

Traffic Demand Forecasting on Campus-Taking the West Campus of Shandong University of Technology as an Example

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Abstract: Through the investigation and analysis of the traffic situation in the West Campus of Shandong University of Technology, this paper forecasts the traffic demand for the next year, and provides a basis for the future campus planning of the West Campus.

1. Introduction

With the rapid development of Chinese universities' planning and construction, University campus and its traffic planning and design has become a major concern of the community. At present, the campus traffic of various colleges in our country generally exists the mixed traffic situation of the slow traffic and the people-car altogether, which often causes the chaos of the campus traffic. The problems in road system, parking planning, public transport planning, traffic safety facilities and traffic organization in campus have brought unfavorable effects on campus traffic. Traffic survey is an ordinary, heavy workload and very important basic work. In order to solve the problems in the campus traffic planning and design, we must actively carry out systematic and planned traffic investigation work. Through the investigation, providing the accurate data information for the campus transportation planning design each aspect service.

2. Investigation and analysis of traffic situation

2.1 Shandong University of Technology of West Campus overview

Shandong University of Technology Campus covers an area of about 3600 acres, of which the West Campus covers an area of about 3000 acres. West Campus is located on the west side of Zhangdian District government, east of Nanjing Road, north of the Renmin West Road, south of the Xincun West Road, west of Beijing Road, 5.6 kilometers from the Zibo railway station, 2.7 kilometers from the passenger center. And West Campus is the main campus of Shandong University of Technology. Around the stone Crystal City, Kerry Garden, Zibo Sports Center, Zibo Experimental Middle school and other large population flow, high density of the region. Therefore, the network traffic pressure of roads which around Shandong University of Technology campus will be larger, resulting in the surrounding roads often congestion and other phenomena. The overall use of the land is shown in Figure 1.

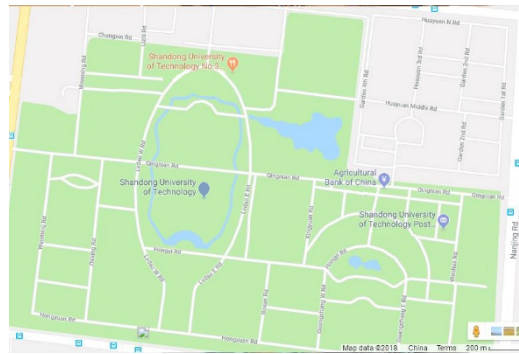


Fig. 1 The present situation of West campus

2.2 Investigation and analysis on the present situation of campus roads

The grade of road and the width of different grades of road are two important indexes to weigh the advantages and disadvantages of the campus road system, which is different from the factors such as campus size, campus location and school nature. The campus road grade divides the campus road function localization as the foundation, the complete campus road is composed of the following four levels: The Campus class road, the function partition grade road, the group class road, the House Road.

Through the investigation of some important roads in the West campus of Shandong University of Technology, the data obtained are as shown in table 1 according to the standard of school road grade.

Table 1. Road grading and width in West campus

Number	Road name	Road level	Road width (m)	Number of motor road	Width of the motor road (m)	Sidewalk width (m)
1	Lvdao West Rd	the group class road	14.4	2	4	3.2
2	Shiwuzhongxin North Rd	the function partition grade road	18.8	2	6	3.4
3	Qingnian Rd (Lvdao East Rd intersection west section)	The Campus class road	19.4	2	3.9	3.5
4	Boya Rd	the function partition grade road	22.6	2	4.5	2.3
5	Hongyi Rd (Tennis Court Section)	the group class road	15.6	2	4	3.9
6	Wenming Rd (North Section)	the group class road	15.8	2	4.1	3.8
7	Xinyuan Rd	the group class road	6	2	3	2.3
8	Hongyi Rd (Information Building Section)	the group class road	12.2	2	3	4
9	Zhixing Rd	the function partition grade road	6.2	2	3.1	0
10	Lvdao East Rd	the group class road	14.2	2	4	3.1
11	Hubin Rd	the function partition grade road	17.6	2	6	2.8
12	Chengxin Rd	the group class road	6	1	6	0

According to the table above, many roads belong to the cluster-level roads and functional zoning roads, but there is no restriction on the travel of motor vehicles.

The use of various grades of road is not clear, all roads for motor vehicles, non-motorized vehicle

mpus, to limit the traffic of motor vehicles on campus, in order to reduce the conflict between motor vehicle, non-motorized vehicle and pedestrian.

Survey on the traffic flow of the main sections of the West Campus Peak period, that is, from Monday to Friday morning 7:30-8:05 and noon 11:45-12:20 period, as shown in table 2.

Table 2. Traffic volume of main road during peak period of West Campus

Road name	Pedestrian traffic volume(people/35min)		Vehicles non-motor traffic volume(car/35min)		Traffic volume of motor(car/35min)	
	Early Peak	Midday Peak	Early Peak	Midday Peak	Early Peak	Midday Peak
Lvdao West Rd	899	2085	464	1185	25	49
Shiwuzhongxin North Rd	1608	815	686	573	44	40
Qingnian Rd (Lvdao East Rd intersection west section)	412	475	359	361	173	143
Boya Rd	66	194	116	237	137	72
Hongyi Rd (Tennis Court Section)	2033	1430	470	266	35	38
Wenming Rd (North Section)	168	797	359	512	35	32
Xinyuan Rd	410	503	233	176	27	26
Hongyi Rd (Information Building Section)	679	836	235	217	42	31
Zhixing Rd	147	194	212	202	20	18
Lvdao East Rd	1829	1776	540	699	10	13
Hubin Rd	114	204	184	232	73	54
Chengxin Rd	116	372	149	195	0	0

According to the data of the survey, the vast majority of traffic flows were undertaken during the peak hours of Lvdao East Road, Lvdao West Road, Shiwuzhongxin North Road and Hong Yi Road.

Lvdao East Road is located on the west side of the second stadium, which mainly undertakes the traffic between the 5-22 dormitory building and the 3rd teaching building and the library. The road width of 14.2m, sidewalks wide 3.1m. Although the heavy traffic flow, but the breadth of the road is wide, basically can meet the demand.

Lvdao West Road is located on the eastern side of 12, 13th teaching building, which mainly undertakes the traffic between the northern living area and 12, 13th teaching building and the traffic between the library. Its width of 14.4m, sidewalks wide 3.2m. During peak hours, the pedestrian flow in Lvdao West Road is beyond the reach of its sidewalk.

Shiwuzhongxin North Road, situated between the No. 8th Dormitory building and the 9th dormitory building, is mainly responsible for the traffic flow from the school to the North Outer Ring Road and to the dormitory building. Its width of 13.4m, sidewalks wide 3.4m. The phenomenon of the road machine is very serious, and the pedestrian is parked on both sides of the pavement, which leads to a serious shortage of pedestrian capacity.

Hong Yi Road is located between the 3rd teaching building and second stadium, which mainly undertakes the traffic volume between the north side living area and the 3rd teaching building. The width of the road is 15.6m, the sidewalk width is 3.9m. The pavement of the road is occupied by the non-motor vehicle, the pedestrian space is severely compressed, which leads to the mixed phenomenon of pedestrians, non-motorized vehicles and motor vehicles in this road.

3. Using Transcad for OD back-pushing

Create the following road network layer and zoning layer, add the following attributes to the road network layer. And enter the flow rate of each section in advance, calculate the capacity of the traffic and the travel time of each section, the data is shown in table 3:

Table 3. Flow rate, traffic capacity and travel time of each section

ID	Length	Name	Peak traffic	Traffic capacity
1	75.57	Qingnian Rd (Lvdao East Rd intersection west section)	986	1800
2	58.54	Xinyuan Rd	708	1800
3	61.10	Guangchang West Rd	588	1800
4	76.95	Hongyi Rd	2888	1800
5	101.06	Zhixing Rd	449	1800
6	181.84	Lvdao West Rd	1633	1800
7	70.46	Boya Rd	257	1800
8	64.43	Hongyi Rd (Information Building section)	4000	1800
9	250.36	Wenming Rd	617	1800
10	78.80	Shiwuzhongxin North Rd	2714	1800
11	196.95	3rd Canteen East Rd	2564	1800
12	53.60	Lvdao East Rd	2878	1800
13	147.95	Southeast Corner of 5th Dormitory Building	443	1800

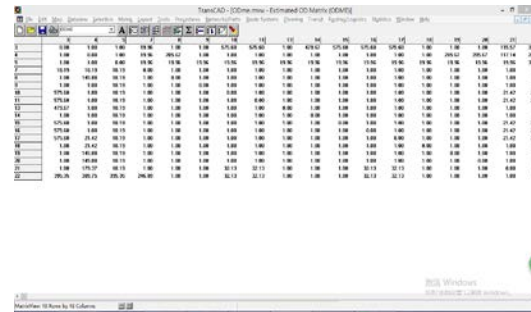
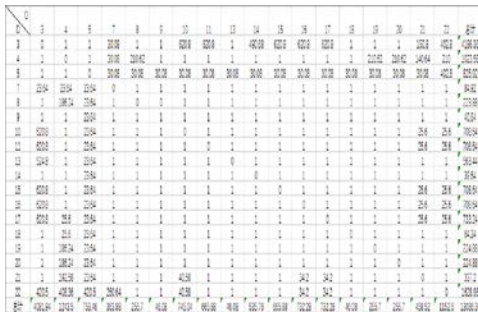


Fig. 2. Traffic community division Fig. 3. OD traffic between the various traffic communities

Using TransCAD to carry out OD back-pushing, the traffic plot as shown in Figure 2 and the OD traffic between each traffic area shown in Figure 3 are obtained.

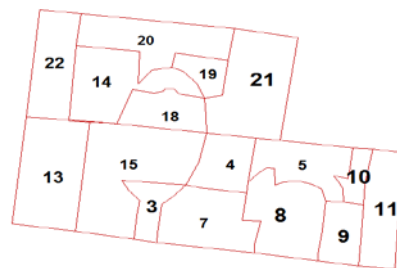


Fig. 4. Forecast of traffic volume of West Campus in future years

Based on the current OD table, we use TransCAD to forecast the traffic demand of West Campus for the next year, the results are as shown in Figure 4.

4. Conclusion

This paper investigates the road situation of the West campus of Shandong University of technology and analyzes the problems of the West campus in this aspect. According to the survey, to make traffic demand forecasts forecasts of the West campus. To lay a good foundation for the future campus planning, design and management. And on this basis, take appropriate improvement measures to create a safe, green and quiet campus traffic environment.

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