

Load Rating



Overview

- Load Rating Equation
- Standard Legal Vehicles
- Specialized Hauling Vehicles
- Load Posting Signs
- Emergency Vehicles

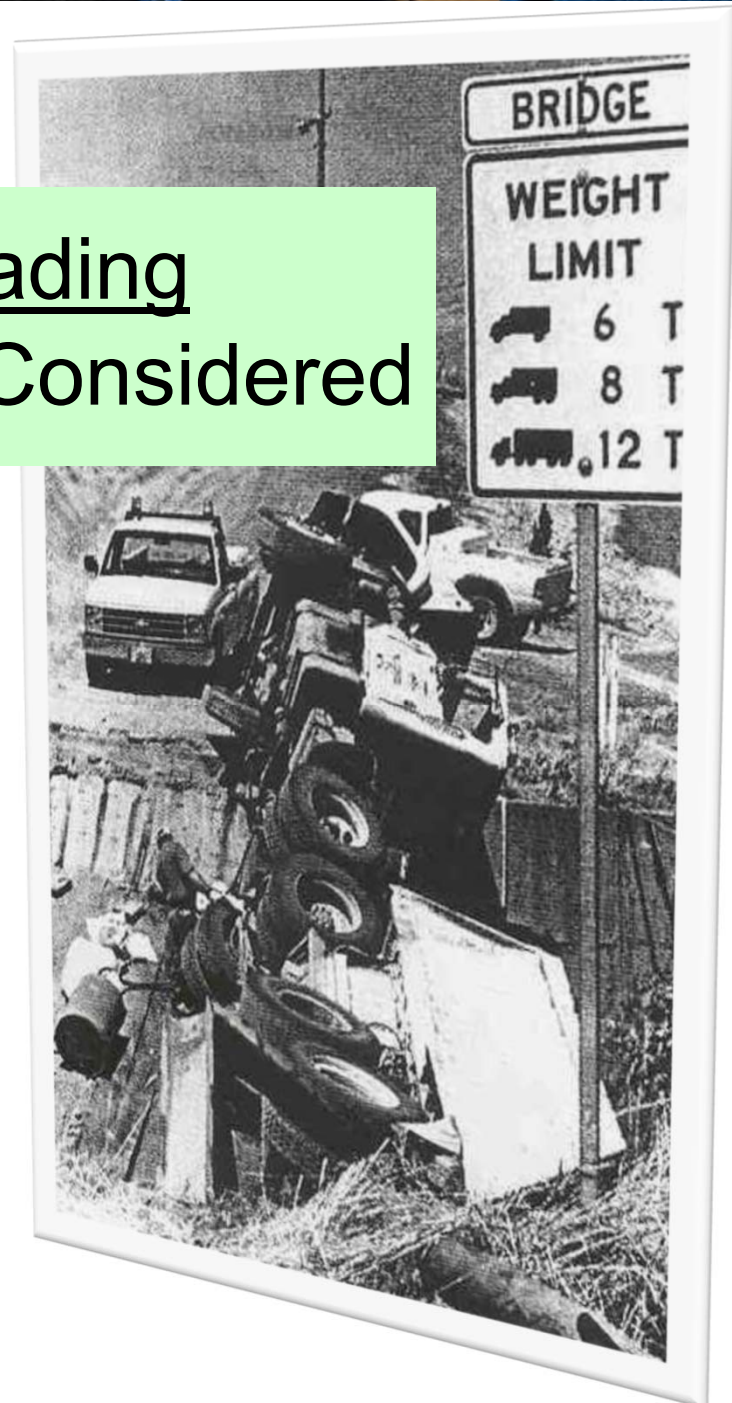


Oregon
Department of Transportation

Loadrating Purposes



$$RF = \frac{\text{Safe Level of Loading}}{\text{Load of Vehicle Considered}}$$



$$RF = \frac{\text{Capacity} - \text{Dead Load}}{\text{Liveload} + \text{Impact}}$$



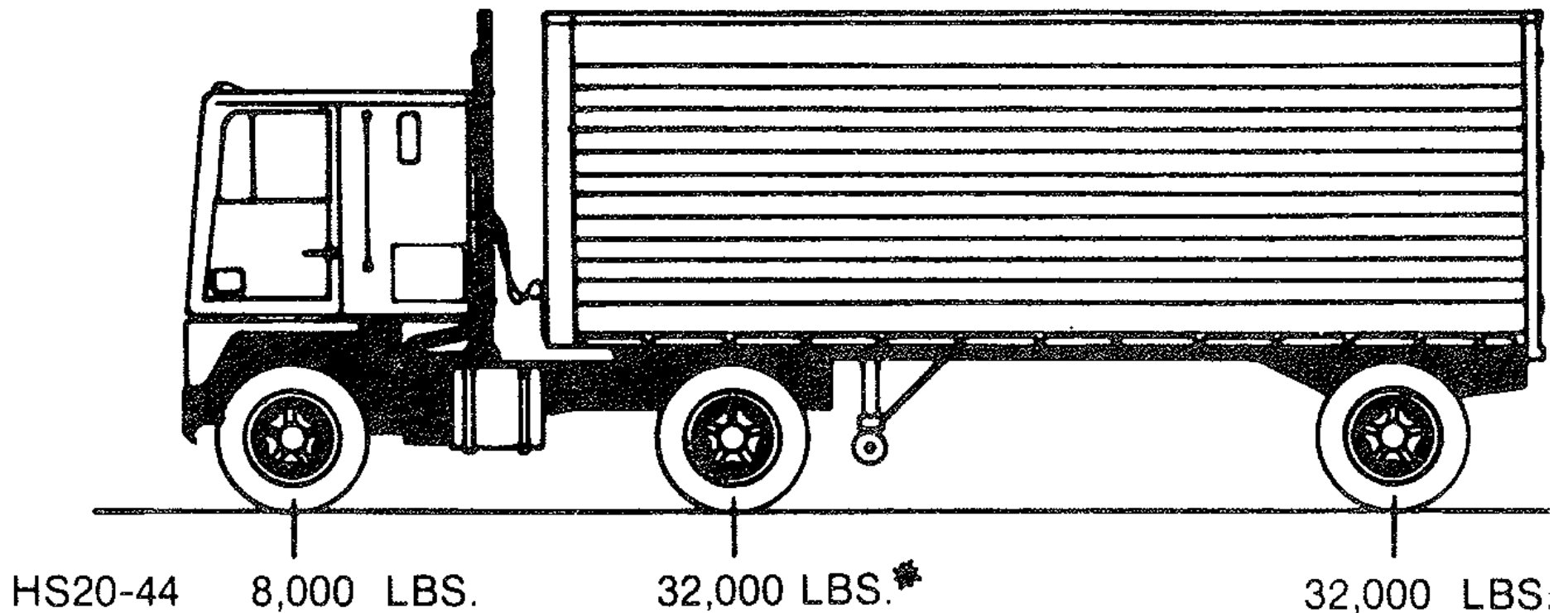
April 23, 2004







HS-20 (Highway Semi Vehicle 36 Tons)



Current design vehicle (HL-93) is an HS-20 truck and a lane load of 640 lbs./ft.

Legal loads

truck

Type 3

Single Unit Vehicle

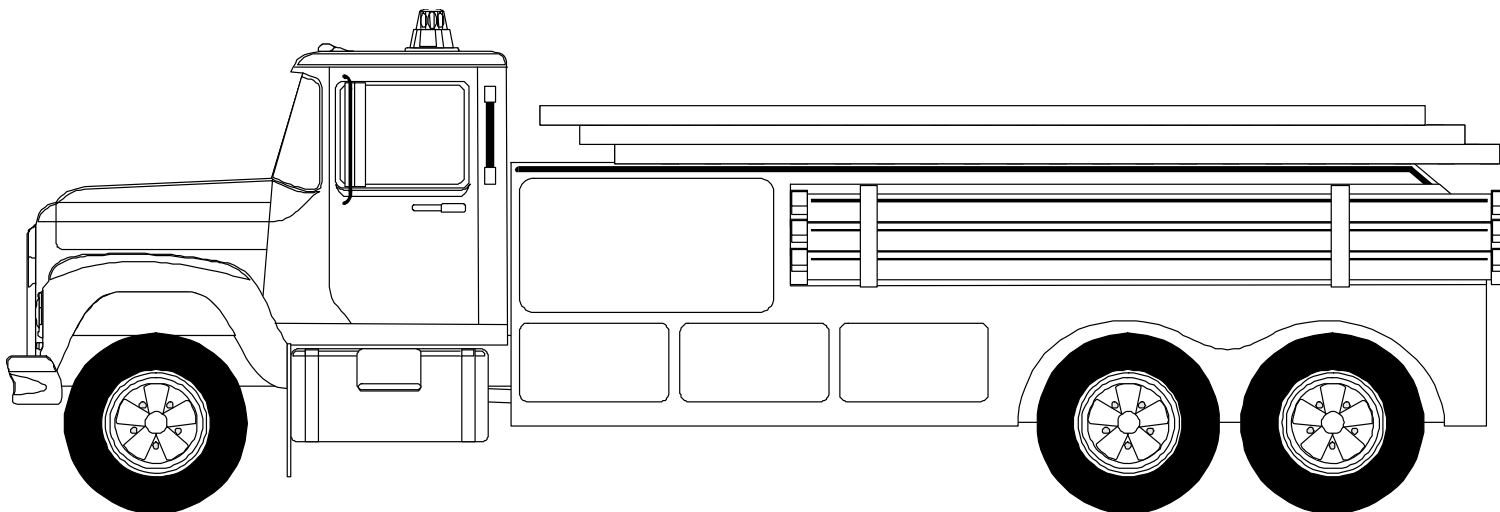
Type 3S-2

Type 3-3

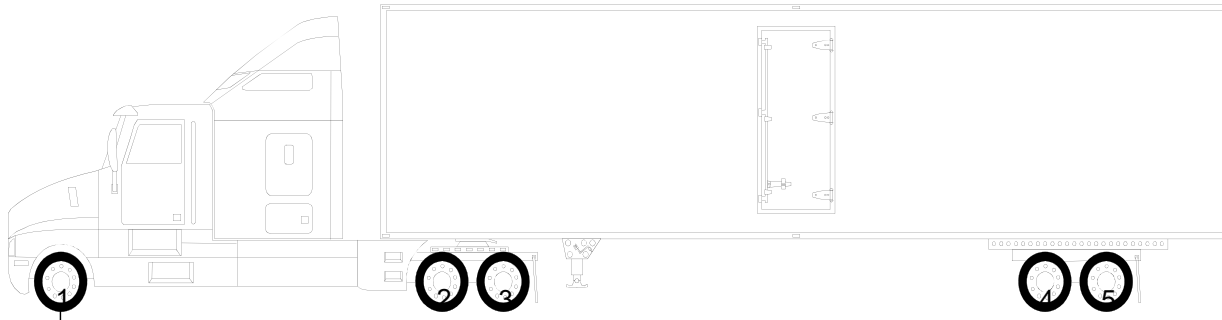
20,000 lbs. Max Single Axle

34,000 lbs. Max Tandem Axles (4 ft. to 8 ft.)

50,000 lbs. Total Weight



Legal loads



truck

Type 3

Type 3S-2

Type 3-3

80,000 lbs. Truck

- **All commodities, from fruits to nuts.**
 - Examples: groceries, restaurant supplies, hardware supplies, paper, beverages, tires, appliances, furniture, mail, nursery stock, etc.

Legal loads

Combination Vehicle

20,000 lbs. Max Single Axle

34,000 lbs. Max Tandem Axles (4 ft. to 8 ft.)

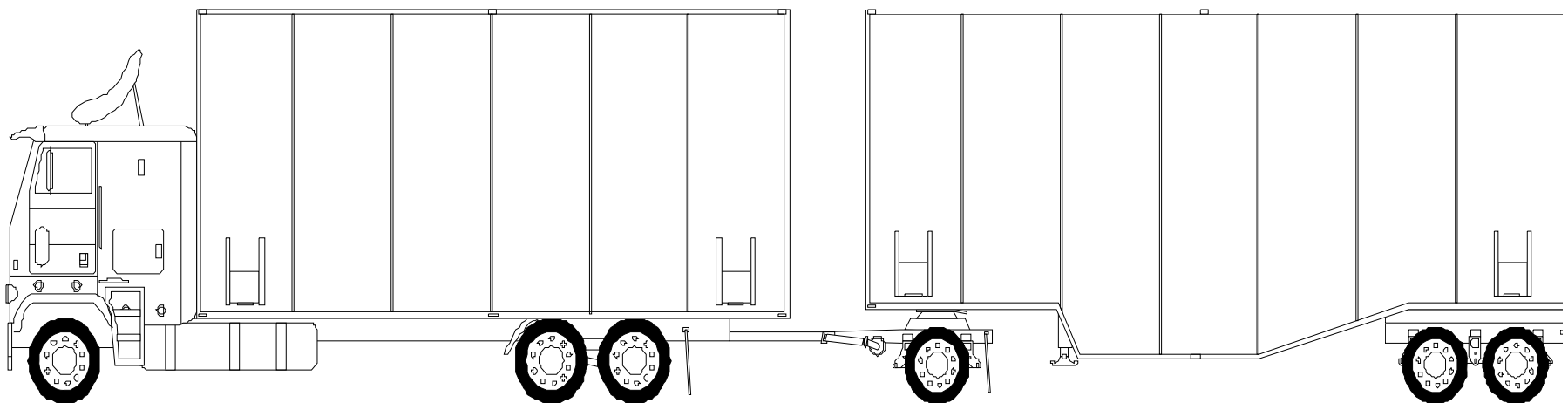
80,000 lbs. Total Weight

truck

Type 3

Type 3S-2

Type 3-3



Standard Legal Loads

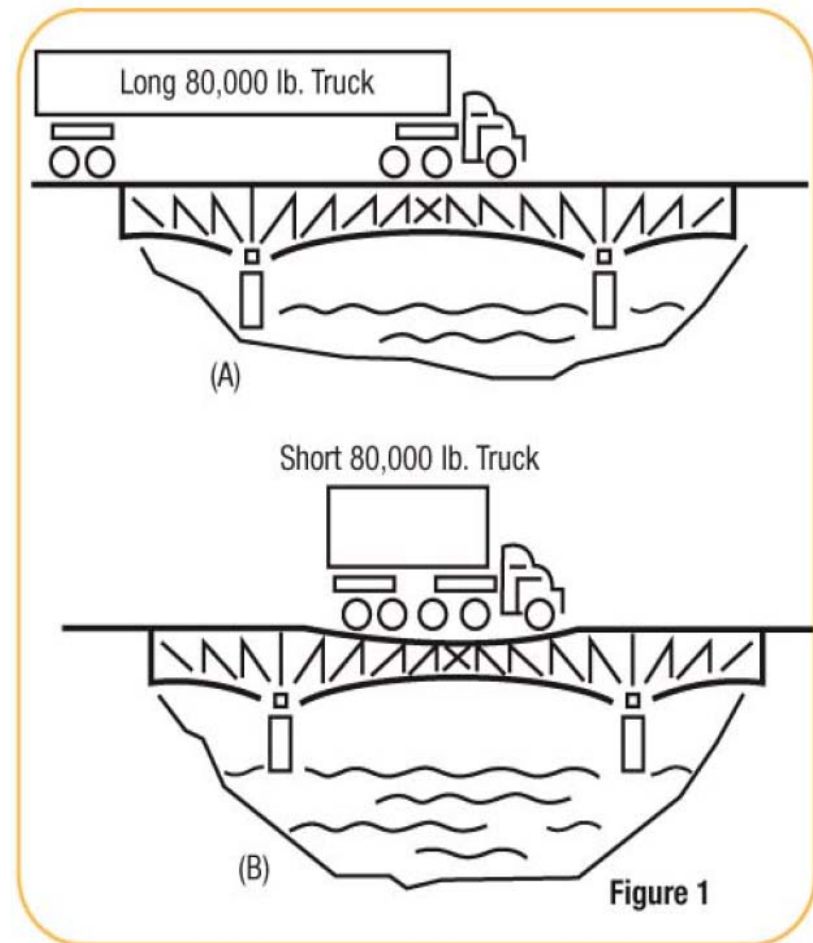
<u>truck</u>	<u>Rating Factor</u>	<u>% Below</u>	<u>Posting Required</u>	<u>Controlling Member</u>	<u>Actual Posting</u>	<u>Posting Date</u>
Type 3	0.64	1	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	24.0	3/4/16
Type 3S-2	0.57	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	34.0	3/4/16
Type 3-3	0.80	3	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	40.0	3/4/16

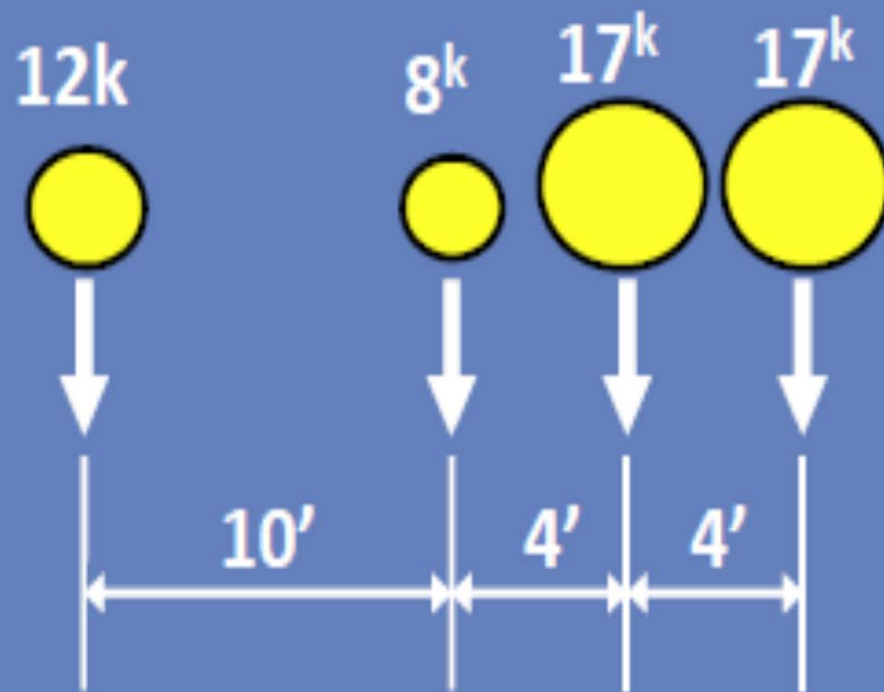
$$RF = \frac{\text{Safe Level of Loading}}{\text{Load of Vehicle Considered}}$$

Code	Operating Rating Compared To Maximum Legal Load		
5	At/Above Legal Loads		
4	0.1 - 9.9% below		
3	10.0 - 19.9% below		
2	20.0 - 29.9% below		
1	30.0 - 39.9% below		
0	>39.9% below		

Specialized Hauling Vehicles (SHV)

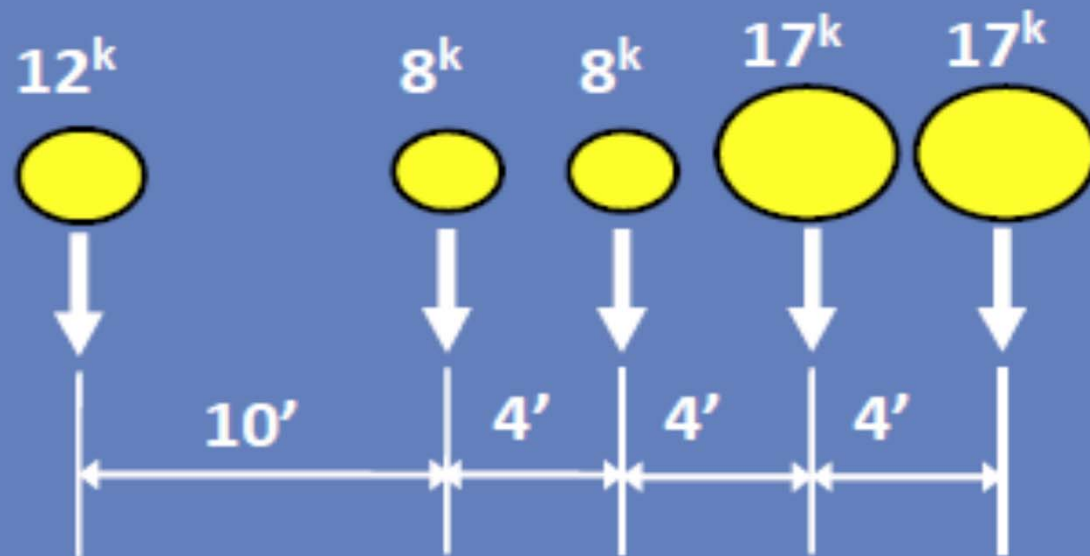
- SHV's legal under 1975 bridge formula
- Yet concentrate legal weight in smaller area concentrating loading on bridges





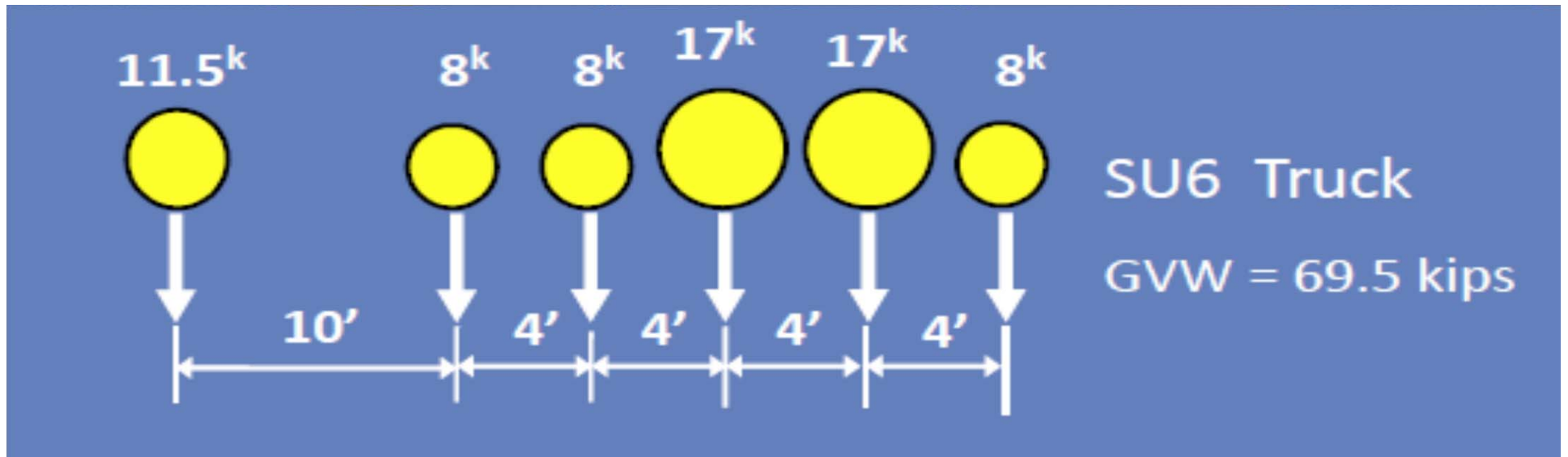
SU4 Truck
GVW = 54 kips

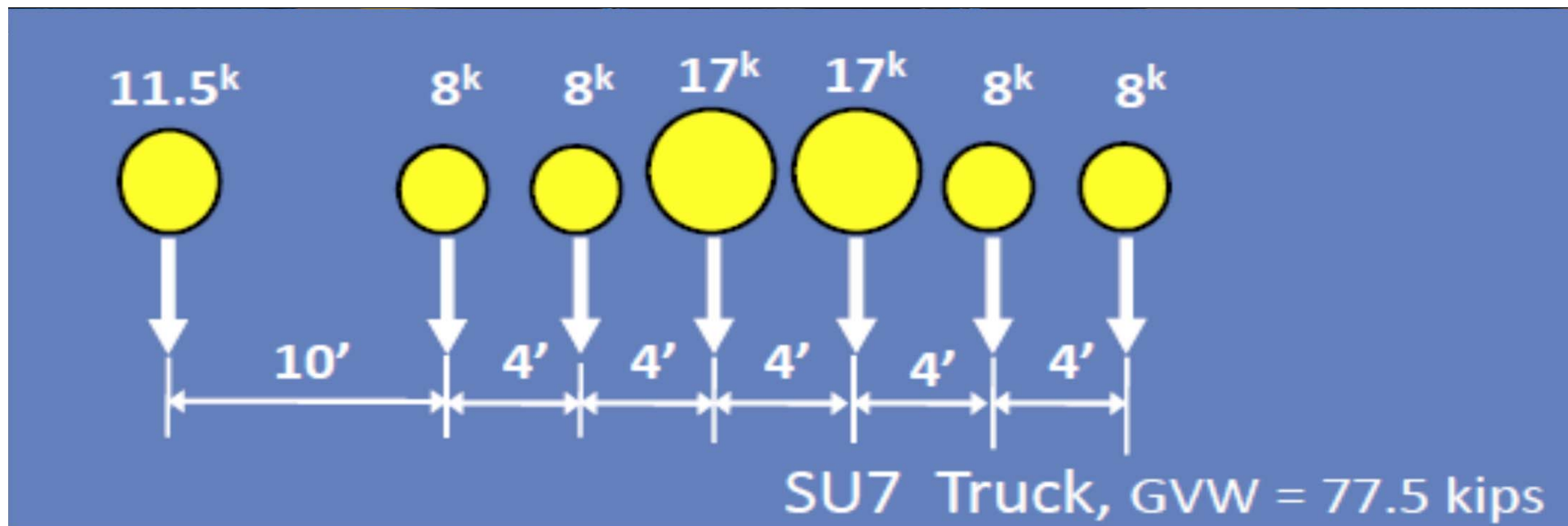




SU5 Truck
GVW = 62 kips







Specialized Hauling Vehicles



<u>truck</u>	<u>Rating Factor</u>	<u>% Below</u>	<u>Posting Required</u>	<u>Controlling Member</u>
SU4	0.53	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L
SU5	0.49	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L
SU6	0.45	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L
SU7	0.43	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L

Load Rating

Rating Date	11/16/2016	Posting Req	0 >39.9% below
Design Load	4 M 18	Posting Status	P Posted for load
Operating Load	12.10ton	OR Method	8 LRFR RF HL93
Inventory Rating	9.40ton	IR Method	8 LRFR RF HL93

<u>truck</u>	<u>Rating Factor</u>	<u>% Below</u>	<u>Posting Required</u>	<u>Controlling Member</u>	<u>Actual Posting</u>	<u>Posting Date</u>
Type 3	0.64	1	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	24.0	3/4/16
Type 3S-2	0.57	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	34.0	3/4/16
Type 3-3	0.80	3	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	40.0	3/4/16
SU4	0.53	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	21.0	3/4/16
SU5	0.49	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	22.0	3/4/16
SU6	0.45	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	23.0	3/4/16
SU7	0.43	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	23.0	3/4/16
EV2						
EV3						

Item 41 - Structure Open, Posted, or Closed to Traffic (cont'd)

Code

Description

 = Most Common

 A

Open, no restriction

 B

Open, posting recommended but not legally implemented (all signs not in place or not correctly implemented)

D

Open, would be posted or closed except for temporary shoring, etc. to allow for unrestricted traffic

E

Open, temporary structure in place to carry legal loads while original structure is closed and awaiting replacement or rehabilitation

G

New structure not yet open to traffic

K

Bridge closed to all traffic

 P

Posted for load (may include other restrictions such as temporary bridges which are load posted)

R

Posted for other load-capacity restriction (speed, number of vehicles on bridge, etc.)

US-30 Plympton Creek

LOAD:	Y _L	R.F.
DESIGN & LEGAL VEHICLES		
HL93 (INVENTORY)	1750	0.55
TYPE 3 (50K)	1300	1.30
TYPE 3S2 (80K)	1300	1.18
TYPE 3-3 (80K)	1300	1.70
TYPE 3-3 & LEGAL LANE	1300	
TYPE 3-3 TRAIN & LEGAL LANE	1300	2.73
SU4 TRUCK (54K)	1300	1.08
SU5 TRUCK (62K)	1300	1.06
SU6 TRUCK (69.5K)	1300	0.99
SU7 TRUCK (77.5K)	1300	0.97
CTP VEHICLE, MULTI-LANE		
OR-CTP-2A (105.5K)	1250	1.39
OR-CTP-2B (105.5K)	1250	1.21
OR-CTP-3 (98K)	1300	1.09
STP VEHICLE, MULTI-LANE		
OR-STP-3(120.5K)	1100	1.28
OR-STP-4A (99K)	1250	1.20
OR-STP-4B (185K)	1000	1.41
OR-STP-4C (150.5K)	1000	1.07
OR-STP-4D (162.5K)	1000	1.46
OR-STP-4E (258K)	1000	1.22
OR-STP-5B'W (204K)	1000	1.35
-----	-----	

Posted – Does Not Require Posting

Load Rating

Rating Date	04/26/1994	Posting Req	5 At/Above Legal Loads
Design Load	2 M 13.5 (H 15)	Posting Status.	P Posted for load
Operating Load	31.00ton	OR Method	1 LF Load Factor
Inventory Rating	19.00ton	IR Method	1 LF Load Factor

<u>truck</u>	<u>Rating Factor</u>	<u>% Below</u>	<u>Posting Required</u>	<u>Controlling Member</u>	<u>Actual Posting</u>	<u>Posting Date</u>
Type 3	1.13	5	No	Floorbeam Bending	25.0	2/28/08
Type 3S-2	1.06	5	No	Floorbeam Bending	40.0	2/28/08
Type 3-3	1.19	5	No	Floorbeam Bending	40.0	2/28/08
SU4						
SU5						
SU6						
SU7						

Load Rating Notes

Actual Posting entered by BHH 11/5/09. Posting sign is for 20,000 single axle, 34,000 tandem, max gross weight 80,000. Restricted bridge list shows weight table 1 which is 80,000 lb and legal axle loads. While the 25/40/40 tons are not on the sign, this bridge is posted for legal loads.

Load Rating Comparison Chart

Rating Date 04/23/2009

Load Rating Condition Comparison Chart

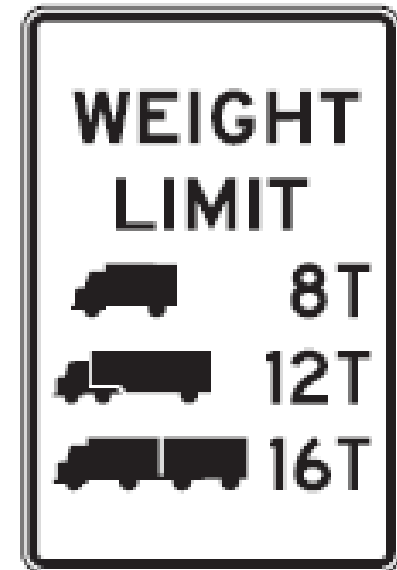
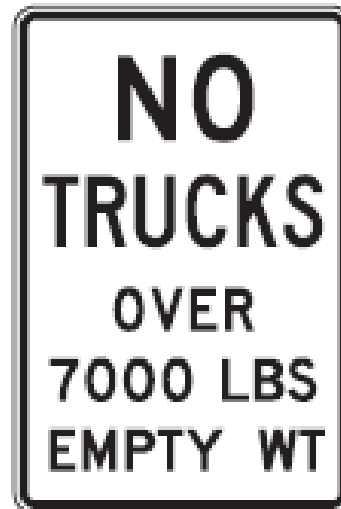
Category	NBI#	Rating	Condition	Current Condition
Traffic Impact				CS3
Deck Condition	58	6		6
Superstructure	59	5		5
Substructure	60	5		4
Temporary Repairs	103			
Wearing Surface Thickness	293	1.50		0.00

Maintenance Recommendations

As of: 10/23/2013

Urgent	Seaside Bridge Crew	(994420) 228 Replace	REPLACE PILE 1 AT BENT 22; HOLLOW SOUNDING ABOUT 10" ABOVE THE DOUBLE HORIZONTAL BRACING.	2500	Unknown	10/4/11
Urgent	Seaside Bridge Crew	(994420) 228 Replace	REPLACE PILE 5 AT BENT 44; 2.5X-10R-2.5X WITH RESISTOGRAPH ABOUT 12' BELOW THE CAP.	2500	Unknown	10/4/11

Load Posting Signs





Location of Load Posting Signs

- Locate at the Bridge
 - Visible to Truckers
- Locate at Decision Point Prior to Bridge
 - Inform Truckers Prior to Arrival at the Bridge

Advanced Warning Signs

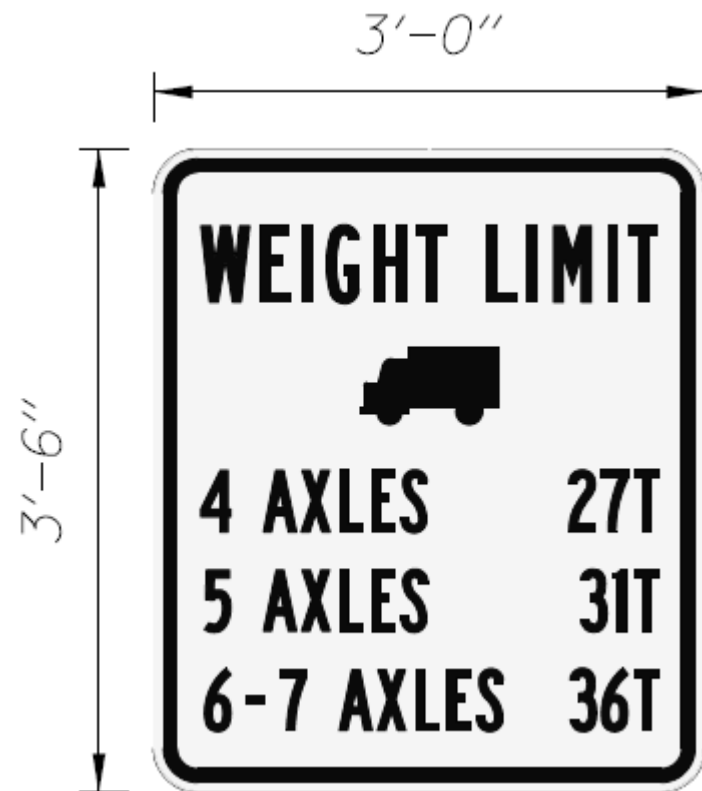
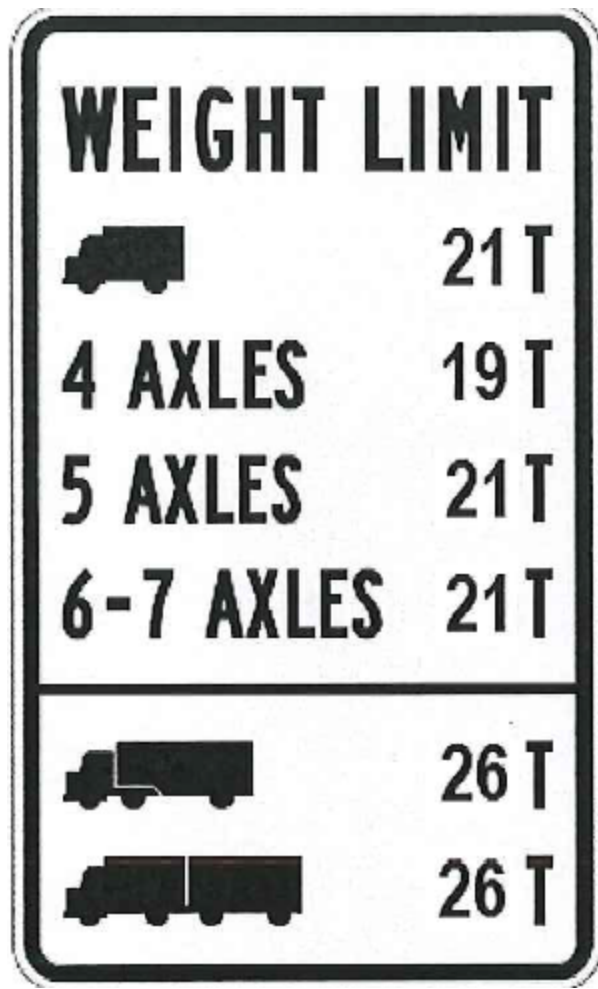




Item 41

B Open, posting recommended but not legally implemented (all signs not in place or not correctly implemented.)

Oregon Load Posting Signs



Load Rating

Rating Date	11/16/2016	Posting Req	0 >39.9% below
Design Load	4 M 18 (H 20)	Posting Status.	P Posted for load
Operating Load	12.10ton	OR Method	8 LRFR RF HL93
Inventory Rating	9.40ton	IR Method	8 LRFR RF HL93

<u>truck</u>	<u>Rating Factor</u>	<u>% Below</u>	<u>Posting Required</u>	<u>Controlling Member</u>	<u>Actual Posting</u>	<u>Posting Date</u>
Type 3	0.64	1	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	24.0	3/4/16
Type 3S-2	0.57	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	34.0	3/4/16
Type 3-3	0.80	3	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	40.0	3/4/16
SU4	0.53	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	21.0	3/4/16
SU5	0.49	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	22.0	3/4/16
SU6	0.45	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	23.0	3/4/16
SU7	0.43	0	Yes	Int.gir_Span5, span 1 of 1 +M at 0.5L	23.0	3/4/16

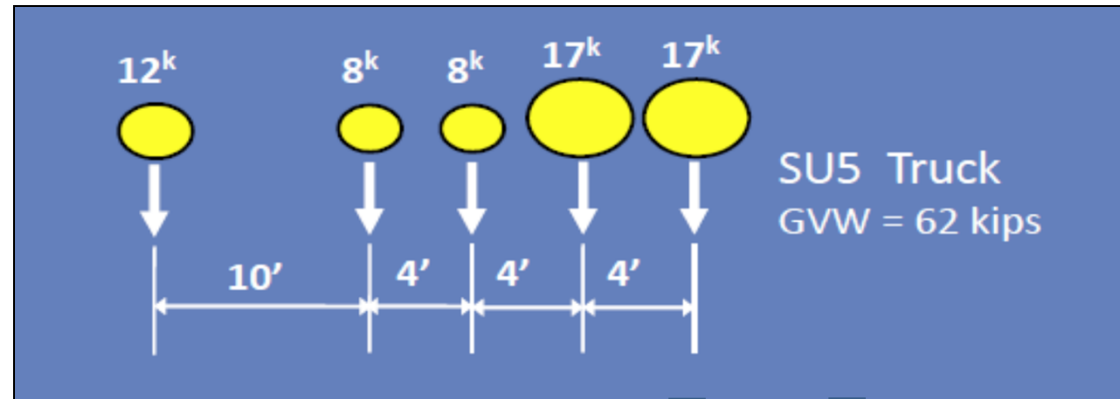
EV2
EV3

Fixing America's Surface Transportation Act (FAST)

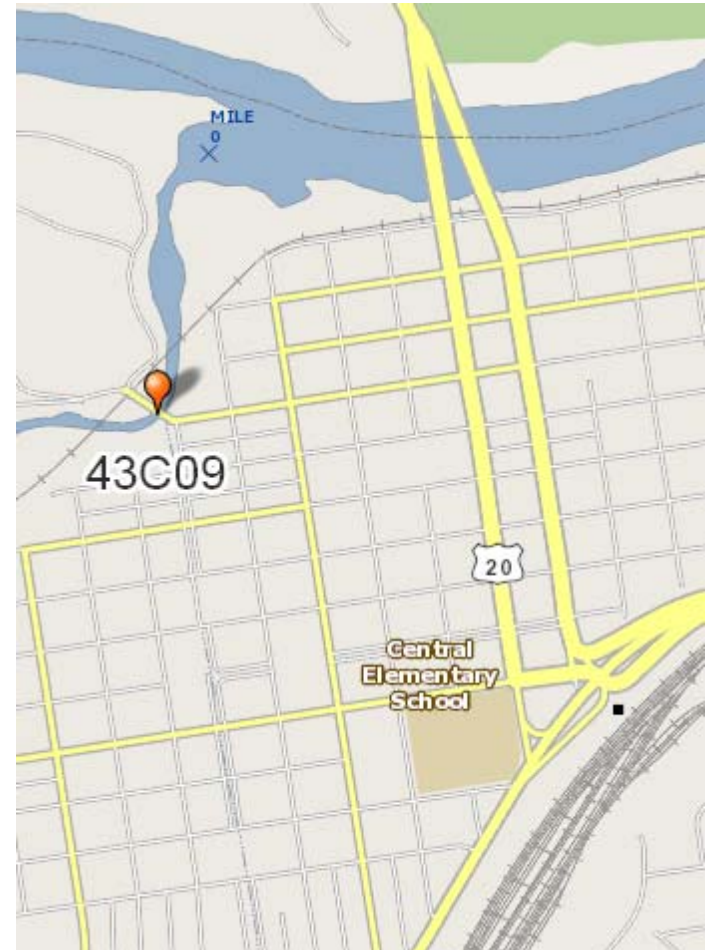
- Interstate and within reasonable access to the Interstate
- Emergency Vehicle Limits
 - 86,000 Lbs. GVW
 - 24,000 Lbs. Single Steer Axle
 - 62,000 Lbs. Tandem Axle



Fixing America's Surface Transportation Act (FAST)



Calapooia River, Albany



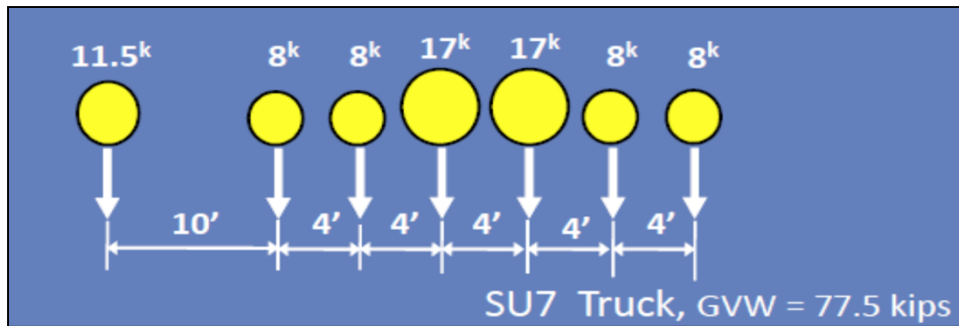
Calapooia River, Albany



- Currently there is a sign stating the bridge has a 30-Ton limit. Is this an absolute weight limit, or can a fire truck that weights over 30-Ton cross in a limited capacity (i.e. emergency use)

Calapooia River, Albany

- **ODOT Response:** If you happen to have any single-unit emergency vehicles with 6 and 7 axles, then you would need to adhere to the load posting. All other legal vehicles can use this bridge without restrictions.



Lost River, East Langell Valley Road



Built in 1967

157 Feet Long

32 Foot Maximum Span

“Good” Condition

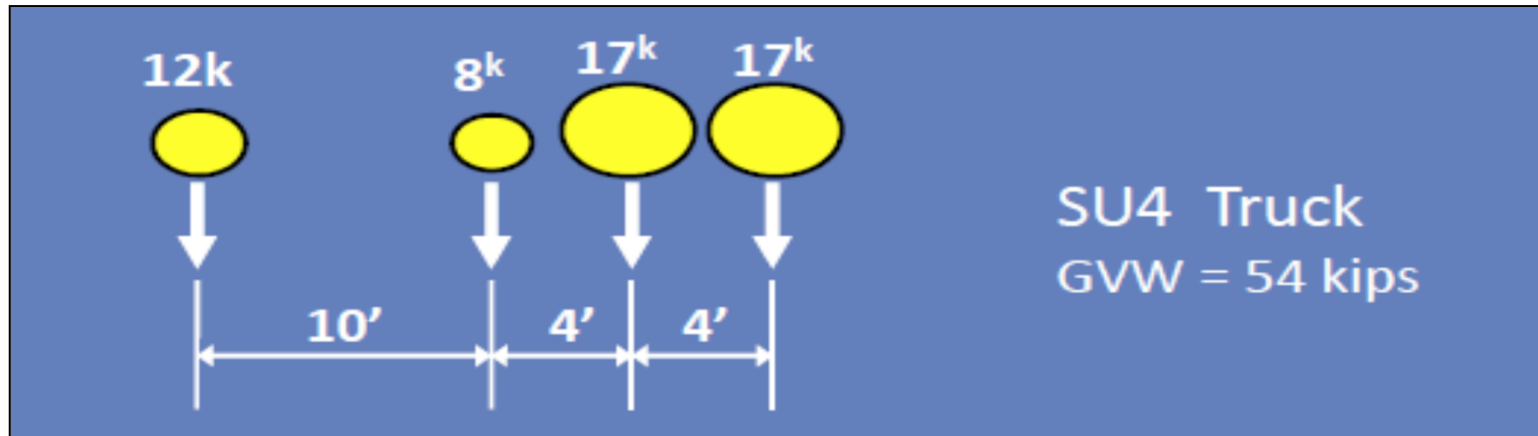
Four Axle Tractor



Four Axle Trailer



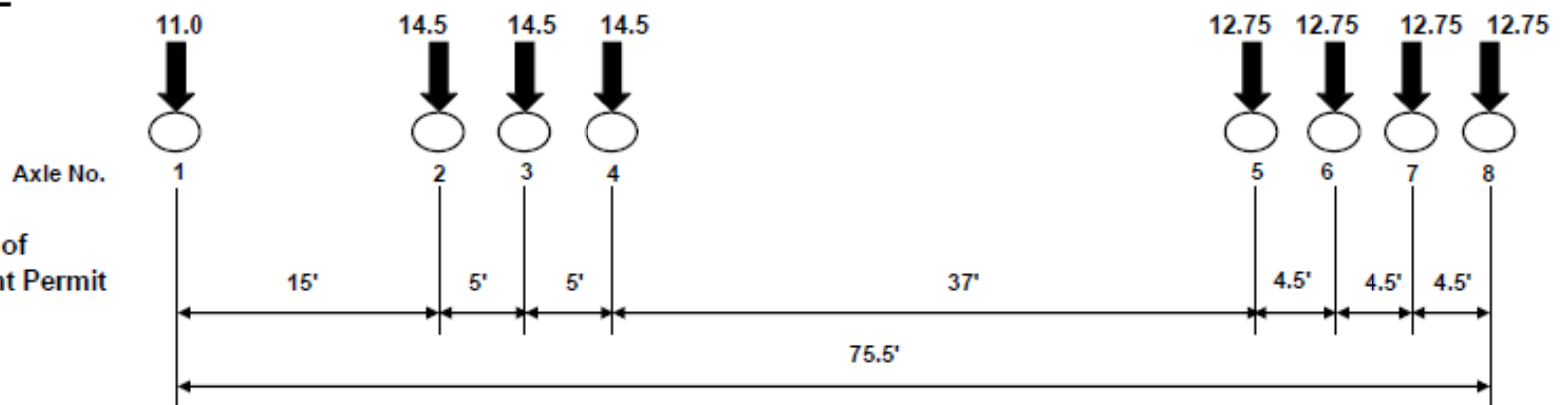
SU-4 Vs. 105,500 lb. CTP



Type OR-CTP-2B

8 Axle Vehicle
Gross Weight = 105.5 k

Representative Sample of
Annual Extended Weight Permit
Weight Table 2
Maximum 4-axle group



SU-4 Vs. 105,500 lb. CTP

LOAD:	γ_L	R.F.	Limit State
SU4 TRUCK (54K)	1.300	0.88	St1
SU5 TRUCK (62K)	1.300	0.82	St1
SU6 TRUCK (69.5K)	1.300	0.75	St1
SU7 TRUCK (77.5K)	1.300	0.71	St1
CTP VEHICLE, MULTI-LANE			
OR-CTP-2A (105.5K)	1.300	1.29	St2
OR-CTP-2B (105.5K)	1.200	1.30	St2
OR-CTP-3 (98K)	1.200	1.15	St2

Load Rating Equation

$$RF := \frac{\phi_c \cdot \phi_s \cdot \phi \cdot (R_n) - (\gamma_{DC})(DC) - (\gamma_{DW})(DW)}{(\gamma_L)(LL + IM)}$$

SU-4 Vs. 105,500 lb. CTP

$$RF = \frac{\text{Capacity}(\textcolor{red}{Less}) - \text{Dead Load}}{(\textcolor{red}{More})\text{Live Load} + \text{Impact}}$$

Outreach Effort

Motor Carrier News - February 2018

Interpreting Oregon's new weight limit signs for bridges

Weigh-In-Motion data shows a greater variation in vehicles operating at 80,000 pounds or less, than those combinations operating under an extended weight permit.

THE END

