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RESEARCH ARTICLE

REAL TIME INVESTIGATION ON REPAIR AND MAINTENANCE OF RESIDENTIAL BUILDING

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Abstract

Now days it has become a major challenge to select right techniques, materials, and procedures for the repair of a building structure.Repair and Maintenance of Residential Building have gained in importance around the world.Despite the authorities in charge of building maintenance, the residents are also a factor contributing to poor maintenance on building.The use of poor quality material by the maintenance department, improper maintenance strategy often cause maintenance to achieve a result less than expected.The first duty of every Civil engineer is to give emphasis on the durability aspect during construction as well as maintenance. The emergence of maintenance application can improve the efficiency of quality and duration of the work.Lack of management in maintenance is one of the factors which is the reason for poor building condition.

Introduction:-

1. The main function of building is to protect the occupants and contents from weather, mainly rain, wind and extreme temperatures.
2. Building maintenance is work undertaken to keep, restore or improve every part of building, its services to a currently acceptable standard and to sustain utility and value of the facility.
3. Maintenance is the process of ensuring that buildings and other assets can retain a good appearance and operate at optimum efficiency.
4. It should be very clearly understood that 'Waterproofing' is not a work of magic, but a system that provide resistance or defense against the ingress of water into the core of concrete structure.
5. Higher and stronger defense or resistance against the water ingress will result in stopping the water from percolating into the body of structure and this effect is called Waterproofing.
6. Leakages through construction joints due to inappropriate use of vibrator during compaction process is the main reason which leads to seepage problem in future.
7. It requires quite a bit of thinking while formulating the specifications and methodology. Correct selection of products, specifications and methodology is of utmost importance, and, at the same time, the application expertise is the only key to success.
8. Basement area, toilet area, podium, terraces, lift ducts&water tanks these are the main part of building structure which most probably get affected due to leakages problems.
9. While designing a suitable treatment of waterproofing, it is essential to know and understand the Location, Strata, Type of building (industrial / Residential), Type of structure (i.e. PT or conventional), Grade of concrete,

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Expansion joint provisions, Seismic joints provision, and many more aspects of the said 'construction which cannot be listed here, but would need a special attention.

10. Completion of preliminary work like execution of every system from procurement of materials to selection of waterproofing material.
11. Prepared a sustainable system for research by observing the execution process of waterproofing as per site conditions. Analysis of the developed system by discussing its results after the period of execution.

Objectives Of The Project:-

1. To keep the structure in good and healthy condition.
2. To prevent serious damages in buildings.
3. To prevent decay of structure caused due to adverse effects of weathering agencies.
4. To strengthen the structures or to maintain the standard of structure.
5. To make some needful improvements in the building so that it can preform its function properly.
6. To improve the facilities depending on the modernization of that area.
7. To increase the durability of structure.
8. To enhance the serviceability of a structure.
9. To learn the implementations of Basement waterproofing treatments on construction locations
10. To present arranged waterproofing system by understanding the site labours work.

Problem Statement

Rapid construction works has some huge adverse impacts on quality of construction. Construction quality is adversely affected due to poor workmanship, bad quality materials, less curing etc. These types of issues will affect directly on building's life span. Leakage problems are observed in large amounts in now days. So, to overcome that problems with exact solution is very important. For minimizing that type of problem waterproofing is important.

Literature Review:-

Repairs Management:

It is necessary to identify the suitable repair procedure and inspection data to use right waterproofing solution. Early detection of damaged structure can minimize the cost of repairs also proper maintenance will helps to avoid further repairs cost. Selecting an appropriate repair methodology is very important to achieve durable, effective and economic repairs.

Waterproofing Methods:

There are conventional as well as new advanced waterproofing methods. Some conventional systems are practiced successfully and some modern systems designed taking consideration of material and structural behavior. In India, there are some challenges in market like, unskilled labour, lack of interest for implementation and negligence in following right steps for waterproofing repairs.

There are many causes for deterioration of structure like an error in construction, poor material quality, error in design, poor workmanship etc. In this paper, they had defined the term Repair as the process of bringing back the aesthetics of the building, restoration as the process of structural repair and make the structural elements enough to bear the loads coming on them and transfer all loads safely.

According to Saurabh Borle, Ghadge A.N., that the conventional systems are easy for usage; but they are inefficient & can be simply crumbled due to variation in environmental circumstances. as compare to old systems of waterproofing advanced waterproofing methods like epoxy coating, polymer coating, polyurethane coating and APP membrane system gives well results but are expensive and hold an excessive struggle while fitting. Modern coating systems require skilled labors for their installations. As linked to this, crystalline method has better benefit of striking cracks established over a period of time by the reaction of water with crystals. That's why it has a better stability.

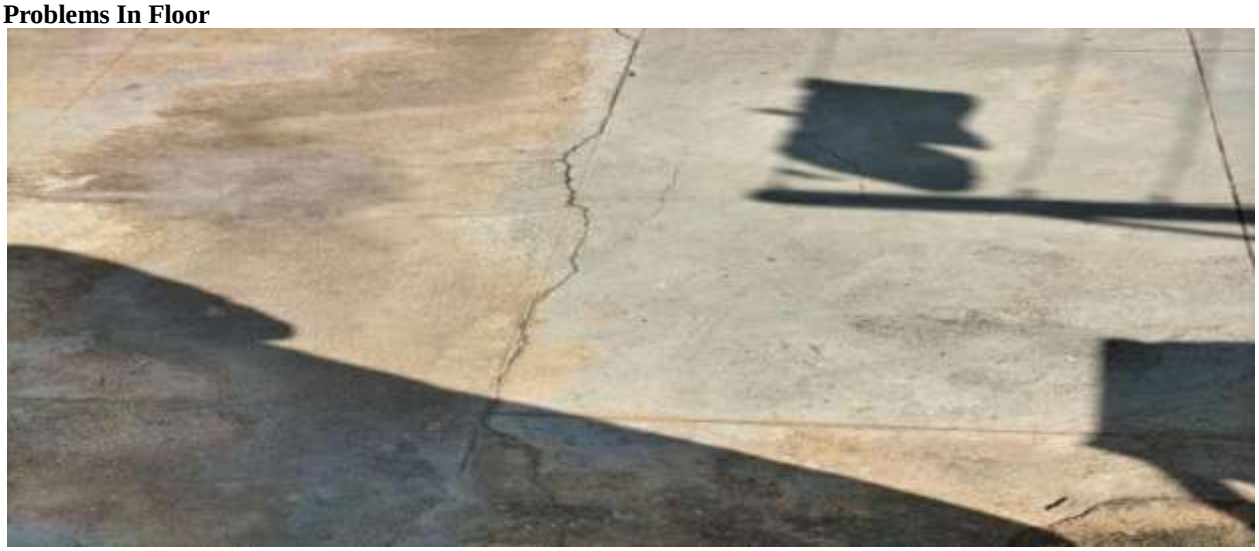
According to. Soma Anil Mishra, Ar. Prakool Soni, Dr. R. K. Pandit Water seepage can be a threat to structure.it will leads to various types of issues in structures like roof leakages, concrete damage, fungus in house. They also conclude that correct waterproofing treatment is very important to prevent the entry of water inside the building.

Roslan Talib & David Boyd made research onthe waterproofing resources used for actual site trials connecting actual problem mostly with rooftop related seepage which occurred in Malaysia and also in the United Kingdom. The study frameworks typical issue dealing with building seepage problem in the humid climate. It also shows seepage situation found in conflicting of season's weather in the United Kingdom. It also tabling the list of real-world waterproofing solution done for the seepage problem showing the waterproofing methods & appropriate finest materials and products used. The motive of this research paper is to support the maintenance team, construction landlord to find the precise steps while selecting the correct waterproofing materials at the time of structure's repair work characteristically dealing with the structure's seepage issue. They find that Even though UK, Malaysia both countries have dissimilar types of weather; but the waterproofing material used for the project is the commonly used worldwide material. So, it is very important for the contractor to quote a quotation with preciseleakage job.in a same way it is also important that the site owner also have some knowledge of waterproofing products just to confirm that the contractor is doing is job correctly or not.Thus, the paper concludes that contractors actual site work experience of waterproofing and papers finding will help the house owner to find correct waterproofing products.

Problems In Wall

Crack Formation In Parapet Wall – Krishnagiri

Problems In Floor



Crack Formation In Flooring – Krishnagiri

Material and Methodology:-

Ar. Soma Anil Mishra, Ar. PrakoolSoni, Dr.R.K. Pandit (2014) made research on waterproofing systems in building construction in which they conclude that House construction includes a good balance of workmanship, detailed drawings, regular maintenance and stability with landscape. A project reach to its achievement if it matches above mentioned features. A house is a manmade assembly used for supporting many residences. Residents generate dissimilar types of energies which, in all troubles, damage & usage up the accessible resources of it. The quality of building is depending upon the workermenship it will affect the whole life span of structure. If the quality gets compromised then it degrades the structure. then it will result in seepage problems of buildings.

Dhiren J Panchal, Nehal H Shah, Chirag R Sindhav, Chaitanya Joshi, Awadhesh Chauhan (2015) presents a powerful research on Waterproofing Challenges and Suggested Remedial Measures for High Rise Buildings. They conclude that, Seepage can happen in both ancient & new buildings. Most probably it has been observed in old buildings. This is a main issue tackled by the structures. As it is disturbing both external & internal part of structures & also producing injury to structural members. It also damages paint of the wall. The delinquent includes investigation of not only seepage, but also mugginess and leakage in the housingblocks. This research gives better & additional methodically created understanding of the role of waterproofing constituents to support the anticipation of dampness from piercing walls and slabs. The meaning of the investigation subject is to provide a review of the progress of waterproofing ingredients in executing waterproofing systems in construction industry with some case studies in India.Author concluded that the absorbency of Dr. Fixit damp proof is abridged by 38.88% related to Kembond K-Fix 75. Hence the research concluded that is Dr. Fixit damp proof is the best waterproofing chemical for use on the site. He also concludes that the construction work needs good supervision, skilledlabours, good quality chemicals and materials and most important regular maintenance of building.

Pradip Manjrekar and Rathi (2006) carried out some studies on waterproofing admixtures on concrete structures. Inhis paper he said that the superpalsticicers generally work by giving better dispersion of cement andsimultaneously reducing the surface tension of the water or aqueousphase.This results into better wetting and proper hydration at lesser waterrequirements.It was concluded that the addition of admixtures can offsetvarious errors, increasing the possibility of producing concrete uptospecifications. He also says that the waterproofingadmixtures are pore fillingand porosity reducing materials

Acryseal:

Acryseal is a crack sealing cementatious material in sealant form. It is easy to apply and can be finished or smoothened off with a putty blade or a damp sponge. It sets quickly on application and can be over coated with common paints / coatings.

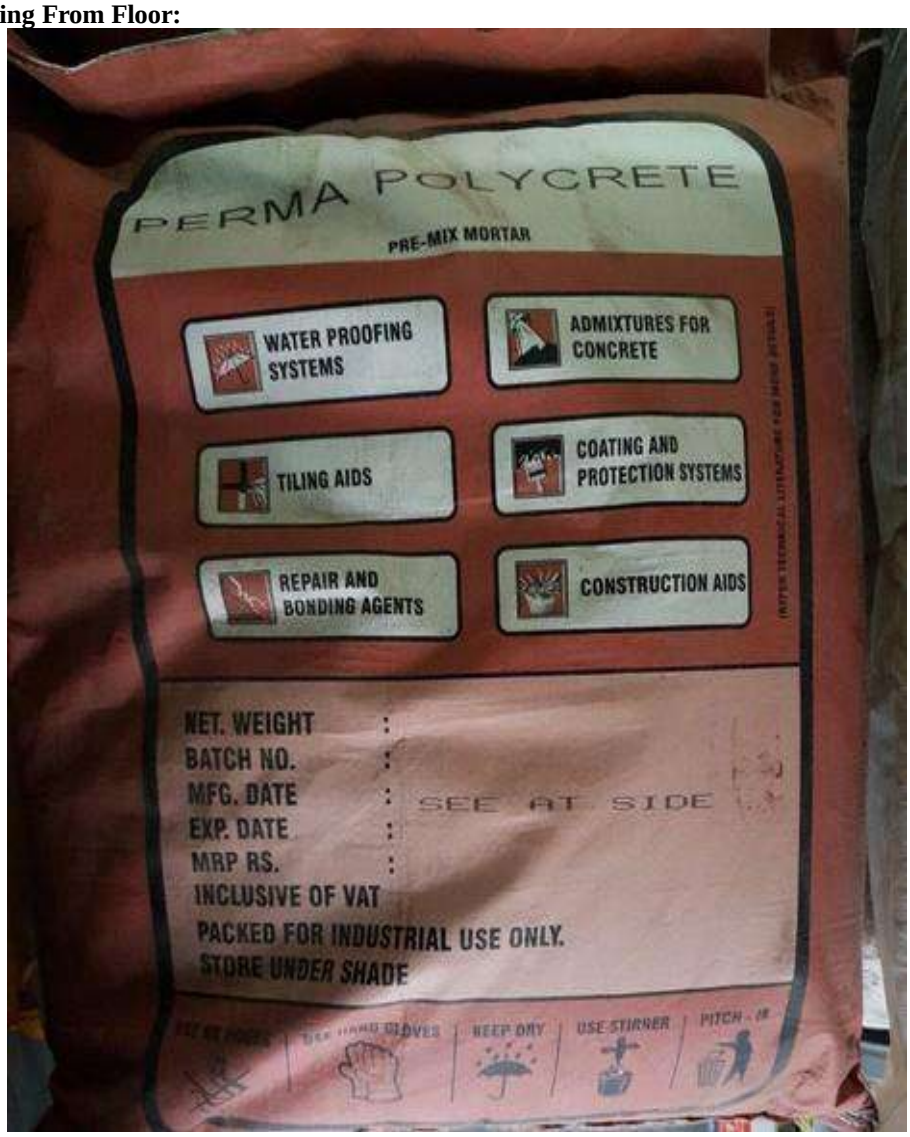
1. Formulated for Indian weather conditions.
2. Ideal for both internal as well as external application.
3. Can be over coated with emulsion or enamel paints.
4. Does not need priming.
5. Good weather resistance.
6. Elongation at break 400%.

7. Water based, hence environmentally safe and non toxic.
8. Excellent adhesion to most substrates.

Bond SBR :

1. Single component liquid can be easily gauged as required
2. Improves cohesion and workability
3. Improves mortars to provide waterproof repairs, renders and toppings which are highly resistant to freeze/thaw cycling.
4. Improved tensile and flexural properties allow thin applications
5. Excellent bond to concrete, masonry, stonework, plaster and block work.
6. Contains no chloride admixtures Can be applied to damp substrates.
7. Corrosion protection of steel.
8. Floor screed and topping.
9. Concrete and floor screed repairs.
10. Waterproofing and tanking of basements.
11. Bonding of old concrete to new concrete.

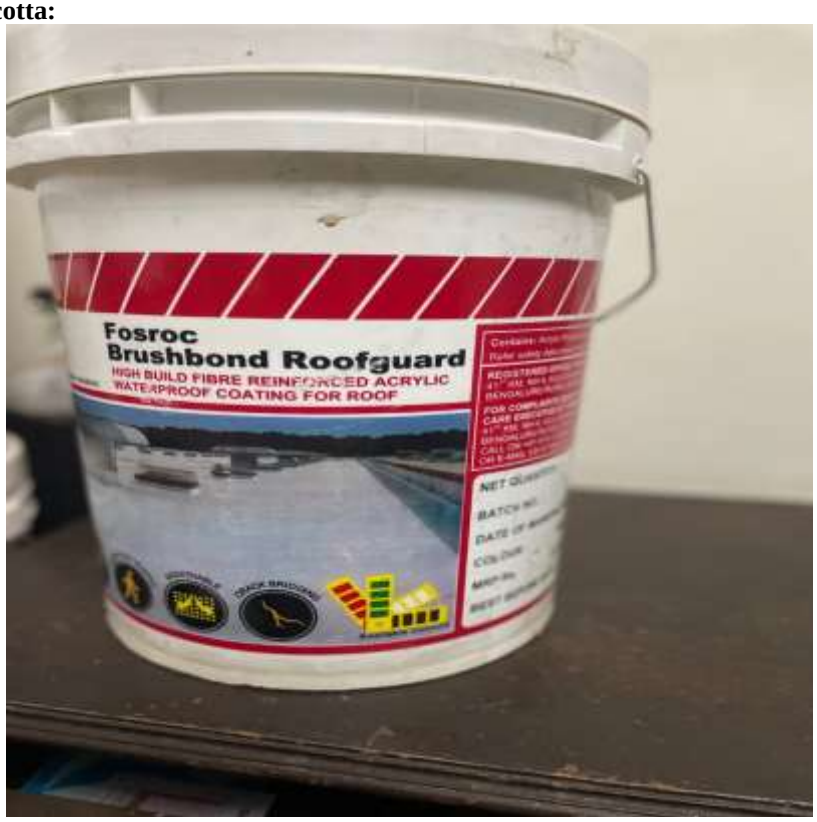
Polycrete Packing From Floor:



Perma Polycrete is a cementatious grey powder with micro fine aggregates which allows reconcreting of the damaged structures. The product is a boon for present day rehabilitation engineers. The product needs only addition of water to form concrete with enormous initial and final strengths. The product is reinforced with glass fibers to strengthen cohesion and make it crack resistant.

1. Perma Polycrete is fairly viscous hence it can be applied on vertical surfaces and soffit of beams and ceiling with ease.
2. Perma Polycrete develops light compressive, tensile and flexural strength in excess of parent concrete.
3. Perma Polycrete develops a very strong bond with the parent concrete. It is impermeable and protects reinforcements from corrosion.
4. It does not need elaborate curing, just sprinkling water for 2-3 days is sufficient for gaining good compressive strength.

Roof Guard Terracotta:



1. High Build system provides higher dry film thickness of more than 1mm in three coats.
2. The product can applied directly on existing sound concrete, brickbat coba, screed concrete even without removal.
3. Excellent bond to concrete and masonry.
4. Good crack accommodation capacity.
5. Minimum surface preparation needed and low labour**.**

Tile Adhesive:

Perma Weather Proof Adhesive is a cementitious Polymer based material in powder form, which only needs on site addition of water to make a paste which is used for fixing tiles or stone cladding to vertical as well as horizontal cementitious surfaces.

1. Easy to use.
2. No wetting of tiles required before fixing.
3. No wetting of surface to be tiled.
4. Makes the tiled area waterproofs.

5. Holds the tile even at high temperatures.
6. Withstands temperatures up to 200°C

Fibermesh AR:

Perma Fibre mesh AR is a fabric made up of alkali resistant glass fibre for use in screeds, plasters, waterproofing and weather proofing membranes to control the cracks which result from either two materials of different coefficient of thermal expansion or those caused by shrinkage or tensile stress created by the seasonal expansion and contraction. It is manufactured from virgin glass. Perma Fibremesh AR products are extremely tough, light weight, flexible, high in tensile strength and easy to work with. This product is available as Perma Fibremesh AR 75 GSM and Perma Fibremesh AR 145 GSM.

Cement Grouting:

Cementitious grouting is a process in which a fluid cementitious grout is pumped under pressure to fill forms, voids, and cracks. It can be used in several settings including bridges, marine applications, dams, and rock anchors. The grouted mass has an increased strength, stiffness, and reduced permeability.

Bitu Coat:

1. Perma Bitu Coat is used for waterproofing all types of RCC, brickbat coba, asbestos cement sheets and zinc/aluminium sheets etc.
2. Perma Bitu Coat can be used for repairing the damaged bitumen felts, cracked stoneware drainage pipes.
3. As a damp proof course applied under the first layer of bricks or block work in the masonry.
4. As a waterproof coating externally applied on the basement walls, footings etc before back filling.
5. As an anti corrosive and anti-termite coating in all subsoil structures before back filling.
6. As a crack filler and repair waterproof coating on brickbat coba and on concrete roofs.

Latex SBR:

Perma Latex SBR is based on Styrene Butadiene rubber, special adhesive and bonding chemicals along with hydrophilic agents. Perma Latex SBR gives a versatile performance in many civil engineering applications. The product is a milky white liquid.

PU Grouting &PU Injection:

PU Grouting is a specialized technique that involves the injection of expanding Polyurethane to stop any water flowing down or through cracks or to fill voids under slab, concrete joints or behind concrete walls and joints. Polyurethane Grouts are designed to react with water and expand in-place, forming a tight, impermeable, elastomeric seal that immediately stops the flow of water. Polyurethane seals in three ways: First, It forms a chemical bond to the concrete surface area; Second, It forms a mechanical anchor by entering the pores and voids; and Third, by expanding, It forms a compression seal within the crack, joint, or void to act as a waterstop.

Process of PU Injection Grouting:

A)Install injection packers:

Surface packers (Short rigid-metal tubes with a flat base) serve as handy entryways for getting the repair material into the crack. They eliminate the need to drill into the concrete, reducing labor time and cleanup. The base of the packer is placed directly over the crack and bonded to the surface with an Epoxy paste. A general rule-ofthumb is to space the packer an inch apart for each inch of wall thickness.

B) Seal the packer: Use an Epoxy Adhesive to seal over the packer and exposed cracks. The paste cures in about 20 to 45 minutes to provide a surface seal with excellent bond characteristics that holds up under injection pressures. The entire exposed crack is covered with the paste, leaving only **the packers holes uncovered.**

C) Inject the crack: Begin injecting at the lowest packer on the wall and continue until the Epoxy or PU begins to ooze out of the packer above it. The pressure of PU Grouting Machine is generally 200- 250 PSI. That's the visual sign that the crack has been filled to that level. Plug the first packer with the cap provided and move up to the next packer, repeating this procedure until the entire crack has been filled with Epoxy or PU. Let the compression spring on the dispensing tool push the material into the crack using slow, constant pressure. This will reduce the possibility of leaks or blow-outs and allow time for the repair material to fully penetrate the crack.

D) Remove the packer: Allow 24 to 48 hours at room temperature for the Epoxy or Polyurethane to cure and penetrate into the cracks. The injection packer can then be removed by striking them with a trowel or hammer. If appearance is an issue, the Epoxy surface seal can be chipped away or ground off with a sanding disk. Another option is to use a surface seal that can simply be peeled off the wall after the repair is fully cured.

1. PU Grouting is recommended only in RCC walls/ concrete walls.
2. PU Grouting is generally used in severe leakage problems or to stop water leakage immediately. It is generally used at the location where water flows
3. PU Grouting is recommended in Basement, Swimming Pool, Water Wank, Terrace Garden or areas where water is flowing or leaking continuously.

PU – Sealant :

Perma PU Sealant – White is a highly flexible and durable Polyurethane Sealant which is ideal for sealing joints in internal as well as external surfaces of the building. Perma PU Sealant – White has good adhesion to a variety of building materials and surfaces.

1. Perma PU Sealant – White is tough and hence resists foot traffic. It is suitable for sealing expansion joints in the walkways and on podiums.
2. Perma PU Sealant – White is resistant to UV light hence in the exposed conditions its color is unaffected.
3. Perma PU Sealant – White can be painted over with enamel paints so that the uniformity of the appearance can be mentained.
4. Perma PU Sealant – White is resistant to a high degree of temperature exposures. It can resist temperatures between -30°C to +120°C.
5. Perma PU Sealant – White is very strong in adhesive properties and is suitable for use in a variety of surfaces such as concrete metal and wood without a primer.
6. Upon curing Perma PU Sealant – White creates a smooth and even surface

Plug:

Perma Plug is a quick setting cement sand mortar supplied in dry powder form. This constitutes a blend of cements, graded sand and chemical set control agents. The product needs only on site addition of required amount of water just before its use.

1. Heavy duty Plugging: Perma Plug is suitable for plugging of prestressing /post tensioning holes or depressions in the pipes, sleepers or girders.
2. Repairs of Buildings: Repairs to corners and edges of high strength concrete structures and general repairs in the building industry.
3. Plugging Running Leaks: Perma Plug is used to stop leakages from water tanks and leaky basements because of its quick setting property
4. Sealing Joints: Perma Plug can be effectively used for filling joints, pointing brick stone masonry and waterproofing.
5. Easy to Use: Perma Plug is supplied in powder from. It only needs addition of water before use.
6. Rapid Setting: Rapid setting property of this prodct makes it useful in stopping running water.
7. High strength: Perma Plug hardens to high strength which is comparable to the strength of the member under repair in hours only.
8. Compatibility: Perma Plug is highly compatible for use with all cementitious materials, stone, brick, steel etc.

Conbextra GP2:

ConbextraGP2 isused forprecision grouting where it is essential to withstand static and dynamic loads. Typical applications would be the grouting of base plates of turbines, compressors, boiler feed pumps etc., It can also be used for anchoring a wide range of fixings. These include masts, anchor bolts and fence posts.

1. Gaseous expansion system compensates for shrinkage and settlement in the plastic state .
2. No metallic iron content to cause staining.
3. Pre-packed material overcomes onsite batching variations .
4. Develops high early strength without the use of chlorides .
5. High ultimate strength ensure the durability of the hardened grout.
6. Free flow ensures high level of contact with load bearing area

Conclusion:-

If proper construction material and technique is used during construction and in case of periodic maintenance, the major causes that affect the building can be minimised. Therefore it is very essential for the people to know the exact condition of the structure. So that they can take a proper safety measures with the help of expertise.

From the above result we can conclude that the permeability of Fosroc & Perma hypercrete is reduced by 38.88% compared tothat ofKembond K-Fix 75. Hence we can say that on sitethe best suited chemical is Fosroc and perma damp proof so as toincrease the life of structure.We can also conclude that the construction processneeds proper supervision, better workmanship, use ofchemicals in required amount, qualitative materials andimportantly maintenance of structural components.Final conclusion from the above project is that thetotal cost of waterproofing is reduced by Rs.1,40,110 and also we can say that workability of chemical suggestedin this project is more efficient than the chemical which wasused on site.