

Power supply system of high-rise building design Abstract: With the continuous development of city size, more and more high-rise buildings, therefore, high-rise building electrical design to the designers had to face. In this paper, an engineering example, describes the electrical design of high-rise buildings and some of the more typical issues of universal significance, combined with the actual practice of an engineering solution to the problem described. Key words: high-rise building; electrical design; distribution; load calculation

1 Project Overview The commercial complex project, with a total construction area of 405570m², on the ground floor area of 272330m², underground construction area of 133240m², the main height of 99m. Project components are: two office buildings, construction area is 70800m², 28 layers, the standard story is 3.2m.

2 Load Calculation

1) Load characteristics: electric load, much larger than the "national civil engineering technical measures" Large 120W/m² indicators, especially in the electricity load more food, and different types of food and beverage catering different cultural backgrounds also high.

2) the uncertainty of a large load, because the commercial real estate rents are often based on market demand, and constantly adjust the nature of the shops, making the load in the dynamic changes.

3) There is no specification and technical measures in the different types of commercial projects refer to the detailed parameters of the shops, engineering design load calculation in the lack of data, in most cases to rely on staff with previous experience in engineering design calculations. Load the selection of parameters: for the above problems, the load calculation, the first developer of sales and good communication, to determine the form of layers of the forms and nature of floor area, which is calculated on the basis of electrical load basis; followed to determine parameter index within the unit area of shops is also very important and complex because there is no clear indicator of the specification can refer to; and different levels of economic development between cities is not balanced, power indices are also different; will be in the same city, different regions have different consumer groups .

3) the need to factor in the choice: parameters determined, the need for load calculation. Need to factor commonly used method, the calculation will not repeat them. Need to explore is the need for coefficient selection, which in the current specifications, manuals and the "unified technical measures" is also not clear requirements, based on years of design experience that most end shops in the distribution or level within the household distribution box with case Kx generally take a while, in the calculation of the loop route to take 0.7 to 0.8, the distribution transformers in the substation calculations take 0.4 to 0.6.

3 substations set Load calculation based on the results of this project the total installed capacity of transformer 43400Kv.A, after repeated consultations with the power company, respectively, in the project in northern, central and southern three sections set the three buildings into three power substations, 1 # set 6 sets 2500Kv.A transformer substation, take the northern section of power supply; 2 # 4 1600Kv.A transformer substations located, plus 6 sets 2000Kv.A transformers, take the middle of the power supply, in addition to 5 Taiwan 10Kv.A high-pressure water chillers (total 4000Kv.A); 3 # substation located 2 units plus 2 units 1000Kv.A 2000Kv.A transformers, take the southern section of A, B two office supply. 10Kv power configuration of this project into two points, each at the two 10Kv lines, the power company under the provisions of 10Kv power capacity: maximum load per channel is about to 11000Kv.A, two is the 22000Kv.A, design # 1 , 3 # combination of a substation 10Kv, power line, with a total

capacity of 21000Kv.A; 2 # substation transformers and 10Kv, 10Kv chillers sharing a power line, with a total capacity of 22400Kv.A. The design of the substation layout, in addition to meeting regulatory requirements, it also need to consider the high-pressure cabinets, transformers and low voltage power supply cabinet by order of arrangement, especially in low voltage distribution cabinet to feed the cable smooth and easy inspection duty problems are not seriously consider the construction of the cable crossing will cause more long detour, a waste of floor space, and convenient inspections and other issues. 4 small fire load power supply In the design of large commercial projects often encounter small fire load of electrical equipment and more dispersed distribution, if fed by a substation, a substation will be fed a lot of low-voltage low-current counter circuit breaking capacity circuit breaker and conductor of the dynamic and thermal stability in a certain extent. According to GB50045-1995 "fire protection design of tall buildings," rule "should be used in Fire Equipment dedicated power supply circuit, the power distribution equipment shall be provided with clear signs." Interpretation of the provisions of the power supply circuit means "from the low-voltage main distribution room (including the distribution of electrical room) to last a distribution box, and the general distribution lines should be strictly separated." In this design, the use of methods to increase the level of distribution, that is different from the substation bus segments, respectively, a fire fed a special circuit, set in place two distribution cabinets, distribution cabinets and then the resulting radial allocated to the end of the dual power to vote each box, so that not only meets the specification requirements for dedicated power supply circuit, but also to avoid feeding the substation level of many small current loop. 5, the choice of circuit breaker and conductor Commercial real estate projects use the room as the uncertainty in the choice of circuit breakers and conductors must be considered in a certain margin to meet the needs caused by adjustment of the load changes. According to this characteristic, increased use in the design of the plug bus-powered, not only meet the requirements of large carrying capacity, and also allows the flexibility to increase supply and distribution, are reserved in each shaft in the plug-box backup in order to change, according to changes in upper and lower load, to adjust. For example: a bus is responsible for a shaft 1 to 3 layers of power, when a layer due to the change in capacity increases, while the 3-layer capacity is reduced, you can use a spare plug box layer off the 3-layer 1 layer capacity rationing . This level distribution in the substation, select the circuit breaker to choose the setting

value when the circuit breaker to adjust to changes at the end to adjust the load setting value; in the bus and the transformer circuit breaker according to the choice of the general framework of values to select . For example: Route certain equipment capacity 530Kv, Kx take 0.7 to calculate current of 704A, select the frame circuit breaker is 1000A, tuning is 800A; current transformer for the 1000/50; bus carrying capacity for the 1000A, this road can meet the maximum 1000A current load requirements, even if there is adjustment, power distribution switches and circuit can not make big changes. 6 layer distribution box set According to the division of layers of fire protection district, respectively numbered as A ~ K layers within the set level shaft for the retail lighting power distribution box, with one on one power supply shops in radial power. Should be noted that the forms of the complex layers of layers of fire partition, does not correspond to the lower, making some of shaft power in charge of the fire district at the same time, also responsible for the power supply adjacent to the fire district. At design time, using the principle of proximity, while also taking into account the burden of the whole trunk load conditions, so that each shaft as far as possible a more balanced load. 7 public area distribution box set Taking into account the future needs of the business re-decoration of public areas must be reserved for power. Here the design needs to consider the following points: ① question of how much reserve power, lighting and electricity, which according to GB50034-2004 "Architectural Lighting Design Standards" table of Article 6.1.3 and 6.1.8, commercial building lighting power density value, high-end supermarkets, business offices as 20W/m², under the "decorative lighting included 50% of the total lighting power density calculation" requirements, using the reserved standard 40W/m². ② In order to facilitate the decoration in each partition set fire lighting in public areas and emergency lighting distribution box distribution box, in order to identify the electrical power distribution decoration cut-off point. ③ the staircase, storage rooms and other parts of the decoration does not need to do, set the power distribution circuit or a separate distribution box, try not to be reserved from the public area of electricity distribution board fed hardcover out. ④ control of lighting in public areas, the majority in two ways, namely, C-BUS control system or the BA system, the use of C-BUS has the advantage of more flexible control, each road can be fed out of control, adjustable light control; shortcomings is a higher cost. BA system control advantages of using low cost, simple control; disadvantage is that the exchanges and contacts for the three-phase, three-way control may be related both to open, or both, in the decoration of the contacts required to feed the power supply circuit diverge to avoid failure blackouts. Design of distribution box 8 In the commercial real estate design, shop design is often only a meter box, and outlet route back to the needs of the user according to their second design, but the shops are difficult to resolve within the power supply fan coil units, air-conditioning system as a whole can not debug. The project approach is to add a circuit breaker in the meter box for the coil power supply, another way for users to use the second design, as shown below.

User distribution box design 9 distribution cabinet / box number and distribution circuits Large-scale projects are often low voltage distribution cabinet / box number, low-voltage circuits to feed the more often there will be cabinet / box number and line number duplication, resulting in the design and the future looks difficult maintenance and overhaul. The project has three 10Kv substations, 20 transformer, hundreds of low-voltage fed out of

the closet, fed the circuit more. Accordance with the International Electrotechnical Commission (IEC) and the Chinese national standard requirements: ① All the distribution number to be simple and clear, not too box and line numbers are not repeated. ② number to simple and clear, not too long. ③ distinction between nature and type of load. ④ law was easy to find, make viewer at a glance. Based on the above requirements and on the ground, fire district and the underground construction industry form the different conditions, using two slightly different ways. Essential for the underground garage, uses a single comparison, also relatively fire district neat, according to fire district number, such as AL-BL-1 / 1, AP and APE, the meaning of the letters and numbers: AL on behalf of lighting distribution (AP on behalf of Power distribution box, APE on behalf of the emergency power distribution box); BI on behalf of the basement; 1 / 1 for partition 1, I fire box. Above ground is more complex, more fire district, and on the fire district does not correspond to the lower, according to shaft number is better, such as AL-1-A1, AP, and APE, letters and numbers mean: 1 represents a layer; A1 on behalf of A, No. 1 shaft fed a distribution box. Fed a low-voltage circuits, such as the number of uses: W3-6-AL-1-A1, W3-6) indicates that the route back to power supply transformer 3, 6, feed the power distribution cabinet, AL-1-A1, said the then the first loop of the distribution box for the AL-1-A1 and so on, and so on. 10 Conclusion With more and more complex commercial design projects, designers need to continually improve the design level, designed to make fine. These are only bits of the design in the business lessons learned, and the majority of designers want to communicate