GRC furniture in precast prison units

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SUMMARY

This paper outlines the project details and some aspects of the fabrication process for beds, tables and lavatories made of glassfibre -reinforced concrete (GRC) panels for precast prison units. The furniture is made of GRC sandwich panels with a cellular concrete core. The main consideration for the furniture project is the prisoners' safety. In Brazilian prisons rebellions are frequent and, on these occasions, elements of furniture are often used as weapons in internal conflicts.

To this end the GRC composite prevents prisoners using elements of furniture as weapons against other prisoners and prison officers. In this project beds are joined together through the precast wall, with no visible fixings. Further, as GRC composite is non-combustible, the furniture is able to resist the consequences of inmate uprisings, which are usually followed by fire. In addition, as the furniture is made of white cement, this contributes to the internal illumination of the prison units and also facilitates easy maintenance.

KEYWORDS: GRC, Precast panels, furniture, prison

INTRODUCTION

The problem of insufficient numbers of Brazilian prisons and their poor standards has raised the question of public security among the media and the general population. Moreover, there has been a significant increase in these problems during in the last decade. The sophistication of organised crime has turned Brazilian prisons into well-developed centres for illicit drugs and weapons, aided by human and financial resources that manage to outstrip the resources allocated to the authorities for fighting this type of crime. Poor access control, frequent escapes and ease of communication between prisoners and the criminal world, allow prisoners to work together with criminal organisations.

Consequently, it is necessary to develop strategies to combat organised crime and to develop projects that prevent illicit internal and external activity in prisons. However, the methods chosen must not contravene human rights. Prison overpopulation increases the difficulties of control, generating the environment for a criminal school. This synergy promotes the diffusion of new criminal strategies and the strengthens the stronghold of the main Brazilian criminal organisations. These organisations were created inside the jails and nowadays have a net that reaches different regions

in the country, promoting crime and establishing their own 'laws'. This situation puts pressure on other prisoners and prison officers to collaborate with the criminal organisations involved.

The habitability of the new prison units must be achieved within a minimum of space but at the same time allowing prisoners physical integrity and adequate hygiene in order to maintain health and to create a minimum level of comfort in the jails. These requirements mean that careful consideration has to be given to choice of materials, for example use of resistant and durable construction systems which facilitate cleaning and maintenance. Other considerations include the use of security systems, such as electronic monitoring, specially trained prison officers, network security using fibre-optic cables, and tight control of access and the use of mobile phones.

Such a situation demands emergency solutions that, in this case, have been resolved by the use of precast jail units that offer flexible composition, satisfying security and habitability requirements. The construction system employs concrete and glassfibre reinforced concrete (GRC) panels to assemble the precast units. The high performance of concrete gives rigidity and security to the walls and the GRC composite is used in the internal walls and in the precast furniture, as shown in Figures 1–5.

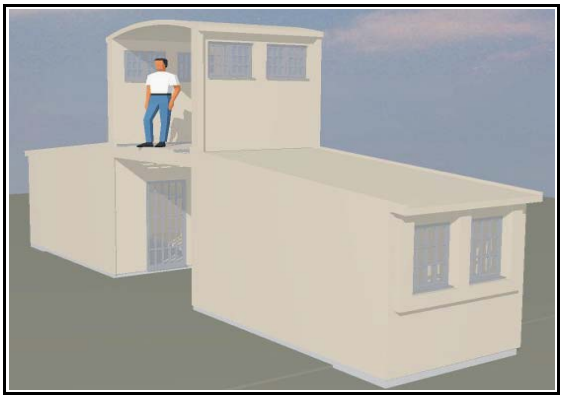

Figure 1 – Standard precast prison units

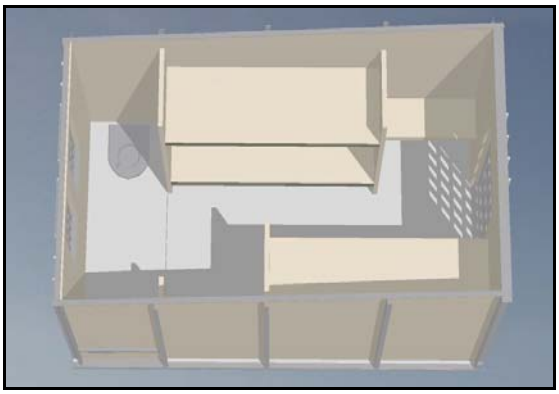

Figure 2 – Perspective of the cell

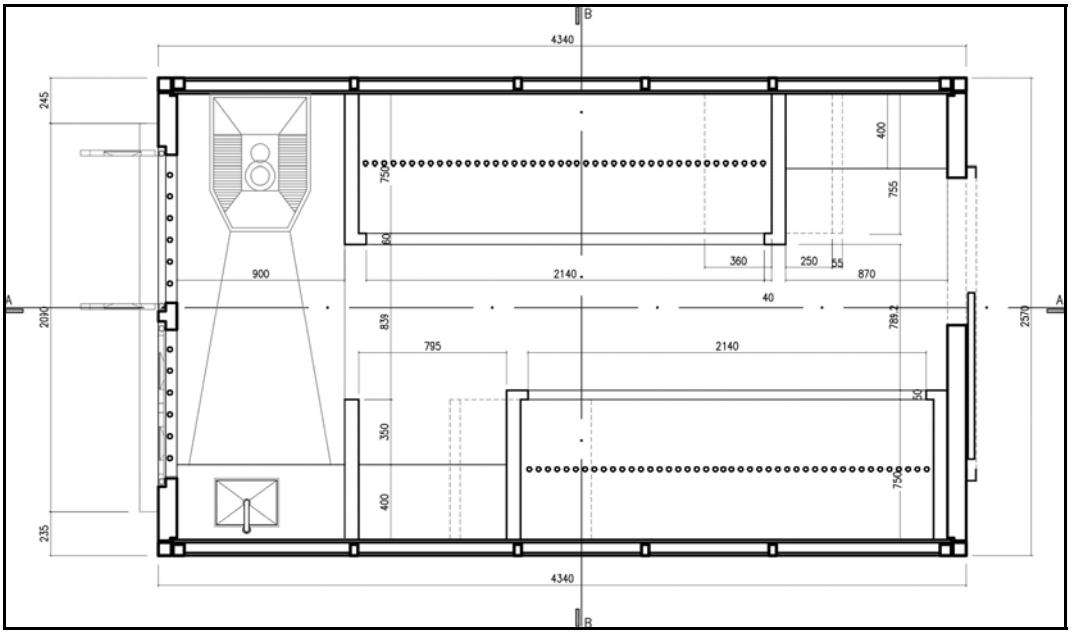

Figure 3 – Prison unit furniture

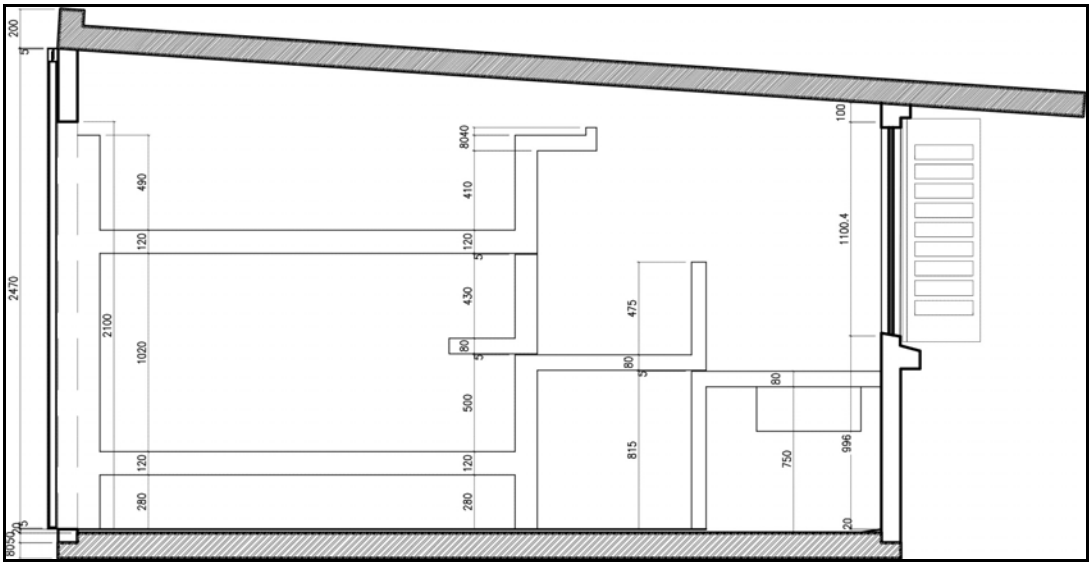

Figure 4 – Longitudinal section of jail unit

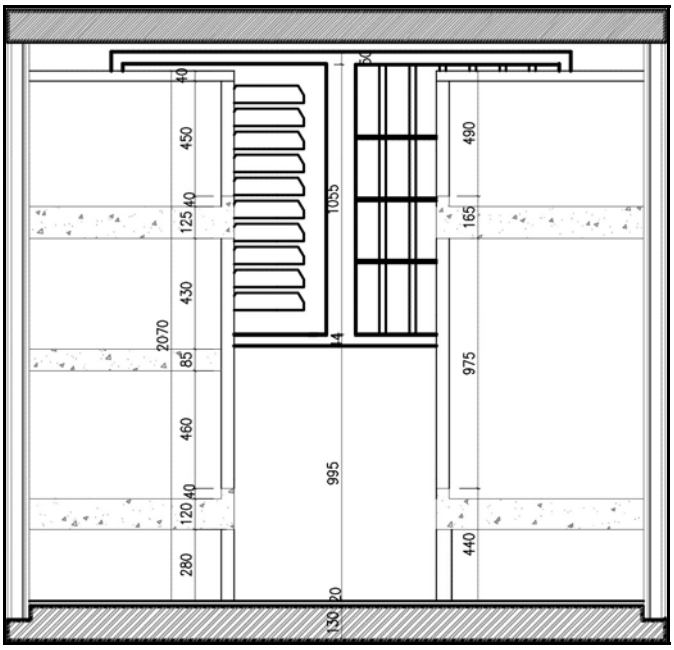

Figure 5 – Cross-section of jail unit

CHARACTERISTICS OF PRISON UNIT FURNITURE

The prison is formed by modular cells and galleries. Each cell is equipped with four beds, one washbasin, one shower and one toilet. Each bed has an individual shelf to store personal belongings such as clothes and toiletries. The shower and the toilet are located close to the window to allow permanent ventilation. In order to permit a degree of visual inspection and preclude criminal actions, the shower and the toilet are not totally enclosed. With regard to prisoners' comfort, this is guaranteed via thermal insulation of the sandwich panels and natural ventilation from the window.

Beds, shelves and tables are fabricated from GRC precast sandwich panels, anchored into the concrete precast panels and supported by the reinforced concrete floor. The GRC sandwich panels used for the furniture also have a 50 mm cellular concrete core. The electrical installation comprises sockets next to each bed and a central light with an internal switch near the door. The cell unit has an external energy control device which can be turned off by prison officers. Water services are supplied through the external wall panel. The furniture creates individual spaces for each prisoner, as shown in Figures 6–8.

Figure 6 – precast beds

Figure 7 – shower

Figure 8 – GRC beds and furniture

Maintenance of water services can be undertaken externally. The washbasin and the toilet are made of stainless steel, fixed in the GRC sandwich panel, to prevent prisoners detaching these elements and using them as weapons.

FURNITURE FABRICATION

Beds, shelves and lavatories are fabricated from GRC moulds, as shown in Figures 9–11. These moulds permit a high degree of reutilisation, without loss of aesthetic characteristics. The use of white cement contributes to the internal illumination of the prison units and also allows easy maintenance.

Figure 9 – GRC bed mould

Figure 10 – GRC shelf mould

Figure 11 – GRC beds and washbasins made by Verdicon Construções Ltda, Canoas, Brazil

FINAL CONSIDERATIONS

The jail project development and the construction of prototypes resulted in a positive evaluation of the precast prison units and their GRC furniture. This construction system can contribute to improving the current condition of Brazilian prisons. The composite quality and the materials used allow conditions of comfort and can improve the security situation of the prisoners and prison officers.