



Concrete Canvas: An Adaptable Material for Construction.

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Abstract: Due to its high demand in the construction industry globally, cement concrete is one of the most commonly used building materials. Concrete has numerous uses and benefits from many harsh environments, but it has one drawback: it is not flexible. Concrete Canvas introduced Geosynthetic Cementitious Composite Mats (GCCMs), a breakthrough replacement for traditional concrete with a wide range of uses. It is a canvas made of flexible concrete that hardens as it hydrates to create a coating of low-carbon, strong, waterproof concrete. As a water- and fire-resistant material, concrete canvas may find enormous application in the construction industry. Due to its self-healing ability, the concrete canvas extends the material's useful life.

Keywords: Geosynthetic cementitious composite mats (GCCMs), self-healing ability and fire resistant, water resistant

I. INTRODUCTION

Concrete canvas is a versatile material that is fireproof, waterproof, and bulletproof due to its flexible nature and ease of workability. Every year, grants of lakhs of rupees are given for the upkeep, restoration, and repair of buildings and canal lining. All of this occurs as a result of concrete fractures that eventually need to be fixed. A suitable solution for treating expansion joints is Concrete Canvas, which prolongs the life of buildings and the lining of canals and helps them recoup both monetarily and in terms of time. The product's science or technology is based on the idea that concrete canvas hardens and gains 80 percent of its strength after being hydrated. Over time, this strength increases.

II. METHODOLOGY

2.1 WHAT IS CONCRETE CANVAS?

It is made of three dimensional impregnated fabric matrix fiber which contains mixture of Dry Concrete, matrix fiber at its top and a Waterproof layer made of PVC which arrests water completely without seeping the water to the other side of the material. It is a flexible roll before hydration, after the hydration process it completely gets hardened and gains 80% strength and eventually gains more strength as time prolongs. It can be hydrated with any water even the salt water. The product was specifically developed for applications within the Petrochemical and Oil & Gas industries. It is available in three different thicknesses in market: CC5, CC8 and CC13, which are respectively 5mm, 8mm and 13mm thick.

2.2 Preparation of Concrete canvas/Cloth (CONCRETE CANVAS)

Concrete canvas consists of mixture of Dry concrete, Top surface with fabric matrix, Waterproof PVC at bottom coating.

Concrete Canvas is a Geo Composite. It is required at places where a hard protective surface is required and where there is no chance of installing of conventional concrete. Figure 1 show various materials used in concrete canvas.

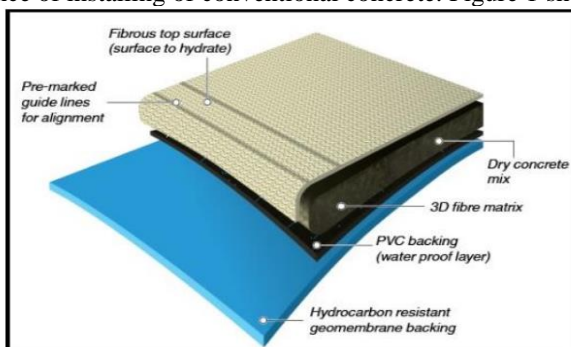


Figure.1 Materials used in Concrete Canvas

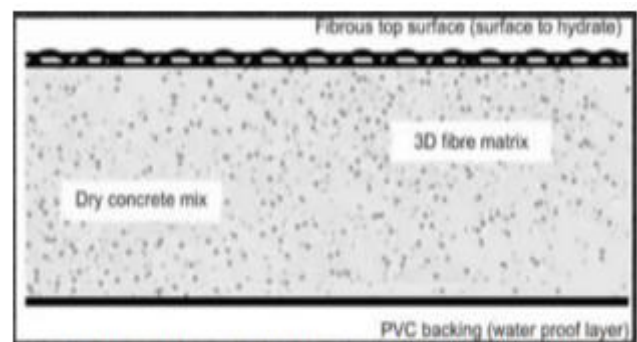


Figure 2 Crosssectional view of Concrete Canvas.



Figure 2 shows the cross section of Concrete Canvas. Our main objective is to test the concrete canvas with Fire, water and Bullets so as to adopt the technology for AP state Police Force in agency extremist areas, where the construction activity is very difficult to take place. Concrete canvas can be used for deploying shelters in less time of 24 hours with minimum manpower. This can be used for guarding the sentry post with sand bags to prevent bursting of sand bags from firing of bullets. It acts as fire retardant in chances of fire accident. Since it is water proof material it has resistance to withstand heavy rains.

2.3 Materials Used:

Petrol, Water (For Curing and Testing), Sand Bags stacked (40Nos), Bamboo Sticks (4 Nos), GI Wire, Concrete Canvas 13mm (CC). Figure 4 shows the materials used for installation and conducting the test.

Weapons Used: SLR (Self-loading Rifle), AK 47 (Avtomat Kalashnikova), LMG (Light Machine Gun), Bullets 7.62 mm (45 rounds).



Fig.2 Materials Used

2.4 Installation Procedure:

- 1) The Sentry Post is first prepared by stacking sand bags one on each other in two rows with height 1.8m X Width 1.1m.
- 2) The concrete canvas is rolled out and laid on the sentry post covering the sentry post back and front.
- 3) Concrete Canvas is fixed to the sentry post by using 4 Nos bamboo sticks 2nos at front and 2 nos at back by using GI wire.
- 4) The concrete canvas is cured with water. Figure 5 shows the installation procedure of sentry post with sand bags and concrete Canvas.



Fig3. Installation of Sentry post with Sand Bag

Test Procedure:

- 1) **Fire Retardant:** 250 ml of Petrol is poured on the concrete canvas and burnt.
- 2) **Water Proof:** Water is poured on the Concrete Canvas.
- 3) **Bullet Proof:** 45 Rounds of Bullets are fired on the Concrete Canvas with three guns SLR, LMG, AK47 out of which 20 rounds of burst firing done by LMG. 10 rounds burst firing with AK47.



2.5 APPLICATIONS OF CONCRETE CANVAS

a. Ditch Lining: It is mostly used for ditch lining because it is quick, easy and less expensive when compared to conventional method of concrete for the application of ditch lining.

b. Slope Protection: Concrete Canvas can be used as slope stabilization. It can also be used as erosion control application.

c. Protection for Pipeline: The Concrete Canvas acts as protection for pipeline which prevent leakage of pipelines. It acts has a hard shield for the pipeline which prevents damages of pipelines any thereby improves its durability and life.

d. Force Protection: It is already proved in Afghanistan in January 2008 a notable amount of concrete canvas are laid in the frontline to analyse the field usage and the performance Concrete Canvas: A Multifaceted Construction Material 1901 Published By: Blue Eyes Intelligence Engineering & Sciences Publication Retrieval Number: C4462098319/19©BEIESP DOI:10.35940/ijrte.C4462.098319 Journal Website: www.ijrte.org which is satisfactory for U.K army, as a reward the manufacturer got huge order of concrete canvas of 5500 sqm to the frontline of Afghanistan by U.K ministry of defense. Helipad: Dust suppression system in helipad.

III. RESULTS AND OBSERVATIONS

3.1 The benefits of concrete canvases

1) **Water Proof:** Concrete Canvas is excellent waterproof material which does not allow seepage of water through the on the other side of the material which has chemically tested PVC Sheet.

2) **Fire Retardant:** Concrete Canvas is 100% fire retardant material because when petrol is poured and burnt on the concrete Canvas it burns only until the petrol is present on the concrete canvas and it is observed that it doesn't even leave any burnt stains on the material.

3) **Bullet Proof :** Concrete Canvas is tested with three guns LMG,AK47,SLR firing 45 rounds of 7.62mm bullets out of which 20 rounds of burst firing done by LMG. Ten rounds burst firing with AK47. It is observed that 45 rounds of bullets pierced into the Concrete Canvas and than into first Sand Bag, out of which one bullet came out from other side of Concrete Canvas where there is loose sand and gap between the first and second Sand bag. It is also observed that the structure of Sentry Post is same and remains undisturbed even after 45 rounds of Firing. Test results and observations are shown in the figure 6 below.



Figure 6 Test results and observations

3.2 Utilizations in APSPHCL Projects

For AP State Police Housing Corporation Limited projects, the concrete canvas has a number of uses.

1. To make toilet floors waterproof and stop roof leaks, apply this substance beneath tiles.
2. Maintenance tasks like repairing terrace slab leaks may be done with it.
3. It may be utilized to stop leaks in terrace water tanks.
4. In order to stop leaks, it can be used to cover sanitary pipes.



3.3 Police Force Applications

The AP State Police Force may apply the concrete canvas in a number of ways.

1. In agency locations, temporary shelters may be constructed with the use of this technology.
2. Sentry Post security is another use for the technology.
3. You may use concrete canvases to build the temporary outposts.
4. It protects against fire, water, and bullets, enabling it to resist any unfavorable weather situation.

3.4 RESERVES

There are the following restrictions with Concrete Canvas:

One cannot overhydrate concrete canvas.

2. A high pressure jet applied directly to the concrete canvas should not be used to hydrate it as this might wash the material away.
3. After it has begun to set, it is still workable for one to two hours after being hydrated, so don't move it.

The amount of time spent working on concrete canvas is decreased in hot temperatures.

5. Setbacks in setup time might occur if CC is fully saturated.

IV CONCLUSION

- Concrete canvas is a great fire- and waterproof-resistant material, but it has to be improved for bulletproofing. For the material to be bulletproof, the producers must make improvements.

- It may be utilized in APSPHCL for a variety of maintenance and repair tasks.

Concrete canvas may be utilized to make Sentry Post's structure undesired by using it to quickly and cheaply build temporary shelters in agency extreme locations.

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