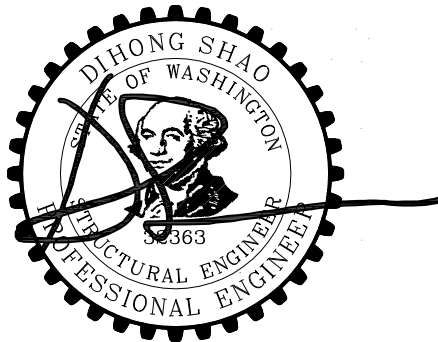




**DRAINAGE PLAN 2423 63rd AVE SE
MERCER ISLAND, WA**

Structural Calculations

June 2022



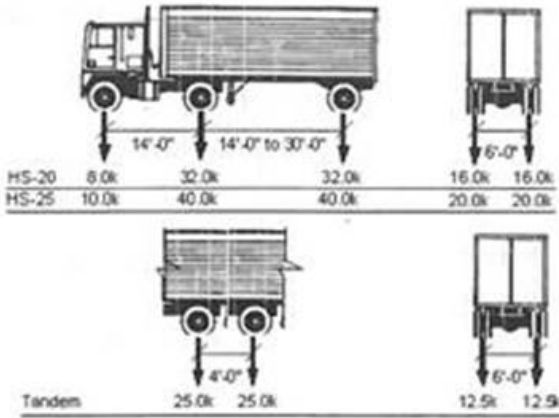


Figure 1. AASHTO Design Truck (HS-20), Design Truck plus 25% (HS-25), and Design Tandem

Assume acting on 6ft strip.

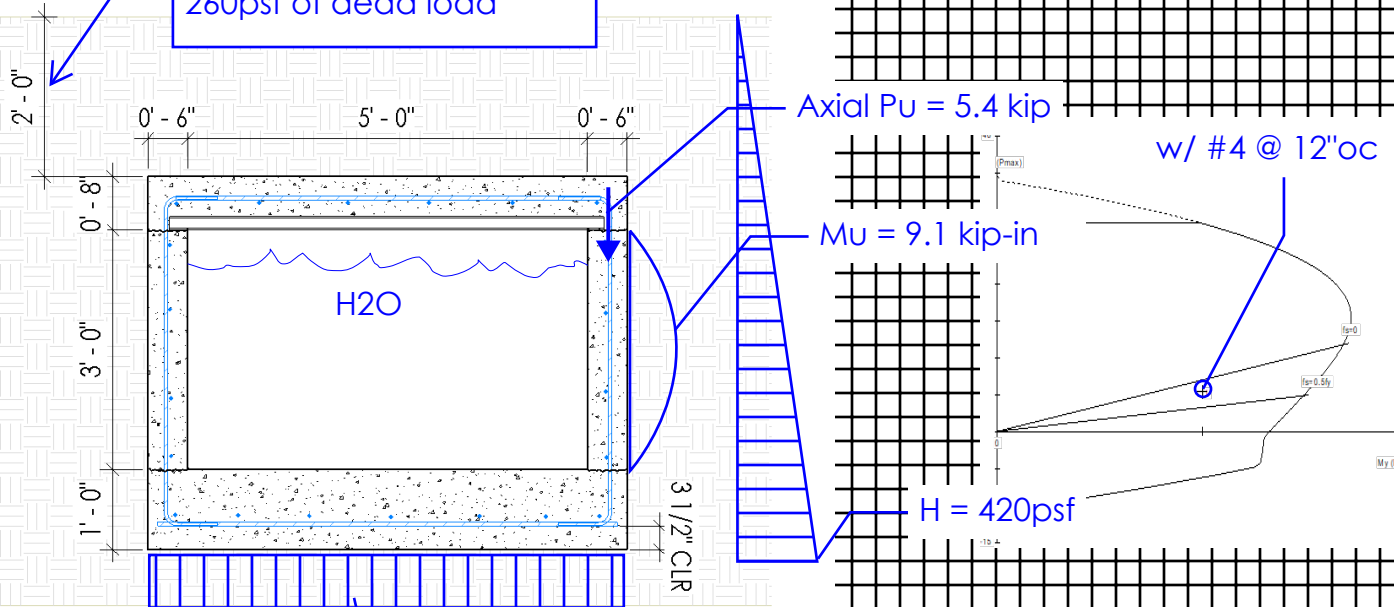
$$M_{max} = 16 \times 5ft / 4 / 6 = 3.3 \text{ k-ft}$$

Equivalent pressure:

$$3.3 \times 8 / (5 \times 5) = 1.07 \text{ ksf}$$

Total load = 1350 psf

Assume 2ft of soil cover.
260psf of dead load



$$\text{Max Bearing} = 150 + 3 \times 64 + 8/12 \times 150 + 260 + 1070 = 1770 \text{ psf}$$

Max Allowable for temporary loading = $4/3 \times 1500 = 2000 \text{ psf}$ ----> okay

Project: Drainage Plan 2423 63rd Ave SE, Mercer Island

Designed by:

Date:

Project No:

Client:

Checked by:

Sheet:

of

3.3 2WH-36 Composite Deck

7 1/4" Total Slab Depth

Normal Weight Concrete (145 pcf)

Concrete Volume 1.910yd³/100ft²

3 Hour Fire Rating



2WH-36 7 1/4 " Slab Depth, 145 pcf NWC

Maximum Unshored Span	Gage	Single	Double	Triple
	22	6' - 3"	7' - 1"	7' - 5"
21	6' - 11"	7' - 9"	8' - 0"	
20	7' - 9"	8' - 9"	9' - 1"	

Maximum Unshored Span	Gage	Single	Double	Triple
	19	8' - 3"	9' - 1"	9' - 5"
18	8' - 6"	9' - 10"	10' - 2"	
16	9' - 1"	11' - 3"	11' - 3"	

Gage	Vertical Load Span (ft-in)	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"
22	ASD & LRFD - Available Superimposed Load Capacity, W (psf)															
	ASD, W/Ω	1180	997	851	734	638	559	492	436	388	346	310	279	252	227	206
	LRFD, φW	1591	1342	1144	985	854	746	656	579	513	457	408	366	328	295	266
	L/360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LRFD - Available Diaphragm Shear Capacity, φS_n (plf / ft) 36/4 Attachment Pattern															
	Arc Spot Weld 1/2" Effective Dia	5673	5646	5608	5576	5547	5522	5500	5491	5472	5455	5440	5426	5414	5410	5399
	PAF Base Steel ≥ .25"	5425	5417	5396	5378	5362	5347	5335	5334	5324	5314	5305	5297	5290	5291	5285
	PAF Base Steel ≥ 0.125"	5406	5399	5379	5362	5347	5334	5322	5322	5312	5303	5295	5287	5280	5282	5276
	#12 Screw Base Steel ≥ .0385"	5388	5383	5364	5348	5334	5321	5310	5311	5301	5293	5285	5278	5271	5273	5267
	Concrete + Deck =	77.1	psf		I _{cr} = 109.5		in ⁴ /ft		ASD	M _{no} /Ω = 59.4	kip-in/ft		V _n /Ω = 5.24		kip/ft	
(I _{cr} +I _u)/2 =	228	in ⁴ /ft		I _u = 346.6		in ⁴ /ft		LRFD	φM _{no} = 90.9	kip-in/ft		φ V _n = 7.61		kip/ft		

Gage	Vertical Load Span (ft-in)	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"
21	ASD & LRFD - Available Superimposed Load Capacity, W (psf)															
	ASD, W/Ω	1313	1110	949	819	713	625	551	489	436	390	350	315	285	258	234
	LRFD, φW	1772	1496	1277	1100	956	836	736	651	578	516	462	415	373	337	304
	L/360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LRFD - Available Diaphragm Shear Capacity, φS_n (plf / ft) 36/4 Attachment Pattern															
	Arc Spot Weld 1/2" Effective Dia	5752	5723	5680	5642	5609	5580	5555	5545	5524	5505	5487	5471	5456	5453	5440
	PAF Base Steel ≥ .25"	5467	5460	5436	5414	5396	5379	5365	5366	5353	5342	5332	5322	5314	5316	5309
	PAF Base Steel ≥ 0.125"	5445	5440	5417	5397	5379	5364	5350	5352	5340	5329	5320	5311	5303	5306	5299
	#12 Screw Base Steel ≥ .0385"	5426	5422	5400	5381	5365	5350	5337	5340	5328	5318	5309	5301	5293	5297	5290
	Concrete + Deck =	77.3	psf		I _{cr} = 119.4		in ⁴ /ft		ASD	M _{no} /Ω = 65.8	kip-in/ft		V _n /Ω = 5.76		kip/ft	
(I _{cr} +I _u)/2 =	235	in ⁴ /ft		I _u = 350.6		in ⁴ /ft		LRFD	φM _{no} = 100.7	kip-in/ft		φ V _n = 8.32		kip/ft		

Gage	Vertical Load Span (ft-in)	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"
20	ASD & LRFD - Available Superimposed Load Capacity, W (psf)															
	ASD, W/Ω	1423	1204	1030	890	775	680	600	533	475	426	383	345	312	283	257
	LRFD, φW	1922	1624	1387	1196	1040	911	802	711	632	565	506	455	411	371	336
	L/360	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	LRFD - Available Diaphragm Shear Capacity, φS_n (plf / ft) 36/4 Attachment Pattern															
	Arc Spot Weld 1/2" Effective Dia	5810	5780	5733	5692	5655	5624	5595	5586	5563	5541	5522	5504	5488	5485	5471
	PAF Base Steel ≥ .25"	5498	5492	5465	5442	5421	5403	5387	5389	5375	5363	5352	5341	5332	5336	5327
	PAF Base Steel ≥ 0.125"	5474	5470	5445	5423	5404	5387	5371	5374	5361	5349	5339	5329	5320	5324	5316
	#12 Screw Base Steel ≥ .0385"	5454	5452	5428	5407	5389	5372	5358	5362	5349	5338	5328	5319	5310	5315	5307
	Concrete + Deck =	77.5	psf		I _{cr} = 127.5		in ⁴ /ft		ASD	M _{no} /Ω = 71.1	kip-in/ft		V _n /Ω = 6.18		kip/ft	
(I _{cr} +I _u)/2 =	240.7	in ⁴ /ft		I _u = 353.9		in ⁴ /ft		LRFD	φM _{no} = 108.8	kip-in/ft		φ V _n = 8.90		kip/ft		

All Gages	LRFD - Available Diaphragm Shear Capacity, φS _n (plf / ft) for all vertical load spans, WWF Size or Area of Steel per foot width					
	3/4" Welded Shear Studs	6x6 W1.4xW1.4	6x6 W2.9xW2.9	6x6 W4.0xW4.0	4x4 W4xW4	4x4 W6xW6
		A _s = 0.028 in ² /ft	A _s = 0.058 in ² /ft	A _s = 0.080 in ² /ft	A _s = 0.120 in ² /ft	A _s = 0.180 in ² /ft
	12 in o.c.	n/a	7750	8740	10540	13240
	24 in o.c.	n/a	7750	7750	7750	7750
36 in o.c.	n/a	5170	5170	5170	5170	