Vehicle Collisions with Roadside Objects

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The National Safety Council predicted a minimum of 500 traffic fatalities on the Nation's highways during the 1961 Christmas holiday weekend. That prediction was only too true, for the toll was considerably greater than the forecast.

And so it goes; as it has for many years—and it is presumed will be evident for many years to come—the Nation's motorists operate their vehicles in such a careless manner that accident statistics receive more pronounced attention than the economic progress or the population growth of democratic society. Through the press and other news media all are made aware, that drivers must be alert to the many existing hazards, and that it is a privilege and an honor to operate their vehicles on the wonderfully built and maintained transportation arteries furnished for their use. If care, intelligence, and courtesy were observed, there would be a notable decrease in the many accidents that take countless lives, injure and disable many people, and damage many billions of dollars of property.

This paper presents statistics compiled regarding vehicle collisions with roadside objects. They raise the question how the planning, design, construction, and landscape treatment can be improved so that the number of fatalities will be reduced, the number of injuries lessened, and the property loss diminished.

On August 29, 1961, Robert M. Williston, Chief of the Ohio Highway Traffic Division, requested information as to the number of vehicle accidents with fixed roadside objects, for the period 1955 through 1959. The printed record form listed the following principal objects: highway guide rail, utility pole, tree, sign, bridge, culvert, bank or ledge, snow bank, fence or wall, curbing, fire hydrant, boulder, catch basin, building, median barrier and other. These were to be reported on as to type of road: two-lane highways; multi-lane, undivided highways; divided highways—no control of access; or divided highways—full control of access.

Again, this was broken down further as to whether the accident was on an urban or rural section of road, whether it occurred on the right, on the left, or on the median if it were a divided highway.

Further, it requested the number of all accidents, fatal accidents, injury accidents, and those involving property damage with the totals listed in each category for each year.

Twenty-nine States either reported information was not available, or did not reply. Some States (Tables 1 and 2) forwarded summary reports; others (Tables 3, 4, 5, 6) submitted more detailed reports.

An article appeared in the Hartford Courant on January 1, 1962, dealing with Connecticut accidents that took 800 lives in 1961, of which 276 were traffic fatalities. The article points out that of the total fatalities listed, the majority were the result of single-vehicle accidents. Of the total of 33 deaths, 17, or more than 50 percent, are listed as vehicular collisions with roadside objects and 12 of the deaths resulted from cars crashing into trees. Apparently, all these accidents were the result of driver failure: excessive speed, poor judgment, intoxication, fatigue, health defects, or some similar category; there might have been vehicular mechanical failures but usually this is not the case—the greatest cause is generally improper and unlawful vehicular operation.

From an analysis of some of the statistics from Connecticut it appears that of the 226 fatalities that occurred in collisions with fixed objects on rural highways in the five-year period 22 were with guide rails, 33 with utility poles, 3 with signs, 107 with trees, 33 with bridges, 12 with a bank or ledge, 7 with a fence or wall, 1 with a curbing, 2 with boulders, 4 with buildings, 2 with unknown objects. Nearly 50 percent of these were the result of crashes with trees. However, because they are more numerous than any other object along rural highways, it is understandable that trees are involved in the greatest number of roadside collisions.

Fatality records on divided highways, where full control of access is in effect, show that there were 30 fatalities during this period, with 11 occurring on the right, 5 on the left, and 14 in the median. Of this total, the greatest number occurred on the Merritt Parkway where many large shade trees had been planted over twenty-five years ago, and they are now reaching maturity. In other words, when there is an impact with one of these trees, it is usually severe. But how many lives have been saved because of those trees is unknown, for if the trees did not exist, there would be many more multiple fatalities listed, because, without trees, vehicles would be able to cross the median into the other lane.

There were 252 accidents with trees in the medians of divided highways, 125 resulting in injuries, 113 in property damage, and the 14 mentioned previously as fatalities. It is rather apparent that many lives have been saved, including those of operators of uncontrolled vehicles, which would have been mere vital statistics if those trees had not been planted.

The Merritt Parkway, which is still thought of as one of the safest and most beautiful sections of highway

TABLE 1
SUMMARY OF ACCIDENTS FOR SEVERAL STATES, 1955-59

State	Rural or Urban	Year	Total Accidents	Fixed Object Accidents (No.)			
				Fatal	Injury	Property Damage	Total
Del.	R and U	1955	5,712	4	78	253	335
		1956	6,323	3	87	311	401
		1957	6,040	7	88	310	405
		1958	6,110	4	72	310	386
		1959	6,195	9	99	321	429
		1955-59	30,380	27	424	1,505	1,956
Fla.	R and U	1955	76,954	40	593	1,482	2,115
		1956	87,329	52	566	1,560	2,178
		1957	97,401	41	584	1,698	2,323
		1958	100,497	53	549	1,662	2,264
		1959	115,642	41	606	1,975	2,622
		1955-59	477,823	227	2,898	8,377	11,502
Ga.	R	1955	-	95	485	837	1,417
		1956	-	152	757	1,457	2,366
		1957	-	100	1,022	1,966	3,088
		1958	-	105	1,021	1,983	3,111
		1959	-	94	1,052	2,170	3,316
		1955-59	-	546	4,337	8,413	13,298
	U	1955	-	20	24	52	96
		1956	-	26	47	106	179
		1957	-	27	472	1,008	1,507
		1958	-	18	450	789	1,257
		1959	-	20	184	326	530
		1955-59	-	111	1,177	2,281	3,569
	R and U	1955-59	-	657	5,514	10,694	16,867
Idaho	R	1955	-	8	95	479	682
		1956	-	11	90	288	389
		1957	-	9	57	234	300
		1958	-	7	65	165	237
		1955-58	-	35	307	1,166	1,608
	U	1955	-	4	41	249	294
		1956	-	2	44	136	182
		1957	-	9	110	507	626
		1958	-	1	55	151	207
		1955-58	-	16	250	1,043	1,309
	R and U	1959	-	6	113	387	506
Ill.	R	1955-59	-	57	670	2,596	3,423
		1955		140	1,070	1,303	2,513
		1956	-	131	1,065	1,275	2,471
		1957	-	108	1,155	1,408	2,671
		1958	41,433	155	1,320	1,645	3,120
		1959	44,090	125	1,338	1,950	3,413
		1955-59	85,523	659	5,943	7,581	14,188
	U	1955	-	77	1,206	1,865	3,148
		1956	-	78	1,284	1,825	3,187
		1957	-	75	1,336	1,839	3,250
		1958	165,801	97	1,651	3,384	5,132
		1959	173,400	70	1,433	2,975	4,478
		1955-59	339,201	397	6,910	11,888	19,195
	R and U	1955-59	424,724	1,056	12,858	19,469	33,383
Mass.	R and U	1955	-	85	1,094	1,145	2,324
		1956	-	66	1,317	1,424	2,807
		1957	-	63	1,126	1,132	2,321
		1958	-	71	1,235	1,190	2,496
		1959	-	71	1,444	1,381	2,896
		1955-59	-	356	6,216	6,272	12,844
N.H.	R and U	1955	-	42	628	1,375	2,045
		1956	-	32	683	1,400	2,115
		1957	-	31	645	1,473	2,149
		1958	-	35	617	1,380	2,032
		1959	-	47	706	1,714	2,467
		1955-59	-	187	3,279	7,342	10,808
N.Y.	R and U	1955	-	496	10,916	14,284	25,696
		1956	-	501	11,193	15,056	26,750
		1957	-	561	12,744	16,456	29,761
		1958	-	531	12,020	13,450	26,001
		1959	-	604	13,420	11,580	25,604
		1955-59	-	2,693	60,293	70,826	133,812
N.D.	R and U	1960	-	2	98	867	967
Ore.	R	1955	-	69	571	1,403	2,043
		1956	-	44	455	1,014	1,513
		1957	-	29	223	630	882
		1958	-	29	219	563	811
		1959	-	32	269	702	1,003
		1955-59	-	203	1,737	4,312	6,252
	U	1955	-	15	281	1,110	1,406
		1956	-	4	213	851	1,073
		1957	-	5	112	514	631
		1958	-	5	96	526	627
		1959	-	8	335	1,192	1,535
		1955-59	-	37	1,037	4,193	5,272
	R and U	1955-59	-	240	2,774	8,505	11,524
R.I.	R	1959	250	-	-	-	69
	U	1959	13,308	-	-	-	2,308
	R and U	1959	13,558	-	-	-	2,377
Utah	R and U	1955	-	10	148	380	538
		1956	-	9	139	370	518
		1957	-	4	116	510	630
		1958	-	5	158	929	1,092
		1959	-	6	141	929	1,076
		1955-59	-	34	702	3,118	3,854
Vt.	R and U	1955	10,104	-	-	-	2,782
		1956	10,198	-	-	-	993
		1957	10,105	-	-	-	3,029
		1958	11,617	-	-	-	2,960
		1959	11,777	-	-	-	3,040
		1955-59	53,801	-	-	-	12,804
W.Va.	R	1955	-	45	242	272	559
		1956	-	55	377	364	796
		1957	-	51	348	439	838
		1958	-	63	358	342	763
		1959	-	59	295	322	676
		1955-59	-	273	1,620	1,739	3,632
	U	1955	-	4	4	5	13
		1956	-	5	1	6	12
		1957	-	7	2	1	10
		1958	-	14	1	2	17
		1959	-	8	10	27	45
		1955-59	-	38	18	41	97
	R and U	1955-59	-	311	1,638	1,780	3,729

TABLE 2

FIXED OBJECT ACCIDENTS ON VIRGINIA RURAL HIGHWAYS, 1959

Object	Accidents (no.)			
	Fatal	Injury	Property Damage	Total
Bank or ledge	23	387	573	983
Structure	36	188	289	513
Tree	30	277	236	543
Utility pole	8	221	302	531
Fence	5	110	352	467
Guide rail	6	102	210	318
Sign	2	67	180	249
Miscellaneous	12	195	486	693
Total	122	1,547	2,628	4,297
Total accidents	448	6,706	17,284	24,438

in the country, was built under the guidance of the Merritt Parkway Commission, and was intensively landscaped in accordance with the policy of those members. They dictated to a certain extent the planting design that best fit the picture at that time. The design speed was 50 mph and today the limit is set at 55 mph, with the bulk of the traffic, of course traveling 60 mph or more. The traffic volume is now three times more than the road was designed to handle, so there is some excuse for the few accidents that occur and for the plantings installed many years ago.

However, it is evident that if one were to design a functional planting for a relatively narrow median today, materials that would serve as crash barriers and decelerate the vehicle out of control would be used rather than plants that would cause damage or death at some future date.

Another incident comes to mind. In the fall of 1960 the highway commissioner ordered the installation of a section of chain link fence (with cables as developed in California) on one of the most accident-prone curves on the Merritt Parkway. The fence extended a distance of approximately 1,000 feet from a heavily planted section of tangent median to a bridge. Soon after installation a car was enmeshed in the fence and prevented from crossing the esplanade. However, just to the east of the fence a vehicle traveling west at high speed bounced off a car traveling in the same direction, went several hundred feet through the planted median, barely missed several major and minor shade trees, tore up mature shrubs, and crashed head-on into a vehicle in the opposing lane; the result was four killed, including the operator of the rampaging vehicle, his lady companion, and two innocent victims traveling in the other car. The most devoted efforts to prevent this sort of thing are frequently not enough. And these statistics are not included in this compilation, for they were not collisions with fixed objects.

On a percentage basis, the total number of accidents involving fixed objects is given in Table 7.

It is obvious that the fixed object-collision frequency varies considerably between urban and the rural areas. Guide rails are heavy contributors in both areas, indicating their frequency along Connecticut's roads. However, the speed of vehicle operation in urban locations is generally reduced, which undoubtedly accounts for the approximately 15 percent lower rate.

The utility pole frequency rate in urban areas climbs about 15 percent above rural highways, which indicates they are more numerous in the cities than in the country—so, if there must be obstructions the operator of the uncontrolled vehicle certainly has a knack for finding an object to hit.

Trees are less frequent in the city than in the rural areas, but they certainly take their share of the impacts in both locations.

There is one more figure that might be mentioned. This is the one case under "Full Control of Access on Divided Highways," in the "Bank or Ledge" category. This fatality was one of the Department's own men, and a very capable landscape foreman for many years. Early one foggy morning, while traveling in his pick-up truck along a section of divided highway where the lanes are separated by several hundred feet, a man driving a station wagon at high speed bumped the rear of the truck and forced him into a ledge outcropping on his right. The impact caused him to be thrown from the truck, landing head first on the ledge. (Had there been seat-belts furnished at that time, it probably would have been another matter.) A safety rest area has been established as a memorial to this man and his death has been the one and only fatality which occurred on this type of highway during the period of the report and in the situation described.

In concluding the author would like to cite the report given by Kenneth A Stonex, Assistant Director of the General Motors Proving Grounds, presented at the 39th Highway Research Board Annual Meeting in

TABLE 3

NUMBER OF VEHICLE COLLISIONS WITH ROADSIDE OBJECTS

STATE OF NEW MEXICO

1955-59

RURAL ☐ URBAN ☒

YEAR SUMMARY

OBJECT INVOLVED / OBJECT LOCATION		TWO LANE HIGHWAYS				MULTI-LANE UNDIVIDED HIGHWAYS				DIVIDED HIGHWAYS NO CONTROL OF ACCESS				DIVIDED HIGHWAYS FULL CONTROL OF ACCESS				TOTAL			
		ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS
HIGHWAY GUIDE RAIL	ON RIGHT	11		2	9	1		1		2		2						14		5	9
	ON LEFT	9		3	6													9		3	6
	ON MEDIAN									1			1					1			1
	TOTAL	20		5	15	1		1		3		2	1					24		8	16
UTILITY POLE	ON RIGHT	238	1	56	181	50	2	15	33	49		22	27					337	3	93	241
	ON LEFT	139	1	45	93	9		5	4	16		6	10					164	1	56	107
	ON MEDIAN									140	2	41	97					140	2	41	97
	TOTAL	377	2	101	274	59	2	20	37	205	2	69	134					641	6	190	445
HIGHWAY SIGN	ON RIGHT	38	1	2	35	9			9	11		1	10					58	1	3	54
	ON LEFT	22	1	4	17					7			7					29	1	4	24
	ON MEDIAN	2			2					51		6	45					53		6	47
	TOTAL	62	2	6	54	9			9	69		7	62					140	2	13	125
TREE	ON RIGHT	118	3	46	69	6	1	3	2	7		6	1					131	4	55	72
	ON LEFT	90	4	30	56					3		2	1					93	4	32	57
	ON MEDIAN									2			2					2			2
	TOTAL	208	7	76	125	6	1	3	2	12		8	4					276	8	87	131
BRIDGE	ON RIGHT	36		5	31	2				1		1	2					39		6	33
	ON LEFT	12		3	9	2			1	5		3	3					19		6	13
	ON MEDIAN									1			1					1		1	
	TOTAL	48		8	40	4			1	7		5	5					59		13	46
CULVERT	ON RIGHT	11	4	3	4					2		2						13	4	5	4
	ON LEFT	2		1	1													2		1	1
	ON MEDIAN																				
	TOTAL	13	4	4	5					2		2						15	4	6	5
BANK OR LEDGE	ON RIGHT	36		13	23					3			3					39		13	26
	ON LEFT	47	1	17	29					3		1	2					50	1	18	31
	ON MEDIAN									3		1	2					3		1	2
	TOTAL	83	1	30	52					9		2	7					92	1	32	59
SNOW BANK	ON RIGHT																				
	ON LEFT	1			1													1			1
	ON MEDIAN																				
	TOTAL	1			1													1			1
FENCE OR WALL	ON RIGHT	174		26	148	8		2	6	18		5	13					200		33	167
	ON LEFT	162	1	33	128	9		5	4	4		1	3					175	1	39	135
	ON MEDIAN																				
	TOTAL	336	1	59	276	17		7	10	22		6	16					375	1	72	302
CURBING	ON RIGHT	83	2	23	57	7		1	6	23		7	16					113	3	31	79
	ON LEFT	38	1	9	29	5		1	4	2			2					48		10	35
	ON MEDIAN																				
	TOTAL	121	3	32	86	12		2	10	25		7	18					158	3	41	114
FIRE HYDRANT	ON RIGHT	35			35	5		1	4	3			3					43		1	42
	ON LEFT	19		2	17					1			1					20		2	18
	ON MEDIAN																				
	TOTAL	54		2	52	5		1	4	4			4					63		3	60
BOULDER	ON RIGHT	3		3														3		3	
	ON LEFT																				
	ON MEDIAN																				
	TOTAL	3		3														3		3	
CATCH BASIN	ON RIGHT																				
	ON LEFT																				
	ON MEDIAN									1		1						1		1	
	TOTAL									1		1						1		1	
BUILDING	ON RIGHT	90	1	16	73	3		1	2	5	1	1	3					98	2	18	78
	ON LEFT	65		17	48	2		1	1	4		2	2					71		20	51
	ON MEDIAN																				
	TOTAL	155	1	33	121	5		2	3	9	1	3	5					169	2	38	129
MEDIAN BARRIER	ON RIGHT									11		4	7					11		4	7
	ON LEFT	1	1							74	4	18	52					75	5	18	52
	ON MEDIAN																				
	TOTAL	1	1							85	4	22	59					86	5	22	59
OTHER GUARD POST	ON RIGHT	10		2	8					4	1	2	1					14	1	4	9
	ON LEFT	12	1		11													12	1		11
	ON MEDIAN									9			9					9			9
	TOTAL	22	1	2	10					13	1	2	10					35	2	4	20
OTHER _____	ON RIGHT	51		6	45	4			4	14		2	12					69		8	61
	ON LEFT	24		5	19	5		1	4	3		1	2					32		7	25
	ON MEDIAN									6		2	4					6		2	4
	TOTAL	75		11	64	9		1	8	23		5	18					107		17	90
TOTAL	ON RIGHT	934	13	202	719	93	3	24	66	155	2	55	98					1182	18	281	883
	ON LEFT	643	10	169	464	31		13	18	123	4	34	85					797	14	216	567
	ON MEDIAN	2			2					214	2	52	160					216	2	52	162
	TOTAL	1579	23	371	1185	124	3	37	84	492	8	141	343					2195	34	549	1612

TABLE 4

NUMBER OF VEHICLE COLLISIONS WITH ROADSIDE OBJECTS

STATE OF Ohio

STATE
RURAL ☒ URBAN ☐

YEAR 1959

OBJECT INVOLVED / OBJECT LOCATION		TWO LANE HIGHWAYS				MULTI-LANE UNDIVIDED HIGHWAYS				DIVIDED HIGHWAYS NO CONTROL OF ACCESS				DIVIDED HIGHWAYS FULL CONTROL OF ACCESS				TOTAL			
		ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS
HIGHWAY GUIDE RAIL	ON RIGHT	15	3	5	7	1		1										16	3	6	7
	ON LEFT	15	1	7	7													15	1	7	7
	ON MEDIAN																				
	TOTAL	30	4	12	14	1		1										31	4	13	14
UTILITY POLE	ON RIGHT	7		2	5					1			1					8		2	6
	ON LEFT	1			1													1			1
	ON MEDIAN					1			1	1		1						2		1	1
	TOTAL	8		2	6	1			1	2		1	1					11		3	8
HIGHWAY SIGN	ON RIGHT	3	1		2									2			2	5	1		4
	ON LEFT	2			2					1			1	1			1	4			4
	ON MEDIAN	3			3									2			2	5			5
	TOTAL	8	1		7	1				1			1	5			5	14	1		13
TREE	ON RIGHT	2		2														2		2	
	ON LEFT																				
	ON MEDIAN																				
	TOTAL	2		2														2		2	
BRIDGE	ON RIGHT	54	8	22	24									8	1		7	64	9	22	31
	ON LEFT	40	13	15	12	1			1	4	2		2	5		3	2	50	15	18	17
	ON MEDIAN	9		1	8					1		1		4	1	2	1	14	1	4	9
	TOTAL	103	21	38	44	1			1	5	2	1	2	17	2	5	10	126	25	44	57
CULVERT	ON RIGHT	3	2	1														3	2	1	
	ON LEFT	7	3	1	3													7	3	1	3
	ON MEDIAN																				
	TOTAL	10	5	2	3													10	5	2	3
BANK OR LEDGE	ON RIGHT																				
	ON LEFT																				
	ON MEDIAN																				
	TOTAL	1		1														1		1	
SNOW BANK	ON RIGHT																				
	ON LEFT																				
	ON MEDIAN																				
	TOTAL																				
FENCE OR WALL	ON RIGHT	1		1														1		1	
	ON LEFT	4		1	3													4		1	3
	ON MEDIAN																				
	TOTAL	5		2	3													5		2	3
CURBING	ON RIGHT									1			1					1			
	ON LEFT																				
	ON MEDIAN																				
	TOTAL									1			1					1		1	
FIRE HYDRANT	ON RIGHT																				
	ON LEFT																				
	ON MEDIAN																				
	TOTAL																				
BOULDER	ON RIGHT	4		1	3													4		1	3
	ON LEFT																				
	ON MEDIAN	1			1													1			1
	TOTAL	5		1	4													5		1	4
CATCH BASIN	ON RIGHT																				
	ON LEFT																				
	ON MEDIAN																				
	TOTAL																				
BUILDING	ON RIGHT																				
	ON LEFT																				
	ON MEDIAN																				
	TOTAL																				
MEDIAN BARRIER	ON RIGHT																				
	ON LEFT	2			2									1		1		3		1	2
	ON MEDIAN													1			1	1			1
	TOTAL	2			2									2		1	1	4		1	3
OTHER LANE BARRIKADE	ON RIGHT	10		3	7	1			1					4			4	15		3	12
	ON LEFT	3			3									3			3	7			7
	ON MEDIAN	13		2	11	2			2	3			3	4			4	22		2	20
	TOTAL	26		5	21	3			3	4			4	11			11	44		5	39
OTHER Objects in Roadway / Center of Roadway	ON RIGHT																				
	ON LEFT																				
	ON MEDIAN																				
	TOTAL	30		8	22					2		1	1	4		1	3	36			
		30		8	22					2		1	1	4		1	3	36			
TOTAL	ON RIGHT	100	14	38	48	2		1	1	2		1	1	14	1		13	118	15	40	63
	ON LEFT	74	17	24	33	1			1	6	2		4	10		4	6	91	19	28	44
	ON MEDIAN	56		11	45	3			3	7		3	4	15	1	3	11	81	1	17	63
	TOTAL	230	31	73	126	6		1	5	15	2	4	9	39	2	7	30	290	35	85	170

41 DEATHS 144 INJURIES $272,911.4 P.D.

TABLE 5

NUMBER OF VEHICLE COLLISIONS WITH ROADSIDE OBJECTS

STATE OF CONNECTICUT

1955 - 1959

RURAL ☐ URBAN ☒

YEAR COMBINED

OBJECT INVOLVED / OBJECT LOCATION		TWO LANE HIGHWAYS				MULTI-LANE UNDIVIDED HIGHWAYS				DIVIDED HIGHWAYS NO CONTROL OF ACCESS				DIVIDED HIGHWAYS FULL CONTROL OF ACCESS				TOTAL			
		ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS
HIGHWAY GUIDE RAIL	ON RIGHT	412	2	108	302	65		26	39	52		18	34	298	4	93	201	827	6	245	576
	ON LEFT	16 (2)	1	42	118 (2)	7		3	4	8	1		7	16		6	10	192 (2)	2	51	139 (2)
	ON MEDIAN									1		1		56	1	26	29	57	1	27	29
	TOTAL	575	3	150	422	72		29	43	61	1	19	41	370	5	125	240	1078	9	323	746
UTILITY POLE	ON RIGHT	357	11	276	270	193	2	112	79	80	1	45	34	35		19	16	865	14	452	399
	ON LEFT	230 (1)	3	125 (1)	102	31	3	12	16	7	1	2	4 (1)	5		2	3	273 (2)	7	141 (1)	125 (1)
	ON MEDIAN	1		1		1		1		7 (1)		4	3	21		12	9	30		18	12
	TOTAL	789	14	403	372	229	5	125	95	95	2	51	42	61		33	28	1170	21	612	537
HIGHWAY SIGN	ON RIGHT	28		4	24	4		1	3	5		3	2	5		1	4	42			33
	ON LEFT	10 (2)		3	7 (2)	2 (3)		1 (1)	2 (4)	1			1	2 (1)	1		1 (1)	15 (8)	1	3 (1)	11 (7)
	ON MEDIAN	3		1	2	1		1		3		1	2	6		4	2	13		7	6
	TOTAL	43		8	35	12		3	9	9		4	5	14	1	5	8	78	1	20	57
TREE	ON RIGHT	184	10	93	81	19		11	8	11		8	3	3			3	217	10	117	90
	ON LEFT	123	9	63	51	14		4	10	4		2	2					141	9	69	63
	ON MEDIAN					2		1	1	2		1	1	1			1	4			3
	TOTAL	307	19	156	132	34		20	14	17		11	6	4	1	1	4	362	19	187	156
BRIDGE	ON RIGHT	51	1	23	27	17		3	12	7			2	41	1	18	22	113	3	46	63
	ON LEFT	20	2	11	7	4		1	3	1 (1)		1		8		3	5	33 (2)	2	16 (1)	15 (1)
	ON MEDIAN												(1)	13 (1)		9	4 (1)	13		9	4
	TOTAL	71	3	34	34	21		6	15	4		2	2	63	1	30	32	159	4	72	83
CULVERT	ON RIGHT	8		3	5									1			1	9		3	6
	ON LEFT	2		2						1			1	1		1		4		3	1
	ON MEDIAN																				
	TOTAL	10		5	5					1			1	2		1	1	13		6	7
BANK OR LEDGE	ON RIGHT	57	2	22	33	2	1		1	9		6	3	5		1	4	73	3	29	41
	ON LEFT	29		16	13	2			2	1			1	2		2		34		18	16
	ON MEDIAN									1		1		1			1	2		1	1
	TOTAL	86	2	38	46	4	1		3	11		7	4	8		3	5	109	3	48	58
SNOW BANK	ON RIGHT													2		1	1	2		1	1
	ON LEFT																				
	ON MEDIAN																				
	TOTAL													2		1	1	2		1	1
FENCE OR WALL	ON RIGHT	58	1	22	35	17		10	7	1			1	6		1	5	82	1	33	48
	ON LEFT	31 (1)	1	12	18 (1)	6		2	4									37	1	14	22 (1)
	ON MEDIAN													1			1	1 (1)			1
	TOTAL	90	2	34	54	23		12	11	1			1	7		1	6	121	2	47	72
CURBING	ON RIGHT	19		4	15	7		3	4	5		2	3	12	1	3	8	43	1	12	30
	ON LEFT	7		2	5	2 (1)		(1)	2	1		1		3		1	2	13 (1)		4 (1)	9
	ON MEDIAN					2		2		9		4	5	25		15	10	36		21	15
	TOTAL	26		6	20	12		6	6	15		7	8	40	1	19	20	93	1	38	54
FIRE HYDRANT	ON RIGHT	36		9	26	9		3	6	2		2						46		14	32
	ON LEFT	8		2	6													8		2	6
	ON MEDIAN	1			1													1			1
	TOTAL	44		11	33	9		3	6	2		2						55		16	39
BOULDER	ON RIGHT	9		4	5	2			2	1		1						12		5	7
	ON LEFT	8 (1)		4	4 (1)	2		2										10 (1)		6	4 (1)
	ON MEDIAN																				
	TOTAL	18		8	10	4		2	2	1		1						23		11	12
CATCH BASIN	ON RIGHT																				
	ON LEFT	(3)		(1)	(2)													(3)		(1)	(2)
	ON MEDIAN																				
	TOTAL	3		1	2													3		1	2
BUILDING	ON RIGHT	30	1	12	17	7		2	5	4		2	2					41	1	16	24
	ON LEFT	26	1	10	15	7	1	2	4	1		1		1		1		35	2	14	19
	ON MEDIAN																				
	TOTAL	56	2	22	32	14	1	4	9	5		3	2	1		1		76	3	30	43
~~MEDIAN~~ BARRIER	ON RIGHT	1		1		1			1					1			1	3		1	2
	ON LEFT	(1)			(1)	(3)			(3)	(2)			(2)				(1)	(6)			(6)
	ON MEDIAN	1			1																
	TOTAL	3		1	2	4			4	2			2	27		15	12	36		16	20
OTHER UNKNOWN	ON RIGHT	66		24	42	20	1	6	13	8		2	6	20	1	6	13	114	2	38	74
	ON LEFT	30 (62)		6 (34)	24 (24)	6 (45)		3 (6)	3 (9)	1 (22)		(13)	1 (9)	1 (8)		(4)	(4)	38 (137)		9 (69)	29 (68)
	ON MEDIAN					3								9		5	4	12		6	6
	TOTAL	159		66	93	71	1	25	45	33		16	17	38	1	15	22	301	2	122	177
OTHER MEDIAN	ON RIGHT													4		3		4		3	1
	ON LEFT													(1)			(1)	(2)			(2)
	ON MEDIAN	1			1					3 (1)		2	1 (1)	5		2	3	9		4	5
	TOTAL	1			1					4		2	2	10		5	5	15		7	8
TOTAL	ON RIGHT	1515	28	605	882	363	4	184	175	180	1	89	90	433	7	146	280	2491	40	1024	1427
	ON LEFT	685 (73)	17	298 (38)	370 (35)	83 (54)	4	29 (18)	50 (36)	26 (27)	2	7 (14)	17 (13)	39 (11)	1	16 (4)	22 (7)	833 (165)	24	350 (74)	459 (91)
	ON MEDIAN	8		2	6	5		4	1	28		15	13	164	1	88	75	205	1	109	95
	TOTAL	2281	45	943	1293	505	8	235	262	261	3	125	133	647	9	254	384	3694	65	1557	2072

TABLE 6

NUMBER OF VEHICLE COLLISIONS WITH ROADSIDE OBJECTS

STATE OF CONNECTICUT

1955-1959

RURAL ☒ URBAN ☐

YEAR COMBINED

OBJECT INVOLVED / OBJECT LOCATION		TWO LANE HIGHWAYS				MULTI-LANE UNDIVIDED HIGHWAYS				DIVIDED HIGHWAYS NO CONTROL OF ACCESS				DIVIDED HIGHWAYS FULL CONTROL OF ACCESS				TOTAL			
		ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS	ALL ACCIDENTS	FATAL ACCIDENTS	INJURY ACCIDENTS	PROPERTY DAMAGE ACCIDENTS
HIGHWAY GUIDE RAIL	ON RIGHT	2536	10	586	1940	37		6	31	88	1	30	57	836	5	251	580	3497	16	873	2608
	ON LEFT	1145	4	321	820	9		2	7	19		8	11	97	2	34	61	1270	6	365	899
	ON MEDIAN	1(8)		1(4)	(4)					6		2	4	40		9	31	47(8)		12(4)	35(4)
	TOTAL	3690	14	912	2764	46		8	38	113	1	40	72	973	7	294	672	4822	22	1254	3546
UTILITY POLE	ON RIGHT	963	14	479	470	35	1	17	17	56	1	33	22	20		12	8	1074	16	541	517
	ON LEFT	569	17	300	246	9		7	2	6		6		2		2		580	17	315	248
	ON MEDIAN	2(2)		2	(2)	(1)			(1)	6		4	2	6		4	2	14(3)		10(1)	4(2)
	TOTAL	1530	31	781	718	45	1	25	19	68	1	43	24	28		18	10	1671	33	867	771
HIGHWAY SIGN	ON RIGHT	77	2	17	58	2			2	5		1	4	26		9	17	110	2	27	81
	ON LEFT	43	1	9	33					1			1	4		1	3	48	1	10	37
	ON MEDIAN	11(3)		2	9(3)					3			3	21		4	17	35(3)		6	29(3)
	TOTAL	134	3	28	103	2			2	9		1	8	51		14	37	196	3	43	150
TREE	ON RIGHT	686	32	367	287	7	1	2	4	12		9	3	162	11	86	65	867	44	464	359
	ON LEFT	495	48	274	178	2		2		4		4		43	5	23	15	544	48	303	193
	ON MEDIAN	2(4)			2(4)					6(1)	1	3	2(1)	252(1)	14	125	113(1)	260(8)	15	128(3)	117(6)
	TOTAL	1189	75	643	471	9	1	4	4	23	1	16	6	458	30	234	194	1679	107	897	675
BRIDGE	ON RIGHT	147	9	37	81									91	12	41	38	238	21	98	119
	ON LEFT	56	3	18	35	2			2					22	6	10	6	80	9	28	43
	ON MEDIAN					1								28(3)	3	15(1)	10(2)	29(3)	3	16(1)	10(2)
	TOTAL	203	12	75	116	2			2	1		1		144	21	67	56	350	33	143	174
CULVERT	ON RIGHT	59		26	33	1		1		1		1		6		3	3	67		31	36
	ON LEFT	30		10	20									2		2		32		12	20
	ON MEDIAN													4		3	1	4		3	1
	TOTAL	89		36	53	1		1		1		1		12		8	4	103		46	57
BANK OR LEDGE	ON RIGHT	397	4	163	230	2			2	20		7	13	61		25	36	480	4	195	281
	ON LEFT	346	5	161	180	1		1		8	2	2	4	10	1	6	3	365	8	169	188
	ON MEDIAN	1(3)		1	(3)					7		3	4	4		3	1	12(3)		7	5(3)
	TOTAL	747	9	325	413	3		1	2	35	2	12	21	75	1	34	40	860	12	371	411
SNOW BANK	ON RIGHT																				
	ON LEFT	2		2														2		2	
	ON MEDIAN																				
	TOTAL	2		2														2		2	
FENCE OR WALL	ON RIGHT	159	4	64	91	1		1		2		2		4		2	2	166	4	69	93
	ON LEFT	155	3	67	85					2			2	2			2	159	3	67	89
	ON MEDIAN	1		1										1		1		2		2	
	TOTAL	315	7	132	176	1		1		4		2	2	7		3	4	327	7	138	182
CURBING	ON RIGHT	21		11	10	1			1	1			1	25	1	14	10	48	1	25	22
	ON LEFT	9		6	3									6		1	5	15		7	8
	ON MEDIAN	3		1	2					7		5	2	59		34	25	69		40	29
	TOTAL	33		18	15	1			1	8		5	3	90	1	49	40	132	1	72	59
FIRE HYDRANT	ON RIGHT	15		4	11													15		4	11
	ON LEFT	7		1	6	1		1										8		2	6
	ON MEDIAN																				
	TOTAL	22		5	17	1		1										23		6	17
BOULDER	ON RIGHT	94	1	33	60					1			1	6		3	3	101	1	36	64
	ON LEFT	75	1	37	37													75	1	37	37
	ON MEDIAN	(6)		(3)	(3)													(6)		(3)	(3)
	TOTAL	175	2	73	100					1			1	6		3	3	182	2	76	104
CATCH BASIN	ON RIGHT	1			1									2		1	1	3		1	2
	ON LEFT									2		1	1					2		1	1
	ON MEDIAN	(2)		(1)	(1)									2		2		2(2)		2(1)	(1)
	TOTAL	3		1	2					2		1	1	4		3	1	9		5	4
BUILDING	ON RIGHT	31	2	13	16					1			1	1			1	33	2	13	18
	ON LEFT	37	2	13	22	1		1		3		1	2					41	2	15	24
	ON MEDIAN																				
	TOTAL	68	4	26	38	1		1		4		1	3	1			1	74	4	28	42
MEDIAN BARRIER	ON RIGHT					1			1									1		2(1)	1
	ON LEFT													1		1		1		(2)	
	ON MEDIAN					(1)			(1)					4(1)		2	2(1)	4(2)		2	2(1)
	TOTAL					2			2					6		3	3	13		7	7
OTHER MEDIAN	ON RIGHT																				
	ON LEFT													1			1	1			1
	ON MEDIAN									1			1	7		4	3	8		4	4
	TOTAL									1			1	8		4	4	9		4	5
OTHER UNKNOWN	ON RIGHT	141		41	100	3		2	1	5		3	2	37	1	12	24	186	1	58	127
	ON LEFT	100		34	64	4		1	3					2		1	1	106		38	68
	ON MEDIAN	6(175)		4(58)	2(67)	(9)		(4)	(5)	2(7)	(1)	(8)	2(8)	20(29)		8(11)	12(18)	28(180)	(1)	12(81)	16(98)
	TOTAL	372		139	233	16		7	9	24	1	11	12	88	1	32	55	500	2	189	309
TOTAL	ON RIGHT	5327	78	1861	3388	90	2	29	59	192	2	86	104	1277	30	459	788	6886	112	2435	4339
	ON LEFT	3063	79	1255	1729	29		15	14	45	2	22	21	192	14	81	97	3329	95	1372	1862
	ON MEDIAN	22(183)		12(68)	15(87)	(11)		(5)	(6)	39(18)	1(1)	18(8)	20(9)	448(34)	17	214(72)	217(27)	514(218)	18(1)	244(93)	252(94)
	TOTAL	8572	157	3196	5219	130	2	49	79	294	6	134	154	1951	61	766	1124	10947	226	4144	6577

TABLE 7

PERCENT OF TOTAL ACCIDENTS WITH FIXED ROADSIDE OBJECTS

Object	Total Accidents (%)	
	Rural	Urban
Guide rail	44.0	29.1
Utility pole	15.0	31.7
Highway sign	1.7	2.1
Tree	15.0	9.8
Bridge	3.0	4.3
Culvert	0.9	0.3
Bank or ledge	8.0	3.0
Snow bank	-	-
Fence or wall	3.0	3.3
Curbing	1.0	2.5
Fire hydrant	-	1.5
Boulder	1.6	0.6
Catch basin	-	-
Building	0.7	2.0
Median barrier	-	1.0
Other-median	1.6	8.1
Unknown	4.4	0.6
Total	99.9	99.9

1960. The figures in his report of vehicle collisions with roadside objects confirm his analysis and findings, and more and more attention must be given to the recommendations he has presented.

The figures presented here should emphasize to those who are engaged in the landscape development of highways the need to select plant materials carefully in order to utilize completely their functional values. By correctly choosing plant types, and by giving appropriate attention to landscape design principles, one can effect vehicular turning movements, guide traffic, provide crash barriers that will decelerate a vehicle out of control with minimum damage, and improve the aesthetics of roadsides.

Every effort possible can and must be employed to reduce the number of roadside objects, and to design and locate essential roadside appurtenances so that highways will provide transportation with safer, trouble-free roadside areas. If these principles are adhered to accident statistics in future reports will be considerably improved.