Exceeding the Gross Vehicle Weight on a Bus

Information compiled January 5, 2005

The Question: A Washington State Transit Insurance Pool member (WSTIP) is concerned about Gross Vehicle Weight Ratings (GVR) on 29 of its buses. They suspect GVR problems may resonate nationwide. We have offered to collect information on this topic because we agree this is a risk management issue that could impact the entire Pool.

The chassis on these particular buses are Ford E-450's. The GVR for these buses are 14,050 with a seat configuration of 21. According to the WSTIP member, transit industry standards are an estimate of 150 pounds per person on these buses. The airlines went to 180 pounds per person. The member thinks the transit industry is going to 170 -175 pounds a person soon.

Their concern is this:

- Scale Weight of the bus is 11,480
- 21x 150 = 3,300
- Manufacturer GVR = 14,050
- 14,050 – 11,480 = 2,570
- 2,570 – 3,300 = 700 pounds short

Manufacturer specifications don't meet the reality of today's American who has gained some girth in the last 20 years. What are other transits doing about this issue especially with their small buses?

Grays Harbor Transit says … I think this is a real concern that should be addressed. I assume the bus we are talking about is also a two wheelchair position configuration as well. If that's the case and those positions were occupied with electric wheelchairs it could possibly bring that weight up another 1,000 to 1,200 lbs.

Pierce Transit says … I did some checking here at Pierce Transit on our Shuttle Buses which our on E-450 chassis. Our tare weight on this empty bus fully equipped and ready for service is: 10,840 lbs. Our current configuration is for 15 passengers (driver included). Using your estimated transit industry weight of **170 lbs/person** here is how we are sitting:

Scale wt. = 10,840
15 x 170 lbs. = 2,550
Gross wt. = 13,390

14,050 GVWR - 13,390 = **510 lbs under weight**.

Five of our seats (10 passengers) are flip-ups to accommodate 5 wheel chair stations. During the times when we have 5 wheel chairs onboard and 5 passengers we could be pushing the GVWR maximum depending on size/weight of wheel chairs and occupants. Thanks for the heads up.

Delaware Transit Corporation says … Concerning cutaways, our seating configuration used at DTC are either 10 forward facing with 4 wheelchair tie down positions, or 16 forward facing with two wheelchair tie down positions. In either case, the payload weight maximum available is not exceeded on our Ford E-450 Superduty cutaways. All FTA funded vehicles have to undergo Altoona testing which verifies weight capacities under durability testing conditions using human dimensions specified in SAE Recommended Practice J833. This test is recognized by APTA Standard Bus Procurement guidelines and FTA. Other weight factors effecting structure/chassis durability that should be considered are front and rear bus design overhangs (front and rear), and additional components spec'ed into buses which add weight. In addition all FMVSS regulations must be met.

Until SAE changes J833 to increase weights per person, FTA/APTA will not recognize this as a requirement. For protection, I recommended that other parties procuring new cutaway buses add into their spec the language we use:

The maximum curb weight of the vehicle shall not cause the chassis GVWR, as certified by the chassis OEM to be exceeded when loaded to the seating configuration and any combination of options required in this Specification.

Should the OEM chassis GVWR be exceeded, the Contractor shall incorporate additional capacity and shall certify that the vehicle does meet the higher GVWR.

Whatcom Transit says … You will recall we dealt with this exact issue when we discussed overloading on the flex route cutaways. In that case we limited the load to 17 seated and 2 standees.

Halsey King says … There has been a long running challenge to bus body builders of small / cutaway buses since these type of buses were developed in the mid-seventies. The primary manufacturer (typically Ford/Chevy) designs a cab and chassis to meet a certain GVWR and no more. These GVWR are regulated by virtually every state and the US DOT.

When the secondary manufacturer gets the stripped down chassis with a cutaway top and missing right door, they are instructed by the primary manufacturer to not exceed the GVWR for safety, maintenance cost, and regulatory reasons. The chassis, for years, had a GVWR limitation of approximately 8,500 and 11,000 GVWR respectively.

Bus manufacturers (or secondary manufacturers) in their attempt to serve the customer need would build the buses with seats, lifts, engines, rear A/C, fare boxes, and other extras that the customer wanted. Unfortunately, the weight of front and rear axles became so high that bus components such as shocks, springs, tires, brake shoes, transmissions and drive shafts "U-Joints" failed repeatedly, increasing maintenance cost through the stratosphere.

The primary manufacturers then started to produce cutaway chassis in the 14,000 - 15,000 lbs rated GVWR. But, as they did, customers wanted longer buses with more seats and fare boxes, and destination signs - so the issue persists.

As a footnote to this industry issue, bus body manufacturers started to build a mid-range, light weight bus with a total length of somewhat less than 30 feet, some 25-27-19 and 30 feet. The customer side said "hey maybe this 7 year bus at $80K would be a better investment than a 4 year bus at $65,000, with less seats and less GVWR." That is worth considering in any instance where you find you are routinely running a bus over GVWR. My suggestions to WSTIP members would be the following:

- Insure that language covering FMVSS and 49 CFR about weight certification are in the bus RFP to manufacturers. US DOT calculations for 150 pound per passenger is still active although I have heard that SAE and DOT are reviewing these weight standards for ground vehicles.
- Insure that the bus - while at the plant and with lift, seats and all options, is weighed and that the weight slip arrives at the customer's location with the other vehicle documents.
- Insure that the proper tire(s) are installed with the correct carrying capacity and load range as printed on the door jamb installed by the chassis manufacturers.
- Take the new vehicle to a certified public scale and get a curb weight certificate, follow the instructions on the weight certificate to properly prepare the vehicle for curb weight. Weigh the front axle. Weigh the rear axle and weigh the entire bus.
- Do the math:
  Allow for 150# per seat, plus the driver, Example

10 seats	=
1 driver	=
2 WWC tie downs	=
Fuel	=

  Compare these totals with the chassis manufacturers maximum weight and the totals from the tire GVWR maximums.
  Also compare these latest weight certifications with the one completed at the plant. Typically your buses will not all weigh the exact same. Given the amount of fuel in the tank, parts and hardware on some of the buses may differ.
- Discrepancies - If the buses are 1000 lbs or more out of specifications, investigate it immediately. It could be that seats, fare boxes or other equipment were installed after the bus body was complete and before it arrived at the customer's door.

In any event, I do not know of a state where you can operate a bus fully loaded with passengers, fuel, bags, ADA equipment, when that bus is heavier than its chassis manufacturer rating, both axles and in total.

Halsey King, President of Halsey King & Associates, has more than 25 years experience in the repair, inspection, and management of vehicle fleets. Halsey has consulted or trained over 700 fleets worldwide including the highway patrol in 43 states. Currently he provides maintenance seminars for the Washington State Transportation Training Coalition, Community Transportation Association of America, Metro Magazine, the American Bus Association, and the United Motor

Coach Association. Articles written by Halsey on maintenance and technology issues appear regularly in transportation and engineering magazines.