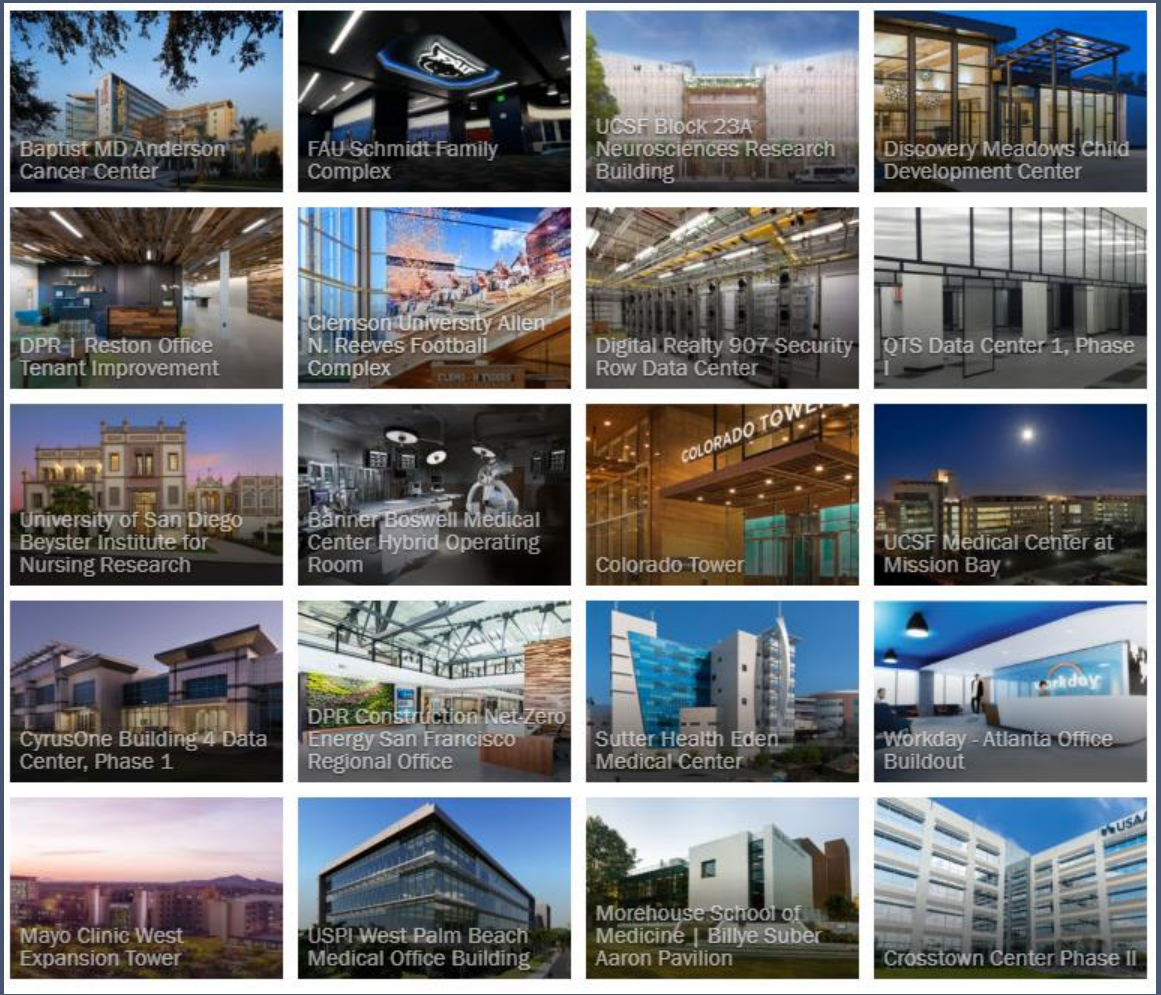


DPR CONSTRUCTION

Founded

1990

Privately held, employee owned

Collaborative, open-office environment

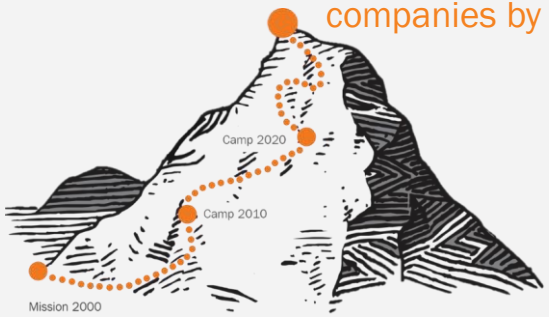
Culture of discipline

Specialize in technically challenging and sustainable projects

National and targeted international experience

GOAL for VDC at DPR

To be one of the most admired companies by 2030!



MISSION STATEMENT:

Virtual Design & Construction (VDC) Is focused on **integrating** the use of the building information model (BIM) to **improve our everyday processes** for **project delivery**… beyond design coordination.

DPR Construction is working to fully **implement VDC** on our projects to help our teams deliver projects **more efficiently,** in order to provide **more predictable** results to our clients while elevating the job satisfaction of our teams.

VDC vs BIM

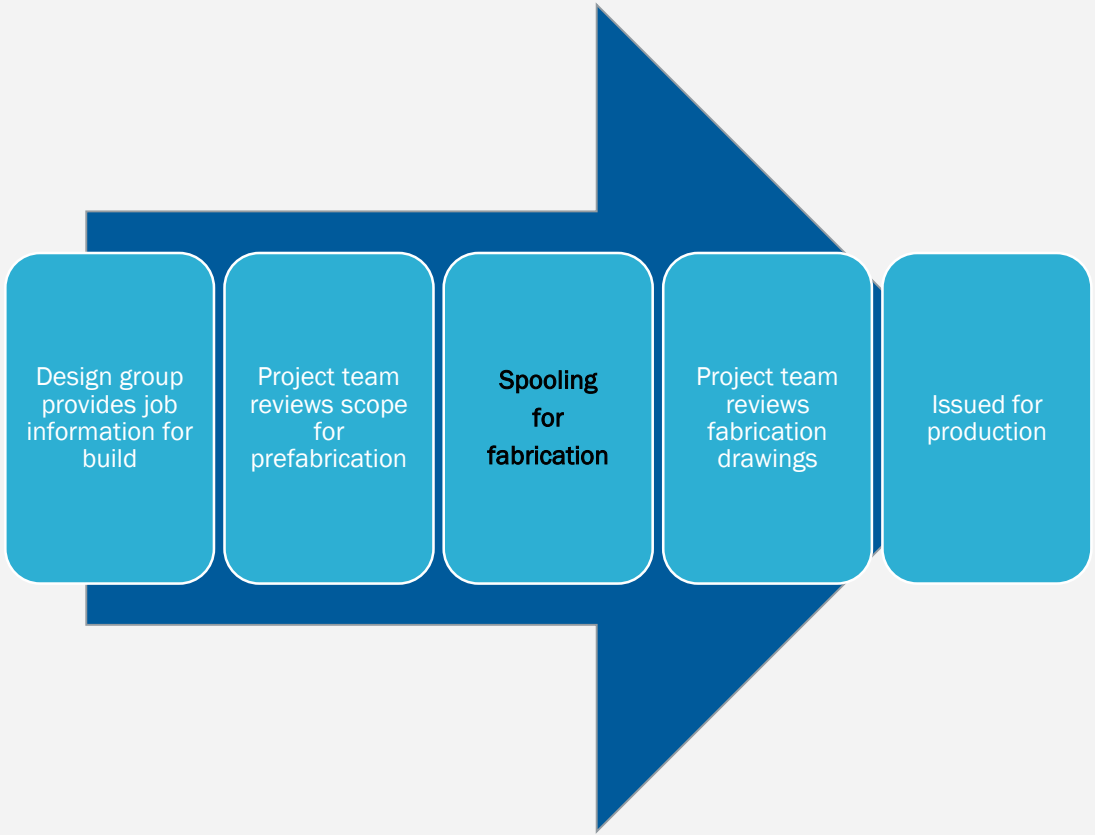
*Virtual Design & Construction is about using the BIM to improve the building process **through a visual medium**.*

*VDC is more than just having a BIM model, it's about combining people, process and tools **to better execute work.***

VDC Self Perform Work Process

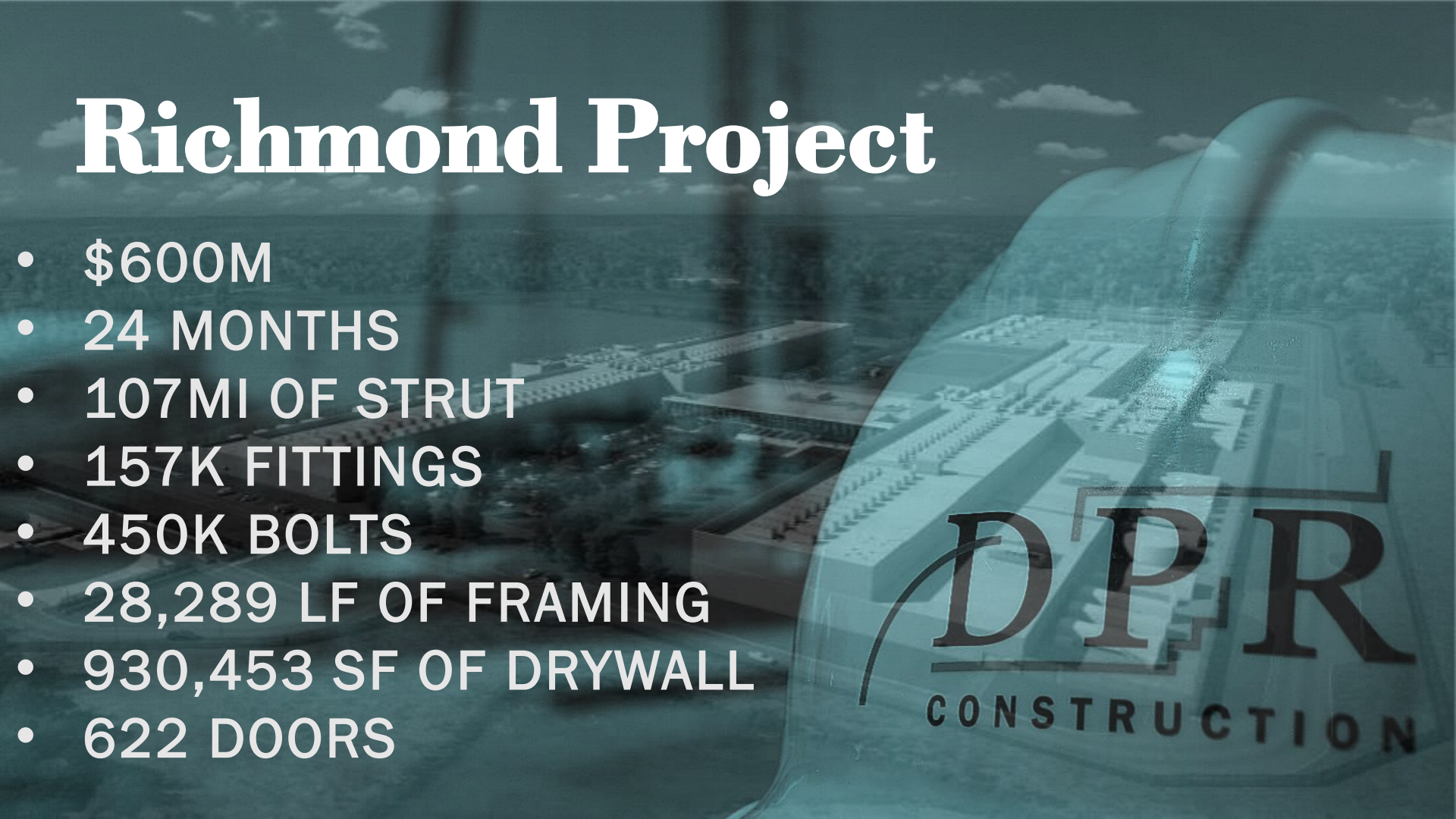
From Design to Production

- **Defining scope of Self Perform Work**
- **Model coordination**
  - Vconstruct assists with SPW scope model creation
- **Creating production drawings**
  - Production drawings are given a unique name or number that is used to identify, quantify and track the scopes through the entire process.
- **QC review**
- **Approved production set**



Richmond Project

- $600M
- 24 MONTHS
- 107MI OF STRUT
- 157K FITTINGS
- 450K BOLTS
- 28,289 LF OF FRAMING
- 930,453 SF OF DRYWALL
- 622 DOORS



Project Expectations

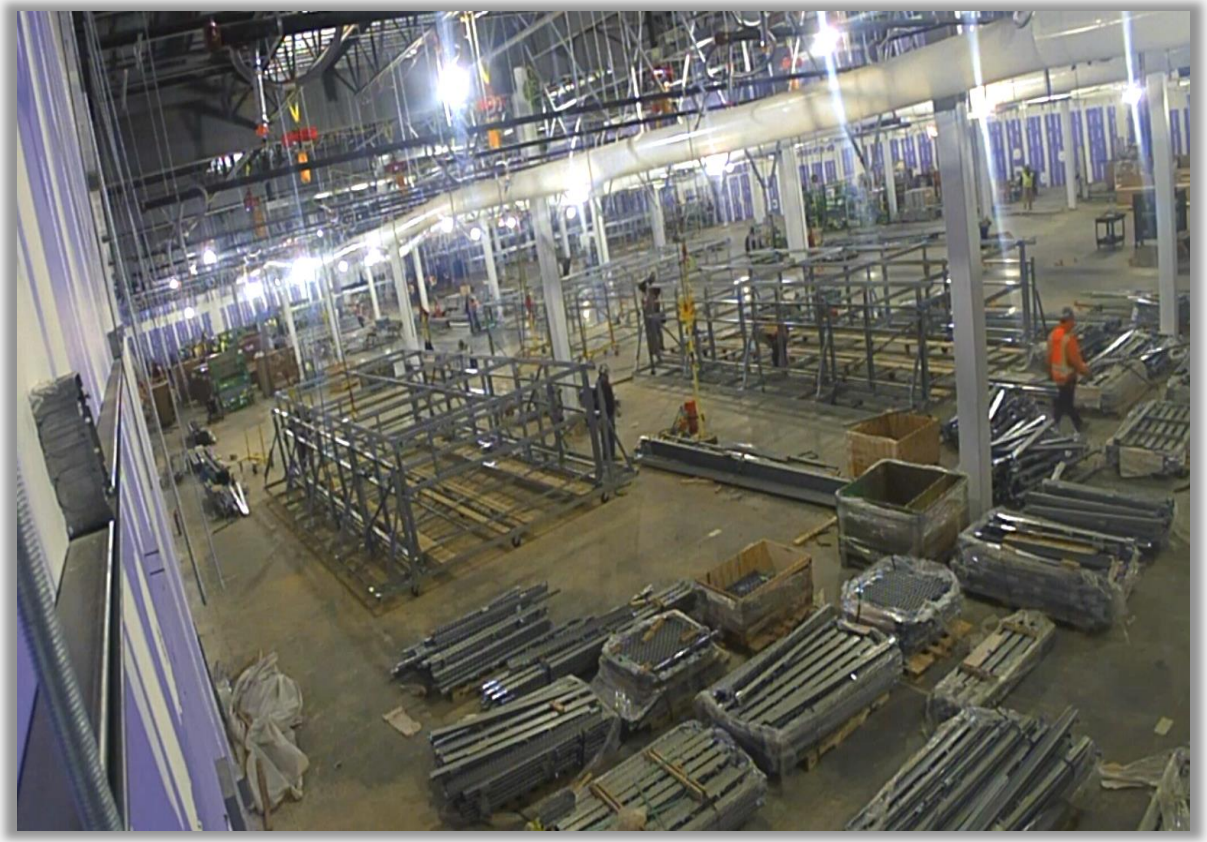
How we measure success

- Prefabrication
- Order setup
- Inventory Tracking
- Supplier Issues log
- High level visuals
- Production Tracking
- Status Tracking

Prefabrication

Benefits of this approach

- Reduced coordination with other trades
- Early installation/reduced schedule risk
- Comprehensive and complete execution of design using jigs
- Consistent quality control using standardized methods and practices
- Increased on-site efficiency
- Reduced manpower

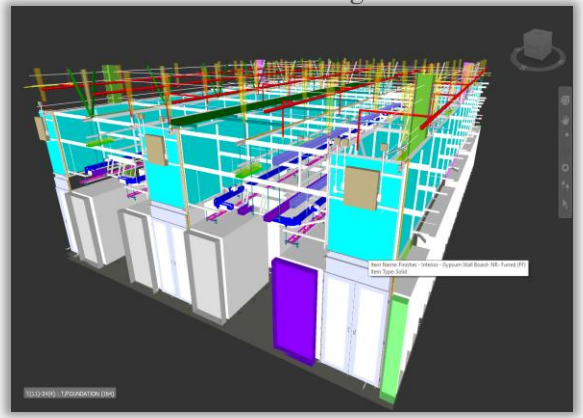


Overhead Unistrut Structure

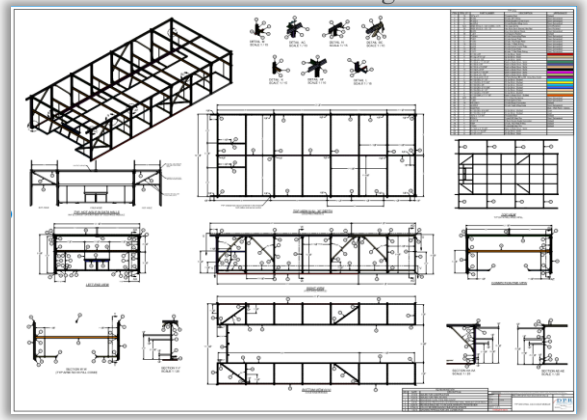
Prefabrication Cycle

- VDC
- Production
- Manufacturing
- Install

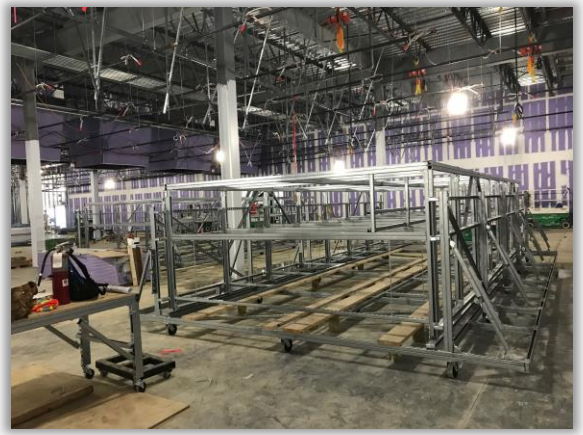
Virtual Design



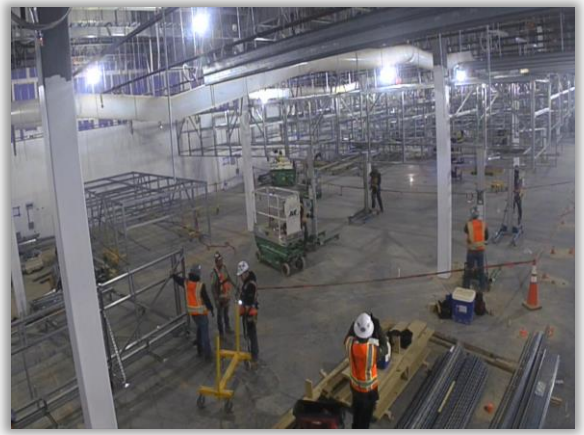
Production Design



Manufactured Module



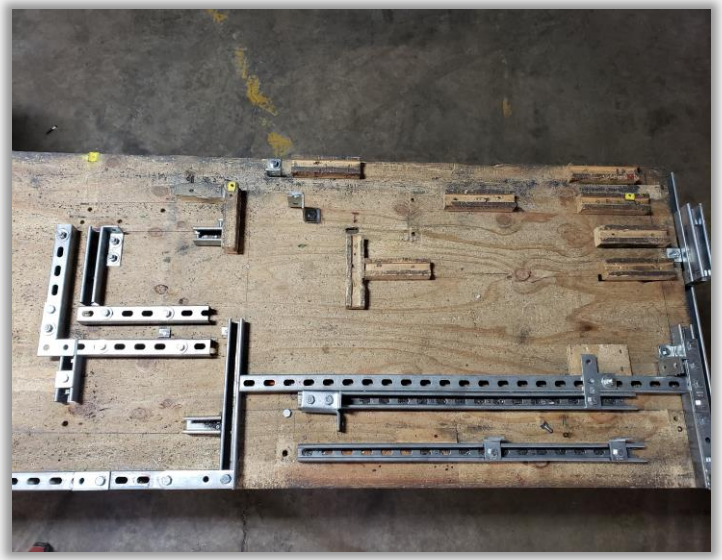
Module Install

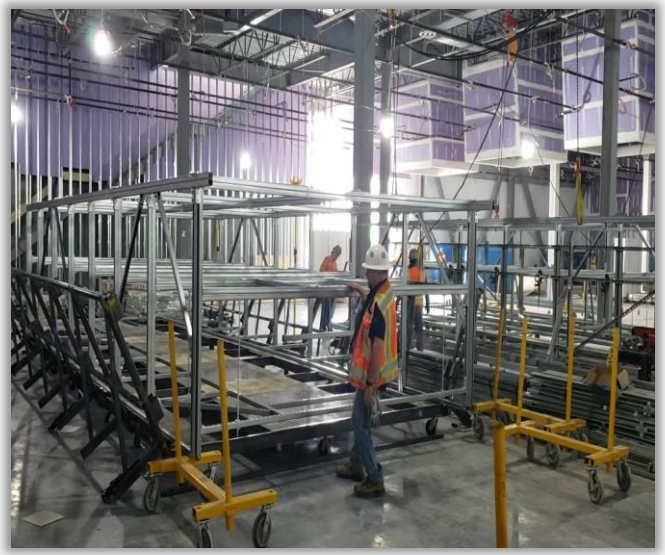


Overhead Unistrut Grid

Coordinating the Strut

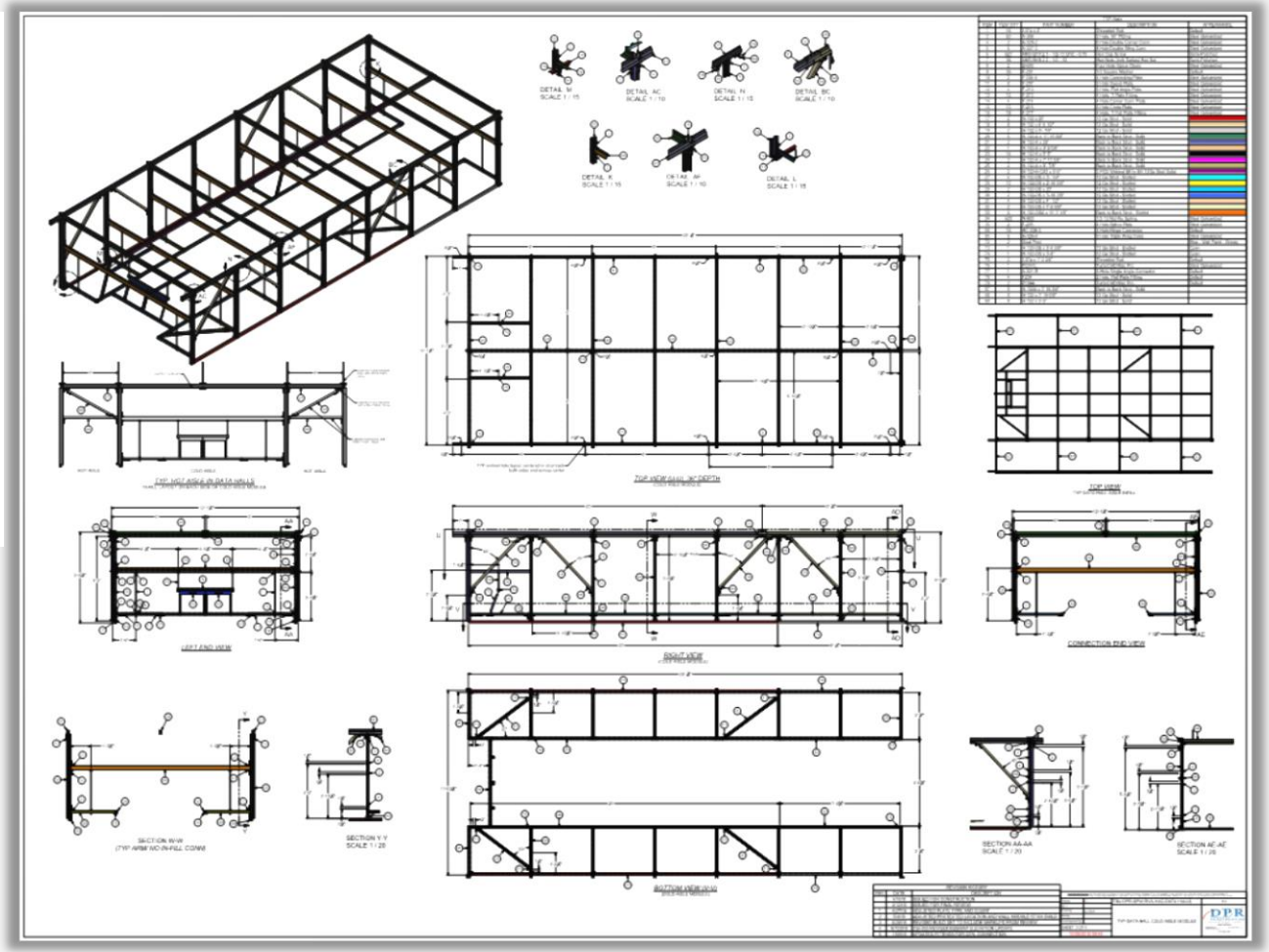
- Creating Parts
- Material list
- Prefabrication
- Jigs
- Shipments
- Field install





Unistrut Module

TYP-Aisle				
ITEM	ITEM QTY	PART NUMBER	DESCRIPTION	APPEARANCE
1	18	1/2"ø x 3'	Threaded Rod	Default
2	62	A-306	3 Hole, 90° Fitting	Steel Galvanized
4	2	A-326-2	6 Hole Double Corner Conn	Steel Galvanized
5	6	A-327-2	8 Hole Double Wing Conn	Steel Galvanized
6	602	ANSI B18.2.1 - 1/2-13 UNC - 0.75	Hex Cap Screw	Semi-Polished
7	34	ANSI B18.2.2 - 1/2 - 13	Hex Nuts (Inch Series) Hex Nut	Semi-Polished
8	2	B-605	Four Hole Splice Clevis	Steel Galvanized
9	34	F-201	1/2 Square Washer	Default
10	2	F-204-4	4 Hole Connecting Plate	Steel Galvanized
11	8	F-207	3 Hole Swivel Plate	Steel Galvanized
12	4	F-210	3 Hole, Flat Angle Plate	Steel Galvanized
13	13	F-213	4 Hole, T Plate Fitting	Steel Galvanized
14	4	F-214	4 Hole Corner Conn Plate	Steel Galvanized
15	13	F-216	5 Hole Cross Plate	Steel Galvanized
16	18	F-217	4 Hole, T Flat Plate Fitting	Steel Galvanized
17	2	H-132 x 20'	12 Ga Strut - Solid	
18	8	H-132 x 4'-5 1/2"	12 Ga Strut - Solid	
19	2	H-132 x 8'- 7/8"	12 Ga Strut - Solid	
20	5	H-132-A x 11'-10 3/8"	Back to Back Strut - Solid	
21	2	H-132-A x 20'	Back to Back Strut - Solid	
22	1	H-132-A x 3'-9 5/8"	Back to Back Strut - Solid	
23	14	H-132-A x 5'-5"	Back to Back Strut - Solid	
24	3	H-132-A x 7'-10 3/8"	Back to Back Strut - Solid	
25	2	H-132-A x 9'- 7/8"	Back to Back Strut - Solid	
26	2	H-132-A-CA3 x 5'-5"	3 PCS Welded BK to BK 12Ga Strut Solid	
27	2	H-132-OS x 11'-7 1/8"	12 Ga Strut - Slotted	
28	12	H-132-OS x 2'-10 5/8"	12 Ga Strut - Slotted	
29	2	H-132-OS x 20'	12 Ga Strut - Slotted	
30	2	H-132-OS x 3'-10 3/8"	12 Ga Strut - Slotted	
31	4	H-132-OS x 4'- 1/2"	12 Ga Strut - Slotted	
32	2	H-132-OS x 7'-9 5/8"	12 Ga Strut - Slotted	
33	8	H-132-OSA x 11'-7 1/8"	Back to Back Strut - Slotted	
34	602	N-803	1/2-13 Nut-No Spring	Steel Galvanized
35	2	F205	4 Hole Splice Plate	Steel Galvanized
66	16	HC-208-3	3 Hole Hinge Connector	Default
85	6	A-326-9	9 Hole Triple Wing Conn	Steel Galvanized
67	8	H-132A x 3' 10-3/8"	Back to Back Strut - Solid	
68	8	H-132 x 3' 10-3/8"	12 Ga Strut - Solid	
69	8	H-132 x 3'-5"	12 Ga Strut - Solid	



Cut Optimization

Waste Reduction

- Cut Optimization
- Identifying waste
- Results

Stocks								
	Used Qty:	2762						
	Unused Qty:	69438						
	Layout Qty:	42						
Parts								
	Cut Parts:	6525						
	Uncut Part:	0						
Stock ID	**Stock Length**	**Material/**	**Qty**	**Layout No.**	**Cut Parts**	**Offcut Length**	**Utilization, %**	**Cost**
5	20'	H-132 - O	496	32	1		100	$22.00
4	20'	H-132 - A	134	12	1		100	$56.20
1	20'	H-132	176	1	1		100	$22.00
1	20'	H-132	4	2	2		100	$22.00
2	22'	H-132 - A	2	9	3		99.76	$56.20
5	20'	H-132 - O	4	33	2	1 1/8"	99.53	$22.00
4	20'	H-132 - A	14	13	1	1 5/8"	99.32	$56.20
4	20'	H-132 - A	1	14	4	2"	99.17	$56.20
7	20'	H-132 - O	30	41	2	3 1/8"	98.7	$56.20
4	20'	H-132 - A	18	15	2	3 1/2"	98.54	$56.20
8	22'	H-132 - A	70	31	4	4"	98.48	$168.84
1	20'	H-132	3	3	4	4"	98.33	$22.00
5	20'	H-132 - O	160	34	5	4 1/4"	98.23	$22.00
5	20'	H-132 - O	104	35	4	5 3/4"	97.6	$22.00
1	20'	H-132	56	4	4	6"	97.5	$22.00
4	20'	H-132 - A	15	16	4	7 5/8"	96.82	$56.20
4	20'	H-132 - A	4	18	3	8 1/8"	96.61	$56.20
6	12'	H-132 - O	218	42	1	4 7/8"	96.61	$13.20
4	20'	H-132 - A	2	17	5	8 1/8"	96.61	$56.20
4	20'	H-132 - A	62	19	5	8 1/4"	96.56	$56.20
5	20'	H-132 - O	1	36	5	9 3/4"	95.94	$22.00
5	20'	H-132 - O	4	37	2	10 1/8"	95.78	$22.00
5	20'	H-132 - O	48	38	3	11 5/8"	95.16	$22.00
2	22'	H-132 - A	8	10	3	1' 1 7/8"	94.74	$56.20
1	20'	H-132	140	5	5	1' 7/8"	94.64	$22.00
5	20'	H-132 - O	9	39	8	1' 2 1/4"	94.06	$22.00
2	22'	H-132 - A	8	11	4	1' 4"	93.94	$56.20
4	20'	H-132 - A	228	20	3	1' 3 5/8"	93.49	$56.20
4	20'	H-132 - A	28	21	2	1' 6 1/8"	92.45	$56.20
4	20'	H-132 - A	18	22	2	1' 7 5/8"	91.82	$56.20
1	20'	H-132	30	6	2	1' 9"	91.25	$22.00
4	20'	H-132 - A	8	23	1	2' 3/4"	89.69	$56.20
4	20'	H-132 - A	11	24	1	2' 7/8"	89.64	$56.20
1	20'	H-132	265	7	2	2' 2 1/4"	89.06	$22.00
4	20'	H-132 - A	4	25	2	2' 7 3/4"	86.77	$56.20
4	20'	H-132 - A	260	26	2	2' 8 5/8"	86.41	$56.20
4	20'	H-132 - A	2	27	4	3' 5/8"	84.74	$56.20
4	20'	H-132 - A	17	28	2	3' 2 1/8"	84.11	$56.20
4	20'	H-132 - A	1	29	2	3' 2 1/4"	84.06	$56.20
4	20'	H-132 - A	83	30	3	3' 2 3/8"	84.01	$56.20
1	20'	H-132	15	8	3	3' 3"	83.75	$22.00
5	20'	H-132 - O	1	40	5	6' 1/4"	69.9	$22.00
Utilization, %:	**94.98**							
Total Cost:	**$101,888.00**							

Building 1 **MDF A**

Stock Info **Page:** 1D_2

Qty:	2
Length:	20'
Cost:	$44.00
Usage, %:	82.71
Waste, %	17.29
Offcut Length:	3' 5 1/2"
Material/Type:	H-132

Cuts Info

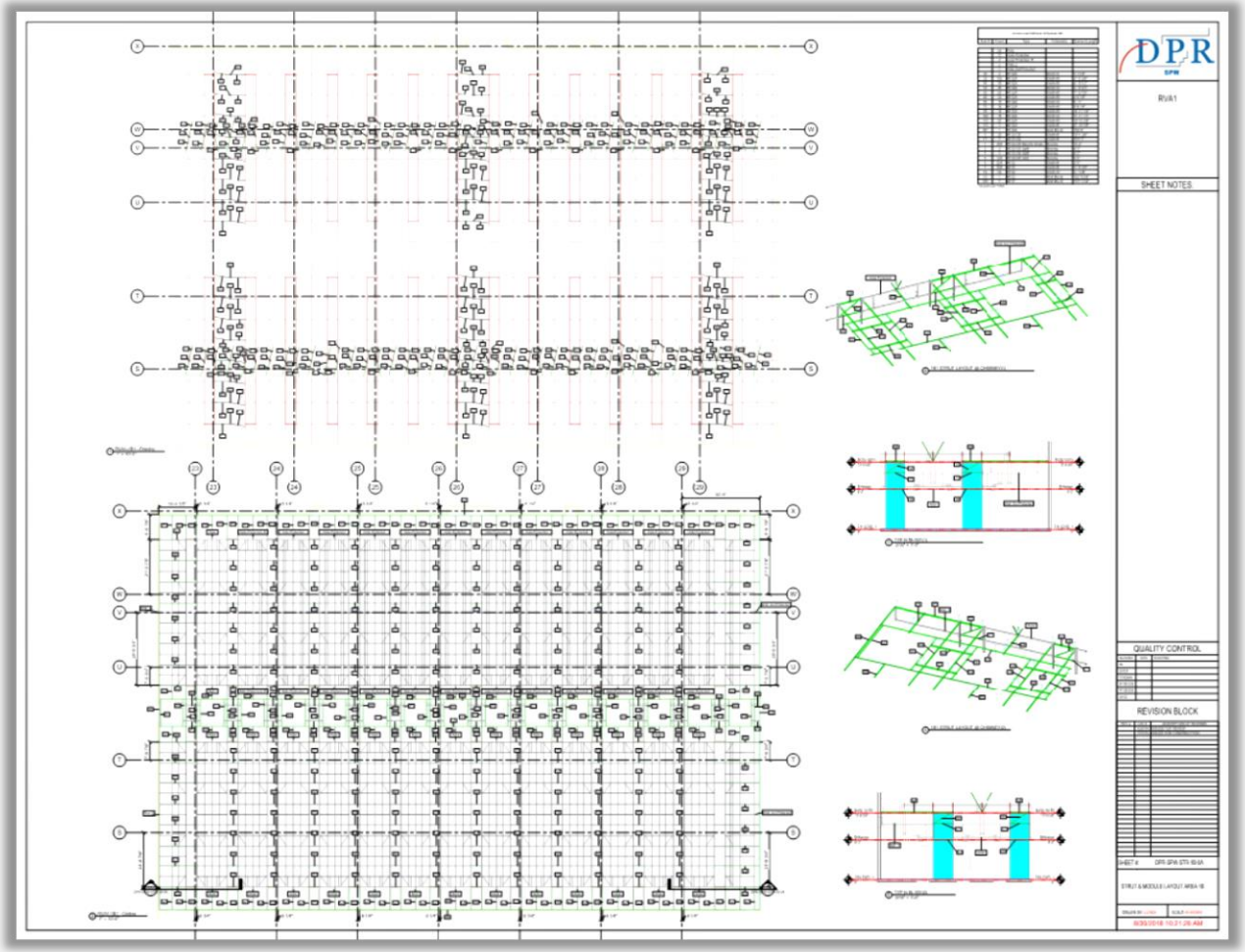
Cut No.	1	2	3	4
Cut Location	4' 1 5/8"	8' 3 1/4"	12' 4 7/8"	16' 6 1/2"

Qty: 2

4' 1 5/8"	4' 1 5/8"	4' 1 5/8"	4' 1 5/8"	3' 5 1/2"
MDF - 15	MDF - 15	MDF - 15	MDF - 15	

Stock ID	Part ID	Length	Location
1	MDF - 15	4' 1 5/8"	
1	MDF - 15	4' 1 5/8"	4' 1 5/8"
1	MDF - 15	4' 1 5/8"	8' 3 1/4"
1	MDF - 15	4' 1 5/8"	12' 4 7/8"

Overhead Unistrut Layout (OVERALL)



Unistrut and Module Schedule-1D1				
Item #	Count	Type	Comments	Element Length
	46	Aisle		
	6	Aisle Protected		
	2	Aisle Protected_L		
	2	Aisle Protected_R		
	2	Wall		
32	208	H132A	Grid/Infill	3'-10 3/8"
50	30	H132A	Grid/Infill	5'-10 1/2"
53	30	H132A	Grid/Infill	6'-10 3/4"
65	28	H132A	Grid/Infill	7'-10 7/8"
72	28	H132A	Grid/Infill	8'-8 3/4"
65	16	H132A	Grid/Infill	8'-11"
72	16	H132A	Grid/Infill	9'-8 7/8"
74	8	H132A	Grid/Infill	10'-2"
78	16	H132A	Grid/Infill	12'-5"
101	8	H132A	Grid/Infill	17'-10 1/4"
110	28	H132A	Grid/Infill	19'-10 3/8"
115	1	H132A	Grid/Infill	21'-10 5/8"
117	1	H132A	Grid/Infill	84'-6 5/8"
367	1	H132A	Wall Mount	152'-8"
119	1	H132A	Grid/Infill	152'-9 3/8"
9	31	H132-OS	Grid/Infill	10'-1 3/8"
22	2	H132-OS	Grid/Infill	250'-6 3/4"
1	268	H132-OS Seismic Angle	Bracing	13'-0"
5	129	H132-OS Uplift	Bracing	9'-8"
6	224	H132	Grid/Infill	3'-5"
7	224	H132	Grid/Infill	3'-10 3/8"
10	56	H132	Grid/Infill	4'-1 5/8"
334	1	H132	Wall Mount	7'-8 1/8"
337	1	H132	Wall Mount	68'-3 1/2"
361	1	H132	Wall Mount	84'-4 1/2"
20	1	H132	Wall Mount	242'-10 1/2"
365	1	H132	Wall Mount	250'-5 7/8"

Grand total: 1417

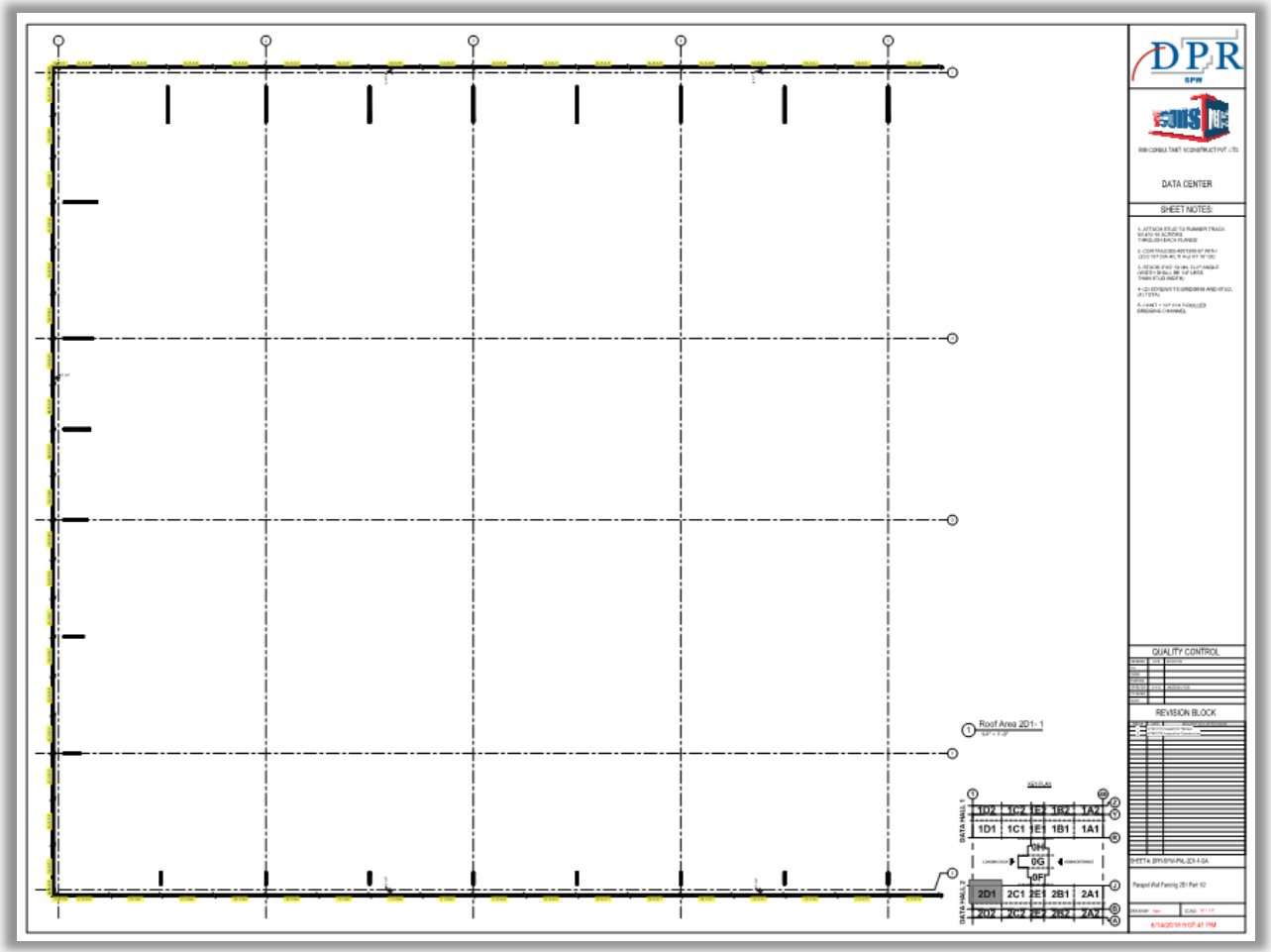
Exterior Stud Panels

Layout, Order, Build

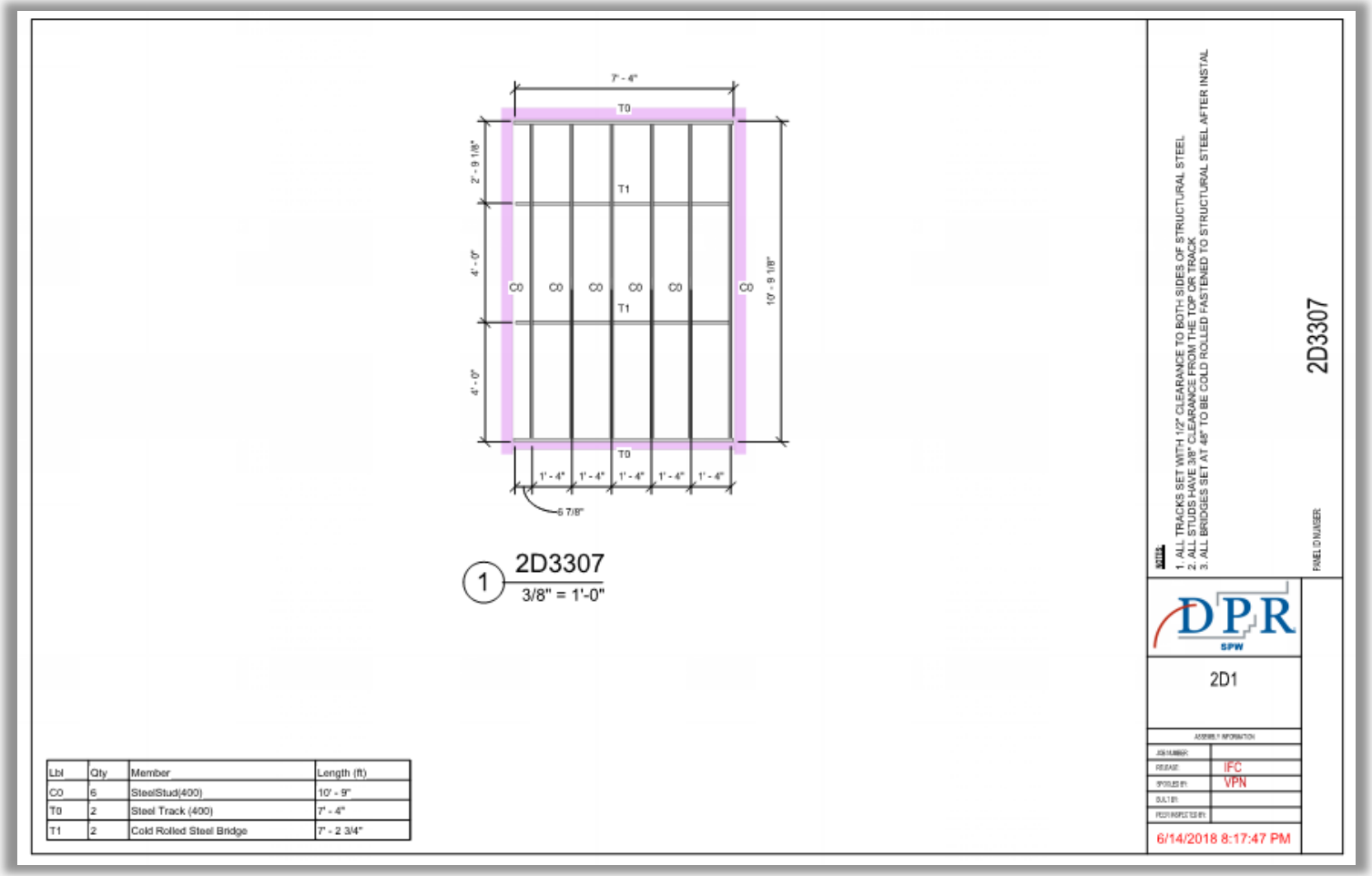
- Panel creation
- QTO
- Benefits

Roof Area 2E2 QTO				
Area	Member	Count	Length	Total Length
Area 2E2 Roof	Steel Stud	100	9' - 2 7/8"	924' - 5"
Grand total:		**100**		924' - 5"
Area 2E2 Roof	Cold Rolled Steel Bridge	4	4' - 9 3/8"	19' - 1 3/4"
Area 2E2 Roof	Cold Rolled Steel Bridge	2	5' - 2 7/8"	10' - 5 7/8"
Area 2E2 Roof	Cold Rolled Steel Bridge	2	5' - 4 3/4"	10' - 9 3/8"
Area 2E2 Roof	Cold Rolled Steel Bridge	4	5' - 5 7/8"	21' - 11 3/4"
Area 2E2 Roof	Cold Rolled Steel Bridge	4	6' - 11 7/8"	27' - 11 3/4"
Area 2E2 Roof	Cold Rolled Steel Bridge	12	7' - 5 7/8"	89' - 11 1/8"
Area 2E2 Roof	Cold Rolled Steel Bridge	4	7' - 8 3/8"	30' - 9 3/4"
Area 2E2 Roof	Cold Rolled Steel Bridge	4	7' - 11 7/8"	31' - 11 3/4"
Grand total:		**36**		243' - 1"
Area 2E2 Roof	Steel Stud	4	4' - 9 1/2"	19' - 2"
Area 2E2 Roof	Steel Stud	8	5' - 6"	44' - 0"
Area 2E2 Roof	Steel Stud	4	7' - 0"	28' - 0"
Area 2E2 Roof	Steel Stud	12	7' - 6"	90' - 0"
Area 2E2 Roof	Steel Stud	4	7' - 8 1/2"	30' - 10"
Area 2E2 Roof	Steel Stud	4	8' - 0"	32' - 0"
Grand total:		**36**		244' - 0"

Exterior Stud Panels (OVERALL)



Exterior Stud (Panel Sheet)

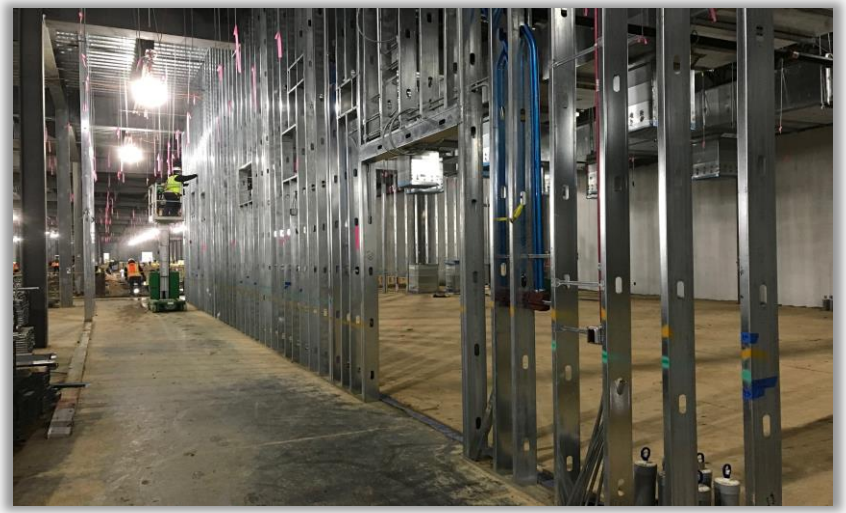


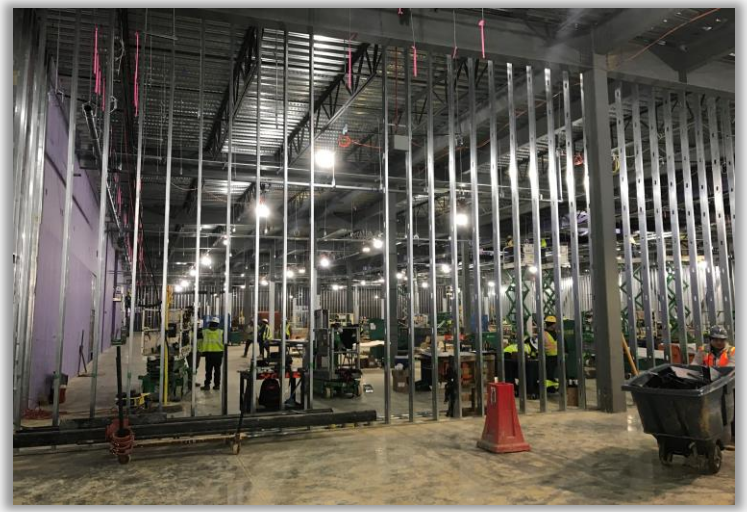
Lbl	Qty	Member	Length (ft)
C0	6	SteelStud(400)	10' - 9"
T0	2	Steel Track (400)	7' - 4"
T1	2	Cold Rolled Steel Bridge	7' - 2 3/4"

Interior Stud Wall Layout

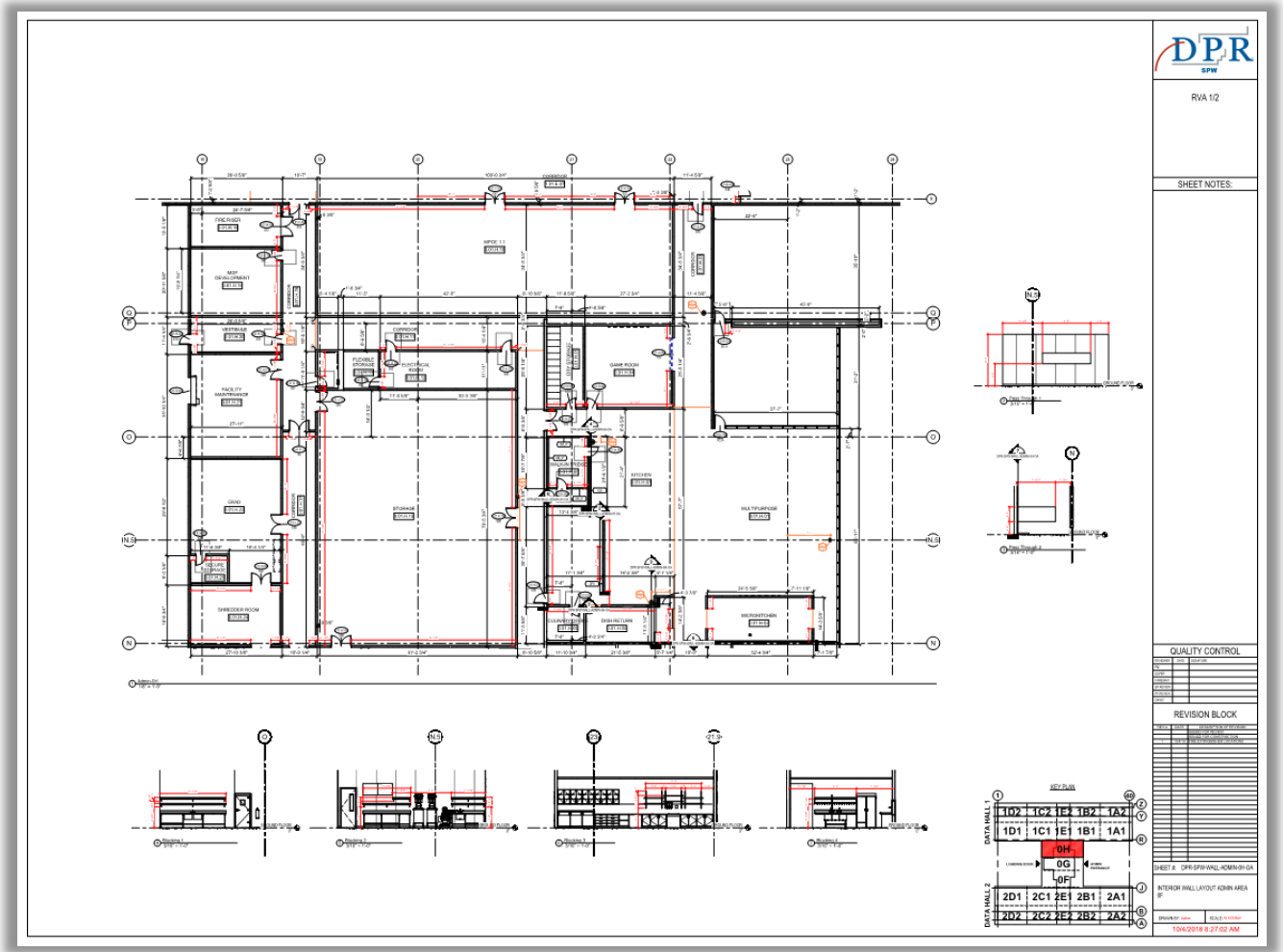
Wall Preparation

- Wall layout drawing
- Rough opening layout
- Quality control





Interior Wall Layout (OVERALL)



Interior Stud Wall Penetrations

Box Outs

- Wall Layout Drawing
- Rough Opening Layout
- Quantity Takeoff

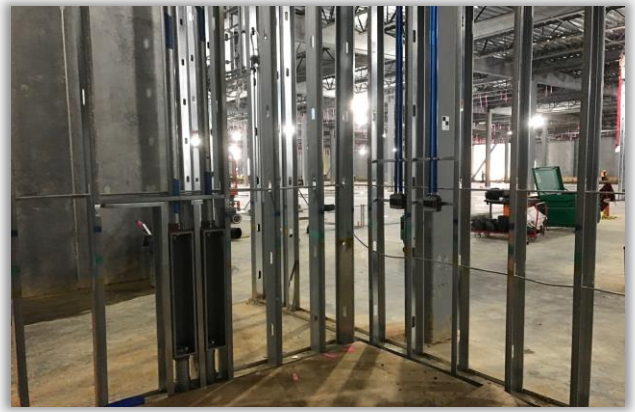
QTO for Area 1C

Studs

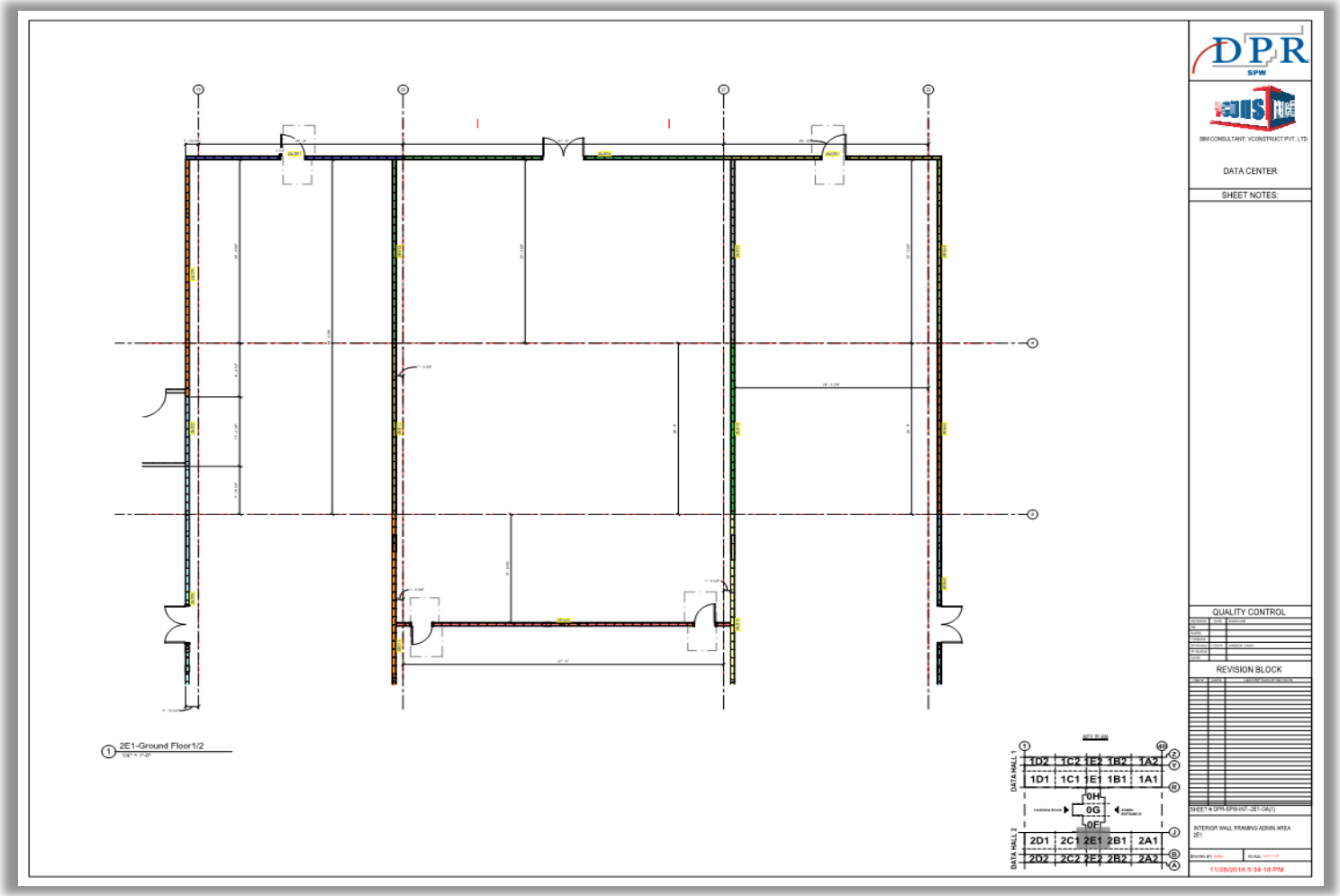
Sum of Length	Type						
Type of Wall	Corners		Infills	Kings	Cripples	Infilles	Grand Total
Stud (600)		345	961	1740	243	198	**3487**
Stud (600s)		1805	10701	188	8455	3013	**24161**
Grand Total		**2150**	**11663**	**1928**	**8698**	**3210**	**27648**

Tracks

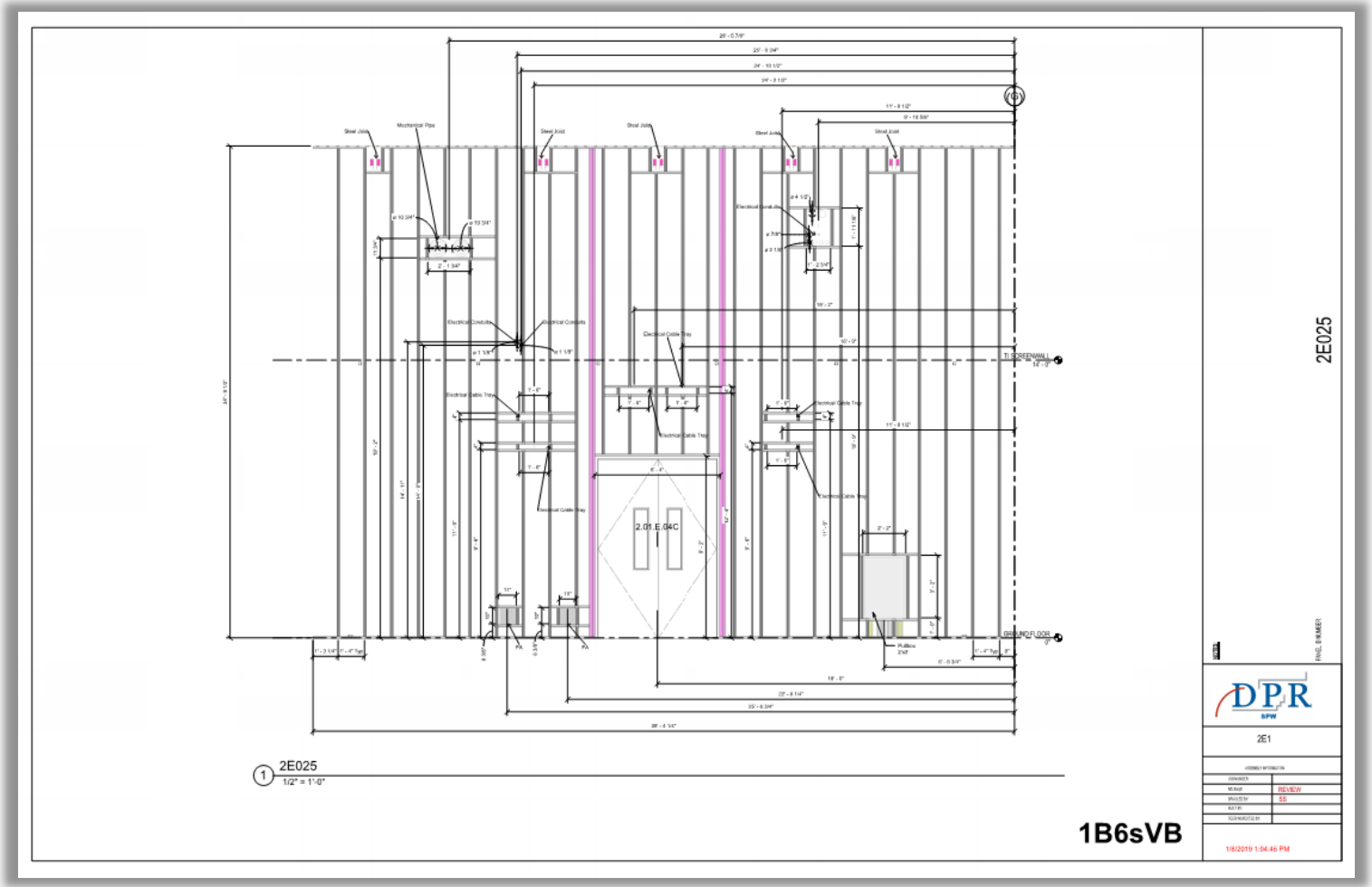
Row Labels	Sum of Length
Bottom Track	1284
Header	831
Top Track	1593
Bridge	94
Grand Total	**3802**



Interior Wall Penetrations (OVERALL)



Interior Wall Penetrations (Panel sheet)



Doors Frames & Hardware

Hardware Preinstall

- Stocking of material
- Build sheet
- Quality control

Prefab, Production Tracking & Quality Control

Assemble Systems

Analyze, condition, and share model-based building information to improve preconstruction and construction processes

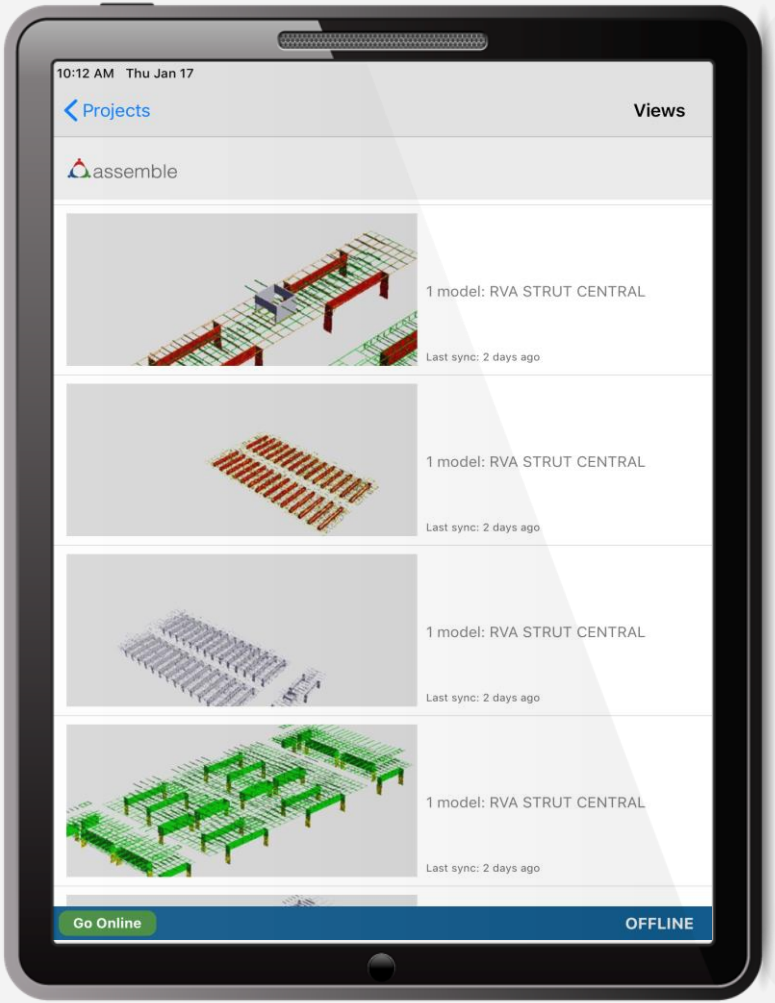
Publish
- Access to BIM
- Import/Export to excel

Manage
- Model-Based Takeoff
- Estimating

Share
- Visualize Model data
- Organize by Color

iPad Online/Offline

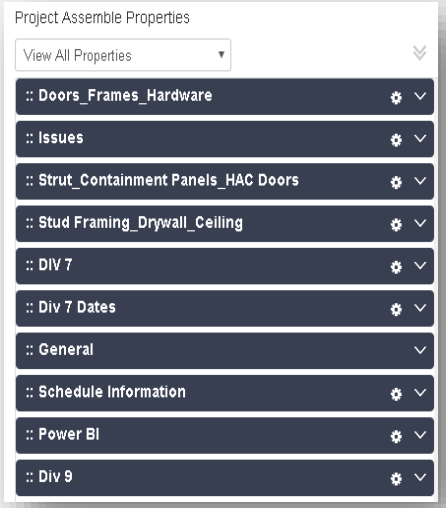
Easy to use interface allows for quick grouping of similar scopes
Setup and filter multiple views to update data based on individual user needs

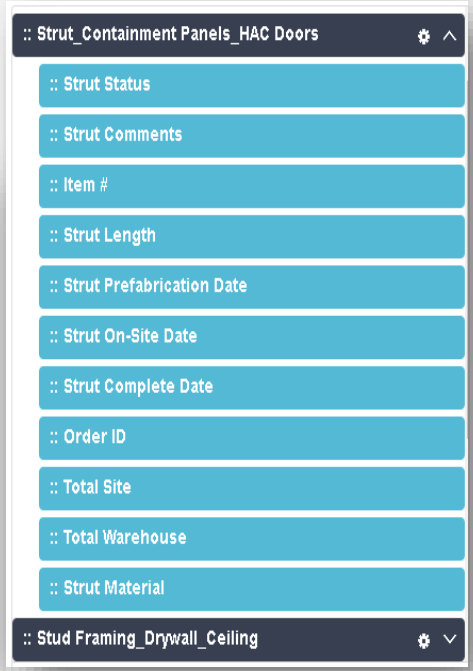


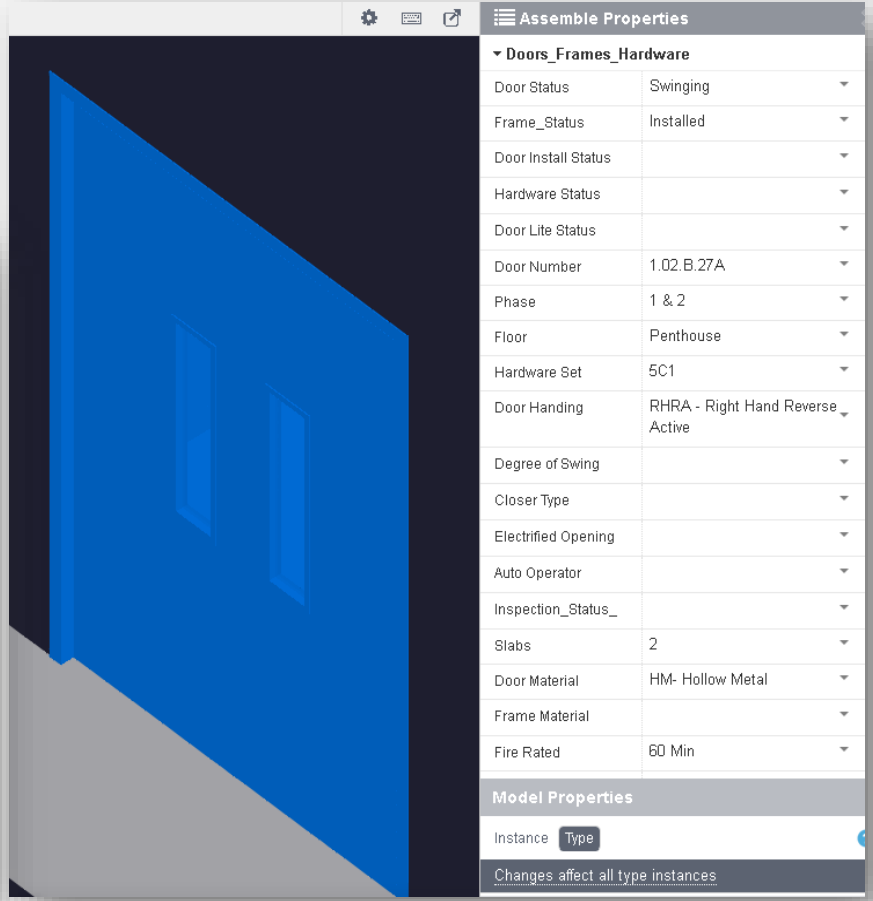
Parameter Creation

GROUPS

- Based on scopes of work
- Properties based on data to be tracked



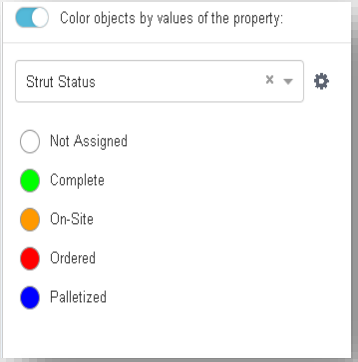


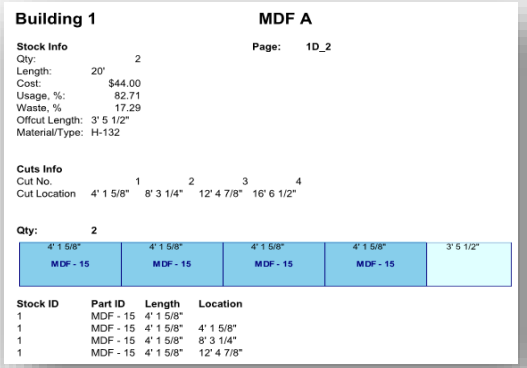


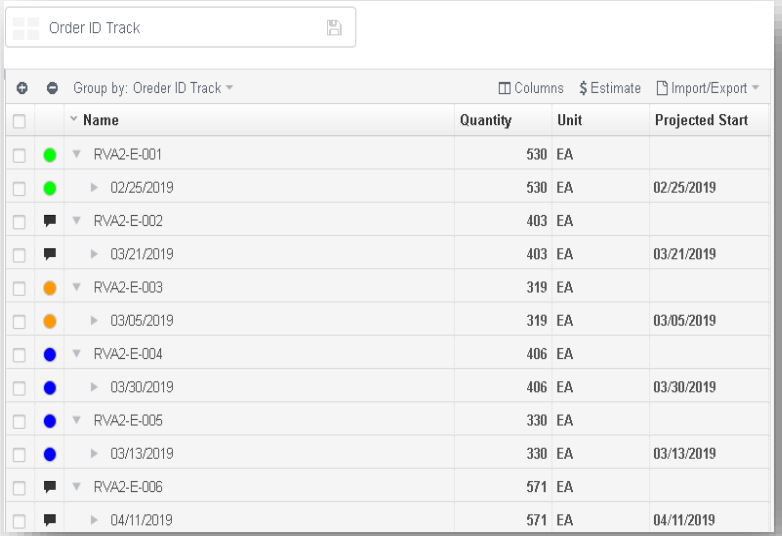
Strut Prefabrication

Order ID

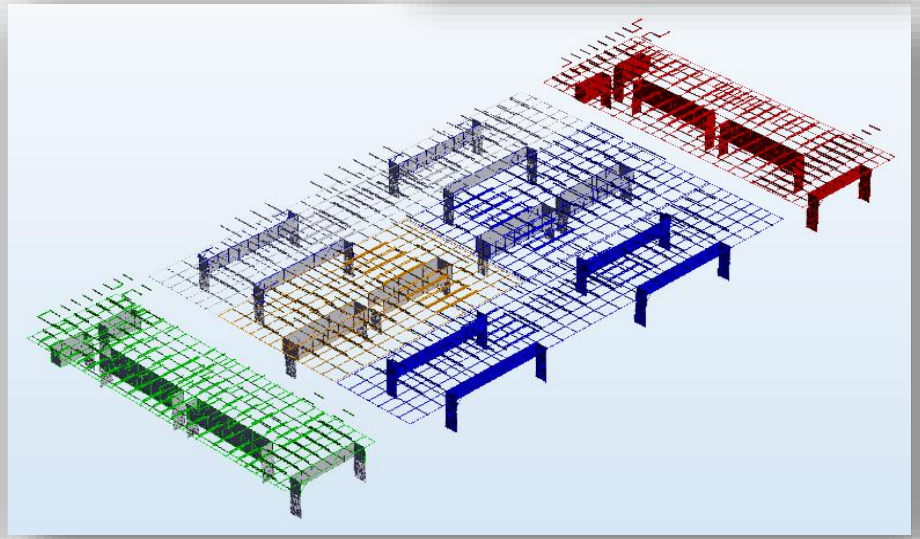
- Work package breakdown/Scheduling
- Organization of parts for cut optimization
- Tracking the build through Prefab Process
  - Packaging/Shipment/Delivery/Install
- Visualizing Percent complete using Power BI







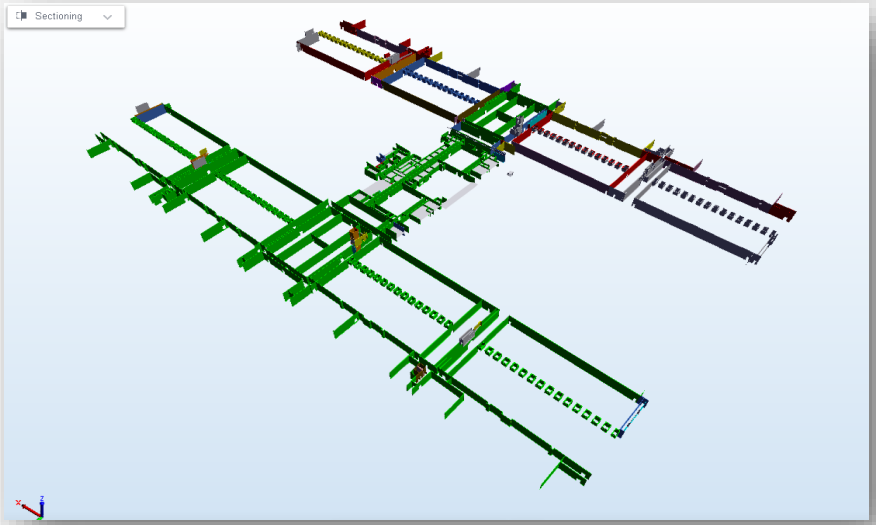
Name	Quantity	Unit	Projected Start
RVA2-E-001	530	EA	
02/25/2019	530	EA	02/25/2019
RVA2-E-002	403	EA	
03/21/2019	403	EA	03/21/2019
RVA2-E-003	319	EA	
03/05/2019	319	EA	03/05/2019
RVA2-E-004	406	EA	
03/30/2019	406	EA	03/30/2019
RVA2-E-005	330	EA	
03/13/2019	330	EA	03/13/2019
RVA2-E-006	571	EA	
04/11/2019	571	EA	04/11/2019



Framing and Inspection

Current Information

- Track multiple install and status completions
- Track inspections
- Work activity Dates, Issues, Notes
- Generate model based takeoffs
- Visualizing Percent complete using Power BI



Group by: Wall/Ceiling Tracking | Columns | $ Estimate | Import/Export

Name	Quantity	Unit
Walls	62,420.90	SF
0F	20,589.27	SF
1 side hung & finished	778.64	SF
2 sides hung	491.76	SF
2 sides hung & finished	18,276.21	SF
2 sides hung, 1 side finished	651.93	SF
Not Assigned	390.74	SF
0G	19,068.66	SF
2 sides hung & finished	17,582.32	SF
2 sides hung, 1 side finished	829.93	SF
Framed	645.82	SF
Not Assigned	10.59	SF
0H	22,762.96	SF
2 sides hung	205.15	SF
2 sides hung & finished	21,768.80	SF
2 sides hung, 1 side finished	652.50	SF
Framed	136.51	SF
Building 1	202,077.01	SF
Ceilings	662.00	SF
0G	594.86	SF
1 side hung & finished	286.00	SF
2 sides hung & finished	211.01	SF
Not Assigned	97.85	SF
1B1	67.15	SF

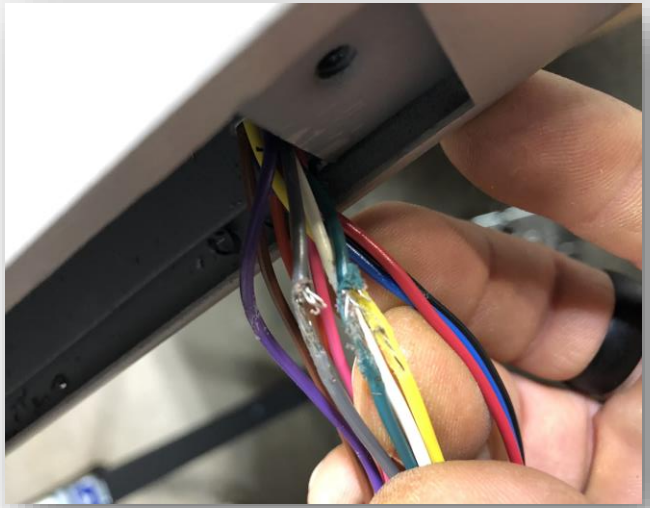
Door and Hardware Installation

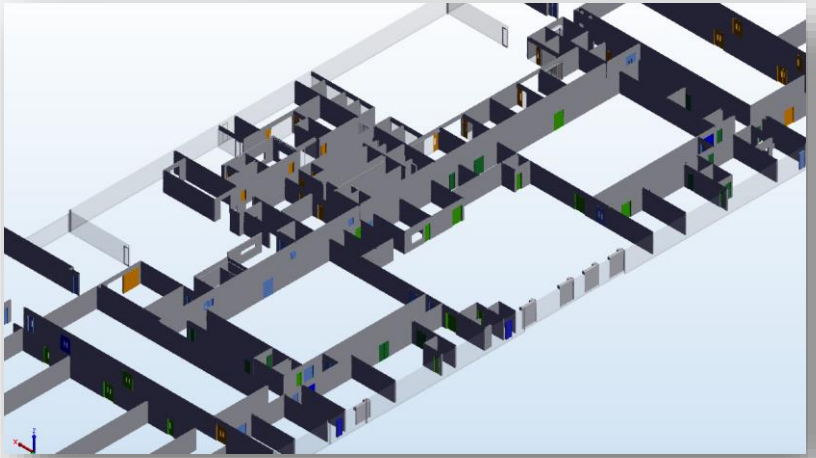
Real Time Solutions

- Barcode scanning to quickly find the door you need
- Link Excel to assemble to create spreadsheets based on data
- Document, track, and share issues quickly and easily
- Inventory tracking

0.01.F.01B

Name	Quantity	Unit
HM- Hollow Metal	204	EA
Benched	49	EA
DDFD	21	EA
Ordered	1	EA
Shop	1	EA
Site	83	EA
Swinging	49	EA
Horiz Rolling Gate	3	EA
By Others	3	EA
Roll Up	7	EA
By Others	7	EA
WD - Wood Door	29	EA
Shop	29	EA
3	119	EA
HM- Hollow Metal	114	EA
Benched	28	EA
Ordered	2	EA
Shop	73	EA
Site	11	EA

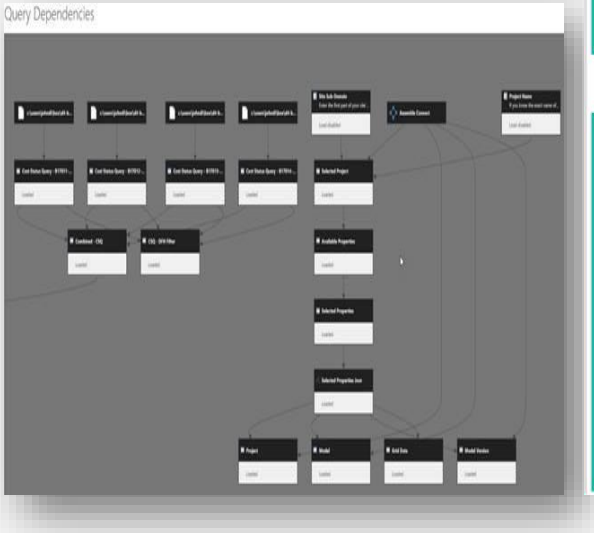




Progress & Budget status

Power BI integration

- Publish to Power BI for completion % and budget tracking
- Data manipulation
- Cost & Trend analysis



Thank You!

To everyone for attending

DPR CONSTRUCTION