

**Palmdale Health and Wellness
38921 Trade Center Drive
Palmdale, CA 93551**



Tenant Improvement – Structural Calculations

Prepared For:

Dr. Eugene Rajaratnam
Dr. Mukesh Misra

Prepared By:

Duke Engineering
44732 Yucca Avenue
Lancaster, CA 93534
661-952-7918

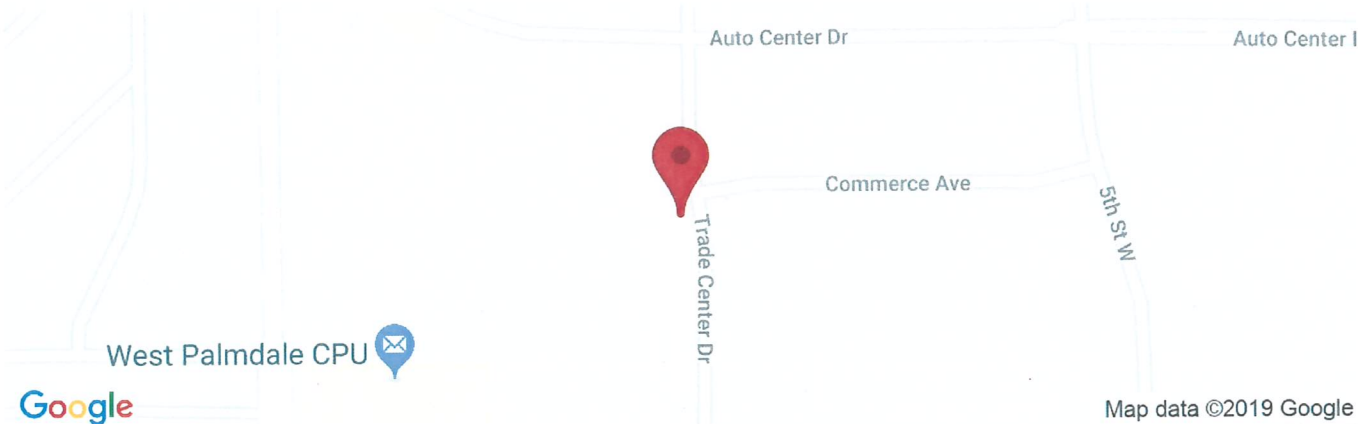
1/16/2019



PHW Tenant Improvements

38921 Trade Center Dr, Palmdale, CA 93551, USA

Latitude, Longitude: 34.5893148, -118.1433457



Date		1/16/2019, 7:12:17 AM
Design Code Reference Document		ASCE7-10
Risk Category		II
Site Class		D - Stiff Soil

Type	Value	Description
S _S	2.467	MCE _R ground motion. (for 0.2 second period)
S ₁	1.148	MCE _R ground motion. (for 1.0s period)
S _{MS}	2.467	Site-modified spectral acceleration value
S _{M1}	1.723	Site-modified spectral acceleration value
S _{DS}	1.645	Numeric seismic design value at 0.2 second SA
S _{D1}	1.148	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	E	Seismic design category
F _a	1	Site amplification factor at 0.2 second
F _v	1.5	Site amplification factor at 1.0 second
PGA	0.948	MCE _G peak ground acceleration
F _{PGA}	1	Site amplification factor at PGA
PGA _M	0.948	Site modified peak ground acceleration
T _L	12	Long-period transition period in seconds
S _{sRT}	2.993	Probabilistic risk-targeted ground motion. (0.2 second)
S _{sUH}	3.224	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
S _{sD}	2.467	Factored deterministic acceleration value. (0.2 second)
S _{1RT}	1.379	Probabilistic risk-targeted ground motion. (1.0 second)
S _{1UH}	1.525	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S _{1D}	1.148	Factored deterministic acceleration value. (1.0 second)
PGA _d	0.948	Factored deterministic acceleration value. (Peak Ground Acceleration)



Project Title: Palmdale Health and Wellness
Engineer: Ryan Duke - Mechanical Equip
Project Descr: Mechanical Equipment Project ID: 18088

Printed: 16 JAN 2019, 7:16AM

Project Information

File = C:\Users\ryand\DROPBO~1\JOBFIL~1\18088P~1\4-STRU~1\2-STRU~1\MECHAN~1.EC6

ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:6.17.12.31

Lic. # : KW-06011784

Licensee : Duke Engineering

Project Title : Palmdale Health and Wellness

Description : Mechanical Equipment

I.D. : 18088

Address : 38921 Trade Center Drive, Palmdale, CA 93551

Project Leader : Ryan Duke - Mechanical Equipment Only

Phone : 661-952-7918

Fax :

eMail : ryan@duke-engineering.com

Project Notes



Project Title: Palmdale Health and Wellness
 Engineer: Ryan Duke - Mechanical Equip Project ID: 18088
 Project Descr: Mechanical Equipment

Printed: 16 JAN 2019, 7:16AM

ASCE Seismic Base Shear

File = C:\Users\ryand\DROPBOX\1\JOBFIL~1\18088P~1\4-STRU~1\2-STRU~1\MECHAN~1.EC6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:6.17.12.31

Lic. #: KW-06011784

Licensee: Duke Engineering

Palmdale Health and Wellness

Risk Category			Calculations per ASCE 7-10
Risk Category of Building or Other Structure :	"II" : All Buildings and other structures except those listed as Category I, III, and IV		ASCE 7-10, Page 2, Table 1.5-1
Seismic Importance Factor	=	1	ASCE 7-10, Page 5, Table 1.5-2
USER DEFINED Ground Motion			ASCE 7-10 11.4.1

Max. Ground Motions, 5% Damping :

$$\begin{aligned} S_S &= 2.467 \text{ g, 0.2 sec response} \\ S_1 &= 1.148 \text{ g, 1.0 sec response} \end{aligned}$$

Site Class, Site Coeff. and Design Category

Site Classification "D" : Shear Wave Velocity 600 to 1,200 ft/sec	=	D	ASCE 7-10 Table 20.3-1	
Site Coefficients F_a & F_v (using straight-line interpolation from table values)	F_a F_v	= =	1.00 1.50	ASCE 7-10 Table 11.4-1 & 11.4-2
Maximum Considered Earthquake Acceleration	$S_{MS} = F_a * S_s$	=	1.500	ASCE 7-10 Eq. 11.4-1
	$S_{M1} = F_v * S_1$	=	1.722	ASCE 7-10 Eq. 11.4-2
Design Spectral Acceleration	$S_{DS} = S_{MS}^{*2/3}$	=	1.000	ASCE 7-10 Eq. 11.4-3
	$S_{D1} = S_{M1}^{*2/3}$	=	1.148	ASCE 7-10 Eq. 11.4-4
Seismic Design Category	=	E $S_1 \geq 0.75$	ASCE 7-10 Table 11.6-1 & -2	

Resisting System

Basic Seismic Force Resisting System . . .	Moment Resisting Frame Systems Special steel moment frames		
Response Modification Coefficient "R"	=	8.00	Building height Limits :
System Overstrength Factor "Wo"	=	3.00	Category "A & B" Limit: No Limit
Deflection Amplification Factor "Cd"	=	5.50	Category "C" Limit: No Limit
<i>NOTE! See ASCE 7-10 for all applicable footnotes.</i>			Category "D" Limit: No Limit
			Category "E" Limit: No Limit
			Category "F" Limit: No Limit

ASCE 7-10 Section 12.8.2

Lateral Force Procedure

Equivalent Lateral Force Procedure

The "Equivalent Lateral Force Procedure" is being used according to the provisions of ASCE 7-10 12.8

Use ASCE 12.8-7

Determine Building Period

Structure Type for Building Period Calculation : All Other Structural Systems

$$\begin{aligned} \text{"Ct" value} &= 0.020 & \text{"hn" : Height from base to highest level} &= 40.0 \text{ ft} \\ \text{"x" value} &= 0.75 \\ \text{"Ta" : Approximate fundamental period using Eq. 12.8-7 :} & & \text{Ta} = \text{Ct} * (\text{hn}^x) &= 0.318 \text{ sec} \\ \text{"TL" : Long-period transition period per ASCE 7-10 Maps 22-12 -> 22-16} & & &= 12.000 \text{ sec} \end{aligned}$$

$$\text{Building Period "Ta" Calculated from Approximate Method selected} = 0.318 \text{ sec}$$

"Cs" Response Coefficient

ASCE 7-10 Section 12.8.1.1

S_{DS} : Short Period Design Spectral Response	=	1.000	From Eq. 12.8-2, Preliminary C_s	=	0.125
"R" : Response Modification Factor	=	8.00	From Eq. 12.8-3 & 12.8-4, C_s need not exceed	=	0.451
"I" : Seismic Importance Factor	=	1	From Eq. 12.8-5 & 12.8-6, C_s not be less than	=	0.072

User has selected ASCE 12.8.1.3 : Regular structure,

Cs : Seismic Response Coefficient =

0.1250

Less than 5 Stories and with $T \leq 0.5$ sec, SO $S_s \leq 1.5$ for C_s calculation

Seismic Base Shear

ASCE 7-10 Section 12.8.1

$$C_s = 0.1250 \text{ from 12.8.1.1}$$

$$W \text{ (see Sum } W_i \text{ below)} = 0.00 \text{ k}$$

$$\text{Seismic Base Shear } V = C_s * W = 0.00 \text{ k}$$



Project Title: Palmdale Health and Wellness
 Engineer: Ryan Duke - Mechanical Equip Project ID: 18088
 Project Descr: Mechanical Equipment

Printed: 16 JAN 2019, 7:16AM

Steel Beam

File = C:\Users\ryand\Dropbox\1\18088P\1\4-STRU~1\2-STRU~1\MECHAN~1.EC6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:6.17.12.31

Lic. #: KW-06011784

Licensee: Duke Engineering

Description: Mechanical Supports

CODE REFERENCES

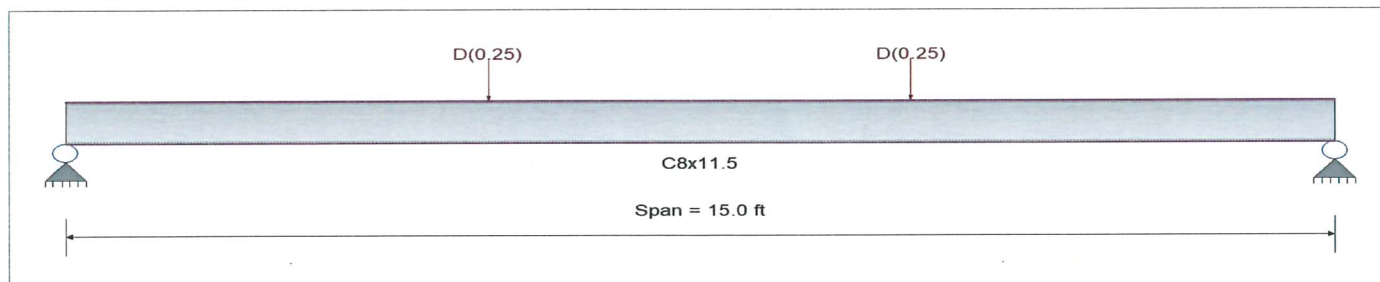
Calculations per AISC 360-10, IBC 2015, ASCE 7-10

Load Combination Set: IBC 2015

Material Properties

Analysis Method: Allowable Strength Design
 Beam Bracing: Beam is Fully Braced against lateral-torsional buckling
 Bending Axis: Major Axis Bending

Fy: Steel Yield: 50.0 ksi
 E: Modulus: 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading

Load(s) for Span Number 1

Point Load: D = 0.250 k @ 10.0 ft

Point Load: D = 0.250 k @ 5.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.065 : 1	Maximum Shear Stress Ratio =	0.011 : 1
Section used for this span	C8x11.5	Section used for this span	C8x11.5
Ma: Applied	1.573 k-ft	Va: Applied	0.3363 k
Mn / Omega: Allowable	24.027 k-ft	Vn / Omega: Allowable	31.617 k
Load Combination	+D+H	Load Combination	+D+H
Location of maximum on span	7.500 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.000 in	Ratio =	0 < 360
Max Upward Transient Deflection	0.000 in	Ratio =	0 < 360
Max Downward Total Deflection	0.069 in	Ratio =	2604 >= 180
Max Upward Total Deflection	0.000 in	Ratio =	0 < 180

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H														
Dsgn. L = 15.00 ft	1		0.065	0.011	1.57		1.57	40.13	24.03	1.00	1.00	0.34	52.80	31.62
+D+L+H														
Dsgn. L = 15.00 ft	1		0.065	0.011	1.57		1.57	40.13	24.03	1.00	1.00	0.34	52.80	31.62
+D+Lr+H														
Dsgn. L = 15.00 ft	1		0.065	0.011	1.57		1.57	40.13	24.03	1.00	1.00	0.34	52.80	31.62
+D+S+H														
Dsgn. L = 15.00 ft	1		0.065	0.011	1.57		1.57	40.13	24.03	1.00	1.00	0.34	52.80	31.62
+D+0.750Lr+0.750L+H														
Dsgn. L = 15.00 ft	1		0.065	0.011	1.57		1.57	40.13	24.03	1.00	1.00	0.34	52.80	31.62
+D+0.750L+0.750S+H														
Dsgn. L = 15.00 ft	1		0.065	0.011	1.57		1.57	40.13	24.03	1.00	1.00	0.34	52.80	31.62
+D+0.60W+H														
Dsgn. L = 15.00 ft	1		0.065	0.011	1.57		1.57	40.13	24.03	1.00	1.00	0.34	52.80	31.62
+D+0.70E+H														
Dsgn. L = 15.00 ft	1		0.065	0.011	1.57		1.57	40.13	24.03	1.00	1.00	0.34	52.80	31.62
+D+0.750Lr+0.750L+0.450W+H														
Dsgn. L = 15.00 ft	1		0.065	0.011	1.57		1.57	40.13	24.03	1.00	1.00	0.34	52.80	31.62
+D+0.750L+0.750S+0.450W+H														
Dsgn. L = 15.00 ft	1		0.065	0.011	1.57		1.57	40.13	24.03	1.00	1.00	0.34	52.80	31.62



Project Title: Palmdale Health and Wellness
 Engineer: Ryan Duke - Mechanical Equip
 Project Descr: Mechanical Equipment
 Project ID: 18088

Printed: 16 JAN 2019, 7:16AM

Steel Beam

File = C:\Users\ryand\Dropbox\1\JOBFIL~1\18088P~1\4-STRU~1\2-STRU~1\MECHAN~1.EC6
 ENERCALC, INC. 1983-2017, Build:10.17.12.10, Ver:6.17.12.31

Lic. # : KW-06011784

Licensee : Duke Engineering

Description : Mechanical Supports

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+0.750L+0.750S+0.5250E+H														
Dsgn. L = 15.00 ft		1	0.065	0.011	1.57		1.57	40.13	24.03	1.00	1.00	0.34	52.80	31.62
+0.60D+0.60W+0.60H														
Dsgn. L = 15.00 ft		1	0.039	0.006	0.94		0.94	40.13	24.03	1.00	1.00	0.20	52.80	31.62
+0.60D+0.70E+0.60H														
Dsgn. L = 15.00 ft		1	0.039	0.006	0.94		0.94	40.13	24.03	1.00	1.00	0.20	52.80	31.62

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.0691	7.543		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.336	0.336
Overall MINimum	0.202	0.202
+D+H	0.336	0.336
+D+L+H	0.336	0.336
+D+Lr+H	0.336	0.336
+D+S+H	0.336	0.336
+D+0.750Lr+0.750L+H	0.336	0.336
+D+0.750L+0.750S+H	0.336	0.336
+D+0.60W+H	0.336	0.336
+D+0.70E+H	0.336	0.336
+D+0.750Lr+0.750L+0.450W+H	0.336	0.336
+D+0.750L+0.750S+0.450W+H	0.336	0.336
+D+0.750L+0.750S+0.5250E+H	0.336	0.336
+0.60D+0.60W+0.60H	0.202	0.202
+0.60D+0.70E+0.60H	0.202	0.202
D Only	0.336	0.336
Lr Only		
L Only		
S Only		
W Only		
E Only		
H Only		

Description : BM-1

CODE REFERENCES

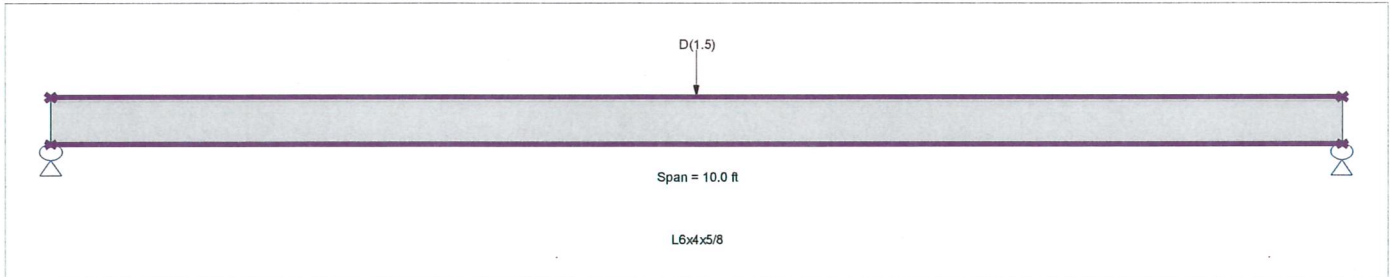
Calculations per AISC 360-10, IBC 2012, ASCE 7-10

Load Combination Set : ASCE 7-10

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Minor Axis Bending

Fy : Steel Yield : 50.0 ksi
E : Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight NOT internally calculated and added

Load(s) for Span Number 1

Point Load : D = 1.50 k @ 5.0 ft, (LAMP)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =

0.398 : 1

Maximum Shear Stress Ratio =

0.017 : 1

Section used for this span

L6x4x5/8

Section used for this span

L6x4x5/8

Ma : Applied

3.750 k-ft

Va : Applied

0.750 k

Mn / Omega : Allowable

9.426 k-ft

Vn/Omega : Allowable

44.910 k

Load Combination

+D+H

Load Combination

+D+H

Location of maximum on span

5.000 ft

Location of maximum on span

0.000 ft

Span # where maximum occurs

Span # 1

Span # where maximum occurs

Span # 1

Maximum Deflection

Max Downward Transient Deflection

0.000 in

Ratio =

0 <360

Max Upward Transient Deflection

0.000 in

Ratio =

0 <360

Max Downward Total Deflection

0.250 in

Ratio =

480 >=180.

Max Upward Total Deflection

0.000 in

Ratio =

0 <180.0

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mny	Mny/Omega	Cb	Rm	Va Max	Vny	Vny/Omega
+D+H													
Dsgn. L = 10.00 ft	1	0.398	0.017	3.75		3.75	15.74	9.43	1.00	1.00	0.75	75.00	44.91
+D+L+H													
Dsgn. L = 10.00 ft	1	0.398	0.017	3.75		3.75	15.74	9.43	1.00	1.00	0.75	75.00	44.91
+D+Lr+H													
Dsgn. L = 10.00 ft	1	0.398	0.017	3.75		3.75	15.74	9.43	1.00	1.00	0.75	75.00	44.91
+D+S+H													
Dsgn. L = 10.00 ft	1	0.398	0.017	3.75		3.75	15.74	9.43	1.00	1.00	0.75	75.00	44.91
+D+0.750Lr+0.750L+H													
Dsgn. L = 10.00 ft	1	0.398	0.017	3.75		3.75	15.74	9.43	1.00	1.00	0.75	75.00	44.91
+D+0.750L+0.750S+H													
Dsgn. L = 10.00 ft	1	0.398	0.017	3.75		3.75	15.74	9.43	1.00	1.00	0.75	75.00	44.91
+D+0.60W+H													
Dsgn. L = 10.00 ft	1	0.398	0.017	3.75		3.75	15.74	9.43	1.00	1.00	0.75	75.00	44.91
+D+0.70E+H													
Dsgn. L = 10.00 ft	1	0.398	0.017	3.75		3.75	15.74	9.43	1.00	1.00	0.75	75.00	44.91
+D+0.750Lr+0.750L+0.450W+H													
Dsgn. L = 10.00 ft	1	0.398	0.017	3.75		3.75	15.74	9.43	1.00	1.00	0.75	75.00	44.91
+D+0.750L+0.750S+0.450W+H													
Dsgn. L = 10.00 ft	1	0.398	0.017	3.75		3.75	15.74	9.43	1.00	1.00	0.75	75.00	44.91
+D+0.750L+0.750S+0.5250E+H													
Dsgn. L = 10.00 ft	1	0.398	0.017	3.75		3.75	15.74	9.43	1.00	1.00	0.75	75.00	44.91
+0.60D+0.60W+0.60H													
Dsgn. L = 10.00 ft	1	0.239	0.010	2.25		2.25	15.74	9.43	1.00	1.00	0.45	75.00	44.91

Steel BeamFile = H:\My Drive\2 - Projects\1151 - 38921 Trade Center Drive Palmdale 93551\4 - Calculations\1151.ec6
ENERCALC, INC. 1983-2016, Build:6.16.10.31, Ver:6.16.11.30

Lic. #: KW-06011328

Licensee: AL7 Engineering

Description: BM-1

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+0.60D+0.70E+0.60H														
Dsgn. L = 10.00 ft		1	0.239	0.010	2.25		2.25	15.74	9.43	1.00	1.00	0.45	75.00	44.91

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.2500	5.000		0.0000	0.000

Vertical Reactions

Support notation: Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.750	0.750
Overall MINimum	0.450	0.450
+D+H	0.750	0.750
+D+L+H	0.750	0.750
+D+Lr+H	0.750	0.750
+D+S+H	0.750	0.750
+D+0.750Lr+0.750L+H	0.750	0.750
+D+0.750L+0.750S+H	0.750	0.750
+D+0.60W+H	0.750	0.750
+D+0.70E+H	0.750	0.750
+D+0.750Lr+0.750L+0.450W+H	0.750	0.750
+D+0.750L+0.750S+0.450W+H	0.750	0.750
+D+0.750L+0.750S+0.5250E+H	0.750	0.750
+0.60D+0.60W+0.60H	0.450	0.450
+0.60D+0.70E+0.60H	0.450	0.450
D Only	0.750	0.750
Lr Only		
L Only		
S Only		
W Only		
E Only		
H Only		