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# Performance Contract — Focus on Losses Controle, in Social Vulnerability Areas: Cangaíba Case Study

Silvio Henrique Campolongo, Luis Guilherme Bechuate, and Eduardo Augusto Ribeiro Bulhões Filho
*Effico Saneamento, Brazil*

**Abstract:** Among the modalities of contracts in the sanitation sector, there is a contracting modality implemented in mid-2010 and which is on the rise, where the due payments to the hired company, is based and dependent of the results reached in the project. There are several variations on this model of contract, since the that one where the receivables are completely dependent of the results until that one where there is a fixed price for the assets and basic services, and there is a plus compensation for the overcome results. This modality has been diffused specially because of the achieve remarkable results for both sides, contractor and contracted. The possibility of increasing gains with mutual advantages, as well as to enable greater technological advancement, are the great attractive and the driving force of this type of contracting: The model used to allow the contracted company to apply technical solutions, although not provided in the scope, if it promises improvement on the results of the project.

**Key words:** social vulnerability, performance, infrastructure management

## 1. Introduction

The water supply system in the metropolitan region of São Paulo, especially in municipalities located in peripheral regions, suffers from irregular connections, which are characterized by the unofficial use of water and irregularities in connections and water meters. There are also occupations in areas protected by law, where housing is not allowed.

The situations described above, whose growth has been observed along with the demographic explosion in the Metropolitan Region of São Paulo, represent a socio-environmental problem that is difficult to solve for the State and an economic problem for the water concessionaire, which has high rates of water loss in these regions, real and apparent.

The challenge of supplying this population with treated water is latent. Among the main benefits of having treated water, sewage collection and treatment, are the reduction of expenses with public health and child mortality. The index in the State of São Paulo in 2020 was 9.75 deaths of children under one year per thousand live births, against 31.2 in 1990. The drop was 61.8% in those 20 years. A study by the WHO (World Health Organization) shows that, for every R$1 invested in sanitation, R$4 is saved in health expenses.

The various actions to combat water losses implemented by the water concessionaire since the 70s suffer negatively from the growth of the problem of irregular housing. These houses grow, most of the time, in prohibited areas, connecting to the concessionaire's networks in a disorderly way and harmful to the water distribution system.

The project's challenge was to provide services to recover the metering and billing of the water volume provided by Company in the Regional Management Unit (UGR) São Miguel, having as reference the areas identified as irregular areas and in those adjacent areas already consolidated, but affected by the situation in the neighbourhood.

**Corresponding author:** Silvio Henrique Campolongo, Project Manager; research areas: water supply in smart cities. E-mail: silvio.campolongo@effico.com.br.

In the case that is described in this article, it was encompassed actions in a universe of 7,404 water connections. Composed by 6,020 connections to be regularized, 1,178 inactive connections and 206 connections with zero consumption, all actions in order to raise up the measured volume. It is important to consider that, to guarantee a proper pressure to the connections, several engineering services where provided, with hydraulic modelling of the supply system, buildings for new pipelines, sectorization services, etc..

All the services described above where done based on a performance contract, offering risks for the contracted company, since minimum targets had to be reached to enable the payments and, of course the economic feasibility of the operation. For sure, since the results are reached, or overcome, both sides of the contract profits.

## 2. Objective

Provide engineering services to reduce losses in social vulnerability areas through actions to regularize water connections with the suppression of irregular infrastructure and customer regularization. All the services through a performance contract aimed to increase the efficiency in the supply sectors of the regional management unit operated by the local sanitation company, in São Paulo/Brazil.:

- Social action focused on environmental education;
- Regularization of inactive connections;
- Regularization of connections with zero consumption;
- Execution of new connections for regularization;
- Installation of standard cases for water meters;
- Installation of pipes and networks adjustments for regularization purposes;
- Installation of valves;
- Installation of hydrometers;
- Interconnection of networks;
- Monitoring of consumption.

The Fig. 1 shows the nomenclature of the project zone:

| ÁREA |
|---|
| CANGAÍBA |
| CARLOS CARNEIRO |
| CÉU SÃO CARLOS + IDA VANUCE |
| CLEMENTE SEGURA |
| FAZENDINHA |
| HELENIRA REZENDE + ÁGUA REAL |
| JARDIM LOURDES + VALE ENCANTADO |
| MANUEL BUENO DA FONSECA |
| SAMPEI SATO |
| SANTANA DO AGRESTE |

**Fig. 1 Project target zone.**

Universe of connections comprised in the target zone:

- 7,404 of water connection units being:
- 6,020 to be regularized;
- 1,178 inactive;
- 206 with zero consumption.

## 3. Methodology Used

To establish the methodology for the implementation and execution of the activities, it was necessary to evaluate the contractual conditions established. These conditions are shown in Fig. 2, where we can find three stages.

According to Brazilian law, public contracts may have their values increased by up to 25%, respecting other legal and administrative parameters.

In view of this, and with a view to encouraging the private partner to achieve better results, the contract provided that remuneration would be subject to the achievement of indicators ranging from 75% to 120% of the goals established for the project. In other words, regardless of the degree of success of the actions, the remuneration ceiling would be 120% of the contractual values, and in case of failure, below 75% of the targets, only the implemented assets would be remunerated.

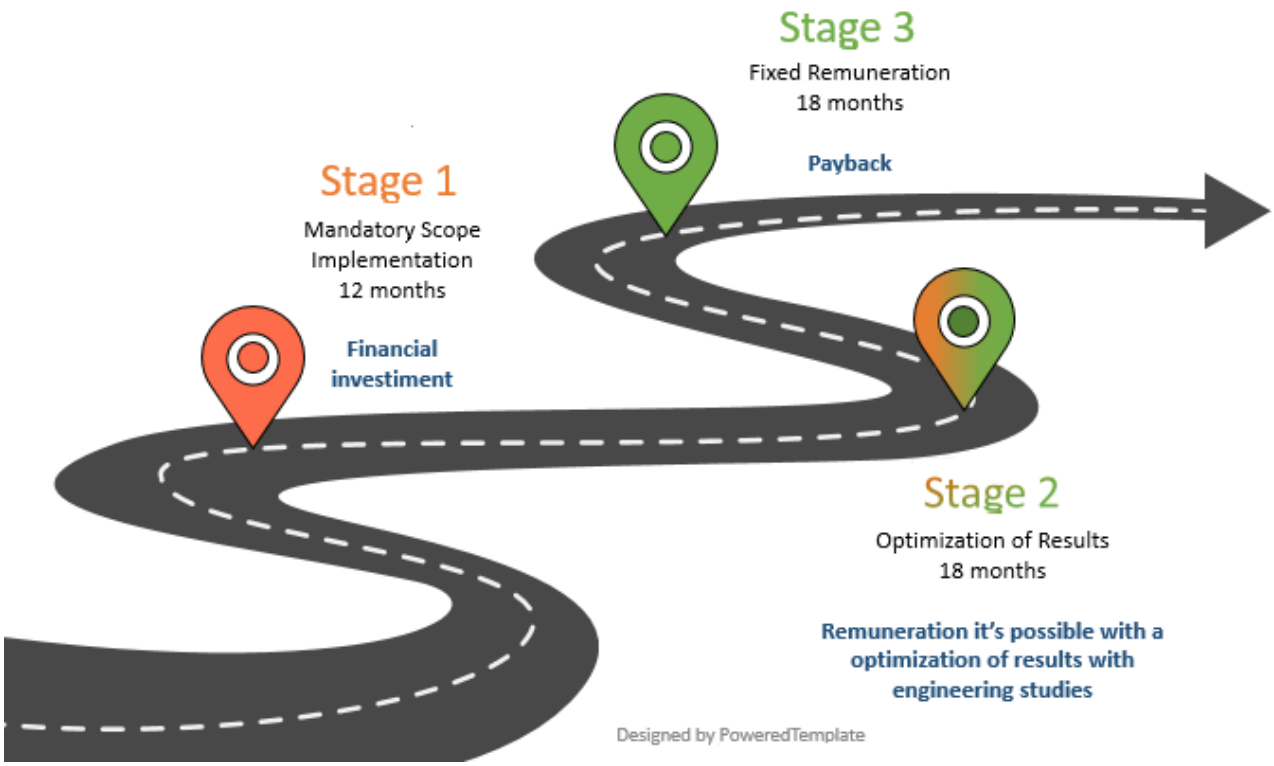


**Fig. 2 Stages of the project.**

In the present case of the Cangaiba Project, the target imposed was to increase the micro-measured volume in social vulnerability areas, by 87,219 m3/month operating in 7404 connections, or approximately 11.79 m3/connection/month (recovery).

*3.1 Stage 1: Mandatory Scope Implementation*

The minimum mandatory scope was performed according to the following activities:

a) Social Action Focused on Environmental Education

A communication plan was studied and implemented, informing about the benefits of home connection, disseminating, clarifying, raising awareness and mobilizing the population about the benefits of the project. It was used resources like lectures, pamphlets, presentations at schools, sound cars, always having as the final objective the agreement and adhesion of the local population to the project, allowing, accepting the new connections. The Fig. 3 below shows one of the lectures held in the community.

**Fig. 3 Event held by the consortium with community artists.**

b) Regularization of Inactive Connections

The inactive registry was provided by the contracting company, and inspected "in loco" in conjunction with social mobilization. When authorized by the resident in immediate condition, regularization was carried out with the consent of the customer with a debt renegotiation agreement. In the event of a customer's refusal, the denial was passed on to Company and no action was taken by the contractor.

The Fig. 4 shows the cadastral census carried out in the community.

**Fig. 4 Initial registration of consumers.**

c) Regularization of Connections With Zero Consumption

It was defined as zero consumption, connections that did not show variations between the readings of the water meters, which basically occurred in two situations:

The contracted company carried out the civil interventions to enable the regularization of the water meters under the following conditions:

Irregular installations with derivations not recognized by the concessionaire;

Facilities that were regularized until the entrance to the property, but the resident did not complete the installation for use.

The Fig. 5 shows the standard case used to receive the new hyfrometer.

**Fig. 5 Connection regularization.**

d) Execution of New Connections for Regularization

After confirming the cadastral survey in the field, social mobilization activities, permission from residents for regularization, planning of works, the new connections were installed and registered in the register basis of the Company.

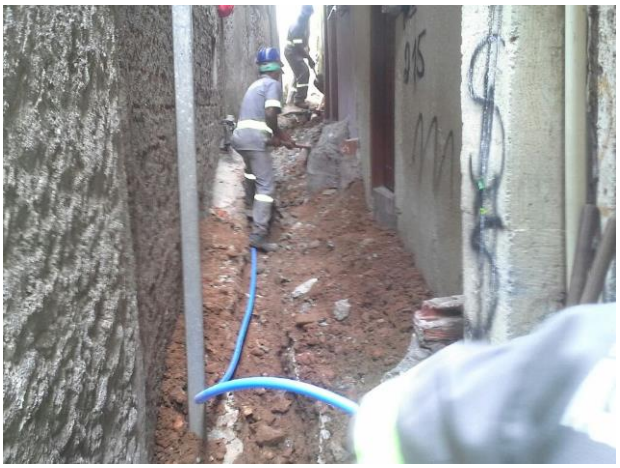

**Fig. 6 Executing new connections.**

e) Installation of Standard Cases for the Hydrometers

The water meters, when existing, were installed on the floor, wall, inclined, sometimes irregular and non-standard. The resident decided where to install the box one. Small civil interventions, such as small walls for fixing were built by the contractor. The Fig. 7 shows the installation of the regularized water connection box.

**Fig. 7 Installation of regularized water connection box.**

f) Settlement of Networks for Regularization Purposes

Initially, the project sector was not divided into sectors, with networks in situations: not registered, old, leaking and inadequately dimensioned. The Contractor used hydraulic simulation of the sanitation company's registry to determine and implement the networks presented in Table 1.

**Table 1 Implemented pipes.**

| Diameter (mm) | Material | Lengh (m) | % |
|---|---|---|---|
| 32 | PEAD | 4061 | 46% |
| 63 | PEAD | 537 | 6% |
| 75 | FOFO | 94 | 1% |
| 100 | FOFO | 1938 | 22% |
| 150 | FOFO | 1570 | 18% |
| 200 | FOFO | 416 | 5% |
| 300 | FOFO | 153 | 2% |
| Sum | | 8769 | 100% |

The Fig. 8 shows the installation of the distribution network. Not all interference was detectable. For unforeseen interference, the network was diverted according to the local scenario.

**Fig. 8 Distribution network pipes installation.**

g) Installation of Valves

In conjunction with the implemented networks, it was necessary to install valves with a view to eliminating communication between non-registered networks and implementing zones. The diameters of the valves ranged from Ø 75 to Ø 300 mm. The Fig. 9 shows the installation of a shut-off valve.

**Fig. 9 Installation of shut-off valve.**

h) Installation of Hydrometers

The contracting party supplied the water meters. The Contractor carried out the supply and installation of the "one" standardized boxes. The installation took place as the connections were raised and the civil works to make the installation feasible were completed. The following Fig. 10 shows the installation.

**Fig. 10 Installation of hydrometers inside the regularized water connection box.**

i) Interconnection of Networks

It was necessary to interconnect with the existing water network of the sanitation concessionaire, as well as the interconnections between the implemented water network. The contractor, together with the sanitation company, executed the sector's inlet network in a favorable location for the sanitation company to install a water meter or even a pressure reducing valve in the future. The Fig. 11 shows an interconnect and branch locations.

**Fig. 11 Interconnection in water networks.**

*3.2 Stage 2: Optimization of Results*

After carrying out the activities with a minimum scope, the water utility company started the performance verification process, which presented a return of 73,815 m³ in the first measurement, a challenging result, initially below the established target of 87,219 m³.

However, the contractor carried out activities to enhance the results, such as hydrometer networks that identified networks not registered in charge, responsible for supplying unregulated connections, commercial and social activities encouraging maintaining regular connections and expanding the project area with a view to enhance the results. These activities enabled an increase in VU in fixed remuneration.

*3.3 Stage 3: Fixed Remuneration*

At this stage, it is not allowed to carry out additional works. All ongoing activities have been closed. The contractor received a fixed remuneration calculated based on the average of the months of the previous phase, which resulted in a micro-measured volume increase of 10% above the target, 96,242 $m^3$/month.

## 4. Project Execution Schedule

The Contract had a total duration of 4 years (48 months). The activities contemplated within each phase respected the deadline. The Fig. 12 shows the general contract schedule with the indication of the 3 phases, the execution period and the conditional relationship between them, finalize a phase, to start the next phase.

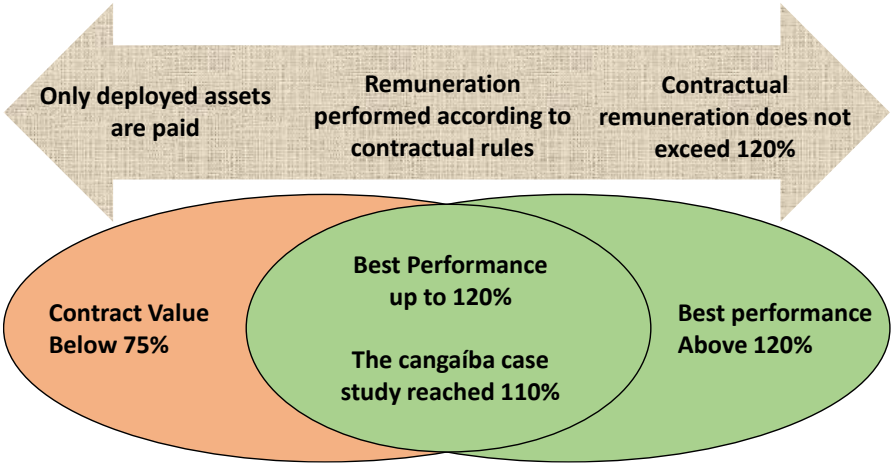


**Fig. 12 Contractual remuneration.**

## 5. Results Obtained

The contract enabled the recovery of 98,242 $m^3$/month, called Meta Augmentation VM with the generation of 6,000 new regularized water connections, created from regularized connections and improved the quality of life of the population under the project's influence by improving the quality of supply under the flow and pressure optics and population awareness. Indirect results were also observed, such as the improvement of the company's image and environmental education and education for the local community.

## 6. Analysis of Results

The result represented a percentage of 110.35% of the established contractual goal, that is, a financial increase of 10.35% of the contractual values for the contractor and an increase in MV for the water concession company. Thus, the result was remarkably positive. The Fig. 12, in percentage terms, the minimum and maximum goals, the result achieved and the possible results.

## 7. Conclusion

Hiring through performance can present remarkable results, it brings a new paradigm for partnerships between the public and private, providing a common engagement around expected results, changing contractual relations, before focused merely on completion of scopes by the private and inspection by the public (Fixed Price).

In this perspective, the engineering study to enhance the results is essential. In practice, this type of contract represents the integration of the field works with engineering studies, and cost to benefit analyses.

This model brings another dynamic on the steps involved in infrastructure projects. The time and the engagement involved, allows to the contractor bring the targets, the results in a shorter period of time, when compared with the traditional hiring models.

This model described on this article represents an alternative and advantageous option compared to "Turn Key" contracts, as the mutual incentive (contractor-contracted) enhances the optimization of results within the project's purpose.

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