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ENGINEERING PRODUCTION SUPPORT MEMORANDUM NO. 25-01

Regarding Revised Drainage Manual Chapter 6 – End Treatments

Effective immediately, the following sections of the drainage manual chapter 6 have been revised. The revisions were made to introduce protected endwall treatment type (D-PEW) and remove references to endwall treatment types A & B.

6.04.3.1 END TREATMENTS

End treatments for a pipe culvert will consist of a safety cross drain end wall (type U), safety side drain (parallel) end walls (type SEW) or protected end walls (straight or type PEW) conformed to the slope of the roadway embankment. The choice of end treatment for a culvert will be determined by the type of facility being served, the culvert size, and whether the ends of the culvert is within the clear zone as defined in the TDOT Standard Roadway Drawings.

6.04.3.1.1 END TREATMENTS FOR CROSS DRAINS UNDER MAINLINE

All cross drains (perpendicular) placed under a mainline roadway inside the clear zone, require type u end walls conforming to the roadway fill slope as shown on standard drawings D-PE-15A through D-PE-48A for end wall geometry and D-PE-99 for grate details. All culvert end walls located within the clear zone (S-CZ-1) require a safety grate. Type U cross drain end walls standards limited to 48" pipe size. Larger pipe end treatments shall refer to D-PEW-5 protected end wall standard. All cast in place cross drain culvert treatments larger than 48" must be protected by a guardrail or end wall or must be placed outside the clear zone.

Cross drain end walls placed outside the clear zone may use cast-in-place type PEW (D-PEW-1 thru 5), or straight headwall (D-PE-4 and 5) in lieu of type U or if the pipe end wall is protected by a guardrail.

6.04.3.1.2 END TREATMENTS FOR SIDE DRAINS UNDER PUBLIC SIDE ROADS AND PRIVATE DRIVES

All side drains (parallel) placed under a side road, driveway, or field entrance, etc. that intersect a mainline roadway, require safety endwalls as shown on the D-SEW- series standard drawings with safety grate (D-SEW-1A) with a maximum 6:1 taper if the culvert endwalls are located inside the clear zone (S-CZ-1). If other end wall types, U, straight or PEW used they

must be shielded by guardrail.

6.04.3.1.3 END TREATMENTS FOR MEDIAN CROSSOVERS

All median crossover side drains (longitudinal) placed under median openings require safety endwalls as shown on D-SEW- 12D standard drawing with safety grate (D-SEW-1A) with maximum 12:1 taper if the culvert endwalls are located inside the clear zone (S-CZ-1). If pipe end walls are protected by guardrail, then a safety end wall may be substituted by any other type U, straight or PEW, or straight headwall types.

6.04.3.1.4 END TREATMENTS FOR CROSS DRAINS SKEWED TO THE ROADWAY

Type “U” concrete endwalls are preferred so that the surface of the endwall and its grates are flush with the face of the roadway embankment. Normally, this will require that the endwall be perpendicular to the centerline of the roadway. Where the cross drain will be skewed with respect to the roadway centerline, the designer will have two options. One option will be to extend or relocate the culvert so that the ends will be located outside of the mainline clear zone. The endwall would then be selected based upon the criteria provided above for each functional roadway classification with culvert ends outside of the clear zone.

The second option would be to connect the cross drain to the Type “U” concrete endwall at an angle as shown in Figure 6-9 and on Standard Drawing D-PE-99 for small skews. The designer should ensure that the selected endwall will be sufficiently wide to accommodate the skewed width of the pipe. This is typically accomplished by selecting the next larger sized endwall. When this option is chosen, the designer should also recheck the hydraulic performance of the culvert, taking into account the additional head losses caused by the non-linear alignment. A procedure for this check is provided in Section 6.05.2.2.1.3.

If cross drainpipe skew is larger than 10 degrees and extending to relocate the ends outside of the mainline clear zone not feasible, type PEW cast-in-place end walls should be used with GR protection.

Improved inlets (discussed in the following section) should normally be perpendicular to the pipe. An improved inlet is specified on a skewed pipe, the roadway fill slope will have to be transitioned (warped) to accommodate the improved inlet structure walls. If the improved inlet is within the clear zone, it should be protected with an appropriate roadside barrier (i.e. guardrail, etc.). When this is not feasible, then the option of extending the pipe beyond the clear zone should be considered.

The revised drainage design manual chapter 6 can be found on the TDOT's website:

<https://www.tn.gov/tdot/engineering-division/engineering-production-support/design-standards/drainage-manual.html>

A handwritten signature in black ink, appearing to read "Shane M. Hester", written over a horizontal line.

Shane Hester, PE
Engineering Division Director

SMH: LHC: ARH: DS
January 31, 2025