

BRIEF NOTE ON DESIGN & CONSTRUCTION OF HAZARD RESISTANT TOILETS

According to Census 2011, India's urban population is 377 million or 31% of the total world population. This number is expected to increase to 600 million by 2031. The Census 2011 also showed that in 4,041 statutory towns, close to eight million households do not have access to toilets and defecate in the open (7.90 million). Weak sanitation has significant health costs and untreated sewage from cities is the single biggest source of water resource pollution in India. This indicates both the scale of the challenge ahead of the Indian cities and the huge costs incurred from not addressing them.¹ With the emerging drive to improve the accessibility to safe and proper sanitation, Swachh Bharat Mission (SBM) aims to make the country open defecation free through development of physical sanitation infrastructure at household, community and public toilets both rural and urban settlements while also focusing on bringing increased public awareness on hygiene practices and public health through behaviour change strategy and IEC.

Whilst the programme has gained much momentum, a need has also been felt to improve the sustainability of the built infrastructure through incorporation of disaster risk reduction features in the existing design. Anecdotal records from the recent floods in Bihar have highlighted this need as many household level toilets constructed under the programme have been reported dysfunctional or destroyed due to the impact of floods.

GAPS IN EXISTING TOILET DESIGNS

In 2016, RedR India with the support of Unicef conducted a study of the existing toilet designs in Dhemaji, Assam to understand the sanitation situation and sustainability of the Public Health Engineering Department (PHED) designed toilets with respect to flood hazard. The PHED has designed a twin-leach-pit toilet and to its addition has integrated a subsidy of 12000 INR to the households if they construct it as per the standard design and specifications. Assam being highly prone to multiple hazards, is extremely vulnerable to floods which barricades the access to sanitation for half a year and exposes people to public health risks. The study revealed that the existing standard design did not adequate disaster risk reduction measures and therefore are vulnerable to hazards like floods or any seismic shocks.



Corrugated galvanised iron (CGI) sheet were thinner and could be torn during high speed winds.

Poor anchorage of CGI Sheet to purlin wall making the roof vulnerable to high speed winds.

The door frame was poorly anchored thereby can be damaged or can be blown away by high speed winds leading to early breakage or disuse.

Water tanks were leaking because of improper plastering. Also its position is highly vulnerable to flood

The height of Plinth considering the flood level was low making it vulnerable to flooding, leading to unused toilets during monsoon and floods.

The distance, height and measurement of dry pits were inconsistent and non durable. The pits will lose its functionality during floods possibly leading to ground water contamination.

¹ http://www.swachhbharaturban.in:8080/sbm/content/writereaddata/SBM_Guideline.pdf

Based on this study, RedR India developed a design for hazard Resilient Toilet Design by reinforcing elements to the existing standard design. The new design was highly appreciated by the Government Officials during the Assam Conference on Sanitation 2017.

IMPROVED DESIGN

Roof

- Thicker CGI Sheet
- Proper anchoring of CGI Sheet to wooden purlins
- Proper anchoring of purlins to walls

Door

- Proper fixing of Door to walls
- Cross bracing in door-style

Walls

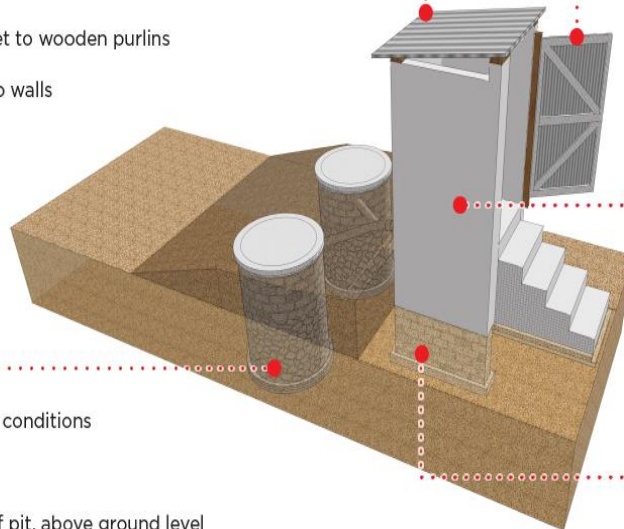
- Horizontal banding at 2 Levels in wall
- Plastering of Inner and outer walls

Pits

- Pits redesigned for 'Wet' pit conditions
- Raising of pits
- Plastering of outer surface of pit, above ground level
- Sealing of pit bottom

Plinth

- Raising of Plinth height
- Increased depth of foundation



TRAINING ON DESIGN AND CONSTRUCTION OF “DISASTER RESILIENT TOILET”

With an objective to build the capacities of concerned officials from PHED to mainstream the hazard resilient toilets, RedR India conducted a 4-day training program on “Design and Construction of Disaster Resilient Toilets” at the campus of the Water and Sanitation Support Organisation in Betkuchi, Guwahati. The participants were a mix of PHED Engineers and Local NGO staff from four disaster prone districts of Assam namely – Dhemaji, Bepata, Dhubri and Morigaon. The purpose of the training was to enable the PHED engineers, district coordinators, masons and Local NGO staff from disaster prone districts in Assam to Understand and construct Disaster Resilient Toilets as per the finalised design and technical specifications aligning with standard codes of practice.’ The training design consisted of the following topics:

TRAINING SCHEDULE

Day 1

- ✓ An overview of current sanitation situation.
- ✓ Introductory session on Disaster Risk Reduction (DRR) and its related terminologies.
- ✓ Identification of various hazards faced by households.
- ✓ Need identification for modifications in the standard toilet design for making it disaster resilient.

Day 4

- ✓ Recapitulation of the learnings from the practical session
- ✓ Cost estimation of various components of the disaster resilient toilet that were constructed by the respective participants in the practical session.
- ✓ Strategy formulation on Application of learnings and construction of cost effective hazard resistant disaster resilient toilet.

Day 2 & Day 3

Hands on practical training on design and construction details of the Disaster Resilient Toilet

- ✓ Foundation and brick masonry up to Ground Level.
- ✓ Brick masonry from Ground Level to Plinth level.
- ✓ Bottom sealing and honey-comb brickwork in leach pits.
- ✓ Fixing pan, trap, inspection chamber and pipe laying.
- ✓ Making door using wooden styles and CGI sheet.
- ✓ Making roof structure using wood, fixing purlins with wooden cleats, fixing anchor bolts, fixing CGI sheet using J-bolt and twisted umbrella nail etc.

For more details on the Hazard Resilient Toilets write to us at info@redrindia.org

