



REAVELEY

Engineers

Structural Calculations

Intermountain IMED

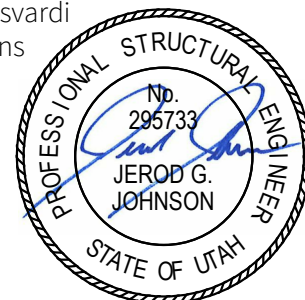
Angiography Room Remodel

2022.0193

Construction Documents

VCBO Architecture
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Salt Lake City, UT 84102
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Jerod Johnson, SE
Cameron Lusvardi
Dustin Perkins



PROJECT 2022.0193 – Angiography Room

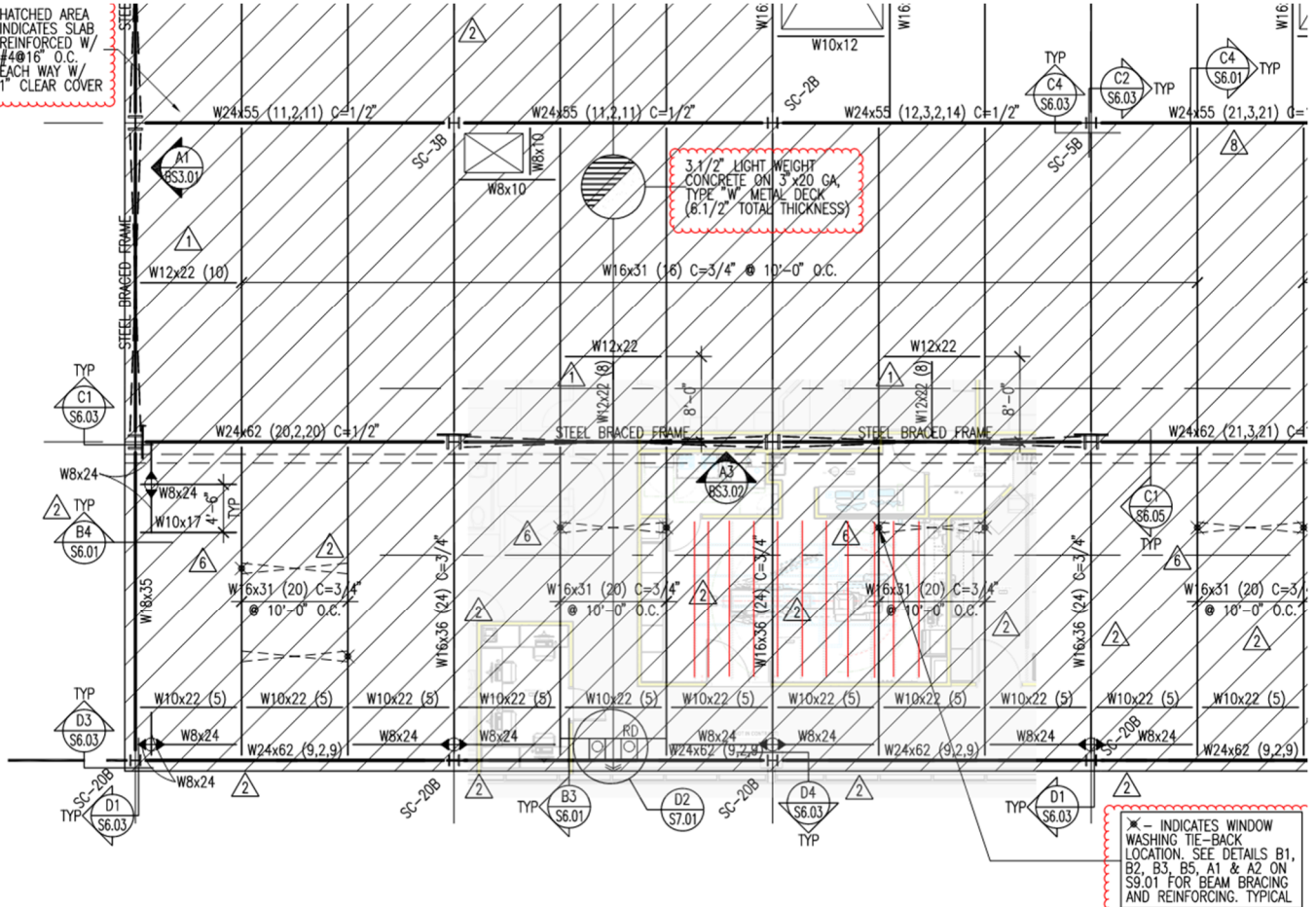
DATE 5/31/2022

BY CL

Equipment Support

Level 3:

HATCHED AREA
INDICATES SLAB
REINFORCED W/
#4@16" O.C.
EACH WAY W/
1" CLEAR COVER



PROJECT 2022.0193 – Angiography Room	DATE 5/31/2022	BY CL
Equipment Support		

Existing Information:

Existing Loads:

DESCRIPTION: Typical Floor Framing w/ 3.1/2" LW Concrete Over 3" Metal Deck

NAME: FLOOR

MATERIAL	DECK	BEAMS	GIRDERS	COLUMNS	SEISMIC	DESCRIPTION
Slab/Deck	48.0	48.0	48.0	48.0	48.0	20 Ga W3 w/ 3.1/2" LW Conc. (6.1/2" total)
Defl. Conc. Wt.	5.0	5.0	5.0	5.0	5.0	1/2" Lightweight Concrete
Beams		4.0	4.0	4.0	4.0	W18x40 @ 10' o.c.
Girders			3.0	3.0	3.0	W24x76 @ 30' o.c.
Columns				5.0	5.0	W14x311
Ceiling	5.0	5.0	5.0	5.0	5.0	5/8" Gyp Board w/ Metal Channel System
Mech/Elect/Plumb	7.0	7.0	7.0	7.0	7.0	Allowance
Misc	3.0	3.0	3.0	3.0	3.0	
DEAD	68	72	75	80	80	
PARTITIONS	20	20	20	20	10	
LIVE	80	80	80	80	0	
TOTAL	168	172	175	180	90	

Existing Criteria:

D. Earthquake:

1. Site Specific Spectral Response Accelerations, MCE:

a. Fault Parallel Component – North/South Direction

$$\begin{array}{lll}
 \text{SaMS} = 1.50 \text{ g} & \text{SaM1} = 0.987 \text{ g} & \text{SaM2} = 0.499 \text{ g} \\
 \text{SDS} = 1.00 \text{ g} & \text{SD1} = 0.665 \text{ g} &
 \end{array}$$

b. Fault Normal Component – East/West Direction

$$\begin{array}{lll}
 \text{SaMS} = 1.50 \text{ g} & \text{SaM1} = 1.042 \text{ g} & \text{SaM2} = 0.576 \text{ g} \\
 \text{SDS} = 1.00 \text{ g} & \text{SD1} = 0.768 \text{ g} &
 \end{array}$$

2. Mapped Spectral Response Accelerations:

$$\begin{array}{ll}
 \text{SS} = 1.565 \text{ g} & \text{SDS} = 1.043 \text{ g} \\
 \text{S1} = 0.699 \text{ g} & \text{SD1} = 0.699 \text{ g}
 \end{array}$$

3. Soil Site Class:

$$\begin{array}{ll}
 \text{Fa} = 1.0 & \text{Fv} = 1.5
 \end{array}$$

6. Building B – Ambulatory Care Center:

- | | |
|-----------------------------|---|
| a. Seismic Use Group: | III |
| b. Seismic Design Category: | D |
| c. SFRS: | BRBF |
| d. Importance Factor, IE: | 1.5 |
| e. Design Base Shear, V: | 0.1875 W (North/South), 0.172 W (East/West) |
| f. Design Story Drift, D: | 1% |
| g. Analysis Procedure: | Response Spectrum Modal Analysis (Dynamic) |

PROJECT 2022.0193 – Angiography Room

DATE 5/31/2022

BY CL

Equipment Support

Seismic:

Seismic Design Value and Fp coefficient:

SDS=1.043

Not attached to Risk Category IV building

Ip=1

Coefficients for Architectural Components (Table 13.5-1 ASCE 7-16)

Ap=1

Rp=2.5

Based on Lab Equipment

Height of Attachment:

Z=31.5ft

Height of Roof:

H=112.5ft

Z/H=0.280

$Fp_coeff=0.4*Ap*SDS*(1+2*(Z/H))/(Rp/Ip)=0.260$

PROJECT 2022.0193 – Angiography Room

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BY CL

Equipment Support

Equipment Criteria:

STRUCTURAL NOTES

- All steel work and parts necessary to support ceiling mounted tube hanger or other equipment are to be supplied by the customer or his contractors. The unistrut or equivalent structure should run continuous with no fittings extending below face of unistrut channel, run wall to wall, be parallel, square and in the same horizontal plane flush with finished ceiling. The system is to be cross braced vertically, horizontally and diagonally to allow no movement and a maximum of 1,58mm (1/16") deflection. (10) 12,7mm (1/2") dia. X 38,1mm (1 1/2") long bolts with unistrut 12,7mm (1/2") nuts with springs are to be provided by customer or his contractors for each stationary and auxiliary support rail. Closure strips shall be provided for areas of unistrut exposed and without mounting units.
- Methods of support for the steelwork that will permit attachment to structural steel or through bolts in concrete construction should be favored. Do not use concrete or masonry anchors in direct tension.
- All units that are wall mounted or wall supported are to be provided with supports where necessary. Wall supports are to be supplied and installed by the customer or his contractors. See plan and detail sheets for suggested locations and mounting hole locations.
- All ceiling mounted fixtures, air vents, sprinklers, etc. To be flush mounted, or shall not extend more than 6,35mm (1/4") below the finished ceiling.
- Control walls with tube hanger passage above shall be constructed to 2130mm (7'-0") high.
- Floor slabs on which equipment is to be installed must be level to 3,17mm (1/8") in 3050mm (10'-0")
- Minimum floor thickness of 203mm (8").
- Dimensions are to finished surfaces of room.
- Customers contractor must provide all penetrations in post tension floors.
- Customers contractor must provide and install any non-standard anchoring. Documents for standard anchoring methods are included with GE equipment drawings for geographic areas that require such documentation.
- Customers contractor must provide and install hardware for "through the floor" anchoring and/or any bracing under access floors. This contractor must also provide floor drilling that cannot be completed because of an obstruction encountered while drilling by the GE installer such as rebar etc.
- It is the customer's responsibility to perform any floor or wall penetrations that may be required. The customer is also responsible for ensuring that no subsurface utilities (e.g., electrical or any other form of wiring, conduits, piping, duct work or structural supports (i.e. post tension cables or rebar)) will interfere or come in contact with subsurface penetration operations (e.g. drilling and installation of anchors/screws) performed during the installation process. To ensure worker safety, GE installers will perform surface penetration operations only after the customer's validation and completion of the "GE surface penetration permit"

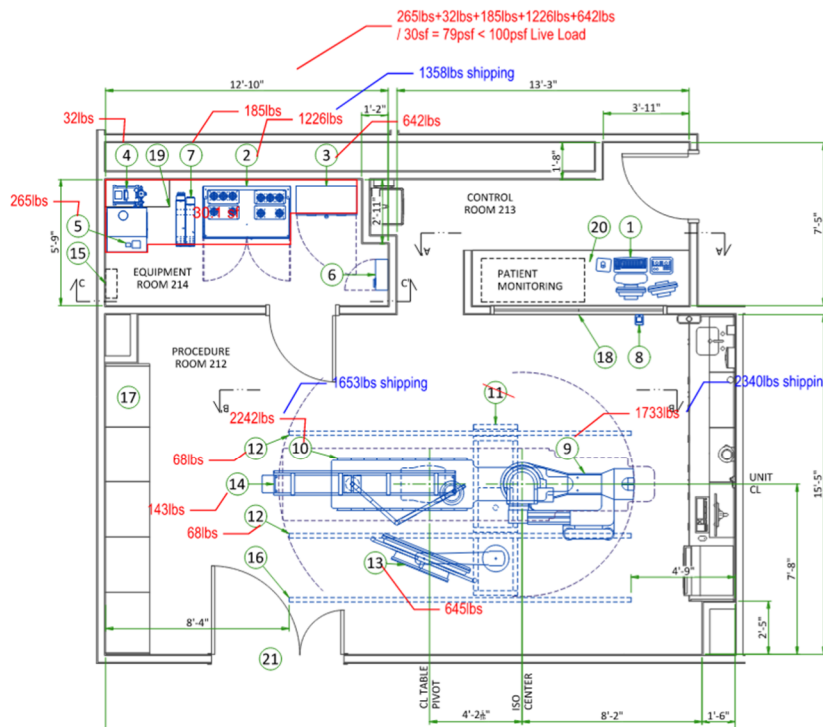
PROJECT 2022.0193 – Angiography Room

DATE 5/31/2022

BY CL

Equipment Support

Equipment Loading:



See equipment drawings in appendix

Table Load is 2300lbs

Vertical seismic load for table is

$$2300\text{lbs} \times 0.2 \times \text{SDS} = 479.780\text{lbs}$$

C-arm load is 1733lbs

Vertical seismic load for C-arm is

$$1733\text{lbs} \times 0.2 \times \text{SDS} = 361.504\text{lbs}$$

Total load of ceiling equipment is

$$\text{Equipment} = (68\text{lbs} + 143\text{lbs} + 68\text{lbs} + 645\text{lbs}) = 924.000\text{lbs}$$

Vertical seismic load for ceiling equipment is

$$(68\text{lbs} + 143\text{lbs} + 68\text{lbs} + 645\text{lbs}) \times 0.2 \times \text{SDS} = 192.746\text{lbs}$$

Dynamic equipment load (+350 acceleration)

$$\text{Dynamic_Equipment} = \text{Equipment} + 350\text{lbs} = 1274.000\text{lbs}$$

The cabinets load the floor with less than a 100psf live load. No further checks are required.

LEGEND				
BY	ITEM	DESCRIPTION	MAX HEAT OUTPUT (btu)	WEIGHT (lbs)
A	1	Operator console	341	19.6
A	2	C-FRT Cabinet	7370	1226
A	3	System Interface Cabinet (PDU)	1706	642
A	4	Detector conditioner	717	32
A	5	COOLIX 4100 tube chiller	23646	265
B	6	Main Disconnect Panel	205	49
A	7	8kVA UPS	1760	185
A	8	Xray buzzer	-	1
A	9	LC gantry	5528	1733
A	10	Tilting table	-	2242
A	11	Monitor suspension short bridge	-	-
A	12	Longitudinal stationary rail	-	68
A	13	Large Display Monitor with two backup monitors	341	645
A	14	Mavig YLED lamp with transformer on 2.5m ceiling track	-	143
B	15	Light signaling control box	-	26
C	16	Cable drape rail		
C	17	Storage cabinet		
C	18	Control wall to ceiling with lead glass viewing window.		
C	19	Shelf - customer to provide adequate wall support		
C	20	Counter top for equipment- provide grommeted openings as require		
C	21	Minimum door opening for equipment delivery is 46 in. w x 87 in. h 2200mm), contingent on a 96 in. [2438mm] corridor width		

EXAM ROOM HEIGHT

FINISHED FLOOR TO FALSE CEILING

PROJECT 2022.0193 – Angiography Room

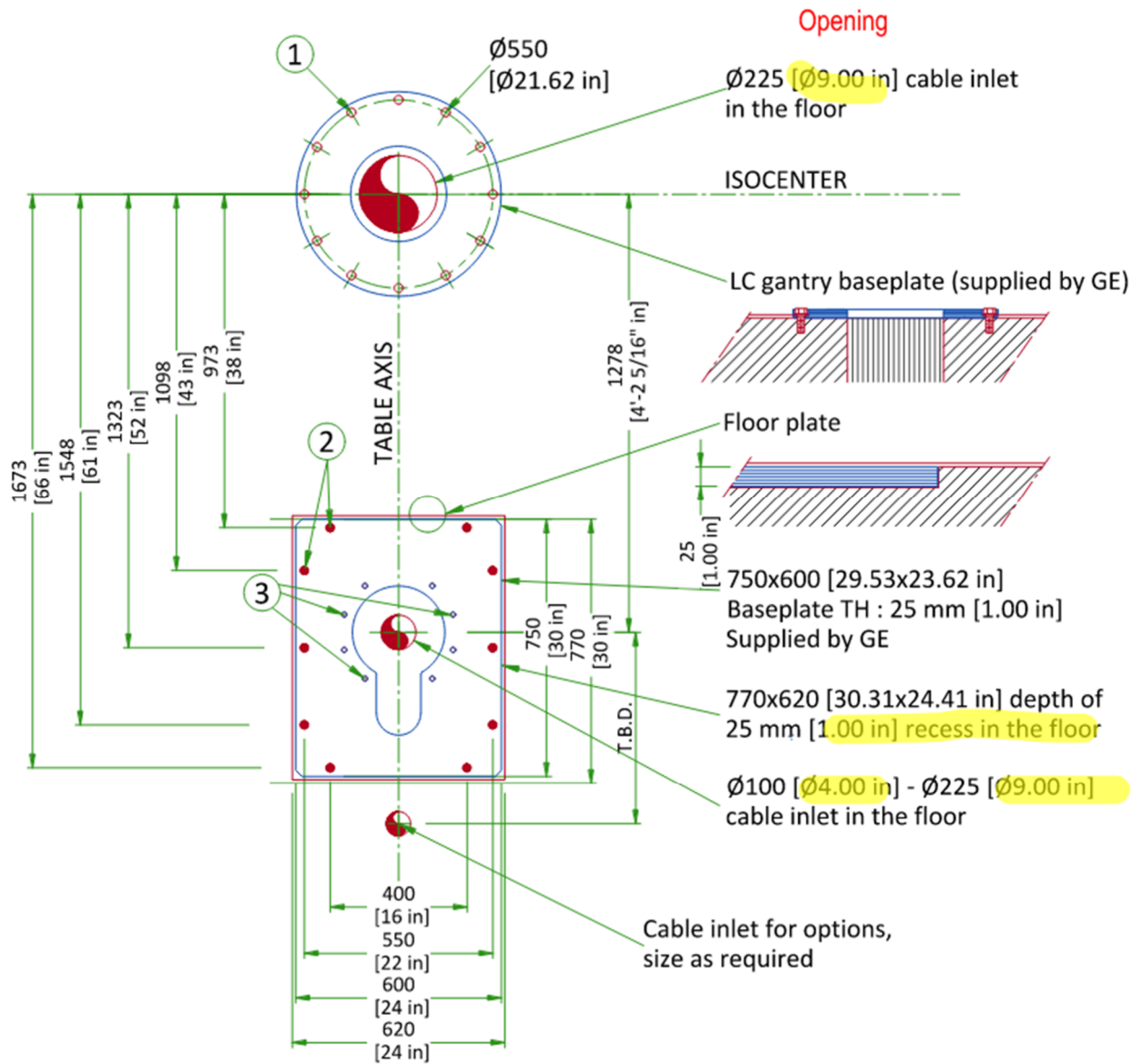
DATE 5/31/2022

BY CL

Equipment Support

Equipment Base Layout:

LC GANTRY AND TABLE ANCHORING WITH TABLE BASEPLATE



Anchorage is not provided by the equipment vendor due to the concrete floor thickness being insufficient. Thru bolting is required. Bolt sizes are provided in the vendor drawings.

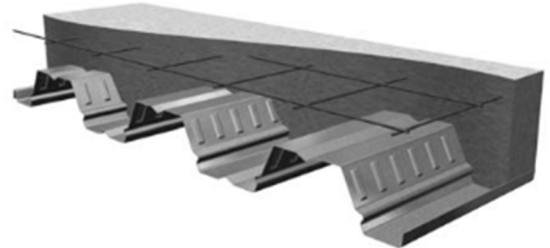
Thru bolting will help resolve the tension loads on the deck. When combined with gravity, the effects are minimum when distributed with backing plates.

PROJECT 2022.0193 – Angiography Room	DATE 5/31/2022	BY CL
Equipment Support		

Deck Capacity:

PLW3™ or W3 FORMLOK™

- 6¼ in. TOTAL SLAB DEPTH
- Light Weight Concrete
- 2 Hour Fire Rating



Maximum Unshored Clear Span (ft-in.)

Deck Gage	Number of Deck Spans		
	1	2	3
22	10'-0"	10'-7"	11'-3"
21	10'-10"	11'-8"	12'-1"
20	11'-7"	12'-4"	12'-9"
19	12'-1"	13'-8"	14'-1"
18	12'-5"	14'-10"	14'-7"
16	13'-1"	16'-4"	15'-4"

Concrete Properties

Density (pcf)	Uniform Weight (psf)	Uniform Volume (yd ³ /100 ft ²)	Compressive Strength, f' _c (psi)
110	43.5	1.466	3000

Notes:

1. Volumes and weights do not include allowance for deflection.
2. Weights are for concrete only and do not include weight of steel deck.
3. Total slab depth is nominal depth from top of concrete to bottom of steel deck.

Shoring is required for spans greater than those shown above. See Footnote 1 on page 69 for required bearing.

Allowable Superimposed Loads (psf)

Deck Gage	Number of Deck Spans	Span (ft-in.)														
		8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"	13'-6"	14'-0"	15'-0"	16'-0"
22	1	317	287	261	238	219	160	145	132	120	109	100	91	83	70	58
	2	317	287	261	238	219	202	145	132	120	109	100	91	83	70	58
	3	317	287	261	238	219	202	145	132	120	109	100	91	83	70	58
21	1	342	309	281	257	236	218	160	145	133	121	111	101	93	78	66
	2	342	309	281	257	236	218	201	187	133	121	111	101	93	78	66
	3	342	309	281	257	236	218	201	187	174	121	111	101	93	78	66
20	1	366	330	300	275	252	232	215	200	144	132	121	111	102	86	73
	2	366	330	300	275	252	232	215	200	186	132	121	111	102	86	73
	3	366	330	300	275	252	232	215	200	186	174	121	111	102	86	73
19	1	400	373	339	310	285	263	243	226	210	154	142	131	120	103	88
	2	400	373	339	310	285	263	243	226	210	196	184	173	120	103	88
	3	400	373	339	310	285	263	243	226	210	196	184	173	163	103	88
18	1	400	400	375	343	315	290	269	250	232	175	161	149	137	118	102
	2	400	400	375	343	315	290	269	250	232	217	203	191	180	118	102
	3	400	400	375	343	315	290	269	250	232	217	203	191	180	118	102
16	1	400	400	400	400	375	346	320	297	277	259	242	185	171	148	128
	2	400	400	400	400	375	346	320	297	277	259	242	228	214	186	153
	3	400	400	400	400	375	346	320	297	277	259	242	228	214	186	128

See footnotes on page 69.

Shoring required in shaded areas to right of heavy line.

PROJECT 2022.0193 – Angiography Room

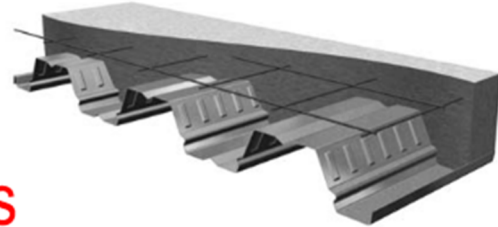
DATE 5/31/2022

BY CL

Equipment Support

PLW3™ or W3 FORMLOK™

- 5½ in. TOTAL SLAB DEPTH
- Light Weight Concrete
- 1 Hour Fire Rating



For Slab Recess

Maximum Unshored Clear Span (ft-in.)

Deck Gage	Number of Deck Spans		
	1	2	3
22	10'-7"	11'-6"	11'-11"
21	11'-6"	12'-4"	12'-9"
20	12'-1"	13'-0"	13'-6"
19	12'-6"	14'-5"	14'-8"
18	12'-11"	15'-8"	15'-1"
16	13'-7"	16'-11"	15'-11"

Concrete Properties

Density (pcf)	Uniform Weight (psf)	Uniform Volume (yd ³ /100 ft ²)	Compressive Strength, f' _c (psi)
110	36.7	1.235	3000

Notes:

1. Volumes and weights do not include allowance for deflection.
2. Weights are for concrete only and do not include weight of steel deck.
3. Total slab depth is nominal depth from top of concrete to bottom of steel deck.

Shoring is required for spans greater than those shown above. See Footnote 1 on page 69 for required bearing.

Allowable Superimposed Loads (psf)

Deck Gage	Number of Deck Spans	Span (ft-in.)														
		8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"	13'-6"	14'-0"	15'-0"	16'-0"
22	1	278	251	228	209	191	176	128	116	106	96	88	80	74	62	52
	2	278	251	228	209	191	176	163	152	106	96	88	80	74	62	52
	3	278	251	228	209	191	176	163	152	106	96	88	80	74	62	52
21	1	300	271	247	225	207	191	177	164	117	107	98	90	82	69	59
	2	300	271	247	225	207	191	177	164	153	107	98	90	82	69	59
	3	300	271	247	225	207	191	177	164	153	143	98	90	82	69	59
20	1	321	290	264	241	221	204	189	175	163	117	107	98	90	77	65
	2	321	290	264	241	221	204	189	175	163	152	143	98	90	77	65
	3	321	290	264	241	221	204	189	175	163	152	143	134	90	77	65
19	1	363	328	298	273	250	231	214	198	185	173	125	116	107	91	78
	2	363	328	298	273	250	231	214	198	185	173	162	152	138	91	78
	3	363	328	298	273	250	231	214	198	185	173	162	152	138	91	78
18	1	400	364	331	302	277	256	237	220	205	191	143	132	122	105	90
	2	400	364	331	302	277	256	237	220	205	191	176	161	146	119	90
	3	400	364	331	302	277	256	237	220	205	191	176	161	146	119	90
16	1	400	400	395	361	332	306	283	263	243	222	201	179	152	131	108
	2	400	400	395	361	332	306	283	263	243	222	201	179	161	131	108
	3	400	400	395	361	332	306	283	263	243	222	201	179	161	131	108

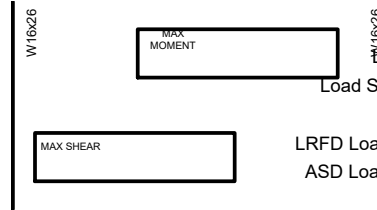
See footnotes on page 69.

Shoring required in shaded areas to right of heavy line.

Checking the Floor for table load on deck span. See excel calculation.

PROJECT NAME: 2022.0193 - Angiography Room
 Description: Table Loading

 ENGINEER: CL
 DATE: 2022-05-31
Input Floor System Information

 Beam Size : W16x26
 Beam Spacing : 7.5 ft
 Deck Span, I : 7.0 ft
 Deck Profile : W3
 Deck Gauge : 0.0359
 Concrete Thick Above Flutes, tc : 2.5 in
 Thickness of Durable Topping, tt : 0.0 in
 Concrete Type : Light Weight
 Concrete Strength, f_c : 3000 psi
 Span Condition : Continuous
 Design Deck Span : 7.5 ft
 Deck Allowable Super. Load : 321 psf
 Reinforcing Size : 6x6-W2.9/W2.9 WWF
 Reinforcing Spacing : 12.0 in
 Reinforcing Strength, f_y : 60 ksi
 d : 1.00 in
 As : 0.058 in²/ft

Input Load Information

 Load Space Parallel to Flutes : 48 in
 Load Space Perpendicular to Flutes : 21 in
 LRFD Load Combination: **1.2D+1.6L**
 ASD Load Combination: **D+L**
Uniform Loads

	Unfactored	Factored
Uniform Dead Load :	20.0 psf	24.0 psf
Uniform Live Load :	60.0 psf	96.0 psf
Total :	80.0 psf	120.0 psf
Moment :	563 ft-lbs/ft	844 ft-lbs/ft
Shear :	300 lbs/ft	450 lbs/ft

Point Loads

	P1	P2	Total
Load Width:	21.0 in	21.0 in	
Load Length:	10.0 in	10.0 in	
Super Dead Load :	0 lbs.	0 lbs.	0 lbs.
Live Load :	1300 lbs.	1300 lbs.	2600 lbs.
E Load :	0 lbs.	0 lbs.	0 lbs.
P :	1300 lbs.	1300 lbs.	2600 lbs.
Pu :	2080 lbs.	2080 lbs.	4160 lbs.

Larger Load (Left)

 Load Width, b_m : 26.0 in
 Effective Slab Width for M_{max}, b_e : 36.4 in
 Effective Slab Width for V_{max}, b_e : 26.1 in
 Location of Load for M_{max}, x : 2.5 ft
 Location of Load for V_{max}, x : 0.5 ft
 Distribution Parallel to Flutes, w : 42.3 in
 Weak Axis Moment, Mu : 120 in-lb/in
 Strong Axis Shear, Vu : 895 lbs/ft

Smaller Load (Right)

 Load Width, b_m : 26.0 in
 Effective Slab Width for M_{max}, b_e : 27.4 in
 Effective Slab Width for V_{max}, b_e : 33.3 in
 Location of Load for M_{max}, x : 6.5 ft
 Location of Load for V_{max}, x : 4.5 ft
 Distribution Parallel to Flutes, w : 42.3 in
 Weak Axis Moment, Mu : 90 in-lb/in
 Strong Axis Shear, Vu : 275 lbs/ft

Weak Axis Moment Check

	UNITY	
Weak Axis φM _n :	247 in-lb/in	0.48 OK
Mu :	120 in-lb/in	

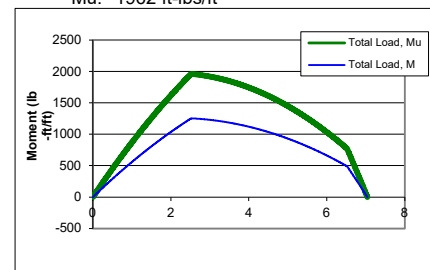
Strong Axis Shear and Moment Check

	UNITY	
Allow. Strong Axis Moment (ASD):	1990 ft-lbs/ft	0.63 OK
One-Way Shear Capacity, φV _n :	4930 lbs/ft	0.33 OK
Punching Shear Capacity P1, φV _n :	29577 lbs.	0.07 OK
Punching Shear Capacity P2, φV _n :	29577 lbs.	0.07 OK
Maximum Moment :	1.255 kip-ft	
Equivalent Uniform Load :	202 psf	0.63 OK

Check for Large Load at Midspan

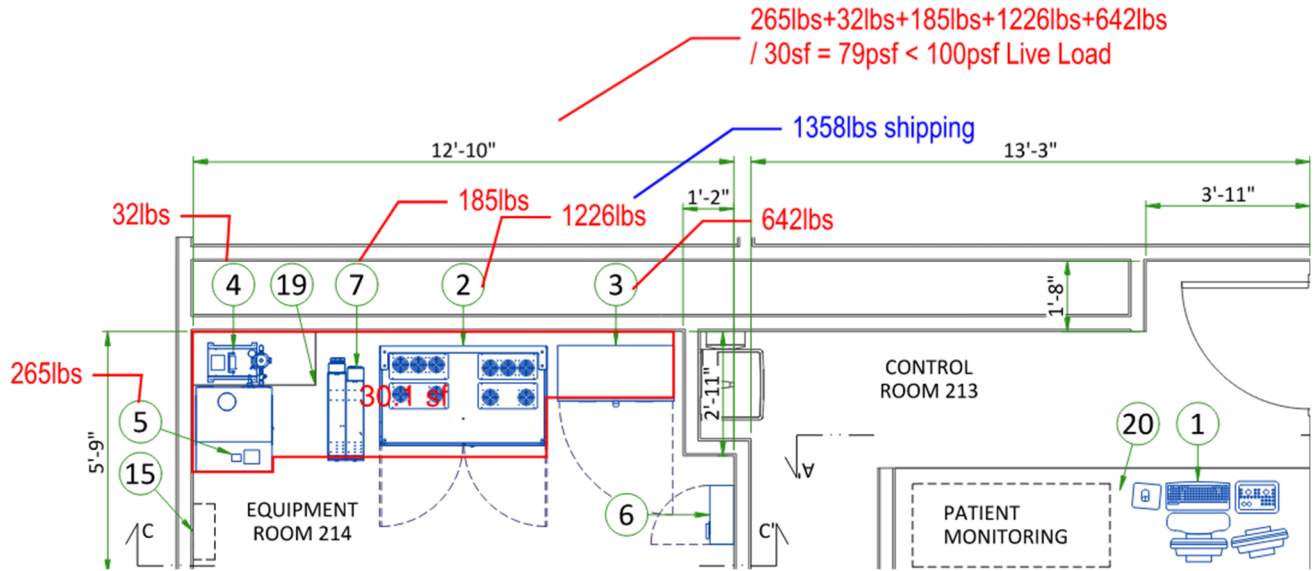
	UNITY	
Effective Slab Width for M _{max} , b _e :	37.6 in	
Location of Load for M _{max} , x :	3.5 ft	
Distribution Parallel to Flutes, w :	52.3 in	
Weak Axis Moment, Mu :	100 in-lb/in	0.40 OK
Strong Axis Moment, M (ASD) :	1227 ft-lbs/ft	0.62 OK

Maximum Total Loads

 M: 1255 ft-lbs/ft Vu: 1620 lbs/ft
 Mu: 1962 ft-lbs/ft


PROJECT	2022.0193 – Angiography Room	DATE	5/31/2022	BY	CL
Equipment Support					

Other floor equipment:



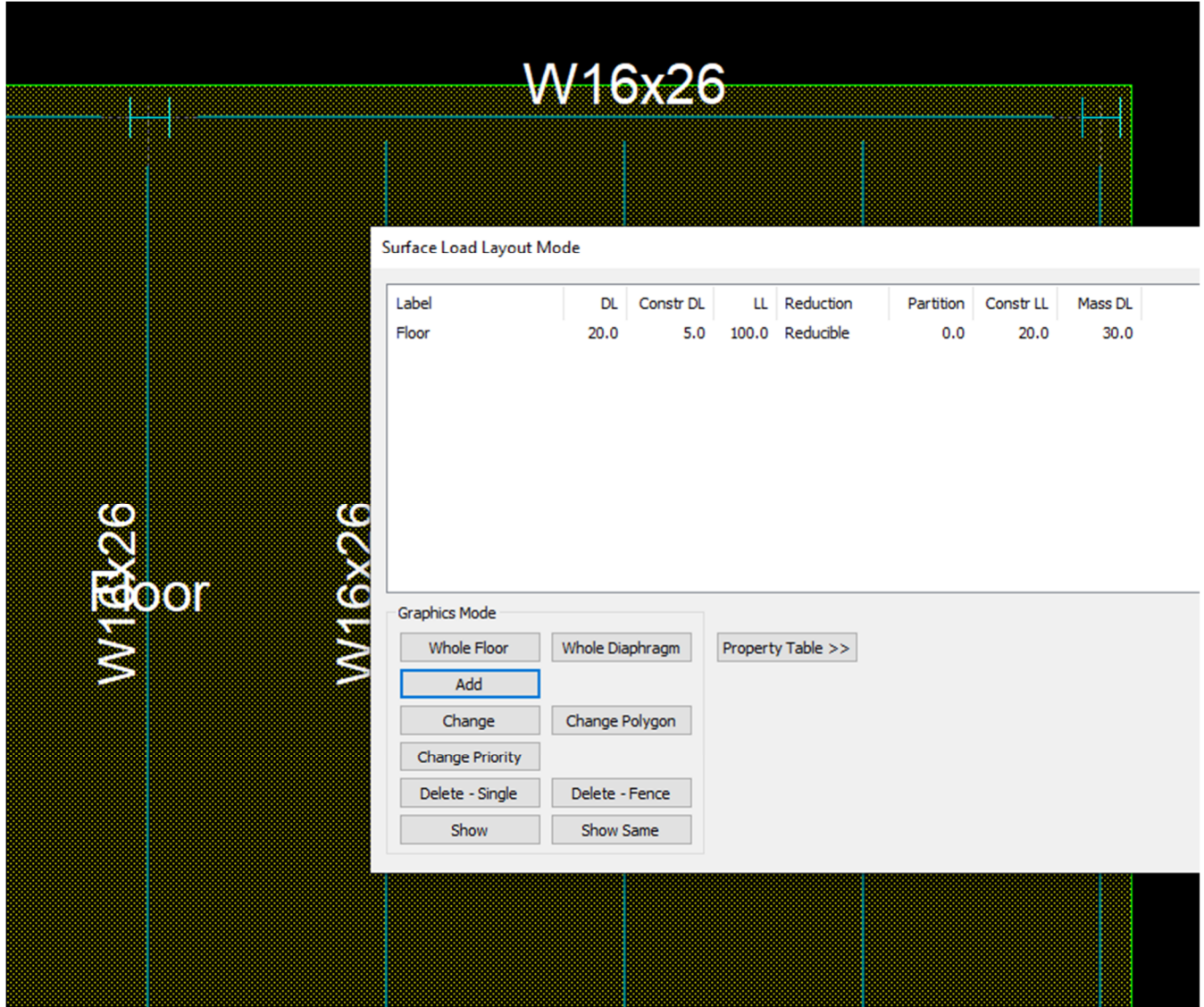
The floor equipment over the area is less than 100psf. The deck capacity is capable of supporting 100psf per the existing structural drawings GSN. Cabinets okay.

Beam Support:

Beam support was done in RAM SS since the recess effects the composite capacity. A full report can be made available upon request. See following screenshots for quick check.

PROJECT 2022.0193 – Angiography Room DATE 5/31/2022 BY CL
Equipment Support

Floor Loading



Surface Load Layout Mode

Label	DL	Constr DL	LL	Reduction	Partition	Constr LL	Mass DL
Floor	20.0	5.0	100.0	Reducible	0.0	20.0	30.0

Graphics Mode

Whole Floor Whole Diaphragm Property Table >>

Add

Change Change Polygon

Change Priority

Delete - Single Delete - Fence

Show Show Same

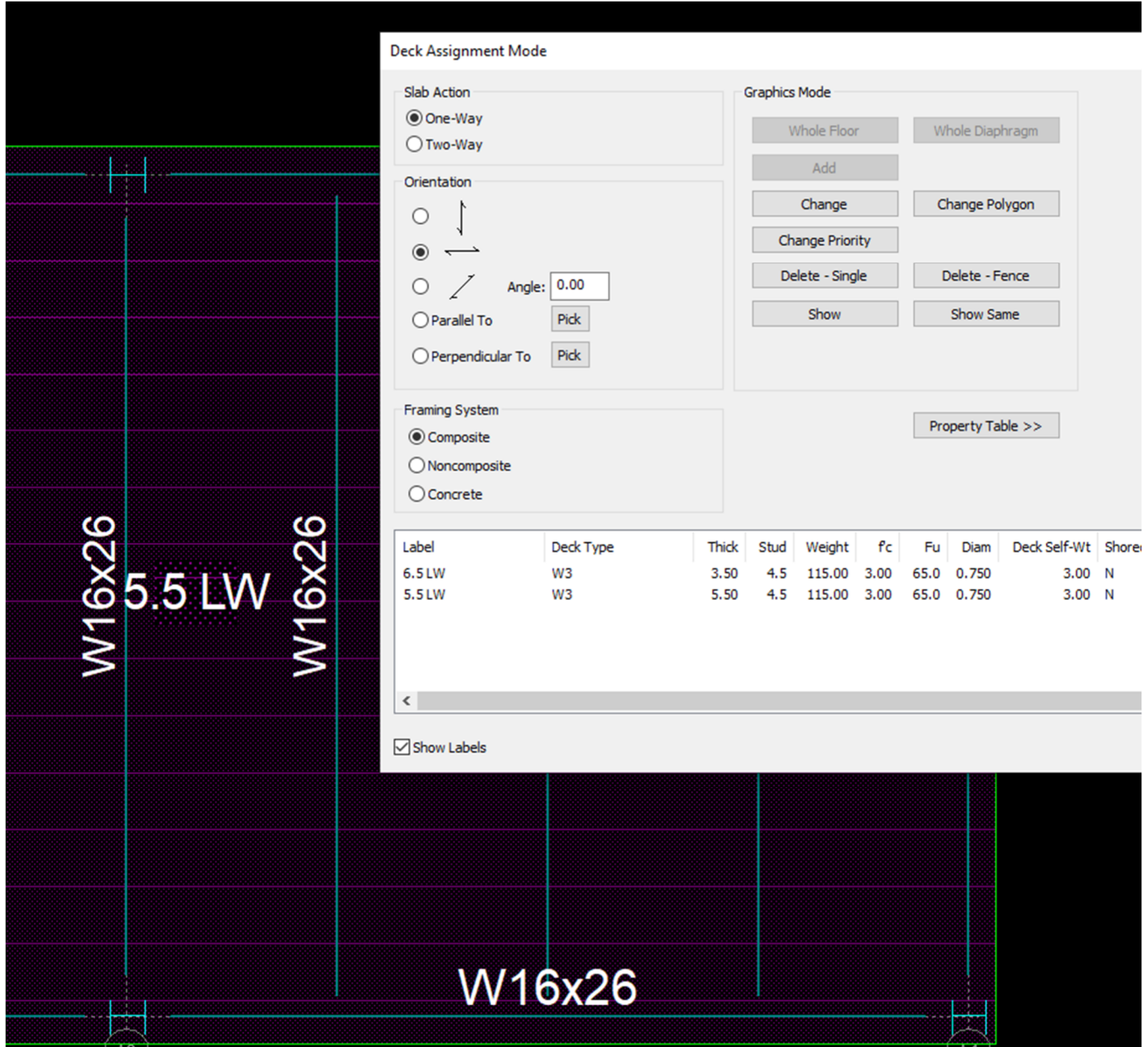
PROJECT 2022.0193 – Angiography Room

DATE 5/31/2022

BY CL

Equipment Support

Deck types and spans



Deck Assignment Mode

Slab Action
 One-Way
 Two-Way

Orientation
 [Up Arrow]
 [Right Arrow]
 [Down Arrow] Angle: 0.00
 Parallel To [Pick]
 Perpendicular To [Pick]

Framing System
 Composite
 Noncomposite
 Concrete

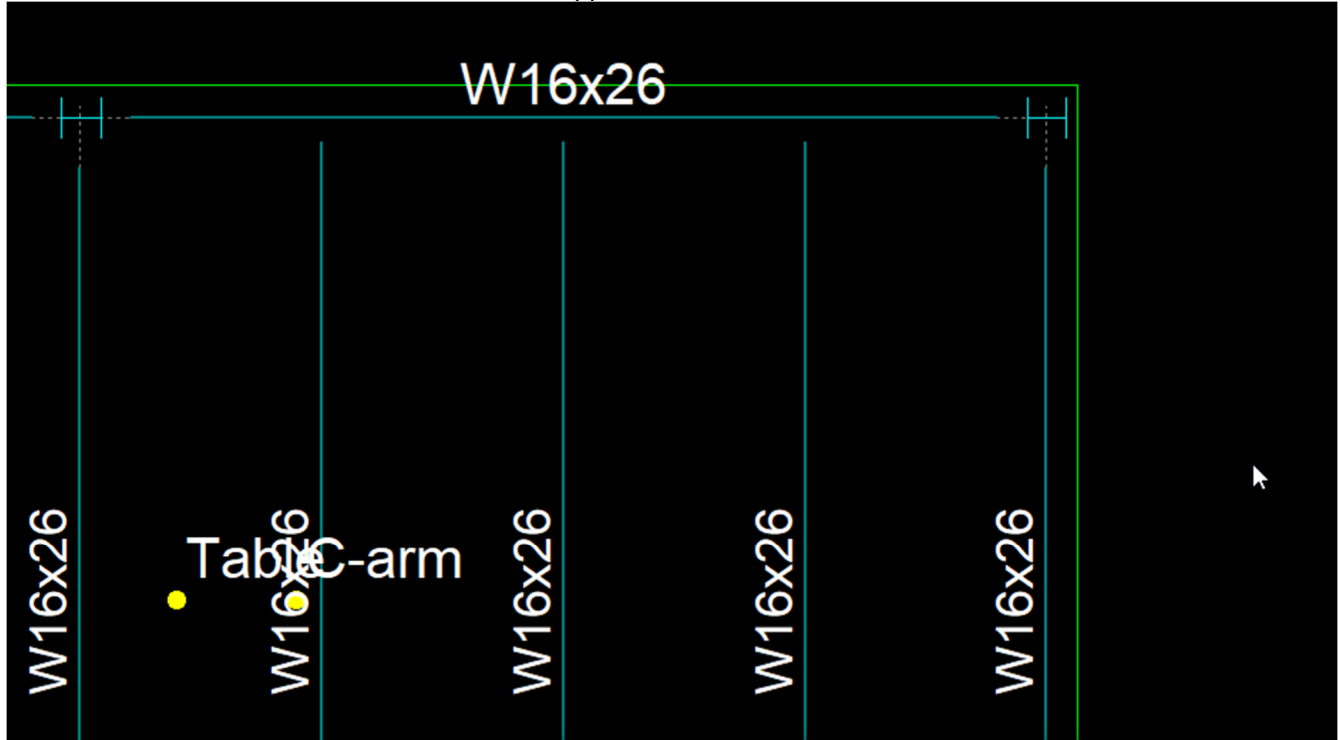
Graphics Mode
 Whole Floor Whole Diaphragm
 Add
 Change Change Polygon
 Change Priority
 Delete - Single Delete - Fence
 Show Show Same
 Property Table >>

Label	Deck Type	Thick	Stud	Weight	f _c	F _u	Diam	Deck Self-Wt	Shore
6.5 LW	W3	3.50	4.5	115.00	3.00	65.0	0.750	3.00	N
5.5 LW	W3	5.50	4.5	115.00	3.00	65.0	0.750	3.00	N

Show Labels

PROJECT 2022.0193 – Angiography Room DATE 5/31/2022 BY CL
Equipment Support

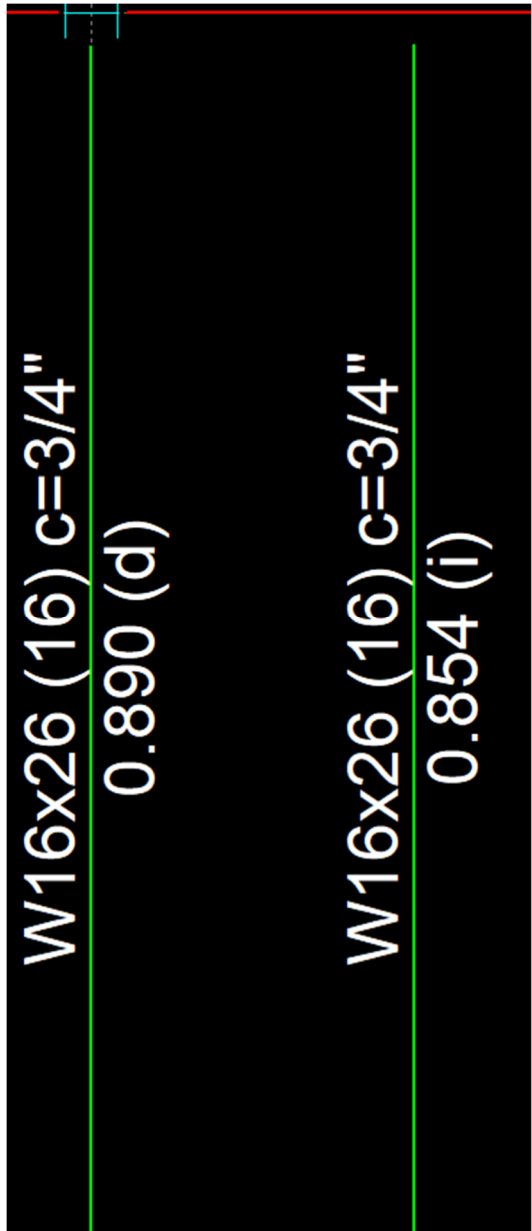
Beam locations with loads of Table and C-arm applied



Point Load Layout Mode

Label	DL	Constr DL	LL	Reduction	Partition	Constr LL	Mass DL
EXISTING BOOM	0.350	0.000	0.000	Reducible	0.000	0.000	0.000
C	0.750	0.000	0.500	Reducible	0.000	0.000	0.000
A+B	0.750	0.000	1.200	Reducible	0.000	0.000	0.000
Table	0.000	0.000	2.300	Unreducible	0.000	0.000	0.000
C-arm	0.000	0.000	2.400	Unreducible	0.000	0.000	0.000

PROJECT	2022.0193 – Angiography Room	DATE	5/31/2022	BY	CL
Equipment Support					



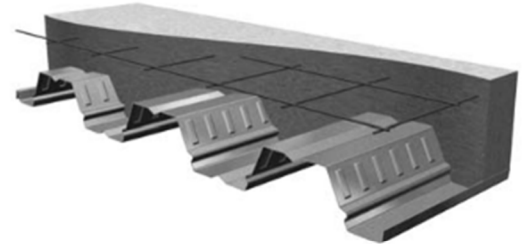
PROJECT	2022.0193 – Angiography Room	DATE	5/31/2022	BY	CL
Equipment Support					

Ceiling Support:

Checking the ceiling for Unistrut load on deck span. See excel calculation.

PLW3™ or W3 FORMLOK™

- 6½ in. TOTAL SLAB DEPTH
- Normal Weight Concrete
- 1 Hour Fire Rating



Maximum Unshored Clear Span (ft-in.)

Deck Gage	Number of Deck Spans		
	1	2	3
22	8'-10"	8'-5"	9'-6"
21	9'-7"	10'-3"	10'-9"
20	10'-3"	11'-0"	11'-5"
19	11'-2"	12'-2"	12'-8"
18	11'-6"	13'-3"	13'-6"
16	12'-2"	14'-9"	14'-2"

Concrete Properties

Density (pcf)	Uniform Weight (psf)	Uniform Volume (yd ³ /100 ft ²)	Compressive Strength, f' _c (psi)
145	60.4	1.543	3000

Notes:

1. Volumes and weights do not include allowance for deflection.
2. Weights are for concrete only and do not include weight of steel deck.
3. Total slab depth is nominal depth from top of concrete to bottom of steel deck.

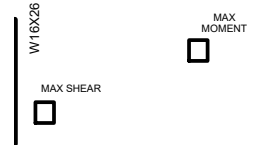
Shoring is required for spans greater than those shown above. See Footnote 1 on page 69 for required bearing.

Allowable Superimposed Loads (psf)

Deck Gage	Number of Deck Spans	Span (ft-in.)														
		8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"	13'-6"	14'-0"	15'-0"	16'-0"
22	1	331	299	215	192	171	153	138	124	111	100	90	81	73	59	47
	2	331	242	215	192	171	153	138	124	111	100	90	81	73	59	47
	3	331	242	215	192	171	153	138	124	111	100	90	81	73	59	47
21	1	357	323	293	268	189	170	153	138	125	113	102	92	83	68	55
	2	357	323	293	268	246	170	153	138	125	113	102	92	83	68	55
	3	357	323	293	268	246	170	153	138	125	113	102	92	83	68	55
20	1	381	345	313	286	263	185	167	151	137	124	113	102	93	77	63
	2	381	345	313	286	263	242	224	151	137	124	113	102	93	77	63
	3	381	345	313	286	263	242	224	151	137	124	113	102	93	77	63

PROJECT NAME: 2022.0193 - Angiography Room
 Description: Unistrut

 ENGINEER: CL
 DATE: 2022-05-31
Input Floor System Information

 Beam Size : **W16X26**
 Beam Spacing : **10.0 ft**
 Deck Span, I : **9.5 ft**
 Deck Profile : **W3**
 Deck Gauge : **0.0359**
 Concrete Thick Above Flutes, tc : **3.5 in**
 Thickness of Durable Topping, tt : **0.0 in**
 Concrete Type : **Light Weight**
 Concrete Strength, fc : **3000 psi**
 Span Condition : **Continuous**
 Design Deck Span : **10.0 ft**
 Deck Allowable Super. Load : **252 psf**
 Reinforcing Size : **#4**
 Reinforcing Spacing : **12.0 in**
 Reinforcing Strength, fy : **60 ksi**
 d : **1.00 in**
 As : **0.200 in²/ft**

Input Load Information

 Load Space Parallel to Flutes : **6 in**
 Load Space Perpendicular to Flutes : **12 in**
 LRFD Load Combination: **1.2D+1.6L**
 ASD Load Combination: **D+L**
Uniform Loads

	Unfactored	Factored
Uniform Dead Load :	20.0 psf	24.0 psf
Uniform Live Load :	100.0 psf	160.0 psf
Total :	120.0 psf	184.0 psf
Moment:	1500 ft-lbs/ft	2300 ft-lbs/ft
Shear:	600 lbs/ft	920 lbs/ft

Point Loads

	P1	P2	Total
Load Width:	12.0 in	12.0 in	
Load Length:	3.0 in	3.0 in	
Super Dead Load :	0 lbs.	0 lbs.	0 lbs.
Live Load :	900 lbs.	900 lbs.	1800 lbs.
E Load :	0 lbs.	0 lbs.	0 lbs.
P :	900 lbs.	900 lbs.	1800 lbs.
Pu :	1440 lbs.	1440 lbs.	2880 lbs.

Larger Load (Left)

 Load Width, bm : 19.0 in
 Effective Slab Width for Mmax, be : 34.6 in
 Effective Slab Width for Vmax, be : 18.6 in
 Location of Load for Mmax, x : 4.6 ft
 Location of Load for Vmax, x : 0.5 ft
 Distribution Parallel to Flutes, w : 33.1 in
 Weak Axis Moment, Mu : 100 in-lb/in
 Strong Axis Shear, Vu : 878 lbs/ft

Smaller Load (Right)

 Load Width, bm : 19.0 in
 Effective Slab Width for Mmax, be : 34.5 in
 Effective Slab Width for Vmax, be : 21.1 in
 Location of Load for Mmax, x : 5.1 ft
 Location of Load for Vmax, x : 1.0 ft
 Distribution Parallel to Flutes, w : 33.1 in
 Weak Axis Moment, Mu : 100 in-lb/in
 Strong Axis Shear, Vu : 731 lbs/ft

Weak Axis Moment Check UNITY

 Weak Axis ϕM_n : 733 in-lb/in **0.14** OK
 Mu : 100 in-lb/in

Strong Axis Shear and Moment Check UNITY

Allow. Strong Axis Moment (ASD):	2868 ft-lbs/ft	0.97	OK
One-Way Shear Capacity, ϕV_n :	6248 lbs/ft	0.40	OK
Punching Shear Capacity P1, ϕV_n :	25305 lbs.	0.06	OK
Punching Shear Capacity P2, ϕV_n :	25305 lbs.	0.06	OK
Maximum Moment :	2.780 kip-ft		
Equivalent Uniform Load :	244 psf	0.97	OK

Check for Large Load at Midspan Check Not Needed

Effective Slab Width for Mmax, be :	34.6 in		
Location of Load for Mmax, x :	4.8 ft		
Distribution Parallel to Flutes, w :	60.3 in		
Weak Axis Moment, Mu :	55 in-lb/in	0.08	OK
Strong Axis Moment, M (ASD) :	2111 ft-lbs/ft	0.74	OK

Maximum Total Loads

 M: 2780 ft-lbs/ft Vu: 2529 lbs/ft
 Mu: 4358 ft-lbs/ft
