15 PASSENGER VANS

Adapted from
NHTSA SAFETY STUDY
15 Passenger Vans

Fifteen-passenger vans are in widespread use for the transportation of college sports teams, van pools, church outings, hotel shuttles, and other similar groups. There have been a number of widely-publicized single vehicle crashes that have involved fifteen-passenger vans in the last year. All but one of these crashes have involved rollover of the fifteen-passenger van.
15 Passenger Vans

Fifteen-passenger vans differ from most light truck vehicles in that they have a large payload capacity and the occupants sit fairly high up in the vehicle. Therefore, when loaded the vehicle may have a much worse rollover propensity than when unloaded.
This study was performed using the crash data from Florida, Maryland, Missouri, New Mexico, Ohio, Pennsylvania and Utah for crash years 1994 through 1997.

The calculated rollover ratios are ratios of the numbers of rollovers to the numbers of all single vehicle crashes.
NHTSA Study

Looking at all rollovers, regardless of the number of vehicle occupants, fifteen-passenger vans have almost the same rollover ratio as does a comparison group: all light trucks and vans (LTVs).

The rollover ratios were observed over four categories of occupancy levels: under 5, 5-9, 10-15 and over 15 occupants.
Between 1994 and 1999, the National Highway Transportation Safety Administration Conducted a study on the “Rollover Propensity of 15-Passenger Vans.” The results are described in the following slides:
### NHTSA Study (1994 –1999)

<table>
<thead>
<tr>
<th>Occupancy Level</th>
<th>All SV Crashes</th>
<th>All Rollovers</th>
<th>Rollover Ratios</th>
<th>Combined Roll-Over Ratios 1 to 9 and 10 or more occupants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5</td>
<td>1,815</td>
<td>224</td>
<td>12.3%</td>
<td>12.7%</td>
</tr>
<tr>
<td>Five to Nine</td>
<td>77</td>
<td>16</td>
<td>20.8%</td>
<td></td>
</tr>
<tr>
<td>Ten to Fifteen</td>
<td>55</td>
<td>16</td>
<td>29.1%</td>
<td>35.4%</td>
</tr>
<tr>
<td>Over Fifteen</td>
<td>10</td>
<td>7</td>
<td>70.0%</td>
<td></td>
</tr>
</tbody>
</table>

15 Passenger Vans have a much higher propensity to Rollover during a crash when carrying more than 5 passengers! Remember, adding “Cargo” increases the chances of rolling as well!
NHSTA Study

As seen in Table 1, the propensity to roll over increases with the occupancy level. It can be inferred from Table 1 that a fifteen-passenger van that has over 15 occupants runs almost six times the risk of rolling over as compared to a fifteen-passenger van that has less than 5 occupants (70.0 vs. 12.3 rollovers per 100 crashes), when involved in a single vehicle crash.
NHTSA Study

When confining the analysis to two groups, less than 10 occupants and 10 or more occupants, the rollover ratio for the vehicles with 10 occupants or more occupants is almost 3 times (35.4 percent vs. 12.7 percent) that of vehicles with less than 10 occupants.
NHTSA Study

Loading the vehicles to GVW has an adverse affect on the rollover propensity due to the increase in center-of-gravity height. Loading the vans with passengers and cargo also moves the center of gravity rearward, increasing the vertical load on the rear tires. Table 5 contains values for longitudinal distance from the front axle to the center of gravity, a, and for percent weight on the rear axle.
## Weight Distribution and Steering

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Wheelbase (in.)</th>
<th>@LLW</th>
<th>% Weight Rear Axle</th>
<th>@GVD</th>
<th>% Weight Rear Axle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998 Dodge Caravan</td>
<td>113.6</td>
<td>46.8</td>
<td>41.2%</td>
<td>59.1</td>
<td>52.0%</td>
</tr>
<tr>
<td>1998 Ford E150 Club Wagon</td>
<td>138.0</td>
<td>62.1</td>
<td>45.0%</td>
<td>70.9</td>
<td>51.4%</td>
</tr>
<tr>
<td>2000 Ford E350 XLT Super Duty</td>
<td>138.2</td>
<td>72.4</td>
<td>52.4%</td>
<td>90.3</td>
<td>65.3%</td>
</tr>
</tbody>
</table>

*a: Longitudinal distance from front axle to vehicle center of gravity.
The simulated GVW fifteen-passenger van exhibits both lateral and roll instabilities under extreme maneuvers. The facts that the center of gravity is higher and further rearward both contribute to the lateral instability. The roll instability results from the facts that the GVW vehicle spins out and that the center of gravity is higher. Note that these instabilities are probably not unique to fifteen-passenger vans; other vehicles with high payload to empty weight ratios may well have similar instabilities.
NHTSA Study

All three sizes of vans for which rollover propensity metrics were measured during NHTSA’s field tests had an increase in rollover propensity, measured using SSF, (static stability factor) from the driver-only loading condition to the 15-occupant loading condition. However, the effects of occupant loading were greater for the fifteen-passenger van than for the seven-passenger van or the minivan.
NHTSA Study

In measuring the inertial parameters of a fully loaded fifteen-passenger van versus a lightly loaded van, the decrease in stability under the fully-loaded condition correlates to an increase in the rollover risk of approximately 40 percent.
Weight Distribution
Why?

- Long, Narrow Wheel Base
- Higher Center Of Gravity
- Loaded Heavy With Cargo
- Designed for High Occupancy
Why?

Many Passengers
...Many Distractions

Driver is Over The Steering Axle.

Size/Shape makes the Vehicle “Unpredictable” in the Wind
With the combined Weight of the Occupants, Cargo & The high Center of Gravity – 15-Passenger Vans are extremely vulnerable to Rollovers during otherwise “minor” accidents.

15-Passenger Van “Chassis” Are Different Than Standard Vehicles.
What are the Differences?

- Take longer to stop
- Tend to “Hydroplane” in Wet weather conditions
- Are affected by the wind much more than Standard Passenger Vehicles.

The weight, height, occupant load and Cargo load Create a “Combined Center of Gravity” that makes the Overall vehicle prone to stop/corner “sluggishly” and Increases the likelihood of rolling over during a crash.

Minor “miscues” are compounded in these Vans
The **BLUE** line represents the plane in which the Center of Gravity of a van loaded w/5 or less occupants floats. The **RED** line shows where the “**Combined Center-of-Gravity**” is when fully loaded.
15-Passenger vans are difficult to maneuver and operate in close, confined areas. The driver’s “perception” of vision is most often wrong...leading to costly accidents. Understanding & using Reference Points can help drivers not familiar with 15-Passenger Vans minimize the risk of having an accident.
What are Reference Points?

Reference Points are Visual Landmarks located on Various parts of the interior of the vehicle. The Driver uses these Fixed Points on the inside of The Vehicle to provide reference to where the Outside Of the vehicle is. Follow along to see how:
Reasons for Visual Misperception

- The driver sits up higher.
- More blind spots.
- The distance between the rear axle and the rear bumper limits visibility.
- The length of the vehicle is a change for most drivers.
- The driver sits almost directly over the front axle.
Minimum Driver Standards

- Acceptable Driving Record
- Completion of on-line training session
- Avoid driver distractions (cell phone, two way radios, etc.)
Monitor Program

- Regular MVR reviews
- Motorist complaints
- Passenger complaints
- Employee complaints or comments
- Equipment damage/misuse
- Accident/incident investigation
FINAL STEP

- Print the 15-passenger van certification form from attached Word file
- Complete the certification form and forward it to VP of Finance and Operations
- Request use of 15-passenger van through normal process for requesting use of college vehicles
Questions and Comments

Forward any questions to Director of Finance and Operations
THANKS!!!

Thank you for taking the time to help the college meet the requirements set by our fleet insurance carrier.