# Index 521-002 Pier Protection Barrier

## Design Criteria

***AASHTO LRFD Bridge Design Specifications***, 8th Edition; ***Structures Design Guidelines (SDG)***; ***FDOT Design Manual (FDM)***; ***AASHTO Manual for Assessing Safety Hardware (MASH)***, Test Level 5 Criteria; ***AASHTO Roadside Design Guide (RDG)***, 4th Edition

## Design Assumptions and Limitations

A. General:

Use Pier Protection Barrier (PPB) when bridge piers require protection. See ***FDM 215*** and ***SDG***, Chapter 2, for PPB requirements and options. Example Layouts for PPB are shown in ***Index 521-002***.

For determination of PPB applicability, see the Pier Protection Selection Flowchart in ***FDM 215***. Generally, if the bridge pier is designed to withstand the ***LRFD*** impact force, then ***Index 536-001*** for Guardrail or ***Index 521-001*** for Concrete Barrier may be applicable instead.

Although intended for shielding bridge piers, PPB may also be used on a project-specific basis to protect other critical roadside objects where deemed necessary and appropriate.

B. Barrier Height:

Determine the required PPB height (i.e. 44" or 56") depending on its proposed location relative to the bridge pier, as defined in ***FDM 215.***

C. Pier Protection - Begin/End Length of Need Stations:

Determine the Pier Protection Barrier's limiting Stations using the Runout Length and the Length of Need (LON) calculation in the ***AASHTO Roadside Design Guide (RDG)***, 4th Edition.

See the FDOT ***Pier Protection Barrier Length of Need (LON)*** Excel program for plan view details and assistance with determining Begin/End LON Stations for shielding various pier configurations. This program is located in the Design Tools column on the ***Standard Plans*** website.

D. Crash Wall:

Crash Wall may be used to reduce the overall length of the PPB system by tapering the system to a greater lateral offset from the roadway as shown in the ***Index 521-002*** Example Layouts and in the LON Excel program plan views. Select a Crash Wall height to match its connecting PPB (i.e. 44" or 56"). For vehicle crashworthiness, Crash Wall itself requires shielding by a Connection / Continuation to Guardrail or Concrete Barrier as defined below.

E. Connections / Continuations:

PPB may be connected to either Guardrail per ***Index 536-001*** or Concrete Barrier per ***Index 521-001*** following the details of the ***Standard Plans***. Extend these continuing barriers a length to sufficiently shield the Crash Wall or miscellaneous roadside hazards using the LON methodology of the respective Standard Plans Index.

F. End Treatments:

Where the PPB does not have a continuation to Guardrail or Concrete Barrier, the blunt end of PPB requires an end treatment. For this case, connect the PPB to either a Crash Cushion (C.C.) per ***Index 544-001*** or a Guardrail Approach Terminal with its required Approach Transition Connection to Rigid Barrier per ***Index 536-001***. Note that these End Treatments are not considered sufficient for protecting piers, so their lengths should not be considered in the LON calculation for Pier Protection Barrier or Crash Wall.

G. Footings:

Determine the appropriate footing configuration(s) (Symmetrical, Front or Rear Flush) for a continuous run of Pier Protection Barrier using the Pier Protection Barrier Example Layouts in ***Index 521-002***. Select the footing configuration(s) based on traffic control needs and locations of piers, pier footings, utilities, drainage structures, etc. as shown. Footing configurations along a continuous run of Pier Protection Barrier may be intermixed as shown in ***Index 521-002***.

If the existing adjacent pier footing is too shallow to provide the 6-inch minimum clearance between footings as shown, reduce the riser dimension between the barrier and the barrier footing and prepare project-specific details to supplement the ***Standard Plans***. The Pier Protection Barrier itself must not be modified; only its footing and riser should be modified adjacent to the pier footing as to provide adequate clearance. A project-specific shallow footing must provide equivalent overturning and sliding resistance to the standard footing.

## Plan Content Requirements

A. General:

In the Roadway Plan views, label Begin and End Stations of Pier Protection Barrier as they correspond to the callout points shown in ***Index 521-002*** (e.g. Begin PPB Sta.) Designate the Pier Protection Barrier height and footing configuration(s).

Where applicable, label the Crash Wall Station & Offset as it corresponds to the callout point shown in ***Index 521-002*** (e.g. Crash Wall Sta. & Offset). Designate the Crash Wall height to match the height of the connecting Pier Protection Barrier. Show the Crash Wall offset from the end of the Pier Protection Barrier as it differs for either a Guardrail Connection or Concrete Barrier Connection per the Example Layouts in ***Index 521-002***.

On the Typical Sections, Cross Sections, Roadway Plan views, and all other appropriate sheets, show the Pier Protection system to scale, using barrier section dimensions from ***Index 521-002*** as applicable. Follow the geometry requirements of the Example Layouts in ***Index 521-002***. Show Cross Sections as required to locate Pier Protection Barrier, Crash Wall (when required) and footings adjacent to bridge piers, columns or footings, drainage structures, utilities, etc. Prepare project-specific footing and riser details if required.

Along with the project-specific geotechnical information provided in the Plans, include the definition for the subgrade to coordinate with the ***Index 521-002*** General Notes, as linked to the ***Flexible Pavement Design Manual***.

B. Summary of Permanent Barrier Wall Table:

Tabulate the individual Pay Items as defined in the ***Basis of Estimates Manual*** and ***Specification 521***. Produce the Summary of Permanent Barrier Wall table. See the CADD Production Support Office website for details.

The location callouts of barrier segments will be listed as Station to Station, but the length of the corresponding segments must be measured along the gutter line of the barrier and include the effect of curvature.

## Payment

| Item number | Item Description | Unit Measure |
|---|---|---|
| 521-72-XX | Shoulder Concrete Barrier | LF |