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Engineering and Geological Processes of Urban Territories

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ABSTRACT: The authors consider urban agglomerations, a developing form of settlement, and the urban economy's territorial organisation in the article. Concentrating on their huge scientific, technical, industrial and socio-cultural potential, they are the primary basic acceleration of scientific and technological progress and significantly impact the vast territories surrounding them. The study of it is especially relevant today. In urban conditions, engineering-geological processes associated with human economic activity are hazardous factors affecting the development of urban construction. Studying these processes involving the city's development should become the basis for long-term planning, development and implementation of urban targeted programs for socio-economic development, urban planning, and environmental programs.

KEY WORDS: Classification, Data Mining, Machine Learning, Predictive analysis, Social Networking Spam, Spam detection.

I.INTRODUCTION

Currently, specific work is being carried out by the State Committee of Geology and Mineral Resources of the Republic of Uzbekistan based on several decisions and instructions adopted by the President and the Council of Ministers of the Republic of Uzbekistan to improve the quality of engineering and geological research conducted in urban areas.
Urban agglomerations are a developing form of settlement and territorial organisation of the economy. Concentrating a substantial scientific, technical, industrial and socio-cultural potential, they are the main bases for accelerating scientific and technological progress and significantly impact the vast territories surrounding them. Hence, their study is especially relevant today.

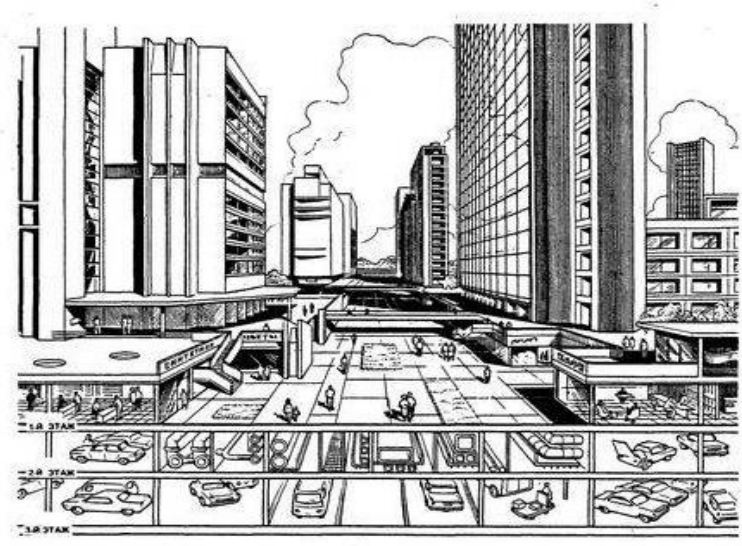

Fig. 1. The city's underground and ground floors (G.A. Razumov, M.F. Khasin, 1991).

The growth of industrial and civil construction, the development of urban infrastructure, and measures to improve residential areas lead to the movement of a significant amount of soil masses, an increase in the volume of anthropogenic

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and technogenically modified soils, changes in the conditions of heat transfer, infiltration, runoff and discharge of groundwater, groundwater balance, equilibrium state slopes, etc. The negative consequences of these changes are local activation of natural geological processes - landslides, suffusions, erosion, flooding, etc., and the appearance of their artificial analogues. At present, Tashkent is increasingly complex, with various engineering structures.

II. LITERATURE SURVEY

The degree and nature of the impact of the construction and operation of a structure in Tashkent are primarily determined by construction technologies, the depth of the foundation and the size of the system, local geomorphological, engineering-geological, hydrogeological and other conditions of the territory. The impact of structures and construction works on rocks and groundwater manifests in static and dynamic loads; changes in groundwater regime, stress state, soil properties, etc. [1,2,3].

Subsidence of the earth's surface: - static loads on the rock mass from the weight of buildings and structures, resulting in compaction of foundation soils. The reduction of rocks under the weight of buildings is accompanied by a decrease in their moisture content and porosity and an increase in density.

With dense development, the depressions of subsidence from each building close to their outer edges, and under the city, there is a sizeable areal depression [3].

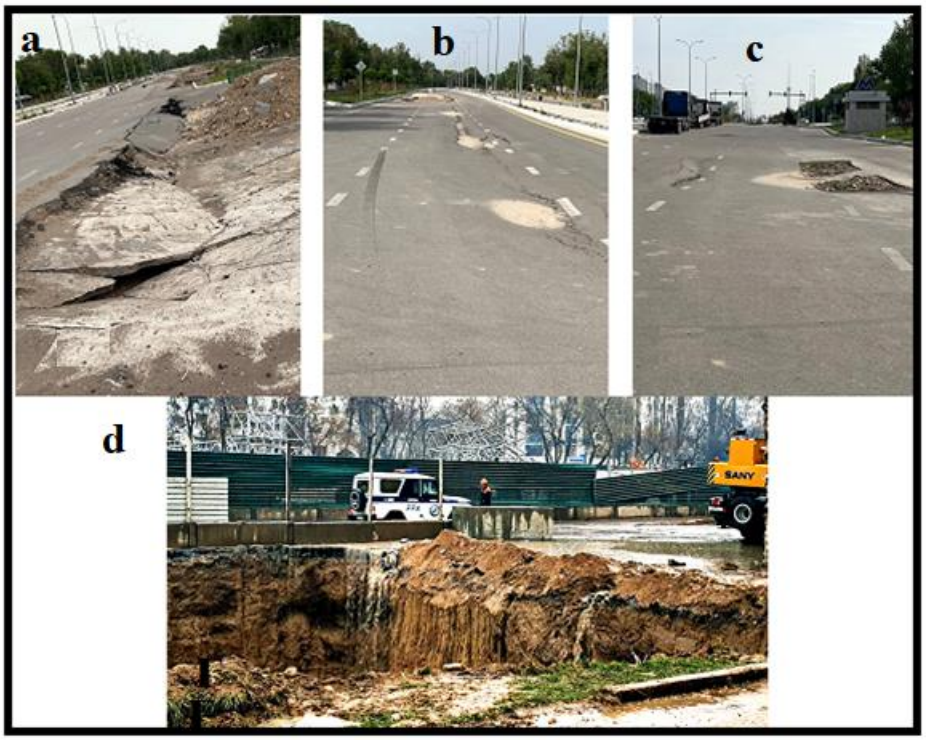

Fig. 2. Subsidence of the earth's surface (a, b, c) and the pit wall collapse (d) along the Tashkent metro line.

Dynamic loads that occur near industrial enterprises (using vibration generating devices, etc.), at construction sites, extensive roads, railways, subways, and various engineering and geological processes and phenomena (landslide and landslide, compaction of loose and under compacted soils, liquefaction and thixotropic softening of water-saturated varieties, etc.), accompanied by a change in the strength and deformability of grounds and a violation of their stability (Fig. 2). The specific pressure from the weight of buildings, structures, dams and dumps in modern cities ranges from 0.1 to 10-20 kg/cm 2 and more. For example, Moscow State University's high-rise building rises to 180 m and has a volume of about 2 million m 3. The compaction of rocks under the weight of the building caused the earth's surface to settle under the centre of 4.7 cm. [5,7,10,11].

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III. METHODOLOGY

With the dense development of the depression, the subsidences close with their outer edges, and a large-scale depression appears on the cities' territory. The area of such excavations varies from fractions of a square kilometre to 3500 km 2 or more. Uneven precipitation is especially dangerous for structures. For example, the famous Leaning Tower of Pisa sank by 2 m. Still, the difference in the lowering of the base between its northern and southern edges was 1.8 m, which led to the deviation of the tower from the vertical position by 10 °.
Dynamic loads (vibrations, shocks and shocks) compact loose-grained, loose and under compacted soils. In addition, they can destroy the structure of fragile thixotropic soils. Sandy soils are much more compacted under a pulsating load than static ones [4,5,6].

IV. EXPERIMENTAL RESULTS

For example, observational statistics show that Moscow buildings and structures located along streets with heavy traffic settled on average 3-8 mm more than structures located in alleys and dead ends. Among the buildings in the zone of vibrational influence of the metro, some have undergone additional precipitation by 5-20 cm.
In Tashkent, subsidence troughs over metro lines, linear communication structures are formed as a result of the combined action of several processes: 1) gravitational compaction of compressible rocks under the foundations of structures; 2) hydrodynamic sealing during drainage, 3) sealing under the action of vibration from the movement of trains (Fig. 2).
Subsidence of the earth's surface: - "spot development" of high-rise buildings with multi-level parking lots is often accompanied by large volumes of pumped water. A depression funnel is formed around the construction site. Under these conditions, soil settlement occurs under neighbouring houses, which is especially dangerous due to its unevenness under the foundation. Homes of old construction now often do not withstand such a "neighbourhood".
According to the analysis of the causes of deformation, a group is distinguished, related to the period of operation of the building, but due to the influence of construction activities carried out near the building. This class includes 58% of defamation cases, and only 14% of cases belong.
to the class of other causes of the operating period,
And 28% of cases belong to the class associated with errors in surveying, designing and erecting the object itself.
When constructing or developing deep pits for underground structures, the settlements of neighbouring buildings, in most cases, are several times higher than the allowable value of the additional payment.
Suffusion Processes. They are caused by the mechanical removal of soil particles by water. Suffusion deformations, as a rule, are confined to the zones of influence of the routes of sewer collectors and water-bearing communications or are located directly above them (Fig. 3).

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Fig. 3. Dips in the asphalt pavement result from the development of suffusion processes.

Leaks from underground utilities represent the greatest danger. This danger lies in a sharp, abrupt change in hydrodynamic conditions in soils, which increases the filtration rate of groundwater and, consequently, their destructive ability. Bulk soils are especially unstable, and most surface deformations are confined. Their instability is associated with the heterogeneity of soils in terms of granulometric and lithological composition and insufficient compaction [8,9,12].
Deformations associated with sewer wells: - Wells are usually not hermetic and therefore are drained for surface water; - bulk soils in the adjacent zone are not compacted and, thus, are well porous and subject to suffusion removal of particles; - the continuity of the asphalt pavement is often disturbed at the initial stage due to the compaction of bulk soils and compensatory deflection of the asphalt, after which conditions are created for the drainage of surface water, which, in turn, increases the intensity of the manifestation of the suffusion process. In most cases, this type's surface manifestations of suffusion dips are usually less significant than in-depth.

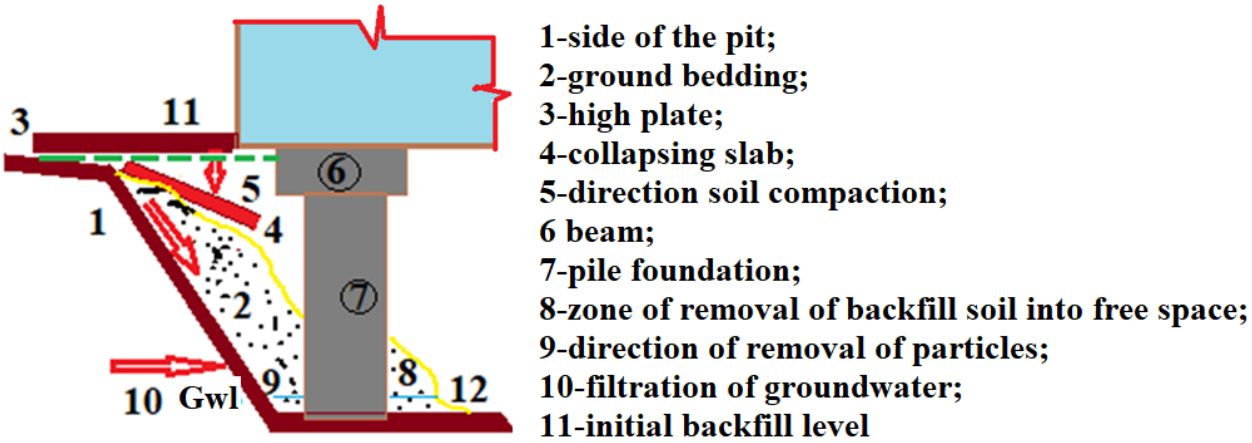

Fig. 4. Suffusion removal from the sides of deep pits to the basement.

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According to the scheme of suffusion removal, the cohesion of the side of the pit and the pile foundation is often disturbed at the initial stage due to compaction of bulk soils and compensatory failure of the underlying slab or asphalt deflection. This phenomenon creates conditions for the drainage of atmospheric and surface waters, enhancing the intensity of suffusion processes.

V. CONCLUSION AND FUTURE WORK

Thus, in urban conditions, subsidence, precipitation and surface deformation are associated with dynamic loads near industrial enterprises, construction sites, roads and railways, including the existing underground metro traffic. Studying these engineering and geological processes affecting the city's development should become the basis for long-term planning, development and implementation of urban targeted programs for socio-economic development, urban planning, and environmental programs. In addition, the cartographic basis of the territory of cities should include the definition of areas of possible manifestation of engineering and geological processes (gully formation, suffusion, subsidence, sedimentation) affecting the development of the city.

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