This Pier Protection Barrier has been structurally evaluated to be equivalent or greater in strength to other safety shape traffic barriers which have been crash tested to NCHRP Report 350 T-5 criteria. This barrier meets the requirements of the AASHTO LRFD Bridge Design Specifications for a barrier used for bridge pier protection.

GENERAL NOTES:
1. Concrete with a Class III or IV unless otherwise called for in the plans. Exposed concrete surfaces shall have a Class 1 surface finish in accordance with Section 522 of the Specifications unless another finish is called for in the plans. The surfaces shall have a Class 2 applied finish coating in accordance with Section 400 only when called for in the plans.
2. Construct Pier Protection Barrier continuous without transverse contraction or expansion joints. Transverse construction joints may be used at a spacing greater than or equal to 40 feet. Provide longitudinal reinforcing steel continuous across construction joints.
3. When the Pier Protection Barrier is installed adjacent to roadway or shoulder pavement, compact the top 12 inches of the subgrade to at least 100% of the density as defined in the AASHTO T-99 specifications.
4. Isolate Barrier Wall Inlets, Index 215, from Pier Protection Barriers and Footings with 1/4" expansion material.
5. On roadways designated for reverse lane, mark all downstream barrier ends that are not aligned or outside the clear zone with Type 3 Object Markers. Include the cost of the Object Marker in the cost of the Pier Protection Barrier.

Payment: Pier Protection Barrier and Crash Wall to be paid for under the contract unit price for Shoulder Concrete Barrier Wall (Rigidity = Shoulder 42") L.F., or Shoulder Concrete Barrier Wall (Rigidity = Shoulder 54") L.F.

PIER PROTECTION BARRIER FOOTING LAYOUT SCHEMATICS

INSTRUCTIONS TO DESIGNER:

As used in this standard, setback distance is as defined by LRFD. See Section 700 for minimum recoverable terrain and horizontal clearance requirements.

Establish the offset from the Pier Protection Barrier to the bridge pier, column or pier bent based on project constraints.

Determine the required Pier Protection Barrier height, i.e., 42" or 54", in accordance with the requirements of the LRFD Bridge Design Specifications and the Structures Design Guidelines.

Determine the appropriate limiting stations of the Pier Protection Barrier and its end treatment(s) using the Pier Protection Barrier Length of Advancement diagrams provided.

Select Pier Protection Barrier terminal treatment for design speeds greater than or equal to 50 mph:
- a. Terminated outside of the clear zone at any approach traffic
- b. Terminated within a shaded location
- c. Terminal protection by the use of a crash cushion system or
- d. Terminated in conjunction with a suitably designed transition to another barrier.

Determine the appropriate footing configuration(s) (Front Cantilever or Back Cantilever) for a continuous run of Pier Protection Barrier using the Pier Protection Barrier Footing Layout Schematics. 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.

Designate the Pier Protection Barrier height, footing configuration(s) and limiting stations on the Plan-Profile sheets, e.g.:

1. 42" Pier Protection Barrier with Front Cantilever Footing, Sta 100+00.00

Indicate Crash Wall locations (when required) and lengths on the Plan-Profile sheets. Designate Crash Wall height to match height of adjacent Pier Protection Barrier.

In absence of continuous concrete barrier, determine guardrail requirements in accordance with Indexes 400 and 420.

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 Traffic Control Plans to accommodate Pier Protection Barrier, Crash Wall (when required) and footing construction.

Include (lengths) of Crash Walls (measured along front face) in length of Pier Protection Barrier for payment.

Although intended for shielding bridge piers, the Pier Protection Barrier can be used on a project specific basis to shield other critical roadside objects when deemed necessary or appropriate.
(LEFT SIDE OPPOSITE HAND)
ONE-WAY TRAFFIC

Design Speed
\[ \text{mph} \]
\[ 245 \quad = \quad 250 \quad < \quad 45 \text{ mph} \]

\[ X \text{ (Length of Advancement) Ft.} \]

\[ 42^\circ \text{ or } 54^\circ \text{ Pier Protection Barrier} \quad \text{at } 50^\circ \text{ Min.} \]

Note:
Length of Advancement determined from the diagrams and equations shown establishes the location of the upstream beginning length of need for a Pier Protection Barrier, however, the Length of Advancement for the combination of Pier Protection Barrier and required guardrail can be no less than that required by other details of Index 400.

Equation Variables:
\[ D \text{ = Distance in feet from the near edge of the near approach traffic lane to either (a) the back of pier, when the pier is located inside the Setback Distance or (b) the Setback Distance, when the pier extends to or goes beyond the Setback Distance. For left side piers on two-way undivided facilities, } D \text{ is measured from the inside edge of the near approach traffic lane.} \]

\[ d \text{ = Distance in feet from the near edge of the near approach traffic lane to the Pier Protection Barrier gutter line at its intersection with the departure line or the face of guardrail at its intersection with the departure line. For left side hazards on two-way undivided facilities, } d \text{ is measured from the inside edge of the near approach traffic lane.} \]

DETAIL 'A'
(Guardrail not shown for clarity)

LENGTH OF ADVANCEMENT DIAGRAMS - PIER PROTECTION BARRIER WITH GUARDRAIL CONTINUATION
LENGTH OF ADVANCEMENT DIAGRAMS – PIER PROTECTION BARRIER WITH CONCRETE BARRIER WALL CONTINUATION
(LEFT SIDE OPPOSITE HAND)
ONE-WAY TRAFFIC

42' or 54' Pier Protection Barrier with Crash Walls - 50' Min.

LENGTH OF ADVANCEMENT DIAGRAMS - PIER PROTECTION BARRIER WITH CRASH WALL AND GUARDRAIL CONTINUATION
(LEFT SIDE OPPOSITE HAND)
ONE-WAY TRAFFIC

TWO-LANE TWO-WAY TRAFFIC

NOTES:
See Index 410 for Clear Zone and Horizontal Clearance Length of Advancement Diagrams.
PPB = Pier Protection Barrier

See Notes on Sheet 2.

LENGTH OF ADVANCEMENT DIAGRAMS – PIER PROTECTION BARRIER WITH CRASH WALL
AND CONCRETE BARRIER WALL CONTINUATION
NOTES

1. The Pier Protection Barrier radial segments are intended for use on approach and trailing ends of both one-way and two-way facilities. The guardrail connections shown on this sheet apply to one-way approaches and to the approaching and trailing ends of two-lane two-way facilities. On trailing ends of two-lane two-way facilities the end connection on Index 410, Sheet 2 may be used.

For guardrail connections, see Index 410, Sheet 24.

2. Refer to Index No. 400 Detail J for additional guardrail information.

<table>
<thead>
<tr>
<th>A/B</th>
<th>LENGTH (ft.)</th>
<th>DISTANCE</th>
<th>OFFSETS</th>
<th>&quot;x&quot; (ft.)</th>
<th>&quot;y&quot; (ft.)</th>
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</tr>
<tr>
<td>6</td>
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<td>16</td>
<td>15.95</td>
<td>1.02</td>
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<td>25</td>
<td>24.81</td>
<td>2.65</td>
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Note: Barrier may be constructed in chords having lengths ≤ 4 Feet.

FOR USE WITH EITHER 1:10 OR 1:20 GUARDRAIL TRANSITIONS

STANDARD THREE-BEAM OFFSET BLOCK (FIELD TRIMMED)

PLAN FOR DESIGN SPEED ≤ 50 MPH

FLARED END TREATMENT – PIER PROTECTION BARRIER WITH GUARDRAIL CONTINUATION

END TREATMENT – PIER PROTECTION BARRIER WITH CONCRETE BARRIER WALL CONTINUATION

NOTE: PPB = Pier Protection Barrier.
END TRANSITION AND TAPERED TOE DETAILS - PIER PROTECTION BARRIER WITH GUARDRAIL CONTINUATION

PARTIAL ELEVATION - 54" PPB DETAIL

ELEVATION - BARRIER END TRANSITION - 42" PPB (shown): 54" PPB (similar) (Guardrail and back leg of Shirrup not shown for clarity)

END TRANSITION DETAILS - PIER PROTECTION BARRIER WITH GUARDRAIL OR CONCRETE BARRIER WALL CONTINUATION

ESTIMATED 42" PPB QUANTITIES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
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<tr>
<td>Reinf Steel</td>
<td>LB/CF</td>
<td>33.10</td>
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ESTIMATED 54" PPB QUANTITIES

<table>
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<tr>
<th>ITEM</th>
<th>UNIT</th>
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</thead>
<tbody>
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<td>Concrete</td>
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<tr>
<td>Reinf Steel</td>
<td>LB/CF</td>
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NOTE: PPB = Pier Protection Barrier.


**CONVENTIONAL REINFORCING STEEL BENDING DIAGRAMS**

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<tr>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
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<tbody>
<tr>
<td>B</td>
<td>5</td>
<td>6'-6&quot;</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>6'-6&quot; / 7'-6&quot;</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>S</td>
<td>3</td>
<td>11'-0&quot;</td>
</tr>
</tbody>
</table>

**REINFORCING STEEL NOTES:**
1. All bars dimensions in the bending diagrams are cut to length.
2. Lap splices for Bars 5B shall be a minimum of 2'-0".
3. The Contractor may use Welded Wire Reinforcement when approved by the Engineer. Welded wire reinforcement shall conform to ASTM A 497.

**ESTIMATED CRASH WALL & FOOTING QUANTITIES**

<table>
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<tr>
<th>ITEM</th>
<th>UNIT</th>
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<tr>
<td>Concrete (42&quot; Crash Wall)</td>
<td>CY/RF</td>
<td>0.539</td>
</tr>
<tr>
<td>Concrete (54&quot; Crash Wall)</td>
<td>CY/RF</td>
<td>0.590</td>
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<tr>
<td>Reinforcing Steel (42&quot; Crash Wall)</td>
<td>LB/RF</td>
<td>66.06</td>
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<tr>
<td>Reinforcing Steel (54&quot; Crash Wall)</td>
<td>LB/RF</td>
<td>70.23</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Provide 3" lip when optional construction joint is used.
2. See Sheet 8 for Barrier Details and Sheet 9 for Barrier Footing details.

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**PIER PROTECTION BARRIER**

**SECTION H-H**

- **NOTE:**
  - PRO = Pier Protection Barrier

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**PLAN VIEW**

- Concrete Barrier Wall Continuation shown, Guardrail Continuation similar
- Barrier Cutter Line
- 42" or 54" Pier Protection Barrier
- 32" Concrete Barrier Wall

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**VIEW G-G**

- Match height of adjacent Pier Protection Barrier
- 42" or 54" Pier Protection Barrier
- 42" or 54" Crash Wall
- See Plans for length
- Field trim Bars 5C and bend Bars 5B locally as required to maintain cover (Typ.)
- Match Cross Slope of Shoulder
- Slope of Shoulder
- 3" Lip (See Note 1)

---

**CRASH WALL & FOOTING DETAILS**

- 2" Cover (Top & sides)
- 3" Lip (See Note 1)
- 2" Cover (Bottom)
- Bottom of Spread Footing
- Bars 5B placed with Bars 5C