# ..... m NOISE BARRIER - Item No. ..... m NOISE BARRIER INCLUDING PRECAST NOISE/TRAFFIC BARRIER - Item No. ..... m NOISE BARRIER ON STRUCTURES - Item No. ..... m SALVAGEABLE NOISE BARRIER - Item No. ..... m SALVAGEABLE NOISE BARRIER INCLUDING PRECAST NOISE/TRAFFIC BARRIER - Item No.

PRECAST NOISE/TRAFFIC BARRIER - Item No.

Special Provision No. 799F01

March 2012

### CONSTRUCTION SPECIFICATION FOR THE INSTALLATION OF NOISE BARRIER

### **TABLE OF CONTENTS**

1.0	SCOPE
2.0	REFERENCES
3.0	<b>DEFINITIONS - Not Used</b>
4.0	DESIGN AND SUBMISSION REQUIREMENTS
5.0	MATERIALS
6.0	EQUIPMENT - Not Used
7.0	CONSTRUCTION
8.0	QUALITY ASSURANCE
9.0	MEASUREMENT FOR PAYMENT
10.0	BASIS OF PAYMENT
1.0	SCOPE

This specification covers the requirements for the installation of noise barriers.

# 2.0 REFERENCES

This specification refers to the following standards, specifications or publications:

## **Ontario Provincial Standard Specifications, Construction:**

OPSS 206	Grading
OPSS 501	Compacting
OPSS 609	Grounding

### **Ontario Provincial Standard Specifications, Material:**

OPSS 1352 Precast Concrete Barriers

## **Canadian General Standards Board:**

CGSB 1-GP-181-M1977 & March 1978 Amendment - Coating; Zinc Rich, Organic, Ready Mix

# **CSA Standards:**

CSA Z107.9-00	Standard for Certification of Noise Barriers February 2000
CAN/CSA-S6-06	Canadian Highway Bridge Design Code
CSA G164-M1981	Hot Dip Galvanizing of Irregularly Shaped Articles
CSA W 47.1-1983	Certification of Companies for Fusion Welding of Steel Structures
CSA W 59.1-1982	Welded Steel Construction (Metal-Arc Welding)
CAN3-A23.2-M77	Method of Test for Concrete
CAN3-A5-M 1983	Portland Cement/Masonry Cement/Blended Hydraulic Cement

## 4.0 DESIGN AND SUBMISSION REQUIREMENTS

### 4.01 Design Requirements

The Contractor shall construct a noise barrier with the following minimum design features.

#### 4.01.01 Reference Wind Pressure

Reference wind pressure: \*.

#### 4.01.02 Acoustics

The minimum acoustical characteristic of the noise barrier shall be such that the noise barrier is \*\*.

### 4.01.03 Aesthetics

The exact colour and pattern for the barrier will be specified following award of the contract but will be within the following parameters:

Number of colours adjacent to highway \*\*\*.

in the proportion of			
----------------------	--	--	--

Number of textures \_\_\_\_\_

in the proportion of \_\_\_\_\_\_ \_\_\_\_\_

Number of colours adjacent to residential property \*\*\*.

in the proportion of \_\_\_\_\_\_ \_\_\_\_\_

Number of textures \_\_\_\_\_

in the proportion of \_\_\_\_\_ \_\_\_\_ \_\_\_\_

Final colour selections will be determined by the Contract Administrator at the point of manufacture from samples prepared by the Manufacturer.

### 4.02 Submission Requirements

### 4.02.01 Shop Drawings

The Contractor shall submit to the Contract Administrator six (6) copies of all shop drawings for noise barriers at least four (4) weeks prior to the commencement of construction. The shop drawings shall show full details of noise barrier related items, erection procedures and if applicable, connections to structures. All shop drawings shall bear the seal and signature of an Engineer.

### 4.02.02 Certificates of Conformance

### 4.02.02.01 Constructed Footings

Prior to shipment of the noise barrier from the fabrication facility, the Contractor shall submit to the Contract Administrator a Certificate of Conformance sealed and signed by a Quality Verification Engineer. The Certificate shall state, that the footings have been constructed in general conformance with the contract documents including requirements for the location, top of footing elevation and finish to the specific tolerances.

#### 4.02.02.02 Noise Barrier Installation

Upon completion of the installation of the noise barrier, the Contractor shall submit to the Contract Administrator a Certificate of Conformance sealed and signed by a Quality Verification Engineer. The Certificate shall state that the installation has been carried out in general conformance with the contract documents and shop drawings.

## 5.0 MATERIALS

The Contractor shall only use one type of barrier except on those contracts where additional barrier types are specified for use on structures or for differing sound absorption requirements.

#### 5.01 Welds

All welds shall conform to CSA W59.1 and CSA W47.1.

Steel posts to which special attachments are welded shall be hot dip galvanized after fabrication according to the requirements of CSA Standard G164-M.

### 5.02 Silicone Sealant

Silicone sealant shall be CGE SILPRUF 2000 Series.

# 5.03 Post Footings

Concrete in post footings shall be 20 MPa according to the requirements of OPSS 1350.

## 5.04 Granular Materials

Granular material shall be as specified elsewhere in the Contract.

### 7.0 CONSTRUCTION

### 7.01 Site Grading and Preparation

Grading and berm construction, which is associated with the barrier installation, shall be completed to within 25 mm below the bottom of the barrier prior to constructing the barrier footings.

All grading shall be in accordance with OPSS 206.

Excavated material not designated to be incorporated as backfill shall be managed as specified elsewhere in the Contract.

Earth and granular materials shall be compacted according to the requirements of OPSS 501.

There shall be no visible gaps between any barrier panels nor beneath the bottom panels after completion of the barrier.

Tree pruning and removal shall be kept to a minimum.

#### 7.02 Highway Signs

Existing highway signs shall be maintained. If necessary, these signs may be placed on temporary stands during construction.

#### 7.03 Footings

The depth of the footings shall be determined by the Contractor in accordance with CAN/CSA-S6 Canadian Highway Bridge Design Code Clause 12.5.7 based on the following soil design parameters.

Sta. to Sta. Soil Design Parameter

\*\*\*\*

## 7.03.01 Footings in Earth

Where footings are to be installed on or within 1 m from a downward slope of 3:1 or steeper, the shop drawings shall reflect this and shall note an increase in embedment depth of a minimum of 0.5 m greater than the requirements of the Canadian Highway Bridge Design Code. Concrete for drilled footings shall be cast entirely against undisturbed soil. If other than drilled footings are necessary, the footing shall be formed and the excavation shall be backfilled with granular materials and compacted to at least 95% Proctor. For concrete posts, the concrete working slab below the construction joint in the footing shall be placed a minimum of 4 hours prior to installing the post. Where required, the tops of all footings are to be shaped to provide for full horizontal

seating of panels, the remaining surface area is to be sloped away from the post so as to shed water. Stepped footings are to be constructed to suit grade changes.

The concrete in the footings shall be cured for a minimum period of 5 days before the noise panels can be installed.

### 7.03.02 Footings in Rock

When rock is encountered within the specified excavation depth for footings in earth, the footing shall be constructed in accordance with the "Footings in Earth" design down to a minimum of 300 mm into the solid rock or 1.5 m below the top of footing grade, whichever is the greater depth.

All excavations into rock shall be backfilled entirely with concrete. The excavation above the top of rock may be formed to the required dimensions and the remainder of the excavation backfilled with granular material.

### 7.04 Posts

The barrier shall be constructed to the line and grades specified with a tolerance of  $\pm 10$  mm. The posts shall be plumb within a tolerance of  $\pm 10$  mm in 5 m.

Galvanized surfaces which are abraded shall be cleaned and painted with a zinc-rich paint conforming with CGSB 1-GP-181M.

Changes in horizontal direction shall be made using special arrangements of the posts as specified by the manufacturer.

#### 7.05 Panels

The profile of the barrier shall be installed to match the ground profile up to the maximum grade specified on the drawings. To accommodate ground profiles greater than the maximum grade, the barrier shall be stepped in accordance with manufacturer's recommendations.

All panels and posts shall be cleaned of any oils, dirt and debris.

#### 7.06 Noise Barriers on Structures

Noise barriers shall be attached to the structure as specified in the contract.

Flashing shall be installed according to the details in the contract and in such a manner that water will not pond on the structure. Upon completion of the flashing installation the Contractor shall apply silicone sealant according to the manufacturer's recommendations and as follows:

- a) all surfaces to receive sealant shall be clean and dry;
- b) the flashing surface is to be wiped with Naphtha to remove oils and dirt; and
- c) deleterious material is to be removed from the concrete surface by light wire brushing.

# 7.07 Precast Noise/Traffic Barriers

The precast noise/traffic barrier units shall be constructed to the line and grades specified in the contract with a tolerance of  $\pm 10$  mm. All related posts shall be plumb within a tolerance of  $\pm 10$  mm in 5 m.

When changes in horizontal alignment greater than 2 degrees or when changes in vertical alignment greater than 2% between adjacent units occur, the ends of the units shall be manufactured with the appropriate skewed end detail. Units required to match ground profiles with grades in excess of 2% shall be manufactured with skewed ends to match vertical post detail. The space between each unit on the traffic side surface shall not exceed 25 mm at the base of the traffic barrier. The difference in elevation between adjacent units shall not exceed 25 mm. Any levelling or plumbing of units shall be done solely by the use of mortar bedding on the post footings.

The granular base for the precast noise/traffic barrier units shall be placed in such a manner as to ensure that there are no voids between the bottom surface of units and the granular material and that the units are set to the correct line and grades.

The precast noise/traffic barrier units shall be set into a bed of fresh mortar at the post footings. The top of footings shall be clear of foreign material, ice, snow or water.

The precast noise/traffic barrier units shall be positioned so as to have complete contact with the post flange along the traffic side of the units.

The top of the noise/traffic barrier units shall be cleared of any foreign or loose material, ice, snow, or water prior to installing the noise barrier panels.

The point of contact between the top of the precast noise/traffic unit and the bottom of the noise barrier panels shall be sealed with either mortar, neoprene or silicone sealant on both sides of the noise barrier panels along the entire length.

## 7.08 Salvageable Noise Barriers

Salvageable noise barriers when specified are to be installed in accordance with the manufacturer's instructions.

## 7.09 Connection to Existing Chain Link Fence

Where sections of an existing chain link fence are to be removed and/or replaced with a noise barrier, the Contractor shall ensure that a sufficient length of existing chain link security fence is maintained in good condition to adequately allow for connection to a new post at locations shown in the Contract.

## 7.10 Underground Utility and Drainage Crossings

Shortened post spacing will be allowed to avoid placing posts on top of utilities and drainage facilities that interfere with the originally proposed barrier footing location.

## 7.11 Existing Overhead High Voltage Lines

Where the potential of arcing exists due to the close proximity of existing overhead high voltage lines, metal noise barrier panels and girts must be grounded in accordance with the requirements of OPSS 609.

# 7.12 Personnel

The Contractor shall engage the services of an Engineer who will act as the Quality Verification Engineer.

# 7.13 Quality Control

The Contractor shall destructively test a minimum of one in 500 concrete noise barrier panels to verify:

- depth of concrete cover to the reinforcing steel
- position of the reinforcing steel
- thickness of concrete and sound absorptive layers

Where noise barrier includes concrete panels without the sound absorptive layers, the Contractor shall carry out compressive strength according to CAN3-A23.2-M and CAN3-A5-M and salt scaling resistance tests according to OPSS 1352.

The Contractor shall submit to the Contract Administrator the destructive test results, compressive strength test results and salt scaling resistance test results at least 7 days prior to the installation of the panels. The compressive strength and salt scaling test results shall not be more than 12 months old at the time of submission.

### 8.0 QUALITY ASSURANCE

The Contractor shall install noise barrier materials, which are visually uniform in appearance in terms of colour, pattern and texture. Uniformity of appearance is subject to approval of the Contract Administrator. Noise barrier panels must visually match adjacent panels. Inspection will occur during construction after installation at a distance of approximately 15 metres from the noise barrier.

## 9.0 MEASUREMENT FOR PAYMENT

m Noise Barrier
m Noise Barrier Including Precast Noise/Traffic Barrier
m Noise Barrier On Structures
m Salvageable Noise Barrier
m Salvageable Noise Barrier Including Precast Noise/Traffic Barrier
Precast Noise/Traffic Barrier

Measurement for the above items shall be by Plan Quantity by the horizontal length in metres, of the specified height of noise barrier. Transitions between barrier heights will form part of the higher barrier, and terminations will form part of the adjoining barrier.

At the discretion of the Contract Administrator, if unidentified difficult soil conditions, i.e. rock, shale or unstable earth is encountered above the design footing depths, work necessary to complete the design requirements such as caissons, dewatering, additional concrete or different augering equipment, will be paid for as a Change in the Work.

10.0	BASIS OF PAYMENT
10.01	m Noise Barrier - Item
	m Noise Barrier Including Precast Noise/Traffic Barrier - Item
	m Noise Barrier On Structures - Item
	m Salvageable Noise Barrier - Item
	m Salvageable Noise Barrier Including Precast Noise/Traffic Barrier - Item
	Precast Noise/Traffic Barrier - Item

Payment at the Contract price(s) for the above tender item(s) shall be full compensation for all labour, Equipment and Material necessary to construct the noise barrier(s) and for providing test samples.

Grading of up to a depth of 300 mm shall be included as part of the noise barrier item. For earth grading requirements greater than 300 mm in depth, the full depth of grading is provided under the earth excavation item.