TP-301S-02
Dec 13, 1996

# U.S. DEPARTMENT OF TRANSPORTATION

## NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

## LABORATORY TEST PROCEDURE

## FOR

## FMVSS 301S

## Fuel System Integrity —
## School Buses Over 10,000 Pounds GVWR


**ENFORCEMENT**
**Office of Vehicle Safety Compliance**
**Room 6115, NVS-220**
**400 Seventh Street, SW**
**Washington, DC 20590**

# REVISION CONTROL LOG
FOR OVSC LABORATORY
TEST PROCEDURES

TP-301S
Fuel System Integrity for School Buses over 10,000 pounds GVWR

| TEST PROCEDURE | | FMVSS 301S | | DESCRIPTION |
|---|---|---|---|---|
| REV. No. | DATE | AMENDMENT | EFFECTIVE DATE | |
| 00 | | | | Original release signed by O.D. |
| 01 | | | | |
| 02 | 12/13/96 | | 12/13/96 | |
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**OVSC LABORATORY TEST PROCEDURE NO. 301S**
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## 1. PURPOSE AND APPLICATION

The Office of Vehicle Safety Compliance (OVSC) provides contracted laboratories with Laboratory Test Procedures (TPs) which serve as guidelines for obtaining compliance test data. The data are used to determine if a specific vehicle or item of motor vehicle equipment meets the minimum performance requirements of the subject Federal Motor Vehicle Safety Standard (FMVSS). The purpose of the OVSC Laboratory Test Procedures is to present a uniform testing and data recording format, and provide suggestions for the use of specific equipment and procedures. Any contractor interpreting any part of an OVSC Laboratory Test Procedure to be in conflict with a Federal Motor Vehicle Safety Standard or observing any deficiencies in a Laboratory Test Procedure is required to advise the Contracting Officer's Technical Representative (COTR) and resolve the discrepancy prior to the start of compliance testing.

Contractors are required to submit a detailed test procedure to the COTR before initiating the compliance test program. The procedure must include a step-by-step description of the methodology to be used.

The OVSC Laboratory Test Procedures are not intended to limit or restrain a contractor from developing or utilizing any testing techniques or equipment which will assist in procuring the required compliance test data.

**NOTE:** The OVSC Laboratory Test Procedures, prepared for use by independent laboratories under contract to conduct compliance tests for the OVSC, are not intended to limit the requirements of the applicable FMVSS(s). In some cases, the OVSC Laboratory Test Procedures do not include all of the various FMVSS minimum performance requirements. Sometimes, recognizing applicable test tolerances, the Test Procedures specify test conditions which are less severe than the minimum requirements of the standards themselves. Therefore, compliance of a vehicle or item of motor vehicle equipment is not necessarily guaranteed if the manufacturer limits certification tests to those described in the OVSC Laboratory Test Procedures.

## 2. GENERAL REQUIREMENTS

FMVSS 301S sets the minimum performance requirements relative to the integrity of school bus fuel systems by establishing the maximum amounts of fuel leakage or spillage permitted for periods of time following a moving contoured barrier impact test. This standard applies to school buses that have a Gross Vehicle Weight Rating (GVWR) greater than 10,000 pounds and have been manufactured on or after April 1, 1977. The standard does NOT APPLY to school buses that use fuels with a boiling point BELOW 32° F.

The purpose of the standard is to reduce deaths and injuries occurring from fires that result from fuel spillage during and after school bus crashes.

## 3. SECURITY

The contractor shall provide appropriate security measures to protect the OVSC test vehicles (school buses) from unauthorized personnel during the entire compliance testing program. The contractor is financially responsible for any acts of theft and/or vandalism which occur during the storage of test vehicles. Any security problems which arise shall be reported by telephone to the Industrial Property Manager (IPM), Office of Contracts and Procurement (OCP), within two working days after the incident. A letter containing specific details of the security problem will be sent to the IPM (with copy to the COTR) within 48 hours. The contractor shall protect and segregate the data that evolves from compliance testing before and after each vehicle test. No information concerning the vehicle safety compliance testing program shall be released to anyone except the COTR, unless specifically authorized by the COTR or the COTR's Branch or Division Chief.

**NOTE:** NO INDIVIDUALS, OTHER THAN CONTRACTOR PERSONNEL DIRECTLY INVOLVED IN THE COMPLIANCE TESTING PROGRAM OR OVSC PERSONNEL, SHALL BE ALLOWED TO WITNESS ANY VEHICLE COMPLIANCE TEST UNLESS SPECIFICALLY AUTHORIZED BY THE COTR.

## 4. GOOD HOUSEKEEPING

Contractors shall maintain the entire vehicle compliance testing area, test fixtures and instrumentation in a neat, clean and painted condition with test instruments arranged in an orderly manner consistent with good test laboratory housekeeping practices.

## 5. TEST SCHEDULING AND MONITORING

The contractor shall submit a vehicle test schedule to the COTR prior to conducting the first compliance test. Tests shall be completed as required in the contract. Scheduling of vehicle tests shall be adjusted to permit vehicles to be tested to other FMVSSs as may be required by the OVSC. All vehicle compliance testing shall be coordinated with the COTR in order to allow monitoring by the COTR and/or other OVSC personnel if desired.

## 6. GOVERNMENT FURNISHED PROPERTY (GFP)

ACCEPTANCE OF VEHICLE

The Contractor has the responsibility of accepting the test vehicle from either a new school bus manufacturer, distributor, dealer or a vehicle transporter. In all instances, the contractor acts in the OVSC's behalf when signing an acceptance of the test vehicle. If the vehicle is delivered by a dealer, the contractor must check to verify the following:

A. All options listed on the "window sticker" are present on the test vehicle.

B. Tires and wheel rims are new and the same as listed.

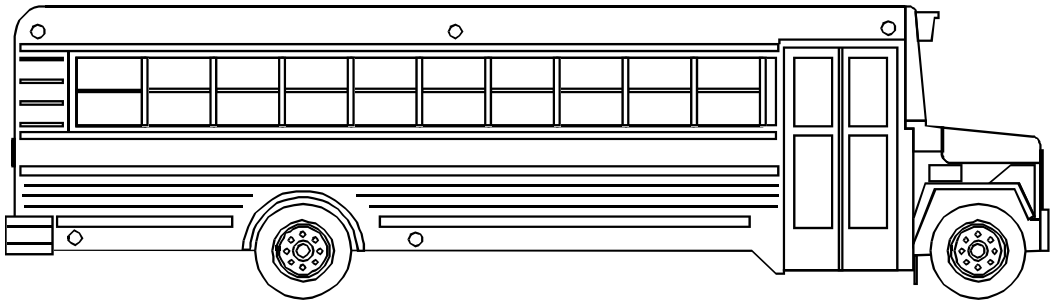
C. There are no dents or other interior or exterior flaws.

D. The vehicle has been properly prepared and is in running condition.

E. The glove box contains an owner's manual, warranty document, consumer information, and extra set of keys.

F. Proper fuel filler cap is supplied on the test vehicle.

If the test vehicle is delivered by a government contracted transporter, the contractor should check for damage which may have occurred during transit.



A "Vehicle Condition" form will be supplied to the contractor by the COTR when the test vehicle is transferred from the dealer, manufacturer, distributor or between test contracts. The upper half of the form describes the vehicle in detail, and the lower half provides space for a detailed description of the post test condition. Vehicle Condition forms must be returned to the COTR with the copies of the Final Test Report or the reports will NOT be accepted.

NOTIFICATION OF COTR

The COTR must be notified within 24 hours after a vehicle has been delivered.

## 7. FACILITY AND EQUIPMENT

### 7.1 TOW ROAD AND TEST SURFACE

The tow road surface must be straight, level, smooth, and of uniform construction. The concrete surface on which the impact test is conducted must have a skid number of 75 when measured in accordance with ASTM Method E-274-65T at 40 mph, omitting water delivery as specified in paragraph 7.1 of that method. The tow road must have sufficient length to obtain stabilization of moving barrier velocity (essentially-zero acceleration) before impact. A photography pit will be located in the tow road at the impact area (at least 100 feet from any fixed barrier) so that any leakage from the fuel system can be photographed during the moving barrier impact event. A minimum of obstructions (grating, rails, etc.) will be placed in the camera field of view.

### 7.2 MOVING CONTOURED BARRIER (refer to Appendix A & B)

A. Must meet the specifications of FMVSS 301 drawings for “Common Carriage with Contoured Impact Surface Attached” and be of rigid construction symmetrical about a longitudinal-vertical plane, with a solid nonsteerable front axle and fixed rear axle attached directly to the frame rails **with no spring or other type suspension system** on any wheel.

B. The total weight shall be between 3,900 and 3,980 pounds with weight distribution of 895 pounds plus 0 pounds and minus 25 pounds at each REAR wheel and 1,095 pounds plus 0 pounds and minus 25 pounds at each FRONT wheel.

C. The Center of Gravity (CG) shall be 54.0 inches plus or minus 1.5 inches REARWARD of the FRONT wheel axis, in the vertical- longitudinal plane of symmetry, 15.8 inches plus or minus 0.5 inch ABOVE the GROUND.

D. Moving Barrier Carriage shall have an onboard braking device capable of stopping it.

E. Front and rear tire tread width will be 60 inches plus or minus 1 inch.

F. The Moving Barrier Carriage will have a wheelbase of 120" ± 2".

G. The Moving Barrier Carriage will use G-78 x 15 pneumatic tires on all wheels with a minimum inflation pressure of 24 psi.

H. The moment of inertia about the CG will be as follows:

$I_x = 271 \pm 13.6$ slug/ft$^2$

$I_z = 3475 \pm 174$ slug/ft2

**7. FACILITY AND EQUIPMENT....Continued**

**NOTE:** The contractor shall provide data to the COTR which indicates the Contoured Moving Barrier meets the design criteria of the standard, including the CG and mass moments of inertia specifications, before tests begin.

I. The impact surface of the moving contoured barrier shall measure 78 inches wide and 24.75 inches high. It shall be attached to the carriage such that the moment of inertia about the CG is as specified above. The barrier surface shall not be covered with plywood and the ground clearance to the lower edge of the impact surface will be 5.25 inches plus or minus 0.5 inch

7.3 PROPULSION/TOW AND GUIDANCE OF THE BARRIER

A propulsion/tow and guidance system shall be capable of ensuring that the barrier impact the vehicle at the required velocity (28.9 mph to 29.9 mph) and pre-selected impact point (±2") and impact angle (±5 degrees). The barrier must release from the guidance mechanism a minimum of one foot before impact with the vehicle.

7.4 BARRIER IMPACT VELOCITY MEASUREMENT

The final velocity shall be measured after the tow system release when the front of the barrier is within 1 foot of impact vehicle surface, and the reported impact velocity will take into consideration all of the response characteristics of the entire velocity measurement system utilized in its determination. Impact velocity will be measured by no less than 2 sets of timing devices, and the timing devices shall be accurate to within plus or minus 0.05 mph and be calibrated by an instrument traceable to the National Institute of Standards and Technology. The impact velocity shall be permanently recorded. A photograph of the digital readout from the timing device will be kept on file by the contractor for this purpose. A third timing device will be placed along the tow road at a sufficient distance from the vehicle face for monitoring the velocity of the barrier and permit aborting the test if the barrier's speed is outside of the specified velocity range of 28.9 to 29.9 mph.

7.5 BRAKE ABORT SYSTEM

The moving contoured barrier shall be equipped with an onboard brake abort system. Abort criteria consists of readiness, barrier speed and stability of the moving barrier on the tow road. These criteria may be monitored automatically. For added safety, a means of manual aborting the test shall be available from start, until the point at which the barrier is impossible to stop without impacting the school bus.

## 8. CALIBRATION OF TEST INSTRUMENTS

Before the contractor initiates the safety compliance test program, a test instrumentation calibration system will be implemented and maintained in accordance with established calibration practices. Guidelines for setting up and maintaining such calibration systems are described in MIL-C-45662A, "Calibration System Requirements". The calibration system shall be set up and maintained as follows:

A. Standards for calibrating the measuring and test equipment will be stored and used under appropriate environmental conditions to assure their accuracy and stability.

B. All measuring instruments and standards shall be calibrated by the contractor, or a commercial facility, against a higher order standard at periodic intervals **not to exceed twelve (12) months**! Records, showing the calibration traceability to the National Institute of Standards and Technology (NIST), shall be maintained for all measuring and test equipment.

C. All measuring and test equipment and measuring standards will be labeled with the following information:

(1) Date of calibration

(2) Date of next scheduled calibration

(3) Name of the technician who calibrated the equipment

D. A written calibration procedure shall be provided by the contractor which includes as a minimum the following information for all measurement and test equipment:

(1) Type of equipment, manufacturer, model number, etc.

(2) Measurement range

(3) Accuracy

(4) Calibration interval

(5) Type of standard used to calibrate the equipment (calibration traceability of the standard must be evident)

E. Records of calibration for all test instrumentation shall be kept by the contractor in a manner which assures the maintenance of established calibration schedules. All such records shall be readily available for inspection when requested by the COTR. The calibration procedure must be approved by the COTR before the test program commences.

## 9. PHOTOGRAPHIC DOCUMENTATION

9.1 Still Photographs

The final test report shall have 8" x 10" color photographs that are properly focused for clear images. A tag, label or placard identifying the test vehicle, NHTSA number and test date shall appear in each photograph and must be legible. Each photograph shall be labeled as to the subject matter. As a MINIMUM, the following STILL pretest and post test photographs are required and shall be included in each vehicle final test report.

A. Pretest Photographs

(1) Front View of Vehicle

(2) Side view of Vehicle

(3) Rear view of Vehicle

(4) Right front three-quarter view of Vehicle

(5) Left rear three-quarter view of Vehicle

(6) School bus certification label and FMVSS 120 label

(7) Undercarriage view of fuel tank, tank mounting straps and brackets, connecting lines, vent lines, etc.

(8) Impact side -Front to Rear -three quarter view of Vehicle and Barrier

(9) Impact side - Rear to Front - three quarter view of Vehicle and Barrier

B. Post test Photographs

(1) Undercarriage view of fuel tank, tank mounting straps and brackets, connecting lines, vent lines, etc.

(2) Impact side -Front to Rear -three quarter view of Vehicle and Barrier

(3) Impact side - Rear to Front - three quarter view of Vehicle and Barrier

(4) Close-up of Impact point - Vehicle and Barrier

(*5) Close-ups of fuel leakage area

***NOTE:** In the event of a failure, it is recommended that additional post test photographs be taken.

## 9. PHOTOGRAPHIC DOCUMENTATION...Continued

9.2 CRASH TEST FILM -16mm

Motion pictures (16 mm) of the barrier impact will be recorded in color at a minimum speed of 1000 frames per second (FPS). Timing marks will be registered on the film edge every five milliseconds as a minimum along with a time zero impact mark in order to permit kinematic analysis on a film analyzer. A strobe light with a duration of at least 1.5 milliseconds will be placed in the field of view of each camera to indicate first contact or "TIME ZERO" for the impact event. Light from the strobe should not cover more than three frames (3 ms) on the film.

9.3 VEHICLE IDENTIFICATION PLACARDS

Test vehicle identification placards shall be positioned so that at least one placard will be visible in each of the camera's field of view. Information to be shown follows:

A. Target vehicle's NHTSA number

B. The words "301S Impact Test"

C. Date of the test

D. Name of laboratory

E. Vehicle year, make and model

9.4 CRASH FILM TITLE HEADING AND SEQUENCE

The contractor shall submit 3 copies of the 16 mm color movie film for each crash test two weeks from the date of the vehicle crash test. The master print for each of the crash test films shall be retained by the contractor, but will be made available to the OVSC upon request.

The 16 mm color test movie film shall include the following title frames:

A. The following 301S FUEL SYSTEM INTEGRITY test was conducted under the contract with the National Highway Traffic Safety Administration by (laboratory name, city, state).

B. 30 mph, ____ (ANGLE) Barrier Impact
Test Vehicle Model Year, Make and Model
NHTSA No. CXXXXX
Date of Impact Event
Contract No.: DTNH22-XX-X-XXXXX

C. The ending frame shall state "THE END".

**9. PHOTOGRAPHIC DOCUMENTATION....Continued**

D. The film shall be edited in the following sequence:

(1) Title

(2) Fuel Filler Cap Installation

(3) Pretest Coverage

(4) Real Time Pan Coverage

(5) All high speed coverage

(6) Post test Coverage

(7) Any vehicle failures or anomalies.

(8) "The End"

9.5 CAMERA COVERAGE

A. One right side camera aligned along the impact plane to capture the right side of the barrier impacting the vehicle during the event

B. One left side camera to capture the left side view of the barrier impacting the vehicle during the event

C.* Two pit cameras, one focused (close-up) at the point of impact, the other focused (wider) on the vehicle underbody.

D. One 24 frame per second real time camera to provide a pan view of the crash event.

***NOTE:** Sufficient lighting must be provided to assure clarity of photographic documentation, especially in capturing the underbody views.

**9. PHOTOGRAPHIC DOCUMENTATION....Continued**

CAMERA LAYOUT FOR A TYPICAL 90 DEGREE IMPACT

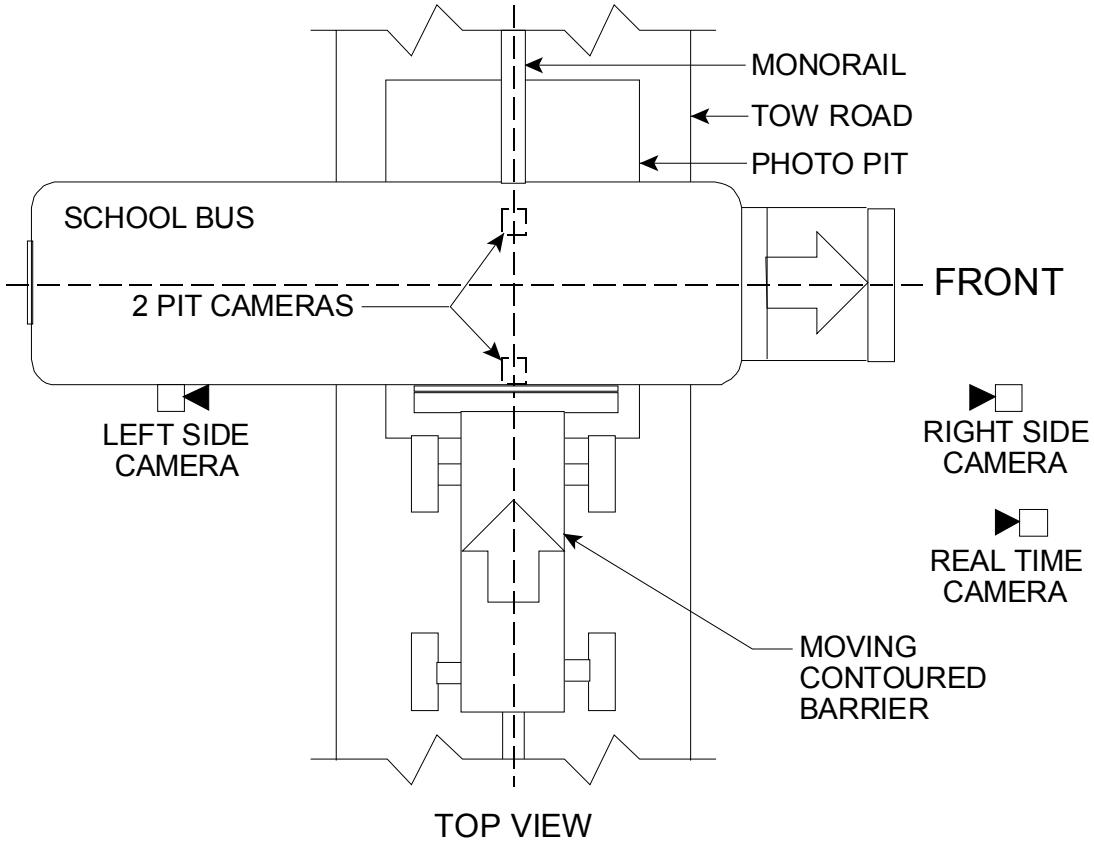



FIGURE 1

**10. DEFINITIONS**

**DESIGNATED SEATING POSITION (DSP)**

Any plan view location intended by the school bus manufacturer to provide seating accommodation while the bus is in motion for an occupant at least as large as a 5th percentile adult female. NOTE: DRIVER'S SEAT TO BE INCLUDED AS A DSP

**DESIGNATED SEATING CAPACITY (DSC)**

The total number of DSP's provided in the school bus.

**FUEL SPILLAGE**

The fall, flow, or run of fuel from the school bus but does not include the wetness resulting from capillary action.

## 10. DEFINITIONS....Continued

### GROSS AXLE WEIGHT RATING (GAWR)

Value specified by the school bus manufacturers as the load carrying capacity of a single axle measured at the tire-ground interfaces.

### GROSS VEHICLE WEIGHT RATING (GVWR)

Value specified by the school bus manufacturers as the loaded weight of the vehicle.

### SCHOOL BUS

Bus that is sold, or introduced in interstate commerce, for purposes that include carrying students to and from school or related events, but does not include a bus designed and sold for operation as a common carrier in urban transportation.

### SCHOOL BUS IMPACT POINT

Single impact by a moving contoured barrier at the most vulnerable point on the periphery of the school bus body.

### STODDARD SOLVENT

Clear fluid (usually dyed red or blue) used to fill the school bus fuel system having the physical and chemical properties of Type I solvent, Table 1 ASTM Std. D484-71, "Standard Specifications for Hydrocarbon Dry Cleaning Solvents."

### TEST SURFACE

Concrete surface upon which the school bus is tested is level, rigid, and of uniform construction, with a skid number of 75 when measured in accordance with ASTM Method E-274-65T at 40 mph, omitting water delivery as specified in paragraph 7.1 of that method.

### UNLOADED VEHICLE WEIGHT (UVW)

Weight of a school bus with maximum capacity of all fluids necessary for operation of the vehicle, but without cargo or occupants.

## 11. TEST EXECUTION

Prior to conducting any compliance tests, contractors are required to submit a detailed in-house compliance test procedure to the COTR which includes a step-by-step description of the methodology to be used. Written approval must be obtained from the COTR before initiating the compliance test program.

### 11.1 IMPACT POINT AND ANGLE

Tests are performed with the barrier impacting the bus at any pre-selected point and angle. The contractor shall locate an impact point and angle based upon engineering judgment of the probable “worst case” scenario. The contractor shall take into consideration the most vulnerable point on the periphery of the school bus body for penetration of the impacting barrier into the major fuel system components. Once the contractor locates an impact point and angle, the COTR shall be consulted for approval.

TEST VEHICLE PREPARATION

A. Wash and clean the school bus as necessary. Identify the vehicle with the assigned NHTSA number which shall be utilized as a primary identification number throughout the test program.

B. Obtain and record the Unloaded Vehicle Weight (UVW) of the school bus with the maximum capacity of vehicle fluids (i.e., fuel, oil, transmission fluid, coolant, etc.)

C. Inflate all tires to the manufacturer’s specifications.

D. On a level surface, obtain and record the school bus attitude.

D. Drain all fuel from the tank and operate the engine until the system is depleted of fuel.

E. With the school bus on a level surface, slowly refill the entire fuel system with Stoddard solvent which has been dyed red, having the physical and chemical properties of Type 1 solvent, Table I ASTM Standard D484-76 "Standard Specifications for Hydrocarbon Dry-cleaning Solvents," until, not less than 90 percent and not more than 95 percent, of the vehicle manufacturer's stated "usable" capacity is reached. This volume will be furnished by the COTR. Drain all other fluids from the test vehicle so that Stoddard solvent leakage from the fuel system will be evident. Just prior to the test, operate the engine to assure that Stoddard solvent is present throughout the entire fuel systems. Make necessary records on the data sheets.

**11. TEST EXECUTION...Continued**

F. Paint the fuel tank, retainer straps, filler pipe, lines, etc. bright colors to facilitate photographic analysis during the impact event.

G. Calculate the Target School Bus Test Weight (TSBTW) as follows:

TSBTW = UVW + (N x 120 pounds) where --

UVW is the **Unloaded Vehicle Weight** or the actual weight of the school bus with maximum capacity of fuel, oil, and coolant.

N is the number of **Designated Seating Positions** (DSPs) in the school bus INCLUDING the driver's seat.

Record the TSBTW.

H. Load the ballast (120 lb. for each DSP) in the interior of the bus. Distribute the load evenly, throughout the bus body according to GAWR's by placing ballast on the seats (or floor, if necessary).

I. Weigh the loaded vehicle. Record as actual School Bus Test Weight (ASBTW)

**NOTE:** ASBTW shall be equal to or no more than 20 lb. less than TSBTW.

J. Place the school bus across the tow road monorail so that moving barrier will impact the bus at the pre-selected angle.

K. Place transmission in neutral and set the parking brake.

11.2 IMPACT TEST CONDITION

A. Check for proper installation of the fuel filler cap.

B. Verify proper barrier alignment, angle of impact and impact point.

C. Position the speed traps and check positioning of speed wand on barrier.

D. Position barrier at start of track.

E. Check abort system(s).

F. Attach tow and guidance mechanism.

G. Aim, load, focus, and check operation of all photographic equipment.

**11. TEST EXECUTION....Continued**

H. Place Stoddard solvent collection equipment in vicinity of impact area.

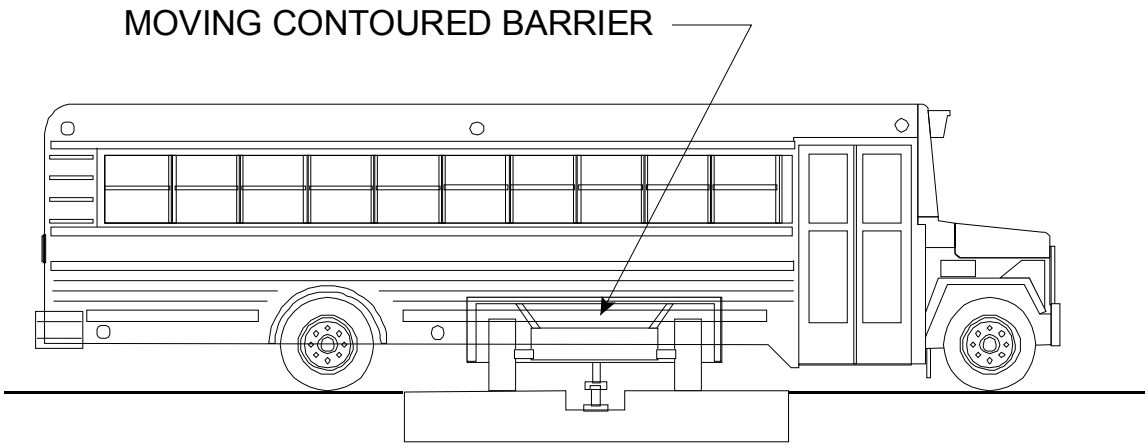
I. Commence propulsion/tow of barrier toward vehicle

J. Inspect entire fuel system for Stoddard solvent leakage.

K. Record post impact data

11.3 . FUEL SPILLAGE COLLECTION

The school bus fuel system spillage requirements for the moving contoured barrier impact test are shown below. Fuel spillage shall not exceed the values shown for the 3 time periods following initial contact between the moving contoured barrier and the school bus. Containers for the collection of possible fluid spillage and a calibrated stop watch are required. Containers must be labeled before they are photographed.




CROSS-SECTION OF TOW ROAD

FIGURE 2

**11. TEST EXECUTION....Continued**

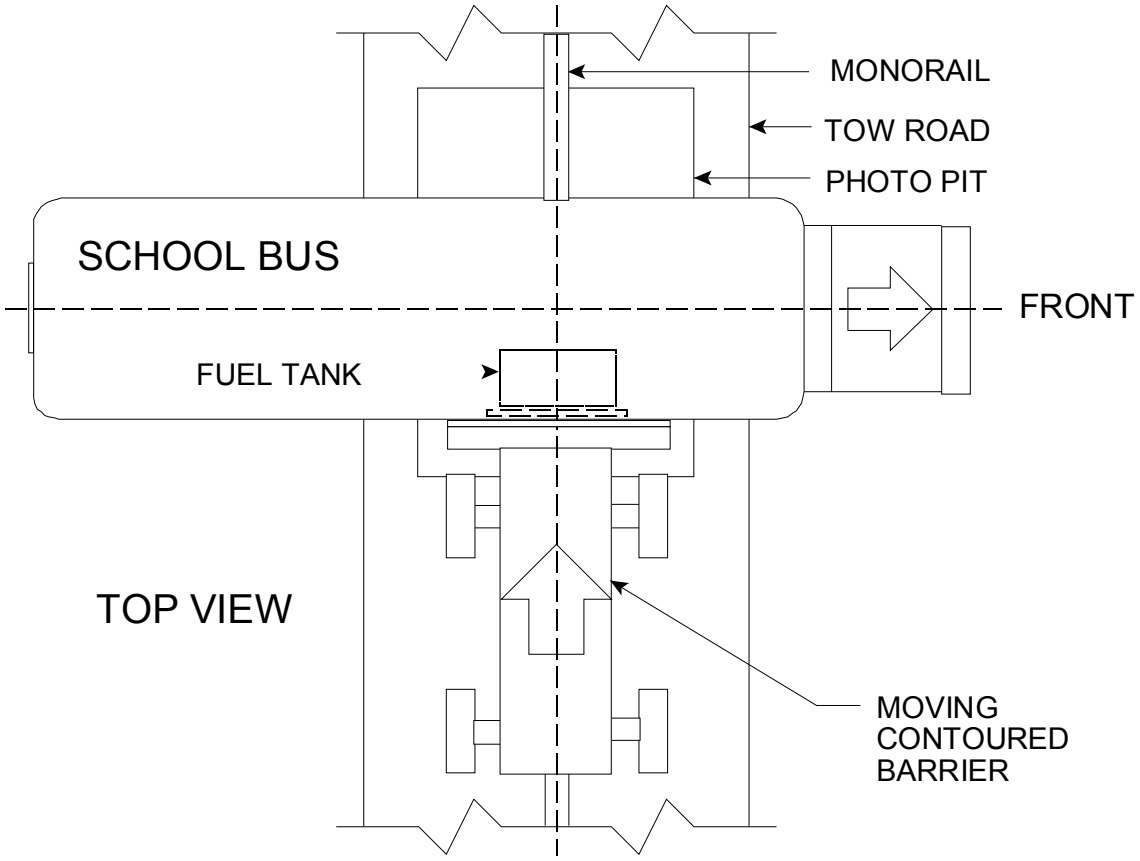



FIGURE 3

**11. TEST EXECUTION....Continued**

T0 = TIME ZERO (IMPACT)
T1 = MOTION OF BUS HAS CEASED
ALLOWABLE SPILLAGE = 1 OUNCE

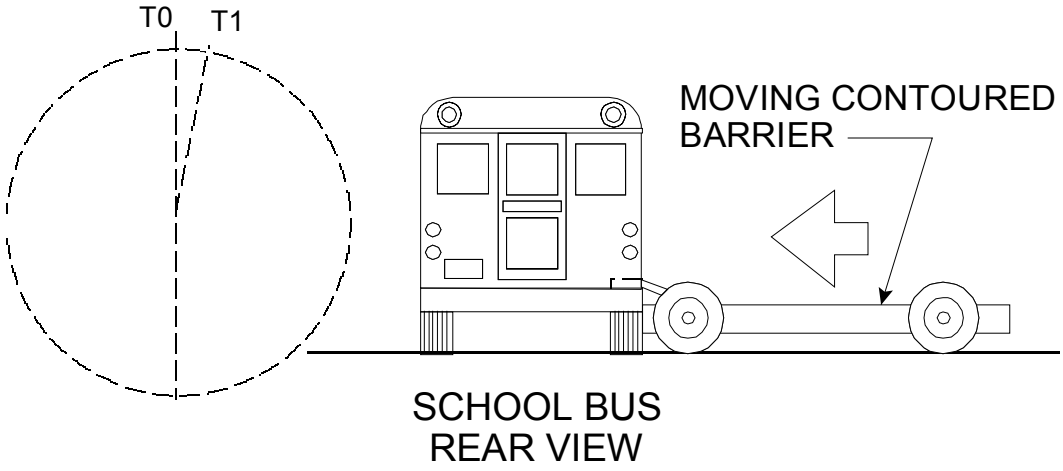



**Figure 4**

T1 = MOTION OF BUS HAS CEASED
T2 = 5 MINUTES AFTER MOTION CEASED
ALLOWABLE SPILLAGE = 5 OUNCES

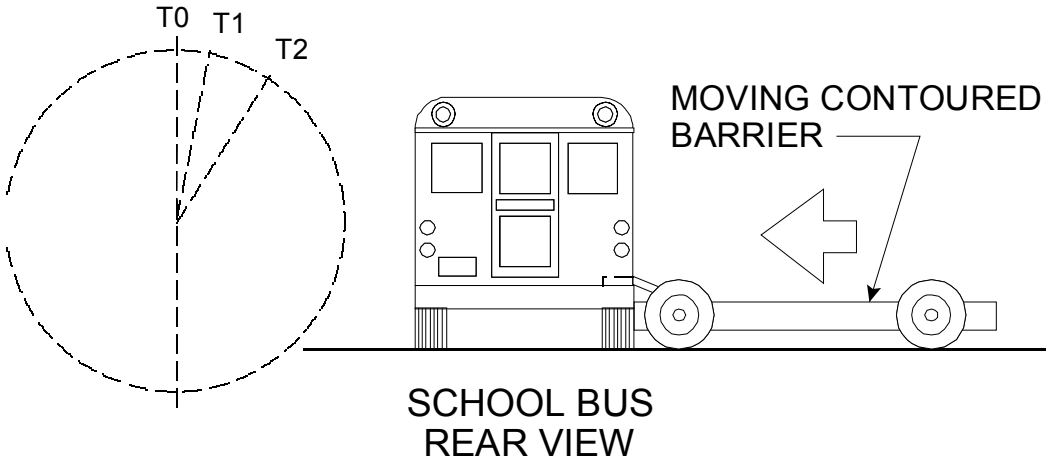



**Figure 5**

## 11. TEST EXECUTION....Continued

T2 = 5 MINUTES AFTER BUS MOTION HAS CEASED
T3 = SUBSEQUENT 25 MINUTE PERIOD
ALLOWABLE SPILLAGE = 1 OUNCE PER MINUTE

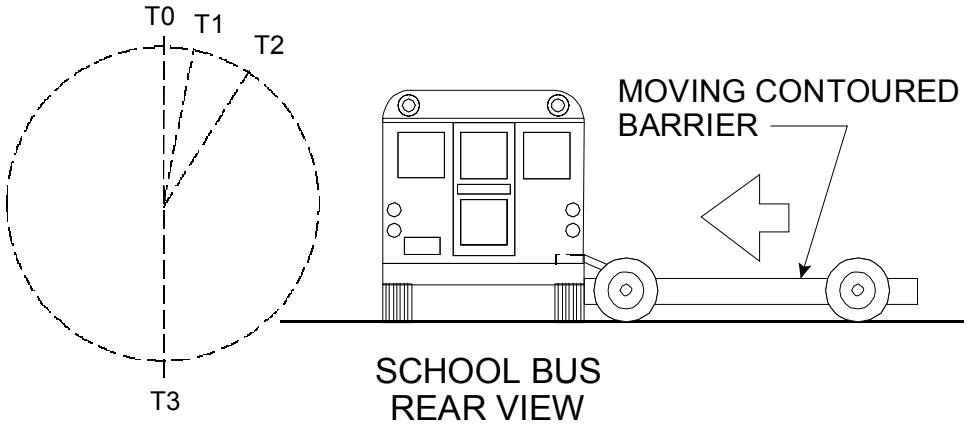



FIGURE 6

## 12. TEST DATA DISPOSITION

The contractor shall make all vehicle preliminary compliance test data available to the COTR at the test site within two hours after the test. Final test data, including digital printouts and computer generated plots (if applicable), shall be furnished to the COTR within five working days. Additionally, the contractor shall analyze the preliminary test results as directed by the COTR. All backup data sheets, strip charts, recordings, plots, technician's notes, etc., shall be either sent to the COTR or destroyed at the conclusion of each delivery order, purchase order, etc.

### 12.1 TEST DATA LOSS

A compliance test is not to be conducted unless all of the various test conditions specified in the applicable OVSC Laboratory Test Procedure have been met. Failure of a contractor to obtain the required test data and to maintain acceptable limits on test parameters in the manner outlined in the applicable OVSC Laboratory Test Procedure may require a retest at the expense of the contractor. The retest costs will include the cost of the replacement vehicle (with the same equipment as the original vehicle) and all costs associated with conducting the retest. The original test specimen (vehicle) used for the invalid test shall remain the property of OVSC, and the retest specimen shall remain the property of the contractor. If there is a test failure, the contractor shall retain the retest specimen for a period not exceeding 180 days. If there is no test failure, the Contractor may dispose of the test specimen upon notification from the COTR that the final test report has been accepted. The Contracting Officer of NHTSA is the only NHTSA official authorized to notify the contractor that a retest is required.

## 12. TEST DATA DISPOSITION....Continued

The retest shall be completed within two (2) weeks after receipt of notification by the Contracting Officer that a retest is required. If a retest is conducted, no test report is required for the original test.

## 13. REPORTS

### 13.1 MONTHLY STATUS REPORTS

The contractor shall submit a monthly Test Status Report and a Vehicle Status Report to the COTR. The Vehicle Status Report shall be submitted until all vehicles are disposed of. Samples of the required Monthly Status Reports are contained in the report forms section.

### 13.2 APPARENT NONCOMPLIANCE

Any indication of a test failure shall be communicated by telephone to the COTR within 24 hours with written notification mailed within 48 hours (Saturdays and Sundays excluded). A Notice of Test Failure (see report FORMS section) with a copy of the particular compliance test data sheet(s) and preliminary data plot(s) shall be included. In the event of a test failure, a post test calibration check of some critically sensitive test equipment and instrumentation may be required for verification of accuracy. The necessity for the calibration shall be at the COTR's discretion and shall be performed without additional costs to the OVSC.

### 13.3 FINAL TEST REPORTS

#### 13.3.1 COPIES

In the case of a test failure, **SIX** copies of the Final Test Report and **TWO** copies of the film shall be submitted to the COTR for acceptance within three weeks of test completion. Where there has been no indication of a test failure, **TWO** copies of each Final Test Report and **ONE** copy of the film shall be submitted to the COTR within three weeks of test completion. Payment of contractor's invoices for completed compliance tests may be withheld until the Final Test Report and film are accepted by the COTR. Contractors are requested to NOT submit invoices before the COTR is provided copies of the Final Test Report and film.

Contractors are required to PROOF READ all Final Test Reports before submittal to the COTR. The OVSC will not act as the contractor’s quality control for test reports. Reports containing a significant number of errors will be returned to the contractor for correction. Invoice payment will be withheld until all corrections are made.

**13. REPORTS....Continued**

13.3.2 REQUIREMENTS

The Final Test Report, associated documentation (including photographs) are relied upon as the chronicle of the compliance test. The Final Test Report will be released to the public domain after review and acceptance by the COTR. For these reasons, each final report must be a complete, self-standing document.

The contractor should use **detailed** descriptions of all compliance test events. Any events that are not directly associated with the standard but are of technical interest should also be included. The contractor should include as much **detail** as possible in the report, including the contractor's test procedure.

Instructions for the preparation of the first three pages of the final test report are provided below for the purpose of standardization.

13.3.3 FIRST THREE PAGES

A. FRONT COVER —

A heavy paperback cover (or transparency) shall be provided for the protection of the final report. The information required on the cover is as follows:

(1) Final Report Number such as 301S-ABC-9X-001 where

301S is the FMVSS tested (S = School Bus)
ABC are the initials for the laboratory
9X is the Fiscal Year of the test program (or 0X)
001 is the Group Number (001 for the 1st test, 002 for the 2nd test, etc.)

(2) Final Report Title And Subtitle such as

SAFETY COMPLIANCE TESTING FOR FMVSS 301S
Fuel System Integrity — School Buses
* * * * * * * * * * * * * * *
SAFERIDE BUS COMPANY
199X DELUXE 65-PASSENGER SCHOOL BUS
NHTSA No. CX0900

(3) Contractor's Name and Address such as

COMPLIANCE TESTING LABORATORIES, INC.
4335 West Dearborn Street
Detroit, Michigan 48090

**13. REPORTS....Continued**

**NOTE:** DOT SYMBOL WILL BE PLACED BETWEEN ITEMS (3) AND (4)

(4) Date of Final Report completion

(5) The words "FINAL REPORT"

(6) The sponsoring agency's name and address as follows

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
ENFORCEMENT
Office of Vehicle Safety Compliance
400 Seventh Street, SW
Room 6115 (NVS-220)
Washington, DC 20590

**13. REPORTS....Continued**

B. FIRST PAGE AFTER FRONT COVER —

A disclaimer statement and an acceptance signature block for the COTR shall be provided as follows;

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Prepared By: _____

Approved By: _____

Approval Date: _____

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: _____

Acceptance Date: _____

**13. REPORTS....Continued**

C. SECOND PAGE AFTER FRONT COVER —

A completed Technical Report Documentation Page (Form DOT F1700.7) shall be completed for those items that are applicable with the other spaces left blank. Sample data for the applicable block numbers of the title page follows.

Block 1 — REPORT NUMBER

301S-ABC-9X-001

Block 2 — GOVERNMENT ACCESSION NUMBER

Leave blank

Block 3 — RECIPIENT'S CATALOG NUMBER

Leave blank

Block 4 — TITLE AND SUBTITLE

Final Report of FMVSS 301S Compliance Testing of 199X Deluxe 65-Passenger School Bus, NHTSA No. CX0900

Block 5 — REPORT DATE

March 1, 199X

Block 6 — PERFORMING ORGANIZATION CODE

ABC

Block 7 — AUTHOR(S)

John Smith, Project Manager / Bill Doe, Project Engineer

Block 8 — PERFORMING ORGANIZATION REPORT NUMBER

ABC-DOT-XXX-001

Block 9 — PERFORMING ORGANIZATION NAME AND ADDRESS

ABC Laboratories
405 Main Street
Detroit, MI 48070

**13. REPORTS....Continued**

Block 10 — WORK UNIT NUMBER

Leave blank

Block 11 — CONTRACT OR GRANT NUMBER

DTNH22-9X-D-12345

Block 12 — SPONSORING AGENCY NAME AND ADDRESS

US Department of Transportation
National Highway Traffic Safety Administration
ENFORCEMENT
Office of Vehicle Safety Compliance (NVS-220)
400 Seventh Street, SW, Room 6115
Washington, DC 20590

Block 13 — TYPE OF REPORT AND PERIOD COVERED

Final Test Report
Feb. 15 to Mar. 15, 199X

Block 14 — SPONSORING AGENCY CODE

NVS-220

Block 15 — SUPPLEMENTARY NOTES

Leave blank

Block 16 — ABSTRACT

Compliance tests were conducted on the subject 199X Deluxe 65-Passenger School Bus in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-301S-0X for the determination of FMVSS 301S compliance.

Test failures identified were as follows:

None

**NOTE:** Above wording must be shown with appropriate changes made for a particular compliance test. Any questions should be resolved with the COTR.

**13. REPORTS....Continued**

Block 17 — KEY WORDS

Compliance Testing
Safety Engineering
FMVSS 301S — School Bus

Block 18 — DISTRIBUTION STATEMENT

Copies of this report are available from —

NHTSA Technical Reference Division
Room 5108 (NPO-230)
400 Seventh St., SW
Washington, DC 20590
Telephone No.: 202-366-4946

Block 19 — SECURITY CLASSIFICATION OF REPORT

Unclassified

Block 20 — SECURITY CLASSIFICATION OF PAGE

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Block 21 — NUMBER OF PAGES

Add appropriate number

Block 22 — PRICE

Leave blank

13.3.4 TABLE OF CONTENTS

Final test report Table of Contents shall include the following:

Section 1 — Purpose of Compliance Test

Section 2 — Compliance Test Data Summary

Section 3 — Compliance Test Data

Section 4 — Noncompliance Data (if applicable)

Section 5 — Photographs

## 14. DATA SHEETS

DATA SHEET 1

TEST VEHICLE INFORMATION:

MODEL YR/MAKE/MODEL: _____

NHTSA NO:_____; BUILD DATE: _____

VIN: _____

Build Date for School Bus Chassis:_____ ; VIN for Chassis:_____

Incomplete Vehicle Manufactured By: _____

Engine Displacement:_____ cu. in.;

Fuel Pump Actuation: ___ Electrical ___ Mechanical

___ Pump "ON" with Ignition

___ Pump "ON" with engine

School Bus Width: _____ inches; School Bus Length: _____ inches

Number of Designated Seating Positions (DSP's):_____ (Including driver)

**WEIGHT**

School Bus Unloaded Vehicle Weight (UVW) = _____ lbs

School Bus Occupant Load: DSP's x 120 lbs = _____ lbs

Target School Bus Test Weight **(TSBTW)** = _____ lbs

Actual School Bus Test Weight **(ASBTW)** = _____ lbs.

**TIRE DATA**

Tire Manufacturer: _____

Recommended Cold Tire Inflation Pressure: Frt = _____ psi Rear = _____ psi

Tire Size and Load Range: _____

**14. DATA SHEETS....Continued**

**SCHOOL BUS ATTITUDE**

As Received: RF= ____ in.; LF= ____ in.; RR= ____ in.; LR= ____ in.;

As Tested: RF= ____ in.; LF= ____ in.; RR= ____ in.; LR= ____ in.;

**TEST FLUID DATA**

Fuel Tank Capacity: _____ gal. x 0.90 = _____ gal.

Fuel Tank Capacity: _____ gal. x 0.95 = _____ gal.

Actual Test Volume: _____ gallons

REMARKS:

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

**14. DATA SHEETS....Continued**

DATA SHEET 2
SCHOOL BUS IMPACT DATA

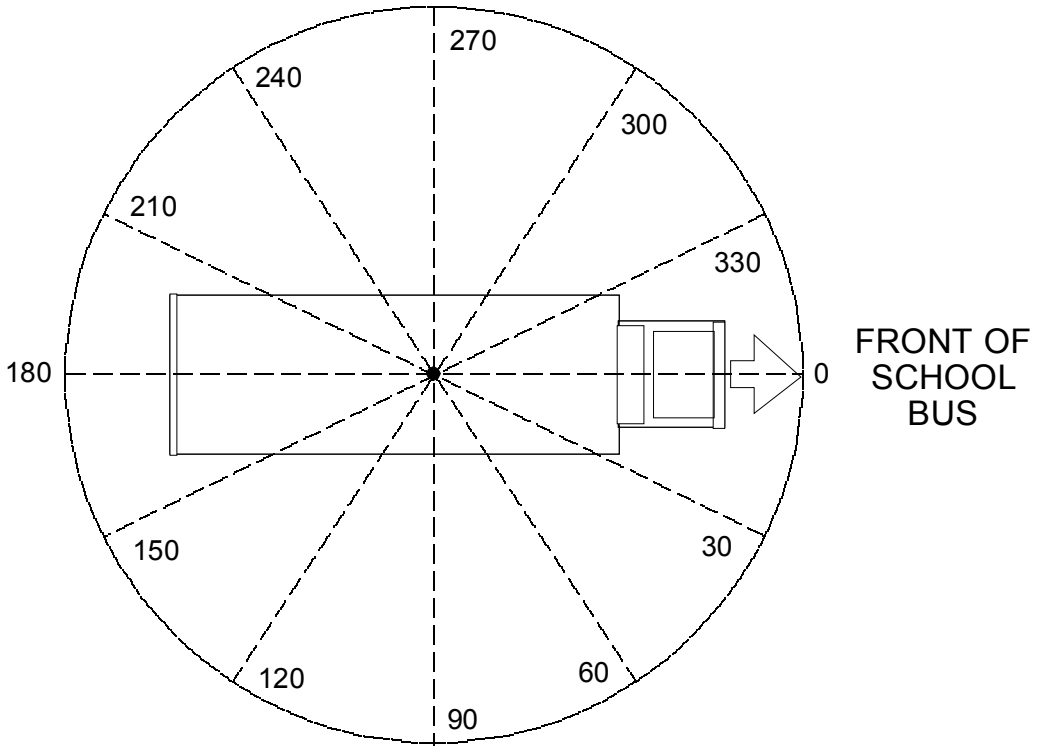
LABORATORY: _____

LOCATION: _____

TEST DATE: _____ ; TIME: _____ ; AMBIENT TEMP.: _____ □F

BARRIER VELOCITY: _____ mph ; BARRIER PENETRATION: _____ inches

INDICATE IMPACT POINT BELOW:




TOP VIEW

LEGEND: Mark the above sketch as follows —

Use ARROW to indicate point and angle of barrier impact (centerline of arrow coincides with centerline of tow road)

Use a dotted rectangle to indicate location of fuel tank

**14. DATA SHEETS....Continued**

FUEL SPILLAGE NOTED: _____ YES; _____ NO

REMARKS:

DETAILS OF FUEL SPILLAGE:

Stoddard solvent spillage in excess of FMVSS 301 maximum allowable determined to start __minutes, _____ seconds after TIME ZERO (T0).

A total of _____ ounces by weight of Stoddard solvent spilled during _____ minutes, ___ seconds.

Maximum spillage amount allowed by FMVSS 301 = _____ ounce(s) in _____ minute(s).

ADDITIONAL FAILURE DETAILS:

REMARKS:

RECORDED BY: _____ ; DATE: _____

APPROVED BY: _____

**15. FORMS**

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 301-School Bus ; TEST DATE: _____

LABORATORY: _____

CONTRACT NO.: _____ ; DELV. ORDER NO.: _____

LABORATORY PROJECT ENGINEER'S NAME: _____

SCHOOL BUS DESCRIPTION: _____

_____

BUS NHTSA NO.: _____ ; VIN: _____

MANUFACTURER: _____

TEST FAILURE DESCRIPTION: _____

_____

_____

_____

FMVSS REQUIREMENT, PARAGRAPH §____ : _____

_____

_____

_____

NOTIFICATION TO NHTSA (COTR) : _____

DATE: _____ ; BY: _____

REMARKS:

**15. FORMS....Continued**

MONTHLY TEST STATUS REPORT
FMVSS 301S
DATE OF REPORT: _____

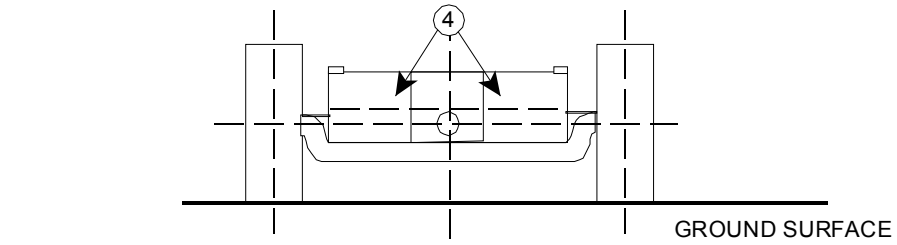
| NO. | BUS NHTSA NO., MAKE & MODEL | COMPLIANCE TEST DATE | PASS/ FAIL | DATE REPORT SUBMITTED | DATE INVOICE SUBMITTED | INVOICE PAYMENT DATE |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |

**MONTHLY VEHICLE STATUS REPORT**
**FMVSS 301S**
**DATE OF REPORT: _____**

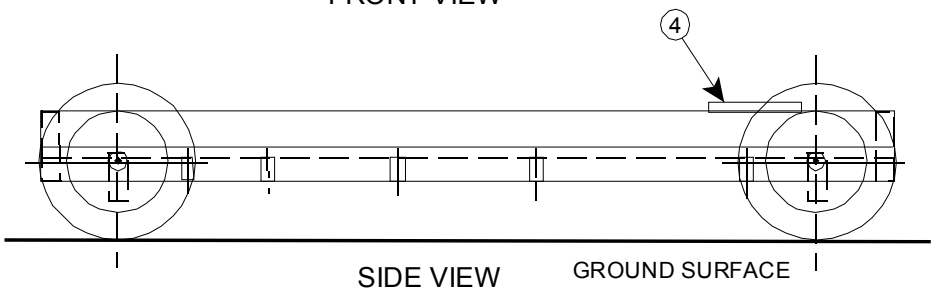
| NO. | BUS NHTSA NO., MAKE & MODEL | DATE OF DELIVERY | ODOMETER READING | TEST COMPLETE DATE | BUS SHIPMENT DATE | ODOMETER READING |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |

**APPENDIX A**

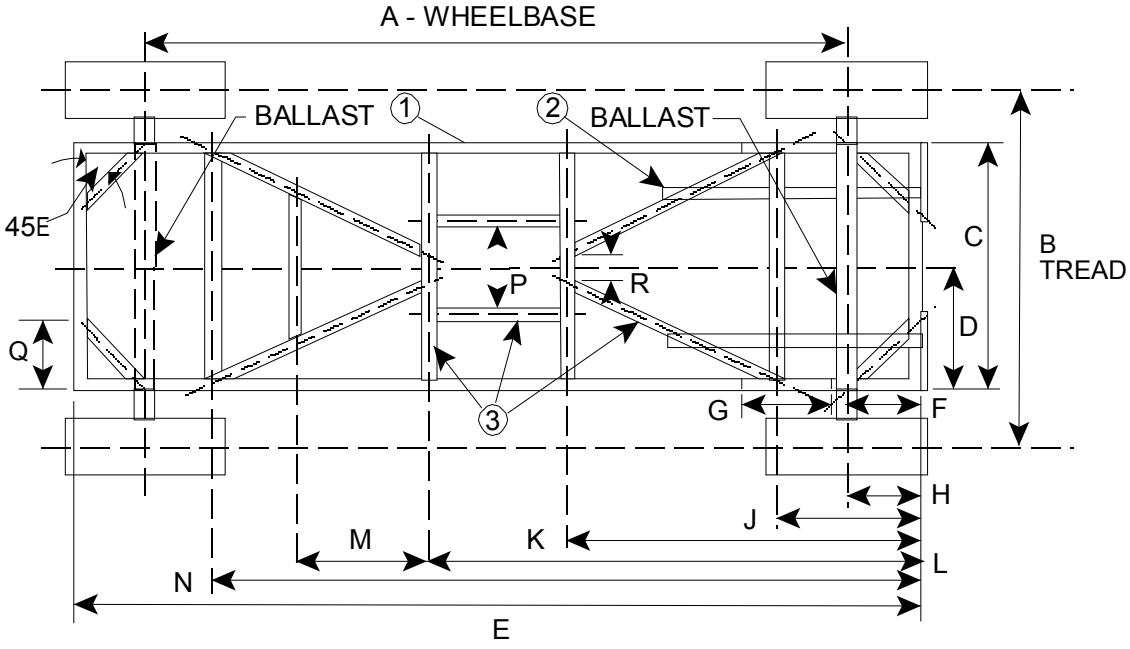
# COMMON CARRIAGE FOR MOVING BARRIERS




FRONT VIEW




SIDE VIEW




TOP VIEW

DIMENSIONS SHOWN IN TABLE ON NEXT PAGE

NOTES:
1. OUTER FRAME 6.0 x 2.0 x 0.19 in. (152 x 51 x 5 mm) STEEL TUBING, TWO PIECES WELDED TOGETHER FOR A 12.0 in. (305 mm) HEIGHT.
2. BALLAST TIE DOWNS.
3. ALL INNER REINFORCEMENTS AND FRAME GUSSETS OF 4.0 x 2.0 x 0.19 in. (102 x 51 x 5 mm) STEEL TUBING.
4. REINFORCE AREAS FOR BOLTING ON FACE P;LATES.

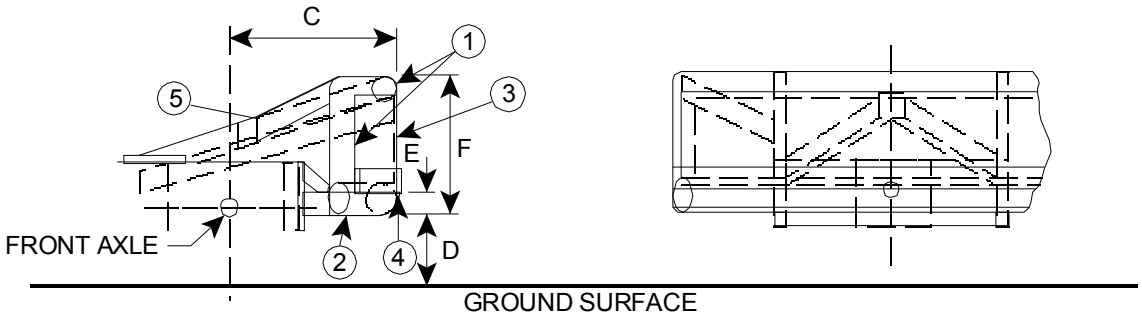
**APPENDIX A....Continued**

DIMENSIONS FOR COMMON CARRIAGE FOR MOVING BARRIERS

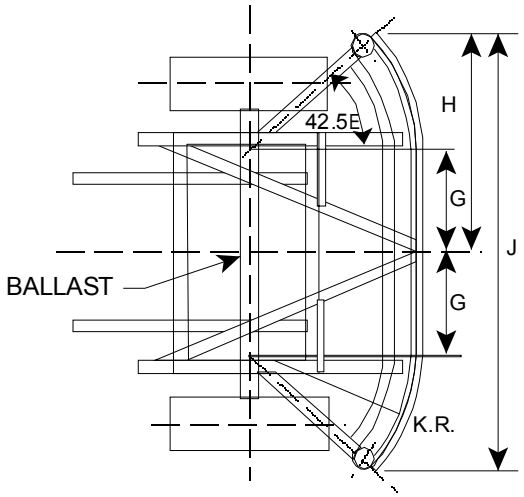
| LETTER | INCHES | MILLIMETERS |
|---|---|---|
| A | 120.0 | 3048 |
| B | 60.0 | 1524 |
| C | 42.0 | 1067 |
| D | 21.0 | 533 |
| E | 144.0 | 3658 |
| F | 15.0 | 381 |
| G | 16.0 | 406 |
| H | 12.0 | 305 |
| J | 24.0 | 610 |
| K | 60.0 | 1524 |
| L | 84.0 | 2134 |
| M | 22.0 | 559 |
| N | 120.0 | 3048 |
| P | 16.0 | 406 |
| Q | 12.0 | 305 |
| R | 6.0 | 152 |

# APPENDIX B

## CONTOURED IMPACT SURFACE FOR COMMON CARRIAGE




SIDE VIEW FRONT VIEW




TOP VIEW

DIMENSIONS SHOWN IN TABLE ON NEXT PAGE

NOTES:
1. Upper Frame 4.0 in. dia x 0.25 in. wall (102 mm dia x 6 mm wall) Steel Tubing (3 Sides)
2. Lower Frame 6.0 in. dia x 0.50 in. wall (152 mm dia x 13 mm wall) Steel Tubing
3. Face Plate 0.75 in. (19 mm) thick cold rolled steel
4. Leading Edge 1.0 s 4.0 in. (25 x 102 mm) steel band, sharp edges broken
5. All Inner Reinforcements 4.0 x 2.0 x 0.19 in. (102 x 51 x 5 mm) steel tubing

Total Weight = 4,000 ± 50 lbs (1,814.1 ± 22.7 kg)
Weight at each Rear Wheel =
900 ± 25 lbs (408.2 ± 11.3 kg)
Weight at each Front Wheel =
1,100 ± 25 lbs (499.0 ± 11.3 kg)
Moments of Inertia:
$I_X$ = 271 ± 13.6 slug-ft$^2$ (367 ± 18.4 kg-m$^2$)
$I_Z$ = 3,475 ± 174 slug-ft$^2$ (4,711 ± 236 kg-m$^2$)

**APPENDIX B....Continued**

DIMENSIONS FOR CONTOURED IMPACT SURFACE

| LETTER | INCHES | MILLIMETERS |
|---|---|---|
| A | 54.0 | 1372 |
| B | 15.8 | 401 |
| C | 30.0 | 762 |
| D | 5.25 | 133 |
| E | 3.75 | 95 |
| F | 24.75 | 629 |
| G | 18.0 | 457 |
| H | 39.0 | 991 |
| J | 78.0 | 1981 |
| K | 30.0 | 762 |