Construction and Infiltration Characteristics of Pervious Concrete Pavements

Bairi Saikumar and Dr. Anush K. Chandrappa

Presented by
Dr. Anush K. Chandrappa
Associate Professor
School of Infrastructure
IIT Bhubaneswar
akc@iitbbs.ac.in

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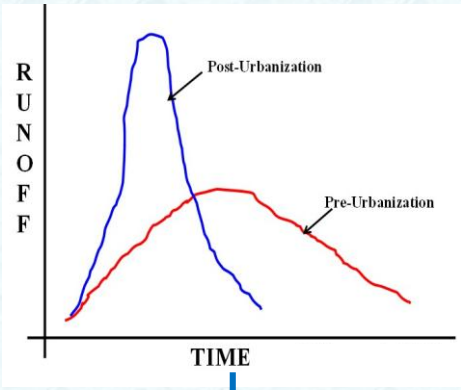
IRF INDIA CHAPTER

Global Road Infratech Summit & Expo

BACKGROUND

Changes in :
- ❖ Hydrological aspects
- ❖ Temperature in surrounding environment



Pavement systems: 35-50%

Can Stormwater drains and RWHs alone solve the issue associated with urban flooding?

Bangalore

Chennai

BACKGROUND

Do we need impervious pavements for non-motorized and parking applications

BACKGROUND

Li et al. (2022), China

Seslija et al. (2018), Serbia

Projects Executed by WaterPave, Melbourne, Australia

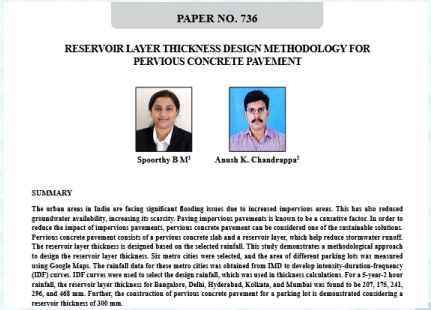
Projects Executed by “Bay Area Pervious Concrete” for Municipal Work, California, USA

PROBLEM STATEMENT

- Pervious concrete has garnered significant attention as best stormwater management solution worldwide
- Its application in India is very limited due to lack of expertise and past performance data
- Construction practice for pervious concrete pavement is not well-established in India
- Maintenance activity and its effectiveness is not well understood locally

OBJECTIVE & SCOPE

Objective: To construct pervious concrete pavement and evaluate its water infiltration performance over time



PAPER NO. 736

RESERVOIR LAYER THICKNESS DESIGN METHODOLOGY FOR PERVIOUS CONCRETE PAVEMENT

Spoorthy B M[1] Anush K. Chandrappa[2]

SUMMARY

The urban areas in India are facing significant flooding issues due to increased impervious areas. This has also reduced groundwater availability, increasing its scarcity. Paving impervious pavements is known to be a causative factor. In order to reduce the impact of impervious pavements, pervious concrete pavement can be considered one of the sustainable solutions. Pervious concrete pavement consists of a pervious concrete slab and a reservoir layer, which help reduce stormwater runoff. The reservoir layer thickness is designed based on the selected rainfall. This study demonstrates a methodological approach to design the reservoir layer thickness. Six metro cities were selected, and the area of different parking lots was measured using Google Maps. The rainfall data for these metro cities was obtained from IMD to develop intensity-duration-frequency (IDF) curves. IDF curves were used to select the design rainfall, which was used in thickness calculations. For a 5-year-2 hour rainfall, the reservoir layer thickness for Bangalore, Delhi, Hyderabad, Kolkata, and Mumbai was found to be 207, 176, 241, 296, and 468 mm. Further, the construction of pervious concrete pavement for a parking lot is demonstrated considering a reservoir thickness of 300 mm.

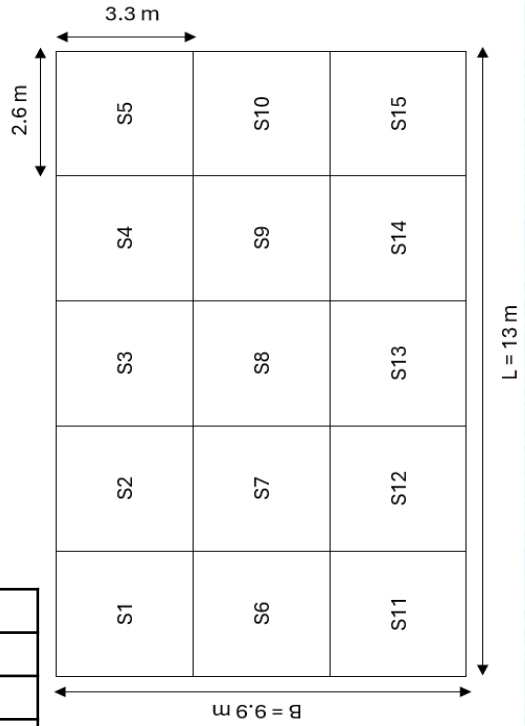
1. Design of reservoir layer for PCP system
2. Mix design and production of PC mixture at RMC plant
3. Construction of PCP
4. Measuring infiltration capacity of PCP as per ASTM C1701
5. Inferences on infiltration capacity and construction issues

STUDY AREA

Pervious concrete pavement

Interlocking concrete block pavement

Google Map View of Parking Lot



Slab Layout of PCP
DOC: July 2024

150 mm Pervious Concrete Slab

300 mm Reservoir Layer

Subgrade Layer

Material	Quantity (kg/m^3)
Cement	370
Aggregates	1554
Water	125.8
Admixtures	0.925

CONSTRUCTION

Preparation of Subgrade

Preparation of Reservoir Layer

Pouring of Pervious Concrete Mixture from RMC

Spreading of Pervious concrete

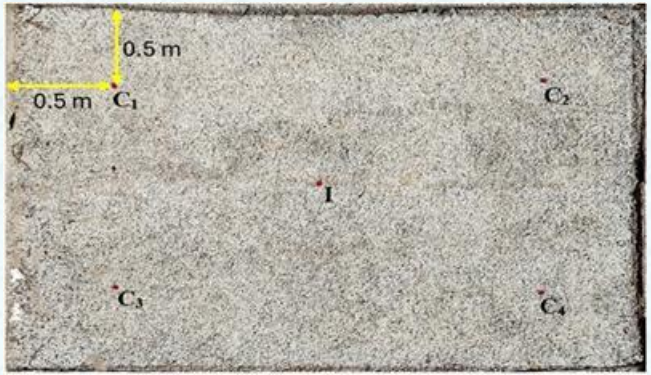
Finished View of Pervious Concrete Slab Surface

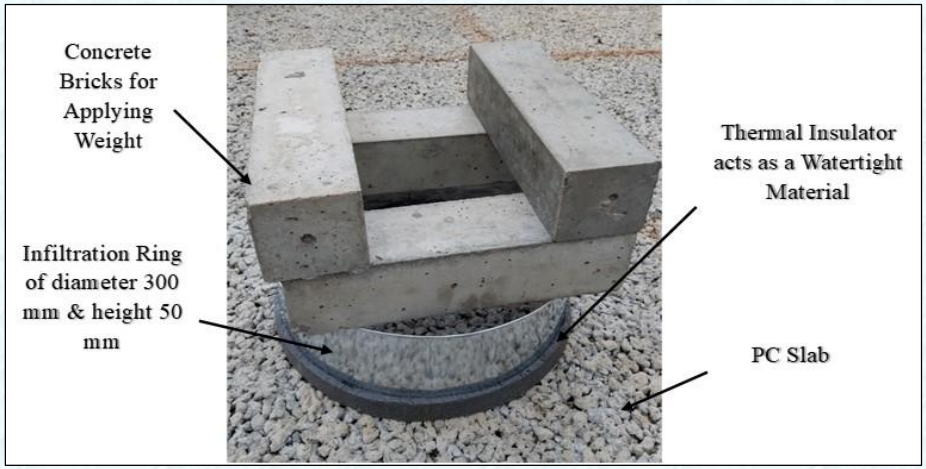
Compacted slabs covered with Wet gunny bags

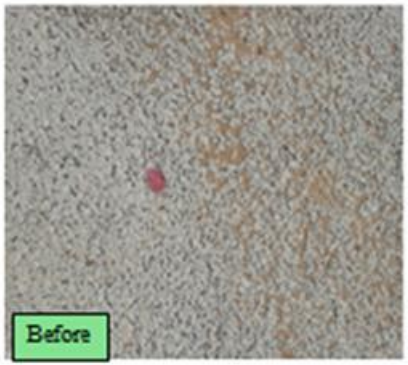
CONSTRUCTION

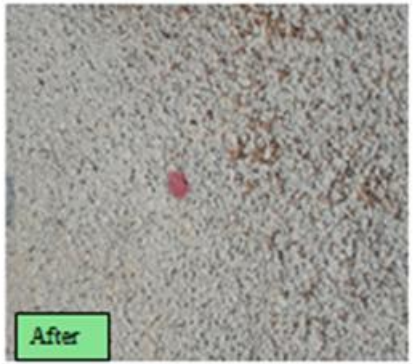
- Finished View of PCP
- No special treatment was given at joint

INFILTRATION TEST



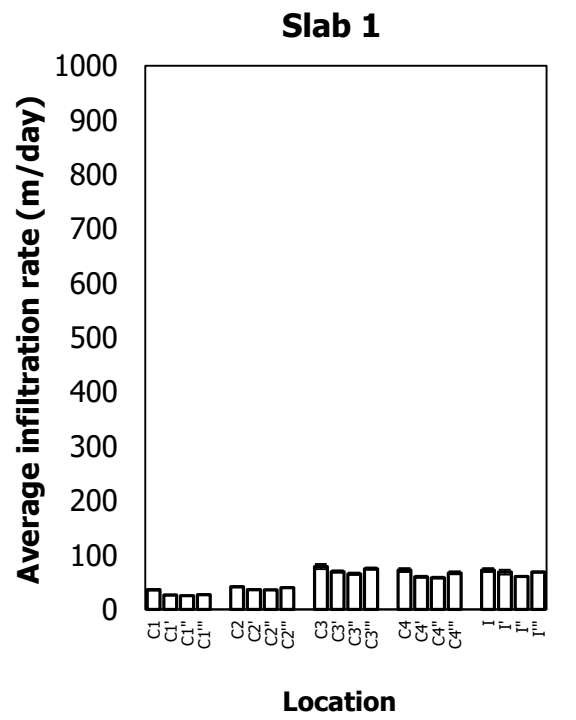


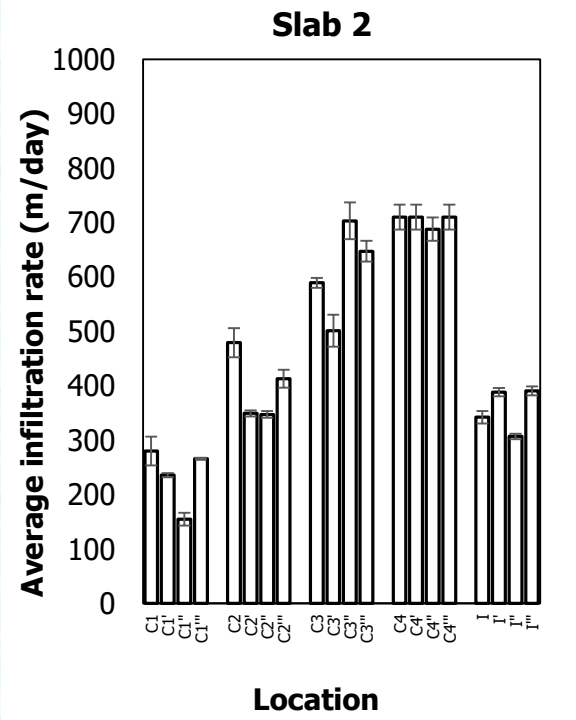


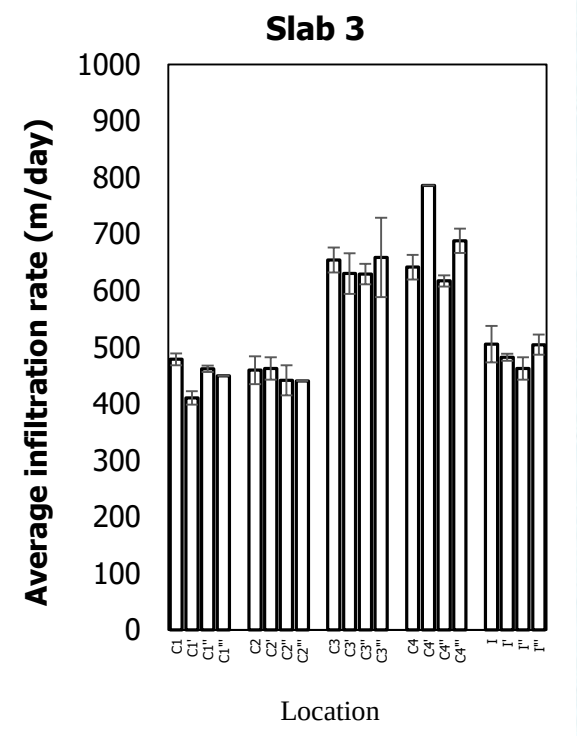


RESULTS & ANALYSIS

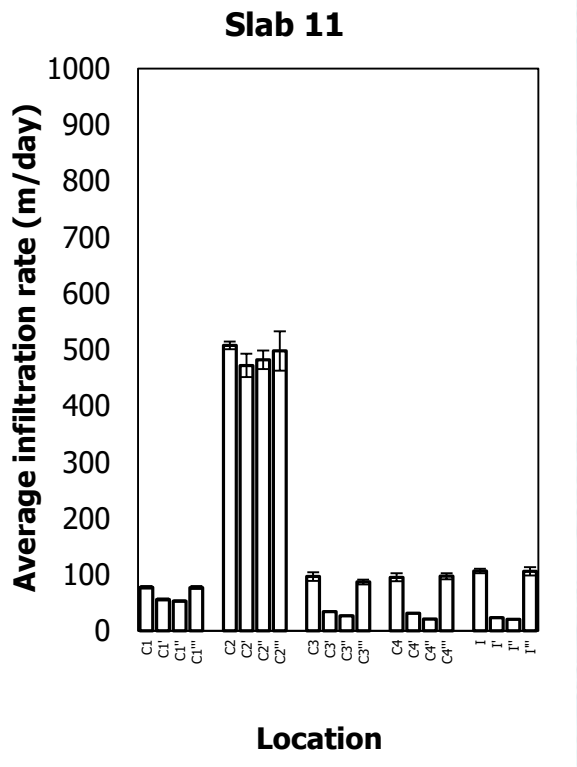
Summary of **900** infiltration capacity readings

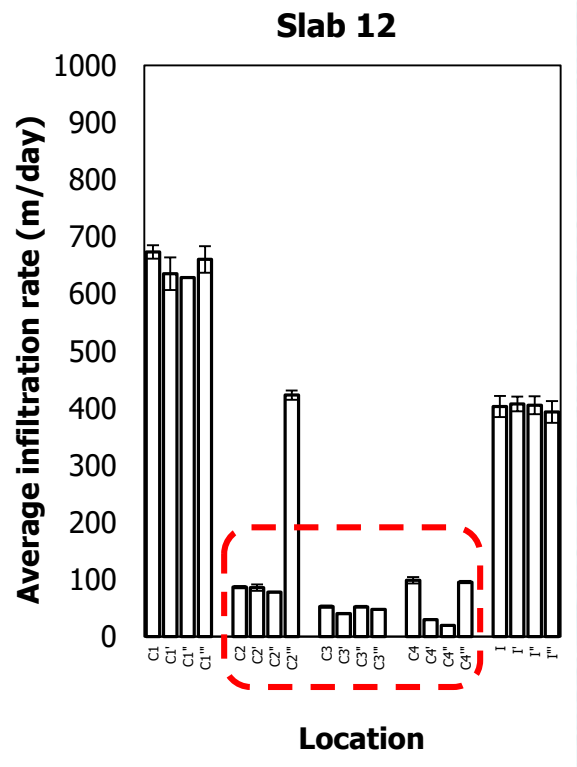


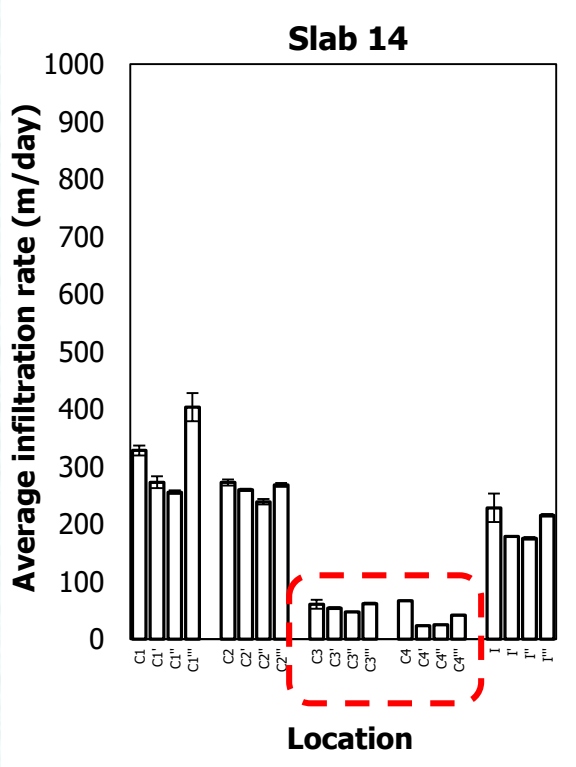




RESULTS & ANALYSIS







RESULTS & ANALYSIS

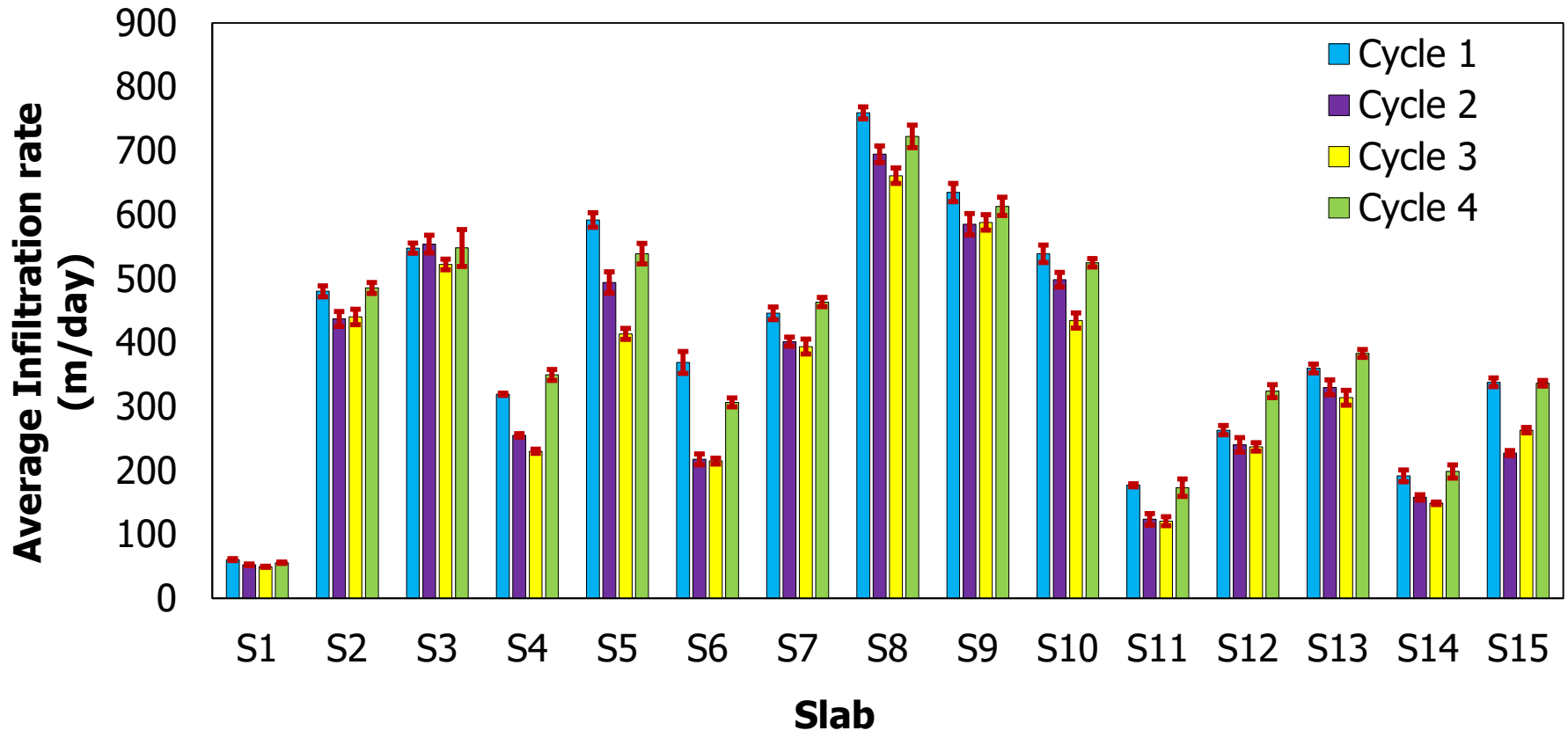
Slab 11 (Location: C3)

Slab 13 (Location C3)

Slab 12 (Location C3)

Slab 14 (Location C3)

RESULTS & ANALYSIS

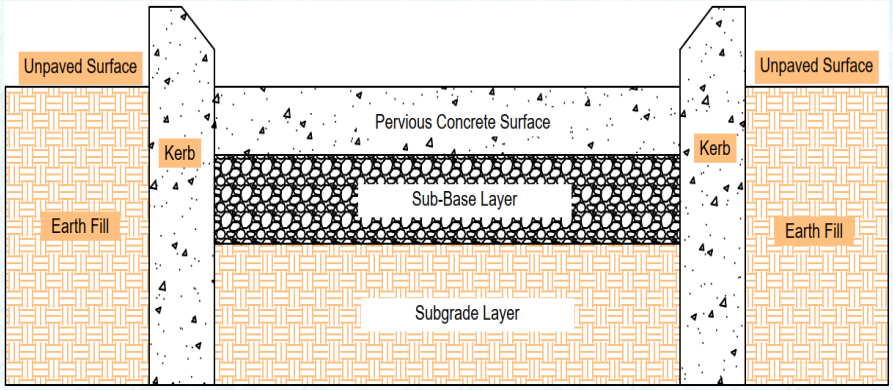


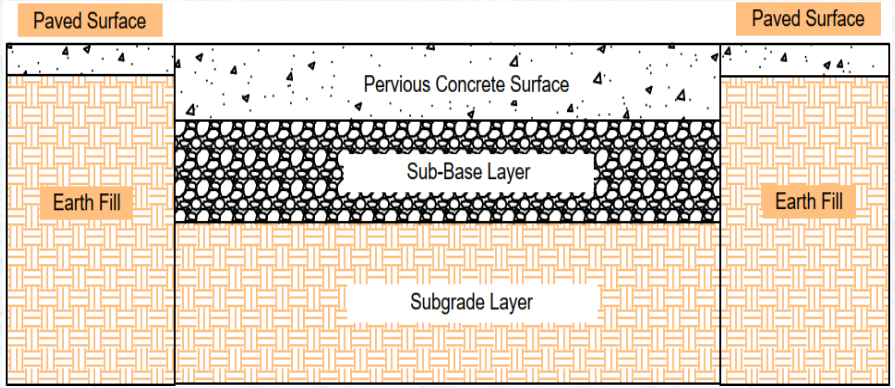
PERFORMANCE

CONCLUSIONS

Ranking of Slabs Based on In-Situ-Infiltration Rates

CONCLUSIONS

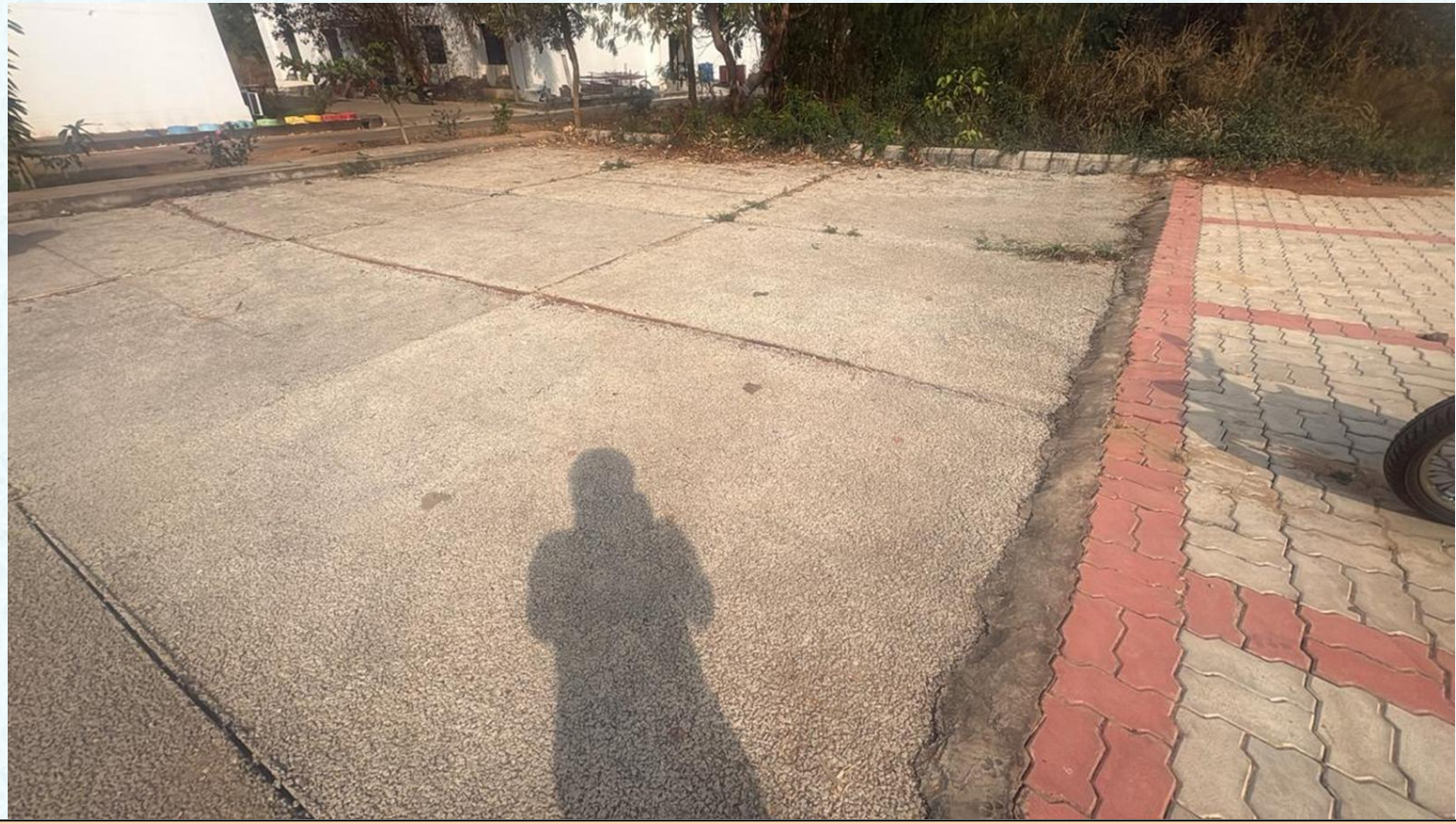




Proposed cross-sections considering adjoining areas of pervious concrete

CONCLUSIONS

CONCLUSIONS



REFERENCES

- Ibkar. A., Mukherjee. A., Didwania. N., Rai. S. (2023). Impact of Urbanization on Groundwater in Changing Climatic Scenario: A Case Study, Chapter-17, Impacts of Urbanization on Hydrological Systems in India, Ed. By P. Thambidurai, Anil Kumar Dikshit, Springer International Publishing
- US-EPA (2025). Experimental Permeable Pavement Parking Lot and Rain Garden for Stormwater Management.
- ACPA (2006). Stormwater Management with Pervious Concrete Pavement, American Concrete Pavement Association, USA, Pages. 6.
- Singh. A., Chandrappa. A.K., Biligiri. K.P. (2024). Evolution of Sustainable and Resilient Pervious Concrete Pavement Technologies in India, Transportation in Developing Economies, Springer International Publishing, Vol. 10, https://doi.org/10.1007/s40890-023-00196-5
- Spoorthy. B.M., Chandrappa. A.K. (2024). Reservoir layer thickness design methodology for pervious concrete pavement, Journal of Indian Roads Congress, Vol. 83, Issue No.3, pp. 49-55
- ASTM C1701 (2023). Standard Test Method for Infiltration Rate of In Place Pervious Concrete, ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA