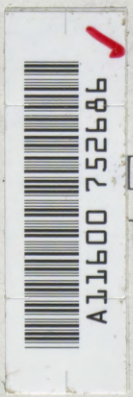
Y 4
.P 96/10
92-H 29
1043

WIDER BUSES AND THE INTERSTATE HIGHWAY SYSTEM

GOVERNMENT
Storage



HEARINGS

BEFORE THE

SUBCOMMITTEE ON ROADS

OF THE

COMMITTEE ON PUBLIC WORKS

UNITED STATES SENATE

NINETY-SECOND CONGRESS

FIRST AND SECOND SESSIONS

ON

H.R. 4354

AN ACT TO AMEND SECTION 127 OF TITLE 23 OF THE UNITED STATES CODE RELATING TO VEHICLE WIDTH LIMITATIONS ON THE INTERSTATE SYSTEM IN ORDER TO INCREASE SUCH LIMITATIONS FOR MOTORBUSES

DECEMBER 13, 14, 1971, AND FEBRUARY 14, 1972

SERIAL NO. 92-H29

Printed for the use of the Committee on Public Works

U.S. GOVERNMENT PRINTING OFFICE
71-954 O WASHINGTON : 1972

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

Y 4
.P 96/10
92-H 29

COMMITTEE ON PUBLIC WORKS

JENNINGS RANDOLPH, West Virginia, *Chairman*

EDMUND S. MUSKIE, Maine
B. EVERETT JORDAN, North Carolina
BIRCH BAYH, Indiana
JOSEPH MONTOYA, New Mexico
THOMAS F. EAGLETON, Missouri
MIKE GRAVEL, Alaska
JOHN V. TUNNEY, California
LLOYD BENTSEN, Texas

JOHN SHERMAN COOPER, Kentucky
J. CALEB BOGGS, Delaware
HOWARD H. BAKER, JR., Tennessee
ROBERT J. DOLE, Kansas
JAMES L. BUCKLEY, New York
LOWELL P. WEICKER, JR., Connecticut
ROBERT T. STAFFORD, Vermont

J. B. HUYETT, Jr., *Chief Clerk;* M. BARRY MEYER, *Chief Counsel*
BAILEY GUARD, *Minority Clerk;* THOMAS C. JORLING, *Minority Counsel*
JOSEPH F. VAN VLADRICKEN and LEON G. BILLINGS, *Senior Staff Members*
PHILIP T. CUMMINGS, *Assistant Counsel*

Professional Staff Members: RICHARD D. GRUNDY, JOHN W. YAGO, HAROLD H. BRAYMAN, RICHARD W. WILSON, JUDY PARENTE, RICHARD HEROD, CLARK NORTON, DAVID SANDOVAL, and MARSHALL LANCASTER

SUBCOMMITTEE ON ROADS

BIRCH BAYH, Indiana, *Chairman*

JENNINGS RANDOLPH, West Virginia
B. EVERETT JORDAN, North Carolina
JOSEPH MONTOYA, New Mexico
MIKE GRAVEL, Alaska
EDMUND S. MUSKIE, Maine

JOHN SHERMAN COOPER, Kentucky
J. CALEB BOGGS, Delaware
HOWARD H. BAKER, JR., Tennessee
LOWELL P. WEICKER, JR., Connecticut
ROBERT T. STAFFORD, Vermont

CONTENTS

ALPHABETICAL LIST OF WITNESSES

	Page
Bierwagen, W. J., director, public affairs, Amalgamated Transit Union	44
Brady, Charles N., director, Highway Department, American Automobile Association	238
Cafferty, Michael, chairman of the board, Chicago Transit Authority	48
Corriveau, Paul, State representative, State of Massachusetts	257
Prepared statement	262
Clark, Hon. Frank M., a Representative in Congress from the State of Pennsylvania	6
Davis, Gen. Benjamin O., Assistant Secretary for Safety and Consumer Affairs, Department of Transportation	267
Davison, W. G., county engineer, Cerro Gordo County, Iowa	247
de Lorenzi, John, managing director, public and government relations, American Automobile Association	238
Findley, Hon. Paul, a Representative in Congress from the State of Illinois	234
Foster, William C., Acting Director, Bureau of Surface Transportation Safety, Department of Transportation	287
Franklin, Ellis, B., chairman, National Council of Greyhound Divisions	45
Gudinas, James J., transportation economist, American Automobile Association	238
Kerrigan, James L., president, Greyhound Lines, Inc	28
Middleton, Verne, vice president, regulatory regulations, Greyhound Lines, Inc	28
O'Mara, John J., associate professor, University of Iowa	250
Pauquette, Joseph E., director, traffic operations, New York Thruway Authority	306
Puls, Fritz, General Counsel, National Transportation Safety Board	287
Reece, T. S., president, Continental Trailways	18
Reed, John H., Chairman, National Transportation Safety Board	287
Schmieg, Anthony L., Chief, Highway Safety Division, Department of Transportation	287
Schwengel, Hon. Fred, a Representative in Congress from the State of Iowa	93
Prepared statement	101
Silberstein, Eric C., Legislative Affairs Officer, National Transportation Safety Board	287
Sloane, Robert, vice president, American Transit Association	48
Thompson, Robert F., president, Vermont Transit Co., Inc	38
Toms, Douglas W., Administrator, National Highway Safety Traffic Administration	267
Turner, Frank M., Administrator, Federal Highway Administration	267
Van Roekel, Paul, county highway engineer, Oakland County, Mich	246
Webb, Charles, president, National Association of Motor Bus Owners	9

CHRONOLOGICAL LIST OF WITNESSES

DECEMBER 13, 1971 (p. 1)

Bierwagen, W. J., director, public affairs, Amalgamated Transit Union	44
Cafferty, Michael, chairman of the board, Chicago Transit Authority	48
Clark, Hon. Frank M., a Representative in Congress from the State of Pennsylvania	6
Franklin, Ellis B., chairman, National Council of Greyhound Divisions	45
Kerrigan, James L., president, Greyhound Lines, Inc	28

Page

Middleton, Verne, vice president, regulatory regulations, Greyhound Lines, Inc. 28
Reece, T. S., president, Continental Trailways 18
Sloane, Robert, vice president, American Transit Association 48
Thompson, Robert F., president, Vermont Transit Co., Inc. 38
Webb, Charles, president, National Association of Motor Bus Owners 9

DECEMBER 14, 1971 (p. 67)

Brady, Charles N., director, Highway Department, American Automobile Association 238
Corriveau, Paul, State representative, State of Massachusetts 257
Prepared statement 262
Davison, W. G., county engineer, Cerro Gordo County, Iowa 247
de Lorenzi, John, managing director, public and government relations, American Automobile Association 238
Findley, Hon. Paul, a Representative in Congress from the State of Illinois 234
Gudinas, James J., transportation economist, American Automobile Association 238
O'Mara, John J., associate professor, University of Iowa 250
Schwengel, Hon. Fred, a Representative in Congress from the State of Iowa 93
Prepared statement 101
Van Roekel, Paul, county highway engineer, Oakland County, Mich 246

FEBRUARY 14, 1972 (p. 265)

Davis, Gen. Benjamin O., Assistant Secretary for Safety and Consumer Affairs, Department of Transportation 267
Foster, William C., Acting Director, Bureau of Surface Transportation Safety, Department of Transportation 287
Pauquette, Joseph E., director, traffic operations, New York Thruway Authority 306
Puls, Fritz, General Counsel, National Transportation Safety Board 287
Reed, John H., Chairman, National Transportation Safety Board 287
Schmieg, Anthony L., Chief, Highway Safety Division, Department of Transportation 287
Silberstein, Eric C., Legislative Affairs Officer, National Transportation Safety Board 287
Toms, Douglas W., Administrator, National Highway Safety Traffic Administration 267
Turner, Frank M., Administrator, Federal Highway Administration 267

ADDITIONAL STATEMENTS AND MATERIAL SUPPLIED FOR THE RECORD

American Association of State Highway Officials:
Johnson, H. E., executive director, statement of 69
"Recommended Policy on Maximum Dimensions and Weights of Motor Vehicles to be Operated Over the Highways of the United States" 1968 report of 74
Appendix:
Responses from States permitting operation of 102-inch-wide buses under the grandfather clause of the 1956 act:
Colorado 313
Connecticut 313
Hawaii 314
Idaho 314
Montana 314
New Mexico 315
Pennsylvania 315
Wyoming 316
Responses from State toll road or turnpike commissions:
Delaware 317
Indiana 317
New Jersey 318
Ohio 318
Pennsylvania 319

Page

Responses from other State highway departments:
Indiana ---- 321
Maryland ---- 321
Pennsylvania ---- 322
Editorials, reprints of:
Arkansas:
"Wider Buses Would Be a Deterrent to Safety," Arkansas Democrat, May 27, 1971 ---- 324
California:
"Highway Monster Lobby Still Is Around," Sacramento Bee, May 30, 1971 ---- 324
Colorado:
"More on Wider Buses," Rocky Mountain News, December 20, 1971 ---- 325
Florida:
"No to Wider Monsters!" Daytona Beach, Fla., Morning Journal ---- 325
"Just Six Inches," Orlando, Fla., Explorer, November 1971 ---- 326
"The Big-Bus Menace," Orlando, Fla., Explorer, November 1971 ---- 326
"Proceed With Caution," Tampa, Fla., Times, May 11, 1971 ---- 327
"A Backwards Bill," Tampa, Fla., Tribune, July 27, 1971 ---- 327
Illinois:
"How Big Can Buses Grow?" Chicago Daily News, May 19, 1971 ---- 328
"Hold Line on Bus Widths," Chicago Daily News, July 24, 1971 ---- 328
Indiana:
"No Wider, Please," Terre Haute, Ind., Tribune, August 4, 1971 ---- 329
"More on Wider Buses," Evansville, Ind., Courier and Press, January 2, 1972 ---- 329
Iowa:
"Beat the Wider Bus Bill," Times-Democrat (Davenport-Bettendorf, Iowa), July 29, 1971 ---- 330
"Big-Vehicle Haggling," Cedar Rapids (Iowa) Gazette, December 18, 1971 ---- 330
"Big Bus Bill" Drive, Des Moines (Iowa) Register, January 25, 1971 ---- 331
Kentucky:
"The Wider Buses Pave the Way for Wider Trucks," Courier Journal (Louisville, Ky.), July 26, 1971 ---- 331
Maryland:
"Wider Buses," Baltimore (Md.) Sun, July 23, 1971 ---- 332
"A Sickening Show," the (Baltimore, Md.) News American, July 29, 1971 ---- 332
Massachusetts:
"A Sickening Show," the Record American (Boston, Mass.) July 29, 1971 ---- 333
"Danger on the Highways," the Boston Evening Globe, July 27, 1971 ---- 333
Minnesota:
"People's Transportation Needs Priority," Worthington, Minn., Globe, December 16, 1971 ---- 334
Missouri:
"Another Bus Bill Poses Trouble for Car Drivers," Jefferson City, Mo., Capital News, January 1, 1971 ---- 335
"Buses Wide Enough Now," the St. Louis (Mo.) Globe-Democrat, May 17, 1971 ---- 336
"No Bigger Buses," the St. Louis (Mo.) Post Dispatch, May 28, 1971 ---- 336
"Bus Passenger Bill—More Buses Needed," the Fulton, Mo., Sun-Gazette, February 2, 1972 ---- 336
"The Bus Bill," the St. Louis, Mo., Gazette, February 2, 1972 ---- 337

Editorials—Continued
Missouri—Continued
"The Public—And Public Transportation in Missouri, Chillicothe, Mo., Constitution-Tribune, February 22, 1972 — Page 338
"Wider Buses For Safety, Comfort," Independence, Mo., Examiner, March 1, 1972 — 338
"Bills in the Public Interest," Cape Girardeau, Mo., Southeast Missourian, March 1, 1972 — 339
New York:
"The National Scene—A Sickening Show," Albany, N.Y., Times Union, July 29, 1971 — 339
Oklahoma:
"How Wide the Bus?" Tulsa, Okla., Tribune, May 18, 1971 — 340
Ohio:
"More on Wider Buses," Columbus Citizen-Journal, December 20, 1971 — 340
"No Wider!" the Toledo, Ohio, Blade, February 18, 1972 — 341
Oregon:
"Bus Lanes Better," Portland, Oreg., Sunday Oregonian, July 25, 1971 — 341
Pennsylvania:
"Double Blow to Safety," Meadville, Pa., Tribune, August 14, 1971 — 342
"Hold the Line," Meadville, Pa., Tribune, December 27, 1971 — 342
"Motorists May Face Bigger Trailers, Buses," Wilkes-Barre, Pa., Times-Leader, May 18, 1971 — 343
"Bill to OK Wider Buses Questioned," Allentown, Pa., Chronicle, May 14, 1971 — 343
Texas:
"Sickening Show," San Antonio, Tex., Light, July 29, 1971 — 343
Tennessee:
"More on Wider Buses," Knoxville, Tenn., Knoxville News-Sentinel, December 25, 1971 — 344
"For Dimensions of Highway—Buses Are Wide Enough," Nashville, Tenn., Banner, January 31, 1971 — 344
Virginia:
"8-foot-6-inch Buses Pose Threat," Alexandria, Va., Gazette, August 7, 1971 — 345
"Now, a Bid for Wider Buses," Norfolk (Va.) Ledger Star, July 23, 1971 — 346
"And Larger Trucks—Bigger Buses—and Hazards," the Virginian-Pilot, August 10, 1971 — 346
Washington:
"Highway Monsters," the Seattle (Wash.) Post-Intelligencer, December 29, 1971 — 347
West Virginia:
"House Bill Has Managed To Stick It to People," Charleston, W. Va., Gazette, August 14, 1971 — 347
"Bigger Buses Dangerous," the Huntington (W. Va.), Herald Dispatch, May 16, 1971 — 348
"Oversize Bus Is Back," the Huntington, (W. Va.) Herald Disptach, July 23, 1971 — 348
"Wider Buses? No!" the Huntington, (W. Va.) Herald Dispatch, December 29, 1971 — 349
Wisconsin:
"Bus-Truck Lobby—When an Inch Is a Ton," the Wisconsin State Journal, August 14, 1971 — 350
Cafferty, Michael, chairman of the board, Chicago Transit Authority, material supplied by:
Cities where the 102-inch transit buses are in operation or permitted — 50
"Project Suggestion Bus," material relating to — 57
States in which the 102-inch-wide buses are permitted to operate in intercity service — 52
"The Case for the 102-inch Bus," reprint from Passenger Transport, Journal of the American Transit Association — 53
Davis, Gen. Benjamin O., Assistant Secretary for Safety and Consumer Affairs, responses to questions submitted by Senator Bayh — 271

Page

Burgess, Isabel, member, National Transportation Safety Board, dissent statement, to Senator Bayh, dated February 14, 1972 292
H.R. 4354, reprint of 2
Interstate Commerce Commission:
Tables of economic data:
Operating revenues assignable to passenger and allied services, 1965–69 352
Operating revenues, class I carriers of passengers engaged in intercity service, all districts, 1965–69 352
Operating revenues of certificate route air carriers, total domestic operations, 1965–70 353
Stafford, George M., Chairman, Interstate Commerce Commission, letter to Senator Bayh, dated February 17, 1972 351
Kerrigan, James L., vice president, Greyhound Lines, Inc., material supplied by:
Comparison of scenicruiser and supercruiser specifications 29
Exchange of correspondence with Senator Boggs 32
Response to Senator Bayh's request for additional information 34
National Association of Motor Bus Owners, letter from Charles A. Webb to Stanley Gaffen, Department of Transportation, dated December 9, 1971 353
National Society of Professional Engineers, statement of Paul H. Robbins, executive director 67
National Transportation Safety Board, dissent statement of Isabel Burgess, member, to Senator Bayh, dated February 14, 1972 292
National Transportation Safety Board, fiscal year 1973 budget submission, excerpts of 297
Reed, John H., Chairman, National Transportation Safety Board, letter to Senator Randolph, dated February 18, 1972 296
Robbins, Paul H., executive director, National Society of Professional Engineers, statement of 67
Reece, T. S., president, Continental Trailways, material supplied by:
Exchange of correspondence with Senator Boggs 27
Comparison table showing specifications between the 96- and 102-inch-wide buses 19
Continental Trailways accident analysis 26
Response to Senator Bayh's request for additional information 25
Thompson, Robert F., president, Vermont Transit Co., Inc., material supplied by:
American Seating Co., the, excerpts from a study made by 40
Response to Senator Bayh's request for additional information 44
Transportation, Department of, response by Gen. Benjamin O. Davis to questions submitted by Senator Birch Bayh 271
Webb, Charles A., National Association of Motor Bus Owners, letter to Stanley Gaffen, Department of Transportation, dated December 9, 1971 353

WIDER BUSES AND THE INTERSTATE HIGHWAY SYSTEM

MONDAY, DECEMBER 13, 1971

U.S. SENATE,
SUBCOMMITTEE ON ROADS OF THE
COMMITTEE ON PUBLIC WORKS,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to notice, in room 4200, New Senate Office Building, Senator Birch Bayh (chairman of the subcommittee) presiding.

Present: Senator Bayh.

Senator BAYH. We will convene the Senate Subcommittee on Roads which today meets to consider H.R. 4354, a House-passed bill which would expand from 96 to 102 inches the maximum width of buses using the Interstate Highway System.

As most of those present will recall, the Federal Highway Act of 1956 prohibited the appropriations of funds for any State which permitted vehicles wider than 96 inches to use the interstate system. Exceptions were allowed for the nine States which, prior to July 1, 1956, had independently established width limitations greater than 96 inches.

H.R. 4354 would amend the act to allow the remaining States to permit the wider buses to use the interstate system. I will put a copy of H.R. 4354 in the record.

(The bill referred to follows:)

92D CONGRESS
1ST SESSION

H. R. 4354

IN THE SENATE OF THE UNITED STATES

JULY 22, 1971

Read twice and referred to the Committee on Public Works

AN ACT

To amend section 127 of title 23 of the United States Code relating to vehicle width limitations on the Interstate System, in order to increase such limitations for motor buses.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 127 of title 23 of the United States Code is amended by striking out the first word and inserting in lieu thereof the following: "(a) Except as provided in subsection (b) of this section, no", and by adding at the end thereof the following new subsection:

"(b) Apportionment of funds shall not be denied to any State for allowing the operation of motor buses upon the Interstate System within such State with a width not in

excess of one hundred and two inches plus additional width necessary for officially approved safety devices; or with the maximum width permitted for motor buses using the Interstate System within such State under laws or regulations established by appropriate State authority in effect on July 1, 1956, whichever is greater. As used in this subsection, the term 'motor buses' means motor vehicles with motive power, except trailers, designed for carrying more than ten persons."

SEC. 2. The amendments made by the first section of this Act shall not be applicable to any segment of the Interstate System, the traffic lanes of the main traveled way of which are less than twelve feet wide.

SEC. 3. The amendments made by the first section of this Act shall take effect on the first day of the first fiscal year which begins after the date the Secretary of Transportation has completed the necessary safety studies (including engineering and testing analyses) concerning the effects of such amendment and has promulgated such safety regulations as he deems necessary, or on July 1, 1973, whichever date first occurs unless, prior to such effective date, the Secretary reports to Congress that as a result of such studies he has determined that the operation of motor buses having a width in

excess of 96 inches but not in excess of 102 inches upon twelve foot wide traffic lanes of the Interstate System will be unsafe and cannot be made safe by promulgation of safety regulations.

Passed the House of Representatives July 21, 1971.

Attest: W. PAT JENNINGS,

Clerk.

Senator BAYH. Our schedule calls for the committee to hear the proponents of the legislation today and opponents tomorrow. A subsequent session or sessions, as necessary, will hear Government and perhaps additional public witnesses some time in the future. We hope to hear everyone who wants to be heard who has a legitimate interest in the subject before the subcommittee takes final action on the bill.

In the course of the hearings, we will seek to ferret out definitive answers to the questions of safety raised by this proposed legislation. Among some of the questions which the committee would like to have answered are the following:

Does the additional width and resulting increase in the size of the bus pose a safety hazard?

What is the "blast" effect of the larger buses, especially when traveling at high speeds, on automobiles, particularly small, light-weight automobiles? Are such vehicles difficult to control when passing or being passed by one of the larger buses?

It is my understanding that this question is now being investigated by the Department of Transportation and I hope some reliable information will be developed by the time the Department witnesses testify on the bill.

Should certain conditions be attached to the legislation requiring structural modifications of the wider bus to insure there would be no greater safety hazard?

Since a total of 38 or more States now permit the wider buses to be used on certain State and local roads, can any additional gain in highway safety be made by keeping the buses off the more improved interstate highways?

In addition, there are a number of administrative questions that need to be resolved.

Why is it necessary to include the grandfather clause of the 1956 legislation, thus continuing to exempt in nine States buses wider than even the 102-inch bus specifically provided for in the bill?

Perhaps I am wrong, but as I read the grandfather clause, it would mean that in those States that are now covered by it, there would not even be a 102-inch limit.

Is it wise for Congress to enact a law, the effective date of which would be contingent on the results of studies not yet completed?

Should perhaps Congress ask for the results of these studies before it enacts the law?

The question of safety, of course, is the main concern of the subcommittee and, hopefully, also for most of the witnesses. Therefore, I trust that all the witnesses will adress themselves to this subject, with a minimum of rhetoric and a maximum of facts.

Our first witness this morning is the distinguished Congressman from Pennsylvania, the Honorable Frank M. Clark.

Congressman Clark, we appreciate your taking the time to come and the fact that you have put on your most formal attire to address this most important subject.

STATEMENT OF HON. FRANK M. CLARK, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF PENNSYLVANIA

Mr. CLARK. Thank you very much, Mr. Chairman.

Coming over here, I felt I should be dressed very formally because I know how the chairman dresses sometimes. I wanted to be appropriately attired for him.

Senator BAYH. I want my friend from Pennsylvania to know that, as chairman, I don't believe I should see red as far as this legislation is concerned.

Mr. CLARK. I am sure you won't.

I appear before you in support of H.R. 4354, a bill which I introduced and which passed the House of Representatives on July 21, 1971.

The bill which passed the House would authorize an increase from 96 to 102 inches in the vehicle width limitations on the Interstate System for motor buses. This legislation is permissive. In other words, it lets each individual State decide whether or not they want to allow this increased width. Thus, even after Federal action, there is still a requirement for enabling legislation by the States.

The bill as passed by the House was amended to take care of any and all of the legitimate questions raised by those who opposed the bill at the hearings. The bill was amended to:

1. Give the Secretary of Transportation veto power over its implementation. If he reports prior to July 1973 that the use of buses with an increased width of 102 inches will be unsafe for use on the Interstate System and cannot be made safe by the promulgation of safety regulations, the increase in width will be killed then and there.

2. Authorize and direct the Secretary of Transportation to make a complete study of all the safety features involved with this increased width, including engineering and testing analyses thereof.

3. Limit the application and use of these buses to traffic lanes that are at least 12 feet in width.

In appearing before you this morning, I hope to clear up some of the misconceptions that have appeared in the newspapers about this legislation.

The 102-inch-wide buses have been operating extensively in cities and on highways where permitted for 20 years with no safety problems to the traveling public. The Urban Mass Transportation Administration, under the Department of Transportation, has purchased with Federal financial assistance, over 1,700 of these 102-inch-wide buses.

It is inconceivable to me if there were any possibility that this bus was unsafe, that the Department of Transportation or the Congress of the United States would authorize and appropriate funds for these buses to operate on our highways.

I have been reading the newspapers recently with a great deal of interest concerning the steam bus which the Department of Transportation has financed and is putting into operation in California. This bus, gentlemen, is 102 inches wide. Again, the Department of Transportation acknowledges that there is no safety problem.

I would like to state that more people in this country travel by 102-inch-wide buses than by 96-inch-wide buses—over 2.5 billion last year.

For example, they are operating safely in St. Louis, Memphis, Indianapolis, Chicago, New York City, Dallas, and many other cities. I do not believe for one minute that these cities would permit the operation of these buses if there was any problem of safety.

Recently I have heard a lot of discussion about the blast effects of larger vehicles. I had my staff check into this problem and they have been unable to find any study which shows that a 40-foot-long bus (standard bus size) by increasing its width from 96 to 102 inches, has a greater blast effect.

There may be some study on blast effect that I am not aware of, but not on buses.

My staff also found no reported accidents that were the result of blast effects.

In addition, these buses will be using the Interstate System, which is a divided highway with 12-foot-wide lanes going in the same direction on each side of the median.

I have heard the argument used by one of the opponents of this bill about what happens when these 102-inch-wide buses get off the Interstate System and use the city streets.

The answer is simply that these 102-inch-wide buses have been using the city streets for over 20 years and more than 20,000 of them are operating in the cities and highways where permitted and whether this legislation passes or not they will continue to use the city streets and highways where legal.

Our jurisdiction is over the Interstate System—the safest of all highways—and there is where we are requesting permission for these buses to operate.

What about the question of more studies?

There is no justification for any more time to study this bill.

As I previously stated, 102-inch-wide buses have been in operation on the highways of this country for over 20 years. The Secretary of Transportation is provided with veto power over implementation of the bill if he reports prior to July 1973 that the use of these buses on the Interstate System will be unsafe and cannot be made safe by the promulgation of safety regulations.

The reason that we feel we have to go ahead with this legislation at this time, and not wait for more studies, is that it seems that every time we wait for a study and not give a specific date the study just never gets done.

What else are we talking about in this bill? What would be accomplished?

First, we are all interested in the mass transit problems of this country, and the problem of the crowded highways. By increasing bus transportation, and using a safer, more comfortable bus, we will take cars off of the highways. For every bus you gentlemen see, there are an average of 15 fewer cars on the highway.

Thus, to the extent that intercity bus travel is maximized, safety is enhanced and pollution is minimized. The bus industry intends, within the next few years, to put turbine engines in all of their buses—this again will help minimize pollution.

In summary, I would again like to look at the safety record of the intercity bus industry. Four passengers were killed on class I carriers in 1970—I repeat, four passengers—on over 17.6 billion miles. It is my

understanding that the Greyhound Corp. is now putting over a million miles a month on these 102-inch buses and their safety record is 42 percent greater.

The safety record of the intercity bus industry over the years is unequaled by any other form of public transportation. Travel by bus is 15 to 20 times safer than travel by automobile. This safety record is not an accident but, rather, results from, among other things:

1. Constant improvement in the design of buses and in their operation and maintenance.

2. Highly skilled professional drivers who undergo frequent retraining, and

3. Periodic inspection and maintenance in accordance with closely enforced Federal and State regulations.

If the bus industry is to be a true public servant and viable in today's vital transportation business, it must be able to put on the road a bus that is safer and more comfortable for the traveling public.

Thank you.

Now, Mr. Chairman, although I have completed my formal statement, there is one thought I would like to leave with the committee.

There have been many erroneous stories in the press recently concerning the results of studies conducted by the Department of Transportation on the 102-inch bus problem. I have had this checked with the appropriate officials and have been told that these studies have not been completed. They have not been concerned with buses; they have been concerned with trucks; and that even the preliminary results indicate that the differences between the 96-inch vehicle and the 102-inch vehicle are minuscule.

I do appreciate your allowing me the opportunity to appear before your committee this morning, Mr. Chairman.

Senator BAYH. We appreciate the fact that you would come over and express your concern and support for this legislation.

Inasmuch as you introduced the original bill and have been involved in its passage by the House, I can understand your interest in the departmental studies. Have you gotten any idea when these studies are going to be completed? Apparently the research is being conducted now.

Mr. CLARK. That is right. When they appeared before our subcommittee—incidentally, I have been a member of that subcommittee for 17 years—they could not give us any time at that time when we had the hearings when the studies would be completed. This is why we put the additional amendment into this that would give the Secretary veto power if there was any safety hazard.

Senator BAYH. Studies are being conducted now, so apparently the department believes the question at least should be examined.

Mr. CLARK. Our subcommittee has asked them to make this additional study.

Senator BAYH. These officials will have a chance to testify before this subcommittee so we can ask them personally about that.

I appreciate your taking the time to appear before us on this matter.

Mr. CLARK. Thank you very much.

Senator BAYH. The next witness this morning is Mr. Charles A. Webb, president of the National Association of Motor Bus Owners.

STATEMENT OF CHARLES A. WEBB, PRESIDENT, NATIONAL ASSOCIATION OF MOTOR BUS OWNERS

Mr. WEBB. Mr. Chairman and members of the subcommittee.

I appreciate this opportunity to appear on behalf of the National Association of Motor Bus Owners in support of H.R. 4354.

NAMBO is the national trade association for the intercity motor bus industry. Our member carriers provide more than 90 percent of the intercity bus transportation in the United States.

The pending bill would amend section 108(j) of the Federal-Aid Highway Act of 1956 (23 U.S.C. 127) to enable the States, if they choose, to increase from 96 to 102 inches the maximum width of buses permitted to use the interstate system.

The sole purpose of liberalizing that limitation is to provide increased comfort for passengers.

The bill would not change the length, weight, or height limitations prescribed for buses by Federal or State law.

As far as the weight limitation of the present Federal-Aid Highway Act is concerned, the intercity motor bus is 30,000 pounds under the permissible gross overall weight for vehicles using the interstate system.

The Trailway 102-inch bus, for example, is only 600 pounds heavier than its 96-inch-wide bus.

Any concern about the safe operation of 102-inch-wide buses should be allayed by section 3 of the pending bill. That section authorizes the Secretary of Transportation to retain the 96-inch bus width limitation if he should find on or before July 1, 1973 that the operation of 102-inch-wide buses on the interstate system "will be unsafe and cannot be made safe by promulgation of safety regulations."

As you know, Mr. Chairman, the motor vehicle width limitation prescribed by the Federal-Aid Highway Act of 1956 applies only to the Interstate System. This restriction was adpoted as a temporary standard pending the completion of a study by the Secretary of Commerce to determine the maximum desirable dimensions and weights for vehicles operating on the Interstate System.

That study, authorized by section 210 of the 1956 act, was transmitted to the Congress by the Secretary of Commerce on August 18, 1964, and published as House Document 354 of the 88th Congress. The report recommended that section 123 of title 23, United States Code, be amended by increasing from 96 to 102 inches the maximum width of vehicles permitted to use the Interstate System.

The present restriction on the maximum width of buses has been outmoded by continuing improvements in highway construction and design. For more than 40 years, 96-inch-wide buses have been operated safely on the Nation's highways.

In 1932, when more than half of the primary rural highways had traffic lanes less than 10 feet wide, the American Association of State Highway Officials AASHO, recommended 96 inches as the maximum width of motor vehicles (Policy Concerning Maximum Dimensions, Weights and Speeds of Motor Vehicles To Be Operated Over the Highways of the United States, American Association of State Highway Officials, p. 33, app. I (1946)).

71-954 O - 72 - 2

As early as 1946, AASHO recognized that "certain conditions inherent in the design of vehicles suggest the desirability of 102 inches as a standard of maximum width."

In 1964, and again in 1968, AASHO recommended a 102-inch maximum width for vehicles using the Interstate System. (Recommended Policy on Maximum Dimensions and Weights of Motor Vehicles to be Operated Over the Highways of the United States, American Association of State Highway Officials, p. 11 (1968).) (See p. 74 for reprint of referred to publication.)

The change in AASHO policy over the past four decades reflects improvements in highway design during the same period. For the primary Federal-aid highway system totaling about 250,000 miles, 62 percent of the system has traffic lanes 12 feet or wider, and 95 percent of that system has traffic lanes at least 10 feet in width. (Hearings before the Subcommittee on Roads of the House Committee on Public Works on H.R. 4354, 92d Congress, first sess. (1971), p. 66.)

Current standards of the Federal Highway Administration for Federal-aid systems other than the Interstate System call for traffic lanes of the width necessary to accommodate 102-inch-wide buses. (Hearings before the Subcommittee on Roads of the House Committee on Public Works on H.R. 11870 and H.R. 11619, 91st Congress, first sess. (1969) p. 668.)

Today, approximately 85 percent of all intercity bus miles are run on highways with lane widths of at least 12 feet. Having operated 96-inch-wide buses safely in 108-inch-wide highway lanes for many years, the intercity bus industry now seeks authority to operate 102-inch-wide buses in 144-inch-wide lanes.

The proposed legislation does not authorize an increase of more than 6 inches in the maximum permissible width of buses. In computing maximum width limitations, the width of approved safety devices such as outside mirrors and side lights has always been excluded. In other words, what we seek and what the proposed bill authorizes is an increase of just 6 inches in the maximum width of buses and not a fraction of an inch more.

The question posed by the pending bill is not whether 102-inch-wide buses should be manufactured or operated on the Nation's highways. More than 20,000 wider buses, many of them financed by the Department of Transportation under the Urban Mass Transportation Act, are being operated today.

These wider buses outnumber the intercity bus fleet and carry many times more passengers—more than 2.5 billion last year. So the real question posed by H.R. 4354 is whether this large and growing fleet of 102-inch-wide buses should be permitted to use the safest highways available—the Interstate System—or whether these buses should be required to operate over highways that are not as safe. The answer would seem to be obvious.

Thirty-three States have concluded that the 96-inch limitation on the width of buses is obsolete. On July 1, 1956, nine States—and those nine States are shown on the map here on the board in blue—Colorado, Connecticut, Hawaii, Idaho, Montana, New Mexico, Pennsylvania, Rhode Island, and Wyoming—permitted the operation of 102-inch-wide buses in intercity service.

Because of the grandfather clause of the Federal-Aid Highway Act of 1956, wider buses may be operated in these States on both the Interstate System and on other Federal-aid highways. In addition, 102-inch-wide buses may be operated over the older toll roads such as the Indiana and Ohio Turnpikes and the New York State Thruway.

Nine States, those are the States, Mr. Chairman, colored in green on this map—California, Maine, Maryland, Nevada, New Jersey, North Dakota, Oregon, South Dakota, and Vermont—have enacted legislation to permit 102-inch-wide buses to be operated in intercity service on Federal-aid highways other than the Interstate System. These States were unable to permit the operation of 102-inch-wide buses over their safest highways—their portion of the Interstate System—because of the Federal bus width limitation.

The nine States just named and 15 additional States, and the 15 additional States are those colored in yellow on the map—Arizona, Delaware, Indiana, Kansas, Kentucky, Minnesota, Nebraska, New York, North Carolina, Oklahoma, Tennessee, Utah, Virginia, Washington, and Wisconsin—have enacted legislation permitting use of the Interstate System by 102-inch-wide buses if the Federal-Aid Highway Act of 1956 is amended as proposed by the pending bill.

In short, the legislatures of 33 States have recognized that the operation of 102-inch-wide buses on the Interstate System and other improved highways is safe and otherwise consistent with the public interest.

In addition, the operation of 102-inch-wide buses in local and suburban service is permitted to some extent in 43 States.

I have indicated on this other map, Mr. Chairman, by the red dots, some of the major metropolitan areas where 102-inch-wide buses are either operating or permitted to operate in local and suburban service.

Now, in 38 of these States, such operations were permitted prior to July 1, 1956, which means they are permitted today on some local and suburban segments of the Interstate System.

In other States and municipalities, local and suburban bus operators must confine their modern 102-inch-wide buses to routes which do not embrace any part of the Interstate System.

Although the use of wider buses in intercity service has been approved in principle by the legislatures of 33 States, intercity bus operators cannot make extensive use of new and wider buses unless the entire Interstate System in a number of contiguous States lawfully may be used.

The proposed legislation is completely permissive. Any State which desired to retain its 96-inch limitation on maximum width of buses would be free to do so. Or, a State could permit the operation of 102-inch-wide buses only on highways meeting certain specifications.

Some opponents of the bill have noted that most bus trips do not begin or end on the Interstate System. Accordingly, some concern has been expressed about the practical ability of the States to enforce any limitation on vehicle width lower than the maximum established by the Congress. This concern, as applied to operations of the intercity bus industry, is groundless. In virtually all the major metropolitan areas linked by the Interstate System, the operation of 102-inch-wide buses is lawful.

Our problem is not in getting to and from the Interstate System to downtown passenger terminals, but in operating on the Interstate System.

It is incongruous that the most restrictive limitation on motor bus width applies to the Interstate System, which is the system best able to accommodate wider vehicles. This situation is not compatible with optimum safety of operations.

For example, 102-inch-wide buses could be operated between Washington and Chicago if Interstate 70, the best available road in Maryland, is not used. North-South operations may be conducted in Maine over U.S. 1 but not over Interstate 95.

Greyhound, for example, is presently operating its wider bus between Los Angeles and San Francisco, not over the interstate highway but over a noninterstate Federal-aid highway.

We are unable to reconcile these service restrictions with findings of the Federal Highway Administration that travel over the Interstate System is almost twice as safe as travel over other Federal-aid highways.

Wider buses are rapidly replacing 96-inch-wide buses in local and suburban service and in charter operations incidental thereto. Many of these 102-inch-wide buses are purchased with the financial assistance of the Department of Transportation. It is not conducive to safety of operations to forbid the transportation of school groups and other charter parties in the best available equipment over the best available highways.

In hearings in 1969 before the Roads Subcommittee of the House Public Works Committee, Mr. Francis C. Turner, the Federal Highway Administrator, pointed out that under existing law the States can and do:

> Permit larger vehicles on the Federal-aid primary and secondary systems than they do on the Interstate System.

He described this practice as "incongrous" and "questionable from a safety standpoint." (Hearings before the Subcommittee on Roads of the Committee on Public Works on H.R. 11870 and H.R. 11619, 91st Cong., 1st sess. (1969), p. 670.)

Mr. Turner also observed:

> The interstate highways are already being built to accommodate vehicles of this dimension (102 inches wide) and current standards for other Federal-aid systems are similarly set to accommodate this size of vehicle.

(Hearings before the Subcommittee on Roads of the Committee on Public Works on H.R. 11870 and H.R. 11619, 91st Cong., 1st sess. (1969) p. 668.)

If the proposed legislation is enacted, the intercity bus industry is prepared to invest millions of dollars in modernizing its fleet so that its passengers may ride in wider and more comfortable buses.

NAMBO's other witnesses will explain the particular interest of their companies in the pending bill to increase the maximum width of buses permitted to use the Interstate System.

In conclusion, Mr. Chairman, I am aware of the argument to the effect that if the Congress should increase the limit for buses it would be obliged to do the same for trucks.

We simply ask that our case be considered on its own merits.

The Congress in legislation, the Interstate Commerce Commission in regulations, the Federal Highway Administration in safety regulations, have treated trucks differently from buses in a number of respects. So, we simply request that you consider our case on its merits.

Any proposal that the trucking industry may have should be considered on its merits.

Thank you.

Senator BAYH. Thank you very much, Mr. Webb.

First, could you provide a little background about how a movement like this gets started? Assuming that most companies were using 96-inch buses, how does the industry start moving to a 102-inch bus?

Mr. WEBB. It started because over the last 40 years the American people have been growing taller and, hence, a little broader.

Senator BAYH. You are not asking for taller buses, are you?

Mr. WEBB. No; not taller buses. It is simply a desire to extend to passengers more comfort. I think you could tell if you sat in these seats which are down in front the difference between the seats which are an inch and a half or two inches wider than the other seats.

That is basically the only reason why we want the wider bus, to give the passengers a little more seating room. We cannot possibly widen the seats if the bus width is 96 inches.

Senator BAYH. Are there any 96-inch buses being manufactured today?

Mr. WEBB. Yes. Of course, most of the interstate buses are 96 inches wide and most of those manufactured are of that width. The new buses used in local and suburban service, I think the new ones are predominantly 102 inches wide.

Senator BAYH. What percentage of the buses manufactured today are 96 and what percentage are 102?

Mr. WEBB. Practically all of the intercity buses are 96 inches wide, those being manufactured. I think Greyhound has about 100 wider buses in operation and Trailways about 50. That is out of a total fleet of around 20,000.

Senator BAYH. Can you provide us with additional data on how this relates to the entire industry, since our record is just commencing? How many total buses are operating in the United States?

Mr. WEBB. There are about 22,000 intercity buses, Mr. Chairman. There are about 45,000 buses, as I understand it, operated in the local and suburban service primarily; perhaps only 40,000. And then about 22,000 of those 40,000 operated in local and suburban service are 102 inches wide.

Now, the witness for the American Transit Association can tell you more precisely than I can how the current model production divides as between the 96 and the 102.

Senator BAYH. You mentioned the fact that some question has been raised relative to the relationship between buses and trucks.

Mr. WEBB. Yes, sir.

Senator BAYH. You mentioned further that trucks and buses are treated differently in a number of respects.

Could you give us some of those examples, please?

Mr. WEBB. Yes, sir.

In the Interstate Commerce Act, for example, interstate motor carriers of passengers are required by law to enter into joint rates

and through routes with other such carriers. Motor carriers of freight are not required by the Interstate Commerce Act to enter into joint rates and through routes with other such carriers.

From the standpoint of regulation of the Interstate Commerce Commission, the Commission last year adopted one set of rules for buses, stating the conditions under which they might deviate from their regular routes. The Commission found it desirable to adopt an entirely different set of deviation regulations for motor carriers of property. We are treated somewhat differently in the safety regulations.

For example, a person who has suffered the loss of a hand or other extremity can get a waiver and drive a truck in interstate commerce. No such waiver is permitted for the driver of a bus.

Those are examples of differences in the law and in the regulations.

Senator BAYH. May I ask you to deal with certain criteria that might be a bit more relevant to this bill?

Are there examples of width of trucks being treated any differently from the width of buses?

Mr. WEBB. As far as the bill is concerned, there are no—with rare exceptions—there are no 102-inch-wide trucks being manufactured or in operation. There are only three or four States which have seen fit to increase the width limitation for trucks beyond the 96-inch limit.

There is an obvious difference between the transportation of passengers and the transportation of property.

Senator BAYH. To what extent are weight limitations treated differently between buses and trucks?

Mr. WEBB. The weight limitations are the same in the Federal-Aid Highway Act of 1956 but, of course, as far as the gross overall vehicle weight is concerned, buses only come up to 50 percent of the allowable gross weight.

Now, the other weight limitations in the Federal Highway Act are the single axle and double axle weight limitations. We are not seeking and we have not sought any increase in those axle weight limitations because we do not require any additional weight for the wider buses.

Senator BAYH. I am trying to anticipate what kinds of questions we might be confronted with in the future.

Can you see any reason why buses should be treated differently from trucks as far as width is concerned?

Mr. WEBB. I think simply if buses can provide their passengers with a bit more comfort and attract more passengers to bus transportation that will alleviate to some extent the number of automobiles on the highways because each bus that you see on the highway represents about 15 to 20 automobiles.

Senator BAYH. Would it not be fair to say also that a wider truck could haul more freight per vehicle and that this would also limit the number of vehicles on the highway hauling freight, as well?

Mr. WEBB. Well, you can't haul much more freight with a wider truck and we are not increasing the capacity of the bus. We are not hauling any more passengers in any single wider bus. We would be hauling the same number of passengers but we would hope that we

would fill more seats. The seating capacity, though, would be unchanged.

Senator BAYH. As mentioned earlier, I have not prejudged this in any way, but I have been advised by some who have studied it that, because of the present 8-foot limitation on the width of trucks and because of the 4-foot dimensions of loading sleds and other types of containers, perhaps the truck situation is contrary to what you have just said. I have been told that the additional few inches might in some cases almost double the carrying capacity, but I don't know if this is accurate.

Are you familiar at all with this situation?

Mr. WEBB. Yes; I am, Mr. Chairman.

It is quite true that the reason that the trucking industry wanted the additional 6 inches was to enable them to do a much better job in the handling of containerized freight. Personally, I think that is a good argument.

My only suggestion is that you consider each of us on our own case.

Senator BAYH. That is what we shall do because the present bill applies only to buses.

Has the bus industry done anything to study the safety problems that might be created by a 6 inch wider vehicle moving down the highway?

Mr. WEBB. We are not aware that there is any safety problem but our other witness will explain to you the safety record which has been achieved to date with the limited operation of wider buses. We are not aware of any safety problem involved in the operation of wider buses in highway lanes 12 feet wide or wider.

Senator BAYH. How about such buses operating on highway lanes that are narrower than that?

Mr. WEBB. We are not aware of any problems in that regard, either, because over such highways these wider buses presumably would be operating at lower speeds on city streets, that is, between the interstate system and the downtown passenger terminal.

Senator BAYH. It seems to me that you may be perilously close to rebutting our own previous argument that, because wider buses are used in cities, they should axiomatically be allowed on interstate highways. The speed limits in cities are less than they are on highways. If there is a larger mass moving at a faster speed, this will increase the safety problem; will it not?

Mr. WEBB. No; because there is a considerable experience in operating the wider buses on the urban portions of the Interstate System at a relatively high speed. We have seen no data which would indicate in any way that the operation of the wider buses is unsafe.

Senator BAYH. I am anxious to see this data.

Do you have information compiled which the subcommittee can study that shows the safety record and the relationships between wider buses and narrow buses?

Mr. WEBB. Yes; Mr. Kerrigan and Mr. Reece, who will follow me, will tell you what their experiences have been.

Senator BAYH. What about the grandfather clause? Do you see any reason why the grandfather clause should be continued if we go ahead with the wider bus?

Mr. WEBB. It has no practical effect, really, Mr. Chairman. All it does is to preserve, for example, for the State of Hawaii its width limit of 108 inches.

There are a few States, I think Illinois is one and maybe Minnesota is another, which have a width limit of 104 inches for buses used in local and suburban service. To the best of my knowledge, there is no bus which has been produced, and certainly none contemplated, which would be in excess of 102. So, the grandfather clause really has very little effect as far as we are concerned.

Senator BAYH. Although Senator Boggs could not be here, because he has some other Senate business, he requested me to ask you some specific questions, which I will do with your permission.

Mr. WEBB. Certainly.

Senator BAYH. What specific studies, if any, have you made to evaluate the relative impact of wind blast which occurs when a 96-inch bus is driven down a highway at 60 or 70 miles an hour compared with a bus 102 inches wide? This question is similar to one I asked a moment ago.

Mr. WEBB. We have made no such studies, Mr. Chairman. We understand the Department of Transportation is making such studies. I don't think there has ever been a claim ever filed against any bus company alleging that there was an injury due to some blast effect.

Senator BAYH. I may say that doesn't mean that there is no blast effect.

Mr. WEBB. That is true. This is the fifth time I have testified on this subject and it wasn't until last year before the House Committee that anyone mentioned the so-called blast effect.

The Department of Transportation, I understand, is trying to see if there is any appreciable difference between the blast effect of a 96-inch-wide bus and a 101-inch-wide bus. I am not an engineer, I would not think the difference is appreciable; but that is one of the things that the DOT is studying.

Senator BAYH. Probably the Department officials should be asked this question. Apparently the blast effect happens after the bus has passed. Thus, the vehicles most affected probably would not include the buses and would not be available in the studies or the statistics that you have.

Mr. WEBB. We have no statistics on that, Mr. Chairman.

Senator BAYH. Take a small car, for example. I don't know the probability or the facts at all, but suppose there is such a potential blast effect. A big bus passing a small vehicle, such as a Volkswagen, would be affected by such a blast. It seems obvious that it would affect the smaller vehicle rather than the bus. So, you have no such information on that in your studies, I suppose?

Mr. WEBB. We have made no study. We understand that the Department of Transportation has a study underway.

Senator BAYH. We will talk to them.

What is the reason you suggest that Congress should proceed with enacting this bill before getting the final evidence from studies being conducted by the Department of Transportation?

Mr. WEBB. Our concern is that if the legislation were to await the completion of studies by the Department of Transportation the studies would not be completed.

Senator BAYH. Is that a fair criticism of the Department of Transportation?

Mr. WEBB. I think that is a fact.

Senator BAYH. In other words, there is a critical problem here that is supposed to be studied, but the study itself is made contingent on the passage of legislation?

Mr. WEBB. The matter came up before the House Committee. It was felt that the Department of Transportation should be given whatever time it thought would be necessary to study the effect of bus width on safety.

The July 1, 1973, figure you see in the bill is not our figure; it is not our suggestion. It is the date selected by Mr. Turner and the Federal Highway Administration as the date which would give them ample time to investigate the whole question of safety and determine whether the operation of a 102-inch-wide bus on the interstate system would or would not be safe.

Senator BAYH. Would the bus industry await the passage of that date before gearing up all the things that would be done with the final enactment of this legislation?

Mr. WEBB. Yes, sir, because I am sure that no one will want to incur the risk of manufacturing any more wider buses or buses which do not, or may not, meet regulations which the Secretary might promulgate if this legislation were adopted.

Senator BAYH. Let me continue now with the questions from Senator Boggs. Let me ask them:

What will the cargo capacity of the 102-inch bus be compared with the capacity of the 96-inch bus, and what will this mean in additional revenue per bus?

Mr. WEBB. Mr. Kerrigan has attached to his statement a comparison of the bus model specifications for the Greyhound bus, the MC–6, as compared with the Scenicruiser, PD–4501 placed in service 15 years ago. (See p. 29.)

The difference in the luggage compartment capacity: There would be 106 more cubic feet for the later bus. That is due mainly, however, because Greyhound's new bus is higher, that is, taller.

For the wider Continental Trailways bus, the increase in the underfloor luggage compartment capacity is just 23 cubic feet. In other words, the extra 6 inches of width means 23 more cubic feet. But, of course, if the bus is higher, you get a corresponding increase in luggage compartment capacity.

Senator BAYH. Do you have any estimate about what this will mean in additional revenue?

Mr. WEBB. As far as the 23 cubic feet is concerned, it would be negligible. I would defer to Mr. Kerrigan on the increase in revenue resulting from a 100-foot increase in cubic capacity.

Senator BAYH. The argument has been made that the 102-inch bus will be safer than the existing 96-inch bus because of improved braking.

Why could not the improved braking system go into a 96-inch bus?

Mr. WEBB. I would rather have that question, too, if it is agreeable with the Chair, answered by Mr. Kerrigan. I am not an engineer, and I could not give you the technical explanation.

Senator BAYH. What distance would be required to stop a 102-inch bus going 60 miles an hour, and how does this compare with the distance needed to stop a passenger car traveling at that speed?

I suppose a pertinent and related question is: What distance would be required to stop a 96-inch bus going the same speed?

Mr. WEBB. Yes.

If I might, Mr. Chairman, I would like to furnish that for the record.

We are able to meet all of the DOT regulations on stopping performance. I don't think we stop quite as fast as a passenger car but we stop in a somewhat shorter distance than a truck because we are not as heavy.

Senator BAYH. I wish you would give us that for the record, if you will, please.

Mr. WEBB. Certainly.

(The information requested was submitted as part of the testimony of Mr. James L. Kerrigan and may be found on p. 35.)

Senator BAYH. What, if anything, is being done to improve the distance that the rearview mirror on a safety device extends from the side of the bus? What is the average overhang of the device on the proposed 102-inch bus?

Mr. WEBB. The overhang of the device, I think, is about 7 inches on each side; that is, the rearview mirror.

It is my understanding that you cannot reduce that extension without impairing safety. That is the extension which is required for the best possible rearview vision.

Senator BAYH. So, instead of 102 inches of space you are really talking about 116 if you include that part of the highway space used by mirrors on both sides of the bus.

Mr. WEBB. That is true.

If you are talking about 116 including safety devices you are really comparing 116 with the present 110.

Senator BAYH. Thank you very much, Mr. Webb. We appreciate your testimony.

Mr. WEBB. Thank you, Mr. Chairman.

Senator BAYH. The next witness is Mr. T. S. Reese, president of the Continental Trailways.

STATEMENT OF T. S. REECE, PRESIDENT, CONTINENTAL TRAILWAYS

Mr. REECE. Mr. Chairman and members of the subcommittee, my name is T. R. Reece. I am president of Continental Trailways, Dallas, Tex., and have served in that position for the past 7 year. I have been associated with the Trailways organization in various capacities since 1937.

My appearance today is on behalf of Continental Trailways and the National Association of Motor Bus Owners (NAMBO). We urge your favorable consideration of the bill (H.R. 4354) to increase by 6 inches the width of buses permitted to use the Interstate System.

When the length of buses was increased from 35 to 40 feet, we were able to provide more leg room for our passengers. The 40-foot length also provided space for a restroom. With these additional comforts,

our intercity buses were able to compete with the airplane and the private automobile.

Today the average American is taller than he was 30 years ago and, hence, broader. To compensate for this physical change, we must provide our passengers with roomier seats. Therefore, Continental Trailways favors the proposed increase of 6 inches in the width of buses permitted to use the Interstate System, as provided in H.R. 4354.

Continental Trailways has developed a 40-foot bus, 102 inches wide. We have 50 of these prototype buses which have been operating since 1967 on highways on which the operation of wider equipment is lawful. Most of the wider buses are operated between Philadelphia and New York City and in Colorado and Wyoming.

We have accumulated 10 million miles of travel with these wider buses.

Attached to my statement is a sheet setting forth the specifications for our 102-inch-wide bus (model 07) and for our 96-inch-wide buses (models 01 and 05). As shown on the attached sheet, the wider bus is no longer or higher and only 626 pounds heavier than our 96-inch-wide equipment.

(The attachment referred to follows:)

Item	Model 01 (production prior to 1968)	Model 05 (new model in 1968)	Model 07 (new model in 1969)
Seating capacity	46	46	46.
Overall length	40 ft.	40 ft.	40 ft.
Overall width	96 in.	96 in.	102 in.
Overall height	11 ft. 2 in.	11 ft. 2 in.	11 ft. 2 in.
Weight loaded (gross vehicle in pounds)	37,900	37,900	38,500.
Number of axles	3	3	3.
Front axle	10,440	10,440	11,000.
Drive axle	18,000	18,000	18,000.
Trailing or load axle	9,460	8,800	8,800.
Underfloor luggage compartment capacity (cubic feet)	215	327	350.
Engine horsepower, governed speed	263	290	290.
Tire sizes all wheels	11.00 by 20	11.00 by 20	12.5 by 22.5
Total road contact area of tires (footprint area in square inches).	591	591	600.
Road contact area in square inches per ton gross vehicle weight.	31.1	31.1	31.1.
Total effective brake drum area (square inches)	1,554	1,554	1,554.
Effective brake area per ton of gross vehicle weight	82.0	81.7	80.7.
Brake size (diameter and width of drums):			
Front	16½ by 4 in.	16½ by 4 in.	16½ by 4 in.
Rear driving	16½ by 7 in.	16½ by 7 in.	16½ by 7 in.
Rear (trailing or pusher)	16½ by 4 in.	16½ by 4 in.	16½ by 4.
Interior headroom at center aisle minimum	75 in.	75 in.	75 in.
Width between seats at center aisle	14 in.	14 in.	14 in.
Width of double passenger seat	37 in.	37 in.	40 in.

Mr. REECE. Today, an intercity bus passenger travels more comfortably than a generation ago. Air-conditioning, restrooms, and foam rubber seats are some of the features added over the past 30 years.

By adding 6 inches to overall width, an inch and a half can be added to each seat, thus providing additional comfort for passengers. With this additional space, intercity bus operators can improve their load factors by attracting more passengers from the private automobile and, to that extent, alleviate highway congestion.

Continental Trailways inaugurated its five-star golden eagle service some 10 years ago on the west coast and has expanded this special type of service—hostess, snackbar, seat reservations, pillows, blankets, and personal passenger services—each year.

We now operate that type of service with limited stops between New York and Los Angeles; New York and Washington; Boston and Atlanta; and many other points.

The additional seat width would be especially attractive to passengers traveling on long runs and would, in our opinion, encourage more people to leave their automobiles at home and use intercity buses.

Continental Trailways will not operate 102-inch-wide buses on highways which are too narrow to handle them with complete safety.

In addition to humanitarian considerations, we have a strong economic incentive for the avoidance of accidents. Based on 40 years' experience in the intercity bus industry, I can state unequivocally the addition of just 6 inches to the width of a bus—only 3 inches on the left or passing side—poses no safety hazard on the Interstate System and on the roads connecting that system with downtown passenger terminals.

Senator BAYH. Excuse me for interrupting.

What happens to the other 3 inches?

Mr. REECE. You have it on the other side. You are not passing on two sides at the same time.

Senator BAYH. I would suggest, if I may take the liberty, that this is not one of your strongest arguments.

Mr. REECE. Shall I proceed?

Senator BAYH. Please.

It is difficult for me to understand why, if there is a vehicle with a 6-inch increased width coming down the highway, you would argue it would not really be as unsafe as some people say because only one-half of that, 3 inches, is on the passing side.

If we are talking about the total amount of space used by that vehicle, it will be 6 additional inches, not just 3.

So, we ought to give our attention to what effect that extra 6 inches will have. I don't know what the answer is. Certainly not just 3 inches on the passenger side.

Mr. REECE. I am afraid I will have to withdraw that.

Senator BAYH. Don't withdraw it.

Mr. REECE. That argument has not made much impression on you.

Senator BAYH. It did but the wrong kind.

Please go ahead.

Mr. REECE. For almost 3 years, Continental Trailways and Ford Motor Co. have been experimenting in the operation of Silver Eagle buses with turbine power. We believe this motive power will prove adaptable to intercity bus use.

The advantages of the turbine engine are a minimal amount of noise, few vibrations, lighter weight, and smoke-free exhaust emission. The combination of such superior powerplant performance and added seat comfort would be the greatest improvement in bus travel in our history.

Our company operates 204,732,000 miles annually, transporting approximately 26,600,000 passengers. Continental, as well as all other intercity operators, has provided this essential transportation service at a modest profit, without any form of Federal or State subsidy, and at the lowest fare per passenger mile of any form of intercity transportation.

Your approval of H.R. 4354 will assist us in our efforts to attract more people from their automobiles and thereby assist in the reduction of traffic congestion and, in our opinion, in highway accidents.

I will be very happy to furnish the subcommittee with any additional information desired on the present and prospective operation of 102-inch-wide buses by Continental Trailways.

I should like to add that our opinion of the 102–inch bus is that it is really extremely important from the standpoint of traffic production, the development of business.

We are fighting every day to maintain our position in the world of transportation because we have to pay our own bills and with the continued rise in costs and the diminishing revenues, it bring us to a situation that we want to avoid, if at all possible. We think whatever our Congress or anybody else can do to help us to maintain the service that is being provided for the general public in the United States should be done by all means. This is one of the ways it would be possible to make our service more attractive and to serve more passengers.

Senator BAYH. When you say anything I am sure you would expect us to specify criteria that are consistent with safety on the highway.

Mr. REECE. Yes, sir; by all means.

Senator BAYH. For those who use buses and those who don't.

Please provide us with some additional background information.

In long distance or intercity travel, you cited several routes taken by your buses. This may not be directly relevant, but for my own information, do you have a formula used to evaluate the comfort of a passenger? Do you estimate a person can sit still for a certain period and then have a stop, or do you just travel from city to city, no matter the time or distance?

Mr. REECE. I believe we must say in that regard that the passenger controls the length of time that he wants or is willing to sit, let us say. Our schedules are constructed to run a continuous service, that is, nonstop, no change of bus, on the same bus from New York to Los Angeles, or from New York to Miami.

Senator BAYH. For example, in the New York to Los Angeles trip, how many hours does that take?

Mr. REECE. It is about 78 hours, I believe, at the present time.

Senator BAYH. How many stops will the bus make during that cross-country trip?

Mr. REECE. I would say that we would have at least one every 4 hours, minimum. In other words, you would go from here to Pittsburgh, for example. Then you just carry on, at given intervals—after all, we have meal times and there are stops for meals. This is every 6 hours. Then we have intermediate points for change of operators.

I would say 3 to 4 hours is the maximum length of a nonstop trip.

Senator BAYH. What percentage of your passengers on Continental Trailways are those that go for extended journeys? For example, if you are going from Washington to Los Angeles, what percentage would go from Washington to Pittsburgh or go halfway across the country? Do you have any figures on that?

Mr. REECE. No; I do not have any here.

I will say this will vary with the area of the country.

You used an example if you were going from New York to Los Angeles and you wanted to divide up the traffic on that trip. You would probably find a sustaining or continuing capacity of about 20 percent on through passengers.

The other 80 percent would be made up of people who were getting off at Pittsburgh, getting on at Pittsburgh, going on another 200 or 300 miles and getting off or on.

Senator BAYH. Twenty percent for the whole trip?

Mr. REECE. If you were looking for through traffic from New York to Los Angeles.

Senator BAYH. You have heard a great deal of the problems of the airline industry.

What percentage of occupancy does a Trailway bus have to have to make money, and what has been your record in the last year or two as far as the average level of occupancy in general?

Mr. REECE. Would you allow an estimate or do you want the figures?

Senator BAYH. An estimate would be fine. If you would rather just wait or do both, you could give us the specifics for the record if you have compiled them.

Mr. REECE. I think it would probably be better.

If you use a 40 percent load factor which is about the average, then to answer the second part of your question, what is the difference in the 40 percent load factor and what it takes for you to break even for making money; is that the question?

Senator BAYH. Yes, sir.

Mr. REECE. I would like to submit that information, if permissible.

Senator BAYH. That would be fine, if you would, please.

I would appreciate it.

(The information to be furnished may be found on p. 25.)

Senator BAYH. I am most sympathetic with that part of the argument presented in support of the wider bus which maintains that a more comfortable bus will attract more people to use public transportation and thus diminish the number of vehicles on the highway. I think this is a worthwhile goal, considering the amount of congestion and pollution.

Has Trailways conducted studies as to how more people can be induced to use buses?

There appears to be two problems: How to get them to use buses for across country trips, and how to get them to use the public transportation available in the metropolitan areas? Do you have any suggestions that you can give us from the results of the studies which have been conducted?

Mr. REECE. Mr. Chairman, I wouldn't have any specifics for you on the studies. You are asking me for the answer to what I have spent my life in the bus business trying to find and that is how do you create traffic for the buses. We have many ways that we attempt to do it but we are never conclusive in knowing that this was the one that caused a passenger to come and travel with us on a bus.

Senator BAYH. I was just wondering whether, over the period of years which you have devoted to the study of this, you have any facts which show a direct relationship between the number of passengers

that use buses when the leg room is longer versus when the leg room is shorter.

Also, what was the result of installing air-conditioning, the rest rooms and snack bars which you mentioned?

Is there any evidence from which you can attribute increases in use to those particular features?

Mr. REECE. No. I can only tell you my personal experience in that regard.

We do not speak in terms of an improvement that comes into being immediately. In other words, if we could replace a fleet all at one time, then we could probably feel the impact that you are seeking here. But by and large, our changes have been coming into the fleet on a very slow basis. Unless it is some special improvement we don't have the benefit of those records that you would ordinarily get automatically.

We have our "Five Star Service" where we have the hostess and all the other things that go with it, and limited schedules. We know why people are using that service and why they came to us, because of questionnaires that our hostesses are able to obtain from the individual passengers on the trip. The questionnaire is just a fact sheet made up of what the comforts are, what are the complaints, what is wrong, what is good and what is bad.

In this way, we get a very good picture.

Senator BAYH. Do you have one of those questionnaires that the hostesses pass out?

Mr. REECE. No; I do not.

Senator BAYH. Do you have any of those?

Mr. REECE. I don't have any 102-inch Five Star equipment either.

Senator BAYH. I thought there might be a question on that questionnaire which said, "Would you be more comfortable if you had 3 more inches on one side for the seat of your pants and 3 more inches on the other to sit on."

My counsel tells me that would have to be divisible by four.

I ask the question because I think it is pertinent from a comfort standpoint and makes commonsense. One of the reasons advanced in favor of the additional space is that, because of greater comfort, more passengers will be attracted and the economics and congestion will be strongly weighted on the side of the wider bus.

I wondered whether you had some data which might show the relationship of comfort to inches of width in the past.

Mr. REECE. Senator, when we first placed this 102-inch equipment in service, we were all excited and happy and felt that everybody was doing their job on the thing and we did make a survey and study of that. Those references, I am sure, are still available, but they are 3 years old now. It would be no problem to develop more because this is something that you can receive by the same questionnaires.

Senator BAYH. Trailways is operating 102-inch buses now?

Mr. REECE. Yes, sir.

Senator BAYH. If you do have any information of this type, and if you can give us some idea of passenger reaction or the economics involved as well as capacity utilization between the 102- and the 96-inch buses, I think it would be helpful in putting this record together.

You mentioned turbine power. Are you sufficiently familiar with the engineering problems to be able to answer the question about the possibility of putting this type of an engine in a 96-inch bus?

Mr. REECE. Yes, sir. You are talking about a turbine engine?

Senator BAYH. Yes, sir. In other words, would it be possible to put a turbine engine in a 96-inch bus?

Mr. REECE. It would be possible to put it in, but it would be far more practical to put it in a newly constructed type of bus that is made to fit this particular engine, which is what we propose to do when the time comes. The time will come when the motor has proven itself. Our activity now is experimental, a test and fit procedure, until Ford finally gets around to say we are ready for production. When that time comes we propose to make the installation in new buses.

The answer to your question is that it could be put in a 96-inch bus, not the present 96-inch bus, which would mean a complete modification and change of that job as opposed to the 102-inch bus that would have to be changed regardless.

Senator BAYH. I didn't know whether you make engines to fit buses or buses to fit engines.

Mr. REECE. You make buses to fit engines. The simple reason is that by and large you don't make an exclusive bus engine, you make a bus engine that can be used in other things.

Senator BAYH. As a top management outfit with the credentials of Trailways, will you not be able to tell Ford Motor what the specifications are for the engine you are willing to buy?

Mr. REECE. That is not necessarily true, for this reason: You have to bear in mind the cost factor. If you go telling Ford Motor how they are going to build their engine for you and to fit your purpose, they are going to give you the bill that fits it. That may mean you don't want their engine. If you are able to adapt what they are making for the general public, we will say 10,000 engines, and you are only going to use a thousand of them, they are not going to construct that engine to fit your need and make 9,000 other customers use your specification. This is the reason I said we build the bus to fit the engine.

The ultimate aim for the mass production of turbine engines is trucks. The location and installation of an engine in a truck and location and installation in a bus are two different things.

Senator BAYH. They certainly are. Could you give us the benefit of any safety records you might have as far as your Trailway operation of 96- and 102-inch buses?

Mr. REECE. We have operated to date approximately 10 million miles.

Senator BAYH. 102-inch buses?

Mr. REECE. Yes, sir.

Senator BAYH. How does that compare with the 96-inch buses?

Mr. REECE. It doesn't compare much. We run 210 million miles a year.

Senator BAYH. 210 million miles total?

Mr. REECE. Yes, sir. This 10 million is an accumulation since the beginning of our operation of the 102-inch buses, which is two and a half years.

Senator BAYH. Do you have any safety records relative to the——

Mr. REECE. Yes, sir.

Senator BAYH. Can you give us a breakdown of that?

Mr. REECE. Yes, sir. In the 10 million miles that we have operated we have had 20 accidents reported to DOT. Of those accidents, I am talking about types of accidents which, as you perhaps know, are required to be reported if they involve more than $250 damage; or any accidents involving personal injuries and fatalities. The 20 accidents out of the 10 million miles obviously is a 500,000 miles per accident record. This is slightly in excess of our normal average record system-wide, which is in the 490,000 group. Of the 20 accidents there were seven that involved injuries. So, if you are talking about safety from the standpoint of injuries to the public, the record would be a million and a half miles per accident.

Senator BAYH. Is there any way we can compare the injuries for the 96-inch bus to the seven injuries per 10 million miles traveled for the 102-inch bus? What would be the injury record in a 96-inch bus with two times as much travel?

Mr. REECE. I did not break this down or bring those figures, but I daresay we could arrange for them. It is my opinion that you would have the same upward adjustment, if you extract it from the total number of accidents those that involved personal injuries for the system as opposed to the figure I just gave you.

Senator BAYH. Could you give us those for the record, please, plus the type of injuries involved? When you say seven injuries, is that seven accidents in which injuries occurred?

Mr. REECE. In which personal injuries occurred.

Senator BAYH. Do you know how many people were involved in each one of the accidents; could we have that also, please?

Mr. REECE. Yes, sir.

Senator BAYH. I also would like to know whether these injuries occurred only to passengers within the bus or whether they included injuries to persons in other vehicles and to pedestrians, if you please.

Do you have a breakdown as to the type and general width of highway that is used by your 102-inch bus, so that we can understand the relationship?

Mr. REECE. They are only operating in the States on the Federal highways that permit it at the present time. There are no narrow or two-lane areas involved.

Senator BAYH. In order to get the true picture it might be necessary to obtain a general breakdown, because the impact and the safety record of the 102-inch bus on a wider Interstate System might be more favorable than the safety record on some of the highways that you now travel.

Mr. REECE. This is entirely possible, because of the 10 million miles, the bulk of it accumulated in the Philadelphia-New York area. The accident record was minimal.

Senator BAYH. Any statistics you can give us will be very helpful.

(Mr. Reece supplied the following information pursuant to Senator Bayh's request.)

CONTINENTAL TRAILWAYS,
Dallas, Tex., January 6, 1972.

Senator BIRCH BAYH,
Chairman, Subcommittee on Roads,
U.S. Senate,
Washington, D.C.

DEAR SENATOR BAYH:

Question No. 1: What percentage of occupancy or load factor is required for us to break even?

Answer: Using 1970–1971 through November, our occupancy was 39.1 for 1970 and 38.5 for 11 months of 1971. Our break even point for 11 months of 1971 was 30.1. Because each period is effected by increasing costs the latter period was used.

Question No. 2: Do you have any record of passengers reaction to the use of your 102'' bus vs. the present 96'' bus and the economics involved?

Answer: We have no survey records quoting individual passenger reactions, only our operators statements that all comments from passengers have been favorable, this came with operators generally reporting to us of the 102'' bus performance.

Question No. 3: Do you have any safety records relative to the 102'' bus vs. 96'' bus?

Answer: Attached is a complete breakdown of the question asked. (See table below.)

Question No. 4: Do you have any breakdown of the type of highway which is used by your 102'' bus?

Answer: More than 60 percent of our 10,000,000 plus miles operated by our 102'' buses have been between Philadelphia and New York City using the New Jersey Turnpike, Highways 73 and 38, and Admiral Wilson Boulevard.

The New Jersey Turnpike consists of three 12 feet lanes in each direction.

Highways 73 and 38 consists of two 11 feet lanes in each direction.

Admiral Wilson Boulevard consists of four 10 feet lanes in each direction.

Balance of our miles for 102'' bus were accumulated in Kansas over U.S. 54, Kansas State 154-U.S. 50. These highways are two (2) lanes, 12 feet each.

In Colorado and Wyoming using I 25, between Trinidad and Casper. From Casper, Wyoming to Billings, Montana over U.S. Highways 20, 26, and 310, these highways are 12 feet two lane roads. Majority of other operations in Wyoming and Montana are 12 feet, two lane roads, the same is true for remaining operations in Colorado.

Yours truly,

T. S. REECE.

CONTINENTAL TRAILWAYS ACCIDENT ANALYSIS

	1970		1971 (through October)	
	102 inches	96 inches	102 inches	96 inches
Total bus miles	4,765,615	199,966,385	4,753,968	166,857,741
Total number of accidents	10	474	10	390
Miles per accident	476,561	421,870	475,396	427,840
Number of accidents with personal injuries to passengers of bus	3	126	4	144
Miles per accident with passenger injury	1,588,538	1,587,034	1,188,492	1,158,734
Number of injuries to bus passengers:				
Serious	2	7	0	22
Minor	11	180	8	175
Number of injuries in other vehicle:				
Serious	0	51	0	18
Minor	2	134	13	137

Senator BAYH. Do you have any thoughts or data about the rear view vision problem that might exist if the bus has 6 more inches in width? Is that a factor that you have considered in your studies?

Mr. REECE. No; but from experience and practical use, I don't see that you have any change in that situation. You would be using the same mirrors. You are talking about rearview mirrors?

Senator BAYH. I am thinking primarily about the problem when a bus turns, parks, and this type of thing. If there is 6 more inches of bus and the same width mirror, the same projection of the mirror, would there be a difference in the amount which can be seen on the wide bus?

Mr. REECE. I can only give you the statements of our operators, which is to the effect that they see no difference, and it creates no blind spots

if that is what you have in mind, as opposed to the present bus. They really and truly say that they see no difference, feel no difference.

Senator BAYH. Thank you very much, Mr. Reece. I appreciate your testimony.

Mr. REECE. Thank you, Mr. Chairman.

(The following is an exchange of correspondence between Senator Boggs and Mr. Reece:)

DECEMBER 15, 1971.

Mr. T. S. REECE,
President, Continental Trailways, Dallas, Tex.

DEAR MR. REECE: I was sorry to miss the hearing Monday and to hear your very interesting testimony in support of H.R. 4354. I was very interested to see, in the transcript, the discussion with various witnesses on the impact that a 102-inch bus would have on the cargo capacity of your fleet.

As a result of that discussion, I was particularly interested in testimony that was given yesterday by Mr. John DeLorenzi on behalf of the American Automobile Association. He said in part:

"Express shipments now total some 13 percent of Greyhound's transportation revenues whereas five years ago they totaled only 10 percent. That approval of a wider bus is important to the continued growth of this sector of the company's business is best illustrated by the statement in the 1970 Annual Report of the Greyhound Corporation:

> Our 102-inch-wide Supercruiser bus, with increased package-carrying capacity, began operating in additional areas of the nation under state authority. It's now running in New York and California, the nation's two most populated states, and in Canada. Authority to operate this safety-engineered vehicle on federal interstate highways is being awaited.

"The Company itself chose to emphasize its 'package-carrying capacity' rather than the passenger comfort factor."

Although this statement is directed at the Greyhound situation, I would appreciate it if you would comment on the situation as it affects Continental Trailways. When I receive your answer, I will have it included in the hearing record.

My thanks for your assistance in this matter.

With best wishes for the holiday season, I am

Sincerely,

J. CALEB BOGGS.

CONTINENTAL TRAILWAYS,
December 29, 1971.

Senator J. CALEB BOGGS,
United States Senate,
Washington, D.C.

DEAR SENATOR BOGGS: This serves to answer your letter of December 15, 1971.

I believe the enclosed will answer your questions asked concerning H.R. 4354 regarding package express capacity and volume being handled.

Our record covers the past four years and eleven months of 1971.

For your further information concerning the 102" vs. 96" cargo capacity.

We, Continental Trailways, use a "Silver Eagle" bus of our own design. The current 96" width model has 350 cubic feet of space for baggage and package express, and the experimental model 102" wide "Silver Eagle" has 372 cubic feet of baggage and package express, a difference or increase of 22 cubic feet. However, it must be stated that this increase is not available or usable in one specific spot or location, instead it is distributed around the inside perimeter of the entire carrying space of the bus which makes it hard to find or realize an increased capacity.

We are pleased with your interest in facts relating to this bill and if we can further assist, please call upon us.

Yours truly,

T. S. REECE.

Enclosure.

CONTINENTAL TRAILWAYS

Year	Passenger revenue	Percentage of total	Express revenue	Percentage of total	Total revenue
1967	$87,939,000	71.3	$15,820,000	12.8	$123,363,000
1968	94,780,000	69.8	19,817,000	14.6	135,691,000
1969	91,023,413	67.1	22,885,000	16.9	135,562,146
1970	104,817,985	67.8	26,555,147	17.1	154,558,062
1971 (November)	104,741,527	68.4	24,877,238	16.3	153,075,986

Note: Bus-miles operated 11 months of 1971, 188,033,272.

Senator BAYH. Our next witness is Mr. James L. Kerrigan, president of Greyhound Lines, Inc., accompanied by Mr. Verne Middleton, vice president, regulatory relations, Greyhound.

STATEMENT OF JAMES L. KERRIGAN, PRESIDENT, GREYHOUND LINES, INC., ACCOMPANIED BY VERNE MIDDLETON, VICE PRESIDENT, REGULATORY REGULATIONS, GREYHOUND LINES, INC.

Mr. KERRIGAN. Mr. Chairman and members of the subcommittee, my name is James L. Kerrigan. I am president of Greyhound Lines, Inc., of Phoenix, Ariz., and have served in that position since July 1970. For the past 25 years, I have been involved in the transportation of passengers and express by Greyhound.

I appear before you on behalf of Greyhound Lines, Inc., and the National Association of Motor Bus Owners (NAMBO) in support of H.R. 4354. Greyhound is the Nation's largest intercity passenger bus operator transporting about 100 million passengers a year.

Based on our experience, we are convinced that increasing the width of intercity buses from 96 to 102 inches has a substantial impact on riding comfort. The increase in comfort will be many times greater than the 6¼-percent width increase H.R. 4354 would allow. Greyhound has operated its 102-inch-wide bus more than 20 million miles on those highways where the operation of wider buses is lawful.

To date, Greyhound has manufactured 102 wider buses. These buses have been in service for almost 3 years, operating throughout Canada and in those States where the operation of such equipment is lawful. Our 102-inch-wide bus, which we call the Supercruiser, carries the same number of passengers—43—as our current 96-inch-wide Scenicruiser model. Although the luggage compartment of the wider bus is larger than the present 96-inch bus, any resulting increase in express revenue would be negligible. We have developed our new and wider bus for the sole purpose of providing more comfortable seating and to encourage more people to ride our buses. In view of the sharp curtailment of rail passenger service and increasing congestion on the Nation's highways, greater utilization of bus transportation should be encouraged.

Today, the greatest single obstacle to improving the quality of bus transportation is the 96-inch Federal width limitation applicable to the Interstate System. So long as this limitation exists, the width of passenger seats on intercity buses cannot be increased. That is because Greyhound and other large intercity bus companies operate approximately 80 percent of their total bus miles on the Interstate System.

By increasing the width of the buses from 96 to 102 inches each pair of seats can be made 2 to 3 inches wider. The average American is not only getting taller but also broader. A pair of seat cushions in a con-

ventional intercity bus is only 34 inches wide, and 17 inches are simply not adequate for the comfort of many of our passengers, especially those on a long bus trip.

Previous witnesses have pointed out that other forms of transportation, notably the airlines, are very conscious of the need for wider, more comfortable seating, and are furnishing the traveling public with wider seats. There is no justification, in our opinion, for denying to the relatively less affluent traveler by bus a degree of seating comfort comparable to that enjoyed by more affluent travelers by other modes.

In addition to providing increased passenger comfort, the additional width has enabled us to incorporate important safety features in our new MC–6 Supercruiser. For example, the air suspension support bellows have been spaced much farther apart for greatly increased vertical stability, improved sidewise stability and improved steering and handling. On our new Supercruiser, the air suspension support bellows are placed at the far outboard points of the bus—80 inches apart as opposed to 31½ inches on other coaches. The net result is increased passenger safety and comfort.

The effective brake drum area of of the Supercruiser is 11 percent greater than that of our 96-inch-wide Scenicruiser bus. The effective brake area per ton of gross vehicle weight on the MC–6 Supercruiser is 5.4 percent larger than that of the 96-inch Scenicruiser model. These are only two of the several safety improvements that were achieved in the design of our 102-inch bus.

The bill before you does not change the 18,000-pound single-axle weight limitation established by section 108(j) of the Federal-Aid Highway Act of 1956. Our Supercruiser meets this standard. In addition, our new bus is no longer, only slightly higher and only 2,000 pounds heavier than the 96-inch-wide Scenicruiser placed in service 15 years ago. Attached to my statement is a printed sheet comparing the specifications of Greyhound's 102-inch-wide bus and its 96-inch-wide Scenicruiser.

(The attachment referred to follows:)

COMPARISON OF SCENICRUISER (PD–4501) AND SUPERCRUISER (MC–6) BUS MODEL SPECIFICATIONS

Item	Scenicruiser dual level PD–4501	Supercruiser new bus model MC–6
Seating capacity	43	43.
Overall length	40 ft	40 ft.
Overall width	96 in	102 in.
Overall height	10 ft. 11¼ in	12 ft.
Weight loaded—(gross vehicle weight in pounds)	40,000	42,000.
Number of axles	3	3.
Front axle	10,735	14,000.
Drive axle	14,955	18,000.
Trailing axle	14,310	10,000.
Underfloor luggage compartment capacity (cubic feet)	344	450.
Engine horsepower, at governed speed	310	380.
Engine horsepower per ton of gross vehicle weight	15.5	18.05.
Total road contact area of tires (footprint area in square inches)	800	754.6.
Road contact area per ton gross vehicle weight (area in square inches)	40.0	35.9.
Total effective brake drum area (square inches)	1,909	2,116.
Effective brake are per ton of gross vehicle weight	95.45	100.6.
Brake size (diameter by width of drums):		
Front	14½ by 5 in	16½ by 6 in.
Rear driving	14½ by 8 in	16½ by 10 in.
Rear trailing	14½ by 8 in	14½ by 5 in.
Interior headroom at center aisle, minimum	75½ in	76¾ in.
Width between seats at center aisle	14 in	14½ in.
Width of double passenger seat	38 in	40 in.

Mr. KERRIGAN. As stated earlier, Greyhound has operated its new MC–6 Supercruiser more than 20 million miles. Our experience to date shows that the additional width is not a safety hazard.

For example, a comparison of our highway accident experience to date of the 96-inch-wide bus fleet versus the 102-inch-wide fleet shows that the operation of our 102-inch bus is significantly safer.

Mr. Chairman, I appreciate the opportunity to appear before your committee and to explain Greyhound's reasons for supporting the pending bill. I will be pleased to answer any questions which you or other members of the subcommittee may have. Before answering your questions, however, I would like Mr. Verne Middleton, vice president, regulatory relations, to present to you a 10-minute film produced for NAMBO under his supervision. This film shows the operation of 102-inch-wide buses in typical traffic situations.

Mr. MIDDLETON. Mr. Chairman, our basic reason for developing this film was to try to overcome somewhat the statements made that we were coming up with a brand new bus and it was going to be a huge thing on the highway. We want to show people they have been living with this bus for 20 years and did not recognize it.

(At this point a short film presentation was given.)

Senator BAYH. Do you have any safety records available? I asked Mr. Reece relative to the Trailways experience, and he has agreed to provide some more details. Do you have a breakdown of the safety records experienced with the 102-inch and the 96-inch bus?

Mr. KERRIGAN. Not with me today, but I will see that you have them.

Senator BAYH. I would appreciate that. Also any breakdown you could provide relative to the type of injuries.

(The information requested appears on p. 34.)

Senator BAYH. Would you care to add anything to what Mr. Reece said relative to the turbine engine and its ability to be used in the 102 vis-a-vis the 96-inch bus?

Mr. KERRIGAN. Yes, sir. We have also been experimenting with the turbine with the Detroit people and Allison over the past several years. We have had a model in operation. We will have one in passenger service right after the first of the year.

The turbine can be adapted to the 96-inch but it can be more easily adapted to 102. The 96-inch bus today is an awfully tight package, to include air conditioning, to include technological improvements it is pretty difficult. If you looked at one on a lift, you would see that it is pretty difficult.

Senator BAYH. Does Greyhound have any study of what some of the new customer comfort has done to improve use?

Mr. KERRIGAN. Yes, sir. I can tell you this. When we introduced the Scenicruiser 15 years ago the impression of the public was so significant—at that time I was managing a small bus station in Springfield, Mass., I was very close to our customers—that people would call on the phone and say, "If we can ride the Scenicruiser we will take the bus to Florida." We started to identify the schedules with the equipment. Equipment is very, very important. We do get letters from our customers. We ride the buses, ourselves, and talk with passengers. While the man on the street would not readily identify a 102 and 96

bus, our passengers can. When they get on the bus they notice the difference right away, it is roomier and more comfortable.

Senator BAYH. I notice in your statement you referred to several specific safety features of the new MC–6 Supercruiser, such as air suspension support bellows.

What is that?

Mr. KERRIGAN. It is the type of suspension system used on Greyhound buses. It is like an air doughnut. Picture three or four doughnuts on top of each other filled with air. It is a shock absorber system. We have moved that outboard.

Senator BAYH. Here again, in their relationship to 96-inch buses and 102-inch buses, since the air-support bellows system is so important, would there not be room to move them out in the 96-inch bus where they are only 36 inches apart? It would seem they could be spaced farther apart now.

Mr. KERRIGAN. It would seem so. In order to move them outboard, if we can make a bus wider, we can make a bus higher. The Supercruiser is higher by a foot than the Scenicruiser. With the ability to go up it gave us the ability to go out. Within the 96-inch package we were not able to engineer a suspension system that far out. We need greater height to do that.

Senator BAYH. Why do you need a wider bus to go higher?

Mr. KERRIGAN. Because of the stability of the bus. With 6 inches, going any higher would make it topheavy.

Senator BAYH. The center of gravity is a factor?

Mr. KERRIGAN. Yes, sir.

Senator BAYH. I have heard it argued that by widening the bus you are lowering the center of gravity, but if the height is increased also you are really ending up at the same place, aren't you?

Mr. KERRIGAN. I am not an engineer. There would be relationships. We know by going wider we are able to go higher and still maintain the balance that we need.

Senator BAYH. Does this improve or does it stay about the same?

Mr. KERRIGAN. It improves it.

Senator BAYH. Do you have any figures to give us on the relationship between the old and the new?

Mr. KERRIGAN. I can send you some information, yes, sir, and I will.

Senator BAYH. I would appreciate that.

(See p. 35 for the information requested.)

Senator BAYH. I notice in the discussion about wider brake bands, the Supercruiser has a 5.4 percent larger effective brake area per ton than of the Scenicruiser model. Is that really what we are trying to accomplish? Could that also be accomplished with the 96-inch bus?

Mr. KERRIGAN. Again, to get the larger drums we needed a little more height than we had on the 96-inch.

Senator BAYH. I notice in the attached sheet comparing the Supercruiser and the Scenicruiser one item of interest with respect to the total road contact area of tires, or the footprint area in square inches. If I read the chart correctly, it seems that in the narrower bus, the 96-inch bus, there are 800 square inches of road contact and in the Supercruiser there is only 754.6. That would lead a layman to believe

that there is not as much traction with the wider bus as with the narrower bus. How would this be related to the safety area?

Mr. KERRIGAN. If I may, I would like to have our vice president of engineering send you that in writing, explaining how the footprint and the effective brake area per gross weight of vehicle would affect it.

Senator BAYH. I would appreciate that very much.

(The information appears on p. 35.)

Senator BAYH. Could we have a breakdown for our record, please, Mr. Kerrigan, of the number of miles that the 102-inch bus is driven over various widths of highway? If you could give us that, it would be helpful in giving us a better picture of the present situation.

Mr. KERRIGAN. Yes, sir, we will include that. (See p. 35.)

Senator BAYH. Compared, of course, with the number of miles that the 96-inch bus is driven on wider versus narrower highways.

Mr. KERRIGAN. I don't think we can isolate the 96-inch fleet to just the Interstate Highway. They haxe exposures on both types of highways. The 102-inch bus is just on the wider highway. Let me give you the information I have which is available.

Senator BAYH. I think it would be helpful to us if we could get a breakdown on the type and mileage of highways the wider buses would have to use in order to reach the terminal. I recall that one picture in the film we saw of the bus passing a truck, where the commentator said there was no problem encountered. Fortunately, I was not driving either one of those vehicles or that probably would not have been the case. I wonder how many similar narrow and congested access routes will the wide buses encounter when going to terminals?

I don't know if you have that kind of data or not.

Mr. KERRIGAN. No, we do not. Of course in the film we tried to be as fair as we could in illustrating the situations. By leaving this in the film you will recognize that we were trying to show you all the extremes.

Senator BAYH. You did that.

Mr. Kerrigan, that is all for now. Thank you very much. If we have additional questions, I hope we can ask them and if you can provide additional information it will be very helpful to us.

Mr. KERRIGAN. Thank you.

(An exchange of correspondence between Senator Boggs and Mr. Kerrigan follows:)

DECEMBER 15, 1971.

Mr. JAMES L. KERRIGAN,
President, Greyhound Lines, Inc.,
Phoenix, Ariz.:

DEAR MR. KERRIGAN: I was sorry to miss the hearing Monday and to hear your very interesting testimony in support of H.R. 4354. I was very interested to see, in the transcript, the discussion with various witnesses on the impact that a 102-inch bus would have on the cargo capacity of your fleet.

As a result of that discussion, I was particularly interested in testimony that was given yesterday by Mr. John DeLorenzi on behalf of the American Automobile Association. He said in part:

"Express shipments now total some 14 percent of Greyhound's transportation revenues whereas five years ago they totaled only 10 percent. That approval of a wider bus is important to the continue growth of this sector of the company's business is best illustrated by the statement in the 1970 Annual Report of the Greyhound Corporation:

"'Our 102-inch-wide Supercruiser bus, with increased package-carrying capacity, began operating in additional areas of the nation under state authority. It's now running in New York and California, the nation's two most populated states, and in Canada. Authority to operate this safety-engineered vehicle on federal interstate highways is being awaited.'

"The company itself chose to emphasize its 'package-carrying capacity' rather than the passenger comfort factor."

In view of this statement, I would appreciate it very much if you would comment in some detail as to the expected impact on your freight should H.R. 4354 pass.

When I receive your answer, I will have it included in the hearing record.

My thanks for you assistance in this matter.

With best wishes for the holiday season, I am

Sincerely,

J. CALEB BOGGS.

GREYHOUND LINES, INC.,
Phoenix, Ariz., December 21, 1971.

Hon. J. CALEB BOGGS,
U.S. Senate, Committee on Public Works, Washington, D.C.

DEAR SENATOR BOGGS: Thank you for your letter regarding my testimony in support of H.R. 4854.

It is my opinion that the question of cargo-carrying or package-carrying capacity of the 102-inch bus has been blown up all out of proportion. Mr. DeLorenzi quoted an excerpt from The Greyhound Corporation 1970 annual report correctly. In our 1969 annual report, it was also stated:

"Greyhound's 102-inch wide Supercruiser bus—safer, more comfortable, with more spacious interior and seats and greater cargo-carrying capacity than any other bus on the highway today—will be authorized to operate in 27 states on passage by the U.S. Congress of necessary pending legislation."

This statement was merely part of the message carried in our annual reports telling our stockholders about new or pending developments. Certainly the message in the 1969 report stressed the "passenger comfort factor."

Package express revenue is very important to Greyhound. In fact, in 1970, express revenue amounted to 14.5% of our total operating revenue. However, the relative importance of passenger and express traffic is evident when we consider that express revenue in 1970 was $62,136,000 and passenger revenue was $325,537,000.

But our 102-inch wide bus was not designed for the purpose of handling increased volumes of express; it was, as we have testified, designed for increased passenger comfort.

The cargo compartments on our buses are used for the transportation not only of package express, but also of passengers' baggage, mail, newspapers and company supplies. The size of the compartments has varied from year to year with the model of buses.

For example, the Scenicruiser Model 4501, made in 1954–1956, has 316 cubic feet of space. Model MC–5A, made in 1965–1968, has 212 cubic feet; Model PD–4107 made in 1966–1967, has 283 cubic feet; and Model MC–7, which is currently our first-line bus, has 325 cubic feet of compartment space.

Even though our express traffic is important, it is only incidental to our principal activity which is carrying passengers and our buses are designed with this relationship in mind.

Actually, the increased baggage and express space on the 102-inch bus is the result not so much of the added six inches of the compartments, as the added height of the compartments, which is brought about by raising the passenger compartment approximately 14 inches higher from the ground than present buses. This enabled us to increase height of the compartments from 28 inches on Model MC–5A buses and 35 inches on MC–7 buses to a height of 54 inches in two-thirds of the compartments and 46 inches in one-third of the compartments on Model MC–6.

As stated above, our Model MC–7 buses have 325 cubic feet of compartment space. On practically all schedules this space is more than ample to handle all passengers' baggage, mail and express offered. Since we, in most instances, operate frequent schedules, should an unusually large volume of express be presented for transportation, that which could not be handled on the first schedule out is put on the next schedule with very little delay. Certainly, any problem we might

occasionally encounter in handling all express offered would not justify our spending hundreds of thousands of dollars developing a wider bus.

Greyhound's purpose in designing and engineering the 102-inch bus is to provide our customers with a safer, more comfortable bus ride. We can only expect to recover this additional investment if this improvement in customer service attracts added passengers. The new bus has the same number of seats as the Scenicruiser we are presently operating. We could not begin to justify the new bus in the basis of added package revenue. Very frankly, this is an honest effort on the part of our industry to offer improved service.

Thank you for writing.

Sincerely,

JAMES L. KERRIGAN.

(Pursuant to Senator Bayh's request Mr. Kerrigan supplied the following information:)

To clearly define the information requested, we have taken the liberty of restating the questions. All statistical information submitted is for the year 1970, which is the last complete calendar year available and is representative of our experience for the operations involved. The questions are as follows:

1. What are the total number of accidents reported to the D.O.T. involving the 102-inch bus?

Response

Six accidents were reported to D.O.T. in 1970.

2. What is the accident injury experience of the 102-inch bus versus the 96-inch bus including the number of persons involved whether or not these persons were in the bus or the other vehicle?

Response

In 1970 our 102-inch bus operated 3,100,000 miles and was involved in three injury accidents, which produced two injuries on the bus (one minor and one serious) or an average of 550,000 miles per injury. This involved a total of 97 persons including bus drivers on the bus and three other persons not in the bus.

Our 96-inch fleet average is 348,500 miles per injury. We were not able to determine the number of accidents that produced this number of injuries or evaluate their severity from our current records without reviewing each claim file individually, a tabulation which would entail costly excessive manhours.

The difference in the two figures reflects in part the benefits our passenger receives from many of the built-in safety features of the Model MC–6, 102-inch bus; for example, passengers are above any collision impact area, and the fact that our operation of the 102-inch bus is largely confined to those limited access, divided highways where we are allowed to operate.

3. What is the general accident experience of the 96-inch bus versus the 102-inch bus?

Response

Greyhound began highway operation of the MC–6, 102-inch bus in July, 1967 and to date has operated in excess of 20,000,000 miles. The MC–6 bus current accident frequency rate is 3.55 accidents per million miles traveled. The 96-inch fleet accident rate during the comparable period of time was 5.13 accidents per million miles traveled. Based on this information, it is apparent that there is no adverse safety affect to the traveling public as a result of wider buses, and in fact, the wider bus has proved to be safer and should continue to be so with expanded authority to use them with an Interstate Highway System, the safest highway system ever built.

4. Provide a breakdown on the type of highways presently used by the 102-inch wide bus and lane width.

Response

Attached in Exhibit "A" are descriptions setting forth geographical areas and highways presently being utilized for the operation of the 102-inch bus and to our best knowledge, all routes used by us in the operation of this bus have twelve foot lanes.

5. Why is it not possible to provide a comparable improved braking system on our 96-inch bus that we have incorporated in the 102-inch bus?

Response

The MC–6 (102-inch) bus because of its additional width has larger tires (13.50 x 24.5) on the front and drive axles. The larger tires and wheels permit the use of larger 16½ x 6 inch brakes. The 96-inch bus has 14½ x 5 inch brakes. The table below lists the full comparison.

	102-inch	96-inch
Front	16½ x 6	14½ x 5
Drive	16½ x 10	14½ x 8
Trailing	14½ x 5	14½ x 8

Without the larger brakes made possible by the added width, we cannot have a comparable brake system.

6. What is the stopping distance of 102-inch and 96-inch buses?

Response

Available data indicates the approximate stopping distance required to stop a 96-inch bus from 60 m.p.h. is 200 feet. The distance required by the 102-inch bus is 190 feet. The improvement is the result of an increase in the total effective brake drum area, 2,116 square inches in the 102-inch bus versus 1,909 square inches in the 96-inch bus, which produces a better ratio of effective brake drum area per ton of gross vehicle weight (100.6 for the Supercruiser versus 94.45 for the Scenicruiser).

7. What is the center of gravity location of the 102-inch bus versus the 96-inch bus and why the difference?

Response

The 96-inch bus is 129 inches high which places the center of gravity at 49.5 inches from the ground or 38.3 percent of height.

The 102-inch bus is 144 inches high which places the center of gravity at 55 inches from the ground or 38.1 per cent of height.

8. The 96-inch bus has 800 square-inch of tire footprint area and the 102-inch Supercruiser has 754.6 square-inch tire footprint area. What is the relationship of footprint area to traction and improved safety performance?

Response

The difference in total square-inch of tire footprint area is due to the number of wheels involved between the Supercruiser and Scenicruiser. The Supercruiser has 8 wheels (tires) versus the Scenicruiser with 10 wheels (tires). As a result of the additional width of the 102-inch wide bus, we were able to achieve better distribution of weight which eliminated the need for four wheels on the trailing axle of the Supercruiser which has only two wheels on the trailing axle. However, the key to improve traction performance is in the improved braking achieved as discussed in responses 5 and 6 above.

EXHIBIT "A"

GREYHOUND LINES—EAST

The following is a description of the routes utilized in connection with the operation of MC–6 Buses (102'' wide).

New York City-Chicago (1967–68)

From New York City via the Lincoln Tunnel and N.J. State Route 3 to interchange 16 of the New Jersey Turnpike, thence to interchange 6, thence over Pennsylvania, Ohio, and Indiana Turnpikes to Ill. State line, thence via I–90 (Chicago Skyway and Dan Ryan Expressway) to Chicago and return over same route.

New York City-Chicago via New Jersey, Pennsylvania, Ohio and Indiana Turnpikes (1969 to date)

New York City access route—From New York City via the Lincoln Tunnel and N.J. State Route 3 to Interchange 16 of the New Jersey Turnpike.

Philadelphia access route—From Interchange 4 of the New Jersey Turnpike via New Jersey Highway 73 to New Jersey Highway 38, thence via New Jersey Highway 38 to US 30, thence via US 30 to Philadelphia. From Philadelphia via I–76 (a) (Schuylkill Expressway) to the Pennsylvania Turnpike. Willow Grove access route—From Pennsylvania Turnpike at Willow Grove Interchange #27 via US 611 to Willow Grove and return over same route.

King of Prussia access route—From King of Prussia Interchange #24 via I–76 (a) to US 202 and thence via US 202 to King of Prussia shopping center.

Harrisburg access route—From Highspire Interchange #19 via I–283 (a) to I–83 (a), and thence via I–83 (a) to Harrisburg. From Harrisburg via I–83 (a) to US 11, and thence via US 11 to US 15, to Gettysburg Interchange #17 of the Pennsylvania Turnpike. Also from Harrisburg via I–83 (a) to US 11, and thence via US 11 to Carlisle and return from Carlisle via US 11 to the Carlisle Interchange #16 of the Pennsylvania Turnpike.

Breezewood Access route—Via Pennsylvania Turnpike Interchange #12 access route to US 30 and thence via US 30 to Breezewood and return over same route.

Pittsburgh access route—From Pittsburgh Interchange #6 of the Pennsylvania Turnpike via I–75 (a) to Pittsburgh. Also from Irwin Interchange #7 of the Pennsylvania Turnpike via US 30 to US 19, approximately 3 miles south of Wexford, and thence via US 19 to Perry Highway Interchange #3 of the Pennsylvania Turnpike.

Cleveland access route—From Brecksville Interchange of the Ohio Turnpike via US 21 to Cleveland. Also from Brecksville Interchange via US 21 to Miller Road in Brecksville, thence via Miller Road to I–77 (b), and thence via I–77 to Rockside Road in Independence, thence via Rockside Road to US 21, thence via US 21 to Cleveland. From Cleveland via I–71 (b) to the Strongsville Interchange of the Ohio Turnpike.

Chicago access route—From the Indiana Turnpike at the Indiana/Illinois state line and Chicago city limits via Chicago Skyway and Dan Ryan Expressway into downtown Chicago.

Philadelphia-Scranton via Pennsylvania Turnpike

Philadelphia access route—From Philadelphia via I–76 (a) (Schuylkill Expressway) to the King of Prussia Interchange #24 of the Pennsylvania Turnpike.

Wilkes-Barre access route—From Pennsylvania Turnpike Interchange #36 via Pennsylvania Highway 115 to Wilkes-Barre, and then return from Wilkes-Barre via Pennsylvania Highway 115 to I–81 (a) and thence via I–81 (a) to Scranton.

Washington-Annapolis

From Washington via US 50 to Annapolis. Also from Washington via Maryland Highway 214 to Maryland Highway 2 and thence via Maryland Highway 2 to Annapolis. Also from Washington via US 50 to Maryland Highway 3, thence via Maryland Highway 3 to Maryland Highway 450, thence via Maryland Highway 450 to Annapolis.

Detroit-Metro Airport

From Detroit via Business Route I–696 (c) John C. Lodge Expressway to I–94 (c) thence via I–94 (c) Edsel-Ford Expressway to Detroit Metro Airport.

New York City-Buffalo via New York Thruway

New York City access route—From New York City via Lincoln Tunnel and N.J. State Route #3 to Interchange #17 of the New Jersey Turnpike and thence via New Jersey Turnpike to Interchange #18, thence via US 46 to New Jersey Highway 17, thence via New Jersey Highway 17 and New York Highway 17 to Suffern Interchange #15 of the New York Thruway.

Albany access route—From Albany downtown Interchange 23 of the New York Thruway via I–781 (d) to downtown Albany and return over the same route.

Schnectady access route—From Schenectady east Interchange #25 of the New York Thruway via I–890 (d) to Schenectady. From Schenectady via New York Highway 5S to Schenectady west Interchange #26 of the New York Thruway.

Fultonville access route—From Fultonville Interchange #28 of the New York Thruway via the Interchange access road to the agency which is located immediately next to the interchange on New York Highway 30A.

Utica access route—From Utica Interchange #31 of the New York Thruway via New York Highway 8 to downtown Utica.

Syracuse access route—From Syracuse north Interchange #36 via I–81 (d) to Syracuse. From Syracuse via I–690 (d) to Syracuse west Interchange #39.

Rochester access routes—From Interchange 45 of the New York Thruway via New York Highway 96 and I–490 (d) to Rochester. From Rochester via I–490 (d) to Interchange #47 of the New York Thruway.

Buffalo access routes—From Interchange #51 of the New York Thruway via New York Highway 33 Kinsington Expressway to Buffalo.

Atlanta-Miami

From Atlanta to Macon via US 41 or US 23. From Macon via US 23 to Jacksonville. Also from Macon via US Highway 129 to Georgia Highway 32 and thence via Georgia Highway 32 to US Highway 23 and thence via US Highway 23 to Jacksonville. Also from Macon via US Highway 129 to Georgia Highway 32, thence via Georgia Highway 32 to Georgia Highway 158, thence via Georgia Highway 158 to US 82, thence via 82 to US Highway 23, thence via US Highway 23 to Jacksonville. From Jacksonville to Miami via US Highway 1. As an alternate route from Fort Pierce via Florida Highway 70 to the Sunshine Parkway, thence via the Sunshine Parkway to Florida Highway 838, thence via Florida Highway via 135th Street to I-95 (e) and thence via I-95 (e) to Miami. Also as an alternate route between Jacksonville and Daytona Beach via I-95-(e) and US 1.

References

(a) Operation permitted by prior law permitting operation of 102″ buses to approval by Pa. PUC.
(b) Operation of 102″ buses permitted by statute in contiguous communities.
(c) Operation of 102″ buses permitted within 25 miles of Detroit metropolitan area.
(d) Operation of 102″ buses permitted under annual permit issuance.
(e) Operation of 102″ buses permitted in 1969 by special permit issued by State of Florida.

GREYHOUND LINES—WEST

The following is a description of the routes utilized in connection with the operation of MC-6 buses (102″ wide).

1968

San Francisco, Cal.—Reno, Nev. via U.S. Highway 40 and interstate 80.

1969

None.

January thru May 1970

San Diego, Calif.—San Ysidro, Calif. Via US 101.
Fargo, N.D.—Winnipeg, Can. via US 81, ND 5 and Manitoba 75.
San Francisco, Calif.—Novato, Calif. via US 101.

June thru November 19, 1970

San Diego, Calif.—San Ysidro, Calif. via US 101.
Fargo, N.D.—Winnipeg, Can. via US 81, ND 5 and Manitoba 75.
San Francisco, Calif.—Novato, Calif. via US 101.
San Francisco, Calif.—San Jose, Calif. via US 101.

November 20, 1970 to Date

San Francisco, Calif.—Los Angeles, Calif. via US 101.
Fargo, N.D.—Winnipeg. Can. via US 81. ND 5 and Manitoba 75.

GREYHOUND LINES OF CANADA

The following is a description of the routes utilized in connection with the operation of MC–6 buses (102″ wide).

1969

Sudbury, Ont.—Calgary, Alta. via Trans-Canada Highways 17 and 1.
Calgary, Alta.—Vancouver, B.C. via Trans-Canada Highway 1.
Edmondton, Alta.—Calgary, Alta, via Alta. Highway 2.

1970

Sudbury, Ont.—Calgary, Alta. via Trans-Canada Highways 17 and 1.
Calgary, Alta.—Vancouver, B.C. via Trans-Canada Highway 1.
Edmonton, Alta.—Calgary, Alta. via Alta. Highway 2.

1971

Sudbury, Ont.—Calgary, Alta, via Trans-Canada Highways 17 and 1.
Calgary, Alta.—Vancouver, B.C. via Trans-Canada Highway 1.
Edmonton, Alta.—Calgary, Alta. via Alta. Highway 2.
Toronto, Ont.—Detroit, Mich. via Ontario Highways 2 and 98, MacKenzie—Cartier Freeway, and Detroit-Windsor Tunnel.

Senator BAYH. The next witness is Mr. Robert F. Thompson, president of the Vermont Transit Co., Inc., Burlington, Vt.

STATEMENT OF ROBERT F. THOMPSON, PRESIDENT, VERMONT TRANSIT CO., INC.

Mr. THOMPSON. Mr. Chairman and members of the subcommittee. My name is Robert F. Thompson and my business address is 135 St. Paul Street, Burlington, Vt. 05401. I am president of Vermont Transit Co., Inc., and have held that position for 24 years. For the past 40 years I have been involved in the transportation of passengers by bus in Vermont and northern New England.

My appearance today is on behalf of Vermont Transit and the National Association of Motor Bus Owners. Vermont Transit's operations cover most of Vermont, much of New Hampshire, and portions of Massachusetts, Maine, and New York. In cooperation with connecting carriers, we provide through coach service without change of coach to Montreal and Scherbrooke, Canada, and from points in Vermont to major cities in southern New England and to New York City. An associated company, Burlington Rapid Transit Co. provides local bus service in Burlington, Vt., and vicinity.

Vermont Transit is a medium-sized, independent, privately owned and unsubsidized bus line. None of its stock is owned by any other bus line or corporation, nor is its stock traded on any exchange or over the counter. Ours is a small enterprise with a proud history of public service and a continuing desire and determination to give our customers the most convenient and comfortable bus service that it is possible to provide.

We have 212 employees; operate 52 intercity buses and five station wagons; and had gross operating revenues of $4,080,531 in 1970. Vermont Transit provides the only public passenger transportation service to a very substantial majority of the cities and towns along its routes. There is no rail passenger train service in Vermont, New Hampshire, or Maine. Only a few cities are served by air and, except at Burlington, schedules are infrequent.

Although Vermont Transit's service is essential in Vermont and its neighboring States, our future depends largely on our ability to compete with the private automobile. We can compete effectively on the basis of cost and our travel time disadvantage is not too great. However, we are seriously handicapped by our inability to offer prospective passengers a measure of comfort comparable to that of the private automobile. Even the Volkswagen has front seats which are 2½ inches wider—19½ inches—than our bus seats—17 inches.

Intercity bus operators have been competing with the private automobile for many years and, as the congestion on highways will show, it has been a losing battle. Although Vermont Transit and most other intercity bus companies have earned modest profits over the years, steadily rising costs are becoming progressively harder to absorb or to pass along to the traveling public.

If the service of small- and medium-sized intercity bus operators are essential—and they are in the rural areas we serve—the way to preserve them is to increase average ridership by two or three passengers per bus mile. This means that passengers must be offered a more comfortable ride. An increase of 1½ inches in the width of a seat may seem negligible, but it is vitally important to the future of the intercity bus industry.

I do hope, Senator Bayh, before you leave the room you will take the opportunity to sit in the 17-inch-seat and in the large 102-inch bus seats that are on display here. If you don't believe there is a difference—undoubtedly you have tried five abreast coach seating in an airliner as against six abreast. I had the occasion to fly to the coast about 2 months ago. I went out in six abreast coach seating and returned in five. I can vouch for the fact that there is a real difference in comfort.

Attached to my statement are excerpts from a study made by American Seating Co. in 1968 on the trend toward installing wider seats in theaters, stadiums, and other public places. As shown in that study, Americans have been growing taller, with a corresponding increase in breadth. For example, from 1935 to 1957 the average height of students entering Amherst College and Yale University increased three-fourths of an inch and their average weight by 18 pounds. Because of this physiological trend, the 17-inch seat in public places and conveyances has been rendered obsolete. For example:

Seats at Robert Kennedy Memorial Stadium are 18½ inches wide. Those at National Theater are 18 inches wide. 1971 Ford Mustang seats measure 22 inches at their widest point. Coach seats on the Amtrak Penn Central Metroliner are 18¾ inches wide.

Passenger seats on intercity buses are only 17 inches wide, and cannot be made wider in a 96-inch-wide bus.

(The attachment to Mr. Thompson's statement appears on p. 40.)

In recent years intercity rail passenger train service has been sharply curtailed. The number of intercity passenger miles of class I railroads declined from 17.5 billion in 1959 to 6.2 billion in 1970, a decrease of almost two-thirds. Almost three times as many bus passenger miles, or 17.3 billion, were performed in 1970 by class I motor carriers. The intercity bus industry today serves 40,000 communities and provides the only scheduled passenger transportation service for most of them.

Buses provide the only economically feasible service for millions of low-income people, a service preferred by many for relatively short distances, and a service generally preferred by persons traveling in a group. Each bus which is filled means 20 to 25 fewer automobiles on highways which are becoming progressively more congested. Unfortunately, the inherent economic and service advantages of bus transportation cannot be fully realized until passengers are provided greater comfort than is now possible under the 96-inch limitation on maximum width.

Airline coach seats in six-across seating are about 17 inches wide, the same width of the seats on a 96-inch-wide bus. The difference, of course, is that the average bus passenger must remain seated for a much longer time than the traveler by air. Also, since airline passengers are able to leave their seats for short periods of time, they are less likely to become fatigued.

The importance of several additional inches in width is shown by the advertising of airlines and the efforts of some air carriers to require the imposition of a surcharge for coach seats 2½ inches wider than the conventional six-across seats. United Airlines, for example, widely advertises its five-across coach seating which provides a seat cushion width of 19.3 inches as opposed to the conventional 16.8 inches. TWA and several other airlines have urged the Civil Aeronautics Board to require a fare differential for the wider coach seating offered by United on some of its flights.[1]

An additional inch or inch and a half in the width of bus seats may seem unimportant but this additional space would do much to insure the continuance of essential intercity bus service in northern New England and in many other parts of the United States.

I appreciate this opportunity to appear in support of H.R. 4354 and I will be happy to try to answer any questions you may have.

Thank you.

(The attachment to Mr. Thompson's statement referred to on p. 39 follows:)

SOME CONSIDERATIONS ABOUT SEATING: EXCERPTS FROM A STUDY MADE BY THE AMERICAN SEATING CO., GRAND RAPIDS, MICH.

There is considerable evidence to confirm the fact that people are demanding more sitting room for whatever seating requirements they have. It is particularly notable when considering auditorium and stadium chairs that the trend is towards wider more comfortable seats. The 17" and 18" seat that was used 20 or 25 years ago is obsolete and even the 19" seat is found only occasionally and then usually only because space requirement dictates the use of a few of these narrow sizes. Most auditoriums are concentrating on 20", 21" and 22" seats to give the public what is demanded. Obviously in an auditorium increasing the width of the seat decreases the capacity for a given area but the objections to narrow seats has been sufficient to overcome objections to the extra space required.

The reasons for the increased width of seats are, first, people are getting bigger and their bodies take up more space and, secondly, people are demanding more comfortable seating; the width of the seat is a major contributor to the comfort that can be built into the seat.

Considerable data has been collected and serves to prove the fact that both children and adults are getting bigger. In a pamphlet published by the United States Department of Agriculture entitled, "Heights and Weights of Adults in the United States", Home Economics Research Report #10, measurements have been tabulated of a number of groups showing this increase over the years. One of the interesting charts in this book shows the increase in height and weight of students entering Amherst and Yale Universities for many years. Throughout this research report many records prove the increase in weight which is, of course, a big factor in the comfort of the person seated. I have shown a chart of this collected data to accompany this report. One of the interesting figures shown is that in 20 years—from 1935 to 1957 the average student increased ¾" in height and about 18 pounds in weight.

Another interesting publication bearing on this subject is "Weight, Height and Selected Body Dimensions of Adults in the United States—1960–1962. This is a publication by the Public Health Service No. 1000–Series 11–No. 8. In this

[1] Domestic Passenger Fare Investigation—Phase 6A—Seating Configuration, C.A.B. Docket No. 21866–6A.

study a nationwide probability sample of 7,710 persons in the 18 to 79 age bracket was selected, and a vast amount of anthropometric data was tabulated. Interestingly enough they show seat breadth for men averaging 14'' and a seat breadth for women averaging 14.4''. This is one of the few body measurements in which women exceed men. Also they go on to point out that the increase in size to the middle age maximum is slightly greater in women than for men. However, seating cannot be designed for averages and to use average dimensions is misleading when considering adequate seat width.

In this same publication they show that to the 95 percentile men measure 16'' in seat breadth and to the 99 percentile 17.4''. For women in the same range—95 percentile 17.6'' and the 99 percentile 19''. The man reaches maximum seat breadth in the ages 25 to 34 whereas the woman attains this width somewhat later in life in the age brackets of 45 to 54. Since the usual seat in an inter-city bus measures approximately 34'' between the two arms, it can readily be seen that two women in the upper ranges of these dimensions would be squeezed in quite tightly in such a seat. For example, to accommodate larger women the seat just does not have enough breadth to even give them minimal sitting space. This publication from the U.S. Department of Health, Education & Welfare on page 21 makes an interesting observation and I quote it in the next paragraph as it appears there.

"Changes in body size have been taking place throughout the course of human evolution, but various studies, some of which are cited here, indicate that these changes may have been sufficiently accelerated in very recent times to cause significant differences in anthropometric surveys made only a few years apart. An indication of this trend is afforded by a comparison of Army inductees measured at three different times over the past 40 years. Inductees during World War II were 0.67 inches taller and 10.7 pounds heavier than the inductees of World War I. Inductees measured during 1957–58 were 0.50 inches taller and over 7 pounds heavier than the World War II inductees, thus making a total increase from 1917–18 to 1957–58 of about 1.2 inches and 19 pounds.

"The same trend toward increased body size is also suggested in civilian studies. In two successive generations of Harvard students from the same families, the sons were 1.3 inches taller and 10 pounds heavier than their fathers were at the same age. A more recent study suggests that the average height of college students is continuing to increase."

Obviously from the statistics we can conclude that bus seats allow an inadequate width for many persons today and it is reasonable to believe that the changes that have been recorded in body dimensions and the increases shown will continue. If we think in terms of the future the tight conditions existing today will become even more serious as time goes on.

For comfort it is not adequate just to provide a minimal sitting breadth. A person cannot be comfortable when restricted from movement. For long periods of sitting such as is the case in inter-city bus travel there should be opportunity for freedom of movement without the necessity for standing which, of course, in itself would be hazardous.

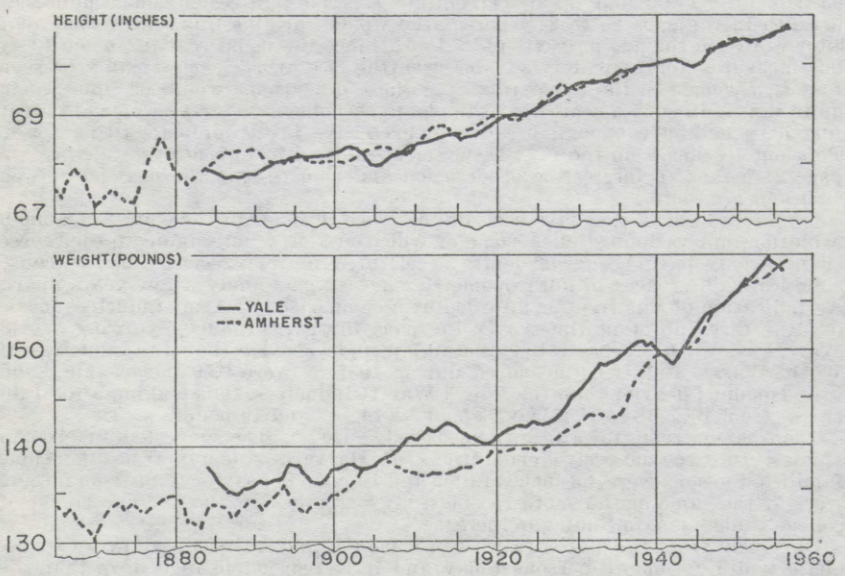
We have been considering a seat breadth primarily, but another factor is shoulder width. In a bus seat installation the seats are placed close to the wall in order to give sufficient aisle space. The person seated at the wall side of the bus quite often has interference at the shoulder level and lacks freedom of movement of the upper torso, when both seats are occupied, because the shoulder of the person seated next to him severely confines him.

One of the important factors in seating fatigue is time. If we compare the relatively short time that a person sits in the theatre, perhaps an hour and a half or two, with the longer time that he is likely to sit in a bus, sometimes as much as six or eight hours, it becomes evident that unless the bus seat is comfortable, sitting fatigue is a serious factor. If the seat is so confining that there is no chance to shift a little in the seat to change the pressure on the sensitive popliteal area and the buttocks, then fatigue sets in quite rapidly. A wider cushion whether it is flexible foam or foam supported on springs, can be designed to give a much more comfortable cradling effect than a narrower cushion. It might be interesting to remember that the airlines have recently been subject to criticism because of the relatively narrow seats that are provided in the tourist section of the cabin. The first class passengers get a very comfortable wide seat, 24 inches sometimes. Railroad seating too provides much wider seating per passenger than bus seating. In the case of the bus seat the vehicle size and the aisle width determine the sitting space so restrictively that some increase

in the vehicle width is a real necessity before major improvements in sitting comfort can be made.

All the available data seems to corroborate the fact that people are getting larger and need more sitting space and that this trend will continue. The seat width that might have been adequate for the ancient knight whose stature was that of the boy of today is inadequate for a large percentage of the bus travelers of 1968 and will be more inadequate in the years ahead.

B. W. HENRIKSON,
Vice President, Research and Development.



SERIAL HEIGHTS AND WEIGHTS OF STUDENTS ENTERING AMHERST COLLEGE AND YALE UNIVERSITY FROM 1861 to 1957.

Source: "Heights and Weights of Adults in the United States"
Home Economics Research Report No. 10
Agricultural Research Service
United States Department of Agriculture

Senator BAYH. Thank you very much, Mr. Thompson.

You pointed out that the No. 1 challenge which confronts a company such as yours is to compete with the passenger car. I just wonder whether the width of seat and comfort are the compelling reasons to use a car rather than a bus, or whether it is mainly convenience?

Mr. THOMPSON. Well, there are various factors, Senator Bayh. Obviously, convenience is one factor. That is particularly true in the very short haul market for distances up to 15 or 20 miles, for shopping, for a doctor's appointment, and whatnot. That is why, very frankly, I think the local and suburban and short-haul business has been so hard hit nationwide.

In the case of our small operation, the backbone of our business years ago consisted of hauls of 1 to 15 miles. As a matter of fact, I can remember when our average length of ride on an intercity operation was 15 miles. It consisted of people going into town to shop or to go to doctors' appointments. Since World War II that business is gone. We know we have lost it. We could run every 5 minutes and we still would not carry enough passengers to support it. Fortunately what has taken place in the meanwhile is that we have become a much more

effective competitor of the automobile, and to an extent the airlines for people who are traveling 150, 200, 250 miles, perhaps up to 300 miles. There are any number of cases of that. Our passenger traffic, for example, between Burlington, Vt., and Boston, Mass., has measurably increased since we have been able to offer passengers the comfort of an air-conditioned bus, a restroom equipped bus, and, due to the interstate system, the ability to read a newspaper while you travel, which was never true before. The one thing that we keep hearing, however, over and over and over again is, "Your darn seats are too crowded." This is particularly true from the business traveler who wants comfort, who is used to it because he travels by air a good bit of the time, or else he drives his own car. We can make a dent in this market if we are given the tool of an additional inch or inch and a half in seat width.

Senator BAYH. Does your company operate 102-inch buses now?

Mr. THOMPSON. No, sir.

Senator BAYH. You are confined to the 96-inch buses. I was wondering—I might ask Mr. Kerrigan and Mr. Reece or their representatives—if you could provide for the record any benefit of efforts made by Trailways and Greyhound to relate the size of the bus to the width of the highway. I would appreciate that. I don't know if that is possible, with schedules commingled with interstate routes and access to terminals.

Have you given any thought to the safety factor, Mr. Thompson?

Mr. THOMPSON. Yes, sir. I was delighted to hear you open this hearing with the statement that the committee was going to give great consideration to the safety factor. I can assure you that I would not be here today if I were not personally convinced that the 102-inch bus not only will not be unsafe, but will be safer than the 96-inch bus. Now our company has not operated these and I can't speak from personal experience, but I have watched and kept in close contact with the experience of others. When I started in this business years ago we operated 96-inch buses, in 1931 we operated 96-inch-wide buses on 18-foot roads, 9-foot traffic lanes, with safety. The highways have improved, the buses have improved over the years. I have no doubt that you can operate 102-inch buses safely on modern highways. Nobody is suggesting that we are going to operate these on little narrow backhill roads any more than we operate 96-inch buses on that type of highway.

Senator BAYH. Of your 52 intercity buses, are they all 96-inch?

Mr. THOMPSON. Yes. The only thing in addition to that are the five station wagons we operate on feeder routes.

Senator BAYH. Is it fair to assume that a company of your size probably could not afford the luxury of different width buses to meet different width highways? I am trying to learn whether in your part of the country in particular, there are a number of scenic roads, the topography is such that the roads often are not straight, and the scenery is beautiful—I have seen that from first-hand experience—if you should adopt the 102-inch bus, all of your buses will probably have to be 102-inch, will they not?

Mr. THOMPSON. Not necessarily.

Senator BAYH. Remember, if you are going to compete with the passenger car and the complaint, as you said, is that your seats are too narrow, would you not have to use the larger bus?

Mr. THOMPSON. I am aware of that, sir. I also am aware of the fact from long experience that interchangeability of equipment is a highly desirable objective. But today, to use your words, we afford the luxury of some buses which are 40 feet in length and others which are 35 feet in length. I don't believe that we would ever eliminate 96-inch buses entirely from our operation.

These station wagons that I mentioned, we are probably unique among most intercity bus lines in operating them, but we are doing it to provide a measure of public service to a community which has no other public passenger transportation. Frankly, we are doing it at a loss.

Senator BAYH. What percentage of your miles traveled is on interstate and what percentage is on noninterstate?

Mr. THOMPSON. I haven't had occasion to compute that exactly. I will be happy to submit an exact figure. I would estimate about 50 percent of our total operated mileage is on the State highway system. That is not 50 percent of our route mileage. But where the interstate has been completed, our service is much more frequent.

Senator BAYH. Thank you very much, Mr. Thompson. If you could give us some additional information specifically about the relative percentage of your routes that are interstate and otherwise I would appreciate that.

Mr. THOMPSON. I will be happy to submit that for the record, Mr. Chairman.

Thank you.

(Mr. Thompson subsequently supplied the following information:)

While we do not regularly keep a breakdown of the mileage which we operate on the Interstate System as against other roads, I have had a special check made and find that on the basis of our October 12, 1971 timetable which was in effect at the time of the hearing, 39.27% of our scheduled first section mileage was on the Interstate System, 9.28% was on comparable super highways and 51.54% was on other roads.

I believe that on a year round basis the percentage of miles operated on the Interstate System and comparable highways would be higher since (1) much of our charter operations (which are not reflected in the above figures) are over the Interstate System and comparable super highways, (2) throughout the year we operate more extra sections on trips which are routed via the Interstate and comparable super highways, and (3) during the summer months we schedule additional service, much of which is via such highways.

Senator BAYH. Our next witness is Mr. W. J. Bierwagen, director of public affairs, Amalgamated Transit Union, and he is accompanied by Mr. Ellis Franklin, chairman of the National Council of Greyhound Divisions.

STATEMENT OF W. J. BIERWAGEN, DIRECTOR, PUBLIC AFFAIRS, AMALGAMATED TRANSIT UNION; ACCOMPANIED BY ELLIS B. FRANKLIN, CHAIRMAN, NATIONAL COUNCIL OF GREYHOUND DIVISIONS

Mr. BIERWAGEN. My name is Walter J. Bierwagen, with offices at 5025 Wisconsin Avenue NW., Washington, D.C. I am a mem-

ber of the general executive board, and serve as director of public affairs of the Amalgamated Transit Union, AFL–CIO. My appearance here is on behalf of the 130,000 members of the Amalgamated Transit Union which is under the direction of International President John M. Elliott, and I am also here under his direction.

The Amalgamated Transit Union is the dominant union in the local transit and over-the-road bus industries. This union, through its various local divisions and councils, represents, for collective bargaining purposes, every Greyhound busdriver in the United States and Canada; a substantial number of Trailways drivers, and the operating employees of scores of other over-the-road systems. In addition, we represent over 105,000 members engaged in the local transit industry, most of which, as you know, is bus.

Appearing with me today is Ellis B. Franklin, the principal officer of the National Council of Greyhound Divisions. The council is made up of all of our Greyhound local divisions operating east of the Rockies. Mr. Franklin will also present a statement to the committee in support of H.R. 4354.

The Amalgamated Transit Union supports the request of our industry employers for legislation permitting the use of 102-inch wide buses on the Interstate System, where allowed by the individual States. For many years, members of the ATU have been operating 102-inch wide buses in many of the principal cities throughout the country. There have been no reports coming to our office indicating that our members have difficulty with these wider buses or that the buses present a hazard to the riding or driving public.

Further, many of our members employed by the over-the-road carriers have been driving 102-inch buses over certain parts of the Interstate System for some time now, also with no adverse effect and without a greater incidence of accidents, so far as we know. Mr. Franklin will speak to that in his statement, since that falls more directly into his field of expertise and competency.

We read carefully the industry position paper, and other earlier statements regarding the use of 102-inch buses. Without attempting to embrace their supportive statements and documentation as our own, suffice it to say the Amalgamated Transit Union fully supports the position of our industry employers on the issue of permitting the use of 102-inch-wide buses.

In order to accomplish this objective, we respectfully urge the committee to report favorably on H.R. 4354 and to seek and support its enactment into law.

Mr. Chairman, in closing, we wish to thank the committee for permitting us to thus express our views on this legislation. We appreciate it.

Senator BAYH. Mr. Franklin, you may proceed with your statement.

STATEMENT OF ELLIS B. FRANKLIN

Mr. FRANKLIN. Thank you, Mr. Chairman.

My name is Ellis B. Franklin. I serve as chairman of the National Council of Greyhound Divisions of the Amalgamated Transit Union, AFL–CIO. My address is 1 Public Square Building, Cleveland, Ohio 44113.

The National Council which I have the honor to represent is composed of local divisions whose members are employed by the Greyhound Corp. as drivers and other employees. Over 14,000 of such employees are represented by the council.

For purposes of better identification, the Amalgamated Transit Unions relation with the Greyhound Corp. are divided into three areas, western Greyhound, eastern Greyhound, and Canada. The National Council of Greyhound Divisions is composed of all of the local unions operating as Greyhound-East and part of Greyhound-West; in general terms those operating east of the Rockies and south of the Canadian border.

I appear here on behalf of the 14,000 operating employees of Greyhound represented by the national council to express our support of H.R. 4354. We want the committee to know that we fully subscribe to the position enunciated by Mr. Bierwagen on behalf of our parent organization, the Amalgamated Transit Union.

We support the employers within our industry and their request that legislation be enacted permitting the use of the 102-inch-wide bus on the Interstate Highway System in those States which will permit such use.

For the past 2 or 3 years our members have been operating these wider buses successfully in several areas throughout the country. As chairman of the national council, it is incumbent upon me to be knowledgeable of the many serious problems that face our members in their day-to-day operation. I can assure you that during that period of time nothing has come to my attention that would reflect adversely upon the use of the 102-inch bus.

As a matter of fact, in my inquiry into this matter in preparation for this appearance before the committee I was unable to learn of even a single accident that may have taken place involving these buses. This is not to say that such a thing might not have happened, but if it did it was not significant enough to be brought to the attention of the council or to my attention.

In addition, I have personally driven one of these 102-inch buses and I find it to be a very safe bus to operate. It is our belief that the wider bus will provide additional comfort and safety to the passengers. We believe this will make the bus service more attractive to more passengers and be more likely to retain those we now have.

To the degree that this minimizes use of private auto transportation it would to that degree reduce the incidence of accidents, thereby improving safety for those using the highways. It would reduce air pollution, thereby improving our environment.

As employees, as drivers, we have no evidence at hand, and none has been brought to our attention, that would reflect adversely upon the use of these wider buses. We believe that we will continue to be able to safely drive these wider buses as we have all other vehicles in service by our over-the-road carrier employers.

We fully support our employers in their request for legislation to permit the use of the 102-inch-wide bus over all the Interstate Highway System. We respectfully urge you, therefore, to report favorably H.R. 4354 and to support efforts for its enactment by the Congress of the United States.

We wish to thank you for granting us this opportunity to appear before you to express our views in support of this legislation.

Thank you.

Senator BAYH. Thank you, gentlemen.

Mr. Franklin, you mentioned you conducted an inquiry. What kind of inquiry did you conduct to get the opinion of the bus drivers?

Mr. FRANKLIN. We meet with our presidents, who are representatives of over 42 States, on any type of safety factors, new buses or anything else, rerouting, we meet once every 2 or 3 months and we have 23 representatives in the United States and one in Canada. We have a discussion of anything that contains or surrounds safety of new equipment, buses, or any problems we might be having. There has been no report of any safety factor concerning the 102-inch bus.

Senator BAYH. We have been talking about the fact that this bill would necessitate access by buses to the Interstate System to and from terminals. I suppose several of your drivers have driven the 102-inch bus on the narrower highways.

Mr. FRANKLIN. I assume that some of them have, yes; not that I represent but of the parent organizations of the city buses. I only represent Greyhound.

Senator BAYH. The use by Greyhound of the 102-inch bus is not confined to the Interstate System, is it?

Mr. FRANKLIN. Not entirely, no. They have connecting highways. For example, the one I drove I had to drive on some city streets to get down to Interstate 71.

Senator BAYH. Mr. Kerrigan, didn't I understand that both Greyhound and Trailways use the larger buses to some extent now on Federal-aid roads outside of the Interstate System, at this time? Is that not accurate?

Mr. KERRIGAN. Yes, sir; where it is lawful to operate today. For example, it would be lawful to operate the 102-inch bus in Connecticut by law on all highways.

Senator BAYH. Have you had any complaints from your drivers about the safety factors? Are the drivers' concerned about pulling 6 more inches of bus in day-to-day traffic?

Mr. FRANKLIN. We have had no complaints whatsoever about the bus. In fact, any comments we have received have been favorable because of the extra equipment, I guess you would say, in the bus. For example, it has a tilt steering wheel, it has a more comfortable seat. The visibility is basically no different—I am talking about the rear view mirrors—basically no different than it is on the 96-inch buses. All of the comments we have, have been favorable.

Senator BAYH. How about your ability to stop and turn?

Mr. FRANKLIN. On the turning I saw no difference in the 96 when I drove it. The stopping—and I am not an engineer—but I was commenting to Mr. Bierwagen before we came to the hearing, and I am a driver, I drove 10 years. I don't drive now as I am on a full-time union job, but I have never driven a bus in my experience that had the stopping ability that this bus has.

Senator BAYH. Have any of the drivers expressed any concern about operating the wider bus in tunnels because of possble hazard?

Mr. FRANKLIN. I have never heard of any objections to the use of the bus because I assumed that all of the routes with tunnels, if there

are any, and I am not familiar with this, would be checked out before the bus would be authorized by Greyhound to travel a certain route.

Senator BAYH. Thank you, gentlemen. I appreciate your contribution.

Mr. BIERWAGEN. Thank you, Mr. Chairman.

Senator BAYH. Our next witness is Mr. Michael Cafferty, chairman of the board, Chicago Transit Co., representing the American Transit Association.

STATEMENT OF MICHAEL CAFFERTY, CHAIRMAN OF THE BOARD, CHICAGO TRANSIT AUTHORITY, ON BEHALF OF THE AMERICAN TRANSIT ASSOCIATION; ACCOMPANIED BY ROBERT SLOANE, EXECUTIVE VICE PRESIDENT, THE AMERICAN TRANSIT ASSOCIATION

Mr. CAFFERTY. Thank you, Mr. Chairman.

My name is Michael Cafferty. I am chairman of the board of the Chicago Transit Authority, and a member of the board of directors of the American Transit Association.

I am accompanied today by Robert Sloane, who is the executive vice president of the American Transit Association.

I am appearing today on behalf of the association, which represents the urban transit industry and encompasses local motorbus and rail transit systems throughout the United States and Canada. The transit system members of the American Transit Association carry 85 percent of the country's urban mass transit riders.

ATA apppreciates this opportunity to present its views to the subcommittee with respect to H.R. 4354, a bill to amend section 127 of title 23 of the United States Code relating to vehicle width limitations on the Interstate System in order to increase such limitations for motorbuses. The association supports H.R. 4354, as it would increase the allowable widths of vehicles using the Interstate System from 96 inches, the present limitation, to 102 inches.

The American Transit Association is a national association of urban and suburban transit systems, both publicly and investor owned. The number of local motorbus transit systems in the United States is 1,075. They operate in urban and suburban service a combined fleet of approximately 50,000 vehicles and transport annually in excess of 5 billion passengers—almost three times as many total passengers as are carried on all of the subway and elevated lines in the Nation.

The vast majority of local transit systems operate wholly within a single State, and a sizable number provide charter bus service under certificates or other operating authority issued to them by appropriate Government agencies.

At the time Congress enacted the Federal-Aid Highway Act of 1956, about half of the States permitted the operation of 102-inch buses in major cities for local and suburban service. This extensive use of the 102-inch buses resulted to a large degree, from the efforts of local transit companies to retain the comfort and safety of the wider conveyance first typified by the streetcar and then the trolley bus, to better attract and serve their passengers.

The wider aisle made possible by the wider bus is an important safety factor as well as an important convenience factor. The wider

bus also permits more shoulder and hip room for seated passengers. The fact that the Federal Aid Highway Act of 1956 prescribed a limitation of 96 inches on the width of buses using the Interstate System was not recognized at that time as a matter of great concern to the transit industry.

Furthermore, it was made clear by the terms of the act and its legislative history that the limitations imposed upon the widths of vehicles were intended to be temporary and subject to the results of a study and recommendation of the Secretary of Commerce with respect to proper Federal standards.

However, notwithstanding the report and recommendation of the Secretary of Commerce made in 1964, and the continuing investigation in this field being carried on by the Bureau of Public Roads, and the Department of Transportation, the 1956 "temporary" standards are still in effect.

In the meantime, a substantial portion of the Interstate System has been completed and, in certain areas where the Interstate System runs, the width limitation of 96 inches has created convenience, safety, and economic problems which the passage of H.R. 4354 would materially remedy. Also, in the meantime additional States have enacted legislation permitting the use of buses of 102-inch width in urban and suburban service under prescribed conditions or upon compliance with certain procedures. Presently 102-inch transit buses are in operation in 112 cities in the United States. Appendix "A" a list of cities where 102-inch transit buses are in operation or permitted, is attached for the subcommittee's information.

(The appendix A referred to appears on p. 50.)

With the advent of the Interstate System into areas where the local transit systems are permitted to use 102-inch width buses in their local operation, a serious conflict arises between the Federal limitation and locally approved procedures. This conflict confronts the local transit operator with the choice of foregoing the use of the Interstate System, the Nation's safest roads, in its regular service and charter assignments, or arranging its operation so that only 96-inch buses will operate on these highways. This conflict could involve the necessity of providing two different widths of equipment with attendant additional capital outlay and increased operating costs; an obvious economic waste, along with penalizing the passengers required to ride in a bus only 96 inches wide as compared with the safe and more comfortable 102-inch bus.

And, Mr. Chairman, there has been talk that upon completion of the Interstate System, the highway program will focus its attention and considerable finances on two areas: the cities and our primary system of roads. Federal Highway Administrator Francis Turner, speaking before the Highway Safety Conference of the National Association of Women, Highway Safety leaders said of primary roads, and I quote, "I am convinced that we must convert the heaviest traveled of these roads into junior interstates."

If indeed a system of "junior interstates" is envisioned for the future, then it is doubly imperative that the legislation we testify on today be adopted lest the use of the 102-inch bus be further restricted.

In addition to the difficulties created for regular urban bus routes because of the 96-inch limitation, the operation of charter bus service

is seriously hampered. In order to obtain a better utilization of equipment and manpower and in order to improve their revenue situation, many local transit companies are now engaged in charter service usually under appropriate State authority. Many of these charter operations are at night, and on Saturdays, Sundays, and holidays, when spare buses from the regular weekday schedules are plentiful.

This is an important source of revenue and it provides a much needed and patronized service to the public. A charter bus eliminates from 15 to 20 automobiles from the highway, and an addition to the service to the public, the revenue is the difference to some companies between survival and surrender. It is a serious drawback to charter service that the 102-inch bus is prohibited from using the Interstate System. The results of a recent survey made by the American Transit Association of 1970 transit operating revenue and charter service for 46 companies which render both, show that the charter revenue averaged 4.49 percent of the total revenue. This revenue is vital to an industry that is currently operating at a collective deficit of $360 million a year with no relief in sight.

In addition to the advantages with respect to safety and convenience for the passengers, and the improvement in efficient use of equipment for the transit operator, there would be a marked advantage to the manufacturer by an improved standardization of bus widths, all of which in turn will be reflected to the benefit of the entire communities by improved and more economical bus service.

In conclusion, the American Transit Association respectfully urges that Congress replace the provisional standards adopted 15 years ago with those recommended by the Secretary of Commerce 7 years ago. Such action would permit each State to determine within the limitations of those standards what the permissible widths of vehicles will be on segments of the Interstate System lying within the State. This is the clear intent of the Federal Aid Highway Act of 1956. We are not aware of any valid reason for any further delay in making the terms of the act in this respect fully operative.

Thank you very much.

(Appendix A referred to previously on p. 49 follows:)

APPENDIX A

Cities Where 102" Transit Buses Are in Operation or Permitted

ALABAMA

Birmingham

CALIFORNIA

Alameda
Culver City
Fresno
Long Beach
Los Angeles
Montibello
Oakland
San Diego
San Francisco
Santa Monica

COLORADO

Denver

CONNECTICUT

New Haven
Hartford
Stamford

D.C.

Washington

GEORGIA

Atlanta
Fulton City
Richmond

HAWAII

Honolulu
Oahu

IDAHO

Boise
Pocatello

ILLINOIS

Chicago
Chicago Heights
Harvey
Lombard
Mundelein
Oak Lawn
Rockford
Skokie

INDIANA

Gary
Hammond
Indianapolis

IOWA

Cedar Rapids
Des Moines

KANSAS

Topeka

KENTUCKY

Covington
Elsmore
Louisville
Newport

LOUISIANA

Gretna
New Orleans

MAINE

Portland

MARYLAND

Baltimore

MASSACHUSETTS

Boston

MICHIGAN

Birmingham
Dearborn
Detroit
Flint
Grand Rapids
Grosse Point
Lansing
Pontiac

MINNESOTA

Duluth
Minneapolis
St. Paul

MISSOURI

Kansas City
St. Louis

MONTANA

Billings
Butte
Great Falls

NEBRASKA

Omaha

NEVADA

Las Vegas

NEW JERSEY

Newark

NEW MEXICO

Albuquerque

NEW YORK

Buffalo
New York City
and Metro Area
Flushing
Jackson Heights
Jamaica
Rochester
Yonkers

NORTH CAROLINA

Charlotte

NORTH DAKOTA

Bismarck
Fargo

OHIO

Akron
Bedford
Berea
Brecksville
Broadview Heights
Cincinnati
Cleveland
Columbus
Dayton
Garfield Heights
Independence
Maple Heights
North Olmstead
North Royalton
Toledo

OKLAHOMA

Oklahoma City

OREGON

Portland

PENNSYLVANIA

Philadelphia
Pittsburgh

RHODE ISLAND

Providence

SOUTH CAROLINA

Greenville

SOUTH DAKOTA

Sioux Falls
Rapid City

TENNESSEE

Knoxville
Memphis

TEXAS

Dallas
El Paso
Fort Worth
Houston

VERMONT

Burlington

VIRGINIA

Norfolk
Richmond

WASHINGTON

Seattle

WISCONSIN

Milwaukee

WYOMING

Casper
Cheyenne

STATES IN WHICH 102'' WIDE BUSES ARE PERMITTED TO OPERATE IN INTERCITY SERVICE

On both the Interstate System and other Federal-aid highways:

Colorado.
Connecticut.
Hawaii (108'' limit).
Idaho (highways must be 20' wide).
Montana (highways must be 20' wide).
New Mexico (highways designated by Highway Commission).
Pennsylvania (with permission of Public Utilities Commission and over highways 20' wide).
Rhode Island.
Wyoming (highways must be 20' wide).

On Federal-aid highways other than the Interstate System:

California.
Maine.
Maryland (with approval of Department of Highways).
Nevada (with approval of Department of Highways).
New Jersey (with permission of Public Utilities Commission).
North Dakota.
Oregon (with permission of Highway Commission).
South Dakota (with approval of Highway Commission).
Vermont.

On Interstate System and other designated highways, if use of Interstate System is permitted by Congress:

Arizona.
Delaware.
Indiana.
Kansas.
Kentucky.
Minnesota.
Nebraska.
New York.
North Carolina.
Oklahoma.
Tennessee.
Utah.
Virginia.
Washington (with approval of Highway Commission).
Wisconsin.

Senator BAYH. Thank you, Mr. Cafferty.

Could you tell me what percentage of the buses now used in the local transit business are 102 inches in width?

Mr. CAFFERTY. First I would like to mention Chicago Transit Authority with which I happen to be personally familiar, and Mr. Sloane can supplement that relative to the industry collectively.

We have in the Chicago Transit Authority some 2,869 buses currently. All but 30 of these are 102-inch width buses. We first started acquiring 102-inch buses in 1935. Those were the original trolley buses. From 1935 to 1952 we acquired 567 of those. The first 102-inch bus was purchased in 1950. The total purchased to date is some 3,006 102-inch buses. So the Chicago Transit Authority has a substantial history of using the 102-inch bus in its service.

Mr. SLOANE. In answer to the Senator's question about the industry, I would say that about 40 percent of the buses in local transit service are 102-inch-wide buses.

The American Transit Association has prepared a publication which was published in our weekly newspaper "Passenger Transport" and we called this publication "The Case for the 102-inch Bus." And I would like to offer that now and ask that it be made a part of the record.

Senator BAYH. Without objection, that will be submitted for the record.

(The publication referred to follows:)

On the Interstate Highway System

The Case for the 102" Bus

Industry Is Hampered By 102" Ban–ATA

The wide bus bill (HR4354), which passed the House July 21 after extensive debate and attempts to kill the measure by amendment and a recommit motion, has been referred to the Senate Public Works Committee where public hearings are scheduled Dec. 13-14.

ATA expects to testify in behalf of the bill before the committee headed by Sen. Jennings Randolph (D-W. Va.) and Sen. John Sherman Cooper (R-Ky.).

An Ohio transit official testifying in behalf of ATA earlier this year told a House subcommittee that banning 102-inch-wide buses from Interstate highways is "a serious drawback" to bus companies.

Testifying before the Subcommittee on Roads of the House Committee on Public Works March 30, William W. Owen, president of the City Transit Company at Dayton, called for support of the bill which would increase the allowable widths of buses using the Interstate System from 96 to 102 inches.

"Such action would permit each state to determine within the limitations of those standards what the permissible widths of vehicles will be on segments of the Interstate System lying within the state," he explained.

Dwelling on how the 96-inch limitation is seriously hampering charter bus service, Owen noted that many local transit companies are engaged in charter service, utilizing spare buses from regular work-day schedules.

"A charter bus eliminates from 15 to 20 automobiles from the highway," he declared. "And, in addition to the service to the public, the revenue is the difference to some companies between survival and surrender."

Owen noted that wider aisles made possible by wider buses are important safety and convenience factor, and that the wider buses also provide more shoulder and hip room for seated passengers.

He said results of a recent ATA survey of 1970 transit operating revenue and charter service for 46 companies rendering both charter and public service show that the charter averaged 4.49 percent of the revenue.

Owen recalled that when Congress enacted the Federal-Aid Highway Act of 1956, about half the states permitted operation of 102-inch buses in major cities for local and suburban service.

He said that at the time, the width limitation of 96 inches was not a matter of concern to the transit industry, as terms of the Act and its legislative history made it clear that the limitations were to be temporary and subject to the results of further study and recommendation.

However, he noted that the 1956 "temporary" standards are still in effect – despite the fact that additional states have enacted legislation permitting use of the wider buses under prescribed conditions, or upon compliance with certain procedures.

There are presently 102-inch buses operating in 112 cities, he said.

In addition to passenger safety and convenience and more efficient utilization of equipment by the transit operator, Owen said improved standardization of bus widths would also be a marked advantage to the manufacturer.

The transit industry safety record is no accident, but rather results from, among other things: (1) constant improvement in the design of buses and in their operation and maintenance; (2) highly skilled professional drivers who undergo frequent retraining, and (3) periodic inspection and maintenance in accordance with closely enforced federal and state regulations.

If the bus industry is to be a true public servant and viable in today's vital transportation business, it must continue to put a bus on the road that is safer and more comfortable for the traveling public.

Cities Where 102" Transit Buses Are in Operation or Permitted

ALABAMA
Birmingham

CALIFORNIA
Alameda
Culver City
Fresno
Long Beach
Los Angeles
Montibello
Oakland
San Diego
San Francisco
Santa Monica

COLORADO
Denver

CONNECTICUT
New Haven
Hartford
Stamford

D.C.
Washington

GEORGIA
Atlanta
Fulton City
Richmond

HAWAII
Honolulu
Oahu

IDAHO
Boise
Pocatello

ILLINOIS
Chicago
Chicago Heights
Harvey
Lombard
Mendelein
Oak Lawn
Rockford
Skokie

INDIANA
Gary
Hammond
Indianapolis

IOWA
Cedar Rapids
Des Moines

KANSAS
Topeka

KENTUCKY
Covington
Elsmere
Louisville
Newport

LOUISIANA
Gretna
New Orleans

MAINE
Portland

MARY[illegible]
[illegible]

MASS[illegible]
[illegible]

MICHIGAN
Birmingham
Dearborn
Detroit
Flint
Grand Rapids
Saginaw

MINNESOTA
Duluth
Minneapolis
St. Paul

MISSOURI
Kansas City
St. Louis

MONTANA
Billings
Butte
Great Falls

NEBRASKA
Omaha

NEVADA
Las Vegas

NEW JERSEY
Newark

NEW MEXICO
Albuquerque

NEW YOR[illegible]
New Yor[illegible]
and M[illegible]
Buffa[illegible]
Fl[illegible]
[illegible]s

NORTH DAKOTA
Bismarck
Fargo

OHIO
[illegible]ron
[illegible]ford
[illegible]a
[illegible]ksville
[illegible]dview Heights
[illegible]cinnati
[illegible]eveland
[illegible]olumbus
Dayton
Garfield Heights
Independence
Maple Heights
North Olmstead
North Royalton
Toledo

[illegible]OLINA
[illegible]otte

OKLAHOMA
Oklahoma City

OREGON
Portland

PENNSYLVANIA
Philadelphia
Pittsburgh

RHODE ISLAND
Providence

SOUTH CAROLINA
Greenville

SOUTH DAKOTA
Sioux Falls
Rapid City

TENNESSEE
Knoxville
Memphis

TEXAS
Dallas
El Paso
Fort Worth
Houston

VERMONT
Burlington

VIRGINIA
Norfolk
Richmond

WASHINGTON
Seattle

WISCONSIN
Milwaukee

WYOMING
Casper
Cheyenne

States in Which 102" Wide Buses Are Permitted to Operate in Intercity Service

On both the Interstate System and Other Federal-aid highways

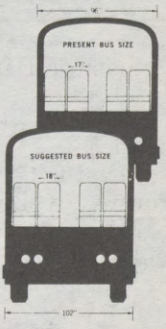
Colorado
Connecticut
Hawaii (108" limit)
Idaho (highways must be 20' wide)
Montana (highways must be 20' wide)
New Mexico (highways [illegible] Highway Commission)
Pennsylvania (with permission of Public Utilities Commission and over highways 20' wide)
Rhode Island
Wyoming (highways must be 20' wide)

On Federal-aid highways other than the Interstate System

California
Maine
Maryland (with approval of Department of Highways)
Nevada (with approval of Department of Highways)
[illegible] (with permission of Public Commission)
North Dakota
Oregon (with permission [illegible] Commission)
South Dakota (with approval of Highway [illegible]
Vermont

On Interstate System and other designated highways, if use of Interstate System is permitted by Congress

Arizona
Delaware
Indiana
Kansas
Kentucky
Minnesota
Nebraska
New York
North Carolina
Oklahoma
Tennessee
Utah
Virginia
Washington (with approval of Highway Commission)
Wisconsin



Reprinted from
PASSENGER TRANSPORT Journal of the American Transit Association

November 26, 1971 PASSENGER TRANSPORT Page 5

HR 4354 Leaves Decisions to States

Amended Bill Answers All Opponents

H R 4354, a bill which would authorize an increase in the width of buses on the Interstate System from 96 to 102 inches, is a permissive piece of legislation—it is left up to each individual state whether or not to allow these buses to operate on their portion of the Interstate System.

The bill is totally different from the bill as originally introduced, in that it takes care of *any and all* legitimate questions raised by those who opposed the bill as introduced.

- The bill was amended so the Secretary of Transportation has a veto power over its implementation. If he reports prior to July 1973, that the use of buses with an increased width of 102 inches will be unsafe for use on the Interstate System and cannot be made safe by the promulgation of safety regulations, this kills the increase in width then and there.
- The legislation authorizes and directs the Secretary of Transportation to make a complete study of all the safety features involved with this increased width, including engineering and testing analysis thereof.
- The bill limits the application and use of these buses to traffic lanes that must be at least 12 feet in width.
- Francis C. Turner, federal highway administrator, has stated pertinent studies can be completed in their entirety before July 1, 1973, and in fact some of these studies are now underway.
- The Urban Mass Transportation Administration, under the Department of Transportation, has assisted in the purchase, through December 31, 1970, over 1700 of these 102-inch-wide buses, and they have been put in use to implement UMTA's rapid transit program.
- This legislation deals solely with an increase in width for buses and in no way, shape or form has anything to do with trucks.

On the Road for 20 Years

The 102-inch-wide bus, for which the bus industry is now seeking permission to use the entire Interstate System, has been operating successfully for over 20 years in the cities and on some highways of this country. Today, practically all major cities in the United States are using 102-inch-wide buses. Two of our largest cities, New York and Chicago, use these 102-inch-wide buses exclusively. There are approximately 22,000 102-inch-wide buses in operation in various parts of the nation today. Last year more than 2.5 billion Americans rode in local and suburban 102-inch-wide buses.

This bill would bring uniformity to the bus industry—already 33 states have concluded that the 96-inch limitation on the width of buses is obsolete. Nine of these states permitted the operation of buses 102 inches in width in intercity service prior to the July 1, 1956 effective date of limitation. Nine states have authorized the use of 102-inch-wide buses on highways other than the Interstate System. Fifteen states have enacted legislation to permit wider buses to be operated if the Federal-Aid Highway Act of 1956 is amended as proposed by this legislation, according to NAMBO.

The bus industry has invested millions of dollars in the development of a safer, more comfortable bus for the public. This bus has been acclaimed for its safety features, and has been well received in Canada and in those areas of the United States where it is permitted. For each intercity bus on the road, there are eleven fewer cars on the highway. Thus, to the extent that intercity bus travel is maximized, safety is enhanced and pollution is minimized.

The safety record of the intercity bus industry over the years is unequalled by any other form of public transportation. Travel by bus is 15 to 20 times safer than travel by automobile.

The Wide Bus Issue—Fact & Fancy

The wider bus bill, H R 4354, is one of the most misunderstood and maligned pieces of legislation to come before Congress in many years.

Either because of a plain misunderstanding of the bill itself or a prejudicial attitude about buses, false and misleading statements have appeared in many newspaper articles and editorials.

To set the record straight, some of these "fancies" have been supplied the factual rebuttal.

FANCY—If Congress fails to pass H R 4354, wider buses will not be manufactured or operated.

FACT—102-inch-wide buses have been operated extensively for more than 20 years. Today, more than 20,000 of these wider buses are being operated by local transit systems. Approximately 1,700 of these buses have been purchased with federal financial assistance. The question is not whether 102-inch-wide buses will be produced but whether thousands of wider buses now being produced will be permitted to use the most modern highways available.

FANCY—102-inch-wide buses are not widely used.

FACT—More people—2.5 billion a year—ride on 102-inch-wide buses than on 96-inch-wide buses. The general public cannot tell the difference in width. Almost all major city transit systems in the U.S., such as Dallas, New York City, Memphis, St. Louis, Baltimore and Chicago, operate 102-inch-wide buses.

FANCY—Bus drivers do not like the wider bus.

FACT—Testimony in favor of H R 4354 was presented to the House Committee on Public Works by Walter J. Bierwagen, director of public affairs for the Amalgamated Transit Union.

FANCY—The operation of 102-inch-wide buses in intercity service has not been shown to be safe by reliable accident data and statistics.

FACT—The wider intercity buses have been operated safely more than 27 million bus-miles and 570 million passenger-miles on highways where such operation is lawful.

FANCY—Intercity transportation of passengers does not normally begin or end on the Interstate System; therefore, removal of the 96-inch width limitation will be either meaningless or will force the states, as a practical matter, to increase their vehicle width limitations on roads leading to and from the Interstate System.

FACT—In virtually all major metropolitan areas linked by the Interstate System the operation of 102-inch-wide buses is already lawful. The problem confronting operators of 102-inch-wide buses is not that of getting to and from the Interstate System, but rather the inability to operate *on* the Interstate System.

FANCY—The desirability of increasing the federal bus width limitation has not been adequately studied.

FACT—Among highway engineers and safety experts there is virtually no opposition to increasing by six inches the federal width limitation applicable to buses using the Interstate System. The American Association of State Highway Officials favors a six-inch liberalization of the present federal width limit. An increase in the bus width limit from 96 to 102 inches was also recommended by the Bureau of Public Roads in its 1964 report to the Congress. The report was called for by the Congress in the Federal-Aid Highway Act of 1956 when the present width limitation, admittedly temporary, was placed in the law.

FANCY—Approval of H R 4354 would be detrimental to safety.

FACT—Section 3 of the bill provides that the Secretary of Transportation may prevent the legislation from becoming effective if he finds that the operation of 102-inch-wide buses on the Interstate System "will be unsafe and cannot be made safe by promulgation of safety regulations."

FANCY—H R 4354 would authorize an increase in the height of buses.

FACT—No limitation on the height of buses is specified in H R 4354 or in existing federal law. All states permit buses to be 13 1/2 feet high but the industry has no plans to produce a bus that high.

FANCY—Passage of H R 4354 would lead to a substantial increase in the weight of intercity buses.

FACT—Any increase in bus weight attributable to a six-inch increase in bus width would be *de minimis*. For example, the 102-inch-wide Continental Trailways bus weighs just 626 pounds more than its standard 96-inch model. H R 4354 does not increase the maximum weight limitations applicable to vehicles using the Interstate System.

FANCY—The real purpose of the intercity bus industry in pressing for enactment of H R 4354 is not to enhance passenger comfort but to increase cargo-carrying capacity.

FACT—The increase in luggage compartment space attributable to a six-inch increase in width is negligible. For example, the 102-inch-wide Continental Trailways bus has just 22.9 more cubic feet of package-carrying capacity than its 96-inch-wide bus. Greyhound's 102-inch-wide Supercruiser has only 81 more cubic feet of cargo space than its 96-inch-wide Scenicruiser.

Americans are growing bigger

HEAVIER TALLER BROADER





The members' chairs in the U.S. Senate chamber are 19".



Coach seats on the government-aided Metroliner are 18¾".



The 1971 Volkswagen front seat tapers to 19½".

Senator BAYH. Did you say that about 40 percent of the buses in local transit service are 102-inch-wide buses?

Mr. SLOANE. Yes, sir. About 22,000 102-inch-wide buses in daily service.

Senator BAYH. What is the practice nationwide with regard to uniformity of size?

Mr. Cafferty talked about Chicago having 2,869 total vehicles with only some 30 not 102 inches wide. It is usually all one kind or another, or is there usually a general mix?

Mr. SLOANE. Of course with the acceptance of the 102-inch bus or the desirability of the 102-inch bus in the local transit service, the majority of the local transit systems started acquiring 102-inch buses when they purchased new buses. Of course with a large fleet it is only possible to purchase a number at a time. So that most of the fleets that have 102-inch buses would have a mix of 96- and 102-inch. I would think perhaps Chicago is maybe further down the road on a hundred percent 102-inch fleet than the others.

New York City is almost a hundred percent 102-inch buses.

Senator BAYH. Is anybody buying 96-inch buses now?

Mr. SLOANE. Yes, there are some, particularly those that are in States where they are restricted to 96-inch buses. They can't use them on the city streets at all.

Senator BAYH. With respect to local transit services, do you have any studies or can you gentlemen advise the committee about the average length of ride, timewise, or mileagewise in local transit operations?

Mr. SLOANE. Local transit services basically are short rides. A short ride can be anything from three or four blocks up to several miles. Again, it would vary with the location.

Senator BAYH. We all recognize the problems local transit companies have been having, which have been rather significant and have not yet been fully dealt with from a national standpoint. You have probably conducted a lot of studies to try to determine not only how to make bus service available but also how to furnish a type of service that will be fully utilized. How significant is the comfort factor in a 3- or 4-mile ride of a few minutes?

Mr. CAFFERTY. Senator, I would like to address myself to that question because in Chicago we happen to be in the process of ordering a thousand new buses to replace a thousand buses which are 15 years or more of age. This is in connection with a very extensive capital renewal program. It is a 2-year capital program of $121 million to replace wornout equipment.

In trying to relate this program to the community we came up with a technique which seems to have worked well, and that was called the suggestion bus: a bus to go out into the community and to go to the people and for the purpose of asking them what they wanted to see in their new buses, what was wrong with the buses we have now, how could we improve them? We just completed that. We estimated we would get somewhere between 6,000 and 7,000 people going through these two buses over a 2-week period. We in fact had over 35,000 people going through the buses. Over 30,000 of those people took the time to fill out a questionnaire that we had prepared telling us what it is that they would like to see not only in our buses but in our entire capital program, and how can we improve service to the community. That has just been completed. We are not in possession of all the facts that have come out of that, but we will be doing a very thorough study of that information. If nothing else, this exercise demonstrated that people have a very lively interest in their bus system, their transit system, and what they would like to see in it. From the spontaneous observa-

tions that have been made and from what has been written to me, comfort is extremely important. It is something that you can't shortchange the customer on; if you do you will drive him away from public transit. You have to give him something that is dignified, is clean, is reasonably comfortable.

Senator BAYH. It would be helpful if we could have the benefit of that study.

Mr. CAFFERTY. I certainly will make it available to the committee—the questionnaire and the information that we asked and also a summary of what we found from our survey. (See p. 60.)

Senator BAYH. You mentioned wider aisles and related them to safety. How does a wider aisle make a bus safer?

Mr. CAFFERTY. Just in the ease of movement, passengers circulating through the bus. It is a very difficult thing. You have to take into account that you are going to have to have standees, that you will have limited space. On the intercity bus, which is the 96-inch bus, there is a very limited aisle area. Part of the space would be to give you a wider aisle as well as wider seat. The problem here is that you have to have a bus that will accommodate not only in our kind of operation and in most of the city operations at the peak hour buses that will permit people to stand as well as be seated. So you try to make it as comfortable as you can under the circumstances.

Senator BAYH. What you are suggesting is that with wider aisles on buses more people can stand in them.

Mr. CAFFERTY. I am talking about people not tripping over each other, also, so that they can negotiate the trip wherever they are going.

If I might, Senator, as I was listening to the testimony and your questions relative to safety, it occurred to me that we have asked our drivers to comment on how we should improve the buses as well. This is a sort of negative confirmation of something I guess but the question of the wider bus presenting any sort of safety problem just never was raised by any of our drivers, which I find a little remarkable in light of the fact that it was an open ball game, that they could say anything they wanted relative to the buses. But our drivers have no problems at all negotiating 102-inch buses on relatively narrow city streets and in congested traffic.

Senator BAYH. Inasmuch as only 30 of your 2,869 buses are less than 102 inches wide I suppose that might be a moot point. There is only one kind of bus used in Chicago as far as most drivers are concerned. On the other hand, if this were a difficult problem for them, I am sure they would have brought it to your attention. I am sure they are not unaware that there are narrower buses available.

Mr. CAFFERTY. Senator, I was very much interested in the testi-

mony that the gentleman representing the amalgamated presented, and he has been a driver for 10 years. He did not see any problem between the 96-inch bus and the 102-inch bus. In the local transit industry almost everywhere, where you have 102-inch buses, the fleets are mixed. The transit operators say that their drivers are not conscious, really, of getting into a 96-inch bus and driving it versus the 102-inch bus.

Senator BAYH. Gentlemen, thank you very much for letting us have your testimony.

Mr. CAFFERTY. Thank you, Mr. Chairman.

(In accordance with Senator Bayh's request Mr. Cafferty supplied the following material:)

CHICAGO TRANSIT AUTHORITY,
Chicago, Ill., December 17, 1971.

HON. BIRCH BAYH,
Member of the U.S. Senate,
New Senate Office Building,
Washington, D.C.

DEAR SENATOR BAYH: As you requested when I appeared before the U.S. Senate subcommittee on Roads, Committee on Public Works, I am submitting the following report on our suggestion bus project.

We here at Chicago Transit Authority have just completed what we think of as the largest public hearing ever held for a federal funding application. It was conducted in conjunction with a grant application to the U.S. Department of Transportation to fund a $121 million two-year capital program.

We called it "Project Suggestion Bus".

We began with two vintage buses, both of which will be replaced when our grant application is approved. The interiors of those buses were totally redesigned but the exteriors were left untouched. In each bus, the first one-third of the interior was refurbished with new lighting, different color schemes, various wall treatments and alternative style seating. In effect, it suggested to the public a variety of atmospheres and environments, and we invited comment.

The rear two-thirds of the bus became a virtual gallery of renderings and information pertinent to the $121 million, two-year capital replacement program. The walls were wood-paneled, there was carpeting throughout, and CTA staff was present to guide, explain and answer questions.

The buses went to the people, locating at twenty-five busy sites during an ensuing two-week period.

Advertisements in the metropolitan and community newspapers told when and where the buses would be present and asked people to visit and give us their comments.

At the time we began, we publicly estimated that 6,000 to 7,000 visitors would have pleased us. In fact, we registered 35,000 persons! More than 30,000 took the time to fill out our questionnaires concerning the Capital Program. They made certain selections, expressed preference and commented on how we at CTA could provide better service to the community.

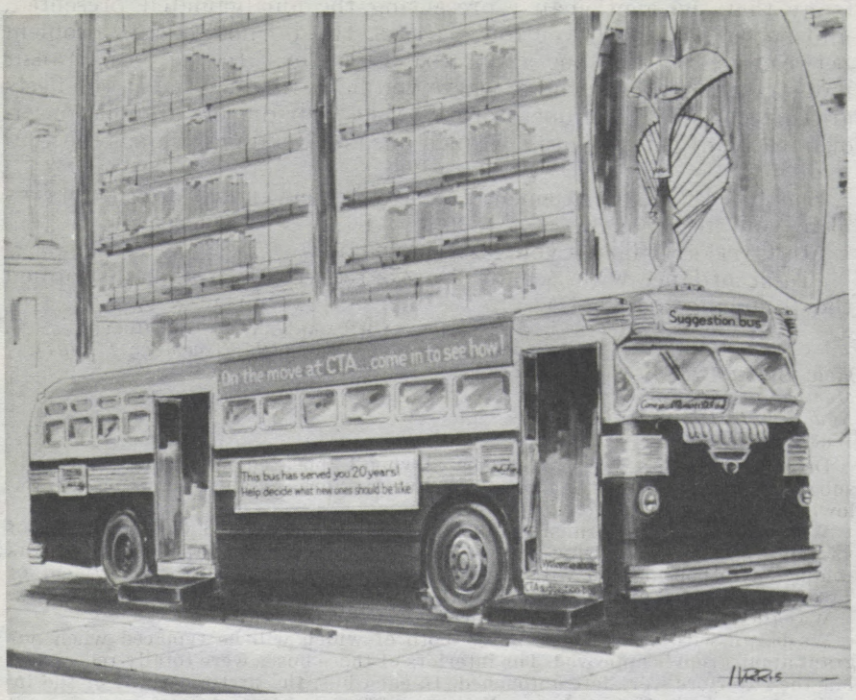
The CTA is proud of what appears to be a quantum breakthrough for citizen participation conducted on a truly productive basis rather than in the characteristic "charged atmosphere". We think the project has demonstrated its merit and its adaptability to any location in the nation

Enclosed is the kit setting forth the details of the Suggestion Bus Project.

Sincerely,

MICHAEL CAFFERTY, *Chairman.*

71-954 O - 72 - 5



STATEMENT OF CHAIRMAN MICHAEL CAFFERTY, CHICAGO TRANSIT AUTHORITY, ON PROJECT SUGGESTION BUS

On November 1st the CTA is introducing a new and unique project to help in our pursuit of the most modern, most serviceable and most accommodating transit system in the nation.

"Project Suggestion Bus" borrows from the concept of the company suggestion box but carries the idea one step further (or maybe four wheels further is more apt). We are asking the people to come to us with their suggestions—and we are going to them. We know of no other transit system that has ventured so far in this participatory direction.

This project is part of the previously announced CTA Capital Improvement Program which provides $121 million in city, state and federal funds for capital improvements. Included are funds for the purchase of 1,000 new buses.

Before purchasing these new buses, CTA is asking its riders to help decide what they should be like. We are asking for our riders' views toward making these new buses the safest, most comfortable and best looking of any buses in use anywhere in the world.

This project has received enthusiastic approval and support from the Department of Transportation in Washington. DOT officials will be watching it closely and are anxious to see the results. I believe this experiment in community participation can influence and determine future trends in the transit industry.

Two 20-year-old CTA buses are being used for the Suggestion Bus project. Exterior signs will identify the Suggestion Buses and will invite people to come aboard. Inside, various styles and colors of seats, lighting systems and safety and comfort designs take up one-third of the space. Sundberg-Ferar, the coun-

try's leading transit design consultants, created this display for CTA. The remaining two-thirds of the bus contain CTA display materials and space for conducting interviews and filling out questionnaires.

Fares from riders support the CTA. We want people to know that we recognize this, and we want to make the CTA responsive to the needs of the people who use it.

CTA Launches a New Concept in Suggestion Box Idea

Chicago, Ill., October 27.—Chicago Transit Authority (CTA) Chairman Michael Cafferty today announced a major innovation in public transportation to be launched by CTA on November 1st. Cafferty said that the program, known as "Project Suggestion Bus," is designed to give the public an opportunity to communicate their ideas directly to CTA regarding the decisions that affect their transit system.

"The CTA has a responsibility to let people make their views known and, as chairman, I welcome their opinions and response," Cafferty said.

Cafferty explained that "Project Suggestion Bus" borrows from the concept of the company suggestion box. Two CTA Suggestion Buses will circulate in Chicago neighborhoods allowing people to make suggestions on how to improve the CTA. Specifically, people are being asked to give opinions on seating, color schemes and other details of bus interiors. This information will be suited by CTA prior to selecting the interior design of 1,000 new buses soon to be purchased.

In addition people will be invited to fill out a questionnaire relating to various aspects of CTA equipment and service. A sampling of riders will be selected for more detailed and in-depth personal interviews.

CTA's Suggestion Buses will be introduced in a ceremony in the Civic Center Plaza at noon on Monday, November 1st. From there the two Suggestion Buses will follow a two-week schedule that will take them to 25 locations in Chicago.

Cafferty said that the project has the "enthusiastic approval and support" of Department of Transportation officials in Washington, D.C. He added: "This experiment in community participation can influence and determine future trends in the transit industry."

SAMPLE QUESTIONNAIRE SAMPLE QUESTIONNAIRE

CTA SUGGESTION BUS QUESTIONNAIRE

The Chicago Transit Authority wants your opinion about what it should have on its new buses and what you think about CTA. We'd appreciate it if you would take three minutes to fill out this questionnaire and deposit it in the Suggestion Box next to the exit.

If you can't complete this questionnaire now, fill it out when you have the time and send it to CTA "Suggestion Bus", Merchandise Mart Plaza, Chicago, Ill. 60654.

PLEASE MARK THE BOX THAT YOU PREFER

1. Which of the three seat colors on the bus do you prefer?
   Orange ☐ Green ☐ Brown ☐
   No Preference ☐

2. Which of the two types of seats on the bus do you prefer?
   Seat "A" ☐ Seat "B" ☐
   No Preference ☐

3. Which wall covering do you prefer, the one that looks like wood grain or the one that looks like linen?
   Wood Grain ☐ Linen ☐
   No Preference ☐

4. If you were standing on a bus, would you prefer to hold onto the new seat handles or the bars that go from floor to ceiling?
   Seat Handles ☐ Bar ☐
   No Preference ☐

5. Do you have any other comments about the "Suggestion Bus"?

_____

_____

_____

Job No. B857
Page 1
Qu. No. _____ (1-3)

CTA BUS DESIGN

C.T.A. Repr. _____

Bus Location _____ Date _____ 4 [ ][ ] 5

Time Interview Began: _____ AM/PM Time Ended: _____ AM/PM

Hello, I'm ____, we're doing a survey about what people like and don't like about CTA buses and we'd like to get your opinions. (7-8 OPEN)

1. First, how often do you use a CTA bus? Would you say you use a CTA bus . . . . .

   About every day 1
   2 or 3 times a week 2
   About once a week 3
   Less often than once a week . . 4
   Or, almost never . . . . . 5 —— (TERMINATE)

   9

2. Now, I'd like to ask your opinions about some of the things you've seen on this bus. First, let's talk about the seats. As you can see, there are two types of seats, one marked "A" and the other "B". I'd like you to sit down in each of the seats. (FOR EACH SEAT, ASK:)

(SEAT "A")

2a. How do you like that seat? Would you say that that seat is 10

   Very comfortable 1
   Somewhat comfortable 2
   Neither comfortable nor uncomfortable. . . 3
   Somewhat uncomfortable 4
   Or, very uncomfortable 5

2b. Why do you say that? _____ 13 [ ] 14
_____
_____

(SEAT "B")

2c. How do you like that seat? Would you say that that seat is 15

   Very comfortable 1
   Somewhat comfortable 2
   Neither comfortable nor uncomfortable. . . 3
   Somewhat uncomfortable 4
   Very uncomfortable 5

2d. Why do you say that? _____ 16 [ ] 17
_____
_____

14. How many automobiles do you have in your household?

1 2 3 4(or more) 0(None) 40

15. Including yourself, how many people in your family live at home with you?

1 2 3 4 5 6 7 8 9 (9 or more) 0(None) 41

16. How many years did you go to school?

Grade school	1	2	3	4	5	6	7	8	42
High school	9	10	11	12					43
College	1	2	3	4	5	6	7	8	44

17. What age group are you in? (READ)

17 or under	1	46 to 55	5	45
18 to 25	2	56 to 65	6	
26 to 35	3	More than 65	7	
36 to 45	4			

18. Which of the following groups includes (your/your household's) monthly income before taxes?

Less than $200	1	$700 to $1,000	4	46
$200 to $499	2	More than $1,000	5	
$500 to $699	3			

BY OBSERVATION:

Sex:	Male 1	Female 2		47
Race:	Latin-American	1		48
	Black	2		
	Oriental	3		
	White or other	4		

(50-80-OPEN)

3a. Which seat do you think you prefer, the "A" seat or the "B" seat?

"A" seat 1 "B" seat 2 No difference 3 Don't know 9 18

3b. Why do you feel that way? _____

_____

_____

_____

4a. Now, I'd like to ask you about the colors in this bus. There are three different colors on the seats. Which of the colors do you think you like best? Would you prefer the ORANGE, or the GREEN, or the BROWN?

Orange 1 Green 2 Brown 3 Don't know 9 21

4b. Do you prefer that color much more or only a little bit more than the other two colors?

Much more 1 Little bit more 2 Don't Know 9 22

4c. Which color is your second choice?

Color _____ 23

4d. Do you prefer that color much more or only a little bit more than the other color?

Much more 1 Little bit more 2 Don't Know 9 24

4e. Is there any other color, besides the ones you've seen here, that you might like better than the color that was your first choice? 25

(WHAT COLOR IS THAT?) _____

5a. What if, instead of all buses having the same color seats, different buses had different color seats so that one bus could have ORANGE seats, another BROWN seats, and other buses could have other colors. How would you feel about that? Would you say you would . . . . .

Like that very much 1

Like that somewhat. 2 26

Neither like nor dislike it . . . 3

Dislike that somewhat. 4

Dislike that very much 5

5b. Looking at the walls of the bus, you can see there are two different types of wall covering. One has a wood grain look while the other has a linen look to it. Which do you prefer?

Wood 1 Linen 2 Don't know 9 27

6. Now, if you'll look at the ceiling you'll see that it is a neutral color. Do you like having the ceiling with a neutral color or one that was co-ordinated with the color of seats and wall?

Neutral 1 Co-ordinated with seats 2 Don't Know 9 28

7. If you'll look at the seats again, you'll see that the new seats have handles on them for a standing passenger to hold onto. The bus also has bars running from floor to ceiling for passengers to hold onto. Now, if you were standing on the bus, do you think you would be more comfortable holding onto a handle on the seat or a bar running from the floor to ceiling?

Handle 1 Bar 2 Don't Know 9 29

8. Thinking about how CTA buses look on the outside, what if the buses were different colors so that the outside of one bus would be one color and the outside of another would be another color. Would say you would. 30

Like that very much 1
Like that somewhat. 2
Neither like nor dislike that. . 3
Dislike that somewhat. 4
Dislike that very much 5
(DO NOT READ) Don't Know 9

9. If the outside of CTA buses were different colors so that one bus was one color and another bus another color, do you think you would find it. . . . 31

Much easier to know a bus was coming 1
Somewhat easier to know a bus was coming 2
Neither easier or harder 3
Somewhat harder to know a bus was coming 4
Much harder to know a bus was coming 5

10. CTA is thinking about putting air-conditioning on its new buses. But, if it puts air-conditioning on them it can't buy as many new buses. On the bus route that you ride, would you rather have all new buses without air-conditioning or would you rather have some new buses with air-conditioning and some old buses without air-conditioning? 32

New buses without air-conditioning . . 1
Some new/some old 2
Don't Know 9

11. In thinking about CTA as a whole, is there anything you like about it? (What is that?) 33 [ ] 35

_____
_____
_____

12. Is there anything you dislike about CTA? (What is that?) 36 [ ] 38

_____
_____
_____

13. Just a few more questions now. When you take a CTA bus, what is usually the purpose of your trip? Do you take a bus to get to 39

Work 1
Shopping 2
Entertainment, like the movies. 3
Visit the doctor, dentist or hospital. . 4
School 5
Or, something else (WHAT IS THAT?) _____

(1-B858)

CTA SUGGESTION BUS QUESTIONNAIRE

The Chicago Transit Authority wants your opinion about what it should have on its new buses and what you think about CTA. We'd appreciate it if you would take three minutes to fill out this questionnaire and deposit it in the Suggestion Box next to the exit.

If you can't complete this questionnaire now, fill it out when you have the time and send it to CTA "Suggestion Bus", Merchandise Mart Plaza, Chicago, Illinois 60654.

PLEASE "X" ONE BOX FOR EACH QUESTION

1. Which of the three seat colors on the bus do you prefer?
   - Orange ☐1
   - Green ☐2
   - Gold ☐3
   - No preference ☐4

   1

2. Which of the two types of seats on the bus do you prefer?
   - Seat "A" ☐1
   - Seat "B" ☐2
   - No preference ☐3

   2

3. Which wall covering do you prefer, the one that looks like wood grain or the one that looks like linen?
   - Wood grain ☐1
   - Linen ☐2
   - No preference ☐3

   3

4. If you were standing on a bus, would you prefer to hold onto the new seat handles or the bars that go from floor to ceiling?
   - Seat handles ☐1
   - Bar ☐2
   - No preference ☐3

   4

5. Do you have any other comments about the "Suggestion Bus"?

   _____ _____ _____

   5 ☐ ☐ ☐ 7

PLEASE "X" THE ONE BOX IN EACH QUESTION THAT BEST DESCRIBES YOUR USE OF CTA

6. How often do you use CTA?
   - Almost every day ☐1
   - 2-3 times a week ☐2
   - Once a week ☐3
   - Once every 2 weeks ☐4
   - Less often ☐5

   8

7. Do you usually use a CTA bus or the subway "L"?
   - Both ☐1
   - Bus only ☐2
   - Subway or "L" only ☐3

   9

8. What time of day do you usually use CTA?
   - During the rush hours ☐1
   - Between the rush hours ☐2
   - After rush hours ☐3

   10

(CONTINUE ON OTHER SIDE)

PLEASE READ THE FOLLOWING STATEMENTS AND "X" THE ONE BOX FOR EACH THAT BEST DESCRIBES YOUR OPINION.

		Agree Very Much	Agree Somewhat	Neither Agree Nor Disagree	Disagree Somewhat	Disagree Very Much	
9.	I never have to wait for CTA buses.	☐1	☐2	☐3	☐4	☐5	11
10.	CTA buses are too slow moving.	☐1	☐2	☐3	☐4	☐5	12
11.	I can get to where I want to go very easily on the CTA.	☐1	☐2	☐3	☐4	☐5	13
12.	CTA buses are always too crowded.	☐1	☐2	☐3	☐4	☐5	14
13.	CTA buses are comfortable to ride on.	☐1	☐2	☐3	☐4	☐5	15
14.	I do not hesitate to use CTA at night.	☐1	☐2	☐3	☐4	☐5	16
15.	CTA service is worth the price of the fare.	☐1	☐2	☐3	☐4	☐5	17

16. Do you have any other comments about CTA? 18

_____ ☐

_____ ☐

_____ ☐ 20

PLEASE "X" THE APPROPRIATE BOX FOR EACH QUESTION.

17. How old are you?

17 or under	☐1	46 to 55	☐5	
18 to 25	☐2	56 to 65	☐6	21
26 to 35	☐3	More than 65	☐7	
36 to 45	☐4			

18. Where do you live?

South Side	☐1	North Side	☐4	
Southwest Side	☐2	Northwest Side	☐5	22
West Side	☐3	Suburbs	☐6	

19. What is your household's monthly income before taxes?

Less than $200	☐1	$700 to $1,000	☐4	
$200 to $499	☐2	More than $1,000	☐5	23
$500 to $699	☐3			

20. Are you .... Male ☐1 OR Female ☐2 24

21. Are you .... Spanish-speaking American ☐1
Black ☐2
Oriental ☐3 25
American Indian ☐4
White ☐5

LPIB 153-L

Senator BAYH. The subcommittee will recess now and reconvene tomorrow morning at 10 o'clock.

We appreciate the contribution that all of you have made today.

(Whereupon, at 12:55 p.m., the committee was recessed, to reconvene at 10 a.m., Tuesday, December 14, 1971.)

WIDER BUSES AND THE INTERSTATE HIGHWAY SYSTEM

TUESDAY, DECEMBER 14, 1971

U.S. SENATE,
SUBCOMMITTEE ON ROADS OF THE
COMMITTEE ON PUBLIC WORKS,
Washington, D.C.

The subcommittee met at 10:10 a.m., pursuant to recess, in room 4200, NSOB, Senator Birch Bayh, chairman of the subcommittee, presiding.

Present: Senators Bayh and Boggs.

Senator BAYH. The subcommittee will reconvene to continue its hearings on H.R. 4354. Before hearing the first wit ess this morning, I would like to announce that Mr. Paul H. Robbins, executive director for the National Society of Professional Engineers, was unable to be present. I ask unanimous consent to have his statement entered into the record.

(The statement referred to follows:)

STATEMENT OF PAUL H. ROBBINS, EXECUTIVE DIRECTOR, NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

The National Society of Professional Engineers, a nonprofit organization headquartered in Washington, D.C., and consisting of some 67,000 individual engineers who are engaged in virtually every specialty, branch, and aspect of engineering practice and employment, appreciate this opportunity to present views in opposition to H.R. 4354.

H.R. 4354, a bill which would amend 23 U.S.C. 127 so as to permit states to increase allowable motor bus widths on the interstate highways within their boundaries, is a precursor to legislation which will permit states to allow truck weights and widths to be increased on the same portions of the interstate highways. As such, it is inseparable in principle from the same considerations applicable to these other forms of highway use—a use by those whose motivations are wholly financial. The National Society of Professional Engineers has consistently opposed measures to permit wider and bigger commercial vehicles on the interstate system, and presently opposes H.R. 4354 for the same reasons.

These bills are, in reality, adverse to public safety. They would, in order to serve the special commercial interests of a minority of highway users, exacerbate present safety problems on all highways and roads, and create a plethora of new ones. Safety, we submit, is paramount to profit.

But to the extent that monetary considerations are at all valid, it is generally acknowledged that increased width and weight allowances will most certainly result in an earlier obsolescence of the highway system and impose upon the states and municipalities the need to build a system of secondary roads, streets and structures capable of accommodating the larger vehicles entering upon and existing from the Interstate System.

Finally, no change in vehicle weights, widths or lengths should be entertained, we feel, without reference to vehicle performance standards.

Although Section 127 of Title 23 of the United States Code as it presently exists. and, as it is intended to be amended by H.R. 4354 and other weight/width bills, does not require any state to increase the allowable sizes which may lawfully be used by vehicles on the Interstate System within that state's boundaries, it does as a practical matter, leave states no alternative but to do so. No individual state can realistically maintain present limits when its neighboring states adopt the permissible maximums which enactment of these measures would allow.

The argument that such legislation is permissive only fails of persuasion because no state or group of states can be expected to stop larger vehicles arriving at their borders from adjacent states.

The Congress has recognized this *network* concept. Senate Report No. 1928 to accompany S. 3953 (July 23, 1958), for example, commenting on the codification of the highway laws, states that "Motor vehicle transportation has become of major importance in the United States, and the construction of an adequate *network* of highways to serve the transportation needs of this country is of critical importance". (Emphasis supplied)

The H.R. 4354 type bill cannot be considered in reference to the Interstate System alone, particularly as it will open the door for reconsideration of legislation to allow larger trucks on the Interstate System. (See H.R. 11870, 91st Congress.) That System is part of an overall national traffic *network* which is straining under presently existing loads.

Even assuming that the Interstate System is structurally capable of accommodating bigger trucks, for which enactment of H.R. 4354 would serve as a compelling precedent, the problem then shifts to those streets and highways serving the Interstate System. Terminal facilities are located off the Interstate highways, and the larger vehicles must of necessity travel off the System in order to serve their purposes. Few off-Interstate, over-the-road facilities can withstand increased loadings over present limits. Many existing city streets and state and county roads are incapable of sustaining present loads. There are, for instance, nearly two hundred bridges in the state of Kentucky alone having load limitations below present allowable maximums. Typically, these bridges are also in need of repair or replacement. In the interest of safety, it would be unconscionable to permit the use of larger vehicles on such structures.

And the financial demands which the H.R. 4354 type legislation would impose upon states and municipalities by causing instant or shorter-than-planned-for obsolescence of the vast *network* of non-Interstate highways and facilities are ones which cities and states are simply incapable of meeting at the present time.

In permitting, and thereby encouraging, bigger loads on the nation's *entire network* of roads, bills such as the one presently under consideration take no concurrent cognizance of the adverse safety problems produced. We respectfully submit that consideration must be given to weight-size-horsepower ratios in order to discourage the use of underpowered vehicles which impede traffic and cause hazardous driving conditions for all users; braking capacities in relation to sizes and loads; reduced visibility of smaller vehicle users incident to the presence of the larger sized vehicles; aerodynamic characteristics and the effects produced by bigger vehicles on smaller ones; strains on auto drivers produced by larger vehicle noise, moisture splatter, and traffic mix; and, the psychologically-related safety hazards inherent in the auto versus behemoth struggle on the highways.

In conclusion, the National Society of Professional Engineers recognizes the vital contribution of the motor bus industry to the public interests of the United States. The role of motor buses is vitally important to America's commerce, particularly since their importance to the nation's efforts in helping to solve the mass transit problem has become recognized. Our opposition to enactment of H.R. 4354, however, is based on a conviction that the optimum balance between the maximum and most efficient use of *all* highways by *all* users under *present* conditions will not be achieved by passage of the bill. In our judgment, an adverse balance can only result should H.R. 4354 become law. We are equally convinced that should H.R. 4354 be enacted, it will constitute a clear precedent for the small further step with respect to allowing wider or longer or heavier trucks on the Interstate Highway System.

Senator BAYH. Mr. A. E. Johnson, executive director of the American Association of State Highway Officials, has also requested that he be granted the privilege to submit a statement. I ask that this be included in the record, along with a copy of the 1968 AASHO report on this matter.

(The material referred to follows:)

STATEMENT OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS

The Member Departments of the American Association of the State Highway Officials appreciate the opportunity of filing this statement for the record with the Senate Subcommittee on Roads.

Because of the closing date of the AASHO Annual Meeting, and the induction of our new President being so near your scheduled hearing dates of December 13th and 14th, 1971, it was decided that President J. C. Dingwall, State Highway Engineer and Chief Administrative Officer of the Texas State Highway Department, and AASHO's Executive Director A. E. Johnson, would file a statement for the record instead of trying to present a statement in person at the two-day hearings.

Should you have any questions when your hearings on H.R. 4354 resume, one or both of the undersigned will be glad to be on hand to give answers or to obtain and assemble any information from the Member State highway departments that you might wish.

The subject matter of H.R. 4354, called the "Wider Bus Bill," was discussed by the Chief Administrative Officers of the Member Departments of AASHO during our recent Annual Meeting in Miami Beach, which meeting was also attended by some of the staff of your Committee.

At this point, we want to express our appreciation for permitting your staff people to attend our Annual Convention, as we believe it is mutually beneficial for them to participate in our meetings.

It was the decision of the Chief Administrative Officers that AASHO reaffirm its Weight and Size Policy Recommendations of 1968, most of which was developed from the analysis of data from the $27 million AASHO Road Test Research Project carried on in Illinois from 1955 to 1961, and reported by the Highway Research Board of the National Academy of Sciences in 1962.

The Highway Research Board conducted and administered this research project for AASHO, and the United States Army furnished the truck drivers for the two years of test driving 24 hours a day, every day of the year, for that period of time. In the Federal-aid Highway Act of 1956, Congress called for information to come from the Road Test project.

It is believed at this point that a little history of the subject of vehicle weights and sizes over the highways of the United States may be helpful to your Committee, because until 1956, the Congress of the United States had not entered into the field.

Very early in the modern highway program in the United States, which actually had its beginning immediately following World War I, it became evident to highway administrators, engineers and researchers that there it a definite relationship between highway and bridge structural design on one hand, and the vehicular loads and frequency of those loads on the other hand.

It was also evident that the geometrics of the highway is closely related to the length, the width, the height, the speeds and the tracking characteristics of the vehicles using the highways.

It also became very clear that for a highway to justify its existence, and to protect the public's investment in it, it had to give a reasonable life expectancy for the expendable features or components, and to do so there had to be regulations and controls exercised over the weights and sizes of vehicles using the facilities.

The vehicle having a much shorter service life than the highway makes it mandatory that controls be exercised, otherwise a single generation of vehicles could obsolete a massive public investment in roads and large segments of the highway system, since one of the characteristics of the American system of private enterprises is to be aggressive and progressive, if it is to succeed, and

at times, the industry has not given sufficient consideration to the protection of the public highway system.

Up until the passage of the Interstate highway program act, the Federal-aid Highway Act of 1956, the State highway departments, operating through AASHO, single handedly developed recommended weight and size regulations and controls for consideration by the several State Legislatures, and it was the State highway administrators and engineers that actually represented the public's interest in trying to hold to an optimum balance between a reasonable life expectancy of the highway and the best use of the highway for moving people and goods. We still have that charge.

It must also be understood that the life expectancy of a pavement may be from 20 to 30 years, but we also must realize a 40, 50 or 60 years' service life out of expensive bridge structures, and the structural capacities of a bridge are closely related to the weights and configurations of the vehicles using the structure, particularly the spacing and weight of the axle groups as they affect the bridge floor systems, so weights or sizes of vehicles cannot escalate very rapidly.

In 1932, AASHO adopted its first official policy concerning maximum dimensions, weights and speeds of motor vehicles. It had advised legislative bodies previously, in an unofficial capacity.

In 1944, the AASHO Transport Committee gave initial consideration to the revision of the 1932 policy, and the Special edition recommendations of 1942, which were developed by AASHO to conserve critical materials used in motor vehicle transport, particularly to make tires and roads last as long as possible, during the war emergency.

As a result of the 1944 action, a new AASHO Weight and Size Recommended Policy was formulated in 1946, which is still reflected in the weight and size laws of about two-thirds of the States.

In 1951, the AASHO Transport Committee decided that additional scientific data would be desirable to prove or disprove the bridge and pavement design procedures used by the various States, which, of course, vary because of the quality of native subgrade materials, local construction materials, climate, and kind and density of traffic.

In 1956, the AASHO Executive Committee directed its Transport Committee to present a new Recommended Policy on Vehicle Weights and Sizes at the conclusion of the AASHO Road Test Project, which was implemented in 1955.

The data coming from this Research Project, amounting to over two million pieces, and related data from other sources, were used in developing a policy dated 1964, which was revised later to a minor degree and now constitutes our current 1968 Recommended Policy on Maximum Dimensions and Weights of Motor Vehicles to be Operated Over the Highways of the United States.

It is this Policy that the Chief Administrative Officers of the Member Departments of AASHO reaffirmed at our recent Annual Meeting, and a copy of it is being furnished for the record.

The special bridge structures that were used at the AASHO Test Road Research Project were specially designed to be overloaded to the degree that an evaluation of the earlier empirical bridge formula of 1946, that was developed by our Committee on Bridges and Structures in cooperation with certain universities, could be made. The results proved that the formula was very close and needed only minor corrections that were made.

Of course, the bridge formula is given a great deal of consideration in determining vehicle weight and size recommendations.

We might say at this point that modern bridges, designed on the basis of the AASHO HS–20 Loading, is designed for 32,000-pound axle loadings, which is consistent with our 1946 Policy Recommendations and our latest ones, the 1968 Recommendations.

The Congress, in 1956, in authorizing the Interstate program, froze vehicle weight and size regulations on those routes making up the Interstate network, on the basis of the 1946 AASHO Policy, or whatever was allowed in the individual State as of July 1, 1956, whichever was the greater.

The purpose in Congress was to take a look at the effects of weights and sizes

of vehicles on the Federal-aid highway systems, and give Congress time to make some judgments as to what might be done to protect the Federal Government's interests and investments in road systems.

We would like to observe, at this time, that prior to 1956, the Federal contribution in highway construction in the United States was probably of the magnitude of 10% to 12% of the total expended by the States, and a great part of the existing Primary System of highways was financed mainly by State funds, particularly the long mileages of the older, functionally obsolete sections that have had to be held in service because of the lack of funding.

In fact, Federal-aid to the highway program during a current two-year period exceeds the Federal Government's total contribution to highway construction the first 40 years of Federal-aid in the United States, that being from 1916 to 1956.

The Bill before you is actually the second vehicle weight and size legislation that has been considered in Congress since the 1956 Legislation. The first had to do with the entire vehicle weight and size matter, which was not enacted. H.R. 4354 deals only with buses.

Before we go further into the discussion of additional widths, we would like to discuss some of the procedures in the development of the 1946 AASHO Policy.

In accordance with our practices in the development of vehicle policies, we always discuss our recommendations with all components of the highway industry, including manufacturers, users, etc., before our recommendations are finalized.

At the time the 1946 Policy was developed, there was considerable desire on the part of those operating larger vehicles to increase the width of trucks and buses from 96'' to 102''. The purpose of this request was to get a more stable cargo center of gravity, better springing and support of the vehicle, and more room for improved braking.

At that time, a goodly portion of the truck line highways in the United States had 9 and 10-foot lanes, and we were just beginning to get into the 11-foot lane design.

AASHO rejected the request, but promised consideration of it would be given at a later time, when the highway system might have the geometry to better accommodate wider vehicles.

In the 1950's, we started building the 12-foot lane, but we wish to make the point it was not designed primarily for 102'' vehicles. The 12-foot lane was developed through the work of AASHO's Planning and Design Policies Committee in the early 1950's, which Committee is the top engineering committee in the United States, and is made up of 20 Chief Engineering Officers of State highway departments, with the Federal Highway Administration furnishing the secretariat.

Several States volunteered to assist the AASHO Committee by researching the matter of 8-foot wide trucks traveling at 55 miles per hour as top highway speed, and automobiles traveling at 70 miles per hour, driven on long tangents of payment that were so instrumentated as to determine the normal lateral weaving of these vehicles when driven at those speeds under conditions that reduce steering strain for a driver.

In plotting up the lateral weaving to determine the traverse width required, it was found that the out-to-out tire paths required 10 feet of width. One foot was then added to the inside for safety in passing and for the clearance of rearview mirrors, and the like, and one foot was added to the outside to reduce expensive shoulder maintenance and to prevent semi-circular pavement edge loadings which are very undesirable.

In other words, the 12-foot lane was developed for modern driving for the 8-food-wide vehicle.

Almost 80% of the State highway administrators are of the opinion that if wider vehicles are allowed for such vehicles as intercity or interstate buses, or for moving mobile or modular homes, that it will be the forerunner of wider trucks, *which causes them considerable concern since trucks constitute a far greater percentage of the composite traffic stream than does the bus or the special*

permit vehicle, and we are quite concerned when it comes to moving special permit vehicles in excess of 12 feet wide, especially if such movements were to develop in quantity.

At this time, we wish to explain AASHO did encourage 6" wider buses for intracity urban mass transit purposes to make the seating more comfortable and more appealing to the public.

We are also of the opinion that within the time frame that we have, as well as the available funds, that improved urban bus service hauling more people with fewer vehicles in high density traffic areas must be encouraged, and may be the only choice we have in the majority of the cases, considering the cost, construction time, and limited routing of other transportation modes.

We also believe that such service must entice the person out of his automobile, for any attempt to forceably prohibit the use of the automobile can definitely change the spatial form of the city, its operation, and have a detrimental effect on the central business intercity section. So, for that reason, we definitely encouraged the use of the wider bus in urban service to make it more attractive to the public.

Such a vehicle, along with exclusive or preferential lanes, and the strategic location of adequate fringe and corridor parking along major arteries into the city operated in such a manner as to give adequate, safe, comfortable and convenient service must be encouraged.

AASHO has also encouraged the 20,000-pound single axle loading on the grounds that it would be advantageous for urban delivery vehicles and for buses where speeds are lower. The detrimental effects of axle loadings increase geometrically as speeds increase, especially after a pavement roughens.

In developing our current Policy, AASHO kept its promise to industry by leaving it to the option of the individual States regarding the use of 6" wider vehicles if the State, in its opinion, had a system or prescribed routes that could accommodate them.

Practically all the States are having to operate many miles of 30 to 40 year old Primary trunk lines that by modern standards are very circuitous, have narrow shoulders, narrow pavements, inadequate sight distances, and steep grades and, of course, they would object to wider vehicles using many of these, and they also have home concern about the difficult enforcement problem that might be involved in keeping wider vehicles off of some of the older functionally obsolete Primaries, since these roads constitute a large portion of the routes for intercity and interstate bus operations.

We know that the wider bus has been successfully used in several cities for some length of time, and that there has been a limited degree of such runs, mainly over some of the turnpikes.

At this point, we would like to refer to a current research study being conducted by the Federal Highway Administration which has compared the blast effects experienced by a car and a truck passing under controlled conditions, and has used truck widths of both 96 and 102 inches. Tests have been conducted on pavements with 8, 12 and 16-foot lanes and under conditions of head-wind, no-wind and cross-wind, with a passenger vehicle both down-wind and up-wind of the truck. The test vehicles used were a 1970 full-sized station wagon and a 3-axle, cab over engine tractor, towing a 40-foot 2-axle dry freight van.

In all cases, the tests were conducted with the car overtaking and passing the truck. It was assumed initially that both the car and truck were centered in their respective lanes, and a lateral deviation occurred only in the car with the truck maintaining its same relative position in the lane. Under no wind conditions, the main car disturbance resulted from a bow wave from the front of the truck. On lanes of less than 12-foot width, the peak lateral deviation was sufficient to cause the automobile to leave its lane in a direction away from the truck.

A head-wind will slightly increase the magnitude of the disturbance, but cross-winds can cause a considerably larger disturbance when the car passes down-wind through the truck wake. With the car in this position, the lateral deviation is toward the truck and for winds of the magnitude of 18 to 20 mph, the car may cross into the adjacent lane, despite corrective action by the driver.

When the cross-wind is from the other direction, a small deviation occurs approximately the same as the no-wind case. Deviation in the car's path is less when the relative speed between the two vehicles is smaller.

Increases in the truck widths increases the intensity of the truck disturbance and decreases the lateral clearances, but the effect are relatively small in going from a 96-inch to a 102-inch truck for the test vehicles used.

Under no ambient wind conditions, the increase in truck width causes a peak deviation in lateral clearance of from 5 to 7%. With 12-foot lane widths, results indicate the necessity for an approximate 6-inch increase in lane width to off-set the disturbance caused by the increased vehicle width. Drop-bed trailers and vans, which do not permit wind flow under the body cause much larger disturbances. The same could be true for the bus configuration.

In summarizing our position, we want to stress that AASHO took the forefront in encouraging the wider bus for urban service, where speeds are considerably less than for over-the-road. *In fact, some of the highest speeds recorded by the State highway departments in speed studies on highways are by buses, and the blast effects outlined in the Department of Transportation study, of course, are proportional to speeds.*

In the Federal highway research referred to above, some comment is made that the use of dire vehicles might require or make desirable limited widening of existing pavements. We do not believe that the State highway departments would be much interested in this sort of a program, for the expense could be completely out of balance with the economic gains of the industries that might benefit, and their widening strips along highways, especially high-speed highways, could not avoid having a longitudinal joint, the edges of which might not always continue to match and could be a detriment to safe steering. Also, it would give more edge loadings on the pavements since it would be impracticable to try to have load transfer devices from the edge of the existing pavement to the narrow widening strips.

However, for over-the-road operation, AASHO goes along with the wider bus proposition so long as it is left to the option of the individual highway departments involved as to whether its operation will be permitted in that State, and be permitted to take such actions as are necessary to prevent such buses from using the older, narrower, two-lane, or even multi-lane Primary highways that may form part of the routes of the bus service.

After all, the several State highway departments have the primary official responsibility over the planning, design, construction, maintenance and operation of the State highway systems, which accommodate most of the intercity and interstate highway traffic of the United States.

We also stress that every foot of the Interstate System is under State control, and that except for the some 2,000 miles of the toll roads that were blanketed into the Interstate mileage, that every foot of the Interstate routes are a part of the several State highway system, and the title of these roads are in the State, although constructed through a Federal-aid program.

Therefore, the highway administrators of the Member Departments of AASHO are extremely interested in not only getting the best and optimum service and balance between reasonable road life and the best use of the highway, but also in protecting the convenience, comfort and safety of all of the public that uses the highway systems. Our statement is given in this context.

Thank you.

71-954 O - 72 - 6

Recommended Policy On Maximum Dimensions and Weights Of Motor Vehicles To Be Operated Over The Highways Of The United States

Prepared by The Committee on Highway Transport
The American Association of State Highway Officials

Officially Adopted by the American Association
of State Highway Officials

December 7, 1964 and
Revised January 15, 1968

Copyright 1968

COMMITTEE ON HIGHWAY TRANSPORT

R. G. Stapp, Wyoming, *Chairman*

A. E. Johnson, *Secretary & Technical Advisor*

Region I

R. H. Whittaker, New Hampshire
Robert W. Sweet, New York
Daniel O. Cargill, Rhode Island
T. F. Airis, District of Columbia

Region II

D. B. Fugate, Virginia
Ward Goodman, Arkansas
T. C. Robbins, Mississippi
C. W. Lee, North Carolina

Region III

John W. Hossack, Nebraska
John E. Meyer, Michigan
Walter Johnson, Kansas
John H. Swanberg, Minnesota

Region IV

R. G. Stapp, Wyoming
Forrest Cooper, Oregon
C. G. Prahl, Washington
J. A. Legarra, California

Past Members

During the Development of the Policy *

R. C. Keeling, Kansas, *Chairman* (1954)
W. A. McWilliams, Delaware, *Chairman* (1955)
Carl Vogelgesang, Indiana, *Chairman* (1955)
R. R. Bartelsmeyer, Illinois, *Chairman* (1962)
George E. White, Jr., West Virginia, *Chairman* (1964
L. M. Clauson, Iowa, *Chairman* (1966)
C. F. Rogers, Bureau of Public Roads, *Secretary* (1953)
E. A. Finney, Michigan, *Secretary* (1965)

Region I

Wm. F. Childs, Jr., Maryland (1954)
William R. B. Froehlich, Pennsylvania (1962)
E. H. Holmes, Bureau of Public Roads (1962)
Edward J. McCarthy, Massachusetts (1963)
Charles F. Mistretta, Massachusetts (1964)
N. M. Pritchett, Maryland (1961)
George J. Richards, Pennsylvania (1959)
R. A. Holden, Vermont (1966)

Region II

J. A. Anderson, Virginia (1957)
Herbert Eldridge, Arkansas (1959)
L. W. Erickson, Tennessee (1954)
R. A. Harris, Mississippi (1954)
R. B. Richardson, Louisiana (1961)
George E. White, Jr., West Virginia (1964)
D. H. Bray, Kentucky (1965)

Region III

Frank Barker, Illinois (1954)
John G. Butter, Iowa (1960)
George M. Foster, Indiana (1962)
M. J. Hoffman, Minnesota (1957)
Charles M. Noble, Ohio (1959)
E. S. Preston, Ohio (1962)
L. F. Schaeublin, Ohio (1957)
F. R. White, Iowa (1954)
L. P. Zimmerman, Minnesota (1961)
L. M. Clauson, Iowa (1966)

Region IV

R. H. Baldock, Oregon (1956)
G. Bryce Bennett, Idaho (1964)
Burton G. Dwyre, New Mexico (1954)
Earl V. Miller, Idaho (1956)
R. C. Perkins, Arizona (1954)
Fred C. Quinnell, Jr., Montana (1964)
J. W. Vickery, California (1959)
W. C. Williams, Oregon (1962)
L. D. Wilson, New Mexico (1960)
J. R. Bromley, Wyoming (1965)
J. C. Womack, California (1967)

* Date of resignation or decease, parenthesized.

FOREWORD

The Committee on Highway Transport was organized to investigate and evaluate the various transportation needs that should be served by the highway system of the United States; determine the degree to which these needs are met by the highway system in its current state of improvement, under existing regulatory laws; and recommend such policies, regulations, laws, and practices as may contribute to improve the efficiency of highway transportation with due regard for the conservation and cost of the highway plant.

In November 1932, the Association adopted its first Policy concerning maximum dimensions, weights, and speeds of motor vehicles. At the 1944 annual meeting of AASHO, the Transport Committee gave initial consideration to a revision of the 1932 Policy and the substitute recommendations adopted May 27, 1942, applicable for the duration of the war emergency. The 1932 Policy and 1942 substitute recommendations were formulated into a new Policy which was adopted April 1, 1946. At its June 27, 1956 meeting, the AASHO Executive Committee directed the Transport Committee to present a new recommended Policy on Vehicle Dimensions and Weights at the conclusion of the AASHO Road Test. The Policy presented here is the result of this AASHO Executive Committee directive.

In preparing the Policy, the Committee considered historic trends in motor vehicle use; in traffic volumes; in vehicle weights, types, and compositions; in State regulatory limitations; and in the geometric capacities and structural capabilities of the highway system. Use was made of the results of the series of road tests, particularly of the AASHO Road Test, administered by the Highway Research Board of the National Academy of Sciences under sponsorship of the American Association of State Highway Officials. Consideration was given to the requirements of national defense with respect to both existing road and bridge capacity and probable future developments. Also, the Committee utilized the information developed from certain special studies and related researches, conducted by the Bureau of Public Roads and the States.

The formal statements and testimony of the following groups have been considered in formulation of the Policy: Automotive Manufacturers Association, Truck-Trailer Manufacturers Association, National Association of Motor Bus Operators, American Petroleum Institute, Rubber Manufacturers Association, Society of Automotive Engineers, American Trucking Association, American Automobile Association, Mobile Homes Manufacturers Association, Mobile Home Dealers National Association, National Highway Users Conference, National Automobile Transporters Association, Construction Industries Manufacturers Association, Private Truck Council of America, and Automotive Safety Foundation.

The Policy was prepared with the assistance of the AASHO Committees on Design, and Bridges and Structures, and in cooperation with the Bureau of Public Roads as related to its responsibility in making recommendations to the Congress with respect to maximum desirable vehicle dimensions and weights called for under Section 108 of the Federal-Aid Highway Act of 1956.

CONTENTS

		Page
	PURPOSE AND INTENT OF POLICY	5
1.00	DEFINITIONS	7
2.00	VEHICLES IN REGULAR OPERATION	11
2.01	Scope	11
2.02	Exclusions	11
2.03	Notation	11
2.04	Width	11
2.05	Height	11
2.06	Length	11
2.07	Tire Pressure	13
2.08	Maximum Permissible Weight	13
2.08.01	Single-axle weight	13
2.08.02	Tandem-axle weight	13
2.08.03	Maximum permissible axle-group weight	13
2.08.04	Maximum permissible vehicle gross weight	13
2.08.05	Weight reductions	14
2.09	Performance Requirements	14
3.00	VEHICLES OPERATING BY SPECIAL PERMIT	17
3.01	Conditions for Permit	17
3.02	Statutory Provisions	17
3.03	Permit Issuance	17
4.00	NATIONAL DEFENSE	19
4.01	State Procedures	19
4.02	Military Certification	19
4.03	Joint Policies (AASHO and Department of Defense)	19
4.04	Procedures for Implementing Joint Policies	19

PURPOSE AND INTENT OF THE RECOMMENDED POLICY

It is the opinion of the American Association of State Highway Officials that the adoption by all States of uniform standards governing the maximum dimensions and weights of motor vehicles operating over the highways is necessary for the following reasons:

(a) To promote the safety of highway transportation;

(b) To promote efficiency and economy in both the intrastate and interstate operation of motor vehicles;

(c) To establish and stabilize the basis for regulation of the many relations between the dimensions and weights of motor vehicles and the strengths and capacities of compatible highways;

(d) To provide for the fundamental prerequisites of geometric and structural highway design.

The Recommended Policy set forth herein has been designed to these ends and it constitutes a recommendation for the consideration of appropriate Legislative bodies having the responsibilities of motor vehicle regulatory legislation. It is hoped that the several states will make their respective codes of motor vehicle laws consistent with this Policy to effect uniform motor transportation conditions throughout the nation.

INTENT

It is the intent of the American Association of State Highway Officials that the limits herein prescribed for vehicles shall be:

(a) *Absolute maximum limits which are inclusive of all enforcement, weighing, scale, or other tolerances;*

(b) Enacted in all States as soon as possible for roads and bridges on the completed portions of the National System of Interstate and Defense Highways and other Designated Highways;

(c) Enacted in all States for all roads and bridges on other routes or systems after an engineering determination has been made by the State highway departments that the roads and bridges of these routes or systems over which such operations are to be authorized are sufficiently adequate in geometric capacity and structural capability to accommodate such operations safely and economically; and

(d) Maximum limits, which are not to be exceeded in the laws of any State, during such period as this Policy shall remain in effect.

The Policy provides for regulation of vehicles in regular operation, for regulation of overweight and oversize vehicles operated by special permit, for issuance of special permits including assessment of permit fees, and for highway movements essential to the national defense.

Supporting material used in the formulation of the Policy came from an analysis of the physical research findings of the AASHO Road Test Project, from pertinent material developed by individual States, AASHO Committees, the Bureau of Public Roads, the Highway Research Board and from an extensive evaluation study of the load supporting capabilities of existing pavements on the several State highway systems made cooperatively by the Bureau of Public Roads and the States in 1962.

It is recommended that the Congress continue to set a ceiling on vehicle weights and sizes similar to the pattern set in Section 127 of Title 23, U.S. Code, Highways, but incorporating maximum controls from this recommended AASHO Policy, with the individual States continuing to establish motor vehicle weight and size legislation and regulations under that ceiling, and that any such Congressional ceiling contain a "Grandfather Clause" allowing any motor vehicle that exceeds such maximum ceiling limitations but is legally used as of the effective date of such Congressional action, to continue to be used until July 1, 1975. (This is not intended for vehicles operating under special permit.)

CHAPTER 1.00 DEFINITIONS

APPLICANT: See SPECIAL PERMIT APPLICANT.

AXLE: The common axis of rotation of one or more wheels whether power-driven or freely rotating, and whether in one or more segments, and regardless of the number of wheels carried thereon. See also SINGLE AXLE.

AXLE GROUP: An assemblage of two or more consecutive axles considered together in determining their combined load effect on a bridge or pavement structure.

AXLE WEIGHT: See SINGLE AXLE WEIGHT.

BUS: A motor vehicle designed for the transportation of more than 10 persons.

CARGO: The items or freight to be moved; including items placed on or in a vehicle, towed by a vehicle, or a vehicle itself.

CONNECTING MECHANISM: An arrangement of parts interconnecting two or more consecutive axles to the frame of a vehicle in such a manner as to equalize the load between axles.

DUMMY AXLE: A single axle attached independently to the frame of a vehicle and so designed and placed as to indicate the appearance of a normal tandem axle.

FREIGHT: See CARGO.

GROSS WEIGHT: The weight of a vehicle and/or vehicle combination without load plus the weight of any load thereon.

HEIGHT: The total vertical dimension of any vehicle above the ground surface including any load and load-holding device thereon.

HIGHWAY: The entire width between the boundary lines of every way publicly maintained when any part thereof is open to the use of the public for purposes of vehicular travel; synonymous and interchangeable in usage with "street."

HIGHWAY DEPARTMENT: The highway administrative body of a State, which is authorized and required to design, construct, maintain, operate, and control all highways under its jurisdiction.

LENGTH: The total longitudinal dimension of any vehicle or combination of vehicles, including any load or load-holding devices thereon.

LOAD: A weight or quantity of anything resting upon something else regarded as its support.

MOTOR VEHICLE: A vehicle which is self-propelled or propelled by electric power obtained from overhead trolley wires, but not operating upon rails.

OWNER: A person, other than a lien-holder, having the property in or title to a vehicle, including a person entitled to the use and possession of a vehicle subject to a security interest in another person, but excluding a lessee under a lease not intended as security.

PAVEMENT STRUCTURE: The combination of subbase, base course, and surface course placed on an earth subgrade to support the traffic load and distribute it to the roadbed.

REGULAR OPERATION: Movement over highways of vehicles, vehicle combinations, and loads thereon, subject to the recommended limitations contained in this Policy governing maximum weights and dimensions for motor vehicles and loads thereon.

ROADWAY: The portion of a highway, including shoulders, for vehicular use. A divided highway has two or more roadways.

SCALE TOLERANCE: An allowable variation in the static weight of an axle load in accordance with, but not exceeding, the precision of the scale involved.

SEMITRAILER: A vehicle designed for carrying persons or property and drawn by a truck tractor on which part of its weight and load rests.

SINGLE AXLE: An assembly of two or more wheels, whose centers are in one transverse vertical plane or may be included between two parallel transverse vertical planes 40 inches apart extending across the full width of the vehicle.

SINGLE AXLE WEIGHT: The total weight transmitted to the road by a single axle.

SPECIAL PERMIT: A written authorization to move or operate on a highway a vehicle or vehicles with indivisible load of size and/or weight exceeding the limits prescribed for vehicles in regular operation.

SPECIAL PERMIT APPLICANT: An individual, firm, partnership, corporation, or association making application for a special permit to transport a vehicle, vehicles, and/or load which is oversize or overweight and under whose authority and responsibility such vehicle or load is transported.

STATE HIGHWAY ADMINISTRATIVE BODY: See HIGHWAY DEPARTMENT.

TANDEM AXLE: Any two or more consecutive axles whose centers are more than 40 inches but not more than 96 inches apart, and are individually attached to and/or articulated from a common attachment to the vehicle including a connecting mechanism designed to equalize the load between axles.

TANDEM AXLE WEIGHT: The total weight transmitted to the road by two or more consecutive axles whose centers may be included between parallel transverse vertical planes spaced more than 40 inches and not more than 96 inches apart, extending the full width of the vehicle.

TIRE, PNEUMATIC: A tire of rubber or other resilient material which depends upon compressed air for support of a load.

TRAILER: A vehicle designed for carrying persons or property and drawn by a motor vehicle which carries no part of the weight and load of the trailer on its own wheels.

TRAVELED WAY: The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

TRUCK: A motor vehicle designed, used, or maintained primarily for the transportation of property.

TRUCK-TRACTOR: A motor vehicle designed for drawing other vehicles, but not for a load other than a part of the weight of the vehicle and load drawn.

TURNING PATH: The path of a designated point on a vehicle making a specified turn.

TURNING TRACK WIDTH: The radial distance between the turning paths of the outside of the outer front tire and the outside of the rear tire which is nearest the center of the turn.

VEHICLE: A device in, upon, or by which any person or property may be transported or drawn upon a highway, except devices moved by human power or used exclusively upon stationary rails or tracks.

VEHICLE COMBINATION: A truck-tractor and semitrailer, either with or without a full trailer, or a truck with one or more full trailers.

WEIGHT: See GROSS WEIGHT.

WIDTH: The total outside transverse dimension of a vehicle including any load or load-holding devices thereon, but excluding approved safety devices and tire bulge due to load.

CHAPTER 2.00 VEHICLES IN REGULAR OPERATION

2.01 Scope

The provisions of this Chapter governing width, height, length, tire pressure, permissible loads, and performance limits shall apply to vehicles serving in regular operation, as defined in Chapter 1.00. Vehicles operated under the terms of special permits are covered in Chapter 3.00.

2.02 Exclusions

Such operation as may be excluded by this Policy, if not covered by special permit, may be covered in State regulatory legislation by an appropriate "grandfather" clause for the registration life of the vehicle.

2.03 Notation

Figure 1 shows silhouettes of most basic commercial vehicle types in regular operation as designated by code based on axle arrangement. The first digit indicates the number of axles of the truck or truck-tractor. The letter "S" indicates a semitrailer, and the digit immediately following an "S" indicates the number of axles on the semitrailer. Any digit other than the first in a combination, when not preceded by an "S", indicates a trailer and the number of its axles. For instance, a 2-S2 combination is a two-axle truck-tractor with a tandem-axle semitrailer. A 3-S1-2 combination is a three-axle truck-tractor with tandem rear axles, a semitrailer with a single axle, and a trailer with two axles.

2.04 Width

No vehicle, including any load and loadholding devices thereon, using completed sections of the National System of Interstate and Defense Highways shall exceed a width of 102 inches, excluding both tire bulge and approved safety devices. Further use of the 102-inch maximum width shall not be applicable on other routes in a State unless the State's highway system is predominantly of sufficient lane width for safe accommodation of vehicles of such width.

2.05 Height

No vehicle, including any load and load-holding devices thereon, shall exceed a height of 13 feet 6 inches.

2.06 Length

2.06.01 No single truck or truck-tractor, including any load thereon, shall have an overall length, inclusive of front and rear bumpers, in excess of 40 feet.

2.06.02 No single two-axle or three-axle bus, including any load thereon, shall have an overall length, inclusive of front and rear bumpers, in excess of 40 feet.

2.06.03 No single semitrailer or trailer, including any load thereon, shall have an overall length, inclusive of rear bumper, in excess of 40 feet.

2.06.04 No combination of truck-tractor and semitrailer, including any load thereon, shall have an overall length, inclusive of front and rear bumpers, in excess of 55 feet.

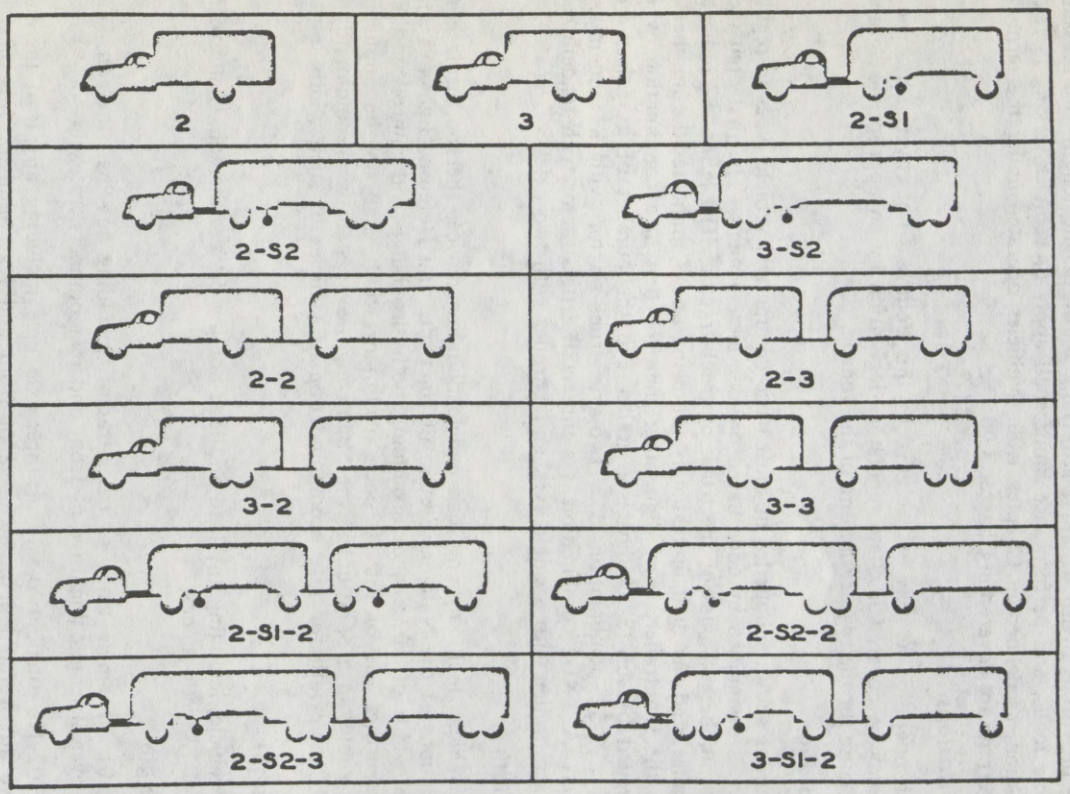


Figure 1. Common commercial vehicle types as designated by code based on axle arrangement.

2.06.05 No other combination of vehicles shall consist of more than two units, except that one truck-tractor semitrailer may haul one complete trailer, and no such combination of vehicles, including any load thereon, shall have an overall length, inclusive of front and rear bumpers, in excess of 65 feet.

2.07 *Tire Pressure*

The loads hereinafter specified for vehicles in regular operation shall be permissible only when such loads are transmitted to the road surface through wheels equipped with pneumatic tires, and no such tire equipment shall be designed for use or used with an operating inflation pressure in excess of 95 pounds per square inch.

2.08 *Maximum Permissible Weights*

2.08.01 *Single-axle weight*: The total gross weight imposed on the highway by the wheels of any one single axle of a vehicle shall not exceed 20,000 pounds, including any and all weight tolerances.

2.08.02 *Tandem-axle weight*: The total gross weight imposed on the highway by two or more consecutive axles in tandem articulated from a common attachment to the vehicle, and spaced not less than 40 inches nor more than 96 inches apart, shall not exceed 32,000 pounds, including any and all weight tolerances, and no one axle of any such group of two consecutive axles shall exceed the weight permitted for a single axle. Further, the weight imposed on the highway by two or more consecutive axles, individually attached to the vehicle and spaced not less than 40 inches nor more than 96 inches apart, shall not exceed 32,000 pounds. No one axle of any such group of two or more consecutive axles shall exceed the weight permitted for a single axle.

2.08.03 *Maximum permissible axle group weights*: The total gross weight in pounds imposed on the highway by any group of two or more consecutive axles on a vehicle or combination of vehicles, shall not exceed the value given in Table 1, corresponding to the distance in feet between the extreme axles of the group measured longitudinally to the nearest foot. (The following general formula was used in preparing Table 1):

$$W = 500\left(\frac{LN}{N-1} + 12N + 32\right)$$

where W=maximum weight in pounds carried on any group of two or more axles, including any and all weight tolerances.

L=distance in feet between the extremes of any group of two or more consecutive axles

N=number of axles in the group under consideration.

2.08.04 *Maximum permissible vehicle gross weight*: The total gross weight imposed on the highway by a vehicle or combination of vehicles with two or more consecutive axles, shall be determined by the application of the maximum permissible axle group weights presented in Table I and as limited by allowable length and axle weight controls as demonstrated for certain typical vehicle types in Table II. It shall be the responsibility of each State to interpret and integrate the maximum permissible gross axle group weights into a simplified scheme for checking individual axle weights and total gross vehicle weights at monitoring scales.

2.08.05 *Weight reductions:* The maximum single-axle, tandem-axle, and axle-group weights recommended in paragraphs 2.08.01, 2.08.02, and 2.08.03 are subject to reduction at the discretion of the appropriate highway authorities during periods when road subgrades have been weakened by water saturation, frost-action, or some other cause.

2.09 Performance Requirements

2.09.01 The total gross weight of any vehicle or combination of vehicles shall not exceed a ratio of 400 pounds per engine net horsepower delivered to the clutch or its equivalent under conditions specified in SAE Test Code.

2.09.02 Brake performance shall conform to the requirements set forth in the most recent Uniform Vehicle Code of the National Committee on Uniform Traffic Laws and Ordinances.

2.09.03 Linkage between combinations of vehicles shall conform to the current recommended practice of the Society of Automotive Engineers.

2.09.04 Dummy axles shall not be considered in the determination of allowable loads.

TABLE I

COMPUTED GROSS WEIGHT TABLE

For various spacings of axle groupings

BASED ON AASHO H15 (44) BRIDGES WITH OVERSTRESSES NOT TO EXCEED 30 PERCENT

Weight Formula $W = 500\left(\frac{LN}{N-1} + 12N + 32\right)$

Distance in feet between the extremes of any group of two or more consecutive axles (wheelbases)	Maximum computed weight in pounds for any group of two or more consecutive axles (wheelbases)				
	2 axles	3 axles	4 axles	5 axles	6 axles
4			Not Permitted	Not Permitted	Not Permitted
5					
6					
7					
8	32000				
9	37000	40500			
10	38000	41500			
11	39000	42000			
12	40000	43000	48000		
13		43500	48500		
14		44500	49500		
15		45000	50000		
16		46000	50500		
17		46500	51500		
18		47500	52000		
19		48000	52500		
20		49000	53500		
21		49500	54000		
22		50500	54500		
23		51000	55500		
24		52000	56000		
25		52500	56500		
26		53500	57500		
27		54000	58000		
28		55000	58500		
29		55500	59500		
30		56500	60000		
31		57000	60500		
32		58000	61500		
33		58500	62000		
34		59500	62500		
35		60000	63500		
36			64000		
37			64500		
38			65500	69500	
39			66000	70500	
40			66500	71000	
41			67000	71500	
42			68000	72000	
43			68500	73000	
44			69500	73500	
45			70000	74000	
46			70500	74500	
47			71500	75500	
48			72000	76000	81000
49			72500	76500	81500
50			73500	77000	82000
51			74000	78000	82500
52			74500	78500	83000
53			75500	79000	83500
54			76000	79500	84500
55			76500	80500	85000
56			77500	81000	85500
57			78000	81500	86000
58			78500	82000	87000
59			79500	83000	87500
60			80000	83500	88000

Note: The loads are computed to the nearest 500 lbs.
The modification consists in limiting the maximum load on any single axle to 20,000 lbs. and the load on any two axles spaced 8 ft. or less to 32,000 lbs.
Loaded vehicles of 7 or more axles regardless of type and of wheelbase are not permitted.
The weight formula given above should be applied to determine the permissible loads of vehicles whenever the load on the front axle is considerably less than the permissible loads.

TABLE II PERMISSIBLE GROSS LOAD TABLE

BASED ON AASHO H15(44) BRIDGES WITH OVERSTRESSES NOT TO EXCEED 30 PERCENT FOR CERTAIN TYPICAL VEHICLES IN REGULAR OPERATION ILLUSTRATING WHEN TOTAL COMPUTED GROSS WEIGHT OR THE AXLE LOADINGS CONTROL THE PERMISSIBLE GROSS LOAD OF THE VEHICLE.

Weight Formula $W = 500\left(\frac{LN}{N-1} + 12N + 32\right)$

(A)—Permissible Gross Load of Vehicle Limited by Axles (B)—Computed Gross Load Controls

Distance in feet between the extremes of any group of two or more consecutive axles	Maximum load in pounds carried on any group of two or more consecutive axles										
	2 Axles	3 Axles		4 Axles			5 Axles		6 Axles		
	Type 2	Type 3	Type 2-S1	Type 2-2	Type 2-S2	Type 3-S1	Type 3-2	Type 3-S2	All Types		
4											
5											
6		32000									
7		32000									
8	32000	32000									
9	37000	40500	40500								
10	38000	41500	41500								
11	39000	42000	42000								
12	40000	43000	43000	48000	48000	48000					
13		43500	43500	48500	48500	48500					
14		44500	44500	49500	49500	49500					
15		45000	45000	50000	50000	50000					
16		46000	46000	50500	50500	50500					
17		46500	46500	51500	51500	51500					
18		47500	47500	52000	52000	52000					
19		48000	48000	52500	52500	52500					
20		49000	49000	53500	53500	53500					
21		49500	49500	54000	54000	54000					
22		50500	50500	54500	54500	54500					
23		51000	51000	55500	55500	55500					
24		52000	52000	56000	56000	56000					
25		52500	52500	56500	56500	56500					
26			53500	57500	57500	57500					
27			54000	58000	58000	58000					
28			55000	58500	58500	58500					
29			55500	59500	59500	59500					
30			56500	60000	60000	60000					
31			57000	60500	60500	60500					
32			58000	61500	61500	61500					
33			58500	62000	62000	62000					
34			59500	62500	62500	62500					
35			60000	63500	63500	63500					
36				64000	64000	64000					
37				64500	64500	64500					
38				65500	65500	65500					
39				66000	66000	66000					
40				66500	66500	66500					
41				67000	67000	67000					
42				68000	68000	68000					
43				68500	68500	68500					
44				69500	69500	69500					
45				70000	70000	70000					
46				70500	70500	70500					
47				71500	71500	71500					
48				72000	72000	72000					
49				72500	72500	72500					
50				73500	73500	73500					
51				74000							
52				74500							
53				75500							
54				76000							
55				76500							
56				77500							
57				78000							
58				78500							
59				79500							
60				80000							

Not Permitted (Type 2 — 2 Axles)

30,000 (A)

Not Permitted (Type 3 — 3 Axles)

42,000 (A)

Not Permitted (Type 2-S1 — 3 Axles)

50,000 (A)

Not Permitted (Type 2-2 — 4 Axles)

70,000 (A)

Not Permitted (Type 2-S2 — 4 Axles)

62,000 (A)

Not Permitted (Type 3-S1 — 4 Axles)

62,000 (A)

Not Permitted (Type 3-2 — 5 Axles)

82,000 (A)

Not Permitted (Type 3-S2 — 5 Axles)

74,000 (A)

Not Permitted (All Types — 6 Axles)

Note: The loads are computed to the nearest 500 lbs.
The modifications consist in limiting the maximum load on any single axle to 20,000 lbs. and the load on any two axles spaced 8 ft. or less on centers to 32,000 lbs.
Loaded vehicles of 7 or more axles regardless of type and of wheelbase are not permitted.
Table I is applicable to gross loads of vehicles.
The permissible load on any group of 2 or more axles spaced 8 ft. or less between the centers of the extreme axles of the group is 32,000 lbs.
For the purposes of this table the steering axle is assumed to be 10,000 lbs. and 5 feet is subtracted from the maximum permissible vehicle length to arrive at the distance between the centers of extreme axles.

CHAPTER 3.00 VEHICLES OPERATING BY SPECIAL PERMIT

3.01 Conditions for Permit

The operation of vehicles or combinations of vehicles having dimensions or weights in excess of the maximum limits herein recommended shall be permitted only if authorized by special permit issued by an appropriate State authority.

In the interest of safety, no permit shall be issued for other than short haul local movements where the vehicle, or vehicle with load is of such width that would require more than one lane of the selected route of travel. Exceptions may be made if the movement is essential to the National Defense, as outlined in Chapter 4, or is made necessary under unusual or unavoidable circumstances and is in the public interest.

3.02 Statutory Provisions

It is recommended by the American Association of State Highway Officials:

(a) that statutory provisions be made by each State for authorization of oversize and/or overweight vehicular movements by special permits;

(b) that the statutory authority for the issuance of special permits governing such vehicular movements and for the establishment and collection of special permit fees be vested in the State highway departments;

(c) that such statutory provisions make mandatory the requirement that the issuance of such special permits shall be predicated, in each case, on an engineering determination of economy and feasibility made by the State highway department.

3.03 Permit Issuance

It is further recommended that each State highway department establish a general policy governing the issuance of special permits covering the movement of vehicles not permitted in regular operation which will provide just and uniform treatment for the occasional movement of vehicles and cargoes of excessive size and weight essential in pursuit of legitimate and objective enterprise within the State.

71-954 O - 72 - 7

CHAPTER 4.00 NATIONAL DEFENSE

4.01 State Procedures

It is recommended that each State highway department establish procedures to permit highway movements in excess of legal limits which are essential to national defense.

4.02 Military Certification

It is the intent of this Policy on movements essential to national defense that the Department of Defense shall be the sole certifying agency during peacetime for all movements by any national agency declared essential to the national defense. During a national emergency, movements essential to national defense would be far greater in scope, and those not under direct control of one of the military departments or Department of Defense agencies would be certified by the appropriate emergency transportation authority.

4.03 Joint Policies (AASHO and Department of Defense)

4.03.01 Except to meet overriding military necessity, no vehicular movement which exceeds any legal weight or dimension limitation, nor any other special military movement, will be undertaken over public highways unless prior permission is secured from the State authorities concerned. Necessary permits for short-distance local movements not under the jurisdiction of States will be obtained from local governments in accordance with applicable regulations and ordinances.

4.03.02 If movements of oversized or overweight vehicles that are militarily owned or operated are in the interest of national defense but cannot be certified as essential to national defense, designated military representatives may discuss the matter with designated State representatives concerned. If a permit is approved by the proper issuing authority of a given State without regard to the military essentiality of the movement, this approval will be accepted by the military departments as evidence that such movement in the State of issue is within the provisions of the laws of such State governing civilian cargo movements.

4.03.03 Permits for oversized or overweight movements which may be applied for by a commercial carrier and approved by a State issuing authority in a given State without regard to the military character of the cargo, will be accepted by the military departments as evidence that such movements in the State of issue are within the provisions of the laws of that State governing civilian cargo movements. However, if it is essential to national defense that an oversized or overweight movement be made by highway, under no condition shall carriers be authorized to certify the military necessity of such a movement to State authorities.

4.04 Procedures for Implementing Joint Policies

4.04.01 Each State will designate an official (and alternates, if desired) authorized to issue permits for oversized, overweight, or other special military movements on public highways.

4.04.02 The Army, Navy, Air Force, and Marine Corps will designate a limited number of officials authorized to request permits for oversized, overweight, or other special military movements on public highways.

4.04.03 The Chief of Transportation, Department of the Army, will maintain a directory showing the name(s) of the individual(s) in each State authorized to issue permits, together with a list of officials within the Department of Defense authorized to request permits, and will furnish current copies of same to all States and to Department of Defense agencies.

4.04.04 Authorized military representatives will determine whether a movement by highway is essential to national defense and will make necessary certifications to the appropriate State authorities.

4.04.05 Authorized military representatives will, when applying to State representatives for permits for oversized, overweight, or other special vehicular movements, furnish such information as may be necessary to enable the State representatives to make a reasonable evaluation of the effects of the movements on the highway facilities and traffic involved.

American Association of State Highway Officials

OFFICERS FOR 1968

President

JOHN O. MORTON, New Hampshire, 1968

First Vice President

ROSS G. STAPP, Wyoming, 1968

Regional Vice Presidents

Region I—ERNEST A. DAVIDSON, Delaware, 1969
Region II—BURL A. SAWYERS, West Virginia, 1969
Region III—W. J. BURMEISTER, Wisconsin, 1968
Region IV—JOHN A. LEGARRA, California, 1968

Past Presidents (Ex Officio)

D. H. STEVENS, Maine
J. BURCH MCMORRAN, New York
C. E. SHUMATE, Colorado
E. M. JOHNSON, Mississippi

Federal Highway Administrator (Ex Officio)

LOWELL K. BRIDWELL

Executive Committee Members

VIRDEN E. STAFF, Illinois, 1968
THOS. F. AIRIS, District of Columbia, 1968
C. G. PRAHL, Washington, 1969
WARD GOODMAN, Arkansas, 1969
FORREST COOPER, Oregon, 1970
D. B. FUGATE, Virginia, 1970
JOHN W. HOSSACK, Nebraska, 1971
ANGELO A. MARCELLO, Rhode Island, 1971

Treasurer

S. N. PEARMAN, South Carolina, 1968

Executive Director

A. E. JOHNSON, Washington, D. C.

Senator BAYH. Unfortunately, as chairman of the subcommittee, I find myself wearing two hats this morning. For the benefit of those present, will you please bear with me if around 10:45 I depart the premises for about 5 minutes. It is necessary for me to testify on one of my own bills at the opening of another hearing, but I will return here as soon as possible to resume this session.

Our first witness this morning is Honorable Fred Schwengel, our colleague from the House. We are pleased to welcome you, Congressman Schwengel.

STATEMENT OF HON. FRED SCHWENGEL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF IOWA

Mr. SCHWENGEL. Mr. Chairman, and members of the committee, I have a rather detailed statement which I would like to submit for inclusion in the printed record of these hearings along with four appendixes. Among the appendixes are the summary report and the actual report of the truck blast study conducted by Systems Technology Inc., for the Department of Transportation.

If that is agreeable, I will proceed to summarize my statement.

Senator BAYH. We will be glad to put all of the information and your entire statement in the record and you may proceed as you desire.

(The statement referred to appears on p. 101.)

Mr. SCHWENGEL. Mr. Chairman and members of the subcommittee, I appreciate this opportunity to appear before your committee in opposition to the big bus bill. While I am always happy to have the opportunity to appear before my distinguished colleagues here in the Senate, I am not happy to be appearing before you with respect to this particular legislation.

This legislation has been before the last three Congresses, and has been rejected by our two immediate precedessors, the 90th and the 91st Congresses.

It is particularly disappointing to find that we are still trying to deal with this subject in the absence of adequate factual data, and that we are dealing with it in an even more piecemeal fashion than before. Gentlemen, let me start by telling you what this bill does not do.

One of the most erroneous points made by proponents of the bill is that it will be the solution to our urban mass-transit problems. Nothing could be further from the truth. Proponents argue that the wider seats in the wider bus will lure the driver out of his automobile.

The fact of the matter is that the majority of our large cities have 102 inch buses by virtue of the grandfather clause in the 1956 act. Few, if any, of these wider buses have seats wider than the 17-inch seats contained in most of the present day Greyhound and Trailway buses.

By comparison, coach seats on most United Airlines planes measure 16½, 16¾, and 17 inches respectively. The transit people have put the extra space into wider aisles so that more people can stand in their buses. There is little likelihood that the prospect of standing in the wider aisle is going to entice many drivers out of their automobiles.

It is my conviction that the major interest of the city transit people have in this legislation is to obtain permission to run their existing 102 inch buses on the Interstate System for charter trips.

The charter trips are a lucrative source of income for many city transit systems. This statement was supported by the testimony given yesterday by Michael Cafferty, chairman of the board of the Chicago Transit Co.

Increased charter business will have little impact on solving urban traffic congestion. In addition, for reasons set forth in the section on tires contained in my full statement, it may be a bad public policy to encourage use of these buses for charter business.

Despite the vigorous denial by the proponents, this bill is a foot in the door for another big truck bill. Believe me, the truckers are vitally interested in this bill. That is why one of their lobbyists asked me not to oppose this bill on the House floor.

That is why the House gallery was filled with American Trucking Association lobbyists the day we considered the bill. And they have reason to be interested because it is difficult for me to see on what rational basis you can deny the wider width limitation to truckers once you've granted it to the bus owners.

Further, no assurances were offered by the proponents that a big truck bill will not be introduced by them. This position is further confirmed by a prediction contained in a recent issue of a leading financial newsletter. The newsletter predicted passage of the bus bill followed by a passage of a truck bill next year.

In my statement I deal more thoroughly with this point.

Now, let's go to air turbulence. This is a point I raised repeatedly when this bill was before the committee on the House side. It would appear that my earlier fears and the fears of others with respect to increased air turbulence have been substantiated by a recent study conducted for the Department of Transportation. The study was conducted by Systems Technology, Inc., of Hawthorne, Calif.

I have studied their record. They are a competent and reliable company.

The study shows that there is definitely an increase in air turbulence with an increase of 6 inches in truck width. Earlier, Department of Transportation officials indicated that the truck studies would not have a bearing on the bus turbulence problem because the truck turbulence originated primarily in the gap between the truck trailer and its cab.

The report specifically negates this proposition, by this statement:

> The amount of gap between trailer and tractor is not as significant because the corresponding flow is mostly above the level of the car.

For this reason, I feel it is valid to assume that the results of the bus air turbulence tests will be similar to the results of the truck studies. We must, of course, complete the bus studies, but the proponents of the bill are demanding action before the bus tests are completed, and so we have to act on the best information presently available.

The Department has advised me that the bus blast study will not be completed until January of 1973.

The most important finding contained in the truck report is the fact that air turbulence does constitute a serious hazard to motorists. The tests revealed that under certain conditions the auto being tested was nearly blasted out of its traffic lane onto the shoulder.

In another case, the auto was blasted—or sucked—so close to the truck as to create imminent danger of collision.

With respect to increasing the truck width by 6 inches, the study notes: "Increasing truck width has two main effects: It increases the intensity of the truck disturbance and it decreases the side to side clearance between car and truck.

Also, "Increasing truck width can increase the disturbance (blast) and affect car/driver performance." Testifying on the big truck legislation in 1970, Mrs. Walter Varney Magee, president of the General Federation of Women's Clubs said:

> Statistics cannot reflect our fears when our cars are rocked when passing or being passed by a huge vehicle several times the size of a passenger car.

The people conducting the truck air disturbance study have come up with some real "think tank" language to describe the fear of which Mrs. Magee spoke. The report states:

> The psychophysiological response measures show an increased driver stress associated with the truck disturbance input. This autonomic recruitment can help the driver improve his performance. However, it may have associated perceptual narrowing which reduces his attention to other aspects of the driving task.

In plain language, this means the air blast from trucks scares the Hades out of most drivers.

Mrs. Magee underestimated our modern scientists when she said "Statistics cannot reflect our fears * * *" The study precisely documents those fears as statistics. The report states:

> The driver heart rate data reflects increased stress at higher speeds * * * for example, the heart rate variability is reduced and the heart rate increases from about 65 to 80 beats per minute * * * these data show that the experienced driver is "stressed" by the knowledge that the truck interference disturbance can represent a potentially hazardous situation.

The House Public Works Committee report states that the bill will result in costs of approximately $400,000 over a 5-year period, mainly for costs of the blast studies. That figure may be drastically changed by a recommendation made in the truck blast study. The study states:

> With 10 to 12 foot lane widths these results imply that approximately a 6-inch increase in centerline separation—lane width—is needed to offset the disturbance increment due to an overall truck width increase from 96 to 102 inches.

If carried out, this would mean adding an additional 2 feet of paving to most of our Interstate Systems, the greater portion of which has four traffic lanes. The cost of such an alteration would be astronomical. It would represent billions more of expenditures on the roads.

While these findings obviously were not derived from buses, they certainly present enough of a warning flag to warrant delaying this legislation until the bus studies are completed.

This bill in and of itself, provides only for a 6-inch increase in width. However, the testimony of the busowners clearly indicate that they intend to use the new provision along with existing provisions to put much larger buses on our highways.

Greyhound's new bus is not only 6 inches wider, but 2 feet taller, 5 feet longer, and 12,267 pounds heavier than the model most commonly used at present. That, from any viewpoint is a big bus. And, those extra pounds are going to cause increased wear and tear on the highways, and thus, increased maintenance costs.

Mr. Chairman, I may be able to partially answer one of the questions which you asked yesterday with respect to braking capacity. You know, considering the safety advantages claimed for the bigger bus, it always seems to me that the proponents of this bill are woefully lacking when it comes to specific answers on safety-related questions. It would seem they should have those answers on the tip of their tongues, especially since several of the questions which you asked were asked during the House hearings on the bill.

Specifically, the National Highway Traffic Safety Administration regulations for new buses and trucks require them to stop within 245 feet at 60 miles per hour. Industry spokesmen yesterday said the new buses meet this standard.

By comparison, a typical automobile is required to stop within 216 feet at 60 miles per hour. The danger of mixing in the same stream of traffic vehicles with such widely varying braking ability should be readily apparent to all. The National Transportation Safety Board has repeatedly addressed itself to this question.

Mr. Chairman, when a bill of this importance is enacted, granting very significant new privileges to one group of citizens, it would seem logical that a certain balancing of the various interests involved would occur. Such is not the case with this bill. Proponents deny this by pointing to the fact that the Secretary of Transportation will have the opportunity to promulgate necessary regulations before the effective date of the bill. Let's look a little closer at this question.

First, the Secretary has advised me that the final report on the bus blast studies will not be available until January of 1973. The effective date of the legislation is July 1, 1973, which gives the Secretary a mere 6 months to promulgate the necessary regulations.

Even under ideal conditions, with full industry cooperation, it is highly doubtful if necessary regulations could be promulgated. Given the prior history of the bus industry with respect to safety regulations, it will take a good deal longer than 6 months. Even now, they have taken the Department of Transportation to court to delay the regrooved tire regulations.

The point I would make here is that if this legislation is eventually enacted, the public should get some "quid pro quo" for the new privilege granted to the bus owners. And, that "quid pro quo" should be contained in the legislation itself, and should be in the form of assurances that the increased width will in fact be put to the maximum possible use for safety.

Mr. Chairman, at the minimum, I recommend that you postpone further action on this legislation until the bus blast studies are completed in January of 1973. If you feel that some action should be taken now, I urge you to act on proposals such as my bill, H.R. 453, creating a Commission to study the whole question of sizes and weights on all Federal-aid highways.

It is high time we gave some consideration to the public interest in this matter, and stopped dealing on the basis of piecemeal, special-interest legislation.

Should your committee decide to report favorably on the House-passed version of the bill, I would respectfully request that you amend its coverage to the entire Federal-aid system.

Surely, if my colleagues in the House were sufficiently worried about operation of the wider bus on sections of the interstate having less than 12-foot lanes, to prohibit operation on those sections, they must have been even more concerned about the 8- and 10-foot lanes on other portions of the Federal System.

I yield the balance of my time.

Senator BAYH. Thank you very much, Congressman Schwengel. I know how deeply you feel about this. I have read several statements that you have made previously and I am anxious to read all of the information you have in your testimony that you did not cover in your oral statement.

Public interest is what you are trying to protect. As for this member of the committee, that factor will be the ultimate consideration as I make my personal determination. Do you have time for one or two questions?

Mr. SCHWENGEL. Yes.

Senator BAYH. The fact that compounds this decision in my mind is the situation which exists today, one which it would be rather naive to ignore. If we are going to suggest that 102-inch buses are dangerous on the most modern of our highways, do we not have the responsibility to be consistent and point out they are even more dangerous on noninterstate highways where the lanes are often more narrow?

Mr. SCHWENGEL. I would be glad to respond to that. I am aware of this problem and this is the reason for my bill, H.R. 453. We ought to study this whole area and determine what should be public policy. It is my feeling, my deep feeling, but I would like to reserve final judgment on this until a study, but it is my deep feeling now that we ought to look toward reducing sizes to standard sizes of 96 inches to all buses and trucks.

We had hearings for 74 days when we brought the Interstate System into being and those hearings determined widths of highways and we were considering then 96-inch buses and 96-inch buses and trucks are relatively safe on 24-foot highways where we have the four lanes.

Senator BAYH. I don't know of anyone, sir, who has yet suggested that we prohibit these buses from being on the other Federal-aid highways that are narrower than 12 feet. Was there an effort made to amend the bill in the House? Should we start studies to take them off of those roads?

Mr. SCHWENGEL. A question was brought up here but we agreed on a grandfather clause at that time which I have never agreed to.

Senator BAYH. But it in fact does exist today.

Mr. SCHWENGEL. Yes, it does exist.

Senator BAYH. The safety factors are the ones that I want to delve into. They have not been as adequately presented or as thoroughly

analyzed as I would like. The proponents of the wider bus bill suggest that, because of the new equipment, larger brakes and tires and more room for air cushions for shock absorbers, and so forth, that the wider bus does have increased built-in safety factors.

Do you know of any tests that would either substantiate this or rebut it?

Mr. SCHWENGEL. I am not an engineer but I have counseled with engineers and they tell me that buses with the present widths can improve their braking capacity, with improved tires.

Senator BAYH. Do you know of any such specific study? We of course will have some Government people in to testify and can ask whether they have looked into this.

Mr. SCHWENGEL. They are looking into this, I am sure. Further, on that point, one of the big bus companies came before our committee, and while admitting that they could get wider drums and more braking space with wider buses, also said they had no plans to change the size of their chassis. So they weren't going to take advantage of it and the bill didn't require that at all.

Senator BAYH. Apparently that bus company has not testified here yet, or perhaps I didn't ask the right questions.

Mr. SCHWENGEL. Well, it is in the hearing on the House side. I can cite that source for you.

Senator BAYH. Part of your testimony about the size of the new, wider bus seemed to compare some of the smaller, older buses that exist today to the so-called supercruiser, which is the big 102-inch bus, rather than to use the statistics of the most commonly used bus, the so-called scenic cruiser which is 96 inches.

Let me list some of this data about the scenic cruiser so you can see if you have contrary data about this bus which is presently being used widely today. Of course, it is 96 inches in width, compared to the new big bus of 102 inches in width.

The overall length would be identical—40 feet. Seating capacity would be the same. Overall height would be 1 foot ¾ inch higher and its loaded gross weight would only be 2,000 pounds heavier.

Mr. SCHWENGEL. That is the testimony I think you heard yesterday. The testimony I referred to was testimony appearing before our committee and I can give you the citation for that. I have some notes here that will confirm that.

Senator BAYH. Were you comparing the new 40-feet bus with the older 35-foot bus?

Mr. SCHWENGEL. Yes; but the comparison you made was not a true comparison either compared to that, considering the earlier testimony which I referred to which this bill would legalize if you passed it. They were talking yesterday about plans, I guess, but with the testimony before us, we had the testimony that, I believe it was the Greyhound MC 5 and 6, and this is from the testimony of the Greyhound people themselves at an earlier time.

I am not referring to yesterday. We can give the citation on that if you would like to have it.

Senator BAYH. I would appreciate that if our staff could get some information from you. It would be helpful to us.

There is one other matter that I wanted to ask you about. There has been no chance to have the people who made this blast study up here, but I hope we can get additional information and see what further efforts the Department has made. I was interested in your testimony citing the study which you placed in the Congressional Record and is before me. You stated that increasing the truck widths would have two main effects: it would increase the intensity of the truck disturbance; and it would decrease the side-to-side clearance between car and truck.

I think that is what you included in your testimony. That obviously makes good sense. When a car passes one of these big trucks or big buses, there is a noticeable effect. However, in looking specifically at the problem that confronts us, I notice that the report further makes this statement:

"Both effects are relatively small in going from a 96 to a 102 inch truck, for the test vehicle used. * * * The effect of a nominal truck width increase is insignificant in a large cross-wind because the basic cross-wind disturbance is large and persuasive, as noted."

Do you have other comments on this? I haven't had a chance to study the full report carefully.

Mr. SCHWENGEL. The full report will deal with that point which I have asked to put in the record and I think you will find your answer there.

Senator BAYH. It seems to indicate that, although there is considerable blast or disturbance caused by passing such large vehicles as trucks, an increase in width of 6 inches would not make a very great difference in that effect.

Here again, we must keep in mind what impact it would have. I don't think any of us would say we would favor taking buses and trucks completely off the road, but we are trying to determine in our minds what the increase of 6 inches would have as far as blast effect. This report, unless I read it erroneously, would lead one to believe it is a rather insignificant difference—not exactly insignificant, but at least it would not make a very great difference in that effect.

Mr. SCHWENGEL. Under certain circumstances this would be right, but under certain circumstances it could have very significant influence. I don't know the exact citation you have there.

Senator BAYH. I have been reading from the reprint in the Congressional Record, December 2, 1971, page E12831, which I think you requested to be printed on December 1.

Senator BOGGS. Mr. Chairman, you are discussing this report on an investigation of the effect of truck hydrodynamic disturbances on passenger car control and performance, dated October 1971. I believe the passage in question appears on page 6.

Senator BAYH. That is right.

Senator BOGGS. This has been made a part of the record?

Senator BAYH. Yes; Congressman Schwengel put it in the Congressional Record and I was reading from the Congressional Record, Extensions of Remarks, for December 2, 1971.

(The report referred to, entitled "Appendix III," is part of Congressman Schwengel's complete statement and appears on p. 122.)

Senator BAYH. I know you are terribly busy, Congressman Schwengel, and you have been very kind to appear as a witness today. Please let us have the benefit of your staff examination of the report and we will study it also to learn what additional information there is and what other tests are being conducted.

Mr. SCHWENGEL. There may be others following on this program that will deal with this point also.

Senator BAYH. Thank you very much. There is one other question I wanted to raise with you. Although we make judgments for ourselves, I think we have to give our colleagues who might differ full marks for sincerity.

You are deeply concerned that the wider bus bill should not become a wider truck bill?

Mr. SCHWENGEL. Yes, I am.

Senator BAYH. Perhaps that might follow. However, let me emphasize that I have been approached by both the bus people and the truck people, each of which has stressed that they are most anxious their cases should be presented on their own merits and that they believe it would be dangerous to both of them to commingle them.

Are there any 102-inch trucks on the road today? Are they covered any way by the type of grandfather clause which now covers significant parts of the country relative to wider buses?

Mr. SCHWENGEL. There may be situations where they have some but they are not in general use, certainly, across the country.

Senator BAYH. But what I am trying to explore in my own mind is, does it necessarily follow that wider buses would mean wider trucks? It seems when Congress was considering this matter in the Interstate System bill, it did not consider trucks and buses equally in 1956 because it made significant exceptions by which buses could escape in a number of States the limitation of 96 inches.

Mr. SCHWENGEL. They were combined in one bill, buses and trucks originally but we defeated it originally. Trucks and buses were together. They were partners at that time and they were supporting each other.

Now I have clear evidence that truckers are supporting this and hoping that it will pass and the argument then will be, I am sure, "Well, you give this advantage to the buses, so what is the difference then? How can you be inconsistent and not give it to us because we are traveling on the same highways?"

Senator BAYH. What you are arguing appears to be very logical. However, Members of Congress have a rather strange attitude of independence. Just because interested groups present a logical argument doesn't mean that a majority of Members will approve it. That was apparently the case in the Congress some 15 years ago, although I was not here at the time, when the Members were presented with a similar parallel argument. They gave the grandfather clause protection to the wider bus but not to trucks.

Mr. SCHWENGEL. You and I know that grandfather clauses are agreed to get a bill passed oftentimes so you don't develop opposition to the proposition and we had the interstate question before us and so as far as I was concerned I thought we could deal with this later and I have a vehicle in my bill, H.R. 453, a resolution to study this whole question.

I think in fairness to the industry itself we ought to have a national policy on wides and we ought not to give privileges to the cities over the countryside and, if a 96-inch bus is safer in the country, it is safer in the city, I am sure, but on this question, I think we ought to research and study and know what we are doing.

My big quarrel here is that the supporters of the bus bill are asking us to pass something before we have all of the facts, the data to support it or oppose it.

Now, one phase of that study, which is the truck blast, is before us. It is in the record. You were generous of giving us the privilege of putting it in the record. I think it belongs there and I hope every member of this committee will study and read it and ponder on it because it is a very valuable first study but it is only a first study.

Senator BAYH. I am hopeful that we can get all of the available data and then make a determination as to whether more study is needed.

I appreciate your alerting us to this possible weakness in the information that is available.

Senator Boggs?

Senator BOGGS. I have no questions, Congressman. We appreciate your testimony. I apologize for coming in late, but I had a conflict in my schedule.

(Congressman Schwengel's complete statement together with appendixes follows:)

STATEMENT OF HON. FRED SCHWENGEL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF IOWA

I. HISTORY OF SIZE AND WEIGHT LEGISLATIONS

A. BACKGROUND—FEDERAL AID HIGHWAY ACT OF 1956

In 1956, the Congress first considered the subject of vehicle weights and dimensions. The subject was broached in the consideration of the Federal Aid Highway Act of 1956 which established a vast new highway system spanning the country known as the National System of Interstate and Defense Highways. The Federal-State ratio of contribution was to be 90–10.

The magnitude of the Federal contribution gave support to the imposition of standards for vehicle users designed to protect the useful life of this enormous investment and to enhance the safety of the motorists who travel on our highways. Before this time, the matter of regulation had been primarily regarded as a State concern. Naturally, the standards varied quite widely from State to State, ranging, for example, from 18,000 to 24,000 pounds for single axles—from 28,650 to 44,000 pounds for tandem axle maximums.

Ten years earlier, the American Association of State Highway Officials (AASHO), concerned with the same problem of promoting the maximum useful life of the nation's highways, established certain standards to that end. This group of professional highway officials from the various States set forth the following standards:

1. Maximum weights: (a) single axle—18,000 lbs. (b) tandem axle—32,000 lbs. (c) gross truck—73,280 lbs. (as determined by AASHO formula based on maximum allowed length within the states.)
2. Maximum height: 12½ feet.
3. Maximum width: 96 inches.
4. Maximum length: (a) single unit trucks—35 ft. (b) Buses with 2 axles—35 ft. (c) Buses with 3 axles—35 ft. (d) Truck-trailer semi-trailers—50 ft. (e) Other combinations—60 ft.

Although in 1956 some thought that these standards were out of date and somewhat restrictive, still it was felt that they were reliable to be incorporated into the Federal Aid Highway Act. As passed, the 1956 legislation adopted the following legal limits and made them binding upon all Interstate mileage, with certain exceptions for States then having more liberal size and weight standards:

1. Maximum weight: (a) single axle—18,000 lbs. (b) tandem axle—32,000 lbs. (c) gross truck—73,280 lbs.
2. Maximum height: 12½ feet.
3. Maximum length: no limit.
4. Maximum width: 96 inches.

The states protected by the "grandfather clause" exception contained in Section 108(J) of the 1956 Act are: Connecticut, Hawaii, Maine and Rhode Island.

All the time of the bill's passage, a commitment was also made to undertake extensive research to determine the standards necessary to ensure maximum useful life of the new Interstate System. The commitment was embodied in Section 108(K) of the act which reads: Test To Determine Maximum Desirable Dimensions and Weights.

"The Secretary of Commerce is directed to take all action possible to expedite the conduct of a series of tests now planned, or being conducted by the Highway Research Board of the National Academy of Sciences, in cooperation with the Bureau of Public Roads, the several states, and other persons and organizations, for the purpose of determining the maximum desirable dimensions and weights for vehicles operated on the Federal Aid Highway Systems, including the Interstate System, and, after the conclusion of such tests, but not later than March 1. 1959, to make recommendations to the Congress with respect to such maximum desirable dimensions and weights."

In 1956, AASHO already had in the planning stage, a series of tests which were designed to elicit much the same information as that mandated by the Act. With some modifications to meet the requirements of Section 108(K), 836 sections of test pavements were built late in 1956 near Ottawa, Illinois. Beginning in 1958 and spanning a two-year period, a nearly continuous series of tests of fully-loaded trucks was conducted over these sections of pavement. The purpose was to gather information bearing on the relationship between pavement types and bridge construction, and vehicle weight limits and axle loadings. The resulting data was to be a critical factor in setting the maximum desirable weights of motor vehicles on the Interstate System.

After several delays, the data from the tests was made available by the Secretary of Commerce and printed as House Document No. 354, 88th Congress, 2nd Session.

The maximum weights and dimensions of vehicles recommended on the basis of the Ottawa tests were the following:

1. maximum weight: (a) single axle—20,000 lbs. (b) tandem axle—34,000 lbs. (c) gross truck—(to be determined by the formula).

$$W=500\left(\frac{LxN}{N-1}+12N+36\right)$$

Where W is the maximum weight in pounds carried on any group of two or more axles, L is the distance in feet between the extension of any group of two or more axles, and N is the number of axles in the group under consideration.

2. maximum height: 13½ feet.
3. maximum width: 102 inches.
4. maximum length: (a) single unit truck—40 feet. (b) single unit bus—40 feet. (c) semi-trailer—40 feet. (d) truck-trailer semi-trailer—55 feet. (e) all other combinations—65 feet.

B. Action in the 90th Congress

1. Senate action

In November of 1967, Senator Warren Magnuson. and others, introduced a bill, S. 2658, to increase the maximum weights and dimensions of vehicles operating on the Interstate System. This bill provided for the following limitations:

1. Maximum weight: (a) single axle—20,000 lbs. (b) tandem axle—36,000 lbs. (c) gross weight—computed by formula:

$$W=500\left(\frac{LxN}{N-1}+12N+40\right)$$

Where W equals the maximum weight in pounds carried on any group of two or more axles, L equals the distance in feet between the extension of any group of two or more axles, and N equals the number of axles in the group under consideration.

2. Maximum length—no limitation.
3. Maximum width—102 inches exclusive of tire bulge and safety devices such as mirrors.

Four days of hearings were held before the Senate Public Works Committee in February and March of 1968. The bill was reported out of committee after it was amended to include the following weight limitations:

Single axle—20,000 lbs. Tandem axle—34,000 lbs. Gross weight—(computed by formula).

$$W = 500\left(\frac{L \times N}{N-1} + 12N + 36\right)$$

The bill was then considered by the Senate under suspension of the rules, and passed by a voice vote with only seven Senators on the Floor.

2. House action

Similar legislation, H.R. 14474, was introduced in the House of Representatives by Congressman Kluczynski of Illinois and eight others. During the general hearings on the Federal Aid Highways Act of 1968, this bill was considered together with S. 2658. The hearings were held in February, May and June of 1968. On July 3, 1968, the House Public Works Committee favorably reported the bill, S. 2658, as amended, to the House.

Subsequently, a rule was obtained from the Rules Committee and the bill was placed on the Union Calendar, Number 669. The bill, however, was never called up for action and died at the end of the session.

3. Position of Department of Transportation

Lowell K. Bridwell, Federal Highway Administrator, testified before the Senate Public Works Committee that the Department of Transportation was opposed to S. 2658 as introduced. He stated, however, that the Department recognized the inadequacies of the existing size and weight limitations. Mr. Bridwell offered the following substitute bill on behalf of the Department:

[Attachment C]

A bill to provide for more uniform standards for the weights and dimensions and the safety and performance of vehicles using the Federal-aid systems, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. That,

Section 127, of title 23 of the United States Code is hereby amended to read as follows:

"Sec. 127. Vehicle weight and dimension limitations, safety and performance standards

"(a) No funds authorized to be appropriated for any fiscal year for expenditure upon the Federal-aid systems shall be apportioned to any State within the boundaries of which any Federal-aid system may lawfully be used by a vehicle or vehicle combination with:

(1) weight in excess of twenty thousand pounds including tolerances carried on any one axle, or with a tandem-axle weight in excess of thirty-four thousand pounds including tolerances, or with an overall width in excess of one hundred and two inches excluding tire bulge due to loads and safety devices approved by the Secretary, or with an overall height in excess of thirteen feet, six inches, or with an overall gross weight including tolerances on a group of two or more consecutive axles in excess of that derived by application of the following formula:

$$W = 500\left(\frac{LN}{N-1} + 12N + 36\right)$$

Where W represents overall gross weight on any group of two or more consecutive axles to the nearest 500 pounds; L represents distance between centers of the extreme axles of any group of two or more consecutive axles to the nearest foot; and N represents number of axles in the group under consideration; or

(2) the corresponding weights and dimensions permitted for vehicles or vehicle combinations using the public highways of such State under laws or regu-

lations established by appropriate State authority in effect on January 1, 1968, whichever is the greater.

"(b) Any amount which is withheld from apportionment to any State pursuant to subsection (a) of this section shall lapse. Subsection (a) of this section does not deny apportionment to any State allowing the operation within such State of vehicle or vehicle combination that could be lawfully operated within such State on January 1, 1968, or the operation within an urban area as defined in section 101(a) of this title of any transit-type bus meeting the requirements of section 4483(c) of title 26, United States Code, that could be lawfully operated within such area while engaged in scheduled bus service on January 1, 1968.

"(c)(1) In the interest of safety and the efficient utilization of the Federal-aid highway system the Secretary, after consulation with the States and such other public and private organizations as he deems appropriate and no later than two years following the enactment of this act, shall develop and publish in the Federal Register reasonable and practicable performance standards providing objective criteria applicable to vehicles and vehicle combinations having more than two axles or an overall gross weight in excess of 14,000 pounds, which shall prescribe:

(A) minimum performance standards specifying a ratio of gross weight of a vehicle or vehicle combination to the net engine horsepower available for movement of the vehicle or vehicle combination;

(B) minimum performance standards for the braking system of a vehicle or vehicle combination; and

(C) minimum performance standards for the strength and operation of the linkage and coupling systems between the components of a vehicle combination.

(2) The Secretary shall determine the effective date of any standard prescribed under this subsection, which date shall be not less than one nor more than two years after the beginning of the fiscal year next following it publication in the Federal Register unless the Secretary finds, for good cause shown, that a later date is in the public interest and publishes his reasons for such findings. The Secretary may revise, amend or revoke any standard prescribed under this subsection by notice published in the Federal Register, but the effective date of any revision or amendment shall not be less than one nor more than two years after the beginning of the fiscal year next following its publication in the Federal Register, unless the Secretary finds, for good cause shown, that a later date is in the public interest and publishes his reasons for such finding.

(3) After the effective date of any standard prescribed under this subsection, 10 per centum of funds authorized to be appropriated for any fiscal year for expenditure upon the Federal-aid systems shall be withheld from apportionment to any State within the boundaries of which any segment of any system may lawfully be used by vehicles in violation of that standard. No withholding from the amounts which would otherwise be apportioned to such State shall be made pursuant to the preceding sentence where a reduction in apportionment under section 402(c) of this title is applied to that State for the same fiscal year. Where he determines it to be in the public interest the Secretary may suspend, for such periods as he deems necessary, the application of this subsection to any State. Any amount which is withheld from apportionment to any State pursuant to this subsection shall lapse.

(4) Nothing in this section shall diminish any authority conferred upon the Secretary or the Federal Highway Administrator pursuant to any other act.

Sec. 2. Section 101(a) of title 23, United States Code is hereby amended by adding at the end thereof the following:

"The term 'single axle' means an assembly of two or more wheels, whose centers are in one transverse vertical plane or may be included between two parallel transverse vertical planes forty inches apart extending across the full width of the vehicle.

"The term 'tandem-axle' means any two or more consecutive axles whose centers are more than forty inches but not more than ninety-six inches apart and are individually attached to and/or articulated from a common attachment to the vehicle including a connecting mechanism designed to equalize the load between axles.

"The term 'overall gross weight' means the weight of a vehicle or vehicle combination without load plus the weight of any load thereon.

"The term 'vehicle' means a mechanical device intended primarily for highway transportation of any person or property therein or upon, or by which such device may be drawn upon a highway, except devices moved by human power or used exclusively upon stationary rails or tracks.

'The term 'vehicle combination' means a truck-tractor and semitrailer either with or without a trailer, or a truck with one or more trailers."

Sec. 3. The analysis of chapter 1 of title 23 of the United States Code is amended by revising the caption of section 127 to read as follows:

"Vehicle weight and dimension limitations, safety and performance standards."

It would appear from the printed hearings that the Department of Transportation officials did not testify directly before the House Public Works Committee on this legislation. The only evidence of the Department's position with respect to S. 2658, as passed by the Senate is contained in the answers to a series of questions submitted to the Department by Congressman William Cramer of Florida. The Department's responses appear at pages 164–166 of the printed hearings, and appear to have been in line with the contents of the substitute amendment above which was submitted by Mr. Bridwell in the Senate.

4. 1968 Presidential campaign

During the Presidential Campaign of 1968, the question of increasing the vehicle weight and dimension limitations became a national issue. Eventually, both major candidates issued statements on the subject. President Richard M. Nixon observed during the 1968 campaign, that:

"This proposal raises serious issues, including the safety and convenience of the motoring public. Questions remain about the extent to which greater truck size and weight would impose additional wear and tear on a road network.

"I believe these matters are so important to so many of our people that I favor postponement of action on the bill now before the House.

"As President, I would want this entire matter most carefully reconsidered, I would direct the Secretary of Transportation to take a hard look to make certain that the interests of the traveling public and also the life of our highways are fully protected as we facilitate the vital movement of goods in the Nation's commerce."

Former Vice-President Humphrey also indicated his opposition to the legislation during the campaign.

C. Action in the 91st Congress

1. House action

In June tof 1969, Representatives John Kluczynski and Robert Denney introduced legislation essentially the same as that which was reported out of the House Public Works Committee in amended form in 1968. The bill was H.R. 11870. The only change was the addition of a length limitation not contained in S. 2658. The following limits are provided in the Kluczynski-Denney bill:

1. Maximum weight—(a) single axle—20,000 lbs. (b) tandem axle—34,000 lbs. (c) gross struck—as computed by the formula:

$$W=500\left(\frac{L\times N}{N-1}+12N+36\right)$$

2. Maximum height: no change from present limits.
3. Maximum width: 102 inches.
4. Maximum length: 70 feet.

The Subcommittee also had under consideration H.R. 11619, which would have permitted an increase in the width of buses operated on the Interstate System from 96 inches to 102 inches. The bill was introduced by Congressman Frank Clark of Pennsylvania.

Eleven days of hearings were held on these two bills during July, August and September of 1969. In December, the Subcommittee reported the bill back to the full Public Works Committee without recommendation. The full Committee took no further action on either bill. As a result, both bills died at the end of the 91st Congress.

2. Position of the Department of Transportation

Mr. Francis C. Turner, Federal Highway Administrator, testified before the Committee with respect to H.R. 11870 and H.R. 11619. He stated that the Department of Transportation could not support the legislation unless the following changes were made in the bill:

1. That the effective date of the legislation be delayed three years to allow enactment of appropriate safety regulations governing the larger vehicles. He specifically mentioned regulations concerning: brake system performance, tires, weight-horsepower ratios, and track width.

71-954 O - 72 - 8

2. That the provision in H.R. 11870 permitting two consecutive sets of tandem axles to carry a gross load of 68,000 pounds, notwithstanding other restrictions in the bill, should be eliminated.
3. That the term "tandem axle weight" be fully defined.
4. That the exception to width limitations for safety devices be modified to include "officially approved" safety devices.
5. That the exception to width limitations for "tire bulge" be eliminated.
6. That the length limitation be 65 feet instead of 70 feet.
7. That the protection of the "grandfather clause" be gradually eliminated.
8. That the size and weight limitations of section 127, Title 23 U.S.C., be extended to all Federal Aid Highway Systems, and not just the Interstate System as currently provided.

3. Senate action

The Senate took no action respecting vehicle size and weight limitations during the 91st Congress.

D. Action in the 92nd Congress

1. House action

On February 17, 1971, Congressman Frank Clark introduced H.R. 4354, authorizing an increase of six inches in the permissable width of motor buses operating on the Interstate System.

On July 12, 1971, the House Public Works Committee favorably reported an amended version of H.R. 4354. The report is numbered 92-345. The bill came before the House for action on July 21, 1971 and was passed on a voice vote after a straight motion to recommit was defeated by a vote of 178 yeas to 213 nays.

2. Senate action

No size and weight legislation has been introduced in the Senate during this session. However, the House passed bill, H.R. 4354, and has been referred to the Roads Subcommittee of the Works Committee. Initial hearings have been scheduled for December 13 and 14, 1971.

3. Position of safety agencies

Both the Department of Transportation and the National Transportation Safety Board opposed the bill. The Department of Transportation position is based in part on the recommendation of the National Highway Traffic Safety Administration, a component of the Department. The National Transportation Safety Board is an independent safety agency with a great deal of expertise and experience in the field of highway safety. The National Committee on Uniform Traffic Laws and Ordinances has *rejected* a proposal to modify the Uniform Vehicle Code to permit 102 inch vehicles where 12 feet traffc lanes are available.

II. ISSUES

The question of changing the limitations on size and weight is extremely complex, and at times, extremely emotional in nature. I will attempt to discuss some of the major issues involved, hopefully in a relatively unemotional manner.

A. Not a Solution to Urban Mass Transit Problem

One of the most erroneous points made by proponents of the bill is that it will be the solution to our urban mass transit problems. Nothing could be further from the truth! Proponents argue that the wider seats in the wider bus will lure the driver out of his automobile. The fact of the matter is that the majority of our large cities have 102 inch buses by virtue of the grandfather clause in the 1956 Act. Few, if any, of these wider buses have seats wider than the 17 inch seats contained in most of present day Greyhound and Trailways buses. The transit people have put the extra space into wider aisles so that more people can stand in their buses. There is little likelihood that the prospect of standing in the wider aisle is going to entice many drivers out of their automobiles!

It is my conviction that the only real interest that the city transit people have in this legislation is to obtain permission to run their existing 102 inch buses on the Interstate System for charter trips. The charter trips are a lucrative source

of income for many city transit systems. Increased charter business will have little impact on urban traffic congestion. In addition, for reasons set forth in the following section on tires, it may be a bad public policy to encourage use of these buses for charter business.

B. This is a "Truck Bill"

Despite the vigorous denial by the proponents, this bill is a foot in the door for another Big Truck Bill. Believe me, the truckers are vitally interested in this bill. That is why one of their lobbyists asked me not to oppose the bill on the floor. That is why the House Gallery was filled with American Trucking Association lobbyists the day we considered the bill. And they have reason to be interested, because it is difficult for me to see on what rational basis you can deny the wider width limitation to truckers once you've granted it to the bus owners. Further, no assurances were offered by the proponents that a Big Truck Bill will not be introduced by them. This position is further confirmed by a prediction contained in a recent issue of a leading financial newsletter. The newsletter predicted passage of the bus bill followed by a truck bill next year.

C. Accident Data

For a number of reasons there simply are no accident statistics which are sufficiently accurate to analyze this complex question of the effect of increased size and weight on highway safety. To begin, the accident forms utilized in the various states do not distinguish between various sizes and classes of trucks and buses involved in accidents. For example, they do not distinguish between 96 inch buses and 102 inch buses (which, of course, are permitted to operate in some states on primary and secondary roads). Even if the report forms did distinguish between the two sizes of buses, the data still would not be adequate for purposes of this legislation. This is due to the fact that by far the majority of the 102 inch buses now in operation are operated within city limits. They have as a result, a much higher exposure to the possibility of accidents. At the same time, they are not exposed to identical hazards, and they don't expose other drivers to the same hazards, as would be the case on more rural highways. That is to say, areas where the problems of air turbulence are more pronounced.

Thus, we are severely lacking in sound data on what should be one of the first and most important factors in considering this legislation.

D. Braking Capacity

One of the arguments utilized by proponents of the bill is that the additional space will permit better braking systems. They state that the new wider buses will have braking systems which are considerably more effective. National Highway Traffic Safety Administration regulations for new buses and trucks require them to stop within 245 feet at 60 miles per hour.

By comparison automobiles are required to stop within 216 feet from a speed of 60 miles per hour.

The danger of mixing in the same stream of traffic, vehicles with such widely varying braking ability should be apparent to all. The National Transportation Safety Board in its recent report on the tragic multiple-vehicle accident which occurred on the New Jersey Turnpike, November 29, 1969, (Report No. NTSB–HAR–71–3) recognized this problem and recommended that:

"3. The National Highway Traffic Safety Administration set a high priority on establishing performance requirements for new buses, trucks, trailers, and combinations in regard to: (1) improved braking capabilities with balanced skid resistance, reduced "fade", and shorter stopping with maximum load; (2) the use of energy-absorbing underride and override barriers to reduce passenger-car impact decelerations through controlled yielding; and (3) minimum limits on stability factors for loaded vehicles. (Stability factor is defined as one-half the tread width between centers of outside tire footprints, divided by the height of the center of gravity of a loaded vehicle.)

"4. The Bureau of Motor Carrier Safety, Federal Highway Administration, consider the promulgation of regulations to require improved braking capabilities of regulated vehicles, and inclusion of a numerical statement of the stability factor (value) on the identification plate of all tank trailers which transport hazardous materials, in implementing Recommendation 3, above."

In a recent address, Dr. William Haddon, Jr., President, Insurance Institute for Highway Safety, spoke of similar problems regarding braking capacity. Dr. Haddon is the former Director of the National Highway Safety Bureau. In an address to the Society of Automotive Engineers in January of this year. Dr. Haddon stated:

"A *second* noteworthy problem in relation to highway losses involving trucks and buses involves the extent to which their designers and manufacturers provide adequate braking ability. Simply stated, all vehicles in the dense traffic streams typical of many present roads must be able to break at essentially the same rate, lest in emergencies the slower braking vehicles literally sweep the faster before them with results well known to students of the daily press. This is not a requirement that logic places only on the members of one class of vehicles, such as passenger cars—where the at present huge discrepancies in maximum braking rates are also a serious problem (9) for the same and other reasons. It is also not a problem for vehicles only in a particular state of load. It is a logical, necessary performance requirement for all vehicles, especially including the heaviest trucks under their fullest loadings. Moreover, the braking capacity must approach closely at least that of the fastest braking vehicles now on the road since the alternative of worsening, for intervehicular compatibility, the latter's rates would be expected to yield increased losses in their own highway use.

"There is *no* present adequate Federal standard for truck braking rates. And the Uniform Vehicle Code suggested for states has only a weak requirement for stopping distance (10), and that in a test at only twenty miles per hour. Actual braking performance of heavy trucks is commonly two to three times worse than that of passenger cars. (12) (13) In many emergencies, regardless of the skill of their drivers, this guarantees intervehicular collisions, with property damage, injury, and/or death the result—a problem also presented by automobiles with inadequate brakes. In illustration, consider reports of the multivehicular holocaust, November 29, 1969, on the New Jersey Turnpike, in which among other factors one after another huge truck was unable to stop in a short enough distance and plowed into the vehicles and people ahead. Nationwide increases in traffic densities; the remaining lifetimes of present heavy vehicles whose maximum braking ability is incompatible with those of other, intermixed, and usually more vulnerable vehicles; and the indefinite continuation of present brake performance policies lead me to believe that increasing numbers of such disasters will occur."

The contractor's report of work recently completed for the National Highway Safety Bureau by the TRW Systems Group, dealing with the kinds of degradation which occur in the principal brake system design types manufactured during the years 1964–1969 for use on American-made automobiles and light-weight trucks, includes the following conclusion:

"Current road tests of stopping distance from a speed of 20 MPH, as implemented in the various states, achieved results which are non-uniform to the point that the results indicate this type of test is relatively ineffectual as a means of detecting brake degradation. Such tests cannot predict 60 MPH performance. (11)"

E. Vehicle Power

The question of variations in the relative amount of power available to propel vehicles of varying size and weight is directly related to the previous discussion on braking ability. There are extreme differences in the relative power of buses, trucks, and automobiles. This too, is rather apparent to the motorist stuck behind a big truck on a steep slope. The same applies to buses, if to a somewhat lesser degree. The various agencies of the Department of Transportation are in the process of prescribing certain minimum requirements in this respect. Here again, we are still doing research on a question vitally related to the issues involved in the pending legislation.

F. Pollution

Buses are one of the most serious polluters of our environment in two respects, air and noise. One doesn't spend much time behind, or anywhere near, a bus without being made rather pointedly aware of the extent of the air pollution created by the bus. The same is true of noise, but this is probably more true with respect to pedestrians than motorists.

In this regard, the proponents of the bill hinted that the increase in width would speed development of their turbine engine which does not pollute the air. If this is in fact the case, the proposed legislation should be amended to permit only those wider buses which utilize turbine engines!

G. Automobile Versus Bus Safety

One of the major points used by proponents of the legislation is the increased safety of passengers. They point out the fact that on the larger buses, the passenger seats will be well above the point of impact for the majority of accidents. That's fine for the bus passenger, but what about the auto driver and auto passengers who are still located at the point of impact? In 1969, 977 billion intercity passenger miles were ridden in automobiles as compared to 26 billion passenger miles in buses. Naturally, I'm not opposed to protecting the bus passenger from injury. However, in view of the relative amounts of travel by the two modes, the case for increased bus passenger safety at the expense of auto passenger safety will have to be very compelling. With 86.4% of all travel in the United States in 1969 being achieved through the use of the automobile, we clearly must give the auto the benefit of the doubt in resolving any safety questions as between the two modes of transporation. It is also important to be aware of the fact that in 1968, 104,702,000 motor vehicles of all types were registered in the United States. Of that total figure, approximately 21,400 were intercity buses.

This all goes once again to the question of mixing in the same stream of traffic vehicles with widely varying power performance, braking capacity, and ability to survive a collision without serious damage.

H. Actual Width

The width limitations contained in the 1956 Act included an exception for safety devices and tire bulge. As has been indicated earlier, the term tire bulge is now obsolete and should be deleted from the statute. The safety device exception is not obsolete. It does need to be revised so that the exception covers only those safety devices approved by the Department of Transportation. This exception has been abused by some vehicle operators.

The question of the safety device exception is directly related to the question of increased width limitations. The present width limitation is 96 inches. It certainly was a shock to me to find that the large mirrors on each side of buses effectively extends that width limitation to as much as 114 inches. By their own testimony, officials of the National Association of Motor Bus Owners indicated mirrors could protrude as much as 9 inches on each side. I personally measured some bus mirrors which protruded 12 inches. That would make the total width 120 inches. In either case, it certainly doesn't leave much room to spare, even on a twelve foot traffic lane. The problem is magnified when you have two vehicles this size passing one another.

Proponents of the bill argue that the mirrors are designed to break away in case they strike another vehicle or a fixed object along the highway. That is not a satisfactory answer to the problem. No driver is going to drive anywhere near the point that his mirror might hit another vehicle. In the normal course of driving he is going to leave sufficient space so that the mirrors will clear the adjacent vehicles. This places him 9–12 inches closer to the other lane on a multiple lane highway, or to the shoulder on a two lane highway.

Another problem in this area is that of "off tracking." This refers to the portion of a vehicle which swings outside the normal line of the vehicle due to the fact the wheels are mounted some distance from the front and rear of the vehicle. We have all witnessed the problem of "off tracking" when a bus attempts to turn a corner, especially in a multi lane intersection. The additional six inches in width and the additional five feet in length obviously further aggravate the problem.

Testifying before the House Public Works Committee on the question of highway safety, Dr. Robert Brenner, then acting director of the National Highway Safety Bureau, responded as follows to this question:

Schwengel. "And I would like to ask, have you done any research or are you planning any research on the effects of increasing the width of the trucks on the highway?"

Dr. BRENNER. "We have work in progress at the present time in the general problem area of stability of trucks, truck-trailer combinations, double bottoms, semis, the whole problem of truck-trailer stability. And insofar as the width of the vehicle, wheel base in relation to the height as well as the mass distribution, are certainly central to stability studies and we will be working in the general area.

"As to the specifics of what the extra width does or does not do in the safety picture, I am not aware of my works specifically in that regard."

This statement, made in 1969, indicates that a mere two years ago the Department of Transportation was doing little or nothing to study this problem. More studies are now underway and the truck blast study is completed. However, the Department's interest was stirred rather belatedly.

I. ECONOMIC EFFECT

While the economic impact of increasing the size of buses is not as great as the impact of the increases in size and weight contained in H.R. 11870, it is certainly a factor to be considered. Indeed, the new bus will be approximately 13,267 pounds heavier than the older models. However, since this is within the present weight limitations, no change in the law is required. The increased wear and tear on the highways will be clearly present.

The major economic effect of wider buses related to the increased highway costs which may result from widening various highway structures to accommodate them. Conceivably, the traffic lanes of our Interstate System will have to be widened beyond their present twelve feet to accommodate the larger buses.

My basis for the foregoing statement lies in the fact that the present lane widths of twelve feet were the result of studies conducted in the late 1940's and early 1950's using vehicles 96 inches wide. Measurements were taken to determine the normal path for the 96 inch vehicles under various conditions. After allowances were made for the "waiver patterns" which were developed, it was determined that the traffic lanes should be twelve feet wide. It seems logical that similar tests using 102 inch vehicles would show a need for still wider traffic lanes. The cost of such a change in the Interstate System alone would be phenomenal!

There has been a good deal of speculation as to the intent of the Congress with respect to lane widths when the Federal Aid Highway Act of 1956 was enacted. It seems to me that the comments of Senator Gore with respect to an amendment offered by Senator Kerr offers some clarification of at least the Senate intent on this question. Senator Kerr's amendment, contained a limitation on maximum width to 96 inches. The amendment was agreed to; Senator Gore's remarks follow:

Mr. GORE. "The committee felt that with the vast investment the people are to make in this magnificent Interstate System of highways, somewhere, somehow, we should call a halt to the ever-increasing weights, to the ever-increasing widths, to the ever-increasing lengths of vehicles traveling the highways.

"Therefore, the Senate Committee approved by unanimous vote inclusion of the AASHO code for maximums, provided the States themselves do not have maximums in excess, in which event they would be permitted to participate in the 90 percent funds without reducing to these maximums.

"Now let us come to the amendment of the Senator from Oklahoma (Mr. Kerr) to the comittee amendment. The Senator from Oklahoma pointed out that there was no uniformity in width, and the record shows that that is so. But I did not think the provisions voted by the House were sufficient. The Senator from Oklahoma originally submitted his amendment to have it comply exactly with the provision voted by the House, which applies only to axle weights—18,000 pounds in the case of a single axle and 32,000 pounds in the case of tandem axles.

"According to the testimony before the Senate committee, the most important factor, and the one causing the greatest damage to the highways, is the axle weight. The width causes great hazards in traffic. I insisted that we provide a limitation on width. It happens that there is more uniformity as regards width than as regards any other dimension or specification. At the present time, 46 States have a maximum width of 8 feet, and two States have a maximum width in excess of that. The amendment of the Senator from Oklahoma to this committee amendment provides a maximum width of 8 feet for 46 States, and allows the maximum of the two States in excess of that to remain."

"I shall be glad to reply. As I see it, the most important thing to protect the investment of the people in the roads, that is, to keep the roadbeds and surfaces from being crushed by excess weight, is the control of the axle weights. The most important thing in preserving bridge structures is control of overall weights. The most important thing in preserving safety of traffic is control of the width of the vehicles. The Kerr amendment applies to all three.

J. Tires

One phase of the "safer bus" argument used by proponents of the bill is to the effect that the new buses will have wider tires. They argue that wider tires means more tread contact with the highway surface, and thus better braking ability. Safety experts have advised me that increased tread width will not increase braking effectiveness under normal traffic conditions. It improves only the braking ability on curves.

These experts further advise me that the crucial element here is the chemical composition of the tires, and not the width. To really effectively increase traction, the chemical composition of the tires must be changed to give a "softer" tire. This would, of course, result in a much shorter tire life.

It would be interesting to know if the bus owners are willing to use these "softer" tires in order to really improve the breaking ability of their buses. I'm inclined to think they are not willing to do so inasmuch as they are fighting the Department of Transportation efforts to establish tougher standards for retread tires used on buses. The American Transit Association and the National Association of Motor Bus Owners have joined in a lawsuit challenging the validity of the Department of Transportation's new regulations on regrooved tires. The regulations require that there be a 3/32 inch of undertread below the grooves of the regrooved tire. The bus owners claim this would reduce tire life by 15%. They claim they can safely utilize the thinner tire on intra-city operations. It must be noted, however, that most city transit systems are supplementing their income with extensive charter operations. Assuming the thinner tire can be used safely on intra-city operations, there can be no assurance that the thinner tires will not be used on intra-city buses utilized for charter operations on the open highway.

K. Bumpers

The need for more adequate energy absorbing systems in the case of collisions between large vehicles such as trucks and buses, and automobiles is readily apparent. As noted earlier, the bus driver and bus passengers may be "well above the point of impact", however, the auto driver and his passengers located right at the point of impact. There is an urgent need for bumper systems designed to absorb amounts of energy sufficient to minimize the damage to the persons and property involved. Also, there is a great need for standardization of bumper heights for all vehicles. These improvements in bumpers should be made before we increase the width, length, and weight of buses.

L. Seat Widths

One of the major arguments made in favor of the wider bus is the fact a portion of the increased width would be used to widen the passenger seats. Bus owners indicate they would add 1 to 1½ inches to each seat in the wider buses. They claim the additional comfort which would be afforded to passengers is vitally needed to attract more passengers. They, of course, point to the government's efforts to encourage more use of mass transportation facilities such as buses.

This question of seat widths is one which needs a good deal of very close scrutiny. It is especially necessary because of the extent to which the bus owners rely on the need for wider seats to justify the wider bus. Mr. Charles Webb, President of the National Association of Motor Bus Owners testified that passenger seats on inter-city buses are 17 inches. The seat model displayed by the bus owners representing present seats during the hearings measured 33½ inches from the inside of one arm rest to the inside of the other arm rest. This would allow 16¾ inches for each passenger. The model representing the proposed wider seats measured 36½ inches or 18¼ inches per passenger. With these figures in mind, it is interesting to learn that the coach seats in most of United Airline's planes vary from 16½ to 16¾ inches in width! Seats on the Seaboard Coast Line Railroad Company are 18¼ inches wide.

In view of the foregoing indication that present bus seats are wider than many air coach seats, it is interesting to note that in 1968, the airlines compiled 113,910,636,000 revenue-passenger miles whereas the bus operators compiled only 24,500,000,000 revenue-passenger miles. Clearly, the nation's travelers spent a good deal more time in the narrower air coach seats. There has apparently been no great outcry from this group of travelers with respect to seat width.

If the regulatory agency for the buses, the Interstate Commerce Commission, follows the example of the airline's regulatory agency, bus owners may not gain much by installing wider seats. The Civil Aeronautics Board (C.A.B. has recently ruled that the airlines must charge 8.5% more for wider seats). For example, United Airlines has removed one row of seats in its coach sections on some planes. This "five across" seating results in seat width varying from 18.99 inches to 19.74 inches. These wider seats would be covered by the surcharge order of the C.A.B.

An extension of the wider seat argument is equally invalid. This argument is to the effect that wider seats will attract more passengers to bus transportation and thus alleviate urban traffic congestion. This argument conveniently overlooks the fact that most bus seats on present intra city-commuter buses are narrower than 17 inches, even though many cities allow 102 inch wide buses. The explanation is simply that the bus companies use the extra bus width to provide more room in the aisle for passengers required to stand up. So it is clear that increased bus width does not contribute to a reduction in urban traffic congestion.

If bus companies are sincerely interested in attracting more passengers they could do better to start by cleaning up their dirty bus depots! They might also add seat belts as the National Transportation Safety Board continually urges them to do if they are so concerned about the welfare of their passengers!

M. Coercion of the States

Still another consideration with which we must deal is that of the relative roles of the Federal and State government in regulation of vehicle weights and dimensions. This Congressman realizes that the action we take with respect to this legislation will have effects more far-reaching than those which simply concern the Interstate System of this nation. In this respect we should look once again to the mandate of the 1956 legislation. The Federal Aid Highway Act of 1956 directed a study of the appropriate vehicle weight and size limitations with respect to all Federal Aid Highways. The AASHO studies and the recommendations resulting therefrom, have been directed solely ot the Interstate Highway System. Obviously, the Interstate System has been built to the highest standards of any highway system in our Nation. The greater problem arises from the fact that our Interstate System does not lead from one vacuum to another, but, in fact, leads from one city to another via the ABC, or primary and secondary road systems. The Federal government has an investment of 50% in the cost of constructing these systems. Granted, this amount may be considerably less than the 90% of construction costs which we have invested in the Interstate System, but there is no logical argument by the Federal government should not protect its investment merely because it is "only 50% of the total cost."

The larger buses which would be permitted on the Interstate System under the legislation now before the Public Works Committee are not going to load and unload in the middle of that system. They must, of necessity, use the primary and secondary systems in their movement from one point to another. Section 109 of the Federal Air Highway Act of 1956, which includes standards for all Federal Aid Systems, specifies that the Secretary of Transportation may not approve plans and specifications for proposed projects unless they provide a facility "(1) that will meet the existing and probable future traffic needs and conditions in a manner conducive to safety, durability, and economy of maintenance." AASHO stated in testimony in 1969 that they believe the standards adopted as maximums should apply to all systems. It is clear that passage of this legislation by the Congress would serve as leverage to force the various States to increase their size limitations on the primary and secondary systems so as to equal that of the Interstate System. And, of course, there would be pressure to extend the width increae to other vehicles, namely trucks! This is despite the clear fact that our primary and secondary systems are not up to the same standards as our Inter-

state System. It is one thing to say that this legislation is merely "'permissive" and doesn't force the States to do anything. To adopt this philosophy is to be something more than naive.

N. Driver Rear Vision

With both trucks and buses there is a rather extensive "blind spot" to the rear of the vehicle. In this area, the driver is unable to see any other vehicle. The rear view mirrors simply do not cover this area, and any motorist caught in that blind spot can be in for serious trouble. I have estimated that for an average truck-trailer combination 65 feet long, this blind spot includes about 346.7 cubic feet. The total for buses would be somewhat less because the driver does have some vision out the rear of the bus, and because the bus isn't as long.

To increase the width of the bus by six inches, and to increase its length by five feet obviously will increase the number of cubic feet contained in the "blind spot". Again, the Department of Transportation has recognized the problem and is working on it. Several possibilities exist for solving the problem. One is a series of overhead mirrors. Another is electronic equipment utilizing some form of television. It is foolish to increase the scope of this problem by increasing the amount of blind space, when we are just beginning to study solutions to the problem.

A related problem is the fact these large vehicles also block the forward vision of the vehicles behind them. They make it extremely difficult to see directional and warning signs in time to take proper action. The bus owners indicate the new bus will be safe because the bus driver will be in a higher position and then better able to see problems in the road ahead. Again, I ask, but what about the automobile driver who can't see the accident ahead because of the big bus in front of him? Incidentally, the new bus is also two feet higher, further compounding the problem.

A recent Evening Star article reported a significant breakthrough with respect to the blind spot in automobiles. A series of mirrors gives the driver virtually a complete picture of the area behind him. I'm convinced that we can make similar advances with respect to trucks and buses if we really try. The article to which I refer appears at page E12746 of the Record for November 30, 1971.

O. Air Turbulence

It would appear that my earlier fears with respect to increased air turbulence have been substantiated by a recent study conducted for the Department of Transportation. The study was conducted by Systems Technology, Inc. of Hawthorne, California. The study shows that there is definitely an increase in air turbulence with an increase of six inches in truck width. Earlier, Department of Transportation officials indicated that the truck studies would not have a bearing on the bus turbulence problem because the truck turbulence originated primarily in the gap between the truck trailer and its cab. The report specifically negates this proposition, by this statement: "The amount of gap between trailer and tractor is not as significant because the corresponding flow is mostly above the level of the car." For this reason, I feel it is valid to assume that the results of the bus air turbulence tests will be similar to the results of the truck studies. We must, of course, complete the bus studies, but the proponents of the bill are demanding action before the bus tests are completed, and so we have to act on the best information presently available.

The most important finding contained in the truck report is the fact that air turbulence does constitute a serious hazard to motorists. The test revealed that under certain conditions the auto being tested was nearly blasted out of its traffic lane onto the shoulder. In another case, the auto was blasted (or sucked) so close to the truck as to create imminent danger of collision.

With respect to increasing the truck width by six inches, the study notes: "Increasing truck width has two main effects: it increases the intensity of the truck disturbance and it decreases the side to side clearance between car and truck". Also, "Increasing truck width can increase the disturbance [blast] and affect car/driver performance."

Testifying on the big truck legislation in 1970, Mrs. Walter Varney Magee, President of the General Federation of Women's Clubs said:

"Statistics cannot reflect our fears when our cars are rocked when passing or being passed by a huge vehicle several times the size of a passenger car."

The people conducting the truck air disturbance study have come up with some real "think tank" language to describe the fear of which Mrs. Magee spoke. The report states:

"The psychophysiological response measures show an increased driver stress associated with the truck disturbance input. This autonomic recruitment can help the driver improve his performance. However, it may have associated perceptual narrowing which reduces his attention to other aspects of the driving task".

In plain language, this means the air blast from trucks scares the Hades out of most drivers!

Mrs. Magee underestimated our modern scientists when she said, "Statistics cannot reflect our fears. . ." The study very precisely documents those fears as statistics. The report states: "The driver heart rate data reflects increased stress at higher speeds, . . . for example, the heart rate variability is reduced and the heart rate increases from about 65 to 80 beats per minute." ". . . these data show that the experienced driver is "stressed" by the knowledge that the truck interference disturbance can represent a potentially hazardous siuation."

The House Public Works Committee Report states that the bill will result in costs of approximately $400,000 over a five year period. That figure could be drastically changed by a recommendation made in the truck study. The report states:

"With 10 to 12 feet lane widths these results imply that approximately a 6-inch increase in centerline separation (lane width) is needed to offset the disturbance increment due to an overall truck width increase from 96 to 102 inches."

If carried out this would mean adding an additional two feet of paving to most of our Interstate System (most of it has four traffic lanes) the cost of such an alteration would be astronomical!

While these findings obviously were not derived from buses, they certainly present enough of a warning flag to warrant delaying this legislation until the bus studies are completed.

P. Constitutionality

During debate on this bill on the floor of the House, the Gentleman from Texas, (Mr. White), raised a very interesting question. He asked if it might not be unconstitutional to delegate what is in effect a veto power over a piece of legislation to a Presidential appointee. I am not a lawyer and I don't have the answer to his question, but it certainly has a good deal of logic. It would be somewhat analogous to legalizing marihuana, until such time as the Secretary of Health, Education, and Welfare is able to prove that its use adversely affects the users health!

Let's not "pass the buck" on this problem to the Secretary of Transportation. He is a very competent man, and I have the highest respect for him. However, this question is far too important to the safety and well being of our consituents to warrant legislating—we have the facts!

III. CONCLUSIONS

The major conclusion that must be drawn from the foregoing discussion is the fact that we are woefully lacking in solid information with respect to the effect of this legislation on highway safety. I have repeatedly called for studies to develop authoritative answers to the questions which have been raised. In this Congress as well as the 91st Congress, I have introduced legislation calling for a Presidential Commission to study all of the aspects of this legislation, from an economic standpoint as well as from a safety standpoint. The Commission would be composed of people broadly representative of the public, as well as the special interest groups affected by the proposed legislation. My bill H.R. 453, would direct the Commission to examine, among other things, the following questions:

(1) What share of highway construction and maintenance costs is allocable to each class of highway users?

(2) What would be the effect on the costs of the Federal-aid highway systems (both original costs and recurring costs) of permitting motor vehicles having greater weights or dimensions, or both, than those permitted under existing law to use the highways?

(3) What overall economic benefits would accrue from permitting motor vehicles having greater weights or dimensions, or both, than these permitted

under existing law to use the highways, and which sectors of the economy would receive these benefits?

(4) How should the costs referred to in paragraph (2) be allocated on the basis of the economic benefits referred to in paragraph (3)?

(5) What would be the effect of permitting motor vehicles having greater weights or dimensions, or both, than these permitted under existing law to use the highways on all aspects of highway safety?

It seems to me that these are fair and reasonable questions. They are certainaly questions any reasonable Member of Congress would want satisfactorily answered before he voted in favor of this legislation. If the truck and bus owners are really sincere they would get behind my legislation and work for its early enactment. If the facts are as represented by proponents of the legislation, a favorable report by an unbiased commission would in fact, speed passage of the legislation.

Presumably, if the Commission recommended legislation raising highway user taxes for trucks and buses, the proponents of the size and weight legislation would support that legislation with equal vigor.

With respect to the size and weight legislation presently under consideration, H.R. 4354, there are many factors which mitigate against its present enactment. Among the most significant is the opposition of the National Transportation Safety Board and the Department of Transportation to its enactment. The Board is a completely autonomous board which has the authority to investigate, make final cause determination, and report the facts and circumstances of major surface transportation accidents; and make recommendations for the purpose of preventing accidents and promoting safety in transportation. The Board also condutcs special transportation safety studies, examines the adequacy of transportation safety standards, and determines compliance with these standards.

When an agency which has as broad a mandate as this Board has, and which obviously has the necessary experts to carry out the mandate, opposes a piece of legislation on safety grounds it is difficult for me to see how any Member of Congress could seriously consider voting for the legislation. The Department of Transportation is also charged wtih responsibility for traffic safety, primarily through the National Highway Traffic Safety Administration. The Administration is under the capable leadership of Douglas Toms. Secretary Volpe and Mr. Toms are to be commended for recognizing the safety problems inherent in the big bus bill, and for urging that it not be enacted. While the opposition of the Department isn't as broad as I would have liked to see, I'm certainly glad to have the Department on my side.

In addition, we have the warning flag raised by the truck blast study. While we must await the actual completion of the bus blast studies in order to have all the facts, those facts contained in the truck study are serious enough to warrant postponing action until the bus studies are completed.

To act favorably on this legislation in light of the warnings contained in the truck blast study would be to show a callous disregard for the safety of the motoring public. It would be in effect a vote in favor of the special interest groups, the bus owners, and again the general public. It seems to me that it would be extremely difficult for a Senator to justify to his constituents such a vote against them, and in favor of special interest legislation.

[APPENDIX I]

[From the Wall Street Journal, July 28, 1971]

BIGGER BUSES

The government has been doing a lot of talking about highway safety, but not all the agencies of the establishment appear to be getting the message.

At any rate, the House has passed a bill to permit wider buses on interstate highways. We don't know exactly what effect such vehicles would have on safety, although we'll admit that even the existing ones make us a bit uncomfortable as they roar past at 65 miles an hour or more.

That, in fact, is just the point: no one knows what the buses would mean to safety. In Public Works Committee hearings on the bill, the Transportation

Department and the National Transportation Safety Board objected to the measure because of a lack of safety research.

But the committee approved the bill anyway. "By so doing," said Rep. Fred Schwengel (R., Iowa), "the committee has shown a callous disregard for the safety of the motoring public. The committee in effect has voted in favor of special interest groups, the bus owners, and against the general public."

Perhaps members of the Senate, unlike their House colleagues, will remember whom they're really supposed to represent.

[From the Evening Star, Washington, D.C., July 30, 1971]

Obese Buses

The country is having to learn the painful way that bigger isn't necessarily better, and Congress has been of little help in controlling the grotesque inflation of about everything. It has, for example, allowed trailer trucks on the nation's highways to grow much too large for the safety and sanity of the motoring public. (The truckers disagree and want authorization for still larger ones.) And now the House has passed a bill that would permit the operation of wider buses on interstate routes.

Some practical-sounding arguments were offered by the proponents. It seems, for instance that about 22,000 buses wider than the present interstate limit have been manufactured and already are operating on many state roads and city streets (including District of Columbia streets). Perish the thought that all those shall be denied the use of the interstate highways, some congressmen said.

Also, the advocates maintained, buses must be wider so that wider seats can be installed, so that the highway congestion problem can be solved. "We have but one purpose, and that is to make bus travel more comfortable and convenient for commuters, so they will leave their cars at home," said Representative James C. Wright Jr., of Texas. But surely a seat an inch or so wider wouldn't make all that much difference to a short-haul commuter.

Then there was the argument that the bill only calls for six-inch widening of buses, and who is going to quibble about six inches? Representative Schwengel of Iowa did, explaining that this would add 13,000 pounds to the weight of the vehicle. Nor, he said, is the potential road hazard factor to be sniffed at.

Anyway, this would undeniably be more of the creeping congestion that has advanced by two inches here and six inches there until it has become almost suffocating. If this bill passes, will the bus manufacturers begin making a dream cruiser six inches wider than the new legal interstate limit, and when enough of those accumulate will their very numbers be used to justify another stretching of the limit? That seems almost predictable.

And is this just a prelude to another attempt to increase truck sizes and weights? That's denied, but some of the House pleaders for larger buses are among those who have in the past advocated bigger trucks. A truck-enlargement bill was squelched in the last Congress, and we hope the Senate will give similar treatment to this bus proposition.

[From the Des Moines Register, May 25, 1971]

Now They Want Wider Buses

The continuing fight over bigger vehicles on the highways has turned in this session of Congress from trucks to buses. The House Committee on Public Works recently approved a bill permitting the width of buses on Interstate highways to increase from 96 inches to 102 inches.

The measure is opposed by the two federal agencies most concerned about highway safety—the National Highway Traffic Safety Administration in the Department of Transportation and the National Transportation Safety Board.

Representative Fred Schwengel (Rep., Iowa), a leader in the successful battle against bigger trucks in 1969, is gearing up for a new fight against bigger buses.

Although research into the causes of accidents is appallingly incomplete Schwengel says bigger buses might increase traffic accidents by taking up more of the road, by creating a more powerful air "blast" when meeting or passing a

light car, and by creating a larger "blind spot"—the area directly behind a bus which its driver can't see.

Proponents of the bill argue that wide buses would permit more comfortable seats, so buses would attract more passengers and the national goal of increased mass transit would be achieved. However, Schwengel points out that the width of present bus seats is the same as in most United Air Lines planes.

"If bus companies are sincerely interested in attracting more passengers they could do better by cleaning up their dirty bus depots," Schwengel said.

The 12-foot widths of the lanes of Interstate highways were designed to be safe based upon research using 96-inch wide vehicles, if the Interstate system were rebuilt to provide the same margin of safety for vehicles 102 inches wide, the expense would be phenomenal.

The big bus bill would be permissive. States could continue their 96-inch wide limits. However, if the bill became law, there would be great pressure on states to allow the wider buses on state highways, many of which are narrower and less safe than the Interstates.

The wide-bus bill is the latest target in domino strategy of the truck and bus industries. If 102-inch wide buses are allowed, why not 102-inch wide trucks? And if wider trucks are permitted, why not let them carry larger weights? And so on.

Before Congress pushes over the wide-bus domino, it should obtain a reliable and comprehensive analysis of the impact of the wide vehicles on highway safety.

[From the New York Times, July 26, 1971]

An Inch Is a Ton

Almost since Congress began the interstate highway system in 1956, the trucking interests have been lobbying for a change in the law to permit wider trucks. A wider truck is also a heavier and therefore more profitable vehicle. But not even a highway built to interstate standards can sustain the wear and tear of heavier trucks pounding over its surface day after day. Inevitably they mean a shorter life for the highway and a bigger highway repair bill for the taxpayer. Thus, the plea for a wider truck limit is not an innocuous request It is really a disguised raid on the public treasury by the trucking interests.

A wider truck can also mean a shorter life for ordinary motorists. Trucks create a visual hazard because they block a view of the road ahead. Their mass moving past smaller vehicles at high speed also creates a "blast effect" which can disrupt the motorist's control of his own car. These economic and safety arguments explain why limits on the width and weight of trucks and buses are written into Federal highway legislation.

Since the trucking lobby has repeatedly failed to get the law amended, its allies in the House Public Works Committee devised a bill covering only buses. Despite pious protestations on all sides that buses and nothing but buses are in the minds of the bill's sponsors, everyone well knows that the bus bill is only a dry run for a truck bill. The humble and politically popular bus passenger is, so to speak, carrying the legislative freight for the arrogant and unpopular trucker. Once buses have breached the existing limit and established a precedent, it will be much easier to enact a significantly wider limit for trucks.

Even if the bill were not a precedent-maker for something worse, it would be a bad bill on its own merits. Heavy buses also wear out the highways, obstruct the vision of other drivers, and when traveling above the speed limits—as intercity buses habitually do—they create the same dangerous "blast effect."

The bill would permit buses to be 102 inches wide instead of the present limit of 96 inches. The gain for the bus passenger would be trivial. Each of the four seats would be an inch wider and the aisle would be two inches wider. But in terms of the overall weight of the bus, the change would be startling. Representative Schwengel of Iowa pointed out in the House debate the other day that if this bill becomes law, a major bus line plans to increase the length of its buses to 40 feet, their height to 12 feet, and their weight from approximately 29,000 pounds to 42,000. In other words, every inch wider means a bus that is a ton heavier.

The bus-and-truck interests prevailed in the House. But if the Senate has concern for the nation's taxpayers and motorists, this is a bill that deserves to be flagged down and waved to the side of the road.

[From the Seattle Post-Intelligencer, July 29, 1971]

A Sickening Show

A P-I View: The U.S. Senate should defeat the House-approved bus extension measure.

You are invited here to consider a shameful example of how our lawmakers in Washington too often ignore the public interest when the dubious pressures of well-heeled lobbies go to work.

As background, you should know that the economically powerful trucking interests for 15 years have been pushing for permission to use wider and thus more profitable trucks on the nation's interstate highway system. Never mind that the present freight-train monsters already chew up the tax-built roadways, block vision and dangerously rock passing private cars with their air blast effects.

Thanks only to concerted opposition by the private motorists, voiced largely through the American Automobile Association (AAA) and newspaper editorials, the truckers thus far have failed in their campaign. This year, however, a subterfuge approach is giving them fresh hope.

Their gimmick was to back a proposal to widen interstate motor buses from the present maximum of 96 inches to 102 inches—the same width extension sought for themselves. As the AAA pointed out, this would mean little in added comfort to the bus passengers. But it would serve as a precedent for similarly breaching the truck limitations later.

Every informed person and legislator in Washington understood this. Nevertheless, on July 12, the House Public Works Committee reported favorably on the bus extension measure—ignoring the opposition not only of the AAA but that of the Department of Transportation and the National Transportation Safety Board.

A vigorous opponent of the legislation, Rep. Fred Schwengel, R-Iowa, said when the bill—HR-4354—was approved by the committee:

"It is incredible that the bill would be reported favorably. By so acting, the committee has shown a callous disregard for the safety of the motoring public. The committee, in effect, has voted in favor of special interest groups and against the general public."

Despite this and similar expressions of outrage, the House on July 21 approved the measure by the majority of 38 votes and sent it to the Senate for action.

"It was a sickening performance," Rep. Schwengel said.

It surely was. And it must not be repeated in the upper House of Congress if integrity and devotion to the public welfare still take precedence there.

If anything, interstate buses and trucks should be made smaller—not larger than they already are.

[From the Louisville Times, July 23, 1971]

The Big-Bus Lobby Roars Ahead

The never-ending fight to keep dangerously oversized trucks and buses off the nation's highways has suffered a serious defeat. The House has passed and sent to the Senate a bill to increase the permissible width of intercity buses by six inches. On highways where 70 miles an hour is a normal speed, that six inches could measure the difference between life and death.

It would be bad enough if the widening were confined to buses. But lurking in the wings is a second bill that would permit trucks, too, to be even wider and heavier than the monsters now hogging the highways. Though this one has not yet cleared the House Rules Committee, there seems little doubt that it will. Having obliged the bus lobby, the committee is in no position to deny the truckers even if it wanted to.

Both measures were approved several weeks ago by the House Public Works Committee despite opposition from the Federal Transportation Department and the National Transportation Safety Board. What the committee was thinking about we can't imagine, but it obviously wasn't highway safety.

Present law governing the dimensions of trucks and buses on interstate highways limits their width to eight feet. The interstate system was designed with these dimensions in mind. Its lanes are 12 feet wide, which leaves just 24 inches of clearance on either side for vehicles of maximum size. As a Kentucky safety expert once expressed it, any increase in vehicle width would render the system "marginal from a safety standpoint." That means, in plain language, dangerous.

And what about other highways, where the lane width often is less than 12 feet? It is true, as the truck-bus lobbies like to point out, that the bills before Congress refer to interstates only. That is because vehicle regulations on other highways and roads are fixed by state legislation. But nobody expects the bigger trucks and buses to remain on the interstates all the time. They would have to get off and onto lesser roads frequently, if only to load and unload their passengers or cargo.

It is true that local transit systems in some cities now operate 102-inch buses, the width proposed in the House-approved bill. But these vehicles, remember, are not competing in 70 mph (or faster) traffic. Nor are we persuaded by the argument that the bill is needed so that these buses can transport big-city commuters over interstate highways to the suburbs. There are other routes to the suburbs. The real beneficiaries of this outrageous legislation would be the big cross-country buses that zoom along with the fast intercity traffic—and after them, the boxcar-size trucks.

The lobbyists figure that, once Congress has let down the bars on interstates, getting the various state standards relaxed would be easy. No doubt they are right in that assumption.

It now is up to the Senate to stop this threat to highway safety. Unfortunately, experience makes that body a dubious goal tender on this issue. This was demonstrated in 1968 when legislation for bigger trucks and buses won approval in the upper chamber.

It might have passed the House as well but for some embarrassing disclosures regarding congressional campaign funds. Like the bills now pending, the 1968 legislation had won the House Public Works Committee's endorsement and was ready for a vote on the floor when a Des Moines newspaper revealed that a "nonpartisan" truckers' committee had been feeding the campaign kitties of several key congressmen, including members of both political parties. That killed the goose for that session.

But now the lobby is back in full force, and making entirely too much headway for comfort. Does its latest success mean that most House members believe their constituents have forgotten 1968? It must.

[From the Charlotte Observer, July 29, 1971]

Bill To Make Buses Wider Should Get A Wide Berth

The House of Representatives last week passed and sent to the Senate a bill authorizing state governments to permit wider buses on the interstate highway system.

That's bad news for motorists and little help for urban mass transit systems.

The bill is bad news for the motorists for two reasons. First, no one is sure yet what safety factors are involved in widening a bus from 96 inches to 102 inches and operating it at high speeds on a freeway.

At 96 inches wide, buses already create an "air blast" with measurable effect upon passing motorists. A wider bus would create a greater blast.

The Department of Transportation, which opposed the "bigger bus" bill (as did the National Transportation Safety Board and the American Automobile Association), is still studying this and other safety factors of the proposal.

TRUCKS, TOO?

The second bit of bad news for motorists is that the bill would create a precedent for manufacturers and operators of trucks to exploit. Longer trucks are

already fought over at the state level, and a bill for wider trucks almost got out of congressional committees last year.

Supporters of the bill claimed that the wider buses would be more comfortable, attract more commuter passengers and thus take more cars off crowded urban expressways. Thousands of the bigger buses are already operating on inner city streets of New York, Chicago, Detroit and Los Angeles. About 40 per cent of the nation's mass transit bus fleet is 102 inches wide.

But studies of declining bus-passenger numbers in mass transit systems do not support such argument. In fact they suggest just the contrary, that what is needed is not a bigger bus but a smaller bus.

Opinion surveys show passengers want speed and service more than they want comfort in buses. Commuters are not concerned about the ride a bus gives on the freeway so much as they are the time a bus takes reaching their inner-city destination.

LESS FLEXIBLE

Wider buses mean heavier, slower, less maneuverable vehicles on city streets, where riders get most frustrated. Bigger buses would not be more flexible but less flexible. They would be less able to take passengers where they want to go.

General Motors, the manufacturer of the majority of America's bus fleet, has built a prototype of a bus to overcome riders' objections. It is smaller, faster and better able to move in and out of city traffic.

The real benefit of bigger buses would go to the bus companies, not to the passengers. The companies want bigger buses to facilitate their charter service.

Once the morning-evening commuter rush periods are over, most metropolitan bus companies supplement their revenues by offering charter service to groups—to take the Little Leaguers to a game or the choir to a concert. The fact that bigger buses are not permitted on freeways handicaps this service.

BAD ECONOMICS

In the short run, such charter service may help bus companies overcome losses from their normal mass-travel operations. But when the charter demand for larger buses begins to overweigh the needs of the mass-transit system, then the economics of bigger buses are questionable.

The Senate should bury this bill.

APPENDIX II

National Transportation Safety Board's Position on H.R. 4354

H.R. 4354 is identical to H.R. 11691, 91st Congress. At that time we noted the absence of reliable data with respect to the safety effect of larger buses, both on the Interstate System and on the roads of lesser characteristics. The situation remains unchanged and, therefore, we continue to oppose the enactment of such legislation.

Some hazards of larger buses arise directly from the increased width itself, while others arise from other bus design features made possible by the increased width. Some of the hazards apply only to bus occupants, while others apply to everyone who uses highways.

Proponents of H.R. 4354 claim some features of improved safety by the increased width, but it is not clear what the performance effect of these improvements may be, nor is there any requirement in H.R. 4354 that any such improvements actually be made. Two types of 102-inch wide intercity buses are now being operated; in only one type are substantial safety-improving changes claimed.

While recognizing the economic benefit of H.R. 4354, which would substantially increase the express package capacity of intercity buses, we address ourselves to those aspects of the bill which relate to safety. Changes in the pattern of bus operation on Interstate and other highways which might come about with an increased capability for express package service and which might affect highway casualties have not been evaluated, to our knowledge. Until in-depth studies of casualty results are made, or until it is clear in some detail which changes in bus safety performance would be brought about by regulation in the very near future, it would not be reasonable or prudent to accept any degree of increased hazard. We believe that legislation permitting wider buses should be deferred until the Department of Transportation has developed regulations and standards for larger and heavier buses.

Research is lacking in determining the relative safety of wider buses with respect to:

1. Comparison of buses of different widths through past accident statistics, using an adequate statistical base and separating noncomparative factors; and
2. Implementation of a carefully designed and controlled experiment involving selected bus designs, drivers, and routes.

The approach of determining what types of accidents could occur which would not otherwise happen, and making a comparison of off-setting improvements, is mentioned on page 42 of the "Review of Safety and Economic Aspects of Increased Vehicle Sizes and Weights" issued by the Federal Highway Administration, September, 1969.

Although a number of representations of possible safety improvements for wider buses have been advanced, it is not clear that all of the hazards of the wider buses have as yet been identified and evaluated.

Among the identifiable questions of hazards or safety improvements are the following:

a. Frequency of excursions into other lanes will increase with wider buses under present driver capabilities and highway configurations. This question involves vehicle steering stability and driver steering behavior.

b. Possible improved braking by all models of buses and, if so, by how much, and in what braking performance characteristics.

c. Possible reduced tire loadings on wider buses resulting in increased or decreased traction.

d. Higher floors of wider buses inhibiting passenger escape from windows when bus is standing upright, or producing injuries due to longer drop to the ground.

e. Increased width of bus inhibiting window escape when bus is lying on its side with windows above.

f. Changed visibility of road ahead for other vehicles due to 6-inch wider bus and concomitant 2-foot increase in bus weight.

g. Increased influence of wind blast in passing other vehicles in opposite directions which might affect safety margins of some vehicles.

h. Wider buses may facilitate installation of occupant crash protection.

i. Potential for passenger injuries may be reduced by higher seated position above other vehicles or increased by higher impact velocity when bus overturns.

j. Increased bus width may improve measured overturn stability when accompanied by increased floor height and what effects will be upon each bus model.

k. Raised floor height and increased proportion of weight represented by express capacity may cause the bus to become topheavy when passengers are carried with empty luggage and express compartments.

In summary, these questions of hazards or safety improvements derive in part from existing bus safety recommendations of the Safety Board and in part from observations of 102-inch width buses and descriptive literature. We believe that the assessment of most of these questions need not await the occurrence of accidents, as some proponents claim, but may be accomplished by scientific testing or analysis of available engineering information. Until the results of such analysis and reviews are known, and safety standards developed therefrom, we would oppose the passage of H.R. 4354.

OSCAR M. LAUREL,
Member.
FRANCIS H. MCADAMS,
Member.
LOUIS M. THAYER,
Member.

MINORITY POSITION CONCERNING H.R. 4354

Under existing law, the States can and do permit larger buses to operate on the Federal-Aid primary and secondary road systems than are allowed to operate on the Interstate Highway System. H.R. 4354 is permissive legislation that would authorize each State to permit the use of 102-inch buses on the Interstate System within its boundaries; however, no State would be required to increase its present limitations.

As the Interstate System was designed to accommodate the wider bus and has a much lower accident and fatality rate than the Federal-Aid and secondary road systems, we believe that the use of wider buses on a safer roadway would offer benefits to the passenger and to the general public which would outweigh any possible safety hazard which so far has not been proven to exist.

71-954 O - 72 - 9

However, we do concur in general with the views of the majority of the National Transportation Safety Board as to the possible approaches to evaluating and judging the comparative safety of the wider buses. We support the enactment of H.R. 4354 at this time providing it is amended to delay its effective date until such time as the Secretary of Transportation completes the necessary studies and promulgates such safety regulations as might be required.

JOHN H. REED,
Chairman.
ISABEL A. BURGESS,
Member.

APPENDIX III

AN EXPERIMENTAL AND ANALYTICAL INVESTIGATIONS OF THE EFFECT OF TRUCK-INDUCED AERODYNAMICS DISTURBANCES ON PASSENGER CAR CONTROL AND PERFORMANCE—SYSTEMS TECHNOLOGY, INC., HAWTHORNE, CALIF.

EXECUTIVE SUMMARY REPORT OF TECHNICAL REPORT NO. 1001–1, CONTRACT FH–11–7570

This applied research program provides a preliminary quantification of the nature and magnitude of truck-car disturbance effects and associated car/driver safety performance. It compares the effects of contemporary and wider trucks, as well as examining the more general questions associated with truck-induced aerodynamic disturbances on the Interstate System.

A truck disturbance consists of aerodynamic forces and moments acting on adjacent vehicles due to air flow around a truck. This disturbance can pull the vehicle towards the truck or push it away, depending on the conditions.

The effects of the disturbances are expressed in terms of overall car/driver safety performance. The emphasis is on driver steering control and associated lateral (side to side) deviations in the car's path along the roadway. The specific performance measure used to compare situations is the peak lateral deviation experienced by the car during a given truck disturbance. Safety performance boundaries are revealed by such things as lane edge exceedances, potential collision with the truck or other vehicles, and driver control difficulties.

SITUATIONS STUDIED

Several types of disturbance conditions were examined experimentally and analytically. The basic situations studied involved:

- A station wagon car and a tractor/semitrailer truck.
- Two lanes of a flat, tangent roadway.
- Car-truck overtaking, passing, and oncoming.

Within this framework, the following primary situational parameters were varied:

- Truck shape and width (including 96 versus 102 in.)
- Car-truck lateral separation and lane width (from 8 to 16 ft.)
- Crosswind and headwind magnitude.
- Relative and absolute car-truck speed.
- Car handling.
- Driver skill and alertness.

The applied research results were interpreted to determine possible remedial actions and implications in the areas of roadway design and operations, truck size and configuration, and car/driver dynamics and control characteristics.

TECHNICAL APPROACH

The study comprised full scale experiments, wind tunnel tests, and combined car/driver/disturbance analyses. Together, these elements of technology permitted the basic experimental results to be interpreted in the more meaningful terms of car/driver safety performance in a given situation on the highway.

The full scale experiments involved instrumented vehicles operating at a test site under controlled conditions and with various ambient winds. Measured vehicle response and full scale flow properties provided for verification of the more systematic analytical and wind tunnel results. Task stress was measured by driver heart rate.

The wind tunnel tests provided data to quantify the disturbing forces and moments on the car for various car-truck orientations and lateral separations, crosswind angles, and truck widths and shapes. These data, suitably scaled, pro-

vided the input to the combined car/driver analysis procedure. The latter used the verified car equations of motion, and empirically-based driver response properties, to compute vehicle motions and path trajectories for various disturbance situations. Path measures such as peak lateral deviation in the lane during the disturbance were used to describe the safety performance boundaries and limits.

TEST VEHICLES

The test vehicles selected for the tests allowed concentration on the more significant types of car-truck disturbance. The disturbed car was a 1970 full size station wagon. The truck was a 3-axle, cab over engine tractor towing a 40 ft, 2-axle dry freight van. The overall truck length was 55 ft, and its standard width was 96 inches.

RESULTS

The results show that truck width, lane width, relative speed, absolute speed, ambient winds, car handling, and driver skill and alertness can have substantial effects on car/driver safety performance under certain car-truck disturbance conditions. Some of the more significant points are given in this summary. Numerical values are given mainly for illustration, and more definitive results are provided in the main report.

Typical results are highlighted in the Table. The ambient wind is the basic wind over the ground in the environment. For the table entries, the car and truck are traveling in the same direction. Each is initially aligned with its respective lane centerline. During the disturbance the car displaces laterally along its trajectory, but the truck is assumed to be undisturbed from its lane center. The initial centerline separation is the same as the lane width. The "car-truck initial clearance" is the side to side distance between the vehicles. The initial "lane edge clearance" is the distance between the side of the car and the edge of its lane. The "peak lateral deviation" is the maximum side excursion of the car which occurs during the truck disturbance, despite appropriate driver control reactions. A crosswind "towards the car" means that the car is downwind of the truck traversing its wake, and vice versa. The table entries are elaborated below.

Ambient wind

With no ambient wind (no wind over the ground) the main car disturbance results from a bow wave near the front of the truck. The disturbance intensity varies with lateral separation, car-truck relative speed, and truck shape and width. Under the nominal case of a car at 60 mph overtaking a truck at 50 mph on a highway with 12 ft lane width, the disturbance momentarily displaces the passing car/driver about 0.7 ft further away from the truck.

A headwind will increase the magnitude of the car's lateral deviation. For the nominal case noted above, the peak lateral deviation away from the truck will nearly double for a 20 mph headwind.

TYPICAL CAR/DRIVER PERFORMANCE RESULTS

Truck and ambient wind	Speed (m.p.h.)		Lane width (feet)	Initial clearances (feet)		Peak lateral deviation (feet)	
	Car	Truck		Car-truck	Lane edge	Toward truck	Away from truck
Tractor/semitrailer (96 inches wide):							
None	60	50	8	0.7	0.7	----------	1.1
			12	4.7	2.7	----------	.70
			16	8.7	4.7	----------	.5
	60	55	12	4.7	2.7	----------	1.15
	70	65	8	.7	.7	----------	3.3
			12	4.7	2.7	----------	2.2
			16	8.7	4.7	----------	1.4
20 m.p.h. headwind	60	50	12	4.7	2.7	----------	1.3
20 m.p.h. crosswind (towards car)	60	50	8	.7	.7	2.4	----------
			12	4.7	2.7	2.6	----------
			16	8.7	4.7	2.6	----------
20 m.p.h. crosswind (away from car)	60	55	12	4.7	2.7	3.2	----------
	60	50	12	4.7	2.7	----------	1.3
Tractor/semitrailer (102 inches wide):							
None	60	50	12	4.4	2.4	----------	.75
	70	65	12	4.4	2.4	----------	2.3
20 m.p.h. crosswind (towards car)	60	50	12	4.4	2.4	2.7	----------
Tractor/semitrailer (96 inches wide) with van underbody: 20 m.p.h. crosswind (towards car)	60	50	12	4.7	2.7	4.7	----------

Crosswinds can cause a significantly larger disturbance when the car passes downwind, through the truck wake. For the nominal case noted, the disturbance begins to increase in magnitude abruptly when the crosswind exceeds about 10 mph (i.e., about a 10 deg relative wind angle). Now the car/driver disturbance is caused by the truck interrupting the wind and causing a wake, and the net effect is to pull the car towards the side of the truck. For 18 to 20 mph crosswinds the car may exceed the lane boundary clearance (32 inches for a 12 ft lane) despite corrective driver steering actions. When the crosswind is from the other direction and blows the wake away from the car, the car does not encounter interrupted wind, and the smaller disturbance corresponds approximately to the no ambient wind case.

Car-truck relative speed

The car lateral deviation increases with decreasing relative speed, because the force and moment disturbance changes more slowly and has a longer duration. For the nominal case noted above with the car at 60 mph and no ambient wind, peak deviation increases about 5 inches if the truck is going 55 mph instead of 50.

In a crosswind, the percentage change is about the same but the net deviation is larger because the basic disturbance is larger. For the 20 mph crosswind case noted, the peak car deviation is about 7 inches further toward the truck when a higher truck speed reduces the relative speed to 5 mph. This is made more significant by the fact that the car is already moved to near the lane boundary for this crosswind condition when the car-truck relative speed is 10 mph.

Lateral separation or lane width

With no ambient wind, or with only a headwind, the peak lateral deviation of the disturbed car/driver decreases to about half as the centerline separation increases from 8 ft to 16 ft. For the case with no ambient wind and car 60 mph overtaking truck 50 mph, the peak deviation decreases from a little over a foot to about 6 inches away from the truck.

With increased car-truck speeds the separation effect is larger. For a 70 mph car overtaking a 65 mph truck, for example, the peak deviation is decreased from over 3 ft to about 1.4 ft by increasing centerline separation from 8 ft to 16 ft. For the narrower 8 ft lanes the lane boundary is greatly exceeded, and at least an 11 ft lane is needed to just contain the car's peak deviation (in this 70–65 case).

With a strong crosswind, the peak deviation is large as noted before (about 2.6 ft for the 20 mph crosswind in the nominal 60–50 case), but there is very little change in this peak value when car-truck lateral separation is varied over a wide range. This insensitivity occurs because the disturbing wake caused by the wind interruption extends downwind (leeward) for some distance in a relatively unchanged form. Hence, increased lane width reduces the hazard by moving the car away from the truck, but it has little effect on the intensity of the disturbance experienced by the car.

Truck width

Increasing the truck width has two main effects: it increases the intensity of the truck disturbance and it decreases the side to side clearance between car and truck. Both effects are relatively small in going from a 96 inch to a 102 inch truck, for the test vehicles used. In general the incremental increase in the disturbed car's peak lateral deviation is roughly double that which would occur due to the reduced separation alone.

The effect of a nominal truck width increase is insignificant in a large crosswind, because the basic crosswind disturbance is large and pervasive, as noted.

With no ambient wind and fixed centerline separations, a 102 inch wide truck causes a peak deviation which is about 5 to 7 percent more than for a 96 inch truck. About half of this increment is due to a reduced clearance effect. For the nominal case with a 60 mph car overtaking a 50 mph truck on 12 ft centerlines, this increment is less than 1 inch out of a total of about 0.7 ft. For a more critical case of a 70 mph car overtaking a 65 mph truck and 12 ft lanes, the increase is about 1.5 inches out of a total deviation of over 2 ft, previously noted.

With 10 to 12 ft lane widths these results imply that approximately a 6 inch increase in centerline separation (lane width) is needed to offset the disturbance increment due to an overall truck width increase from 96 to 102 inches. Expressed

in other terms, the disturbance change caused by a 6 inch width increase is about the same as the increased disturbance effect due to to a 5 mph increment in the ambient headwind. Preliminary experiments show that the bow wave disturbance effect of a 6 inch overall width increase can be offset somewhat by suitable rounding and streamlining of the otherwise blunt front of the tractor.

Truck configuration

The disturbance effect of the truck wake, especially in crosswinds, is affected by other truck configuration changes. Drop bed trailers and vans that allows less flow under the truck cause larger car/driver disturbances and deviations in a crosswind, with the car passing on the downwind side. The amount of gap between tractor and trailer is not as significant because the corresponding flow is mostly above the level of the car. Generally, the more porous the truck/trailer configuration is to a crosswind (flow under and through the rig) the less the disturbance on a vehicle passing on the downwind side. With no ambient wind, or only a headwind, streamlining the front of the tractor can reduce the disturbance magnitude somewhat, as can increased ground clearance under the tractor.

Preliminary investigations of trucks length effects were accomplished extrapolating the existing data to a double bottom truck configuration with two 27 ft trailers instead of one 40 footer. The same tractor was used and the overall length increased by about 10 ft. The analyses suggested no difference would occur in the on crosswind case, because the bow wave is unchanged and it dominates the disturbance. The crosswind effects were about the same also, because the flow between the trailers appears to offset the effect of increased vehicle length.

RECOMMENDATIONS

The implications of the findings and recommendations with respert to truck configuration, highway design and operations, and car/driver characteristics are summarized below.

Truck configuration and operation

Increasing truck width can increase the disturbance and affect car/driver performance. These effects can be offset by such things as a small increase in lane width, a decrease in any ambient headwinds, an increase in the car's relative passing speed, or suitable streamlining of the blunt front of the truck.

The truck driver should move toward the side of the lane away from passing vehicles and other traffic, when there are no vehicles or pedestrians on the shoulder. He should be alert for a passing car that may experience difficulty, and he should recognize that when his truck overtakes a slower vehicle it will cause an unexpected disturbance of that vehicle and its driver. Preliminary analyses (and some corroborative accident data) show that this latter situation can be particularly critical when the truck overtakes a car towing a house trailer.

Highway design and operations

For the highway designer and traffic engineer, the important variables in the truck disturbance situations include ambient winds, lateral separation, vehicle speed, and driver alertness.

The ambient wind plus the vehicle's ground speed combine to produce a net airspeed. It is always desirable to reduce this net airspeed by reducing vehicle speed or ambient headwind or both. In terrain with prevailing headwinds, the route and roadway layout should attempt to reduce their effect where feasible.

Similarly, strong steady crosswinds can cause large disturbances. These can be alleviated by suitable consideration of the prevailing wind direction and strength during the highway design process. Landscaping and cross slope design provide one means. Severe cut and fill proocedures, with alternate shadowing and exposure to the wind should be avoided. Exposed raised roadways and bridges are more likely to create a crosswind disturbance situation.

Adequate lateral separation of the vehicles can be achieved in windy regions by increasing lane width and medians. Another possibility is to separate truck lanes from other vehicle lanes by an auxiliary median (or lane closed to traffic under extreme wind conditions). With no crosswinds, a small increase in lateral separation will offset truck width increase effects, as noted above. With strong crosswinds, however, the truck wake persists some distance downwind from the truck, and increasing separation may not reduce the disturbance.

This study shows that the disturbance effects are generally more critical when car and truck are proceeding in the same direction. With no crosswind, the bow wave disturbance from an oncoming truck causes a relatively small car/driver lateral deviation because of its very short duration. Adequate lateral separation by increased lane width or addition of a median will provide sufficient alleviation.

Higher relative overtaking speeds (same direction) generally cause less disturbance of the car, because the duration is shorter and the car inertia tends to attenuate rapidly changing forces and moments. Hence, reduced truck speeds may provide additional alleviation under adverse conditions.

Certain types of vehicles such as small vans, cars towing trailers, and camper combinations are expected to provide the more critical cases from the standpoint of highway design and operation. They are more susceptible to aerodynamic disturbances. They have poorer handling response once disturbed. They tend to have lower speeds relative to the disturbing trucks, and they tend to operate in the right lanes on multilane highways, in closer proximity to the trucks.

An alerted driver, skilled in responding to truck disturbances, can be essential to safe operation in the more critical situations. Since the intensity of the disturbance varies significantly with the conditions, the driver cannot always anticipate a disturbance situation when overtaking a truck or other large vehicle. Suitable warning signs in areas with prevailing winds, training, and publicity are potential means of alleviation.

The psychophysiological response measures show an increased driver stress associated with the truck disturbance input. This autonomic recruitment can help the driver improve his performance. However, it may have associated perceptual narrowing which reduces his attention to other aspects of the driving task. Hence, other driver workload, such as reading direction signs and cross traffic, should be minimized on stretches of highway which characteristically present potential truck disturbance situations.

Car/driver characteristics

It is difficult for the driver to anticipate a truck disturbance because the intensity varies with conditions, but he should expect it alongside the truck in a crosswind and at the front of the truck with a headwind. The poorer driver (e.g., with a longer time delay) or one who is unfamiliar with his vehicle may have more difficulty.

Defensively, the driver should increase his overtaking speed to have about a 10 to 20 mph headway advantage. He should move towards the edge of the lane away from the truck when the wake is blowing towards his car. With no crosswind he should stay in the middle of this lane to avoid being pushed beyond the lane boundary by the bow wave.

The car's handling and aerodynamic properties are also important. The correct vehicle loading and tire pressures should be observed. The better handling vehicle will improve the response and performance, once disturbed. The aerodynamic design can be tailored to reduce the susceptibility to truck disturbance inputs as well as other types of highway gusts. The basic aerodynamic data simply quantify the input, however, and they have to be interpreted to estimate the safety performance. The designer/analyst must consider the dynamic response properties of the car/driver combination as a closed loop system, not just the dynamics of the car alone. This will help avoid problems such as driver induced steering oscillations. This type of integrated design process can be accomplished with contemporary analysis and design procedures of the sort used in the analytical and interpretive phases of this study.

APPENDIX IV

SYSTEMS TECHNOLOGY, INC.

Technical Report No. 1001-1

AN EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF THE EFFECT OF TRUCK-INDUCED AERODYNAMIC DISTURBANCES ON PASSENGER CAR CONTROL AND PERFORMANCE

Final Technical Report, Contract FH-11-7570

David H. Weir
Robert F. Ringland
Robert K. Heffley
Irving L. Ashkenas

October 1971

Department of Transportation
Federal Highway Administration
Washington, D. C.

FOREWORD

This report presents the results of an experimental and analytical program to quantify the effect of truck-induced aerodynamic disturbances on passenger car safety performance. It represents an extension and application of applied research performed for the Bureau of Public Roads and the Federal Highway Administration under Contracts CPR-11-2770 and FH-11-6145. The program reported herein was accomplished for the Traffic Systems Division, Office of Research, Federal Highway Administration under Contract FH-11-7570. The FHWA Contract Manager was Phyllis Huntington. The STI Technical Director was Irving Ashkenas, and the Principal Investigator was David Weir.

The authors would like to acknowledge the contribution of Professor Eugene Larrabee of Massachusetts Institute of Technology who performed the supplementary small scale wind tunnel experiments. Significant contributions were made by a number of other STI staff members, including R. Wade Allen during the psychophysiological measurements, James Nagy in connection with the vehicle instrumentation, and Arthur Thomas in preparing the wind tunnel models. The generous assistance of the General Motors Corporation and the Peterbilt Motors Company in supplying drawings and chassis data was greatly appreciated. Finally, the authors are indebted to the STI Production Staff for their care and patience in preparing the final report.

ABSTRACT

This report presents a preliminary quantification of the nature and magnitude of the effect of truck-induced aerodynamic disturbances on passenger cars. The results are expressed in terms of overall car/driver safety performance, with the emphasis on steering control and side to side deviations in the car's path along the roadway. The basic situations studied involve a station wagon and a tractor/semitrailer, a two lane road, overtaking and passing and car-truck oncoming. Within this framework the following parameters are varied: truck width and shape, lateral separation and lane width, ambient wind magnitude and direction, car-truck speeds, car handling properties, and driver skill and alertness. Specific attention is given to the effect of increasing truck width from 96 to 102 inches. The study comprised full scale experiments, wind tunnel tests, and combined car/driver/disturbance analyses. The results are interpreted in terms of possible actions and remedial implications in the areas of roadway design, truck size and configuration, and car/driver dynamics and control characteristics.

CONTENTS

		Page
I.	INTRODUCTION	1
	A. Objectives	1
	B. Scope	2
	C. Report Overview	5
II.	RESULTS AND RECOMMENDATIONS	6
	A. Effects of Ambient Wind on Performance	8
	B. Effects of Car-Truck Relative Speed	13
	C. Effects of Lane Width or Lateral Separation	18
	D. Effects of Truck Width Variation	20
	E. Effects of Truck Configuration Changes	23
	F. Effects of Car/Driver Degradation and Improvement	26
	G. Driver Psychophysiological Response	29
	H. Summary of Ambient Wind Effects on Performance	29
	I. Implications and Recommendations	35
III.	TECHNICAL APPROACH	41
	A. Driver/Vehicle Analyses	41
	B. Wind Tunnel Experiments	53
	C. Full Scale Experiments	68
	D. Comparisons Between Full Scale and Analytical Results	74
REFERENCES		84
APPENDIX A.	DETAILS OF THE COMBINED ANALYSES	86

FIGURES

		Page
1.	Typical Truck Disturbance Situation	3
2.	Relative Wind Geometry	8
3.	Effect of Relative Wind on Performance: Car/Driver A, Standard (96 inch) Truck	9
4.	Computed Car Trajectory: Car/Driver A at 60 mph Passing Truck at 50 mph, No Ambient Wind	10
5.	Computed Car Trajectory: Car/Driver A at 60 mph Passing Truck at 50 mph, −20 deg Crosswind Angle	11
6.	Effect of Relative Speed on Performance: Car Driver A, Standard (96 inch) Truck	14
7.	Computed Car Trajectory: Car/Driver A at 60 mph Passed by Truck at 70 mph, Crosswind Angle −20 deg	16
8.	Effect of Lane Width and Separation on Performance: Car/Driver A, Standard (96 inch) Truck.	19
9.	Effect of Truck Width on Performance, Car/Driver A, 10 ft Lanes	21
10.	Effect of Truck Width on Performance: Car/Driver A, 12 ft Lanes	21
11.	Effect of Truck Configuration Changes on Performance: Car/Driver A	24
12.	Comparison of Rectangular Block and Truck Crosswind Effects.	25
13.	Effect of Car/Driver Degradation on Performance; Crosswind Angle, ψ_W = −20 deg.	27
14.	Effect of Driver Improvement on Performance.	28
15.	Effects of Car/Driver Condition, Car-Truck Speeds, and Truck Width on Headwind Boundaries for 12 ft Lane Exceedance; Zero Crosswind.	30
16.	Effects of Car/Driver Condition, Car-Truck Speed and Truck Configuration on Boundaries: 90 deg Ambient Crosswind.	34
17.	Driver/Vehicle System Structure for Analyses.	42

18. Comparison of Measured and Computed Car Dynamic Response at 60 mph. 44

19. Car/Driver Response with Heading Angle Feedback. 47

20. Car/Driver Response with Heading Angle and Lateral Deviation Feedbacks 48

21. Computed Responses: Car Passes Truck, Crosswind = 18.2 mph (ψ_W = −20 deg). 50

22. Computed Responses: Car Passes Block, Crosswind = 18.2 mph (ψ_W = −20 deg). 52

23. Station Wagon Wind Tunnel Model 54

24. Disassembled Station Wagon Model. 55

25. Station Wagon Model Underbody Detail 55

26. Tractor/Semitrailer Truck Tunnel Model. 56

27. Truck and Car Models at Positive Crosswind Angle 57

28. Rectangular Block and Car Models, No Crosswind 57

29. Double Trailer Rig for Data Extrapolation. 58

30. Measured Boundary Layer in Northrop Tunnel 60

31. Array of Possible Relative Car-Truck Locations 61

32. Typical Axial Flow Wind Tunnel Data. 63

33. Typical Crossflow Wind Tunnel Data 64

34. Typical Wind Tunnel Data Showing Effect of Truck Width 65

35. Effects of Relative Car-Truck Speed on Measured Side Force; Zero Crosswind, 10 Ft ℄ Separation. 68

36. Standard Truck Used in Full Scale Tests 70

37. Standard Car and Truck Used in Full Scale Tests. 70

38. Full Scale and Wind Tunnel Flow Data Comparison; −4 deg Crosswind Angle 75

39. Comparison of Full Scale and Analytically Computed Results . . . 77

40. Full Scale Data Comparison. 79

41. Computed Car/Driver Response 82

42. Combined Analysis Flow Chart 87

43. Effect of Driver Response on Performance: 12 ft ℄ Separation, ψ_W = −20 Deg, Car 60, Truck 50 93

44. Computed Effects of Driver Gain Variation on Car/Driver Performance 94

45. Outer Loop (Lateral Deviation) Comparisons Between Standard and Loaded Conditions 97

TABLES

1. Car/Driver Equations of Motion 89

2. Vehicle Design Parameters 91

3. Driver Describing Function Parameters 92

SYMBOLS

a	Distance from center of mass to front axle
a_y	Car lateral acceleration (center of mass)
a'_y	Car lateral acceleration at accelerometer
A	Vehicle frontal area
AT	Aligning torque
b	Distance from center of mass to rear axle
C_ℓ	Rolling moment coefficient
C_n	Yawing (heading) moment coefficient
C_y	Side (lateral) force coefficient
e	Distance from center of sprung mass to roll axis
ECG	Electrocardiogram of driver
h_f	Roll axis height at front wheels
I	Moment of inertia
K_{p_ψ}	Driver heading loop gain
K_{p_y}	Driver lateral deviation loop gain
ℓ	Wheelbase
L	Roll moment
m	Vehicle total mass
m_s	Vehicle sprung mass
p	Car roll angle rate
q	Dynamic pressure for force and moment scaling
r	Car heading angle rate
s	Laplace transform variable
t	Time; tread
u_w	Ambient wind component parallel to lane centerline

U_c	Car forward velocity (relative to ground)
U_T	Truck forward velocity (relative to ground)
v	Lateral velocity
v_w	Ambient wind component normal to lane centerline
$\|WV\|$	Wind velocity, as measured by wind vane on car
$\measuredangle WV$	Wind flow angle, as measured by wind vane on car
x_T	Car (center of mass) longitudinal position relative to truck front
y_I	Car lateral deviation (side to side position of car center of mass)
$\hat{y}_I$	Car peak lateral deviation
y_T	Lateral separation of car and truck centerlines
Y	Side (lateral) force
Y_c	Controlled element (vehicle) dynamics
Y_{p_y}	Driver describing function for lateral deviation control
Y_{p_ψ}	Driver describing function for heading control
α	Tire slip angle
δ_{sw}	Car steering wheel angle
δ_w	Car front wheel steer angle (average of left and right)
ϵ	Roll steer coefficient
λ	Roll axis tilt angle
ξ	Camber angle
ρ	Air density
τ_e	Driver reaction time delay
φ	Roll angle
ψ	Car heading (yaw) angle relative to roadway centerline
ψ_I	Ambient wind angle relative to roadway centerline (ground)
ψ_W	Crosswind angle relative to moving truck

ω_{c_y} Crossover frequency (bandwidth) for lateral deviation

ω_{c_ψ} Crossover frequency (bandwidth) for heading control

Other Notations

$\overline{y_I}$ Mean value of variable y_I

$|y_I|$ Absolute value of variable y_I

SECTION I

INTRODUCTION

A. OBJECTIVES

The initial objective of this program was to make a preliminary quantification of the nature and magnitude of the truck-car aerodynamic disturbance problem. This truck disturbance consists of aerodynamic forces and moments on a car due to air flow caused by an adjacent truck. These can pull the car toward the truck or push it away, depending on the conditions. One disturbance component is like a "pressure wave" which occurs in still air due to displacement of the air around the truck. Another component results with an ambient "crosswind" when the car is on the downwind side, moving in and out of the disturbed flow or wake about the truck.

As part of quantifying these disturbances, safety performance boundaries are identified. These are revealed by potential

- Lane or roadway boundary exceedances
- Collisions with truck or other vehicles
- Driver control difficulties
- Vehicle performance limit exceedances

The emphasis is on steering control. The most direct measure of "safety performance" is the lateral (side to side) deviation of the vehicle path relative to the lane centerline. A convenient single measure for a given situation is the "peak lateral deviation" of the driver/vehicle system during the truck disturbance.

Having quantified the potential disturbance problems for various environmental conditions and roadway situations, remedial actions and solutions can be developed. These relate to the general categories of

- Roadway design
- Traffic operation
- Truck and car design limits
- Driver alertness and training

71-954 O - 72 - 10

The parameters associated with these categories are used in the experiments and analyses which define the safety performance boundaries, hence those boundaries can be expressed in physical terms.

This program represents a direct continuation and application of applied research already accomplished by STI for FHWA under Contracts CPR-11-2770 and FH-11-6145, and documented in Refs. 1-3. The combined analysis techniques (as applied to highway design and safety problems) were developed and demonstrated during these prior studies, and the bases for the experimental procedures and data interpretation were established.

B. SCOPE

The overall study consists of full scale experiments, wind tunnel tests, and combined driver/car/disturbance analyses. The combined analyses use the full scale and tunnel data plus a car/driver system model to estimate performance under a range of conditions, and to identify any associated safety boundaries.

In addition to identifying safety boundaries for a car and truck operating in proximity on the highway, the study provides an initial data base relevant to possible legislation on size limits for trucks on Interstate Highways. It examines the effects of increasing overall width from 96 inches to 102 inches, and some attention is given to longer lengths and to even larger widths.

1. Situations

The primary situations considered are:

- One station wagon and one tractor/semitrailer truck
- Two lane, flat, tangent roadway
- Car-truck overtaking and passing
- Car-truck oncoming

Within this framework, parameters are varied to investigate the effects of:

- Truck size and shape
- Car-truck lateral separation and lane width

- Crosswind operation
- Relative car-truck speed
- Car handling and aerodynamic shape
- Driver skill and alertness

A typical situation is sketched in Fig. 1, which serves to define the terms. The car is shown on the left of the truck, either overtaking or being overtaken depending on the relative speed ($U_C - U_T$). Positive lateral path deviations (y_I) move the car toward the right (towards the truck in this case). A positive crosswind is one which results in the truck's wake blowing away from the lane containing the car, and conversely. Because the car and truck are symmetrical, the results are equally applicable to the reverse case with the car on the right of the truck (with proper attention to the sign conventions). The vehicles are assumed to be traveling along their respective lane centerlines for a given lane width.

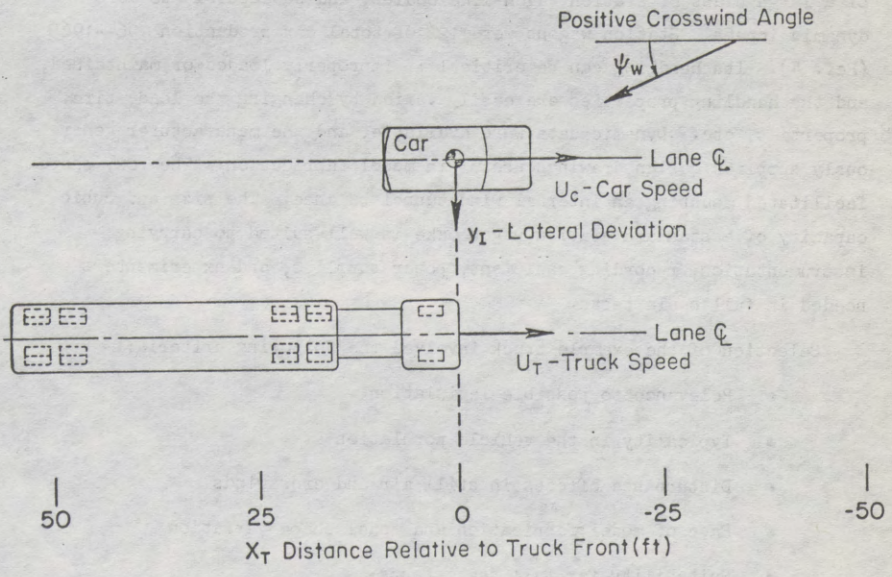


Figure 1. Typical Truck Disturbance Situation

2. Test Vehicles

The test vehicles were selected to make the results as general as possible, yet concentrate on the more critical types of truck disturbance.

Some of the criteria considered in selecting the car were

- Typicality in the vehicle population
- Susceptibility to aerodynamic disturbances
- Handling response when disturbed
- Existing descriptive data base
- Ease of model fabrication and balance instrumentation
- Suitability for full scale tests
- Accident experience

The resulting selection was a 1970 Chevrolet station wagon. It is typical of a large class of station wagon-like bodies, and susceptible to aerodynamic inputs. Station wagons were 12% of total car production 1964-1969 (Ref. 4). Its handling can be critical if improperly loaded or maintained, and the handling properties are easily varied by changing the load, tire properties, etc. Dynamic data were available, and the manufacturer generously supplied design drawings useful in model fabrication. The boxy shape facilitated mounting an internal wind tunnel balance. The size and cubic capacity of a standard station wagon make it well suited to carrying instrumentation, recording equipment, power supplies, and experimenters needed in full scale tests.

Selection of the example truck involved the following criteria:

- Relevance to possible legislation
- Typicality in the vehicle population
- Disturbance effects in still air and crosswinds
- Ease of model fabrication and model shape variation
- Suitability for full scale tests

The vehicle selected was a 3 axle, 86 inch cab-over-engine tractor, with a 186 inch wheelbase; pulling a 40 ft, 2 axle insulated dry freight van.

Additional details of the vehicles, and a description of truck configuration modifications tested in the wind tunnel, are given subsequently. Photos of the test vehicles are given in Section III.

C. REPORT OVERVIEW

The report emphasizes results, and these are presented and interpreted in Section II. The systematic examination of parameter variations for the more critical car-truck disturbance combinations results in cross plots showing the corresponding safety performance boundaries. Section II concludes with recommendations and a discussion of remedial implications.

Supporting details are presented in Section III. The car/driver combined analysis procedures are described and demonstrated. The important parts of the wind tunnel tests are presented, including model details and test procedures. Examples of the wind tunnel force and moment data (which provide the input to the combined analysis) are shown. The full scale experiments are described next, including instrumentation and test procedures.

Section III concludes with a comparison and correlation of results. Full scale flow measurements are used to verify the wind tunnel results. Computed car/driver dynamic response and performance are shown to correlate well with the more difficult to obtain (and generally more variable) full scale measures. Finally, overall full scale results show the correlations between truck disturbance input, car response, driver steering control actions, and driver internal state as measured by heart rate.

SECTION II

RESULTS AND RECOMMENDATIONS

The principal results of this program relate driver/vehicle safety performance to the parameters of a variety of car-truck aerodynamic interference situations. These results are based on wind tunnel experiments and combined analyses. They are shown in Section III to correlate well with corresponding full scale performance and response measurements. The analytical technique thus verified provides an accurate and efficient means of studying systematic vehicle-vehicle interactions on the roadway under various environmental conditions. It avoids the considerable difficulties and costs associated with extensive field experiments using all combinations of parameters; and it permits the study of more hazardous situations which define the safety performance limits.

Exercising this technique to obtain safety performance boundaries involves varying ambient wind conditions, lane widths, highway and passing speeds, and truck configurations. Car/driver dynamic response properties are varied, also, to account for possible degrading effects due to either poor vehicle condition or reduced levels of driver attention. The variations are carried out with respect to several nominal cases as follows:

- Car/driver A: A nominally alert and skilled driver driving a standard full size station wagon containing driver, experimenter, and about 350 lbs of instrumentation and equipment.
- Car/driver E: Similar to A, except that the driver's skill and alertness are essentially the best he can do, near optimum.
- Car/driver D: A degraded condition representative of either an over-loaded station wagon (an additional 560 lbs in the aft storage well) with a nominal driver, or the standard station wagon with an inattentive or less skilled driver.

These car/driver combinations are developed and detailed in Section III. Other characteristics of the nominal cases include car at 60 mph overtaking truck at 50 mph, and no ambient wind (relative to the ground). A nominal

lane width of 12 ft is used, consistent with the Ref. 5 observation (p. 741) that about 62% of the Primary System has a surface width of 24 ft or more.

The performance results from the experiments and combined analyses are expressed in terms of the car's lateral deviation (side to side movement) relative to its lane centerline*, and whether the disturbance would cause the car to move far enough to exceed the lane boundary or even strike the truck.

Whether a collision will in fact occur under a given set of circumstances depends, of course, on the initial truck and car locations in their respective lanes, i.e., their mean lateral placement before the encounter. If the mean placement for both car and truck is biased toward the common line separating their lanes then the probability of a collision is higher. Thus, to properly assess the overall accident probabilities of situations which approach the nominal zero car-truck clearance boundaries shown later (for initial lateral placement in the center of the lane) requires an appreciation for the statistical dispersions of both trucks and cars relative to their nominal lane centers. Such considerations must also take into account the fact that the crosswind may bias the actual initial lateral separation. While there are no specific data on this latter point, there are general statistical data on the lateral distributions of vehicles relative to their lane centerlines (e.g., Refs. 6 and 7). In addition the probability of given ambient wind and roadway conditions must be known. Such distributions superposed on the computed performance boundaries can be used to estimate the probability of an accident for the exact environmental, car/driver, and truck conditions corresponding to the performance boundary. Such estimates are beyond the scope of this study, and the car and truck are assumed to be in the center of their lanes initially. Thus, we are making conservative estimates, yet it is clear that there is a finite probability of an accident when the performance and lane boundaries coincide; and that such probability increases as the performance boundary exceeds the zero clearance boundary and vice versa.

---

*Analytically and in the wind tunnel the disturbing forces remain those pertinent to the lane centerline even though the car is displaced laterally, and the forces are not modified to account for the car moving closer to or away from the truck. In other words, the forces and moments are measured and computed along a nominal straight path, and there is no iterative field effect computationally. While feasible, including this small correction would complicate the analysis unduly.

A. EFFECTS OF AMBIENT WIND ON PERFORMANCE

The ambient wind results from the movement of the air relative to the ground, in the absence of the truck or car. It can cause a headwind, crosswind, or tailwind; depending on the direction of traffic. Because the car-truck disturbance situation is an aerodynamic phenomenon, the ambient wind can have a large effect.

The reference crosswind flow angle, ψ_W, is measured relative to the moving truck because of the way the basic wind tunnel data were obtained (see Section III). Accordingly, the ambient crosswind velocity component (at right angles to the road) is given in general by

$$v_w = -(U_T - u_w)\tan \psi_W \qquad (1)$$

U_T is the truck velocity relative to the road, and u_w is the ambient fore and aft wind component. The geometry is shown in Fig. 2*. The positive and negative signs for ψ_W indicate that the truck wake is being blown away from and towards the car, respectively. A positive u_w corresponds to a tailwind.

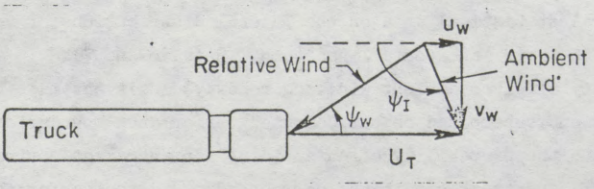


Figure 2. Relative Wind Geometry

Figure 3 shows the effect of ambient wind conditions on the performance of car/driver A (at 60 mph) when passing the standard (96 inch wide) truck proceeding at 50 mph. The performance measure is given by the points and

*For example, with U_T = 50 mph; ψ_W = ±20 deg corresponds to crosswind components, v_w = ±18.2 mph for zero headwind and ±25.5 mph for a 20 mph headwind (negative u_w). For the 20 mph headwind example, the corresponding total ambient wind is directed at an angle, ψ_I (relative to the ground), of $\tan^{-1}(\pm 25.5/20) = \pm 51.9$ deg; and its magnitude is $\sqrt{20^2 + 25.5^2} = 32.4$ mph.

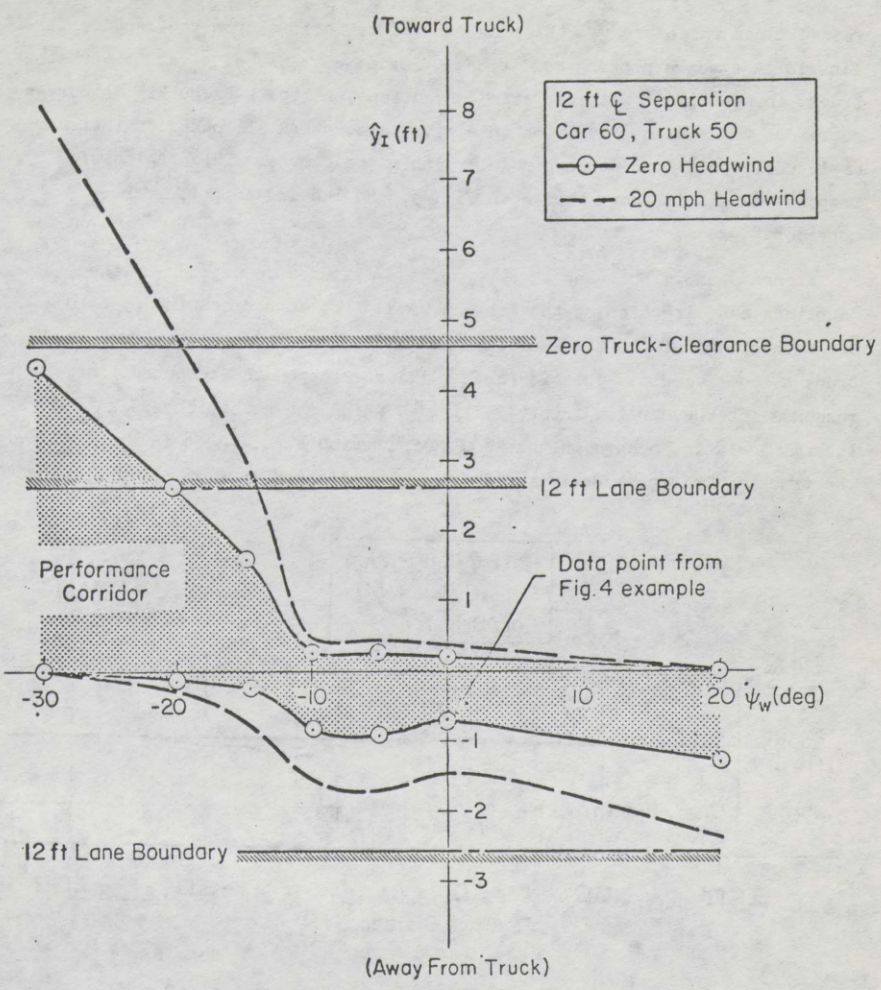


Figure 3. Effect of Relative Wind on Car Performance: Car/Driver A, Standard (96 inch) Truck

faired lines which are $\hat{y}_I$, the peak lateral deviations from the lane centerline for the corresponding conditions. Positive values of $\hat{y}_I$ are toward the truck, in accordance with the sign conventions of Fig. 1. The Fig. 3 curves represent the extreme deviation in a given encounter; all other deviation amplitudes during the maneuvers fall within the curves. This region of response levels is shown shaded in Fig. 3, and labeled a "performance corridor."

Figure 3 shows that the severity of the disturbance depends on the magnitude and direction of the ambient wind. For zero crosswind ($\psi_W = 0$) the main effect of the truck disturbance is to push the car away from the truck a small amount. This is further illustrated by the computed time response for the car trajectory in Fig. 4, which shows that the peak lateral deviation occurs in the "bow wave" region about 15 ft in front of the truck.* This peak deviation point is highlighted in Fig. 3 for clarity.

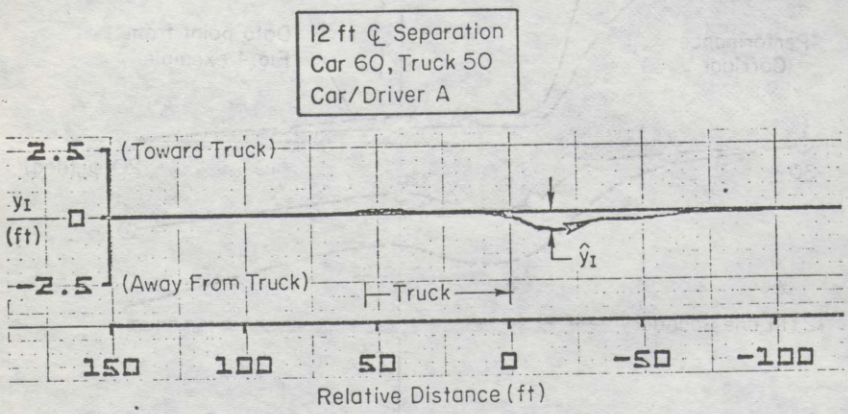


Figure 4. Computed Car Trajectory: Car/Driver A at 60 mph Passing Truck at 50 mph, No Ambient Wind

*Car center of mass in line with the front edge of the truck corresponds to zero relative distance in Figs 1 and 4.

For positive crosswinds, the truck wake is blown away from the car. The bow wave disturbance persists, and the performance is roughly unchanged from the zero crosswind case, as shown in Fig. 3. For negative crosswinds, however, where the truck wake is blown towards the car, there is a significant decrement in performance for flow angles beyond about −15 deg. The disturbance now pulls the car toward the truck, with increasingly larger excursions as the relative crosswind increases in magnitude; and the peak displacement can exceed the boundary of a 12 ft lane. This pulling effect is graphically illustrated in Fig. 5, which shows that the peak lateral deviation of the car trajectory occurs alongside the truck.

For the standard truck, which has significant clearance under the trailer, the transition from predominant pushing to pulling occurs at about −10 deg relative crosswind, as shown by the rapid increase in the performance

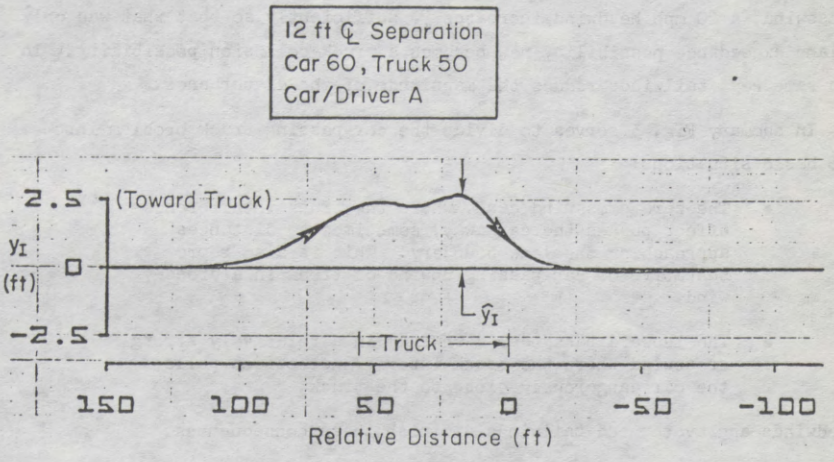


Figure 5. Computed Car Trajectory: Car/Driver A at 60 mph Passing Truck at 50 mph, −20 deg Crosswind Angle

corridor in Fig. 3. This abrupt change is associated with a transition in the flow from around the truck to through and under the truck. As shown later in the discussion of truck configuration effects, the growth in peak deviation ($\hat{y}_I$) with increasing negative crossflow (ψ_W) is more gradual for the impervious rectangular block, which has only one basic flow regime (i.e., around the block).

Ambient headwind components can have a significant added influence, because the magnitude of the force and moment inputs to the car is proportional to the product of car and truck airspeeds. This is illustrated by the dashed boundaries in Fig. 3 and developed in Section III. Thus a headwind (negative u_w) magnifies the zero headwind effective disturbance by the ratio*:

$$\frac{(U_T - u_w)(U_c - u_w)}{U_T U_c}$$

For the 20 mph case shown in Fig. 3 this ratio is 1.865. The corresponding changes in performance are larger of course for situations where the basic (no ambient wind) value of $\hat{y}_I$ is already high. For instance, at −20 deg rel. crosswind, a 20 mph headwind increases $\hat{y}_I$ sufficiently so that what was only a lane exceedance possibility now becomes a truck collision possibility. In the same way, tailwinds reduce the magnitude of the disturbance.

In summary Fig. 3 serves to divide the car-passing-truck problem into two basic situations:

- The zero crosswind case, where the truck interference effect pushes the car away, sometimes to distances approaching the lane boundary. This is also representative of car passing upwind of truck in a crosswind.
- The leeward pass (car downwind) in a relatively strong crosswind where the truck interference effect pulls the car dangerously close to the truck.

Headwinds aggravate, and tailwinds diminish these consequences.

---

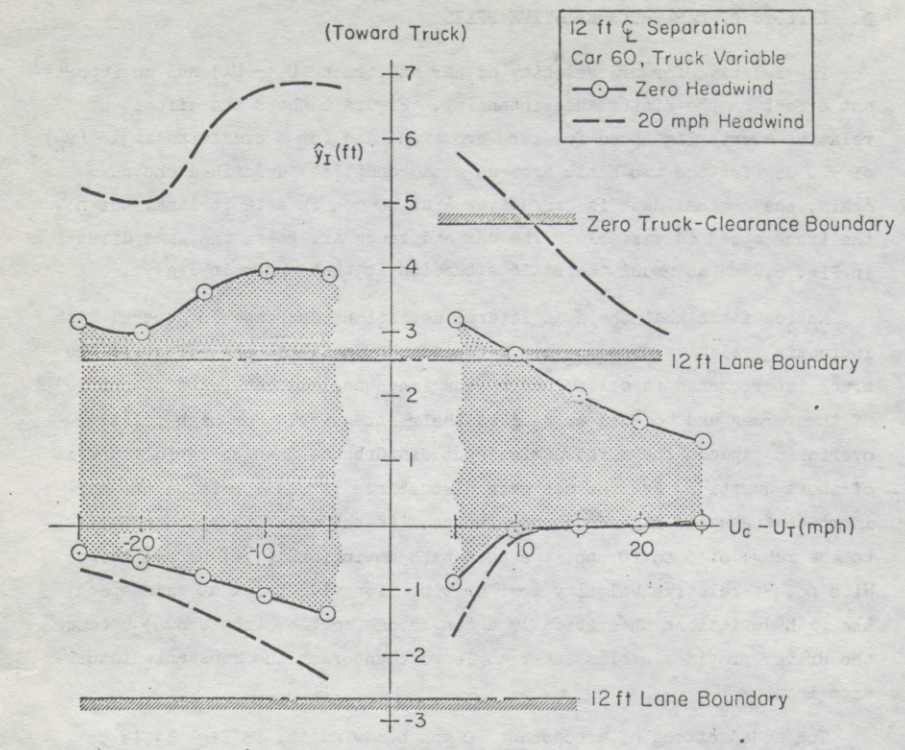
*Considering the total relative airspeeds at a given ψ_W results in an additional trigonometric factor for the exact (dynamic pressure) ratio. However, this factor is a maximum of 1.009 at $\psi_W = \pm 30$ deg and is, practically speaking, negligible (although used in the actual calculations made).

B. EFFECTS OF CAR-TRUCK RELATIVE SPEED

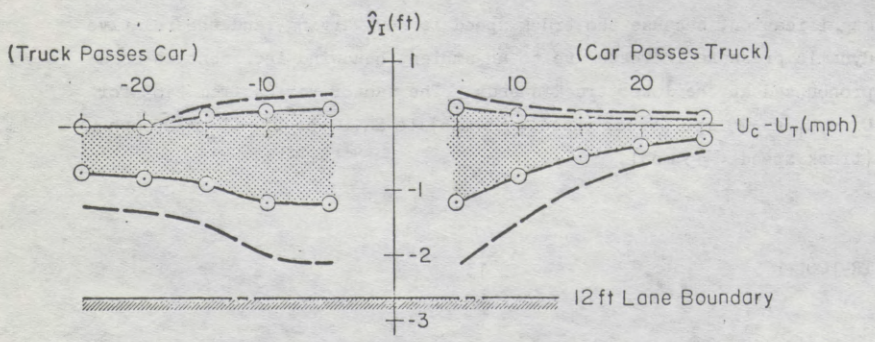
The relative forward velocity of car and truck ($U_c - U_T$) has an important effect on the disturbance intensity. Figure 6 shows the effects of relative overtaking speed for zero crosswind and for a crosswind angle (ψ_W) of −20 deg for the two basic ambient wind conditions described above. Again, the nominal case is car/driver A at 60 mph in a 12 ft lane, but now the truck speed is variable. The car and truck are going the same direction in Fig. 6, and as usual the basic situation is that shown in Fig. 1.

Notice first that the peak lateral deviations decrease in general with increasing relative speed. This reflects the fact that the effect of the truck interference is determined by the frequency content (rate of change) of the forces and moments as well as their intensity. For high relative overtaking speeds the aerodynamic input disturbance changes rapidly and is of short duration, and the net path disturbance is small because the car inertia attenuates high frequency inputs. As the relative speed reduces to the range of 5 to 10 mph, the peak path deviations ($\pm\hat{y}_I$) become larger. With no net relative velocity (car driving alongside truck at same speed) the path deviations theoretically again become smaller (not shown) because the driver provides a bias steer angle to counteract the constant disturbance input.

The added effect of a constant 20 mph headwind (as in Fig. 3) is to widen the performance corridors, i.e., to increase $\hat{y}_I$. Conversely, a tailwind would narrow them. Unlike Fig. 3, the effect is not a constant magnification, because the truck speed is now varying, and the relative dynamic pressure increase due to an ambient headwind increment is more pronounced at the lower truck speeds. The factor varies from 1.65 for $U_c - U_T = -25$ mph (truck speed = 85 mph) to 2.10 for $U_c - U_T = 25$ mph (truck speed = 35 mph).



a) Crosswind Angle, $\psi_w = -20$ deg



b) Zero Crosswind, $\psi_w = 0$

Figure 6. Effect of Relative Speed on Performance: Car/Driver A, Standard (96 inch) Truck

A dynamic pressure effect* largely accounts for the $\hat{y}_I$ differences in Fig. 6 between the truck passing the car and the car passing the truck at a given absolute relative speed, $|U_c - U_T|$. Since the car is going a constant 60 mph, the truck passing car gives a higher disturbance level, and vice versa. A small difference is due to the nonconstant crosswind component which increases with truck speed, because V_W is constant in Fig. 6. Furthermore, the time history of the input reverses with the sign of the relative speed, which changes the sequence of the disturbance; and this causes small differences as well. But, overall, the simple dynamic pressure scaling* provides a very good approximation to the important differences between the car-passing-truck and truck-passing-car cases for a given relative speed in the crosswind case. Similar scaling considerations do not account for the main differences in the zero crosswind case, because the dominant bow wave effect is encountered from different initial conditions; abruptly for the truck overtaking the car and gradually when the car overtakes the truck.

Another difference between car passing truck and truck passing car is the location of the peak lateral deviation ($\hat{y}_I$) along the car's trajectory relative to the truck. This is not evident in Fig. 6, because it simply plots the peak deviation regardless of where it occurred. For the car passing truck, this peak occurs alongside the truck cab, as shown in Fig. 5. When the truck passes the car, however, the peak occurs after the truck is already well ahead of the car; hence the absence of a zero truck-clearance boundary for the left half of Fig. 6. Figure 7†, the companion to Fig. 5, illustrates this. Here the car is first pushed away from the truck, then it is pulled toward the truck. The peak deviation ($\hat{y}_I$) occurs when the

*For example, with zero headwind, the ratio of dynamic pressures for the truck-passing-car versus the car-passing-truck at a given absolute relative speed is simply the ratio of truck speeds (since car speed is constant). For 5 mph this ratio is 65/55 = 1.18, whereas the $+\hat{y}_I$ values for the −20 deg crosswind case in Fig. 6a are in the ratio of 3.9/3.2 = 1.22. Similar comparisons for other relative speeds are: for 10 mph, 1.40 versus 1.49; for 15 mph, 1.67 versus 1.82; for 20 mph, 2.0 versus 1.87; for 25 mph, 2.43 versus 2.46. The comparisons are generally good, and the secondary factors, other than direct dynamic pressure scaling, are small.

†Note that the sign of the abcissal scale is reversed from Figs. 4 and 5. However, the arrows on the trajectory still show the car's direction of motion relative to the passing truck (i.e., from the front to the rear of the truck).

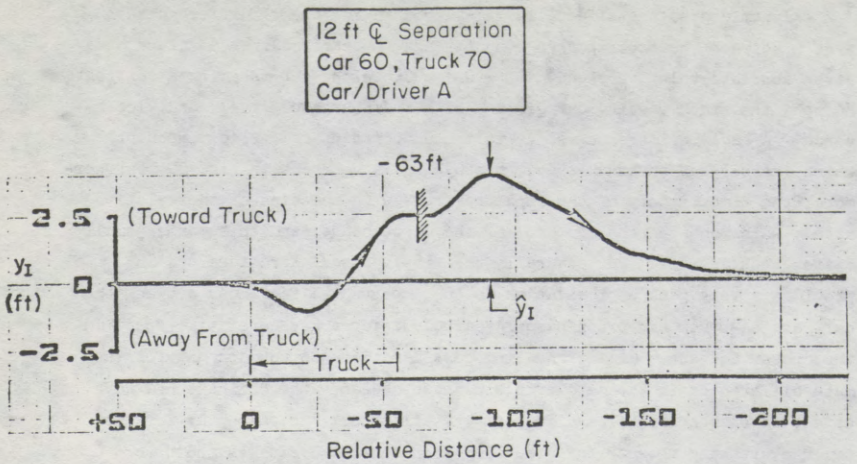


Figure 7. Computed Car Trajectory: Car/Driver A at 60 mph Passed by Truck at 70 mph, Crosswind Angle −20 deg

front of the truck has progressed 90 ft beyond the car (center of mass). Since the standard truck is 55 ft long and the front of the car is about 8 ft ahead of the center of mass, the relative distance must be less than about 63 ft for an incipient collision with the truck. However at this point on Fig. 7, y_I is about 2.5 ft, a value slightly less than the peak deviation for the car passing truck case (Fig. 5). Similar examination of the computed car trajectories for the remaining truck passing car cases shows that $\hat{y}_I$ occurs progressively farther aft of the truck as the truck speed increases; e.g., from a relative distance of 85 ft for a 5 mph pass to a distance of 115 ft for a 25 mph pass. The values of y_I at 63 ft progressively decrease as truck speed increases; and in all cases they are either about the same, or less than $\hat{y}_I$ for the car passing truck situation at the same absolute relative speed.

The nominal situations selected for the investigation of other parameters involve a car passing a truck; because this is more typical, and because of the increased exposure time attending the car passing truck case

(the broad, near maximum, y_I extending over about 35 ft, exhibited in Fig. 5, is a common feature of all car-passing-truck situations). Most of these situations (e.g., Fig. 3) are for a car at 60 mph passing a truck at 50 mph; a limited number of comparisons are available for a car at 70 mph passing a truck at 65 mph. The 10 mph relative speed while not quite as critical as 5 mph is considered more representative; also it provides a basis for scaling the results to a truck overtaking situation at the same relative speed which is most critical for the $\hat{y}_I$ performance corridors shown in Fig. 6a. Although these truck-passing-car peak deviations are not quite large enough to represent potential collisions with the disturbing truck when the car and truck are initially in their respective lane centers; the lane boundary exceedances of the magnitude shown (Fig. 6a) do represent a considerable hazard with respect to other following traffic in the truck lane.

Car-truck oncoming and car stopped provide other kinds of limiting cases. For no ambient wind (particularly no crosswind) the truck bow wave causes a high intensity but very short duration input to the car. Because this bow wave input is high frequency, little net path deviation results as the car inertia attenuates the disturbance, and this is confirmed by observational full scale data. The data of Ref. 8, which gives the measured forces and moments on a stationary car when passed by a bus, show trends similar to Fig. 6 with increasing bus speed. That is, with the car in motion, increasing the relative car-bus speed reduces the resulting value of $\hat{y}_I$, with no crosswind. Looking now at the wake effects, the full scale and wind tunnel flow measurements show that the truck wake consists of a large body of entrapped air (extending one or two truck lengths aft of the truck and) moving along with the truck. In a crosswind with the wake towards the car and with the car stopped or meeting the truck oncoming; the resulting disturbance is an extended duration wake pulse. This wake pulse acts on the car like a discrete gust with a velocity about equal to the car-truck relative velocity, and the crosswind component of this discrete gust can cause a significant disturbance. This effect remains to be quantified.

71-954 O - 72 - 11

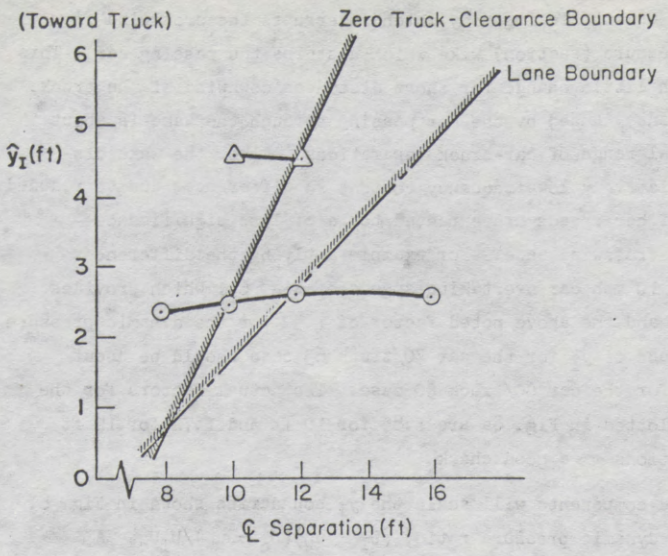
C. EFFECTS OF LANE WIDTH OR LATERAL SEPARATION

Lane width and vehicle separation are important highway design parameters, and the lateral separation between car and truck has an important effect on the intensity of the interference disturbance under some conditions. This is shown in Fig. 8 for the −20 deg crosswind and zero crosswind cases.

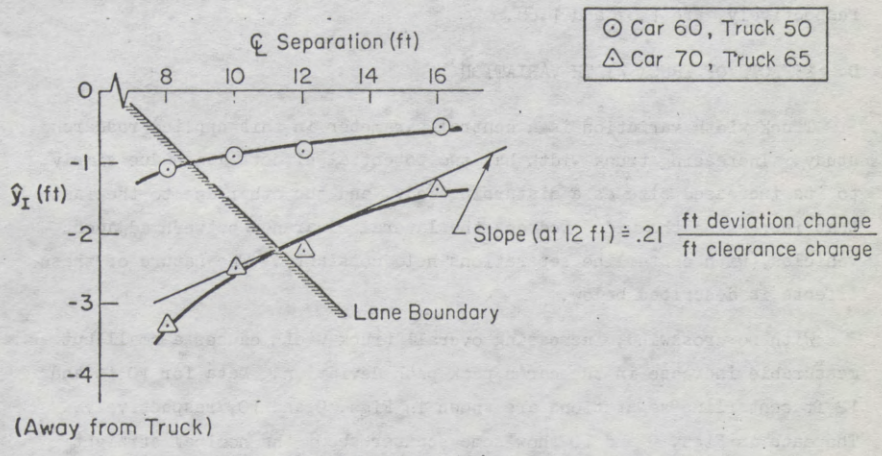
For zero crosswind, the primary disturbance effect has been shown to be due to the bow wave. Fig. 8b shows that the magnitude of the peak path deviations, $|-\hat{y}_I|$, decrease more or less exponentially with increased separation.* The bow wave disturbance peak force and moments decrease similarly (as shown in Fig. 32). Typically, the car's peak deviation magnitude decreases about 50% as lane width increases from 8 ft to 16 ft. The decrease in the peak aerodynamic disturbance is somewhat greater (as shown in Fig. 32). In the absence of crosswinds and for the car 60/truck 50 situation, the maximum disturbance is small and away from the truck as noted previously. Increasing the car and truck speed to 70 and 65 mph, respectively, increases the peak path disturbances by about a factor of 3. About half of this factor (1.52) is due to the ratio of effective dynamic pressure. The differences between a 5 mph and a 10 mph pass shown in Fig. 6b account for an additional factor of 1.48. The remaining factor of about 1.33 is due mainly to the change in the vehicle dynamics at the higher speed (see Section III), which causes a reduction in the frequency response of the car/driver system. This effect is most noticeable for zero crosswind conditions where the bow wave input is of relatively high frequency content.

For a crosswind angle, ψ_W, of −20 deg (wake toward the car) the disturbance at a given separation is larger than for no crosswind, and it is in the direction of the truck as shown in Fig. 3. However, the effect of changing lane width and lateral separation in the presence of a crosswind is small for both speed combinations, as shown in Fig. 8a. Physically,

*Unlike Figs. 3 and 7, which show a performance corridor, only one-sided peak deviation curves are shown in Fig. 8. The peak deviations in the opposite direction were invariably smaller than a fraction of a foot.



a) Crosswind Angle, ψ_w = -20 deg



b) Zero Crosswind

Figure 8. Effect of Lane Width and Separation on Performance: Car/Driver A, Standard (96 inch) Truck

the truck acts as an interfering body which interrupts the crosswind flow creating a low pressure (suction) wake which disturbs the passing car. This wake persists with little change for short distances downwind of the truck. Thus, the disturbance caused by the car passing through the wake is about the same over a nominal range of car-truck separations. Also, the wake disturbance is of relatively low frequency content so differences due to reduced car dynamics at higher speeds are expected to be of less significance than for the zero crosswind case. For example applying the differences between the 5 and 10 mph car overtaking speeds of Fig. 6a, which provides a factor of 1.21, and the above noted factor of 1.52 for the dynamic pressure increase; the values of $\hat{y}_I$ for the car 70/truck 65 case should be about 1.85 times those for the car 60/truck 50 case. The actual factors for the computed points plotted in Fig. 8a are 1.85 for 10 ft and 1.72 for 12 ft centerline separations — a good check.

Added headwind components will scale the $\hat{y}_I$ boundaries shown in Fig. 8, as before, by the dynamic pressure ratio, $(U_T - u_w)(U_c - u_w)/U_T U_c$. A given headwind will therefore have a larger relative effect on the lower car/truck speed combination. For example for a 20 mph headwind the amplification factors appropriate to the 60/50 and 70/65 speed combinations, respectively, are 1.87 and 1.68.

D. EFFECTS OF TRUCK WIDTH VARIATION

Truck width variation is a central parameter in this applied research study. Increasing truck width has two potential effects: one due simply to its increased size as a disturbing body, and the other due to the fact that increasing the width reduces the lateral clearance between adjacent vehicles (with centerline separations held constant). The nature of these effects is described below.

With no crosswind, increasing overall truck width causes a small but measurable increase in the car's peak path deviation. Data for 10 ft and 12 ft centerline separations are shown in Figs. 9 and 10, respectively. The data in Figs. 9 and 10 show some scatter about the nominal straight line due to variability in the data and its fairing and interpolation between wind tunnel test points. The trends are clear, however, and corresponding

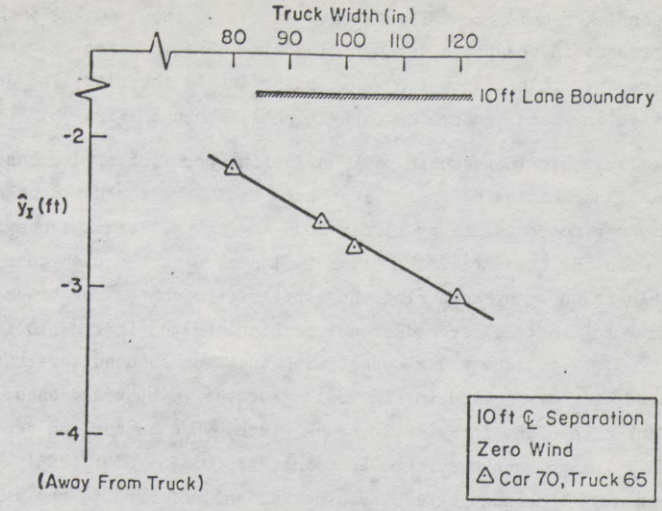


Figure 9. Effect of Truck Width on Performance, Car/Driver A, 10 ft Lanes

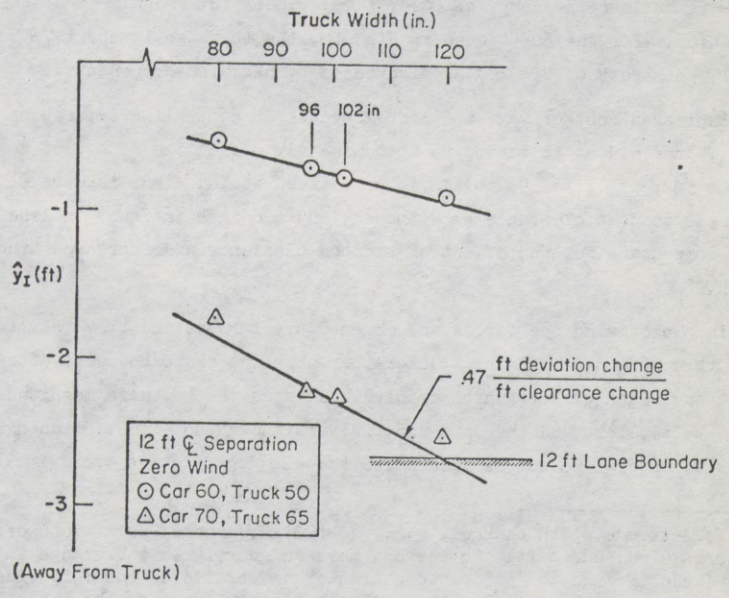


Figure 10. Effect of Truck Width on Performance: Car/Driver A, 12 ft Lanes

differences in force and moment levels between the 96 inch and 102 inch widths are present in the basic aerodynamic data. The increase is seen to be somewhat greater than that which would occur due to the resulting decreased clearance (with the same centerline separations), shown in Fig. 8b.

Specifically, this increase in peak deviation (per foot of decreased car-truck clearance caused by increasing truck width) is roughly double the increased disturbance obtained by simply reducing the car-truck centerline separations with the standard width truck (which reduces the clearance a like amount). This is shown by comparing the slope of the change for truck width increase and resulting clearance decrease combined (given in Fig. 10 for the car 70/truck 65, 12 ft lane width case), with that for reduced car-truck separation effects only (given in Fig. 8b). For the 70-65 speed case, the overall effect of a 6 in. increase in truck width, when centerline separation is increased 3 in. to keep clearance constant, is $(0.47 - 0.21)(.25) = .065$ ft. This is about a 3% increase in peak path deviation, referred to the values for the standard 96 inch wide truck. When centerline separation is kept constant at 12 ft, the Fig. 10 slope (for 70-65) shows that a 6 in. increase in truck width is an increase in $\hat{y}_I$ of $(0.47)(.25) = 0.12$ ft, roughly 5% of the peak deviation. For the 60-50 case in Fig. 10, the increase is about 7%. As usual, both sets of figures are increased by headwind components.

Expressed another way, a 6 inch increase in centerline separation (i.e., lane width) is needed to approximately offset the effect of a 6 inch increase (from 96 to 102 in.) in truck width. That is, the 6 inch increase reduces clearance by 3 inches, and a 6 inch increase in lane width will compensate for the effect of reduced clearance and increased truck width.

In a crosswind the forces and moments are larger, and they result from flow through and around the truck rather than the basic bow wave effect. Hence any width effect (which mainly influences the bow wave magnitude) would be smaller, and the data and analyses showed no effect of changing truck width from 96 to 102 inches for the −20 deg relative crosswind.*

*For extreme width changes, e.g., 80-120 in., there was a width effect in the crosswind; due partly to the bow wave and partly to the change in the flow field through the gap between tractor and trailer. The very wide truck reduced the ratio of gap length to width, thereby changing the amount of air flowing through the gap.

This corresponds to the insensitivity to centerline separation in the crosswind cases, previously noted.

E. EFFECTS OF TRUCK CONFIGURATION CHANGES

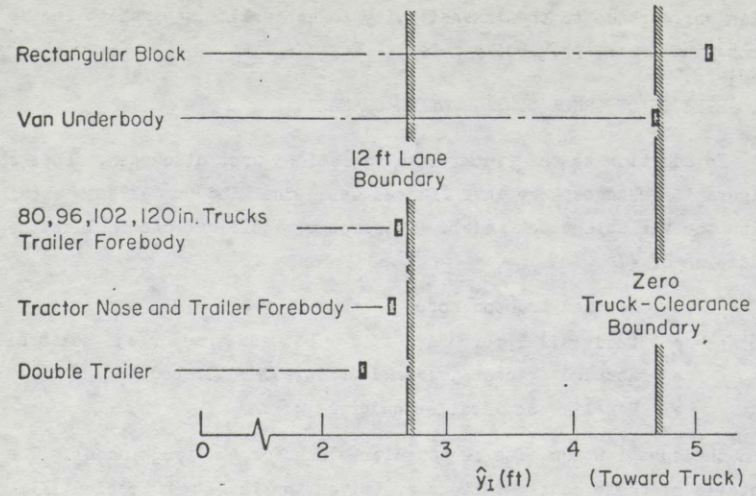
In addition to the truck width variations just discussed, other configuration changes were investigated using the wind tunnel data obtained with the variable truck model. These other modifications include the addition of:

- Rounded tractor nose
- Semitrailer forebody (filler between tractor and semitrailer)
- Rounded tractor nose and semitrailer forebody
- Van-like semitrailer underbody;

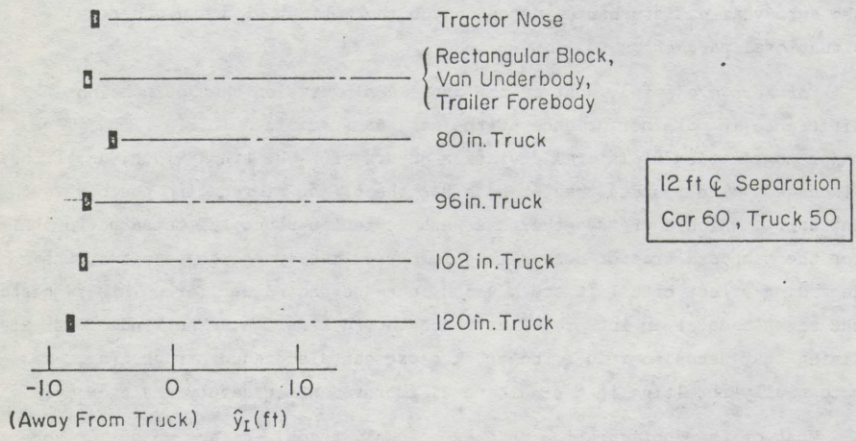
and the substitution of a rectangular block for the truck model. The details of these configurations are given in Fig. 26 in Section III. The standard truck wind tunnel data were also extrapolated to provide a preliminary estimate of the disturbance due to a tractor plus double trailer rig. The changes were expected to have varying effects on the nature of the aerodynamic disturbance, depending on the ambient wind and other situational parameters.

For zero crosswind, most of the above configuration changes make no difference in path performance of the car, as summarized in Fig. 11b. The major degradation of lateral deviation occurs with the truck width, as already discussed. The rounded tractor nose has the effect of reducing the bow wave intensity, which decreases the peak path deviation about 15% compared to that for the standard tractor nose. This is approximately enough to offset the degrading effect of a 1 ft truck width increase, noted earlier. This suggests the advantages of an integrated approach to truck design. The kind of streamlining that tends to reduce the truck blast can also reduce truck drag, potentially resulting in a simultaneous improvement in safety and economy.

Most of the configuration changes had only a small effect on performance in the −20 deg crosswind case (Fig. 11a). In each case, the path performance is significantly poorer than the corresponding zero crosswind case, as noted before. The rectangular block and semitrailer underbody (van) performance results are much worse than the other crosswind cases; and this is related



a) Crosswind Angle, ψ_w = -20 deg



b) Zero Crosswind

Figure 11. Effect of Truck Configuration Changes on Performance: Car/Driver A

to the lack of substantial air flow under the truck in crosswind conditions. The other truck configurations all have several feet of ground clearance under the trailer (between the wheels), and this tends to alleviate the large differences in cross flow which are encountered as the car passes through the wake behind the block or the van. Figure 12 compares the rectangular block with the standard truck (from Fig. 3) for negative crosswind angles, and graphically shows this difference. It illustrates the more gradual increase in $\hat{y}_I$ for the block, as opposed to the truck data which transition rapidly to a sharp increase at about −10 deg relative crosswind. As noted earlier, this is associated with a change in flow from around, to through, the truck

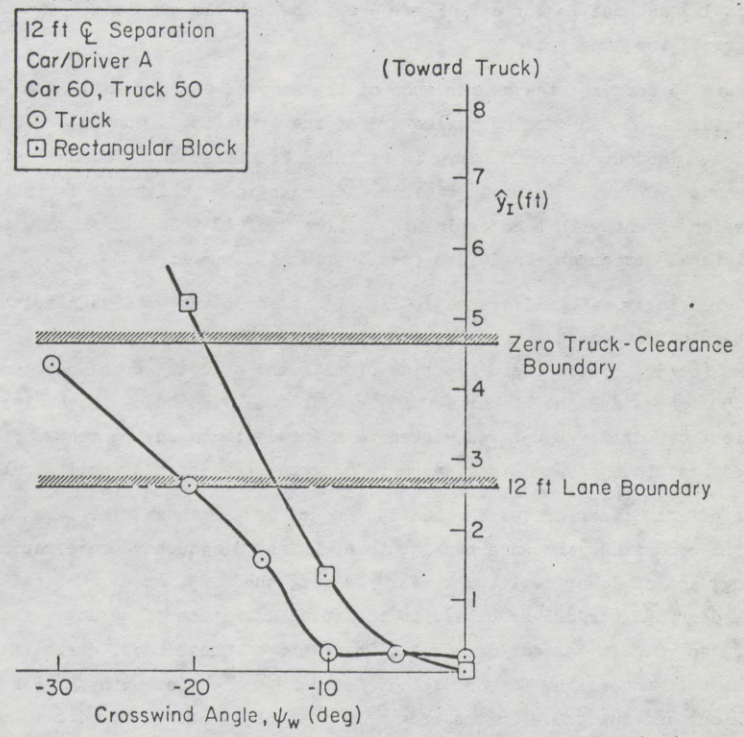


Figure 12. Comparison of Rectangular Block and Truck Crosswind Effects

F. EFFECTS OF CAR/DRIVER DEGRADATION AND IMPROVEMENT

A nominal set of car/driver dynamic response characteristics has been used in the preceding investigation of the effects of varying other situational parameters. Driver alertness and skill, and the vehicle's handling dynamics can also have an important effect on safety performance. Accordingly, the sensitivity of the performance results to variations in car/driver response properties is examined below.

As noted in the Introduction and developed in Section III, car/driver A provides a nominally skilled, attentive case. Car/driver D represents a degraded situation where the vehicle characteristics are the same as for car/driver A but the driver is less attentive and skilled, or the driver is nominally as good as for car/driver A but the vehicle handling dynamics are degraded for some reason.

Figure 13 compares the performance of the nominal and degraded cases for the car at 60 mph passing to leeward of the truck at 50 mph in a −20 deg crosswind. The car/driver A curve is repeated from Fig. 8a. The car/driver D curve shows a dramatic, roughly twofold, increase in peak lateral deviation. This is consistent with (and explained by) the twofold reduction in outer-loop, lateral deviation, bandwidth (see Section III and Appendix A).

Interestingly, the difference in Fig. 13 is about the same magnitude as that noted for car/driver A between the standard and van-type trucks at the same (60/50) speeds (see Fig. 11a) or with the standard truck between the 60/50 speeds and the higher (70/65) speeds (see Fig. 8a). If the less-proficient car/driver D were subjected to these degraded environments, or to added headwinds, even larger and more dangerous excursions would result.

The effect of car/driver degradation is not as pronounced for zero crosswind conditions, because the inputs are higher frequency (more rapidly changing) and of lower amplitude. For example, the 60/50 speed combination for the degraded car/driver D results in a peak deviation of about −1 ft, compared to −0.7 ft for car/driver A. The ratio of these two figures (1.3) is about the same as the factor of 1.33 noted in connection with the Fig. 8b discussion; and due there to the change in the car dynamics with increased speed. A corresponding degradation in car/driver dynamics is also a feature of the response details of car/driver D, as shown in Section III.

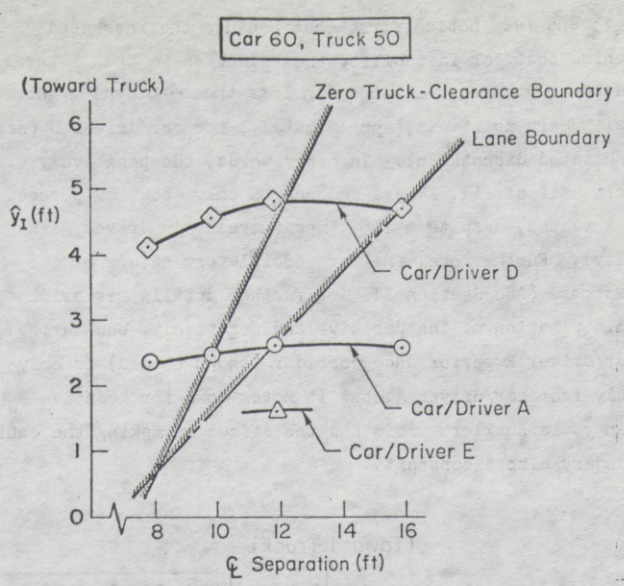


Figure 13. Effect of Car/Driver Degradation on Performance; Crosswind Angle, $\psi_W = -20$ deg

Car/driver A provides a nominal case that is somewhat less than optimum. A percentage of the drivers who are more skilled and alerted will use tighter closed loop control prior to and during a truck passing maneuver, thereby obtaining improved performance. The tightness of control relates to the rapidity and amplitude of driver steering corrections, and it is limited ultimately by closed loop stability considerations (among other things). Estimates of the response characteristics of a near optimum car/driver E are made in Section III; based on considerations of stability, full scale response measurements, and corresponding driver describing function measurements and their interpretation. It involves an increase in outer loop gain and system bandwidth of about a factor of 2.5 over car/driver A. The effects of this increase on the performance corridor are shown for car/drivers A

and E in Figs. 13 and 14. Notice first that because the increased gain is approaching that for instability the reduction in peak lateral deviation for large negative crosswinds (ψ_W less than −10 deg) is no longer linear with gain as it was, approximately, for car/driver D (see Fig. 13 and associated discussion). In other words, the positive $\hat{y}_I$ values in the upper left half of Fig. 14 are reduced to only about 62 percent of the car/driver A values, despite a 2.5 times increase in driver gain (control activity). Furthermore, the more oscillatory nature of the car/driver E response (see Section III for further details) is evident in the more even distribution of the positive and negative $\hat{y}_I$ boundaries. That is, the car/driver E performance corridor (shown shaded) is only narrowed slightly from car/driver A, but it moves down for negative ψ_W so that the mean $\hat{y}_I$ is smaller. This has the effect of making the entire negative $\hat{y}_I$ boundary almost constant.

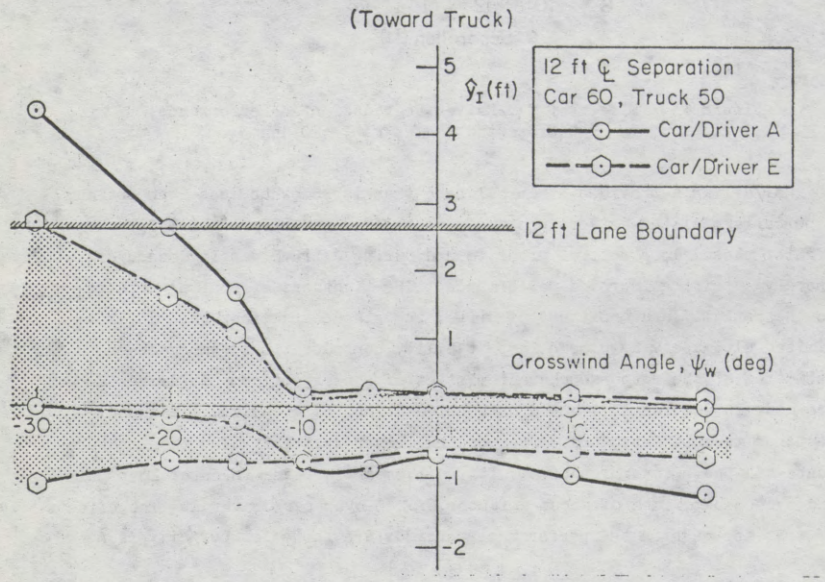


Figure 14. Effect of Driver Improvement on Performance

G. DRIVER PSYCHOPHYSIOLOGICAL RESPONSE

An important corollary to the driver's dynamic response is his internal stress response, as reflected in suitable psychophysiological measures. Typical results shown in Section III include electrocardiogram (ECG) and heart rate data for instrumented drivers during full scale passes. When tied into other measures (see Section III), these data show that the experienced driver is "stressed" by the knowledge that the truck interference disturbance can represent a potentially hazardous situation. For example (see Fig. 40, Section III), the raw ECG record is typically modulated by breath flow, and this sinus arrhythmia effect (heart rate variability due to breathing) increases following the passing maneuver. This correlates with previous research (e.g., Ref. 9) which has shown sinus arrhythmia to be strongest during low stress periods. At the same time, the heart rate gradually increases from about 65 to 80 beats per minute as the car overtakes and comes abreast of the truck, and sinus arrhythmia fluctuations decrease, which is consistent with the data shown in Fig. 40. Full scale experiments were not accomplished with a 102 inch truck to assess any differential psychophysiological effects associated with increasing truck width.

H. SUMMARY OF AMBIENT WIND EFFECTS ON PERFORMANCE

Since ambient winds have a profound effect on the path performance of the car, over a range of situations, it is appropriate in summarizing to establish the limiting wind conditions which just produce a lane boundary exceedance, and/or a penetration of the zero truck-clearance boundary. Headwind and crosswind effects are treated separately.

1. Headwinds

For zero crosswind conditions, the pure headwinds required to magnify the truck blast disturbances to a level resulting in lane boundary exceedances comprise a "headwind margin." These margins are shown in Fig. 15 as a function of truck width. As seen in Fig. 11 (and noted earlier) truck width is an important configuration variable when there is no appreciable crosswind.

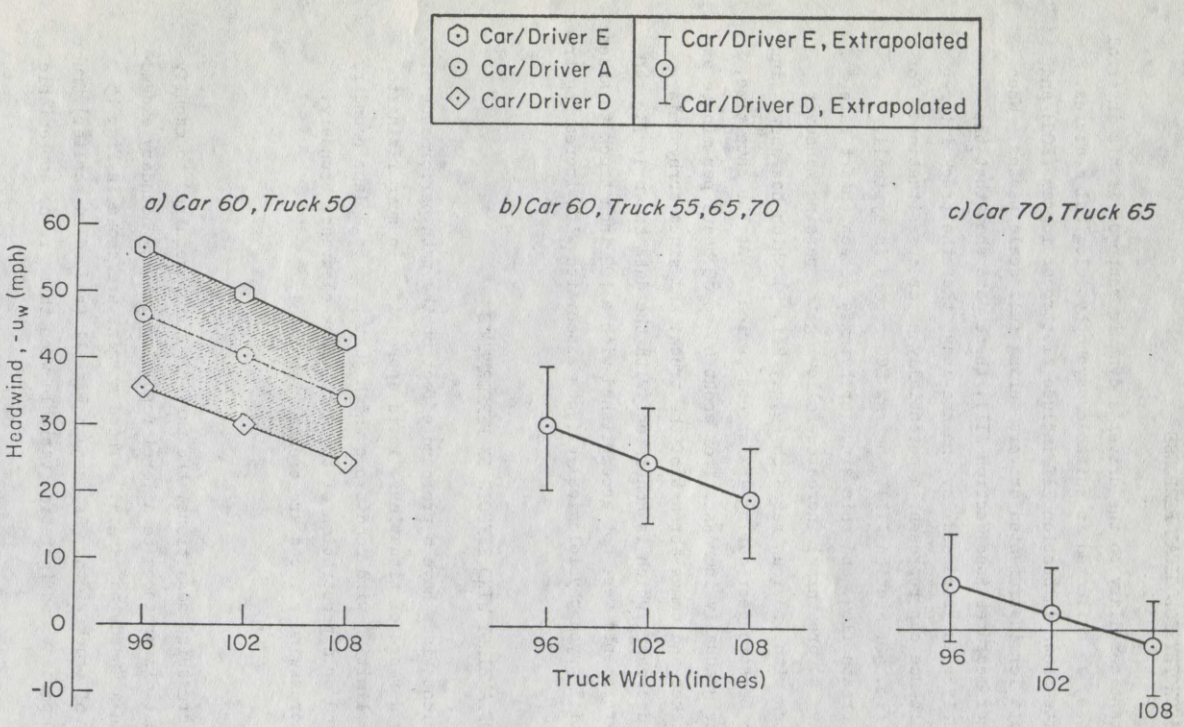


Figure 15. Effects of Car/Driver Condition, Car-Truck Speeds, and Truck Width on Headwind Boundaries for 12 ft Lane Exceedance; Zero Crosswind

Figure 15 shows headwind margins based on the zero wind $\hat{y}_I$ values already presented for car/truck speeds of 60/50 mph. These $\hat{y}_I$ values were magnified* using the headwind components shown to obtain values of $\hat{y}_I$ which just account for the remaining available lane width. Figure 15a shows that for any of the 60/50 car/driver conditions considered, it takes a very strong headwind in the range of 35 to 57 mph to produce a lane exceedance for a 96 inch truck. Increasing truck width reduces the headwind margin which increases the probability of encountering such a condition. Conversely, the higher the headwind required the greater the margin of safety.

Figures 15b and c show the car/driver A headwind margin points for other speed combinations, based on the zero wind $\hat{y}_I$ values plotted in preceding figures. The variabilities associated with car/driver variations E and D are shown as vertical lines about these points because explicit computations for these combinations were not accomplished. Instead, these variances were estimated by extrapolation†, using the scaling procedures previously discussed. As also shown in Fig. 6b the values of $\hat{y}_I$ are essentially

---

*The needed headwind increment was computed according to the simple formula:

$$\frac{(U_c - u_w)(U_T - u_w)}{U_c U_T} \hat{y}_I \left(1 + 0.06\Delta w\right) = 2.67 - \frac{\Delta w}{2} \qquad (2)$$

where:

$\hat{y}_I$ in ft is the zero-wind value for the given car/driver combination,

2.67 ft is the available lane width on each side of the car when it is initially in the center of its 12 ft lane,

$\Delta w/2$ in ft represents the decreased available lane width for fixed initial clearance, as truck width is increased Δw ft,

$1 + .06\Delta w$ represents the increased $\hat{y}_I$ per foot of truck width for constant clearance, as noted in connection with Fig. 10. This percentage is roughly constant for the two speed conditions shown in Figs. 8 and 10 which cover the range of speeds in Fig. 15.

†The extrapolation simply involved the use of the 60/50 results on the various car/driver combinations (e.g., shown in Fig. 14 and noted in connection with Fig. 13) to ratio up or down the more complete car/driver A results, viz., D/A = 1.25, E/A = 0.825. This also amounts to applying the ratios implicit in the changed speed conditions for car/driver A, e.g., Figs. 8b and 6b, to the basic 60/50 D and E cases.

constant for relative speeds of 5 to −10 mph; hence the Fig. 15b data apply approximately to the range of truck speeds noted.

Figure 15 provides a quantitative summary of the adverse effects of increasing car-truck speeds, degrading car/driver condition and increasing truck width. Furthermore it would provide the basis for assessing the probability of lane exceedance as a function of truck width; given statistical data on car/driver condition, wind distributions, and car-truck speeds. In the absence of such statistics it is still pertinent to observe that at not uncommon highway speeds, car 70/truck 65, the headwind required to cause a good station wagon/driver combination (E) to exceed the available lane width is only about 15 mph; and that this relatively slim margin is reduced by about 5 mph for each 6 inches of increased truck width.

In general, the effect of a 6 inch increase in truck width is about the same as a 5 mph decrease in headwind margin.

As observed earlier, streamlining the tractor nose to reduce the bow wave is generally helpful in counteracting increased width effects. The 15 percent reduction in $\hat{y}_I$ resulting from a simple round nose fairing (Fig. 11) is just a little more than needed to counteract a 1 ft width increase for constant centerline separation*. Thus the headwind margin for a round nose 102 inch truck would be in general a little greater than that for the standard 96 inch truck.

2. Crosswinds

For pure crosswinds, the important general trend of the results previously shown is a linear increase in $\hat{y}_I$ with increasing cross flow angles

*That is, applying both a rounded nose and a 6 inch width increase to Eq. 2 and comparing with a standard 96 inch truck

	102 in. Round Nose Truck	96 in. Truck
$\frac{(U_c - u_w)(U_T - u_w)}{U_c U_T} \hat{y}_I$	$= \frac{(2.67 - 0.25)1.15}{1.03} = 2.70,$	vs. 2.67

($-\psi_W$) beyond the flow transition point (e.g., Figs. 3, 12, 14). The magnitude of the pure crosswind that will just produce a lane exceedance or zero truck clearance has been estimated for this linear region, and using appropriate scaling procedures to extrapolate* the ψ_W data. The results are shown as crosswind margins in Fig. 16 for the standard truck and van underbody with a variety of car-truck speeds and car/driver conditions, as crosswind margins. The crosswind margin levels in each of the figures correspond, in descending order, to car/driver E, A, and D. The left of each plotted pair, for a given car-truck speed, shows the crosswind needed to induce zero truck-clearance; the right, that to produce a lane exceedance. Again, as in the preceding figure, the higher the wind the lower the margin of safety.

Referring to Fig. 16, notice that the crosswind margins are very similar in parts a) and b), for the car at 60 mph and the truck at 50 mph and 70 mph respectively. This shows, in effect, that the crosswind margin for a given car speed is a function of the relative velocity and is largely independent of absolute truck speed. What happens is that as truck speed increases the cross flow angle, ψ_W, (relative to the truck) corresponding to the margin is reduced, but the crosswind component magnitude, $v_w = -U_T \tan \psi_W$, remains constant. For the higher car speed, 70 mph, shown in Fig. 16c the crosswind margin drops somewhat from that in Fig. 16b due to several effects:

- The increased $\hat{y}_I$ due to the lower relative speed (e.g., see Fig. 6)
- The slightly increased effective dynamic pressure, 70×65 vs. 60×70, which further increases $\hat{y}_I$
- The reduced truck speed which reflects directly on the crosswind magnitude, and the somewhat degraded car dynamics.

This comparison further emphasizes that the nearly equal values shown in parts a) and b) result from the constant relative speed of 10 mph. As

*For example, for 60/50, $\hat{y}_I$ for car/driver D is 1.83 times that for car/driver A, the van underbody magnifies the basic truck by 1.7, etc.

71-954 O - 72 - 12

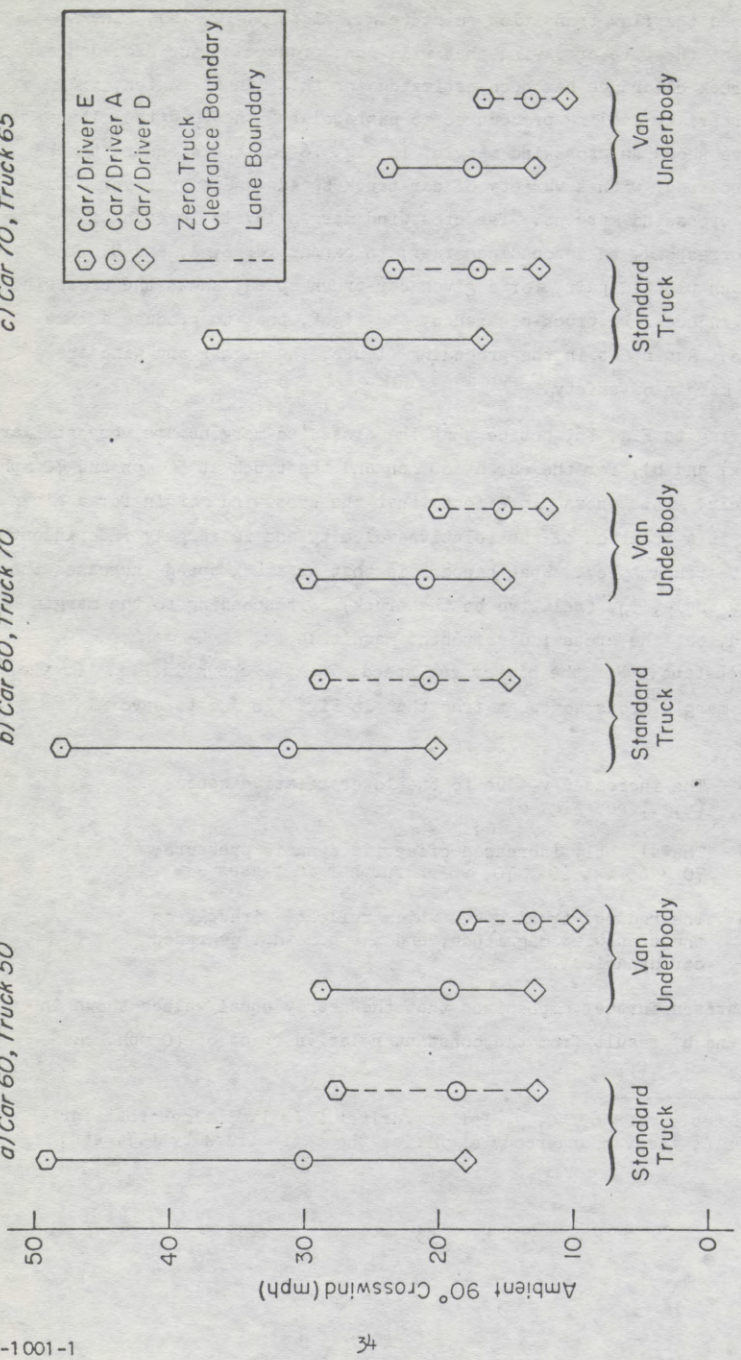


Figure 16. Effects of Car/Driver Condition, Car-Truck Speed and Truck Configuration on Boundaries: 90 deg Ambient Crosswind

truck speed is progressively increased from 50 to 70 mph the crosswind margin first decreases and then returns to nearly its original value.

Another interesting aspect of Fig. 16 is that two sets of boundaries for each of the car-truck speed combinations are almost identical; those corresponding to the standard truck for lane exceedance and the van underbody for zero clearance. Accordingly, car/driver A traveling at 60 mph (Fig. 16a and b) in a 20 mph crosswind alongside the standard truck might expect to get pulled over to the lane boundary; but if the truck had a van underbody the car might well be pulled into a near collision with the van. At 70 mph (Fig. 16c) it would take somewhat less crosswind (17 mph) to produce this same result. Not knowing the truck configuration or the crosswind conditions in advance would preclude the driver from making an optimum steering response (car/driver E), hence the more nominal, car/driver A configuration is used as being more realistic.

I. IMPLICATIONS AND RECOMMENDATIONS

The foregoing results show that lane width, truck width, relative speed, absolute speed, ambient winds, car handling, and driver skill and alertness can have a substantial effect on car/driver safety performance under certain car-truck disturbance conditions. The implications of these findings and recommendations with respect to truck configuration, highway design and operations, and car/driver characteristics are discussed below.

1. Truck Configuration and Operation

The disturbance effect of the truck wake, especially in crosswinds, needs to be recognized. Drop bed trailers and vans that allow less flow under the truck cause larger car/driver disturbances and deviations in a crosswind, with the car passing on the downwind side. The amount of gap between tractor and trailer is not as significant because the corresponding flow is generally above the level of the car. With the car on the upwind side of the truck, the wake blows the other way, and the disturbance is generally very small.

With no ambient wind or only a headwind, the main disturbance comes from the bow wave near the front of the truck. Streamlining the front of the tractor can reduce the disturbance magnitude somewhat, as can increased ground clearance under the tractor. Headwinds tend to magnify the bow wave disturbance. With a crosswind the bow wave disturbance component is still there, but the other crosswind related disturbance effects are much larger when the car is passing downwind.

Increasing truck width can increase the disturbance and affect car/driver performance. With a large crosswind the width effect is relatively small, compared to the basic crosswind effect. With no wind or headwinds only, the incremental width effects are a greater percentage of the basic bow wave disturbance. In the more critical speed regime, a 6 inch overall width increase will cause about a 5% increase in lateral deviation of the car, which is about double the percentage increase associated with a 3 inch reduction in side to side clearance of car and truck. For nominal lane widths (10 to 12 ft) this means that approximately a 6 inch increase in centerline separation (lane width) is needed to offset the disturbance increment due to an overall truck width increase from 96 to 102 inches. Expressed yet another way, the disturbance change caused by a 6 inch width increase is about the same as the disturbance magnification effect due to a 5 mph increment in the ambient headwind. Preliminary experiments show that the bow wave disturbance effect of a 6 inch overall width increase can probably be largely offset by suitable rounding and streamlining of the otherwise blunt front of the tractor.

---Preliminary investigations of truck length effects were accomplished by extrapolating the existing data to a double bottom truck configuration with two 27 ft trailers instead of one 40 footer. The same tractor was used and the overall length increased by about 10 ft. The analyses suggested no difference would occur in the no crosswind case, because the bow wave is unchanged and it dominates the disturbance. The crosswind effects were about the same also, because the flow between the trailers appears to offset the effect of increased vehicle length. Generally, the more porous the truck/trailer configuration to a crosswind (flow under and through the rig) the less the disturbance to a vehicle passing on the downwind side.

The results also suggest guidelines for operation by the truck driver. He should move toward the side of the lane away from passing vehicles and other traffic, when there are no vehicles or pedestrians on the shoulder. He should be alert for a passing car that may experience difficulty. In the same vein, he should recognize that when his truck overtakes a slower vehicle it will cause an unexpected disturbance of the overtaken vehicle and its driver. Preliminary analyses (and some corroborative accident data) show that this latter situation can be particularly critical when the truck overtakes a car towing a house trailer.

2. Highway Design and Operations

From the standpoint of the highway designer and traffic engineer, the important variables in the truck disturbance situation are

- Ambient winds on the roadway
- Lateral separation of the vehicles
- Absolute speed of the vehicles
- Relative (overtaking) speed of the vehicles
- Driver alertness

Specific numerical results, boundaries, and criteria have already been presented. The combined implications are discussed below.

The ambient wind plus the vehicle's ground speed combine to produce a net airspeed. Since this is an aerodynamic phenomenon the dynamic pressure of this airspeed scales the intensity of the disturbance; as the square of the airspeed for a single vehicle or as the product of the respective car and truck airspeeds in the disturbance situation. Hence, it is always desirable to reduce the net airspeed by reducing vehicle speed or ambient headwind or both. In terrain with prevailing headwinds, the route and roadway layout should attempt to reduce their effect where feasible.

Similarly, strong steady crosswinds (e.g., greater than about 25% of the truck's forward ground speed) can cause large disturbances to overtaking vehicles which are downwind of the truck. These can be alleviated by suitable consideration of the prevailing wind direction and strength

during the highway design process. Landscaping and cross slope design provide one means. Severe cut and fill procedures, with alternate shadowing and exposure to the wind should be avoided. Exposed raised roadways and bridges are more likely to create a crosswind disturbance situation.

Adequate lateral separation of the vehicles can be achieved in windy regions by increasing lane widths and medians. Another possibility is to separate truck lanes from other vehicle lanes by an auxiliary median (or lane closed to traffic under extreme wind conditions). With no crosswinds, a small increase in lateral separation will offset truck width increase effects, as noted above. With strong crosswinds, however, the truck wake disturbance persists some distance downwind from the truck (viz. Fig. 13), and simply increasing separation is less effective.

This study shows that the disturbance effects are generally more critical when car and truck are proceeding in the same direction. With no crosswind, the bow wave disturbance from an oncoming truck causes a relatively small disturbance because of its very short duration, and adequate lateral separation (via lane width or median) will provide sufficient alleviation. With a crosswind, the wake blowing from the oncoming truck towards the car can provide a large disturbance input. The resulting effect on performance is expected to be of the same order as that for the same direction of travel case, but this remains to be quantified.

Higher relative overtaking speeds (same direction) generally cause less disturbance of the car, because the duration is shorter and the car inertia tends to attenuate rapidly changing forces and moments. Hence, reduced truck speeds may provide additional alleviation under adverse conditions.

Certain types of vehicles such as small vans, cars towing trailers, and camper combinations are expected to provide the more critical cases from the standpoint of highway design and operation. They are more susceptible to aerodynamic disturbances. They have poorer handling response once disturbed. They tend to have lower speeds relative to the disturbing trucks, and they tend to operate in the right lanes on multilane highways, in closer proximity to the trucks.

An alerted driver, skilled in responding to truck disturbances, can be essential to safe operation in the more critical situations. Since the intensity of the disturbance varies significantly with the conditions, the driver cannot always anticipate a disturbance situation when overtaking a truck or other large vehicle. Suitable warning signs in areas with prevailing winds, training, and publicity are potential means of alleviation.

The psychophysiological response measures show an increased driver stress associated with the truck disturbance input. This autonomic recruitment can help the driver improve his performance. Yet, it may have associated perceptual narrowing which reduces his attention to other aspects of the driving task. Hence, other driver workload, such as reading direction signs and cross traffic, should be minimized on stretches of highway which characteristically present potential truck disturbance situations.

3. Car/Driver Characteristics

The truck disturbance can result in a serious lateral deviation of the car/driver system, in some cases causing a lane boundary exceedance or potential collision. It is difficult for the driver to anticipate the disturbance because the intensity varies with conditions, but he should expect it alongside the truck in a crosswind and at the front of the truck with a headwind. Conservatively, the driver should always expect it and be prepared to react and then counterreact as the disturbance decreases. The poorer driver (e.g., with a longer time delay) or one who is unfamiliar with his vehicle may have more difficulty.

Defensively, the driver should increase his overtaking speed to have about a 10 to 20 mph headway advantage. He should move towards the edge of the lane away from the truck when the wake is blowing towards his car. With no crosswind, he should stay in the middle of his lane to avoid being pushed beyond the lane boundary by the bow wave.

The car's handling and aerodynamic properties are also important. The correct vehicle loading and tire pressures should be observed. The better handling vehicle will improve the response and performance, once disturbed. The aerodynamic design can be tailored to reduce the susceptibility to

truck disturbance inputs as well as other types of highway gusts. The basic aerodynamic data simply quantify the input, however, and they have to be interpreted to estimate the safety performance. The designer/analyst must consider the dynamic response properties of the car/driver combination as a closed loop system, not just the dynamics of the car alone. This will help avoid problems such as driver induced steering oscillations. This type of integrated design process can be accomplished with contemporary analysis and design procedures of the sort used in the analytical and interpretive phases of this study.

SECTION III

TECHNICAL APPROACH

This section summarizes the aspects of the technical approach used to quantify and study the truck-induced aerodynamic disturbance effects described in Section II. This approach involves the application of an empirically based combined analysis procedure for estimating safety performance in a given car-truck disturbance situation. The empirical bases consist of data and models for driver behavior and vehicle response, wind tunnel data to quantify the disturbing forces and moments, and supplementary full scale tests to confirm the wind tunnel data and to provide overall verification of the analytical results. The full scale tests also yield performance measures that cannot be obtained easily in other ways, such as driver psychophysiological response.

A. DRIVER/VEHICLE ANALYSES

The typically skilled driver adjusts his steering response properties to suit the vehicle's handling dynamics, thereby achieving some acceptable or required level of directional performance in path following and disturbance regulation tasks (e.g., Refs. 10-12). Variations in driver control characteristics with attention, skill, fatigue, and degradation of visual cues cause changes in path following (lane keeping) performance in the presence of a given truck disturbance input. For the more critical situations, the driver will not keep the vehicle within the lane boundaries despite suitable rapid corrections, and may even go off the road or strike the truck as shown in Section II.

1. Driver Describing Function and Perceptual Structure

Operation near a truck (passing, overtaking, or oncoming) results in a significant truck-induced aerodynamic disturbance only under certain conditions. Thus the driver does not always expect a large input, and he must wait and see what happens and then compensate for path errors as they develop. Precognitive operation involving execution of a learned, internally programmed, discrete steering response is not an appropriate tactic in

general. The driver's compensatory closed loop steering control can be quantified by a quasi-linear describing function (Refs. 10-12) which contains the following driver parameters*:

- Gain, which expresses the amount of steering correction for a perceived level of error.
- Time delay, which accounts for latencies due to perception, interpretation, and neuromuscular actuation.
- Equalization, which tailors the form of the driver's response to suit a given vehicle's handling qualities.

These parameters, together with the vehicle handling dynamics determine the performance of the car/driver system in the presence of the disturbance input.

The loop structure of the car/driver system used in the analyses is given in Fig. 17. The driver is assumed to respond to perceptual feedbacks of car heading angle (ψ) and lateral deviation (y_I) to produce a net steering wheel correction (δ_{sw}). While not unique, these heading and path feedbacks

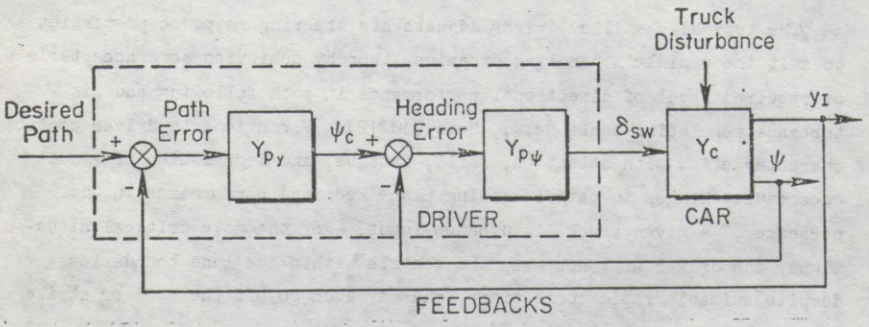


Figure 17. Driver/Vehicle System Structure for Analyses

*"Remnant" effects can be added to the quasi-linear behavior to account for control inputs not linearly correlated with the disturbance. Such effects serve to introduce an added random variation in driver steering response and in the truck-disturbed path, and the full-scale results (e.g., Fig. 40) show that these are small in comparison to the main disturbance. Additional dispersions due to initial lateral placement and the nonsteadiness winds also occur in the real life situations. None of these added random effects are included in these analyses, which concentrate on the main features of the path disturbance as reflected in the quasi-linear steering response and nominal car trajectory. As already noted, dispersion effects can readily be added to the performance corridors and margins developed in Section II to yield probabilities of lane exceedance or accidents.

satisfy the system's guidance and control requirements, as well as driver centered requirements relating to ease of control and good subjective opinion of his ability to accomplish the driving task. As later shown, the resulting computed car/driver performance compares well with that observed in the full scale tests.

2. Car Dynamics

The next step in estimating car/driver system response and performance is numerical definition of the car's dynamic response properties, Y_c. This definition can take the form of differential equations of motion which are useful in computing time responses; or as equivalent transfer functions (Laplace transform of the differential equations) which provide a frequency domain description useful in car/driver analyses. These equations for car motion response to driver steering wheel and aerodynamic inputs were initially based on design data from the vehicle manufacturer, as modified for the standard experimental loading condition (driver, experimenter and 350 lbs of instrumentation)*. These initial estimates were then refined using measured dynamic responses (from full-scale tests) to obtain more precise results. The equations and additional details are given in Appendix A.

A three degree of freedom (heading, lateral velocity, and roll) vehicle model was mechanized on an analog computer as part of this verification process. A comparison of the measured (full scale) and analytically computed (model) vehicle responses to a test steering wheel† input (δ_{sw}) is given in Fig. 18. The heading angle rate (r), roll angle rate (p), and lateral acceleration (a_y') all show excellent agreement between the analyses and full scale tests. The resulting steering response transfer functions were:

Heading angle, ψ

$$\frac{\psi}{\delta_{sw}} = \frac{0.67(s + 3.8)[s^2 + 2(0.28)(8.5)s + (8.5)^2]}{s[s^2 + 2(0.61)(4.5)s + (4.5)^2][s^2 + 2(0.35)(9.2)s + (9.2^2]} \qquad (3)$$

*In some cases, the experimental car was operated outside the manufacturer's recommended load range in order to explore more critical car/driver disturbance response regimes. Although a Chevrolet was used, the results are representative of most full-sized American station wagons operated under similar conditions.

†For the dynamic conditions of the truck disturbance response, involving large rapid steering motions; the effective ratio between steering wheel angle (δ_{sw}) and front wheel steer angle (δ_w) is about 32 to 1, and this ratio applies to all numerical results in this report. The static steering ratio (which was not used) is closer to 26 to 1.

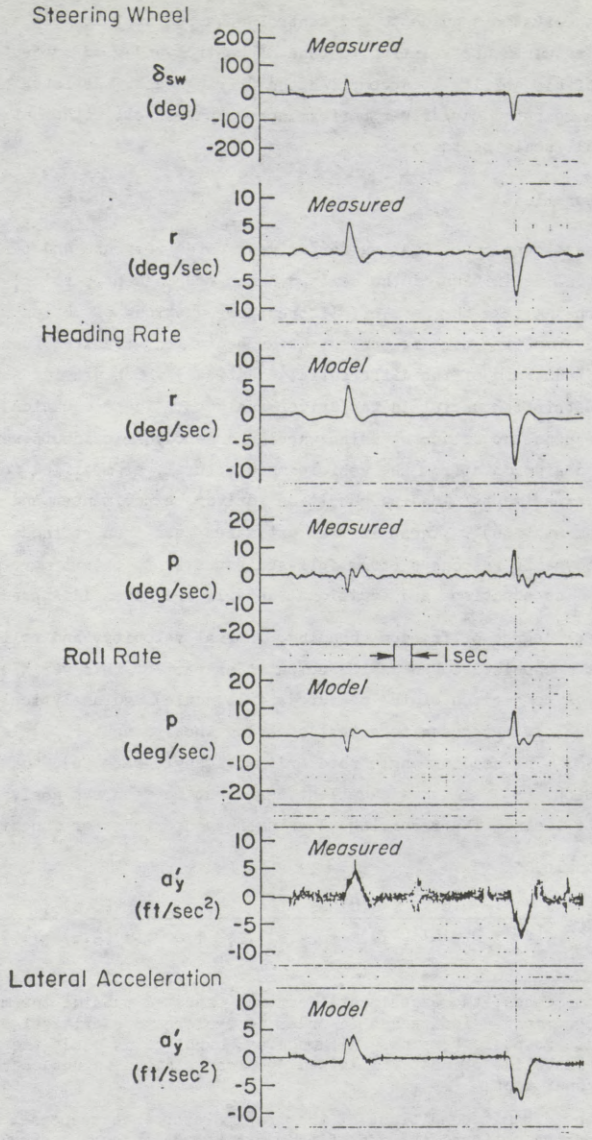


Figure 18. Comparison of Measured and Computed Car Dynamic Response at 60 mph

Lateral deviation, y_I (4)

$$\frac{y_I}{\delta_{sw}} = \frac{5.1[s^2 + 2(0.08)(7.7)s + (7.7)^2][s^2 + 2(0.26)(7.3)s + (7.3)^2]}{s^2[s^2 + 2(0.61)(4.5)s + (4.5)^2][s^2 + 2(0.35)(9.2)s + (9.2)^2]}$$

The moderately damped, high frequency quadratic pair in the numerator and denominator of each transfer function is related to the roll mode, and it tends to cancel out. The corresponding vehicle differential equations of motion were used in the car/driver-truck disturbance computations, described subsequently.

For purposes of estimating driver dynamic behavior and analyzing the effects of variations in car/driver dynamic response; a simpler set of two degree of freedom (heading and sideslip) equations was used. The corresponding simplified steering wheel transfer functions at 60 mph were:

Heading angle, ψ

$$\frac{\psi}{\delta_{sw}} = \frac{0.49(s + 3.5)}{(s)[s^2 + 2(0.63)(4.04)s + 4.04^2]} \quad (5)$$

Lateral deviation, y_I

$$\frac{y_I}{\delta_{sw}} = \frac{2.82[s^2 + 2(0.17)(7.3)s + (7.3)^2]}{s^2[s^2 + 2(0.63)(4.04)s + (4.04)^2]} \quad (6)$$

The roll mode effect is included implicitly in these expressions, and they are used in the car/driver closed loop analyses presented below.

3. Nominal Car/Driver Response Properties

Based on the car/driver loop structures and vehicle response properties, driver dynamic response was estimated for the several tasks using the previously developed describing function models (e.g., Refs. 10-12). The assumed feedbacks and computed vehicle dynamics indicated that an appropriate form for the driver describing function blocks in Fig. 17 is:

Heading response

$$Y_{p_\psi} = K_{p_\psi} e^{-\tau e j\omega} \quad (7)$$

Lateral deviation (path) response

$$Y_{p_y} = K_{p_y} \tag{8}$$

Equation 7 shows that the driver's heading response is nominally a gain (K_{p_ψ}) plus a time delay (τ_e). The path response in Eq. 8 is a simple gain (K_{p_y}). Additional details are given in Appendix A.

Combining the driver characteristic Y_{p_ψ} with the car heading transfer function of Eq. 5 gives the car/driver heading response properties of Fig. 19. The open loop frequency response on the right of Fig. 19 shows a heading crossover frequency (bandwidth) of about 2.3 rad/sec, which is based on established driver modeling rules, and (in part) values observed in recent describing function measurements (Refs. 11 and 12) for a range of drivers in simulated steering control tasks with crosswind gust inputs. The resulting closed loop heading response dynamics are shown on the root locus, on the left side of Fig. 19, as solid rectangles. These inner loop results (roots) become the outer loop starting point (roots) for estimating the lateral deviation response, as shown in Fig. 20. The frequency response in Fig. 20 shows an outer loop lateral deviation crossover frequency (path bandwidth) of about 0.4 rad/sec. Complex as this may sound, it simply states that the response of the car is changed by the actions of the driver; and that the amplitude and rapidity of the response are determined by the driver's reaction time and the size of his steering motions (which are describing function parameters).

The car/driver system described above, and by Figs. 19 and 20, is designated as car/driver combination A in Section II and elsewhere. It is the nominal case.

Estimates of car/driver response were also made for 70 mph forward speed. At 70 mph, the station wagon dynamics are changed somewhat from the 60 mph values, and the two degree of freedom steering wheel response transfer functions become:

$$\frac{\psi}{\delta_{sw}} = \frac{0.49(s + 3)}{s[s^2 + 2(0.58)(3.8)s + (3.8)^2]} \tag{9}$$

$$\frac{y_I}{\delta_{sw}} = \frac{2.8[s^2 + 2(0.14)(7.3)s + (7.3)^2]}{s^2[s^2 + 2(0.58)(3.8)s + (3.8)^2]} \tag{10}$$

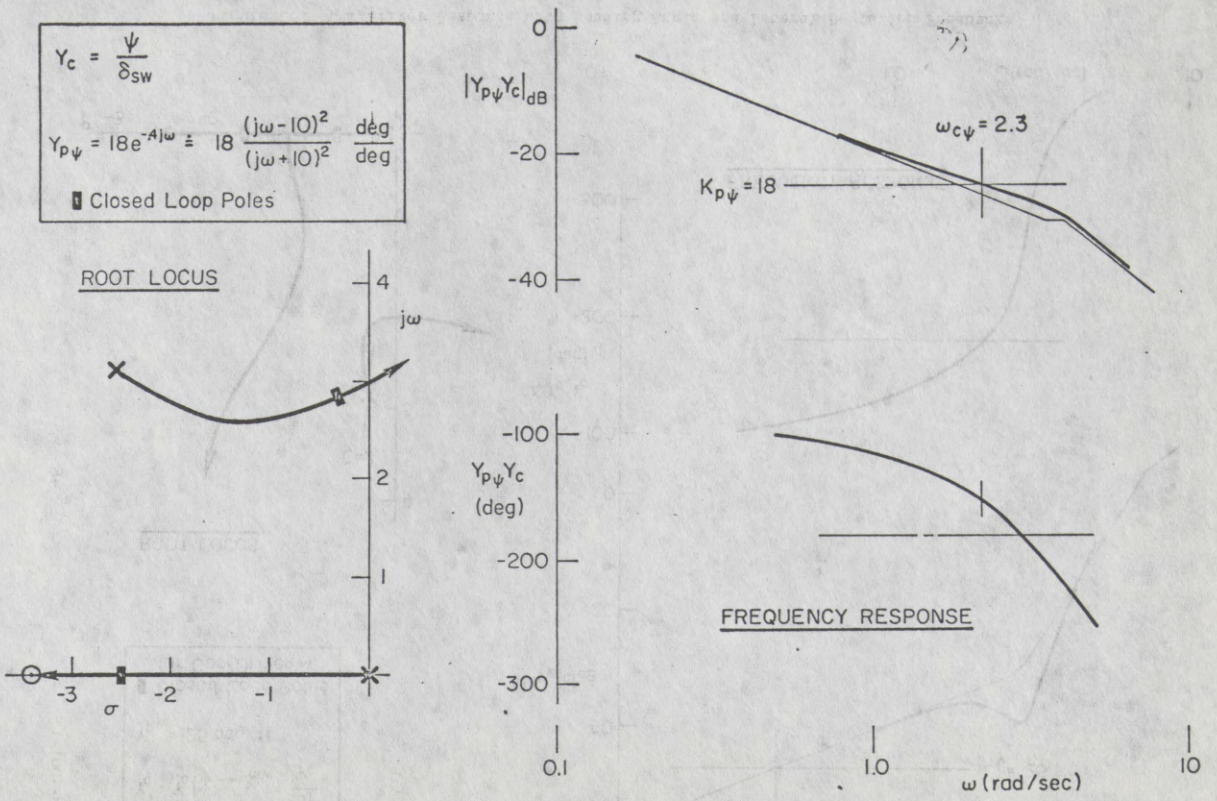


Figure 19. Car/Driver Response with Heading Angle Feedback

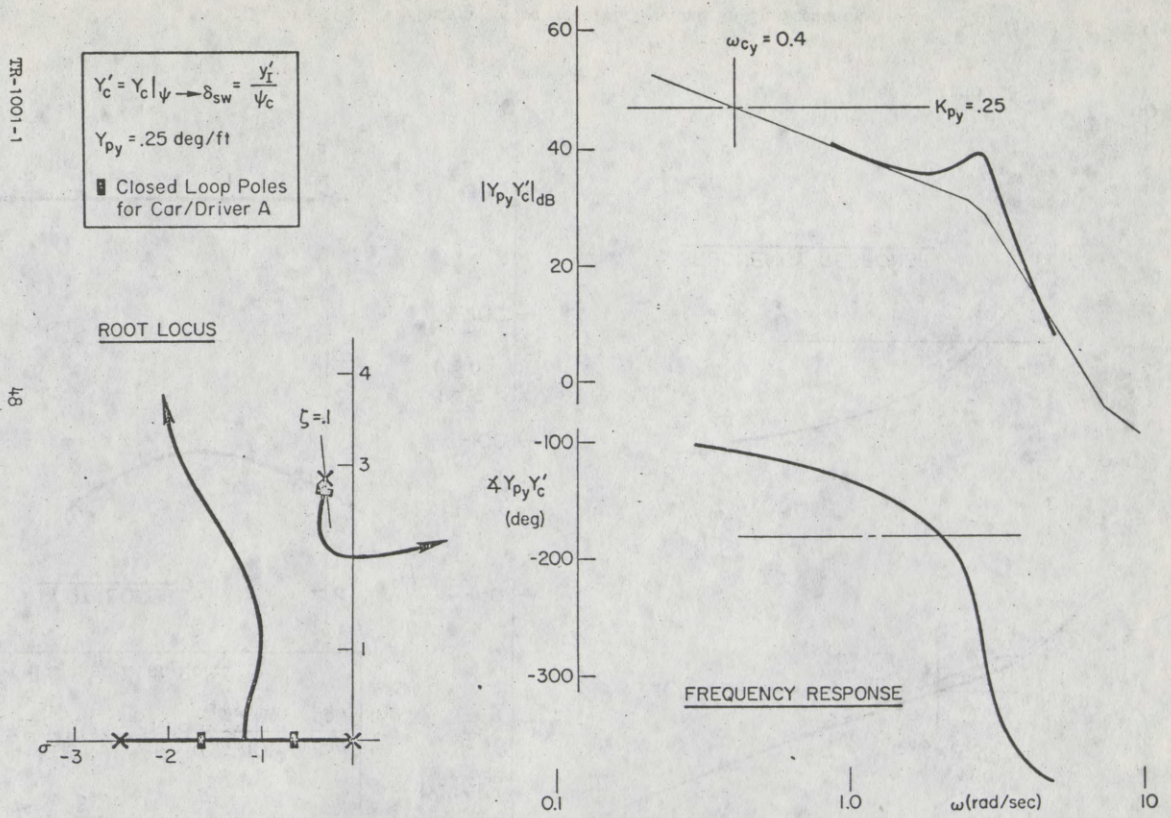


Figure 20. Car/Driver Response with Heading Angle and Lateral Deviation Feedbacks

The main effect of the speed change is to decrease the natural frequency and damping of the car. This in turn can reduce the inner loop (heading) crossover frequency to about 2.1 rad/sec, consistent with maintaining the same closed loop damping coefficient ($\zeta \doteq 0.1$) as for the 60 mph case (e.g., Figs. 19 and 20). The resulting outer loop is then very similar to that shown in Fig. 20, except that the first order lag shown at about 2.5 rad/sec is shifted down to about 1.9 rad/sec. About the same outer loop crossover frequency (0.5 rad/sec) was used, so that the nominal car/driver response at 70 mph was similar to that at 60 mph. The resulting 70 mph nominal case is called car/driver I in Appendix A.

To obtain the desired performance estimates for the various situations, the resulting car/driver response models are then subjected to the truck-induced aerodynamic force and moments inputs, based on the wind tunnel measurements (as described in Subsection B, below). For a given situation, the aerodynamic interference from the truck causes side forces, yawing moments, and rolling moments on the car which change with time, due to the changing spatial orientation of truck and car at some relative speed. Operationally, with the car/driver model, the effect is treated in the time domain using digital computation. The three degree of freedom differential equations for the car/driver system (described previously) were placed in the computer and integrated to obtain the time history of driver steering control actions and vehicle motion response. The calculation procedure is described in more detail in Appendix A.

Example results are given in Fig. 21 for car/driver A at 60 mph, passing the standard truck at 50 mph in an 18 mph ambient crosswind (−20 deg crosswind angle). The figure shows lateral acceleration (a_y), lateral deviation (y_I), heading rate (r), and driver steer angle* (δ_w) as a function of the car center of mass location relative to the front of the truck. Note that the car center of mass is a few inches ahead of the mid wheelbase. In Fig. 21 the peak lateral deviation ($\hat{y}_I$) is about 2.6 ft toward the truck, occurring at a point alongside the front of the trailer. The steer angle (δ_w) trace

*Steer angle (δ_w) is measured at the front wheel, while δ_{sw} in Fig. 18 is measured at the steering wheel. The measured steering system gain under dynamic conditions is about 32 to 1, as noted previously.

71-954 O - 72 - 13

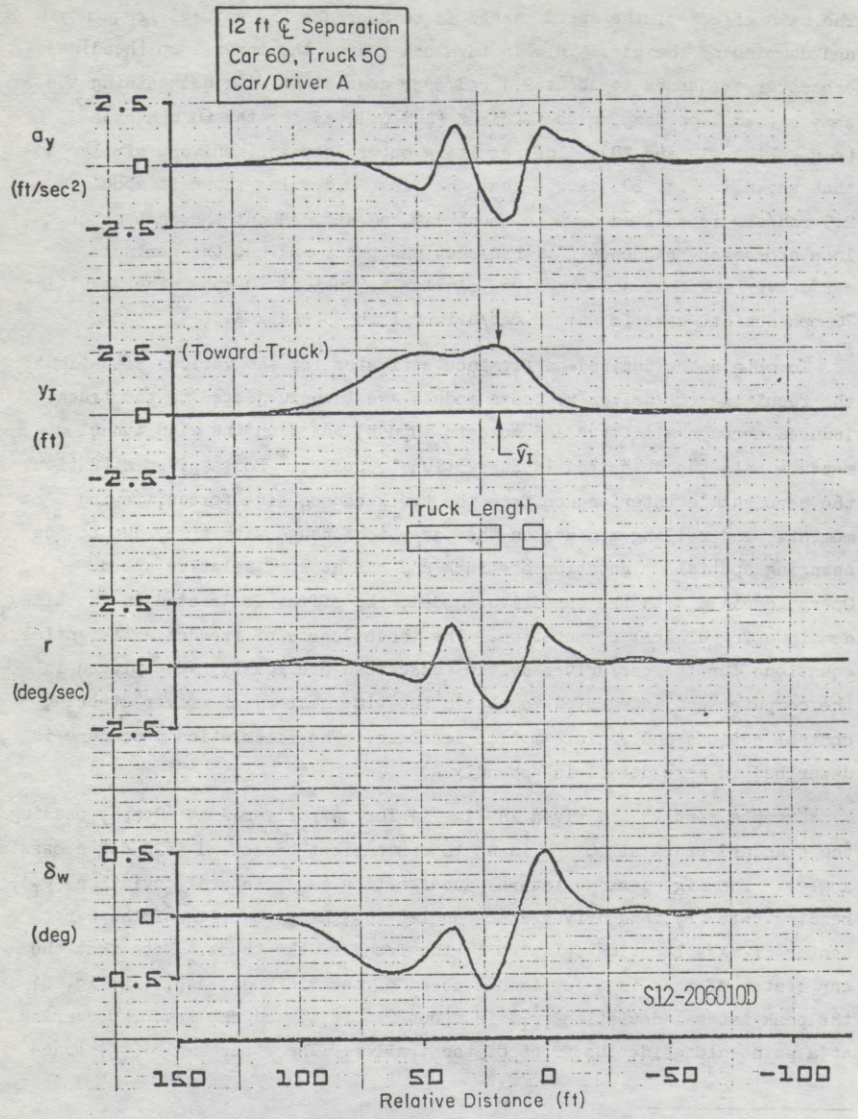


Figure 21. Computed Responses: Car Passes Truck, Crosswind = 18.2 mph (ψ_w = −20 deg)

shows that the driver makes several steering corrections in an effort to stay in the center of his lane. These steering corrections are reflected in the high frequency heading rate and lateral accelerations of the car, along with the car/driver response to the external forces and moments.

Replacing the truck with a 30 ft long rectangular block gives the example results shown in Fig. 22. This increases the peak deviation to 5 ft in a direction toward the disturbing vehicle. This value is larger than that for the standard truck (Fig. 21), due mainly to:

- The lack of flow under the block, which in the truck/semi-trailer case tends to reduce the magnitude of the change in side force as the car goes past, and
- The shorter length of the block combined with the lack of flow which results in one large disturbance with a rapid onset and termination.

The other variables in Fig. 22 reflect the driver's additional control difficulties for this case. The lightly damped high frequency steering corrections correspond to the closed loop root at about 2.7 rad/sec natural frequency in Fig. 20. The lower frequency lateral deviation motion corresponds to the 0.4 rad/sec crossover frequency in Fig. 20.

4. Variations in Car/Driver Response Properties

The car/driver response properties described above represent a nominal case. Degrading or improving the car/driver dynamic characteristics produces the corresponding changes in path performance detailed in Section II. This variation in characteristics can result from changes in the driver, the car, or both. The levels of driver behavior are determined by the describing function parameters (gain, time delay, and equalization) previously discussed. Changes in the car handling dynamics can occur by varying the load, tire properties, etc.; or by using a different disturbed vehicle. The general result is to change the system bandwidth and other response properties, which in turn modify the path performance.

An investigation of the effect of changing car/driver response properties is given in Appendix A. This involves variations about the nominal to achieve representative near optimum and degraded cases; car/driver combinations E and D, respectively.

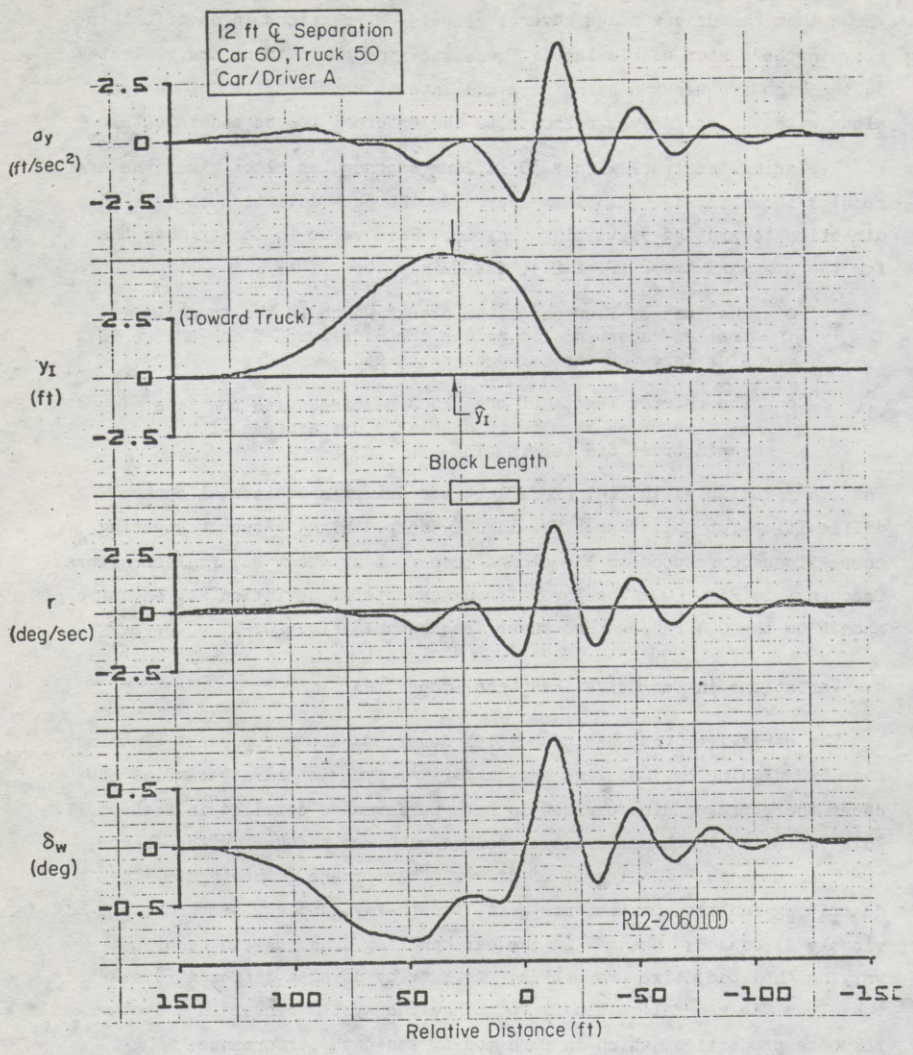


Figure 22. Computed Responses: Car Passes Block, Crosswind = 18.2 mph (ψ_W = −20 deg)

3. WIND TUNNEL EXPERIMENTS

The purpose of the wind tunnel experiments was to obtain quantitative force, moment, and flow data for various car-truck orientations and cross-winds; and to investigate truck shape variations. The wind tunnel data provided the needed inputs to the analyses, and served to correlate the analytical and model scale results with the full scale measures. Some limited, preliminary aerodynamic measurements for similar types of disturbance situations were examined in the literature (Refs. 8 and 13 to 15), and these were used in formulating the test plans.

1. Wind Tunnel Models

The basic tests were run in the Northrop Aircraft subsonic wind tunnel using 1/10 scale models. The metric (instrumented) model was a 1970 Chevrolet Brookwood station wagon (see Fig. 23). It contained a six-component strain gauge balance, connected to the yaw table in the tunnel floor by a balance block and strut. A probe* was mounted ahead of the car (on its centerline) to measure the angularity and magnitude of the local horizontal flow component. The disassembled car is shown mounted in the wind tunnel in Fig. 24. The underbody detail of the car is shown in Fig. 25.

The primary truck model (see Fig. 26, solid lines) corresponded to the following tractor/semitrailer rig:

- Tractor — 1967 three-axle Peterbilt, 86 in. cab over engine (COE) with 186 in. wheelbase.
- Semitrailer — two-axle Strick, 40 ft × 13 ft 6 in. insulated dry freight van.

The truck and car models are shown in Fig. 27. A flow probe similar to that ahead of the car was also mounted in front of the tractor/semitrailer model to measure the angularity and magnitude of the horizontal component of the incident flow. A generic, rectangular block (with no wheels or

*The flow probe locations, shown in Figs. 23 and 26, correspond to vehicle mounted flow vector vanes used in the full scale tests.

Model Scale 1/10 Full Size - Dimensions Shown in Inches
Pitch Attitude Fixed at 0.9 deg Nose Up
No Radiator Flow
Simulated Underbody Detail
Wind Tunnel Axes Shown

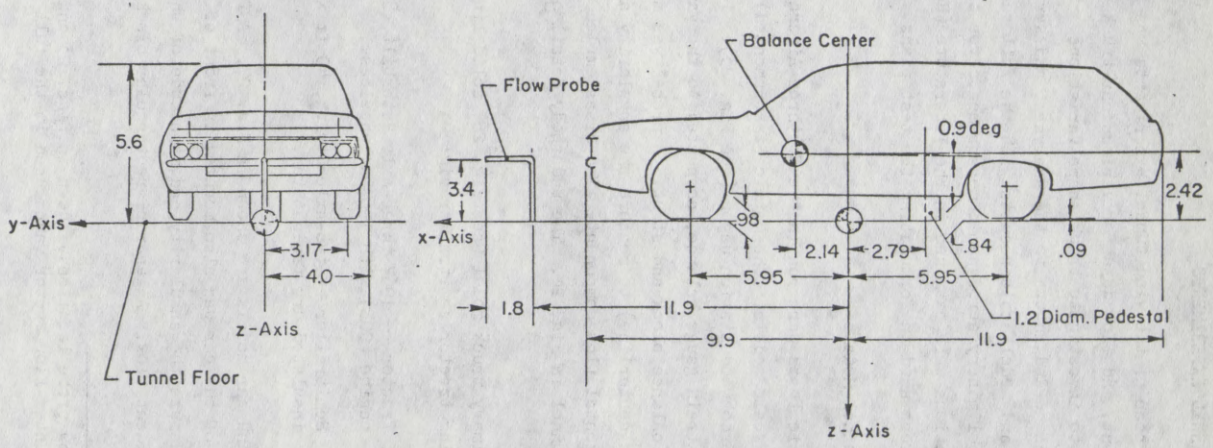


Figure 23. Station Wagon Wind Tunnel Model

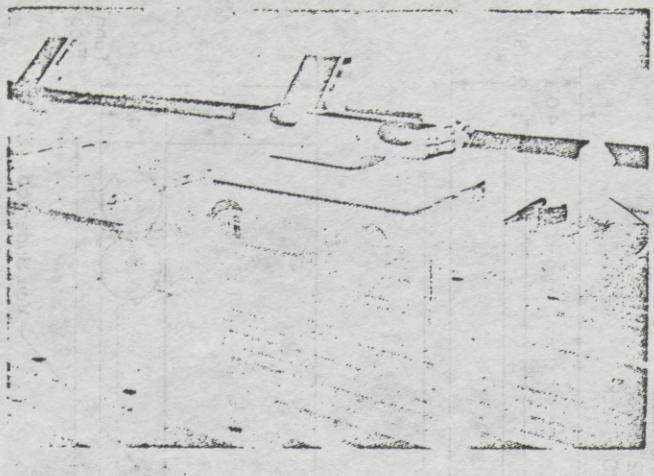


Figure 24. Disassembled Station Wagon Model

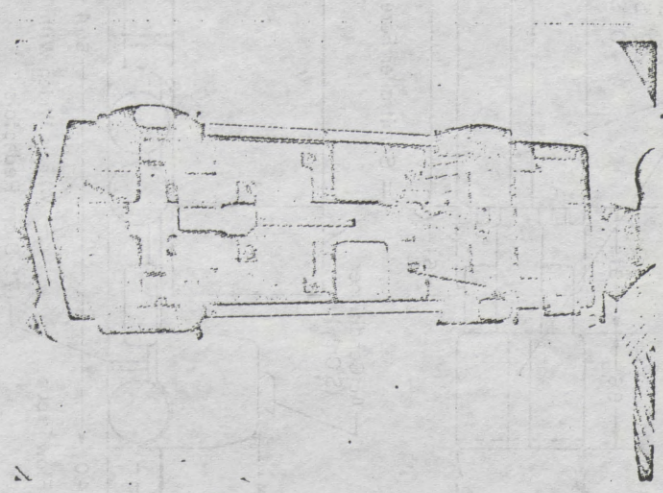


Figure 25. Station Wagon Model Underbody Detail

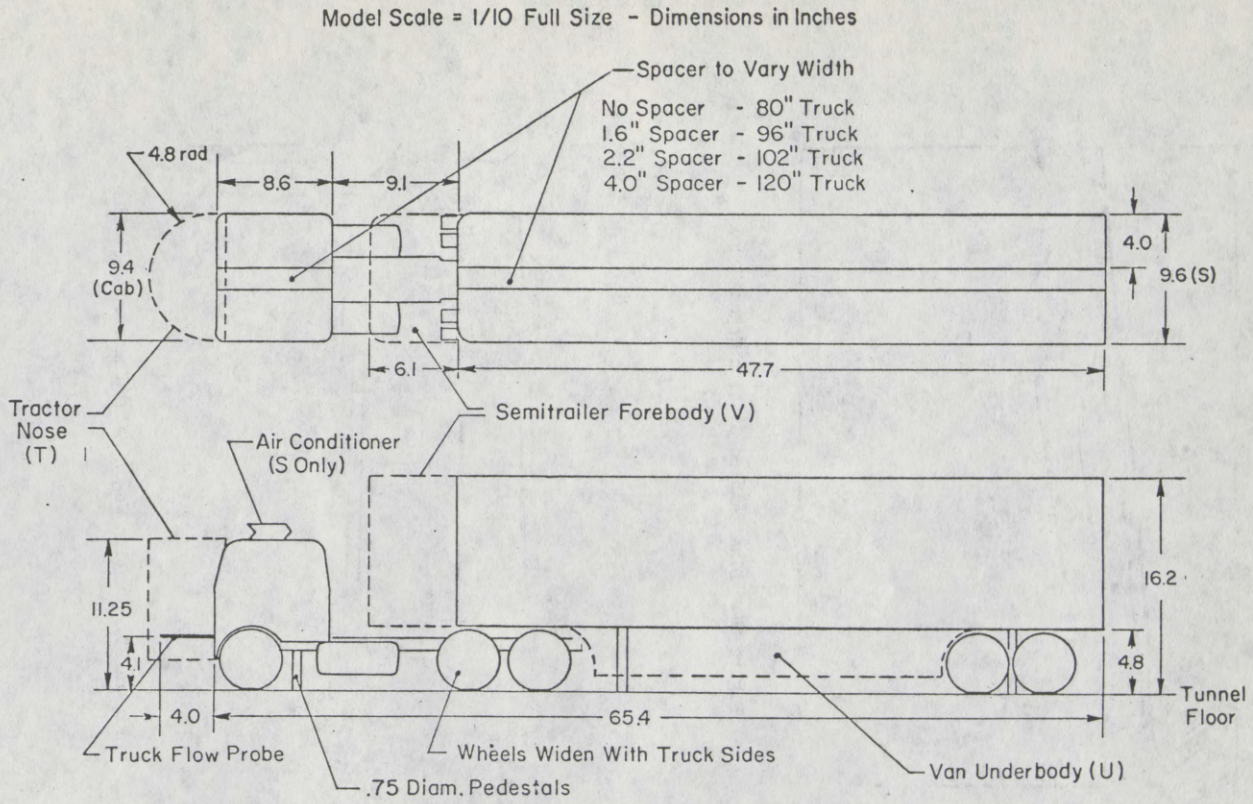


Figure 26. Tractor/Semitrailer Truck Tunnel Model

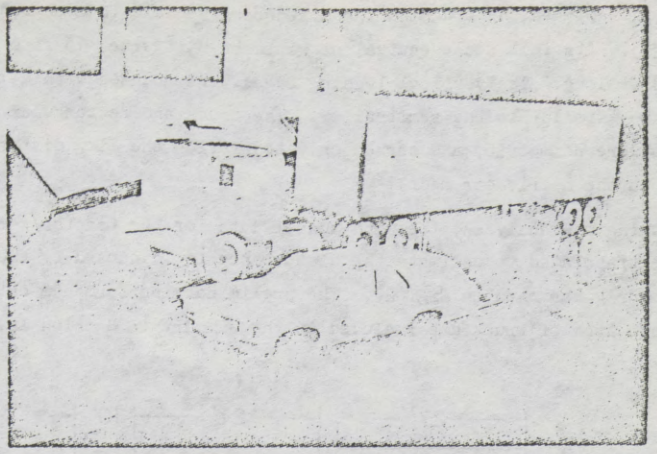


Figure 27. Truck and Car Models at Positive Crosswind Angle

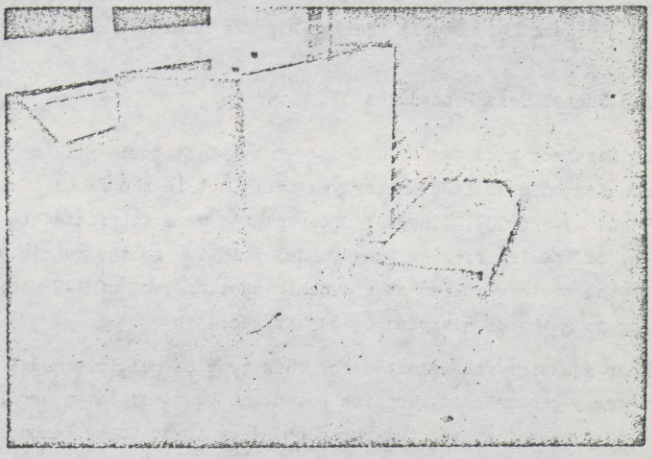


Figure 28. Rectangular Block and Car Models, No Crosswind

details) replaced the truck as the disturbing vehicle in some runs (see Fig. 28). Its full scale equivalent would be 8 ft wide, 13 ft 6 in. high, and 30 ft long. The vertical leading edges were rounded with a one inch radius — similar to the semitrailer. The truck and rectangular block models were nonmetric, and served only to provide the flow disturbance input to the metric car model.

During the analyses, the wind tunnel data for the tractor/semitrailer were extrapolated to estimate the disturbance field caused by the double trailer rig sketched in Fig. 29. The preliminary performance estimates for this type of truck are included in the summary in Section II.

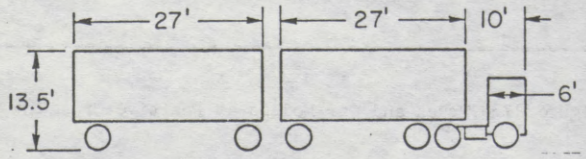


Figure 29. Double Trailer Rig for Data Extrapolation

2. Wind Tunnel Test Procedures

The Northrop wind tunnel has a 7 ft by 10 ft test section. The models were mounted on a 10 ft diameter yaw table set in the floor of the tunnel (see Figs. 27 and 28). Special floor plates were fabricated to permit movement of the interfering truck model relative to the metric car model. Most of the tests were run at a dynamic pressure, q, of 140 psf; corresponding to a tunnel airspeed of 343 ft/sec.

Floor mounting was selected for this type of multiple model test because of its great convenience, despite potential boundary layer problems. Available data showed the expected floor boundary layer to be comparable to that at the midpoint of the Northrop groundboard, and one initial test series verified the good boundary layer properties. This series used a rake-like array of pressure tubes to measure the boundary layer on the tunnel floor in the test section. This was done with and without the rectangular

block to see whether the boundary layer tended to thicken as a result of propagation around the tunnel. This thickening did not occur, and the effective boundary layer was confirmed to be small relative to the height of the lower part of the car model (see Fig. 30). The displacement thickness was about 0.38 in.

The metric car model and probe were then installed in the tunnel to obtain aerodynamic force and moment data for the car alone, and to provide a calibration for the probe. Repeat runs were made at various Reynold's Numbers (Re) to determine any sensitivity to Re and to provide a basis for relating our data to other lower Re results (such as those obtained in Refs. 8 and 13). Over the range of Re from 10^6 to 2.2×10^6 (referenced to the car model wheelbase) no variations appeared in the wind tunnel data. At lower values of Re the balance became too insensitive because of the low dynamic pressure. The standard value of Re used in the remaining data runs was 2.2×10^6.

The standard (96 in. wide) truck model was then placed in the tunnel along with the car model, and the test series was accomplished to determine the effect on the car disturbance of relative location of car and truck. This consisted of positioning the truck model at various locations relative to the car model, as shown in Fig. 31. Figure 31 is drawn as if the car location was varied relative to the truck, and this is convenient for data presentation and interpretation but it does not affect the validity of the results. At each location, the entire assembly was tested at zero deg and yawed ±5, ±10, ±20, and ±30 deg to simulate the effect of various crosswinds. The resultant force and moment data for the car were then cross plotted to give variations with position for a given crosswind flow angle. The forward truck location data also served to calibrate the truck probe. The data were plotted as the tests progressed so that the more critical regions could be defined in greater detail.

The next series of tests involved variations in the truck configurations for a subset of relative car-truck locations identified as important from the locations surveyed with the standard truck. Variations included (see Fig. 26):

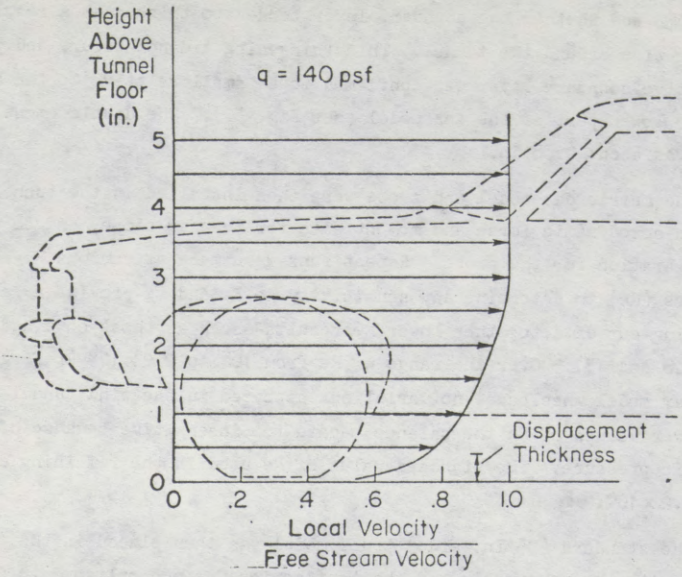


Figure 30. Measured Boundary Layer in Northrop Tunnel

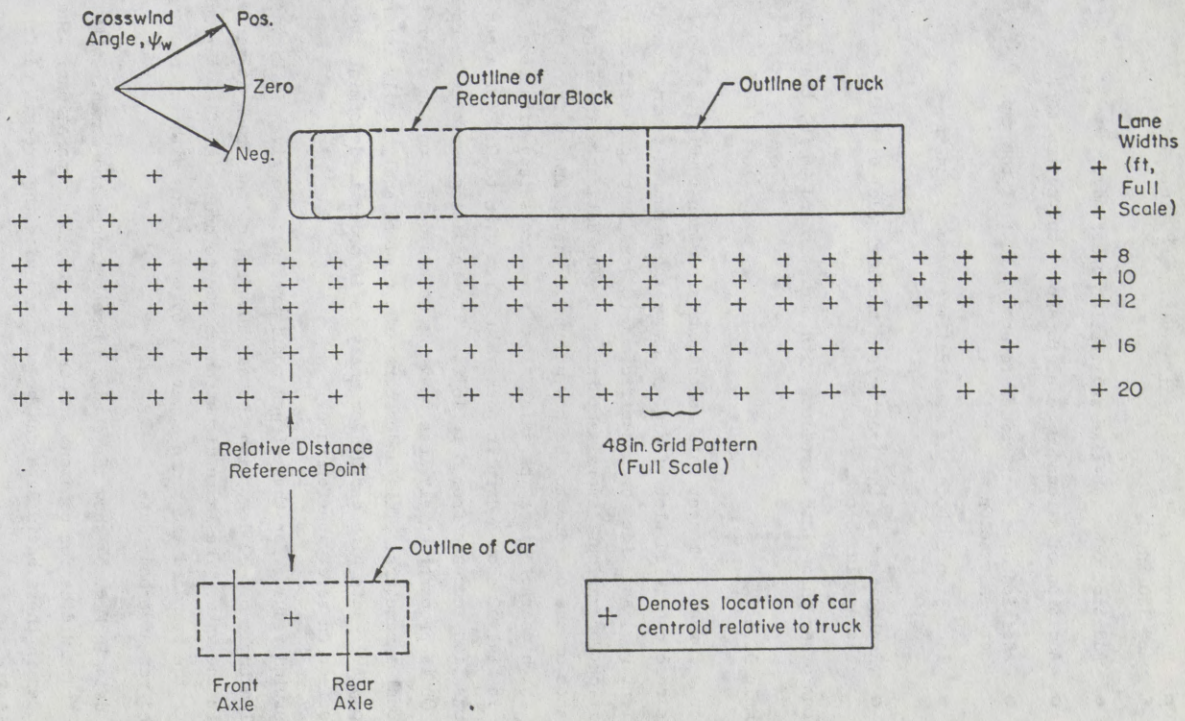


Figure 31. Array of Possible Relative Car-Truck Locations

- Different tractor/semitrailer widths (80 in., 102 in., and 120 in.).
- Addition of a van-like semitrailer underbody.
- Addition of a rounded nose (forebody) to the tractor.
- Addition of a semitrailer forebody, to fill the gap between tractor and trailer.
- Inclusion of both the semitrailer forebody and the tractor nose.
- Replacement of the tractor/semitrailer model with the rectangular block.

Variations other than width were done with the standard 96 in. truck width.

3. Example Data

Example force and moment data on the car are given in Figs. 32, 33, and 34. The zero crosswind plot of Fig. 32 shows the measured yawing moment coefficient (C_n) and side force coefficient (C_y) as functions of relative car position for various lateral separations. The data show the large disturbance of the car due to the bow wave adjacent to and in front of the tractor which characterizes the axial flow (zero crosswind) situation. The C_n data in Fig. 32 show a drop in peak value from 0.26 to 0.1 for a centerline separation increase from 8 to 16 ft. The resulting performance change in Fig. 8b is proportionately less, and the values depend on the other situational parameters. This underscores the need to analytically interpret the aerodynamic data with car/driver analyses in order to determine the actual effect on safety performance.

Crosswind results for three truck configurations are given in Fig. 33 for a flow angle of −20 deg, with the car downwind of the truck at various points in the wake. The large disturbances due to crosswind flow through and under the standard truck are apparent, by comparison with the rectangular block and van underbody data.

The data in Fig. 34 show the change in peak forces and moments with varying truck widths for constant car-truck centerline separations. The differences in these basic data can be compared with the overall performance effect in Fig. 10.

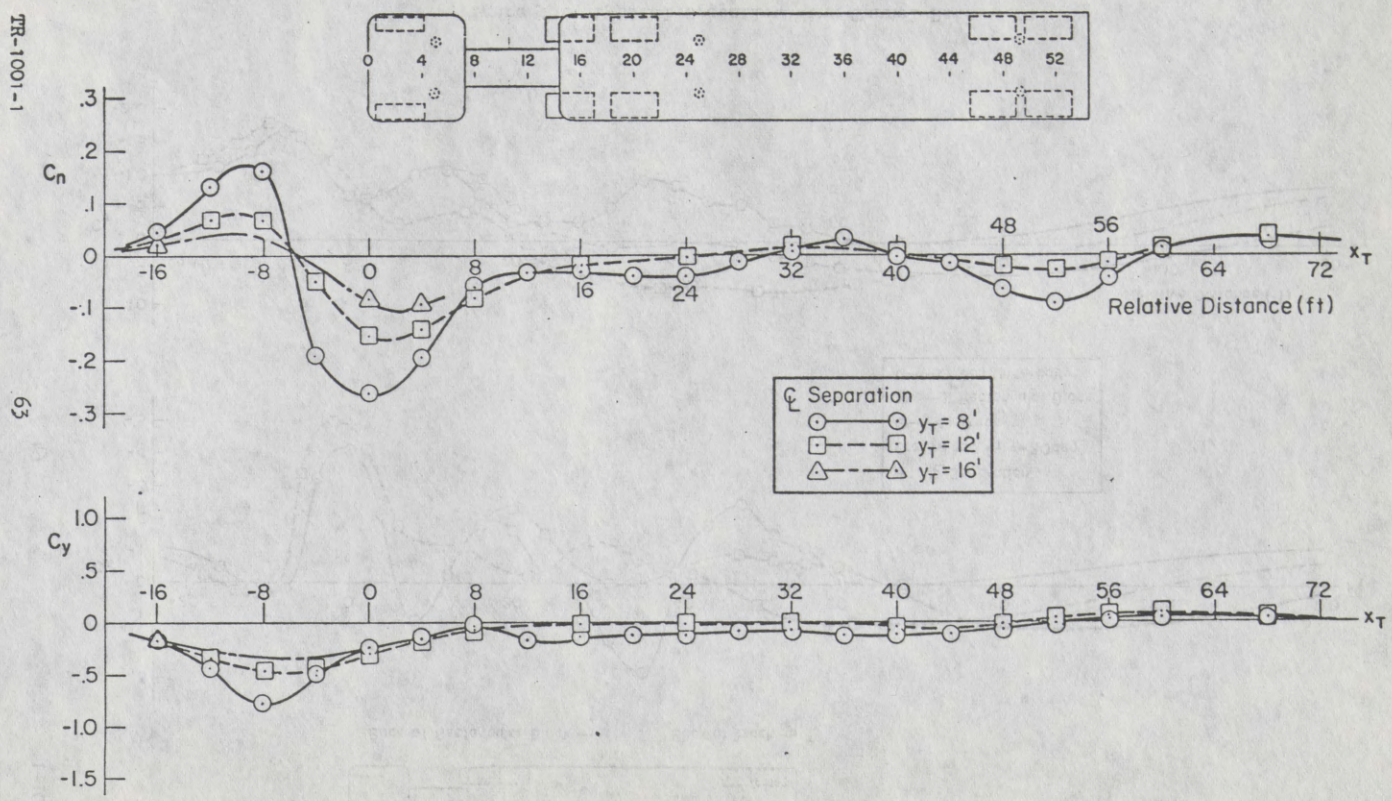


Figure 32. Typical Axial Flow Wind Tunnel Data

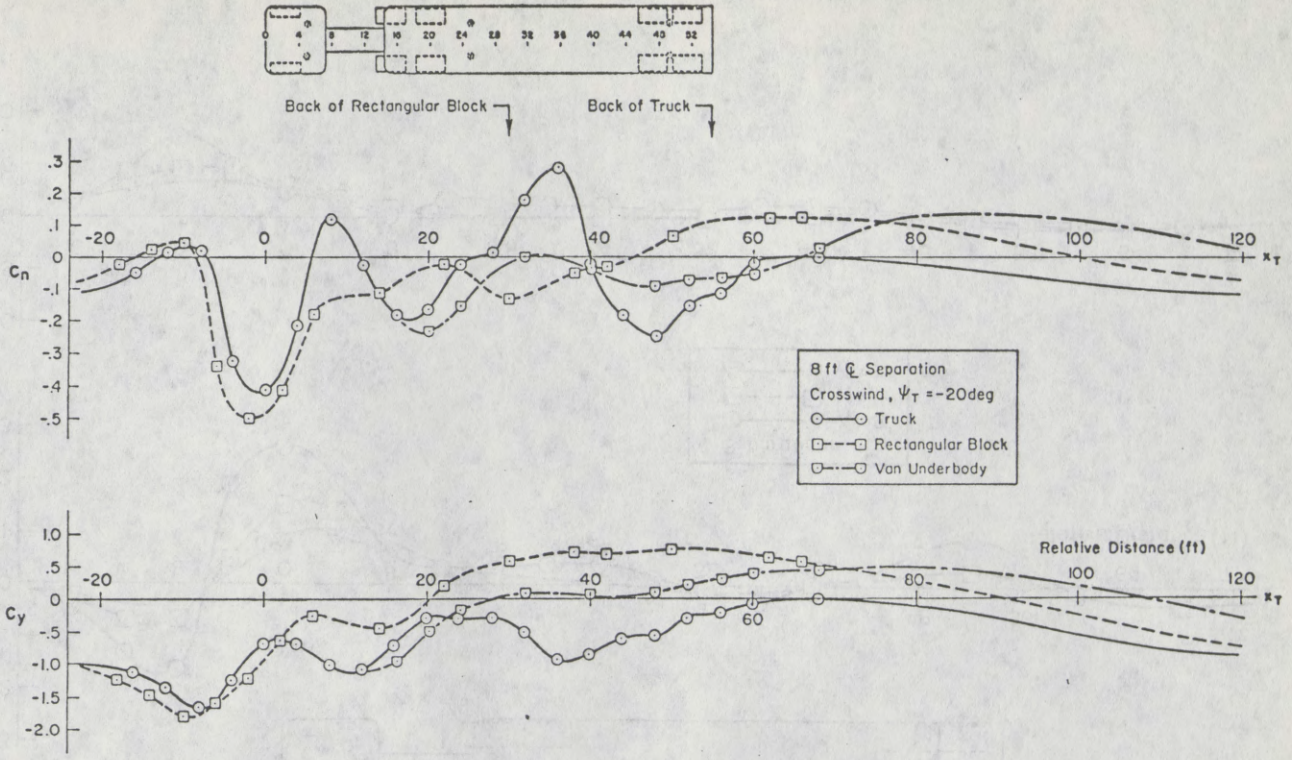


Figure 33. Typical Crossflow Wind Tunnel Data

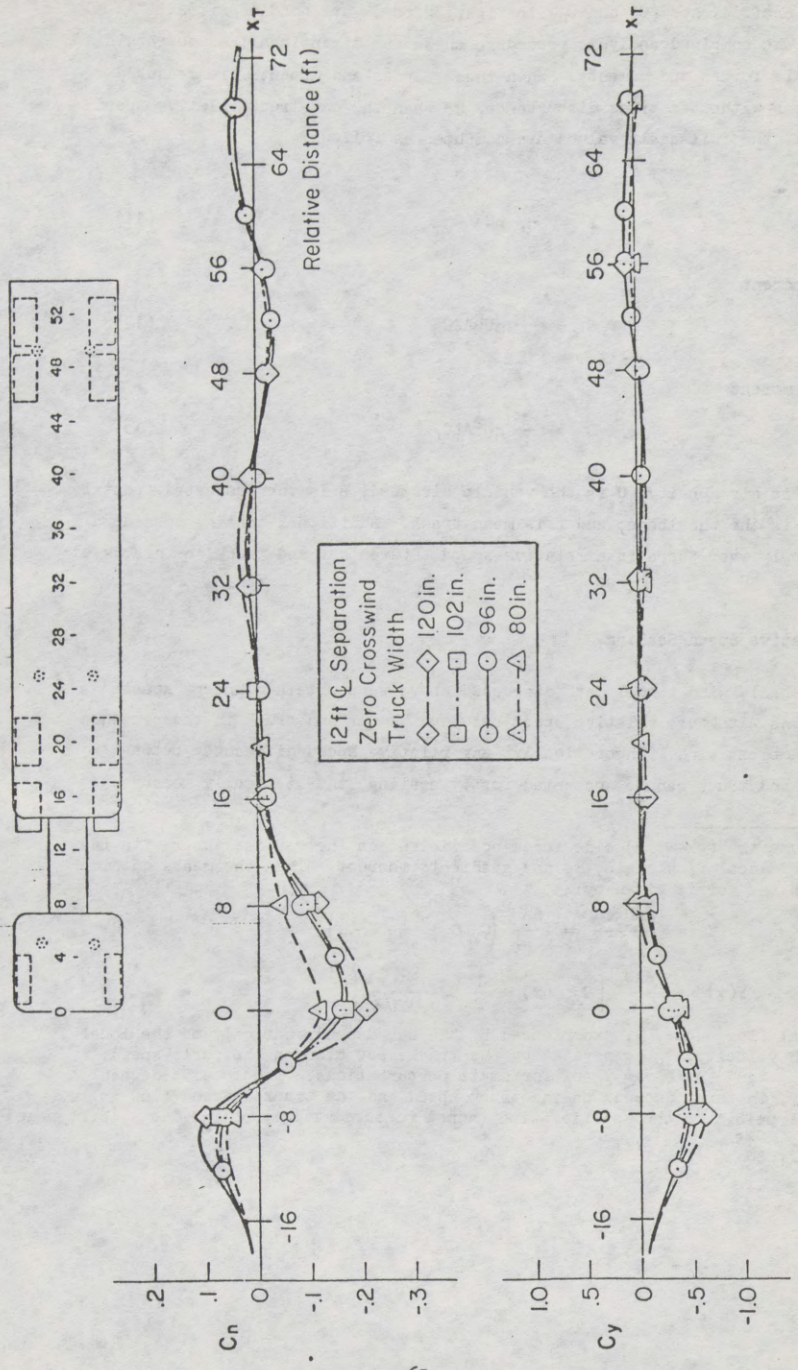


Figure 34. Typical Wind Tunnel Data Showing Effect of Truck Width

71-954 O - 72 - 14

The coefficients (C_y and C_n) in Figs. 32 to 34 are nondimensional. As part of the combined analysis procedure these are dimensionalized to obtain full scale forces and moments. When these forces and moments are measured on the car without a truck disturbance, or when the car-truck relative speed is small, the full scale values are computed as follows:

Side force

$$Y = \frac{1}{2} \rho U^2 A C_y \tag{11}$$

Yawing moment

$$N = \frac{1}{2} \rho U^2 A \ell C_n \tag{12}$$

Rolling moment

$$L = \frac{1}{2} \rho U^2 A t C_\ell \tag{13}$$

where ρ is air density, U is the vehicle airspeed, A is the projected frontal area, ℓ is the wheelbase, and t is mean track. Additional scaling considerations apply when there is a relative speed between car and truck, as discussed below.

4. Relative Speed Scaling

The basic wind tunnel data discussed above were obtained under "static" conditions with zero relative speed between the car and truck in the presence of the ambient wind. Theoretically, any relative speed difference between the car and truck can be accounted for by scaling* the statically measured

---

*Assume the (example) side force coefficient on the car is linear with the disturbed local flow angle, β, and gradients thereof. Then the measured side force on the car is given by:

$$Y = \frac{\rho A U_c^2 C_Y}{2} = \frac{\rho A U_c^2}{2} \left(C_{y_\beta} \beta + \frac{\ell}{2U_c} C_{y_{\dot\beta}} \dot\beta \right)$$

$$Y(x) = \frac{\rho A U_c^2}{2} \left[C_{y_\beta} \beta(x) + \frac{1}{2} C_{y_{\dot\beta}} \frac{\partial \beta(x)}{\partial x/\ell} \right]$$

The local flow angle, β, experienced by the car depends not only on the local sidewash velocity, v_o, generated by the truck, but also on the car's speed; i.e., $\beta = \tan^{-1}(v_o/U_c) \doteq v_o/U_c$ for small perturbations. The local sidewash velocity, in turn, depends on the truck speed and the truck-induced flow angle, $\beta_c(x)$, implicit in the "static" wind tunnel measured values of C_y; i.e., [next page]

forces and moments. The result is that first order relative speed effects were accounted for by using a composite dynamic pressure containing the product of the car and truck airspeeds to compute full scale forces and moments from the model scale data.

To test the practical validity of these theoretical scaling procedures; some limited experiments were accomplished in the small MIT wind tunnel. These experiments consisted of measuring the forces induced on a small (1/25-scale) Chevrolet station wagon model by a (reflection plane) half model rectangular block propelled rapidly upstream through the wind tunnel test section along one wall. The block was also fixed to the wall at various locations relative to the car to obtain static measurements for comparison with the Northrop wind tunnel data.

The results obtained are compared in Fig. 35, where the side force coefficient (C_y) is based on conventional usage of the wind tunnel dynamic pressure. The static force ($U_T/U_c = 1.0$) results obtained in both the Northrop and MIT tests compare quite favorably, despite a rather large difference in Reynolds' Number and test technique. Perhaps there are compensating effects; however, the absence of any appreciable Reynolds' Number effect is consistent with the Northrop wind tunnel results down to $Re = 1.0 \times 10^6$ (as noted previously).

Of most pertinence to the question of relative speed scaling are the single- and double-flagged points in Fig. 35, which represent near maximum values of C_y obtained for relative speed ratios of 1.135 and 1.293 respectively. These points show values of C_y greater than the static value by ratios of 0.44/0.40 = 1.10 and 0.52/0.40 = 1.30. These ratios are very close to the theoretical ratios, based on the composite dynamic pressure,

---

in general $v_o = U_T \tan \beta_o(x) \doteq U_T \beta_o(x)$. Accordingly, $\beta(x) \doteq v_o/U_c = (U_T/U_c)\beta_o(x)$; e.g., increasing the car's speed relative to the truck's reduces the sidewash flow angle seen by the car. Substituting for $\beta(x)$ in the above expression for Y, gives:

$$Y(x) = \frac{\rho A U_c U_T}{2}\left[C_{y_\beta}\beta_o(x) + \frac{1}{2} C_{y_{\dot\beta}} \frac{\partial \beta_o(x)}{\partial x/\ell}\right] = \frac{\rho A U_c U_T}{2} C_{y_o}(x)$$

where $C_{y_o}(x)$ is the wind tunnel measured value at zero relative speed as e.g., in Fig. 32. Therefore to theoretically account for first order relative speed effects simply requires the application of a "composite" dynamic pressure, based on the product of car and truck air speeds, to the basic force and moment coefficients measured in the wind tunnel.

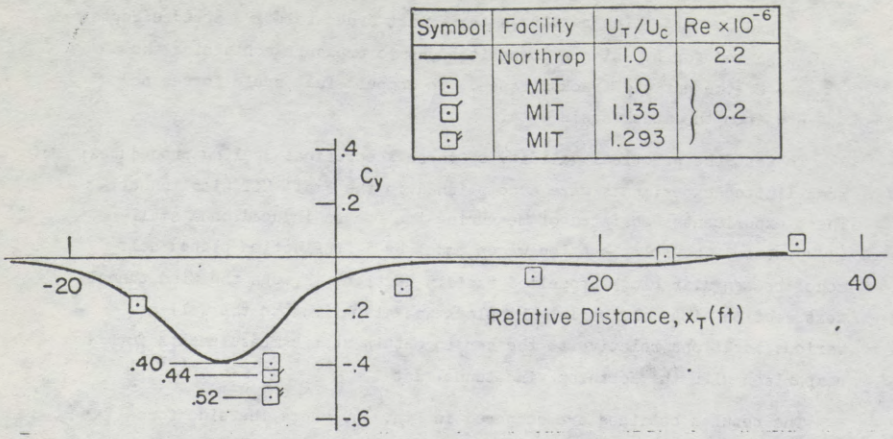


Figure 35. Effects of Relative Car-Truck Speed on Measured Side Force; Zero Crosswind, 10 Ft ℄ Separation

which corresponds to the values of U_T/U_c ($= U_T U_c/U_c^2$) shown in Fig. 35 and noted above.

This relative speed scaling procedure is valid over the nominal range covered in the results in Section II. It tends to break down for limiting cases, such as with one vehicle stopped or with car and truck traveling in the opposite direction. In these cases other procedures are needed.

C. FULL SCALE EXPERIMENTS

The full scale experiments were designed to supplement the more definitive wind tunnel experiments and car/driver analyses. The objectives of the full scale tests were to:

- Help define the wind tunnel test requirements
- Verify the wind tunnel flow field properties
- Measure driver psychophysiological response
- Verify wind tunnel based analytical response and performance predictions
- Demonstrate the overall results.

Experiments were conducted at the Kern County Airport No. 7 in Mojave, California. This test site features an abandoned runway (maneuvering area) and two lane perimeter roads which are closed to public use. The test site is well suited for this work, because of good weather conditions and strong, steady ambient winds which typically prevail during the afternoon hours.

1. Test Vehicles and Instrumentation

The vehicles used in the tests were the full scale counterparts of the standard truck and car wind tunnel models; a 1970 Chevrolet Brookwood station wagon, a 1967 3-axle Peterbilt 86 in. cab-over-engine tractor with a 186 in. wheelbase, and a Strick 2-axle 40 ft x 13 ft 6 in. insulated dry freight van semitrailer. These are shown in Figs. 36 and 37.

The test car (station wagon) was instrumented* with the following sensors:

- Steering wheel angle potentiometer (δ_{sw})
- Heading rate gyro (r)
- Roll rate gyro (p)
- Lateral accelerometer (a_y')
- Front wheel tachometer (car speed, U_c)
- Car-truck lateral separation "feeler" mounted on roof (y_I)
- Vector vanes to measure relative wind direction ($\angle WV$) and velocity ($|WV|$) mounted on the roof and in front of the car (see Fig. 37)
- Event marker

For certain runs, the following driver psychophysiological variables were measured (as detailed subsequently):

- Heart rate (ECG)
- Passive limb muscular tension (EMG)
- Breath flow (BF)

The car also contained signal conditioning electronics, power supplies, and strip chart and tape recorders.

*The same basic instrumentation package was used under Contract FH-11-6145, and additional details are given in Ref. 3.

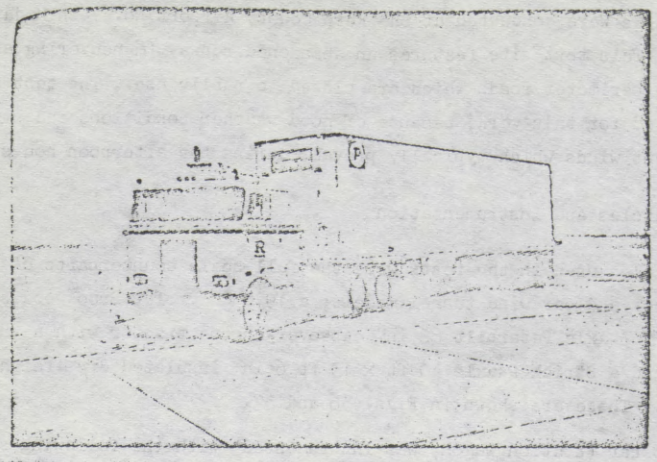


Figure 36. Standard Truck Used in Full Scale Tests

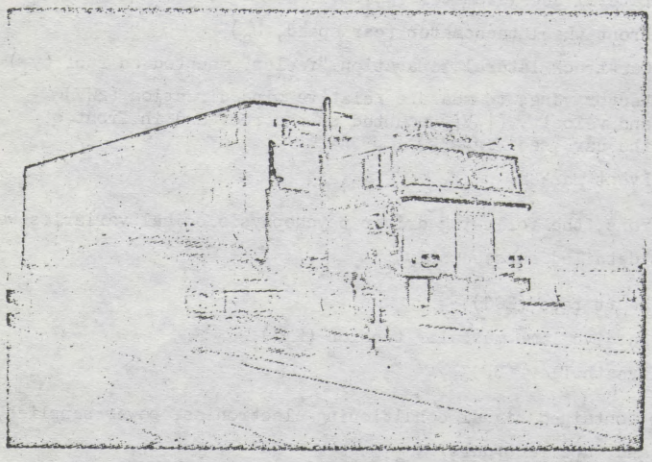


Figure 37. Standard Car and Truck Used in Full Scale Tests

The truck instrumentation consisted of a boom mounted vector vane (see figs. 36 and 37) to measure the relative wind velocity and magnitude, together with associated power supply, conditioning electronics, and two channel strip chart recorder. A pair of short range transceivers permitted communication between the car and truck during the tests.

Considerable effort in the full scale tests was directed towards obtaining car/driver dynamic response data for comparison with the wind tunnel based analytical results. Some difficulties were encountered with proper operation of the lateral feeler and with "noise" in the recorded signals.

Problems with the feeler occurred because it tended to be blown back due to the car's velocity, keeping it from touching the truck. Stiffening the spring restraints caused it to bounce when the truck was contacted. Further stiffening and damping to avoid this might have resulted in structural failure. Despite these problems, sufficient data were obtained with the feeler to help verify the analytical results, and to demonstrate the overall feasibility of using a feeler-type sensor in these kinds of tests.

Some of the recorded signals were noisy. The accelerometer response contains structural vibration which is easily filtered to retain the basic car motion quantity desired. Minor tape recorder dropouts occurred at some points in some runs due to vibration and motion of the tape recorder. The resulting glitches are easily identified as such on the response records, and can be eliminated.

In addition to using the feeler, the lateral deviation of the car was computed by double integrating the lateral acceleration signal. Since the truck proceeded, undisturbed, in the center of its lane, this also gave the lateral separation between car and truck. The double integration results were only approximate because the accelerometer was body-fixed rather than inertially stabilized, but the errors are small (on the order of 10 to 15 percent). This method was used in the full scale data comparisons shown subsequently.

2. Test Procedures

Most of the tests were run on the two lane airport perimeter roads since this permitted a wide range of relative wind angles and road conditions; and

provided realistic situations for close proximity passing of car and truck. The perimeter roads had a paved surface about 24 ft wide with soft shoulders. There was very little crown or grade, and the tangent test sections were approximately 1 mile in length. The curves at the end of the test sections could be negotiated at about 35 mph. An adjacent abandoned runway was available for tests which involved larger lateral path excursions than available on the two lane roads (e.g., investigation of car dynamics with fixed steering wheel, and car-truck passing situations with lowered car rear tire pressures).

A typical test sequence consisted of the following events:

- Car and truck stop at beginning of test section to communicate nature of next test run and speeds of car and truck
- Start recorders
- Measure ambient wind with vehicles stopped
- Truck accelerates to predetermined fixed speed, in center of own lane
- Car accelerates to predetermined speed in adjacent lane and overtakes and passes truck
- Experimenter in car keys event marker as center of car passes both rear and front of truck
- Subject driver concentrates on maintaining given lateral position in own lane (closed loop steering control) during overtaking and passing situation
- Car and truck stop at end of the course
- Measure ambient wind with vehicles stopped
- Note comments on run.

Other tests included truck overtaking car, and car-truck oncoming encounters.

3. Psychophysiological Measurements

The psychophysiological measurements on the driver were designed to quantify the "stress" involved in the truck disturbance encounters. Of the various physiological correlates that can be used as indirect measures

of stress level (Refs. 16 and 17), heart rate, breath flow, and passive leg neuromuscular tension were selected because they are relatively simple to obtain and have shown good correlation with the stress of manual control tasks in previous research (Refs. 18 and 19).

The instrumentation setup was arranged to be simple, convenient, and unencumbering to the driver. The sensors applied to the driver were connected to amplifiers via flexible, light weight wires; and the amplified signals were recorded on tape for future analysis. The details of the various measures are given below:

Electrocardiogram (ECG) and Heart Rate. The ECG was measured with sternum electrodes. This location gives freedom from movement artifacts, good signal due to proximity to the heart, and it is commonly used in research. The lower electrode was placed just above the xiphoid process and the upper electrode on the manubrium. A high gain amplifier was used to amplify the ECG signal. The low frequency cutoff was set at 1 Hz and the high frequency cutoff at 1 KHz. The resulting ECG signal has good signal quality and provided a strong R-wave spike for the heart rate measurement.

Heart Rate. The recorded ECG signal was replayed off line through a cardiac tachometer, driven by the R-wave leading edge. The resulting derived heart rate signal was recorded along with the ECG and car/driver response instrumentation signals.

Electromyogram (EMG) Measurements. As a measure of general body muscle tension the EMG activity of the gastroc nemius muscle on the (inactive) left leg was measured. Bipolar electrodes were used with a separation of approximately 1.25 inches. The electrode voltage was amplified with a gain of 100,000, and tape recorded.

Mouth Ground. This consisted of a twisted loop of tinned copper bus wire placed over the subject's lips and under his tongue to effect a stable, centrally located ground reference for the ECG and EMG measurements. Its use yielded low sensor noise yet it was easy to install and comfortable to wear. (A subject could talk without noticeable artifact.) The mouth ground also served to keep the subject's mouth closed which encouraged nasal breathing and therefore more reliable breath flow measurement.

Breath Flow. A measure of nasal breath flow with mouth closed was obtained using a simple nasal thermistor. The differing average temperatures of inspired and expired air provide two asymptotic temperatures for the thermistor and varying flow rates give a corresponding (nonlinear) change in

the temperature between these two extremes. These changes in thermistor temperature were transformed into a breath flow voltage signal using a simple resistor bridge circuit. The voltage signal was then amplified and tape recorded.

The tape recorded signals were of good quality and free from artifacts such as ignition noise and the subject's driving movements. As with previous research (Refs. 18 and 19) all three measurements tended to show similar responses to the stress associated with the truck disturbance control task: increased heart rate, increased breathing rate and increased EMG activity. Also the height of the ECG R-wave was modulated by breath flow as noted in previous research (Ref. 19), which made the breath flow and ECG measurements somewhat redundant.

Based on preliminary results, the ECG was selected as the best overall measure of stress, especially when processed to furnish a derived heart rate; and breath flow and EMG were not used during the later experimental runs. Typical full scale test data, including ECG and heart rate traces, are shown and discussed subsequently in Fig. 40.

D. COMPARISONS BETWEEN FULL SCALE AND ANALYTICAL RESULTS

A major use of the full scale measurements was to verify the model-scale wind tunnel data, and the corresponding car/driver response and performance estimates. Selected full scale results, obtained as discussed above, are here presented in their most meaningful form, to provide the desired comparisons and verification.

1. Flow Data Comparison

Full scale and model scale flow properties were measured using the car model probe and the corresponding forward mounted full scale vector vane. An example comparison is given in Fig. 38. The car at 60 mph is passing on the downwind side of the truck which is going 45 mph. The free stream crosswind relative to the truck was approximately -4 deg, while the ambient crosswind was about -40 deg at 10 ft/sec. The basic time traces are the full scale vector vane angle ($\measuredangle WV_1$) and velocity ($|WV_1|$). Overlaid, in the region of the truck, are the wind tunnel flow probe measurements. The comparison is seen to be very good. This serves to confirm the basic

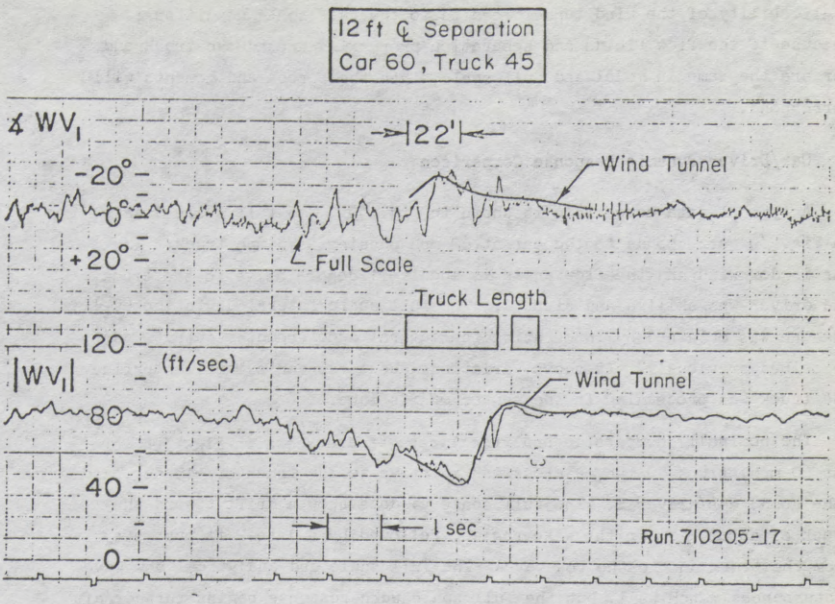


Figure 38. Full Scale and Wind Tunnel Flow Data Comparison; -4 Deg Crosswind Angle

applicability of the wind tunnel results to the full scale conditions; because if the flow fields and separation properties around the truck and car are the same in model and full scale, then the forces and moments will correspond.

2. Car/Driver Dynamic Response Comparison

A typical data comparison is shown in Fig. 39. The full scale data in Fig. 39 corresponds to the car at 62 mph passing a 45 mph truck. The car is downwind and the flow angle is about −11 deg relative to the truck. The driver was skilled and alerted. The full scale lateral deviation (y_I) measure was obtained by integrating the lateral accelerometer output, as described previously. It shows variations about the car's lane centerline. The truck was proceeding in the center of its lane.

The nominally comparable analytical results are shown in Fig. 39b for car 60 mph, truck 50 mph, a crosswind relative to the truck of −15 deg, and (the good) car/driver E. The full scale y_I data show a drift toward the truck of about 2 ft in the wake region, followed by a 1 to 2 ft push away from the truck due to the bow wave. The full scale and analytical bow wave disturbances match well, but the full scale wake response begins further aft of the truck due to variability in the real wind and/or initial car/driver misalignment in the lane. The somewhat larger amplitude of the full scale responses is due in part to the full scale ambient head wind component of about 13 ft/sec*. The lateral acceleration, heading rate, and steering wheel response traces; full scale and analysis; show similar dominant features in the vicinity of the truck, bearing in mind that the two plots are mirror images. The dominant period (peak to peak interval) in the lateral acceleration response alongside the truck is about 50 to 60 ft relative distance in both cases. The additional, lower amplitude random response which persists throughout the full scale data is due, of course, to added random disturbances and variability in the real world. It results from such things as turbulence in the ambient wind, roadway irregularities, and additional (uncorrelated with the truck disturbance) driver steering response (modeled as remnant in the operational description of

*As described in Section II, this would amplify the lateral deviations by about a factor of 1.4.

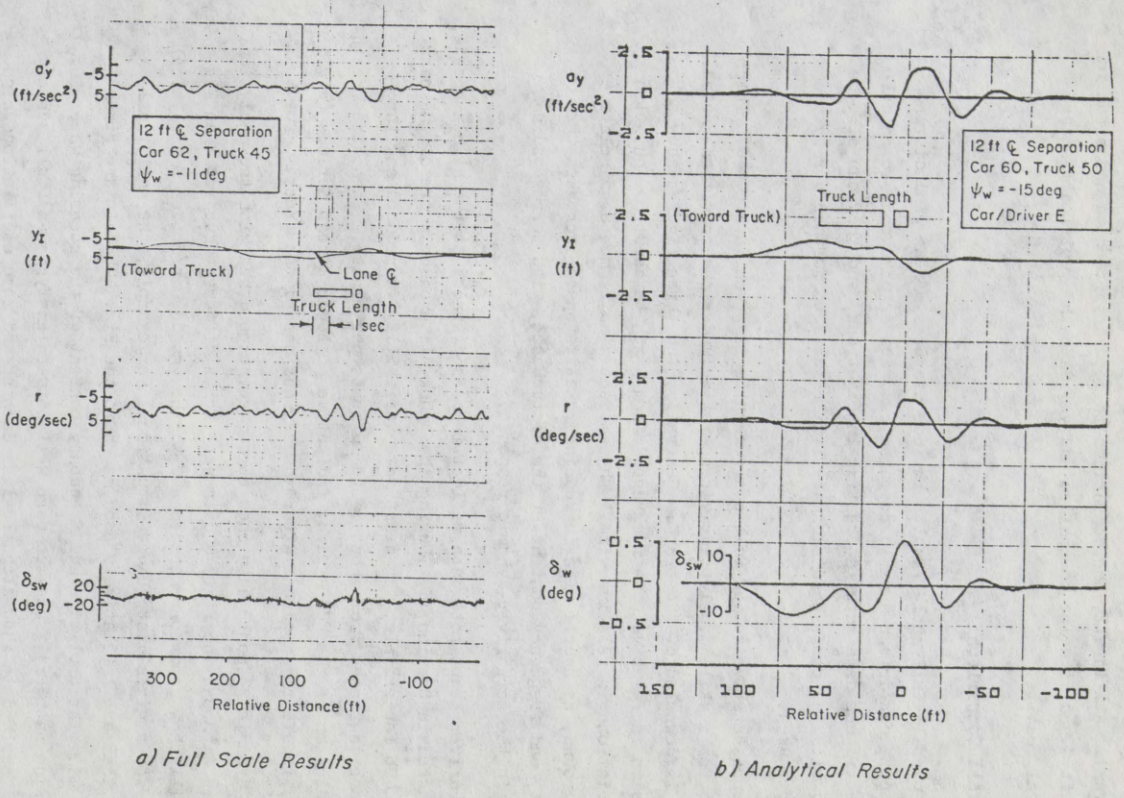


Figure 39. Comparison of Full Scale and Analytically Computed Results

the driver). All in all, the comparison is good despite data and situation variability, and it helps to confirm and validate the empirically based analytical results.

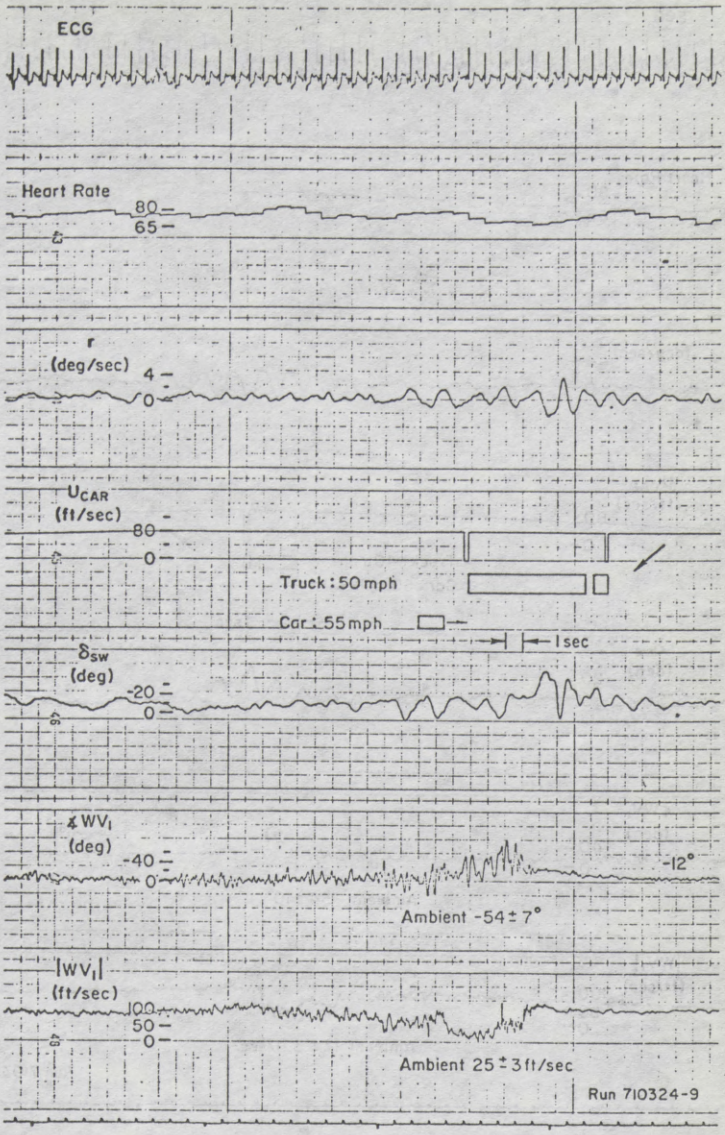
3. Overall Comparison

The overall full scale results include measures of the wind disturbance input, car/driver dynamic response, and driver psychophysiological response. These data show interesting interactions, and they can also be compared with the corresponding analytical results to further verify the procedures used.

A representative set of full scale results is given in Fig. 40. These data are for a skilled, alert driver operating under the conditions noted. The car is downwind of the truck. Generally, the three figures show a progression in relative car-truck speed from 5 mph to about 20 mph, with some variations in relative wind. The ambient wind is measured relative to the ground, as usual. The increasing relative speed increases the intensity and frequency content of the disturbance, with corresponding changes in the car/driver dynamic response.

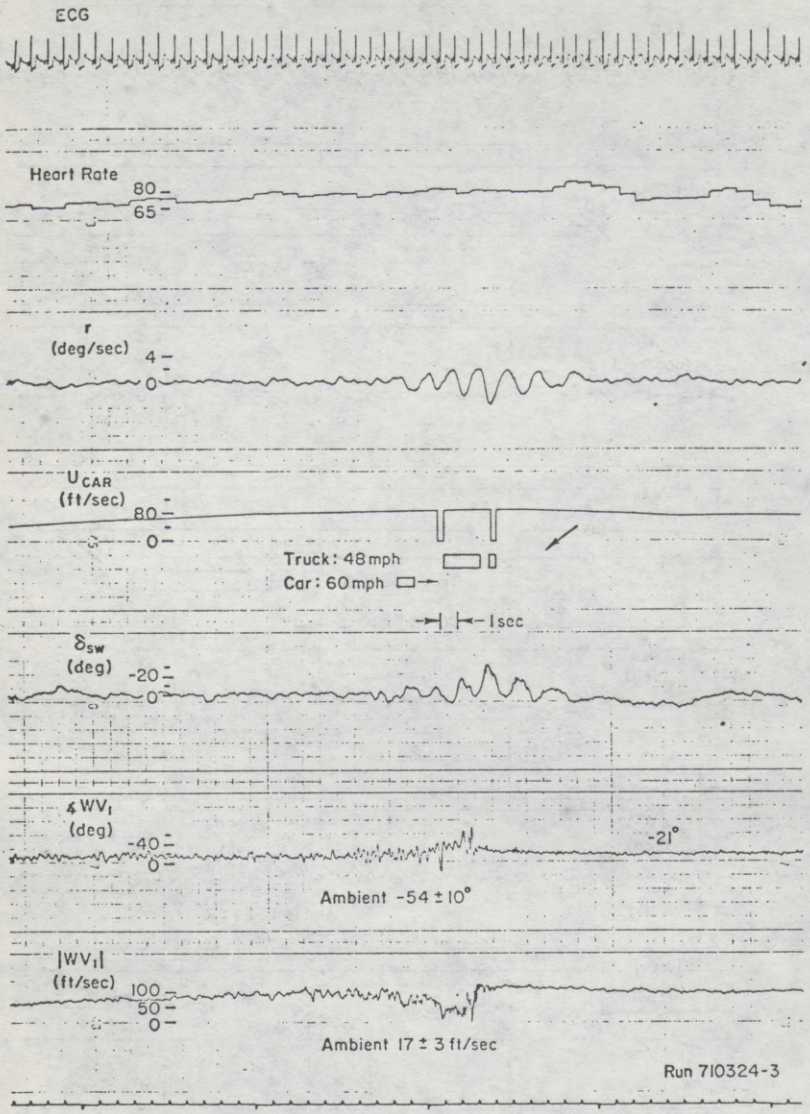
The driver heart rate data reflect increased stress at the higher speeds, as discussed in Section II. During the truck disturbance phase of the pass in Fig. 40b for example, the heart rate variability is reduced and the heart rate increases from about 65 to 80 beats per minute. Then, the breathing modulation of the ECG R-wave, indicative of lower stress periods (e.g., Ref. 9), is clearly apparent after the car has passed the truck.

The dynamic response data show a good correspondence with the analytical results. Although the Fig. 40 data were for a different subject than Fig. 39a, they still show good correspondence with the (good) car/driver E analytical results for a given disturbance situation. For example, the analytical results that are a relatively good match to the Fig. 40b data are given in Fig. 41. The amplitude and frequency content of the steering wheel (δ_{sw}) and heading rate (r) traces compare well between analysis and full scale. The full scale data show slightly less damping and more oscillation which suggests a somewhat higher gain than car/driver E, but the differences are



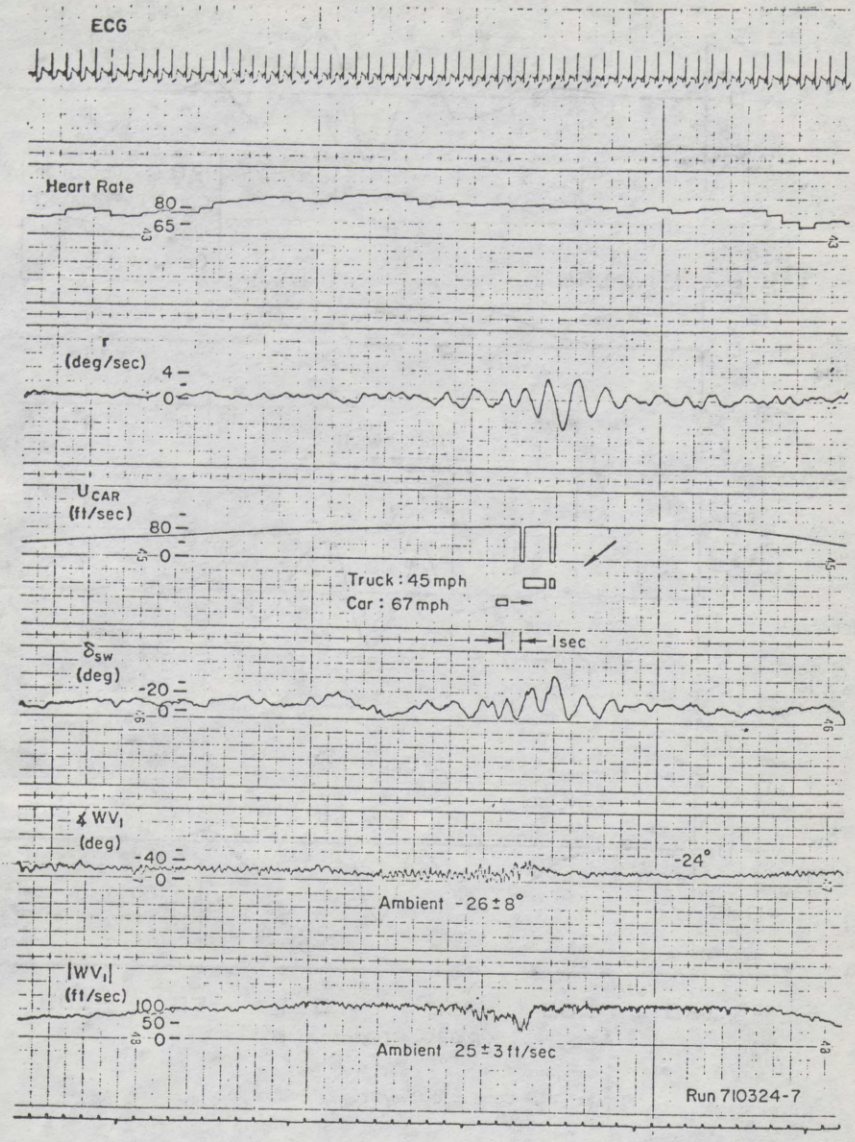
a) $\Psi_W \doteq -10$ Deg, $U_C - U_T \doteq 5$ MPH

Figure 40. Full Scale Data Comparison



b) $\psi_W \doteq -20$ Deg, $U_C - U_T \doteq 10$ MPH

Figure 40 (Continued)



c) $\Psi_W \doteq -20$ Deg, $U_c - U_T \doteq 20$ MPH

Figure 40 (Concluded)

71-954 O - 72 - 15

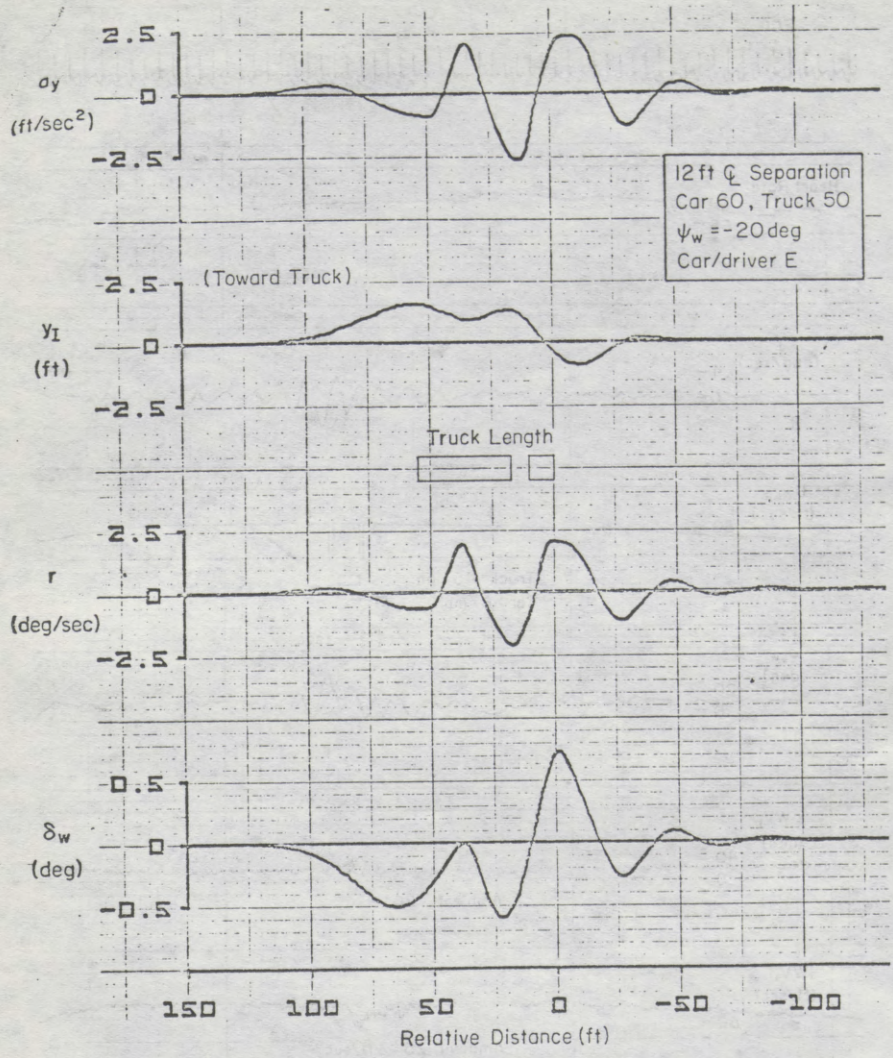


Figure 41. Computed Car/Driver Response

small. This somewhat higher gain actually degrades performance, as discussed in Appendix A. The additional random car/driver response, previously discussed, is present in Fig. 40 also. Other differences between Fig. 40 and Fig. 39 reflect differences in style of the two test drivers.

REFERENCES

1. Weir, D. H., C. P. Shortwell, and W. A. Johnson, Dynamics of the Automobile Related to Driver Control, Systems Technology, Inc., Tech. Rept. TR-157-1, July 1966. Also SAE Paper No. 680194.

2. Weir, David H., and Duane T. McRuer, Driver Control During Overtaking and Passing, Systems Technology, Inc., Tech. Rept. No. 157-2, Dec. 1967.

3. Weir, David H., Frederic R. Alex, and Robert F. Ringland, Driver Control During Overtaking and Passing Under Adverse Conditions, Systems Technology, Inc., Tech. Rept. No. 174-1, May 1969.

4. 1970 Automobile Facts and Figures, Automobile Manufacturers Association, Detroit, Michigan, 1970.

5. "Vehicle Weight and Dimension Limitations," Hearings before the Sub-committee on Roads of the Committee on Public Works. House of Representatives, Ninety-first Congress, First Session on H.R. 11870... H.R. 11619, 1969.

6. Taragin, A., "Driver Behavior as Affected by Objects on Highway Shoulders," Proc. 34th Annual Meeting of the Highway Research Board, Vol. 34, Jan. 1955, pp. 453-472.

7. Michaels, Richard M., and Lee W. Cozan, "Perceptual and Field Factors Causing Lateral Displacement," Public Roads, Vol 32, No. 11, Dec. 1963, pp. 233-240.

8. Beauvais, F. N., Aerodynamic Inputs to a Parked Vehicle Caused by a Passing Bus, SAE Paper No. 700037, Jan. 1970.

9. Kalsbeek, J. W. H., and J. H. Ettema, "Sinus Arrhythmia and the Measurement of Mental Load," Communication at the London Conf. of the Brit. Psychol. Soc., Dec. 1965.

10. Weir, David H., and D. T. McRuer, "A Theory for Driver Steering Control of Motor Vehicles," Road User Characteristics, Highway Research Record No. 247, 1968, pp. 7-28.

11. Weir, D. H., and Charles K. Wojcik, Simulator Studies of the Driver's Dynamic Response in Steering Control Tasks, Paper presented at the 50th Annual Meeting of the Highway Research Board, Jan. 1971.

12. Weir, David H., and Duane T. McRuer, Measurement and Interpretation of Driver-Vehicle System Dynamic Response, paper presented at Sym. on Psychol. Aspects of Driver Beh., Noordwijkerhout, Netherlands, Aug. 1971.

13. Larrabee, E. Eugene, Small Scale Research in Automobile Aerodynamics, SAE Paper No. 660384, June 6-10, 1966.

14. Goetz, Hans, The Influence of Wind Tunnel Tests on Body Design, Ventilation, and Surface Deposits of Sedans and Sport Cars, SAE Paper No. 710212, Jan. 11-15, 1971.

15. Romberg, G. F., F. Chianese, Jr., and R. G. Lajoie, Aerodynamics of Race Cars in Drafting and Passing Situations, SAE Paper No. 710213, Jan. 11-15, 1971.

16. Morgan, Clifford T., Physiological Psychology, McGraw-Hill, N.Y., 1965, 3rd Ed.

17. Brown, Clinton C., Ed., Methods in Psychophysiology, Waverly Press, Baltimore, 1967.

18. Benson, Alan J., Jo H. F. Huddleston, and John M. Rolfe, "A Psychophysiological Study of Compensatory Tracking on a Digital Display," J. Human Factors Society, Vol. 7, No. 5, Oct. 1965, pp. 457-472.

19. Jex, H. R., and R. W. Allen, "Research on a New Human Dynamic Response Test Battery, Part I. Test Development and Validation, Part II. Psychophysiological Correlates," Paper presented at 6th Annual Conference on Manual Control, AFIT, Wright-Patterson AFB, Ohio, Apr. 7-9, 1970, (STI P-96).

20. Hirsch, K., Preliminary Tymshare Edition of Conversational Continuous System Modeling Program (CCSMP) User Manual, Tymshare, Inc. Informal Documentation, 1970.

APPENDIX A

DETAILS OF THE COMBINED ANALYSES

This appendix outlines the techniques used to compute the closed loop car/driver time responses for various car-truck disturbance situations. The overall flow chart of this process is shown in Fig. 42. The wind tunnel force and moment coefficient data, properly scaled, act as forcing functions for differential equation and describing function descriptions of the car/driver system. These equations are integrated on a time sharing digital computer using the Continuous System Modeling Program (CSMP). The resulting time responses are plotted at a computer terminal for ease in assessing the safety performance measures. The appendix concludes with an investigation of the effects of varying the car/driver response properties.

Aerodynamic Disturbance Data

The basic wind tunnel data provide normalized side force (C_y), yawing moment (C_n), and rolling moment (C_ℓ) coefficients; as functions of the lateral separation (y_T), the longitudinal car-truck location (x_T), the truck configuration, and the crosswind direction (ψ_W) relative to the truck. The basic moment coefficients are referenced to the ground plane at the midpoint of the wheelbase, and these are translated to the car center of mass for purposes of analysis. Examples of these data are plotted in Figs. 32 and 33. The disturbing (input) aerodynamic forces and moments are computed as if the car trajectory relative to the truck were at a fixed y_T. The aerodynamic disturbance data used are therefore tables of C_y, C_n, and C_ℓ as functions of x_T; with a separate table for each combination of truck configuration, nominal lateral separation, and wind direction. These tables have entries for every four feet of x_T. Intermediate points in the less variable regions are interpolated as necessary. For steady ambient crosswinds (nonzero values of ψ_W), the steady crosswind values of C_y, C_n, and C_ℓ are subtracted from the data, and the disturbance data $C_y(x_T)$, $C_n(x_T)$, and $C_\ell(x_T)$ actually represent perturbations in these quantities from the free stream (no truck disturbance) values.

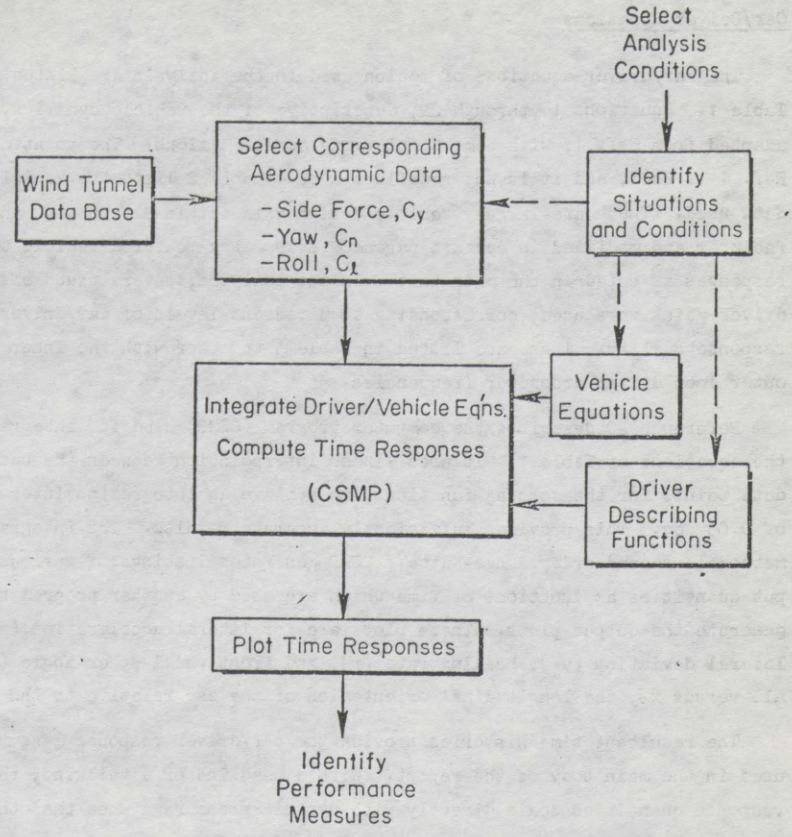


Figure 42. Combined Analysis Flow Chart

Car/Driver Equations

The car/driver equations of motion used in the analysis are listed in Table 1. Equations 14 through 22, descriptive of the vehicle dynamics, are adapted from Ref. 1, with some simplifying approximations. The notation of Ref. 1 is used, and it is not redefined here. Table 2 lists the vehicle data used. These are largely vehicle design data obtained from the manufacturer and modified in certain parameters to match measured vehicle time responses as noted in the main text. In the analyses, several sets of driver gains were used, corresponding to different levels of car/driver response quality. These are listed in Table 3 together with the inner and outer loop driver crossover frequencies.

Reference 20 describes the computer program (CSMP) used for integrating the equations of Table 1. It uses linear interpolation between the basic data points for the forcing functions, to achieve an integration interval of 0.05 sec. This provides sufficiently accurate results. The integration method is second order Runge-Kutta. CSMP generates listings of various output quantities as functions of time which are used by another program to generate the output plots. These plots are for lateral acceleration (a_y), lateral deviation (y_I), heading rate (r), and front wheel steer angle (δ_w); all versus x_T, the longitudinal orientation of the car relative to the truck.

The resultant time histories provide the car/driver response measures used in the main body of the report. With a headwind or a tailwind, the response quantities scale directly with dynamic pressure q when the other parameters are fixed.

Variations in Car/Driver Response Properties

Degrading or improving the car/driver response properties from nominal produces the corresponding changes in path performance detailed in Section II. This variation in characteristics can result from equivalent changes in the car handling, the driver response, or both. Changes in driver response behavior provide an appropriate means for investigating such variations. Analytically one could vary driver gain, time delay, or equalization; again

TABLE 1

CAR/DRIVER EQUATIONS OF MOTION

Lateral Acceleration

$$a_y = \frac{2}{57.3m}\left(\frac{\partial Y}{\partial \alpha_1}\alpha_1' + \frac{\partial Y}{\partial \alpha_2}\alpha_2'\right) - \frac{m_s e}{57.3m}\dot{p} + \frac{qA}{m}C_y(x_T) \tag{14}$$

Lateral Velocity

$$\dot{v} = a_y - \frac{U_c}{57.3}r \tag{15}$$

Heading Acceleration

$$\dot{r} = \frac{2}{I_{zz}}\left(a'\frac{\partial Y}{\partial \alpha_1}\alpha_1' - b'\frac{\partial Y}{\partial \alpha_2}\alpha_2'\right) - \frac{I_{DZ}}{I_{zz}}\dot{p} + \frac{57.3qA}{I_{zz}}\left[\ell C_n(x_T) + \frac{a-b}{2}C_y(x_T)\right] \tag{16}$$

Heading Rate

$$\dot{\psi} = r \tag{17}$$

Roll Acceleration

$$\dot{p} = -L_p - L_\varphi\varphi - \frac{57.3m_s e}{I_\varphi}a_y - \frac{I_{DZ}}{I_\varphi}\dot{r} + \frac{57.3qA}{I_\varphi}\left[tC_\ell(x_T) + \ell\lambda C_n(x_T) - (h_f + \frac{\ell}{2}\lambda)C_y(x_T)\right] \tag{18}$$

Roll Rate

$$\dot{\varphi} = p \tag{19}$$

TABLE 1 (Concluded)

Effective Front Tire Slip Angle

$$\alpha_1' = \delta_w - \frac{57.3}{U_c} v - \frac{a}{U_c} r + \epsilon_1' \varphi \tag{20}$$

Effective Rear Tire Slip Angle

$$\alpha_2' = -\frac{57.3}{U_c} v + \frac{b}{U_c} r + \epsilon_2' \varphi \tag{21}$$

Lateral Deviation

$$\ddot{y}_I = a_y \tag{22}$$

Driver Steer Angle Response

$$\delta_w = K_{p_\psi}[-\psi(t-\tau_e) - K_{p_y} y_I(t-\tau_e)] \tag{23}$$

Dynamic Pressure

$$q = \frac{1}{2} \rho U_T U_c \frac{\sqrt{1 + \left(\frac{U_T}{U_c}\right)^2 \tan^2 \psi_I}}{\cos \psi_I} \tag{24}$$

Rate of Change of Relative Distances

$$\dot{x}_T = U_T - U_c \tag{25}$$

Subsidiary Relations

$$a' = a + \frac{\partial AT/\partial \alpha_1}{\partial Y/\partial \alpha_1} \qquad \epsilon_1' = \epsilon_1 + \frac{\partial \xi}{\partial \varphi_1} \frac{\partial Y/\partial \xi_1}{\partial Y/\partial \alpha_1}$$

$$b' = b - \frac{\partial AT/\partial \alpha_2}{\partial Y/\partial \alpha_2} \qquad \epsilon_2' = \epsilon_2 + \frac{\partial \xi}{\partial \varphi_2} \frac{\partial Y/\partial \xi_2}{\partial Y/\partial \alpha_2} \tag{26}$$

TABLE 2

VEHICLE DESIGN PARAMETERS*

SYMBOL	UNITS	VALUE
m	slugs	165.5
I_{zz}	slug-ft^2	4858.3
ℓ	ft	9.92
a	ft	5.86
a'	ft	5.788
b	ft	4.06
b'	ft	4.182
t	ft	5.28
h_f	ft	-0.01
λ	rad	0.096
A	ft^2	23.9
ρ	slugs/ft^3	0.002377
$m_s e/m$	ft	1.32
$m_s e/I_\varphi$	ft	0.2939
$I_{\varphi z}/I_\varphi$	—	0.360
$I_{\varphi z}/I_{zz}$	—	0.0636
$\partial Y/\partial \alpha_1$	lb/rad	7415.
$\partial Y/\partial \alpha_2$	lb/rad	13470.
ϵ_1'	—	0.160
ϵ_2'	—	-0.100
L_p	sec^{-1}	-2.935
L_φ	sec^{-2}	-62.5

*Test station wagon with instrumentation, driver and passenger.

TABLE 3

DRIVER DESCRIBING FUNCTION PARAMETERS*

DRIVER MODEL	CROSSOVER FREQUENCY		GAIN		REMARKS
	ω_{c_ψ} (rad/sec)	ω_{c_y} (rad/sec)	K_{p_ψ}	K_{p_y}	
A	2.3	0.4	0.56	0.25	60 mph nominal
D	1.5	0.2	0.42	0.13	60 mph degraded
E	2.3	0.9	0.56	0.57	60 mph optimum
I	2.1	0.5	0.50	0.29	70 mph nominal

*The driver's effective delay, τ_e, is a nominal 0.40 sec in all cases.

with similar effects from equivalent perturbations in time delay or gain, for example. Of these, driver gain is analytically convenient and this is the parameter varied in the following discussion.

For the standard car, the effects on path performance of changes in driver gain (response amplitude and alertness) are presented in Fig. 43. The three car/driver combinations labeled are summarized in Table 3. The performance is given in terms of both peak deviation (y_I) and integral absolute deviation $\overline{|y_I|}$, where

$$\overline{|y_I|} \equiv \frac{1}{T}\int_0^T |y_I|\,dt \qquad (27)$$

This approximates the standard deviation under some conditions, and provides an estimate of path variability. Peak deviation ($\hat{y}_I$) is more convenient to use, and the trends are similar in the region at and below the optimum.

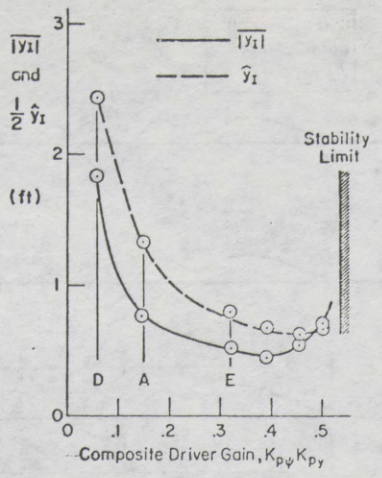
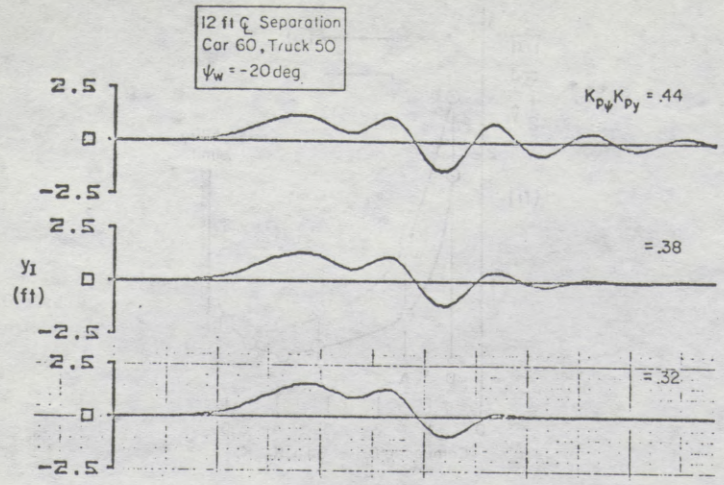


Figure 43. Effect of Driver Response on Performance: 12 Ft ℄ Separation, $\psi_W = -20$ Deg, Car 60, Truck 50

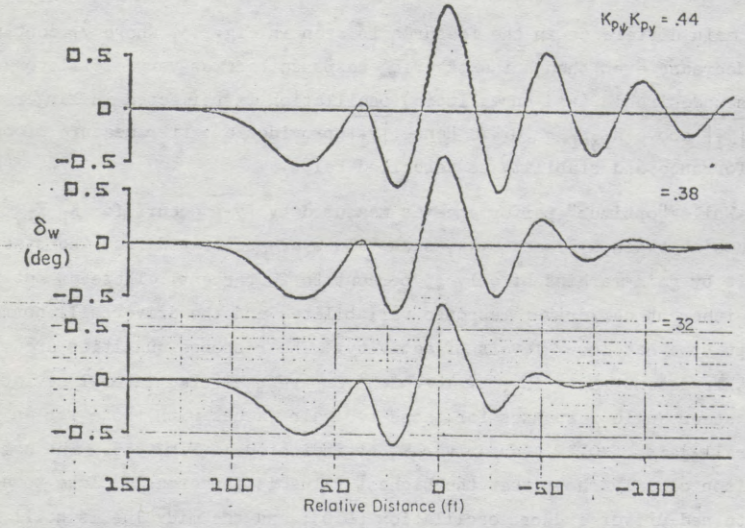
The main difference in the measures is seen in Fig. 43, where $\hat{y}_I$ continues to decrease even though the steering response becomes very oscillatory. This undesirable (and unrealistic) oscillation is reflected in larger values of $\overline{|y_I|}$ above $K_{p_\psi}K_{p_y} = 0.4$. Hence $\overline{|y_I|}$ provides a better measure of overall performance and stability as described below.

While "optimum" performance as measured by $\overline{|y_I|}$ occurs for $K_{p_\psi}K_{p_y}$ values* between 0.38 and 0.44, such values are separated from the stability limit by gain margins of only 35 percent to 20 percent. These do not allow for inherent car/driver response variability, and the driver will normally adopt somewhat lower levels of activity. The response qualities are further demonstrated in Fig. 44 which compares selected lateral deviation and steer angle responses for these two gain values with those for an overall gain of 0.32 (car/driver E, as indicated in Fig. 43). The comparison clearly shows that the highest value is dangerously close to a sustained driver induced oscillation (DIO); and the midvalue is still more oscillatory than is consistent with observed driver behavior (see earlier

*The value of K_{p_ψ} used here is referred to the steer angle, δ_w.



a) Lateral Deviation Responses



b) Steer Angle Responses

Figure 44. Computed Effects of Driver Gain Variation on Car/Driver Performance

parisons with full scale results). Furthermore, any decrease in driver time delay will make the response more oscillatory.* Hence, faster driver reactions or an increased level of effort will serve to worsen performance. In view of these considerations, car/driver E represents about the best that can reasonably be expected of an alerted experienced driver with this vehicle. The corresponding gain line in Fig. 20 passes about 1 dB above the peak; therefore, the system is both phase and gain stable and reasonably DIO resistant.

Car/driver A (Table 3) has about half of the car/driver E lateral deviation gain and a nominal gain margin of 6 dB (Fig. 20), which is comfortable for normal, relaxed operation. Figure 43 shows that it is on the conservative edge of the good performance minimum, and, therefore well suited as a nominal, typical case for investigating the effects of other situational parameters, as in Section II.

As a representative degraded case, car/driver D reflects not only a further reduction in outer loop (lateral deviation) gain, but also a departure from the inner loop characteristics shown in Fig. 19. As already mentioned, this combination has a dual character in that it can be either a "standard" car and a degraded driver, or a degraded car and a "nominal" driver (i.e., A). For the degraded driver, the product of outer and inner loop gains is that indicated in Fig. 43; and the standard vehicle characteristics used in Fig. 19 apply. However, the inner loop (heading angle) crossover frequency shown there is reduced to 1.5 rad/sec, by about a 25 percent

*These gain levels, which are roughly three times more than for car/driver A, would shift the amplitude crossover line on the frequency response plot of Fig. 20 down about 10 dB; the gain line would then pass below the amplitude ratio peak at about 3 rad/sec. The phase angle at this frequency is roughly −260 deg, so the system, corresponding to these higher gain levels, is phase rather than gain stabilized. This means that any reduction in phase lag will tend to decrease rather than increase the closed loop damping. For instance, if the high gain driver also utilizes modest lead equalization, corresponding to a time constant of about 0.5 sec, the phase lag at 3 rad/sec will be reduced by about 60 deg to around −200 deg. The resulting closed loop will have essentially zero damping. Similar consequences attend any reduction in the driver's effective time delay; and "trying harder," which usually means larger, faster reactions and anticipatory (leading) responses, will only worsen the driver control problem. This is a classic DIO prone situation.

reduction in Kp_{ψ}.* This increases the phase margin (to 50 deg) and correspondingly increases the closed loop damping coefficient (to about 0.17). In sum, the degraded driver can be characterized as relatively inattentive, and less responsive with reduced performance.

An alternate interpretation of car/driver D assumes that the car properties are degraded rather than the driver. One way this can be achieved is with the heavily aft loaded station wagon, as in Ref. 3. Comparing the standard with the loaded station wagons as given in that reference, shows that for the driver A nominal phase margin of 30 deg, the inner loop crossover frequency shifts from 2.0 rad/sec for the standard condition to 1.2 rad/sec for the loaded condition.† The resulting outer loop (lateral deviation) frequency responses, sketched in Fig. 45, show that for a given gain margin, relative to the peak amplitude, the crossover frequency for the loaded condition is about 0.4 times that for the base condition. A direct comparison of the important closed loop parameters in both versions of car/driver D relative to the nominal car/driver A condition shows that the changes‡ in both inner and outer loop crossover frequencies are about the same for either form of degradation. The additional inner loop phase margin and damping for the degraded driver, and the slightly better crossover ratios‡ imply that this case is, if anything, slightly better than the degraded car condition.

---

*In the resulting outer loop there is now, accordingly, less "peaking" around 3 rad/sec than in Fig. 20. However, the reduced outer loop gain characterizing the degraded driver (about half of car/driver A) is sufficiently low to completely avoid the peak; the resulting lateral deviation crossover frequency is 0.2 rad/sec.

†The corresponding closed loop frequencies for damping coefficients of about 0.10 (consistent with car/driver A's behavior in Fig. 19) are 2.9 and 1.9 rad/sec, respectively; and the associated first order poles are at about 2.0 and 3.3 rad/sec.

‡For the degraded driver the ratios of crossover frequencies are $1.5/2.3 = 0.65$ for $\omega_{c_{\psi}}$ and $.2/.4 = 0.5$ for ω_{c_y}; for the degraded vehicle they are $1.2/2 = 0.6$ for $\omega_{c_{\psi}}$ and $.16/.4 = 0.4$ for ω_{c_y}.

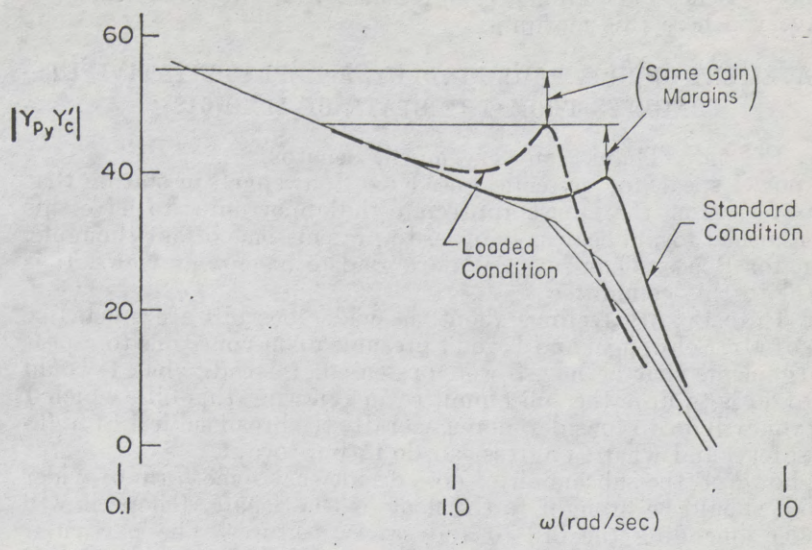


Figure 45. Outer Loop (Lateral Deviation) Comparisons Between Standard and Loaded Conditions

In closing this discussion of car/driver response properties, it is pertinent to note that changes other than to driver gain(s) could have been used. For example, the various levels of driver behavior could be characterized by changes in driver time delay or equalization. However, as already observed in connection with setting an upper limit on gain (car/driver E), projected "improvements" in these parameters do not always produce the desired improvement in performance, and vice versa. Moreover, the range of response properties obtained by the simple expedient of changing gains is more than adequate to cover the important aspects affecting performance in a truck disturbance environment.

71-954 O - 72 - 16

Senator Boggs (presiding). Congressman Findley, we are honored to have you here this morning.

STATEMENT OF HON. PAUL FINDLEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. Findley. Thank you very much, Senator.

I know I speak for my colleague, Fred Schwengel, in stating that those of us from the House appreciate the opportunity to have this distinguished forum hear us in order to present some of our thoughts.

Senator Boggs. Thank you. We are glad to have your views. It is helpful to this committee.

Mr. Findley. My feelings about the wider bus bill are much like those of Mr. Schwengel and I won't presume upon your time to repeat his arguments that he has so well presented. Instead, what I would like to do is to urge the subcommittee in rejecting this bill, which I hope you will do, to consider more generally the broad subject of highway safety, and what Congress can do to improve it.

If, however, the subcommittee does decide that some form of wider bus bill should be brought to the floor of the Senate, I hope it will consider amending the bill to add safety features. The particular amendment that I would like to suggest is one that would enhance the safety of buses regardless of their width.

This amendment is contained in a bill that I introduced earlier in the year, H.R. 10267, the Bus and Truck Safety Act of 1971, which would require that buses and trucks operated in interstate commerce be equipped with a tachograph, a recording instrument which provides a permanent record by chart of speed in miles per hour, distances traveled, the number and duration of stops, driver changes, and most important, an audible or visible signal indicating when the driver is exceeding a specific speed.

Mr. Chairman, I brought such a device to the hearing room today. It is not widely known in this country, although it has been required equipment in several foreign countries on taxicabs, trucks and buses. It could well be that Members of the Senate are not aware of its existence.

Senator Boggs. Is this an expensive item?

Mr. Findley. This item, I guess, could be called the deluxe model and it provides all of the functions that I just listed. By opening the face, a disk is readily placed in the device. It is then closed up and can be sealed so that any further opening of it will be clearly indicated. Then that chart inside the device operates to make this permanent record of speed, and miles per hour, distance traveled, and all of the other facts.

The cost of this unit installed would be under $150. It could be close to $100. I think the price of the equipment not installed is under $100.

The experience in foreign countries, where the tachograph is mandatory equipment, shows clearly that these devices promote speed control, serve as a safety warning to drivers, and provide accurate records for owners, drivers, and law enforcement agencies.

Several States already have such laws or are considering them. This year bills that require a tachograph on all buses were introduced for the first time in Massachusetts, Connecticut, and Rhode Island.

For years tachographs have been mandatory equipment on all buses and trailer trucks using New York State roads. In my view, the tachograph should be mandatory on the present size buses and if this bill, which the subcommittee is considering, should pass, it will be even more important to have the instrument on the over-sized vehicles.

Except for occasional tragic schoolbus accidents, public interest and that of the press seem to focus more on trucks which use our Nation's highways rather than buses. Perhaps the primary reason for this is the fact that for every bus on the road, there are more than 50 tractor trailers.

Buses do have somewhat better accident rates than the trucks. Yet I am sure that most Americans have had the experience of driving on one of the interstate highways at the legal speed limit and being passed by a Greyhound bus, which very likely is also belching smelly exhaust fumes. I feel that the safety considerations apply equally to both trucks and buses.

At this point in my statement, I would like to present some data showing accidents and accident frequencies for buses and trucks.

(The information referred to follows:)

TOTAL ACCIDENTS AND ACCIDENT FREQUENCIES FOR BUSES AND TRUCKS, 1969, BUREAU OF MOTOR CARRIER SAFETY, DEPARTMENT OF TRANSPORTATION

	Buses	Trucks
Fatalities	91	1,953
Fatalities per 100,000,000 miles	6.0	10.92
Total accidents	2,014	47,877
Accidents per million miles	1.47	2.46
Injuries	3,103	24,106
Property damage	$3,032,000	$102,000,000

Mr. FINDLEY. A recent article in the National Observer entitled "Danger Rides With Big Rigs," tells a grim story. The Observer states that there is evidence that significantly large numbers of long-distance truck drivers take amphetamines and drink while driving. Many pilot seriously defective machines. Others force themselves to stay at the wheel after fatigue has made them dangerous. One truck driver who is concerned about the bad reputation of his fellow truck drivers has recently written a series of letters to me. Because he is afraid for his personal security as well as his job, he has asked to remain anonymous and, of course, I must respect his wish.

I can tell you, though, that this man has received a National Safety Council safe driver award for 16 years of driving without an accident. When he received the award, he had never had a traffic citation while driving a truck or his personal automobile. In 1969 the company for which Mr. X works established new work rules which, according to this truck driver, jeopardize the safety of everyone on the road.

Let me quote directly from one of his letters to me:

> Prior to the start of this present style of operation we were trained, instructed and required to not only obey all of the posted speed limits, but to be professionals in every sense of the word, defensive drivers. Quite often due to road and traffic conditions we had to drive at speeds far below the posted limits, with no thought of arrival time at our destination. Our single goal was to arrive safely with due consideration to ourselves, our cargo and the public.

Dispatch procedures were so arranged that drivers seldom ever approached the 70-hour maximum on duty time. This company has a group of drivers, all of whom have driven at least one million miles consecutively without an at-fault accident. I think this group would agree 100 percent that control of speed was the single most (important) factor involved in reaching this milestone.

Every traffic survey ever taken would probably show that obedience to traffic laws reduces accidents. I would like to add that any professional driver worth his salt does not feel that he is exempt from these laws. Quite the contrary, if he should become involved in a serious accident, his very job may depend on his ability to prove that he was obeying all of the traffic laws including the legal speed limit, or less if traffic and road conditions should dictate.

It is a fact of life that once that truck rolls out onto the highway the only man responsible for its safe operation is the driver. He can even be held responsible in a court of law, receive a jail term or heavy fine for negligent operation, including excessive speeding.

In the last two years I have been told on several occasions in very subtle terms that if I do not violate the posted speed limits I could jeopardize my job. I have been with this company (almost 20) years. All of my future security, retirement and other fringe benefits are dependent upon keeping this job. Other big companies do not make a practice of hiring castoffs from other big companies.

I complained very strongly to DOT, BMCS, (Department of Transportation, Bureau of Motor Carrier Safety) and the only result was that somehow the company learned of my complaints and again in very subtle terms I was told that I could very easily be replaced.

So now when the boss says speed, I speed. To hell with the public, to hell with the law, ice, snow, or fog be dammed, sleepy, tired, or sick. Sometimes I do this with 45,000 pounds of high explosive military cargo. Would you like to share the road with me on these occasions?

This company has learned its psychology lesson very well. Certain drivers, new on the job and anxious to please the boss are very willing to risk their all and drive in this manner, thus placing added pressure on those who are more conscientious. They are openly praised as examples of what we can do if we just apply our talents.

Mr. FINDLEY. Then he describes in detail one of the two accidents in which he personally was involved after this new policy was established by his company:

It's 12:30 a.m. on a cold, lonely road in the mountains. The traffic is very light, almost non-existent. I'm rolling along at the legal speed, about 50 mph, sort of bored by inactivity but concerned that I must make [my destination] as the dispatcher has already said that it would be advisable. A brisk wind is blowing from left to right, but since the highway is bare and dry, this is not a problem. A car is approaching toward me. Suddenly there is a strong gust of wind, the car crosses the center line and comes at me head-on. The highway shoulders are wide and paved at this point so I instinctively steered to the right to avoid contact, as I had always been taught to yield the right of way to avoid a collision. As the car goes by I glance in my mirror to see that he gets safely by the rear of my trailer, which he does. When my gaze returns to the front I am headed straight for a small, concrete bridge. I steer violently to the left, but the rear trailer wheels contact the bridge and damage the running gear of the trailer and it is disabled. I was verbally disciplined for this, as I was supposed to know that I had to have a piece of the other auto to verify my story. I received an official reprimand, by registered mail, stating that if I should be involved in any more such accidents I would be subject to discharge or suspension. By labor agreement this letter is good for a period of 9 months. They were not concerned that I had perhaps saved myself or the auto driver death or injury, but that they had no second party to pay the few dollars damage to our equipment. Thus for the next nine months I was to make sure that if a similar situation should develop I must be prepared to accept a head-on collision before hitting a fixed object or leaving the roadway. I could be forced to become involved in an accident in order to keep my job. I like my job but I do not feel like dying for it. Besides, I don't know if I could ever drive again if I thought someone had died because I had failed to do everything in my power to prevent the accident.

Mr. FINDLEY. Mr. X says that the Bureau of Motor Carrier Safety has the power to regulate many of these abuses now but he asks do they have the backbone? I am yet hopeful that I can persuade Mr. X to personally come to Washington to present his story before an appropriate congresional committee. It is indeed a great pity that in this day some Americans are still afraid to tell the plain unvarnished truth.

The cost of installing tachographs on buses is not at all prohibitive. As I stated in answer to Senator Boggs' question the total cost to purchase and install the devices would be well under $150 per vehicle.

Surely this is a small price to pay for an instrument which greatly improves safety on the road and would be invaluable in establishing more reasonable safety traffic laws and regulations.

Had a device like this been required equipment on the trucks which Mr. X has been operating, it would have provided police officers with a detailed record of the speed that vehicle had been traveling for the past number of miles. There could have been no way to alter it without the alteration being quite plain.

I am confident the subcommittee will consider the serious safety implications of the bill before them. I hope that if you do act on this bill, you will make an attempt to improve it so perhaps it can be renamed the "safer bus bill." Most important, I do hope that at an appropriate time the subcommittee will consider the broader question of safety on our Nation's highways.

It is a sad but true fact that each year more Americans are killed on our Nation's highways than died at the height of the Vietnam war, and although the Vietnam war and American casualties have been reduced, the slaughter on our highways still continue at a frightening pace.

Senator BOGGS. Thank you very much, Congressman, for a very fine and interesting presentation. I imagine that your legislation, if enacted, would require the company to report every so often the record from the tachograph to the ICC or some other public agency.

Mr. FINDLEY. I would think that would be a logical procedure. In any event, there would be required to be on file a complete record of the operation of each vehicle.

Senator BOGGS. At each company for inspection?

Mr. FINDLEY. That is right, so if there should be need for the information, it would be readily available.

Senator BOGGS. It is a very interesting approach. I am sensitive myself to the problems of the driver who wrote to you. It is unfortunate that he has to have an experience like that. I would say, though, that if that is the policy of his company, it won't be in business very long. People won't do business with it, and the ICC, and the State, wherever it is licensed, would catch up with the facts, and it would soon be out of business.

Mr. FINDLEY. That, of course, is possible. In the meantime it could cause a great anguish to a lot of innocent people.

Senator BOGGS. I would also doubt that it could get insurance; some of these big insurance companies would shy off from it. They have their own cars going around tailing these trucks, I understand.

Mr. FINDLEY. Yet I am sure you, like myself, have had the experience

of being on the finest interstate highways driving at the speed limit, and being passed by buses as well as big transport trucks, and as long as there is no officer within sight, they get by with it.

If an accident occurs, there is no way to establish whether they were exceeding the speed limit or not, whereas with this device, if an accident occurred, the bus or truck would have a record within the vehicle which likely would survive the worst collision, and be subject to inspection, and admission as evidence in court.

Senator Boggs. You point out that the State of New York has required this for several years. Do they require it only on trucks that are registered in New York, or on all trucks that travel on New York highways?

Is it for buses and trucks?

Mr. Findley. It is required on all buses and trucks that operate within the State on State highways.

Senator Boggs. Thank you very much. The committee appreciates your appearance.

The next witness is Mr. de Lorenzi, managing director of government and public relations, American Automobile Association.

STATEMENT OF JOHN DE LORENZI, MANAGING DIRECTOR, PUBLIC AND GOVERNMENT RELATIONS, AMERICAN AUTOMOBILE ASSOCIATION, ACCOMPANIED BY CHARLES N. BRADY, DIRECTOR, HIGHWAY DEPARTMENT, AND JAMES J. GUDINAS, TRANSPORTATION ECONOMIST

Mr. de Lorenzi. Thank you, Senator. I have with me Charles N. Brady, director, highway department, and Mr. James Gudinas, transportation economist for us.

Senator Boggs. Very good. We are pleased to have you, gentlemen, and appreciate your taking the time to be here.

Now, you just proceed as you wish, sir.

Mr. de Lorenzi. Thank you, Senator. My name is John de Lorenzi and I appear before you today to register the American Automobile Association's opposition to H.R. 4354, a bill which would permit an increase in the width of motor buses operating on the interstate system from the present 96 inches to 102 inches, exclusive of safety devices.

The American Automobile Association has long opposed Federal legislation that would permit wider, longer and heavier vehicles. The legislation before you today is the same proposal for increasing vehicle widths as was contained in S. 2658, a bill considered and recommended by this committee in 1968.

Public outcry and editorial indignation killed that bill as well as H.R. 11870 and H.R. 11619 in 1969. The AAA opposed enactment of these provisions in the past and we oppose the enactment now for the same reasons.

When we appeared before this subcommittee in 1968, we expressed the very real fear of the motorist in passing the trucks and buses that are now on the highways. Consistently, in a biennial survey of AAA members, buses and trucks have loomed large as a concern of the motorist. It was reaffirmed in our latest survey which was published in

October of this year. And Congressman Schwengel also added some data to that.

In our earlier testimony we raised the question of whether increasing the size and bulk of large vehicles, and hence the wind resistance and suction effect, would increase the hazard for passenger car drivers.

Our earlier observations about the blast effect of large vehicles are borne out by a recent study prepared for the Department of Transportation by Systems Technology, Inc., of Hawthorne, Calif. This study investigated the effect on automobiles of truck blast and was conducted using actual on-the-road and wind tunnel tests.

We believe the results also are applicable to buses. A summary of the study appeared on page E12831 of the Congressional Record of December 2, 1971. Senator Bayh referred to this study earlier.

The researchers found that auto drivers encountered a substantial blast effect when attempting to pass a large truck. Under a no-wind condition, a standard-size station wagon traveling at 70 miles per hour, while overtaking and passing a truck traveling at 65 miles per hour, was blown away from the truck to within 6 inches of the lane edge.

This occurred on a roadway having 12-foot traffic lanes with a truck combination 96 inches wide. With a 20 mile-per-hour crosswind, the station wagon traveling at 60 miles per hour was sucked to within 18 inches of the truck traveling at 55 miles per hour.

In cases where the semitrailer was of the van underbody type, such as a moving van, and a 20 mile-per-hour crosswind existed, the suction was computed to be sufficient to result in zero clearance between the vehicles with a high possibility of collision. It is apparent to us that a truck with a low van underbody is similar in configuration to a bus.

This study raises a whole new set of questions about the traffic mix of cars, trucks, and buses on our highways even if no width increases are permitted. About 88 percent of our primary system of highways is composed of two-lane roads and about 60 percent of the rural primary highways have traffic lanes less than 12 feet wide.

These are the roads that often would have to be used by the proposed monster buses to get on and off the Interstate System. Certainly, these and other implications in the study indicate that existing 96-inch-wide trucks and buses are incompatible with other vehicles on the highways.

Rather than considering increasing sizes, we ought to be examining what steps might be required to improve the present situation, even if that means reducing the size of existing trucks and buses. To take any steps which would lead to even wider vehicles at this time would be most imprudent.

It is our understanding that both the Federal Highway Administration and the National Highway Traffic Safety Administration are sponsoring research programs on the possible effects of increasing bus widths to 102 inches. Included in the research are studies on aerodynamic disturbances, characteristics and effects; lateral placement, lateral stability, off-tracking, and accident data analysis. Significantly, this research will not be completed and available until late 1972.

I believe Congressman Schwengel said it looked like 1973 at this point.

AAA suggests that it would be wiser to legislate after the study results are known rather than to proceed as is called for in this bill. This precedent setting legislation would increase the widths of buses if it were not vetoed by the Secretary of Transportation.

He is given this unusual power in the eventuality that the still to be made studies show 102-inch buses would constitute a highway safety hazard. We find it hard to accept the principle of legislate first and study later.

We feel that the Congress should retain its prerogatives and responsibilities by requiring the studies to be completed, evaluated, and reported to it before considering such important legislation. The Secretary of Transportation should not be granted veto power over the legislation. If it is a bad bill, it shouldn't be passed.

Bus industry representatives claim that the major reasons for requesting this increased width are to provide greater comfort and safety for their passengers.

We might observe that one of the new bus configurations proposed by industry representatives, while having the same seating capacity as present buses, provides a 30 percent larger cargo capacity. This is highly significant.

The Texas Transportation Institute of Texas A. & M. University reported in 1971 in its publication, "The Role of the Texas Mass Transportation Commission," that revenues from express shipments for Greyhound Bus Lines have increased 75 percent over the last 5 years while passenger revenue increased only 13 percent during the same period.

Express shipments now total some 13 percent of Greyhound's transportation revenues whereas 5 years ago they totaled only 10 percent. That approval of a wider bus is important to the continued growth of this sector of the company's business is best illustrated by the statement in the 1970 annual report of the Greyhound Corp.

> Our 102-inch-wide Supercruiser bus, with increased package-carrying capacity, began operation in additional areas of the nation under State authority. It is now running in New York and California, the nation's two most populated states, and in Canada. Authority to operate this safety-engineered vehicle on Federal interstate highways is being awaited.

The company itself chose to emphasize its package-carrying capacity rather than the passenger comfort factor.

During the floor debate in the House on H.R. 4354, the issue was switched from interstate operations, which is what the bill is really about, to a debate on intracity or transit buses.

Repeatedly, proponents of the legislation referred to environmental improvements that the wider bus would bring. So, the issue evolved to where a vote for the wide bus was portrayed as a vote to cut pollution, congestion, and automobile use. We hope this issue will not become muddled here. We are talking about bus operations on the Interstate System, not in the city.

The size of buses in the city is a separate issue. Since the majority of large cities already allow 102-inch buses under the grandfather clause of the 1956 Highway Act, enactment of this legislation would affect relatively few additional cities.

However, let us examine this particular issue for a moment. The argument that wider aisles, or even wider seats, on transit buses will

lure people out of their autos is highly suspect. Studies of the declining passenger use of bus systems in many of the cities that allow 102-inch buses do not support these claims.

We feel that convenience, speed, and pricing are the primary considerations that would cause a commuter to choose bus transit over the private auto.

A wider aisle also is being touted as an added benefit for commuters. It seems to us that the prospect of standing in a wider aisle, besides being the most unsafe place to ride in a bus, will attract few people.

For these reasons, we feel that this bill will have little or no effect in reducing urban traffic congestion. In fact, experiments are underway to demonstrate that some transit buses should be made smaller instead of larger to provide maximum maneuverability and greater speed in taking people where they want to go.

It was brought out in the debate on the House floor that some proponents considered the 102-inch bus presently in use in some cities to be safe with no problems attributable to that width. We disagree.

For example, we have been informed that the Mass Transit Administration of Baltimore, Md., is no longer ordering 102-inch buses because of problems with these larger buses on crowded city streets.

An examination of the accident involvement rates for 102- and 96-inch buses in Baltimore shows the 102-inch buses being involved in 25 percent more accidents on a vehicle mileage basis.

The National Transportation Safety Board has recommended against any increase in vehicle sizes or weights. So has the National Society of Professional Engineers and the General Federation of Women's Clubs.

Just last month, the National Committee on Uniform Traffic Laws and Ordinances refused to accept a proposal by one of its subcommittees that the Uniform Vehicle Code be so modified as to permit 102-inch vehicles on highways where traffic lanes were 12 feet wide.

The AAA believes that this growing opposition to this legislation is an accurate reflection of the concern of many people, and organizations over the safety hazards posed by larger and wider vehicles on our highways.

Thank you, Mr. Chairman.

Senator Boggs. Thank you for a very fine presentation. I have some questions that I would like to ask. Is there any scientific verification or evidence that the blast effect from trucks would also be caused by buses?

Mr. de Lorenzi. I believe this was the point that Mr. Schwengel made—that these studies have been ordered and as we have said before, we feel that the evidence should be in before this bill is legislated. For example, in a letter which I have from the Department of Transportation, they say, very definitely, that the research programs include the study of blast effects as well as other safety aspects too.

We do not have the data at this time.

Senator Boggs. I am wondering about the relevancy of your comments where you discuss the present mix of trucks, buses, and cars on highways. Are you saying that buses and trucks of 96-inch width should be banned from present highways?

Mr. de Lorenzi. We are not necessarily recommending that now

but the point was made by Senator Bayh earlier that on the truck studies the increase in size did not make that much difference in safety.

But another way of putting it is that we have a very bad situation right now and larger vehicles will make it just that much worse. But we are not necessarily recommending a complete banning of large vehicles.

For example, on the New Jersey Turnpike, we participated in the investigation with the National Transportation Safety Board on that unfortunate multiple truck and auto crash on Thanksgiving 2 years ago.

One of the recommendations we made, and one made by the National Transportation Safety Board, was that the mix on that road be changed by having lane restrictions on large vehicles where there were three lanes or more because studies made on the northern part of the turnpike where restrictions were in effect show that this did reduce the number of accidents and they have now extended this further down the turnpike.

Senator BOGGS. I asked that question because you said in your statement that 96-inch-wide trucks and buses are incompatible with other vehicles on the highways.

Mr. DE LORENZI. That seemed to be the implication.

Senator BOGGS. Have you sponsored technical studies of your own on the comparative hazards of 102-inch vehicles as opposed to 96-inch vehicles other than surveys of driver subjective attitudes?

Mr. DE LORENZI. No; we feel this would be much less biased if it came from the Government.

Senator BOGGS. Thank you. Now, you express doubt that more comfortable and wider seats on buses would attract additional commuter traffic in urban areas. However, testimony yesterday stressed a need for more comfortable seating for passengers on longer bus routes.

Do you doubt that better seating might be a factor that would attract additional passengers on longer trips, say from Washington to New York or to St. Louis?

Mr. DE LORENZI. I think the factors we stated earlier as to the reason people take the buses are valid. Perhaps Mr. Brady can comment.

Mr. BRADY. I think one of the things that was brought out yesterday was the load factor on these buses is 40 percent which means that the present seats are not even 50 percent occupied.

So, in effect, the person has, in many instances, the full width of two seats and certainly adding 1 inch to his particular seat isn't going to make that much difference.

Senator BOGGS. Thank you. You suggest that the 102-inch bus is dangerous in city traffic. If this is so, why do so many urban transit companies now operate the 102-inch buses?

Mr. DE LORENZI. There are several reasons, one being the grandfather clause, but there have been no major studies made of this danger. We merely cited the record in Baltimore as an example and think there should be further studies.

Senator BOGGS. I know that AAA tries to represent the views of automobile users. But is it not in the best interest of drivers to reduce traffic congestion by making bus travel more convenient, comfortable, and popular?

Mr. DE LORENZI. Senator, the thrust of our argument was that we did not think this argument applies to this particular bill because that is city transit as opposed to interstate highway transit which the bill relates to and it would have no effect on the city transit.

Senator BOGGS. Do you support the use of highway trust funds for fringe parking areas?

Mr. BRADY. No, sir; we do not support the trust fund for fringe parking.

Senator BOGGS. Do you support the use of trust funds for construction of bus lanes?

Mr. BRADY. No, we do not, when they are for exclusive bus use.

Senator BOGGS. If AAA supports bus travel, not only for those who may not own cars or who may not want to drive long distances, but also to reduce highway congestion, would it not be logical to support construction of better facilities for buses including parking facilities?

Mr. DE LORENZI. Senator, I would like to make several comments on this. First, of all, I have a feeling whoever posed the question is really talking more about city or commuter type of traffic. In this bill we are talking about the interstate business and I don't think highway congestion is a major factor here.

The policy we have on the highway trust fund is not a policy lightly arrived at. All policies the AAA has and supports must be reviewed every year. They must be approved by the delegates to the annual meeting and the delegates must change them or reaffirm them. They do not go on year to year unchallenged.

Many of the things you have talked about have been considered but still AAA maintains this particular trust fund policy position. It was last reaffirmed at our annual meeting in New York city this past September.

Senator BOGGS. I assume AAA is opposed to wider and heavier trucks, as well as buses?

Mr. DE LORENZI. Senator, it is like Gertrude Stein said, "A rose is a rose is a rose." Whether a truck or bus, 102 inches is 102 inches is 102 inches.

Senator BOGGS. Do you have any figures on whether the width of the average automobile has increased or decreased snce 1956?

Mr. DE LORENZI. I am not sure I can answer that. Jim, do you have any information on that?

Mr. GUDINAS. No, I don't.

Senator BOGGS. I didn't know if there had been an increase or decrease, because of the increased use of small cars.

Mr. BRADY. We are getting more small cars on the roads now.

Senator BOGGS. There are a lot of minicars on the road.

Mr. DE LORENZI. Yes.

Senator BOGGS. Is there a significant difference in the disturbance when you pass a fast moving bus or truck in a normal size car, compared with a minicar? Does the minicar feel a much greater effect?

Mr. BRADY. This is something that would be speculation. The studies that are being done on the wide bus will bring this out although I think it is significant that in this study a popular-size station wagon was used. It would be my estimate that the handling of that vehicle would not be as adversely affected as if the vehicle were smaller such as a Volkswagen or a Volkswagen van type.

Mr. DE LORENZI. Correct me if I am wrong, but we understand from the Department of Transportation that a Volkswagen will be included among the models they are using in the bus tests, is that not correct, Chuck?

Mr. BRADY. That is correct.

Senator BOGGS. Mr. Chairman, we have heard some very interesting and helpful testimony. I have asked some questions and received good answers. I don't have any further questions. I thank you, gentlemen.

Senator BAYH (presiding). Thank you, Senator Boggs and I apologize to our distinguished witnesses for being temporarily absent because I had to testify before the Interior subcommittee on one of my bills.

I understand that Senator Boggs has already dealt with the question on testing. I am anxious for the subcommittee to be able to nail this down and to separate fact from fiction. Anybody who has walked along a highway, had a flat tire or driven along the highway knows there is a tremendous blast effect from large vehicles passing.

Can you comment further on anything that has been done or is being done on this key question, namely, how much does the blast increase by adding 6 inches to the width of the vehicle?

Mr. DE LORENZI. We had discussed that, Senator, and the answer was, of course, they are doing studies. I also made the observation that while the truck studies showed the increased blast from 96 inches to 102 inches may not be too bad, the blast itself was tremendous. Another way of saying it is that we have a bad situation now and this will make it worse.

Mr. BRADY. I would like to supplement that a little bit. In questioning Mr. Schwengel, you addressed yourself to the material which appears in the Congressional Record and noted the statement here which is in center spread of this page E 12832 pointing out the effect of nominal truck widths increase is insignificant.

I believe you used those words directly from that statement. Dropping down another paragraph the study investigators say:

> With 10 or 12 foot lane widths these results imply that approximately 6 inch increase in center line separation (lane widths) is needed to offset the disturbance increment due to overall truck width increase from 96 inches to 102 inches.

Now, this deals with this truck study and as I understood this summary, the major part of the blast is what they identify as a bow wave. This comes from the front of the tractor. How similar the front of the truck tractor is to the front of a bus, may give us some clue as to what the relationship and impact of this blast might be.

We will find out that when the bus blast studies are completed late in 1972.

Senator BAYH. We will want to study those tests and all other evidence in greater detail. It doesn't seem to me to be revolutionary to suggest that if the width of a vehicle is increased 6 inches, approximately a 6-inch increase should be added to centerline separation. That is obviously the size of the enlarged vehicle.

We need to find out how much this increased width would compound the blast effect, if any. Also, there seems to be conflicting evidence as

to whether the space between the cab and the trailer of a truck would have a different impact than would a solid vehicle, such as a bus. Do you have any evidence which is different than what has been offered so far?

Mr. DE LORENZI. That is the reason we are awaiting the results of these studies.

Senator BAYH. Also, we need to know whether the length of the vehicle would compound the blast effect. Is the effect for a 40-foot vehicle the same with the 102-inch width as it would be for one 55 feet long?

We need to get answers to some of these questions. Has the AAA, which is recognized as the most vocal and continuous public lobby for citizens who use the highways, given sufficient thought to this problem? Have you made any substantial effort to inquire into the use of the wider buses now permissible in several States under the grandfather clause, and especially their use on highways that don't conform to standards of the Interstate System?

Mr. BRADY. We have not taken action on the grandfather clause within the cities. Once again the city problem is different from the interstate problem because city buses operate at roughly 20 or 25 miles an hour. You do not have this blast effect.

Senator BAYH. Of course, I am sure you know we are not talking about just the city problem. There are several States that permit wider buses to operate on Federal-aid highways, rural highways that are not interstate.

I am referring now not to the Interstate System, but to A–B–C or primary and secondary rural roads.

Mr. BRADY. Some of our affiliated clubs have appeared before State legislatures and have opposed increases in widths of buses or trucks.

Senator BAYH. But apparently not in favor of decreases in size. We have to move from where we are to where we are going, not conjure up some hypothetical impossibility. The tough fact to reconcile is that some States are now permitting these wider buses on a number of Federal-aid highways that are not nearly as capable of accommodating them as the Interstate System.

Mr. BRADY. One thing that creates a problem, Senator, is the fact that section 127 deals only with the Interstate System. It does not deal with Federal aid to highways as such. Only the Interstate System is covered in that section.

In 1969 the Department of Transportation among its recommendations suggested that whatever vehicle sizes and weight limits were established, be established for all Federal-aid highways and that the grandfather clauses be removed and that the sizes and weights apply to all States. It seems to me this is a very practical approach to this problem because the highway engineers have to know the size of vehicles for which they are building the traffic lanes.

If you have a situation whereby the traffic lanes are built to 12 feet and the industry comes in and wants wider, longer, heavier, bigger trucks, you quickly render obsolete your tremendous capital investment in highways if this is granted.

So just like an architect building a building, the highway engineer must know the parameters of the problems, the types of vehicles which

are going to be handled on that highway, generally the traffic counts, how frequently these large vehicles are going to be in the traffic stream, and so forth. If we keep changing the ground rules, we never will catch up in improving our highway plans.

Senator BAYH. Thank you very much, gentleman. We appreciate your testifying. I am sorry not to have been able to hear all of the testimony but I will read it with great interest.

Mr. DE LORENZI. Thank you, Mr. Chairman.

Senator BAYH. The next witness is Mr. Paul Van Roekel president, National Association of County Engineers and county engineer of Oakland County, Mich., accompanied by Mr. Warren G. Davison, county engineer for Cerro Gordo County, Iowa.

STATEMENT OF PAUL VAN ROEKEL, COUNTY HIGHWAY ENGINEER, OAKLAND COUNTY, MICH., ACCOMPANIED BY W. G. DAVISON, COUNTY ENGINEER, CERRO GORDO COUNTY, IOWA

Mr. VAN ROEKEL. Thank you, Mr. Chairman; I am Paul Van Roekel, county highway engineer for Oakland County at Pontiac, Mich. I have with me Mr. W. G. Davison, county engineer for Cerro Gordo County at Mason City, Iowa, who will make a brief statement after I complete mine.

We appreciate this opportunity to appear on behalf of the National Association of County Engineers, of which I am president. We are opposed to H.R. 4354, not so much for what it would permit at this time, but mainly because we fear an ever increasing avalanche of wider vehicles of all types on this Nation's entire 3.7-million-mile road system.

One-half of this road system is under county jurisdiction and, as a result, any change made on any other major part of the system may have a very detrimental effect to county roads.

We are convinced that if buses are allowed to expand to 102 inches on the Interstate System that other vehicles such as trucks and trailers will also soon be allowed similar widths. If this happens, nearly two out of three vehicles will suddenly be an extra 6 inches wider.

Needless to say, all such vehicles would have to travel on roads other than the interstate system and in the case of trucks they would be scattered on the entire county and local road system which is least able to safely accommodate them.

We recognize and sympathize with the need of cities and urban areas to reduce traffic congestion by some means. Perhaps better, more comfortable buses can help in that problem, and such vehicles are currently in use in most major cities. We therefore suggest that 102-inch buses be permitted on the urban sections of the interstate system only.

In these locales, speeds are normally reduced and number of lanes increased, thus somewhat reducing safety problems.

We are cognizant of the fact that this bill is highly restrictive at this time, in that it relates only to the interstate system, 12-foot lanes, is permissive to the States and contains a provision for safety study and regulation by the Secretary of Transportation.

It in fact, gives the Secretary veto power if he finds the 102-inch width to be more unsafe than the 96-inch width. It leaves the entire

issue to the Secretary, he can fail to act and thus let it become law, in spite of possible safety consequences.

On the other hand, he could pursue studies which might indicate that the 96-inch vehicle is a substantial hazard but that the 102-inch vehicle is an equal hazard, in which event the proposed law will still become effective.

Is it not more proper to order and review studies prior to formulating the law if there is a question? In the interest of time, I will not elaborate on the various problems which wide vehicles can cause on noninterstate roads, but we respectfully request that you consider this side of the issue.

Mr. Chairman, with your permission, I would like Mr. Davison to give the remainder of our statement.

STATEMENT OF W. G. DAVISON, COUNTY ENGINEER, CERRO GORDO COUNTY, IOWA

Mr. DAVISON. Mr. Chairman, members of the committee and guests. It is with great pleasure that I accompany Mr. Van Roekel on this mission for our National Association of County Engineers.

At the time of House hearings on H.R. 4354, little was available other than opinion and conjecture on the factor of aerodynamic disturbances on motor vehicles. In October of 1971 an executive summary report prepared for DOT on this subject was released.

This report by System Technology, Inc., and titled "An Experimental and Analytical Investigation of the Effect of Truck-Induced Aerodynamic Disturbances on Passenger Car Control and Performance" reveals that a change from 96- to 102-inches width on trucks would increase effects by around 5 percent.

(The report referred to was submitted as appendix IV to Congressman Schwengel's statement and may be found on p. 127.)

In the case of a 96-inch van type body their figures indicate impact between car and truck at a car speed of 60 m.p.h. and truck speed of 50 m.p.h. with a 20 m.p.h. cross wind. We don't have 3 inches of clearance to play with. The profile of a bus resembles that of the test vehicle and I would have to assume the result to be the same.

I do not present to be an expert in this field, but am alarmed by what I see in this report. I urge that you avail yourselves of expert testimony on the subject prior to enactment of the subject bill.

Substantial savings of time required between metropolitan areas has been realized by the commercial bus lines on the interstate system. Perhaps this inducement to patrons is adequate. Certainly travel time is a factor in use of commercial transportation.

It has been noted that House testimony of the FHWA, NSPE and the National Transportation Safety Board were in opposition. These are all highly impressive and authoritative and should merit our attention.

On November 30, 1971, at a seven State meeting—Minnesota, Iowa, Missouri, Kansas, Nebraska, South Dakota, and North Dakota—of county and State highway engineers, I polled those present for their opinion of increased dimensions of motor buses. They were opposed to the man, to such a bill.

In summary, we are opposed to H.R. 4354 for the following reasons:
1. We are fearful that the 102-inch width will become the standard for commercial vehicles of all types and that as such, use of roads far below the standards of the interstate system will be essential regardless of safety.
2. We believe that the urban mass transit problem can be materially aided by restricting use of wider vehicles to urban segments of the interstate.
3. We believe there is reasonable doubt of the safety of widespread use of the 102-inch wide vehicle and favor study before legislation.
4. We believe that the public is opposed to continual highway construction with the rotation of upgrading, antiquation and updating to permit use of larger vehicles.
5. It is a virtual certainty that if the allowance is made for motor buses that schools will avail themselves for the use of such buses for their routes. Such buses would be extremely hazardous if use were expanded to the secondary roads of the Nation.
6. Safety devices to reduce the blind area behind the vehicles should be developed prior to enactment.
7. The wider vehicle substantially reduces visibility of training vehicles, particularly if the height is increased.

We now have most of an interstate highway system completed. It has proven to be less accident-prone than any other system because it has been expected to carry the same vehicle as roads of lesser design. This fact alone should provide something to us.

Our older highways were built for something less than the vehicles currently using them; the interstate system has caught up to the vehicle. Shall we prepare now for a super-super system to facilitate even greater vehicles? Where do we stop this endless cycle?

Mr. Van Roekel and I will be glad to try and answer any questions you may have. Thank you.

Senator BAYH. Why is it that you are not as concerned about the use of the wider bus in urban areas as you are in the rural areas of the interstate system?

Mr. DAVISON. As we stated, Senators, the speeds of the vehicles are normally reduced in urban sectors. Urban speed limits in most cases are reduced by 15 to 20 miles per hour on all vehicles in urban areas in the States and this of course does reduce effects of wind and also gives better driver control.

In addition, we usually have a four-lane rural interstate system widening to a six- or eight-lane urban section within the urban limits. These things give us more opportunity for safety.

Senator BAYH. But there is also more intense use, much greater intensity, in the urban area as far as other competing vehicles, is there not?

Mr. DAVISON. That is true.

Mr. VAN ROEKEL. I would like to add that it might be like the New Jersey Turnpike where you have three- or four-lanes in one direction and the trucks and buses tend to travel in the right-hand lane, and you have more opportunity for cars and trucks, and buses to separate themselves than you do on just a two-lane rural interstate type road.

Senator BAYH. Let me ask either or both of you gentlemen this question. As far as county highway engineers are concerned, what is

the practice now in and around those cities that presently permit the use of 102-inch-wide buses? Do county officials, county ordinances, or State law prohibit the use of these buses for charter service out on the county roads involved?

Mr. VAN ROEKEL. I believe in some of the States the permissive law for the 102-inch width is strictly within an urban area, a defined area, and this has been true for a long period of time and we would have to assume that they have designed and built for this situation over a long period of time. There are relatively few States where that width is authorized statewide.

Senator BAYH. There are several States that apparently permit the use of these buses in intercity traffic on State highways. Laws have been passed by the State legislatures that permit their use, but the Federal law prohibits their use on the interstate system in most States.

I wondered whether these wider buses, which apparently can go from one city to another on primary roads, can also get out on the county roads?

Mr. VAN ROEKEL. We are aware there are a very few States that allow 102-inch buses statewide but a number of the States that do have 102-inch buses restrict those to urban areas only and they do not get out on what we might call the secondary or county road system.

Senator BAYH. Could you give me the benefit of your engineering expertise? I think, Mr. Davison, you mentioned there could be a 5-percent increase in the impact or gravity of the blast effect. In examining that record as a layman, it would not seem to make that much difference.

Mr. DAVISON. In basic dimension, I think they show in their table, Senator, varying amounts of deviation or effect. With the 102-inch vehicle, I believe they increase the effect for the same condition as would exist for 96-inch vehicles, which involves one-tenth of a foot more deviation.

Using the normal figure from their table of 2½ feet, that is how I came up with this 5-percent figure. In some cases it would show more where they show seven-tenth deviation for 96.

Senator BAYH. Is that a 5-percent greater danger to the car? In the 5 percent do you also consider the fact that interstate roads are usually wider?

Mr. DAVISON. With the roads we have today, 12-foot lane highway on the interstate, you are increasing the hazard, you are drawing these vehicles closer to the other vehicle or pushing them further away toward the edge of the pavement by about 5 percent more than you would with the 96-inch vehicle.

Senator BAYH. What is your judgment relative to the compounding effect, if any, that the configuration of a truck trailer test vehicle might have vis-a-vis a bus when computing the blast effect, because of the gap between the tractor and the trailer? Is that difference significant or not in engineering terms?

Mr. DAVISON. Of course, the study that you have had previously I believe says that there is no significant effect on passenger vehicles by the gap between the trailer and the cab because it is too high to effect the vehicle.

In other words, the effect caused by the gap is above the passen-

ger vehicle. So I think I would have to take what the study has come up with. They are the experts. They have run the tests and they have the results.

Senator BAYH. What significance should be placed on the length of the vehicle in determining the blast effect? I seem to remember from my study about 200 years ago, during a year of freshman engineering at Purdue, that total size could be important. Of course that is minuscule compared to the kind of engineering experience you gentlemen have had.

Does the 55-foot length increase the blast in comparison to a 40-foot-length bus or doesn't it? I don't know.

Mr. DAVISON. The study indicates that the main effect on the blast is the bow blast, which is the front of the vehicle. I think your possibility of collision, of course, would be more in the longer vehicle basically because of the fact that you have more exposure time alongside that vehicle.

Senator BAYH. More time to hit it?

Mr. DAVISON. Right.

Senator BAYH. What about the height and blast effect? As far as a passenger car is concerned, how does the height of a passing vehicle compound the blast, or doesn't it?

Mr. DAVISON. I think that the surplus area of the vehicle, of the passenger vehicle and its relative weight would have quite an effect. I don't know, but I have observed, and this is not from technical experience but from plain observation, that a driver, in following a Volkswagen or a lightweight vehicle, passing a semi or a bus, there you see a quick movement of that vehicle considerably out of its normal lane of traverse, and yet when you drive through the same blast you don't get nearly the same effect.

The feel, if your vehicle is a heavier vehicle, is considerably different. So I would certainly feel that the relative area of the vehicle, the surplus area to be affected by the air currents as opposed to its relative weight would be quite influential in its action.

Senator BAYH. Gentlemen, thank you very much. I think the subcommittee will have to pursue this question further with those who have been conducting these studies. Hopefully, when the Government witnesses testify, they can provide some first-hand information. We appreciate your taking the time to let us know what your objections are and what you personally believe about this subject.

Mr. VAN ROEKEL. Thank you, Mr. Chairman.

Senator BAYH. The next witness is Dr. John O'Mara, professor of civil engineering, University of Iowa.

Dr. O'Mara, we appreciate your joining us here today.

STATEMENT OF JOHN J. O'MARA, ASSOCIATE PROFESSOR, UNIVERSITY OF IOWA

Mr. O'MARA. Thank you, sir. First if I might, I should like to extend a word of personal greeting to the chairman.

I am a native of Terre Haute. I played on football teams against teams coached by your father. I think I can say for Hoosiers everywhere that we are all proud of the excellent service the chairman is performing in the Senate of the United States.

Senator BAYH. Thank you very much. I appreciate those comments plus the fact that you are willing to join us and give us your expertise on the question before us.

Mr. O'MARA. Thank you.

I have submitted a written statement and I respectfully ask that it be made a part of the record.

Senator BAYH. Without objection that will be the order.

(The statement referred to follows:)

STATEMENT OF JOHN J. O'MARA, ASSOCIATE PROFESSOR, UNIVERSITY OF IOWA

Mr. Chairman and members of the committee, any proposal to change any facet of public policy concerning highway transportation must be evaluated in the context of the grievous highway accident situation which results in thousands of persons killed and millions injured each year in the United States. The problem has been given more attention in recent years, but so far, countermeasures have not materially reduced the toll.

It is quite apparent that if the acceleration of the highway slaughter is to be stopped, firm resolution and action is required. One fundamental act would be to firmly resolve that no change in highway transportation policy should be adopted by any legislative body or other governmental agency *unless that change holds definite promise of improvement in the accident situation.*

SCOPE OF THE TRAFFIC ACCIDENT PROBLEM

From 1936 through 1961 the annual death toll of traffic accidents remained at about 38,000 per year with fewer during World War II. In 1962 the toll jumped above 40,000 for the first time in history, and it continued to rise until 1969 when an estimated 56,000 persons were killed. The total for 1970 is estimated at 54,800. See Table 1. Approximately 2,000,000 persons are injured each year and economic losses exceed $12 billion annually.

Even before 1962 it could be said that:

1. Motor-vehicle accidents are the third leading cause of death in the United States.
2. More American lives have been lost in motor-vehicle accidents than in all the wars in which the United States has engaged.
3. More children die as a result of motor-vehicle accidents than from any other cause.
4. Half of the victims are in the prime of life, between 15 and 45 years of age.
5. From the social and economic viewpoint, motor-vehicle accidents can be considered the most serious cause of death and injury in the United States.

VEHICLE DIMENSIONS AND WEIGHT

The physical characteristics of vehicle govern the design of many highway features including the steepness of grades, dimensions and strength of bridges, sharpness of curves, the geometry of intersections and interchanges, and the width and thickness of pavements. Consequently, it is necessary that the public regulate the size and weight of vehicles in order that they not exceed the traffic and structural capacities of existing highways and streets and their components.

Safety is the primary factor to be considered in establishing most limiting criteria, and this is true of maximum dimensions and weights of vehicles. Public authorities, however, in adopting controls for these characteristics often enact measures which compromise safety and endanger the public. Such sections are primarily due to the paucity of reliable information concerning traffic and accidents.

LACK OF INFORMATION

The meager size of the accident data bank available is almost incredible. Highway transportation in the United States is an economic activity which exceeds $150 billion annually of which the various governments spend approximately $20 billion directly. The Federal government alone directly spends approximately $5 billion each year. Yet comparatively little money or effort has been spent to determine the essential facts of traffic accident occurrence.

One important aspect of this situation is that almost all accident investigation and reporting is directed toward the purpose of establishing that some person was at fault. The type, size and condition of the vehicles most often are not recorded at all.

It is, therefore, difficult if not impossible to relate with certainty the incidence of traffic accidents to any single characteristic or pair of characteristics of vehicles. The same can be said of characteristics of roads, drivers and pedestrians. In most cases, however, general inferences can be drawn, e.g., the incidence of traffic accidents is higher among teen-age drivers.

VEHICLE WIDTH

Increasing the width of vehicles presents additional hazards in many ways. One is that they will be too wide for the width of existing lanes on existing highways.

As vehicle width has increased over the years, lane widths have needed to be increased from 7 or 8 feet to 9 feet to 10 feet to 11 feet and now 12 and 13 feet. A lane width of at least 12 feet is generally provided wherever there are more than a few trucks or buses. These lane widths are because of 8′–0″ wide vehicles. If vehicles become 8′–6″ plus allowances, which implies actual widths of more than 9′–0″, pavements should be widened additionally. The situation is compounded for wider, as well as longer, vehicles on curves.

There is a limit to lane width, and we may have already reached it. When lanes are widened to 13 or 14 feet, some drivers try to forcefit 3 lanes of traffic into 2 lanes of a highway or street.

There may also be a limit to vehicle width as long as the highway system involves vehicles and pavements of the present sort. On a curving path both of the front wheels of a highway vehicle cannot follow curves of the same radius. Consequently, one front wheel must slip. This phenomena not only affects the stability of vehicles negotiating turns and curves, it also adversely affects maneuverability. The wider the vehicle tread, the more pronounced is this effect.

OUTRIGGER MIRRORS AND OTHER PROTRUSIONS

Any lateral protrusions from the vehicle must be considered a part of the width of the vehicle. The most common of lateral protrusions are the rear-view mirrors mounted outside the body width of trucks and buses and of passenger cars and small trucks pulling trailers or carrying camper bodies.

These mirrors undoubtedly add to the driver's ability to steer and maneuver the vehicle, but they are sometimes lethal. A casual reading of press reports of traffic accidents suggests that many serious and fatal injuries are being inflicted by these projections upon persons standing or working in the shoulder areas adjacent to pavements. (As an additional comment on the lack of accident data, it might be noted that in the preparation of this report an attempt was made to quantify this situation with accident facts. State and federal agencies were contacted, but no such data was available.)

There is research and development work in progress which promises to produce equipment which will provide the driver with a full-compass view from inside the vehicle without the necessity of looking sidewise into protruding mirrors. Indications are that this equipment will entail only a minimal increase in the cost of a large bus or truck. However, until protruding mirrors are eliminated in some such manner, they and other projections must be included in vehicle width, and their placement should be regulated to prevent striking pedestrians at least.

WIND BLAST FROM WIDE VEHICLES

Aerodynamic disturbances, or wind blast effects, created by wide vehicles are very dangerous to passing vehicles. This has been established definitely in a recent report prepared for the Federal Highway Administration, "An Experimental and Analytical Investigation of the Effect of Truck-Induced Aerodynamic Disturbances on Passenger Car Control and Performance". Preliminary investigation of length effects indicate that the results generally would be applicable to all long vehicles including buses.

The results reported in this investigation indicate that, under conditions which

are even less severe than many typical of Interstate traffic, a passenger car in passing a tractor/semi-trailer truck can be moved sidewise more than two feet away from the truck. Worse still, the car may be moved more than four feet toward the truck. Vehicles such as small vans, cars towing trailers and camper combinations are expected to prove more critical than passenger cars.

As long as such operating effects exist in highway traffic no widening of vehicles or narrowing of pavements should be authorized.

VEHICLE LENGTH AND WIDTH

There are many safety aspects of the length and width of vehicles operating on highways. One is the fact that the rear wheels of a highway vehicle on a curve usually follow a path closer to the center of the curve than the path of the front wheels. For example, a long vehicle making a right turn at a street intersection often must encroach upon the left lanes of both streets in order that the rear wheels clear the curb on the inside of the turn.

The same phenomenon occurs on a highway curve to a lesser extent. The longer the vehicle, the wider the vehicle and the sharper the curve, the more the rear end of the vehicle will be displaced toward the adjacent lane.

NEED OF RESEARCH

The assessment of prospective structural damage to bridges and pavements can be predicated upon a reasonable body of knowledge, but the same cannot be said of many of the other aspects of vehicle size and weight. For example, the geometry of the positions and paths of wheels and the overhang portions of large vehicles on curves and turns is so complex that much design data is based on measurements of small models.

One area of needed research is, then, that associated with the operations of vehicles of various sizes and weights under actual field conditions. Testing should be done with full size vehicles under all kinds of roadway, traffic and climatic conditions. This research should include all important aspects of safety and operation such as braking performance, splash and spray effects, and the involvement of vehicles of different dimensions and weight in traffic accidents.

NEED OF TRANSPORTATION POLICY

It is more important still that research be done in the more fundamental aspects of the total transportation problem. A common expression for the state of transportation in this country is that it is "a mess". There is a lack of an effective and coordinated effort to establish and pursue long-range goals and objectives.

For example, it is ironic that present public policy is increasing the highway slaughter by encouraging more and more highway travel while at the same time it is throwing away a railroad transportation system which is at least ten times safer than highway transportation. The relative safety of rail travel is usually expressed in terms of passenger miles, but the same advantage holds true for freight: if some freight traffic could be shifted from the highway, safety would benefit. The re-establishment and further improvement of safe and efficient movement of people and goods by rail is imperative for the United States.

Air transportation is in a critical state and has been for some time, and other media and situations present serious problems. The nature of the road system to be encouraged and supported by the Federal government is the subject of current deliberation.

A national transportation policy is needed, a policy such as that developed by the study initiated by President Franklin D. Roosevelt, which was begun in January, 1940 and completed in May, 1942. The report was published as "Transportation and National Policy", a very comprehensive summary of the situation at that time and a competent statement of worthy goals and objectives for the future. With proper support a similar study could be performed now and similarly could be completed in a relative short time.

For the present it would be well to hold in abeyance any critical policy changes, especially those which are of a piece-meal nature. In highway transportation no such change concerning trac regulations should be adopted unless it shows promise of lessening the tragic toll of motor vehicle accidents.

TABLE 1.—MOTOR VEHICLE DEATHS AND DEATH RATES

Year	Number of deaths	Population rates [1]
1961	38,091	20.8
1962	40,804	22.0
1963	43,564	23.1
1964	47,700	24.9
1965	49,163	25.4
1966	53,041	27.1
1967	52,924	26.7
1968	54,862	27.6
1969	56,000	27.9
1970	54,800	27.7

[1] Deaths per 100,000 population.

REFERENCES

1. Accident Facts, 1971 Edition. National Safety Council, Chicago, Illinois.
2. An Experimental and Analytical Investigation of the Effect of Truck-Induced Aerodynamic Disturbances on Passenger Car Control and Performance (Executive Summary Report). Systems Technology Incorporated. Prepared for the Federal Highway Administration. Washington, D.C., 1971.
3. Hearings, Subcommittee on Roads, Committee on Public Works, House of Representatives, 91st Congress, 1st Session and 90th Congress 2nd Session. Washington, D.C., 1968 and 1961.
4. Hearings, Subcommittee on Roads, Committee on Public Works, U.S. Senate, 90th Congress, 2nd Session, Washington, D.C., 1968.
5. Maximum Desirable Dimensions and Weights of Vehicles Operating on the Federal Aid System. House Document No. 354, 88th Congress, 2nd Session. Washington, D.C., 1964.
6. A Policy on Geometric Design of Rural Highways. American Association of State Highway Officials. Washington, D.C., 1954 and 1965.
7. The AASHO Road Test. HRB Special Reports and Records. Various Dates. Highway Research Board, Washington, D.C.
8. Transportation and National Policy. National Resources Planning Board. Washington, D.C., 1942.
9. Highway Design and Operational Practices Related to Highway Safety. American Association of State Highway Officials, Washington, D.C., 1967.

Mr. O'MARA. In order to avoid needless repetition, I should like to enumerate areas covered in my statement and to discuss points of interest to the committee.

The statement touches on the following areas of concern, primarily with respect to safety: The gravity of the highway accident situation, the need to regulate vehicle size and weight for safety's sake, the lack of information concerning accidents, safety aspects of vehicle widths and lane widths, outrigger mirrors and other protrusions, aerodynamic disturbances created by wide vehicles, safety aspects of vehicle length and width combined, need of research and the need of a national transportation policy.

Mr. Chairman, we have an unbroken record of being "wrong end to" in matters of highway design controlled by vehicle size and weight. Changes have evolved by first making the vehicle larger or heavier after which we attempt to modify the highway to accommodate the larger vehicle.

It is time to right this backward procedure. First, we need a comprehensive national transportation policy. That policy should determine the optimum size and weight of highway vehicles.

If the optimum vehicles require it, highways should be built or modified to carry those vehicles. Then when the highways are available, the vehicles could be authorized.

In the meantime, no such change should be adopted unless that change holds definite promise of improvement in the tragic traffic accident situation.

Thank you.

Senator BAYH. I am anxious to read your statement in some detail, Dr. O'Mara. You heard some questions that I asked the two preceding gentlemen relative to engineering expertise and experiences as far as aerodynamics and blasts.

In your judgment, is there a difference between the blast caused by a 102-inch vehicle that is 40 feet long and one that is 50 or 55 feet long? Is there a difference between one that is a continuous vehicle such as a bus or one that has a separate tractor and trailer? What is the aerodynamics of that situation?

Mr. O'MARA. Sir, may we separate the question?

Senator BAYH. Please, in as many parts as you want.

Mr. O'MARA. I think the study just referred to by the previous speakers indicated that in the opinion of the research agency, there was no additional intensity of the bow wave from the front of the vehicle as to whether the vehicle was 96- or 102-inches wide, but the report does say quite clearly that of course you need the 6 additional inches.

In other words, there is that added factor. Your vehicle is 6 inches wider, therefore, the wave is wider by that much.

On vehicle length, and the field testing involved a tractor-trailer, but their report, and I believe it is supported by their wind tunnel work, indicated that they saw no significance in length, that the measured effect was the bow wave and it would not make very much difference whether the vehicle was as long as the one they tested or somewhat shorter.

I would presume this would apply to a bus which might be 40 feet long instead of 55 feet. I think probably just as a matter intuitive judgment on the basis of fluid mechanics, and so on, I would think that would be quite correct because the opposite could be true. The shorter vehicle might make the intensity greater, particularly the negative pressure and suction situatiton that draws one vehicle toward a bigger vehicle.

I could see that it possibly could intensify if the vehicle were a little shorter.

Senator BAYH. Could you give us a prescription that a layman reading this record can understand to differentiate between the type of pressures that would force a car away from an oncoming truck because of the low wave and the type of force that would force a car toward the truck?

When are these differing pressures existent and is there anything that can be done about it?

Mr. O'MARA. If I remember the general sense of that research, the executive summary of the report is all I have seen, the general sense was that the two critical situations were, one, when there was a crosswind blowing in the direction of the car towards the bus and then when the crosswind was blowing the opposite way, coupled with the headon bow effect.

Now, I don't think the combination that affects the crosswind which would blow the car away from the truck is perhaps so difficult to under-

stand, but the opposite one which, to my view is the worst condition, the one that draws the vehicles together. The crosswind, of course, exerts a pressure, a lateral pressure on the side of the passenger car vehicle. It is blowing against the side of it.

Now, the wind blowing between the two vehicles can actually create a suction effect or a negative pressure effect anytime, but it will be most intense when there is pressure exerted on the opposite side because then you not only have the negative pressure between the vehicles but you also have a positive pressure tending to push the vehicles together.

One way I can think of explaining about this, is to look at that Corps of Engineer seal behind you and suggest that perhaps in hydraulic testimony here concerning hydraulic projects, perhaps someone has referred to the Venturi Meter for measuring the quantity of water flowing through a pipe. We can do this quite often by arranging a Venturi Meter which simply is to take the pipe and reduce it in size for a short section and then enlarge it again.

Contrary to popular belief, and what would be my intuitive understanding if I didn't know better, when you do this, the pressure in the small section actually is reduced. The pressure is not increased by forcing the water in there, it is reduced.

We measure the flow of water by simply putting a gage on the big pipe and a gage on the neck and measuring the drop in pressure coupled with the measurements of the pipe and we can compute the flow. The reason this happens is that if you have a quantity of water, so many gallons a minute going through the pipe, it also has to go through the little pipe, and in order to do that the velocity has to increase. It has to go faster through the small pipe and if it goes faster the pressure has to drop. So the same effect happens in between the two vehicles when the wind blows between them. You can have the same effect on the upper surface of an airplane wing when the wind blows over it; you can get a negative pressure or a suction. This effect, again, would be most intense. I think, with the crosswind against the small vehicle in the case of highway vehicle situation under consideration.

I suppose I have managed to confound you completely.

Senator BAYH. Perhaps not completely.

Mr. O'MARA. Well, I am sorry, that is the best I can do.

Senator BAYH. We understand from reading the report that these various currents, crosscurrents, and pressures, are only increased by a 6-inch wider vehicle to the extent that the same vehicle would need a space of 6 more inches to move down the highway. Is that an accurate assessment?

Mr. O'MARA. No; I don't think that is what I understand from the report. Their report would indicate that the pressure situation would be the same from the bow wave of the vehicle whether it is 96 inches or 102 inches wide. But you are still left with the fact that you are increasing the vehicle by 6 inches. Therefore, you need 6-inch wider lanes.

You are still making the vehicle that much wider so you need that much more width in the lane.

My paper certainly supports the need for extra lane width. We have gone from early days of having 6 feet wide lanes, then 7 feet, 8 feet, 9 feet, and 10 feet as the vehicle sizes have increased, and we have been

established now for many years on major roads of 12 or sometimes 13 feet, because we did create 8 feet wide vehicles and we need this width for 8 feet wide vehicles. That is why wide lanes were established.

We have this problem of off-tracking of vehicles on curves and it is not 2 feet thrown away on either side of the vehicle. We have to have it, otherwise they will interfere with each other in travel.

Senator BAYH. Have you done any independent study at the University of Iowa, or do you know of anybody else that has done this type of research, other than the report we have here?

Mr. O'MARA. No, sir, I don't. I think there would be some similarity of the work that has been done at the University of Iowa. The Institute of Hydraulic Research has worked on airflow in other circumstances but not in this particular instance.

Senator BAYH. Thank you very much. We will read that report and analysis in great detail and we appreciate your taking the time to be with us.

Senator BAYH. Our next and last witnesses this morning is State Representative Paul Corriveau of the State of Massachusetts.

STATEMENT OF PAUL CORRIVEAU, STATE REPRESENTATIVE, STATE OF MASSACHUSETTS

Mr. CORRIVEAU. Mr. Chairman, I appreciate the opportunity to address you today and, if I may transgress a bit, I would apologize first for the inadequacy of the statement that I submitted. It was sort of a mixup.

It appears I took one brief case and too few containing a more detailed and sensible presentation.

Senator BAYH. Let me say that I have not had the chance to read your statement that you have, but I hope you will feel free to revise it and extend it in any way you want. (See p. 262 for Representative Corriveau's statement).

Mr. CORRIVEAU. I appreciate that.

First off, may I describe the district that I represent in Massachusetts Legislature. It is a small community in the central part of Massachusetts but it is crosspatched with four major highways: The Massachusetts Turnpike, U.S. 20, newly completed or nearly completed I–68, and a very busy main artery between western part of Massachusetts and Providence, R.I., which is Route 131.

So the people in Sturbridge are exposed to traffic, its hazards and its problems much more than a great many people elsewhere.

Senator BAYH. Excuse me, I might say that my family and I had the opportunity to spend Thanksgiving Day at Sturbridge in about 12 inches of snow. We can attest to the fact that the traffic, even with the snow, is intense.

I suppose you can say with some justifiable pride it has remained so because of the historic significance of that part of the State of Massachusetts.

Mr. CORRIVEAU. Yes, I hope you enjoyed your meal as much as we did. We were only able to leave our home until later.

Senator BAYH. No extra charge for that commercial.

Mr. CORRIVEAU. I would mention one thing which has not been mentioned. You mentioned snow. There are some States that do get snow and since you were in Sturbridge on Thanksgiving, you know we get snow. A 12-foot lane in a snow storm ends up being a 10-foot lane if you are lucky and a 10-foot lane with a bus doesn't leave much room for error, much less room for other vehicles which necessarily have to use our highways.

I oppose any expansion of the size of vehicles allowed on these highways and I would like to not repeat so many of the things that were said this morning because I feel so deeply, as I have listened to people's plea, and I have been moved to the point that I am here.

We are out of session, which is a wonderful feeling, but I feel so strongly about some of the things that should be said that I am here and I appreciate the opportunity to be here.

When I read the headlines that announce a terrible tragedy somewhere, I don't see it as an announcement in a paper. It is not a list of survivors or the deceased, it is very real to me. I have the experience of having been an ambulance driver in that small community of Sturbridge which has been the scene of some rather tragic accidents.

The sounds and sights stay with you an awful long time. I have sat and listened to people who plead, and it isn't easy, but with the memory, and with pictures of youngsters who have expired, especially youngsters, I think we are all moved by that, who have expired because of an accident, unfortunate as it may seem.

I was especially moved by one such hearing in which a mother, just weeks after her son was killed by a schoolbus, that she has enough concern to appear before my committee and plead, "Please do something to make schoolbuses safer in Massachusetts."

It was too late for their little Jim, but it wasn't too late for thousands of other little Jimmies that would be riding schoolbuses and it is that trend that I should hope to transmit to you, sir.

There are an awful lot of little Sturbridges that have miles and miles of roads within their boundaries and there are people who live on these roads who look out and see the monsters, the buses, trucks, that are very necessary to our commerce, but they should not be totally catered to at the expense of those people who necessarily use our highways and who live on them.

I have listened to the testimony, and I wish I had the eloquence to match that that was presented, factual, articulate, but most of it lacked the necessary ingredient that I think we in Government, and in my small part in State government are somewhat removed from, and that is the human elements, the effect of our decisions on those citizens that we are so responsible for and have often removed from because of technicalities and compilation of statistics that we have left out the human element of so many of our decisions. I plead guilty to it, too.

There are so many things that should be done before we make a decision. As mentioned earlier, a bad situation, even if it is a little bit worse, 6 inches on the width of a bus, may create just a very small increase in a blast, so-called, the bow blast, but it is an increase.

In my tenure in the Massachusetts legislature, we have authorized the use of double bottom trucks on the Massachusetts Turnpike. Double

bottom trucks are two trailers with one tractor attached. I can tell you, sir; having traveled the Massachusetts Turnpike for 5 years at least, 4 days a week, that it isn't a little bit of added blast, it is an awful blast.

And whether our weather is such in the New England States especially, we get drizzle, rain, and that little bow blast 6 inches wider ends up being a sheet of impenetrable mist that obliterates the highway for, hopefully, just seconds until you either go by the bus or truck, but if you are caught behind it, you can't see the highway for this blast, really, which makes itself visible in wet weather.

But I have some very vivid memories that have brought me here. Accidents involving trucks and automobiles. And I shouldn't want to relate those to you, but they are important to the effect that they have brought me here.

I hope that is evidence enough. I still hear screams. I still see sights that I try to forget.

In their behalf, I ask that before we allow the expansion of vehicles in size and weight, in making our highways less safe, I don't know how you hack this up. This is going to take a greater amount of braking surface to stop a vehicle that is made 6 inches wider. That is an increase.

We have had pretty much the same bill submitted in Massachusetts legislature. Fortunately, it didn't go anywhere and I hope this one doesn't. I hope that we can answer to those who have gone, for whom we can do nothing, by doing something for those that we still have prerogatives of making our highways safer. To that end I have to put in a plug for one of my bills that I submitted and we have a similar bill here calling for the installation of tachographs. They are, I believe one of the finest and cheapest pieces of equipment that you could attach to every vehicle, primarily trucks, buses, and any vehicle.

I have to tell you about the jazz I have been getting from people who object to tachographs. They would object to everything that would hamper their total freedom.

I don't think our highways are free for people to use as they choose. They are for all of us to use sensibly and intelligently and safely.

I have a very good friend who wishes to remain anonymous, a truck driver who now works for registry of motor vehicles in Massachusetts. I hope I haven't given him away by thus describing him. I spoke to him about tachographs and what he thought of it, knowing of his expertise as a truck driver, which is very valuable to the registry of motor vehicles, and he told me, in words that I am sure you would not want on the record, what he thought of tachographs. After he had gone on to describe them for sometime, he stopped abruptly and said, "As much as I hated them, they made me a better driver."

If they did this for that particular individual, then I think they're worth considering for all people who drive and are entrusted with the lives of passengers.

I would like to take one step at a time, making them mandatory on school buses where they are able to. I hope you will consider tachograph another safety equipment on buses, whether they are 96 inches wide or 102 inches wide.

There was a question asked earlier and I would like to end my little

presentation here, confused as it may sound. Someone asked if automobiles were getting bigger. Twenty years ago it seems, my wife sat closer to me in a 1947 Ford than she does now in our big late model Pontiac. Cars are getting wider.

But bigger doesn't necessarily mean getting better.

Senator BAYH. Maybe your wife is getting more narrow.

Mr. CORRIVEAU. Well, she asked how come we didn't sit so close together anymore and I informed her that I had not moved.

I sincerely appreciate the opportunity, as I mentioned before, to come before you, and bring to you the plea of those people in communities, and transmit to you the terrible need for concentration on highway safety, and I think increasing the size of vehicles, just as sure as the camel sticks his nose under the tent, you are going to have the whole body in there, and the whole body will be trucks.

Senator BAYH. Could I ask a couple of quick questions and I do appreciate your taking the time to let us have your personal thoughts and experiences. Does the city of Boston or any of the cities in Massachusetts permit the use of the 102-inch bus within the confines of the metropolitan area?

Mr. CORRIVEAU. Yes, sir; the Metropolitan Boston Transit Authority does use 102-inch bus, and arguments have been made that the wider bus is going to solve the transportation needs, and entice people to use the transportation offered if it is wider, and more comfortable.

I wish this were so. Then we wouldn't have to, in the legislature, appropriate funds to pick up the deficit of the transit authority. It has not proven to be so.

Senator BAYH. Is there any movement of these buses outside of the city for charter and this type of thing?

Mr. CORRIVEAU. The only movement allowed outside of the metropolitan area is a stretch of the Massachusetts Turnpike to a garaging area now.

Senator BAYH. Has the State legislature done any investigation or conducted any studies of the statistical safety factors of the 102-inch bus versus the 96-inch bus or of its use in various other places in the State?

Mr. CORRIVEAU. None as a body. They pretty much relied on the expertise that was afforded us by organized groups, the automobile associations, the truckers association and, of course, they all submit their figures, and I appreciate the complexity of sifting through these figures, and statistics.

Statistics very often can be compiled to say almost anything you want them to say. I have a little example of the 4 ounces of liquid in an 8 ounce bottle.

Those which choose to call a bottle half-full, those who choose not to, call it half-empty, so you have to be careful in relying on statistics.

I think in Government we have a tendency to do so and we very often forget the human element. I hope I have been successful in bringing to you today that there is a human factor that we should not lose sight of.

Senator Bayh. But you don't have any research or any evidence on the accident factor where the larger buses have been used compared to the smaller buses?

Mr. CORRIVEAU. None that I could accurately relate other than the argument that has been presented that the wider, more comfortable bus is going to induce people to use it has not proven true. Since we come from the western part of the State which doesn't benefit directly from the Massachusetts Metropolitan Transit Authority facilities, I have a terrible time justifying an expenditure in its behalf to my constituents.

Senator BAYH. I am not persuaded, at least as of this moment, that in the municipal-type transit system the factors of extra width and comfort are nearly as important as convenience of scheduling and other aspects of good metropolitan transportation service.

Rather, it seems that comfort of a seat in a public transportation vehicle would be more important in travel for longer distances. So, if you are going from Los Angeles and New York, an extra inch and a half would be more important than if you were going from Cambridge to downtown Boston.

Mr. CORRIVEAU. Equally important is the thickness of the seat you are sitting on for that distance, too. Surely there are some things that have to be done in public transportation if we are going to cure some of our urban traffic ills.

I don't believe that the wider bus that really has not proven itself in my area, which is the city of Boston, as having solved that problem. I think we have to look at some other things such as scheduling and pricing, and all of the buses in the world don't do any good if they leave at 4:10 and you get out of work at 4:30.

I think these are the kind of problems that we seek to solve with a wider bus. We are focusing our attention on the wrong problem.

Senator BAYH. As a State legislator, would you have any concern about Congress moving into this area by establishing a uniform highway policy to which all States would have to adhere and doing away with the grandfather clause that now creates certain discrepancies in the way this matter is treated from State to State?

Mr. CORRIVEAU. I think if there is a solution, it lies in so many of our problems. The State right is a great thing. We have to have standardization.

Our country has grown smaller with technology being what it is today but I marvel at the fact that it took me 1 hour and 7 minutes for me to get here. We're getting closer to each other through technology and we have to have regulation. I think it is pointed up in so many other areas, not only uniform highways and uniform traffic, but I would like to see a uniformity in other areas that would make life compatible to our sister States.

I think that our holiday fiasco is very, very significant in this aspect, but we celebrate holidays on different days than neighboring States. I have an interesting phenomenon where the southerly town boundary of Sturbridge is also that State boundary and there is confusion traveling between the States, and we prohibit holiday traffic of commercial vehicles. We deem some days holidays that other States do not. I think this is the kind of uniformity that has to come from here so that we all play the game according to the same rules.

I would like to see uniform licensing procedures. We are coming to that. There is no sense that one State allows a person with an un-

examined vision or unqualified vision to operate a motor vehicle and go over a State boundary if he so chooses and really operate a motor vehicle in that State that he could not be licensed by that particular State to operate.

Safety means so much to all of us. It is lives. I don't think we can afford to lubricate the system with human lives as we have in the past.

Senator BAYH. Thank you very much. I appreciate your thoughts. The whole matter of traffic law uniformity has been one that has been of some concern to me since my freshman year in the Indiana Legislature, where I happened to be a member of the highway safety committee. At that same time I was almost killed in an automobile accident and my wife was unconscious for an extended period of time. When one looks at such personal incidents he can get a better understanding of the need for sanity than just reading the cold statistics of 50,000 people killed every year.

I appreciate your taking the time, Mr. Corriveau, to let us have your thoughts. I hope all goes well in Sturbridge.

Mr. CORRIVEAU. I hope you come to visit us again with a somewhat different title someday.

(Representative Corriveau's statement together with an editorial from the Boston Record American follows:)

STATEMENT OF PAUL J. CORRIVEAU, STATE REPRESENTATIVE, STATE OF MASSACHUSETTS

My name is Paul J. Corriveau of Sturbridge a community in Central Massachusetts cut through in a East to West direction by the Mass Turnpike, Route 20 cut through its middle North and South by newly constructed I–86, diagonally by I–131 so that residents of Sturbridge become authorities on traffic in order to survive. I represent this community in the Massachusetts Legislature.

In the 1971 session of the Massachusetts Legislature I filed a petition directing the Registrar of Motor Vevicles of the Commonwealth to promulgate rules and regulations relative to the installation of tachographs and similar instruments on school buses in the Commonwealth. The intent of that bill is limited to scope but similar to that introduced in Congress by Rep. Findley. Briefly it would mandate the installation of each bus in the Commonwealth a tachograph which is a recording instrument which provides a permanent record by chart of speed and miles per hour, distance traveled, number and duration of stops as well as warning the drivers of said school buses by either audible or visual signal when a specified speed is reached or exceeded.

The tachograph often referred to as "a tattle tale" should be regarded instead as a "co-pilot".

My interest in highway safety stems from several sources. Namely, personal experience as an ambulance driver, police officer and member of the Massachusetts Legislature Joint Committee on Public Safety.

1. As an ambulance driver, the attention getting headlines "3 die in fiery crash" are not just a list of names and addresses of deceased and their survivors. They are the screams of pain, the unbelieving stare of on-lookers and the pleading confused, questioning look of relatives or friends as they ask all who will listen that almost unanswerable question WHY?

2. As police officer the utter frustration of being in pursuit of an offender in the West bound lane observing another out of reach headed East.

3. As a legislator on the Public Safety Committee listening to the pleas of parents of accidentally killed or injured youngsters to make buses safer for other youngsters since it is too late for theirs.

All of our efforts, yours here in the federal government, mine in state government cannot put the breath of life back into those expired. We can only hope to prevent the untimely in the future. A great step to that end would be the installation of tachographs on all buses and trucks engaged in interstate commerce.

More directly to the main bill being heard today, namely, the wider bus bill in opposition to it the following factors.

A. In those states where they will have the winter phenomena of snow a 12-foot lane is very often reduced to 10 or less feet in winter.

B. Added weight, volume, all create additional mechanical problems i.e. driving in the wake of a large vehicle in stormy weather.

C. The introduction of statistics for or against the wider bus bill cannot be relied on exclusively. Statistics can be arranged to say almost anything i.e., 4 ounces of fluid in an 8 ounce bottle. Those who choose to can call the bottle half full. Those who choose to can call it half empty. Both are correct.

[From the Boston Record American, Dec. 30, 1971]

HIGHWAY MONSTERS

If you are among the many millions of Americans who drive their own cars on the nation's highways, you should be seriously concerned by the impending threat to your safety and pocketbook which the powerful and persistent truck lobby in Washington is determined to ram through Congress eventually—one way or another.

In past years, time and again, the wealthy trucking industry has sought legislation to permit an increase in the size of the huge motorized freight cars already in use. These are the roaring monsters which chew up the best of roadways, at your expense, and terrify many private drivers by rocking passing cars with blasts of unnerving air turbulence.

We have consistently opposed every bill which would allow these behemoths to be bigger than they already are. Many others also have rallied in resistance—and thus far the truckers have not succeeded in getting permission for the dangerous expansion of trailer carrier volume they so dearly desire.

Today, however, thanks to a roundabout maneuver, the truckers are closer to success than they ever were. They are pushing a bill which would allow interstate buses to be expanded in width from 96 to 102 inches. It already has passed the House and awaits action in the Senate when it reconvenes. If approved, the measure will set a precedent for the similar size expansion sought for trailers.

There is no sound reason why interstate buses should be widened by six inches. Present seating capacities are quite adequate. But an extra six inches in trailer truck volume could mean millions in annual profits to the trucking industry—at a cost to highway maintenance and general safety which is incalculable.

The pending bill and the sinister precedent its backers are trying to establish can and should be stopped. If you agree, why not clip this editorial and send it to your favorite Senator along with a notation demanding his rejection of the latest trickery game being played by the persistent truckers.

Senator BAYH. We are going to recess our hearings now, pending the Christmas recess, and hope to resume next year, not with a clean slate but with governmental witnesses and other public witnesses that want to be heard.

Thank you all for your patience and Merry Christmas.

(Whereupon, at 12:30 p.m., the hearing adjourned to reconvene at the call of the Chair.)

WIDER BUSES AND THE INTERSTATE HIGHWAY SYSTEM

MONDAY, FEBRUARY 14, 1972

U.S. SENATE,
SUBCOMMITTEE ON ROADS OF THE
COMMITTEE ON PUBLIC WORKS,
Washington, D.C.

The subcommittee met at 10:20 a.m., pursuant to recess, in room 4200, NSOB, Senator Birch Bayh (chairman of the subcommittee) presiding.

Present: Senators Bayh and Randolph.

Also present: M. Barry Meyer, chief counsel, and Clark Norton, professional staff member.

Senator BAYH. The subcommittee will please come to order.

This is the third day of public hearings held by the Subcommittee on Roads on H.R. 4354, a bill which would authorize the States to permit the operation of buses not to exceed 102 inches wide on the Interstate Highway System.

During 2 days of hearings in December, the subcommittee heard testimony offered by proponents and opponents of the bill representing various private organizations, associations, and companies.

As announced at that time, the subcommittee postponed until a later date the appearance of official public witnesses in the hope that additional scientific data would be available which might prove or disprove some of the conflicting testimony presented both to this subcommittee and during hearings conducted previously in the House of Representatives.

Although it is my understanding that research on this matter sponsored by the Department of Transportation has not yet been completed, we are hoping that some worthwhile evidence can be produced today which will help the members in their evaluation of this bill.

Scheduled to appear today are four officials from the Department of Transportation and one from the New York State Thruway Authority.

Gen. Benjamin O. Davis, Assistant Secretary for Safety and Consumer Affairs, will represent Secretary Volpe and present the views of the Department.

Accompanying him as expert witnesses are Mr. Frank Turner, Administrator of the Federal Highway Administration, and Mr.

71-954—72——18

Douglas W. Toms, Administrator of the National Highway Safety Traffic Administration.

Mr. John H. Reed, Chairman of the National Transportation Safety Board, will speak for that agency.

Because of claims that the wider bus would constitute a traffic hazard, the subcommittee has made a special effort to obtain specific data from certain States in which there has been some experience with actual intercity operation of these buses on various highways.

There are nine States in which the 8 foot width limitation for vehicles on the Interstate System has not applied at all because of a "grandfather clause" in the 1956 act.

Nine other States have enacted legislation which allows the 102-inch-wide bus to operate on other Federal-aid highways that are not on the interstate.

Moreover, at least five States have permitted the wider bus to make regular commercial runs on their toll roads.

I am very pleased that a representative of one of these jurisdictions, Mr. Joseph E. Pauquette, who is director of traffic operations for the New York State Thruway, will testify here today.

Finally, the subcommittee has received communications and reports from a number of State highway and toll road officials about the status and operation of the 102-inch bus in their areas, and expects to receive additional data from several others in response to requests which have been addressed to them.

If there is no objection, I will ask that these communications and reports, together with a number of newspaper editorials and other material of importance which have been brought to the attention of the subcommittee, be printed in the hearing record at the conclusion of today's testimony.

I request further that the record remain open for 30 days to permit inclusion in the printed hearings of material not yet received by the subcommittee, of supplementary written data furnished by witnesses in response to questions which might be asked today, and of additional significant evidence which might be submitted by interested parties.

We are now pleased to welcome our first witness, Gen. Benjamin O. Davis, Assistant Secretary for Safety and Consumer Affairs for the Department of Transportation.

We appreciate the fact that you are here, General Davis, to kick off this portion of our hearings. I think you know that the Chairman and members of this subcommittee are seeking the most reliable information possible. As Sergeant Friday used to say and still says, "We are after the facts!"

We want to try to find a way to assist in determining fact from fiction, to differentiate allegation from experience. That is why testimony from those of you who have had personal and professional experience in the highway safety field will be valuable to this inquiry.

We welcome you.

STATEMENT OF GEN. BENJAMIN O. DAVIS, ASSISTANT SECRETARY FOR SAFETY AND CONSUMER AFFAIRS, DEPARTMENT OF TRANSPORTATION (REPRESENTING SECRETARY JOHN A. VOLPE); ACCOMPANIED BY MR. FRANK TURNER, ADMINISTRATOR, FEDERAL HIGHWAY ADMINISTRATION; AND MR. DOUGLAS W. TOMS, ADMINISTRATOR, NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

Mr. DAVIS. Mr. Chairman, we shall do exactly as you direct and try to present you with the facts as the Department sees them.

I welcome the opportunity to appear before you today to present the Department's views on H.R. 4354, a bill relating to increased vehicle limitations for buses on the Interstate Highway System, and to offer further comments and suggestions which we believe would be helpful to the committee in its deliberations on this proposal.

I am accompanied today by Mr. Francis Turner, Administrator, Federal Highway Administration, and Mr. Douglas Toms, Administrator, National Highway Traffic Safety Administration.

At the outset, Mr. Chairman, I want to state that the Secretary of Transportation considers the issue of safety the major factor in the ultimate determination of the usage of wider buses on the Nation's highways. He has placed great emphasis on this particular subject and is personally following the progress of the Department's work related to wide bus safety through monthly progress reports that are made to him on our studies.

It is my intent today to outline for you the current legislative authorities the Department possesses to control highway safety specifically relating to truck and bus traffic, to advise you as to what the Department is doing and expects to accomplish in this area of safety, and to suggest for your consideration an alternate approach to this subject.

To begin, let me briefly discuss the Department's current statutory authority relating to the regulation of vehicle sizes and weights. Section 127 of Title 23: United States Code, prohibits the apportionment of Federal-aid highway funds for the Interstate System to States which lawfully permit vehicles wider than 96 inches to use their part of the Interstate System.

There is, however, a "grandfather clause" which exempts from that prohibition those States which allowed wider vehicles on their highways prior to July 1, 1956, or, in the case of Hawaii, February 1, 1960. I must point out that there is no equivalent prohibition relating to the primary and secondary highway systems, and the States currently set size and weight limits on all their roads.

There also exists within the Department authority to regulate the safety of operation and equipment of certain motor carriers, including the authority to investigate and report on the need for Federal regulation of sizes and weight. This authority was trans-

ferred to the Department from the Interstate Commerce Commission when the Department was created, and it is administered by our Bureau of Motor Carrier Safety (BMCS) within the Federal Highway Administration. This authority extends only to carriers involved in interstate or foreign commerce and does not authorize BMCS to regulate directly the sizes and weights of motor vehicles.

Finally, the National Highway Traffic Safety Administration (NHTSA) has authority under the National Traffic and Motor Vehicle Safety Act of 1966 to set safety standards for motor vehicles, including buses and trucks. Under this authority, NHTSA sets performance requirements for new motor vehicles so that the public is protected against unreasonable risk of accidents occurring as a result of their design or construction or performance.

For example, NHTSA, through the imposition of performance requirements, can, in effect, influence the size and weight limitations for new motor vehicles. Unlike BMCS authority, the NHTSA authority extends to all new vehicles, whether used in interstate commerce or not.

In the spring of 1971, and in response to many questions raised in previous congressional hearings relative to the safety of wider buses, the Department initiated a number of studies addressed specifically to the safety of 102-inch buses. These studies relate primarily to such factors as aerodynamic disturbances, characteristics and effects; but also include the related factors of lateral placement of vehicles; lateral stability; off-tracking on sharp curves; and accident data analysis needed to support the primary study objectives.

In addition, we will examine the safety of the 102-inch buses on both the 12-foot-wide lanes of the Interstate System and narrower roads and in situations where buses and other vehicles are traveling in the same direction and in opposite directions on two-lane highways.

Let me now briefly discuss these studies, Mr. Chairman, and give some indication of what we hope to derive from them.

In the past there has been limited research on the aerodynamic effects of large vehicles passing or being passed by other vehicles. It is also recognized that due to varying speed of vehicles, highway geometric changes—grades, curves, lane widths, road crown characteristics, surface conditions, et cetera—and varying wind velocity and direction, the environmental conditions in which vehicles pass each other vary widely. To obtain reliable data on these aerodynamic effects a comparative analysis of 96-inch- and 102-inch-wide buses has been undertaken, utilizing two approaches to the problem.

The first approach uses scale model, wind tunnel testing, while the second uses moving scale model testing. Thus, our studies will involve: Full scale tests with instrumented vehicles; one-tenth scale model tests, some of which are conducted in a wind tunnel; and in addition a computer-based analytical model technique which will enable us to analyze a wide variety of situations.

The purpose of the full scale tests is to verify the accuracy of our computer based analytical-model results. The results of these two scale model testing techniques will be compared with each

other and with the results of full scale tests to provide further validation of the analytical model.

We are studying the aerodynamic forces generated by various bus configurations, and the effect of those forces on passing vehicles or vehicles being passed. A variety of passenger vehicles are being examined, including a subcompact sedan, a microbus, and a pickup truck with camper. Situations examined include a variety of wind conditions, vehicle speeds, lane widths, car handling characteristics, and driver skill levels.

In addition, we have other related and supporting studies underway. We are evaluating the increased probability of sideswipe accidents when wider buses are used by obtaining reliable data on both placement of buses within lanes and clearance between buses and other vehicles.

Using this information as an input to our aerodynamic studies, we will be able to relate bus-induced aerodynamic disturbances to real-world traffic situations. We consider these data vital to our aerodynamic studies.

We are undertaking observational studies to update the existing data on vehicle lane placement on two-lane rural highways, and to obtain comparable data on freeways. The influence of standard and wide buses on motorist lane placement, as well as the lane placement of the buses themselves, will be observed and evaluated.

We are studying lateral stability for both 96-inch and 102-inch buses to determine the likelihood of a bus turning over, its yaw stability (fishtailing), and ease of control along its intended path employing a hybrid computer simulation. Lateral stability may be critical when buses are executing sharp turns, such as on freeway ramps. The physical properties—dimensions, weight, loading, suspension system, et cetera—of particular buses may have major effects on their lateral stability.

We have also undertaken a study into the problem of off-tracking on sharp curves. Maneuvering around sharp highway curves, especially at freeway ramps and intersection turns, could prove to be a key problem of wider buses. The ability of wider buses to negotiate such maneuvers within available lane widths restrictions must be verified. The Department is undertaking experiments with scale models to define the off-tracking characteristics of 96-inch- and 102-inch-wide buses. The results of this work will be coupled with available information on highway geometric features to define the proportion and types of highway situations that are critical.

Finally, we are conducting a statistical analysis of bus accident experience of 96-inch- and 102-inch buses on intercity routes. If the required data are available, the statistical analysis of accident data will include an examination of rollover accidents by type of bus, and will estimate the proportion of accidents and fatalities which are expected to occur in such accidents.

Mr. Chairman, the foregoing gives some indication of what the Department is now doing to find answers to the safety questions raised in this area. At this juncture, with most of our studies and tests recently underway, we are not in the position to provide the committee with conclusive findings.

At this time, let me briefly refer to an interim report dealing with the aerodynamic effects of trucks recently submitted to the Department. This study was authorized by the Federal Highway Administration in the summer of 1970 and covers a test period from June 1970 through September 1971.

From that report, it appears that in the presence of substantial crosswinds, potentially hazardous situations occur at high speeds when cars pass downwind of trucks. The report also suggests that these situations may be hazardous when cars pass buses.

Although we do not accept the results of the truck research as final fact for buses, we do feel it would be imprudent not to follow up on these findings. For example, the aerodynamic studies of tractor-trailer combinations indicate that significant vehicle disturbance and deviations may occur in certain truck-car passing situations involving crosswind conditions.

The study also implies similar hazardous conditions may exist in bus-car passing situations. As a result, it appears that in this common highway experience the aerodynamic effect of buses may pose hazardous situations similar to trucks.

As you are well aware, Mr. Chairman, H.R. 4354, as originally introduced in the House, would have increased to 102 inches the maximum permissible width of buses which may utilize the Interstate System. Presently, the maximum width of trucks and buses permitted on the Interstate System without loss of apportioned interstate funds is 96 inches, except for those States having the benefit of the grandfather clause which I referred to earlier.

The bill, as passed by the House and before us today, would increase to 102 inches the maximum bus width permitted on those lanes of the Interstate System that are at least 12 feet wide. The effective date would be the first to occur of (a) the first day of the first fiscal year which begins after the completion of the necessary safety studies and the promulgation of any necessary safety regulations; or (b) July 1, 1973.

However, prior to such time, if the Secretary finds that as a result of these studies the operation of wider buses on the interstate's 12-foot lanes will be unsafe and cannot be made safe by safety regulation, usage of the wider buses will not become effective.

As you can see, Mr. Chairman, we are looking at the safety problem in great detail, and we strongly recommend that H.R. 4354 not be enacted at this time. Other than a requirement for the Department to complete its studies and make its findings and recommendations known to Congress by July 1, 1973, we oppose any other legislative action on this matter.

Mr. Chairman, we oppose H.R. 4354 at this time for three basic reasons. First, let me state that this Department has always been concerned about the safety of operation of all motor vehicles, regardless of width and whether or not they operate on or off the Interstate System.

We believe that if safety questions are raised and are verified by the Department's research efforts in this area, the Federal response to the problem should be made applicable to buses on all our Nation's highways. The movement of people and goods in interstate commerce is not limited to our Interstate System or our Federal-aid system. It involves our country's entire network of highways.

Federal concern over the safety of the traffic should not be limited to only certain of these roads.

Second, we cannot support enactment of this proposal at this time, even though we recognize that the bill presently does provide the Secretary of Transportation with, in effect, a veto over the actual usage of wider buses on the Interstate System. We feel the bill places unnecessary and unreasonable time constraints on the Department.

The bill requires the Department, within 18 months, to make its studies and also to promulgate whatever regulations it deems necessary to make the operation of these wider vehicles safe on the Interstate System.

If, after our studies are completed, we find rulemaking proceedings would be necessary in this regard, it would be improbable, if not impossible, for the Department to satisfy the responsibilities placed on it in the time frame set forth in this bill.

Third, let me say that a different date in this bill would not change our opposition to legislative action at this time. We simply feel that, in light of the various studies currently under way, Congress should wait until the findings of those studies are available. Only at that time will the Department, Congress, industry, and other interested parties have the information before them necessary to take an informed position on this subject. That is the time for more meaningful discussion and appropriate congressional action.

In conclusion, Mr. Chairman, I recognize that all of my discussions to this point have dealt with the safety issue. There can be no question that this is the Department's primary concern with respect to this bill. I also recognize, however, that some benefits may accrue to bus riders and bus operators by the usage of wider buses.

We recognize that the wider bus may result in greater comfort for the traveling public, due to the increase in the present seat and aisle width. Also, local transit operators, many of whom now own and operate 102-inch buses on city streets, would be able to conduct transit operations over segments of the Interstate System, where they are now barred.

I must emphasize, however, that the Department has always recognized safety as the overriding consideration which must take precedence over other consumer factors.

This concludes my prepared statement, Mr. Chairman, and at this time my colleagues and I will be happy to answer any questions you or the committee may have.

Senator BAYH. Thank you, General and gentlemen. There are a number of questions to which we would like answers, if you have no objection. I would like to submit some of these questions in writing to you so that the responses may be included in the record.

Mr. DAVIS. Very well, sir.

(The questions referred to together with the responses follow:)

RESPONSES TO SENATOR BAYH'S QUESTIONS

Q. What is the total number of 102-inch wide buses purchased with financial assistance provided by DOT under the Urban Mass Transportation Act of 1964, as amended?

A. Out of almost 9,000 buses purchased with financial assistance provided by DOT under the Urban Mass Transportation Act of 1964, approximately 4,300 have been 102 inches wide.

Q. How many 102-inch wide buses have been purchased in each of the last two fiscal or calendar years with the financial assistance of DOT?

A. In calendar years 1970 and 1971 respectively, 670 and 2,048 buses of the 102-inch width have been purchased with DOT financial assistance.

Q. How many 96-inch wide buses have been purchased with DOT financial assistance during each of the last two fiscal or calendar years?

A. In calendar years 1970 and 1971 respectively, 1,116 and 2,073 buses of the 96-inch width have been purchased with DOT financial assistance.

Q. Has DOT received any evidence that operation of the 102-inch wide bus, either on urban or rural segments of the Interstate where legal or on other Federal-aid highways, has been more hazardous or dangerous than operation of the 96-inch bus?

A. The National Highway Traffic Safety Administration in coordination with the Federal Highway Administration has undertaken a study effort to compare and evaluate the relative safety record of 102-inch wide and of 96-inch wide buses engaged in interstate passenger line haul operation. Initial efforts to evaluate these safety performance records of 102-inch and of 96-inch wide buses on a specific route basis (e.g., New York to Chicago) or for specific types of highways (interstate-rural/urban, other Federal-aid highways, etc.) proved infeasible. The requisite exposure data to perform such analysis are simply not recorded. The study did develop individual accident rates per bus mile traveled on an *aggregated* basis for all U.S. 96-inch and 102-inch wide bus operations for major carriers engaged in interstate passenger operations. Within the study limitations imposed by the availability of data for analysis, the study concludes that there does not appear to be a (statistically) significant difference in the historical accident rates experienced between the 102-inch wide and 96-inch wide buses operated by these carriers.

Q. Because of present uncertainty about the safety of the 102-inch wide bus, should any such vehicles purchased with Federal aid be allowed to operate on urban or other portions of the Interstate?

A. In States where 102-inch wide buses are now permitted to operate on urban or other portions of the Interstate system, we believe that they should be permitted to continue to do so whether or not they were purchased with Federal aid funds. As indicated in our February 14 testimony, if safety questions are raised and verified in our research efforts, that will be the time to consider imposing additional restrictions on bus usage. Furthermore, such restrictions should be made applicable to all buses on all our Nation's highways.

Q. Would DOT favor an amendment to the law or a regulation which would specifically prohibit the operation of any 102-inch bus purchased with Federal financial help on any segment of the Interstate, urban or rural?

A. No, not at this time. As indicated in our testimony of February 14, on the basis of the facts as they exist, namely: there are several thousand buses operating today; we really do not know about the safety of the 102-inch bus at this time; and we have a responsibility to determine whether it is safe; we believe that definite, positive, overt actions should not be taken on the unwarranted assumption either that the bus is safe or that it is unsafe. As an alternative, we should complete our safety studies as soon as possible with the understanding that once they are complete they will point the way to those actions that should be taken.

Q. Has DOT taken any action to assure that 102-inch buses purchased with Federal financial assistance are not being operated on the Interstate System where prohibited by the 1956 Act?

A. Annually a telegram is sent by FHWA to the highway departments inquiring whether there have been any changes in State law or regulation with respect to weights and widths of motor vehicles, and whether the Interstate System may lawfully be used by vehicles with weights and widths in excess of the limitations specified in 23 U.S.C. 127, or State laws or regulations in effect on July 1, 1956, whichever is the greater. The State certificates are filed in response.

However, this is not the limit of our activity with respect to section 127. Through our field organization significant changes in State law and regulations

as they occur are brought to our attention and then we promptly advise any State of the possible loss of Federal-aid Interstate apportionment in the event the changes continue in effect under section 127.

UMTA has not taken any specific action to assure that 102-inch buses purchased with Federal financial assistance are not operated on the Interstate System where prohibited by the 1956 Highway Act.

Q. Would safety be promoted by keeping the 102-inch bus off the Interstate System but allowing it on other Federal-aid highways?

A. As a practical matter, keeping 102-inch wide intercity buses off the Interstate System so reduces the market for that type of equipment that few wide buses are manufactured and consequently few travel on the non-Interstate Federal-aid highways. The 102-inch buses are allowed on the non-Interstate Federal aid system now. However, the nation's largest intercity bus operator, Greyhound, only operates 132 102-inch buses. A number of relatively small markets exist which do not use the Interstate. However, the motor bus operators usually like to be able to interchange their equipment among the different routes for which they are certified, which usually involve parts of the Interstate System. Thus, they would be unlikely to use 102-inch buses in these small markets. Only the few markets (such as New York to Philadelphia) which do not utilize the Interstates and which are large enough to support a separate pool of buses for exclusive use in that market make significant use of 102-inch buses. Most of the remaining 23,000 102-inch buses operate in local transit service, and conduct most of their operations on urban and suburban streets, rather than on highways. Thus, to the extent that keeping the 102-inch wide buses off the Interstates promotes safety, safety is effectively promoted on most of the Federal-aid highway system.

However, as indicated in our February 14 testimony, if safety questions are raised and verified by our research efforts on 102-inch wide buses, the Federal response to the problem should be made applicable to buses on all our nation's highways.

Q. Does the Department have any opinion on the claim that the wider bus, because of greater passenger comfort, would attract more passengers for intercity trips?

A. The Urban Mass Transportation Administration feels that increasing seat width, and therewith comfort, can contribute significantly to attracting commuters from autos to transit buses, although UMTA lacks hard evidence to support this belief. UMTA hopes to obtain more insight into the extent of consumer preference for buses of increased width by evaluating user response to the different aisle and seat widths of 96-inch and 102-inch wide buses that will be used in a demonstration project incorrectly being conducted on Shirley Highway.

The extent to which consumer preference for wider transit buses will translate into increased usage to such buses will be difficult to measure, as will the application of such findings to intercity coach-type buses. Nevertheless, we feel the Shirley Highway analysis will provide some insight into the consumer preference question. We feel that, in general, increased comfort would be a smaller factor in luring passengers from autos to buses in intercity operations than it would in transit operations. However, we simply lack factual data on these questions. It could well be that the major effect of an increase in the width of intercity buses will be to make such buses more competitive on certain routes with other modes of public transportation, such as trains and airplanes.

Q. Do you have any information on the extent to which the more than 20,000 102-inch wide buses now owned and operated by local transit companies are operated illegally, either on urban or rural sections of the Interstate or other Federal-Aid Highway systems?

A. We have no specific information about this question.

Q. Does the Federal Highway Administration have a program under which it attempts to determine whether vehicles wider than 96 inches operate illegally on the Interstate System where it is not lawful?

A. Yes. See answer to Question 7.

Q. Has any State ever been denied or threatened with denial of Federal-aid funds for highways or for the purchase of buses, because it had permitted wider buses to operate illegally on the Interstate System?

A. No.

Q. Has the Federal Highway Administration ever formally advised any State that it is illegally permitting 102-inch buses to operate on sections of the Interstate in that State?

A. No.

Q. Would you recommend that Congress apply the 96-inch width limitation to all Federal-aid highways, and not just to the Interstate System?

A. If our studies indicate that 102-inch wide buses are unsafe, as indicated in our February 14 testimony, we would recommend appropriate congressional action applicable to buses on all our Nation's highways.

Q. Since H.R. 4354 does not require states to permit the operation of wider buses on the Interstate System within their borders, would the bill (if passed) still not guarantee uniform national policy on this issue?

A. The enactment of H.R. 4354 would permit but not require States to authorize operation of buses with a width of 102 inches on their portion of the Interstate System. Therefore, some States could continue to restrict bus widths to 96 inches. Also, there would be no requirement, because of the grandfather clause, that buses now legally operating on the Interstate System with widths in excess of 102 inches cease such operation. Hence, enactment of the bill would not guarantee a uniform nationwide width for buses.

Q. What purpose, if any would be served by retaining the "grandfather clause" in the bill? Would the effect of this be to permit certain states to allow the operation on the Interstate of buses with a width greater than 102 inches?

A. No purpose would be served by retaining the "grandfather clause" in the bill insofar as it relates to operation of buses on the Interstate System. Retaining the clause would permit operation of buses greater than 102 inches wide in two States (Maine and Hawaii).

Q. In view of the reported extensive use of 102-inch wide buses on highways in Canada, has any effort been made to obtain data about the safety experience of this vehicle from Canadian officials?

A. The operation of 102-inch wide buses in Canada commenced at approximately the same time as such operation were initiated within the United States, namely early 1969. From early 1969 Greyhound Corporation of Canada has operated a small number of 102-inch wide buses, in contrast to a maximum of 132 intercity 102-inch wide buses (currently) in operation by Greyhound of the United States. It is believed that Greyhound of Canada is the only Trans-Canadian carrier engaged in transprovincial passenger operations employing 102-inch wide buses. Major U.S. bus carriers have amassed a much greater interstate (intercity across State lines) operational experience with the greater number of 102-inch wide buses and this operational experience was more readily available for DOT analysis. Finally, all major U.S. interstate bus carriers by law must submit standardized reports for all bus accidents (except for those property damage only accidents of less than $250 total damages) to the Bureau of Motor Carrier Safety, Federal Highway Administration. These resports serve as a centralized and standardized accident data source for subsequent analyses.

Q. Has any agency of the Department of Transportation conducted or sponsored tests to determine the speed with which passengers can escape from intercity type buses involved in traffic accidents?

A. No meaningful research specifically aimed at determining passenger time has been conducted by the Department. The NHTSA under a contract with the University of Oklahoma has conducted limited "escape" tests using intercity buses. This research was focused on the size and shape of the window exits and compared escape times for various size openings. Two shortcomings of this research are that (1) the escape openings were confined to window exits and were not standard sizes or shapes; and (2) the time values did not consider queue or waiting time of passengers.

Q. To what extent have structural and engineering features designed to improve safety, such as increased braking capacity, larger tires, better suspension, and greater stability, been incorporated in the approximately 23,000 buses of 102-inch width?

A. The primary thrust of the NHTSA research effort is the evaluation of the intercity 102-inch buses, i.e., those operated by Greyhound and Trailways. The city or urban 102-inch buses are being considered secondarily. This emphasis is consistent with the questions posed by H.R. 4354. Further, the configuration of the intercity bus is significantly different from that of the urban bus. For example, the intercity bus has a higher center of gravity because it, unlike the urban bus, has a luggage compartment under the seating area. Therefore, the intercity bus, which represents only a small fraction of the approximately 23,000 102-inch buses, should be considered to be a completely different entity.

Evaluations of the brake designs and braking capacity of the intercity 102-inch buses have not been made. However, it should be noted that Federal Motor Vehicle Safety Standard No. 121, "Air Brake Systems", which becomes effective September 1, 1974, specifies minimum braking performance requirements for all buses and trucks regardless of their widths. The effect of larger tires on the 102-inch buses has not been investigated by the NHTSA. We understand from the testimony by Continental Trailways that the company does not intend to use larger tires on their 102-inch buses. With regard to suspension and stability, the NHTSA has recently initiated a study that will compare the stability characteristics of 96-inch and 102-inch buses.

Senator BAYH. Let me go over a few questions.

It is your judgment now that Congress should not act on this measure because the "jury is still out," is that accurate?

Mr. DAVIS. That is one of the major reasons. There is one other which I touched on in my testimony. That is, that in the event the Department finds that the 102-inch bus is, in fact, in its current condition, unsafe, and it is necessary to promulgate certain regulations, the Department would not be able by July 1, 1973, when the bill would become effective, to meet this requirement. For that reason, I think the Department would find itself in violation of the law.

Senator BAYH. I think you said in your testimony also that if the date in the bill were changed, that still would not alter your opinion?

Mr. DAVIS. That is correct, sir.

Senator BAYH. So in the last analysis you believe, as I am sure you do or you would not say it, that something is inherently wrong with this legislation which cannot be corrected by changing the date. I don't want to put words in your mouth, but you seem to believe that essential facts relative to safety have not yet been determined.

Mr. DAVIS. That is exactly correct, Mr. Chairman.

Senator BAYH. I am looking at a letter dated August 20, 1971, written to my colleague in the House, Congressman Fred Schwengel, which was sent by Under Secretary James M. Beggs, Department of Transportation. According to this communication there are three separate research projects underway which perhaps we ought to put in proper perspective here. First, FHWA Truck Research, started June 1970; interim report in April 1971; and the final report, which I believe is the one we talked about, in September 1971.

Second, a bus research project that was started in July 1971.

The interim report is scheduled for May of this year, and the final report in January 1973. That would give the Department 6 months to assess the data contained therein, in addition to having a running start because of the material contained in the interim report.

Third, NHTSA has a vehicle research study which started July 1971, the final report for which is due in April 1972. Are those reasonably accurate dates for these reports?

Mr. DAVIS. They vary by a month or two, sir; but they are generally correct.

We estimate, now that all of our studies as currently outlined will be completed by November of this year. The consolidation and evaluation of the studies we are confident, will be completed by January 1973, if not before.

Senator BAYH. Let me ask you to comment on the thoroughness, the validity and accuracy of facts and conclusions in the truck research project which has been concluded. Are you satisfied that the conclusions reached there are accurate, that the study does indeed go into all of the problems and that the conclusions are reasonable after the facts have been disclosed?

Mr. DAVIS. Sir, we have talked a lot about this study, obviously, especially in preparation for this hearing before your subcommittee. We feel that this is a limited study. It involved one vehicle only in opposition to a truck.

Senator BAYH. Pardon me. One vehicle?

Mr. DAVIS. One type of vehicle, sir. It did not involve a wide range of vehicles that might interact on the highway with a truck. Our studies, sir, as I indicated in my statement, go from station wagons to small vehicles.

In this particular study it was only one type of vehicle.

Senator BAYH. That was a station wagon, right?

Mr. DAVIS. Yes, only one type.

Senator BAYH. I thought at first you meant only one vehicle was being tested in the study on the truck width.

Mr. DAVIS. No, I meant only one type. I am attempting to point out, Mr. Chairman, that this study, I don't think, should be taken as gospel or as conclusive on all aspects of the interaction of vehicles and trucks on highways.

Further, it is our view that the truck problem and the bus problem should be treated independently. So, consequently, as I indicated, is, in the statement, we believe that it would be very imprudent on our part to disregard the findings of this study. At the same time I think that the major effect of the study is to point the way to further our own aerodynamic studies. We hope to determine whether in fact the dangerous situation portrayed in the crosswind effect on a car that passes downwind of a truck with a crosswind coming into the truck does in fact apply to busses and whether these major deviations from lane placement would take place in the event of a bus.

So, Mr. Chairman, in summary, we don't think this truck study is conclusive. We feel also in the main that we must take it into consideration in further studies with respect to buses.

Senator BAYH. Do you have a real question in your mind that

there may be a significant safety problem related to operation of the wider bus?

Mr. DAVIS. There may be, sir; and I would put it in your words exactly, Mr. Chairman. It is a question and it is a responsibility of the Secretary to determine whether the 102-inch bus is safe before he supports its introduction onto the Interstate System.

Senator BAYH. All right. I concur with that and salute you for accepting that responsibility. And I think the Congress should bear some of that responsibility, too, although we must look to you for advice and counsel.

Mr. Toms, we look especially for help from those who work for NETSA and who have the expertise to sort out fact and fiction. Sometimes it is difficult to differentiate between the two.

Let me ask you this, Mr. Toms. We are all aware of the fact that there are 102-inch wide buses now being produced. Do you have any idea how many there are on our highways now? How many of these 102-inch wide buses are roaming the reaches of America, either on inner-city or on interstate highways?

Mr. TOMS. Mr. Chairman, under the Federal standards there are presently 12 currently in use and——

Senator BAYH. Pardon me. Twelve?

Mr. TOMS. I will double check to make sure of the exact figures here.

Mr. DAVIS. 23,000 sir.

Senator BAYH. 23,000 total?

Mr. DAVIS. Wide buses, sir, of which today there are about 100 being operated by Greyhound and about 48 or 49 being operated by Trailways in intercity operation.

Senator BAYH. One hundred forty-nine intercity. Now, those particular buses use what kind of highways?

Mr. DAVIS. They use toll roads such as Ohio or New Jersey Turnpikes and other roads of that type. In addition, the roads leading to those roads from their terminals.

Senator BAYH. You said 12 something, Mr. Toms. To what did you refer?

Mr. TOMS. We had a breakdown by standards here and it did not apply to the question directly.

Senator BAYH. Can you tell me, of the 23,000 total 102-inch buses, with only 149 used for intercity operations, this would mean that 22,800-plus are used primarily in transit situations, that is, intracity. Is that accurate?

Mr. DAVIS. Yes, the great majority.

Senator BAYH. Can you tell me, are these situations where it is necessary, in going from point to point, that any of these 149 102-inch buses are forced to use some parts of the Interstate System now?

Mr. DAVIS. Yes, sir, and they do use it in those States where the law, the grandfather clause permits them to use it, and also in certain intracity close suburban operation.

Senator BAYH. These buses, I take it, are not only on the Federal highways, but may go intercity. They are not confined to 4-lane or multiple lane highways. They can be permitted to use any type of

highway that is available except the Interstate System, is that correct?

Mr. DAVIS. That is correct, sir.

Senator BAYH. Then it is reasonable to assume that some of these 149 buses might well be traveling on 2-lane highways?

Mr. DAVIS. Correct, sir.

Senator BAYH. Is it a reasonable question for the chairman to ask if the Department is anxious to urge delay in passing this measure until the results of research are available relative to modern Interstate System because of the safety questions involved?

Let me ask if you are equally concerned about the safety involved in using these same wider buses in circumstances where the hazards should be significantly greater? Question No. 2, have you done anything about this latter problem?

Mr. DAVIS. We are so concerned, sir, and this has to be part of our examination.

Senator BAYH. Has there been any effort made to limit the purchases of these buses with Federal funds pending the outcome of these tests?

For example, with respect to funds available under the Urban Mass Transit Act of 1964, have any 102-inch buses been purchased with funds from that act?

Mr. DAVIS. Mr. Chairman, a large number of 102-inch buses have been purchased from funds pursuant to that act and more are currently being considered for purchase. This problem, sir, has been very agonizingly considered by the Department and it is our feeling that inasmuch as so many of these buses operate in transit operations and not on the high speed turnpike type operation of the interstate, that it would be wise for us to continue as we are doing. It would be economically better and the fact that so many of them are already in existence, we would not be aiding the situation materially if we simply said we are not going to buy any more until we complete our studies.

I think we recognize, however, Mr. Chairman, that this is something of an unsatisfactory position and it points out to me without any question that we must complete our studies at the earliest possible time and determine whether the 102-inch bus is safe, and, or if necessary, determine what must be done to it to make it safe.

Senator BAYH. We are now permitting, are we not, these wider buses to run on the Interstate System within municipal areas, in some 28 States or 30 States, are we not?

Mr. DAVIS. We are, sir.

Senator BAYH. Of course we both find ourselves in a rather inconsistent position here. We are saying, "Wait, don't permit these buses to operate in the States where they are now prohibited from running on the best highways in the country," but at the same time we are not saying, "Wait, don't purchase any more 102-inch buses to operate in those areas where the conditions may not be nearly as good, such as municipal areas where the traffic is greater, and even on the interstate in many urban areas."

Will the study that you are conducting now relate to at least two problems which seem clear? One is the aerodynamic problem, the

forces which tend to pull a Volkswagon into or away from a bus or a following vehicle. The second relates to the use of wider buses on innercity streets. Where the streets are narrow and traffic is congested, there is a different type of collision problem.

If a person is driving 20 or 30 miles an hour there is not much of an aerodynamic problem, but when the streets are narrow a collision problem might still exist. Are you addressing yourself to both of these matters, seeking ways to provide data relative to aerodynamics and to the congested inner city?

Mr. TOMS. We are looking at the first one and are trying to assess statistical evidence that might be available on the latter. We don't know there are any research studies that directly apply to innercity relationship between vehicles at low speeds.

Senator BAYH. Is it reasonable to raise the aerodynamic question? I don't know. Having examined the truck study, I note that, despite concerns which have been expressed, the report says, "Both effects are relatively small in going from 96 to 102-inch buses for the test vehicles used."

On the other hand, the effect of a nominal width increase can be significant in a heavily congested area. Even with 96-inch vehicles going down the highways in those ares there is a problem. But the point here is that the research report stated there was a 5 to 7 percent increase in the aerodynamic problem caused by increasing the inches by 6. This does not appear to be very significant, but we can't be certain of the effects of that until your study makes that determination. However, if that same 102-inch bus is driven down a relatively narrow city street, my farm boy logic tells me I know what the impact of that might be. If studies show that it has not been significant and that there has not been an increase in accidents, that would be important. At least we should be asking ourselves that question.

Mr. TOMS. I think we agree that the available data and defining the exact size of bus and the exact traffic conditions surrounding a crash have not been well studied out yet, and we are trying to go back and review that material and make sure in the future that we specify and gather more complete information so we can answer that question.

Very often an accident investigator does not include the lane widths information and parked cars and the general traffic congestion in a collision report sufficiently so that when we review it we can tell the kind of things you were asking in your question.

Senator BAYH. Are you studying also the situation that apparently exists today relative to the use of these wider buses outside of the urban areas on the interstate? For example, it has been claimed that the Cleveland Transit Company has operated 102-inch buses from Cleveland to the Ohio State Fairgrounds in Columbus on Interstate 71. It supposedly has more than 800 buses 102 inches in width. Other examples of wider buses operating on the Interstate System in States not exempt by the grandfather clause include from Memphis, Tennessee to West Memphis on Interstate 40, in Detroit over Interstate 94 to Detroit Metropolitan Airport, and in areas around Chicago, Indianapolis, and Louisville on interstate highways within metropolitan areas.

It seems to me we should be able to determine what happens with wider buses operating in that kind of situation. Will this be part of the study?

Mr. TOMS. That is part of the Department's activity, and we are making direct comparisons on this information. We checked this morning before we came in and I have not received anything definitive back yet, but we are looking for this as soon as possible.

Mr. DAVIS. In a meeting, Mr. Chairman, last Monday afternoon at which we were discussing the research effort, we specifically focused in on the question that you have raised about the accident investigation and the question as to whether our study is thorough enough to answer these types of questions concerning cities, and the interstate traffic in our urban areas.

Senator BAYH. Fine. I hope you will include this aspect in the study. Whether it involves Cleveland, Memphis, Detroit, Chicago, Indianapolis, Dayton, Knoxville, Louisville, Atlanta, or any other city where there appears to be evidence wider buses are being used over interstate highways, either within or outside cities, without legal authority to do so, it should be inquired into.

Mr. DAVIS. In every case, sir, where a violation of the law has come to our attention, action has been taken to stop the operation. We know of no violations of this law at the present time.

Senator BAYH. I hope that you will discuss this matter with our staff.

Mr. DAVIS. We certainly will, sir, and that particular question has already been discussed and we know of no cases in which wide buses are being used on the interstate in violation of the law. No current cases.

Senator BAYH. For example, is it legal for 102-inch wide buses to go from Cleveland to the Ohio State Fairgrounds at Columbus on Interstate 71?

Mr. DAVIS. Is that one of the grandfather clauses?

Mr. TURNER. No. That operation that you refer to, Mr. Chairman, we know about. It is not legal under the provisions of the 1956 act. We have asked for corrective action. It is either done on the basis of a permit or it is illegal.

Senator BAYH. Can the State grant permits to permit this kind of operation to happen, or can the Department?

Mr. TURNER. We do not have authority to grant permits at all. The operation of any vehicle on a highway in any of the States is under the control of the State or the local city government. We have no control over that at all.

Senator BAYH. I think we could become all tied up in too much detail in looking at particular cases. It is a very inconsistent situation, however, where this situation exists but the act provides for denial of funds if this does happen. That would be, of course, your responsibility. Even though the State may have a right to grant special permits, it is difficult to understand how that can subvert a Federal law. We don't want to impose hardship on anybody. This helps to illustrate the inconsistency that exists in the way these 102-inch buses are now being handled. They are allowed to run on many highways, and yet there are some States where they cannot operate on the best highways.

Mr. DAVIS. Mr. Chairman, we will try to find any cases that are violations and try to take appropriate action.

Senator BAYH. The irony is that, if there is a danger, for us to say "OK, we will find out whether there is a violation and will prohibit it." The restriction will apply only to the safest roads. There is probably a greater danger on the highways where you can't prohibit the wider buses than on those that you can. Is that not an accurate comparison? What do you think, Mr. Turner? You are sitting there in the hot seat.

Mr. TURNER. Mr. Chairman, the point you are referring to is in the 1956 legislation and the sanctions that the Federal Government has the authority to apply did not relate to the operation of the vehicle but to whether or not the State has authorized that operation to become legal. If it is illegal, thus it is operating in violation of the State law, then that does not of itself require us to impose sanctions. It is whether or not the State legalizes that operation.

Senator BAYH. And if the State legalizes it, then what?

Mr. TURNER. Then we would have to apply the sanction.

Senator BAYH. I understand. I didn't mean to give any other inference. But is my generalization accurate? In your position of responsibility, you might be required to intervene and say, "wait a minute, stop this or we are going to penalize you." Aren't you really stopping the use of the vehicle on the highway where it is safer to use it rather than in other areas where you can't stop it?

Mr. TURNER. Yes, that is the inconsistency of the act and that was one of the purposes of the legislation as proposed to remove that rather glaring inconsistency. The description that you have given of the way the buses operate on the less satisfactory mileages of the system is correct and what the legislation sought to achieve when introduced was to permit the use of the wider vehicle on the better highways which is, of course, the interstate system by and large. That is really the question before you.

Senator BAYH. Has any effort been made in the allocation of Federal funds under the Urban Mass Transit Act to determine whether the fund is going to be spent for 102- or 96-inch buses? Is that part of the criteria?

Mr. DAVIS. As far as I know, sir, there is no description in that act that pertains to the widths of buses that shall be purchased.

Mr. TURNER. Mr. Chairman, in that connection, I think we should point out that assistance given through Urban Mass Transportation Act apply only to vehicles being used inside the urban areas. The majority of those, as the general has indicated earlier in response to one of your questions, are 102-inch wide at the present time.

The buses that you are really talking about in this legislation are the intercity buses operating on the main highways between the cities. In that case, UMTA does not give any assistance to that type of a bus.

Senator BAYH. Yes, but we all admit, do we not, that the possibility of less safe characteristics exist now in those areas where the wider buses can be purchased under mass transit funds.

Mr. TURNER. That is in the urban areas only.

Senator BAYH. Yes, but there are situations in those areas technically described as urban which now qualify, right?

Mr. TURNER. That is correct. But in most cases those are 102-inch buses at the present time.

Senator BAYH. Right. That is part of the hypocrisy in this situation. I hope those buses prove to be safe because there are a lot of them now being used.

Mr. TURNER. In most if not all of those cases I believe you will find that those bus widths are permitted under State statute, either under the grandfather clause or under special legislation which permits the wider bus, but restricts it to the use on the streets inside the urban areas, and restricts it from the rural parts of the system between the cities.

Senator BAYH. I noticed an article in the Washington Post 3 or 4 days ago to the effect that DOT, in conjunction with or through FAA, has given permission for the operation of commuter buses to and from Reston on the Dulles Airport access road. Are those buses going to be 102-inch buses or 96-inch buses?

Mr. TURNER. I don't think that we know, Mr. Chairman, precisely which unit of equipment is being operated out there, but I believe that most of the buses that are used by the W. B. & M. or Capital Transit are probably 102-inch width but I do not know for sure.

Mr. DAVIS. May we supply the answer for the record, Mr. Chairman?

Senator BAYH. Yes.

(The following information was subsequently supplied:)

Present plans for the Reston commuter buses are to maintain the 96-inch width. The private carrier operating the service is definitely interested in going to the 102-inch bus, but is constrained by the restrictions on its overall use in his operations.

Senator BAYH. Do you have any problem about the legality of using wider buses on those particular roads?

Mr. TURNER. No, if you want to be technical, the statute would not apply because the Dulles access road is Federal property and is not part of the Interstate System.

Senator BAYH. Is the access to Reston totally on Federal property?

Mr. TURNER. No. the point I make is that the sanctions, just as we were talking about earlier, apply only to legal operations on the Interstate System, not to the other roads and streets.

Senator BAYH. If we are going to be consistent about this, gentlemen, here is a good example of a project that is pretty well under Federal control, through DOT and FAA. In general you have already come to the conclusion that there is a problem deciding whether it is safe to use the wider buses on the interstate. Thus you advocate that this bill should not be passed until the research reports are all in. OK, I will buy that. But if we are going to be consistent, should we go ahead and sanction the same wider bus in a federally controlled type situation despite the fact there is enough question about its advisability that you can come up here and testify this bill should not be passed?

Mr. TURNER. But those buses are buses already operating, Mr. Chairman, from Reston on the existing highway system of the State.

Senator BAYH. Then why does the General come up here and make

his previous statement? Unless there is some question in your mind about the safety of these buses, the General would not testify like he has.

Mr. TURNER. We don't know the answer. That is our position. We don't know the answer one way or the other.

Senator BAYH. You don't know the answer about the safety or the operation on the access from Dulles, either, do you?

Mr. TURNER. That is correct.

Senator BAYH. Yet you are permitting use of the wider buses there.

Mr. TURNER. That is correct.

Senator BAYH. I suppose Federal funds are being used to help with the purchase of those buses?

Mr. TURNER. Well, I don't know about those particular buses. The answer is that we don't know and therefore we are asking you to delay action.

Senator BAYH. I concur that if you don't know, it is best to err on the side of safety. But aren't you being a little inconsistent, because you don't know that factor about the Dulles access either?

Mr. TURNER. The buses are already operating, Mr. Chairman, and the same inconsistency is they are operating on totally unsatisfactory, less adequate roads than the Dulles access road.

Senator BAYH. I concur. I concur. I am sure they are. But the same point could be made about this bill. We have gotten ourselves over our heads in inconsistencies here. If we are really going to be consistent, it seems to me we should say to the transit companies, "Wait a minute, here is an access road totally within Federal control. Let us wait and use only 96-inch buses now on this highway until we get answers to the questions that have not been satisfactorily resolved about the wider bus on the Interstate System."

Mr. TURNER. Right, but we may be drawing conclusions in this instance that are unwarranted. I said I don't know whether the buses are 96 or 102 inches. The reason I suspect they are 102-inch buses, is because the majority of the buses that D.C. Transit owns and operates are 102-inch buses.

Senator BAYH. Is the bus lane on I–95 out Shirley Highway covered by a grandfather clause or any other provision which would permit wider buses to be used there?

Mr. TURNER. The special bus lane that is now being used on Shirley Highway, much of that is purely a temporary construction type lane at the present time, that is being replaced by a regular lane 12 feet in width and the buses that are operating on Shirley Highway are operating legally. The 102-inch bus can operate legally both in the District and in Virginia within the D.C. metropolitan area. It cannot operate elsewhere on the Interstate System but it can operate within the Washington, D.C. metropolitan area and can do so legally on the Interstate System.

Senator BAYH. Is there anything else this committee should do? I find myself in a rather uncomfortable situation here as chairman of the subcommittee. I suppose any chairman of a subcommittee who doesn't want to face this kind of a situation should not occupy that post and perhaps should even not run for the Senate in the first

place. But I think we really have a serious inconsistency here, based upon a large number of reports that these buses are being operated satisfactorily and safely, but with inconclusive data whether indeed this is true in other areas. Nevertheless, many places are using the buses, in some cases buying them with Federal funds, and often operating them in conditions that are much less safe than those which prevail on the interstate where they are now prohibited.

Is there anything we can do, whether by urging, pleading, or appropriating, to expedite the completion of those studies on the safety of the wider bus?

Mr. DAVIS. Mr. Chairman, I would like to address that question. Certainly there is very great validity in everything you have said. I think that from the standpoint of the facts as they exist: namely, that there are several thousand of these buses today operating; and the fact, as Mr. Turner stated, that we really don't know about the safety of the 102-inch bus; and that it is really and truly our responsibility to determine whether it is safe; we feel that we should not take definite, positive overt actions, either in the direction of an assumption that the bus is safe or that it is unsafe. As an alternative we should complete thorough safety studies as soon as we possibly can with the understanding that once they are complete, they will point the way hopefully toward actions which can make them safe if in fact they are not already safe.

In response to your question, whether there is anything that the subcommittee can do, I would prefer that you adopt along with us the view that we must complete our studies rapidly, that we should report to you on the progress of those studies and that you should have an understanding of the directions in which the studies are pointing and the actions that the Department may have to take in the event there are safety deficiencies in the 102-inch wide bus.

I believe, sir, that we have recognized the dilemma you have pinpointed, and I think we have viewed it as a dilemma. But on the other hand, if we take an action in either direction, it would be on an unwarranted assumption, either that the 102-inch bus is safe or that it is unsafe. And of course there is the other fact I have mentioned that there are so many thousands of these buses already in operation.

(Additional comments relative to the above colloquy follows:)

Q. Is there anything the Congress can do, either by urging, pleading, appropriations, or otherwise to expedite completion of our studies?

A. The interest Congress has shown in the wide bus issue by virtue of the hearings has in itself stimulated the Department of Transportation to insure that research relative to wide buses is completed in timely manner. Availability and scheduling of facilities, including the wind tunnel installation, precludes further speedup in the research process.

Senator BAYH. Let me submit some of these other questions that seem pertinent to you for your consideration and response in written form because several of them involve statistics. If there is anything that we can do to urge the expeditious consummation of this research so it could be moved up ahead of January 1973, I hope you will let us know. There could be a lot of people's lives at stake. There are many companies that are dedicated to providing comfortable, rapid service which are anxious to avoid becoming involved in acci-

dents. Since they are relying on the outcome of these studies, it is our responsibility to make that information available as quickly as we can.

You are familiar, perhaps, with New York Thruway's analysis which will be reported today. The Chicago authority earlier gave these buses a clean bill of health. Has the Department looked into any other studies at all? Do you give any of them the Good Housekeeping Seal of Approval? What is your opinion of these?

Mr. DAVIS. Mr. Chairman, I personally have read all of the testimony before this subcommittee very recently, and I assure you that we feel, as you have indicated, the rather hot breath of urgency in completing our studies. We believe very strongly that these studies can be completed before a year is out and that we will be able to consolidate them and make a determination on the safety of the 102-inch wide bus.

Senator BAYH. I hope you realize that some of us are very anxious to be sure that does happen. Whatever congressional pressure, or I should prefer to say congressional assistance that is needed to get that job done, let us know. We want to work with you, not against you, to help find the answers to these questions.

One last question. We are concerned, as you are, about the whole future and place of mass transit. Are there any studies being conducted, or should some be undertaken, which would determine the effect more comfortable buses might have on traffic congestion? Do we indeed get cars off the highway, and more passengers into mass transit vehicles, by making buses 6 inches wider and providing whatever additional comfort that brings? Has the Department given any attention to this problem?

Mr. DAVIS. Yes, sir.

(The following information was subsequently supplied:)

Q. Are there any studies going on right now, or should some be undertaken, to determine to what extent wide buses induce persons to use mass transit facilities?

A. As part of the evaluation of the Shirley Highway Express Bus project, riders will be surveyed to rate the relative importance of the features of the Shirley service. Of the 60 buses purchased for the project, one half have been 102 inches wide, and the other half have been 96 inches wide. It will be possible to gain some insight into the inducement the wide buses with the wider seats have in getting people to ride the buses. In order to precisely determine the added inducement of the wide bus, it would be necessary to carefully measure the passenger demand in a corridor served with regular buses and then replace all the regular buses without fanfare with wide buses and measure demand for an extended period thereafter. The Department does not have any plans to undertake a test of such a great magnitude.

Senator BAYH. When 20 cars go by in the rush hour, each with only one person, and perhaps a pickup truck with two people, one wonders what has been done in the way of seeing whether more people could be attracted by mass transit?

Mr. DAVIS. Mr. Chairman, the Secretary personally, and the gentlemen who are here with me this morning, I know, have personally considered that problem very, very intensively, particularly during the recent past.

As a matter of fact, the Secretary addressed himself to this problem at the Transportation Institute in New York just 10 days ago,

as did Mr. Carlos Villarreal, Administrator, Urban Mass Transportation Administration. I might say, sir, there is a philosophical argument that if you simply substitute buses for automobiles, the automobile accidents being much more numerous than the bus accidents, that you immediately create a safer situation for the people involved. I feel very strongly, sir, that the mass transit problem will create a more accident-free situation and one in which there is less pollution of the atmosphere. In fact, all of the efforts, it would seem to me, should point us toward reduction in the numbers of automobiles that come into the highly congested areas.

Senator BAYH. Are there any specific projects being undertaken to nail this down, or is this simply Benjamin O. Davis logic? It is pretty good logic, but are there any facts and figures to back that up? Are steps being taken to get that data?

Mr. DAVIS. May I ask Mr. Turner to comment, sir?

Mr. TURNER. Mr. Chairman, there is no subject in the highway field at least that is getting any more attention than the one you are talking about.

Senator BAYH. It involves pressures relative to other, more comprehensive legislation upon which I am sure you will be here to testify later.

Mr. TURNER. I am aware of the circumstances that you describe and I assure you that there are not a few experiments but many, many, and a great deal of effort being effected in the direction you just described.

Now, we will bring to you in hearings later this year, this session, some proposals to further the objective that you describe, which is ours too, to reduce the number of passenger cars crowding into our congested downtown urban areas, and replace those with mass transit type vehicles. In the Washington, D.C. case and hopefully in other metropolitan areas we would like to accomplish the same thing. Also, we are considering proposals that will make better utilization of vehicles by increasing the number of occupants of those vehicles, which is aimed in the direction you described.

You will be hearing more of this from not only Department witnesses but others in the next few months.

Senator BAYH. I am anxious to get those ideas and those statistics. It seems to me that reasonable development and use of a workable mass transit system is indispensible to our well-being. From a governmental standpoint, those of us who have to structure the program so it will function properly and be acceptable to the public, have to see that this type of mass transit system is the kind that meets the needs of all of the various types of communities that exist.

But one of the real tie-ups and one source of the real opposition to mass transit per se has been its limited scope and application. One reason there has not been sufficient private investment and Federal resources is that so much of our mass transit program, at least from a public standpoint, has been directed at only a few localities. There has been little publicity or activity about what could be done to help people get back and forth to work and other pursuits in the average hometown throughout the country. Any system that doesn't do that, we are not going to be able to sell.

Mr. TURNER. I have been preaching that gospel rather loudly at every opportunity.

Senator BAYH. Permit me to say amen.

Mr. TURNER. In 13 minutes I am due downtown to participate in the dedication of 20 new buses to be used on the Shirley Highway exclusive bus line.

Senator BAYH. Are they 102-inch buses?

Mr. TURNER. I believe they are 102-inch-wide buses.

Senator BAYH. Why don't you get yourself out of here so you can be there on time. Thank you very much, gentlemen. We will be in touch, and Mr. Turner, we will be seeing you.

Senator BAYH. The next witness is Mr. John H. Reed, Chairman, National Transportation Safety Board.

You may proceed, Governor.

STATEMENT OF JOHN H. REED, CHAIRMAN, NATIONAL TRANSPORTATION SAFETY BOARD; ACCOMPANIED BY FRITZ PULS, GENERAL COUNSEL; WILLIAM C. FOSTER, ACTING DIRECTOR, BUREAU OF SURFACE TRANSPORTATION SAFETY; ANTHONY L. SCHMIEG, CHIEF, HIGHWAY SAFETY DIVISION; AND ERIC C. SILBERSTEIN, LEGISLATIVE AFFAIRS OFFICER

Mr. REED. Thank you.

I am John H. Reed, Chairman of the National Transportation Safety Board. With me today are Mr. Fritz Puls, General Counsel; Mr. William C. Foster, Acting Director, Bureau of Surface Transportation Safety; Mr. Anthony L. Schmieg, Chief, Highway Safety Division; and Mr. Eric C. Silberstein, Legislative Affairs Officer. We appreciate the opportunity of appearing before your subcommittee to discuss H.R. 4354.

On May 4, 1971, the Safety Board presented its position on this bill to the House Public Works Subcommittee on Roads. The Board opposed passage of the bill pending results of the analysis and review of hazards or safety improvements derived from our existing bus safety recommendations and from observations of 102-inch-wide buses and descriptive literature. We proposed that an assessment of the safety problems associated with wider buses could be accomplished by scientific testing and analysis of available engineering information, instead of waiting for accidents to occur.

Among the identifiable safety hazards we previously pointed out and which the Department of Transportation is now studying are:

(a) Frequency of excursion into other lanes will increase with wider buses under present driver capabilities and highway configurations. This question involves vehicle steering capability, vehicle stability, and driver steering behavior;

(b) Improved braking on all models of buses, including braking performance characteristics;

(c) Reduce tire loadings on wider buses resulting in increased or decreased traction;

(d) Increased influence of wind blast in passing other vehicles in opposite directions which might affect safety margins of some ve-

hicles. The blast effect is a significant hazard, but we feel tests will show little difference between the blast characteristics of the 96-inch and 102-inch buses.

I will now discuss certain hazards which appear to be inherent in wider buses as a result of designs made possible by increasing the width to 102 inches. You will note from my discussion of these hazards that some of the safety problems are also present in most other types of buses. Whether the hazard exists in only 102-inch buses or in all buses, there should be assurance that means to correct these safety problems are found and, in the case of 102-inch buses, that the hazards are eliminated in the design stage of the vehicles before expanded operations are approved. The Safety Board believes it is fortunate that we have an opportunity to make the vehicles safer in the design stage in this instance rather than the necessity to make safety recommendations concerning vehicles already in service.

Much work is now underway in the Department of Transportation to identify and solve the problems associated with wider buses. We believe, however, that attention should be given, prior to enactment of H.R. 4354, to insure that the stability of wider buses is not comprised by alterations made possible by the increased width; that the safety of passengers be considered in the event of an accident where the bus may overturn; and that more effective escape facilities are provided.

The increased height of the bus, which could go as high as 13½ feet, would place seated passengers at a greater height than ever before. In the 12-foot-high bus, the head of a 6-foot tall seated passenger is over 9 feet above the level of the road. In the event the 102-inch bus overturns, a passenger would strike the ground at a higher velocity than in any previous bus.

Also, the linear velocity of unrestrainted passengers is proportionately increased by the added height, thus tending to increase the severity of injuries. The tumbling effect of the unrestrained passengers thrown from their seats is also increased. We believe that passenger safety will be adversely affected by raising seats to this height and that the design of the wider buses must compensate for this problem in order to provide an acceptable level of safety.

In addition, the increased height of 102-inch buses may raise the center of gravity and provide a relatively poor overturn stability factor for a loaded bus, as compared to the stability factors in some contemporary buses. The stability factor of a vehicle is the ratio of the center of gravity height to one-half of the vehicle tread width and is a specific numerical relationship which can be related directly to the likelihood or the susceptibility of the vehicle to overturn.

There is no way in which the stability factor for the proposed 102-inch-wide bus can be estimated unless we know its tread width and center of gravity height. One 102-inch bus seen by the Safety Board did have a wider tread width. A second had a wider and higher bus body superimposed on a 96-inchwide axle with the same suspension and braking systems. The stability for these two buses appears to be different.

The reason we attach so much importance to the stability factor is that evidence from accident investigations shows that overturning of buses is present in most fatal bus accidents. The Board has asked the Federal Highway Administration to study the relationship between bus overturn accidents and fatalities.

The stability factor of higher and wider buses can be very sensitive to changes in the load weight in the express compartment. Increased express package capacity, combined with higher seat height, require that an acceptable center of gravity be maintained in order to preserve the present overturn stability numbers. When a bus is carrying adult passengers, as on a 1-day excursion, with no cargo in the underfloor compartments, the overturn stability factor will be adversely affected. At this time the stability factor of wider buses is not set by regulation. This hazard should be controlled by a standard before the wider buses are approved.

As mentioned before, the Board is concerned about the difficulty of passengers escaping from bus windows when the bus is overturned. In existing buses the windows are 8 feet above the side wall of the bus on which passengers will come to rest when they are thrown from their seats. On 102-inch buses the height of the escape windows would increase, and this is a critical factor.

Senator BAYH. Is that a plus or a negative factor, in your judgment?

Mr. REED. This would be a negative factor because the height of the escape window would be higher on the 102-inch bus.

Senator BAYH. Could you please go over the figures? How much higher?

Mr. REED. Six inches higher.

Senator BAYH. What difference would it make if the bus is on the side? Is the height of the window going to be 6 inches more from the top of the bus? It is the 6 inch dropping down from the side of the bus which would be important. This is a layman talking. You tell me whether I am right or wrong.

Mr. REED. The 6 inches would be that much further out and it would be more difficult to escape. You would have to move that much farther to get to the opening.

Senator BAYH. All right.

Mr. REED. If the bus is turned over, you would have a higher velocity at impact because of the increased height.

Senator BAYH. That is a different point. I was trying to put in proper perspective the height of the window.

You are talking about a bus that is on its side, with 6 inches more required to get up or down to the opposite window.

Mr. REED. That is right.

Senator BAYH. Not the height of the window per se in the vehicle.

Mr. REED. No, it is the distance the passengers have to travel to escape.

Actual performance tests of escape from buses should be required to determine if passengers can escape from a bus regardless of its attitude following a crash. This problem exists in all buses, of course,

but we believe the hazard will be increased in the case of wider buses. We expect that escape performance tests for existing buses will show the need for additional escape methods, and that currently required windows are unsatisfactory in the present bus configuration.

If additional escape methods are not provided, there is increased probability that in higher buses in an upright attitude a person who drops or falls to the ground through push-out escape windows will suffer more severe injuries. Also, when the wider bus is on its side, the presently required push-out windows would be 6 inches farther away from the passenger who must stand on the side arms of the seats and push the 80-pound window up and hold it open while he climbs out.

Time also is a critical factor in escape from buses following a collision even if the bus remains upright. The University of Oklahoma Research Institute under contract to the National Highway Traffic Safety Administration published a report entitled "Escape Worthiness of Vehicles and Occupant Survival."

Finding No. 9 cites that—

> Minimum demonstrated escape times for inclusion in a performance standard have not been studied specifically under this contract. However, escape times longer than 90 seconds with 50 per cent of the exits usable should be viewed with skepticism.

The report discusses tests of escape from a schoolbus in an upright attitude, and on its side. The bus was occupied by 58 high school students. Escape tests were made under daylight and simulated night conditions. Some of the students were injured when push-out windows fell on them and when they jumped from the bus even though mattresses had been placed on the ground under all exits. In this experiment escape times were excessive.

The average times for escape were as follows:

(1) Bus in upright attitude. Using all exits.

(*a*) Daytime, 41.0 seconds.

(*b*) Nighttime (simulated), 43.5 seconds.

Senator BAYH. What kind of bus was involved in the test?

Mr. REED. This was a schoolbus, 58 youngsters.

Senator BAYH. I am trying to see how that relates to the 102 inch versus 96 inch width.

Mr. REED. I will point this out a little later.

(2) Bus on its side.

(*a*) Daytime, using all exits, 82 seconds.

(*b*) Daytime, only rear exit, 107 seconds.

(*c*) Nighttime, using all exits, 154 seconds.

(*d*) Nighttime, only rear exit, 161 seconds.

The Board is concerned about what these escape times would be if a 96-inch wide, or especially a 102-inch wide intercity bus, were substituted for a schoolbus and the young, agile students were replaced by an average load of commercial bus passengers.

Senator BAYH. Do you not think that the escape speed record of high school students would be greater than average bus passengers?

Mr. REED. Yes, sir; I think that would be a logical conclusion. Tests

should be made to determine a safe time to escape from a bus the same as you do in an airplane.

Senator BAYH. I don't want to interrupt your testimony, but a minute ago you said there would be an answer to my earlier question.

Mr. REED. You wanted to know the connection. We are pointing out our belief that tests should be conducted with 96- and 102-inch buses because of this test with a schoolbus. It took quite awhile for the youngsters to get out. How long would it take for the average load of business passengers to get out? That is the point we are trying to make.

Senator BAYH. Whose responsibility is it to conduct that type of test? Is it yours, or is it Mr. Toms' and his agency, or who would have the ball in this matter?

Mr. REED. It would be the National Highway Traffic Safety Administration. Mr. Toms' organization should conduct these studies.

Senator BAYH. You don't know whether he has or has not done so?

General Davis, is any study like that under consideration?

Mr. DAVIS. No, Mr. Chairman. But what is under consideration are all of the recommendations of the National Transportation Safety Board with respect to the 102-inch bus and they have raised several items that are not under consideration, and it is up to the Department to determine whether they should properly be brought under consideration or the reasons for not doing so.

Senator BAYH. When were these recommendations made?

Mr. REED. The various recommendations date back to March 7, 1968, and we have made some since that time.

Senator BAYH. I think it is a reasonable question.

General, you are not on the stand now, but why is the Department just now considering those recommendations?

Mr. DAVIS. Mr. Chairman, there is a very reasonable question as to why we are late in conducting the studies.

Senator BAYH. If we are late, then let's not be any later.

Mr. DAVIS. That is my view, sir.

Senator BAYH. Let me insist, if I may, as I earlier suggested, that we have common ground here. We are not going in a different direction in regard to the importance, urgency, and need for the study.

Let me emphasize as well its completeness, so that when it is finished there will be no need to feel duty-bound to say, "But you haven't answered these questions that have been raised since 1968."

Let's include those questions so that if we are going to err, let's err on the side of inclusion, not exclusion, if I may suggest.

This is important not only in determining policy. If these questions are brought into proper focus within the industry, various companies can take advantage of these investigations and the questions that you raise. Perhaps they already have, but I think it would be helpful to them as well as the public.

Mr. REED. Mr. Chairman, have I clarified the reasons I think the school bus escape is important?

I might also point out——

Senator BAYH. For buses of any width.

Mr. REED. That is correct.

We first raised this question after investigation of a bus accident at Baker, Calif. The Board called upon the Federal Highway Administration and the bus industry to change the basis of their requirements intended to insure escape from buses so that they are based upon performance tests of ocupants escaping from buses in all attitudes. This recommendation was repeated again in the Safety Board's report entitled, "Chartered Interstate Bus Crash, I–80S, at Beaver Falls, Pa."

As far as we know, no escape tests have been made other than those involving school buses referred to previously, and no escape performance standards have been established.

These results strongly suggest that all buses should comply with performance standards.

For the reasons stated, the Safety Board recommends that H.R. 4354 not be enacted until the completion of the Department of Transportation's studies and until the DOT has promulgated, and the bus industry has implemented, adequate safety standards. I should add that one member of the Board does dissent and favors enactment, and submit for the record Isabel Burgess' dissent from the position I am enunciating to you today. I offer her dissent statement for your consideration.

Senator BAYH. I ask unanimous consent that her statement be included in the record.

Mr. REED. I hope this information is useful in assisting your subcommittee in its work and assure you that the Safety Board is prepared to provide you with any additional information which you might find necessary. Again, I would like to thank you for this opportunity to testify today. My staff and I would be happy to answer any questions you or the committee members may have.

(The statement of Isabel Burgess referred to, follows:)

DEPARTMENT OF TRANSPORTATION,
NATIONAL TRANSPORTATION SAFETY BOARD,
Washington, D.C., February 14, 1972.

HON. BIRCH BAYH,
Chairman, Subcommittee on Roads,
Committee on Public Works, U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: This letter is in regard to your Subcommittee's hearings on H.R. 4354, a bill to amend section 127 of title 23 of the United States Code relating to vehicle width limitations on the Interstate System, in order to increase such limitations for motor buses.

A review of the testimony of the Honorable John H. Reed, Chairman of the National Transportation Safety Board, and that of General Benjamin O. Davis, Jr., Assistant Secretary of Transportation for Safety and Consumer Affairs, leads me to believe that the Department of Transportation and a majority of the Members of the National Tranportation Safety Board may have lost sight of the basic intent of H.R. 4354.

Obviously, safety is of great concern to everyone, and I certainly do not want to see unsafe buses—or any other unsafe vehicles, for that matter—travelling our nation's highways. If there is a need to revise the design of buses to make

them safer, and that need is supported by tests and actual experience, then it is certainly incumbent upon the Department of Transportation to apprise the bus industry of those changes required to eliminate these problems. However, I think it is unfair to withhold passage of H.R. 4354 at this time until everyone is completely satisfied that buses have been made as safe as possible. This satisfaction may not be attained for many years, and, as is the case with most things we do in life, we must reach the point of compromise.

The purpose of this legislation, in my opinion, is simply to put States not covered by the Grandfather Clause, which was included in legislation passed in 1956, on equal footing with States already operating 102" buses. By denying passage of this permissive legislation, the Congress would economically penalize those States not now authorized to operate 102" buses.

My position might be different if I were convinced that there is a clear and present danger associated with the operation of 102" buses. However, I cannot accept that conclusion since a review of accidents involving 102" buses does not indicate that a clear and present danger exists.

I believe H.R. 4354 should be enacted. I also believe that the Department of Transportation should continue its studies of ways and means to make buses safer. I am convinced that both of these purposes can be accomplished simultaneously.

I shall greatly appreciate your entering this letter in the permanent record of the hearings on H.R. 4354.

Sincerely yours,

(Mrs.) Isabel A. Burgess,
Member of the Board.

Senator Bayh. Let me ask two or three questions about the points that you have raised. First, though, I express the subcommittee's appreciation for the responsibilities you have and the way that you are carrying them out. Have you discussed this problem of bus escape, and the concern that you have about the design characteristics which you think might decrease safety in a wider bus, with the management of those companies that operate and manufacture this type of vehicle?

Mr. Reed. Yes, Mr. Chairman, as a Board we feel it is important to maintain a close contact with the industry. We have met with the National Association of Motor Bus Operators and have a fine working relationship with them. They brief us occasionally to update the state of the art as far as bus manufacture and operation are concerned.

We have discussed with them various problems we felt were of concern, and I believe they are aware of the views of the Board pertaining to some of the points raised today.

Senator Bayh. Has any effort been made to incorporate some of the suggestions you have made or to deal with criticisms you point out?

Mr. Reed. Yes, the bus operators and bus manufacturers have been responsive. I won't say they will always agree, but I personally feel they have a positive attitude in wanting to improve the level of safety on their buses.

Do you have a comment, Captain Foster, concerning response from the industry in relation to a number of our recommendations?

Mr. Foster. In the Baker, Calif. accident, the Board's recommendations were released on December 31, 1968. One was to NAMBO. Their response was that they acknowledged the receipt of our recom-

mendations and indicated that they would be in further correspondence with the Board.

We received a further reply indicating that they felt that performance standards and test procedures relative to escape capabilities of buses should be developed by an independent research group working under guidelines established by FHWA and with appropriate advice and assistance from both the administrator and intercity bus industry.

Senator BAYH. Is any study like that being undertaken now?

Mr. FOSTER. To the best of my knowledge, I don't believe so. We have had further response from them, however. In 1970, Greyhound Lines made a positive comment with respect to a Board recommendation that there be advice to passengers as to the location of escape windows. They have indicated that they have put decals in to advise passengers of the location of escape windows.

General Motors Corporation is very interested in methods of escape from buses after crashes. Their next line of intercity coaches will incorporate escape hatches. Windshields should be the push-out type to provide for emergency escape. This was the essence of the response from industry.

Mr. REED. Positive steps have been taken by segments of the industry to implement some of the Board's recommendations.

Senator BAYH. With regard to proposed research being conducted by an independent agency, do you think that is a reasonable suggestion? What is your position on it?

Mr. REED. I don't know if I quite understand the question.

Senator BAYH. Apparently the motorbus operators have suggested in response to the Board's recommendation after the accident at Baker that they thought an independent agency or independent group should study and recommend criteria for safe escape from buses involved in accidents. Is that an accurate interpretation?

Mr. FOSTER. Their specific response was that they felt that the information desired that would be used to determine performance standards and test procedures could best be determined through an independent research group working under guidelines established by FHWA and with appropriate advice and assistance from both the administrator and the intercity bus industry.

I read into this their desire to have detailed testing done under contract by an appropriate—that would be to my reading—organization approved by the industry. I would assume that it would be done in a fashion similar to most of the contract performance which is under the authority of NHTSA.

Senator BAYH. Do you think that is a good idea?

Mr. REED. I personally feel it is reasonable to have a Federal agency do the research and establish criteria. I see nothing wrong with this, although the bus industry could also establish standards of their own and this might obviate the necessity of a Federal regulation.

Senator BAYH. You point out the concern you have that the wider and the taller bus would be less safe. Is there any reason why the bus that is wider, per se, need be any taller?

Mr. REED. I would think that would be a matter of maintaining the center of gravity, the stability factor. If compensation factors are built into the design, there is no reason why it should not be as safe. I think what we are saying is that there should be designs to take care of the extra height and still be as safe as the present day buses.

Senator BAYH. Those who are suggesting very strongly that the legislation before us is adequate also claim that the wider bus is safer, the primary ingredients of that safety being a larger brake drum and more undercarriage capacity.

For example, the Greyhound chart indicates that total effective brake drum area in square inches in the 96-inch but is 1,909, whereas in the new model it is 2,116.

Do you have any thoughts on that?

Mr. REED. I would say there——

Senator BAYH. They also point out there would be a better suspension system.

Mr. REED. There is no reason why the 102-inch bus can't be safer than the present bus, especially with greater braking and better stability. It can be a safer bus. I think what we are saying primarily is we still don't know, and we need the results of these tests which are underway in the Department to be really sure.

Senator BAYH. There seems to be two concerns that you stress relative to the safety aspect of the wide bus. One is the height, which you fear would increase and would raise the center of gravity, thus increasing tipover possibility. Second is the escape problem.

Are those the two primary ingredients?

Mr. REED. Those are the two primary concerns we have.

Senator BAYH. Going again to the safety factor, is there any evidence in the studies you have made of bus accidents to show that a larger number of 102-inch buses have tipped over than 96-inch buses?

Mr. REED. I am not aware of any.

Mr. Schmieg, Chief of our Highway Division is here.

Mr. SCHMIEG. No, sir, we have not, and the record we get from FHWA doesn't give the widths or has not so far.

Mr. REED. It is my understanding that we have not investigated accidents involving 102-inch-wide buses.

Senator BAYH. Is that to say there have been no accidents with 102-inch buses?

Mr. REED. No, sir. Our charter is such that we have to be selective in the accidents we choose to investigate because of our limited manpower in this particular field. We select those where a considerable number of people have been injured or killed, those that are of national interest, or those from which lessons can be learned. We make recommendations which, hopefully, will eliminate that type of accident.

Senator BAYH. If, indeed, there is a safety problem with 102-inch-wide buses, and your organization is charged with responsibility of investigating those accidents that are significantly important, and if

there are no 102-inch-wide bus accidents which meet your criteria of significance, you haven't investigated them. At least as of today the reality of this presumed increase in accident potential has not been borne out.

Mr. REED. That is correct, not in the types of accidents that meet our criteria.

Senator BAYH. How many bus accidents do you investigate in a year?

Mr. REED. Not too many. It would not be over 3 or 4 a year.

Mr. SCHMIEG. About two a year.

Mr. REED. Not many because of our limited manpower. As you know, we investigate automobile accidents as well as bus accidents.

Senator BAYH. One last question.

Mr. REED. We only have seven people in the highway field full-time, so we are limited. We would like to do more.

Senator BAYH. I believe that the members of this committee, during the years of our distinguished chairman's leadership, have been greatly concerned about highway safety. We can be more responsible by urging the Administration and everybody else involved to provide your agency more resources so you can operate more effectively over a larger area.

Mr. REED. We are most eager to do that, and any help you can give us will be appreciated.

Senator BAYH. I am sure the chairman of the full committee will agree with me.

Senator RANDOLPH. May I interrupt at that point?

Senator BAYH. You can never interrupt, Mr. Chairman. Please proceed.

Senator RANDOLPH. Proceeding with the question of funds to do an adequate job. Have you made a request for those funds?

Mr. REED. Yes, we have made a request for funds.

Senator RANDOLPH. In what amount?

Mr. REED. Our request to the Office of Management and Budget was for a total budget of $10.3 million. We will provide a copy of the budget for the record.

(The budget referred to follows:)

NATIONAL TRANSPORTATION SAFETY BOARD,
DEPARTMENT OF TRANSPORTATION,
Washington, D.C., February 18, 1972.

HON. JENNINGS RANDOLPH,
Chairman, Committee on Public Works,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This letter is in further response to your question regarding the National Transportation Safety Board's budget submission to the Office of Management and Budget following my testimony before the Subcommittee on Roads concerning H.R. 4354.

By copy of this letter, I will also provide the Subcommittee Chairman, Senator Birch Bayh, with the same material.

If I can be of any further assistance, please do not hesitate to let me know.

Sincerely,

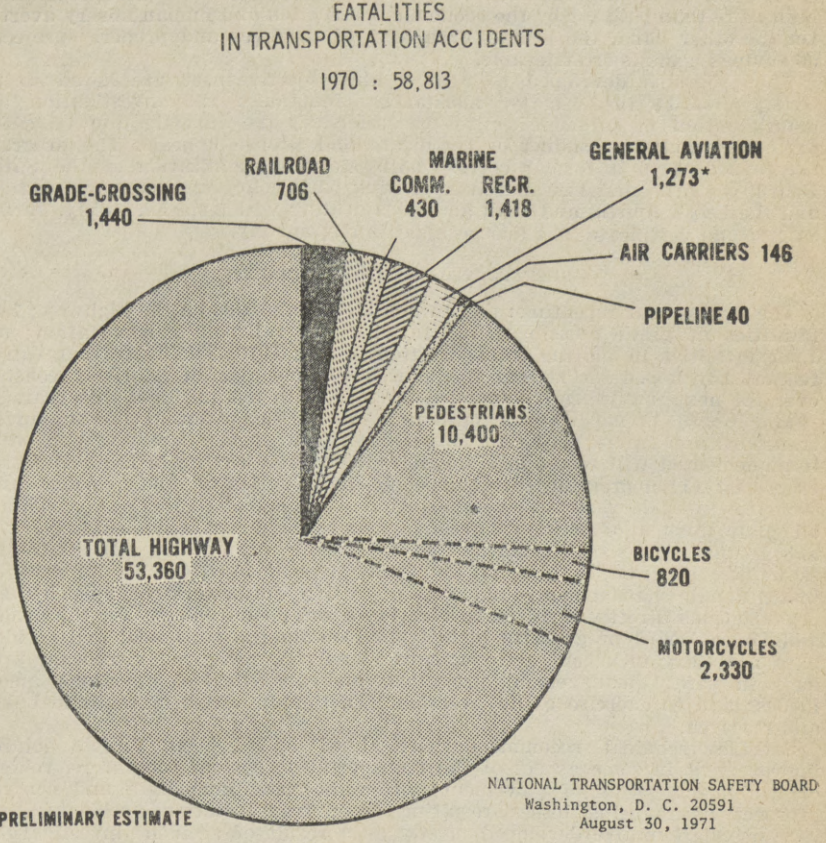
JOHN H. REED,
Chairman.

Enclosure

EXCERPTS FROM THE NATIONAL TRANSPORTATION SAFETY BOARD FY 1973 BUDGET SUBMISSION TO THE OFFICE OF MANAGEMENT AND BUDGET

SUMMARY AND HIGHLIGHTS

One of the most profound and pressing problems facing the nation today is how to improve transportation safety. The situation is alarmingly simple—how to reduce the individual fatalities that occur every day which, when added up, paint the tragic picture shown below:



Transportation accident-related deaths, according to the Statement on National Transportation Policy, are the sole cause of the increased probability of accidental death across the country. In fact, the actual magnitude of the loss of life due to transportation accidents over the past ten years is equivalent to the total destruction of the population of San Diego, California, or Denver, Colorado, or Cincinnati, Ohio, or Atlanta, Georgia.

Nor does the nation's anguish end with the deaths alone. To these deaths must be added 14,000,000 accidents, severe injuries to more than 2,000,000 persons, and economic losses surpassing $15,000,000,000 every year.

The National Transportation Safety Board operates in the service of the national goal to reduce this unconscionable loss, which has heretofore commanded limited resources and attention. It is the Board's responsibility, as well, to assure that the public is not slighted because of a desire to economize

at the expense of achieving major reductions in death, injury and property loss. The National Transportation Safety Board believes that its 1973 budget, though minimal, strikes the best balance between the need for economy and the overwhelming necessity to insure the public safety.

In this budget submission we have for the first time attempted to quantify to the extent possible the results we believe can be achieved—in terms of savings in lives and property loss—if the resources requested to carry out the programs described are made available. We expect during the coming year to refine and clarify these objectives further and to develop more effective means for measuring results achieved. In the interim, however, even if the objectives set are only 50% met, the additional cost of the programs requested will have been more than paid for by the economic destruction and human misery averted. On the other hand, the loss of even 50% of the lives and property projected as savings goals is irretrievable.

The programs developed to achieve the objectives set are keyed to the Safety Board's three major substantive functions: the investigation and determination of probable cause of accidents; the investigation of safety problems; and the conduct of certificate and license appeals. The programs are presented in a format corresponding to the organization of the Safety Board, with the first two activities dealing with policy and support functions, and the third, fourth, and fifth activities dealing with aviation safety, surface safety, and certificate and license appeals respectively.

SURFACE TRANSPORTATION SAFETY

The figures bear repeating: there were 53,360 fatalities on the highway; 1,440 fatalities at grade crossings; 706 fatalities in railroad transportation; and 1,782 fatalities in marine transportation during 1970. The most that can be realistically hoped for is that the figures will not remain relatively constant over the next few years if expanded programs are not initiated this year.

The Board is nevertheless optimistic about the potential of its surface transportation safety program. Three major new thrusts are proposed which if implemented will result in a tangible, identifiable saving in lives, and property loss: (1) a program to take specific direct action against accident losses occuring in each mode of transportation through conduct of a forensically adequate number of accident investigations by field staffs immediately available to investigate such accidents before evidence disappears; (2) a carefully structured program to identify and make recommendations to improve the institutional, management, and administrative framework of agencies and organizations directly involved in creating a safer environment for the modes; and (3) a Board program to identify and obtain the statistical and accident data necessary to permit accident causal analysis, review of significant problems in safety management programs, and analytical comparisons among modes; and to exercise of an oversight function in terms of statistical data and research.

Specific technical recommendations aimed at effecting direct, detailed improvement in some aspect of the transportation system (operators, vehicles or equipment, paths of movement) offer the most immediate and concrete prospect of reducing losses resulting from transportation accidents. Such recommendations are developed mostly as a result of accident investigations. But the Board has encountered major difficulties in exercising its accident investigation function in the field of surface transportation safety. The most serious problem is that Safety Board personnel cannot reach automobile, rail, and pipeline accidents at distant locations throughout the United States from Washington in key time to thoroughly investigate all aspects of the accident before key factual information is lost (vehicles moved and repaired, witnesses dispersed, accident scene cleared, etc.). To overcome this deficiency, highway, rail, and pipeline accident investigators will be placed in 11 strategic locations throughout the United States to assure prompt investigative response on significant surface transportation accidents.

The Safety Board has identified 30 significant institutional and management needs and problems, some of which apply to all the modal agencies and others

to individual areas of transportation. While the impact on losses, if these problems are not corrected, is substantial and the effects are long lasting, the process of correction itself is a long-term one. Nevertheless, the Board's program in this area calls for an increase in the number of institutional and management recommendations made primarily through special surface safety studies. Particular emphasis will be given to responding to the need to improve the administration of new safety authorities in their initial stages.

Another severe difficulty faced by the Safety Board is its inability to perform reviews and analyses of typical accident data. In great part this is due to the lack of the data itself. Thus, the program proposed by the Board in this area involves establishment of a special data analysis staff. The work effort of this staff will consist of reviews of statistical data programs of the modal agencies, reviews of data available to the modes (or which should be available to the modes), reviews of modal research programs and independent evaluation of individual research results, and independent analysis of accident data held by the modes to reveal new problems.

If the Board's surface program and budget recommendations are not adopted, the piecemeal approach to surface transportation safety problems will be perpetuated. NTSB's programs, on the other hand, will result in comprehensive accident investigation and safety analysis, major institutional changes, a systematic surface safety program and most importantly, the following specific reductions in future transportation accident losses:

A saving of 5,000 highway fatalities by 1974 representing a minimum of $215,000,000 in costs relating to this loss of life;

A saving of 14,838 accidents and $860 million in total damage costs from railroad derailments over a 10-year period;

A reduction to zero of the number of losses caused by poor packaging of passengers in crashes involving newly built trains or cars, both in railroad and rail transit;

A saving of 720 lives per year in grade-crossing fatalities, at the end of 15 years;

The prevention of 3 major ship casualties, 60 to 80 fatalities, and one major ecological or environmental disaster per year in marine transportation;

The prevention of 380 accidents and 10 fatalities per year resulting from pipeline accidents; and

A saving of 1,000 accidents and 55 fatalities per year in hazardous materials accidents.

CERTIFICATE OR LICENSE APPEALS

The limited resources in the National Transportation Safety Board's third activity, that of certificate or license appeals, also presents an alarming problem. The workload for the Office of Hearing Examiners has significally increased. Fifty percent of this increase is due to the fact that NTSB is now the only point of appeal in aviation cases since the FAA no longer has a hearing procedure. The result of this increased workload is a year's backlog in certificate and license appeals. The unacceptable time lag in conducting these appeals will adversely affect the ability of a certificate or license holder to earn his livelihood . This selfsame delay in reviewing an appeal may imperil the public safety by not taking immediate action against a certificate or license holder who is irresponsible.

The National Transportation Safety Board's budget submission for FY 1973 of 471 positions and $10,480,000, an increase of 182 positions and $3,330,000 over FY 1972, represents what we believe are the minimum resources required to undertake the program goals outlined above.

Included are an increase of 85 personnel for a total of 278 in the aviation function; an increase of 68 personnel for a total of 102 in the surface function; an increase of 2 personnel for a total of 14 in the appeals function; and an increase of 27 personnel for a total of 77 in the policy and support functions.

These programs and positions, which we have justified in the following activities will, if implemented, provide a substantial beneficial impact on transportation safety and will result in significant major safety divdends.

II. FINANCIAL REQUIREMENTS

	NTSB Total			
	Fiscal year 1972, actual	Fiscal year 1972, estimate	Fiscal year 1973, estimate	Increase
Positions	281	289	471	182
Permanent man-years	264.8	274.6	370.9	96.3
Temporary man-years	7.0	4.0	8.0	4.0
Amount	$6,375,700	$7,150,000	$10,480,000	$3,330,000

Breakdown of increase:

Increased salary costs:	
Annualization of fiscal year 1972 staff expansion	$89,900
Annualization of fiscal year 1972 within-grade increases	50,600
For fiscal year 1973 within-grade increases	43,600
Increased overtime and premium pay requirements	28,000
2 less days pay in fiscal year 1973	(45,000)
Annualization of positions approved in prior years	73,700
Decrease in average grade .3 for fiscal years 1972 and 1973	(75,500)
Increased cost of temporary and intermittent employees	31,000
Increased cost of military reimbursement	6,000
Increased cost of witnesses	1,000
Total	203,300
Adjustments in current program due to increased cost and workload:	
Annualization of fiscal year 1972 staff expansion	16,700
Increase in regular travel and automobile rental	60,000
Increased cost of transportation of household goods	10,000
Increased cost of rent and communications	31,000
Increased cost of hearings	12,000
Increased cost of government support services	55,900
Increased cost of transportation investigations	42,300
Increased cost of printing and photographic services	88,000
Increased cost of supplies	8,000
Increased cost of laboratory equipment	219,000
Total	542,900
Increased costs associated with additional positions:	
Personnel compensation and benefits for ½ man-year	1,405,900
Travel (includes training ($45,000), rent of commercial vehicles ($24,000), change of station ($37,500), and basic travel ($109,500))	216,000
Transportation of things (includes cost of transportation of investigation equipment ($10,000) and movement of personal property or change of station ($102,000))	112,000
Rent, communications, and utilities (increased cost of communications, mail service, etc., for additional personnel)	105,000
Other services (increased cost of additional government and nongovernment services such as payroll, health, wreckage removal, analysis, guard service, hearing costs, visuals, DOT support and aviation safety studies)	443,600
Printing and reproduction (increased cost due to increased production)	145,000
Supplies ($100 per person)	18,200
Equipment ($900 per secretary, $900 per investigator, $400 per GS–13 and under, $800 per GS–14 and over)	138,100
Total	2,583,800
Grand total	3,330,000

SUMMARY OF PROGRAM REQUIREMENTS BY ACTIVITY

	1971 actual			1972 program			1973 estimate			Difference		
	Permanent positions	Man-years	Amount	Permanent positions	Man-years	Amount	Permanent positions	Man-years	Amount	Permanent positions	Man-years	Amount
Policy formulation, legal assistance, and information services	24	23.4	$574,800	24	23.8	$609,200	35	29.3	$755,600	+11	+5.5	$146,400
Program execution and support	27	25.3	693,600	26	25.5	745,700	42	33.5	893,700	+16	+8.0	148,000
Investigation of aviation accidents and safety problems	188	177.3	4,223,600	193	183.8	4,716,500	278	231.0	6,555,700	+85	+47.2	1,839,200
Investigation of surface accidents and safety problems	32	28.8	641,500	34	32.0	794,900	102	66.6	1,895,700	+68	+34.6	1,100,800
Certificate or license appeal	10	10.0	242,300	12	9.5	283,700	14	10.5	379,300	+2	+1.0	95,600
Total	281	264.8	6,375,800	289	274.6	7,150,000	471	370.9	10,430,000	+182	+96.3	3,330,000

NATIONAL TRANSPORTATION SAFETY BOARD FINANCIAL DATA TABLE

(In thousands)

	Unobligated beginning balances available			Budget authority			Obligated balances end of year			Outlays		
	1971	1972	1973	1971	1972	1973	1971	1972	1973	1971	1972	1973
Federal funds:												
Salaries and expenses	$6,374	$7,150	$10,480	0	0	0	$6,399	$7,150	$10,480	$447	$497	$877	$6,292	$7,100	$10,100
Subtotal (Federal)	6,374	7,150	10,480				6,399	7,150	10,480				6,292	7,100	10,100
Trust funds:												
Donations				$28	$28	$28						
Subtotal (trust)												
Grand total	6,374	7,150	10,480				6,399	7,150	10,480				6,292	7,100	10,100

NATIONAL TRANSPORTATION SAFETY BOARD EMPLOYMENT DATA TABLE

	Positions			Permanent man-years			Other man-years			End of year permanent employment		
	1971	1972	1973	1971	1972	1973	1971	1972	1973	1971	1972	1973
Appropriation:												
Salaries and expenses	281	289	471	264.8	274.6	370.9	7.0	4.0	8.0	274	275	460
Grand total	281	289	471	264.8	274.6	370.9	7.0	4.0	8.0	274	275	460

Highway Safety Division—Permanent positions

1971 actual	11
1972 estimate	11
1973 estimate	19
Increase	8

Highway safety covers 91% of losses from transportation accidents and the resultant death, injury and property loss. The highest losses in relation to exposure occur in the highway mode. The passenger fatality rate per hundred million passenger miles is far higher for automobile than for the total of all rail, bus, and air carrier transportation.

1970 Passenger Death Rate Per 100 Million Passenger Miles

Automobiles	2.10
Buses	.10
Railroads	.09
Scheduled Air Carriers	.00

In addition, the fatality rate ber billion tons of freight transportation is four times as high for highway freight transportation as for the other surface modes.

This problem will be attacked through the investigation of highway accidents and highway safety problems. The Safety Board's program in FY 1973 provides for the adequate investigation in a timely manner of a significant number of highway accidents, determining the cause of these accidents, and developing and publishing recommendations to prevent their recurrence. A key aspect of this investigation program is the implementation of a highway investigation field staff to provide immediate access to the accidents, as the accident scene is cleared very rapidly in highway accidents. In addition significant institutional, management and administrative safety problems in the highway safety area will be analyzed and special studies will be developed which include recommendations to correct these problems. A major deficiency in this area, in the past, has been the lack of staff to analyze the available statistical data which offer the potential for uncovering many new safety problem areas. This deficiency will be corrected through the requested safety data analysis staff. The workload and staffing required to accomplish this program in FY 1973 is as follows:

WORKLOAD

Indicator	Professional man-hours to accomplish 1 work unit	Number of units of work accomplished			Professional man-hours reqts.		
		FY 1971 (actual)	1972 (estimate)	1973 (estimate)	1971	1972	1973
Accident investigation—major	600	5	5	10	3,000	3,000	6,000
Accident investigation—other	40	10	10	20	400	400	800
Observation—other agency investigations	25	20	20	25	500	500	625
Analysis of other agency accident reports	2	530	530	750	1,060	1,060	1,500
Special safety studies	400	5	5	9	2,000	2,000	3,600
Recommendations	2	74	100	225	148	200	450
Public hearings—accidents	300	2	2	6	600	600	1,800
Symposiums—safety issues	300	0	2	2	0	600	600
Technical conferences	8	12	12	15	96	96	120
Liaison—other agencies	2				700	700	700
Monitor DOT safety and research programs	25	30	30	50	750	750	1,250
Safety goal studies	50	0	10	12	0	500	600
Recommendation implementation meetings	50	0	5	8	0	250	400
Public inquiries		1,000	1,000	600	600	600	600
Administration and other workload					2,600	2,600	2,600
Professional					12,454	13,856	21,645
Clerical					5,400	5,400	8,100
Total					17,854	19,256	29,745
Workload man-years					9.9	10.4	16.5
Available positions					11	11	[1]19

[1] Includes an increase of 8 positions which it is assumed will be available on a half-year basis only.

STAFFING PLAN

	Fiscal year 1972 program	New positions	Fiscal year 1973 program
Positions by title and grade:			
Division Chief, GS-15	1		1
Highway Safety Specialist, GS-14	1	1	2
Field Coordinator, GS-14		1	1
Automotive Engineer, GS-14	1		1
Do		1	1
Traffic Engineer, GS-14	1		1
Highway Structural Design Engineer, GS-13	1		1
Accident Analyst, GS-13		1	1
Transportation Specialist, GS-13	1		1
Highway Safety Specialist, GS-13	1	1	2
Highway Safety Specialist, GS-12	1		1
Secretary, GS-07		1	1
Secretary, GS-05	1	1	2
Clerk-typist, GS-05	2	1	3
Total	11	8	19

To undertake this program in FY 1973 will require eight additional positions: a field coordinator, two highway safety specialists, an automotive engineer, an accident analyst and 3 additional clerical support positions. The field coordinator will train, assist and direct the 17 additional field personnel requested in the highway area in the investigation of accidents, revew of other agency activities and writing of accident reports. This position will assure that the investigation activities of the field function are coordinated with the accident investigation and safety program analysis effort of the Washington staff. The expanded accident investigation and safety program efforts in the form of major investigations, assistance to field investigators on other investigations, and special studies will require three additional investigative positions, two highway safety specialists and an automotive engineer. These activities are estimated to increase approximately 100% in FY 1973.

The accident analyst is needed to review and analyze for cause the accident reports from the field, the increased number of major and others reports from the Washington staff, and the 50% increase in accident reports from other agencies. In addition he will assist the safety management analysis staff by providing a bridge between the mutually reinforcing aspects of accident investigation work and the analysis of transportation problems in the institutional, management and administrative area.

Three additional clerical positions are needed to assist the professional staff with the estimated 100% increase in reports and studies projected. Without adequate clerical support the projected output cannot be accomplished, because highly paid professional staff must then perform such functions as filing, searching for data and copying in lieu of their analysis and investigation duties.

Senator RANDOLPH. Thank you, Mr. Reed. As both of us know, this is a jurisdictional matter in a sense. This would be the Commerce Committee rather than the Public Works Committee, but we do have an intense interest in developing the facts that might bear on the subject matter we have before us today. I want to ask you, Mr. Reed, if you feel that at this point it is advisable for our subcommittee, chaired by the able Senator from Indiana, to continue to move, in an earnest manner to resolve the conflict which seems to have arisen in certain testimony?

Mr. REED. Mr. Chairman, it is my feeling that the Department should be allowed to continue these tests. I would not be in a position to say what they need for additional resources.

Senator RANDOLPH. I have mentioned, Mr. Reed, that the Commerce Committee is primarily concerned with the authorization of these funds. I do believe, Chairman Bayh, that it would be appro-

priate, either for you or the committee through me, to address a letter to Chairman Magnuson calling attention to the testimony given today and indicating, if you so desire, and I certainly would desire, to pledge our cooperation in reference to making a case for the funds which you believe, Mr. Reed, must be provided if you are to be able to come here and give testimony based on facts rather than partial facts or assumptions. Is that correct?

Mr. REED. That is correct, Mr. Chairman. It would be extremely helpful to the Board to have additional resources to do a better job for you and the Congress.

Senator BAYH. Mr. Chairman, I think that is an excellent suggestion. May I suggest that we frame such a letter. I directed a similar inquiry to Governor Reed when he was before us last May relative to highway safety programs. It impressed me then in a broader sense, with respect to their investigation of significant highway accidents, not only those involving buses, that here was an agency with the expertise to examine and evaluate accidents and to make a total objective appraisal of what had happened and why there might have been a loss of life. Since they lacked the resources to do everything necessary, I certainly would think this would be a very salutary step to take.

Senator RANDOLPH. Mr. Chairman, I don't want to question Mr. Reed further. I come into the hearing today at this point so I could be here while you were testifying because I have the utmost confidence in the work that you and the persons within your structure have brought forth in the field of safety in many aspects of our transport life.

Mr. REED. We certainly greatly appreciate that comment, Senator Randolph.

Senator BAYH. Thank you very much, Mr. Chairman, for your contribution and your presence. Despite your busy schedule, I know how interested you are in the field of highway safety and how much cooperation you have given to me as the subcommittee chairman.

One last question, Mr. Reed. As I pointed out the increase in brake drum area between the 96-inch and 102-inch wide bus, I should also point out, as I did previously, to the company involved at the time its representative testified, that there was a listed decrease from 800 square inches to 754.6 square inches in total road contact area of tires.

Now, in your judgment, which is the most important, the contact area of tires or the brake drum area?

I am reading these statistics from a fact sheet given to the subcommittee by the company involved.

Mr. REED. In my judgment, they would be closely interrelated; that is, the capacity of the brake drum in connection with the tread that is gripping the highway. I would like to call upon Mr. Schmieg, who is our technical expert in this field, to comment further.

Mr. SCHMIEG. It is true that when you increase the brake drum capacity, if you decrease the gripping or coefficients of friction of the tires, you gain nothing. So if they stay the same and you increase the brake drum, you have gained something. If you increase both the tire gripping area, the footprint, and the braking capacity, then you have gained considerably.

The thing about the bill is that we feel there should be some controls to assure that this is done because, as the Governor pointed out, in the Trailway bus that the Board used, all they did was put a larger bus body, 102-inch bus body on 96-inch axle, with the same brakes and suspension, and as a result they gained nothing but economical benefits. No safety value was gained at all. It was lost.

Senator BAYH. How was that particular bus used? Was that for interstate or intrastate purposes?

Mr. SCHMIEG. That was an interstate bus, the Silver Eagle.

Senator BAYH. Have you any data to show what percentage of the wide buses now in use, which according to the General's testimony now total about 23,000, have involved significant structural changes providing increased safety features or additional safety benefits?

Also what percentage involved just taking the old chassis and putting a new facelifting job, a new body on it?

Mr. REED. We don't have that information, Mr. Chairman, because many, of course, are intrastate buses and we do not have these statistics.

Senator BAYH. General, do you have that information?

Mr. DAVIS. Sir, if I may, I would like to furnish it for the record.

Senator BAYH. Could you furnish that for us?

Mr. DAVIS. I will.

(The information requested follows:)

Question: Do you have any data to show what percentage of wide buses now in use—the General told us there were 20,000 total—involves significant structural changes with the increased benefit or possible increased benefit of additional safety and what percentage involved just taking the old chassis and putting a new face-lifting job, a new bottom on it?

Answer: There are approximately 22,000 wide buses currently in use. Of this total, 147 are coach-type buses used in intercity operations by Greyhound and Trailways. Those remaining are transit-type buses generally used in intracity operations. The information requested is not available for the intracity transit-type buses.

The intercity coach-type buses are those for which we have the data requested. Of the 147 wide buses engaged in intercity operations, 45 consist of the 102-inch body on the 96-inch chassis. The remaining 102 intercity buses reflect a complete structural change. Whether or not the structural change embodies possible safety benefits has not yet been ascertained.

Senator BAYH. I think this question is important if we are going to evaluate benefits of the wider bus.

Gentlemen, I think that is all we need at this time. You have been very kind, and we will follow through on the chairman's suggestion here to see if it is possible to secure more resources. As I said last May, I think we ought to strengthen your hand any way we can.

Mr. REED. Thank you very much, Mr. Chairman.

Senator BAYH. The next witness is Mr. Joseph Pauquette, director of traffic operations, New York State Thruway Authority.

We are glad to have you with us.

STATEMENT OF JOSEPH E. PAUQUETTE, DIRECTOR, TRAFFIC OPERATIONS, NEW YORK STATE THRUWAY AUTHORITY

Mr. PAUQUETTE. Thank you. As you have already noted, I am Joseph E. Pauquette, Albany, N.Y., director of traffic operations for the New York State Thruway Authority, operator of the 559-mile New York State Thruway system.

The thruway system, which began its toll operation on June 24, 1954, is the longest toll highway network in the United States. It extends through the population and economic heart of the Empire State, generally serving some 85 percent of New York's population residing between New York City and Buffalo, with expressway connections to New Jersey, Connecticut, Massachusetts, Pennsylvania, and Canada.

Senator Birch Bayh, chairman of your Subcommittee on Roads, on January 19 formally requested that the thruway authority testify before this hearing of your subcommittee, specifically on the operating experiences the thruway has had in the operation of 102-inch-wide buses on the superhighway.

I have been designated by Chairman R. Burdell Bixby of the thruway authority and by John A. Tiesler, the authority's executive director, to represent the authority at this hearing and to present factual accounts of our operating experiences with this relatively new type of intercity bus.

Initially, I would emphasize that the thruway authority is not appearing here today to promote the business or economic interests of any particular segment of the transportation industry or of any particular business concern. I appear on request of your subcommittee chairman to provide the subcommittee members and staff with a factual account of the operating experiences with the 102-inch-wide buses.

I would interject at this point that highway safety—the maintenance of the thruway system's excellent safety record and a continuous effort to develop new ways and means of improving that record—always are the prime considerations in any programs undertaken by the authority board and its staff. Any experiments, any suggestions, any programs that even hint at the possibility of new or additional hazards to our patrons are not even given serious consideration.

The thruway system has enjoyed excellent overall safety records since its toll operations began almost 18 years ago. I note, for instance, that the thruway's fatality rate during 1971, a 12-month period when more than 4 billion vehicle miles were traveled on the facility, was only 1.69 for each 100 million miles—marking the 3d best year since our operations started back in 1954. This rate may be compared to a mark of 5.0 for U.S. highways generally and a New York State rate of 4.7 in 1970, the last year for which comparative statistics are available at this time.

The thruway authority was created in 1950 by the New York State Legislature to build, operate, and maintain the 559-mile thruway system on a self-supporting basis without recourse to public tax funds, either Federal or State, for its basic financing or its annual costs of operation and maintenance.

In creating the thruway authority, the New York State Legislature specifically directed that the thruway system should be operated for the "benefit of the people of the State of New York for the increase of their pleasure, convenience and welfare, for the improvement of health, to facilitate transportation and for their recreation and commerce and for the common defense."

Under this broad directive, the thruway authority and its staff have through the years concerned themselves with promoting the

flow of commerce throughout the Empire State and throughout the Northeast, have encouraged new techniques and procedures that were designed to make all types of highway travel more convenient and particularly more safe for the public and, in fulfillment of their economic objectives, to promote a healthy growth in traffic and revenue over the thruway system.

It was with these broad objectives in mind that the authority's executive staff in June 1969, entertained a formal request by The Greyhound Corporation for the experimental use by that company of a relatively new type of intercity bus on the thruway system.

The only question concerning the new type of vehicle was the fact that it was 102 inches wide, or 6 inches wider than the 96-inch limit generally allowed on Federal and State highways. Within its jurisdictional powers, however, the thruway authority did have the right to permit travel by the wider vehicle under a special hauling permit procedure (applicable to overdimensional and overweight vehicles), and therefore its basic concerns in considering the Greyhound request revolved about operational needs of such vehicles to serve the public, their overall safety, and incidentally about the authority's continuing objectives to promote travel over the thruway system.

Safety was the most important consideration, with public convenience also of major interest.

Representatives of The Greyhound Corporation demonstrated to members of the authority's executive staff that the 102-inch-wide bus, because of its modest increase in width, permitted the incorporation of a number of safety features not practical on the more common 96-inch vehicle. These included a more sophisticated air-suspension system that the Greyhound personnel contended resulted in greater stability of the vehicle, improved steering and handling features and higher resistance to turnovers.

They also noted that the wider width of the vehicle permitted an increase in the vehicle's brakeshoe area, with resultant improvements in braking characteristics, the use of larger tires to promote better road adhesion, better steering, greater skid resistance, and more effective braking, and other safety features involving better driver visibility and increased passenger safety.

The Greyhound personnel also emphasized that the greater vehicle width would permit the use of wider passenger seats and greater aisle width, both conducive to more passenger comfort and convenience.

Finally, the Greyhound representatives reported that two models of their new 102-inch-wide bus had been operating for 2 years and had traveled more than half a million miles without operating problems between New York City and Chicago via the New Jersey Turnpike, the Pennsylvania Turnpike, the Ohio Turnpike, the Indiana Toll Road and the Chicago Skyway. They also noted that 102-inch-wide buses already were permitted for intracity operation in many localities.

Following an intensive staff evaluation, the thruway authority's executive staff recommended to the three-member thruway authority board that the 102-inch-wide buses be permitted to travel on the New York Thruway System under an annual special hauling permit to permit practical evaluation of such vehicles. The request by The

Greyhound Corporation was approved on November 17, 1969, and a formal permit was issued by the authority's department of operations on November 24, 1969, covering the period from December 1, 1969 to November 30, 1970.

During the first year of operation, a total of 1,166,849 miles was traveled by the 102-inch-wide buses on the thruway system without a single accident or incident of any kind. Field observations by members of the authority staff and field personnel and by members of State Police Troop T, which patrol the thruway, indicated that the wider coaches presented no traffic, operation or safety problems. It was also clear that the wider coaches prompted no negative reactions from other motorists since we had no indication by other patrons that they had even noticed the wider units.

Based on the obvious success of the initial permit period, The Greyhound Corporation was permitted to renew its special hauling permit through December 31, 1971. During this period, the wider coaches traveled 1,676,977 miles on the thruway system with similar success. On February 5, 1971, however, a passenger vehicle was involved in an accident with one of the wider buses when the car went out of control as it passed the bus and struck the right side of the coach. The police report of this incident attributed the cause to driver inattention by the operator of the passenger car.

In conclusion, I am pleased to report that the demonstrated operational success of Greyhound's 102-inch-wide bus to date has prompted the thruway authority to renew the company's special hauling permit through the calendar year 1972. This permit was issued with the approval of the authority board on December 30, 1971.

During the coming year, the thruway authority staff and its field personnel together with members of State Police Troop T will continue their comprehensive evaluation of the operation of the 102-inch-wide bus, pending actions either by Congress or by the New York State Legislature in determining future operations of such vehicles on highways generally.

Thank you.

Senator BAYH. Thank you very much. I appreciate your taking the time to prepare your statement and to appear here. Let me congratulate you on behalf of the committee for the excellent safety record that the New York Thruway has compiled over the last several years.

From your testimony, I think it is fair to imply that the 102-inch-wide bus which has been used on the New York Thruway has not been involved in many accidents and that its safety record, at least as you see it, cannot be questioned?

Mr. PAUQUETTE. That is right. We think the negative record so far as accidents speaks for itself.

Senator BAYH. You say that "during this period, the wider coaches traveled 1,676,977 miles on the thruway system," and you point out that there was only one accident involving one of the wider buses. This occurred when a car went out of control as it passed the bus and struck the right side of the coach. According to the State police report, the operator of the bus was not involved.

Was there any evidence that the blast effect, about which some have expressed concern, was involved in that particular accident?

Mr. PAUQUETTE. There is no indication on the report that that was a factor.

Senator BAYH. Do you believe that if it had been a factor, it would have been included in the report?

Mr. PAUQUETTE. I would think that it would have to be part of the description of the accident, yes.

Senator BAYH. Do you have any comparable statistics showing the miles traveled on the thruway by 96-inch buses and the number of accidents that they have been involved in over that same 2-year period?

Mr. PAUQUETTE. No, we would not make the distinction between the two types of buses.

Senator BAYH. May I suggest that you already have.

In your testimony you testified that during 2¾ million miles traveled on the thruway by the 102-inch bus there has only been one accident.

If that is the case with 102-inch buses, are there no statistics on the 96-inch buses using the thruway? If so, what is their accident record?

Let me ask why you would have detailed statistics on 102-inch buses but not on 96-inch buses.

Mr. PAUQUETTE. What I specifically addressed myself to was that this was the only accident involving the 102-inch bus.

Our accident figures on other buses, I am not prepared to address myself to today. I don't have any figures based on that.

Senator BAYH. Does the 2¾ million miles reflect the entire bus mileage on the thruway during that 2-year period, or is it just for the wider bus?

Mr. PAUQUETTE. That is just the wide bus.

Senator BAYH. Far be it from me to suggest how you should carry out your duties, but I have certain responsibilities as far as this committee is concerned. Let me ask you again why it is possible to have data relative to the 102-inch bus but not have it on other buses?

What good could come from compiling accident data on just one kind of bus?

Mr. PAUQUETTE. For purposes of this report, we addressed ourselves to the 102-inch-wide bus. However, other accident data would be available, and we would be glad to make it available to you.

Senator BAYH. I wish you would, please. It really is pertinent to the credibility of the statistics that you present. I know you would not have any reason, nor am I suggesting that you would, to present loaded statistics, but we certainly would not want that inference to be left, either. It is possible that someone might draw such a conclusion.

So I would like to know the total number of miles traveled by all buses on the thruway during that same 2-year period, and also to have the same kind of accident record report on the other types of buses so that the statistics be put in proper perspective, if you will, please.

Mr. PAUQUETTE. Sure, we can make those figures available.

(Mr. Pauquette subsequently supplied the following information:)

Senator Birch Bayh, the Sub-Committee Chairman, had a number of questions, two of which I was unable to answer immediately.

The first question concerned detailed accident and mileage figures for the normal 96 inch wide buses. According to our records there were forty-one (41) accidents in 1970 and fifty-three (53) accidents in 1971 on the Thruway in which a bus was involved. There is no indication in our reports that any of these accidents involved other than the normal 96 inch wide vehicles, except for the one that occured on February 5, 1971 and which I alluded to in my testimony on February 14, 1972.

Unfortunately, we are unable to supply you with total mileage figures for all the buses that use the Thruway. Our bus toll callification, which we would use to obtain this information, includes other vehicles not identified as buses.

The second question on which Senator Bayh requested clarification involved a difference in tire surface to improve road adhesion. My testimony at the hearing on February 14, indicated that the wider buses would have larger tires to promote better road adhesion, while a Greyhound representative reported at the previous hearing in December, 1971 that there is smaller road contact with the wider buses.

I obtained information from the Greyhound Corporation that their representative was referring to the Scenicruiser which has 10 wheels, and would obviously have more tire contact with the road surface than the 102 inch wide Supercruiser, which has only 8 wheels.

Since there were only 1,000 Scenicruisers produced in 1954, which are presently being replaced, along with all other models having only 8 wheels, the majority of the replacement vehicles will in fact have a greater tire-to-road surface contact.

The reason my testimony differed from the Greyhound representative was due to the fact that my figures compared an 8 wheel Supercruiser to an 8 wheel standard bus, while the information presented by Greyhound at the December hearing included a comparison to the 10 wheel Scenicruiser. I trust this will clarify the difference.

Senator BAYH. As the director of traffic operations for New York State Thruway Authority, how did you happen to conduct a study on the 2 years of operation of just one type of bus?

Mr. PAUQUETTE. We reviewed our experience with 102-inch-wide buses specifically, at your invitation to appear here today.

Senator BAYH. The staff of the committee asked you to do this. I want it to be made clear that we asked you to make this study.

Mr. PAUQUETTE. Yes, we were responding to your invitation.

Senator BAYH. All right. I was fearful that perhaps my questioning might have caused some persons to infer otherwise. I think the record should be made clear that this summary of statistics resulted from our request.

Now, let me broaden that request, if it is not too inconvenient.

Let me also ask about one part of your testimony relative to the safety features incorporated in the wider bus which are the 96-inch vehicle Bus company officials reported to you that wider width vehicles permitted increased vehicle brakeshoes, the use of larger tires to promote better road adhesion, better steering, greater skid resistance, higher resistance to turnover, more effective braking and other safety features.

The only information that has been made available to this committee—and I should point out, parenthetically—inasmuch as there are some members of the corporation involved present, that if this is erroneous, we would like to have other data for the record—the only information we have shows that, indeed, while there is an increased brake drum area, there is also a smaller road contact area for tires.

Do you have any information to the contrary?

I am referring now to a comparison sheet given to us by the president of the corporation involved, who testified in support of the

wider bus that it would be safer. Do you have any information about this point?

Mr. PAUQUETTE. The Greyhound people made available to us this information which was used in making our original determination. I am unable to explain why the information they gave you was different from what they gave us.

Senator BAYH. Could you give us a copy of that information?

Mr. PAUQUETTE. Surely.

Senator BAYH. Let me ask unanimous consent that the staff be given permission to revise this record if this information that I have is incomplete. There is no intent to prejudice the case for these buses. But the facts before us, at least one set of statistics, indicate that while one safety factor might be increased another appears to be decreased. I don't know what the relative effect safety wise would be. Certainly if the wider vehicle can travel 2¾ million miles with only one acident not related to the operation of the bus, that is a pretty good safety record.

We want to be sure this is based on actual fact and evidence.

Thank you, Mr. Pauquette. You have been very patient and helpful. If you could get that other data for us, it would help.

We regret any inconvenience you may have been caused by delay, and we appreciate the fact that you would accept our invitation not only to testify but also to compile the study on the wider bus.

Mr. PAUQUETTE. Thank you. We appreciate the opportunity.

Senator BAYH. Thank you.

We will recess this morning, pending the call of the Chair if it should develop that other hearings are necessary.

We extend our appreciation to all of you who have joined us this morning.

(Whereupon, at 12:38 p.m., the subcommittee recessed, subject to the call of the Chair.)

APPENDIX

Responses From States Permitting Operation of 102-inch Wide Buses Under the Grandfather Clause of the 1956 Act

COLORADO

STATE OF COLORADO,
COORDINATOR OF HIGHWAY SAFETY,
Denver, Colo., February 14, 1972.

SENATE COMMITTEE ON PUBLIC WORKS,
New Senate Office Building, Washington, D.C.

GENTLEMEN: Senator Bayh, Chairman of the Subcommittee on Roads, recently made inquiry to this office concerning the operation of buses with widths of 102 inches. Colorado is one of nine states permitting use of buses 102 inches wide under the "grandfather clause" of the 1956 Highway Act. Operation of the wide bus is authorized in Colorado Revised Statutes 13–5–119(S):

"The total outside width of buses and coaches used for the transportation of passengers shall not exceed eight feet six inches."

The Denver Metro Transit System owned by the City and County of Denver operates about 150 buses of this width. Their use is generally confined to the urban street system. The DMT buses occasionally use the Interstate system as a means of getting to the end of their route and on express trips. The operation department of DMT informs me that it is their opinion that no additional traffic hazards are imposed by the use of the 102 inch bus.

Continental Trailways is the only carrier in Colorado using the 102 inch buses in intercity service. These people use the wide bus on both the Interstate system and other Federal-aid highways in Colorado and other western states. R. F. Berndt, General Manager of Continental Trailways, states that the company has had no trouble with accidents on account of width.

Colorado accident records do not show width of passenger buses involved in accidents, thus documentation of the foregoing statements from state records is not possible. The Colorado State Patrol expressed no opinion either for or against the use of these buses.

Sincerely,

CORDELL SMITH,
Coordinator of Highway Safety.

CONNECTICUT

STATE OF CONNECTICUT,
DEPARTMENT OF TRANSPORTATION,
BUREAU OF HIGHWAYS
Wethersfield, Conn., February 3, 1972.

Re 102'' Wide Buses.

MR. CLARK NORTON,
% Senate Committee on Public Works,
4202 New Senate Office Building
Washington, D.C.

DEAR MR. NORTON: With regard to your recent inquiry relative to information pertaining to our experience with the operation of 102'' wide buses on our highway system. I am sorry to state that there is no specific information available relative to their operation in our State.

71–954—72——21

Connecticut Statutes limit the width of any vehicle operating on Connecticut highways to 102 inches. Therefore, specific information pertaining to vehicles below the statutory limitations has not been particularly noted. It is possible to extract, from our accident records system, accident involvement regarding buses, however, there would be distinction as to the width of the buses involved and the necessary computer programs that would have to be written to extract this data would not be available until well after your upcoming hearing date.

I am sorry I cannot give you any definite information on this, however, if you have any additional questions, please feel free to contact me again.

Very truly yours,

NORMAN C. BOOTH,
Governor's Representative.

HAWAII

HONOLULU, HAWAII.

Hon. BIRCH BAYH,
Chairman, Senate Committee on Public Works,
New Senate Office Building, Washington, D.C.

Regarding your hearings on H.R. 4354, city of Honolulu uses 101-inch wide buses. Legal limit here is up to 108 inches. We have had no complaints nor know of any difficulty with the wide buses.

E. ALVEY WRIGHT,
State Highway Safety Coordinator.

IDAHO

STATE OF IDAHO,
TRAFFIC SAFETY COMMISSION,
Boise, Idaho, February 2, 1972.

Hon. BIRCH BAYH,
Chairman, Subcommittee on Roads,
U.S. Senate Committee on Public Works,
Washington, D.C.

DEAR SENATOR BAYH: We are in receipt of your letter regarding 102 inch buses which you sent to Mr. Mark Gibson. I am taking the liberty of answering your letter as Mr. Gibson has gone to another job and I have taken over his position as Director.

In checking with various departments of Law Enforcement, I am unable to come up with any statistics that include bus width. I have also contacted the bus companies operating within Idaho and none of them are running 102 inch buses due to the fact they can not use them on their total run under current federal law. All indicated a keen interest in the proposed legislation.

I am sorry we are unable to give your subcommittee any statistics on this matter. I trust in the future, you will feel free to contact us for other information we may provide.

Sincerely,

PAT EHRLICH,
Director.

MONTANA

STATE OF MONTANA,
MONTANA HIGHWAY SAFETY DIRECTOR,
Helena, Mont., February 4, 1972.

Hon. BIRCH BAYH,
Chairman, Subcommittee on Roads, Senate Committee on Public Works,
New Senate Office Building,
Washington, D.C.

DEAR SIR: May I respectfully submit this statement concerning your present deliberations on H.R. 4354.

Montana is included in the "grandfather clause" of the 1956 Highway Act. Section 32–1123 of Montana Law reads:

"No vehicle, unladen or with load, shall have a total outside width in ex-

cess of ninety-six (96) inches, except buses which may have a total outside width not to exceed one hundred two (102) inches, and such bus width shall be allowed only on paved highways twenty (20) feet or more in width;"

Two buses of the 102 width category enter Montana daily through Wyoming and end their run in Billings, Montana. These are the only 102 inch buses currently operating in Montana. In checking accident records for 1970 and 1971, we have no reported accidents involving these buses in either year. I have received no written or verbal complaints concerning these buses in this same two-year period.

I would respectfully submit that the number of vehicle miles driven in Montana by the 102 inch bus is totally insufficient to be of value to you in determining its relative safety considerations.

Sincerely yours,

ALBERT E. GOKE,
Governor's Representative.

NEW MEXICO

STATE OF NEW MEXICO,
NEW MEXICO TRAFFIC SAFETY COMMISSION,
Santa Fe, N. Mex., February 10, 1972.

Senator BIRCH BAYH,
Chairman, Subcommittee on Roads, U.S. Senate,
Washington, D.C.

DEAR SENATOR BAYH: This is in response to your letter of January 24, 1972.

New Mexico passed a law since 1956 authorizing the New Mexico Highway Commission to regulate the width of buses that use the state's highways.

Our records reflect that only one application was received to operate a 102-inch wide bus in the state and this request was denied after a Commission hearing.

Due to the above action, we are not in a position to relate any experience on the operation of 102 inch buses.

If I can be of any further assistance in the future, please feel free to call on me.

Sincerely,

D. K. KELLY,
State Traffic Safety Director.

PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA,
DEPARTMENT OF TRANSPORTATION,
Harrisburg, Pa., March 14, 1972.

Senator BIRCH BAYH,
Chairman, Subcommittee on Roads, Committee on Public Works,
New Senate Office Building, Washington, D.C.

DEAR SENATOR BAYH: In your letter of February 16 regarding H.R. 4354 you invited me to forward any additional data that might be pertinent.

We have now found that the City of Philadelphia has taken action which precludes the future use of 102 inch buses. There are now about 400 of the wider buses utilized by the Southeastern Pennsylvania Transportation Authority. We understand that all but 50 of these buses will soon be scrapped and replaced with 96 inch wide buses under a Federal grant.

I trust that this information will be of interest to your committee, since it somewhat negates that which we furnished earlier.

Sincerely yours,

EDMUND R. RICKER,
Chief, Highway Safety Group.

WYOMING

OFFICE OF HIGHWAY SAFETY
Cheyenne, Wyo., January 27, 1972.

BIRCH BAYH,
Chairman, Subcommittee on Roads, U.S. Senate,
Washington, D.C.

DEAR SENATOR BAYH: In answer to your letter of January 24 relative to buses operating in Wyoming, because of the fact that Wyoming is a "bridge" state we do not have buses in excess of 96-inches operating on our Interstate Highways.

I have requested a report from the Wyoming Highway Patrol and the Wyoming Public Service Commission relative to their opinions relative to traffic hazards posed if H.R. 4354 passes the Senate and bus companies are allowed to go to the 102-inch width.

Since buses of the width probably would operate primarily on our Interstate Highways or primary roads with greater than 20-foot width, we do not see it as a difficult problem or a hazard.

When the prepared statement is returned to me, I will forward it to you prior to the February 14 date so that it can be published in the official hearing record as you have requested.

Sincerely,

FRANK HICKS,
Director, Governor's Office of Highway Safety.

Responses From State Toll Road or Turnpike Commissions

DELAWARE

STATE OF DELAWARE,
DELAWARE TURNPIKE,
JOHN F. KENNEDY MEMORIAL HIGHWAY,
Newark, Del., March 21, 1972.

Hon. BIRCH BAYH,
Chairman, Subcommittee on Roads, Senate Public Works Committee, U.S. Senate, Washington, D.C.

DEAR SENATOR BAYH: By request of a committee member I am responding regarding 102" buses. The State of Delaware as listed in the Code may, in the event federal law permits buses in excess of eight feet in width on the national system of interstate and defense highways, permit buses not to exceed 102" on the system of interstate and defense highways within the State and upon U.S. Route 40 and U.S. Route 13.

The Delaware Turnpike is a part of Interstate 95 as is regulated by the State Department of Highways and Transportation. The width of traffic lanes on the Turnpike will accommodate the 102" width buses, however, the Turnpike does not necessarily endorse the increased width of buses.

I should appreciate more background on this subject. If you have literature, please forward.

Yours very truly,

EARLE M. DAVIS, *General Manager.*

INDIANA

INDIANA TOLL ROAD COMMISSION,
South Bend, Ind., February 10, 1972.

Re Width of Buses on Interstate System.

Hon. BIRCH BAYH,
U.S. Senate Committee on Public Works,
New Senate Office Building, Washington, D.C.

DEAR BIRCH: Since my telephone conversation with Mr. Norton, I have tried to research the questions and I am afraid I can't come up with too much in the way of records.

However, the Toll Road, about five years ago, awarded a safety plaque to a Greyhound driver and immediately following this, we permitted them to use the 102 inch wide bus, to be reviewed in six months and at the end of the year. I cannot tell you how many of this type use the road daily. I am sure Greyhound would have this record. However, through this first year period, both my General Counsel at that time, and the police made a number of observations of their operation actually out on the road and to the best of my knowledge around here they have never been involved in an accident on our facility. This would be accurate because other than something of a minor nature, we have complete accident records.

We have had only one serious bus accident during this period and that was a charter bus from Indiana Motor Bus in South Bend. This was also one of the earlier versions of the bus between here and Indianapolis. We do not know the cause other than it was indicated that the driver may have either dozed off or had a temporary fainting spell. There was a recent judgment from this case from one of the passengers against the bus company and the trucking company involved. The Toll Road was not involved in the lawsuit.

I am sorry I can't be of more help. However, in talking to my people, we are convinced they are safe and probably the bus company has some argument in their showing of the design and width being safer. Both Greyhound and Trailways are a large volume user of the Toll Road and as stated above, their record is good; we wish we had more of them.

Please feel free to call me if there is any research I can do to help you.

Yours very truly,

ROBERT A. TILLETT,
General Manager.

NEW JERSEY

NEW JERSEY TURNPIKE AUTHORITY,
New Brunswick, N.J., March 10, 1972.

Senator BIRCH BAYH,
Senate Public Works Committee, New Senate Office Building,
Washington, D.C.

DEAR SENATOR BAYH: In response to your inquiry concerning the operation of 102 inch wide buses on the New Jersey Turnpike and the safety aspects thereof, I wish to convey to you the following comments.

The Greyhound Corporation and the Continental Trailway Corporation has been operating approximately 100 of these oversize buses on the New Jersey Turnipike for the past two years. These buses have been operating on this facility by virtue of a special permit granted to them by the Authority.

During the year 1970, there were 34 accidents involving buses and in the year 1971, 36 accidents involving buses. In this total of 70 accidents which involved buses it did not appear, based on a review of our records, that any of the 102 inch wide buses were involved. Furthermore, there is no indication, from the operational standpoint, that these vehicles have generated any adverse safety conditions on this facility.

While these buses have been permitted on this facility, on an experimental basis, and have operated with no difficulty, it must be pointed out that I still feel that the 8 ft. 6 in. wide vehicle is incompatible with the basic 12 foot wide traffic lane. The 12 foot wide traffic lane was designed to accomodate an 8 foot wide vehicle. It is from this standpoint that I fear that the approval of 8 ft. 6 in. wide buses will result in the future approval of 8 ft. 6 in. wide tractor trailers. If this occurs, then I am convinced that the deterioration of safety on facilities similar to this Turnpike will be great.

It is my hope that you will find this information helpful in the conduct of your hearing.

Very truly yours,

PAUL M. WECKESSER,
Traffic Engineer.

OHIO

OHIO TURNPIKE COMMISSION,
Berea, Ohio, February 18, 1972.

Hon. BIRCH BAYH,
Chairman, Subcommittee on Roads, U.S. Senate Committee on Public Works,
New Senate Office Building, Washington, D.C.

DEAR SENATOR BAYH: Reference is made to your letter to me dated February 9, 1972, received here on February 14, in which you asked whether we would be willing to submit a statement to the Subcommittee on the matter of permitting buses not in excess of 102" wide to operate on the Interstate Highway System. You indicated this is before the Senate in H.R. 4354, a bill which has already been passed by the House of Representatives.

This is to advise that Greyhound has operated such buses on the Ohio Turnpike on a very limited scale from July, 1967 to the present. There has never been more than one per day in each direction and, usually, it has been on a less frequent basis.

During the five year period from 1967 through 1971, Greyhound had an approximate total of 281,000 trips and travelled approximately 22 million miles

on the Ohio Turnpike. The 102'' wide buses travelled 276,000 miles of this which amounts to just slightly more than one per cent of the total miles travelled. There were no accidents involving either the regular or wide buses during the five year span but the number of wide bus trips is hardly enough to give any meaningful data on their potential safety hazard.

Traffic on the Ohio Turnpike continues to grow each year and the Commission is becoming increasingly concerned over the possible safety hazard presented by large numbers of oversized vehicles, especially overwidth vehicles. While we still permit oversized vehicles, this concern led us to ban mobile homes over twelve feet wide from the Ohio Turnpike effective April 1, 1971. It is likely that future such restrictions on oversized vehicles will be necessary in the future.

Very truly yours,

ALLAN V. JOHNSON,
Executive Director.

PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA,
PENNSYLVANIA TURNPIKE COMMISSION,
Harrisburg, Pa., February 1, 1972.

SENATE COMMITTEE ON PUBLIC WORKS,
New Senate Office Building, Washington, D.C.

GENTLEMEN: The Pennsylvania Turnpike Commission has been requested by Senator Bayh to submit a voluntary statement to the Committee pertaining to H. R. 4354 as it concerns experience gained during the period this equipment (102") has been operating on the Pennsylvania Turnpike System.

The Pennsylvania Turnpike Commission has allowed inter-city buses up to 102" wide to use the Turnpike System since July, 1967.

The Pennsylvania Turnpike Commission regulations allow the following limits to use the System without a special hauling permit:

Width, 96"; 120" During hours of daylight Monday through Friday and until noon Saturday (mainly used by house-trailers). Length, 70'–0". Height, 13'–6". Weight, 100,000 pounds, gross.

In granting specific permission to operate these 102" vehicles on this highway system, the Commission considered the following facts:

1. The weight of a bus in service varies only by slight amounts. Therefore, the increased cubic capacity of the body would provide more room for passengers rather than additional passengers or space for large quantities of freight.

2. Buses are constructed to operate most efficiently at their loaded capacity; size of engine, brakes, suspension, and steering are designed to meet this requirement.

3. Buses have a lower center of gravity than trucks, and the increased room for passengers would not affect this balance.

4. Buses of 102" width had been driven over the Turnpike System for several years by manufacturers making deliveries to various eastern cities which used them. Such buses did not carry passengers on such trips. There was no indication that this traffic had induced any traffic problems or hazards.

Therefore, the Commission granted permission to operate these wider buses on a regular basis throughout the System. Greyhound and Continental Trailways, who were most interested in this project, also applied to the Pennsylvania Utilities Commission for the same rights. The PUC granted these rights in a docket dated March 6, 1967.

The first bus of 102" width on the Pennsylvania Turnpike was operated by Greyhound on July 14, 1967, and such buses logged over 4,000 miles during the remainder of July 1967. Since that date, the 102" wide buses operated by Greyhound have logged 1,043,771 miles to December 31, 1971 on our System.

Our maintenance department reports that they have had no problems in any work area where traffic must be temporarily restricted which could be traced to the wider buses.

The fare collection department reports that they have not had a single incident involving the 102" wide buses in the restricted area of entry or departing lanes in the toll booth area.

The State Police Detail assigned to the Turnpike System reports 175 accidents in which buses of all types (scheduled over the road, charter, school, etc.) were involved, since 1967. In no single incident is there anything in the official report of the accident that would indicate that a wider than usual bus was the primary or contributing cause of the accident.

The above record has been compiled under the following conditions:

1. From July 1, 1967 through December 31, 1971 the following traffic usage has occurred: Passenger cars, 202,863,897; commercial vehicles, 28,047,138. Total, 230,911,035.

2. Unfortunately, there are no statistics on the exact number of buses which are included in the numbers cited above. The Pennsylvania Turnpike Commission classifies according to the gross weight of the vehicle, as follows:

Class I—up to 7,000 pounds (passenger cars).
Class II—7,001–15,000 pounds (commercial).
Class III—15,001–19,000 pounds (commercial).
Class IV—19,001–30,000 pounds (commercial).
Class V—30,001–45,000 pounds (commercial).
Class VI—45,001–62,000 pounds (commercial).
Class VII—62,001–80,000 pounds (commercial).
Class VIII—80,001–100,000 pounds (commercial).
Class IX—over 100,001 pounds (commercial).
(Or overdimension by special permission).

Practically all in service buses of 102" width are classified within Class V (30,001 to 45,000 pounds). During the period between July 1, 1967 and December 31, 1971, the Turnpike handled 4,328,295 vehicles falling into this class.

Thus, this class of vehicle accounted for approximately 1.9% of the total number of vehicles. Since all buses constituted only a small portion of the total Class V vehicles, the contribution of buses to the overall traffic volume involves much less than 1% of the total traffic.

This small impact on total traffic has had no adverse effect upon our operations; nor can we foresee any problem arising if the use of such buses in intercity traffic increases materially.

Very truly yours,

FRANKLIN V. SUMMERS,
Director of Operations.

Responses From Other State Highway Departments

INDIANA

STATE OF INDIANA,
DEPARTMENT OF TRAFFIC SAFETY
AND VEHICLE INSPECTION,
Indianapolis, January 25, 1972.

Mr. CLARK NORTON,
Office of Senator Bayh, U.S. Senate,
Washington, D.C.

DEAR MR. NORTON: Enclosed, you will find a copy of the law that would cover the width of buses discussed during our phone conversation.

If there are any more questions, please feel free to contact me.

Sincerely,

THOMAS D. COLEMAN, *Director.*

STATE OF INDIANA
CHAPTER 304
CHAPTER 303.
(S. 236. Approved March 15, 1969.)

An Act to amend the title and provisions of an act entitled An Act concerning the width of buses operated in cities and towns or between contiguous cities and towns located in counties having a population of one hundred sixty thousand or more according to the last preceding United States census.

(Be it enacted by the General Assembly of the State of Indiana:)

SECTION 1. Acts 1953, c. 78, s. 1 is amended to read as follows: Sec. 1. The width of any motor vehicle designed and used for the carrying of more than seven (7) persons and operated either wholly within the limits of cities and towns or between contiguous cities and towns located in counties having a population of one hundred sixty thousand (160,000) or more according to the last preceding United States census or in the event federal law and regulation thereunder permits the operation of passenger buses of widths in excess of eight (8) feet on the national system of interstate and defense highways, the Indiana State Highway Commission, may by rule or regulation which is consistent with such federal law or regulation, permit the operation of passenger buses of a total outside width, exclusive of safety equipment on any public highway, shall not exceed eight (8) feet six (6) inches.

SEC. 2. The title of Acts 1953, Chapter 78 is amended to read as follows: An act concerning the width of passenger buses operated over certain streets and highways in the State of Indiana.

MARYLAND

EXECUTIVE DEPARTMENT,
OFFICE OF THE HIGHWAY SAFETY COORDINATOR,
Baltimore, Md., January 26, 1972.

Senator BIRCH BAYH,
Chairman, Subcommittee on Roads, Senate Committee on Public Works,
New Senate Office Building, Washington, D.C.

DEAR SENATOR BAYH: Your letter of January 21, 1972 confirms several discussions I have had with Mr. Clark Norton on hearings which your Subcommittee on Roads is conducting on H.R. 4354 to permit the operation of buses not in excess of 102 inches wide on the interstate highways.

The position of the State of Maryland is clearly set forth in Section 14-102(c) of Article 66½ of the Annotated Code of Maryland (Motor Vehicle Laws).

Section 14-102(c) permits the 102 inch width for passenger buses on the State Primary System of Highways and authorizes the State Highway Administration to grant, by special or general order without further legislative action, permission for the 102 inch width on the Interstate System whenever and at such time the Federal law and regulations thereunder permit the operation of passenger buses of widths in excess of 96 inches.

The Legislative intent of Section 14-102(c) clearly indicates that Maryland is in support of any Federal legislation that would increase the maximum width limit of passenger buses to 102 inches.

I hope this information will be helpful to your Subcommittee members.

Sincerely,

RICHARD H. TURK,
Acting Highway Safety Coordinator.

(STATE OF MARYLAND)

§ 14-102. Width of vehicles.

(a) *In general.*—No vehicle, other than farm equipment and implements of husbandry, in excess of 96 inches in width, including the load thereof, except traction engines and any load of forage crops in connection with harvesting operations where the distance of hauling is less than 5 miles on highways of the State, shall be operated on any highway in this State, and no traction engine in excess of 100 inches in width shall be operated on any highway, without the special permission of the State Roads Commission in the case of a road under its jurisdiction, or the permission of the city authorities in the case of a city street, or the permission of the county authorities in the case of a county highway. Provided, however, that nothing in this subsection shall be construed to prevent the operation upon any street or highway in this State, of a motor vehicle loaded with tobacco hogsheads and having an overall width when loaded not in excess of 103 inches. Providing further that nothing in this subsection shall be construed to prevent the operation upon any street or highway in this State of farm equipment, implements of husbandry, or motor vehicles transporting farm equipment or implements of husbandry.

(b) *Municipal ordinances.*—Incorporated cities, towns, and municipalities may by ordinance permit the operation within their respective jurisdiction of any motor bus with a maximum outside width of not to exceed 102 inches.

(c) *Exception as to certain passenger buses.*—Nothing in this section shall be construed to prevent the operation of passenger buses upon the highways of this State which are designated as the State primary system, but not to include those highways which are part of the national system of interstate and defense highways, having an overall width of 102 inches, exclusive of safety equipment. If federal law and regulations thereunder permit the operation of passenger buses of widths in excess of 96 inches on the national system of interstate and defense highways, the State Roads Commission, by special or general order, may permit the operation of passenger buses having an overall width of 102 inches, exclusive of safety equipment, on the federal interstate and defense highways.

PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA,
DEPARTMENT OF TRANSPORTATION,
Harrisburg, Pa., February 1, 1972.

Senator BIRCH BAYH,
Chairman, Subcommittee on Roads, Committee on Public Works, New Senate Office Building, Washington, D.C.

DEAR SENATOR BAYH: This is in reply to your letter of January 21, and Mr. Clark Norton's phone call regarding Pennsylvania experience with the operation of 102 inch width buses.

Section 909(a) of the Pennsylvania Vehicle Code which permits the operation of 102 inch buses reads as follows:

"Motor buses and motor omnibuses shall not exceed a total maximum length of four hundred eighty (480) inches and shall not exceed a total maximum

height of one hundred fifty (150) inches, motor buses and motor omnibuses shall not exceed a total maximum width of ninety-six (96) inches: Provided, however, That any motor bus or motor omnibus operated within a municipality or in a business or residence district may be of a total height, including any load thereon, of one hundred seventy-four inches: Provided further, That any motor bus or motor omnibus operated on a route or in group or party service wholly within a municipality may, with the consent of the municipality, be of a total length not exceeding four hundred eighty (480) inches and of a total width not exceeding one hundred two (102) inches and any motor bus or motor omnibus operated on a regular route or in group or party service which traverses more than one political subdivision may, with the approval of the Public Utility Commission, be of a total length not exceeding four hundred eighty (480) inches and of a total width not exceeding one hundred two (102) inches.

"No motor bus nor motor omnibus having a total maximum width in excess of ninety-six (96) inches shall operate on any street or highway where the cartway (exclusive of parking space) is less than ten (10) feet in width on one-way routes or less than twenty (20) feet in width on two-way routes".

The 102 inch buses are operated in our two largest urban areas, and we have discussed the subject of your letter with officials of the Southeastern Pennsylvania Transportation Authority which operates in the Philadelphia area and the Port Authority of Allegheny County which operates in the Pittsburgh area. The following information obtained from them may be of interest to your Committe.

The City Transit Division of SEPTA operates a total of 447 102 inch buses, which represents 30.7% of their fleet. They initiated this operation in 1956 when 347 buses were purchased with 50 being added in 1963 and again in 1966. These buses are generally assigned to routes on the wider streets, both as a practical matter, and in recognition of the limitations stated in the second paragraph of the law quoted above. A cursory examination of SEPTA's accident records indicates that the wider buses are not involved in side swipes or turning accidents, in an excessive proportion compared to their numbers in the fleet.

The Transportation Authority of Allegheny County has been operating the 102 inch buses since 1964 when 146 were purchased, in 1965 133 were added, in 1966 115, in 1967 2, and in 1971 185, for a grand total of 581. This compares with approximately 400 96 inch buses in the fleet. Representatives of the Authority indicate that the wider buses are operated on all of the major routes, with the narrower ones being used for part time or rush hour operations. While no detail accident statistics are available, they show that their fleet accident rate has not gone up during the years when the wider buses were being added.

We have a very good accident analysis system in the Pennsylvania Department of Transportation, but unfortunately the width of buses has not been keyed in as an item of information. Thus, we cannot provide you with any real evaluation of the relative success of the operation of the wider buses.

We trust that this information will be of interest to your Committee.

Sincerely yours,

EDMUND R. RICKER, *Chief, Highway Safety Group.*

Reprints of Editorials on the Wider Bus Issue

[From the Arkansas Democrat, May, 27, 1971]

WIDER BUSES WOULD BE A DETERRENT TO SAFETY

(By Karr Shannon)

Those interested in the preservation and safety of our highways fought down a bill before Congress in 1969 that would have permitted bigger trucks with heavier loads to roll along our highways.

Now a bill has been introduced in the House that would allow buses 102 inches wide to operate on our highways. The proposal has drawn caustic criticism from the American Automobile Association, the National Transportation and Safety Board, and the Department of Transportation.

The present allowable maximum width is 96 inches. The opposition points up the safety hazards that would be caused by the added six inches in width.

It is difficult to fathom any real justification for the increase in width of interstate buses. The bus companies simply want wider buses—and that's that.

But the House Public Works Committee approved the bill that would permit the increase in width—and without anything approaching a thorough study of the question.

The proposal provides that the change would become effective July 1, 1973, in event a study by the Secretary of Transportation during the interim determines the extra width would not be detrimental to highway safety.

This is an odd way to get a new law—a controversial law—on the books. Call for a study AFTER the legislation has been completed. Such tactics should be viewed with jaundice eye—especially when the Department of Transportation is already on record as saying that based upon its own analyses to date it could not support passage of the bill.

Possibly even more important is the fact that enactment of the bill would clearly be a "foot in the door," as Congressman Fred Schwengel of Iowa put it, for another "Big Truck Bill."

"Clearly, it would be difficult to legitimately distinguish between wider buses and wider trucks," said Congressman Schwengel. "And there is little point in widening the trucks unless you also allow them to carry a heavier load."

The wider-bus bill should be accorded the same defeat accorded the bigger-truck bill two years ago.

[From the Sacramento Bee, May 30, 1971]

HIGHWAY MONSTER LOBBY STILL IS AROUND

In 1969 attempts were made by lobbyists in Washington to increase greatly the size and weight limits on trucks using the federal interstate highway system. Only after a strong battle by the opposition in Congress was this proposal, described as the "highway monster bill," defeated.

The fight is not over. At the current session of Congress the big vehicle lobby is attempting to increase the allowable width of buses on the federal highway system from 96 to 102 inches. This is known as the big bus bill of 1971.

While the increased width restrictions would apply to buses only, one can be certain the big truck advocates would not be far behind should Congress allow the first foot in the door.

The justification for defeat of the big truck bill three years ago is equally equitable in beating the big bus bill of this year: Highway safety.

The two major safety agencies in the federal government oppose the big bus measure. The National Highway Traffic Safety Administration, a part of the Department of Transportation, and the National Transportation Safety Board testified against the bill.

Still, the House Committee on Public Works has voted for it.

Rep. Fred Schwengel of Iowa, a leader of the opposition, declared:

"Faced with the opposition of these two prestigious safety agencies it is simply inconceivable that the committee would take favorable action on the bill."

The big bus bill should be stopped. The motorized monsters already using the highways are sufficiently annoying. The federal highway system was not built to handle bigger vehicles. Public safety needs override any economic benefits which can be devised in favor of bigger vehicles.

[From the Denver, Colo. Rocky Mountain News, Dec. 20, 1971]

MORE ON WIDER BUSES

Several days of hearings have reinforced the conviction that Congress should reject—at least for now—a proposal to permit wider buses on all interstate highways.

The bus companies contend that a bus 102 inches wide is no more hazardous to other drivers than the usual 96-inch buses and would make bus travel more comfortable for passengers by widening the seats.

The American Automobile Association alleges that buses already are too wide for safety and that no one will be lured from a car to a bus simply because the seats are an inch or two wider.

The real reason for the request, the auto association claims, is to increase the cargo capacity of interstate buses and thereby bolster bus company profits. The bus companies deny this.

Rep. Fred Schwengel, R-Iowa, predicts that once the wider buses are approved, the trucking companies will be back in Congress with another big-truck bill. This may be true, but Congress can consider the two issues separately.

Whatever the merits of wider buses, there is no cause to change the present law until the safety factors have been fully examined.

[From the Daytona Beach, Fla., Morning Journal]

NO TO WIDER MONSTERS!

When one returns from a motor trip, he or she may have nightmares about monster trucks approaching ruthlessly from the rear, engines roaring, air brakes moaning. That has been our experience this past week.

Consequently, one of the issues to be followed with intense interest as Congress resumes its session is the fate of the wide bus permit legislation that is up for consideration in the Senate.

It passed the House last Summer, with the help of our Rep. Bill Chappell and eight other Florida Congressmen, with Reps. Fascell, Pepper and Sikes not included.

If 102 inch wide buses are permitted on the highways as the House unconsciously says they should, there would be no way to prevent the trucking industry from following suit. Indeed, trucking lobbyists have been after Congress for several years to get permission for longer, wider trucks.

The American Automobile Association is fighting the move. Joining the AAA is Rep. Fred Schwengel, R-Iowa, who is armed with technical data to present to a Senate subcommittee considering the bus legislation that says even the present 96 inch wide limit is dangerous.

Any driver of a relatively small car will applaud his presentation that says wide trucks create severe wind disturbances and bow waves that actually can move such a car off its course. The intensity of the "shock wave" can be heightened by cross winds or head winds.

Then there is the hazard for all drivers of the view ahead and behind

being obstructed even with 96 inch wide vehicles. How much more frightening it would be if trucks and buses were six inches wider!

Finally, there is the added abuse to the public of the way much heavier trucks and buses would cause still more deterioration of the public's highways.

State Senator Bill Beaufort of Jacksonville is deeply concerned now with what he says is deterioration from speeding monsters on Florida's highways.

In a letter to Reid Clifton, director of the Florida Highway Patrol, Beaufort called for a reduction of the speed limit at which these trucks are allowed to operate. He noted that Florida law permits one of the highest load limits in the nation—20,000 pounds per axle load, and that can vary up to 10 percent higher.

"We allow these heavy rigs to travel at the rate of 65 miles per hour," the Legislator said, "and it is generally accepted by the motoring public that the Highway Patrol will give an additional five miles, making it 70 if the rig appears to be operated in a safe manner."

Listening to trucks growling past our motel on Route 17 at a stop at Georgia one night, we estimated that 60 passed there in a single hour. Route 17 is a route favored by travelers because it leads into I–95. So it is a highway packed with motorized danger today.

Tomorrow must not see that danger made ever more omnious by the bus and trucking lobbyists becoming successful in their pleading before the U.S. Senate.

Rep. Schwengel spoke well when he told the House: "A vote for wider buses and trucks is a callous disregard for the safety of the motoring public."

[From the Orlando, Fla., Explorer, Nov. 1971]

JUST SIX INCHES

Lanes on the interstate highway system are 12-feet wide. That seems enough room to allow the width of buses to be increased from 8 feet to 8 feet, six inches.

Commercial highway users want the same measurements for trucks but they have received such firm turndowns from Congress that they are now proposing that the limit be raised just for buses.

Car users are not being lulled by this seemingly small increase of six inches. They know that if buses get such a favor it will not be long before trucks will be asking the same; and will have a good chance of getting it.

It is difficult enough to drive beside these oversize vehicles on interstates with their drafts in dry weather and their mists on wet pavement; but when they are on streets and roads with less than 12-foot lanes they are nothing but obstacles.

Time to stop the bus people's activity is now. If congressmen know that voters do not want public highways made into rights-of-way for monster vehicles, they will hold the line.

[From the Orlando, Fla., Explorer, Nov. 1971]

THE BIG-BUS MENACE

If you think you have met road hogs before, you're going to be pretty shocked at what the long lines bus companies have in mind.

The U.S. House of Representatives has approved and sent on to the senate a bill which would allow the maximum width of buses traveling the interstate highway system to be increased from the present 96 inches to 102 inches.

This should make them big enough to blow a midget car right out into the scenery. No doubt it is true that widening the buses would make the quarters more comfortable for the passengers, but that's not a good enough reason for the proposed change.

Buses are plenty big now, if we are going to give the drivers of the ordinary passenger car a fair chance on the highway.

Another point to consider is this—that once bigger buses were allowed, the manufacturers and operators of trucks, who have their lobbies, too, would go to Congress for permission to make their vehicles bigger.

Also, bigger buses on the superhighways would increase an evil that already is here. Many oversized buses are operating now on the city streets of Chicago, Detroit, Los Angeles and New York. In fact, about 40 per cent of the buses in the mass transit systems of the nation are 102 inches wide.

The bus lobby says that business is declining on these big-city systems because the riders want bigger buses. On the other hand, opinion surveys have shown that what the customers, or potential customers, want is speed and service, mainly, and are more interested in getting where they are going than in lollying around on the way.

The U.S. Department of Transportation is against this idea of allowing bigger buses on the interstate highways. So is the National Transportation Safety Board. So is the American Automobile Association.

So are we.

[From the Tampa, Fla. Times, May 11, 1971]

PROCEED WITH CAUTION

If you think that most of those buses you pass on the highways—or which roar past you—are behemoths on wheels, maybe you should look into a bill before the House in Washington which would allow even wider buses on the interstate highway system.

The legislation, which cleared the House Public Works Committee the other day, would permit the widening of buses to eight and a half feet, as against the present eight-foot limit. The argument of proponents is that the change would permit more comfortable seating in buses, but it would undeniably add to the difficulties of motorists attempting to pass these broad-beamed monsters.

The conclusion of the American Automobile Association is that the measure "poses a serious threat to both the rights and the safety of all motorists." One of the organization's spokesmen quite properly warned that the bill's passage could lead to other legislation allowing wider and heavier trucks on the highways.

Moreover, it is impractical to think that wider buses will just travel on the interstate system. Since there are no bus terminals presently on these highways, the buses would have to use primary and secondary roads and city streets which were not designed and built to accommodate buses of the proposed new width to get to and from the interstate.

One of the strange things about the bill is that it calls for the change in width to become effective on July 1, 1973, provided a study by the U.S. secretary of transportation determines there would be no adverse effect on travel safety. Like the AAA, we are dumbfounded over House committee members first approving a bill and then requesting a study to determine its feasibility.

The bus industry undeniably plays a vital role in the nation's economy and transportation network, and its reasonable use of the public highways—which it helps to finance—is entirely proper. But if the roads are also to be used by operators of private passenger vehicles, suitable limits on bus widths and weights must be set and kept.

The best road sign for congressional consideration of the measure is to first check all pertinent data on the safety aspects and then: Proceed With Caution.

[From the Tampa, Fla., Tribune, July 27, 1971]

A BACKWARDS BILL

In voting conditional approval for wider buses to use Interstate highways, the U. S. House of Representatives is operating in reverse gear.

The Department of Transportation has begun a study to determine whether wider buses—102 inches as compared with the present 96—constitute a traffic hazard. Instead of waiting for completion of this study, the House rushed approval of a bill to permit the larger vehicles to run on Interstate highways provided the Secretary of Transportation *does not* find them to be a hazard.

This was the procedure recommended last May by the House Public Works Committee, which approved the wider buses while calling for a study of the safety factor.

We agree with the objection of the American Automobile Association that this is peculiar logic in legislative procedure.

The principal argument for the wider buses is that some 22,000 of them are already operating in such cities as New York, Chicago and Washington and they should be permitted to use the faster Interstates to the suburbs.

But a better argument against them, we think, is tha tif Congress approves six-inch-wider buses what will it say when the inevitable proposal for six-inch-wider trucks roars up to the door? It would be difficult to admit one and bar the other.

Any motorist who travels the Interstates could get an idea of the future by mentally adding six inches to the width of the road giants he now encounters.

The Senate, we hope, will put the brakes on the House's backwards bill.

[From the Chicago Daily News, May 19, 1971]

How Big Can Buses Grow?

No sooner do we get better and safer highways than some people move in to increase the size of the vehicles that use them, with the predictable result that they will be less stafe and break down faster.

For several years, the trucking industry has been trying to persuade Congress to allow wider, longer and heavier trucks on the Interstate system. So far, Congress has resisted. Now, the main effort is to relax the rules for buses, so wider, longer and heavier ones can roar down the road.

The House Committee on Public Works has already approved a "Big Bus Bill" that would allow buses to grow six inches in width. Rep. Fred Schwengel (R-Iowa) has vowed to stop it, and we're with him all the way.

The House committee acted in spite of objections from two federal agencies concerned with highway safety—the National Highway Traffic Safety Administration, and the National Transportation Safety Board. Evidently the committee was thinking more of the welfare of the bus lines (and later the trucking companies?) then of the welfare of John Q. Citizen out there on the Interstate in his private car.

There's hardly a driver alive who hasn't had a brush with a bus on the highway, in between his adventures in dodging mammoth trucks. And even on the Interstate, where conditions are best, it can be a nerve-rattling experience to look in the rear-view mirror and see a bus creeping up behind in total violation of the speed limits. The air blast in passing situations is bad enough now, and the margin of clearance minimal. Give the buses another six inches in width (from 96 to 102 inches), with the additional height and length that would follow, and the hazard to the ordinary motorist would multiply.

Schwengel suspects, and he's probably right, that the Big Bus Bill is a forerunner of another Big Truck Bill. Be that as it may, Congress should hold the line. The behemoths roaming the highways are big enough now—too big, many would say. Let them grow no more.

[From the Chicago Daily News, July 24, 1971]

Hold Line On Bus Width

The House of Representatives has voted to let buses operating on the interstate highway system grow in width from the present 96-inch limit to 102 inches. The Senate should block this bill, but if it doesn't the secretary of transportation should. The new width limit would go into effect no later than July 1, 1973, unless the transportation secretary finds in the meantime that it would be a safety hazard.

The bus companies say that adding a mere six inches to the width of their vehicles wouldn't even be noticeable from the outside, but it would make passengers more comfortable, with slightly wider seats and aisles. They also point out that 102-inch buses are already operating in many states on roads narrower than the interstate, with no provable reduction in safety.

All this may be true, but it misses the main point. It's up to Congress to hold the line on highway behemoths, and if it gives way now, where does it end? If 8½-foot buses are more comfortable than the 8-foot model, wouldn't 9-foot

buses be still better? And with a 10-foot model maybe a bar-lounge could be installed and everyone would be still happier — everyone except the vast numbers of motorists for whom the interstate system was built. Competing with a bus on a busy highway is an unequal contest as things stand now. Wider, longer, higher buses would make visibility and convenience that much worse.

But there is another reason for holding the line on bus widths. The trucking lobby has been trying for years to get Congress to allow wider trucks on federally supported roadways. If the bus lines break through, here come the bigger trucks. And there go your highways, beaten to death by monsters. The family car would be hopelessly outclassed in the highway scramble, and the slim safety margin the private motorist now has would go glimmering.

The main reason the Kennedy and Dan Ryan expressways are being rebuilt this summer — far ahead of expectations — is that more and heavier trucks are using these highways than the planners foresaw. Richard H. Golterman, the state's chief highway engineer, put the blame for the breakdown of the Ryan, especially, squarely on trucks.

The bus companies deny that they are working in collusion with the truck lobby in trying to break through the size limit. Perhaps they aren't, but the trucking industry will be in there pitching for wider, longer, heavier trucks if Congress doesn't turn back this bus-in-the-door bill.

[From the Terre Haute, Ind., Tribune, Aug. 4, 1971]

No Wider, Please

The last thing we need on our highways is wider buses and trucks. The House of Representatives has nevertheless approved and sent to the Senate a bill to permit operation of buses six inches wider than at present. It is a fair guess that once such a measure became law, wider trucks would be next.

Special interests have for years been seeking congressional approval of such changes. Thus far the broad public interest in safety on the highways has been preserved. Now one barrier has crumbled.

Some may think it lugubrious to speak in such terms. They may argue that adding another six inches to the present 96-inch width permitted for buses operating on interstate highways is not much to get excited about. They may say that even widening trucks by that amount would not really be objectionable.

In a sense, all this begs the question. The heart of the matter is that giant trucks and buses already constitute a serious hazard—one we tolerate because trucks and buses seem necessary, but a hazard all the same. Any extension of the perimissible width adds to the hazard. The logic of that is inescapable.

In approving the bus width bill the House in effect ignored the spirit of legislation in recent years requiring safer design and engineering of vehicles. The Senate should take the opportunity to reaffirm that spirit by rejecting the bill.

[From the Evansville, Ind., Courier and Press, Jan. 2, 1972]

More On Wider Buses

Several days of hearings have reinforced the conviction that Congress should reject—at least for now—a proposal to permit wider buses on all interstate highways.

The bus companies contend that a bus 102 inches wide is no more hazardous to other drivers than the usual 96-inch buses and would make bus travel more comfortable for passengers by widening the seats.

The American Automobile Association alleges that buses already are too wide for safety and that no one will be lured from a car to a bus simply because the seats are an inch or two wider.

The real reason for the request, the auto association claims, is to increase the cargo capacity of interstate buses and thereby bolster bus company profits. The bus companies deny this.

Rep. Fred Schwengel, R-Iowa, predicts that once the wider buses are approved, the trucking companies will be back in Congress with another big-

truck bill. This may be true, but Congress can consider the two issues separately.

Whatever the merits of wider buses, there is no cause to change the present law until the safety factors have been fully examined.

[From the Times-Democrat (Davenport-Bettendorf, Iowa), July 29, 1971]

BEAT THE WIDER BUS BILL

The fate of a bill to permit wider buses on interstate highways is now up to the Senate.

Rep. Fred Schwengel of Davenport lost in his attempt to get the bill beaten in the House of Representatives.

The present 96-inch limit would be widened to 102 inches under the new provisions which would be scheduled to go into effect no later than July 1, 1973.

"If eight-and-a-half foot buses are more comfortable than the eight-foot model," reasons Schwengel, who a few years ago successfully led the fight that prevented a "big-truck" bill from reaching the House floor, "shouldn't nine-foot buses be still better?"

The bus companies contend that adding a mere six inches to the width of their vehicles would hardly be noticeable from the outside and would provide more comfort to the passengers.

They further point out that the wider buses already are operating in many states on roads narrower than the interstates with no added hazard.

All of this may be true, but don't overlook the other problem to be considered.

The truckers may have been defeated once by Schwengel, but if the wider bus bill is passed, it is only a matter of time before they are back demanding wider and longer trucks.

Even with the present sizes, some engineers say that damage inflicted by trucks on the interstates is much worse than originally predicted.

With wider buses and wider trucks, the family car would be even more hopelessly outclassed in the highway scramble.

The bus companies may say they are not involved in any collusion with the truck industry, but the handwriting is on the wall.

The Senate should defeat the bus bill.

[From the Cedar Rapids (Iowa) Gazette, Dec. 18, 1971]

BIG-VEHICLE HAGGLING

A house-passed bill authorizing wider buses on interstate routes sailed into senate subcommittee the other day for a calm think-through. Instead it got a sound emotional buffeting.

This was the old safety vs. commercialism affray with an American Automobile Assn. spokesman sounding the keynote blast: Require that buses be made smaller instead of larger. From transportation interests came an equally intriguing asertion: The 102-inch wide bus (present maximum allowed is 96 inches) would solve urban mass transit problems.

It takes no transportation expert to discern that both sides are using superficial arguments. To reduce the maximum bus size allowable would be to cut freight space in the vehicles and hike freight costs apace with the reduction. To allow the extra six inches of width would have negligible effect on urban transit fortunes, because, as Rep. Fred Schwengel (R-Iowa) pointed out, most cities (including Cedar Rapids) already have buses 102 inches wide.

Emotional haggling aside, what is the desirability of letting bus manufacturers widen the 40-foot coaches? We don't purport to know the answers experts are struggling to find, but the key questions come easily to mind:

Would wider vehicles pose a safety hazard? First district Congressman Schwengel cited tests which show air turbulence caused by a large passing vehicle can blast a car out of its traffic lane.

Would a wider vehicle riding wider axles be more stable than the largest coaches presently allowable if the maximum height (13 feet, 6 inches) re-

mained the same? The bus industry says yes and basic physics seems to support its conclusion.

Would a wider bus go-ahead give the transportation industry carte blanche advantage in getting bigger trucks? Weighing against this possibility is the difference between buses and trucks: Buses carry passengers upside and baggage and freight down; weight is not a problem since virtually all buses are of aluminum construction. Trucks are — well, trucks.

What difference would the embattled six inches make? Widening a 30-foot-long, 4-foot-high freight compartment by half a foot would add 60 cubic feet of space. Topside it would give added aisle space for passenger convenience.

Before it cuts into the meat of these questions and others, the senate public works subcommittee should toss out the emotional gristle.

[From the Des Moines (Iowa) Register, Jan. 25, 1971]

"Big Bus Bill" Drive

The U.S. Senate is preparing to take up the "Big Bus Bill" — a measure which would authorize an increase in the width of buses allowed on the Interstate System from 96 inches to 102 inches. The House passed the bill last year.

This is a special-interest bill sought not only by bus owners but also by truckers who believe that if big buses are allowed then big trucks will be close behind. When the House acted last year, the gallery was filled with American Trucking Association lobbyists.

Representative Fred Schwengel (Rep., Iowa), a leading opponent of the bill in the House, has continued his opposition in recent testimony before the Senate Public Works subcommittee considering the bill.

Schwengel's position, which is undeniable in its logic, is that Congress should find out the impact of the bigger buses on traffic safety before it approves the bill. He has proposed congressional studies of truck safety and highway costs with little success. The Department of Transportation is undertaking several bus and truck safety studies, but not all have been completed.

One completed study measures the increase in air turbulence which results from a six-inch increase in truck widths. Under some conditions the auto being tested was nearly blasted out of its traffic lane onto the shoulder and under different conditions the auto was sucked so close to the truck there was an imminent danger of collision.

Increasing truck width has two main effects: it increases the intensity of the truck disturbance and it decreases the side to side clearance between car and truck.

In the tester's language, "The psychophysiological response measures show an increased driver stress associated with the truck disturbance input." That means the wind blast from a big truck scares the stuffins out of anyone in a light car.

In Schwengel's words, "To act favorably on this legislation in light of the warnings contained in the truck blast study would be to show a callous disregard for the safety of the motoring public. It would be in effect a vote in favor of the special interest groups, the bus owners and against the general public."

[From the Courier Journal (Louisville, Ky.), July 26, 1971]

The Wider Buses Pave The Way For Wider Trucks

Behind the concrete curtain of the Interstate highway system, the slick operators of the automotive world are bamboozling the public. And they are getting away with it. As an example, the House has just passed a bill allowing wider buses to operate on Interstate highways.

That seems reasonable, especially the way the bus-makers tell it. Since Interstate driving lanes are wider, they can handle wider bus bodies without endangering anyone. But that brings up a question: What are these wide-bodied buses going to do once they leave the Interstates. Take wings? No, they are going to have to drive over the ordinary roads and small-town streets that are not as wide as Interstate lanes, and where their extra width will create danger and nuisance.

THE THING COULD PYRAMID

Actually, it's hard to see why the bus-makers bother. Wide-bodied buses can already operate on most city streets, and making over-the-road buses six inches wider isn't going to make much difference, either to the passenger or the bus company. Each passenger will have one inch more seat space, and each aisle will be two inches wider. Who is going to gain from this? Truck-makers, that's who. If wide buses are allowed on the Interstates, how long do you think it's going to be before wide-bodied trucks start demanding—and getting—equal treatment?

And once we get the wide-bodied trucks on the Interstates, no road will be as safe or as serviceable for ordinary automobile drivers. For like the buses, wide-bodied trucks are not going to take wings and fly from the Interstate to their destination in town. They will be using, and crowding more than ever, the ordinary, narrow-lane surface roads.

In fact, the trucks are already using the old "on Interstate highways" gimmick here in Kentucky where, for a fee, truckers are permitted to operate "double bottoms" (two trailers in line) on the Interstates. Since they must load and unload at points off the Interstates, the law also allows them to operate 15 miles from the Interstates, which means that, for a fee, a trucker can operate one of these highway freight trains practically anywhere in the state, including narrow country roads and small-town streets where they are a definite menace.

Now, with the wider-bus bill past the House, the truck-makers have a foot in the door. Soon we shall be hearing that wide trucks are no more dangerous than wide buses—on Interstate highways. And once they are permitted on the Interstates, watch out.

[From the Baltimore (Md.) Sun, July 23, 1971]

WIDER BUSES

Those big new air-cooled buses on Baltimore streets are 96 inches wide and few users have voiced any passionate feeling that they should be wider. But 102-inch buses can be had, and the House passed a bill on Wednesday to authorize the additional six inches. Under present law 96 inches is the outside limit for vehicles on interstate highways.

But why add the extra inches? A proponent of the House bill said it was necessary for passenger comfort. Representative James C. Wright, Jr., wanted, he claimed, to ease the way for commuters "to leave their cars at home." Cars certainly ought to be left at home, but there were other speakers in the debate who sensed what they thought might be an additional, if unstated, goal. Would a 102-inch bus lead to a 102-inch truck? And would wider trucks and wider buses cut still further into other modes of transport?

In short, what will be the effect of bigger motor transport vehicles on the still grievously lagging railroads? Buses may control much of the commuter traffic now, but in the larger cities there are still people who go to work by rail, and rail plans are under consideration here. One of the questions in the House debate was whether a wider bus would present new safety problems to people. Surely the Department of Transportation, charged with overall responsibility for efficient use of all transport modes, should testify as well on the effect of bigger buses and, just possibly, bigger trucks, on the railroad future.

[From the (Baltimore, Md.) News American, July 29, 1971]

A SICKENING SHOW

You are invited here to consider a shameful example of how our lawmakers in Washington too often ignore the public interest when the dubious pressures of well-heeled lobbies go to work. Holding your nose is recommended—this is a real smeller.

As background, you should know that the economically powerful trucking interests for 15 years have been pushing for permission to use wider and thus more profitable trucks on the nation's interstate highway system. Never mind that the present freight-train monsters already chew up the tax-built road-

ways, block vision and dangerously rock passing private cars with their air blast effects.

Thanks only to concerted opposition by the private motorists, voiced largely through the American Automobile Association (AAA) and newspaper editorials, the truckers thus far have failed in their campaign. This year, however, a subterfuge approach is giving them fresh hope.

Their gimmick was to back a proposal to widen interstate motor buses from the present maximum of 96 inches to 102 inches—the same width extension sought for themselves. As the AAA pointed out, this would mean little in added comfort to the bus pasesngers. But it would serve as a precedent for similarly breaching the truck limitations later.

Every informed person and legislator in Washington understood this. Nevertheless, on July 12, the House Public Works Committee reported favorably on the bus extension measure — ignoring the opposition not only of the AAA but that of the Department of Transportation and the National Transportation Safety Board.

A vigorous opponent of the legislation, Rep. Fred Schwengel, R.-Iowa, said when the bill—HR-4354—was approved by the committee:

"It is incredible that the bill would be reported favorably. By so acting, the committee has shown a callous disregard for the safety of the motoring public. The committee in effect has voted in favor of special interest groups and against the general public."

Despite this and similar expressions of outrage, the House on July 21 approved the measure by the majority of 38 votes and sent it to the Senate for action.

"It was a sickening performance," Rep. Schwengel said.

It surely was. And it must not be repeated in the upper house of Congress if integrity and devotion to the public welfare still take precedence there.

If anything, interstate buses and trucks should be made smaller—not larger than they already are.

[From the Record American (Boston, Mass.), July 29, 1971]

A Sickening Show

Consider a shameful example of how our lawmakers in Washington ignore the public interest when the dubious pressures of well-heeled lobbies go to work.

The economically powerful trucking interests for 15 years have been pushing for permission to use trucks wider and thus more profitable than the present freight-train monsters which already chew up the tax-built roadways, block vision and dangerously rock passing private cars with their air blast effects.

Thanks only to concerted opposition by the private motorists, voiced largely through the American Automobile Ass'n (AAA) and newspaper editorials, the truckers thus far have failed.

This year, however, a subterfuge approach is giving them fresh hope. Their gimmick was to back a proposal to widen interstate motor buses from 96 inches to 102 inches — the same width extension sought for themselves. This would mean little in added comfort to the bus passengers. But it would serve as a precedent for breaching the truck limitations later.

Every informed person and legislator in Washington understood this. Nevertheless, on July 12, the House Public Works Committee reported favorably on the bus extension measure. Despite expressions of outrage, the House on July 21 approved the measure by the majority of 38 votes.

It must not be repeated in the upper house of Congress if integrity and devotion to the public welfare still take precedence there.

[From the Boston Evening Globe, July 27, 1971]

Danger On The Highways

The bill which recently passed the US House of Representatives allowing buses on interstate highways to be six inches wider may sound innocent, even attractive to travellers who can't afford to fly and can't find a railroad to carry them from here to there these days.

In fact, wider buses will bust up the highways, blast passing automobiles off

the road and, most important, will break trail for wider and heavier trucks which will do more of the same.

In exchange, each passenger will get one more inch of seating space and two more inches of standing room in the aisle, hardly much of a gain for the traveler. But, if the bus companies add height and length to match the increase in girth (as the trucks surely will do when their turn comes), each added inch of width could add one ton to the load pounding the nation's pavements to the tune of increased highway tolls for the taxpayer.

Buses account for about 30 percent of all travel by public conveyance and, while planes have replaced trains as the major source of public travel, the bus's share has changed very little since 1950. But the private automobile far exceeds all other modes of long distance travel in the United States and the real source of competition here comes from trucks which now carry just over half of the nation's freight on interstate highways.

The railroads are valiantly fighting back and increased their share of freight transportation slightly between 1963 and 1967. In the Midwest 50- and 75-car freights still roar round the bend. And today they carry most of their freight on wheels, ready to be driven off the flatcar to the shop or factory door. With the old problem of trans-shipping at each end of the road now resolved, it makes much more sense to support rail transportation for freight, leaving the highways to cars.

Anyone who has traveled interstate highways recently, knows full well the hazards of competing for road space with buses and trucks which block visibilty and create a blast of air that rocks the car as they pass, or as the car passes them. If they don't know the hazards, a look at highway fatalities should be convincing evidence that highway travel is dangerous enough as it is, without adding wider buses and trucks to the road.

The new Secretary of Public Safety, Richard E. McLaughlin, has long fought the wider-bus bill, seeing it as "one more attempt by the truck and bus industry to hog more than their proper or legal share of the road . . .

"The proposal to add six inches to the width of buses would mean that all our existing traffic lanes, presently 12 feet wide, would be dominated by monster buses with less than 22 inches of lateral clearance on either side of the bus. Considering the high and illegal speeds frequently attained by these buses, such clearances are obviously inadequate."

His position is shared by the Department of Transportation, the National Transportation Safety Board, and the American Automobile Association. Yet only this year the state Legislature voted to increase the allowed width of buses in Massachusetts from 98 inches to 102 inches, exclusive of tires and mirrors. Enactment of the state law depends on passage of the Federal bill. Let us hope that the Senate in Washington shows more sense than the House and kills a bill that could leave the country with an unbalanced transportation network, that would damage the highways and seriously endanger those who drive on them.

[From the Worthington, Minn., Globe, Dec. 16, 1971]

People's Transportation Needs Priority

Somewhere something has got to give. And we must acquire more patience and tolerance. These platitudes are directed in this instance not to international relations or to race relations but to public transportation. While the need for expanded public transportation facilities and equipment seems obvious, present circumstances (legal and economic) threaten to destroy the inadequate public transportation which still exists.

The passenger train has been lost to much of the nation. Whether the Amtrak experiment can succeed is counted questionable by many and wholly doubtful by some.

Airlines, generally, are doing well although few can be described as flourishing. But airlines are not public transportation — not "people's transportation." Airfares ($48 roundtrip Worthington-Minneapolis) have restricted air transportation to the affluent plus individuals (servicemen, salesmen) with expense accounts or transportation allowances.

This leaves only bus transportation for citizens of average or below-average incomes. And the buses are having their problems.

Specifically, the nation's overland bus companies would like to introduce wider buses (bus width is presently restricted to 96 inches; the companies have petitioned for 102 inches). Wider buses might accommodate more passengers, permit passengers more seating room, and expand the spaces for freight and luggage. Wider buses would make bus operations more economic.

The House of Representatives has passed a bill which would allow the larger buses on the U.S. Interstate system. Hearings on the bill are now underway in the Senate Public Works subcommittee. They have been termed "stormy."

Prominent among the lobbyists against the proposal for wider buses is the American Automobile Association represented at the hearings by John de Lorenzi. The AAA is doing nothing amiss; Mr. de Lorenzi is undoubtedly representing the desires of a vast majority of AAA members in opposing wider buses on America's highways. Obviously wider buses would make motoring somewhat more difficult, somewhat less pleasant.

Back to the original insistence that "we must acquire more patience and tolerance."

There are substantial numbers of citizens — in particular children, students, the poor, the elderly, the handicapped — who cannot own or who cannot operate automobiles. There are many other citizens less disadvantaged who nonetheless require public transportation.

Added to this is the rather self-evident fact that every one among us is going to become increasingly dependent upon public transportation. The population of the United States will be doubled by the turn of the century. There is good question whether it will be possible to tolerate or to accommodate twice the present number of private automobiles. Or, granting that this is possible, how many among us may desire not to drive in traffic twice its present volume to parking lots and parking problems twice their present proportions?

Again: Somewhere something has got to give.

Provision must be made for public transportation. Increasingly, year by year, public transportation must be given official encouragement. And for millions of Americans public transportation must be translated bus transportation.

The Daily Globe (speaking now of editors as motorists) would prefer that buses were not made wider. The Daily Globe would prefer that there were never ice or snow upon any street or highway. The Daily Globe would prefer that it would never be necessary to drive a detour. The Daily Globe would prefer that there were never traffic jams.

There are some things — some hazards, some inconveniences, some minor annoyances, some impositions — which all of us simply must accept in life, however. Prefer them or not, the Daily Globe lends support to urging that buses six inches wider be permitted on America's Interstate highways. A first-class people's transportation system must be preserved in this nation.

[From the Jefferson City, Mo. Capital News, Jan. 1, 1972]

ANOTHER BUS BILL POSES TROUBLE FOR CAR DRIVERS

The continuing uproar of forced busing of school children has overshadowed a potentially harmful effect of another bus issue.

Legislation now before the U. S. Senate would open the federal interstate system to wider buses — 102 inches or 8½ feet. It would supplant the present bus width restriction of 96 inches or 8 feet.

With the bus lobby in full gear, the measure already has slipped through the House. Since the attention of the public now is focused on the school busing issue, it's possible the highway bus bill will go unnoticed through the Senate and become law, unless vetoed by President Nixon.

The bus lobby suggests that the extra width would benefit passengers, providing greater comfort and safety. This lobby conveniently ignores the safety and comfort of private car drivers who are forced to compete for highway space with buses and trucks of growing proportions.

Of course, wider buses would also have a dangerous impact on traffic on primary highways and other roads. To get in and out of terminals, the buses would have to use the latter, composed mostly of two-lane highways and streets. Many in rural areas have traffic lanes less than 12 feet wide. As one of our peers has suggested, an 8½ foot bus on one of these roads would leave very little margin for error.

Nor is this legislative malady limited to Congress. A wide bus bill, which ran out of gas in the last session, has been refueled and probably will be on the Missouri General Assembly agenda again.

The American Automobile Association contends oversized buses — as well as trucks — would be incompatible with other traffic on the nation's highways. It cites results of recent tests conducted for the U. S. Department of Transportation, which shows that wind blast and suction effects of larger vehicles would "increase the hazard for passenger car drivers." The AAA even suggests Congress should consider buses be smaller, not larger.

A stop to this dangerous nonsense of wider and longer buses and trucks must be made.

Millions of private passenger car owners, who pay a majority share of the cost of our highway system, should demand that their U.S. senators kill this ill-advised and dangerous legislation. Missourians also must be on their guard against wider bus legislation in the 1972 State General Assembly.

[From the St. Louis (Mo.) Globe-Democrat, May 17, 1971]

BUSES WIDE ENOUGH NOW

A bill in the House of Congress, that would permit building buses 102 inches wide, has drawn strong criticism from the American Automobile Association, the National Transportation Safety Board and the Department of Transportation.

The present maximum width is 96 inches. The opposition stems from safety hazards the widening would create.

There doesn't seem any real justification for a six-inch increase in the width of interstate buses except that the bus companies want wider buses.

Nevertheless, the House Public Works Committee approved the bill that would allow the increase in width without anything approaching an adequate study of the question.

The bill provides that the change would become effective July 1, 1973, if a study by the Secretary of Transportation determines there would be no adverse effect on travel safety.

This is a strange way to frame legislation, calling for a study after it has been enacted. Furthermore, the Department of Transportation already is on record as saying that based upon its analysis to date it could not support enactment of the bill.

There should be no decision on this measure until a full study is completed. Then, if the wider width is found to be safe—which we doubt at this time—action could be taken.

[From the St. Louis (Mo.) Post Dispatch, May 28, 1971]

NO BIGGER BUSES

Representative Fred Schwengel of Iowa, who succesfully opposed a 1968 effort to legalize wider trucks on the interstate highway system, is trying to block a similar attempt to extend the width of buses. The National Association of Motor Bus Owners wants the maximum increased from 8 to 8½ feet; the plea is that Americans are growing taller and broader and need more space. There is statistical evidence of such a long-range trend, but maybe the answer, if one is needed, is in the direction of fewer seats rather than bigger buses. Mr. Schwengel thinks the big bus bill has fewer objectionable features than the big truck bill, but he believes, and so do we, that if bigger buses are allowed the truck people will be right back. Apart from other considerations, there is ample reason to oppose wider interstate buses on grounds of safety; they are wide enough now.

[From the Fulton, Mo., Sun-Gazette, Feb. 2, 1972]

BUS PASSENGER BILL.—MORE BUSES NEEDED

With virtually no rail passenger service any more and with most of the smaller communities in Missouri without any airline service, the people of the

State have become more and more dependent on bus transportation to meet their public transportation needs. This is especially true in view of the automobile congestion on our highways.

For that reason a bus Bill passed out of a House Committee of the Legislature last week has special significance for the residents of Fulton and the surrounding area.

This Bill would permit the State Highway Commission to designate specific highways having traffic lanes at least 12 feet wide to operate the new, more comfortable and safer buses now in operation in 19 other states.

These buses would have wider, more comfortable seats, tires with 46 percent more contact with the pavement, brakes that are 69 percent larger together with greater stability — all making for safer, more comfortable passenger transportation.

Although these buses would be six inches wider than those generally in use in Missouri, they would create no safety hazard, because there would be more passing room than is currently the case with the buses now in use on 9½ and 10-foot lanes.

The intercity bus industry has compiled a fantastic safety record—nearly 20 times better than passenger automobiles, and this record has been compiled largely on the narrower traffic lanes. If the wider buses are restricted to highways with 12-foot lanes, there is no reason at all why they would create any traffic hazard.

The Missouri Safety Council and the State Highway Department which in the past have objected to any increase in size of vehicles have not objected to this Bill. The Missouri Automobile Club did object to this measure in its original form, but has withdrawn its opposition after the Bill was amended to restrict the wider buses to highways having lanes at least 12 feet wide.

We believe this is a good Bill in the public interest. Buses are filling the void created by the elimination of so many rail passenger schedules, and it is our hope that the Legislature will act promptly to give the public the passenger service it deserves.

[From the St. Joseph, Mo., Gazette, Feb. 2, 1972]

THE BUS BILL

Almost unnoticed, certainly without full public realization, St. Joseph has become completely cut off from incoming or outgoing rail or air passenger service.

There are no longer any passenger trains coming into this city which was once a rail hub of the Midwest, and there are no commercial airline flights to Rosecrans Field which not too many years ago had as many as three separate airlines with planes landing here.

This is true of every city in Missouri of a size smaller than this, the fourth largest city in the state. Hence, anyone without private transportation is today dependent upon buses if he or she wants to travel outside of town.

Legislation to upgrade bus service is now before the Missouri legislature. The bill would permit the State Highway Commission to designate highways with traffic lanes 12 feet wide or wider to serve new and more comfortable buses which now are in operation in 19 other states. The bill has been passed out of House committee and is expected to be acted upon by the House this week.

The new buses, although six inches wider to accommodate wider and more comfortable seating, are said to pose no new road hazard because they would be limited to traveling highway lanes two feet wider than many of today's buses only six inches narrower now travel. There would be more passing room than now exists on nine and ten-foot lanes.

In addition, wider tires would have 46 per cent more traction contact with pavement, for better braking and less per-square-inch wear and tear on road surfaces, plus larger brakes.

While the Missouri Safety Council and the State Highway Department have in the past objected to increases in the size of buses, they have expressed satisfaction with limitations written into the new bill. The Missouri Automobile Club has also dropped past opposition to the bill in its original form after it was amended to restrict the wider buses to the wider highways.

This appears to be a progressive bill in view of the trend toward wider highways and the great need for decent transportation to replace that by rail and air now no longer available for many citizens. Of the 19 states already allowing the wider buses, the adjoining states of Kansas and Oklahoma are listed.

[From the Chillicothe, Mo., Constitution-Tribune, Feb. 22, 1972]

THE PUBLIC — AND PUBLIC TRANSPORTATION IN MISSOURI

Bills before the Missouri Legislature this session include two, House Bill 1112 and S. B. 375, which would permit the use of 6-inch-wider buses on Missouri highways.

Buses could be 8½ feet wide instead of eight but the wider buses would be permitted only on those highways having 12-foot lanes and then only if specifically designed by the State Highway Commission.

Proponents say the additional width would permit more comfortable seating and that 8½-foot buses, where they have been used, have actually proved safer because they are more stable, have more rubber on the ground and bigger brakes.

Missouri cities of over 75,000 population already permit 8½-foot-wide buses. In the St. Louis area, Bi-State operates 362 of the wider buses. The Area Transportation Authority in Kansas City has been operating 102-inch-wide buses for 15 years.

Proponents say that intercity bus transportation is becoming increasingly important to the public—rail passenger schedules have been a steadily eliminated—and that intercity buses now provide the only scheduled passenger service for many cities and towns. Thus, they say, it is up to the buses to provide the most comfortable, safe and economical service possible.

Wider buses are currently in use in 19 states and in city transit service in 38 states.

There has been no change in Missouri's bus width limits in 47 years.

The Missouri Safety Council and highway department experts reportedly have offered no objections to the proposal for six-inch-wider buses, although the Automobile Club has opposed them, suggesting that Missouri withhold legislation until federal studies are in on the various safety effects of wider vehicles.

In view of the fact that wider buses seem to have weathered the traffic well in the cities and in many other states and the bus industry's belief it can make the public more comfortable in providing the only scheduled transportation many legislative bills should deserve support.

And there is something to be said that enabling carriers to have a greater degree of uniformity throughout their operation systems would provide a plus factor to bus operations.

[From the Independence, Mo., Examiner, March 1, 1972]

WIDER BUSES FOR SAFETY, COMFORT

Two identical bills are now before the state legislature. They are Senate Bill 375 and House Bill 1112. The bills would permit intercity buses to have a width of 102 inches (only six more than at present). The buses would be used only on highways designated by the State Highway Commission and not on the interstate system until federal laws permit such width. They would be limited to highways with 12-foot lanes.

The need for better, safer, more comfortable mass transportation is apparent. Rail passenger schedules have been drastically reduced over the past 20 years, leaving only the buses to fill the gap.

The intercity bus industry safety record is unequalled by any other form of motor vehicle transportation. Travel by bus is 15 to 20 times safer than travel by passenger automobile. This record, for the most part, has been established by buses operating on 10-foot lanes.

There are now about 250 buses of the 102-inch width operating in Independence and Kansas City. They have been used for the past 15 years. Larry Huffman, an executive of the ATA, says the accident experience between the 96-inch and the 102-inch buses show no difference.

In St. Louis, 362 of the wider buses are in operation and have caused no problem whatever.

The additional six inches would not add more seating capacity but it would make the bus passenger more comfortable and the vehicle safer. When traveling on 12-foot lanes, they would pose no greater safety hazard for other vehicles.

We would urge our legislators to pass these bills for the comfort, convenience and safety of those who ride the buses.

For those of us who still prefer the personal passenger car, we would urge the industry to extend the buses exhaust line to the roof of the vehicle to relieve us of the stench caused by the fumes.

[From the Cape Girardeau, Mo., Southeast Missourian, March 1, 1972]

BILLS IN THE PUBLIC INTEREST

Having struggled for years behind buses and trucks on the winding hills and curves of Highway 61 to the north, we normally take a jaundiced view of legislation which would do anything to increase length or width limits of these large vehicles.

We are persuaded, however, that measures now before the Legislature in House Bill 1112 and Senate Bill 375 are with merit and should be passed.

This legislation would allow the use of a new type of bus which is now operated in 19 states. It has wider seats and wider aisles, is more easily handled and more stable and is safer for both passengers and the motoring public.

The safety comes in because the buses' wider tires have 46 per cent more area in contact with the pavement and its brake-drums are 69 per cent more effective than those on existing conventional buses.

All of this would be accomplished by widening the bus by 6 inches from 8 feet to 8½ feet. Length is not affected.

The legislation restricts the use of these buses to 12-foot highway lanes, and then only if approved by the State Highway Commission. Neither the Missouri Safety Council, a division of the National Safety Council, nor highway department safety experts object to the wider buses. Be it remembered, too, that bus lines have built a remarkable safety record over 40 years by using 8-foot buses on 9½- and 10-foot lanes.

The Missouri Bus and Truck Association reports there are approximately 1,500 commercial buses registered for use on Missouri highways compared with a total motor vehicle load of almost 3,000,000. Only a small number of buses would be involved on wider pavements.

In this day when the only means of travel outside the private automobile is by flying or bus, every step must be made to make bus travel safer and more attractive. We believe these bills will do so and thing the Legislature should pass them.

[From the Albany, N.Y. Times Union, July 29, 1971]

THE NATIONAL SCENE.—A SICKENING SHOW

ISSUE: Should the Congress succumb to lobby pressures to permit bigger trucks and buses on highways or pay more attention to the safety of the motoring public?

You are invited here to consider a shameful example of how our lawmakers in Washington too often ignore the public interest when the dubious pressures of well-heeled lobbies go to work. Holding your nose is recommended—this is a real smeller.

As background, you should know that the economically powerful trucking interests for 15 years have been pushing for permission to use wider and thus more profitable trucks on the nation's interstate highway system. Never mind that the present freight-train monsters already chew up the tax-built roadways, block vision and dangerously rock passing private cars with their air blast effects.

Thanks only to concerted opposition by the private motorists, voiced largely through the American Automobile Association (AAA) and newspaper editor-

ials, the truckers thus far have failed in their campaign. This year, however, a subterfuge approach is giving them fresh hope.

Their gimmick was to back a proposal to widen interstate motor buses from the present maximum of 96 inches to 102 inches—the same width extension sought for themselves. As the AAA pointed out, this would mean little in added comfort to the bus passengers. But it would serve as a precedent for similarly breaching the truck limitations later.

A vigorous opponent of the legislation, Rep. Fred Schwengel (R.-Iowa), said when the bill—HR-4354—was approved by the committee:

"It is incredible that the bill would be reported favorably. By so acting, the committee has shown a callous disregard for the safety of the motoring public. The committee in effect has voted in favor of special interest groups and against the general public."

Despite this and similar expressions of outrage, the House on July 21 approved the measure by a majority of 38 votes and sent it to the Senate for action.

"It was a sickening performance," Rep. Schwengel said.

It surely was. And it must not be repeated in the upper house of Congress if integrity and devotion to the public welfare still take precedence there.

If anything, interstate buses and trucks should be made smaller — not larger than they already are.

[From the Tulsa (Okla.) Tribune, May 18, 1971]

How Wide The Bus?

First the execution, then the trial:

The House Public Works Committee has approved a bill to increase the present 96-inch federal limit on interstate bus widths to 102 inches effective July 1, 1973, if a study by the secretary of transportation determines there would be no adverse effect on travel safety.

This reverse order brought a raised-eyebrow response from the American Automobile Association: "We seriously question the logic of first legislating a bill and then calling for a study to determine its feasibility," John de Lorenzi, AAA managing director of public and government relations, said.

The committee acted, de Lorenzi said, despite renewed opposition by the National Transportation Safety Board and statements by Francis Turner, federal highway administrator, that he could not support the bill.

"Some of the hazards apply only to bus occupants," the Safety Board told the committee, "while others apply to everyone who uses the highways."

And everyone who uses the highways must hope the House of Representatives isn't as eager as the Public Works Committee to allow wider buses. The pending bill could be a forerunner to legislation providing for wider and heavier trucks on the highways.

[From the Columbus Citizen-Journal (Columbus, Ohio) Dec. 20, 1971]

More On Wider Buses

Several days of hearings have reinforced the conviction that Congress should reject—at least for now—a proposal to permit wider buses on all interstate highways.

The bus companies contend that a bus 102 inches wide is no more hazardous to other drivers than the usual 96-inch buses and would make bus travel more comfortable for passengers by widening the seats.

The American Automobile Association alleges that buses already are too wide for safety and that no one will be lured from a car to a bus simply because the seats are an inch or two wider.

The real reason for the request, the auto association claims, is to increase the cargo capacity of interstate buses and thereby bolster bus company profits. The bus companies deny this.

Rep. Fred Schwengel, R-Iowa, predicts that once the wider buses are approved, the trucking companies will be back in Congress with another big-truck bill. This may be true, but Congress can consider the two issues separately.

Whatever the merits of wider buses, there is no cause to change the present law until the safety factors have been fully examined.

[From the Toledo, Ohio, Blade, Feb. 18, 1972]

NO WIDER!

A bill that would allow wider busses on the interstate highway system has been challenged on a further count by the National Transportation Safety Board. This one reveals that such busses would elevate passenger seats 13½ feet above the road, which could make the vehicles potentially top heavy and unstable. The basic goal of the bus bill is to gain an added 6-inch width for an overall 102 inches. And behind the bus bill is the trucking industry, quietly assisting with its own lobby in hopes of following in the busses' wider wake.

Passenger safety, important as it is, is only one of the concerns of the safety board. But in urging delay of any congressional action, the board challenged the argument that the increased height should be granted simply to allow for more express cargo space below. Width is the other dimension sought mainly for the same reason.

How such a jumbo bus would ride if loaded with a day-long excursion of adult passengers with no cargo for ballast is just one question the safety board is asking; and it wonders, as well, about stability in the event the weight of the cargo should shift in the compartment.

In earlier hearings before the Senate public works committee, the safety board submitted test statistics on the effect of passing automobiles buffeted by combined winds and air streams from the big vehicles. In some situations cars were sucked as closely as 2½ feet toward the test truck-trailers at 60 miles an hour, and under other conditions were blown as far as four feet away from their normal forward course.

Given the standard 12-foot lanes on most interstate systems, there are no valid arguments by bus or truck operators to warrant stretching the limits of traffic safety beyond those they have managed over the years to extract either in width or length. The broader-bus bill should be shelved indefinitely.

[From the Portland, Oregon, Sunday Oregonian, July 25, 1971]

BUS LANES BETTER

Would one-inch additional width of a bus seat lure additional riders away from private automobiles?

The U. S. House of Representatives evidently believes it would. By voice vote, the House has passed a bill permitting buses 102 inches wide to operate on interstate highways, unless the secretary of transportation determined they would create a traffic hazard. The limit now on the national system of freeways is 96 inches. The additional six inches would add one inch to the width of each seat and two inches to aisles.

Critics of the bill smelled a scheme to permit larger and heavier trucks to use the interstate system. Legislation allowing wider buses would be followed, they warned, by proposals to legalize wider trucks. But Rep. James Wright, D-Tex., said the only purpose was to make bus travel more comfortable and thus induce commuters to leave their cars at home.

The 102-inch buses are now permitted in some cities and on non-interstate highways in some states. About 22,000 of the wider carriers are now operating, but because of the 96-inch restriction on interstate highways they cannot use these routes to transport suburban passengers to the cities. Lanes on the freeways are at least 12 feet wide and one congressman declared it was ridiculous that the widest buses are not allowed on the widest highways in the nation.

The Senate still must act on the bill. Should it and the secretary of transportation go along with the House, no immediate upsurge in bus patronage can be expected. One-inch more hip room will not cause Americans to change their long-established habit of driving their own cars to work. A more effective way of encouraging use of buses would be to establish exclusive lanes for these carriers on the freeways. A passenger on a bus whizzing by barely moving lines of private cars at the rush hour would likely become an instant convert to mass transportation.

[From the Meadville (Pa.) Tribune, Aug. 14, 1971]

DOUBLE BLOW TO SAFETY

Final approval of measures that would permit buses and snub-nosed trucks on the highways would deal a blow to traffic safety.

The U.S. House of Representatives approved a bill that would permit buses six inches wider than the current 96-inch limit to operate on interstate highways. The bill goes to the U.S. Senate for its consideration.

In Pennsylvania, a state Senate-approved bill permitting snub-nosed trucks that can haul longer trailers has been okayed by the state House and sent to the governor for his signature.

Both developments could result in an increase in traffic accidents on state and national highways.

The United States Senate should defeat the wider bus measure, and Gov. Shapp should not sign the truck bill. Both bills have been opposed by safety groups and the U.S. Department of Transportation. Their arguments should be considered.

At their current width, buses already create an "air blast" that affects safe operation of passing cars. It follows that wider buses would create an even more dangerous blast. This possibility needs more study before wider buses are allowed on interstate highways.

If the bus companies succeed in pressuring passage of the wider bus bill, it's likely that truck interests will demand equal treatment. The argument would be that if wider buses are okay, why not wider trucks, too?

As for the snub-nosed trucks, they aren't able to maneuver as efficiently as the standard semi-trailer trucks now in use in Pennsylvania. A snub-nose cab allows a longer trailer to be hauled, although still within overall lengths limits set by Pennsylvania law.

Longer trailers mean more profitable runs, since greater cargo volumes are possible. Bus companies claim wider buses will give passengers greater comfort, which supposedly would attract more business for the bus firms. Both these measures would benefit special interests, but not the motoring public, which should receive first consideration.

[From the Meadville (Pa.) Tribune, Dec. 27, 1971]

HOLD THE LINE

A spokesman for the American Automobile Association has advised the roads subcommittee of the Senate Public Works Committee that if Congress considers a change in the size of buses, it should make them smaller, not larger. The subcommittee is studying a proposal that would allow buses to be wider than the present 96-inch limit permitted by law.

It wouldn't be feasible to reduce this limit, contrary to the suggestion by John de Lorenzi, AAA managing director of public and government relations. Congress should hold the line, however, and not approve any increase in bus sizes.

Advocates of the wider bus measure contend that the increase is needed to generate more business for the busing industry. It is hoped wider buses with more comfortable seats would make buses more competitive with airliners as a means of long-distance traveling.

Opponents, though, fear that wider buses would lead to a bill for wider trucks. Since trucks far outnumber buses, a change to permit bigger trucks would be a much greater safety hazard than wider buses. Trucks and buses have wind blast and suction effects that create handling problems for cars that pass by them. If larger vehicles were to be permitted, the hazards would increase.

De Lorenzi cites statistics from a study conducted recently for the federal Department of Transportation that "indicate that existing 96-inch-wide trucks and buses are incompatible with other vehicles on the highways." To correct this, he feels steps should be taken, "even if that means reducing the size of existing buses and trucks."

This would be unfair and difficult to implement, however. It would be much too costly to require that all vehicles that are at the present maximum width be taken off the highways. A more reasonable course would be to hold the exist-

ing limit, and initiate studies to find ways to reduce the blast effects of large highway vehicles.

[From the Wilkes-Barre, Pa., Times Leader, May 18, 1971]

MOTORISTS MAY FACE BIGGER TRAILERS, BUSES

Longer trailers and wider buses will be traversing Pennsylvania's highways unless the Commonwealth's motorists are able to muster more potent opposition than demonstrated to date.

The longer trailer bill, before the Legislature at present, has passed the Senate, and will come before the House when the General Assembly reconvenes after the election. It would erase the present 40-foot trailr limit and would permit trailers as long as 48 feet, provided the overall length of trailer and tractor did not exceed 55 feet. Use of shorter tractors would open the roads to the mammoth trailers, under the proposal, unless the State House defeats it.

The wider bus proposal has also made headway, despite claims by motorist groups it would add to highway perils. The U.S. House Public Works Committee has approved a six-inch increase—from 96 inches to 102 inches—effective in 1973 on interstate roads.

We share the surprise of the American Automobile Association in citing the committee approval, which included provision for a study, as the AAA put it to see if it is an unsafe measure. The motorists' group said it seriously questioned "the logic of first legislating a bill and then calling for a study to determine its feasibility."

While the bill relates to interstate highways, the buses would be required to use primary and secondary roads en route to the superhighways. It is noted that some 60 per cent of the rural primary road system has lanes less than 12 feet wide.

The measure is still to be voted on by the House, and Congressmen have been urged by the AAA to take a serious look at it prior to passage. Perhaps, as part of their study, they could imagine a 102-inch wide bus approaching a passenger car on a 12-foot wide road. That should be a persuasive experience.

[From the Allentown, Pa., Chronicle, May 14, 1971]

BILL TO OK WIDER BUSES QUESTIONED

A congressional bill to increase the federal limit on interstate bus widths by six inches is being questioned by the Lehigh Valley Motor Club.

The local club joins other American Automobile Association (AAA) affiliates in questioning the measure approved by the House Public Works Committee. After approval, the committee called for a study to see if it is an unsafe measure.

The bill would increase the present 96-inch federal limit on bus widths to 102 inches. The change would become effective in July 1973 — if a study by the secretary of transportation determines no adverse effect on travel safety.

A spokesman for the AAA said, "We seriously question the logic of first legislating a bill and then calling for a study to determine its feasibility."

He noted that the House committee approved the proposal despite opposition by the National Transportation Safety Board and by Federal Highway Administrator Francis Turner. Both refused to support the measure for reasons involving highway safety.

John de Lorenzi, AAA managing director of public and government relations, said, "This measure poses a serious threat to both the rights and safety of all motorists."

He said it could be a forerunner to passage of laws allowing wider and heavier trucks on highways.

[From the San Antonio, Tex., Light, July 29, 1971]

SICKENING SHOW

You are invited to consider a shameful example of how our lawmakers in Washington too often ignore the public interest under the pressures of well-heeled lobbies.

The economically powerful trucking interests for 15 years have been pushing for permission to use wider and thus more profitable trucks on the nation's interstate highway system. (Never mind that the present freight-train monsters already chew up the tax-built roadways, block vision, and dangerously rock passing private cars with their air blast effects.)

Thanks only to concerted opposition by the private motorists, voiced largely through the American Automobile Association and newspaper editorials, the truckers thus far have failed in their campaign. This year, however, a subterfuge approach is giving them fresh hope.

Their gimmick was to back a proposal to widen interstate motor buses from the present maximum of 96 inches to 102 inches — the same width extension sought for themselves. As the AAA pointed out, this would mean little in added comfort to the bus passengers. But it would serve as a precedent for similarly breaching the truck limitations later.

Every informed person and legislator in Washington understood this. Nevertheless, on July 12, the House Public Works Committee reported favorably on the bus extension measure — ignoring the oposition not only of the AAA but that of the Department of Transportation and the National Transportation Safety Board.

A vigorous opponent of the legislation, Rep. Fred Schwengel (R.-Iowa), said when the bill — HR-4354 — was approved by the committee:

"It is incredible that the bill would be reported favorably. By so acting, the committee has shown a callous disregard for the safety of the motoring public. The committee in effect has voted in favor of special interest groups and against the general public."

Despite this and similar expressions of outrage, the House on July 21 approved the measure by a majority of 38 votes and sent it to the Senate for action.

"It was a sickening performance," Rep. Schwengel said.

It surely was. And it must not be repeated in the upper chamber of Congress if integrity and devotion to the public welfare still take precedence there.

[From the Knoxville News-Sentinel (Knoxville, Tenn.) Dec. 25, 1971]

MORE ON WIDER BUSES

Several days of hearings have reinforced the conviction that Congress should reject—at least for now—a proposal to permit wider buses on all interstate highways.

The bus companies contend that a bus 102 inches wide is no more hazardous to other drivers than the usual 96-inch buses and would make bus travel more comfortable for passengers by widening the seats.

The American Automobile Association alleges that buses already are too wide for safety and that no one will be lured from a car to a bus simply because the seats are an inch or two wider.

The real reason for the request, the auto association claims, is to increase the cargo capacity of interstate buses and thereby bolster bus company profits. The bus companies deny this.

Rep. Fred Schwengel, R-Iowa, predicts that once the wider buses are approved, the trucking companies will be back in Congress with another big-truck bill. This may be true, but Congress can consider the two issues separately.

Whatever the merits of wider buses, there is no clause to change the present law until the safety factors have been fully examined.

[From the Nashville (Tenn.) Banner, Jan. 31, 1971]

FOR DIMENSIONS OF HIGHWAY—BUSES ARE WIDE ENOUGH

There are at least two good reasons—valid, important, timely reasons—for the concerned public to voice right now its proper opposition to further, dangerous experimentation with longer, wider, heavier commercial vehicles on the highways.

(1) The proposal to that end—initially a measure to broaden buses to 102 inches—is before Congress.

(2) A similar measure, for passenger or freight vehicles, or both, will be before the Tennessee General Assembly. It always is. The one for tandem rigs, heavier loads, etc., did not get through the legislature last time—but inevitably it will be back.

The U.S. House of Representatives narrowly approved the bus change last session. It now is scheduled for action in the Senate.

It should be defeated, in the interest of protecting this nation's investment in costly highways, but especially in the interest of life-saving. It should be remembered that even the Interstates—the lanes on them—have been designed for narrower vehicles than those now proposed. That is to say that buses 96 inches wide are about as wide as these lands can safely accommodate, and adding six inches—for the complicating factor of another full foot when one of these passes another—diminishes the safety margin.

Congressman Fred Schwengel, of Iowa has helped lead the fight against this attempt to widen buses, and has renewed the attack on three grounds, principally:

As strictly a bus measure, it would not provide the solution claimed for it in the matter of urban mass transit problems; it assuredly would be a forerunner for similar action on trucks, for wider, longer, heavier vehicles in this category; and, there can be no question that it would affect adversely the public safety on these thoroughfares.

It would greatly compound construction and maintenance costs, too. For such heavier and intensified commercial use would increase the surface damage; and there would be no way to use even the interstates for such vehicles without similarly providing more adequate exit points and collateral thoroughfares.

Besides all that, it recently has been disclosed that there are thousands of bridges regarded as unsafe by modern evaluation standards.

The buslines, with presently legal equipment have access to these highways and rightly. So have the truckers. Nobody is proposing to divest them of that. But THEIR idea of compelling the public—those footing the major part of the highway construction and upkeep cost—and the respective levels of government, to conform to THEIR preferences, would be an imposition altogether unreasonable and unjust. Now is the time to reject it flatly.

[From the Alexandria, Virginia, Gazette, August 7, 1971]

8'6" Buses Pose Threat

The maximum width of buses traveling on the interstate highway system now is 91 inches—7 feet, 7 inches. The House has passed a bill to allow buses 102 inches wide—8 feet, 6 inches, or almost one foot wider. It may get through the Senate for lack of anyone to lead the opposition.

The arguments for wider buses is that they will allow wider seats, coaxing motorists into riding intercity buses and solving the traffic congestion problem. Opponents reply that most of the urban traffic congestion comes from intracity traffic, not intercity traffic.

Perhaps the most potent argument against wider buses is that they will be precedent-making, that they will open the way for wider and heavier trucks that would play hob with the pavement of the interstate highway system; also, that they would create a hazard for family cars which would be crowded over. They would also have longer distances to go to pass them and would create more wind turbulence to sway autos as they rush along the superhighways.

This is a serious matter for automobile drivers. Small cars especially have a hard time now holding their wheels in line when buses and trucks pass by. The rush of wind that tugs at the wheel in the auto driver's hand is a continuous hazard. Trucks and buses are enough of a menace now without widening them even more. The fight to keep the interstate safe for motorists should move senators in the public interest to lead the fight against it.

[From the Norfolk (Va.) Ledger Star, July 23, 1971]

NOW, A BID FOR WIDER BUSES

The House of Representatives has passed a bill that would permit wider buses to travel Interstate highways. Specifically, the maximum bus width of 96 inches would be increased to a permissible 102 inches, allowing a one-inch widening of each of four seats and a two-inch widening of the aisle.

A proponent of this measure presented the dubious argument that the width revisions would "make bus travel more comfortable and convenient for commuters so they will leave their cars at home."

Well, we'd be mighty surprised if the promise of an inch wider seat and a two-inch wider aisle would lure many motorists onto the buses or make their ride appreciably more comfortable if they did switch. Nonetheless, 213 Congressmen voted for the measure and only 178 against.

Its passage also has trained new attention on the old controversy surrounding truck widths. The trucking industry has long sought wider vans in order to reduce operating expenses. This effort in the past has been denied Congressional endorsement, and the Congress was entirely correct.

Despite truckers' and bus operators' assurances to the contrary, the larger vehicles would, we think, increase driving hazards. To be sure, Interstate lanes may be wider than the average, but speed limits are higher, too. Moreover, the vehicles must move over regular and sometimes extra narrow roads to make their way to and from the more commodious superhighways.

Many motorists doubtlessly feel that tractor-trailers and buses already are large enough. The mere presence of these vehicles, even with skilled and considerate operators behind the wheel, can be something of an intimidation to the average driver. And this suggests that even wider vehicles would be an even larger potential intimidation, and hence a greater threat to the highway motorist's safety.

Some of those in the House who opposed the wider-bus bill contended that its passage would open the door to similar legislation for trucks.

The Senate ought of course to reject this bill, but not primarily because of the possible boost it could mean for wider trucks; rather because wider buses themselves would confront motorists with new safety hazards on the highways.

[From the Virginian-Pilot August 10, 1971]

AND LARGER TRUCKS.—BIGGER BUSES—AND HAZARDS

Before breaking away for the summer the House of Representatives did the Nation's motorists a bad turn by approving a bill to widen interstate buses from the present maximum of 96 inches to 102 inches. The Senate should kill this proposal, which House opponents charged with running interference for ever-wider trucks on the highways.

An extra inch of seat space for each bus rider and two inches for the aisle would not provide much more comfort for the passengers and meanwhile would increase traffic congestion. Studies indicate that smaller, more maneuverable buses would thread city traffic faster.

The extra six inches would add immeasurably to the motorist's risks in passing one of the behemoths or in trying to control his car in the wake of an air blast from a bus cruising at 65 to 70 miles an hour.

In overriding pleas for further study of safety factors by the Department of Transportation, the National Transportation Safety Board, and the American Automobile Association, the House, as Iowa Representative Fred Schwengel declared, put on a "sickening performance." If the bill becomes law, Mr. Schwengel noted, a major bus line plans to increase the length of its buses to 40 feet, their height to 12 feet, and their weight from 29,000 pounds to 42,000. For every inch in width, a bus would gain a ton.

The interstate highway system was designed on the basis of laws limiting the width of trucks and buses to eight feet. An interstate highway lane is 12 feet wide, which leaves 24 inches of clearance on either side for vehicles of maximum size. To shrink that margin also might shorten the life expectancy of the motorist.

On its own demerits and as an undesirable precedent-maker for even worse proposals for wider, heavier trucks, the bill for bigger buses should be stopped.

[From the Seattle (Wash.) Post-Intelligencer, Dec. 29, 1971]

Highway Monsters

If you are among the many millions of Americans who drive their own cars on the nation's highways, you should be seriously concerned by the impending threat to your safety and pocketbook which the powerful and persistent trucking lobby in Washington is determined to ram through Congress eventually—one way or another.

In past years, time and again, the wealthy trucking industry has sought legislation to permit an increase in the size of the huge motorized freight cars already in use. These are the roaring monsters which chew up the best of roadways, at your tax expense, and terrify many private drivers by rocking passing cars with blasts of unnerving air turbulence.

We have consistenly opposed every bill which would allow these behemoths to be bigger than they already are. Many others also have rallied in resistance—and thus far the truckers have not succeeded in getting permission for the dangerous expansion of trailer carrier volume they so dearly desire.

Today, however, thanks to a roundabout maneuver, the truckers are closer to success than they ever were. They are pushing a bill which would allow interstate buses to be expanded in width from 96 to 102 inches. It already has passed the House and awaits action in the Senate when it reconvenes. If approved, the measure will set a precedent for the similar size expansion sought for trailers.

There is no sound reason why interstate buses should be widened by six inches. Present seating capacities are quite adequate. But an extra six inches in trailer truck volume could mean millions in annual profits to the trucking industry—at a cost to highway maintenance and general safety which is incalcuable.

The pending bill and the sinister precedent its backers are trying to establish can and should be stopped. If you agree, why not clip this editorial and send it to your favorite senator—along with a notation demanding his rejection of the latest tricky game being played by the persistent truckers.

[From the Charleston (W.Va.) Gazette, Aug. 14, 1971]

House Bill Has Managed to Stick it to People

Before its members left Washington for a summer vacation, the House of Representatives managed to stick it to the people in the form of a bill increasing the maximum allowable width of interstate buses.

That big monster which tailgaited you into town yesterday or whose bulk prevented you from passing today is already 96 inches wide. Unless the Senate kills the House bill, the bus of tomorrow will be 102 inches wide.

Opponents of the measure have charged that it is merely the forerunner of laws which would permit ever-wider trucks on the highways. The House bill, they say, is a surprise package from the truck lobby.

But even if trucks aren't expectantly waiting to be widened, the bill is a bad one. Six more inches would do very little toward making buses more comfortable but a whole lot toward traffic congestion. And much, much more toward enlarging the risk of passing a bus on the highway.

Buses, rushing to meet tight schedules, already are a menace to the private automobile on roads not built to accommodate behemoths. If Rep. Fred Schwengel can be believed, a new maximum width will make the highways far more dangerous than a tiny six inches suggests.

If the House bill passes, Schwengel declared both on the floor of the House and in a newspaper interview, a major bus line proposes not only to widen its vehicles to the new maximum but also to increase the length to 40 feet, their height to 12 feet, and their weight from 29,000 pounds to 42,000. For every inch in width, a bus on this particular line would gain a ton.

We think Schwengel may be understating the case when he says the House put on a "sickening performance" in agreeing to the new maximum width. Congressmen drive cars. Surely they know the dangers to which they have given their endorsement.

If they didn't already know it, interstate highway lanes are 12 feet wide, which leaves two feet of clearance on both sides of a vehicle of today's maximum size. When vehicles travel at 60 miles an hour or more, this clearance shouldn't be decreased.

The Senate, if it has the interest of the people in mind, will make short work of the House bus bill.

[From the Huntington, (W.Va.) Herald Dispatch, May 16, 1971]

BIGGER BUSES DANGEROUS

Add the American Automobile Association (AAA) to the list of those opposed to the trucking lobby's latest bid to win federal approval for bigger trucks and buses on the nation's highways.

As noted here the other day, a House Public Works subcommittee has approved a measure (H.R. 4354) which would increase the maximum permissable width of buses from 8 feet to 8½ feet.

Most observers feel the legislation for wider buses is a forerunner to another attempt to win an okeh for wider and heavier trucks on the highways, something for which the trucking lobby has long been working.

In giving its approval to the wider buses, the subcommittee also directed the secretary of Transportation to conduct a study to determine if they would pose any "safety problems." They must have been kidding.

John de Lorenzi, (AAA) managing director of public and government relations, decried this, saying "We seriously question the logic of first legislating a bill and then calling for a study to determine its feasibility."

De Lorenzi also noted the committee approved the proposal despite opposition by both the National Transportation Safety Board and Federal Highway Administrator Francis Turner.

At a hearing conducted on the bill last March, De Lorenzi testified that the wider buses, if approved, would "create a very real safety hazard to motorists, bus operators and passengers."

He noted that although the measure applies only to the Interstate highway system, "there are no bus terminals on the Interstates" and therefore the wider buses would be required to use primary and secondary roads to get to and from the Interstates. And more than half of the country's rural primary roads have lanes less than 12 feet wide.

In short, De Lorenzi told the group, "this measure poses a serious threat to both the rights and the safety of all motorists."

[From the Huntington, (W.Va.) Herald-Dispatch, July 23, 1971]

OVERSIZE BUS IS BACK

They've done it again! Those people-punishing congressmen who evidently have never tried to pass a flock of trucks traveling bumper to bumper on a two-lane highway, have approved a bill to permit buses to add another six inches to their girth—making them 102 inches wide instead of the present 96 inches.

The bill which passed the House Wednesday authorizes the new oversize buses to travel only on Interstate highways, but that's just a joke. We have never yet seen a bus station on any Interstate highway, so obviously the big buses would have to travel on regular thoroughfares in order to get from the stations to the Interstates.

The bill also provides that the Secretary of Transportation has until July 1, 1973, to continue a study now in progress on the question of whether the wider and heavier buses would create a safety problem. But that's sheer nonsense. Nobody who has ever driven an automobile can doubt that today's mammoth trucks and buses pose a greater safety problem to the private motorist than those of two decades ago.

What kind of evidence is the secretary seeking? How can he determine the number of impatient, often desparate drivers who have caused fatal accidents by passing trucks and buses (unwisely and even illegally) without a clear view of the road ahead? How do you get a clear view of the road ahead when it's obscured by a couple of tailgating trucks?

To be sure, the supporters of this outrageous bill say it has nothing to do with trucks. Only buses. They would have you believe that one type of vehicle could be 102 inches wide, while another type could be only 96 inches wide. But that would be discrimination against truckers—so in a year or two the law would be amended to permit 102-inch trucks as well as 102-inch buses.

Perhaps the most ridiculous argument which the bus lobbyists have sold to their "friends" in Congress is that the only purpose of the bill is "to make bus travel more comfortable and convenient for commuters so they will leave their cars at home."

Brother, can you spare a ruler? The proposed seats on the proposed buses would be one inch wider than present seats and the aisles would be two inches wider. That's comfort and convenience?

These gentlemen in Congress who make silly speeches about the comfort and convenience of the public, while voting to add half a foot to the girth of the behemoths of the highways, either have never driven an automobile on the highways or they have no respect for the intelligence of the public.

Ask any motorist whether he thinks trucks and buses ought to be made wider or ought to be made narrower. The chances are about 10 to 1 he'll say commercial vehicles are too wide now.

The wide-bus-bill is on its way to the Senate—which passed a similar bill a couple of years ago. If you want to stop it you'll have to appeal to your U.S. senators.

In West Virginia, the senators are Jennings Randolph and Robert C. Byrd; in Kentucky, John Sherman Cooper and Marlow W. Cook; in Ohio, William B. Saxbe and Robert Taft, Jr.

[From the Huntington (W.Va.) Herald-Dispatch, Dec. 29, 1971]

Wider Buses? No!

When Congress gets back down to work on Jan. 18, one of the many matters confronting it will be proposed legislation authorizing the use of six-inch-wider buses on the Interstate highway system.

The measure is now in the hands of the U.S. Senate Subcommittee on Roads, having been okehed by the House of Representatives last July, despite opposition by the Department of Transportation, the National Transportation Safety Board, Federal Highway Administrator Francis Turner and the American Automobile Association (AAA) on grounds that such wider buses would create additional highway safety hazards.

In testimony before the Senate Subcommittee just before the lawmakers went home for their holiday recess, James L. Kerrigan, president of the Greyhound Corp., termed the present 96-inch federal width limitation on intercity buses "the greatest single obstacle to improving the quality of bus transportation."

"So long as this limitation exists," Kerrigan said, "the width of passenger seats on intercity buses cannot be increased. That is because Greyhound and other large intercity bus companies operate approximately 80 per cent of their total miles on the Interstate system."

Kerrigan and other witnesses favoring the legislation said the larger bus would be safer because the added size would make design improvements easier.

But a very different view of things was offered by John de Lorenzi, managing director of public and government relations for the AAA, who suggested that Congress, rather then allowing buses to be widened, should instead order them made smaller.

The AAA official cited results of recent tests conducted by the Department of Transportation which showed that the wind blast and suction effects of larger vehicles would "increase the hazard for passenger car drivers."

The study results, de Lorenzi said, "indicate that existing 96-inch-wide trucks and buses are incompatible with other vehicles on the highways. Rather than considering increasing sizes, we ought to be examining what steps might be required to improve the present situation, even if that means reducing the size of existing trucks and buses."

De Lorenzi also voiced sharp criticism of a provision in the bill which would give the Secretary of Transportation veto power over the legislation if further tests show that the larger vehicles would be dangerous.

Noting that these tests already are being conducted by DOT, he argued that it would be far wiser to wait until the test results are known in late 1972 before taking any action to increase vehicle size.

"We find it hard to accept the principle of legislate first and study later," de Lorenzi said. "It's a bad bill, it shouldn't be passed."

The Herald-Dispatch believes exactly that — it's a bad bill, one which shouldn't be passed. Like the AAA, we have long opposed any federal legislation that would permit wider, longer and-or heavier vehicles on the nation's roadways.

The legislation now before the Senate Subcommittee on Roads — chaired, by the way, by Sen. Birch Bayh, D-Ind. — is essentially identical to a bill which was considered and recommended by the same committee in 1968. Public outcry killed that bill as well as similar efforts in 1969.

But it looks as if the public is going to have to speak up again.

[From the Wisconsin State Journal, Aug. 4, 1971]

BUS-TRUCK LOBBY.—WHEN AN INCH IS A TON

Almost since Congress began the interstate highway system in 1956, the trucking interests have been lobbying for a change in the law to permit wider trucks. A wider truck is also a heavier and therefore more profitable vehicle.

But not even a highway built to interstate standards can sustain the wear and tear of heavier trucks pounding over its surface day after day. Inevitably they mean a shorter life for the highway and a bigger highway repair bill for the taxpayer. Thus, the plea for a wider truck limit is not an innocuous request. It is really a disguised raid on the public treasury by the trucking interests.

A wider truck can also mean a shorter life for ordinary motorists. Trucks create a visual hazard because they block a view of the road ahead. Their mass moving past smaller vehicles at high speed also creates a "blast effect" which can disrupt the motorist's control of his own car. These economic and safety arguments explain why limits on the width and weight of trucks and buses are written into federal highway legislation.

Since the trucking lobby has repeatedly failed to get the law amended, its allies in the House Public Works Committee devised a bill covering only buses. Despite pious protestations on all sides that buses and nothing but buses are in the minds of the bill's sponsors, everyone well knows that the bus bill is only a dry run for a truck bill.

The humble and politically popular bus passenger is, so to speak, carrying the legislative freight for the arrogant and unpopular trucker. Once buses have breached the existing limit and established a precedent, it will be much easier to enact a significantly wider limit for trucks.

Even if the bill were not a precedent-maker for something worse, it would be a bad bill on its own merits. Heavy buses also wear out the highways, obstruct the vision of other drivers, and when traveling above the speed limits — as intercity buses habitually do — they create the same dangerous "blast effect."

The bill would permit buses to be 102 inches wide instead of the present limit of 96 inches. The gain for the bus passenger would be trivial. Each of the four seats would be an inch wider and the aisle would be two inches wider. But in terms of the overall weight of the bus, the change would be startling. Rep. Schwengel of Iowa pointed out in the House debate the other day that if this bill becomes law, a major bus line plans to increase the length of its buses to 40 feet, their height to 12 feet, and their weight from approximately 29,000 pounds to 42,000. In other words, every inch wider means a bus that is a ton heavier.

The bus-and-truck interests prevailed in the House. But if the Senate has concern for the nation's taxpayers and motorists, this is a bill that deserves to be flagged down and waved to the side of the road.

INTERSTATE COMMERCE COMMISSION,
Washington, D.C., February 17, 1972.

Hon. BIRCH BAYH,
Chairman, Subcommittee on Roads, Committee on Public Works, U.S. Senate, Washington, D.C.

DEAR CHAIRMAN BAYH: This letter will serve to acknowledge the oral request directed to this agency by your Professional Staff Member, Dr. Clark Norton. He advised that you are in the process of holding hearings on H.R. 4354, a bill to increase the permissive width of buses operating on the interstate system from 96 to 102 inches.

As you know, H.R. 4354 has now passed the House of Representatives. A review of the hearings, the Report that accompanied the bill to the floor, and the floor discussion reveals that the major issue involved in the desirability of such legislation is safety—safety of bus passengers and drivers and occupants of private automobiles. The functions, powers and duties of the Interstate Commerce Commission relative to safety were transferred to and vested in the Department of Transportation pursuant to Public Law 89–670. Therefore, we no longer have sufficient in-house expertise to make an informed judgment as to the desirability of the proposed legislation from a safety standpoint. This fact was suggested to your Subcommittee Staff and they advised that the Commission could be of assistance by furnishing economic data with respect to the bus industry's share of the intercity transportation market. Therefore, I am enclosing the following tables for inclusion in your hearing record: (1) Operating Revenues Assignable to Passenger and Allied Services, 1965–1969; (2) Operating Revenues, Class I Carriers of Passengers engaged in Intercity Service, All districts, 1965–1969; and (3) Operating Revenues of Certificated Route Air Carriers Total Domestic Operations, 1965–1970.

The National Transportation Safety Board has recognized that enactment of H.R. 4354 would increase the cargo carrying capacity of intercity buses. It would appear that a 102-inch wide Continental Trailways Bus would provide 22.9 more cubic feet of cargo capacity than its 96-inch wide bus. Greyhound's 102-inch Supercruiser would allow 81 more cubic feet of cargo than its present 96-inch wide Scenic Cruiser. Since almost 19% of the gross revenue of Class I carriers in 1969 can be attributed to express and mail revenue, it would appear that enactment of such legislation would substantially increase the ability of intercity bus companies to compete for additional cargo business.

I trust the above is sufficient for your purposes but if you desire further information, please let me know.

Sincerely yours,

(Signed) GEORGE M. STAFFORD,
Chairman.

OPERATING REVENUES ASSIGNABLE TO PASSENGER AND ALLIED SERVICES, 1965-69

(Class 1 line-haul railroads)

ALL DISTRICTS

Item	1965	1966	1967	1968	1969
Number of railroads represented	76	76	76	75	73
I. TRANSPORTATION—RAIL LINE					
Freight	$7,321,609	$7,577,900	$5,738,871	$2,403,973	$2,101,438
Passenger	552,885,399	543,564,621	485,266,007	444,104,927	438,237,781
Baggage	1,335,530	1,177,488	1,020,415	810,145	632,101
Sleeping car	3,449,051	2,900,471	3,008,490	2,601,812	16,471,642
Parlor and chair car	2,819,272	2,954,475	2,671,104	2,142,410	2,085,068
Mail	308,606,451	301,760,036	238,205,672	130,709,232	98,497,496
Express	75,144,190	63,085,270	53,904,064	22,237,634	1,933,703
Other passenger train	14,748,407	26,987,562	28,622,620	29,832,491	26,471,988
Milk	409,879	287,410	243,190	152,133	96,783
Passenger-service train revenue	959,398,179	942,717,333	812,941,562	632,590,784	584,426,562
Switching	401,060	586,716	532,883	387,157	184,437
Water transfers	2,065,782	2,297,327	1,921,628	1,612,589	1,638,300
Rail-line transportation revenue—Total	969,186,630	953,179,276	821,134,944	636,994,503	588,350,737
III. INCIDENTAL					
Dining and buffet	39,452,627	39,267,931	32,646,692	26,692,346	24,821,958
Hotel and restaurant	800,438	757,363	643,497	422,094	404,383
Station, train, and boat privileges	5,007,784	5,219,162	5,122,092	4,908,771	4,480,121
Storage—Freight					
Demurrage					
Communication	49,002	38,351	31,302	17,357	11,141
Grain elevator					
Power	135,817	130,036	139,594	137,423	105,541
Rents of buildings and other property	7,213,433	6,571,391	6,639,237	6,239,028	7,885,125
Miscelleaneous	12,483,158	4,900,866	4,096,035	3,375,131	2,643,259
Incidental operating revenue—Total	65,142,259	56,885,100	49,318,449	41,792,150	40,351,528
IV. JOINT FACILITY					
Joint facility—Cr	9,141,181	8,821,429	8,528,181	7,993,942	9,605,757
Joint facility—Dr	1,387,217	1,333,421	1,270,904	996,596	121,199
Joint facility operating revenue—Total	7,753,964	7,488,008	7,257,277	6,997,346	9,484,558
Railway operating revenues—Total	1,042,082,853	1,017,552,384	877,710,670	685,783,999	638,186,823

Source: Transport Statistics in the United States, Pt. 1, Railroads, table 165, 1965-69.

OPERATING REVENUES, CLASS I CARRIERS OF PASSENGERS ENGAGED IN INTERCITY SERVICE, ALL DISTRICTS, 1965-69

Item	1965	1966	1967	1968	1969
Number of carriers represented	156	166	177	173	[1] 70
Passenger revenue	$466,553,559	$490,300,509	$493,792,299	$503,856,026	$496,228,659
Special bus revenue	64,353,011	72,367,992	84,973,341	89,450,717	75,432,532
Baggage revenue	176,882	322,614	304,390	302,662	298,863
Mail revenue	1,321,626	1,221,076	2,940,053	2,940,050	2,451,460
Express revenue	61,024,025	64,652,312	71,768,537	83,841,131	89,735,312
Newspaper revenue	1,574,136	2,339,266	1,580,462	1,768,036	1,772,154
Miscellaneous station revenue	8,722,599	9,069,301	10,527,249	9,119,892	8,788,787
Other operating revenue	3,611,109	4,047,474	3,691,591	3,320,957	2,318,697
Total, operating revenues	607,336,947	644,320,544	669,577,922	694,599,471	677,026,464

[1] Effective Jan. 1, 1969, a class I motor carrier of passenger is one having average gross operating revenues (including interstate and intrastate) of $1,000,000 or over annually, from passenger motor carrier operations.
Prior to this date, a class I motor carrier of passenger was one having gross operating revenues of $200,000 or over annually.

Source: Transport Statistics in the United States, pt. 7, Motor Carriers, table 21, 1965-69.

OPERATING REVENUES OF CERTIFICATED ROUTE AIR CARRIERS, TOTAL DOMESTIC OPERATIONS, 1965–70

[In thousands]

	1965	1966	1967	1968	1969	1970
1. Passenger, 1-class (sch.)	$1,127,457	$1,236,170	$1,334,488	$1,447,698	$1,633,351	$1,644,554
2. Passenger, coach, and economy (sch.)	2,014,591	2,298,165	2,925,512	3,464,981	4,310,094	4,601,862
3. Total passenger resources (sch.)	3,142,048	3,534,335	4,260,000	4,912,679	5,943,446	6,246,416
9. Excess baggage (sch.)	12,041	5,954	7,236	8,943	11,699	12,134
10. Charter passenger	44,900	73,660	98,926	111,942	153,894	112,872
Total (3, 9, 10)	3,198,989	3,613,949	4,366,162	5,033,564	6,109,039	6,371,422

Note: Passenger and passenger related revenues.

Source: 1965–68 CAB Handbook of Airline Statistics (1969 ed.) pt. IV, table 2, p. 200. 1969–70 CAB Air Carrier Financial Statistics (December 1970) table I, p. 1.

NATIONAL ASSOCIATION OF MOTOR BUS OWNERS
Washington, D.C., December 9, 1971.

MR. STANLEY GAFFEN,
Transportation Specialist,
Office of the Assistant Secretary for Safety and Consumer Affairs, Department of Transportation, Washington, D.C.

DEAR MR. GAFFEN: As requested at our meeting on December 7, 1971, I am setting forth in this letter the States in which 102-inch-wide buses are either permitted to operate in intercity service or will be permitted to operate if the 96-inch-width limitation in the Federal-Aid Highway Act of 1956 is modified in H.R. 4354.

In addition, I am setting forth those States having laws which permit the operation of 102-inch-wide buses in local and suburban service.

I. States in which the operation of 102-inch-wide buses in intercity service has been approved or has been conditionally approved.

There are 9 States in which the operation of 102-inch-wide buses in intercity service was permitted prior to July 1, 1956, by virtue of the grandfather clause of the Federal-Aid Highway Act of 1956. 102-inch-wide buses may be operated in these States both on the Interstate System and on other Federal-aid highways. These 9 States are: Colorado, Connecticut, Hawaii, Idaho, Montana, New Mexico, Pennsylvania, Rhode Island, and Wyoming.

There are 9 other States which subsequent to July 1, 1956, enacted legislation permitting the operation of 102-inch-wide buses in intercity service on Federal-aid highways other than the Interstate System. Operation of such buses over the Interstate System could not be approved by the State Legislatures involved because of the Federal limitation. These 9 States are: California, Maine, Maryland, New Jersey, Nevada, North Dakota, Oregon, South Dakota, and Vermont.

There are 15 States which have enacted legislation which will permit 102-inch-wide buses to be operated in intercity service on the Interstate System and on other Federal-aid highways if the Congress increases from 96 to 102 inches the maximum width of buses permitted to use the Interstate System. These States are: Arizona, Delaware, Indiana, Kansas, Kentucky, Minnesota, Nebraska, New York, North Carolina, Oklahoma, Tennessee, Utah, Virginia, Washington, and Wisconsin.

II. States in which 102-inch-wide buses may be operated on the Interstate System in local and suburban service.

There are 38 States in which 102-inch-wide buses may be operated lawfully on the Interstate System in local or suburban service. They are:

Alabama—Municipalities may regulate provided maximum is not less than provided in state statute (96 inches).

California—104 inches—Buses in urban or suburban service when subject to Public Utilities Commission, prior approval of Commission is necessary.

Colorado.

Connecticut.

Florida—by permit.

Hawaii.

Idaho.

Illinois—104 inches—Buses operated within the limits of cities and villages in counties of 500,000 population or more.

Indiana—102 inches for buses which operate in cities or towns or between contiguous cities and towns located in counties of at least 160,000 population.

Iowa—State Highway Commission and local authorities may in their discretion issue trip or annual permits for wide vehicles.

Kansas—102 inches—Buses used in local urban transit.

Kentucky—102 inches—City and Suburban Buses.

Louisiana—Motor buses operating under a franchise or indeterminate permit wholly within the corporate limits of a municipality exceeding 100,000 population exempt from State statute of 96 inches.

Maine.

Maryland—Incorporated cities, towns and municipalities may by ordinance permit within their jurisdiction the operation of motor buses with a maximum outside width of 102 inches.

Massachusetts—102 inches for buses operated in cities served by the Metropolitan Transit Authority.

Michigan—102 inches—Suburban buses when operated on streets and highways 20 feet wide within a radius of 30 miles of municipal corporation limits, by permission of P.S.C.

Minnesota—108 inches for buses operated exclusively within any city or village. 102 inches for buses operating within 20 miles of a city of first class.

Missouri—108 inches within the corporate limits of communities of 75,000 inhabitants or more and within 2 miles of the corporate limits of such cities.

Montana.

Nebraska—102-inch-wide buses restricted to city streets.

New Hampshire—102 inches—provided low pressure tires are used.

New Mexico.

New York—102 inches—Operated wholly within cities. (If sanctioned by local law or ordinance).

North Carolina—102 inches—buses operated in Charlotte, N.C. only.

Ohio—104 inches—Buses operating exclusively within municipalities.

Oklahoma—Buses operating only within the city limits of incorporated cities may be 102 inches wide.

Oregon—102 inches—Trolley coach or trolley coach converted to motor bus operated exclusively within city limits and placed in operation on or after 6/1/47 and prior to 1/1/55.

Pennsylvania

Rhode Island.

Tennessee—Statutory restrictions are inapplicable within municipalities and within 5 miles of the limit of municipalities under 100,000 population and within 12 miles of municipalities of over 100,000.

Texas—102 inches on motor buses operated within limits of city with population of 425,000 and within cities, towns and suburbs contiguous thereto.

Virginia—102 inches—In incorporated cities and towns, with consent of local authorities; in counties having a population in excess of 5,000 per square mile on designated highways if State highway commission, acting upon application by county governing body, so orders.

West Virginia—Incorporated cities and municipalities may permit motor buses to a width not exceeding 102 inches.

Wisconsin—104 inches—Urban passenger buses operated as an auxiliary to or as a part of a street railway system in counties of 500,000 population or operated within or between counties of 500,000 or more and contiguous thereto.

Washington—102-inch width buses permitted under authority of State Highway Commission.

Wyoming.

District of Columbia.

Sincerely yours,

CHARLES A. WEBB.