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Alternative Use of Material in Construction using Waste

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***Abstract:** In regular strategy for development there are numerous normal assets is been squandered. Making of traditional materials likewise makes contamination and some natural impacts. The size and weight of the ordinary materials in development assumes a principle part in fixing the costs for efficiency and absolute gauge of the task because of the interest of the customary materials. So, actualizing the creative materials in development undertaking will lessen the interest of traditional materials by and by, additionally the assembling of the imaginative materials is eco-friendly. The size and state of the ordinary materials are unpredictable, yet imaginative materials are fabricated by machines so the materials can be made in different sizes and shapes. Likewise, the creative materials are light in weight which will lessen the dead heap of the construction and furthermore make some plan changes, size and light weight builds profitability in ease. Hence the inventive materials can get a positive change both underlying and the executives, part of the undertaking regarding cost and time.*
Keywords: **Traditional material, Contamination, Gauge, Imaginative material, Fabricated, Dead heap**

I. INTRODUCTION

A. What is plastic?

The term "plastic" is gotten from the Greek word "plastikos", which means fit for trim. Plastic is a material comprising of any of a wide scope of engineered or semi-manufactured natural mixes that are pliable and can be shaped into strong items. Versatility is the overall property of all materials which can distort irreversibly without breaking however, in the class of malleable polymers, this happens so much that their genuine name gets from this particular capacity.

TYPES OF PLASTIC Plastic source	Characteristics	Common use of virgin plastic	Common use for recycled plastic
Polyethylene Terephthalate (PET)	Clear hard plastic, suitable for fiber	Soft drink and mineral water bottles	Clear and soft film for Packaging and wrapping, rug fibers, rain coats
Low density polyethylene (LDPE)	Soft, flexible plastic, milky white, unless a pigment is added	Lids of food containers, garbage bags, and rubbish bins	Soft film, wrapping industry, plant packaging and nurseries bags
High density Polyethylene (HDPE)	Commonly used plastic in white or colored	Puckered shopping bags, milk storage bags (freeze)	Compost bins, detergent bottles, crates, and mobile rubbish bins
Unplasticised Polyvinyl chloride (UPVC)	Hard rigid plastic, clear type	Sanitary piping, plumbing pipes and fittings	Dishwasher bottles, toiletries detergent bottles, tiles, and plumbing pipe fittings
Plasticized Polyvinyl chloride (PPVC)	Flexible, clear, elastic Plastic	Garden hose, shoe soles, blood bags and tubing	Hose inner core, and industrial flooring
Polypropylene (PP)	Hard, but flexible plastic	Ice-cream containers, potato crisp bags,	Compost bins, kerb side recycling crates

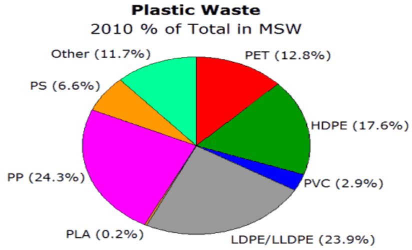

Fig: Pie-Chart of Plastic Waste Table (Author)

280 millions tons of plastic has been created worldwide from sum around 130 million huge loads of the plastics were land filled or recycled of remaining 150 million tons plastic will discover their place in day by day lives of person.

B. Problem of Plastic Waste?

1) Slowly debasing
2) Plastic junk than at any other time, and next to no of it gets reused. Plastics and their side-effects are littering our urban communities, seas, and streams, and adding to medical conditions in people and creatures.

C. How Can Reduce Plastic Waste?

1) Adoption of 3R framework in plastic squander.
2) Alternative of plastic

D. Preferences of Alternate Building Materials

1) Other than being eco-accommodating, different preferences of utilizing these materials for development are:
2) Better practical effectiveness.
3) Cost adequacy.
4) Better toughness.
5) Simplicity of development.
6) Better completion.
7) Least waste.
8) Less upkeep cost.
9) Least imperfections.
10) Less energy serious.
11) One of the significant part of Eco-lodging works on utilizing 'Substitute Building Materials' is Sustainable Construction Practices.

E. Reasons for Poor Acceptability of Alternative Building Materials

1) Absence of information about new materials.
2) Exclusion in different National codes and determinations.
3) In-suitable climate for innovative work.
4) Non-accessibility of appropriate gathering for advancing new materials.
5) Incapable and inappropriate exposure.
6) Ignorance among clients.
7) Helpless rivalry among new material producers.
8) More exorbitant cost construction of new materials.
9) Lower accentuation on exploration on eco-accommodating materials.
10) Negative demeanor of designers/draftsmen towards non-booked things.
11) Lower certainty on quality.
12) Immaterial innovative push for more extensive acknowledgment and selection.

II. LITERATURE STUDIES

A. Polli-Bricks: Recycled Plastic

The inventive personalities at miniWIZ as of late appeared the Polli-Brick, a reused polymer bottle that can be interlocked to assemble an extraordinary cluster of designs. Produced using reused PET jugs, the lightweight blocks offer astounding acoustic and warm protection and can construct anything from wall and rooftops to pots for plants, lookout windows and lovely dividers of light.

Figure: Plastic Walls of Light(syncronia.com)

Any individual who has gone on an outing to the United States' southwest desert has likely seen early instances of reused bottle design. From excavator's shacks to expand homes, these useful and cunning designs helped early frontiersmen and ladies settle The West. Presently miniWIZ, the innovative group that presented to us the HY-smaller than expected, miniNOTE and SOLARBULD, have taken the thought and changed it into an incredible new innovation. Polli-Bricks have unimaginable warm and sound protecting attributes notwithstanding a wonderful solidarity to weight proportion, which should make them a hit with planners and developers the same. While you can't yet get these at your nearby structure supply super store, the economy, adaptability and underlying capability of the Polli-Brick may simply be what a striving building market needs.

B. Stackable Bricks Made From Recycled Plastic

Utilizing neighborhood plastic, modeler RushabhChheda of Conscious Designs planned structure blocks which can be stacked in different manners to encourage self-constructed, reasonable lodging.

Mexico City, similar to urban communities in most non-industrial nations, has seen a sharp expansion in its metropolitan populace, and the interest for reasonable lodging is expanding. This implies more development material, and hence a bigger carbon impression.

planned structure components produced using waste plastic and fly debris.

The segments can be conveyed locally through implantation molding.

The blocks are supposed to be multiple times more protecting than mud blocks and can without much of a stretch withstand Mexican temperatures. To make the blocks fireproof and improve its pressure strength, the liquid plastic is blended in with an eco-accommodating filler produced using mechanical waste. The originators say that the technique for development could decrease the development costs by right around 60%.

The task won the Clean Energy Challenge.

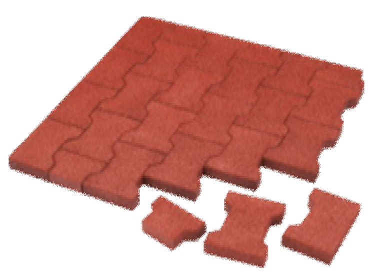

Figure : Stakable Bricks(desdignboom.com) made of Stakable Bricks(designboom.com)

A comparative venture that was named was set up by Kenyan architect Jay Sandhu, who additionally planned particular squares produced using single utilize plastic waste.

C. Classrooms Made From Recycled Plastic Waste Come To Ivory Coast

UNICEF gauges the nation will require 15,000 new homerooms by 2021 and 30,000 by 2025. Utilizing the plastic block method is roughly a third less expensive than traditional development.

ConceptosPlásticos' plastic block manufacturing plant in Bogotá purchases its material from 15,000 authorities, 300 tons of plastic waste a day, of which just around 5 percent is at present reused.

Five tons of plastic blocks, each around 50cm long and a lot lighter than different kinds of building block, are needed to construct a study hall. At the point when the industrial facility is at full limit, its 9,200 tons of block will be sufficient to assemble in excess of 1,800 study halls a year. UNICEF has consented to purchase enough blocks from ConceptosPlásticos for more than 500 homerooms.

UNICEF checks the country will require 15,000 new homerooms by 2021 and 30,000 by 2025. Using the plastic square technique is about a third more affordable than customary turn of events.

Figure: Prototype of a classroom (france24.com)

Conceptos Plásticos' plastic square assembling plant in Bogotá buys its material from 15,000 specialists, 300 tons of plastic waste a day, of which just around 5 percent is at present reused.

Five tons of plastic squares, each around 50cm long and much lighter than various types of building block, are expected to develop an examination corridor. Right when the modern office is at full breaking point, its 9,200 tons of square will be adequate to amass more than 1,800 examination lobbies a year. UNICEF has agreed to buy enough squares from ConceptosPlásticos for in excess of 500 homerooms. Worked with blocks produced using plastic rescued from the roads of Bogotá, the display areas have convinced the Colombian organization, ConceptosPlásticos, that what they are doing in Bogotá could be repeated somewhere else in West Africa.

D. 'Silica Plastic Block' Is A Sustainable Brick Made From Recycled Sand + Plastic Waste

India-based organization, rhino machines has dispatched the 'silica plastic square' – a reasonable structure block produced using reusing foundry dust/sand squander (80%) and blended plastic waste (20%). the undertaking was finished in a joint effort with r+d labs; the examination wing of the design firm r+d studio.

The 'silica-plastic square' project began with an away from of delivering zero waste from the sand recovery plant in rhino machines foundry plant. in the underlying stages, tests were led by utilizing foundry dust in concrete fortified fly debris blocks (7-10% waste reused) and dirt blocks (15% waste reused).

Figure: Silica Plastic Products(designboom.com)

Since the SPB is made out of waste, the expense of creation can without much of a stretch rival the normally accessible red earth block or the CMU (solid workmanship unit).

The SPBs were found to have 2.5 occasions the strength of typical red earth blocks while, to be devoured they need around 70 to 80% of the foundry dust with 80% lesser utilization of normal assets.

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III.CASE STUDY

A. Beijing National Aquatics Center.

The National Aquatics Center, otherwise called the 'Water Cube', was perhaps the most emotional and energizing brandishing settings built for the 2008 Beijing Olympic Games.

The structure is motivated by the regular arrangement of cleanser bubbles. Arup's originators and primary architects understood that a construction dependent on this exceptional math would be profoundly tedious and buildable, while seeming natural and arbitrary.

Ethyl tetrofluoroethylene (ETFE) was picked for the façade. This material weighs only 1% of glass and is a superior warm protector. Around 20% of sun oriented energy is caught and utilized for warming.

Figure : Interior of Aquatic Centre (Wikipedia.org)

The sunlight permitted into the solid shape sets aside to 55% on the lighting energy needed for the recreation pool corridor.

An ETFE façade was additionally utilized successfully on Munich's Allianz Arena. Ethylene tetrafluoroethylene (ETFE) is a fluorine-based plastic. It was intended to have high erosion obstruction and strength over a wide temperature range. ETFE is a polymer and its source-based name is poly(ethene-co-tetrafluoroethene). It is likewise known under its image name: Tefzel. ETFE has a generally high liquefying temperature, superb substance, electrical and high-energy radiation opposition properties. At the point when consumed, ETFE discharges hydrofluoric corrosive.

The clear and recyclable ETFE boards guarantee the middle is sufficiently bright during the day with proper degrees of interior sunshine, visual association and visual solace. Up to 55% reserve funds on lighting energy use are accomplished in the recreation pool corridor. To lessen the energy utilization of the middle further, the plan has consolidated numerous energy recuperation frameworks, for example, heat recuperation from warm fumes air for heating up the cold external air (natural air supply).

The Water Cube acts like a nursery on account of the blue air pocket ETFE (ethylene tetrafluoroethylene) material façade. Its clear quality permits characteristic sunshine to infiltrate the structure inside, and goes about as a cover to inactively warm the structure and pool water. This feasible idea diminished energy utilization by 30% – the identical to covering the whole rooftop in photovoltaic boards. The Water Cube acts like a nursery because of the blue air pocket ETFE (ethylene tetrafluoroethylene) material façade. Its clear quality permits common sunlight to enter the structure inside, and goes about as an encasing to latently warm the structure and pool water. This supportable idea decreased energy utilization by 30% – the comparable to covering the whole rooftop in photovoltaic boards.

B. Structural Elements

1) Ethylene Tetra Fluoro Ethylene (ETFE) foil pads that structure the cladding
2) The enormous pads are really in three layers (external, center and internal), with their contained air pressurized to 200pa, giving an impact like a depression divider**.**

C. Plastic House

(Location-Tokyo, Japan Year-2002 Size-172.75m2)

The residence remains in the focal point of the city and different pieces of 'living' are available to the metropolitan condition.

The two-story structure remembers a photograph studio for the storm cellar and an outdoors studio on the level rooftop, which bears the cost of a view over the city. This space is utilized for parties just as for tea services, which are held in the back of the rooftop porch for companions of the customer.

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(Fiber-fortified plastic)FRP is 4mm thick material in different shapes from pultrusion. I made connections of various characteristics by consolidating these shapes.

Figure: Plastic House Kengo Kuma & Associates(sublitas)

It is a novel material that occasionally seems like rice paper and now and then like bamboo because of the nature of contained fibers. Designed subtleties with exceptional treatment not to reduce this quality. Rather than utilizing dot at joints, butyl elastic and plastic screws were chosen for the development. The materiality of plastic that seems like a living animal would remain by utilizing these subtleties then the material begins to convey to our body. In this undertaking I considered 'living' not through the arrangement, but rather through the material.

D. Olympic Shooting Venue by Magma Architecture

The shooting displays for the London 2012 Olympic games are shrouded in spots that look the suckers of an octopus' appendages.
Planned by Magma Architecture of London and Berlin, the Olympic Shooting Venue involves three PVC tents that have been raised at London's memorable Royal Artillery Barracks in Woolwich.
measured steel supports and individuals outline straightforward cubed volumes with 18,000 square meters of pvc twofold layer film extended over the structures.
As the designs are just brief, they will be destroyed following the Olympics and reassembled in Glasgow for the 2014 Commonwealth Games. The shooting displays for the London 2012 Olympic Games are shrouded in spots that look the suckers of an octopus' appendages.
The shooting exhibitions for the London 2012 Olympic Games are canvassed in spots that look the suckers of an octopus' arms.
Planned by Magma Architecture of London and Berlin, the Olympic Shooting Venue involves three PVC tents that have been raised at London's memorable Royal Artillery Barracks in Woolwich.
Particular steel brackets and individuals outline basic cubed volumes with 18,000 square meters of pvc twofold layer film extended over the structures.
As the designs are just brief, they will be destroyed following the Olympics and reassembled in Glasgow for the 2014 Commonwealth Games

Figure 3.12: Olympic Shooting Venue/Magma Architecture (designboom.com)

Expanding the 18,000 m² of sans phthalate pvc layer fairly flowed the breeze load and thwarted the façade from shuddering, with the openings moreover filling in as doors at ground level and ventilation confirmations above.

The Olympic Delivery Authority kept up unforgiving necessities for acceptability, which transformed into a basic factor in framing the arrangement.

All materials were either reused or reused. Every one of the three of the settings are totally versatile, with each joint expected for reassembly. Additionally no composite materials or concretes were used. The shady facade on two of the three regions reduce the prerequisite for counterfeit lighting and the openings gave totally.

The tensioning focal point was refined through a creative arrangement of standard, detached sections regularly used in short lived structures. The twofold recurring pattern figuring was improved to extend the unbending nature of layer material. These particular requirements, hitched with the hankering to make a rich and vaporous development, delivered the arrangement of the constructions.

E. India's First Road Being Made Out Of Plastic Module In Noida

The Bharat Petroleum Corporation Limited and Noida Authority on Thursday launched the first road construction pilot project in India using plastic waste module.

A 500-metre-long And 12 meter wide road parallel to Noida-Greater Noida Expressway will be constructed in Sector 129. The road construction will use 35 metric tons of plastic waste. Sheets of plastic modules are being laid on the stretch which will then be covered by two layers of bitumen measuring 40 mm and 50 mm, respectively.

"The road that has been constructed has used around 35 metric tons of plastic waste in this R&D preliminary. In whole India, it is the first occasion when that modules made of plastic waste are being utilized for development of street and this is going on in Noida," he asserted.

Plastic-bitumen composite streets have preferable wear obstruction over standard black-top solid streets. They don't assimilate water, have better adaptability which brings about less rutting and less requirement for fix. Street surfaces stay smooth, are lower support, and retain sound better.

the Dutch development organization Volker Wessels assessed that reused plastic streets could last at any rate 50 years, or around multiple times longer than regular streets.

Figure: India’s First Road Being Made Our of Plastic Module(inshorts.com

IV. COMPARITIVE ANALYSIS

S.NO.	PARAMETERS	BEIJING NATIONAL AQUATICS CENTER	PLASTIC HOUSE	MONSANTO HOUSE OF THE FUTURE	OLYMPIC SHOOTING VENUE	INDIA'S FIRST ROAD BEING MADE OUT OF PLASTIC MODULE IN NOIDA
1.	PROJECT TYPOLOGY	AQUARIC CENTER	RESIDENTIAL	RESIDENTIAL	SHOOTING VENUE	ROAD
2.	SITE LOCATION	BEIJING, CHINA	TOKYO, JAPAN	ANAHEIM, CALIFORNIA, USA	WOOL WICH COMMON LONDON USA	NOIDA INDIA
3.	AREA OF PROJECT	90000M2	172.75M2	118.9 M2	14,305M2	500M LONG
4.	ALTERNATE OF	GLASS, STEEL	STEEL, WOOD, ALUMINUM	WOOD,STEEL,ALUMINUM,	WOOD, GLASS	Coal tar
5.	PLASTIC MATERIAL USED	ETHYLENE TETRA FLUORO ETHYLENE (ETFE)	FIBRE-REINFORCED PLASTIC (FRP)	POLYVINYL CHLORIDE (PVC)	PHTHALATE-FREE PVC MEMBRANE	WASTE PLASTIC
6.	ARCHITECT /FIRM	PTW ARCHITECTS	KENGO KUMA & ASSOCIATES	MONSANTO COMPANY	MAGMA ARCHITECTURE	NOIDA AUTHORITY
7.	DURABILITY	LIFE TIME	LIFE TIME	LIFE TIME	LIFE TIME	LIFE TIME
8.	AVAILABILITY	EASILY	EASILY	EASILY	EASILY	EASILY
9.	EFFECT ON NATURE	LOW	LOW	LOW	LOW	LOW
10.	RECYCLE	YES	YES	YES	YES	YES

V. INFERENCES

1) Ethylene tetra fluoro ethylene (etfe),fibre-fortified plastic(frp),polyvinyl chloride (sans pvc),phthalate pvc film are ecoamicable than traditional materials.
2) These materials are strong than ordinary materials.
3) These are energy productivity.
4) Ethylene tetra fluoro ethylene (etfe),fibre-fortified plastic(frp),polyvinyl chloride (without pvc),phthalate pvc layer Are materials are option of wood steel aluminum .
5) These materials are recyclable.
6) Less energy serious in assembling.
7) The lightweight of plastic materials takes into consideration speedy and simple establishment.

VI. COMPARITIVE ANALYSIS

S. No.	Parameters	Conventional material	Alternative material
		PLYWOOD BOARDS	PVC BOARD
1.	Material Used	Woods	Poly Vinyl Chloride (PVC)
2.	Strength	Low	High
3.	Durability	50 years	100 years or more
4.	Hardness	Low	High
5.	Thermal Properties	Not so good Insulator	Thermal Insulator
6.	Malleability	High	Low
7.	Ease of Construction	Hard	Easy
8.	Impact of Material used on surrounding	Unsustainable	Sustainable
9.	Awareness of these materials in respect to the current scenario	Widely known	Widely known
10.	Environment Impact and Carbon footprint	Deforestation and not reusable	Ecofriendly and recyclable
11.	Time consumption	More time taking	Less time taking
12.	Workability	Hard to install	Easy to install
13.	Ease of access of raw material	Costly raw material but available	Cost effective and easily available
14.	Acceptability	Widely	Widely
15.	Output alloted after completion of the work (facade)		
16.	Availability of workers	Vastly available	Vastly available

S. No.	Parameters	Conventional material	Alternative material
		WOODEN FURNITURE	PLASTIC FURNITURE
1.	Material Used	Woods	Polyethylene (PET) or Polypropylene (PP)
2.	Strength	Low	High
3.	Durability	10-20 years	20 years or more
4.	Hardness	Low	High
5.	Thermal Properties	High resistant	Low Resistant
6.	Malleability	Low	High
7.	Ease of Construction	Hard	Easy
8.	Impact of Material used on surrounding	Unsustainable	Sustainable
9.	Awareness of these materials in respect to the current scenario	Widely known	Widely known
10.	Environment Impact and Carbon footprint	Deforestation and non reusable	Recyclable and does not support deforestation
11.	Time consumption	More time taking	Less time consuming
12.	Workability	Heavy weight hard to move around	Lightweight easy to move around and rearrange
13.	Ease of access of raw material	Expensive but available	More affordable
14.	Acceptability	Widely	Not as much as wooden furniture
15.	Output alloted after completion of the work (facade)	Shows signs of damage from moisture, mold, sunlight and insects.	Continue to look great
16.	Availability of workers	Vastly available	Rarely

S. No.	Parameters	Conventional material	Alternative material
		GIRDERS	PLASTIC GIRDERS
1.	Material Used	Concrete or steel	Recycled Plastic
2.	Strength	Low	High
3.	Durability	100+ years	100+ years
4.	Hardness	high	Low
5.	Thermal Properties	Varies with the Density	Excellent Insulator
6.	Malleability	High	Low
7.	Ease of Construction	Hard	Easy
8.	Impact of Material used on surrounding	unsustainable	sustainable
9.	Awareness of these materials in respect to the current scenario	Widely known	Experimental phase
10.	Environment Impact and Carbon footprint	Draining energy resources	Use of plastic waste so ecofriendly
11.	Time consumption	More time taking	Experimental Phase
12.	Workability	Hard	easy
13.	Ease of access of raw material	Available but limited	More than need
14.	Acceptability	Widely	Less
15.	Output alloted after completion of the work (facade)		
16.	Availability of workers	Easily available	Not available

S. No.	Parameters	Conventional material	Alternative material
		WOOD PANELING	PLASTIC PANELING
1.	Material Used	Woods	PVC
2.	Strength	low	High
3.	Durability	10 years	25 to 30 years
4.	Hardness	Low	High
5.	Thermal Properties	Low thermal conductivity	Insulated
6.	Malleability	Low	High
7.	Ease of Construction	Moderate	Easy
8.	Impact of Material used on surrounding	High	Low
9.	Awareness of these materials in respect to the current scenario	Widely Known	Widely known
10.	Environment Impact and Carbon footprint	Deforestation	Recycled so ecofriendly
11.	Time consumption	more	less
12.	Workability	Short term, Maintainance cost high	Long-lasting, fire-resistant,hygienic and Easy to maintain
13.	Ease of access of raw material	Easily available	Easily available
14.	Acceptability	Widely	Widely
15.	Output alloted after completion of the work (facade)		
16.	Availability of workers	Many	Many

S. No.	Parameters	Conventional material	Alternative material
		CAST IRON PIPE	PVC PIPES
1.	Material Used	Iron	PVC
2.	Strength	High but prone to rust	Low
3.	Durability	100+ years	50+ years
4.	Hardness	High	Moderate
5.	Thermal Properties	Can cause rusting	Good insulator
6.	Malleability	low	high
7.	Ease of Construction	Heavy weight hard to install	Light weight to easy to install
8.	Impact of Material used on surrounding	Draining energy resources	Can be recycled
9.	Awareness of these materials in respect to the current scenario	Widely	Widely
10.	Environment Impact and Carbon footprint	Moderate	Low
11.	Time consumption	More	Less
12.	Workability	High Maintainance cost	Low maintainance cost
13.	Ease of access of raw material	Easy to access but high cost transport	Easy to access
14.	Acceptability	Widely	Widely
15.	Output alloted after completion of the work (facade)		
16.	Availability of workers	Many	Many

S. No.	Parameters	Conventional material	Alternative material
		TRADITIONAL BRICKS	POLLY-BRICKS
1.	Material Used	Sand, Clay and Lime	Polyethylene Terephthalate (PET)
2.	Strength	Very less tensile Strength	Strong
3.	Durability	500 years	Lifetime
4.	Hardness	3-5 N/mm2	6.66 N/mm2
5.	Thermal Properties	Good Insulator	Good insulator
6.	Malleability	High	Low
7.	Ease of Construction	Hard	Easy
8.	Impact of Material used on surrounding	Unsustainable	Sustainable
9.	Awareness of these materials in respect to the current scenario	Traditional so everyone knows about it.	Less Known
10.	Environment Impact and Carbon footprint	Release millions of tons of CO2 into the atmosphere	Don't use any Mortar
11.	Time consumption	More	Less
12.	Workability	Hard	Easy
15.	Output alloted after completion of the work (facade)		
16.	Availability of workers	Vastly available	Limited workers

LEGEND		
GOOD	**BAD**	**NORMAL**

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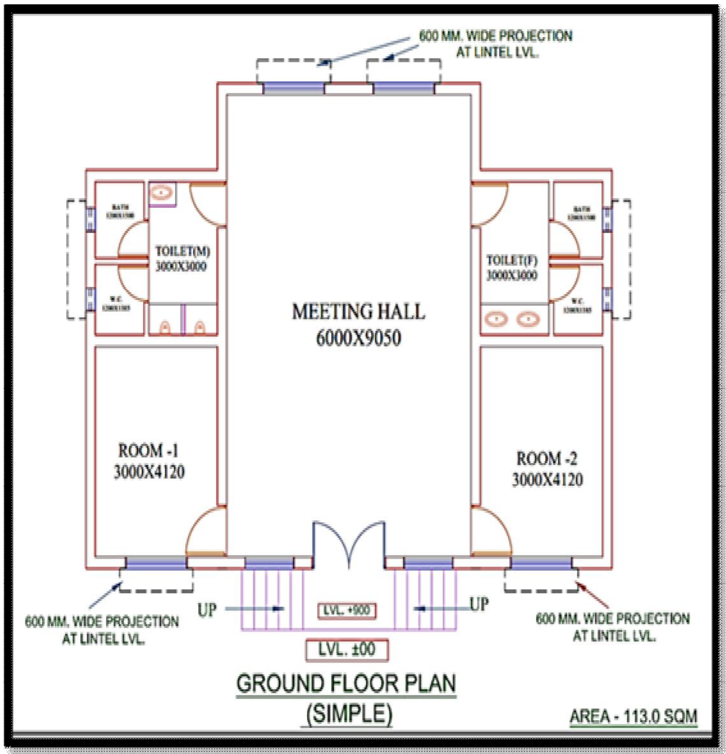
VII. MATERIALS COST ANALYSIS



Plan (gramin abhiyantran vibhag)

Materials					
S.N	Items of Work	Qty.	Unit	Rate	Total Amount
Part (01) - Manrega					
1	S/o. 40mm Brick Ballast	10.00	Cum.	1200.0	22800.00
2	S/o. Bricks M150	38226	No.	4.00	152904.00
				Total	175704.00
Part (02) – Rajya Vitt					
1	S/o. Cement (PPC)	390	Bag	250.0	97500.0
2	S/o. Coarse Sand	54.06	Cum.	2800.0	151368.0
3	S/o. 20mm Stone Grite	22.68	Cum.	2400.0	54432.0
4	M.s. Sections	960.00	Kg	40.0	38400.0
5	M.S. Bar	18.84	Qtl.	4200.0	79128.0
6	Distemper	64.0	Kg	90.0	5760.0
7	Cement Primer	39.0	Kg	105.0	4095.0
8	Wall tiles 200*300mm	62.20	Sqm.	280.0	17416.0
9	Floor tiles 300*300mm	18.00	Sqm.	250.0	4500.0
10	Sign Board/Marble Patiya	1.0	No.	2500.0	2500.0
				Total	455099.0
Overall Cost				630803.00	

Materials					
S.N	Items of Work	Qty.	Unit	Rate	Total Amount
Part (01) - Manrega					
1	S/o. 40mm Brick Ballast	10.00	Cum.	1200.0	22800.00
2	S/o. Bricks M150	38226	No.	5.80	221710.80
				Total	244510.80
Part (02) – Rajya Vitt					
1	S/o. Cement (PPC)	390	Bag	250.0	97500.0
2	S/o. Coarse Sand	54.06	Cum.	2800.0	151368.0
3	S/o. 20mm Stone Grite	22.68	Cum.	2400.0	54432.0
4	M.s. Sections	960.00	Kg	40.0	38400.0
5	M.S. Bar	18.84	Qtl.	4200.0	79128.0
6	Distemper	64.0	Kg	90.0	5760.0
7	Cement Primer	39.0	Kg	105.0	4095.0
8	Wall tiles 200*300mm	62.20	Sqm.	500.0	31100.0
9	Floor tiles 300*300mm	18.00	Sqm.	525.00	9450.0
10	Sign Board/Marble Patiya	1.0	No.	5000.0	5000.0
				Total	476233.00
Overall Coast 720743.80					

VIII. RECOMMENDATION

The project elucidates about the use of plastic in building construction industry. The components used include plastic bricks, doors, windows, and tiles. These plastic materials mainly use PVC (for door, windows and tiles) and plastic waste (for plastic bricks).

A. By using plastic as modifier , we can reduce the quantity of cement and sand by their weight, hence decreasing the overall cost of construction.
B. Constructing a room (12*12) by mainly using plastic materials offers us 25-30% diminution in the final cost.
C. Separation of various components of cost shows that the use of local manpower in plastic materials based construction can lead to labor cost reduction because of the light weight of materials compared to conventional way of construction.
D. Using the non-brittle materials can reduce construction waste. Unlike bricks, plastic bricks produce less construction waste.
E. Flexibility is a characteristic which makes the building performance against the higher load and capacity against the earthquake. Since the plastic is not fragile, they can be flexible and tolerate sudden load without failure.
F. Plastics are strong yet lightweight, and so they are easy to transport &manoeuvre. They are durable , knock-and scratch resistant with excellent weatherability. They do not rot or corrode.
G. The plastics are low conductors of heat and thus are used as insulation materials in green building concepts. Generally the plastic houses are bio-climatic in design, which means that when it is cold outside is warm inside and vice versa.
H. Use of plastic bricks in place of conventional bricks can reduce the co2 emission in manufacturing the cement by reducing the percentage of cement used.

IX. CONCLUSION

A. The research studied the extent of application of plastic materials over traditional/conventional materials for structural elements in building industry.
B. It discovered that plastic materials are more cost effective then traditional materials.
C. PVC and polystyrene are the major plastics used in construction as they are applied in bricks, doors, windows, expansion joints and structural components.
D. Cost effectiveness and light weight have been the highest driving factor for the acceptance of plastic materials in construction industry.
E. The rating of acceptance of plastics in structural applications is getting high day by day but not at its full potential.
F. These research results will form the basis for further research on the use of plastic materials for the structural components of building construction.
G. It has been proven that the use of plastic waste as innovative materials for building can be a proper solution for replacement of conventional materials.
H. So, in order to properly manage these plastic wastes while improving the sustainability of the environment, their use for various construction applications is a good option.

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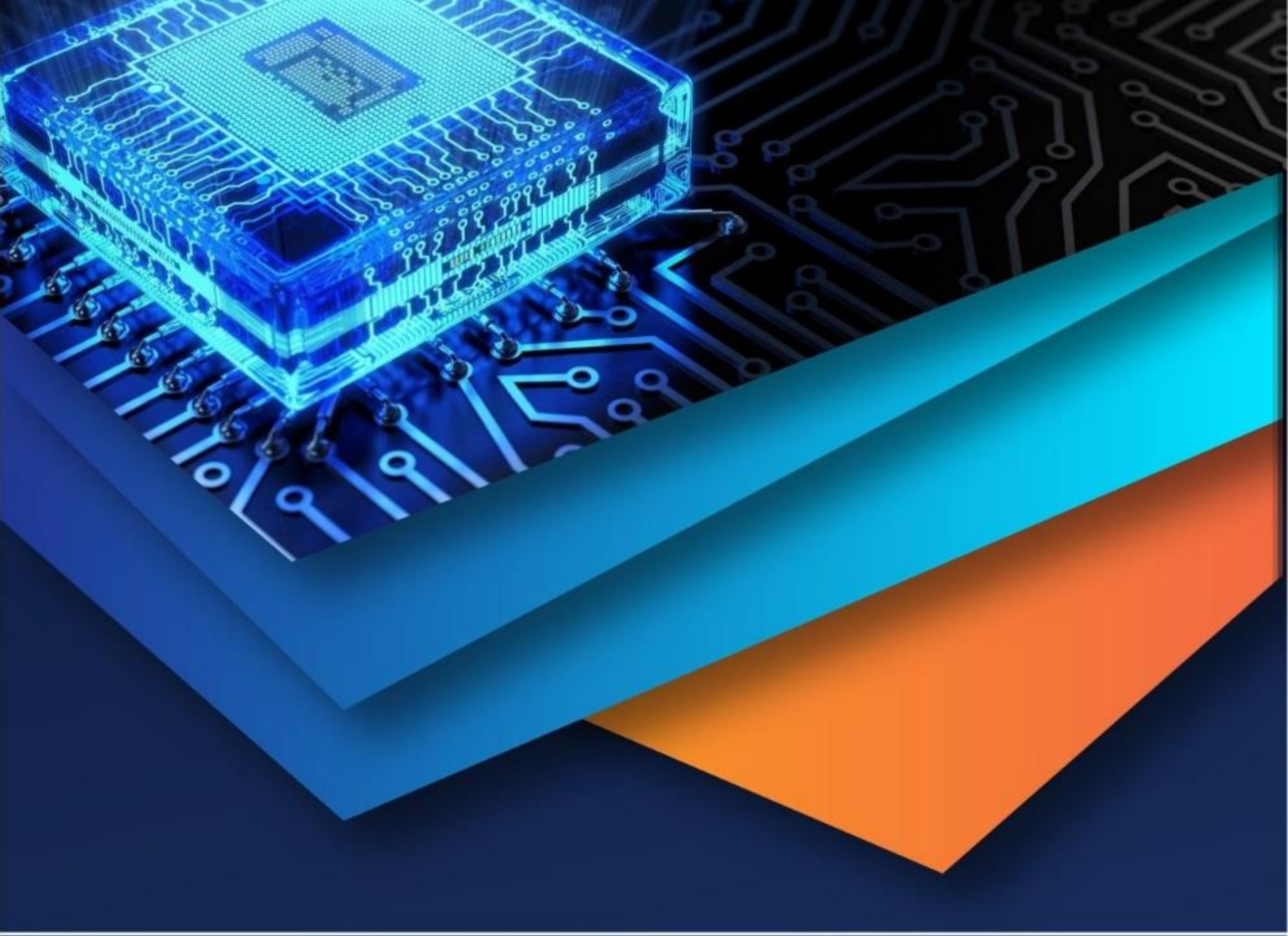

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