# FOUNDER


**Civil Engineering Department will always remember your directions…**

# DREAM INSTITUTE OF TECHNOLOGY

DEDICATION ● RESERCH ● EDUCATION ● ADVANCEMENT ● MOTIVATION

ISO 9001:2015 CERTIFIED

Affiliated to Approved by NBA Applied DIT IEDC Funded by Institution's Innovation Council Indian Chamber of Commerce Eduskills West Bengal Innovation Network Heartfulness WF Global

5 Star ★★★★★ Place to Work

Perfect Workplace for Women

**CHAIRPERSON**

SUSMITA SARKAR

**PRINCIPAL**

PROF. (DR.) DIPANKAR SARKAR

DREAM INSTITUTE OF TECHNOLOGY

DEDICATION ● RESERCH ● EDUCATION ● ADVANCEMENT ● MOTIVATION

ISO 9001:2015 CERTIFIED

5 Star ★★★★★ Place to Work

Perfect Workplace for Women

# Cividge

## Annual departmental magazine

## Year of publication: 2021-2022

## Publisher: CE Department

# Shear strengthing of RC beam using RFRP Composites

Partial or complete replacement of non renewable composite materials with natural fiber reinforced polymer composites such as basalt fiber, carbon, fiber and glass fiber reinforced polymer composite can reduce the consumption of non renewable resources and damage to the ecological environment in the civil engineering construction.

With the continuous development of new technologies and new processes in the field of engineering ,higher requirements are imposed on new materials, which not only require excellent mechanical properties and good durability, but also have environmental protection, renewable and degradable functions.

. Shear failure is one of the most important concepts in concrete structural members. Shear failure is caused by shear forces. RC members resist shear force using several mechanisms. The shear failure is tolerated in RC beams by providing web reinforcement. The web reinforcement usually takes the form of vertical stirrups or the 45° bars that surround the longitudinal bars along the faces of the beam.

The main goal of the present study is to design and develop ANN and ANFIS models for estimating RC beam shear strength. The performances of the models were evaluated and the results were compared with empirical ICI and ACI concrete codes. Several empirical formulas were used for computing the shear strength of RC beams in concrete codes. The models were applied in the prediction of the shear resistance strength of RC beams.

**Name:** Avranil Hazra

**Year:** 2nd Year

# Highway construsion Survey

The applications of surveying may be explained in following points:

1. To prepare the topographical map which shows hills, rivers, forests, valleys, etc.
2. To prepare the engineering map showing engineering details like highways, railways, canals, dams, reservoirs, etc.
3. To prepare the contour map to determine the best possible route and amount of earthwork required.
4. To prepare the geographical and political map.
5. To prepare archeological map showing the places where ancient relics may have lied.
6. To prepare cadastral map showing boundaries of properties like houses, buildings, fields, colonies, etc.
7. To prepare a military map showing different strategic points important for the deference of a country.

Highway surveying is a specialized type of land surveying generally conducted for government agencies during the planning stages of a highway development project. During the construction process, a highway construction survey can ensure that progress is occurring as it should, and that the highway is located precisely where it should be. After the highway is built, a highway survey can be used to provide an accurate layout of roadways, utilities, storm drainage systems, overhead wires, nearby buildings, and other features of the landscape.

A construction surveyor is often involved in the placement process for the highway. This requires a survey of the existing terrain to find the best route. Highway construction surveys are particularly concerned with areas where dirt must be moved, noting to what level and grade. Often the goal of this survey is to determine the appropriate route where the least amount of land will need to be moved. An engineer can use the survey data to determine where the dirt should be moved to reduce the total amount of dirt relocation.

Not only do surveyors determine how the land must be prepared before the highway can be constructed, but they also assist engineers in the mapping of optimal routes. This includes grading (slopes), curves and the creation of tunnels or other features along the highway route. It is necessary to understand the geographic restrictions and the layout of an area before attempting to determine the best route for placement of

the highway. Because of the natural landscape, the presence existing buildings and other features, few highways are able to run perfectly straight along their entire length. One of a surveyor's many jobs during highway construction is to aid in the mapping of this route. The most challenging part of highway planning is often the necessity of bridges or tunnels. Surveyors provide input on their location, and also monitor the highway construction process to ensure that they are located correctly.

Once the dirt has been graded and leveled, a surveyor will again survey the area to ensure that the land has been correctly prepared according to the plans. Before the advent of GPS technology, this involved the use of surveying stakes to mark the road edges. Today, GPS has eliminated this process, making it much easier to ensure that the road is aligned with the plans. Once the grading and leveling have been verified by the surveyor, construction begins.

Determine topography: One of the first things the survey team will do is determine the topography of the proposed construction site. They will carefully analyze the slope of the site, along with the quality of the soil and the terrain. The topographical survey will outline any existing roadways, as well as waterways, utility lines and other obstacles.

Account for infrastructural needs: Using the collected data, the surveyor will then begin to outline each site's infrastructural needs. This means that they will account for any overpasses, bridges or tunnels that will need to be constructed to create the highway. They will also outline the necessary gradation of the roadway under construction.

Outline best routes: Surveyors can also use the data collected during the survey to propose the best possible route, given the overall conditions of the site and the type of soil present in various sections throughout the property.

Verification: After the contracting team has graded and leveled the site of the proposed highway, the surveyors will revisit the site and ensure that all of the measurements are accurate. This will keep the roadway safe for public use, and ensure that it's ready for traffic upon completion.

Road repair and maintenance: A number of future surveys may need to be conducted in order to repair and maintain the roadway. Over time, the gradation may shift, new utilities may be installed and more. Additional surveys will keep the future roadway safe and accurate.

Name: Akash Kundu

Year- (2nd Year)

# Modular Construction

. Using the same design it includes the building constructed off-site materials and of the same standards on-site construction as conventional.

It also helps in limiting environmental disruption, and when needed, turning construction and delivering components as into a logistics exercise.

The modular also offers strong sustainability benefits, from fewer vehicle movements to less waste.

By using as components this method with up to 70 percent of a building produced, it allows a move towards delivery and manufacturing.

In the UK and the United States this method is currently popular, recently completed a 57-story skyscraper by the Chinese developer Broad Sustainable Building

**The Advantages of Modular Construction**

1. Saves Time

An obvious one is that modular construction allows a chunk of the work to be made in a factory while site work and foundations are simultaneously performed on the site. This time-saving benefit keeps the project on schedule and speeds up construction time while still being efficient. There is potential to save 30 to 60 percent of overall schedule through a modular approach.

2. No Possibility of Weather Delay

Furthermore, by fabricating the modules inside a controlled environment, worries about weather delaying construction of the modular units is virtually eliminated. It also provides workers safer and more comfortable conditions to be more productive and produce a higher quality product. Also, the modules arrive on-site usually outfitted with flooring, cabinets, counters, plumbing and electrical fixtures, and appliances, thereby needing little effort and time to be ready for use.

3. No Need to Store Materials

Another advantage of modular construction involves storage of materials. When a site is tight on space, for instance in a compact urban setting like Philadelphia, staging and moving materials around is difficult. This causes clutter, slows down work and creates theft concerns. By building the modules in a factory, construction sites can remain cleaner and safer, and provide more space to work and move around freely.

4. Lower Labor Costs

An important and potentially controversial advantage involves economics of labor. Skilled labor is in short supply for construction in most places and can be very expensive in cities for a variety of reasons. Without getting into politics, this leads to

real challenges when trying to get a building constructed for a given budget and timeline. Modular allows those coveted skilled workers to remain in fixed locations with controlled and safer conditions as mentioned. Modular plants can be located to attract those competitive workers and take advantage of important access to raw materials and logistic connections, like highways and rail lines, common in other industries, such as automotive and technology products. Savings on labor can vary widely, but there is a potential for up to 25 percent on construction costs.

5. Lower Volume of Waste

According to a recent UK study, up to a 90% reduction in materials can be achieved with modular building. With the environment being a growing concern in the construction industry, modular strategies are becoming more popular to limit the amount of waste on each project. There are even efforts to maximize recycling within factories that put the building portions together.

**The Challenges of Modular Construction**

1. Mass Production / Limited Variety

First, a modular (think mass production) approach on scale is better the more uniform and repetitive the spaces and products. So naturally, apartment buildings and hotels are likely candidates if each unit can be standardized and stacked. At this stage of technology, trying to create distinct or non-repetitive modules reduces, and potentially defeats, the time and cost advantages for both buyer and supplier parties.

2. Higher Amount of Complex Decisions / Front Loaded Design

Second, modular demands that more decisions and greater design and engineering be completed up front in the process. It requires architects, engineers and contractors to be familiar with the intricacies of the modular fabrication and erection stages. For instance, the taller the building (higher modules stacked) the more attention is needed to how they are connected together to be aligned and how both modules and the exterior skin will allow for compression. (The weight of stacked modules can actually crush wood below.) This front-loaded design process forces buyers and owners to make final selections on things like finishes and appliances so they can be purchased well before the work even begins. Those of you familiar with the construction business may see this as an advantage: You know that changes made late in the process can be a headache.

3. Approval Process Can Be Complicated

Third, the approvals process can be complicated. No matter how they are constructed, all projects must meet federal, state and local laws and codes. However, the codes that are applicable change based on method. Some states and local jurisdictions are more favorable to modular production than others. Ideally, the modules are made subject to state codes (such as Pennsylvania Industrialized Housing Act) and can be inspected and completed at the factory with only connections and work performed on site subject to local inspection. On the contrary, states like Maryland require local inspections of systems preventing walls from being closed and finishes applied until

on site. In places with strong union influence, how contractors navigate trade relationships can further complicate both the approval and execution phases.

4. Risk is on Few Suppliers

Additionally, you're concentrating execution risk for the project into one or a few suppliers. Modular manufacturers have mostly focused on making single-family homes as their bread-and-butter products. While the number of companies producing commercial and multi-family products is growing, it's still very limited in those that are interested, capable and have the financial capacity to deliver. Buyers, whether they're owners or general contractors, must perform full diligence on companies before entering into an agreement that puts all their eggs in one basket. And, they must continue to be diligent following up throughout their work. Even if bonded, it would have to be a huge disaster to switch to another manufacturer in the middle of a project.

5. Transportation Costs & Risk

Then there's the transportation risk. Since modules are prefabricated in a factory miles from the job site, they need to be transported either directly to the job site or staged at a place nearby and then set in place. The transporters and riggers must be extremely careful with each module as one mishap during transportation and the entire module could need significant repairs or replacement. This could potentially hold up an entire sequence of installation. On our Philadelphia project delivery, staging and set went fairly smoothly with limited cracking of interior drywall due to lifting the modules into place. This damage was easily repairable, so not much to worry about there.

It's important for the transportation and rigging companies to spend serious effort in tracing down the roads and plotting the logistics of moving the modules throughout their entire journey. They can't get hung up by bridges, tight turns, traffic problems, crane setup and temporary road closure permits. Module sizes are usually limited first by allowable size on road (maybe 10 feet wide by 70 feet long) and capacity of available crane (to lift as much as 25 tons) across the depth of a project site. Make sure you also have your insurance advisor work with a broker and carrier familiar with the many related risks to off-site construction.

6. Difficult Financing Process

Another challenge involves financing. Since modular construction requires purchasing and making things on a faster timeline, the bills are usually much larger earlier in the construction period than investors and lenders may be used to seeing and paying. Therefore, take time to work with the manufacturer and contractor to understand the amounts and timing of anticipated funding (create a projection by month) and update it as the project unfolds. This will help to make sure that adequate monies are available to keep the job going and prevent mechanic's liens. A related item is that someone representing the contractor, owner and bank should plan to visit the factory at stages of production to make sure that funds are being invested into your modules and not into somebody else's (this is applicable for any type of funding of stored materials and pre-fabricated purchases).

Name- Debabrata Mazumder

Year- 2nd Year

-

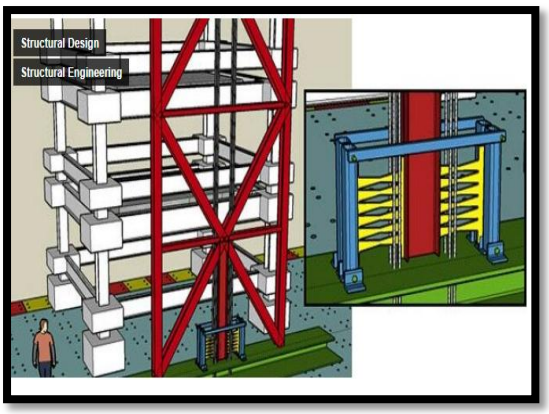
# Earthquake Proof Buildings

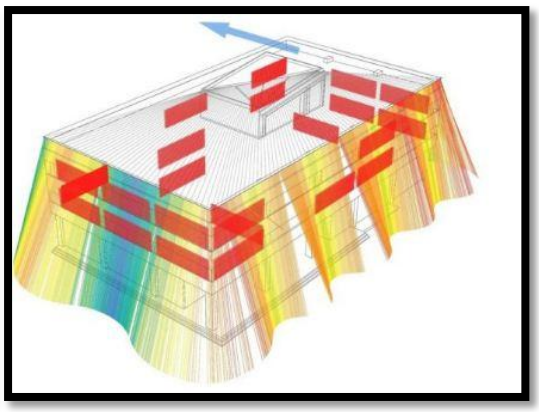
We all know that Japan is in Severe Earthquake prone area where frequent Earthquakes are common. Researchers and citizens are constantly finding the solution for building Earthquake proof buildings.

With a collaboration of textile company, Japan Earthquake engineers came up with new innovation in Earthquake Engineering where the curtain of cables anchored to ground could make building Earthquake proof.

To make Earthquake proof buildings these Composite rods are tied & secured roof to the ground and installed around the building. Rods are also installed inside the building to strengthen the interior walls. To make Earthquake proof buildings these Composite rods are tied & secured roof to the ground and installed around the building. Rods are also installed inside the building to strengthen the interior walls. These Composite threads made up of textiles helps in rods to stretch and draw the structure back in opposite direction to prevent shaking of the structure the fabrication of a building or structure that is able to withstand the sudden ground shaking that is characteristic of earthquakes, thereby minimizing structural damage and human deaths and injuries. Suitable construction methods are required to ensure that proper design objectives for earthquake-resistance are met. Construction methods can vary dramatically throughout the world, so one must be aware of local construction methods and resource availability before concluding whether a particular earthquake-resistant design will be practical and realistic for the region. Building designed to prevent total collapse, preserve life, and minimize damage in case of an earthquake or tremor. Earthquakes exert lateral as well as vertical forces, and a structure's response to their random, often sudden motions is a complex task that is just beginning to be understood. Earthquake-resistant structures absorb and dissipate seismically induced motion through a combination of means: damping decreases the amplitude of oscillations of a vibrating structure, while ductile materials (e.g., steel) can withstand considerable inelastic deformation. If a skyscraper has too flexible a structure, then tremendous swaying in its upper floors can develop during an earthquake. Care must be taken to provide built-in tolerance for some structural damage, resist lateral loading through stiffeners (diagonal sway bracing), and allow areas of the building to move somewhat independently.

For suppose during an earthquake if building is pushed towards left side the threads or rods on right pulls it back this keep building in position and minimizes the structural damage and human death.





*Fire Resistant Building Materials Used in Construction

Any material that resists fire and does not melt for a while, that is to say, it can withstand heat; so that the residents of the structure can safely leave the premises is called **Fire Resistant Building Materials**. It is crucial to pay attention to fire safety especially in the construction industry. **Fire retardant materials** are different than fire-resistant materials. Fire retardant materials are materials that burn slowly.

**Fire Safety is Important** -To employ greater **fire-resistant materials** to a structure, attention began to be paid to the properties of the materials used. The materials started to be evaluated for their resistance to a standard fire and some standard tests were developed.

**General Requirements of Fire Resistant Construction Materials:**

It should be able to resist fire for such duration that occupants can safely vacant the building

It should not lose its strength considerably

It should have a low coefficient of thermal expansion, i.e. it should not expand when subjected to heat, preventing the generation of additional stresses in the building

Its thermal conductivity should also be less

It is preferable if it has self-insulation properties.

Name- Samir Das

Year- 4th Year

# Modern Dam

Basic problems in dam design

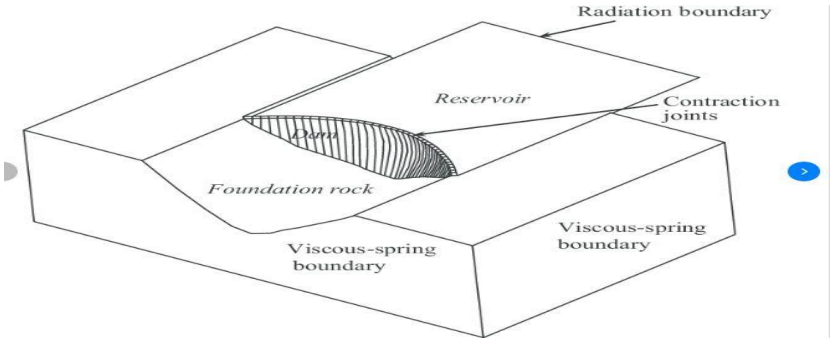
Most modern dams are of two basic types: masonry (concrete) gravity designs and embankment (earthfill or rockfill) designs. Masonry dams are typically used to block streams running through relatively narrow gorges, as in mountainous terrain; although the structures may be very high, the total amount of material required for such sites is limited. Embankment dams are often preferred to control rivers and streams passing through broad, wide valleys where only a very long barrier, requiring a great volume of material, will surface. The choice of design depends on the geology and configuration of the site, the purposes of the dam, and cost factors related to material supply and site accessibility.

Site investigation and testing

Investigation of a site for a dam includes sinking trial borings to determine geological strata. These borings can be supplemented by shafts and tunnels. In the shafts and tunnels, which are often used sparingly because of their cost, tests can be made to measure strength, elasticity, permeability, and prevailing stresses in rock strata, with particular attention given to the properties of thin partings, or walls, between the more massive beds. The presence in groundwater of chemical solutions harmful to the materials to be used in the construction of the dam must be assessed. Sources of construction materials (such as sand and rock aggregate needed in the production of concrete) often require exploration. As a design increases in height, the study of foundation conditions becomes more important because the pressures that will be exerted on the foundation increase proportionally.

Arch Dam

The advantages of building a curved dam—thus using the water pressure to keep the joints in the masonry closed—were appreciated as early as Roman times. An arch dam is a structure curving upstream, where the water thrust is transferred either directly to the valley sides or indirectly through concrete abutments. Theoretically, the ideal constant angle arch in a V-shaped valley has a central angle of 133° of curvature.




**Name-** Ramich Raja Ali

**Year-** 2nd Year

# Digital highway

- Cities can connect roads to devices, and gather traffic and weather data. This type of connectivity can improve safety, traffic management, and energy efficiency.
- Traffic management networks: For improving safety and reducing congestion. The network uses speed cameras to provide warning signs for hazardous conditions, and sends automated traffic diversion signals that control traffic.
- Traffic lights optimization: Systems that use data from closed-circuit television (CCTV) cameras or smart vehicles to optimize traffic lights and update commuters on jams or bottlenecks.

- Smart Road technologies
- Smart Roads
- Specially engineered roadways fitted with smart features, including sensors that monitor and report changing road conditions, and WiFi transmitters that provide broadband services to vehicles, homes and businesses. The smart road can also charge electric cars as they drive.

## Glow in the dark roads

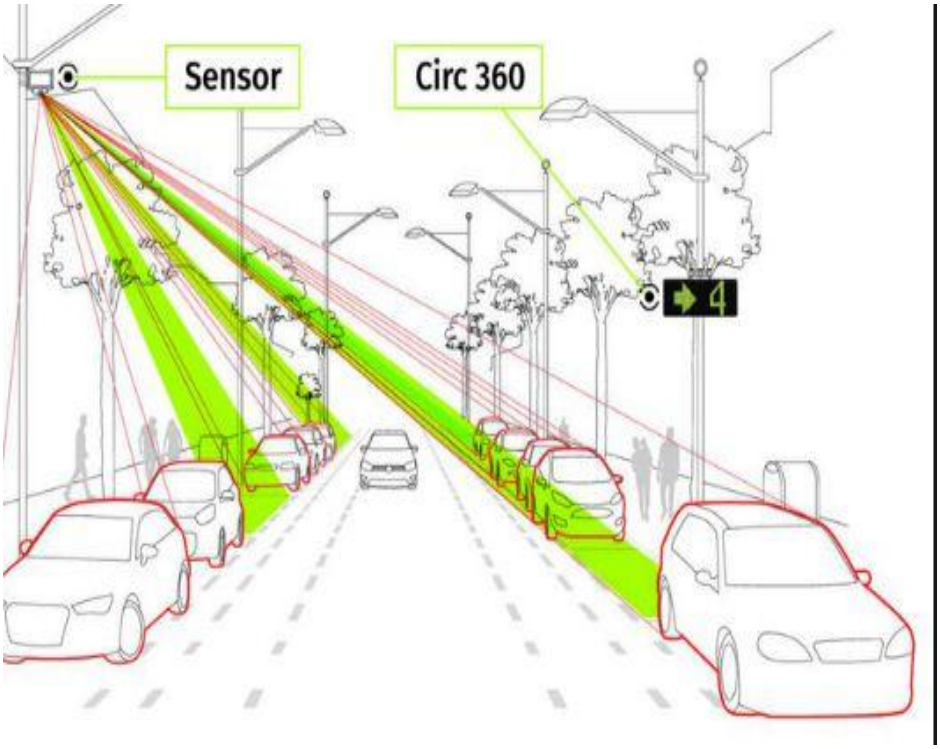
Glowing markers painted onto existing roadway surfaces use a photo-luminescent powder that absorbs and stores daylight. The 500m long strips glow for 8 hours after dark. This technology is still in the testing phase, and the glow is not yet consistent, but it could be more cost-effective than traditional road lighting technologies.

## Interactive lights

Road lights activated by motion sensors to illuminate a particular section of the road as cars approach. The lights dim once the car passes. Suited for roads with less traffic, interactive lights provide night visibility as needed and reduce energy wastage when there are no cars. One design, developed in Holland, uses the wind generated by passing vehicles to power lights.

## Electric priority lane for charging electric vehicles

Embedded cables generate magnetic fields that charge electric vehicles while driving. A receiver coil in the vehicle picks up electromagnetic oscillations from a transmitter coil embedded in the road and converts them to AC, which can then power the car. Inductive charging technology already exists for static cars, but future wireless technology could charge batteries while in motion, providing distance range solutions for electric vehicles which travel longer journeys.




**Name-** Somnath Paul

**Year-** 3rd Year

# The road innovations of the future:

Our planet is covered in roads. And by 2050 our global network of highways is projected to increase by 60%. Volvo Construction Equipment takes a trip down the roads of the future to look at some incredible innovations and find out just how design, materials and use will adapt in the years to come.

*Recycled plastic is added to asphalt mix*

## 1.1 Plastic Roads

Concrete production contributes to 8% of global $CO^2$ emissions according to the WWF. It is made from quarried aggregates – such as limestone, granite or sand – bound with cement, bitumen (asphalt) or other agents. But what if we replace these finite resources with one of humanity's infamous products, such as plastic  India has been filling potholes using plastic as a binder on a small scale for years. This process makes the road considerably stronger and last much longer than traditional material. UK adopted this for all new roadways. But life in plastic, isn't always fantastic. As roads break down, small micro particles of plastic are released into the surrounding environment and can have detrimental impacts on wildlife and human health. Plastic roads were first development by RAJAGOPALAN VASUDEVAN in 2001,consting of an asphalt mix incroporating plastic waste.

### ADVANTAGE:

1. In the proposed model by volkerwessels,plastic roads can have hollow space built in to allow case of wiring, conneting pipes etc.

2. using less asphalt saves on cost and resources.Asphalt saves on cost  and resources. Asphalt concrete required petroleum which is becoming more scarce.

3. The addition of plastic in asphalt can reduce the viscosity of the mix. This allows a lower working tempareture  which lower VOC and CO emissions.

### DISADVANTAGE :

1..Plastics in the road can break down into microplastic and can find their way into the soil and bodies of water. These microplastics can also absorb other pollutants.

2. Everytime maintenance is performed on these modular road in the flow of power,water,and internet that has been installed within will be interrupted.

In India, Chennai was among the first cities globally to adopt the technology of plastic road in 2004.

### *1.2* Jigsaw Road

The hollow design also allows for pipes and cables to be installed without extensive digging and has the capacity to store excess water during storms and floods. The trial phase began this September with the opening of a bike path the Netherlands.

*Jigsaw roads slot into the future*


Transpotation benefit :

1. Improve community health
2. Economic benefits to the community
3. Improve fuel efficiency
4. Public transportation reduce air pollution
5. Improve road congestion
6. Improves community mobility

**Name-** Mrinmoy Patra
**Year-** 4th Year

# 3D Printing

3D printing as a construction technology has the potential to change material sourcing. For prefabrication, materials for a project can be printed and then transported to the job site, ready for use immediately. This can allow companies to get materials faster and streamline the process by removing extra steps in the middle.

According to the U.K. Green Building Council, around 15% of materials delivered to construction sites end up in landfills.

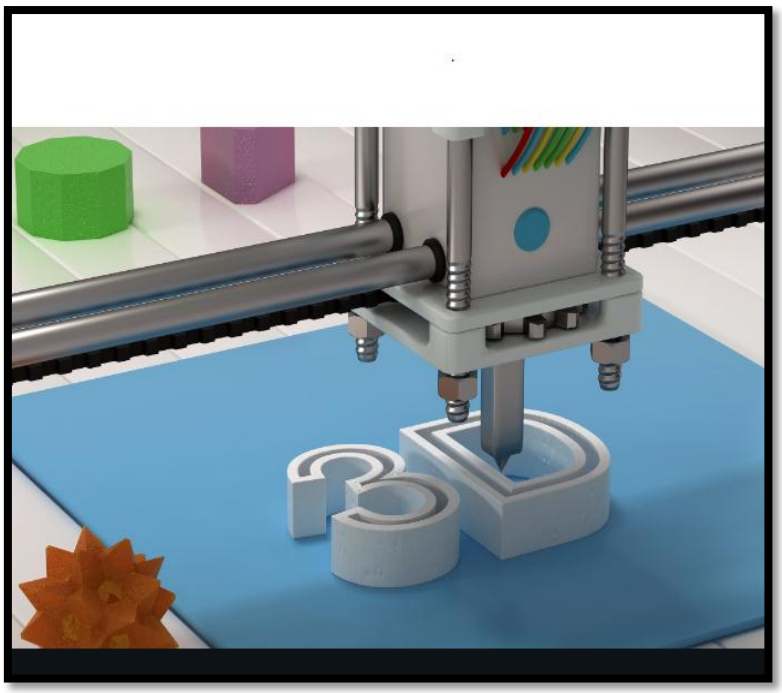
## Few Advantages of 3D Printing:

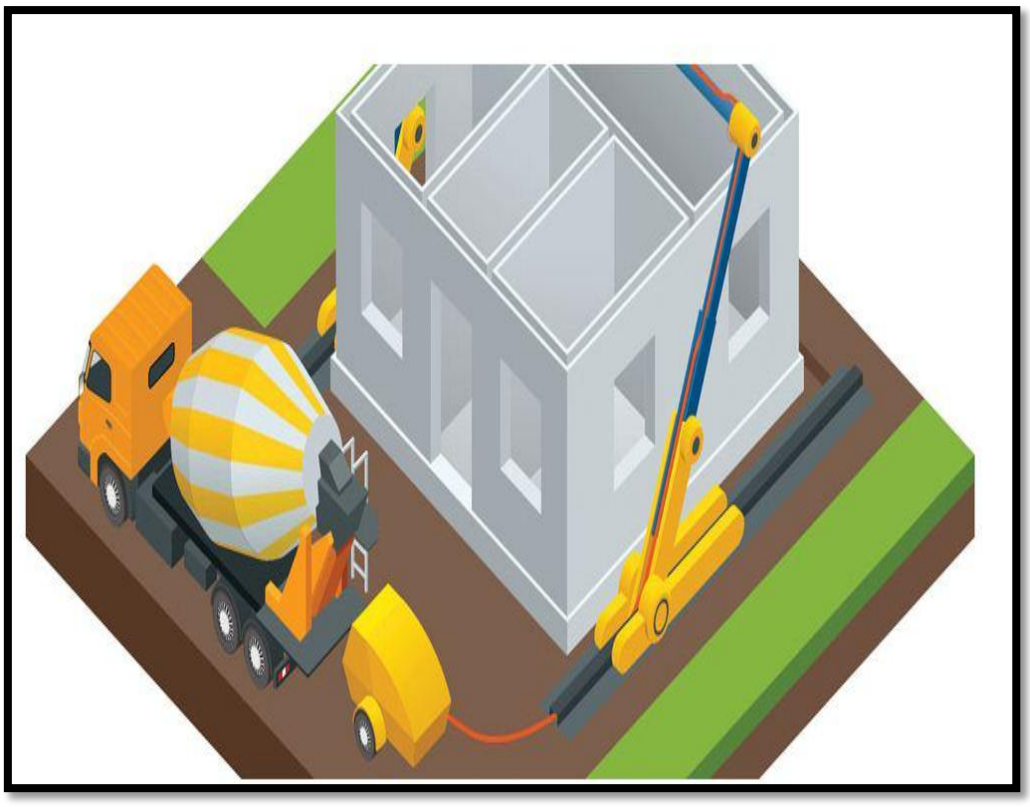
One of the most valuable advantages of 3D printing in this field is faster construction by employing a quick drying cement, so a simple building may be erected and set within hours. When civil engineering companies pair their expertise with this tech, the lines between form and function can be blurred and truly marvelous structures can be created. Buildings can now be designed and crafted to combine a broader variety of functions, including cooling or heating features, and neater integration into the buildings' surroundings. 3D printing is also being used to assist in day-to-day operations, like printing simple mountings for existing equipment to be utilized in alternate ways, saving on the need to buy whole new pieces of equipment.

Reduction of Waste and Construction: There are very few construction projects that can boast 0% waste once the doors are open. Civil engineers can use 3D printing to produce next to no excess waste during a construction project by using computer aided drawing (CAD) and large-scale industrial concrete 3D printers. They can plot out exactly where, what, and how much they are going to roads are being quickly made by engineers through 3D printingr, with more complex geometries, in a faster time frame, and at lower labor costs than traditional construction techniques. The time and manpower saved through 3D printed construction is remarkable, and the continued progress in this field should continue to help lower these costs.

## 3D Printing and the End of Road Woes:

Road transportation is one of the most important methods for transferring ourselves and our goods across countries and some continents. Improvements in asphalt, tar, and concrete roads are being quickly made by engineers through 3D printing. One of their biggest hurdles was that asphalt acts like a non-Newtonian fluid when passing through the end of the extruder. Once they overcame that obstacle, they were able to tailor the method of 3D printing asphalt to be able to cast complex roads and be able to repair damage and fractures in the asphalt. This has paved the way toward autonomous road repair through the use of drones, scanning, and 3D printing technology.





**Name**- Rajan kumar

**Year**-2nd Year

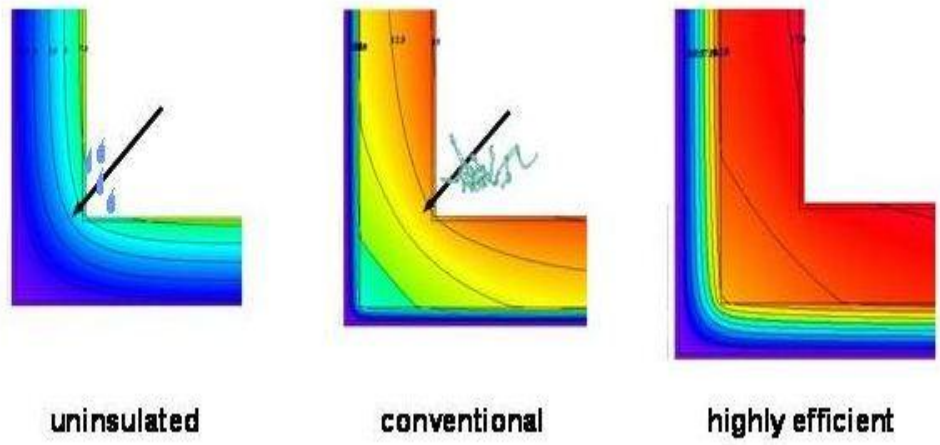
# Thermal Bridging

The demand for efficient insulation material is
becoming crucially important throughout the construction industry**.**

The heat through walls tends to cross directly through the building envelope, be it masonry, block, or stud frame, to the internal fascia such as drywall**.** Heat always wants to flow from hot areas to cold ones. In doing so, it follows the path of least resistance. A thermal bridge is a localized area of the building envelope where the heat flow is different (usually increased) in comparison with adjacent areas. In other words, these thermal bridges act as a heat highway headed straight to the outdoors. Due to this, the temperature of the interior surface near the thermal bridge is lower. If this spot becomes too cold, it could lead to condensation and moisture build-up. Over time, mould may even form, potentially damaging the building structure.

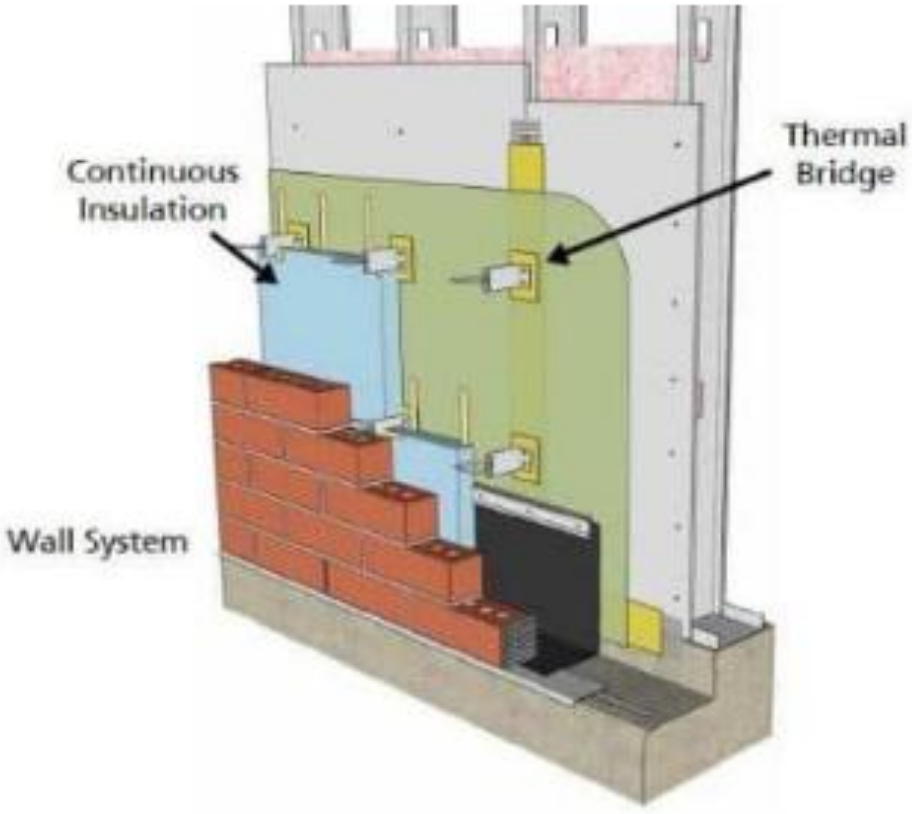
## Types of thermal bridges

In general, a distinction is made between linear and point thermal bridges. Linear thermal bridges include ceiling junctions, projecting balcony slabs, outer corners, verges and eaves.




*Heat flow simulations of a thermal bridge for outer corners of different insulation levels.*

Point thermal bridges are single penetrations in the thermal envelope of the building. Examples of these include mounting brackets for canopies, penetrations by electrical cables, sub-constructions for ventilated façades and insulation fasteners. Let’s look at one fo the most common examples of a thermal bridge: the projecting balcony slab.




**Thermal Bridging**

**Name**- Shyamal sasmal

**Year**- 2nd Year

# Solar Roadways

The pros of solar roadways (according to Solar Roadways)

**Huge energy capacity:** According to the company, we could produce three times our annual energy consumption by converting our existing road network into solar roadways.

**Safer 'smart' roads:** The panels will incorporate LED lights. These can be used to light up dark roads at night and to flash warnings to drivers about obstructions like upcoming roadwork, or a deer crossing the road just around the bend.

**Electric car charging:** Solar roadways will be able to provide inductive charging – which means that electric vehicles can be charged simply by driving on them.

**Usable anywhere:** They're not just for roads; they can be installed on any ground-level surface: on parking lots, residential driveways, bike paths, playgrounds...the options are almost endless.

**Snow-free surfaces:** Solar road panels can incorporate a heating element that can quickly melt off any ice and snow that lands on them. Imagine there's a snowstorm and the road panels immediately melt off the snow off the roads, and even off your driveway – no shoveling required!

**Durable and long-lasting:** The company claims that road panels will be waterproof and have a lifespan of 20 years – this is longer than the 10 odd years that asphalt roads typically last before needing repairs.

It's a compelling pitch, and it's easy to see why Solar Roadways has generated so much buzz. Solar Roadways has used it to win endorsements from numerous major celebrities, Indiegogo crowd funding from 50,000 donors, multiple government research grants, and over six million dollars in raised capital, including $2.5 million in a recent (2021) .

It’s worth pointing out here that Solar Roadways Inc, the company, is different from solar roadways, the concept. Some other organizations and initiatives also work with solar road panels and similar products. We'll explore them later.

Solar Roadways: the reality

After successfully generating hype for so many years, what has Solar Roadways achieved so far? And what of the other companies working in this space?

1. Solar Roadways have made no solar roadways

Between 2016 and 2017, news circulated that a Solar Roadways installation on Route 66 in Missouri was in the works. However, the project was not for a roadway at all, but for a solar sidewalk alongside the highway. Whatever the case, the contract fell through (for unspecified reasons) before a single road panel was ever laid.

The only place their product has been used is in their pilot project: a small 150-square-foot installation of walkway in their hometown of Sandpoint, Idaho, installed in 2016. The initial rollout was underwhelming, suffering a fire in its electrical system and then failing to melt snow that fell upon it.

Solar Roadways: the problems

The various solar roadway trials conducted so far have revealed numerous problems, and they're proving hard to overcome. Here are the biggest concerns:

Solar Roadways cons

**High cost:** All installation of solar roads completed thus far have been very expensive. The Watt Way project in France, for instance, cost $5.2 million for a 0.62-mile stretch of road, or $8.4 million on a per-mile basis. It's estimated that the panels' thick, tough glass surface will cost 3-4 times the price of a standard asphalt road – and that's before accounting for all the other components in a road panel.

**Can't handle traffic loads:** Engineers have thus far been unable to make a solar road panel that can successfully withstand the pressure of heavy vehicles while remaining transparent enough to let sunlight in.

**Low solar power production:** Solar roadways produce just one-third the power of solar panels of equivalent capacity in a solar power plant, according to expert engineering analysis. There are several reasons for this:

**Less sunlight:** Unlike rooftop systems, solar road panels can't be tilted to achieve the best solar panel angle, which means an energy loss of 20% or more.

**Shading:** They'll also experience shading from passing vehicles, surrounding buildings and vegetation, and debris like dust and leaves. Even a small amount of shade has a major impact on solar panel production.

**Excess heat:** As they're built into the road, the ground panels can't be cooled by air circulation. This will reduce solar panel efficiency, which drops as panel temperatures exceed optimal levels

**Safety and noise concerns:** As solar road panels are built with a glass outer surface, this raises doubts about their ability to provide the traction necessary for fast-moving vehicular traffic. In the case of WattWay, the issue was noise. Apparently, vehicles driving over the road surface made so much noise that the speed limit was reduced to 43 miles per hour.

This long list of issues and challenges means that all solar roadway trials so far have yielded disappointing results. Although companies like Solar Roadways and French civil engineering giant Colas (the maker of WattWay) still hope to make it a workable option, that seems unlikely to happen soon – if ever.

Fig: Solar Roadways

**Name –**Siddheswar Das

**Year -**2nd Year

# Modern Tunneling Techniques

Since the 1970s, tunneling techniques have advanced considerably. To start, Box Jacking has become a common technique used to construct tunnels that do not run deep underground especially below major roads and airport runways. TBMs are now widely used to tunnel underwater or under mountains. An alternative way of creating tunnels underwater is by installing pre-cast concrete tunnel segments in pre-dug trenches. A similar method known as cut and cover is used when building tunnels on dry land. This technique essentially involves excavating a trench, building a tunnel structure on it, and then covering everything with backfill material. When tunneling in areas with soft soil, it is standard to construct support structures to improve stability. In the US, the NATM method or Sequential Excavation Method involves integrating surrounding soil and rock material into a ring-like support structure. To succeed in the tunneling industry, one must have domain knowledge in structural, geotechnical, and construction fields.

## Tunneling Risks

Tunneling is a risky industry registering 204 incidents in 2010 out of which 36% were collapses. In addition, 28% of reported collapses occurred during the day. An 18-month study involving tunnel-jacking construction workers exposed to crystalline silica at levels exceeding OSHA safety guidelines and published in the American Journal of Industrial Medicine in 2006 found that 29% experienced shortness of breath. This is in addition to 25% with asthma-like symptoms, 10.7% with chronic bronchitis, and 6.6% with physician-diagnosed asthma.

## Atal tunnel: a symbol of engineering marvel: **The tunnel is in the form of a single-tube double lane and has a shape similar to the horseshoe. Because of the topography, the 9.02 km-long tunnel also contains an escape tunnel in itself making it the country's first tunnel to have the peculiar feature. The deployment of Rowe Flyer Technology provides an advantage for the engineers to work at inverted levels.**

## Significance:

- **Reduced Road Distance**: The distance between Manali and Leh is reduced by 46 KM by road which in turn reduced the time by 4 to 5 hours. As a result, the distance between Manali to Lahaul and Spiti Valley is estimated to be covered in about 15 minutes.
- **Electromechanical Systems:** The Tunnel has a system of separate ventilation ducts for fresh air, fire-fighting systems and solutions controlled by SCADA, fire hydrants at every 60 meters, turning cavern at every 2.2 km, and illumination. It also has two monitoring systems at both ends of the tunnel to analyze the movement of the vehicle and keep a view on pollution control.
- **Connectivity Throughout the Year:** The major advantage of the tunnel is in providing fascinating connectivity to Ladakh. Now the connection between Ladakh to Manali and Chandigarh exists throughout the year which was not possible before due to the winter season as the roads were covered with snow.
- **Strategic Importance:** The Tunnel was also treated as a boon for the armed forces. It gives continuous connectivity to the borders throughout the year. Due to snowbound

reasons, earlier it was difficult for the armed forces to travel along the borders, but the foundation of this tunnel proved a boon for the armed forces with their easy access to the border areas.

- **Availability of Essential Commodities:** The necessities of life like petrol, vegetables, diesel, and other supplies would also be available throughout the year which was not possible earlier.
- **Easy Access to Farmers, Horticulturalists, and Youth:** The Tunnel also benefitted farmers and other daily living youth in India to have easy access to the capital of the country to approach job opportunities, sales, and consumer markets. In this way, farmers can protect their precious crops from decaying in the trucks before reaching the market.
- **Motivate and Enhance Tourism:** The Atal Tunnel will gradually enhance the tourism sector. This will improve the livelihoods of the people residing in Lahaul Valley and Ladakh and thus tourism.
- **Network Connectivity:** Three 4G base transceiver stations (BTS) were installed by BSNL in the Tunnel providing strong network connectivity which makes it possible for the residents to contact and reach the outside world. The Tunnel also possesses an automatic incident detection system along with high-resolution CCTV cameras at every 250 meters and a telephonic facility at every 150 meters.
- **Emergency Terms and Conditions:** The Atal Tunnel has a public announcement system in times of emergency. Avalanche control structures have also been constructed to prevent any damage to the roads.

Conclusion: Human beings from the start were builders or in a better way are creators. As with the pace of time, technology advances and man get more creative and competitive, the list of such astonishing engineering marvels will keep growing. With the current advancement in technology, engineers can challenge the impossible and make their dreams a reality. By developing the tunnels like Atal Tunnel, engineers have given society a new sense of outstanding experiences, making it clear that anything can be achieved. And similar achievements cum feats are highly expected in the future.


**Name-** Sk Imran Ali

**Year-**2021-2022 (2nd Year)

# Robotics Construction

Robotic automation has been a big story throughout the 21st century — but it's also been over-hyped. Although acclaimed as a game-changer, robots have never materialized to fulfill either our utopian or dystopian expectations of AI-driven sci-fi.

Having just addressed whether or not 2020 is the year robots take over the construction industry (it isn't by the way), we want to take a more measured look at what robots can and cannot do when it comes to construction projects.

## Advantages of robotics in construction:

.Construction is a labour-intensive sector. Automation robotics has proved to be very effective in other industries for reducing labour costs while also improving productivity and quality .

Using robots can increase productivity and help address this shortage. It will also allow wages to rise for workers with advanced skills. At least during the transition time — which will take a decade or longer — those with advanced skills definitely will be more in demand.

## Increasing speed by moving to off-site production

Producing individual components, or modules in factories lends itself to more automation compared to what can be done on-site. A substantial shift to modular construction off-site could have a significant impact on building construction, but again the transition will take time.

The construction in these factories is mostly carried out manually, but over time, as scale increases, the process will become more automated.

## Making sites more efficient

Automated and robotic systems are being  piloted on construction sites around the world. Tasks such as bricklaying, steel-truss assembly, welding, installation, painting, concrete laying are all being automated with varying degrees of success.

These types of systems are known as single-task construction robots (STCRs), executing a single task in a repetitive manner. A typical example is Hadrian X, a robotic arm used for bricklaying.

## Providing safer work environments

A safe environment is one of the most critical responsibilities of a construction manager. Aside from the concerns of keeping workers injury-free, there are significant costs associated with an unsafe site. Robots are being looked at as a means of improving safety in some of the more dangerous tasks — for example, demolition.

***Disadvantages of robots in construction**

### 1. Complexity of the construction process

There are reckoned to be around 80 building trades engaged in a construction site. There may be solutions that emerge that are capable of doing the work of these multiple trades, but it looks like construction sites will always be in various stages of change.

Traditionally, it's tough to make robots work in that kind of unstructured and changing environment. They can't, as yet, really think for themselves and need detailed plans to be deployed. Some sort of standardization of sites would be needed to enable robots and people to work together safely.

### 2. User resistance:

Most of the research of robotics in construction has focused on the development of new systems. Construction workers are rightfully concerned that robots are going to take their jobs. So far, there hasn't been the same emphasis on the interaction between construction workers and robots.

### 3. Technology limitations:

Robotic technology is evolving, but construction throws up its own unique problems. There are many challenges to be addressed for robots to be used effectively in construction, including:

- Coping with outdoor and rugged environments
- Battery life restricting operations
- Complex operation requiring additional training and increased cost
- Stringent regulations that increase adoption costs
- Potential additional risks to health and safety

**Name-** Soumya Shekhar Ghosh
**Year-** 2nd Year

# Electro Kinetic Road

We always try to look some sustainable development so here's a new technology in civil engineering of electro-kinetic pavement design of roads. Just think when roads will start returning the kinetic energy what it gets from the vehicle on its pavement. The pavement is designed in such manner that it has some electric storing elements like piezoelectric and transducer in pavement.

## Working

When vehicle passes through roads, they apply stress on the pavement generally the heavy trucks apply heavy stress value. Mechanical energy exerted by traffic, especially heavy trucks, can be converted into electricity in several ways. The mechanical stress from traffic can be captured by piezoelectric material, or causes relative movement in electromagnetic generator. Also, significant solar energy absorbed by pavement can be harvested using photovoltaic cells, heat flux, or thermoelectric material. Even geothermal energy can be collected with a heat pump and underground thermal energy storage. As research done by Dr. Wang (Rutgers, Civil and Environmental Engineering) and his collaborator, Dr. Ahmed Safari (Rutgers, Materials Science and Engineering) has published many papers related to that.

## Advantages

- By using this technology, we can reduce scarcity of electricity to some extent.
- We always talk about green energy and this is one of them which is making waste as useful.
- Smart Roads are going to be future roads.

## Disadvantages

- Since this is a new technology and expensive so it's little uneconomical to install specially for developing and undeveloped nation
- These things and technology are to set up under the pavement, so already built road you have to scrap, set and then built again so it sounds uneconomical.

## Conclusion

Digital wave is everywhere. World has been taken over by digital wave. 'Smart roads' or 'Smart highways' are the road to the future so its really a good innovation in the field of

energy saving. In up coming days it will progress rapidly, even some nation already and still many researches going on. It will sort out energy problem to certain extent.

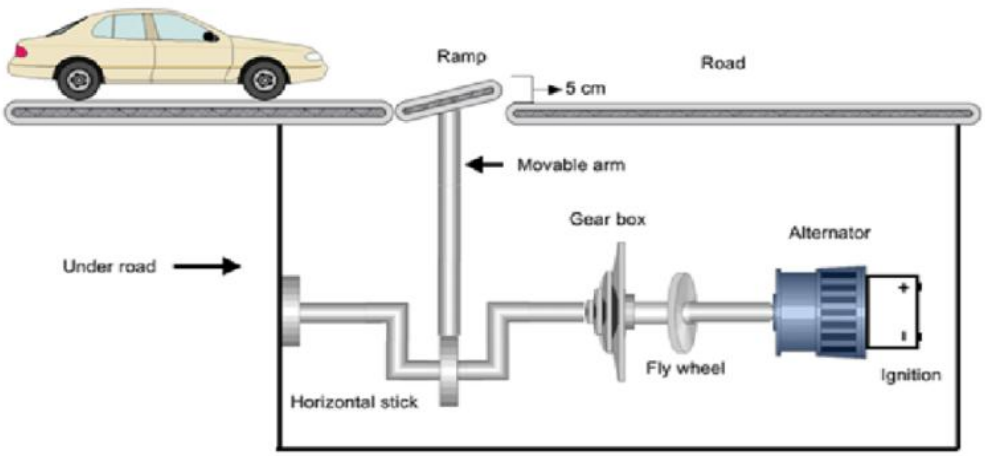



Fig: Kinetic Roadways

**Name-** Amit Kr Jha

**Year-** 3rd Year

# Green Roof construction

A green roof system is an addition made to the roof of an existing building for growing flora. Depending on the type of green roof you install, the plants may be modular or have drainage layers. However, all green roofs include a few important features, such as waterproofing and root repellent, to keep the structure safe and undamaged. Here are two primary forms of green roofing: intensive and extensive. These are differentiated by the amount of vegetation utilized. While extensive green roofs can support up to 25 pounds of vegetation per square foot, intensive green roofs can hold 150 pounds per square foot.

the intensive format allows you to pick and choose which flowers you would like represented, enabling you to sculpt the aesthetic you desire. Extensive green roofs are designed only to be entered for their yearly maintenance, so they become more naturally overgrown than their intensive counterpart. This makes extensive green roofs harder to navigate, meaning individuals can't walk through the space to enjoy the flora.

Both green roofs utilize a layering system, which establishes a base for the planters through the use of various soils, mats, and other materials to retain the nutrients while forcing out any waste by-products. Through these layers, a soil profile is mimicked, thus creating a drainage process that allows liquid to be filtered through safely while also nourishing the plants.

## Benefits Of Green Roofing

.The installation of a green roof reduces the need to manage any storm water that accumulates, as well as the stress put on local sewer systems.

- In urban settings, the inclusion of green roofs reduces the overall heat conducted by the buildings, covering many of the surfaces that would generate the most warmth.
- . The plants prevent the distribution of smog and dust while also catching many of the pollutants found in the air.
- Green roofs can be public spaces, such as gardens or recreational areas, to be enjoyed by the community.
- Due to the amount of work and money that goes into the creation and installation of green roofs, the use of them in a neighborhood can result in an increase of jobs and revenue for local businesses.

## Negatives Of Green Roofing

While green roofing can benefit you and the community, it is a costly process that can lead to some unforeseen expenses:

- Insurance for green roofs is important, due to the potential of droughts or unforeseen storms, but also is expensive.
- The weight of the green roof may result in liability issues if the pressure of it causes sagging.
- Any damage the plants might do to the building, such as the roots growing into the shingles, will result in costly repairs.

Fig; Green Roof Contruction

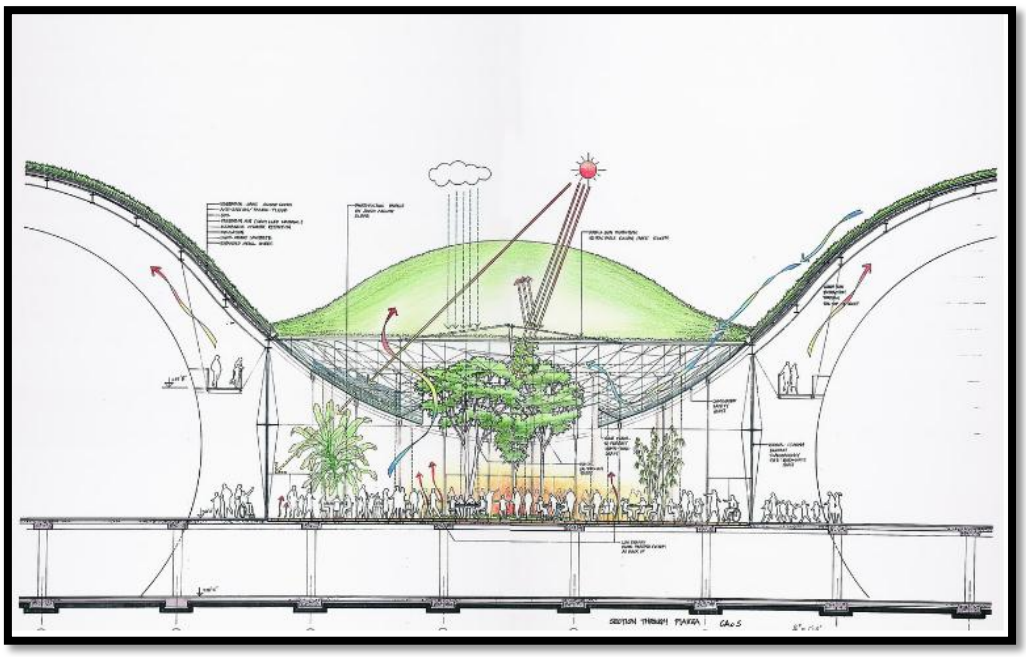


Fig: Green Roof Construction System

**Name-** Ankan Mondal

**Year-** 3nd Year

# Rainwater Harvesting

Harvesting rainwater is a climate adaptation strategy that has been used in many ancient and modern societies. The antiquated rainwater harvesting techniques of the past were attempts to cope with severe climate conditions by storing the water as it fell, allowing populations to drink the water or prevent oversaturation of the land during extreme precipitation. Modern rainwater harvesting is fundamentally the same in theory, but advancements in science and engineering have introduced sophisticated filtration and rain-capturing technologies that boost the efficiency of the process.

Dutch engineers and researchers have observed that effective large-scale implementation of rainwater harvesting infrastructure can reduce stormwater runoff by 20 to 50 percent, mitigating the strain that excess storm precipitation usually places on sewers and drainage systems. This is made possible by mounting rainwater catchment devices on the roofs of buildings, then routing the rainwater that is collected by the catchment through a treatment system and into a storage tank. To ensure the effectiveness of these rainwater-harvesting systems, the contents of each storage tank must be depleted before significant rainfall events occur. Therefore, civil engineers must obtain the knowledge and experience necessary to analyze the precipitation patterns and water usage rates of a region before installing any rainwater harvesting systems. With cost-effective approaches to the catchment, storage, and filtration technology used in rainwater harvesting currently being implemented and improved, large-scale rainwater collection is poised to become a widely used, economically viable solution to urban potable water shortages and storm water management.

Large cities often come with many social benefits, but there will always be disadvantages to having large populations that are constricted to a finite amount of space. Ensuring that humans can live sustainably in highly populated urban environments requires creative solutions to infrastructural issues like road safety, housing crises, and food and water shortages. An advanced degree in civil engineering will provide an individual with an in-depth understanding of the environmental, structural, and infrastructural engineering knowledge required to work with the civil engineering innovations listed above

## The Benefits Of Rainwater Collection

- Rainwater is a relatively clean and absolutely free source of water
- You have total control over your water supply (ideal for cities with water restrictions)
- It is socially acceptable and environmentally responsible
- It promotes self-sufficiency and helps conserve water
- Rainwater is better for landscape plants and gardens because it is not chlorinated
- It reduces storm water runoff from homes and businesses
- It can solve the drainage problems on your property while providing you with free water
- It uses simple technologies that are inexpensive and easy to maintain
- It can be used as a main source of water or as a back up source to wells and municipal water
- The system can be easily retrofitted to an existing structure or built during new home construction
- System are very flexible and can be modular in nature, allowing expansion, reconfiguration, or relocation, if neccesary

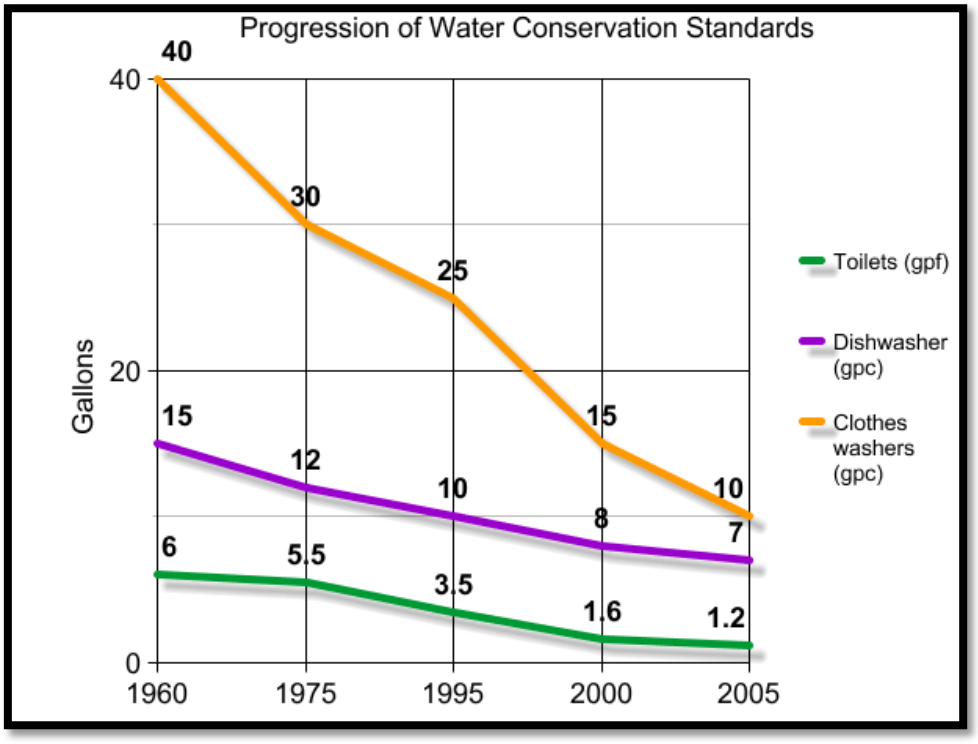
- It can provide an excellent back-up source of water for emergencies.

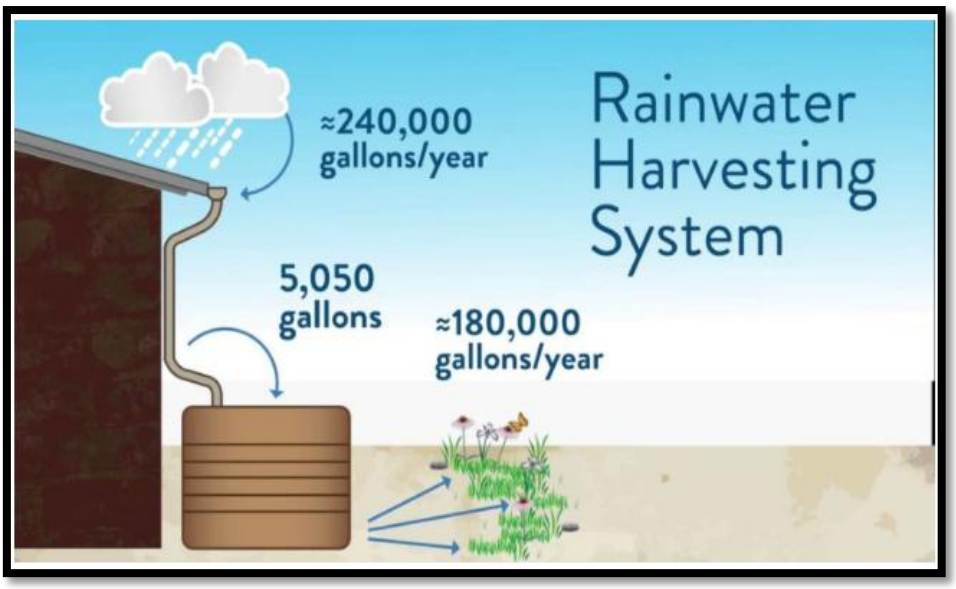
## Rainwater Harvesting Important

Rainwater harvesting is important for several reasons but one of the biggest is the fact that we are tapping out water conservation gains inside our homes so we need to start looking outdoors for more opportunities.

The following graph shows the gains that have been achieved with our indoor water fixtures through the combination of governmental standards and innovation by fixture companies. As you can see, we don't have much more room to go in terms of achieving more efficiency gains with our indoor fixtures. What's next… the 0.2 gallon per flush toilet? Probably not!

This phenomenon is known as the law of diminishing returns. So where will the next revolution in water conservation take place? We believe we offer services in the areas where this revolution will take place.






**Name-** Altab Molla

**Year -** 3nd Year

# CIVIL FACULTIES

**DR. SANGITA CHOWDHUARY**
Head of the Department
Call :
Email :

**MR. SAMIR BANDYOPADHYAY**
Adjunct Faculty
Call : 9339762690
Email : essbee08@gmail.com

**MR. ANWAY SARKAR**
Assistant Professor
Call : 6297312819
Email : anwaysrkr@gmail.com

**MR. DHRITIMAN MONDAL**
Assistant Professor
Call : 9903213545
Email : dhritimanmondal8@gmail.com

**MR. PRASENJIT BHOWMICK**
Assistant Professor
Call : 8629965449
Email : bhowmick.civil@gmail.com

**MS. WASIM MOLLA**
Assistant Professor
Call : 9153167511
Email : mollaaliah@gmail.com

**MR. ADITYA SHANKAR GHOSH**
Assistant Professor
Call : 8697400802
Email : adityaghosh369@gmail.com

**MR. RUDRADEEP DAS**
Assistant Professor
Call : 9674348605
Email : rudardeepdas6@gmail.com

**MR. MD. AFROZ**
Assistant Professor
Call : 9123008781
Email : mohammedafroz999@yahoo.com