

Truck Weights: Know Your Limits Participant Manual

The mission of the West Virginia LTAP Center is to foster a safe and efficient transportation system which enhances the economic development of West Virginia by improving skills and increasing knowledge of the transportation workforce and decision makers.



Presented by:
West Virginia Local Technical Assistance Program



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A Closer Look at the WV LTAP



The WV LTAP is part of the national Local Technical Assistance Program (LTAP). The Federal Highway Administration (FHWA) created the LTAP in 1982 to provide local agencies with information and training programs to address the maintenance of local roadways and bridges.

The WV LTAP, housed at West Virginia University, receives funding from the FHWA and the West Virginia Department of Transportation.



CHECK OUT OUR FACEBOOK PAGE.

Type in Facebook.com/WVLTAP or within the search feature in Facebook, type WV Local Technical Assistance Program (WVLTAP). You can also scan the tag to the right with your smart phone. Be sure to “like” our page!



VISIT THE WV LTAP WEBSITE.

Visit our website to view training opportunities, request technical assistance, access publications such as our quarterly newsletter *Country Roads & City Streets*, and more! You can also update your contact information.

wvltap.wvu.edu

INTERESTED IN OTHER LTAP CLASSES?



Seminars, workshops, and training sessions are scheduled both on-demand and at preset times around the state. Our trainers are available to come to your location!

Thank you for attending today's training.

Our goal is for you to be able to apply what you learned to your professional duties in the field.

Workshop Websites

Session 2 Highway Types:

- Truck Weight and Size Limits List of Restrictions

http://www.transportation.wv.gov/highways/maintenance/hauling_permits/Documents/SELECTED%20ROUTES.pdf

- Gross Vehicle Weights

http://www.transportation.wv.gov/highways/programplanning/preliminary_engineering/Pages/GrossVehicleWeights.aspx

Session 3 Vehicle Weight Limits:

- Hauling Permits

http://www.transportation.wv.gov/highways/maintenance/hauling_permits/Pages/default.aspx

- Requirements for Manufacturers of Motor Vehicles

<https://www.law.cornell.edu/cfr/text/49/567.4>

- Bridge Weight Formula Table

https://ops.fhwa.dot.gov/Freight/publications/brdg_frm wgths/bridge_formula_all_rev.pdf

Weight, size and load reference sheet

Width limits (17C-17-2)

*96 inches –OR–

*102 inches on vehicles or equipment that operate on bi-directional roadways, if the lane widths are 10 feet or greater. 96 inch vehicles or trailers cannot haul 102 inch wide loads.

Height and length limits (17C-17-4)

*Height = 13 foot 6 inches

***Length**

*Single motor vehicle = 40 feet (including load)

*Combinations on National Network = no limit

*Combinations on other U.S. and State routes = 70 feet (no limit on National network).

*Combinations on County routes = 70 feet (*changed in the spring of 2014)

*Saddle mounts = 97 feet on National Network. State Routes = 75 feet.

#Pole trailers are exempt to the above when transporting poles or pipes or structural material which cannot be dismembered: Provided, if over 80 feet, a permit must be obtained.

Special load limits (17C-17-5)

*Front overhang = 3 feet beyond foremost part of vehicle

*Rear overhang = 6 feet beyond bed or body of vehicle

Note: digger/derrick line trucks are allowed 6 feet in the front and 9 feet in the rear

#Pole trailers = same exemption as listed above in the length limit section.

Weight limits – Interstate highways (National Network)

*Single axle = 20,000 pounds (steering or back axle) (17C-17-8)

*Tandem axle = 34,000 pounds (17C-17-8a)

*Tri-axle, inner bridge, outer bridge = see chart in 17C-17-9

*80,000 weight limit on the Interstate highway system

#Weight limits – U.S. & State Routes (Not Interstate)

*Single axle = 20,000 pounds (steering or back axle) (17C-17-8)

*Tandem axle truck = 60,000 pounds + a 10% tolerance (66,000 pounds) (vehicle must be registered for at least 60,000 to receive the tolerance) 17C-17-9a (b) (1)

*Tri-axle truck = 70,000 pounds + a 10% tolerance (77,000) (must be registered for at least 70,000 to receive the tolerance) 17C-17-9a (b) (2)

*Quad axle truck = 73,000 pounds + a 10 % tolerance (80,300) (must be registered for at least 73,000 to receive the tolerance) 17C-17-9a (b) (3)

*Truck and pup trailer, *tractor-semitrailer combo with five axles, *tractor-semitrailer combo with six axles = 80,000 pounds + a 10% tolerance (88,000) (must be registered for 80,000 to receive the tolerance) (17C-17-9a (b) (4)

#Note: some state roads may have a 65,000 pound weight limit, with a 10% tolerance (71,500 pounds). Check your weight load limit map. Individual county maps, with more routes can be found at:

http://www.transportation.wv.gov/highways/programplanning/preliminary_engineering/Documents/Gross%20Weight%20Limit.PDF

Truck Weights: Know Your Limits Workshop

Session 1 Introduction



1-1

Workshop Topics

- Types of routes with different load limits
- Legal truck weight capacity
- Determining weight limits for a route
- Examples and exercises



1-2

Training Objective

- To empower truck owners and operators to comply with Truck Weight Limitations in West Virginia
- Preserve infrastructure
 - Pavement
 - Bridges
- Avoid over stressing the trucks
- Safety concerns

1-3

Goals

- Communicate weight limits allowed on West Virginia highways
- Load limits vary by
 - Highway type
 - Truck
 - Type
 - Axle
 - Tire

1-4

Audience

- Drivers
- Loaders
- Owners/Fleet managers
 - Private
 - WVDOH

1- 5

Preserve Infrastructure

Pavements



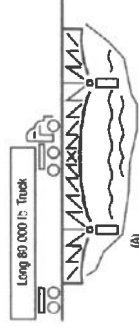
Bridges



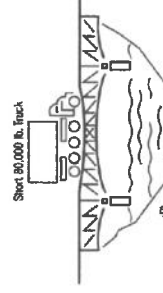
1- 6

Bridges are designed to support a wide variety of vehicles and their expected loads. As trucks grew heavier in the 1950s and 1960, something had to be done to protect bridges.

The solution for interstate highways was to link allowable weights to the number and spacing of axles.



For non-interstate highways, bridges are protected by defining weight limits for specific vehicle types.



1- 7

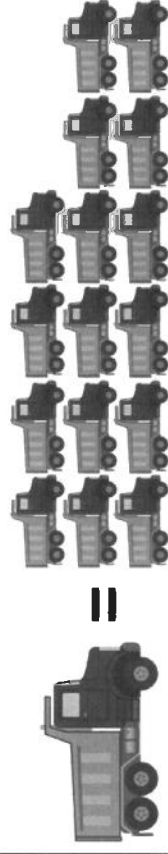
Pavement Damage Factor

Myth

- It takes twice the weight to do twice the damage

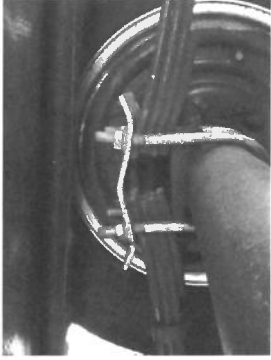
Fact

- An axle overloaded 20% causes over twice the damage of a legally loaded axle
- Twice the weight causes 16x the damage



1- 8

Vehicle Damage



<http://www.foxcarparts.com/vehicle-damage-repairs/>
<http://www.foxcarparts.com/vehicle-damage-repairs/>

1-9

Increased Risk of Rollover



<http://www.foxcarparts.com/vehicle-damage-repairs/>
<http://www.foxcarparts.com/vehicle-damage-repairs/>

1-10

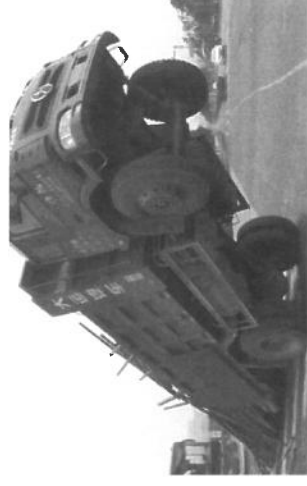
Stopping Distance



<http://www.foxcarparts.com/vehicle-damage-repairs/>
<http://www.foxcarparts.com/vehicle-damage-repairs/>

1-11

What Were They Thinking???



<http://www.foxcarparts.com/vehicle-damage-repairs/>
<http://www.foxcarparts.com/vehicle-damage-repairs/>

1-12

What Were They Thinking???



- It's not just big trucks!

http://www.ctsblog.net/2011_01_01_archive.html

1-13

They Called This an Accident???



<http://charlotteonline.net/truck-accidents-north-carolina/>

1-14

Exception

• §17C-17-1.

- (b) The provisions of this article governing size, weight, and load shall not apply to fire apparatus, road machinery, or to implements of husbandry, including farm tractors, temporarily moved upon a highway, or to a vehicle operated under the terms of a special permit issued as herein provided.



Interpreted to provide exception for salt and plow trucks when responding to snow events.

http://www.officeshires.com/VEST/VIRGINIA/FIREAPPARATUS/VE-KFFP-FI-DI/DSC_0689-L.jpg
<http://www.westvirginiafire.com/CH/20140303/D40101/303033965/EP/13/EP-303033965.jpg>

1-15

FAST Act

Fixing America's Surface Transportation Act

Emergency Vehicles – a vehicle designed to be used under emergency conditions

- suppression of fires
- mitigation of other hazardous situations.

Gross Vehicle Weight

– 86,000 lb.

Single Steering Axle

– 24,000 lb.

Single Drive Axle

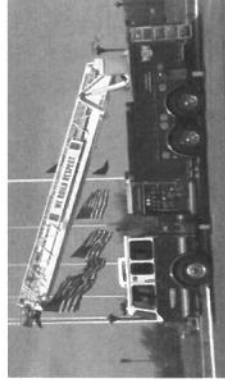
– 33,500 lb.

Tandem Rear Drive Steer Axle

– 52,000 lb.

Tandem Axle

– 62,000 lb.



Section 1410 of the FAST Act amended 23 U.S.C. 127 by including new vehicle weight limits for Emergency Vehicles on the Interstate Highway System.

<http://thehighwaytrust.com/wp-content/uploads/2016/10/Interstate-1410-FAST-Act-Changes.pdf>

1-16

Let Us Not Forget

- Truck accident litigation can present unique problems

"If you are ever in a truck accident, it is critical to find as many defendants as possible. Often times this will include the driver, the owner of the truck, contractors, employers and insurance companies."



<http://www.arklaw.com/2014/07/20/truck-accident-8-litigation-issues-online-problems.html>

<http://abata.sagepub.com/buyback/CSP/CSP47/4447913.pdf>

1-17

Summary

- Operating trucks with in legal limits is important:
 - Protect the infrastructure
 - Pavements
 - Bridges
 - Prevent excess vehicle damage
 - Safety
 - Potential legal liability

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Session 2 Highway Types



2-1

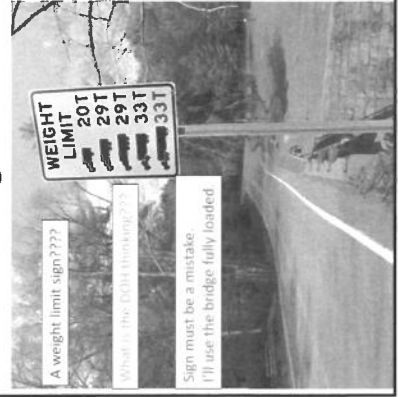
Bridge Weight Limit Signs Supersede Everything



- These are placed for bridges which cannot handle standard loads

2-2

Nice Bridge



2-3

Weight and Size Limits

- List of Restrictions can be found at:
http://www.transportation.wv.gov/highways/maintenance/hauling_permits/Documents/WEIGHT%20AND%20CLEARANCE%20RESTRICTIONS%202014.pdf

WEIGHT AND CLEARANCE RESTRICTIONS

US Routes and other Routes
C-5 Marshall County - Bridge at MP 3.99 - Restricted to 12 tons
C-5 Marshall County - Bridge at MP 7.84 - Restricted to 26 tons
C-74 Marshall County - Bridge at MP 3.72 - Restricted to 29 tons
US 11 Berkeley County - Downtown Martinsburg Railroad Underpass - 17' 6" B7 overpass and southbound

- This list is used when issuing blanket permits.
- It is not all inclusive of the bridges with weight restrictions.
- The only way sure to determine if a route has weight restricted bridge is to drive the route.

2-4

Weight and Size Limits

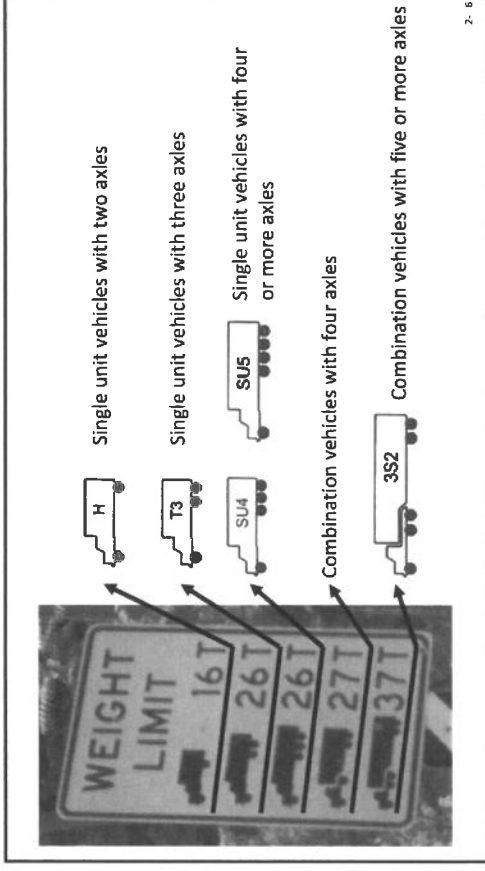
WEIGHT AND CLEARANCE RESTRICTIONS

WV 63 Greenbrier County - MP 21.36 - Restricted to 37 tons



Limits on this list apply to the largest truck type. Other truck types have lower limits.

2-5



2-6

Note: CRTS Routes Use Different Weight Limit Signs

Standard bridge weight limit sign



Bridge weight limit sign for CRTS (Coal haul routes)



2-7

CRTS Weight Limit Sign Applies to All Trucks



All single unit vehicles with four or more axles

All combination vehicles with five or more axles

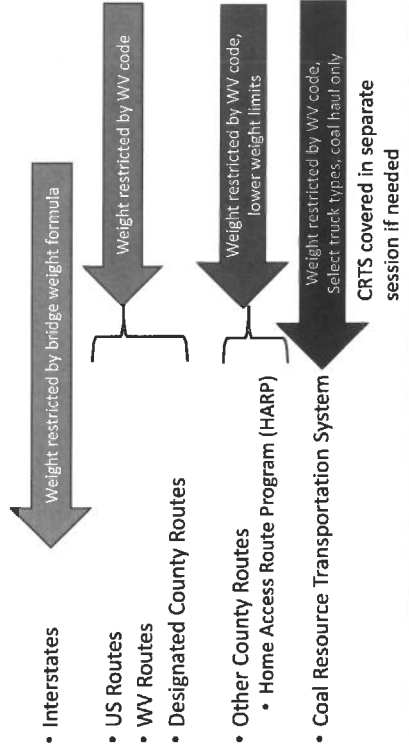
2-8



<http://www.enr.com/story/2013/04/11/indianapolis-bridge-collapse-bridge-collapse-connection-math/1013111>

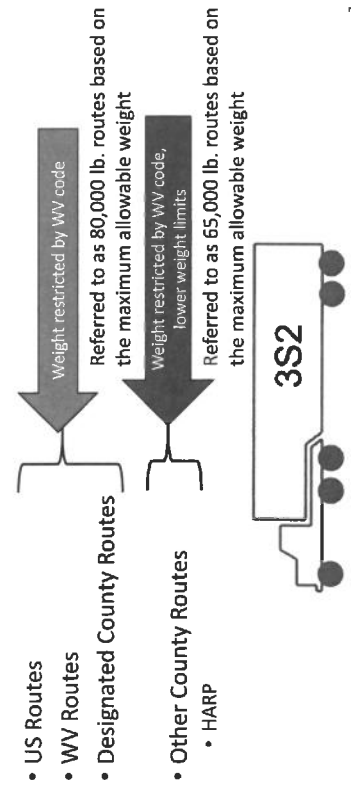
2-9

Highway Types



2-10

Highway Types specifically in the WV code



2-11

Weight Limits Based on Highway Type:

- | | |
|---|---|
| Interstate <ul style="list-style-type: none"> • 20,000 lb. Single Axle Weight Limit • 34,000 lb. Tandem Axle Weight Limit • Gross Vehicle Weight • Bridge Weight Formula | US, WV, and Designated County Routes <ul style="list-style-type: none"> • 20,000 lb. Single Axle Weight Limit • Gross Vehicle Weight |
| County Routes (Non-Designated) <ul style="list-style-type: none"> • 20,000 lb. Single Axle Weight Limit • Gross Vehicle Weight (Lower) | |

2-12

Weight, size and load reference sheet at the end of the workbook



<http://www.marshall.edu/transportation/Policies.aspx>

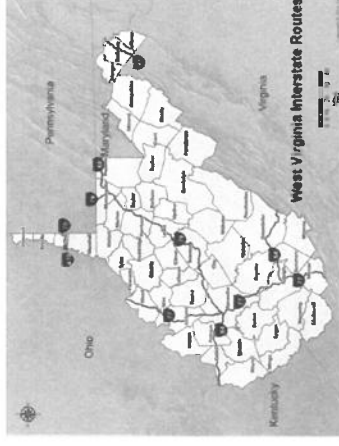
2-13

Interstate Highways

- National Interstate and Defense Highways



Truck Weight Limits are controlled by :
Axle Weight Restrictions
Gross Vehicle Weight (GVW)
Bridge Weight Formula



2-14

Roads Governed by WV Code

US Numbered Highways (US 50)
Badge with Route Number



WV Numbered Highways (WV 7)
Square with Route Number



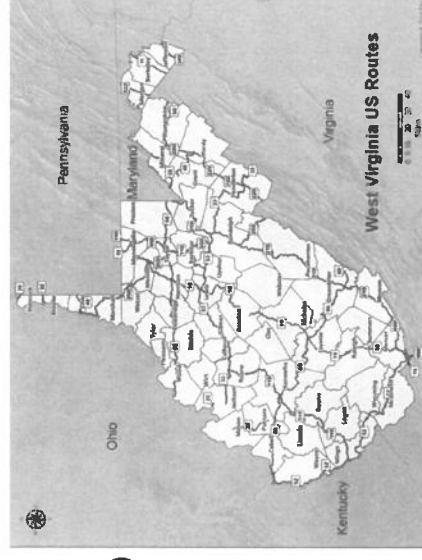
Select WV County Numbered Routes (CR 65 & CR 9/1)
Circle with Route Number



2-15

US Routes

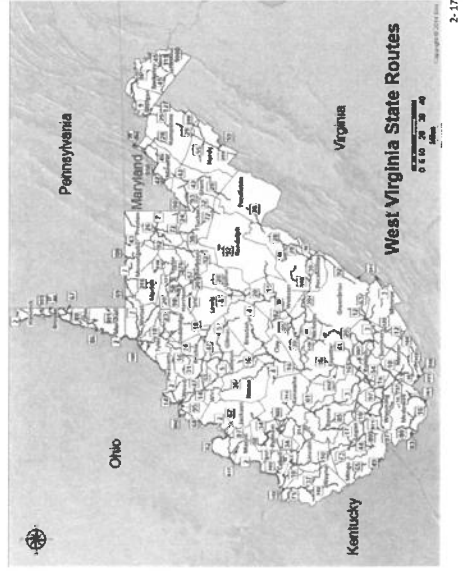
US Numbered Highways (US 50)
Badge with Route Number



2-16

WV Routes

WV Numbered Highways
(WV 7)
Square with Route Number

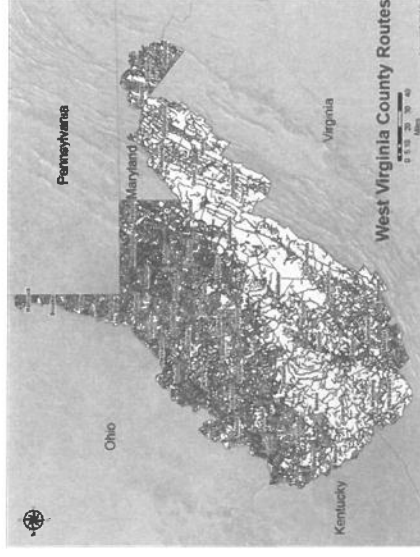


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County Routes

County Routes (CR 65 & CR 9/1)
Circle with Route Number

Some County Routes may be
designated to have the same
load limits as US and WV routes



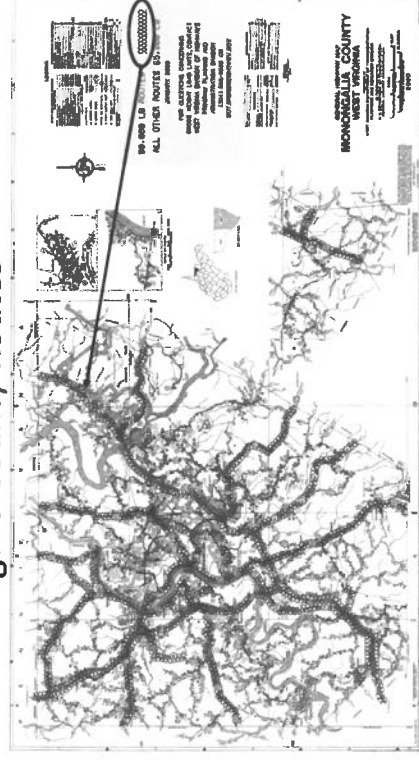
2-18

Designated WV County Routes

- For designated county routes, truck weight limits are the same as US and WV numbered state routes
- The select county routes are not identified with signs
- Maps available from WVDOT internet showing the designated routes
http://www.transportation.wv.gov/highways/programplanning/preliminary_engineering/Pages/GrossVehicleWeights.aspx

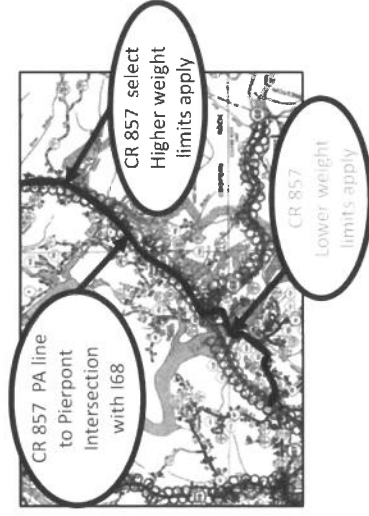
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East Monongalia County Routes



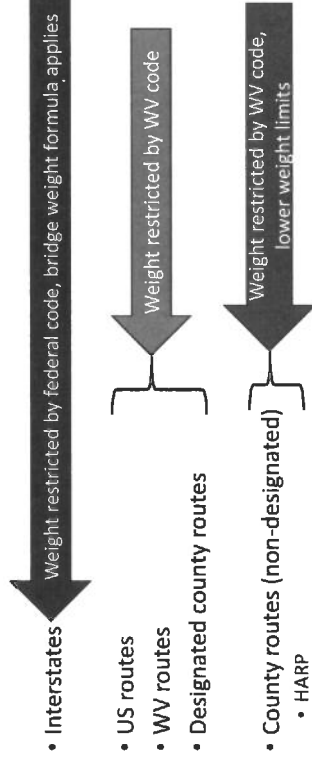
2-20

Example Changing Weight Limits on a County Route



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Highway Type Summary



2-22

Workshop for Truck Weight Limits in the State of
West Virginia

Session 3 Vehicle Weight Limits



3-1

Session Content



- Overweight permits
- Terminology
 - Vehicles
 - Axles
- Rules for the roads
 - WV
 - Interstate
- Tires
- Examples

3-2

Overweight Permits

- Special Hauling Permits can be issued over the weight limit for trucks or routes
- The load must be indivisible
- Information for these permits can be found at:

http://www.transportation.wv.gov/highways/maintenance/hauling_permits/Pages/default.aspx

- Or contact:

Wayne Kessinger, Permit Section Administrator
Building Five, Room 356
1900 Kanawha Boulevard East
Charleston WV, 25305-0430
Phone: 304-558-0384

3-3

Indivisible Load

A load is indivisible if dividing it would diminish the value of the load or if would require more than 8 working hours to disassemble.



http://www.wv.gov/transportation/hauling_permits/Pages/default.aspx

3-4

Session Content

- Overweight permits
- Terminology
 - Vehicles
 - Axles
- Rules for the roads
 - WV
 - Interstate
- Tires
- Examples



3-5

Truck and Axle Terminology

- Manufacturer Limits
 - Vehicle Weight Terms
 - Tire Load Rating
- Gross Vehicle Weight (GVW) –
- Gross Combination Weight (GCW)
- Gross Vehicle Weight Rating (GVWR)
- Gross Combination Weight Rating (GCWR)
- Gross Axle Weight Rating (GAWR)

Total Weight on a scale

Manufacturer Weight recommendations

3-6

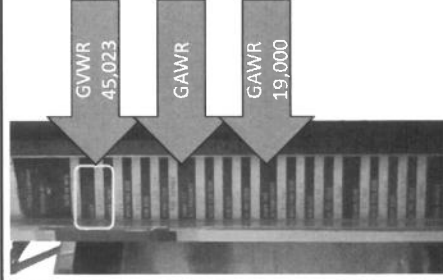
Truck Manufacture Weight Ratings

Code of Federal Regulations

- 49 CFR 567.4 - Requirements for manufacturers of motor vehicles
 - Label required on all vehicles
 - Gross Vehicle Weight Rating (GVWR)
 - Gross Axle Weight Rating (GAWR)

Not enforceable weight limits

But remember the lawyers



<https://www.federalregister.gov/documents/2014/05/20/2014-10234>

3-7

Overloading is the No. 1 Danger Facing Your Fleet

- Overloading is the scourge of fleets. It creates an unsafe vehicle that can cause injuries and fatalities, which will invariably result in a lawsuit.
- Statistics show that overloaded and improperly loaded trucks are among the leading causes of truck accidents.
 - Overloading shortens a truck's service and increases operating expenses. In fact, fleet maintenance surveys consistently show that overloading is the No. 1 cause of unscheduled maintenance for trucks.
 - premature wear-and-tear on tires and suspension component

3-8

DON'T OVERLOAD YOUR MOTOR TRUCK

Overloading a motor truck not only results in excessive strains and a greatly accelerated rate of depreciation, but in unnecessary high maintenance cost.

Overloading affects frame, springs, wheels, axles, tires, power plant, and even the driving mechanism—and while the truck is designed with a certain factor of safety, this factor was intended merely for emergencies, and not for continuous and continual abuse.

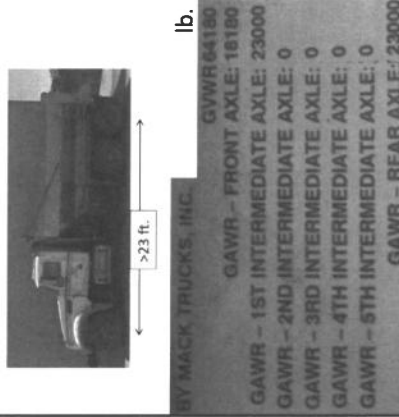
Overloading means motor truck suicide.

Truck overloading is not a new problem

August 27, 1918

http://books.google.com/books?id=5WwGQAAMAEAC&pg=PA33&dq=overloading+motor+truck&as_scd=1302
<http://www.federalregister.gov/articles/1918/08/27/overloading-motor-trucks>

3-9



Interstate

Front axle 20,000 lb.
Tandem 34,000 lb.
External Bridge 54,000 lb.



Weight Limit with tolerance

66,000 lb.

Minimum tire rating
Front - 18180/2 = 9090 lb.
Tandem - 23000/4 = 5750 lb.

3-



Interstate

Front axle 20,000 lb.
Rear axle 20,000 lb.
External Bridge 40,000 lb.



Weight Limit
40,000

Minimum tire rating
Front - 13200/2 = 6,600 lb.
Tandem - 23000/4 = 5,750 lb.

3-

Axle Terms

- **Steering Axle** – The axle that controls the direction of the vehicle
- **Drive Axle or Live Axle** – An axle in which the shaft also transmits power to the wheels
- **Dead Axle** – An axle that supports the vehicle and does not transmit any drive
- **Single Axle** – Side view of truck shows single wheel on the truck
 - Dual - Side view of truck shows single wheel on the truck with two tires on each side of the axle
 - Single - Side view of truck shows two wheels on the truck front to back with a spacing between the center of the wheels less than 40 inches or greater than 96 inches

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Axle Terms (Cont.)

- Tandem Axle – Side view of truck shows two or more consecutive axles whose centers are more than 40 and less than 96 inches apart (Used on Interstate)
- Tridem Axle - Side view of truck shows three consecutive axles (Used off Interstate)
- Quadem Axle - Side view of truck shows four consecutive axles (Used off Interstate)
- Lift axles – axles installed ahead of (*pusher*) or behind (*tag*) the driving tandem axles on a straight truck or tractor.
- Split Axle – Two or more consecutive axles whose centers are more than 96 inches apart

3-13

Axle Terms Used in WV Code

§17C-17-8. Single-axle load limit.

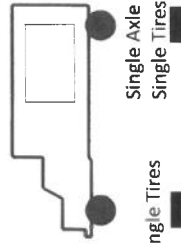
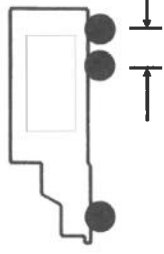
(a) The gross weight imposed on the highway by the wheels of any one axle of a vehicle shall not exceed twenty thousand pounds.

(b) For the purpose of this article an axle load shall be defined as the total load transmitted to the road by all wheels whose centers are included between two parallel transverse vertical planes forty inches apart, extending across the full width of the vehicle.

- Tandem defined in code for Interstate
 - More than 40 inches and less than 96 inches
- The WV code does not include an axle load limit for tandems on the US, WV, and County Route systems.
- Tridem and Quadem are used in the code but are undefined.

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Single Axles

Single Tires

Single Axle with Single Tires

Single Axle with Dual Tires

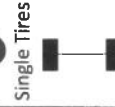
If the spacing between the axles is less than 40" the axle is treated as a single axle



3-15

WV Code of Deeds
Title 17, Chapter 17C, §17C-17-8. Single-axle load limit.
Repealed by Act 100 of 2011, effective 6/1/11.
Repealed by Act 100 of 2011, effective 6/1/11.
Repealed by Act 100 of 2011, effective 6/1/11.
Repealed by Act 100 of 2011, effective 6/1/11.

Tandem Axles



Single Tires

Tandem Axle with dual tires

Single Tires

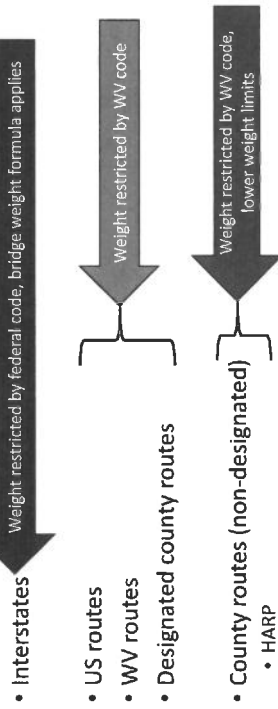
Tandem Axle with super single tires

Spacing must be more than 40" and less than 96"

3-16

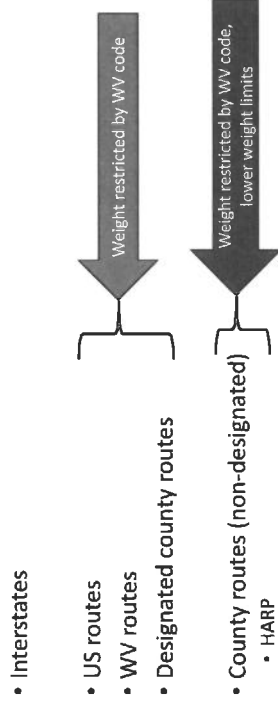
WV Code of Deeds
Title 17, Chapter 17C, §17C-17-8. Single-axle load limit.
Repealed by Act 100 of 2011, effective 6/1/11.
Repealed by Act 100 of 2011, effective 6/1/11.
Repealed by Act 100 of 2011, effective 6/1/11.
Repealed by Act 100 of 2011, effective 6/1/11.

Highway Types



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Highway Types



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US and WV Routes

- Five truck types in WV code
 - To be eligible for the 10% tolerance, the truck must be registered for the maximum GVW for the vehicle type
- LEGAL WEIGHT LIMITS**
- US, WV, AND COUNTY ROUTES DESIGNATED FOR 80,000 POUNDS
- | TRUCK TYPE | LEGAL WEIGHT (POUNDS) |
|------------|-----------------------|
| H | 40,000 |
| T3 | 60,000* |
| SU4 | 70,000* |
| SU5 | 73,000* |
| 3S2 | 80,000* |
- * 10% tolerance applies
- NOTE: WV CODE SETS A SINGLE AXLE WEIGHT LIMIT OF 20,000 POUNDS. THERE IS NO TOLERANCE ON THIS LIMIT.
- NO TOLERANCE ON SINGLE AXLE TWENTY THOUSAND POUND WEIGHT LIMIT!
-except T3 Single unit vehicle with three axles allowed 10% tolerance = 66,000 lb.

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US and WV Routes

LEGAL WEIGHT (POUNDS)	Weight limit with tolerance
40,000	66,000 lb.
60,000*	77,000 lb.
70,000*	80,300 lb.
73,000*	88,000 lb.
80,000*	

* 10% tolerance applies

Vehicles carrying more than the manufacturer's GVWR may have legal problems if involved in an accident
WV code does not limit the registration weight of a vehicle to the rated gross vehicle weight

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County Routes

- Five truck types in WV code

LEGAL WEIGHT LIMITS

COUNTY ROUTES DESIGNATED FOR 65,000 POUNDS

LEGAL WEIGHT (POUNDS)	Truck Type
40,000	H
60,000*	T3
65,000*	SU4
65,000*	SU5
65,000*	3S2

* 10% tolerance applies

NOTE: WV CODE SETS A SINGLE AXLE WEIGHT LIMIT OF 20,000 POUNDS. THERE IS NO TOLERANCE ON THIS LIMIT.

NO TOLERANCE ON SINGLE AXLE TWENTY THOUSAND POUND WEIGHT LIMIT!
-except T3

3-25

County Routes

LEGAL WEIGHT (POUNDS)

Truck Type	Weight Limit with tolerance
H	40,000
T3	60,000*
SU4	65,000*
SU5	65,000*
3S2	65,000*

* 10% tolerance applies

Weight Limit with tolerance

66,000 lb.
71,500 lb.
71,500 lb.
71,500 lb.

3-26

Designated County Routes

LEGAL WEIGHT LIMITS

US, WV, AND COUNTY ROUTES DESIGNATED FOR 80,000 POUNDS

LEGAL WEIGHT (POUNDS)	Truck Type
40,000	H
60,000*	T3
70,000*	SU4
73,000*	SU5
80,000*	3S2

* 10% tolerance applies

NOTE: WV CODE SETS A SINGLE AXLE WEIGHT LIMIT OF 20,000 POUNDS. THERE IS NO TOLERANCE ON THIS LIMIT.

Same load limits as US and WV Routes

NO TOLERANCE ON SINGLE AXLE TWENTY THOUSAND POUND WEIGHT LIMIT!
- except T3

Designated County Routes are not identified with road signs! See session 2

3-27

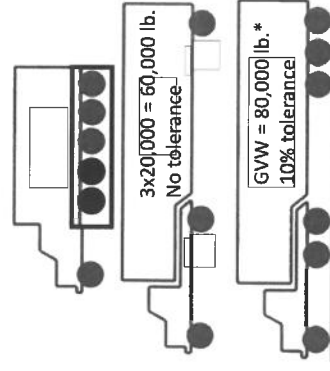
Trucks not identified in WV Code

- Single Unit Trucks with more than four load carrying axles have the same limits as a SU5

- Semi trucks

- Limited by 20,000 lb. per axle

- Any Semi with 5 or more axles is treated as a 3S2

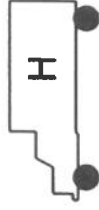


* 65,000 plus 10% on non-designated county routes

H- Truck

Single unit truck
2 –Axles
Maximum of 20,000 lb. per axle
Maximum Gross Vehicle Weight of
40,000 lb. (No Tolerance)

Limit applies to all US, WV, and
County Routes



<http://www.kentuckytrucks.com/images/12014/07/forpublicuse-h.jpg>

3-29

T-3 Truck

Single unit truck
Single drive axle and tandem axle
Maximum of 20,000 lb. per single axle
Maximum Gross Vehicle Weight of
60,000 lb. (10% Tolerance)
66,000 lb. with Tolerance

Limit applies to all US, WV, and County
Routes



<http://www.kentuckytrucks.com/images/130120/05/2014/forpublicuse-t3.jpg>

3-30

SU4 Truck

Single unit truck
Single drive axle and tridem axle
US, WV and Designated County Routes
Maximum of 20,000 lb. per single axle
Maximum Gross Vehicle Weight of
70,000 lb. (10% Tolerance)
77,000 lb. with Tolerance

County Routes
Maximum of 20,000 lb. per single axle
Maximum Gross Vehicle Weight of
65,000 lb. (10% Tolerance)
71,500 lb. with Tolerance



<http://www.kentuckytrucks.com/images/12014/07/forpublicuse-su4.jpg>

3-31

SU5 Truck (plus all single unit vehicles with more than five axles)

Single unit truck
Single driving axle and quadrum axle
US, WV and Designated County Routes
Maximum of 20,000 lb. per single axle
Maximum Gross Vehicle Weight of
73,000 lb. (10% Tolerance)
80,300 lb. with Tolerance

County Routes
Maximum of 20,000 lb. per single axle
Maximum Gross Vehicle Weight of
65,000 lb. (10% Tolerance)
71,500 lb. with Tolerance

- Typically SU5 trucks have lift axles
- For weight limit purposes the lift axles must be fully engaged
- If the lift axles are not engaged the weight limits for a T3 would apply



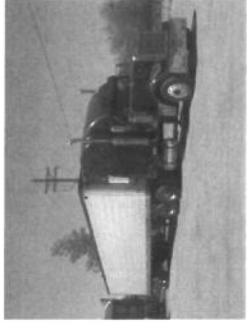
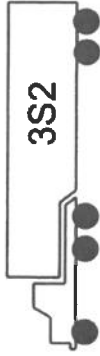
3-32

3S2 Truck plus all combination vehicles with more than five axles

Semi or Tractor and trailer truck
Single driving axle and tandem axle on tractor
as well as a tandem axle on trailer

US, WV and Designated County Routes
Maximum of 20,000 lb. per single axle
Maximum Gross Vehicle Weight of 80,000 lb.
(10% Tolerance)
88,000 lb. with Tolerance

County Routes
Maximum of 20,000 lb. per single axle
Maximum Gross Vehicle Weight of 65,000 lb.
(10% Tolerance)
71,500 lb. with Tolerance



3-33

Do Not Forget About Weight Restricted Bridges!!!!

- These signs supersede any route weight limits

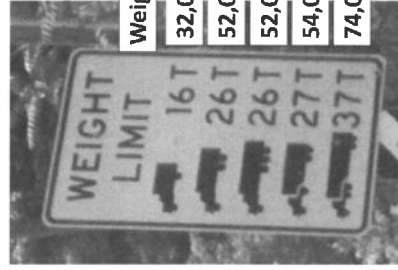


- No tolerance on posted weights for bridges
- These signs are posted in tons!!! (1 ton = 2000 lb.)

http://www.winnebagoaccountyowa.gov/wp-content/uploads/2013/11/IMG_1130.jpg

3-34

- These signs are posted in tons



Weight Limit
32,000 lb.
52,000 lb.
52,000 lb.
54,000 lb.
74,000 lb.

	LEGAL WEIGHT (POUNDS)	Weight Limit with tolerance
	40,000	40,000 lb.
	60,000*	66,000 lb.
	70,000*	77,000 lb.
	73,000*	80,300 lb.
	80,000*	88,000 lb.

*** 10% tolerance applies**

3-35

WV Code complete -



Think about it for a while

Interstates next

3-36

Session Content

- Overweight permits
- Terminology
 - Vehicles
 - Axles
- Rules for the roads
 - WV
 - Interstate
- Tires
- Examples



3-37

Interstates – Bridge Weight Formula

Quiz

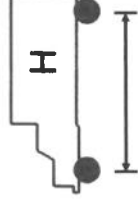
What is a bridge?

A. A structure for carrying traffic



The bridge weight formula was implemented to limit damage to bridges due to truck loads.

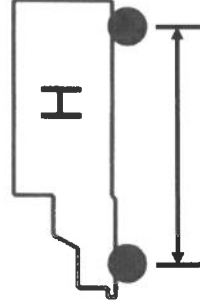
B. A group of axles on a truck



Grouping of truck axles are also called bridges.

3-38

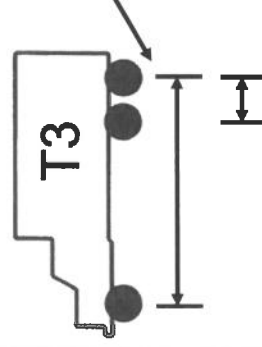
Examples of Truck Bridges



This truck has one bridge
This is an external bridge

3-39

Examples of Truck Bridges

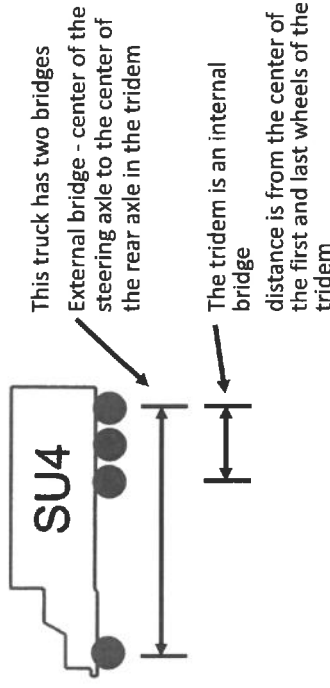


This truck has two bridges
External bridge - center of the steering axle to the center of the rear axle in the tandem

The tandem is an internal bridge
distance is from the center of the first and last wheels of the tandem

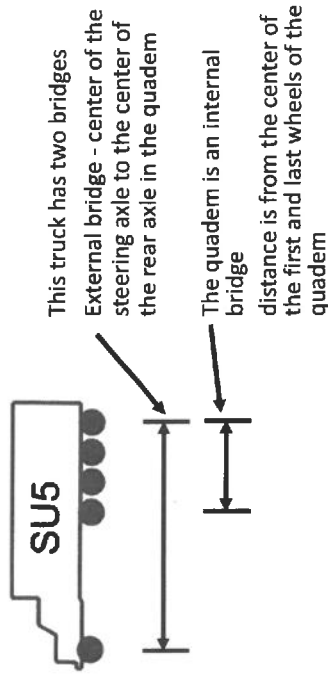
3-40

Examples of Truck Bridges



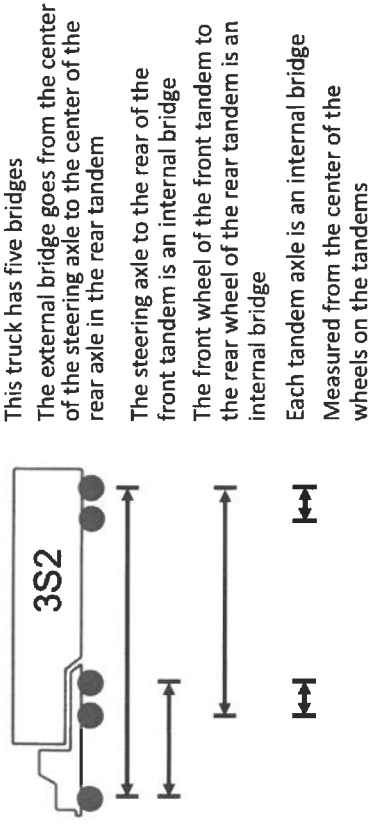
3-41

Examples of Truck Bridges



3-42

Examples of Truck Bridges



3-43

Interstates – Bridge Weight Formula

- Single Axle Limit = 20,000 lb.
- Tandem Axle Limit = 34,000 lb.
- Gross Vehicle Weight Limit = 80,000 lb.
- Bridge Weight Formula governs axle weight limits

$$W = 500 \left(\frac{LN}{N-1} + 12N + 36 \right)$$

- W = Overall Gross Weight of any two or more consecutive axle rounded to the nearest 500 lb.
- L = spacing
- N = number of axles

THERE IS NO TOLERANCE FOR WEIGHT LIMITS ON INTERSTATE

3-44

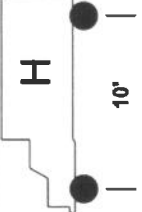
This calculation is repeated for each bridge of a truck

$$W = 500 \left(\frac{LN}{N-1} + 12N + 36 \right)$$

Where:

- W = the overall gross weight on any group of two or more consecutive axles to the nearest 500 pounds
- L = the distance in feet between the outer axles of any group of two or more consecutive axles
- N = the number of axles in the group under consideration

When using the formula instead of the table, if the value is ends in 250 or 750, round down



For Full Trucks:

L = 10 feet

N = 2 axles

W = 500[10*2/(2-1)+12*2+36] = 40,000 pounds

W = 40,000 pounds

3-45

Note: Single axle limit.

$$W = 500 \left(\frac{LN}{N-1} + 12N + 36 \right)$$

Where:

- W = the overall gross weight on any group of two or more consecutive axles to the nearest 500 pounds
- L = the distance in feet between the outer axles of any group of two or more consecutive axles
- N = the number of axles in the group under consideration

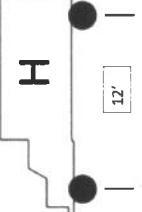
For Full Trucks:

L = 12'

N = 2 axles

W = 500[12*2/(2-1)+12*2+36] = 42,000 pounds

W = 40,000 pounds controls.



For Full Trucks:

L = 12'

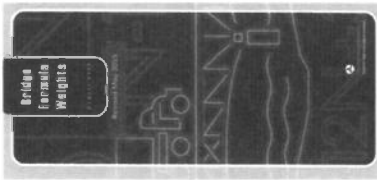
N = 2 axles

W = 500[12*2/(2-1)+12*2+36] = 42,000 pounds

W = 40,000 pounds controls.

3-46

Tabular form of Bridge Weight Formula



See Bridge Weight Formula Table at back of workbook

3-47

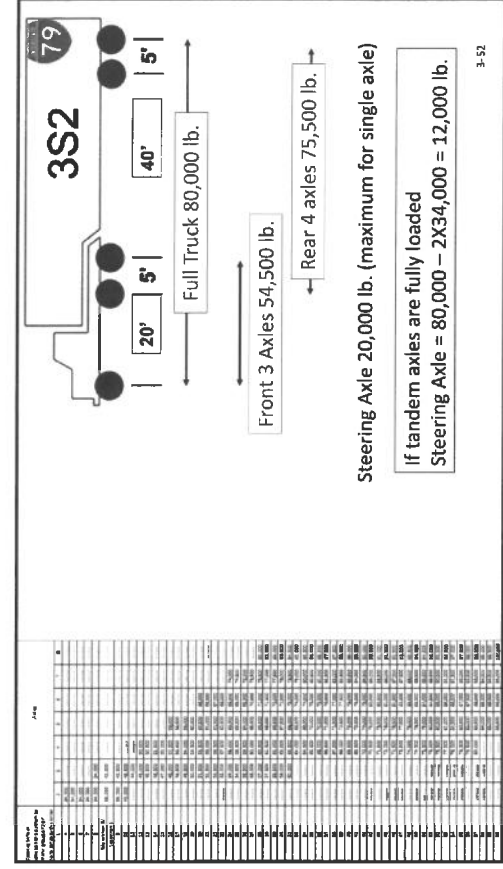
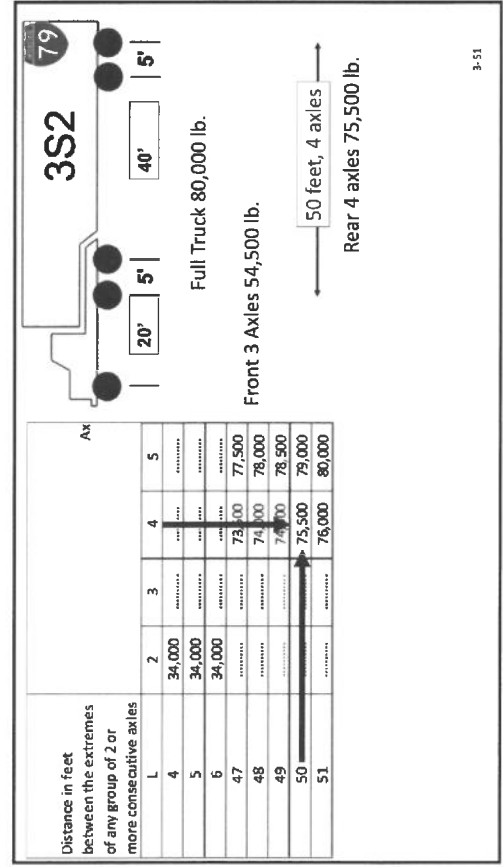
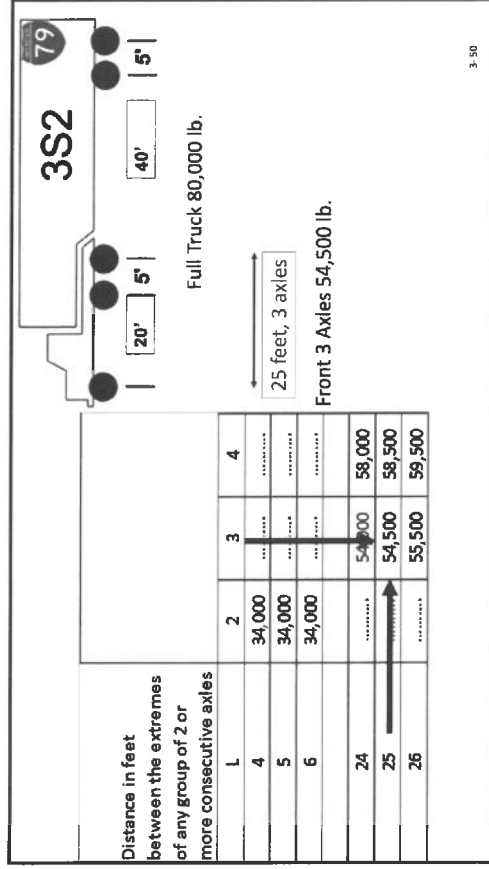
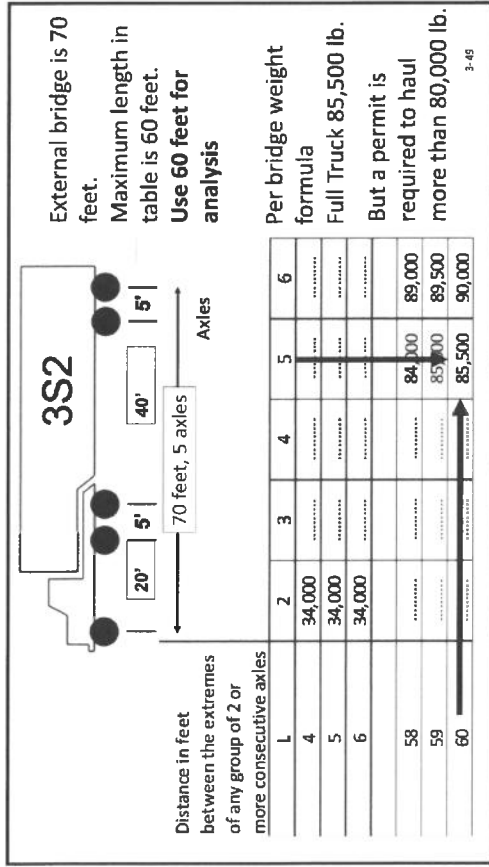
Distance in feet between the extremes of any group of 2 or more consecutive axles

L	2	3
4	34,000	
5	34,000	
6	34,000	
7	34,000	
8	34,000	34,000
More than 8/ Less than 9	38,000	42,000
9	38,000	42,500
10	40,000	43,500
11		44,000
12		45,000

40,000 lb.



3-48



Tire Load Limits

- The load on each tire cannot exceed the rated capacity for the tire.
- Major safety issue!!!!



<http://106.photobucket.com/albums/m254/trainwrm/trucking009.jpg>

3-57

Tires

Tire Load Ratings

- **Manufacturer limits**
 - GVW
 - Tire Load Rating
- **Tire Load Rating**—maximum safe weight a tire can carry at a specified pressure, stated on the side of each tire
 - Rating varies for single vs dual axle



85-E

Tire Load Ratings

Historically based on number of
plies to define load ratings

Load capacity varies with tire pressure

Tire Size Designation		Load Index (kg/lbs) at various Cold Inflation Pressures (kPa/psi). Pressure Listed is the Minimum for the Load									
Tire Size Designation	Load Limit (kg/lbs)	205/75R22.5					RADIAL TIRE				
		1600	1800	2000	2200	2400	1600	1800	2000	2200	2400
295/75R22.5	USA/ECE	1600	1800	2000	2200	2400	1600	1800	2000	2200	2400
	DUAL	1600	1950	2000	2130	2220	2300	2380	2470	2575	2630
	INFL.	4055	4350	4540	4890	4890	5070	5197	5300	5440	5575
295/75R22.5	USA/ECE	2030	2130	2230	2340	2440	2030	2130	2230	2340	2440
	SINGLE	4600	4715	4840	4960	5105	5270	5440	5610	5790	5980
	INFL.	4600	4715	4840	4960	5105	5270	5440	5610	5790	5980

3-59

Example tire load capacities

Model	Load Capacity		Load Capacity	
	Single Thrust	Double Thrust	Single Thrust	Double Thrust
2565/75022.5	8175	1118	2565/75022.5	8175
2567/75024.5	8175	1118	2567/75024.5	8175
11524.5	6910	925	11524.5	6910
12562.5	6910	925	12562.5	6910
12564.5	7180	925	12564.5	7180

Tires

Tire Load Ratings

- In the US tire load ratings are molded into the sidewall



- Load rating is for single and dual application
- Tire pressure is specified

03 E

Tire Load Ratings

FMCSA
Part 393
PARTS AND ACCESSORIES NECESSARY FOR SAFE OPERATION
§ 393.75: Tires.

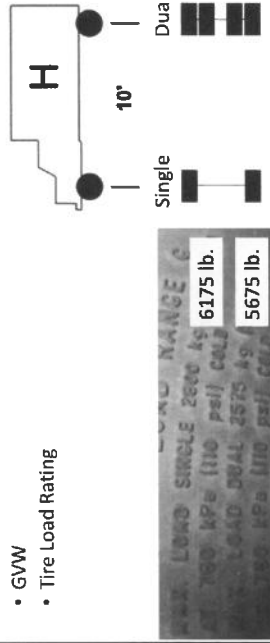
- a. No motor vehicle shall be operated on a highway with tires that are not marked with a load capacity rating.
- b. Any tire on the front of a heavy or light truck, or on a truck tractor, shall have a load capacity rating of at least 4,000 lb. when inflated to the rated air pressure.
- c. Any tire on the rear of a heavy or light truck, or on a truck tractor, shall have a load capacity rating of at least 4,000 lb. when inflated to the rated air pressure.
- d. Except as provided in paragraph 1, all tires on any motor vehicle shall have a rated gross weight capacity rating (GVWR) of at least 4,000 lb. when inflated to the rated air pressure.
- e. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- f. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- g. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- h. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- i. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- j. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- k. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- l. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- m. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- n. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- o. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- p. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- q. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- r. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- s. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- t. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- u. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- v. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- w. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- x. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- y. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.
- z. The GVWR shall be marked on the tire sidewall, or on a placard in the vehicle, or on a label in the vehicle, or on a label in the vehicle.

1. The vehicle is being operated under the terms of a special permit issued by the State, and
2. The vehicle is being operated at a reduced speed as a condition of the permit.

3-61

Tires

- Manufacturer Limits
- GVW
- Tire Load Rating
- Rating varies for single vs dual axle



Allowable Weight Based on Tire Ratings

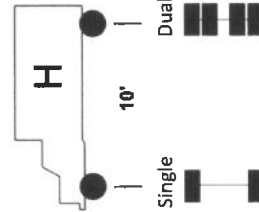
6175 lb.
 2 x 6175 lb.
 12,350 lb.

5675 lb.
 4 x 5675 lb.
 22,700 lb.

3-62

Tire Limits vs Code GVW

Tires



Allowable Weight Based on Tire Ratings
 12,350 lb.

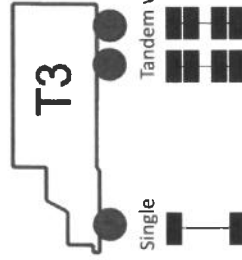
Allowable Weight Based on Code
 35,050 lb.
 40,000 lb.
 40,000 lb.
 40,000 lb.

US, WV, and Designated County Routes
 Interstate
 County Routes

Tires Control

3-63

Tires



Allowable Weight Based on Tire Ratings
 6175 lb.
 2 x 6175 lb.
 12,350 lb.

5675 lb.
 8 x 5675 lb.
 45,400 lb.

3-64

Tire Limits vs GVW

Single

12,350 lb.

Tandem with Dual tires

45,400 lb.

Interstate

47,000 lb.

County Routes

66,000 lb.

GVW

57,750 lb.

Allowable Weight Based on Tire Ratings

US, WV, and Designated County Routes

Bridge Formula controls on Interstate and Tires control all other roads

3-65

Tires

Single

6175 lb.

2 x 6175 lb.

12,350 lb.

Tridem with Dual tires

5675 lb.

12 x 5675 lb.

68,100 lb.

Allowable Weight Based on Tire Ratings

3-66

Tire Limits vs GVW

Single

12,350 lb.

Tridem with Dual tires

68,100 lb.

Interstate

77,000 lb.

County Routes

71,500 lb.

GVW

80,450 lb.

Allowable Weight Based on Tire Ratings

US, WV, and Designated County Routes

Bridge Formula controls on Interstate and WV Code control all other roads

3-67

Tires

Single

6175 lb.

2 x 6175 lb.

12,350 lb.

Quadem with Dual tires

5675 lb.

16 x 5675 lb.

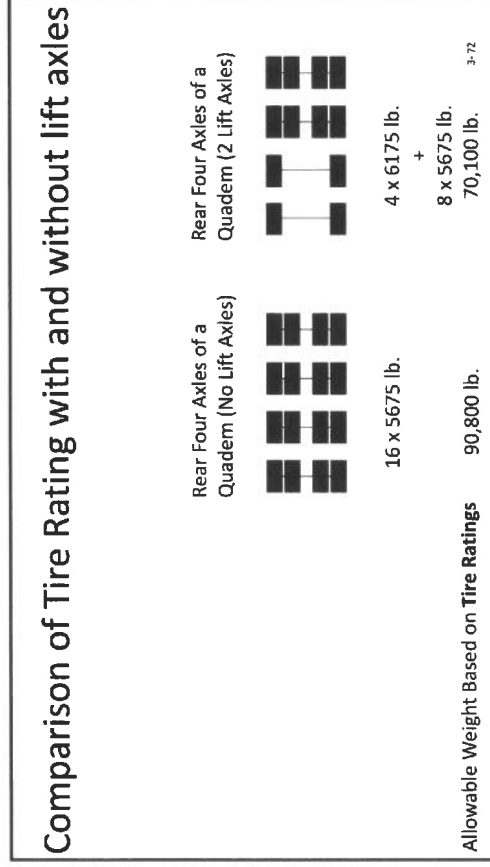
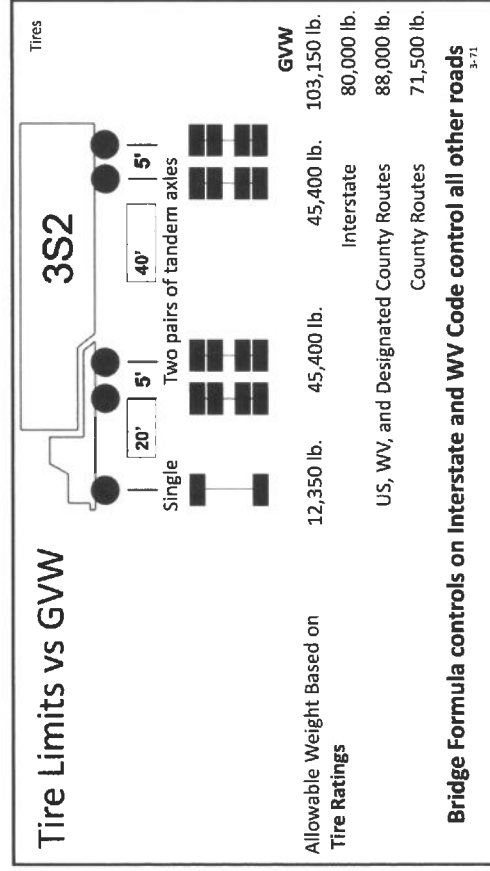
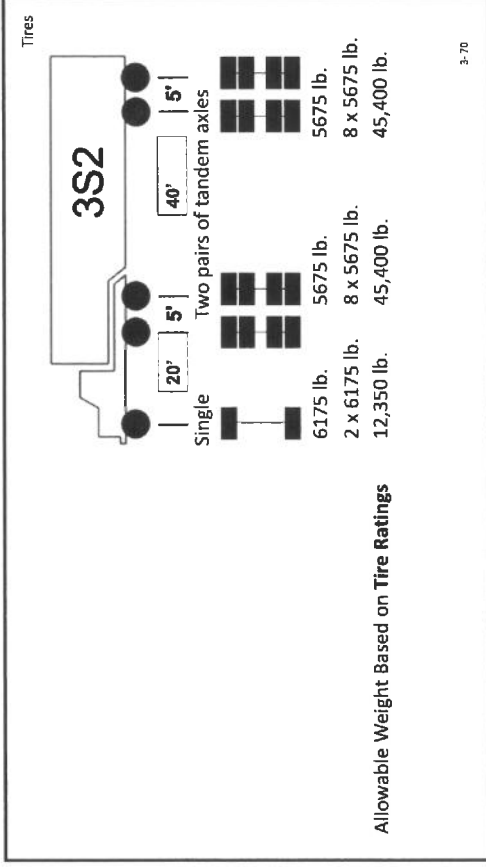
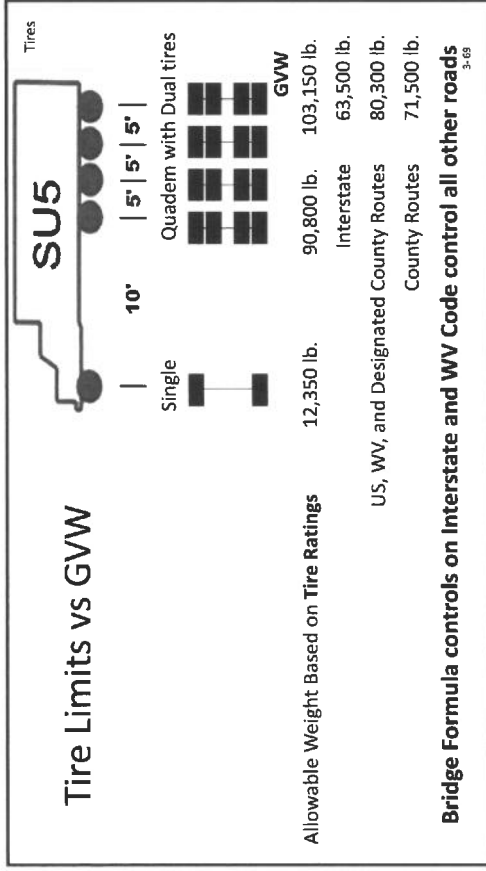
90,800 lb.

Allowable Weight Based on Tire Ratings

3-68

Truck Weights: Know Your Limits 2019

33



Super Single Tires – a tire with a load rating of approximately two times the rating for a conventional tire

T3

Single
6175 lb.
2 x 6175 lb.
12,350 lb.

Tandem with super single tires
11,000 lb.
4 x 11,000 lb.
44,000 lb.

Allowable Weight Based on Tire Ratings

<http://www.ford.com/2013/03/03/18-201-145-1m>

3-73

Time to refresh yourself.

- Your turn to workout examples next.

HELP! THEY ARE KIDNAPPING ME

I'LL SAVE YOU!

<http://webpage.com/unsolicited/asker/2013/03/03/18-201-145-1m>

3-74

Session Content

- Overweight permits
- Terminology
 - Vehicles
 - Axes
- Rules for the Roads
 - WV
 - Interstate
- Tires
- Examples

3-75

Examples DOH trucks

- Ford F550 – Class H – 2 axle
- Hino 380 – Class H – 2 axle
- Mac – Class T3 – 3 axle

3-76

ROAD RULES

Interstate

Front axle	20,000 lb.	Axle limits
Rear axle	20,000 lb.	control
External Bridge	40,000 lb.	



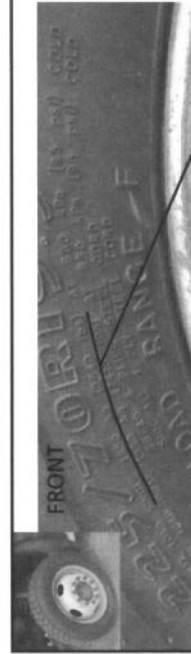
Weight Limit
40,000



Front axle 20,000 lb.



MANUFACTURE LIMITS	
GVWR	17,950 lb.
Front GAWR	7,000 lb.
Rear GAWR	13,660 lb.



TIRE LIMITS	
Front single	3,640 lb.
Rear dual	3,415 lb.



LOAD LIMIT ON AXLE DUE TO TIRE LIMITS

Front single	$2 \times 3,640 = 7,280 \text{ lb.}$
Rear dual	$4 \times 3,415 = 13,660 \text{ lb.}$



MANUFACTURE LIMITS		LOAD LIMIT ON AXLE DUE TO TIRE LIMITS		MAXIMUM LOAD (SELECT MINIMUM)
GVWR	17,950 lb.			
Front GAWR	7,000 lb.	Front single	2 x 3,640 = 7,280 lb.	Front 7,000 lb.
Rear GAWR	13,660 lb.	Rear dual	4 x 3,415 = 13,660 lb.	Rear 13,660 lb.
				TOTAL 20,660 lb.

NOTE
GVWFF



17,950 lb. so the axles cannot be fully loaded

COMPARE VEHICLE AND TIRE LIMITS TO ROAD RULES



ROAD RULES
 Truck Type H (SU 2, 2 axle)
 Interstate
 Axle 20,000 lb. single axles
 GVW 40,000 lb. Bridge Weight formula

West Virginia Regulations
 Same limits apply to all H trucks for all roads in West Virginia other than Interstate
 Axle 20,000 lb.
 GVW 40,000 lb.

Vehicle limits:
 Front 7,000 lb.
 Rear 13,660 lb.
 GVWR 17,950 lb.

Vehicle limits are below road rules.

ROAD RULES

Interstate
 Front axle 20,000 lb. limits
 Rear axle 20,000 lb. limits
 External Bridge 40,000 lb. control

50 **7** **65** **9**

H

Front axle 20,000 lb.
 GVW 40,000 lb

INFO BY ACE TRUCK EQUIPMENT CO.

DATE OF MFR. BLD	10	YR	2009
GVWR	14,950	KG	33,050
GVW-FRONT	KG	13,200	LB
GVW-R	11,922.5N	IMMS	830
(120	PSI COLD	SINGLE	LB
GVW-INTERMEDIATE (1)	KG	13,200	LB
WITH	IMMS	830	PSI COLD
GVW-INTERMEDIATE (2)	KG	13,200	LB
WITH	IMMS	830	PSI COLD
GVW-FRONT	KG	13,200	LB
GVW-R	11,922.5N	IMMS	830
(120	PSI COLD	SINGLE	LB
GVW-INTERMEDIATE (1)	KG	13,200	LB
WITH	IMMS	830	PSI COLD
GVW-INTERMEDIATE (2)	KG	13,200	LB
WITH	IMMS	830	PSI COLD

MANUFACTURE LIMITS
 GVWR 33,000 lb.
 Front GAWR 13,200 lb.
 Rear GAWR 23,000 lb.

TIRE LIMITS

Front single 6,610 lb.
 Rear dual 6,005 lb.

LOAD LIMIT ON AXLE DUE TO TIRE LIMITS
 Front single 2 x 6,610 = 13,220 lb.
 Rear dual 4 x 6,005 = 24,020 lb.

MANUFACTURE LIMITS

GVWR	33,000 lb.
Front GAWR	13,200 lb.
Rear GAWR	23,000 lb.

LOAD LIMIT ON AXLE DUE TO TIRE LIMITS

Front single	2 x 6,610 = 13,220 lb.
Rear dual	4 x 6,005 = 24,020 lb.

MAXIMUM LOAD (SELECT MINIMUM)

Front	13,200 lb.
Rear	23,000 lb.
TOTAL	36,200 lb.

NOTE

GVWR 33,000 lb. so the axles cannot be fully loaded



COMPARE VEHICLE AND TIRE LIMITS TO ROAD RULES



ROAD RULES

Truck Type H (SU 2, 2 axle)

Interstate	20,000 lb. single axles
GVW	40,000 lb. Bridge Weight formula

West Virginia Regulations

Same limits apply to all H trucks for all roads in West Virginia other than Interstate

Axle	20,000 lb.
GVW	40,000 lb.

Vehicle limits:

Front axle and GVWR are below roads rules.

Front	13,200 lb.
Rear	23,000 lb.
GVWR	33,000 lb.

Rear axle is greater than single axle limit.

Allowable loads for all limits

Front	13,200 lb.
Rear	20,000 lb.
GVW	33,200 lb.



ROAD RULES

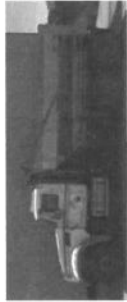
Interstate

Front axle	20,000 lb.
Tandem	34,000 lb. limits
External Bridge	54,000 lb. control

50 7 65 9/1



Front axle 20,000 lb.
GVW limit 66,000 lb.



MANUFACTURE LIMITS

GVWR	64,180 lb.
Front GAWR	18,180 lb.
Rear GAWR 2 x 23,000 =	46,000 lb.

lb.

GVWR	64180
GAWR - FRONT AXLE	18180
GAWR - 1ST INTERMEDIATE AXLE	23000
GAWR - 2ND INTERMEDIATE AXLE	0
GAWR - 3RD INTERMEDIATE AXLE	0
GAWR - 4TH INTERMEDIATE AXLE	0
GAWR - 5TH INTERMEDIATE AXLE	0
GAWR - REAR AXLE	23000

MANUFACTURE LIMITS		LOAD LIMIT ON AXLE DUE TO TIRE LIMITS		MAXIMUM LOAD (SELECT MINIMUM)	
GVWR					
Front GAWR	23,000 =	Front single	$2 \times 10,000 = 20,000$ lb.	Front	18,180 lb.
Rear GAWR	$2 \times 23,000 =$	Rear dual tandem	$8 \times 6,005 = 48,040$ lb.	Rear	45,000 lb.
				TOTAL	64,180 lb.

NOTE
GVWR and GAWR control

Route Example

- A. Know Your Truck
 1. Axle Configuration
 2. Tire Rating
- B. Know Your Route
 1. What is the lowest limit Highway?
 2. Are there any Load Restricted Bridges?
- C. Axle Limitations
 1. Interstate
 2. Tires

3-52

Route Example

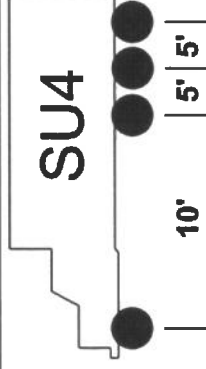
- Need to haul horse manure from K n M Quarter Horses in Mooresville WV to Rich's Farms past the state line on Rt 857.



3.93

For more information, please contact: info@horsesoft.com or call 1-800-451-4511

- (1) Know Your Truck**
 - (1) Axle Configuration
 - (2) Tire Rating
- (2) Know Your Route**
 - (1) What is the lowest
 - (2) Are there any Load
- (3) Axle Limitations**
 - (1) Interstate
 - (2) Tires



G Rated Tires

Single Tires on Steering Axle and Dual Tires for rear 3 Axles

6175 lb.

5675 lb.

(1) Know Your Truck

- (1) Axle Configuration
 - (2) Tire Rating
- (2) Know Your Route**
- (1) What is the lowest limit Highway?
 - (2) Are there any Load Restricted Bridges?
- (3) Axle Limitations**
- (1) Interstate
 - (2) Tires

Starting point (blue) and ending point (red)

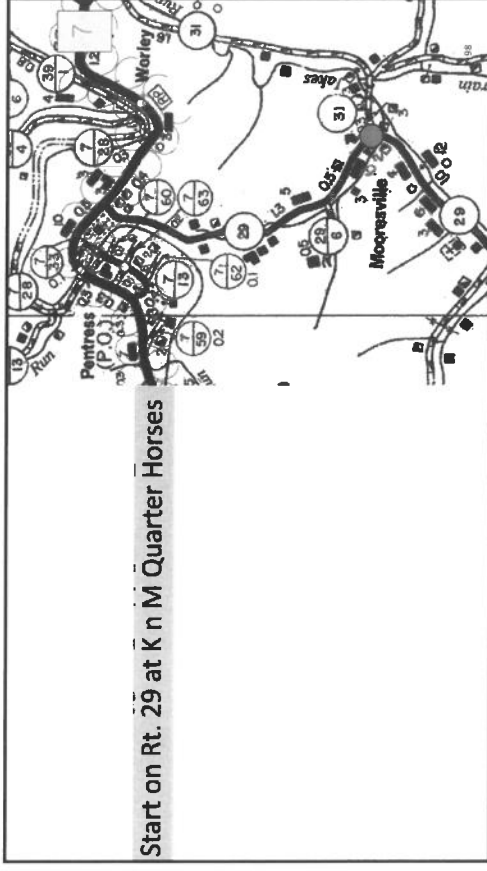


3-02

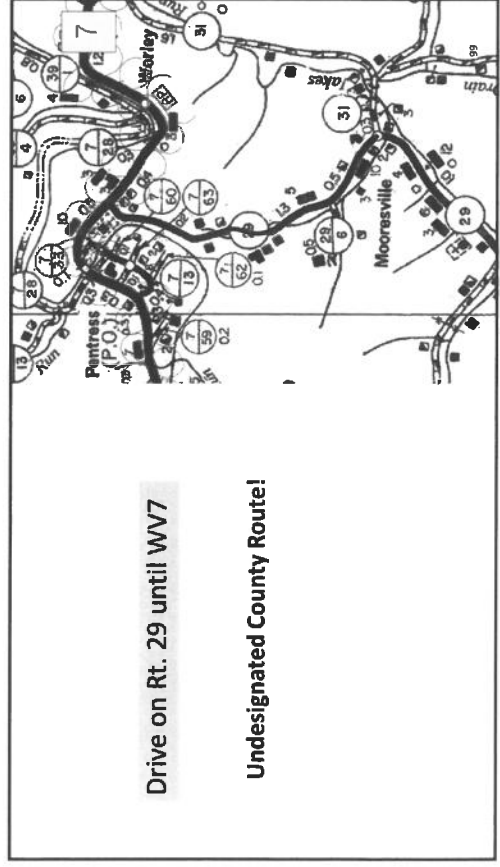
From the State Line on 857 to Mooresville WV

Start on Rt. 29 at K n M Quarter Horses
 Drive on Rt. 29 until WV7
 Drive on WV7 until Load Limited Bridge
 Load Limited Bridge on WV7
 Continue on WV7 until I79 (Exit 155)
 Drive on I79 until I68
 Drive on I68 until Rt. 857 (Exit 10)
 Drive on Rt. 857 until State Line
 End at State Line

3-97

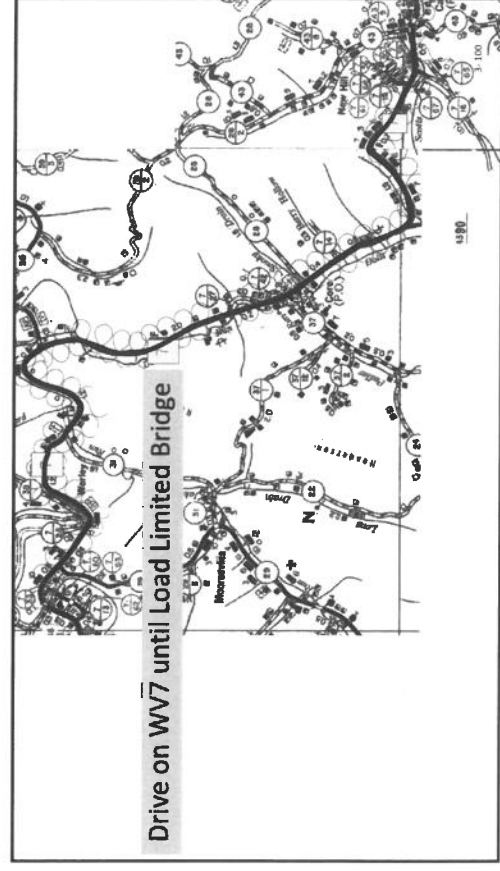


Start on Rt. 29 at K n M Quarter Horses

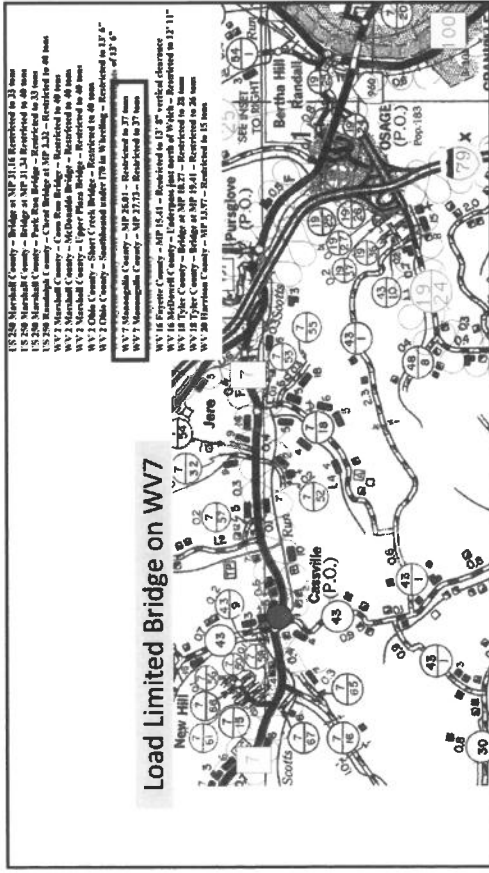


Drive on Rt. 29 until WV7

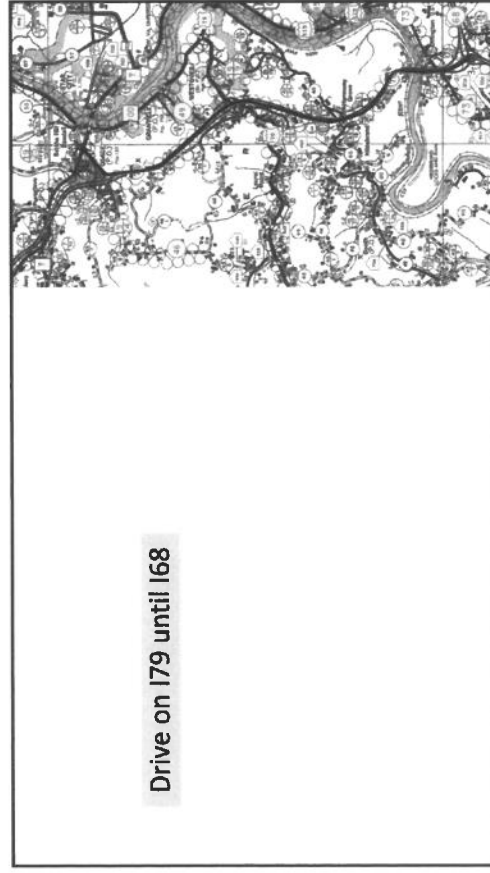
Undesignated County Route!



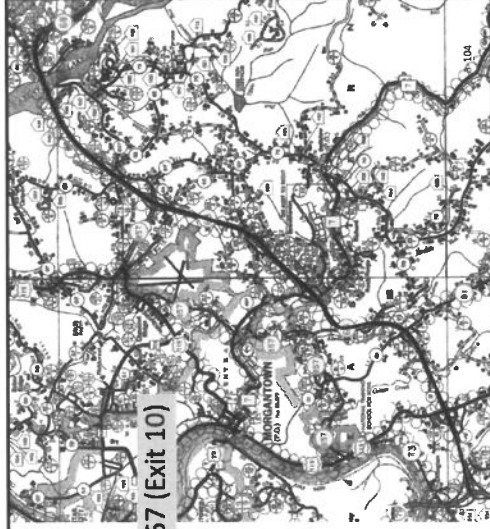
Drive on WV7 until Load Limited Bridge



Continue on WV7 until I79 (Exit 155)



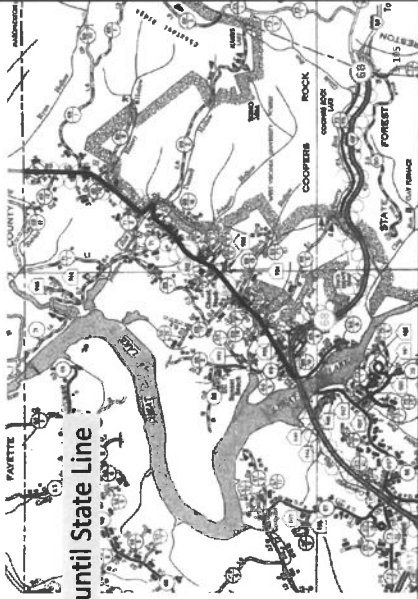
Drive on I79 until I68



Drive on I68 until Rt. 857 (Exit 10)

Designated County Route!

Drive on Rt. 857 until State Line



End at State Line



(1) Know Your Truck

- (1) Axle Configuration
- (2) Tire Rating

(2) Know Your Route

- (1) What is the lowest limit Highway?
- (2) Are there any Load Restricted Bridges?

(3) Axle Limitations

- (1) Interstate
- (2) Tires

County Route is the Lowest Restricted
(Non Interstate) Route...

LEGAL WEIGHT LIMITS

COUNTY ROUTES DESIGNATED
FOR 60,000 POUNDS

LEGAL WEIGHT	AXLE WEIGHT
40,000	11
60,000*	13
65,000*	20
65,000*	24
65,000*	30

* 10% tolerance applies

NOTE: WV CODE SETS A SINGLE AXLE WEIGHT
LIMIT OF 20,000 POUNDS. THERE IS NO
TOLERANCE ON THIS LIMIT.

3-107

(1) Know Your Truck

- (1) Axle Configuration
- (2) Tire Rating

(2) Know Your Route

- (1) What is the lowest limit Highway?
- (2) Are there any Load Restricted Bridges?

(3) Axle Limitations

- (1) Interstate
- (2) Tires



26 T = 52,000 lb. so Bridge Limit Controls GVW

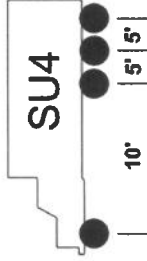
3-108

... But on Interstate ...

- (1) Axle Configuration
(2) Tire Rating

(2) Know Your Route

- (1) What is the lowest limit Highway?
- (2) Are there any Load Restricted Bridges?



Distance in feet between the extremes of any group of 2 or more consecutive assets	1	2	3	4	5	6
4		34,000		12		1,000,000
5		34,000		12		1,000,000
6		34,000		12		1,000,000
19			50,000	50,000	60,000	
20				55,500	50,500	66,000
21				56,000	61,000	66,500

55.500 lb. is the GVW!!!

3-109

(1) Know Your Truck

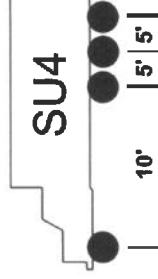
- (1) Axle Configuration
(2) Tire Rating

(2) Know Your Route

- (1) What is the lowest limit Highway? Front Axle = 2 x 6175 = 12,350 lb.
- (2) Are there any Load Restricted Bridges? Rear Tridem = 12 x 5675 = 68,100 lb.
- Tire Limit

(3) Axle Limitations

- (1) Interstate
(2) Tires



	Distances in feet between the extremes of any group of 2 or more consecutive axes						Axes					
	L	2	3	4	5	6		2	3	4	5	6
1		34,000	77,000	127,000	180,000	235,000	1	34,000	77,000	127,000	180,000	235,000
2		34,000	77,000	127,000	180,000	235,000	2	34,000	77,000	127,000	180,000	235,000
3		34,000	77,000	127,000	180,000	235,000	3	34,000	77,000	127,000	180,000	235,000
4		34,000	77,000	127,000	180,000	235,000	4	34,000	77,000	127,000	180,000	235,000
5		34,000	77,000	127,000	180,000	235,000	5	34,000	77,000	127,000	180,000	235,000
6		34,000	77,000	127,000	180,000	235,000	6	34,000	77,000	127,000	180,000	235,000
7		34,000	77,000	127,000	180,000	235,000	7	34,000	77,000	127,000	180,000	235,000
8		34,000	77,000	127,000	180,000	235,000	8	34,000	77,000	127,000	180,000	235,000
9		39,000	42,000	45,000	48,000	51,000	9	39,000	42,000	45,000	48,000	51,000
10		43,500	44,000	44,500	45,000	45,500	10	43,500	44,000	44,500	45,000	45,500
11		44,000	44,500	45,000	45,500	46,000	11	44,000	44,500	45,000	45,500	46,000

1.2. LOAD SINGLE 2800 Lb 1875 Nbf
 AT 760 kPa (110 psi) GOLF
 1.3. LOAD DUAL 2575 Lb 1875 Nbf
 AT 760 kPa (110 psi) GOLF

52,000 lb. from the Restricted Bridge Limit governs

this route from K n M Quarter Horses to the State Line.



http://8753575591655-of-09842374-eventingnational.netdna-cdn.com/wp-content/uploads/2014/02/smilting_horse1.jpg

3-111

Summary

- **Vehicle Weight Limits:**
 - **Vehicle – Vehicles Tag identifies:**
 - Gross Vehicle Weight Rating (GVWR)
 - Gross Combination Weight Rating (GCWR)
 - Gross Axle Weight Rating (GAWR)
 - **Tires**
 - Load rating molded into tire side wall
 - **Axle load**
 - **Minimum of:**
 - Number or tires on axle times tire load rating
 - GAWR
- **Maximum weight the truck can carry**
 - **Minimum of**
 - Total loads on axles
 - GVWR or GCWR

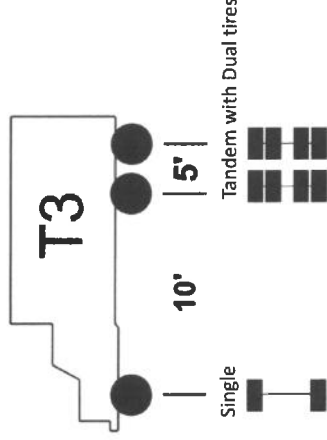
3-112

Example Exercise 1

On Interstate

Tire Info:

Dual Tires on Rear
Rated for 6065 lb. Dual
Rated for 6610 lb. Single



3-113

Solution

- On Interstate
 - Tandem Limit = 34,000 lb.
 - Single Axle Limit = 20,000 lb.
- Use Table to determine GVW
 - $L = 10 + 5 = 15$
 - $N = 3$
 - GVW = 47,000 lb.

Distance in feet between the centers of any group of 2 or more consecutive axles

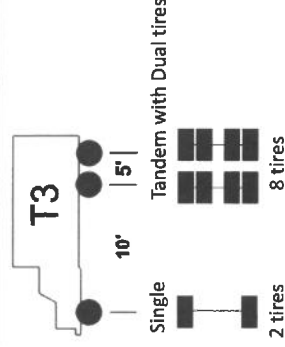
L	2	3	4
4	34,000		
5	34,000		
14		47,000	51,500
15		47,000	52,000
16		48,000	52,500

3-114

Solution

- On Interstate
 - Tandem Limit = 34,000 lb.
 - Single Axle Limit = 20,000 lb.
- Use Table to determine GVW
 - $L = 10 + 5 = 15$
 - $N = 3$
 - GVW = 47,000 lb.
- Tire Limit
 - Front Axle = $2 \times 6610 = 13,220$ lb.
 - Rear Tandem = $8 \times 6065 = 48,520$ lb.
 - Total = $13,220 + 48,520 = 61,740$ lb.

GVW limit of 47,000 lb. controls



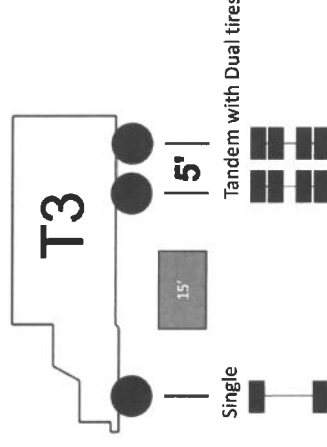
3-115

Exercise 1

On Interstate

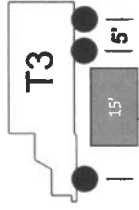
Tire Info:

Dual Tires on Rear
Rated for 6125 lb. Dual
Rated for 6750 lb. Single



3-116

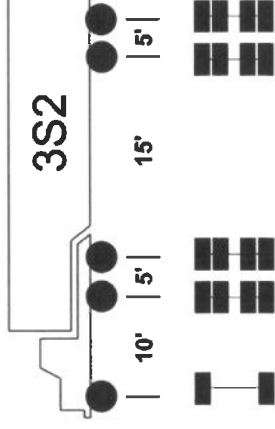
- Interstate



On County Route
(not designated)

Tire Info:

Dual Tires on Rear 4 Axles
Rated for 6065 lb. Dual
Rated for 6610 lb. Single



3-118

- On County Route
- Single Axle Limit

= 20,000 lb.

$$= 65,000 + 10\% = 71,500 \text{ lb.}$$

**COUNTY ROUTES DESIGNATED
FOR 65,000 POUNDS**

LEGAL WEIGHT (POUNDS)	
40,000	11
60,000*	17
65,000*	20.4
65,000*	20.2
65,000*	20.2

• 10% tolerance needed

NOTE: WV CODE SETS A SINGLE AXLE WEIGHT LIMIT OF 20,000 POUNDS, THERE IS NO TOLERANCE ON THIS LIMIT.

3-119

- On County Route
- Single Axle Limit

$$= 20,000 \text{ lb.}$$

• 352

- **GVW**

Fire Limit

- Front Axle

- Rear Tractor Tandem

- **Rear Trailer Tandem**

- Total

GVW limit of 71,500 lb. controls

Rated for 6065 lb. Dual

Rated for 6610 lb. Single

3-120

Exercise 2

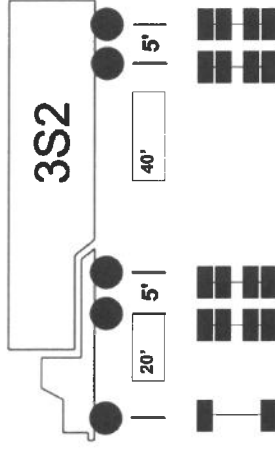
On WV7

Tire Info:

Dual Tires on Rear 4 Axles

Rated for 6247 lb. Dual

Rated for 6522 lb. Single



3-121

Solution

- On County Route
 - Single Axle Limit = 20,000 lb.
 - 3S2 = 65,000 + 10% = 71,500 lb.
 - GVW
- Tire Limit
 - Front Axle = 2 x 6610 = 13,220 lb.
 - Rear Tractor Tandem = 8 x 6065 = 48,520 lb
 - Rear Trailer Tandem = 8 x 6065 = 48,520 lb
 - Total = 13,220 + 48,520 + 48,520 = 110,260 lb.

GVW limit of 71,500 lb. controls

3-122

Exercise 3

On Interstate

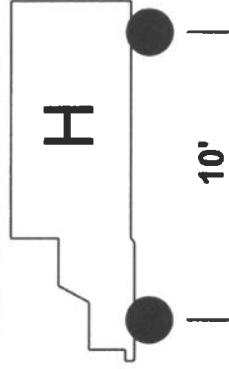
Tire Info:

Super Single Tires on Rear Axle

Rated for 6065 lb. Dual

Rated for 6610 lb. Single

Rated for 11,000 lb. Super Single



3-123

Solution

3-124

Exercise 4

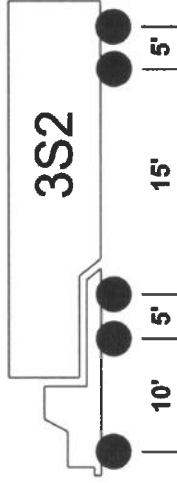
On Designated County Route
Tire Info:

Super Single Tires on Rear 4 Axles

Rated for 6065 lb. Dual

Rated for 6610 lb. Single

Rated for 11,000 lb. Super Single



3-125

Solution

3-126

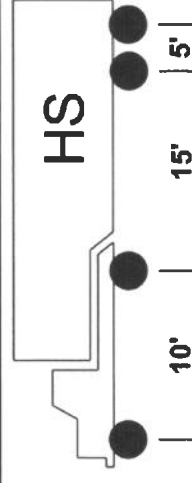
Exercise 5

On Interstate
Tire Info:

Dual Tires on Rear 3 Axles

Rated for 6065 lb. Dual

Rated for 6610 lb. Single



3-127

Solution

- On Interstate
 - Single Axle Limit = 20,000 lb.
 - Tandem Axle Limit = 34,000 lb.

3-128

Exercise 6

Analyze for axle in raised and in load carrying positions

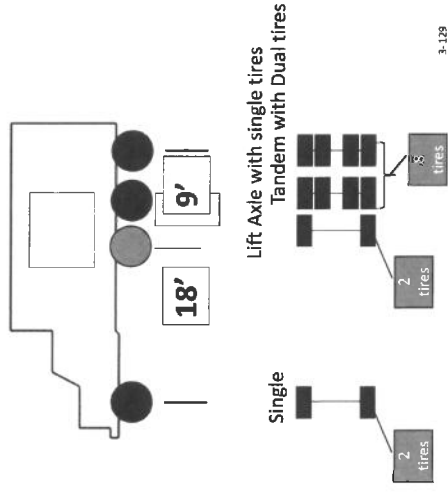
On US Route

Tire Info:

Dual Tires on Rear

Rated for 6065 lb. Dual

Rated for 6610 lb. Single



3-129

Solution

3-130

Session Content

- Overweight permits
- Terminology
 - Vehicles
 - Axles
- Rules for the Roads
 - WV
 - Interstate
- Tires
- Examples



THE WV TRUCK WEIGHT WORKSHOP

<http://www.wv.gov/transportation/weightlimits/>

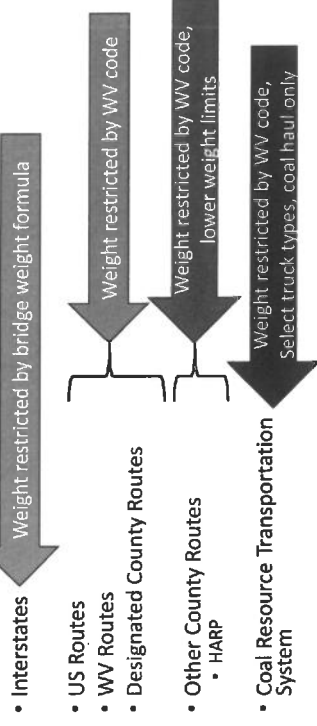
3-131

Session 4 Coal Resource Transportation System



4-1

Highway Types



4-2

West Virginia Sign Routes Types Exceptions

Coal Resource Transportation System

Trucks with a coal haul permit can operate with heavier loads on designated routes

And when hauling coal!!

4-3

CRTS Designated Routes

- Coal Haul Trucks
 - Must have permit to haul at special weight limits
 - Permit only for hauling coal, no other materials
 - Permit only available for certain truck configurations
- Other Trucks – without coal haul permit
 - Route designation weight limits apply

4-4

CRTS Signs



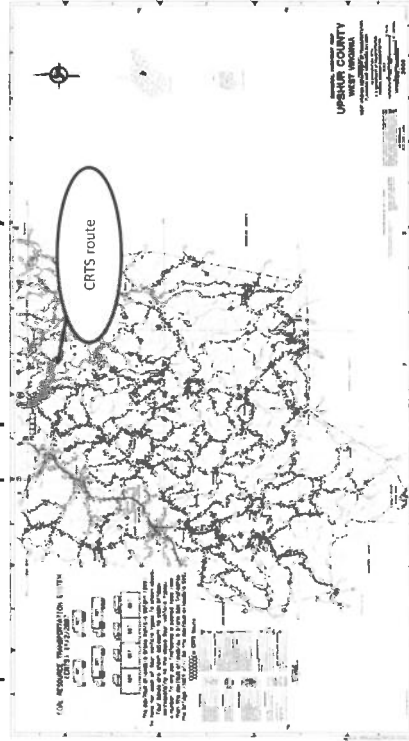
4-5

CRTS Routes In West Virginia



4-6

Example CRTS map Upshur County



4-7

Highway types grouped by truck weight limits

- Interstate
- US Route System
- WV Numbered Highways
- WV Numbered County Routes (Designated)
- WV Numbered County Routes (All Others)

May be designated as CRTS

4-8

Coal Haul Trucks

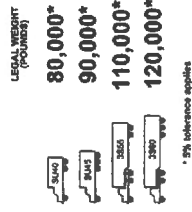
- Specific Truck types that operate by permit on the Coal Resource Transportation System



<https://www.jhrincorp.com/permits/states/truckpermits.html>

CRTS

LEGAL WEIGHT LIMITS COAL RESOURCE TRANSPORTATION ROADS (CRTS) SYSTEM

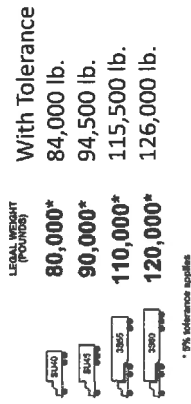


4-9

Permitted Coal Haul Trucks

- Single axle load limit of 20,000 lb. does not apply
- Tire load limits can be adjusted based on speed

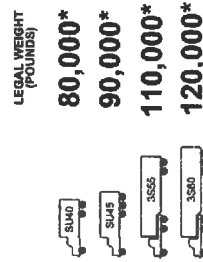
LEGAL WEIGHT LIMITS COAL RESOURCE TRANSPORTATION ROADS (CRTS) SYSTEM



4-10

LEGAL WEIGHT LIMITS

COAL RESOURCE TRANSPORTATION ROADS (CRTS) SYSTEM



- SU40 – single unit truck with single steering axle and tandem load axle. Permitted to have a GVW of 80,000 lb. (40 tons)
- SU45 – single unit truck with single steering axle and tandem load axle. Permitted to have a GVW of 90,000 lb. (45 tons)
- 3S55 – Semi truck with single steering axle and tridem load axle on tractor and tandem axle on trailer. Permitted to have a GVW of 110,000 lb. (55 tons)
- 3S60 – Semi truck with single steering axle and tandem load axle on tractor and tridem axle on trailer. Permitted to have a GVW of 120,000 lb. (60 tons)

4-11

Tires

Assume tires are G load rated



	Single	Tandem with Dual tires
6175 lb.	6175 lb.	5675 lb.
2 x 6175 lb.	2 x 6175 lb.	8 x 5675 lb.
12,350 lb.	12,350 lb.	45,400 lb.

Allowable Weight Based on Tire Ratings

4-12

Tires

SU-40

Single

Tandem with Dual tires

Assume tires are G load rated

Allowable Weight Based on Tire Ratings

12,350 lb.

45,400 lb.

57,750 lb.

84,000 lb.

GVW

CRTS

4-13

Tires Control

Tires

SU-40

Single

Tandem with Dual tires

Assume steering tires are G load rated
Load tires are L load rated

Tire Ratings

6175 lb.

2 x 6175 lb.

12,350 lb.

8270 lb.

8 x 8270 lb.

66,160 lb.

Allowable Weight Based on Tire Ratings

4-14

Tires

SU-40

Single

Tandem with Dual tires

Tire Limits vs GVW

Assume steering tires are G load rated
Load tires are L load rated

Allowable Weight Based on Tire Ratings

12,350 lb.

66,160 lb.

78,510 lb.

84,000 lb.

GVW

CRTS

4-15

Tires control

Tires

SU-40

Single

Tandem with Dual tires

Assume all tires are L load rated
315/80/R22.5

Steering axles generally limited
to 12,000 to 13,500 lb. max.
(not a legal limit.)

9090 lb.

2 x 9090 lb.

18,180 lb.

8270 lb.

8 x 8270 lb.

66,160 lb.

Allowable Weight Based on Tire Ratings

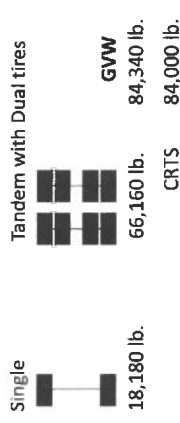
4-16

Truck Weights: Know Your Limits 2019

54

Assume all tires are L load rated
315/80/R22.5

Tires

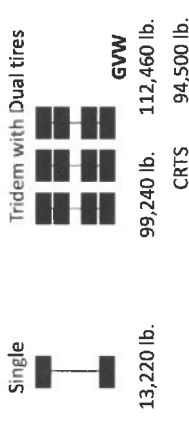


Allowable Weight Based on Tire Ratings

4-17

Assume steering tires are G load rated
Load tires are L load rated

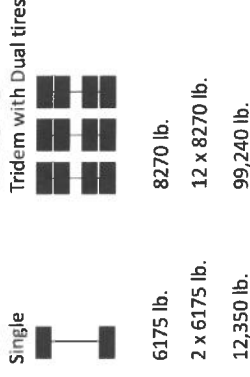
Tires



Allowable Weight Based on Tire Ratings

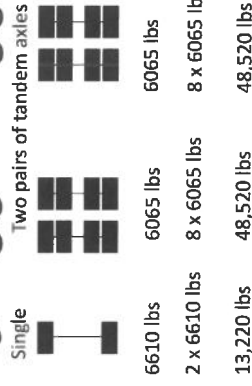
4-19

Tires



4-18

CRATS



Individual Tire Ratings

Allowable Weight Based on Tire Ratings

110,260 lbs

110,260 lbs

CRTS

3S-55

Single

Two pairs of tandem axles

Assume tires are G load rated

6175 lb.

5675 lb.

2 x 6175 lb.

8 x 5675 lb.

12,350 lb.

45,400 lb.

Allowable Weight Based on Tire Ratings

4-21

CRTS

3S-55

Single

Two pairs of tandem axles

Tire Limits vs GVW

Assume tires are G load rated

12,350 lb.

45,400 lb.

103,150 lb.

115,500 lb.

Allowable Weight Based on Tire Ratings

4-22

CRTS

3S-55

Single

Two pairs of tandem axles

Assume steering tires are G load rated
Load tires are H load rated

6175 lb.

6940 lb.

2 x 6175 lb.

8 x 6940 lb.

12,350 lb.

55,200 lb.

Allowable Weight Based on Tire Ratings

4-23

CRTS

3S-55

Single

Two pairs of tandem axles

Tire Limits vs GVW

Assume steering tires are G load rated
Load tires are H load rated

12,350 lb.

55,520 lb.

123,390 lb.

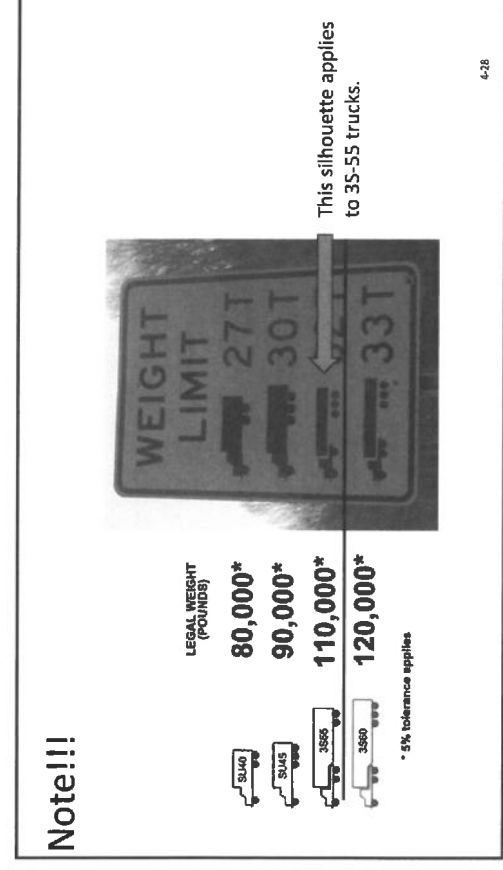
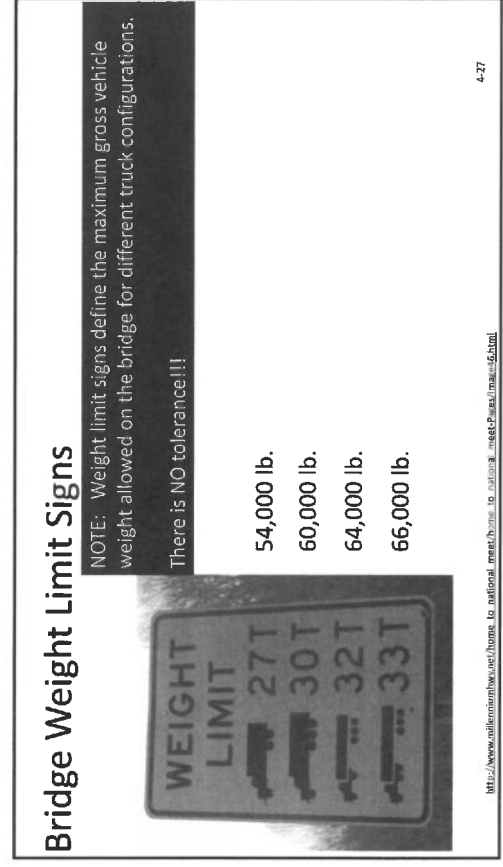
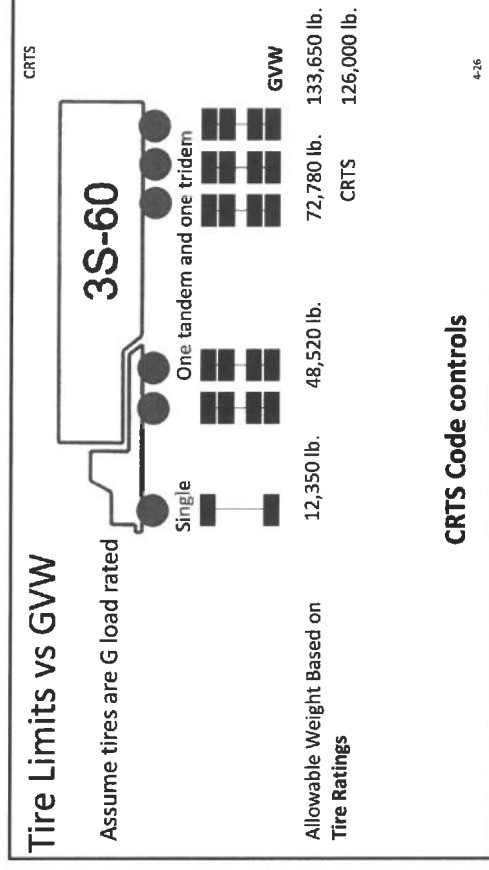
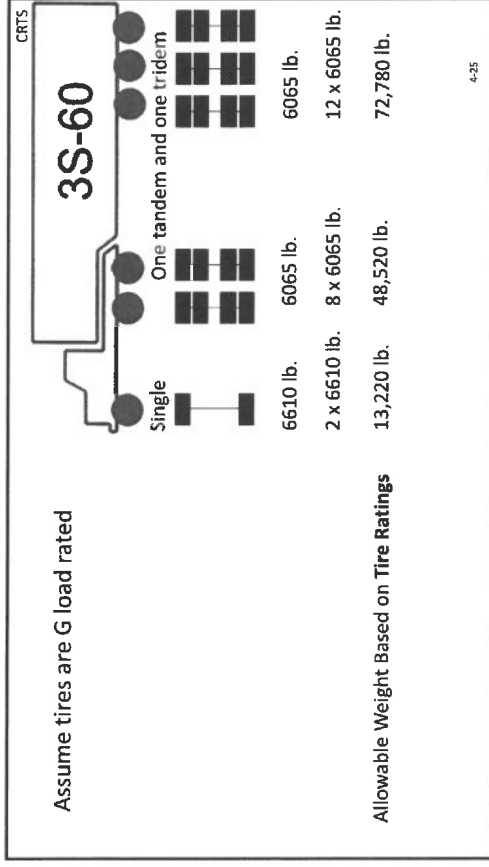
115,500 lb.

Allowable Weight Based on Tire Ratings

4-24

Truck Weights: Know Your Limits 2019

56

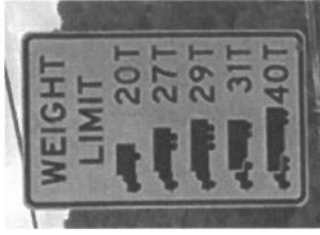


Note!!!

Bridge truck weight limit signs for coal haul trucks on CRTS sections have 4 silhouettes



Bridge truck weight limit signs for other trucks on other highways have 5 silhouettes



4-29

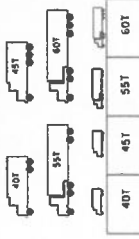
Hughes bridge



4-30

CRTS Weight Posted Bridges

COAL RESOURCE TRANSPORTATION SYSTEM (CRTS) 1/2/2013



The maximum allowable Gross Vehicle Weight (GVW) in tons for each of four vehicle types is shown above. Four boxes are shown adjacent to each bridge, corresponding to the above four vehicle types. A bridge is shown with a weight limit of 40T. A blank box indicates the bridge limit will be the maximum allowable GVW.

XXXXXX = CRTS Route



Example from Boone County

Maps Available at:

http://www.transportation.wv.gov/highways/programplanning/preliminary_engineering/Pages/CRTSMAPSANDDIRECTORIES.aspx

4-31

Exercise 1

On CRTS Route

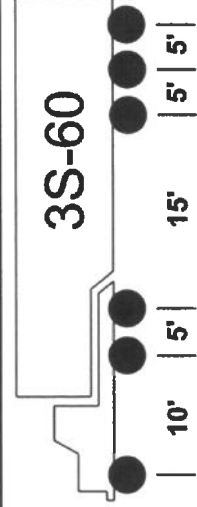
hauling sand

Tire Info:

Dual Tires on rear 5 Axles

Rated for 6065 lb. Dual

Rated for 6610 lb. Single



4-32

Solution

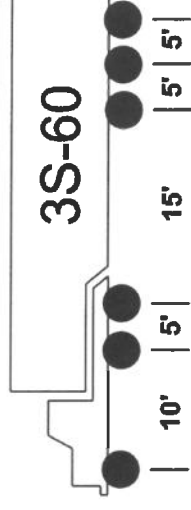
4-33

Exercise 2

On CRTS Route
hauling coal

Tire Info:

Dual Tires on rear 5 Axles
Rated for 6065 lb. Dual
Rated for 6610 lb. Single



4-34

Solution

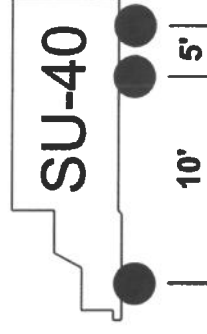
4-35

Exercise 3

On WV State Route

Tire Info:

Dual Tires on rear 2 Axles
Rated for 6065 lb. Dual
Rated for 6610 lb. Single



4-36

Solution

4-37

Exercise 4

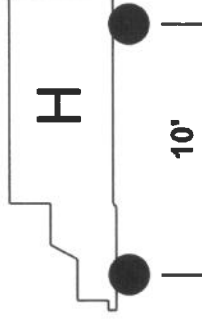
On CRTS Route

Tire Info:

Single Tires

Rated for 6065 lb. Dual

Rated for 6610 lb. Single



4-38

Solution

4-39

LEGAL WEIGHT LIMITS

US, WV, AND COUNTY ROUTES
DESIGNATED FOR 80,000 POUNDS

LEGAL WEIGHT
(POUNDS)

	40,000
	60,000*
	70,000*
	73,000*
	80,000*

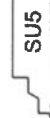
* 10% tolerance applies

NOTE: WV CODE SETS A SINGLE AXLE WEIGHT
LIMIT OF 20,000 POUNDS, THERE IS NO
TOLERANCE ON THIS LIMIT.

LEGAL WEIGHT LIMITS

COUNTY ROUTES DESIGNATED
FOR 65,000 POUNDS

LEGAL WEIGHT
(POUNDS)

	40,000
	60,000*
	65,000*
	65,000*
	65,000*

* 10% tolerance applies

NOTE: WV CODE SETS A SINGLE AXLE WEIGHT
LIMIT OF 20,000 POUNDS, THERE IS NO
TOLERANCE ON THIS LIMIT.

LEGAL WEIGHT LIMITS

COAL RESOURCE TRANSPORTATION ROADS
(CRTS) SYSTEM

LEGAL WEIGHT
(POUNDS)

	80,000*
	90,000*
	110,000*
	120,000*

* 5% tolerance applies

Bridge Weight Formula for Interstate Highways

Distance in feet between the extremes of any group of 2 or more consecutive axles

L	Axles							
	2	3	4	5	6	7	8	9
4	34,000							
5	34,000							
6	34,000							
7	34,000							
8	34,000	34,000						
More than 8/ Less than 9	38,000	42,000						
9	39,000	42,500						
10	40,000	43,500						
11		44,000						
12		45,000	50,000					
13		45,500	50,500					
14		46,500	51,500					
15		47,000	52,000					
16		48,000	52,500	58,000				
17		48,500	53,500	58,500				
18		49,500	54,000	59,000				
19		50,000	54,500	60,000				
20		51,000	55,500	60,500	66,000			
21		51,500	56,000	61,000	66,500			
22		52,500	56,500	61,500	67,000			
23		53,000	57,500	62,500	68,000			
24		54,000	58,000	63,000	68,500	74,000		
25		54,500	58,500	63,500	69,000	74,500		
26		55,500	59,500	64,000	69,500	75,000		
27		56,000	60,000	65,000	70,000	75,500		
28		57,000	60,500	65,500	71,000	76,500	82,000	
29		57,500	61,500	66,000	71,500	77,000	82,500	
30		58,500	62,000	66,500	72,000	77,500	83,000	
31		59,000	62,500	67,500	72,500	78,000	83,500	
32		60,000	63,500	68,000	73,000	78,500	84,500	90,000
33			64,000	68,500	74,000	79,000	85,000	90,500
34			64,500	69,000	74,500	80,000	85,500	91,000
35			65,500	70,000	75,000	80,500	86,000	91,500
36			66,000	70,500	75,500	81,000	86,500	92,000
37			66,500	71,000	76,000	81,500	87,000	93,000
38			67,500	71,500	77,000	82,000	87,500	93,500
39			68,000	72,500	77,500	82,500	88,500	94,000
40			68,500	73,000	78,000	83,500	89,000	94,500
41			69,500	73,500	78,500	84,000	89,500	95,000
42			70,000	74,000	79,000	84,500	90,000	95,500
43			70,500	75,000	80,000	85,000	90,500	96,000
44			71,500	75,500	80,500	85,500	91,000	96,500
45			72,000	76,000	81,000	86,000	91,500	97,500
46			72,500	76,500	81,500	87,000	92,500	98,000
47			73,500	77,500	82,000	87,500	93,000	98,500
48			74,000	78,000	83,000	88,000	93,500	99,000
49			74,500	78,500	83,500	88,500	94,000	99,500
50			75,500	79,000	84,000	89,000	94,500	100,000
51			76,000	80,000	84,500	89,500	95,000	100,500
52			76,500	80,500	85,000	90,500	95,500	101,000
53			77,500	81,000	86,000	91,000	96,500	102,000
54			78,000	81,500	86,500	91,500	97,000	102,500
55			78,500	82,500	87,000	92,000	97,500	103,000
56			79,500	83,000	87,500	92,500	98,000	103,500
57			80,000	83,500	88,000	93,000	98,500	104,000
58				84,000	89,000	94,000	99,000	104,500
59				85,000	89,500	94,500	99,500	105,000
60				85,500	90,000	95,000	100,500	105,500

ROADS SCHOLAR I (RS I) & ROADS SCHOLAR II (RS II) PROGRAMS



WV Local Technical Assistance Program

ROADS SCHOLAR I

The Roads Scholar I program is designed for local and state level transportation personnel to expand their knowledge and improve their skills in roadway maintenance and management techniques. This is a great way for roadway agencies to keep their employees properly trained and educated. Most training is offered for no or minimal fees, and training sessions are offered at various locations throughout the state.

ROADS SCHOLAR II

The Roads Scholar II program is designed primarily for local, state, and private transportation employees, who are in higher-level supervisory, management, and/or technical positions. Elected officials, engineers, planners, consultants, and contractors are a few of the individuals who will benefit from this program. Most training is offered for no or minimal fees and training sessions are offered at various locations throughout the state.

Graduation Requirements and Completion Awards

- To become either a RS I graduate, or a RS II graduate, each participant must take a total of 8 classes in the respective program. These classes must be completed in a five-year period, with exceptions made if class offerings have not been available.
- Participants are automatically enrolled in the Roads Scholar programs. There is no need to do any extra paperwork, other than submitting the typically requested registration information.
- Each RS I graduate receives a framed certificate, an orange and white traffic barrel shaped mug, and a baseball cap.
- Each RS II graduate receives a framed certificate and a leather bound embossed pad-folio.



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