(c) Impact Formula.

The amount of this allowance or increment is expressed as a fraction of live load stress, and shall be determined by the formula:

$$I = \frac{50}{L+125} \text{ in which}$$

I = impact fraction (maximum 30 per cent)

L= length in feet of the portion of the span which is loaded to produce the maximum stress in the member.

For uniformity of application the loaded length "L" shall be especially considered as follows:

For roadway floors, use the design span length.

For transverse members, such as floor beams, use span length of member.

For computing truck load moments use span length, except for cantilever arms use the length from moment center to far end of truck.

For shear due to truck loads use length of the loaded portion of span from the point under consideration to the reaction, except for cantilever arms use 30 per cent.

For continuous spans use length of span under consideration for positive moment, and use average of two adjacent loaded spans for negative moment.

For culverts with cover 0′ to 1′ 0″ inc. I = 30%
" " " " 1′ 1″ to 2′ 0″ inc. I = 20%
" " " " 2′ 1″ to 2′ 11″ inc. I = 10%

3. 2. 13.—Longitudinal Forces.

Provision shall be made for the effect of a longitudinal force of 5 per cent of the live load in all lanes carrying traffic headed in the same direction and using lane loads, with concentrated load for moment, and no impact. The reductions in load intensity of article 3. 2. 9. shall apply. This force shall be considered as acting 4 feet above the floor.

The longitudinal force due to friction at expansion bearings shall also be provided for in the design.

3. 2. 14.—Wind Loads.

The following lateral forces shall be applied to all structures. They shall be considered to act horizontally in any direction. (See Art. 3. 4. 1 for design stresses used under various combinations of loads and forces):

(1) A transverse wind force on the structure applied as a moving horizontal load of 50 pounds per square foot on 1½ times the area of the structure as seen in elevation, including the floor system and railings and on one-half of the area of all trusses or through girders in excess of two in the span. In no case shall the total of this force be less than 300 pounds per linear foot of bridge.

The intensity of this force may be reduced 70 per cent (to 15 pounds per square foot) when included in the combination of forces designated as Group III of Art. 3. 4. 1.

(2) A lateral force of 200 pounds per linear foot due to the action of wind against a moving live load, and applied 6 feet above the roadway. (This force is designated "W.L." in Art. 3. 4. 1.) Where a reinforced concrete floor slab or a steel grid floor is effectively attached to its supports it may be assumed to transmit this lateral force to the ends of those supports.

(3) The total assumed lateral force shall not be less than 300 pounds per linear foot in the plane of the loaded chord and 150 pounds per linear foot in the plane of the unloaded chord on truss spans, and not less than 300 pounds per linear foot on girder spans.

(4) In calculating the uplift in posts and anchorage of viaduct towers due to the foregoing lateral forces, the decks shall be considered as loaded on the leeward traffic lane with a uniform vertical load of 400 pounds per linear foot of lane, against which load the lateral force of paragraph (2) above shall be applied. These loads shall be applied only in case they increase the net uplift.

(5) A longitudinal wind force shall be assumed, equal to the following percentage of the total lateral or transverse wind forces on the structure:

For through or deck trusses .....50% of lateral
for through or deck girders or beams .....25% of lateral.

(6) The wind forces specified above may be reduced if there are permanent features of terrain which clearly act to reduce the possible wind pressures on exposed surfaces.

3. 2. 15.—THERMAL FORCES.

Provision shall be made for stresses or movements resulting from variations in temperature. The rise and fall in temperature shall be fixed for the locality in which the structure is to be constructed and shall be figured from an assumed temperature at the time of erection. Due consideration shall be given to the lag between air temperature and the interior temperature of massive concrete members or structures.

The range of temperature shall generally be as follows:

Metal Structures

Moderate climate, from 0° to 120° F.
Cold climate, from –30° to 120° F.

Concrete Structures	Temperature rise	Temperature fall
Moderate climate	30° F.	40° F.
Cold climate	35° F.	45° F.

3. 2. 16.—FORCE OF STREAM CURRENT, FLOATING ICE AND DRIFT.

All piers and other portions of structures which are subject to the force of flowing water, floating ice, or drift shall be designed to resist the maximum stresses induced thereby.

Pressure of ice on piers shall be calculated at 400 pounds per square inch. The thickness of ice and height at which it applies shall be deter-