697.13 DPW4
Dr. 20-2018

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

19 FEB 2018

DEPARTMENT ORDER)
)
No. 28)
Series of 2018) Dr. 20.18

SUBJECT : DPWH Standard Specification on Item 1722 – FENCE AND RAILINGS

In order to provide Specifications for fences and railings which are specified in Department Order No. 143, Series of 2017 [*Revised Standard Pay Item List for Infrastructure Projects*] and in line with the mandate of the Department in providing effective Standard Specifications in the implementation of various infrastructure projects, the attached **DPWH Standard Specification on Item 1722 – FENCE AND RAILINGS** is hereby prescribed, for the guidance and compliance of all concerned.

This specification shall form part of the on-going revision of the DPWH Standard Specifications for Public Works Structures - Buildings, Ports and Harbors, Flood Control and Drainage Structure and Water Supply Systems, Volume III, 1995 Edition.

This Order shall take effect immediately.

MARK A. VILLAR
Secretary

14.1.2 FET/RGT

Department of Public Works and Highways
Office of the Secretary
WIN8U01576

DPWH Standard Specification for Item 1722 – FENCE AND RAILINGS

1722.1 Description

This Item shall consist of furnishing and constructing posts and fences either concrete hollow block (CHB), precast, cyclone/ welded wire, precast plant box, and railings in accordance with the details, and at the locations, shown on the Plans, or as required by the Engineer, and in accordance with this Specification.

1722.2 Material Requirements

1722.2.1 Concrete Hollow Block (CHB) Fence

CHB shall conform to the applicable requirements of Item 1046 – Masonry Works.

1722.2.2 Precast Fence

Precast fence shall conform to the applicable requirements of Item 900 – Reinforced Concrete.

If commercial precast fences are to be used, it shall be indicated in the Plans and shall be approved and certified by the Engineer.

1722.2.3 Welded Wire Fence

1722.2.3.1 Right-Of-Way Fence

Typhoon style welded wire mesh fence system shall be indicated in the Plans and certified and approved by the Engineer prior to application.

1. Wire shall be hardened elongated, gauge # 7, stretched diameter.
    a. The material breaking point of the welded mesh shall be at least 427 MPa.
    b. The tensile strength of the wire mesh shall be at least 489 MPa.
    c. The elongation factor of the wire mesh shall be 7 percent.
    d. Welding points shall be able to withstand force of at least 5.3 kN.
2. Terminal Posts:
    a. Square steel tubing shall be fabricated conforming to ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes or ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing. The square steel tubing can be substituted with schedule 40 steel pipe only if the fence manufacturer has confirmed in writing that the tubular member is compatible to installation of the mesh fence panels.
    b. Post Caps: Each post shall have a square cap to seal out moisture. Flat and form plastic to the shape of the post. Coating to match the fabric.

c. Base Plates and Miscellaneous Hardware: It shall conform to the applicable requirements of ASTM A 36 – Standard Specification for Carbon Structural Steel.

3. Bottom Rails and Bracing:

Square steel tubing shall be fabricated conforming to ASTM A 500 or ASTM A 501. The rectangular steel tubing can be substituted with schedule 40 steel pipe only if the fence manufacturer has confirmed in writing that the tubular member is compatible to installation of the mesh fence panels.

4. Fence hardware: Manufacturer fittings and all hot-dip galvanized.

   a. The fasteners connecting panels to each post shall be 3 mm diameter "U" shaped wire fastener.

   b. Hat brackets (horizontal connectors of the welded wire mesh fence) shall be 1.3 mm thick by 30 mm long pre-molded clip fastener.

   c. Gouge ties (vertical connectors of the welded wire mesh fence): 1.3 mm thick by 15 mm long pre-molded clip fastener.

5. Gate Hardware: Hinges, latches, drop rods, as needed, shall be hot dip galvanized steel and sized to assure proper gate operation.

1722.2.3.2 Concrete

Horizontal alignment and grades shall be verified as established by survey and plan dimensions and elevations. Securely set posts in alignment at proper depth and height, and rigid bracing where needed.

Concrete shall conform to the applicable requirements of Item 900 – Reinforced Concrete.

Footing hole shall be clear of roots or other organic materials. The hole shall be moistened prior to concrete pour. No water standing at bottom of hole.

Concrete shall be thoroughly mixed and vibrated.

1722.2.3.3 Shop Finishes

Hot dip galvanized posts and welded wire mesh after fabrication shall be in accordance with ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

1722.2.4 Precast Plant Box Fence

Portland cement, aggregates and water shall conform to the applicable requirements of Item 700 – Hydraulic Cement, Item 703 – Aggregates, and Item 714 – Water, respectively.

For its coloring, pigments used shall be inorganic, resistant to alkalinity and used as per Plans and of Manufacturer's, and Contractor's recommendations with the approval and certification of the Engineer. Item 709 – Paints shall also be used if its requirements are applicable.

1722.2.5 Railings

It shall be in accordance to the applicable requirements of Item 1051 – Railings.

1722.3 Construction Requirements

1722.3.1 Concrete Hollow Block (CHB) Fence

CHB shall conform to the applicable requirements of Item 1046 – Masonry Works.

1722.3.2 Precast Fence

1722.3.2.1 Installation

Precast concrete fence shall be installed as per manufacturer's recommendations with the approval of the Engineer.

Reinforcement steel, bars and wire fabric shall be thoroughly cleaned before placing and again before the concrete is placed, shall be accurately positioned and secured in place. Standard bar charts shall be provided for all beam steel off the ground.

All reinforcement shall be installed with the following clearances between reinforcing steel and face of concrete:

1. Footing, pier or beam bottom: 75 mm
2. Earth-formed pier of beam sides: 50 mm
3. Formed footing, pier or beam sides exposed: 25 mm
4. Precast exposed to weather: panels 19 mm post 32 mm

Splices within continuous unscheduled reinforcing steel shall have a minimum lap of 30 bar diameters.

Footing size shall be based on soil properties at the site.

Fresh poured concrete shall be tamped into place by steel rammer, slicing tools or mechanical vibrator until concrete is thoroughly compact and without void.

Make excavations for footing to undisturbed soil or to the depth noted on the drawings. Leave the bottom-bearing surface clean and smooth. If footing excavations are made deeper than intended, only concrete shall be used for fill. All loose material shall be removed from grade beam excavations prior to concrete pouring.

Posts and panels to be plumb shall be aligned and levelled. Plastic or non-organic shims may be used where necessary to ensure that each panel and post is square and level.

If a gate or any other structure will be mounted to a column, the column should be filled to the top. Columns should not be left unattended or without bracing until filled with concrete (with or without panels installed).

1722.3.2.2 Damaged Units

The Contractor shall replace panels and other components of work that have been damaged at his own expense.

Prior to substantial completion of fence, the Contractor shall clean the surfaces of the fence.

1722.3.2.3 Cleanup

The Contractor shall cleanup site and dispose of all debris, trash, excavated soil, etc. to the satisfaction of the Engineer.

1722.3.3 Installation of Welded Wire Fence

For concrete footings, holes shall be drilled or dig for post footings in firm, undisturbed or compacted soil. Depth and post embedment shall be indicated in the Plans or directed by the Engineer. Trowel tops of footings and slope or dome shall direct water away from posts. Slope in pedestrian paving shall not be domed.

For posts which are set in concrete footings shall be plumbed vertical. Post depth and spacing shall be indicated on the Plans and as directed by the Engineer. Space posts shall be at lesser distance between centers to compensate for terrain variation such as sharp variations in incline or decline.

Welded mesh panels shall be installed according to manufacturer's instructions and generally as follows:

1. Begin at corner/start post. Layout each piece of the welded wire mesh fence. Connect mesh panels with a minimum of 8 junction clips per panel.

2. Connect one end of tensioning device to the intermediate post that is fastened to support brace. Connect other end of tensioning device to the connected panels. Mesh panels shall be tensioned with 8.90 kN. pull in tensioning device. Leave tensioning device connected until the adjacent section is installed and tensioned. Repeat this operation until the welded mesh fence is installed from corner post to corner post.

3. Trim panels as needed for landscaped purposes.

For fence fabric, pull fabric taut and tie to posts, rails and tension wires. Fabric shall remain under tension after pulling force is released.

Gates shall be installed plumb, level, and secure for full opening without interference.

Ground-set items in concrete shall be installed as recommended by the fence manufacturer. Adjust hardware for smooth operation and lubricate. Sliding gates shall operate smoothly and easily under minimum pressure.

1722.3.4 Precast Plant Box Fence

1722.3.4.1 Handling, Storage and Delivery

1722.3.4.1.1 Handling

Precast plant box fence units shall be handled and transported in a manner to minimize damage. Lifting devices or holes shall be consistent with industry standards. Lifting shall be accomplished with methods or devices intended for this purpose as indicated on shop drawings. Upon request, the precast concrete producer/ supplier shall provide documentation on acceptable handling methods for the product.

1722.3.4.1.2 Storage

Precast Plant Box Fence units shall be stored in a manner that will minimize potential damage.

1722.3.4.1.3 Delivery

Precast plant box fence units shall be delivered to the site in accordance with the delivery schedule to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite all precast concrete units shall be inspected by the Engineer for quality and final acceptance.

1722.3.4.1.4 Final Acceptance

Upon final acceptance, the Engineer shall acknowledge and understand the appropriate methods for handling the accepted precast plant box fence unit(s). Upon acceptance by the Engineer, the precast plant box fence manufacturer shall not be responsible for replacing damaged product resulting from improper handling practices on the job site. The damaged precast plant box fence unit shall be replaced by the Contractor at his own expense.

1722.3.4.2 Installation of Precast Plant Box Fence

1722.3.4.2.1 Site Access

The general contractor shall be responsible for providing adequate access to the site to facilitate hauling, storage and proper handling of the precast plant box fence units.

1722.3.4.2.2 Installation

Precast plant box fence units shall be installed to the lines and grades shown in the Plans.

Precast plant box fence units shall be lifted by suitable lifting devices at points provided by the precast plant box fence producer/ supplier.

Precast plant box fence units shall be installed in accordance with applicable industry standards or as directed by the Engineer. Upon request, the producer/ supplier of precast plant box fence shall provide installation instructions.

Field modifications to the product shall relieve the precast producer/ supplier of liability regardless if such modifications result in the failure of the precast plant box fence unit.

1722.3.4.2.3 Watertightness

Where watertightness is a necessary performance characteristic of the precast plant box fence unit's end use, watertight joints, pipe-entry connectors and inserts should be used to ensure the integrity of the entire system.

1722.3.5 Railings

Railings shall conform to the applicable requirements of Item 1051 – Railings.

1722.4 Method of Measurement

The quantity to be paid for shall be the number of linear meters measured center to center of posts of fencing erected in place and accepted.

1722.5 Basis of Payment

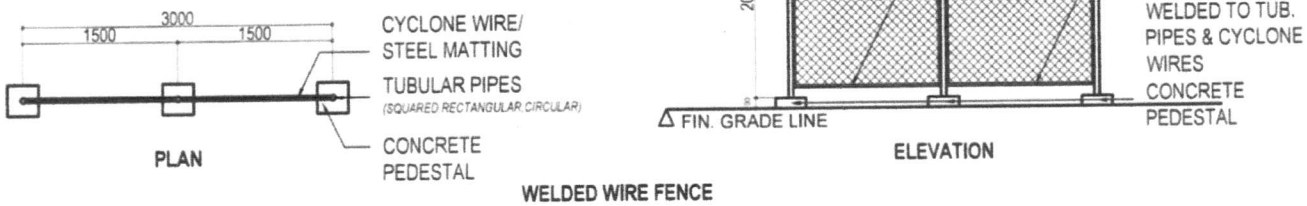
The quantity, as determined in Section 1722.4, Method of Measurement, shall be paid for at the contract price per unit of measurement respectively for each of the particular items listed below and as shown in the Bid Schedule, which price and payment shall be full compensation for furnishing and placing all materials and for all labor, equipment, tools and incidentals necessary to complete the Item.

Payment shall be made under:

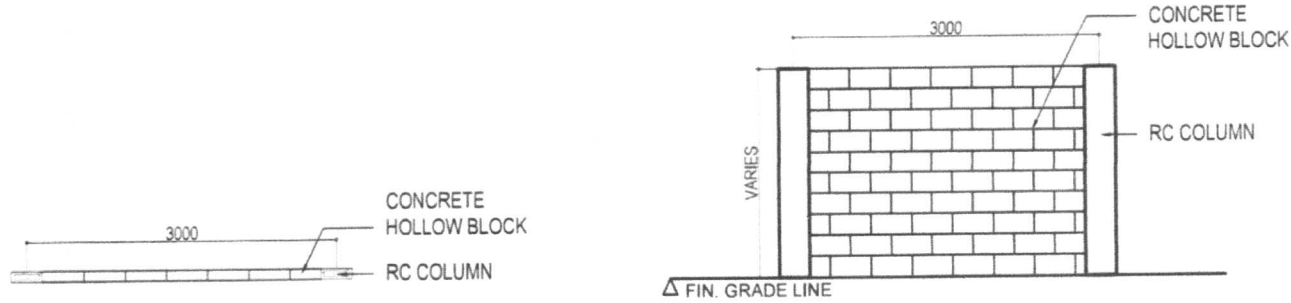
Pay Item No.	Description	Unit of Measurement
1722 (1) a	Fence (CHB)	Square Meter
1722 (1) b	Fence (Precast)	Square Meter
1722 (1) c	Fence (Welded Wire)	Square Meter
1722 (2)	Fence (Precast Plant Box)	Linear Meter
1722 (3)	Railings	Linear Meter

References:

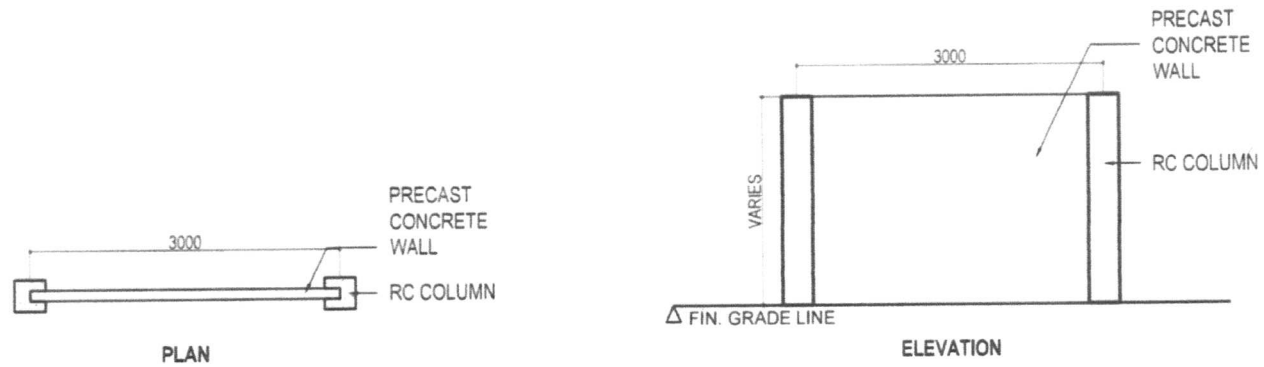
1. DPWH Standard Specifications for Public Works Structures, Volume III (Buildings, Ports and Harbors, Flood Control and Drainage Structure and Water Supply Systems)
   a. Item 1046 – Masonry Works
   b. Item 900 – Reinforced Concrete
   c. Item 1051 – Railings
2. DPWH Standard Specifications for Highways, Bridges, and Airports, Volume II, 2012 Edition
   a. Item 700 – Hydraulic Cement
   b. Item 703 – Aggregates
   c. Item 714 – Water
   d. Item 709 – Paints
3. Site Furnishings Precast Concrete Planters Unformatted Specifications
4. Specification for Construction & Installation for Woodcrete® Rail Precast Concrete Fence
5. Specifications for Precast Wall System
6. Welded Wire Mesh Fence
7. ASTM F2453 – Welded wire-mesh Fence Fabric 23



WELDED WIRE FENCE



CONCRETE HOLLOW BLOCK FENCE



PRECAST CONCRETE FENCE

PRECAST PLANT BOX FENCE