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Construction Project Management Special reference to Alternate Building Foundation methods

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ABSTRACT

Purpose: This study gives the theoretical aspects of soil testing and pile foundation design. It suggest general recommendation and alternate design of foundation which gives cost saving. The step by procedures and methodology of alternate foundation is illustrated in the paper.

Design / Methodology / Approach: This is on site and laboratory testing methodologies are followed. This study conducting Standard Penetration Test (SPT) at regular depth intervals. Collecting split spoon samples or disturbed soil samples, Conducting relevant laboratory tests, Recommend a suitable foundation system, Safe bearing pressure at foundation in different level are provided. Grain size analyses are conducted for every levels of soil and Foundation design is arrived.

Findings: This study reveal the alternate foundation design for the soft soil where the generally the costly pile foundation occupied. This study indicated result of Moisture Content, Sieve Analysis, Liquid limit, Plastic Limit and Plasticity Index and Differential Free Swell Test. Actual soil result showed lesser strength which leads to costlier foundation, by the alternate foundation methods this cost can be reduced considerably and the safe bearing capacity of 15 t/m2 could be recommended under the foundations at the depth 2 mts. For safest design it indicates the lowest size of footing or strip raft shall not be less than 1 m.

Originality : The originality of study is focusing on foundation cost reduction and safer building design for the residential sector. In residential side, the focus is very much required because the investors are middle class people who mostly spent their earning on repayment of loan on entire life time for the amount spent on their dream residential building.

Paper Type: Case Based Study

KEYWORDS: Project Management | Soil Testing and Pile Foundation Design | Standard Penetration Test | Foundation Consideration

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Introduction

This report presents the geotechnical investigations results carried out for the proposed construction of (Stilt+4) Residential Building at Kumbakonam. This work was authorized by the Client , Standard Penetration Testing for boreholes were drilled at the site up to a maximum depth of40.0mbelow existing ground level. The investigation consists of drilling nine boreholes, soil sampling, field and laboratory testing and preparation of a Geotechnical Report for the Proposed Construction of (Stilt+4) Residential Building.

Key words "Standard Penetration Test, Foundation Recommendation, construction project management"

Scope of Work

The scope of this investigation is to:

- Conducting Standard Penetration Test (SPT) at regular depth intervals.
- Collecting split spoon samples or disturbed soil samples.
- Conducting relevant laboratory tests
- Recommend a suitable foundation system and safe bearing pressure at foundation level.

Site Description

The site for the proposed construction of (Stilt+4) Residential Building at Colony, Kumbakonam. The elevation of site is same from the nearby road level.

Literature Review

Bored pile involves making pile holes on construction foundation, then placing the pile in the hole and forming the foundation of building. According to the different digging methods, it can be divided into hand-dug pile, cast in place by sinking pipe, and bored piles. Among them, the hand-dug piles have larger labor intensity, poor safety and slow speed of construction. Cast in place by sinking pipe is to cast pile by hammering method, which will produce a greater shock and noise, thus affecting the surrounding buildings. Hence, it is not suitable for urban construction projects and some cities have even banned the use of this method in the urban areas. While bored pile solves the defects of artificial pile and immersed tube piles, is a relatively superior pile method and is widely used in modern construction projects. However, there are also drawbacks in bored pile, as it is very difficult to control the quality of concrete and the construction quality will directly affect the affordability of pile. Therefore, bored pile technology is very important. Especially with the rapid development of economy, urban construction is becoming faster and the construction business booms. Thus, mastering advanced core technology has played a key role in the survival and development of construction enterprises in the highly competitive market. Here, the author will combine the domestic and foreign advanced technology and long-term experience and present some views on bored piles technology of building construction. This is to learn with peers, in order to make bored pile technology more specialized and standardized and provide some help to the development of construction enterprises.

Bored pile foundations, also known as drilled shafts, are indeed integral components in the construction of high-rise buildings, bridges, and other large structures (Huynh et al., 2022a). They play a crucial role in supporting the structural stability and integrity under various loading conditions.

Accurately predicting the load-displacement behavior of these piles is essential for the safety and reliability of such structures (Nguyen et al., 2023). Current approaches for assessing axial load-bearing capacity can be broadly categorized into two main groups: those independent of pile displacement and those coupling load and pile displacement.

The former approach, commonly employed in design codes, concentrates on achieving ultimate total resistance while largely disregarding pile displacement (Asem, 2019).

Although this approach has widespread practical use, it has faced criticism for oversimplifying the pile design process (Fellenius, 2023; Nguyen and Fellenius, 2024). Notably, experts in the field have stressed the significance of considering pile displacement for more accurate predictions.

Recent advancements in ocean engineering pile foundation engineering have significantly improved understanding of load transfer mechanisms and enhanced bearing capacities(Jiang et al., 2023). Jiang et al (2023). introduced sophisticated load transfer models focusing on pile-side friction mobilization, particularly in sea reclamation areas with gravel.

Gong et al. (2023) demonstrated the efficacy of combined tip-and-side post-grouting techniques for offshore wind turbine foundations through full-scale field tests.

Yan et al. (2022)shed light on large-diameter driven pipe piles in multilayered soils, revealing insights into enhancing ultimate compressive capacities.

Wu et al. (2023). provided valuable insights into vertical bearing mechanisms, highlighting the role of post-grouting technology in mitigating weak bearing characteristics.

Duan et al. (2021) employed Discrete Element Method (DEM) simulations to analyze micro-mechanical behavior, offering critical implications for accurate pile capacity estimation. Despite these strides, there's a continued need for

more robust models to capture load-displacement behavior in practical pile foundation design for offshore structures.

After the visual inspection of the site, the subsurface investigation was carried out as mentioned below:

One (1) exploration boreholes were drilled to a maximum depth of 40.0m

BH-1was started and completed

Equipment Used

The equipment used for performing the drilling operations is a Calyx Rotary Drill Rig with direct mud circulation technique. The drill mud used was made out of Sodium Bentonite.

Methodology of drilling

In the soil strata, the drilling operations have been carried out using special drill bits and cutters coupled with direct mud circulation.

In-Situ Strength Tests:

Standard Penetration Test:

Standard penetration tests were conducted at the borehole locations, in accordance with IS: 2131. The tests were conducted at every change of strata up to the depth of termination of the borehole as directed by the engineer-in-charge.

Collection of Samples:

Disturbed Soil Samples

The SPT-samples collected were used as disturbed soil samples. These samples were used for visual and physical identification and for conducting laboratory classification tests as per I.S.1498-1970.

Laboratory Testing

All the extracted soil samples were brought to our Laboratory for further examination in accordance with IS: 1498-1970. Selected samples were subjected to the following physical tests.

Moisture Content

Sieve Analysis (IS: 2720 Part IV – 1985)

Liquid limit (IS: 2720 Part V – 1985)

Plastic Limit and Plasticity Index (IS: 2720 Part VI – 1972)

Differential Free Swell Test

The laboratory test results are given in Appendix "C".

Subsurface Soil Description

Based on boreholes information, sub surface soil profile for the proposed construction of (Stilt+4) Residential Building is given below:

Table 1: Soil description

Depth (m)		Soil Description
From	To	
0.0	2.5	Brownish silty sand
2.5	16.5	Brownish high plastic and swelling clay
16.5	21.0	Blackish clayey sand
21.0	37.0	Blackish high plastic and swelling clay
37.0	40.0	Dark brownish medium plastic and swelling clay

Ground Water

Ground water table was found at the depth of 2.5m below the existing ground level during the time of field investigation. However it will fluctuate due to seasonal variations.

General Considerations

The recommendations for foundation design and construction are based on the information obtained from the boreholes drilled at site. When foundation construction is underway, the recommendations of this report should be checked through field inspection, to validate the information for use during the construction stage. Any variation in underground conditions revealed by the borehole should be brought to our attention for alternate recommendations, if required.

Table 2 : General Considerations

W_N	=	Natural Moisture content (%)
W_L	=	Liquid limit (%)
WP	=	Plasticity Limit (%)
I_P	=	Plasticity Index (%)
F.S.I	=	Free Swell Index (%)
IS	=	Indian Standard Classification
CL	=	Low compressibility Clay of W_L < 35%
CI	=	Inorganic Clay of 35% < W_L <50%
CH	=	High Compressibility Clay of W_L > 50%
SP	=	Poorly graded sand
GP	=	Poorly graded gravel
SW	=	Well graded sand
SM	=	Silty sand

Table 3 Physical Analysis of Soil - Bh-1

Test results of Moisture content, Atterberg limits

DEPTH M	Moisture Content%	Atterberg limits				IS Classification
		W_L%	W_P%	I_P%	FSI%	
1.0	18.92	Non plastic				CI
2.0	19.67	Non plastic				CH
3.0	28.13	54	26	28	56	CH
4.5	30.42	51	25	26	52	CH
6.0	27.11	50	25	25	50	CH
8.0	29.25	59	29	30	55	CH
10.0	31.2 4	63	30	33	60	CH
12.5	33.05	65	34	31	65	CH
15.0	35.36	67	35	32	65	CH
17.5	17.82	Non plastic				SC
20.0	18.12	Non plastic				SC
22.5	32.66	64	33	31	60	CH
25.0	34.71	66	34	32	60	CH
27.5	32.96	63	32	31	65	CH
30.0	33.28	63	31	32	62	CH
32.5	34.92	65	33	32	65	CH
35.0	36.05	68	34	34	68	CH
37.5	14.72	Non plastic				SP
40.0	15.04	Non plastic				SM

Table 4 : Grain Size Analysis of Soil -Bh-1

DEPTH M	GRAVEL SAND 90%	COARSE SAND 99%	MEDIUM SAND %	FINE SAND %	SILT + CLAY%
1.0	-	-	12	52	36
2.0	-	-	15	46	39
3.0	-	1	2	2	95
4.5	-	-	3	5	92
6.0	-	-	3	10	87
8.0	-	-	1	1	98
10.0	-	-	-	1	99
12.5	-	-	-	1	99
15.0	-	-	-	1	99
17.5	-	-	3	51	46
20.0	-	-	4	55	41
22.5	-	-	-	1	99
25.0	-	-	1	1	98
27.5	-	-	-	1	99
30.0	-	-	1	2	97
32.5	-	-	-	2	98
35.0	-	-	-	1	99
37.5	-	1	48	39	12
40.0	-	-	31	52	17

Design of Pile Foundation

(for dia 900.00 mm)

Type of Installation of Pile Bored Cast in Situ

Geometrical Data

Assumed Diameter of pile (D) : 900.00 mm

Length of Pile : 40.00 m

Design of Pile for Vertical Compression Computation of Skin Resistance:

Layer-I

Type of Strata : Clay Length of strata, lc 30.00 m

Average SPT of the strata, N : 15

Bulk Density of the strata, γ : 16.86 kN/m^3

Undrained Shear Strength (Cu) : 25.00 kN/m^2

Adhesion, σ : 0.50

Skin Resistance of the pile,q_s : 1059.75 kN (q:σ*Cu*pi*d*Ic)

Layer-II

Type of Strata : sand

Average SPT of the strata,N : 12

Bulk Density of the strata, γ : 16.28 kN/m^3

Angle of Shearing Resistance - Limited to a Maximum of : 30.00 Deg

tan phi : 0.58

Top of Strata : 0.00 m

Bottom of Strata : 2.50 m

Average Thickness of Strata, I_c : 2.50 m

Effective overburden pressure at the ^{midd} : 7.85 kN/m^2

middle of the strata, σ Coef. Earth Pressure at Rest : 0.65

Skin Resistance of the pile,q_s : 20.80 kN

(q_s: σ *k*tanϕ *pi()*d*Ic)

Layer-III

Type of Strata: Sand : S : sand

Average SPT of the strata, N : 15 Sa 15

Bulk Density of the strata, γ : 17.65 kN/M^3 : 17.65 kN/m^3

Angle of Shearing Resistance - Limited to a Maximum of tan phi : 30.50 Deg 0.59

Top of Strata : 16.50 m

Bottom of Strata : 21.00 m

Average Thickness of Strata,I_c	:	^{midd} 4.50 m Effective
overburden pressure at	:	32.91 kN/m^2
the middle of the strata, σ		
Coef. Earth Pressure at Rest	:	0.65
Skin Resistance of the pile,q_s	:	160.15 *k*tanϕ *pi()*d*Ic)
Ultimate Load Carrying Capacity (Qs+Qp)	:	6134.12 kN
Safe Load Carrying Capacity (Qsafe =Qu/2.5)	:	2453.6 kN
say		2450 kN
Lateral Load Bearing Capacity		196 kN
Ultimate uplift resistance		2128.26 kN
Safe Uplift resistance		709.42 kN
Self wt. of pile	:	381.51 kN
Say		1091 kN

Foundation Recommendations

Based on the borehole information and laboratory test results in addition to the nature of structure, the recommendations for the proposed structure are given below

Bored pile foundation:

A Pile length of 40.0m has been analyzed below and the corresponding Pile capacities are given. Selection of Pile length was estimated according to soil profile and soil stiffness as obtained from SPT values. In case of bored pile the pile cap shall be placed 1.0m below ground level.

Pile Capacities

Bedrock was not encountered up to a maximum explored depth. Hence, the Piles utilizing friction shall be adopted for the proposed structures. The Pile capacities of the bored piles are worked out considering a depth of 40.0m below ground level as the top of pile level. Estimation of Pile capacities are given below with reference to the boreholes drilled at site

Table 5: Bored Pile Capacity Calculations

BORED PILE CAPACITY CALCULATIONS				
Pile Length (m)	Pile Diameter (mm)	Factor of Safety = 3.0 Allowable Pile Load Capacity (kN)	Lateral load bearing capacity (kN)	Uplift Resistance (kN)
40.0	750	1820	145	850
40.0	900	2450	195	1090
40.0	1000	2900	230	1250

Table 6: Friction Pile @ 20.0m

Friction pile Capacity		
Pile Depth (m)	Pile Diameter (mm)	Factor of Safety = 2.5 Allowable Pile Load Capacity (kN)
20.0	450	265
20.0	500	295
20.0	600	355

Foundation Considerations

A PCC (Plain Cement Concrete) layer of 20cm thickness is recommended below the Pile cap/ foundation. Any over excavation in the foundation trenches should be re-filled by plain concrete and any disturbed and loose materials found in the foundation trenches should be removed before placement of P.C.C. Excavated material cannot be used as general backfill material. As per general practice the backfill material should not contain more than 15 % fines passing 0.075 mm sieve, retain 40% on 4.75mm size sieve while the maximum size of gravel allowed is 50mm.

Backfilling materials shall be placed in horizontal layers not exceeding 25 cm thickness and each layer shall be compacted to at least 95% of the maximum dry density.

Alternate Foundation Considerations

Alternate to option 1, because of presence of predominantly loose sandy soil gradually increasing SPT value in the soil, Ground Improvement is recommended up to a depth of 4.2 m below the existing ground level. Then open Foundations (individual column footings or combined footings, if there are two or more columns close to each other, or Strip Raft combining each row of columns, if each row of columns are close to each other when compared to the distance or span between rows of columns, or raft foundation) can be adopted.

The different Ground improvement techniques are: High energy impact compaction, Granular compaction piles, cement slurry injection, lime slurry injection, Removal of clay soft soil and back filling with inert material such as sand, well compacted in layers, etc. are available Considering the Soil profile and cost effectiveness, the OPC 53 Grade Cement Slurry Injections are applicable to this site.

i) After Cement Slurry injection Open Foundations (individual column footings or combined footings, if there are two or more columns close to each other, or Strip Raft combining each row of columns, if each row of columns are close to each other when compared to the distance or span between rows of columns, or raft foundation) can then be adopted.

ii) After thorough compaction of the bottom of excavation, a layer of clean sand (clean river sand or Quarry sand or M sand), 100 mm thickness, shall then be laid. The sand cushion layer shall be at least 100 mm wider on each of the four sides of the column footing/combined footings / raft foundation or on each of the two sides of strip raft. The sand cushion layer shall be watered and well compacted.

iii) PCC for the foundations can be laid on the compacted sand cushion layer.

iv) A safe bearing capacity of 15 t/m^2 is recommended under the foundations at the depth 2 mts. However, the width of any column footing or strip raft shall not be less than 1 m.

v) At the time of excavation for foundations, if ground water table occurs within the recommended depth of excavation, sumps may be made to an additional depth of 0.3 m at one or more corners of the foundation pits for column footings/combined footings or at desired locations along the periphery of excavation for strip raft/ raft foundation and the water collected in the sumps may be bailed out. At the time of laying the sand cushion layer, the bottom of excavation shall be relatively dry (not slushy). Dewatering shall be maintained until that part of the concrete in the foundations, which comes below the ground water table level, sets.

Guidelines for Fill Material and for Filling to Raise the General Ground Level

In site two water sumps are constructed in the site. This depth are 2.3 and 2.5 meters Depth from the surface level. If the tanks are fouling in the foundation of proposed Building, these tank's foundations to be removed and refilling to be done based on the following norms.

Before filling to raise the general ground level, any organic matter or plants, present in the Plot, shall be removed with roots. Relatively inert material such as sand or gravel shall be used for filling. The percentage of fines (grain size less than 0.075 mm) shall not exceed 20%. The liquid limit shall not exceed 30% and the plasticity index shall not exceed 10%. The fill material shall be free from contamination from decomposed organic matter and harmful chemicals.

Filling shall be done in layers of not more than 150 mm thickness, each layer.

Each layer shall be well compacted at about the optimum moisture content of the fill soil. Compaction may be monitored by taking field density measurements at the rate of at least one test for every 750 square meters* of area compacted. At least 95% of the maximum dry density obtained in the laboratory Standard compaction test (as per IS: 2720, Part VII-1980 (Reaffirmed 2011, Second Revision): Methods of test for soils, Determination of water content-dry density relation using light compaction, Second Revision) shall be achieved in the field.

Table 7: Control Tests on Borrow Materials

S. No	*Test*	*Test Method*	*Minimum desirable frequency*
1.	Gradation@ / Sand-content	IS : 2720 Part IV-1985 (Reaffirmed 2006, Second Revision)	1-2 tests per 8000 m^3 of soil
2.	Plasticity index	IS : 2720 Part V-1985 (Second Revision)	-do-
3.	Standard Proctor Test	IS : 2720 Part VII-1980 (Reaffirmed 2011, Second Revision)	-do-
4.	CBR on a set of 3 specimens **	IS : 2720 Part XVI-1987 (Reaffirmed 2002, Second Revision)	One test per 3000 m^3
5.	Deleterious constituents	IS : 2720 Part XXVII – 1977	As required
6.	Natural moisture content	IS : 2720 Part II – 1973 (Reaffirmed 2010, Second Revision)	One test per 250 m^3 of soil

@ If specifications call for such tests.

** For purposes of design only, unless otherwise specified.

Table 8: Tests for Compaction Control

S. No	Test	Test Method	Minimum desirable frequency
1.	Moisture content just before compaction	IS : 2720 Part II-1973 (Reaffirmed 2010, Second Revision)	2-3 tests per 250 m^3 of loose soil
2.	Dry density of compacted layer	IS : 2720 Part XXVIII-1974 (Reaffirmed 2010, First Revision)	Generally, one test per 1000 m^2 of compacted area for the body of the embankment, to be increased to one test per 500-1000 m^2 of compacted area for top sub grade layers, i.e., top 500 mm portion of the embankment.

Specifications for Cement Slurry Injection for Ground Improvement

a) Depth of injection: As per pressure bulb depth from foundation bottom level. maximum from 5 meters to 7 meters level

b) Concentration : Lime : 250 Grams per liter of water

c) Wetting agent : Chemical intrusion aid such as "Calcium ligno sulphonate", one part in 1500 parts of water

d) Expected consumption : 100 to 150 Liters of slurry meter depth of injection.

e) Spacing for injection : 1.5 Meters center to center distance.

f) Injection pressure : The injection pressure shall be of the order up to 10 kg/cm2

g) After grouting is done at each injection point, the grout hole will be plugged, to prevent the grout (which was injected under pressure) from gushing out.

h) To facilitate curing of the injected slurry into the soil, moisture is required. For this purpose, water may be sprayed once a day, for a period of four weeks.

i) Final Report to be given indicating the no of bore hole done with planned bore holes, it's location, it's dept, amount of slurry consumed by each bore hole.

Opportunity for Future Development

This paper deals about the construction foundation methods of Pile foundation and alternate method of foundation system. The comparative cost estimation according to the soil condition can be planned for cost saving.

Limitations

If the testing at site and laboratory are not followed properly and Corrective Actions are not carried out properly, the effectiveness and efficiency will be lost. The recommendation is based on the sample collected and result received from the laboratory, so the it will not give exactly 100 % accuracy level.

Conclusion

In general for the soil with loose silty sandy clay and low bearing capacity, the conventional type Pile foundation method will be recommended. In this paper the alternate method of foundation planning with ground improvement technique is suggested in the alternate way where the pile foundation is difficult to execute. In this Stilt+4 story building as per the soil condition the Pile foundation has recommended for 40 meters depth and need to be rest on the rock or in the hard strata. This will be very costly and the budget up to one crore which equivalent to cost of total building cost. In this case additional 100% costing for piling alone. In common the foundation cost will be in the ranging 15 % to 25 % according to soil conditions.

Further this alternate suggested ground improvement method the soil will be strengthened in the region of pressure bulb accruing depth ranging from 5 meters to 7 meters only. So this alternate foundation method is definitely cost effective compared pile foundation. .

References

- Alnuaimi, A. S., & Al Mohsin, M. A. (2013). Causes of delay in completion of construction projects in Oman. *International Conference on Innovations in Engineering and Technology*.
- Divya, R., & Ramya, S. (2015). Causes, effect and minimization of delays in construction projects. *National Conference on Research Advances in Communication, Computation, Electrical Science and Structures*, 47–53. ISSN: 2348-8352.
- Johnson, R. M., & Babu, R. I. I. (2018). Time and cost overruns in the UAE construction industry: A critical analysis. *International Journal of Construction Management*, 1–10. https://doi.org/10.1080/15623599.2018.1484864
- Katre, V. Y., & Ghaitidak, D. M. (2016). Elements of cost and schedule overrun in construction projects. *International Journal of Engineering Research and Development*, 12(7), 64–68.
- Marzouk, M., & El-Rasas, T. (2013). Analyzing delay causes in Egyptian construction projects. *Journal of Advanced Research*, 5(1), 49–55.
- Mulla, S. S., & Waghmare, A. P. (2015). A study of factors caused for time and cost overruns in construction project & their remedial measures. *International Journal of Engineering Research and Applications*, 5(1, Part 6), 48–53.
- Niazai, G. A., & Gidado, K. (2012). Causes of project delay in the construction industry in Afghanistan. Retrieved from https://core.ac.uk
- Prasanath, A. M. A., & Raja, T. K. (2014). Analysis of cost & schedule performance of residential building projects by EVM technique. *Journal of Construction Engineering, Technology and Management*, 4, 1–7. ISSN: 2347-7253.
- Ramanathan, C., & SambuPotty, N. (2014). Qualitative analysis of time delay and cost overrun in multiple design and build projects. *International Conference on Data Mining, Civil and Mechanical Engineering*, Bali, Indonesia.
- Raya, S. M. K. R., & Prakash, S. S. B. (2016). Cost and time overruns in Indian construction industry. *Industrial Science*, 2(4), 1–9.

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Annexure 16.4.5

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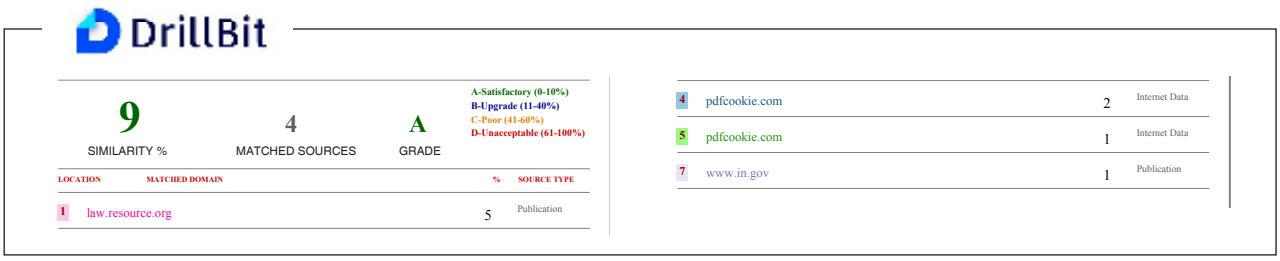

Reviewers Memorandum

Reviewer's Comment 1: This manuscript addresses a relevant topic, "Construction Project Management Special reference to Alternate Building Foundation methods". However, this paper would benefit from the inclusion of a more detailed introduction supported by previous studies and the definition of a clear research problem, as it gives clarity to readers about the study.

Reviewer's Comment 2: This paper presents the data and results in tables, which makes this manuscript very attractive to readers. The cited current and highly relevant studies in the domain ensure that the article is solidly grounded in the most recent discussions. However, the literature review part could add more recent and relevant studies in the specific field.

Reviewer's Comment 3: This manuscript linked the various sections of the article in a good way. It presents findings comprehensively. However, the conclusion sections may be provided in a detailed manner. Also, providing future scope would help future researchers in extending the research in this domain and add knowledge to the literature.

Citation

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Editorial Excerpt

The article has 9% of plagiarism which is the accepted percentage as per the norms and standards of the journal for publication. As per the editorial board's observations and blind reviewers' remarks the paper had some minor revisions which were communicated on a timely basis to the authors (Chandramohan, Ramya, and Srinivas), and accordingly, all the corrections had been incorporated as and when directed and required to do so. The comments related to this manuscript are noticeably related to the theme "Construction Project Management Special reference to Alternate Building Foundation methods" both subject-wise and research-wise. This is an insightful manuscript that makes a significant contribution as it focuses on foundation cost reduction and safer building design for the residential sector. The study presents the data and results in tables, and linked the various sections of the article in a good way. After comprehensive reviews and editorial board's remarks the manuscript has been categorized and decided to publish under the "**Case Based Study**" category.

Acknowledgement

The acknowledgment section is an essential part of all academic research papers. It provides appropriate recognition to all contributors for their hard work and effort taken while writing a paper. The data presented and analyzed in this paper by (Chandramohan, Ramya, and Srinivas) were collected first handily and wherever it has been taken the proper acknowledgment and endorsement depicts. The authors are highly indebted to others who facilitated accomplishing the research. Last but not least, endorse all reviewers and editors of GJEIS in publishing in the present issue.

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