

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION

subject: New Bridge Design Standard
Practice-Load Ratings to be
performed using LRFD

memorandum

date: January 26, 2011

to: Mr. Thomas A. Harley
Bureau Chief
Bureau of Engineering and
Construction

from: Julie F. Georges
Prin. Eng.-Cons.Design Bridge
Bureau of Engineering and
Construction

Described below is a proposed new Bridge Design Standard Practice which addresses the following concern:

The Federal Highway Administration (FHWA) now requires that bridges designed using LRFD Specifications be rated by LRFR methods.

Proposed new practice:

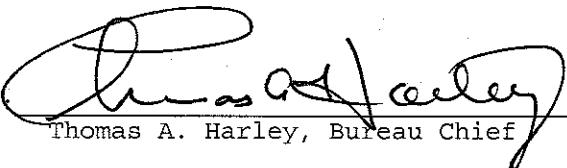
In order to provide Load Ratings using LRFR methods, Sections 1.4.4 and 3.1.3 of the Bridge Design Manual should be revised to provide bridge designers proper guidance for the new requirement.

It should be noted that several additional live load vehicles are now provided, including the MTV paving train.

Implementation:

Upon approval, a CE General Memorandum will be prepared informing the consulting community of the new standard practice. In-house bridge designers will be informed by this memorandum.

APPROVED BY:



Thomas A. Harley, Bureau Chief

DATE:

January 28, 2011

cc: David W. Nardone, Federal Highway Administration

Attachments

Julie F. Georges/dm

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Robert P. Zaffetti-Theodore Lapierre

Richard Van Allen-David Hiscox

FROM THE DESK OF
JULIE F. GEORGES

JAN 28 2011

COPY
SENT

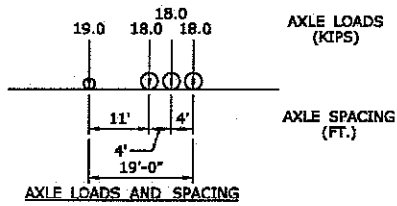
L. BACHO		
D. CUTLER		
T. FIELDS		
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3.1.3 Vehicular Live Load

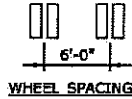
All new structures and existing structures that undergo major rehabilitation (such as deck replacement and superstructure replacement), repair or strengthening shall be designed for the HL-93 design live load in accordance with the AASHTO LRFD Specifications.

In addition to the HL-93 design live load, the structures shall be designed to carry the legal and permit live loads shown in Figure 3.1. The load and resistance factors, multiple presence factors, dynamic load allowance and distribution factors for the legal and permit live loads shall be consistent with Section 1.4.4.

Structures may be directly designed for each of the live loads or designed for one live load and analyzed for the remaining live loads. All members, elements and components of a structure shall be adequate to support each of the design, legal and permit live loads.



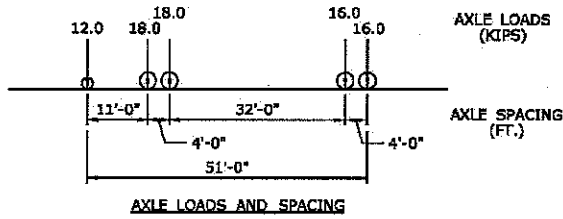
AXLE LOADS AND SPACING



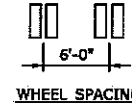
WHEEL SPACING

NOTE: CT-L73.0 REPRESENTS THE CONSTRUCTION VEHICLE DESCRIBED IN SECTION 14-269(c) OF THE CT GENERAL STATUTES

CT-L73.0 LEGAL LIVE LOAD VEHICLE
73 KIPS ON 4 AXLES



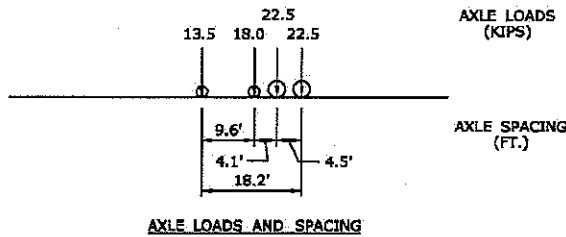
AXLE LOADS AND SPACING



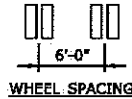
WHEEL SPACING

NOTE: CT-L3S2 REPRESENTS THE VEHICLE DESCRIBED IN SECTION 14-267A(b)(8) OF THE CT GENERAL STATUTES

CT-L3S2 LEGAL LIVE LOAD VEHICLE
80 KIPS ON 5 AXLES



AXLE LOADS AND SPACING



WHEEL SPACING

CT-P76.5 PERMIT LIVE LOAD VEHICLE
76.5 KIPS ON 4 AXLES

FIGURE 3.1

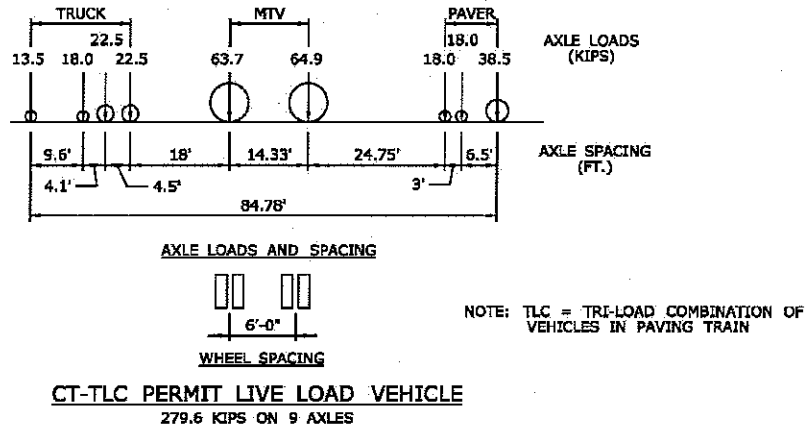
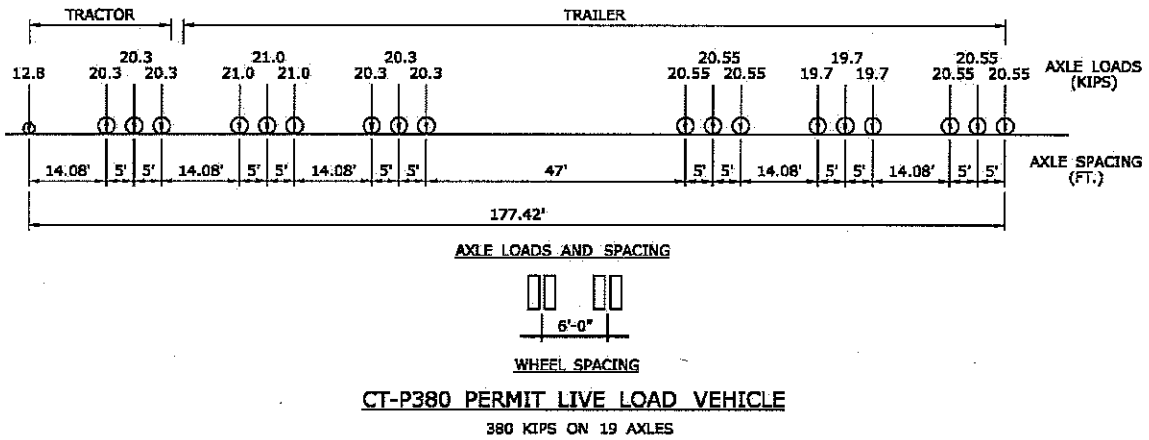
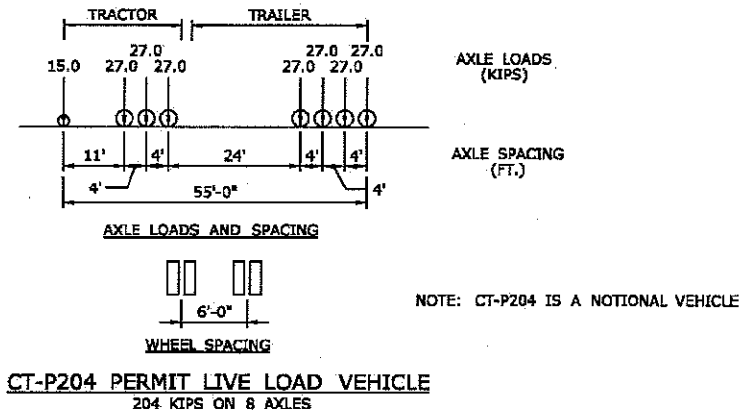


FIGURE 3.1

1.4.4 Design, Legal and Permit Live Load Ratings

Design, legal and permit vehicle live load ratings shall be prepared for all new structures and existing structures where rehabilitation/repair of the structure will affect the live load rating.

The live load ratings shall conform to the load and resistance factor rating (LRFR) method in accordance with the AASHTO Manual for Bridge Evaluation. The live load ratings shall be prepared and submitted in accordance with the Department's Bridge Inspection Manual.

Live load ratings for new structures shall be prepared for the live loads, and the load factor criteria and analysis parameters shown in Table 1.1. The minimum acceptable rating factors shall be no less the values shown in Table 1.1.

TABLE 1.1			
Rating Procedure	Live Load Vehicle	Load factor criteria and analysis parameters	Minimum Acceptable Rating Factor (RF)
Design Load Rating	HL-93	Evaluation Level – inventory	1.00
Design Load Rating	HL-93	Evaluation Level – operating	Report value
Legal Load Rating	CT-L73.0	Load factor = 1.80	1.00
Legal Load Rating	CT-L3S2	Load factor = 1.80	1.00
Permit Load Rating	CT-P76.5	Permit Type: Routine or Annual Frequency: Unlimited Crossings Loading Condition: Mix with traffic Distribution Factor: Two or more lanes ADTT: > 5000	1.00
Permit Load Rating	CT-P204	Permit Type: Routine or Annual Frequency: Unlimited Crossings Loading Condition: Mix with traffic Distribution Factor: Two or more lanes ADTT: > 5000 Minimum Load Factor: 1.35	1.00
Permit Load Rating	CT-P380	Permit Type: Special or Limited Crossing Frequency: Single Trip Loading Condition: Escorted with no other vehicles on the bridge Distribution Factor: One lane ADTT: N/A	1.00
Permit Load Rating	CT-TLC	Permit Type: Special or Limited Crossing Frequency: Single trip Loading Condition: Mix with traffic Distribution Factor: One lane ADTT: > 5000 Dynamic Load Allowance: 0.00	1.00

Live load ratings for existing structures that undergo major rehabilitation, such as superstructure replacement or deck replacement, shall be prepared for the live loads, and the load factor criteria and analysis parameters shown in Table 1.2. The minimum acceptable rating factors shall be no less the values shown in Table 1.2 unless permitted otherwise.

TABLE 1.2			
Rating Procedure	Live Load Vehicle	Load factor criteria and analysis parameters	Minimum Acceptable Rating Factor (RF)
Design Load Rating	HL-93	Evaluation Level – inventory	1.00; may be less than 1.00, if permitted in writing by the Department.
Design Load Rating	HL-93	Evaluation Level – operating	1.00
Legal Load Rating	CT-L73.0	Load factor = 1.80	1.00
Legal Load Rating	CT-L3S2	Load factor = 1.80	1.00
Permit Load Rating	CT-P76.5	Permit Type: Routine or Annual Frequency: Unlimited Crossings Loading Condition: Mix with traffic Distribution Factor: Two or more lanes ADTT: > 5000	1.00; may be less than 1.00 if permitted in writing by the Department.
Permit Load Rating	CT-P204	Permit Type: Routine or Annual Frequency: Unlimited Crossings Loading Condition: Mix with traffic Distribution Factor: Two or more lanes ADTT: > 5000 Minimum Load Factor: 1.35	1.00; may be less than 1.00 if permitted in writing by the Department.
Permit Load Rating	CT-P380	Permit Type: Special or Limited Crossing Frequency: Single Trip Loading Condition: Escorted with no other vehicles on the bridge Distribution Factor: One lane ADTT: N/A	1.00; may be less than 1.00 if permitted in writing by the Department.
Permit Load Rating	CT-TLC	Permit Type: Special or Limited Crossing Frequency: Single trip Loading Condition: Mix with traffic Distribution Factor: One lane ADTT: > 5000 Dynamic Load Allowance: 0.00	1.00; may be less than 1.00 if permitted in writing by the Department.

Live load ratings for existing structures that undergo minor rehabilitation, such as increased overlay thickness, shall be prepared for the live loads, and the load factor criteria and analysis parameters shown in Table 1.3. The minimum acceptable rating factors shall be no less the values shown in Table 1.3.

TABLE 1.3			
Rating Procedure	Live Load Vehicle	Load factor criteria and analysis parameters	Minimum Acceptable Rating Factor (RF)
Design Load Rating	HL-93	Evaluation Level - inventory	Report value
Design Load Rating	HL-93	Evaluation Level - operating	1.00
Legal Load Rating	CT-L73.0	Load factor = 1.80	1.00
Legal Load Rating	CT-L3S2	Load factor = 1.80	1.00
Permit Load Rating	CT-P76.5	Permit Type: Routine or Annual Frequency: Unlimited Crossings Loading Condition: Mix with traffic Distribution Factor: Two or more lanes ADTT: > 5000	Report value, may be less than 1.00
Permit Load Rating	CT-P204	Permit Type: Routine or Annual Frequency: Unlimited Crossings Loading Condition: Mix with traffic Distribution Factor: Two or more lanes ADTT: > 5000 Minimum Load Factor: 1.35	Report value, may be less than 1.00
Permit Load Rating	CT-P380	Permit Type: Special or Limited Crossing Frequency: Single Trip Loading Condition: Escorted with no other vehicles on the bridge Distribution Factor: One lane ADTT: N/A	Report value, may be less than 1.00
Permit Load Rating	CT-TLC	Permit Type: Special or Limited Crossing Frequency: Single trip Loading Condition: Mix with traffic Distribution Factor: One lane ADTT: > 5000 Dynamic Load Allowance: 0.00	Report value, may be less than 1.00