Florida SU Load Posting Signs for AASHTO SHV-SU Trucks

Andrew DeVault, November 14, 2017

HISTORY

In 1974, Senate Bill 3934 endorsed the Bridge Formula for Interstate highways.
https://www.fordlibrarymuseum.gov/library/document/0055/1668954.pdf

In 1982, the Surface Transportation Act of 1982 mandated the Bridge Formula for Interstate Highways.
https://www.gpo.gov/fdsys/pkg/STATUTE-96/pdf/STATUTE-96-Pg2097.pdf

In 2007, NCHRP Report 575, "Legal Truck Loads and AASHTO Legal Loads for Posting," showed that existing AASHTO legal loads inadequately characterize the loading imposed by specialized hauling vehicles (SHVs) that the Bridge Formula allows. The report proposed several new legal trucks, the AASHTO SU4, SU5, SU6, and SU7.
http://www.trb.org/Publications/Blurbs/158703.aspx

On 11-15-2013, FHWA memorandum "Load Rating of Specialized Hauling Vehicles" required consideration of SHVs, unless State laws preclude SHV use, or existing State legal truck models envelope legally permissible SHVs.
https://www.fhwa.dot.gov/bridge/loadrating/131115.cfm

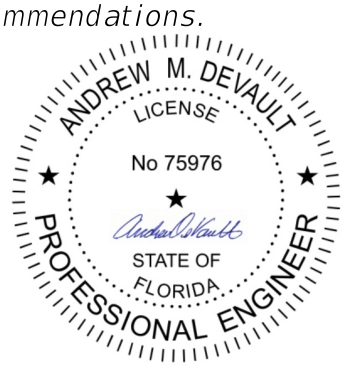
In March 2014, FHWA report "Questions and Answers, Load Rating of Specialized Hauling Vehicles" provided numerous clarifications, among them that 23 CFR 658.17 imposes the Bridge Formula and its SHVs upon all Interstate highways.
https://www.fhwa.dot.gov/bridge/loadrating/shv_qa.pdf

On 04-30-2014, FDOT's Bryan Hubbard completed "Report on Florida's Compliance with AASHTO Specialized Hauling Vehicle Load Rating Requirements," showing that the Florida SU4 envelopes all AASHTO SU trucks, excepting the AASHTO SU7 – which Florida law precludes.

On 12-10-2014, FDOT's Thomas Beitelman completed "Specialized Hauling Vehicle Load Rating Requirements for Transverse Segmental Box Girder Sections," an amendment to Hubbard's report, that considered transverse loading in segmental box girders.

On 01-25-2017, FDOT's Thomas Beitelman completed an additional report, "Specialized Hauling Vehicle Load Rating Requirements for Specialized Hauling Vehicle SU7," that showed postings were adequate for all AASHTO SHVs among the Interstate and within 1 mile reasonable access, given bridge conditions at the time of the evaluation.

On 03-30-2017, FHWA's Jeffrey Ger corresponded with Thomas Beitelman, outlining several recommendations. This report responds to those recommendations.



SUMMARY

This report uses parametric assessments to show that existing Florida load posting signs are sufficient for AASHTO SHV/SU trucks. The report also provides a mechanism to ensure that future postings based upon Florida legal trucks will adequately restrict AASHTO SHV/SU trucks.

Of the four AASHTO SU trucks, only the AASHTO SU7 meaningfully exceeds the Florida SU envelope, and the incidence of loaded AASHTO SU7 type trucks is rare, in Florida. For practical off-interstate travel, an ASU7 requires a permit, and a search of the state permitting database found no 7-axle straight trucks between 70 and 80 kips. Furthermore, existing Florida SU posting restriction signs are generally conservative for AASHTO SU trucks, and the Florida SU envelope exceeds the AASHTO SU envelope for span lengths less than 50 feet, where incidences of weight restrictions predominate. In fact, of the 648 bridges in Florida posted for load in June 2017, only 40 have span lengths that exceed 50 feet. For longer spans, the AASHTO SU7 envelope does exceed the Florida SU envelope, and among shorter spans a diligent effort will find isolated cases where the Florida SU posting slightly overstates the AASHTO SU posting level. However, the differences are acceptable, and Florida SU restrictions are sufficient for all AASHTO SU trucks on all spans.

Nevertheless, to reduce the possibility of SU7 overload, the following will be added to the 2018 Florida Bridge Load Rating Manual. "In order to satisfy federal requirements regarding AASHTO SHV vehicles, for the circumstance where the analysis does recommend posting for C-Class combination trucks, but does not recommend posting for the SU-Class, post the SU-Class for 35 tons. This provides a safe posting for AASHTO SU trucks." Therefore, to remain unposted for the SU-Class, the structure must be sufficient for both the Florida SU4 and the Florida C5. This reduces the potential AASHTO SU7 overstress to a maximum of 5%.

PART 1 – COMPARE LIVE LOAD ENVELOPES

If the Bridge Load Rating Manual adopts, "for the rare circumstance where the analysis does recommend posting for C-Class combination trucks, but does not recommend posting for the SU-Class, post the SU-Class for 35 tons," what will the maximum potential AASHTO SU7 overstress be? 5%.

REFERENCES

The Florida Bridge Load Rating Manual (BLRM) describes Florida trucks in its Appendix at "Florida Legal Loads."
http://www.fdot.gov/maintenance/STR/LR/FDOT_Load_Rating_Manual.pdf

The AASHTO Manual for Bridge Evaluation (MBE) 2nd Edition, describes AASHTO SU trucks at Appendix D6A.e.

METHOD AND NOMENCLATURE

Approximate the maximum live load effects for several spans on roller supports between 0 and 200 feet. Neglect axles not contributing to the force under consideration, use one lane, and apply no dynamic impact. Apply one truck throughout; neglect the special negative moment two-truck BLRM provisions at "LRFR Legal Load Combinations" (conservative, for AASHTO/FDOT comparison). Compare maximum force effects using the following nomenclature.

SPANS	*"1" means one span; "2" means two continuous equal-length spans*
FT	*Span length in feet*
FSU2	*Florida Single-Unit 2-axle truck*
FSU3	*Florida Single-Unit 3-axle truck*
FSU4	*Florida Single-Unit 4-axle truck*
FC5	*Florida Combination 5-axle truck*
ASU4	*AASHTO Single-Unit 4-axle truck*
ASU5	*AASHTO Single-Unit 5-axle truck*
ASU6	*AASHTO Single-Unit 6-axle truck*
ASU7	*AASHTO Single-Unit 7-axle truck*

ASU/FSU = (AASHTO SU) / (Florida SU) = envelope ratio

$$= \frac{max(|ASU4|, |ASU5|, |ASU6|, |ASU7|)}{max(|FSU2|, |FSU3|, |FSU4|)}$$

ASU7/FL = potential ASU7 overstress, with Florida posting procedure

$$= \frac{|ASU7|}{max(|FSU4|, |FC5|)}$$

POSITIVE MOMENT (kip-ft)

SPANS	FT	FSU2	FSU3	FSU4	FC5	ASU4	ASU5	ASU6	ASU7	ASU /FSU	ASU7 /FL
1	0.001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.77	-15%
1	2.0	11.0	11.0	9.4	10.0	8.5	8.5	8.5	8.5	0.77	-15%
1	4.0	22.0	22.0	18.7	20.0	17.0	17.0	17.0	17.0	0.77	-15%
1	6.0	33.0	33.0	28.1	30.0	25.5	25.5	25.5	25.5	0.77	-15%
1	8.0	44.0	48.1	40.9	43.8	38.2	38.2	38.2	38.2	0.79	-13%
1	10.0	55.0	68.9	62.3	62.7	55.8	55.8	55.8	55.8	0.81	-11%
1	12.0	66.0	90.1	90.4	81.9	76.6	76.6	76.6	76.6	0.85	-15%
1	15.0	82.5	122.3	132.5	111.2	108.0	108.0	108.8	108.8	0.82	-18%
1	20.0	110.0	176.5	202.6	160.5	160.4	168.2	176.3	176.3	0.87	-13%
1	25.0	141.7	249.1	272.7	220.9	212.8	230.7	248.7	253.1	0.93	-7%
1	30.0	183.0	331.0	358.5	283.3	273.7	293.1	321.2	335.2	0.94	-6%
1	40.0	266.5	495.3	532.4	408.3	408.0	436.0	480.1	509.9	0.96	-4%
1	50.0	350.6	659.8	706.8	599.6	542.6	589.8	653.3	703.6	1.00	0%
1	60.0	435.0	824.6	881.4	798.3	677.3	744.0	826.8	897.3	1.02	2%
1	80.0	604.2	1154.1	1230.9	1196.5	946.9	1052.9	1173.7	1284.6	1.04	4%
1	100.0	773.8	1484.0	1580.6	1595.4	1216.8	1362.4	1521.0	1672.0	1.06	5%
1	125.0	985.9	1896.3	2017.9	2094.6	1554.1	1749.3	1955.2	2156.4	1.07	3%
1	150.0	1198.1	2308.7	2455.2	2593.8	1891.5	2136.5	2389.4	2640.8	1.08	2%
1	175.0	1410.5	2721.0	2892.5	3093.5	2228.9	2523.9	2823.6	3125.1	1.08	1%
1	200.0	1622.9	3133.3	3329.9	3593.3	2566.2	2911.2	3257.8	3609.5	1.08	0%
2	0.001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.77	-15%
2	2.0	9.1	9.1	7.8	8.3	7.1	7.1	7.1	7.1	0.77	-15%
2	4.0	18.2	18.2	15.5	16.6	14.1	14.1	14.1	14.1	0.77	-15%
2	6.0	27.4	27.4	23.3	24.9	21.2	21.2	21.2	21.2	0.77	-15%
2	8.0	36.5	40.0	34.0	36.4	31.6	31.6	31.6	31.6	0.79	-13%
2	10.0	45.6	56.1	48.5	51.0	44.2	44.2	44.2	44.2	0.79	-13%
2	12.0	54.7	72.8	69.8	66.2	60.4	60.4	60.4	60.4	0.83	-13%
2	15.0	68.4	98.8	102.9	89.8	85.5	85.5	87.0	87.0	0.85	-15%
2	20.0	91.2	142.9	159.5	129.9	128.0	133.3	137.5	137.5	0.86	-14%
2	25.0	119.1	200.5	219.9	177.1	171.0	183.5	195.6	200.1	0.91	-9%
2	30.0	151.2	264.8	288.0	227.2	221.8	234.3	254.3	265.5	0.92	-8%
2	40.0	217.9	396.9	428.0	330.9	329.0	352.6	385.4	404.9	0.95	-5%
2	50.0	286.3	531.0	570.2	477.9	438.3	476.0	524.4	559.7	0.98	-2%
2	60.0	355.3	666.1	713.5	634.8	548.7	601.3	665.4	716.7	1.00	0%
2	80.0	494.4	937.7	1001.6	956.0	770.6	854.7	949.8	1033.6	1.03	3%
2	100.0	634.5	1210.2	1290.5	1281.7	993.3	1109.7	1235.8	1352.4	1.05	5%
2	125.0	810.0	1551.3	1652.4	1691.8	1272.4	1429.5	1594.4	1752.2	1.06	4%
2	150.0	985.8	1892.7	2014.5	2103.4	1551.6	1749.8	1953.5	2152.7	1.07	2%
2	175.0	1161.7	2234.3	2376.8	2515.9	1831.0	2070.4	2313.0	2553.5	1.07	1%
2	200.0	1337.7	2576.0	2739.2	2929.0	2110.6	2391.1	2672.5	2954.5	1.08	1%

NEGATIVE MOMENT (kip-ft)

SPANS	FT	FSU2	FSU3	FSU4	FC5	ASU4	ASU5	ASU6	ASU7	ASU /FSU	ASU7 /FL
2	0.001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.77	-15%
2	2.0	-4.2	-4.2	-3.6	-3.8	-3.3	-3.3	-3.3	-3.3	0.77	-15%
2	4.0	-8.5	-16.2	-13.8	-14.8	-12.7	-12.7	-12.7	-12.7	0.79	-14%
2	6.0	-12.7	-24.7	-21.6	-22.5	-19.2	-19.2	-19.2	-19.2	0.78	-14%
2	8.0	-16.9	-29.5	-34.2	-26.8	-26.3	-28.1	-29.8	-29.8	0.87	-13%
2	10.0	-26.8	-45.9	-43.3	-37.7	-32.3	-39.1	-39.1	-39.1	0.85	-10%
2	12.0	-37.1	-66.1	-56.9	-50.9	-44.3	-47.6	-51.1	-51.7	0.78	-9%
2	15.0	-49.0	-89.8	-83.0	-67.0	-66.4	-64.9	-67.1	-68.3	0.76	-18%
2	20.0	-62.7	-117.5	-116.6	-121.1	-94.5	-99.3	-106.3	-110.2	0.94	-9%
2	25.0	-72.0	-136.6	-142.7	-169.3	-115.8	-129.8	-140.8	-147.4	1.03	-13%
2	30.0	-81.2	-155.2	-168.3	-211.0	-132.9	-154.7	-171.8	-185.0	1.10	-12%
2	40.0	-117.7	-226.6	-243.1	-270.5	-184.2	-202.1	-222.7	-247.8	1.02	-8%
2	50.0	-152.8	-295.1	-315.3	-311.1	-240.3	-268.1	-297.3	-323.6	1.03	3%
2	60.0	-187.2	-362.2	-386.0	-376.6	-295.3	-332.2	-369.6	-405.5	1.05	5%
2	80.0	-254.8	-493.7	-525.0	-550.4	-403.0	-457.5	-510.7	-564.4	1.08	3%
2	100.0	-321.6	-623.5	-662.4	-716.8	-509.5	-580.5	-649.1	-719.8	1.09	0%
2	125.0	-404.3	-784.4	-832.8	-919.5	-641.2	-732.7	-819.8	-911.0	1.09	-1%
2	150.0	-486.9	-944.8	-1002.6	-1118.8	-772.4	-883.9	-989.6	-1100.8	1.10	-2%
2	175.0	-569.3	-1104.4	-1172.0	-1316.4	-903.1	-1034.6	-1158.5	-1289.7	1.10	-2%
2	200.0	-651.4	-1264.0	-1341.2	-1512.4	-1033.7	-1184.8	-1327.0	-1478.2	1.10	-2%

POSITIVE SHEAR (kip), SPAN 1

SPANS	FT	FSU2	FSU3	FSU4	FC5	ASU4	ASU5	ASU6	ASU7	ASU /FSU	ASU7 /FL
1	0.001	22.0	22.0	18.7	20.0	17.0	17.0	17.0	17.0	0.77	-15%
1	2.0	22.0	22.0	18.7	20.0	17.0	17.0	17.0	17.0	0.77	-15%
1	4.0	22.0	22.0	18.7	20.0	17.0	17.0	17.0	17.0	0.77	-15%
1	6.0	22.0	28.7	24.4	26.1	22.7	22.7	22.7	22.7	0.79	-13%
1	8.0	22.0	32.5	27.7	29.6	25.5	25.5	25.5	25.5	0.78	-14%
1	10.0	22.0	34.8	32.7	31.7	28.8	28.8	28.8	28.8	0.83	-12%
1	12.0	22.0	36.4	36.6	33.1	31.0	31.0	31.0	31.0	0.85	-15%
1	15.0	23.6	37.9	40.5	35.0	33.2	34.8	34.8	34.8	0.86	-14%
1	20.0	26.2	44.7	46.1	38.7	36.6	38.6	38.6	38.6	0.84	-16%
1	25.0	27.8	49.0	50.9	41.0	40.1	42.3	42.3	42.3	0.83	-17%
1	30.0	28.8	51.8	54.1	43.3	42.4	45.6	45.5	45.5	0.84	-16%
1	40.0	30.1	55.4	58.1	50.0	45.3	49.7	51.3	52.4	0.90	-10%
1	50.0	30.9	57.5	60.5	54.0	47.0	52.2	55.0	57.4	0.95	-5%
1	60.0	31.4	58.9	62.0	57.0	48.2	53.8	57.4	60.8	0.98	-2%
1	80.0	32.1	60.7	64.0	62.8	49.7	55.9	60.4	64.9	1.01	1%
1	100.0	32.4	61.7	65.2	66.2	50.5	57.1	62.2	67.5	1.03	2%
1	125.0	32.8	62.6	66.2	69.0	51.2	58.1	63.7	69.5	1.05	1%
1	150.0	33.0	63.2	66.8	70.8	51.7	58.7	64.7	70.8	1.06	0%
1	175.0	33.1	63.6	67.3	72.1	52.0	59.2	65.3	71.8	1.07	-1%
1	200.0	33.2	63.9	67.6	73.1	52.3	59.5	65.9	72.5	1.07	-1%
2	0.001	22.0	22.0	18.7	20.0	17.0	17.0	17.0	17.0	0.77	-15%
2	2.0	22.0	22.0	18.7	20.0	17.0	17.0	17.0	17.0	0.77	-15%
2	4.0	22.0	22.0	18.7	20.0	17.0	17.0	17.0	17.0	0.77	-15%
2	6.0	22.0	26.7	22.7	24.3	21.1	21.1	21.1	21.1	0.79	-13%
2	8.0	22.0	30.5	25.9	27.7	23.9	23.9	23.9	23.9	0.79	-14%
2	10.0	22.0	32.9	29.9	29.9	26.8	26.8	26.8	26.8	0.81	-11%
2	12.0	22.0	34.7	33.5	31.5	29.0	29.0	29.0	29.0	0.84	-13%
2	15.0	23.0	36.5	37.5	33.5	31.4	32.4	32.4	32.4	0.86	-14%
2	20.0	25.1	41.9	42.9	36.9	34.6	36.3	36.3	36.3	0.85	-15%
2	25.0	26.6	46.0	47.5	39.2	37.8	39.7	39.7	39.7	0.84	-16%
2	30.0	27.7	49.0	50.9	40.9	40.2	42.9	42.8	42.8	0.84	-16%
2	40.0	29.2	53.0	55.4	46.6	43.4	47.2	47.8	47.8	0.86	-14%
2	50.0	30.2	55.5	58.2	50.8	45.5	50.0	51.8	53.3	0.91	-9%
2	60.0	30.8	57.2	60.2	53.8	46.8	51.9	54.7	57.1	0.95	-5%
2	80.0	31.6	59.4	62.6	59.0	48.6	54.4	58.3	62.0	0.99	-1%
2	100.0	32.1	60.7	64.1	63.0	49.7	55.9	60.5	65.0	1.02	2%
2	125.0	32.4	61.8	65.2	66.3	50.5	57.1	62.3	67.5	1.03	2%
2	150.0	32.7	62.5	66.0	68.6	51.1	57.9	63.5	69.2	1.05	1%
2	175.0	32.9	63.0	66.6	70.2	51.5	58.5	64.3	70.3	1.06	0%
2	200.0	33.0	63.3	67.0	71.4	51.8	58.9	65.0	71.2	1.06	0%

NEGATIVE SHEAR (kip), SPAN 1

SPANS	FT	FSU2	FSU3	FSU4	FC5	ASU4	ASU5	ASU6	ASU7	ASU /FSU	ASU7 /FL
1	0.001	-22.0	-22.0	-18.7	-20.0	-17.0	-17.0	-17.0	-17.0	0.77	-15%
1	2	-22.0	-22.0	-18.7	-20.0	-17.0	-17.0	-17.0	-17.0	0.77	-15%
1	4	-22.0	-22.0	-18.7	-20.0	-17.0	-17.0	-17.0	-17.0	0.77	-15%
1	6	-22.0	-28.7	-24.4	-26.1	-22.7	-22.7	-22.7	-22.7	0.79	-13%
1	8	-22.0	-32.5	-27.7	-29.6	-25.5	-25.5	-25.5	-25.5	0.78	-14%
1	10	-22.0	-34.8	-32.7	-31.7	-28.8	-28.8	-28.8	-28.8	0.83	-12%
1	12	-22.0	-36.4	-36.6	-33.1	-31.0	-31.0	-31.0	-31.0	0.85	-15%
1	15	-23.6	-37.9	-40.5	-35.0	-33.2	-34.8	-34.8	-34.8	0.86	-14%
1	20	-26.2	-44.7	-46.1	-38.7	-36.6	-38.6	-38.6	-38.6	0.84	-16%
1	25	-27.8	-49.0	-50.9	-41.0	-40.1	-42.3	-42.3	-42.3	0.83	-17%
1	30	-28.8	-51.8	-54.1	-43.3	-42.4	-45.6	-45.5	-45.5	0.84	-16%
1	40	-30.1	-55.4	-58.1	-50.0	-45.3	-49.7	-51.3	-52.4	0.90	-10%
1	50	-30.9	-57.5	-60.5	-54.0	-47.0	-52.2	-55.0	-57.4	0.95	-5%
1	60	-31.4	-58.9	-62.0	-57.0	-48.2	-53.8	-57.4	-60.8	0.98	-2%
1	80	-32.1	-60.7	-64.0	-62.8	-49.7	-55.9	-60.4	-64.9	1.01	1%
1	100	-32.4	-61.7	-65.2	-66.2	-50.5	-57.1	-62.2	-67.5	1.03	2%
1	125	-32.8	-62.6	-66.2	-69.0	-51.2	-58.1	-63.7	-69.5	1.05	1%
1	150	-33.0	-63.2	-66.8	-70.8	-51.7	-58.7	-64.7	-70.8	1.06	0%
1	175	-33.1	-63.6	-67.3	-72.1	-52.0	-59.2	-65.3	-71.8	1.07	-1%
1	200	-33.2	-63.9	-67.6	-73.1	-52.3	-59.5	-65.9	-72.5	1.07	-1%
2	0.001	-22.0	-22.0	-18.7	-20.0	-17.0	-17.0	-17.0	-17.0	0.77	-15%
2	2	-22.0	-22.0	-18.7	-20.0	-17.0	-17.0	-17.0	-17.0	0.77	-15%
2	4	-22.0	-22.0	-18.7	-20.0	-17.0	-17.0	-17.0	-17.0	0.77	-15%
2	6	-22.0	-30.2	-27.0	-27.5	-24.5	-24.5	-24.5	-24.5	0.81	-11%
2	8	-22.0	-34.6	-31.1	-31.4	-27.8	-27.8	-27.8	-27.8	0.81	-11%
2	10	-22.0	-36.9	-35.6	-33.6	-30.8	-30.8	-32.0	-32.0	0.87	-10%
2	12	-22.0	-38.9	-40.4	-35.3	-33.2	-33.2	-34.5	-34.5	0.85	-15%
2	15	-24.0	-41.2	-44.9	-36.9	-35.4	-37.4	-38.0	-38.8	0.86	-14%
2	20	-27.1	-47.6	-49.8	-41.3	-38.9	-41.3	-41.8	-42.9	0.86	-14%
2	25	-28.9	-52.2	-54.8	-44.6	-42.6	-45.2	-45.6	-46.4	0.85	-15%
2	30	-30.0	-55.1	-58.0	-46.8	-45.0	-48.7	-49.5	-49.9	0.86	-14%
2	40	-31.2	-58.4	-61.6	-54.2	-47.8	-52.8	-55.6	-57.6	0.94	-6%
2	50	-31.9	-60.3	-63.6	-58.3	-49.3	-55.1	-59.0	-62.6	0.98	-2%
2	60	-32.3	-61.4	-64.9	-62.1	-50.2	-56.5	-61.2	-65.6	1.01	1%
2	80	-32.8	-62.7	-66.4	-67.6	-51.3	-58.1	-63.6	-69.2	1.04	2%
2	100	-33.1	-63.5	-67.2	-70.6	-51.9	-59.0	-65.0	-71.1	1.06	1%
2	125	-33.3	-64.0	-67.8	-72.9	-52.4	-59.7	-66.0	-72.6	1.07	0%
2	150	-33.4	-64.4	-68.2	-74.3	-52.7	-60.1	-66.7	-73.5	1.08	-1%
2	175	-33.5	-64.7	-68.5	-75.2	-52.9	-60.4	-67.1	-74.2	1.08	-1%
2	200	-33.6	-64.8	-68.7	-75.9	-53.0	-60.6	-67.5	-74.6	1.09	-2%

PART 2 – ASSESS EXISTING SU POSTING SIGNS

Should existing Florida Single Unit (SU) posting signs be revised, to account for the possibility of AASHTO SU trucks? No. Florida SU trucks are more compact than AASHTO SU trucks, typically induce more conservative posting levels, and existing SU posting signs need not be revised.

METHOD

1. Develop simple-span live load tables for all Florida and AASHTO SU trucks.
2. Given a Florida SU posting, infer the equivalent AASHTO SU posting.
3. Do this for 1280 instances (20 span lengths • 8 posting levels • 4 AASHTO SU trucks • 2 loadings, moment and shear), and highlight the worst cases.

An abbreviated summary of the method and its nomenclature follows.

SU	Single Unit
SU_Post	Existing Florida SU Posting Sign
ASU_Post	Equivalent AASHTO SU Posting Sign, selected AASHTO SU truck
LL_{FSU2}	Live Load, 17 ton Florida SU 2-axle truck
LL_{FSU3}	Live Load, 33 ton Florida SU 3-axle truck
LL_{FSU4}	Live Load, 35 ton Florida SU 4-axle truck
LL_{ASU}	Live Load, selected AASHTO SU truck
GVW_{ASU}	Gross Vehicle Weight, selected AASHTO SU truck

$$ASU\_Post = \frac{max\left(\left(\begin{array}{c} \left|LL_{FSU2}\right| \cdot \dfrac{min(17tonf, FSU\_Post)}{17tonf} \\ \left|LL_{FSU3}\right| \cdot \dfrac{min(33tonf, FSU\_Post)}{33tonf} \\ \left|LL_{FSU4}\right| \cdot \dfrac{min(35tonf, FSU\_Post)}{35tonf} \end{array}\right)\right)}{\left|LL_{ASU}\right|} \cdot GVW_{ASU}.$$

LIVE LOAD EQUATIONS (1 of 2)

$ips := 100$ - increments per span precision

$max\_ab(A,B) := max(A,B)$

$max\_abc(A,B,C) := max(A,B,C)$

$max\_abcd(A,B,C,D) := max(A,B,C,D)$

$min\_ab(A,B) := min(A,B)$

$min\_abc(A,B,C) := min(A,B,C)$

$min\_abcd(A,B,C,D) := min(A,B,C,D)$

Lane load (special for FL120)

$$\omega_{lane}(L,TRK) := \begin{array}{|l} \text{return } 0klf \text{ if } cols(TRK) < 3 \\ \text{return } TRK_{1,3}\cdot klf \text{ if } rows(TRK) < 3 \\ \text{return } TRK_{1,3}\cdot klf \text{ if } TRK_{1,3} > 0 \\ \text{return } TRK_{3,3}\cdot klf \text{ if } L > TRK_{2,3}\cdot ft \\ 0\cdot klf \end{array}$$

Increments

$ix := 1 .. ips + 1$

$$x(L) := \begin{array}{|l} \text{for } i \in 1 .. ips + 1 \\ \quad T_i \leftarrow \frac{L}{ips}\cdot(i-1) \\ T \end{array}$$

Reactions, Left and Right

$$RXN_L(L,x_{axl}) := if\left(0 \le x_{axl} \le L, \frac{L - x_{axl}}{L}, 0\right)$$

$$RXN_R(L,x_{axl}) := if\left(0 \le x_{axl} \le L, \frac{x_{axl}}{L}, 0\right)$$

Moment

$$M(L,x_{axl},x) := min\left[RXN_R(L,x_{axl})\cdot(L-x), RXN_L(L,x_{axl})\cdot x\right]$$

$$M_\omega(L,\omega,x) := 0.5\cdot\omega\cdot\left(L\cdot x - x^2\right)$$

Shear

$$Vp(L,x_{axl},x) := RXN_L(L,x_{axl})$$

$$Vn(L,x_{axl},x) := -RXN_R(L,x_{axl})$$

$$V_\omega(L,\omega,x) := 0.5\cdot\omega\cdot L - \omega\cdot x$$

Location of axle No. "i.axl," when axle No. "i.axle.at.x" is at location "x"

$$x_{ax}(x,TRK,i_{axl.at.x},i_{axl}) := \left[\frac{x}{ft} + \sum_{k=1}^{i_{axl.at.x}} \left(TRK^{\langle 1\rangle}\right)_k - \sum_{k=1}^{i_{axl}} \left(TRK^{\langle 1\rangle}\right)_k\right]\cdot ft$$

LIVE LOAD EQUATIONS (2 of 2)

Moment on span "L" at location "x" from truck "TRK;" try all axles

$$M_{TK}(x, L, TRK) := \left| \begin{array}{l} mx \leftarrow 0 \\ \text{for } i \in 1..\text{rows}(TRK) \\ \quad mx \leftarrow \max\left[mx, \sum_{k2=1}^{\text{rows}(TRK)} \left(TRK_{k2,2} \cdot kip \cdot M\left(L, x_{ax}(x, TRK, i, k2), x\right)\right)\right] \\ mx \end{array} \right.$$

Maximum moment, where VEH - is one or more trucks.

$$M_{VEH}\left(L, VEH, IM_{axl}, IM_{lane}\right) := \left| \begin{array}{l} M1(x) \leftarrow \left| \begin{array}{l} \text{for } i \in 1..\text{rows}(VEH) \\ \quad T_i \leftarrow IM_{axl} \cdot M_{TK}\left(x, L, VEH_i\right) + IM_{lane} \cdot M_{\omega}\left(L, \omega_{lane}\left(L, VEH_i\right), x\right) \\ \max(T) \end{array} \right. \\ \max\left(\overrightarrow{M1(x(L))}\right) \end{array} \right.$$

Shear on span "L" at location "0" and "L" from truck "TRK;" try all axles

$$V_{TK}(L, TRK) := \left| \begin{array}{l} v \leftarrow 0 \\ \text{for } i \in 1..\text{rows}(TRK) \\ \quad v \leftarrow \max\left[\left[\begin{array}{c} v \\ \sum_{k2=1}^{\text{rows}(TRK)} \left(TRK_{k2,2} \cdot kip \cdot Vp\left(L, x_{ax}(0, TRK, i, k2), 0\right)\right) \\ \sum_{k2=1}^{\text{rows}(TRK)} \left(TRK_{k2,2} \cdot kip \cdot -Vn\left(L, x_{ax}(L, TRK, i, k2), L\right)\right) \end{array} \right]\right] \\ v \end{array} \right.$$

Maximum shear, where VEH - is one or more trucks.

$$V_{VEH}\left(L, VEH, IM_{axl}, IM_{lane}\right) := \left| \begin{array}{l} \text{for } i \in 1..\text{rows}(VEH) \\ \quad T_i \leftarrow IM_{axl} \cdot V_{TK}\left(L, VEH_i\right) + IM_{lane} \cdot \left(0.5 \cdot L \cdot \omega_{lane}\left(L, VEH_i\right)\right) \\ \max(T) \end{array} \right.$$

Span lengths under consideration. Use fewer span lengths for clarity.

$$SPANS := \left(10^{-10} \;\; 2 \;\; 4 \;\; 6 \;\; 8 \;\; 10 \;\; 12 \;\; 15 \;\; 20 \;\; 25 \;\; 30 \;\; 40 \;\; 50 \;\; 60 \;\; 80 \;\; 100 \;\; 125 \;\; 150 \;\; 175 \;\; 200\right)^T \cdot ft$$

LL equations for shear and moment, multispan ignoring impact

$$LL_M(VEH) := \left| \begin{array}{l} LL(L) \leftarrow M_{VEH}(L, VEH, 1.00, 1.00) \\ \overrightarrow{LL(SPANS)} \end{array} \right.$$

$$LL_V(VEH) := \left| \begin{array}{l} LL(L) \leftarrow V_{VEH}(L, VEH, 1.00, 1.00) \\ \overrightarrow{LL(SPANS)} \end{array} \right.$$

RUN LIVE LOAD (LL)

$$\begin{pmatrix} HS20m \\ HS20v \end{pmatrix} := \left[\begin{bmatrix} \begin{pmatrix} 0 & 8 & 0 \\ 14 & 32 & 0 \\ 14 & 32 & 0 \end{pmatrix} \\ \begin{pmatrix} 0 & 18 & 0.64 \end{pmatrix} \end{bmatrix} \begin{bmatrix} \begin{pmatrix} 0 & 8 & 0 \\ 14 & 32 & 0 \\ 14 & 32 & 0 \end{pmatrix} \\ \begin{pmatrix} 0 & 26 & 0.64 \end{pmatrix} \end{bmatrix}\right]^T$$

$$\begin{pmatrix} FSU2 \\ FSU3 \\ FSU4 \\ FC5 \\ ASU4 \\ ASU5 \\ ASU6 \\ ASU7 \end{pmatrix} := \left[\begin{pmatrix} 0 & 12 \\ 13 & 22 \end{pmatrix} \begin{pmatrix} 0 & 22 \\ 11 & 22 \\ 4.167 & 22 \end{pmatrix} \begin{pmatrix} 0 & 13.9 \\ 9.167 & 18.7 \\ 4.167 & 18.7 \\ 4.167 & 18.7 \end{pmatrix} \begin{pmatrix} 0 & 10 \\ 10 & 20 \\ 4.167 & 20 \\ 17.667 & 15 \\ 4.167 & 15 \end{pmatrix} \begin{pmatrix} 0 & 12 \\ 10 & 8 \\ 4 & 17 \\ 4 & 17 \end{pmatrix} \begin{pmatrix} 0 & 12 \\ 10 & 8 \\ 4 & 8 \\ 4 & 17 \\ 4 & 17 \end{pmatrix} \begin{pmatrix} 0 & 11.5 \\ 10 & 8 \\ 4 & 8 \\ 4 & 17 \\ 4 & 17 \\ 4 & 8 \end{pmatrix} \begin{pmatrix} 0 & 11.5 \\ 10 & 8 \\ 4 & 8 \\ 4 & 17 \\ 4 & 17 \\ 4 & 8 \\ 4 & 8 \end{pmatrix} \right]^T$$

AASHTO HS20 MBE $HS20\_m := LL_M(HS20m)$ $HS20\_v := LL_V(HS20v)$ $\sum \left(HS20m_1\right)^{\langle 2 \rangle} \cdot kip = 36 \cdot tonf$

FLORIDA SU2 (FSU2) $FSU2\_m := LL_M((FSU2))$ $FSU2\_v := LL_V((FSU2))$ $\sum FSU2^{\langle 2 \rangle} \cdot kip = 17 \cdot tonf$

FLORIDA SU3 (FSU3) $FSU3\_m := LL_M((FSU3))$ $FSU3\_v := LL_V((FSU3))$ $\sum FSU3^{\langle 2 \rangle} \cdot kip = 33 \cdot tonf$

FLORIDA SU4 (FSU4) $FSU4\_m := LL_M((FSU4))$ $FSU4\_v := LL_V((FSU4))$ $\sum FSU4^{\langle 2 \rangle} \cdot kip = 35 \cdot tonf$

FLORIDA C5 (FC5) $FC5\_m := LL_M((FC5))$ $FC5\_v := LL_V((FC5))$ $\sum FC5^{\langle 2 \rangle} \cdot kip = 40 \cdot tonf$

AASHTO SU4 (ASU4) $ASU4\_m := LL_M((ASU4))$ $ASU4\_v := LL_V((ASU4))$ $\sum ASU4^{\langle 2 \rangle} \cdot kip = 27 \cdot tonf$

AASHTO SU5 (ASU5) $ASU5\_m := LL_M((ASU5))$ $ASU5\_v := LL_V((ASU5))$ $\sum ASU5^{\langle 2 \rangle} \cdot kip = 31 \cdot tonf$

AASHTO SU6 (ASU6) $ASU6\_m := LL_M((ASU6))$ $ASU6\_v := LL_V((ASU6))$ $\sum ASU6^{\langle 2 \rangle} \cdot kip = 34.75 \cdot tonf$

AASHTO SU7 (ASU7) $ASU7\_m := LL_M((ASU7))$ $ASU7\_v := LL_V((ASU7))$ $\sum ASU7^{\langle 2 \rangle} \cdot kip = 38.75 \cdot tonf$

HDR1 := ("SPAN" "FSU2" "FSU3" "FSU4" "FC5" "ASU4" "ASU5" "ASU6" "ASU7")

HDR2 := ("(ft)" "(k-ft)" "(k-ft)" "(k-ft)" "(k-ft)" "(k-ft)" "(k-ft)" "(k-ft)" "(k-ft)")

HDR3 := ("(ft)" "(kip)" "(kip)" "(kip)" "(kip)" "(kip)" "(kip)" "(kip)" "(kip)")

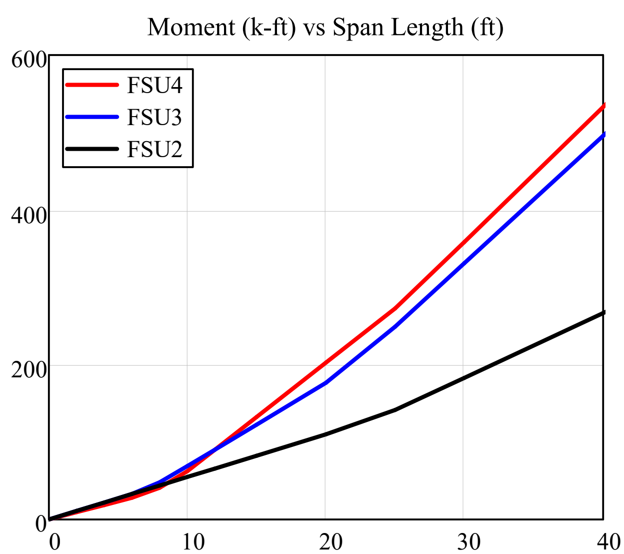
$$M := stack\left(HDR1, HDR2, augment\left(\frac{SPANS}{ft}, \frac{FSU2\_m}{kip \cdot ft}, \frac{FSU3\_m}{kip \cdot ft}, \frac{FSU4\_m}{kip \cdot ft}, \frac{FC5\_m}{kip \cdot ft}, \frac{ASU4\_m}{kip \cdot ft}, \frac{ASU5\_m}{kip \cdot ft}, \frac{ASU6\_m}{kip \cdot ft}, \frac{ASU7\_m}{kip \cdot ft}\right)\right)$$

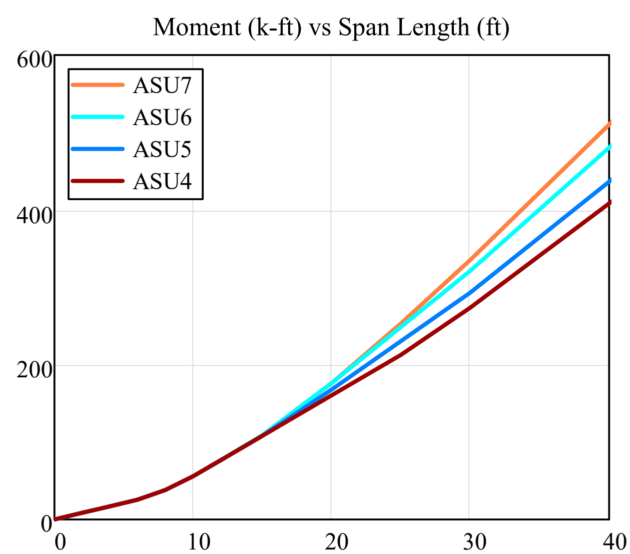
$$V := stack\left(HDR1, HDR3, augment\left(\frac{SPANS}{ft}, \frac{FSU2\_v}{kip}, \frac{FSU3\_v}{kip}, \frac{FSU4\_v}{kip}, \frac{FC5\_v}{kip}, \frac{ASU4\_v}{kip}, \frac{ASU5\_v}{kip}, \frac{ASU6\_v}{kip}, \frac{ASU7\_v}{kip}\right)\right)$$

LL MOMENT

M =

"SPAN"	"FSU2"	"FSU3"	"FSU4"	"FC5"	"ASU4"	"ASU5"	"ASU6"	"ASU7"
"(ft)"	"(k-ft)"	"(k-ft)"	"(k-ft)"	"(k-ft)"	"(k-ft)"	"(k-ft)"	"(k-ft)"	"(k-ft)"
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.0	11.0	11.0	9.4	10.0	8.5	8.5	8.5	8.5
4.0	22.0	22.0	18.7	20.0	17.0	17.0	17.0	17.0
6.0	33.0	33.0	28.1	30.0	25.5	25.5	25.5	25.5
8.0	44.0	48.1	40.9	43.8	38.2	38.2	38.2	38.2
10.0	55.0	68.9	62.3	62.7	55.8	55.8	55.8	55.8
12.0	66.0	90.1	90.4	81.9	76.6	76.6	76.6	76.6
15.0	82.5	122.3	132.5	111.2	108.0	108.0	108.8	108.8
20.0	110.0	176.5	202.6	160.5	160.4	168.2	176.3	176.3
25.0	141.7	249.1	272.7	220.9	212.8	230.7	248.7	253.1
30.0	183.0	331.0	358.5	283.3	273.7	293.1	321.2	335.2
40.0	266.5	495.3	532.4	408.3	408.0	436.0	480.1	509.9
50.0	350.5	659.8	706.8	599.6	542.6	589.8	653.3	703.6
60.0	435.0	824.6	881.4	798.3	677.3	744.0	826.8	897.3
80.0	604.2	1154.1	1230.9	1196.5	946.9	1052.9	1173.7	1284.6
100.0	773.8	1484.0	1580.6	1595.4	1216.8	1362.4	1521.0	1672.0
125.0	985.9	1896.3	2017.9	2094.6	1554.1	1749.3	1955.2	2156.4
150.0	1198.1	2308.7	2455.2	2593.8	1891.5	2136.5	2389.4	2640.8
175.0	1410.5	2721.0	2892.5	3093.5	2228.9	2523.9	2823.6	3125.1
200.0	1622.9	3133.3	3329.9	3593.3	2566.2	2911.2	3257.8	3609.5



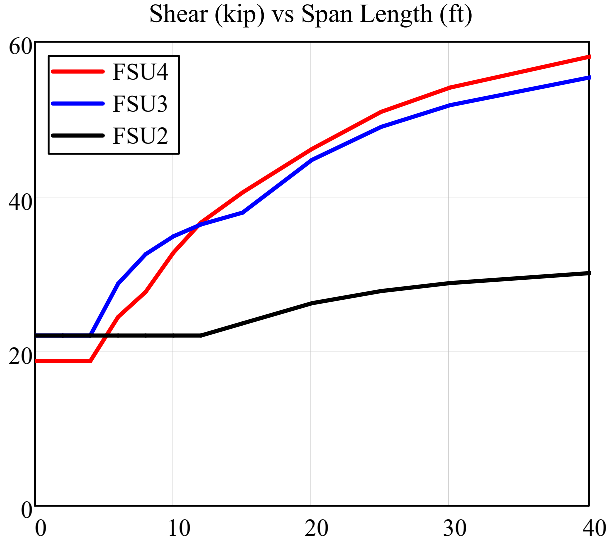


LL SHEAR

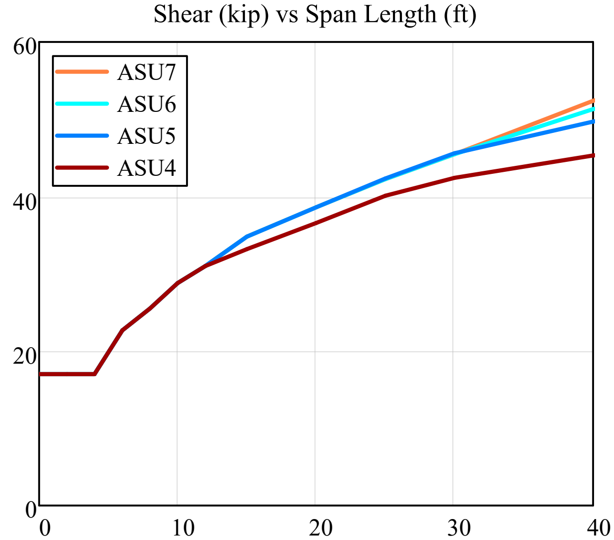
V =

"SPAN"	"FSU2"	"FSU3"	"FSU4"	"FC5"	"ASU4"	"ASU5"	"ASU6"	"ASU7"
"(ft)"	"(kip)"	"(kip)"	"(kip)"	"(kip)"	"(kip)"	"(kip)"	"(kip)"	"(kip)"
0	22	22	18.7	20	17	17	17	17
2	22	22	18.7	20	17	17	17	17
4	22	22	18.7	20	17	17	17	17
6	22	28.72	24.41	26.11	22.67	22.67	22.67	22.67
8	22	32.54	27.66	29.58	25.5	25.5	25.5	25.5
10	22	34.83	32.72	31.67	28.8	28.8	28.8	28.8
12	22	36.36	36.62	33.05	31	31	31	31
15	23.6	37.89	40.52	35	33.2	34.8	34.8	34.8
20	26.2	44.73	46.15	38.75	36.6	38.6	38.6	38.6
25	27.76	48.99	50.92	41	40.08	42.32	42.26	42.26
30	28.8	51.82	54.1	43.3	42.4	45.6	45.47	45.47
40	30.1	55.37	58.07	49.98	45.3	49.7	51.32	52.38
50	30.88	57.49	60.46	53.98	47.04	52.16	54.96	57.4
60	31.4	58.91	62.05	57.01	48.2	53.8	57.38	60.75
80	32.05	60.68	64.04	62.76	49.65	55.85	60.41	64.94
100	32.44	61.75	65.23	66.21	50.52	57.08	62.23	67.45
125	32.75	62.6	66.18	68.97	51.22	58.06	63.68	69.46
150	32.96	63.16	66.82	70.81	51.68	58.72	64.65	70.8
175	33.11	63.57	67.27	72.12	52.01	59.19	65.35	71.76
200	33.22	63.87	67.61	73.1	52.26	59.54	65.86	72.47

Shear (kip) vs Span Length (ft)



Shear (kip) vs Span Length (ft)



FLORIDA SU vs AASHTO SU

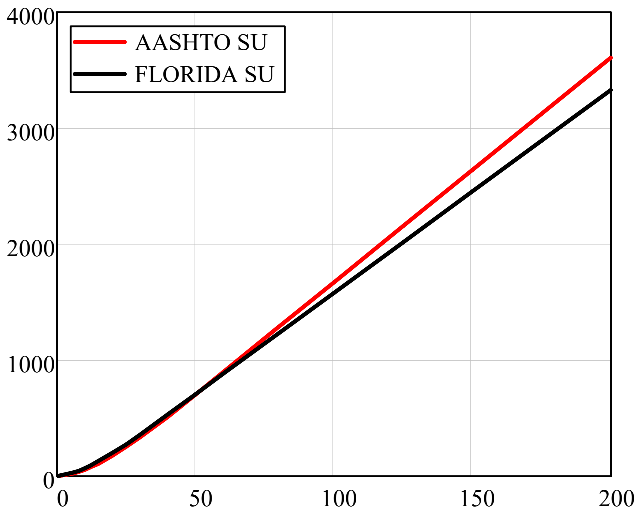
$FSUm := \overrightarrow{max\_abc(FSU2\_m, FSU3\_m, FSU4\_m)}$ - maximum moment, Florida SU

$ASUm := \overrightarrow{max\_abcd(ASU4\_m, ASU5\_m, ASU6\_m, ASU7\_m)}$ - maximum moment, AASHTO SU

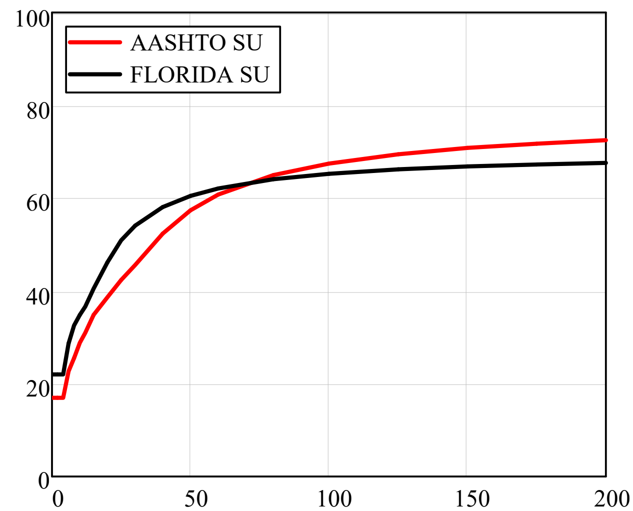
$FSUv := \overrightarrow{max\_abc(FSU2\_v, FSU3\_v, FSU4\_v)}$ - maximum shear, Florida SU

$ASUv := \overrightarrow{max\_abcd(ASU4\_v, ASU5\_v, ASU6\_v, ASU7\_v)}$ - maximum shear, AASHTO SU

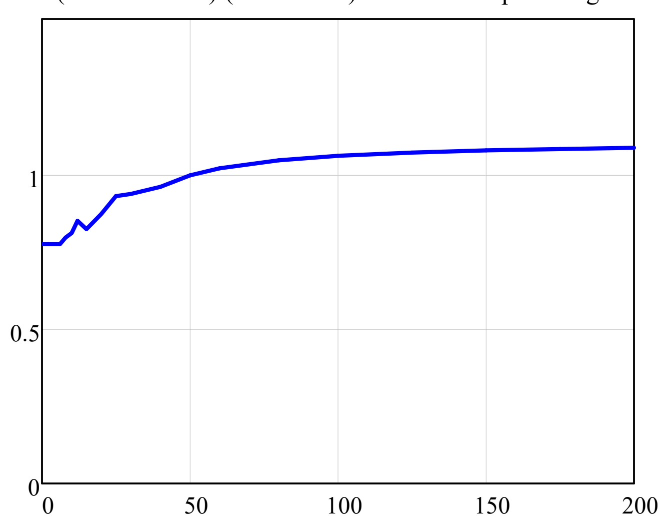
Moment (k-ft) vs Span Length (ft)



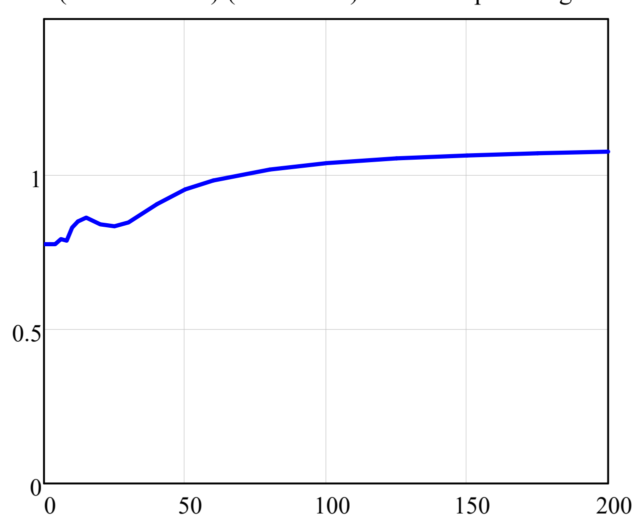
Shear (kip) vs Span Length (ft)



(AASHTO SU)/(Florida SU) Moment vs Span Length



(AASHTO SU)/(Florida SU) Shear vs Span Length



$\max\left(\frac{ASUm}{FSUm}, \frac{ASUv}{FSUv}\right) = 1.08$ - maximum amount by which AASHTO SU trucks exceed Florida SU trucks

$\max\left(\frac{FSUm}{ASUm}, \frac{FSUv}{ASUv}\right) = 1.29$ - maximum amount by which Florida SU trucks exceed AASHTO SU trucks

POSTING EQUATIONS (1 of 2)

NOTE. Florida SU postings do not consider rating factors over 1.00. For example, a 19 ton SU posting only restricts the 33 ton SU3 and 35 ton SU5. A 19 ton posting sign neglects the 17 ton SU2. That is, a 19 ton posting sign does not permit an SU2 to exceed its maximum 17 ton legal weight. Since posting signs do not permit supra-legal loads, inferences upon the available capacity are limited to $\min(\text{PostingSign}, \text{GrossVehicleWeight})$.

Given a Florida SU posting, infer the maximum moment capacity available for live load

$$LLm_{FDOT}(Post) := \left| \begin{array}{l} T \leftarrow \overrightarrow{\text{max\_abc}\left(\frac{\min(Post, 17tonf)}{17tonf} \cdot FSU2\_m, \frac{\min(Post, 33tonf)}{33tonf} \cdot FSU3\_m, \frac{\min(Post, 35tonf)}{35tonf} \cdot FSU4\_m\right)} \\ \text{if}\left(Post \geq 3tonf, T, 10^{-10} \cdot T\right) \end{array} \right.$$

Given a Florida SU posting, infer the maximum shear capacity available for live load

$$LLv_{FDOT}(Post) := \left| \begin{array}{l} T \leftarrow \overrightarrow{\text{max\_abc}\left(\frac{\min(Post, 17tonf)}{17tonf} \cdot FSU2\_v, \frac{\min(Post, 33tonf)}{33tonf} \cdot FSU3\_v, \frac{\min(Post, 35tonf)}{35tonf} \cdot FSU4\_v\right)} \\ \text{if}\left(Post \geq 3tonf, T, 10^{-10} \cdot T\right) \end{array} \right.$$

Flatten submatrices into one single matrix

$$DeFunk(M) := \left| \begin{array}{l} \text{for } i \in 1..\text{rows}(M) \\ \quad \left| \begin{array}{l} \text{for } j \in 1..\text{cols}(M) \\ \quad T1 \leftarrow \text{if}\left(j = 1, M_{i,j}, \text{augment}\left(T1, M_{i,j}\right)\right) \\ T2 \leftarrow \text{if}(i = 1, T1, \text{stack}(T2, T1)) \end{array} \right. \\ T2 \end{array} \right.$$

Example Florida SU posting sign restrictions

$$POSTINGS := (3 \;\; 5 \;\; 10 \;\; 15 \;\; 20 \;\; 25 \;\; 30 \;\; 35)^{T} \cdot tonf$$

Given an AASHTO SU live load and its GVW, say the posting sign, considering moment

$$POSTmAASHTO(LL\_ASUX, GVW\_ASUX) := DeFunk\left[\frac{\left(\overrightarrow{LLm_{FDOT}(POSTINGS)}\right)^{T}}{\text{matrix}(1, \text{rows}(POSTINGS), f(i,j) \leftarrow LL\_ASUX)}\right] \cdot GVW\_ASUX$$

Given an AASHTO SU live load and its GVW, say the posting sign, considering shear

$$POSTvAASHTO(LL\_ASUX, GVW\_ASUX) := DeFunk\left[\frac{\left(\overrightarrow{LLv_{FDOT}(POSTINGS)}\right)^{T}}{\text{matrix}(1, \text{rows}(POSTINGS), f(i,j) \leftarrow LL\_ASUX)}\right] \cdot GVW\_ASUX$$

POSTING EQUATIONS (2 of 2)

$$HDR\_p1 := augment\left("FL\_SIGN:", \frac{POSTINGS^{T}}{tonf}\right)$$

$$HDR\_p2 := augment("SPAN", matrix(1, rows(POSTINGS), f(i,j) \leftarrow "POST"))$$

$$HDR\_p3 := augment("(ft)", matrix(1, rows(POSTINGS), f(i,j) \leftarrow "(ton)"))$$

$$p(POST) := stack\left(HDR\_p1, HDR\_p2, HDR\_p3, augment\left(\frac{SPANS}{ft}, \frac{POST}{tonf}\right)\right)$$

$$PmASU4 := POSTmAASHTO(ASU4\_m, 27tonf)$$

$$PmASU5 := POSTmAASHTO(ASU5\_m, 31\ tonf)$$

$$PmASU6 := POSTmAASHTO(ASU6\_m, 34.75\ tonf)$$

$$PmASU7 := POSTmAASHTO(ASU7\_m, 38.75\ tonf)$$

$$PvASU4 := POSTvAASHTO(ASU4\_v, 27tonf)$$

$$PvASU5 := POSTvAASHTO(ASU5\_v, 31\ tonf)$$

$$PvASU6 := POSTvAASHTO(ASU6\_v, 34.75\ tonf)$$

$$PvASU7 := POSTvAASHTO(ASU7\_v, 38.75\ tonf)$$

$$P\_ASU4 := \overrightarrow{min\_ab(PmASU4, PvASU4)}$$

$$P\_ASU5 := \overrightarrow{min\_ab(PmASU5, PvASU5)}$$

$$P\_ASU6 := \overrightarrow{min\_ab(PmASU6, PvASU6)}$$

$$P\_ASU7 := \overrightarrow{min\_ab(PmASU7, PvASU7)}$$

EXAMPLE 1

Say span L = 6 feet and the Florida SU Posting Sign = 10 tons.
The 10 ton Florida SU Posting Sign shows that there is 19.4 kip-ft available for moment

$$FSU2 = \begin{pmatrix} 0 & 12 \\ 13 & 22 \end{pmatrix} \qquad LL\_FSU2 := 22kip \cdot \frac{6ft}{4} \cdot \frac{\min(10tonf, 17tonf)}{17tonf} = 19.4 \cdot kip \cdot ft$$

$$FSU3 = \begin{pmatrix} 0 & 22 \\ 11 & 22 \\ 4.17 & 22 \end{pmatrix} \qquad LL\_FSU3 := 22kip \cdot \frac{6ft}{4} \cdot \frac{\min(10tonf, 33tonf)}{33tonf} = 10.0 \cdot kip \cdot ft$$

$$FSU4 = \begin{pmatrix} 0 & 13.9 \\ 9.17 & 18.7 \\ 4.17 & 18.7 \\ 4.17 & 18.7 \end{pmatrix} \qquad LL\_FSU4 := 18.7kip \cdot \frac{6ft}{4} \cdot \frac{\min(10tonf, 35tonf)}{35tonf} = 8.0 \cdot kip \cdot ft$$

$$LL\_FSU := \max\left(\begin{pmatrix} LL\_FSU2 \\ LL\_FSU3 \\ LL\_FSU4 \end{pmatrix}\right) = 19.4 \cdot kip \cdot ft$$ - moment available for live load

$$ASU4 = \begin{pmatrix} 0 & 12 \\ 10 & 8 \\ 4 & 17 \\ 4 & 17 \end{pmatrix} \qquad LL\_ASU4 := 17kip \cdot \frac{6ft}{4} = 25.5 \cdot kip \cdot ft$$ - maximum moment, 27 ton AASHTO-SU4

$$AASHTO\_SU4m := \frac{LL\_FSU}{LL\_ASU4} \cdot 27tonf = 20.6 \cdot tonf$$

$AASHTO\_SU4m = 20.6 \cdot tonf$ - inferred AASHTO SU4 Posting, <u>moment</u>

$$AASHTO\_SU4m := \frac{LL\_FSU}{LL\_ASU4} \cdot 27tonf = 20.6 \cdot tonf$$ - inferred AASHTO SU4 Posting, <u>moment</u>

EXAMPLE 2

Say span L = 15 feet and $\text{Florida\_SU\_Posting\_Sign} := 25\text{tonf}$.

$$\text{LL\_FSUX} = \text{LL}_{\text{FSUX}} \cdot \frac{\min(\text{Florida\_SU\_Posting}, \text{GVW}_{\text{FSUX}})}{\text{GVW}_{\text{FSUX}}}$$ - live load capacity

$$\text{LL\_FSU2} := 82.5 \cdot \text{kip} \cdot \text{ft} \cdot \frac{\min(\text{Florida\_SU\_Posting\_Sign}, 17\text{tonf})}{17\text{tonf}} = 82.5 \cdot \text{kip} \cdot \text{ft}$$

$$\text{LL\_FSU3} := 122.3 \cdot \text{kip} \cdot \text{ft} \cdot \frac{\min(\text{Florida\_SU\_Posting\_Sign}, 33\text{tonf})}{33\text{tonf}} = 92.7 \cdot \text{kip} \cdot \text{ft}$$

$$\text{LL\_FSU4} := 132.5 \cdot \text{kip} \cdot \text{ft} \cdot \frac{\min(\text{Florida\_SU\_Posting\_Sign}, 35\text{tonf})}{35\text{tonf}} = 94.6 \cdot \text{kip} \cdot \text{ft}$$

$\text{LL\_FSU} := \max(\text{LL\_FSU2}, \text{LL\_FSU3}, \text{LL\_FSU4}) = 94.6 \cdot \text{kip} \cdot \text{ft}$ - available for live load moment

$\text{LL\_ASU4} := 108.0 \cdot \text{kip} \cdot \text{ft}$ - maximum moment, 27 ton AASHTO-SU4

$$\text{AASHTO\_SU4m} := \frac{\text{LL\_FSU}}{\text{LL\_ASU4}} \cdot 27\text{tonf} = 23.7 \cdot \text{tonf}$$ - inferred AASHTO SU4 Posting, moment

$$\text{LL\_FSUX} = \text{LL}_{\text{FSUX}} \cdot \frac{\min(\text{Florida\_SU\_Posting}, \text{GVW}_{\text{FSUX}})}{\text{GVW}_{\text{FSUX}}}$$ - live load capacity

$$\text{LL\_FSU2} := 23.6 \cdot \text{kip} \cdot \frac{\min(\text{Florida\_SU\_Posting\_Sign}, 17\text{tonf})}{17\text{tonf}} = 23.6 \cdot \text{kip}$$

$$\text{LL\_FSU3} := 37.9 \cdot \text{kip} \cdot \frac{\min(\text{Florida\_SU\_Posting\_Sign}, 33\text{tonf})}{33\text{tonf}} = 28.7 \cdot \text{kip}$$

$$\text{LL\_FSU4} := 40.5 \cdot \text{kip} \cdot \frac{\min(\text{Florida\_SU\_Posting\_Sign}, 35\text{tonf})}{35\text{tonf}} = 28.9 \cdot \text{kip}$$

$\text{LL\_FSU} := \max(\text{LL\_FSU2}, \text{LL\_FSU3}, \text{LL\_FSU4}) = 28.9 \cdot \text{kip}$ - available for live load shear

$\text{LL\_ASU4} := 33.2 \cdot \text{kip}$ - maximum shear, 27 ton AASHTO-SU4

$$\text{AASHTO\_SU4v} := \frac{\text{LL\_FSU}}{\text{LL\_ASU4}} \cdot 27\text{tonf} = 23.5 \cdot \text{tonf}$$ - inferred AASHTO SU4 Posting, shear

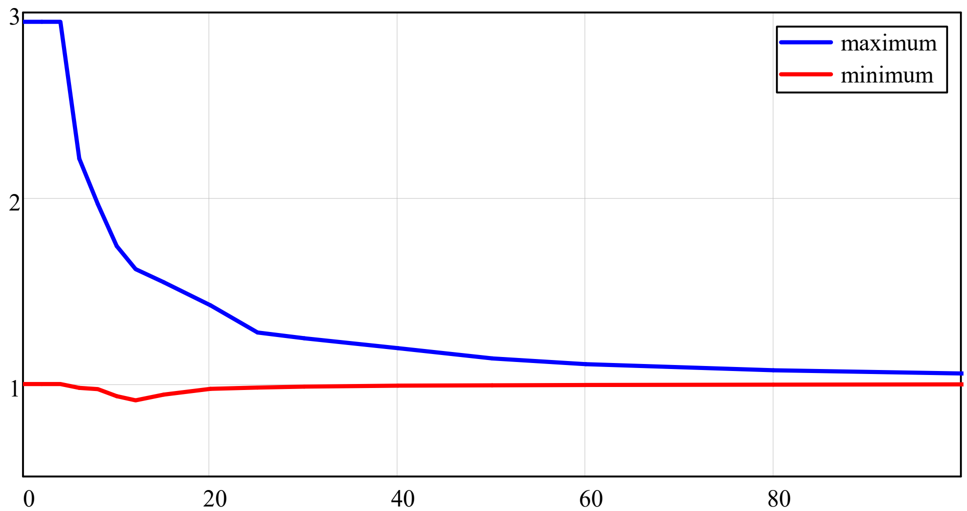
$$\text{AASHTO\_SU4} := \min\left(\begin{pmatrix} \text{AASHTO\_SU4m} \\ \text{AASHTO\_SU4v} \end{pmatrix}\right) = 23.5 \cdot \text{tonf}$$ - inferred AASHTO SU4 Posting

FLORIDA SU POSTING vs AASHTO SU POSTING

SU Posting, AASHTO SU vs Florida SU

$$AvsF := \left| \begin{array}{l} \text{for } i \in 1..\text{rows(SPANS)} \\ \left| \begin{array}{l} MIN_i \leftarrow \min\left[\frac{(P\_ASU4^T)^{\langle i \rangle}}{POSTINGS}, \frac{(P\_ASU5^T)^{\langle i \rangle}}{POSTINGS}, \frac{(P\_ASU6^T)^{\langle i \rangle}}{POSTINGS}, \frac{(P\_ASU7^T)^{\langle i \rangle}}{POSTINGS}\right] \\ MAX_i \leftarrow \max\left[\frac{(P\_ASU4^T)^{\langle i \rangle}}{POSTINGS}, \frac{(P\_ASU5^T)^{\langle i \rangle}}{POSTINGS}, \frac{(P\_ASU6^T)^{\langle i \rangle}}{POSTINGS}, \frac{(P\_ASU7^T)^{\langle i \rangle}}{POSTINGS}\right] \end{array} \right. \\ \text{augment(MIN, MAX)} \end{array} \right.$$

(AASHTO SU POSTING) / (FLORIDA SU POSTING) vs SPAN LENGTH (ft)



AvsF, plotted above, identifies the most and least conservative Florida SU posting restrictions.

2.95 = Florida SU Posting[(38.75 ton ASU7)/(17 ton FSU2)][(22kip FSU2 axle load)/(17 kip ASU7 axle load)]
Among spans between 0 and 6 feet having Florida SU postings between 3 and 15 tons, an AASHTO SU7 posting sign would be equal to (Florida SU Posting)(2.95). Here, the Florida SU posting is excessively conservative for the AASHTO SU7 truck.

0.91 = Florida SU Posting[(27 ton ASU4)/(35 ton FSU4)][(36.6kip FSU4 shear)/(31.0 kip ASU4 shear)]
Among 12 foot spans with a Florida SU posting of 33-to-35 tons, an AASHTO SU4 posting sign would be equal to (Florida SU Posting)(0.91). Here, the Florida SU posting appears unconservative for the AASHTO SU. However the scenario cannot practically apply, as the AASHTO SU4 weights 27 tons, less than the 33-to-35 ton Florida SU posting range that the equation supposes.

In practice, among the several spans and posting levels considered, the worst-case posting occurs when (1) the span length is 15 feet, (2) shear governs, (3) the Florida SU posting is 25 tons, and (4) the analytical result was actually 25 tons, and not truncated to 25 tons as is typical. A 25 ton Florida SU posting shows (25/35)(40.5 kip) = 28.9 kip strength, and the corresponding AASHTO SU posting is (28.9 kip available/33.2 kip demand)(27 tons ASU4) = 23.5 tons, or 23 tons truncated. The difference is 2 tons, and judged acceptable.

MAKE OUTPUTS (1 of 2)

$Spacer := matrix(rows(SPANS), 1, f(i,j) \leftarrow \text{"*"})$

$$ASU4mv := augment\left(\frac{SPANS}{ft}, \frac{PmASU4}{tonf}, Spacer, \frac{SPANS}{ft}, \frac{PvASU4}{tonf}, Spacer\right)$$

$$ASU5mv := augment\left(\frac{SPANS}{ft}, \frac{PmASU5}{tonf}, Spacer, \frac{SPANS}{ft}, \frac{PvASU5}{tonf}, Spacer\right)$$

$$ASU6mv := augment\left(\frac{SPANS}{ft}, \frac{PmASU6}{tonf}, Spacer, \frac{SPANS}{ft}, \frac{PvASU6}{tonf}, Spacer\right)$$

$$ASU7mv := augment\left(\frac{SPANS}{ft}, \frac{PmASU7}{tonf}, Spacer, \frac{SPANS}{ft}, \frac{PvASU7}{tonf}, Spacer\right)$$

$$ASU\_Postings := \left| \begin{array}{l} \text{for } i \in 1..rows(P\_ASU4) \\ \quad \text{for } j \in 1..cols(P\_ASU4) \\ \quad\quad T_{i,j} \leftarrow min\left(\left(\begin{array}{c} if(P\_ASU4_{i,j} > 27tonf, 99tonf, P\_ASU4_{i,j}) \\ if(P\_ASU5_{i,j} > 31tonf, 99tonf, P\_ASU5_{i,j}) \\ if(P\_ASU6_{i,j} > 34.75tonf, 99tonf, P\_ASU6_{i,j}) \\ if(P\_ASU7_{i,j} > 38.75tonf, 99tonf, P\_ASU7_{i,j}) \end{array}\right)\right) \\ T \end{array} \right.$$

MAKE OUTPUTS (2 of 2)

```
HDR1(LBL1) := | T(LBL2) ← augment(LBL1, matrix(1, rows(POSTINGS) − 1, f(i,j) ← ""), LBL2, "")
              | augment(T("FLEXURE"), T("SHEAR"))
```

```
HDR(LBL) := | T1 ← HDR1(LBL)
            | T2 ← augment(matrix(1, rows(POSTINGS) + 2, f(i,j) ← ""))
            | T3 ← augment("SU_SIGN:", POSTINGS^T·tonf^(−1), "")
            | T4 ← augment("SPAN:", matrix(1, rows(POSTINGS), f(i,j) ← "POST"), "")
            | stack(T1, augment(T2, T2), augment(T3, T3), augment(T4, T4))
```

```
Z := | T ← stack(HDR("AASHTO SU4, GVW = 27 tons"), ASU4mv)
     | T ← stack(T, matrix(1, cols(T), f(i,j) ← ""))
     | T ← stack(T, HDR("AASHTO SU5, GVW = 31 tons"), ASU5mv)
     | T ← stack(T, matrix(1, cols(T), f(i,j) ← ""))
     | T ← stack(T, HDR("AASHTO SU6, GVW = 34.75 tons"), ASU6mv)
     | T ← stack(T, matrix(1, cols(T), f(i,j) ← ""))
     | T ← stack(T, HDR("AASHTO SU7, GVW = 38.75 tons"), ASU7mv)
     | T ← stack(T, matrix(4, cols(T), f(i,j) ← ""))
     | U1 ← augment[("FSU_SIGN:", "SPAN")ᵀ, stack(POSTINGS^T / tonf, matrix(1, rows(POSTINGS), f(i,j) ← "POST"))]
     | U2 ← augment(SPANS / ft, ASU_Postings / tonf)
     | U ← stack(U1, U2)
     | U ← augment(U, matrix(rows(U), cols(T) − cols(U), f(i,j) ← ""))
     | stack(T, U)
```

```
Z := WRITECSV(Z, "POSTING_floridaSU_vs_aashtoSU.csv")
```

AASHTO SU4, GVW = 27 tons — *FLEXURE*

SPAN (ft)	FLORIDA SU POSTING SIGN (tons) 3	5	10	15	20	25	30	35
	EQUIVALENT AASHTO SU4 POSTING (tons)							
0	6.2	10.3	20.6	30.8	34.9	34.9	34.9	34.9
2	6.2	10.3	20.6	30.8	34.9	34.9	34.9	34.9
4	6.2	10.3	20.6	30.8	34.9	34.9	34.9	34.9
6	6.2	10.3	20.6	30.8	34.9	34.9	34.9	34.9
8	5.5	9.1	18.3	27.4	31.1	31.1	31.1	34.0
10	4.7	7.8	15.7	23.5	26.6	26.6	30.3	33.4
12	4.1	6.8	13.7	20.5	23.3	24.1	28.9	31.8
15	3.6	6.1	12.1	18.2	20.6	23.6	28.4	33.1
20	3.3	5.4	10.9	16.3	19.5	24.4	29.2	34.1
25	3.2	5.3	10.6	15.9	19.8	24.7	29.7	34.6
30	3.2	5.3	10.6	15.9	20.2	25.3	30.3	35.4
40	3.1	5.2	10.4	15.6	20.1	25.2	30.2	35.2
50	3.1	5.1	10.3	15.4	20.1	25.1	30.1	35.2
60	3.1	5.1	10.2	15.3	20.1	25.1	30.1	35.1
80	3.0	5.1	10.1	15.2	20.1	25.1	30.1	35.1
100	3.0	5.0	10.1	15.1	20.0	25.1	30.1	35.1
125	3.0	5.0	10.1	15.1	20.0	25.0	30.0	35.1
150	3.0	5.0	10.1	15.1	20.0	25.0	30.0	35.0
175	3.0	5.0	10.1	15.1	20.0	25.0	30.0	35.0
200	3.0	5.0	10.0	15.1	20.0	25.0	30.0	35.0

AASHTO SU4, GVW = 27 tons — *SHEAR*

SPAN (ft)	FLORIDA SU POSTING SIGN (tons) 3	5	10	15	20	25	30	35
	EQUIVALENT AASHTO SU4 POSTING (tons)							
0	6.2	10.3	20.6	30.8	34.9	34.9	34.9	34.9
2	6.2	10.3	20.6	30.8	34.9	34.9	34.9	34.9
4	6.2	10.3	20.6	30.8	34.9	34.9	34.9	34.9
6	4.6	7.7	15.4	23.1	26.2	26.2	31.1	34.2
8	4.1	6.9	13.7	20.6	23.3	26.1	31.3	34.5
10	3.6	6.1	12.1	18.2	20.6	24.7	29.7	32.7
12	3.4	5.6	11.3	16.9	19.2	24.0	28.8	31.9
15	3.4	5.6	11.3	16.9	19.2	23.5	28.2	32.9
20	3.4	5.7	11.4	17.1	20.0	25.0	30.0	34.0
25	3.3	5.5	11.0	16.5	20.0	25.0	30.0	34.3
30	3.2	5.4	10.8	16.2	20.0	25.0	30.0	34.4
40	3.2	5.3	10.6	15.8	20.0	25.0	30.0	34.6
50	3.1	5.2	10.4	15.6	20.0	25.0	30.0	34.7
60	3.1	5.2	10.3	15.5	20.0	25.0	30.0	34.8
80	3.1	5.1	10.3	15.4	20.0	25.0	30.0	34.8
100	3.1	5.1	10.2	15.3	20.0	25.0	30.0	34.9
125	3.0	5.1	10.2	15.2	20.0	25.0	30.0	34.9
150	3.0	5.1	10.1	15.2	20.0	25.0	30.0	34.9
175	3.0	5.1	10.1	15.2	20.0	25.0	30.0	34.9
200	3.0	5.0	10.1	15.1	20.0	25.0	30.0	34.9

AASHTO SU5, GVW = 31 tons *FLEXURE*

SPAN (ft)	FLORIDA SU POSTING SIGN (tons) 3	5	10	15	20	25	30	35
	EQUIVALENT AASHTO SU5 POSTING (tons)							
0	7.1	11.8	23.6	35.4	40.1	40.1	40.1	40.1
2	7.1	11.8	23.6	35.4	40.1	40.1	40.1	40.1
4	7.1	11.8	23.6	35.4	40.1	40.1	40.1	40.1
6	7.1	11.8	23.6	35.4	40.1	40.1	40.1	40.1
8	6.3	10.5	21.0	31.5	35.7	35.7	35.7	39.0
10	5.4	9.0	18.0	27.0	30.6	30.6	34.8	38.3
12	4.7	7.9	15.7	23.6	26.7	27.6	33.1	36.6
15	4.2	7.0	13.9	20.9	23.7	27.2	32.6	38.0
20	3.6	6.0	11.9	17.9	21.3	26.7	32.0	37.3
25	3.4	5.6	11.2	16.8	20.9	26.2	31.4	36.7
30	3.4	5.7	11.4	17.1	21.7	27.1	32.5	37.9
40	3.3	5.6	11.1	16.7	21.6	27.0	32.4	37.9
50	3.3	5.4	10.8	16.3	21.2	26.5	31.8	37.2
60	3.2	5.3	10.7	16.0	21.0	26.2	31.5	36.7
80	3.1	5.2	10.5	15.7	20.7	25.9	31.1	36.2
100	3.1	5.2	10.4	15.5	20.6	25.7	30.8	36.0
125	3.1	5.1	10.3	15.4	20.4	25.5	30.7	35.8
150	3.1	5.1	10.2	15.3	20.4	25.4	30.5	35.6
175	3.1	5.1	10.2	15.3	20.3	25.4	30.5	35.5
200	3.0	5.1	10.2	15.2	20.3	25.3	30.4	35.5

AASHTO SU5, GVW = 31 tons *SHEAR*

SPAN (ft)	FLORIDA SU POSTING SIGN (tons) 3	5	10	15	20	25	30	35
	EQUIVALENT AASHTO SU5 POSTING (tons)							
0	7.1	11.8	23.6	35.4	40.1	40.1	40.1	40.1
2	7.1	11.8	23.6	35.4	40.1	40.1	40.1	40.1
4	7.1	11.8	23.6	35.4	40.1	40.1	40.1	40.1
6	5.3	8.8	17.7	26.5	30.1	30.1	35.7	39.3
8	4.7	7.9	15.7	23.6	26.7	30.0	36.0	39.6
10	4.2	7.0	13.9	20.9	23.7	28.4	34.1	37.5
12	3.9	6.5	12.9	19.4	22.0	27.5	33.1	36.6
15	3.7	6.2	12.4	18.5	21.0	25.8	30.9	36.1
20	3.7	6.2	12.4	18.6	21.8	27.2	32.7	37.1
25	3.6	6.0	12.0	17.9	21.7	27.2	32.6	37.3
30	3.5	5.8	11.5	17.3	21.4	26.7	32.0	36.8
40	3.3	5.5	11.0	16.6	20.9	26.2	31.4	36.2
50	3.2	5.4	10.8	16.2	20.7	25.9	31.1	35.9
60	3.2	5.3	10.6	16.0	20.6	25.7	30.9	35.8
80	3.1	5.2	10.5	15.7	20.4	25.5	30.6	35.5
100	3.1	5.2	10.4	15.5	20.3	25.4	30.5	35.4
125	3.1	5.1	10.3	15.4	20.3	25.3	30.4	35.3
150	3.1	5.1	10.2	15.4	20.2	25.3	30.3	35.3
175	3.1	5.1	10.2	15.3	20.2	25.2	30.3	35.2
200	3.1	5.1	10.2	15.3	20.2	25.2	30.2	35.2

AASHTO SU6, GVW = 34.75 tons — FLEXURE

SPAN (ft)	FLORIDA SU POSTING SIGN (tons) 3	5	10	15	20	25	30	35
	EQUIVALENT AASHTO SU6 POSTING (tons)							
0	7.9	13.2	26.5	39.7	45.0	45.0	45.0	45.0
2	7.9	13.2	26.5	39.7	45.0	45.0	45.0	45.0
4	7.9	13.2	26.5	39.7	45.0	45.0	45.0	45.0
6	7.9	13.2	26.5	39.7	45.0	45.0	45.0	45.0
8	7.1	11.8	23.5	35.3	40.0	40.0	40.0	43.7
10	6.0	10.1	20.2	30.2	34.3	34.3	39.0	43.0
12	5.3	8.8	17.6	26.4	29.9	31.0	37.2	41.0
15	4.6	7.7	15.5	23.2	26.3	30.2	36.3	42.3
20	3.8	6.4	12.8	19.1	22.8	28.5	34.2	39.9
25	3.5	5.8	11.6	17.5	21.8	27.2	32.7	38.1
30	3.5	5.8	11.6	17.5	22.2	27.7	33.2	38.8
40	3.4	5.7	11.3	17.0	22.0	27.5	33.0	38.5
50	3.3	5.5	11.0	16.5	21.5	26.9	32.2	37.6
60	3.2	5.4	10.8	16.1	21.2	26.5	31.8	37.0
80	3.2	5.3	10.5	15.8	20.8	26.0	31.2	36.4
100	3.1	5.2	10.4	15.6	20.6	25.8	31.0	36.1
125	3.1	5.2	10.3	15.5	20.5	25.6	30.7	35.9
150	3.1	5.1	10.2	15.4	20.4	25.5	30.6	35.7
175	3.1	5.1	10.2	15.3	20.3	25.4	30.5	35.6
200	3.1	5.1	10.2	15.3	20.3	25.4	30.4	35.5

AASHTO SU6, GVW = 34.75 tons — SHEAR

SPAN (ft)	FLORIDA SU POSTING SIGN (tons) 3	5	10	15	20	25	30	35
	EQUIVALENT AASHTO SU6 POSTING (tons)							
0	7.9	13.2	26.5	39.7	45.0	45.0	45.0	45.0
2	7.9	13.2	26.5	39.7	45.0	45.0	45.0	45.0
4	7.9	13.2	26.5	39.7	45.0	45.0	45.0	45.0
6	6.0	9.9	19.8	29.8	33.7	33.7	40.0	44.0
8	5.3	8.8	17.6	26.5	30.0	33.6	40.3	44.3
10	4.7	7.8	15.6	23.4	26.5	31.8	38.2	42.0
12	4.4	7.3	14.5	21.8	24.7	30.9	37.1	41.0
15	4.2	6.9	13.9	20.8	23.6	28.9	34.7	40.5
20	4.2	6.9	13.9	20.8	24.4	30.5	36.6	41.5
25	4.0	6.7	13.4	20.1	24.4	30.5	36.6	41.9
30	3.9	6.5	12.9	19.4	24.0	30.0	36.0	41.3
40	3.6	6.0	12.0	18.0	22.7	28.4	34.1	39.3
50	3.4	5.7	11.5	17.2	22.0	27.5	33.0	38.2
60	3.4	5.6	11.2	16.8	21.6	27.0	32.4	37.6
80	3.3	5.4	10.8	16.3	21.2	26.4	31.7	36.8
100	3.2	5.3	10.7	16.0	20.9	26.1	31.3	36.4
125	3.2	5.3	10.5	15.8	20.7	25.9	31.1	36.1
150	3.1	5.2	10.4	15.6	20.6	25.7	30.9	35.9
175	3.1	5.2	10.4	15.5	20.5	25.6	30.7	35.8
200	3.1	5.2	10.3	15.5	20.4	25.5	30.6	35.7

AASHTO SU7, GVW = 38.75 tons *FLEXURE*

SPAN (ft)	FLORIDA SU POSTING SIGN (tons) 3	5	10	15	20	25	30	35
	EQUIVALENT AASHTO SU7 POSTING (tons)							
0	8.8	14.7	29.5	44.2	50.1	50.1	50.1	50.1
2	8.8	14.7	29.5	44.2	50.1	50.1	50.1	50.1
4	8.8	14.7	29.5	44.2	50.1	50.1	50.1	50.1
6	8.8	14.7	29.5	44.2	50.1	50.1	50.1	50.1
8	7.9	13.1	26.2	39.3	44.6	44.6	44.6	48.8
10	6.7	11.2	22.5	33.7	38.2	38.2	43.5	47.9
12	5.9	9.8	19.6	29.4	33.4	34.5	41.4	45.7
15	5.2	8.6	17.3	25.9	29.4	33.7	40.4	47.2
20	4.3	7.1	14.2	21.3	25.4	31.8	38.2	44.5
25	3.8	6.4	12.8	19.1	23.9	29.8	35.8	41.7
30	3.7	6.2	12.4	18.7	23.7	29.6	35.5	41.4
40	3.6	6.0	11.9	17.9	23.1	28.9	34.7	40.5
50	3.4	5.7	11.4	17.0	22.2	27.8	33.4	38.9
60	3.3	5.5	11.0	16.6	21.8	27.2	32.6	38.1
80	3.2	5.4	10.7	16.1	21.2	26.5	31.8	37.1
100	3.2	5.3	10.5	15.8	20.9	26.2	31.4	36.6
125	3.1	5.2	10.4	15.6	20.7	25.9	31.1	36.3
150	3.1	5.2	10.3	15.5	20.6	25.7	30.9	36.0
175	3.1	5.1	10.3	15.4	20.5	25.6	30.7	35.9
200	3.1	5.1	10.2	15.4	20.4	25.5	30.6	35.7

AASHTO SU7, GVW = 38.75 tons *SHEAR*

SPAN (ft)	FLORIDA SU POSTING SIGN (tons) 3	5	10	15	20	25	30	35
	EQUIVALENT AASHTO SU7 POSTING (tons)							
0	8.8	14.7	29.5	44.2	50.1	50.1	50.1	50.1
2	8.8	14.7	29.5	44.2	50.1	50.1	50.1	50.1
4	8.8	14.7	29.5	44.2	50.1	50.1	50.1	50.1
6	6.6	11.1	22.1	33.2	37.6	37.6	44.6	49.1
8	5.9	9.8	19.7	29.5	33.4	37.5	45.0	49.4
10	5.2	8.7	17.4	26.1	29.6	35.5	42.6	46.9
12	4.9	8.1	16.2	24.3	27.5	34.4	41.3	45.8
15	4.6	7.7	15.5	23.2	26.3	32.2	38.7	45.1
20	4.6	7.7	15.5	23.2	27.2	34.0	40.8	46.3
25	4.5	7.5	15.0	22.5	27.2	34.0	40.8	46.7
30	4.3	7.2	14.4	21.7	26.8	33.5	40.2	46.1
40	3.9	6.5	13.1	19.6	24.8	31.0	37.2	43.0
50	3.7	6.1	12.3	18.4	23.5	29.4	35.3	40.8
60	3.5	5.9	11.8	17.7	22.8	28.5	34.2	39.6
80	3.4	5.6	11.3	16.9	21.9	27.4	32.9	38.2
100	3.3	5.5	11.0	16.4	21.5	26.9	32.2	37.5
125	3.2	5.4	10.7	16.1	21.2	26.5	31.7	36.9
150	3.2	5.3	10.6	15.9	21.0	26.2	31.4	36.6
175	3.2	5.3	10.5	15.8	20.8	26.0	31.2	36.3
200	3.1	5.2	10.4	15.7	20.7	25.9	31.0	36.2

AASHTO SU POSTING, FLEXURE & SHEAR

SPAN (ft)	FLORIDA SU POSTING SIGN (tons) 3	5	10	15	20	25	30	35
	EQUIVALENT AASHTO SU POSTING SIGN, *TRUNCATED* (tons)							
0	6	10	20					
2	6	10	20					
4	6	10	20					
6	4	7	15	23	26	26		
8	4	6	13	20	23	26		
10	3	6	12	18	20	24		
12	3	5	11	16	19	23		
15	3	5	11	16	19	23	30	
20	3	5	10	16	19	24	34	
25	3	5	10	15	19	24	32	
30	3	5	10	15	20	25	33	
40	3	5	10	15	20	25	33	
50	3	5	10	15	20	25	32	
60	3	5	10	15	20	25	30	38
80	3	5	10	15	20	25	30	37
100	3	5	10	15	20	25	30	36
125	3	5	10	15	20	25	30	36
150	3	5	10	15	20	25	30	36
175	3	5	10	15	20	25	30	35
200	3	5	10	15	20	25	30	35

AASHTO SU POSTING / FLORIDA SU POSTING

SPAN (ft)	FLORIDA SU POSTING SIGN (tons) 3	5	10	15	20	25	30	35
	POSTING RATIO: (AASHTO SU SIGN)/(FLORIDA SU SIGN)							
0	2.00	2.00	2.00					
2	2.00	2.00	2.00					
4	2.00	2.00	2.00					
6	1.33	1.40	1.50	1.53	1.30	1.04		
8	1.33	1.20	1.30	1.33	1.15	1.04		
10	1.00	1.20	1.20	1.20	1.00	0.96		
12	1.00	1.00	1.10	1.07	0.95	0.92		
15	1.00	1.00	1.10	1.07	0.95	0.92	1.00	
20	1.00	1.00	1.00	1.07	0.95	0.96	1.13	
25	1.00	1.00	1.00	1.00	0.95	0.96	1.07	
30	1.00	1.00	1.00	1.00	1.00	1.00	1.10	
40	1.00	1.00	1.00	1.00	1.00	1.00	1.10	
50	1.00	1.00	1.00	1.00	1.00	1.00	1.07	
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09
80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.06
100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03
125	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03
150	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03
175	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
200	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Above, each cell considers 8 possibilities (4 AASHTO trucks, moment and shear for each truck), and reports the worst-case.