TO:

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ENGINEERING INSTRUCTION

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

SUBJECT: ITEM 16555.5002 AND ITEM 16555.5502

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APPROVED: for J. H. Grassette

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Supersedes: EI 83-43

This Engineering Instruction transmits the text for

1. Item 16555.5002 - Permanent Concrete Traffic Barrier for Structures (Safety Shape-Full Section).

2. Item 16555.5502 - Permanent Concrete Traffic Barrier for Structures (Safety Shape-Half Section).

These items are identical to Items 16555.5001 and 16555.5501 of the same title except that the Construction Details will now require a dry run prior to barrier installation. The dry run requirement should eliminate stops due to unexpected obstructions (e.g. bridge drains, reinforcing bars, etc.) which have occurred on some previous projects.

These items become effective with the letting of May 17, 1984 (P.S.& E. February 23, 1984).

ITEM 16555.5002 - PERMANENT CONCRETE TRAFFIC BARRIER FOR STRUCTURES
(SAFETY SHAPE - FULL SECTION)
ITEM 16555.5502 - PERMANENT CONCRETE TRAFFIC BARRIER FOR STRUCTURES
(SAFETY SHAPE - HALF SECTION)

DESCRIPTION:

A. WORK. The work shall consist of constructing concrete traffic barrier, of the safety shape configuration, at the locations indicated on the Contract Plans.

B. METHODS. Construction of the barrier shall be accomplished by cast-in-place methods. Slip forming will be allowed as an acceptable cast-in-place method.

Precasting methods of construction will be considered on a project-by-project basis. If permitted, precast construction methods shall conform to the requirements of this specification.

C. SHAPE MODIFICATION. The barrier shape indicated on the plans shall not be altered. Minor modifications, to allow slip-forming, will be submitted to the Deputy Chief Engineer (Structures) for approval.

D. LOCK AND ANCHORING. Precast barrier units are required to be locked together, as well as anchored to the structural slab. If the Contractor is permitted to construct by the precast method, he shall submit his proposed locking and anchoring methods to the Deputy Chief Engineer (Structures) for approval.

E. APPROVALS. For approval requirements and procedures refer to the Construction Details.

MATERIALS:

A. MATERIALS. Materials used for this work shall meet the following requirements:

1. CONCRETE

a. Precast - The requirements of Subsection 704-05 shall apply.
b. Cast-in-Place - Constructed Forms - The requirements of Section 501 pertaining to Class A Concrete shall apply.
c. Cast-in-Place - Slip Formed - Concrete shall be made in accordance with the following mix design criteria:

Cement.....680 lb.
Fine Aggregate.....45.8%
Coarse Aggregate
Type (Table 501-2).....CA1
Water/Cement Ratio.....0.44
Air Content.....6% ± 2%
Slump (Maximum).....1"

Concrete shall be made in accordance with the requirements of Section 501.

2. Epoxy Coated Reinforcing Bars.....709-04

3. Portland Cement Bonding Grout.....705-22

4. Steel Tubes.....ASTM A500, Grade B or C

5. Steel Plates, or Bars.....ASTM A36

6. Anchor Bolts (Fully Threaded).....ASTM A449

7. Nuts.....ASTM A563 Grade DH

8. Washers.....Plain, Hardened

9. Concrete Repair Material.....701-04

10. Joint Filler.....705-07

11. Curing Compound.....711-05

12. Locking and anchoring devices for precast units shall be made of steel conforming to the requirements of.....715-1 and 709-04, as applicable.

B. GALVANIZING. Galvanizing shall be done in accordance with the requirements of Subsection 719-01. All steel, except reinforcing steel, shall be galvanized.

C. FABRICATION TOLERANCES. All concrete barrier, regardless of the method of construction, shall conform to the following finished tolerances:

Bar Reinforcement Cover.....-0" + 1/2"*
Width (Top).....-0" + 1/4"
Width (Bottom).....-0" + 1/2"
Surface Straightness
(Deviation from theoretical
centerline of individual section or unit).....1/2" in 20 feet

Vertical Alignment
(Deviation from a line parallel
to the theoretical grade line).....1/2" in 20 feet
Horizontal and Vertical Misalign-
ment between adjacent precast units.....± 3/16"

*Reinforcement cover shall be verified while the concrete is still plastic, except in the case of cured precast units. In that case, cover will be verified in accordance with established Department procedures. These procedures may include coring.

CONSTRUCTION DETAILS:

A. APPROVALS.

1. CAST-IN-PLACE CONCRETE-MODIFICATIONS TO CONTRACT PLANS. The D.C.E.S. shall be supplied with three copies of pertinent details and necessary design computations. Every effort will be made to render a decision, in a timely manner, after all pertinent information has been received. However, the time required to render a determination will not be taken into account should the Contractor request an extension of time as provided for under subsection 108-04.

2. PRECAST CONCRETE. The terms of A1 above shall apply.

B. GENERAL.

1. CLEANING. Surfaces against which barrier is to be placed shall be thoroughly vacuum cleaned.

2. DEFECTS. Defects are divided into two categories; minor defects and major defects. Minor defects in the barrier may be repaired in the field. Major defects shall be cause for rejection of the section, or the section shall be repaired in the manner directed by the D.C.E.S.

a. 1. MINOR DEFECTS. Minor defects are defined as holes, honeycombing or spalls which are six inches, or less, in diameter, and which do not expose the outermost surface of the steel reinforcement.

2. Surface voids 5/8", or less, in diameter, and 1/4", or less, in depth are not considered defects. They do not require repair.

b. 1. MAJOR DEFECTS. Major defects are defined as:

a. Any defects, except as noted in B.2.a.2. above which does not meet the definition of a minor defect.

b. Minor defects which, in aggregate, comprise more than five percent (5%) of the surface area of the barrier section.

3. REPAIR.

a. MINOR DEFECT REPAIR. Repair shall be made with a material acceptable under Subsection 701-04. Methods of repair shall be acceptable to the Engineer. The color of the repaired portion shall match, as nearly as practicable, the color of the surrounding concrete. Repaired portions shall exactly match shape requirements. The repaired portion shall withstand a moderate blow from a 16 ounce hammer. Repair shall be done at no cost to the State.

b. MAJOR DEFECT REPAIR. Major defect repair, shall be pre-approved by the D.C.E.S. Repair shall be done at no cost to the State.

C. CAST-IN-PLACE CONCRETE: CONSTRUCTED FORMS. The requirements of Section 555, and Section 556 shall apply with the following modification:

"If the forms are removed before seven curing days have passed curing shall be continued in the following manner:

Concrete shall be cured by means of a clear curing compound. No curing blankets will be required. Curing compound shall be sprayed on the concrete surface immediately following the slipforming and handfinishing operations. The compound shall be applied by means of pressure spraying or distributing equipment at the rate directed by the Engineer, but not less than one gallon per 150 square feet of surface. The equipment for applying the compound shall be such that the compound is applied as a fine spray with no surface damage to the concrete. The equipment shall also provide for adequate agitation of the compound during application, and shall be approved by the Engineer before work is started. Should the method of applying the compound produce a non-uniform film, or should the spraying equipment fail and duplicate equipment not be immediately available, the application of curing compound shall be discontinued immediately and the curing shall be accomplished by another method acceptable to the Engineer. The Contractor shall stockpile sufficient approved coverings for protection of the concrete in the event of rain, non-uniform film application, or breakdown of spray equipment.

D. CAST-IN-PLACE- CONCRETE: SLIPFORMED. The requirements of Section 555, Section 556 and the following, shall apply:

1. The forming of the barrier shall be accomplished by self-propelled equipment approved by the D.C.E.S. The requirements of subsection 555-3.03 shall not apply.

2. After all reinforcing bars have been placed, all bridge joints installed, and all other hardware placed in the area of the barrier, the Contractor shall perform a "dry run" over the entire length of the barrier installation location. It is necessary only to "dry run" a single day's placement during any given day; however, the entire barrier length shall be traversed.

The "dry run" may be made with either the actual slip forming equipment, or with an exact "mock-up" of the equipment. The "mock-up"; if utilized, shall be the exact size, shape and dimensions of the slip forming equipment. It shall be a minimum of four feet long. Its movement shall be able to be correlated with a string, or survey, line indicating the correct offset location of the barrier.

3. After the "dry run" portion of the work has been completed and all obstructions have been cleared, the slip-forming equipment shall be demonstrated for capability. The demonstration shall be done in the presence of the Engineer. The Contractor shall make all adjustments, or alterations, to ensure that the equipment has the capability to produce an acceptable product. No work shall be done without the Engineer's approval. The capability demonstration will be required only once for each piece of forming equipment used on the project.

4. The Engineer's approval is for equipment capability only. The Contractor shall be entirely responsible for meeting the tolerances given under MATERIALS, subsection "C. Fabrication Tolerances". Sections which do not meet tolerance requirements are subject to removal and replacement at no cost to the State, at the discretion of the Engineer.

5. Concrete supply shall be sufficient to produce a continuous, completely shaped barrier. If concrete placement is interrupted, for any reason, the placement shall be protected from drying by several layers of wet burlap. A construction dam, or bulkhead, shall be installed if the interruption exceeds 30 minutes. If the interruption exceeds 90 minutes, further placement shall be discontinued. Concrete placement at this location may then resume only after 24 hours, measured from the time of delay, has elapsed.

6. Concrete placement may begin at the joint beyond the bulkhead without time constraints. If the length of placement between the bulkhead and the next joint is such that, in the opinion of the Engineer, it may not be slipformed, he will require the Contractor to form the section by methods other than slipforming.

7. Cold joints in the barrier, that is joints formed due to the attachment of fresh concrete to set concrete shall be made in the following manner. The set concrete shall have its surface cut to remove all loose, and otherwise unsatisfactory materials. Tools used for this purpose shall be approved by the Engineer, prior to use. The surface shall be scrubbed with wire brooms and shall be kept wet until new concrete is placed. Immediately prior to placing fresh concrete, the set surface shall be completely coated with portland cement bonding grout (705-22) thoroughly brushed in.

8. The Contractor shall make provisions to allow hand finishing, should it be necessary, on all surfaces. Hand finishing, if done, shall be done immediately after the passage of the slipforming equipment. Curing compound shall be applied only after hand finishing has been completed at any particular location.

9. Concrete shall be cured by means of a clear curing compound in accordance with the requirements of Part C.

10. Joints and construction grooves shall be introduced at the locations indicated on the Contract Plans. If sawcutting methods are employed the following requirements shall apply:

    a. The equipment shall be demonstrated, for capability, to the Engineer.

    b. No sawcuts, for any purpose, shall be made in the structural slab.

    c. In order to avoid sawcuts in the structural slab, the portion of the joint directly above the structural slab (3"±) shall be hand tooled immediately after finishing.

E. PRECAST CONCRETE.

1. Immediately prior to installation, the barrier units shall be inspected for defects. Defects which conform to the definition of minor defects as given in the CONSTRUCTION DETAILS subsection B.2.a.1 shall be repaired in accordance with CONSTRUCTION DETAILS Subsection B.3.a.

2. If concrete grout is used as bedding beneath the barrier units, care shall be taken to prevent the grout from setting prior to unit placement. If the Engineer determines that the grout is setting, or has set, it shall be removed; the surface shall be reprepared; new grout shall be placed all at no cost to the State.

3. The drilling of holes, and grouting of bolts shall conform to the following requirements:

    a. HOLES NOT COMPLETELY DRILLED THROUGH THE STRUCTURAL SLAB.

        1. Drilling shall be done by means of a core drill, or a rotary impact drill. If a rotary impact drill is used and reinforcing steel is encountered, the reinforcing steel shall be cut and removed by means of a core drill. The remainder of the drilling may be done with the rotary impact drill.

        2. Drilling with a lubricant shall not be permitted. Water is not considered a lubricant.

        3. Concrete spalled, or otherwise damaged by the Contractor's operations, shall be repaired in a manner approved by, and to the satisfaction of, the Engineer.

4. Grout shall be mixed and placed in strict accordance with the manufacturer's instructions, unless otherwise modified herein.

5. Grout placement will be done only if the ambient air temperature is a minimum of 50° F., and expected to rise during the working day.

6. The hole shall be thoroughly clean and dry prior to grout placement.

7. Grout material will be thoroughly brushed onto all surfaces of the hole immediately prior to placement. The grout shall be inserted to a depth sufficient to complete filling of the hole after insertion of the bolt.

8. Bolts shall be clean and dry at the time of insertion into the grouted holes. They shall be inserted full depth into the holes, and manipulated to ensure complete coverage by the grout. After insertion of the bolt, all excess grout shall be struck off flush with the concrete face. Should the grout fail to fill the hole after bolt insertion, enough grout shall be added to the hole to allow a flush strike-off.

b. HOLES COMPLETELY DRILLED THROUGH THE STRUCTURAL SLAB.

1. The requirements of E.3.a.1; 2; 3; 4; & 5 above shall apply.

2. The hole shall be clean and dry prior to the insertion of the bolt.

3. The bolt shall be clean and dry at the time of insertion. It shall be held in place in such a manner that it will remain vertical during subsequent grout placement. The method of bolt retention shall be such that grout will be held within the hole until setting is complete.

4. Grout shall be struck off flush with the concrete face.

4. Joints between units shall be installed in the manner indicated on the Contract Plans, or approved by the D.C.E.S.

5. Units which are damaged during installation, due to the Contractor's operations, shall be repaired, or replaced, as determined by the Engineer. Repair or replacement shall be done at no cost to the State.

METHOD OF MEASUREMENT. The work will be measured as the number of linear feet of concrete traffic barrier installed. Measurement will be taken along the centerline of the top of the barrier. No deduction will be made for joints.

BASIS OF PAYMENT.

A. The unit price bid per linear foot shall include the cost of all labor, materials and equipment necessary to complete the work. This price shall also include the cost of bar reinforcement and coring.

B. In the case of barrier constructed by cast-in-place methods, 40% of the linear footage will be paid for after all of the bar reinforcement has been placed and approved by the Engineer. This payment shall include the cost of chairs, supports, fastenings, connections and any splices not specifically indicated on the plans. If the Engineer permits the substitution of larger bars than those specified, or the D.C.E.S. permits splices not indicated on the plans, the payment will not be increased nor will any extra compensation be considered.

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