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Comparison Between Concrete Paver Block Road and Red Brick Laying Road

Abhishek Kumar¹, Lavlesh Pal², Sobhit Kumar³, Aman Yadav⁴, Km.Moni⁵, Rukmini Kumari⁶, Mo Sahban Khan⁷, Asst. Prof. Satyam Singh⁸

Department of Civil Engineering G.C.R.G. Group of Institutions, Bakshi Ka Talab, Lucknow, UP, India

Abstract: *The concrete pavers offer durability and ease of maintenance, while red bricks provide a more aesthetic and potentially higher durability in certain conditions but require making more labour concrete pavers block are known for their strength and resistance to wear and tear, making them suitable for low volume traffic areas. The colour of concrete pavers can fade over time especially if exposed to harsh weather conditions. Some find the appearance of concrete paver are less appealing than traditional brick. Red bricks are known for their strength and durability especially when fired at higher temperatures. The natural clay used in making bricks provides a durable and long-lasting colour that is less prone to fading. Bricks are made from natural materials and are sustainable options. Brick pavers require, more maintenance such as cleaning and sealing to prevent staining and deterioration. For durability ease of installation cost-effectiveness, and variety of colours and shapes especially in low-traffic areas.*

Keywords: *Durability, Maintenance, Strength, Appearance, Longevity, etc.*

I. INTRODUCTION

In infrastructure development, especially in the context of road construction, selecting the appropriate paving material is vital for ensuring the longevity, visual appeal, maintenance requirements, and overall cost-effectiveness of a project. Among the popular paving materials utilized, concrete paver blocks and red bricks are particularly favoured, especially in developing areas and semi-urban environments.

Concrete paver blocks are precast units made of concrete, formed into various geometric shapes that interlock with each other. These blocks, composed of a blend of cement, aggregates, and water, are recognized for their exceptional compressive strength, resistance to weather conditions, and straightforward installation and upkeep. They are commonly employed for pavements, driveways, walkways, and parking areas due to their durability and flexible design options. Furthermore, they permit aesthetic personalization through a range of colours, patterns, and textures.



FIG1.1: CONCRETE PAVER BLOCK (200*160*80)mm

Red bricks, traditionally produced from clay and fired in kilns, have a long history of application in road and building construction. They are appreciated for their natural look, environmental friendliness, and thermal insulation capabilities. When correctly installed in road construction, red bricks can provide a reasonable load-bearing capacity along with visual attractiveness. However, they require more labour to install and tend to suffer from weathering and erosion more than concrete blocks over time. As urban infrastructure and rural connectivity expand, it is crucial for engineers, planners, and policymakers to understand the relative benefits and drawbacks of these two paving materials. This comparison affects not only the durability of roads but also influences maintenance expenses, environmental factors, and the overall experience for users.

Thus, a thorough assessment of concrete paver blocks versus red bricks in road construction delivers important insights for sustainable and economically viable infrastructure planning.



FIG1.2:REDBRICK(190*90*90)mm

II. LITERATUREREVIEW

- 1) Muraleedharan et al. (2003): Documented the historical and current usage of paver blocks in India. The development and implementation of precast paver blocks began in the 1970s and continued into the 1980s. During the late 1980s and early 1990s, a high-strength Concrete Block Pavement (CBP) technique was employed, with CBPs developed in the 1970s and 1980s being tailored for local conditions. Additionally, efforts were made in the 1990s to introduce and popularize small-element, high-strength Interlocking Concrete Block Pavement (ICBP) for specific uses through laboratory research, construction monitoring, and standardization initiatives.
- 2) Brožovský et al. (2005): Found that the compressive strength test for concrete paver blocks could be assessed using non-destructive techniques such as ultrasonic pulses and rebound hardness testing.
- 3) Ling et al. (2006): Observed that the dry density and compressive strength of concrete paving blocks vary based on the cement content and water-to-cement (w/c) ratio. An increase in cement content relative to the optimum water amount in the concrete mix leads to improved dry density and compressive strength.
- 4) Tapkire et al. (2010): They suggested utilizing waste materials, such as plastic bottles, pallets, and carrybags—specifically polypropylene (PP) and polyethylene terephthalate (PET)—as partial replacements for traditional concrete aggregates. Incorporating 20% recycled plastic in place of aggregates does not negatively affect the properties of concrete.
- 5) M Ravi et al. (2012): Iron ore tailings, a byproduct from mining, present disposal challenges, thus their incorporation into concrete has been explored to enhance strength. When iron ore tailings are used at levels between 5% and 15%, there is a notable increase in compressive strength compared to standard concrete, while percentages from 15% to 25% lead to a decrease in compressive strength relative to conventional blocks.

III. METHODOLOGY

Comparison: Concrete Paver Blocks vs. Red Brick Road Laying:

The methods used for constructing roads with concrete paver blocks and those made of red bricks, while aiming to achieve similar functional objectives, vary greatly in terms of procedure, materials, labor intensity, and structural characteristics. Grasping the detailed methodology of both approaches aids in assessing the viability, efficiency, and suitability of each technique based on particular project needs, site conditions, and intended use.

A. Site Preparation (Common for Both)

- Prior to the installation of any surface material, diligent site preparation is crucial. This entails:
- Removing vegetation, debris, and any existing surface materials from the site.
- Excavating the topsoil to the necessary depth, in accordance with the anticipated traffic load.
- Grading and levelling to create the desired slope for proper drainage.

B. Sub-base and Base Layer Construction

1) Concrete Paver Blocks:

- A granular sub-base (GSB) or WBM (Water Bound Macadam) layer is initially laid, usually about 100–150 mm thick, and compacted adequately using a vibratory roller or plate compactor.
- A sand bedding layer (25–40 mm thick) is evenly spread and levelled over the sub-base. This layer enables the pavers to fit correctly and facilitates interlocking.
- Edge restraints (curb stones or edge blocks) are put in place to uphold the shape and alignment of the paved area.

2) Red Brick Laying:

- A comparable sub-base preparation is necessary; compacted earth, moorum, or a granular layer is commonly utilized.
- A layer of mud mortar or cement-sand mortar is applied on top of the base, depending on whether the method is dry or wet laying.
- In some traditional rural areas, red bricks are placed directly on compacted soil with a thin layer of sand or mortar to even out the surface.

C. Laying Of Surfacing Material

1) Concrete Paver Blocks:

- Paver blocks are positioned manually on the sand bed in a specified arrangement (herringbone, stretcher bond, etc.) to ensure proper interlocking.
- Gaps between pavers are filled with dry sand by sweeping and using a plate compactor to vibrate the surface for locking and uniformity.

2) Red Bricks:

- Bricks are laid either in a single layer or a double layer, depending on the necessary load-bearing capacity.
- The laying follows a straight-line or diagonal arrangement, keeping joints consistent.
- When mortar is used, it is applied between each brick, and extra material is cleared away to achieve a smooth finish.
- Joints may be pointed or left open based on the expected traffic and water drainage requirements.

D. Compaction and Finishing

1) Concrete Paver Blocks:

- Additional sand is sprinkled and swept across the surface to fill any gaps that remain between the blocks.
- A final compaction guarantees a flat, tightly interlocked surface.

2) Red Bricks:

- The brick surface is compacted with light mechanical or manual tampering tools.
- In certain situations, a cement slurry is applied over the surface to further bind the bricks and fill the gaps.
- The surface is then cured for several days by spraying water to enhance bonding and decrease early wear.

E. Curing and Opening for Use

1) Concrete Paver Blocks:

- Minimal curing is needed.
- The road can be opened to pedestrians and light vehicles almost right after the final compaction.
- Full load-bearing ability is reached without extended curing times, making it ideal for fast-track projects.

2) Red Bricks:

- A curing duration of 5 to 7 days is generally required, particularly if mortar or cement slurry is applied.
- The road is made available for use only once sufficient strength has developed and the setting is complete.



FIG4.1 LAYING OF SURFACING MATERIAL



FIG 5.1 COMPACTION AND FINISHING



FIG4.2 LAYING OF SURFACING MATERIAL



FIG 5.2 COMPACTION AND FINISHING

IV. RESULT & DISCUSSION

A. Concrete Paver Block Tests:

1) Compressive Strength Test

To evaluate load-bearing capability.

2) Water Absorption Test

It must not exceed 6% by weight.

It guarantees durability and resistance to weathering.

3) Dimension Test (according to IS 15658)

Concrete paver blocks are precast elements produced under strict quality control, resulting in uniform dimensions with tight tolerances—typically within ± 2 mm for length and width, and ± 3 mm for thickness.

4) Efflorescence Test (according to IS 15658)

In concrete paver blocks, the efflorescence test is generally carried out in accordance with IS 3495 (Part 3), where a sample is partially submerged in water for 24 hours, and the surface is subsequently checked for white salt deposits.

B. Red Brick Laying Road Tests:

1) Compressive Strength Test (Bricks)

Minimum strength: 3.5–7.5 MPa depending on brick classification (IS: 3495 (Part-1)).

2) Water Absorption Test (Bricks)

It must not exceed 20% by weight (according to IS 3495 (Part 2)).

It identifies soluble salts that create white patches on the surface.

3) Dimension Test: (IS 1077 RA 2021)

Red brick roads utilize traditional burnt clay bricks, which commonly exhibit greater dimensional variability and reduced strength (approximately 10–15 MPa).

4) Efflorescence Test: (IS 3495 (Part-3))

In red bricks, the efflorescence test is usually performed according to IS 3495 (Part 3), where a sample is partially immersed in water for 24 hours, and the surface is then inspected for white salt deposits.



Fig7:Efflorescenceofredbrick



Fig6:Efflorescenceofconcretepaverblock



Fig7:Waterabsorptionofredbrick

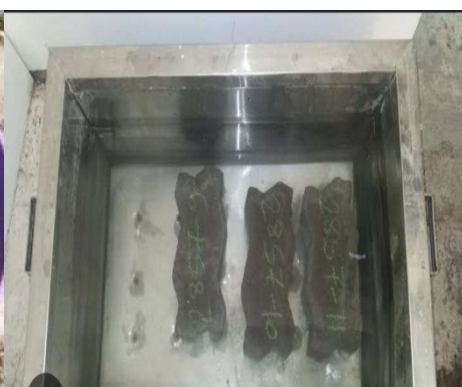


Fig6:Waterabsorptionofconcretepaverblock

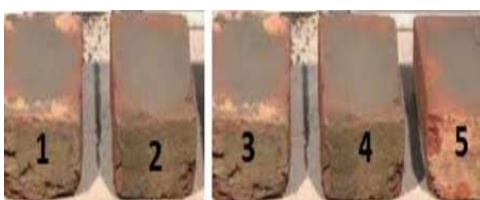


Fig7:Compressivestrengthofredbrick



Fig6:Compressivestrengthofpaverblock

COMPARISON OF CONCRETE PAVER BLOCK AND RED BRICK LAYING ROAD

S.NO	TEST PERFORMANCE	CONCRETE PAVER BLOCK	RED BRICK
1.	Compressive strength	29.5N/mm ²	10.45N/mm ²
2.	Water absorption	1.9%	11.12%

3.	Dimension test	Length=200±5mm Width=160±3mm Height=80±3mm	Length=4602±80mm Width=2201±40mm Height=1403±40mm
4.	Efflorescence test	SLIGHT	SLIGHT
5.	Cost of Item per Unit	Rs 10 to Rs 50	Rs 8 to Rs 12
6.	Estimated Value per Sq metre	Rs 8500 to Rs 9500	INR 300 to INR 600

S.no	TEST	IS CODE		IS CODE	
		PAVER BLOCK	REDBRICK	PAVER BLOCK	REDBRICK
1.	Compressive Strength	IS 15658-2021	IS:3495(PART1)-2019	30-40MPa	3.5-4.5MPa
2.	Water Absorption	IS 15658-2021	IS:3495(PART2)-2019	Not exceed 6%	Not exceed 20%
3.	Dimension Test	IS 15658-2021	IS 1077RA 2021	Length and width=±2mm Thickness=±3mm	Length=4602±80mm Width=2201±40mm Height=1403±40mm
4.	Efflorescence Test	IS 15658-2021	IS:3495(PART3)-2019	Slight	Slight

V. CONCLUSION

Concrete paver blocks and red bricks are both commonly used materials in road construction, each offering distinct advantages and disadvantages depending on their application and environmental conditions. Concrete paver blocks are made of interlocking units composed of a mixture of cement, sand, and aggregates, designed for seamless assembly. They are known for their exceptional durability, resistance to cracking, and capacity to withstand heavy loads and harsh weather conditions. The design of these blocks promotes better water drainage, as the gaps between them enhance permeability, reducing water accumulation and erosion. Additionally, individual blocks can be easily removed and replaced without disturbing the entire surface, making maintenance and repairs more cost-effective and efficient. In contrast, red brick roads, often laid in traditional herringbone or basket weave patterns, offer a visually attractive, rustic look. Constructed from fired clay, red bricks are valued for their strength and durability, although they may not provide the same long-term resilience as concrete. They can be prone to cracking under heavy traffic or pressure, especially in areas with extreme temperature fluctuations. Maintaining red brick roads can be labour-intensive, as replacing a damaged brick often requires the removal and reinstallation of several sections, which can be both time-consuming and costly. However, red bricks are regarded as more environmentally friendly, being made from natural materials and having a lower carbon footprint compared to concrete pavers. In conclusion, while concrete paver blocks are better suited for high-traffic, heavy-duty roads due to their strength and ease of maintenance, red bricks offer aesthetic and ecological benefits but may require more extensive upkeep.

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