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Capitalizing On Revit Families to Improve Formwork Design of Parking Structures

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**Learning Objectives**

- Understanding the Benefit of Formwork Modeling
- Understanding the Challenges of Formwork Modeling
- Understanding of Formwork Components for Long Span Parking Structure
- Understanding the Applications of Formwork Models

**Description**

This session will cover the story of how McCarthy collaborated across regions to develop and refine formwork models for long-span parking-structure projects using Cunningham Beam System.
Khoi Pham is a VDC Specialist at McCarthy Building Companies, INC. During his 8 years in construction industry, Khoi expertise has developed in concrete construction of various project types, as well as design-build long-span parking structures. He has a unique experience working dual roles as both VDC engineer and traditional engineer that enabled him to merge a wide range of field knowledge with the virtual construction technologies and helped further leverage the brain power of operation teams through visual communication of models.

James Blair is an Asst. Superintendent at McCarthy Building Companies, INC. He has 18 years of experience in the construction industry and has worked as a Carpenter, Carpenter Foreman, General Foreman and currently as Asst. Superintendent. He made the jump in 2018 to the VDC Dept. and has since worked on multiple projects such as hospitals, commercial buildings, schools, and parking structures. His responsibilities include model-based layout, creation and supervision of construction concrete models, form-work design, and design assistance. James’ experience gives him a unique understanding of all the aspects of the construction process and how the entire process comes together virtually. James is also the lead drone pilot for McCarthy’s SoCal region and heads the effort for incorporating drone data into job sites for quality control as well as its use for marketing and business development.
Learning Objective 1: Understanding the Benefit of Formwork Modeling

- Sequence planning.
- Recyclability of FW families in different projects (with some level of customization).
- Increase speed, output quality and information compared to 2D drawings because of parametric capabilities.
  - Auto update of families.
  - Properties that can be reserved for user input.
  - Properties that can be linked to schedule.
- Generate Bill of Materials/Material List (BOM) for buyout and fabrication.
- Translate field experience onto 3D drawings and retain/organize that information for future projects.

Learning Objective 2: Understanding the Challenges of Formwork Modeling

- Expectations
- Initial investment in time and resources to create content/families that are reusable.
  - Workaround to sacrifice view setting for faster view generation.
  - Selective details to include that will show up in schedule/fabrication need.
  - Standardization of formwork details and drawings with field team.
    Consistent position of information in drawings for faster reference.
- General field knowledge of formwork assembly/installation/fabrication.

Learning Objective 3: Understanding of Formwork Components for Long Span Parking Structure

- Parking structure formwork is designed to allow for placing, stripping, moving and resetting of very large areas of very quickly. Individual pieces have fly-by and NET sides that allow for quick install and removal. Must be durable to withstand multiple concrete pours. Bracing and handrails are pre-built and easily installed and removed.
- Column Forms
- Upturn Beam Forms
- Downturn Beam Forms
- Capitals
- Cunningham Beam Forms
- Deck Panels
- Safety/Handrail Forms
**Learning Objective 4:** Understanding the Application of Formwork Models

- Constructability review in 3D:
  - Congested/tight space that need high level of precision/accurate dimensions.
  - Precon Application
- Specific to Long Span Parking Structure type.

**Summary**

- Review of objectives.
- Lessons learned
- Improvement parametric ability of the model (determining constrain, references, stability).
- Dynamo development for spot elevations @ Gridline intersection.
- Assemble integration – potential AU2021 presentation.