

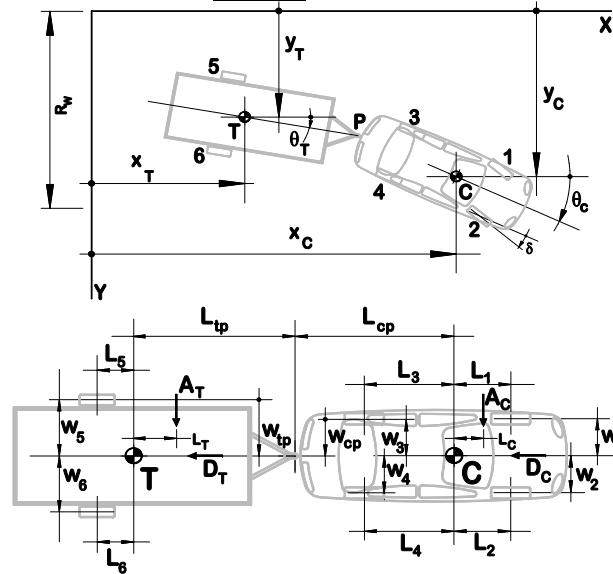
### Vehicle Dynamical Simulation

	Single Vehicle (or Tow Vehicle)				Semitrailer	
	Weight, Wc, lb	yaw inertia, Jc, ft-lb-s <sup>2</sup>			Weight, Wt, lb	Inertia, Jt, ft-lb-s <sup>2</sup>
weight, yaw inertia	4000.00	2000.00			2000.00	2000.00
	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>
lengths, ft	3.00	3.00	5.22	5.22	5.00	5.00
	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	W <sub>5</sub>	W <sub>6</sub>
widths, ft	2.42	2.42	2.42	2.42	3.00	3.00
			L <sub>CP</sub>	W <sub>CP</sub>	L <sub>TP</sub>	W <sub>TP</sub>
trailer/pin dimensions, ft			7.00	2.42	5.00	3.00
	h <sub>C</sub>				h <sub>T</sub>	
center of gravity heights, ft	1.76				4.00	
tire lateral (steering)	C <sub>α1</sub>	C <sub>α2</sub>	C <sub>α3</sub>	C <sub>α4</sub>	C <sub>α5</sub>	C <sub>α6</sub>
coefficients, lb/rad	13000.0	13000.0	13000.0	13000.0	13000.0	13000.0
Longitudinal BNP Constants	BNP-Cx	1.50	BNP-Ex	0.50	1.50	0.50
values 0 < C <sub>x</sub> < 2.0, -5 < E <sub>x</sub> < 1.2	C <sub>s1</sub>	C <sub>s2</sub>	C <sub>s3</sub>	C <sub>s4</sub>	C <sub>s5</sub>	C <sub>s6</sub>
coefficients, lb	13000.0	13000.0	13000.0	13000.0	13000.0	13000.0
Lateral BNP Constants	BNP-Cy	1.40	BNP-Ey	0.60	1.40	0.60
values 0 < C <sub>y</sub> < 2.0, -5 < E <sub>y</sub> < 1.2	s <sub>1</sub>	s <sub>2</sub>	s <sub>3</sub>	s <sub>4</sub>	s <sub>5</sub>	s <sub>6</sub>
wheel brake slip, values, 0 < s < 1	0.00	0.00	0.00	0.00	0.00	0.00
wheel acceleration	T <sub>1</sub>	T <sub>2</sub>	veh accel, g/s	0.00	T <sub>5</sub>	T <sub>6</sub>
traction coefficients, T (0 or 1)	0	0	0	0	0	0
aero drag coeffs, ft <sup>2</sup>	C <sub>DCX</sub> A <sub>XC</sub>	C <sub>DCY</sub> A <sub>YC</sub>	W <sub>X</sub>	W <sub>Y</sub>	C <sub>DTX</sub> A <sub>XT</sub>	C <sub>DTY</sub> A <sub>YT</sub>
and wind speeds, W, ft/s	0.00	0.00	0.00	0.00	0.00	0.00
front-to-rear aero force offset, ft				L <sub>C</sub>		L <sub>T</sub>
				0.00		0.00
initial conditions	X <sub>C</sub> , ft	X <sub>C</sub> - Vel, ft/s	Y <sub>C</sub> , ft	Y <sub>C</sub> - Vel, ft/s		
	0.00	73.33	0.00	2.00		
initial conditions	θ <sub>C</sub> , deg	θ <sub>C</sub> - Vel, °/s			θ <sub>T</sub>	θ <sub>T</sub> - Vel
	0.00	0.00			0.00	0.00
steer angle, δ, deg	0.00					

g, ft/s<sup>2</sup> 32.17

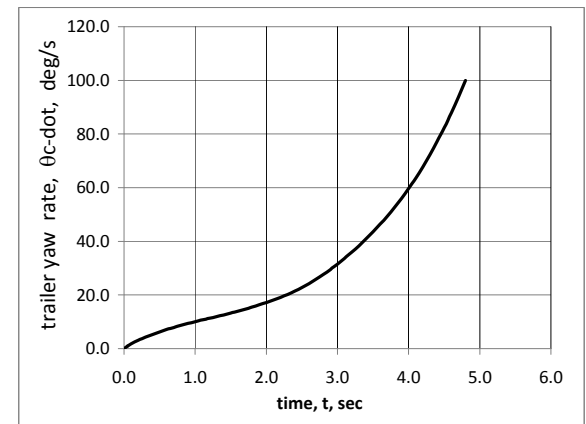
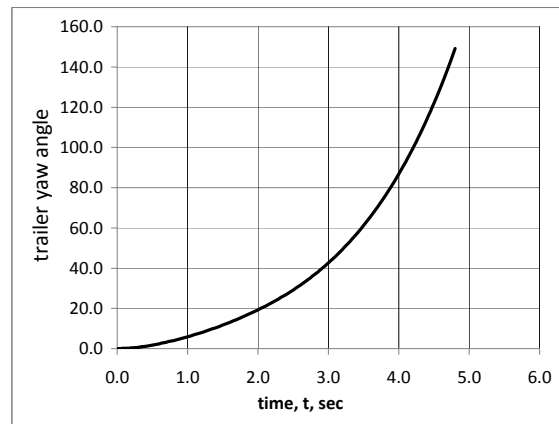
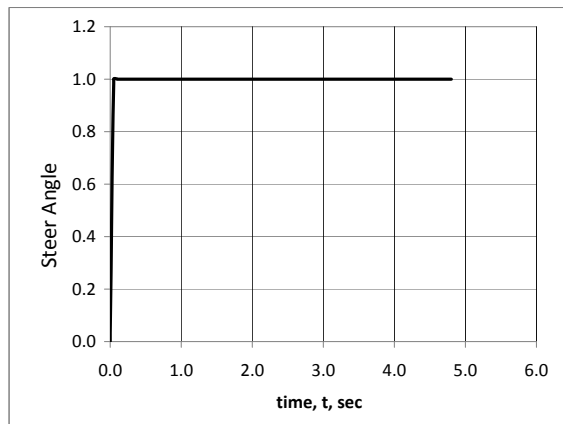
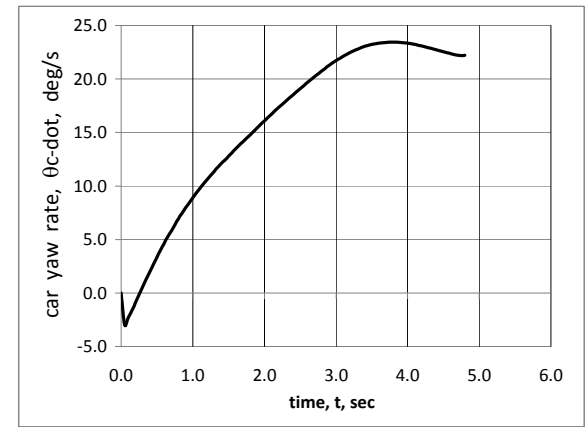
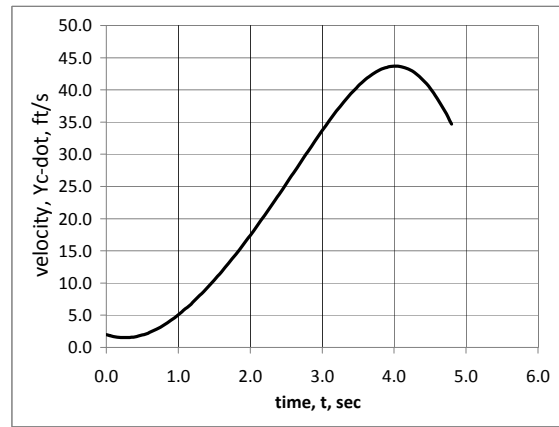
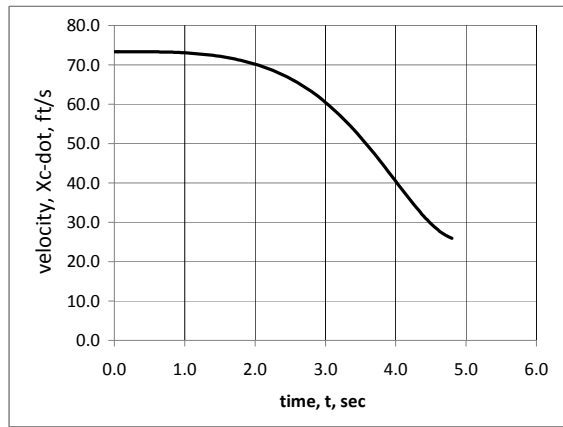
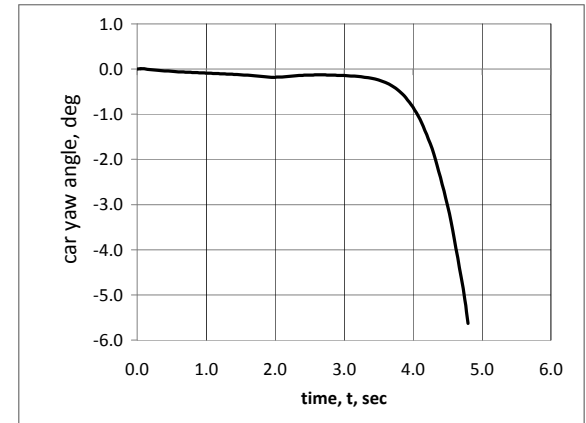
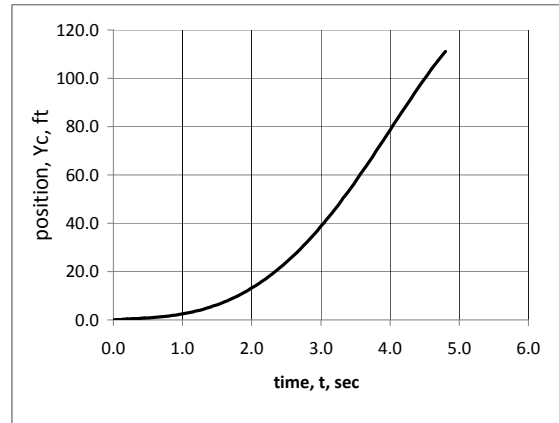
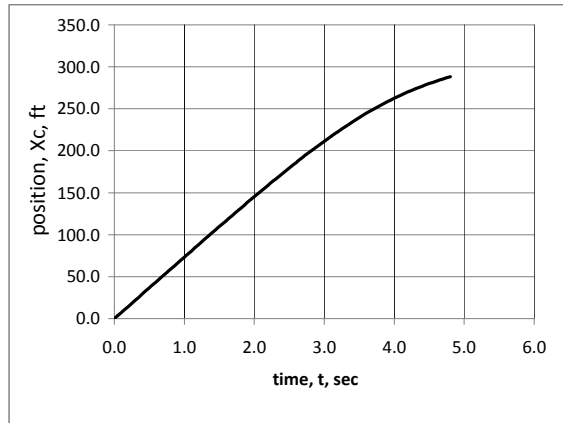
	friction coefficients			
	R <sub>w</sub> , road width, ft	road f <sub>R</sub>	shoulder f <sub>B</sub>	
roadway parameters	24.0	0.70	0.70	
	integration interval, s	print interval	steering mode, KM	number of wheels
program run parameters	0.005	10	-1	6
	final time, s			1
	5.00			trailer MEQ (0/1)
			KM mode	
			-1	tabular steer (S5:T25)
lane change duration, s	5.00		0	all wheels locked
begin time	1.00		1	lane change

tabular front wheel steer angles, KM = -1	
time, s	δ, deg
0.000	1.00
0.500	1.00
1.000	1.00
1.500	1.00
2.000	1.00
2.500	1.00
3.000	1.00
3.500	1.00
4.000	1.00
4.500	1.00
5.000	1.00
5.500	1.00
6.000	1.00
6.500	1.00
7.000	1.00
7.500	1.00
8.000	1.00
8.500	1.00
9.000	1.00
9.500	1.00
10.000	1.00



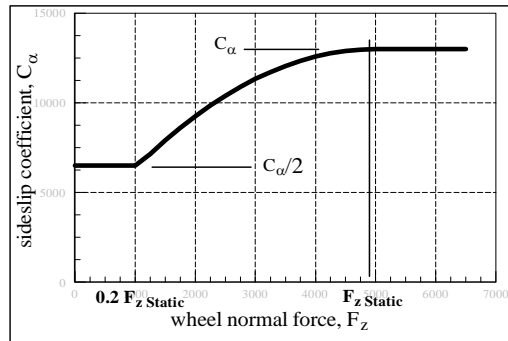
Steer Solution with Tabular Steer Angles, KM = -1													105.00		
time, t	X <sub>C</sub>	X <sub>C</sub> - Vel	Y <sub>C</sub>	Y <sub>C</sub> - Vel	X <sub>C</sub> - Acc	Y <sub>C</sub> - Acc	θ <sub>C</sub>	θ <sub>C</sub> - Vel	δ	θ <sub>T</sub>	θ <sub>T</sub> - Vel	X <sub>T</sub> - Vel	Y <sub>T</sub> - Vel		
sec	ft	ft/s	ft	ft/s	ft/s <sup>2</sup>	ft/s <sup>2</sup>	deg	deg/s	deg	deg	deg/s	ft/s	ft/s		
0.000	0.00	73.33	0.00	2.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	73.33	2.00		
0.050	3.67	73.33	0.10	1.84	0.01	-2.96	0.02	0.91	1.000	0.03	1.17	73.33	1.83		
0.100	7.33	73.33	0.18	1.71	0.00	-2.31	0.09	1.73	1.000	0.11	1.98	73.33	1.70		
0.150	11.00	73.33	0.27	1.61	0.00	-1.61	0.19	2.46	1.000	0.22	2.40	73.33	1.60		
0.200	14.67	73.33	0.35	1.54	-0.01	-0.89	0.33	3.13	1.000	0.35	2.46	73.33	1.53		
0.250	18.33	73.33	0.42	1.52	-0.02	-0.15	0.51	3.73	1.000	0.46	2.28	73.33	1.51		
0.300	22.00	73.33	0.50	1.53	-0.02	0.58	0.71	4.28	1.000	0.57	1.98	73.33	1.52		
0.350	25.67	73.33	0.58	1.58	-0.03	1.29	0.93	4.80	1.000	0.66	1.69	73.33	1.56		
0.400	29.33	73.32	0.66	1.66	-0.04	2.00	1.19	5.30	1.000	0.74	1.48	73.32	1.65		
0.450	33.00	73.32	0.74	1.78	-0.04	2.68	1.46	5.77	1.000	0.81	1.40	73.32	1.76		
0.500	36.66	73.31	0.83	1.93	-0.05	3.34	1.76	6.23	1.000	0.88	1.48	73.31	1.91		
0.550	40.33	73.30	0.94	2.11	-0.06	3.99	2.09	6.67	1.000	0.96	1.71	73.30	2.09		
0.600	43.99	73.29	1.05	2.32	-0.06	4.62	2.43	7.10	1.000	1.06	2.09	73.29	2.31		
0.650	47.66	73.28	1.17	2.57	-0.06	5.22	2.80	7.52	1.000	1.17	2.57	73.28	2.55		
0.700	51.32	73.26	1.30	2.85	-0.07	5.81	3.18	7.92	1.000	1.32	3.14	73.26	2.82		
0.750	54.98	73.24	1.45	3.15	-0.07	6.38	3.59	8.30	1.000	1.49	3.75	73.24	3.13		
0.800	58.65	73.21	1.62	3.48	-0.07	6.92	4.01	8.67	1.000	1.69	4.39	73.22	3.46		
0.850	62.31	73.18	1.80	3.84	-0.08	7.45	4.45	9.03	1.000	1.93	5.03	73.19	3.81		
0.900	65.96	73.15	2.00	4.22	-0.08	7.95	4.92	9.38	1.000	2.19	5.65	73.15	4.19		
0.950	69.62	73.11	2.22	4.63	-0.09	8.44	5.39	9.72	1.000	2.49	6.24	73.11	4.60		
1.000	73.27	73.06	2.47	5.06	-0.09	8.91	5.89	10.05	1.000	2.82	6.80	73.06	5.03		
1.050	76.93	73.01	2.73	5.51	-0.09	9.36	6.40	10.37	1.000	3.17	7.32	73.01	5.48		
1.100	80.58	72.95	3.02	5.99	-0.10	9.79	6.92	10.68	1.000	3.55	7.81	72.95	5.96		
1.150	84.22	72.88	3.33	6.48	-0.10	10.20	7.47	11.00	1.000	3.95	8.27	72.88	6.45		
1.200	87.86	72.80	3.67	7.00	-0.10	10.61	8.02	11.31	1.000	4.38	8.70	72.81	6.96		
1.250	91.50	72.72	4.03	7.53	-0.11	10.99	8.60	11.62	1.000	4.82	9.11	72.73	7.49		
1.300	95.14	72.63	4.42	8.08	-0.11	11.37	9.19	11.94	1.000	5.29	9.51	72.63	8.05		

Steer Solution with Tabular Steer Angles, KM = -1											105	
Static Normal Forces, lb												
1270.1	1270.1	1154.4	1154.4	575.6	575.6	Full Equil		f (ROAD)	0.70	M <sub>EQ</sub>	1	
1161.8	1161.8	1338.2	1338.2	500.0	500.0	M <sub>EQ</sub> = 0		f (OFF ROAD)	0.70			
LF		RF		LR		RR		TL		TR		
time, s	wheel 1	friction	wheel 2	friction	wheel 3	friction	wheel 4	friction	wheel 5	friction	wheel 6	friction
	total force	limit, lb	total force	limit, lb	total force	limit, lb	total force	limit, lb	total force	limit, lb	total force	limit, lb
0.000	0.0%	889.1	0.0%	889.1	0.0%	808.1	0.0%	808.1	0.0%	402.9	0.0%	402.9
0.050	7.7%	841.7	6.9%	936.3	24.9%	760.7	22.3%	855.3	58.2%	203.1	27.0%	602.9
0.100	5.3%	851.9	4.9%	926.2	20.6%	770.8	18.9%	845.1	38.3%	247.4	20.0%	558.6
0.150	2.7%	863.0	2.6%	915.2	16.2%	781.8	15.2%	833.9	21.4%	293.3	13.2%	512.7
0.200	0.0%	874.6	0.0%	903.8	11.7%	793.2	11.4%	822.4	9.6%	335.1	7.0%	471.0
0.250	2.8%	886.3	2.7%	892.2	7.4%	804.7	7.4%	810.7	2.2%	369.5	1.9%	436.6
0.300	5.4%	897.9	5.5%	880.8	3.2%	816.2	3.3%	799.0	2.0%	396.4	1.9%	409.7
0.350	8.0%	909.3	8.4%	869.5	0.8%	827.5	0.8%	787.6	4.1%	417.1	4.4%	389.0
0.400	10.5%	920.5	11.3%	858.4	4.6%	838.5	5.0%	776.5	5.1%	433.5	5.9%	372.7
0.450	13.0%	931.3	14.2%	847.6	8.2%	849.4	9.2%	765.7	5.4%	447.1	6.7%	358.9
0.500	15.3%	941.9	17.1%	837.1	11.7%	860.0	13.3%	755.2	5.5%	459.4	7.2%	346.5
0.550	17.5%	952.1	20.0%	826.9	15.0%	870.3	17.5%	745.1	5.7%	471.4	7.8%	334.1
0.600	19.6%	962.1	22.8%	817.0	18.1%	880.4	21.6%	735.3	6.0%	484.0	8.8%	321.2
0.650	21.6%	971.7	25.7%	807.4	21.0%	890.2	25.6%	725.9	6.7%	497.5	10.4%	307.4
0.700	23.5%	981.0	28.5%	798.0	23.8%	899.7	29.5%	716.8	7.7%	512.0	12.7%	292.5
0.750	25.3%	990.0	31.2%	789.0	26.4%	908.9	33.3%	708.0	9.0%	527.3	15.8%	276.7
0.800	27.1%	998.6	33.9%	780.4	28.9%	917.9	36.9%	699.6	10.5%	543.4	19.6%	260.2
0.850	28.8%	1006.9	36.5%	772.0	31.2%	926.4	40.5%	691.5	12.1%	559.7	24.1%	243.4
0.900	30.4%	1014.9	39.1%	764.0	33.5%	934.7	43.9%	683.8	13.8%	576.1	29.3%	226.5
0.950	32.0%	1022.6	41.6%	756.3	35.6%	942.7	47.2%	676.3	15.6%	592.3	35.0%	209.9
1.000	33.5%	1030.0	44.0%	748.8	37.6%	950.3	50.3%	669.2	17.3%	607.9	41.1%	193.8
1.050	35.0%	1037.0	46.4%	741.7	39.5%	957.7	53.3%	662.3	19.1%	622.9	47.4%	178.4
1.100	36.4%	1043.9	48.7%	734.8	41.4%	964.8	56.2%	655.7	20.9%	637.1	54.0%	163.7
1.150	37.8%	1050.4	50.9%	728.2	43.1%	971.6	59.0%	649.4	22.6%	650.5	60.6%	149.8
1.200	39.1%	1056.8	53.1%	721.8	44.9%	978.2	61.6%	643.2	24.4%	663.2	67.1%	136.7
1.250	40.4%	1063.0	55.2%	715.7	46.5%	984.6	64.2%	637.3	26.1%	675.2	73.5%	124.4
1.300	41.7%	1068.9	57.3%	709.6	48.2%	990.8	66.6%	631.5	27.9%	686.4	79.7%	112.7



	Car/Cab		Semitrailer
<b>Longitudinal BNP Coefficients</b>	<b>1.5</b>	$C_x$	<b>1.5</b>
$0 < C_x < 2.0, -5 < E_x < 1.2$	<b>0.5</b>	$E_x$	<b>0.5</b>
<b>Lateral BNP Coefficients</b>	<b>1.4</b>	$C_y$	<b>1.4</b>
$0 < C_y < 2.0, -5 < E_y < 1.2$	<b>0.6</b>	$E_y$	<b>0.6</b>

DEFAULT VALUES	Car/Cab		Semitrailer
Longitudinal BNP Coefficients	1.5	$C_x$	1.5
$0 < C_x < 2.0, -5 < E_x < 1.2$	0.5	$E_x$	0.5
Lateral BNP Coefficients	1.4	$C_y$	1.4
$0 < C_y < 2.0, -5 < E_y < 1.2$	0.6	$E_y$	0.6



US g 32.17404 ft/s<sup>2</sup>

