FREY-MOSS STRUCTURES	JOB NO:	G20V36
Sheetz's Inc.	CALC BY:	A.R.
Modular Car Wash	DATE:	1/8/2021

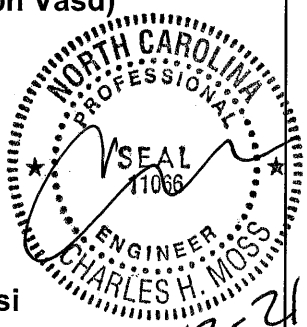
REVISED BY: REVISION DATE: FILE: bldg-v-1642-30-115-NC

STRUCTURAL CALCULATIONS

DESIGN LOADS

ROOF LIVE LOAD =	30	psf (Ground Snow Load = 5 psf)
ROOF DEAD LOAD =	6	psf
FLOOR LIVE LOAD =	100	psf
FLOOR DEAD LOAD BAY =	45	psf
FLOOR DEAD LOAD EQUIPMENT =	30	psf
POINT LOAD FROM VEHICLE =	2.25	kips
WIND SPEED =	115	mph Vult (89 mph Vasd)
EXPOSURE =	C	
SITE CLASS =	D	
SEISMIC DESIGN CATEGORY =	A	

C.H. MOSS, P.E.
P.O. BOX 28
COVINGTON, GA 30015



1-13-21

STRUCTURAL MATERIAL

STRUCTURAL STEEL ASTM A-36-05 Fy = 36 ksi
W-SHAPE STEEL ASTM A-992-06a Fy = 50 ksi
TUBULAR STEEL ASTM A-500-07 GRADE B Fy = 46 ksi
ROOF DECK ASTM A-653-07 Fy = 50 ksi
BOLTS ASTM A-307-04e01 Ft = 20 ksi Fv = 10 ksi
ANCHOR BOLTS A-307 -04e01 Fu = 58 ksi

REFERENCES

MANUAL OF STEEL CONSTRUCTION AISC (ASD) 15th Edition
INCLUDING - AISI/AISC 360-10
SPECIFICATION FOR THE DESIGN OF COLD-FORMED
STEEL MEMBERS - AISI S100-12
2015 INTERNATIONAL BUILDING CODE
ASCE 7-10

ROOF DECK CALCULATION

CEILING DECK CALCULATION::

Note: Ceiling deck supports 24 GA Roof Decking

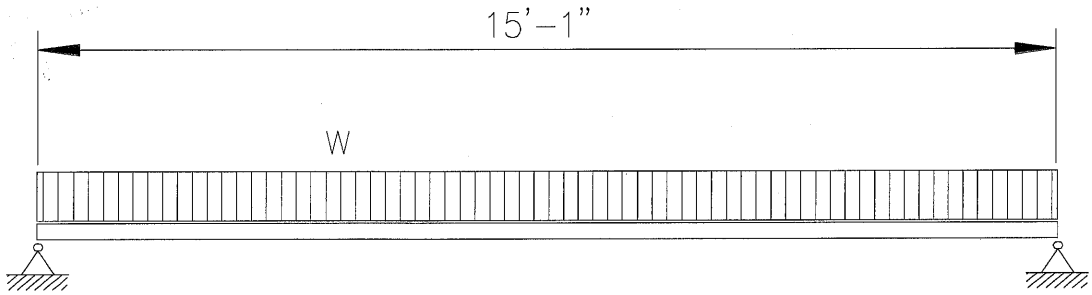
LL= **30** psf
DL= **6** psf
w= **42.0** #/ft (per (1) 14" panels)

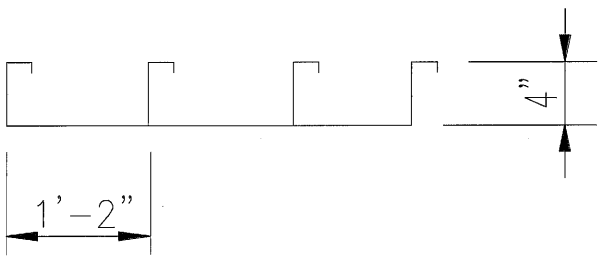
try 20 ga roof deck w/4" deep deck ribs

Mmax(+)= **14.33** in-kips
Mmax(-)= **0.00** in-kips

fb= **21.89** ksi < allowable=30 ksi o.k

use 20 ga roof deck w/4" deep deck ribs
see last sheets of calculations for panel properties.





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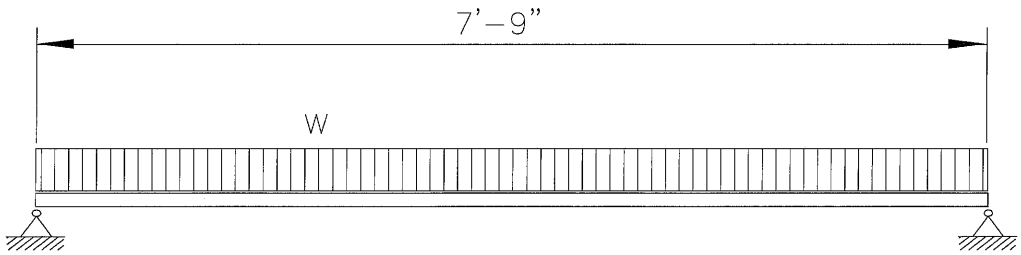
ROOF DECK CALCULATION

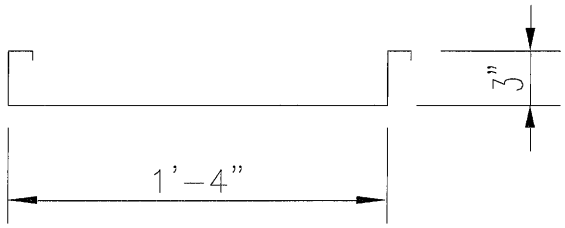
CEILING DECK CALCULATION::

Note: Ceiling deck supports 20 GA Roof Decking

LL=	**30**	psf
DL=	**6**	psf
w=	**47.9**	#/ft(per 16" panel)
Mmax(+)=	**4.32**	in-kips
Mmax(-)=	**0.00**	in-kips
fb=	**13.92**	ksi < allowable=30 ksi o.k

** use **20 ga** roof deck **
see next to last sheet for panel properties.





PANEL SECTION

FREY-MOSS STRUCTURES	JOB NO:	G20V36
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CAR WASH ROOF BEAM RB1

dead load = **6** psf end L= **0.00** ft
live load = **30** psf span L= **13** ft

beam carries **8.0** ft tributary width w= **288** # / ft

end defl= **0** in/ 100^4 span defl= **0.004** in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(240)(100)/(Lx12) = **1** in^4

try **C5x6.7** Ix (in^4)= **7.49** S (in^3)= **3** **R1=1.87k**

unbraced -L (in) =	**16**	unbraced -L (in) =	**16**	
(-)Mmax (k-in) =	**25.83**	(+)Mmax (k-in) =	**13.16**	**R2=3.23k**
(-)Fb(ksi)=	**23.8**	(+)Fb(ksi)=	**23.8**	
(-)fb(ksi)=	**8.6**	(+)fb(ksi)=	**4.4**	

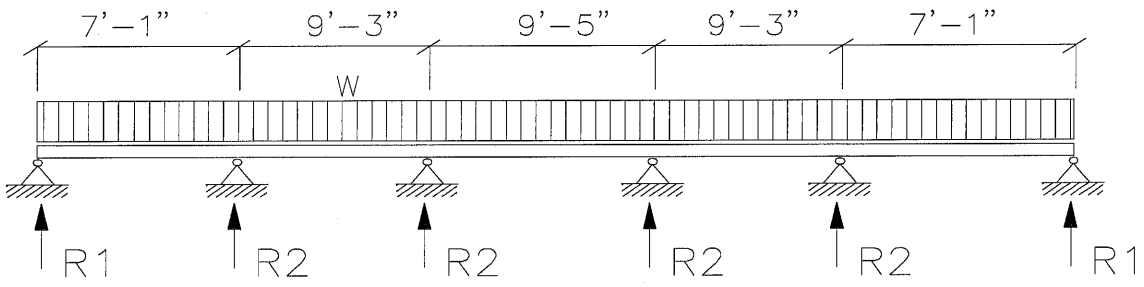
target deflections:(in)

end due to DL+LL =L/180=	**0.00**	span due to DL+LL =L/240=	**0.65**
end due to DL =L/540=	**0.00**	span due to DL =L/720=	**0.22**

actual deflections:(in)

end due to DL+LL =	**0.00**	span due to DL+LL =	**0.05**
end due to DL =	**0.00**	span due to DL =	**0.01**

Use C5x6.7 with Zero Flange Brace(s) per Span



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CAR WASH ROOF BEAM RB2

dead load =	6	psf	end L=	0.00	ft
live load =	30	psf	span L=	10	ft

beam carries **1.3** ft tributary width w= **48** # / ft

end defl=	0	in/ 100^4	span defl=	0.00113	in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(240)(100)/(Lx12) = **0** in^4

try **C5X6.7** Ix (in^4)= **7.49** S (in^3)= **3** **R1=1.73k**

unbraced -L (in) =	16	unbraced -L (in) =	16
(-)Mmax (k-in) =	4.18	(+)Mmax (k-in) =	3.02
(-)Fb(ksi)=	23.8	(+)Fb(ksi)=	23.8
(-)fb(ksi)=	1.4	(+)fb(ksi)=	1.0

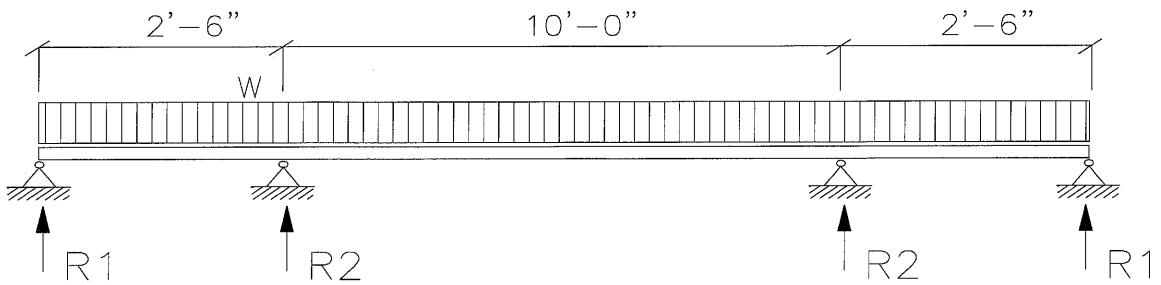
target deflections:(in)

end due to DL+LL =L/180=	0.00	span due to DL+LL =L/240=	0.50
end due to DL =L/540=	0.00	span due to DL =L/720=	0.17

actual deflections:(in)

end due to DL+LL =	0.00	span due to DL+LL =	0.02
end due to DL =	0.00	span due to DL =	0.00

Use C5X6.7 with Zero Flange Brace(s) per Span



FREY-MOSS STRUCTURES	JOB NO:	G20V36
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EQUIPMENT ROOF BEAM: RB3

dead load =	6	psf	end L=	0.00	ft
live load =	30	psf	span L=	11	ft
beam carries	4.0	ft tributary width w=	144	# / ft	
end defl=	0	in/ 100^4	span defl=	0.002	in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(240)(100)/(Lx12) = **0** in^4

try **C5X6.7** Ix (in^4)= **7.49** S (in^3)= **3** **R =1.37k**

unbraced -L (in) =	**16**	unbraced -L (in) =	**16**
(-)Mmax (k-in) =	**0**	(+)Mmax (k-in) =	**13.1**
(-)Fb(ksi)=	**23.8**	(+)Fb(ksi)=	**23.8**
(-)fb(ksi)=	**0.0**	(+)fb(ksi)=	**4.4**

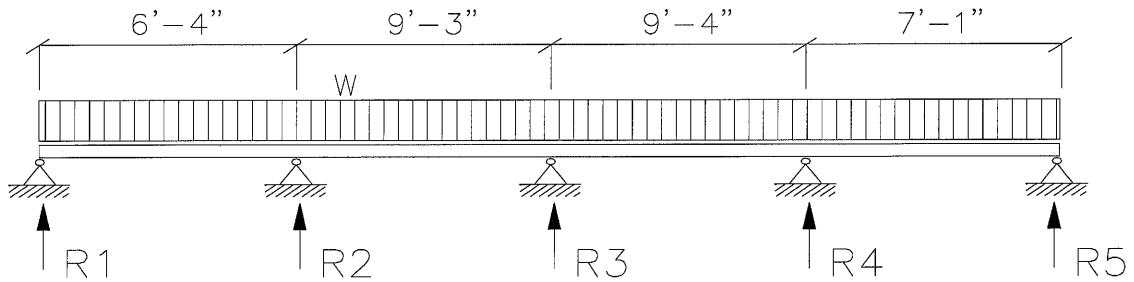
target deflections:(in)

end due to DL+LL =L/180=	**0.00**	span due to DL+LL =L/240=	**0.55**
end due to DL =L/540=	**0.00**	span due to DL =L/720=	**0.18**

actual deflections:(in)

end due to DL+LL =	**0.00**	span due to DL+LL =	**0.03**
end due to DL =	**0.00**	span due to DL =	**0.00**

Use C5X6.7 with Zero Flange Brace(s) per Span



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EQUIPMENT ROOF BEAM: RB4

dead load =	**6**	psf	end L=	**0.00**	ft
live load =	**30**	psf	span L=	**7.75**	ft

beam carries **2.0** ft tributary width w= **72** # / ft

end defl=	**0**	in/ 100^4	span defl=	**0.002**	in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(240)(100)/(Lx12) = **1** in^4

try **C5X6.7** Ix (in^4)= **7.49** S (in^3)= **3** **R1=0.22k**

unbraced -L (in) =	**16**	unbraced -L (in) =	**16**
(-)Mmax (k-in) =	**0**	(+)Mmax (k-in) =	**6.49**
(-)Fb(ksi)=	**23.8**	(+)Fb(ksi)=	**23.8**
(-)fb(ksi)=	**0.0**	(+)fb(ksi)=	**2.2**

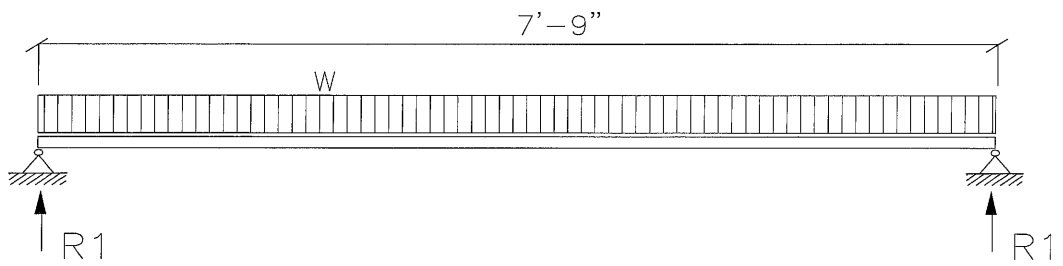
target deflections:(in)

end due to DL+LL =L/180=	**0.00**	span due to DL+LL =L/240=	**0.39**
end due to DL =L/540=	**0.00**	span due to DL =L/720=	**0.13**

actual deflections:(in)

end due to DL+LL =	**0.00**	span due to DL+LL =	**0.03**
end due to DL =	**0.00**	span due to DL =	**0.00**

Use C5X6.7 with Zero Flange Brace(s) per Span



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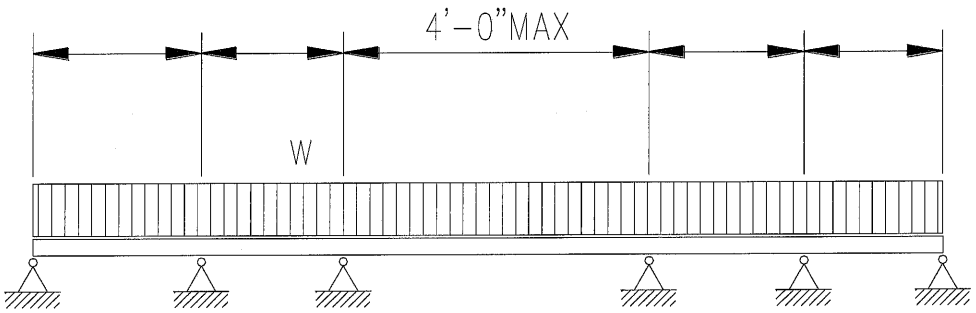
FLOOR DECK CALCULATION

FLOOR DECK CALCULATION::

LL= **100** psf
DL= **45** psf
TL = **145.0** psf

Maximum Load Allowed = **153** psf o.k
Per F-Deck Properites Chart
22 GA with 3-Span Min.

Use 22 GA F-Deck



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CAR WASH FLOOR PURLIN: FP1

dead load =	**45**	psf	end L=	**0.00**	ft
live load =	**100**	psf	span L=	**15.1**	ft

beam carries **3.3** ft tributary width w= **479** # / ft

end defl=	**0**	in/ 100^4	span defl=	**0.08**	in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(360)(100)/(Lx12) = **16** in^4

try **W6 x 15** Ix (in^4)= **29.1** S (in^3)= **9.72** **R1=3.26k**

unbraced -L (in) =	**16**	unbraced -L (in) =	**16**
(-)Mmax (k-in) =	**0**	(+)Mmax (k-in) =	**164**
(-)Fb(ksi)=	**23.8**	(+)Fb(ksi)=	**23.8**
(-)fb(ksi)=	**0.0**	(+)fb(ksi)=	**16.8**

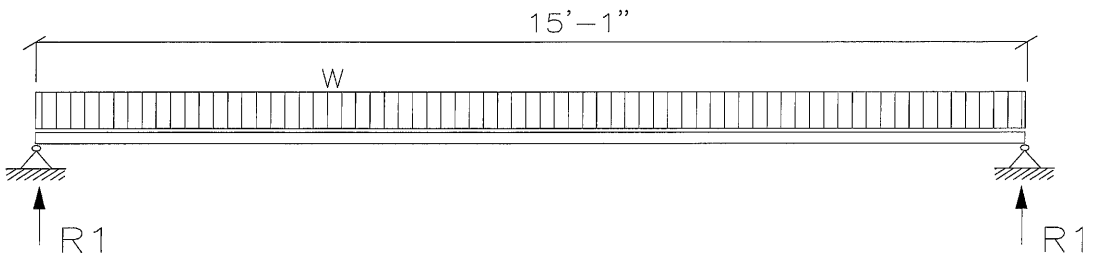
target deflections:(in)

end due to DL+LL =L/180=	**0.00**	span due to DL+LL =L/360=	**0.50**
end due to DL =L/540=	**0.00**	span due to DL =L/720=	**0.25**

actual deflections:(in)

end due to DL+LL =	**0.00**	span due to DL+LL =	**0.28**
end due to DL =	**0.00**	span due to DL =	**0.09**

Use W6 x 15 with Zero Flange Brace(s) per Span



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CAR WASH FLOOR PURLIN: FP1

dead load =	**45**	psf	P1 =	**2.25**	kips
live load =	**0**	psf	span L=	**15.1**	ft
beam carries	**3.3**	ft tributary width w=	**149**	# / ft	
end defl=	**0**	in/ 100^4	span defl=	**0.08**	in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(240)(100)/(Lx12) = **10** in^4

try **W6 x 15** Ix (in^4)= **29.1** S (in^3)= **9.72** **R1=3.35k**

unbraced -L (in) =	**16**	unbraced -L (in) =	**16**
(-)Mmax (k-in) =	**0**	(+)Mmax (k-in) =	**167**
(-)Fb(ksi)=	**23.8**	(+)Fb(ksi)=	**23.8**
(-)fb(ksi)=	**0.0**	(+)fb(ksi)=	**17.2**

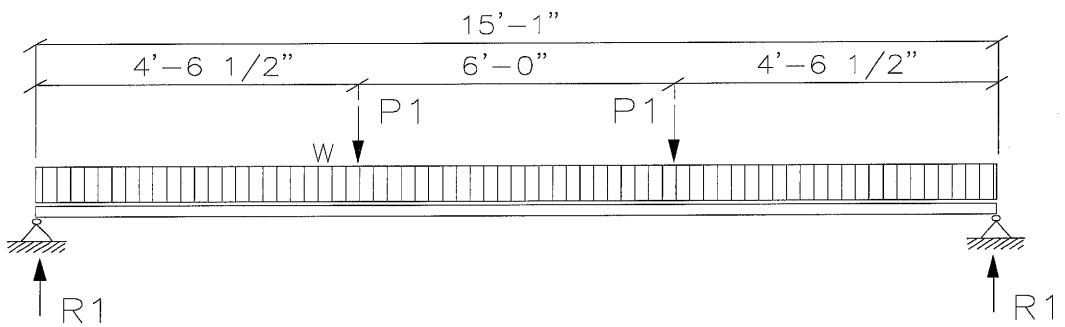
target deflections:(in)

end due to DL+LL =L/180=	**0.15**	span due to DL+LL =L/360=	**0.50**
end due to DL =L/540=	**0.05**	span due to DL =L/720=	**0.25**

actual deflections:(in)

end due to DL+LL =	**0.00**	span due to DL+LL =	**0.27**
end due to DL =	**0.00**	span due to DL =	**0.27**

Use W6 x 15 with Zero Flange Brace(s) per Span



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EQUIPMENT FLOOR PURLIN: FP2

The purlins calculated using the vehicle point loads are slightly higher than with just the 100 psf live load. If all purlins are loaded with 100 psf live load this will put much more load into side channels

dead load =	**30**	psf	end L=	**0.00**	ft
live load =	**100**	psf	span L=	**7.75**	ft
beam carries	**4.0**	ft tributary width w=	**520**	# / ft	

end defl=	**0**	in/ 100^4	span defl=	**0.015**	in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(240)(100)/(Lx12) = **4** in^4

try **W6 x 9** Ix (in^4)= **16.4** S (in^3)= **5.56** **R1=1.73k**

unbraced -L (in) =	**16**	unbraced -L (in) =	**16**
(-)Mmax (k-in) =	**0.00**	(+)Mmax (k-in) =	**46.85**
(-)Fb(ksi)=	**23.8**	(+)Fb(ksi)=	**23.8**
(-)fb(ksi)=	**0.0**	(+)fb(ksi)=	**8.4**

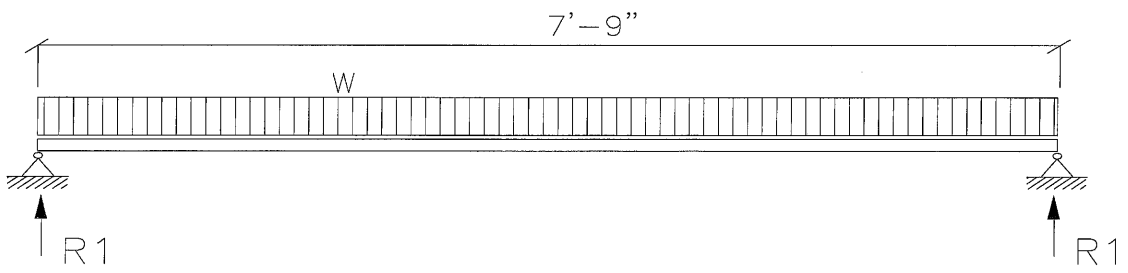
target deflections:(in)

end due to DL+LL =L/180=	**0.00**	span due to DL+LL =L/360=	**0.26**
end due to DL =L/540=	**0.00**	span due to DL =L/720=	**0.13**

actual deflections:(in)

end due to DL+LL =	**0.00**	span due to DL+LL =	**0.09**
end due to DL =	**0.00**	span due to DL =	**0.02**

Use W6 x 9 with Zero Flange Brace(s) per Span



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CAR WASH FLOOR BEAM: FB1

dead load =	**45**	psf	end L=	**0.00**	ft
live load =	**100**	psf	span L=	**11**	ft

beam carries **8.0** ft tributary width w= **1160** # / ft

end defl=	**0**	in/ 100^4	span defl=	**0.066**	in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(240)(100)/(Lx12) = **12** in^4

try **C12X20.7** Ix (in^4)= **129** S (in^3)= **21.5** **R =14.4k**

unbraced -L (in) =	**48**	unbraced -L (in) =	**48**
(-)Mmax (k-in) =	**176**	(+)Mmax (k-in) =	**123**
(-)Fb(ksi)=	**23.8**	(+)Fb(ksi)=	**23.8**
(-)fb(ksi)=	**8.2**	(+)fb(ksi)=	**5.7**

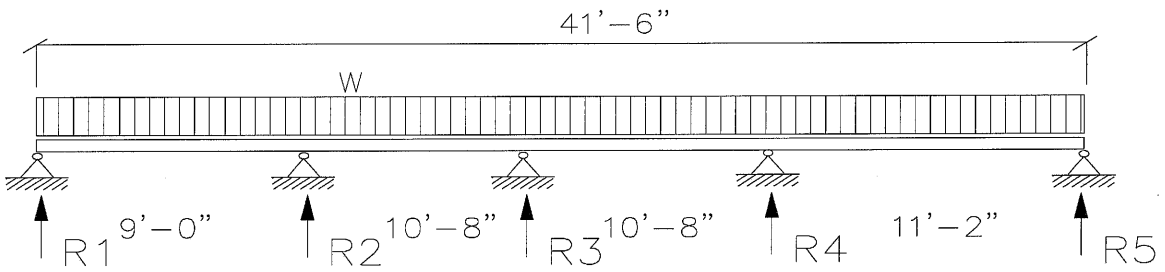
target deflections:(in)

end due to DL+LL =L/180=	**0.00**	span due to DL+LL =L/360=	**0.37**
end due to DL =L/540=	**0.00**	span due to DL =L/720=	**0.18**

actual deflections:(in)

end due to DL+LL =	**0.00**	span due to DL+LL =	**0.05**
end due to DL =	**0.00**	span due to DL =	**0.02**

Use C12X20.7 with Zero Flange Brace(s) per Span



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EQUIPMENT FLOOR BEAM: FB2

dead load =	**30**	psf	end L=	**2.00**	ft
live load =	**100**	psf	span L=	**11**	ft

beam carries **4.0** ft tributary width w= **520** # / ft

end defl= **0** in/ 100^4 span defl= **0.024** in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(240)(100)/(Lx12) = **4** in^4

try **C12X20.7** Ix (in^4)= **129** S (in^3)= **21.5** **R1 =2.16 k**

unbraced -L (in) =	**16**	unbraced -L (in) =	**48**	
(-)Mmax (k-in) =	**72**	(+)Mmax (k-in) =	**50**	**R2 =6.16 k**
(-)Fb(ksi)=	**23.8**	(+)Fb(ksi)=	**23.8**	
(-)fb(ksi)=	**3.3**	(+)fb(ksi)=	**2.3**	

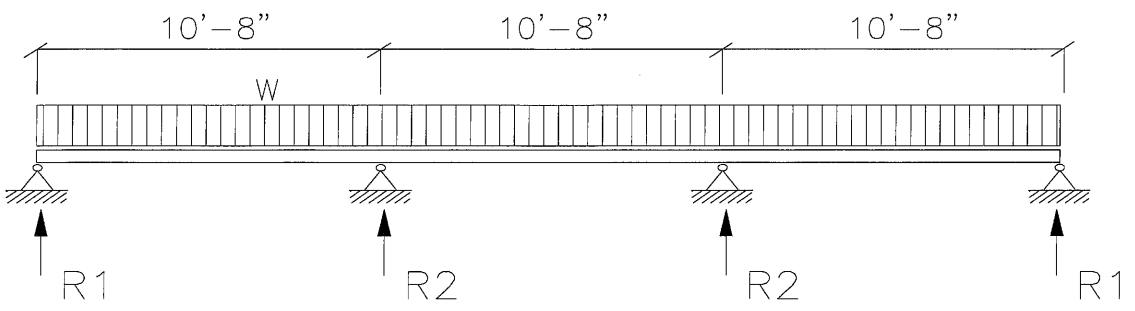
target deflections:(in)

end due to DL+LL =L/360=	**0.07**	span due to DL+LL =L/360=	**0.37**
end due to DL =L/540=	**0.04**	span due to DL =L/720=	**0.18**

actual deflections:(in)

end due to DL+LL =	**0.00**	span due to DL+LL =	**0.02**
end due to DL =	**0.00**	span due to DL =	**0.00**

Use C12X20.7 with Zero Flange Brace(s) per Span



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CARWASH FLOOR BEAM: FB3

dead load =	**45**	psf	end L=	**0.00**	ft
live load =	**100**	psf	span L=	**15.1**	ft
beam carries	**2.0**	ft tributary width w=	**290**	# / ft	
end defl=	**0**	in/ 100^4	span defl=	**0.116974**	in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(240)(100)/(Lx12) = **15** in^4

try	**C12X20.7**	Ix (in^4)=	**129**	S (in^3)=	**21.5**	**R1=2.18k**
	unbraced -L (in) =	**16**		unbraced -L (in) =	**12**	
	(-)Mmax (k-in) =	**0**		(+)Mmax (k-in) =	**99.18**	
	(-)Fb(ksi)=	**23.8**		(+)Fb(ksi)=	**23.8**	
	(-)fb(ksi)=	**0.0**		(+)fb(ksi)=	**4.6**	

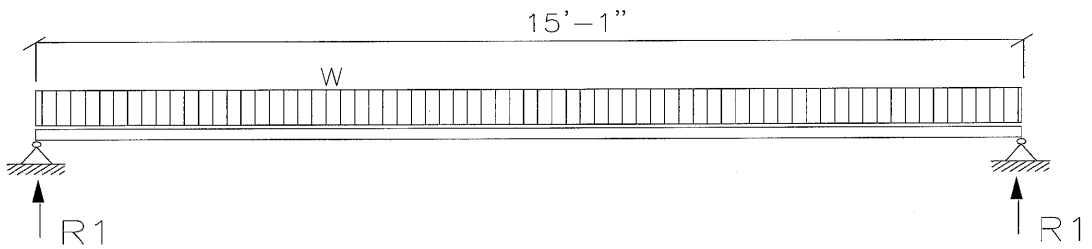
target deflections:(in)

end due to DL+LL =L/180=	**0.00**	span due to DL+LL =L/360=	**0.50**
end due to DL =L/540=	**0.00**	span due to DL =L/720=	**0.25**

actual deflections:(in)

end due to DL+LL =	**0.00**	span due to DL+LL =	**0.09**
end due to DL =	**0.00**	span due to DL =	**0.03**

Use C12X20.7



CARWASH FLOOR BEAM: FB3

dead load =	**45**	psf	P1 =	**2.25**	kips
live load =	**0**	psf	span L=	**15.1**	ft

beam carries **2.0** ft tributary width w= **90** # / ft

end defl=	**0**	in/ 100^4	span defl=	**0.17**	in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(240)(100)/(Lx12) = **23** in^4

try **C12X20.7** Ix (in^4)= **129** S (in^3)= **21.5** **R1=2.91k**

unbraced -L (in) =	**16**	unbraced -L (in) =	**12**
(-)Mmax (k-in) =	**0**	(+)Mmax (k-in) =	**147.00**
(-)Fb(ksi)=	**23.8**	(+)Fb(ksi)=	**23.8**
(-)fb(ksi)=	**0.0**	(+)fb(ksi)=	**6.8**

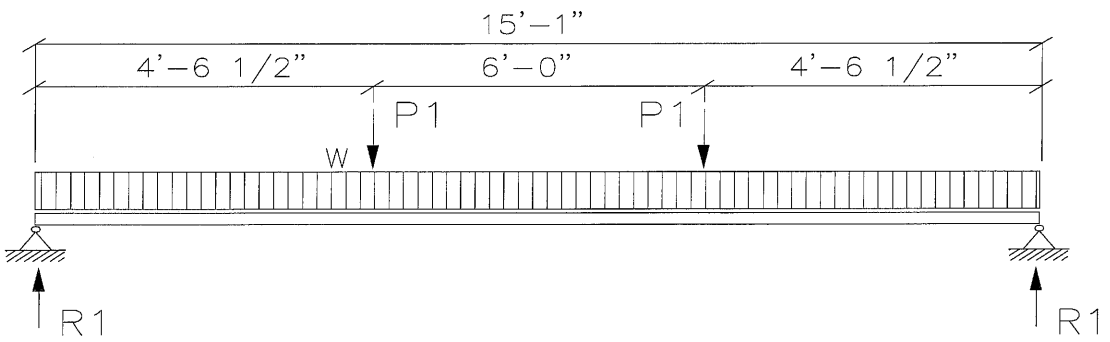
target deflections:(in)

end due to DL+LL =L/180=	**0.15**	span due to DL+LL =L/360=	**0.50**
end due to DL =L/540=	**0.05**	span due to DL =L/720=	**0.25**

actual deflections:(in)

end due to DL+LL =	**0.00**	span due to DL+LL =	**0.13**
end due to DL =	**0.00**	span due to DL =	**0.13**

Use C12X20.7



FREY-MOSS STRUCTURES	JOB NO:	G20V36
Sheetz's Inc.	CALC BY:	A.R.
Modular Car Wash	DATE:	1/8/2021

EQUIPMENT FLOOR BEAM: FB4

dead load =	**45**	psf	end L=	**0.00**	ft
live load =	**100**	psf	span L=	**7.75**	ft

beam carries **2.0** ft tributary width w= **290** # / ft

end defl=	**0**	in/ 100^4	span defl=	**0.008**	in/ 100^4

target end Ix= defl(180)(100)/(Lx12) = **0** in^4
target span Ix= defl(240)(100)/(Lx12) = **2** in^4

try **C7 x 9.8** Ix (in^4)= **21.3** S (in^3)= **6.08** **R1=.87k**

unbraced -L (in) =	**16**	unbraced -L (in) =	**16**
(-)Mmax (k-in) =	**0**	(+)Mmax (k-in) =	**26.13**
(-)Fb(ksi)=	**23.8**	(+)Fb(ksi)=	**23.8**
(-)fb(ksi)=	**0.0**	(+)fb(ksi)=	**4.3**

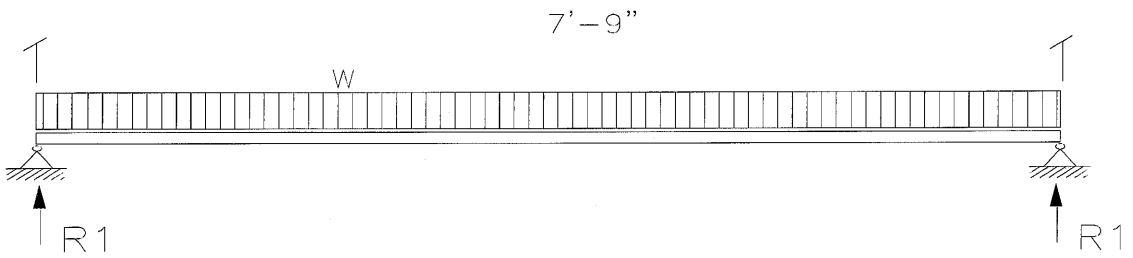
target deflections:(in)

end due to DL+LL =L/180=	**0.00**	span due to DL+LL =L/240=	**0.39**
end due to DL =L/540=	**0.00**	span due to DL =L/720=	**0.13**

actual deflections:(in)

end due to DL+LL =	**0.00**	span due to DL+LL =	**0.04**
end due to DL =	**0.00**	span due to DL =	**0.01**

Use C7 x 9.8 with Zero Flange Brace(s) per Span



WIND & SEISMIC ANALYSIS

wind analysis: refer 2015 INTERNATIONAL BUILDING CODE

height to top of structure =	11.83	ft
wind speed =	115	mph
Importance factor, I =	1.00	
Adjustment Factor (λ) for exposure C =	1.21	
Per figure 28.6-1 Zone A =	21	psf
Per figure 28.6-1 Zone C =	13.9	psf
Load Factor from ASCE 2.4.1 for all cases =	0.6	
design wind force (zone A) = Wind Load X 1.0 X 1.21 X 0.6 =	**15.25**	psf
design wind force (zone C) = Wind Load X 1.0 X 1.21 X 0.6 =	**10.09**	psf
Wind Load on the Side of Building =	**11.07**	psf
Use Minimum Wind Speed per code =	**16.00**	psf

seismic analysis: refer 2015 INTERNATIONAL BUILDING CODE

From Figure 22-1 Ss =	0.062 g
From Figure 22-2 S1 =	0.034 g

From Section 11.4.2 The Site Class D has been selected

From table 11.4-1 Fa =	1.6
From table 11.4-2 Fv =	2.4
Seismic Occupancy Catagory from Table 1-1	1
SMS = Fa x Ss =	0.0992
SM1 = Fv x S1 =	0.08
SDS = 2/3 SMS =	0.07
SD1 = 2/3 SM1 =	0.0544
Seismic Design Category	A
Response Modification Factor from Table 12.2-1.G.1	2.5

WIND & SEISMIC ANALYSIS

seismic analysis continued:

Per Section 12.14.8 the Simplified Analysis has been selected

Equation 12.14-11 shows $V = 1.2 \times S_{DS} / R \times W$

W = (12 psf dead load + 42' Length X 24' Width
= **6.05** kips

Reaction from Seismic at top of building = V = 0.192 kips

moment from wind load:

Tributary height of wall for wind = **6.33** ft

Reaction from wind (Rw) = Tribuatry height (L) (F) = **4.25** kips

Reaction from Wind is greater than from Seismic - Use **4.25** kips

Force taken by shear wall (Fs) = Length of Wall X 181 #/ft = **4.34** kips

Force per Column = (Rw - Fs) / # Columns = **0.00** kips

Moment in column = Force X Height = **0.00** ft-kips

FREY-MOSS STRUCTURES	JOB NO:	G20V36
Sheetz's Inc.	CALC BY:	A.R.
Modular Car Wash	DATE:	1/8/2021

COLUMN CALCULATION

Column Selection:

Try **TS 3 x 3 x 3/16" Columns**

Sx =	1.73 in^3	A =	2.02 in^2	r =	1.13 in
Ix =	2.6 in^4	K =	1.2	Height =	11 ft
KH/r =	140.18	Fa =	7.60 ksi	Fe=	7.60 ksi
		Fb =	27.6 ksi		

Column Calculation at Rigid Frame:

Wind Moment is Greater

Load Combination : DL + LL + WL

P = DL + LL = 3.23 kips

fa=P/A = 1.60 ksi fa/Fa= 0.21

AISC EQ.H1-1 APPLIED

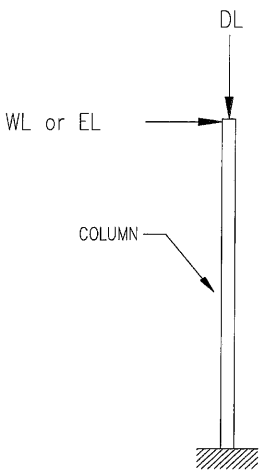
Maximum Moment= 0.00 ft-kips

fb = Moment*12/Sx = 0.00

Use Equation H1-1 = Cm (fb) / [Fb (1- fa/Fe)] = 0.00 ksi

fa/Fa + fb/Fb = **0.21** < 1.00 0.k.

*****USE TS 3 x 3 x 3/16" FOR COLUMN *****



FREY-MOSS STRUCTURES	JOB NO:	G20V36
Sheetz's Inc.	CALC BY:	A.R.
Modular Car Wash	DATE:	1/8/2021

OPTIONAL COLUMN CALCULATION

Column Selection:

Try **TS 3 x 3 x 14 GA Columns**

Sx =	0.9 in^3	A =	0.95 in^2	r =	1.18 in
Ix =	1.33 in^4	K =	1.2	Height =	11 ft
KH/r =	140.18	Fa =	7.60 ksi	Fe=	7.60 ksi
		Fb =	27.6 ksi		

Column Calculation at Rigid Frame:

Wind Moment is Greater

Load Combination : DL + LL + WL

P = DL + LL = 3.23 kips

fa=P/A = 3.40 ksi fa/Fa= 0.41

AISC EQ.H1-1 APPLIED

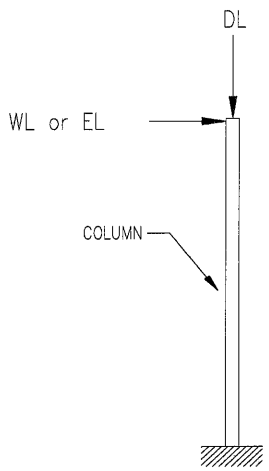
Maximum Moment= 0.00 ft-kips

fb = Moment*12/Sx = 0.00

Use Equation H1-1 = Cm (fb) / [Fb (1- fa/Fe)] = 0.00 ksi

fa/Fa + fb/Fb = **0.41** < 1.00 0.k.

*****USE TS 3 x 3 x 14 GA FOR COLUMN *****



OPTIONAL COLUMN CALCULATION

Column Selection:

Try **TS 3 x 2 x 14 GA Columns**

Sx =	0.65 in^3	A =	0.78 in^2	r =	1.12 in
Ix =	0.98 in^4	K =	1.2	Height =	11 ft
KH/r =	140.18	Fa =	7.60 ksi	Fe=	7.60 ksi
		Fb =	27.6 ksi		

Column Calculation at Rigid Frame:

Wind Moment is Greater

Load Combination : DL + LL + WL

P = DL + LL = 3.23 kips

fa=P/A = 4.14 ksi fa/Fa= 0.55

AISC EQ.H1-1 APPLIED

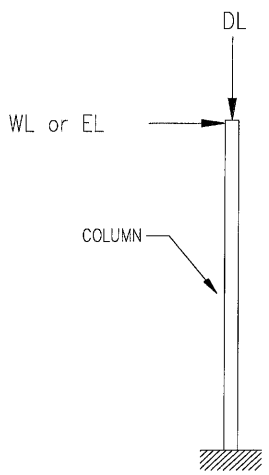
Maximum Moment= 0.00 ft-kips

fb = Moment*12/Sx = 0.00

Use Equation H1-1 = Cm (fb) / [Fb (1- fa/Fe)] = 0.00 ksi

fa/Fa + fb/Fb = **0.55** < 1.00 0.k.

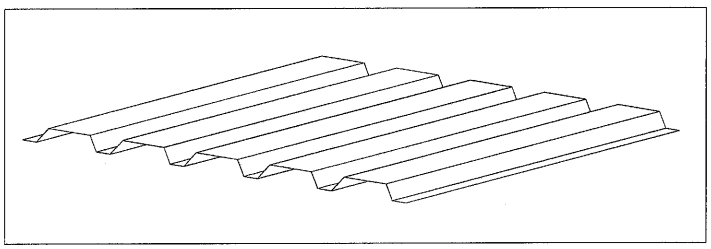
*****USE TS 3 x 2 x 14 GA FOR COLUMN *****

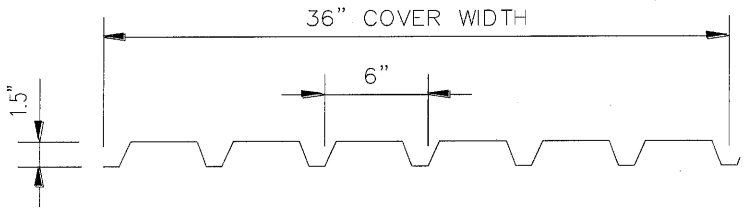


F—DECK FOR FLOOR

SECTION PROPERTIES TABLE

	22 GAGE	20 GAGE	18 GAGE	16 GAGE
DESIGN THICKNESS	.0299	.0359	.0478	.0598
WEIGHT – ptd.	1.6	1.9	2.6	3.2
WEIGHT – galv.	1.7	2.0	2.7	3.3
I_p in^4	.133	.170	.246	.316
S_p in^3	.136	.167	.231	.294
I_n in^4	.158	.189	.252	.316
S_n in^3	.147	.178	.238	.298



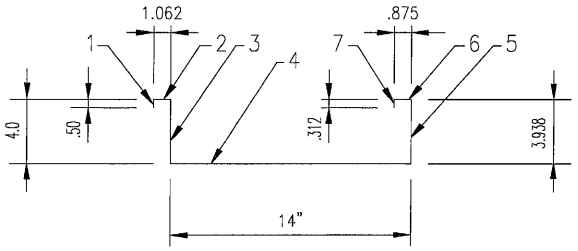


UNIFORM LOAD TABLE (lbs/ft^2)

	SINGLE SPAN				DOUBLE SPAN				TRIPLE SPAN			
	22 GAGE	20 GAGE	18 GAGE	16 GAGE	22 GAGE	20 GAGE	18 GAGE	16 GAGE	22 GAGE	20 GAGE	18 GAGE	16 GAGE
4'–0"	113	139	193	245	123	148	198	248	153	185	248	310
4'–6"	90	110	152	194	97	117	157	196	121	147	196	245
5'–0"	73	89	123	157	78	95	127	159	98	119	159	199
5'–6"	60	74	102	130	65	78	105	131	81	98	131	164
6'–0"	50	62	85	106	54	66	88	110	68	82	110	138
6'–6"	42	51	69	86	46	56	75	94	58	70	94	118
7'–0"	35	43	57	70	40	48	65	81	50	61	81	101
7'–6"	31	36	48	59	35	42	56	71	44	53	71	88
8'–0"	27	32	42	51	31	37	50	62	38	46	62	78
8'–6"		28	36	44	27	33	44	55	34	41	55	69
9'–0"		25	32	38		29	39	49	30	37	49	61
9'–6"			29	34		26	35	44	27	33	44	55
10'–0"			26	31			32	40		30	40	49
10'–6"				28			29	36		27	36	44
11'–0"				26			26	33		25	33	39
Maximum Spans and Cantilevers for Construction Maintenance Loads												
SPAN	4'–6"	5'–6"	7'–1"	8'–0"	5'–6"	6'–8"	8'–3"	9'–4"	5'–7"	6'–10"	8'–4"	9'–6"
CANT.	1'–1"	1'–4"	1'–9"	2'–3"	1'–1"	1'–4"	1'–9"	2'–3"	1'–1"	1'–4"	1'–9"	2'–3"

FREY-MOSS STRUCTURES	JOB NO:	G20V36
Sheetz's Inc.	CALC BY:	A.R.
Modular Car Wash	DATE:	1/8/2021

20 GA. CARWASH CEILING DECK



Fy = 50,000 PSI
Fb = 30,000 PSI
t = .036 in

Calculation Taken from From "AISI Cold Formed Steel Design" 2007 Edition - Section 3.5 & 3.6

	POSITIVE BENDING					NEGATIVE BENDING				
Member	A	Y	AY	AY2	I	A	Y	AY	AY2	I
1	0.50	3.75	1.88	7.03	0.01	0.50	3.75	1.88	7.03	0.01
2	0.99	3.98	3.94	15.70	0.00	0.99	3.98	3.94	15.70	0.00
3	4.00	2.00	8.00	16.00	5.33	4.00	2.00	8.00	16.00	5.33
4	13.93	0.02	0.25	0.00	0.00	1.61	0.02	0.03	0.00	0.00
5	3.94	1.97	7.75	15.27	5.09	3.94	1.97	7.75	15.27	5.09
6	0.80	3.92	3.15	12.34	0.00	0.80	3.92	3.15	12.34	0.00
7	0.31	3.78	1.18	4.46	0.00	0.31	3.78	1.18	4.46	0.00
Totals	24.47		26.15	70.80	10.44	12.15		25.93	70.80	10.44

Determine Effective Width Using Equation B2.1-1 through B2.1-5

Check Compression Members

w/t = 0.990/0.036 = 28 < 30 OK

w/t = 13.928/0.036 = 387 > 30

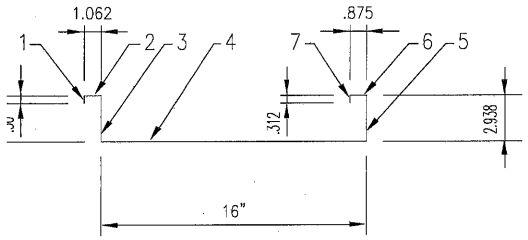
Calculate Effective Width of Compression Flange

b = p X w = 0.101 X 0.036 = 1.611 in

Ybar = 26.150/24.471 = 1.069
C = 4.000 - 1.069 = 2.931
I = 10.437 + 70.803 - 24.471(1.069)^2
I = 53.297 x t = 53.297 x 0.036
I = 1.919 in^4
S = 1.919 / 2.931
S = 0.655 in^3

Ybar = 25.928/12.154 = 2.133
C = 4.000 - 2.133 = 1.867
I = 10.436 + 70.799 - 12.154(2.133)^2
I = 25.923 x t = 25.923 x 0.036
I = 0.933 in^4
S = 0.933 / 1.867
S = 0.500 in^3

20 GA Equipment Ceiling/ All Wall Deck - 3" Tall



Fy = 50,000
Fb = 30,000
t = .036 in

Calculation Taken from From "AISI Cold Formed Steel Design" 2007 Edition - Section 3.5 & 3.6

	POSITIVE BENDING					NEGATIVE BENDING				
Member	A	Y	AY	AY2	I	A	Y	AY	AY2	I
1	0.500	2.750	1.375	3.781	0.010	0.500	2.750	1.375	3.781	0.010
2	0.990	2.982	2.952	8.803	0.000	0.990	2.982	2.952	8.803	0.000
3	3.000	1.500	4.500	6.750	2.250	3.000	1.500	4.500	6.750	2.250
4	15.928	0.018	0.287	0.005	0.002	1.611	0.018	0.029	0.001	0.000
5	2.938	1.469	4.316	6.340	2.113	2.938	1.469	4.316	6.340	2.113
6	0.803	2.920	2.345	6.847	0.000	0.803	2.920	2.345	6.847	0.000
7	0.312	2.782	0.868	2.415	0.003	0.312	2.782	0.868	2.415	0.003
Totals	24.471		16.643	34.941	4.378	10.154		16.385	34.937	4.377

Determine Effective Width Using Equation B2.1-1 through B2.1-5
From 2001 AISI Standard with 2004 Supplement

Check Compression Members
w/t = 0.990/0.036 = 28 < 30 OK

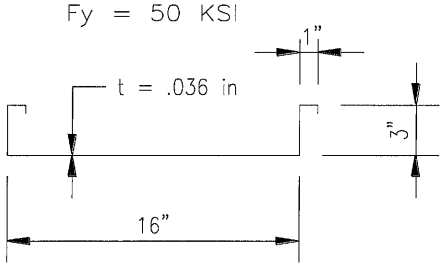
w/t = 15.928/0.036 = 442 > 30

Calculate Effective Width of Compression Flange
b = p X w = 0.101 X 0.036 = 1.611 in

Ybar = 16.643/24.471 = 0.680
C = 3.000 - 0.680 = 2.320
I = 4.378 + 34.941 - 24.471(0.680)^2
I = 28.001 x t = 28.001 x 0.036
I = 1.008 in^4
S = 1.008 / 2.320
S = 0.435 in^3

Ybar = 16.385/10.154 = 1.614
C = 3.000 - 1.614 = 1.386
I = 4.377 + 34.937 - 10.154(1.614)^2
I = 12.874 x t = 12.874 x 0.036
I = 0.463 in^4
S = 0.463 / 1.386
S = 0.334 in^3

Fy = 50 KSI



(3.4.1) SHEAR STRESS IN WEBS

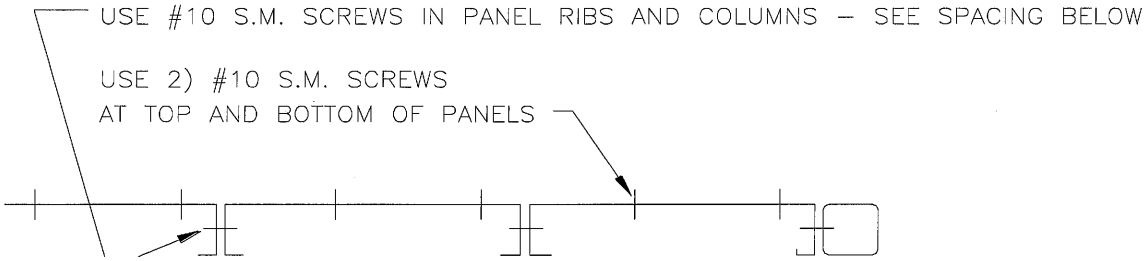
h/t = 16/.036 = 444

$547/\sqrt{33} = 95 \quad 95 < 444$

$Fv = 83.200/(444)^2 = .422$ KSI

V = .422 KSI

MAX. SHEAR PER FOOT = .422 (12 in) (.036) = 182 #/FT



SHEAR WALL FASTENER SPACING

#10 S.M. Screw (Minor Diameter = .18 in)

Value in Shear per Screw = 250# per AISI
Cold Formed Steel Design Table IV

Using Spacing of 22 inches

Max. Shear per Foot in Shear Wall = 250 (1.33) (12 in/ft) / 22 in = 181 #/ft

Use Value of 181 #/ft for Max. Shear per Foot in Shear Wall

Check Wall Deck against Wind Load

From Table 30.7-2 from ASCE 7-10 Zone 5 Pressure = 48.4 psf

Distributed Load on Wall = 48.4 psf X 1.21 X 4/3 ft = 78.1 #/ft

Moment in Panel = 78.1 #/ft X 11 ft^2 / 12 = 787 ft-lbs = 9.45 in-kips

9.45 in-kips / 0.334 in^3 = 28.29 ksi < 30 ksi OK

Calculation for Fastening Roof Flashing

From Table 30.7-2 from ASCE 7-10 Zone 3 Pressure = 82.6 psf

Maximum Wind Load = -82.6 psf X 1.21 = 99.9 psf

Panels are 1.0 ft wide and fasteners are 3'-0" O/C Max

Load in each fastener = 99.9 psf X 1.0 ft X 3 ft = 300 lbs

#10 Teks are good for 302 # Pullout, 1125 # Pullover and 731 # Shear OK

COMcheck Software Version 4.1.5.1

Envelope Compliance Certificate

Project Information

Energy Code:	90.1 (2013) Standard
Project Title:	Sheetz Automatic Carwash
Location:	Cameron, North Carolina
Climate Zone:	3a
Project Type:	New Construction
Performance Sim. Specs:	EnergyPlus 8.1.0.009 (EPW: USA_NC_Charlotte-Douglas.Intl.AP.723140_TMY3.epw)

Construction Site:
Sawyer Rd. & NC 24-87
Cameron, NC 28326

Owner/Agent:

Designer/Contractor:
Andy Rape
Frey-Moss Structures
1801 Rockdale Industrial Blvd.
Conyers, GA 30012
770-483-7543
fms@frey-moss.com

Building Area	Floor Area
1-Transportation : Nonresidential	923

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor(a)
Roof 1: Metal Building, Standing Seam, Double Insulation Layer with Thermal Blocks (c), [Bldg. Use 1 - Transportation]	268	11.0	17.0	0.038	0.041
Floor 1: Steel Joist, [Bldg. Use 1 - Transportation]	268	19.0	5.6	0.040	0.038
NORTHEAST					
Exterior Wall 1: Other Steel Framed Wall, [Bldg. Use 1 - Transportation] (b)	325	---	---	0.052	0.077
SOUTHEAST					
Exterior Wall 2: Other Steel Framed Wall, [Bldg. Use 1 - Transportation] (b)	83	---	---	0.052	0.077
SOUTHWEST					
Semi-Exterior Wall 1: Other Steel Framed Wall, [Bldg. Use 1 - Transportation] (b)	325	---	---	0.089	0.124
NORTHWEST					
Exterior Wall 3: Other Steel Framed Wall, [Bldg. Use 1 - Transportation] (b)	83	---	---	0.052	0.077
Door 1: Insulated Metal, Swinging, [Bldg. Use 1 - Transportation]	28	---	---	0.350	0.700

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.
(b) 'Other' components require supporting documentation for proposed U-factors.
(c) Thermal spacer block with minimum R-3.5 must be installed above the purlin/batt, and the roof deck secured to the purlins.

Project Notes

Envelope PASSES: Design 2% better than code

Envelope Compliance Statement

Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed envelope systems have been designed to meet the 90.1 (2013) Standard requirements in COM*check* Version 4.1.5.1 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Robert B. Smith - PE		01/25/2021
Name - Title	Signature	Date

Exterior Wall - Rs = 0.17 (Exterior Air Film) + 13.0 (2" Redmax) + 0.39 (Durock) + 0.0 (Metal Panel) + 0.68 (Interior Air Film) = 14.24
ER = 11.1 (3.5" R-13 Batt Insulation) x 0.46 (Correction Factor "Fc" from table C402.1.4.1) = 5.11
Uo = 1/(Rs + ER) = 1/(14.24 + 5.11) = 0.052
Semi-Exterior Wall - Uo = 1/(Rs + ER) = 1/(1 + 5.11 x 2) = 0.089

COMcheck Software Version 4.1.5.1

Interior Lighting Compliance Certificate

Project Information

Energy Code:	90.1 (2013) Standard
Project Title:	Sheetz Automatic Carwash
Project Type:	New Construction

Construction Site:
Sawyer Rd. & NC 24-87
Cameron, NC 28326

Owner/Agent:

Designer/Contractor:
Andy Rape
Frey-Moss Structures
1801 Rockdale Industrial Blvd.
Conyers, GA 30012
770-483-7543
fms@frey-moss.com

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B X C)
1-Transportation	923	0.70	646
		Total Allowed Watts =	646

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
1-Transportation				
LED 1: 1: LED: Other:	1	6	80	480
LED 2: 1: LED: Other:	1	4	40	160
		Total Proposed Watts =		640

Interior Lighting PASSES: Design 1% better than code

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 90.1 (2013) Standard requirements in COM*check* Version 4.1.5.1 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Floyd Keels - PE — Name - Title

Signature

01/25/2021 — Date

COM*check* Software Version 4.1.5.1

Exterior Lighting Compliance Certificate

Project Information

Energy Code:	90.1 (2013) Standard
Project Title:	Sheetz Automatic Carwash
Project Type:	New Construction
Exterior Lighting Zone	2 (Neighborhood business district)

Construction Site:
Sawyer Rd. & NC 24-87
Cameron, NC 28326

Owner/Agent:

Designer/Contractor:
Andy Rape
Frey-Moss Structures
1801 Rockdale Industrial Blvd.
Conyers, GA 30012
770-483-7543
fms@frey-moss.com

Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watts (B X C)
Illuminated length of facade wall or surface	16 ft	2.5	No	40
			Total Tradable Watts (a) =	0
			Total Allowed Watts =	40
			Total Allowed Supplemental Watts (b) =	600

(a) Wattage tradeoffs are only allowed between tradable areas/surfaces.
(b) A supplemental allowance equal to 600 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Proposed Exterior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Illuminated length of facade wall or surface (16 ft): Non-tradable Wattage				
LED 1: 3: Wallpack: Other:	1	2	91	182
			Total Tradable Proposed Watts =	0

Exterior Lighting PASSES: Design 0.0% better than code

Exterior Lighting Compliance Statement

Compliance Statement: The proposed exterior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed exterior lighting systems have been designed to meet the 90.1 (2013) Standard requirements in COM*check* Version 4.1.5.1 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Floyd Keels - PE
Name - Title

Signature

01/25/2021
Date

COM*check* Software Version 4.1.5.1

Mechanical Compliance Certificate

Project Information

Energy Code:	90.1 (2013) Standard
Project Title:	Sheetz Automatic Carwash
Location:	Cameron, North Carolina
Climate Zone:	3a
Project Type:	New Construction

Construction Site:
Sawyer Rd. & NC 24-87
Cameron, NC 28326

Owner/Agent:

Designer/Contractor:
Andy Rape
Frey-Moss Structures
1801 Rockdale Industrial Blvd.
Conyers, GA 30012
770-483-7543
fms@frey-moss.com

Mechanical Systems List

Quantity	System Type & Description
1	HVAC System - Item #18 (Single Zone): Heating: 1 each - Hydronic or Steam Coil, Hot Water, Capacity = 175 kBtu/h No minimum efficiency requirement applies Fan System: None
1	Water Heater - Item #D: Electric Instantaneous Water Heater, Capacity: 0 gallons No minimum efficiency requirement applies

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 90.1 (2013) Standard requirements in COM*check* Version 4.1.5.1 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Robert B. Smith - PE
Name - Title

Signature

01/25/2021
Date

COM*check* Software Version 4.1.5.1

Inspection Checklist

Energy Code: 90.1 (2013) Standard

Requirements: 100.0% were addressed directly in the COM*check* software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
4.2.2, 5.4.3.1.1, 5.7 [PR1][1]	Plans and/or specifications provide all information with which compliance can be determined for the building envelope and document where exceptions to the standard are claimed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6
4.2.2, 6.4.4.2.1, 6.7.2 [PR2][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P5
4.2.2, 7.7.1, 10.4.2 [PR3][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the service water heating systems and equipment and document where exceptions to the standard are claimed. Hot water system sized per manufacturer's sizing guide.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P5
4.2.2, 8.4.1.1, 8.4.1.2, 8.7 [PR6][2]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the electrical systems and equipment and document where exceptions are claimed. Feeder connectors sized in accordance with approved plans and branch circuits sized for maximum drop of 3%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E1
4.2.2, 9.4.3, 9.7 [PR4][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the interior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include interior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E2

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
9.7 [PR8][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the exterior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include exterior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E2
6.7.2.4 [PR5][1]	Detailed instructions for HVAC systems commissioning included on the plans or specifications for projects >=50,000 ft2.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Footing / Foundation Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
4.2.4 [FO1][2]	Installed below-grade wall insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports.	R-_____	R-_____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
4.2.4 [FO3][2]	Installed slab-on-grade insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports.	R-_____ ☐ Unheated ☐ Heated	R-_____ ☐ Unheated ☐ Heated	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.5.3.5 [FO5][2]	Slab edge insulation depth/length.	_____ ft	_____ ft	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.8.1.7 [FO6][1]	Exterior insulation protected against damage, sunlight, moisture, wind, landscaping and equipment maintenance activities.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6
5.8.1.7.3 [FO7][1]	Insulation in contact with the ground has <=0.3% water absorption rate per ASTM C272.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6
6.4.3.7 [FO9][3]	Freeze protection and snow/ice melting system sensors for future connection to controls.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P5
6.4.4.1.5 [FO11][3]	Bottom surface of floor structures incorporating radiant heating insulated to >=R-3.5.	R-_____	R-_____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6 *See the Envelope Assemblies table for values.*

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Framing / Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
5.4.3.2 [FR1][3]	Factory-built and site-assembled fenestration and doors are labeled or certified as meeting air leakage requirements.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
5.5.4.3a [FR8][1]	Vertical fenestration U-Factor.	U-____	U-____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.5.4.3b [FR9][1]	Skylight fenestration U-Factor.	U-____	U-____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.5.4.4.1 [FR10][1]	Vertical fenestration SHGC value.	SHGC:____	SHGC:____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.5.4.4.2 [FR11][1]	Skylight SHGC value.	SHGC:____	SHGC:____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.8.2.1, 5.8.2.3, 5.8.2.4, 5.8.2.5 [FR12][2]	Fenestration products rated (U-factor, SHGC, and VT) in accordance with NFRC or energy code defaults are used.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** A2
5.8.2.2 [FR13][1]	Fenestration and door products are labeled, or a signed and dated certificate listing the U-factor, SHGC, VT, and air leakage rate has been provided by the manufacturer.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** A2
5.5.3.6 [FR14][2]	U-factor of opaque doors associated with the building thermal envelope meets requirements.	U-____ ☐ Swinging ☐ Nonswinging	U-____ ☐ Swinging ☐ Nonswinging	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.4.3.1 [FR15][1]	Continuous air barrier is wrapped, sealed, caulked, gasketed, and/or taped in an approved manner, except in semiheated spaces in climate zones 1-6.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.4.1.4, 6.4.1.5 [ME1][2]	HVAC equipment efficiency verified. Non-NAECA HVAC equipment labeled as meeting 90.1.	Efficiency:_____	Efficiency:_____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
6.4.3.4.1 [ME3][3]	Stair and elevator shaft vents have motorized dampers that automatically close.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
6.4.3.4.5 [ME39][3]	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
6.4.3.4.4 [ME5][3]	Ventilation fans >0.75 hp have automatic controls to shut off fan when not required.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P1
6.4.3.8 [ME6][1]	Demand control ventilation provided for spaces >500 ft2 and >25 people/1000 ft2 occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Systems with a design outdoor airflow less than 1200 cfm.
6.5.3.2.1 [ME40][2]	DX cooling systems >= 75 kBtu/h (>= 65 kBtu/h effective 1/2016) and chilled-water and evaporative cooling fan motor hp >= ¼ designed to vary indoor fan airflow as a function of load and comply with operational requirements.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. *See the Mechanical Systems list for values.*
6.4.4.1.1 [ME7][3]	Insulation exposed to weather protected from damage. Insulation outside of the conditioned space and associated with cooling systems is vapor retardant.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P1
6.4.4.1.2 [ME8][2]	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	R-_____	R-_____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P5
6.4.4.1.3 [ME9][2]	HVAC piping insulation thickness. Where piping is installed in or under a slab, verification may need to occur during Foundation Inspection.	_____ in.	_____ in.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
6.4.4.1.4 [ME41][3]	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
6.4.4.2.1 [ME10][2]	Ducts and plenums sealed based on static pressure and location.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P1

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.4.4.2.2 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
6.5.2.2.1 [ME50][2]	Three-pipe hydronic systems using a common return for hot and chilled water are not used.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
6.5.2.3 [ME19][3]	Dehumidification controls provided to prevent reheating, recooling, mixing of hot and cold airstreams or concurrent heating and cooling of the same airstream.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Cooling capacity 40 kBtu/h.
6.5.2.4.1 [ME68][3]	Humidifiers with airstream mounted preheating jackets have preheat auto-shutoff value set to activate when humidification is not required.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
6.5.2.4.2 [ME69][3]	Humidification system dispersion tube hot surfaces in the airstreams of ducts or air-handling units insulated >= R-0.5.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
6.5.2.5 [ME70][3]	Preheat coils controlled to stop heat output whenever mechanical cooling, including economizer operation, is active.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P1
6.5.3.3 [ME42][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. *See the Mechanical Systems list for values.*
6.5.4.2 [ME25][3]	HVAC pumping systems >10 hp designed for variable fluid flow.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Minimum flow is less than required for proper operation and pump power =75 hp.
6.5.4.3, 6.5.4.3.1, 6.5.4.3.2 [ME26][3]	Fluid flow shutdown in pumping systems to multiple chillers or boilers when systems are shut down.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P5
6.5.6.1 [ME56][1]	Exhaust air energy recovery on systems meeting Tables 6.5.6.1-1, and 6.5.6.1-2.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
6.5.6.2 [ME31][3]	Condenser heat recovery system that can heat water to 85 ºF or provide 60% of peak heat rejection is installed for preheating of service hot water.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P1
6.5.7.1.1 [ME32][2]	Kitchen hoods >5,000 cfm have make up air >=50% of exhaust air volume.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
6.5.7.1.5 [ME49][3]	Approved field test used to evaluate design air flow rates and demonstrate proper capture and containment of kitchen exhaust systems.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
6.5.8.1 [ME34][2]	Unenclosed spaces that are heated use only radiant heat.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
7.4.2 [ME36][2]	Service water heating equipment meets efficiency requirements.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.3.9 [ME63][2]	Heating for vestibules and air curtains include automatic controls that shut off the heating system when outdoor air temperatures > 45F. Vestibule heating systems controlled by a thermostat in the vestibule with setpoint <= 60F.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
6.5.10 [ME73][3]	Doors separating conditioned space from the outdoors have controls that disable/reset heating and cooling system when open.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Building entrances have automatic closing devices. **Location on plans/spec:** A2

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
8.4.2 [EL10][2]	At least 50% of all 125 volt 15- and 20-Amp receptacles are controlled by an automatic control device.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Space type is not private office, open office, or computer classroom.
9.4.1.1 [EL1][2]	Automatic control requirements prescribed in Table 9.6.1, for the appropriate space type, are installed. Mandatory lighting controls (labeled as 'REQ') and optional choice controls (labeled as 'ADD1' and 'ADD2') are implemented.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E2
9.4.1.1 [EL2][2]	Independent lighting controls installed per approved lighting plans and all manual controls readily accessible and visible to occupants.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E2
9.4.1.2 [EL11][2]	Parking garage lighting is equipped with required lighting controls and daylight transition zone lighting.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
9.4.1.1f [EL13][1]	Daylight areas under skylights and roof monitors that have more than 150 W combined input power for general lighting are controlled by photocontrols.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
9.4.1.4 [EL3][2]	Automatic lighting controls for exterior lighting installed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E2
9.4.1.3 [EL4][1]	Separate lighting control devices for specific uses installed per approved lighting plans.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E2
9.6.2 [EL8][1]	Additional interior lighting power allowed for special functions per the approved lighting plans and is automatically controlled and separated from general lighting.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E2
10.4.1 [EL9][2]	Electric motors meet requirements where applicable.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P5

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Insulation Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
4.2.4 [IN2][1]	Installed roof insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports. For some ceiling systems, verification may need to occur during Framing Inspection.	R-____ ☐ Above deck ☐ Metal ☐ Attic	R-____ ☐ Above deck ☐ Metal ☐ Attic	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.8.1.2, 5.8.1.3 [IN3][1]	Roof insulation installed per manufacturer's instructions. Blown or poured loose-fill insulation is installed only where the ceiling slope is <= 3:12.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6
4.2.4 [IN6][1]	Installed above-grade wall insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports.	R-____ ☐ Mass ☐ Metal ☐ Steel ☐ Wood	R-____ ☐ Mass ☐ Metal ☐ Steel ☐ Wood	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.8.1.2 [IN7][1]	Above-grade wall insulation installed per manufacturer's instructions.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6
4.2.4 [IN8][2]	Installed floor insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports.	R-____ ☐ Mass ☐ Steel ☐ Wood	R-____ ☐ Mass ☐ Steel ☐ Wood	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.8.1.2 [IN9][2]	Floor insulation installed per manufacturer's instructions.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6
5.8.1.1 [IN10][2]	Building envelope insulation is labeled with R-value or insulation certificate has been provided listing R-value and other relevant data.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
5.8.1.9 [IN18][2]	Building envelope insulation extends over the full area of the component at the proposed rated R or U value.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
5.8.1.4 [IN11][2]	Eaves are baffled to deflect air to above the insulation.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6
5.8.1.5 [IN12][2]	Insulation is installed in substantial contact with the inside surface separating conditioned space from unconditional space.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6
5.8.1.6 [IN13][2]	Recessed equipment installed in building envelope assemblies does not compress the adjacent insulation.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Insulation Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
5.8.1.7.1 [IN15][2]	Attics and mechanical rooms have insulation protected where adjacent to attic or equipment access.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6
5.8.1.7.2 [IN16][2]	Foundation vents do not interfere with insulation.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
5.8.1.8 [IN17][3]	Insulation intended to meet the roof insulation requirements cannot be installed on top of a suspended ceiling. Mark this requirement compliant if insulation is installed accordingly.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** S4-S6

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
5.4.3.3 [FI1][1]	Weatherseals installed on all loading dock cargo doors in Climate Zones 4-8.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** A2
6.4.3.1.2 [FI3][3]	Thermostatic controls have a 5 °F deadband.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** having jurisdiction.
6.4.3.2 [FI20][3]	Temperature controls have setpoint overlap restrictions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
6.4.3.3.1 [FI21][3]	HVAC systems equipped with at least one automatic shutdown control.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P5
6.4.3.3.2 [FI22][3]	Setback controls allow automatic restart and temporary operation as required for maintenance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P5
6.4.3.6 [FI6][3]	When humidification and dehumidification are provided to a zone, simultaneous operation is prohibited. Humidity control prohibits the use of fossil fuel or electricity to produce RH > 30% in the warmest zone humidified and RH < 60% in the coldest zone dehumidified.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P5
6.7.2.1 [FI7][3]	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
6.7.2.2 [FI8][3]	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
6.7.2.3 [FI9][1]	An air and/or hydronic system balancing report is provided for HVAC systems serving zones >5,000 ft2 of conditioned area.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
6.7.2.4 [FI10][1]	HVAC control systems have been tested to ensure proper operation, calibration and adjustment of controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P5
7.4.4.3 [FI11][3]	Public lavatory faucet water temperature <=110°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** P1
8.7.1 [FI16][3]	Furnished as-built drawings for electric power systems within 30 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
8.7.2 [FI17][3]	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
9.2.2.3 [FI18][1]	Interior installed lamp and fixture lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Interior Lighting fixture schedule for values.*
9.4.2 [FI19][1]	Exterior lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Exterior Lighting fixture schedule for values.*
10.4.3 [FI24][2]	Elevators are designed with the proper lighting, ventilation power, and standby mode.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
7.4.3 [FI45][2]	First 8 ft of outlet piping is insulated	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Report Prepared By:

Frey-Moss Structures

For: Sheetz Carwash North Carolina
Sawyer Rd. & NC 24-87
Cameron, North Carolina 28326

P-1359 01/25/2021

Design Conditions: Fayetteville, Pope; Latitude: 35; Time 4:00 PM

Indoor:		Outdoor:	
Summer temperature:	75	Summer temperature:	92
Winter temperature:	72	Winter temperature:	20
Relative humidity:	50	Summer grains of moisture:	111
		Daily temperature range:	20

Building Component			Sensible Gain (BTUH)	Latent Gain (BTUH)	Total Heat Gain (BTUH)	Total Heat Loss (BTUH)
Floor	268.1	sq.ft.	0	0	0	3,437
NE Wall	325	sq.ft.	439	0	439	1,352
SW Wall	325	sq.ft.	406	0	406	1,352
NW Wall	62.5	sq.ft.	52	0	52	260
Door	20	sq.ft.	190	0	190	582
Leakage Summer	14	cfm	262	447	709	0
Leakage Winter	27	cfm	0	0	0	1,544
SE Wall	82.5	sq.ft.	159	0	159	343
Ceiling	268.1	sq.ft.	680	0	680	697
People/Vent	0	people	0	0	0	0
Ventilation	100	cfm	1,870	3,196	5,066	5,720
Infiltration Summer	167.8733	cfm	3,139	5,365	8,504	0
Infiltration Winter	176.81	cfm	0	0	0	10,114
Lights	360	watts	1,476	0	1,476	0
Whole Building - All Components			8,673	9,008	17,681 (1.5 tons)	25,401