



COMMUNITY RESOURCES AGENCY

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County Ordinance Code in Relation to the Proposed Change in the SRA* Fire Safe Regulations

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The California Board of Forestry and Fire Protection is proposing to change the language in Title 14 of the California Code of Regulations, Article 2, §1273.02, to read "Roadways shall be designed and maintained to support the imposed load of fire apparatus weighing at least 75,000 pounds..." Mike Laird has asked the Engineering and Roads Departments if the County Ordinance Code would need to be amended in order to conform to this state wide regulation.

County Ordinance Code 11.12.020 B states:

"All road structures shall be capable of supporting a 40,000 pound axle load and shall be constructed to carry at least the maximum load and provide the minimum vertical clearance as required by Vehicle Code sections 35550, 35750 and 35250. (Ord. 3239 §2, 2013; Ord. 1875 §2 (part), 1991; Ord. 1559 §1 (part), 1987)."

§35550 (a) of the California Vehicle Code (CVC) states:

The gross weight imposed upon the highway by the wheels on any one axle of a vehicle shall not exceed 20,000 pounds and the gross weight upon any one wheel, or wheels, supporting one end of an axle, and resting upon the roadway, shall not exceed 10,500 pounds.

There are exemptions to §35550, and §35551 has additional requirements, but the basic regulation is that the weight limit is 20,000 lbs per axle. County Ordinance Code, and the proposed regulation are unique in that they specify a minimum weight that the roadways will be designed to support. **There is no comparable standard specified by the CVC or the Highway Design Manual.**

The California Code of Regulations give weight limit exemptions to Fire Trucks in Title 21, Division 2, Chapter 7, §1411.7(a):

(a) Any fire truck may exceed the maximum allowable weights of the Department's Transportation Permit Program, but shall not exceed the following axle weight limits:

Axle Configuration	Max. Allowable Weight (lbs)
Single Steering Axle (front and rear)	24,000
Single Drive Axle	31,000
Tandem Axles	48,000
Tandem Rear Drive Steer Axles	48,000
Tridem Axles	54,000

These are also the maximum weights that are allowed by the Transportation Permit Program

*SRA - State Responsibility Area

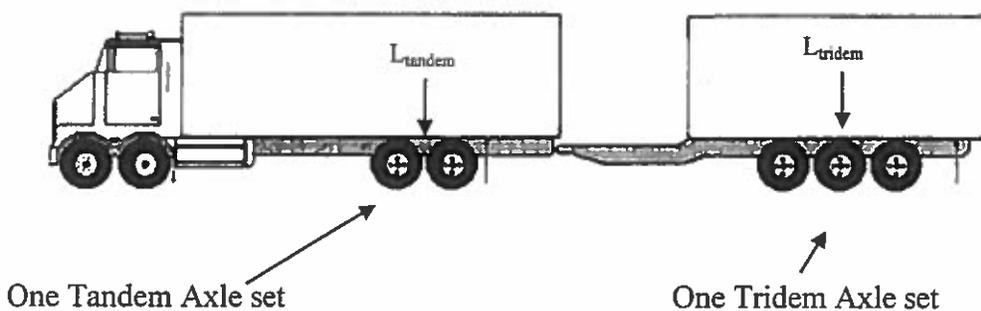
In order to compare these regulations, Load Equivalency Factors (LEFs) will be used. LEFs are factors that relate various axle load combinations to the standard 18,000 lbs (80 KN) single axle load, and they are also known as Equivalent Single Axle Load (ESAL) Factors. The equation to convert an actual weight to an LEF is:

$$LEF_{single\ axle} = \left(\frac{L_{single}}{18,000\ lbs} \right)^4$$

$$LEF_{tandem\ axle} = 2 * \left(\frac{L_{tandem}}{2 * 18,000\ lbs} \right)^4$$

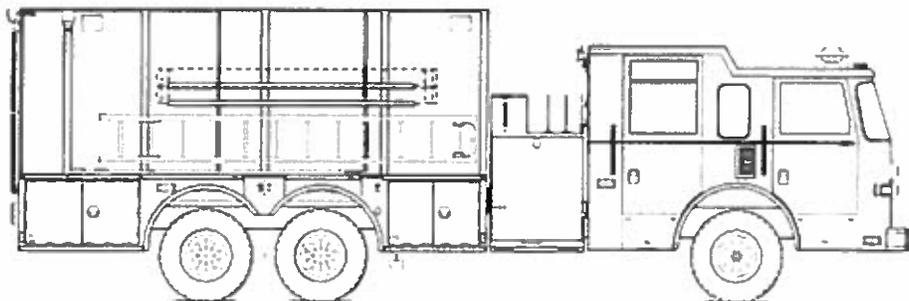
$$LEF_{tridem\ axle} = 3 * \left(\frac{L_{tridem}}{3 * 18,000\ lbs} \right)^4$$

Where L_{single} is the load (in lbs) on a single axle, and L_{tandem} and L_{tridem} are the loads (in lbs) on one set of tandem or tridem axles, with respect.



The proposed regulation calls for a Gross Vehicle Weight (GVW) of 75,000 lbs. This regulation is very vague because it does not specify how much weight will be on one axle. Due to this vagueness, a design vehicle must be assumed. FEMA and the International Fire Chiefs Association have published a document titled "Emergency Vehicle Size and Weight Regulation Guideline." In this document, several fire trucks are presented as "Typical fire apparatus configurations." The following truck is assumed to be the design vehicle because it has a GVW close to 75,000 lbs:

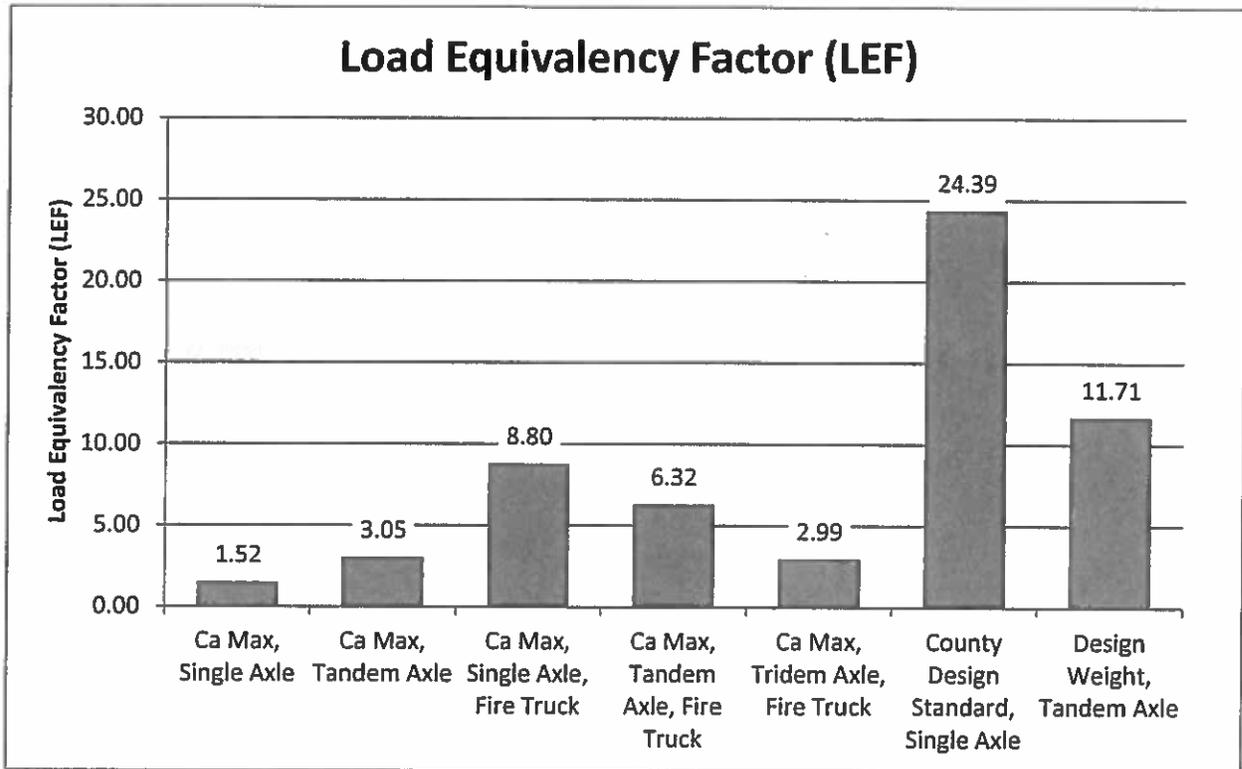
Custom Chassis Tanker – Tandem Rear Axle



	Min Weight (lbs)	Max Weight (lbs)
Front GAWR*	18,740	22,8000
Rear GAWR*	40,000	56,000**

*GAWR – Gross Axle Weight Rating
 **Assumed Design Weight (tandem axle)

With all of this in mind, a chart is built comparing the different loads and axle configurations in the form of LEFs:



The chart above shows that one pass of the assumed design vehicle's tandem axle is equivalent to 11.71 passes of one ESAL. This LEF of 11.71 is almost twice the LEF of the California maximum for tandem fire trucks, but it is half the LEF of the County design standard for single axles. It is important to note that one pass of any of these vehicles, even the one with the highest LEF, will not likely destroy the roadway in one pass. However, many repetitions of a vehicle a high LEF will significantly decrease the life of the roadway.

Recommendations:

The assumed design vehicle will not likely be driving on County roads consistently or frequently. Further, the County Ordinance Code is not substandard to the proposed regulation. Therefore, it is recommended that County Ordinance Code **not** be amended in order to conform to the new regulation. However, County Ordinance Code specifies that the roads be designed for a single axle weight that is twice as heavy as what the CVC allows. It would be prudent to consider amending the County Ordinance Code in order to conform with CVC §35550 and California Code of Regulations Title 21, Division 2, Chapter 7, §1411.7(a).

Appendix