Overview

- What Bridge Information Modeling is
- Why you should consider 3D based design
- BrIM and Visualization
- Questions
Michael Alestra, PE

- Project Engineer
- ~20 yrs of 3D modeling experience
- 18 yrs of experience in bridge design and engineering
- 5+ yrs – Developing and Implementing Bridge Information Models and practices
As an ESOP-owned firm, every Pennoni employee has a vested interest in the success of each project.
Office Locations

Milton, DE
Newark, DE
Clearwater, FL
Delray Beach, FL
Miami Beach, FL
Pensacola, FL
Tallahassee, FL
Winter Haven, FL
Boston, MA
Baltimore, MD
Columbia, MD
Camden, NJ
Haddon Heights, NJ
Newark, NJ
Vineland, NJ
Chapel Hill, NC

Akron, OH
Columbus, OH
King of Prussia, PA
Bethlehem, PA
Mechanicsburg, PA
Pittsburgh, PA
State College, PA
Uniontown, PA
Warrington, PA
West Chester, PA
Wyoming Valley, PA

Corporate Headquarters
New York, NY
Philadelphia, PA
Why not 3D design?

- 3D modeling has been around for over two decades
Why should we change?

- Streamlined design
- Easily accommodate design changes
- Visualize design
BrIM Project – Vertical Lift Bridge
BrIM Project – Vertical Lift Bridge
Moving away from 2D

- Innovations, such as Bridge Information Modeling, allow us to change the way we do business.
3D Bridge Modeling Software
Bridge Information Modeling (BrIM) is a process, not a program.
What is Bridge Information Modeling (BrIM)?

- A process for creating, communicating, and reviewing bridge information in a collaborative manner.
BrIM is how 3D digital bridge models get built
BrIM is not only a construction tool, it’s a planning tool, designing tool and a life cycle management tool.
BrIM Process

- Concept Design
  - BrIM Model
- Final Design
  - BrIM Model
- Construction
  - BrIM Model
BrIM Process

BrIM Model

Quantities and Cost Estimate

Geometry and Parameters

Material and Pay Items

Design and Analysis

Detailing

Construction

Plans

3D Viz.
“Design the model, not model the design”
BrIM Enhances Design
BrIM Enhances Design

- Object driven, parametric models that represent actual bridge components
- Can include large amounts of information
Model Building – 3D Survey Data
Model Building - 3D Survey Data
Model Building – Alignments
Model Building – Bridge Model
BrIM Process

BrIM Model

- Quantities and Cost Estimate
- Visualization
- Plans
- Construction
- Detailing
- Design and Analysis
- Material and Pay Items
- Geometry and Parameters
BrIM Process

BrIM Model

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BrIM Process

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- Plans

Geometry and Parameters
BrIM Enhances Design
Plan Development

- Details are made from views and sections of model
- Linework on the plans is the model
- When the model updates, the plans update
BrIM Process

BrIM Model

- Quantities and Cost Estimate
- Visualization
- Plans
- Construction
- Detailing
- Material and Pay Items
- Geometry and Parameters
- Design and Analysis
Analysis and Design

- Model sent directly into analysis
- Design changes sent back to design model
Analysis and Design

- 1D, 2D, FEM analysis
- AASHTO LRFD Design checks
- Easily evaluate loading conditions
BrIM Process

BrIM Model

Geometry and Parameters

Quantities and Cost Estimate

Visualization

Material and Pay Items

Plans

Design and Analysis

Construction

Detailing
Detailing

- Parametric reinforcement modeling
- 2D symbolic details
- Auto tabulated bar bending and bar schedules
- Accurate quantities
BrIM Process

Quantities and Cost Estimate

Geometry and Parameters

Material and Pay Items

Design and Analysis

Detailing

Construction

Plans

Visualization

BrIM Model
Quantities and Cost Estimate

- Quantities automatically tabulated
- Difficult items to quantify are streamlined
  - Cut/fill
  - Steel components
  - Irregular pier shapes
BrIM Enhances Design

- Quantities
- Geometry Reports
  - Deck Elevations
  - Cambers
- Engineers can better visualize design
  - Conflicts
  - Clash detection
- Promotes constructability
18 Yrs. Engineer

Business development and Marketing

Joe Spadea, PE
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Design Visualization

- Animations
- 3-D Modeling
- Photorealistic Rendering
- Virtual/Augmented Reality
- Built from real, meaningful Design Data
Practical Applications

- High Definition Laser Scanning
- Drones / UAV
We are visual creatures
60,000X
Value
Public Meetings
Design Alternatives
Stakeholders
CSD

Stakeholder Acceptance

Acceptance
Budget + Schedule

Concepts that meet goals + needs

CLIENT/DOT

Pennoni

Impacts + Outages
Aesthetics

goals + needs

finding balance

achieving success
DATA

3-D MODEL

PRODUCT
Select Examples
More Examples
Review

- Bridge Information Modeling is the future
- How BrIM improves design and promotes constructability
- Why Visualization is important and how having access to 3D models reduces effort
Thank you / Questions?

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Pennoni.com/BrIM
to learn more