The 2018 Illinois Tollway Structure Design Manual (SDM) has been revised to include details for a buried moment slab option. Changes made are based on NCHRP report 22-20(2) and Section 13 of AASHTO LRFD Bridge Design Specifications 8th Edition. Details are applicable where a flexible pavement shoulder is used.

The goal during the implementation of these new details is to maintain as many current methods of construction and details as practical while achieving the strength requirements for TL-5 loading.
**Design Criteria**

Design procedure is based on AASHTO LRFD Chapter 13. Design guidelines for buried moment slab shall follow section 22.14 of the Illinois Tollway Structure Design Manual and as modified herein, and in the attached figures. The following are modifications to the SDM and design criteria used to develop details shown in the attached figures.

**42in Barrier: (Figures 1 & 2)**

- A moment slab includes both the horizontal slab and the 42 in tall F-shape traffic railing
- Global Stability – Sliding and overturning stability of the moment slab shall be based on an Equivalent Static Load (ESL) applied to the top of the traffic parapet. For TL-5 parapet systems, the ESL shall be 64 kips.
- For sliding of the parapet-moment slab system: \( \phi = \text{resistance factor} = 0.8 \) (AASHTO Table 10.5.5.2.2-1) and \( \Upsilon = \text{Load Factor} = 1.0 \) (AASHTO Table 3.4.1-1)
- For overturning of the parapet-moment slab system: \( \phi = \text{Resistance Factor} = 0.8 \) (AASHTO Table 10.5.5.2.2-1) and \( \Upsilon = \text{Load Factor} = 1.0 \) (AASHTO Table 3.4.1-1)
- Minimum length between moment slab expansion joints shall be 35ft.
- Asphalt overburden unit weight was taken as 118 pcf.
- For cast-in-place retaining walls without moment slab system, the barrier system shall be designed and detailed as per this design bulletin.

**72in Barrier with NAW: (Figure 3)**

Design criteria used to develop details shown in Figure 3 can be found in Design Bulletin No. 18-02 Structure Mounted Noise Abatement Wall (TL-5) dated May 25, 2018.
Design Loads shall be as follows for the 42 in Barrier (Figures 1 & 2):

<table>
<thead>
<tr>
<th>Design Loads for TL-5 Barrier 42in</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail Height, H (in.)</td>
<td>42</td>
</tr>
<tr>
<td>$F_t$, Transverse (kips)</td>
<td>160</td>
</tr>
<tr>
<td>$F_L$, Longitudinal (kips)</td>
<td>75</td>
</tr>
<tr>
<td>$F_v$, Vertical (kips)</td>
<td>160</td>
</tr>
<tr>
<td>$L_L$ and $L_t$ (ft)</td>
<td>10</td>
</tr>
<tr>
<td>$L_v$ (in)</td>
<td>40</td>
</tr>
<tr>
<td>$H_e$ (in)</td>
<td>34</td>
</tr>
<tr>
<td>$F_s$ (kips)</td>
<td>64</td>
</tr>
<tr>
<td>$W_{min}$ (ft)</td>
<td>7</td>
</tr>
</tbody>
</table>

Where terms are defined as follows:

- $H =$ Barrier Height
- $F_t =$ Transverse force assumed to be acting at distance $H_e$
- $F_L =$ Longitudinal friction force along the barrier
- $F_v =$ Vertical force of vehicle laying on top of the barrier
- $L_t =$ Longitudinal length of distribution of impact force $F_t$
- $L_L =$ Longitudinal length of distribution of friction force $F_L$
- $L_v =$ Longitudinal distribution of vertical force $F_v$ on top of the barrier
- $H_e =$ Height of impact force applied to the barrier above pavement
- $F_s =$ Equivalent static load
- $W_{min} =$ Minimum width of the moment slab
NOTES:

1. AWWA D6690, TYPE II

2. THE M.W.E. WALL SUPPLIER SHALL CONSIDER INTERNAL AND EXTERNAL STABILITY DESIGN ACCOUNTING FOR THE MOMENT SLABS BEARING PRESSURE SUBSURFACE OF 2.0 KSF AND HORIZONTAL SLIDING FORCE OF 0.5 KSF/FT OF WALL.

3. MINIMUM LENGTH OF MOMENT SLAB SHALL BE 30'-0" BETWEEN EXPANSION JOINTS FOR THIS CONFIGURATION.

4. FOR DETAILS ON MOMENT SLAB STABILITY AND EXPANSION JOINT SEE STRUCTURAL DESIGN MANUAL, FIGURE 22.5.1.

5. DETAIL SHOWN ARE FOR WALL MOUNTED MOMENT SLAB, SIMILAR DETAILS MAY BE USED FOR A GROUND MOUNTED TL-3 BARRIER CONFIGURATION.

6. DO NOT LOCATE EXPANSION JOINTS WITHIN 6'-0" OF THE CENTERLINE OF A LIGHT POLE.

7. OR CLASS STYROFOAM TO PANEL WITH WATERPROOF ADHESIVE AS REQUIRED TO KEEP STYROFOAM IN PLACE DURING PLACEMENT OF CLAY CONCRETE.

CAST-IN-PLACE BURIED MOMENT SLAB DETAIL

FIGURE 1
NOTES:

1. ASTM D6890, TYPE II

2. THE M.S.E. WALL SUPPLIER SHALL CONSIDER INTERNAL AND EXTERNAL STABILITY DESIGN ACCOUNTING FOR THE MOMENT SLABS INCLINED PRESSURE SURFACE OR 1.0 KSF AND HORIZONTAL SLIDING FORCE OF 1.5 KIP/ft OF WALL.

3. PROVIDE A MINIMUM PRECAST BARRIER LENGTH OF 11'-0" PANEL.

4. FOR DETAILS FOR MOMENT SLAB STABILITY AND EXPANSION JOINT SEE STRUCTURAL DESIGN MANUAL, FIGURE 22.142. OTHER ROADWAY DETAILS INCLUDING PIPE LAYER DRAIN, SUBGRADE GROUT, AND PRECAST CONCRETE ARE NOT SHOWN FOR CLARITY. SEE FIGURE 22.142 FOR ADDITIONAL DETAILS.

5. DESIGNER SHALL PROVIDE DETAILS AT DRAINAGE STRUCTURE.

6. CONTRACTOR TO MAINTAIN STABILITY OF PRECAST SECTIONS PRIOR TO MOMENT SLAB COMPLETION.

7. LEVELING CONCRETE AS REQUIRED TO ACHIEVE PROPER PROFILE. 2" MIN. AND 1 1/2" MAX. THICKNESS. REINFORCE THICKNESSES GREATER THAN 4" WITH A LONGITUDINAL #5 BAR CENTERED IN THE POUR.

8. DO NOT LOCATE EXPANSION JOINTS WITHIN 6'-0" OF THE CENTRELINE OF A LEFT POLE.

9. DETAILS SHOWN ARE FOR WALL MOUNTED MOMENT SLAB. OTHER DETAILS MAY BE USED FOR A GROUND MOUNTED T-4 BARRIER CONFIGURATION, EXCEPT FOR THE NOTCH AND REINFORCEMENT AT THE BASE OF THE BARRIER.

10. GLUE STYROFOAM TO PANEL AS REQUIRED TO KEEP STYROFOAM IN PLACE DURING PLACEMENT OF PRECAST BARRIER.

PRECAST BURIED MOMENT SLAB DETAIL

FIGURE 2