

SCOPE OF CRIME AND VANDALISM ON URBAN TRANSIT SYSTEMS

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This paper reports on an attempt to quantify the extent and seriousness of crime and vandalism on urban transit systems. Although many imprecisions in the recording of criminal incidents and the computing of vandalism costs impose limitations on the data, the authors believe that the findings constitute a significant first step toward knowledge of the incidence of transit crime and the monetary costs of transit vandalism. On the basis of data obtained from 37 U.S. transit systems, the total number of criminal incidents on all systems in 1971 is estimated at approximately 33,000 to 39,000. No functional relationships were found between various factors such as total crime indexes and total crime per 100,000 vehicle-miles or 100,000 revenue-passengers. A computed transit exposure index led to the tentative conclusion that the risk of being involved in a criminal incident could be at least twice as great when riding on urban transit vehicles as in nontransit circumstances. If this conclusion is sound, the problem of crime on transit systems may be proportionately more serious than has been generally credited. The total national transit vandalism costs for 1971 are estimated at \$7.7 million to \$10 million. Direct transit vandalism costs on the average amounted to less than 0.5 percent of operating costs in 1971, but the problem assumes greater dimensions when indirect costs are also considered. Window breakage was the largest component, followed by damage to seats, damage to stationary facilities, and graffiti. National transit system costs of liability claims resulting from incidents of crime and vandalism in 1971 are estimated at \$1.85 million to \$2.33 million.

• THE TOTAL number of criminal incidents occurring on U.S. urban transit systems in 1971 is estimated approximately at 33,000 to 39,000, according to a study prepared for the Urban Mass Transportation Administration. This compares with a national total of almost 6,000,000 criminal incidents as reported in the seven crime classifications of the Federal Bureau of Investigation Index of Crime.

Before these figures on transit crime can be accepted, however, a number of limitations and imprecisions concerning data on crime in general and on transit system crime in particular must be considered. The authors acknowledge that some of what will be discussed here is open to question. Notwithstanding, to the best of their knowledge, the findings represent the first attempt to quantify the extent and seriousness of the transit crime and vandalism problem.

BACKGROUND

In the autumn of 1970, the Urban Mass Transportation Administrator suggested that a study be undertaken concerning the costs and forms of vandalism on transit systems and the problems pertaining to rowdyism and passenger harassment. The American Transit Association submitted a proposal to UMTA for a study that would attempt to ascertain and categorize the scope and characteristics of the vandalism and passenger security problem, summarize and evaluate types of antivandalism and passenger security procedures and devices, draw conclusions from demonstration projects, and

furnish recommended courses of action to combat the major forms of vandalism and improve passenger security.

The vandalism and passenger security (VAPS) project, as accepted by UMTA, had two major goals: to appraise the national scope of transit crime and vandalism and to explore means of controlling the problems of crime, vandalism, and rowdiness and make specific suggestions on the basis of the research findings. This paper is a distillation of the findings that concern transit crime and vandalism.

A literature search confirmed that, although there is much published material on crime and vandalism in general, there is a dearth of material relating directly to crime and vandalism on urban transit systems. To obtain data, researchers conducted interviews with personnel of transit systems in more than 60 cities of the United States and Canada. Although some of the gaps in the information were filled in by telephone calls, correspondence, and follow-up questionnaires, blank spaces still remain because many systems do not keep records of all the types of data desired. The findings reported in this paper are based on figures obtained from 37 U.S. and 4 Canadian systems that were able to supply responses to most of the categories.

LIMITATIONS OF DATA

Several limitations should be kept in mind when using the data. Although vandalism is a form of crime, in this paper vandalism is differentiated from crime and treated as an aspect of juvenile delinquency because most vandals are juveniles and if arrested are brought before juvenile courts. What constitutes a crime varies from one jurisdiction to another and from one period in time to another. An action can be a felony in one state and merely a misdemeanor, or possibly even quite legal, in another state. Thus, differences in legal concepts can determine whether an act is recorded as an incident of crime, an incident of vandalism, or not recorded at all.

The FBI's standard set of crime classifications defines vandalism as "willful or malicious destruction, injury, disfigurement, or defacement of property without consent of the owner or person having custody or control." An element of judgment enters into identification of an offense as an act of vandalism even with this definition. If a 3-year-old child smashes a bus window, his action is considered irresponsible and is not counted as an act of vandalism, but then one may ask how old the child must be for his act to be counted as willful or malicious destruction. Gray areas of this sort contribute to the uncertainties of crime and vandalism data.

That differences in methods of reporting or changes from one period to another can strongly affect crime statistics is illustrated in the following quotation from the report of the Task Force on Assessment of the President's Commission on Law Enforcement and Administration of Justice:

Although Chicago, with about 3 million people, has remained a little less than half the size of New York City with 7½ million throughout the period (1935-1966), it was reporting in 1935 about 8 times as many robberies. . . . In 1950 New York discontinued its prior practice of allowing precincts to handle complaints directly and installed a central reporting system. . . . In the first year, robberies rose 400 percent and burglaries 1,300 percent, passing Chicago in volume for both offenses. In 1960 Chicago installed a central complaint bureau of its own, reporting thereafter seven times more robberies than New York. In 1966 New York, which appeared to have had a sharp decline in robberies in the late fifties, again tightened its central controls and found a much higher number of offenses. Based on preliminary reports for 1966, it is now reporting about 40 percent more robberies than Chicago.

The foregoing is to warn the reader that the findings reported are not the last word. Indeed, the authors earnestly hope that data will continue to be gathered in years to come, that some measure of standardization of record-keeping among transit systems will be realized, and that the figures will be refined and rendered more accurate with passage of time. All the same, the data reported provide an important base on which useful statistical information can be accumulated. It is believed that these statistics constitute a significant contribution to knowledge about the incidence of crime and the monetary costs of vandalism to urban transit systems.

FINDINGS

Transit Crime

Statistical tables were compiled for 37 U.S. and 4 Canadian transit systems about the following:

1. Incidents of violent crime, other crime, and total crime in transit systems for 1969, 1970, and 1971 (Table 1);
2. Ratios of transit violent crime and total crime to system vehicle-miles for 1970 and 1971;
3. Ratios of transit violent crime and total crime to vehicle-hours for 1970 and 1971; and
4. Ratios of transit violent crime and total crime to revenue-passengers for 1970 and 1971 (Table 2).

On the basis of ATA estimates, the 1971 figures on vehicle-miles and revenue-passengers for the 37 U.S. systems approximate 60 percent of the vehicle-miles and revenue-passengers for all systems in the United States. System vehicle-miles, vehicle-hours, revenue-passengers, and number of vehicles are given in Table 3. Since these systems constitute a representative sample of most of the largest and some of the smallest transit systems, national crime and vandalism incidents and costs were extrapolated in the study on the hypothesis that the sample also represents 60 percent of the crime and vandalism incidents and costs in the United States. However, such extrapolation from vehicle-miles and revenue-passengers to criminal incidents and vandalism costs is open to challenge.

A total of 20,889 criminal incidents for 1971 was reported by the 37 U.S. transit systems (Table 1). The total of criminal incidents occurring on all U.S. systems for the year was extrapolated by the simple relation that, if total transit system vehicle-miles for 37 systems (B) is determined to be a certain percentage of transit system vehicle-miles for the entire United States (A), then the total of criminal incidents for the 37 systems (Y) is a corresponding percentage of the national total of transit criminal incidents (X), or $B/A = Y/X$. This same simple ratio was used also for revenue-passengers, number of vehicles per system, and vehicle-hours. Information on vehicle-hours was not available in the annual data reported in ATA's Fact Book, and therefore, the figure used was an approximation. It was postulated that, if the four computations yielded roughly similar results, the range could be considered as approximating the total criminal incidents for all U.S. systems. Results of the four computations were as follows:

<u>Basis</u>	<u>Incidents</u>
Revenue-passengers	33,194
Vehicle-miles	36,568
Number of vehicles	39,716
Vehicle-hours	39,011

Accordingly, the total number of criminal incidents occurring on U.S. transit systems in 1971 is estimated at approximately 33,000 to 39,000.

Attempts to determine whether any relationships exist between various possible influences and transit crime and vandalism were universally negative. Scatter diagrams were plotted, but in every instance the wide dispersion of the points indicated an absence of any functional relationship. Figure 1 shows a representative diagram. The diagrams were based on the following combinations of factors:

1. City size and number of incidents of total crime on transit systems in 1971;
2. Total crime indexes and total transit crime per 100,000 vehicle-miles;
3. Total crime indexes and total transit crime per 100,000 revenue-passengers;
4. Vandalism costs and vehicle-miles;
5. Vandalism costs and revenue-passengers;
6. Vandalism costs and vehicle-hours;
7. Vandalism costs and number of vehicles operated;

Table 1. Incidents of transit violent crime and total crime to revenue-passengers, 1969, 1970 and 1971.

System	Violent Crime			Other Crime			Total Crime		
	1969	1970	1971	1969	1970	1971	1969	1970	1971
>1,000,000*									
Boston (MBTA)	56	234	168	1,120	1,879	1,966	1,176	2,113	2,134
Chicago (CTA)	1,090	405	714	1,480	1,841	2,410	2,570	2,246	3,123
Cleveland (CTS)	—	36	11	—	79	26	—	115	37
Detroit (DSR)	—	—	—	—	—	—	—	—	—
Los Angeles (SCRTD)	217	45	87	192	765	1,108	409	810	1,185
Montreal (MUCTC)	8	8	14	115	128	178	123	136	192
New York (NYCTA)	381	204	305	8,399	9,921	10,619	8,780	10,125	10,924
New York (PATH)	14	21	22	70	94	68	84	115	90
Philadelphia (PATCO)	0	0	1	—	—	35	—	—	36
Philadelphia (SEPTA)	95	132	102	689	625	325	784	757	427
Toronto (TTC)	8	1	1	375	341	484	383	342	485
250,000-1,000,000									
Albany	—	—	3	—	—	19	—	—	22
Atlanta	—	—	6	—	—	41	—	—	47
Baltimore	—	25	23	—	1,490	860	—	1,515	883
Columbus	0	1	3	18	28	16	18	29	19
D. C. (Metro)	—	—	—	—	—	—	—	—	—
Denver	—	—	0	—	—	54	—	—	54
Ft. Worth	11	16	5	39	41	38	50	57	43
Indianapolis	4	42	21	248	372	249	252	414	270
Milwaukee	46	60	73	190	158	269	238	218	342
New Orleans	154	514	28	120	179	249	274	683	277
Oakland (AC Transit)	—	—	6	—	—	266	—	—	272
Ottawa	1	3	4	9	10	12	10	13	16
Portland	7	4	2	—	—	171	—	—	173
St. Louis	19	16	10	123	140	153	142	156	163
San Antonio	0	0	0	60	71	43	60 ^b	71	43
San Diego	0	0	2	50	59	54	50 ^b	59	56
Seattle (STS)	—	24	22	—	130	110	—	154	132
Seattle (MTC)	0	0	0	6	6	11	6	6	11
Winnipeg	3	1	1	4	4	4	7	5	5
<250,000									
Ann Arbor, Mich.	—	0	0	—	15	15	—	15	15
Billings, Mont.	0	0	0	5	5	5	5	5	5
Chattanooga, Tenn.	0	1	1	5	5	5	5	6	6
Concord, N. H.	0	0	0	0	0	0	0	0	0
Dayton, Ohio	0	0	7	17	28	60	17	28	67
Everett, Wash.	0	0	0	0	0	0	0	0	0
Lafayette, Ind.	0	0	0	—	—	4	—	—	4
Orlando, Fla.	0	0	0	0	0	0	0	0	0
Pueblo, Colo.	0	0	0	0	0	0	0	0	0
Schenectady, N. Y.	0	0	1	—	9	9	—	9	10
Syracuse, N.Y.	—	—	0	—	—	2	—	—	2
Tacoma, Wash.	2	0	0	10	12	16	12	12	16
1971 total									
All systems			1,643			19,854			21,597
U.S. systems			1,623			19,276			20,899

*Including rail cities.

^bEstimate.

Table 2. Ratios of transit violent crime and total crime to revenue-passengers, 1970 and 1971.

System	Violent Crime ^a		Total Crime ^a	
	1970	1971	1970	1971
>1,000,000 ^b				
Boston (MBTA)	0.092	0.075	0.832	0.957
Chicago (CTA)	0.103	0.185	0.568	0.809
Cleveland (CTS)	—	0.013	—	0.043
Detroit (DSR)	—	—	—	—
Los Angeles (SCRTRD)	0.032	0.061	0.570	0.851
Montreal (MUCTC)	0.003	0.003	0.052	0.070
New York (NYCTA)	0.012	0.019	0.608	0.683
New York (PATH)	0.054	0.056	0.295	0.231
Philadelphia (PATCO)	0	0.011	—	0.382
Philadelphia (SEPTA)	0.069	0.051	0.395	0.215
Toronto (TTC)	0.000	0.000	0.106	0.147
250,000-1,000,000				
Albany	—	0.027	—	0.215
Atlanta	—	0.014	—	0.106
Baltimore	0.026	0.023	1.55	0.876
Columbus	0.004	0.017	0.143	0.109
D.C. (Metro)	—	—	—	—
Denver	—	0	—	0.403
Ft. Worth	0.292	0.106	1.04	0.915
Indianapolis	0.239	0.143	2.35	1.842
Milwaukee	0.095	0.106	0.35	0.500
New Orleans	0.673	0.038	0.908	0.374
Ottawa	0.009	0.011	0.038	0.045
Oakland (AC Transit)	—	0.012	—	0.538
Portland	0.026	0.012	—	1.016
St. Louis	—	0.016	—	0.255
San Antonio	0	0	0.339	0.204
San Diego	0	0.015	0.450	0.420
Seattle (STS)	0.076	0.075	0.485	0.452
Seattle (MTC)	0	0	0.224	0.501
Winnipeg	0.002	0.002	0.009	0.009
<250,000				
Ann Arbor, Mich.	0	0	—	3.070
Billings, Mont.	0	0	—	1.667
Chattanooga, Tenn.	0.034	0.038	0.204	0.228
Concord, N.H.	0	0	0	0
Dayton, Ohio	0	0.075	2.05	0.714
Everett, Wash.	0	0	0	0
Lafayette, Ind.	0	0	0	4.101
Orlando, Fla.	0	0	0	0
Pueblo, Colo.	0	0	0	0
Schenectady, N. Y.	0	0.413	3.818	4.128
Syracuse, N. Y.	—	0	—	0.021
Tacoma, Wash.	0	0	0.194	0.256

^aPer 100,000 revenue passengers. ^bIncluding rail cities.

Table 3. Vehicle-miles, vehicle-hours, revenue-passengers, and number of vehicles in transit system, 1971.

System	Vehicle-Miles	Vehicle-Hours	Revenue-Passengers	Vehicles ^a
>1,000,000 ^b				
Boston (MBTA)	43,487,462	2,643,073	229,918,049	1,983
Chicago (CTA)	146,267,671	11,169,353	386,158,185	3,824
Cleveland (CTS)	25,449,379	—	85,000,000	1,011
Detroit (DSR)	35,144,977	2,736,722	97,362,318	1,171
Los Angeles (SCRTRD)	58,784,000	4,634,000	149,444,000	1,511
Montreal (MUCTC)	64,498,802	5,891,479	274,212,787	2,221
New York (NYCTA)	428,467,769	28,247,612	1,599,641,865	11,270
New York (PATH)	9,674,236	439,712	38,877,360	252
Philadelphia (PATCO)	3,704,823	123,494	9,414,029	75
Philadelphia (SEPTA)	57,589,758	—	198,601,500	2,739
Toronto (TTC)	72,374,255	5,608,722	330,495,450	1,886
250,000-1,000,000				
Albany	4,307,998	434,685	10,212,949	—
Atlanta	19,025,715	1,469,628	44,376,614	504
Baltimore	23,365,293	2,237,593	100,853,864	832
Columbus	7,794,434	643,156	17,374,867	250
D.C. (Metro)	31,830,887	—	101,965,573	1,176
Denver	7,412,075	6,224,443	13,400,000	214
Ft. Worth	3,718,726	331,110	4,701,201	120
Indianapolis	5,798,143	482,184	14,654,958	233
Milwaukee	19,981,612	1,740,148	69,009,345	538
New Orleans	14,294,830	1,438,848	74,004,380	494
Oakland (AC Transit)	25,632,834	1,793,601	50,584,495	721
Ottawa	8,890,022	848,604	35,513,898	323
Portland	11,477,735	724,284	17,032,133	311
St. Louis	21,181,416	1,848,567	64,000,000	963
San Antonio	8,123,809	628,993	21,048,118	261
San Diego	8,126,243	—	13,328,668	228
Seattle (STS)	13,851,952	1,179,451	29,207,562	424
Seattle (MTC)	3,232,135	215,476	2,196,086	115
Winnipeg	14,461,707	1,330,360	58,076,195	484
<250,000				
Ann Arbor, Mich.	387,975	33,600	488,562	26
Billings, Mont.	147,285	12,420	300,000	5
Chattanooga, Tenn.	1,540,761	128,145	2,632,525	81
Concord, N.H.	—	—	—	—
Dayton, Ohio	3,929,328	333,681	9,390,241	185
Everett, Wash.	660,000	38,688	654,000	17
Lafayette, Ind.	329,441	30,419	97,548	21
Orlando, Fla.	1,580,834	131,736	3,416,000	58
Pueblo, Colo.	1,650,000	—	1,231,702	—
Schenectady, N. Y.	852,973	76,522	242,243	—
Syracuse, N. Y.	4,143,216	364,538	9,694,489	192
Tacoma, Washington	3,108,169	245,490	6,253,063	108
Total				
All systems	1,215,380,680	864,805,370	4,159,066,822	36,827
U.S. systems	1,055,155,894	728,013,720 ^c	3,460,768,592	31,913 ^d

^aIncluding nonpassenger vehicles.

^bIncluding rail cities.

^c32 systems.

^d34 systems.

Figure 1. Total transit crime per 100,000 revenue-passengers compared with total crime index for 1971.

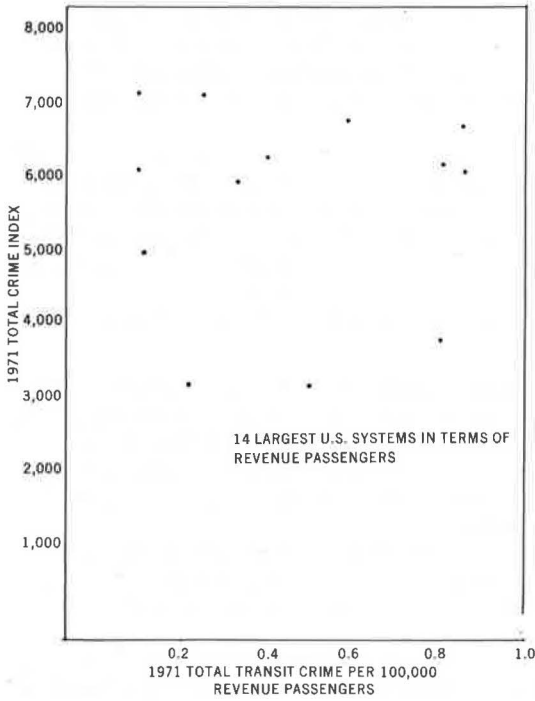


Table 4. Total vandalism costs (\$) for 1969, 1970, and 1971.

System	1969	1970	1971
>1,000,000 ^a			
Boston (MBTA)	187,100	211,634	257,581
Chicago (CTA)	520,000	593,249	686,496
Cleveland (CTS)	—	60,643	68,250
Detroit (DSR)	40,325	55,819	32,874
Los Angeles (SCRTD)	42,407	49,191	78,000
Montreal (MUCTC)	60,580	74,000	90,700
New York (NYCTA)	1,732,274	2,152,782	2,013,823
New York (PATH)	38,007	34,698	33,535
Philadelphia (PATCO)	—	27,200	19,390
Philadelphia (SEPTA)	669,355	803,977	976,000
Toronto (TTC)	42,179	47,844	42,469
250,000-1,000,000			
Albany	6,600	5,500	4,839
Atlanta	105,000	95,000	90,000
Baltimore	147,994	156,692	190,152
Columbus	5,372	7,847	8,618
D.C. (Metro)	246,000	334,000	289,000
Denver	—	—	22,500
Ft. Worth	11,000	11,000	11,000
Indianapolis	15,837	19,234	22,146
Milwaukee	56,000	62,000	71,000
New Orleans	30,000	30,000	29,808
Oakland (AC Transit)	59,419	63,688	83,219
Ottawa	12,300	14,800	16,300
Portland	3,475	3,350	2,000
St. Louis	112,000	143,000	140,000
San Antonio	26,898	27,039	24,309
San Diego	12,906	15,699	17,214
Seattle (STS)	35,364	29,980	44,060
Seattle (MTC)	400	400	1,800
Winnipeg	5,900	7,780	6,230
<250,000			
Ann Arbor, Mich.	—	600	600
Billings, Mont.	120 ^b	125 ^b	125 ^b
Chattanooga, Tenn.	1,000	1,100	1,100
Concord, N.H.	—	—	—
Dayton, Ohio	2,200	2,400	2,900
Everett, Wash.	100	100	100
Lafayette, Ind.	800	1,000	600
Orlando, Fla.	900	900	1,000
Pueblo, Colo.	—	500	700
Schenectady, N. Y.	—	1,650	1,400
Syracuse, N.Y.	—	22,750	15,500
Tacoma, Wash.	—	15,000	16,500
Total			
All systems			5,413,838
U.S. systems			5,258,139

Note: In 1972, Boston spent \$282,189; Chicago, \$780,524; and Los Angeles, \$134,000 on repairing transit vandalism.

^aIncluding rail cities.

^bEstimate.

8. Criminal incidents and vandalism costs per 100,000 revenue-passengers; and
9. Number of incidents of violent or total transit crime and size of transit system, whether measured by vehicle-miles, vehicle-hours, or revenue-passengers.

Thus, these findings show, for example, that the number of criminal incidents on a transit system in a large city may or may not be greater than the number on a transit system in a small city. Likewise, the number of incidents of total crime on transit systems does not necessarily vary either directly or inversely with total crime indexes.

Recognizing that comparing incidence of crime per city population with transit crime per city population could be misleading because city population includes many persons who do not use urban transit, the authors tried to draw a comparison between incidence of crime per population (i.e., crime indexes) and transit crime per number of transit users. A difficulty was to derive an accurate measure of transit users. Total revenue-passengers is obviously not the same thing. A person riding twice a day 300 days a year counts as 600 revenue-passengers, but he is only one user. To avoid this obstacle, an attempt was made to develop an exposure index by the following steps:

1. The number of revenue-passengers of a city system for 1971 was divided by the center-city population to ascertain the average number of trips per person for the year;
2. This figure was multiplied by 15 minutes (estimated to be the duration of the average trip), and the result was divided by the total number of minutes in the year, which yielded the fraction of the total minutes to which the average rider was exposed to possible crime or vandalism (the exposure index);
3. A transit violent crime index was computed by dividing the number of violent crimes reported by the system in 1971 by the center-city population, and a transit total crime index was computed from the number of total crimes reported in the same way; and
4. These transit indexes were divided by the exposure index and the results, transit crime exposure indexes, were compared with the FBI Violent Crime Index and Total Crime Index respectively, for the city (per 100,000 population).

Comparisons of selected major systems disclosed that the computed transit exposure index was greater than the FBI index in 13 out of 14 cases. If there is any validity to the computation, the conclusion is that the risk of being involved in a criminal incident is at least two times greater when riding on most major transit systems than it is in nontransit circumstances. This conclusion is strengthened when one looks at the raw figures on crime. For example, there were 168 incidents of violent crime reported on Massachusetts Bay Transportation Authority (MBTA) transit in 1971 compared with 6,993 incidents of violent crime (2.4 percent) in center-city Boston, according to the FBI's Uniform Crime Reports. That the risk of transit violent crime in Boston is more than twice as great as that of nontransit crime does not appear too farfetched, given the brief exposure of riders to crime on urban transit. The problem of crime on transit systems may be proportionately more grave than has been realized.

Transit Vandalism

Statistical tables were compiled for 37 U.S. and 4 Canadian transit systems about the following:

1. Transit vandalism costs for 1969, 1970, and 1971 (Table 4);
2. Transit system vandalism costs per 100,000 vehicle-miles, 100,000 revenue-passengers, and 10,000 vehicle-hours for 1971 (Table 5);
3. Transit system vandalism costs as a percentage of operating expenses for 1971 (Table 6);
4. Transit system vandalism costs per vehicle for 1971;
5. Transit system total vandalism costs for repairing vehicle windows, damaged seats, stationary facilities, and damage from graffiti for 1971 (Table 7); and
6. Transit system costs for windows, seats, graffiti, and stationary facilities as a percentage of total vandalism costs for 1971.

Table 5. System vandalism costs (\$) for vehicle-miles, revenue-passengers, and vehicle-hours in 1971.

System	Per 100,000 Vehicle-Miles	Per 100,000 Revenue-Passengers	Per 10,000 Vehicle-Hours
> 1,000,000*			
Boston (MBTA)	299.583	58.443	974.551
Chicago (CTA)	302.972	114.759	614.625
Cleveland (CTS)	146.565	43.882	—
Detroit (DSR)	93.54	33.765	120.122
Los Angeles (SCRSTD)	132.689	55.554	168.321
Montreal (MUCTC)	91.475	21.517	153.951
New York (NYCTA)	48.79	13.06	712.918
New York (PATH)	346.65	86.30	762.658
Philadelphia (PATCO)	—	—	1,570.117
Philadelphia (SEPTA)	992.150	287.700	—
Toronto (TTC)	58.68	12.85	75.720
250,000-1,000,000			
Albany	112.35	47.39	111.322
Atlanta	473.06	202.81	612.400
Baltimore	813.83	188.54	849.806
Columbus	110.57	49.600	133.995
D.C. (Metro)	907.92	283.43	—
Denver	303.558	167.91	—
Fort Worth	295.86	233.99	332.216
Indianapolis	381.96	151.12	459.285
Milwaukee	355.34	102.89	408.011
New Orleans	208.54	40.26	207.166
Oakland (AC Transit)	324.658	164.515	463.977
Ottawa	183.35	45.90	192.080
Portland	17.43	11.74	27.613
St. Louis	660.97	218.74	757.343
San Antonio	299.26	115.49	386.475
San Diego	211.84	129.15	273.263
Seattle (STS)	318.08	150.85	373.564
Seattle (MTC)	55.890	81.93	83.535
Winnipeg	43.08	10.73	46.829
< 250,000			
Ann Arbor, Mich.	154.649	122.809	178.571
Billings, Mont.	—	41.66	—
Chattanooga, Tenn.	71.393	41.785	85.840
Concord, N.H.	—	—	—
Dayton, Ohio	73.804	30.883	86.909
Everett, Wash.	—	15.291	—
Lafayette, Ind.	182.13	615.082	197.25
Orlando, Fla.	63.258	238.095	75.909
Pueblo, Colo.	—	56.832	—
Schenectady, N. Y.	146.91	577.932	182.95
Syracuse, N. Y.	374.106	159.885	403.081
Tacoma, Wash.	530.86	263.871	672.125

*Including rail cities.

Table 6. Transit system operating expenses and vandalism costs.

System	Operating Expenses (\$1,000)	Total Vandalism Costs (\$)	Vandalism Costs as Percent of Operating Expense
> 1,000,000*			
Boston (MBTA)	117,905	257,581	0.219
Chicago (CTA)	211,578	686,496	0.325
Cleveland (CTS)	29,889	68,250	0.228
Detroit (DSR)	45,814	32,874	0.072
Los Angeles (SCRSTD)	62,690	78,000	0.124
Montreal (MUCTC)	80,573	90,700	0.113
New York (NYCTA)	672,121	2,013,823	0.300
New York (PATH)	24,927	33,535	0.135
Philadelphia (PATCO)	4,756	19,390	0.408
Philadelphia (SEPTA)	88,994	976,000	1.097
Toronto (TTC)	80,192	42,469	0.053
250,000-1,000,000			
Albany	3,963	4,839	0.122
Atlanta	15,750	90,000	0.571
Baltimore	25,326	190,152	0.751
Columbus	7,227	8,618	0.119
D.C. (Metro)	44,127	289,000	0.655
Denver	6,224	22,500	0.361
Ft. Worth	1,968	11,000	0.559
Indianapolis	5,903	22,146	0.375
Milwaukee	18,458	71,000	0.384
New Orleans	18,774	29,808	0.159
Oakland (AC Transit)	23,368	83,219	0.356
Ottawa	9,323	16,300	0.174
Portland	9,137	2,000	0.022
St. Louis	22,852	140,000	0.612
San Antonio	5,886	24,309	0.413
San Diego	7,516	17,214	0.229
Seattle (STS)	13,455	44,060	0.327
Seattle (MTC)	2,235	1,800	0.080
Winnipeg	15,570	6,230	0.040
< 250,000			
Ann Arbor, Mich.	400	600	0.150
Billings, Mont.	50	125	0.250
Chattanooga, Tenn.	1,091	1,100	0.100
Concord, N.H.	—	150	—
Dayton, Ohio	3,705	2,900	0.078
Everett, Wash.	11 ^b	100 ^b	—
Lafayette, Ind.	155	600	0.387
Orlando, Fla.	1,285	1,000	0.078
Pueblo, Colo.	—	700	—
Schenectady, N. Y.	999	1,400	0.140
Syracuse, N. Y.	4,252	15,500	0.365
Tacoma, Wash.	2,634	16,500	0.624

*Including rail cities.

^bFor one month.

Table 7. Transit system specific vandalism costs (\$).

System	Total Vandalism	Vehicle Window	Damaged Seat	Graffiti	Stationary Facilities
>1,000,000^a					
Boston (MBTA)	257,581	73,000	14,508	35,863	112,500
Chicago (CTA)	696,496	274,165	176,060	62,600	90,769
Cleveland (CTS)	68,250	35,200	31,000	—	1,500
Detroit (DSR)	32,874	16,720	18,427	—	30
Los Angeles (SCRTPD)	78,000	39,000	23,400	7,100	0
Montreal (MUCTC)	90,700	22,300	39,400	8,400	4,900
New York (MYCTA)	2,013,823	230,321	38,925	1,266,488	426,893
New York (PATH)	33,535	5,285	10,250	8,000	10,000
Philadelphia (PATCO)	19,390	7,620	3,073	200	8,400
Philadelphia (SEPTA)	976,000	262,014	155,492	126,475	371,598
Toronto (TTC)	42,468	10,000	14,469	1,000	17,000
250,000-1,000,000					
Albany	4,839	4,539	200	100	0
Atlanta	90,000	28,000	42,000	10,000	—
Baltimore	190,150	146,921	25,018	4,000	—
Columbus	8,618	4,788	3,115	471	140
D.C. (Metro)	289,000	192,000	51,000	26,000	6,000
Denver	22,500	10,000	10,000	2,000	0
Ft. Worth	11,000	3,000	5,000	3,000	—
Indianapolis	22,146	13,000	8,400	500	100
Milwaukee	71,000	32,000	28,000	2,500	1,000
New Orleans	29,808	13,138	10,464	3,103	—
Oakland (AC Transit)	16,300	4,300	5,000	500	6,500
Portland	2,000	900	1,000	400	0
St. Louis	140,000	110,000	20,000	—	10,000
San Antonio	24,309	16,720	7,173	208	0
San Diego	17,214	9,407	7,565	200	0
Seattle (STS)	44,060	13,425	29,635	500	0
Seattle (MTC)	1,800	500	500	200	200
Winnipeg	6,230	2,500	400	800	2,327
<250,000					
Ann Arbor, Mich.	600	200	300	100	0
Billings, Mont.	125 ^b	100 ^b	25 ^b	0 ^b	0 ^b
Chattanooga, Tenn.	1,100	500	500	—	—
Concord, N.H.	150	70	50	30	—
Dayton, Ohio	2,900	2,424	276	200	—
Everett, Wash.	100	70	25	5	0
Lafayette, Ind.	600	200	200	100	50
Orlando, Fla.	1,000	600	300	100	—
Pueblo, Colo.	700	300	400	0	0
Schenectady, N.Y.	1,400	1,000	200	200	0
Syracuse, N.Y.	15,500	500	2,500	400	400
Tacoma, Wash.	16,500	4,500	3,300	190	5,180
Total	5,423,988	1,591,227	787,550	1,571,533	1,075,487

^aIncluding rail cities.^bEstimate.

Because few urban transit systems maintain comprehensive records of vandalism costs, few are able to provide breakdowns of material and labor costs for repairs to windows, seats, stationary facilities, and damage from graffiti. This state of affairs exists in many systems because vandalism is not a problem of sufficient magnitude to justify the expense of detailed cost accounting.

Even where detailed records are kept, reports of vandalism costs can vary widely for many reasons. As an example, if two systems sustain the same damage but one repairs it with more durable and costly materials than the other, the difference in repair costs can be incorrectly interpreted as meaning that one suffered greater damage than the other.

The 1971 range of costs for the 37 systems was \$100 for Everett, Washington, to approximately \$2 million for New York City Transportation Authority (Table 4). At least part of this wide range is attributable to differences in reporting procedures rather than differences in actual incidence of vandalism.

The range still remains wide when costs are computed per 100,000 vehicle-miles, 100,000 revenue-passengers, and 10,000 vehicle-hours (Table 5). For instance, the 1971 range on the basis of 100,000 vehicle-miles is from \$17 for Portland, Oregon, to \$922 for Philadelphia (SEPTA). Because of the differences in reporting procedures, it is inadvisable to draw any conclusions about efficiency from these figures. The system with fewer criminal incidents and lower vandalism costs is not necessarily more efficient at combating these problems; it may simply have failed to report incidents and costs as accurately as the others.

National transit vandalism costs and national transit criminal incidents were extrapolated the same way. The ratio, $B/A = Y/X$, was also computed based on revenue-passengers, number of vehicles, and vehicle-hours on the assumption that if roughly similar results were obtained the range could be accepted as approximating the total vandalism costs for all U.S. transit systems. The following table gives the range of these computations:

<u>Basis</u>	<u>Vandalism Costs</u>
Vehicle-hours	7,743,837
Revenue-passengers	8,351,550
Vehicle-miles	9,200,500
Number of vehicles	9,994,600

Thus the wide variations in record-keeping among transit systems give an estimated range between \$7.7 million and \$9.9 million for the national transit bill for vandalism for 1971.

Vandalism costs in terms of percentages of operating expenses for 20 selected systems were mostly less than 0.5 percent (Table 6). Vandalism costs were as much as 1.1 percent of operating costs for only one system (Philadelphia, SEPTA) and possibly this could be attributed to differences in keeping track of vandalism costs. Considering these low percentages, a snap judgment might be that vandalism is not a serious problem, but that would be to ignore indirect costs such as revenues lost while vehicles are being repaired, customers lost to other modes of transportation because of cuts in service, and costs of insurance and legal fees to meet claims against the system for damages. It also ignores social costs such as passenger and employee welfare, customer ill-will caused by having to use dilapidated and disfigured vehicles, and possible injuries to passengers and employees from acts of vandalism such as throwing stones at vehicles. Moreover, the costs of vandalism amount to sizable sums for many systems; for example, NYCTA's vandalism costs for 1971 were in excess of \$2.0 million. To conclude that vandalism costs are unimportant because they constitute a low percentage of operating costs would be to overlook their economic and social significance.

Of the 41 systems reporting, 4 of which are Canadian, the largest component of vandalism costs was window breakage for 20 systems; for 12, it was damage to seats; for 6, damage to stationary facilities; and for 1, disfigurement by graffiti. Costs for the remaining 2 systems were evenly split (Table 7).

The study of transit crime and vandalism was only a first step toward analysis of trends. Data were collected for 2 years in most categories and for 3 years in a few,

but 3 years gives little indication of trends. Inconclusive evidence concerning the course of crime and vandalism was obtained by asking transit management personnel for their opinions. When asked, "Has the nature and level of transit crime in your system changed substantially over the last 5 to 10 years?", 17 of 48 answered yes, 11 no, and 20 did not reply. Of the 17 respondents answering yes, 10 said that crime had increased, 4 said that it had decreased, and 3 said that it had gone up and then down. When asked, "Has the nature and level of transit vandalism in your system changed substantially over the last 5 to 10 years?", 21 of 48 answered yes, 10 no, and 17 did not reply. Of the 21 answering yes, 14 said that vandalism had increased, 4 that it had decreased, and 3 that it had gone up and then down. Further research on analysis of trends is needed.

LIABILITY COSTS

Neither the raw figures on vandalism costs of 37 systems nor the extrapolation of national vandalism costs reported earlier included costs of claims filed against transit systems because of incidents of crime and vandalism. Such claims are customarily covered by insurance, but no figures are available on crime-vandalism insurance costs because systems do not specifically earmark insurance for crime and vandalism. Accordingly, the study attempted to calculate costs attributable to crime or vandalism claims and settlements by extrapolating from Chicago Transit Authority (CTA) experience.

During 1971, a total of 1,166 incidents occurred in which foreign objects were thrown through windows of CTA vehicles, resulting in injuries to 420 passengers. A total of 348 claims was presented, of which 138 were settled during 1971. CTA officials estimated that the third-party assault type of incident that might result from crime or vandalism would add approximately 10 to 15 percent more claims and lawsuits to these totals. A third-party assault would occur if a criminal assaulted a bus driver or a transit patron and another passenger or a bystander was injured during the altercation.

CTA experience with crime or vandalism that involved foreign objects thrown through windows, resulting in injuries to passengers, is presented as an annual average based on 1971 and 1972 data.

<u>Item</u>	<u>Foreign Objects</u>	<u>Third-Party Assaults</u>	<u>Total</u>
Incidents	1,166	174	1,340
Injuries to passengers	420	63	483
Claims presented	348	52	400
Lawsuits filed	17	2.5	19.5

Of the 400 claims listed above, CTA experience indicates that two-thirds are eventually settled at an average payment per claim of \$300 and an average overhead cost of \$113 per claim:

<u>Item</u>	<u>Cost</u>
Settlement costs	$400 \times \frac{2}{3} \times \$300 = \$ 80,000.00$
Overhead costs	$400 \times \frac{2}{3} \times \$113 = \underline{\$ 30,133.33}$
Total	\$110,133.33

Of the 19.5 lawsuits listed above, CTA experience indicates that three-fourths are eventually settled at an average payment per suit of \$1,990 and an average overhead cost of \$501 per suit:

<u>Item</u>	<u>Cost</u>
Settlement costs	$19.5 \times \frac{3}{4} \times \$1,990 = \$29,103.75$
Overhead costs	$19.5 \times \frac{3}{4} \times \$ 501 = \underline{7,327.12}$
Total	\$36,430.87

Therefore, the total claims and lawsuits costs for 1971 were \$146,564.20.

Based on these estimates of CTA liability costs, the following extrapolation of total transit system liability costs for all U.S. systems was made, where A = CTA revenue-passengers, \$386,158,185; B = U.S. revenue-passengers (from ATA Fact Book), \$5,497,000,000; Y = CTA liability costs, \$146,564; and X = U.S. transit system liability costs. Therefore, if $A/B = Y/X$, then $X = \$2,086,350$ for revenue-passengers, \$2,327,892 for transit vehicles, and \$1,849,955 for vehicle-miles. Thus, the range of total liability costs for all U.S. systems in 1971 was from \$1,849,955 to \$2,327,892.

Data on liability costs were obtained only from CTA. The validity of this estimate would be greatly strengthened if results in the same range were computed from data supplied by additional systems.

STANDARDIZED REPORTING SYSTEM

Earlier, this paper remarked on the wide divergence, from one transit system to another, in the amount of transit crime and vandalism data and the form in which they are recorded. As a step toward standardization of record-keeping, a tentative set of forms was drawn up and submitted to transit personnel of long experience for comment. The following objectives were kept in mind in preparing the forms:

1. To measure the quantity of vandalism, crime, and passenger harassment that occurs on a given transit system from year to year;
2. To measure the quantity of vandalism, crime, and passenger harassment in one transit system as compared with another;
3. To measure the quantity of crime on a given transit system as compared with the quantity of crime in the community served by the system; and
4. To avoid compiling and maintaining records of items with little or no utility to transit systems.

The general industry reaction to these tentative forms was that it is inadvisable for any one agency, such as a research team, to draw up forms that would be used by all systems. The procedure generally favored was to inform the industry of the end result desired and leave it up to each system to compile its own forms.

Specific reactions ranged from criticism that the proposed forms were far too detailed to criticism that the proposed forms were not detailed enough. It was evident that some systems would have difficulty in supplying any of the data, some would have difficulty in supplying part of it, and some would have no difficulty in supplying far more than called for.

Questions were raised concerning the value to the system of some of the suggested items as gauged by the costs of compiling the information. The scale of values varied markedly from system to system.

The objection was raised that, because many transit systems pay drivers extra (frequently at overtime rates) for time spent filling out incident reports, such incentive pay can lead to abuse of the practice of filling out incident reports.

Thus it was apparent that, regardless of how desirable standardization of data may be, many obstacles must be overcome to realize it. The authors believe that standardization of data on transit crime, vandalism, and passenger harassment is an important objective and that efforts should continue toward finding a common denominator that will help the majority of transit systems to compile and maintain basic data and provide for compilation of more elaborate data by those systems that are able and willing to undertake such a task.