



CS21366

## Using Parts for Concrete Structures

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**\*\* REFERENCE DARON DENTON \*\***

### Learning Objectives

- Learn how to begin work planning earlier in the process
- Learn how to modify the structural model to mirror your actual pour plans
- Learn how to coordinate penetrations, block-outs, and depressions
- Learn how to easily accommodate design changes

### Description

In this session you'll learn how to use parts in Revit software to create a construction model that will enable you to better plan, coordinate, and execute your work. This session features Revit. AIA Approved

### Your AU Expert

Bill Bennington is the Virtual Construction Manager for PCL Construction's Orlando Division. Bill's role includes leading the Virtual Construction efforts of the District and the production of 3D logistics planning, the creation of construction models, virtual systems coordination, 4D scheduling, the use of robotic total stations, 3D laser scanning, drone applications, the development of new technologies, and reviewing the viability of new product solutions.

Bill received his Bachelor of Science in Construction Management from The Ohio State University. He joined PCL 12 years ago as a Field Engineer and has progressed to his current position as Virtual Construction Manager. His field experience includes projects in the hospitality, entertainment, aviation, and industrial market sectors. He draws on his experiences in the field to validate and match new technologies to real world situations. These experiences also allow Bill to work closely with project teams to improve efficiency and quality through the use of technology.

The PCL family of companies has a century-long tradition of excellence, hard work, and a can-do attitude. PCL is a group of independent construction companies that carry out work across Canada, the United States, the Caribbean, and in Australia. These diverse operations in the civil infrastructure, heavy industrial, and buildings markets are supported by a strategic presence in 31 major centers. Together, these companies have an annual construction volume of more than \$8 billion, making PCL the largest contracting organization in Canada and one of the largest in North America.



## Introduction

Parts can be very time consuming to create and manage. This shortfall has prevented widespread adoption of their use within the construction community, specifically for the purpose of construction documentation. This lack of adoption has prevented other complimentary and downstream processes from maturing and integrating Parts as the actual object being referenced & built.

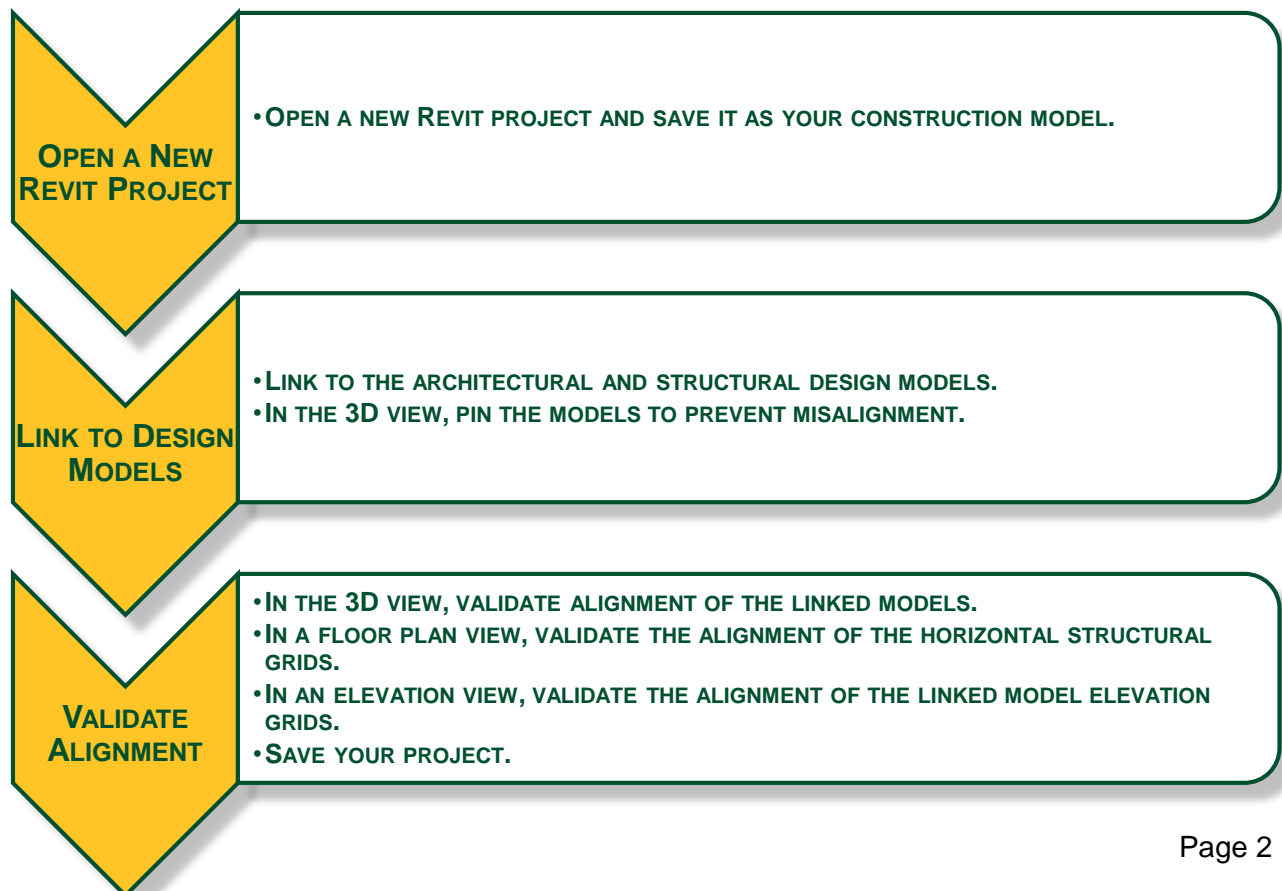
PCL believes Parts are a crucial feature within Revit that creates the ability to maintain construction documentation generated directly from design models that are subject to frequent updates & changes. These design updates can cause substantial rework in the documentation when the modified model information required for construction cannot be maintained.

## Learn How to Begin Work Planning Earlier in the Process

Without parts, project teams typically wait until the design is sufficiently established to begin work planning within the model. At this point the two models, design and construction, tend to diverge and are never again reconciled due to the amount of change in both.

Leveraging the power of parts, begins with the creation of a construction model, which is separate from, but linked to, the project design models. The process of creating a separate construction model allows us to begin planning, sequencing, coordinating, and authoring our own work much earlier in the process. All while being able to quickly incorporate design change.

## Workflow Diagrams: Construction Model Setup





### PHASE MAPPING

- OPEN THE 3D VIEW, SELECT THE STRUCTURAL MODEL BY CLICKING ON THE TOPOGRAPHY OBJECT.
- IN THE PROPERTIES WINDOW, CLICK EDIT TYPE.
- IN THE TYPE PROPERTIES DIALOG, UNDER OTHER, BESIDE PHASE MAPPING, CLICK EDIT.
- CHANGE THE PROPERTY FOR ALL PHASES IN THE PHASE FROM LINK TO EXISTING, EXCEPT THE PROJECT COMPLETION WHICH SHOULD BE NEW CONSTRUCTION.

### SYNC GRIDS PLAN VIEW

- IN A PLAN VIEW, USE YOUR VISIBILITY/GRAPHICS OVERRIDES TO ISOLATE THE LINKED MODEL OF WHICH YOU WISH TO COPY.
- USE COPY/MONITOR TO COPY OVER THE GRIDS YOU WISH TO COPY INTO YOUR CONSTRUCTION MODEL.
- REPEAT THIS PROCESS FOR ANY ADDITIONAL GRIDS IN ANY OTHER LINKED MODELS YOU WISH TO COPY. WHEN FINISHED TURN THE VISIBILITY ON FOR ALL LINKED MODELS.

### SYNC GRIDS ELEVATION VIEW

- IN AN ELEVATION, VIEW USE YOUR VISIBILITY/GRAPHICS OVERRIDES TO ISOLATE THE LINKED MODEL OF WHICH YOU WISH TO COPY.
- USE COPY/MONITOR TO COPY OVER THE LEVELS YOU WISH TO COPY INTO YOUR CONSTRUCTION MODEL.
- ALL LEVEL NAMES IN YOUR CONSTRUCTION MODEL MUST MATCH THE NAMES IN YOUR LINKED MODEL EXACTLY.
- REPEAT THIS PROCESS FOR ANY ADDITIONAL GRIDS IN ANY OTHER LINKED MODELS YOU WISH TO COPY. WHEN FINISHED TURN THE VISIBILITY ON FOR ALL LINKED MODELS.

## Learn How to Modify the Structural Model to Mirror Your Actual Pour Plans

Now that you have created a construction model, you need to create parts in it, from model elements within your linked design models. PCL has created, and now released to the public for free, an Autodesk Revit add-in that automates the creation of thousands of Parts from current or linked model objects with just a few clicks; the add-in is PCL PartsLab (available at [partslab.pcl.com](http://partslab.pcl.com) or the Autodesk Revit app store).

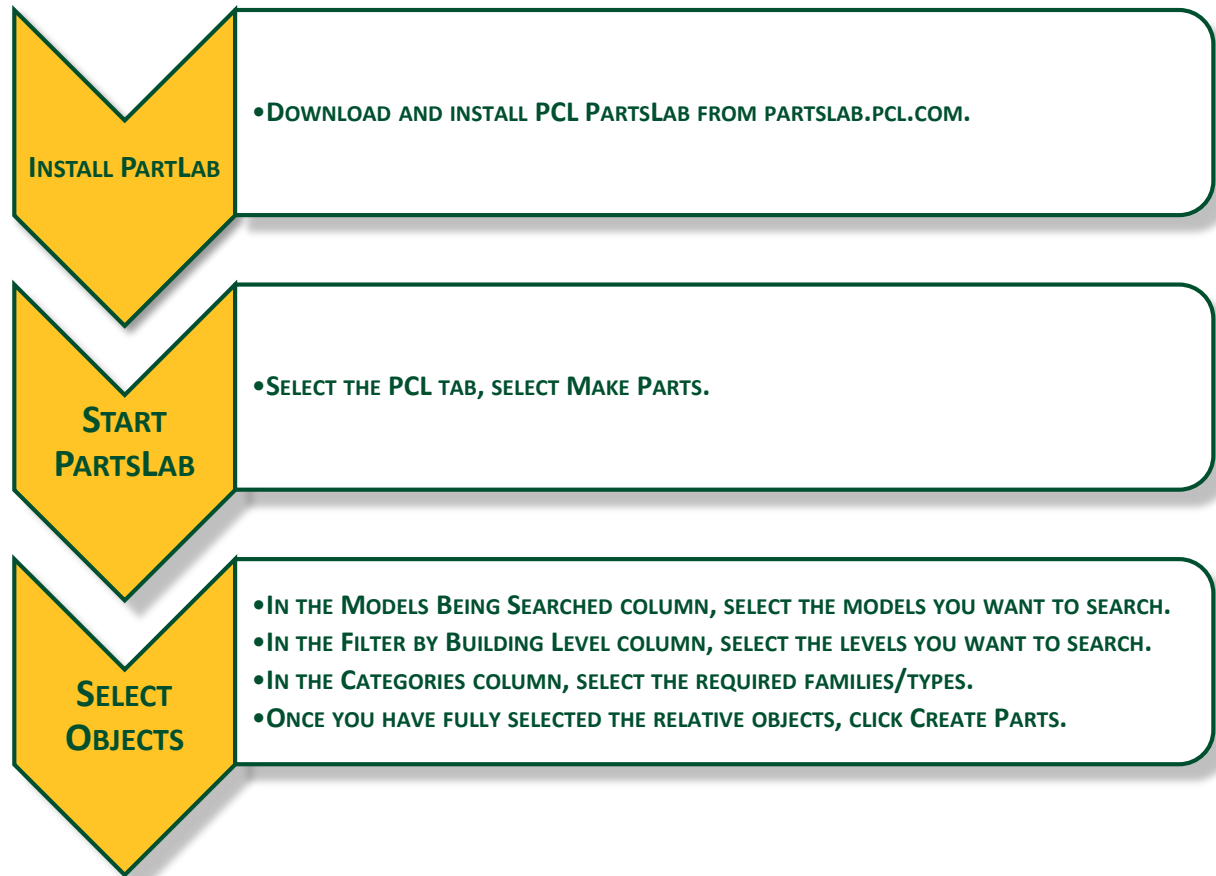
Using PCL PartsLab, you can select model objects by using the PartsLab object tree, or by selecting model objects on-screen directly. Once the appropriate objects have been selected, simply click “Create Parts”.

Now that your construction model contains parts, you can begin transforming the model from a design document into construction plans. You can break the slab, column, wall, and beam parts into individual pours. The pours can be grouped into sequences. Parts that were originally separate, can now be grouped into one. Expansion joints can be accounted for. Overlapping and duplicated elements can be corrected or deleted. You can author the parts to accurately depict what and how you plan to construct your project.

Once your parts have been modified to accurately represent your actual pour plans and sequences, you can use Revit to schedule and quantify your pours.



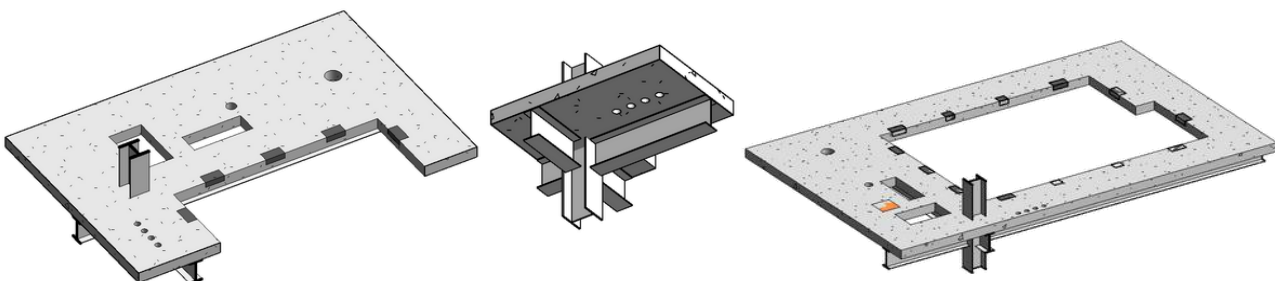
## Workflow Diagrams: Creating Parts



## Learn how to coordinate penetrations, block-outs, and depressions

Having created your construction model, and started planning early, you now have time to add additional detail and facilitate a greater level of coordination within your model.

In some instances, block-outs and slab depressions are shown with 2D line work. You can turn these items into modeled elements that accurately represents its true geometry and volume. These elements can be dimensioned, host structural reinforcement, and host content like embeds and sleeves. Also, MEP penetrations can be created prior to, and in conjunction with, the MEP coordination effort. Revit take-offs and schedules correctly reflect the volumes of your Parts after modification.

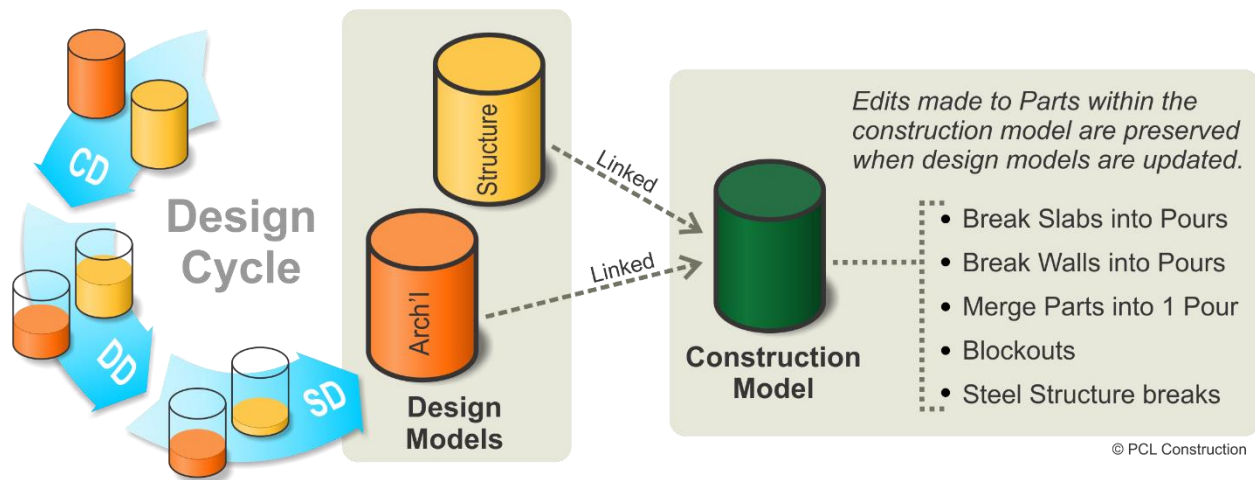




## Learn how to easily accommodate design changes

Now that you have created Parts, a native Revit feature, you have essentially created a clone object in your current model. These cloned objects stay hosted to the original objects, and update in shape and location when the host object updates. The host objects can be within your current model or a linked model.

When the linked design models (containing the host objects) are updated, your Part edits are maintained. Objects placed on your Parts such as dimensions, embeds, sleeves, etc. are still correctly hosted and located. The schedules and quantities that are tied to your parts will also update, based on the new linked design models.



Now being able to easily accommodate design change, you can confidently invest the time and resources required to accurately detail the penetrations, block-outs, sleeves, depressions, and reinforcing within your pours. You can quantify and schedule your work and be able to rely on the data. You can better analyze your all-encompassing plan and leverage the power of your construction model.