



# Florida Department of Transportation

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To: Directors of Transportation Development, District Directors of Operations, Will Sloup, Robert Robertson, District Design Engineers, District Maintenance Engineers, District Structures Maintenance Engineers, District Structures Design Engineers.

From: Jeff Pouliotte, P.E. State Structures Maintenance Engineer. *Jeffrey A. Pouliotte*

Copies: Brian Blanchard, Tim Lattner, Jean Ducher, Richard Kerr, John Clark, Bryan Hubbard.

This Temporary Maintenance Bulletin (TMB) revises the Limit States and Load Factors for FL120 Permit loadings on Prestressed Concrete (Flat Slab and Deck/Girder).

## Requirements:

### 1. Bridge Load Rating Manual

#### a. Table 6A.4.2.2-1 – Replace with revised table below

| Bridge Type  | Direction    | Limit State              | Load Factors   |      |      |                |                |      |             |                             |                             |                              |
|--|--------------|--------------------------|----------------|------|------|----------------|----------------|------|-------------|-----------------------------|-----------------------------|------------------------------|
|  |              |                          | Permanent Load |      |      | Transient Load |                |      | Design Load |                             | Legal Load                  | FL120 Permit                 |
|  |              |                          | DC             | DW   | EL   | FR             | TU<br>CR<br>SH | TG   | Inventory   | Operating                   |                             |                              |
| Steel  | Longitudinal | Strength I               | 1.25           | 1.50 | n/a  | n/a            | n/a            | n/a  | 1.75        | 1.35                        | 1.35                        | n/a                          |
|  |              | Strength II              | 1.25           | 1.50 | n/a  | n/a            | n/a            | n/a  | n/a         | n/a                         | n/a                         | 1.35                         |
|  |              | Service II <sup>2</sup>  | 1.00           | 1.00 | n/a  | n/a            | n/a            | n/a  | 1.30        | 1.00                        | 1.30                        | 0.90                         |
| Reinforced Concrete                                | Longitudinal | Strength I               | 1.25           | 1.50 | n/a  | n/a            | n/a            | n/a  | 1.75        | 1.35                        | 1.35                        | n/a                          |
|  |              | Strength II              | 1.25           | 1.50 | n/a  | n/a            | n/a            | n/a  | n/a         | n/a                         | n/a                         | 1.35                         |
| Prestressed Concrete (Flat Slab and Deck / Girder) | Longitudinal | Strength I               | 1.25           | 1.50 | n/a  | n/a            | n/a            | n/a  | 1.75        | 1.35                        | 1.35                        | n/a                          |
|  |              | Strength II              | 1.25           | 1.50 | n/a  | n/a            | n/a            | n/a  | n/a         | n/a                         | n/a                         | 1.35                         |
|  |              | Service I                | 1.00           | 1.00 | n/a  | n/a            | n/a            | n/a  | n/a         | n/a                         | n/a                         | 1.00                         |
|  |              | Service III <sup>3</sup> | 1.00           | 1.00 | n/a  | n/a            | n/a            | n/a  | 0.80        | 0.80                        | 0.80                        | n/a                          |
| Wood   | Longitudinal | Strength I               | 1.25           | 1.50 | n/a  | n/a            | n/a            | n/a  | 1.75        | 1.35                        | 1.35                        | n/a                          |
|  |              | Strength II              | 1.25           | 1.50 | n/a  | n/a            | n/a            | n/a  | n/a         | n/a                         | n/a                         | 1.35                         |
| Post Tensioned Concrete                            | Longitudinal | Strength I               | 1.25           | 1.50 | 1.00 | 1.00           | 0.50           | n/a  | 1.75        | 1.35                        | 1.35                        | n/a                          |
|  |              | Strength II              | 1.25           | 1.50 | 1.00 | 1.00           | 0.50           | n/a  | n/a         | n/a                         | n/a                         | 1.35 <sup>5</sup>            |
|  |              | Service III <sup>3</sup> | 1.00           | 1.00 | 1.00 | 1.00           | 1.00           | 0.50 | 0.80        | 0.80 or 1.0 SL <sup>4</sup> | 0.80 or 1.0 SL <sup>4</sup> | 0.70 or 0.90 SL <sup>4</sup> |
|  | Transverse   | Strength I               | 1.25           | 1.50 | 1.00 | n/a            | n/a            | n/a  | 1.75        | 1.35                        | n/a                         | n/a                          |
|  |              | Strength II              | 1.25           | 1.50 | 1.00 | n/a            | n/a            | n/a  | n/a         | n/a                         | n/a                         | n/a                          |
|  |              | Service I                | 1.00           | 1.00 | 1.00 | n/a            | n/a            | n/a  | 1.00        | 1.00                        | n/a                         | n/a                          |

**Commentary:**

Prestressed concrete girders and slabs that are designed under LRFD, shall be evaluated at Service I limit state for FL120 permit loads. When performing a Service I limit check, a live load factor of 1.0 is appropriate to ensure that during the passage of permitted vehicles the prestressing tendons will not exceed yield criteria. The use of a multi-presence factor is also appropriate in this case because these ratings will be used to analyze both routine and non routine permits.

**Background:**

AASHTO Load Factor Rating method contained a service check against 90% yield strength of the prestressing strands as part of the operating rating. Load and Resistance Factor Ratings as specified in the Manual for Bridge Evaluation have an optional check for permitted loads which would also check the 90% yield criteria. It is understood that prestressed concrete may crack under Service I loading conditions, however the stress in the tendons is limited to 90% of yield to ensure that once the load has been removed, these cracks will close. A Service I rating will exceed the previously required Service III ratings because it does not limit the tensile stresses in the concrete, thus allowing for a cracked section. Service I is appropriate for permitted vehicles because fatigue does not initiate in prestressed concrete until the section cracks, therefore over the lifetime of a structure the fatigue cycling from permit loads will be insignificant. Application of the Service I limit state to LRFD bridges will increase the mobility of overweight permitted loads throughout the state without compromising the safety or serviceability of Florida's bridges.

**Implementation:**

All requirements for FL120 Service I limit states contained herein are effective immediately for all projects having a design start date on or after the release date of this TMB, and for all re-ratings performed due to changes in bridge condition.

This bulletin is not mandatory for projects currently under design, but Districts may elect to incorporate the requirements into ongoing design projects at their discretion.

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