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Original Article

Improvement of Ganghi Market Infra Structure in Palani Municipality

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Abstract: *The reconstruction of Gandhi Market in Palani Municipality requires a strong and safe foundation to support the new structures. To achieve this, adequate sub-surface data is essential for proper foundation design. A detailed soil investigation was proposed to determine the geotechnical properties of the site, including soil type, strength, and bearing capacity.For this purpose was entrusted with conducting the field investigations, laboratory testing, and analysis. The investigation included borehole drilling, collection of soil samples, and conducting standard laboratory tests to determine parameters such as soil classification, moisture content, density, and shear strength.*

The findings from these investigations have been used to compute the Safe Bearing Capacity and provide recommendations for suitable foundation systems to ensure the safety, stability, and longevity of the reconstructed Gandhi Market.

Keywords: *Urban infrastructure, market redevelopment , drainage improvement , traffic management , sanitation , public Facilities, Palani municipality , Gandhi market development.*

I. INTRODUCTION

The reconstruction of Gandhi Market in Palani Municipality requires a strong and safe foundation to support the proposed new structures. To ensure proper foundation design, it is essential to obtain adequate sub-surface information about the site conditions.

A detailed soil investigation was carried out to determine the geotechnical properties of the soil, including soil type, strength, and bearing capacity. The investigation involved field studies, borehole drilling, collection of soil samples, and laboratory testing.

Standard laboratory tests were conducted to evaluate parameters such as soil classification, moisture content, density, and shear strength. Based on the results obtained, the Safe Bearing Capacity of the soil was calculated.

The findings of this investigation are used to recommend suitable foundation systems, ensuring the safety, stability, and durability of the reconstructed Gandhi Market.

II. LITERATURE STUDY

The study area for this project **is** Gandhi Market, situated in Palani Municipality, Tamil Nadu. The site encompasses the existing market buildings, open spaces, and adjoining access roads planned for reconstruction. The area experiences moderate commercial activity and has varying soil conditions, making it essential to conduct detailed sub-soil investigation to determine suitable foundation design parameters. The investigation focuses on understanding soil stratification, bearing capacity, and geotechnical properties to ensure the safe and durable reconstruction of market infrastructure.

The existing infrastructure is aging and requires reconstruction to improve safety, functionality, and serviceability. The area's soil conditions vary due to prior construction, drainage patterns, and human activities, which may affect foundation performance. Hence, a detailed sub-soil investigation was planned to determine soil stratification, moisture content, density, shear strength, and other geotechnical parameters.

The results of this study will guide the foundation design**,** ensuring stability, load-bearing capacity, and longevity of the reconstructed market. The investigation includes both field studies (borehole drilling, standard penetration tests) and

laboratory tests (soil classification, compaction, moisture content, and strength tests) to provide comprehensive data for design and construction.

This study area forms the basis for planning safe, durable, and economically feasible foundation systems suitable for the reconstructed Gandhi Market infrastructure.

III. MATERIALS AND METHODS

1. Borehole drilling equipment (augers, casing, core barrels)
2. Standard Penetration Test (SPT) rods and split-spoon samplers
3. Soil sampling containers and labels
4. Laboratory testing equipment (sieves, compaction molds, Atterberg limit apparatus)
5. Chemicals and reagents for soil analysis
6. Measuring tapes, levels, and survey instruments Flow in pipes

1. **Field Investigation:**
   Site reconnaissance and layout marking
   Borehole drilling at designated locations
   Collection of disturbed and undisturbed soil samples
   Conducting Standard Penetration Tests (SPT) to determine soil resistance
   Measuring groundwater table and recording stratification

2. **Laboratory Investigation:**
   Grain size analysis for soil classification
   Moisture content determination
   Atterberg limits to assess plasticity
   Compaction tests to determine optimum moisture and maximum dry density
   Shear strength tests (direct shear or triaxial) for bearing capacity calculations

3. **Design Computations:**
   Determination of Safe Bearing Capacity (SBC) of soil
   Selection of suitable foundation type based on soil properties
   Recommendations for foundation design parameters for reconstruction

IV. TEST ON SAMPLES

The following parameters were conducted on the soil samples:

- **Natural Moisture Content:**

  This test is conducted in all disturbed samples to find the water content in the soil samples as per **IS 2720 (Part 2) : 1973.**

- **Grain size Analysis Tests:**

  On the coarse-grained samples, grain size distribution tests were conducted as per**I.S.2720(Part 4)-1985**,toknowthegradationcharacteristics and to classify them.

- **Liquid Limit:**

  Thistestconductedinfine-grainedsoilstofindtheliquidLimitofthesoilasper

  IS2720(Part5):1985

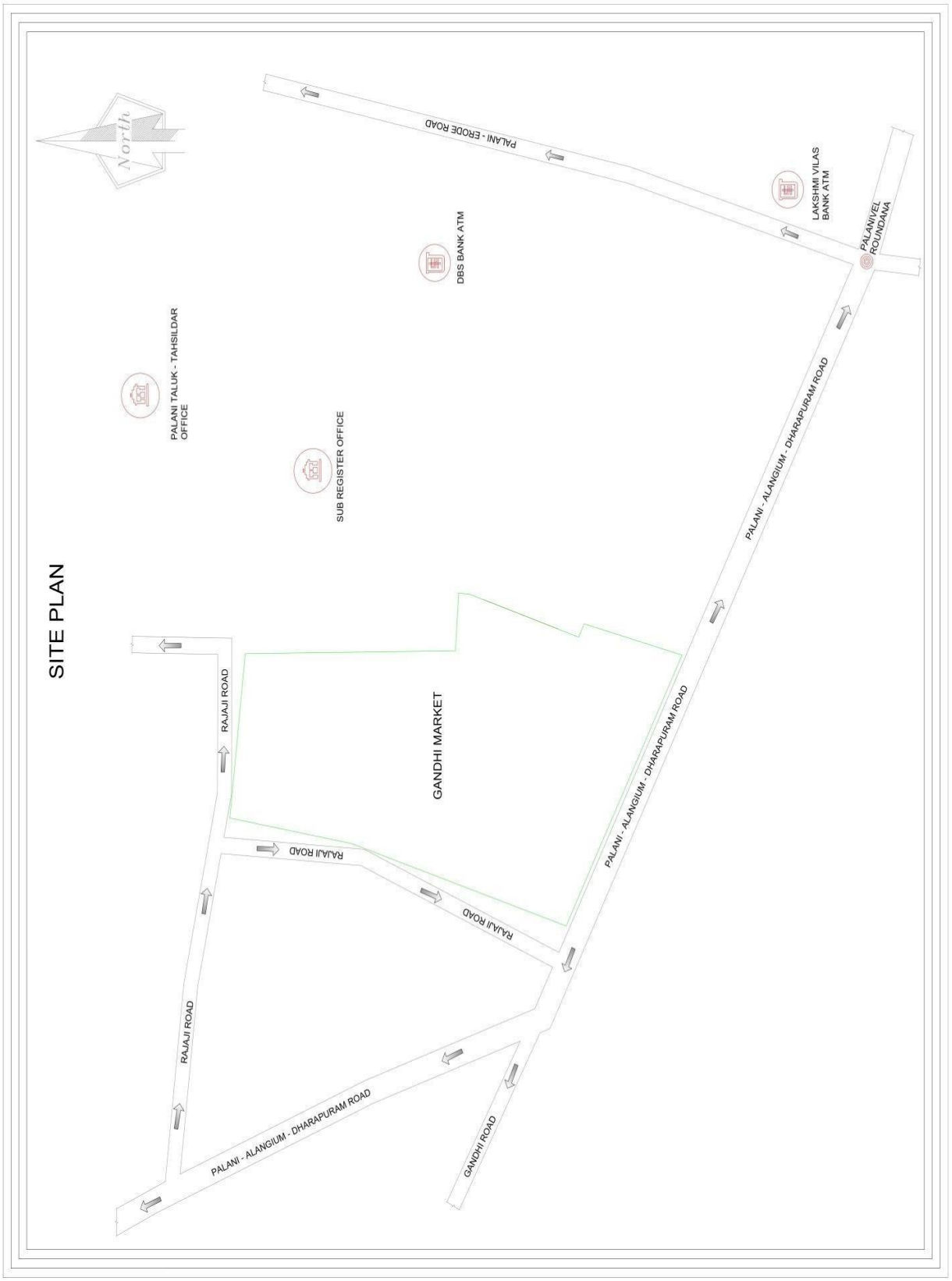
- **Plastic Limit:**

  Thistestconductedinfine-grainedsoiltofindplasticlimitofthesoilasper

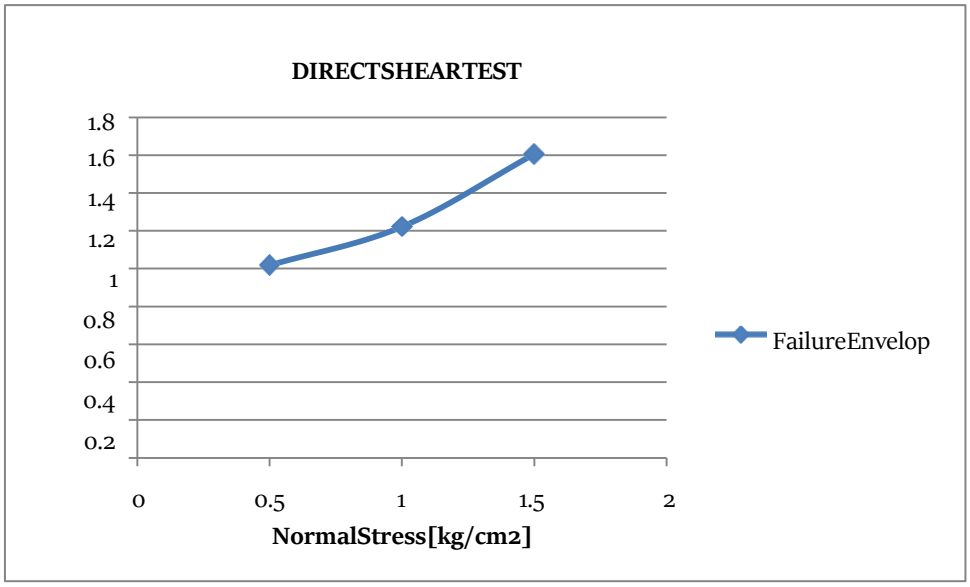
  IS2720(Part5):1985

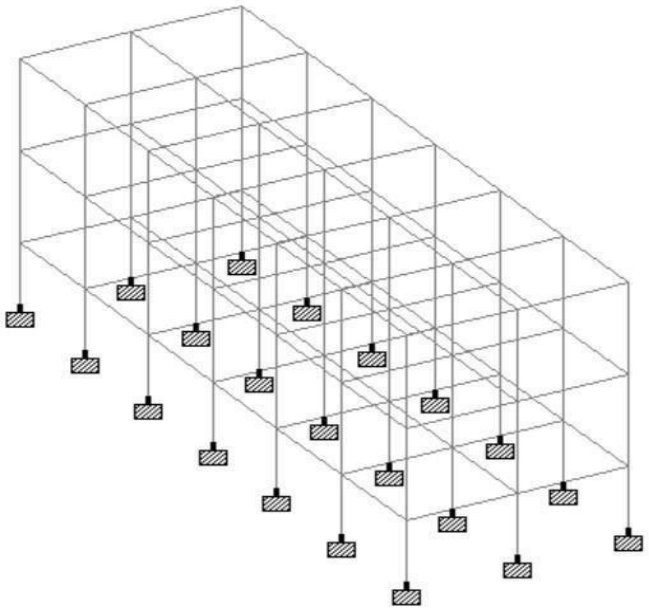
- **Specific Gravity:**

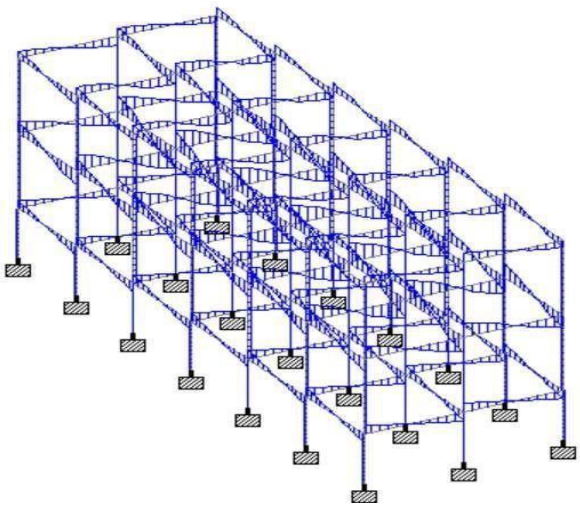
This test is conducted in all disturbed soil samples to find Specific gravity oil as per **IS 2720 (Part 3) : 1980**



V. RESULTS AND DISCUSSION







A. Discussion

The results obtained from the direct shear test indicate the shear strength characteristics of the soil at different normal stresses. The test was conducted for normal stresses of 0.5 kg/cm^2 and 1.5 kg/cm^2, and corresponding shear stress values were calculated.

From the observations:

- At normal stress = 1.5 kg/cm^2, the shear stress gradually increased with shear deformation and reached a maximum value of about 1.60 kg/cm^2.
- At normal stress = 0.5 kg/cm^2, the maximum shear stress obtained was approximately 1.02 kg/cm^2.

This shows that shear strength increases with increase in normal stress, which is a typical behavior of soil due to improved inter-particle friction and cohesion.

The plotted failure envelope from the direct shear test indicates a linear relationship between normal stress and shear stress. From this, the shear strength parameters such as:

- Cohesion (c)
- Angle of internal friction (ϕ)

can be determined. The results suggest that the soil possesses moderate shear strength, making it suitable for supporting structural loads.

The gradual increase in shear stress with deformation also indicates that the soil does not fail suddenly, but undergoes progressive failure, which is safer for foundation design.

Based on these results:

- The soil has adequate bearing capacity.
- Settlement is expected to be within permissible limits.

VI. CONCLUSION

1. Soil investigation at Gandhi Market, Palani Municipality, was successfully completed.
2. Borehole drilling, field tests, and laboratory analyses provided detailed subsurface data.
3. Soil stratification, moisture content, compaction characteristics, and shear strength were determined.
4. Safe bearing capacity of soil is adequate for the proposed market structures.
5. Suitable foundation types (isolated footings or raft foundations) have been recommended.
6. Groundwater conditions and soil properties were considered to minimize settlement risks.
7. Recommendations ensure safe, durable, and cost-effective reconstruction of the market infrastructure.
8. Overall, the soil investigation confirms that the proposed foundation design is reliable and appropriate.

VII. REFERENCES

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