

PERFORMANCE EVALUATIONS OF WATERPROOFING CHEMICALS – A CASE STUDY

R.D.Koshti¹, Uzma Shaikh², Hrishikesh Borase³, Zubair Khan⁴, Rajesh Ghuge⁵, Vishal Yadav⁶

^{1,2}Asst. Prof., Department of Civil Engineering, Dr. DYP SOE, Lohegaon, Pune Maharashtra, India

^{3,4,5,6}U.G. Student, Department of Civil Engineering, Dr. DYP SOE, Lohegaon, Pune Maharashtra, India

Abstract - This case study is an examination on waterproofing techniques for Buildings. Waterproofing has become a basic part of a structure to ensure its stylish appearance, prevent basic harms and for the security of the inhabitants. In like manner, the type and technique for waterproofing required may vary with the area and atmospheric (climatic) conditions. In the development business, various economically available materials are utilized for waterproofing. Present day waterproofing framework manages spouting waters drainage, porosities, joint, leakages, defensive covering, film covering, basic entrance, common stone assurance layer covering. Under this examination, field study is done to distinguish the kinds of waterproofing materials, various strategies for applications identified with waterproofing. Moreover, issues identified with waterproofing are concentrated to distinguish basic issues, which are shown up in a working structure. At that point the correcting strategies and their presentation identified with such issues are likewise contemplated.

Keywords: Waterproofing, Brick Bat Coba, Chemical, Dr Fixit, Membrane

1.0 INTRODUCTION

Waterproofing is one of the most significant parameters considered in the development of building and structures to prevent leakages, moistness and so forth and making the structures strong. For waterproofing most recent trend setting innovations are being utilized around the world. Breaks and soddenness in dividers, roofs, rooftops, and so forth can absolutely be prevented. It is important to welcome that in a nation like India with its occasional substantial precipitation, productive waterproofing of structures should get the most extreme consideration directly at the hour of development itself. Moreover few numerous manufacturers will be in general disregard this essential precautionary measure, not with-standing the way that the pre monsoon fixes before long end up being more costly than pre-arranged preventive measures during development. This is about the development harm, counteraction and waterproofing. Waterproofing is the procedure which plan and keeps water from infiltrating into the structure. It is done in different strategies and stages to stop the

water entrance into the structure. The structure is waterproof by different strategies from the footings to top degrees of a structure also, film and defensive coatings are one of the fundamental perfect techniques to secure structure honesty. This stage is called assembling envelope. Accordingly, the similarity of materials their collaboration, interface of the structure walled in areas inside and out likewise the presentation of the structure. Execution may isolate by the enduring variables and water, seepage outlet assumes the significant job. Waterproofing gives insurance from the enduring parts, drainages. Leakages and vertical travel of water in a structure and the all around are secured by the use of waterproofing framework.

Present day waterproofing framework manages spouting waters drainages, penetrable, joint, leakages, defensive covering, film covering, auxiliary infiltration, normal stone insurance layer covering. Different layers of specific properties of synthetics permits the procedure of various assignments effortlessly of the equal impact of life preservation as a result of utilization of materials associated with the procedure. Lately, with the improvement of sociology and innovation, the new waterproof material and its application innovation are growing quickly and it is creating from multi-layer to single layer from hot to cold development bearing. Waterproofing building is far reaching and commonsense designing innovation, which assumes a crucial job in the capacity of building. The low quality of waterproof development is the immediate reason for leakage of waterproof task. In this way, it may be seen that the waterproofing business has changed incomprehensibly during a decades ago while acquainting numerous items with the development business. Waterproof development designing is one of the most significant elements of building items, is identified with the structure of the utilization worth, use and wellbeing conditions, the impact to individuals' creation exercises, the nature of work and life, to guarantee the building quality has a significant job. Lots of advancements have been acquainted with the business, which can be utilized for various applications. In this manner, reasonableness and ability of different

waterproofing items are yet imprecise when their exhibition is estimated.

Ensuring a structure with the layer of waterproofing film is critical component of its plan and development. Water can penetrate the stone work barrier of the cellar region through the narrow activity. Depending on the physical porosity of the concrete and the involvement of the outside, it is imaginable that water can enter the cellar at any area. Because of the impact of the nearness of the water in a structure, a legitimate consideration is required in choosing a quality appropriate waterproofing material dependent on its area. Living in the time of innovation, there is different kind of new materials being designed for waterproofing treatment which is increasingly powerful to prevent the retention of water by the solid. For example with regards to the waterproofing of the pools, consistent hydrostatic weight is joined with the inflexible and permeable structure of solid pores genuine difficulties for and affecting and enduring occupation. An appropriate precaution measure will be taken to evade future breaks of the structure that will influence the presentation of the waterproofing layer and finally can cause spilling in the water holding structure. The objectives of this case study are three folds;

- Analysis of different types of present waterproofing system.
- To compare actual results of different waterproofing solutions after approximately 0-15 years of construction
- Possible revised method to be used in the construction industry.

1.1 Types of different waterproofing methods used in construction industry

Cementitious Waterproofing keeps the solid concrete secured. Concrete is solid and tough development material that is depended upon structures, spans, tanks, dams, pools, channels and depletes. Be that as it may, the solid is permeable and penetrable. Water and water fume can infiltrate cement and cause disintegration and harm, particularly in situations where the solid is fortified by corrodible materials like steel. Waterproofing solid structure is basic to guarantee a long and successful working life. The upside of remembering a polymer for a concrete based covering is that it increases a level of adaptability (however insufficient to withstand development), it expands attachment, makes the covering waterproof and concoction safe, yet it additionally remains breathable. This implies the fume from the solid won't get caught and cause ranking.

Brick Bat Coba is viable strategy utilized for waterproofing. All current treatment, covering on the chunk top is expelled and the surface is cleaned by hard wire brush and washed with water. The surface should be liberated from any oil, dust and so forth. Laying of Soaked Brick bats (pieces) over new mortar, this goes about as a protection for warm solace. Surface brick Layer has thickness in the middle as 70 mm to 150 mm (Average thickness of 110 mm). It is fundamentally giving inclination or tilted slant to the RCC roof. So water won't continue gathering there, in any case there is leakage, splits, organisms, coming up short of structures. This method is normally done at Toilets, Terrace, and Basements.

Membrane Type Waterproofing is a film is a slight layer of watertight material that is laid over a surface. This layer is persistent and doesn't permit water to go through it. For instance, on a level patio, a waterproofing film could be laid over the basic section and underneath the completion tiles. These films are made out of slim layers of waterproof material. Most are around 2 to 4 mm thick. There are basically 2 sorts of films, sheet-based layers and fluid applied layers. In a perfect world, a waterproofing layer should be solid, adaptable, tear-safe and versatile so it can stretch to cover breaks and furthermore move with the structure.

Injection grouting is a procedure of filling the breaks, voids or honeycombs under tension in cement or stone work basic individuals for fixing of splits, fortifying of harmed cement or brick work basic individuals. Grout is a stream capable plastic material and should have immaterial shrinkage to fill the hole or voids totally and should stay stable without splitting, de-overlay or disintegrating. There are various sorts of grouts utilized for fix and reinforcing of cement and brick work basic individuals. The determination of kind of grout for specific sort of cement or workmanship fix work should be founded on the similarity of the grout with the first material.

2.0 METHODOLOGY

Writing study is done to recognize further steady data for the specific venture. This comprises of suggesting past research articles and strategy explanations. Field review is finished by visiting waterproofing organizations, talking with tenants, visiting significant building locales, meeting modern experts and visiting structures with waterproofing issues. Contrast the ability of each waterproofing item by performing estimations. Writing review is finished by covering principle territories with respect to waterproofing in structures. At first writing clarifying accessible waterproofing techniques was concentrated so as to limit the examination zone of the exploration.

Waterproofing is a wide theme covering various zones in the development segment. In this way, starting phase of the writing study assisted with narrowing down the exploration just to the waterproofing Methods. At that point the philosophies for the utilization of various types of waterproofing materials were suggested. This is finished by contemplating pertinent technique proclamations and item leaflets. The writing with respect to correcting techniques will be concentrated so as to get a thought regarding how the fixing functions should be done when issues are found in a structure.

2.1 Gathering data of actual existing work by visiting a site and locating problems

Field overview is done so as to watch the waterproofing materials and application techniques in structures. Quality controlling measures and standard testing techniques are seen during the field study. Aside from that, we met various industry experts from various waterproofing organizations to get a thought regarding the regular issues, which can happen in structures. Additionally, nearby market study is done on waterproofing materials accessible for waterproofing process. Imperfections in building structure involve extraordinary concern and should be given consideration. A large portion of the issues looked by elevated structure are the between floor water leakage issues. After assortment of information we visited distinctive building destinations for investigation of territories or area of waterproofing. At that point we distinguish the issues in the territories of waterproofing. Imperfect waterproofing can be the underlying driver of deformities that identified with dampness. Regardless of all the new innovations, there is none of the arrangement in construction regulations to investigate water leakage issues. The poor workmanship during utilization of the materials and off base usage of the structure is the primary explanation behind the disappointment of waterproofing frameworks. Following are some key reasons for the building leakages are

- Ratio of concrete mix is not proper.
- No legitimate vibration while cementing.
- Concrete isn't being thick
- Water curing and Selection of concrete raw materials is not done properly.
- Workmanship is not properly done.

There are numerous prospects that water can infiltrate through the structure, among them are through breaks, extension joints, opening in dividers and rooftop and furthermore it can leak through walls that are inclined to permeable trademark. Water can make exorbitant harm to a structure through different ways which is through overwhelming downpours, leaking through the outside introduction, spilling from plumbing and splitting and so on. The waterproofing framework should turn into a

piece of structuring and specifying for guaranteeing the best possible establishment of every segment. Quality control to be accepted, for example, to check pre-pour arrangements for section castings, to oversee at the cluster plant, to oversee at the solid arrangement, to check pre-pour establishment for seals and hoses preceding throwing of divider components, to guarantee legitimate compaction and arrangement of cement during throwing, to guarantee legitimate and adequate relieving of cement in the wake of throwing, to review development joints for surrenders before establishment of layers, to guarantee appropriate records were saved for all exercises and so on. A portion of the reasons for leakage are clamminess, dampness, wetness or indications of soddenness on floor, divider, roof or top of the structure. After that the assessment incorporates the water leakage area and its causes by the physical confirmation.

2.2 Enquiry about methods and waterproofing products used and market survey

We had recognize the waterproofing strategy and items utilized on the individual building site by considering the materials utilized, barometrical states of the area. The old customary frameworks of waterproofing have certain confinements and being supplanted by current waterproofing frameworks. These are various sorts of waterproofing, for example, admixtures, impregnation, film shaping layer, surfacing, joint seal and grouting.

It incorporates neighborhood showcase overview on waterproofing material accessible for waterproofing process. Examination of various Water sealing Materials: It included estimation and costing of the waterproofing zone dependent on available overview. There are umpteen organizations accessible and wide material accessible for various waterproofing materials of various level and various issues. The numerous materials and chemicals used for water proofing include polyvinyl chloride, hypalon, and ethylene propylene diene monomer. Framework improvement has been among the engaged needs in India. Waterproofing is one of the significant territories where numerous new items are coming up. We investigate the 10 best waterproofing materials fit to the Indian atmosphere. Moreover a Portion of the waterproofing items utilized in the development business which is accessible in advertise are recorded beneath

- Dr Fixit
- Syn roof Hi-Build
- FOSROC

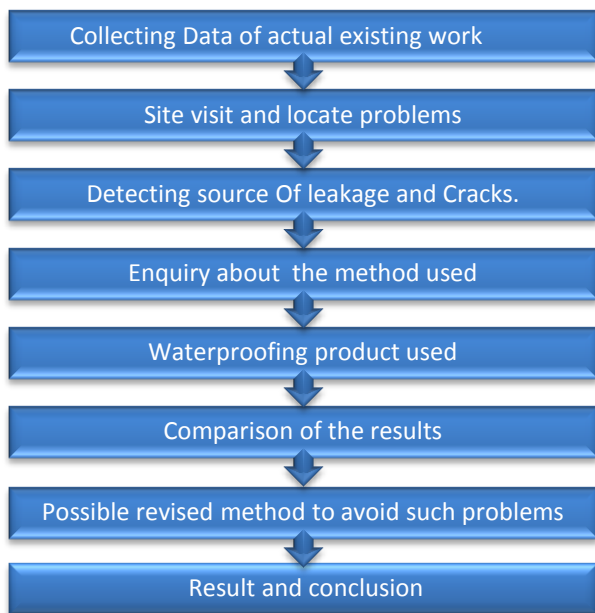
After distinguishing different waterproofing technique and waterproofing materials, we contrasted among them to locate the best possible waterproofing specialist. In

In addition, we compared the specialists on different parameters, for example

- Maintenance and repair cost
- Location and size of the project
- Product quality and durability
- Professional personal involvement and trained applicators
- Availability of products
- Cost and Guarantees

When the overview work is finished, the following work is to discover and propose legitimate solutions for the equivalent. The fundamental thought of this undertaking is to guarantee that the cures proposed by us end up being powerful in controlling the hazard of leakage and drainage issues. The therapeutic measure must not be just successful yet additionally monetary. It should be effectively accessible. The execution must be straightforward and not tedious.

2.3 Flow Chart of Methodology



3.0 RESULTS AND COMPARISON

3.1 Comparison between waterproofing methods:

Parameter	Brick Bat Coba	Sheet Membrane	Injection Grouting
Cost	Rs 150 to Rs 225 per square feet	Rs 170 to Rs 250 per square feet	Rs 1100 per Grout
Cost of	Rs 350 per	Rs 400 per	Rs 500 per

Labour Guarantee	Labour	Labour	Labour
12 years	15 years	10 years	
Maintenance Period	After 10 years	After 12 years	After 8 years
Type of Labour Required	Skilled and Unskilled	Skilled	Skilled

3.2 Comparison between waterproofing chemicals:

Parameter	Dr Fixit	FOSROC
Cost	Rs 160 to Rs 550 per Litre	Rs 40 to Rs 340 per Litre
Guarantee	10 to 12 years	8 to 10 years
Maintenance Period	After 12 years	After 10 years
Availability in Market	Easily Available	Easily Available
Type of Labour Required	Skilled and Unskilled	Skilled and Unskilled
Product Quality	Best	Good
Product Durability	8 years	7 years

Henceforth we can say that on location the most appropriate synthetic is Dr. Fixit and the most feasible method of waterproofing is Brick Bat Coba.

4.0 CONCLUSION

The development business must bend over backward to tackle the issues that are natural in the utilization of current materials and advancements. As of late the expanding cost of new development just as of fixes and rebuilding of built structures, drove basically by heightening crude materials and work costs, is making venture designers and proprietors settle on successful and propelled waterproofing items and arrangements. There is likewise an expanding observation among the undertaking engineers and proprietors that the enduring solid structures alone should not get the job done. The prerequisite of waterproofing should be combined with "style" and furthermore with the "natural requests". From the above outcome we can reason that the penetrability of Dr. Fixit is diminished when contrasted with that of FOSROC. Henceforth we can say that on location the most appropriate synthetic is Dr. Fixit in order to expand the life of structure and the best feasible method of waterproofing is Brick Bat Coba. We can likewise presume that the development procedure needs legitimate oversight, better workmanship, utilization of synthetics in required sum, subjective materials and critically support of auxiliary parts.

REFERENCES

1. Dhiren J. Panchal, Nehal H. Shah, Chirag R. Sindhav, Chaitanya Joshi, Awadhesh Chauhan (2015) " Waterproofing challenges and suggested remedial measures for high rise building: A case Study". IJSRD-Vol.3, Issue 10.
2. Zhineng Tong (2015) " Research on waterproof technology of construction Engineering". Jiangxi Science and Technology normal University, (CMFE 2015).
3. K.P. Duleeka (2015) " Study of waterproofing methods of roof top slab".118609A University of Moratuwa, Sri Lanka.
4. Md. Azree Othuman Mydin, Mohd. Nasrun, Mohd. Nawawi, Muhammad Arkam Che Munaaim (2017) " Assessment of waterproofing failures in concrete buildings and structures" MCRJ Special Issue Volume. 2 No. 2.
5. Annu Baby, Jeena Mathew (2016) "Studies on properties on concrete with various waterproofing compounds". IOSR-JMCE, e-ISSN: 2278-1684, P-ISSN: 2320-334X, PP 14-20.
6. Nurul Asra Abd. Rahman*, Suryani Ahmad a, Zainab Mohamad Zainordin (2013), Perception and Awareness of Leaking for Toilet in Pre-cast Concrete Structure, Procedia - Social and Behavioral Sciences 85 (2013) 61 – 69.
7. Nur Liyana Othman*, Mastura Jaafar, Wan Mariah Wan Harun, Fuziah Ibrahim, (2014), A Case Study on Moisture Problems and Building Defects, Procedia - Social and Behavioral Sciences 170 (2015) 27 – 36.
8. Roslan Taliba, *, David Boydb, Susan Hayhowb, A Ghafar Ahmada, Mzailan Sulieman, (2015), Investigating effective waterproofing materials in preventing roof leaking; initial comparative study: Malaysia, U.K., Procedia Manufacturing 2 (2015) 419 – 427.
9. Maria Ratajczak, Michal Babiak, Marcin Bilski, Krzysztof Zielinski, and Jacek Kosno (2018) " Innovative Methods of Bitumen Modification Used in Waterproofing, International journal Of Engineering and Technology, Vol.10, No.4.
10. A. GEETHA1,* and P. PERUMAL, (2011), Asian Journal of Chemistry; Vol. 23, No. 11 (2011),5145-514.