Guide to Assist Idaho Local Highway Jurisdictions in

Evaluating Route Requests for Trucks Up to 129,000-Pounds

Prepared by:
National Institute for Advanced Transportation Technology
University of Idaho • 2016

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DISCLAIMER

TABLE OF CONTENTS

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16. Abstract The purpose of this guide is to provide assistance to local highway jurisdictions when evaluating requests to increase weight allowances on local roadways for trucks up to 129,000-pounds. The guide has been prepared by the University of Idaho's National Institute for Advanced Transportation Technology (NIATT) to provide guidance local highway jurisdictions when evaluating 129,000-pound route requests in compliance with Idaho Code 49-1004A (1) which states "the authority having jurisdiction may designate routes … for vehicles not exceeding … 129,000-pounds, utilizing criteria established by the board based upon road and bridge structural integrity and engineering standards". Each section of this guide covers one of the following four categories used to evaluate route requests: 1) Offtracking; 2) Bridges and Culverts; 3) Pavement and Gravel Roads; 4) Crash Data and Safety Evaluation. Before a route request is approved, the conditions in all four must be met and satisfied.			
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BACKGROUND

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The State of Idaho has long permitted trucks with a gross vehicle weight (GVW) of 80,000-pounds to operate on all its roads and highways. The permitted truck configurations – truck length, axle weights and axle spacings – are regulated by the Idaho Transportation Department (ITD).

Longer trucks weighing up to 105,500-pounds have also long been permitted on specific routes designated by ITD after evaluating these routes to ensure that bridges and culverts can carry the 105,500-pound trucks and that the longer trucks can negotiate curves along the routes without creating safety issues.

In 2013, the state enacted legislation permitting ITD to allow trucks weighing 105,500 to 129,000-pounds GVW on 35 designated routes on state highways in Idaho. That legislation also authorized local highway jurisdictions to allow trucks weighing up to 129,000-pounds on additional routes approved by each jurisdiction.

The following sections provide some insights on the characteristics of the 129,000-pount trucks.

AXLE LOADS FOR 129,000-POUND TRUCKS

All the truck configurations permitted by ITD – 80,000-pounds and 105,500-pounds up to 129,000-pounds – satisfy a criterion known as the Federal Bridge Formula B. This criterion governs axle weights and spacings, originally for the safety of bridges on U.S. highways. This formula requires more axles on trucks carrying heavier loads. The result is that individual axle loads for trucks weighing from 105,500 to 129,000-pounds do not exceed the axle loads for the 80,000 pound trucks or the agricultural exempt trucks permitted on Idaho highways (see Figures 1, 2, 3, and 4).

EQUIVALENT SINGLE AXLE LOADS (ESALs) FOR 129,000-POUND TRUCKS

The ESALs are used to estimate the effect of truck load on pavement structures. "The damaging effect of the passage of an axle of any mass can be represented by a number of 18,000-pounds single axle loads". [AASHTO Guide for Design of Pavement Structures]. The ESAL provides a comparison between an axle load and a standard 18 kip axle. For example, the ESALs for the 80,000-pounds truck is 2.38 and for the 129,000-pounds truck is 1.87. This means that the impact of the 129,000-pound truck on pavement structure is less than the 80,000-pounds truck by 21.4%. Full details about the comparison between 80,000-pound trucks and 129,000-pound trucks ESALs are provided in Appendix B.

TOTAL LENGTH FOR 129,000-POUND TRUCKS

In most configurations, trucks weighing up to 129,000-pounds are within the same length range as the 105,500-pound trucks and are still limited to 115 ft. maximum length. Accordingly, they can also negotiate the same curves as they must meet the same offtracking requirements (see Figures 1, 2, 3, and 4).

BRAKING CAPABILITIES OF 129,000-POUND TRUCKS

The additional axles on the 129,000-pound trucks are outfitted with brakes providing extra stopping power for the truck compared to 80,000-pound trucks.

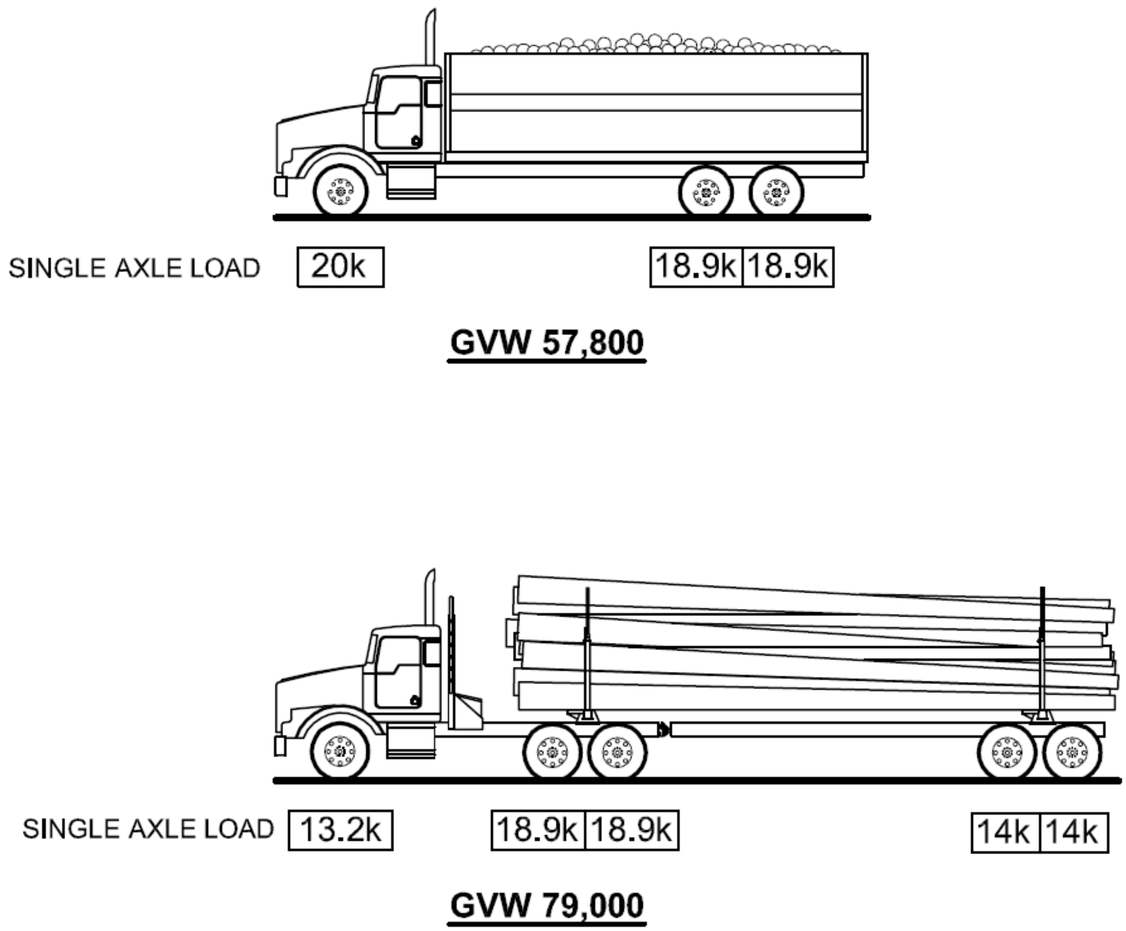

Figure 1: Examples of Agriculture Exempt Trucks with GVW of 57,800 and 79,000-pounds. (figures are not to scale).

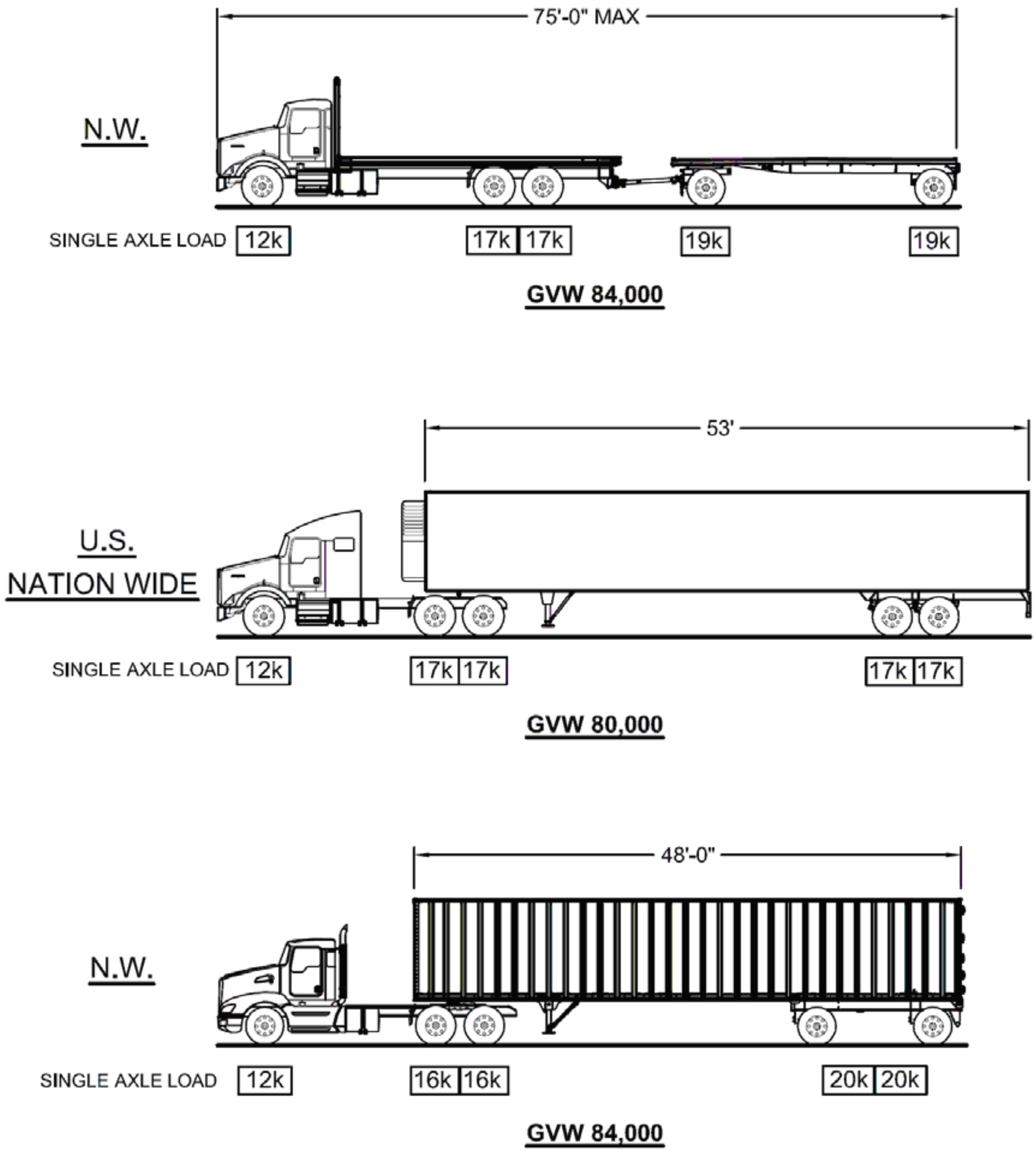

Figure 2: Examples of 5-Axle trucks with GVW of 80,000 and 84,000-pounds (figures are not to scale)

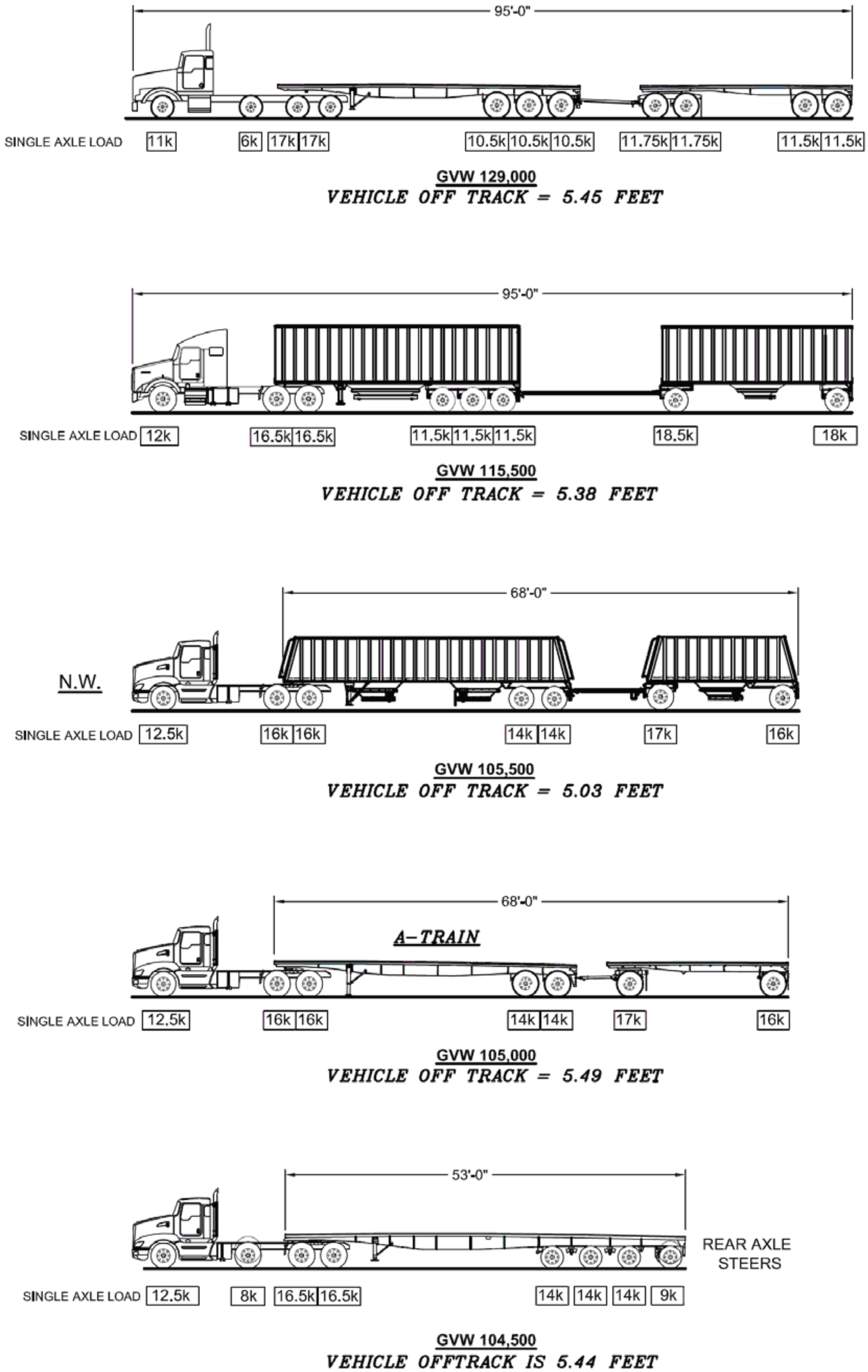

Figure 3: Examples of trucks with overall length less than 95-feet and offtracking value less than 5.5-feet. (figures are not to scale)

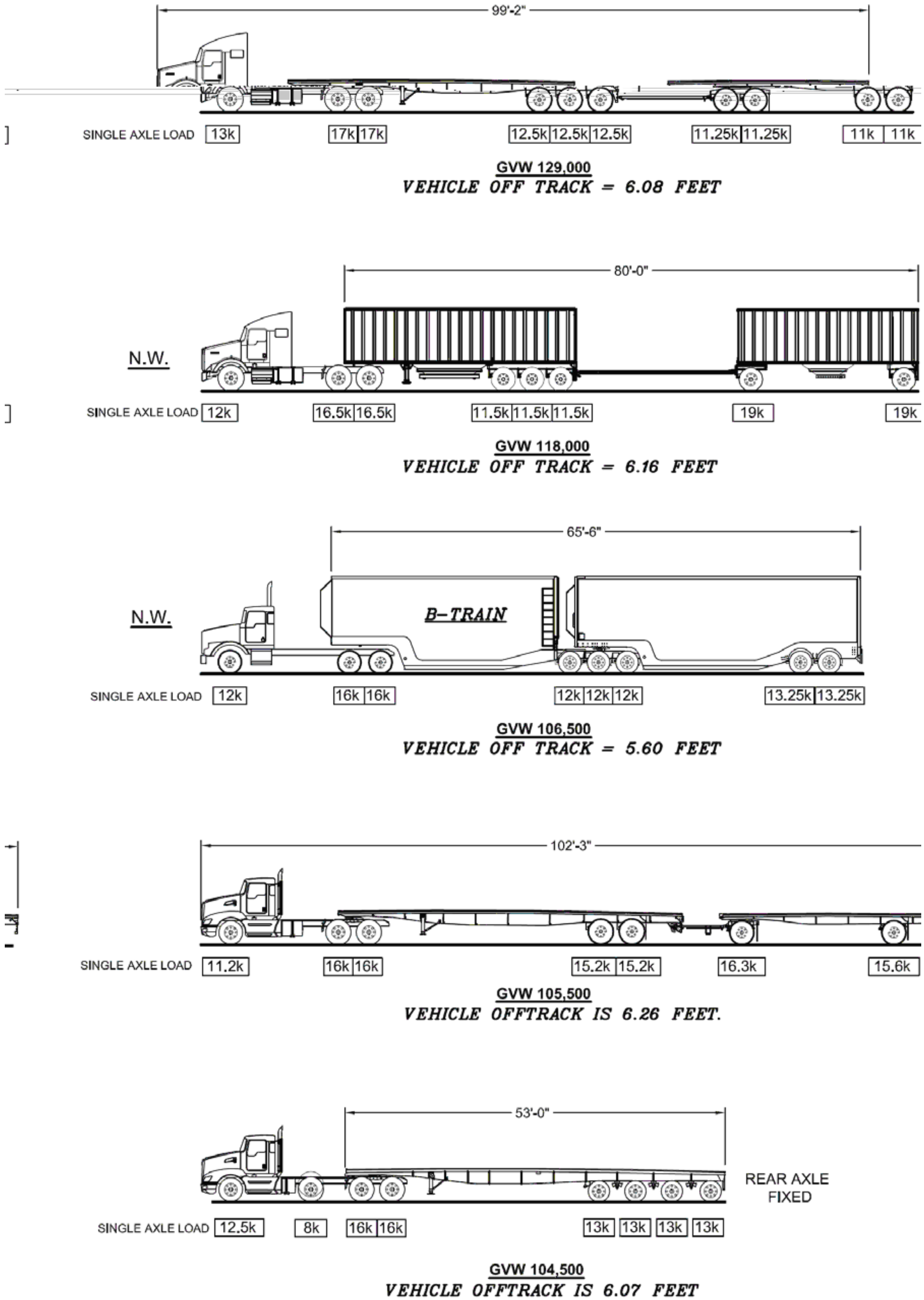

Figure 4: Examples of trucks with overall length less than 115-feet and offtracking values less than 6.5-feet. (figures are not to scale).

PURPOSE AND SCOPE

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The purpose of this guide is to provide assistance to local highway jurisdictions when evaluating requests to increase weight allowances on local roadways for trucks up to 129,000-pounds.

The guide has been prepared by the University of Idaho's National Institute for Advanced Transportation Technology (NIATT) to provide guidance to local highway jurisdictions when evaluating 129,000-pound route requests in compliance with Idaho Code 49-1004A (1) which states "the authority having jurisdiction may designate routes … for vehicles not exceeding … 129,000-pounds, utilizing criteria established by the board based upon road and bridge structural integrity and engineering standards".

This guide is limited to providing assistance in the following four engineering-based categories only: offtracking, structural safety of bridges and culvert, pavement and gravel road conditions, and crash data and safety evaluation. Each section of this guide covers one of these four categories. Before a route request is approved, the conditions in all four categories must be met and satisfied.

- **Section 1: Offtracking** provides guidelines to assess offtracking limitations for the route based on the roadway geometric characteristics;
- **Section 2: Bridges and Culverts** provides guidelines for examining the structural health of bridges and culverts along the route;
- **Section 3: Pavement and Gravel Roads** provides guidelines for examining the condition of pavement and gravel roads on the route;
- **Section 4: Crash Data and Safety Evaluation** provides procedures and guidelines for conducting a safety evaluation for the proposed route based on crash history.

SECTION 1

SECTION 1: OFFTRACKING ALLOWANCES

Offtracking is the characteristic, common to all vehicles, although much more pronounced with the larger design vehicles, in which the rear wheels do not precisely follow the same path as the front wheels when a vehicle traverses a horizontal curve or makes a turn. Offtracking in trucktrailer combinations occurs because the rear wheels of trailer trucks do not pivot and, therefore, will not follow the same path as the front wheels (Figure 4).

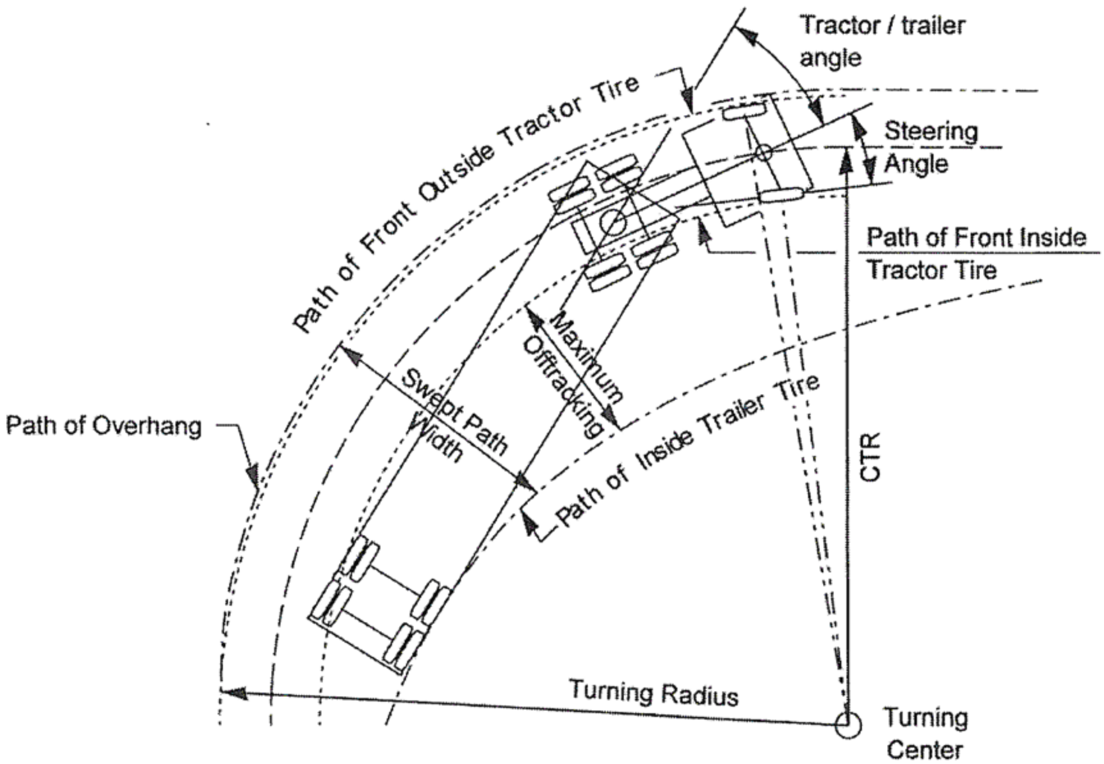


Figure 4: Offtracking illustration for a typical tractor-semitrailer combination truck [source: AASHTO 2011 Design Controls and Criteria]

Overall truck length does not necessarily mean that the offtracking will be more as the maximum offtracking value for a given truck is determined based on the distances between axles rather than the overall truck length (see Figures 1, 2, and 3 for the offtracking values for different truck configurations currently operating on Idaho's highways). For example, the offtracking for a 53 foot trailer combination, commonly used on Idaho's State and Interstate system (AASHTO WB-62 design vehicle shown in Figure 5 below) is 7.80 feet. For a particular 129,000-pounds truck configuration with a total length of 98.57 feet (shown in the Figure 6) below, the maximum offtracking value is 5.81 feet. Details on the procedures for maximum offtracking computation for these two truck configurations are presented in Appendix A.

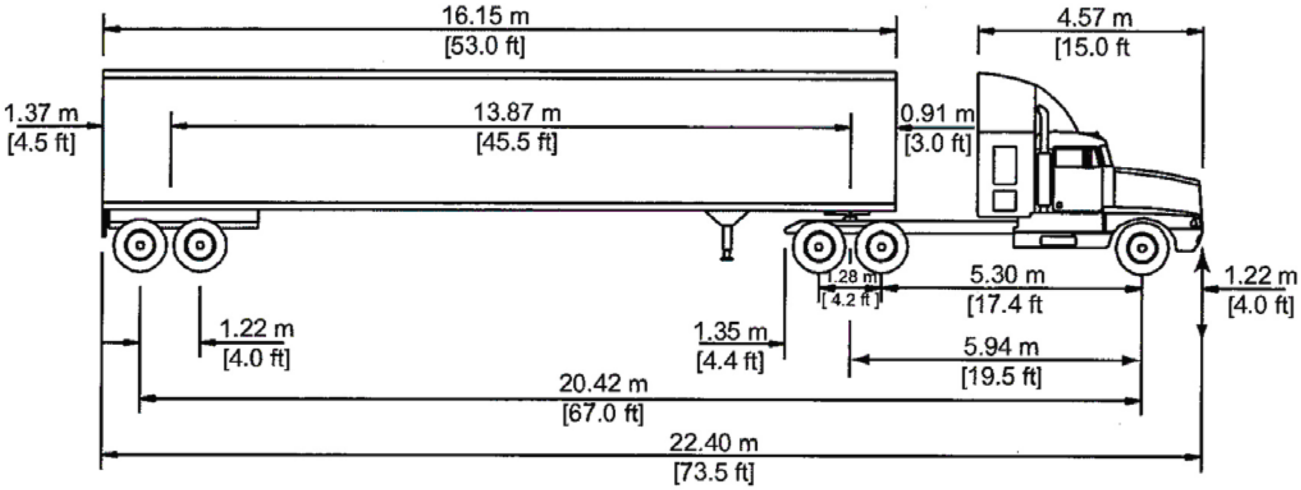


Figure 5: AASHTO Interstate Semitrailer Design Vehicle (WB-62) – Offtracking = 6.53 feet

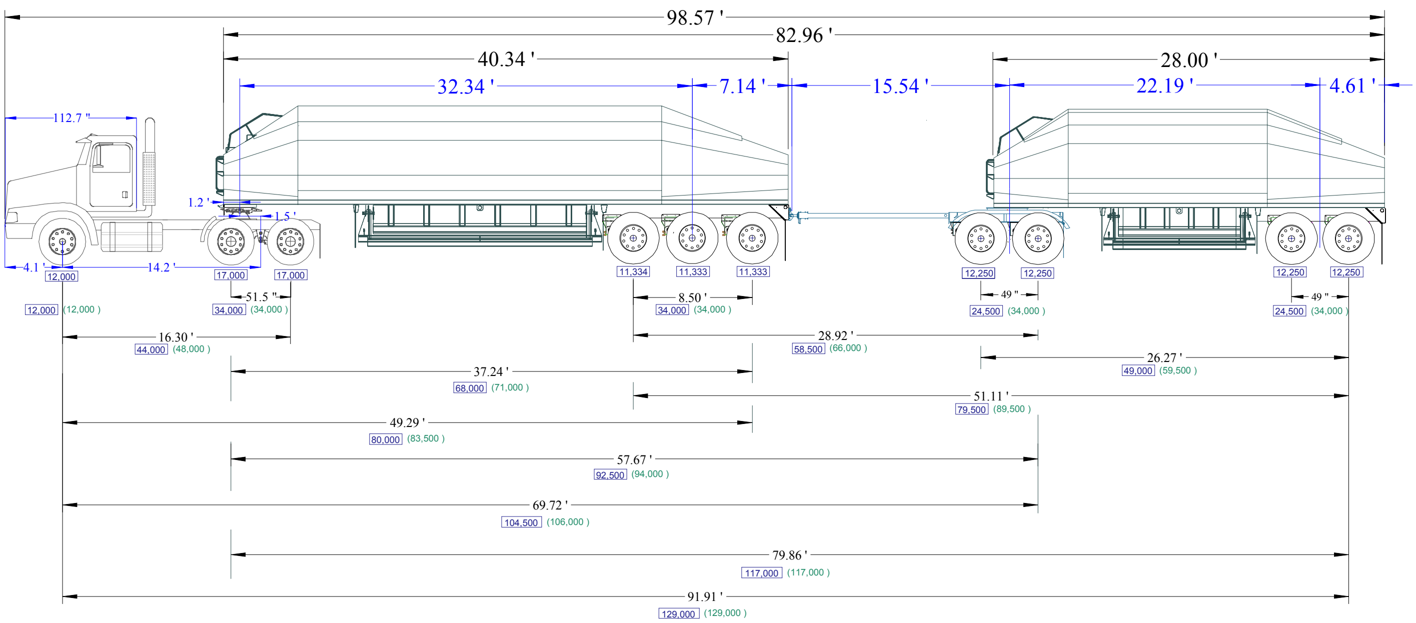


Figure 6: Transystems 129,000K Truck Configuration Offtracking = 5.81 feet

The Idaho Transportation Department routes are categorized by their ability to handle various extra-length vehicle combinations and their offtracking allowances. The two categories that ITD uses when issuing permits to allow vehicle combinations to exceed legal length and carry increased axle weights above 80,000-pounds and up to 129,000-pounds on state highways are designated as follows:

Designated routes for extra length vehicle combination carrying up to 105,500 pounds:

Blue-Coded Routes. Overall length not exceeding 95 feet (including load overhang) and maximum offtracking not exceeding 5.5 feet.

Red-Coded Routes. Overall length not exceeding 115 feet (including load overhang) maximum offtracking not exceeding 6.50 feet.

Black-Coded Routes. Interstate system routes for combination of vehicles with offtracking exceeding 6.50 feet but less than 8.75 feet

Green-Coded Routes. Selected state highway routes for operation of a vehicle combination with maximum offtracking not exceeding 3.0 feet and overall length (including load overhang does not exceed 85 feet.

Designated state approved routes for vehicle combinations to operate at weights above 105,500 pounds up to 129,000 Pound

Magenta-Coded Routes. Overall length not exceeding 115 feet (including load overhang) and maximum offtracking not exceeding 6.50 feet.

Brown-Coded Routes. Overall length not exceeding 95 feet (including load overhang) and maximum offtracking not exceeding 5.50 feet

Orange-Coded Routes. Non-state maintained highways that allow vehicle combinations to operate at weights above 105,500 pounds up to 129,000 Pound. Local jurisdictions adding, modifying or deleting non-state maintained routes for vehicle combinations operating up to 129,000 pounds shall provide the route information to the transportation department.

These routes can be found at:
https://adminrules.idaho.gov/rules/current/39/0322.pdf

PROCEDURES TO DETERMINE IF ROUTE MEETS LENGTH AND OFFTRACKING ALLOWANCES

The purpose of this section of the guide is to evaluate existing conditions and identify when engineering analysis will be required in the context of offtracking, focusing on the difference between 129,000-pound trucks and other trucks currently permitted to operate on the route. If a request is made to run a 129,000-pounds truck on a certain route and its total length is equal to or less than the maximum truck lengths legally allowed on the route, the route request should be approved in the context of offtracking.

The width limits used in this guide are based on the following assumptions: 1) the 28 feet minimum roadway width is based on a 5.5 feet offtracking and 8.5 feet maximum truck width; 2) the 30 foot width is based on a 6.5 feet offtracking and a 8.5 feet maximum truck width.

The procedures to determine if a requested local route meets all length and offtracking allowances for that route are as follows:

A. Routes with straight alignment

As the maximum truck width of 8.5 feet applies to all truck configurations, there is no special requirements needed for 129,000-pounds truck to operate in routes with straight alignment. Therefore, the 129,000-pounds route request should be approved in the context of offtracking.

B. Routes with horizontal curves

Step 1: Identify the horizontal curve that has the minimum total roadway width and/or the tightest turning radius along the route under consideration.

Step 2: Using a tape measure, measure the minimum total width of the roadway at the curve location and apply the following criteria:

2.1 If the minimum width of the roadway is less than 28 feet, a field verification or an engineering study is required to determine the maximum offtrack that should be permitted on the requested route. See the next section for field verification procedures. The agency may also consider limiting the maximum offtracking allowed on the roadway or use alternative signage to restrict certain truck operations on segments of the roadway.

2.2 If the minimum width of the roadway is more than 28 feet and less than 30 feet, the route request should be approved with a condition that trucks operating on the route should not exceed 95-feet overall vehicle length and offtracking value of 5.5 feet or lower. If the route under consideration has any intersections, field verification may be required to verify the safety of truck operations through the intersections.

2.3 If the minimum width of the roadway is 30 feet or greater, the route request should be approved with a condition that trucks operating on the route should not exceed 115-feet overall vehicle length and offtracking value of 6.5 feet or lower. If the route under consideration has any intersections, field verification may be required to verify the safety of truck operations through the intersections.

PROCEDURES FOR FIELD VERIFICATION

The objective of field verification is to ensure that the truck, at different curves along the roadway can safely maneuver through the curve, staying in its lane without encroaching into the opposite lane of travel. Additionally, field verification is needed at intersections to ensure that the truck body shall not encroach onto bike lanes, sidewalks or any area where pedestrians are expected, or any obstacles at the intersection. The procedures to conduct a field verification are as follows:

Step 1: The requestor shall provide the local highway jurisdiction with a test truck trailer combination that has an offtracking width of either 5.5 feet (if the minimum width of the roadway is more than 20 and less than 30 feet) or 6.5 feet (if minimum width of the roadway is 30 feet or greater). Alternatively, the requestor may provide the local highway jurisdiction with a test truck trailer combination that has the maximum possible offtracking width they intend to use on the route.

Step 2: The criteria used to determine whether the test truck passed or failed at each test route are listed below. When applying the criteria below, the terms shall and shall not indicate an absolute and **must be followed**. The terms may and may not indicate a permissive and are, therefore, at the discretion of inspectors conducting field verification tests.

1. Along all portions of the route where there is no turning option, the test truck shall stay within the center line and the pavement edge. Both the body and tires of the truck shall stay within the travel lane.
2. At intersections, the tires and/or body of the vehicle shall not cross into any portion of the opposing traffic lane.
3. The distance between the center line of each of the two wheels on the same axle (truck width) and the movement and path the truck's trailers make when it is turning (swept path width) may encroach onto paved or well-healed gravel shoulders to accommodate turning, provided that the shoulder type and pavement structure are in a condition that allow them to support the weight of the truck.
4. To accommodate a turn, the body of the truck may cross beyond the edge of pavement provided there are no obstructions. However, the truck tires shall remain on the pavement structure, including the shoulder, provided that the shoulder is designed to support truck traffic.
5. The truck body and tires shall not encroach onto sidewalks or any area where pedestrians are expected.
6. The truck body shall not encroach upon any obstacles including, but not limited to, curbs, islands, sign structures, traffic delineators/ channelizers, traffic signals, lighting poles, guardrails, trees, cut slopes, and rock outcrops. poles, guardrails, trees, cut slopes, and rock outcrops.

SECTION 2

SECTION 2: BRIDGES AND CULVERTS

The Idaho Transportation Department inspects and maintains rating data for all bridges and culverts with spans of more than 20 feet. Bridges and culverts on all publicly owned routes in Idaho are inspected every four years at a minimum to ensure they can safely accommodate vehicles. For spans less than 20 feet, the local highway jurisdictions should perform self-inspections.

When determining the truck-carrying capacity of a bridge or culvert, consideration is given to the types of vehicles that routinely use the bridge or culvert and the condition of the bridge or culvert. A bridge or culvert's ability to carry a truck is expressed in terms of a rating factor. Broadly speaking, the rating factor is the bridge's load capacity divided by load imposed on the bridge by a truck. The rating factor should be greater than 1.0, and a larger rating factor indicates a greater capacity to carry the load.

ITD studies indicate that a nominal 121,000-pounds truck configuration generates the highest possible load on bridge and culvert structures. Therefore, it is the truck used by ITD to evaluate the load carrying capacity of these structures (ITD 121k load rating). Accordingly, if a bridge or culvert can safely carry a 121,000-pounds truck, it will safely carry a 129,000-pounds truck.

PROCEDURES TO ASSESS BRIDGES AND CULVERTS

The procedures to assess if a bridge or culvert is in adequate condition to safely carry a truck load above 121,000-pounds are as follows:

Step 1: For bridges or culverts spanning more than 20 feet, obtain the current rating factor for the bridge or culvert from ITD.

- If the rating factor is more than 1.0 for the nominal Idaho 121,000-pounds truck, the request to use the bridge or culvert should be approved from a bridge/culvert structural safety point of view.
- If the rating factor is less than 1.0 for the nominal Idaho 121,000-pounds truck, the request to use the bridge or culvert shall be declined.

Step 2: For bridges or culverts spanning less than 20 feet, the 129,000-pounds truck are found to have less structural impact than the currently allowed 80,000-pound trucks and the request to allow the 129,000-pound trucks on the bridge or culvert under consideration should be approved from a bridge/culvert structural safety point of view.

See Figure 7 for a flowchart of these steps.

BRIDGES AND CULVERTS

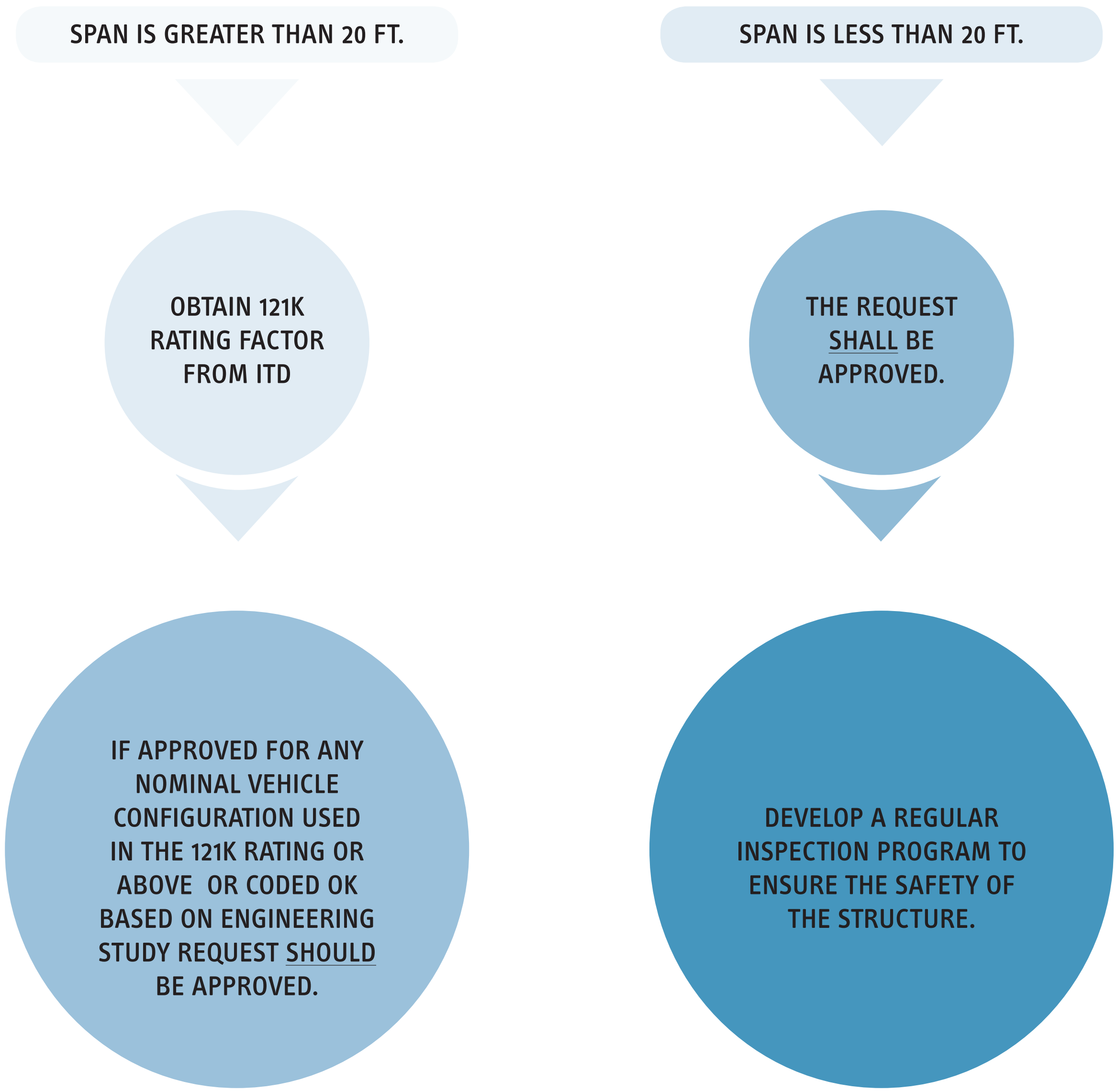


Figure 7: Steps to assess bridges and culverts for 129,000-pound truck request.

SECTION 3

SECTION 3: PAVEMENT AND GRAVEL ROADS

The weight of a 129,000-pounds truck is distributed over more axles; therefore, it has less axle weight compared to trucks of 80,000-pounds. This means the impact of the axle weights from 129,000-pound trucks on the pavement service life will be less assuming the truck volume on the route remains relatively at the same level.

PAVEMENT

The ITD Pavement Rating Manual provides full documentation on the process that ITD uses to determine the condition of both flexible (asphalt) and rigid (concrete) pavements on state highways. Many local jurisdictions in Idaho use the Pavement Surface and Evaluation and Rating (PASER) 1-10 rating system to compare the quality of road segments in order to determine when maintenance is needed.

Because the PASER method does not require measurements of individual distresses, the ratings cannot be disaggregated into component distress data. Therefore, section 3 of this guide uses both the PASER ratings and the ITD Pavement Rating Manual's documentation pertaining to flexible (asphalt) pavements to assist local highway jurisdictions in determining if the pavement conditions are adequate to support the load under consideration.

When evaluating pavement conditions, extra attention should be given to roadway segments with the following characteristics: 1) with uphill grades of more than a 6% slope, 2) at roadway sections where 129,000-pounds truck trips are originated, and 3) at intersection approaches where the 129,000-pound trucks are likely to stop because the traction loads on the pavement from the drive axle under these conditions will be very high.

When reviewing pavement to determine its condition, variables for jurisdictions to consider are the types of cracks, crack severity, and crack extent.

- Crack Severity measures the depth, width, and thickness of a crack. It is rated from slight to moderate to heavy.
- Crack Extent measures the amount of cracking in a pavement section. It is rated from light to moderate to heavy.

PROCEDURES TO ASSESS PAVEMENT CONDITIONS

The procedures to assess if the pavement conditions are adequate to safely carry the load under consideration are as follows:

- Obtain the pavement rating by the local highway jurisdiction if available. If the rating is suitable for 80,000-pound trucks, the 129,000-pound route request should be approved. Special attention should be given to roadway sections where the 129,000-pound trucks are likely to stop then go as the energy exhorted by the driving axle on the pavement during the truck initial acceleration is maximum.
- If no pavement rating is available, inspect the pavement surface for defects or distresses. If pavement rating according to PASER is 6 or more, the request should be approved. If less than 6, pavement strengthening is needed before the request is approved.

GRAVEL ROADS

Jurisdictions should consider the following conditions to determine if the gravel roads are adequate to safely carry the loads under consideration:

AMOUNT OF CROWN.

The *crown* is that part of roadway shape in which the center of the road is higher than the outer edges of the surface to provide drainage of water from the center of the road surface to curbs or ditches.

It is recommended there be no more than 1/2 inch of crown per foot (FHWA Gravel Roads Manual).

Figure 8 shows a gravel road with good shape of the entire cross section. The road has a driving surface with adequate crown that slopes directly to the edge of the shoulder.

Figure 8: Gravel road with adequate crown.

Figure 9 shows a gravel road that lacks adequate crown. As a result, potholes and corrugation are forming because the lack of a crown prevents water from draining off the road surface.

Figure 9: Gravel road with inadequate crown.

Figure 10 shows a gravel road that is wide (25 feet surface width), yet everyone drives in the middle. The primary reason is excessive crown.

Figure 10: Gravel road with excessive crown.

CONDITION OF SHOULDER.

The shoulder should begin no higher or no lower than the edge of the roadway. By maintaining this shape, the low shoulder (or drop-off), which is a safety hazard, is eliminated and improves roadway edge support.

Figure 11 shows two examples of gravel shoulders that match the edge of the roadway very well and drain water to the ditch.

Figure 11: Examples of good gravel shoulders.

PROCEDURES TO ASSESS GRAVEL ROAD CONDITIONS

The procedures to assess if the gravel road conditions are adequate to safely carry the load under consideration are as follows:

Step 1: Determine if the gravel road is approved for 80,000-pound trucks. If yes, go to step 2. If no, the request shall be denied.

Step 2: Inspect the road to determine the condition of the crown. If the crown is ½ inch or less per foot of roadway width, the crown is adequate. If more than ½ inch of crown per foot of roadway width, the request shall be denied.

Step 3: Inspect the road to determine the condition of the shoulder. If the shoulder is no higher or no lower than the edge of the roadway, the condition of the shoulder is adequate. If the shoulder is higher or lower than the edge of the roadway, the request shall be denied.

See Figure 12 for a flowchart of these steps.

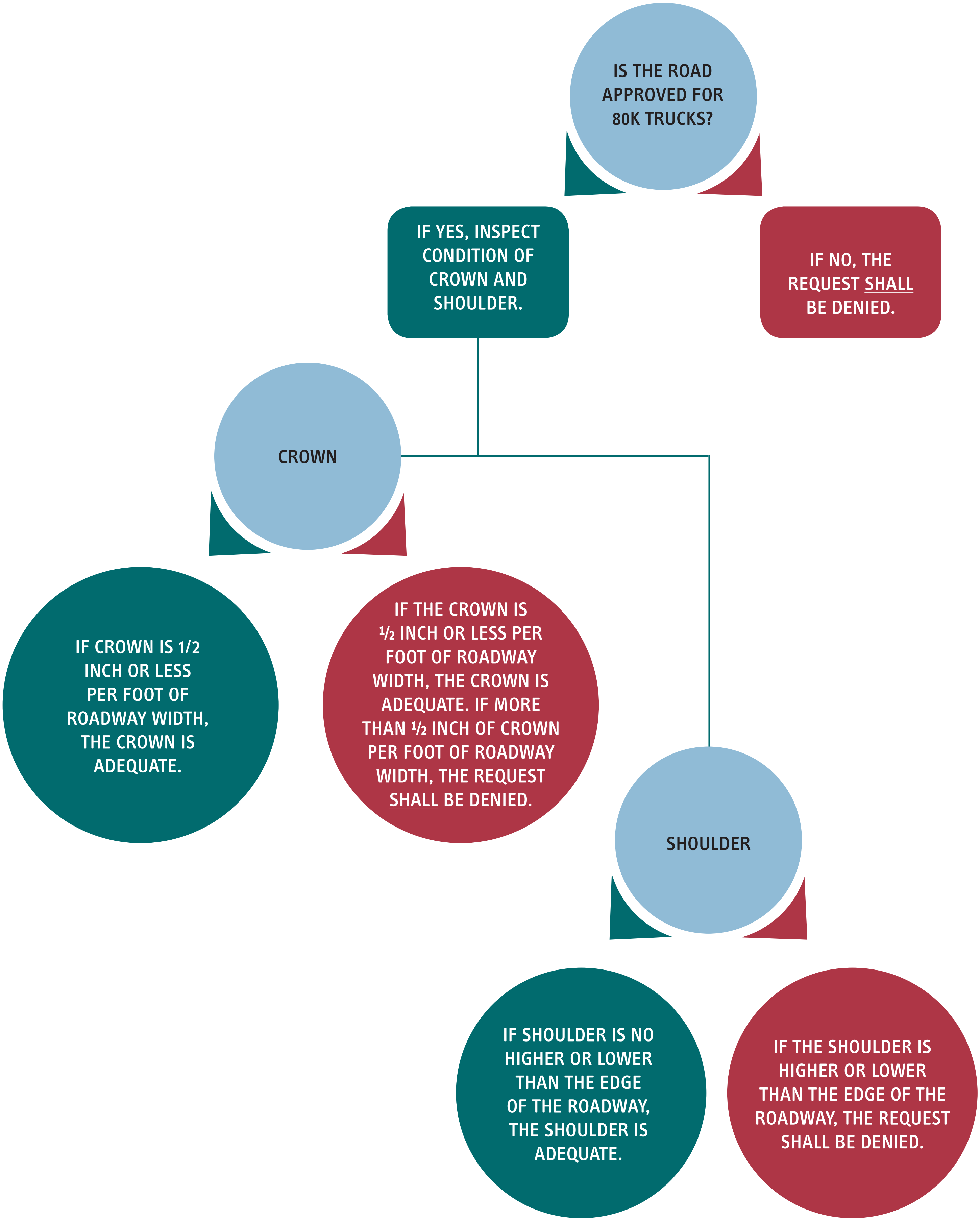


Figure 12: Steps to assess gravel roads.

SECTION 4

SECTION 4: CRASH DATA ANALYSIS AND SAFETY EVALUATION

While this section provides guidelines on conducting a crash data analysis and safety evaluation for the 129,000-pounds truck route designation requests, local highway jurisdictions may still need to consider other factors that are beyond the scope of this guide.

The procedures to follow when conducting a crash data safety evaluation for the proposed route are as follows:

Step 1: Check the Local Highway Technical Assistance Council (LHTAC) Crash Data website to obtain available crash data.

Step 2: Does the crash data show one or more fatal or severe injury crashes, or a pattern of crashes on the route in the last five years?

- If yes, an engineering study is required.
- If no, go to step 3.

Step 3: Were there one or more truck-related crashes in the route during the last five years?

- If yes, an engineering study is required.
- If no, request should be approved.

INTERSECTION SAFETY EVALUATION

Intersection safety should be assessed through the field verification procedures listed in section 1 of this guide as follows:

1. At intersections, the tires and/or body of the vehicle shall not cross into any portion of the opposing traffic lane.
2. The body of the truck may cross beyond the edge of pavement provided there are no obstructions. However, the truck tires shall remain on the pavement structure, including the shoulder, provided that the shoulder is designed to support truck traffic.
3. The truck body and tires shall not encroach onto sidewalks or any area where pedestrians are expected.
4. The truck body shall not encroach upon any obstacles including, but not limited to, curbs, islands, sign structures, traffic delineators/ channelizers, traffic signals, lighting poles, guardrails, trees, cut slopes, and rock outcrops.

If one more of these conditions are not met, the jurisdiction may consider a conditional permit for the 129,000-pound truck on the route requiring a pilot car or a yield-to-all-vehicles rule for the 129,000-pound trucks at specific locations.

See Figure 13 for a flowchart of these steps.

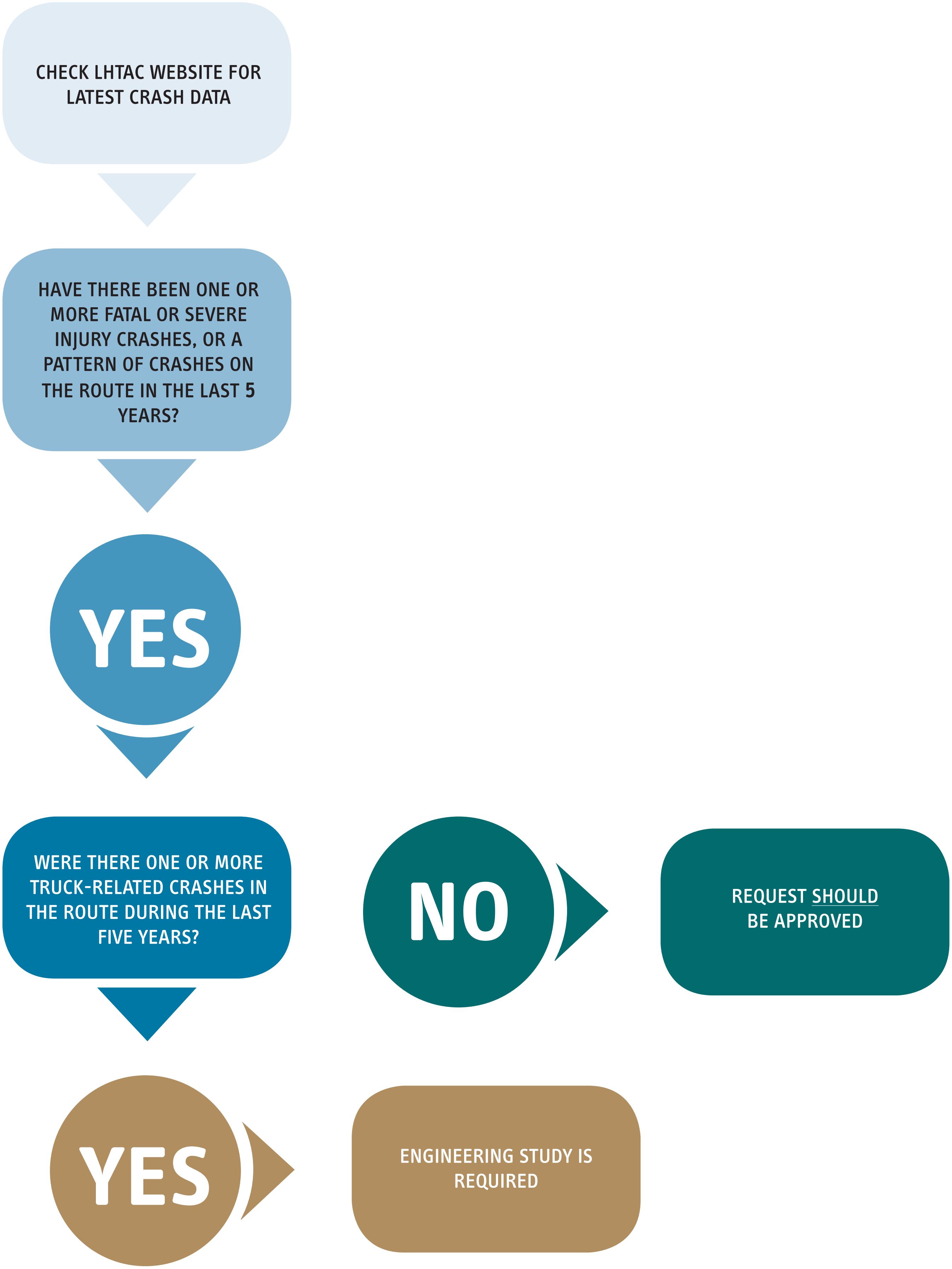


Figure 13: Steps to conduct crash data safety evaluation.

GUIDE LIMITS

The purpose of this guide is to provide engineering assistance to local highway jurisdictions when evaluating requests to increase weight allowances on local roadways for trucks up to 129,000-pound. The guide, however, is limited to providing engineering assistance only for the categories covered in sections 1-4 above.

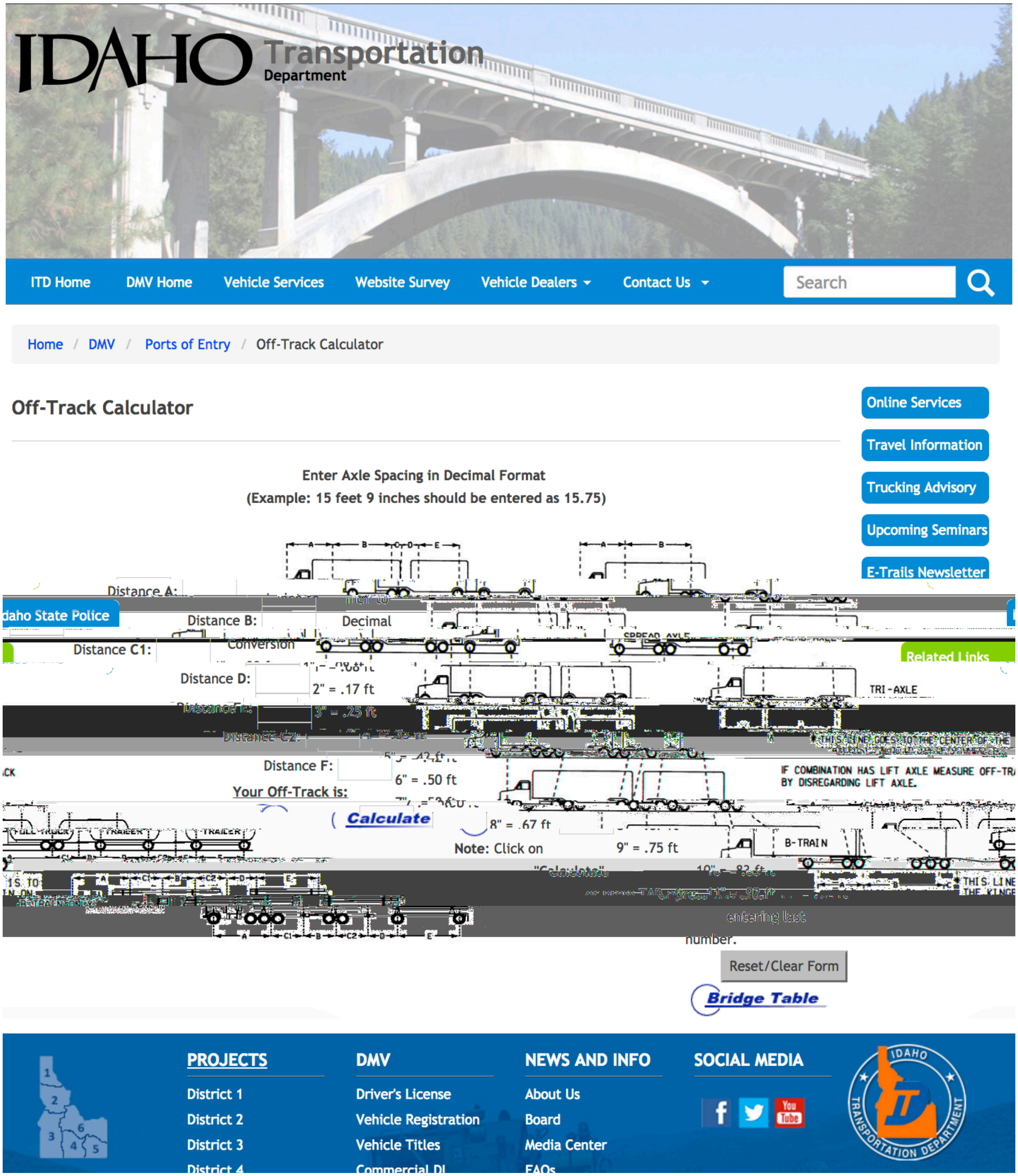
Additional factors beyond the scope of this guide that local highway jurisdictions will need to consider include, but are not limited to, the following:

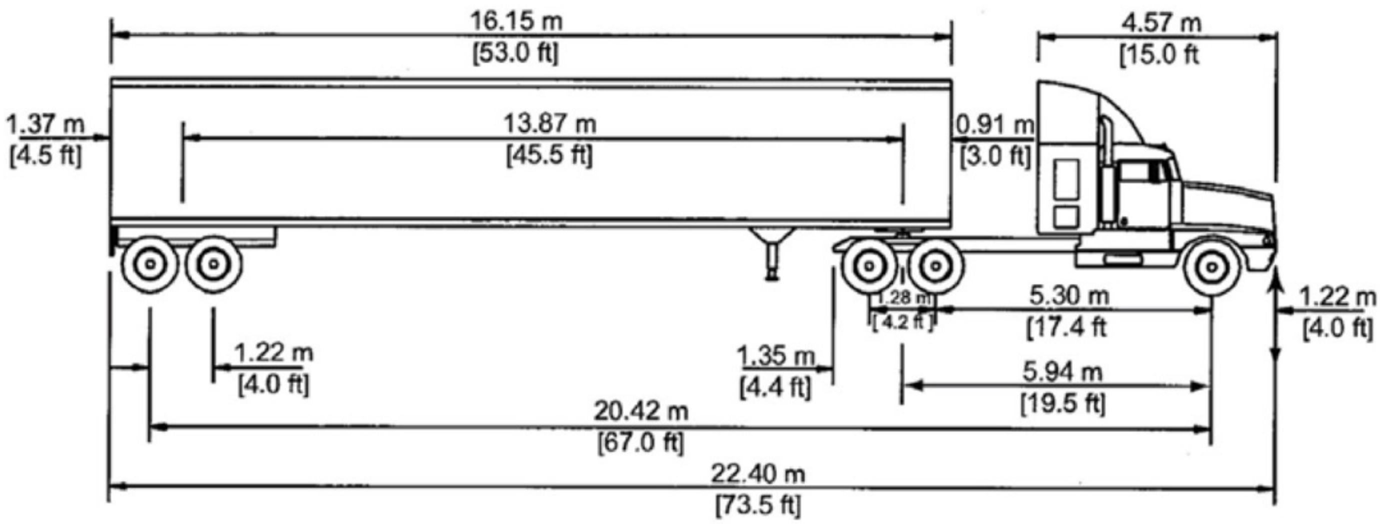
- spring breakup concerns
- existing and needed chain-up areas
- compatibility of the runaway truck escape ramps (if any)
- current and future roadway improvement projects (if any)
- shoulder width including condition of shoulder of paved and gravel roads
- conflicts with pedestrians
- adjacent land use such schools, parks, community centers, retirement communities and other residential areas
- current and future development projects
- possible impact of truck traffic on businesses, particularly, travel through a downtown area

APPENDIX A: PROCEDURES FOR OFFTRACKING CALCULATIONS FOR DIFFERENT TRUCK CONFIGURATIONS

ITD provides an easy-to-use offtrack calculator that can be found here:

http://itd.idaho.gov/dmv/poe/offtrack.html





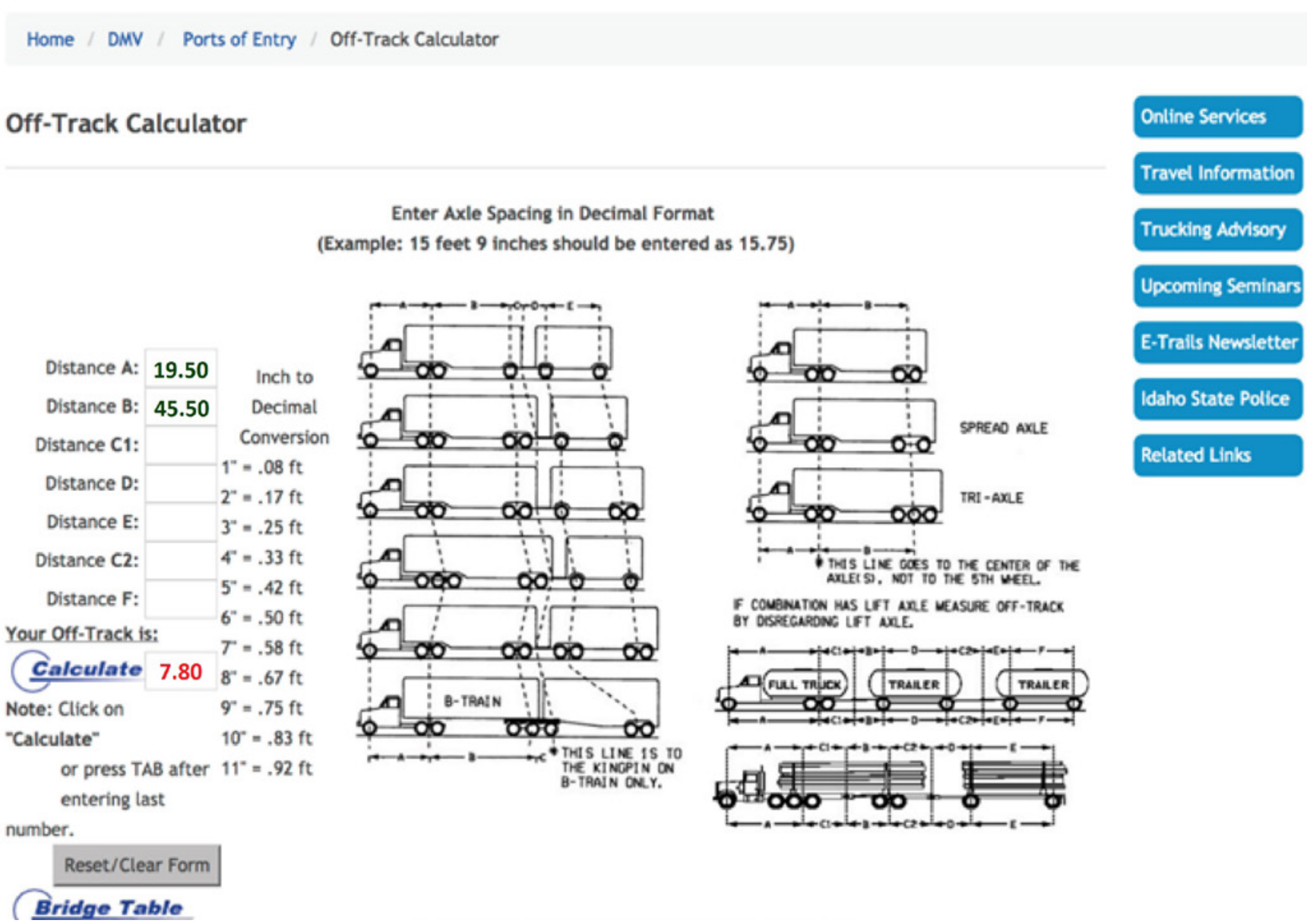
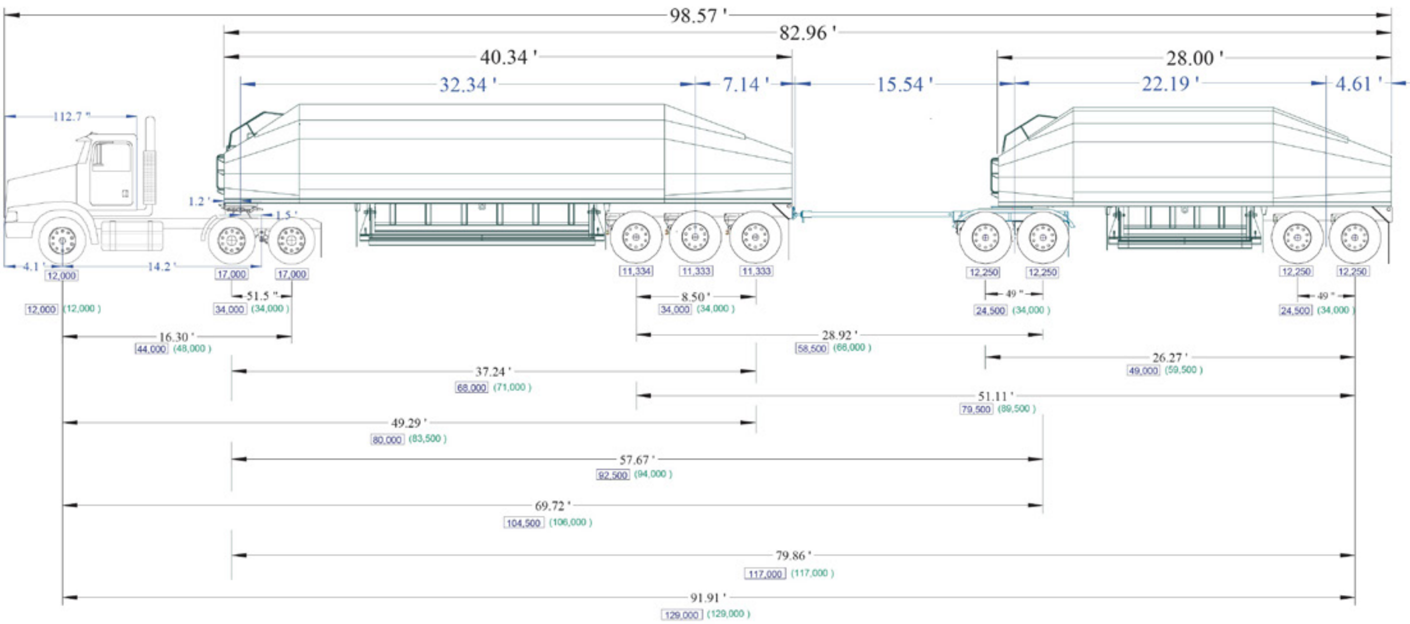


Figure 14: An example of an Interstate Semitrailer configuration with the corresponding offtracking value.



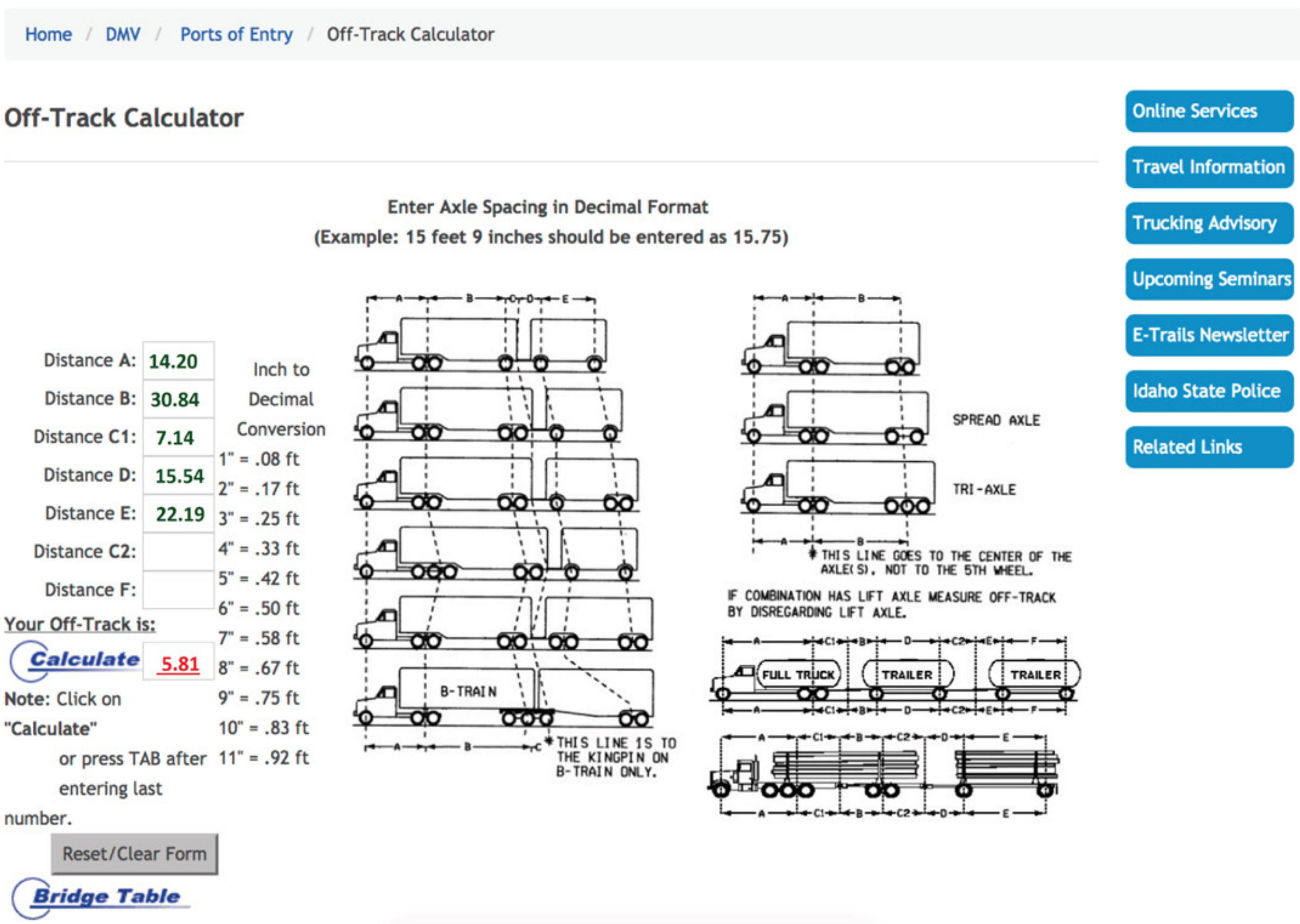


Figure 15: An example of a 129,000-pound truck configuration with the corresponding offtracking value.

APPENDIX B: EQUIVALENT SINGLE AXLE LOADS (ESALs) ANALYSIS

The use of Equivalent Single Axle Loads (ESALs) is a method of estimating the effects of truck loads on the pavement structure. "... The damaging effect of the passage of an axle of any mass can be represented by a number of 18,000-pound single axle loads." (AASHTO Guide for Design of Pavement Structures. 1993 pages 1-10).

Many different axle configurations and loadings are used in the trucking industry. Several specific truck configurations were selected to illustrate ESALs and the relationship between axle configuration with loads and ESALS. Table 1 below shows a comparison of the ESALs values for various trucks. Note that the Asphalt Institute's Equivalent Axle Load Factors were used for these calculations. (Pavement Analysis and Design, Vang H. Huang,pg 296). The truck configurations in Figure A1 were submitted by the trucking industry to the Idaho Transportation Department as an example for the Department's review and analysis. The truck in Figure A2 is an actual 129,000-pound configuration that is currently being used in Idaho.

Table 1: ESAL calculation per truck

Truck Configuration	ESALs
80,000-pound GVW (Fig.A1)	2.38
105,500-pound GVW (Fig.A1)	2.80
129,000-pound GVW (Fig.A1)	1.99
129,000-pound GVW (Fig.A2)	1.87

In other words, using these configurations, the 129,000-pound truck will cause approximately 29% less stress to the roadway than the 105,500-pound truck. This is due to the additional axles and the proximity of axles to each other. (100 x 1.99/2.80 = 71%, 100% - 71% =29%). Similarly, the 129,000-pound truck will cause approximately 16% less stress to the roadway than the 80,000-pound truck. This is due to the additional axles and the proximity of axles to each other. (100 x 1.99/2.38 = 84%, 100% - 84% =16%).

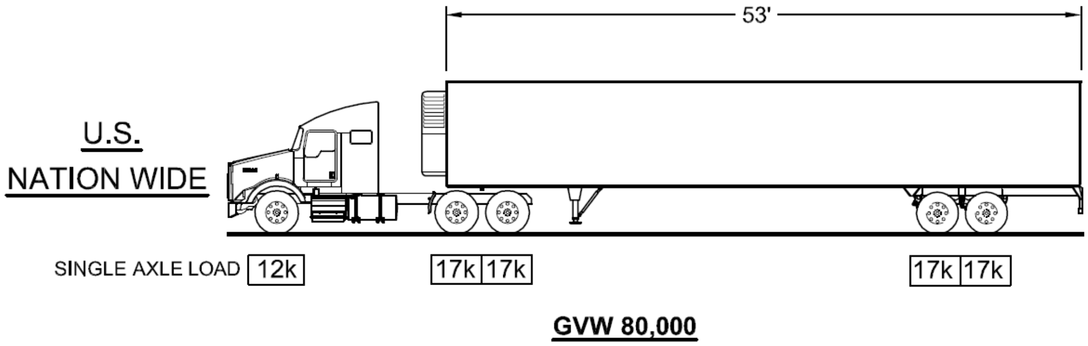
Comparing the net cargo weights between the105,500-pound truck and the129,000-pound truck, the 129,000-pound truck caries 30% more cargo. This can be translated to 30% less truck loads on the roadway. (Approximate tare weights, POE data). Assuming current movement of goods and materials in and out of the mills using these 129,000-pound trucks, the ESALs causing stress to the roadway could be reduced to 52% of the current level.

71% (of 105,500-pound truck ESALs) x 70% (of trucks on roadway) = 52% (of current ESALS on roadway)

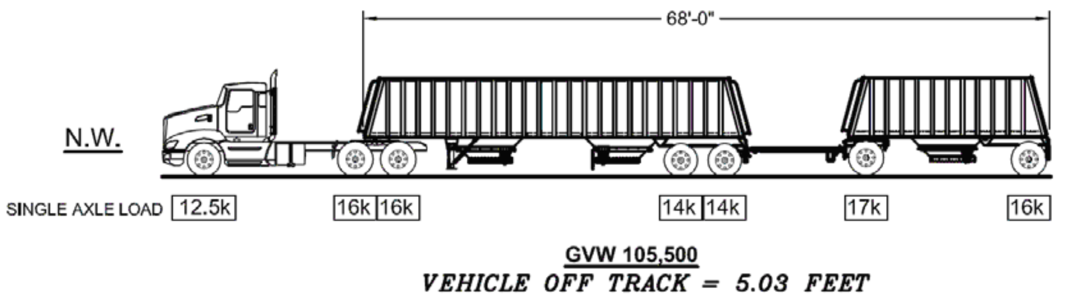
SUMMARY

The use of ESALs is a method of determining stress on a roadway based on loading, truck configuration and numbers of vehicles. By increasing the number of axles, a particular truck may impart less ESALs and therefore, less stress to the roadway than a lighter truck with less axles.

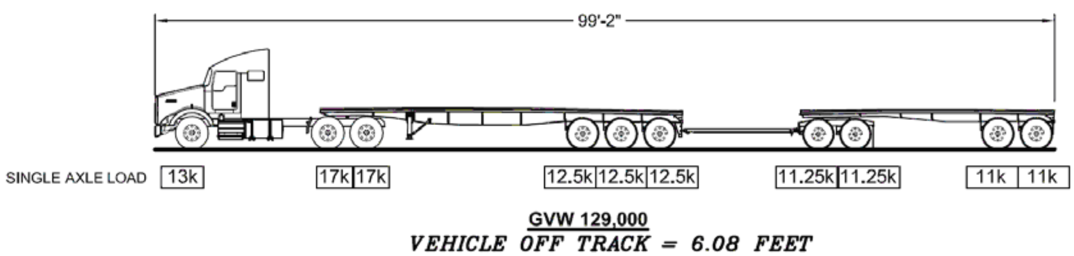
The 129,000-pound trucks analyzed in this report impart approximately 29% less stress than the 105,500-pound truck. Reducing the number of trucks further reduces overall ESALs on the roadway.



ESAL=2.38

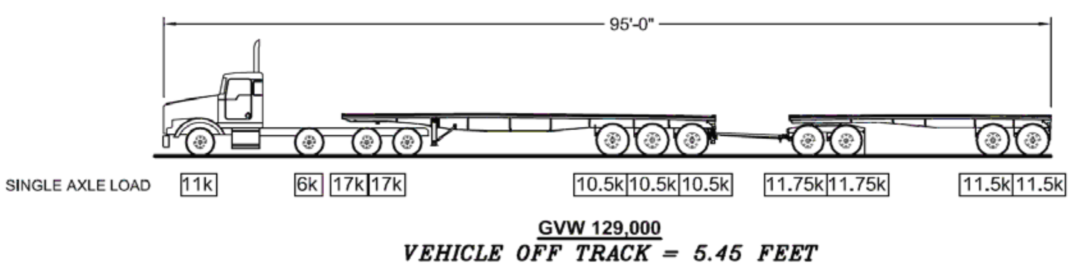


ESAL=2.80



ESAL=1.99

Figure A1: Typical truck configurations will ESAL allocations



ESAL=1.87

Figure A2: 129,000-pound truck currently use in Idaho (11-axles)