A

Seminar report

On

HIGH PERFORMANCE CONCRETE

Submitted in partial fulfillment of the requirement for the award of degree
Of Civil

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Acknowledgement

I would like to thank respected Mr…….. and Mr. ……..for giving me such a wonderful opportunity to expand my knowledge for my own branch and giving me guidelines to present a seminar report. It helped me a lot to realize of what we study for.

Secondly, I would like to thank my parents who patiently helped me as i went through my work and helped to modify and eliminate some of the irrelevant or un-necessary stuffs.

Thirdly, I would like to thank my friends who helped me to make my work more organized and well-stacked till the end.

Next, I would thank Microsoft for developing such a wonderful tool like MS Word. It helped my work a lot to remain error-free.

Last but clearly not the least, I would thank The Almighty for giving me strength to complete my report on time.

Preface

I have made this report file on the topic, **HIGH PERFORMANCE CONCRETE;** I have tried my best to elucidate all the relevant detail to the topic to be included in the report. While in the beginning I have tried to give a general view about this topic.

My efforts and wholehearted co-corporation of each and everyone has ended on a successful note. I express my sincere gratitude to ……..who assisting me throughout the prepration of this topic. I thank him for providing me the reinforcement, confidence and most importantly the track for the topic whenever I needed it.

Introduction

High performance concrete is a concrete mixture, which possess high durability and high strength when compared to conventional concrete. This concrete contains one or more of cementious materials such as fly ash, Silica fume or ground granulated blast furnace slag and usually a super plasticizer.

The term ‘high performance’ is somewhat pretentious because the essential feature of this concrete is that it’s ingredients and proportions are specifically chosen so as to have particularly appropriate properties for the expected use of the structure such as high strength and low permeability.

Hence High performance concrete is not a special type of concrete. It comprises of the same materials as that of the conventional cement concrete. The use of some mineral and chemical admixtures like Silica fume and Super plasticizer enhance the strength, durability and workability qualities to a very high extent.

What is High Performance Concrete?

High Performance Concrete (HPC) is a specialized series of concretes designed to provide several benefits in the construction of concrete structures:

Performance Benefits

- ease of placement and consolidation without affecting strength
- long-term mechanical properties
- early high strength
- toughness
- volume stability
- longer life in severe environments

Cost & Other Benefits

- less material
- fewer beams
- reduced maintenance
- extended life cycle
- aesthetics

APPLICATIONS

- BRIDGES
- HIGH RISE BUILDINGS
- TUNNELS
- PAVEMENTS
- NUCLEAR STRUCTURES

Objectives

To put the concrete in to service at much earlier age, for example opening the pavement at 3-days.

To build high-rise buildings by reducing column sizes and increasing available space.

To build the superstructures of long-span bridges and to enhance the durability of bridge decks.

To satisfy the specific needs of special applications¬ such as durability, modulus of elasticity, and flexural strength. Some of these applications include dams, grandstand roofs, marine foundations, parking garages, and heavy industrial floors.

General Characteristics

High-performance concrete characteristics are developed for particular applications and environments; some of the properties that may be required include:

High strength

High early strength

High modulus of elasticity

High abrasion resistance

High durability and long life in severe environments

Low permeability and diffusion

Resistance to chemical attack

High resistance to frost and deicer scaling damage

Toughness and impact resistance

Volume stability

Ease of placement

Compaction without segregation

Inhibition of bacterial and mold growth

Advantages

1. Reduction in member size, resulting in increase in plinth area/useable area and direct savings in the concrete volume saved.

2. Reduction in the self-weight and super-imposed DL with the accompanying saving due to smaller foundations.

3.Reduction in form-work area and cost with the accompanying reduction in shoring and stripping time due to high early-age gain in strength.

4. Construction of High –rise buildings with the accompanying savings in real estate costs in congested areas.

5. Longer spans and fewer beams for the same magnitude of loading.

6. Reduced axial shortening of compression supporting members.

7. Reduction in the number of supports and the supporting foundations due to the increase in spans.

8. Reduction in the thickness of floor slabs and supporting beam sections which are a major component of the weight and cost of the majority of structures.

9. Superior long term service performance under static, dynamic and fatigue loading.

10. Low creep and shrinkage.

11. Greater stiffness as a result of a higher modulus Ec.

12. Higher resistance to freezing and thawing, chemical attack, and significantly improved long-term durability and crack propagation.

13. Reduced maintenance and repairs.

14. Smaller depreciation as a fixed cost.

Limitations

High Performance Concrete has to be manufactured and placed much more carefully than normal concrete.

An extended quality control is required

In concrete plant and at delivery site, additional tests are required. This increases the cost

Some special constituents are required which may not be available in the ready mix concrete plants.

Conclusion

The design of HPC is met when materials are optimized to produce a strong durable concrete.

The water, cementitious¬ materials, aggregates and chemical admixtures all need to be proportioned effectively to deliver the mix with the most desirable properties for placement, finishing, curing, and hardened condition.

The designs are not cook¬ book and in most cases require that the mix be trial batched to compare the fresh and hardened properties.

As mentioned earlier in¬ this section, the designer needs to be innovative with his materials and the proportioning of these materials.

Once the mix has been¬ designed and prepared, ensure that enough material is available to make additional tests for durability.

References

www.studymafia.org
www.google.com
www.wikipedia.com