

# Journal of Engineering Research

## SOLUTION FOR EXTENDING THE SEWAGE NETWORK IN MND

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**Abstract:** In order to always maintain better results in sanitation services, Sabesp uses the most appropriate techniques for its works, as well as the most modern equipment. The non-destructive method is a recent alternative for sewage collection network works, defined by the positive points it presents in relation to social and environmental impacts and the execution time of the work. The work presented here comprises a 300 mm diameter and 386 m long network using the HDD-directional hole method and its particularities, to collect 8.33 l/s of effluents or sewage previously discarded together with rainwater.

**Keywords:** Non-destructive method, sewage, less impact.

## INTRODUCTION

Due to a growing worldwide concern for sustainable development, the UN has developed a list of 17 goals, in which goal 06 is to ensure the availability and sustainable management of water and sanitation for all.

Brazil has been going through several changes, some of which favor the area of sanitation, such as the governmental targets for the depollution of the main rivers in São Paulo and the change in the population's perception of impacts on the environment.

Sabesp, as a responsible and innovative company, seeks its continuous improvement, thus, in the first half of 2019, the Mooca Maintenance Center began the work of implantation/expansion of a sewage collection network in the region of Córrego Taboão (peripheral area of great movement, passage from important bus lines, student path and is within our challenge area)

The motivation was the collection of effluents that were released into the rainwater gallery, contributing to the contamination of water bodies, soil, air, with damage to the fundamental rights of citizens.

The chosen method for carrying out the project was non-destructive, more specifically HDD-directional hole, due to the large circulation of vehicles and people in the area and the difficulties of a work in VCA (open-air ditch), such as: complete interdiction of the lane, shoring, direct contact with "contaminated" material, exchange of soil and waste along the track.

The project was prioritized in order to improve our IORC indexes (indices of obstructions of the sewage collection network) and the IORD (index of obstructions of domestic sewage branches), but also to meet the governmental measures/goals for depollution of our main rivers and meet the goals of the Business Unit.

## OBJECTIVE AND BACKGROUND

At the Mooca hub, we achieved a high standard of service quality, with a corrective work rate similar to that of more developed countries, overcoming these values is the main challenge, thus requiring a planning methodology so that our efforts are more effective.

## METHODOLOGY

In view of the data, the need for proper collection of the discharged effluent was clear, for the implementation/execution of the service some obstacles emerged. Among these, the first to be dealt with was the execution method, destructive method (VCA) or non-destructive method (MND-HDD), by space configuration (heavy traffic, bus lines, large circulation of people, proximity to commercial areas) and execution time of work the selected method was the MND. This practice is still recent for sewage works, which required the supervisory body of the work to undergo a technical course on the method.

The socio-environmental assessment of the area comes as an essential complement, where

based on the quantitative data established by the list of systems, we can qualify the positive changes that resulted from the work as: increase in the percentage of collected and treated sewage, reduction of pollution of rivers/streams, bringing a better quality of life to the surrounding population.

One difficulty found is the investigation of interferences, the sounding proved to be essential, since an unregistered interference changes the position for drilling the hole.

Problems with releasing the execution of the service by the City Hall and CET, adapting some of the contractor's parameters to Sabesp's standards.

## DEVELOPMENT

### SCENARIO CÓRREGO TABOÃO

Peripheral region, with active population growth, large circulation of people and vehicles, as it is a low-lying region, it is subject to flooding, which invades the houses located close to the stream. With the current configuration of mixing rainwater and sewage, in the event of floods, residents are exposed to this contaminated solution, which increases the likelihood of health problems such as diarrhea, mycoses and others.

The separation of the two systems is an opportunity to advance in the rates of sewage collection and treatment, in the depollution of the rivers and benefit the population, in

addition to increasing the company's income with the inclusion of new connections.

The area of the Taboão stream has striking values, as the non-execution of the work allows the release of 8.33 l/s of sewage (data taken from the signs) in GAP.

### Phase 1: Project design

These technical analyzes depend on a prior assessment of the environment, through a visit to the site and virtual images that make it possible to investigate the flow of vehicles, transit of bus lines, people, proximity to shopping centers, type of road, etc.

Despite the contract establishing the need for more specific technical surveys, without prior knowledge it is difficult to make an adequate project, so we seek to know all the obstacles for a more reliable and smooth execution.

Finally, we chose the type of methodology to be used in the execution of the work, which matches the financial resources available and the characteristics of the project.

### Phase 2: Project Implementation

After bidding, with the project in hand, the team heads to the site to start the works. Then we have the inspection of the construction site (a location close to the work leased by the contractor), preparation of signaling material, topography and soundings.



Fig. 1- Work identification plate.

## PROJECT EXECUTION

Presentation between foreman, supervisor and contractor, together with a technical visit to the area, first negotiations on the work (small changes, adaptations to the documentation).

Analysis of the documentation, execution schedule in the Term of Permission for Occupancy of Roads (TPOV), Sabesp's signaling project, release of permits and authorizations regarding the occupation of the road (TPOV), requirements and restrictions for the execution of the work and occupation of the via.

Visit to the contractor's site, site conditions, organization and cleaning.

## IN THE FIELD

Adequacy of road and punctual signaling (from the place where the intervention is taking place).

Accommodation of materials in order to enable safe pedestrian transit.

The support vehicles are parked near the starting point of the work, as well as the equipment needed at the time.

Signage: Cone, Signs, easels, siding, striped tape and protection net.

In the excavation we have: support truck or bucket, exhaust pump, backhoe, winch, bucket, ladder with guardrail, hammer, shovel, chibanca, inflator, lighting, armco plates, safety belt, glove, pvc boot, helmet, uniform and support vehicle.

In the directional hole: water truck, water tank, chemical compound (phpa), directional drill, navigation device, measuring tape, bars, probe, radio communicator, sledgehammer, cold asphalt, rope, reamer, swivel, helmet, glove, saw electric and uniform.

Pv construction: steel cable, stave, backhoe, bottom slab, neck slab, cap, cement, sand, water, compactor, soil, helmet, glove, uniform and safety belt.

The project foresees the insertion of 366 m of 300 mm HDPE pipe, crossing streets, squares and sidewalks, the execution of 8 PVs, two tunnels (16 and 7 meters) and an auxiliary network, to collect the new connections of 120m x1,20m in VCA.

Progress of works: (Table 1).



-  Shafts placement
-  Shafts placement with tunnels

Fig.2- Place of Execution of the Project - Notes of soil rupture points.

|   |
|---|
| Work Taboão   |
| Topography: demarcation of quotas and interferences;<br>Manual excavation of shafts (2, 3 and 5) and the liner tunnel, connection of the new network to the trunk collector launch PV.  |
| Directional hole (passage of all sections).   |
| C Confection of (PVs 2 and 3) and placement of the tube in the tunnel, occupation of the void with bags of soil/cement.<br>Excavation of PVs 06 and 07  |
| Excavation of PVs 08 and 09<br>Excavation of the 2nd liner tunnel<br><br>Start of execution of auxiliary network in VCA (Sidewalk)  |
| Preparation of PV 09, 05 and 06.  |
| Preparation of PV 07.   |
| Installation of the pipe in the second tunnel and filling with a bag of soil/cement.<br>Preparation of PV 08.   |
| Execution of PVC auxiliary network, open ditch to collect new connections and direct them to the collector.<br>Execution of connections already made possible and points ready to receive the others.<br>Replacement of asphalt cover and execution of damaged sidewalk |

Table 1. Work monitoring.



Fig 3. Topography

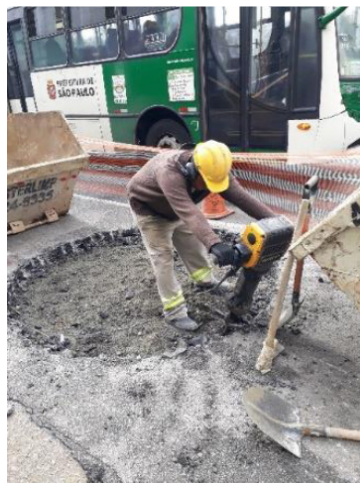


Fig 4. Initial excavation shaft



Fig 5. Shaft completion



Fig 6. Line Tunnel



Fig 7. Directional Drill



Fig 8. Reamer



Fig 9. Pipe Welding



Fig 10. Tube pull



Fig 11. Making the PVs



Fig 12. Sewer connections



Fig 13. Asphaltic Replacement

## RESULTS

The work was completed in November 2019, with great success, we removed the 8.33 l/s of effluent that was released into the stream and conquered 14 more new connections, benefiting the surrounding residents and giving them a feeling of welcome.

The release of effluents in an inappropriate place leads to the proliferation of urban pests (rats and cockroaches), the emission of bad smells and contact with pathogens; with the execution of the work, the effluent is readjusted into our network and directed to treatment, thus solving the previously mentioned problems.

An extremely relevant benefit is the population's feeling of importance, that is, the residents of the area feel remembered, cared for, they feel that they have given real value to the problem they live with on a daily basis.

We also gained in terms of the company's visibility, by changing its constant presence at the site from mitigating measures (DC – sewer collector unblocking, DD- home sewer branch clearing, washing) to a definitive solution.

## REFERENCES

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