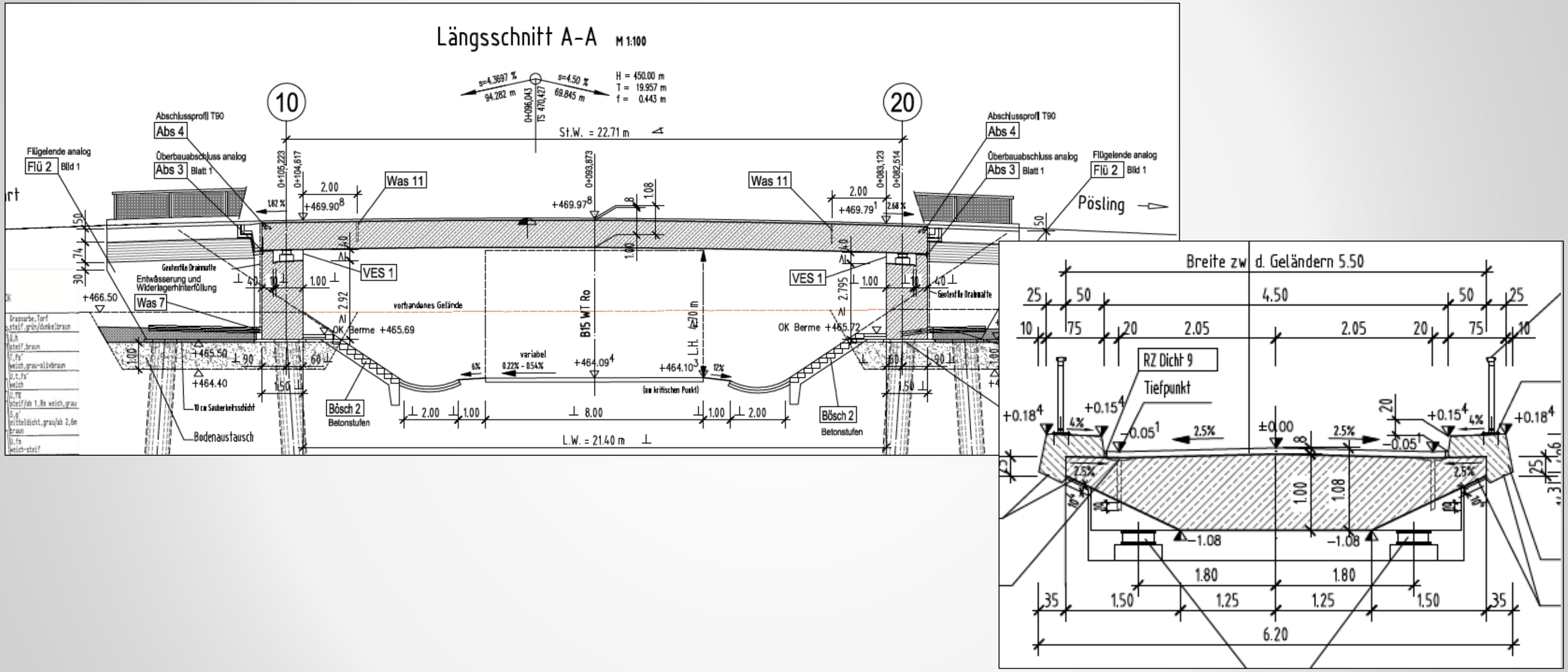


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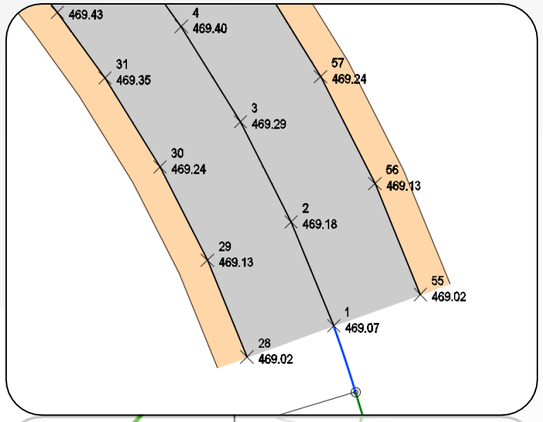
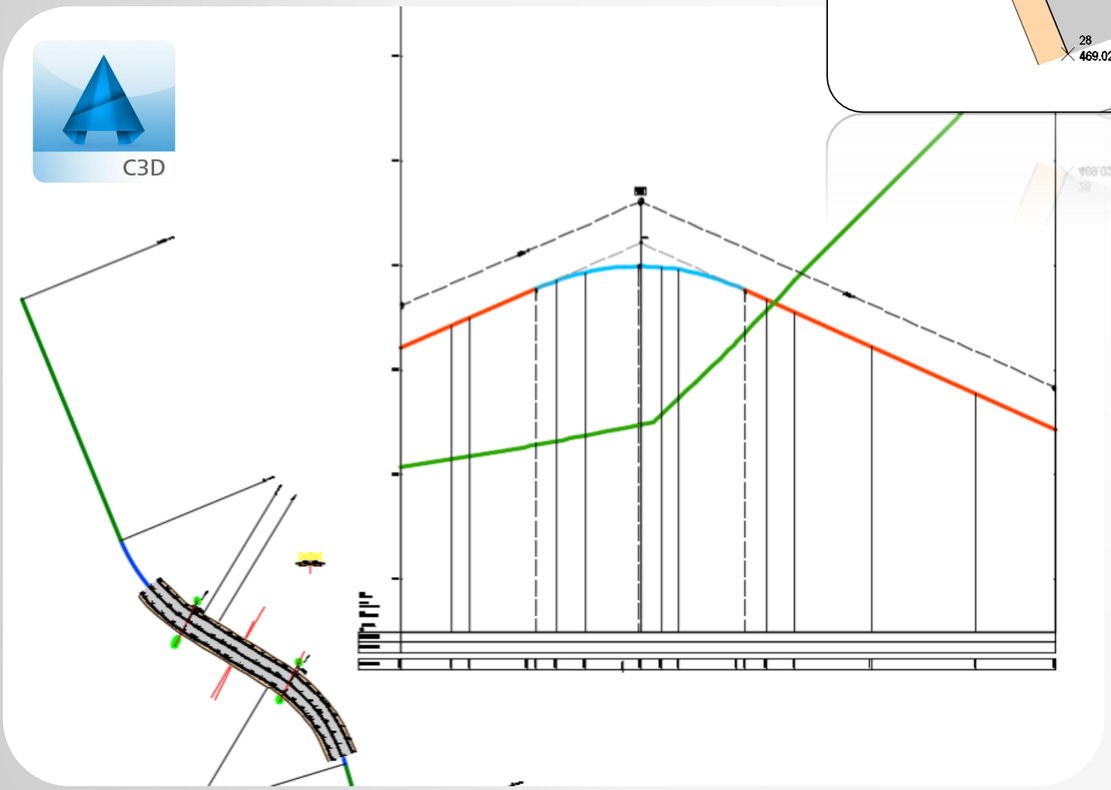
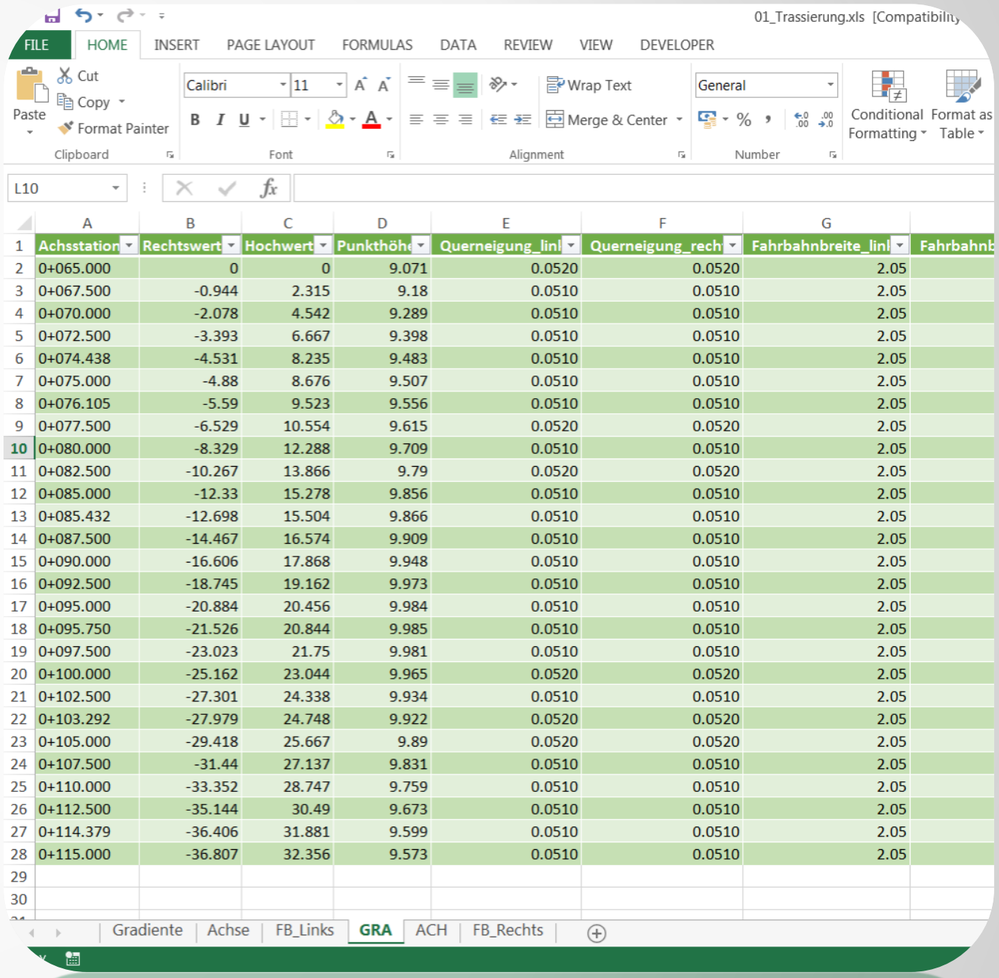
# REVITalize Bridge Design | AutoCAD Civil 3D & Excel

Generation of point lists to describe **alignment, profile, edge of carriageways** and further **variable geometry**



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| 16 | 0+092.500 | -18.745 | 19.162 | 9.973 | 0.0510 | 0.0510 | 2.05 | |
| 17 | 0+095.000 | -20.884 | 20.456 | 9.984 | 0.0510 | 0.0510 | 2.05 | |
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| 20 | 0+100.000 | -25.162 | 23.044 | 9.965 | 0.0520 | 0.0520 | 2.05 | |
| 21 | 0+102.500 | -27.301 | 24.338 | 9.934 | 0.0510 | 0.0510 | 2.05 | |
| 22 | 0+103.292 | -27.979 | 24.748 | 9.922 | 0.0520 | 0.0520 | 2.05 | |
| 23 | 0+105.000 | -29.418 | 25.667 | 9.89 | 0.0520 | 0.0520 | 2.05 | |
| 24 | 0+107.500 | -31.44 | 27.137 | 9.831 | 0.0510 | 0.0510 | 2.05 | |
| 25 | 0+110.000 | -33.352 | 28.747 | 9.759 | 0.0510 | 0.0510 | 2.05 | |
| 26 | 0+112.500 | -35.144 | 30.49 | 9.673 | 0.0510 | 0.0510 | 2.05 | |
| 27 | 0+114.379 | -36.406 | 31.881 | 9.599 | 0.0510 | 0.0510 | 2.05 | |
| 28 | 0+115.000 | -36.807 | 32.356 | 9.573 | 0.0510 | 0.0510 | 2.05 | |
| 29 | | | | | | | | |
| 30 | | | | | | | | |

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# Live Demo

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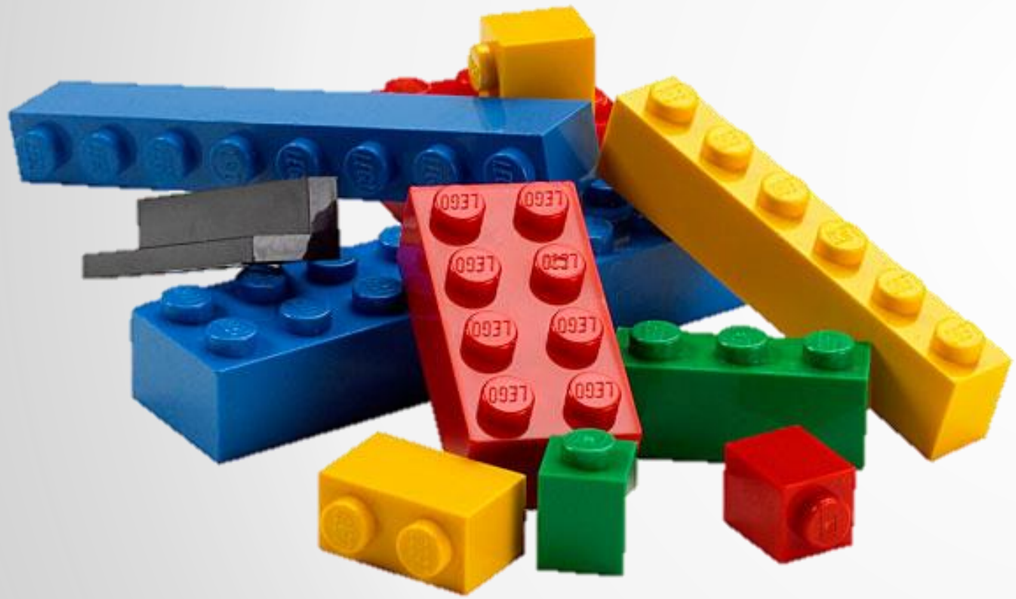
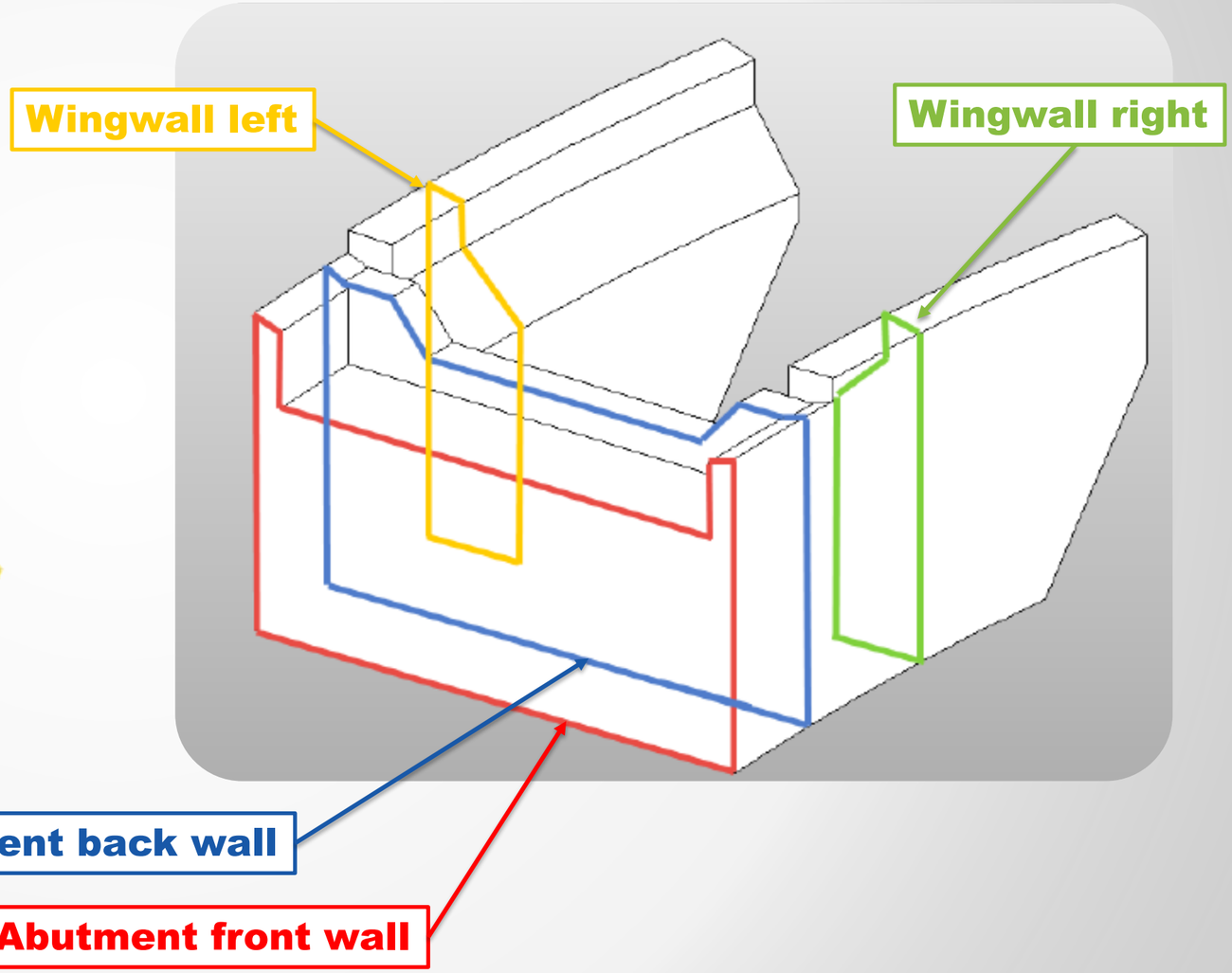
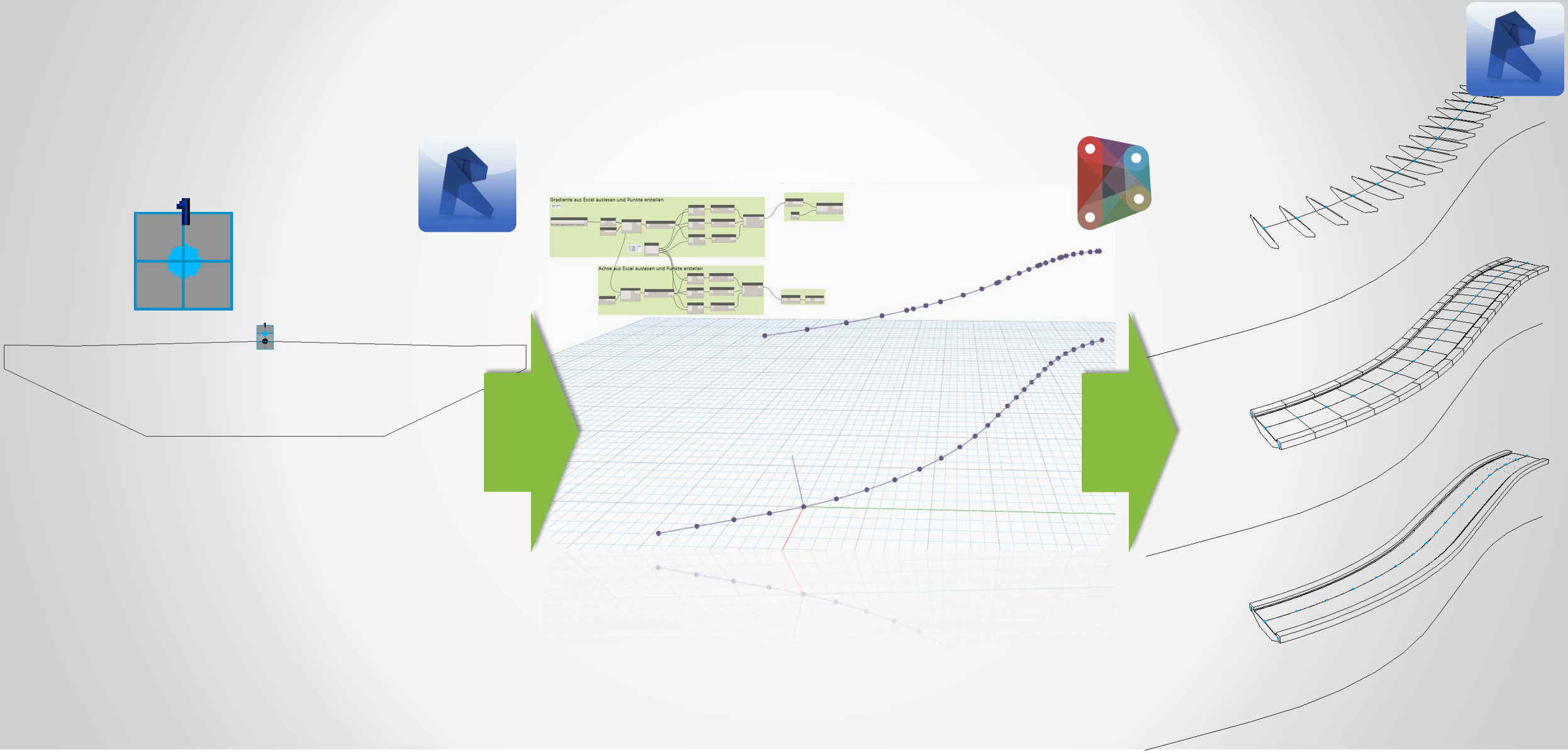
# REVITalize Bridge Design | Cross sections

Think of all your **Lego blocks (cross sections)** needed to build your bridge model





# REVITalize Bridge Design | Modeling concept I



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# REVITalize Bridge Design | Cross sections

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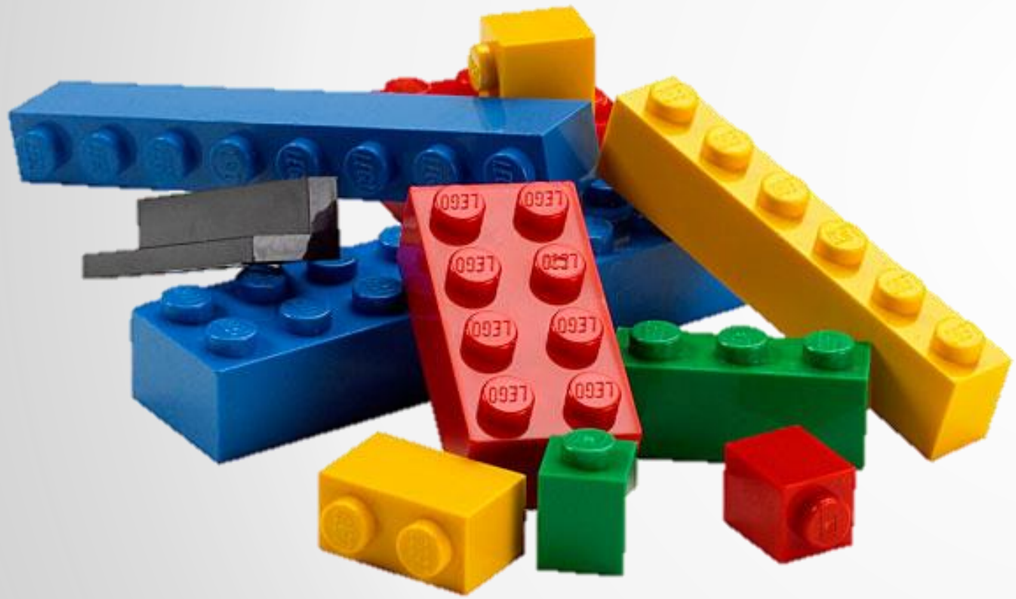
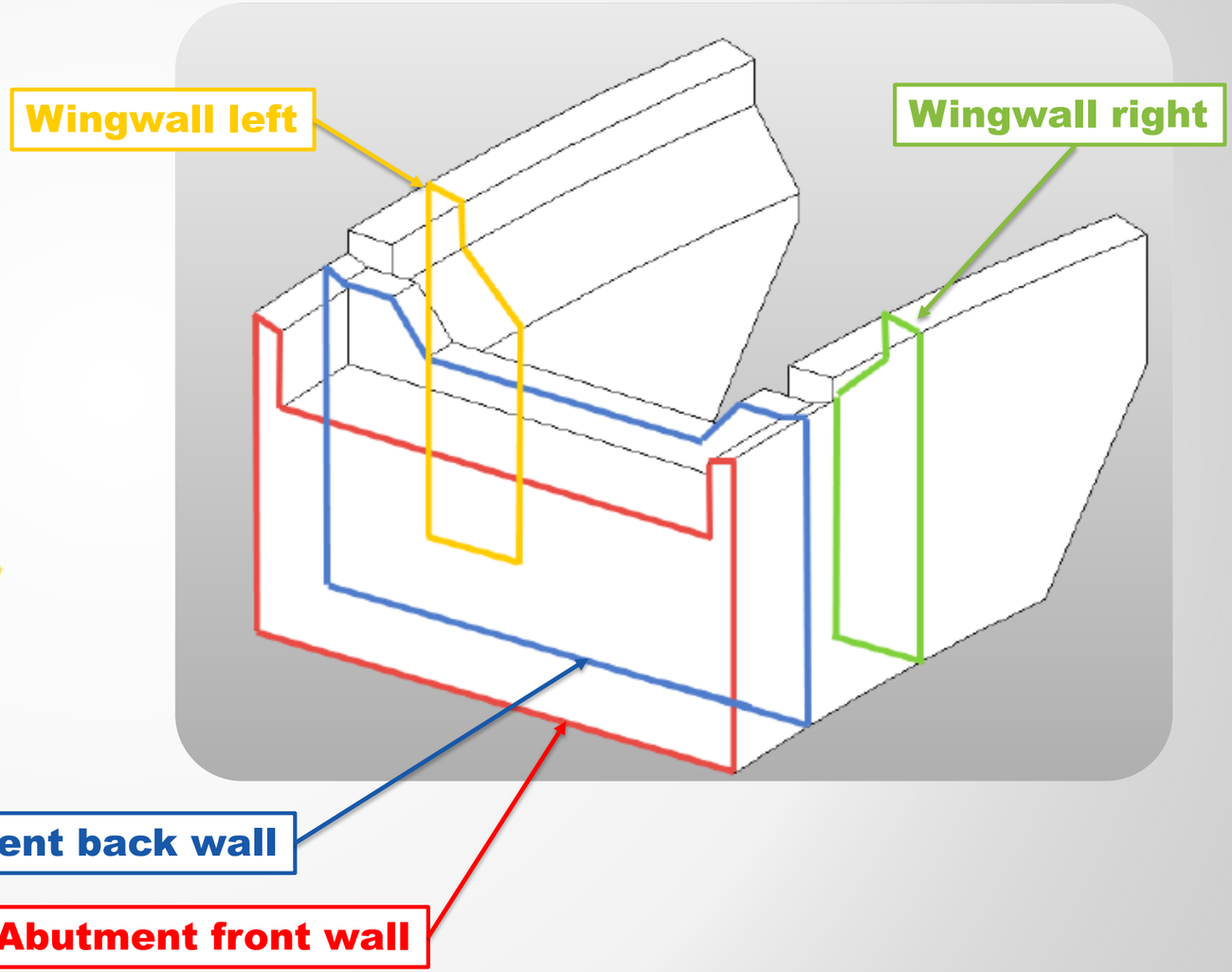
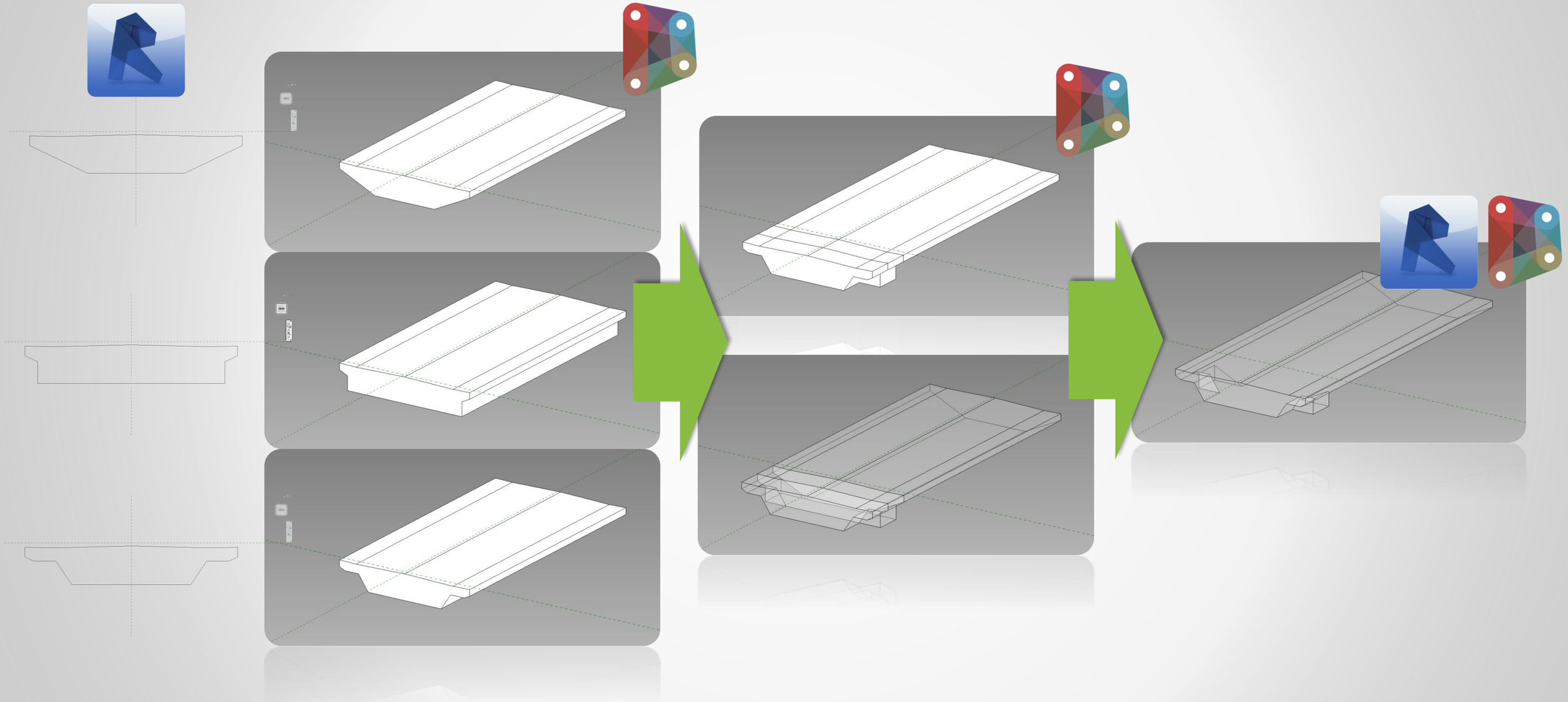
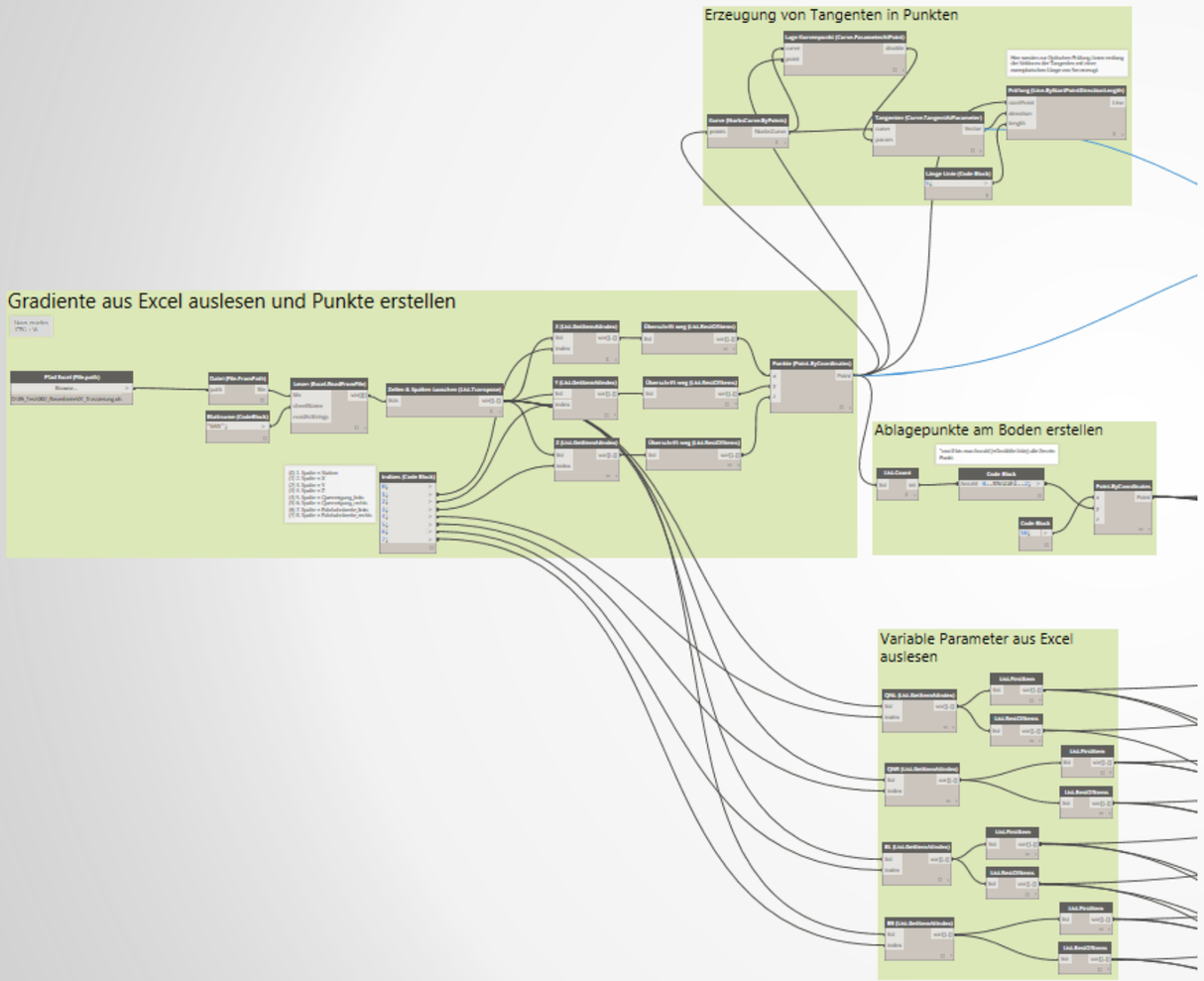




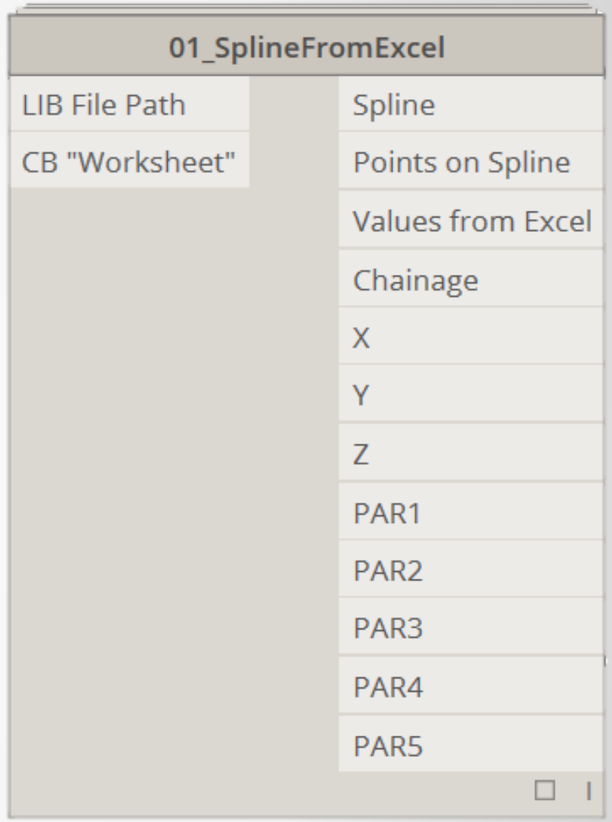
# REVITalize Bridge Design | Modeling concept II



# REVITalize Bridge Design | Custom Nodes




VS.



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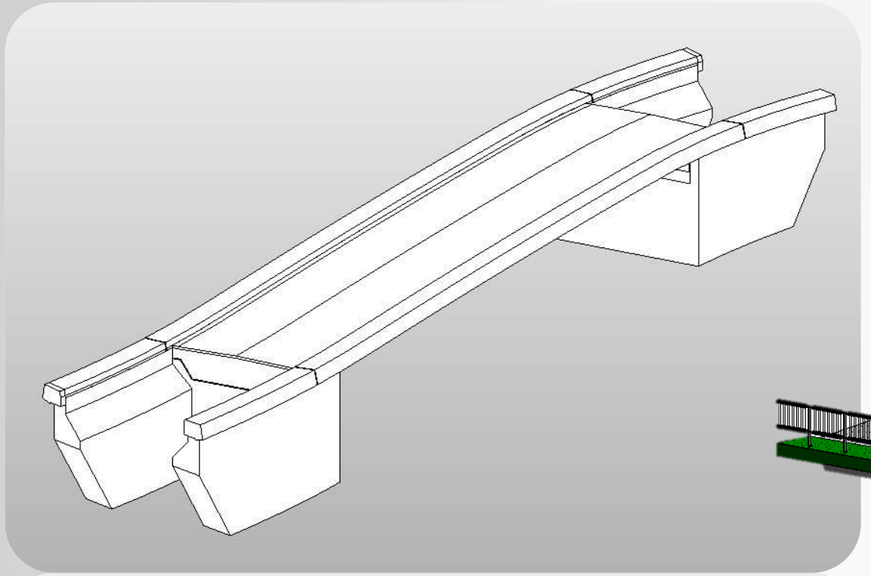
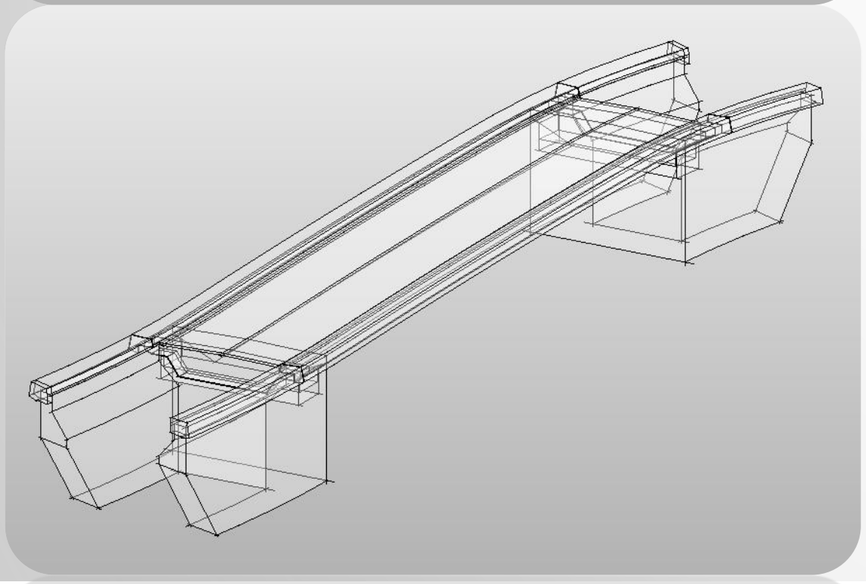
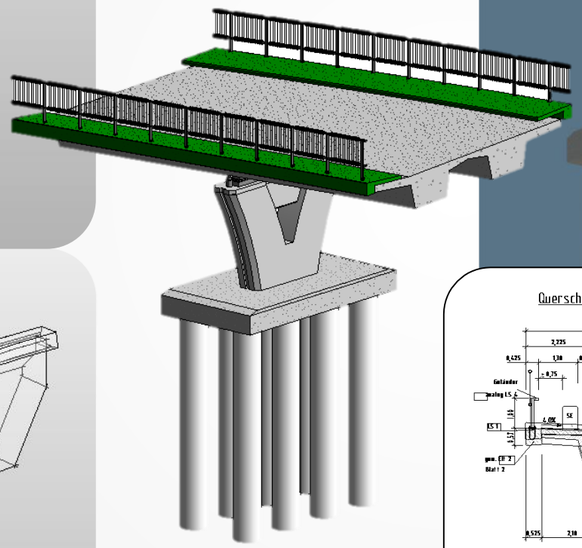
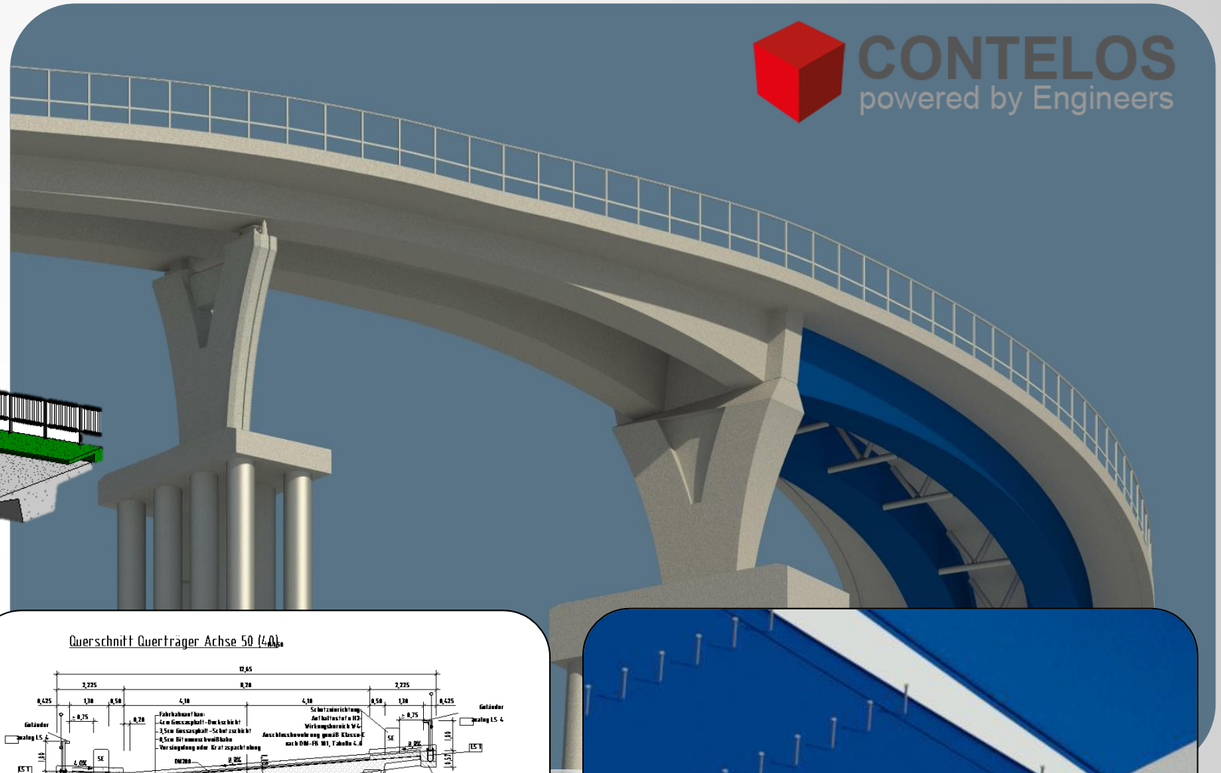
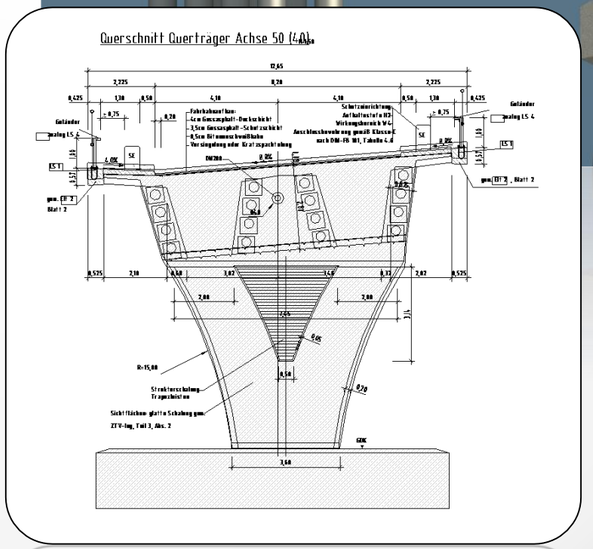
# REVITalize Bridge Design | Examples

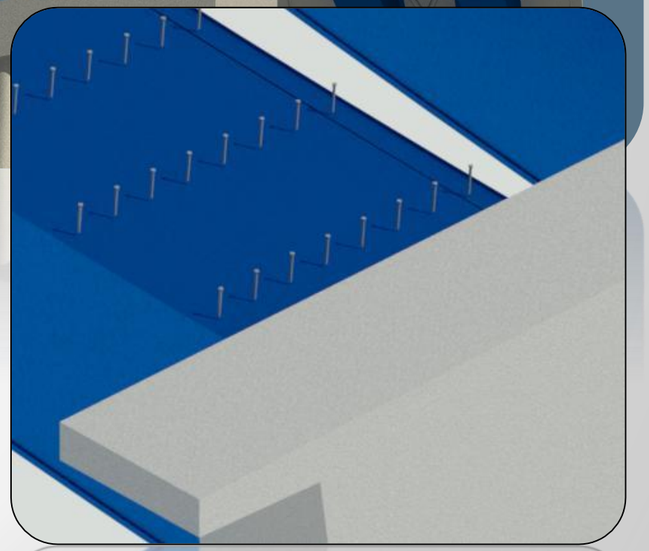




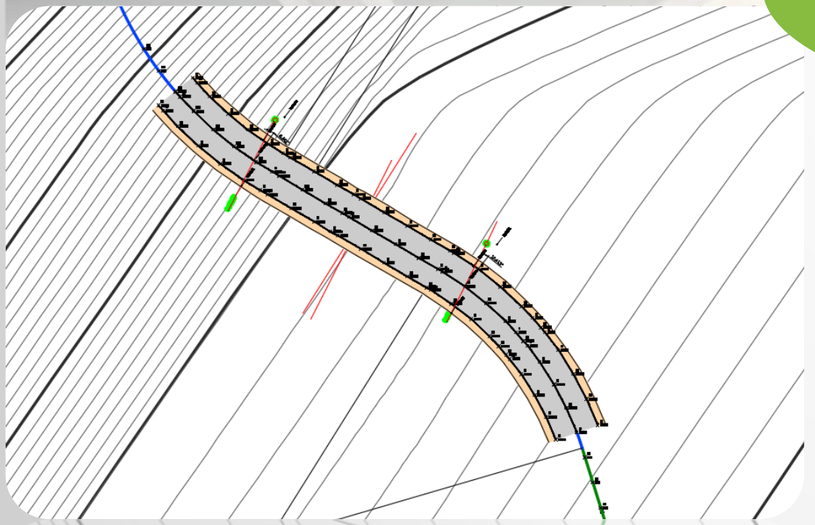


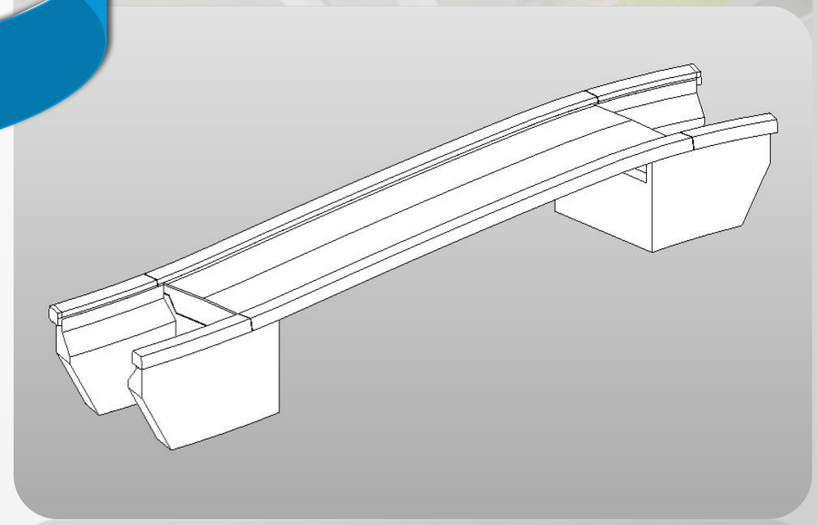


# REVITalize Bridge Design | BIM workflow

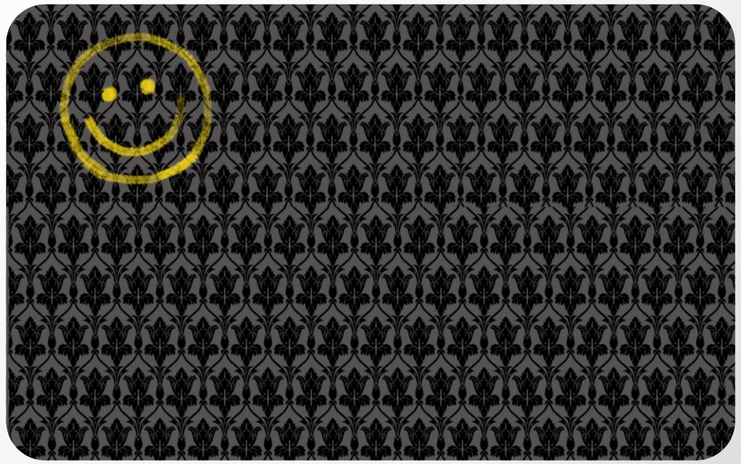


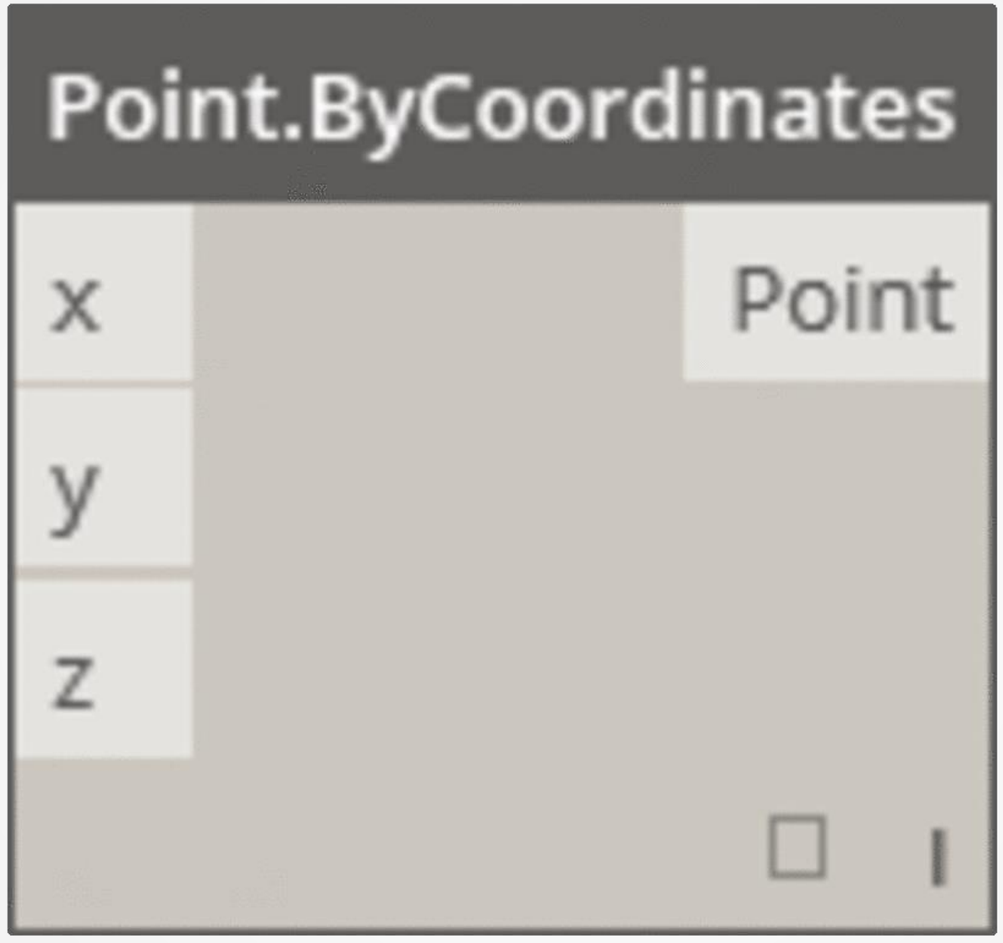


# REVITalize Bridge Design | Summary

- Not fully developed...
  - 3D reinforcement
  - Change management
  - Drawing production
  - Structural analysis

- But...
  - Pretty cool!
  - Already benefits for customers
  - Bunch of ideas waiting
  - Dynamo is the future

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PolyCurve
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closedCurve
Surface
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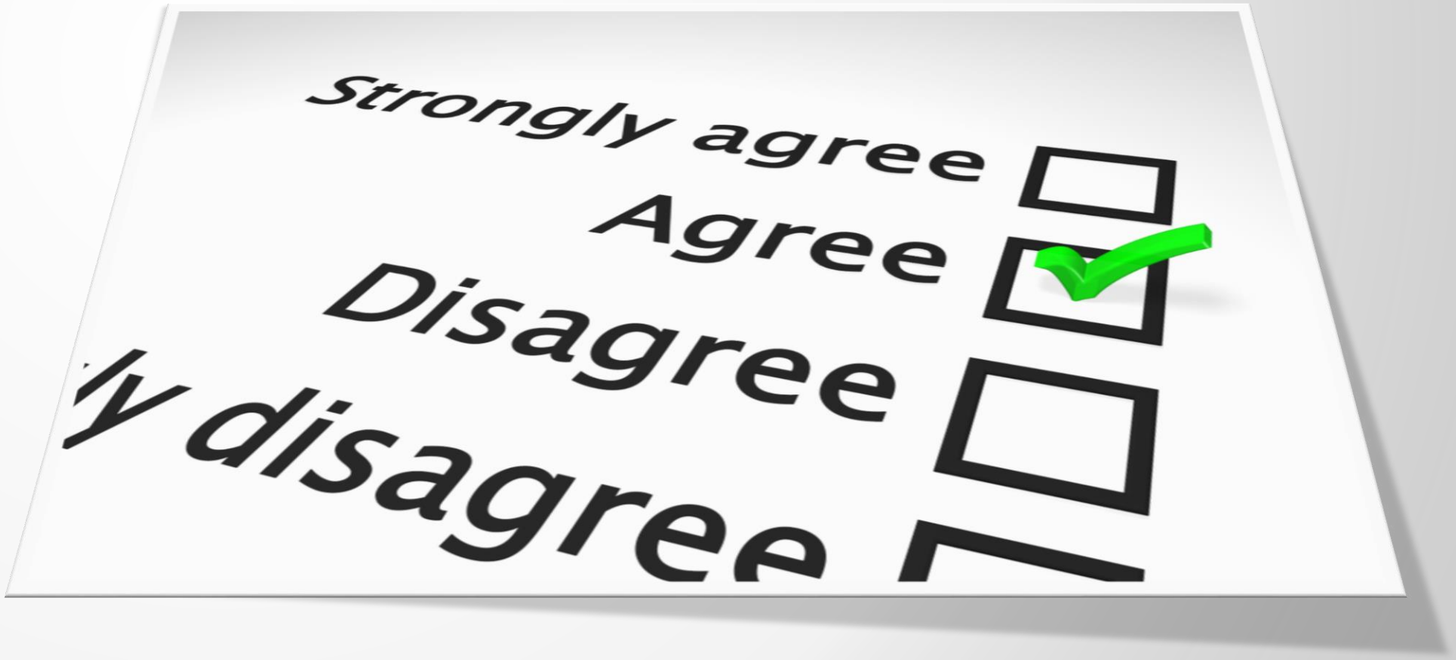

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# Questions…

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