Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
Bonifacio Drive, Port Area Manila

BAGONG PILIPINAS

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DEPARTMENT ORDER)
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NO. 104)
Series of 2025)

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SUBJECT: DPWH Standard Specification for Item 1737 – Geotextile Concrete-Filled Mattress

To support the Department's commitment in updating its standard specifications and adopting effective/appropriate solutions for specific project needs, the attached DPWH Standard Specification for **Item 1737 – Geotextile Concrete-Filled Mattress** is hereby prescribed for adoption in DPWH infrastructure projects.

This standard specification shall form part of the DPWH Standard Specifications for Public Works Structures, Volume III. Likewise, the new pay item subscripts are now included in the Standard Pay Item List and Project and Contract Management Application (PCMA).

This Order shall take effect immediately.

MANUEL M. BONOAN
Secretary

Department of Public Works and Highways
Office of the Secretary
WIN5U02160

Encl.: DPWH Standard Specification for Item 1737 – Geotextile Concrete-Filled Mattress

14.1 JDV/AGC

DPWH Standard Specification for
ITEM 1737 – GEOTEXTILE CONCRETE-FILLED MATTRESS

1737.1 Description

This item shall consist of the furnishing and installation of Geotextile Concrete-filled Mattresses for bank protection, canal construction, irrigation works, coastal and river protection, waterway enhancement, and erosion control. The installation shall be carried out in accordance with this Specification and shall adhere to the lines, grades, levels, and dimensions as shown on the Plans.

A Geotextile Concrete-filled Mattress shall be defined as a geotextile formwork used for concrete placement. The mattress consists of two (2) layers of synthetic fabric interconnected by spacing binders or interwoven areas. The thickness of the mattress shall be controlled by adjusting the length of the spacing elements or the pattern of the interwoven areas.

1737.2 Material Requirements

1737.2.1 Geotextile Form

The geotextile fabric shall have sufficient strength to withstand the pressure exerted by the grout during the filling and shall meet the requirements specified in Table 1737.1.

The geotextile fabric shall have a minimum mill width of 3.8 m. Each mill-width roll shall be cut to the required length and separately connected by sewing to form multiple mill-width panels. Panels shall be pre-manufactured and joined using zippers or on-site sewing to create customized-sized panels.

Fill spouts or nozzles shall be sewn into the top of the geotextile form for grout injection. Ports shall have a diameter of 100 to 200 mm and a length of 0.9 to 1.5 m, spaced appropriately along the top of the geotextile form for access. Fill ports shall be fabricated from the same geotextile material as the main tube.

Table 1737.1 Minimum Property Requirements for Geotextile Form

Property	Test Method	Requirement
Composition		Nylon or polyester
Mass per unit area (double layer), g/m^2	ASTM D5261	403
Thickness, mm	ASTM D5199	0.600
Wide-width tensile strength, kN/m (Machine direction) (Cross direction)	ASTM D4595	 24.5 19.3

Property	Test Method	Requirement
Elongation at break, % (Machine direction) (Cross direction)	ASTM D4595	 20 30
Trapezoidal Tear Strength, N (Machine direction) (Cross direction)	ASTM D4533	 665 445
Apparent Opening Size, mm	ASTM D4751	0.425
Flow Rate, l/min/m^2	ASTM D4491	3665

Note: ASTM D5261 – Standard Test Method for Measuring Mass per Unit Area of Geotextiles
ASTM D5199 – Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
ASTM D4595 – Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method
ASTM D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D4751 – Standard Test Methods for Determining Apparent Opening Size of a Geotextile
ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity

Seams sewn in the factory shall have a minimum seam strength of 15.8 kN/m, when tested in accordance with ASTM D4884, Standard Test Method for Strength of Sewn or Bonded Seams of Geotextiles. All sewn seams and zipper attachments shall be constructed using a double line of chain stitch, performed using industrial-grade sewing machines capable of producing parallel, simultaneously stitched seams. The lines of stitching shall be spaced between 6 mm and 19 mm apart, with each row of stitching consisting of four (4) to seven (7) stitches per 25 mm. Thread used for seaming shall be nylon or polyester, or a combination of both.

1737.2.2 Grout

The grout shall be a pumpable slurry composed of Portland cement, aggregate, water, admixtures, and fly ash (optional). The grout shall have an air content between 5% and 8% of its total volume when tested in accordance with ASTM C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method, and shall achieve a minimum 28-day compressive strength of 13.75 MPa when tested in accordance with ASTM C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens. The cured flowable concrete shall have a dry unit weight of at least 2,080 kg/m^3 when tested in accordance with ASTM C138, Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.

The grout shall be tested for flowability using ASTM C939, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method), with an efflux time between 9 and 12 seconds.

1737.2.3 Drainage Lining

A layer of geotextile filter fabric shall be placed behind the mattress lining, as required in the Plans. It shall conform to the applicable requirements of Item 1404, Filter Fabric and Aggregates.

1737.3 Construction Requirements

1737.3.1 Handling and Storage of Geotextile Forms

The geotextile forms shall be kept dry and properly wrapped to protect them from the elements during shipping and storage. If stored outdoors, the geotextile forms shall be elevated and covered with a waterproof, UV-resistant material. Geotextile forms shall be labeled in accordance with ASTM D4873, Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples.

1737.3.2 Equipment

The Contractor shall obtain the Engineer's approval for all mixing and pumping equipment to be used in preparing and handling the concrete grout. The mixing equipment shall have sufficient capacity to permit continuous placement without interruption. Prior to use, the Contractor shall remove all oil, rust inhibitors, and other contaminants from the mixing drums, stirring mechanisms, and any other component that shall come into contact with the grout. The pumping equipment shall have a variable flow rate and shall provide adequate pressure to pump the grout without causing leakage from the geotextile form.

1737.3.3 Site Preparation

Areas on which geotextile forms are to be placed shall be constructed in accordance with the lines, grades, contours, and dimensions as shown on the Plans. The areas shall be graded and uniformly compacted to a smooth plane surface, free from ponding. Side slopes shall be graded to eliminate any humps or pockets. For slopes with an inclination of 30 degrees or steeper, an analysis shall be conducted to assess mattress anchoring requirements and potential bursting. Tearing of fabric should also be checked for steep slopes.

The areas shall be free of organic material and obstructions such as roots, and projecting stones and grade stakes shall be removed. Where areas are below the allowable grades, they shall be brought to grade by placing compacted layers of select material. The thickness of layers shall be as specified in the Plans, and the degree of compaction shall be in accordance with Item 804, Embankment.

Excavation and preparation of aprons as well as anchor, terminal, or toe trenches shall be done in accordance with Item 802, Excavation.

1737.3.4 Placement of Geotextile Filter Fabric

The geotextile filter fabric shall be placed directly on the prepared area, maintaining intimate contact with the subgrade and free of folds or wrinkles. The upstream roll of filter fabric shall overlap the downstream roll by at least 1.5 m. The transverse joints shall have a minimum

overlap of 500 mm. The geotextile shall extend at least 300 mm beyond the top and bottom concrete lining termination points, or as specified by the Engineer.

1737.3.5 Installation of Geotextile Form

Geotextile forms shall be placed on the filter fabric layer and arranged in accordance with the Plans prior to field seaming. Allowance shall be made for possible contraction of up to 10% after grout filling; thus, sufficient excess geotextile form shall be provided. The anticipated amount of contraction shall be confirmed with the manufacturer and Engineer, considering site-specific conditions.

Geotextile forms shall be positioned to ensure that grout placement follows the direction indicated in the Plans. The preferred direction of placement shall be from upstream to downstream. If construction must start downstream and move upstream, a temporary toe trench shall be constructed at the front edge of the mat system to prevent flow-induced undermining during construction. Prior to filling, adjacent double layers of fabric shall be securely connected by field seaming, either by sewing or zipping. Field seaming shall be permitted only to join factory-assembled geotextile forms together using two lines of single-thread chain stitch.

All factory-sewn seams shall face downward upon completion of the Installation. Zipper seams shall be permitted unless otherwise noted in the contract documents. The finished strength of the field seams shall comply with the manufacturer's recommendations.

Care shall be taken during installation to prevent damage to the geotextile or subgrade.

1737.3.6 Proportioning and Mixing of Grout

The quantity of water shall be sufficient to produce a grout of pumpable consistency. Grout shall be mixed for a minimum of one (1) minute. When continuously agitated, the grout may be held in the mixer or agitator for a maximum of 2.5 hours at ambient temperatures below 21 °C, and up to two (2) hours at higher temperatures. In case of a lapse in pumping operations, the grout shall be recirculated through the pump or through the mixer drum or agitator and pumped to maintain its workability.

1737.3.7 Filling of Geotextile Form

Concrete grout shall be pumped in a manner that avoids excessive pressure on the fabric forms and prevents the formation of cold joints. Once the grout has set, all anchor, terminal, and toe trenches shall be backfilled and compacted in accordance with the Engineer's instructions.

Foot traffic on freshly filled geotextile forms shall be restricted for at least one (1) hour after filling. Where Geotextile Concrete-filled Mattresses are designed to bear on previously installed units, a minimum curing period of four (4) hours shall be observed before installing the vertically adjacent layer. However, abutting Geotextile Concrete-filled Mattresses may be installed immediately following the placement of the preceding units.

To clean or remove surface spills, freshly pumped geotextile concrete-filled mattresses shall not be washed or sprayed with pressurized water. The cement film that bleeds through the upper geotextile layer shall be retained and cured on all surfaces exposed to sunlight. If this film is removed or damaged, it shall be restored by applying a thin layer of water-cement paste to the affected area.

After placement of the geotextile forms, small slits shall be cut in the top layer of the geotextile—only to the minimum length necessary to allow proper insertion of the filling pipe connected to the concrete grout pump hose. Concrete grout shall be pumped between the top and bottom layers of the geotextile, filling the forms to the specified thickness and configuration.

Upon removal of the filling pipe, openings shall be temporarily closed by inserting a piece of nonwoven geotextile or other suitable material. The temporary covering shall be removed once the concrete grout has sufficiently set and is no longer fluid. The exposed grout surface at the opening shall then be cleaned and smoothed by hand to ensure a uniform finish.

1737.4 Method of Measurement

The quantity to be paid for shall be the measured in-placed and accepted Geotextile Concrete-filled Mattress in square meter (m^2) as shown on the Plans.

1737.5 Basis of Payment

The accepted quantities, measured as prescribed in Section 1737.4, Method of Measurement shall be paid for at the Contract Unit Price for Geotextile Concrete-filled Mattress which price and payment shall be full compensation for furnishing and placing all materials, including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1737 (1)a	Geotextile Concrete-Filled Mattress, 100mm thk.	Square Meter
1737 (1)b	Geotextile Concrete-Filled Mattress, 200mm thk.	Square Meter
1737 (1)c	Geotextile Concrete-Filled Mattress, 300mm thk.	Square Meter
1737 (1)d	Geotextile Concrete-Filled Mattress, 400mm thk.	Square Meter
1737 (1)e	Geotextile Concrete-Filled Mattress, 500mm thk.	Square Meter