Table C7. Multiple Presence Probabilities, 2500 < ADTT < 5000, Span = 60.

(2500 < ADTT < 5000) & (Span Length is assumed 60 ft)							
Total # of Correct Data (2500 < ADTT < 5000) 468984		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	122724	122724	122724	122724	122724	122724
	% of MP probabilities	26.17	26.17	26.17	26.17	26.17	26.17
Side by Side	# of Correct Data	1853	2601	4341	8101	14657	3070
	% of MP probabilities	0.40	0.55	0.93	1.73	3.13	0.65
Staggered	# of Correct Data	9316	8568	6828	3094	4	8099
	% of MP probabilities	1.99	1.83	1.46	0.66	0.00	1.73
Multiple	# of Correct Data	5606	5606	5606	5606	5606	5606
	% of MP probabilities	1.20	1.20	1.20	1.20	1.20	1.20
Single	# of Correct Data	445754	445754	445754	445754	442262	445754
	% of MP probabilities	95.05	95.05	95.05	95.05	94.30	95.05

Table C8. Multiple Presence Probabilities, ADTT > 5000, Span = 60.

(ADTT > 5000) & (Span Length is assumed 60 ft)							
Total # of Correct Data (2500 < ADTT < 5000) 2807890		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	1086922	1086922	1086922	1086922	1086922	1086922
	% of MP probabilities	38.71	38.71	38.71	38.71	38.71	38.71
Side by Side	# of Correct Data	19216	27332	45349	85287	157411	33007
	% of MP probabilities	0.68	0.97	1.62	3.04	5.61	1.18
Staggered	# of Correct Data	99921	91805	73788	34199	76	86130
	% of MP probabilities	3.56	3.27	2.63	1.22	0.00	3.07
Multiple	# of Correct Data	62384	62384	62384	62384	62384	62384
	% of MP probabilities	2.22	2.22	2.22	2.22	2.22	2.22
Single	# of Correct Data	2566833	2566833	2566833	2566484	2528483	2566833
	% of MP probabilities	91.42	91.42	91.42	91.40	90.05	91.42

Table C9. Multiple Presence Probabilities, 1000 < ADTT, Span = 100.

(ADTT < 1000) & (Span Length is assumed 100 ft)							
Total # of Correct Data (ADTT < 1000) 106686		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	9093	9093	9093	9093	9093	9093
	% of MP probabilities	8.52	8.52	8.52	8.52	8.52	8.52
Side by Side	# of Correct Data	43	43	44	48	60	42
	% of MP probabilities	0.04	0.04	0.04	0.04	0.06	0.04
Staggered	# of Correct Data	14	14	8	4	0	10
	% of MP probabilities	0.01	0.01	0.01	0.00	0.00	0.01
Multiple	# of Correct Data	21	21	21	21	21	21
	% of MP probabilities	0.02	0.02	0.02	0.02	0.02	0.02
Single	# of Correct Data	105161	105161	105161	105161	105158	105161
	% of MP probabilities	98.57	98.57	98.57	98.57	98.57	98.57

Table C10. Multiple Presence Probabilities, 1000 < ADTT < 2500, Span = 100.

(1000 < ADTT < 2500) & (Span Length is assumed 100 ft)							
Total # of Correct Data (1000 < ADTT < 2500) 162317		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	27853	27853	27853	27853	27853	27853
	% of MP probabilities	17.16	17.16	17.16	17.16	17.16	17.16
Side by Side	# of Correct Data	283	346	513	915	1572	385
	% of MP probabilities	0.17	0.21	0.32	0.56	0.97	0.24
Staggered	# of Correct Data	1201	1138	971	569	7	1099
	% of MP probabilities	0.74	0.70	0.60	0.35	0.00	0.68
Multiple	# of Correct Data	720	720	720	720	720	720
	% of MP probabilities	0.44	0.44	0.44	0.44	0.44	0.44
Single	# of Correct Data	157457	157457	157457	157457	157362	157457
	% of MP probabilities	97.01	97.01	97.01	97.01	96.95	97.01

Table C11. Multiple Presence Probabilities, 2500 < ADTT < 5000, Span = 100.

(2500 < ADTT < 5000) & (Span Length is assumed 100 ft)							
Total # of Correct Data (2500 < ADTT < 5000) 468984		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	178283	178283	178283	178283	178283	178283
	% of MP probabilities	38.01	38.01	38.01	38.01	38.01	38.01
Side by Side	# of Correct Data	1853	2601	4341	8101	14657	3070
	% of MP probabilities	0.40	0.55	0.93	1.73	3.13	0.65
Staggered	# of Correct Data	12235	11487	9747	5987	82	11018
	% of MP probabilities	2.61	2.45	2.08	1.28	0.02	2.35
Multiple	# of Correct Data	7135	7135	7135	7135	7135	7135
	% of MP probabilities	1.52	1.52	1.52	1.52	1.52	1.52
Single	# of Correct Data	436427	436427	436427	436427	435776	436427
	% of MP probabilities	93.06	93.06	93.06	93.06	92.92	93.06

Table C12. Multiple Presence Probabilities, ADTT > 5000, Span = 100.

(ADTT > 5000) & (Span Length is assumed 100 ft)							
Total # of Correct Data (2500 < ADTT < 5000) 2807890		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	1293066	1293066	1293066	1293066	1293066	1293066
	% of MP probabilities	46.05	46.05	46.05	46.05	46.05	46.05
Side by Side	# of Correct Data	19216	27332	45349	85287	157411	33007
	% of MP probabilities	0.68	0.97	1.62	3.04	5.61	1.18
Staggered	# of Correct Data	132867	124751	106734	66798	943	119076
	% of MP probabilities	4.73	4.44	3.80	2.38	0.03	4.24
Multiple	# of Correct Data	79999	79999	79999	79999	79999	79999
	% of MP probabilities	2.85	2.85	2.85	2.85	2.85	2.85
Single	# of Correct Data	2464910	2464910	2464910	2464910	2458639	2464910
	% of MP probabilities	87.79	87.79	87.79	87.79	87.56	87.79

Table C13. Multiple Presence Probabilities, ADTT < 1000, Span = 180.

(ADTT < 1000) & (Span Length is assumed 180 ft)							
Total # of Correct Data (ADTT < 1000) 106686		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	19523	19523	19523	19523	19523	19523
	% of MP probabilities	18.30	18.30	18.30	18.30	18.30	18.30
Side by Side	# of Correct Data	43	43	44	48	60	42
	% of MP probabilities	0.04	0.04	0.04	0.04	0.06	0.04
Staggered	# of Correct Data	26	26	25	9	21	27
	% of MP probabilities	0.02	0.02	0.02	0.01	0.02	0.03
Multiple	# of Correct Data	27	27	27	27	27	27
	% of MP probabilities	0.03	0.03	0.03	0.03	0.03	0.03
Single	# of Correct Data	103665	103665	103665	103665	103665	103665
	% of MP probabilities	97.17	97.17	97.17	97.17	97.17	97.17

Table C14. Multiple Presence Probabilities, 1000 < ADTT < 2500, Span = 180.

(1000 < ADTT < 2500) & (Span Length is assumed 180 ft)							
Total # of Correct Data (1000 < ADTT < 2500) 162317		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	51296	51296	51296	51296	51296	51296
	% of MP probabilities	31.60	31.60	31.60	31.60	31.60	31.60
Side by Side	# of Correct Data	283	346	513	915	1572	385
	% of MP probabilities	0.17	0.21	0.32	0.56	0.97	0.24
Staggered	# of Correct Data	1541	1478	1311	909	252	1439
	% of MP probabilities	0.95	0.91	0.81	0.56	0.16	0.89
Multiple	# of Correct Data	895	895	895	895	895	895
	% of MP probabilities	0.55	0.55	0.55	0.55	0.55	0.55
Single	# of Correct Data	153943	153943	153943	153943	153943	153943
	% of MP probabilities	94.84	94.84	94.84	94.84	94.84	94.84

Table C15. Multiple Presence Probabilities, 2500 < ADTT < 5000, Span = 180.

(2500 < ADTT < 5000) & (Span Length is assumed 180 ft)							
Total # of Correct Data (2500 < ADTT < 5000) 468984		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	287453	287453	287453	287453	287453	287453
	% of MP probabilities	61.29	61.29	61.29	61.29	61.29	61.29
Side by Side	# of Correct Data	1853	2601	4341	8101	14657	3070
	% of MP probabilities	0.40	0.55	0.93	1.73	3.13	0.65
Staggered	# of Correct Data	16214	15466	13726	9966	3410	14997
	% of MP probabilities	3.46	3.30	2.93	2.13	0.73	3.20
Multiple	# of Correct Data	9229	9229	9229	9229	9229	9229
	% of MP probabilities	1.97	1.97	1.97	1.97	1.97	1.97
Single	# of Correct Data	414232	414232	414232	414232	414232	414232
	% of MP probabilities	88.33	88.33	88.33	88.33	88.33	88.33

Table C16. Multiple Presence Probabilities, ADTT > 5000, Span = 180.

(ADTT > 5000) & (Span Length is assumed 180 ft)							
Total # of Correct Data (2500 < ADTT < 5000) 2807890		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	1923705	1923705	1923705	1923705	1923705	1923705
	% of MP probabilities	68.51	68.51	68.51	68.51	68.51	68.51
Side by Side	# of Correct Data	19216	27332	45349	85287	157411	33007
	% of MP probabilities	0.68	0.97	1.62	3.04	5.61	1.18
Staggered	# of Correct Data	179857	171741	153764	113788	41667	166066
	% of MP probabilities	6.41	6.12	5.48	4.05	1.48	5.91
Multiple	# of Correct Data	105483	105483	105483	105483	105483	105483
	% of MP probabilities	3.76	3.76	3.76	3.76	3.76	3.76
Single	# of Correct Data	2239027	2239027	2239027	2239025	2239025	2239027
	% of MP probabilities	79.74	79.74	79.74	79.74	79.74	79.74

Table C17. Multiple Presence Probabilities, ADTT < 1000, Span = 400.

(ADTT < 1000) & (Span Length is assumed 400 ft)							
Total # of Correct Data (ADTT < 1000) 106686		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	39361	39361	39361	39361	39361	39361
	% of MP probabilities	36.89	36.89	36.89	36.89	36.89	36.89
Side by Side	# of Correct Data	43	43	44	48	60	42
	% of MP probabilities	0.04	0.04	0.04	0.04	0.06	0.04
Staggered	# of Correct Data	39	39	38	34	22	40
	% of MP probabilities	0.04	0.04	0.04	0.03	0.02	0.04
Multiple	# of Correct Data	32	32	32	32	32	32
	% of MP probabilities	0.03	0.03	0.03	0.03	0.03	0.03
Single	# of Correct Data	99823	99823	99823	99823	99823	99823
	% of MP probabilities	93.57	93.57	93.57	93.57	93.57	93.57

Table C18. Multiple Presence Probabilities, 1000 < ADTT < 2500, Span = 400.

(1000 < ADTT < 2500) & (Span Length is assumed 400 ft)							
Total # of Correct Data (1000 < ADTT < 2500) 162317		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	85249	85249	85249	85249	85249	85249
	% of MP probabilities	52.52	52.52	52.52	52.52	52.52	52.52
Side by Side	# of Correct Data	283	346	513	915	1572	385
	% of MP probabilities	0.17	0.21	0.32	0.56	0.97	0.24
Staggered	# of Correct Data	2053	1990	1823	1421	764	1951
	% of MP probabilities	1.26	1.23	1.12	0.88	0.47	1.20
Multiple	# of Correct Data	1174	1174	1174	1174	1174	1174
	% of MP probabilities	0.72	0.72	0.72	0.72	0.72	0.72
Single	# of Correct Data	145431	145431	145431	145431	145431	145431
	% of MP probabilities	89.60	89.60	89.60	89.60	89.60	89.60

Table C19. Multiple Presence Probabilities, 2500 < ADTT < 5000, Span = 400.

(2500 < ADTT < 5000) & (Span Length is assumed 400 ft)							
Total # of Correct Data (2500 < ADTT < 5000) 468984		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	304297	304297	304297	304297	304297	304297
	% of MP probabilities	64.88	64.88	64.88	64.88	64.88	64.88
Side by Side	# of Correct Data	1853	2601	4341	8101	14657	3070
	% of MP probabilities	0.40	0.55	0.93	1.73	3.13	0.65
Staggered	# of Correct Data	24079	23331	21591	17831	11275	22862
	% of MP probabilities	5.13	4.97	4.60	3.80	2.40	4.87
Multiple	# of Correct Data	13580	13580	13580	13580	13580	13580
	% of MP probabilities	2.90	2.90	2.90	2.90	2.90	2.90
Single	# of Correct Data	363026	363026	363026	363026	363026	363026
	% of MP probabilities	77.41	77.41	77.41	77.41	77.41	77.41

Table C20. Multiple Presence Probabilities, ADTT > 5000, Span = 400.

(ADTT > 5000) & (Span Length is assumed 400 ft)							
Total # of Correct Data (2500 < ADTT < 5000) 2807890		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(first truck's length)
Following	# of Correct Data	2159761	2159761	2159761	2159761	2159761	2159761
	% of MP probabilities	76.92	76.92	76.92	76.92	76.92	76.92
Side by Side	# of Correct Data	19216	27332	45349	85287	157411	33007
	% of MP probabilities	0.68	0.97	1.62	3.04	5.61	1.18
Staggered	# of Correct Data	263175	255059	237043	197104	124980	249384
	% of MP probabilities	9.37	9.08	8.44	7.02	4.45	8.88
Multiple	# of Correct Data	41830	41830	41830	41830	41830	41830
	% of MP probabilities	1.49	1.49	1.49	1.49	1.49	1.49
Single	# of Correct Data	1779532	1779532	1779532	1779532	1779532	1779532
	% of MP probabilities	63.38	63.38	63.38	63.38	63.38	63.38

Table C21. Side-by-Side Probability as a Function of Traffic Direction for Site 9759.

Station # 9759 (ADTT > 5000)							
Total # of Correct Data (2500 < ADTT < 5000)		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(truck length)
		1854	2073	2605	3997	6697	2091
Same Direction	# of Correct Data	801	895	1139	1753	2930	884
	% of MP probabilities	43	43	44	44	44	42
Opposing Direction	# of Correct Data	1053	1178	1466	2244	3767	1207
	% of MP probabilities	57	57	56	56	56	58

Table C22. Side-by-Side Probability as a Function of Traffic Direction for Site 8839.

Station # 8839 (ADTT > 5000)							
Total # of Correct Data (2500 < ADTT < 5000)		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(truck length)
		1268	1722	2721	5180	9620	1939
Same Direction	# of Correct Data	662	871	1310	2387	4315	952
	% of MP probabilities	52	51	48	46	45	49
Opposing Direction	# of Correct Data	606	851	1411	2793	5305	987
	% of MP probabilities	48	49	52	54	55	51

Table C23. Side-by-Side Probability as a Function of Traffic Direction for Site 7029.

Station # 7029 (ADTT > 5000)							
Total # of Correct Data (2500 < ADTT < 5000)		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(truck length)
		524	830	1516	2927	5214	1060
Same Direction	# of Correct Data	272	422	734	1408	2526	517
	% of MP probabilities	52	51	48	48	48	49
Opposing Direction	# of Correct Data	252	408	782	1519	2688	543
	% of MP probabilities	48	49	52	52	52	51

Table C24. Side-by-Side Probability as a Function of Traffic Direction for Site 9699.

Station # 9699 (ADTT > 5000)							
Total # of Correct Data (ADTT < 1000)		Headway = 10	Headway = 20	Headway = 40	Headway = 80	Headway = 160	Headway = 0.5*(truck length)
		2648	4204	7519	14492	28043	5424
Same Direction	# of Correct Data	1402	2239	3994	7698	14866	2895
	% of MP probabilities	53	53	53	53	53	53
Opposing Direction	# of Correct Data	1246	1965	3525	6794	13177	2529
	% of MP probabilities	47	47	47	47	47	47

APPENDIX D: VEHICLE LOAD EFFECTS

Table D1. Vehicle Load Effects Summary.

			Single Lane (Following) Load Effects, Simple Span					
	Moment				Shear			
Span	Mean	COV	Min.	Max.	Mean	COV	Min.	Max.
20	92	0.39	28	717	22	0.38	5	158
100	936	0.45	148	7088	39	0.46	10	247
400	8355	0.40	1016	39199	60	0.52	23	628
			Single Lane (Following) Load Effects Continuous Span					
	Moment				Shear			
Span	Mean	COV	Min.	Max.	Mean	COV	Min.	Max.
20	69	0.38	6	333	22	0.36	6	124
100	433	0.47	15	1330	40	0.43	10	296
400	2651	0.53	150	18097	62	0.52	12	624
			Two Lane Load Effects, Simple Span					
	Moment				Shear			
Span	Mean	COV	Min.	Max.	Mean	COV	Min.	Max.
20	39	0.38	4	500	8	0.44	1	123
100	249	0.42	27	2835	18	0.44	2	242
400	11002	0.41	875	96040	108	0.41	9	971
			Two Lane Load Effects Continuous Span					
	Moment				Shear			
Span	Mean	COV	Min.	Max.	Mean	COV	Min.	Max.
20	26	0.42	3	272	8	0.40	1	99
100	190	0.41	16	1659	16	0.50	1	226
400	4762	0.41	366	39950	101	0.41	9	928

Table D2. Comparison of Single Vehicle and Following Load Effects.

Single Vehicle Simple Moment				
Span	Mean	COV	Minimum	Maximum
20	93	0.35	28	620
50	317	0.39	71	2458
100	895	0.44	141	5891
200	2267	0.43	284	12777
300	3646	0.43	425	19678
400	5024	0.43	561	26605
Following Vehicles Simple Moment				
Span	Mean	COV	Minimum	Maximum
20	93	0.39	28	717
50	318	0.43	71	2698
100	936	0.45	148	7088
200	3500	0.39	392	18416
300	5929	0.40	637	29330
400	8355	0.40	1016	39199

Table D3. Vehicle Comparison to A, B, C Moment Overload Limits.

	Span = 20	**Percentage**	**Span = 50**	**Percentage**	**Span = 100**	**Percentage**
# of vehicles below C	42730464	99.993696	42671696	99.8561726	42690121	99.899289
# of vehicles between B & C	1664	0.0038939	57568	0.13471506	39896	0.09336076
# of vehicles between A & B	845	0.0019774	1521	0.0035593	1135	0.00265602
# of vehicles above A	177	0.0004142	2373	0.00555306	2006	0.00469425
total # of vehicles above C	2686	0.0062855	61462	0.14382742	43037	0.10071102
	Span = 200	**Percentage**	**Span = 300**	**Percentage**	**Span = 400**	**Percentage**
# of vehicles below C	42722501	99.975062	42727221	99.9861068	42728042	99.988028
# of vehicles between B & C	8410	0.0196803	4067	0.0095172	3425	0.00801485
# of vehicles between A & B	1192	0.0027894	1251	0.00292747	1257	0.00294151
# of vehicles above A	1055	0.0024688	619	0.00144852	434	0.0010156
total # of vehicles above C	10657	0.0249385	5937	0.01389319	5116	0.01197197

*Note these are based on simple span moments; results will shift somewhat if based on other load effects/span conditions. Results are based on a pool of 42,733,158 vehicles from the WIM data.

Table D4. Special Permit Record Load Effects.

Maximum Load Effects				
	Moment (k-ft)		Shear (k)	
Span (ft)	simple	cont.	simple	cont.
20	401	279	91	92
50	1434	1163	133	134
80	2939	2207	154	155
100	2942	2704	181	180
200	11028	5299	243	243
300	18701	8467	265	265
400	26391	11572	275	276

Mean Load Effects Between A and C				
	Moment (k-ft)		Shear (k)	
Span (ft)	simple	cont.	simple	cont.
20	316	223	68	67
50	1089	860	103	102
80	2248	1549	125	125
100	3080	1900	135	134
200	8147	3898	176	171
300	13692	6078	190	186
400	19115	8361	198	198

Mean Load Effects Above Overload A				
	Moment (k-ft)		Shear (k)	
Span (ft)	simple	cont.	simple	cont.
20	396	285	90	90
50	1393	1126	133	128
80	2873	2030	162	165
100	3950	2466	179	179
200	10843	5106	235	231
300	18031	8145	253	249
400	25405	11175	263	264

Mean Load Effects Between B and C				
	Moment (k-ft)		Shear (k)	
Span (ft)	simple	cont.	simple	cont.
20	312	219	67	66
50	1019	842	101	95
80	2208	1490	123	124
100	3021	1820	133	131
200	8017	3813	173	167
300	13464	5946	186	182
400	18802	8142	195	194

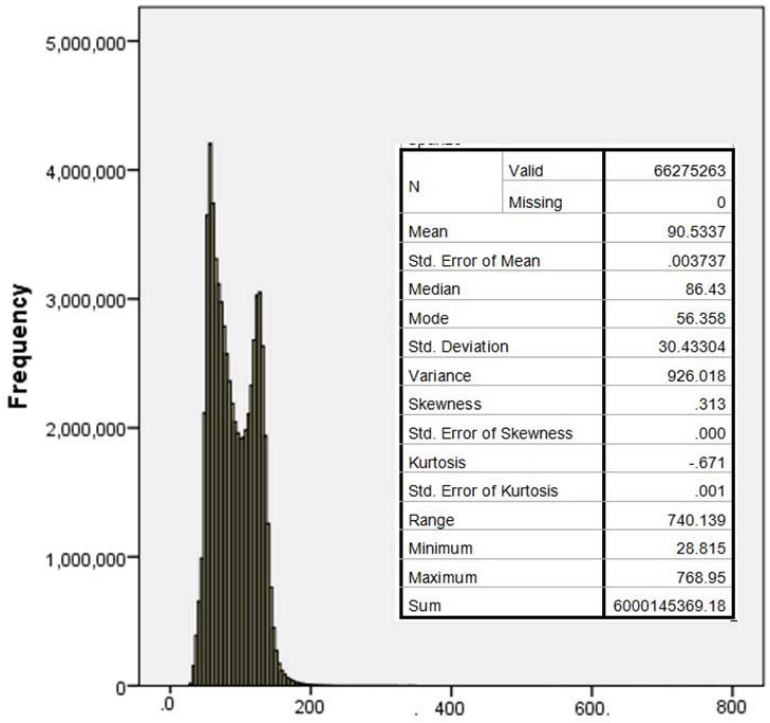
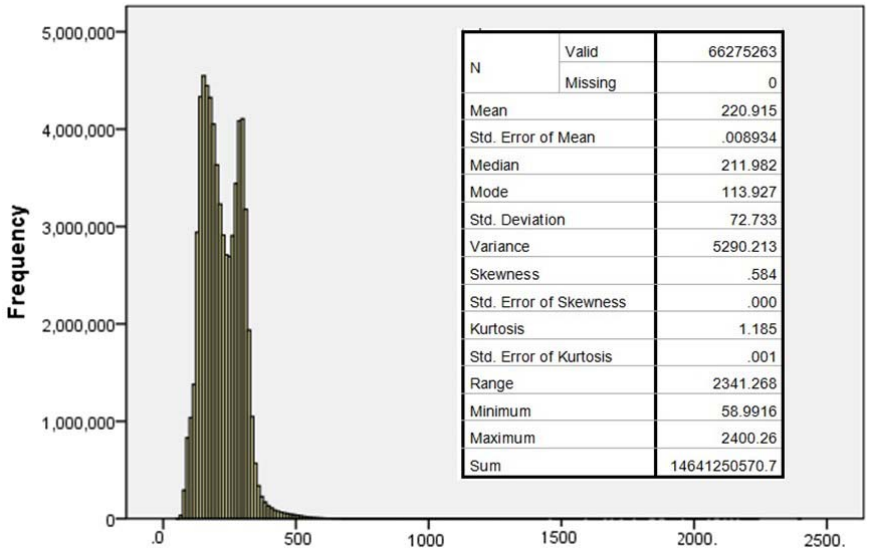
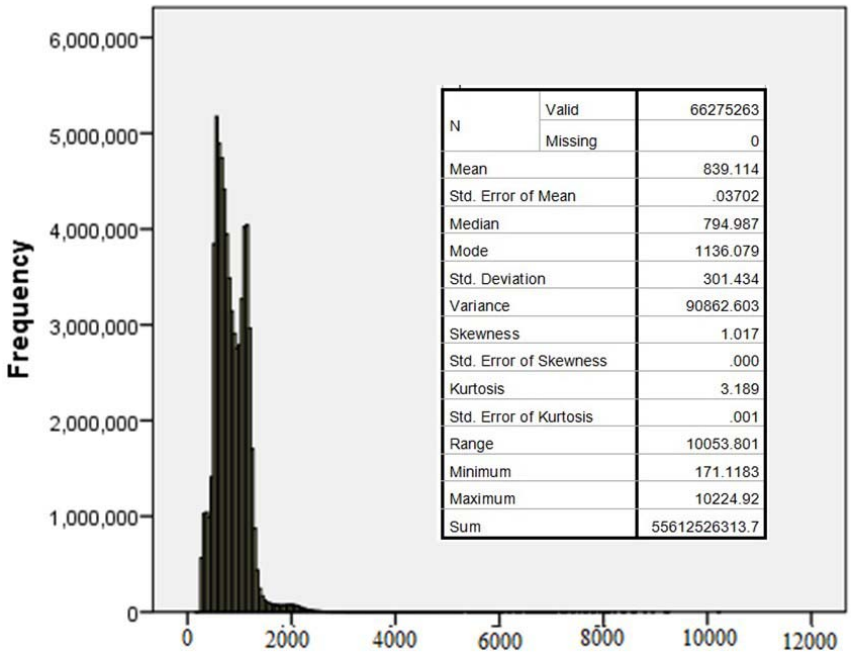


Figure D1. Frequency Histogram of Single Vehicle Moments, 20 ft Simple Span.



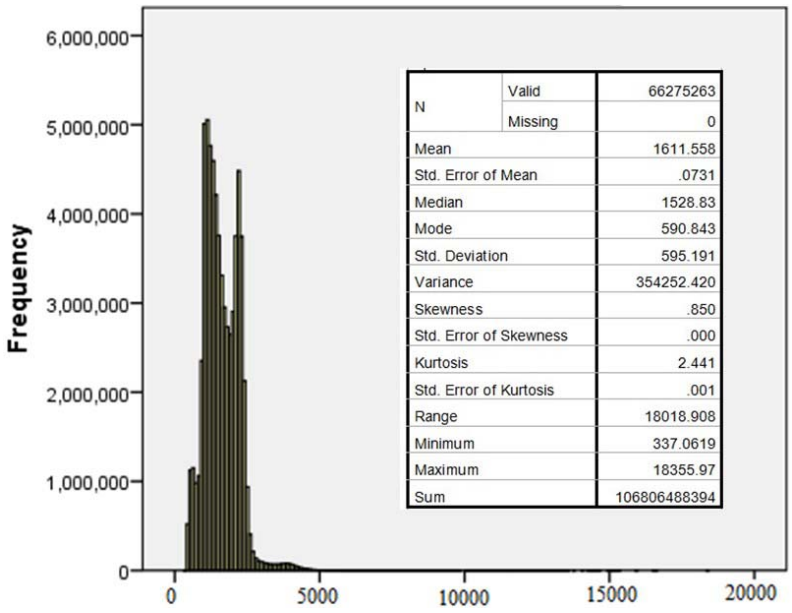
N	Valid	66275263
	Missing	0
Mean		220.915
Std. Error of Mean		.008934
Median		211.982
Mode		113.927
Std. Deviation		72.733
Variance		5290.213
Skewness		.584
Std. Error of Skewness		.000
Kurtosis		1.185
Std. Error of Kurtosis		.001
Range		2341.268
Minimum		58.9916
Maximum		2400.26
Sum		14641250570.7

Figure D2. Frequency Histogram of Single Vehicle Moments, 40 ft Simple Span.



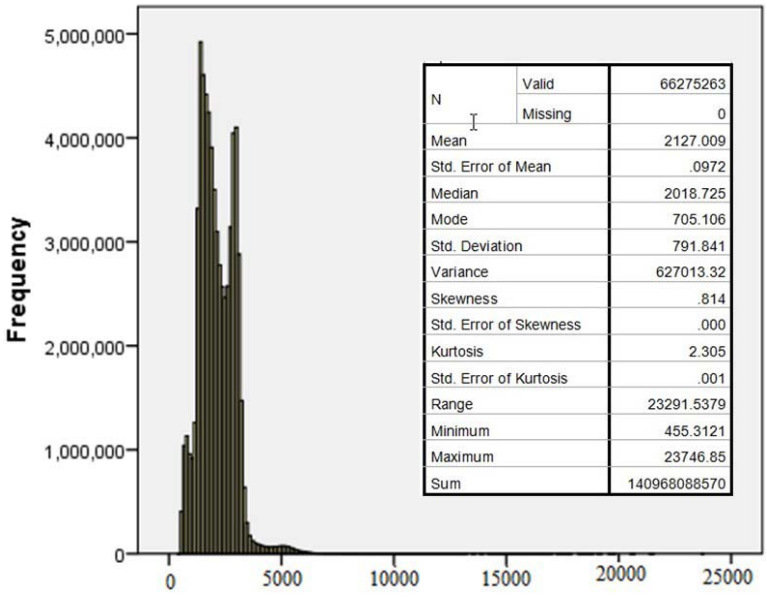
N	Valid	66275263
	Missing	0
Mean		839.114
Std. Error of Mean		.03702
Median		794.987
Mode		1136.079
Std. Deviation		301.434
Variance		90862.603
Skewness		1.017
Std. Error of Skewness		.000
Kurtosis		3.189
Std. Error of Kurtosis		.001
Range		10053.801
Minimum		171.1183
Maximum		10224.92
Sum		55612526313.7

Figure D3. Frequency Histogram of Single Vehicle Moments, 100 ft Simple Span.



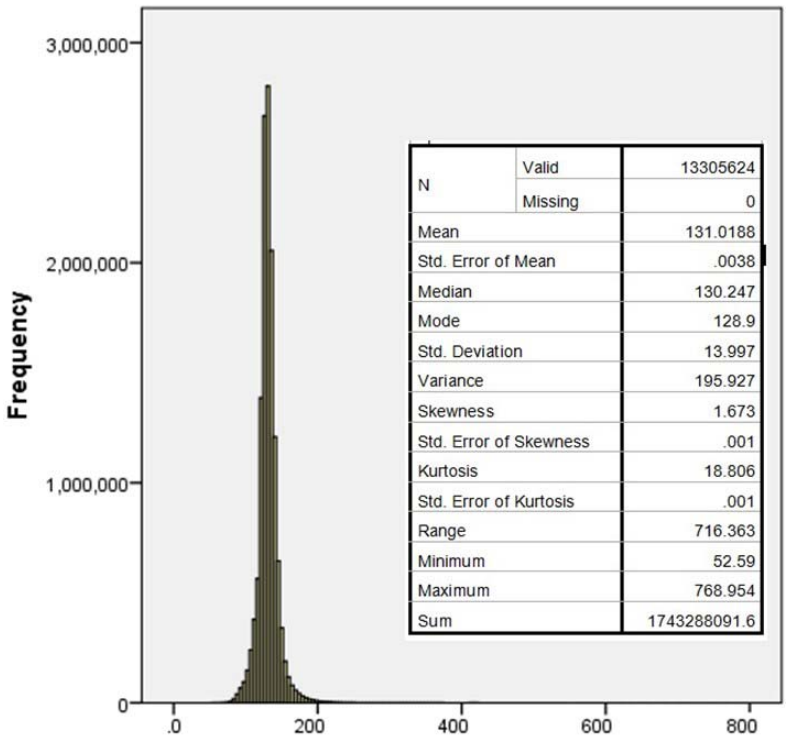
N	Valid	66275263
	Missing	0
Mean		1611.558
Std. Error of Mean		.0731
Median		1528.83
Mode		590.843
Std. Deviation		595.191
Variance		354252.420
Skewness		.850
Std. Error of Skewness		.000
Kurtosis		2.441
Std. Error of Kurtosis		.001
Range		18018.908
Minimum		337.0619
Maximum		18355.97
Sum		106806488394

Figure D4. Frequency Histogram of Single Vehicle Moments, 160 ft Simple Span.



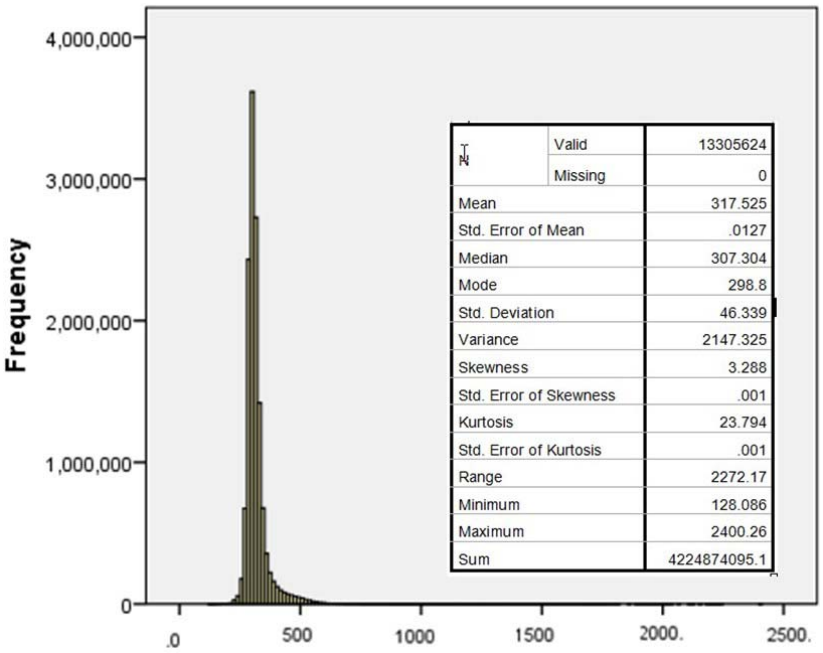
N	Valid	66275263
	Missing	0
Mean		2127.009
Std. Error of Mean		.0972
Median		2018.725
Mode		705.106
Std. Deviation		791.841
Variance		627013.32
Skewness		.814
Std. Error of Skewness		.000
Kurtosis		2.305
Std. Error of Kurtosis		.001
Range		23291.5379
Minimum		455.3121
Maximum		23746.85
Sum		140968088570

Figure D5. Frequency Histogram of Single Vehicle Moments, 200 ft Simple Span.



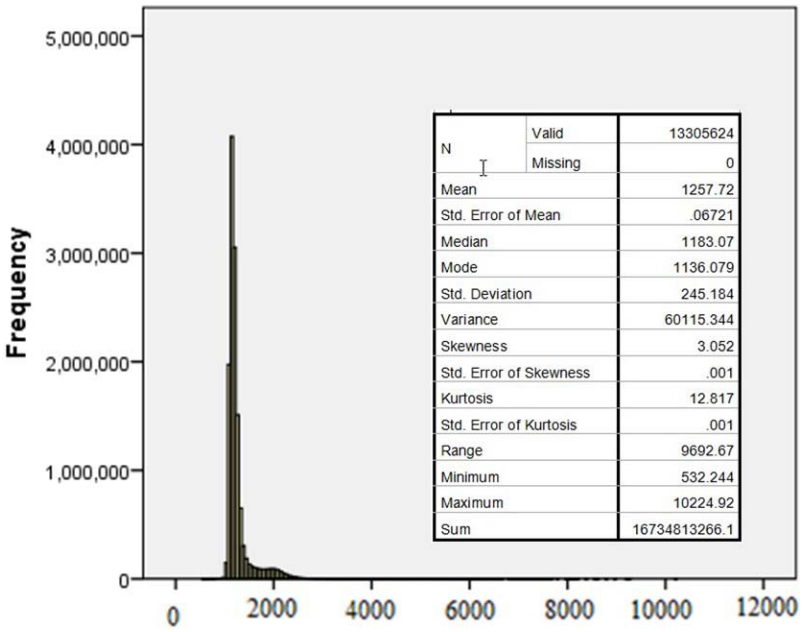
N	Valid	13305624
	Missing	0
Mean		131.0188
Std. Error of Mean		.0038
Median		130.247
Mode		128.9
Std. Deviation		13.997
Variance		195.927
Skewness		1.673
Std. Error of Skewness		.001
Kurtosis		18.806
Std. Error of Kurtosis		.001
Range		716.363
Minimum		52.59
Maximum		768.954
Sum		1743288091.6

Figure D6. Frequency Histogram of Top 20% of Single Vehicle Moments, 20 ft Simple Span.



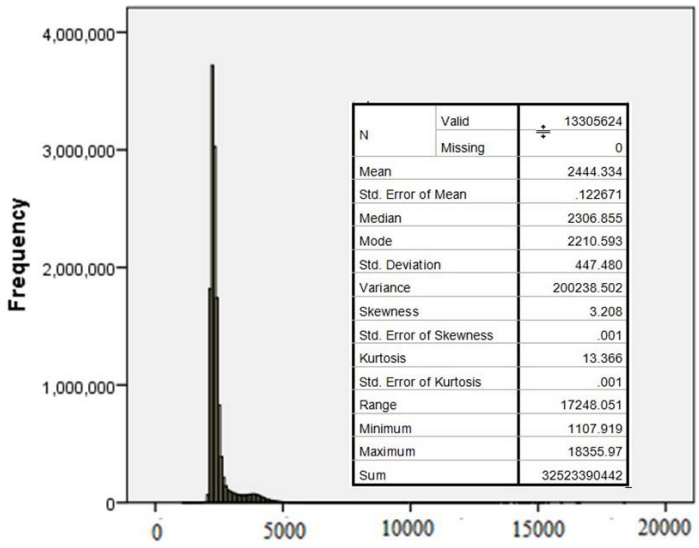
N	Valid	13305624
	Missing	0
Mean		317.525
Std. Error of Mean		.0127
Median		307.304
Mode		298.8
Std. Deviation		46.339
Variance		2147.325
Skewness		3.288
Std. Error of Skewness		.001
Kurtosis		23.794
Std. Error of Kurtosis		.001
Range		2272.17
Minimum		128.086
Maximum		2400.26
Sum		4224874095.1

Figure D7. Frequency Histogram of Top 20% of Single Vehicle Moments, 40 ft Simple Span.



N	Valid	13305624
	Missing	0
Mean		1257.72
Std. Error of Mean		.06721
Median		1183.07
Mode		1136.079
Std. Deviation		245.184
Variance		60115.344
Skewness		3.052
Std. Error of Skewness		.001
Kurtosis		12.817
Std. Error of Kurtosis		.001
Range		9692.67
Minimum		532.244
Maximum		10224.92
Sum		16734813266.1

Figure D8. Frequency Histogram of Top 20% of Single Vehicle Moments, 100 ft Simple Span.



N	Valid	13305624
	Missing	0
Mean		2444.334
Std. Error of Mean		.122671
Median		2306.855
Mode		2210.593
Std. Deviation		447.480
Variance		200238.502
Skewness		3.208
Std. Error of Skewness		.001
Kurtosis		13.366
Std. Error of Kurtosis		.001
Range		17248.051
Minimum		1107.919
Maximum		18355.97
Sum		32523390442

Figure D9. Frequency Histogram of Top 20% of Single Vehicle Moments, 160 ft Simple Span.

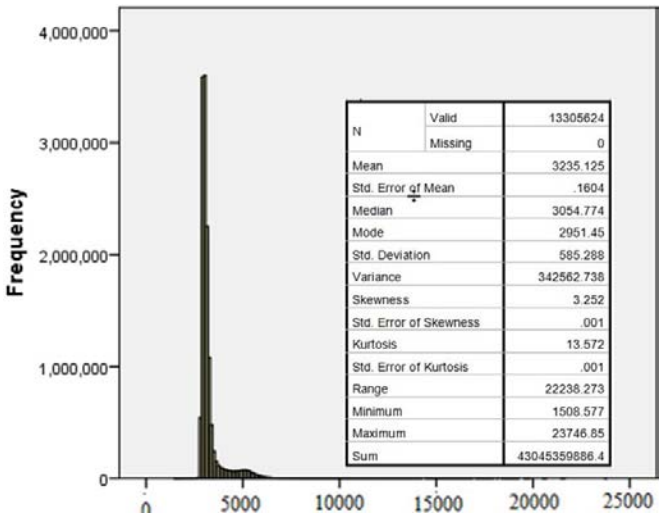
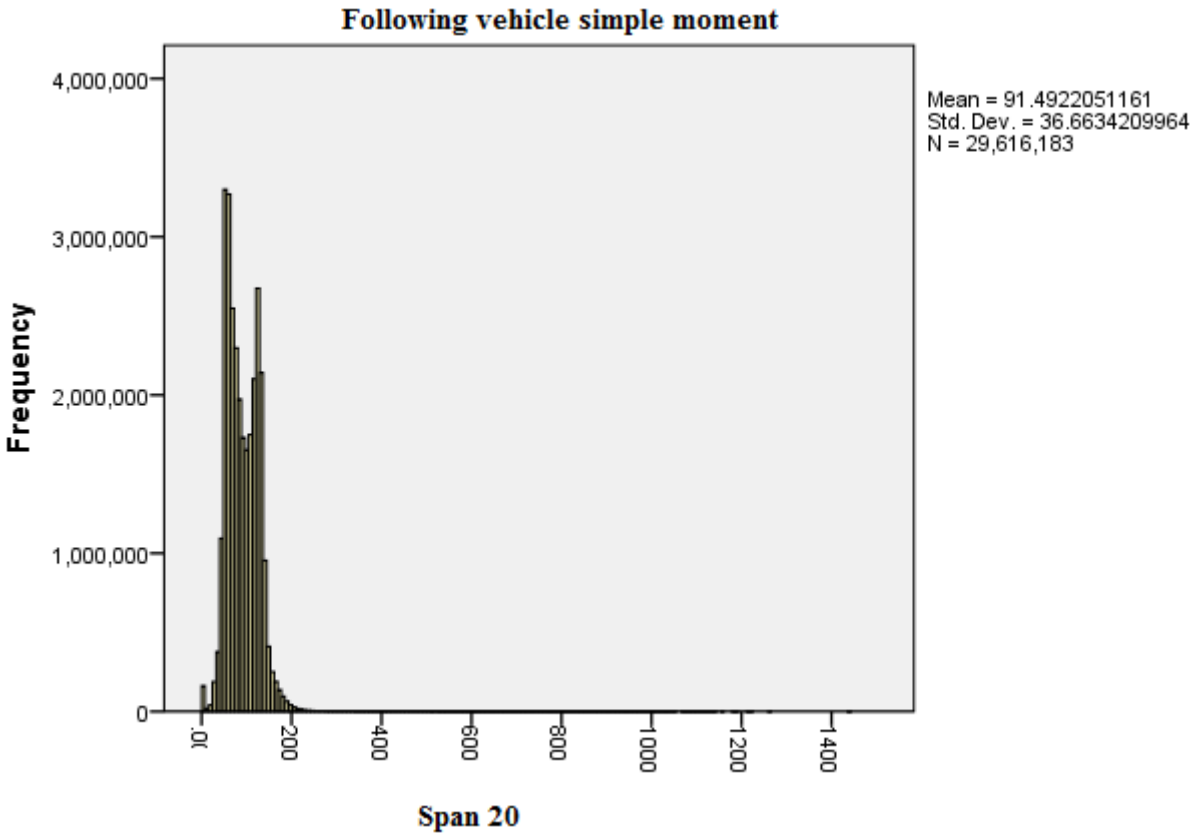


Figure D10. Frequency Histogram of Top 20% of Single Vehicle Moments, 200 ft Simple Span.

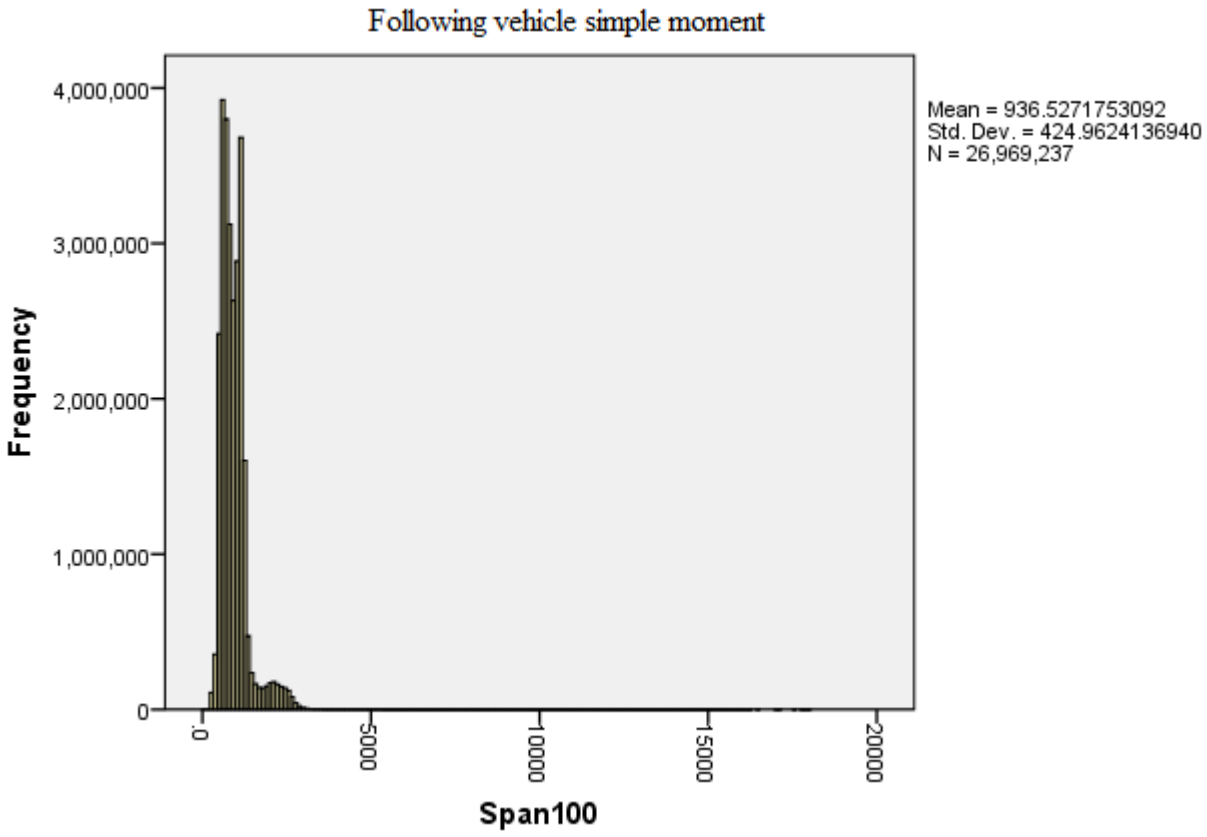


Statistics

Span20

N	Valid	29314766
	Missing	0
Mean		92.2845
Median		87.34475
Mode		55.86
Std. Deviation		35.7285
Variance		1276.527
Range		688.6745
Minimum		28.1815
Maximum		716.856

Figure D11. Single Lane (Following) Moment, 20’ Simple Span.

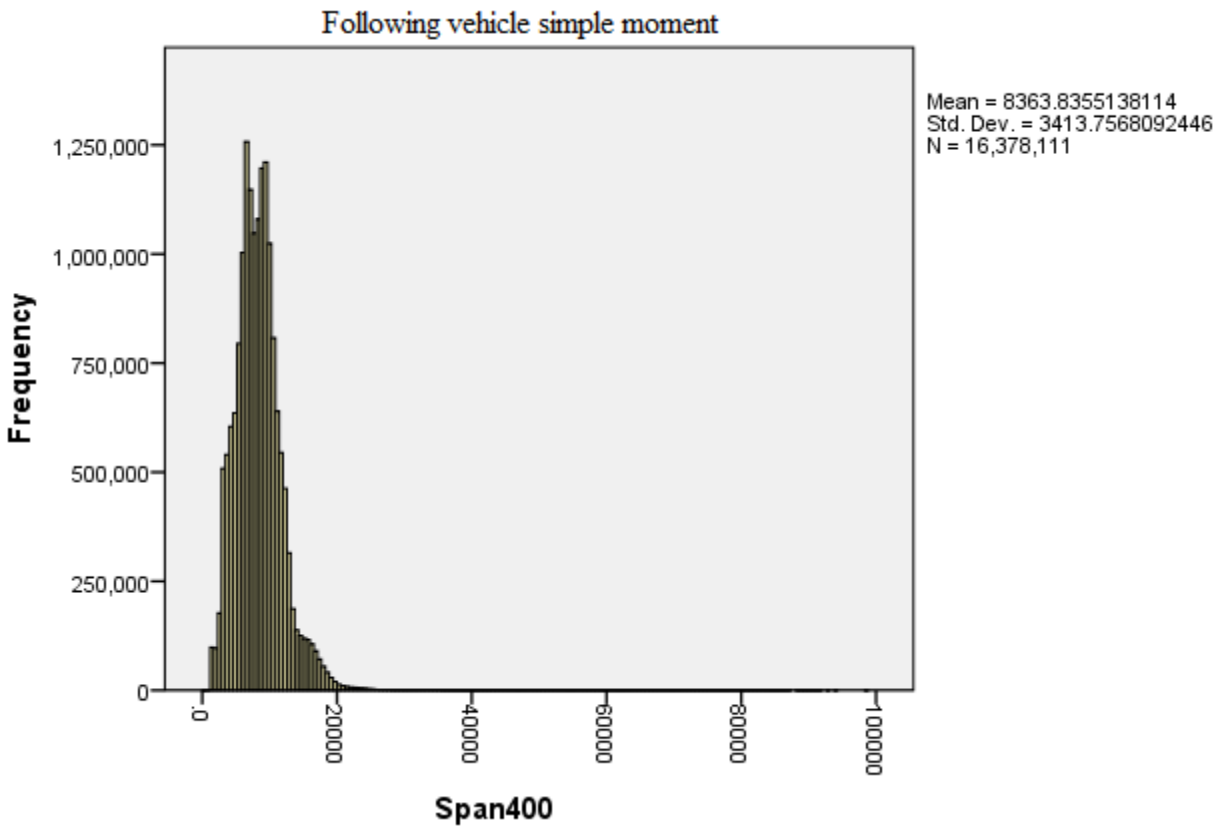


Statistics

Span100

N	Valid	26962016
	Missing	0
Mean		936.03384
Median		859.77975
Mode		1106.497
Std. Deviation		417.92848
Variance		174664.217
Range		6940.1895
Minimum		148.0295
Maximum		7088.219

Figure D12. Single Lane (Following) Moment, 100’ Simple Span.

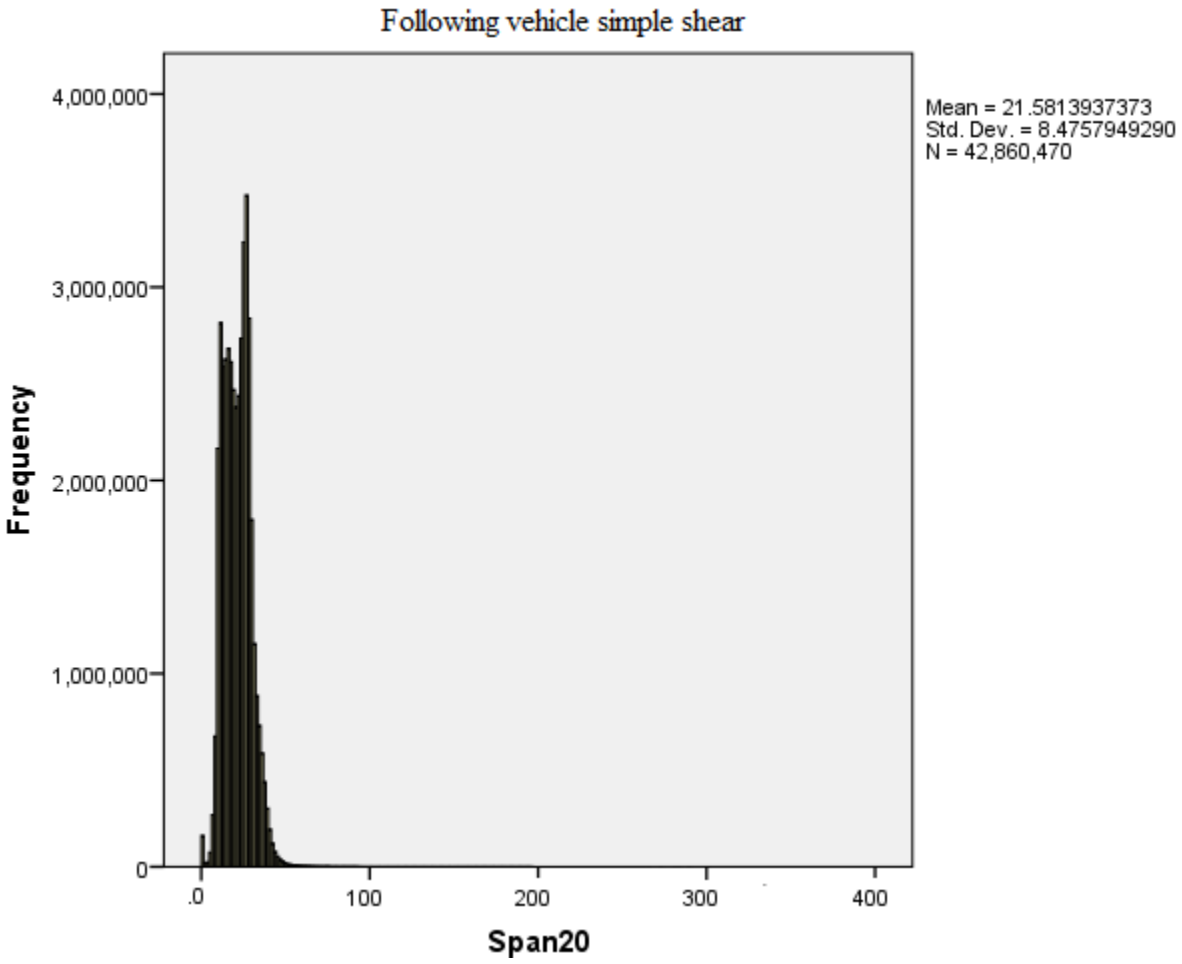


Statistics

Span400

N	Valid	16374081
	Missing	0
Mean		8355.266
Median		8147.077
Mode		10768.75
Std. Deviation		3365.003
Variance		11323247.700
Range		38183.035
Minimum		1016.265
Maximum		39199.3

Figure D13. Single Lane (Following) Moment, 400’ Simple Span.

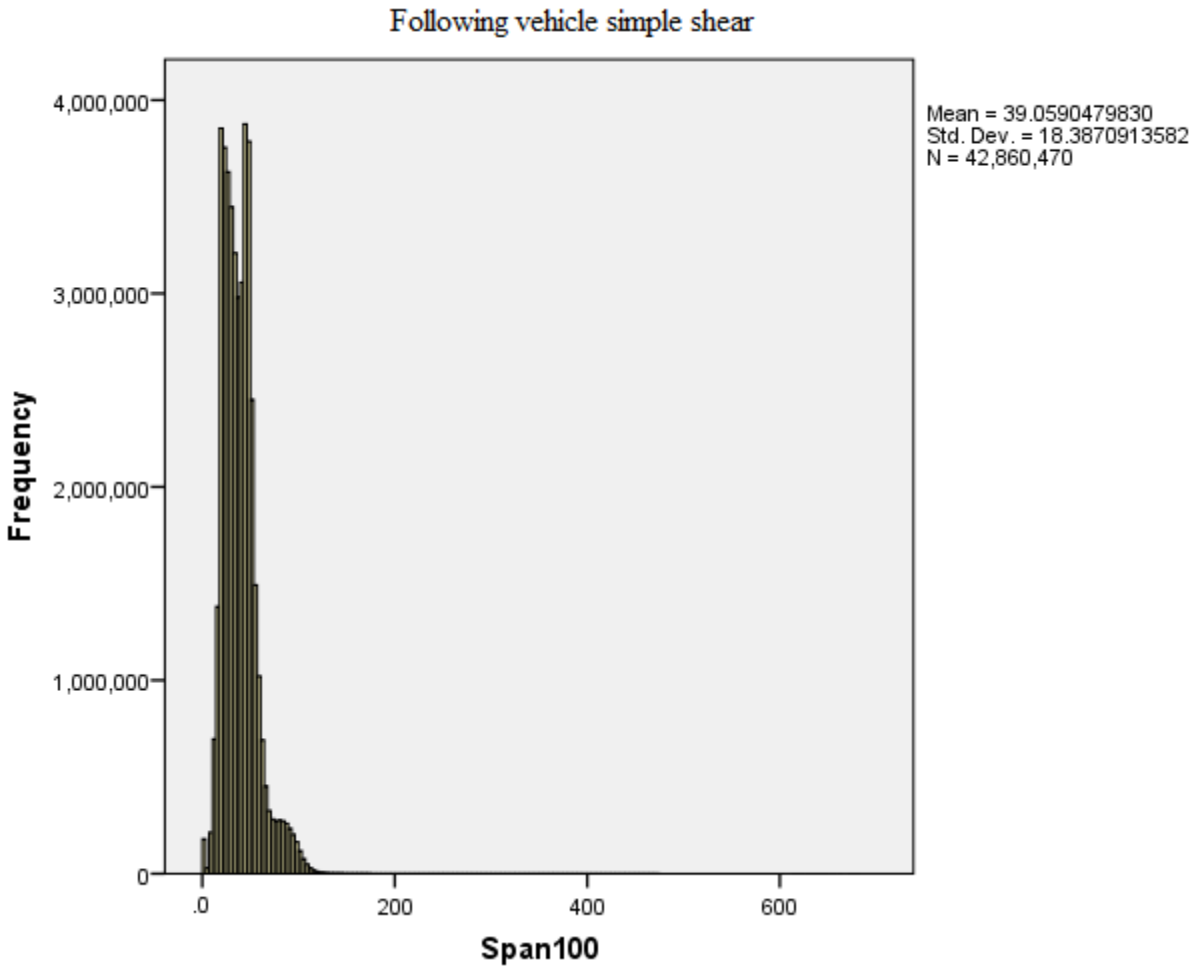


Statistics

Span20

N	Valid	42643736
	Missing	0
Mean		21.6783
Median		21.5203
Mode		10.27425
Std. Deviation		8.326430
Variance		69.329
Range		152.680687
Minimum		5.009213
Maximum		157.6899

Figure D14. Single Lane (Following) Shear, 20’ Simple Span.

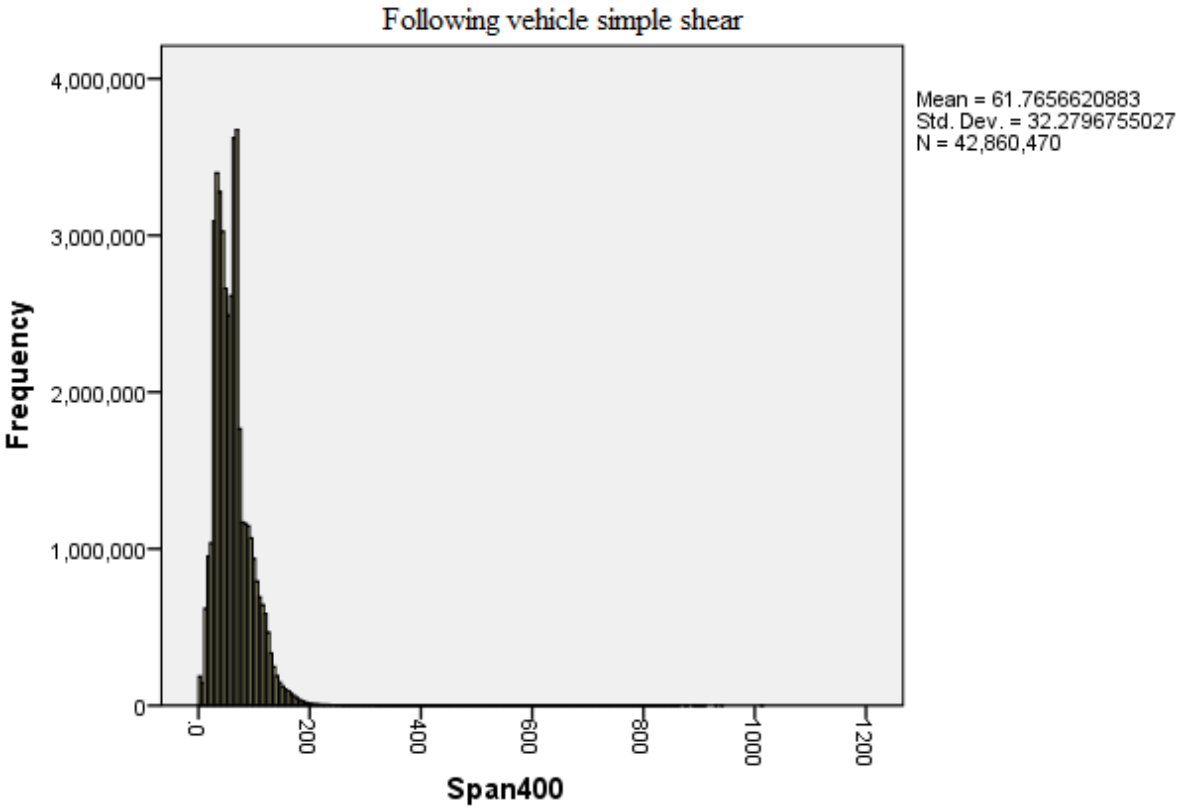


Statistics

Span100

N	Valid	42471020
	Missing	0
Mean		39.32824
Median		37.1555
Mode		27.24753
Std. Deviation		17.851
Variance		318.686
Range		236.5455
Minimum		10.2392
Maximum		246.7848

Figure D15. Single Lane (Following) Shear, 100’ Simple Span.

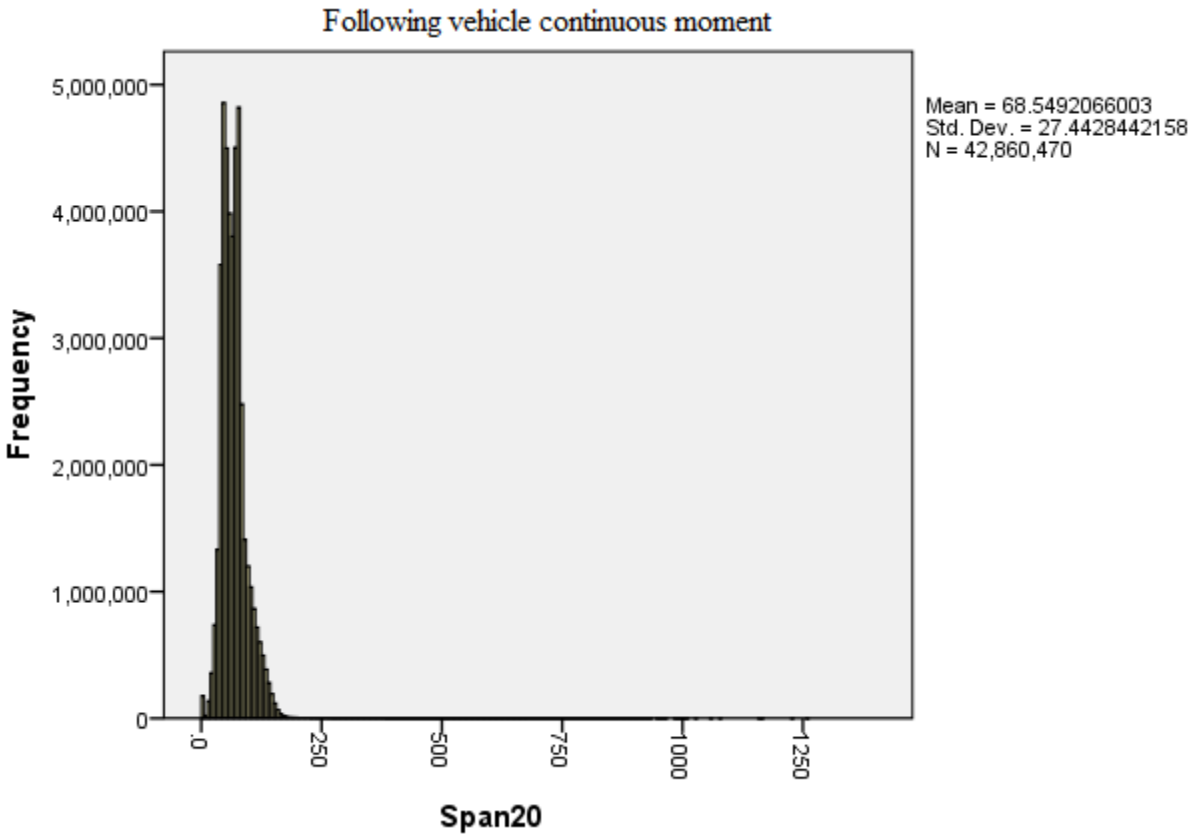


Statistics

Span400

N	Valid	40517143
	Missing	0
Mean		64.43012
Median		59.86651
Mode		65.51521
Std. Deviation		31.04334
Variance		963.689
Range		604.498
Minimum		23.19
Maximum		627.6887

Figure D16. Single Lane (Following) Shear, 400’ Simple Span.

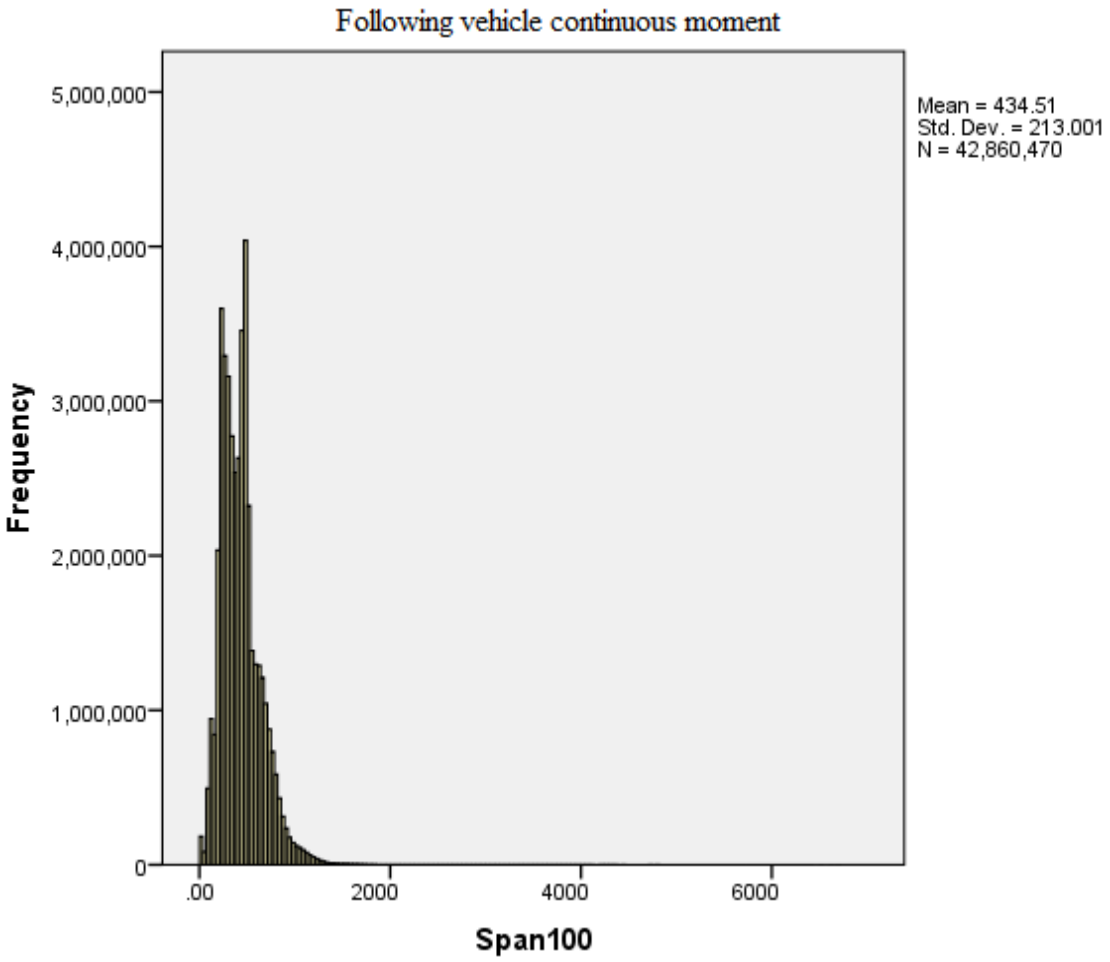


Statistics

Span20

N	Valid	42649996
	Missing	0
Mean		68.7565
Median		65.53857
Mode		31.05262
Std. Deviation		26.3793
Variance		695.869
Range		328.10724
Minimum		5.85436
Maximum		332.9616

Figure D17. Single Lane (Following) Moment, 20’ Continuous Span.

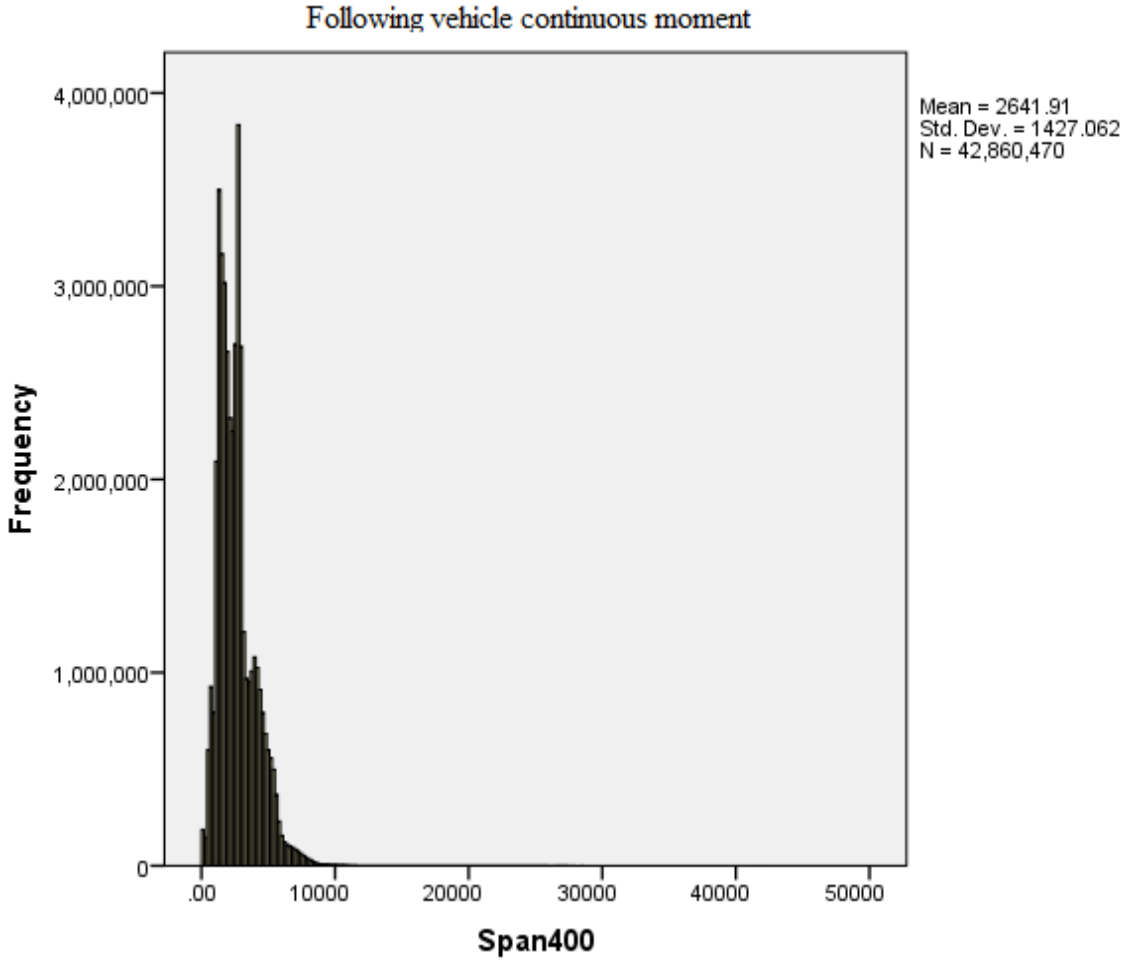


Statistics

Span100

N	Valid	42585708
	Missing	0
Mean		433.0111
Median		413.8128
Mode		240.90
Std. Deviation		201.56097
Variance		40626.825
Range		1314.81
Minimum		15.34
Maximum		1330.15

Figure D18. Single Lane (Following) Moment, 100’ Continuous Span.

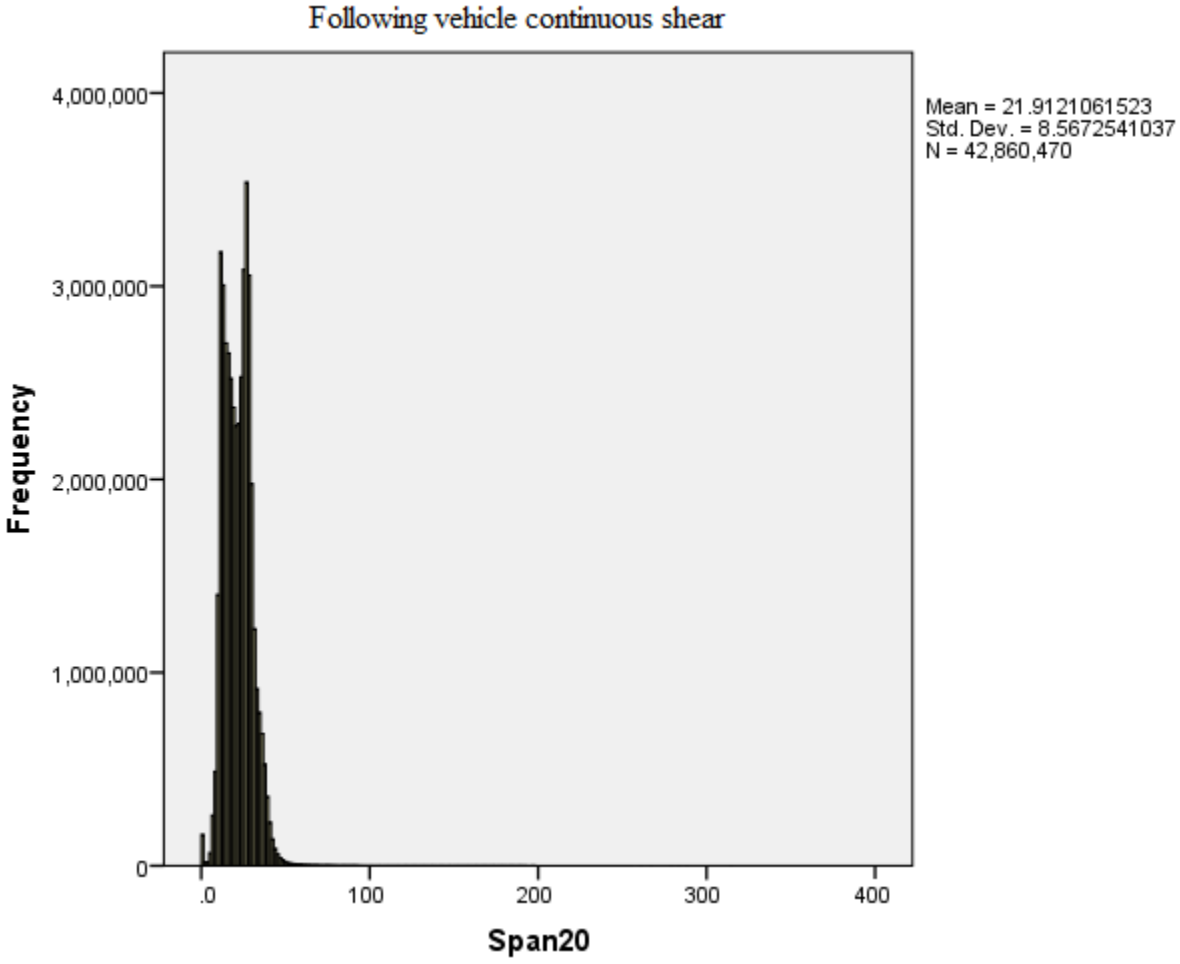


Statistics

Span400

N	Valid	42679024
	Missing	0
Mean		2651.6290
Median		2436.2590
Mode		2765.17
Std. Deviation		1411.12457
Variance		1991272.558
Range		17947.86
Minimum		149.86
Maximum		18097.72

Figure D19. Single Lane (Following) Moment, 400’ Continuous Span.

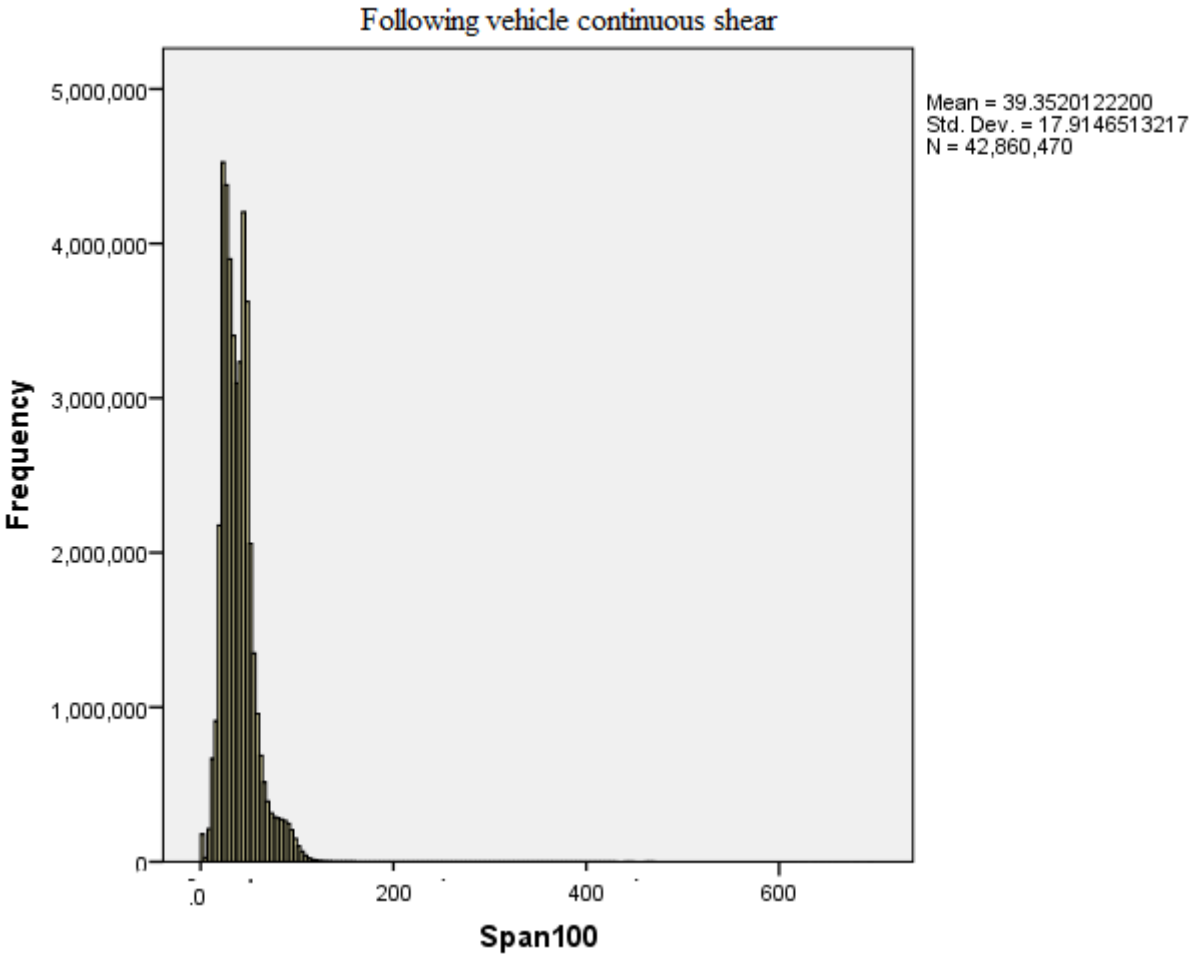


Statistics

Span20

N	Valid	42605039
	Missing	0
Mean		22.01249
Median		21.8262
Mode		10.9890
Std. Deviation		8.32890
Variance		69.371
Range		117.6829
Minimum		5.9820
Maximum		123.665

Figure D20. Single Lane (Following) Shear, 20’ Continuous Span.

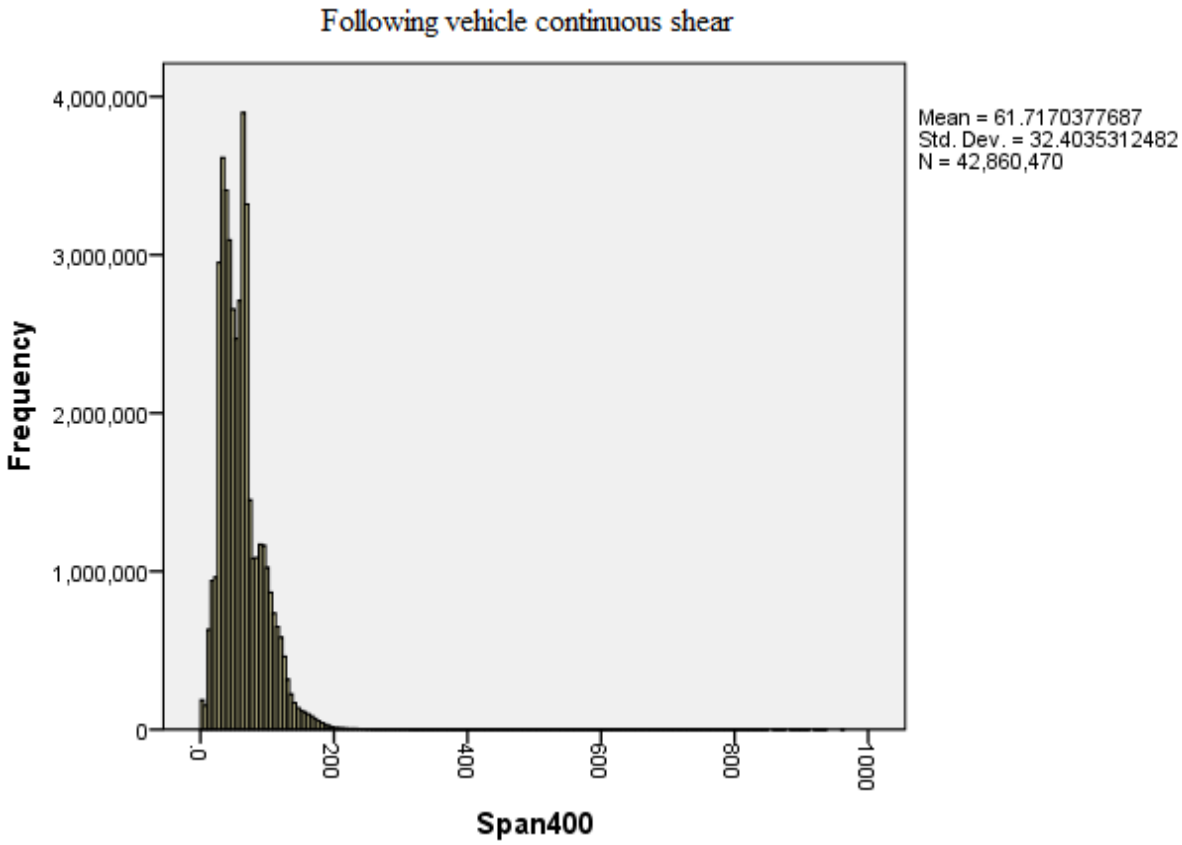


Statistics

Span100

N	Valid	42517592
	Missing	0
Mean		39.609
Median		37.0798
Mode		13.6
Std. Deviation		17.480
Variance		305.572
Range		286.5242
Minimum		9.6281
Maximum		296.1523

Figure D21. Single Lane (Following) Shear,100’ Continuous Span.

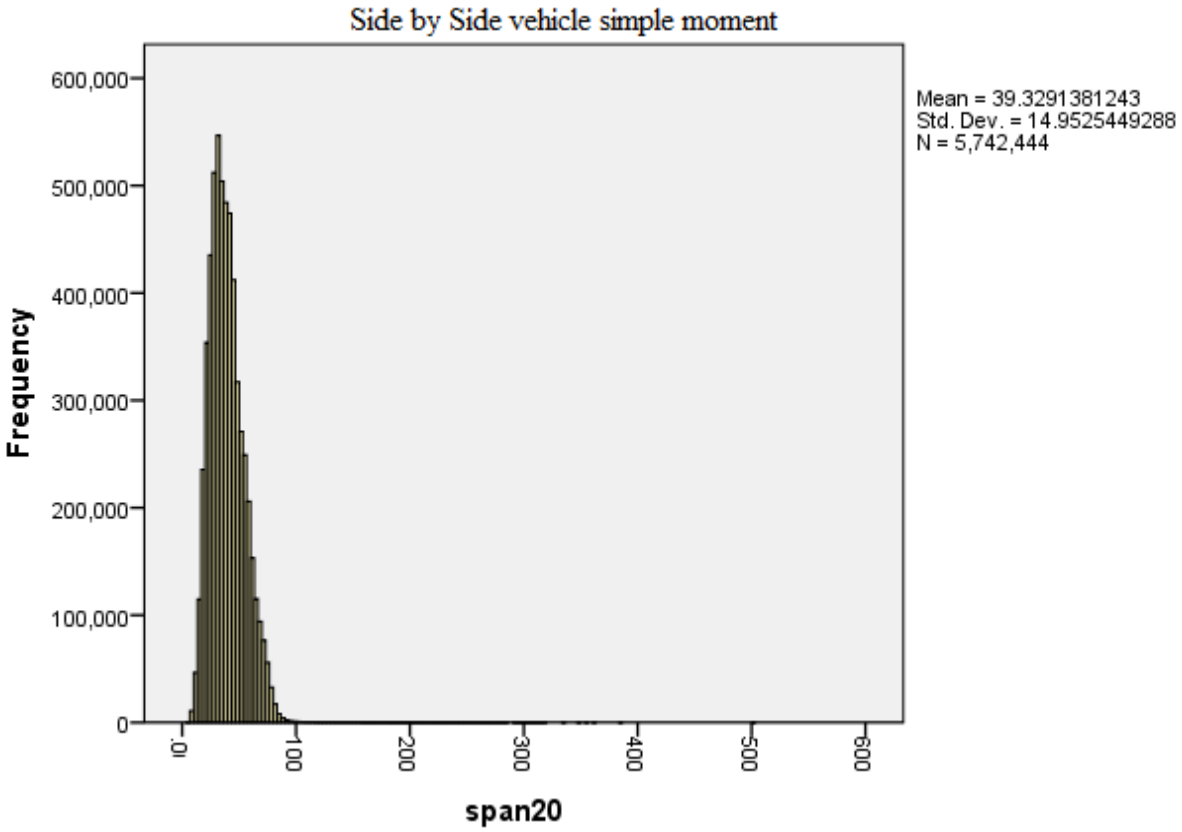


Statistics

Span400

N	Valid	42409815
	Missing	0
Mean		62.2975
Median		57.60
Mode		15.2
Std. Deviation		31.97364
Variance		1022.314
Range		612.2
Minimum		11.769
Maximum		624.0607

Figure D22. Single Lane (Following) Shear,400’ Continuous Span.

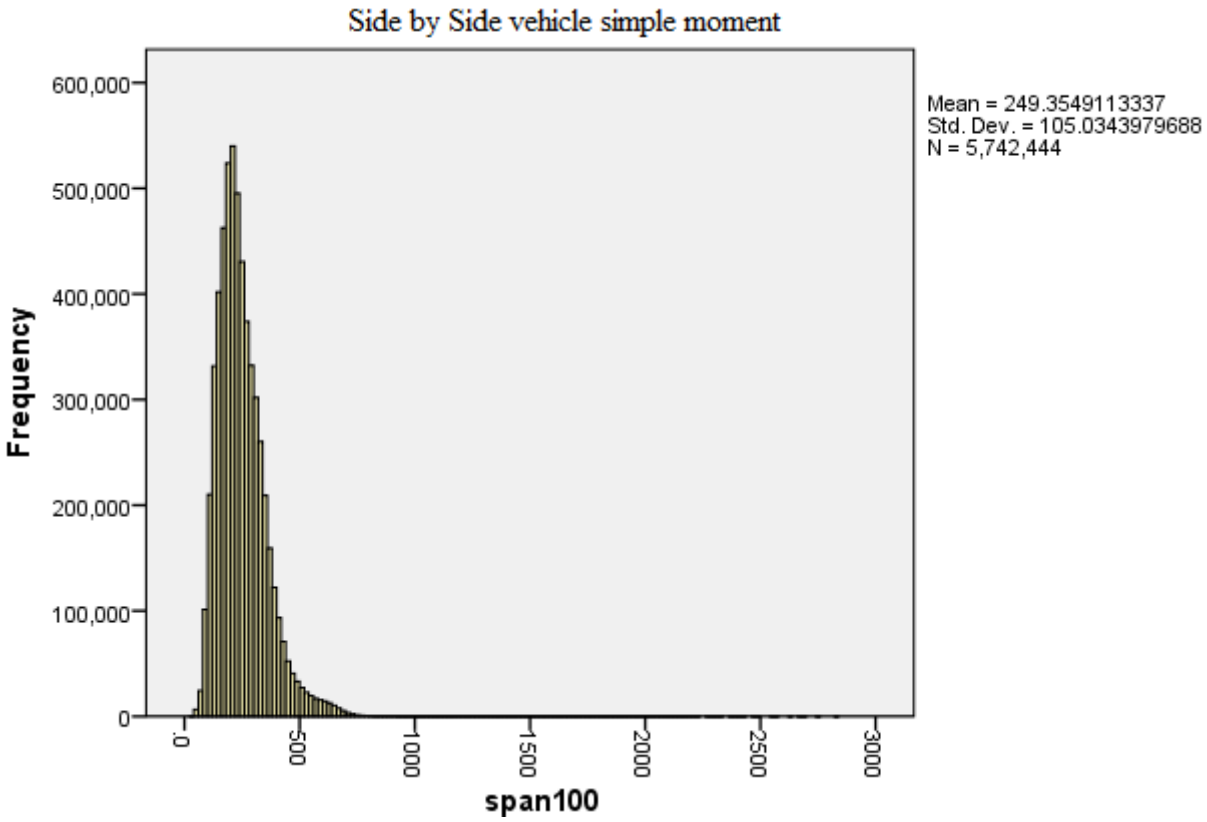


Statistics

span20

N	Valid	5742444
	Missing	0
Mean		39.3291
Std. Error of Mean		.006239
Median		37.427093
Mode		39.228443
Std. Deviation		14.95254712
Variance		223.579
Minimum		3.9134401000
Maximum		500.283260
Sum		225845373.246

Figure D23. Two Lane Moment, 20’ Simple Span. .

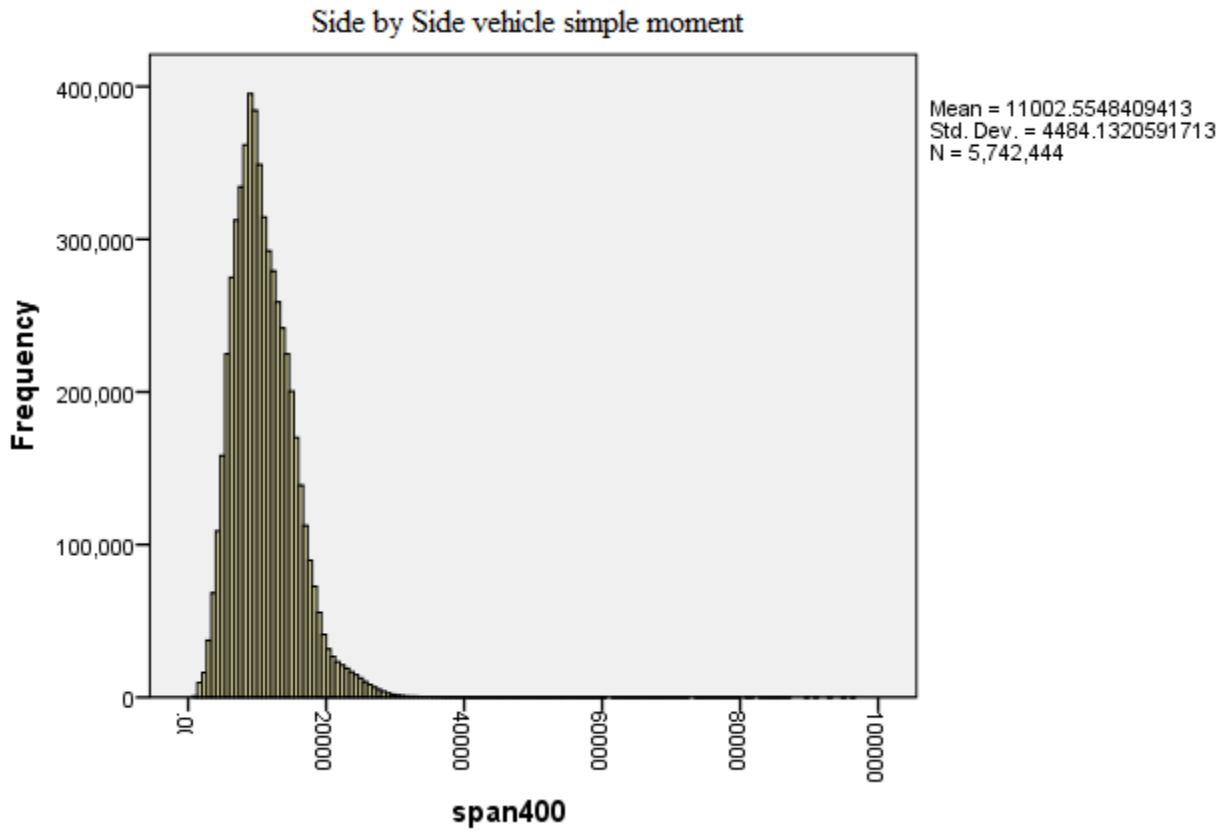


Statistics

span100

N	Valid	5742444
	Missing	0
Mean		249.35491
Std. Error of Mean		.04383111
Median		230.5138455
Mode		289.734312
Std. Deviation		105.03439
Variance		11032.225
Minimum		26.5046
Maximum		2834.5623
Sum		1431906614.45

Figure D24. Two Lane Moment, 100’ Simple Span.

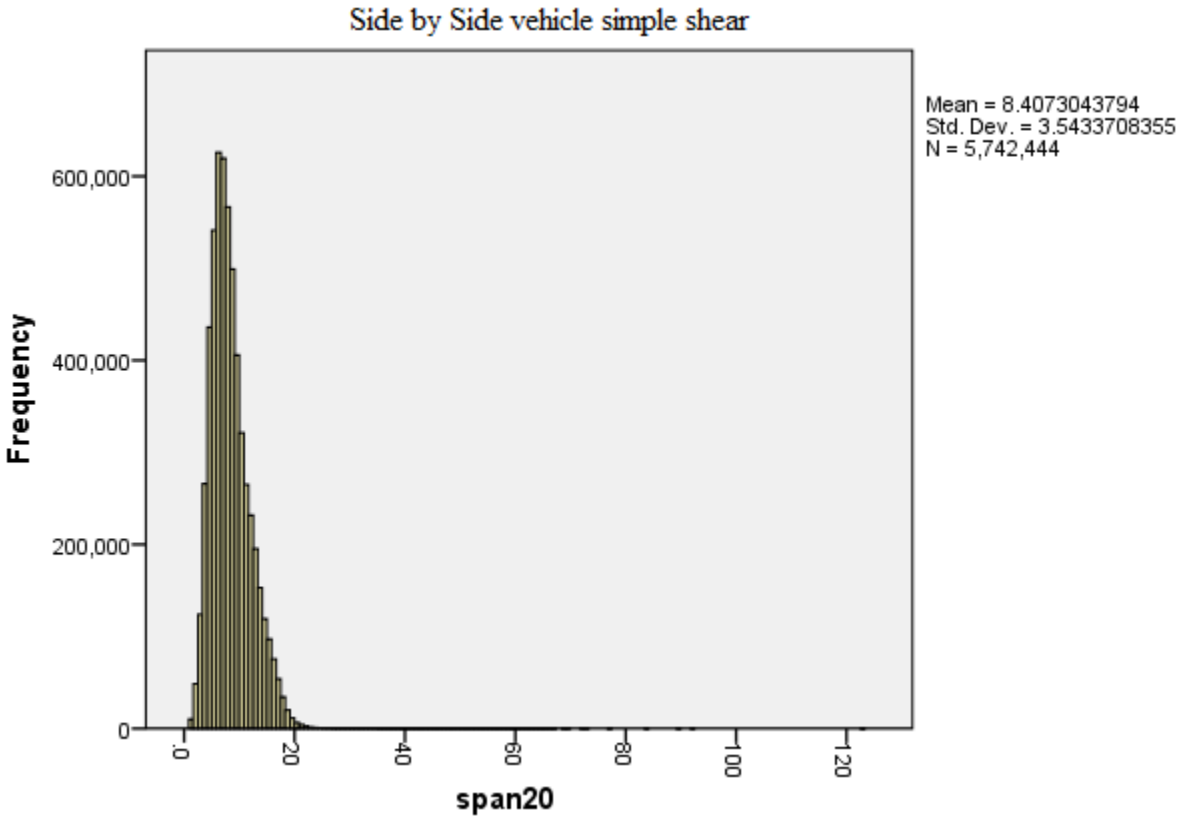


Statistics

span400

N	Valid	5742444
	Missing	0
Mean		11002.554
Std. Error of Mean		1.871242
Median		10341.439
Mode		13199.245
Std. Deviation		4484.1320
Variance		20107440.324
Minimum		875.8027
Maximum		96039.86
Sum		63181555031

Figure D25. Two Lane Moment, 400’ Simple Span.

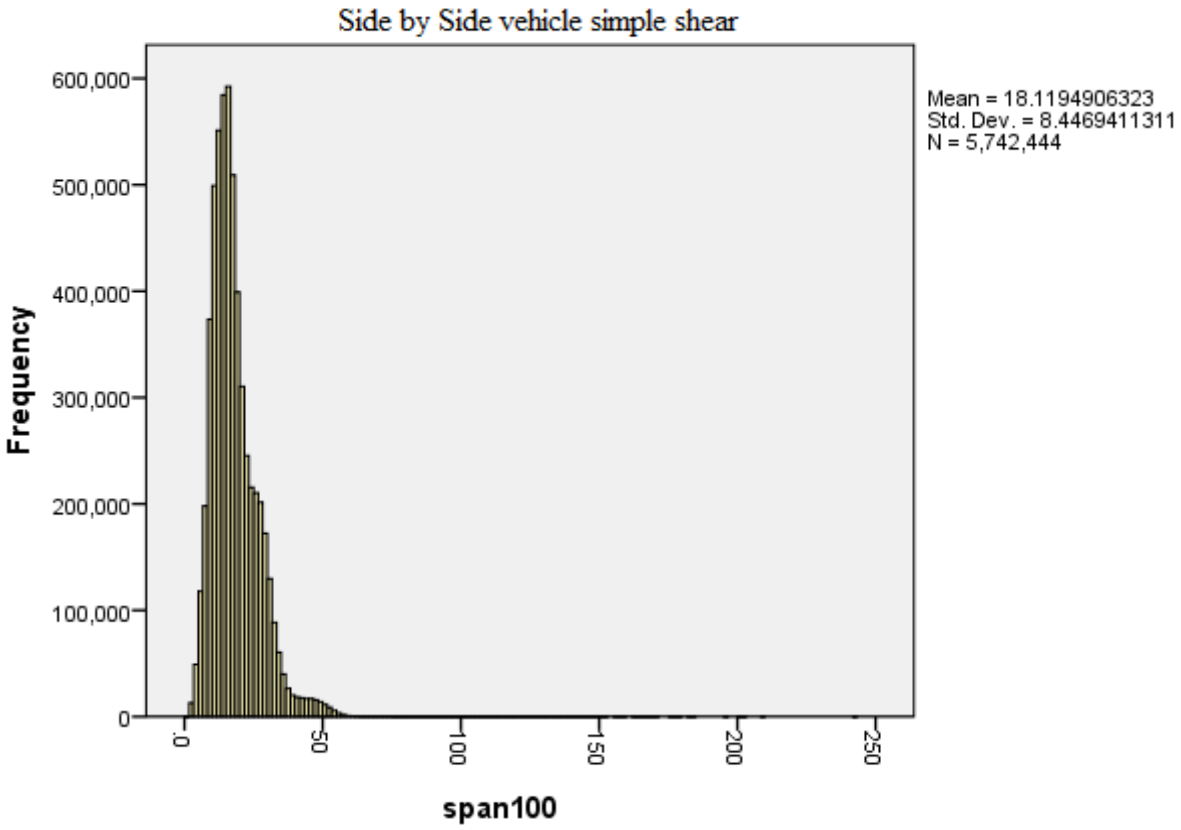


Statistics

span20

N	Valid	5742444
	Missing	0
Mean		8.407
Std. Error of Mean		.001478
Median		7.7848
Mode		7.22
Std. Deviation		3.54332
Variance		12.555
Minimum		.89371
Maximum		123.203
Sum		48278474.58

Figure D26. Two Lane Shear, 20’ Simple Span.

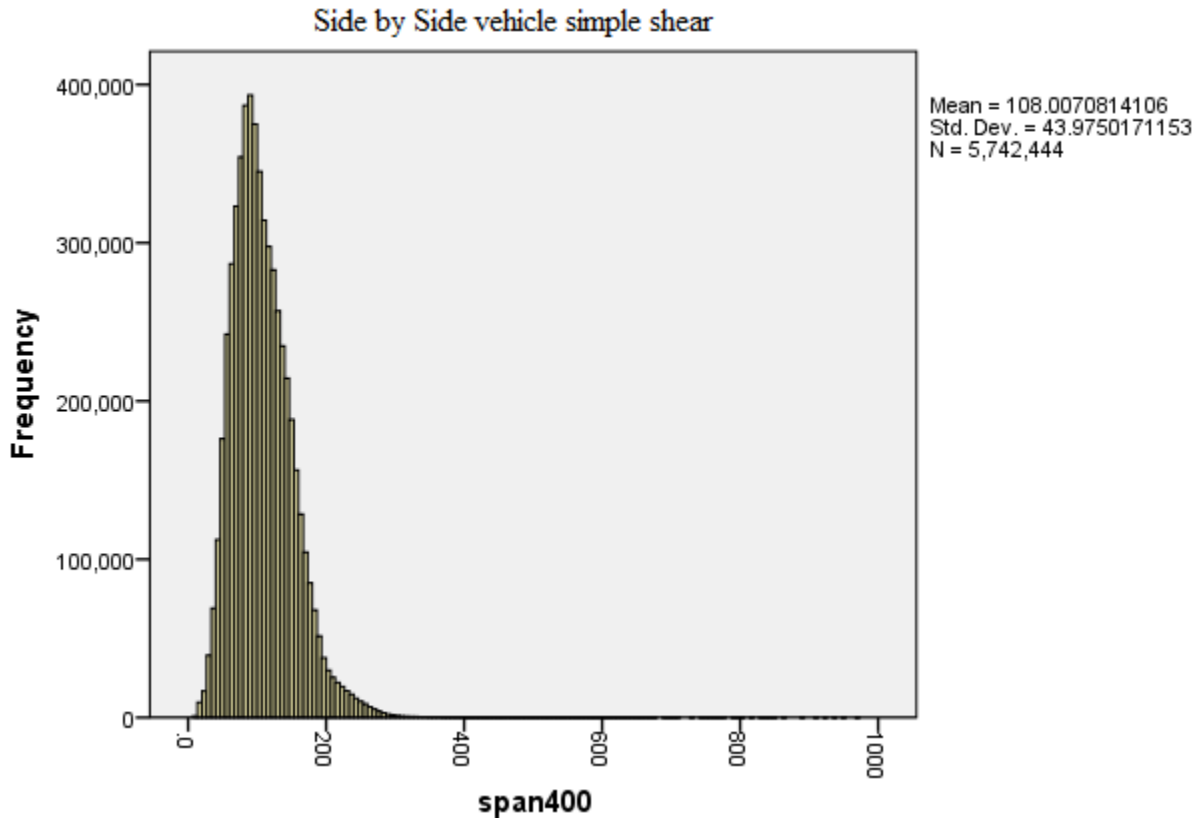


Statistics

span100

N	Valid	5742444
	Missing	0
Mean		18.1194
Std. Error of Mean		.0035249
Median		16.3531240
Mode		15.7166
Std. Deviation		8.4469
Variance		71.351
Minimum		1.3582
Maximum		241.817
Sum		104050160.26

Figure D27. Two Lane Shear, 100’ Simple Span.

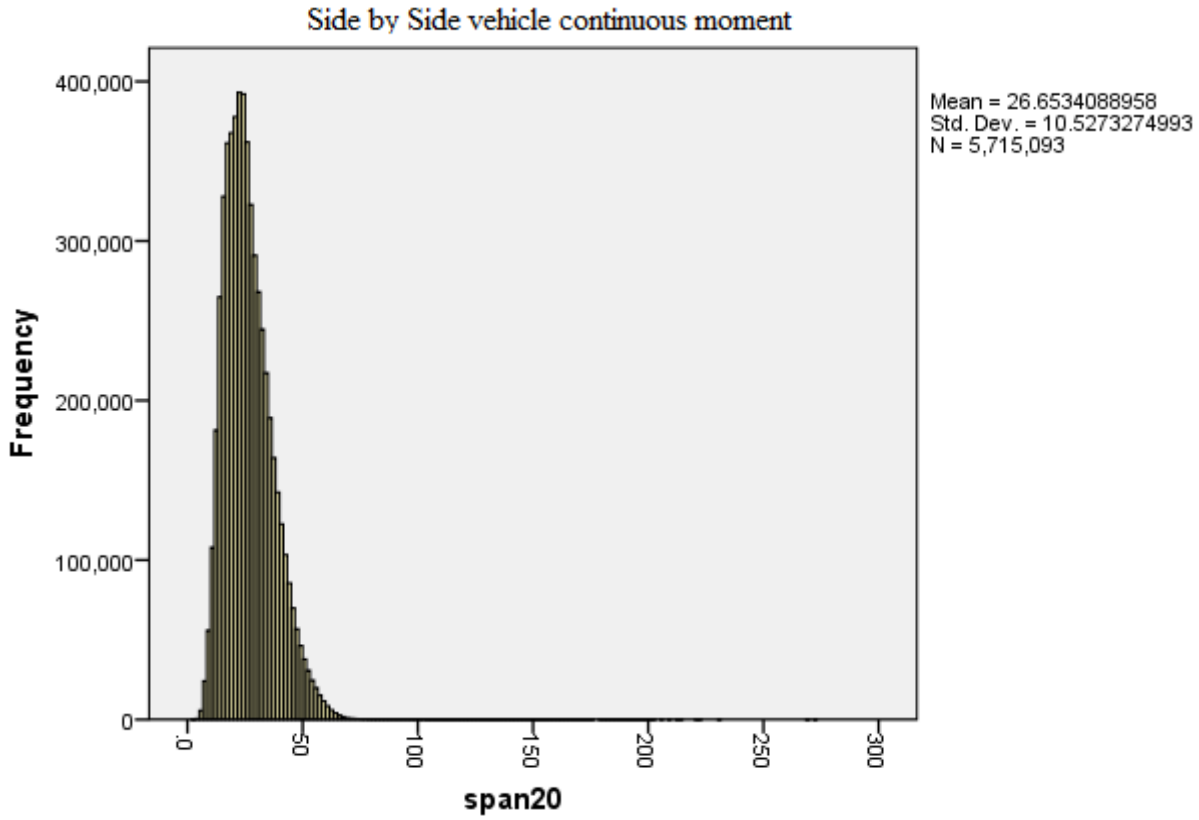


Statistics

span400

N	Valid	5742444
	Missing	0
Mean		108.00708
Std. Error of Mean		.0183509
Median		101.59226
Mode		135.80027
Std. Deviation		43.97501
Variance		1933.80
Minimum		8.96821
Maximum		971.365
Sum		620224616.6

Figure D28. Two Lane Shear, 400’ Simple Span.



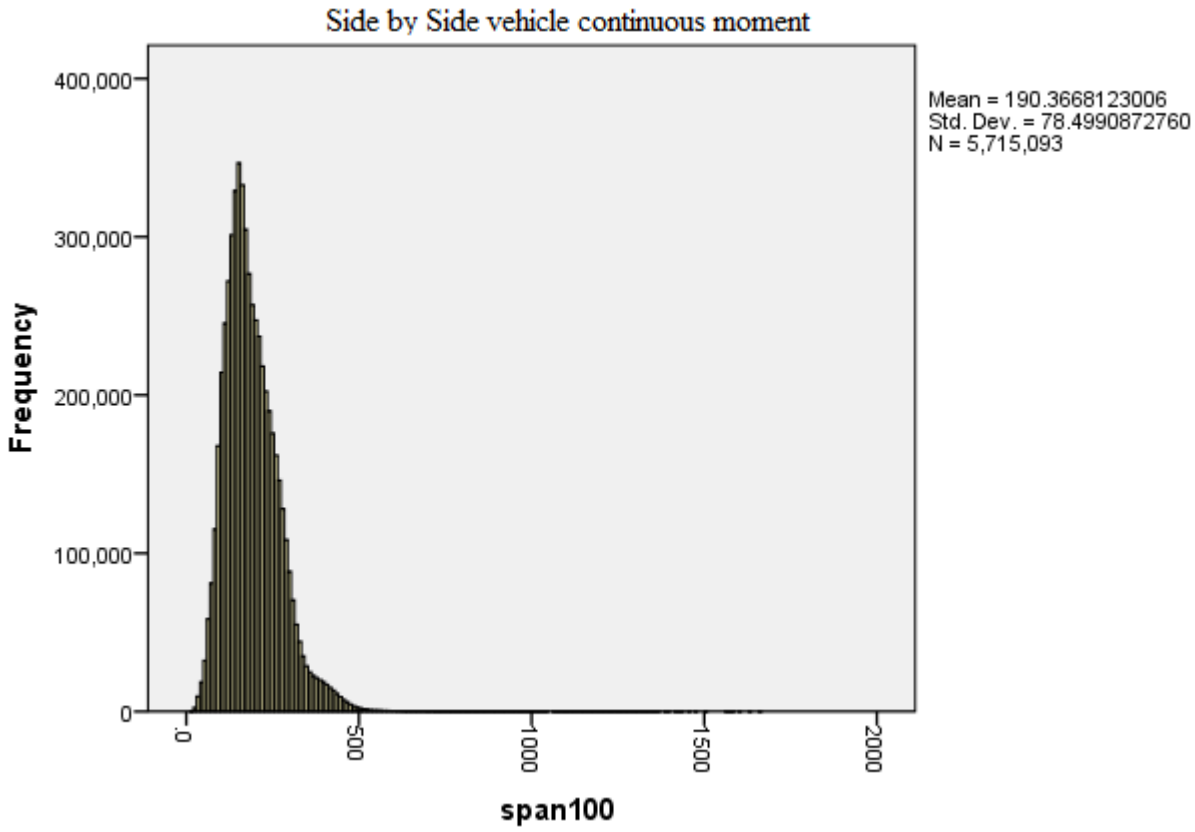
Statistics

span20

N	Valid	5715093
	Missing	0
Mean		26.65331
Std. Error of Mean		.004401
Median		24.986
Mode		26.88
Std. Deviation		10.527
Variance		110.825
Minimum		2.662
Maximum		272.803

‘

Figure D29. Two Lane Moment, 20’ Continuous Span.

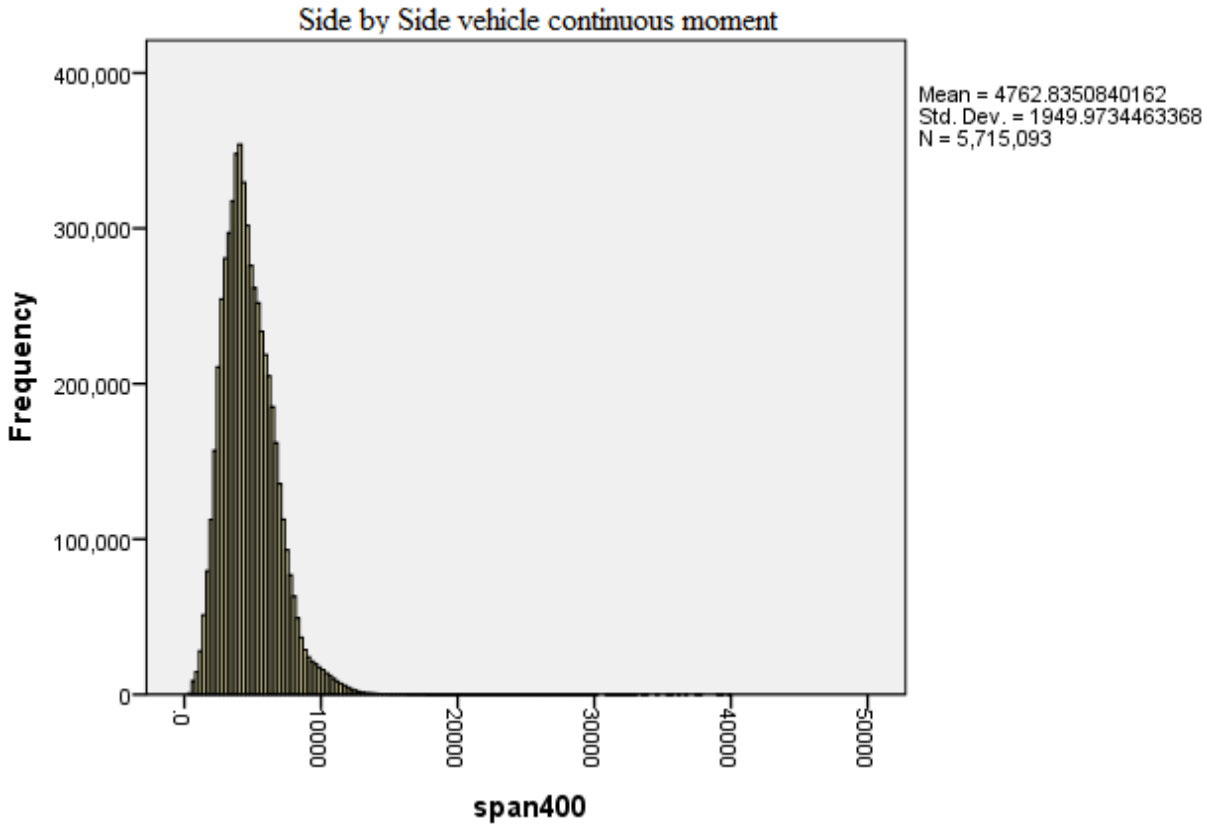


Statistics

span100

N	Valid	5715093
	Missing	0
Mean		190.366
Std. Error of Mean		.032836
Median		177.327
Mode		213.661
Std. Deviation		78.4990
Variance		6162.107
Minimum		16.1623
Maximum		1659.688

Figure D30. Two Lane Moment, 100’ Continuous Span.

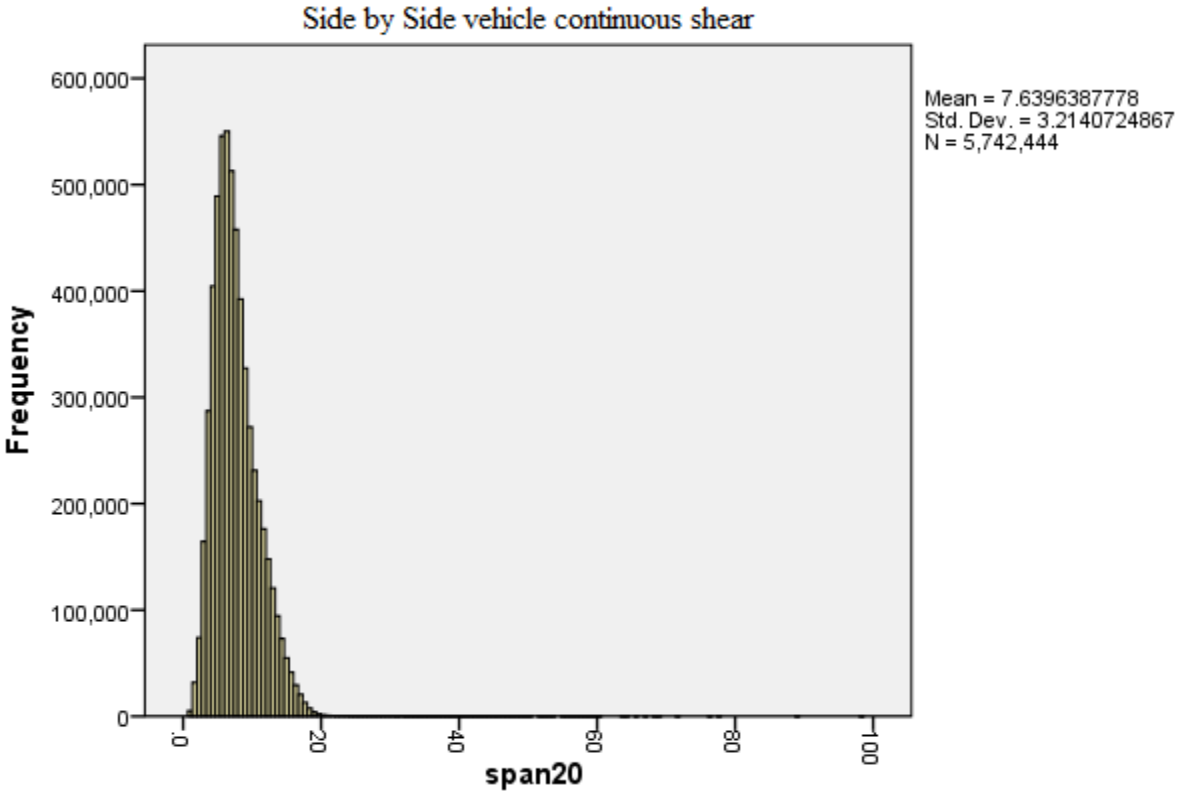


Statistics

span400

N	Valid	5715093
	Missing	0
Mean		4762.83
Std. Error of Mean		.81567480
Median		4484.259
Mode		3717.285
Std. Deviation		1949.9734
Variance		3802396.441
Minimum		366.3774
Maximum		39950.28

Figure D31. Two Lane Moment, 400’ Continuous Span.

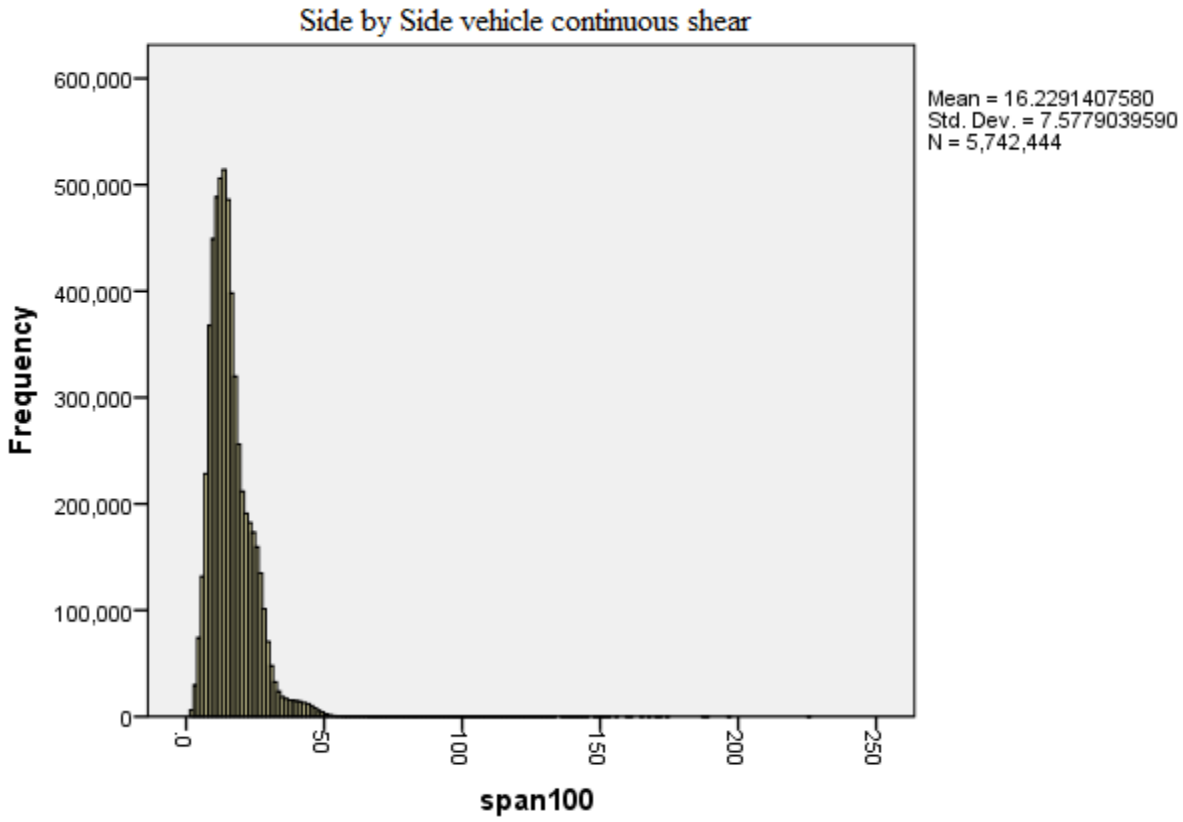


Statistics

span20

N	Valid	5742444
	Missing	0
Mean		7.6396
Std. Error of Mean		.001341
Median		7.0722
Mode		6.4080
Std. Deviation		3.214
Variance		10.330
Minimum		.77865
Maximum		98.5349
Sum		43870197.86

Figure D32. Two Lane Shear, 20’ Continuous Span.

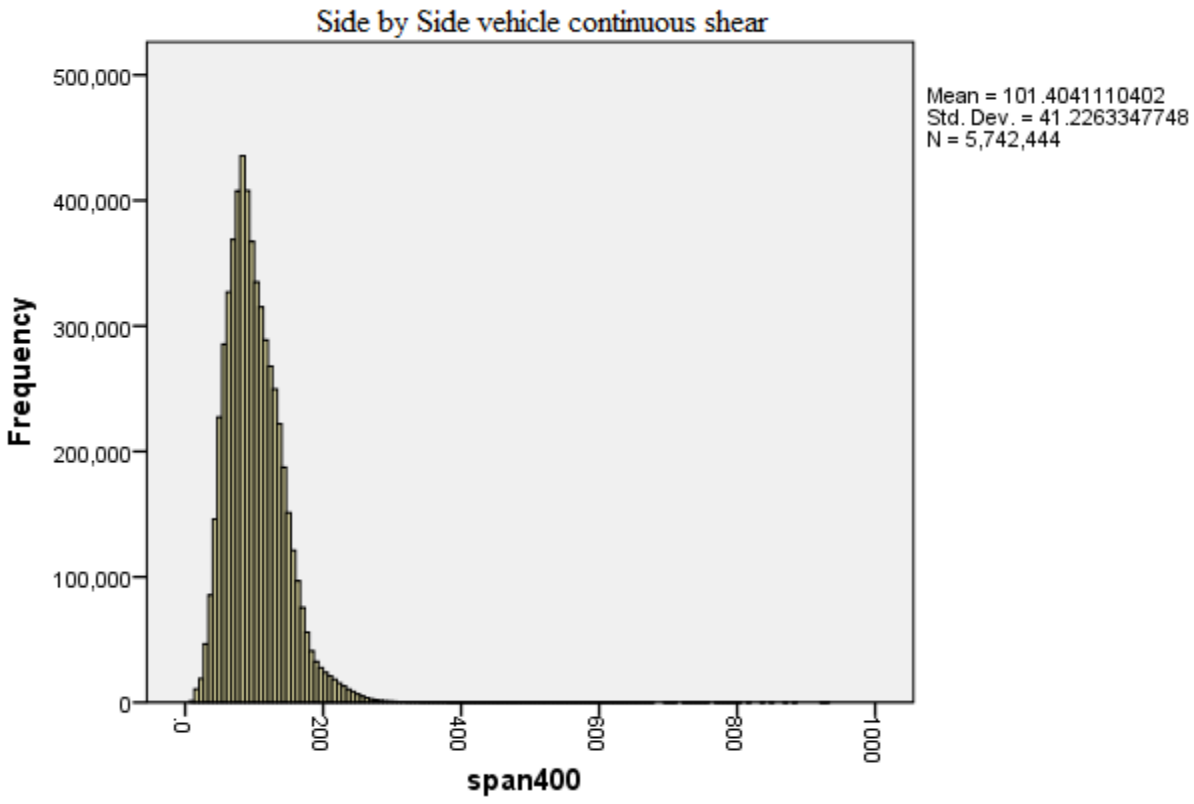


Statistics

span100

N	Valid	5742444
	Missing	0
Mean		16.2291
Std. Error of Mean		.003162
Median		14.6648
Mode		14.1734
Std. Deviation		7.57790
Variance		57.425
Minimum		1.32530
Maximum		226.24597
Sum		93194931.97

Figure D33. Two Lane Shear, 100’ Continuous Span.



Statistics

span400

N	Valid	5742444
	Missing	0
Mean		101.40
Std. Error of Mean		.0172
Median		95.1314
Mode		127.125
Std. Deviation		41.2263
Variance		1699.611
Minimum		8.6516
Maximum		928.3997
Sum		582307429.017

Figure D34. Two Lane Shear, 400’ Continuous Span.

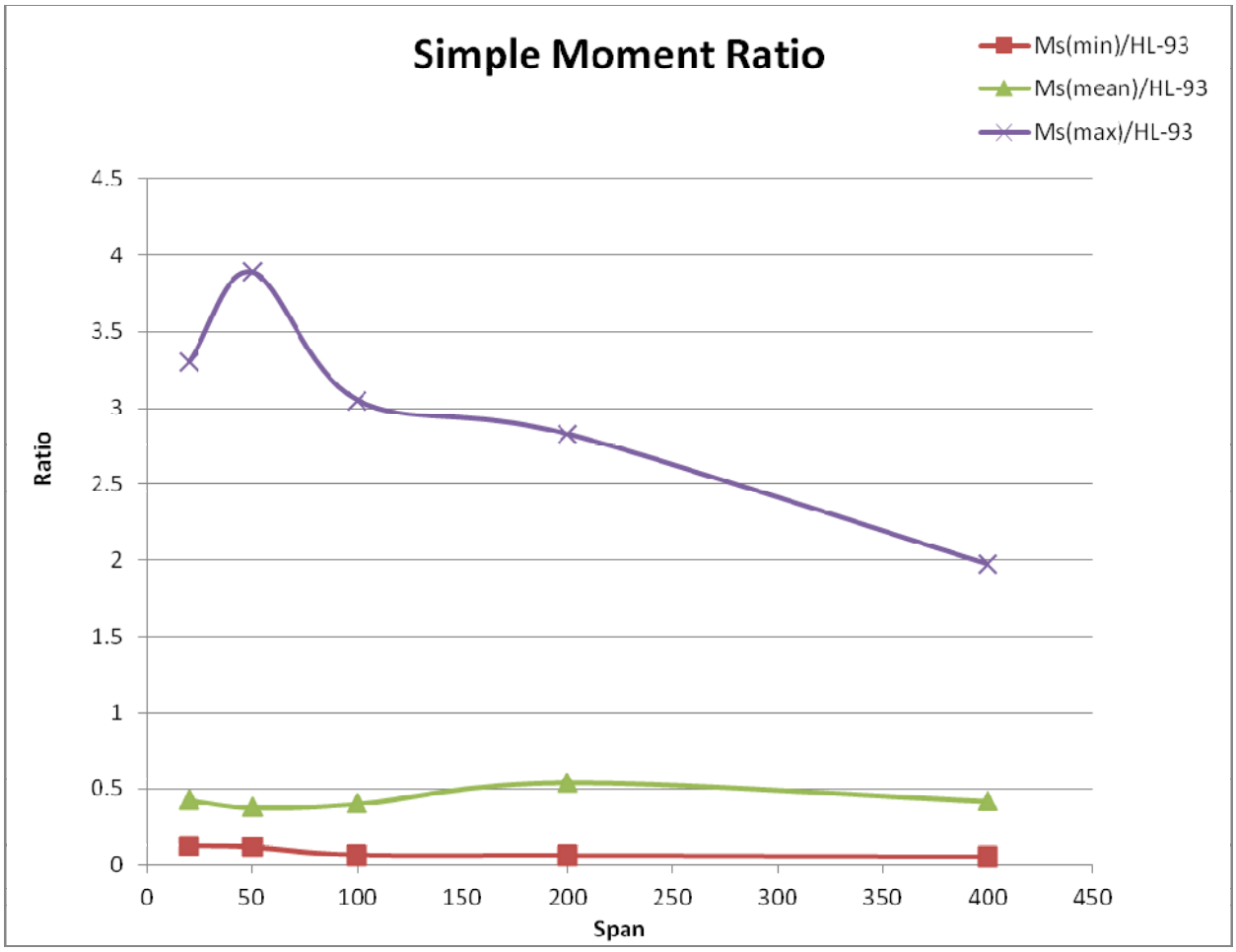


Figure D35. Simple Span Moment Ratios.

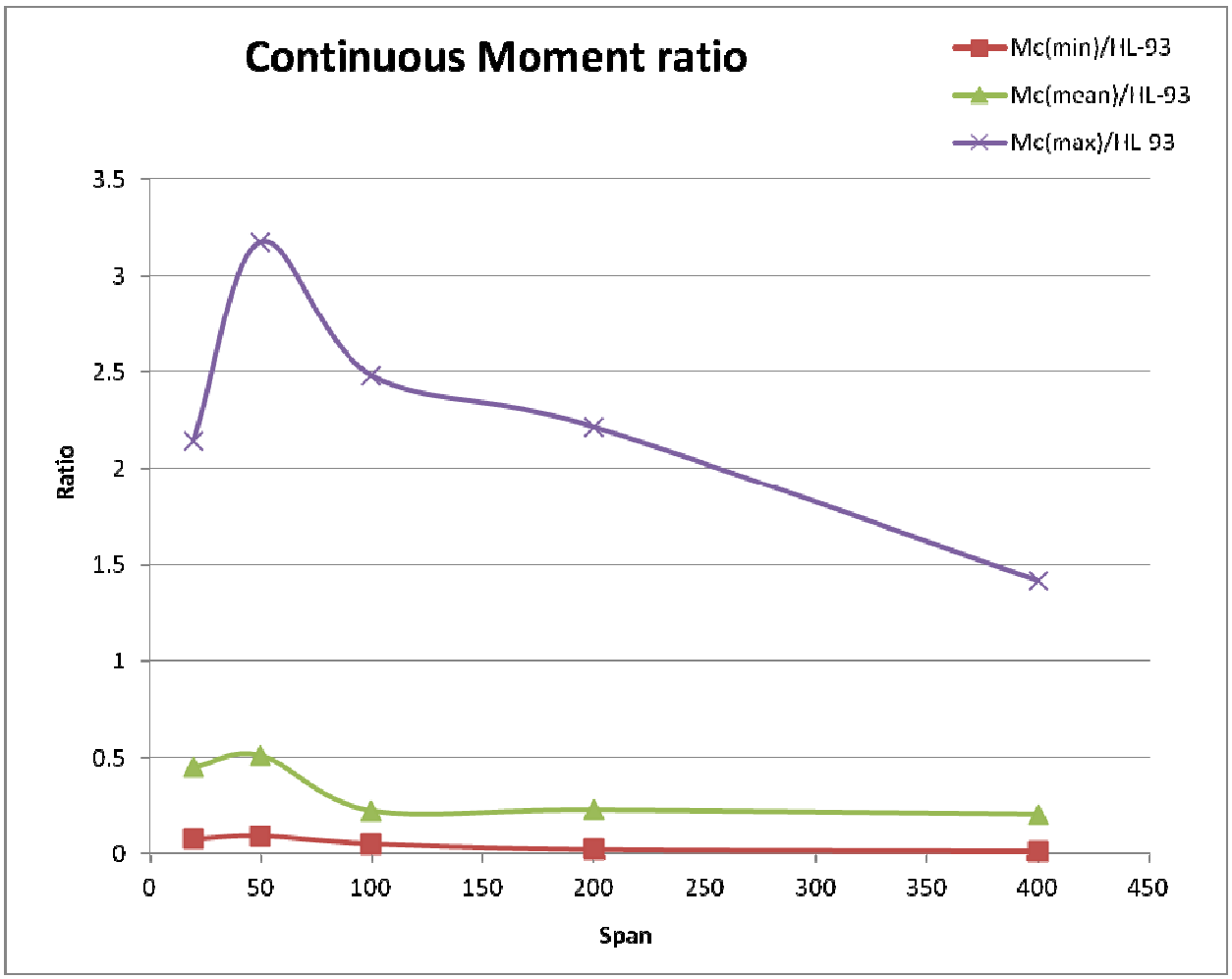


Figure D36. Continuous Span Moment Ratios.

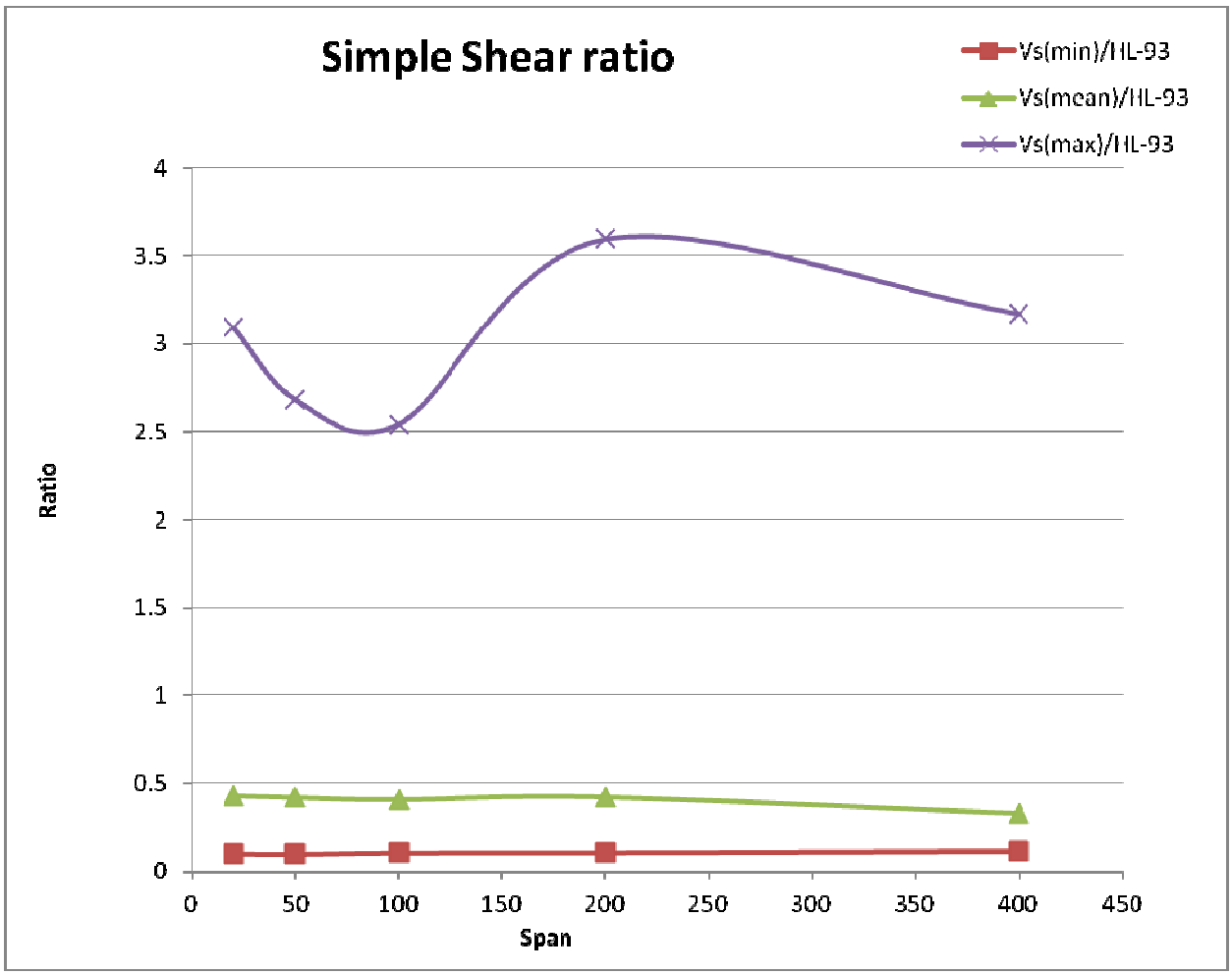


Figure D37. Simple Span Shear Ratios.

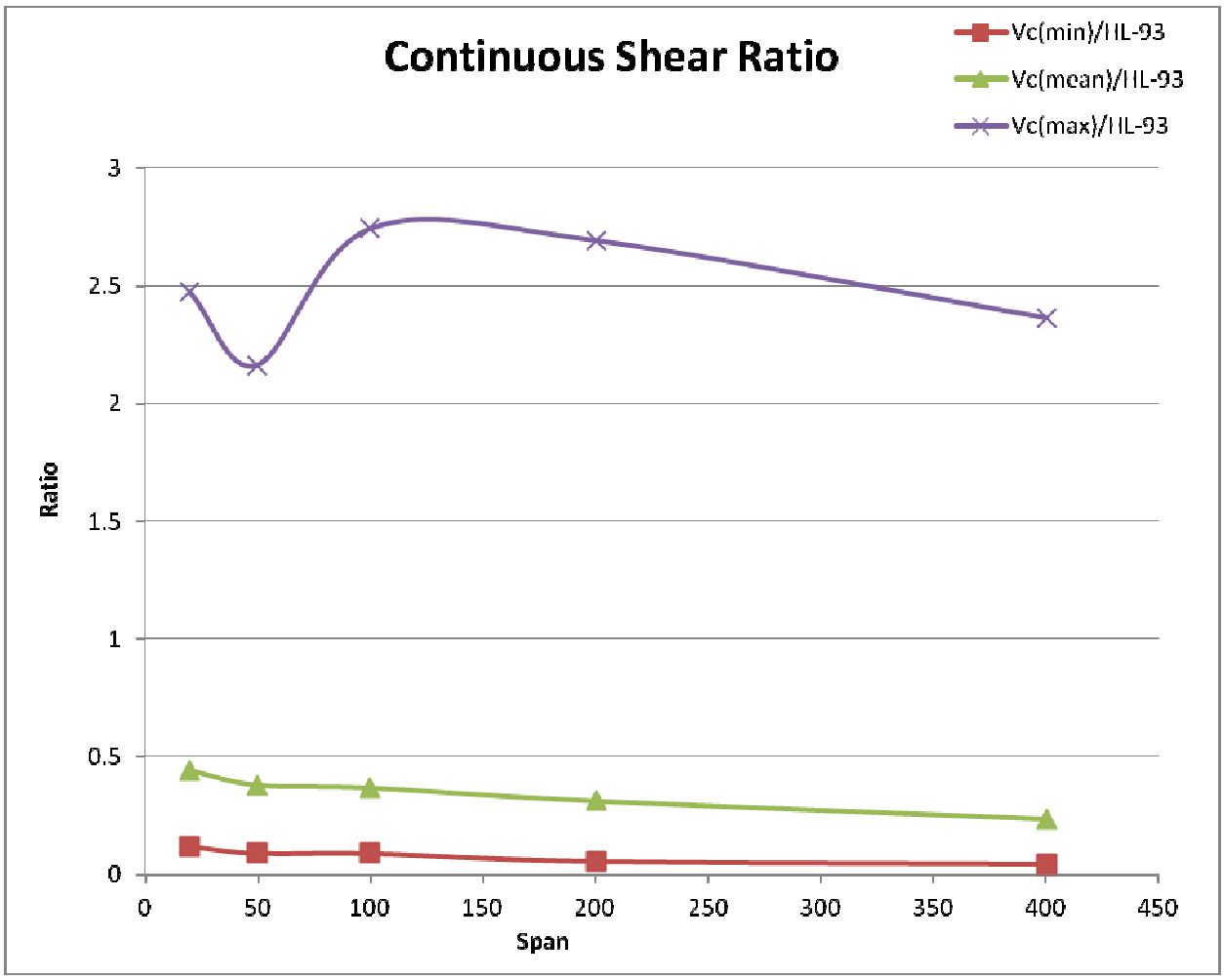


Figure D38. Continuous Span Shear Ratios.

APPENDIX E: BRIDGE STRUCTURE DEAD LOADS

Table E1. Nominal Load Effects for Wearing Surface (Dw) (all bridges).

		SIMPLE SPAN		CONTINUOUS SPAN	
		moment	shear	moment	shear
L	S	Dw (kip-ft)	Dw (kips)	Dw (kip-ft)	Dw (kips)
20	4	5.4	1.1	5.4	1.4
20	6	8.1	1.6	8.1	2.0
20	8	10.8	2.2	10.8	2.7
20	10	13.5	2.7	13.5	3.4
20	12	16.2	3.2	16.2	4.1
50	4	33.8	2.7	33.8	3.4
50	6	50.7	4.1	50.7	5.1
50	8	67.6	5.4	67.6	6.8
50	10	84.5	6.8	84.5	8.4
50	12	101.4	8.1	101.4	10.1
80	4	86.5	4.3	86.5	5.4
80	6	129.8	6.5	129.8	8.1
80	8	173.0	8.6	173.0	10.8
80	10	216.3	10.8	216.3	13.5
80	12	259.5	13.0	259.5	16.2
100	4	135.2	5.4	135.2	6.8
100	6	202.8	8.1	202.8	10.1
100	8	270.3	10.8	270.3	13.5
100	10	337.9	13.5	337.9	16.9
100	12	405.5	16.2	405.5	20.3
200	4	540.7	10.8	540.7	13.5
200	6	811.0	16.2	811.0	20.3
200	8	1081.3	21.6	1081.3	27.0
200	10	1351.7	27.0	1351.7	33.8
200	12	1622.0	32.4	1622.0	40.6

Table E2. Nominal Load Effects for Prefabricated Components (Dp), Prestressed Concrete I-Beam Bridge.

Prestressed Conc.		MOMENT	SHEAR	SHEAR
I-Girder Bridge		(S & C)	Simple	Continuous
L	S	Dp (kip-ft)	Dp (kips)	Dp (kips)
20	all spacing	47.9	4.3	5.4
50		190.9	15.3	19.1
80		816.4	40.8	51.0
100		1237.9	49.5	61.9
200		5650.0	113.0	141.3

Table E3. Nominal Load Effects for Prefabricated Components (Dp), Spread Box Beam Bridge.

Box Beam Bridge (spread)		MOMENT (S & C)	SHEAR Simple	SHEAR Continuous
L	S	Dp (kip-ft)	Dp (kips)	Dp (kips)
20	all spacing	23.0	5.0	8.0
50		209.0	17.0	20.9
80		616.0	31.0	38.5
100		1000.0	40.0	50.0
200		5700.0	114.0	142.5

Table E4. Nominal Load Effects for Prefabricated Components (Dp), Steel Girder Bridge.

Steel Girder Bridge		MOMENT (S & C)	SHEAR Simple	SHEAR Continuous
L	S	Dp (kip-ft)	Dp (kips)	Dp (kips)
20	4	7.0	0.7	0.9
50	4	27.0	2.2	2.7
80	4	184.0	9.2	11.5
100	4	329.0	13.2	16.5
200	4	2780.0	55.6	69.5
20	6	7.5	0.8	0.9
50	6	32.0	2.6	3.2
80	6	205.0	10.3	12.8
100	6	361.0	14.4	18.1
200	6	3303.0	66.1	82.6
20	8	10.0	1.0	1.3
50	8	45.0	3.6	4.5
80	8	228.0	11.4	14.3
100	8	386.0	15.4	19.3
200	8	3790.0	75.8	94.8
20	10	12.0	1.2	1.4
50	10	54.0	4.3	5.4
80	10	246.0	12.3	15.4
100	10	407.0	16.3	20.4
200	10	4190.0	83.8	104.8
20	12	14.0	1.4	1.7
50	12	65.0	5.2	6.5
80	12	281.0	14.1	17.6
100	12	773.0	25.8	32.2
200	12	4875.0	97.5	121.9

Table E5. Nominal Load Effects for Prefabricated Components (Dp), Side-by-Side Box Beam Bridge.

Box Beam Bridge (side by side)		MOMENT (S & C)	SHEAR Simple	SHEAR Continuous
L		Dp (kip-ft)	Dp (kips)	Dp (kips)
20		24.0	5.2	8.2
50	light	215.0	18.0	22.0
80	beams	634.0	32.0	40.0
100		1030.0	41.0	52.0
200		5871.0	117.0	147.0
20		32.0	6.9	10.9
50	heavier	286.7	24.0	29.3
80	beams	845.3	42.7	53.3
100		1373.3	54.7	69.3
200		7828.0	156.0	196.0

Table E6. Nominal Load Effects for Site-cast Components (Ds), All Girder Bridges Except RC.

Girder Bridge (all but RC)		MOMENT (S & C)	SHEAR Simple	SHEAR Continuous
L	S	Ds (kip-ft)	Ds (kips)	Ds (kips)
20	4	55.0	5.5	6.8
50	4	183.0	14.6	18.3
80	4	463.0	23.2	28.9
100	4	681.0	27.2	34.1
200	4	2725.0	54.5	68.1
20	6	75.0	7.5	9.3
50	6	242.0	19.4	24.2
80	6	633.0	31.7	39.6
100	6	931.0	37.2	46.6
200	6	3725.0	74.5	93.1
20	8	93.0	9.3	11.6
50	8	300.0	24.0	30.0
80	8	782.0	39.1	48.9
100	8	1150.0	46.0	57.5
200	8	4600.0	92.0	115.0
20	10	116.0	11.6	14.4
50	10	376.0	30.1	37.6
80	10	984.0	49.2	61.5
100	10	1447.0	57.9	72.4
200	10	5788.0	115.8	144.7
20	12	142.0	14.2	17.8
50	12	462.0	37.0	46.2
80	12	1207.0	60.4	75.4
100	12	1775.0	71.0	88.8
200	12	7100.0	142.0	177.5

Table E7. Nominal Load Effects for Site-cast Components (Ds), Reinforced Concrete Girder Bridge.

Reinforced Concrete Girder Bridge		MOMENT (S & C)	SHEAR Simple	SHEAR Continuous
L	S	Ds (kip-ft)	Ds (kips)	Ds (kips)
20	4	71.0	11.0	13.8
50	4	342.0	26.0	32.5
80	4	1100.0	52.0	65.0
100	4	1877.0	73.0	91.3
20	6	86.0	11.3	14.1
50	6	463.0	33.7	42.1
80	6	1357.0	65.0	81.3
100	6	2257.0	88.0	110.0
20	8	100.0	13.3	16.6
50	8	530.0	38.7	48.4
80	8	1522.0	72.7	90.9
100	8	2572.0	100.0	125.0
20	10	116.0	15.3	19.1
50	10	643.0	47.0	58.8
80	10	1811.0	87.0	108.8
100	10	3049.0	118.0	147.5
20	12	157.0	21.0	26.3
50	12	769.0	57.0	71.3
80	12	2134.0	102.0	127.5
100	12	3589.0	139.0	173.8

APPENDIX F: PROJECTED LIVE LOAD EFFECTS

See Part II of this document.

APPENDIX G: LIVE LOAD FACTORS

See Part II of this document.

APPENDIX H: EXAMPLE CALCULATIONS

See Part II of this document.