

## Internship Report

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I had my internship in HKS Dallas from 14<sup>th</sup> April to 25<sup>th</sup> June. HKS as a well-known American design firm, has great achievement in the field of healthcare design. HKS is one of the three leaders in healthcare design these years. When I worked in ISA of Xian Dai Design Group, my main projects are healthcare, so these more than two months internship gave me a good chance to learn the working mode and design conceptions of this good American firm, also gave me a good chance to learn the



**Pic.1 The lecture which I gave to HKS architects**

differences in healthcare design between USA and China. During my Internship, I gave the HKS architects a lecture of “ISA and Our Healthcare Projects” which concerned with the healthcare design conceptions and works of our company. They are very interested in them and asked me many questions about the condition of healthcare design in China and I discussed with them.

During my internship, I joined in two projects which were the Round Rock Hospital in Texas and the George Town University Hospital. Round Rock Hospital was in the preliminary design stage. My work was the design of the master plans and floor plans. We had a meeting every two weeks with the clients discussing about the plans. The procedure of the meetings were similar with those in China. Before a meeting we always had several different schemes which had different advantages and shortages so that we can decide which to choose together with the clients. George Town University was also in preliminary design stage. I worked on the emergency department on the first floor to arrange the rooms in it.

Except which mentioned above, I always joined in the lectures in HKS and studied the design conceptions and works through the internal shared resources. Through these studies, my gains mainly contained which listed below:

## 1, Work mode

Through these two projects and other studies, I had a summary of the work mode in HKS. 1) Standardized design procedure; 2) Projects make standards better; 3) Digitized work mode. What is standardized design procedure? In each project, HKS has checklists for all the design stages. The checklists range from projects starting up, site analysis, green design, schematic design, design development, construction document to project manager work. The checklist of the construction document contains 23 pages. It is very detailed so that can ensure the design quality of different design groups. Projects making standards better means that when a project is completed, checklists will also be



**Pic.2 Working in HKS Dallas office**

updated so that they can become better. Digitized work mode is that through VPN tools, a HKS architect can use the resources like in the office when he is at anywhere with the internet. Every architect has a video conferencing system. He can take part in a video conferencing meeting with anyone at any offices of HKS throughout the world on his own computer. And any architects in HKS can watch a lecture in progress at any HKS offices all over the world. For example, when my lecture was in progress, many architects in Washington and Atlanta office joined in. Digitized work mode plays an important role in sharing resources. Our Chinese design companies may can study from these three points mentioned above.

## 2, Differences in healthcare design between China and USA

During my internship, one thing which I paid great attention to is that the differences in healthcare design between China and USA. This makes great sense. Some of these differences are due to the different country condition and medical policy and others are due to different design methods. Through comparison, we can find some points which we can use for reference. Which listed below are some differences.

### 1) Hospital in America

A hospital in China contains outpatient, emergency, D&T, inpatient and other departments but in America, a hospital only contains inpatient and D&T departments. In America, there are two kinds of outpatient departments, one is MOB (Medical Office Building) and Ambulatory. Both of them can be a free-standing building which contains simple D&T rooms such as lab, x-rays and ultrasonic. They also can be in the same site with a hospital so that they can share the D&T of the hospital. In this case, this situation is similar with the hospitals of China. The entrances of these buildings can be: main entrance, MOB entrance, ED walk-in entrance, ambulance entrance and service entrance. Among them, the main entrance is the entrance of the hospital. Thus, in America, when designing healthcare buildings, an architect always put the entrance of the hospital close to the most convenient road. That is different from our country, we always regard the entrance of the outpatient department as the main entrance.

Moreover, the national code of America has demands for the areas and investments of hospital like the '*Construction Standards for General Hospitals*'. American hospitals have an average building area of 2500—2700 sf for per bed, which converted into 232—251sm for per bed. This number do not contain the MOB or Ambulatory. Otherwise, the demand for Chinese hospital building area is 90sm per bed, the number will be 76.5sm per bed without the outpatient department. It is almost about one-third of that of America. From the point of investment, the number of the American hospital is about 350 dollars per sf, which converted into 23350RMB per sq. These numbers of the east coast and the west coast are a little higher than that one of the central. In east China where the economic is best in China, this number is about 7000-8000RMB per sq.

### 2) Outpatient department

As mentioned above, there are two kinds of outpatient departments in America. They are MOB (Medical Office Building) and Ambulatory. Any one of them can be together with a hospital in one site. It also can be a free standing one.

The module of a MOB or Ambulatory is similar with that of China. As below, I will talk about some differences. Firstly, Twice Waiting mode which is widely used in Chinese hospital is not used in America. In America, when a patient was registered at the nurse station he can wait in the waiting area outside the exam room area. After he was called by the nurse, he can go into the exam room. After his several minutes waiting, his doctor will go into the exam room to see him. Before he come out of this room, there will be no other patients here. After the doctor has completed check his health and the patient

has left, the doctor will go to another exam room where a new patient is waiting for him. So one doctor has the duty for 3 or 4 exam rooms. This can help to keep the patient in private space. But it is different in China, one doctor stay in one room waiting for the patients. Moreover, In America, there are consulting rooms in exam area. These room are very comfortable like living rooms at home. After the doctor has seen the patient. He can take the patient to this room to talk about his health condition. That will give the patient good mood.

### 3) Care unit

One care unit in American hospital usually contains 24 to 36 beds, nearly half of the number of China. All the patient rooms are one bed room. The ratio of the nurse to patient is higher than China. In surgery and medical care unit the ratio is 1:4 to 1:6. They use central nurse station and sub nurse station mode. The central nurse station is usually at the center of the care unit and the sub nurse stations are at the corridor between two bedrooms. The nurse can work on the sub nurse station for observation and recording. The sub nurse stations are also supply spots for the patient rooms.



**Pic.3 The master plan I designed for Round Rock Hospital**

In the patient rooms, usually contain four kinds of spaces, they are patient space, family space, work space and toilet space. The patient space is in the center, family space close to the window, work space close the care unit corridor. There are at least two seats and a folding sofa in the family space and a hand washing spot in the work space.

Although American codes demand that all the patient rooms should have window to the outside, the patient rooms do not need to face south. But in China, 50% of the patient rooms should face south. The reason cause this difference is that American codes emphasize the view of the nature in the rooms and the Chinese codes pay more attention to the light into the room.

#### 4) Emergency Department

Emergency Department is a part of the D&T in America. There are two kinds of them, 'Initial Emergency Care' and 'Definitive emergency'. The latter one is similar as the emergency department in China. The difference is that one American emergency department need two separated entrances and hall of for the ambulance and the walk-in.

#### 5) Surgery

The room and circulation pattern of the American hospitals have two types, 'Perimeter-corridor' and 'Interior work-core'. In these two types, the same point is that doctors, patients and the soiled pass through the same corridor. The difference is that in the 'Perimeter-corridor mode', the clean supply circulation is also through the same corridor but in the 'Interior work-core', the clean supply circulation is in the work core and separated from that corridor. In this work core, there is an elevator connecting the work core and the central sterile so that the clean supply can directly goes from the central sterile to the work core.

But in China, the circulation is very different. The soiled must be separated from the patient, doctors and the clean supply. So there must be another soiled corridor connecting all the surgery rooms to the soiled elevators.

### **3, combining with the HKS Green Building Checklist, going on doing the research of the sustainability of healthcare design**

HKS has regarded green hospital design as a strategy. Green hospital design is also a direction of the American hospital construction. Combining with the HKS green hospital checklist and the study in sustainability in University of Oregon, I go on my research on the healthcare sustainability design. My research contains 10 aspects.

### 1) The site

Firstly, the sustainability of the site require to protect the original landscape, the plant in the site and keep the Bio-diversity. That is also required by LEED. Secondly, the access of different traffic is needed and it is better to make the vehicle and the walk way separated, both of them should be easy to access the entrances of the building.

### 2) Passive energy saving

There are two kinds of passive energy saving methods, nature light and nature air. The outpatient department operates in the day. If enough nature light can be led into the building, much energy can be saved. For example, we can design glass sky windows on the top of the main hospital street, the street will be brighter. It will be very comfortable if some local illumination is added.

Passive energy saving can be realized through stretching the building shape. When designing the master plan, we should avoid the compact shape. We can set some inner courtyards to ensure that more rooms can have direct nature light and air in order to save energy.

### 3) Regionalism and adaption to climate

The style and shape of a building should be suitable to the regional and climatic features. The facades should express the characteristic of the site, the history of the environment and the texture of the city. One building suitable to this site will not be suitable to another. The facades and the details should be related to the climate. For example, in hot climate zone, the shape of the buildings are loose and we can design some terraces and cornices. But in cold climate zone, the shapes usually are compact.

### 4) Modular and expansion

There are many typical rooms in hospitals, such as exam rooms and patient rooms. All the healthcare buildings need to be renewed by time passing. A modulus building will be very effective to future renovation and expansion. More modulus, more easily to change the function and add new function to the building. That is the base for the development of a healthcare building.

### 5) Facade details

The sunshade panels do great well to the energy saving of a building. We can design horizontal and vertical panels. We also can use inner and external panels. At the Northern Hemisphere, the sunshade panels on the south facades are very important and useful.

## 6) Close to the nature

Closing to the nature can relieve the tension of the patients. It is very important to design more rooms in which people can enjoy nature view of the outside. We have two methods, horizontal and vertical infiltration. We can use the former by stretching the building shape and designing some inner courtyards. We can use the latter by setting green plant on the facades and roof gardens.

## 7) Humanization

Humanization can be reflected in many aspects. We should take the safety of into account. Safety contains supply delivery, access to the toilets, access of the staff, easy observation. Humanization of the patients contains privacy, nature lighting, nature view, storage spaces and personalized decoration. Family space should be close to the patient. They should have at seats, TV and folding sofa for night stay.

Function mixing can relieve patients. By taking the function of other public buildings into healthcare buildings can make a more comfortable environment. These function can be activity room, library, store, game room, dining room or cafe.

Active attraction is one of the humanization design. By using some decorations, landscape or furniture to absorb the attention of the patients so that can make them feeling easy.

## 8) Materials

Recycle and reuse of the building materials is very important for sustainability. Recycled materials contains aluminum panels, stone, steel, glass, wood and etc. Reuse materials contains doors, windows, plumbing fixtures, carpets and air-conditioning plants etc. Non-recyclable materials contains asbestos and etc. when designing a healthcare building, we should raise the amount of the recycled materials and reuse materials and reduces the non-recycled materials.

## 9) Color

Color is very important is healthcare buildings. They can influence the patients' mood. We can use large area of fresh colors and cool colors, but we can use the as embellishment. It is different in children hospitals, we can use much fresh color there.

## 10) Energy strategies

Energy strategies are active energy saving methods such as water saving and solar system.

Three months passed quickly. I gained much through the work and study during this time. If I can combine that and the design of hospitals in our country together, it will be very helpful and useful. I hope that which I learned during the internship can improve my healthcare design.

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