Index 521-510 Concrete Barrier/Noise Wall (8'-0")

Design Criteria

NCHRP Report 350 TL-4; ***NCHRP Report 663***; ***AASHTO LRFD Bridge Design Specifications***; ***Structures Design Guidelines (SDG)***

Design Assumptions and Limitations

The Concrete Barrier / Noise Wall (8'-0") is the basic non-proprietary crash tested concrete barrier / noise wall combination for use on FDOT retaining walls and ground mounted applications within the clear zone when used in conjunction with the foundations presented in Indexes 521-512, 521-513 521-514 and 521-515. For bridges and approach slabs see Index 521-509. This railing is first and foremost a concrete barrier that also serves as a noise wall. To preserve the crashworthiness of the design, this barrier must be used in accordance with the requirements of ***SDG*** 6.7 for all applications. The junction slab and footings within the Indexes 521-511 thru 521-515 were originally sized based on a 54 kip load applied at 49" above the riding surface and applied over the length of the wall between expansion joints (50'-0" minimum on Indexes 521-511 and 521-513 thru 521-515), (30'-0" minimum on Index 521-512). This was based on the recommendation by the crash test researchers at Texas Transportation Institute (TTI). Although the TL-4 load application height is a minimum 32", due to the taller face of the railing/wall the colliding vehicle body engages the structure at a greater height. Recent changes to ***LRFD*** (Section 15) have codified this increase in height to 6'-0" for application of the vehicle collision load for setbacks < 1'-0". However, recent research has also shown that for stability (overturning and sliding) the TL-4, 54 kip dynamic load is very conservative when applied as a static analysis. ***Structures Design Bulletin C11-06*** provides some insight into this for regular height traffic railings, but due the increased height of the noise wall, additional dynamic load is anticipated to be applied to the structure, so no reduced static load for stability is provided at this time, but no changes to the foundation sizes have been made pending review of the anticipated recommendations from ***NCHRP Project 22-20(02).***

For retaining wall applications (Index 521-512), resistance for overturning is calculated using a point of rotation located at the outside face of retaining wall. A special design may be required if bearing conditions between the junction slab and retaining wall warrant consideration for an alternate point of rotation. See ***NCHRP Report 663*** for more information.

Form liners providing a textured finish are permitted on the outside face of the Concrete Barrier / Noise Wall (8'-0") with the following provisions: (1) The maximum amplitude of the form liner on the lower 3'-0" section shall be limited to ½ " depth; (2) Any form liner used above 3'-0", must provide a thickened concrete section to maintain 2" cover. Full details of this thickened section and the form liner shall be provided in the plans. Form liners complying with the requirements of SDG 6.7 are allowed on the upper vertical portion of the inside face of the Concrete Barrier / Noise Wall but are not recommended.

Indexes 400-011, 521-512, 521-513, 521-514, 521-515, contain details for the use of Concrete Barrier / Noise Walls (8'-0") on retaining walls and footings.

The details as shown for installing 2" diameter conduits and associated Embedded Junction Boxes (EJBs) in traffic railings have been determined to be crashworthy in accordance with the requirements of ***NCHRP Report 350***, ***AASHTO Manual for Assessing Safety Hardware (MASH)*** and the ***AASHTO LRFD Bridge Design Specifications***. To preserve the crashworthiness of Concrete Barrier / Noise Walls, no more than three 2" diameter conduits and associated EJBs, as shown on Index 630-010, may be installed within the barrier portion (only) of the Concrete Barrier / Noise Walls.

Project specific details are required for the use of 10'-0" and 12'-0" tall Concrete Barrier / Noise Walls on footings. Base these details on Indexes 521-510 and 521-511.

Concrete Barrier/Noise Walls on two phase wall systems require a special design with the point of rotation located at the interior wall.

Slip forming of the concrete barrier portion is permitted with approved shop drawings. Lap splices must meet AASHTO criteria, and concrete cover must meet FDOT requirements (2½" for slip forming and 2" for C-I-P). Details are available for increasing the crashworthiness of this Concrete Barrier / Noise Wall to ***NCHRP Report 350*** Test Level 5. Contact the Structures Design Office for more information.

Plan Content Requirements

In the Structures Plans:

In the Materials Note on the General Notes Sheet, specify the concrete class in accordance with the superstructure environment classification. See ***SDG*** 1.4.

Show and label, by name or Index number, the Concrete Barrier / Noise Wall (8'-0") on the Plan and Elevation, Typical Section, Superstructure, Approach Slab and Finish Grade Elevations Cross Section sheets, Retaining Wall Control Drawings, and other sheets as required.

All concrete and Bars 5R, 5S and 5V required to construct the Concrete Barrier / Noise Wall are included in the Estimated Concrete Barrier Quantities. Do not include Concrete Barrier / Noise Wall concrete in the estimated concrete quantities, or Bars 5R, 5S and 5V in the reinforcing bar lists and estimated reinforcing steel quantities for supporting retaining walls or footings.

In the Roadway or Structures Plans when the Concrete Barrier / Noise Wall is used on retaining walls:

In the Materials Note on the General Notes Sheet, specify the concrete class in accordance with the retaining wall environment classification. See ***SDG*** 1.4.

Show and label, by name or Index number, the Concrete Barrier / Noise Wall on the Retaining Wall Control Drawings, and other sheets as required. Include cross references to ***Standard Plans*** Index 521-512 and/or 521-600 Series as appropriate.

For Index 521-512, show and label the junction slab as either TYPE 1 or TYPE 2, based on the required width for stability. Determine the appropriate TYPE using Table 1 below. Project specific designs may be required for locations exceeding the listed design parameters.

When the Concrete Barrier / Noise Wall ends on a retaining wall, provide an End Taper and terminate the low end of the End Taper at an open joint in the concrete barrier. Continue the retaining wall mounted concrete barrier along the remainder of the retaining wall.

Table 1 Junction Slab Selection

Wind Speed (mph)	Retaining Wall Height (ft)	Junction Slab Width (ft)
130	≤ 50	5 ft. (TYPE 1)
150	≤ 50	5 ft. (TYPE 1)
170	≤ 50	6 ft. (TYPE 2)

In the Roadway Plans when the Concrete Barrier / Noise Wall (8'-0") is used for ground mounted applications:

In the Materials Note on the General Notes Sheet, specify the concrete class in accordance with the substructure or retaining wall environment classification. See ***SDG*** 1.4.

Show and label, by name or Index number, the Concrete Barrier / Noise Wall (8'-0") on the Plan and Profile, Cross Section and other sheets as required. Include cross references to ***Standard Plans*** Index 521-513, 521-514 and 521-515 as appropriate.

When the approach end of the Concrete Barrier / Noise Wall ends along the roadway within the clear zone, use one of the following treatments:

- Provide an End Taper where the low end of the taper is the height of the continuing Concrete Barrier, or if guardrail or a crash cushion are required, include the Barrier End Transition as shown in Index 521-510.
- Flare the full height Concrete Barrier / Noise Wall (8'-0") out beyond the clear zone. Flare rates vary based on both design speed and highway application (i.e., Interstate, urban or rural installations). See ***Standard Plans*** and FDM for applicable flare rates.
- Terminate the full height Concrete Barrier / Noise Wall (8'-0") within the clear zone and shield the end with a wide crash cushion. Ensure the traffic face of the wide crash cushion is offset at least 24-inches from vertical face of Concrete Barrier / Noise Wall.

When the trailing end of the Concrete Barrier / Noise Wall (8'-0") ends along the roadway within the clear zone of adjacent traffic, and the trailing end is not within the clear zone of opposing traffic, the Concrete Barrier / Noise can remain full height all the

way to the end or the End Taper can be used. Provide Guardrail or Concrete Barrier as required to shield hazards beyond the end of the Concrete Barrier / Noise Wall.

Include project specific details for 10'-0" and 12'-0" tall Concrete Barrier / Noise Walls.

Payment

Item number	Item Description	Unit Measure
521- 8- 11	Concrete Barrier /Noise Wall, with Junction Slab,	LF
521- 72- 24	Shoulder Concrete Barrier /Noise Wall, 8'-0"	LF
630- 2-16	Conduit, Furnish & Install, Embedded	LF
635- 3-13	Junction Box, Furnish & Install, Embedded	EA