Montana Department of Transportation

PO Box 201001
Helena, MT 59620-1001

VISION ZERO
zero deaths
zero serious injuries

Memorandum

To: Distribution

From: Stephanie Brandenberger, P.E., Bridge Engineer SB

Date: February 3, 2020

Subject: Bridge Inspection and Rating Manual Revision

The purpose of this memo is to distribute a substantial revision to MDT's Bridge Inspection and Rating Manual, October 2018 Edition. The attached document, which can also be found on MDT's Bridges and Structures website, is intended to replace *Chapter 8, Section 4 Bridge Posting Policies and Procedures.* This amendatory guidance will remain in effect until a new edition of the Manual is published, or until otherwise superseded.

This substantial revision was developed in response to the following laws enacted by Congress, in addition to several FWHA policy memos:

- Moving Ahead for Progress in the 21st Century Act (MAP-21)
- Fixing America's Surface Transportation Act (FAST Act)
- FHWA Memorandum on Bridge Load Ratings for the National Bridge Inventory, dated October 30, 2006
- FHWA Memorandum on Load Rating of Specialized Hauling Vehicles, dated November 15, 2013
- FHWA Memorandum on Load Rating for the FAST Act's Emergency Vehicles, dated November 3, 2016
- FHWA Memorandum on Timeframe for Installing Load Posting Signs at Bridges, dated April 17, 2019

The revision introduces new bridge load posting guidelines, including updated analysis methods, notification procedures, and new load posting sign configurations. Most notably, it addresses the mandated inclusion of Specialized Hauling Vehicles (SHVs, defined in the AASHTO Manual for Bridge Evaluation) and Emergency Vehicles (EVs, defined in the FAST Act) as legal loads in posting analysis and practice.

Future updates and implementation procedures can be found on MDT's Bridges and Structures website. In addition, there will be a Q&A document that is frequently updated to address to questions or concerns sent via the website link. If you have immediate questions regarding this revision and updated guidance, please contact the Bridge Management Engineer at 406-444-9219.

Please distribute this memo to all MDT personnel and consultants involved in Bridge Design, Load Rating and In-Service Bridge Inspections.

Attachment: 8.4 Bridge Posting Policies and Procedures

E-Distribution:

Engineering Division Administrator
District Administrators
District Construction Engineers
Preconstruction Engineer
Construction Engineer
Bridge Management Engineer
Highways Engineer
Consultant Design Engineer
Bridge Design Engineer
FHWA Montana Division Administrator
FHWA Montana Division Bridge Engineer
Public Agency Bridge Owners
Maintenance Division Administrator
Bridge Inspection Coordinators
MDT Motor Carrier Services Administrator

8.4 Bridge Posting Policies and Procedures

MDT is committed to providing a transportation system that emphasizes quality, safety, cost effectiveness, economic vitality and sensitivity to the environment. Posting of bridges is essential to the safety aspect of this commitment. In addition, NBIS regulations (23 CFR Part 650) require posting or restriction of bridges that are not capable of safely carrying legal loads.

8.4.1 Definitions

ASR – Allowable Stress Rating

Emergency Vehicles (EVs) – vehicles authorized by Section 1410 of the FAST Act, which amended weight limits and made certain emergency vehicles legal on the Interstate and within reasonable access to the Interstate. These vehicles do not meet weight guidelines of Federal Bridge Formula B. Per FHWA's November 3, 2016 memorandum on Load Rating for the Fast Act's Emergency Vehicles:

> *An emergency vehicle as defined in the FAST Act is designed to be used under emergency conditions to transport personnel and equipment to support the suppression of fires and mitigation of other hazardous situations (23 U.S.C. 127(r)(2)).The gross vehicle weight limit for emergency vehicles is 86,000 pounds under section 127(r). The statute imposes the following additional limits, depending upon vehicle configuration:*
>
> - *24,000 pounds on a single steering axle*
> - *33,500 pounds on a single drive axle*
> - *62,000 pounds on a tandem axle*
> - *52,000 pounds on a tandem rear drive steer axle*

Inventory Rating– as defined by AASHTO, describes a live load (in tons) which can safely utilize an existing structure for an indefinite period of time.

LFR – Load Factor Rating

Live Load – loads that remain in place for a relatively short time. Load rating is usually concerned with vehicle live loads (i.e. cars, busses, trucks, etc).

Load Rating – as defined by AASHTO, the determination of the live-load carrying capacity of a new or existing bridge. Load rating results in the safe load capacity for a given truck configuration.

LRFR – Load and Resistance Factor Rating

Operating Rating - as defined by AASHTO, describes the maximum permissible live load to which a structure may be subjected.

Posting Load – weight limit (in tons) used in signing a bridge for load restriction.

Rating Factor – The resulting calculation from a load rating equation. Rating factors are always associated with a particular live load.

Reasonable Access – Defined by *September 30, 1992 Non-Regulatory Supplement to 23 CFR Part 658* as at least one-road-mile from access to and from the National Network of highways, which includes the Interstate System, or further if the limits of a State's reasonable access policy for food, fuel, repairs, and rest extend to facilities beyond one-road-mile. MDT defines reasonable access as 1 mile from any interchange on the Interstate system.

Safe Load Capacity – as defined by AASHTO, a live load that can safely utilize a bridge repeatedly over the duration of a specified inspection cycle. When referenced for LRFR, this represents the upper bound for posting loads.

Safe Posting Load –a posting load specifically associated with LRFR, calculated from MBE Equation 6A.8.3-1

Specialized Hauling Vehicles (SHVs) – legal single-unit, short-wheelbase, multiple-axle trucks commonly used in the construction, waste management, bulk cargo, and commodities hauling industries.

Standard AASHTO Vehicles – AASHTO legal vehicles (Type 3, Type 3S2, and Type 3-3) that are sufficiently representative of average truck configurations in use, used as vehicle models in load rating and bridge posting. This group is considered 'legal' provided they meet the weight guidelines of Federal Bridge Formula B.

SU Trucks – single-unit vehicles (SU4, SU5, SU6, and SU7) that are representative of the most extreme loading effects of single-unit SHVs with four or more axles, used as vehicle models in load rating and bridge posting. This group is considered 'legal' provided they meet the weight guidelines of Federal Bridge Formula B.

8.4.2 Load Posting Analysis

The authority and responsibility of MDT to post or restrict bridges is outlined in the following regulations.

- 23 CFR 650.307
- 23 CFR 650.313
- MCA 60-1-102

Recommendations for posting are made by load rating engineers based on load rating results and the guidance that follows. The Bridge Management Engineer is responsible for making a final determination on all load posting decisions, based on considerations such as the bridge's physical condition, visible distress, structure redundancy, and traffic volume. When determining a course of action, the enforceability of weight restriction is taken into account – if there is concern that significant disregard of load posting will occur, the bridge may be closed in the interest of public safety.

Bridge owners – particularly local agencies – may post bridges for less than the calculated capacity at their discretion. This practice is discouraged by MDT.

8.4.2.1 Posting Requirements

MDT analyzes the following legal load vehicles, any of which may trigger posting.

- Three standard AASHTO Legal Trucks (Type 3, Type 3S2, Type 3-3), or lane loads (LRFR only) as defined in *MBE Appendix D6A-1 thru D6A-5*
- Four single-unit SHVs (SU4, SU5, SU6, SU7), as defined in *MBE Appendix D6A-7*
- Two Emergency Vehicles (EVs) as defined in *FHWA's November 3, 2016 memorandum on Load Rating for the FAST Act's Emergency Vehicles*

A structure must be posted with weight restrictions when load rating calculations for any of the legal loads meet one of the following criteria:

- Operating rating factor is less than 1 based on Allowable Stress (ASR) or Load Factor (LFR) Methods

OR

- Rating factor is less than 1 based on Load and Resistance Factor Method (LRFR)

Although MDT includes EVs in analysis for all bridges, they are only considered to be legal loads on the Interstate and within one road mile from an Interstate interchange[1]. Structures located outside of this range are not subject to posting for EVs.

8.4.2.2 Posting Load Determination

When posting is triggered, each vehicle's posting load should be determined per the applicable sections that follow. Posting values are to the nearest integer, and generally use conventional rounding methods. In cases where engineering judgement is used to arrive at a posting load, it should be applied consistently for all vehicles. Methodology, action, and justification must be fully documented and included in the bridge's Load Posting Form.

8.4.2.2.1 ASR/LFR Methods

The posting load for ASR/LFR Methods is the calculated inventory rating (in tons).

Engineering Judgement

There may be circumstances where posting at the inventory rating level is too conservative, as it is the lower bound of safe load capacity. An alternate posting load may be selected between the inventory and operating levels, depending on a variety of factors such as bridge type, condition rating, redundancy, fatigue sensitive details, ADTT, inspection frequency, enforcement, etc. The posting load must never exceed the calculated operating rating, which is the upper bound of safe load capacity. These situations should be dealt with on a case-by-case basis, and require Bridge Management Engineer approval and documentation of considerations.

[1] Per FHWA Memo dated November 3, 2016, Emergency Vehicles are legal on the Interstate System and within reasonable access to the Interstate System. Per September 30, 1992 Non-Regulatory Supplement to CFR Part 658 and MDT's definition, reasonable access is defined as one mile from any Interstate interchange.

8.4.2.2.2 LRFR Method

8.4.2.2.2.1 Rating Factor less than 0.3

Per MBE 6A.8.3, when the rating factor for any vehicle type falls below 0.3, then that vehicle type should not be allowed on the span. This threshold correlates to the empty weight of a truck, which is typically about 30% of its fully loaded weight. If the bridge cannot support the empty weight of a legal truck, then it may need to be closed or restricted for certain vehicle types.

8.4.2.2.2.2 Rating Factor between 0.3 and 1

The safe posting load for LRFR is calculated using MBE Equation 6A.8.3-1. In cases where the lane load governs, the value of *W* should be taken as 80 kips.

$$SPL = \left(\frac{W}{0.7}\right)[\mathrm{RF} - 0.3] \qquad \text{(MBE 6A.8.3-1)}$$

Where
SPL = Safe Posting Load (in Tons)
W = Weight of Rating Vehicle (in Tons)
RF = Vehicle Rating Factor

Engineering Judgement

The MBE safe posting load equation is a conservative approach that is intended to provide a higher level of safety for load posted bridges. This approach is based on statistical probability of a higher occurrence of overload vehicles and associated failures on posted bridges vs. non-posted bridges. In some cases, this calculation is considered too conservative and overly punitive - particularly for bridges with low rating factors that are currently open to traffic based on past rating methodology/posting policy, which do not exhibit signs of distress or deterioration.

To avoid unnecessary closure of such bridges, engineering judgement may be used to calculate an alternate posting load based on MBE safe load capacity equation 6A.4.4.4-1. The posting load must never exceed this calculated safe load capacity.

$$SLC = RF \; x \; W \qquad \text{(MBE 6A.4.4.4-1)}$$

Where
SLC = Safe Load Capacity (in Tons)
RF = Vehicle Rating Factor
W = Weight of Rating Vehicle (in Tons)

In order to use the safe load capacity as the posting load, ***ALL*** of the following criteria must be met and documented accordingly.

- Bridge is in good to fair condition
  - Superstructure and Deck condition ratings must be 5 or above
- No serious structural defects noted
  - No superstructure or deck components in CS4

8.4.2.3 FAST Act Emergency Vehicles

Posting loads for EVs should be calculated in accordance with Figure 4.2-1. For ASR/LFR, the operating rating factor should be used.

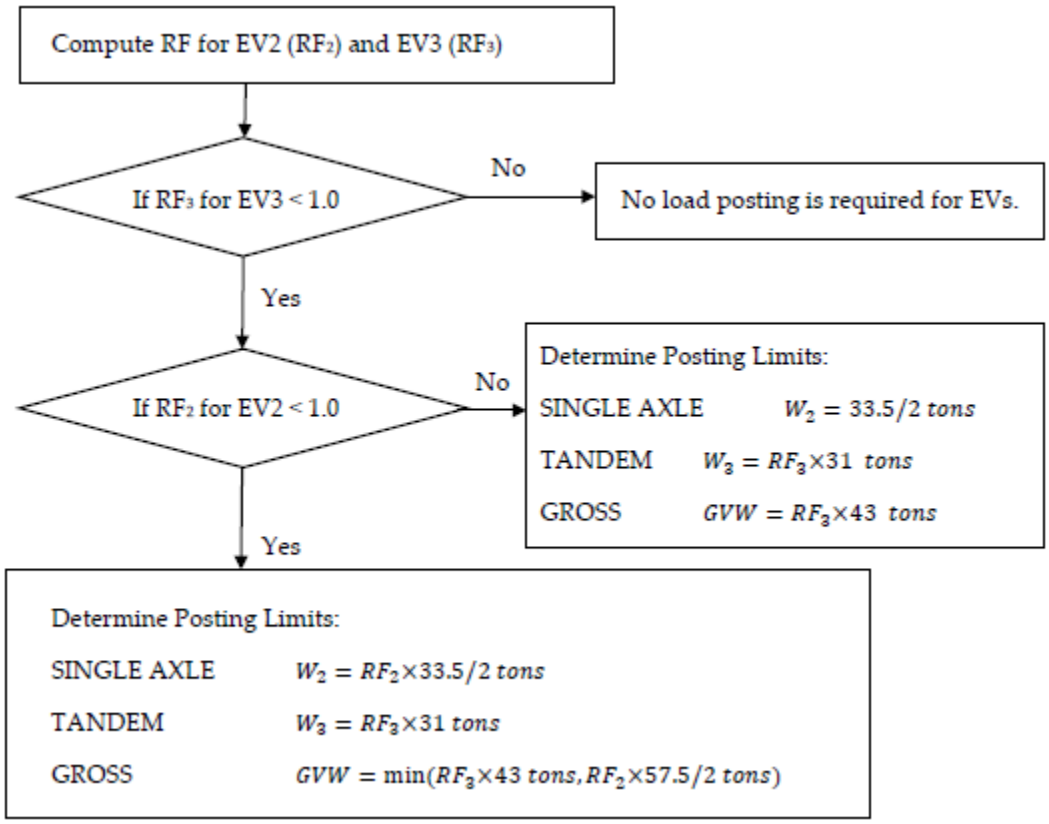


Figure 4.2-1 FAST Act Emergency Vehicle Posting Load Flowchart[2]

8.4.2.4 Minimum Permissible Posting

The minimum permissible posting load is three tons. The MBE requires that bridges not capable of carrying a minimum gross live load weight of three tons must be closed.

8.4.2.5 Posting for Non-Load

In some cases, a bridge may be posted for maximum speed, maximum number of vehicles on a bridge, or other types of non-load related conditions. The decision to use this type of posting is typically left to the bridge owner.

8.4.3 Posting Considerations

Load posting can be a sensitive matter, as it may have considerable impact on the traveling public and industry in the nearby vicinity. There may be situations that warrant additional investigation into allowable variances or analysis techniques to prevent a posting that would result in undue conservatism and significant regional traffic restrictions. In general, these practices should be limited to existing in-service bridges and should not be used for new bridges,

[2] From March 16, 2018 FHWA Load Rating for the FAST Act's Emergency Vehicles Q&A

widenings, or rehabs. Individual situations may be dealt with on a case-by-case basis, with methodology, actions, and justification clearly documented in the load rating report and/or supplemental posting determination document

The strength limit state checks the capacity of structural members and is the primary limit state used by MDT for determining posting needs. MDT incorporates evaluation of the optional service limit state checks in load rating analysis, but a posting decision is not required based on their result. If a load rating is controlled by any of the optional service limit states, and the current bridge inspection shows no signs of shear or flexural cracking, the optional state can be disregarded.

The following are examples of additional techniques that may be used to mitigate or eliminate the need for posting of a particular bridge. This list is not intended to be all-inclusive; additional techniques may be applicable. Any such measures should be discussed with and approved by the Bridge Management Engineer.

- Refined methods of analysis to determine more accurate distribution factors (i.e. finite element analysis, load testing)
- Additional material testing to validate assumptions used in load rating analysis (i.e. concrete strength, steel yield strength)
- Strengthening or repair of structure

8.4.4 Posting and Closure Procedures

When the decision is made to post or close a bridge, it is the responsibility of the bridge owner to erect the necessary signage and barricades *(see Section 8.4.5 for sign guidance).*

Posting should occur as soon as possible, but must not exceed 30 days from the date that a load rating, inspection, or other indication identifies the need to load post a bridge[3]. In some cases, the bridge owner may elect to expedite repairs and strengthen the bridge within the 30-day period in lieu of posting.

Closure should occur as soon as reasonably possible. The need to close a bridge is an emergency situation and should be treated as top priority in order to protect the traveling public.

When posting or closure is declared a Critical Finding, “immediate follow-up inspection or action” and all other associated requirements take precedence over the procedures included in this Section.

8.4.4.1 Structures Owned by MDT

The following procedure should be followed when an MDT owned structure requires closure or load restriction, and signage and/or barricades are not yet installed or are not properly installed (i.e. one sign is missing).

8.4.4.1.1 Notification

When the need for posting is identified and a Load Posting Form has been completed, the Bridge Management Engineer will notify the District Administrator, the FHWA

[3] Per April 17, 2019 FHWA Memorandum on Timeframe for Installing Load Posting Signs at Bridges

Structures Engineer and the appropriate MDT personnel. The following list includes, but is not limited to, internal personnel that should be notified:

- District Maintenance
- Bridge Bureau Chief
- Bridge Management Personnel
- District/Area Bridge Inspection Manager
- Motor Carrier Services
- MDT Road Condition Reports
- MDT Public Information Officer

A Bridge Maintenance Engineer will work with District Maintenance and others as needed to ensure the proper signing is installed.

8.4.4.1.2 Action

The District Administrator is responsible to choose an acceptable sign option from the Load Posting Form and coordinate with District Maintenance personnel to implement posting or closure of the structure. The District is responsible to return documentation (including photos) to the Bridge Management Engineer when posting signs or barricades have been installed. Once the Bridge Management Engineer verifies that the proper signs and/or barricades are in place, documentation will be uploaded to the Structure Management System (SMS) and the database will be updated to reflect the actual posting tonnages or closure (i.e. Item 41, Chapter R). The SMS update must be completed within 30 days of a determination that posting or closure is required.

8.4.4.1.3 Follow-up

For the long term, verification of posting (or non-posting) will be confirmed at routine bridge inspections.

8.4.4.2 Structures not Owned by MDT

The following procedure should be followed when a structure that is not owned by MDT requires closure or load restriction, and signage and/or barricades are not yet installed or are not properly installed (i.e. one sign is missing).

8.4.4.2.1 Notification

When the need for posting is identified and a Load Posting Form has been completed, a letter from the Bridge Management Engineer will sent via email to the bridge owner within 48 hours. For county owned bridges, the email will be sent to the county commissioners and the county road supervisor or superintendent. For bridges owned by other entities, email recipients will be determined on a case-by-case basis. The letter will indicate the reason for posting (i.e. missing sign, new analysis, etc.), and additional information like sign schematics will be included to facilitate proper posting. If bridge closure is required, the letter will include a description and photos detailing the reason for closure (i.e. broken pile, hole in deck).

8.4.4.2.2 Action

The bridge owner is responsible to choose an acceptable sign option from the Load Posting Form and implement posting or closure of the structure. Within 2 business days

of notification, a response should be sent to the Bridge Management Engineer detailing sign selection and implementation method. The local agency is responsible to return documentation (including photos) to the Bridge Management Engineer when posting signs or barricades have been installed. Once the Bridge Management Engineer verifies that the proper signs and/or barricades are in place, documentation will be uploaded to the Structure Management System (SMS) and the database will be updated to reflect the actual posting tonnages or closure (i.e. Item 41, Chapter R). The SMS update must be completed within 30 days of a determination that posting or closure is required.

8.4.4.2.3 Follow-up

If the Bridge Management Engineer does not receive a response from the bridge owner regarding sign concurrence or implementation plan within 2 days, the owner will be contacted again via phone or email. If a response is still not received, MDT will choose a sign option and implement the posting. For the long term, verification of posting (or non-posting) will be confirmed at routine bridge inspections.

8.4.4.3 Rescinding Posting

Once a weight restriction has been established for a bridge, it cannot be removed or improved without written approval by the Bridge Management Engineer. Rescinding of weight restrictions generally requires some level of strengthening, typically by means of rehabilitation or repair. After a bridge is strengthened, a request should be sent to the Bridge Management Engineer that includes updated structural information, such as plans or measurements. Bridge Management personnel will evaluate the request based on the information received, and make a recommendation to the Bridge Management Engineer on whether to approve a rescinded or revised load posting. All correspondence and documentation should be uploaded to the Structure Management System. Appropriate MDT personnel will be notified any time that restrictions are lifted or modified on the State Highway System.

8.4.5 Load Posting Signage

Load posting signs and installation should comply with this posting procedure document, the *Manual on Uniform Traffic Control Devices (MUTCD)*, and *MDT Detailed Drawings.* Closure barricades and signs should conform to *MUTCD Article 2B.67*. Bridges requiring load posting or closure may also require advance posting signs at nearest intersecting roads, ramps, or wide points in the road where a driver can detour or turn around.

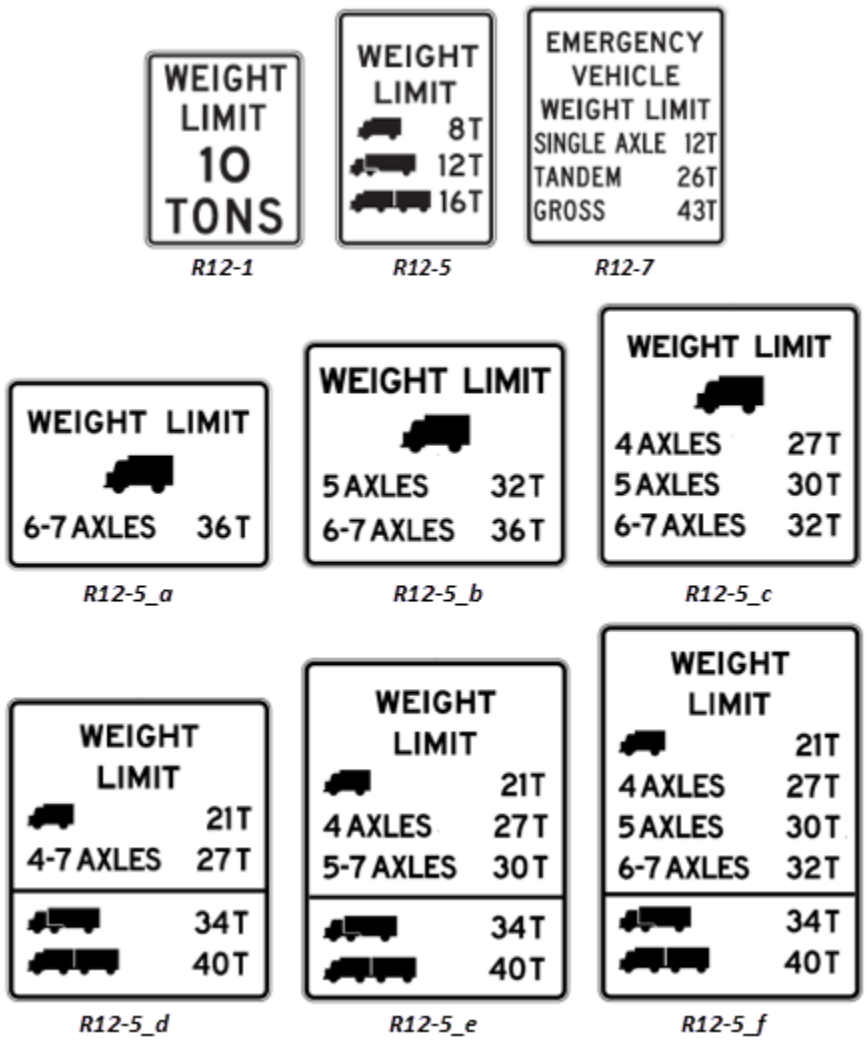


Figure 4.5-1 – Summary of MDT Bridge Posting Signs

See Figure 4.5-1 for a summary of acceptable load posting signs. Take special note that the posting load shown on the sign should not exceed the vehicle's maximum legal weight listed in Table 4.5-1 below. For example, if a vehicle type is shown on a posting sign but does not require posting, the posting load value will be its maximum legal weight.

Table 4.5-1 Maximum Weight Limit Table

Vehicle Type	Maximum Legal Weight
Type 3	25 tons
Type 3S2	36 tons
Type 3-3	40 tons

Vehicle Type	Maximum Legal Weight
SU4	27 tons
SU5	31 tons
SU6	34.75 tons
SU7	38.75 tons

Vehicle Type	Maximum Legal Weight
EV2	28.75 tons
EV3	43 tons

8.4.5.1 Sign Guidance

MDT's goal for load posting is to strike a balance between simplicity and minimizing unnecessary restrictions. Posting sign selection should limit all necessary vehicles as efficiently as possible, yet avoid reducing mobility of vehicles that do not need to be restricted. The following sections provide guidance on applicability of posting signs based on posting triggers.

8.4.5.1.1 Practical Limitations

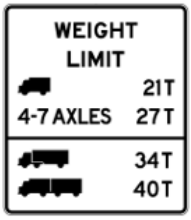
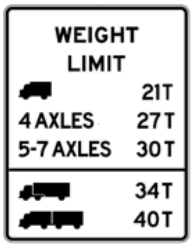
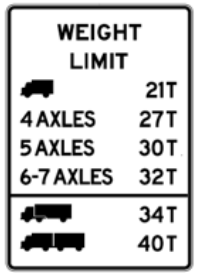
Consideration should be given to practical limitations when determining which posting sign to use. In most cases, it does not make sense to post for a class of vehicles where the empty vehicle weight is greater than its posted limit. In other cases, this approach may be used as a strategy to restrict certain vehicle types on a multi-vehicle sign. In general, R12-1 should be used for low rating bridges with load posting results that converge toward empty vehicle weights.

8.4.5.1.2 Posting Trigger – Standard AASHTO Vehicles

When posting is triggered by standard AASHTO vehicles (Type 3, Type 3S2, Type 3-3), it will also be required for SHVs. MDT preference is to use the simplest, most consolidated weight limit sign possible while considering impact on the trucking industry. R12-5 is most conservative because it groups all single-unit vehicles together, which may be acceptable in areas with minimal truck traffic. R12-5_d, R12-5_e and R12-5_f are intended for use in areas where the single-unit vehicle breakout provides meaningful benefit to the trucking industry. Recommended usage of each sign is summarized in Table 4.5-2 below.

Table 4.5-2. Recommended Sign Usage for Standard AASHTO Vehicles

Load Posting Sign	Example	Recommended Usage
R12-5		▪ Structures on routes with minimal truck traffic ▪ When the difference between Type 3 and SHV posting loads are marginal (i.e. within 2 tons) ▪ When the empty weight of SHVs exceed their calculated posting loads ▪ Weight Limit Determination  *Single Unit Vehicle* Lower of calculated posting load for Type 3, SU4, SU5, SU6, SU7, or 25 Tons  *Truck-Trailer Combination* Lower of calculated posting load for Type 3S2 or 36 Tons  *Truck-Double Trailer Combination* Lower of calculated posting load for Type 3-3 or 40 Tons

R12-5_d		▪ Structures on routes with frequent SHV traffic ▪ When the difference between Type 3 and SHV posting loads is significant ▪ Weight Limit Determination *Single Unit Vehicle (2-3 axles)* Lower of calculated posting load for Type 3, or 25 Tons *Single Unit Vehicle (4+ axles)* Lower of calculated posting load for SU vehicles included in grouping ** **Axle grouping may be done on a case-by-case basis to balance simplicity and acceptable level of conservatism. Text must not exceed 3 lines. In general, SU vehicles should be grouped together on the same line if posting loads are within 2 tons. *Truck-Trailer Combination* Lower of calculated posting load for Type 3S2 or 36 Tons *Truck-Double Trailer Combination* Lower of calculated posting load for Type 3-3 or 40 Tons
R12-5_e		
R12-5_f		





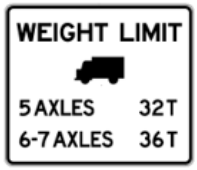


8.4.5.1.3 Posting Trigger – SHVs Only

Specialized Hauling Vehicles can cause force effects in bridges that exceed stresses introduced by standard AASHTO vehicles by over 50 percent. For that reason, there is a possibility that a bridge has sufficient capacity for the three standard AASHTO vehicles but needs to be posted for one or more of the legal 4-7 axle SHV configurations. To avoid penalizing all trucks the R12-5_a, R12-5_b and R12-5_c posting signs were adopted to restrict single-unit vehicles only.

There are multiple variations for each sign depending on which single-unit vehicles trigger posting, how they are grouped, and how many lines of text are needed. Recommended usage of each sign is summarized in Table 4.5-3 below. In general, when posting is triggered by SU4 or SU5 it will also be required for SU6 and SU7. When posting is triggered for SU6, it is also required for SU7. In certain cases, SU7 is the only posting trigger.

Table 4.5-3 Recommended Sign Usage for SHV Vehicles (when standard AASHTO vehicles do not require posting)

Load Posting Sign	Example	Recommended Usage
R12-5_a		▪ When only single unit vehicles require posting (i.e. Type 3, SU4, SU5, SU6, SU7) ▪ Axle grouping may be done on a case-by-case basis to balance simplicity and acceptable level of conservatism. Text must not exceed 3 lines. In general, SU vehicles should be grouped together on one line if posting loads are within 2 tons. ▪ Weight Limit for each line is determined by the lowest value of calculated posting load for SU vehicles included in grouping
R12-5_b		
12-5_c		

8.4.5.1.4 FAST Act Emergency Vehicles

Emergency Vehicle restrictions are unique in that they apply to a very specific group of users in very specific areas. For this reason, EV posting is independent of the other legal vehicles (i.e. standard AASHTO vehicles, SHVs), and standalone signs should be installed separately.

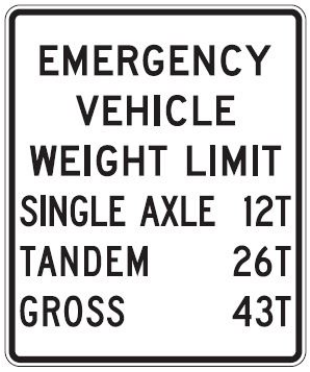


Figure 4.5-2 Emergency Vehicle Posting Sign[4]

[4] Recommended per March 16, 2018 FHWA Load Rating for the FAST Act's Emergency Vehicles Q&A

APPENDIX A: MDT LOAD POSTING SIGNS

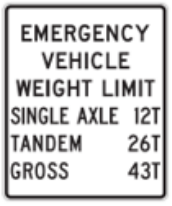
Sign Designation	County/Non State-Owned Routes ***Minimum Sign Size***		State-Owned Route		Interstate		Sign Design Page
R12-1	Refer to MUTCD						A-2
R12-5	Refer to MUTCD						A-3
R12-5_a	42" x 30"	3'-6" x 2'-6"	42" x 30"	3'-6" x 2'-6"	54" x 36"	4'-6" x 3'-0"	A-4, A-5, A-6
R12-5_b	42" x 36"	3'-6" x 3'-0"	42" x 36"	3'-6" x 3'-0"	54" x 42"	4'-6" x 3'-6"	A-7, A-8, A-9
R12-5_c	42" x 42"	3'-6" x 3'-6"	42" x 42"	3'-6" x 3'-6"	54" x 48"	4'-6" x 4'-0"	A-10, A-11, A-12
R12-5_d	42" x 48"	3'-6" x 4'-0"	48" x 48"	4'-0" x 4'-0"	54" x 60"	4'-6" x 5'-0"	A-13, A-14, A-15
R12-5_e	42" x 54"	3'-6" x 4'-6"	48" x 60"	4'-0" x 5'-0"	54" x 66"	4'-6" x 5'-6"	A-16, A-17, A-18
R12-5_f	42" x 60"	3'-6" x 5'-0"	48" x 66"	4'-0" x 5'-6"	54" x 72"	4'-6" x 6'-0"	A-19, A-20, A-21
R12-7	30" x 36"	3'-0" x 3' - 5"	30" x 36"	3'-0" x 3' - 5"	48" x 60"	4'-0" x 5'-0"	A-22



R12-1



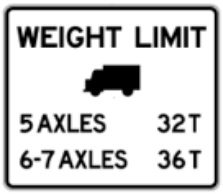
R12-5



R12-7



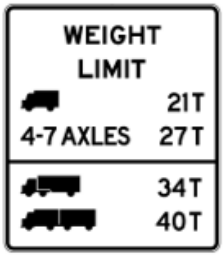
R12-5_a



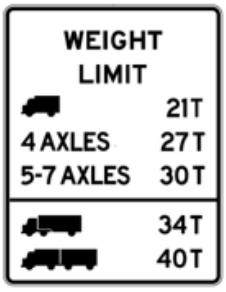
R12-5_b



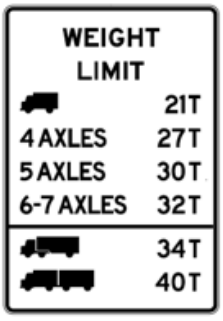
R12-5_c



R12-5_d



R12-5_e



R12-5_f

R12-1

Taken from 2004 Edition of FHWA's "Standard Highway Signs and Markings" book, provided for reference only. R12-1 sign details should be in accordance with latest edition of the publication.



R12-1
WEIGHT LIMIT

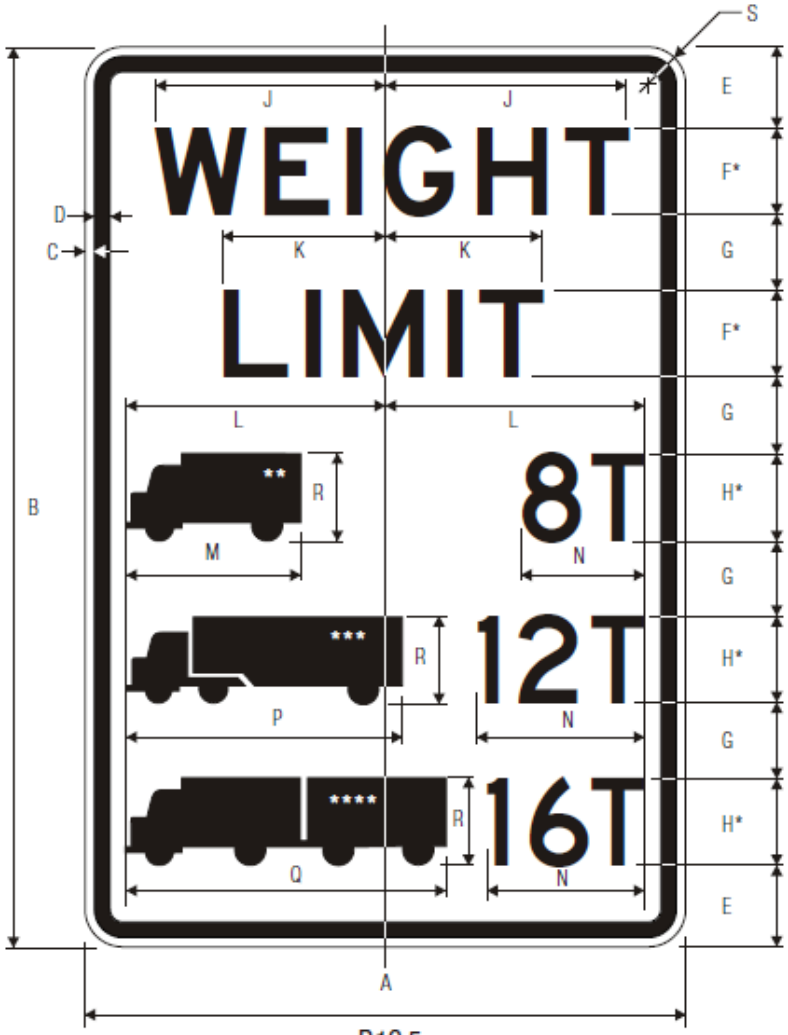
*Optically space numerals about centerline.

C	A	B	C	D	E	F	G	H	J	K	L
	24	30	.375	.625	3	4 D	1.75	2.125	5 E	5D	9
	36	48	.625	.875	4.75	6 D	3	3.75	8 E	8 D	13.5

M	N	P	Q
9.5	6.313	8.25	1.5
14.25	9.438	13.25	2.25

R12-5

Taken from 2004 Edition of FHWA's "Standard Highway Signs and Markings" book, provided for reference only. R12-5 sign details should be in accordance with latest edition of the publication.



R12-5
WEIGHT LIMIT

*Series 2000 Standard Alphabets.
**See page 6-4 for design
***See page 6-5 for design
****See page 6-6 for design

	A	B	C	D	E	F	G	H	J	K	L	M
C	24	36	.375	.625	3.25	3.5 E	3	3.5 D	9.465	6.403	10.375	7
	30	42	.5	.75	3.75	4.5 E	3	4.5 D	12.016	8.192	13.188	9
	36	48	.625	.875	5	5 E	3.25	5 D	13.350	9.099	15	10
	48	60	.75	1.25	6	6 E	4.5	6 D	16.02	10.918	19	12

N	P	Q	R	S
VAR	11	12.813	3.5	1.5
VAR	13.438	16.438	4.5	1.875
VAR	15.438	18.375	5	2.25
VAR	19.688	22	6	3

COLORS: LEGEND – BLACK
BACKGROUND– WHITE (RETROREFLECTIVE)

R12-5_a

C:\dgn\SHV_Weight_ntSISDC001.DGN

SHEET 1

11:59:45 PM
1/16/2020
cm044

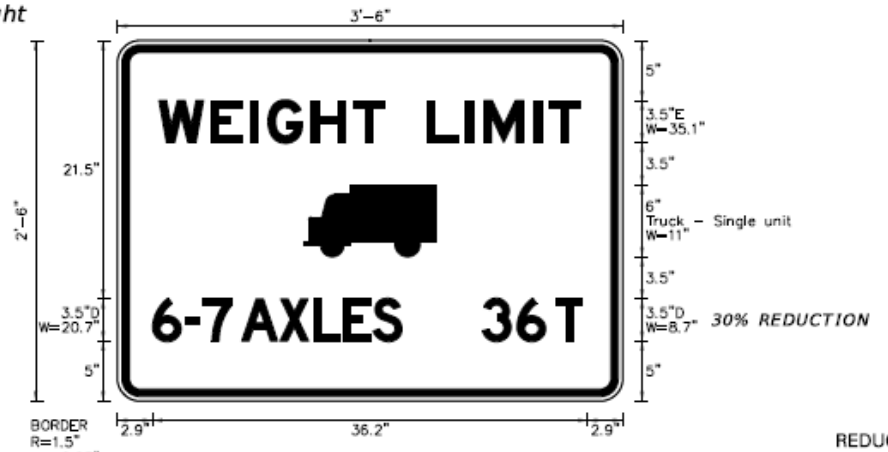
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

3.5" Letter Height



Panel Style: 0_Reg_R-12_3-3.5 E 30+.ssi
M.U.T.C.D.: 2009 Edition

REDUCTION 10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_3-3.5 E 30+.ssi
Dimensions are in inches, tenths

SIGN NAME: R12-5_a

SHT ALUM ☒
ALUM INCR ☐

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_a
WIDTH x HGHT.	3'-6" x 2'-6"
MARGIN	0.38"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
SQ. FEET	8.8 Sq.Ft.
MOUNTING	Ground
TYPE: BACKGROUND COLOR:	High Intensity XI White
TYPE: LEGEND/BORDER COLOR:	Reflective Black/Black

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck - Single unit	0	15.5	12	11	6

LETTER POSITIONS (X)

																					LENGTH	SERIES SIZE
	W	E	I	G	H	T		L	I	M	I	T									35.1	E 2000 3.5
3.4	4.3	3.3	1.4	3.6	3.4	2.6	3.5	3.2	1.5	4.2	1.2	2.6	3.5									
	6	-	7		A	X	L	E	S		3	6		T							36.2	D 2000 3.5
2.9	2.7	1.5	2.4	0.9	3.2	2.8	2.5	2.4	2.4	6.7	2.9	2.4	0.9	2.6	2.9							

C:\dgn\SHV_WeightLimit5ISDC001.DGN

SHEET 6

11:59:54 PM
1/16/2020
a4044

MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

4" Letter Height



Panel Style: 0_Reg_R-12_4E 36+.ssi
M.U.T.C.D.: 2009 Edition

REDUCTION 10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_4E 36+.ssi
Dimensions are in inches. tenths

SIGN NAME: R12-5_a

SHT ALUM ☒
ALUM INCR ☐

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_a
WIDTH x HGHT.	3'-6" x 2'-6"
MARGIN	0.5"
BORDER WIDTH	0.75"
CORNER RADIUS	1.88"
SQ. FEET	8.8 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck - Single unit	0	14.9	12	11	6

LETTER POSITIONS (X)

																				LENGTH	SERIES SIZE
	W	E	I	G	H	T		L	I	M	I	T								36.6	E 2000 4
2.7	4.7	3.6	1.4	3.9	3.7	3	2.8	3.5	1.4	4.5	1.2	3	2.7								
	6	-	7		A	X	L	E	S		3	6		T						36.5	D 2000 4
2.8	3.1	1.7	2.7	1.5	3.6	3.2	2.9	2.8	2.7	2.8	3.3	2.7	1	2.5	2.8						

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SHEET 11

21:00:03 PM
1/16/2020
u4044

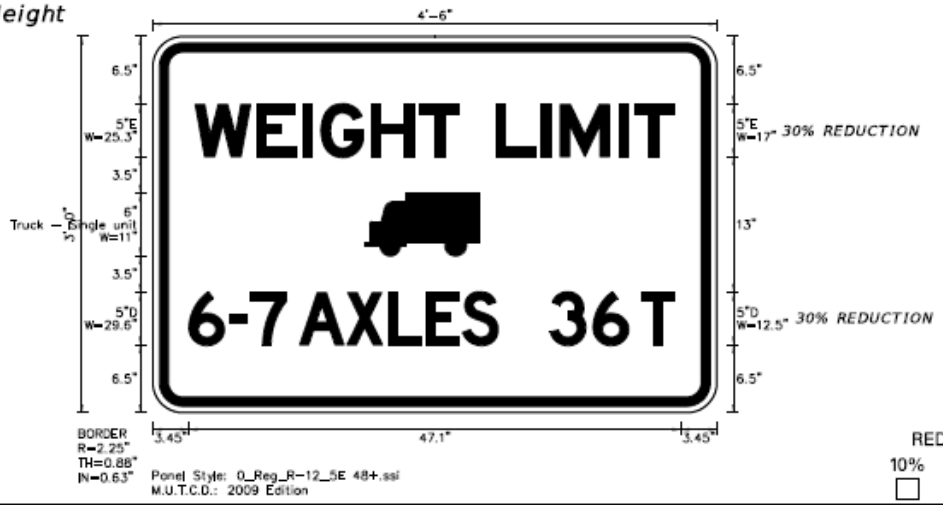
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

5" Letter Height



Panel Style: 0_Reg_R-12_5E 48+.ssi
Dimensions are in inches, tenths

SIGN NAME: R12-5_a

SHT ALUM ☐
ALUM INCR ☒

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_a
WIDTH x HGHT.	4'-6" x 3'-0"
MARGIN	0.63"
BORDER WIDTH	0.88"
CORNER RADIUS	2.25"
SQ. FEET	13.5 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	20.4	15	11	6

LETTER POSITIONS (X)																					LENGTH	SERIES SIZE
	W	E	I	G	H	T		L	I	M	I	T									45.8	E 2000 5
4.1	5.9	4.5	1.7	4.9	4.6	3.8	3.5	4.3	1.8	5.6	1.5	3.8	4.1									
	6	–	7		A	X	L	E	S		3	6		T							47.1	D 2000 5
3.4	3.9	2.1	3.4	1.3	4.5	4	3.6	3.4	3.4	5	4.1	3.4	1.3	3.7	3.4							

C:\dgn\SHV_WeightLimitS150C001.DGN

SHEET 2

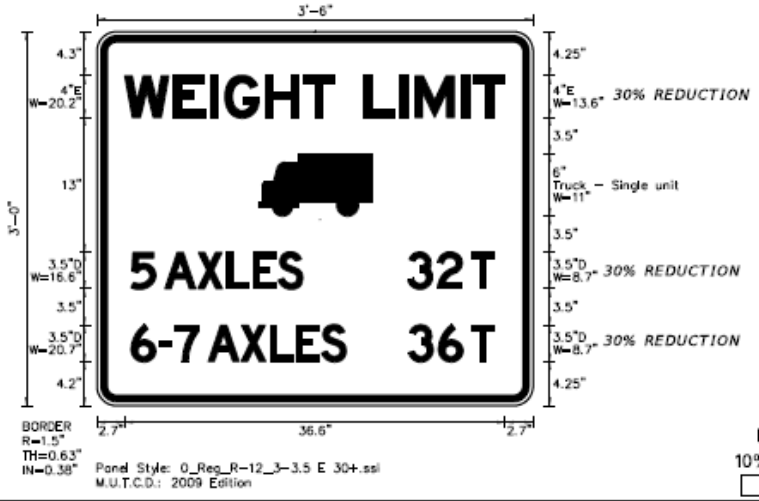
11:59:47 PM
1/16/2020
cm044

MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing
PROJ. TITLE

3.5" Letter Height



REDUCTION
10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_3-3.5 E 30+.ssi
Dimensions are in inches, tenths

SIGN NAME: R12-5_b

SHT ALUM ☒
ALUM INCR ☐

SIGN DETAIL 1:8

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

SIGN NUMBER	R12-5_b
WIDTH x HGHT.	3'-6" x 3'-0"
MARGIN	0.38"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
SQ. FEET	10.5 Sq. Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck - Single unit	0	15.5	18.2	11	6

LETTER POSITIONS (X)

																				LENGTH	SERIES SIZE
	W	E	I	G	H	T		L	I	M	I	T								36.6	E 2000 4
2.7	4.7	3.6	1.4	3.9	3.7	3	2.8	3.5	1.4	4.5	1.2	3	2.7								
	5		A	X	L	E	S		3	2		T								35.4	D 2000 3.5
3.3	2.4	0.9	3.2	2.8	2.5	2.4	2.4	10.1	2.9	2.4	0.9	2.6	3.3								
	6	-	7		A	X	L	E	S		3	6		T						35.5	D 2000 3.5
3.3	2.7	1.5	2.4	0.9	3.2	2.8	2.5	2.4	2.4	6	2.9	2.4	0.9	2.6	3.2						

C:\dgn\SHV_WeightLimit5150C00 1.DGN

SHEET 7

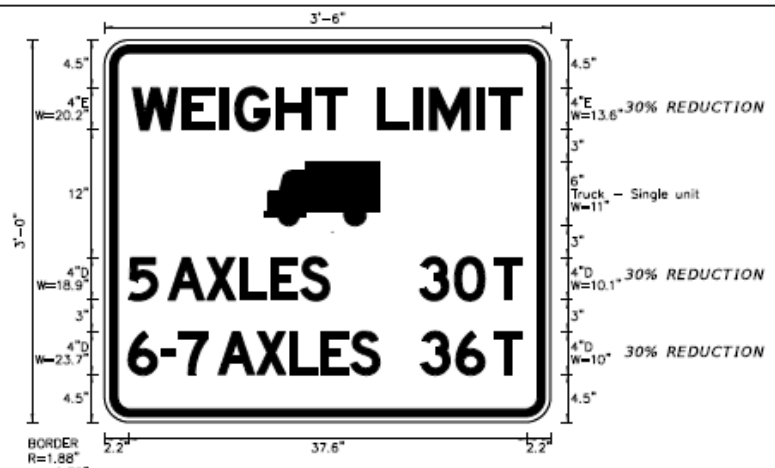
11:59:56 PM
1/16/2020
a4044

MONTANA DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing
PROJ. TITLE

4" Letter Height



REDUCTION
10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_4E 36+.ssi
Dimensions are in inches, tenths

SIGN NAME: R12-5_b

SHT ALUM ☒
ALUM INCR ☐

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_b
WIDTH x HGHT.	3'-6" x 3'-0"
MARGIN	0.5"
BORDER WIDTH	0.75"
CORNER RADIUS	1.88"
SQ. FEET	10.5 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck - Single unit	0	15	18.5	11	6

LETTER POSITIONS (X)

																					LENGTH	SERIES SIZE
	W	E	I	G	H	T		L	I	M	I	T									36.6	E 2000 4
2.6	4.7	3.6	1.4	3.9	3.7	3	2.8	3.5	1.4	4.5	1.2	3	2.7									
	5		A	X	L	E	S		3	0		T									37.5	D 2000 4
2.3	2.7	1	3.6	3.2	2.9	2.8	2.7	8.5	3.3	2.8	1	3	2.2									
	6	-	7		A	X	L	E	S		3	6		T							37.6	D 2000 4
2.2	3.1	1.7	2.7	1	3.6	3.2	2.9	2.8	2.7	3.9	3.3	2.7	1	3	2.2							

C:\dgn\SHV_WeightLimitS15DC001.DGN

SHEET 12

21:00:05 PM
1/16/2020
u4044

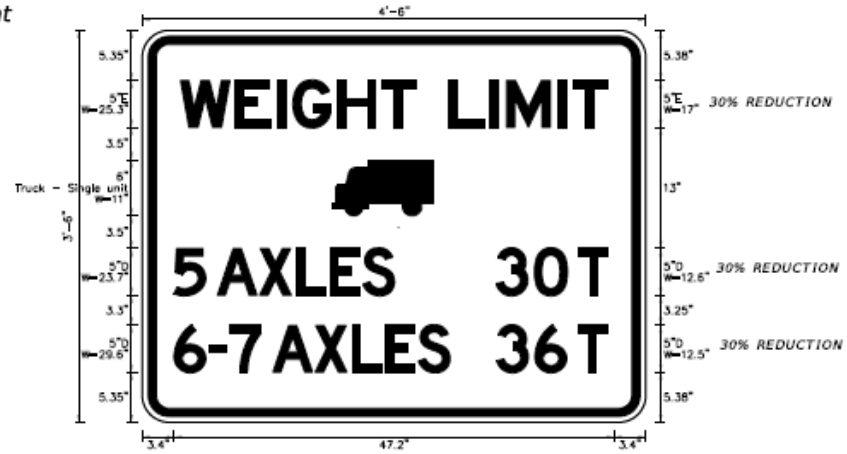
MONTANA DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

5" Letter Height



REDUCTION 10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_5E 48+.ssl
Dimensions are in inches. tenths

SIGN NAME: R12-5_b

SHT ALUM ☐
ALUM INCR ☒

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_b
WIDTH x HGHT.	4'-6" x 3'-6"
MARGIN	0.63"
BORDER WIDTH	0.88"
CORNER RADIUS	2.25"
SQ. FEET	15.8 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck - Single unit	0	20.3	22.1	11	6

LETTER POSITIONS (X)																					LENGTH	SERIES SIZE
	W	E	I	G	H	T		L	I	M	I	T									45.8	E 2000 5
4.1	5.9	4.5	1.7	4.9	4.6	3.8	3.5	4.3	1.8	5.6	1.5	3.8	4.1									
	5		A	X	L	E	S		3	0		T									47.2	D 2000 5
3.4	3.4	1.3	4.5	4	3.6	3.4	3.4	10.9	4.1	3.5	1.3	3.7	3.4									
	6	-	7		A	X	L	E	S		3	6		T							47.1	D 2000 5
3.4	3.9	2.1	3.4	1.3	4.5	4	3.6	3.4	3.4	5	4.1	3.4	1.2	3.8	3.5							

C:\dgn\SHV_Weight.dgn S15DC001.DGN

SHEET 3

11:59:49 PM
1/16/2020
a4044

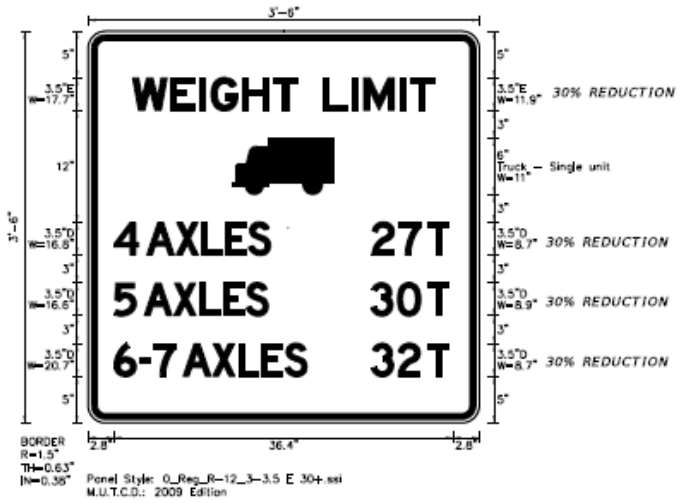
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

3.5" Letter Height



REDUCTION 10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_3-3.5 E 30+.ssi
Dimensions are in inches. tenths

SIGN NAME: R12-5_c

SHT ALUM ☒ ALUM INCR ☐

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_c
WIDTH x HGHT.	3'-6" x 3'-6"
MARGIN	0.38"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
SQ. FEET	12.3 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED:	RDS DATE: 12/2020
CHECKED:	JHC DATE: 12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	15.5	24.5	11	6

LETTER POSITIONS (X)

																					LENGTH	SERIES SIZE
	W	E	I	G	H	T		L	I	M	I	T									32.4	E 2000 3.5
4.8	4.1	3.1	1.2	3.4	3.3	2.6	2.8	3	1.3	3.9	1	2.6	4.8									
	4		A	X	L	E	S		2	7		T									36.4	D 2000 3.5
2.8	2.6	0.9	3.2	2.8	2.5	2.4	2.4	10.9	2.8	2.4	0.9	2.6	2.8									
	5		A	X	L	E	S		3	0		T									36.4	D 2000 3.5
2.8	2.4	0.9	3.2	2.8	2.5	2.4	2.4	11	2.9	2.5	0.9	2.6	2.8									
	6	–	7		A	X	L	E	S		3	2		T							36.4	D 2000 3.5
2.8	2.7	1.5	2.4	0.9	3.2	2.8	2.5	2.4	2.4	6.9	2.9	2.4	0.9	2.6	2.8							

C:\dgn\SHV_Weight Limit\S1SIDC00 1. DGN

SHEET 8

11:59:58 PM
1/16/2020
a4044

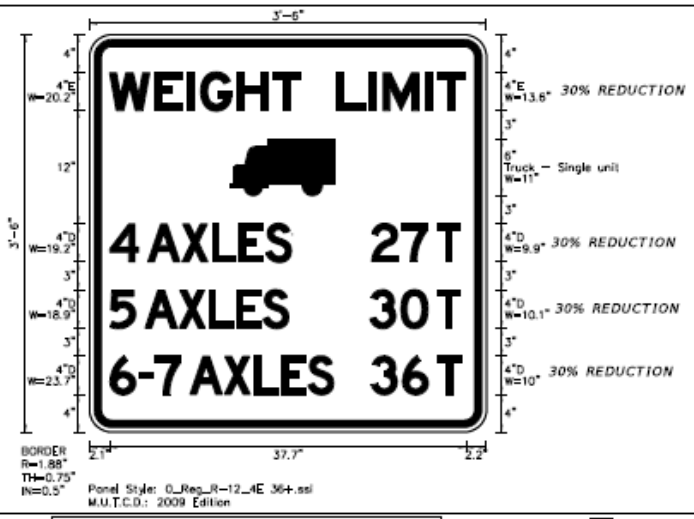
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

4" Letter Height



REDUCTION 10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_4E 36+.ssi
Dimensions are in inches, tenths

SIGN NAME: R12-5_c

SHT ALUM ☒
ALUM INCR ☐

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_c
WIDTH x HGHT.	3'-6" x 3'-6"
MARGIN	0.5"
BORDER WIDTH	0.75"
CORNER RADIUS	1.88"
SQ. FEET	12.3 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck - Single unit	0	15	25	11	6

LETTER POSITIONS (X)

																					LENGTH	SERIES SIZE
	W	E	I	G	H	T		L	I	M	I	T									37.6	E 2000 4
2.1	4.7	3.6	1.4	3.9	3.7	3	3.8	3.5	1.4	4.5	1.2	3	2.2									
	4		A	X	L	E	S		2	7		T									37.6	D 2000 4
2.2	3	1	3.6	3.2	2.9	2.8	2.7	8.5	3.2	2.7	1	3	2.2									
	5		A	X	L	E	S		3	0		T									37.6	D 2000 4
2.2	2.7	1	3.6	3.2	2.9	2.8	2.7	8.6	3.3	2.8	1	3	2.2									
	6	-	7		A	X	L	E	S		3	6		T							37.7	D 2000 4
2.2	3.1	1.7	2.7	1	3.6	3.2	2.9	2.8	2.7	4	3.3	2.7	1	3	2.2							

C:\dgn\SHV_WeightLimit5ISDC00 1. DGN

SHEET 13

21:00:07 PM
1/16/2020
u4044

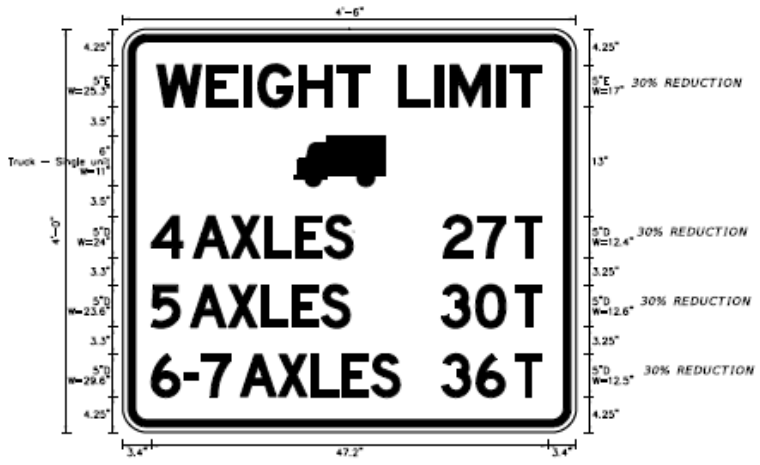
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

5" Letter Height



REDUCTION 10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_5E 484.ssl
Dimensions are in inches, tenths

SIGN NAME: R12-5_c

SHT ALUM ☐
ALUM INCR ☒

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_c
WIDTH x HGHT.	4'-6" x 4'-0"
MARGIN	0.63"
BORDER WIDTH	0.88"
CORNER RADIUS	2.25"
SQ. FEET	18.0 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	20.3	29.3	11	6

LETTER POSITIONS (X)																					LENGTH	SERIES SIZE
	W	E	I	G	H	T		L	I	M	I	T									45.8	E 2000 5
4.1	5.9	4.5	1.7	4.9	4.6	3.8	3.5	4.3	1.8	5.6	1.5	3.8	4.1									
	4		A	X	L	E	S		2	7		T									47.2	D 2000 5
3.4	3.8	1.3	4.5	4	3.6	3.4	3.4	10.8	4	3.4	1.2	3.8	3.4									
	5		A	X	L	E	S		3	0		T									47.2	D 2000 5
3.4	3.4	1.3	4.5	4	3.6	3.4	3.4	10.9	4.1	3.5	1.3	3.7	3.4									
	6	–	7		A	X	L	E	S		3	6		T							47.1	D 2000 5
3.4	3.9	2.1	3.4	1.3	4.5	4	3.6	3.4	3.4	5	4.1	3.4	1.3	3.7	3.5							

C:\dgn\SHV_Weight.dgn S:\SDC00 1. DGN

SHEET 4

11:59:50 PM
1/15/2020
u4044

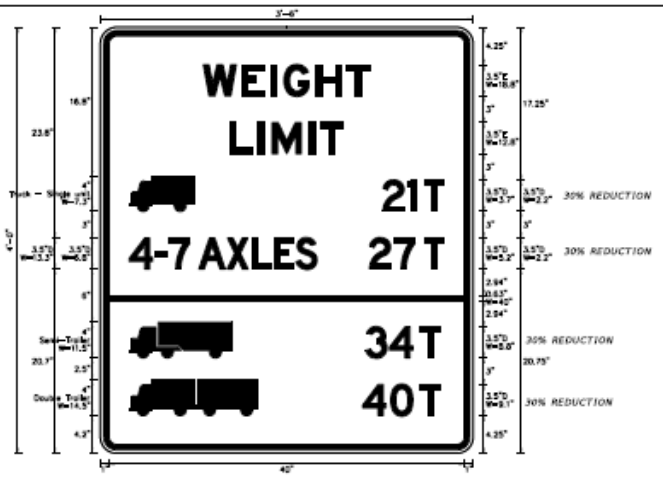
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

3.5" Letter Height



REDUCTION 10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_3-3.5 E 304.ssl
Dimensions are in inches, tenths

SIGN NAME: R12-5_d

SHT ALUM ☒
ALUM INCR ☐

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_d
WIDTH x HGHT.	3'-6" x 4'-0"
MARGIN	0.38"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
SQ. FEET	14.0 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	3.3	27.2	7.3	4
Semi-Trailer	0	3.3	10.8	11.5	4
Double Trailer	0	3.3	4.3	14.5	4

LETTER POSITIONS (X)

																				LENGTH	SERIES SIZE
	W	E	I	G	H	T														18.8	E 2000 3.5
11.6	4.3	3.3	1.4	3.6	3.4	2.6	11.6														
	L	I	M	I	T															12.8	E 2000 3.5
14.6	3.2	1.5	4.2	1.2	2.6	14.6															
	2	1		T																6.9	D 2000 3.5
31.8	2.9	0.9	1	2.2	3.3																
	4	–	7		A	X	L	E	S		2	7		T						35.4	D 2000 3.5
3.3	3	1.5	2.4	1	3.2	2.8	2.5	2.4	2.4	5.9	2.8	2.4	1	2.2	3.3						
	3	4		T																8.8	D 2000 3.5
29.9	2.7	2.6	0.9	2.6	3.3																
	4	0		T																9.1	D 2000 3.5
29.6	3.2	2.5	0.9	2.6	3.3																

C:\dgn\SHV_Weight Limit\S15DC001.DGN

SHEET 9

1:59:59 PM
1/16/2020
d4044

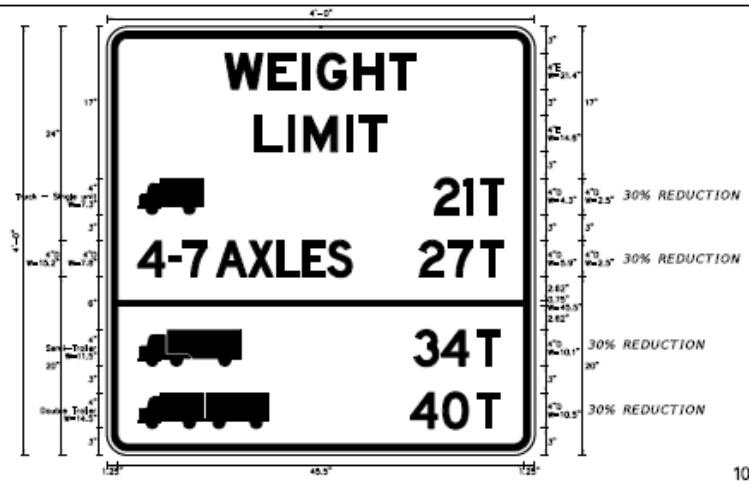
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

4" Letter Height



REDUCTION 10% ☐ 20% ☐ 30% ☒

Panel Style: D_Reg_R-12_4E 36+.ssi
Dimensions are in inches, tenths

SIGN NAME: R12-5_d

SHT ALUM ☒
ALUM INCR ☐

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_d
WIDTH x HGHT.	4'-0" x 4'-0"
MARGIN	0.5"
BORDER WIDTH	0.75"
CORNER RADIUS	1.88"
SQ. FEET	16.0 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	3.5	27	7.3	4
Semi-Trailer	0	3.5	10	11.5	4
Double Trailer	0	3.5	3	14.5	4

LETTER POSITIONS (X)

																				LENGTH	SERIES SIZE
	W	E	I	G	H	T														21.4	E 2000 4
13.3	4.9	3.8	1.6	4.2	3.9	3	13.3														
	L	I	M	I	T															14.6	E 2000 4
16.7	3.7	1.8	4.8	1.4	3	16.7															
	2	1		T																7.8	D 2000 4
36.8	3.3	1	1	2.5	3.5																
	4	–	7		A	X	L	E	S		2	7		T						41	D 2000 4
3.5	3.4	1.7	2.7	1	3.6	3.2	2.9	2.8	2.7	7.6	3.2	2.7	1	2.5	3.5						
	3	4		T																10.1	D 2000 4
34.5	3.1	3	1	3	3.5																
	4	0		T																10.5	D 2000 4
34.1	3.6	2.8	1	3	3.5																

C:\dgn\SHV_WeightLimitS15DC001.DGN

SHEET 14

21:00:08 PM
1/15/2020
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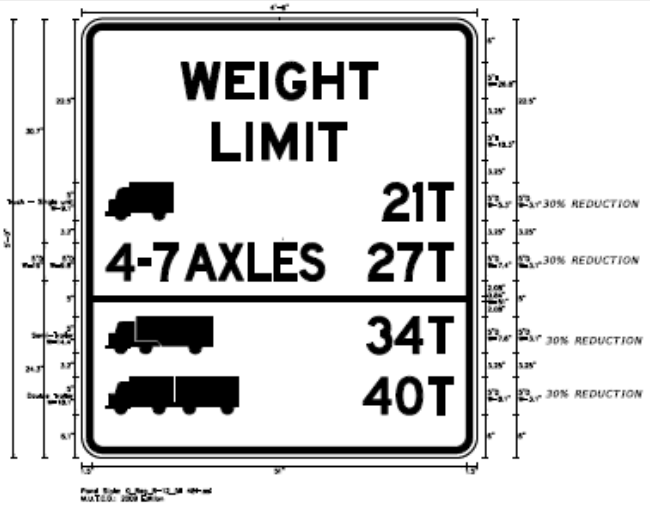
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

5" Letter Height



REDUCTION
10% ☐ 20% ☐ 30% ☒

PanelStyle: 0_Reg_R-12_5E 48t.ssi
Dimensions are in inches, tenths

SIGN NAME: R12-5_d

SHT ALUM ☐
ALUM INCR ☒

SIGN DETAIL
1:8

SIGN NUMBER	R12-5_d
WIDTH x HGHT.	4'-6" x 5'-0"
MARGIN	0.63"
BORDER WIDTH	0.88"
CORNER RADIUS	2.25"
SQ. FEET	22.5 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED: RDS	DATE: 12/2020
CHECKED: JHC	DATE: 12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	3.4	32.5	9.1	5
Semi-Trailer	0	3.4	14.2	14.4	5
Double Trailer	0	3.4	6	18.1	5

LETTER POSITIONS (X)																					LENGTH	SERIES SIZE
	W	E	I	G	H	T															26.8	E 2000 5
13.6	6.2	4.7	2	5.2	4.9	3.8	13.6															
	L	I	M	I	T																18.3	E 2000 5
17.8	4.6	2.2	6	1.7	3.8	17.9																
	2	1		T																	9.4	D 2000 5
41.2	4.1	1.2	1	3.1	3.4																	
	4	–	7		A	X	L	E	S		2	7		T							47.3	D 2000 5
3.4	4.3	2.1	3.4	1	4.5	4	3.6	3.4	3.4	6	4	3.4	1	3.1	3.4							
	3	4		T																	11.7	D 2000 5
39	3.8	3.7	1	3.1	3.4																	
	4	0		T																	12.2	D 2000 5
38.5	4.5	3.5	1	3.1	3.4																	

C:\dgn\SHV_WeightLimitSIGDC00 1. DGN

SHEET 5

11:59:52 PM
1/16/2020
u4044

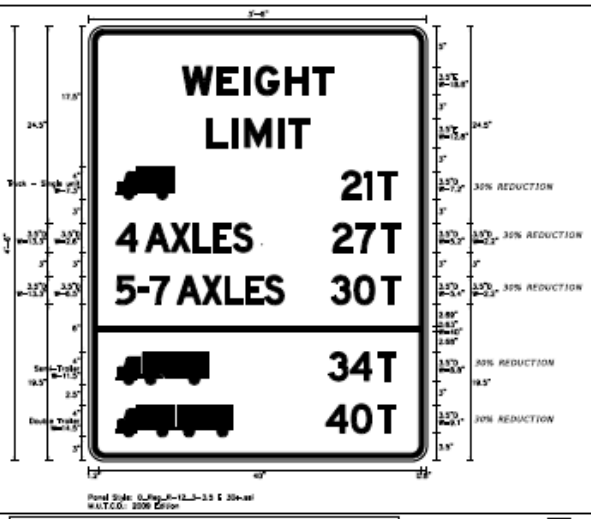
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

3.5" Letter Height



REDUCTION
10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_3-3.5 E 304.ssl
Dimensions are in inches. tenths

SIGN NAME: R12-5_e

SHT ALUM ☒
ALUM INCR ☐

SIGN DETAIL
1:8

SIGN NUMBER	R12-5_e
WIDTH x HGHT.	3'-6" x 4'-6"
MARGIN	0.38"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
SQ. FEET	15.8 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	3.4	32.5	7.3	4
Semi-Trailer	0	3.4	9.5	11.5	4
Double Trailer	0	3.4	3	14.5	4

LETTER POSITIONS (X)

																				LENGTH	SERIES SIZE
	W	E	I	G	H	T														18.8	E 2000 3.5
11.6	4.3	3.3	1.4	3.6	3.4	2.6	11.6														
	L	I	M	I	T															12.8	E 2000 3.5
14.6	3.2	1.5	4.2	1.2	2.6	14.6															
	2	1		T																7.2	D 2000 3.5
31.4	2.9	0.9	0.9	2.6	3.4																
	4		A	X	L	E	S		2	7		T								35.3	D 2000 3.5
3.4	2.6	1	3.2	2.8	2.5	2.4	2.4	10	2.8	2.4	1	2.2	3.4								
	5	–	7		A	X	L	E	S		3	0		T						35.3	D 2000 3.5
3.4	2.7	1.5	2.4	1	3.2	2.8	2.5	2.4	2.4	5.9	2.9	2.5	1	2.2	3.4						
	3	4		T																8.8	D 2000 3.5
29.8	2.7	2.6	0.9	2.6	3.4																
	4	0		T																9.1	D 2000 3.5
29.5	3.2	2.5	0.9	2.6	3.4																

C:\dgn\SHV_WeightLimitSIGD001.DGN

SHEET 10

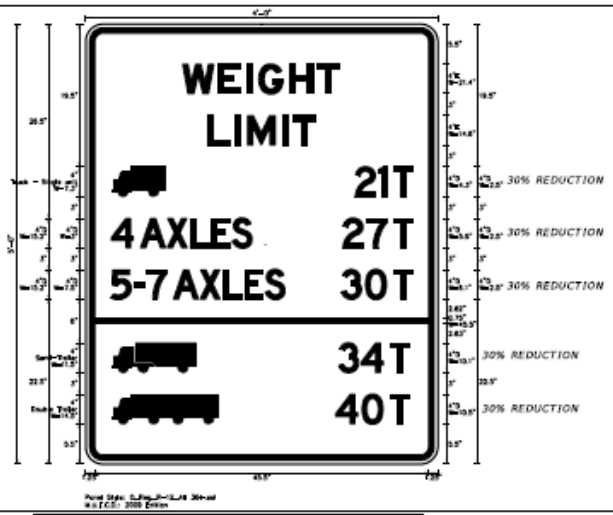
21:00:01 PM
1/15/2020
u4044

MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing
PROJ. TITLE

4" Letter Height



REDUCTION
10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_4E 36t.ssi
Dimensions are in inches, tenths

SIGN NAME: R12-5_e

SHT ALUM ☐
ALUM INCR ☒

SIGN DETAIL
1:8

SIGN NUMBER	R12-5_e
WIDTH x HGHT.	4'-0" x 5'-0"
MARGIN	0.5"
BORDER WIDTH	0.75"
CORNER RADIUS	1.88"
SQ. FEET	20.0 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED: RDS	DATE: 12/2020
CHECKED: JHC	DATE: 12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	3.5	36.5	7.3	4
Semi-Trailer	0	3.5	12.5	11.5	4
Double Trailer	0	3.5	5.5	14.5	4

LETTER POSITIONS (X)

																					LENGTH	SERIES SIZE
	W	E	I	G	H	T															21.4	E 2000 4
13.2	4.9	3.8	1.6	4.2	3.9	3	13.3															
	L	I	M	I	T																14.6	E 2000 4
16.6	3.7	1.8	4.8	1.4	3	16.7																
	2	1		T																	7.8	D 2000 4
36.8	3.3	1	1	2.5	3.5																	
	4		A	X	L	E	S		2	7		T									41	D 2000 4
3.5	3	1	3.6	3.2	2.9	2.8	2.7	12.4	3.2	2.7	1	2.5	3.5									
	5	–	7		A	X	L	E	S		3	0		T							41	D 2000 4
3.5	3.1	1.7	2.7	1	3.6	3.2	2.9	2.8	2.7	7.7	3.3	2.8	1	2.5	3.5							
	3	4		T																	10.1	D 2000 4
34.5	3.1	3	1	3	3.5																	
	4	0		T																	10.5	D 2000 4
34.1	3.6	2.8	1	3	3.5																	

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SHEET 15

21:00:10 PM
1/16/2020
d4044

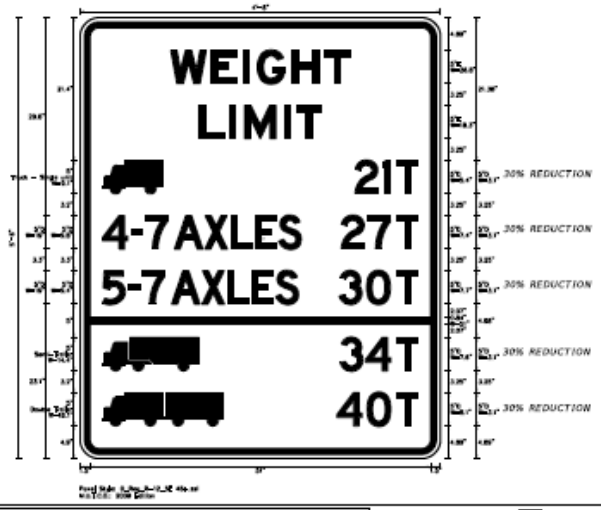
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

5" Letter Height



REDUCTION
10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_5E 48t.ssi
Dimensions are in inches, tenths

SIGN NAME: R12-5_e

SHT ALUM ☐
ALUM INCR ☒

SIGN DETAIL
1:8

SIGN NUMBER	R12-5_e
WIDTH x HGHT.	4'-6" x 5'-6"
MARGIN	0.63"
BORDER WIDTH	0.88"
CORNER RADIUS	2.25"
SQ. FEET	24.8 Sq.Ft.
MOUNTING	Ground
BACKGROUND TYPE:	High Intensity XI
BACKGROUND COLOR:	White
LEGEND/BORDER TYPE:	Reflective
LEGEND/BORDER COLOR:	Black/Black

DESIGNED:	RDS	DATE:	12/2020
CHECKED:	JHC	DATE:	12/2020

Stations:

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	3.4	39.6	9.1	5
Semi-Trailer	0	3.4	13.1	14.4	5
Double Trailer	0	3.4	4.9	18.1	5

LETTER POSITIONS (X)																					LENGTH	SERIES SIZE
	W	E	I	G	H	T															26.8	E 2000 5
13.6	6.1	4.7	2	5.2	4.9	3.8	13.6															
	L	I	M	I	T																18.3	E 2000 5
17.8	4.6	2.2	6	1.7	3.8	17.9																
	2	1		T																	9.5	D 2000 5
41.2	4.1	1.3	1	3.1	3.4																	
	4	–	7		A	X	L	E	S		2	7		T							47.3	D 2000 5
3.4	4.3	2.1	3.4	1	4.5	4	3.6	3.4	3.4	6	4	3.4	1	3.1	3.4							
	5	–	7		A	X	L	E	S		3	0		T							47.2	D 2000 5
3.4	3.9	2.1	3.4	1	4.5	4	3.6	3.4	3.4	6.1	4.1	3.6	1	3.1	3.4							
	3	4		T																	11.7	D 2000 5
39	3.8	3.8	1	3.1	3.4																	
	4	0		T																	12.2	D 2000 5
38.5	4.5	3.6	1	3.1	3.4																	

C:\dgn\SHV_WeightLimitSIGDC00 1. DGN

SHEET 16

21:00: 12 PM
1/16/2020
u4044

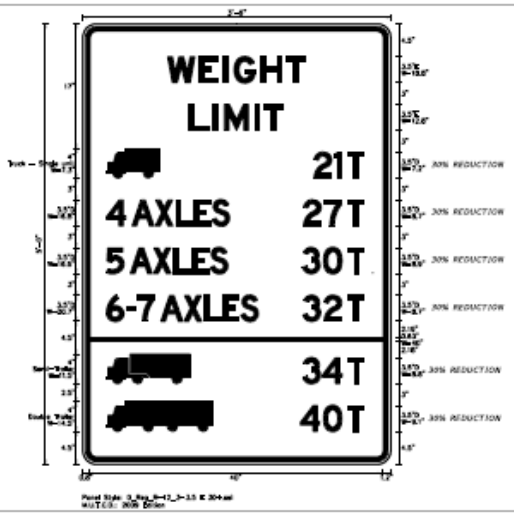
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

3.5" Letter Height



Stations:

REDUCTION 10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_3-3.5 E 30+.ssi
Dimensions are in inches. tenths

SIGN NAME: R12-5_f

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_f
WIDTH x HGHT.	3'-6" x 5'-0"
MARGIN	0.38"
BORDER WIDTH	0.63"
CORNER RADIUS	1.5"
SQ. FEET	17.5 Sq. Ft.
MOUNTING	Ground

SHT ALUM ☐ ALUM INCR ☒

BACKGROUND
TYPE: High Intensity XI
COLOR: White

LEGEND/BORDER
TYPE: Reflective
COLOR: Black/Black

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	3.2	39	7.3	4
Semi-Trailer	0	3.2	11	11.5	4
Double Trailer	0	3.2	4.5	14.5	4

LETTER POSITIONS (X)

																					LENGTH	SERIES SIZE
	W	E	I	G	H	T															18.8	E 2000 3.5
11.6	4.3	3.3	1.4	3.6	3.4	2.6	11.7															
	L	I	W	I	T																12.8	E 2000 3.5
14.5	3.2	1.5	4.2	1.2	2.6	14.6																
	2	1		T																	7.2	D 2000 3.5
31.6	2.9	0.9	0.9	2.6	3.2																	
	4		A	X	L	E	S		2	7		T									35.6	D 2000 3.5
3.2	2.6	0.9	3.2	2.8	2.5	2.4	2.4	10.1	2.8	2.4	0.9	2.6	3.2									
	5		A	X	L	E	S		3	0		T									35.6	D 2000 3.5
3.2	2.4	0.9	3.2	2.8	2.5	2.4	2.4	10.2	2.9	2.5	0.9	2.6	3.2									
	6	-	7		A	X	L	E	S		3	2		T							35.6	D 2000 3.5
3.2	2.7	1.5	2.4	0.9	3.2	2.8	2.5	2.4	2.4	6.1	2.9	2.4	0.9	2.6	3.2							
	3	4		T																	8.8	D 2000 3.5
30	2.7	2.6	0.9	2.6	3.2																	
	4	0		T																	9.1	D 2000 3.5
29.7	3.2	2.5	0.9	2.6	3.2																	

	LEFT MARGIN	RIGHT MARGIN
LINE 1		
LINE 2		
LINE 3		
LINE 4		
LINE 5		
LINE 6		
LINE 7		
LINE 8		
LINE 9		
LINE 10		
LINE 11		
LINE 12		
LINE 13		

DESIGNED: RDS
DATE: 12/2020
CHECKED: JHC
DATE: 12/2020

C:\dgn\SHV_Weight Limit S1500C00 1.DGN

SHEET 17

21:00:14 PM
1/16/2020
d4044

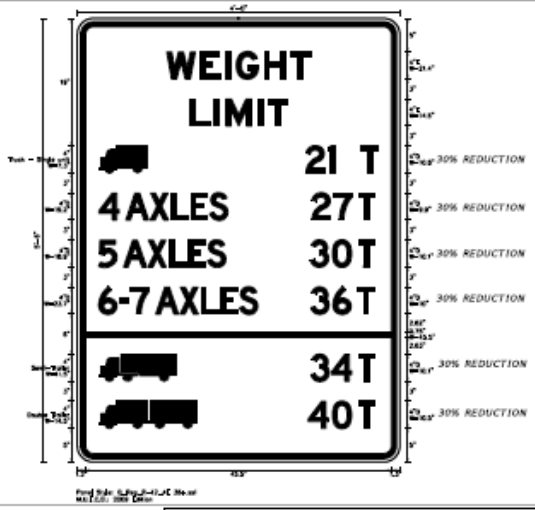
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

4" Letter Height



Statlons:

REDUCTION 10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_4E 36+.ssl
Dimensions are in inches, tenths

SIGN NAME: R12-5_f

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_f
WIDTH x HGHT.	4'-0" x 5'-6"
MARGIN	0.5"
BORDER WIDTH	0.75"
CORNER RADIUS	1.88"
SQ. FEET	22.0 Sq.Ft.
MOUNTING	Ground

SHT ALUM ☐ ALUM INCR ☒

BACKGROUND
TYPE: High Intensity XI
COLOR: White

LEGEND/BORDER
TYPE: Reflective
COLOR: Black/Black

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	3.2	43	7.3	4
Semi-Trailer	0	3.2	12	11.5	4
Double Trailer	0	3.2	5	14.5	4

LETTER POSITIONS (X)

																					LENGTH	SERIES SIZE
	W	E	I	G	H	T															21.4	E 2000 4
13.3	4.9	3.8	1.6	4.2	3.9	3	13.2															
	L	I	W	I	T																14.6	E 2000 4
16.7	3.7	1.8	4.8	1.4	3	16.6																
	2	1		T																	10.8	D 2000 4
34	3.3	1	4	2.5	3.2																	
	4		A	X	L	E	S		2	7		T									41.6	D 2000 4
3.2	3	1	3.6	3.2	2.9	2.8	2.7	12.5	3.2	2.7	1	3	3.2									
	5		A	X	L	E	S		3	0		T									41.6	D 2000 4
3.2	2.7	1	3.6	3.2	2.9	2.8	2.7	12.6	3.3	2.8	1	3	3.2									
	6	–	7		A	X	L	E	S		3	6		T							41.6	D 2000 4
3.2	3.1	1.7	2.7	1	3.6	3.2	2.9	2.8	2.7	7.9	3.3	2.7	1	3	3.2							
	3	4		T																	10.1	D 2000 4
34.8	3.1	3	1	3	3.2																	
	4	0		T																	10.5	D 2000 4
34.4	3.6	2.8	1	3	3.2																	

	LEFT MARGIN	RIGHT MARGIN
LINE 1		
LINE 2		
LINE 3		
LINE 4		
LINE 5		
LINE 6		
LINE 7		
LINE 8		
LINE 9		
LINE 10		
LINE 11		
LINE 12		
LINE 13		

DESIGNED:	RDS
DATE:	12/2020
CHECKED:	JHC
DATE:	12/2020

C:\dgn\SHV_WeightLimitSIGDC001.DGN

SHEET 18

21:00:16 PM
1/16/2020
u4044

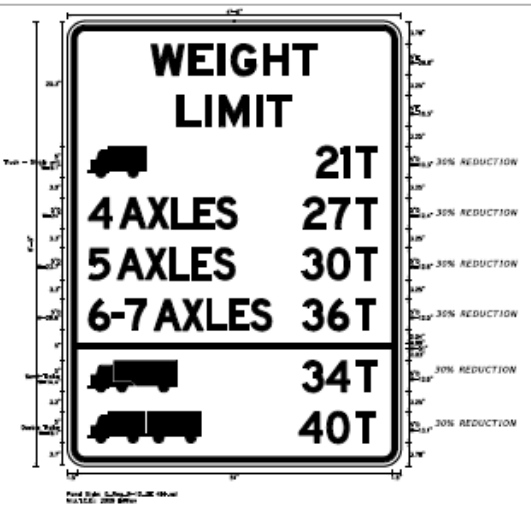
MONTANA MDT DEPARTMENT OF TRANSPORTATION

SIGN DESIGN CALCULATIONS

PROJ. NO. SHV Montana Signing

PROJ. TITLE

5" Letter Height



Stations:

REDUCTION 10% ☐ 20% ☐ 30% ☒

Panel Style: 0_Reg_R-12_5E 48+.ssi
Dimensions are in inches, tenths

SIGN NAME: R12-5_f

SIGN DETAIL 1:8

SIGN NUMBER	R12-5_f
WIDTH x HGHT.	4'-6" x 6'-0"
MARGIN	0.63"
BORDER WIDTH	0.88"
CORNER RADIUS	2.25"
SQ. FEET	27.0 Sq.Ft.
MOUNTING	Ground

SHT ALUM ☐ ALUM INCR ☒

BACKGROUND
TYPE: High Intensity XI
COLOR: White

LEGEND/BORDER
TYPE: Reflective
COLOR: Black/Black

SYMBOL	ROT	X	Y	WID	HT
Truck – Single unit	0	3.4	46.7	9.1	5
Semi-Trailer	0	3.4	12	14.4	5
Double Trailer	0	3.4	3.8	18.1	5

LETTER POSITIONS (X)

																					LENGTH	SERIES SIZE
	W	E	I	G	H	T															26.8	E 2000 5
13.6	6.1	4.7	2.1	5.2	4.9	3.8	13.6															
	L	I	M	I	T																18.3	E 2000 5
17.8	4.6	2.2	6	1.7	3.8	17.9																
	2	1		T																	10.3	D 2000 5
40.3	4.1	1.2	1.3	3.8	3.4																	
	4		A	X	L	E	S		2	7		T									47.2	D 2000 5
3.4	3.8	1.3	4.5	4	3.6	3.4	3.4	10.8	4	3.4	1.3	3.7	3.4									
	5		A	X	L	E	S		3	0		T									47.2	D 2000 5
3.4	3.4	1.2	4.5	4	3.6	3.4	3.4	10.9	4.1	3.5	1.3	3.7	3.4									
	6	–	7		A	X	L	E	S		3	6		T							47.1	D 2000 5
3.4	3.9	2.1	3.4	1.3	4.5	4	3.6	3.4	3.4	5	4.1	3.4	1.3	3.8	3.4							
	3	4		T																	12.6	D 2000 5
38.1	3.8	3.7	1.3	3.8	3.4																	
	4	0		T																	13.1	D 2000 5
37.5	4.5	3.6	1.2	3.8	3.4																	

	LEFT MARGIN	RIGHT MARGIN
LINE 1		
LINE 2		
LINE 3		
LINE 4		
LINE 5		
LINE 6		
LINE 7		
LINE 8		
LINE 9		
LINE 10		
LINE 11		
LINE 12		
LINE 13		

DESIGNED:	RDS
DATE:	12/2020
CHECKED:	JHC
DATE:	12/2020

R12-7



R12-7

EMERGENCY VECHICLE WEIGHT LIMIT

* Reduce character spacing 30%.

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
30	36	0.375	0.625	4	3 D	2	3 C	11.542	7.939	12.525	1.163	2	9.363	13.5
48	60	0.75	1.25	6.875	5 D	3.75	4.5 C	19.237	13.232	20.833	1.979	3.25	15.605	20.833

R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF
10.477	1.5	1.523	5.944	VAR	VAR	12.695	0.805	VAR	VAR	10.354	3.146	VAR	VAR	1.5
15.715	2.5	2.618	8.583	VAR	VAR	19.043	1.790	VAR	VAR	15.531	5.302	VAR	VAR	3

COLORS: LEGEND, BORDER — BLACK
BACKGROUND — WHITE (RETROREFLECTIVE)