

ITEM 10607.9960 M - NOISE BARRIER SYSTEM (HIGHWAY)
ITEM 10607.9970 M - NOISE BARRIER SYSTEM (STRUCTURES)

DESCRIPTION:

This work shall consist of furnishing and erecting noise barriers of the type and size, and at the locations shown on the plans or as directed by the Engineer.

All noise barriers shall consist of posts, panels, foundations, and all other associated members and attachments necessary to fabricate and erect sound abatement structures. Certain barriers will require sound absorptive coatings on the roadway side.

MATERIALS:

The noise barrier shall meet the requirements of 704-03 Precast Concrete - General with the following modifications and additions:

- A. Concrete for Highway Posts, Panels, and Footings
 - 1. Concrete for precast roadway panels and columns shall have a minimum compressive strength of 35 MPa at 28 days after casting. Concrete for panels and columns shall have an integral color pigment.
 - 2. Concrete for footings shall be Class A concrete conforming to the requirements of Section 501.

- B. Structure Panels
 - 1. Lightweight concrete shall be manufactured in accordance with Section 501, and the following modifications to Section 501:
 - A. It will be the Contractor's responsibility to design a lightweight concrete mix, which will have a minimum compressive strength of 35 MPa at the end of 28 curing days.
 - B. Cement Type 1 or 2 701-01
 - C. Fine aggregate natural or manufactured 703-07
 - D. Coarse aggregate (Lightweight aggregates) 703-10

Coarse aggregate gradation shall conform to the 19 mm to 4.75 mm size designation in Table 1, ASTM C330.

 - E. The minimum cement content shall be 385 kg per cubic meter.

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Air entrainment shall be a minimum of 4% and a maximum of 8% total air (entrapped plus entrained). Air content shall be determined by the volumetric method described in ASTM C173.

The average dry unit weight of the cured concrete shall range between 1600 kg per cubic meter minimum to 1840 kg per cubic meter maximum when tested in accordance with ASTM C567.

- F. Stockpiles of lightweight aggregates shall be continuously and uniformly sprinkled with water for eight hours by means of a sprinkler system approved by the Engineer. The occurrence of a steady rain of comparable intensity will permit the turning off of the sprinkler system at the direction of the Engineer, until the rain ceases. At the end of the wetting period, or after the rain ceases, the stockpiles shall be allowed to drain for a period of twelve to fifteen hours immediately prior to use, unless otherwise determined by the Engineer.
- G. Lightweight air-entrained concrete shall be composed of portland cement, air-entraining admixture, water, fine aggregate and coarse aggregate proportioned in accordance with the American Concrete Institute ACI 211.2, Recommended Practices for Selecting Proportions for Structural Lightweight Concrete.
- H. After the materials have been accepted for this work, the Contractor shall determine the proportions for concrete and equivalent batch weights.
- (1) Trial Mixes. The Contractor shall determine the proportions on the basis of trial mixes conducted with the materials to be used in the work in accordance with ACI 211.1, Recommended Practices for Selecting Proportions for Structural Lightweight Concrete. The corresponding cement content for each trial batch shall be determined by means of a yield test in accordance with ASTM C138.

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(2) Proportions. The Engineer shall be provided a copy of the trial mix design including the following:

- The weight in kilograms of fine aggregate and coarse aggregate, (saturated surface-dry condition), per cubic meter of concrete.
- The cement content in kilograms per cubic meter.
- Quantity of water in kilograms per cubic meter.

These values shall be used to manufacture all lightweight concrete for this project.

(3) Batch Weights. The batch weights shall be submitted to the Engineer for approval. Since the proportions are designated in terms of aggregates in saturated surface-dry condition, the equivalent batch weights used by the Contractor shall be corrected periodically, to account for the moisture content of the aggregate at the time of use.

(4) Manufacturer's Representative. The manufacturer of the lightweight aggregate shall supply a service representative at the site for the first two days of lightweight concrete placement operations. The representative shall be responsible to assist the Contractor and the Engineer in the control of lightweight concrete mixing and placement operations.

A technical report shall be submitted to the Engineer, by the lightweight aggregate manufacturer regarding any observations or test results related to the concrete practices at the work site.

I. Lightweight coarse aggregates, together with approximately $\frac{2}{3}$ of the total mixing water, shall be introduced into the mixer and mixed for a minimum of 10 minutes. The fine aggregate, cement and admixtures and remaining mixing water shall then be added, and mixing completed.

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J. Air content, and slump placement limits, for lightweight concrete are as follows:

	<u>Minimum</u>	<u>Desired</u>	<u>Maximum</u>
Air Content (Measured by Roll-A Meter)	4.0%	6.0%	8.0%
Slump	_____	65 mm-90 mm	100 mm

K. Concrete shall have an integral color pigment.

2. Sound Zero system or approved equal shall be manufactured in accordance with the following:

- A. Sound zero or approved equal steel core (50 mm), an 1.2 mm, G-60 galvanized grade B steel – as per ASTM 526-80 M, Minimum I = 17.2 mm. As manufactured by the Manning Company in lengths as required.
- B. J-Channel 38 mm x 50 mm x 76 mm, 1.5 mm G-60 galvanized grade steel as per ASTM 526.80 M in lengths as required. Manufactured by the Manning Company or approved equal.
- C. Passive restraint cables; 6 mm diameter galvanized wire rope – 6 mm diameter 7 x 19 IPS.RRL.IWRC with a flemish eye loop (76 mm x 152 mm) at both ends. Cables shall have a minimum 305 mm of “slack” and a minimum breaking strength of 3.2 metric tons.
- D. Lifting insert; 19 mm diameter Nut, galvanized with flat plate.
- E. EPS board; 16 kg/m³ expanded polystyrene shall meet federal specification HH-I-524C Type I.
- F. Wind-Devil mechanical fastener or approved equal. A polypropylene washer designed for the mechanical attachment of insulation; as manufactured by Wind-Lock Corporation, or approved equal.
- G. Fiberglass reinforcing fabric, 0.41 kg liter/square meter with a minimum tensile strength of 5.4 kg/mm of width.
- H. Basecoat: An acrylic, latex modified cement – mix ratio: 1:1 – by weight.

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Used to embed fiberglass reinforcing fabric.

C. Structural Steel

Steel shall meet the requirements of Subsection 564-2 & 715-01.

1. Steel posts and base plates on structures and base plates for the off-structure integral post and panel option shall be fabricated from ASTM A572 M steel and galvanized per subsection 719-01, Type II.
2. Anchor bolts shall be galvanized ASTM A449 M conforming to Subsection 723-60. Nuts and washers shall be galvanized ASTM A449 M. Headless bolts shall be galvanized ASTM A307 M, hot dipped in accordance with Subsection 719-01, Type II.
3. All exposed steel to be shop painted with three coats to match concrete panels in accordance with the Special Note on Preparation and Painting of Steel Surfaces.

D. Sound Absorptive Coating

Where so noted on the plans, noise barrier panels, both Highway and Structure, shall be fabricated with the special item "Sound Absorptive Coating for Noise Barriers".

E. Integral Color, Staining and Anti-Graffiti Coating

1. Integral Color

The precast concrete and sound zero wall panels shall be integrally colored using a pigment coloring system. Pigment for integrally coloring concrete shall be a chemically pure material pigment, manufactured by a company with proven color mixes capable of producing approved custom colors complying with all environmental codes and ordinances and as approved by the Engineer. The admixture color shall produce a color conforming to the Federal Standard 595 B. The color shall be as indicated on the plans.

2. Concrete Penetrating Stain

The concrete penetrating stain for the texture bands on panel and the post facing roadway side shall be a single component, waterbased, thermoplastic acrylic emulsion which carries its color and water repellent protection into the concrete. The stain shall be delivered in original, sealed 19 liter plastic pails or open head 208

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liter drums, clearly labeled with the manufacturer's name and batch number of the material. The stain shall conform to the Federal Standard 595 B. The color shall be as indicated on the plans.

The penetrating stain shall conform to the following performance requirements:

PHYSICAL PROPERTIES		
CONDITION	RESULTS	TEST METHOD
Dry-through Time	25 Minutes Max.	ASTM D 1640
Dry-to-Recoat Time	1 Hour Max.	ASTM D 1640
Oil, Wax & Silicon Content	None	
Adhesion to Concrete-Elcometer Test (Average of 5 Tests) Gloss Flat	1.4 MPa	ASTM D 4541
Weather-O-Meter Test (500 Hours)	No Visible Degradation	ASTM G 23 Atlas Carbon Arc
Solids by Weight	57% (Plus or Minus 2%)	
Viscosity	70-75 KU	ASTM D 562

The concrete penetrating stain shall comply with New York State Laws regulating the use of volatile organic compounds and solvents.

3. Anti-graffiti Coating

Exposed noise panels and concrete posts shall receive an anti-graffiti coating where indicated on the plans. The anti-graffiti coating shall be a two component, oil-free, non-yellowing, aliphatic, polyester polyurethane coating. The material shall be approved by the Engineer prior to its application.

F. Formliners

Formliners shall be of elastomeric type of the patterns indicated on plans. The liner may be factory bonded or field laminated following the manufacturer's recommendations and instructions. The number of uses per formliner shall not exceed the manufacturer's recommendation.

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G. Paint

Paint shall conform to the Special Note "Preparation and Painting of Steel Surfaces" in the Proposal.

H. Backer Rod and Joint Sealer

The elastomeric sealant shall be polysulfide or polyurethane conforming to the requirements of Subsection 705-06.

The Backer Rod shall be polyethylene foam, conforming to ASTM D3204, Type I, as manufactured by; Dow Corning Corporation, Midland, Michigan; W.R. Meadows, Inc., Elgin, Illinois; Nomaco, Inc., Ansonia, Connecticut; Sonneborn Building Products, Division Contech, Minneapolis, Minnesota; Woodmont Products, Inc., Huntingdon Valley, PA; or approved equal.

I. Miscellaneous

The materials listed below shall conform to the following subsections:

Concrete Grouting Material	701-05
Epoxy Polysulfide Grout	721-03
Neoprene Pads	728-01 or 728-02

Additional materials required specifically for use with structural concrete items shall meet the requirements of Subsections 556-2.01 and 556-2.02.

Fabrication (Concrete Panels and Posts)

The noise barrier shall meet the fabrication curing and repair requirements of 704-03 Precast Concrete - General with the following modifications and additions.

A. General

Panels and posts shall be fabricated to conform to the shapes, sizes, textures, and colors shown on the plans. The reinforcement shall be as shown on the plans.

Six (6) complete sets of working drawings for the precast concrete panels and posts shall be submitted to the Materials Bureau for approval. The processing, approval, and transmittal of working drawings will be in accordance with procedural directives of the Materials Bureau.

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The manufacturer shall produce panels and posts that are uniform in appearance. The units shall be cast in steel forms with elastomeric form liners of specified textures.

The panels and concrete posts shall have a surface texture treatment on both the highway and residential sides as shown on the plans. The panel fabricator shall stipulate on the shop drawings the method he intends to use to achieve the above stated surface treatments. A 600 mm x 600 mm x 100 mm sample of the panel (and a second sample with the sound absorptive layer if the coating is called for) with the integral color and with all proposed surface treatments shall be submitted to the Engineer for color approval prior to production of the sample noise barrier panels. The panel manufacturer shall then construct, at his plant or at a location determined by the Engineer, an acceptable sample noise barrier wall consisting of five posts and four panels of type A, B, C, and either D or two consecutive arched panels if the bridge structure is called for. The wall shall be a minimum of 5.5 meters high and shall be the same size and configuration as the noise barriers on the actual project. These test posts and panels will be used to determine the acceptability of the various surface treatments, color, and quality of construction of both the roadway and residential sides of the noise barrier. If test sections are found to be unacceptable, the panel manufacturer shall make additional samples until an acceptable product is produced. Any additional posts and panels will be made at the Contractor's expense. No panels for the actual noise barrier shall be fabricated until written approval of the sample noise barrier is given. Once these posts and panels have been approved, they shall be retained and used as the standards to determine acceptability of production posts and panels. The panels may be used on the project at the end of precasting operations when released by the Engineer.

B. Integrally Colored Concrete

The exact quantity of pigment to be added shall be determined based on the preparation, examination and approval of the 600 mm x 600 mm x 100 mm test panel or panels to produce the color in the materials Subsection F.1 of this specification (if additional panels are necessary to produce the desired color).

The tint used for all the concrete in the posts and panels shall be from the same batch.

A high quality form release oil, compatible with the integral color shall be used.

C. Staining Concrete and Sound Absorptive Surfaces

Surfaces to receive the concrete penetrating stain shall be fully cured, clean, dry and free from dust, curing agents, oil, grease, efflorescence and any other contaminants that

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could prevent proper adhesion. If necessary the surfaces to be stained shall be pressure washed until all surface contamination has been completely removed. In addition, glazed or glossy surfaces must be chemically or mechanically abraded to remove gloss to allow adhesion.

Prior to any staining operations, the contractor shall be required to complete a test staining program for color acceptance and surface area coverage. This work shall be performed at the concrete precaster's plant. The texture bands of two complete noise barrier sections (one with and one without sound absorptive coating if the coating is called for), including posts, shall be stained. The finished color of the penetrating stain treated areas shall be as indicated on the plans. Viewing shall be under North Standard Daylight. The Contractor shall apply the stain according to the manufacturer's recommendations. The stain test sample must be submitted to and approved by the Engineer prior to ordering the complete stain batch. When approved, the sample areas shall serve as a standard of acceptance for all further work.

Accompanying the sample shall be the manufacturer's literature which shall include materials specifications, physical properties, including ASTM test methods utilized, manufacturer's recommended application rates for the various surface textures and porosity, current application instructions and Material Safety Data Sheets. The Contractor must comply with all safety instructions during all applications.

All concrete stain shall be of the same batch and lot and shall be delivered to the spraying site in original sealed containers clearly marked with the manufacturer's name, brand name, type of material, batch and lot numbers, date of manufacture, and color.

Prior to use, the stain shall be thoroughly mixed using the appropriate mechanical means and shall be mixed during spraying operations as required to maintain uniformity.

Two coats of concrete penetrating stain shall be applied to the fractured fin areas of the precast concrete noise barriers and posts both with and without sound absorptive coating.

At the time of stain application, both the concrete and air temperatures must be between 8 degrees C and 32 degrees C and the concrete shall be completely dry. Stain shall not be applied unless weather conditions will permit complete drying of material prior to rain, fog, dew or temperatures beyond the prescribed limits.

Areas not to receive stain shall be masked. The concrete penetrating stain shall be

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spray applied using conventional or airless spray. The stain shall be applied in two thin coats to provide a uniform appearance and shall be consistent with the quality and appearance of the approved sample.

If unevenness in color, lines of work termination, etc. exist, the Engineer may have all such surfaces resprayed at the Contractor's expense. Respraying, if required, shall be carried to a natural break-off point. Stain may be brushed or roller applied only at locations where overspray would affect adjacent materials and where not practical for spray application.

D. Quality Assurance

1. All units to be considered for acceptance in accordance with procedural directives of the Materials Bureau.
2. The Quality Assurance (QA) inspector employed by the Department must be present during all fabrication of noise barrier panels.
3. The Contractor shall notify the Engineer of the location of proposed period of production of noise barrier panels intended for Department use four weeks prior to his intended start date for fabrication. Notification should be made to the Director, Materials Bureau at least 72 hours before production begins.
4. The precast concrete post and panel noise barrier will be considered for acceptance in stock lot quantities at the manufacturing location based on the procedural directives of the Materials Bureau.
5. Concrete properties of highway noise barrier systems will be evaluated by plastic concrete testing. The acceptability of the concrete properties will be on an individual lot basis. The Contractor's plant technician to be A.C.I. Grade 1 certified.
 - a. Plastic Concrete Testing - The plastic concrete tests shall be performed by the manufacturer in the presence of the Department QA inspector.
 - b. The air content testing shall be as follows:
 - (1) Frequency: One air test shall be performed by the manufacturer for every batch of concrete.
 - (2) Specification: 5.0 - 9.0% Highway, 4.0 - 8.0% Structure.

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E. Finished Noise Barrier Units

Identification: Each unit shall be indelibly marked on surface not exposed upon completion with the following:

1. Name or trademark of manufacturer.
2. Date of manufacture.
3. NYSDOT Lot Number
4. Department Contract Number

F. Accepted/Rejected Units

1. The Quality Assurance inspector will accept or reject units in accordance with the Specifications.
2. Upon final approval the Department representative will stamp "NYSDOT Accepted" on the unit near the identifying information already on the piece.
3. The date of acceptance of a lot will normally be the date of acceptance of the concrete properties, but not necessarily so. The date of acceptance of a lot may be subsequent to the acceptance of concrete properties if the required repairs have not been accomplished. In this case the date of acceptance is the date the Inspection Authority accepts the piece.
4. The inspector shall inform the manufacturer of the Test Number, from Form BR-300 "Concrete Cylinder Report" and the Date of Acceptance, for inclusion on Form BR-97 "Shipment Certification".
5. Rejected Units: Units or lots of units that do not conform to the specifications shall be rejected with the Department representative obliterating the identification markings on the unit(s) which reference the Department.
6. Shipment
 - a. Only "accepted" units may be shipped, i.e. only those units that have been determined by the inspector to be accepted.
 - b. Each shipment of noise barrier units shall be accompanied by Form BR-97, "Shipment Certification", properly executed by the manufacturer.

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- (1) When the inspection authority is under the direct supervision of the Materials Bureau, the distribution of the Form BR-97 will be as indicated on the form.
 - (2) When the inspection authority is the Region, the manufacturer shall submit yellow and pink copies to the Regional Materials Office for their review. They will confirm the information, put a Region stamp and sign or initial the back of the pink copy. The yellow and pink copies will be forwarded to the Materials Bureau for validation and transmittal to the job.
- c. Log: The manufacturer shall maintain an inventory log of shipments. The manufacturer shall retain these records for seven years and have them available to the Department upon request.
- d. The units arriving at the job site are subject to final evaluation by the Engineer. Damaged or defective units may be rejected and returned to the manufacturer.

Fabrication (Bridge Panels)

A. General

Fabricate the panels in an approved plant in accordance with approved drawings and approved quality control plan.

Fabricate, for approval, a 1.2 x 1.2 meter panel and finish as specified for the full height wall system, and erect at a location specified by the Engineer. Fabricate sample wall by the same process that will be used for all production. Panels not conforming to the approved test sample will be rejected.

Sound Zero steel core units (or approved equal) shall be supplied in proper lengths. Each of these units is designed to allow an overlap adjustment one to the other to obtain the required overall height of assembled steel core structure. Minimum overlap 19 mm.

Pieces shall be fastened together along the overlapping seams, with screws at 610 mm o.c. maximum.

J-Channel – shall be placed on both ends to the substrate and secured by welding or screw fastening. Note: All welds shall be “touch-up” with a zinc coating.

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Wire rope with formed loops: (6.3 mm diameter 7 x 19 IPS.RRL.IWRC galvanized wire rope with a minimum breaking strength of 1.6 metric tons) shall be placed as shown on approved shop drawings, with the cables on the community side of the Sound Zero core or approved equal. Cable shall be a minimum one foot longer than the width of the panel. Loops shall be attached securely to the Sound Zero core or approved equal by either plastic or steel strapping.

All surface oils and other foreign materials shall be wiped clean from the steel core structural unit prior to installing Sound Zero NR or approved equal.

Insulation ($1/6 \text{ kg/m}^3$) shall be 610 mm x the full width, perpendicular to the steel core. The insulation shall be fastened using Wind Devil Fasteners or approved equal one per every 0.092 square meters.

Reinforcing fabric: The fiberglass reinforcing mesh shall be embedded into the west basecoat, to encapsulate all six sides of the panel. The mesh shall be overlapped a minimum of 64 mm on all sides.

All the edges of the panel shall be coated with an elastomeric prior to finishing either face of the panel.

The approved finish is then applied to each face of the panel.

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Fabrication (Steel Posts)

A. General

The Contractor shall shop fabricate, structural steel posts and other metal parts as shown on the plans and in accordance with the provisions of the Contract Documents. During fabrication and prior to painting, holes shall be drilled and tapped in the flanges at the locations shown in the Plans. Drilling and tapping shall be 16 mm Dia. galvanized headless bolts, ASTM A307, thread series UNC (coarse). Prior to painting, the holes shall be filled with a bolt to protect the threads. The bolts shall not be removed until after the posts are erected in the field and just prior to panel insertion.

Welding shall conform to the requirements of the SCM. Shop drawings shall be prepared, approved and distributed in accordance with the provisions of the SCM, except that the term "D.C.E.S," shall be interpreted as the "Engineer".

B. Painting

Note that all painting will be done in the shop. Painting shall be done in accordance with Special Note "Preparation and Painting of Steel Surfaces" in the Proposal. The color of the finish or third coat shall be conform to that indicated on the plans. Viewing shall be under North Standard Daylight. The finish coat shall be applied in the shop.

A sample of the steel painting system shall be submitted for approval. A steel plate (ASTM-A36) 300 mm wide, 600 mm long and 10 mm thick shall be completely painted on both sides with the primer coat followed by the intermediate coat of paint for 450 mm of the length, both sides, followed by the finished coat of paint for 300 mm of the length, both sides.

Certification

The Contractor shall submit a certificate stating his compliance with these specifications and the contract plans.

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CONSTRUCTION DETAILS:

A. Noise Barrier System (Highway)

Holes for post foundations 1.0 meter in diameter and to the depths shown on the contract plans shall be pre-augered, true and plumb as approved by the Engineer. Precautions shall be taken to protect the holes from collapse. Holes shall contain no free water at the time of concrete placement. The holes shall then be filled with Class A concrete in direct contact with the soil, properly consolidated to a point shown on the plans as the top of footing elevation. Posts shall be true and plumb. After a seven day curing period the panels shall be positioned in the slots of adjacent posts. The Contractor shall perform any required grading between the posts to provide a continuous and smooth ground line which will produce no openings between the bottom of the panel and the ground surface.

Contractor shall employ an approved jig method to set post plate anchor bolts to assure proper center line to center line spacing and plumbness of posts. Polyethylene rod and neoprene pads shall be placed as shown on the plans.

For panels on structure, the panels shall be set on a thin layer of grout meeting the requirements of Section 721-03 Epoxy Polysulfide Grout.

After the structure panels are in place, they shall be secured by 16 mm diameter galvanized headless bolts, ASTM A307, as shown in the plans. The bolts shall not protrude beyond the outside surface of the flange. If this condition occurs the bolt shall be removed and a shorter bolt used. This shall continue until a satisfactory conditions occurs.

After the posts are set in their final, truly vertical, position the space between the base plate and the top of the wall or footing shall be filled with grout meeting the requirements of Section 701-05, Concrete Grouting Material. The requirements of Subsection 568-3.02 shall apply.

After final placement, exposed panel faces shall have the anti-graffiti coating applied where indicated on the plans in accordance with the manufacturer's surface preparation instructions and recommendations.

Minor defect repairs such as touch-up field painting and staining shall be made as ordered by the Engineer after final placement.

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B. Noise Barrier System (Structure)

Before beginning construction, submit, for approval, shop drawings showing fabrication details; and handling, transportations, and construction procedures for all wall elements including connections.

1. Handling, storage, transportation

Employ positive means to protect panel edges from damage. Load and ship panels with care as indicated or as per manufacturer's recommendation.

Lift panels so as to minimize strain, distortion or impact loads.

2. Erection

Construct structure mounted posts and connections as indicated on the design contract drawings and approved shop drawings.

After the posts are set in their final, truly vertical, position the space between the base plate and the top of the slab shall be filled with a mortar leveling pad meeting the requirements of Section 701-05, Concrete Grouting Material. The requirements of Subsection 568-3.02 shall apply.

Install noise barrier wall as indicated as shown on approved shop drawings, and in accordance with the manufacturer's recommendations.

Install neoprene pad between base plates of the steel posts. The pad should compress sufficiently to provide uniform bearing for the full length of the panel.

Lift panels by the two (2) 19 mm diameter lifting eyes located in the panel. After installation, the lifting eyes shall be removed and replaced with 19 mm diameter x 19 mm galvanized bolt, and washer to seal insert.

Once in place, panels shall be field drilled, at holes in post, to secure 16 mm A325 M diameter bolts through wire rope loops. (Passive restraint system) as indicated.

Use a polyurethane sealant to seal the Sound Zero Panel or approved equal to the post flange. Sealant is only required on one side of panel.

After final placement, exposed panel faces shall have the anti-graffiti coating

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applied where indicated on the Contract Drawings in accordance with the manufacturer's surface preparation instructions and recommendations.

Repair and repair procedures require approval by the Engineer.

3. Technical Assistance:

Have a company representative present, full time, at the project site during erection procedures of the noise barriers to assist the fabricator, contractor, and Engineer. Provide a technical representative to assist in the event unusual problems or special circumstances arise.

METHOD OF MEASUREMENT:

The Noise Barrier System will be measured by the total number of square meters of the noise barrier measured from the top to the bottom of the wall panel and from center to center of post. Only one side of the barrier will be measured for payment.

BASIS OF PAYMENT:

The unit price bid per square meter of Noise Barrier System shall include the cost of all labor, materials, excavation, backfill and equipment necessary to perform the work except that the sound absorptive coating will be paid for under its item. Structural steel (including reinforcing, anchor bolts, washers and nuts), grout, and footing concrete, for the purpose of payment, will be classified as part of the Noise Barrier System and will not be paid for under any other item. No additional payment will be made for the required samples.