

Theoretical Analysis of Construction Drawing Design of College Students' Dormitory

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Abstract: The construction of student dormitories is very important to Chinese universities. It determines the comfort of university life and learning efficiency to a certain extent. The article takes the dormitory space composition and scale as the research object, from the perspective of meeting the living needs of college students, initially explores the reasonable and basic model of student dormitory space design, and focus on the analysis of the overall design, spatial planning, details and other aspects. At the same time, based on the CAD drawings of college student dormitory construction, from the perspective of theoretical analysis, the design points and attention aspects of college student dormitory are explained.

1. Introduction

The construction of students' dormitory is an indispensable part of Chinese colleges and universities, and it is an essential living place for students to have a high-quality study and comfortable live. With the popularization of basic education and the continuous improvement of people's education level, the scale of students in universities is increasing rapidly, and the construction of student dormitory is particularly important at this stage. At present, there is a trend of matching architectural needs with architectural design in various documents. This article strengthens the corresponding relationship between the two and deepens the understanding of architectural scales, in order to dig deeper into the housing needs of college students, and build college student buildings that meet sustainable development.

2. Design Principles of Student Dormitory Building Drawings

The architectural drawings of the student dormitory are planned and designed according to the design principles of the student dormitory^[1]. The design principles of the dormitory are related to technical conditions, building functions, and building image. Among them, whether a residential building can be designed successfully is determined by whether the building function can be realized. For the student dormitory, the building function can be summarized as: sleep function, learning function, storage function of objects, communication function. The dormitory management can be divided into rest space, study space, storage space and communication space.

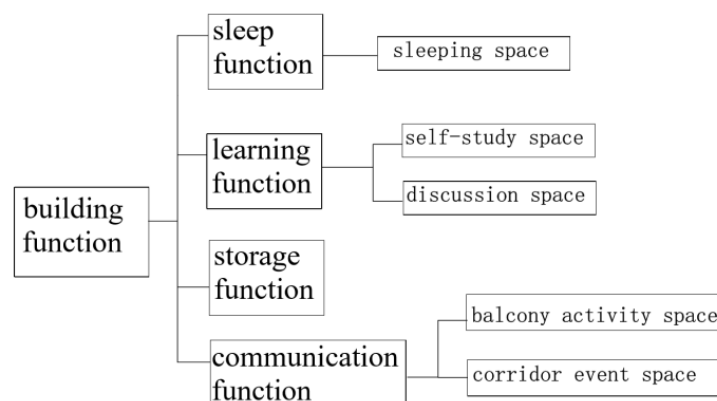


Figure 1. Dormitory function analysis

2.1. Rest space

Sleep is the most important function of the rest space. In the design of the berth, it is necessary to ensure a good sleep for the students. This requires a reasonable design of the bay depth, the floor height and capacities. At the same time, the partition wall can also be used to limit personal living space in order to ensure student's privacy^[2]. Adding mosquito nets, adding closets and other space-dividing methods can also ensure privacy.

2.2. Learning space

Since the most basic need of college students is learning, and dormitory is a place where college students live for the longest period, the dormitory should first fully meet student's learning needs. The dormitory should also have a centralized discussion room to facilitate the separation of students who need to be discussed from the self-study students, which is conducive to the unified management of the dormitory^[3].

2.3. Storage space

The storage function of the items is also very important for the dormitory. Students need to have enough space to store wall cabinets for storage boxes and stand cabinets to hang clothes. With the rise of grades, students' clothing, books, etc. have continued to increase, and the demand for storage functions is also increasing. A lot of research shows that the design of the bunk bed or loft bed with desk make full use of the space at room height, which is a more reasonable and economic living space.

2.4. Communication Space

The communication space should be organically combined with the building space, and tactfully use the building space and expanding nodes for design^[4]. Students' communication space is mainly concentrated in public corridors, dormitory interiors, balconies and other areas. To meet the needs of students' space for communication, the first thing that needs to be satisfied is the privacy of the space. The public corridor is an open space due to its consideration of traffic functions. The design needs to increase the privacy of the dormitory and balcony areas as much as possible. Collective life is an important life experience for cultivating collective spirit, learning to cooperate with others, and training to deal with interpersonal relationships^[5].

Therefore, student dormitory should focus on the design of communication space. The positioning of the architectural image of the student dormitory is not only a practical function of residence, but also has the performance of aesthetic decoration. In summary, we need to take the habitability of students as the basic starting point when designing. The dormitory must be fully functional and easy to use. What's more, we must design the dormitory with a development perspective.

3. The drawing scale of student dormitory

In the case of clear design requirements, theoretically analyze the construction drawing design of college students' dormitory from five aspects: wall foundation, staircase, roof, doors and windows. CAD construction drawings (hereinafter referred to as drawings) are shown in Figure 2.

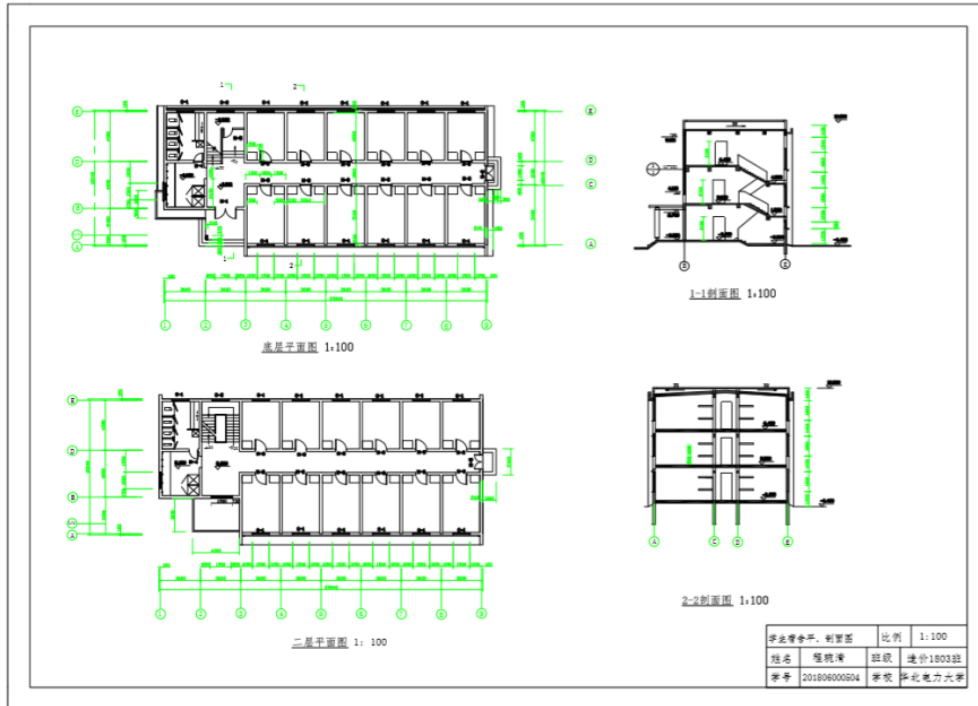


Figure 2. Ground level floor plan

3.1. Foundation wall design

The dormitory structure has a large number of bays, which is suitable for the load-bearing scheme of the horizontal wall. The transverse wall-bearing building has good lateral rigidity and flexible elevation treatment. However, the width of the transverse wall is limited by the span of the beam and slab, and the width of the bays is small, which is more suitable for the room with small area. We can see that the bays shown in the picture, meets the architectural design requirements of the load-bearing horizontal wall.

In the process of masonry construction, a brick wall (24cm walls) or a brick and a half wall (37cm walls) is usually used to build the walls. The advantage of the 37cm wall is that the wall is thicker and the insulation effect is good. They are all load-bearing walls, which bear the load of the upper part of the building and bear the seismic force in the vertical and horizontal directions; the disadvantages are mainly the high cost of occupation and the large space requirement^[6]. The 24cm wall has poor heat insulation and poor seismic resistance, but the 24cm wall saves material cost, labor cost, and transportation cost compared to the 37cm wall.

The 24cm walls are used in the drawings, which can fully save space and cost under the condition of ensuring safety, and is considered feasible. If there is sufficient space and sufficient budget, we can also choose 37 walls, so that the building has better thermal insulation effect.

3.2. Graphic design of corridor

According to the flat type of the dormitory, it can be divided into promenade-style student dormitory, hotel-style student dormitory, and unit-type student dormitory^[7].

The plan design of the drawing adopts the promenade-style, as shown in the figure. The plan design of the drawing adopts a corridor-like plan, as shown in the figure. This plane has the advantages of compact building plane, and economical as well as practical, but it is inevitable that the internal units of the building will be interfered by the corridor, and there are defects such as lack of sunlight in the north-facing rooms and insufficient ventilation and sanitation^[8]. In the drawing, the corridor is about 25m long, with a moderate length, and there are 6 single rooms on each side. Considering the cost, the promenade-style design is reasonable.

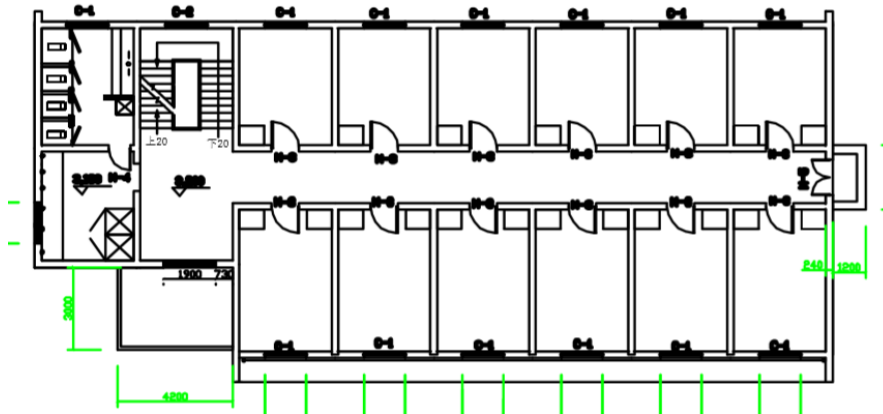


Figure 3. Promenade-style student dormitory

The hotel-style student dormitory is built in the middle corridor or long corridor dormitory^[9]. The centralized bathrooms and toilets are eliminated, and they are set up in each room. This type improves the lighting and ventilation conditions, sets up a separate balcony, and meets the students' needs for sleep, communication, and learning, which has a high cost performance.

Most domestic university dormitories are of unitary structure^[10]. Unit-type student dormitories use staircases and public transportation spaces as channels to connect private spaces together. The unit-type student dormitory has the advantages of large per capita area, more student interaction space, and fully met of sleep needs, but also has the disadvantages of high cost and difficult construction design.

Among the three types of dormitory planes, the corridor-type plane has the lowest cost and can basically meet the various requirements of students. The cost of unit-type student dormitory is high, but the needs of students are fully met. The design should fully consider the environment, cost, time, etc., and select the most suitable graphic design.

3.3. Single living room design

According to the "Code for design of dormitory Building" (hereinafter referred to as the "Code"), the number of people in each room should be less than or equal to 6 people. At present, most dormitory in colleges are 4-person or 6-person dormitory rooms, and the average building area of students should be greater than 8m². The dormitory of college students generally takes the form of loft bed with desk. This article discusses the design points and design considerations on the basis of loft bed with desk.

The rest space that satisfies the sleep function refers to the position of the bed, and its net area is generally 1.89m². In the dormitory unit, four beds occupy the main space, so the placement of the bed greatly affects the use of space in the entire unit. In the dormitory building, the bed is generally placed vertically towards the door, thereby saving space^[11].

Through ergonomics and investigation and research on various campuses, in the dormitory with loft bed with desk, the interior net storey height should be positioned at 3.05m and the floor height at 3.2m. The height of the space under the bed is 1.75m, the sitting posture is 1.35m high, the head is 0.4m away from the bed board, the desktop is 1m away from the bed board, and the indoor roof is 1.3m away from the bed board^[12], as shown in Figure 4.

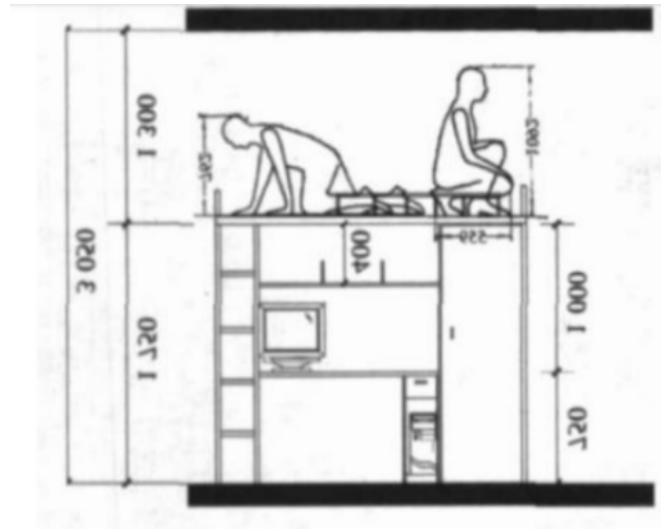


Figure 4. Going to bed and getting off the table (Photo source: Zhu Yilei Yang Changming "Shallow Analysis of the environmental design of the interior space of college student dormitory")

It can be seen from the analysis of the drawings that the dormitory has a height of 3.2m and there are 3 floors in total. From the study of a single room, it can be concluded that the depth of the room is 4.26m, the width is 3.3m, and the net area is about 14m². The size of the dormitory bed is 900mm×2000mm. It can be concluded that the dormitory is designed as a standard 4-person room. A floor of the drawing has north and south sides, there are 6 rooms on one side, a total of 12 living single rooms, one floor can accommodate 48 people, and the building can accommodate a total of 144 people.

3.4. Stair design

The staircase design of the dormitory needs to select an open staircase or an enclosed staircase connected to the open porch according to the actual situation. At the same time, we can choose straight stair with landing, three-flight stairs or spiral stairs according to the planning size^[13].

According to the "Code", the stair step width of the dormitory should not be less than 0.27m, and the step height should not be greater than 0.165m. Handrail height should not be less than 0.90m. When the length of the staircase horizontal railing is greater than 0.50m, the height of its handrail shall not be less than 1.05m. The total width of the staircase door, staircase and walkway should be calculated according to the number of people passing through each floor is not less than 1m per 100 people, and the net width of the ladder section should not be less than 1.20m, and the width of the stair platform should not be less than the net width of the staircase section^[14].

In the drawings, straight stairs with landing are used, and a storage room is about 0.39 meters high on the first floor. The total height of the stairs is 1.6m, the step height is 0.16m, the step width is 1.8m, and the height of the handrail is greater than 1.05m, all of which meet the design requirements.

3.5. Door and window design

Doors and windows, as enclosure members, have requirements for separation, lighting, heat preservation, sound insulation, waterproof and fire prevention. The door is mainly used for traffic in and out, separating the building space, and also has the function of ventilation and wind collection, while the window is mainly used for lighting and ventilation. Doors and windows are objects that people often need to use. They need to be durable, artistic, easy to open and close as well as clean and maintain in time. In the dormitory door and window design, the door is usually a swing door, the window is usually a swing window, and the material is steel, aluminum alloy, plastic, glass, etc.^[15].

When designing windows, it is necessary to pay attention to that the outer windows on the ground floor of the dormitory are generally equipped with safety guardrails. Taking into account the

escape of indoor personnel in an emergency, the guardrails should be provided with an escape opening. Advanced protective measures such as window magnet and door magnet can also be set^[16]. Structurally, the width of the sash is about 600-1500mm, and the height is 800-1500mm. In the student dormitory area, it is necessary to pay attention to the inappropriate location of the windows and not too low to avoid potential safety hazards.

When setting the door, the height is generally between 1900 and 2100mm. It should be noted that the net width of the door of the living room and auxiliary room should not be less than 0.90m, and The net width of balcony door and bathroom door in the room should not be less than 0.80M. The height of the door should not be less than 2.10m. When the number of occupants in the room exceeds 4, the door of the room should have a transom, and the height of the doors which have the transom should not be less than 2.40m^[17].

In the drawings, the height of the window and the height of the door are in accordance with the general numerical requirements. The height of the door is 2700mm, greater than 2.1m, and the clear width of the bathroom door is 800mm, which meets the requirements. It should be noted that in the elevation view, there is a large curtain wall that is about 2 meters long and 4.5 meters wide. When constructing the curtain wall, it is necessary to carefully design according to the "Code for Fire Protection of Architectural Design" and pay attention to fire prevention^[18]. At the same time, a large amount of metal materials used in building curtain walls are good conductors of electricity. If the lightning protection measures are improper, they will be damaged by lightning, so certain lightning protection measures are required^[19].

4. Summary

The building functions of the dormitory can be summarized as: sleep function, learning function, storage function, communication function. The design scale of the building should be realized on the basis of satisfying various functions. This article focuses on the design scale of the building and how the design scheme meets the requirements of people for the building function. In the specific analysis, the specific design of the wall scale and plane is mainly to comprehensively consider the student's living requirements, building budget, environmental characteristics and other aspects and to derive the most cost-effective design method. The design of the single living room is mainly from the perspective of students, and in the case of a certain space, it is hoped to meet the students' rest needs, learning needs and communication needs as much as possible. The design of stairwells, doors, windows and washrooms is to meet the basic needs of students. The above design scheme should meet the domestic architectural design codes while meeting the demand. At the same time, this article analyzes the CAD drawings of the dormitory drawings as examples, and believes that the drawings meet the design requirements while meeting the needs of students in many aspects.

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