Annex-2

PRECAST CONCRETE BOUNDARY WALLS

Working Draft 1

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INTERN-BIS

1. Scope

1.1 This standard covers the design considerations, construction, specifications and methods of test for precast concrete circular manhole components.

1.2 This standard specifies precast products in reinforced or pre-stressed concrete with or without fibres, to be used together or in combination with other elements to erect walls e.g., boundary walls.

2. References

The standards listed in Annex A contain provisions which through reference in this text constitute provisions of this standard.

3. Terms and Definitions

3.1 Types of Fences

3.1.1 Solid Fences
Fences made of post and solid panels.

3.1.2 Open work fence
Fence made of posts and open-work panels possibly including solid panels

3.1.3 Mesh fence
Fence made of posts and woven or welded wire mesh, and/or wires.

3.1.4 Mixed fence
Fence made of posts and a combination of different elements with at least one base panel or fence made of load bearing base enclosure walls acting as a base panel and a combination of different (welded) wire meshes.

3.1.5 Rail fence
Fence made of posts and rails.

3.1.6 Anti-intruder fence
Mesh fence, solid fence or mixed fence with an enhanced level of security provided by the addition of barbed wire, barbed tape or similar attached to posts with cranked or vertical extensions.

Note: Explained in detail in Annex B

3.2 Post
Vertical element of reinforced or pre-stressed concrete, intended to be buried or fastened at its base.
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3.2.1 Intermediate post
post used in the fence line, interposed between ends, direction changes and straining points (if any)

3.2.2 Accessory post
post shaped and designed to provide a particular function

3.2.2.1 corner post
post used at a change of direction

3.2.2.2 End post
post used at the extremity of a fence line

3.2.2.3 Straining Post
post from which tension wires are stretched, with or without struts (e.g. end-straining post, corner post, intermediate straining post)

3.2.2.4 Gate post
post used to support a gate

3.3 Panel
Panel horizontal element of reinforced or pre-stressed concrete, connected to the post

3.3.1 Solid panel
Panel of reinforced concrete

3.4 Surface finish
Finishes are classified as one of two categories corresponding to the different manufacturing techniques detailed below.
3.4.1
Surface finish cast
surface finish obtained at demolding, if necessary, after surfacing or finishing
3.4.2
Surface finish treated
surface finish obtained after complementary treatment on the concrete in fresh state or in hardened state

4. Materials

4.1 Cement
Cement complying with any of the following Indian Standards may be used:

a) Ordinary Portland cement conforming to IS 269:1976, IS 12269:1987
b) Portland slag cement conforming to IS 455:1976,
c) Portland pozzolana cement conforming to IS 1489:1976 (Part 1),
d) Portland pozzolana cement, calcined clay based conforming to IS 1489:1976 (Part 2),
e) Rapid hardening Portland cement conforming to IS 8041:1978

NOTE
1 The manufacturer shall give a certificate indicating the type and quantity of cement used in the concrete mix.
2 Site blending with fly ash up to a maximum of 30 percent may be carried out provided its uniform blending with ordinary Portland cement is ensured

4.2 Aggregates
The aggregate used shall consist of a graded mixture of clean coarse and fine aggregates. The nominal maximum size of coarse aggregate shall not exceed 20 mm conforming to IS 383.

4.3 Pulverized Fuel Ash
Pulverized fuel ash, if used shall conform to IS 3812 (Part 1).

4.4 Ground Granulated Blast Furnace Slag
Ground granulated blast furnace slag, if used shall conform to IS 16714.

4.5 Additives or Chemical Admixtures
Additives or chemical admixtures may be added in the preparation the concrete mix.
Chemical admixture used shall conform to IS 9103.

4.6 Steel reinforcement:
Steel for reinforcement of concrete complying with IS 432may be used:

For the pillar cross-section (pole) 150x150mm, the steel reinforced is with longitudinal 4 Nos. 12 mm/8mm Dia Tor Bars with 4mm Dia stir-ups with spacing 150mm centre to centre. For thicker pillars, reinforcement should be proportionately increased.

For Panels (1500mm x 300mm), they are steel reinforced with longitudinal 3 Nos. 8mm. diameter Tor Steel Rods & transverse 10 Nos. 6 mm plain Steel rods. For lager panels, reinforcement should be proportionately increased.

4.7 Water
The water used in production shall conform to the requirements specified in IS 456.

5. Technical specifications

5.1 Pole
a) Pole Shall be of Base area 150mm*150 and having
Length = 1800mm/2400mm as per customer Specifications.
b) There shall be 7 - 4mm diameter Dowel bars of high tensile carbonized steel per Pole.

5.2 Slab Panels
a) The pole shall be of dimensions
Length=2100mm / 1500mm as per customer needs.
Height=300mm
Thickness=50mm
b) There shall be 4-4mm diameter dowel bars of high tensile carbonised steel per panel.

Note:
1) The post may be fixed to the ground by digging a hole of 500 X 500 X 600 mm and filled with 1 : 3 : 6 concrete after the post has been aligned in these holes. The post will be erected @ 1.615m. centre to centre
2) Since Boundary wall units are available at Different shapes and sizes, if having necessary structural requirements can be allowed for construction

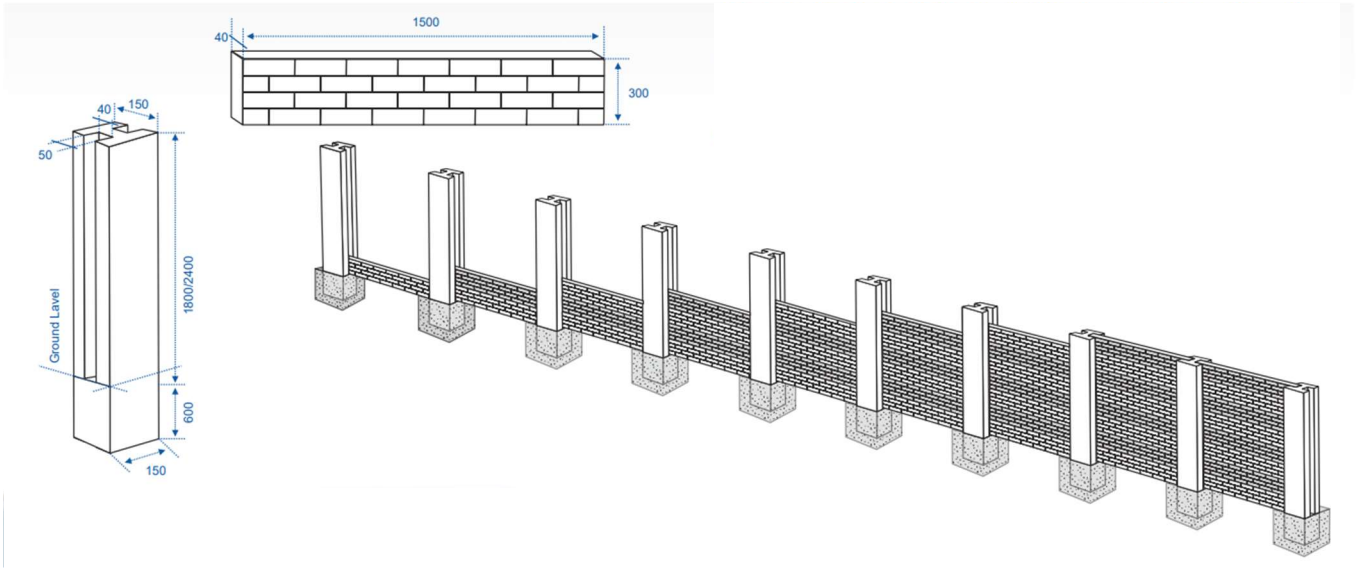
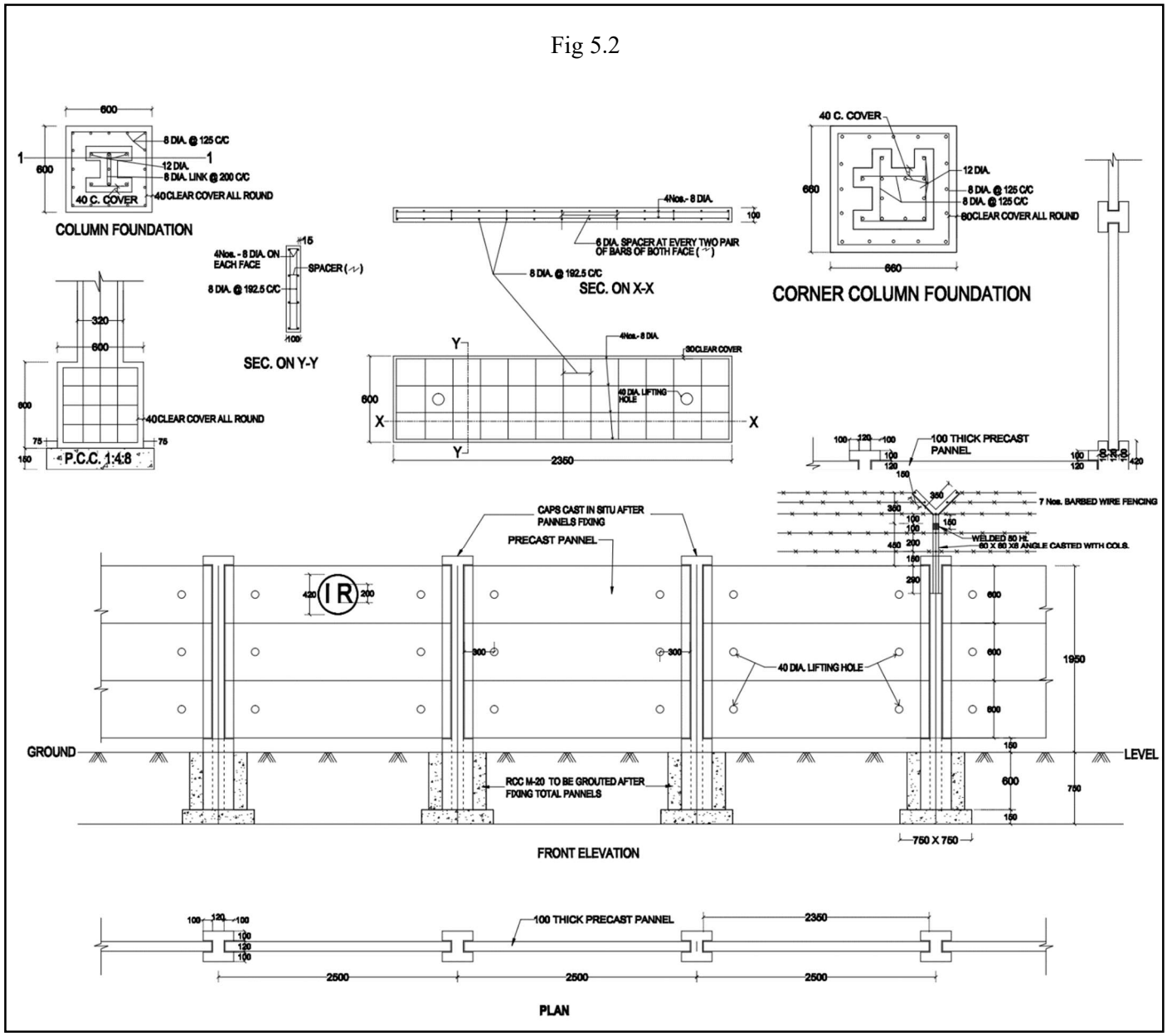

1500
40
300
40
150
50
1800/2400
Ground Lavel
600
150

Fig 5.1

Fig 5.2


600
8 DIA. @ 125 C/C
12 DIA.
8 DIA. LINK @ 200 C/C
40 C. COVER
40CLEAR COVER ALL ROUND
COLUMN FOUNDATION
4Nos. - 8 DIA. ON EACH FACE
SPACER
8 DIA. @ 192.5 C/C
SEC. ON Y-Y
320
600
40CLEAR COVER ALL ROUND
P.C.C. 1:4:8
4Nos.- 8 DIA.
6 DIA. SPACER AT EVERY TWO PAIR OF BARS OF BOTH FACE
8 DIA. @ 192.5 C/C
SEC. ON X-X
30CLEAR COVER
40 DIA. LIFTING HOLE
2350
40 C. COVER
660
12 DIA.
8 DIA. @ 125 C/C
8 DIA. @ 125 C/C
80CLEAR COVER ALL ROUND
CORNER COLUMN FOUNDATION
100 THICK PRECAST PANNEL
S-S
7 Nos. BARBED WIRE FENCING
WELDED 80 HL 60 X 60 X6 ANGLE CASTED WITH COLS.
CAPS CAST IN SITU AFTER PANNELS FIXING
PRECAST PANNEL
40 DIA. LIFTING HOLE
1950
GROUND
LEVEL
RCC M-20 TO BE GROUTED AFTER FIXING TOTAL PANNELS
750 X 750
FRONT ELEVATION
100 THICK PRECAST PANNEL
2350
2500
2500
2500
PLAN

6. Manufacture

The mix proportion of the materials shall be selected accordingly so as to ensure the workability of the fresh concrete and when the concrete mix is hardened it shall have the required strength, durability and surface finish (IS 456). The method of manufacture should be such that the forms and dimensions of the finished product are accurate within the limits specified in this standard. The surfaces and edges should be well defined and true, and their ends should be square with the longitudinal axis. Concrete should be weight in weigh batcher and mixed in mechanical mixer. Mixing should be continued until there is a uniform distribution of the materials and the mass is uniform in color and consistency, but in no case should the mixing be done for less than 2 min for a batch. The Concrete mix then obtained shall then be emptied in to the respective molds. After 12-24 hr it is then demolded and then kept in ordinary sunlight for 48Hrs and then subjected to curing for 14-28days so as to obtain its optimal properties.

7. Tolerance

Sl No.	Item	Tolerance
1	Length, Width	+/- 5mm
2	Thickness	+/- 5 mm
3	Squareness	+/- 5mm
4	Flatness of panel	+/- 5 mm
5	Cross sectional dimension	+/- 5 mm

Table 7.1 Dimensional Tolerances - Physical Requirements

8. Physical Requirements

8.1 Dimensions

The dimensions of the boundary wall components should be in accordance with Section 5, Fig 5.1& 5.2 Subjected to the Tolerance given in table 7.1.

8.2 Compressive Strength

8.2.1 Concrete

The concrete used in manufacture of Precast Concrete Manhole units shall not be less than M25 Grade when tested in accordance with IS 516:2021 (Part 1/Sec 1) / ASTM C469

8.2.2 For Pillars

Impact Strength: When tested in accordance with the method of test the test specimen shall show no visible permanent cracking.

Static Load Test: When tested in accordance with the method of test the load required to produce the first visible crack. (IS 2911:part IV)

8.3. Workmanship

Boundary wall components shall be free from cracks, dents and shall be demoulded with utmost care so as to reduce damage.

9. Sampling and Criteria for Conformity

9.1 Lot

The precast concrete boundary wall component of same size and belonging to the same mix of concrete produced in one day shall be grouped together to constitute a lot.

9.1.1 These precast boundary wall components shall be selected at random. In order to ensure the randomness of selection, procedures given in IS 4905/ISO 24153 may be followed. Any precast manhole component failing to meet one or more of the requirements shall be considered as defective. The lot which has been found as conforming to the dimensional requirement shall then be subjected to strength requirement test. The lot shall be considered as conforming to these requirements if no defect is found.

Annex A- Relevant Codes from IS and Rest of the world

IS 456:2000 Plain and Reinforced Concrete
IS 269:2015 Ordinary Portland Cement 33 grade
IS 12269:2013 Ordinary Portland Cement 53 grade
IS 455:2015 Portland Slag Cement
IS1489:2015 Portland Pozzolana cement
IS 8041:1990 Rapid Hardening Portland cement
IS 1343:1980 Code for practice of Prestressed concrete
IS 11447:1985 Code of practice for construction with large panel prefabricates
IS 516 part 1:sec 1-2021 Compressive, Flexural and Split Tensile Strength
ASTM C1776 Precast modular retaining wall
ASTM C478 – Precast circular manhole
BS EN 12839:2012 Precast concrete products
BS EN 13369:2018 Common rules for precast concrete products
ISO 22965:1:2017 Concrete for structures cast in situ
IS 4905/ISO 24153 Random sampling procedures

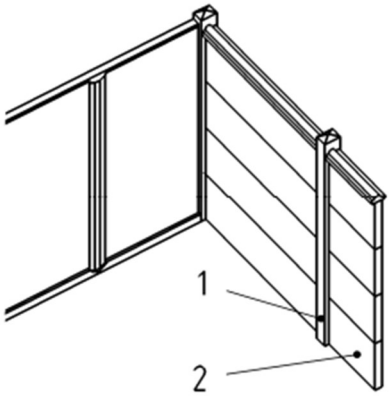
Annex B

3.1.1 Solid Fence

Solid fences are made of posts and solid panels or cladding for the purpose of providing a screen with a height of at least 900 mm.

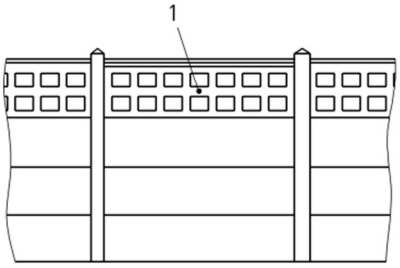
Key

1. Post
2. Solid Panel



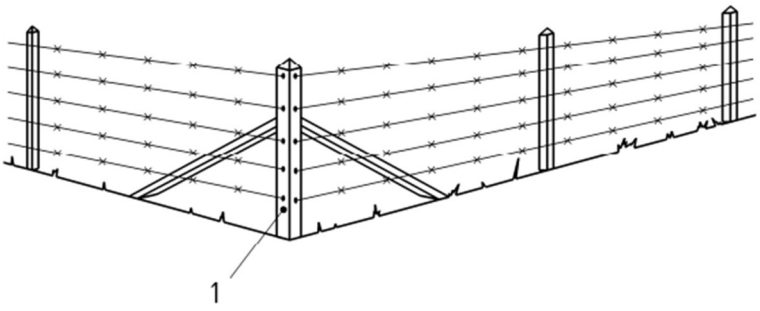
3.1.2 Open Work Fence

Open-work fences are made of posts and open-work panels in association or not with solid panels.



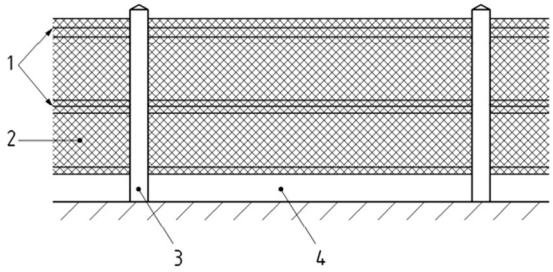
3.1.3 Wire Fence

Mesh or wire fences are made of posts and mesh or wires. The number of wires may vary.



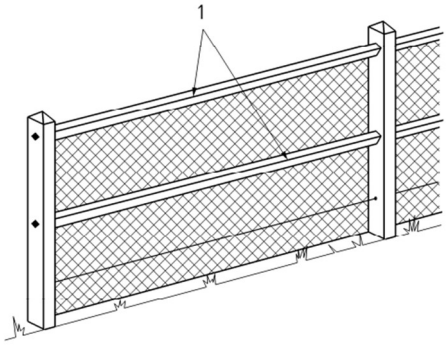
3.1.4 Mixed Fence

Mixed fences are made of posts, base panels and rails or wires or mesh.



3.1.5 Rail Fence

Rail fences are made of posts and rails, with or without infill.



3.1.6 Anti Intruder Fence

Anti-intruder fences are made of solid slab fences, mixed fences or mesh fences.