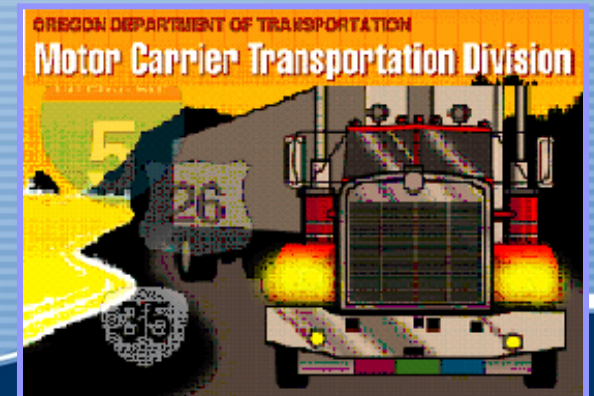


# Heavy Haul Weight and Axle Use in Oregon

# Discussion Topics

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- ❖ Allowable and permitted weights
- ❖ Types of heavy haul axles
- ❖ How they're used
- ❖ Permit weight Tables
- ❖ Bridge measurements
- ❖ Allowable weight for various types of axles.
- ❖ Engineering factors regarding use of trunnion axle groups

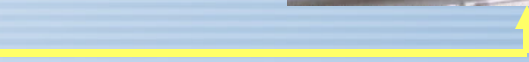


# Legal weight and permitted weight

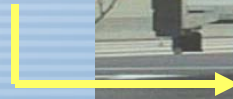
**Legal weight** (without a permit):  
Weight Table 1 (ORS 818.010)



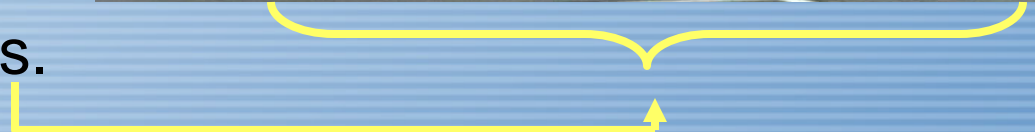
- Single axle – 20,000 lbs.



- Tandem axle – 34,000 lbs.



- Gross weight – 80,000 lbs.



- Bridge weight - Table 1 chart, typically used for short wheelbase vehicle combinations.

# Legal weight and permitted weight

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## Permitted weight:

*OAR 734- 70 through 734-82*

- **Weight Table 2** – extended weight permit to allow between 80,000 and 105,500 lbs. (doubles, triples and tri-axle combinations).



# Legal weight and permitted weight

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## Permitted weight:

*OAR 734- 70 through 734-82*

- **Weight Table 3** – Heavy Haul permit to allow up to 98,000 lbs. for annual permits. Single Trip Permits issued under Table 3 are based on two wheelbase weight formulas.



# Legal weight and permitted weight

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## Permitted weight:

*OAR 734- 70 through 734-82*

- **Weight Table 4** – Based on three wheelbase weight formulas. Allows more weight than Table 3 permits, but limits weight to 21,500 lbs. per single axle and 43,000 lbs. per tandem axle.

Commonly used for cranes, tri-axle lowbed semitrailers, and heavy haul combinations with jeeps and boosters.

# Legal weight and permitted weight

---

## Permitted weight:

*OAR 734- 70 through 734-82*

- **Weight Table 5** – Allowed weight is based on three wheelbase weight formulas and minimum equipment standards. Allows certain combinations to haul more weight than Tables 3 and 4 (lowbed semitrailers with jeeps, trunnions and/or boosters).



# Legal weight and permitted weight

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## How to handle the weight

- There are many combinations of axles and tires to maximize weight allowances for what needs to be transported. The following information should provide an overview of the types of axles and trailers used for Heavy Haul transport.



# Axle configurations for heavy haul use

## Two basic types:

- Standard axle with dual tires on each side.
- Trunnion axle with four tires on each side.



# Comparison of axle configurations

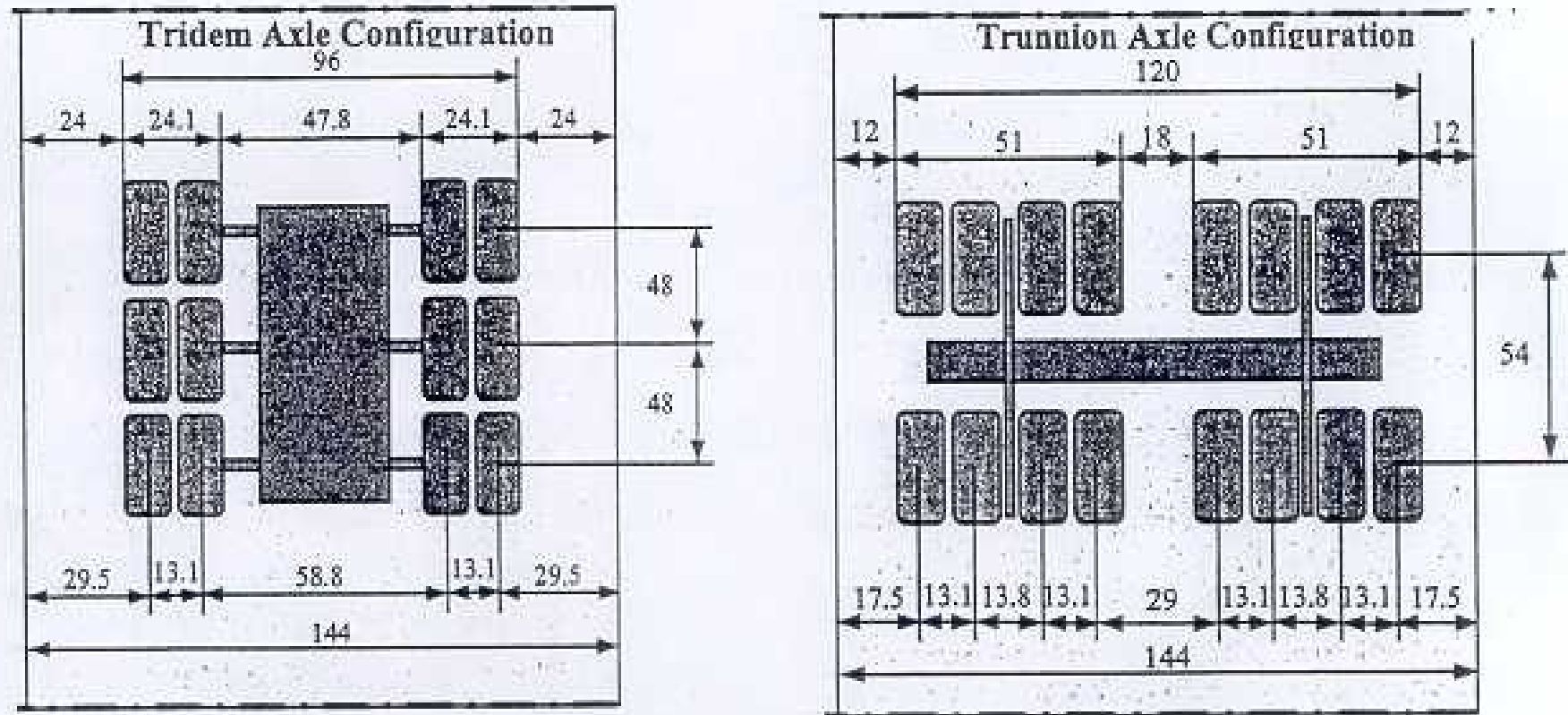


Figure 1.1. Illustration of the Configuration of Tridem and Trunnion Axles on a Typical 12-foot Traffic Lane

# Axle configurations for heavy haul use

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## How they're used

- These axles are used to transport large, typically non-reducible, Heavy Haul permitted loads.

Such as, example #1 -



# Axle configurations for heavy haul use

## How they're used

- Non-reducible, Heavy Haul permitted loads.

### Example #2 -



# Axle configurations for heavy haul use

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## How they're used

- Non-reducible, Heavy Haul permitted loads.

### Example #3 -



# Axle configurations for heavy haul use

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## How they're used

- Non-reducible, Heavy Haul permitted loads.

### Example #4 -



## Permit Weight Table 4 for heavier non-divisible loads



OREGON DEPARTMENT OF TRANSPORTATION  
MOTOR CARRIER TRANSPORTATION DIVISION  
TRANSPORTATION PERMIT UNIT  
550 CAPITOL ST NE  
SALEM OREGON 97301-2530

### Permit Weight Table 4

WHEEL BASE	2 Axles	3 Axles	4 Axles	5 Axles	6 Axles	7 Axles	8 Axles	9 Axles	10 Axles	11 Axles	12 Axles	13 Axles	14 Axles	15 Axles or more
4	43,000													
5	43,000													
6	43,000													
7	43,000													
8	43,000													
<b>OVER 8' (BUT LESS THAN 8'6")</b>														
	43,000	57,600												
9	43,000	58,800												
10	43,000	64,500	65,000											
11	43,000	64,500	68,200											
12	43,000	64,500	70,400											
13	43,000	64,500	72,600											
14	43,000	64,500	74,800											
15	43,000	64,500	77,000											
16	43,000	64,500	79,200											
17	43,000	64,500	81,400											
18	43,000	64,500	83,600											
19	43,000	64,500	85,800											
20	43,000	64,500	86,000	88,000										
21	43,000	64,500	86,000	90,200										
22	43,000	64,500	86,000	92,400										
23	43,000	64,500	86,000	94,600										
24	43,000	64,500	86,000	96,800										
25	43,000	64,500	86,000	99,000										
26	43,000	64,500	86,000	101,200										
27	43,000	64,500	86,000	103,400										
28	43,000	64,500	86,000	105,600										
29	43,000	64,500	86,000	107,500	107,800									
30	43,000	64,500	86,000	107,500	110,000									
31	43,000	64,500	86,000	107,500	113,600									
32	43,000	64,500	86,000	107,500	115,200									
33	43,000	64,500	86,000	107,500	116,800									
34	43,000	64,500	86,000	107,500	118,400									
35	43,000	64,500	86,000	107,500	120,000									
36	43,000	64,500	86,000	107,500	121,600									
37	43,000	64,500	86,000	107,500	123,200									
38	43,000	64,500	86,000	107,500	124,800									
39	43,000	64,500	86,000	107,500	126,400									
40	43,000	64,500	86,000	107,500	128,000									
41	43,000	64,500	86,000	107,500	129,000	129,600								
42	43,000	64,500	86,000	107,500	129,000	131,200								
43	43,000	64,500	86,000	107,500	129,000	132,800								

The loaded weight of a group of axles, vehicles, or combination of vehicles shall not exceed that specified in this permit weight table or any of the following:

- The manufacturer's side wall tire rating but not to exceed 600 pounds per inch of tire width;
- 21,500 pounds per single axle;
- 43,000 pounds per tandem axle;
- The weight shown on the permit; and
- The sum of the permissible axle, tandem axle, or group axle weight, whichever is less;
- Or except as described in OAR 734-082-0010 (2)

### Formulas

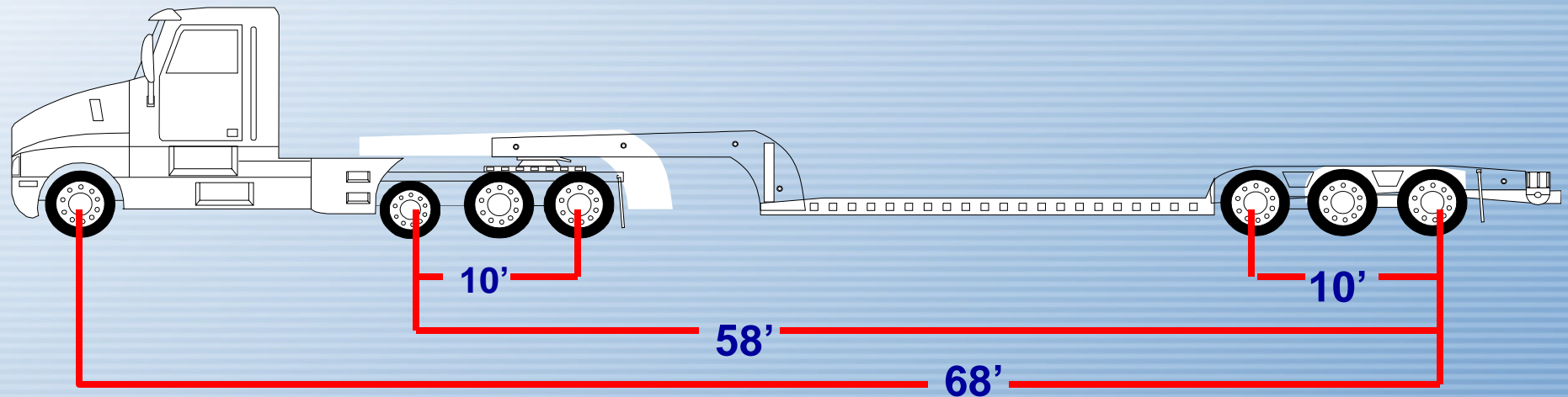
1. if WB >8' and 9'5" or less then  $WA = (WB + 40) 1,200$
2. if WB >9'5" and 30' or less then  $WA = (WB + 20) 2,200$
3. if WB >30' then  $WA = (WB + 40) 1,600$

72	43,000	64,500	86,000	107,500	129,000	150,500	172,000	179,200
73	43,000	64,500	86,000	107,500	129,000	150,500	172,000	180,800
74	43,000	64,500	86,000	107,500	129,000	150,500	172,000	182,400
75	43,000	64,500	86,000	107,500	129,000	150,500	172,000	184,000

Distance measured to the nearest foot; when exactly 1/2 foot or more, round up to the next larger number.

# Permit Weight Table 4

## Using the Weight Table



The distance is bridged between groups of axles, like this.



# Weight Table 4

## Using the Table

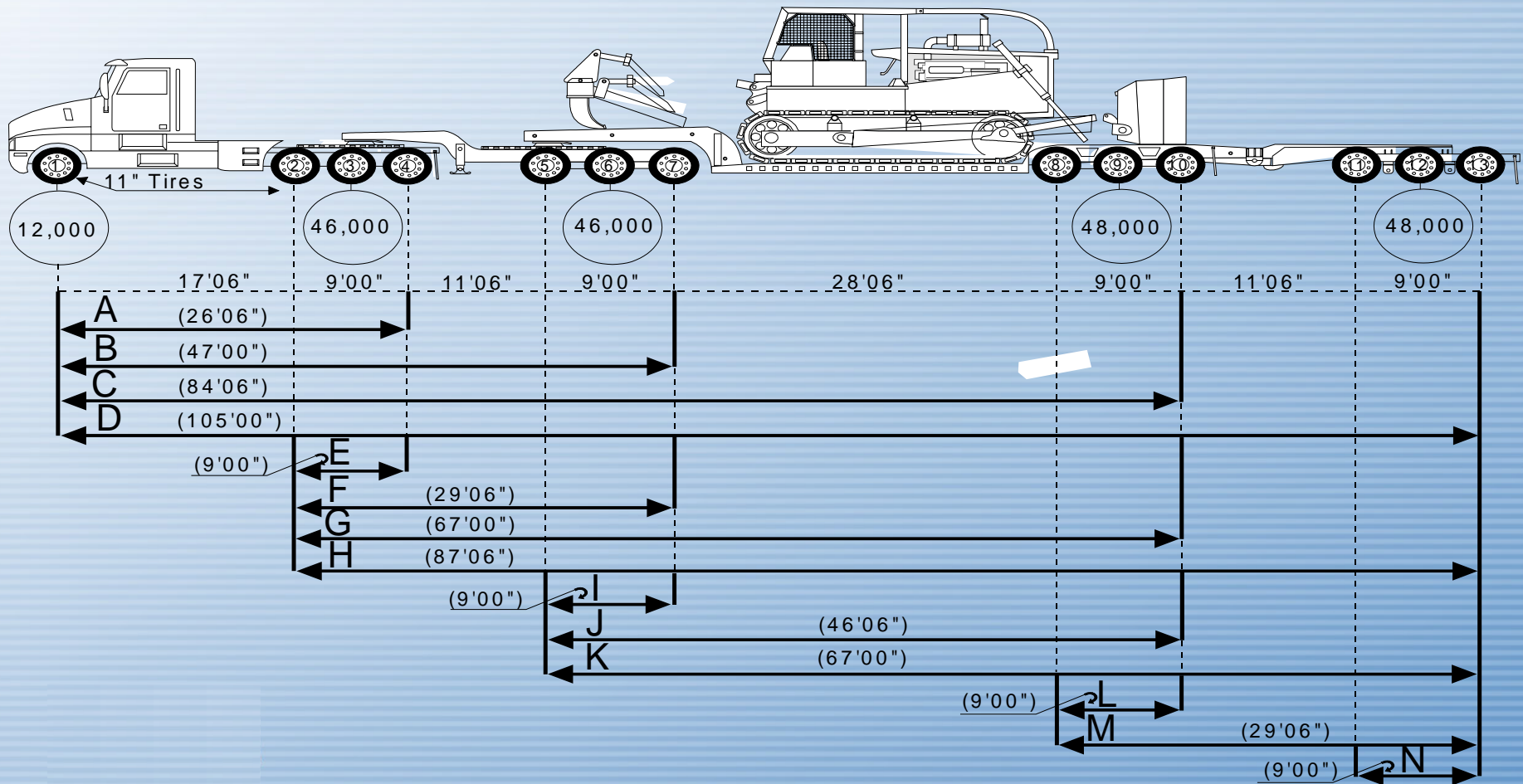
- Drop down to the row for feet of axle spacing.
- Go across to the column for the number of axles to get maximum weight.
- 65,000 lbs. is the maximum for a 3-axle spread at 10 feet.

WHEEL BASE	2 Axles	3 Axles	4 Axles	5 Axles	6 Axles
4	43,000				
5	43,000				
6	43,000				
7	43,000				
8	43,000				
OVER 8' (BUT LESS THAN 8'6")					
	43,000	57,600			
9	43,000	58,800			
10	43,000	64,500	65,000		
11	43,000	64,500	68,200		
12	43,000	64,500	70,400		
13	43,000	64,500	72,600		
14	43,000	64,500	74,800		
15	43,000	64,500	77,000		
16	43,000	64,500	79,200		
17	43,000	64,500	81,400		
18	43,000	64,500	83,600		
19	43,000	64,500	85,800		
20	43,000	64,500	86,000	88,000	
21	43,000	64,500	86,000	90,200	
22	43,000	64,500	86,000	92,400	
23	43,000	64,500	86,000	94,600	
24	43,000	64,500	86,000	96,800	
25	43,000	64,500	86,000	99,000	
26	43,000	64,500	86,000	101,200	
27	43,000	64,500	86,000	103,400	
28	43,000	64,500	86,000	105,600	
29	43,000	64,500	86,000	107,500	107,800
30	43,000	64,500	86,000	107,500	110,000
31	43,000	64,500	86,000	107,500	113,600
32	43,000	64,500	86,000	107,500	115,200
33	43,000	64,500	86,000	107,500	116,800
				0	118,400
				0	120,000
				0	121,600
				0	123,200
				0	124,800
				0	126,400

But, single axle weight is limited to 21,500 lbs. – so triaxle is limited to 64,500 lbs.

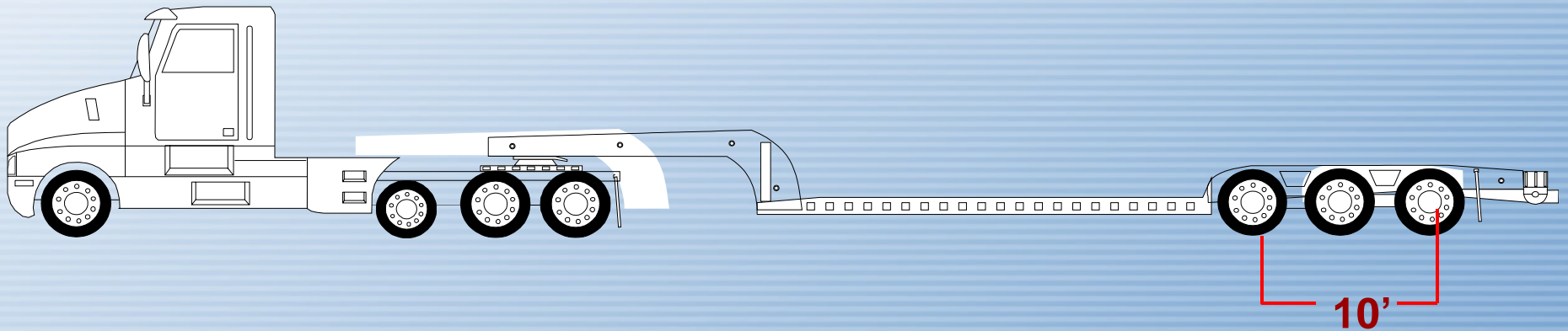
## Heavy Haul Axles

# Example of a large combination and the various axle groups that must be considered



# Tridem axle group limits in Oregon

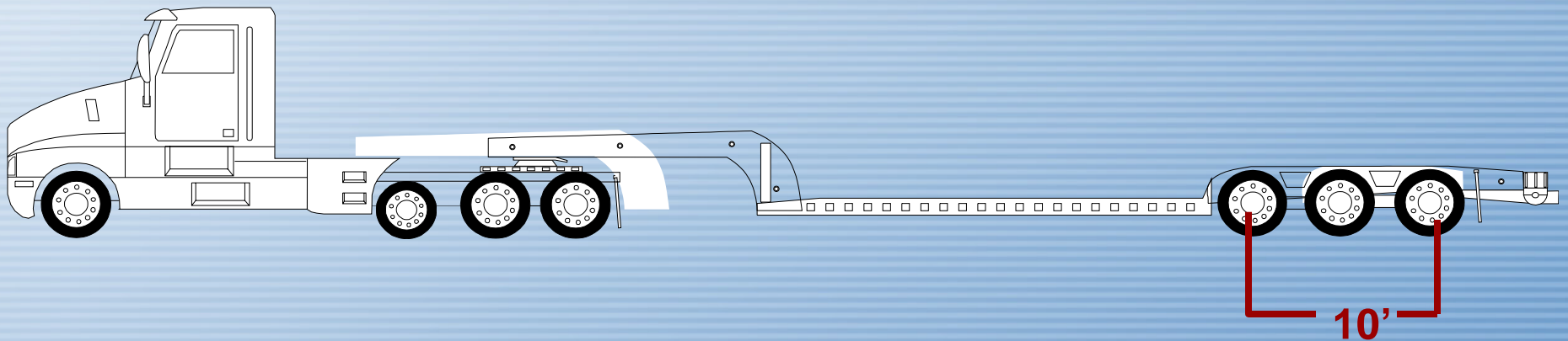
Permit Weight Table 4 allows a maximum of 64,500 lbs. for a common 10' spread, 3-axle tridem.



**Max. 64,500 lbs.**

## Tridem axle group limits in some states

Some states, like California, allow slightly heavier permitted weight if 10-foot wide trunnion style axles are used. This allows for a maximum of 65,953 lbs. for a common 10-foot spread, 3-axle group – **1,453 lbs. more than Oregon.**



**Max. 65,953 lbs.**

## Bonus weights in Oregon

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**Additional weight for tandem axles may be allowed by permit when the combination of vehicles has at least 9 axles, with a steer axle followed by four consecutive tandem axles which are 8' wide (standard). This allows 48,000 lbs. per tandem under Permit Weight Table 5.**

**OAR 734-082-0015(4)(a),(b)**

## Trunnion axle use in Oregon

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Additional weight for tandem axles may be allowed when the required minimum combination of vehicles has 10' wide axles with 4 tires per axle.

**10 percent bonus weight, based on  
48,000 lbs. per tandem = 52,800 lbs.**

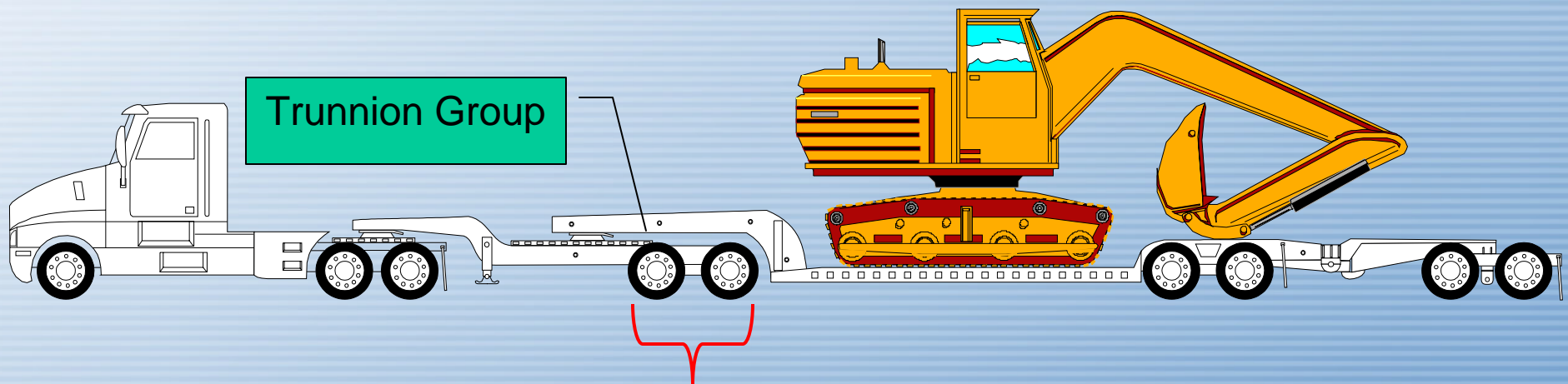
**OR**

Additional weight for tandem axles may be allowed when the required minimum combination of vehicles has 10' wide axles with 8 tires per axle

**25 percent bonus weight, based on  
48,000 lbs. per tandem = 60,000 lbs**

# Example of when trunnion axles could be used to maximize allowable weight

Combination has at least 9 axles (four groups of tandems)  
– is 10' wide – has 4 tires on each side.



48,000 lbs. (allowed by Permit Table 5)

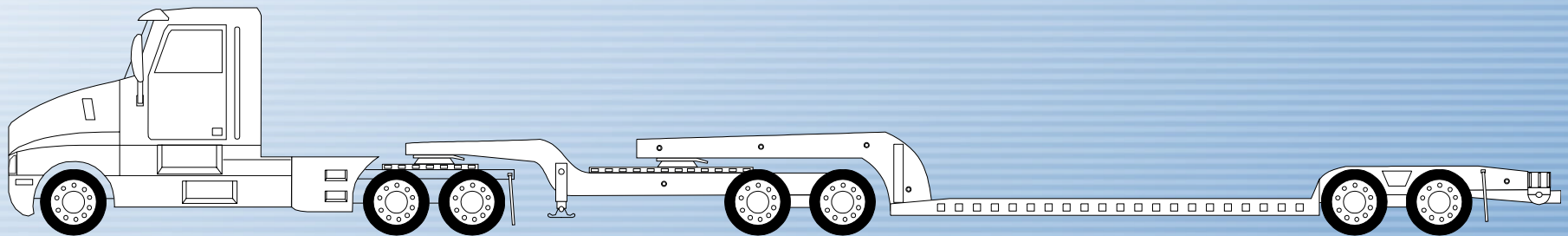
+ 12,000 lbs. (25% added due to trunnion axles)

60,000 lbs.

# Differences in allowable weight on trunnion axles – Oregon v. California

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**In California, a 7-axle combination is allowed 25% more weight on trunnion axle groups.**



**California Permit Table allows more weight for the same criteria as Oregon, but only 7 axles are needed instead of 9.**



## Weights in excess of Oregon Permit Weight Table 5

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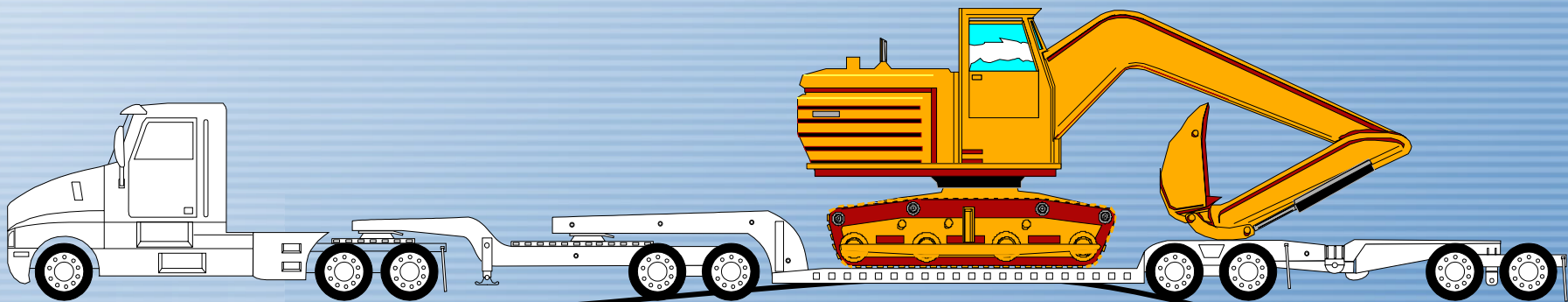
**In special circumstances, ODOT's Bridge Unit may authorize additional weight over the Permit Weight Table.**

**Special circumstances could include moving a large, non-reducible load requiring a vehicle combination like this:**



# One reason current trunnion axle group weight limits may not be appropriate in Oregon

ODOT Bridge Engineers have determined that trunnion-style axles can damage asphalt roads. Tires with a lot of weight all across an axle act as a rolling pin, pushing the asphalt as they go. These dynamic factors are not an issue for states with highways built primarily with concrete as it does not give like asphalt. For example, much of the California metropolitan area highway is built with concrete.





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