Study on Field/Site Investigation Work during Building Construction

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***Abstract*- In building work, the most significant element is getting the valuable information of ground in which the building project is to be founded. We obtain the information via field Investigation Nowadays this work has been considered as part of the contractual obligation. The importance in implementing field investigation is seems to be slowly faded from a engineering point of view. As part of this contractual obligation, personnel involves in construction would only provide Site Investigation reports upon request or else designers tend to prescribe any design parameters based on intuitive values. Also the use of cut-price site investigation - or none at all – is a form of gambling. If the gamble pays off the company will have saved a small proportion of the costs. If not the additional on-going costs will inevitably exceed the price of competent site and field investigation report. This paper will provide practicing engineers a good insight into the importance of field investigation and its process by looking into old habits and getting away from it.**

***Index terms*- Exploration, Experience, Knowledge, Geotechnical Site Investigation, Projects**

I.INTRODUCTION

A genesis of any Geotechnical Design is Site Investigation also call as Geotechnical Site Investigation or subsurface investigation. Ground is an extremely variable and, hence, uncertain material. The potential for incurring financial and time losses is great if the properties of the soil and rock are not adequately quantified. The ground supports all construction projects which inevitably shows that the Site Investigation is of prime important. The results from the site investigation are mainly used to determine the strength of the soil and hence to propose any geometry of the supporting structures. Other reasons for the site investigation are to determine ground water levels which may affect the method of construction and design parameters. The geometry dimensions are necessary for two reasons. If the original estimate of the geometry dimension was too small due to incorrect calculations the structure may punch through the soil and may cause crack and subside (collapse). If the geometry dimension were too big there would be an excessive cost for the materials and labour to construct it. Approximately 50% of all projects over-run and losses of up to 35% of the entire original tender have been suffered. The primary reasons for these losses are either insufficiency of site investigation or lack of understanding of the results.

Site Investigation nowadays has become contracting exercise and we tend to forget that site investigation is an Investigation. As in many investigations it is an iterative process. for information to be reliable, adhere to the procedure is very important. Site investigation is the most procedure oriented operation within Civil Engineering Discipline. This is due to the variability of the soil formation millions of years ago. The properties of soil assessment or test carried out is affected by the latter. Accuracy and correct procedure is of vital important. Using inadequate and unreliable information in the Site Investigation information has cause problems in construction and even after the completion of the projects. The problems can arise from unexpected soil condition and cause failure to the foundation or base of the structure. Such failures often require extensive changes in remedial works entailing increase construction cost, time delay and even threatening public safety. Inadequate in Site Investigation information is often the result of design engineer

failing to properly plan and specify the type of field and laboratory test needed to acquire parameters used for the design. They sometimes leave it at a courtesy of the Site Investigation Contractors to perform the site investigations without supervision as it is part of contractual obligations. Even worse, they permit the Site Investigation Contractors to specify the work for them. Needless to say, geotechnical information thus obtained could well leave much to be desired where the design engineer must specific the scope of the subsurface investigation for the work he is to design.

II. GEOTECHNICAL SITE INVESTIGATION

Geotechnical site investigation is a scientific site exploration with a predetermined objectives. It is usually to start something first through desk studies follow by site visit about the site and project before we can determine the purpose of site investigation to identify the possible geotechnical problems. Subsequently, we plan scope of SI to obtain the necessary parameters to verify, assess and quantify the geotechnical problems identified. Experience and knowledge of the designer about the anticipated geotechnical problems, the project brief and available SI facilities and methods are of prime important. The main objectives are to provide adequate information for site assessment, safe and economical designs. Foresee the construction difficulties and making a choice of site and layout arrangement of the designated project.

Site investigation is normally carried out prior to the commencement of design of any project. Due to lack of or inadequacy of guide/code requirement regarding the extent as well as quality of site investigation work, geotechnical failures often occurred. These failures sometime lead to catastrophic disaster and imposed serious threat to public safety (Moh, 2004). Baecher and Christian (2003) divided the characterization of ground conditions into two phases. First is a preliminary investigation or desk study, which involves collecting information about the regional geology and geological history. The second phase is a site investigation designed to obtain data based on detailed measurements of soil properties. Figure 1.0 shows a typical process of site investigation works.

IV.PRELIMINARY INVESTIGATION

In general the new construction may require a conceptual subsurface investigation, or route selection study, where the geotechnical engineer is asked by the designers to identify the best of several possible routes or locations for the proposed structures, or to evaluate foundation alternatives. This type of project generally does not require a detailed subsurface investigation. It is normally limited to geologic reconnaissance and some sampling, field identification of subsurface conditions to achieve generalized site characterization, and general observations such as the depth to rock or competent soils, presence of sinkholes and/or solution cavities, organic deposits in low lying swampy areas, and/or evidence of old fill, debris, or contamination. Conceptual study investigations require limited laboratory testing and largely depend on the description of subsurface conditions from boring logs prepared by an experienced field engineer and/or geologist. Properly performed exploratory investigations, in cases where the designers have flexibility in locating the project to take advantage of favourable subsurface conditions, have the potential for resulting in substantial savings by avoiding problematic foundation conditions and costly construction methods.

IV.DETAILED INVESTIGATION

A more common type of subsurface investigation is the detailed investigation to be performed for the purpose of detailed site characterization to be used for design. Frequently, the design phase investigation is performed in two or more stages. The initial, or preliminary design, stage investigation is typically performed early in the design process prior to defining the proposed structure elements or the specific locations of foundations, embankments or earth retaining structures. Accordingly, the preliminary design investigation typically includes a limited number of borings and testing sufficient for defining the general stratigraphy, soil and rock characteristics, groundwater conditions, and other existing features of importance to foundation design. Subsequently, after the location of structure foundations and other design elements have been determined, a second, or final design, phase investigation is frequently performed to obtain site specific subsurface information at the final

substructure locations for design purposes and to reduce the risk of unanticipated ground conditions during construction. Further investigation stages can be considered if there are significant design changes or if local subsurface anomalies warrant further study. When properly planned, this type of multi-phase investigation provides sufficient and timely subsurface information for each stage of design while limiting the risk and cost of unnecessary explorations.

Prior to planning and initiating the investigation, the geotechnical engineer needs to obtain from the designers the type, load and performance criteria, location, geometry and elevations of the proposed facilities. The locations and dimensions propose construction should be identified as accurately as practicable. Sufficient detail should be provided to allow a determination of the locations, depths, type, and number of borings to be performed. In cases where the investigation is being done for buildings, the designers should provide the layout and footprint of the building, plans, and any column and wall loads.

V.DEMOLITION OF FLOOR TILES

The floor tiles where demolished by using drilling machine and it was cleaned. The waste was dumped into the tractor. The cost of one load of waste is Rs.450.

Labours involved:
Drillers - 1 Nos
Bhisti - 2 Nos

B.Laying pipes for wiring and plastering:

Poly Vinyl Chloride (PVC) pipe is used for electrical wiring process in floor and wall. Normally 1.5 inch pipe is used for wall wiring and 2 inch is used for concrete wiring. After laying the pipes it is then sealed by plastering. The mortar ratio is 1:6.

Labours involved:
Electrician- 5 Nos
Mason - 1 Nos
Bhisti - 1 Nos

The floor is first leveled and the tile is laid. Glazed vitrified tile (2' x 2') is used for floor. The thickness of tile is 90mm for both floor and wall. The minium rate of tile starts from Rs.25. After laying the tiles the floor care gypsum powder is mixed with the water and poured over the tiles.

Labours involved:
Tiles Laying - 2 Nos
Cost of laying tile for 1sq.ft is Rs. 30

Wood tile:

Laying the tile in wood, we use two types of resin that is part A and part B of superflex eco.

The ratio of resin is part A : part B that is 3.2 : 0.8.

Labours involved:
Tiles Laying - 2 Nos

Granite laying:
The granite is laid for steps. The edges of the granite is polished by using nosing machine. The name of the granite is Z black.

Labours involved:
Granite laying - 2 Nos
Cost for laying granite is Rs.20 for sq.ft

VI.RESIDENTIAL BUILDING

Activities involved:
- Plastering
- Laying pipe for wiring
- Parapet wall construction
- Rain water harvesting tank construction
- White washing
- Parapet wall plastering

Materials used:
- M sand
- P sand
- Coarse aggregate
- Cement
- Steel
- Cover block
- Brick
- Mould hallow brick
- Hallow brick
- PVC pipe
- Switch board
- Lime powder

Plastering:
Plastering is the process of covering rough surfaces and uneven surface by applying the thin cover of cement mortar over the exposed surface in order to safeguard against of penetration of water and also it improves the appearance of the structure and gives decorative effect to the interiors. If any cracks appered we can use chicken mesh. It strengthens the plaster. While using chicken mesh in plastering it also prevents cracks from shrinkage and increase the strength of the wall. Here the plastering is done for 10 days that is inner plastering is done foe bedroom, bathroom, kitchen, hall and entrance. The mix ratio is 1:6 and the thickness of plastering is 6-16mm
Side wall size = 4’9” x 6’6”.
Bedroom ceiling = 16’ x 10’.
Kitchen wall size =10’x 9’
Hall wall size =9’6”x 15’9” (2walls)

Labours involved:

Days	1	2	3	4	5	6	7	8	9	10
Mason	2	2	2	2	1	1	2	1	1	2
Mazdoor	1	1	1	1	-	-	1	-	-	1
Bhisti	2	3	2	2	1	2	2	2	2	2

Laying pipe for wiring:

For wiring purpose normally PVC pipe is widely used because it can withstand high temperature. Plastic are poor counductor of heat and also it can reduse the risk of burning. There are three classes of PVC pipes based on the thickness are 1.2 mm, 1.5 mm and 2 mm pipes.

1.2 mm pipes are economical for wall wiring and 2 mm pipes are used in the concrete layers. In our site they use 1.5 inch pipes for wiring purpose.

After that the switch boards are fixed at the respective places. There are different types of switch boards are availabe some of them are 1M, 2M, 3M, 4M, 6M, 8M, 12M, 18M etc.., In our site we used 1M, 4M, 6M, 8M, and 12M switch boards.

Labours involved:

Electricians = 13 nos (10+ 3 helpers)

Parapet wall construction:

There are four types of bond in the construction of wall they are:

- Stretcher bond
- Header bond
- Flemish bond
- English bond.

In our site they use English bond for the construction of parapet wall.

English bond is made up of alternating layer of stretchers and headers. They use quarter bat bricks at every 12ft. The mix ratio they used is 1:6. For checking the verticality they used plumbob and for horizontility they used level board.

Labours involved:

Mason = 2 Nos

Mazdoor = 1 Nos

Bhisti = 3 Nos

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