?4u QUIZ : 34

Participate in quiz and win a EXECUTIVE Pen.

Question :

The cement whose strength is a little lower than the ordinary cement during the first three months but attains afterwards the same strength, is known as

Options :

(A) low-heat Portland cement

(B) rapid hardening Portland cement

(C) Portland blast slag cement

(D) Portland pozzolana cement

To send the right answer type : your Name, Option (Example : jigar patel, C) and send it to 7574890651

Last date to send the right answer : 31st December'19

Name of the winner will be declared in the next issue.

Result of Quiz : 33
Right Ans.
(C) medium
Winner :
Mr. Vimalesh Patel,
Consulting Engineer - 9825908064
Lucky draw done by
Str. Er. Vrajlal Ambaliya, Surat

SANGHI CEMENT

Readers are requested to forward their valuable articles, views and suggestions to

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Quarter - 03 - 2019 • Issue - 44

4U

SANGHI CEMENT

Sulphate Resistant Cement

From the Editor's Desk...

Dear Reader,

Greetings from Sanghi Cement !

In this edition of 4U, we will discuss about a unique type of cement **'Sulphate Resisting Portland Cement'**. In this article we study about the composition, properties, characteristics, uses, advantages and disadvantages of this type of cement.

We will also interview leading 'Consultants - Architects and Structural Engineers', to learn and share their best practices and give a glimpse of their top projects.

We also discuss about few important areas like 'Dry Mix process and Wet Mix process of Shotcrete Construction', 'Frost actions in the Soil', 'Methods of Strengthening Existing Concrete Walls', 'Important Construction Events Watch' etc. & a round up of efforts invested in the form of Technical Activities done by our Care Services Team to improve construction quality at site, Registration meetings for 'Sanghi Unnati Mobile Application' for Contractor - Masons. We also cover a glimpse of our 'Thanksgiving' to a few leading Consultants, for their efforts in improving site construction practices & for their contributions to the industry.

Please share your valuable feedback & suggestions to make our effort more informative & effective. We will surely be glad to receive them at pavan.sethi@sanghicement.com.

Wish you happy reading.

Pavan Sethi
Sr. Manager - Care Services

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Sulphate Resistant Cement

Sulphate Resisting Cement is a type of Portland Cement in which the amount of tricalcium aluminate (C_3A) is restricted to lower than 5% and ($2C_3A + C_4AF$) lower than 25%, which reduces the formation of sulphate salts. The reduction of sulphate salts lowers the possibility of sulphate attack on the concrete.

In this article we study about the composition, properties, characteristics, uses, advantages and disadvantages of sulphate resisting cement.

Composition of Sulphate Resisting Cement

Due to very low range of tricalcium aluminate in sulphate resisting cement, a very small quantity of calcium aluminate is formed on hydration. The formation of calcium sulpho- aluminates which formed due to reaction of calcium sulpho-aluminates which formed due to reaction of calcium sulphoaluminate and sulphate salts is considerably reduced with use of sulphate resisting cement. The sulphate aluminates are highly expansive in nature and cause maximum damage to the concrete.

Properties of Sulphate Resisting Cement

The properties of sulphate resisting cement are,

Table 1: Properties of sulphate resisting cement

Property	Values
Fineness	280±10 sq m /kg
Setting time	
Initial	80 min
Final	240 min
Soundness	
Lechatelier (mm)	2 (max)
Autoclave	0.25(max)
Compressive strength	
3 days	30 ± 3
7 days	45 ± 3
28 days	65 ± 3
Tri calcium aluminate	0.035
Magnesia	0.02
Loss on ignition	0.02

Characteristics of Sulphate Resisting Cement

1. This cement provides maximum resistance to chloride ions – minimising the risk of corrosion of reinforced steel.
2. It also provides high level of concrete performance and structural integrity in highly aggressive sulphate and acidic environments.
3. It also has increased workability and pumpability.
4. This cement has significantly improved later-age concrete strengths.

Uses of Sulphate Resisting Cement

Sulphate Resisting Cement is recommended for following type of constructions :

1. Foundations.
2. Piling works.
3. Construction in contact with soils or ground water having more than 0.2% or 0.3 % g/l sulphate salts respectively.
4. Concrete surfaces subjected to alternate wetting and drying such as bridge piers, concrete surface in tidal zone, apron etc.
5. Effluent treatment plans.
6. Chimney, cooling towers.
7. Coastal protective works such as sea walls, break waters, tetrapods etc.
8. Building near seacoast.
9. Chemical industries, water storage, sumps, drainage works.
10. Suitable for underground works where Sulphate is present in the Soil and water.

Fig 1: Use of Sulphate Resisting Cement in Pile Construction

Advantages of Sulphate Resisting Cement

1. The use of sulphate resisting cement provides excellent protection against the formation of sulpho-aluminates and consequent resistance to concrete against sulphate attack.
2. Very high compressive strength by economic concrete mix design.
3. Very low heat of hydration helps to avoid shrinkage cracks.
4. Improves life and durability of structures under aggressive conditions.
5. Improves corrosion resistance of steel by preventing sulphate attack.

Disadvantages of Sulphate Resisting Cement

1. Sulphate resisting cement is not suitable where there is danger of chloride attack. This will cause corrosion of rebar.
2. If both Chlorides and Sulphates are present, Ordinary Portland Cement with C_3A between 5 & 8 should be used.
3. Curing process should be done properly with great care for min of 8-10 days.
4. It is not prescribed to use it in marine construction.

SANGHI CEMENT

Technical Activities

Contractor registration for Sanghi Unnati App

Glimpses of Architects & Engineers meet at Gujarat

Site training programme

Realty+ awards conclave, Mumbai

Thank you Er. / Ar.

Plant visit by Engineering College students of Kutch

School Building - Silvassa

Silvassa Municipal Bhavan - Silvassa

School building - Mandoni

Face-to-Face

Str. Er. Ashish Shah

Name of Firm : Suraj Consultancy
Address : 1st Floor, K.D.C.C. Bank Building,
Opp. Navliwala Building,
Station Road, Anand -388001.
Ph. (02692) 251474.
E-Mail : arssuraj@gmail.com,
ars_suraj@yahoo.com.

Professional Affiliation and Association:

- Associate Member of Indian Institute of Engineers
- Registered as a Structural Engineer with AVKUDA, VUDA and AUDA

Career Path:

- B.E. (Civil), A.M.I.E., M.E. (Structures)
- Working in name of 'Suraj Consultancy" since 2000
- Visiting Faculty at Department of Technology, CEPT University since 2004

Landmark Projects :

- School building at Silvassa
- Silvassa Municipal Bhavan
- School building at Mandoni
- Silvassa district panchayat building
- Hostel building at Galonda
- Ashoka Towers at Bhayli, Vadodara

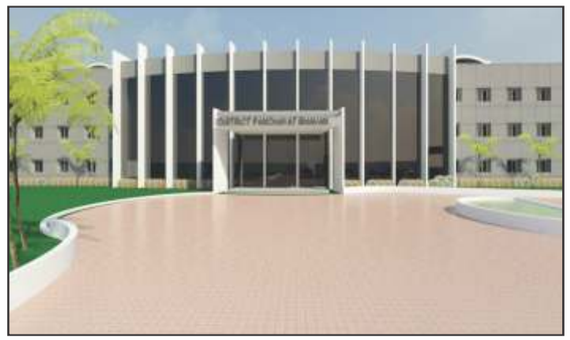
Professional Gurus :

Dr. A. M. Antani, Late Shri J. P. Vyas.

Mission :

To give best to the profession and society.

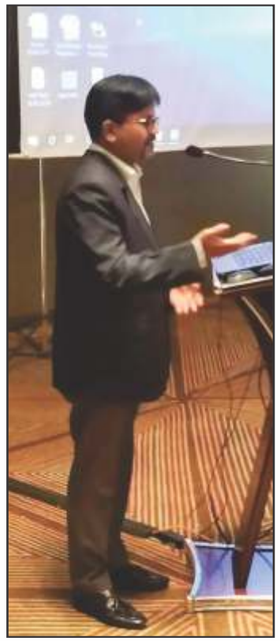
Silvassa District Panchayat - Silvassa



Hostel Building - Galonda

Ashoka Towers - Bhayli, Vadodara

Glimpses of Architects & Engineers meet at Gujarat



Health Tips

Powerful Habits of the Most Healthy and Productive People

1. Become familiar with your "why."

Every superhero journey, space saga, business pursuit, or artistic endeavour starts with a "why". It all starts with knowing why you're doing what you're doing.

2 Scheduling is everything.

If you talk about it, it's a dream, but only once you mark it on your schedule does it become an actual thing. Many proclaim they want to get healthier, start a business, and quit their job, but what story is their schedule telling?

Talk is great, but the action is even better. If it's a priority, then it'll make its way onto your schedule.

3. Think big, but take small and actionable steps.

Pursuing new goals and improving on current endeavours can feel overwhelming initially. If you feel overwhelmed, this means you're trying to take too big of a step.

Don't quit, just make your daily actions smaller. Keep breaking your goal down until it's something that feels manageable in the current moment.

4. Daily routines are key.

What you do on a consistent basis matters more than what you do sporadically. Daily routines are essential because they instill discipline and structure to your day. Your daily routines start with establishing morning habits that propel you to success for the day.

5. Rest is essential.

In a world that awards badges of honour to those who overwork and hustle themselves into the ground, it's important to not overlook your rest and recovery.

To fire on top cylinders requires that you allow your body some downtime to recharge through sleeping.

Without sleep, your waistline, productivity, happiness, and bottom line will suffer.

6. Action (even imperfect) takes precedent over everything else.

Fortune favours those who show up and take action, even if it's imperfect. You're only going to improve once you step onto the playing field. Planning and planning is a disguised version of procrastination.

7. Commit to the long term game.

We live in a microwave generation where many want results yesterday and since they don't have them today, they give up or start complaining. Unfortunately, success doesn't operate under a microwave vacuum.

To truly succeed with your health and improve your productivity requires patience and experimentation. Everything isn't going to work out at the beginning, nor will the journey be smooth sailing.

Understand that chasing immediate gratification only leads to long term agony and disappointment.

8. Be mindful of your environments.

You are who you hang out with and where you spend your time at. If you hang around those who eat junk food and don't prioritize their personal growth, then expect yourself to follow a similar path.

Your environment is pivotal because it has the ability to affect the way you see the world and how you interact with it.

Take an assessment of the company that you're currently keeping. Are they inspiring you or deflating your spirits?

9. Be mindful of what you consume.

Not only with what you eat but also with what you're consuming in regards to what you read and listen to. Understand that if you want to change your business, life and body, then this stats with changing your daily consumption habits.

10. Don't play the comparison game.

The most energy-draining game to play is the comparison game. In today's hyper-connected world, it's easy to fall into this trap because around every corner is someone seemingly doing something way cooler and bigger than you. They're healthier looking, richer and having more fun, but don't fall for this illusion.

Understand that your specific journey is about you and only you. You are your only competition. Don't let the illusion of someone's full-length feature film compete and compare with your raw and unedited behind the scene footage.

Soil

Frost Action in Soils

The two critical frost actions in the soil are the frost heave and the frost boil.

Frost heave is the phenomenon in which the water molecules present in the pores freeze during lower temperature which results in the expansion of the soil.

Frost boil is the phenomenon of loosening of the soil when the frozen soil starts to thaw. Frost boil occurs after the frost heave process.

The main features of frost action and the methods to prevent this are explained briefly.

Frost Heave in Soils

When the atmospheric temperature falls below the freezing point, the water molecules present in the soil pores freeze and ice is formed. These water molecules are mainly moving from the bottom of the water table to the upper portion of the soil. Formation of ice in the soil pores results in the increase in the volume of the soil. This is because the water to ice conversion brings an increase in volume by 9%. So every pore experiences a heave due to the increase in volume. This is called as frost heave.

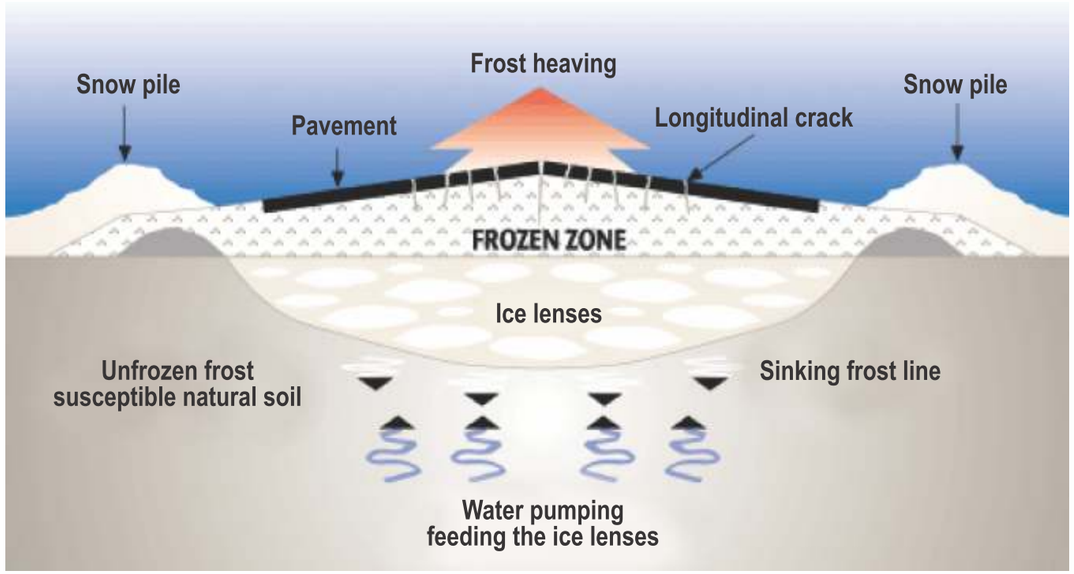


Fig.1. Frost Heave in Pavement

The frost heave results in the soil present on the ground level to lift up. This is one of the major issues when light structures are constructed over the ground.

In actual condition, the frost heave occurred is more than what is expected. This is because the formation of ice lenses disturbs the nearby water film of the soil particles. This can disturb the soil suction and overall equilibrium, which in turn draws more water to the top. Hence the frost heave is caused to almost 20 to 30 percent of the soil depth. The soils that are more prone to frost heave action are silts and fine sands.

Frost Boil in Soils

Once the frost heave has occurred, a decrease in temperature results in the thawing of the ice formed. This results in the liberation of free water in the upper layers. The process of thawing is started at the top layers and it moves down with time.

This way the soil in the upper layer is softened and loosened while the bottom layers are in the frozen state. This phenomenon of softening of soil is called frost boil.The effect of frost boil adversely affects the structures constructed on the ground. This is a major issue observed in highway pavements. Under the action of wheel loads, the soft soil and water get extruded out, thus creating a hole. This can result in breaking of pavement if the condition is extreme. This would result in the exposure of subsoil.

Silty soils are most affected by this. These soil types have lower plasticity index and behave softly for smaller water content.

Prevention of Frost Action in Soils

Frost heave and frost boil bring large maintenance issue in the case of highway and runways. The following measures can be undertaken to mitigate the frost action in soils:

1. The most effective method to prevent frost action is to replace the soil that is prone to frost action with coarse-grained soils like gravels or coarse sand. As the water in coarse-grained soil drains out quickly, there is no chance for frost action to occur.
2. Providing an insulation blanket between the water table and the ground helps to avoid the migration of water to the top. The insulation blanket is a layer of gravel provided at a thickness of 15 to 30cm.
3. Provision of good drainage system prevents the frost action by lowering the water table level and also drains out the water formed after the process of thawing.

The Bayterek, Kazakhstan

- Kazakh legends have it that on the World River bank, there grows the Tree of Life, called Bayterek. Samruk the holy bird of happiness is flying to it to lay a golden egg in the nest, located on its top. The egg symbolizes the Sun, granting life and hope. But beneath, there is Aydakhar, a wicked dragon, hiding among the roots and wishing to eat the egg.
- This is a Kazakh version of the universe. Quite recently, Bayterek, a folklore symbol, was embodied in a beautiful tower, resembling the ever-lasting fight of good and evil. It ushered in a new stage in the people's life, becoming a symbol not only of Astana, but also of the whole country.
- The tower's total height is 97 meters, excluding a basement floor, which houses aquariums, Bayterek Gallery and a small cafe. The tower is supported by 500 piles and its weight exceeds 1,000 tons. Thereat, a large glass ball on the top of Bayterek is 22 meters in diameter and weights almost 300 tons. Inside the tower there is an elevator able to lift the visitors to the height of 86 meters, to the panorama hall with beautiful view of Astana. The hall is occupied by a wooden globe with 17 petals, symbols of the world's religious movements and an impression of the palm of Nursultan Nazarbaev, Kazakhstan's first President. The Bayterek architect is Akmurza Rustembekov.

Project Profile

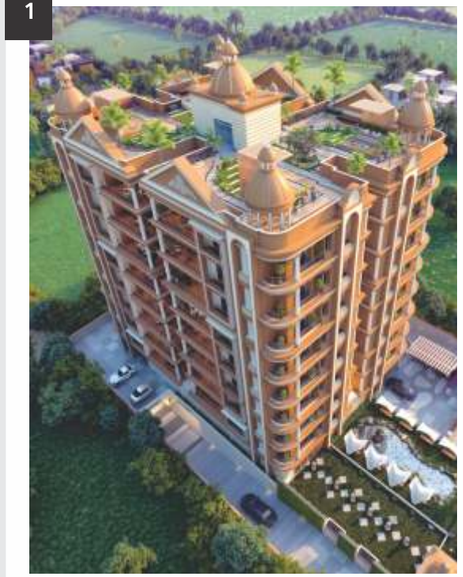
Dr. Vinubhai R. Patel

Zarna Associates
E-mail : zarnaasso@yahoo.com
Mail@zarnaassociates.com

1 Shreenathji Palace - Vadodara
High rise building with iconic dome type roof and palace type look with minimum columns to have good parking space at ground level.

2 Laxminarayan Resort - Vadodara
80 ft long span-column free structure

1



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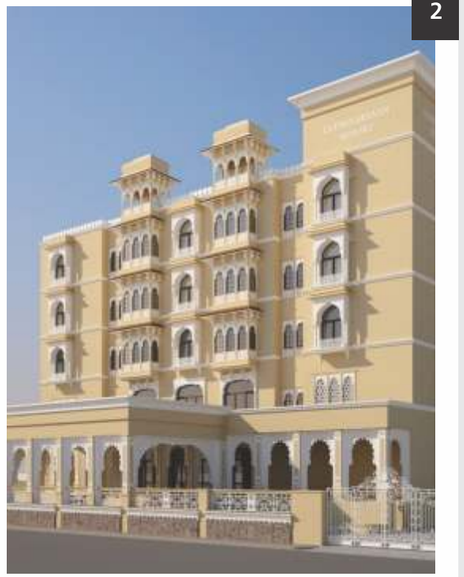

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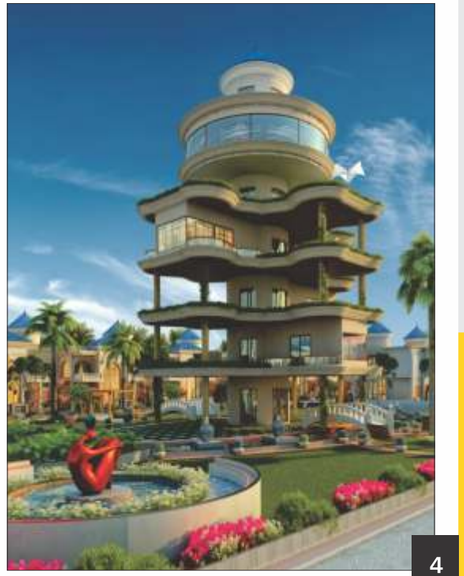


4

3 Sayaji Hotel - Vadodara
Hotel building with column free banquet hall and with terrace swimming pool

4 Shreenathji Villa Club House - Vadodara
Special Unique Structure Architecturally challenging Project

Dry Mix and Wet Mix Process for Shotcrete

Dry mix process and wet mix process are the two methods of shotcrete construction which are based on the time at which the water is added to the mortar or concrete mix. In Dry mix process, water is added at the nozzle, while water is added in the concrete or mortar mix in wet mix process.

The principle, advantages and disadvantages of dry and wet mix shotcrete process is explained below.

Dry Mix Process for Shotcrete

Dry mix shotcrete means" the shotcrete in which most of the mixing water is added at the nozzle."

Fig.1: Dry Mix Process; Image Courtesy: Concrete Construction

Dry Mix Shotcrete Principle

The dry mix process involves the mixing of cement and wet aggregates at required proportion before supplying it to the shotcreting device. The thoroughly mixed ingredients are then placed on the device hopper. During the shotcreting operation, the mix, under the action of compressed air is taken from the hopper to the nozzle through the delivery hose of the equipment.

Once the dry mix reaches the nozzle, water under high pressure is sprayed to the mix through a perforated ring attached to the equipment. While spraying, the water wets the dry mix. Thus, the required wet concrete or mortar mix is jetted at a higher velocity on the surface to be shotcreted.

The amount of water added for the dry mix shotcrete process is either controlled by the nozzleman or placing operator. The water is controlled by means of a valve present in the device.

The dry mix shotcrete is applied in areas where there requires fewer placements and no or limited vehicle access.

Advantages of Dry Mix Shotcrete Process

The main advantages of dry mix shotcrete process are:

1. Increased Bonding ability and bonding strength
2. The water content is controlled at the nozzle
3. Less waste is created during dry shotcrete
4. Low investment

Disadvantages of Dry Mix Shotcrete Process

The main disadvantages of dry mix shotcrete are:

1. Experienced nozzleman is required to control the water content varied through nozzle adjustment
2. Possibilities of making shotcrete with variable water-cement ratio and water content
3. Higher cost
4. Spraying operation is tough
5. High dust emission
6. Water-cement ratio of the mix is dependent on the nozzle operator
7. Difficulty in addition of admixtures

Fig.2: Wet Mix Shotcrete Equipment

Wet Mix Process for Shotcrete

The wet mix process involves the mixing of all ingredients to form mortar or concrete with required water content. Here, the mix to be shotcreted is prepared before placing it in the shotcreting equipment. The delivery equipment used can be either a positive displacement type or a pneumatic-feed.

Wet Mix Shotcrete Principle

The process involves forcing the wet mix to the nozzle through the delivery hose by means of compressed air. The mix is then shot at high velocity on the surface to be shotcreted.

As shown in the figure-2 above, the mixed ingredient is delivered to the shotcrete pump by means of a transit truck.

Fig.3: Roboting Spraying Equipment for wet mix shotcrete process in tunnel Construction

Here, the nozzleman can only control the rate and amount of compressed air introduced. There is no direct control over the concrete or mortar properties by the nozzleman.

As the wet mix prepared requires transportation facilities, it is employed in large area construction and where the access of vehicle is not a concern.

Advantages of Wet Mix Shotcrete Process

1. The water content is controlled more precisely
2. Cost of the process is lesser
3. Labour required is less
4. The spraying operation is easy as the mix is prepared before
5. The air consumed is less
6. Admixtures can be added as per design requirement

Disadvantages of Wet Mix Shotcrete Process

1. Bond strength and tensile strength is less
2. Wastage of materials
3. Transportation of wet mix will require high control

Port, Fortresses and Group of Monuments, Cartagena
Situated in a bay in the Caribbean Sea, Cartagena has the most extensive fortifications in South America. A system of zones divides the city into three neighbourhoods: San Pedro, with the cathedral and many Andalusian-style palaces; San Diego, where merchants and the middle class lived and Gethsemani, the 'popular quarter'.

Historic Centre of Santa Cruz de Mompox
Founded in 1540 on the banks of the River Magdalena, Mompox played a key role in the Spanish colonization of northern South America. From the 16th to the 19th century the city developed parallel to the river, with the main street acting as a dyke. The historic centre has preserved the harmony and unity of the urban landscape. Most of the buildings are still used for their original purposes, providing an exceptional picture of what a Spanish colonial city was like.

United Nations Educational, Scientific and Cultural Organization · World Heritage Convention

World Heritage sites by UNESCO **Colombia**

San Agustin Archaeological Park
The largest group of religious monuments and megalithic sculptures in South America stands in a wild, spectacular landscape. Gods and mythical animals are skillfully represented in styles ranging from abstract to realist. These works of art display the creativity and imagination of a northern Andean culture that flourished from the 1st to the 8th century.

Qhapaq Nan, Andean Road System
This site is an extensive Inca communication, trade and defence network of roads covering 30,000 km. Constructed by the Incas over several centuries and partly based on pre-Inca infrastructure, this extraordinary network through one of the world's most extreme geographical terrains linked the snow-capped peaks of the Andes – at an altitude of more than 6,000 m – to the coast, running through hot rainforests, fertile valleys and absolute deserts.

India to build world's first passenger hyperloop system

Virgin Hyperloop One and DP World are partnering to construct India's first hyperloop system, a high-speed transit technology, between Mumbai and Pune. The Maharashtra government has approved the entities as the 'original project proponent' (OPP).

India's longest electrified rail tunnel inaugurated in Andhra Pradesh

India's Vice President M Venkaiah Naidu recently inaugurated what is known as the country's longest electrified rail tunnel, in Andhra Pradesh. Constructed at Rs 4.37 billion in a record 43 months, the tunnel will provide seamless rail connectivity between Krishnapatnam Port and the hinterland areas for freight movement.

India's second multi modal terminal inaugurated

Prime Minister Narendra Modi recently inaugurated India's second riverine multi modal terminal built at Sahibganj in Jharkhand. Built at Rs 2.90 billion in about two years, the foundation stone of IWAI's Sahibganj multimodal terminal was laid in April 2017. This is the second of the three multi modal terminals being constructed on river Ganga under Jal Marg Vikas Project (JMVP).

Humour

Design

Strengthen Existing Concrete Wall

Strengthening of existing reinforced concrete walls becomes necessary either when they lose their strength and capacity to take up the stipulated loads or when you need to increase their load carrying capacity. This kind of rehabilitation is mostly required for walls constructed in high seismic zone areas.

Different retrofitting techniques can be applied by using the traditional materials or new materials for the strengthening of concrete walls.

Methods to Strengthen Concrete Walls

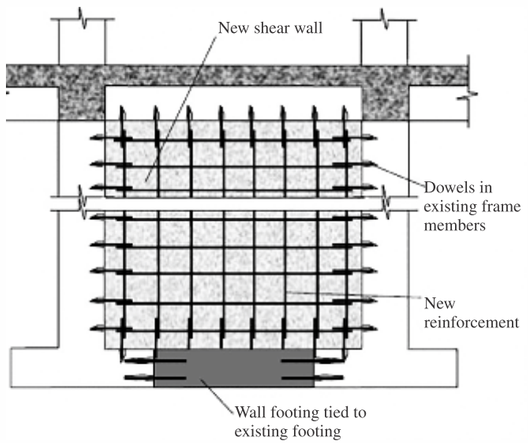
The methods of strengthening include :

1. Concrete Jacketing
2. Concrete Replacement
3. Retrofitting by Steel Materials
4. Shape Memory Alloys
5. FRP Laminates

1. Concrete Jacketing

This is a traditional retrofitting method, where the retrofitting technique is performed to increase the dimension of the wall. This increase in dimension is achieved by adding new concrete to the existing concrete wall. For this, additional steel reinforcement is placed to increase the strength and ductility of the RC wall.

The new steel reinforcement is made into a mesh of horizontal and vertical bars, which is then anchored to the wall foundation. The reinforcement mesh can also be inserted into a hole drilled into the foundation after which it is grouted by epoxy and sealed.



Fig,1. Constructing New Shear Walls with new Reinforcement

As the method focuses on the increase in the wall thickness, an increase beyond a limit increases the dead weight. This would demand the increase in load capacity of the existing foundation in order to take the additional weight.

2. Concrete Replacement

This is one of the simplest and cheapest way to restore the strength and the ductility of the R.C walls. The method initially involves the removal of the damaged concrete. The final surface is cleaned and brushed properly to remove all loose materials. If the reinforcement present in the compression zone is buckled in small amounts, then it should be straightened.

After the preparation is done, the formwork for the wall web is prepared. Into the formwork, fresh concrete is poured from one side of the wall. After concreting, the wall is cured. The top part of the wall can be completed by an epoxy grout as high strength is required to bring contact with the old concrete.

3. Retrofitting by Steel Materials

The use of steel for retrofitting R.C walls only adds a small weight to the old structure. It is a retrofitting technique that causes minimum disruption to the building occupants.

1. Retrofitting by Steel Sections: Steel plate sections are added to the R.C Wall surface which helps in increasing the strength, stiffness and the ductility of the wall structure. Based on the property to be enhanced, the steel plate section can be added either vertically or horizontally.

Fig.2. Coupled Steel Plate Shear Wall

2. Retrofitting by Steel Bracing: Use of steel bracings is common for moment resisting frame structures. Proper connections of the bracing with the existing walls ensure adequate strength, stiffness and ductility for the structure.

Steel bracing also increases the seismic performance of the R.C structure. Providing steel bracing at proper intervals on the R.C walls decreases the buckling length that in turn increases the capacity of the bracing member.

4. Retrofitting using Shape Memory Alloys (SMA)

Shape memory alloys have been gaining a great amount of attention in civil infrastructure researches it is to have a huge future in retrofitting of structure. The use of SMA for the retrofitting of RC walls is being studied through various tests and researches.

The SMA has the property of undergoing large deformations. When the stress applied to the SMA structure is removed, it regains its original shape. This means SMA gains ductility and energy dissipation capacity without undergoing any form of permanent deformation in the member.

5. Use of FRP Laminates

Use of composite materials like Fibre reinforced polymer (FRP) in different forms for retrofitting reinforced concrete wall is a method used from past decades. FRP gains high strength and high resistance to corrosion. In addition to this, they are light in weight and therefore can be applied easily.

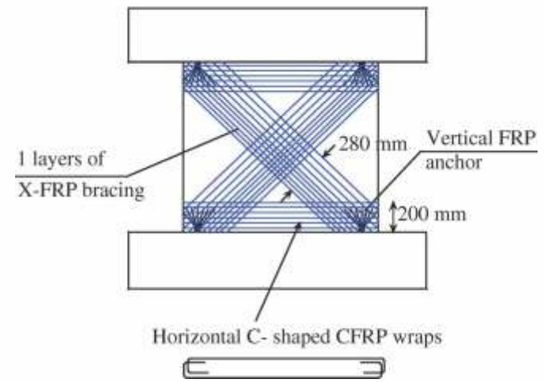


Fig.3. Use of FRP in Shear wall retrofitting

FRP can be used as laminates or sheets or as rods over the R.C wall. The efficiency of this retrofitting can be increased by prestressing the fibres. FRP composites is a fast and easy retrofitting technique.

Events Watch

Parking Infratech Expo 2019
20th – 22nd November 2019
Bombay Convention And Exhibition Centre,
Off Western Express Highway, Goregaon(East),
Mumbai, Maharashtra

Festival Of Architecture & Interior Designing 2019
06th - 07th December 2019
The Lalit, Sahar Airport Road, Andheri East,
Mumbai, Maharashtra

HBLF Show
21st - 24th November 2019
Helipad, Gandhinagar

Sthapatya Exhibition Surat
20th - 23rd December 2019
Vanita Vishram Ground, Surat

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SANGHI CEMENT

>90% of limestone purity — Superior Quality

100% Robotic Technology — Superior Consistency

22±2 MPa One Day Strength — Fast Construction

<314 KJ/Kg Heat of Hydration at 28 Days — Crack Free Construction

CCC Consumer Care Centre — Information Related to Construction

Turning Dreams into ***Concrete Reality***