Drainage geocomposite to underground concrete structures

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ABSTRACT: The Central Station is a bus station building under of The Plaza Grau, located in the city of Lima. This project is part of the Integrated Metropolitan System of Transportation and concentrates the arrivals of buses from the zones north, south, east and west of the city of Lima. The bus station is located under a plaza with extensive gardens and inside of its structures there is a system of perimetric retaining walls place around of the plaza. Before to occurrence the possibility of water infiltration that affect the walls and installations of the station, we detected the necessity to implement a system of drainage. The water infiltrations on the ground can affect to the underground concrete structures, that in most cases they are waterproofed. These is not an integral solution because it does not eliminate the constant pressure of the water on the structure and it maintain the risk of a filtration by failure of the waterproofing. Currently the solutions of drainage with gravel and geotextile are changed by drainage geocomposite systems that give many advantages like to guarantee the funcionability of the long-term system, to improve the quality of the work with uniform the system in all the drainage´s zone, a faster execution and versatility to be installed in reduced spaces without affecting the efficiency of the system. In the retaining walls of the bus station was installed drainage geocomposite which was composed by a geomat between geotextile and a laminate waterproof to protect to the structure to humidity. Finally, in the lower part of the wall, the geocomposite is attached to a perforated drain pipe to evacuate the water.

1 INTRODUCTION

The constant growth of the large cities brings with itself the ground shortage for new constructions, being generated a tendency of vertical growth where the new areas for people are undergrounds or over ceiling buildings. In all the cases, these structures require of preventive or active drainage´s system, that guarantee the structure´s workability.

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Figure 1: The perimetric retaining walls of the bus station.

2 DESCRIPTION OF THE PROBLEM

The bus station is located under a plaza with extensive gardens and inside of its structures there is a system of perimetric retaining walls (Figure 1) place around of the plaza. Before to occurrence the possibility of water infiltration that affect the walls and installations of the station, we detected the necessity to implement a system of drainage. The water infiltrations on the ground can affect to the underground concrete structures, that in most cases they are waterproofed.

Figure 2: The waterproof of walls in all its height..

3 SOLUTIONS TO THE PROBLEM

The perimetric retaining walls of the bus station had a height of 6.60 m approximately, which required to waterproof and install a preventive drainage´s system. The decision was to waterproof the walls in all its height with asphaltic painting (Figure 2) and then, installing 12,000 m2 of drainage´s geocomposite for the first 4.50 m of height (Figure 3, 4).

Besides to waterproof the gardens located over the underground bus station with the asphaltic linear, it decided to install a drainage geocomposite´s system to drain irrigation water. Geocomposite installation was 9,000 m2.

Figure 3: The installing of drainage´s geocomposite for the first 4.50 m of height. in the wall.

The product used was a flexible and light geocomposite drainage, which drainage core is composed by a geomat of 10 mm of thickness with 90% of empty index, which is covered in both sides with geotextiles.

Figure 4: The perforated drain pipe to evacuate the water.

The reasons to decide the use of this product was:

- High drainage capacity and good compression strength: for the case of the retaining walls, 6,60m of depth, Total Reduction Factor of 1.60 and Safety Factor of 1.50, the estimated drainage capacity was 0.64 l / s.m. For the garden`s thickness of 0.30 m and 1% of slope, using the same Reduction and Safety Factors, the estimated drainage capacity was 0.20 l / s.m. So, the drainage values obtained satisfied the project requirements;
- The little thickness and its flexibility permitted to work in zones of difficult access and spaces limited;
- The easy installation contributed to make a clean and fast job (Figure 5).

Figure 5: The drainage´s geocomposite in the wall.

4 CONCLUSIONS

The alternative solution when use the Geocomposite drainage achieve the substitution with a great performance to the traditional system: gravel and geotextil; providing to the project to save money and a quickly - quality building process.

REFERENCES

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