



(DRAFT)

# BULLETIN

SUBJECT Delete Subsection 3.5.1.4 Appurtenances and replace it with 3.5.9 and add an accompanying commentary subsection C3.5.9.1	DRAFT NUMBER	EFFECTIVE DATE 00/00/00	SUPERSEDES 00/00/00
	SECTION Geo/Environmental	APPROVED SIGNATURE /s/ Section Manager or Chief Engineer	
UPDATES GUIDANCE DOCUMENT(S) ODOT Retaining Structures Manual	WEB LINK(S) <a href="http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/geology_geotechnical.shtml#Retaining_Structures_Manual">http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/geology_geotechnical.shtml#Retaining_Structures_Manual</a>		

## PURPOSE

Currently, the only guidance for employing guardrail posts on MSE walls is in 3.5.1.4, In a subsection numbered 3.5.1.4.1 titled Guardrail Posts. This is the only subsection in 3.5.4.1 and it applies only to geotextile walls. The purpose of this bulletin is to delete subsection 3.5.1.4, Appurtenances, to add new subsections, 3.5.9 Appurtenances, and 3.5.9.1 Guardrail Posts and to add an accompanying commentary section C3.5.9.1. Adding 3.5.9 will create a new subsection for appurtenances which can be applied to all MSE walls. Creating a new 3.5.9.1 will allow the insertion of a subsection concerning all MSE walls which will be aligned with recommendations by FHWA, AASHTO and the ODOT Bridge Section.

## BACKGROUND/REFERENCE

FHWA Demonstration Project 82 Reinforced Soil Structures MSEW and RSS (FHWA-SA-96-071, August 1997)

Mechanically Stabilized Earth Walls and Reinforced Slopes (FHWA NHI-00-043, March 2001)

AASHTO LRFD Bridge Design Specifications, 3rd Edition, 2004

ODOT Retaining Structures Manual

## GUIDANCE

Delete the existing **3.5.1.4. Appurtenances** subsection with its subsection **3.5.1.4.1 Guardrail Posts** and replace them with a new subsection **3.5.9.1 Guardrail Posts** under a new subsection **3.5.9, Appurtenances**:

### 3.5.9 Appurtenances

#### 3.5.9.1 Guardrail Posts

Where guardrail posts are required to be constructed in MSE Walls, the posts shall be placed at a minimum horizontal distance of 3.0 feet from the back of the wall face to the back of the guardrail post, driven at least 5 feet below grade and spaced at locations to miss the reinforcement materials where possible. If the reinforcement can't be missed the wall shall be designed accounting for the presence of an obstruction in the reinforced soil zone using one of the following methods:

- 1) Assuming the reinforcement must be partially or fully severed in the location of the guardrail post, design the surrounding reinforcement layers to carry the additional load which would have been carried by the severed reinforcements. The portion of the wall facing in front of the guardrail post shall be made stable against a toppling (overturning) or sliding failure. If this can't be accomplished, the soil reinforcements between the guardrail post and the wall face can be structurally connected to the obstruction such that the wall face does not topple, or the facing elements can be structurally connected to adjacent facing elements to prevent this type of failure.
- 2) Place a structural frame around the guardrail post capable of carrying the load from the reinforcements connected to the structural frame in front of the obstruction to the reinforcements connected to the structural frame behind the obstruction.
- 3) If the soil reinforcements consist of discrete strips and depending on the size and locations of the guardrail posts, it may be possible to splay the reinforcements around the guardrail posts. The splay angle, measured from a line perpendicular to the wall face, shall be small enough that the splaying doesn't generate moment in the reinforcement or the connection of the reinforcement to the wall face. The tensile resistance of the splayed reinforcement shall be reduced by the cosine of the splay angle.

Method 3 would be effective if guardrail posts are installed at the same time as the MSE wall is constructed, i.e. the wall is built around the guardrail posts. If the guardrail posts are installed after the wall is constructed, it is possible that the splayed reinforcements were installed in the wrong location and the guardrail post installation could damage them. It may be possible to build the wall around guides, such as Corrugated Metal Pipe (CMP), into which the guardrail posts could be installed after the wall is completed.

Add the following **C3.5.9.1 Guardrail Posts** to the commentary section of Section 3:

For MSE walls current AASHTO LRFD Bridge Design Specifications require a 3-foot setback of guardrail posts behind the wall face (Article 11.10.10.2). This policy modifies that requirement to require the 3-foot setback distance be measured from the back of the wall face. An MSE wall may be comprised of no facing elements or may be composed of many different types of facing elements such as panels, blocks, or CIP facing each having different dimensions. This could result in actual post setbacks ranging from 1.5 to 3.0 feet in the reinforced zone if measured from the wall face. The new policy establishes a standard post setback distance which is all in the reinforcement zone.

With the exception of the last paragraph, items 1, 2 and 3 concerning guardrail posts acting as obstructions in the MSE reinforced zone were taken almost verbatim from 11.10.10.4, "AASHTO LRFD Bridge Design Specifications", Third edition with 2005 Interims. The last paragraph was added for guidance for the special problem of guardrail posts with item 3. Guardrail posts, where they occur, would be relatively frequent and closely spaced obstructions whose exact locations would likely not be known until installation of the guardrail begins. Therefore, it may be desirable to "fix" the location of the guardrail posts as the wall is built, if the solution of item 3 is used.

These portions of the AASHTO LRFD manual are provided here (instead of referenced) because they have been deleted from earlier versions of the AASHTO manual. Restating the contents of these sections here in the Retaining Structures Manual has the advantage that, if AASHTO drops these sections again, guidance is still available here. The disadvantage is that AASHTO's specifications will need to be watched, so that this section can be modified if AASHTO modifies Sections 11.10.10.2 or 11.10.10.4.

## **EXPLANATION/COMMENTARY**

See "Add the following **C3.5.9.1 Guardrail Posts ...**" above.

## **RESPONSIBILITIES**

Use this guidance when guardrails will be installed behind MSE walls.

## **ACTION REQUIRED**

Provide feedback on effectiveness of this guideline to the Retaining Wall Program Coordinator.

## **SPECIAL INSTRUCTIONS**

May be used immediately.