Note: This is a Google Translation of an article originally in Chinese.
Source: https://mp.weixin.qq.com/s/K1kUw8aaFnS7tWzxTZiKzw

A strong bridge can not afford the weight of greed

From:A Greenwood Aoki Aoki 10/11

Click on "Avergreen Aoki" above to get more information after watching! !

At about 18 o'clock last night , a serious bridge collapse accident occurred in Wuxi, Jiangsu Province, which affected many people's hearts.

A viaduct in Wuxi has collapsed and collapsed. The scene is very fierce. For the driver who is driving on the road, it can be said that it is a disaster.

Video of bridge as it collpses, taken from the dash-camera of a nearby car.
It won't load on the print-to-PDF utility.
It can be found on Youtube.

The results of the accident identification were released at the first time, and the expert group initially determined that this was caused by the overload of the truck.

This conclusion instantly leads to overwhelming accusations on the Internet:

What kind of truck is so powerful, can crush the bridge, actually not tires?

The bridge in Wuxi is not a design problem, it is a quality problem, and less overloaded large trucks are used as shields.

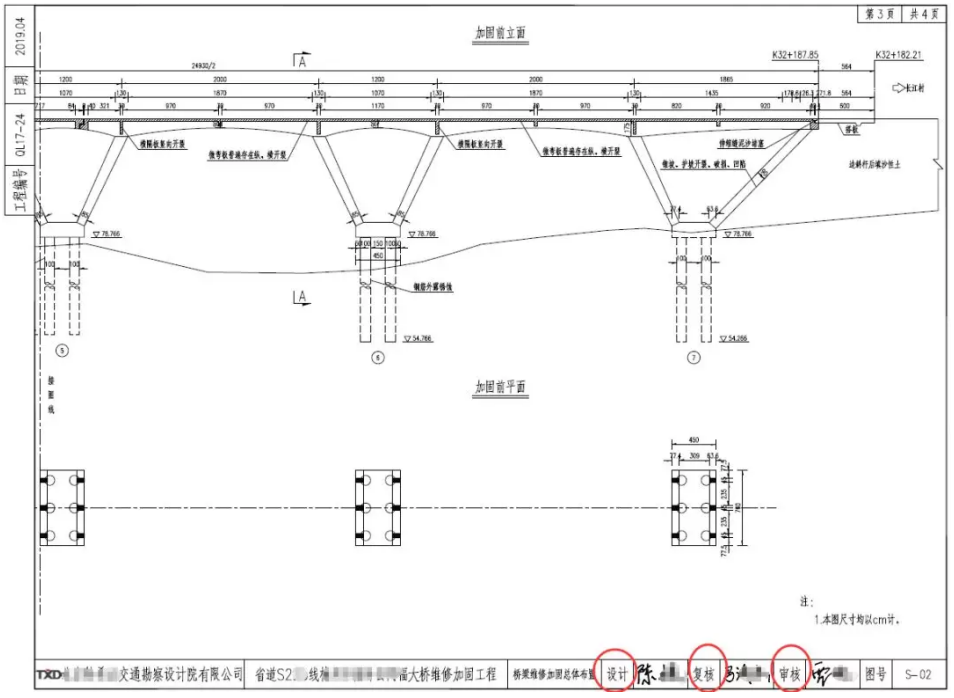
But this time the vicious accident of Wuxi's viaduct was **really caused by the overload of large trucks. The evidence is extremely conclusive.** I will tell you why.

1

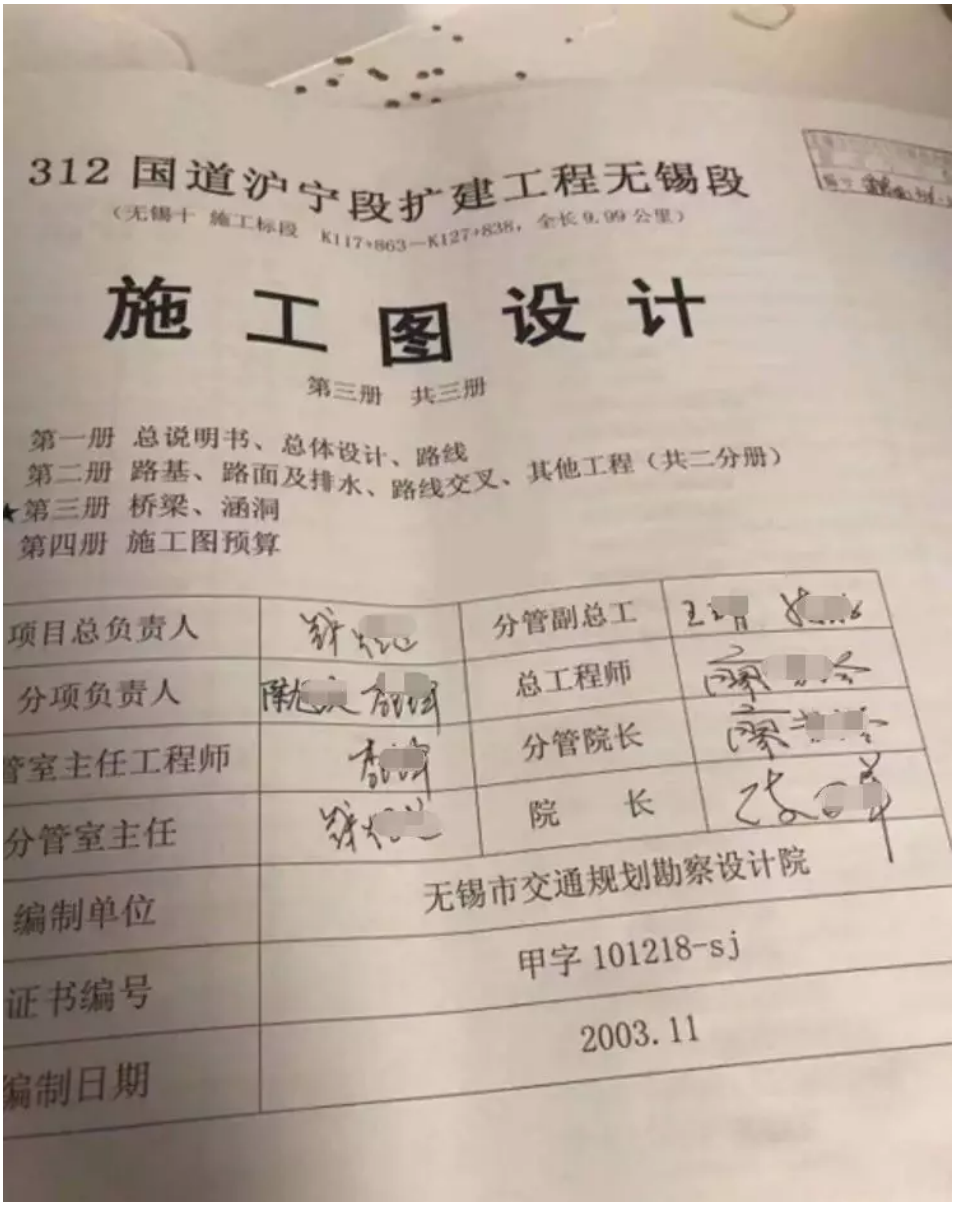
Now China's bridge design adopts a lifelong responsibility system.

The design of a bridge, each page of paper needs to be signed, the engineer responsible for the design must sign, the senior engineer responsible for the review should sign, and the signature of the project leader is required later.

It's impossible to be sure where it comes from, but the defensive tone of the article is unmistakable.
It may be a product of the translation, but given how pervasive it is, I think that's the tone in the original text, too.
I wonder how close M



This is just one page of paper. On the cover of the entire design, the technical management involved in this project in the design institute is almost signed.



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编制单位	无锡市交通规划勘察设计院		
证书编号	甲字 101218-sj		
编制日期	2003. 11		

In addition to the A design institute's own signature, this design must also be sent to the outside B design institute for review. This is called consultation. The national regulations must have this process.

If the design institute is consulting, it is charged. The industry is called consulting fee or drawing fee. However, if they receive the money, they should also give advice. After checking the lack of advice, they must also sign and have their signature. This design will be released.

If there is something wrong with this bridge in the future, it will be identified as a design problem. Those who signed the A and B design institutes, regardless of their job or inactivity, will have to go to jail as long as they are still alive.

WOW !!!

Not kidding you, the design institute has a lot of responsibility.

Just earning some design fees, I don’ t want to catch up for the rest of my life.

In order to ensure their own safety, the current design institute is very conservative in doing things. The design drawings are all based on the upper limit of the national standard, and they like to break through the safety ceiling.

We westerners have different ways to express how we get paid for the work we do. This is more... blunt. Chinese are not shy.

If it is considered that the maximum number of steel bars in this area is OK according to the national standard calculation, then the design institute will generally use the 18th steel bar. The concrete label is the same, and the rule is based on the calculation result, and then the height is higher.

In the design institute, there has never been rounding, and all are four or five.

Four or five "decimal places". Experienced engineers in the west will cringe to read this.

The reason for taking the high standard is also very simple. Now the quality of the construction team is not well controlled, and the overload phenomenon is too much. We are still conservative and do things well. After all, everyone does not want to have an accident.

This reason is reasonable and the general approving staff does not want to have an accident. Therefore, even if the materials are used a little bit more and the cost is higher, the design plan will be released.

This has led to the fact that once the project has gone wrong, we are directly going to check whether the construction team has cut corners, and it is rare to grab the handle from the design institute.

Because the design institute here, how do you check, the conclusions are fully in line with the requirements of the force security.

Because he was originally designed according to the standard higher than the national security ceiling, especially those ordinary bridges with simple structure, in the design institute is simply a production plant, there will be no slight design problems.

Additional load-bearing capacity and stress performance, when you have no accident, you can check, you can barely say that the design institute is wasting the grease, but if you have a problem, can you say that he has increased the performance of the force?

Since it is difficult for the design institute to find faults, is it because the construction unit has cut corners and made the tofu residue project?

2

Nor is it that the accident in Wuxi is completely inconsistent with the bean curd project, which is simply a model of conscience engineering.

Nowadays, the quality of China's engineering, after strict governance, also adopts a lifelong responsibility system, and the bean curd residue is almost extinct.

We watched the close-up video taken by the crowd on the spot. It can be clearly seen from the video that the pier and the beam body are of very good quality. When they fall from a height, they fall and fall, and no structural damage occurs. The integrity is extremely high.

In other words, this viaduct, the overloaded large truck is not crushed, even fell and was hit hard, it is nothing, the quality can be used as a template for conscience engineering.

The question came. Since the quality of the bridge is so good, why did it fall over?

Because of this bridge, the design of the single pole pier is adopted.

What is the design of the single-column pier, as the name suggests, is to use only one pier to support the entire viaduct.

So this is actually a different bridge than the one that collapsed in Jiangsu, but it, too has problems of its own!

This bridge has enough curve for there to be a lateral load (as traffic drives in a curve, it pushes outward on the bridge deck).

The outer lanes have many meters of overhang.

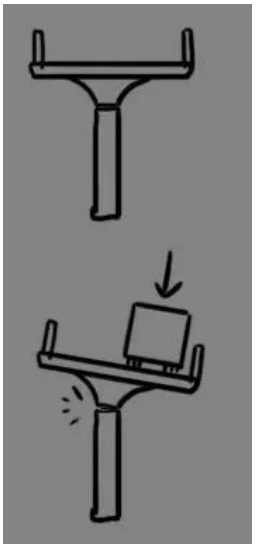
The central column does not have lateral bracing.

In China's conventional two-column design method, two piers need to be arranged laterally, which obviously requires an extra large amount of land.

Therefore, the design method of the single pillar pier, which was introduced from abroad, became popular immediately and was very popular among urban builders.

Everyone knows how expensive the city's land is.

However, the unique design of the single-column pier has a natural defect. Because there is only one pier, it is extremely easy to overturn when the weight of one side is too large. You can understand it by looking at the picture.



Now the ball is kicked back to the design yard, and your design is still a problem.

If it is not a single-column pier design, according to the quality of this bridge, it will not be embarrassing at all, so this pot must be designed by you.

But the design institute said that it was aggrieved. This pot, I really can't help.

When designing a single-column pier, it is also necessary to consider the most unfavorable condition of single-side heavy load.

However, from the above picture of the single-column pier, even if it is not a bridge professional, we can also see that this stuff is not solved by concrete reinforcement.

Overturning is a structural problem. To enhance the anti-overturning ability, the size of the pier must be increased.

In order to combat the overload phenomenon, the design of the **steel bar** used to **protect the safety of the law** , in the single column pier here.

The steel bar is a little higher, and the added cost is not much. However, the expansion of the pier size is too much, and the cost increase is too much, and the cost increase is extremely obvious and unreasonable. The **review unit will not let the design of the waste of state funds go out. of.**

However, there are some sizes that must be there. The viaduct of Wuxi is designed to have a weight limit of 40 tons for bicycles and a large truck with a total weight of 40 tons. Even if the pressure is strong on the far side of the bridge, there is no way to make this. The bridge is overturned.

Is this standard low? Really not low.

According to national standards, the total weight is 14 tons, which is called heavy truck.

> Micro card (total mass <1.8 tons)
>
> Light truck (1.8 tons < total mass ≤ 6 tons)
>
> Medium card (6.0 tons <total mass ≤ 14 tons)
>
> Heavy truck (total mass > 14 tons)

The national regulations expressly stipulate that the 6-axis super heavy truck, the maximum total weight, shall not exceed 49 tons.

货车载重标准

根据 2010 年国家标准 GB1589—2004《道路车辆外廓尺寸、轴荷及质量限值》和 2009 年交通部第 2 号令《超限运输车辆行驶公路管理规定》，比较车辆总轴重限载与车货总重限载，取两者之中的最小值为判别标准。

一、载重标准

1轴限标准

（1）单轴（每侧单轮胎）：7 吨；
（2）单轴（每侧双轮胎）：10 吨；
（3）并装双轴（每侧双轮胎）： 18 吨（每少 2 个轮胎减 4 吨）；
（4）并装三轴（每侧双轮胎）：24 吨（每少 2 个轮胎减 4 吨）。

2.货车总重限的标准

（1）2 轴车： 17 吨；
（2）3 轴车： 25 吨；
（3）4 轴车： 35 吨；
（4）5 轴车： 43 吨；
（5）6 轴车及以上车： 49 吨。

The Wuxi urban viaduct, the main target group is the city car, the car weighs only 1.5 tons, and usually allows some medium-sized trucks to enter the city.

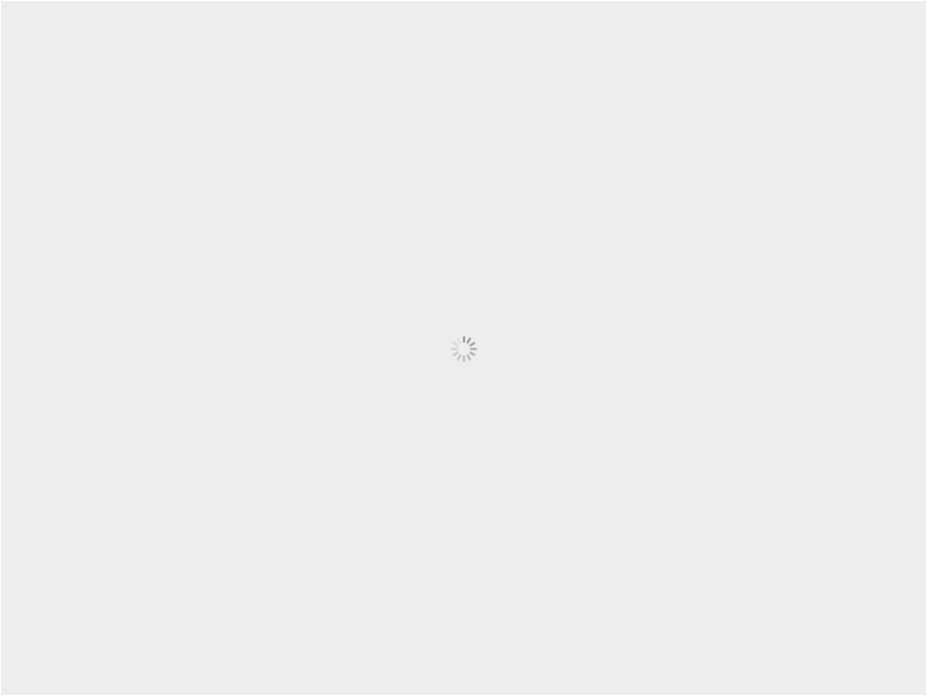
For such a city road, the design institute patted the chest to ensure that there was no problem with the 40-ton crossover of the bicycle. I think this standard is really no problem.

The 140% safety factor required by the national standard is that the 64-ton car has passed, and there will be no problem.

The highest legal load of the country of the truck is 49 tons.

Why is it that something is wrong? Because of the bridge in Wuxi, this time ushered in a daring desperate, the weight of the bicycle reached more than 170 tons.

We can clearly see from the live video that there is a large truck that transports the hot rolled coil, which is the cylindrical object. In this video, we have seen at least four.



Hot rolled coils are commonly used industrial products. Each cylinder is extremely heavy, generally more than 20 tons.

These hot rolled coils have factory labels, and the live-labeled labels show that a hot rolled coil actually weighs 28.535 tons.

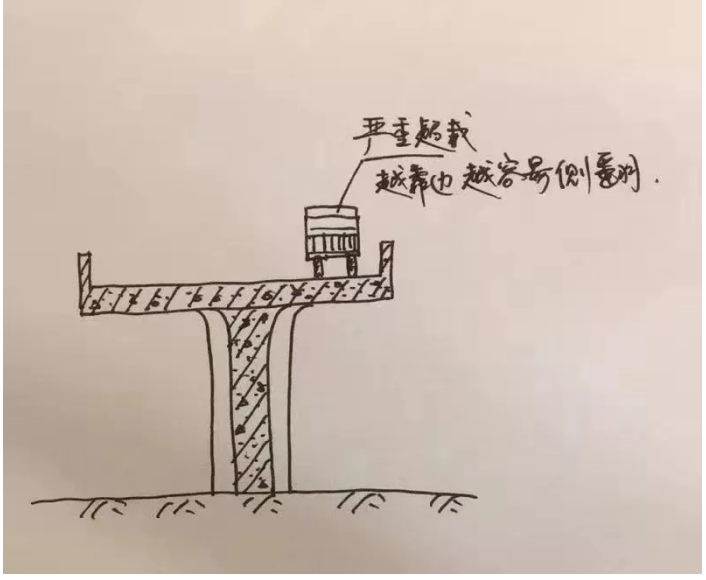
The live video taken by passers-by , we saw at least 4 hot rolled coils, and there are news that there are actually six on the scene, and a large truck pulls the configuration of six hot rolled coils, which is not in real life. Rare.

If the calculation is based on 4 hot rolled coils, the load will reach 114 tons. If the load is 6 yards, the load will reach 171 tons, which is not the weight of the body.

The design of this bridge is the maximum load, only 40 tons of bicycles.

With so many standards, I dare to go on the viaduct, and I have to choose a single-pillared viaduct to go on one side, which is not surprising.

The beam of this bridge has not been directly crushed by such a heavy car, but only overturned, which is strange, the quality far exceeds the design standard.



The Humen Bridge has been traffic jams all the year round, and the bridge deck has become a parking lot. It is full of various cars and looks extremely scary.

Many people are worried that the bridge will be crushed, but in fact this load is negligible for the bridge. A car of 1.5 tons, 100 cars will be worth an overloaded car in Wuxi, and your 100 cars are still Evenly distributed, the overloaded car is pressed against a small area.

The comparison of the harmful forces of the two sides is a world of difference.

When foreigners invented the monolithic pier, they did not consider China’s serious overload problem.

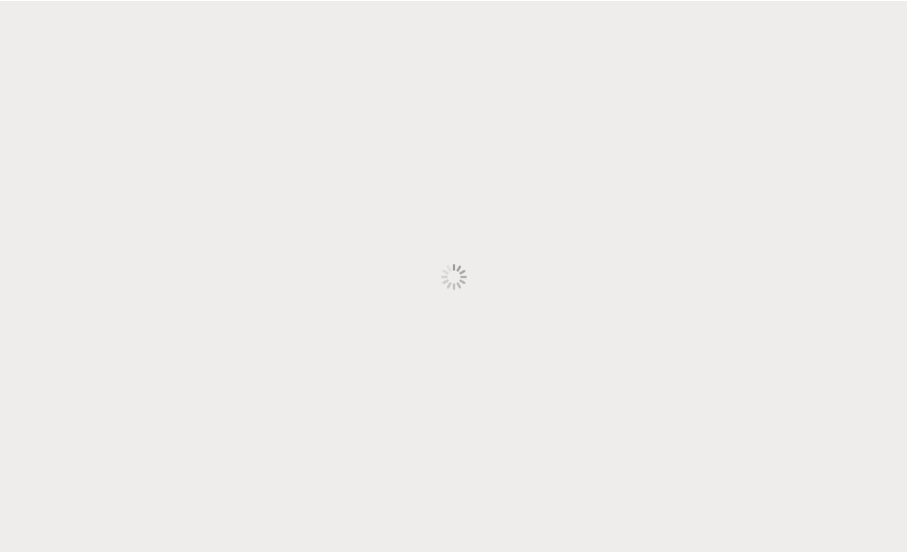
The honey of 汝, the cream of the other.

3

Over the years, China’s overloaded vehicles have intensified on the road to death.

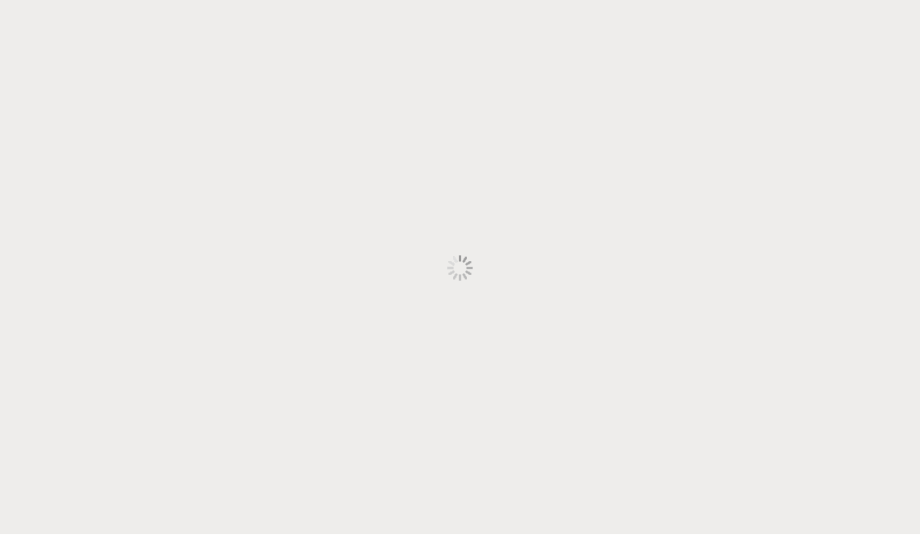
In the past few years, the Baihe Bridge in Beijing was crushed. This bridge is an old bridge with a weight limit of 30 tons.

However, a 6-axle truck was loaded with sand and weighed 160 tons. It was so straightforward to open up. The result was of course that the bridge was directly crushed.



超过桥梁设计最大荷载5倍，谁给你的胆子上这座桥的。

太原也有一个桥，叫东柳林桥，被一辆满载矿粉，车重高达183吨的6轴大货车给直接压断了。



司机被捕时还奇怪的问道，我以前经常拉满煤炭（七八十吨）过这个桥都没塌，为啥这次拉矿粉（一百七八十吨）就塌了。

没文化真可怕，煤炭的密度和矿粉能比么，七八十吨和一百七八十吨，直接差了一个数量级好吧，不垮才怪。

设计院再怎么加钢筋，再怎么提高标准，也架不住司机这么恐怖的超载啊。

大家可以网络搜索**“百吨王”**这个中国特色国情的术语，指的就是那些经过私自改动，把车辆承载能力提升到百吨以上的超级大货车。

把我们家门口路面压的破破烂烂的，就是这些百吨王，因为当初的路面设计中，就没考虑过这么重的货车。

而那些直接压垮桥梁的，通常都是那种一百七八十吨荷载的**王中之王。**

开这样的超载车上路，是在公然破坏公共财物，也是在危害社会公共安全。

为什么百吨王的轮胎没事，路面和桥梁却受不了呢？

回到开头那个问题，**什么货车这么牛逼，能压垮大桥，居然压不垮轮胎？**

实际上，这样的货车并不牛逼，并且十分常见。

人类目前的技术，别说做出百吨王，只要你肯出钱，做出千吨王都没问题。

而人类目前最强的轮胎，单轮胎的承重力就高达20吨，12个轮胎抗下240吨重都没事。

还是那句话，只要你肯出钱，多强的轮胎都有。

而桥梁技术也是一样，无锡这个高架桥，设定最大单车荷载40吨，只要你肯出钱，就是把这个桥修成最大单车荷载400吨，中国工程师也做得到。

那为什么我们不这么做呢？因为不划算。

在无锡这个高架桥上跑的，绝大部分都是守法公民，他们开的小汽车，重量才1.5吨，开的中型货车，重量才十几二十吨。

假设修一个最大设计荷载40吨的高架桥，只需要花10亿就搞定了，如果要满足这些百吨王，修一个最大设计荷载200吨以上的高架桥，成本会剧增，可能需要花100亿都搞不定。

本来可以修10个城市高架桥的资源，现在只能给1个城市修了，只是为了满足极少数不守法的超载司机。

这不是浪费民脂民膏是什么？

我上面说了，现在的设计院为了保守，通常都会略微提高设计标准，理由就是超载。

但如果设计院以超载为理由，把国家最高标准擅自提高几倍甚至十几倍这么夸张，那我们就要怀疑这个设计院的用心到底是为了百姓平安，还是故意套取国家资金了。

桥梁设计出来，是给守法公民用的，而不是给违法公民用的。

但是私自改装的超载大货车就不一样了，**它设计出来就是给故意违法的公民用的，而不是给守法公民用的。**

所以，超载大货车司机有充足的动力，给自己配上一个好轮胎，和收益相比，花这个轮胎的钱非常划算，别说一百七八十吨，上200吨这个轮胎都不会有事。

但是桥梁，漫长无比，遍布全国的桥梁，只能按照30吨、40吨的正常荷载去考虑，不可能处处都要考虑到200吨的超级货车荷载，这样做的成本太高了。

所以，开头那个问题我们就可以回答了，超载大货车就是这么牛逼，能压垮大桥，但压不跨它的轮胎，因为它是私自违法改装的。

如果这辆超载大货车是未经改装的合法车辆，标定荷载30吨，它敢装到百吨以上，我保证它的轮胎一定被压垮。

合法的桥梁，无法抵抗违法的大货车，这很正常，因为违法大货车里面装着的贪婪，太重了。

4

有人说，大货车不超载没法活啊，谁想超载啊， 但是不超载赚不到钱，这些超载司机都是被社会逼的。

这句话很明显是在颠倒黑白，倒果为因。

不是因为运费便宜导致不超载赚不到钱，而是因为超载违法大货车太多导致运费便宜，而运费便宜导致不超载的合法司机赚不到钱，最后逼的大家都超载。

我举个例子，假设当前中国的货车运能不变，但是运货需求量突然暴增一倍，请问会发生什么？

很显然，运费会直接暴涨，直到很多货主无法承担暴涨的运费，最终让运货需求量和运能互相匹配。

超载的违法司机，绝对不会因为自己是违法超载，而放弃这个提价的机会，他们会和合法司机一起提价。

随着中国国民经济的发展，互联网购物的兴起，中国对运能的需求逐年飙升，但是运费涨了么？没有。

为什么呢？因为中国的货车运能也在逐年扩大，让市场始终处于平衡状态。

这里面有很大一部分运能，是违法超载货车提供的，他们挤占了守法货车司机的市场。

第二个问题，假设中国目前的运货需求不变，而运能突然减半，请问会发生什么？

很明显，运费也会直接暴涨，直到很多货主无法承担暴涨的运费，最终让运货需求量和运能互相匹配。

一旦运费上涨，合法运输的货车司机，就能赚到钱，他们就犯不着去超载了。

而之前，合法运输的货车司机之所以赚不到钱，完全是因为违法的超载大货车逼的，所谓劣币驱除良币。

同样一辆车，一个载重30吨，一个载重100吨，甚至一百七八十吨，用脚趾头想都知道双方的市场竞争力差多远。

这才是真正的因果关系。

你的问题又来了，虽然违法大货车超载了，但是他们提供了充沛的廉价运能啊，能降低运价，降低中国人的生活成本。

所以，货车超载行为还是有益的。

这句话又错了，如果百吨大货车运输真的是划算行为的话，中国早就强制命令所有的道路桥梁和汽车厂，全部按100吨荷载来设计了，又不是造不出来，干嘛要自己跟自己过不去。

而国外，也不允许百吨大货车上路，原因只有一个，**从社会全体国民的角度去看，让20~40吨的货车上路是最经济的，让百吨大货车上路，是不经济的。**

违法导致的社会成本一定是很高昂的，这个成本永远只会转移，而不会消失。

大货车超载，具有极强的负外部效应，它的确降低了运价，但是却危害了全国的道路和桥梁。每年，中国因修补道路和桥梁付出的金钱，都是一个天文数字。

这个钱谁出？当然不是违法大货车司机出，而是从全体国民的税收中出。

换句话说，违法超载大货车司机，在悄悄盗窃你的钱袋子。

大货车超载这种行为，和工厂的大气污染行为极其类似，都是通过释放负外部性，而让自己的成本变低。

如果不要求工厂净化污染性气体，工厂的生产成本，会明显降低。

而造成的大气污染后果，却由全体国民承担。

工厂降低的成本，实质上是靠窃取全体国民的健康换来的。

而超载违法大货车对守法货车的冲击，类似于假冒伪劣食品对良心食品的冲击。

如果在中国，假冒伪劣的食品不受监管，可以大行其道，那很明显，扎扎实实做良心食品的人就无法生存，从而被社会淘汰。

当到处都是假冒伪劣食品之后，人们愿意为食品付出的代价就会降低，最终导致的结果就是商家在哀叹：

不是我们想做假冒伪劣食品啊，价格太低了，不造假活不下去啊。

这和今天的货车超载现象，何其相似。

造假食品者的暴利，实质上是靠窃取良心食品的信用而产生，劣币驱除良币之后，最终受害者，是全体国民。

而那些严重超载的百吨王，侵害的绝不仅仅是我们的金钱，还有我们的生命，并散播了恐惧。

百吨王的存在，让我们每次途径高架桥都会战战兢兢，生怕哪天飞来横祸，这严重破坏了社会的和谐和幸福感。

如果非要拿假冒伪劣食品来类比的话，**那百吨王，就是标准的有毒食品。**

5

为什么中国的大货车，如此热衷于违法超载。

因为违法的成本太低，而收益太高。

把30吨的车，改成100吨以上的车，收益直接暴涨，但是带来的惩罚却并不大。

我国法律规定：

> 货运机动车超过核定载货质量的,处二百元以上五百元以下罚款;
> 超过核定载货质量百分之三十或违反规定载客的处五百元以上二千元以下罚款，并强制卸货分载。
> 超载百分之百的处以一万元以上的罚款，并强制卸货分载。

而在欧盟，第一次超载的驾驶员会被登记在案，第二次被发现超载直接判刑3个月，因为大货车司机危害了公共安全。

醉驾入刑搞了很多年才实现，**不知道超载入刑，需要多久才能实现。**

目前我国对超载的惩罚，很低，但就是这么低的惩罚，也不是出门必罚，被抓住的概率也很低，超载10次能抓住1次就不错了。

如果超载被抓住了怎么办？司机的选择是交往罚款之后赶紧继续超载，争取把损失赚回来。

当违法的收益超过违法的成本时，就是在鼓励违法。

海恩法则指出: 每一起严重事故的背后，必然有29次轻微事故和300起未遂先兆以及1000起事故隐患。

超载车上无锡的高架，肯定不止一次了，而是上千次，甚至上万次，才会产生这么一次悲剧。

再坚固的桥梁，也承担不起贪婪的重量。

在这次无锡的遇难者里，白色小车上的遇难者王某是一名单亲父亲，含辛茹苦、独自拉扯女儿长大成人。

王某的女儿，今年初三，看到视频里父亲的车牌，站都站不住，哭得稀里哗啦，至今都不肯吃饭。

那个一直保护她长大成人的天，塌了，没招谁没惹谁。

和醉驾一样，这种事的受害者，**今天可能是他，明天就可能是我们中的任何一个人**，违法超载行为不除，这种威胁永远不会停止。

当灾难降临时，我们会发现，生命的重量，比我们想象中的重得多。

我希望，大家能和我一起行动起来，将超载和醉驾等同，呼吁超载入刑。

往期精彩

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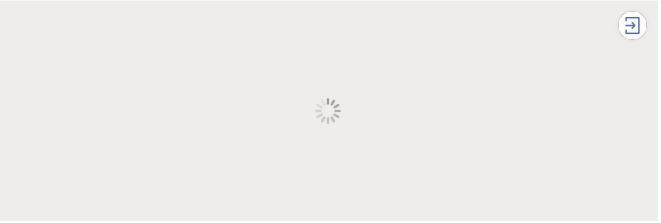

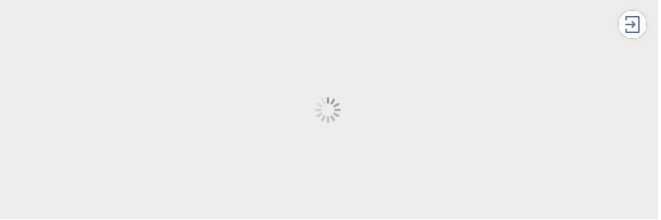

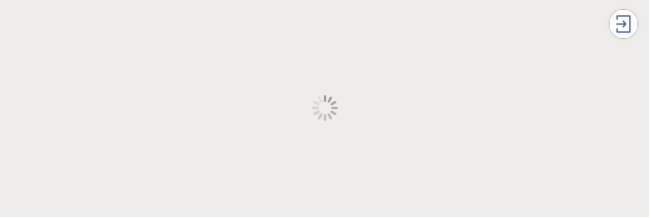

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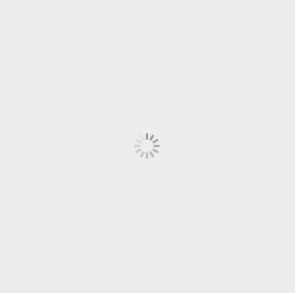

大量读者还没养成点赞的习惯，如写得好，望大家阅读后在右下边“在看”处　点个赞，以示鼓励！长期坚持原创真的很不容易，多次想放弃，坚持是一种信仰，专注是一种态度，希望能和大家天天在一起。

Modified on 2019-10-11

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