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Comparison Between Concrete Paver Block Road and Red Brick Laying Road

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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 knownfortheirstrengthandresistancetowearandtear,makingthemsuitableforlowvolumetrafficareas.The colour ofconcretepavers can fade over time especially if exposed to harsh weather conditions. Somefind the appearanceofconcrete paverarelessappealingthantraditionalbrick.Redbricksareknownfortheir 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. Brickspavers require, moremaintenancesuch as cleaning and sealing to preventstaining 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,Longetivity,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-effectivenessofaproject.Amongthepopularpavingmaterialsutilized,concretepaverblocksandredbricksare 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 interlockwitheachother.Theseblocks,composedofablendofcement,aggregates,andwater,arerecognized 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:CONCRETEPAVERBLOCK(200*160*80)mm

Redbricks,traditionallyproducedfromclayandfiredinkilns,havealonghistoryofapplicationinroadand building construction. They are appreciated for their natural look, environmental friendliness, and thermal insulationcapabilities.When correctly installedinroadconstruction, redbrickscanprovideareasonableload- bearing capacity along with visual attractiveness. However, theyrequire more labour toinstalland tend tosuffer from weathering and erosion more than concrete blocks over time. As urban infrastructure and rural connectivity expand,itiscrucialforengineers,planners ,andpolicymakerstounderstand therelative benefitsand 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 late1980s and early 1990s, a high-strength ConcreteBlockPavement (CBP) technique was employed, withCBPsdevelopedinthe1970sand1980sbeingtailoredforlocalconditions.Additionally,effortsweremade 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 etal. (2005): Found that thecompressive strength test forconcrete paverblocks could beassessed 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 asplastic 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 between5%and15%,thereisanotableincreaseincompressivestrengthcomparedtostandardconcrete,while percentages from 15%to 25% lead to a decrease in compressive strength relative to conventional blocks.

III. METHODOLOGY

Comparison: ConcretePaver Blocksvs.RedBrick RoadLaying:

The methods used for constructing roads with concrete paver blocks and those made of red bricks, while aimingtoachievesimilarfunctionalobjectives,varygreatlyintermsofprocedure,materials,laborintensity, and structural characteristics. Grasping the detailed methodology of both approaches aidsinassessingtheviability, efficiency, andsuitability ofeachtechniquebasedonparticularprojectneeds, site conditions, and intended use.

A. SitePreparation(CommonforBoth)

- Priortotheinstallationofanysurfacematerial,diligentsitepreparationiscrucial.Thisentails:
- Removingvegetation,debris,andanyexistingsurfacematerialsfromthesite.
- Excavating thetopsoil tothenecessarydepth,inaccordancewiththeanticipatedtrafficload.
- Gradingandlevellingtocreatethedesiredslopeforproperdrainage.

B. Sub-baseandBaseLayerConstruction

1) ConcretePaverBlocks:

- Agranularsub-base(GSB)orWBM(WaterBoundMacadam)layerisinitiallylaid,usuallyabout100–150mm thick, and compacted adequately using a vibratory roller or plate compactor.
- Asandbeddinglayer(25–40mmthick)isevenlyspreadandlevelledoverthesub-base.Thislayerenablesthe pavers to fit correctly and facilitates interlocking.
- Edgerestraints(curbstonesoredgeblocks)areputinplacetoupholdtheshapeandalignmentofthe paved area.

2) RedBrickLaying:

- Acomparablesub-basepreparationisnecessary;compactedearth,moorum,oragranularlayeriscommonly utilized.
- Alayerofmudmortarorcement-sandmortarisappliedontopofthebase,dependingonwhetherthe method is dry or wet laying.
- Insometraditionalruralareas,redbricksareplaceddirectlyoncompactedsoilwithathinlayerofsandor mortar to even out the surface.

C. Laying Of Surfacing Material

1) Concrete Paver Blocks:

- Paverblocksarepositionedmanuallyonthesandbedinaspecifiedarrangement(herringbone,stretcher bond, etc.) to ensure proper interlocking.
- Gapsbetweenpaversarefilledwithdrysandbysweepingandusingaplatecompactortovibratethesurface for locking and uniformity.

2) RedBricks:

- Bricksarelaideitherinasinglelayeroradoublelayer,dependingonthenecessaryload-bearingcapacity.
- The layingfollowsastraight-line ordiagonal arrangement,keepingjointsconsistent.
- Whenmortarisused,itisappliedbetweeneachbrick,andextramaterialisclearedawaytoachievea smooth finish.
- Jointsmaybepointedorleftopenbasedontheexpectedtrafficandwaterdrainagerequirements.

D. CompactionandFinishing

1) ConcretePaverBlocks:

- Additionalsandissprinkledandsweptacrossthesurfacetofillanygapsthatremainbetweentheblocks.
- Afinalcompactionguaranteesaflat,tightlyinterlockedsurface.

2) RedBricks:

- Thebricksurfaceiscompactedwithlightmechanicalormanualtamperingtools.
- Incertainsituations,acementslurryisappliedoverthesurfacetofurtherbindthebricksandfillthegaps.
- Thesurfaceisthencuredforseveraldaysbyspraying watertoenhancebondinganddecreaseearlywear.

E. Curing andOpeningforUse

1) ConcretePaverBlocks:

- Minimalcuringisneeded.
- Theroadcanbeopenedtopedestriansandlightvehiclesalmostrightafterthefinalcompaction.
- Fullload-bearingabilityisreachedwithoutextendedcuringtimes,makingitidealforfast-trackprojects.

2) RedBricks:

- Acuringdurationof5to7daysisgenerallyrequired,particularlyifmortarorcementslurryisapplied.
- Theroadismadeavailableforuseonlyoncesufficientstrengthhasdevelopedandthesettingiscomplete.

FIG4.1LAYINGOFSURFACINGMATERIAL

FIG 5.1COMPACTIONANDFINISHING

FIG4.2LAYINGOFSURFACINGMATERIAL

FIG 5.2COMPACTIONANDFINISHING

IV. RESULT & DISCUSSION

A. Concrete Paver Block Tests:

1) CompressiveStrengthTest

Toevaluateload-bearingcapability.

2) WaterAbsorptionTest

Itmustnotexceed6%byweight.

Itguaranteesdurabilityandresistancetoweathering.

3) DimensionTest(accordingto IS 15658)

Concretepaverblocksareprecastelementsproducedunderstrictqualitycontrol,resultinginuniformdimensionswithtighttolerances—typicallywithin±2mmforlengthandwidth,and±3mmfor thickness.

4) EfflorescenceTest(accordingtoIS15658)

In concrete paver blocks, the eflorescence test is generally carried out in accordance with IS 3495 (Part 3), whereasampleispartiallysubmergedinwaterfor24hours,andthesurfaceissubsequentlycheckedforwhite salt deposits.

B. RedBrickLayingRoadTests:

1) CompressiveStrengthTest(Bricks)

Minimumstrength:3.5–7.5MPadependingonbrickclassification(IS:3495(Part-1)).

2) WaterAbsorptionTest(Bricks)

Itmustnotexceed20%byweight(accordingto3495(Part2)).

Itidentifiessolublesaltsthatcreatewhitepatchesonthesurface.

3) DimensionTest:(IS1077RA2021)

Red brick roads utilize traditional burnt clay bricks, which commonly exhibit greaterdimensional variabilityand reducedstrength(approximately10–15MPa).

4) EfflorescenceTest:(IS3495(Part-3))

Inredbricks,theeflorescencetestisusuallyperformedaccordingtoIS3495(Part3),whereasampleis partially immersed in water for 24 hours, and the surface is then inspected for white salt deposits.

Fig7:Effloresceneofredbrick

Fig6:Effloresceneofconcretepaverblock

Fig7:Waterabsorptionofredbrick

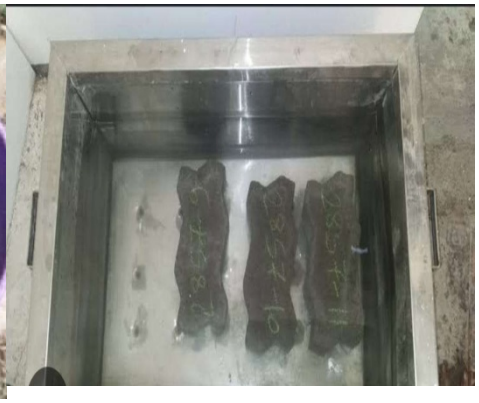

Fig6:Waterabsorptionofconcretepaverblock

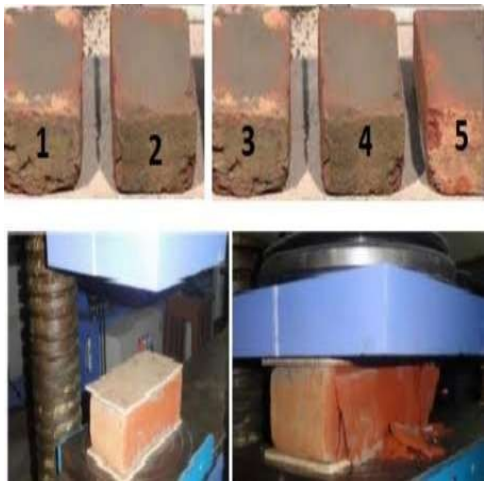

Fig7:Compressivestrengthofredbrick

Fig6:Compressivestrengthofpaverblock

COMPARISONOFCONCRETEPAVERBLOCKANDREDBRICKLAYING ROAD

S.NO	TESTPERFORMANCE	CONCRETEPAVERBLOCK	REDBRICK
1.	Compressivestrength	29.5N/mm2	10.45N/mm^2
2.	Waterabsorption	1.9%	11.12%

3.	Dimensiontest	Length=200±5mm Width=160±3mm Height=80±3mm	Length=4602±80mm Width=2201±40mm Height=1403±40mm
4.	Efflorescencetest	SLIGHT	SLIGHT
5.	CostofItemperUnit	Rs10toRs50	Rs8toRs12
6.	EstimatedValueperSq metre	Rs8500toRs9500	INR300toINR 600

S.no	TEST	ISCODE		ISCODE	
		PAVER BLOCK	REDBRICK	PAVERBLOCK	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	Notexceed6%	Notexceed20%
3.	ıension Test	IS 15658-2021	IS 1077RA 2021	Lengthand width=±2mm Thickness=±3mm	Length=4602±80mm Width=2201±40mm Height=1403±40mm
4.	rescence 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 distinctadvantagesanddisadvantagesdependingontheirapplicationandenvironmentalconditions.Concrete paver blocksare made of interlockingunitscomposedof a mixture ofcement, sand, and aggregates, designed for seamless assembly. They are knownfor their exceptionaldurability, 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 andrepairsmorecost-effectiveandefficient.Incontrast,redbrickroads, oftenlaidintraditional herringboneor basketweavepatterns,offeravisually attractive, rusticlook. Constructedfromfiredclay,red bricksarevalued fortheirstrengthanddurability,althoughtheymaynotprovidethesamelong-termresilienceasconcrete.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 theremovalandre installation ofseveral sections, whichcanbebothtime-consumingandcostly.However,red bricks are regarded as more environmentally friendly, being made from natural materials and having a lower carbonfootprintcompared toconcretepavers. Inconclusion, whileconcretepaver blocksarebettersuitedfor 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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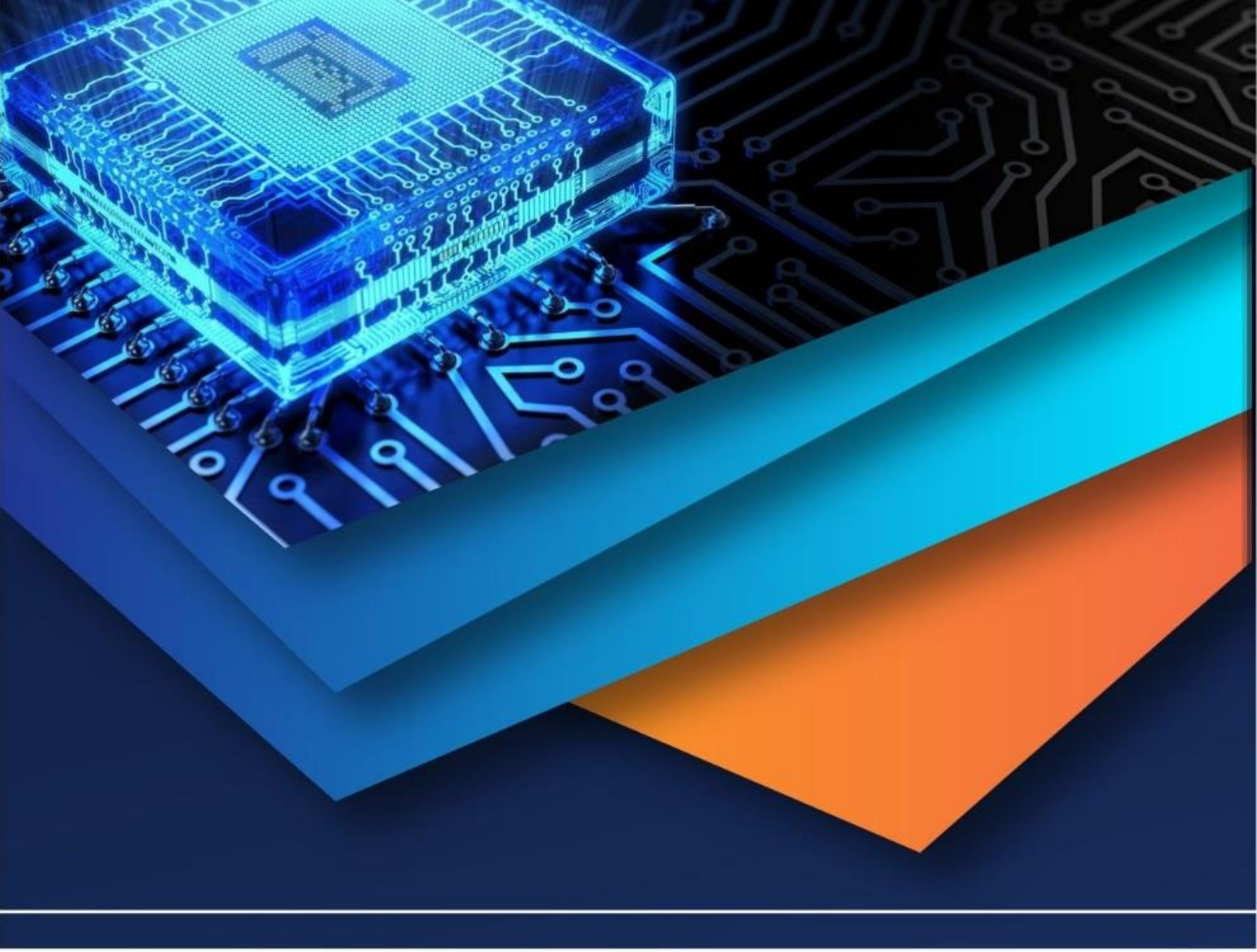

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