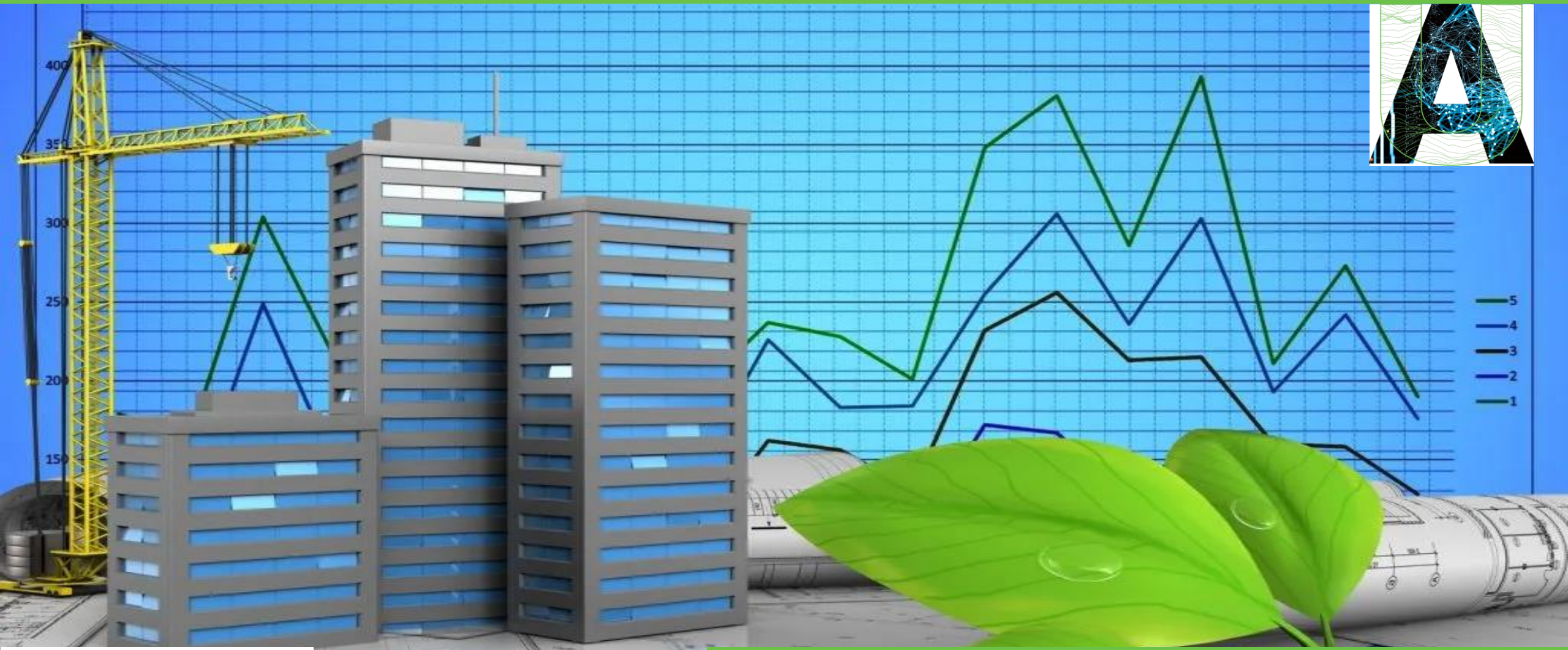
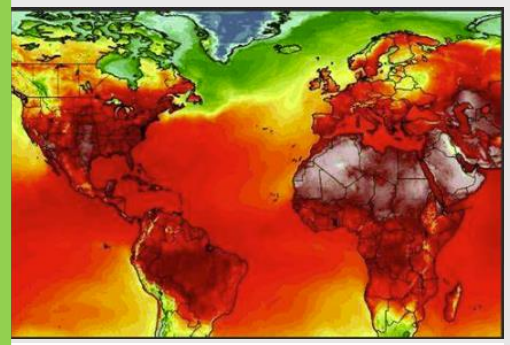
Using Lifecycle BIM for Sustainable Operation & Maintenance



GROUP TD2

By making data driven decisions every day

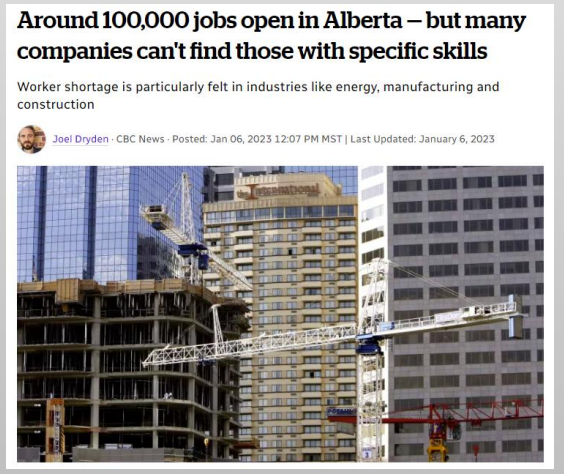


Earth Yet Again Breaks Mark For Hottest Summer On Record

Unplanned plant outage, hot Alberta weather, line issue all contributed to Monday night's grid alert: AESO

"progress and growth are impossible if you always do things the way you've always done things"

Wayne Dyer

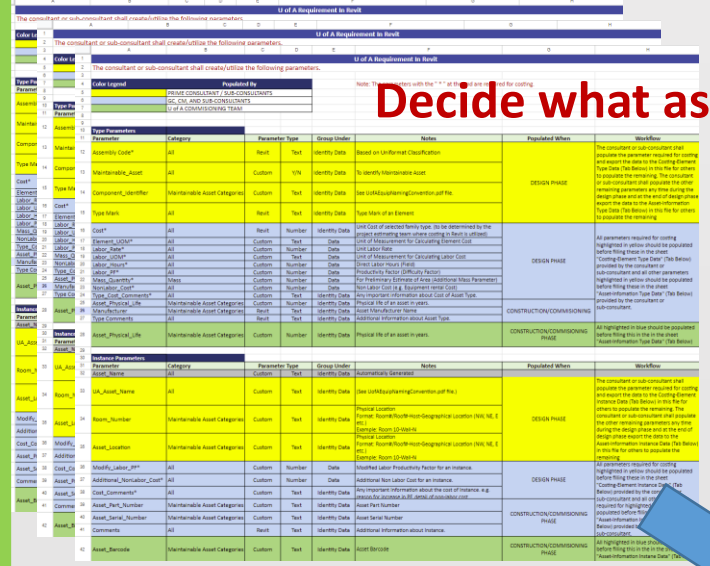


Around 100,000 jobs open in Alberta – but many companies can't find those with specific skills

Worker shortage is particularly felt in industries like energy, manufacturing and construction

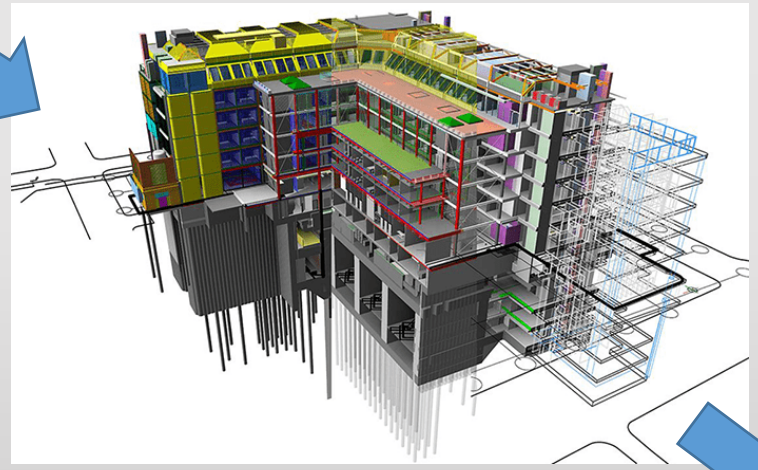
Joel Dryden · CBC News · Posted: Jan 06, 2023 12:07 PM MST | Last Updated: January 6, 2023

Carbon taxes have the potential to act as a hugely powerful engine for change



Decide what assets to track (and what not to)

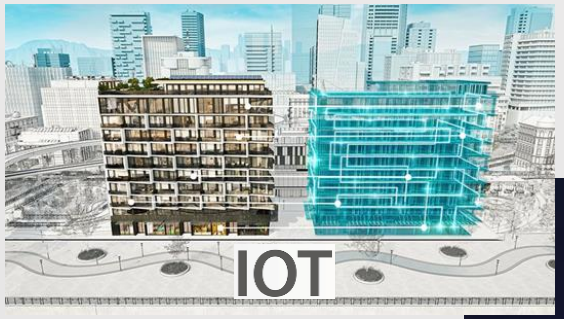
Structured data is embedded into the model

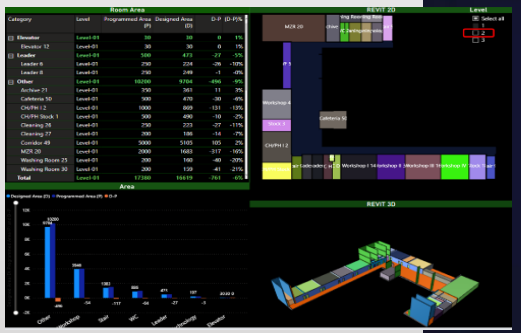


Using industry best practices

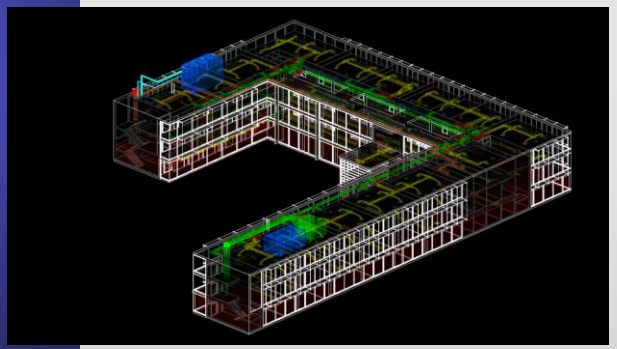
UniFormat™

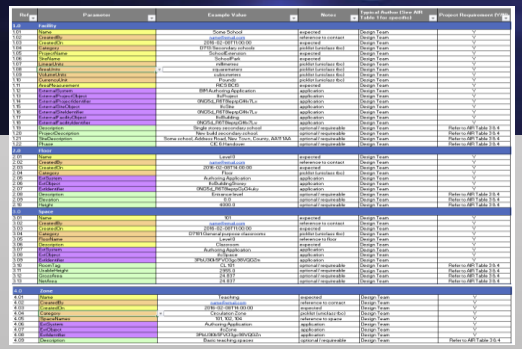
A Uniform Classification of Construction Systems and Assemblies





Common Data Environment





GROUP TD2

PRIMAVERA P6 DASHBOARD - EARNED VALUE MANAGEMENT

DATA DATE
28-Apr-1922

PROJECT
All

TYPE
- Labor
- Equipment
- Cost-LEM's

BAC
155.5K
Budget at Completion

BCWS
60.4K
Planned Value

ACWP
61.4K
Actual Value

BCWP
29.8K
Earned

REM
101.4K
Remaining

ETC
259.6K
Estimate to Complete

EAC
320.7K
Estimate at Completion

VAC
-165.2K
Variance at Completion

Duration
Total Elasped
181
150

SPI
0.49

SV
-30.6K
Performing slowly than planned

PROGRESS
38.8%
19.1%
0.0%
100.0%
Missing Target

CV
-31.6K
Work performed is over budget

CPI
0.48

Unit
Actual Plan
155.5K
61.4K

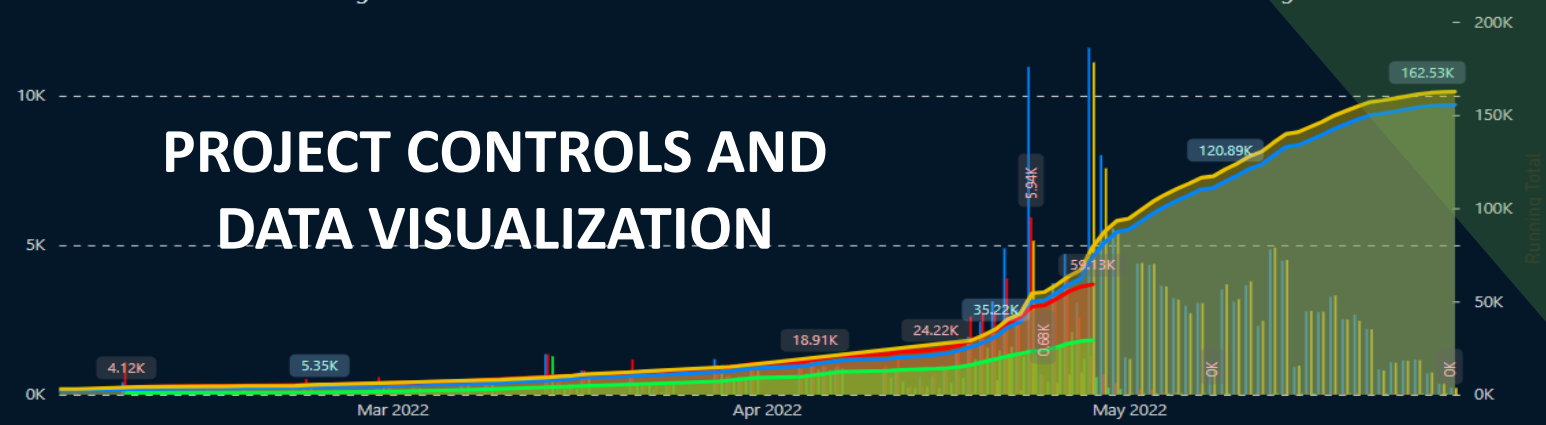
S-CURVE
- Actual
- Earned
- Plan
- Remaining

HISTOGRAM
- Actual
- Earned
- Plan
- Remaining

TYPE
- Daily
- Dynamic
- Monthly
- Weekly
- Yearly

HISTOGRAM & S-CURVE

Plan Actual Remaining Earned Plan-Cummulative Actual-Cummulative Earned-Cummulative Remaining-Cummulative



PROJECT CONTROLS AND DATA VISUALIZATION

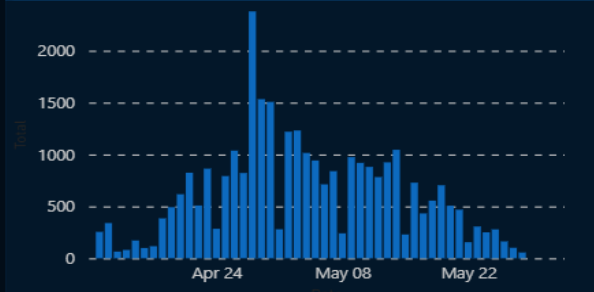
START | **DATE** | **END**

29-Nov-21 | 12/04/2022 | 28/05/2022 | 29-May-22

TASK

Task Name	Days	Start	Finish	Actual Start	Actual Finish	CPI
Erect scaffolding required to access all ba...	10	29-Nov-21	16-Dec-21	29-Nov-21	24-Mar-22	
Erect Scaffolding to Access PSV	2	29-Nov-21	30-Nov-21	29-Nov-21	30-Nov-21	
Erect hanging scaffold to access quench ...	10	05-Jan-22	25-Jan-22	29-Nov-21	14-Jan-22	
Erect Scaffold at TP-01	1	10-Jan-22	11-Jan-22	13-Jan-22	18-Jan-22	
Erect scaffold for bundle removal and inst...	2	10-Jan-22	11-Jan-22	10-Jan-22	17-Jan-22	
Erect Scaffold for installing mechanical Is...	1	10-Jan-22	10-Jan-22	10-Jan-22	28-Mar-22	
Erect Scaffold for installing mechanical Is...	2	10-Jan-22	11-Jan-22	10-Jan-22	11-Jan-22	
Erect scaffold to access all doors on the e...	5	10-Jan-22	18-Jan-22	10-Jan-22	13-Jan-22	
Erect scaffold to access external manways...	1	10-Jan-22	11-Jan-22	10-Jan-22	11-Jan-22	
Total	8027					

RESOURCE ASSIGNMENT



RESOURCES

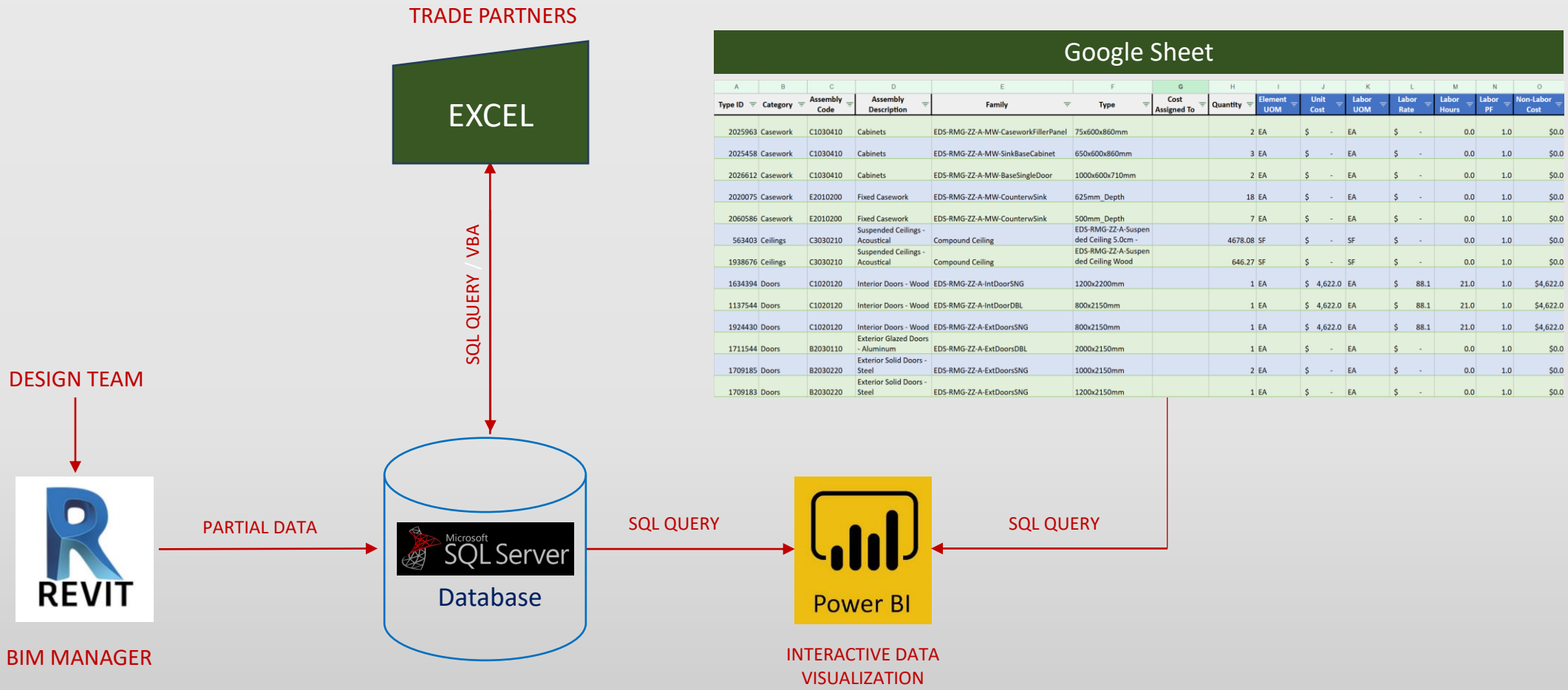
SPI	CPI	Resources
		BOILERMAKER ALTEX S2
		BOILERMAKER ALTEX S3
		BOILERMAKER VESSELS S2
		BOILERMAKER VESSELS S3
		BOILERMAKER WELDER ALTEX
		BOILERMAKER WELDER WORLE
		BOILERMAKER WORLEY S2
		BOILERMAKER WORLEY S3
		BOLT TENSIONING SPECIALI
		BREATHING AIR
		BRICKLAYER S2
		BRICKLAYER S3
		CARPENTER
		CATALYST DRILLING
		CHEMICAL WASHING
		CHEMICAL WASHING - CTP
		CHEMICAL WASHING RTI
		COATING SPECIALIST
		COLD CUTTING
		CONCRETE REPAIR
		COOLING TOWER MAINTENANC
		ELECTRICIAN
		ELECTRICIAN KUZYS
		ELECTRICIAN ROTORK
		ELECTRICIAN S2
		ELECTRICIAN S3
		ELECTRICIAN SHERMCO
		ELECTRICIAN

CODES

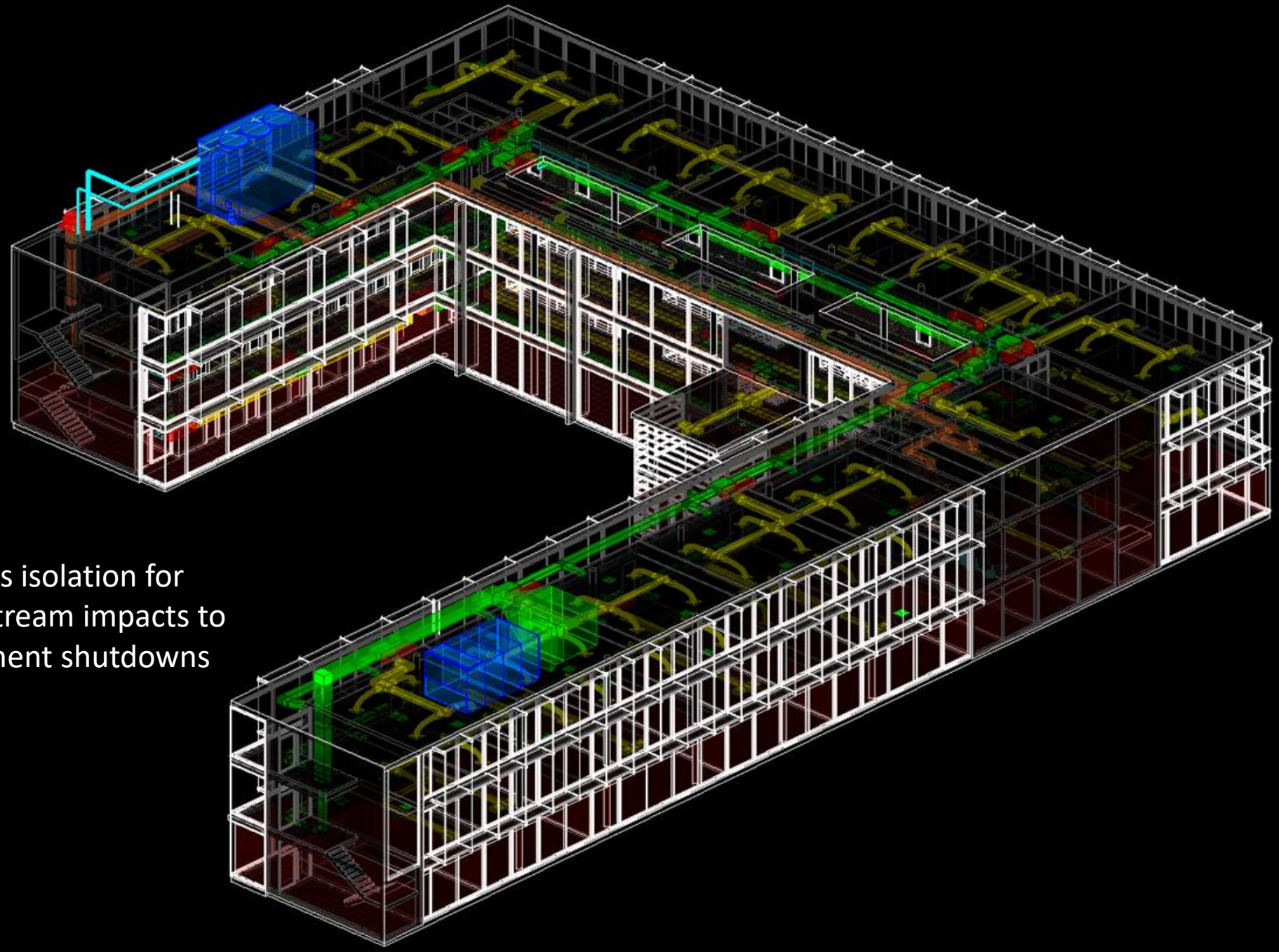
PHASE All | **FLOORS** All | **WORK** All

RESET

BIM – Revit Cost Estimating System



Type ID	Category	Assembly Code	Assembly Description	Family	Type	Cost Assigned To	Quantity	Element UOM	Unit Cost	Labor UOM	Labor Rate	Labor Hours	Labor PF	Non-Labor Cost
2025963	Casework	C1030410	Cabinets	EDS-RMG-ZZ-A-MW-CaseworkFillerPanel	75x600x860mm		2	EA	$ -	EA	$ -	0.0	1.0	$0.0
2025458	Casework	C1030410	Cabinets	EDS-RMG-ZZ-A-MW-SinkBaseCabinet	650x600x860mm		3	EA	$ -	EA	$ -	0.0	1.0	$0.0
2026612	Casework	C1030410	Cabinets	EDS-RMG-ZZ-A-MW-BaseSingleDoor	1000x600x710mm		2	EA	$ -	EA	$ -	0.0	1.0	$0.0
2020075	Casework	E2010200	Fixed Casework	EDS-RMG-ZZ-A-MW-CounterwSink	625mm_Depth		18	EA	$ -	EA	$ -	0.0	1.0	$0.0
2060586	Casework	E2010200	Fixed Casework	EDS-RMG-ZZ-A-MW-CounterwSink	500mm_Depth		7	EA	$ -	EA	$ -	0.0	1.0	$0.0
563403	Ceilings	C3030210	Suspended Ceilings - Acoustical	Compound Ceiling	EDS-RMG-ZZ-A-Suspended Ceiling 5.0cm -		4678.08	SF	$ -	SF	$ -	0.0	1.0	$0.0
1938676	Ceilings	C3030210	Suspended Ceilings - Acoustical	Compound Ceiling	EDS-RMG-ZZ-A-Suspended Ceiling Wood		646.27	SF	$ -	SF	$ -	0.0	1.0	$0.0
1634394	Doors	C1020120	Interior Doors - Wood	EDS-RMG-ZZ-A-IntDoorSNG	1200x2200mm		1	EA	$ 4,622.0	EA	$ 88.1	21.0	1.0	$4,622.0
1137544	Doors	C1020120	Interior Doors - Wood	EDS-RMG-ZZ-A-IntDoorDBL	800x2150mm		1	EA	$ 4,622.0	EA	$ 88.1	21.0	1.0	$4,622.0
1924430	Doors	C1020120	Interior Doors - Wood	EDS-RMG-ZZ-A-ExtDoorsSNG	800x2150mm		1	EA	$ 4,622.0	EA	$ 88.1	21.0	1.0	$4,622.0
1711544	Doors	B2030110	Exterior Glazed Doors - Aluminum	EDS-RMG-ZZ-A-ExtDoorsDBL	2000x2150mm		1	EA	$ -	EA	$ -	0.0	1.0	$0.0
1709185	Doors	B2030220	Exterior Solid Doors - Steel	EDS-RMG-ZZ-A-ExtDoorsSNG	1000x2150mm		2	EA	$ -	EA	$ -	0.0	1.0	$0.0
1709183	Doors	B2030220	Exterior Solid Doors - Steel	EDS-RMG-ZZ-A-ExtDoorsSNG	1200x2150mm		1	EA	$ -	EA	$ -	0.0	1.0	$0.0



Systems isolation for downstream impacts to equipment shutdowns

ENERGY CONSUMPTION & PRODUCTION DATA VISUALIZATION

GROUP TD2

HIGHLIGHT

Discipline

- Architecture
- MEP
- Structure

System

28

- Mechanical Supply Air 28

Category

- Air Terminals
- Ducts
- Equipment
- Pipes

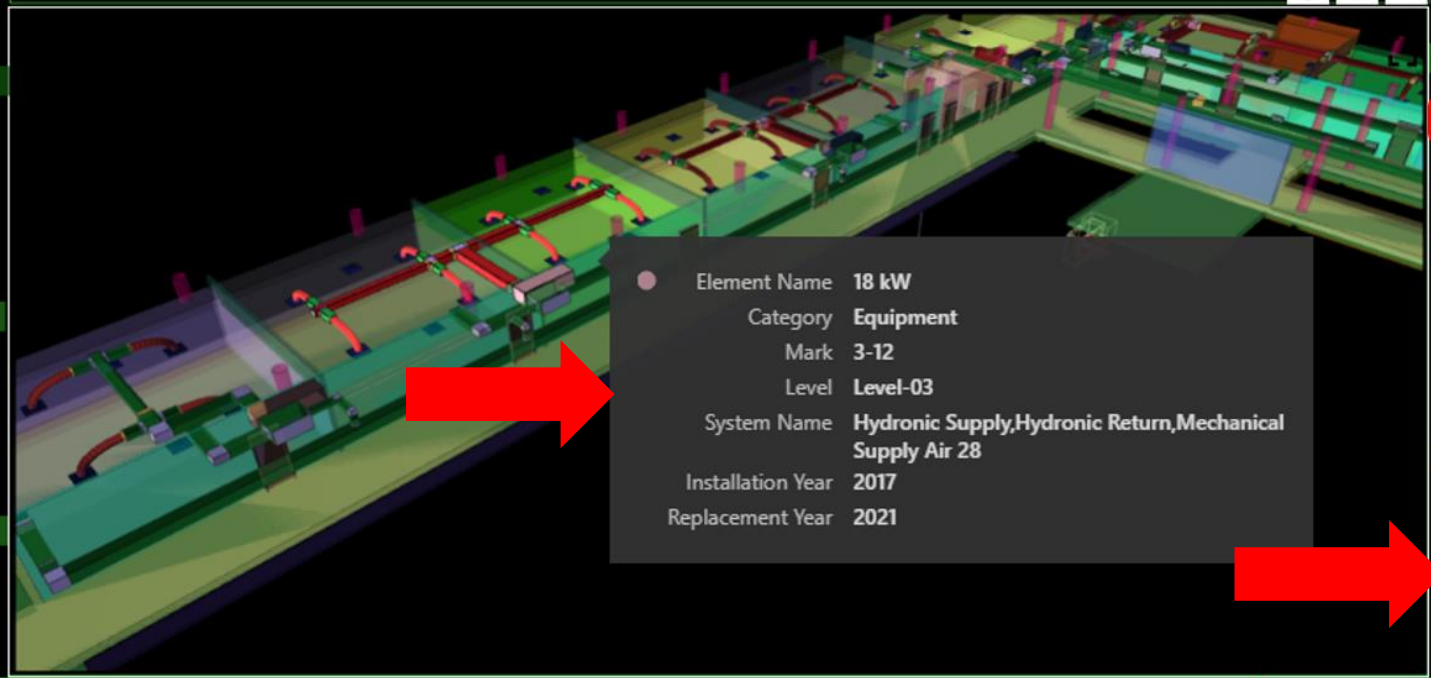
Status

- Due Next Year
- Overdue

ASSET MANAGEMENT - MEP

Search Level

Level-03



ISOLATE

Discipline

- [ ] Architecture
- [ ] MEP
- [ ] Structure

System

- [ ] Mechanical Supply Air 28

Category

- [ ] Air Terminals
- [ ] Ducts
- [ ] Equipment
- [ ] Pipes

Shop Drawing

Category	Status	Level	System Name	Installation Year	Life Cycle	Replacement Year	Initial Cost	Replacement Cost
Equipment	1	3	Hydronic Supply,Hydronic Return,Mechanical Supply Air 28	2017	4	2021	$5,000	$7,000
18 kW		3	Hydronic Supply,Hydronic Return,Mechanical Supply Air 28	2017	4	2021	$5,000	$7,000

Click + to Expand

Category	Size	Length
Flex Ducts	0.82	39.8
Ducts	225x225	60.5
Air Terminals	250°	

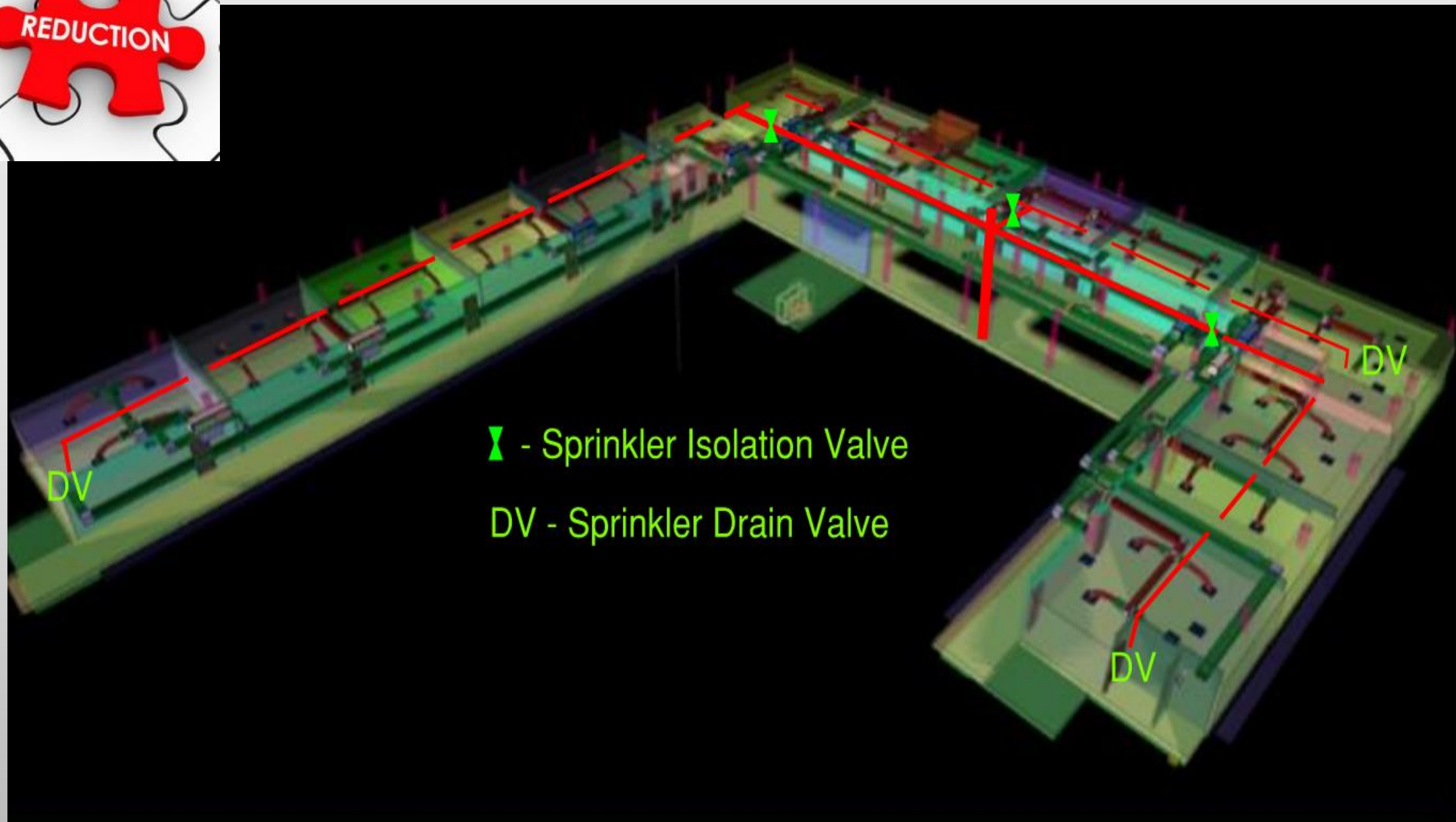
Click + to Expand

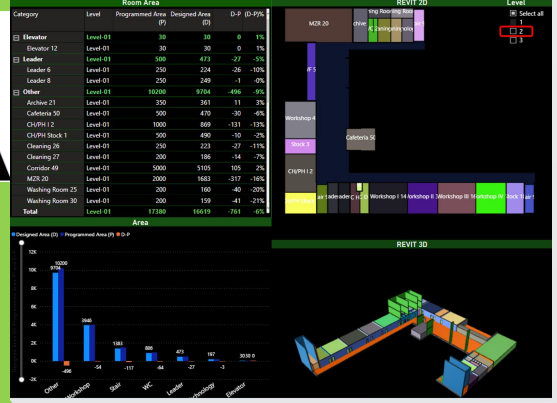
Category	Diameter	Length

Click + to Expand

GROUP TD2


RISK
REDUCTION

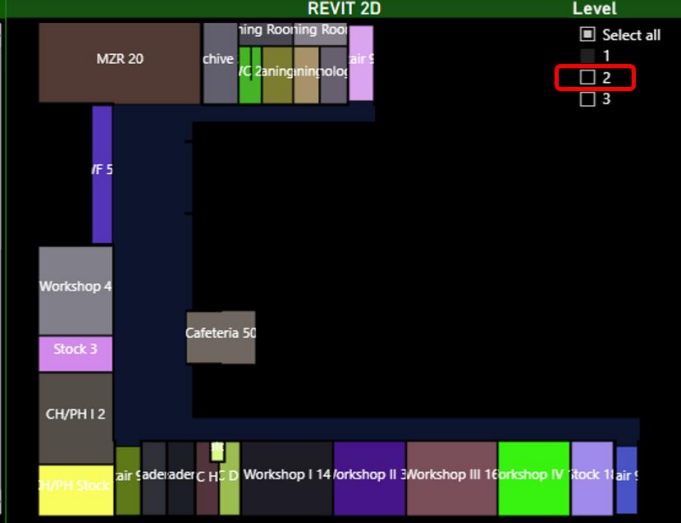

DV
- Sprinkler Isolation Valve
DV - Sprinkler Drain Valve
DV
DV



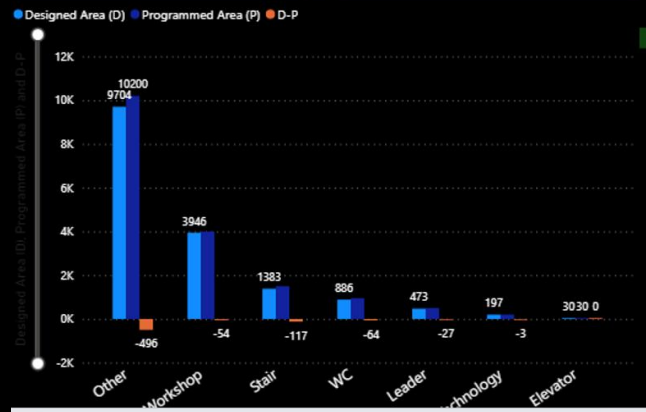
Room Area

Category	Level	Programmed Area (P)	Designed Area (D)	D-P	(D-P)%
Elevator	Level-01	30	30	0	1%
Elevator 12	Level-01	30	30	0	1%
Leader	Level-01	500	473	-27	-5%
Leader 6	Level-01	250	224	-26	-10%
Leader 8	Level-01	250	249	-1	-0%
Other	Level-01	10200	9704	-496	-9%
Archive 21	Level-01	350	361	11	3%
Cafeteria 50	Level-01	500	470	-30	-6%
CH/PH I 2	Level-01	1000	869	-131	-13%
CH/PH Stock 1	Level-01	500	490	-10	-2%
Cleaning 26	Level-01	250	223	-27	-11%
Cleaning 27	Level-01	200	186	-14	-7%
Corridor 49	Level-01	5000	5105	105	2%
MZR 20	Level-01	2000	1683	-317	-16%
Washing Room 25	Level-01	200	160	-40	-20%
Washing Room 30	Level-01	200	159	-41	-21%
Total	Level-01	17380	16619	-761	-6%

REVIT 2D



Area



REVIT 3D

Space planning & program utilization data visualization

GROUP GTD2

HVAC Control
WEBs-AX System

Automation System
Web-Stat /WebVision

Alarm System
Vista 128 Integration

Lighting Controls
Lightning Stryker

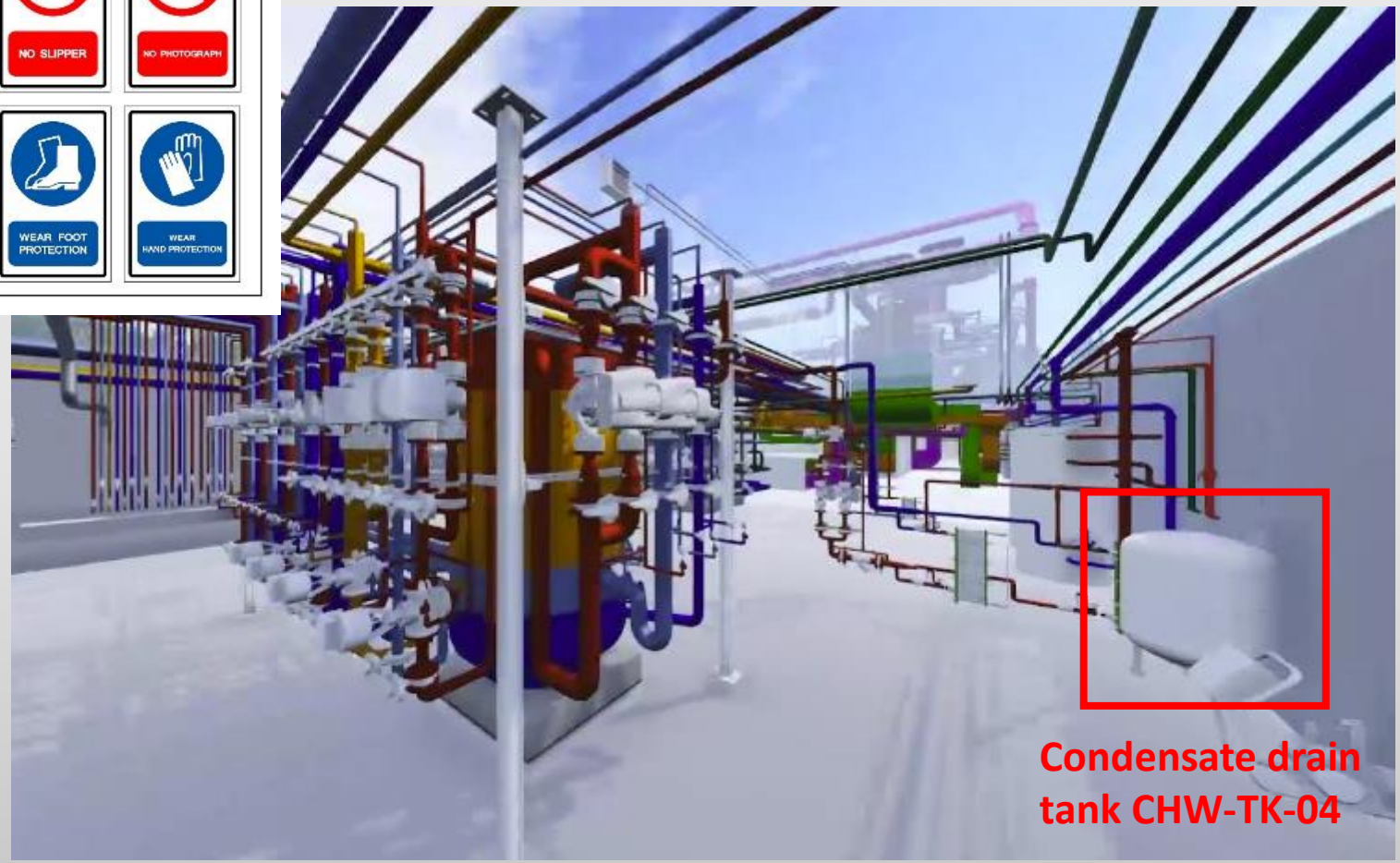
Remote Temperature Controllers
Honeywell Zio Family

Wall Modules
Honeywell Zio Family

Lobby
IP Network Video Recording
Digital Video Manager

Access Control
Pro-Watch Security Management System
Biometric & Smart Card Readers
LobbyWorks Visitor Management

GROUP TD2



Job Hazard Assessment

Recommended PPE

Incident Reports

Combined Impact

- **Overall savings**: **15% to 35%** in total operational costs for buildings and campuses when these technologies are implemented in synergy.
- **Examples of Combined Savings**:
  - Enhanced collaboration between teams leading to fewer design and construction errors.
  - Optimized lifecycle management from design through operation.

Industry-Specific Results:

- **Healthcare**: Up to **25%** in operational savings due to streamlined maintenance and space management.
- **Commercial Real Estate**: Savings of **15% to 30%**, especially in large corporate campuses due to energy-efficient smart building technologies.
- **Education/University Campuses**: Up to **20%** reductions in facility management costs by using digital twins for maintenance and building performance optimization.

These technologies are showing promise in reducing costs, increasing efficiency, and improving overall building performance across various industries.

Tracey@TD2csl.ca

GROUP TD2