Phased Bridge Construction with OpenBridge Modeler

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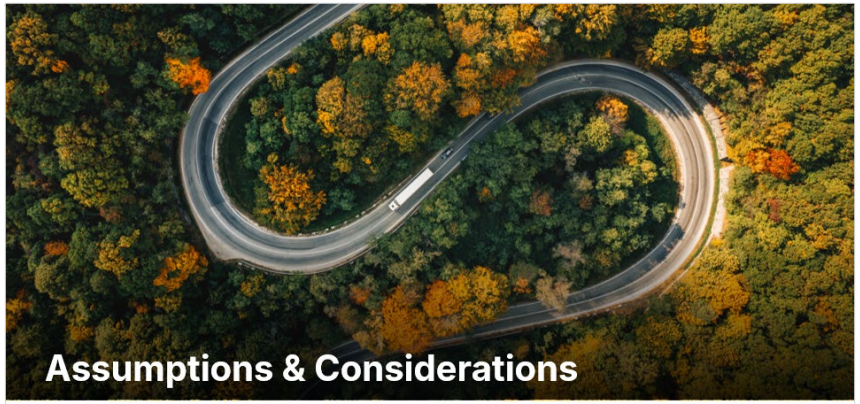
Agenda



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Bridge Modeling

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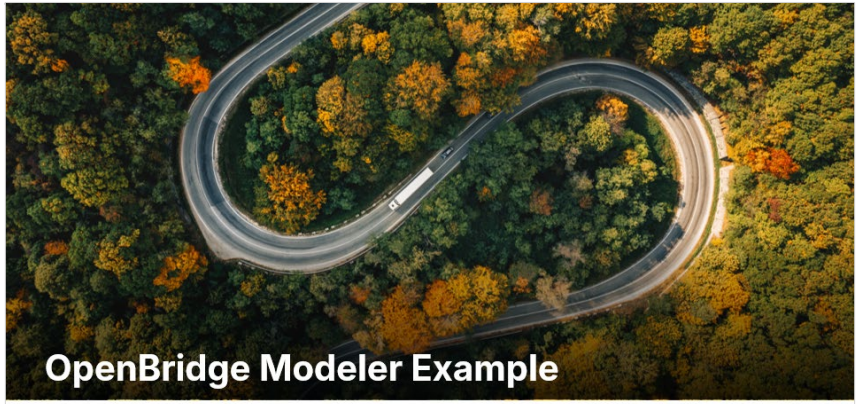

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Assumptions & Considerations

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Considerations…

- Additional Preparation will be need for a Phased Bridge Model compared to a Final Bridge Model.
- Prior to modeling, a preliminary construction sequence should be established.
- Additional Feature Definitions for Phases / Stages is helpful but not required.
- Elevation of the substructure caps are determined by exterior beams, therefore elevation constraints will need to be utilized.
- If using the Phased / Staged models for plans production, knowledge of both Dynamic and Cashed Visible Edges will be helpful.

Model Management

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Model Management

- What does Model organization look like?
  - Should all the bridge models be created in one design model?
  - What about multiple design models in one dgn?
  - Or rather should each bridge have their own design model and dgn?

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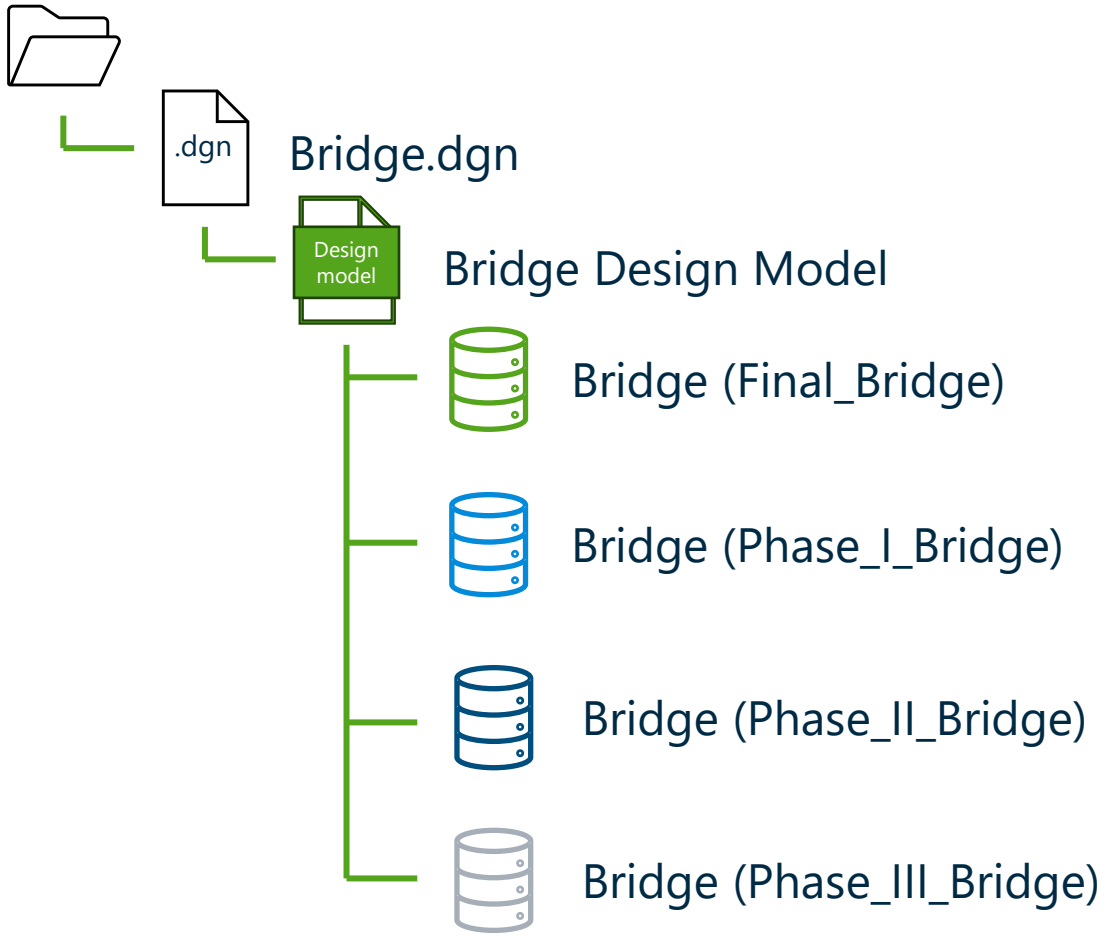
Model Management

Option 1



A single design model for all bridge model

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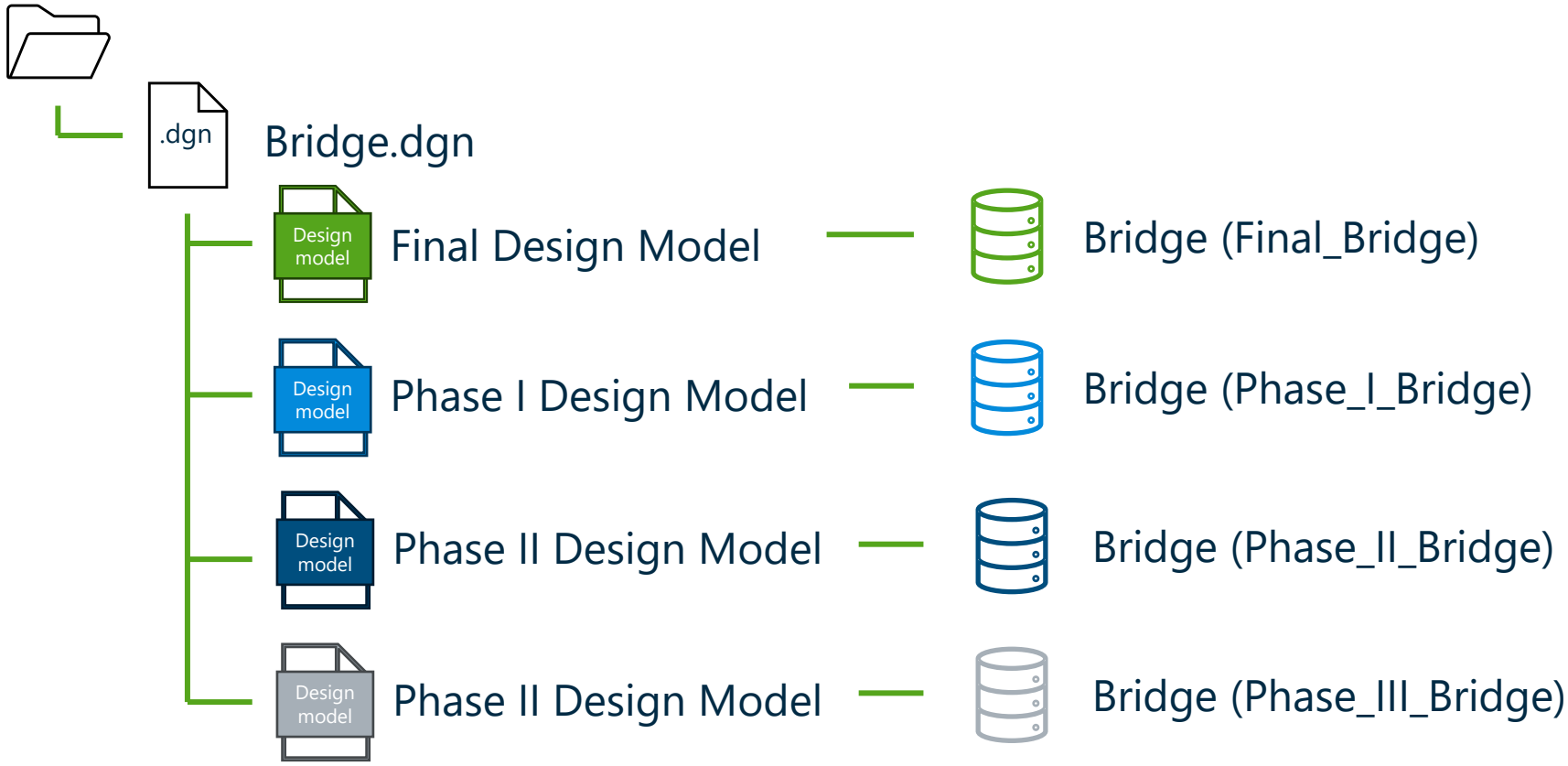
Model Management

Option 2



A separate design model for each bridge model

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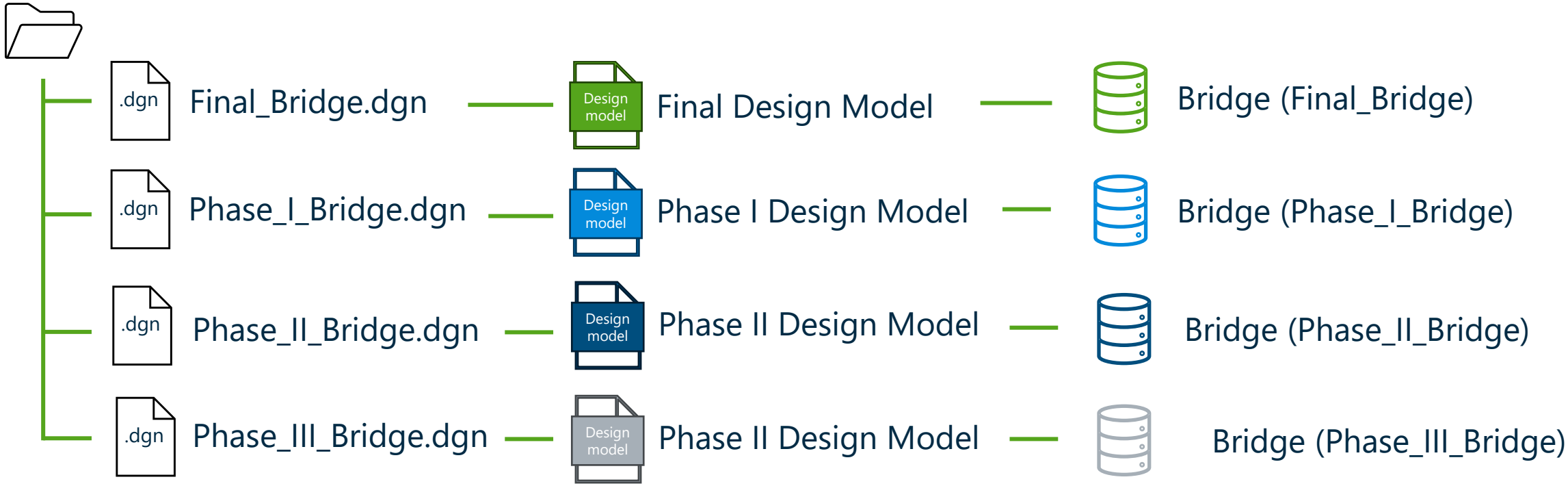
Model Management

Option 3



A separate .dgn for each bridge model

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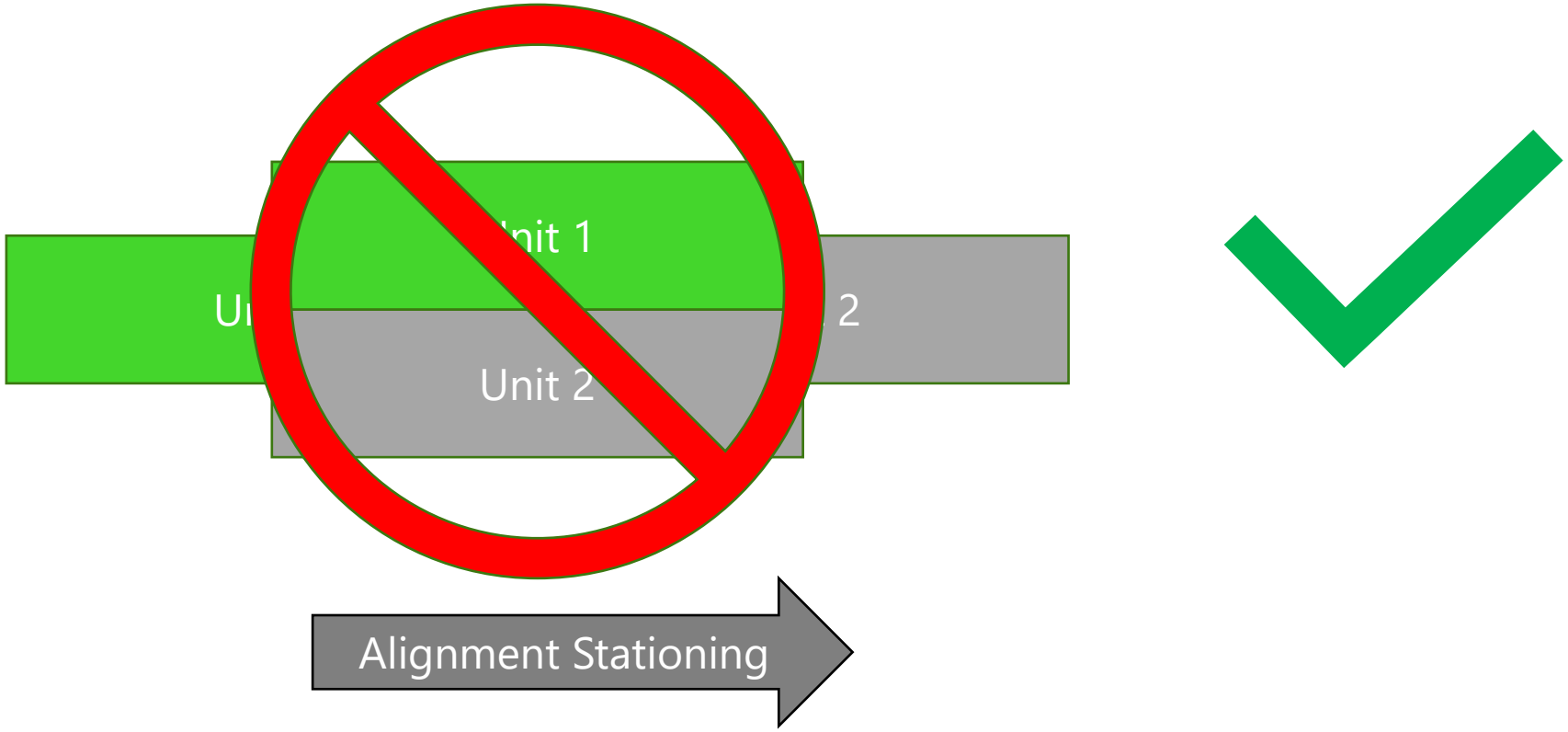
Model Management

- Can I use Units to model phased / staged construction?
  - Not when different Units would overlap the same Station range
  - Otherwise, Yes, Units can be used in conjunction with phased / staged construction



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Model Management

- How many Bridge Models will I need to provide a complete picture of my phased bridge?
  - It depends on a few factors:
    - How many Construction Stages do you anticipate?
    - Will you be using the Bridge Model for Plans Production?
    - Will you also be using the Bridge Model for Analytical Design?

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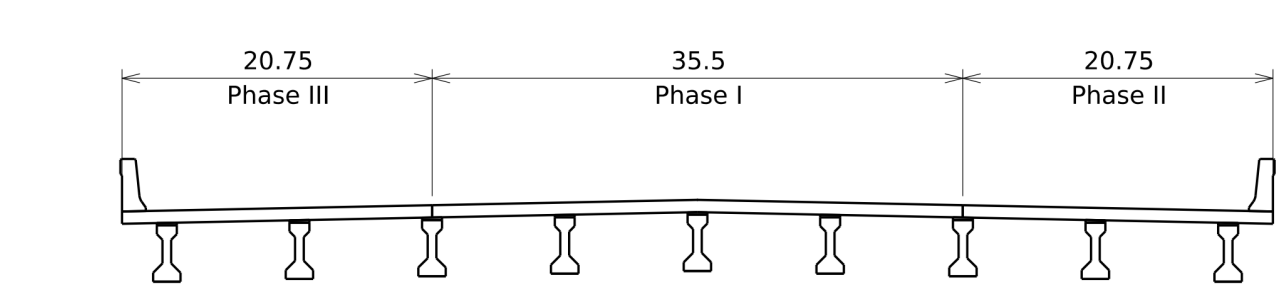
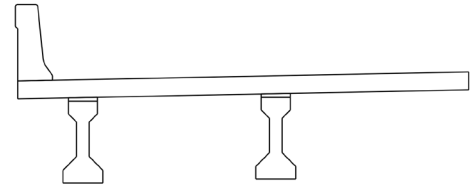
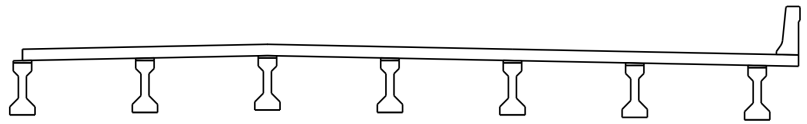
Model Management

- How many Bridge Models will I need to provide a complete picture of my phased bridge?

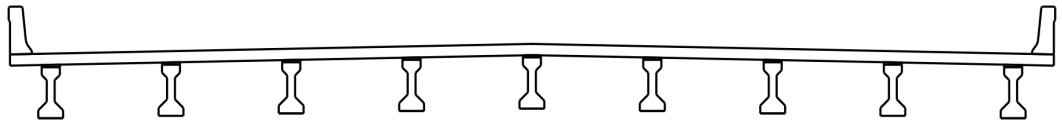




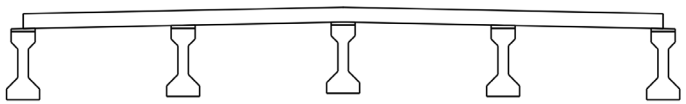
Phase III



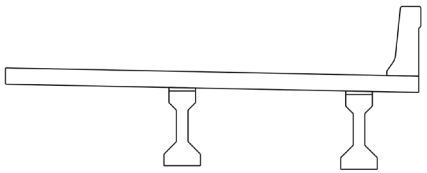
Phase I + Phase II



Final



Phase I



Phase II

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Inside OpenBridge Modeler

Bridge Modeling

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Inside OpenBridge Modeler

An Overview

- Establish a Preliminary Construction Phasing Sequence
- Establish a Preliminary Construction Layout
- Establish the Final Condition of the Bridge
- Determine Layout of Phased Elements
  - Superstructure deck widths, and variables.
  - Substructure template widths, elevation constraints, etc.
- Model Each Phase of the Bridge

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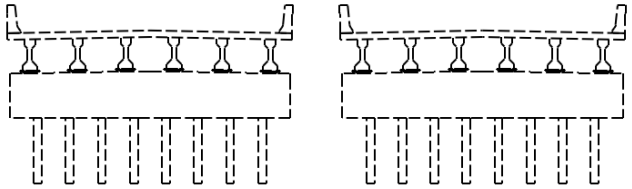
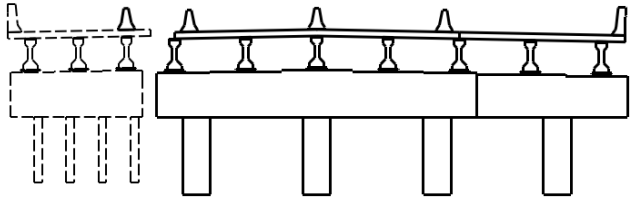
Construction Sequence

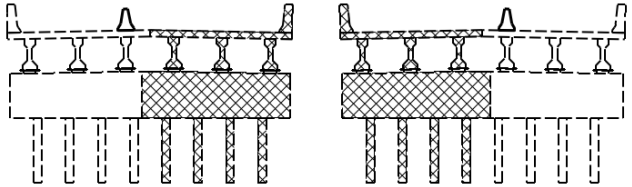
- Establish a Preliminary Construction Phasing Sequence
  - Understanding the location of construction joints and how they related to bridge components.
  - Identifying potential areas for additional consideration / review



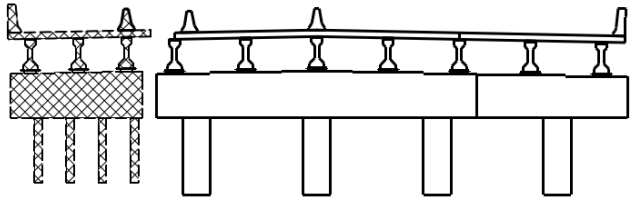
Existing Condition



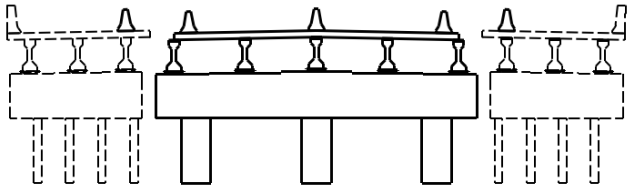
Phase 2 – Construction



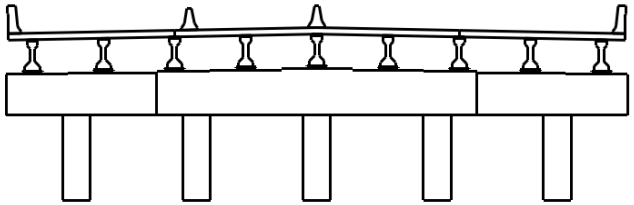
Phase 1 - Removal



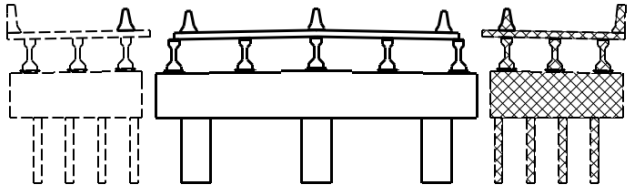
Phase 3 – Removal



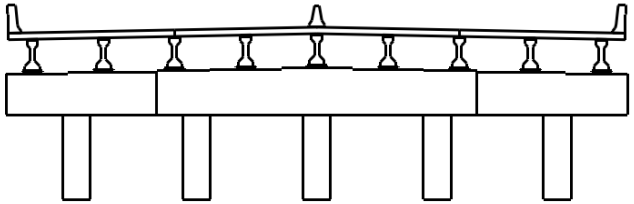
Phase 1 - Construction



Phase 3 – Construction



Phase 2 - Removal



Final Condition

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Construction Sequence

- Establish a Preliminary Construction Phasing Sequence
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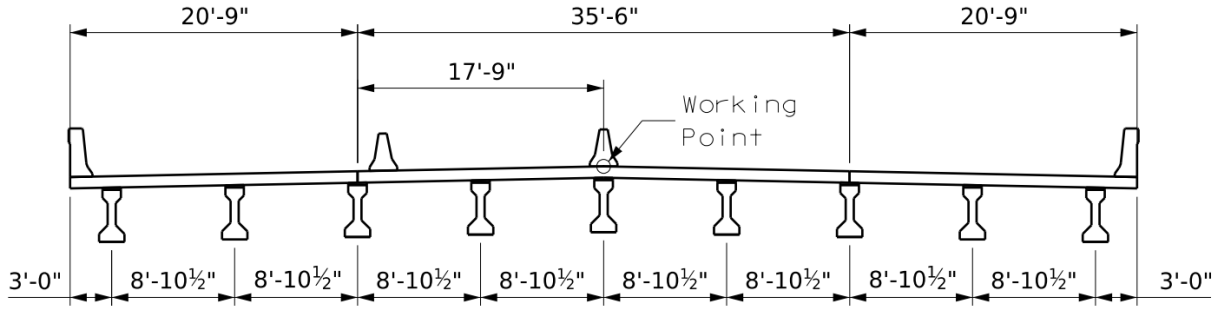
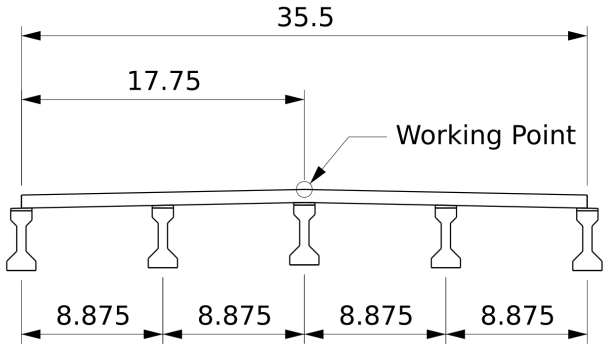
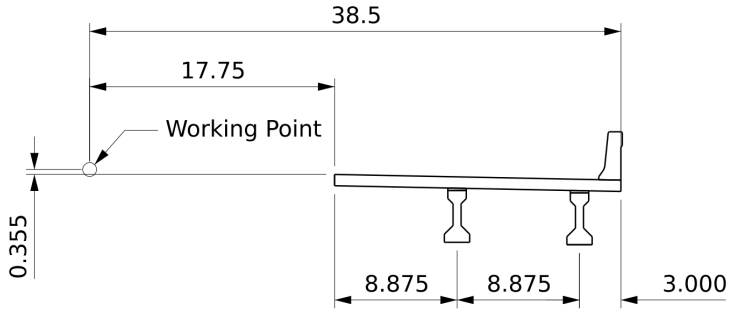
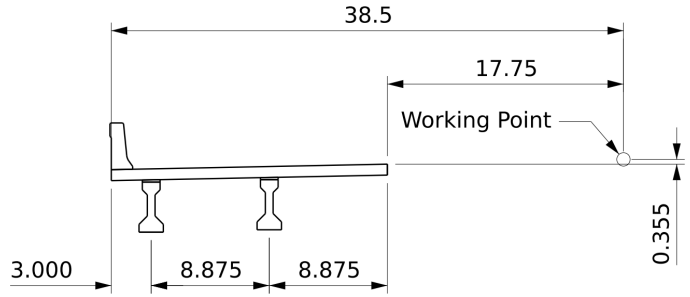
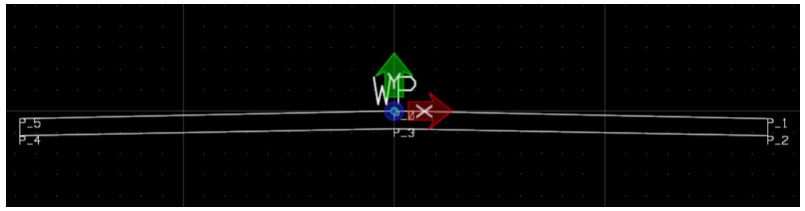
  - Identifying potential areas for additional consideration / review

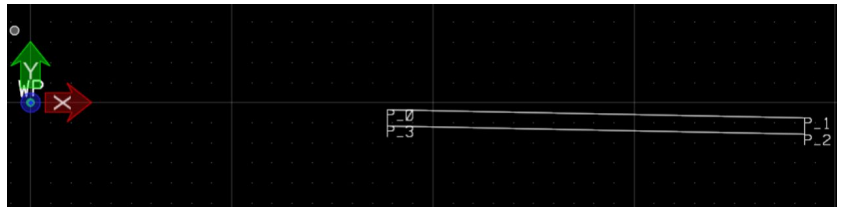


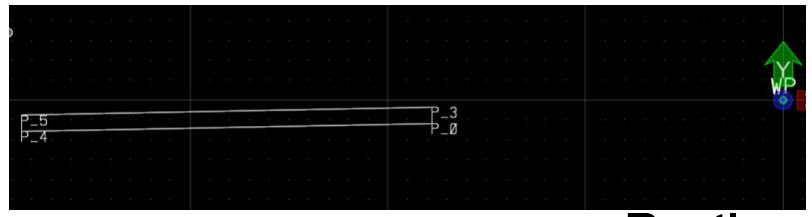












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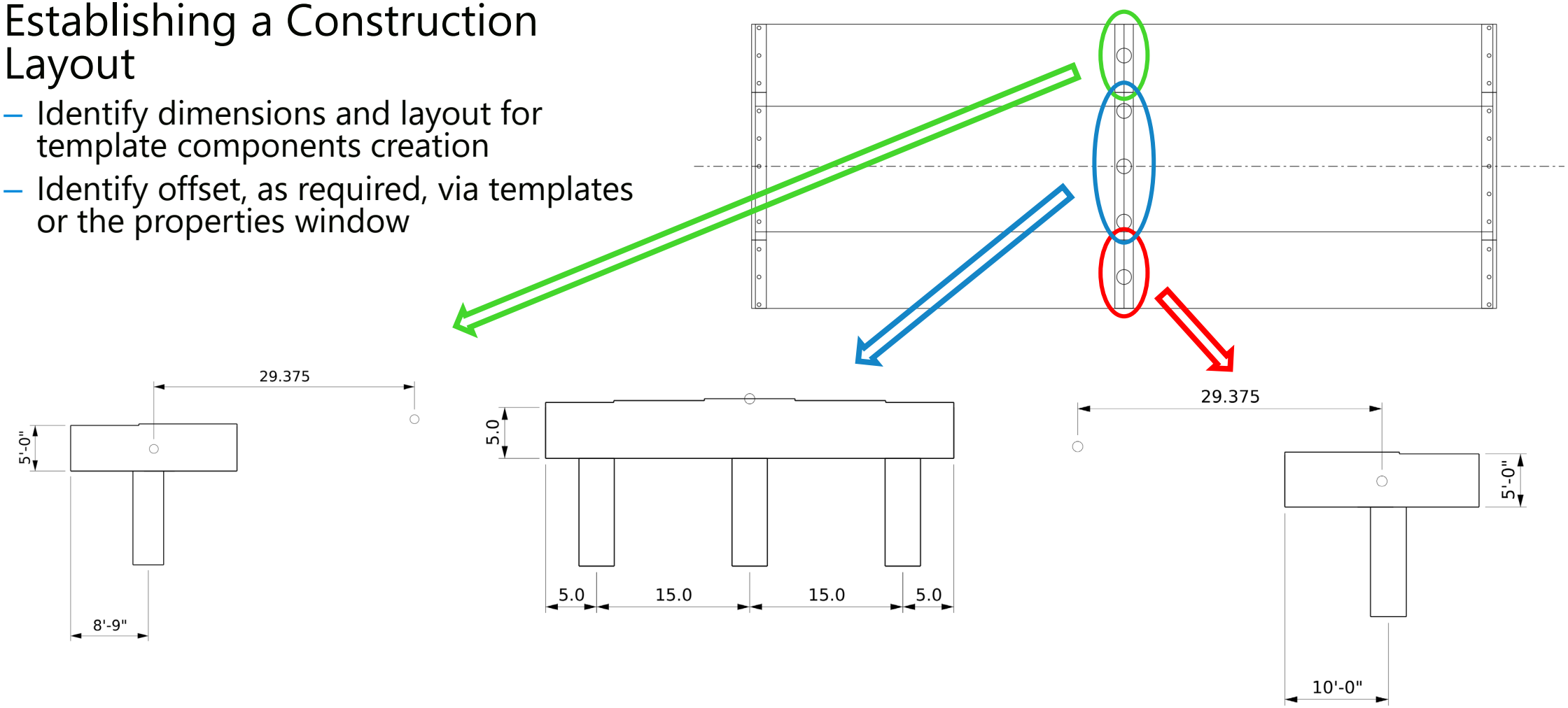
Construction Layout

- Establishing a Construction Layout
  - Identify dimensions and layout for template components creation
  - Identify offset, as required, via templates or the properties window



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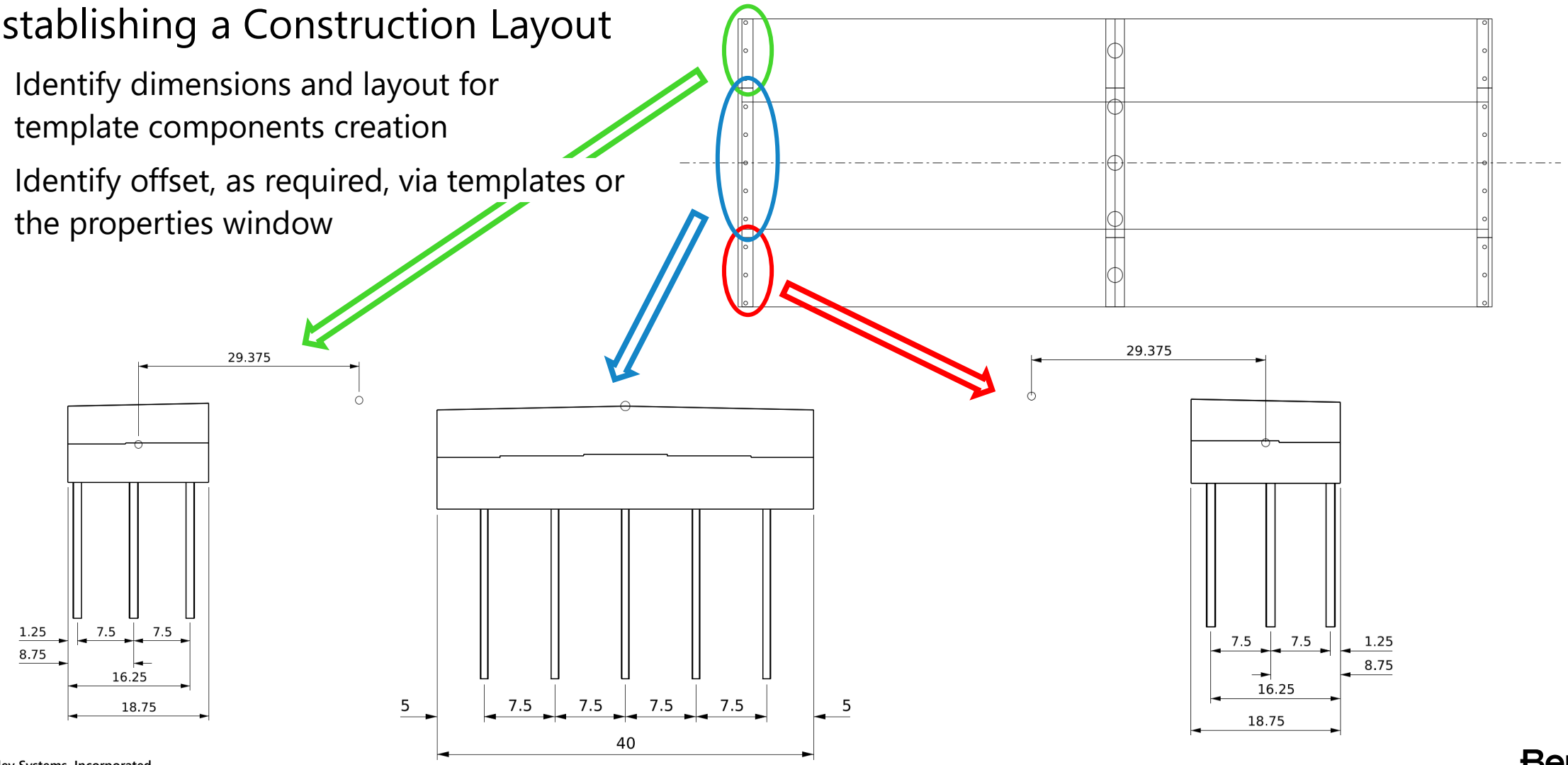

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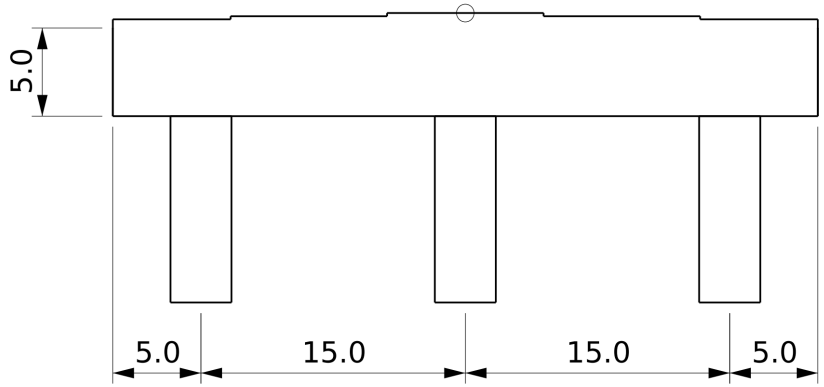
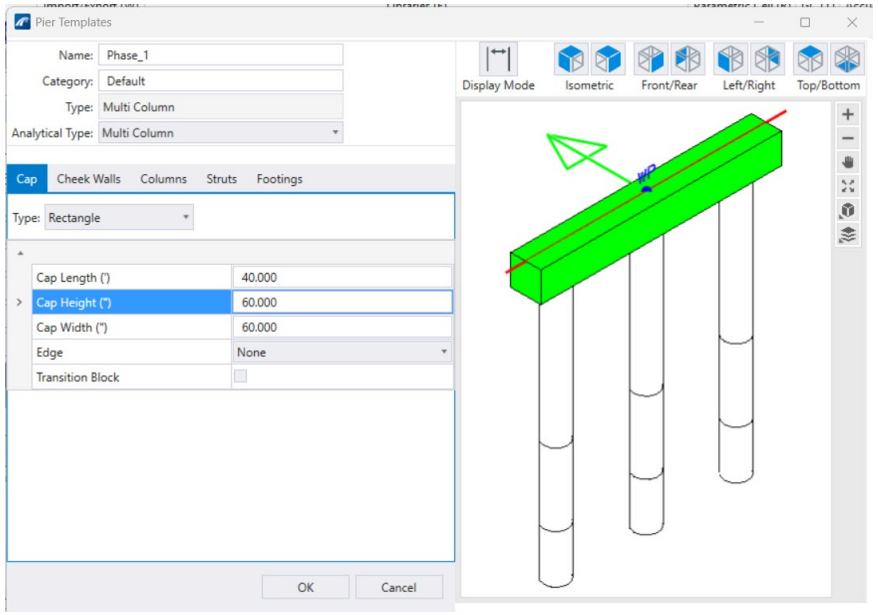
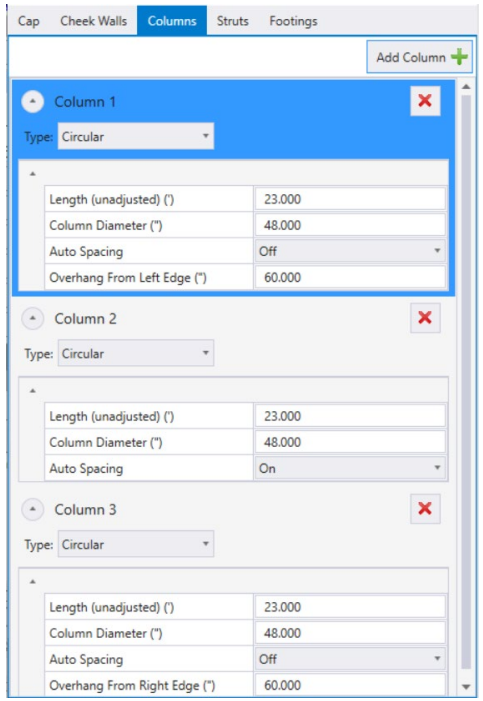
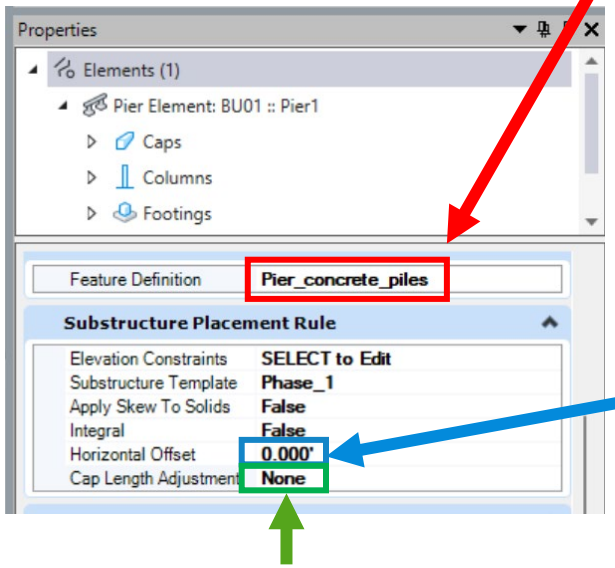
Template Creation & Placement







(Optional) Can assign a Feature specific to the phase and component if available.



How we will control the location of the phased substructure components.

Set to None, so the template controls the length.

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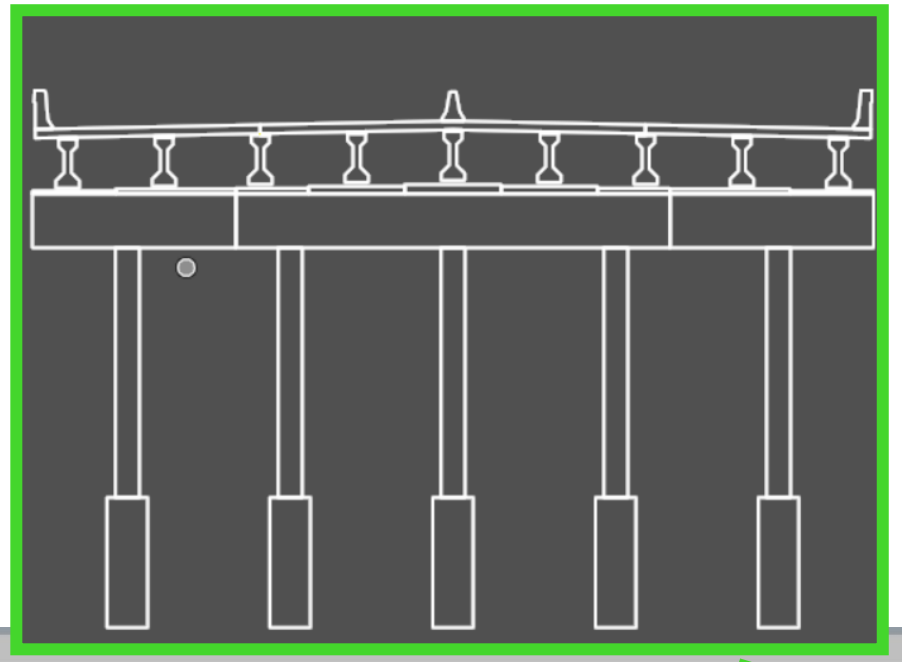
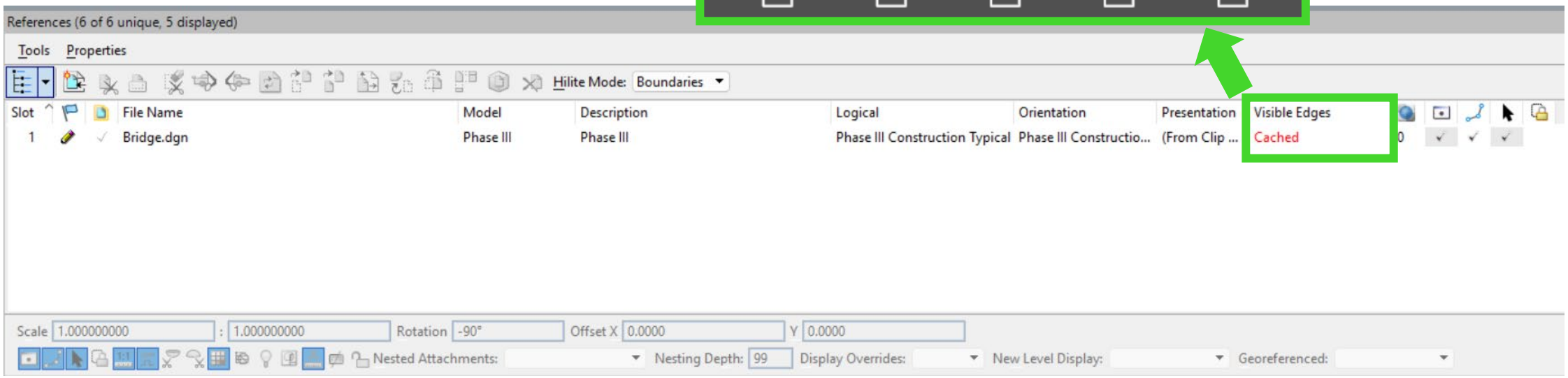
Dynamic View Vs Cashed View

- Dynamic Views
  - Live, interactive slices of the 3D model. They update automatically when the model changes.
    - Useful in Plans Development where real-time visual validation is required or helpful.
    - Useful for Proposed Bridge models that are preliminary or in the middle of design, and subject to change.
    - Requires the use of Feature Definitions or View Level control to display or hide bridge features.
- Cashed Views
  - Static representations of the model geometry captured at a specific moment.
    - Useful in Plan Development when a static moment in time of a structure need to be represented.
    - Useful for compiling Construction Sequences with the minimum amount of references or models.
    - Allows for the use of default Feature Definitions while able to control bridge features that are visible.

Dynamic View Vs Cashed View

- Where do we control Visible Edges?
  - In the Reference Window





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Feature Definitions

What is a Feature Definition?

- An element that defines what the geometric object represents and controls how the object behaves and interacts with other components.
- It is typically stored in DGNLIB and accessed via the Explorer tool.

Feature Definitions

What are the Required Components of a Feature Definition?

1. Feature Definition
- The central element that defines what the geometric object represents (e.g., deck, barrier, pier).
- Controls how the object behaves and interacts with other components.
- Stored in DGNLIB and accessed via the Explorer tool.

2. Feature Symbology
- Specifies the **Element Template(s)** used to draw the feature.
- Determines how the feature appears in plan, profile, and 3D views.
- Also stored in DGNLIB.

3. Element Templates
- Define the visual and structural properties of elements:
  - Level
  - Color
  - Style
  - Weight
  - Class
  - Transparency
  - Priority
  - Material
  - Text Styles
- Configured in DGNLIB and can be customized via right-click options.

4. Levels
- Used to organize and control the display of elements.
- Each feature can be assigned to a specific level for better management.

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Feature Definitions

How can we use Feature Definitions for Phase Bridge Construction?

- Feature Definitions can be helpful
  - Adding Definitions for Existing geometry or bridge stages allows more control over levels, styles, weights, etc. for plans production
    - Individual Elements can then be controlled via level display, display rules. etc.
    - 2D Decorators can become plan ready
  - Feature Definitions are applied when the bridge component is created, but Feature Definitions can be modified after the element is created, through the properties window.

OpenBridge Modeler Example

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