Sewage treatment system certificate

Preamble:

Water is a precious commodity. Most of the earth water is sea water. About 2.5% of the water is fresh water that does not contain significant levels of dissolved minerals or salt and two third of that is frozen in ice caps and glaciers. In total only 0.01% of the total water of the planet is accessible for consumption. Clean drinking water is a basic human need. Unfortunately, more than one in six people still lack reliable access to this precious resource in developing world.

Sewage is 99 % water carrying wastes originating in urine and night soil. It contains waterborne pathogenic organisms from the night soil of already infected persons.

Sewage is a water-carried waste, in solution or suspension that is intended to be removed from a community. Also known as domestic or municipal wastewater, it is characterized by volume or rate of flow, physical condition, chemical and toxic constituents, and its bacteriologic status (which organisms it contains and in what quantities).

Sewage treatment is the process of removing contaminants from wastewater, primarily from household sewage. It includes physical, chemical, and biological processes to remove these contaminants and produce environmentally safe treated wastewater (or treated effluent).A by-product of sewage treatment is usually a semisolid waste or slurry, called sewage sludge, that has to undergo further treatment before being suitable for disposal or land application.

Every community produces liquid waste known as sewage. If untreated waste water is allowed to accumulate, the decomposition of organic materials it contains can lead to the production of large quantities of malodourous gases. In addition, untreated waste water usually contains nutrients which pathogenic microorganisms that dwell in the human intestinal tract. It also contains nutrients which can stimulate the growth of aquatic plants and it may contain toxic compounds. For these reasons the waste water should be treated and disposed hygienically which is desirable for any civilized society.

Report:

The commissioning of Sewage treatment plant in the RIT Campus, MSR Nagar, Mathikere, Bangalore-54. The Design of 250KLD Sewage treatment plant based on advanced sequential batch reactor(SBR) technology which is controlled by Programmable logic controller(PLC).

The SBR treated water is disinfected using Sodium Hypochlorite and filtered through a pressure sand filter. The final treated water will be stored for recycling for gardening purpose and Toilet flush purpose. The waste sludge is used as manure after dewatering through sludge drying beds.

The process of BOD removal, nitrification/de-nitrification, phosphorus removal and sludge separation are achieved continuously in a single SBR tank. The process operates on the continuous inflow and batch outflow principle. The phases of aeration, settling, decantation occur sequentially and are controlled by a PLC.

Sewage from pre-aeration tank flows through openings at the bottom of the baffle wall and into the main aeration tank where BOD removal and nitrification occur. After aeration phase, sludge separation occurs in the settling phase. After settling, the clear water from top is removed through a PLC operated decanter. De-nitrification occurs during anoxic periods of settling and decant phases. The excess sludge is wasted during decant phase.

Principal
M.S.Ramaiah College of Arts, Science & Commerce-Autonomous
MSRIT POST, MSR Nagar
Bengaluru - 560 054

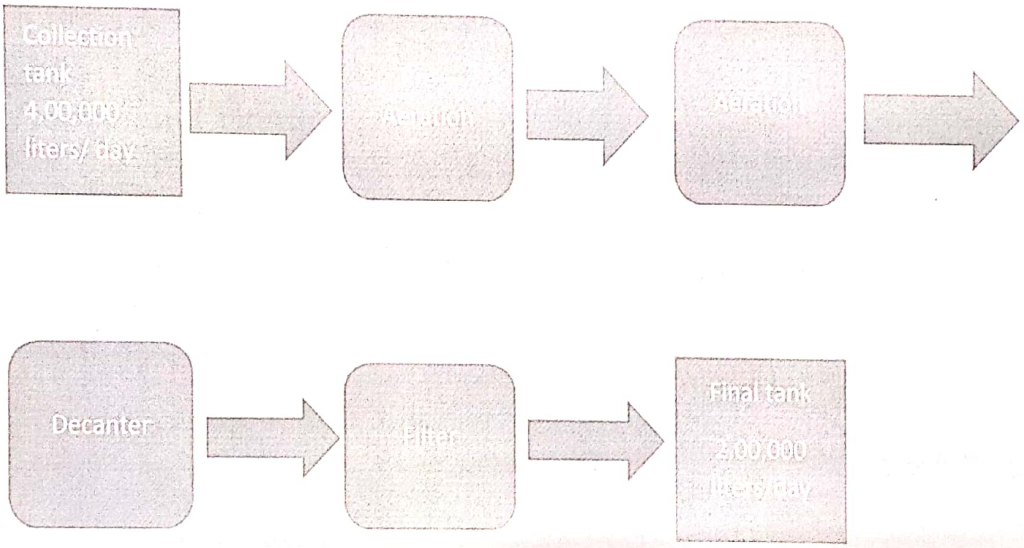
MAINTENANCE ENGINEER
GEF (GS BLOCK)

The tank is divided into pre-aeration and main aeration tanks by a baffle wall with openings at the bottom. The sewage flows continuously into the pre-aeration tank, which acts as a biological selector enhancing the growth of the most desirable organisms while limiting the growth of filamentous bacteria.

Treatment of sewage is absolutely necessary for making the inland water bodies clean and to reuse the treated water for toilet flushing and gardening purposes. Under section 24 of water pollution (Prevention & control) act 1974, the government authorities can prohibit the disposal waste water into UGD. Therefore, it is mandatory to set up STP by the institutions for bridging the treatment gap and also to conserve the water.

This inventory of STP would be helpful to MSR group institutions in formulating action plan for development of Green Campus.

The daily process of 250 KLD Sewage treatment plant



Final treated water has been tested through Labs:

1) We get the PH Value as per IS:3025/PART -11 = 7.35
2) Total Suspended solids as per IS :3025/PART -17 = 13.6 mg/L
3) Biochemical Oxygen Demand (3 days @ 27 c) as per IS:3025/PART-44 = 6.8 mg/L
4) Chemical Oxygen demand as per IS:3025/PART -58 = 36.9 mg/L
5) Total Nitrogen as per IS:3025/PART - 34 = 7.6 mg/L
6) Ammoniac Nitrogen as per IS: 3025/PART-34 = 1.3 mg/L
7) Fecal coliform as per IS 1622- 1981 = 50MPN/100ml

Principal
M.S.Ramaiah College of Arts, Science & Commerce-Autonomous
MSRIT POST, MSR Nagar
Bengaluru - 560 054

MAINTENANCE ENGINEER
GI ...CK)

WASTE TREATMENT CALCULATION:

Evaluation of Sewage treatment plant

Capacity Metric : Capacity Ratio = $\frac{\text{Total STP Capacity (MLD)}}{\text{Total Daily Wastewater generation}}$

$$= \frac{2{,}50{,}000 \text{ Litres}}{4{,}00{,}000 \text{ Litres}}$$

$$= \frac{0.25 \text{ (MLD)}}{0.40 \text{ (MLD)}}$$

$$= 0.625 \text{(MLD)}$$

2. Evaluation Criteria

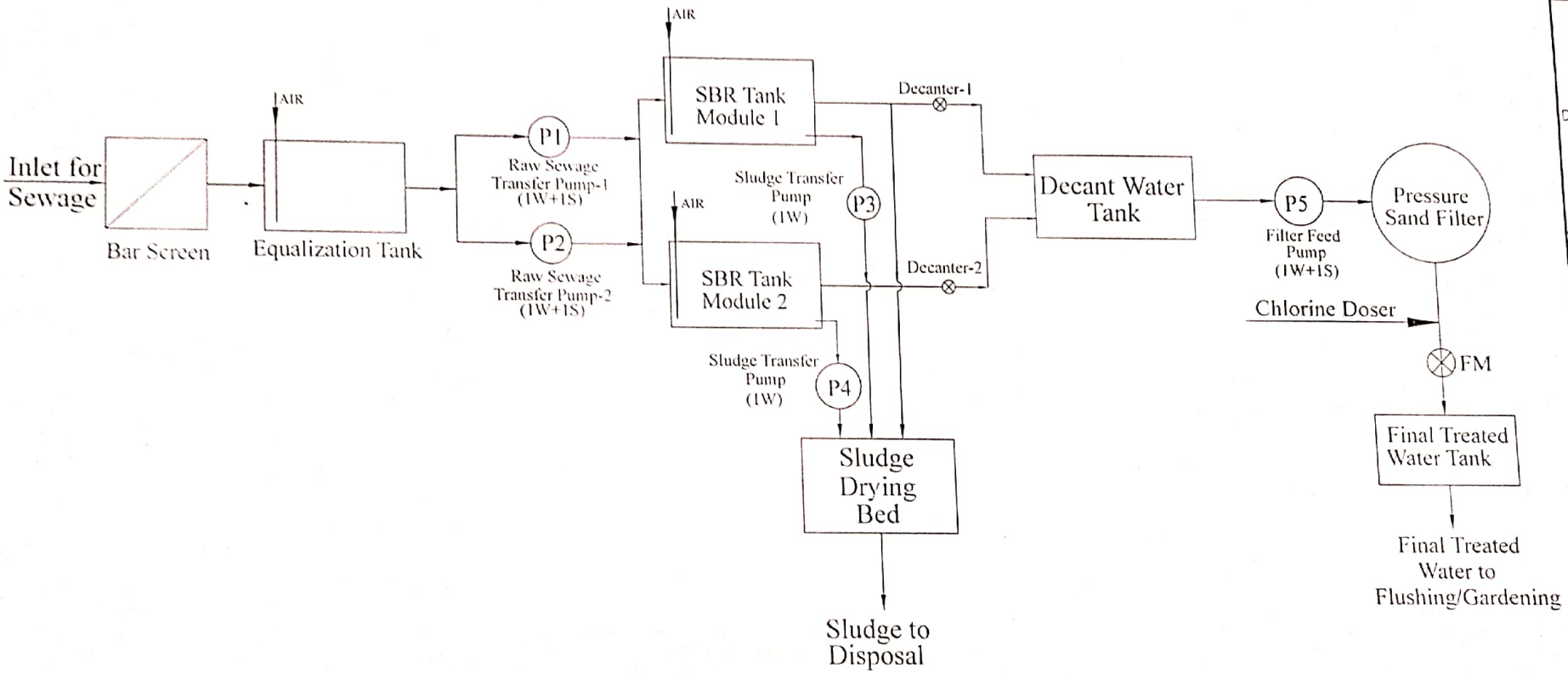
The resulting value of this ratio indicates the plant's operational status:

- **Ratio > 1.0 (Adequate/Safety Margin):** Indicates the plant has a buffer to handle peak flows and future growth. Standard design often aims for a **10–20% safety margin**, leading to a targeted ratio of roughly **1.1 to 1.2**.
- **Ratio = 1.0 (At Capacity):** The plant is operating exactly at its designed limit. This is risky because it lacks a buffer for Peak Flow Factors (surges during morning/evening) or infiltration from rainwater.
- **Ratio < 1.0 (Undersized/Overloaded):** Indicates a "treatment gap." For example, a 2021 CPCB report noted India generated 72,368 MLD but only had 31,841 MLD capacity (Ratio ≈ 0.44), leading to untreated discharge.

Principal
M.S.Ramaiah College of Arts, Science & Commerce-Autonomous
MSRIT POST, MSR Nagar
Bengaluru - 560 054

MAINTENANCE ENGINEER
GEF (GS BLOCK)

TREATMENT FLOW SHEET FOR MODULAR STP



M.S.Ramaiah College of Arts, Science & Commerce-Autonomous
MSRIT POST, MSR Nagar
Bengaluru - 560 054

MAINTENANCE ENGINEER
GEF (GS BLOCK)

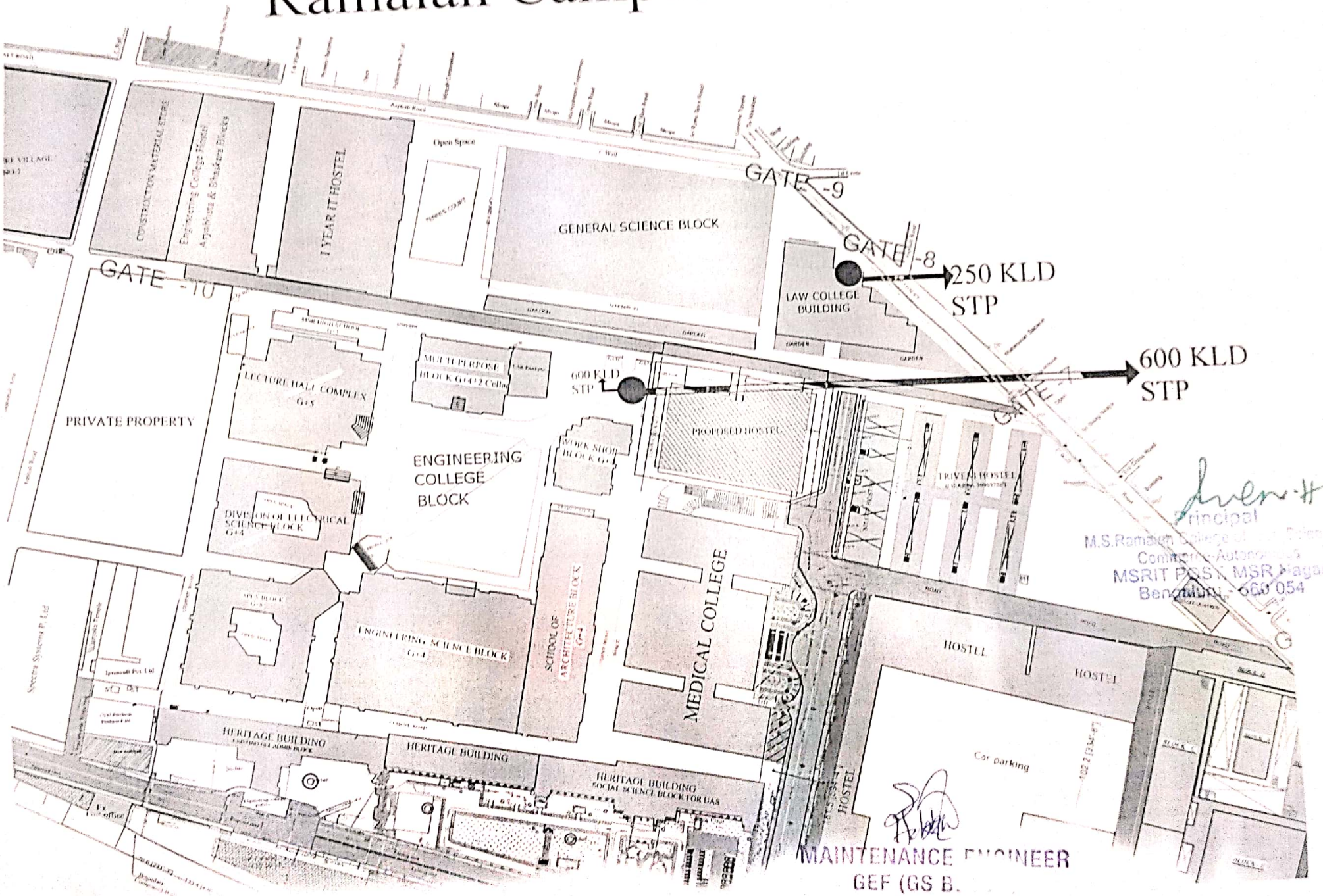
E-1381, 5th cross, 6th Main,
AECS Layout, ITPL Road,
Brookefields,
Bangalore -560 037
Tele Fax: +91 80 41705115

brookefield SBR
Advanced Wastewater Recycling

Doing it Right

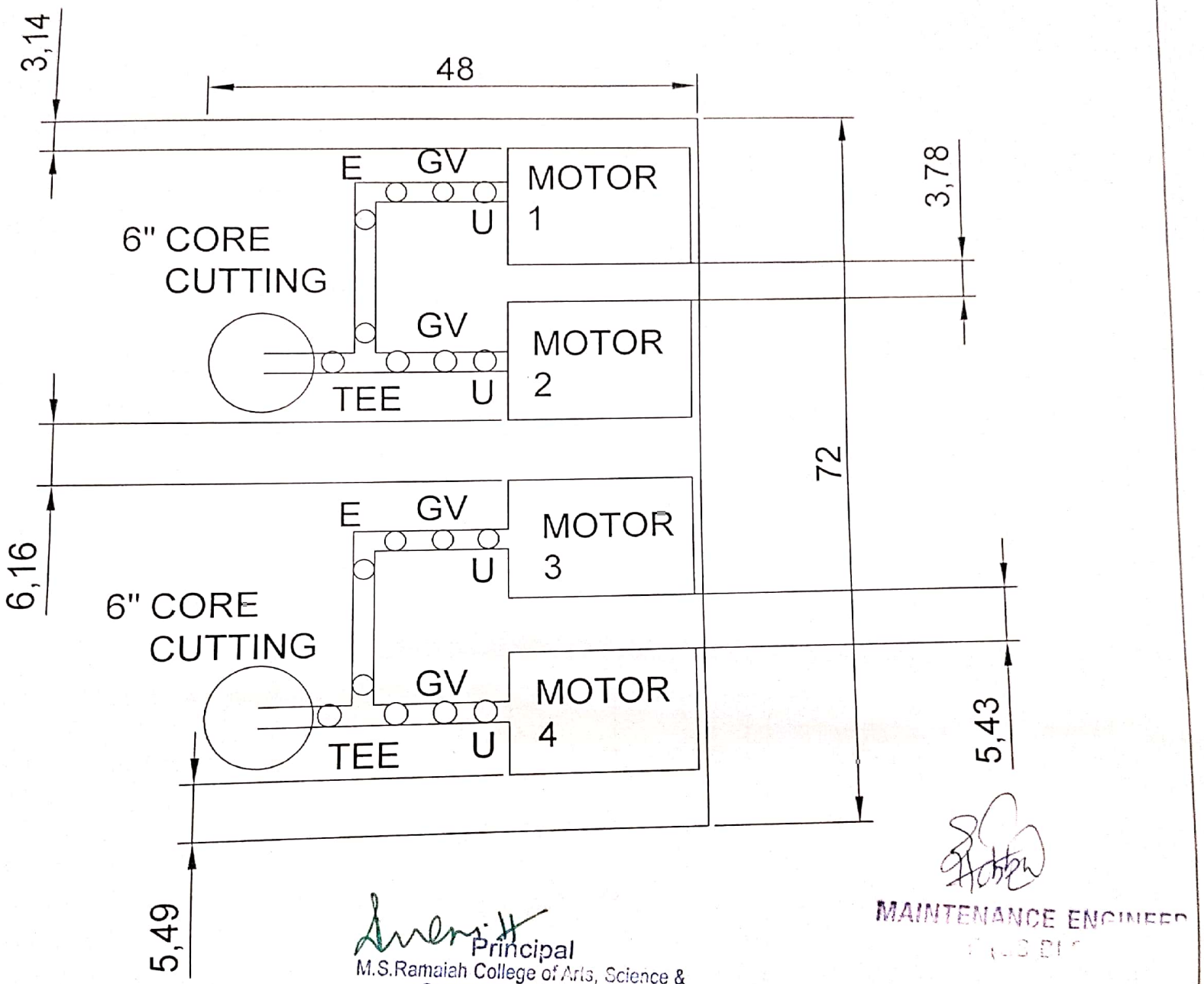
PROJECT	MSRIT
TITLE	250 KLD SEWAGE TREATMENT PLANT (125 x 2 MODULAR)
SUB-TITLE	PROCESS FLOW DIAGRAM

Ramaiah Campus Plan



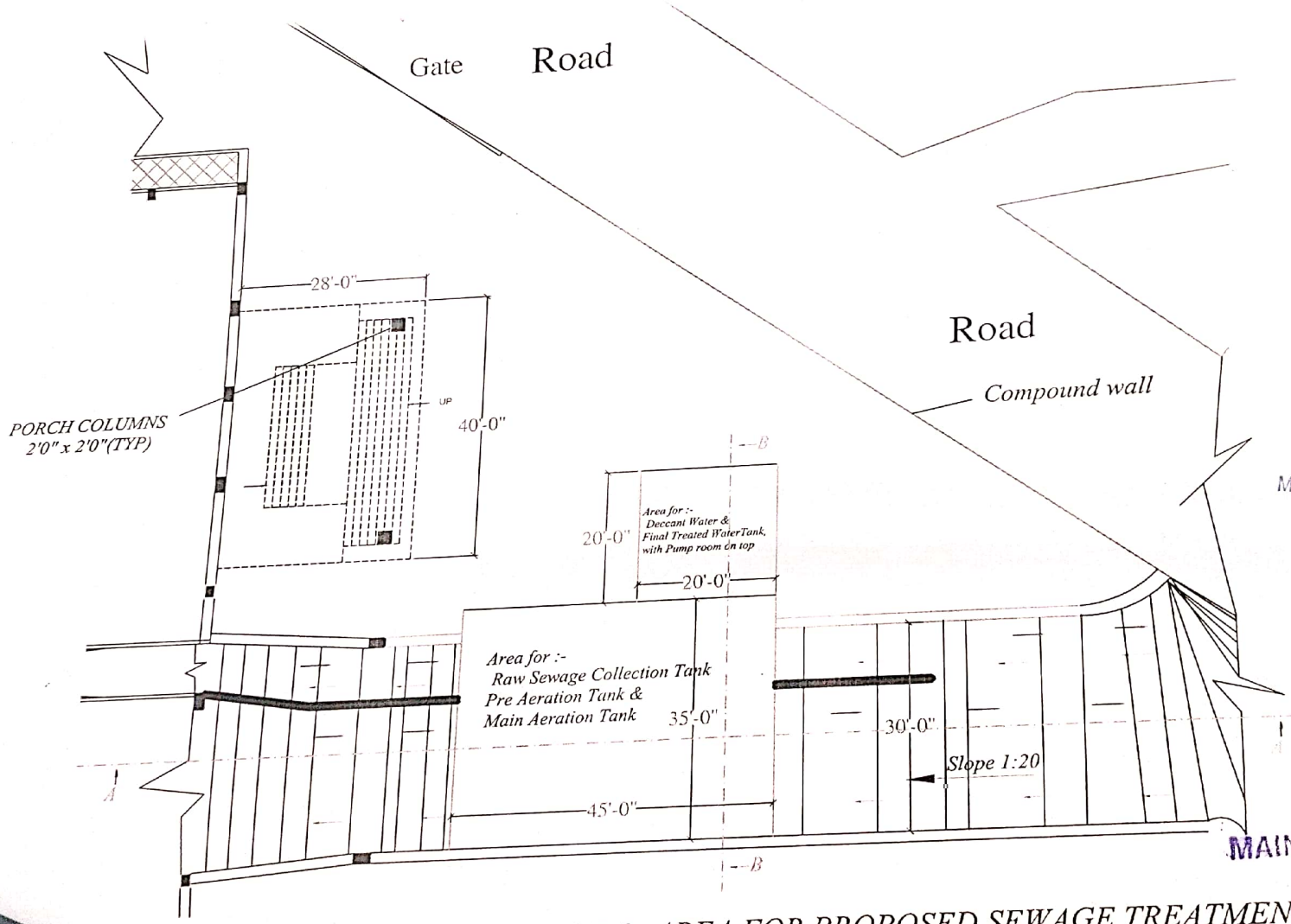
Principal
M.S.Ramaiah College of Arts, Science & Commerce-Autonomous
MSRIT Post, MSR Nagar
Bengaluru - 560 054

MAINTENANCE ENGINEER
GEF (GS B.



Principal
M.S.Ramaiah College of Arts, Science & Commerce-Autonomous
MSRIT POST, MSR Nagar
Bengaluru - 560 054

MAINTENANCE ENGINEER



PLAN SHOWING RAMP LOCATION & AREA FOR PROPOSED SEWAGE TREATMENT PLANT

PRODUCED BY AN AUTODESK STUDENT VERSION

Principal
M.S.Ramaiah College of Arts, Science &
Commerce-Autonomous
MSRIT POST, MSR Nagar
Bengaluru - 560 054

N

MAINTENANCE ENGINEER
(GEr (GS BLOCK)

MAINTENANCE ENGINEER

MSRIT POST, MSR Nagar
Bengaluru - 560 054

Gokula Education Foundation(Engineering and Science)

M.S. Ramaiah college of Arts, Science and Commerce

Report on Rain Water Harvesting

Ramaiah College of Arts, Science and Commerce is situated in RIT Campus, Gokula Education Foundation, MSR Nagar, Mathikere, Bangalore-54.

Preamble :

Rainwater harvesting (RWH) is the collection and storage of rain, rather than allowing it to run off. Rainwater is collected from a roof-like surface and redirected to a tank, cistern, deep pit (well, shaft, or borehole), aquifer, or a reservoir with percolation, so that it seeps down and restores the ground water. Dew and fog can also be collected with nets or other tools. Rainwater harvesting differs from storm water harvesting as the runoff is typically collected from roofs and other surfaces for storage and subsequent reuse. Its uses include watering gardens, livestock, irrigation, domestic use with proper treatment, and domestic heating. The harvested water can also be committed to longer-term storage or groundwater recharge.

Rainwater harvesting is one of the simplest and oldest methods of self-supply of water for households, having been used in South Asia and other countries for many thousands of years. Installations can be designed for different scales including households, neighbourhoods and communities and can also be designed to serve institutions such as schools, hospitals and other public facilities

Report :

Ramaiah College of College of Arts, Science and Commerce is a standalone building which has 8 floors and around 3,387sft garden area, where provision is available to harvest rain water with roof top around 70,952sft. Bangalore has the annual rainfall of 1004.6mm and the rainy season extends to past 1 year.

Ramaiah College of Arts, Science and Commerce has sufficient roof area and the rain water is estimated taking concrete as impervious layer. The open garden area and park area also contributes rain water taking seepage factor. Ramaiah College of Arts, Science and Commerce has rain water harvesting tank and the rainwater harvesting system tank gets collected the rain water that flows from drainage, terrace, garden and park area. The Collected rain water is used for gardening purposes; whenever excess rain happens the overflow from the rainwater harvesting tank is directed to infiltration wells which are very near to bore wells. The rain water gets infiltrated into the ground and recharges the bore wells.

Also a new collection tank to collect excess rain water near alumni building is constructed and subjected to sedimentation, filtration and disinfection. The treated rain water is proposed to be used for domestic purposes particular in wash rooms.

MAINTENANCE ENGINEER
GEF (GS BLOCK)

Principal
M.S.Ramaiah College of Arts, Science &
Commerce-Autonomous
MSRIT Post, MSR Nagar,
Bangalore - 560 054

Water Management:

Assessment of Rainwater Harvesting potential :

Harvestable potential = Total catchment area (m2) x Average Annual Rainfall (m) x Runoff Coefficient

$$V = A \times R \times C$$

1) Average rainfall = 1004.6mm
2) Total area of building = 6,591 m2
3) Coefficient = 0.85

$$V = 6591 \times 1004.6 \times 0.85$$

$$= 5628.12 \text{ m3}$$

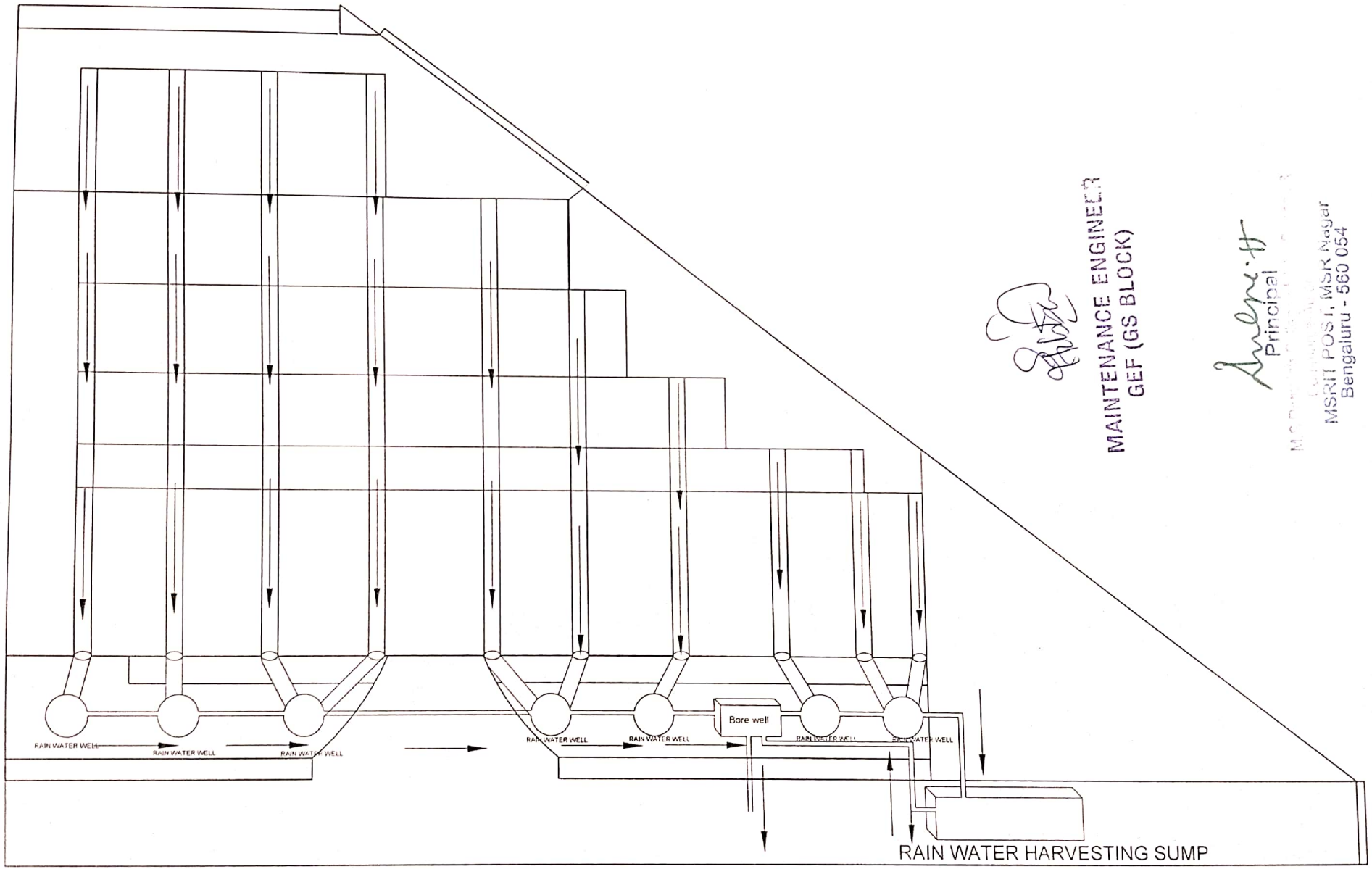
$$= 56,28,120 \text{ litres}$$

Rainwater Harvesting :

In campus we have the Rainwater storage sump and Rainwater storage pit, which has the capacity 5,00,000 litres and 14,934 litres pit 14nos inside the campus, which can save almost 6,49,340 litres during the Rainwater and it also acts as an Rechargeable bodies for ground water bore wells. Rainwater stocked also used for garden purposes during the water scarcity.

MAINTENANCE ENGINEER
GEF (GS BLOCK)

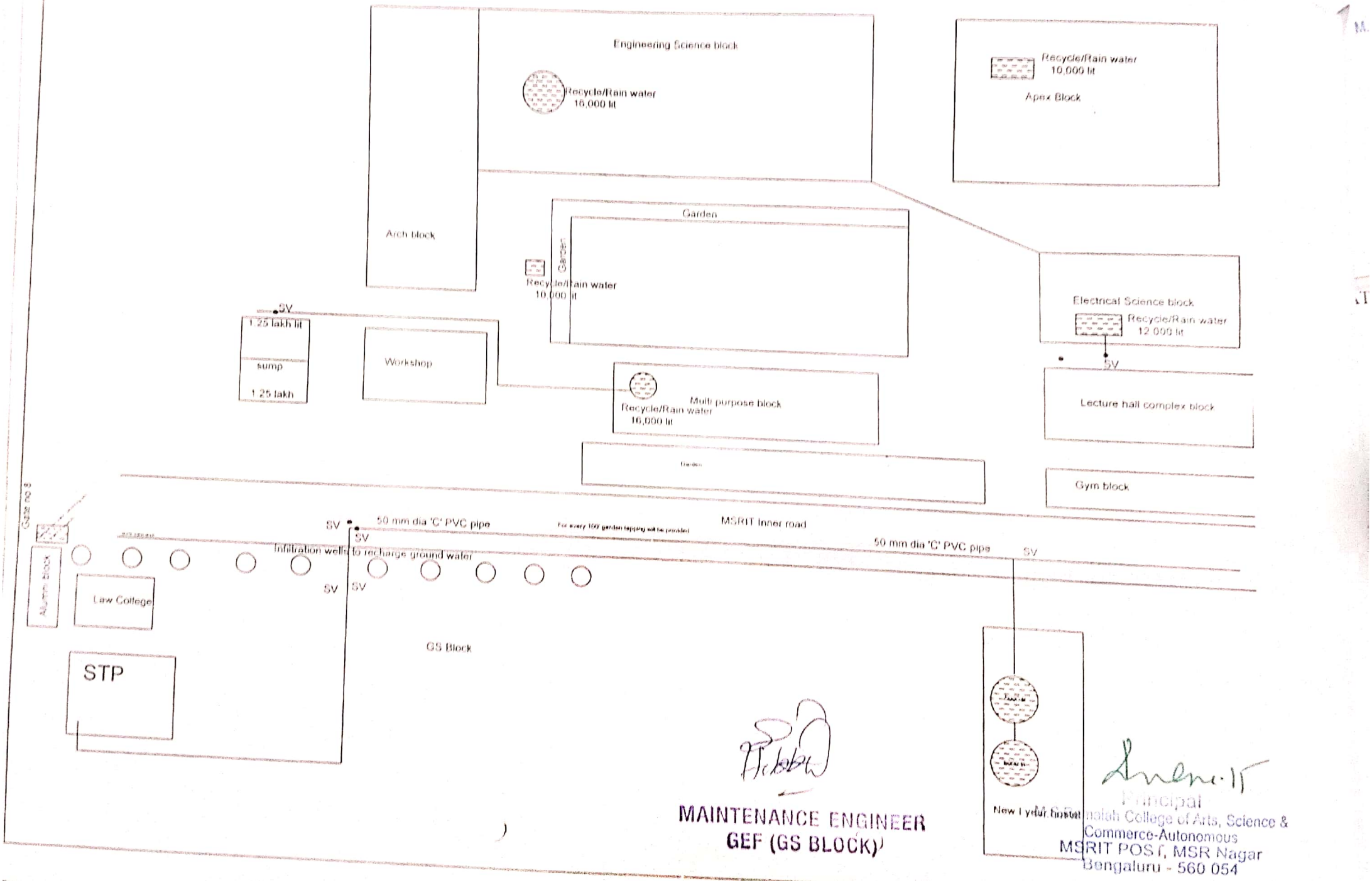
Principal
M.S.Ramaiah College of Arts, Science & Commerce-Autonomous
MSRIT POST, MSR Nagar
Bengaluru - 560 054



MAINTENANCE ENGINEER
GEF (GS BLOCK)

Principal
MSRIT POST, MSR Nagar
Bengaluru - 560 054

Rain water collection well layout



MAINTENANCE ENGINEER
GEF (GS BLOCK)

Principal
Sahyadri College of Arts, Science & Commerce-Autonomous
MSRIT POST, MSR Nagar
Bengaluru - 560 054