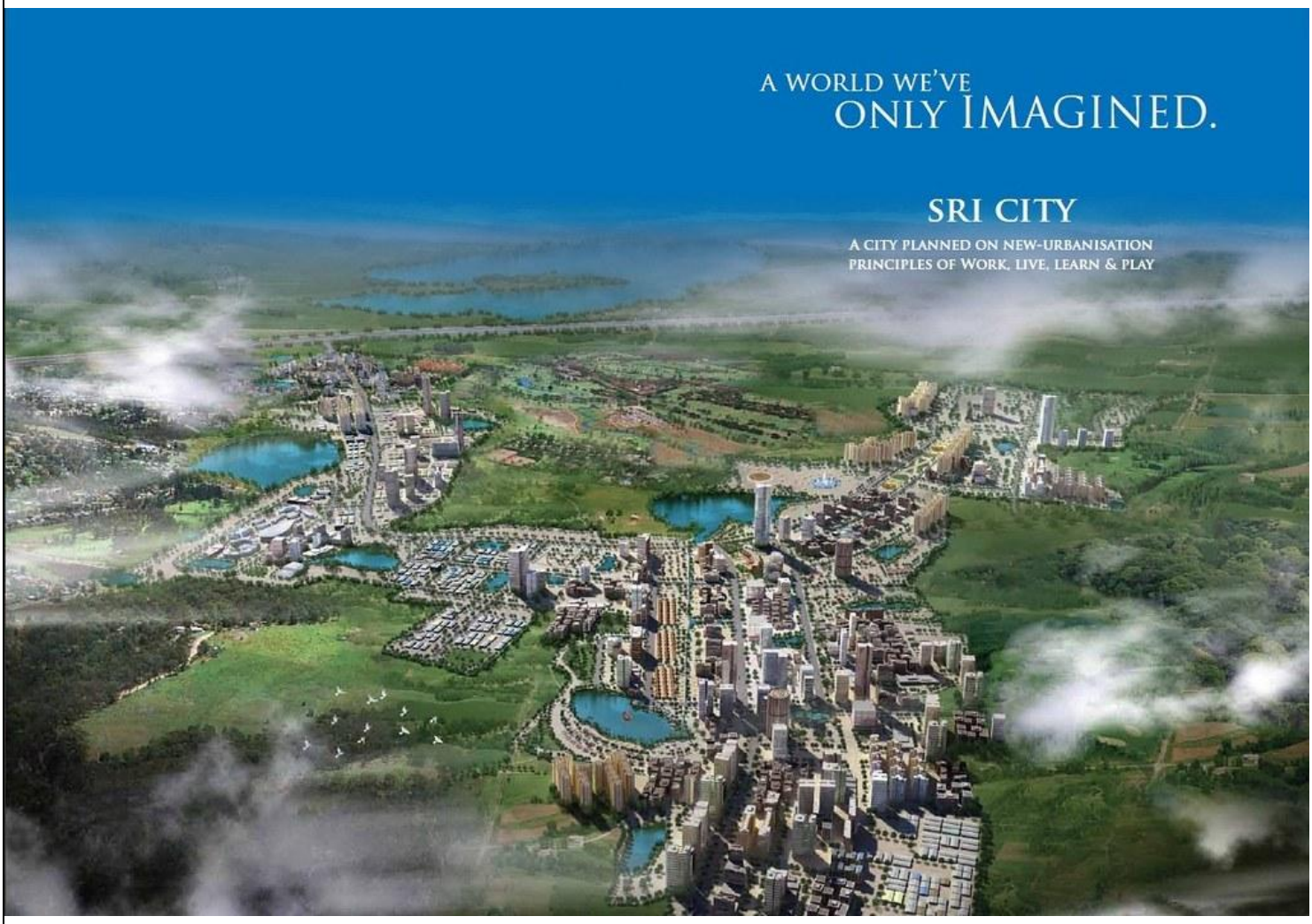
Geotechnical Site Visit Report – Field Observation and Study on SPT

(13/03/26 – 16/03/26)



SRI CITY, TIRUPATI, ANDHRA PRADESH

Acknowledgement

I would like to express my sincere gratitude to **Prof. V. S. Raju Consultants** for providing me with the opportunity to visit the **Sri City International University Project** and for their continuous guidance and support in enhancing my understanding of Soil Investigation Methods and their practical application at site

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Introduction To Sri City:

Sri City is a strategic industrial hub located in the Tirupati district of Andhra Pradesh, India. It is an integrated business city and Special Economic Zone (SEZ) that spans over **7,500 acres** and is strategically located along National Highway 16 (NH16). The city is home to over **200 companies** from **27 countries**, including multinationals like Kellogg's, Mondelez, Toray Japan, Alstom, Kobelco, Foxconn, Unicharm, Danieli, and more. Sri City offers a range of zones for industry, education, commerce, and recreation, making it a comprehensive business destination. The city's infrastructure includes industrial plots, warehouses, utilities, and eco-friendly zones, contributing significantly to the state's **GDP** and creating job opportunities. Sri City is also recognized for its role in promoting socioeconomic growth in nearby villages and supporting education, healthcare, and women's empowerment programs.The region is witnessing rapid development with major construction projects including electronics manufacturing plants, appliance industries, logistics parks, and industrial warehouses.

The site visit was conducted at Sri City located in Tirupati district of Andhra Pradesh. The purpose of the visit was to observe and understand the geotechnical soil investigation process carried out for the proposed construction of the **Sri City International University.** During the visit, various field activities such as borehole drilling, Standard Penetration Test (SPT) using an auto trip hammer, and soil sampling were observed. The boreholes were drilled up to a depth of about **15** m to determine the subsurface soil conditions and engineering properties of the soil. This investigation helps engineers evaluate the bearing capacity and settlement characteristics of the soil to design a safe and suitable foundation for the proposed structure. The site visit provided practical exposure to field investigation techniques and helped in understanding the importance of geotechnical studies before construction.

fig-1 Working with Auto trip Hammer

Objectives of the Site Visit

The main objectives of the site visit were:

- To observe and understand the subsurface soil profiling process.
- To learn the procedure of conducting Standard Penetration Tests (SPT) at regular depth intervals.
- To study the method of soil sample collection during field investigation.
- To gain knowledge about evaluation of soil strength and bearing capacity.
- To understand practical field procedures and equipment used in geotechnical investigation.

Project Details

Project Name: Sri city International University (SIU)

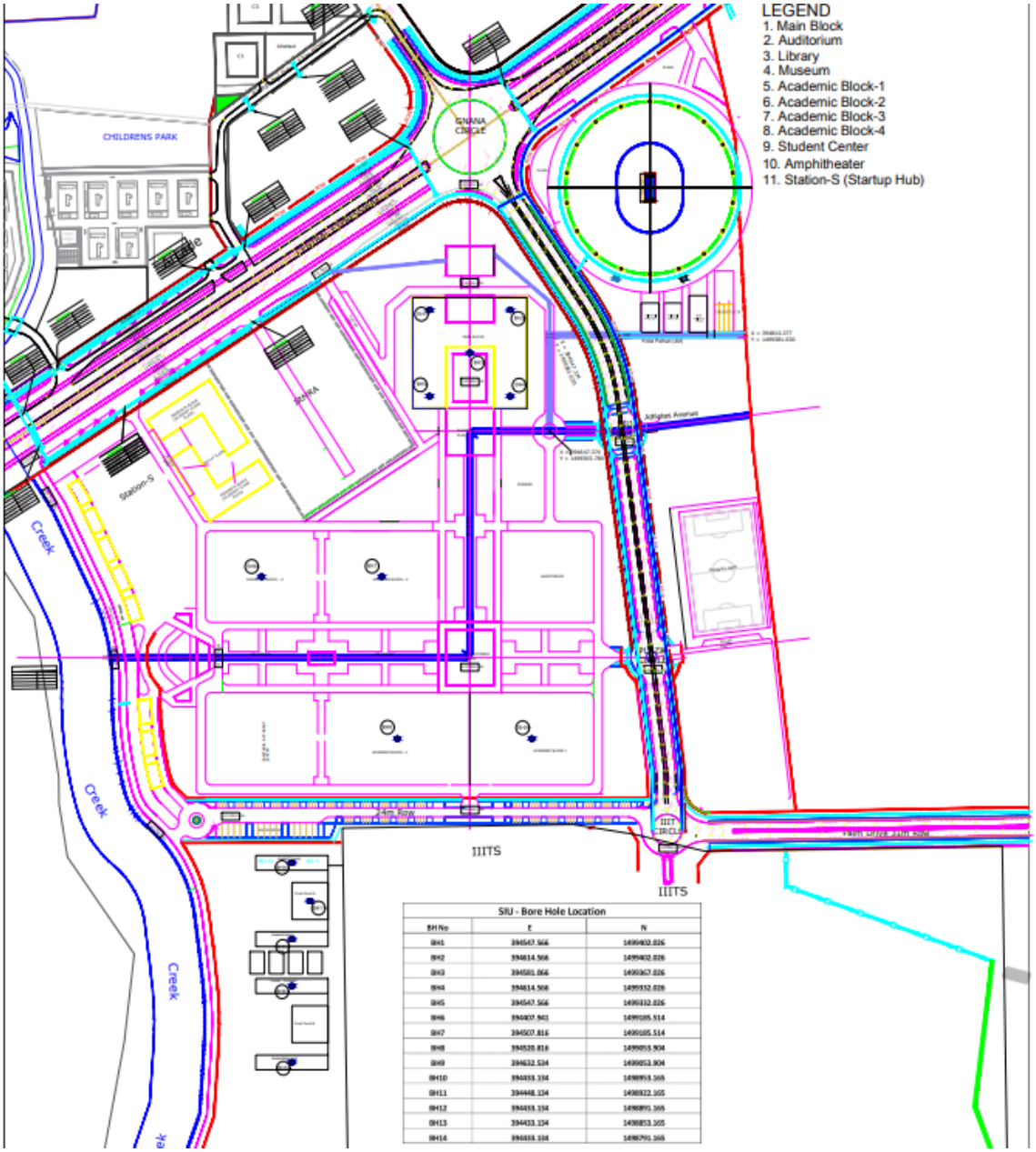
- Site Area: 50 acres
- No of Boreholes: 14
- Depth of Borehole: 15 m
- Dia of Borehole: 150 mm
- Structural configuration: G+4 for main block

The Sri City International University campus comprise of

- Main Block
- Auditorium
- Library
- Museum
- Academic Blocks – 4
- Student center
- Amphitheatre
- Station-S (startup hub)

fig-2 Borehole drilling

fig-3 Borehole



Lay out plan showing Borehole Location

Field Investigation Activities

The following activities were carried out at the site:

- Rig setup
- Soft barricade around working area
- Company signboard (VRR)
- Working platform for tools, soil samples
- Safety - use standard PPE - safety shoe, safety apron, helmet, gloves where suitable
- Safety briefing for all workers daily
- Borehole drilling using a drilling rig.
- Conducting Standard Penetration Tests (SPT)
- Recording SPT N-values.
- Collection of disturbed soil samples.
- Monitoring borehole depth and drilling progress.

Tools & Equipment Used

The following equipment was used during the investigation:

- Drilling Rig
- Auto Trip Hammer
- Split Spoon Sampler
- Drill Rods
- Bentonite
- Measuring Tape and Field Log Sheets

fig-4 Drilling Rig

fig-5 Split Spoon Sampler

fig-6 Drilling Bit

fig-7 Hammer (63.5 kg)

Standard Penetration Test (SPT) - IS-2131:1981

The Standard Penetration Test (SPT) is one of the most commonly used in-situ tests in geotechnical engineering to determine the engineering properties and relative density of soil. It is usually carried out in a borehole during soil investigation for foundation design. In this test, a split-spoon sampler is driven into the soil at the bottom of the borehole using a **63.5** kg hammer that falls freely from a height of **750 mm**. The hammer blow drives the sampler into the soil in three stages of 150 mm penetration each, giving a total penetration of **450** mm. The number of blows required for the first **150** mm is considered as seating drive and is generally ignored, while the blows required for the next **300** mm penetration are added to obtain the SPT N-value. This N-value indicates the resistance of the soil to penetration and helps engineers estimate soil strength, density, and bearing capacity.

During the test, soil samples collected in the split-spoon sampler are taken to the laboratory for further analysis such as grain size distribution and Atterberg limits. In many modern site investigations, an auto trip hammer is used instead of a manual hammer to provide consistent energy during the test and improve the accuracy of results. The SPT test is widely used because it is simple, economical, and suitable for most soil conditions, and it plays an important role in designing safe foundations for buildings and other civil engineering structures.

Out of the total **14 boreholes** planned at the SIU University site, drilling work for **5 boreholes** corresponding to the main block has been successfully completed. The soil samples collected during the Standard Penetration Test (SPT) from these boreholes were carefully retrieved, properly labeled, and safely transported to the laboratory for further testing and analysis. These tests will aid in determining the engineering properties of the soil for foundation design.

fig-8 Retrieval of samples

fig-9 Recording SPT-N Value

fig-10 Soil sample

fig-11 Sample Collection

Refusal depth

Refusal depth is the depth where the SPT sampler refuses to penetrate because the soil or rock is extremely hard or dense, even after applying the maximum standard number of blows.

Refusal is generally considered when any one of the Case:

- The number of blows exceeds about 50 blows for 150 mm penetration.
- The sampler does not penetrate at all after repeated hammer blows.
- The total penetration is less than about 25 mm even after many blows.

Learning Outcomes

During the site visit the following practical knowledge was gained:

• Understanding borehole drilling procedures

• Observing Standard Penetration Tests

• Recording SPT N-values

• Soil sampling techniques

• Importance of safety during field investigation

fig- 12 Auto trip Hammer

fig-13 Determining Type of Soil

Conclusion

The site visit to the soil investigation project provided valuable practical exposure to geotechnical engineering practices. It helped in understanding the procedures involved in borehole drilling, Standard Penetration Testing (SPT), and soil sample collection under field conditions. Observing the use of equipment such as the auto trip hammer and the systematic execution of tests enhanced the understanding of theoretical concepts learned in academics.

The visit also highlighted the importance of proper sample handling, accurate data recording, and safety measures during site operations. Overall, this experience bridged the gap between classroom knowledge and real-world applications, improving technical awareness and preparing for future involvement in geotechnical investigations and foundation engineering.