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Common Problems and Design Methods of Urban Municipal Road Design

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Abstract: With the rapid development of China's economy, the construction scale of urban transport is also expanding. Among them, municipal road construction is an important part of urban infrastructure as well as an important guarantee for the development of people's livelihood; it is also an important driving force to promote urban transport system and social life development. The author expounds the importance and basic requirements of urban road designing, and discusses some common problems and countermeasures, hoping to be helpful.

Keywords: Urban road design; Importance; The basic requirements; Problems and countermeasures

Introduction

Development of market economy has led to the rapid development of urban municipal road construction. Road design plays a decisive role in municipal road construction. The designer, during the design of municipal roads, has to adapt to the needs of the market economy and adhere to people-oriented design principles. Designers should take a variety of environmental factors into account to ensure the smooth progress of urban municipal construction, and to ensure the quality of municipal road construction.

1. The basic requirements of municipal road design

1.1 Environmental protection

With the improvement of urban living standards in China, more and more vehicles driving on the roads has caused urban traffic congestion and caused environmental pollution. This has increased the difficulty for urban environment construction. Therefore, the municipal road designeres have to take the environmental pollution that will be caused into account to ensure the smooth construction of the road and minimum environmental pollution at the same time.

1.2 Economical

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For road construction design, the cost of budget issues should also be taken into account. Under the premise of ensuring the quality of construction, we should reduce the budget and costs as much as possible to improve social and economic benefits. Designers should lower the cost in the original municipal road on the integrated design, and fully consider the flow and stability of traffic, as well as the distribution characteristics of urban infrastructure construction to ensure high road quality and smooth traffic.

1.3 Safe, fast and smooth

"Safety first" is the basic criterion for every national economy body. Thus, it is implemented onto the construction of urban roads as well. Designers should put security in consideration first and foremost and design a road that conforms to scientific construction. Only in the premise of security the smooth road to the city can be guaranteed. When designing the road, the safety of important parts of the road has to be taken into account, such as security factors of crossroads in traffic. Safe roads will smoothen the traffic flow, and the smooth flow of vehicles will be directly reflected in traffic in speed.

2. Problems in the process of designing municipal roads

2.1 Problems in the design aspects

In the designing of urban municipal roads, designers fail to conduct a reasonable design to the road network, only focus on the width of the road after the construction. Not enough attention is directed upon the different levels of road organization, width and density. So in the construction of urban municipal roads, there will be a lot of image engineering and performance projects while the actual municipal road constructions and design concepts are seriously derailed. The image constructions of the project looks like it contains no problem as pedestrians or vehicles can use the road above. In real life, such roads, after a long period of overloading, will affect the safety of road capacity while also discounting the intersection of the traffic function.

2.2 Traffic problems

The rapid development of transportation is an important aspect of urban road design. Road traffic design includes the composition of the vehicle, the road surrounding the road network, the vehicle speed, etc. In order to carry out the urban municipal road design, the issue of traffic must first be considered to correctly, thus the effectiveness of transport and the size of the road can be analyzed. Designers are often lack of overall road information analyzes, holding subjective judgement about traffic conditions on the road, as the design concept is not rigorous.

2.3 Graphic design of urban roads

Urban city road design occupies an important position in the road design of the entire process. But the designers often overlook how to connect with the surrounding road block and how to reduce the demolition project. If the designer is not concentrating or not standardized problems about flat curves, angles, and turning points will rise.

2.4 Drainage design of urban roads

To a certain extent, the construction of municipal roads hinders the infiltration of rainwater. Designers must consider how to improve the drainage system of municipal roads as an important problem. In order to design road drainage

correctly, before the city municipal road drainage design, designers should calculate the catchment area in advance according to the present situation and the topographic map to determine the pipe diameter. Designers often analysis road drainage one-sided, leading to a lack of design basis for the design of road drainage. Designers lack understanding about drainage conditions along the road scene, only according to the plan or subjective judgment, resulting in road operation appear serious water phenomena.

3. Design focus of municipal roads

3.1 Increase the overall city allocation plan

City road construction needs to stand on the overall height of the analysis and its main reference standard is the ability of the road transport passenger flow. But in the whole city road construction, road traffic, passengers and cargos are the certain basis. Designers strive to achieve with the surrounding environment not conflicted. More important, improve the unreasonable situation according to the previous section.

3.2 Traffic analysis

Traffic analysis is a prerequisite for urban road design. which covers vehicle components, vehicle speed, traffic flow and the surrounding road network et. a plurality of elements. So when we are in the early stage of road design, to evaluate the regional traffic status, it is necessary to carry out traffic analysis evaluates system analysis and comprehensive research of such problems. Normally, the urban road grade and design scale must refer to the traffic analysis results, so as not to deviate from the regional traffic conditions. However, many urban road design institutes do not carry out a comprehensive analysis of traffic conditions, which cannot provide adequate reference, proning to unreasonable design problems.

3.3 Linear design

First of all, it should be combined with the overall layout of the city, in strict accordance with the design standards and the relevant design specifications, fully take into account the impact of the city's important buildings on the route design. Before the design, access to detailed data information, carry out the field investigation. If some buildings on the road construction have brought a decisive impact, not blindly remove, we should consider the construction cost and the value of existence. After comprehensive consideration, as far as possible adjust the road alignment and avoid the impact.

Second, we should take into account the beauty of linear. As an important part of urban construction, the linear design of the municipal road has a very important impact on the overall aesthetic of the city. Therefore, in order to realize the unity of the beauty and practicality, we should make a comprehensive analysis of the topography and drainage of the road.

In the end, it can ensure the coordination of the plane, longitudinal and cross section of the road, so as to improve the comfort and safety of the road.

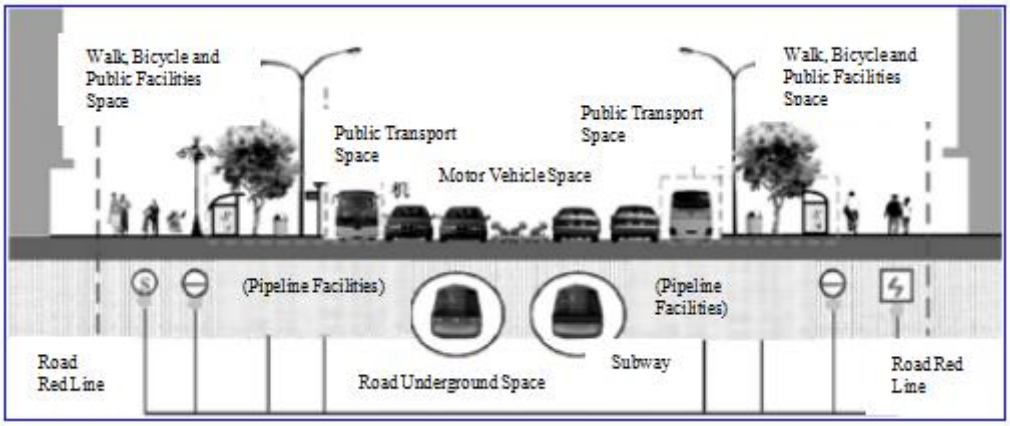
3.4 Longitudinal section design

The key step in the overall design of the road and the difficult part is the design of the longitudinal section. Paying attention to both sides of the building and underground pipelines, ground drainage, road elevation and other cooperation,

must be repeated one by one to ensure safe design. The line of sight and the power performance of the car are determined by the longitudinal line of the road. For long and large vertical slope, the uphill slows down the speed, increasing the overtaking demand, thus an important impact on vehicles that bear better power performances. These vehicles will certainly ignore the traffic situation and overtake by force, which can only increase the number of driving brake, so that security is reduced. Continuous downhill road will make the braking behaviour frequently, affecting the vehicle braking performance, causing a large traffic accident easily. Therefore, it is necessary to adopt the appropriate average longitudinal slope on the continuous uphill or downhill road, strict control, and reasonable set up in the continuous uphill road overtaking lane. Vehicles parked on the long and steep slope of the lack of sight distance lead to a lot of traffic accidents. In the design process, the slope gradient cannot take the limit value. In the special circumstances, reduce the design speed in advance definitely, set up more reasonable warning signs, widen the shoulder and set emergency stop, increase the friction coefficient of pavement properly, can alleviate the brake pressure, set up the emergency Lane in the longitudinal slope below. To avoid lost control of the car have a greater risk, pay attention to the following points:① If the cross in the same level of road, only need to change the transverse slope, needn't change longitudinal slope. In order to ensure the horizontal and vertical gradient of the cross section, only need to change the cross-section of the smaller longitudinal slope. ②When the main roads and secondary roads intersect, ensure the horizontal and vertical section of main road to avoid the main road congestion. ③In order to improve the drainage unobstructed, the design must set aside a road longitudinal slope and the opposite direction. ④In the drainage process, to find the entire road water catchment points through the longitudinal section design, guarantee the street and underground drainage tube pipe connected.

3.5 Sub grade pavement design

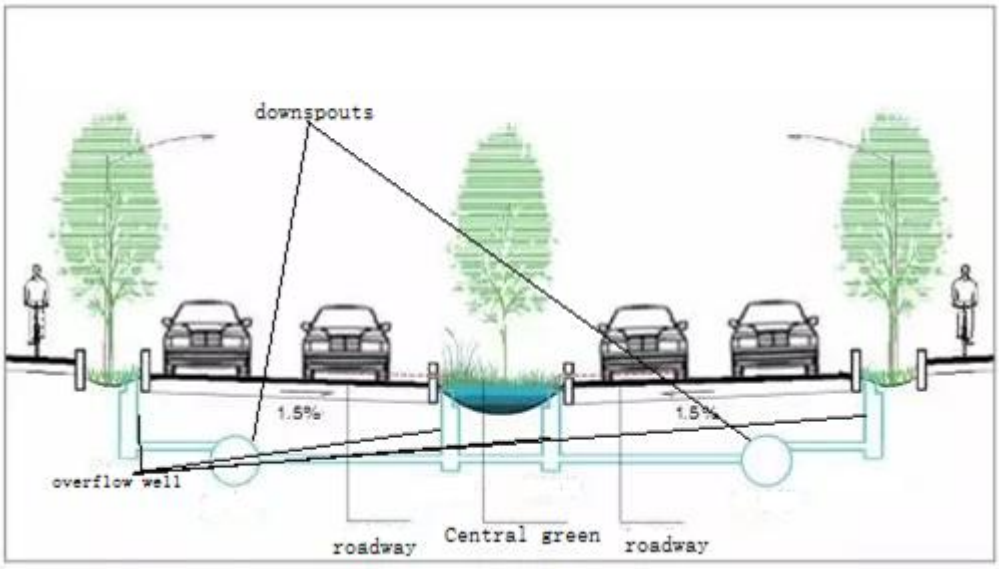
In order to adapt to the requirements of urban development, we must improve the quality of municipal road construction. The quality of road construction depends on the design of sub grade and pavement, transiting from the road load to the service life. In order to improve the service life of urban road, it is necessary to study the new concept of road structure design. China's road service life is 50-150 years. These figures are lack of reliable practice. To take into account the design and construction factors, the road quality control, pay attention to the division, ensure the quality requirements. The road map of the city is shown in the following figure:



Because of the influence of the load and the urban environment, the road will change the internal stress, which will lead to the decline of anti fatigue performance, thus will lead to the destruction of the road structure. If the inhomogeneity of the road material is applied, the cracks will appear under the cyclic load. Therefore, durability design and fatigue performance design should be taken as the core content.

3.6 Drainage designing of the road

Municipal roads and drainage design is generally divided into two categories: The first is to reduce the impact of groundwater to the strength and stability of the roads; the second is the rapid discharge of water in the case of water overflow, thus reducing the impact of water upon the quality of roads, thereby enhancing the road life. For the first type of drainage design, the bottom of the roadbed can be increased in the bottom of the barrier to reduce the amount of groundwater penetration, or to improve the minimum filling height of the roadbed. When the construction site of the groundwater level is relatively high, a temporary drain can be set up, so that more water can be discharged through the drainage ditch to avoid the rising of groundwater level. If the ground is soft soil road construction nature, lay about 50cm of sand cushion to accelerate the drainage rate. For the second type of drainage design, a complete drainage system can be formed by drainage structures such as trench, jet trough and road cross slope. The system can collect road water and quickly discharge from the foundation. For the high section, you can set the central drain and the horizontal drain in the central compartment.



3.7 Road lighting design

3.7.1 Project Overview

The engineering design grade is the grade of urban trunk road. According to the city road lighting design standards, road illumination value should be maintained at two levels, 30lx and 20lx, road junction road illumination value should be maintained at two levels, 50lx and 30lx. The LED products used are required to meet relevant parameters in "road lighting LED lamp performance requirements" (GB / T24907-2010), as shown in Table 1 below. Considering the

current level of technology of manufacturers and energy requirements, the design requirements of lighting products is not less than the initial light efficiency 80lm / W.

Table 1 road lighting LED lamp performance requirements

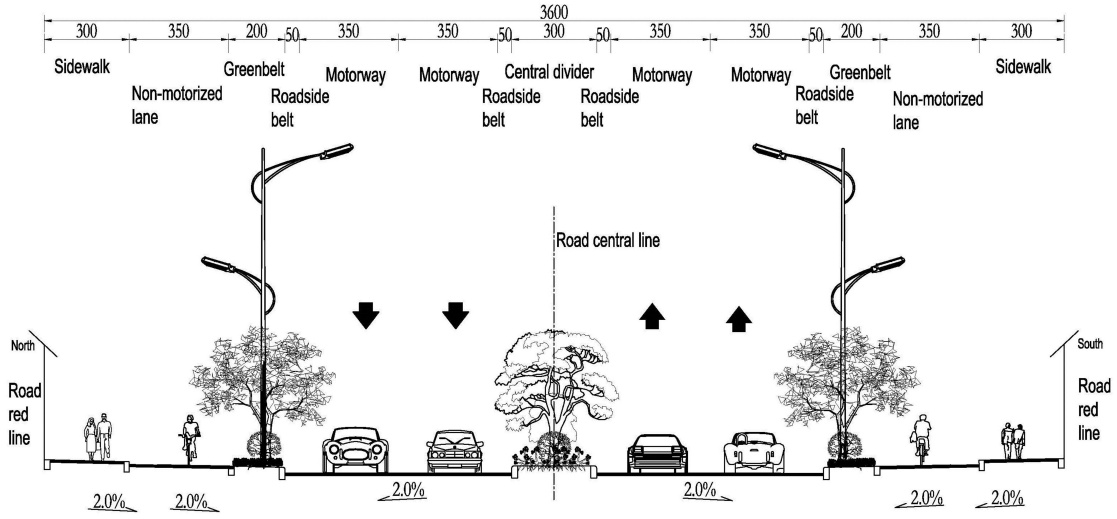
grade	Colour: RR / RZ	Colour: RL / RB / RN / RD
1	75	70
2	60	55
3	50	45

3.7.2 Calculation Parameters

Calculation parameters: small lamp luminous flux, 1m; utilization coefficient U, based on utilization factor curve isolated lamps; maintenance factor K, in accordance with norms take 0.7; lamps number N, calculated unilateral take 1, take 2 to calculate both sides; cloth lamp spacing S, m; calculated road width W, m

3.7.3 The standard segment design

The standard cross section form is: Sidewalks 3m + non-motorized vehicles 3.5m + side strip 2m + the roadway 8m +central divider 3m + the roadway 8m + side strip 2m + non-motorized vehicles 3.5m + Sidewalks 3m, as shown in Figure 2



Poles are arranged on the side-strip, bilaterally symmetrical arrangement, height 9m, interspacing 30m, double pick arm; driveway sided with LED light source 180W, non-motorized vehicles with side LED light source 100W.

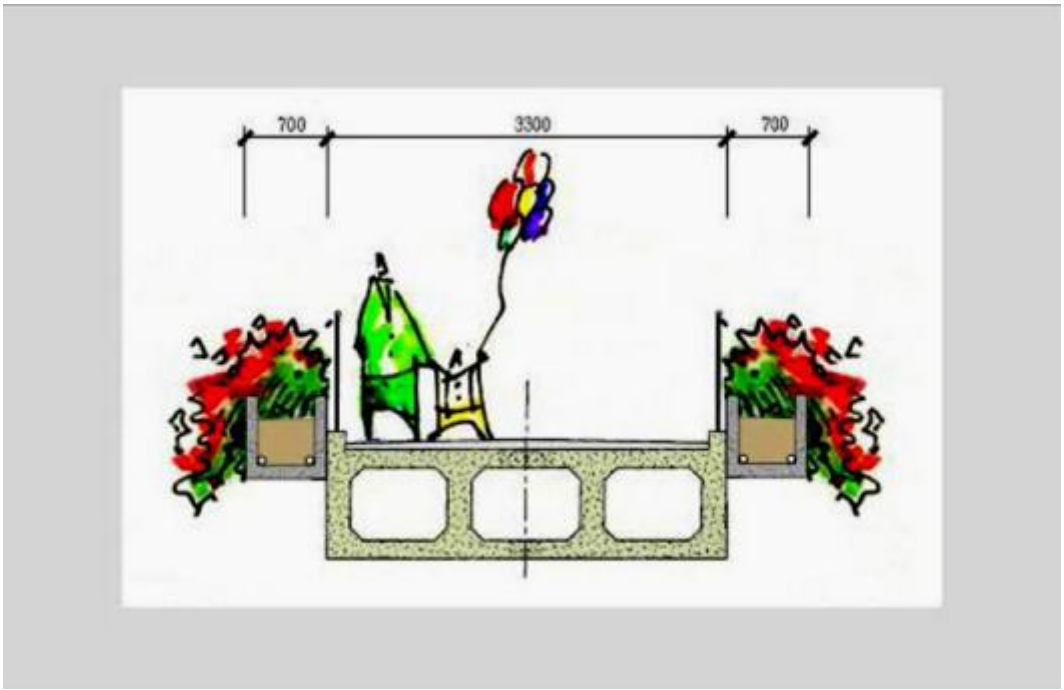
Motor vehicle lanes to maintain average illuminance Eav = UKN / SW = 80x180x0.5x0.7x1 / (30x8) = 211x, meeting the "city road lighting design standards" for the urban main road average illumination requirements,

Power density LPD = P / SW = 180 / (30x8) = 0.75W / m 2, to meet the "city road lighting design standards" for energy efficiency.

Non-motorized vehicles and sidewalks, average maintained illuminance Eav = UKN / SW = 80x100x0.4x0.7x1 / (30x6.5) = 11.51x, to meet the "city road lighting design standards'' average luminance requirements for non-motor vehicle lanes.

3.8 Road Greening Design

Mainly carry out the following aspects of work: One is organic combination of road aesthetics and the use of function. Designers distinguish their nature, combine with the actual characteristics of urban roads, aiming to carry out different ways to green roads at the same time. The greening of the road has the advantages of shading noise reduction, decoration, shade, air purification and sight line induction. It has always been an important content in urban roads. Therefore, in the process of design, the urban environment, road function , the level of the actual situation and other aspects of the characteristics of the design should be combined and strive to regulate the rational principles, so that the road adapt more to the surrounding architectural style. In addition, the surroundings of the greening area will induce the driving vehicle. In the city, vehicles on the trunk road and expressway are usually faster, so a reasonable line of sight to the driver is more effective to improve traffic safety, can improve traffic safety effectively.



4. Conclusion

The pace of economic development in China will not stop, so the road design should also keep pace with the times. Based on the original Road, how to better perform the capacity of road transport, how to better benefit the society, which have been the relentless pursuit of the ideal for the road design workers. Starting from the concept change, ensure friendly environment, improve the rationality of the traffic rules in intersection. Grasp these principles and take

effective measures, improve the current situation of urban roads in actual practice.

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