

# Study of Canvas Concrete in Civil Engineering Works

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**Abstract**— The Cost as well as the time taken by the construction work has always attracted attention of Civil Engineers to be supplemented by some cheaper and fast settling construction material. This paper focuses the advantages of using Concrete canvas or Concrete cloth for Rapid and fast construction of structures like canals and many other which are made for temporary purpose. In the paper the engineering properties of the material is also discussed. This material being ceramic is fire resistant as well as water proof.

**Key words:** Concrete Canvas, Cement, Concrete Canvas Shelter, PVC, Ceramic, etcetera

## I. INTRODUCTION

Concrete Cloth is a ceramic material because of which its fire and water proof. Concrete Cloth (CC) is a flexible cement impregnated fabric that hardens on hydration to form a thin, durable Water proof and fire proof concrete layer. CC has a number of applications in the civil and construction sectors. Other applications for CC include Roofing, Asbestos Containment, Water Tanks, Flood Defenses, Shot Crete Replacement, Tunnel Lining, Retaining Walls, Erosion Control, Building Cladding, and Etcetera.

It comes in a small bag which is easy to carry and it can be easily laid anywhere we want. The main property which gains the most of the attention is that it can be made into home within 24 hours. With just basic three steps that is

- Transport/ delivery.
- Lying as required.
- Curing/watering.

And the structure is ready to use. It uses minimum labor as well as minimum construction cost and is high in performance and durability.

It consists of a three-dimensional fiber matrix, containing a specially formulated dry concrete mix. A PVC backing on one surface of the cloth ensures the material is completely waterproof, while hydrophilic fibers on the opposite surface aid hydration by drawing water into the cement. Concrete cloth can be used to rapidly create waterproof, fireproof, fiber-reinforced thin concrete forms across a wide range of applications: rapid track way or landing surfaces, structural reinforcement, ground stabilization, ballistic protection and sterile concrete shelters.

### A. History:

It's a recent innovation in the concrete sector. Even many of the people had not heard about this product and it's also not so famous in the general market because of its short time in the construction field. But rapidly it's gaining market and will be one of the major products in the coming time because of its performance.

### B. Storage:

CC should be stored in dry conditions away from direct sunlight. CC is supplied in rolls packaged in PE sacks. Once the sack has been opened, the cloth must be kept dry and will gradually lose flexibility and performance if exposed to the air for a number of weeks. The rate of degradation is dependent upon humidity levels.

### C. Cutting:

Concrete Canvas can be cut when it's dry with a suitable razor blade. When cutting, a few mm allowance should be left.

### D. Method of Hydration:

It can be hydrated using saline or non-saline water. The minimum ratio should be 1:2 of water to concrete cloth by weight. Concrete cloth cannot be over hydrated so an excess of water is recommended.

Concrete cloth should be immersed in water for a minimum of 90 seconds.

## II. MAJOR USES

In Civil Engineering it's mainly used in works like:

- 1) Construction of temporary structures at relief camps or in making temporary dispensaries in rural areas.
- 2) Lining of canals where water is to be flowed for the fields for uses of construction works.
- 3) In making the fencings of the house it's used over the barbed wire to provide the additional strength and security.
- 4) It's used at slopes to prevent them from erosion in hilly areas.
- 5) It's also used as water proofing agent over the warehouse's roof as well as over the houses in emergency conditions.

In Military works it's used in many operations:

- 1) It's used to provide a strong layer over the sand bunkers to provide additional strength.
- 2) In construction of runways and helipads for the fighter planes as well as helicopters.
- 3) In construction of military camps over the war front.
- 4) It can be used to repair damaged and unstable gabion walls to provide long-term protection.
- 5) It's also used in making the flooring for various other purposes.

## III. APPLICATIONS

Canvas concrete have many applications in various filed, some of them is given below

### A. Concrete Canvas Shelters:

Concrete Canvas Shelter is one of the major uses of concrete cloth. They are rapidly deployable and require only water and air for construction.

Concrete Canvas Shelters (CCS) are more operational and financial than conventional tented shelter. They provide a hardened structure from the very first day of operation. They provide much better environmental protection, security and very improved medical capability. They have a design life of over 10 years, whereas tents get worn out very rapidly and have to be removed at a very short time period. Concrete Canvas Shelters Save effort and cost.

The key to Concrete Canvas Shelter is the use of inflation to create a surface that is optimized for compressive loading. This allows thin walled concrete structures to be formed which are both robust and lightweight. Concrete Canvas Shelter consist of a revolutionary cement based composite fabric (Concrete Cloth) bonded to the outer surface of a plastic inner which forms a Nissen-Hut shaped structure once inflated.

### B. Slope Protection:

Slope weather protection is important to control soil erosion down slope as a result of direct rainfall and surface runoff. Protection can be a permanent

Slope covering or a temporary measure until the excavation has been backfilled. Uncovered slopes undergo surface raveling and gull eying, leading to instabilities and safety concerns. Soil erosion is normally prevented by applying a thin concrete skin. However, this is difficult to apply uniformly and often breaks apart. Plastic sheeting covers are disturbed by strong winds, water flows or site damage and meshes do not provide the same level of direct weather protection.

Concrete Cloth (CC) provides a quick means to directly apply a thin, uniform, protective concrete covering to the slope surface and can be applied in all weather conditions. CC is fixed by short nails and provides a strong, waterproof, surface stabilizing covering enhanced by internal reinforcing Fibers. CC can be used in conjunction with full length soil nails to increase the stability of slope surfaces by providing similar slope protection measures. CC can also be used to cover landslide scars or cut slopes. Holes can be cut to allow vegetation growth.

### IV. KEY FACTORS

- 1) Easy To Use: CC is available in man portable rolls for applications with limited access or where heavy plant equipment is not available. There is no need for mixing or measuring, the concrete is premixed and cannot be over hydrated. It will set underwater and in sea water.
- 2) Rapid: Once hydrated, CC remains workable for 2 hours and hardens to 80% strength within 24 hours. Accelerated or retarded formulations can be produced to meet specific customer requirements.
- 3) Flexible: CC has good drape characteristics allowing it to take up the shape of complex surfaces including those with a double curvature. The unset Cloth can be cut or tailored using basic hand tools

- 4) Strong: The fiber reinforcement prevents cracking, absorbs energy from impacts and provides a stable failure mode.
- 5) Durable: CC is chemically resistant, has good weathering performance and will not degrade in UV. They have a design life of more than 10 years in shelters. Each shelter is lined with a flame retardant fiber reinforced polyethylene inner with a B1(DIN 4102-01 05/98) fire rating.
- 6) Water proof: The PVC backing on one surface ensures that the material is completely water proof and chemical resistant.
- 7) Fire resistant: It's a ceramic and will not burn.
- 8) Adaptable: CC is currently supplied on 1.1m wide rolls. There are 3 variants available as standard: CC4, CC8 and CC13, which are 5, 8 and 13mm thick respectively. CC can be manufactured up to 20mm thick.
- 9) Workable: It can be made into shelter by only 2 people in less than 1 hour and can be made ready for use in just 24 hours. It's a semi-permanent structure without the associated cost and time delays.

### V. CONCLUSION

The study shows that it's a good material for use at temporary as well as permanent purposes Specially in Tunnel Lining, Defense uses, Water proofing, Fencings, and Construction of military runways, and from cost effective point of view Concrete Canvas/cloth is a competitive alternate product of concrete. Its being ceramic is of great help as because of it its highly fire resistant and because of the three layers present its water proof.

### VI. REFERENCES

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