Onsite Quality Control Solutions Sample Set

Helping The Best Build Better

vec-us.com

Model Validation

PROJECT DATA AT YOUR FINGERTIPS

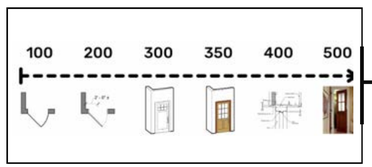
Fast and seamless BIM model verification for consistency, accuracy, and compliance with project requirements

Conduit Specifications

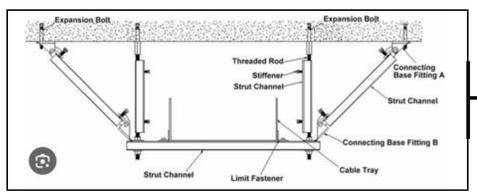
ELECTRICAL CONDUIT DIMENSIONS

EMT			IMC			RIGID		
NOMINAL TRADE SIZE	OUTSIDE DIAMETER	WALL THICKNESS	NOMINAL TRADE SIZE	OUTSIDE DIAMETER	WALL THICKNESS	NOMINAL TRADE SIZE	OUTSIDE DIAMETER	WALL THICKNESS
½	0.706	0.042	½	0.815	0.070	½	0.840	0.104
¾	0.922	0.049	¾	1.029	0.075	¾	1.050	0.107
1	1.163	0.057	1	1.029	0.085	1	1.315	0.126
1¼	1.510	0.065	1¼	1.638	0.085	1¼	1.660	0.133
1½	1.740	0.065	1½	1.883	0.090	1½	1.900	0.138
2	2.197	0.065	2	2.360	0.095	2	2.375	0.146
2½	2.875	0.072	2½	2.857	0.130	2½	2.875	0.193
3	3.500	0.072	3	3.476	0.130	3	3.500	0.250

Level of Development



Seismic Details

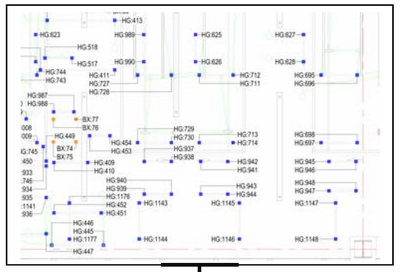


Feeder Schedule

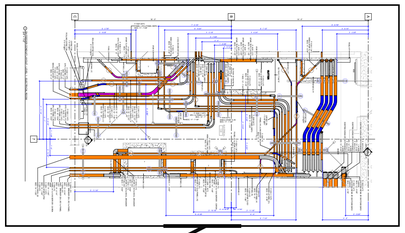
3 PH, 3 WIRE GENERAL LOADS

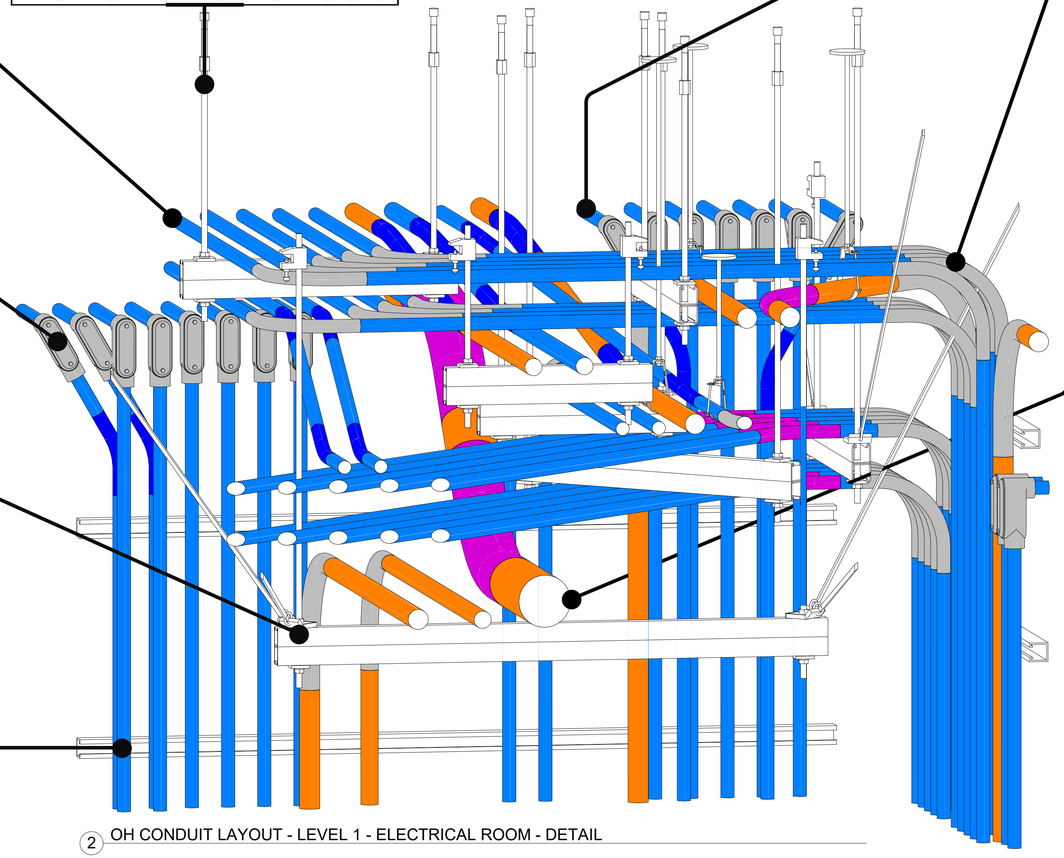
FEEDER DESIGNATION	OVER-CURRENT DEVICE	CONDUCTOR (COPPER) THHN/THWN-2, XHHW-2 (NOTES 1 & 2)			CONDUIT SIZE PER SET
		SETS	PHASE	GROUND	
F20	20	1	3 # 12	# 12	3/4 "
F25	25	1	3 # 10	# 10	3/4 "
F30	30	1	3 # 10	# 10	3/4 "
F35	35	1	3 # 8	# 10	3/4 "
F40	40	1	3 # 8	# 10	3/4 "
F45	45	1	3 # 6	# 10	3/4 "
F50	50	1	3 # 6	# 10	3/4 "
F60	60	1	3 # 4	# 10	1 "
F70	70	1	3 # 4	# 8	1 "
F80	80	1	3 # 3	# 8	1 "
F90	90	1	3 # 2	# 8	1-1/4 "
F100	100	1	3 # 1	# 8	1-1/4 "
...	...	...	...	...	...
F110	110	1	3 # 1	# 6	1-1/4 "

Trimble Point Layout



Installation Drawing



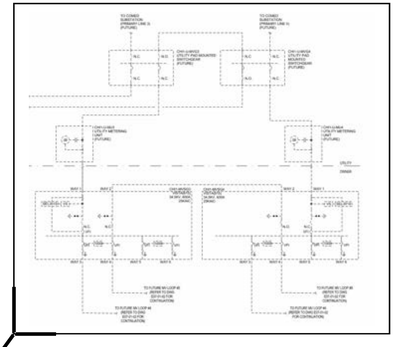


2 OH CONDUIT LAYOUT - LEVEL 1 - ELECTRICAL ROOM - DETAIL

Code Requirements

The National Electrical Code (NEC) does not explicitly forbid 90-degree bends, but it does limit the total number of equivalent bends in a conduit run between pull points. Specifically, NEC 344.26 and other similar sections for different conduit types (like FMC, LFMC, etc.) state that there shall not be more than the equivalent of four quarter bends (360 degrees total) between pull points like conduit bodies and boxes. This means you can have more than 90-degree bends, but the total number of bends cannot exceed the equivalent of four 90-degree bends in a single run.

Single-line Diagram



BIM QA/QC Checklist for rigorous 3D model comparison against the respective drawing set with the exhaustive project data in one place

PROJECT NAME

PROJECT NUMBER

BIM QA/QC CHECKLIST

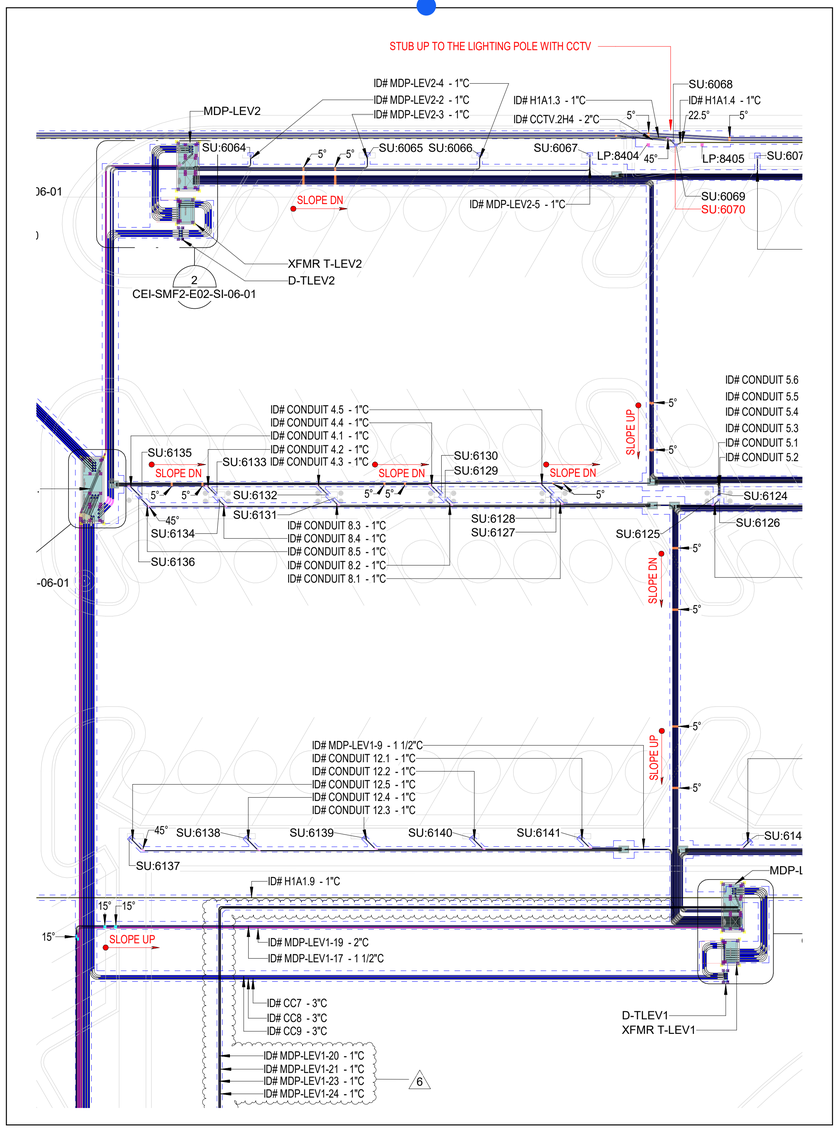
DATE: **REPORT #:**	**RELATED LINKS**
DISCIPLINE:	BEP · Trimble Layout
SYSTEM:	Specifications · Shop Drawing
LOCATION:	Submittal
AREA:	BOM

GENERAL CHECK	YES	NO	N/A
Visual check of the model	☐	☐	☐
Placement of origin point	☐	☐	☐
File naming convention follows BEP	☐	☐	☐
All objects tagged and using correct LOD parameter	☐	☐	☐

DESIGN CHECK	YES	NO	N/A
Verify gridlines are aligned to Architectural, Structural & Civil	☐	☐	☐
Verify Architectural and Structural building dimensions match	☐	☐	☐
Confirm specific types and required properties like object's material	☐	☐	☐
Verify project specifications are followed	☐	☐	☐
Verify against latest submittals	☐	☐	☐

Site Construction Layout

Underground utilities Trimble point drawing set



VEC Provides Enhanced Efficiency of Onsite Operations With Advanced Layout Accuracy for Seamless Installation

SITE LAYOUT SEQUENCING

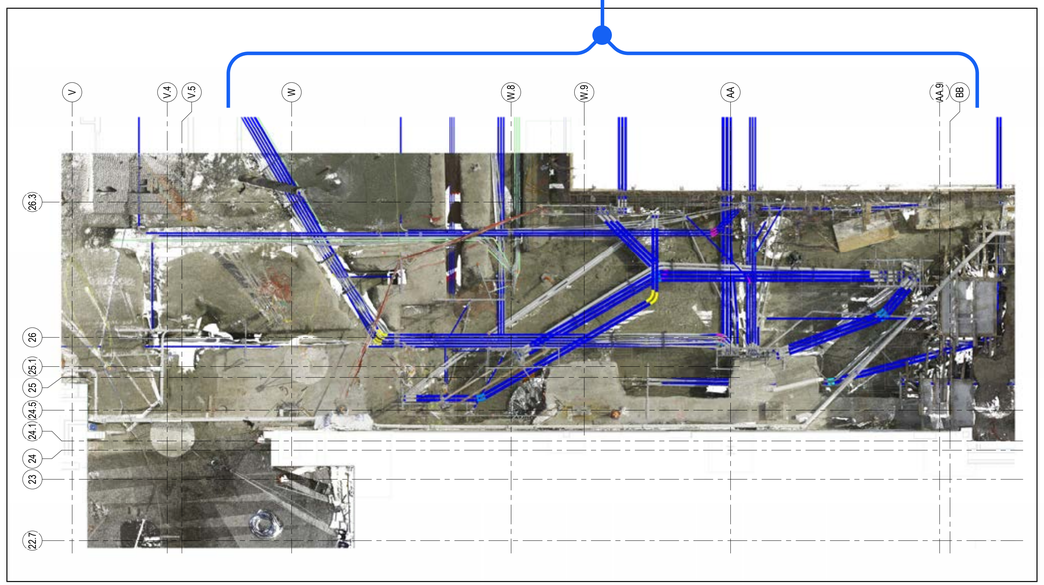
Layout

Trenching

Installation

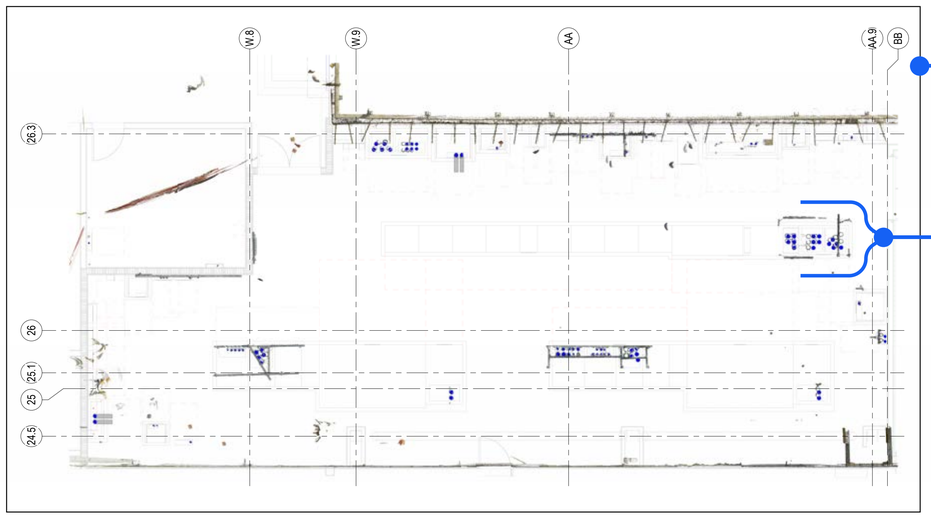
Underground Utility Verification

Could the stub up location issues be avoided with the Scan vs BIM approach at the initial stages of the project?



1 Underground conduit routing
shown via its 3D model overlay on site scan data

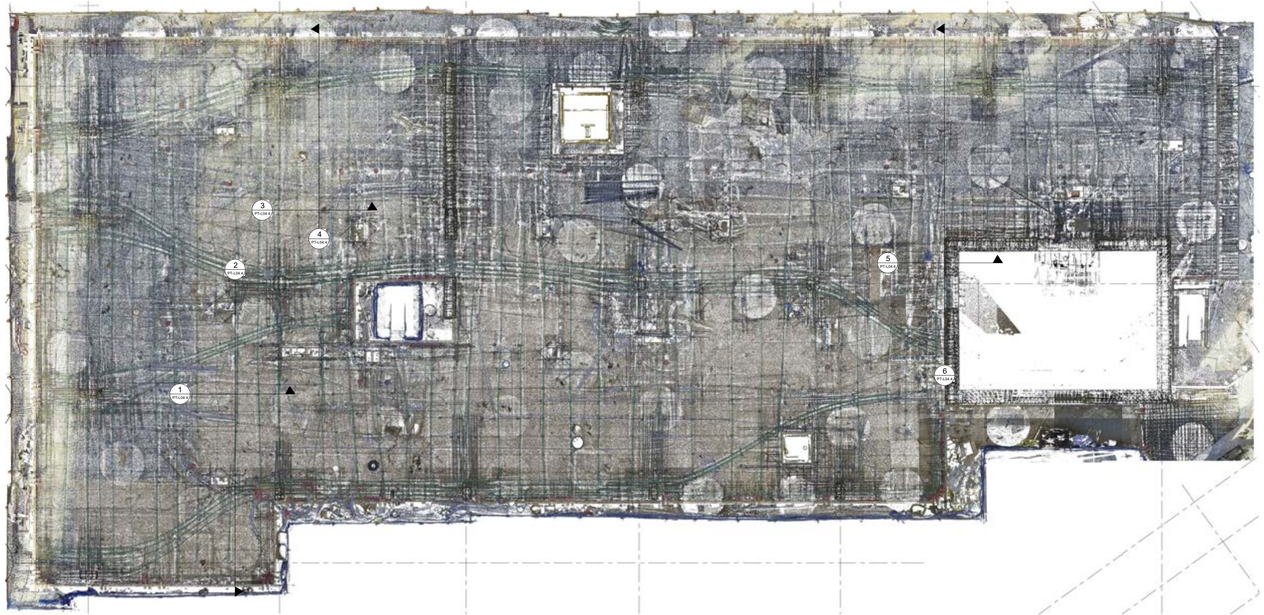
Aerial imagery for
UG utility verification



2 Cross section of all
stub up location

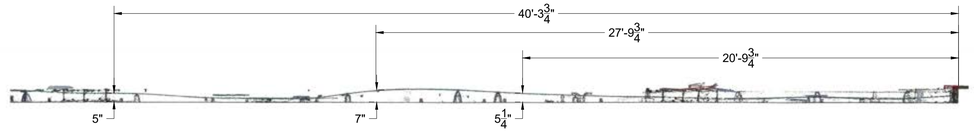
3 Conduit stub ups
Issues visible on the site

24-Hour Pre-Concealment Analysis

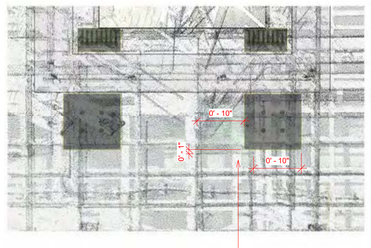


Pre-concealment jobsite scan image

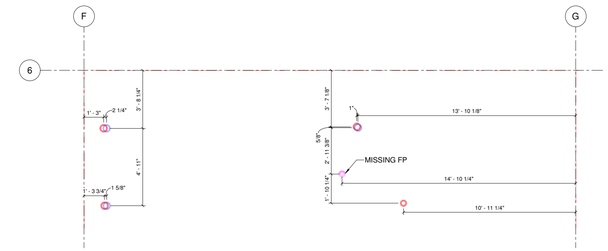
PT Cable Analysis



2 SECTION VIEW - DIMENSIONED



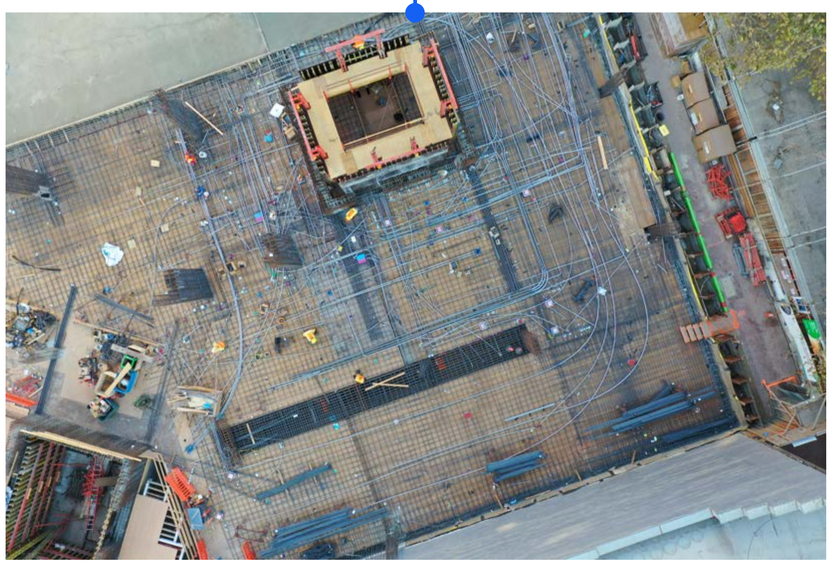
Embed Verification



Stub Up Analysis

Jobsite photo capture

Jobsite aerial capture



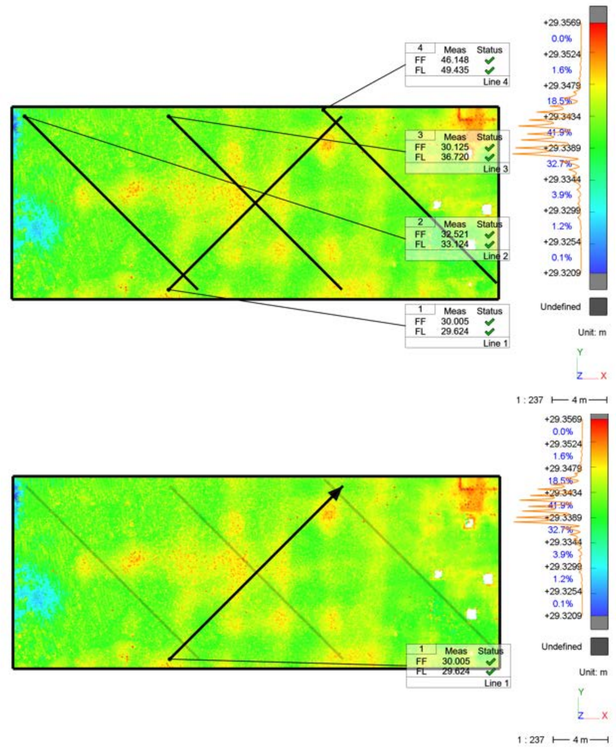
Avoid issues and rework with VEC's 24-hour pre-concealment analysis, which allows to make field adjustments before the elements are covered up

Post-Concealment Analysis

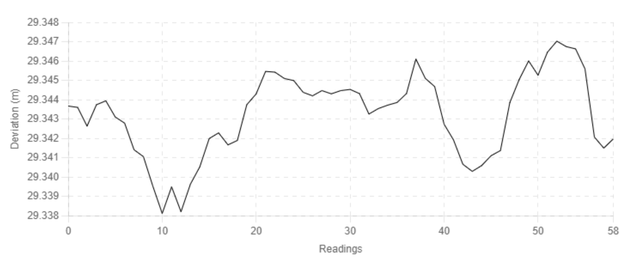
Post-pour concrete floor scanning

Post-pour concrete floor scanning heat map and FF/FL Report

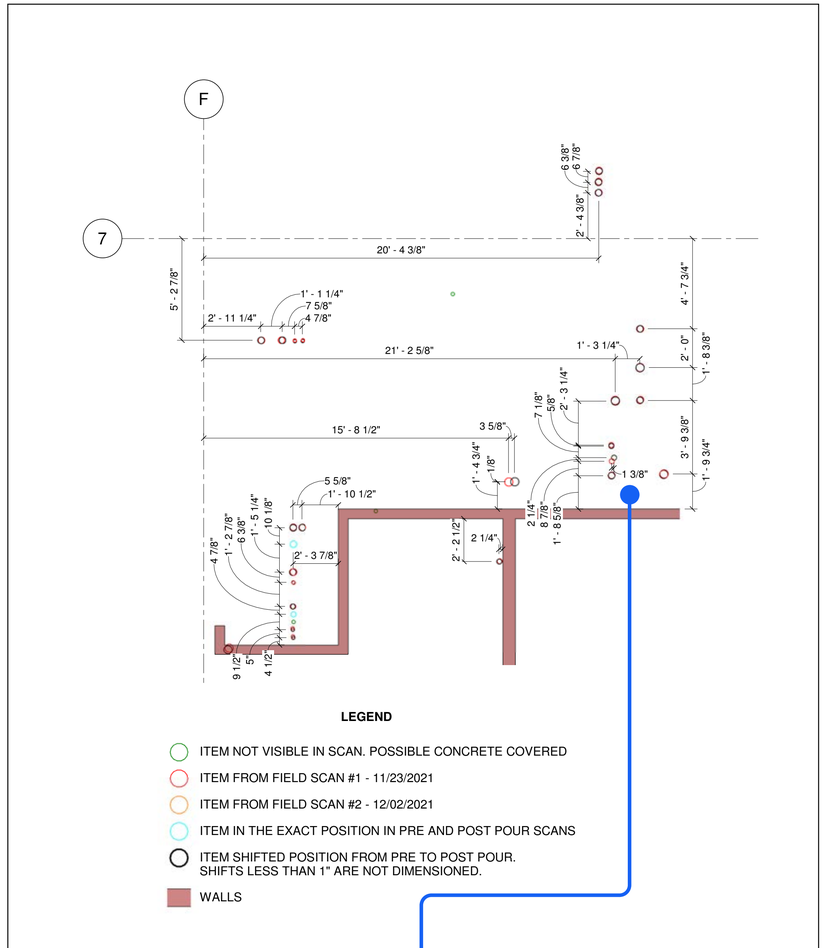
FF/FL Analysis ASTM E1155



Local flatness (FF)	Status	Local levelness (FL)	Status
	PASS	29.62 (24.27 - 34.98)	PASS



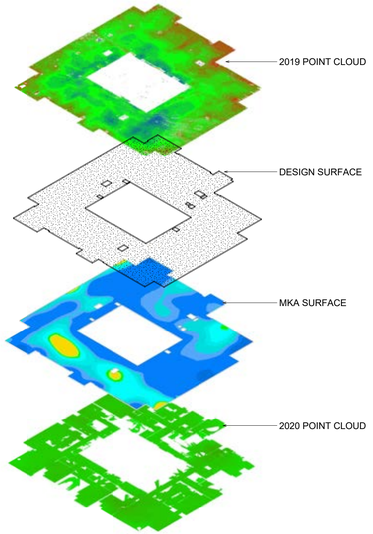
Clear and Precise Analysis of the Final Product



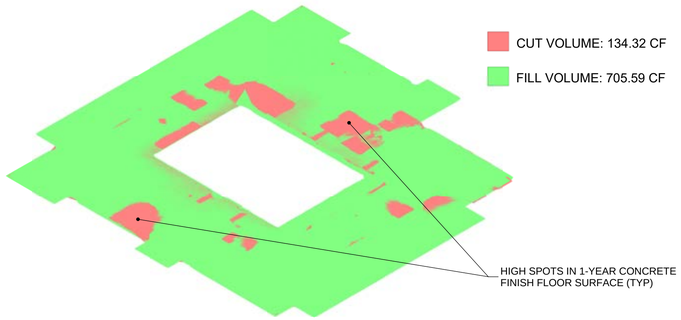
Post-pour floor analysis showing shifted stub up location

Structural Analysis

Deck deflection analysis over time



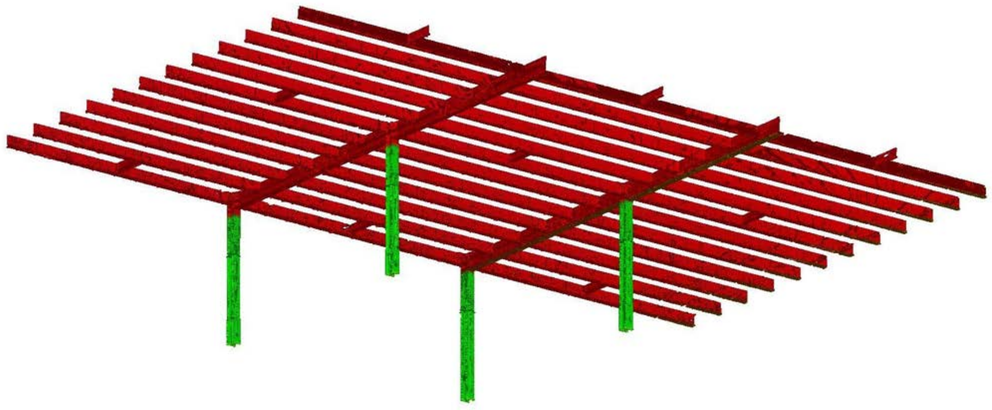
1 LEVEL 30 - DATA SOURCES



2 LEVEL 30 - POST-POUR CONCRETE SURFACE vs. 1-YEAR POST CONCRETE SURFACE

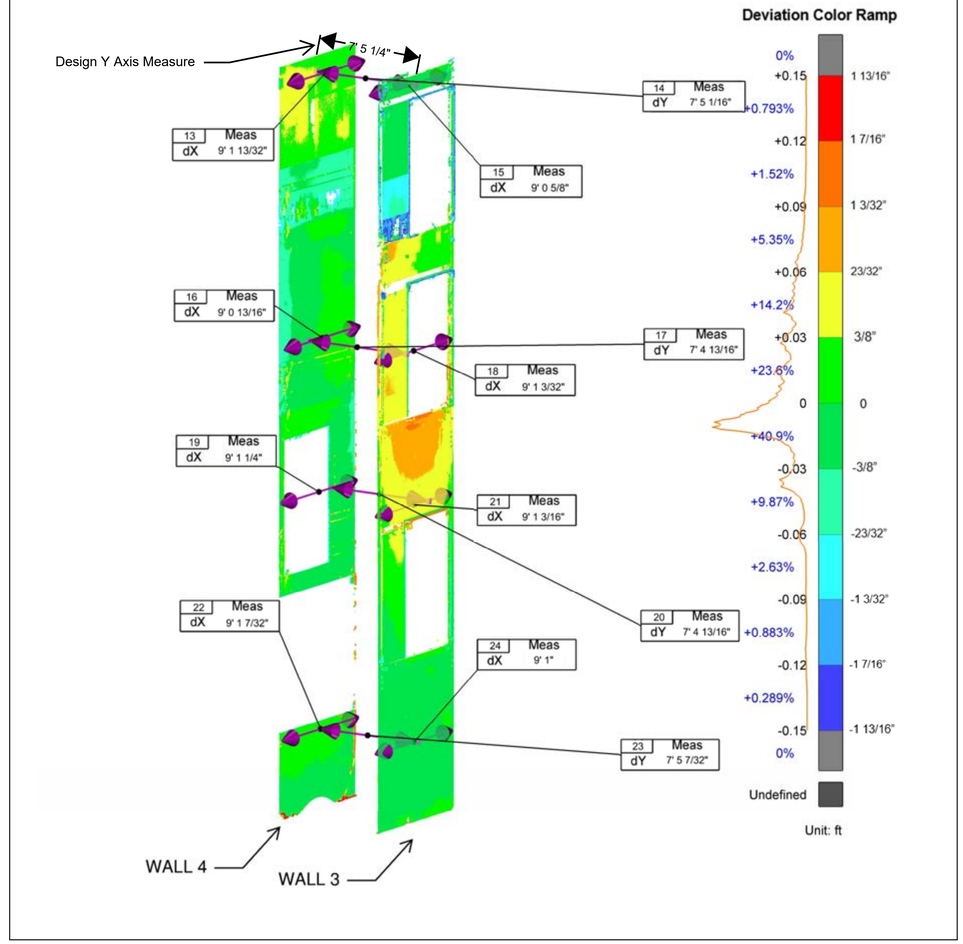
THIS VIEW AND VOLUME CALCULATIONS REPRESENT THE 3D MODELED CONCRETE FINISHED FLOOR SURFACE POURED AND 3D LASER SCANNED ON 07/19/19 COMPARED TO THE 3D MODELED CONCRETE FINISHED FLOOR SURFACE AND 3D LASER SCANNED APPROXIMATELY 1-YEAR AFTER POUR ON 06/01/20

Structural beam deflection and column plumbness analysis



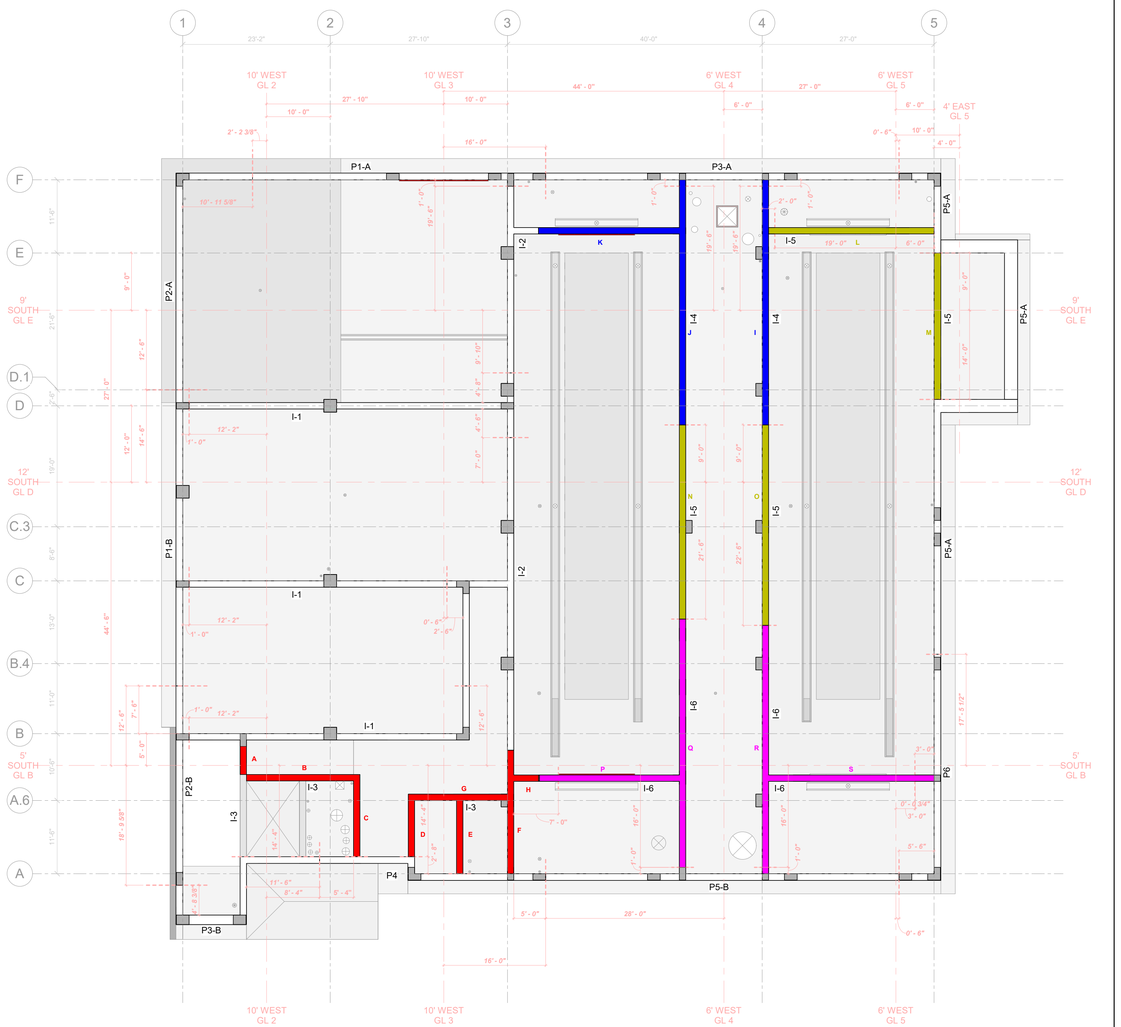
Ensure Structural Reliability Leveraging BIM Data

Elevator shaft concrete plumbness analysis report



Penetrations & Openings

Organized segments of walls to analyze

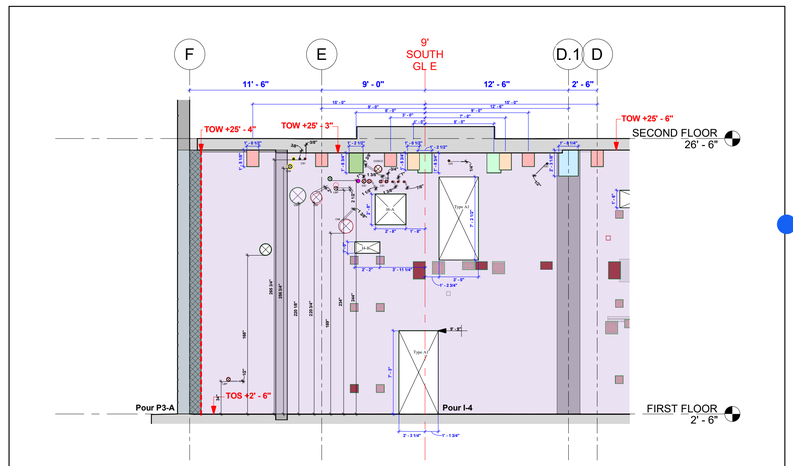


1 Level 1 - Vertical Pour Plan
1/8" = 1'-0"

LEGEND:

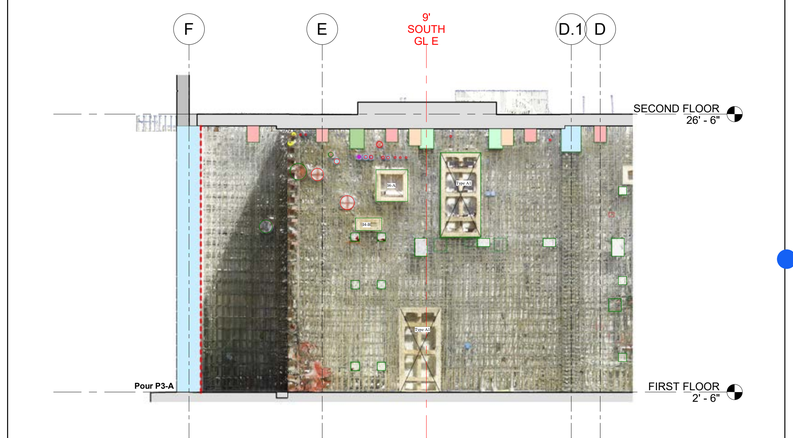
I-3 WALL SEGMENTS | I-4 WALL SEGMENTS | I-5 WALL SEGMENTS | I-6 WALL SEGMENTS

Can any other technology provide the same level of steady confidence in the outcome of on-site operations as BIM?



3 I-4 WALL SEGMENT - J
3/16" = 1'-0"

Model overlayed with point cloud to show visual deviations



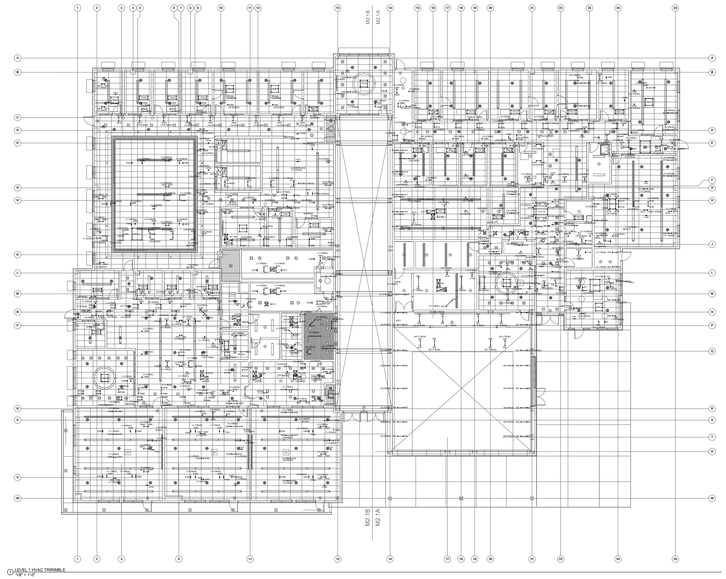
4 I-4 WALL SEGMENT - J - POINT CLOUD
3/16" = 1'-0"

Dimensional analysis of modeled location versus actual installed location

LEGEND:

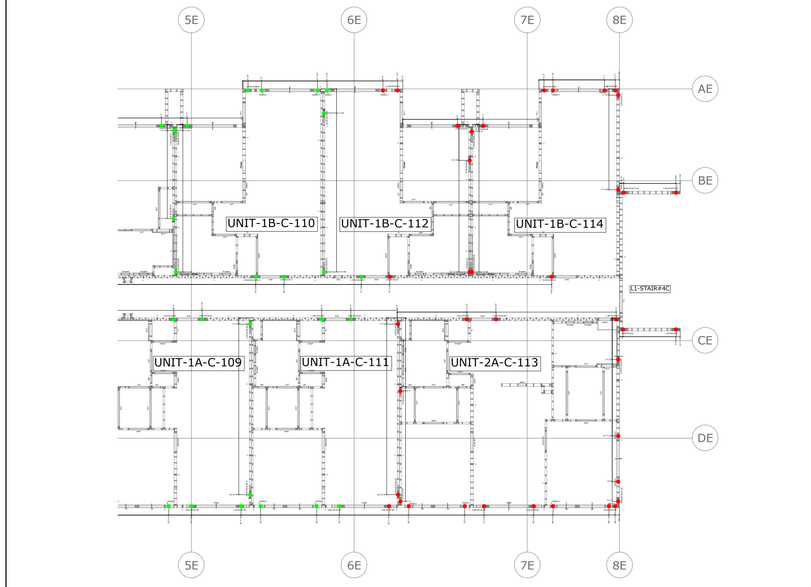
- Coordination model element
- Embed/Opening/Sleeve deviates from coordinated location
- Embed/Opening/Sleeve location acceptable
- Embed/Opening/Sleeve is not installed
- Embed/Opening/Sleeve is installed in the field, not present in coordination model
- Embed/Insers covered by formwork. Can not be verified

Construction Layout

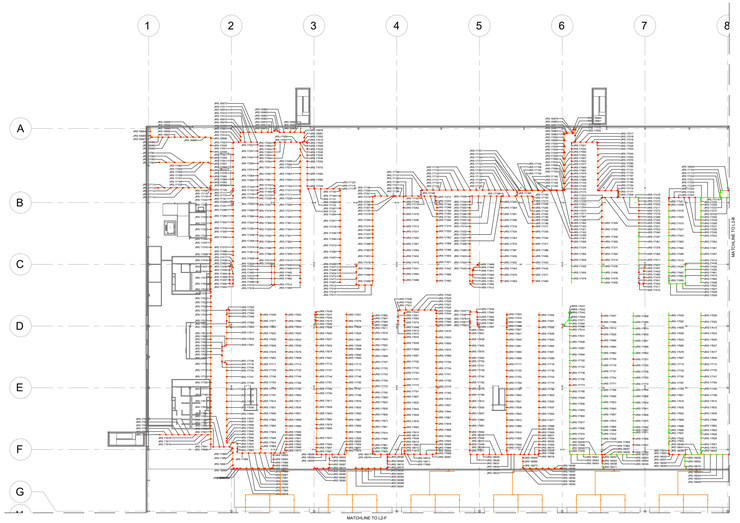


HVAC Trimble Point Layout

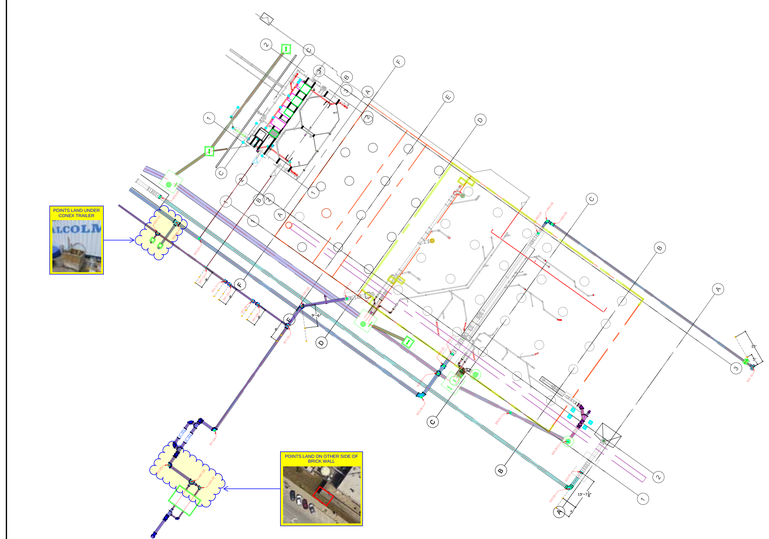
Have confidence that VEC will ensure what is modeled will be laid out in the field efficiently and accurately



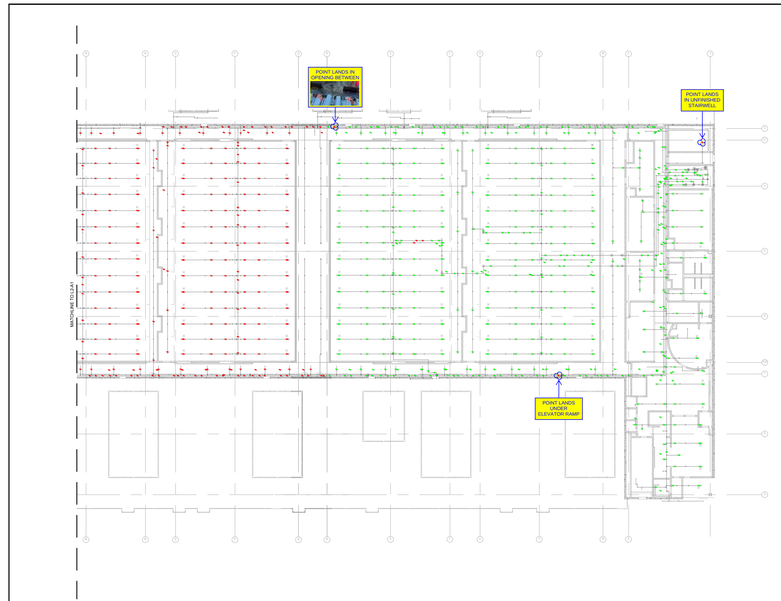
Framing Trimble Report



Electrical VESDA Trimble Report

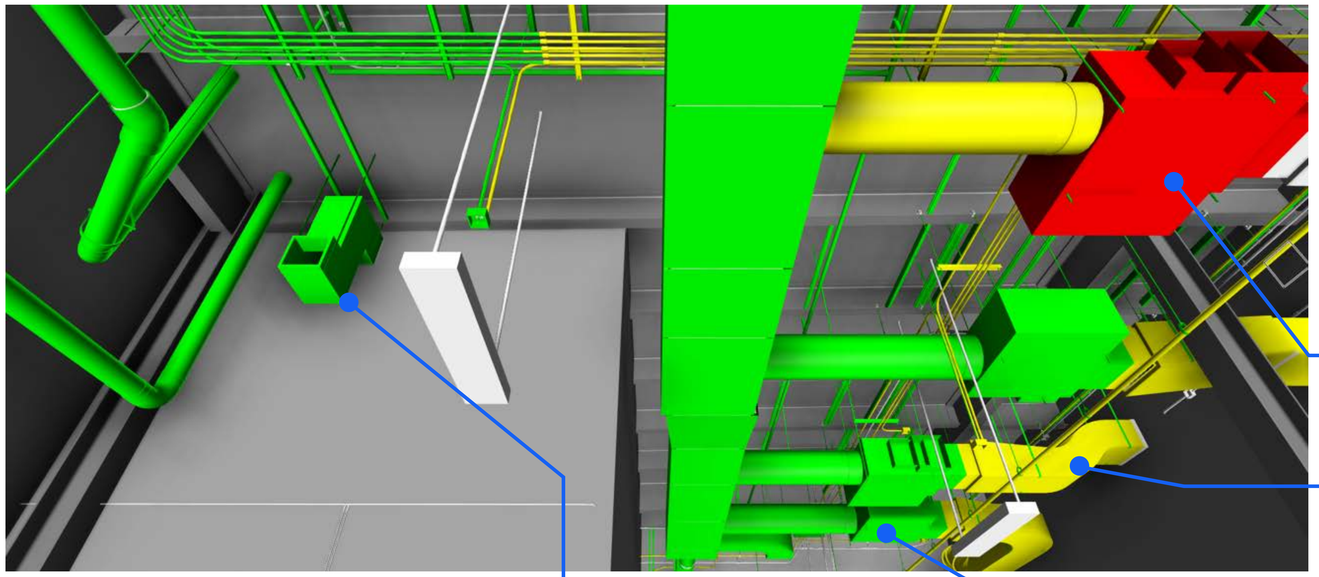


Plumbing Trimble Report



Fire Trimble Report

Construction Progress Documentation



Daily Construction Process Monitor And Constant End-to-End Progress Reporting

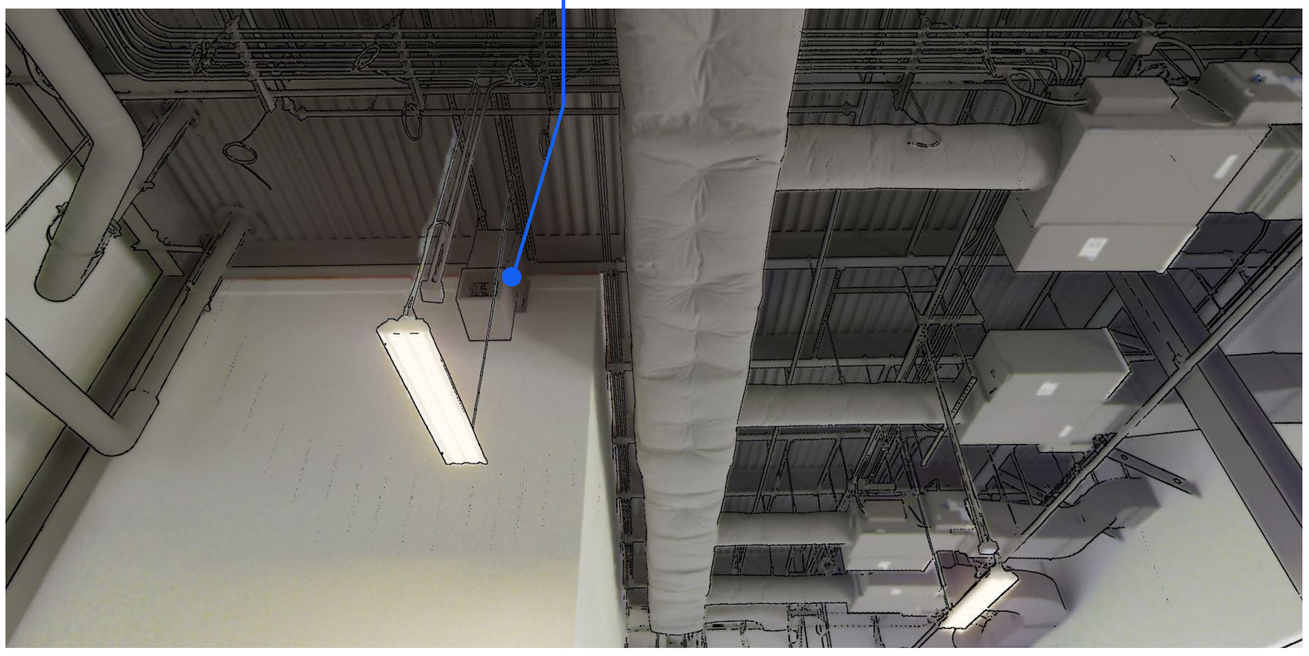
From deviations to logistics to safety concerns — everything is handled proactively and efficiently.

Issue with equipment

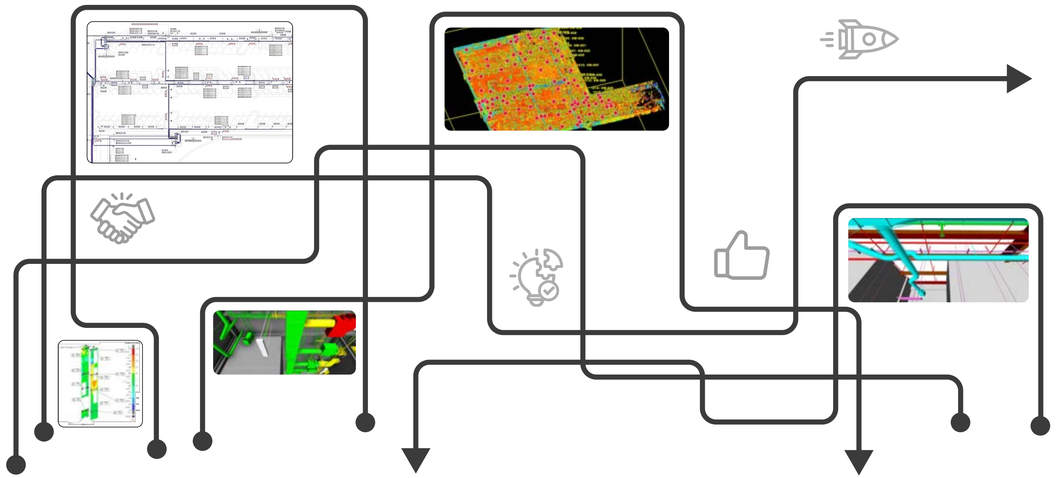
Material received on site

Installed

Quick identification of installation deviations

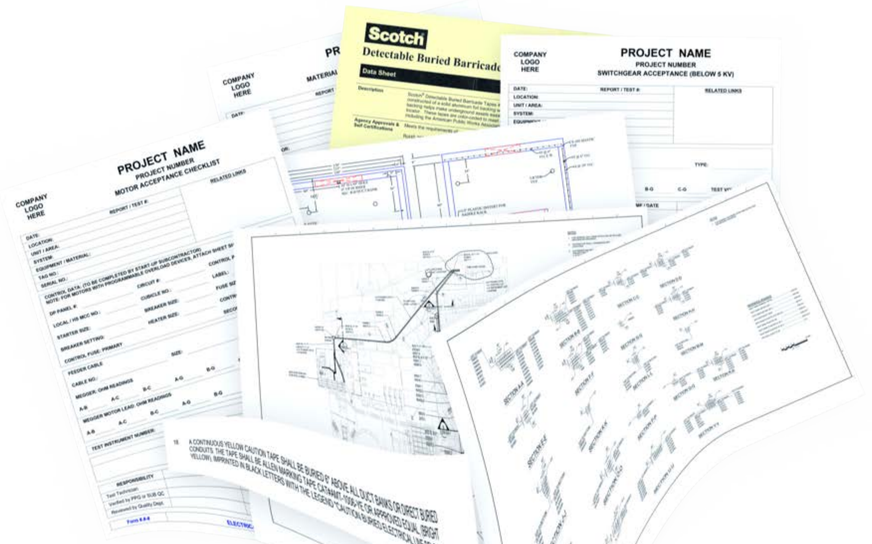


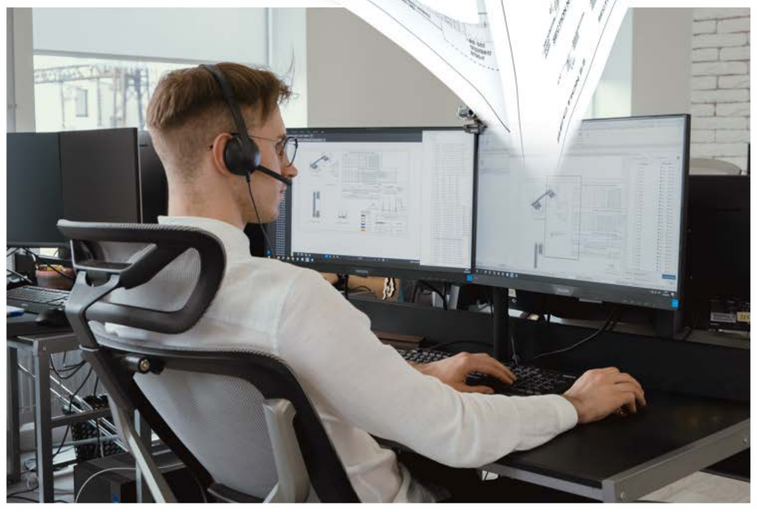
Centralized Data Management



TURN CHAOS INTO ORDER

VEC consolidates all relevant information and communication into one centralized and easy to understand location.





Quality Assurance Observations

UNBIASED THIRD PARTY OBSERVATIONS

Quick access to important documents to ensure quality and compliance are met

COMPANY LOGO HERE

PROJECT NAME

PROJECT NUMBER

UNDERGROUND DUCTBANK / CONDUIT INSPECTION REPORT

DATE:	**REPORT / TEST #:**
DRAWING NO.:	
SYSTEM:	
EQUIPMENT / MATERIAL:	
LOCATION:	
UNIT / AREA:	
STARTING POINT:	
END POINT:	

RELATED LINKS

DRAWING SHEET
DUCT BANK SECTIONS
VAULT SUBMITTAL
NOTE #18: DIRECT BURIAL TAPE
BURIAL TAPE SPECS
IMAGES

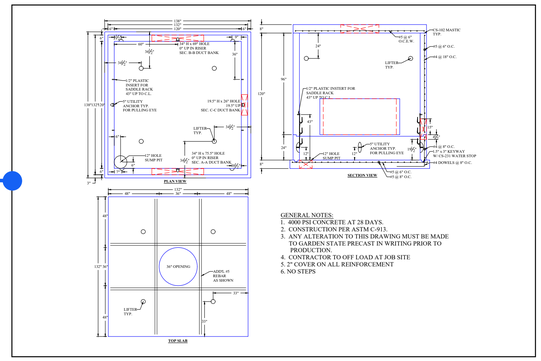
ITEM	INSPECTION CHECKLIST ITEM	SUPVR. / DATE	SUB QC / DATE	PPG / DATE	N/A
1	Visual Inspections Completed				☐
2	Slope / Elevation Verified				☐
3	Conduit Joints Installed per Spec.				☐
4	Conduit Joint Bell Ends Installed per Direction of Cable / Wire Pull				☐
5	Verified Correct Specified Conduit				☐
6	Conduit Spacing				☐
7	Conduit Supported Per Drawing Spec				☐
8	Mandrel Testing as Applicable				☐

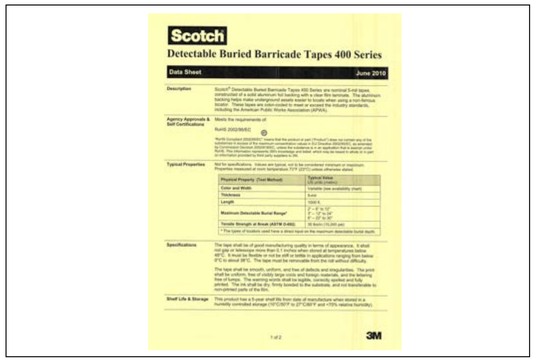
ISSUES DURING INSPECTION	☐ **YES (SEE REMARKS)**	☐ **NO**

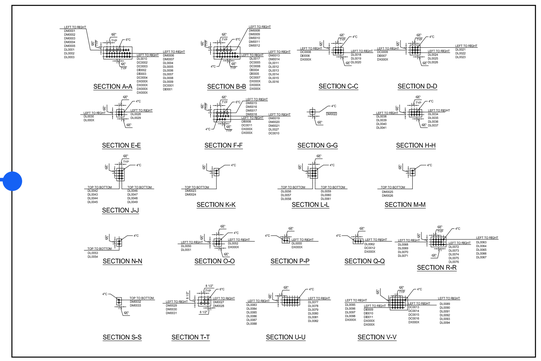
ADDITIONAL REMARKS

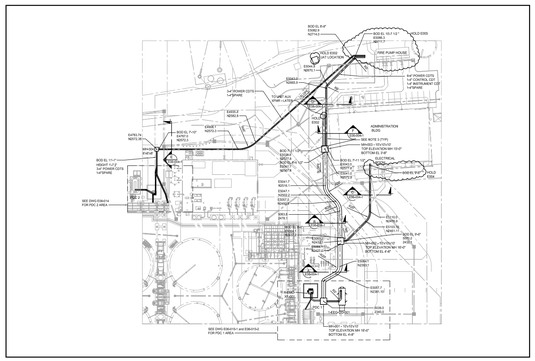
RESPONSIBILITY	NAME	SIGNATURE	DATE:
Verified by PPG or SUB QC			
Reviewed by Quality Dept.			

Form #.#-#	**ELECTRICAL**	**Page 1 of 1**





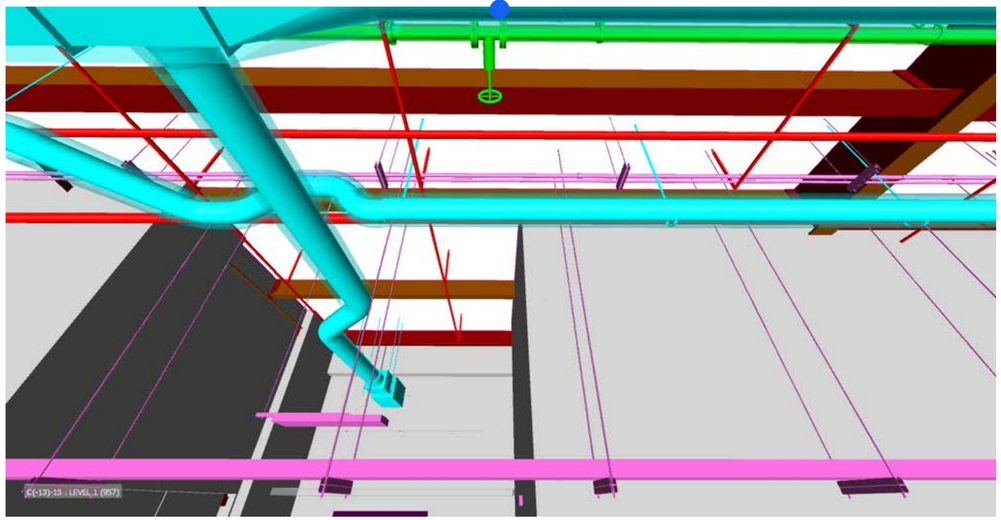




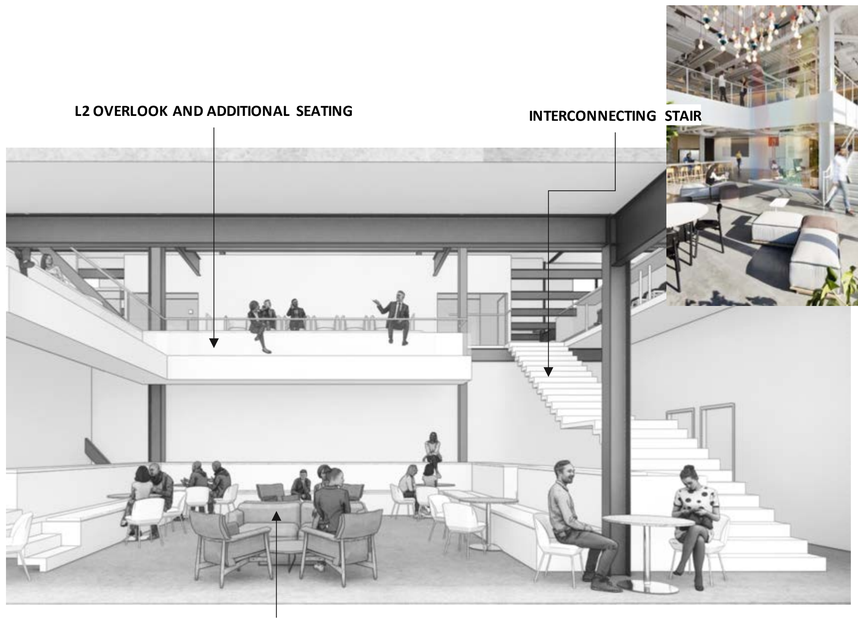
18. A CONTINUOUS YELLOW CAUTION TAPE SHALL BE BURIED 6" ABOVE ALL DUCT BANKS OR DIRECT BURIED CONDUITS. THE TAPE SHALL BE ALLEN MARKING TAPE CAT#AMT-1006-YE OR APPROVED EQUAL. (BRIGHT YELLOW), IMPRINTED IN BLACK LETTERS WITH THE LEGEND "CAUTION BURIED ELECTRICAL LINE BELOW."

Accurate As-Built

Existing Conditions Model

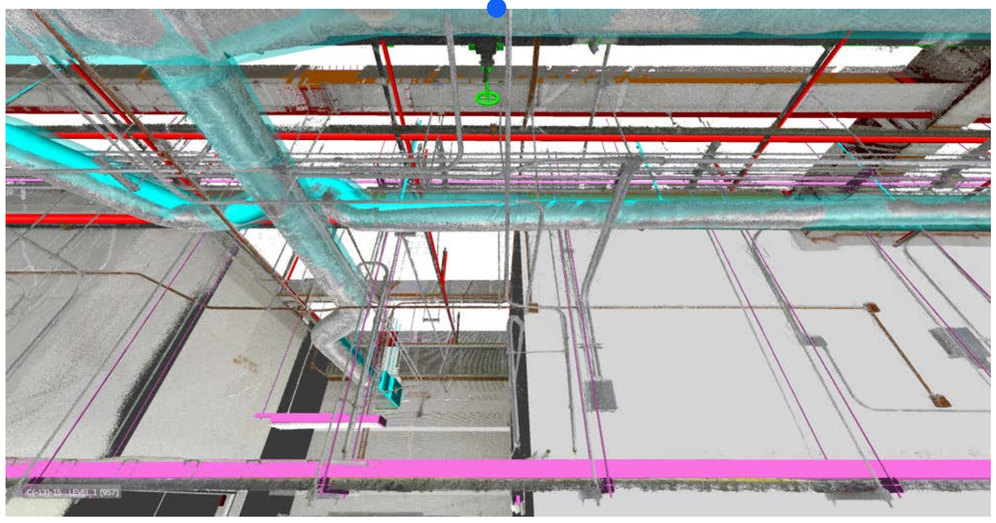


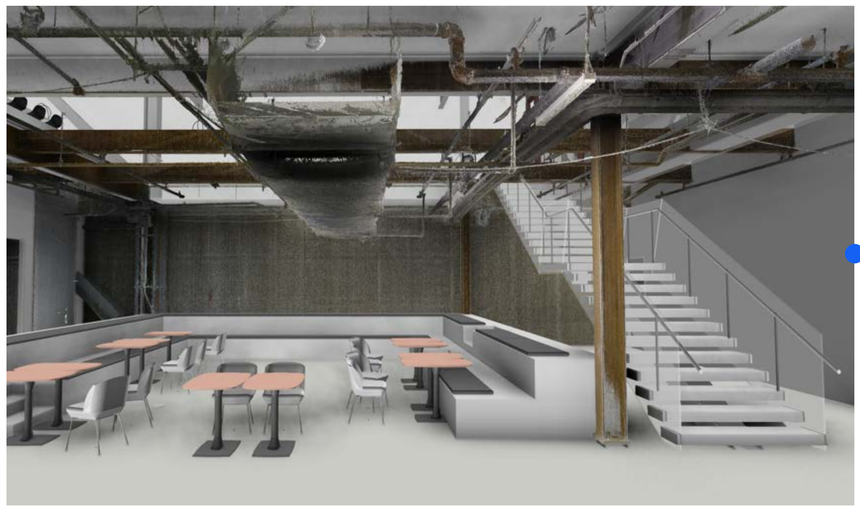
2D & 3D SYNERGY FOR
CONSTRUCTION PREDICTABILITY



Scan Data vs. 3D Model Comparison

Scan data helps visualize what is actually there vs. what is said to be there.





As-built revealing the structural adjustment required to fulfill the design