3.3 Definitions

Delete **Short Span** and replace it with:

Short span – shall be as defined in Clause 14.13.3.1

Add the following definition:

Supervision – monitoring of the passage of an overload by a BC registered professional engineer familiar with bridge design to ensure bridge crossing restrictions in an overload permit are followed by the permit vehicle. Monitoring of the weighing of a permit vehicle is also to be performed if called for in the overload permit. The engineer shall have the authority to stop further movement of the permit vehicle if it is not in compliance with permit requirements. Records of vehicle weight and dimension measurements and of each bridge crossing by the permit vehicle shall be kept by the engineer and a report detailing these observations sent to the Ministry on completion of the move.

3.3 Abbreviations and symbols

3.3.1 Abbreviations

Add the following abbreviation:

BCL – British Columbia Loading

3.5 Load factors and load combinations

3.5.1 General

When special load vehicle lanes are mixed with normal traffic loaded lanes, each lane will be assigned its corresponding different live load factor based on the traffic in the lane. For example, a special load vehicle lane will get a special load live load factor and the other lanes will get normal traffic live load factors.

Add the following to **Table 3.1 Load factors and load combinations**:

	Permanent Loads				**Transitory Loads**				**Exceptional Loads**			
Loads	**D**	**E**	**P**	**L***	**K**	**W**	**V**	**S**	**EQ**	**F**	**A**	**H**
Ultimate Limit States‡												
ULS Combination 5A***	α_D	α_E	α_P	**λ**	**0**	**0**	**0**	**0**	**1.00**	**0**	**0**	**0**

******* For long spans in Seismic Performance Categories 2 and 3, either continuous or semi-continuous for live load, with any one span or combination of spans greater than 200 meters in length. **λ** shall be equal to 0.50 unless otherwise consented to by the Ministry,

Commentary: *For long-span bridges classified as lifeline bridges in accordance with Clause 4.4.2, partial live load shall be included in ULS Combination 5A. Effects of live load on bridge inertia mass for dynamic analysis need not to be considered for this special load case.*

If a vertical design spectrum is considered explicitly in a site-specific study, the load factor for dead load, α_D*, shall be taken as 1.0 in ULS Combination 5 and 5A.*

For long-span lifeline bridges, presence of partial live load during a major seismic event shall be considered. Application of Turkstra's rule for combining uncorrelated loads indicates that 50% of live load is reasonable for a wide range of values of average daily truck traffic (ADTT). This issue has been considered for the first time in the third edition of the AASHTO LRFD Bridge Design Specifications, 2004.

The maximum (1.25) and minimum (0.8) values of load factor for dead load, α_D*, are intended to account for, in an indirect way, the effects of vertical accelerations. If these effects are considered explicitly by using a vertical design spectrum, the load factor for dead load,* α_D*, should be taken as 1.0.*

Add the following two columns to: **Table 3.2 Live load factors ultimate limit states:**

	Live load factor	
	Special loads travelling on bridge without supervision meeting crossing restrictions in Clause 3.8.3.2.3	
Load	**Short spans**	**Other Spans**
ULS Combination 1	**1.70**	**1.50**
ULS Combination 2	**1.60**	**1.40**
ULS Combination 3	**1.40**	**1.25**

Commentary: *These load factors are consistent with the PS load factor approach in Section 14.*

Calibration of load factors and resistance factors in Table 3.2 of S6-14 and the Ministry supplement to CHBDC are based on a minimum annual reliability index of 3.75 for traffic loading, including special load vehicles with no travel restriction or supervision, and 3.50 special load vehicles travelling alone on a bridge under supervision in accordance with Clause 3.8.3.

3.6 Dead loads

Add the following paragraphs:

Dead loads shall include an allowance for an additional 50 mm concrete overlay over the full area of the bridge deck to account for future deck rehabilitation and also to partially account for any unanticipated dead loads that may be added to the structure following construction.

For bridges with waterproof membrane and asphalt overlay on a concrete deck, the dead load for design shall include the design asphalt thickness of 100 mm of asphalt (see Section 2.7), and no allowance for future additional overlay thickness is required.

Add the following to **Table 3.4 Unit material weights**:

Material	Unit Weight, kN/m^3
Wood	
Untreated Douglas Fir	5.4
Creosote treated sawn timber and glulam, >114 mm	6.6
Creosote treated truss chords, < 114 mm	7.0

3.8 Live loads

3.8.3 Traffic Loads

3.8.3.1 Normal traffic

3.8.3.1.1 CL-W loading

Add the following paragraph:

Where the code uses the term “CL-W” loading, this shall be modified to “BCL-625” loading.

BCL-625 design loading described in Figures 3.2(a) and 3.3(a) is the designated live load unless Approved otherwise.

3.8.3.1.2 CL-W Truck

Delete the third paragraph and replace with the following:

A BCL-625 Truck, as specified in Figure 3.2(a) shall be used.

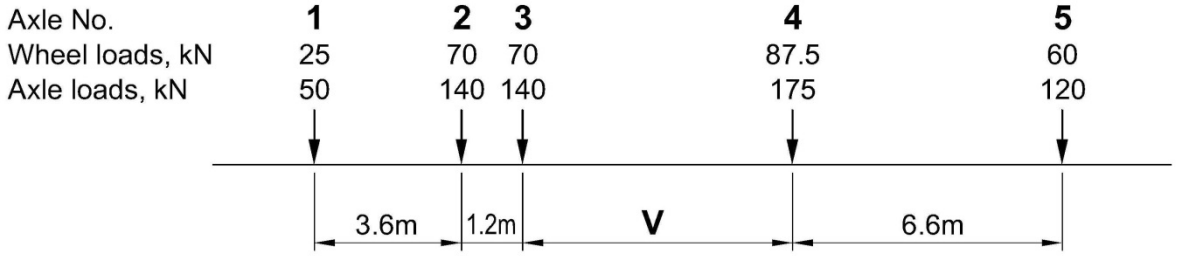
Note: *The total load of the BCL-625 Truck is 625 kN, but the axle loads and distribution differs from that shown in Figure 3.2.*

Delete the fourth paragraph and replace with the following:

The CL-W and the BCL-625 Truck shall be placed centrally in a space 3.0 m wide that represents the clearance envelope for each Truck, unless otherwise specified by the Regulatory Authority or elsewhere in this Code.

Figure 3.2(a)

BCL-625 Truck



V = Variable Spacing - 6.6m to 18m inclusive. Spacing to be used is that which produces the maximum stresses.

Commentary: *Bridges designed to BCL-625 Live Load will have adequate load capacity for 85 tonne Class Permit Vehicles and 6 Axle Mobile Cranes with boom in cradle to travel with other normal traffic. CL-625 Loading is inadequate on short spans for Cranes and on medium length continuous spans in moment for 85 tonne Class Permit Vehicles.*

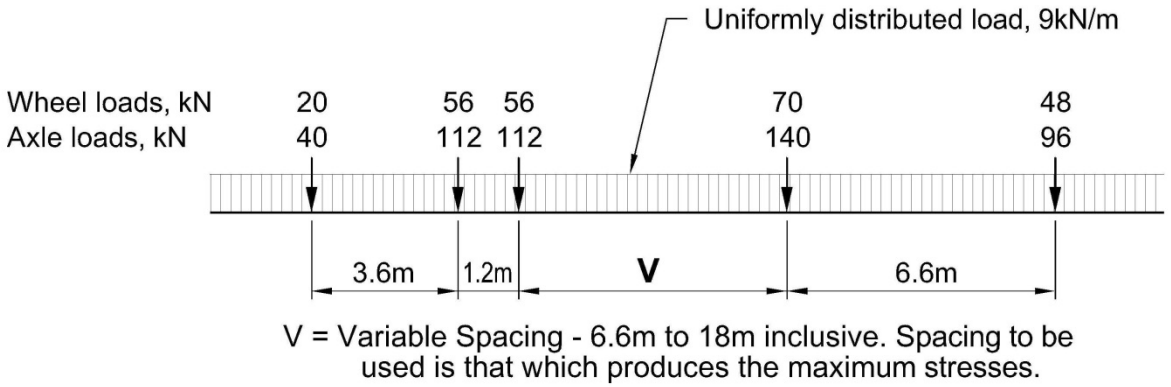
3.8.3.1.3 CL-W Lane Load

Delete the second paragraph and replace with the following:

A BCL-625 Lane Load as detailed in Figure 3.3(a) shall be used.

Figure 3.3(a)

BCL-625 Lane Load



3.8.3.2 Special loads

Add the following Clause in sequence:

3.8.3.2.3 Geographically Specific Special Loads

In addition to BCL-625 loading, structures located in the specific geographic regions indicated below shall also be designed for the indicated special loads. A refined method of analysis shall be used to distribute live loads. Analysis and dynamic load allowance shall be based on the crossing restrictions indicated. Axle spacings and weights for Special Trucks EPLL1 and EPLL2 are shown in Figures 3.8.3.2.3 i, ii and iii. Special Lane load shall be considered for EPLL1 loading only.

The Plans shall show the design vehicle diagrams, design crossing restrictions, and the ULS live load factors used for the Special Loads.

3.8.3.2.3.1 Special Load EPLL1

EPLL1 shall have the following crossing restrictions:

- EPLL1 loading shall be placed in one lane and allowed to travel mixed with normal traffic. Both truck and lane loading shall be considered.

EPLL1 shall apply in the following specific geographic regions:

Sparwood Area

- Hwy 3 between the BC/AB border and the south entrance to Douglas Fir Road in Sparwood, Highway 43, Corbin Road and Fording River Road.

Peace District

- H97 from Prince George to Hasler
- H29N from Chetwynd to Hudsons Hope
- Chowadee Rd #187U
- Cypress Cr Rd #187
- Graham R Rd #123
- Upper Halfway Rd #117
- Fort Nelson Airport Connector
- Fort Nelson Airport Drive
- Rolla Rd #3 south from Rd #222
- Peace River Sweetwater Rd#6 from Rolla Road Rd#3 to Highway H97
- Braden Rd #22
- Jackfish Lake Rd #12
- Rd #137
- Rd #101
- Rd #146
- Rd #146 east
- Beaton Montney #271
- Montney Hwy #114
- Becker #285W
- Prespatou Rd #193
- Buick Cr Rd #154
- Mile 30 Rd #169
- Triad Rd # 169A
- Rosefield Rd #142
- Doig Rd #188
- Siphon Cr Rd #184

3.8.3.2.3.2 Special Load EPLL2

EPLL2 shall have the following crossing restrictions:

- Centerline of the Special Load to remain within 600 mm of the centerline of the available bridge roadway between barriers in the direction of travel of the EPLL2 vehicle.
- For undivided bridge roadways - No other vehicles on the bridge while the Special Load crosses
- For divided bridge roadways - No other vehicles on the bridge travelling in the same direction of the EPLL2 vehicle and with normal traffic allowed on the other side of the barrier(s),
- Crossing speed to be less than 10 km/h
- Travelling on bridge without supervision

EPLL2 shall apply in the following specific geographic regions:

Peace District

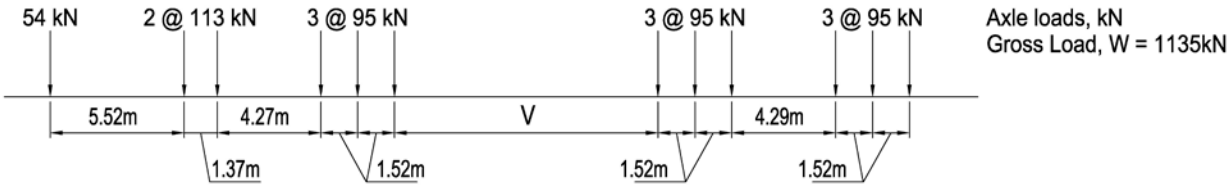
- Highway 2 from the BC/Alberta border to the junction with Dangerous Goods Route
- Highway 52
- Highway 29S from Chetwynd to Highway 52
- Highway 97 from Hasler north to Mile 83.5 on the Alaska Highway/Highway 97
- Highway 49
- Highway 29N from Charlie Lake to Canyon Dr #520R
- Highway 77
- Dangerous Goods Route
- Rd #259 (Fort St John Underpass Bypass)
- Rd 22 / Braden Rd
- Rolla Rd # 3 between Highway 2 and Rd #222
- Rd #148
- Rd#269
- Cecil Lake Rd #103
- Beatton River Airport Rd #151
- Beryl Prairie Rd #118
- Beryl Prairie Arterial Rd #715R
- Darrel Cr Rd #115
- Canyon Dr #520 from Highway 29 to Rd 715R

Other Districts

- Highway 23 between Shelter Bay and the Mica Dam

- Highway 1 between the north and south sections of Highway 23.
- Highway 22 between the BC/US border at Paterson and Highway 3B near Rossland
- Highway 3B between Highway 3 near Nancy Greene Provincial Park and Highway 22A at Waneta Junction
- Highway 3 between Highway 3B near Nancy Greene Provincial Park and the Ootischenia Interchange
- Highway 22 between Castlegar and Trail
- Highway 22A between Highway 3B at Waneta Junction and the BC/US border
- Highway 3A between the Ootischenia Interchange and Blewett Road
- Broadwater Road in Castlegar between the Keenleyside Dam and Highway 3A
- Highway 97 between Highway 39 (near the Parsnip River Bridge No. 1185) and the Old Caribou Highway (south of Prince George).

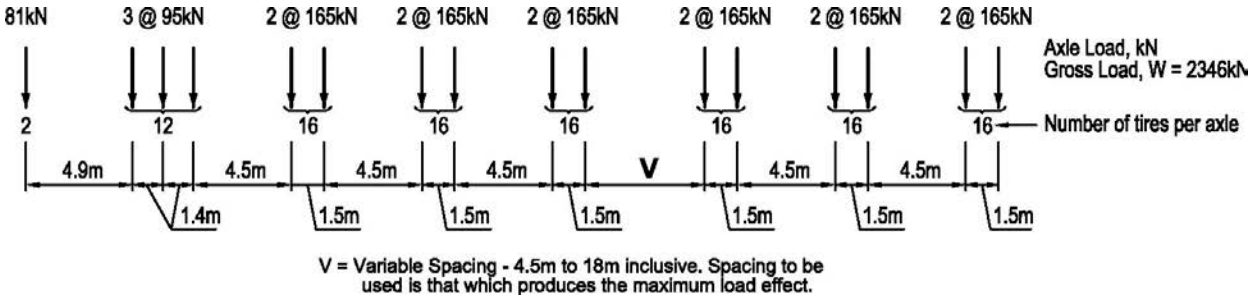
Figure 3.8.3.2.3 i
EPLL1



V = Variable Spacing = 10m to 16m. Spacing to be used is that which produces the maximum load effect

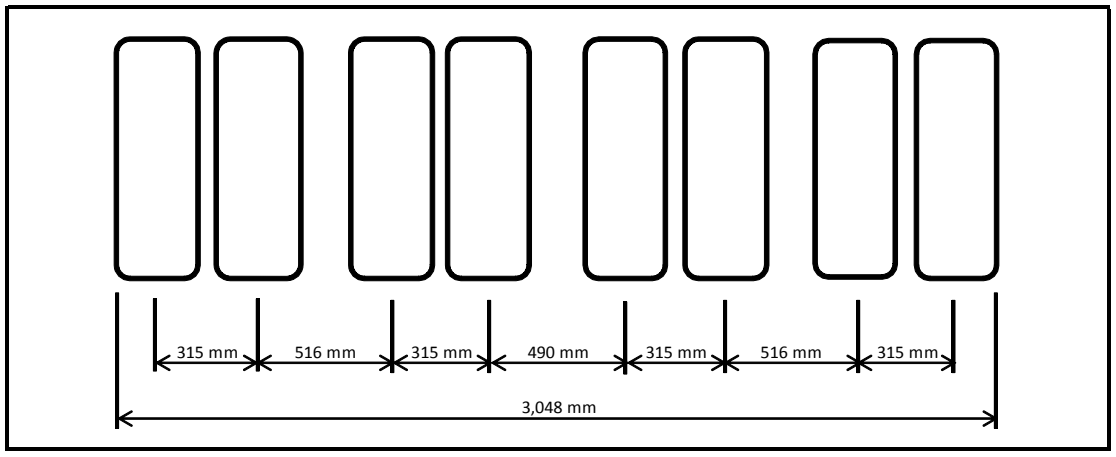
Transverse wheel spacings and the clearance envelope for EPLL1 truck load shall be similar to those indicated for the CL-W truck in Figure 3.2 of CHBDC.

Figure 3.8.3.2.3 ii
EPLL2



For the EPLL2 truck, transverse wheel spacings for 16 tire tandems shall be as indicated in Figure 3.8.3.2.3 iii. Transverse wheel spacings for 2 and 12 tire axles shall be similar to those indicated for the CL-W truck in Figure 3.2 of CHBDC. The clearance envelope for the EPLL2 truck shall be assumed to extend 0.3 m on each side beyond the out to out width of tires shown in Figure 3.8.3.2.3 iii.

Figure 3.8.3.2.3 iii
Transverse Wheel Spacings for 16 Wheel Tandem Axles of EPLL2



Commentary: *The extraordinary vehicle configurations described in this section are based on recent overload evaluation requests in different geographic regions and anticipated future demands. The oil and gas industry is prevalent throughout the Peace District. Compressors, pipe rack modules and drilling equipment frequently need to be hauled in and out of remote locations within the District to and from Alberta. Future supply and servicing of this industry from Prince George is contemplated and therefore full length of the John Hart Highway is included in this geographic region. Maintenance and upgrading of existing, and construction of new hydro power facilities on the Peace, Columbia and Kootenay Rivers requires the transport of turbine runners and transformers. Several coal mines are found in the area around Sparwood. Bridges in this area have been designed or load rated for EPLL1 loading to allow for the transport of mining equipment between different mining operations.*

3.8.4 Application

3.8.4.1 General

Revise (c) to the following:

(c) For the FLS, the traffic load shall be one BCL-625 Truck that causes maximum effects only, increased by the dynamic load allowance and placed at the centre of one travelled lane. The Lane Load shall not be considered.

For the SLS Combination 2, the traffic load shall be one BCL-625 Truck or the Special Truck that causes maximum effects only, increased by the dynamic load allowance and placed at the centre of one travelled lane. The Lane Load shall not be considered.

Commentary: *Special load vehicles are rare compared to other live loads and therefore fatigue design for special load vehicles is not required.*

Add the following at the end of this clause:

(c) Design shall address both the Special Truck and Special Lane loading for special load EPLL1. Design for the EPLL2 special load need only address the Special Truck loading since there is no Special Lane loading for EPLL2. The design lane(s) that the EPLL1 and EPLL2 special load occupies and other lanes that are loaded shall be selected to maximize the load effect. The normal traffic in other loaded lanes shall address both truck and lane loading.

3.8.4.3 Local components

Note: the axle numbers for the BCL-625 Truck are shown in Figure 3.2(a)

3.8.4.5 Dynamic load allowance

3.8.4.5.3 Components other than buried structures

Delete the last paragraph and replace with the following:

The dynamic load allowance given in Items (a) to (d) may be reduced by applying the modification factors from Clause 14.9.3 for a Special Truck travelling at reduced speed.

Note: the axle numbers for the BCL-625 Truck are shown in Figure 3.2(a)

3.8.8 Barrier loads

3.8.8.1 Traffic Barriers

Delete the second sentence and replace with the following:

These loads shall be used only for the design of traffic barrier anchorages, decks and other structural components supporting the barrier.

3.14 Vessel collisions

3.14.2 Bridge classification

Add the following paragraph:

The Ministry shall determine the bridge classification for vessel collision design purposes.

3.16 Construction load and loads on temporary structures

3.16.1 General

Insert the following paragraph:

It shall be the responsibility of the Contractor to ensure that loads developed as a result of the construction methods can be properly carried unless a specific construction methodology is required by the designer. Assumed construction staging and loads shall be indicated on the Plans by the designer if a specific methodology is required.

A3.3 Vessel collision

A3.3.2 Design vessel selection

A3.3.2.1 General

Replace the first sentence with the following:

Method II shall be used for “Class I” bridges, unless the Ministry determines that there is insufficient data to determine reliable probabilistic values. Method I or Method II may be used for “Class II” bridges.

Commentary: *The Ministry does not collect data on vessel type and passage frequency or collision frequency.*

A3.3.3.2 Probability of aberrancy

Replace the first sentence with the following:

The probability of vessel aberrancy, PA (the probability that a vessel will stray off course and threaten a bridge) shall be determined by the following approximate method:

Replace the definition of BR with the following:

BR = aberrancy base rate (0.6×10^{-4} for ships and 1.2×10^{-4} for barges)

Commentary: *The Ministry does not keep a data base of vessel collision with its structures. The values for BR are taken from AASHTO LRFD 2014 and are based on analysis of historical data for high use waterways.*