



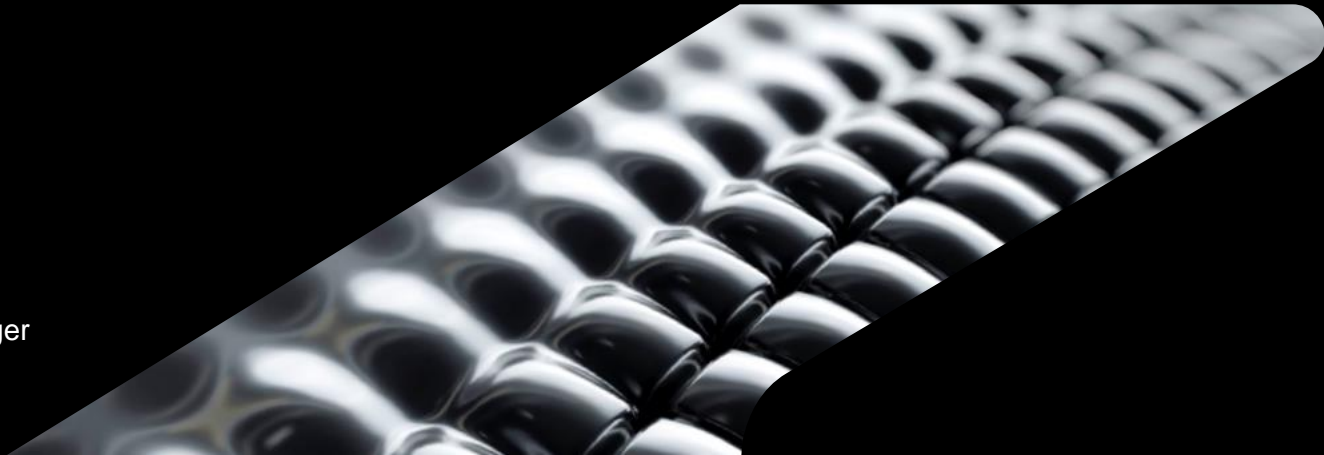
# Assemble + Power BI

## Developing a Powerful and Practical Model-Checking tool

CS502129

Paul Briedis  
Mott MacDonald - Digital Lead

Fouad Mulla  
Mott MacDonald - Information Manager



# Presenters



**Paul Briedis - Digital Lead**

Working with Mott MacDonald for 18 years, originally as Highways engineer and for the last 6 years as Digital Lead supporting the delivery of Transportation projects.



**Fouad Mulla - Information Manager**

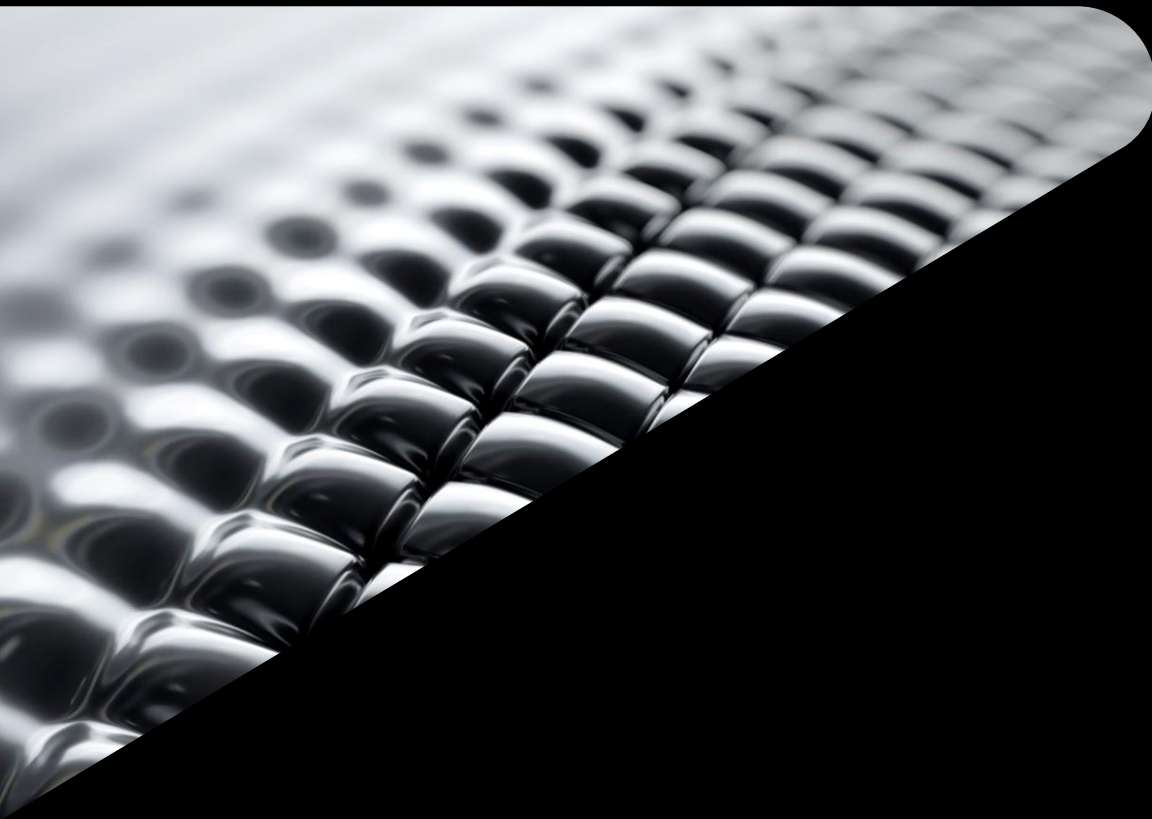
Information and Cyber Security professional with +10 years of experience in the software and engineering industry. Worked with many multinational companies such as Graphisoft. Architect and Solution Designer, passionate about cloud and emerging technologies.

# Why should you stay in the room?

## *Creating a powerful and practice model-checking tool*

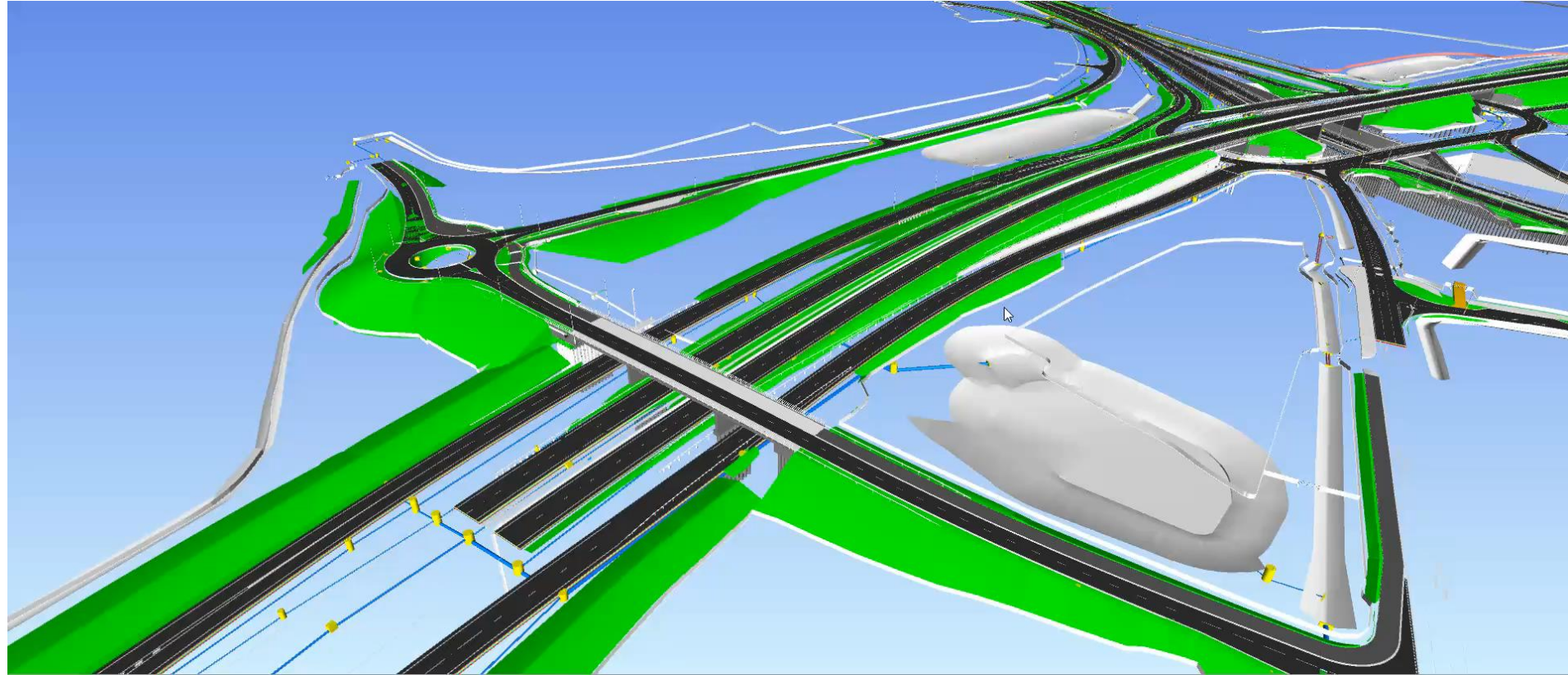
- Highlight our lessons learned and the value gained using this workflow
- Share example how to define model attributes and setup models
- Demonstrate how to set up Power BI dashboard using Assemble
- Better prepared to adopt this or similar approach to your project





# The Project

# Major Highway Project, U.K.



# About the project

- 50+ Bridges and Geotech Structures models in Revit
- LOD4 and LOI4 definition
- Asset, Cost, Time and Carbon information extracted from models
- Strong collaboration between Client and Consultant



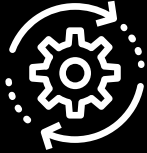




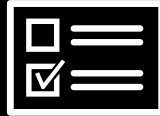
# The challenges we faced

- Regularly submitting 50 models
- 75,000+ attributes
- Client has their own checking tools
- Engineers understanding content of the models
- Limitations with traditional methods of data extraction

# Requirements of the checking tool



Confidence  
model data is  
compliant



Confidence  
design intent  
captured



Easy to use and  
updated quickly



# Our solution

## Step 1

Attribute definition and model setup

The screenshot shows the 'Level of Detail Dashboard' with a search bar and a table of model attributes. The table has columns for 'Layer Name for Federation', 'Example Layer Name (with Notes)', and various LOD levels (LOD 1 to LOD 6). Below the table, there are 'LOD Definitions' and a 3D model of a bridge structure.

## Step 2

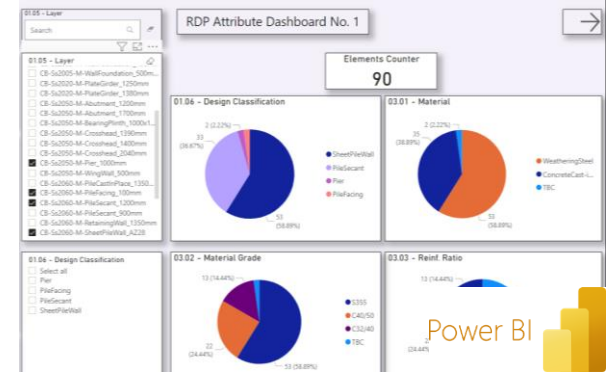
Model data hosted

The screenshot shows the 'Assemble model viewer' with a 3D model of a bridge structure. The model is displayed in a perspective view, showing the bridge deck and supports. The viewer includes a search bar and a list of model elements.

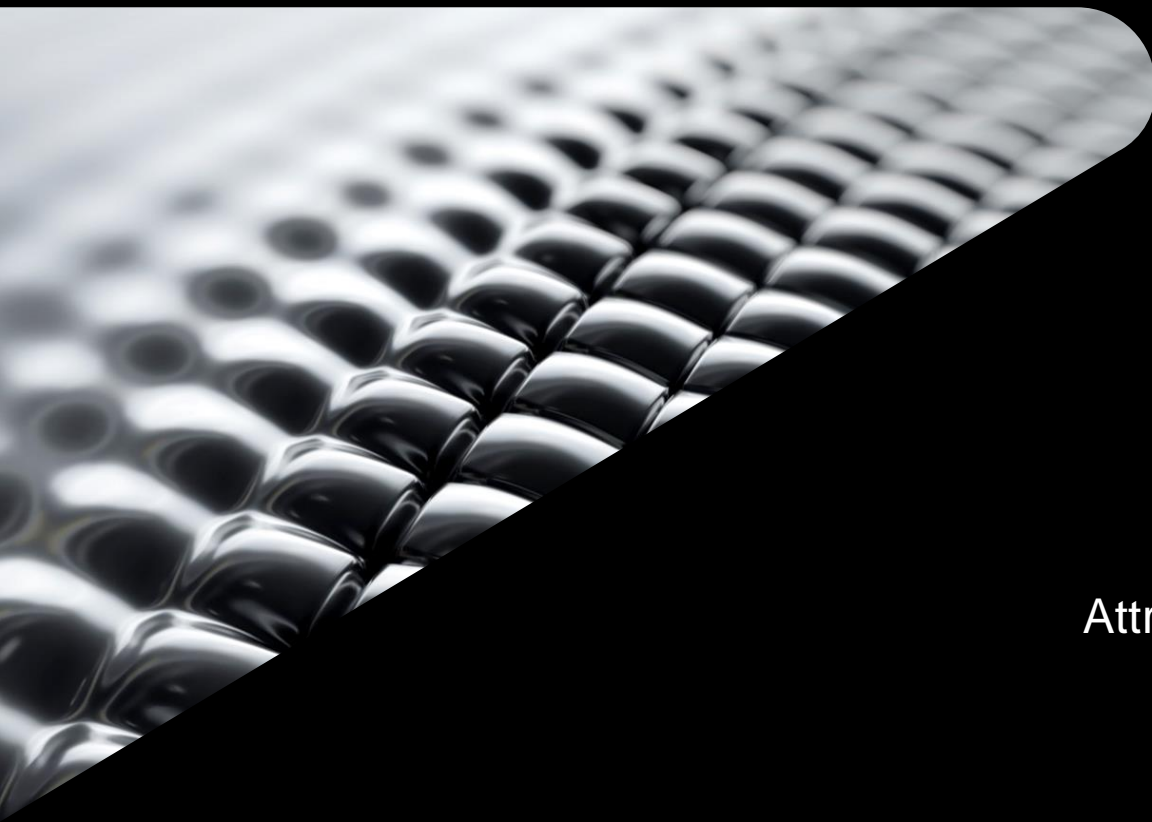
Publish model to Assemble

## Step 3

Interrogate model data



Power BI and Assemble integrated



# Step 1

Attribute Definition and model setup

# Attribute Definition and model setup

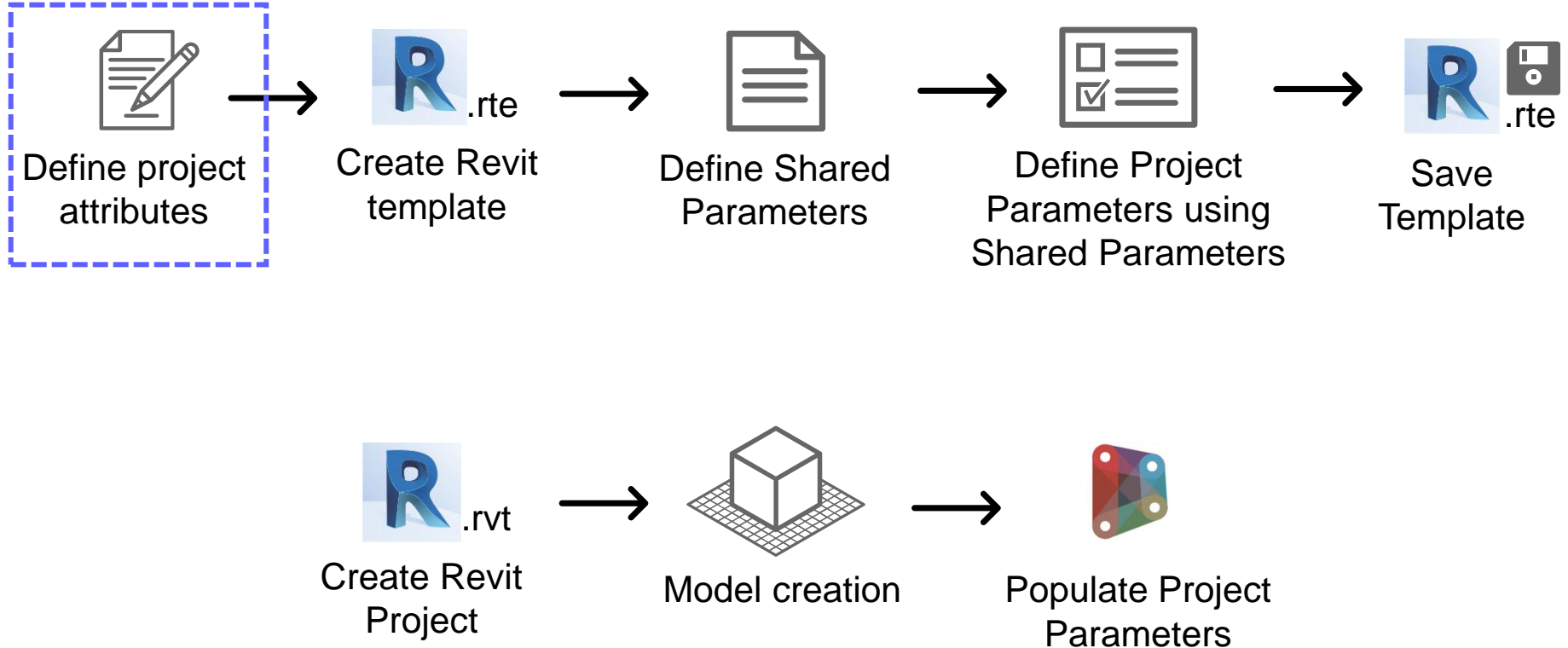
Key points:

- Attributes need to be robust and consider all asset types
- Staff need access to guidance and examples
- Likely to change as the project develops
- It takes time to develop!



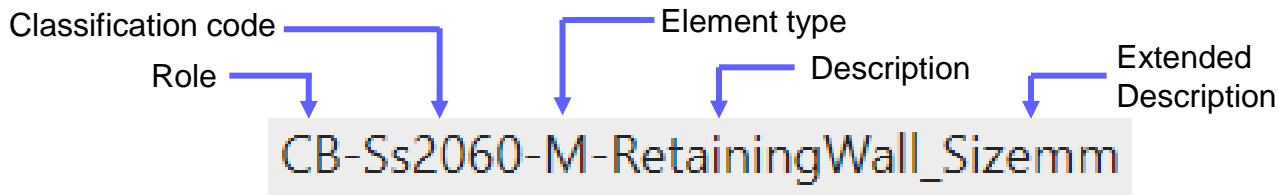
# Attribute definition and model setup

## The workflow



# Define Project Attributes

## Example – Layer name



How we are communicating this with the team:

**Level of Detail Dashboard**  
Level of Detail Matrix and Level of Detail Definitions

**Layer list**

Layer Name for Federation: wall

**Examples**

**Milestone LOD and LOI**

**Attributes**

**Level of Detail Matrix**  
Layer Name for Federation

Example Layer Name (With Notes)

		Con LoD	Con LoI	STR1 LoD	STR1 LoI	STR 2 LoD	STR2 LoI	SGAR 5 LoD	SGAR 5 LoI	Tech LoD	Tech LoI	Full Uniclass Class
CB-Pr2093-M-Headwall_PrecastConcrete	CB-Pr2093-M-Headwall_PrecastConcrete	3	2						0			Pr_20_93_37_6
CB-Ss2005-M-WallFoundation_Sizemm	CB-Ss2005-M-WallFoundation_1500mm (Depth)	3	2	3	3	4	4	4	4	4	5	Ss_25_11_16_7
CB-Ss2050-M-Headwall_Info	CB-Ss2050-M-Headwall_Box (for example, use "Info" accordingly).	3	2	3	3	4	3	4	3	4	5	Ss_20_50_30_3
CB-Ss2050-M-HeadwallExtension_Info	CB-Ss2050-M-HeadwallExtension_HWE1	-	-	-	-	4	3	4	3	4	5	Ss_20_50_30_3
CB-Ss2050-M-WingWall_Sizemm	CB-Ss2050-M-WingWall_300mm (Thickness)	3	2	3	3	4	4	4	4	4	5	Ss_20_50_10_9
CB-Ss2060-M-RetainingWall_Sizemm	CB-Ss2060-M-RetainingWall_300mm (width)	3	2	3	3	3	4	3	4			Ss_20_05 ? Jus part of foundation?

# Define Project Attributes

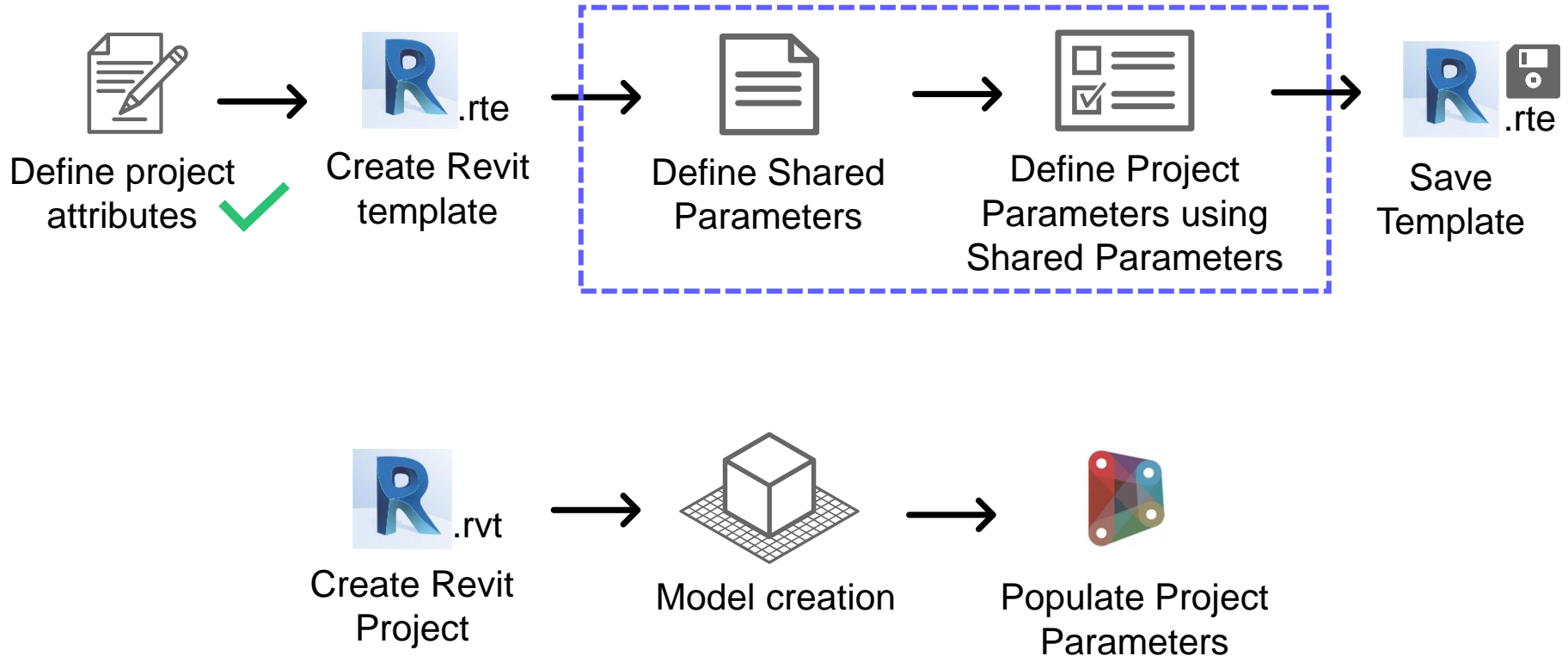
## Example – Full attribute list

01.00 - File Name	}	File name, Discipline, Location
01.01 - Role		
01.02 - Location		
01.03 - Element ID		
01.04 - Systems	}	Primary asset information
01.05 - Layer		
01.06 - Design Classification		
01.06 - Design Description	}	Uniclass
01.07 - Uniclass Classification		
01.07 - Uniclass Description		
01.08 - SubLocation		
01.09 - AD4 Asset Status		
02.01 - ADMM	}	Engineering specific
03.01 - Material		
03.02 - Material Grade		
03.03 - Reinf. Ratio (kg per m3)		
03.04 - Cross Section Type (mm)	}	Spatial
04.01 - Element Weight (T)		
04.02 - Side Surface Gross Area (m2)		
04.03 - Footprint Surface Gross Area (m2)		
04.04 - Bottom Surface Gross Area (m2)		
04.05 - Gross Volume (m3)		
04.06 - Linear Length (m)		
04.07 - Height Length (m)		
05.01 - Suitability Code		
05.02 - Revision Code		
05.03 - Stage Gate		

**27 Project specific attributes**

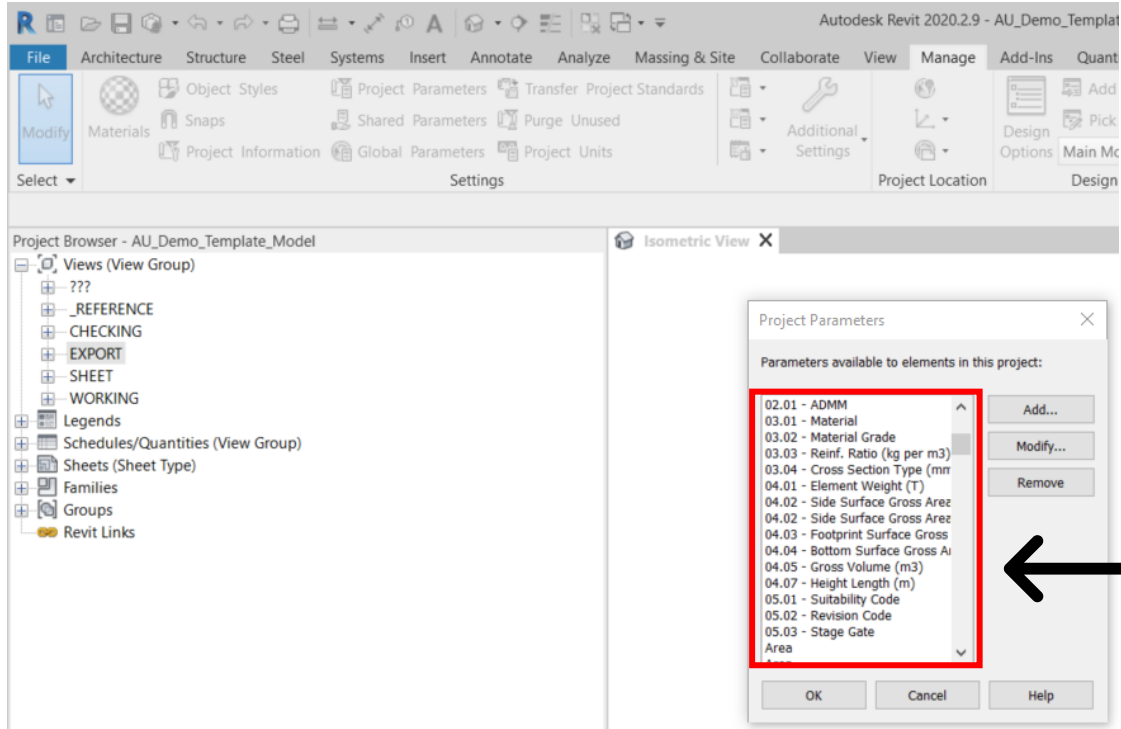
# Attribute definition and model setup

## The workflow





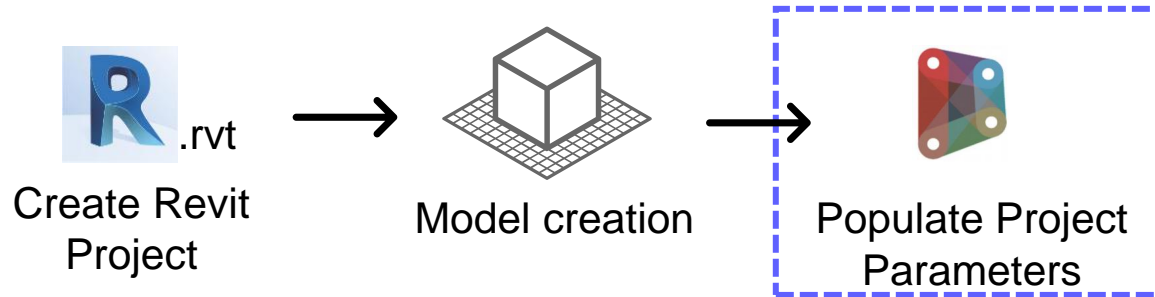
# Revit Shared and Project Parameters



Refer to class handout for detailed instructions

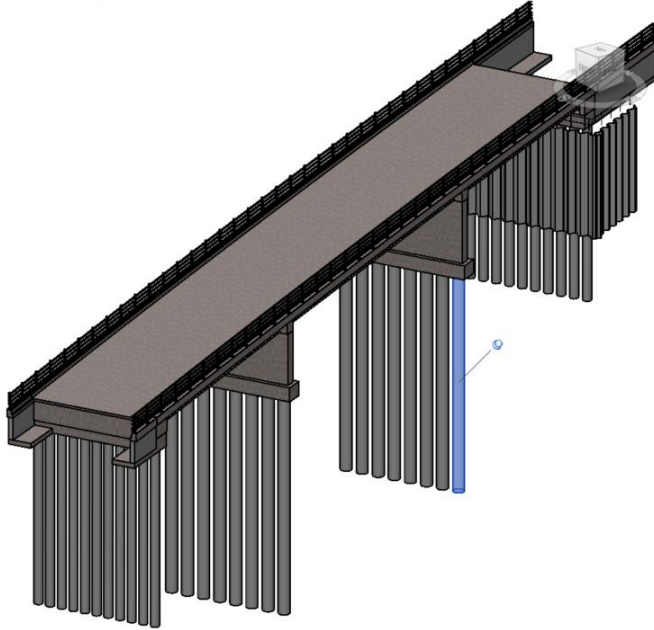
# Attribute definition and model setup

## The workflow

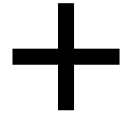
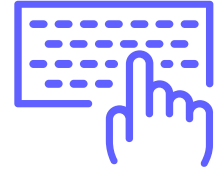


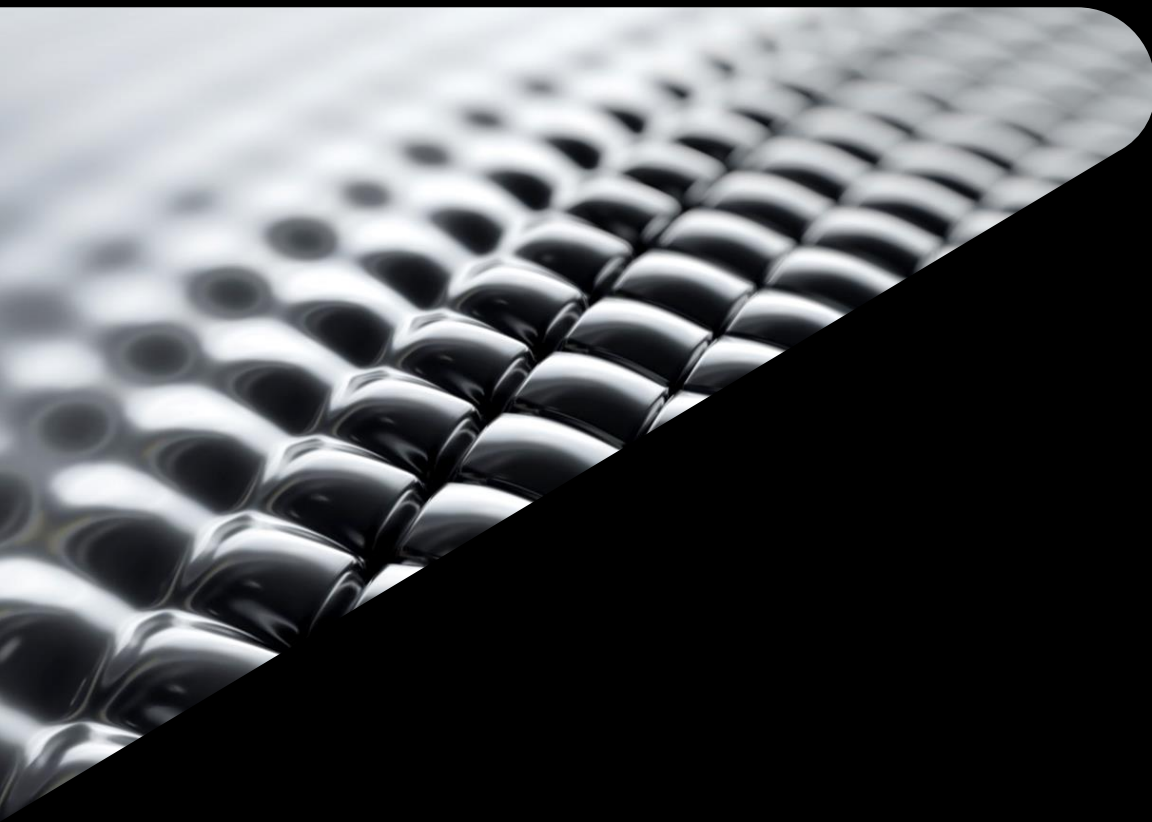
# Project Specific Attributes

Export - RC Export



01.00 - File Name	SBR-SECT1_ST02-M3-CB-00001
01.01 - Role	CB
01.02 - Location	SECT1_ST02
01.03 - Element ID	3651358
01.04 - Systems	SBR
01.05 - Layer	CB-Ss2005-M-PileCastInPlace_1200mm
01.06 - Design Classification	CB-Ss2005-M-PileCastInPlace
01.06 - Design Description	1200mm
01.07 - Uniclass Classification	
01.07 - Uniclass Description	
01.08 - SubLocation	TBC
01.09 - AD4 Asset Status	TBC
02.01 - ADMM	TBC
03.01 - Material	ConcreteCast-in-Place
03.02 - Material Grade	C32/40
03.03 - Reinf. Ratio (kg per m3)	250.000000
03.04 - Cross Section Type (mm)	1200mm
04.01 - Element Weight (T)	0.000000
04.02 - Side Surface Gross Area (m2)	0.000 m²
04.03 - Footprint Surface Gross Area (m2)	0.000 m²
04.04 - Bottom Surface Gross Area (m2)	0.000 m²
04.05 - Gross Volume (m3)	1.631 m³
04.06 - Linear Length (m)	0.0000
04.07 - Height Length (m)	23.0750
05.01 - Suitability Code	TBC
05.02 - Revision Code	TBC
05.03 - Stage Gate	TBC

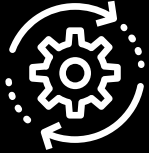




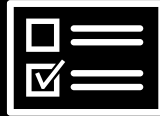
# Step 2

Assemble

# Assemble – What is it?



Cloud-based  
platform



Classify, organise  
and interrogate  
project data



User-friendly  
environment

# Assemble Add-ins



## Navisworks Add-in (Download)

Navisworks Add-in

JULY 18, 2022 | DOWNLOADS



## Revit/AutoCAD/Civil 3D 64-bit Add-in (Download)

Install on any computer running 64-bit versions of Autodesk Revit 2019-2023, Autodesk AutoCAD 2019-2023, and AutoCAD Architecture 2019-2023, AutoCAD MEP 2019-2023, and Autodesk Civil 3D 2019-2023

JUNE 22, 2022 | DOWNLOADS

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Class Editor Download

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# Class Editor



+



POWER BI

## Power BI Files (Download)

Power BI Files Download

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🔍 Enter a keyword

- + Web App
- Integrations
  - Integrations
    - Power BI
      - Schedule Integrator
      - Procore Integration
      - iSqFt Integration
      - Create View
      - Export Data to Microsoft Excel
      - Import Custom Assembly Codes into Revit 2015-2016
      - Import data from Microsoft Excel
      - Sync from View: Sync all properties for instances and types in the view
      - Sync Assemble Data to Revit
      - Sync from View: Sync only properties chosen as columns in the view
      - Sync Everything
- + Unsupported Authoring Tools
- + Publishing Models

## Power BI 🔗 SHARE

### Initial Setup

1. Install the latest version of Power BI Desktop: <https://powerbi.microsoft.com/en-us/downloads/>.
2. Assemble's View connector is now a Microsoft certified connector. Please visit the following for Assemble's Power BI connector: <https://docs.microsoft.com/en-us/power-query/connectors/assembleviews>

Parent page: Integrations

Was this helpful?

Yes

No

# Publishing a model from Revit

File Architecture Structure Steel Systems Insert Annotate Analyze Massing & Site Collaborate View Manage Add-Ins Issues Site Designer BIMcollab BIM Interoperability Tools DiRoots iFieldApp Proving Ground

Modify Wall Door Window Component Column Roof Ceiling Floor Curtain System Mullion Railing Ramp Stair Model Text Line Group Room Room Separator Tag Room Area Area Boundary Tag Area

Select Build Circulation Model Room & Area Opening Datum Work Plane

Properties

3D View

3D View: (3D) Edit Type

Graphics

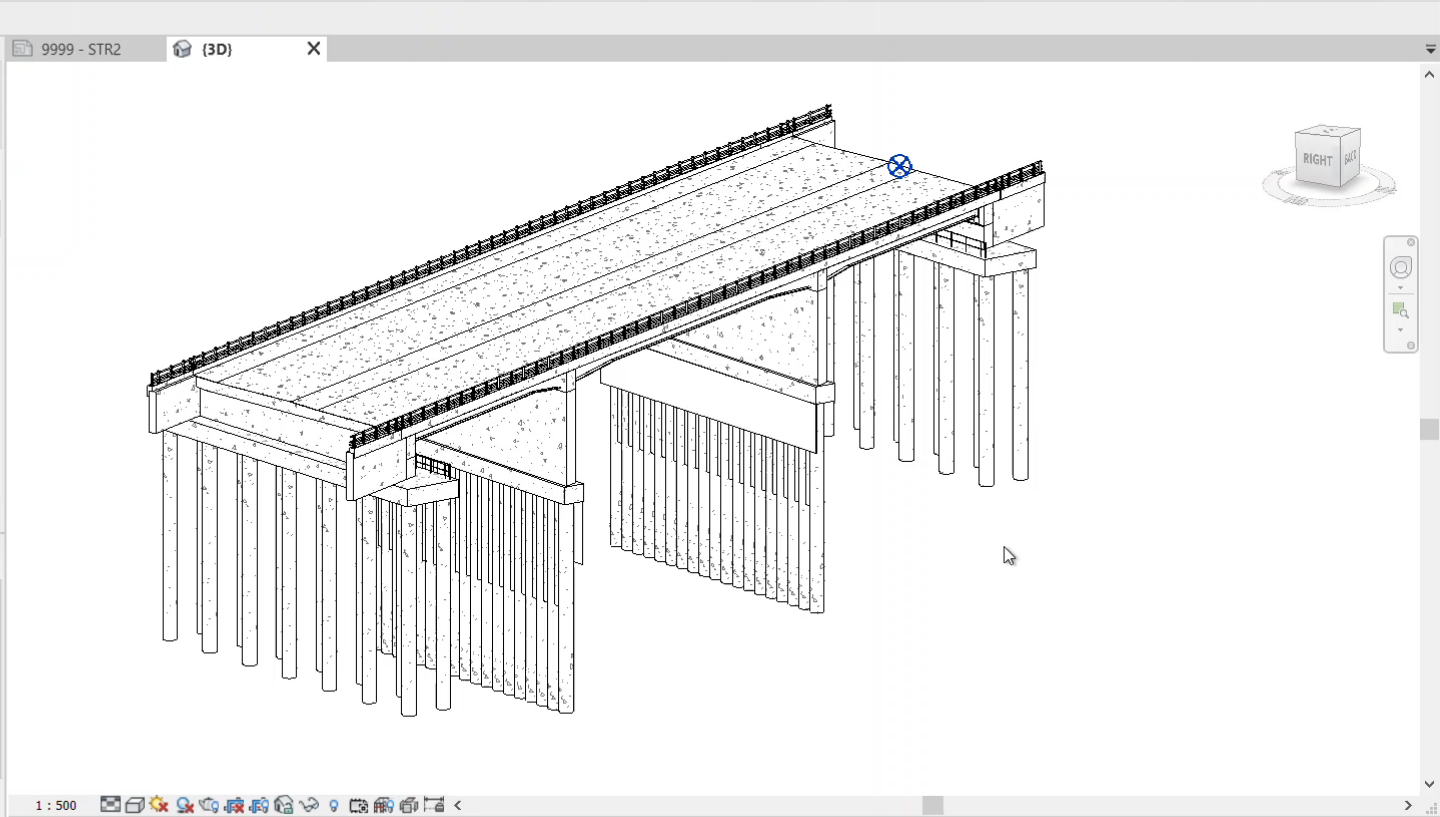
View Scale	1 : 500
Scale Value 1:	500
Detail Level	Medium
Parts Visibility	Show Original
Visibility/Graphics Overrides	Edit...
Graphic Display Options	Edit...
Discipline	Structural
Show Hidden Lines	By Discipline
Default Analysis Display Style	None
Custom-Discipline	
Sun Path	<input type="checkbox"/>

Text

Properties help


Project Browser - SBR-SECT1\_ST05-M3-CB-00501.rvt

- Views (View Group)
  - ???
  - \_REFERENCE
  - CHECKING
  - EXPORT
  - WORKING
- Legends
- Schedules/Quantities (View Group)
- Sheets (Sheet Type)
- Families
- Groups
- Revit links





Properties


3D View

3D View: (3D) 

Graphics

View Scale	1 : 500
Scale Value	1: 500
Detail Level	Medium
Parts Visibility	Show Original
Visibility/Graphics Overrides	 Edit...
Graphic Display Options	 Edit...
Discipline	Structural
Show Hidden Lines	By Discipline
Default Analysis Display Style	None
Custom-Discipline	
Sun Path	<input type="checkbox"/>

Text

[Properties help](#)  Apply

Project Browser - SBR-SECT1\_ST05-M3-CB-00501.rvt

- Views (View Group)
  - ???
  - \_REFERENCE
  - CHECKING
  - EXPORT
  - WORKING
- Legends
- Schedules/Quantities (View Group)
- Sheets (Sheet Type)
- Families
- Groups
- Revit Links

assemble

Fouad Mulla  
mottmac-419768mtp.tryassemble.com Sign out ? x

### Publishing models

SBR-SECT1_ST05-M3-CB-00501	✓ View Model
SBR-SECT1_ST05-M3-CB-00501.rvt	✓

Cancel Close

# Synchronizing a model from Revit

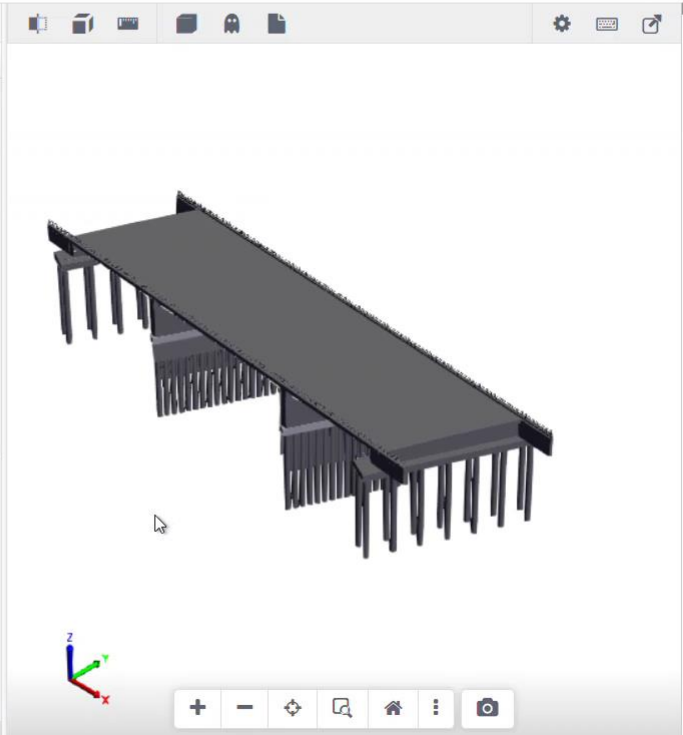
MottMacDonald AU 2022 Demo

Untitled View Show Changes

Grid Isometric View

Group by: Category Columns \$ Estimate Import/Export

Name	Quantity	Unit	Model Name	Count (EA)	Area (M2)
Generic Models	155	EA	SBR-SECT1_...	155	
Generic Models : A428_Parapets : CB-Ss2516-M-Parapet...	116	EA	SBR-SECT1_...	116	2,
Generic Models : Abutment Body : CB-Ss2050-M-Abutme...	2	EA	SBR-SECT1_...	2	
Generic Models : Abutment Elements - Ballast Wall : CB-...	2	EA	SBR-SECT1_...	2	
Generic Models : Abutment Elements - Masking Wall : CB...	4	EA	SBR-SECT1_...	4	
Generic Models : Deck Elements-Abutment Crossheads : ...	2	EA	SBR-SECT1_...	2	
Generic Models : Deck Elements-Deck Structure : CB-Ss...	1	EA	SBR-SECT1_...	1	2,
Generic Models : Deck Elements-Detail Abutment Crossh...	2	EA	SBR-SECT1_...	2	
Generic Models : Deck Elements-Integral Crossheads : C...	2	EA	SBR-SECT1_...	2	
Generic Models : Deck Elements-Stringcourses : CB-Ss3...	2	EA	SBR-SECT1_...	2	
Generic Models : Facing BR05 East : CB-Ss2060-M-PileF...	1	EA	SBR-SECT1_...	1	
Generic Models : Facing BR05 West : CB-Ss2060-M-Pile...	1	EA	SBR-SECT1_...	1	
Generic Models : MM-STR_BearingPlinth : CB-Ss2050-M...	20	EA	SBR-SECT1_...	20	
Railings	38	EA	SBR-SECT1_...	38	
Railings : Railing : CB-Ss2560-M-Handrail_1250mm	38	EA	SBR-SECT1_...	38	
Structural Foundations	2,021.59	M3	SBR-SECT1_...	144	
Structural Foundations : MM-STR_Bearing : CB-Pr2085-...	0.42	M3	SBR-SECT1_...	20	







Properties

9999 - STR2

(3D)

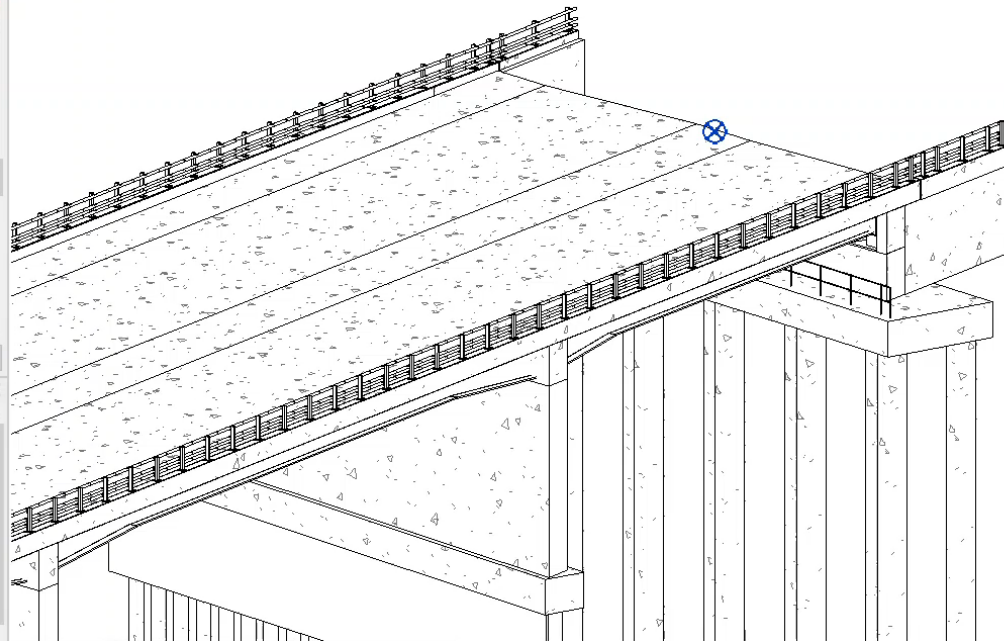
	3D View
3D View: [3D] 	
MMD_Comments_Line_1	
MMD_Comments_Line_2	
MMD_Comments_Line_3	
MMD_Comments_Line_4	
MMD_Comments_Line_5	
MMD_Comments_Line_6	
01.00 - File Name	
01.01 - Role	
01.02 - Location	
01.03 - Element ID	
01.04 - Systems	
01.05 - Layer	
01.06 - Design Classification	

[Properties help](#)

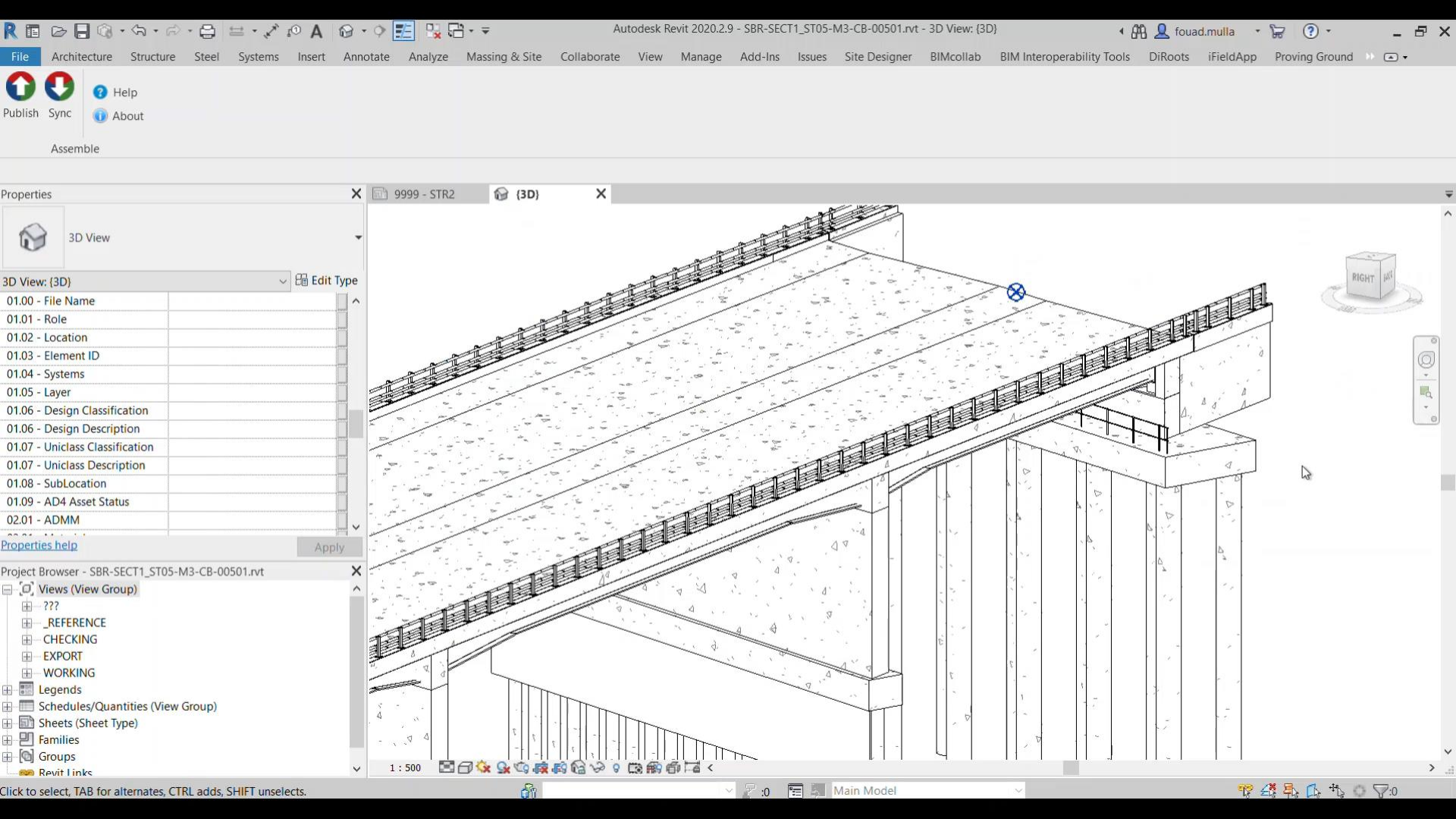
Apply

Project Browser - SBR-SECT1\_ST05-M3-CB-00501.rvt

- Views (View Group)
  - ???
  - REFERENCE
  - CHECKING
  - EXPORT
  - WORKING
- Legends
- Schedules/Quantities (View Group)
- Sheets (Sheet Type)
- Families
- Groups



# Model Versions





# Setting up a view

## MottMacDonald AU 2022 Demo

[Import View](#)[Edit Project](#)

### MODELS

**SBR-SECT1\_ST05-M3-CB-00501**[Details](#)

359 objects

2022-08-23

### VIEWS

#### Multiple Models

This project doesn't have any views with multiple visible models yet. [Learn More](#)

### ACTIVITY LOG

 **Delete View****Paul Briedis** deleted the view ST05 2 minutes ago **Update View****Fouad Mulla** updated the view settings for view [ST05](#)  
19 hours ago **Update View****Fouad Mulla** updated the view settings for view [ST05](#)  
19 hours ago **Create View****Fouad Mulla** created view [ST05](#) 19 hours ago **Update View****Fouad Mulla** updated the view settings for view [ST05](#)  
19 hours ago **Delete View****Paul Briedis** deleted the view STR05 2 days ago

All Events Loaded

# **Assemble and BIM 360**

## MottMacDonald AU 2022 Demo

## MODELS

SBR-SECT1\_ST05-M3-CB-00501

359 objects

2022

## Project Settings

Project Name

Job Code

Description

Project Image

 No file chosen

Card Color



Data Trees

Assemble Properties

Project Units

[Link to a Construction Cloud Project](#)

Members

Contributor

Contributor

## ACTIVITY LOG

Paul Briedis updated the view settings for view ST05  
a day ago

Paul Briedis updated the view settings for view ST05  
a day ago

Paul Briedis created view ST05  
a day ago

Paul Briedis updated the view settings for view ST05  
a day ago

All Events Loaded



## Mott MacDonald AU 2022 Demo

### MODELS

[+Add/Update Models](#)**SBR-SECT1\_ST05-M3-CB-00501**

359 objects

2022-08-23

### VIEWS by visible model ▾

---

**Multiple Models**

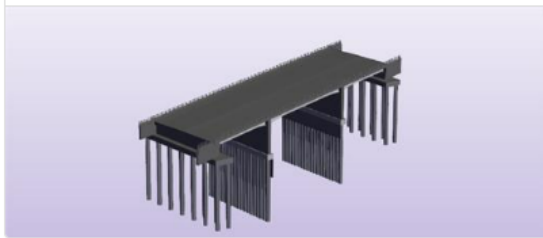
---

This project doesn't have any views with multiple visible models yet. [Learn More](#)

---

**SBR-SECT1\_ST05-M3-CB-00501**

---

**ST05**

## MottMacDonald AU 2022 Demo

Import View

Search models/views by name




MODELS

SBR-SECT1\_ST05-



359 objects

### Select Models



- ▼  Project Files
  - >  00 - BIM 360 Support Documents
  - >  Projects

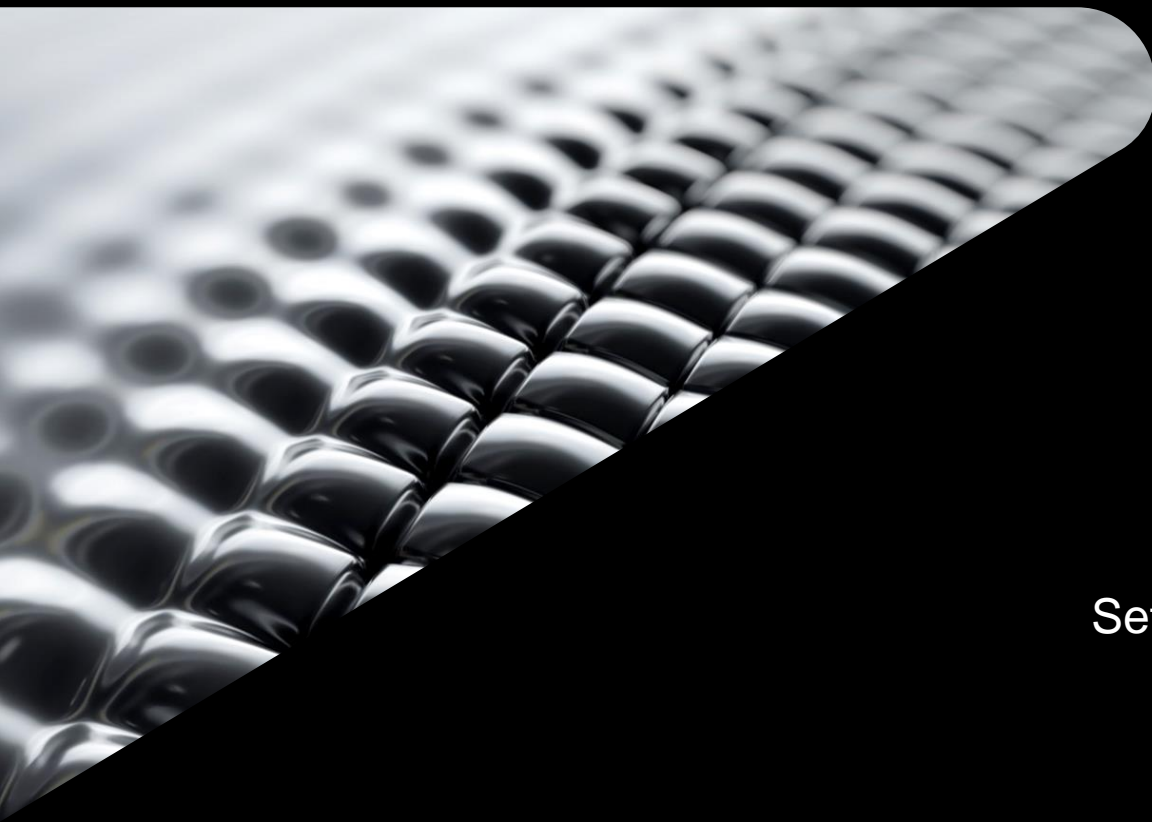
Search

Name	Description	Version	Last updated	Updated by
 00 - BIM 360 Support ...	--		Jun 3, 2022 12:21 PM	 --
 Projects	--		Sep 3, 2022 7:00 PM	 Paul Briedis

No documents selected

Next

Update View



# Step 3

Setting up the Power BI Dashboard



# Setting up the Power BI Dashboard

- Linking Power BI to Assemble
- Data Cleansing
- Add visuals, build our dashboard
- Publish the dashboard

# Linking the Power BI query to Assemble

File

Home

Help

Paste

Cut

Copy

Get data

Excel workbook

Data hub

SQL Server

Enter data

Dataverse

Recent sources

Transform data

Refresh

Manage relationships

Manage roles

View as

Q&A setup

Language

Linguistic schema

Sensitivity

Publish

Clipboard

Data

Queries


Relationships

Security

Q&A

Sensitivity

Share



All tables

+

Properties

Fields

Cards

Search

Show the database in the header when applicable

No

Show related fields when card is collapsed

Yes

Pin related fields to top of card

No

100%

AUTODESK UNIVERSITY

# Data Cleansing

FileHomeHelp

PasteCutCopy

Get dataExcel workbookData hubSQL ServerEnter dataDataaverseRecent sources

Transform dataRefresh

Manage relationshipsManage rolesView as

Q&A setupLanguageQ&ALinguistic schema

SensitivitySensitivity

PublishShare

ClipboardDataQueriesRelationshipsSecurityQ&ASensitivityShare

ALL CB Bridges and S... Rows Collapse

All tables +

PropertiesFields

Cards

Search

Show the database in the header when applicable

No

Show related fields when card is collapsed

Yes

Pin related fields to top of card

No

ALL CB Bridges and Structures



# Setting the Power BI Dashboard

File

Home

Insert

Modeling

View

Help

Paste

Cut

Copy

Format painter

Get data

Excel workbook

Data hub

SQL Server

Enter data

Dataverse

Recent sources

Transform data

Refresh data

New visual

Text box

More visuals

New measure

Quick measure

Sensitivity

Publish

Clipboard

Data

Queries

Insert


Calculations

Sensitivity

Share

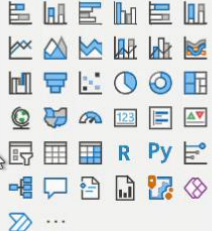
Build visuals with your data

Select or drag fields from the Fields pane onto the report canvas.



Visualizations

Build visual



Values

Add data fields here

Drill through

Cross-report

Keep all filters

Add drill-through fields here

Fields

Search

ALL CB Bridges and Str...

Page 1

# **Publish the dashboard**

FileHomeInsertModelingViewHelp

Paste

Cut

Copy

Format painter

Clipboard

Get data

Excel workbook

Data hub

SQL Server

Enter data

Dataverse

Recent sources

Transform data

Refresh data

Queries

New visual

Text box

More visuals

Insert

New measure

Quick measure

Calculations

Sensitivity

Sensitivity

Publish

Share

Category Name

- Generic Models
- Railings
- Structural Foundations
- Structural Framing
- Structural Stiffeners

01.00-FileName

- SBR-SECT1\_ST02-M3-CB-00001
- SBR-SECT1\_ST03-M3-CB-00301
- SBR-SECT1\_ST05-M3-CB-00501
- SBR-SECT1\_ST06-M3-CB-00601
- SBR-SECT1\_ST09-M3-CB-00901
- SBR-SECT1\_ST88-M3-CB-08801
- SBR-SECT2\_ST10-M3-CB-01001
- SBR-SECT3\_ST45-M3-CB-04501
- SBR-SECT5\_ST28-M3-CB-02801
- SBR-SECT5\_ST31-M3-CB-03101
- SBR-SECT5\_ST38-M3-CB-03801
- SBR-SECT6\_ST40-M3-CB-04001

01.02-Location

- SECT1\_ST02
- SECT1\_ST03
- SECT1\_ST05
- SECT1\_ST06
- SECT1\_ST09
- SECT1\_ST88
- SECT2\_ST10
- SECT3\_ST45
- SECT5\_ST28
- SECT5\_ST31
- SECT5\_ST38
- SECT6\_ST40

Count of 03.01-Material by 03.01-Material

Material	Count	Percentage
TBC	1.33K	44.5%
WeatheringSteel	0.81K	26.9%
ConcreteCast-in-Place	0.65K	21.6%
ConcretePrecast	0.14K	4.6%
WeatheringSteel-Plate	0.08K	2.5%

Count of 03.02-MaterialGrade by 03.02-MaterialGrade

MaterialGrade	Count	Percentage
TBC	1.33K	44.5%
S355	0.87K	29.1%
C40/50	0.32K	10.7%
C32/40	0.31K	10.2%
C35/45	0.08K	2.5%
C25/30	0.08K	2.5%
C50/60	0.08K	2.5%
C57/70	0.08K	2.5%
220	0.08K	2.5%

Visualizations

Fields

Filters

Values

Drill through

Cross-report

Keep all filters

Add drill-through fields here

Page 1 of 1

81%

# Creating a Health Check

FileHomeHelp

PasteCutCopy

Get dataExcelData hubSQL ServerEnter dataDatawarehouseRecent sources

Transform dataRefreshQueries

Manage relationshipsManage rolesView asSecurity

Q&A setupLanguageQ&ALinguistic schema

SensitivitySensitivity

PublishShare

ALL CB Bridges and S...

\_0103-ElementID::string

Collapse

PropertiesFields

Cards

Search

Show the database in the header when applicable

No

Show related fields when card is collapsed

Yes

Pin related fields to top of card

No

ALL CB Bridges and Structures

01.00-FileName

☐ SBR-SECT1\_ST02-M3-CB-00001

☐ SBR-SECT1\_ST03-M3-CB-00301

☐ SBR-SECT1\_ST05-M3-CB-00501

☐ SBR-SECT1\_ST06-M3-CB-00601

☐ SBR-SECT1\_ST09-M3-CB-00901

☐ SBR-SECT1\_ST88-M3-CB-08801

☐ SBR-SECT2\_ST10-M3-CB-01001

☐ SBR-SECT3\_ST45-M3-CB-04501

☐ SBR-SECT5\_ST28-M3-CB-02801

☐ SBR-SECT5\_ST31-M3-CB-03101

☐ SBR-SECT5\_ST38-M3-CB-03801

☐ SBR-SECT6\_ST40-M3-CB-04001

Count of Check by Check

Check	Count	Percentage
False	1,07K	30.08%
True	2,49K	69.92%

01.05-Layer

Check

CB-Pr2085-M-Angles_150x150x10mm	False
CB-Pr2085-M-Angles_150x75x10mm	False
CB-Pr2085-M-BeamConcrete_1200mmW8Beam1	False
CB-Pr2085-M-BeamConcrete_U12	False
CB-Pr2085-M-BeamConcrete_W13	False
CB-Pr2085-M-BeamConcrete_W9	False
CB-Pr2085-M-Bearings_320x165mm	False
CB-Pr2085-M-Bearings_350x400mm	False
CB-Pr2085-M-Bearings_400x350mm	False
CB-Pr2085-M-Bearings_400x460mm	False
CB-Pr2085-M-Bearings_460x400mm	False
CB-Pr2085-M-Bearings_700x600mm	False
CB-Pr2085-M-Bearings_800x700mm	False
CB-Pr2085-M-BearingsPlate_520x350mm	False
CB-Pr3590-M-MatExpansionJoint_300mm	False
CB-Ss2005-M-Foundation_1000mm	False
CB-Ss2005-M-Foundation_500mm	False

Filters

Search

Filters on this visual

01.05-Layer is (All)

Check is (All)

Add data fields here

Filters on this page

Add data fields here

Filters on all pages

Add data fields here

Visualizations

Build visual

01.05-Layer

Check

Columns

01.05-Layer

Check

Drill through

Cross-report

Keep all filters

Add drill-through fields here

Fields

layer

ALL CB Bridges and Str...

01.05-Layer

Layer

LOI

Agreed Layer

Page 1

Health check

# The finished product

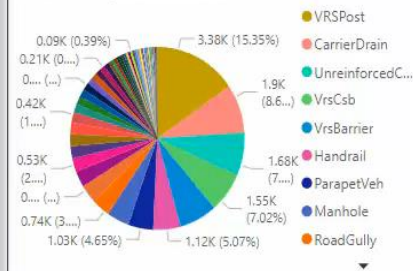


## Attribute Dashboard No. 1

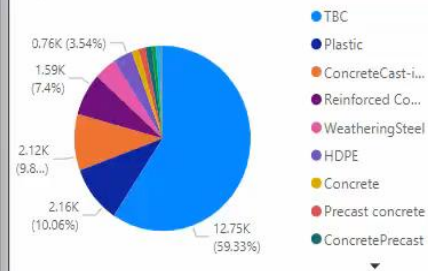
### Elements Counter

23.42K

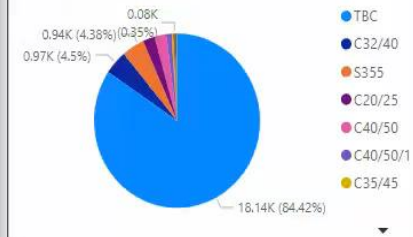
01.06 - Design Classification



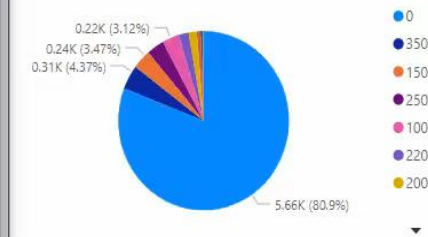
03.01 - Material

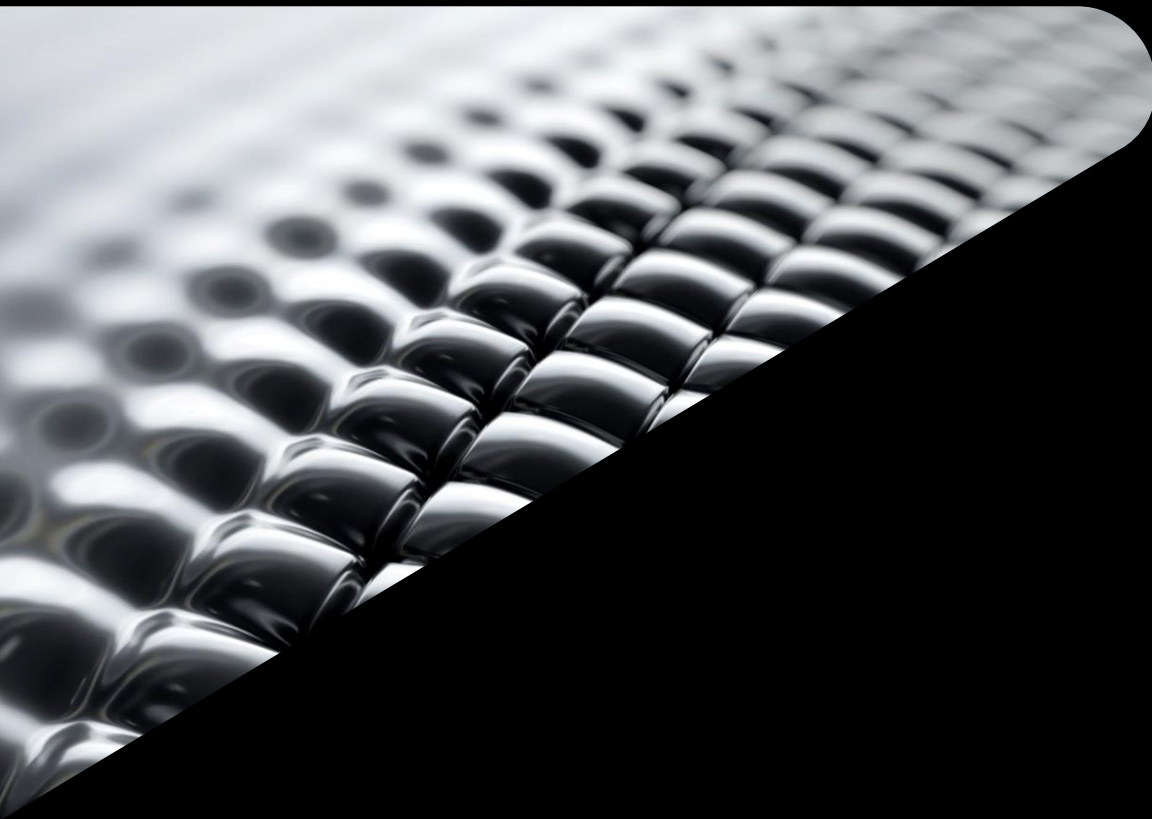


03.02 - Material Grade



03.03 - Reinf. Ratio





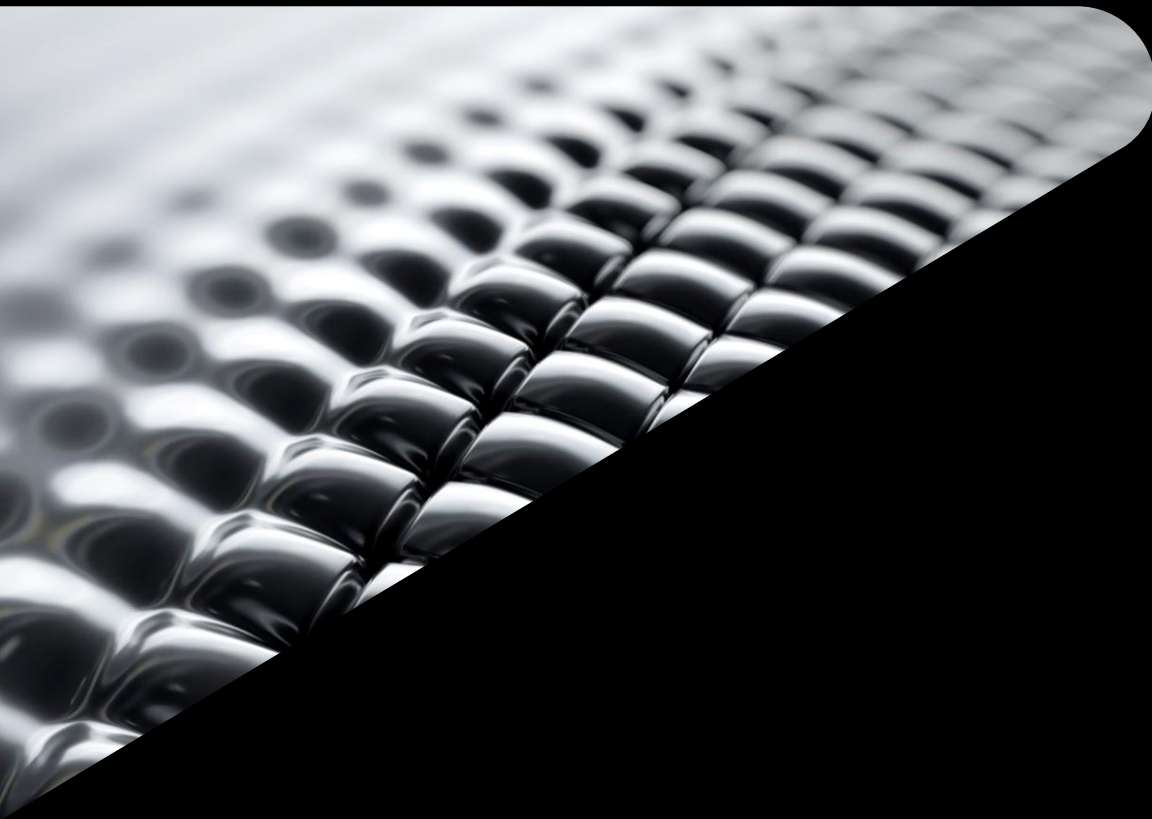
**The outcome**



# Our solution

- Models can be rapidly published and checked
- Clear visibility of all attributes
- Engineers understand design intent
- We have robust method of checking our deliverables

***Confidence and clarity***



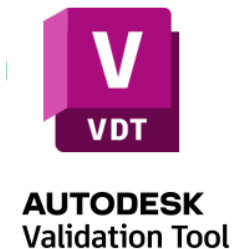
**Next steps**

# Next steps

Forge..



Autodesk Validation Tool..



Carbon...



Scale..





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