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

BAGONG PILIPINAS

097.13 DPWH
02.11.2025

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DEPARTMENT ORDER)
)
NO. 33)
Series of 2025)

dN 2/11/2025

SUBJECT: DPWH Standard Specification for Item 420 – Precast Concrete Arch Panel

To support the Department's commitment to updating its standard specifications and adopting effective/appropriate solutions for specific project needs, the attached revised Standard Specification for **Item 420 – Precast Concrete Arch Panel** is hereby prescribed for adoption in DPWH infrastructure projects.

This revised standard specification shall form part of the DPWH Standard Specifications for Highways, Bridges and Airports, Volume II. Likewise, the additional pay item subscript is 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

Encl: DPWH Standard Specification for Item 420 – Precast Concrete Arch Panel

Department of Public Works and Highways
Office of the Secretary
WIN5U02112

DPWH Standard Specification for
Item 420 – Precast Concrete Arch Panel

420.1 Description

This Item shall consist of fabrication and installation of precast reinforced concrete arch panels in accordance with this Specification and in conformity with the lines, grades, design and dimensions shown on the Plans.

420.2 Material Requirements

420.2.1 Concrete

Concrete materials shall conform to the requirements of Item 405, Structural Concrete. Precast concrete arch panels shall be of Class P with a minimum compressive strength of 41.4 MPa and shall conform with Subsection 405.4.1, Proportioning and Strength of Structural Concrete.

420.2.2 Reinforcing Bars

Reinforcing steel shall conform to the requirements of Item 404, Reinforcing Steel.

420.2.3 Adjustment Seat for Arch Panel

Bolts and steel plates shall be of grades and dimensions shown on the Plans. Bolts shall be 25 mm diameter high strength bolt and shall conform to ASTM F3125M, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.

420.2.4 Waterproofing

Waterproofing shall consist of adhesive primer, waterproofing membrane and tack coat. Waterproofing membrane shall be in bituminous sheet system.

The characteristics of waterproofing membrane shall satisfy the requirement of Table 420.1.

Table 420.1 Properties of Waterproofing Membrane

Property	Requirement	Test Method
Tensile Strength (Longitudinal)	700 N / 50 mm (±20%)	ASTM D5147M
Tensile Strength (Transversal)	600 N / 50 mm (±20%)	
Tear Strength	160 N ± (30%)	
Tear Strength (Longitudinal)	550 N	
Tear Strength (Transversal)	375 N	
Elongation	45% (±15%)	

Property	Requirement	Test Method
Lap Joint Strength (Longitudinal)	750 N / 50 mm	ASTM D5147M
Lap Joint Strength (Transversal)	550 N / 50 mm	
Water Vapor Permeance	0.20 g / 24 hours – m^2	ASTM E96M

Notes: ASTM D5147M - Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material
ASTM E96M - Standard Test Methods for Water Vapor Transmission of Materials

420.3. Construction Requirements

420.3.1 Precasting of Concrete Arch Panels

The precasting of concrete arch panels shall be done at a location selected by the Contractor, subject to the approval of the Engineer.

The Contractor shall prepare drawings and material data for the formwork and shall be submitted to the Engineer for approval unless otherwise directed.

Concrete forms shall be mortar-tight, true to the dimensions and lines of the panels and with sufficient strength, rigidity, shape and surface smoothness as to leave the finished works true to the dimensions shown on the drawings or required by the Engineer and with surface finish as specified. All exposed surfaces of the concrete arch panels shall be formed with the same forming materials to produce similar concrete surface textures, color and appearances.

The inside surface of forms shall be cleaned of all dirt, mortar and foreign material. Forms which later be removed shall be thoroughly coated with form oil prior to use. The form oil shall be of quality form oil or other approved coating which will permit the ready release of forms.

Concrete shall not be deposited in the forms until all works in connection with the construction of forms has been completed, all required materials are incorporated in the unit to be poured and the Engineer shall inspect and approve said forms and materials.

Placing of concrete shall conform to the requirements of Item 407, Concrete Structures.

Concrete surfaces shall be given Class 1, Ordinary Finish as prescribed in Subsection 407.3.7 Concrete Surface Finishing.

Precast concrete arch panels shall be cured either by water method or by steam curing in accordance with Subsection 407.3.8 - 6, Curing Precast Concrete (except piles).

420.3.2 Handling

Extreme care shall be exercised in handling, moving and storing precast concrete arch panel members. Lifting shall be done using lifting hooks in such a manner and location approved or as directed by the Engineer.

Precast concrete arch panels shall not be shipped or transported unless test on concrete cylinders has attained a compressive strength equal to the specified design compressive strength of the concrete panel at a minimum age of 14 days.

420.3.3 Installation

The Contractor shall prepare and submit for approval of the Engineer, the procedure or method including the necessary equipment to be used in installing the precast concrete arch panels in conformity with lines, grade and dimensions shown on the drawings. The approval of the methodology however, shall not relieve the Contractor of any defective works.

If as determined by the Engineer, that such procedure or method produces unsatisfactory results, the Engineer at his discretion may discontinue the implementation and may require the Contractor to re-submit or make some modifications on the procedure. The Contractor shall at his expense remove and replace or rectify the defective work as may be required by the Engineer.

420.3.4. Waterproofing for Arch Culvert

The Contractor shall submit shop drawings of the waterproofing course, slab drain and spring mesh to the Engineer for his review and approval. All shop drawings shall show fully detailed dimensions and materials. No materials shall be ordered nor constructed until such drawings are approved by the Engineer in writing.

The waterproofing shall be done in accordance with the shop drawings provided by the Contractor as approved by the Engineer. It shall also comply with the following requirements:

a. The bituminous sheet membrane must be bonded using a low volatile organic compound (VOC) cold applied primer.
b. Only one brand of waterproofing material shall be used for an entire project. Mixing of different brands of waterproofing material shall not be allowed.
c. Application of primer shall be by brush, spray, or roller.
d. The bituminous sheet membrane must be installed by the recommended applicator of the supplier and must have 10-year experience for torch-on membranes.

420.4. Method of Measurement

The quantity to be measured for payment shall be the total length of precast concrete arch panels installed in place, completed and accepted. It shall include the concrete, reinforcement, grout bedding, sealing, waterproofing, formworks, shuttering and other such material contained within or attached to the member.

420.5. Basis of Payment

The accepted quantities, measured as prescribed in Section 420.4, Method of Measurement shall be paid for at the Contract Unit Price of the Precast Concrete Arch Panel as shown in the Bill of Quantities, in which price and payment shall be full compensation for furnishing, installing and all labor, equipment, tools and incidentals necessary to complete the Item.

Payment shall be made under:

Pay Item Number	**Description**	**Unit of Measurement**
420 (1)	Precast Concrete Arch Panel	Linear Meter
420 (2)	**Precast Concrete Arch Panel**	**Each**