

AXLE WEIGHT FEE FORMULA

LoadPass Permit System | Proposed Permit Fee Structure

OBJECTIVE

- Modify the permit fee formula so fees track the impact of loads on roads, incentivizing industry to reduce that impact.
- Evaluate permit fees based on individual axle weight rather than GVW, in line with standard practice.

FORMULA PROPOSAL

Based on Damage Factor

$$DF = \left(\frac{\text{Axle Weight}}{\text{Standard Axle}} \right)^4$$

- Also known as the 4th Power Law
- A metric that measures actual road impact based on axle weight distribution, not just total vehicle weight.
 - Can be evaluated for a single axle or summed across all axles for a cumulative value
- An industry-wide formula for approximating roadway damage in lieu of the AASHTO formula
 - *Sources: Pavement Interactive and Tensar International*
- Key Principles
 - Road damage increases sharply (to the fourth power) as individual axle weight increases.
 - Distributing weight across more axles dramatically reduces road impact.
- Benefits of using this as the basis for the formula
 - Fees align with actual road damage.
 - Incentivizes better weight distribution.
 - Fair pricing for compliant configurations.
 - Encourages industry to minimize road impact.

Using damage factor as a basis, the proposed formula was refined using feedback from counties and industry on real permits. Adjustments include:

- A flat damage fee when damage factor values fall below a set threshold (Flat Fee Damage Cap)
- A reduction for trunnion axles, i.e., axles with 8 or more tires (Trunnion Adjustment)

- An overweight per ton/mile component for configurations with especially high gross vehicle weights
- Fine-tuning of the fee schedule values

Damage Fee Formula for Trucks and Trailers, Workover Rigs, Cranes, and Special Mobile Equipment

Step 1 – Calculate the damage factor (DF) for each axle

$$DF_{Axle} = \left(\frac{Axle\ Weight}{Standard\ Axle} \right)^4 \times T_a$$

- Standard Axle = the lower of:
 - Table A value for the axle's group configuration and road restriction
 - Tire-based value = 550 × Tire Width (in) × Number of Tires
- T_a (Trunnion Adjustment) = 0.50 for trunnion axles (8 or more tires); 1.00 for all other axles
- Any axle with $DF \leq 1$ (at or under its standard axle) counts as 0

Table A: Standard Axle Matrix, used to determine the standard axle for a given axle based on axle configuration and road restriction

Axle Weight Maximums									
	By Legal Weight	10 ton	9 ton	8 ton	7.5 ton	7 ton	6 ton	5 ton	3 ton
Single Axle	20,000	20,000	18,000	16,000	15,000	14,000	12,000	10,000	6,000
Tandem Axle	17,000	17,000	16,000	16,000	15,000	14,000	12,000	10,000	6,000
3 Axles+	17,000	14,000	14,000	14,000	13,000	12,000	10,000	10,000	6,000

Step 2 – Combine the axle damage factors

- DF_H (Highest Damage Factor) = the largest single-axle DF
- DF_C (Cumulative Damage Factor) = the sum of all axle DFs

Step 3 – Determine the damage fee (caps and rates in Table B)

- No axle DF above 1: no damage fee
- DF_H and DF_C both at or below their Flat Fee Damage Caps: Flat Damage Fee (Table C)
- DF_H or DF_C above its Flat Fee Damage Cap: per-mile damage fee, calculated by road segment:

$$Fee_{Damage} = \sum_{RoadSeg} Mi_{RS} \times (DF_H \times Fee_H + DF_C \times Fee_C)$$

- Mi_{RS} = road segment length (miles)
- Fee_H / Fee_C = per-mile fee for DF_H / DF_C

Step 4 – Calculate the total permit fee

$$Fee_{Permit} = Fee_{County} + Fee_{Damage} + Fee_{Overweight}$$

- Fee_{County} = county fee (Table C)
- Fee_{Damage} = result of Step 3
- $Fee_{Overweight}$ = Tons Overweight × Miles × overweight rate per ton/mile (Table C)
 - Tons Overweight = whole tons of GVW over 200,000 lbs (rounded down)
 - Miles = miles traveled on county roads
- County fees and flat damage fees are assessed once per county.
- Processing and admin fees are not included.

Fee Schedule for Trucks and Trailers, Workover Rigs, Cranes, and Special Mobile Equipment

Table B: Damage-related fee schedule for Trucks and Trailers, Workover Rigs, Cranes, and Special Mobile Equipment

	Flat Fee Damage Cap	Per Mile Fee
DF Highest	3.3	\$2.50
DF Cumulative	10	\$2.25

Table C: Flat fee and overweight fee schedule for Trucks and Trailers, Workover Rigs, Cranes, and Special Mobile Equipment

County Fee	\$20
Flat Damage Fee	\$25
Overweight Fee (\$/ton/mile)	\$5

Fee Formula and Fee Schedule for Roaded Earth Moving Equipment

Roaded Earth Moving Equipment has its own stand-alone fee structure: a flat fee per county plus a graduated per-mile fee, based on GVW and road restriction, applied to the permit mileage.

Table D: Fee schedule for Roaded Earth Moving Equipment

GVW (lbs)	County Fee	By Legal Weight (\$/mi)	10 Ton (\$/mi)	9 Ton (\$/mi)	8 Ton (\$/mi)	7.5 Ton (\$/mi)	7 Ton (\$/mi)	6 Ton (\$/mi)	5 Ton (\$/mi)	3 Ton (\$/mi)
0-39,999	\$20	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
40,000-79,999	\$20	\$100	\$120	\$125	\$130	\$133	\$135	\$140	\$145	\$150
80,000 – 99,999	\$20	\$150	\$170	\$175	\$180	\$183	\$185	\$190	\$195	\$200
100,000+	\$20	\$200	\$220	\$225	\$230	\$233	\$235	\$240	\$245	\$250

PERMIT EXAMPLES

Example 1: T-786800

GVW = 221,000 lbs

One road segment on a By Legal Weight Road for 0.36 miles

Table E: Axle chart for permit T-786800

Axle #	Weight	# of Tires	Tire Width	Track Width	Axle Spacing
1	17,000 lbs	2	385.00 mm	8 ft. 6 in.	14 ft. 2 in.
-- Axle Group Break --					
2	17,000 lbs	4	275.00 mm	8 ft. 6 in.	4 ft. 8 in.
3	17,000 lbs	4	11.00 mm	8 ft. 6 in.	4 ft. 7 in.
4	17,000 lbs	4	11.00 in	8 ft. 6 in.	14 ft. 10 in.
-- Axle Group Break --					
5	17,000 lbs	4	11.00 in	9 ft. 0 in.	4 ft. 4 in.
6	17,000 lbs	4	11.00 in	9 ft. 0 in.	4 ft. 4 in.
7	17,000 lbs	4	11.00 in	9 ft. 0 in.	34 ft. 0 in.
-- Axle Group Break --					
8	17,000 lbs	4	275.00 mm	9 ft. 0 in.	4 ft. 4 in.
9	17,000 lbs	4	275.00 mm	9 ft. 0 in.	4 ft. 4 in.
10	17,000 lbs	4	275.00 mm	9 ft. 0 in.	14 ft. 0 in.
-- Axle Group Break --					
11	17,000 lbs	4	275.00 mm	9 ft. 0 in.	4 ft. 4 in.
12	17,000 lbs	4	275.00 mm	9 ft. 0 in.	4 ft. 4 in.
13	17,000 lbs	4	275.00 mm	9 ft. 0 in.	0 ft. 0 in.
Gross Weight:		221,000 lbs	Overall Bridge Length:		112 ft. 3 in.

Damage Fees

Axle 1: 2 tires, 385 mm (15.16 in), 17,000 lbs, 1-axle group

Standard Axle = $550 \times 15.16 \text{ in} \times 2 \text{ tires} = 16,676 \text{ lbs}$ (tire-based)



AXLE WEIGHT FEE FORMULA

$$\text{Damage Factor} = (17,000/16,676)^4 = 1.08$$

Axles 2–13: each axle weight (17,000 lbs) equals its standard axle (Table A)

$$\text{Damage Factor} = 1 \rightarrow 0 \text{ (DF} \leq 1 \text{ counts as 0)}$$

$$\text{DF}_H = 1.08 \leq 3.3 \text{ (Flat Fee Damage Cap)}$$

$$\text{DF}_C = 1.08 \leq 10 \text{ (Flat Fee Damage Cap)}$$

Both values are at or below their caps, so no per-mile damage fee is assessed; only the \$25 flat damage fee applies.

Overweight Fee

$$\text{GVW} = 221,000 \text{ lbs}$$

$$\text{Tons Overweight} = (221,000 - 200,000) / 2,000 \text{ lbs} = 10.5 \text{ tons} \rightarrow 10 \text{ tons}$$

$$\text{Overweight Fee} = 10 \text{ tons} \times 0.36 \text{ mi} \times \$5/\text{ton/mi} = \$18$$

Overall Fees

$$\text{County Fee} = \$20 \text{ (travels through 1 county)}$$

Flat Damage Fee = \$25 (one axle exceeded its standard axle, but both damage factors were below the caps)

$$\text{Per-Mile Damage Fee} = \$0$$

$$\text{Overweight Fee} = \$18$$

Total Proposed Fee = \$63.00

Permit Fee Under Current Formula: \$103.95

Example 2: T-789913

GVW = 133,000 lbs

One road segment on a By Legal Weight Road for 2.54 miles

Table F: Axle chart for permit T-789913

Axle #	Weight	# of Tires	Tire Width	Track Width	Axle Spacing
1	13,000 lbs	2	11.00 in	8 ft. 6 in.	16 ft. 10 in.
-- Axle Group Break --					
2	20,000 lbs	4	11.00 in	8 ft. 6 in.	4 ft. 6 in.
3	20,000 lbs	4	11.00 in	8 ft. 6 in.	4 ft. 6 in.
4	20,000 lbs	4	11.00 in	8 ft. 6 in.	37 ft. 6 in.
-- Axle Group Break --					
5	20,000 lbs	4	11.00 in	8 ft. 6 in.	4 ft. 6 in.
6	20,000 lbs	8	11.00 in	8 ft. 6 in.	4 ft. 6 in.
7	20,000 lbs	4	11.00 in	8 ft. 6 in.	0 ft. 0 in.
Gross Weight:		133,000 lbs		Overall Bridge Length:	72 ft. 4 in.

Damage Fees

Axle 1: 2 tires, 11 in, 13,000 lbs, 1-axle group

Standard Axle = $550 \times 11 \text{ in} \times 2 \text{ tires} = 12,100 \text{ lbs}$ (tire-based)

Damage Factor = $(13,000/12,100)^4 = 1.33$

Axles 2–5 and 7: 4 tires, 11 in, 20,000 lbs each, 3-axle groups

Standard Axle = 17,000 lbs (Table A)

Damage Factor = $(20,000/17,000)^4 = 1.92$

Axle 6: 8 tires (trunnion), 11 in, 20,000 lbs, 3-axle group

Standard Axle = 17,000 lbs (Table A)

Damage Factor = $(20,000/17,000)^4 \times 0.50$ (Trunnion Adjustment) = $0.96 \leq 1 \rightarrow 0$

$DF_H = 1.92 \leq 3.3$ (Flat Fee Damage Cap)

$DF_C = (1.33 \times 1 \text{ axle}) + (1.92 \times 5 \text{ axles}) = 10.93 > 10$ (Flat Fee Damage Cap), so per-mile damage fees apply

Damage Fee = $(1.92 \times \$2.50/\text{mi} \times 2.54 \text{ mi}) + (10.93 \times \$2.25/\text{mi} \times 2.54 \text{ mi}) = \$74.66$

Overall Fees

County Fee = \$20 (travels through 1 county)

Flat Damage Fee = \$0

Per-Mile Damage Fee = \$74.66

Overweight Fee = \$0 (GVW < 200,000 lbs)

Total Proposed Fee = \$94.66

Permit Fee Under Current Formula: \$80.00

ROLLOUT TIMELINE



Important: January 1, 2027 is tentative, not a fixed launch date. Stakeholder feedback may require major adjustments and a revised schedule.

Demo access remains available until the confirmed go-live date:
<https://demo.loadpasspermits.com>

