

Review of Hazards in Unstable and Deformed Slope and Design of Slope Stabilization in Atlas Plaza Project (Eastern Part)

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Abstract

In construction of eastern part of Atlas Plaza Project, excavation with a depth of 20m in the vicinity of a subway station and a city highway was carried out. After excavation and stabilizing slopes and before execution of foundation, soil downfall, cracking and deformation were observed. This paper investigates hazards and causes of slope instability and then presents results of study on slope stabilization. Two alternatives for stabilization were considered: a) Stabilization by method of lightening wall (outside of trench) and b) Stabilization by using resistant pile and soldier elements (inside of trench). In different steps of study such as analysis of trench wall stability, determining forces on wall and designing of resistant elements, numerical modeling by finite elements method and also hand calculation were applied.

Keywords: Slope Stabilization, Lightening of Trench Walls, Pile and Soldiers, Finite Elements Method,

The Process of Realization in Locating Site Mobilization in Limited Urban Spaces; A Case Study of Atlas Plaza Project (Eastern Part)

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Abstract

One of the initial steps in commencement of a construction project is site mobilization. Lack of required consideration to site mobilization can impact process of project execution. One of the most important parts of site mobilization is locating establishment place in project site. Limitations such as inadequate land allocation can lead to capacities and new capabilities in locating of site mobilization. Space importance in site mobilization is a critical factor for evaluation and encouragement for continuing activities. General form, appearance and setting-up and combination of these components and plural elements should organized in such a way that can illustrate a unified and integrated phantasm, with a sense of vitality in a quiet and attractive environment for human life and activities. The character of site mobilization (character of environment and space), as a space-activity, has an important role in project success. Constraints, bottlenecks, and requirements such as lack of land allocation for site mobilization, work conflicts with other contractors and specific project challenges can be observed in large-scale projects. In this paper with studying a similar project, the process of realization is presented.

Keywords: Site Mobilization, Locating, Limited Urban Spaces

Study of Application of GCL (Bentonite-Based Moisture Insulator) in Eastern Part of Atlas Plaza Project

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Abstract

Moisture infiltration causes catastrophic damages to structural elements of a building like rotting of wooden fabrics, rusting of metals, inflation of gypsum boards and fungus and vermin. During construction, the building is subject to water infiltration, and hence, it is necessary to implement water sealing in building levels below ground level. To avoid infiltration, the common solution is using geo-synthetics products or bentonite based insulators. GCL, a bentonite based moisture insulator, draws attentions in applications where high resistance to fluid infiltration, ease of installation, compatibility to surface profile change and self-maintenance are needed. In Atlas Plaza complex, due to the importance of the building, the high level of water table and large flow rate of water infiltration from neighbor areas like Taleghani Park and War Museum, GCL is employed as a part of drainage system. In this article, different types of moisture insulators are discussed and compared. Then the application of optimum option in the eastern part of Atlas Plaza complex is discussed.

Keywords: Moisture Insulator, Geo-membrane, GCL

Review of Concrete Design Mix and Construction Method for Exposed Concrete in Atlas Plaza Project (Eastern Part)¹

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Abstract

This study examines technical considerations related to concrete mix design and construction of specific and exposed concrete applied in Atlas Plaza Project by Boland Payeh Co. (as eastern part contractor). In designing concrete mix, required priorities, purposes and workability, are achieved by using contractor's experience and also laboratory trial and error. In Atlas Plaza Project, mix design of concrete is very important because of exposed concrete application in beams, columns, walls and ceilings. Regarding required compressive strength and environmental conditions of the project, concrete class is C25 for pile and is C30 for foundation, with maximum aggregate size of 19mm, maximum water-cement ratio of 0.45 and minimum slump of 17mm. concrete class for exposed concrete is C35, with maximum aggregate size of 19mm, maximum water-cement ratio of 0.4 and minimum slump of 21mm. Transportation of concrete to project site was very critical and carried out by using placing boom and pumping station. Considering required strength for concrete, massive concrete in foundation, high density of reinforcement in foundation and special conditions of exposed concrete, using of additives in concrete mix design was inevitable. By comparing performance of additives based on naphthalene and polycarboxilate, especially in exposed concrete, as well as chemical and physical compatibility of cement and additives, the preferred additive was selected. Due to the importance of water quality on concrete durability and strength, the tests for pH amount, insoluble material amount and chloride and sulphate amount in applied water were carried out periodically. Among the aggregate mine, after experimenting chemical and physical tests, "Metosak" and "Masseh Shoo" were selected as preferred options. Due to great amount of concrete and tight schedule of the project, two sets of batching plant were installed in project site at a lower level than ground level; and because of limited space for equipment movement in site, the materials are unloaded from the above with a concrete ramp into the deposit location. With implementing QA/QC procedures and curing of concrete in site by contractor laboratory, in addition to acquiring required strength, the concrete mix design was optimized several times.

Keywords: Concrete Mix Design, Exposed Concrete, Stone Powder, Mock-up

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Role of Formwork Selection in Project Time and Cost; A Case Study of Atlas Plaza (Eastern Part)

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Abstract

Formwork cost comprises a major portion of concrete structure overall cost to an extent that, in some cases it exceeds 75 percent of overall costs. The type of formwork and its assembly method shall be selected in such a way that the formwork becomes economic and maintain its safety and geometry accuracy during concrete pouring. So selection of proper formwork system and optimum configuration method are important in project construction. In current research, a comparison between popular formwork systems is made and their performance is evaluated when applied to case study project. Then, the optimum arrangement is selected in compliance with the project conditions. At the end, the lessons learned from the application of new formwork system in case study project and their correspondent changes in structural drawings are explained.

Keywords: Formwork System, Modular Formwork, Optimum Formwork Assembly