

Cloud-based Clash Detection for Megaprojects Using BIM 360's Model Coordination

Cameron Schaefer

BIM Lead, HDR Inc.

Pedram Oskouie

Deputy BIM Manager, HDR Inc.





About the speaker

Cameron Schaefer

- BIM Lead for the LAX Automated People Mover (APM) Project
- Experienced design technology leader and innovator
- Professional Engineer with design background of over 8 years of highway/roadway, drainage and transit design
Delivering projects from design to construction.
- Extensive experience specializing in blending horizontal (Civil) and vertical (Architectural) projects across multiple platforms



About the speaker

Pedram Oskouie

- Design Team's Deputy BIM Manager for the LAX Automated People Mover (APM) project.
- Researching and working in the AEC industry focusing on BIM and Reality Capture since 2012.
- Involved in multiple aviation and transportation projects in Los Angeles.
- PhD degree in Civil Engineering from the University of Southern California
- Published in academic Journals and conference proceedings of the American Society of Civil Engineers

LAX APM project introduction





LAX APM by the numbers

\$2 B

CONSTRUCTION COST

\$ 5 B Total Project Cost
25 Year O&M Contract

180+

MODELS

Revit
Civil 3D
InfraWorks
Inventor

300+

DESIGNERS

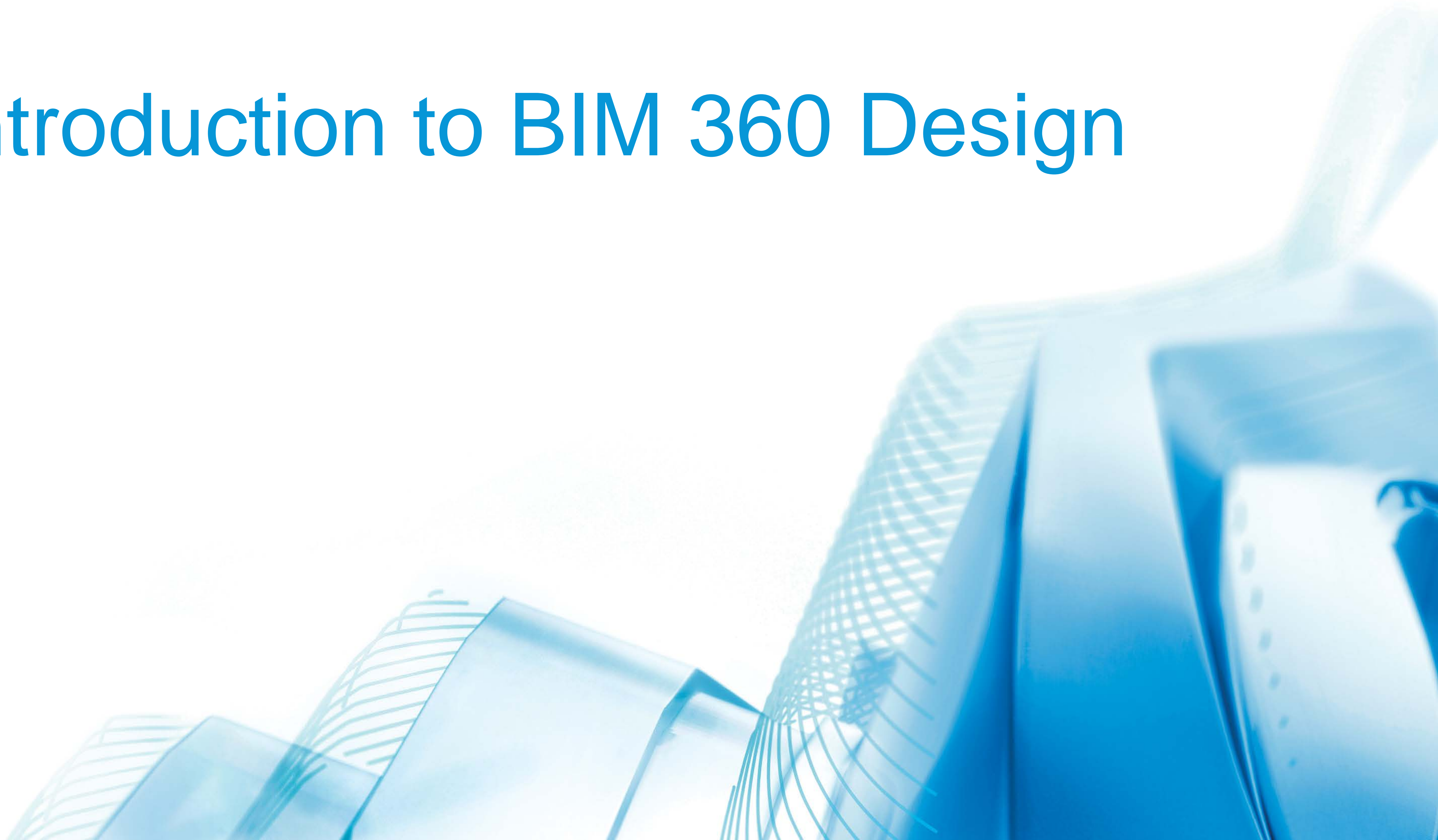
Architecture	Plumbing
Wayfinding	Structural Station
Communication	Structural Guideway
Power Distribution	Roadway
Mechanical	Utilities
Electrical	Drainage

15+

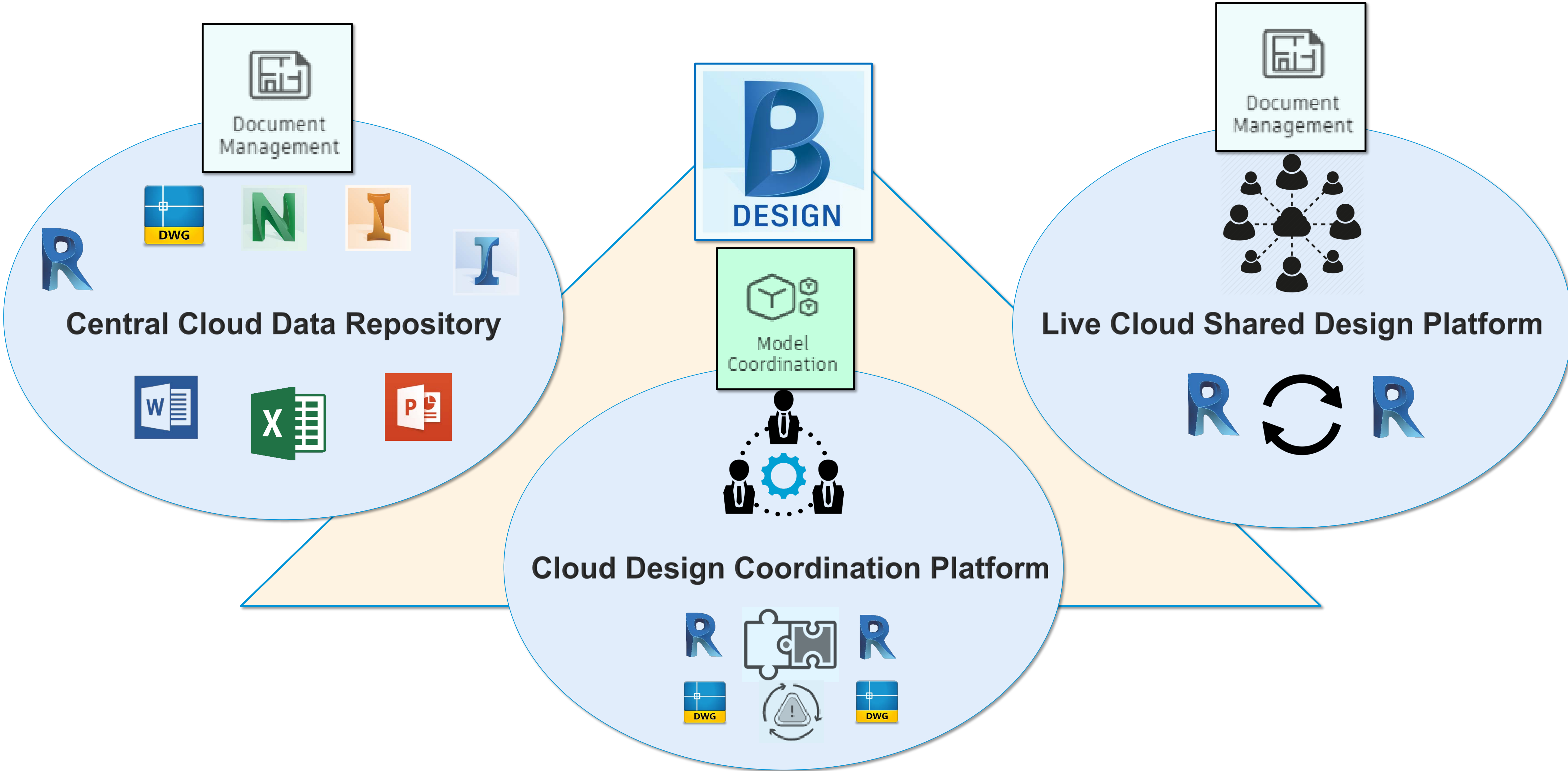
DESIGN FIRMS

33 Offices
22 Cities
9 States
5 Time Zones

Introduction to BIM 360 Design



An All-in-one Cloud-based Design Platform



BIM 360 Design - Document Management



Document Management Folder Structure for APM

AUTODESK BIM 360™

HDR > 10105509_LAWA_APM

Document Management

FOLDERS

REVIEWS

TRANSMITTALS

ISSUES

View by

Folders

Sets

Plans

APM Full Project

CCTA

ECTA

EITF

MSF

P2A & P2B

TPSS1

TPSS3

WCTA

WITF

Project Files

1.0 Project Standards

2.0 Common References

3.0 Revit Models

4.0 NavisWorks Federated Model

5.0 Shared Models - For Reference ...

6.0 Tests

7.0 Autodesk SCO Training

8.0 Archive

Revit Upgrade Report

Upload Files

Showing 10 items

Search for documents

<input type="checkbox"/> Name ^	Title	Set ▼	Version	Last updated	Updated by	Status	File Nam ⚙
<input type="checkbox"/> APM Full Project	--	--	--	Oct 16, 2019 4:12 PM	Pedram Oskouie	--	--
<input type="checkbox"/> CCTA	--	--	--	Oct 10, 2019 9:47 AM	Cameron Schaefer	--	--
<input type="checkbox"/> ECTA	--	--	--	Oct 10, 2019 9:48 AM	Pedram Oskouie	--	--
<input type="checkbox"/> EITF	--	--	--	Oct 10, 2019 9:49 AM	Cameron Schaefer	--	--
<input type="checkbox"/> MSF	--	--	--	Oct 11, 2019 9:05 AM	Cameron Schaefer	--	--
<input type="checkbox"/> P2A & P2B	--	--	--	Oct 10, 2019 9:51 AM	Cameron Schaefer	--	--
<input type="checkbox"/> TPSS1	--	--	--	Oct 10, 2019 9:52 AM	Cameron Schaefer	--	--
<input type="checkbox"/> TPSS3	--	--	--	Oct 10, 2019 9:53 AM	Cameron Schaefer	--	--
<input type="checkbox"/> WCTA	--	--	--	Oct 10, 2019 9:54 AM	Cameron Schaefer	--	--
<input type="checkbox"/> WITF	--	--	--	Oct 10, 2019 9:55 AM	Cameron Schaefer	--	--

Document Management Folder Structure – Project Files – Cloud Shared Models

AUTODESK BIM 360

HDR > 10105509_LAWA_APM

Document Management

FOLDERSREVIEWSTRANSMITTALSISSUES

View by

Folders

Sets

Plans

APM Full Project

CCTA

ECTA

EITF

MSF

P2A & P2B

TPSS1

TPSS3

WCTA

WITF

Project Files

1.0 Project Standards

2.0 Common References

3.0 Revit Models

4.0 NavisWorks Federated Model

5.0 Shared Models - For Reference ...

6.0 Tests

7.0 Autodesk SCO Training

8.0 Archive

Revit Upgrade Report

Upload Files

Showing 15 items

Search for documents

<input type="checkbox"/> Name ^	Description	Version	Size	Last updated	Updated by	Status	Set
<input type="checkbox"/> 3.1 Civil 3D Reference Models	--	--	--	May 14, 2019 2:24 PM	Cameron Schaefer	--	--
<input type="checkbox"/> CCTA	--	--	--	Dec 20, 2018 9:06 AM	Cameron Schaefer	--	--
<input type="checkbox"/> Consumed	--	--	--	Oct 15, 2019 7:13 AM	Cameron Schaefer	--	--
<input type="checkbox"/> CRAC	--	--	--	Jun 6, 2019 8:54 AM	Ally Polancic	--	--
<input type="checkbox"/> ECTA	--	--	--	Oct 11, 2019 9:07 AM	Allyn Polancic	--	--
<input type="checkbox"/> EITF	--	--	--	May 31, 2018 10:35 AM	Cameron Schaefer	--	--
<input type="checkbox"/> MSF	--	--	--	May 31, 2018 10:35 AM	Cameron Schaefer	--	--
<input type="checkbox"/> P2A & P2B	--	--	--	May 31, 2018 10:36 AM	Cameron Schaefer	--	--
<input type="checkbox"/> Project-wide	--	--	--	Jun 6, 2019 2:20 PM	Ally Polancic	--	--
<input type="checkbox"/> TPSS1	--	--	--	Jun 3, 2019 12:52 PM	Ally Polancic	--	--
<input type="checkbox"/> TPSS3	--	--	--	Nov 29, 2018 12:45 PM	Ally Polancic	--	--
<input type="checkbox"/> WCTA	--	--	--	May 31, 2018 10:35 AM	Cameron Schaefer	--	--
<input type="checkbox"/> WITF	--	--	--	May 31, 2018 10:36 AM	Cameron Schaefer	--	--
<input type="checkbox"/> APM-VIS-EXIST-20.rvt	Visualization Only	V4	51.9 MB	Oct 7, 2019 4:43 PM	Cameron Schaefer		
<input type="checkbox"/> APM-VIS-PROP-20.rvt	Visualization Only	V17	2.2 GB	Oct 7, 2019 4:43 PM	Cameron Schaefer		

Document Management Folder Structure – Project Files – Cloud Shared Models

AUTODESK BIM 360

HDR > 10105509_LAWA_APM

Document Management

FOLDERSREVIEWSTRANSMITTALSISSUES

View by

Folders

Sets

Plans

APM Full Project

CCTA

ECTA

EITF

MSF

P2A & P2B

TPSS1

TPSS3

WCTA

WITF

Project Files

1.0 Project Standards

2.0 Common References

3.0 Revit Models

3.1 Civil 3D Reference Models

CCTA

Consumed

CRAC

ECTA

EITF

MSF

Showing 9 items

Search for documents

Upload Files

<input type="checkbox"/>	Name ^	Description	Version	Size	Last updated	Updated by	Status	Set	
<input type="checkbox"/>	Architecture	--	--	--	Jan 8, 2019 5:54 PM	Ally Polancic	--	--	
<input type="checkbox"/>	Bombardier Modeling PCO	--	--	--	Aug 8, 2019 12:56 PM	Cameron Schaefer	--	--	
<input type="checkbox"/>	Communications	--	--	--	Jul 17, 2019 11:10 AM	Shawn Nishimura	--	--	
<input type="checkbox"/>	Lighting	--	--	--	Dec 20, 2018 9:07 AM	Cameron Schaefer	--	--	
<input type="checkbox"/>	MEPFP	--	--	--	Dec 20, 2018 9:07 AM	Cameron Schaefer	--	--	
<input type="checkbox"/>	PDS	--	--	--	Jun 22, 2018 8:36 AM	Christopher Sowers	--	--	
<input type="checkbox"/>	Structure	--	--	--	Feb 26, 2019 2:01 PM	Cameron Schaefer	--	--	
<input type="checkbox"/>	Wayfinding	--	--	--	Mar 21, 2019 2:58 PM	Cameron Schaefer	--	--	
<input type="checkbox"/>	APM-CCTA-ALL-20.rvt	CCTA Federated	V72	1.2 GB	Oct 13, 2019 5:47 PM	Allyn Polancic			

Document Management Folder Structure – Project Files – Cloud Shared Models

AUTODESK BIM 360

HDR > 10105509_LAWA_APM

Document Management

FOLDERS

REVIEWS

TRANSMITTALS

ISSUES

View by

Folders

Sets

Plans

APM Full Project

CCTA

ECTA

EITF

MSF

P2A & P2B

TPSS1

TPSS3

WCTA

WITF

Project Files

1.0 Project Standards

2.0 Common References

3.0 Revit Models

3.1 Civil 3D Reference Models

CCTA

Architecture

Bombardier Modeling PCO

Communications


Lighting

MEPFP

Showing 1 item

Search for documents

Upload Files

<input type="checkbox"/>	Name ^	Description	Version	Size	Last updated	Updated by	Status	Set
<input type="checkbox"/>	 APM-CCTA-A-20.rvt	Architecture	V109	1.4 GB	Oct 16, 2019 2:03 PM	Cameron Schaefer		

Document Management Folder Structure – Project Files – Cloud Shared Models

AUTODESK BIM 360

HDR > 10105509_LAWA_APM

Document Management

FOLDERSREVIEWSTRANSMITTALSISSUES

View by

Folders

Sets

Plans

APM Full Project

CCTA

ECTA

EITF

MSF

P2A & P2B

TPSS1

TPSS3

WCTA

WITF

Project Files

1.0 Project Standards

2.0 Common References

3.0 Revit Models

3.1 Civil 3D Reference Models

CCTA

Architecture

Bombardier Modeling PCO

Communications


Lighting

MEPFP

Upload Files

Showing 1 item

Search for documents

<input type="checkbox"/>	Name ^	Description	Version	Size	Last updated	Updated by	Status	Set
<input type="checkbox"/>	 APM-CCTA-A-20.rvt	Architecture	V109	1.4 GB	Oct 16, 2019 2:03 PM	Cameron Schaefer		

Document Management Folder Structure – Plans Folders – Published Models

AUTODESK® BIM 360™ | HDR > 10105509_LAWA_APM

Document Management

FOLDERSREVIEWSTRANSMITTALSISSUES

View by

FoldersSets

Plans

APM Full Project

CCTA

ECTA

EITF

MSF

P2A & P2B

TPSS1

TPSS3

WCTA

WITF

Project Files

1.0 Project Standards

2.0 Common References

3.0 Revit Models

4.0 NavisWorks Federated Model

5.0 Shared Models - For Reference ...

6.0 Tests

7.0 Autodesk SCO Training

8.0 Archive

Revit Upgrade Report

Upload Files

Showing 10 items

Search for documents

🗑️📅🔍

Name ^	Title	Set ▾	Version	Last updated	Updated by	Status	File Nam ⚙️
<input type="checkbox"/> APM Full Project	--	--	--	Oct 16, 2019 4:12 PM	Pedram Oskouie	--	--
<input type="checkbox"/> CCTA	--	--	--	Oct 10, 2019 9:47 AM	Cameron Schaefer	--	--
<input type="checkbox"/> ECTA	--	--	--	Oct 10, 2019 9:48 AM	Pedram Oskouie	--	--
<input type="checkbox"/> EITF	--	--	--	Oct 10, 2019 9:49 AM	Cameron Schaefer	--	--
<input type="checkbox"/> MSF	--	--	--	Oct 11, 2019 9:05 AM	Cameron Schaefer	--	--
<input type="checkbox"/> P2A & P2B	--	--	--	Oct 10, 2019 9:51 AM	Cameron Schaefer	--	--
<input type="checkbox"/> TPSS1	--	--	--	Oct 10, 2019 9:52 AM	Cameron Schaefer	--	--
<input type="checkbox"/> TPSS3	--	--	--	Oct 10, 2019 9:53 AM	Cameron Schaefer	--	--
<input type="checkbox"/> WCTA	--	--	--	Oct 10, 2019 9:54 AM	Cameron Schaefer	--	--
<input type="checkbox"/> WITF	--	--	--	Oct 10, 2019 9:55 AM	Cameron Schaefer	--	--

🎓

Document Management Folder Structure – Plans Folders – Published Models

AUTODESK BIM 360

HDR > 10105509_LAWA_APM

Document Management

FOLDERSREVIEWSTRANSMITTALSISSUES

View by

FoldersSets

Plans

APM Full Project

CCTA

ECTA

EITF

MSF

P2A & P2B

TPSS1

TPSS3

WCTA

WITF

Project Files

1.0 Project Standards

2.0 Common References

3.0 Revit Models

4.0 NavisWorks Federated Model

5.0 Shared Models - For Reference ...

6.0 Tests

7.0 Autodesk SCO Training

8.0 Archive

Revit Upgrade Report

Upload Files

Showing 9 items

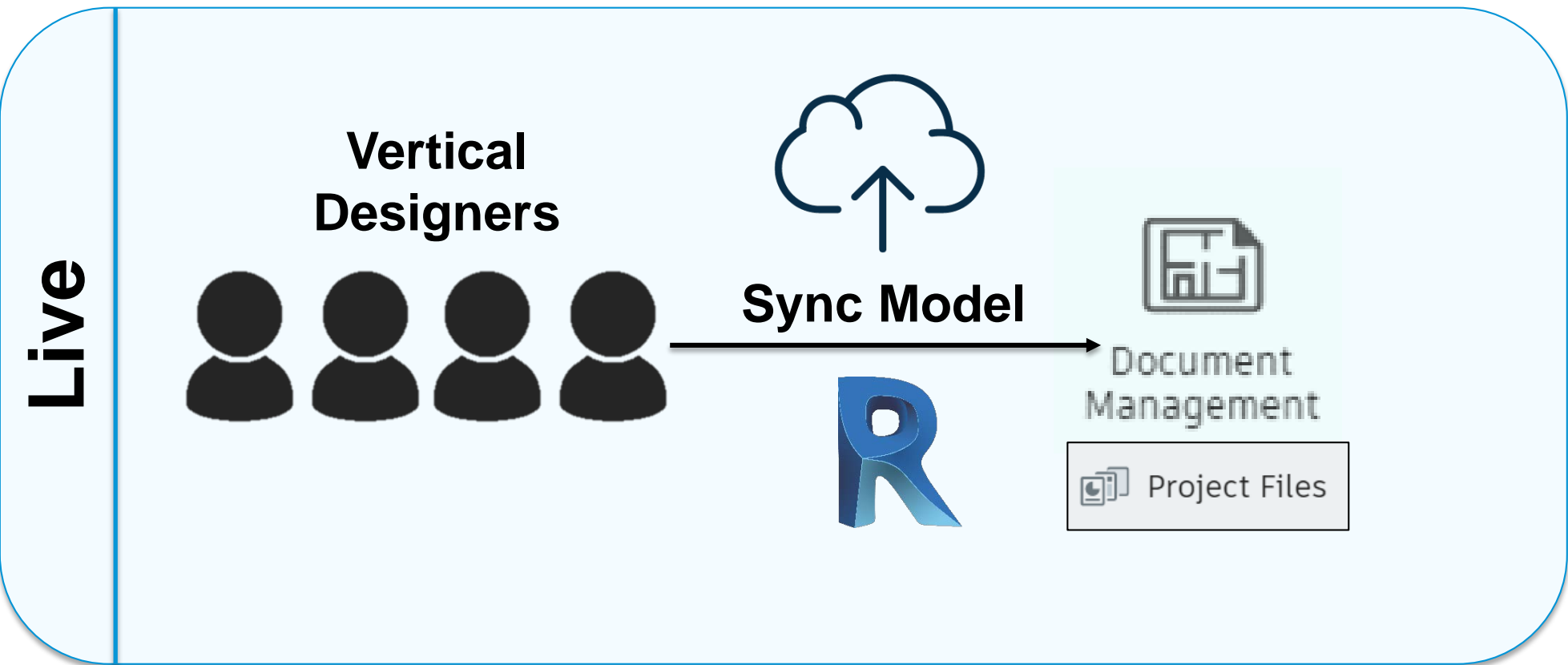
Search for documents

Icons

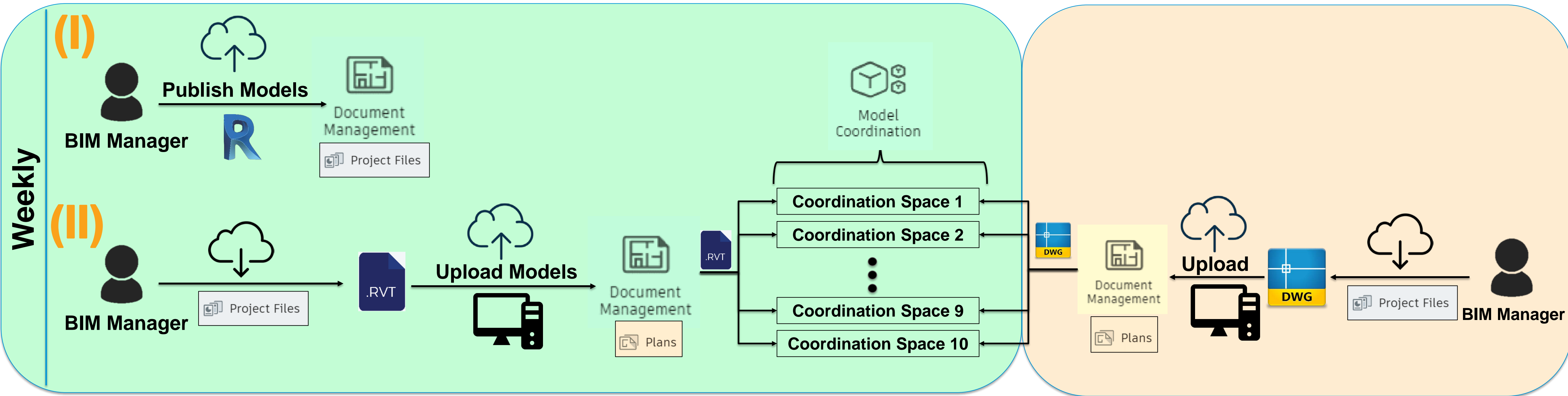
Name ^	Description	Version	Size	Last updated	Updated by	Status	Set
1.0 Project Standards	--	--	--	May 25, 2018 10:41 AM	Pedram Oskoule	--	--
2.0 Common References	--	--	--	Apr 9, 2019 10:36 AM	Pedram Oskoule	--	--
3.0 Revit Models	--	--	--	Aug 19, 2019 10:57 PM	Ally Polancic	--	--
4.0 NavisWorks Federated Model	--	--	--	May 14, 2019 2:20 PM	Cameron Schaefer	--	--
5.0 Shared Models - For Reference Only	--	--	--	Jul 12, 2018 3:23 PM	Cameron Schaefer	--	--
6.0 Tests	--	--	--	Aug 19, 2019 2:52 PM	Cameron Schaefer	--	--
7.0 Autodesk SCO Training	--	--	--	Jul 20, 2018 7:55 AM	Pedram Oskoule	--	--
8.0 Archive	--	--	--	Aug 30, 2019 10:04 AM	Christopher Sowers	--	--
Revit Upgrade Report	--	--	--	Oct 4, 2019 9:30 PM	Ryan H Cook	--	--

Workflow of Setting up Models for Cloud-based Coordination in B360 Design

Vertical Models



Horizontal Models



Setting Up Work Spaces in “Admin” Menu

AUTODESK BIM 360

HDR > 10105509_LAWA_APM

Document Management

FOLDERS

REVIEWS

TRANSMITTALS

ISSUES

View by

Folders

Sets

Plans

APM Full Project

CCTA

ECTA

EITF

MSF

P2A & P2B

TPSS1

TPSS3

WCTA

WITF

Project Files

1.0 Project Standards

2.0 Common References

3.0 Revit Models

4.0 NavisWorks Federated Model

5.0 Shared Models - For Reference ...

6.0 Tests

7.0 Autodesk SCO Training

8.0 Archive

Revit Upgrade Report

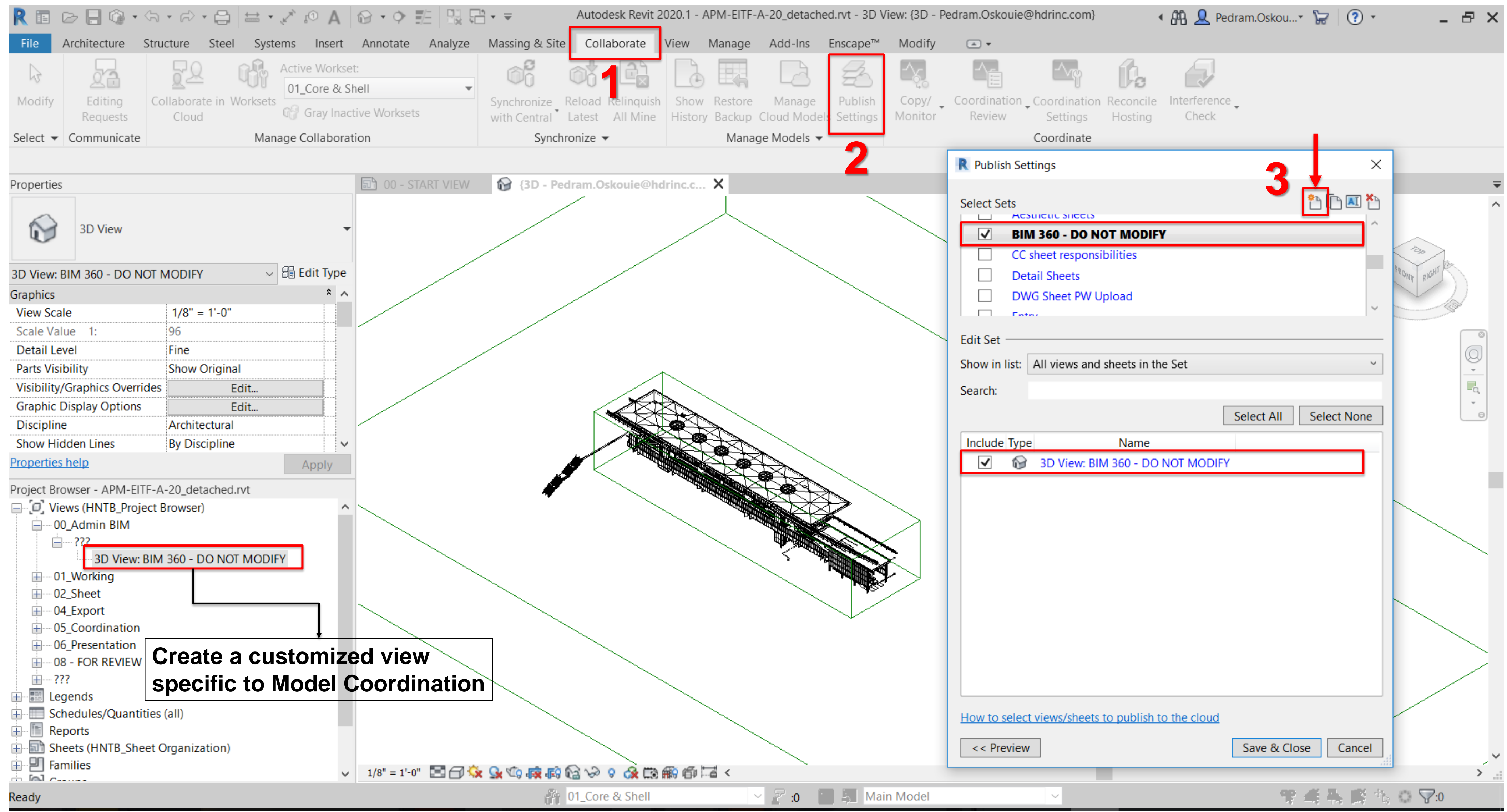
Upload Files

Showing 10 items

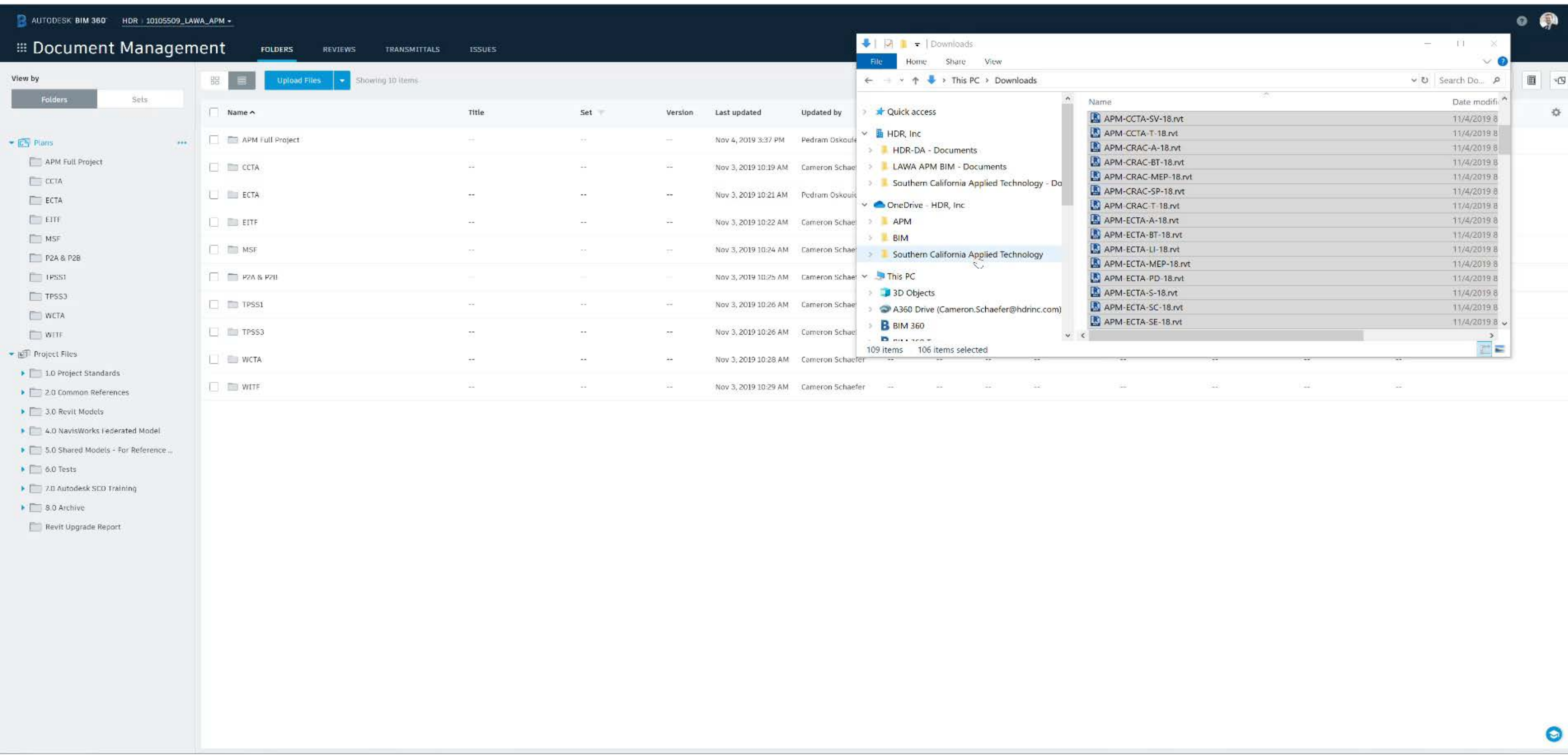
Search for documents

<input type="checkbox"/>	Name ^	Title	Set ▾	Version	Last updated	Updated by	Status ⚙
<input type="checkbox"/>	APM Full Project	--	--	--	Oct 16, 2019 4:12 PM	Pedram Oskouie	--
<input type="checkbox"/>	CCTA	--	--	--	Oct 10, 2019 9:47 AM	Cameron Schaefer	--
<input type="checkbox"/>	ECTA	--	--	--	Oct 10, 2019 9:48 AM	Pedram Oskouie	--
<input type="checkbox"/>	EITF	--	--	--	Oct 10, 2019 9:49 AM	Cameron Schaefer	--
<input type="checkbox"/>	MSF	--	--	--	Oct 11, 2019 9:05 AM	Cameron Schaefer	--
<input type="checkbox"/>	P2A & P2B	--	--	--	Oct 10, 2019 9:51 AM	Cameron Schaefer	--
<input type="checkbox"/>	TPSS1	--	--	--	Oct 10, 2019 9:52 AM	Cameron Schaefer	--
<input type="checkbox"/>	TPSS3	--	--	--	Oct 10, 2019 9:53 AM	Cameron Schaefer	--
<input type="checkbox"/>	WCTA	--	--	--	Oct 10, 2019 9:54 AM	Cameron Schaefer	--
<input type="checkbox"/>	WITF	--	--	--	Oct 10, 2019 9:55 AM	Cameron Schaefer	--

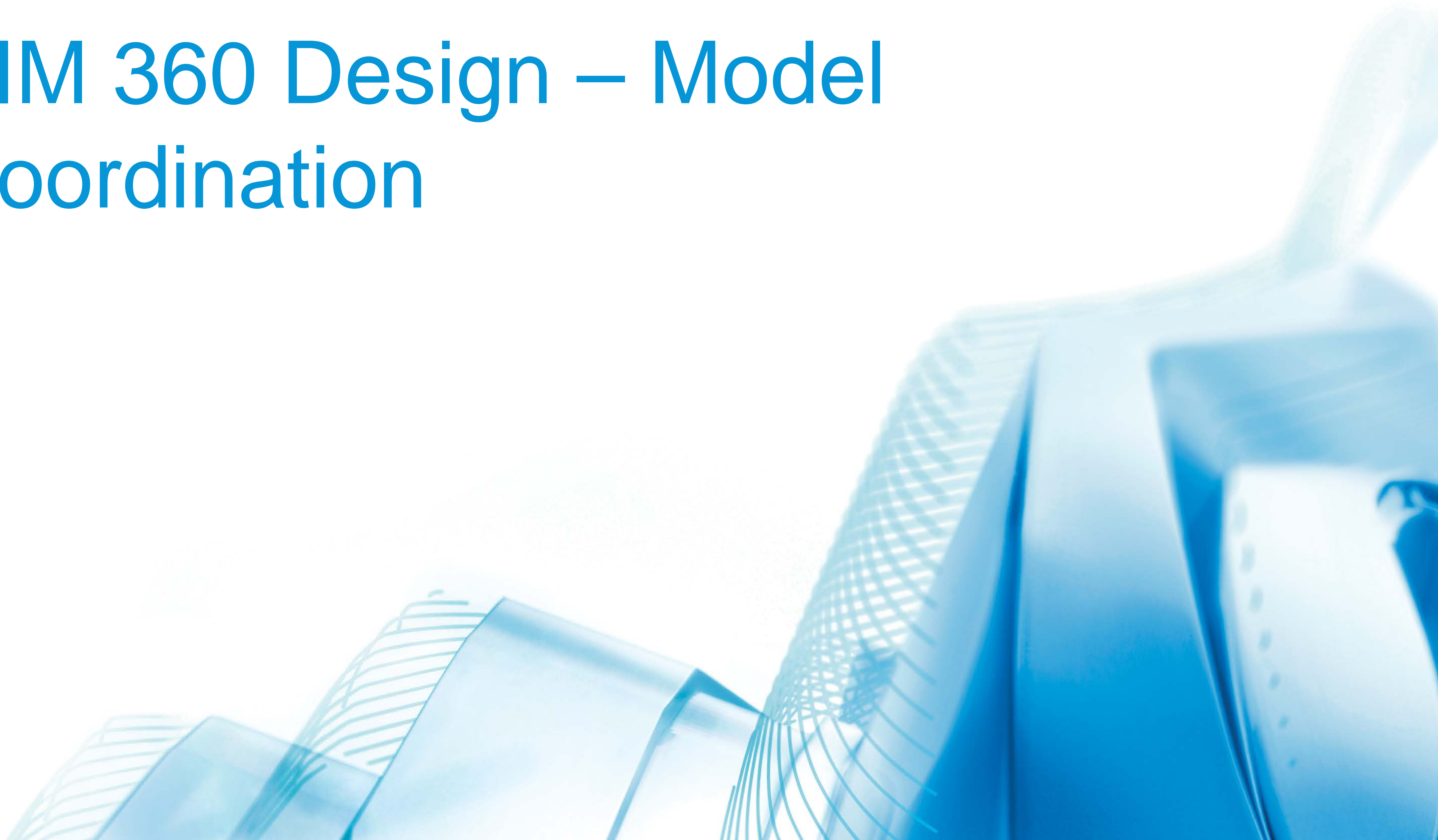
Weekly Model Publishing Process – Preparing the Revit Models



Weekly Model Publishing Process – Publish to Document Management



BIM 360 Design – Model Coordination



Model Coordination – Workspaces, Attributes, Number of Clashes

AUTODESK BIM 360

HDR

10105509_LAWA_APM

Model Coordination

MODELS

CLASHES

VIEWS

Search for models

Models

BIM 360 - DO NOT MODIFY_APM-WITF-A-18.rvt

BIM 360 - DO NOT MODIFY_APM-WITF-S-18.rvt

BIM 360 - DO NOT MODIFY_APM-WITF-SWW-18.rvt

BIM 360 - DO NOT MODIFY_APM-WITF-T-18.rvt

BIM 360 - DO NOT MODIFY_APM-WITF-MEP-18.rvt

BIM 360 - DO NOT MODIFY_APM-WITF-PD-18.rvt

BIM 360 - DO NOT MODIFY_APM-WITF-SBS-18.rvt

BIM 360 - DO NOT MODIFY_APM-WITF-SP-18.rvt

BIM 360 - DO NOT MODIFY_APM-GWY-S-19.rvt

BIM 360 - DO NOT MODIFY_APM-WITF-BT-18.rvt

BIM 360 - DO NOT MODIFY_APM-WITF-LI-18.rvt

BIM 360 - DO NOT MODIFY_APM-WITF-SC-18.rvt

BIM 360 - DO NOT MODIFY_APM-WITF-SG-18.rvt

DA5277-WITF-Utilities-3D - 3D View

DA5277-WITFR-2R3-CI-3D - 3D View

DA5277-GWY-2GW3-UD-3D - 3D View

DA5277-UTIL-OCTA-VU-3D - 3D View

Contributor

Updated date

Cameron Schaefer HDR

10 Oct 2019 09:55

2622

Cameron Schaefer HDR

10 Oct 2019 09:55

547

Cameron Schaefer HDR

10 Oct 2019 09:55

91

Cameron Schaefer HDR

10 Oct 2019 09:55

323

Cameron Schaefer HDR

10 Oct 2019 09:55

2431

Cameron Schaefer HDR

10 Oct 2019 09:55

82

Cameron Schaefer HDR

10 Oct 2019 09:55

18

Cameron Schaefer HDR

10 Oct 2019 09:55

7

Cameron Schaefer HDR

10 Oct 2019 09:55

40

Cameron Schaefer HDR

10 Oct 2019 09:55

Cameron Schaefer HDR

10 Oct 2019 09:55

430

Cameron Schaefer HDR

10 Oct 2019 09:55

503

Cameron Schaefer HDR

10 Oct 2019 09:55

97

Cameron Schaefer HDR

1 Oct 2019 16:13

Cameron Schaefer HDR

1 Oct 2019 16:13

1

Cameron Schaefer HDR

1 Oct 2019 16:13

28

Cameron Schaefer HDR

1 Oct 2019 16:13

Last clash check 10 Oct 2019 10:01

All models

My models

Clashes with my models

Filters

Contributor

Select...

Company

Select...

Date

Clear all

Showing 22 of 22 models

Model Coordination – Creating Issues

AUTODESK BIM 360

HDR

10105509_LAWA_APM

Model Coordination

MODELS

CLASHES

VIEWS

Search for models

CCTA

Last clash check 6 Nov 2019 15:03

<input type="checkbox"/> Models	Contributor	Updated date	
<input type="checkbox"/> BIM 360 - DO NOT MODIFY_APM-CCTA-SP-18.rvt	Cameron Schaefer HDR	6 Nov 2019 14:50	14
<input type="checkbox"/> BIM 360 - DO NOT MODIFY_APM-CCTA-SE-18.rvt	Cameron Schaefer HDR	6 Nov 2019 14:50	222
<input type="checkbox"/> BIM 360 - DO NOT MODIFY_APM-CCTA-S-18.rvt	Cameron Schaefer HDR	6 Nov 2019 14:50	668
<input type="checkbox"/> BIM 360 - DO NOT MODIFY_APM-CCTA-SC-18.rvt	Cameron Schaefer HDR	6 Nov 2019 14:50	169
<input type="checkbox"/> DA5277-UTIL-Z1-US-3D - 3D View	Cameron Schaefer HDR	6 Nov 2019 14:50	1
<input type="checkbox"/> BIM 360 - DO NOT MODIFY_APM-CCTA-A-18.rvt	Cameron Schaefer HDR	6 Nov 2019 14:50	2232
<input type="checkbox"/> BIM 360 - DO NOT MODIFY_APM-CCTA-BT-18.rvt	Cameron Schaefer HDR	6 Nov 2019 14:50	
<input type="checkbox"/> DA5277-UTIL-ICTA-VU-3D - 3D View	Cameron Schaefer HDR	6 Nov 2019 14:50	126
<input type="checkbox"/> DA5277-UTIL-Z1LAWA-UE-3D - 3D View	Cameron Schaefer HDR	6 Nov 2019 14:50	18
<input type="checkbox"/> BIM 360 - DO NOT MODIFY_APM-CCTA-SG-18.rvt	Cameron Schaefer HDR	6 Nov 2019 14:50	75
<input type="checkbox"/> BIM 360 - DO NOT MODIFY_APM-CCTA-SV-18.rvt	Cameron Schaefer HDR	6 Nov 2019 14:50	355

Showing 23 of 23 models.

All models

My models

Clashes with my models

Filters

Contributor

Select...

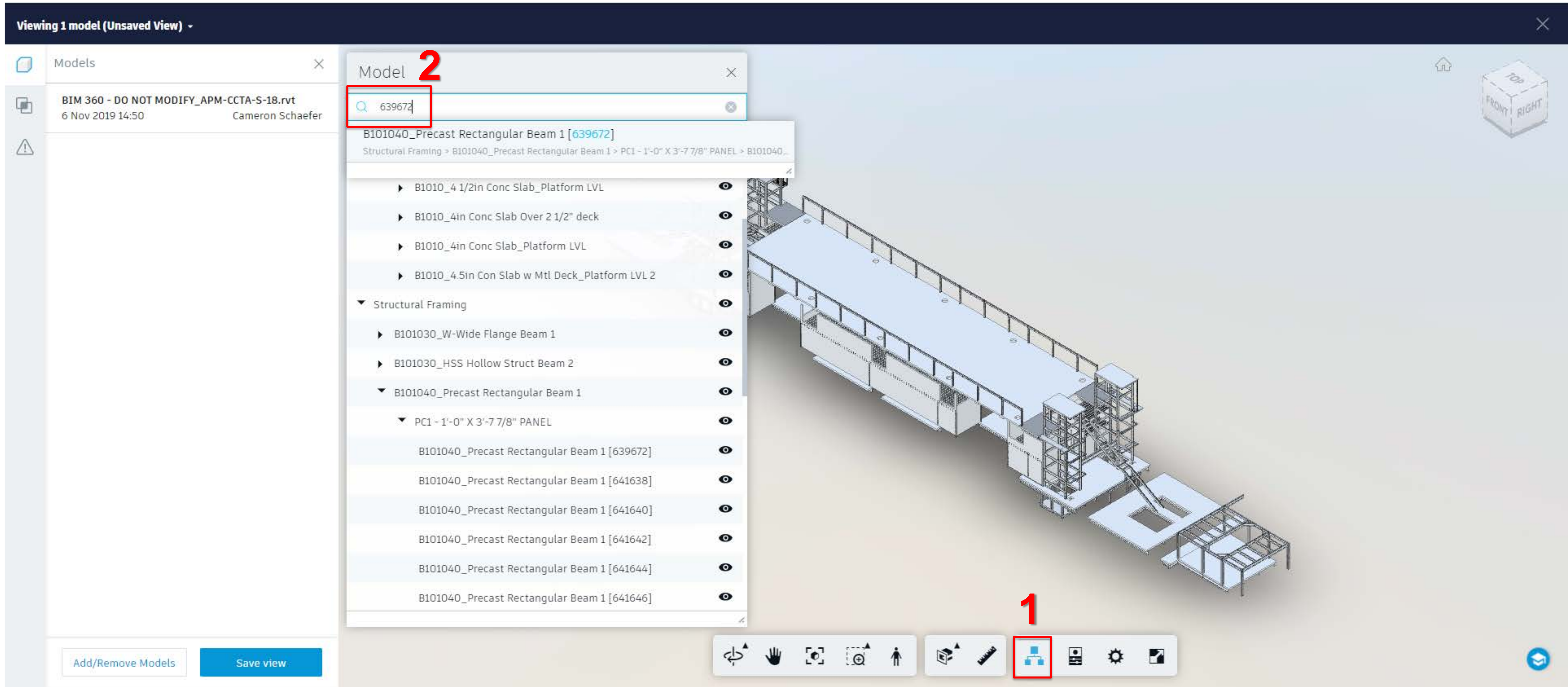
Company

Select...

Date

Clear all

Model Coordination – Searching an Element via Model Browser



Model Coordination – Working with Clashes Matrix

AUTODESK

BIM 360

HDR

10105509_LAWA_APM

Model Coordination

MODELS

CLASHES

VIEWS

Active

Assigned

Closed

TPSS3

Last clash check 6 Nov 2019 15:24

All models

Search for models

	BIM 360...OT MODIFY_APM-GWY- S-19.rvt	BIM 360...OT MODIFY_APM- TPSS3-A-18.rvt	BIM 360...OT MODIFY_APM- TPSS3-BT-18.rvt	BIM 360...OT MODIFY_APM- TPSS...P-18.rvt	BIM 360...OT MODIFY_APM- TPSS3-PD-18.rvt	BIM 360...OT MODIFY_APM- TPSS3-S-18.rvt	BIM 360...OT MODIFY_APM- TPSS3-SP-18.rvt	BIM 360...OT MODIFY_APM- TPSS3-T-18.rvt	DA5277-U... 3D View	DA5277-... 3D View
BIM 360 - DO NOT M...FY_APM-GWY-S-19.rvt 19 clash groups									19	
BIM 360 - DO NOT M..._APM-TPSS3-A-18.rvt 21 clash groups				7	3	8		4		
BIM 360 - DO NOT ...APM-TPSS3-BT-18.rvt 0 clash groups										
BIM 360 - DO NOT M...PM-TPSS3-MEP-18.rvt 250 clash groups		37			71	193				
BIM 360 - DO NOT ...APM-TPSS3-PD-18.rvt 30 clash groups		1		20		12				
BIM 360 - DO NOT M..._APM-TPSS3-S-18.rvt 43 clash groups		11		32	6			2		
BIM 360 - DO NOT ...APM-TPSS3-SP-18.rvt 0 clash groups										
BIM 360 - DO NOT M..._APM-TPSS3-T-18.rvt 5 clash groups		4				2				
DA5277-UTIL-OCTA-VU-3D - 3D View 32 clash groups	29									3
DA5277-UTIL-PW-3D - 3D View 4 clash groups									4	



Model Coordination – Views

AUTODESK BIM 360 | HDR > 10105509_LAWA_APM

Model Coordination

MODELSCLASHESVIEWS

ActiveAssignedClosed

WCTA

Last clash check 6 Nov 2019 15:46

All models

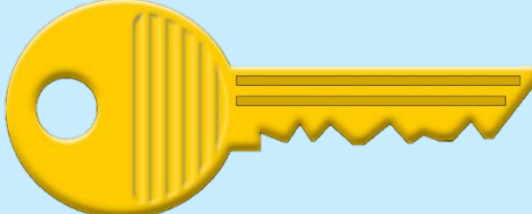
Search for models

	BIM 360...OT MODIFY_APM-GWY- S-19.rvt	BIM 360...OT MODIFY_APM- UWW-S-19.rvt	BIM 360...OT MODIFY_APM- WCTA-A-18.rvt	BIM 360...OT MODIFY_APM- WCTA-BT-18.rvt	BIM 360...OT MODIFY_APM- WCTA-E-18.rvt	BIM 360...OT MODIFY_APM- WCTA-LI-18.rvt	BIM 360...OT MODIFY_APM- WCTA-MP-18.rvt	BIM 360...OT MODIFY_APM- WCTA-PD-18.rvt	BIM 360...OT MODIFY_APM- WCTA-S-18.rvt	BIM 360...OT MODIFY_APM- WCTA-SP-18.rvt	BIM 360...OT MODIFY_APM- WCTA-SV-18.rvt	BIM 360...OT MODIFY_APM- WCTA-T-18.rvt	DA5277-...- 3D View	DA5277-L... 3D View	DA5277-U... 3D View	DA5277-...- 3D View	DA5277-U... 3D View	DA5277-...- 3D View	DA5277-U... 3D View	DA5277-U... 3D View	DA5277-U... 3D View	DA5277-U... 3D View
BIM 360 - DO NOT M...FY_APM-GWY-S-19.rvt 18 clash groups					4								7		9							
BIM 360 - DO NOT M...FY_APM-UWW-S-19.rvt 27 clash groups			2											7	1							
BIM 360 - DO NOT ...Y_APM-WCTA-A-18.rvt 2612 clash groups		4			491	586	706	7	1334	4	413	113		41	7			1	1			
BIM 360 - DO NOT M..._APM-WCTA-BT-18.rvt 0 clash groups																						
BIM 360 - DO NOT ...Y_APM-WCTA-E-18.rvt 3470 clash groups	8		1389			1550	337	39	996	10	95	86		13	35			2			1	
BIM 360 - DO NOT M..._APM-WCTA-LI-18.rvt 1473 clash groups			492		1455		52		197		19	14										
BIM 360 - DO NOT M..._APM-WCTA-MP-18.rvt 3927 clash groups			2773		544	300			1402		511	22		25	29	7		1	4			
BIM 360 - DO NOT M..._APM-WCTA-PD-18.rvt 115 clash groups			113		4				9					1	2							
BIM 360 - DO NOT ...Y_APM-WCTA-S-18.rvt 2176 clash groups			1608		402	170	433	2			8	28		47	162		1	3	5		3	
BIM 360 - DO NOT M..._APM-WCTA-SP-18.rvt 16 clash groups			4		9							2		1								
BIM 360 - DO NOT M..._APM-WCTA-SV-18.rvt 650 clash groups			505		55	8	204		3			20		8	12	2						

Team Responsibilities to Enable An Effective Cloud-based Clash Detection



Designer's Responsibilities

Design	Coordination	Administrative
<ul style="list-style-type: none">✓ Keeping design model up to date✓ Keeping design models clean✓ Managing design worksets to reduce false positive clashes	<ul style="list-style-type: none">✓ Weekly monitoring of active clashes via Clashes Matrix✓ Closing the non-issue (false positive) clashes✓ Addressing clashes that he/she is assigned to✓ Tagging and assigning people to clashes that need review	<ul style="list-style-type: none">✓ Notifying the project's BIM manager on updates to the design scope✓ Notifying the project's BIM manager if there is a new designer added to the team✓ Notifying the project's BIM manager if there is an update to the team's contact info
<div>Active Communication</div> 		

BIM Manager's Responsibilities

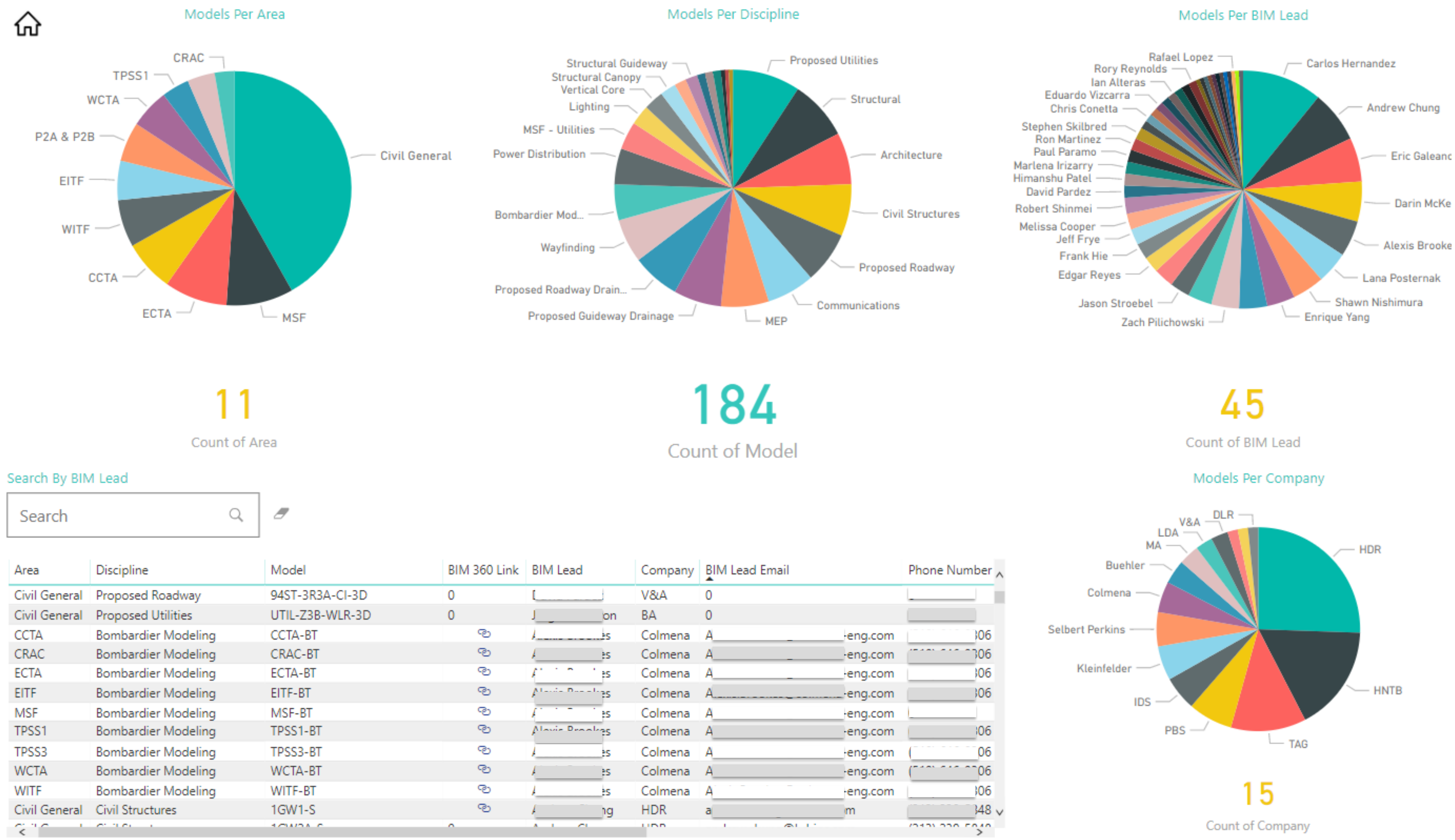
Design	Coordination	Administrative & Project Controls
<div><div>✓</div>Creating and maintaining appropriate views for publishing to B360</div> <div><div>✓</div>Weekly synchronizing and publishing of models</div> <div><div>✓</div>Continuous QCing of the model worksets and Xrefs linked to the models</div>	<div><div>✓</div>Maintaining and managing Model Coordination</div> <div><div>✓</div>Closing out the addressed clashes</div> <div><div>✓</div>Creating views and federated models per project coordination needs</div> <div><div>✓</div>Overseeing the designers' clash assignment practice</div>	<div><div>✓</div>Keeping project and team information up to date</div> <div><div>✓</div>Providing tools to facilitate communication between the designers</div> <div><div>✓</div>Keeping track of the clashes statistics</div> <div><div>✓</div>Prioritizing coordination based on project needs and milestones</div>
Communication Facilitator		

Reporting



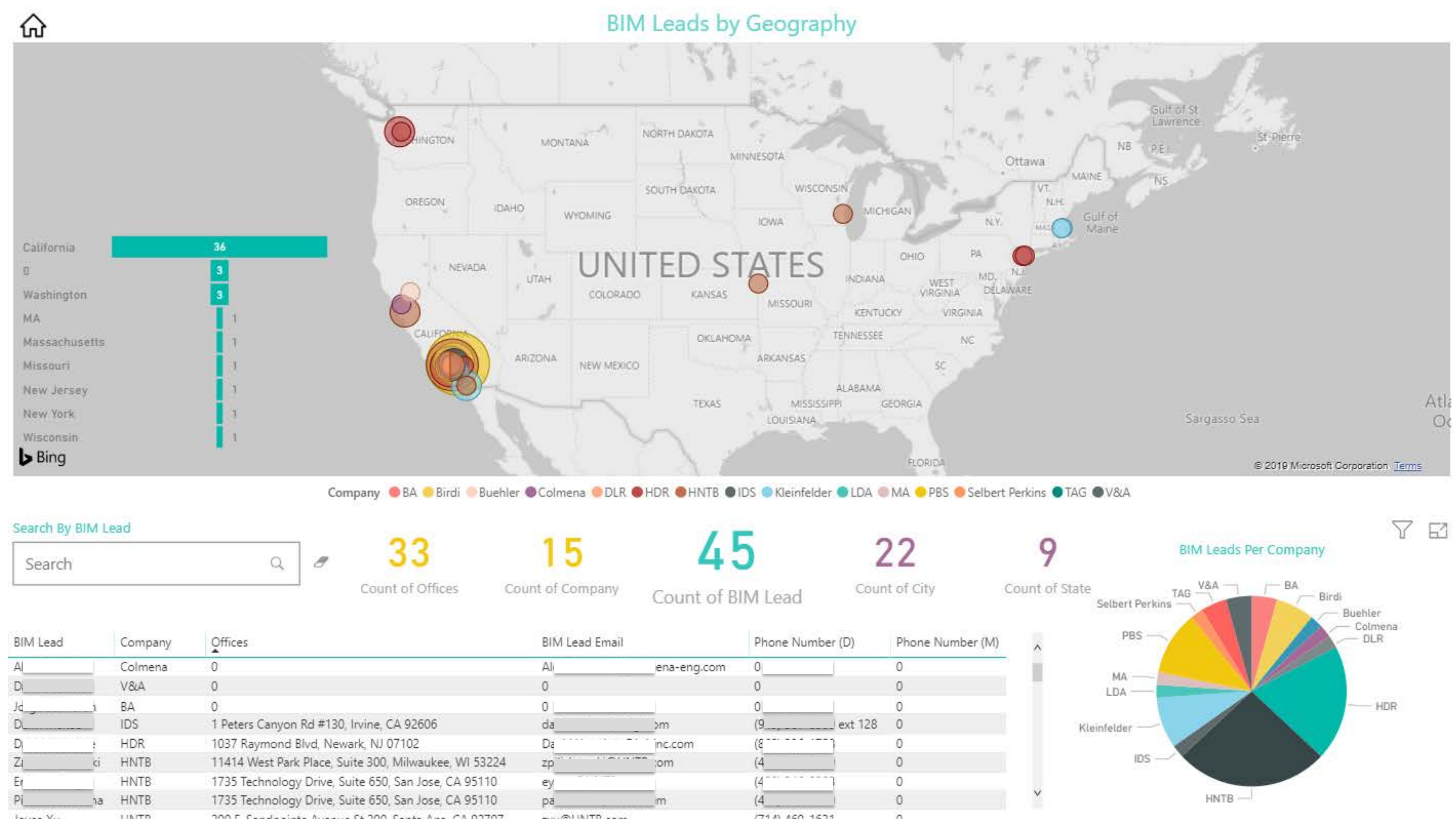
Reporting via the Integration of PowerBI

Models and corresponding BIM leads



Reporting via the Integration of PowerBI

BIM Leads by Geography

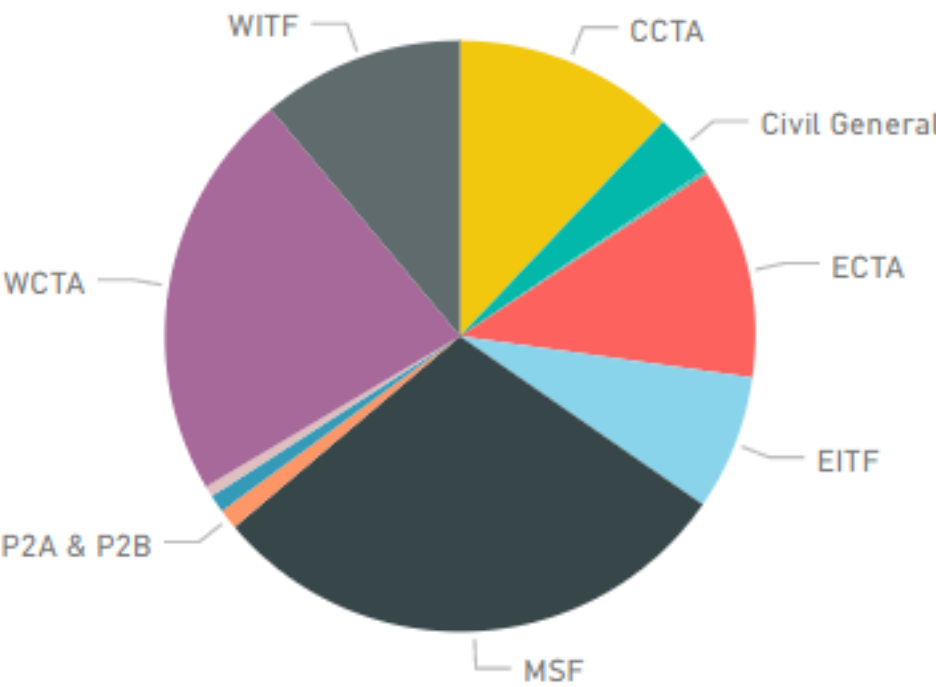


Reporting via the Integration of PowerBI

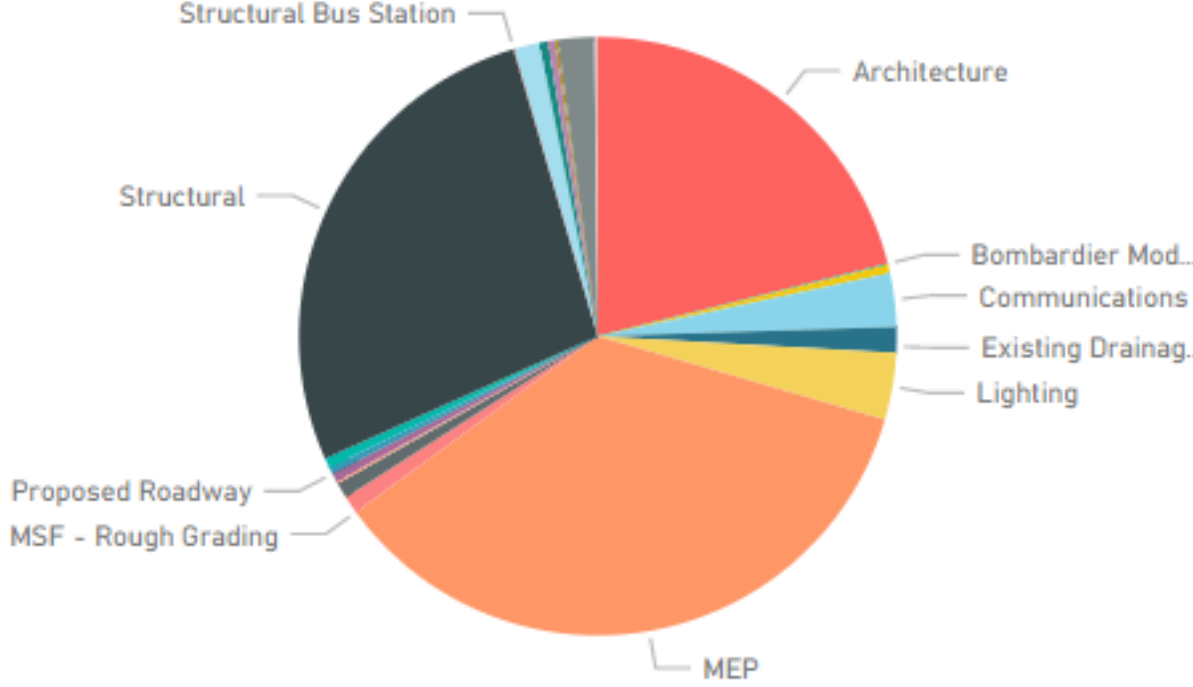
Latest Statistics of Clashes



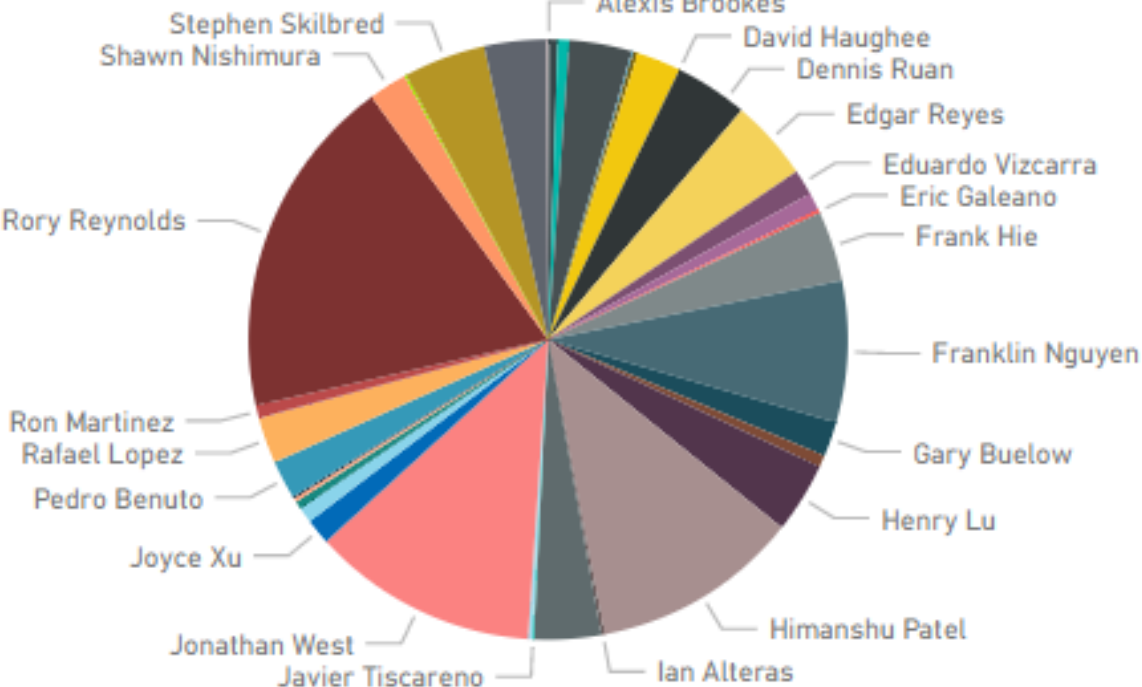
Clashes Per Area



Clashes Per Discipline



Clashes Per BIM Lead

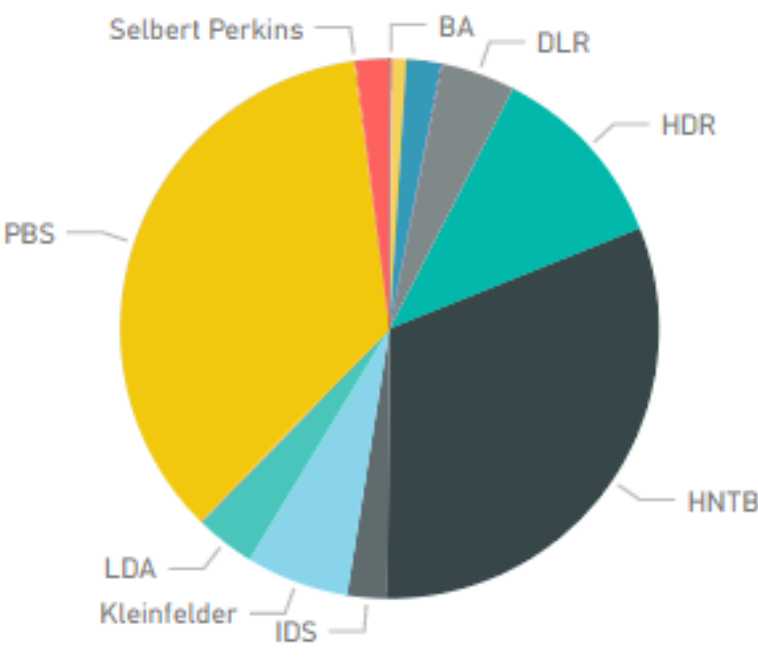


66191

11/04/Clashes

Area	Discipline	Model	Clash Link	BIM Lead	Company	10/23/2019 Clashes	10/27/2019 Clashes	11/04/Clashes	Percent Increase/Decrease
CCTA	Architecture	CCTA-A	Link	Shawn Nishimura	HDR	2267	2267	2232	-1.5%
CCTA	Bombardier Modeling	CCTA-BT	Link	Shawn Nishimura	Colmena	0	0	0	0%
CCTA	Communications	CCTA-T	Link	Shawn Nishimura	HDR	313	334	348	3.9%
CCTA	Lighting	CCTA-LI	Link	Shawn Nishimura	LDA	120	120	111	-7.5%
CCTA	MEP	CCTA-MEP	Link	Shawn Nishimura	PBS	2882	2848	2919	2.4%
CCTA	Power Distribution	CCTA-PD	Link	Shawn Nishimura	HDR	52	57	57	9.6%
CCTA	Structural	CCTA-S	Link	Shawn Nishimura	Kleinfelder	671	670	668	-0.3%
CCTA	Structural	PED56-S	Link	Shawn Nishimura	Kleinfelder	671	801	826	15.3%
CCTA	Structural Canopy	CCTA-SC	Link	Shawn Nishimura	IDS	170	168	169	-1.2%
CCTA	Structural Egress	CCTA-SE	Link	Shawn Nishimura	IDS	222	222	222	0%
CCTA	Structural Guideway	CCTA-SG	Link	Shawn Nishimura	Kleinfelder	59	60	75	25.4%
CCTA	Vertical Core	CCTA-SV	Link	Shawn Nishimura	Buehler	351	354	355	0.8%
CCTA	Wayfinding	CCTA-SP	Link	Shawn Nishimura	Selbert Perkins	7	7	14	100%
Civil General	Civil Structures	1GW1-S	Link	Shawn Nishimura	HDR	230	335	270	-16.7%
Civil General	Civil Structures	1GW2-S	Link	Shawn Nishimura	HDR	0	0	0	0%
Total						60492	65983	66191	

Clashes Per Company



Slide showing PowerBI in B360



Lessons Learned/Limitations



Lessons Learned/Limitations

- Model Coordination was being developed as we were working on the project
- Need for a fast internet especially when loading large models
- Always need to double check the DWG models are published properly
- Maneuvering around multiple models will be challenging if there is a model with large extent
- The issues do not automatically generate a screenshot of the clash
- No rule-based clash detection available as of today



Q & A





AUTODESK®

Make anything™

Autodesk and the Autodesk logo are registered trademarks or trademarks of Autodesk, Inc., and/or its subsidiaries and/or affiliates in the USA and/or other countries. All other brand names, product names, or trademarks belong to their respective holders. Autodesk reserves the right to alter product and services offerings, and specifications and pricing at any time without notice, and is not responsible for typographical or graphical errors that may appear in this document.

© 2019 Autodesk. All rights reserved.

