Title: 3D BIM Modeling in Civil Infrastructural Project

- HUMBLE INTRODUCTION
- Name: Sr T. N. WONG
- Licensed Surveyor, Saabah, Malaysia
- Royal Institution of Surveyors Malaysia
- FRICS, FHKIS, FCInstCES, RISM, MNZIS
- Chairman, NZIS (HK Branch) 2016 - Present
- FIG, Vice President (2003-2006)
- President, HKIS 1997/98
- Chairman, HKIS Land Surveying Division 1992-1994

Contents

- Project Background and software used
- Civil BIM Model at Planning and Design Stage
- Creation of 3D Georeferenced Reality BIM Model of natural and manmade features of existing ground
- Creation of 3D Geo-referenced Civil Design BIM Model
- Incorporation of Reality and Design BIM Models to detect and resolve clashes and missing information
- Formation of a “3D Workable Construction” BIM Model

Contents

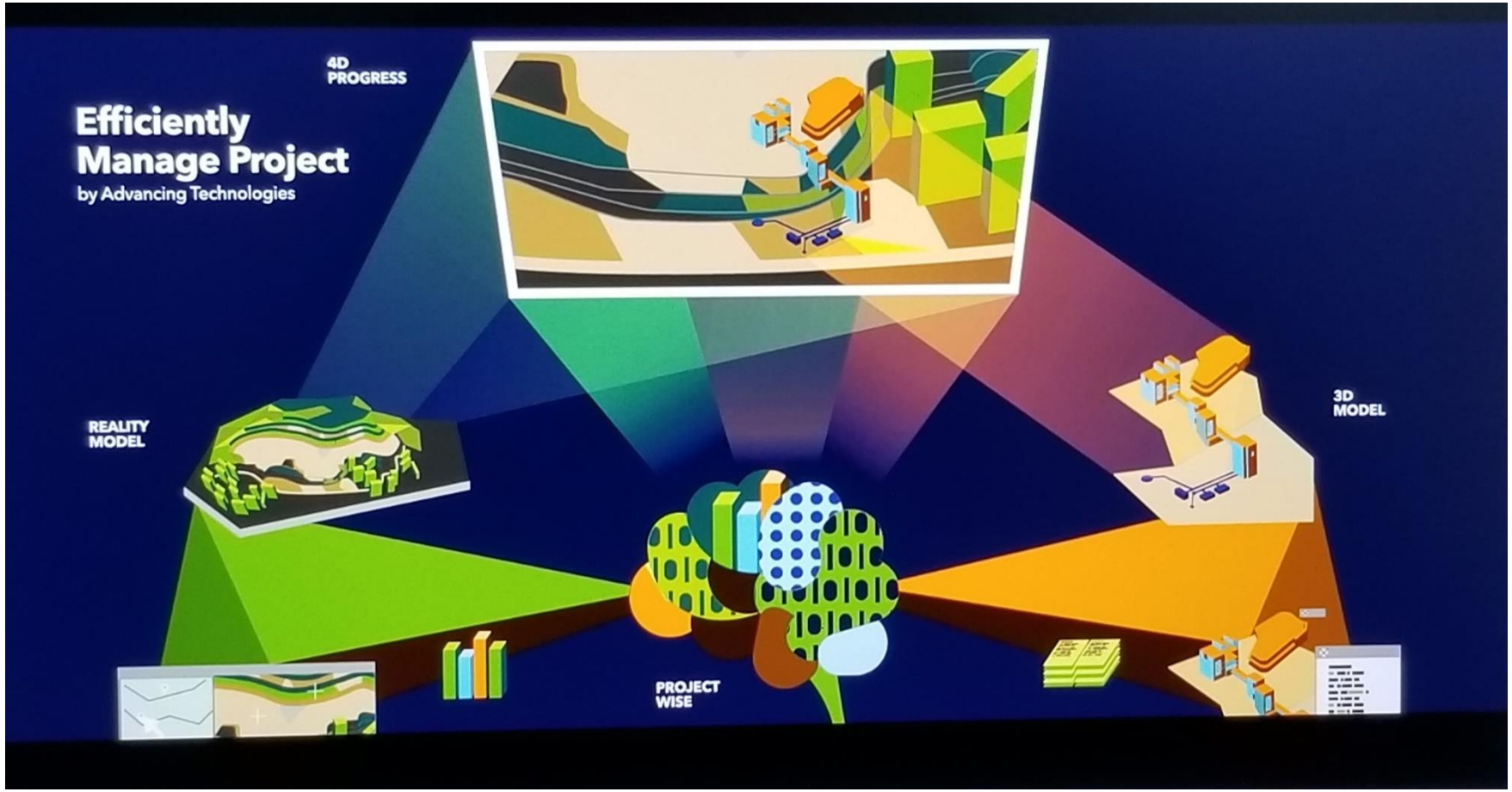
- **Civil BIM Application and building of cell library for operation, management and maintenance of Project Life Cycle.**
- **Conclusion: A good practice of collaboration, interoperable, exchange, communicate and share building information**
- **Advantages at various stages of the Works.**
- **Recommendation: The way forward for surveying professional to diversify/extend their expertise as 3D BIM Model Manager**

Software using to Create Civil BIM

- AECOSim Building Designer
- MicroStation
- OpenRoads
- ProjectWise Geospatial Management System
- Contex Capture



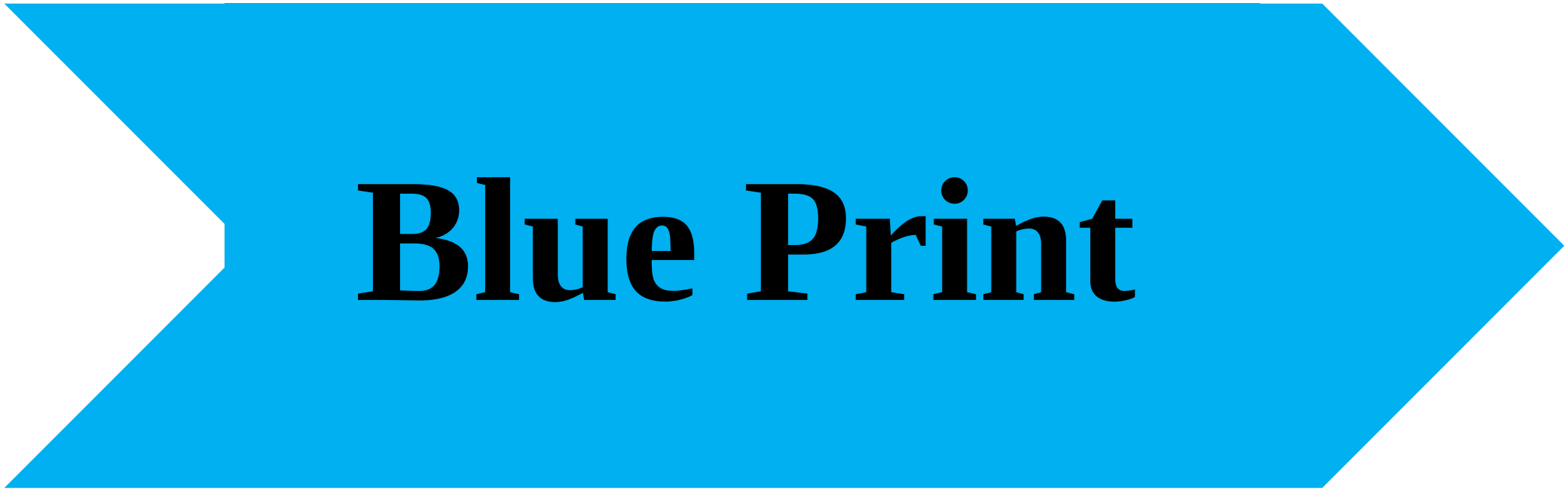
Ideal BIM Model



Stages for Building a Ideal BIM Model

From Blue Print to Facility Management

Development Plan:Blue Print



Geo-Reference 3D Reality by ContextCapture

Geo-Reference 3D Reality (Existing Natural and Man-made Features

Planning



Conceptual Design

Detail Design



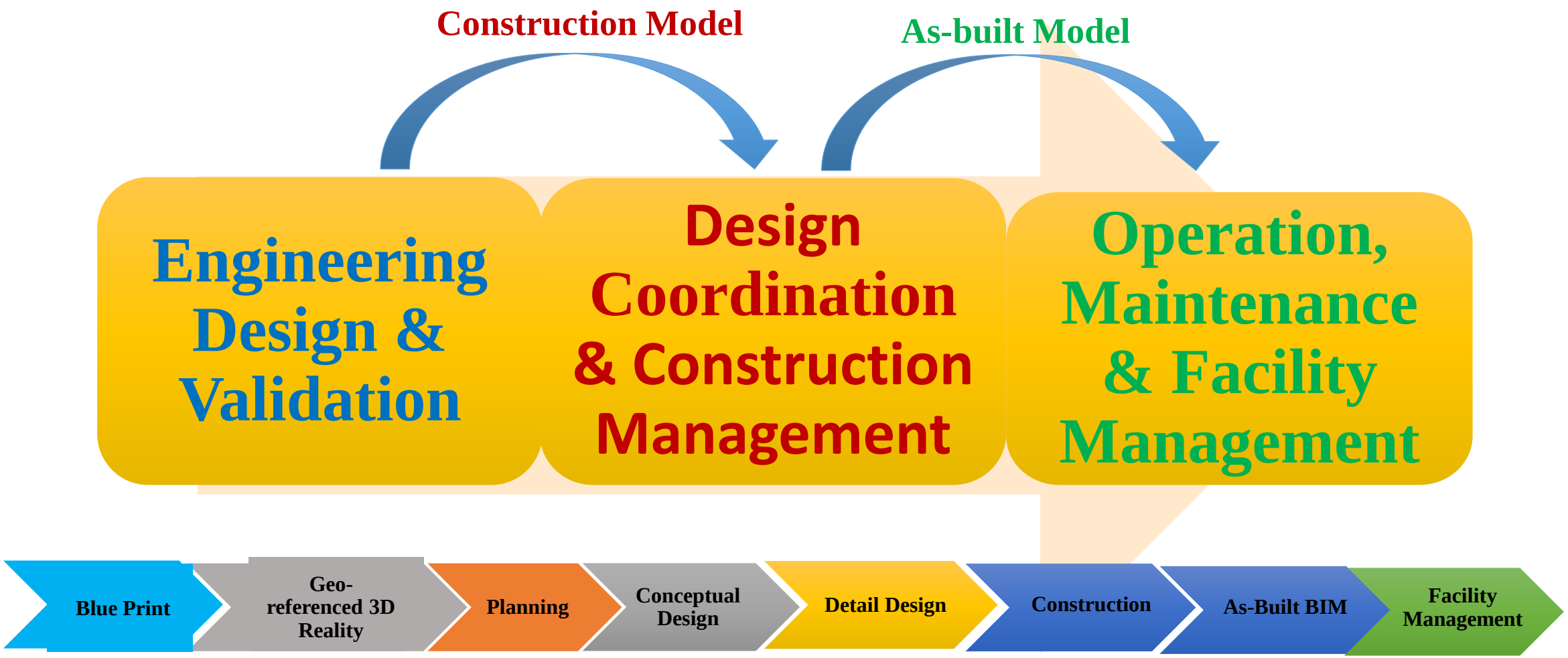
Construction

As-Built BIM

Facility Management



BIM Lifecycle (Ideal)

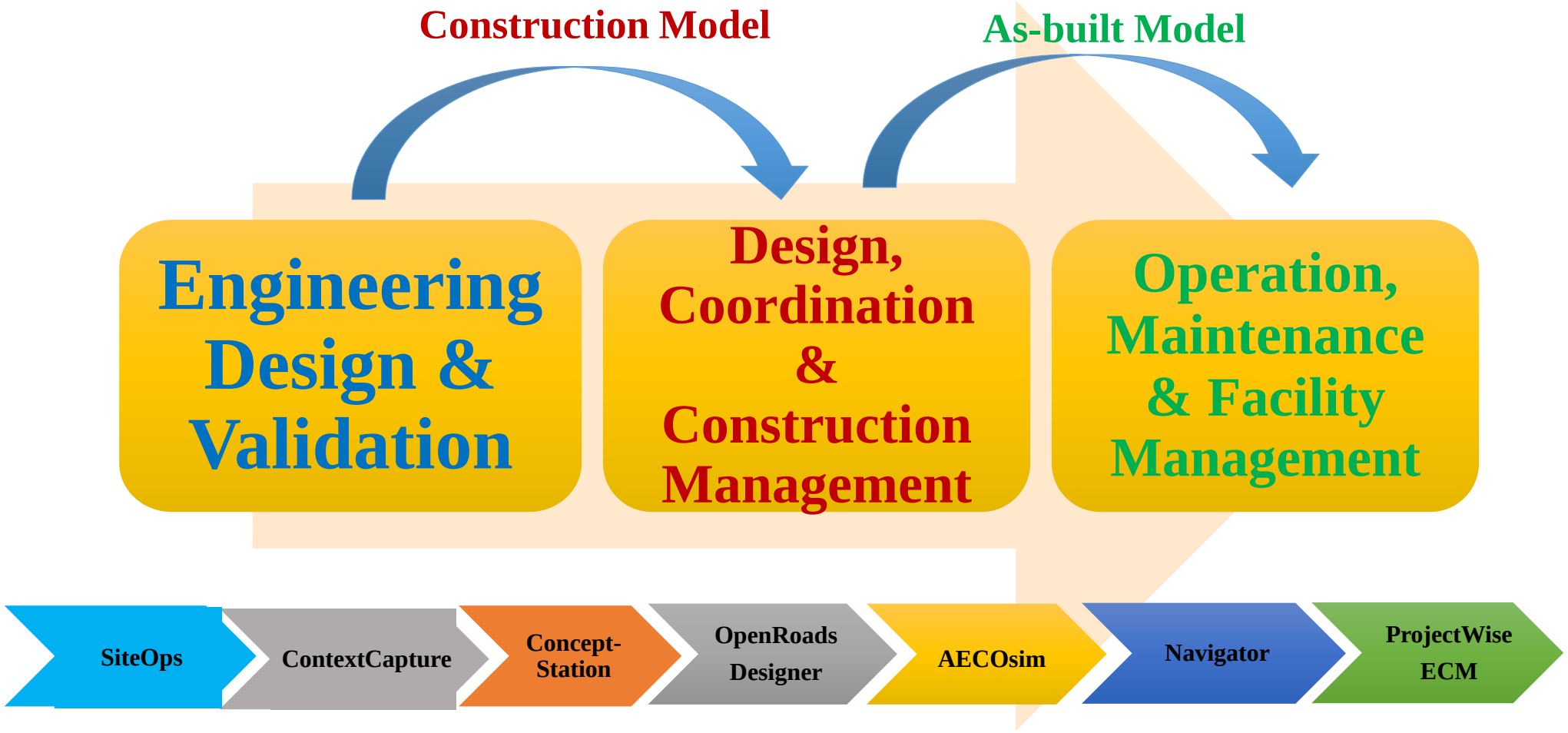


Software using to Create Civil BIM

- AECOSim Building Designer
- MicroStation
- OpenRoads
- ProjectWise Geospatial Management System
- Contex Capture



BIM Lifecycle (Software)

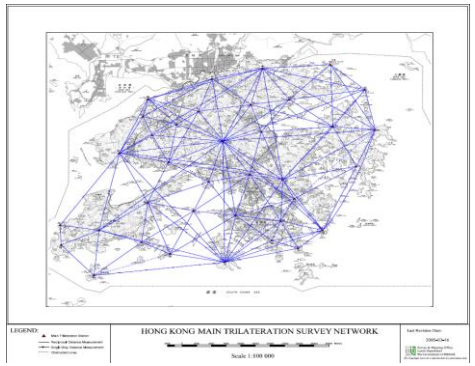


Conceptual planning to Design to Constructible Model

1. HK1980 Datum for Geo-referencing
2. Google Map and Hong Kong 1:1000 Base Map
3. 3D Natural Reality BIM Model
4. 3D Conceptual Design BIM Model
5. 3D Detail Design BIM Model
6. 3D Constructible BIM Model

From 1980 Datum, Existing Environment to BIM Model (From the WHOLE to the PARTS)

1. **HK1980 Datum for geo-referencing**



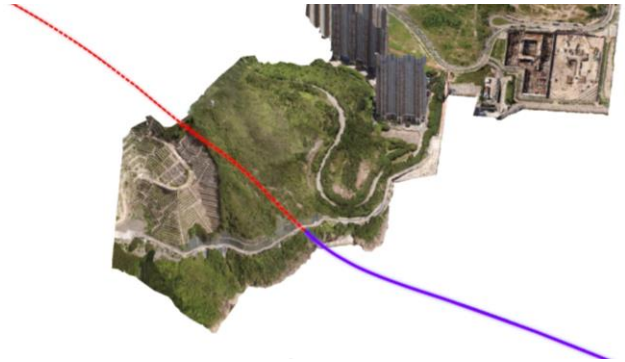
2. Google Map



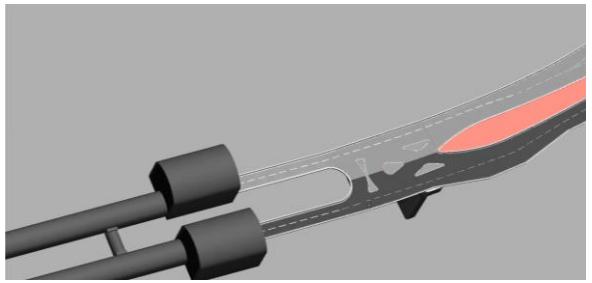
3. 3D Natural Reality BIM Model



4. 3D Conceptual Design BIM Model



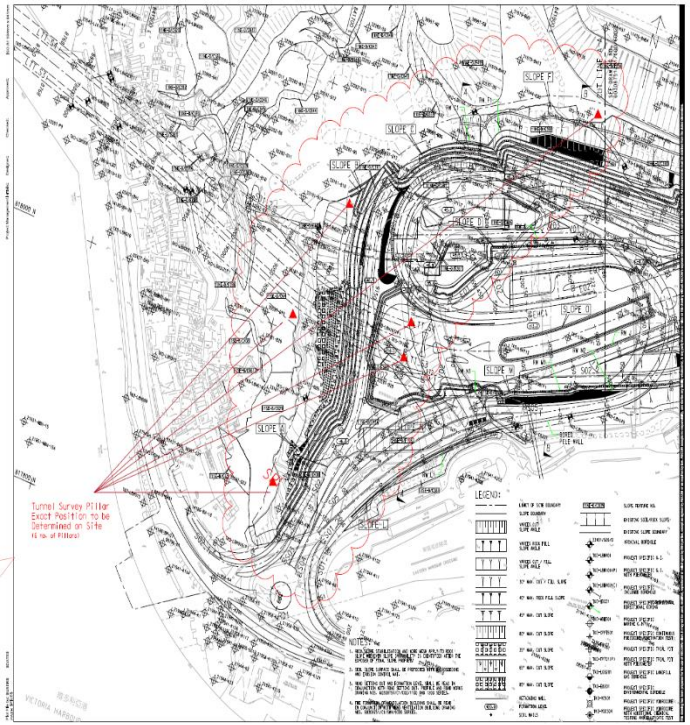
5. 3D Detail Design BIM Model

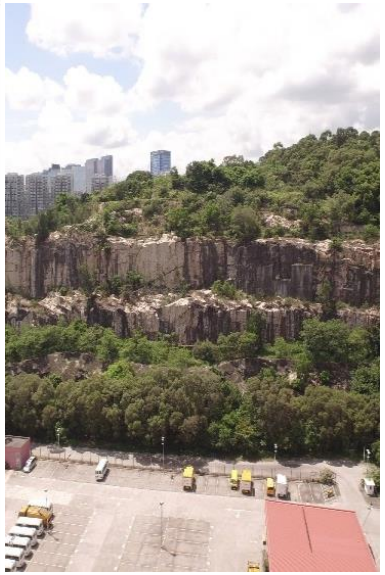


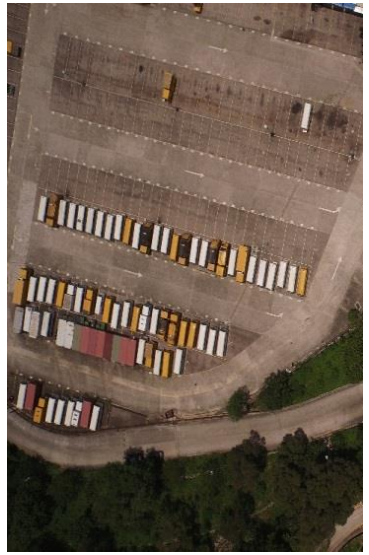
6. 3D Constructible BIM Model)

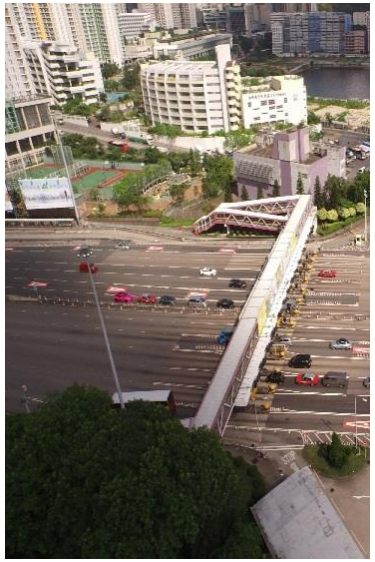


From Working Drawing to Conceptual Design



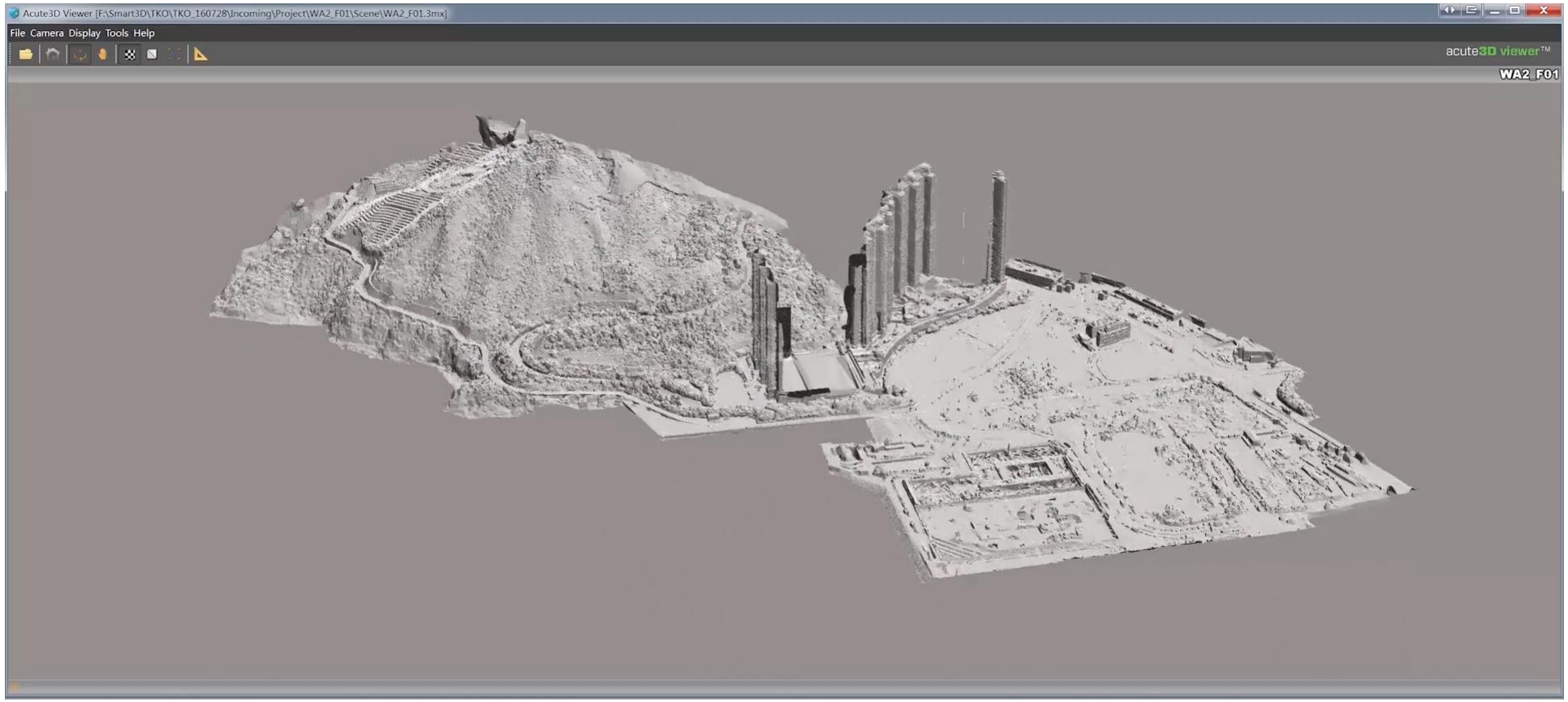








3. Geo-referenced Natural Reality 3D BIM Model



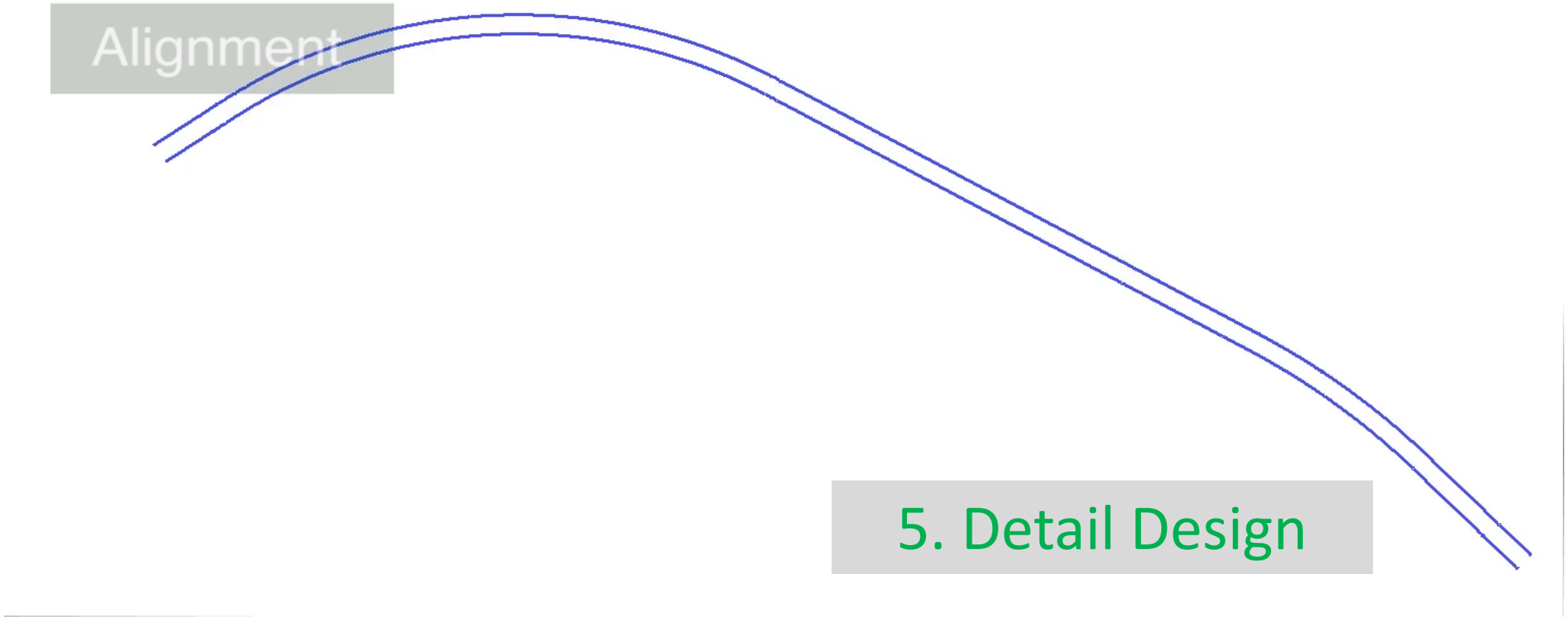
4. 3D Conceptual Design BIM Model



6. 3D Detail Design BIM Model (Tunnel and Approach Roads)



5. 3D Detail Design BIM Model



5. 3D Design BIM Model (Infrastructure Interchanges)



Georeferenced 3D Joint Initial Record Survey BIM Model

- **Capturing and Creation of Georeferenced 3D Joint Initial Record Survey BIM Model before Construction**

Capturing and Creation of Georeferenced 3D Joint Initial Record Survey BIM Model before Construction

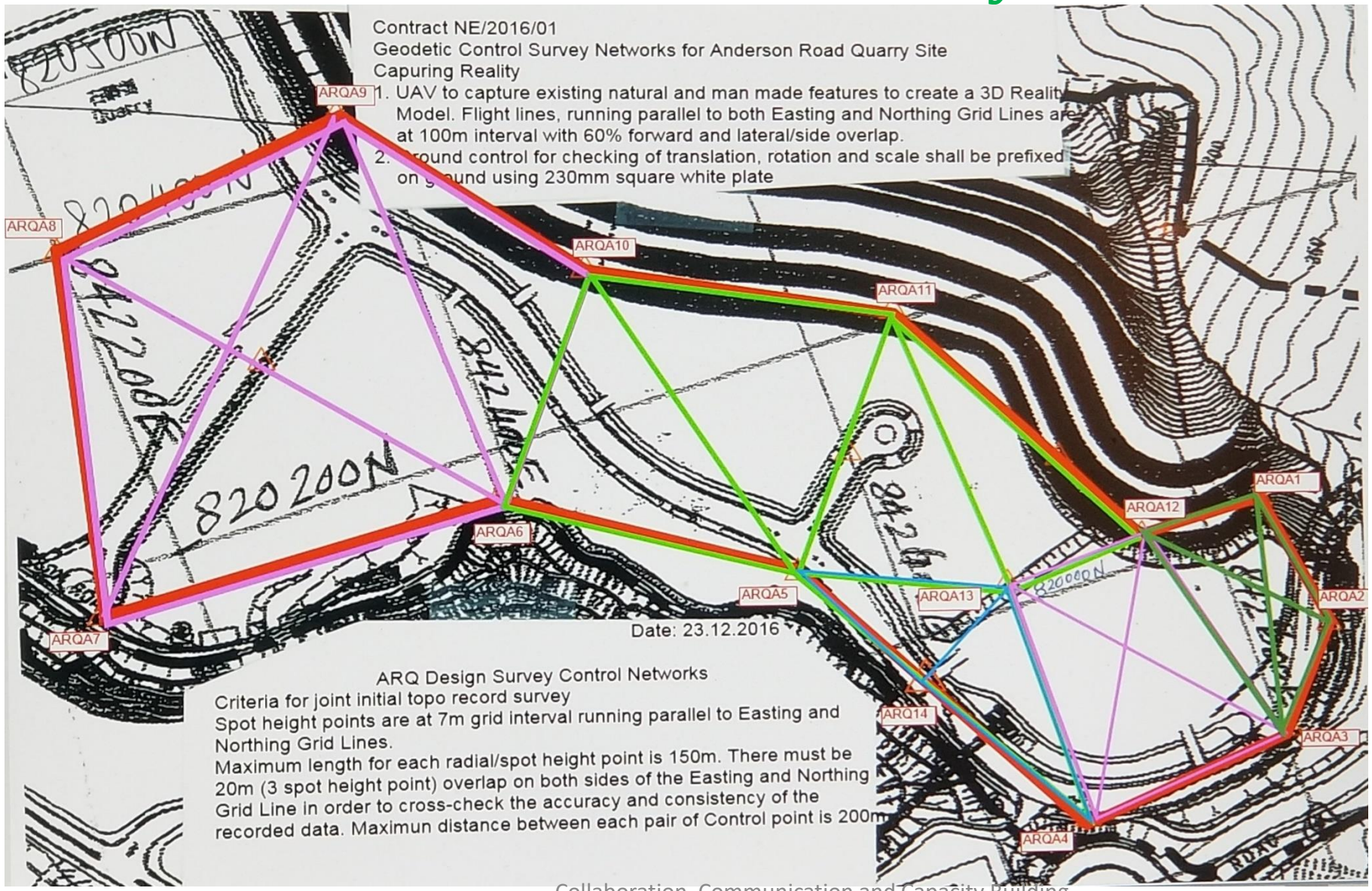
- Geodetic Control Survey Network for Geo-referenced 3D ContextCapturing Reality Modeling

- ******You must get this absolutely correct and conform to the Reference Datum******

Geodetic Control Survey Network for Geo-referenced 3D ContextCapturing Reality Modeling

- Using UAV to capture natural and manmade features of existing ground to create a Geo-referenced 3D ContextCaptured Reality BIM Model
- Flight lines, running parallel to both Easting and Northing Grid Lines at set at 100m interval with 60% forward and lateral/side overslap;
- Ground Control Points (GCP) for spatial correction for translation, rotation and scale shall be prefixed on ground using a 230mm square white plate with black cross.
- Maximum distance between each pair of control points must be kept within 200m for ease of record survey and setting out purposes

Geodetic Ground Control Survey Networks



230mm x 230mm target



230mm x 230mm target



230mm x 230mm target



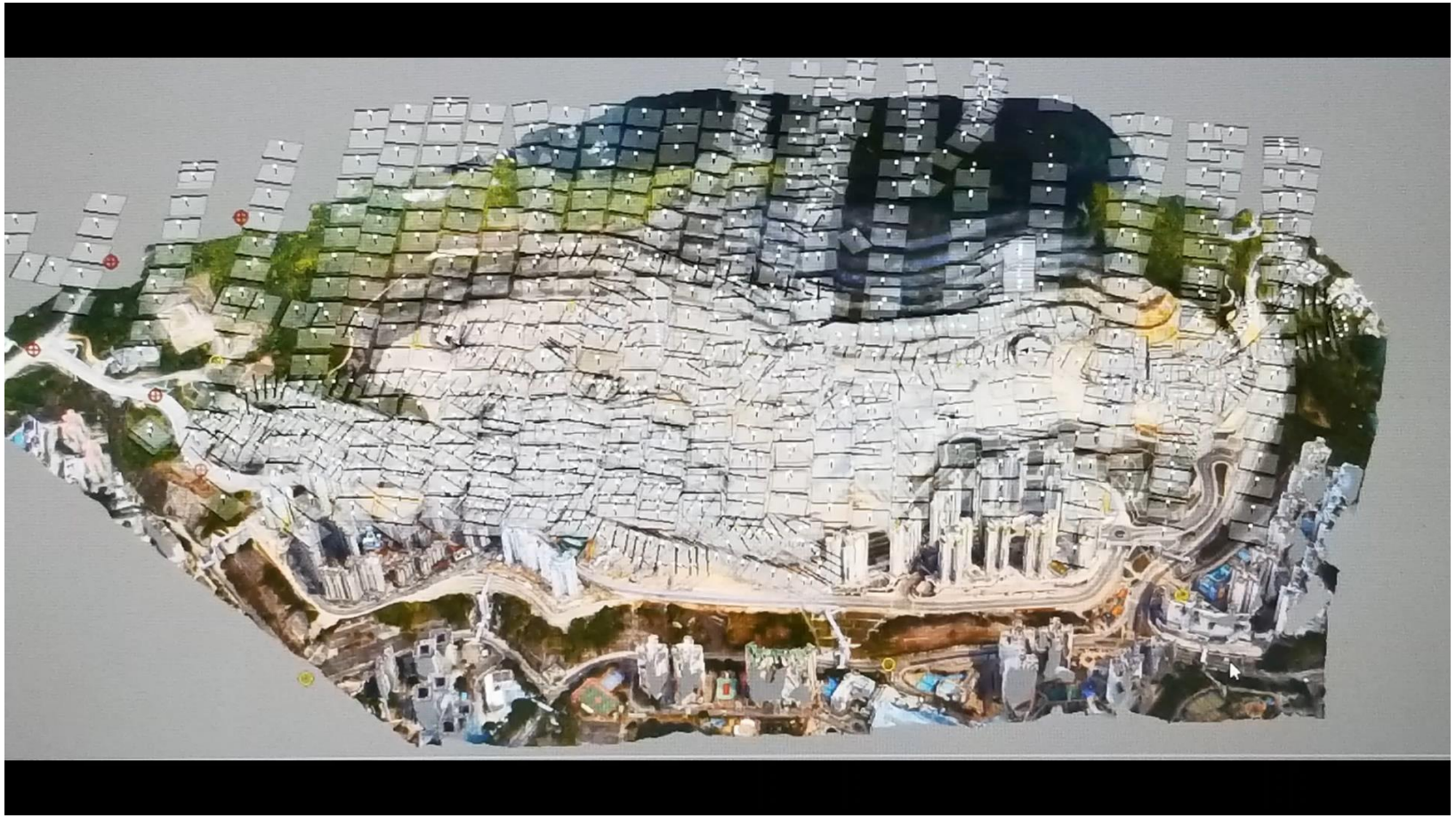
Criteria for joint initial, interim and as-built record survey by Both UAV and ground survey method

- Using TotalStation and 3D Laser Scanner
- Observed Spot height points (SHP) are at 7m grid interval running parallel to Easting and Northing Grid Lines;
- Maximum observed length/distance of each radial/spot height point must be less than 150m from the observation station to minimize the effects of earth curvature and reflection.
- There must be a 20m [3 spot height points (3 x 7m=21m)] forward and lateral/side overlap in order to cross-checked for accuracy and consistency of the recorded data.

Flight Plan



Flight Plan



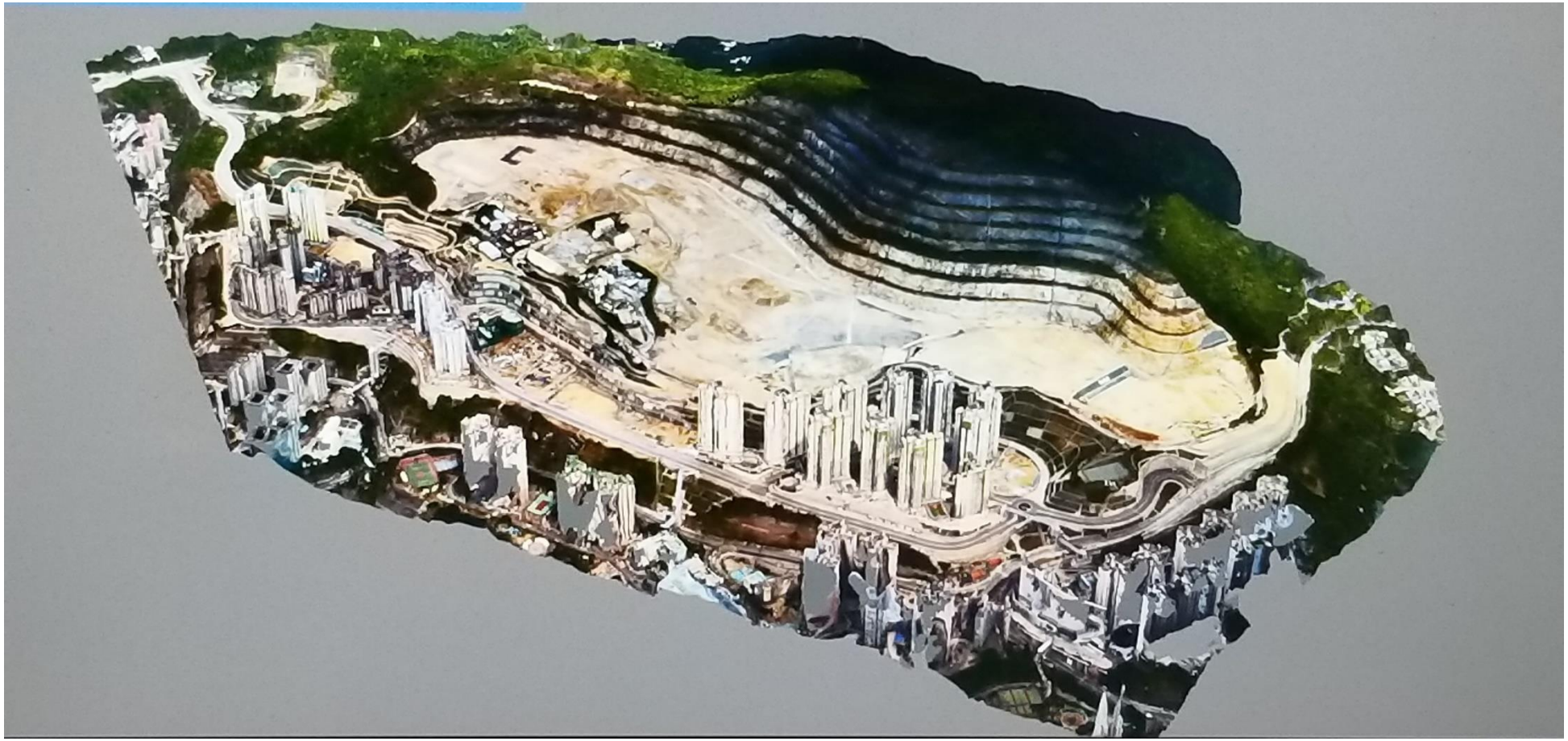
UAV capturing original ground data before construction



UAV in operation



Georeferenced 3D (Initial Record Survey) BIM Model Prior to Construction



1st joint 3D initial BIM Model before construction



Showing Progress : 2nd Model



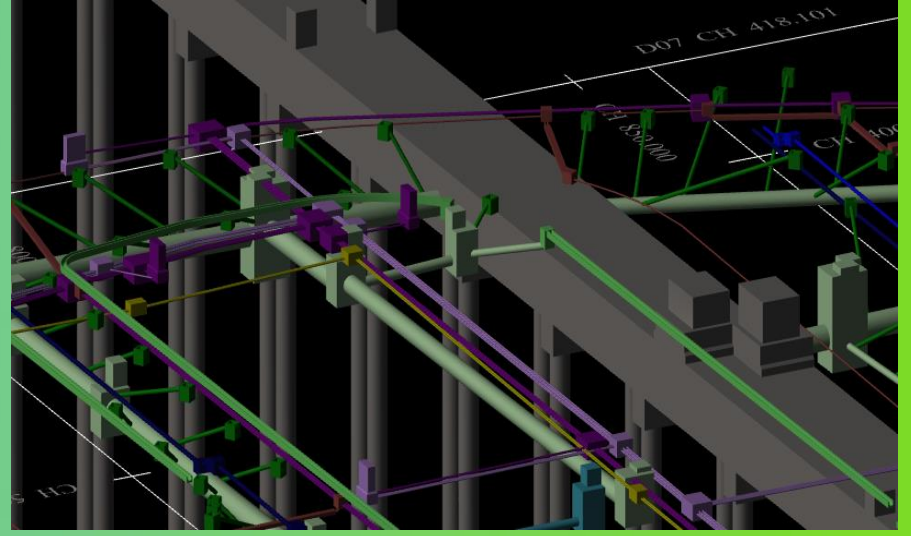
Showing Progress

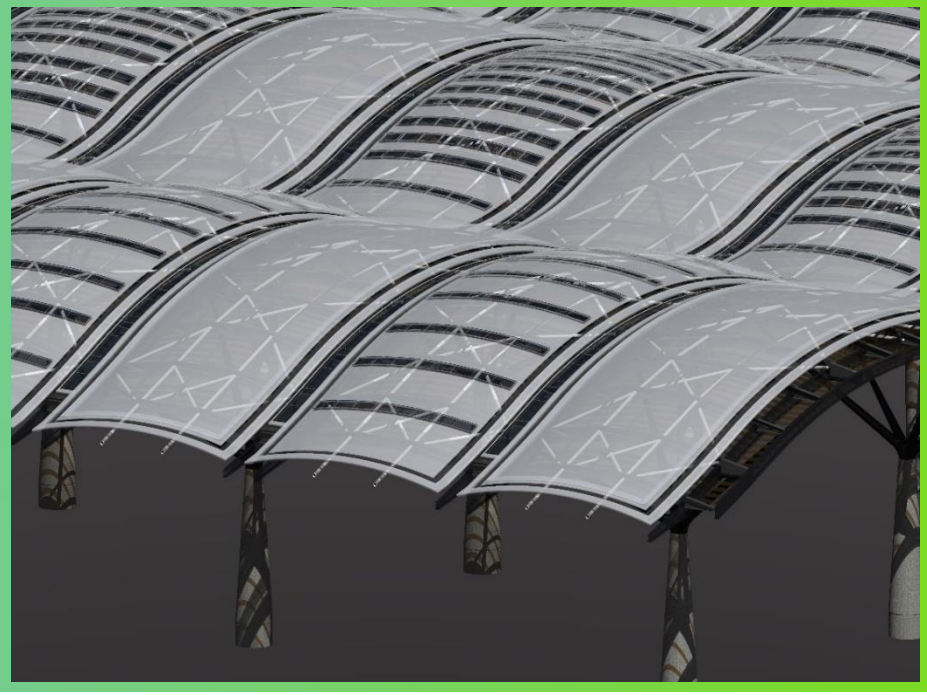


Creation of 3D Constructible BIM Model

- Overview



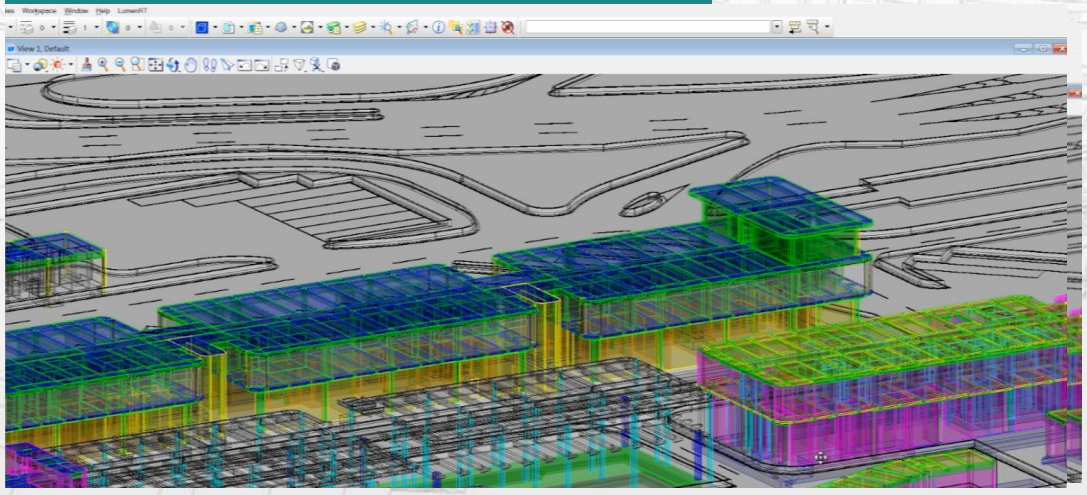




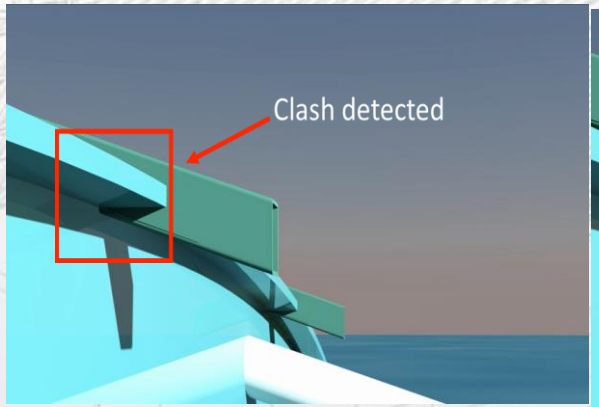
Flow of Civil BIM in Major Civil Projects
1. Blue Print > 2. Geo-referenced Reality 3D BIM Modeling > 3. Planning > 4. Conceptual Design > 5. Detail Design > 6. Construction > 7. As Built > 8. Operation > 9. Maintenance > 10. Management > 11. Project Life cycle

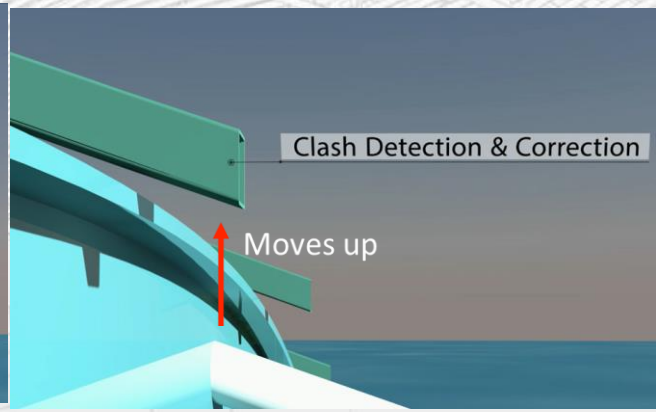
Topics

1) Civil BIM in planning and



2) Clash Analysis, Computation & Construction Modeling

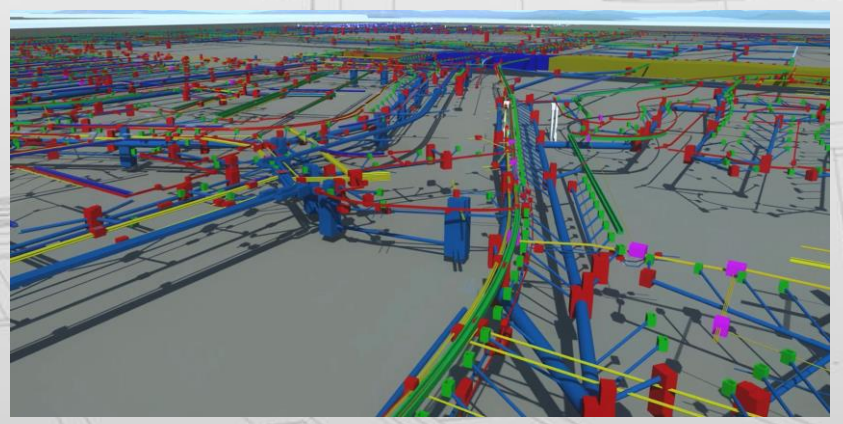


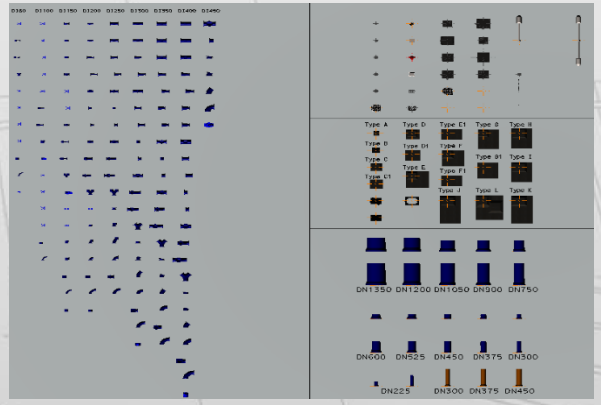


3) As Built BIM Modeling & information input



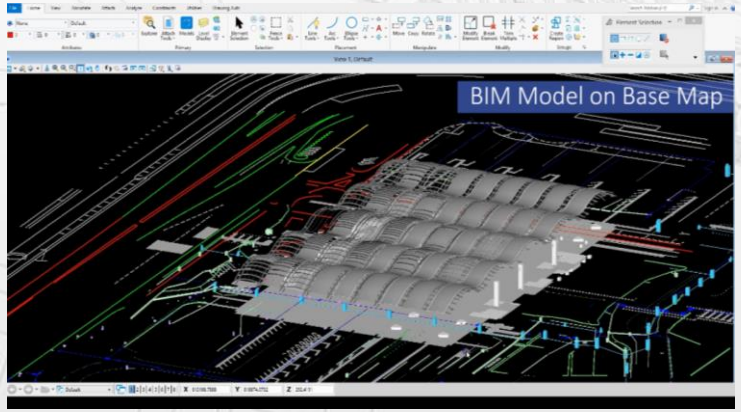
4) Civil BIM Application & Cell Library





Creation of 3D Constructible BIM Model

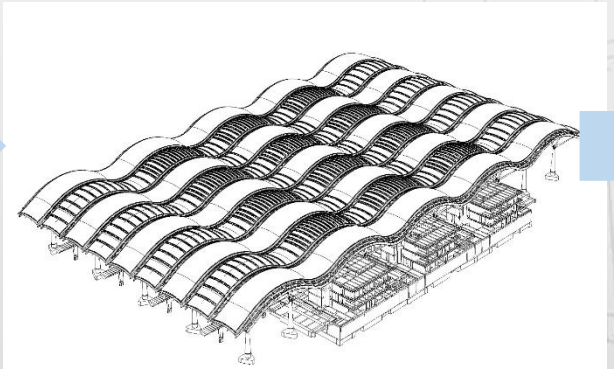
Geo-referenced Data



Approved Design Details
(Working Drawings)

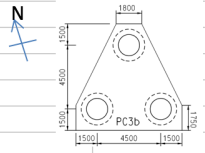


Civil BIM



- Different kind of schedules
- (Material & Utilities)
- Quantity measurements
- Setting Out Reports

SKETCH NO. : SK0187B,SK0168A,SK181A



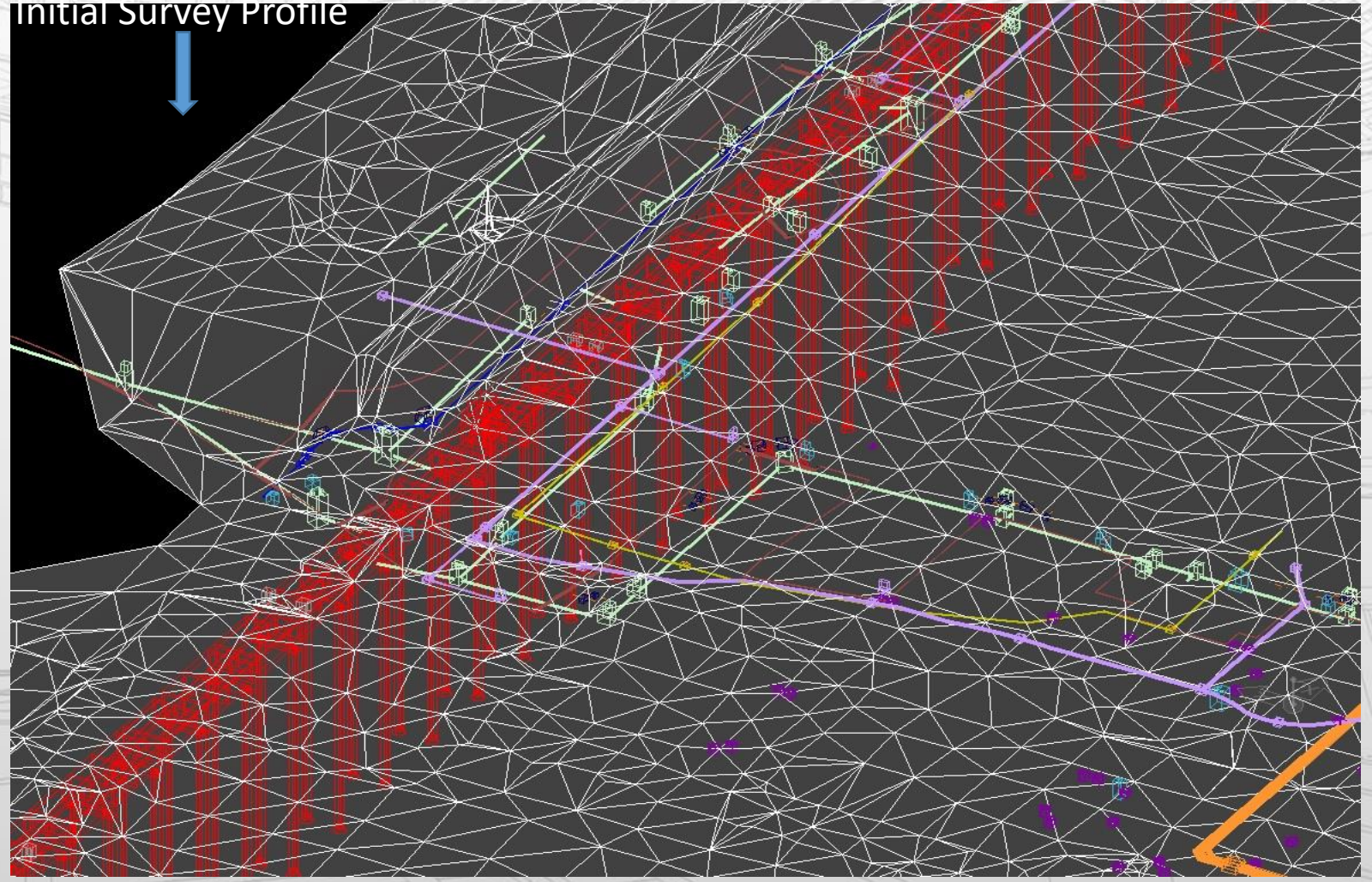
Pile Cap Mark	Pile Mark	E	N	Min. Cut off Level
PC-BC1	BC-BP1	812982.049	820046.021	4.000
	BC-BP2	812983.727	820045.525	4.000
	BC-BP3	812981.604	820038.337	4.000
	BC-BP4	812979.924	820038.828	4.000
	BC-BP5	812975.217	820043.190	4.000
	BC-BP6	812975.727	820044.916	4.000

Step by Step of Creation of 3D Constructible BIM Model

- Detect clashes and missing information

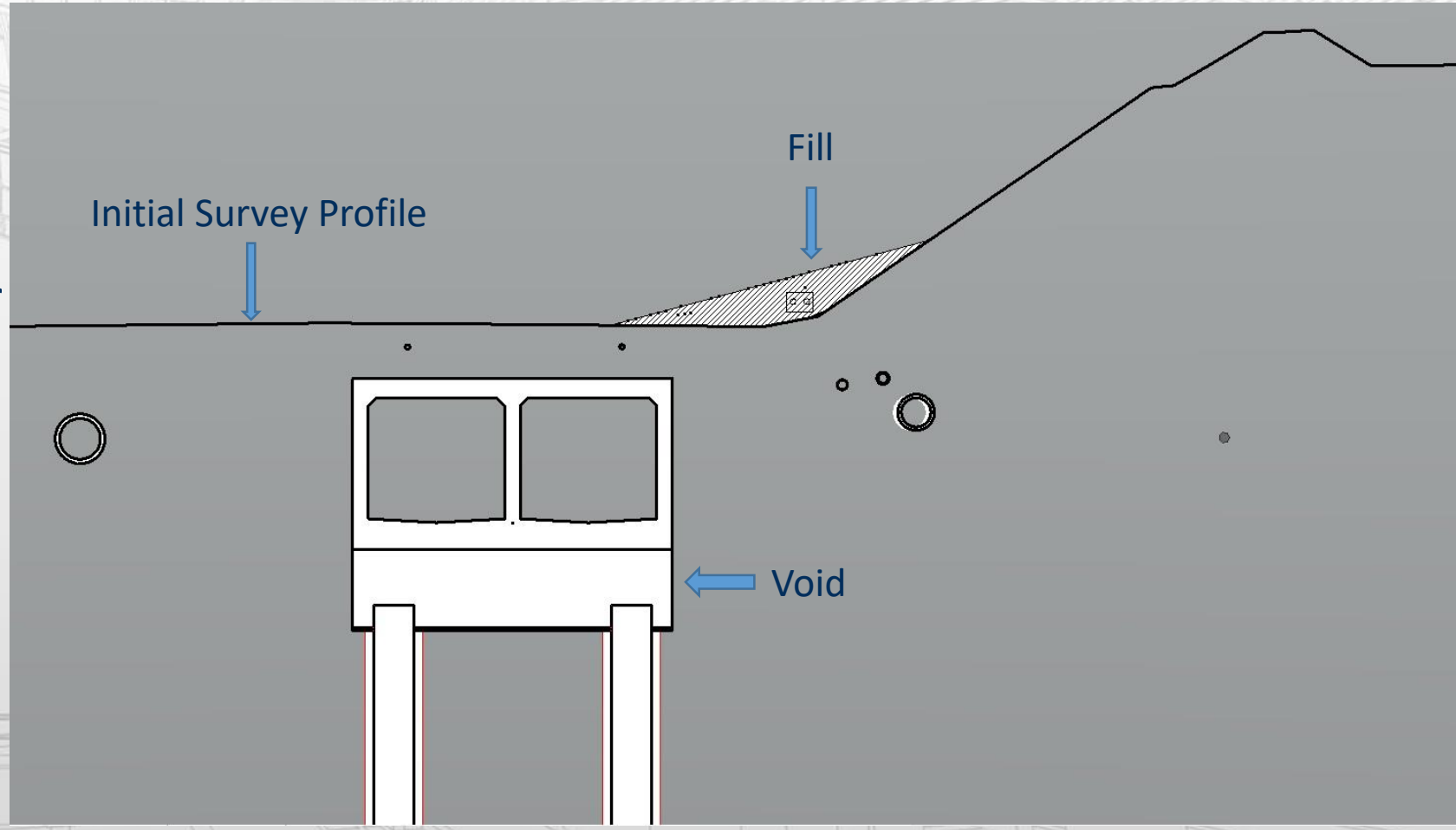
Overlaying Design BIM Model against the Initial Survey (Reality) BIM Model

We can compare the design BIM Mode & Initial Survey BIM Model for Earthwork balance calculation.



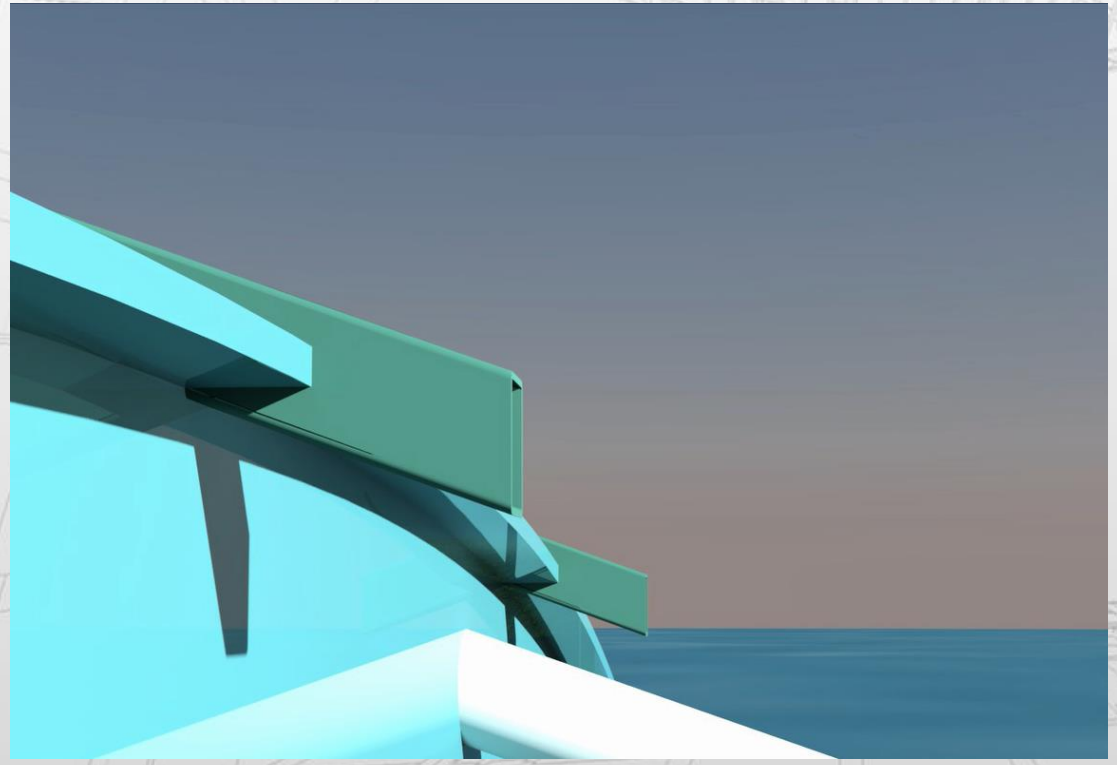
Overlaying Design BIM Model against the Initial Survey (Reality) BIM Model

We can cut a 3D section to check out which location need to cut or fill.

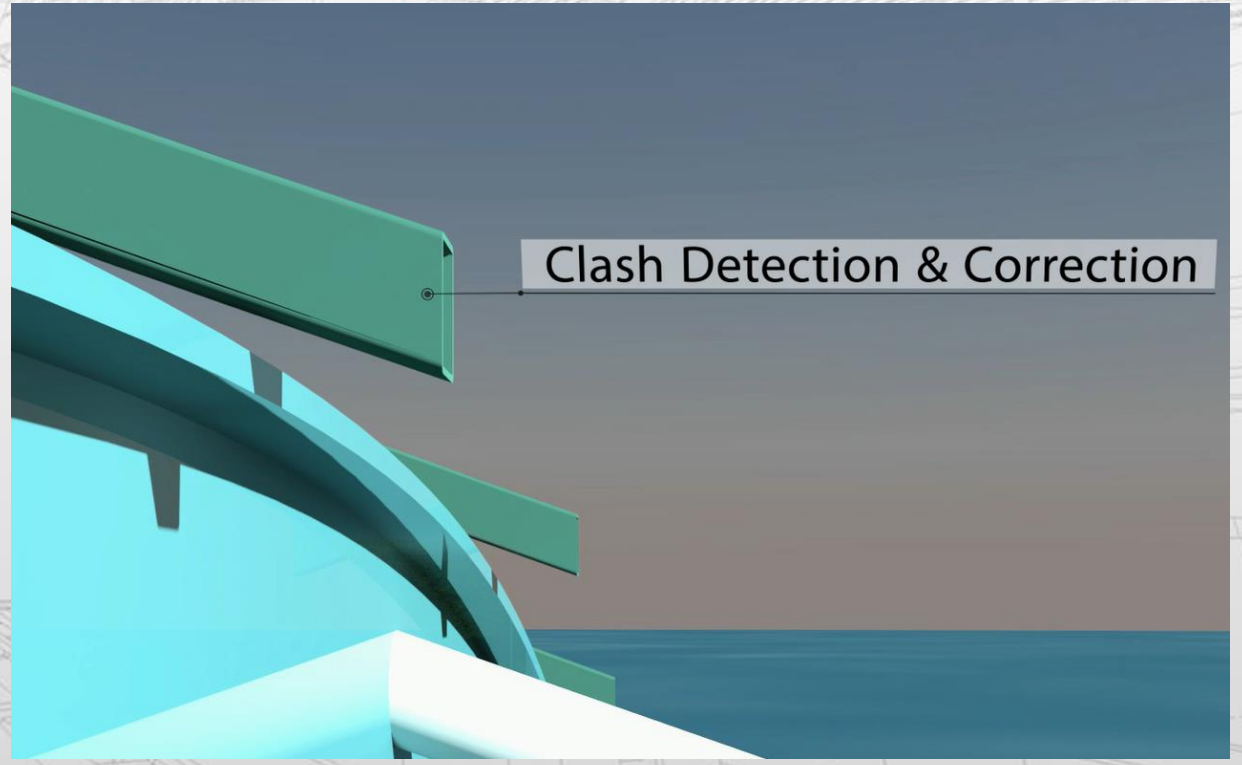


Clash Analysis

Base on drawings

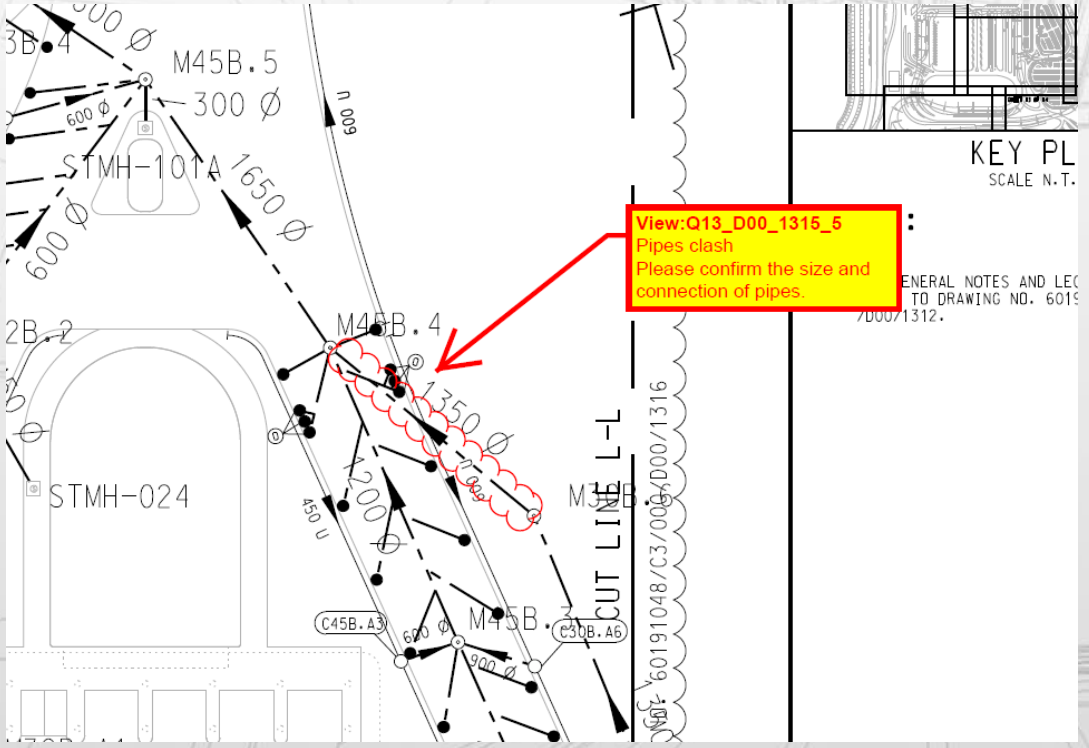


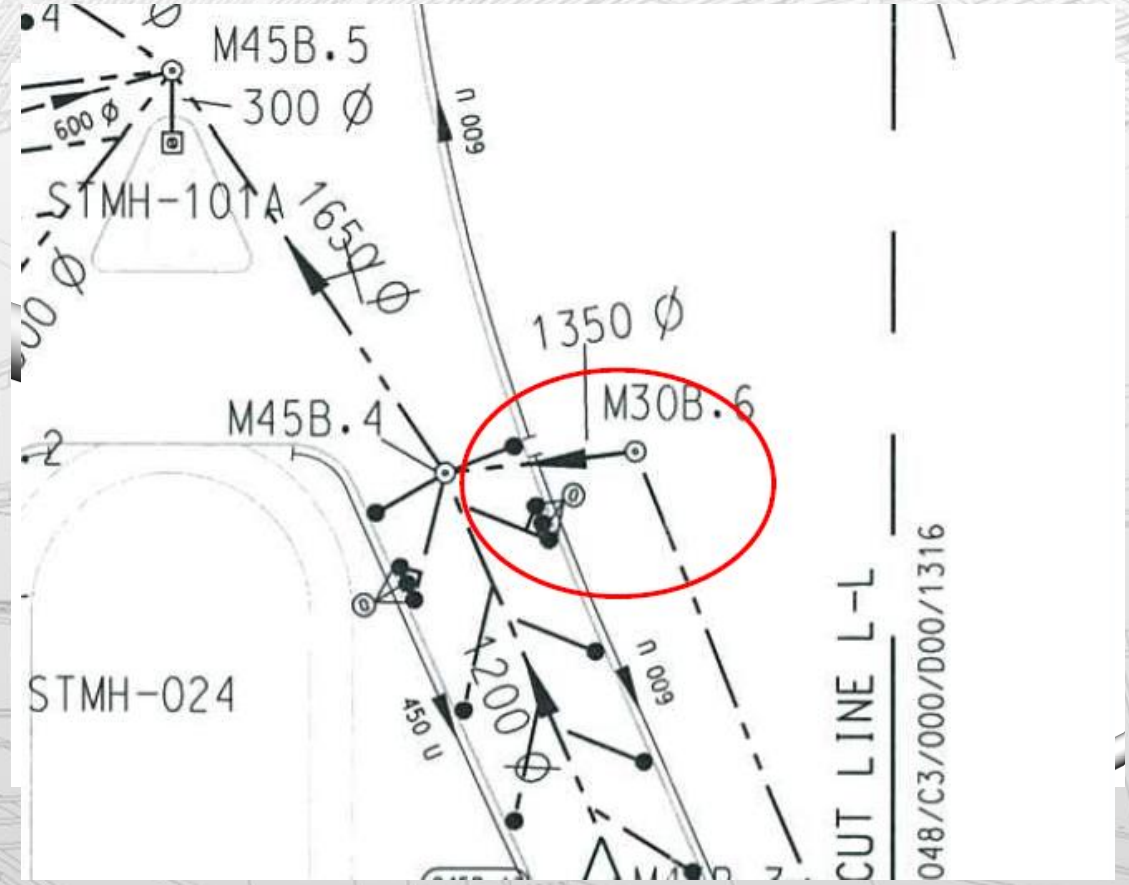
Revised design from engineer



Case Study of Clash Analysis

Existing BIM





Adobe Acrobat Document

Information contain in the 3D Constructible BIM Model

- **Setting out co-ordinates**
- **Types, model and technical specification of material & dimension**
- **Names of manufacturers and Supply Chains**
- **Operation, Management and Maintenance schedules**
- **Area and/or Volume of the item**

- **Example : BIM Model for Bridge**

Asset-Relationship Model

Environmental Qualification

- Environmental Monitoring Method
- Impact Assessment



Design Requirement



Alignment Design
Design Properties

- Design Code (TPDM)
- Speed
- Sight Distance (HZ &Vz)
- Numbers of Lanes
- Geology



Preliminary Design



Structures Maintenance

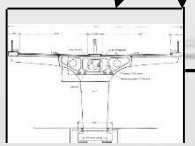
- Budgets
- Frequency
- Records
- Alert, Action Limits
- Lifespan

Contractor Properties

- Project Value
- Contract Period
- Numbers of Labor
- Experience



Location:
Easting/Northing
Chainage
East/Westbound
District



Bridge Section



Supplier Lists



Section 1

C-No. 6791

Test Results

- Tons
- Dimension

C-No. 6792



Section 2

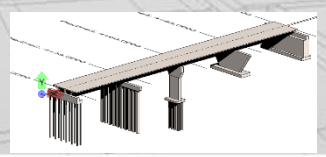


C-No. 6793



Construction Properties

- Method
- Duration
- Safety



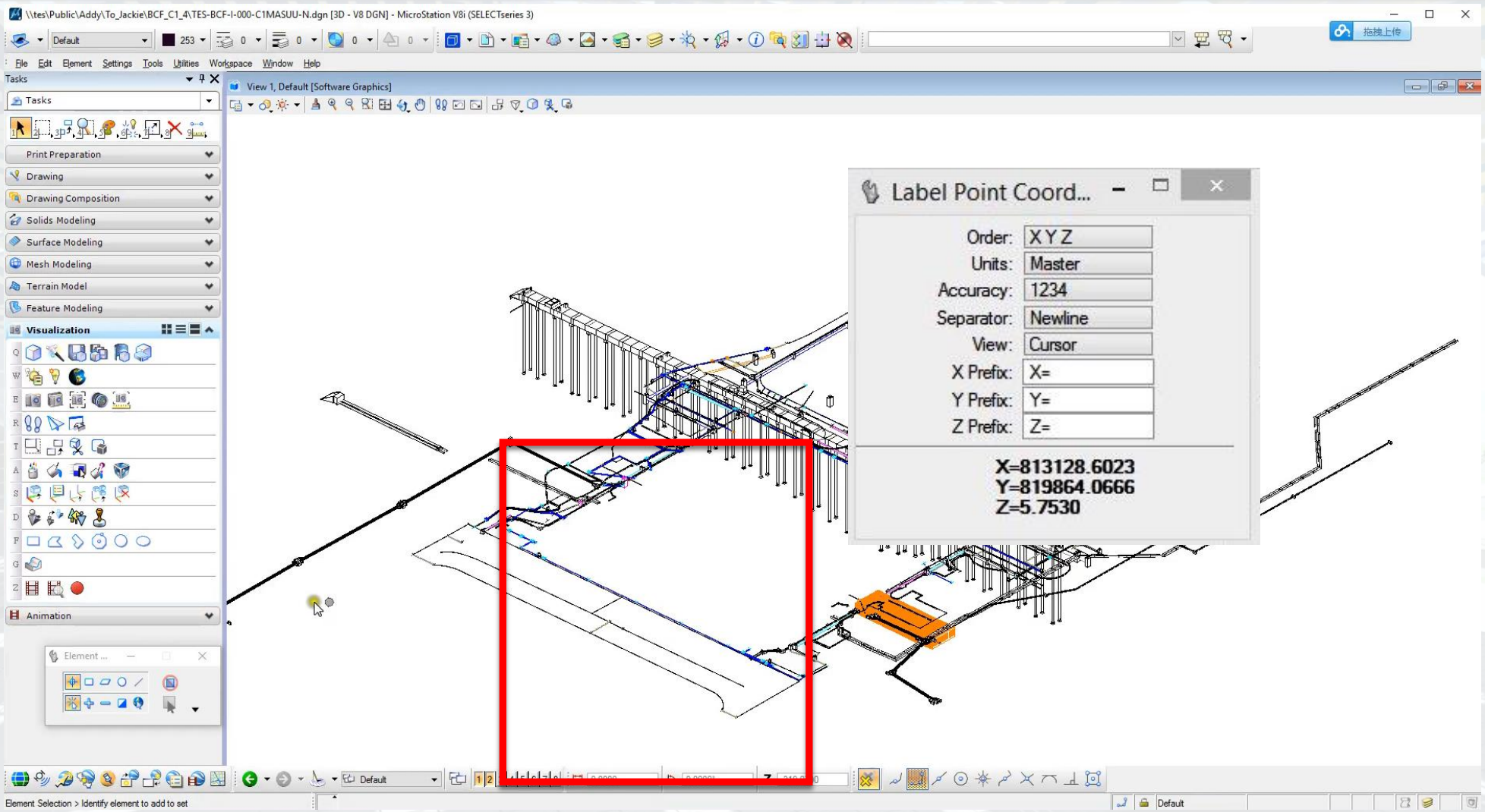
BIM

Logistics Properties

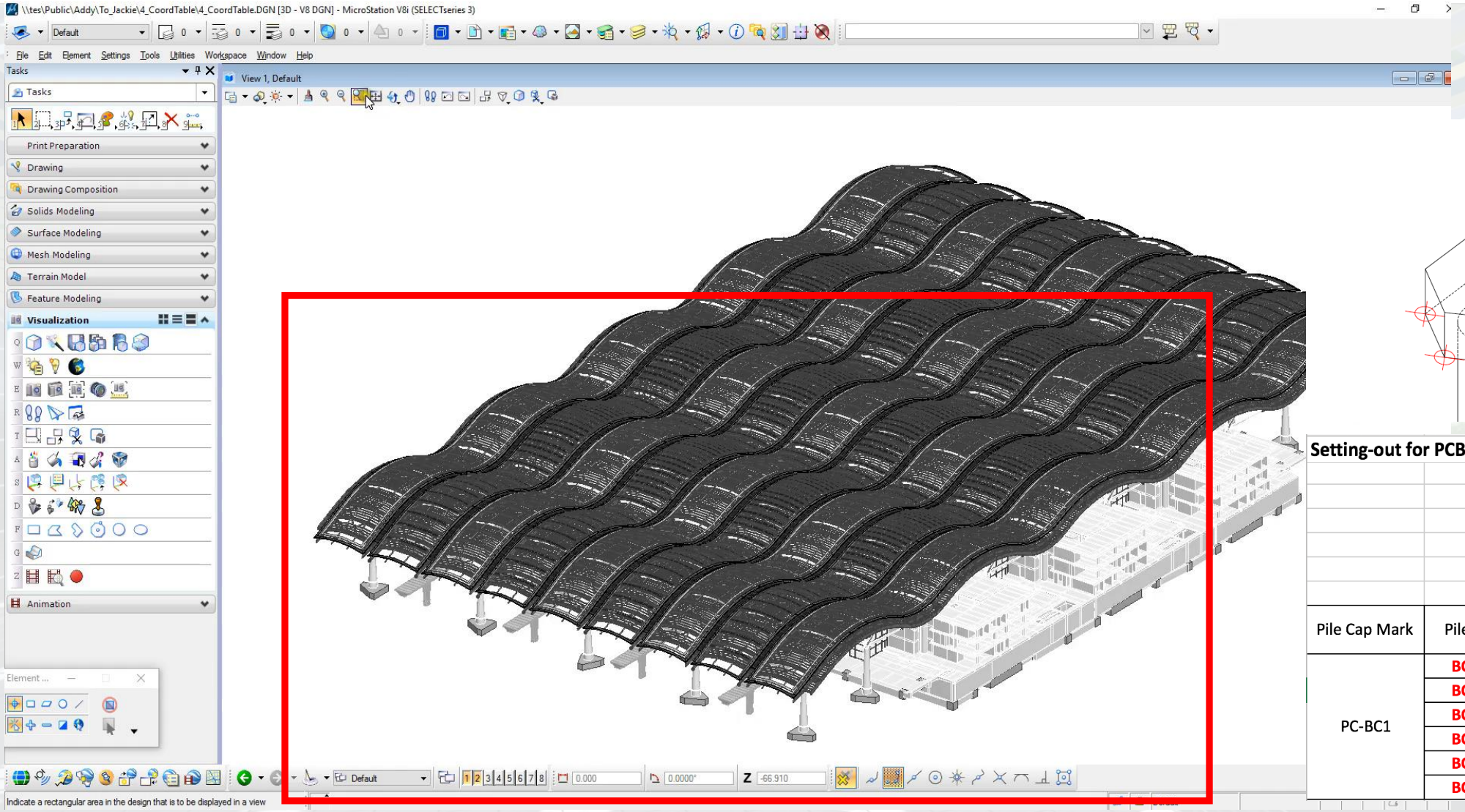
- Locations
- Shipping
- Storage
- PO

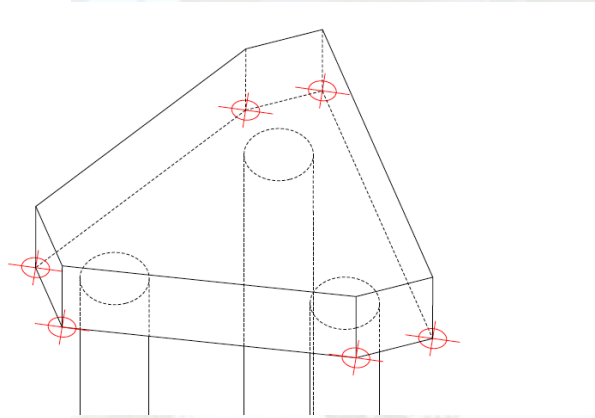
Spare:

Setting Out (Example: Underground Utilities)

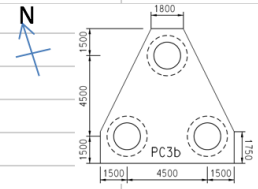


Setting Out (Example: Concrete Structure)



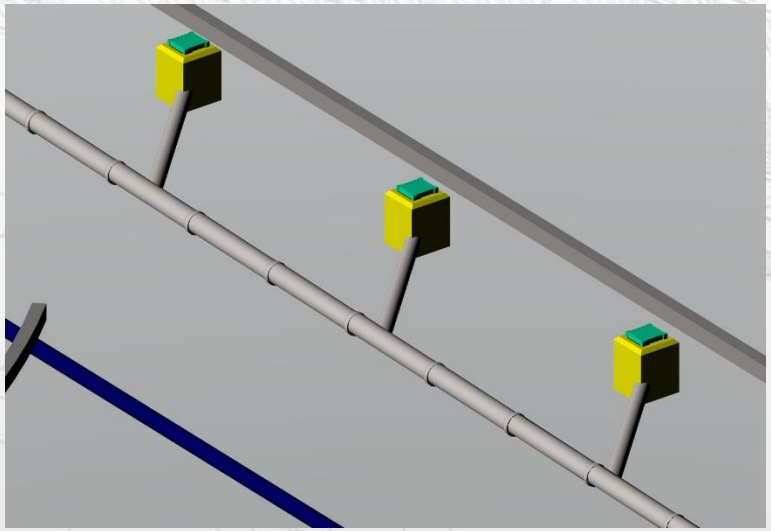


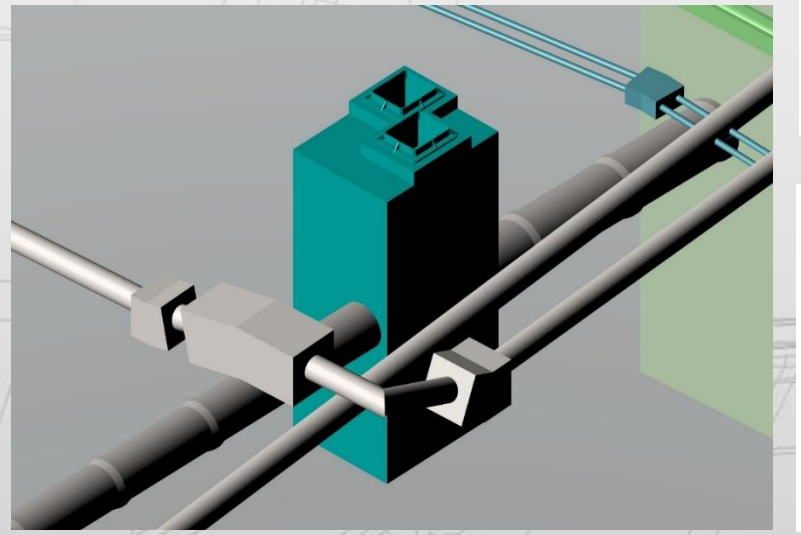
Setting-out for PCB SDO



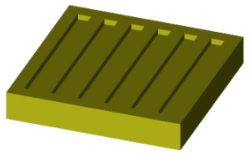
Pile Cap Mark	Pile Mark	E	N	Level
PC-BC1	BC-BP1	812982.049	820046.021	4.000
	BC-BP2	812983.727	820045.525	4.000
	BC-BP3	812981.604	820038.337	4.000
	BC-BP4	812979.924	820038.828	4.000
	BC-BP5	812975.217	820043.190	4.000
	BC-BP6	812975.727	820044.916	4.000

Create BIM Library





Manhole cover



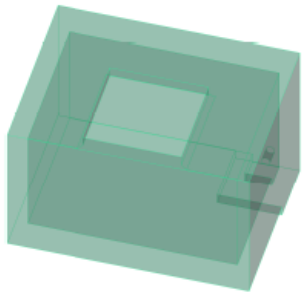
Cat ladder



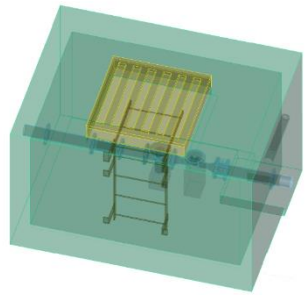
Reducing valve



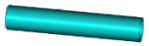
Chamber



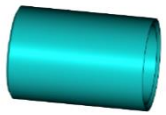
Valve chamber



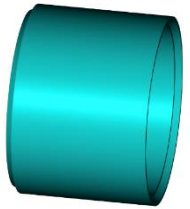
FJP_DN0375



FJP_DN1500



FJP_DN3000



RPJ_DN0600



RPJ_DN1050



RPJ_DN1800



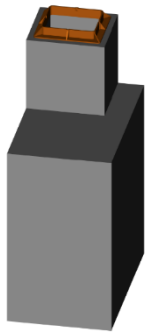
Type C



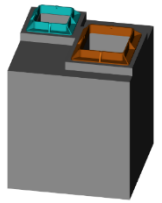
Type E



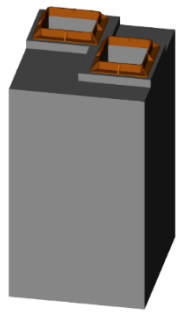
Type K



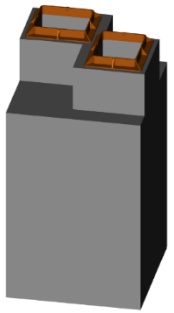
Type G/D



Type J/D

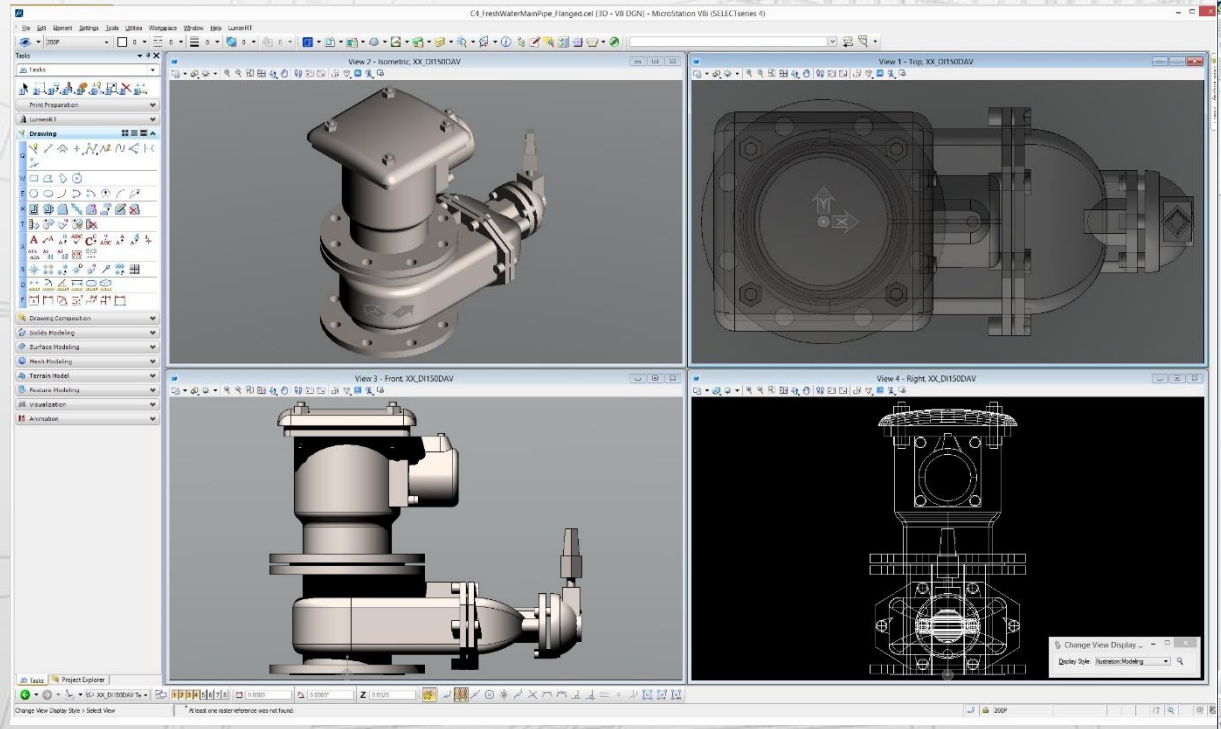


Type I/D

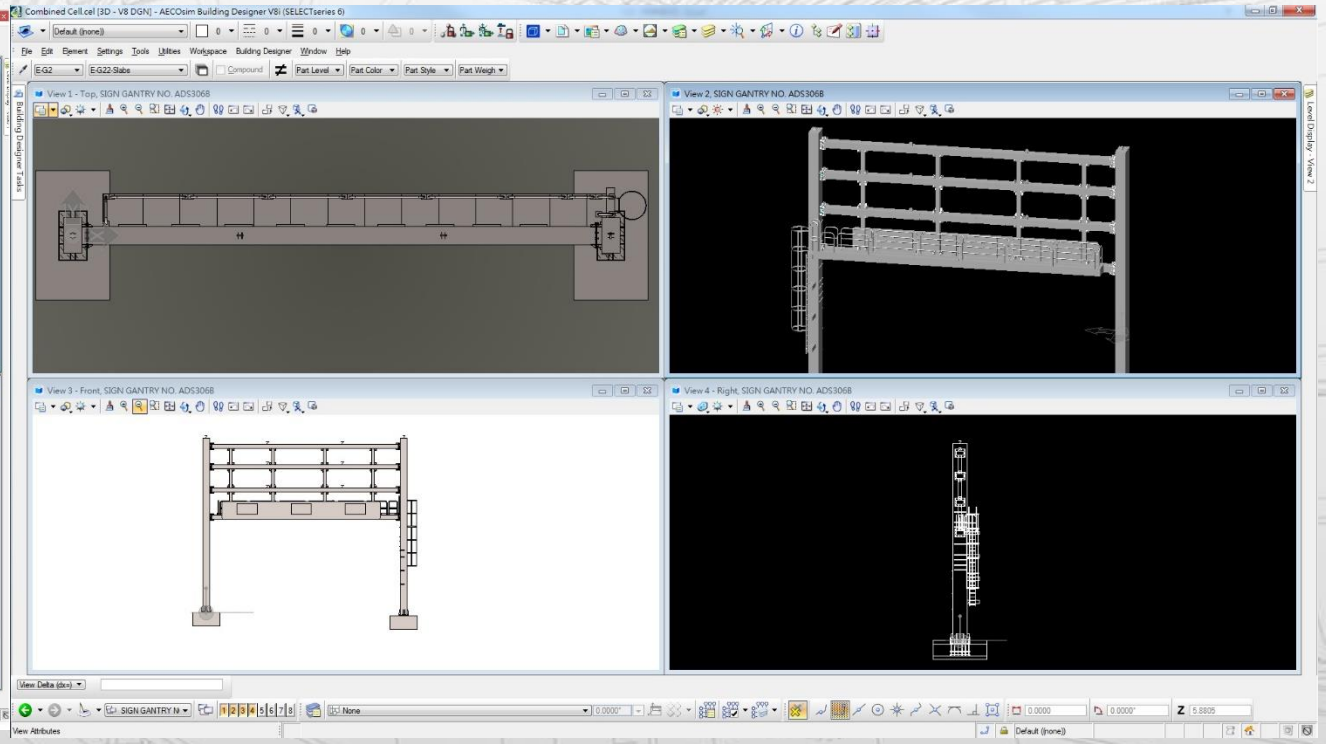


Civil BIM Library

Many objects can be created as a cell for placement conveniently. And it can be reused in any other projects.

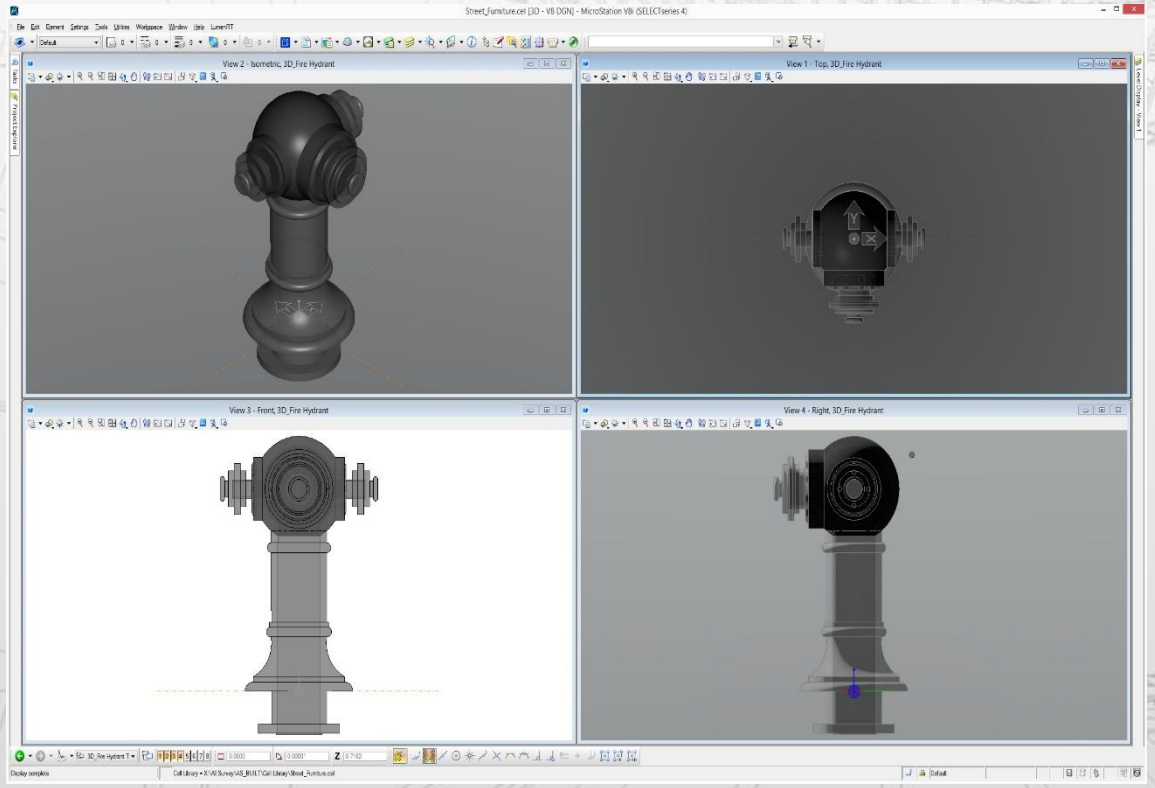


Double Air Valve

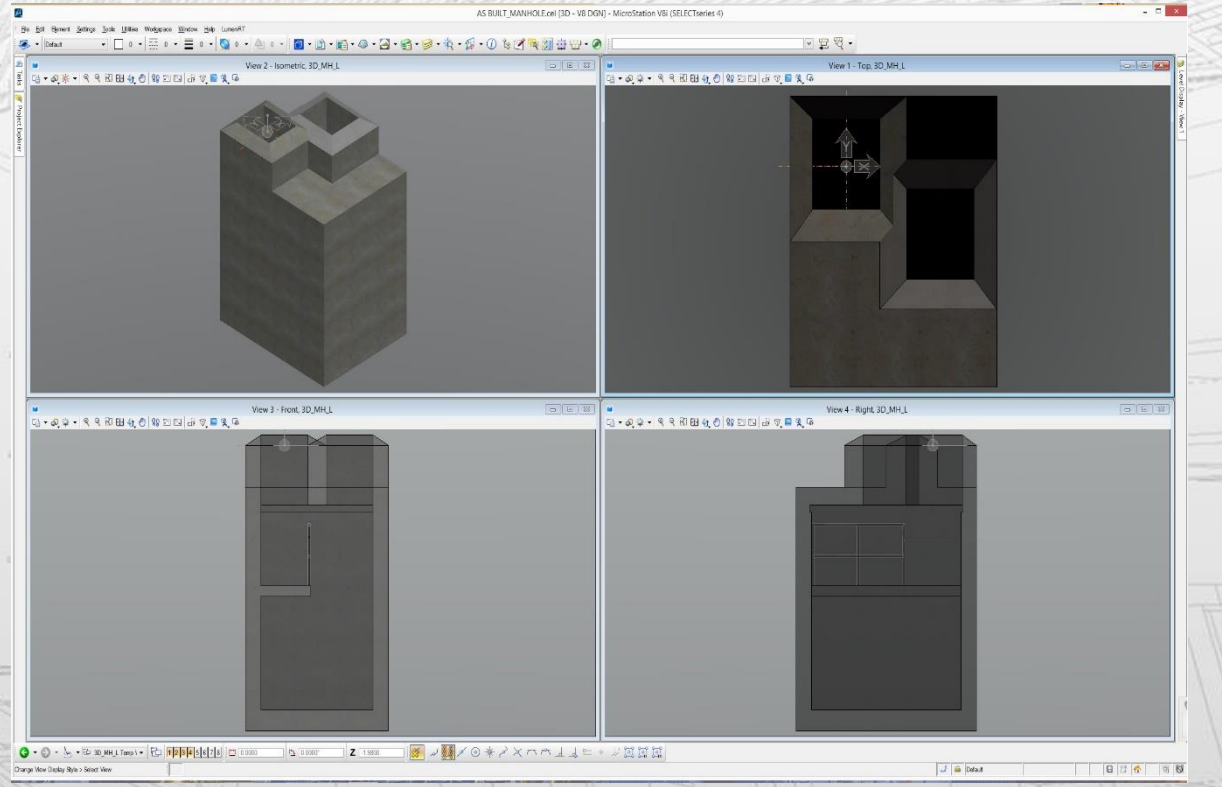


Sign Gantry

Civil BIM Library



Fire Hydrant



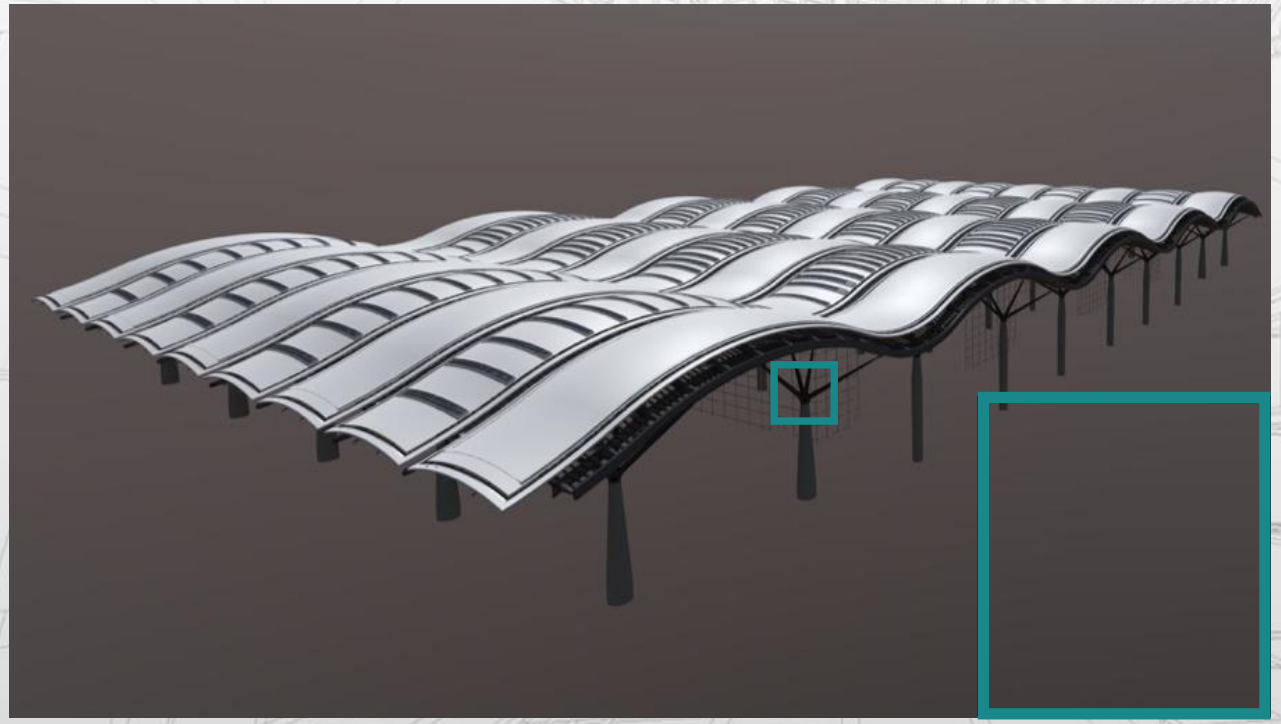
Drainage Manhole

3) As-Built 3D Modeling - 3D Scanning



a) From BIM to Real Node

BIM Model



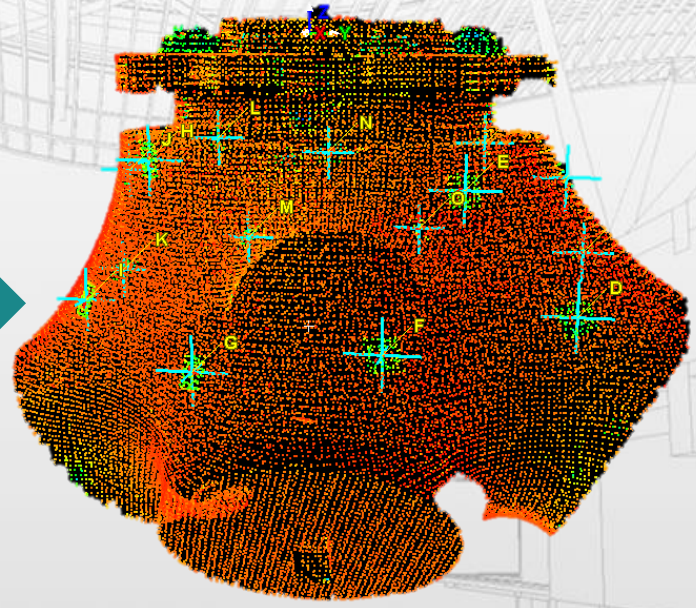
Real Node



b) Compare: As-built vs BIM

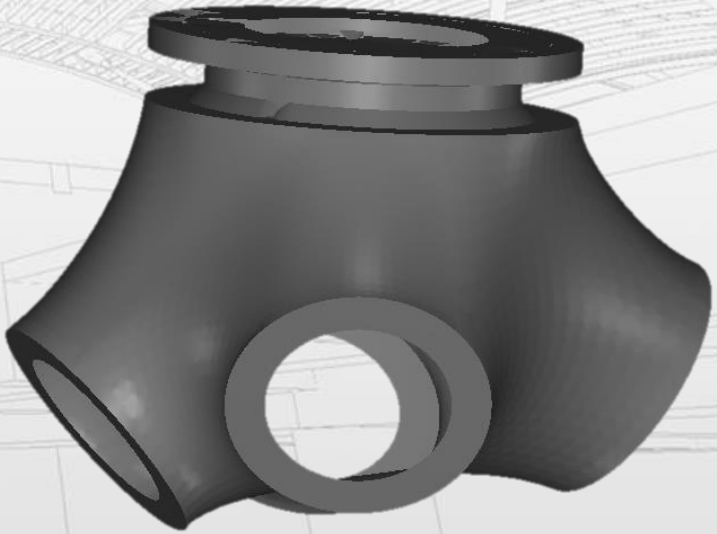


As-built



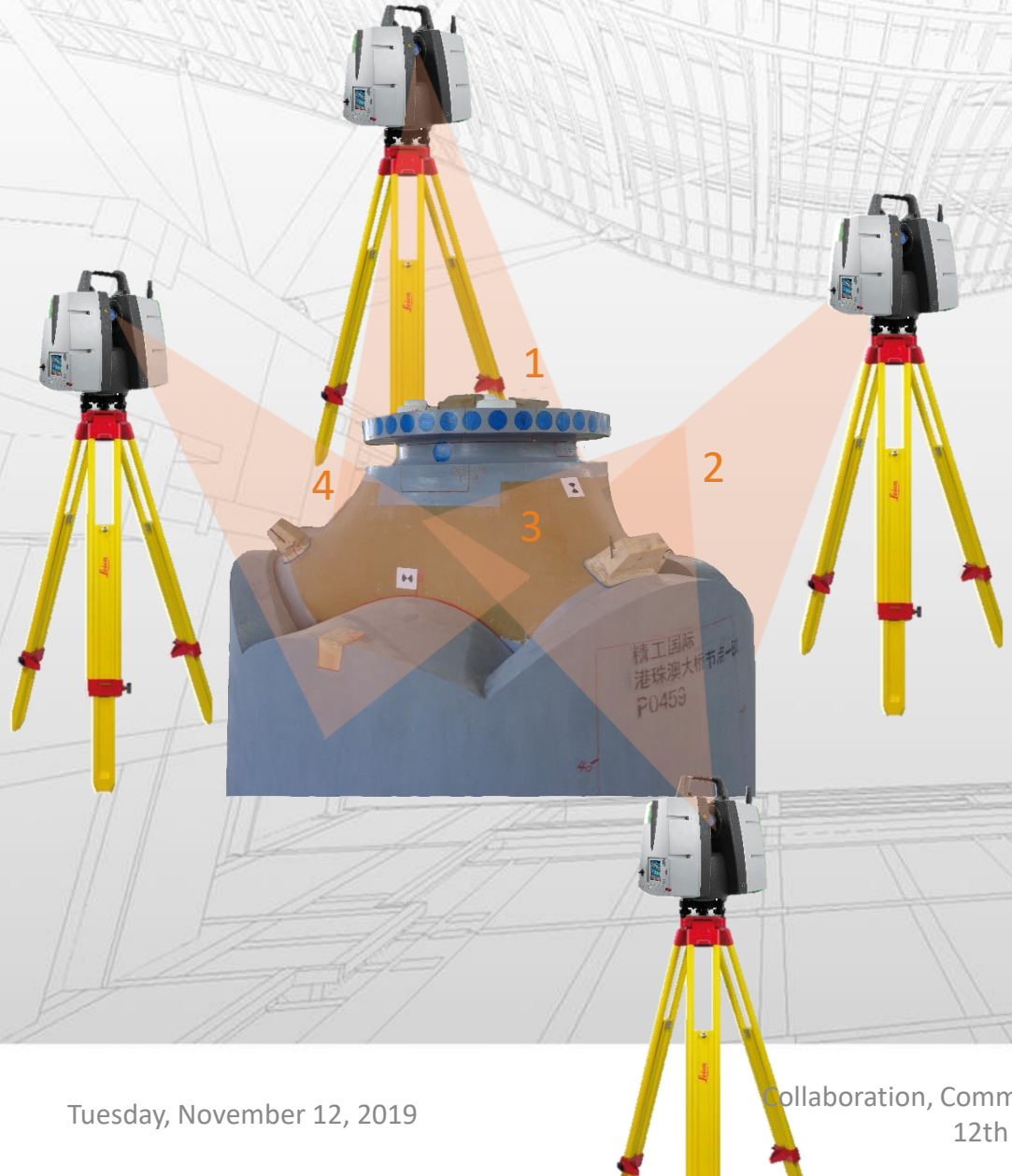
Point cloud

VS



BIM model (Design)

3D Scanning - Declination











3D Scanning - Inclination





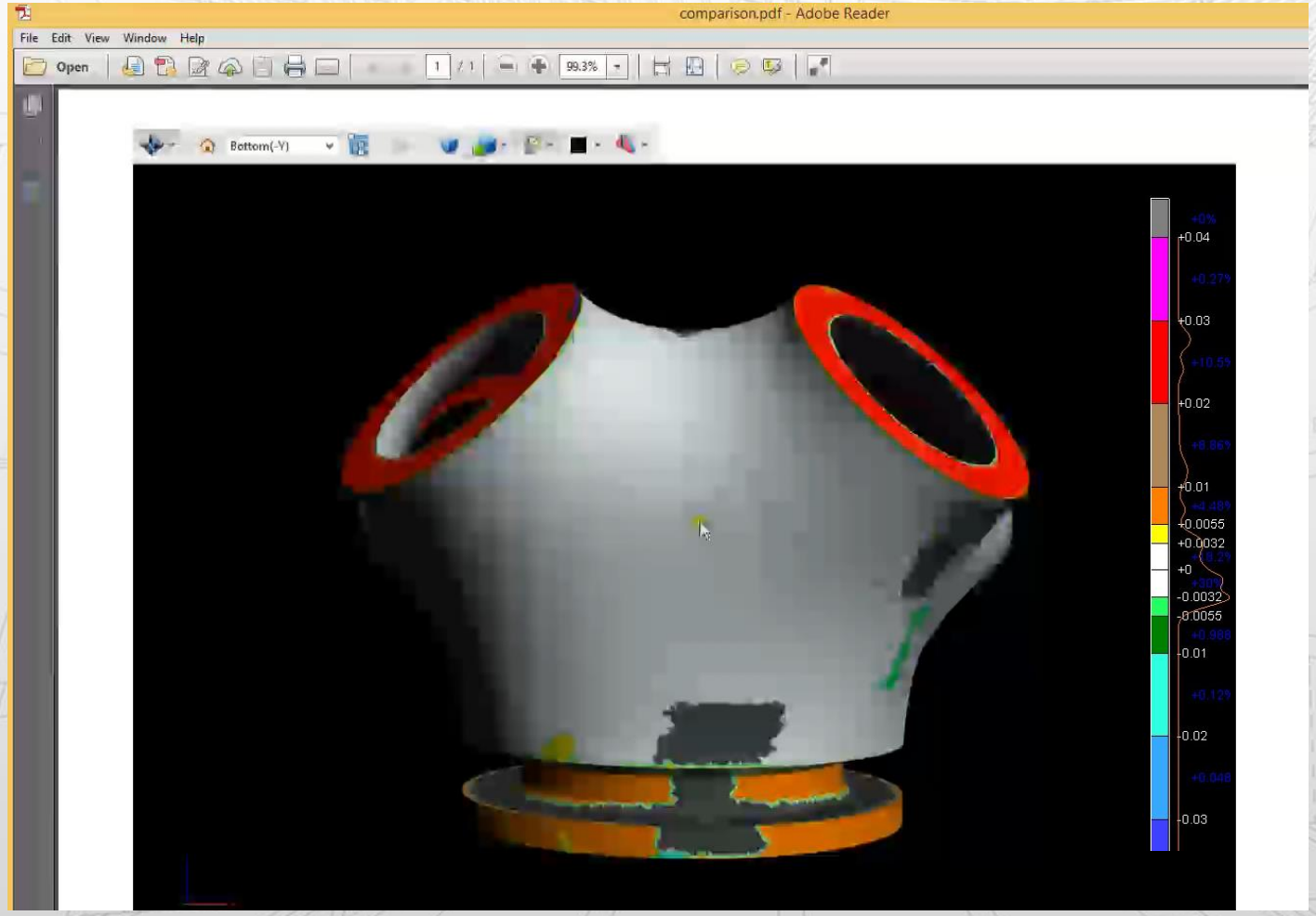




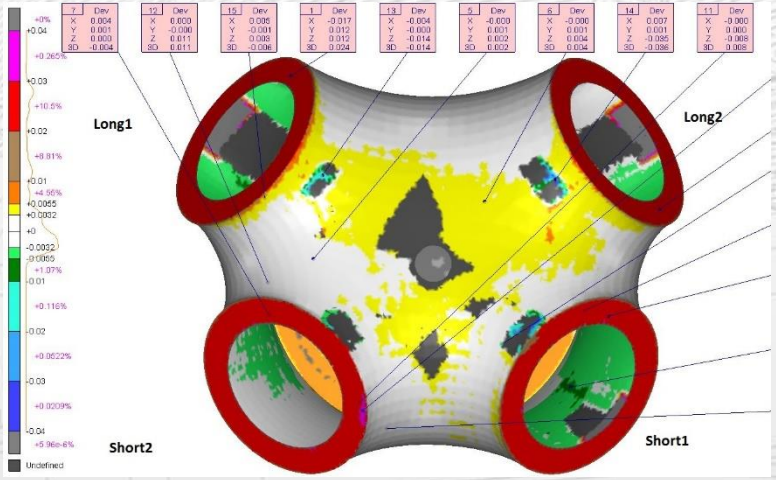


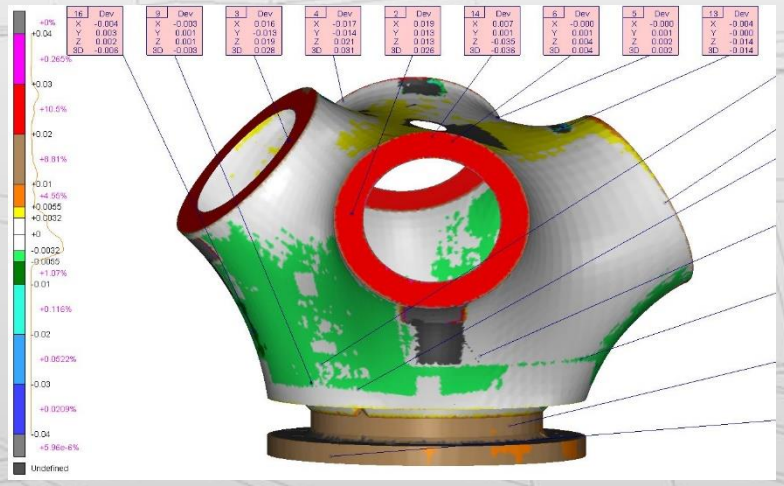
Compare: Point Cloud vs BIM

3D PDF



Report



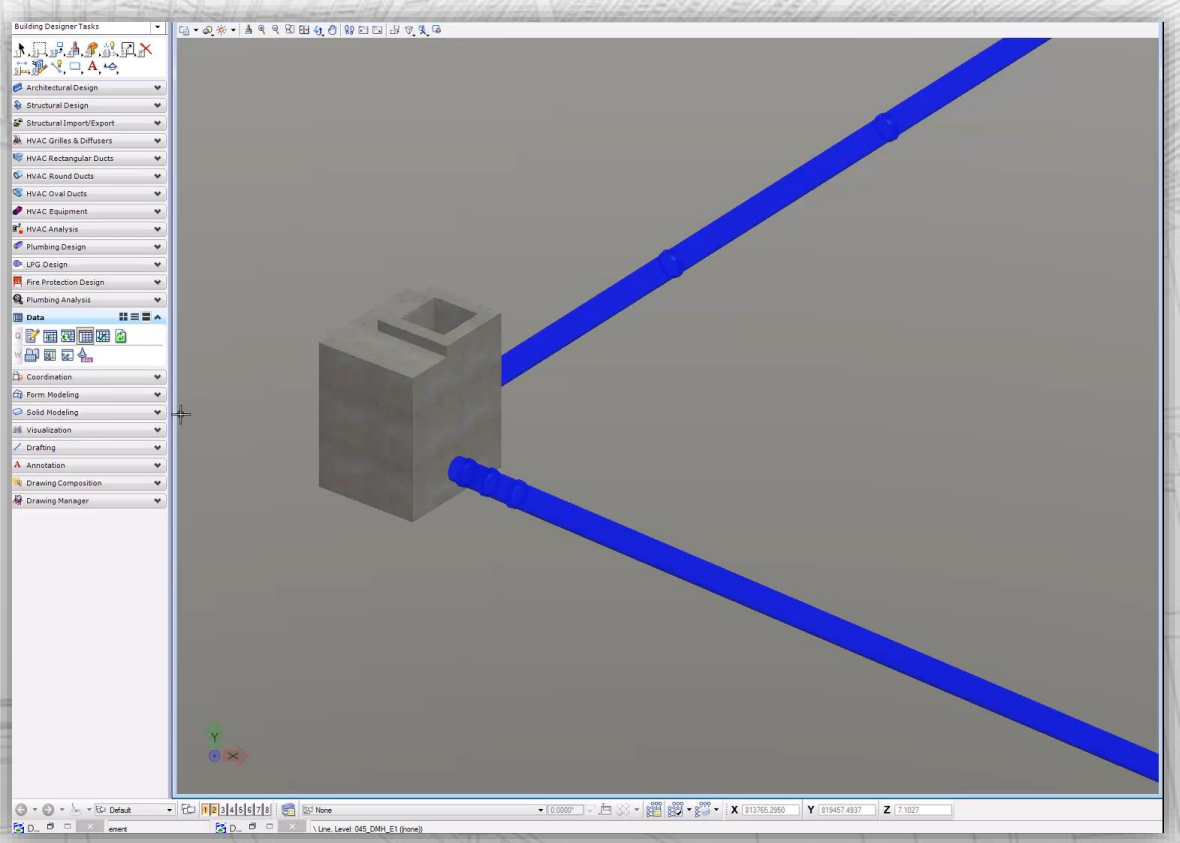


As-built Datagroup/Picture & Document Insert

(For example: Building Drainage Manhole and Pipe)

As-built Information should be updated into BIM model

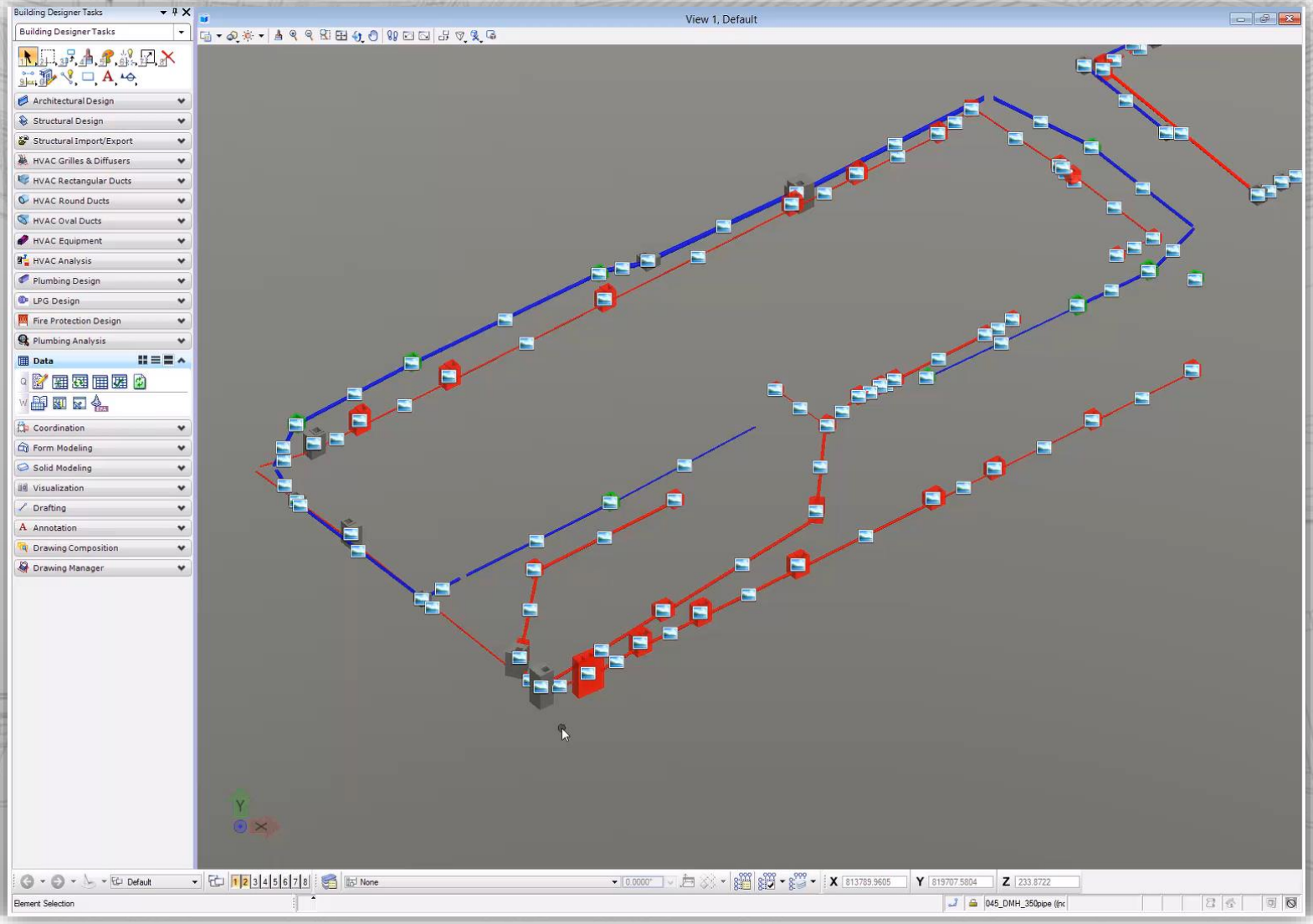
- Manhole As-built Data
- Pipe As-built Data



As-built Datagroup/Picture & Document Insert

Example of other Information:

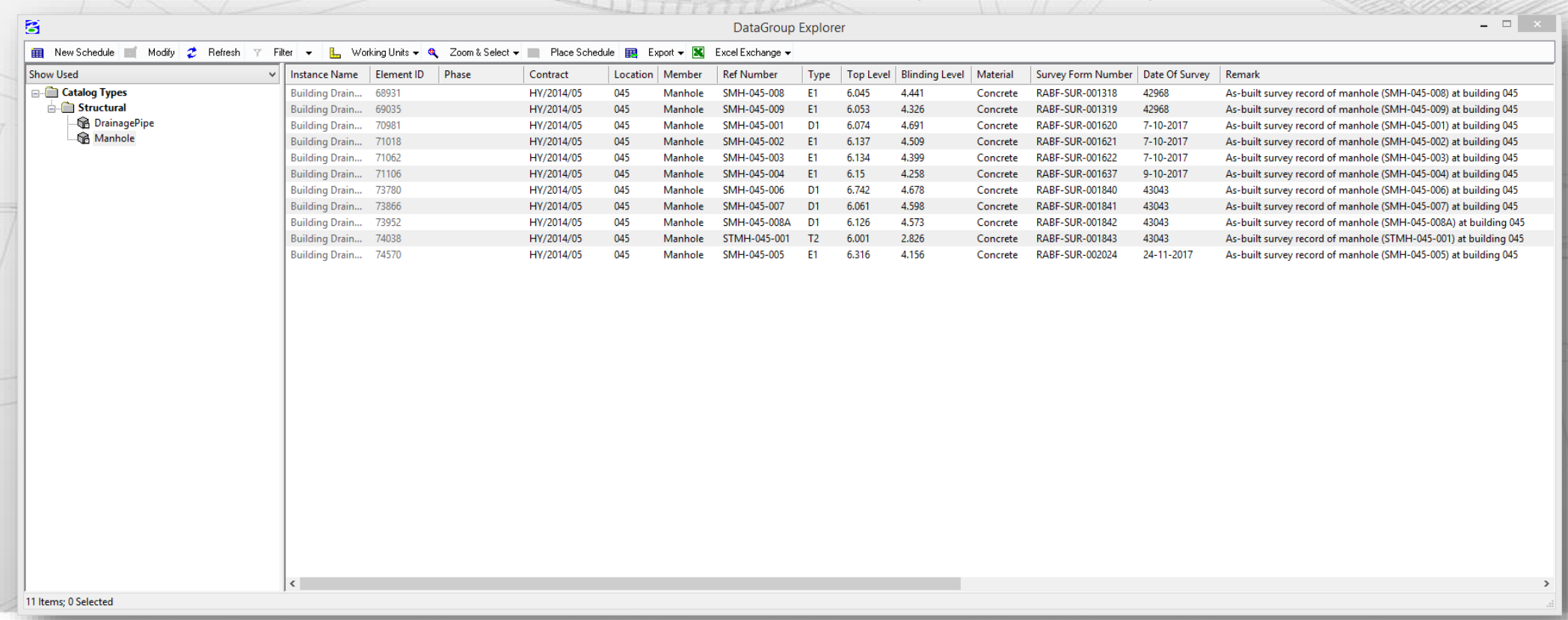
- Photos for all as-built Manhole/Pipe
- Related document in pdf format
- Monitoring record
- Related video



As-built Datagroup/Picture & Document Insert

Major Items for Manhole:

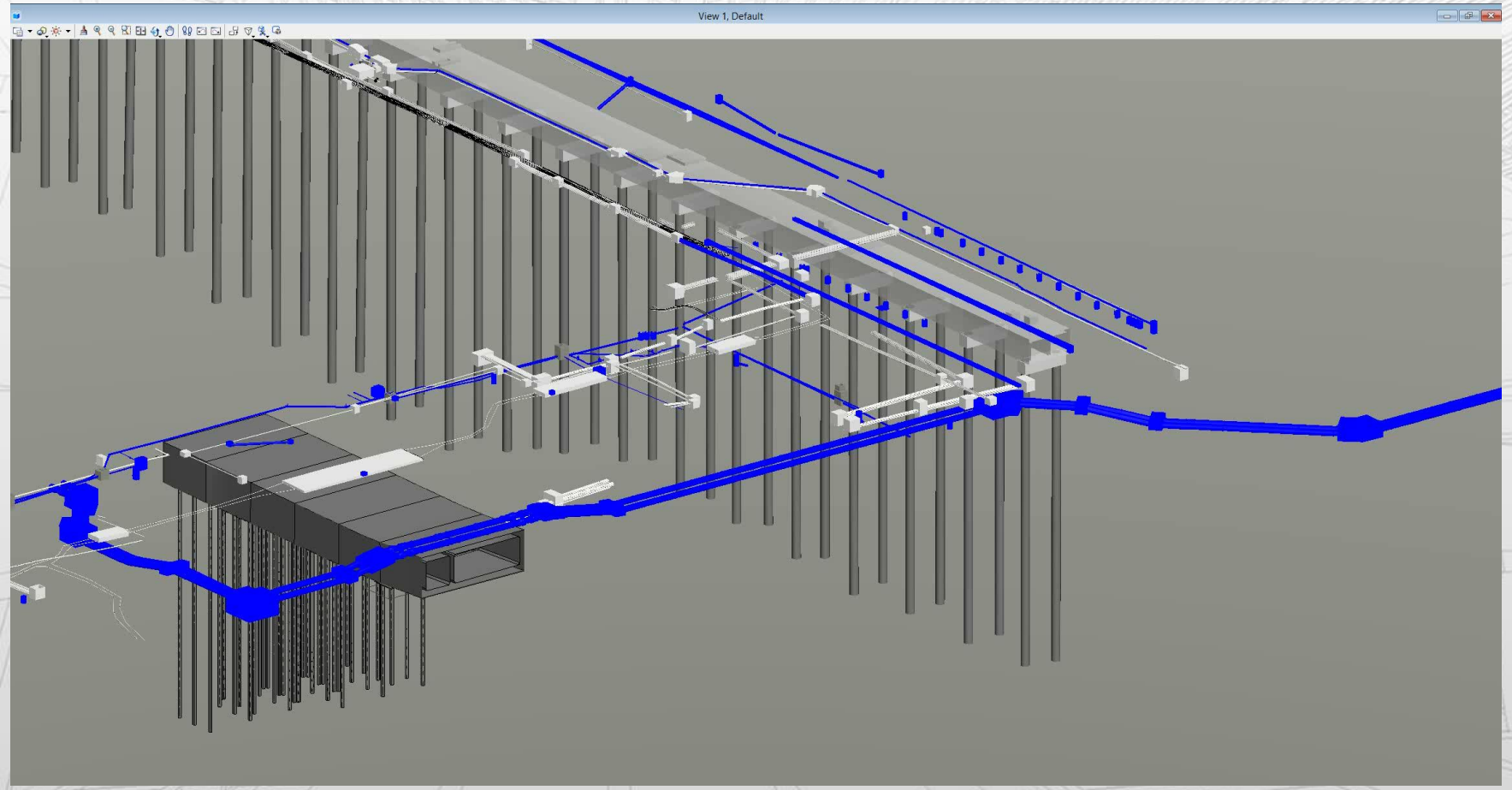
- Contract No.
- Location
- Element's Number
- Type
- Top Level
- Blinding Level
- Material
- Inspection/Survey Form No.
- Inspection/Survey Date
- Report No.
- Letter Ref. No.



Instance Name	Element ID	Phase	Contract	Location	Member	Ref Number	Type	Top Level	Blinding Level	Material	Survey Form Number	Date Of Survey	Remark
Building Drain...	68931		HY/2014/05	045	Manhole	SMH-045-008	E1	6.045	4.441	Concrete	RABF-SUR-001318	42968	As-built survey record of manhole (SMH-045-008) at building 045
Building Drain...	69035		HY/2014/05	045	Manhole	SMH-045-009	E1	6.053	4.326	Concrete	RABF-SUR-001319	42968	As-built survey record of manhole (SMH-045-009) at building 045
Building Drain...	70981		HY/2014/05	045	Manhole	SMH-045-001	D1	6.074	4.691	Concrete	RABF-SUR-001620	7-10-2017	As-built survey record of manhole (SMH-045-001) at building 045
Building Drain...	71018		HY/2014/05	045	Manhole	SMH-045-002	E1	6.137	4.509	Concrete	RABF-SUR-001621	7-10-2017	As-built survey record of manhole (SMH-045-002) at building 045
Building Drain...	71062		HY/2014/05	045	Manhole	SMH-045-003	E1	6.134	4.399	Concrete	RABF-SUR-001622	7-10-2017	As-built survey record of manhole (SMH-045-003) at building 045
Building Drain...	71106		HY/2014/05	045	Manhole	SMH-045-004	E1	6.15	4.258	Concrete	RABF-SUR-001637	9-10-2017	As-built survey record of manhole (SMH-045-004) at building 045
Building Drain...	73780		HY/2014/05	045	Manhole	SMH-045-006	D1	6.742	4.678	Concrete	RABF-SUR-001840	43043	As-built survey record of manhole (SMH-045-006) at building 045
Building Drain...	73866		HY/2014/05	045	Manhole	SMH-045-007	D1	6.061	4.598	Concrete	RABF-SUR-001841	43043	As-built survey record of manhole (SMH-045-007) at building 045
Building Drain...	73952		HY/2014/05	045	Manhole	SMH-045-008A	D1	6.126	4.573	Concrete	RABF-SUR-001842	43043	As-built survey record of manhole (SMH-045-008A) at building 045
Building Drain...	74038		HY/2014/05	045	Manhole	STMH-045-001	T2	6.001	2.826	Concrete	RABF-SUR-001843	43043	As-built survey record of manhole (STMH-045-001) at building 045
Building Drain...	74570		HY/2014/05	045	Manhole	SMH-045-005	E1	6.316	4.156	Concrete	RABF-SUR-002024	24-11-2017	As-built survey record of manhole (SMH-045-005) at building 045

As-built Datagroup/Picture & Document Insert

Example: Check Out Bored Pile Instanct Data

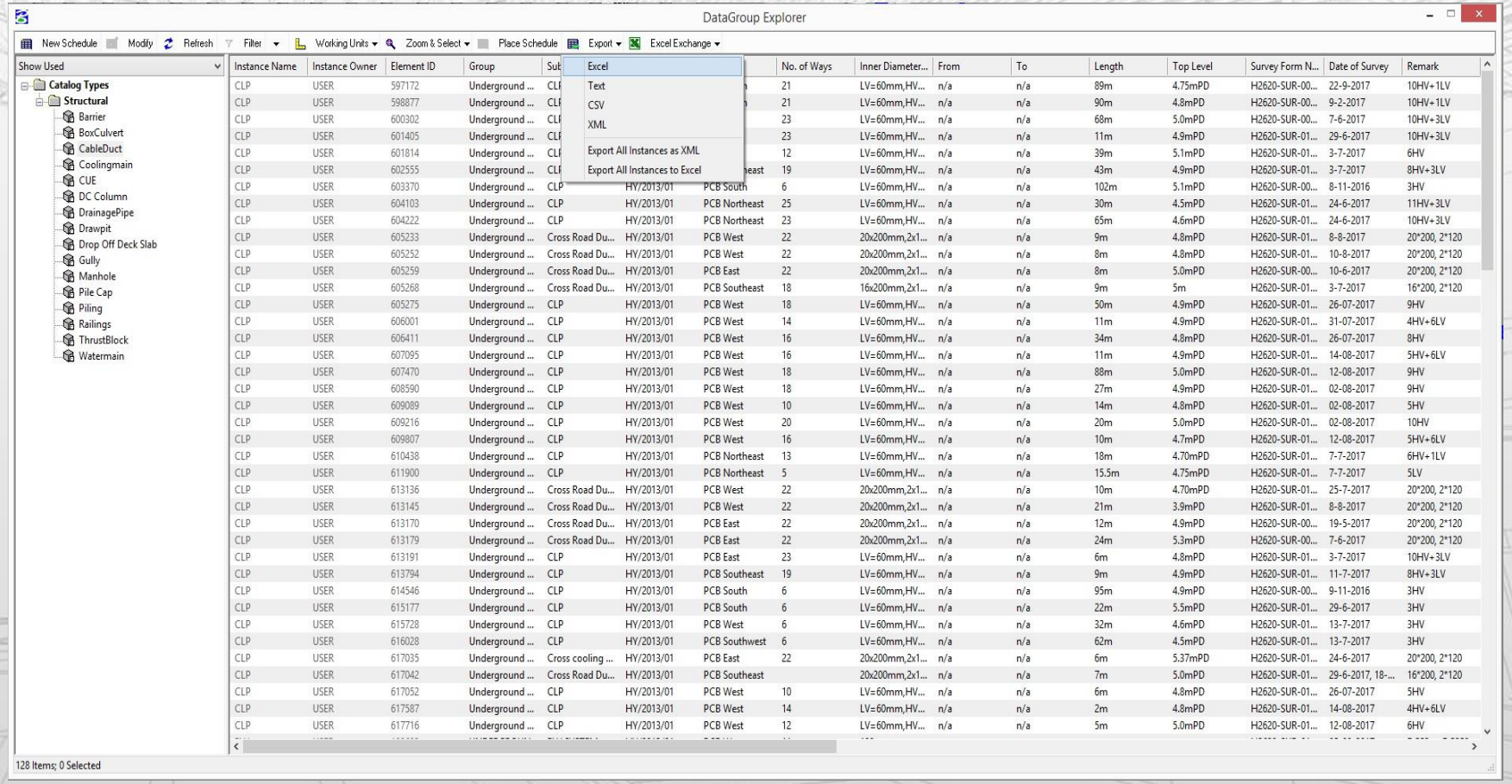


K	L	M	O	Q	R	S	T	U	V	W	X	AA	AB
Ref Number	Pile Type	Gradient	Pile Diameter	As-built Easting	As-built Northing	Verticality(1/x)	As-built Cut Off Level(mPD)	Actual Rockhead Level	Actual Founding Level	Socket Length	Material	Actual Concrete Volume(m3)	Concrete Top Level(mPD)
P508-P1	End bearing	Vertical Pile	2.000000	812707	819539.48	245	2.075	-49.044	-50.285	1.241	Grade 40/20D Concrete	296	3.583
P508-P2	End bearing	Vertical Pile	2.000000	812701	819539.53	172	2.075	-50.245	-51.945	1.7	Grade 40/20D Concrete	296	4.491
P101-P1	Friction	Vertical Pile	2.000000	812722	819503.78	268	2.075	-	-52.63	-	Grade 40/20D Concrete	296	4.02
P101-P2	Friction	Vertical Pile	2.000000	812727	819499.91	134	2.075	-	-54.646	-	Grade 40/20D Concrete	344	5.33
P101-P3	Friction	Vertical Pile	2.000000	812718	819499.38	388	2.076	-	-54.305	-	Grade 40/20D Concrete	327	3.537
P101-P4	Friction	Vertical Pile	2.000000	812723	819495.41	162	2.075	-	-45.202	-	Grade 40/20D Concrete	304	3.43
P102-P1	Friction	Vertical Pile	1.800000	812785	819479.48		2.075	-	-50.7	-	Grade 40/20D Concrete	224	4.154
P102-P2	Friction	Vertical Pile	1.800000	812791	819478.27	288	2.075	-	-50.264	-	Grade 40/20D Concrete	216	3.416
P102-P3	Friction	Vertical Pile	1.800000	812784	819473.8	241	2.075	-	-50.418	-	Grade 40/20D Concrete	216	4.37
P102-P4	Friction	Vertical Pile	1.800000	812789	819472.57	191	2.075	-	-50.369	-	Grade 40/20D Concrete	216	3.923
P103-P1	End bearing	Vertical Pile	2.000000	812829	819468.42	159	1.577	-78.954	-80.43	1.476	Grade 40/20D Concrete	398.4	3.086
P103-P2	End bearing	Vertical Pile	2.000000	812827	819462.62	239	1.575	-77.449	-79.853	2.404	Grade 40/20D Concrete	391.6	3.979
P104-P1	Friction	Vertical Pile	2.000000	812869	819457.61	168	2.075	-	-51.361	-	Grade 40/20D Concrete	287	3.553
P104-P2	Friction	Vertical Pile	2.000000	812868	819451.81	112	2.075	-	-51.159	-	Grade 40/20D Concrete	280	3.633
P105-P1	Friction	Vertical Pile	2.000000	812910	819446.39	179	2.076	-	-54.386	-	Grade 40/20D Concrete	312	4.008
P105-P2	Friction	Vertical Pile	2.000000	812908	819440.69	229	2.075	-	-52.135	-	Grade 40/20D Concrete	296	3.875
A106-P1	Friction	Vertical Pile	2.000000	812950	819435.1	159	2.075	-	-51.222	-	Grade 40/20D Concrete	280	4.276
A106-P2	Friction	Vertical Pile	2.000000	812948	819427.96	106	2.073	-	-50.743	-	Grade 40/20D Concrete	276	3.861

AD	AF	AH	AJ	AL	AN	AP	AR	AT	AV	AX
Date Of Survey Of Setting Out Checking	Date Of Survey Of Second Casing	Date Of Survey Of Final Casing	Date Of Survey Of As-built Record	Date Of Rockhead Inspection	Date Of Socket Inspection	Date Of Founding Inspection	Date Of Concreting Inspection	Date Of Sonic Test Inspection	Date Of Interface Coring Inspection	Date Of Grouting Inspection

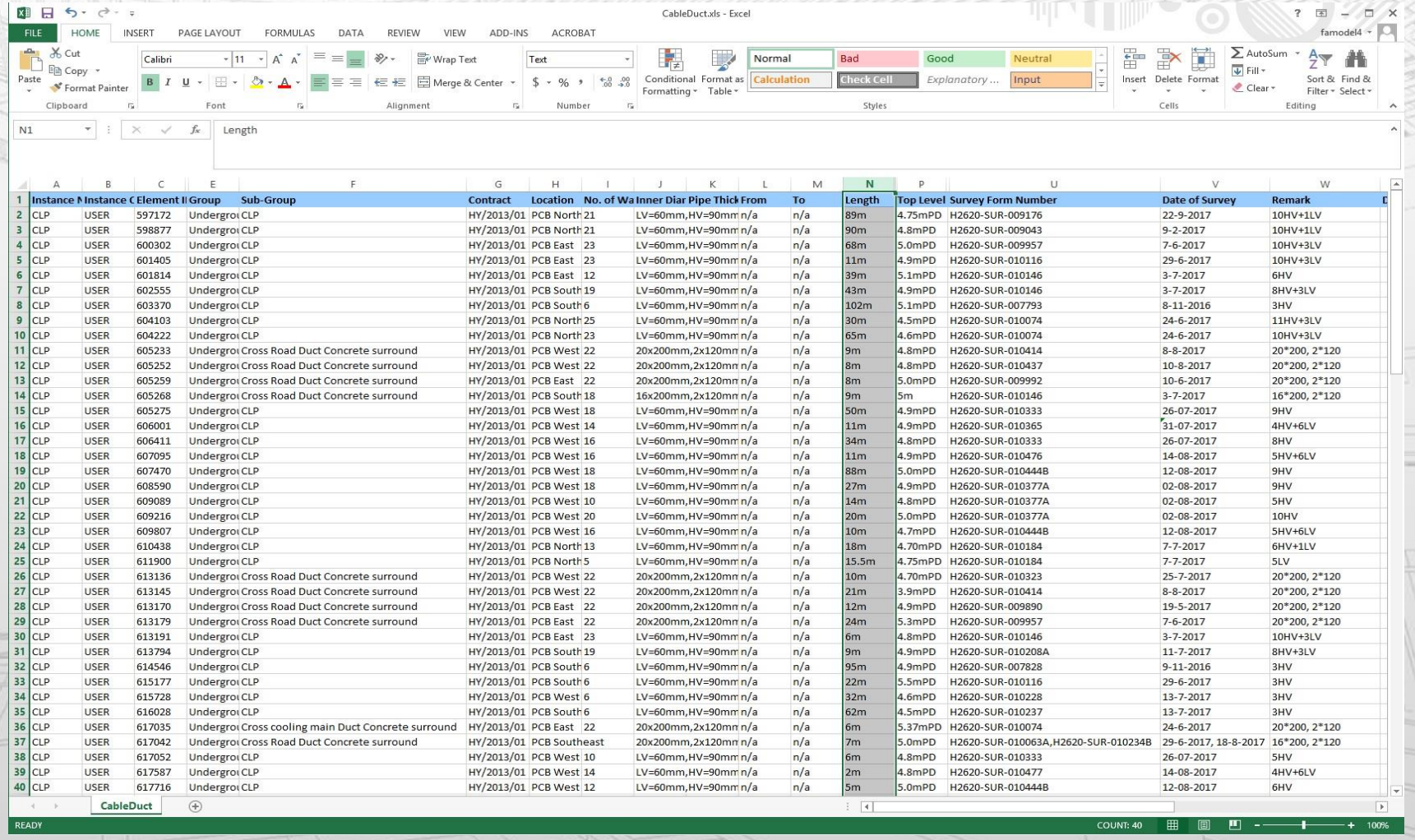
As-built Datagroup/Picture & Document Insert

As-built Information can be exported to Excel format.



As-built Datagroup/Picture & Document Insert

As-built information can be gathered and analysis easily in Excel format.

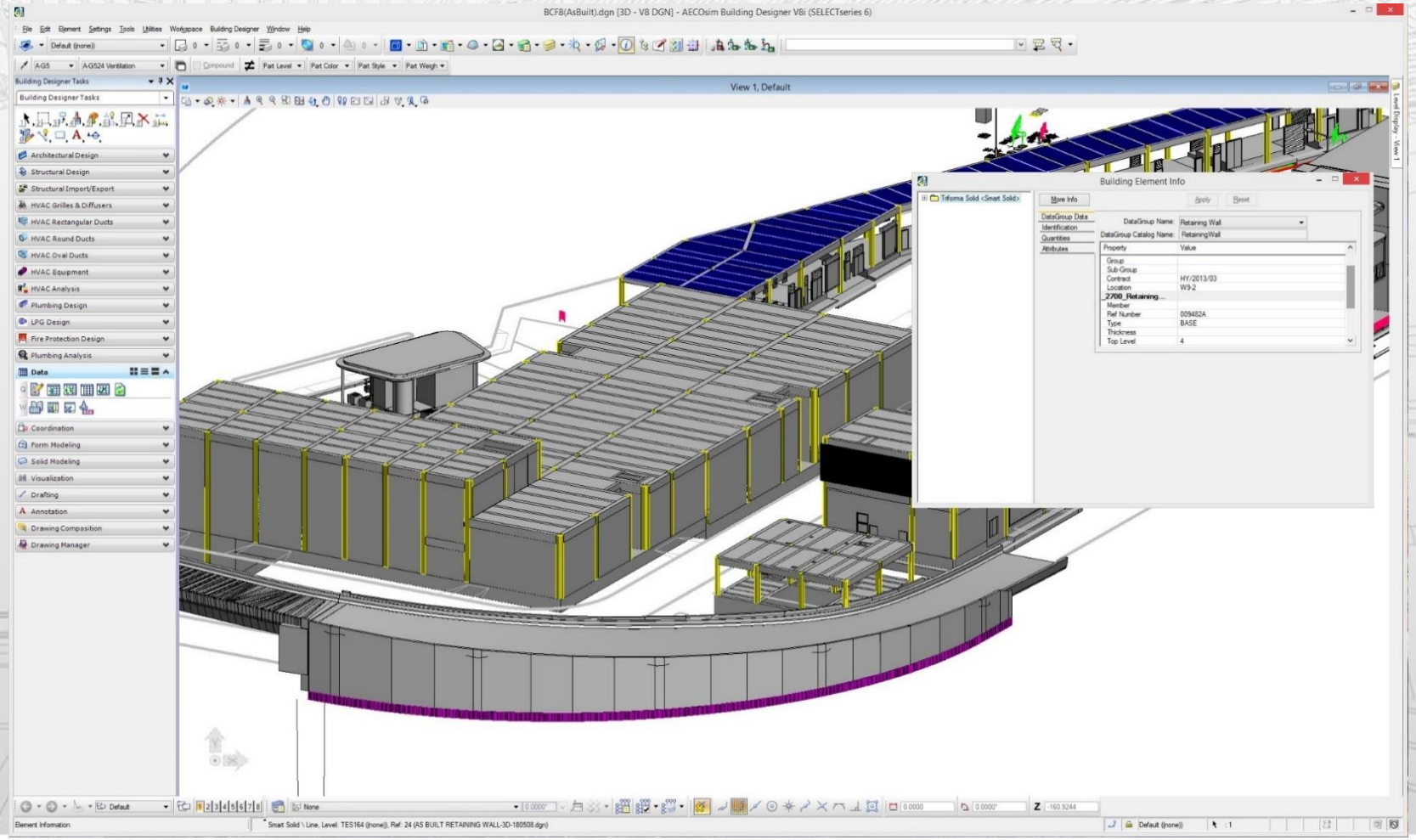


Instance N	Instance C	Element II	Group	Sub-Group	Contract	Location	No. of Wa	Inner Diar	Pipe Thick	From	To	Length	Top Level	Survey Form Number	Date of Survey	Remark
CLP	USER	597172	Undergro	CLP	HY/2013/01	PCB North	21	LV=60mm,HV=90mm		n/a	n/a	89m	4.75mPD	H2620-SUR-009176	22-9-2017	10HV+1LV
CLP	USER	598877	Undergro	CLP	HY/2013/01	PCB North	21	LV=60mm,HV=90mm		n/a	n/a	90m	4.8mPD	H2620-SUR-009043	9-2-2017	10HV+1LV
CLP	USER	600302	Undergro	CLP	HY/2013/01	PCB East	23	LV=60mm,HV=90mm		n/a	n/a	68m	5.0mPD	H2620-SUR-009957	7-6-2017	10HV+3LV
CLP	USER	601405	Undergro	CLP	HY/2013/01	PCB East	23	LV=60mm,HV=90mm		n/a	n/a	11m	4.9mPD	H2620-SUR-010116	29-6-2017	10HV+3LV
CLP	USER	601814	Undergro	CLP	HY/2013/01	PCB East	12	LV=60mm,HV=90mm		n/a	n/a	39m	5.1mPD	H2620-SUR-010146	3-7-2017	6HV
CLP	USER	602555	Undergro	CLP	HY/2013/01	PCB South	19	LV=60mm,HV=90mm		n/a	n/a	43m	4.9mPD	H2620-SUR-010146	3-7-2017	8HV+3LV
CLP	USER	603370	Undergro	CLP	HY/2013/01	PCB South	6	LV=60mm,HV=90mm		n/a	n/a	102m	5.1mPD	H2620-SUR-007793	8-11-2016	3HV
CLP	USER	604103	Undergro	CLP	HY/2013/01	PCB North	25	LV=60mm,HV=90mm		n/a	n/a	30m	4.5mPD	H2620-SUR-010074	24-6-2017	11HV+3LV
CLP	USER	604222	Undergro	CLP	HY/2013/01	PCB North	23	LV=60mm,HV=90mm		n/a	n/a	65m	4.6mPD	H2620-SUR-010074	24-6-2017	10HV+3LV
CLP	USER	605233	Undergro	Cross Road Duct Concrete surround	HY/2013/01	PCB West	22	20x200mm,2x120mm		n/a	n/a	9m	4.8mPD	H2620-SUR-010414	8-8-2017	20*200, 2*120
CLP	USER	605252	Undergro	Cross Road Duct Concrete surround	HY/2013/01	PCB West	22	20x200mm,2x120mm		n/a	n/a	8m	4.8mPD	H2620-SUR-010437	10-8-2017	20*200, 2*120
CLP	USER	605259	Undergro	Cross Road Duct Concrete surround	HY/2013/01	PCB East	22	20x200mm,2x120mm		n/a	n/a	8m	5.0mPD	H2620-SUR-009992	10-6-2017	20*200, 2*120
CLP	USER	605268	Undergro	Cross Road Duct Concrete surround	HY/2013/01	PCB South	18	16x200mm,2x120mm		n/a	n/a	9m	5m	H2620-SUR-010146	3-7-2017	16*200, 2*120
CLP	USER	605275	Undergro	CLP	HY/2013/01	PCB West	18	LV=60mm,HV=90mm		n/a	n/a	50m	4.9mPD	H2620-SUR-010333	26-07-2017	9HV
CLP	USER	606001	Undergro	CLP	HY/2013/01	PCB West	14	LV=60mm,HV=90mm		n/a	n/a	11m	4.9mPD	H2620-SUR-010365	31-07-2017	4HV+6LV
CLP	USER	606411	Undergro	CLP	HY/2013/01	PCB West	16	LV=60mm,HV=90mm		n/a	n/a	34m	4.8mPD	H2620-SUR-010333	26-07-2017	8HV
CLP	USER	607095	Undergro	CLP	HY/2013/01	PCB West	16	LV=60mm,HV=90mm		n/a	n/a	11m	4.9mPD	H2620-SUR-010476	14-08-2017	5HV+6LV
CLP	USER	607470	Undergro	CLP	HY/2013/01	PCB West	18	LV=60mm,HV=90mm		n/a	n/a	88m	5.0mPD	H2620-SUR-010444B	12-08-2017	9HV
CLP	USER	608590	Undergro	CLP	HY/2013/01	PCB West	18	LV=60mm,HV=90mm		n/a	n/a	27m	4.9mPD	H2620-SUR-010377A	02-08-2017	9HV
CLP	USER	609089	Undergro	CLP	HY/2013/01	PCB West	10	LV=60mm,HV=90mm		n/a	n/a	14m	4.8mPD	H2620-SUR-010377A	02-08-2017	5HV
CLP	USER	609216	Undergro	CLP	HY/2013/01	PCB West	20	LV=60mm,HV=90mm		n/a	n/a	20m	5.0mPD	H2620-SUR-010377A	02-08-2017	10HV
CLP	USER	609807	Undergro	CLP	HY/2013/01	PCB West	16	LV=60mm,HV=90mm		n/a	n/a	10m	4.7mPD	H2620-SUR-010444B	12-08-2017	5HV+6LV
CLP	USER	610438	Undergro	CLP	HY/2013/01	PCB North	13	LV=60mm,HV=90mm		n/a	n/a	18m	4.70mPD	H2620-SUR-010184	7-7-2017	6HV+1LV
CLP	USER	611900	Undergro	CLP	HY/2013/01	PCB North	5	LV=60mm,HV=90mm		n/a	n/a	15.5m	4.75mPD	H2620-SUR-010184	7-7-2017	5LV
CLP	USER	613136	Undergro	Cross Road Duct Concrete surround	HY/2013/01	PCB West	22	20x200mm,2x120mm		n/a	n/a	10m	4.70mPD	H2620-SUR-010323	25-7-2017	20*200, 2*120
CLP	USER	613145	Undergro	Cross Road Duct Concrete surround	HY/2013/01	PCB West	22	20x200mm,2x120mm		n/a	n/a	21m	3.9mPD	H2620-SUR-010414	8-8-2017	20*200, 2*120
CLP	USER	613170	Undergro	Cross Road Duct Concrete surround	HY/2013/01	PCB East	22	20x200mm,2x120mm		n/a	n/a	12m	4.9mPD	H2620-SUR-009890	19-5-2017	20*200, 2*120
CLP	USER	613179	Undergro	Cross Road Duct Concrete surround	HY/2013/01	PCB East	22	20x200mm,2x120mm		n/a	n/a	24m	5.3mPD	H2620-SUR-009957	7-6-2017	20*200, 2*120
CLP	USER	613191	Undergro	CLP	HY/2013/01	PCB East	23	LV=60mm,HV=90mm		n/a	n/a	6m	4.8mPD	H2620-SUR-010146	3-7-2017	10HV+3LV
CLP	USER	613794	Undergro	CLP	HY/2013/01	PCB South	19	LV=60mm,HV=90mm		n/a	n/a	9m	4.9mPD	H2620-SUR-010208A	11-7-2017	8HV+3LV
CLP	USER	614546	Undergro	CLP	HY/2013/01	PCB South	6	LV=60mm,HV=90mm		n/a	n/a	95m	4.9mPD	H2620-SUR-007828	9-11-2016	3HV
CLP	USER	615177	Undergro	CLP	HY/2013/01	PCB South	6	LV=60mm,HV=90mm		n/a	n/a	22m	5.5mPD	H2620-SUR-010116	29-6-2017	3HV
CLP	USER	615728	Undergro	CLP	HY/2013/01	PCB West	6	LV=60mm,HV=90mm		n/a	n/a	32m	4.6mPD	H2620-SUR-010228	13-7-2017	3HV
CLP	USER	616028	Undergro	CLP	HY/2013/01	PCB South	6	LV=60mm,HV=90mm		n/a	n/a	62m	4.5mPD	H2620-SUR-010237	13-7-2017	3HV
CLP	USER	617035	Undergro	Cross cooling main Duct Concrete surround	HY/2013/01	PCB East	22	20x200mm,2x120mm		n/a	n/a	6m	5.37mPD	H2620-SUR-010074	24-6-2017	20*200, 2*120
CLP	USER	617042	Undergro	Cross Road Duct Concrete surround	HY/2013/01	PCB Southeast		20x200mm,2x120mm		n/a	n/a	7m	5.0mPD	H2620-SUR-010063A,H2620-SUR-010234B	29-6-2017, 18-8-2017	16*200, 2*120
CLP	USER	617052	Undergro	CLP	HY/2013/01	PCB West	10	LV=60mm,HV=90mm		n/a	n/a	6m	4.8mPD	H2620-SUR-010333	26-07-2017	5HV
CLP	USER	617587	Undergro	CLP	HY/2013/01	PCB West	14	LV=60mm,HV=90mm		n/a	n/a	2m	4.8mPD	H2620-SUR-010477	14-08-2017	4HV+6LV
CLP	USER	617716	Undergro	CLP	HY/2013/01	PCB West	12	LV=60mm,HV=90mm		n/a	n/a	5m	5.0mPD	H2620-SUR-010444B	12-08-2017	6HV

As-built Datagroup/Picture & Document Insert

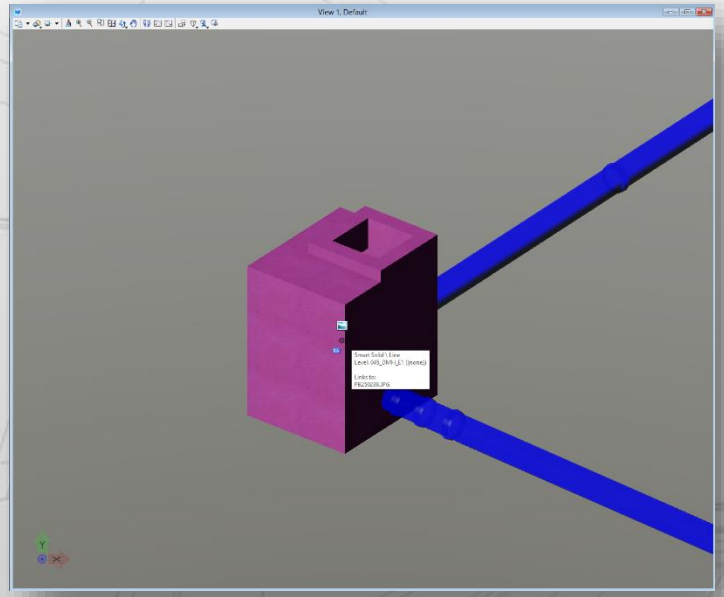
Example of Element Info Data

Retaining Wall's Footing
-Top Level
-Total Area
-Total Volumes

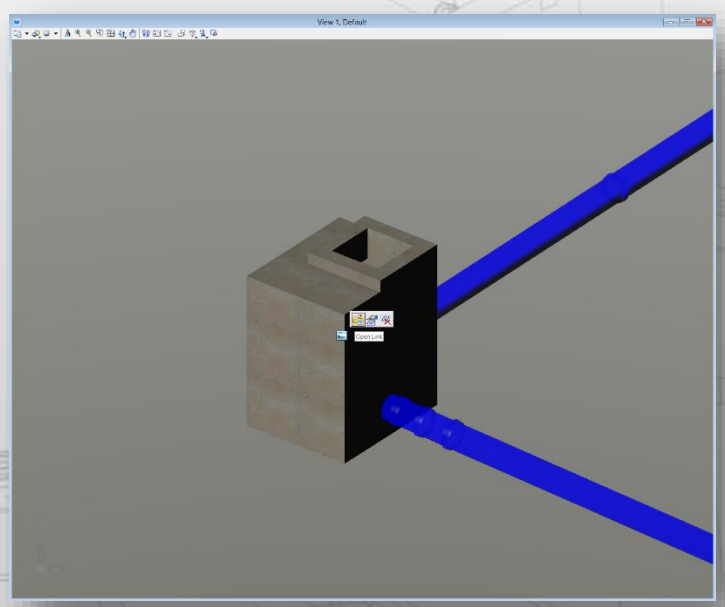


As-built Datagroup/Picture & Document Insert

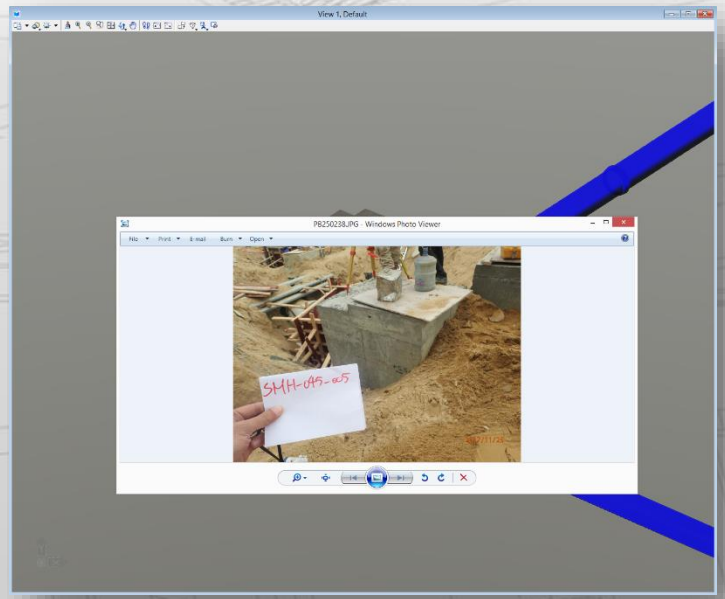
- Picture logo shows on item



- Click “Open Link”



- Picture of item



Conclusion

- Civil BIM must involve different parties to contribute data. (e.g Architects, Engineers, Land Surveyors, Inspection team, GO & etc.)

- Land Surveyor's team could consolidate all relevant information to create, modify, update and distribute Civil BIM Model information among different parties e.g. Architects, Engineers, Surveyors, Project Managers, Construction and Managers of the Clients, Supervisors and Contractors .

Advantages of BIM In Design Stage

- Visualize the whole design easily.
- More effective in the cost estimation for tender, interim payment and final accounting.
- Discover and avoid clashes before construction to avoid abortive and re-work hence minimizing unnecessary claim and delay.

Advantages of BIM In Construction Stage

- Improve the construction scheduling, monitoring progress, review construction method, plants and human resources.
- Increase the efficiency – e.g. drawings production, database for manufacturing, etc. This is particularly true for segment casting off site as most of our segments were cast in China.
- Civil BIM can combine all updated information to an unique model to avoid discrepancy if not ambguity.

- Provide a clear overall review for the construction progress, the outstanding works, even for the checking by project or government auditors, etc.

- Site photos, correspondences, lab reports, etc., can insert into the 3D BIM Model from time to time.

Advantages of As-built BIM

- Reports can be generated to help simplifying the quantities calculation.

- A full detail of relevant information can be provided for future maintenance, operation and management of assets of the Project life cycle.
- Easily avoid clash for future development.



Q & A
Thank You !!