

Position Paper to Clarify Some Issues on Truck Overloading

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1. Background

This position paper was crafted to clarify some issues pertaining to truck overloading and the implementation of the national law (R.A. 8794) from a technical standpoint, and based on an independent assessment of the concerns put forward recently.

Among the issues raised were on the maximum axle load of 13.5 tons, the computed maximum gross vehicle weight (GVW), and the implications of their enforcement on the transport of goods and the trucking industry.

In the absence of extensive data from measurements on actual roads and bridges in the Philippines, reference is frequently made to tests and studies by the American Association of State Highway and Transportation Officials (AASHTO), which are adopted by many other countries.

2. Maximum axle load

For benchmarking purposes, an 8.2-ton axle is referred to as the equivalent single axle load or ESAL. One (1) ESAL is equivalent to a damage potential of 1.0 based on road tests conducted by AASHTO. Damage potential increases very rapidly as the axle load increases. The maximum axle load of 13.5 tons is equivalent to 60 times the damaging potential of an ESAL or 8.2-ton axle load.

The designation of a 13.5-ton maximum already takes into consideration the practice of overloading. (Note that the original maximum single axle load was 8.0 or 8.2 tons.) The 13.5 tons is based on studies conducted by the DPWH back in the 1990s (Philippine Axle Load Study or PALS), which determined the maximum single axle load that may be allowed without compromising the integrity of structures such as bridges. The study measured the weights of trucks throughout the country to establish typical weights for different types of trucks.

For tandem axles, a different maximum load is prescribed due to established findings by AASHTO that two closely spaced axles have a much greater combined damaging potential than two single axles that are far apart. To keep the damaging potential in check, AASHTO has established that in the case of tandem axles, each axle in the tandem should have a maximum load that is 20% less than the maximum allowed for single axles. Thus, the maximum axle load for tandem axles in the Philippines is 10.8 tons, for a total of 21.6 tons for the tandem.

A similar process of reduction is applied to tridem axles and so on, where the damaging potential changes as a function of the proximity of the axles to each other.

3. Maximum gross vehicle weight

The maximum gross vehicle weight (GVW) computation is partly based on the maximum single axle load. Thus, it is clear that a higher maximum single axle load leads to higher maximum GVW.

The GVW is computed based on the optimum distribution of loads for different types of vehicles. This optimum distribution considers the maximum allowable axle loads as discussed above (AASHTO, 1987) as well as the loading characteristics of bridges, for example as detailed in the AASHTO LRFD Bridge Design Specifications (2004).

Further, the optimum loads also take into account the stability of the vehicle as it travels along highways and bridges.

The experience in the U.S. where a compromise was reached between government and the private sector concerning maximum GVW is possible because the weights are based on a maximum single axle load of 9.1 tons and the optimum distribution of load for different types of trucks.

4. Consequences of overloaded vehicles

In the previous sections, the impacts of overloading on road infrastructure such as pavements and bridges were taken into consideration. Overloaded vehicles, particularly trucks, can have detrimental effects on highway safety and traffic operations, too.

Highway safety and traffic operations

Overloading would particularly have impacts on the following handling and stability aspects for trucks, affecting safety in highways:

- Rollover threshold
- Braking
- Steering sensitivity
- Low-speed off-tracking
- High-speed off-tracking

Meanwhile, impacts on traffic operations include:

- Speed on upgrades
- Expressway/highway merging, weaving, and lane changing
- Downhill operations
- Intersection operations
- Traction ability
- Longitudinal barriers

The above factors have been analyzed and are the subject of a special report by the Transportation Research Board of the U.S. (TRB, 1990). It has been established, for

example, that involvement in fatal road crashes increases as the GVW range increases. Also, it has been established that increased truck weights lead to greater reductions in speed and difficulties in merging, weaving and lane changing, and require greater sight distances for safe stopping.

Modification of trucks

The modification of trucks here pertains to the addition of at least one axle with the objective of increasing the GVW while also decreasing the loads of the axles, in order to comply with maximum axle limits.

Any modifications on trucks, especially the addition of axles, should comply with traffic safety standards including those pertaining to handling and stability. Thus, modified trucks should comply with the specifications of the manufacturer or with established standards, if any, for the modification in question.

Any modifications should also be subject to inspections. Problems will arise if there are no standards. In such cases, the manufacturer or experts in the industry should be consulted. The LTO should defer to the recommendations and disapprove any modifications that are not complying with standards or recommendations by qualified persons especially the manufacturer.

In the absence of comprehensive studies on such modifications, data on road crashes or breakdowns (e.g., flat tires, broken axles) need to be collected in order to establish their frequency, determine how serious these tend to be, and ascertain what the crashes or breakdowns are attributed to. This would require detailed information on crashes and breakdowns over a period of, say, 2 to 5 years for statistical significance.

5. Conclusions and Recommendations

The 13.5 tons designated as the maximum single axle load in the Philippines already incorporated the practice of overloading and thus becomes non-negotiable considering that the DPWH has already taken into consideration the maximum loads that can be withstood by highway structures especially bridges in the country. This maximum single axle load is notably higher than the allowance in the US and most other countries.

The following are recommended for further consideration:

- State the allowable maximum axle loads in terms of single axle, tandem axles, tridem axles and so on, in order not to create confusion on the interpretation of the allowable maximum loads.
- Establish standards, type approval system, and monitoring system for truck modifications, in order to ascertain compliance with safety and stability standards.
- Conduct studies on actual axle loads and GVWs on a more regular basis, say every 5 years, by the DPWH, in order to establish a database from which allowable maximum axle loads and GVWs may be updated in aid of legislation.
- Conduct impact assessments.

The U.S. Department of Transportation (2000) recommendations that may be relevant in the impact assessments include:

- a. Infrastructure costs – including implications on road pavements, bridges and geometrics
- b. Safety impacts – including crash/accident rates, public perception, vehicle stability and control, and vehicle comparisons
- c. Traffic operations – impacts on road capacity and speeds
- d. Energy and environment – impacts on fuel consumption and vehicle emissions
- e. Shipper costs – impacts on cost of transporting goods

Impact assessments are essential in order to establish directions for determining the benefits and costs attributed to various scenarios that are currently being discussed at the TWG level. Such benefits and costs will serve as inputs in aid of legislation to improve on the provisions of R.A. 8794 and its Implementing Rules and Regulations.

Design standards particularly for road pavements and bridges in the Philippines are mainly based on AASHTO standards and specifications. The AASHTO standards and specifications are based on AASHTO design vehicles along with their prescribed weight/load distributions. It follows, therefore, that anyone adopting the AASHTO design standards and specifications like the DPWH should also adopt the AASHTO design vehicle specifications. Otherwise, the application of standards and specifications for design will be flawed, resulting in sub-standard infrastructure.

As a general rule, if the Philippines is to adopt a different set of load distributions, maximum axle loads, and gross vehicle weights for its trucks, the country should likewise develop or revise its design standards and specifications to match local experience or setting. This would require comprehensive studies to be led by civil engineering experts in the Philippines and patterned after similar studies conducted elsewhere including the United States.

6. References

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