



5D BIM – QIM

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Kelvin Kuo



- 1 Over 20 years working as QS
- 2 Over 7 years working in BIM
- 3 Expertise in BIM implementation
Integration of BIM and QS practice
- 4 1st 5DBIM project for HKHA
- 5 Provide training in HK, Macau, Malaysia

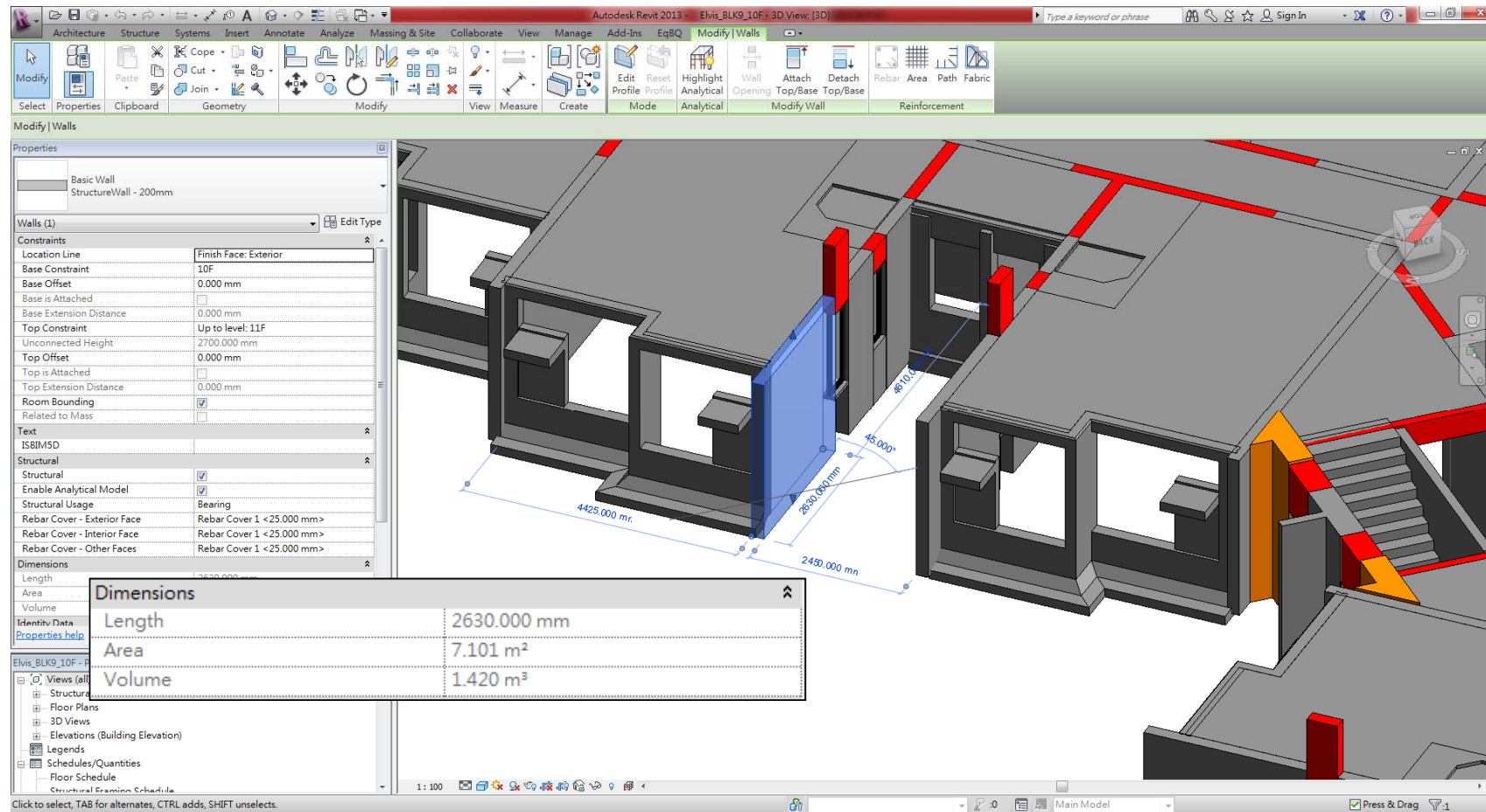
Building Information Modeling & Quantity Surveyors

- ✓ **BIM** is key to future of quantity surveying ...
- ✓ Building Information Modeling (**BIM**) can help quantity surveyors to speed up the estimating process ...



<http://www.rics.org/uk/knowledge/news-insight/press-releases/bim-is-key-to-future-of-qs-profession/>

Building Information Modeling



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Culture Difference

Measurement Classification and Measure rule

America, Uniformat

**Figure 1 - ASTM UNIFORMAT II
Classification of Building Elements (E1557-97)**

Level 1 Major Group Elements	Level 2 Group Elements	Level 3 Individual Elements
A. SUBSTRUCTURE	A10 Foundations	A1010 Standard Foundations A1020 Special Foundations A1030 Slab on Grade
	A20 Basement Construction	A2010 Basement Excavation A2020 Basement Walls
B. SHELL	B10 Superstructure	B1010 Floor Construction B1020 Roof Construction
	B20 Exterior Closure	B2010 Exterior Walls B2020 Exterior Windows Exterior Doors
	B30 Roofing	B3010 Roof Coverings B3020 Roof Openings
C. INTERIORS	C10 Interior Construction	C1010 Partitions C1020 Interior Doors C1030 Specialties
	C20 Staircases	C2010 Stair Construction C2020 Stair Finishes
	C30 Interior Finishes	C3010 Wall Finishes C3020 Floor Finishes C3030 Ceiling Finishes
D. SERVICES	D10 Conveying Systems	D1010 Elevators D1020 Escalators & Moving Walks D1030 Material Handling Systems

Item / element base measurement approach

- Better framework for economic analyses of building projects

vs.

Hong Kong, HKSMM4

Preface to Fourth Edition 2005	i
Preface to First Edition 1962	iii
Preface to Second Edition 1966	iv
Preface to Third Edition 1979	v
I Use of Tabulated Format	1
II General Principles	3
III Preliminaries	9
IV Demolitions and Alterations	19
V Piling and Caissons	25
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VIII Brickwork and Blockwork	75
IX Drainage (including Underground Pipe Duct)	81
X Waterproofing	85
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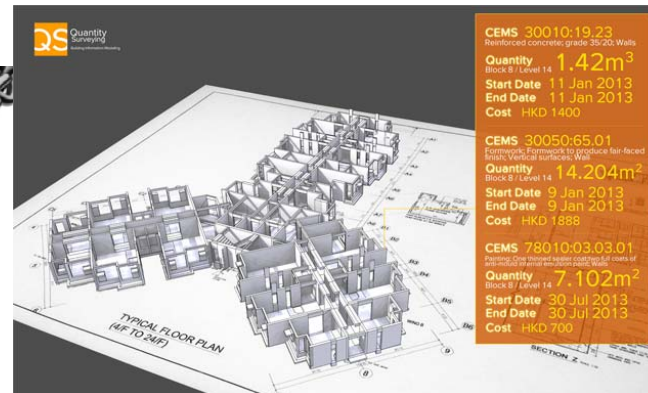
Work / trade base measurement approach

- Better framework for prepare Bills of Quantities (subletting)

Current Challenges

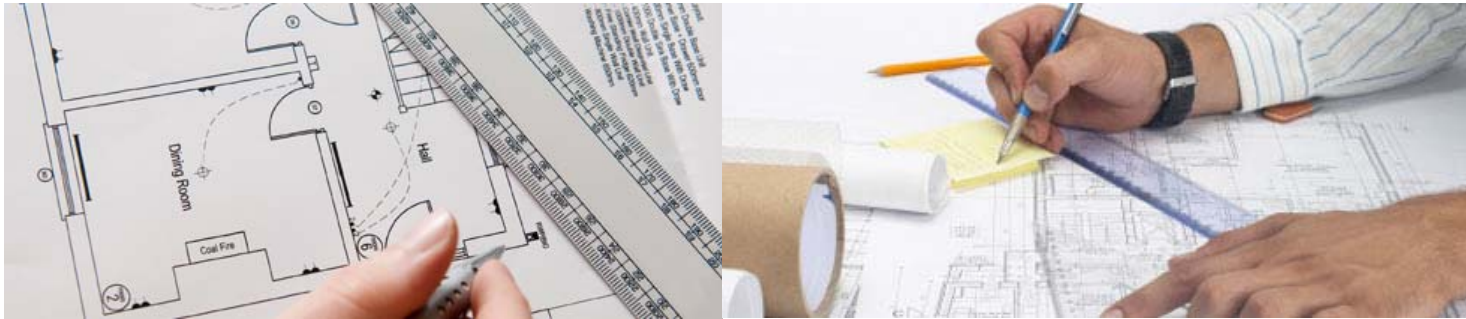
ISG - Crown House, External Envelope

MASONRY				
F10: BRICK/BLOCK WALLING				
Engineering bricks, B.S.3921, Category F, 210 x 102.5 x 65, class B, in cement mortar (1:3)				
Walls				
A	102.5 thick; stretcher bond	10	m ²	
Facing bricks, Horsham Red, Spec F10/110				
Walls				
B	215 thick; English bond; facework both sides	64	m ²	
C	215 thick; Flemish bond; facework one side	62	m ²	
D	102.5 thick; Flemish bond; facework one side	709	m ²	
E	extra; special bricks; vertical angles; squint, B.S.4729, type AN3.2	31	m	
F	extra; special bricks; vertical angles; single cant, B.S.4729, type AN3.2	465	m	
Projections; horizontal				
G	150 wide x 50 projection	112	m	
H	mitre	4	m	
I	300 wide x 75 projection	33	m	
J	extra; special bricks; piers header, single			



- × Design intent and cost data are often separated and isolated in different digital environments
- × Extremely difficult and time consuming to extract data for cost management.

BIM Challenges



- × **Extract quantities** according to the Hong Kong Standard Method of Measurement of Building Works (HKSMW)
- × Different **methods of building** up BIM models will generate different sets of quantities

BIM BIG DATA

An **integrated** 5th Dimensions Approach



Quantitative
Information
Modelling (QIM)



Construction
Schedule



Cost Item



Measurement
Method



Quantities



Elemental
Location

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Why **Native** BIM software QTO?

Native vs. Export / Publish

- ✓ **No** Interoperability or Integration Issue.
- ✓ **No** Information inconsistency Issue
- ✓ **Minimize** impact on design revision
- ✓ **Minimize** data interfaces among other cost solution
- ✓ **Minimize** corporate training requirement
- ✓ **Maximize** corporate knowledge management
- ✓ **Support** pre-measurement Model Auditing

Our perspective

- Aim to develop BIM based QTO, not QTO on 3D files.

Taking off procedure in drawings

1

Taking manual measurement from drawings

2

Transferring dimensions to sheets or spreadsheets

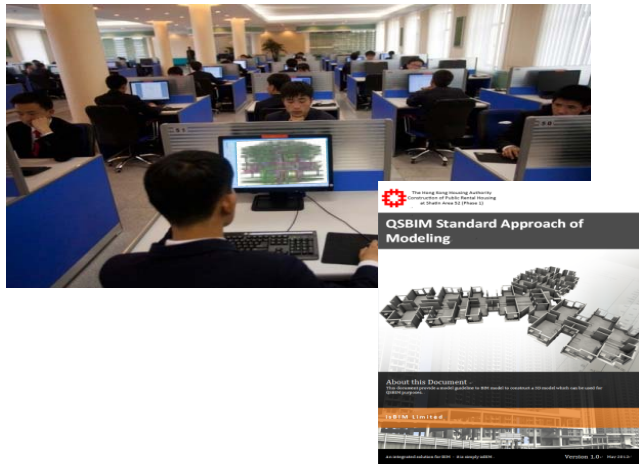
3

Carrying out cost estimates or interim payment assessments



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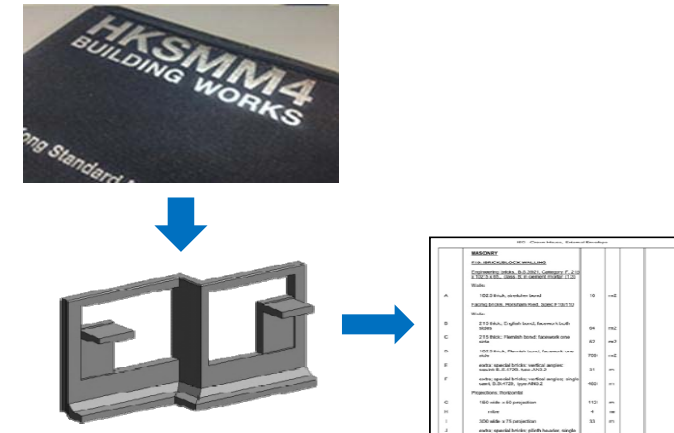
Taking off procedure in BIM



- ▶ Design team's modelers create BIM models according to modeling approach guideline.

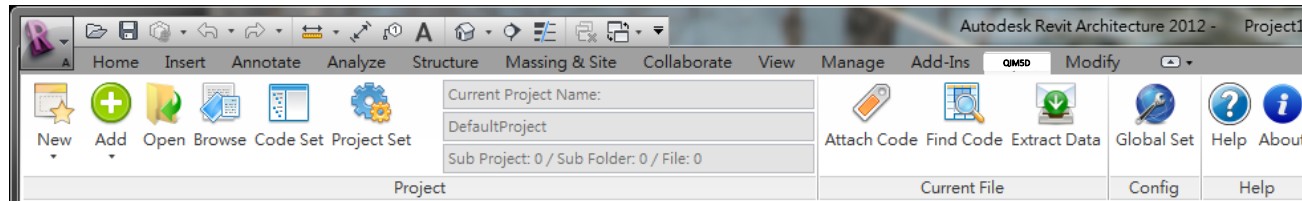


- Quantity Surveyors examine the models and input the BQ requirements via labeling the CEMS code on every BIM objects need to be measure using QIM5D.

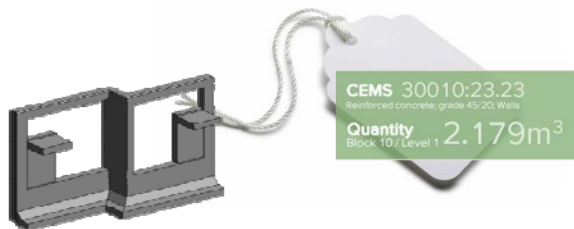


- ▶ BQ Information automatically extracted from BIM model according to the SMM measurement rules.

BIM based QTO Tools – QIM5D



Revolutionary Approach to Quantity-takeoff for integrated 5D simulation

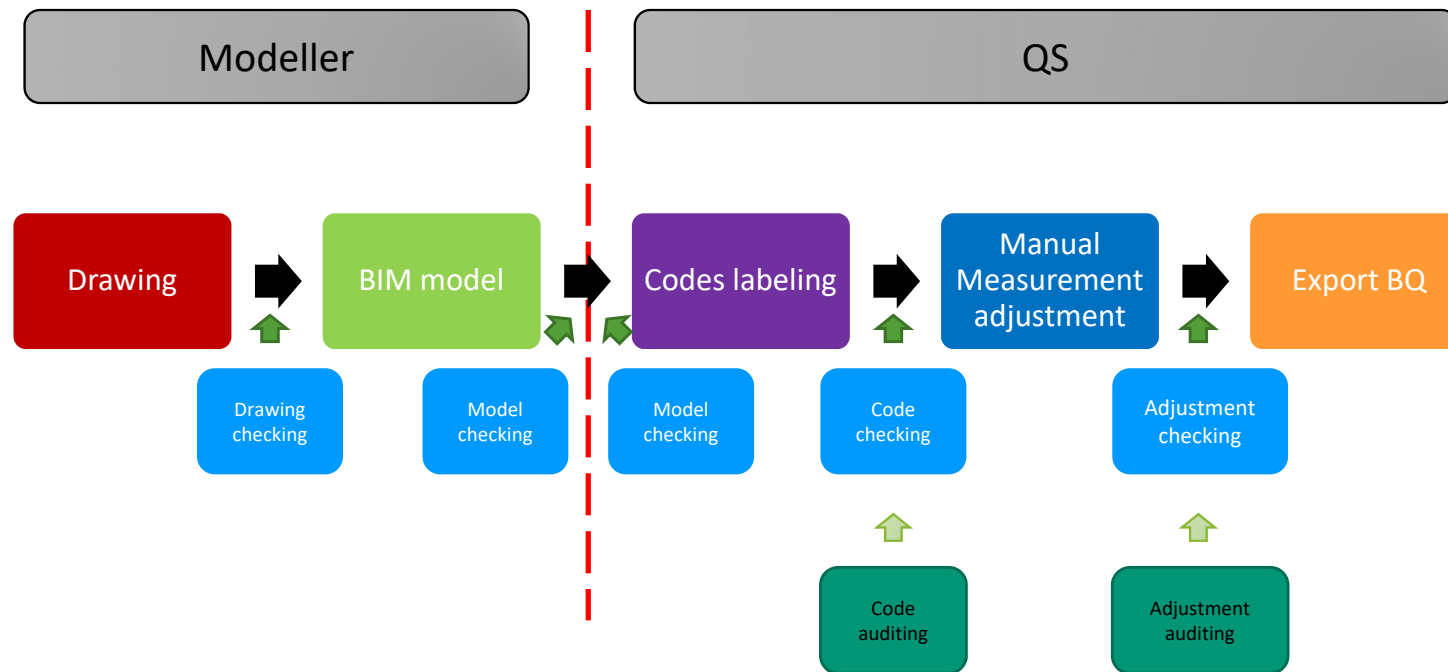


Re-engineered the entire BIM based quantity-takeoff workflow by customizing traditional workflow with a new yet simple approach: Labeling.

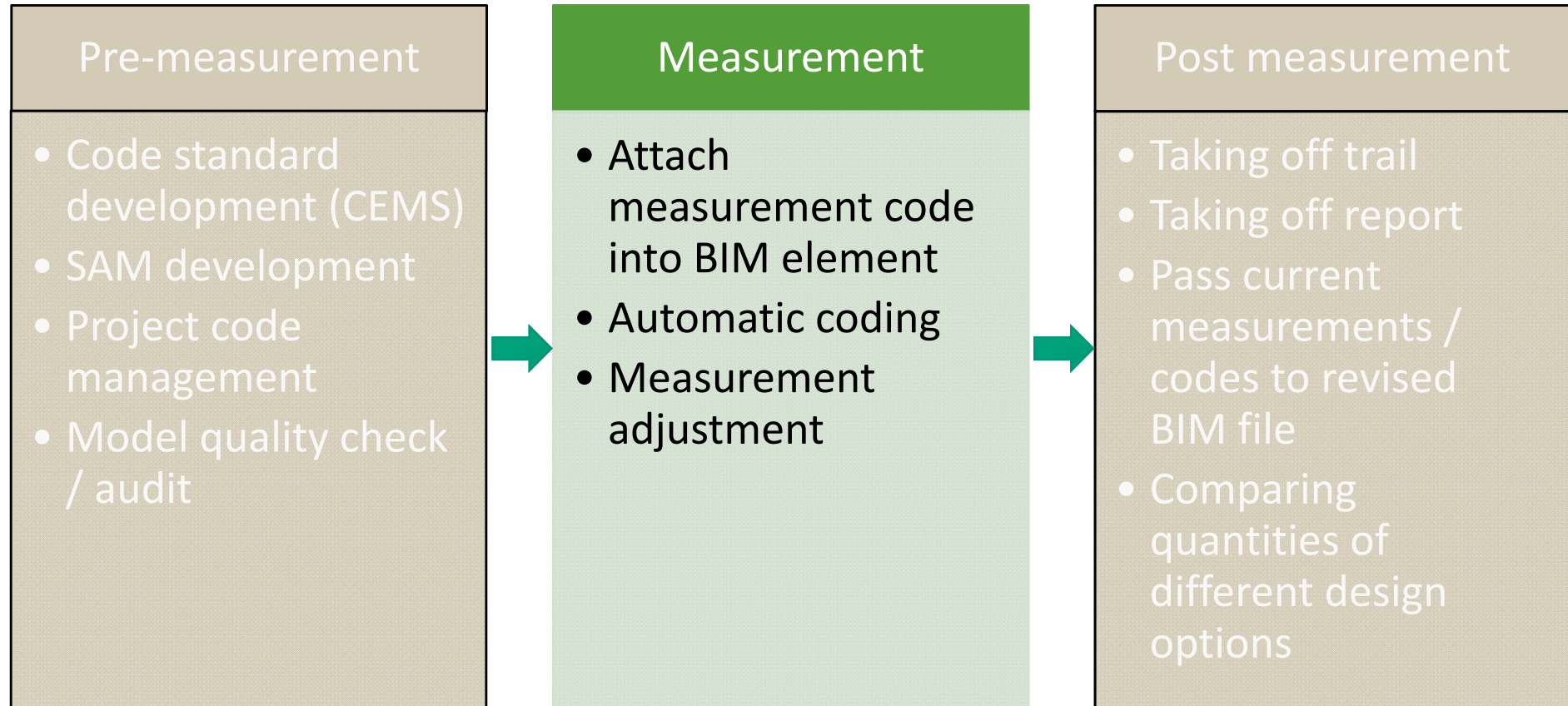
The idea is as simple as shop keepers sticking price tags onto their goods.

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QIM5D Workflow



QIM5D Taking off framework

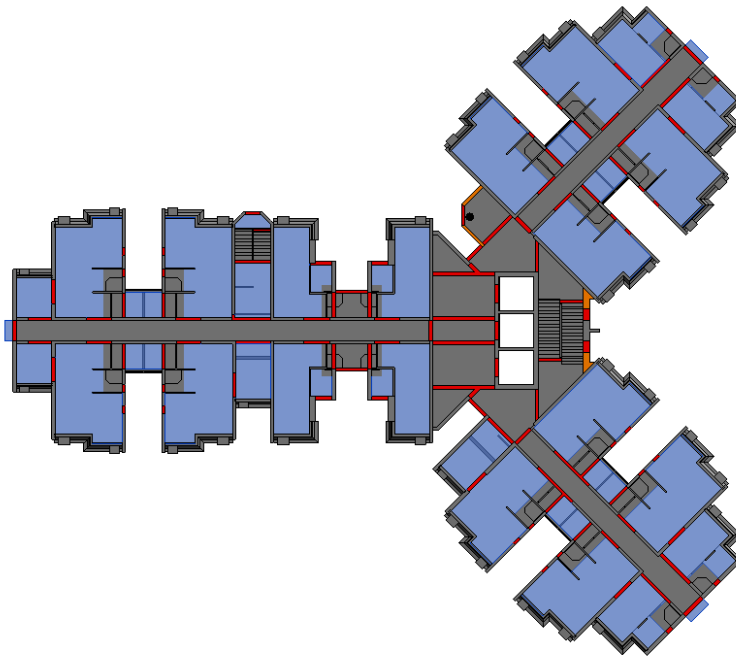


Measurement

Attach Quantity Code

Attach Quantity Code

Select and code (single or multiple)



Attach Code

Search Mode: ☐ Find ☒ Filter Input Quantity Code:

Select Category: Filter by:

- 01 - Blinding
 - 07 - Concrete, grade 20/20
- 01 - Blinding
 - 33 - Beds
- 13 - Concrete, grade 35/20
 - 49 - Filling
- 17 - Reinforced concrete, grade 30/20
 - 33 - Beds
 - 35 - Slabs
 - 100 - 100mm thick
 - 150 - 150mm thick
 - 160 - 160mm thick
- 19 - Reinforced concrete, grade 35/20
 - 33 - Beds
 - 35 - Slabs
 - 100 - 100mm thick
 - 145 - 145mm thick
 - 160 - 160mm thick
 - 175 - 175mm thick
 - 180 - 180mm thick
 - 185 - 185mm thick
 - 200 - 200mm thick
 - 210 - 210mm thick
 - 215 - 215mm thick
 - 300 - 300mm thick

Code	Description	Unit	Category	Method of Calculation	Remarks
30010:19:35:	160mm thick	m3	Floor	Volume	

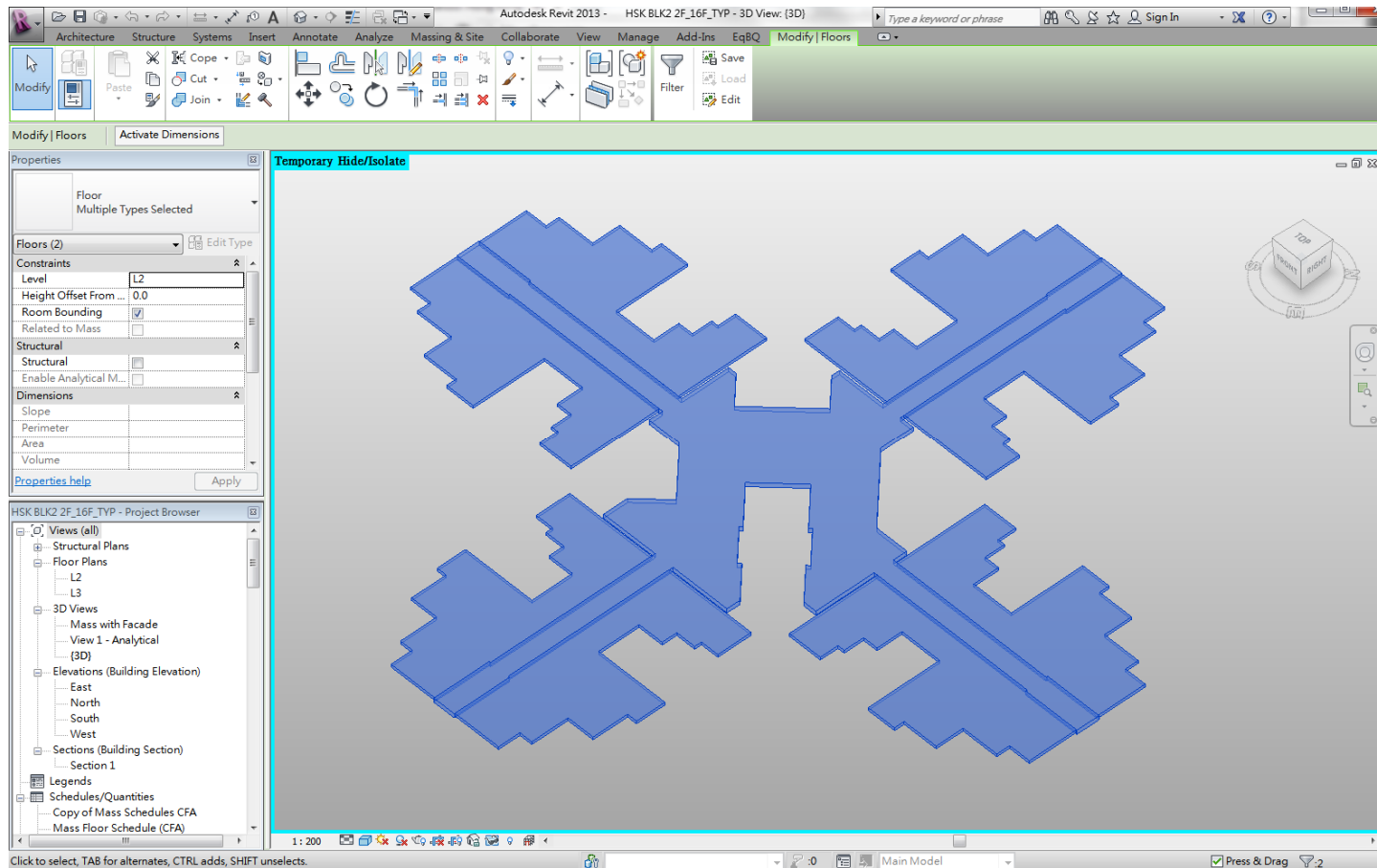
On Selected Element(s) Quantity Code [1] / Code on Instance [1] / Code on Type [0]

Category	Element Type	Element Count
Floors	RC Slab 160mm	35

Quantity Code	Code on Instance	Code on Type
30010:19:35:160	30010:19:35:160	

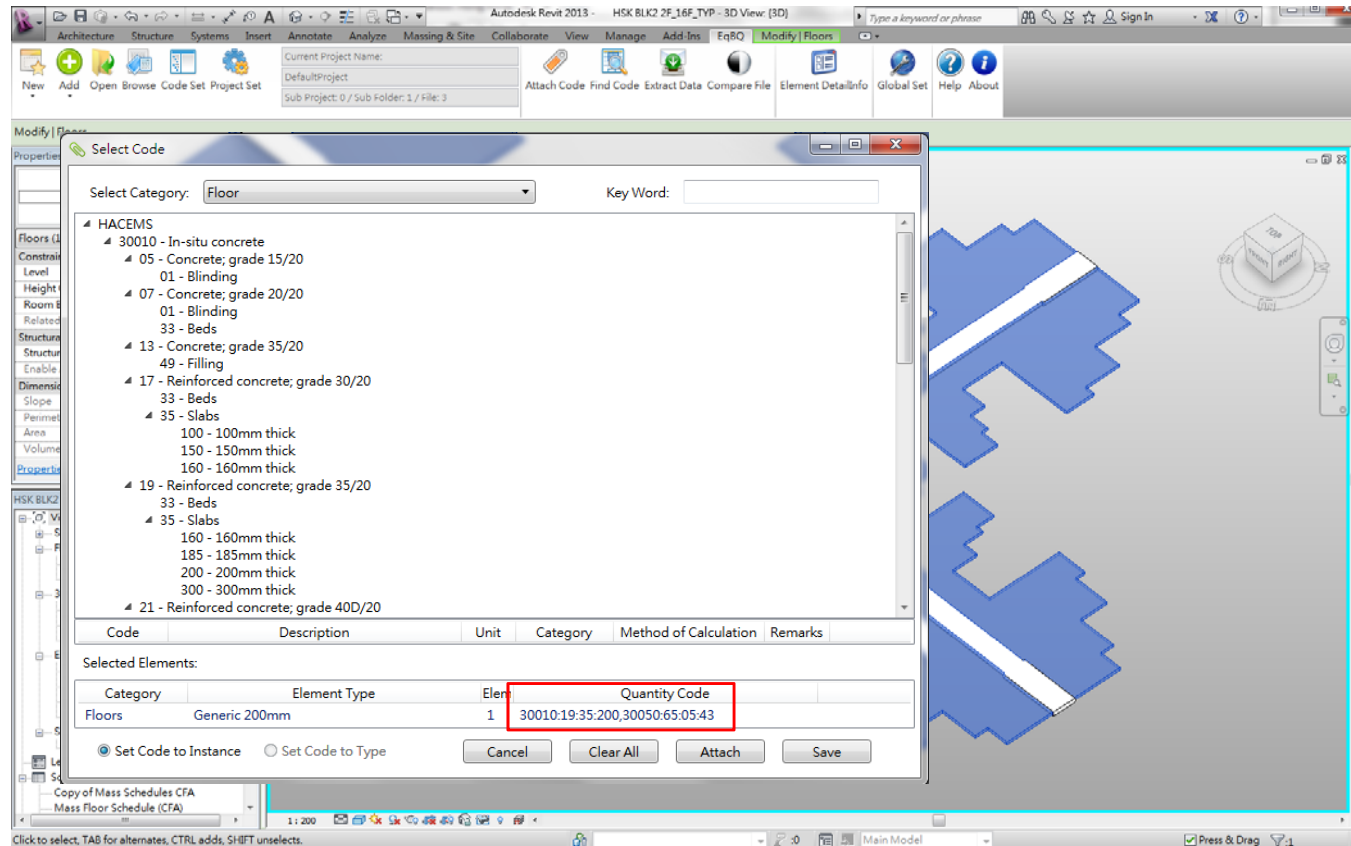
☒ Attach Code to Instance ☐ Attach Code to Type

Attach Quantity Code

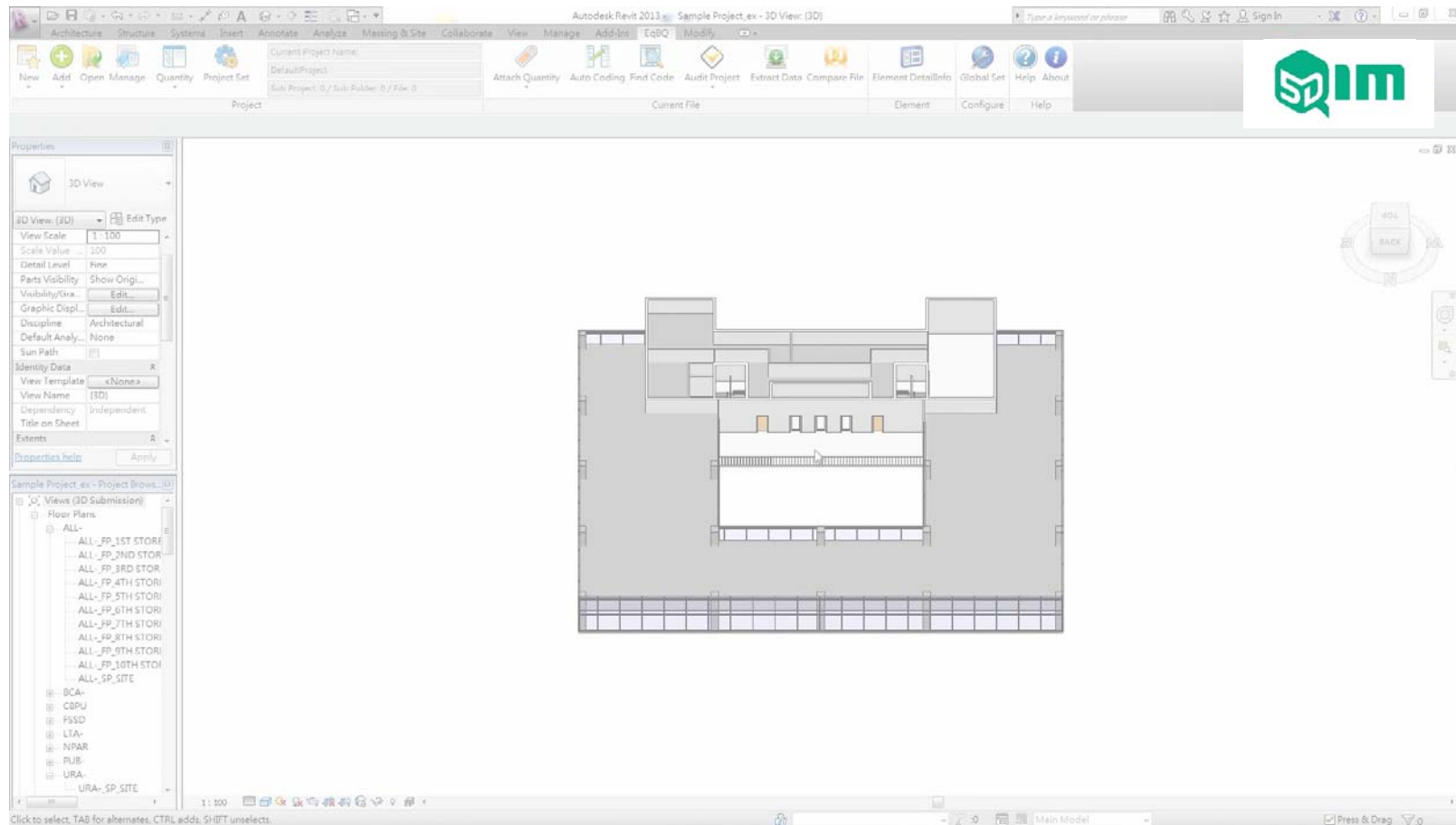


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Attach codes for 200mm thick slab



Attach Quantity Code



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Measurement

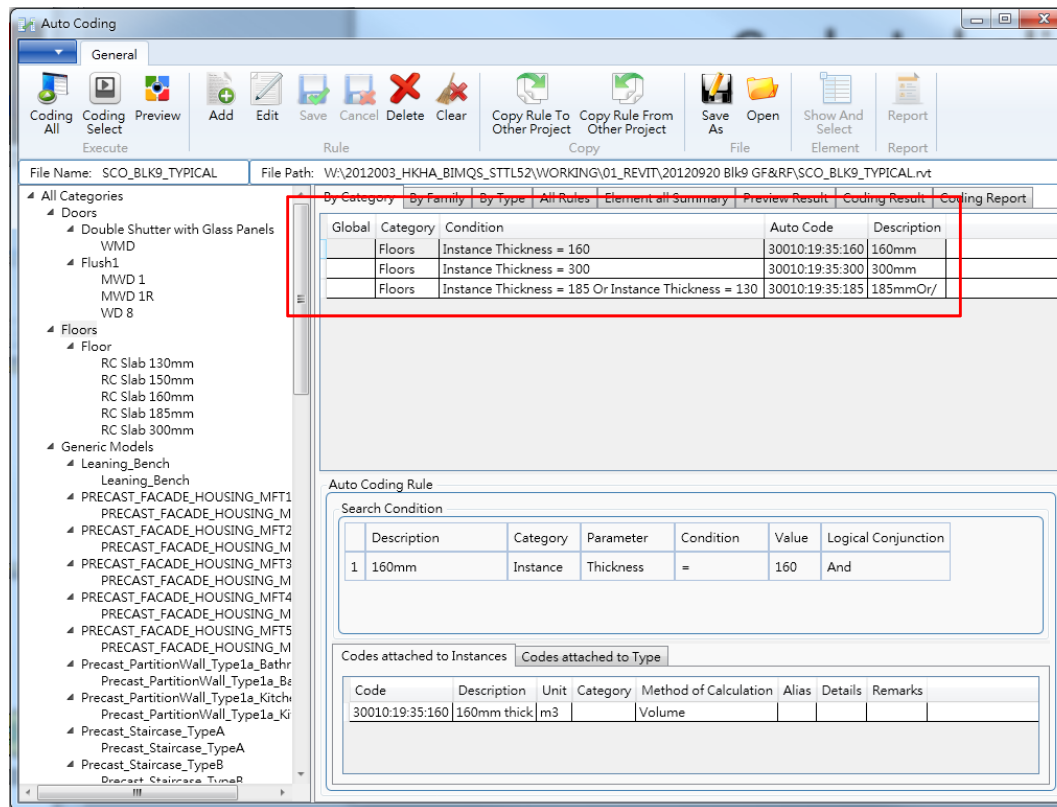
Auto Coding

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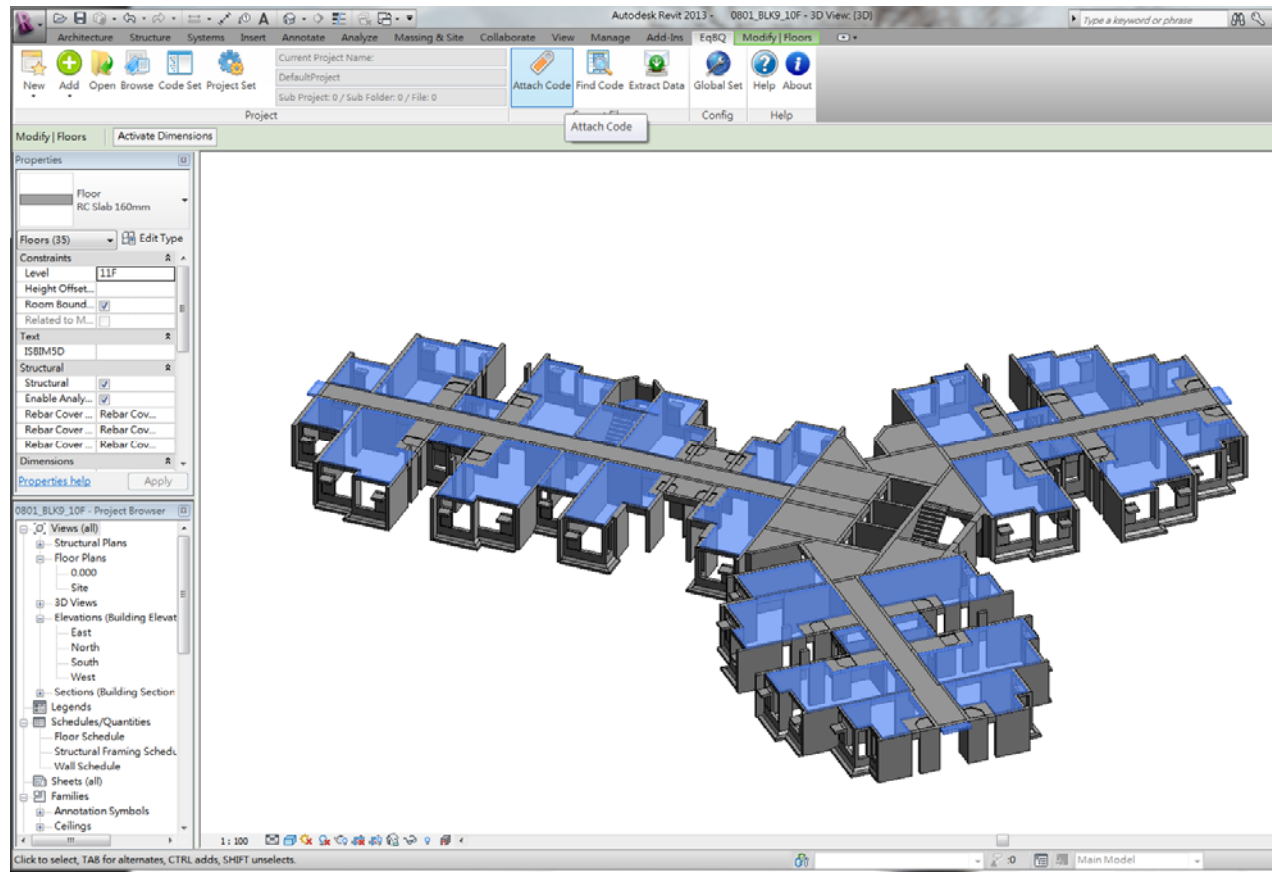
Auto Coding

Auto coding, define rules and code attached automatically



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Auto Coding



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Auto Coding

Instant for slabs and beams basic coding

Category	Kind	Type	All	Element Detail
Structural Framing				

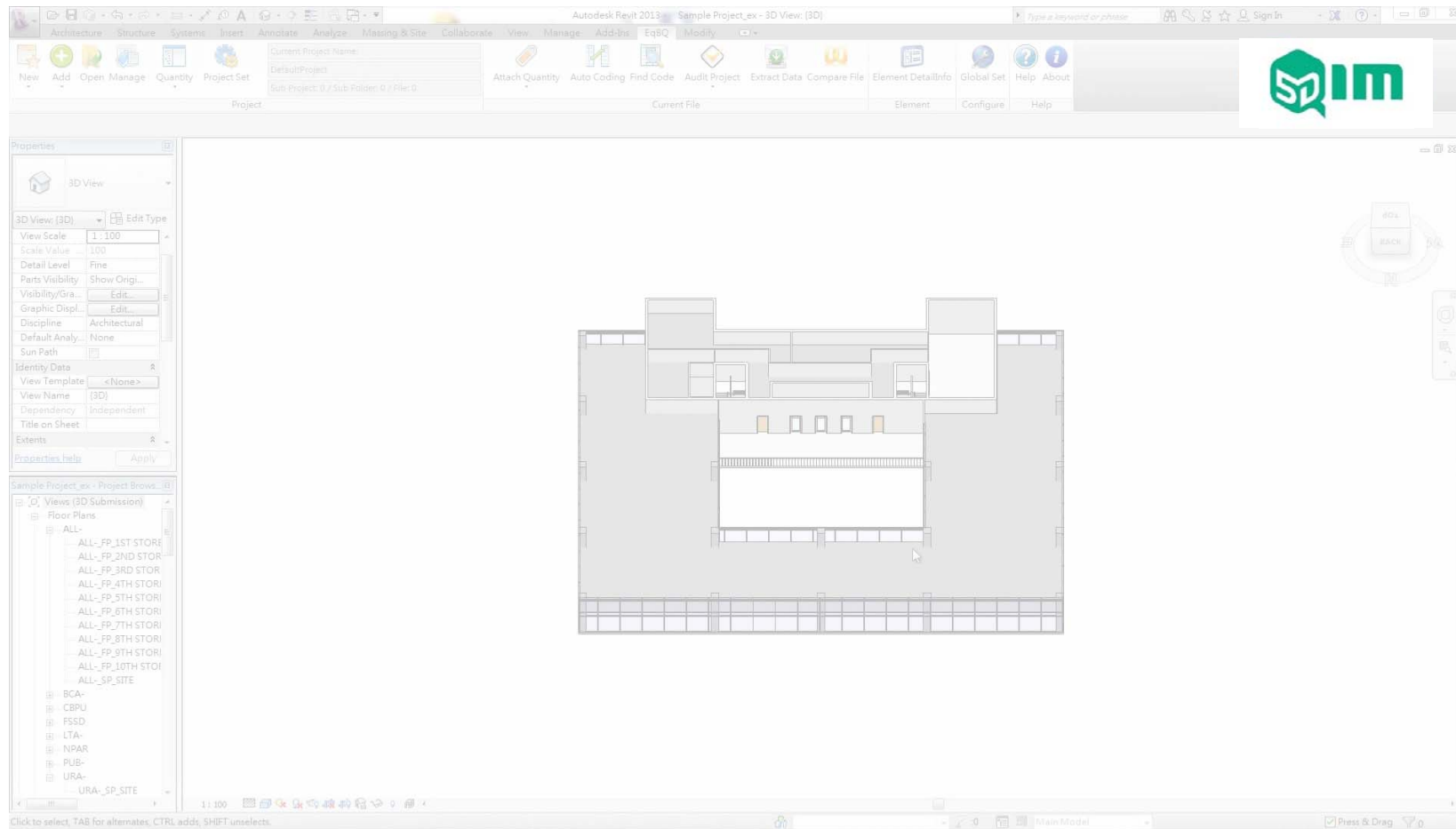
Category Name	Kind Name	Type Name	Search Condition String	Auto Coding String	Search Description S
Structural Framing			Element Volume > 0	30010:19:25:01/30050:65:11:75	All beams

Description	Category	Property	Condition	Value	Logical Condition
1 All beams	Element	Volume	>	0	And

Code	Description	Unit	Category	Method of Calculation	Alias	Detailed Info	Remarks
30010:19:25:01	Generally	m3		Volume			
30050:65:11:75	Beams	m2		Cut Length * (b + h + h)			

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Auto Coding



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Code Labeling

Depends on the nature of items, A-B-C-D approaches applied to all BQ items

Apply
to modeled objects

Borrow
e.g. formwork & ironmongery to door

Calculate
e.g. rebar & glass pane to window

Describe
to prelim. & provisional items

Measurement

Measurement Adjustment

Measurement adjustment

GetQuantity

General Adjust

Save Open Export All Export Code Export Detail Export Adjust Refresh Refresh Selected Not Round Adjust View

File Name: 2012003_BLK7_4F_FULL File Path: W:\2012003_JH04A_BIMQS_STTL52\WORKING\01_REVIT\20130610 Blk7 trial\2012003_BLK7_4F_FULL.rvt Total 13 Rows

Statistics By Element Statistics By Quantity Code Element Detail Information Element Adjust Information

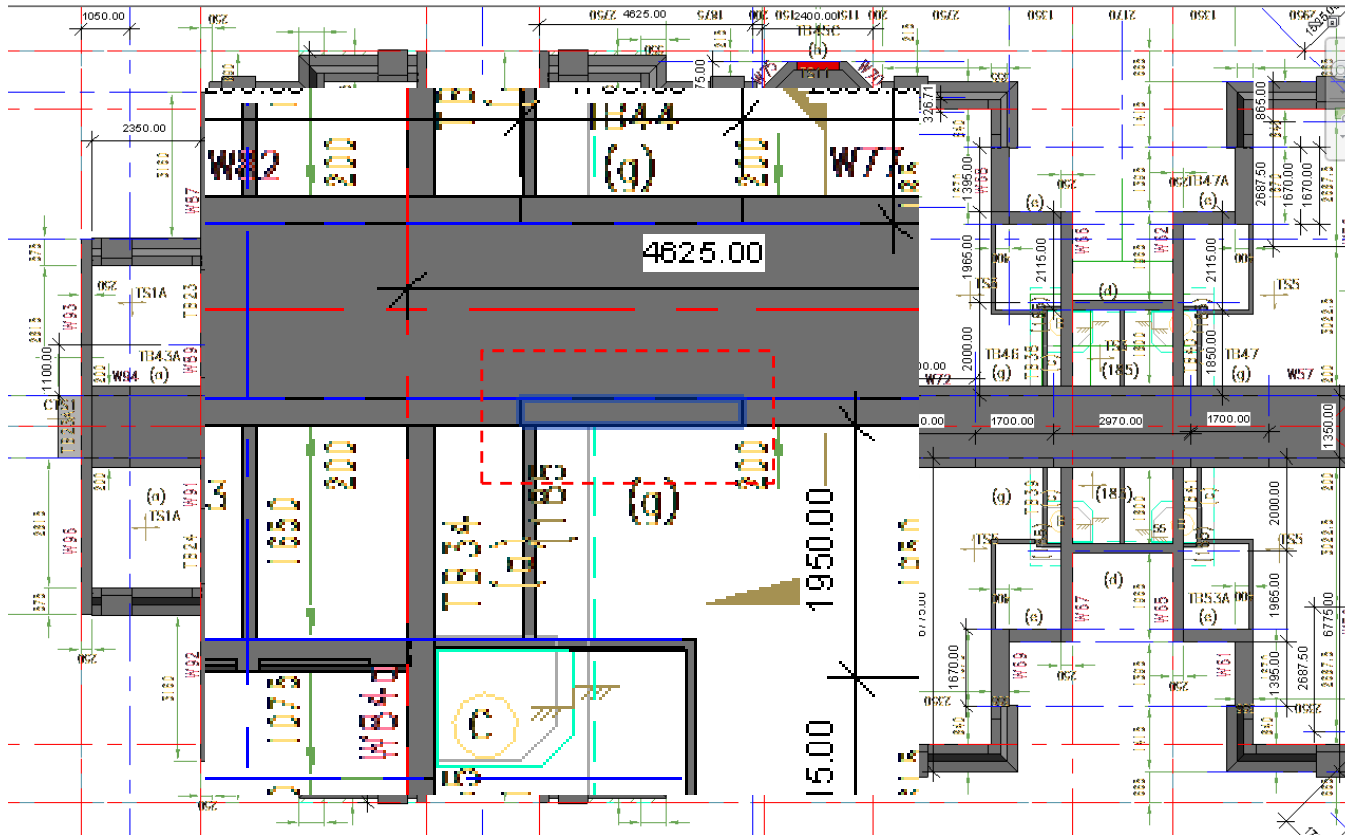
[All Categories] -> [Normal] -> [Structural Framing] -> [M_Concrete-Rectangular Beam] -> [1200 x 200mm]

Horizontal	Vertical	Horizontal And Vertical	ElementId	Level	Quantity Code	Quantity Value	Method of Calculation	Unit	Without Adjust	Adjust Value	Adjust Count	Adjust Description1	Formula Text1	Formula Number1	Adjust Description2	Formula Text2	Formula Number2	Adjust Desci
			1702133	BLK7_SF	30010:19:25:01	0.025	Volume	m³	0.216	-0.191	2	Ddt 160 slab	Volume / depth x slab	Volume / h * -0.16	Ddt 900 inv beam	Volume / depth x inv beam	Volume / h * -0.9	Cut Length * -0.9 * 2
					30050:65:11:75	0.576	Cut Length * (b + h + h)	m³	2.34	-1.764	2	Ddt 160 slab	Length x slab	Cut Length * -0.16	Ddt 900 inv beam	Length x inv beam x 2	Cut Length * -0.9 * 2	
					30010:19:35:160b	0.029	Cut Length * b * 0.16	m³										
					30010:19:27:900	0.162	Cut Length * b * 0.9	m³										
					30050:65:03:25	1.62	Cut Length * 0.9 * 2	m³										
			1702160	BLK7_SF	30010:19:25:01	0.014	Volume	m³	0.12	-0.106	2	Ddt 160 slab	Volume / depth x slab	Volume / h * -0.16	Ddt 900 inv beam	Volume / depth x inv beam	Volume / h * -0.9	
					30050:65:11:75	0.32	Cut Length * (b + h + h)	m³	1.3	-0.98	2	Ddt 160 slab	Length x slab	Cut Length * -0.16	Ddt 900 inv beam	Length x inv beam x 2	Cut Length * -0.9 * 2	
					30010:19:35:160b	0.016	Cut Length * b * 0.16	m³										
					30010:19:27:900	0.09	Cut Length * b * 0.9	m³										
					30050:65:03:25	0.9	Cut Length * 0.9 * 2	m³										
			1702161	BLK7_SF	30010:19:25:01	0.014	Volume	m³	0.12	-0.106	2	Ddt 160 slab	Volume / depth x slab	Volume / h * -0.16	Ddt 900 inv beam	Volume / depth x inv beam	Volume / h * -0.9	
					30050:65:11:75	0.32	Cut Length * (b + h + h)	m³	1.3	-0.98	2	Ddt 160 slab	Length x slab	Cut Length * -0.16	Ddt 900 inv beam	Length x inv beam x 2	Cut Length * -0.9 * 2	
					30010:19:35:160b	0.016	Cut Length * b * 0.16	m³										
					30010:19:27:900	0.09	Cut Length * b * 0.9	m³										
					30050:65:03:25	0.9	Cut Length * 0.9 * 2	m³										
			1702162	BLK7_SF	30010:19:25:01	0.014	Volume	m³	0.12	-0.106	2	Ddt 160 slab	Volume / depth x slab	Volume / h * -0.16	Ddt 900 inv beam	Volume / depth x inv beam	Volume / h * -0.9	
					30050:65:11:75	0.32	Cut Length * (b + h + h)	m³	1.3	-0.98	2	Ddt 160 slab	Length x slab	Cut Length * -0.16	Ddt 900 inv beam	Length x inv beam x 2	Cut Length * -0.9 * 2	
					30010:19:35:160b	0.016	Cut Length * b * 0.16	m³										
					30010:19:27:900	0.09	Cut Length * b * 0.9	m³										
					30050:65:03:25	0.9	Cut Length * 0.9 * 2	m³										
			1702163	BLK7_SF	30010:19:25:01	0.014	Volume	m³	0.12	-0.106	2	Ddt 160 slab	Volume / depth x slab	Volume / h * -0.16	Ddt 900 inv beam	Volume / depth x inv beam	Volume / h * -0.9	
					30050:65:11:75	0.32	Cut Length * (b + h + h)	m³	1.3	-0.98	2	Ddt 160 slab	Length x slab	Cut Length * -0.16	Ddt 900 inv beam	Length x inv beam x 2	Cut Length * -0.9 * 2	
					30010:19:35:160b	0.016	Cut Length * b * 0.16	m³										
					30010:19:27:900	0.09	Cut Length * b * 0.9	m³										
					30050:65:03:25	0.9	Cut Length * 0.9 * 2	m³										
			1702178	BLK7_SF	30010:19:25:01	0.014	Volume	m³	0.12	-0.106	2	Ddt 160 slab	Volume / depth x slab	Volume / h * -0.16	Ddt 900 inv beam	Volume / depth x inv beam	Volume / h * -0.9	
					30050:65:11:75	0.32	Cut Length * (b + h + h)	m³	1.3	-0.98	2	Ddt 160 slab	Length x slab	Cut Length * -0.16	Ddt 900 inv beam	Length x inv beam x 2	Cut Length * -0.9 * 2	
					30010:19:35:160b	0.016	Cut Length * b * 0.16	m³										
					30010:19:27:900	0.09	Cut Length * b * 0.9	m³										
					30050:65:03:25	0.9	Cut Length * 0.9 * 2	m³										
			1702181	BLK7_SF	30010:19:25:01	0.014	Volume	m³	0.12	-0.106	2	Ddt 160 slab	Volume / depth x slab	Volume / h * -0.16	Ddt 900 inv beam	Volume / depth x inv beam	Volume / h * -0.9	
					30050:65:11:75	0.32	Cut Length * (b + h + h)	m³	1.3	-0.98	2	Ddt 160 slab	Length x slab	Cut Length * -0.16	Ddt 900 inv beam	Length x inv beam x 2	Cut Length * -0.9 * 2	
					30010:19:35:160b	0.016	Cut Length * b * 0.16	m³										
					30010:19:27:900	0.09	Cut Length * b * 0.9	m³										
					30050:65:03:25	0.9	Cut Length * 0.9 * 2	m³										
			1702190	BLK7_SF	30010:19:25:01	0.014	Volume	m³	0.12	-0.106	2	Ddt 160 slab	Volume / depth x slab	Volume / h * -0.16	Ddt 900 inv beam	Volume / depth x inv beam	Volume / h * -0.9	
					30050:65:11:75	0.32	Cut Length * (b + h + h)	m³	1.3	-0.98	2	Ddt 160 slab	Length x slab	Cut Length * -0.16	Ddt 900 inv beam	Length x inv beam x 2	Cut Length * -0.9 * 2	
					30010:19:35:160b	0.016	Cut Length * b * 0.16	m³										
					30010:19:27:900	0.09	Cut Length * b * 0.9	m³										
					30050:65:03:25	0.9	Cut Length * 0.9 * 2	m³										

Total Count[13],Length[6.9],Width[1.66],Unconnected Height[1],Count[13],Cut Length[6.9],b[2.6],STAIR_RC Volume[1],Total Bar Length[1],BEAM_DEPTH[1],isFormwork,ScArea[1],h[15.6],dia[1],isFormwork,ScArea[1],QsLength[1],BEAM_BOARD[1],Perimeter[1],CutLength[1],FOOTING_BOARD[1]

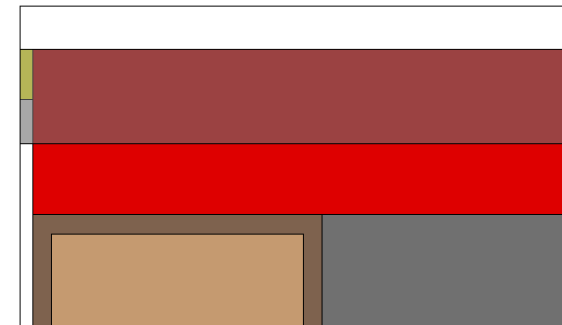
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Blk 9 – Wing A; TB55

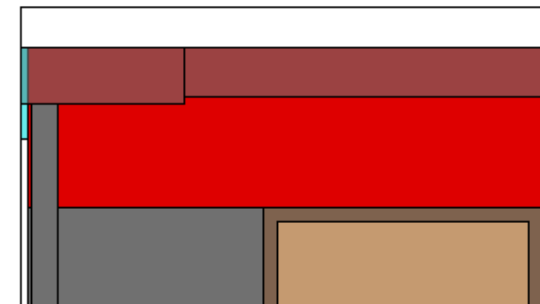


Measurement adjustment

TB55 – Plan View



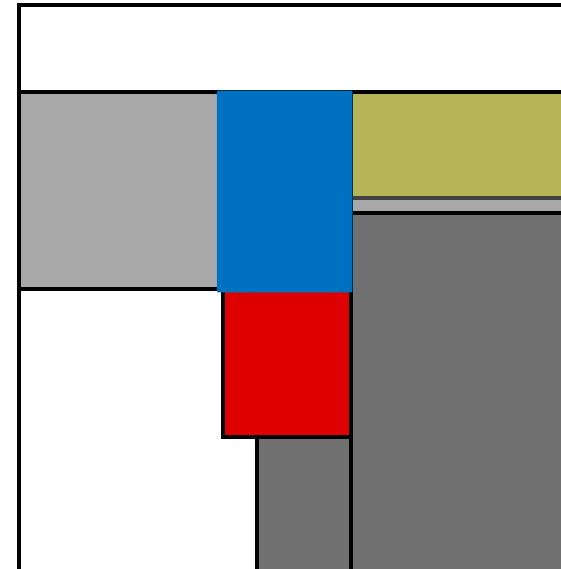
Corridor side view



Flat side view

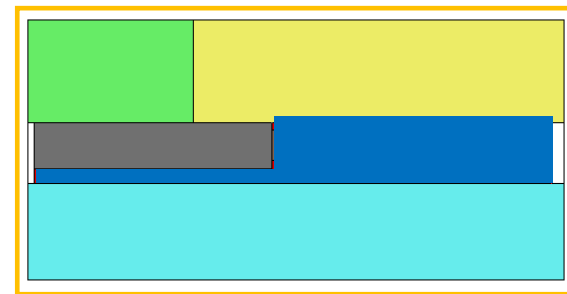
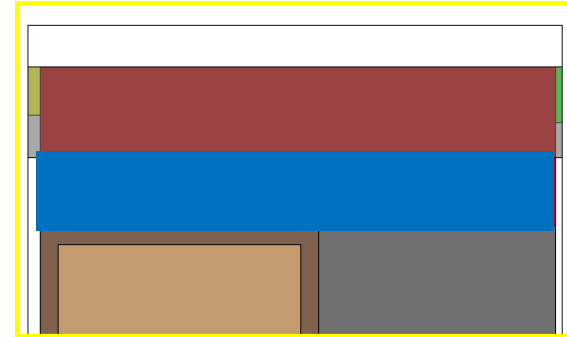
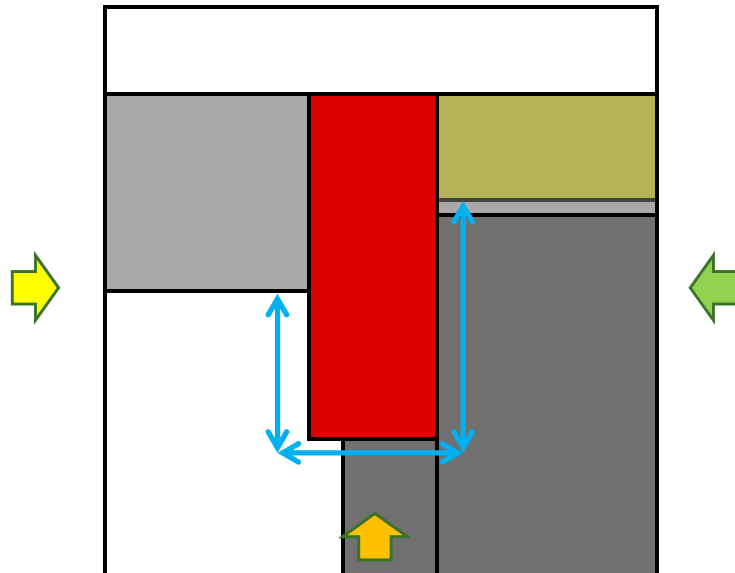
Measurement adjustment

- Concrete Adjustment
- Suit for SMM
- Concrete of beam count in slab (blue)



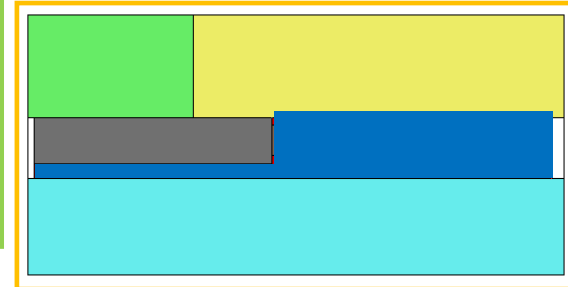
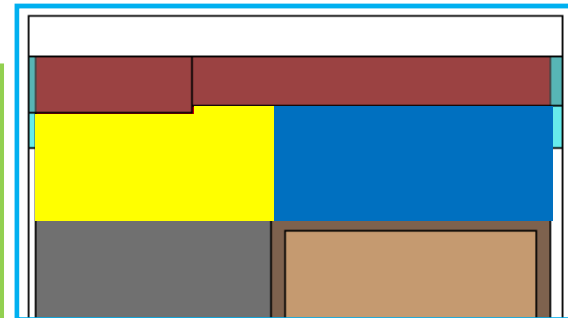
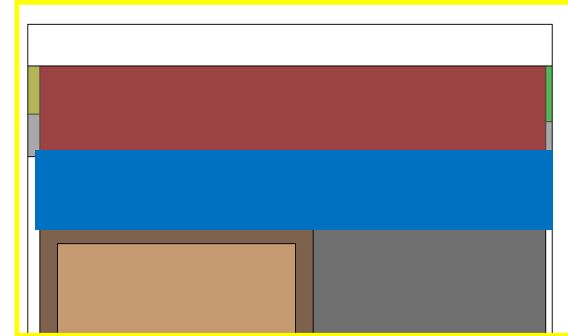
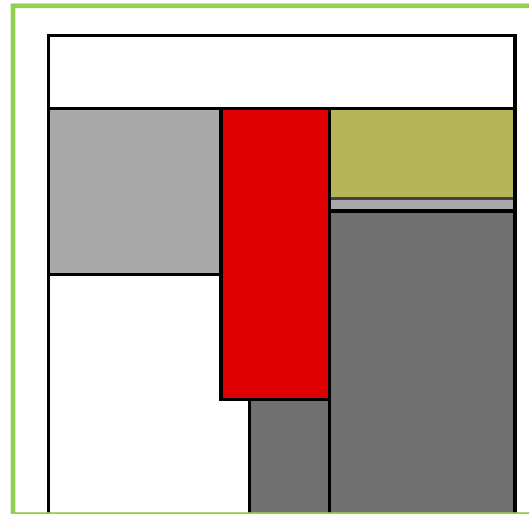
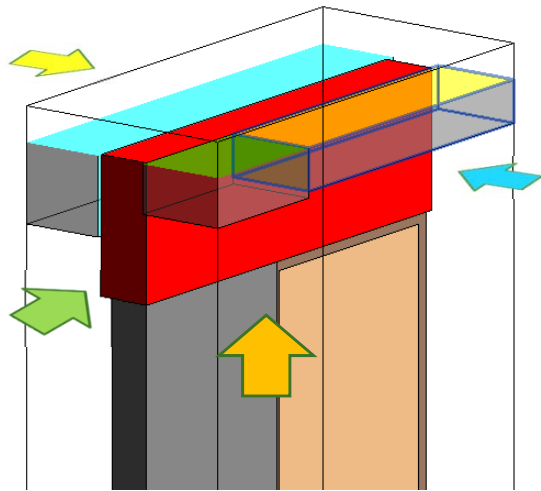
Measurement adjustment

- Formwork Adjustment
- Deduct over-measured
- Formwork of beam (blue)

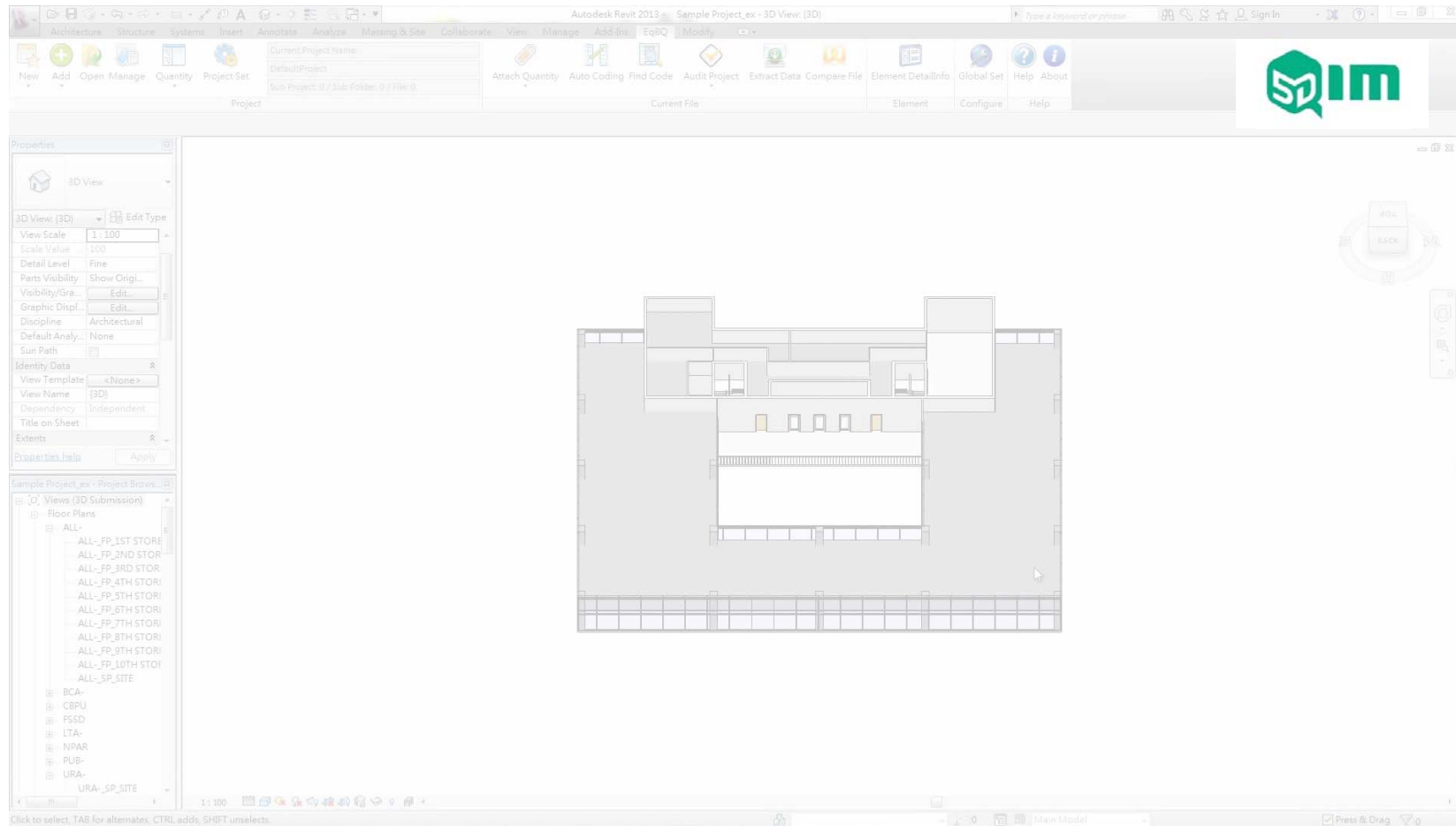


Measurement adjustment

- Suit for SMM
- Formwork of beam (blue)
- Formwork of wall (yellow)

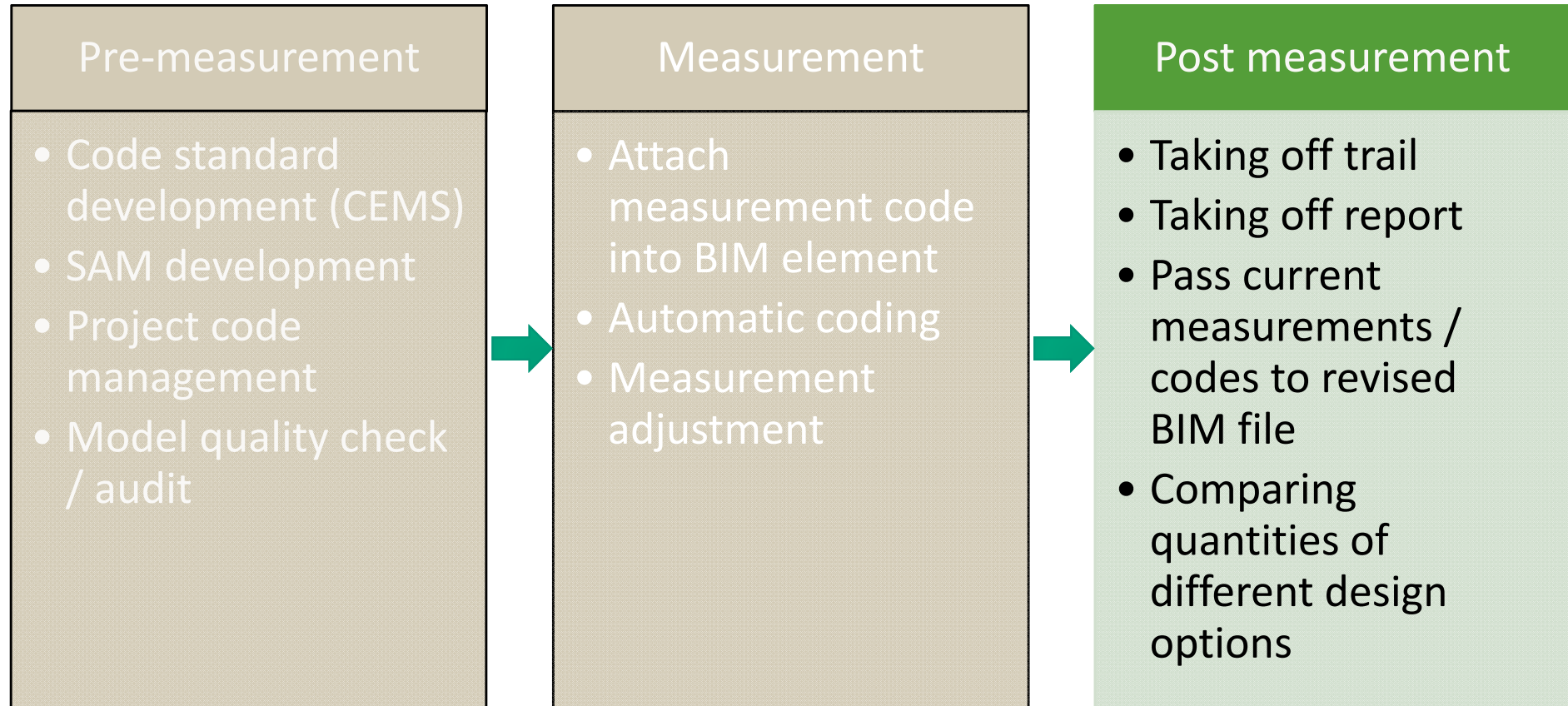


Measurement adjustment



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QIM5D Taking off framework



Post measurement

Taking off trail

Taking off Trail (Element by element)

The screenshot displays the Autodesk Revit 2013 interface. The main window shows a 3D isometric view of a building model. On the left, the 'Properties' panel is open, showing the 'Walls' section with a list of walls and their constraints. The 'Element Info' dialog box is open on the right, displaying the 'General' and 'Quantity' tabs. The 'General' tab shows the 'Element Id' as 474688, 'Category' as Walls, 'Kind' as Basic Wall, and 'Type' as Generic - 250mm. The 'Quantity' tab shows a table with the following data:

Name	Value	Unit
Length	6674.9999995101	mm
Area	18.0812499986528	m2
Volume	4.52031249966319	m3
Unconnected Height	2750	mm

Below the 'Quantity' tab, the 'Code And Quantity' section shows a table with the following data:

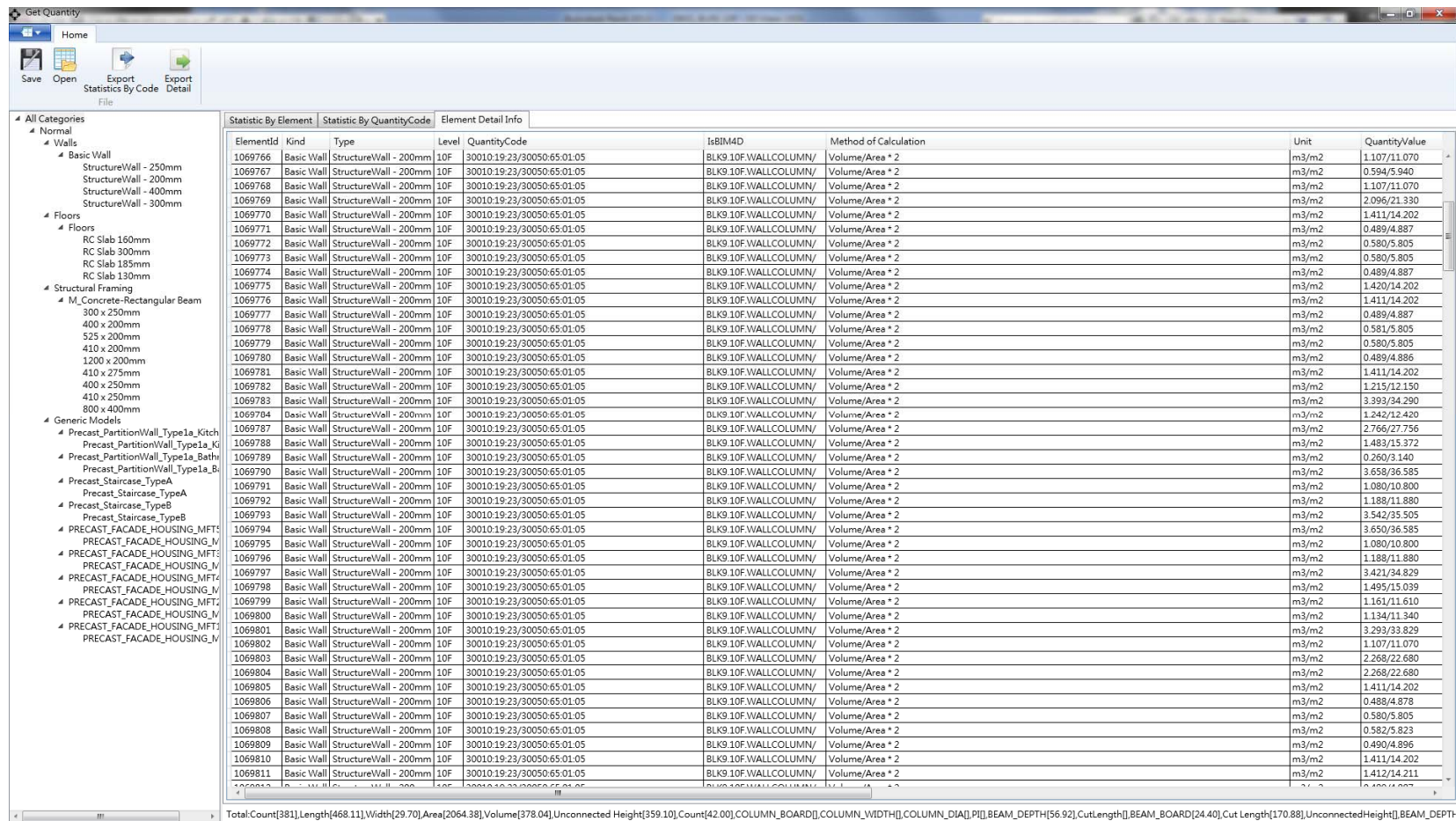
Quantity Code	Quantity Value	Unit	Description	Method of Calculation
30010:19:23:250	4.52	m3	250mm thick	Volume
30050:65:01:05x2	36.162	m2	Wall (2 sides)	Area * 2
30050:65:21:89	2.75	m	Wall	Unconnected Height

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Post measurement

Taking off reports

Taking off reports



The screenshot displays the 'Get Quantity' software interface. The top menu bar includes 'Home', 'Save', 'Open', 'Export Statistics By Code', and 'Export Detail'. The left sidebar shows a tree view of categories: 'All Categories', 'Normal', 'Walls', 'Basic Wall', 'Floors', 'Structural Framing', 'M_Concrete-Rectangular Beam', 'Generic Models', and 'Precast'. The main table lists elements with columns: ElementId, Kind, Type, Level, QuantityCode, IsBIM4D, Method of Calculation, Unit, and Quantity/Value. The table contains 38 rows of data, each representing a different construction element. At the bottom, a summary bar provides totals for various metrics.

ElementId	Kind	Type	Level	QuantityCode	IsBIM4D	Method of Calculation	Unit	Quantity/Value
1069766	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.107/11.070
1069767	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.594/5.940
1069768	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.107/11.070
1069769	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	2.096/21.330
1069770	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.411/14.202
1069771	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.489/4.887
1069772	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.580/5.805
1069773	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.580/5.805
1069774	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.489/4.887
1069775	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.420/14.202
1069776	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.411/14.202
1069777	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.489/4.887
1069778	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.581/5.805
1069779	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.580/5.805
1069780	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.489/4.886
1069781	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.411/14.202
1069782	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.215/12.150
1069783	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	3.393/34.290
1069784	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.242/12.420
1069787	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	2.766/27.756
1069788	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.483/15.372
1069789	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.260/3.140
1069790	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	3.658/36.585
1069791	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.080/10.800
1069792	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.188/11.880
1069793	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	3.542/35.505
1069794	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	3.650/36.585
1069795	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.080/10.800
1069796	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.188/11.880
1069797	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	3.421/34.829
1069798	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.495/15.039
1069799	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.161/11.610
1069800	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.134/11.340
1069801	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	3.293/33.829
1069802	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.107/11.070
1069803	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	2.268/22.680
1069804	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	2.268/22.680
1069805	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.411/14.202
1069806	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.488/4.878
1069807	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.580/5.805
1069808	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.582/5.823
1069809	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	0.490/4.896
1069810	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.411/14.202
1069811	Basic Wall	StructureWall - 200mm	10F	30010.19.23/30050.65.01.05	BLK9.10F.WALLCOLUMN/	Volume/Area * 2	m3/m2	1.412/14.211

Total.Count[381],Length[468.11],Width[29.70],Area[2064.38],Volume[378.04],Unconnected Height[359.10],Count[42.00],COLUMN_BOARD[],COLUMN_WIDTH[],COLUMN_DIA[],PI[],BEAM_DEPTH[56.92],CutLength[],BEAM_BOARD[24.40],Cut Length[170.88],UnconnectedHeight[],BEAM_DEPTH[]

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Extract Quantities

The screenshot displays the 'Get Quantity' application window. The left sidebar shows a tree view of categories under 'All Categories', including 'Abnormal', 'Walls', 'Floors', 'Generic Models', 'Opening', 'Sink Unit with Sink Mixer', 'Shower Curtain Rail_1-2P', 'Finishes around Window (3 sides)', 'Mirror', 'Flat Entrance Gate_SG6', 'Plastic Folding (Opened)', 'Door Closer', 'Door Handle Set', and 'Standard Gate_Sliding Type'. The main panel shows the 'Statistic By Quantity Code' tab, which displays a table of extracted quantities.

File Name: HSK BLK2 2F_16F_TYP
File Path: W:\YauLee_QSBIM_demo\Info\Revit 2013\HSK BLK2 2F_16F_TYP.rvt

Statistic By Element | **Statistic By Quantity Code** | **Element Detail Information**

Total Number of Revit Objects

Category	Count	Length	Width	Area	Volume	Unconnected Height	Count	BEAM_BOARD	Cut Length	STA
Abnormal	1056	452.967	430.23	1940.544	469.6711	464.75	1056			

Total Number of Revit Objects according Level

Level	Count	Length	Width	Area	Volume	Unconnected Height	Count	BEAM_BOARD	Cut Length	STAIR
L2	248	451.5271	126.87	1940.544	416.2467	464.75	248			
	808	1.44	303.36		53.42437		808			

Total Number of Revit Objects according Code

Quantity Code	Count
30010:19:23:200/30050:61:01:05/30050:65:01:05	24
30010:19:23:200/30050:65:01:05x2	46
30010:19:23:200/30050:65:01:05x2/30050:65:19:89	8
30010:19:23:200/30050:65:01:05x2/30050:65:01:HD182/30050:65:47:55w200/30050:65:19:89	8
30010:19:23:250/30050:61:01:05/30050:65:01:05/30050:65:47:55w250/30050:65:21:89	16
30010:19:23:250/30050:65:01:05x2/30050:65:21:89	8

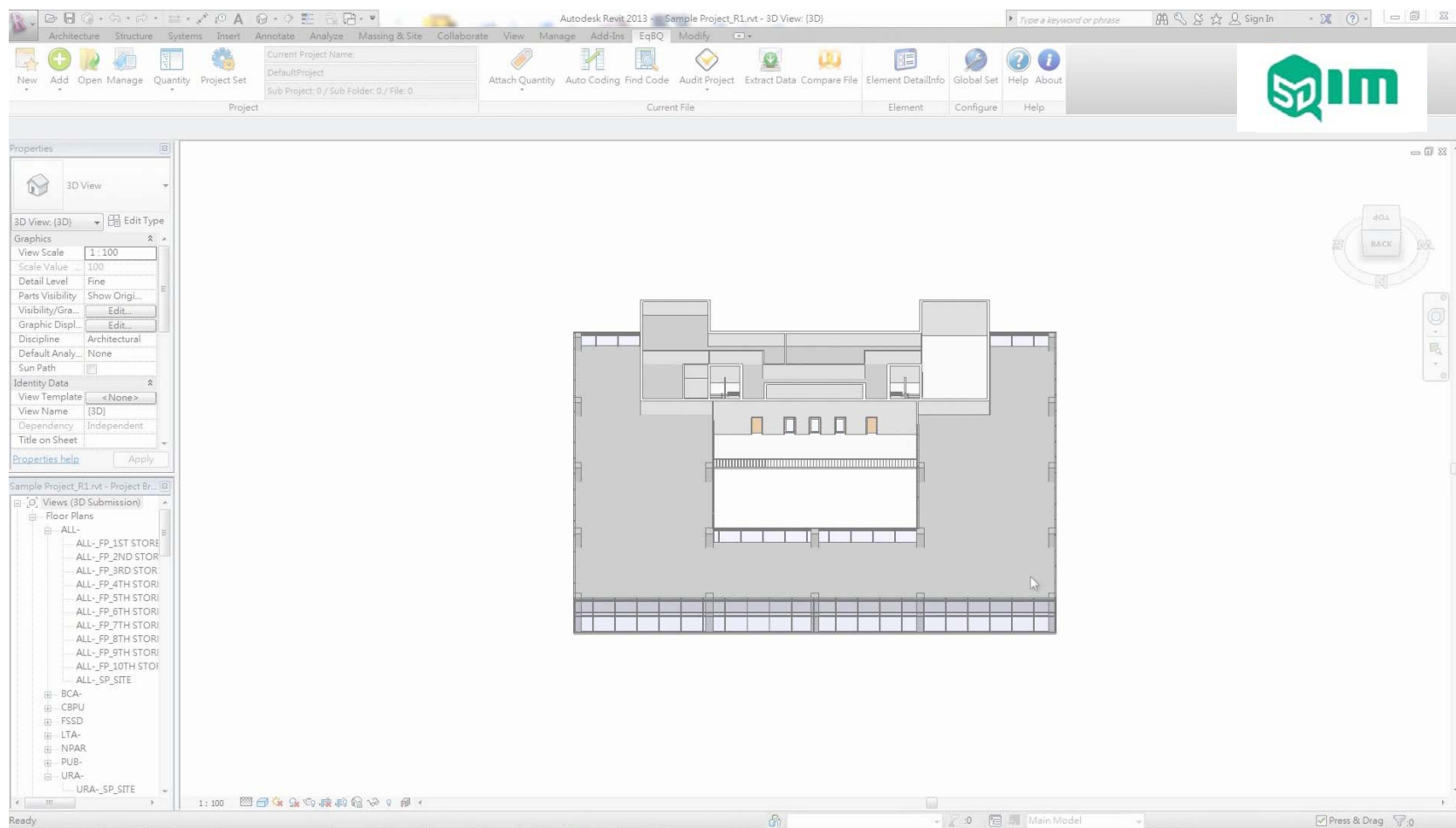
Total Number of Revit Objects according Level and Code

Level	Quantity Code
L2	30010:19:23:200/30050:61:01:05/30050:65:01:05

Total: Count[1056], Length[452.97], Width[430.23], Area[1940.54], Volume[469.67], Unconnected Height[464.75], Count[1056], B

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Extract Quantities



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Export to Excel

The screenshot shows a software interface with a data table and an Excel window. The table has columns A and B, and rows 1-9. The Excel window shows the same data with additional columns C (Unit) and D (Qty).

	A	B
1	HACEMS	Description
2	30010	In-situ concrete
3	30050	Formwork
4	30070	Precast concrete
5		
6		
7		
8		
9		

	A	B	C	D	E	F
1	HACEMS	Description	Unit	Qty		
2	30070:69:09	Partition wall units	no.	8		
3	30070:69:11:02	extreme sizes 1400mm W x 314mm D x 5028mm L	no.	2		
4	30070:69:11:01	extreme sizes 1125mm W x 319mm D x 2781mm L	no.	2		
5	30070:71:13:05	Type MFT5/MFT5r	no.	4		
6	30070:71:13:03	Type MFT3/MFT3r	no.	12		
7	30070:71:13:04	Type MFT4/MFT4r	no.	6		
8	30070:71:13:02A	Type MFT2A/MFT2Ar	no.	4		
9	30070:71:13:01	Type MFT1/MFT1r	no.	4		
10						

Export to BQ

	A	B	C	D	E	F	G
1	Item	HACEMS	Description	Unit	Qty	Rate	Amount
2		30010	In-situ concrete				
3		30010:17	Reinforced concrete; grade 30/20				
4		30010:17:23	Walls				
5	A	30010:17:23:100	100mm thick	m3	1		
6	B	30010:17:23:150	150mm thick	m3	8		
7	C	30010:17:23:200	200mm thick	m3	12		
8	D	30010:17:23:250	250mm thick	m3	1		
9		30010:17:35	Slabs				
10	E	30010:17:35:150	150mm thick	m3	1		
11		30010:19	Reinforced concrete; grade 35/20				
12		30010:19:23	Walls				
13	F	30010:19:23:150	150mm thick	m3	1		
14	G	30010:19:23:200	200mm thick	m3	122		
15	H	30010:19:23:250	250mm thick	m3	20		
16	J	30010:19:23:300	300mm thick	m3	9		
17	K	30010:19:23:400	400mm thick	m3	9		
18	L	30010:19:23:756	756mm thick	m3	3		
19		30010:19:25	Beams				
20	M	30010:19:25:01	Generally	m3	7		
21		30010:19:27	Upstand beam				
22	N	30010:19:27:900	900mm Inv	m3	1		
23		30010:19:35	Slabs				
24	P	30010:19:35:100	100mm thick	m3	1		

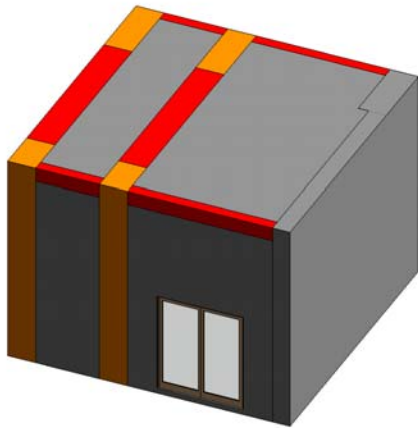
Summary In-situ concrete Formwork Precast concrete

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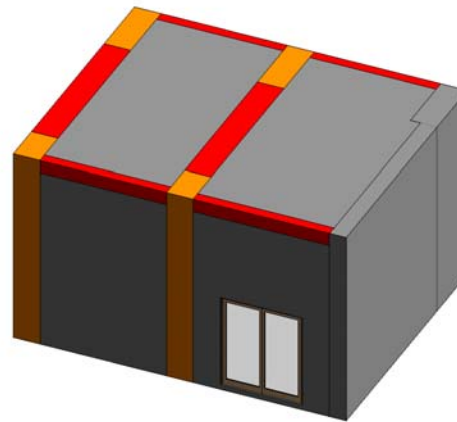
Post measurement

Variation Order and Design Changes

Variation Order / Design Changes

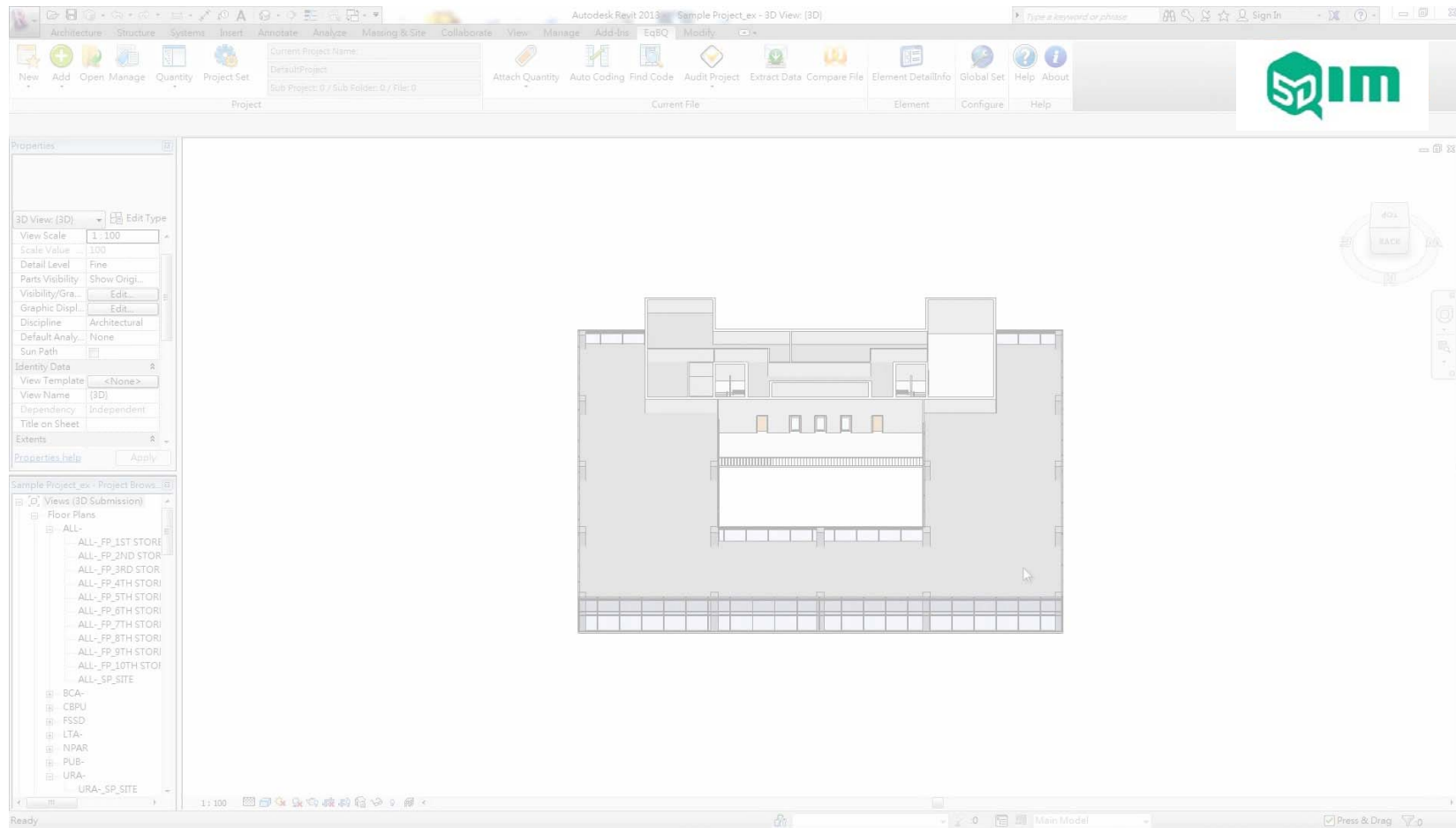


Model rev. A



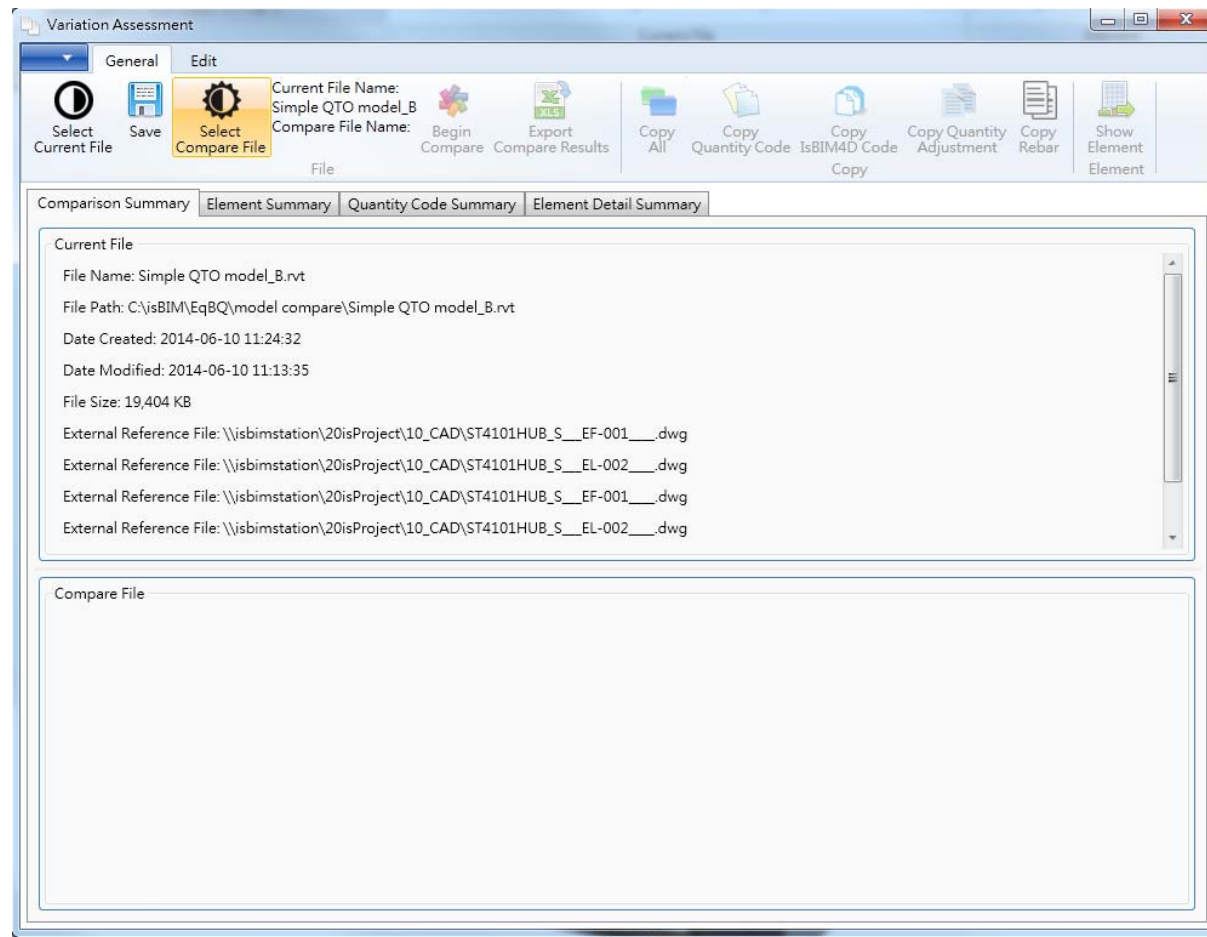
Model rev. B

Compare File

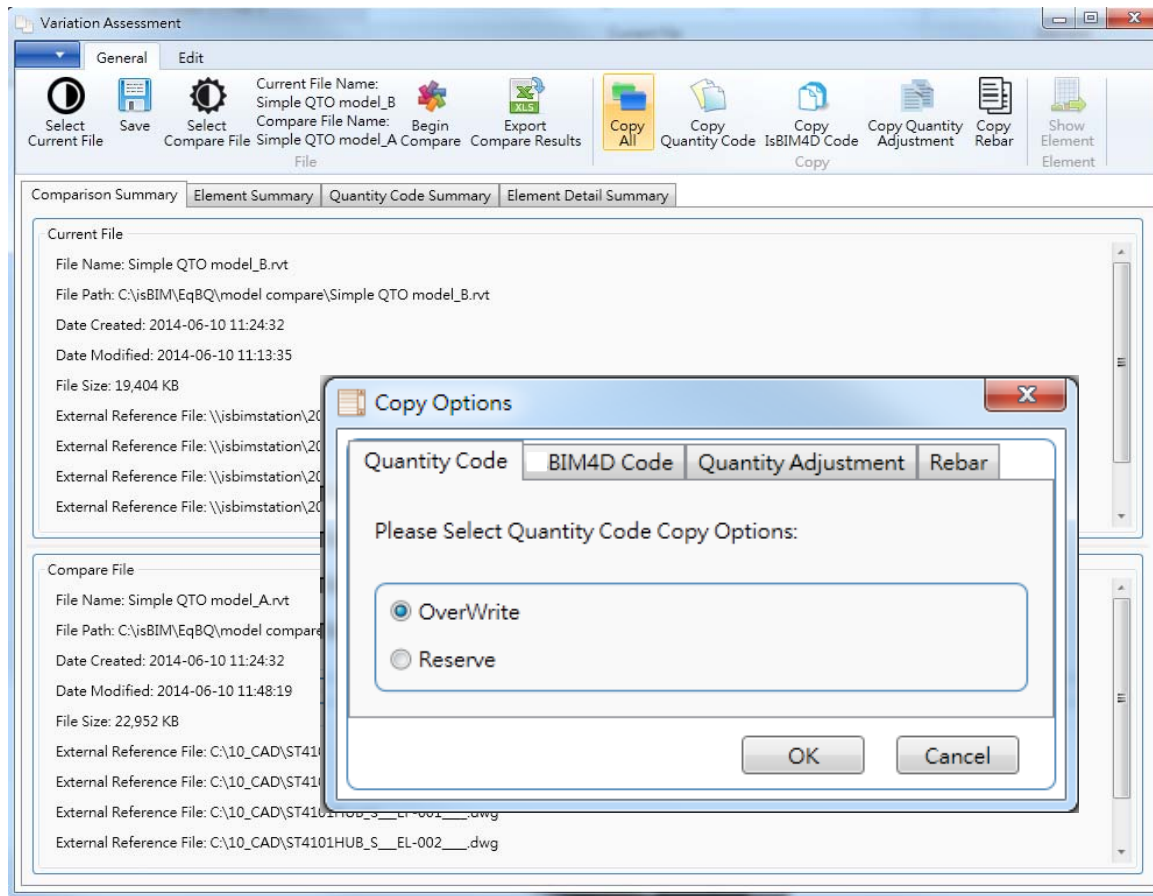


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Select previous file



Copy codes from previous file



Compare results

VerificationAssessment

General Edit

Select Current File Save Select Compare File Current File Name: Simple QTO model_B Compare File Name: Simple QTO model_A Compare Begin Export Results File Copy All Copy Quantity Code Copy IsBIM4D Code Copy Quantity Adjustment Copy Rebar Show Element Element

Comparison Summary Element Summary Quantity Code Summary Element Detail Summary

Level Last Code Summary Level Except Last Code Summary Level First Code Summary

Current File

Quantity Code	Description	Method of Calculation	Unit	Count	Quantity Value	Without Adjust	Adjust Value	Adjust Count
30010:17:23:200	200mm thick	Volume	m³	5	20.955			
30010:19:15	Columns	Volume	m³	4	30.72			
30010:19:23:500	500mm thick	Volume	m³	1	18			
30010:19:23:800	800mm thick	Volume	m³	1	9.6			
30010:19:25:01	Generally	Volume	m³	6	4.305	8.004	-3.699	6
30010:19:35:300	300mm thick	Volume	m³	2	17.385			
30010:19:35:300b	300mm thick slab in beam	Cut Length * b * 0.3	m³	6	3.699			
30050:65:01:05x2	Wall (2 sides)	Area * 2	m²	7	300.975	305.555	-4.58	4
30050:65:03:17	Column	Length * (b + h) * 2	m²	4	105.6	115.2	-9.6	8
30050:65:05:43	Soffit of slabs	Area	m²	2	57.95			
30050:65:11:75	Beams	Cut Length * (b + h + h)	m²	6	27.06	40.09	-13.03	11
62070:19:9	MD9	Count	no.	1	1			

Compare File

Quantity Code	Description	Method of Calculation	Unit	Count	Quantity Value	Without Adjust	Adjust Value	Adjust Count
30010:17:23:200	200mm thick	Volume	m³	5	16.475			
30010:19:15	Columns	Volume	m³	4	30.72			
30010:19:23:500	500mm thick	Volume	m³	1	18			
30010:19:23:800	800mm thick	Volume	m³	1	9.6			
30010:19:25:01	Generally	Volume	m³	6	4.185	7.524	-3.339	6
30010:19:35:300	300mm thick	Volume	m³	2	12.945			
30010:19:35:300b	300mm thick slab in beam	Cut Length * b * 0.3	m³	6	3.339			
30050:65:01:05x2	Wall (2 sides)	Area * 2	m²	7	256.175	260.755	-4.58	4
30050:65:03:17	Column	Length * (b + h) * 2	m²	4	105.6	115.2	-9.6	8
30050:65:05:43	Soffit of slabs	Area	m²	2	43.15			
30050:65:11:75	Beams	Cut Length * (b + h + h)	m²	6	24.66	35.69	-11.03	11
62070:19:9	MD9	Count	no.	1	1			

Comparison Results

Changed Elements

Summary Detail

Quantity Code	Description	Method of Calculation	Unit	Count	Quantity Value	Without Adjust	Adjust Value	Adjust Count
30010:17:23:200	200mm thick	Volume	m³	5	20.955			
30010:17:23:200	200mm thick	Volume	m³	5	16.475			
30010:19:25:01	Generally	Volume	m³	6	4.305	8.004	-3.699	6
30010:19:25:01	Generally	Volume	m³	6	4.185	7.524	-3.339	6
30010:19:35:300	300mm thick	Volume	m³	2	17.385			
30010:19:35:300	300mm thick	Volume	m³	2	12.945			
30010:19:35:300b	300mm thick slab in beam	Cut Length * b * 0.3	m³	6	3.699			
30010:19:35:300b	300mm thick slab in beam	Cut Length * b * 0.3	m³	6	3.339			
30050:65:01:05x2	Wall (2 sides)	Area * 2	m²	7	300.975	305.555	-4.58	4
30050:65:01:05x2	Wall (2 sides)	Area * 2	m²	7	256.175	260.755	-4.58	4
30050:65:05:43	Soffit of slabs	Area	m²	2	57.95			
30050:65:05:43	Soffit of slabs	Area	m²	2	43.15			
30050:65:11:75	Beams	Cut Length * (b + h + h)	m²	6	27.06	40.09	-13.03	11
30050:65:11:75	Beams	Cut Length * (b + h + h)	m²	6	24.66	35.69	-11.03	11

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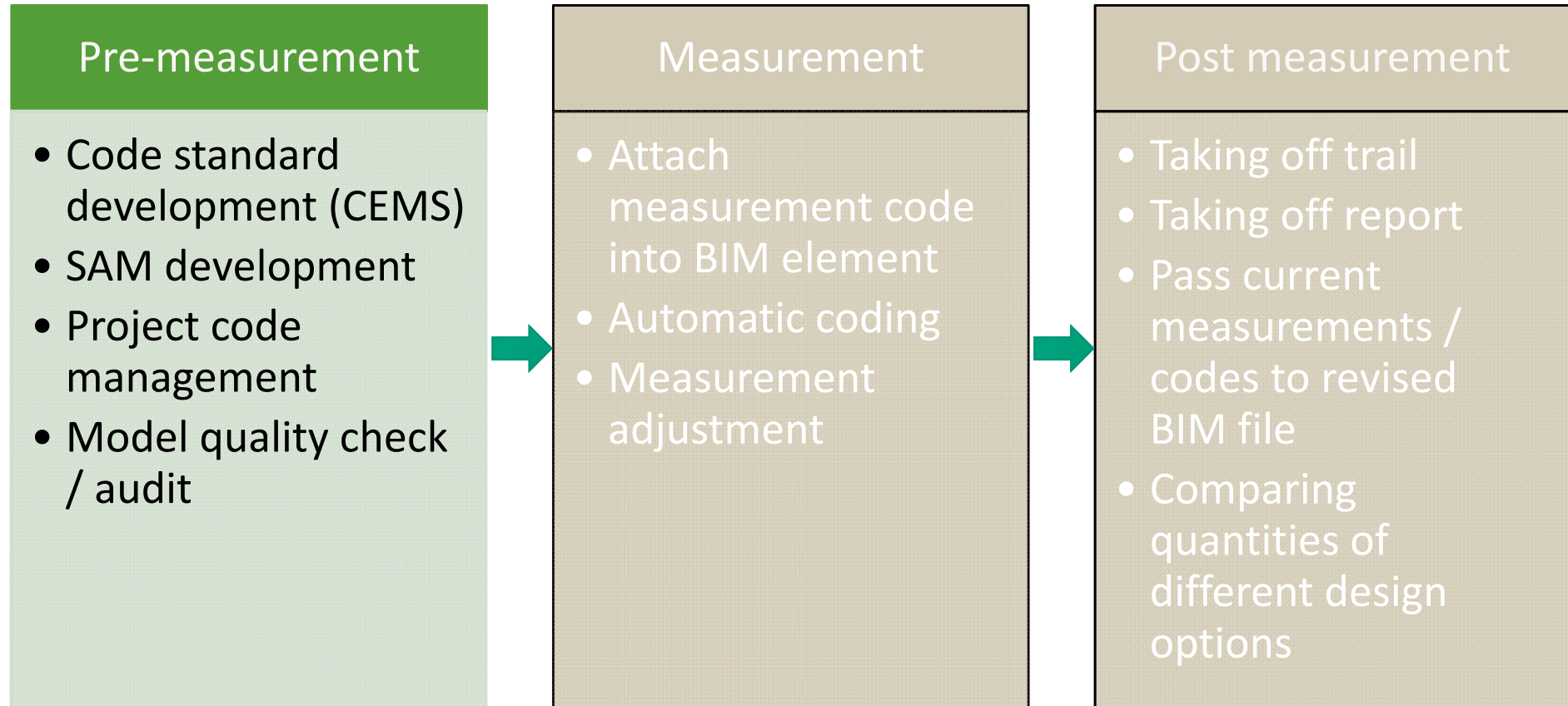


Export compare results

Comparison Summary									
Current File					Compare File				
Element ID	Category	Family	Type	Level	Quantity Code	IsBIM	Element ID	Category	Family
1047641	Structural Columns	Concrete-Rectangular-Column	1200 x 800mm	BLK6_GF	30010.19.15/30050.65.03.17	BLK6_C	1047641	Structural Columns	Concrete-Rectangular-Column
1047642	Structural Columns	Concrete							
1047646	Structural Columns	Concrete							
1047647	Structural Columns	Concrete							
1047662	Walls	Basic V							
1047663	Walls	Basic V							
3749153	Walls	Basic V							
3749154	Walls	Basic V							
3749160	Walls	Basic V							
3749161	Walls	Basic V							
3766834	Walls	Basic V							
1047758	Structural Framing	M_Cor							
1047759	Structural Framing	M_Cor							
1047906	Structural Framing	M_Cor							
1048478	Structural Framing	M_Cor							
1047904	Structural Framing	M_Cor							
1047905	Structural Framing	M_Cor							
1047898	Floors	Floor							
Count: 20									
Comparison Results									
Changed Elements									
Element ID	Category	Family	Type	Level	Quantity Code	IsBIM	Element ID	Category	Family
3749154	Walls	Basic V	Structure/Wall - 200mm	BLK6_GF	30010.17.23.200/30050.65.01.05x2	BLK6_GF.WALLCOLUMN	Volume/Area * 2	m ³ /m ²	2.016/20.16
3749154	Walls	Basic V	Structure/Wall - 200mm	BLK6_GF	30010.17.23.200/30050.65.01.05x2	BLK6_GF.WALLCOLUMN	Volume/Area * 2	m ³ /m ²	4.256/42.56
3749161	Walls	Basic V	Structure/Wall - 200mm	BLK6_GF	30010.17.23.200/30050.65.01.05x2	BLK6_GF.WALLCOLUMN	Volume/Area * 2	m ³ /m ²	2.016/20.16
1047759	Structural Framing	M_Concrete-Rectangular Beam	400 x 300mm	BLK6_1F	30010.19.25.01/30010.19.35.300b/30050.65.11.75	BLK6_1F.BEAMSLAB	Volume/Cut Length * b * 0.3/Cut Length * (b + h + h)	m ³ /m ² /m	0.114/0.342/2.28
1047759	Structural Framing	M_Concrete-Rectangular Beam	400 x 300mm	BLK6_1F	30010.19.25.01/30010.19.35.300b/30050.65.11.75	BLK6_1F.BEAMSLAB	Volume/Cut Length * b * 0.3/Cut Length * (b + h + h)	m ³ /m ² /m	0.054/0.162/1.08
1047906	Structural Framing	M_Concrete-Rectangular Beam	400 x 300mm	BLK6_1F	30010.19.25.01/30010.19.35.300b/30050.65.11.75	BLK6_1F.BEAMSLAB	Volume/Cut Length * b * 0.3/Cut Length * (b + h + h)	m ³ /m ² /m	0.114/0.342/2.28
1047906	Structural Framing	M_Concrete-Rectangular Beam	400 x 300mm	BLK6_1F	30010.19.25.01/30010.19.35.300b/30050.65.11.75	BLK6_1F.BEAMSLAB	Volume/Cut Length * b * 0.3/Cut Length * (b + h + h)	m ³ /m ² /m	0.054/0.162/1.08
1048478	Structural Framing	M_Concrete-Rectangular Beam	400 x 300mm	BLK6_1F	30010.19.25.01/30010.19.35.300b/30050.65.11.75	BLK6_1F.BEAMSLAB	Volume/Cut Length * b * 0.3/Cut Length * (b + h + h)	m ³ /m ² /m	0.123/0.369/2.46
1048478	Structural Framing	M_Concrete-Rectangular Beam	400 x 300mm	BLK6_1F	30010.19.25.01/30010.19.35.300b/30050.65.11.75	BLK6_1F.BEAMSLAB	Volume/Cut Length * b * 0.3/Cut Length * (b + h + h)	m ³ /m ² /m	0.123/0.369/2.46
1047905	Structural Framing	M_Concrete-Rectangular Beam	800 x 800mm	BLK6_1F	30010.19.25.01/30010.19.35.300b/30050.65.11.75	BLK6_1F.BEAMSLAB	Volume/Cut Length * b * 0.3/Cut Length * (b + h + h)	m ³ /m ² /m	1.92/1.152/9.12
1047905	Structural Framing	M_Concrete-Rectangular Beam	800 x 800mm	BLK6_1F	30010.19.25.01/30010.19.35.300b/30050.65.11.75	BLK6_1F.BEAMSLAB	Volume/Cut Length * b * 0.3/Cut Length * (b + h + h)	m ³ /m ² /m	1.92/1.152/9.12
1047909	Floors	Floor	RC Slab 300mm	BLK6_1F	30010.19.35.300/30050.65.05.43	BLK6_1F.BEAMSLAB	Volume/Area	m ³ /m ²	8.436/28.12
1047909	Floors	Floor	RC Slab 300mm	BLK6_1F	30010.19.35.300/30050.65.05.43	BLK6_1F.BEAMSLAB	Volume/Area	m ³ /m ²	3.996/13.32
Count: 7									

MESGROUP

QIM5D Taking off framework



Pre-measurement

Construction Electronic Measurement Standard (CEMS)

MESGROUP



Construction Electronic Measurement Standard (CEMS)



- HA Construction Electronic Measurement Standard (HACEMS)

HACEMS - Quantification Rules

(a) Concrete (continued)

CLASSIFICATION TABLE	MEASUREMENT RULES	DEFINITION RULES	COVERAGE RULES	SUPPLEMENTARY INFORMATION
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VII - CONCRETE WORKS

(a) Concrete (continued)

P.61 - 62

Classification Table	Thickness stated	Unit	HACEMS	Model Approach	Revit Parameter	EqBQ Formula	Adjustment for SAM	Remarks
18. Suspended slabs	Thickness stated	m3	30010:19:35	According to SCO SAM or HASE modeling guide	Volume	=Volume	Nil	
19. Coffered and troughed slabs		m3						NA to this project
20. Beams		m3	30010:19:25		Volume	=Volume	Ddt for slab (e.g. = Volume/d*thickness*-1)	
21. Ground beams		m3	30010:19:13		Volume	=Volume	Ddt for slab (e.g. = Volume/d*thickness*-1)	
22. Casing to structural steelwork		m3						NA to this project
23. Walls	Thickness stated	m3	30010:19:23		Volume	=Volume	Ddt for slab (e.g. = Volume/Unconnected Height*thickness*-1)	
24. Columns		m3	30010:19:15		Volume	=Volume	Ddt for slab (e.g. = Volume/Length*thickness*-1)	
25. Concrete in stairs		m3	30010:19:45		Volume	=Volume	Nil	
26. In-situ concrete in filling between and over hollowblocks in		m3						NA to this project
27. Hollowblocks in suspended slabs		m3						NA to this project

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HAC 0.0000 4

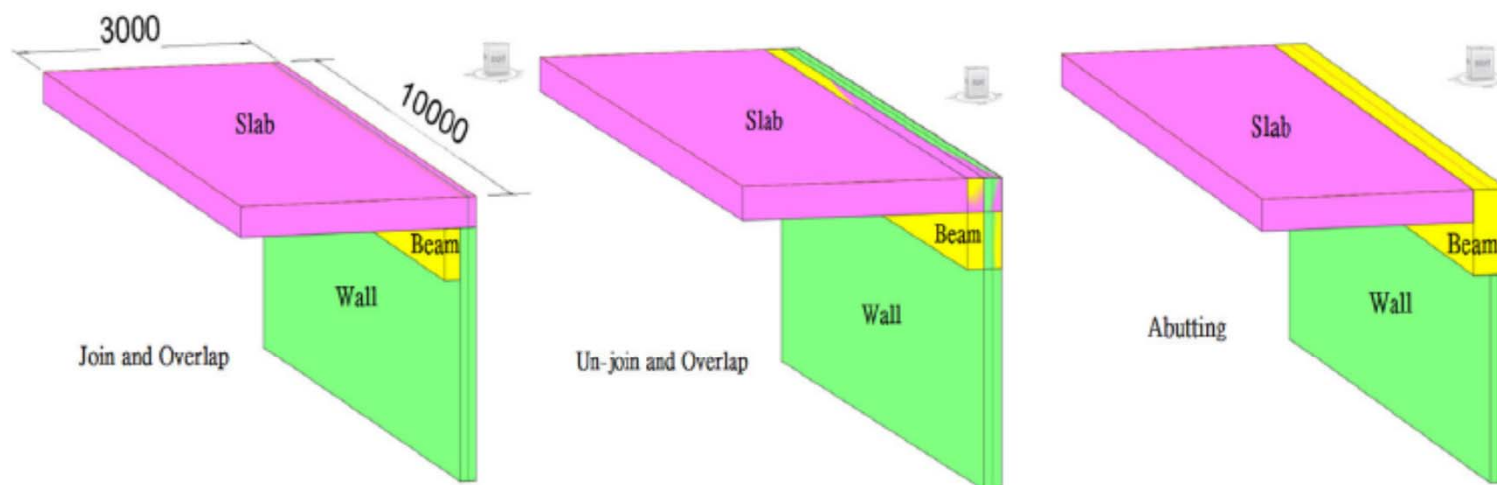
62

Pre-measurement

Standard Approach of Modeling (SAM)

Modeling Approach vs. QTO

Concrete Works Jointing Approaches



Jointing Approach	Length		Unconnected Height	Area		Volume			
	Beam	Wall		Slab	Wall	Slab	Wall	Beam	Total
Join and Overlap	10.00	10.00	2.75	30.00	24.50	9.00	4.90	1.00	14.90
Un-join and Overlap	10.00	10.00	2.75	30.00	27.50	9.00	5.50	3.20	17.70
Abutting	10.00	10.00	1.95	26.00	19.50	7.80	3.90	3.20	14.90

Standard approach of modeling (SAM)



8 QSBIM Standard Approach of Modeling

2.1.2. FOOTING/PILECAP
Irregular shape footing and pile cap must be constructed

Footing and pile cap must use Principal datum reference level to specify another reference levels to place from level" is the actual top level of footing and pile cap.

If the footing and pile cap need to be further edited, "a void form to adjust the shape of footing and pile cap"

Family Type	System family
Family Category	Foundation slab
Reference Level	Principal datum reference level
Height offset from level	Actual pile cap/footing top level (mPD)

2.2.3. STRUCTURAL BEAM
Structural beam shall be constructed by beam tool.

Structural beam shall use its own structural floor level as the reference level. For example, If the beam's top level is 1/F, then it should use 1/F as a reference level. And, if the beam located between 1/F and 2/F, then the beam shall keep 1/F as a reference level and use level offset function to adjust the beam location

Structural beam is defined as horizontal element, so the structural beam will not cut the vertical element.

The start level offset and end level offset is the actual start level (offset from the structural floor level) and end level of the structural beam (offset from the structural floor level).

A project parameter QSLength should be set to store the beam length for QS usage.

Family Type	Loadable family
Family Template	Structural framing
Family Category	Structural framing
Reference Level	Actual structural floor level
Start Level Offset	Actual start level of beam (Offset from structural floor level)
End Level Offset	Actual end level of beam (Offset from structural floor level)

Right

Wrong

Defining how to model each work in Revit

MESGROUP

Pre-measurement

Project code management

[illegible]

2, Load CEMS code



Pre-measurement

Model Audit

MESGROUP



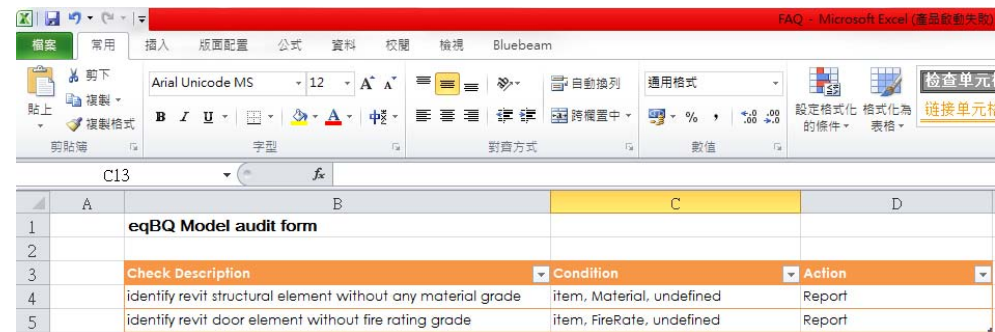
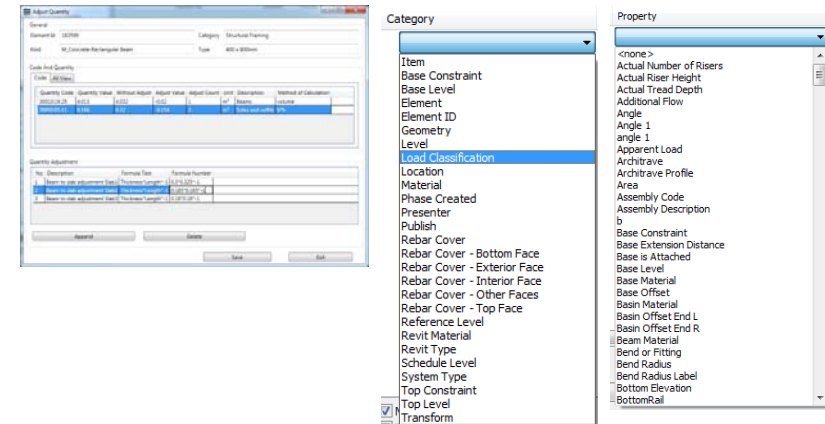
Model Audit

Model Quality Audit

- Check whether model data is sufficient for taking off

Procedure

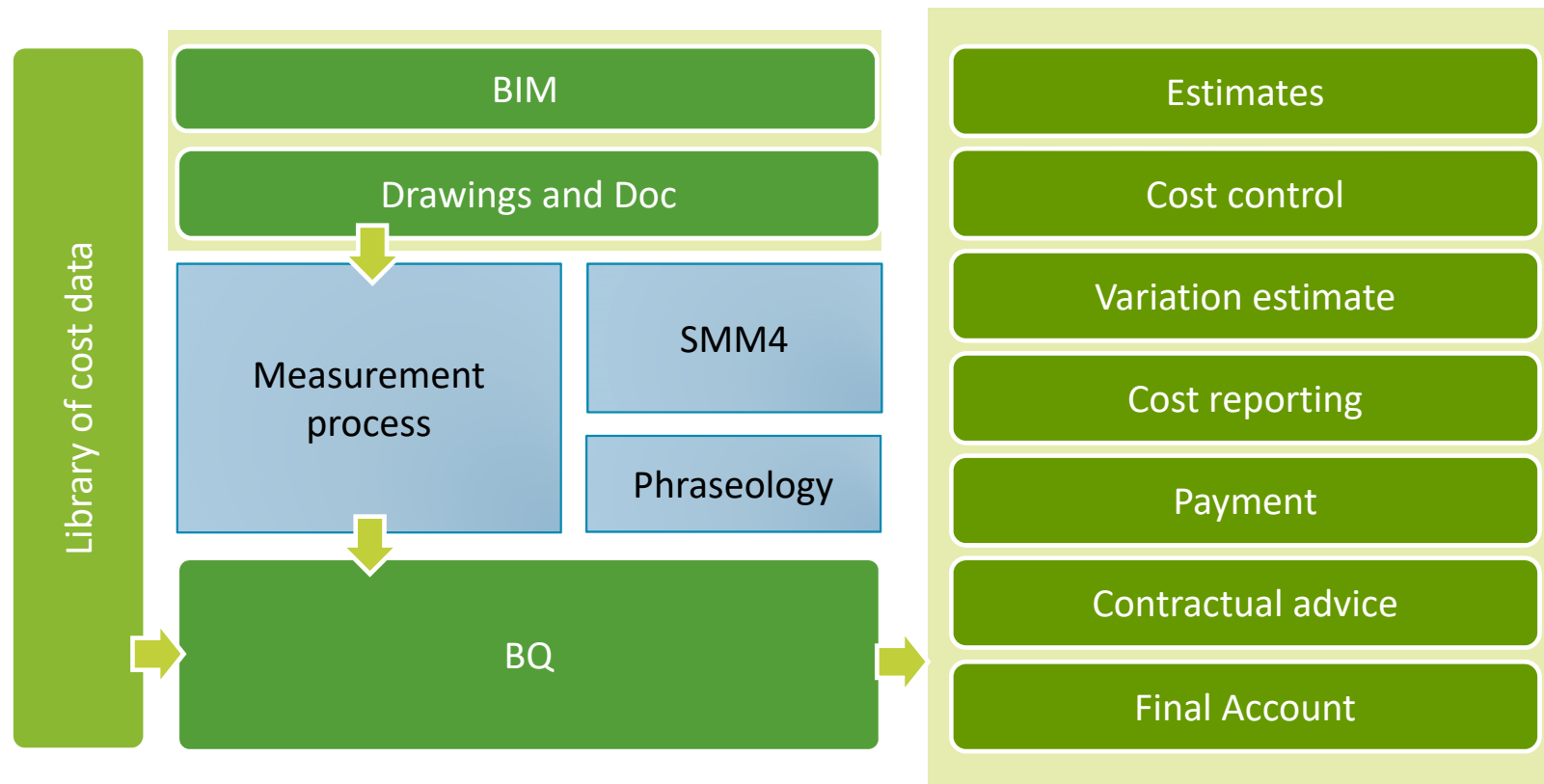
- Prepare audit rules in excel.
- Upload
- Report



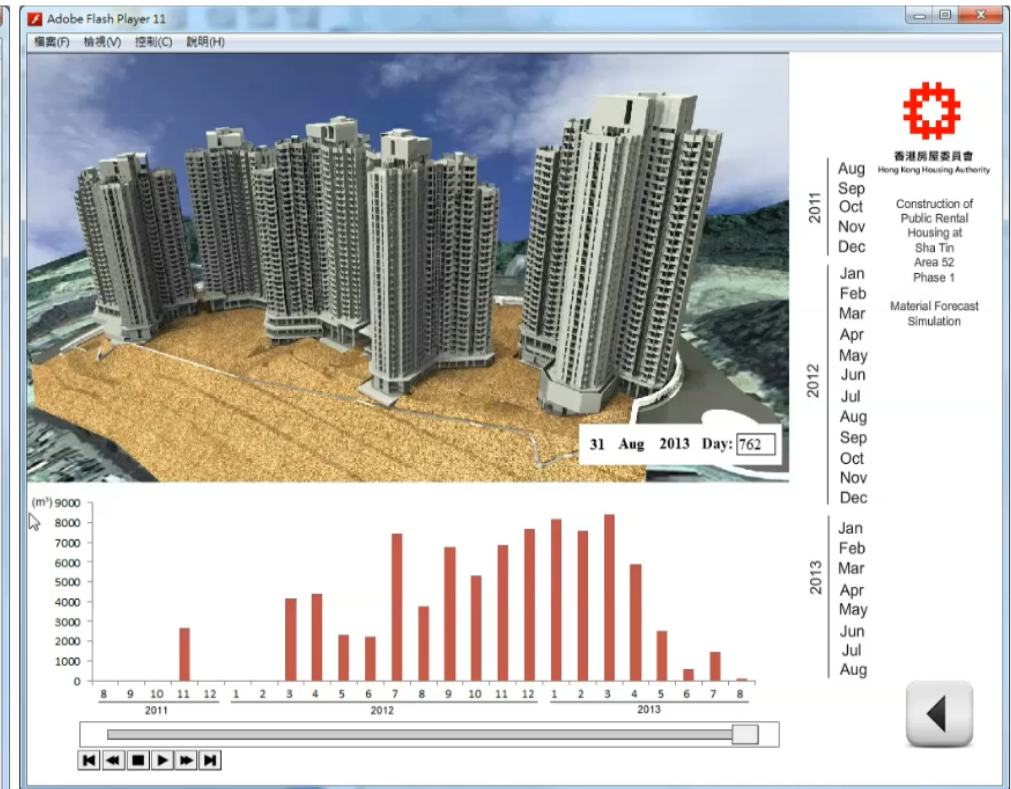
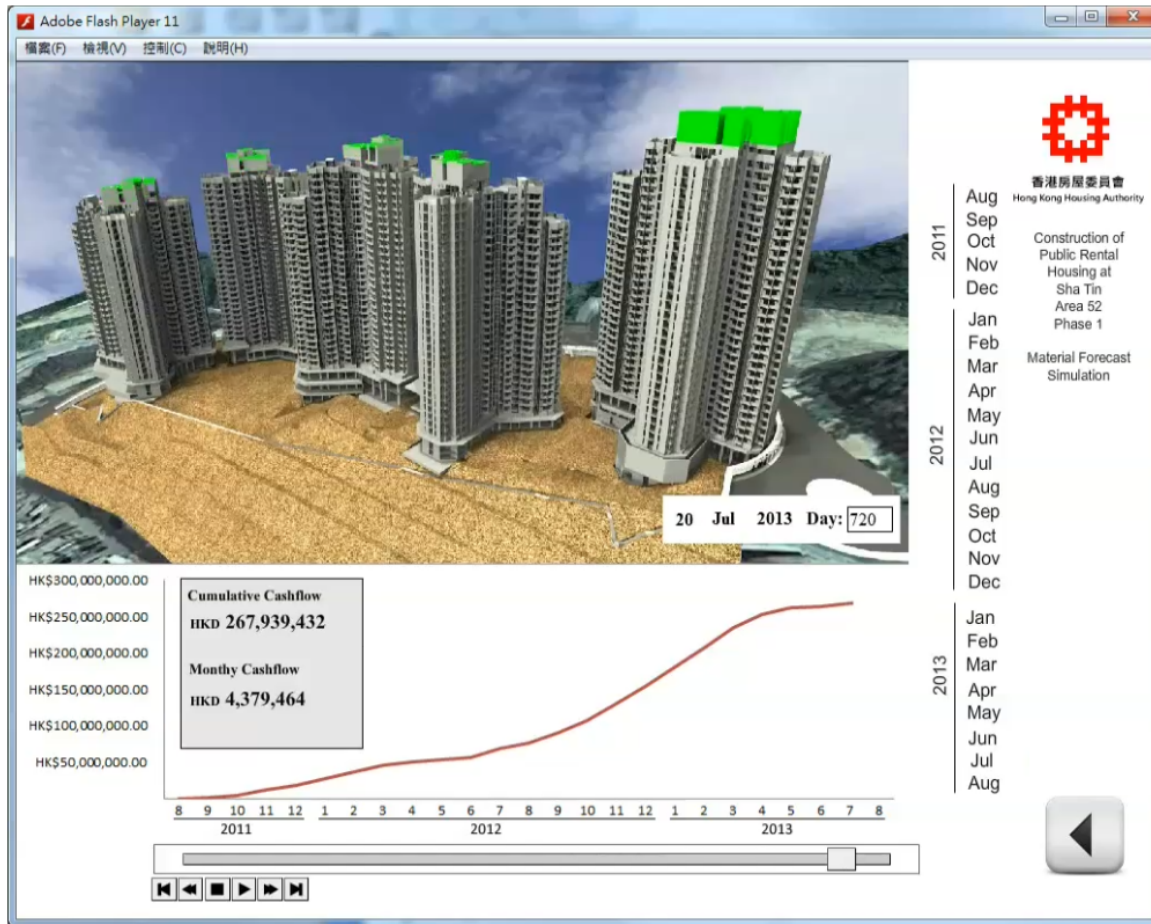
Check Description	Condition	Action
identify revit structural element without any material grade	item, Material, undefined	Report
identify revit door element without fire rating grade	item, FireRate, undefined	Report

QIM is not QTO model

QIM Practice



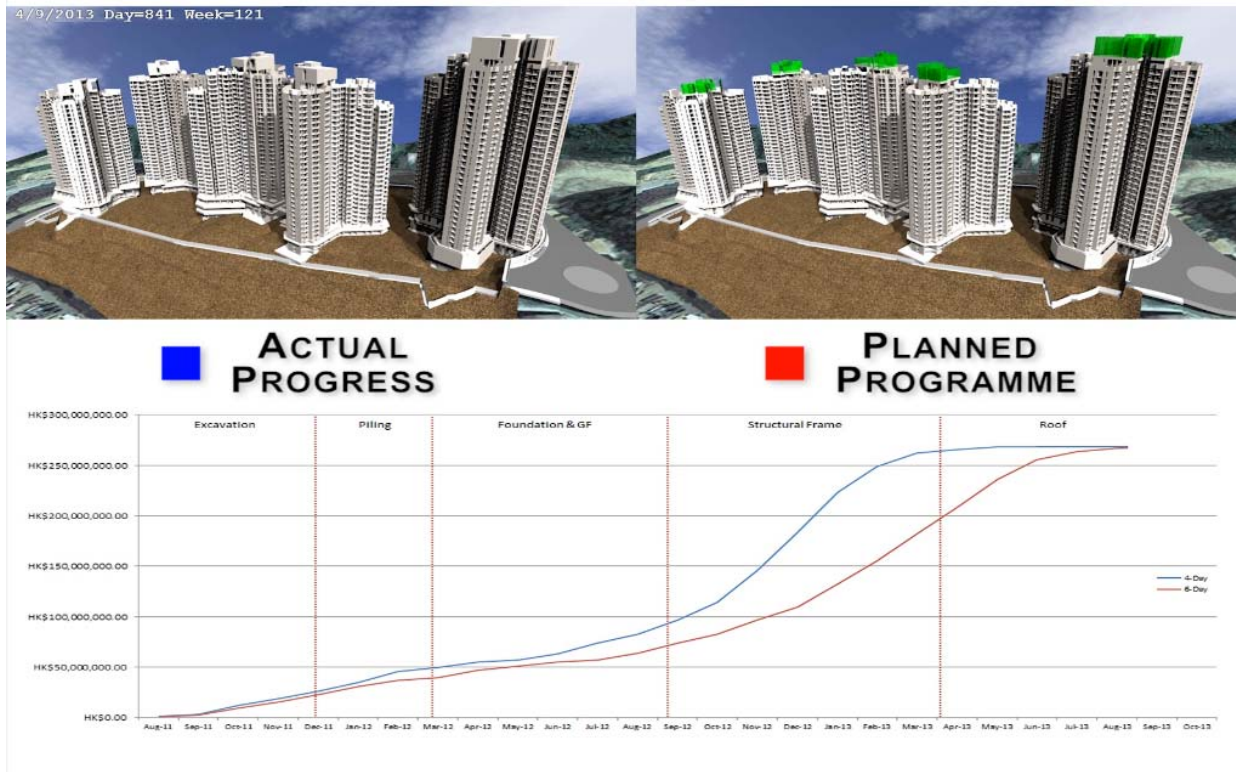
5D Applications



MESGROUP

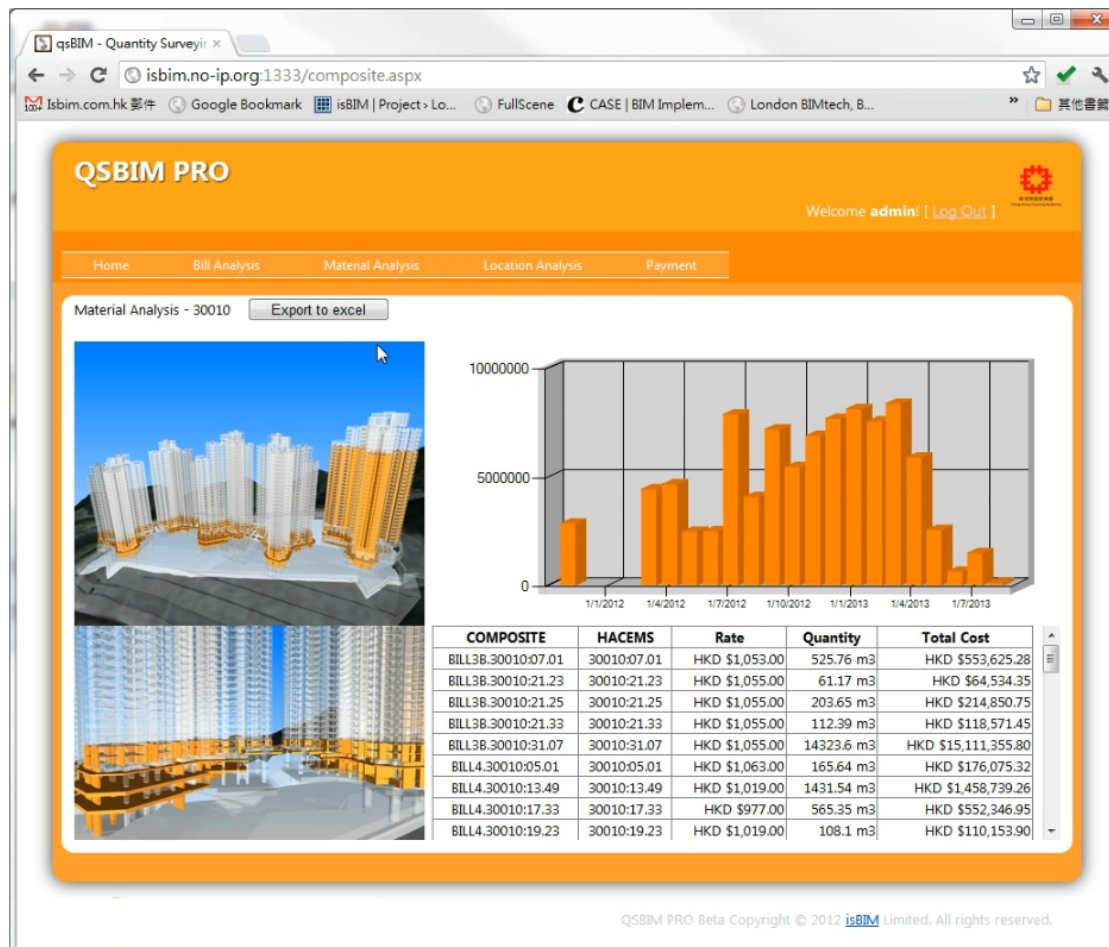
5D Applications

Cash flow simulation has been created by the integration of extracted **quantities** from BIM model, **construction programme** and **cost information**.



- ✓ Reveals actual and predicted cash flow of the project.
- ✓ Better understanding of project cash flow.

Cost Analysis



MESGROUP

Value Engineering

OPTION A

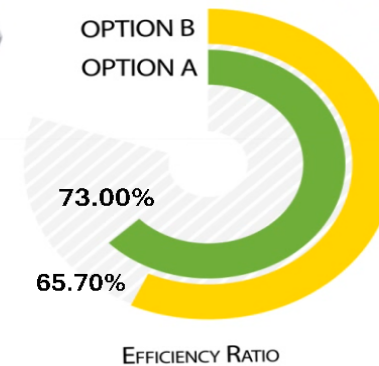
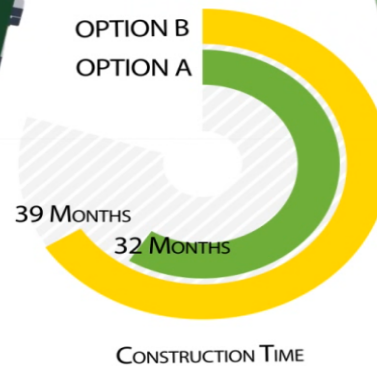
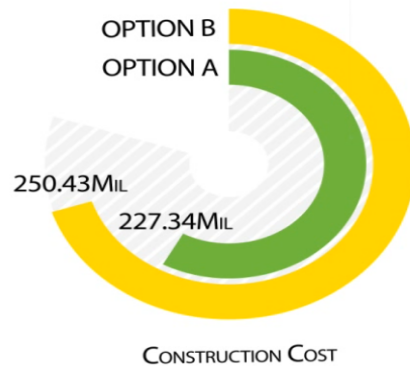
8-Flat Option

Based on the quantities extracted from BIM models and after analysing the data, Design Option A has been selected revealing the option requires:

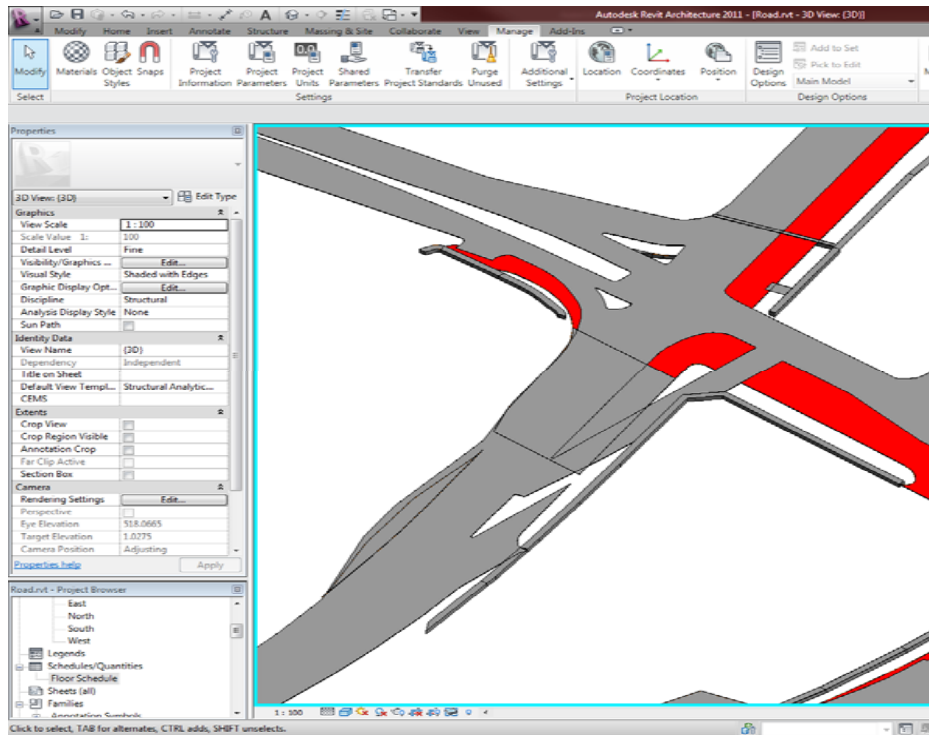
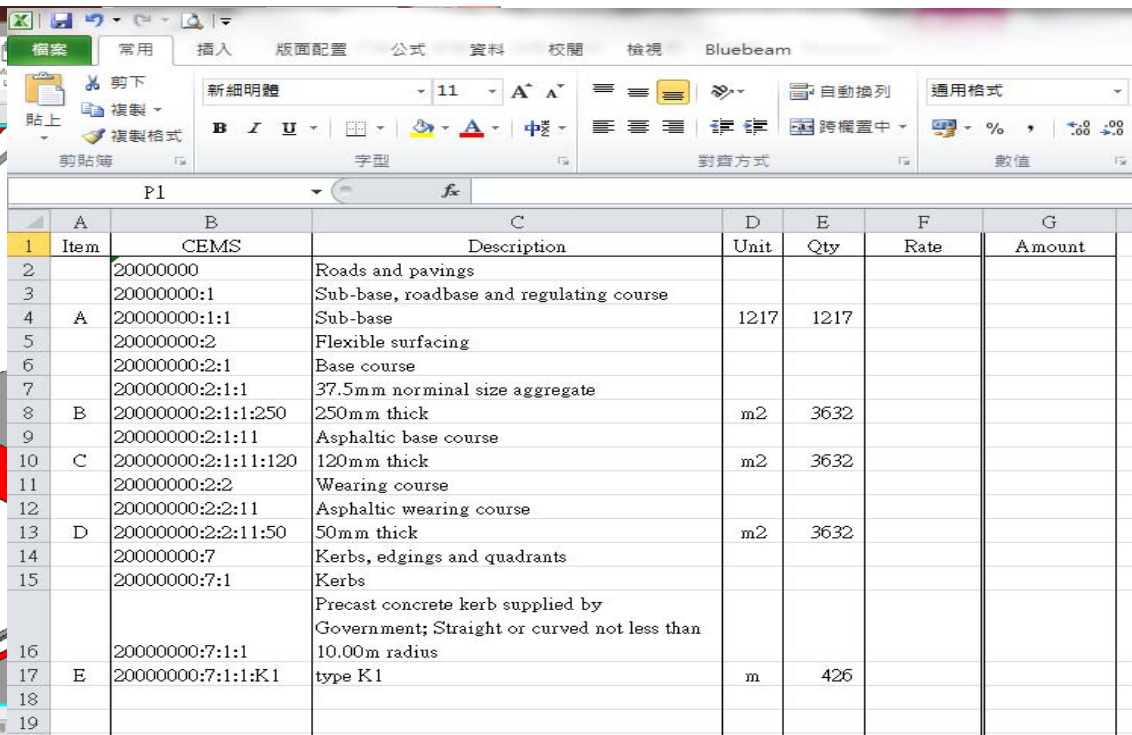
- The lowest Construction Cost
- The least Construction Time
- The highest Efficiency Ratio

OPTION B

6-Flat Option



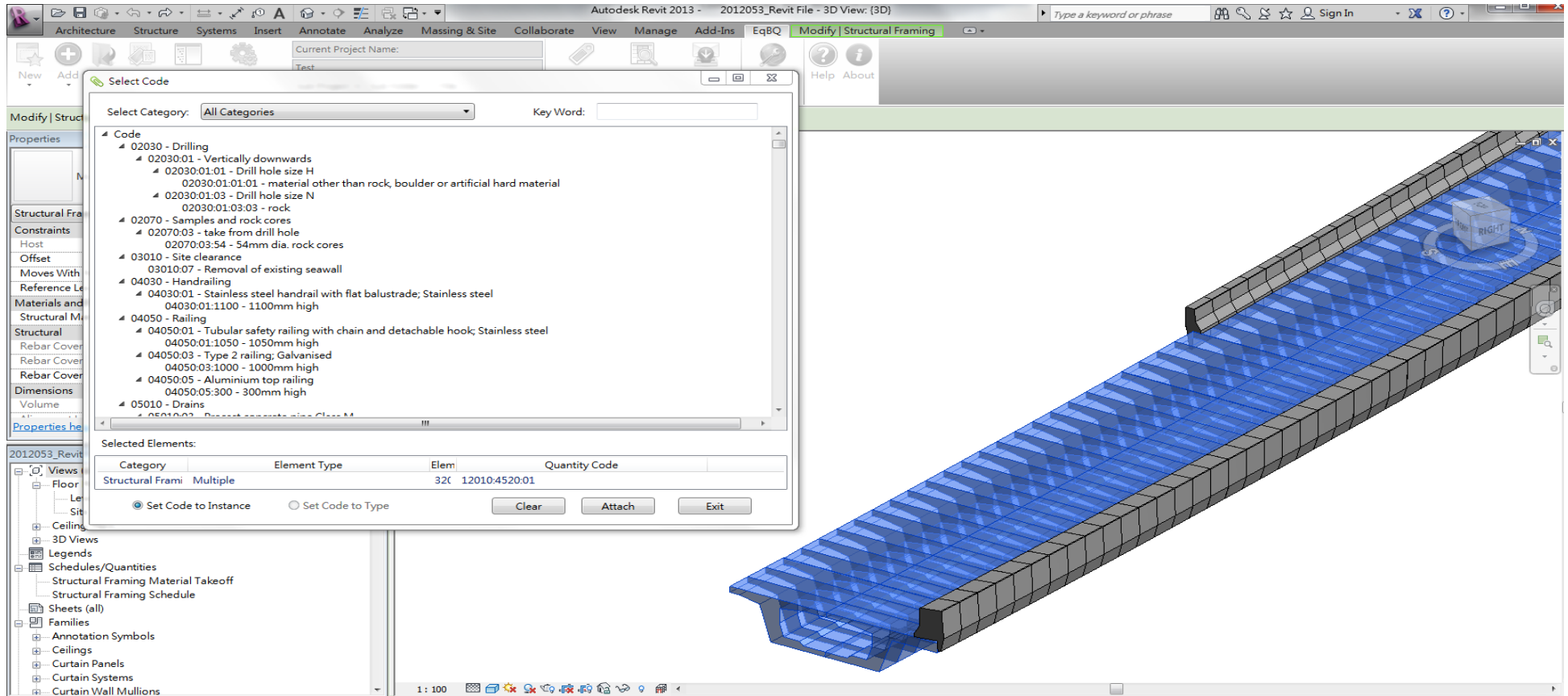
Infrastructure

Item	CEMS	Description	Unit	Qty	Rate	Amount
2	20000000	Roads and pavings				
3	20000000:1	Sub-base, roadbase and regulating course				
4	A 20000000:1:1	Sub-base	1217	1217		
5	20000000:2	Flexible surfacing				
6	20000000:2:1	Base course				
7	20000000:2:1:1	37.5mm nominal size aggregate				
8	B 20000000:2:1:1:250	250mm thick	m2	3632		
9	20000000:2:1:1:1	Asphaltic base course				
10	C 20000000:2:1:1:1:120	120mm thick	m2	3632		
11	20000000:2:2	Wearing course				
12	20000000:2:2:11	Asphaltic wearing course				
13	D 20000000:2:2:11:50	50mm thick	m2	3632		
14	20000000:7	Kerbs, edgings and quadrants				
15	20000000:7:1	Kerbs				
16	20000000:7:1:1	Precast concrete kerb supplied by Government; Straight or curved not less than 10.00m radius				
17	E 20000000:7:1:1:K1	type K1	m	426		

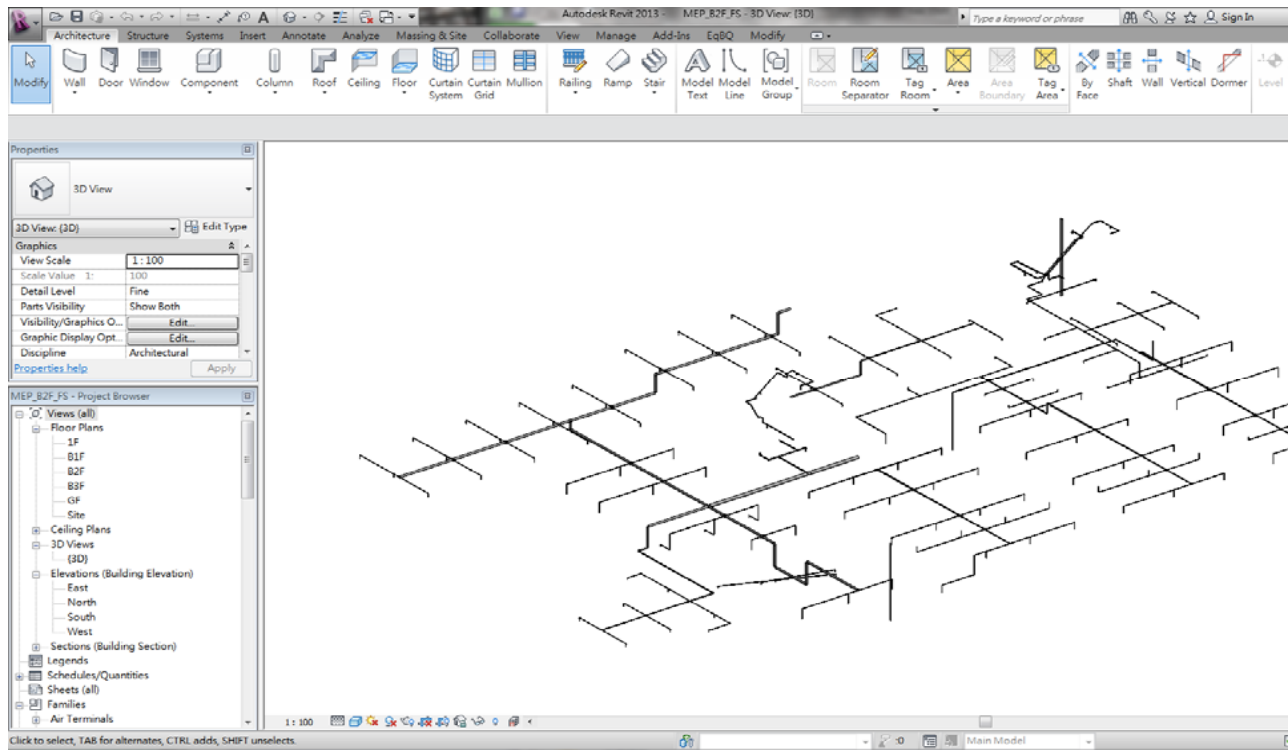
MESGROUP

Highway



MESGROUP

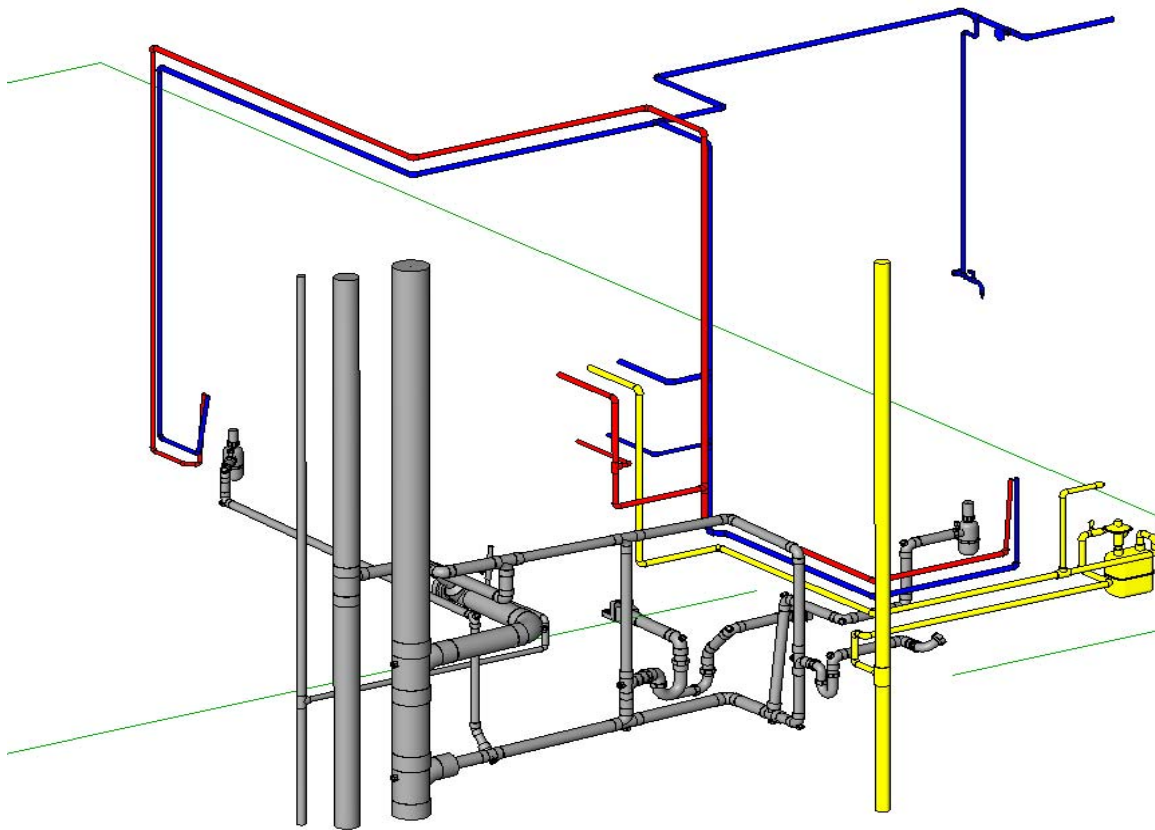
MEP



Q1						
A	B	C	D	E	F	G
Item	HACEMS	Description	Unit	Qty	Rate	Amount
1	70390	Fire fighting installation				
2	70390:33	Galvanised steel pipes and fittings				
3	70390:33:03	Fixing to soffits				
4	70390:33:03:25	25mm dia.	m	239		
5	70390:33:03:32	32mm dia.	m	69		
6	70390:33:03:40	40mm dia.	m	36		
7	70390:33:03:50	50mm dia.	m	37		
8	70390:33:03:65	65mm dia.	m	16		
9	70390:33:03:100	100mm dia.	m	52		
10	70390:33:03:150	150mm dia.	m	8		
11	70390:33:07	Extra for bends				
12	70390:33:07:25	25mm bends	no.	96		
13	70390:33:07:32	32mm bends	no.	35		
14	70390:33:07:40	40mm bends	no.	3		
15	70390:33:07:50	50mm bends	no.	22		
16	70390:33:07:65	65mm bends	no.	2		
17	70390:33:07:100	100mm bends	no.	9		
18	70390:33:19	Extra for tees				
19	70390:33:19:25x25x25	25 x 25 x 25mm tees	no.	16		
20	70390:33:19:32x25x25	32 x 25 x 25mm tees	no.	9		
21	70390:33:19:32x32x25	32 x 32 x 25mm tees	no.	2		
22	70390:33:19:32x32x32	32 x 32 x 32mm tees	no.	25		
23	70390:33:19:40x25x25	40 x 25 x 25mm tees	no.	4		
24	70390:33:19:40x40x40	40 x 40 x 40mm tees	no.	3		
25	70390:33:19:50x50x50	50 x 50 x 50mm tees	no.	5		
26	70390:33:19:65x40x40	65 x 40 x 40mm tees	no.	1		
27	70390:33:19:100x25x25	100 x 25 x 25mm tees	no.	2		
28	70390:33:19:100x100x25	100 x 100 x 25mm tees	no.	2		
29	70390:33:19:100x100x100	100 x 100 x 100mm tees	no.	1		
30	70390:33:19:150x150x50	150 x 150 x 50mm tees	no.	1		
31	70390:33:21	Extra for crosses				
32	70390:33:21:32x32x32x32	32 x 32 x 32 x 32mm crosses	no.	6		
33	70390:33:21:40x40x40x40	40 x 40 x 40 x 40mm crosses	no.	4		
34	70390:33:21:50x50x50x50	50 x 50 x 50 x 50mm crosses	no.	10		
35	70390:33:21:65x65x65x65	65 x 65 x 65 x 65mm crosses	no.	2		
36	70390:33:21:100x100x100x100	100 x 100 x 100 x 100mm crosses	no.	12		
37	70390:33:23	Extra for reducers				
38	70390:33:23:32x25	32 - 25mm reducers	no.	49		
39	70390:33:23:40x25	40 - 25mm reducers	no.	9		
40	70390:33:23:40x25	40 - 25mm reducers	no.	9		

MESGROUP

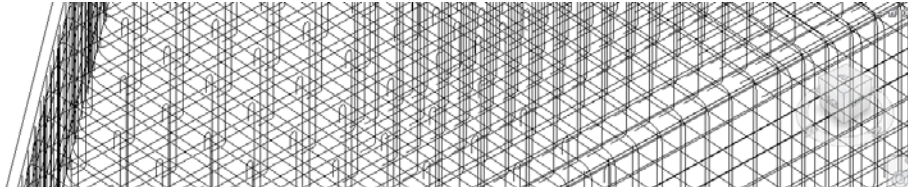
MEP



	A	B	C	D	E	F
1	Quantity Code	Description	Unit	Quantity Value		Count
2	70090	Soil, waste and ventilation pipe system				
3	70090:03	Plastic pipes and fittings				
4	70090:03:01	Fixing to walls and columns				
5	70090:03:01:20	20mm dia.	m	1.74		4
6	70090:03:01:20F	Fitting Length; 20mm dia.	m	0.08	1.81	2
7	70090:03:01:32	32mm dia.	m	2.36		6
8	70090:03:01:32F	Fitting Length; 32mm dia.	m	0.41	2.77	5
9	70090:03:01:40	40mm dia.	m	9.80		24
10	70090:03:01:40F	Fitting Length; 40mm dia.	m	2.06	11.86	17
11	70090:03:01:50	50mm dia.	m	2.68		15
12	70090:03:01:50F	Fitting Length; 50mm dia.	m	1.89	4.57	12
13	70090:03:01:100	100mm dia.	m	3.74		4
14	70090:03:01:100F	Fitting Length; 100mm dia.	m	0.82	4.56	4
15	70090:03:01:150	150mm dia.	m	2.69		2
16	70090:03:01:150F	Fitting Length; 150mm dia.	m	0.89	3.58	2
17	70090:03:07	Extra for bends				
18	70090:03:07:20	20mm bends	no.	2.00		2
19	70090:03:07:32	32mm bends	no.	4.00		4
20	70090:03:07:40	40mm bends	no.	11.00		11
21	70090:03:07:50	50mm bends	no.	7.00		7
22	70090:03:07:100	100mm bends	no.	1.00		1
23	70090:03:13	Extra for junctions				
24	70090:03:13:40x40x40	40 x 40 x 40mm junctions	no.	2.00		2
25	70090:03:13:50x50x32	50 x 50 x 32mm junctions	no.	1.00		1
26	70090:03:13:50x50x40	50 x 50 x 40mm junctions	no.	1.00		1
27	70090:03:13:50x50x50	50 x 50 x 50mm junctions	no.	3.00		3
28	70090:03:13:100x100x50	100 x 100 x 50mm junctions	no.	1.00		1
29	70090:03:13:150x150x100	150 x 150 x 100mm junctions	no.	2.00		2
30	70090:03:19	Extra for tees				
31	70090:03:19:40x40x40	40 x 40 x 40mm tees	no.	2.00		2
32	70090:03:19:100x100x100	100 x 100 x 100mm tees	no.	1.00		1
33	70090:03:23	Extra for reducers				
34	70090:03:23:3220	32 - 20mm reducers	no.	1.00		1
35	70090:03:23:4020	40 - 20mm reducers	no.	2.00		2
36	70090:03:23:10050	100 - 50mm reducers	no.	1.00		1
37	70090:07	Traps and waste outlets				
38	70090:07:19	Plastic anti-syphonage P-traps				
39	70090:07:19:40	Joining to 40mm dia. pipes	no.	1.00		1
40	70090:07:21	Plastic W-traps; Type W-B				

MESGROUP

Rebar



<Rebar Schedule>

Add Rebar

Member: F01 BarMark: 002
 Type And size: H25 Shape code: 21
 No. of mbrs: 1 No. of bars in each: 5

A: 275 B: 1500 C: 275

Length of each bar(mm): 1913 Formula: $A+B+(C)-r-2d$
 Weight of each bar(kg): 7.37 Unit weight(kg): 3.853
 Total length(mm): 9565 Total weight(kg): 36.85
 Quantity code: Quantity value

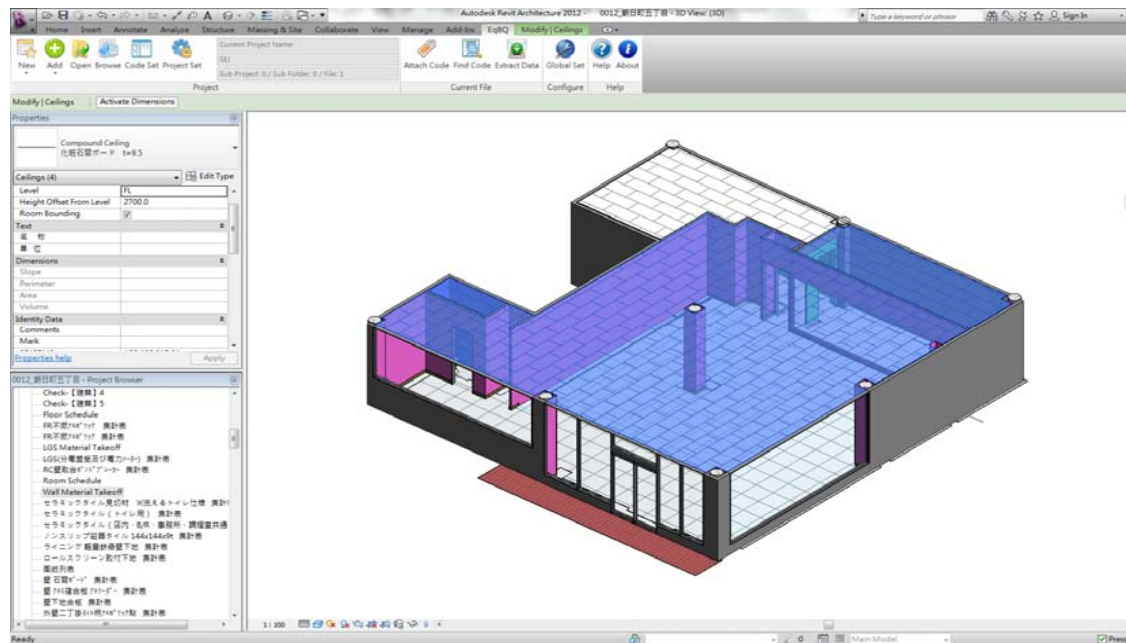
Shape code: 21 Shape: 15

length formula: $A+B+(C)-r-2d$

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Host Mark	Mark	Type	Bar Diameter	Shape	Quantity	Bar Length	Total Bar Length	A	B	C	D	Extra lap length	Reinforcement Volume	Weight
PC6 1500MM	T1-01	T40-200	40	21	84	8100	680400	1400	5450	1400	0	0	0.855 m³	6711.87
PC6 1500MM	T1-01	T40-200	40	21	1	8100	8100	1400	5445	1400	0	0	0.010 m³	79.76
PC6 1500MM	T1-01	T40-200	40	21	1	7950	7950	1400	5285	1400	0	0	0.010 m³	78.20
PC6 1500MM	T1-01	T40-200	40	21	1	7775	7775	1400	5130	1400	0	0	0.010 m³	76.64
PC6 1500MM	T1-01	T40-200	40	21	1	7625	7625	1400	4970	1400	0	0	0.010 m³	75.08
PC6 1500MM	T1-01	T40-200	40	21	1	7475	7475	1400	4810	1400	0	0	0.009 m³	73.52
PC6 1500MM	T1-01	T40-200	40	21	1	7300	7300	1400	4655	1400	0	0	0.009 m³	71.96
PC6 1500MM	T1-01	T40-200	40	21	1	7150	7150	1400	4495	1400	0	0	0.009 m³	70.40
PC6 1500MM	T1-01	T40-200	40	21	1	7000	7000	1400	4340	1400	0	0	0.009 m³	68.83
PC6 1500MM	T1-01	T40-200	40	21	1	6825	6825	1400	4180	1400	0	0	0.009 m³	67.27
PC6 1500MM	T1-01	T40-200	40	21	1	6675	6675	1400	4020	1400	0	0	0.008 m³	65.71
PC6 1500MM	T1-01	T40-200	40	21	1	6525	6525	1400	3865	1400	0	0	0.008 m³	64.15
PC6 1500MM	T1-01	T40-200	40	21	1	6350	6350	1400	3705	1400	0	0	0.008 m³	62.59
PC6 1500MM	T1-01	T40-200	40	21	1	6200	6200	1400	3545	1400	0	0	0.008 m³	61.03
PC6 1500MM	T1-01	T40-200	40	21	1	6050	6050	1400	3390	1400	0	0	0.008 m³	59.47
PC6 1500MM	T1-01	T40-200	40	21	1	5875	5875	1400	3230	1400	0	0	0.007 m³	57.91
PC6 1500MM	T1-01	T40-200	40	21	1	5725	5725	1400	3070	1400	0	0	0.007 m³	56.35
PC6 1500MM	T1-01	T40-200	40	21	1	5575	5575	1400	2915	1400	0	0	0.007 m³	54.79
PC6 1500MM	T1-01	T40-200	40	21	1	5400	5400	1400	2755	1400	0	0	0.007 m³	53.23
PC6 1500MM	T1-01	T40-200	40	21	1	5250	5250	1400	2595	1400	0	0	0.007 m³	51.67
PC6 1500MM	T1-01	T40-200	40	21	1	5100	5100	1400	2440	1400	0	0	0.006 m³	50.11
PC6 1500MM	T1-01	T40-200	40	21	1	4925	4925	1400	2280	1400	0	0	0.006 m³	48.55
PC6 1500MM	T1-01	T40-200	40	21	1	4775	4775	1400	2125	1400	0	0	0.006 m³	46.98
PC6 1500MM	T1-01	T40-200	40	21	1	4625	4625	1400	1965	1400	0	0	0.006 m³	45.42
PC6 1500MM	T1-01	T40-200	40	21	1	4450	4450	1400	1805	1400	0	0	0.006 m³	43.86
PC6 1500MM	T1-01	T40-200	40	21	1	4300	4300	1400	1650	1400	0	0	0.005 m³	42.30
PC6 1500MM	T3-02	T40-200	40	21	16	7775	124400	1240	5450	1240	0	0	0.156 m³	1227.16
PC6 1500MM	T3-01	T40-200	40	21	16	7775	124400	1240	5450	1240	0	0	0.156 m³	1227.16
PC6 1500MM	SB-01	T16-200	16	99	8	13950	111600	2005	1555	6150	4280	550	0.022 m³	176.14
PC6 1500MM	SB-01	T16-200	16	00	8	12350	98800	12340	0	0	0	550	0.020 m³	155.94
PC6 1500MM	SB-01	T16-200	16	21	8	15225	121800	8470	5435	1365	0	550	0.024 m³	192.24

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Interior Design



	A	B	C	D	E
1	SEJCEMS	Description	Unit	Qty	
2	A20	建築工事			
3	A20.110	外部仕上り工事			
4	A20.110.005	犬走り磁器質150角タイル	m2	7.20	
5	A20.120	軽鉄工事			
6	A20.120.001	軽鉄下地			
7	A20.120.001.01	軽量鉄骨壁下地 LGS19mm	m2	105.26	
8	A20.120.001.07	軽量鉄骨壁下地 LGS65mm	m2	27.43	
9	A20.130	内装仕上り工事			
10	A20.130.001	床工事			
11	A20.130.001.01	セラミックタイル (店内, BR, 事務所, 調理室)	m2	128.07	
12	A20.130.001.05	セラミックタイル (トイレ用)	m2	1.80	
13	A20.130.015	天井工事			
14	A20.130.015.01	天井化粧石膏ボード ジブトーン t9.5	m2	112.94	
15	A20.130.015.20	不燃アルポリック	m2	16.16	
16	A20.130.035	壁工事			
17	A20.130.035.40	壁下地合板 (t=9)			
18	A20.130.035.40.1A	洋便所 1A	m2	0.89	
19	A20.130.035.40.1B	洋便所 1B	m2	0.28	
20	A20.130.035.40.1C	洋便所 1C	m2	1.94	
21	A20.130.035.40.1D	洋便所 1D	m2	0.82	
22	A20.130.035.45	耐水合板	m2	2.58	
23	A20.130.035.55	壁 石膏ボード t9.5			
24	A20.130.035.55.1A	洋便所 1A	m2	1.88	
25	A20.130.035.55.1B	洋便所 1B	m2	1.48	
26	A20.130.035.55.1C	洋便所 1C	m2	1.94	
27	A20.130.035.55.1D	洋便所 1D	m2	0.91	
28	A20.130.035.60	壁 アルミ複合版アルリーダー	m2	49.65	
29	A20.130.035.70	アルリーダーコーツシカモア (木目)	m2	14.72	
30	A20.130.035.75	アルリーダーカーン処理マットホワイト	m2	92.90	
31	A20.130.035.80	ソフト巾木	m	40.81	
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Q & A

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