



New Transport System Sparks Smart Urban Planning in West Dongba

OpenPaths™ CUBE™ Helped Create a Transportation Prediction Model, Expected to Improve Travel Efficiency by 15% and Reduce Vehicle Carbon Emissions by 21,000 Tons

REVITALIZING WEST DONGBA

Located in the northeast of Beijing's Chaoyang district, West Dongba has easy access to the central city and urban subcenter, supporting Beijing's strategic endeavor to position it as an international exchange center. The demographics of the area are diverse, with most people relying on public transportation. However, public transport options are insufficient to meet commuter needs. To address these issues, Beijing Municipal Institute of Planning & Design is developing several rail lines and two subway stations. The project is part of the West Dongba's subdistrict detailed plan, which is aimed at creating rail and urban integration.

The development of the new public transportation system will kick off a comprehensive transformation and revival of West Dongba, promoting smart city planning and various modes of green transportation to meet residents' travel needs through an intelligent travel network. "The project focuses on the planning and construction of rail transit, empowering block development through smart planning and design, as well as promoting the overall transformation and rebirth of the project area," said Xiaodong Zhang, director of the digital center at Beijing Municipal Institute of City Planning & Design.

OPTIMIZING PLANNING THROUGH ACCURATE FORECASTING

Developing a smart city to improve travel convenience while also promoting green transport presented challenges when planning and arranging the transportation infrastructure. The team needed to ensure that the new system could accommodate multimodal transport needs. "This project required accurate forecasting of future travel demand, an analysis of the proportion of resident travel modes, and a focus on the composition of rail travel and various connecting modes. [These goals would help] meet residents' travel needs through

the development of a smart travel system," said Zhang. The institute realized that proper planning was critical to the project's success, which required collecting and analyzing data and scenarios to predict traffic volume and transportation modes from each district from Beijing to Dongba.

To determine a suitable plan and design and avoid unseen risks, the team needed a flexible digital transportation modeling solution. They wanted to visualize and test numerous transportation design options in a digital environment based on predictive data and resident travel modes to accurately forecast future travel demands. "[We needed] to create a traffic demand prediction model for West Dongba, accurately and efficiently predicting the traffic structure and transportation needs," said Zhang.

LEVERAGING OPENPATHS CUBE FOR PREDICTIVE TRANSPORTATION MODELING AND SIMULATION

After considering their options, the institute selected OpenPaths CUBE to develop a traffic prediction model, accurately predicting and simulating both traffic structure and transportation connection needs. Using Bentley's software, they built an integrated digital rail station and connection service system for West Dongba that served as a data analysis model to help better understand the impact of their transport network prior to execution. "The system provides scientific data prediction and judgment for the construction of the rail transit microcenter demonstration area, scheduling shared bicycles, mini-buses, shared cars, and other rail transit connection modes," said Zhang. As a flexible and advanced script-driven prediction application, OpenPaths CUBE, easily combined various modules to achieve cross-scenario comparisons to digitally determine and resolve potential problems and optimize planning of the urban transportation network.

PROJECT SUMMARY

ORGANIZATION

Beijing Municipal Institute of City Planning & Design

SOLUTION

Facilities, Campuses, and Cities

LOCATION

Beijing, China

PROJECT OBJECTIVES

- ◆ To improve transportation and urban integration through smart city planning.
- ◆ To develop new railway lines, subway stations, and connection services, supporting green and sustainable transport.

PROJECT PLAYBOOK

OpenPaths CUBE

FAST FACTS

- ◆ This smart city project in West Dongba, Beijing aims to build a smart travel service system to meet residents' transport needs and promote eco-friendly travel.
- ◆ The project required accurate multimodal travel forecasting to allocate the appropriate rail and connection services.
- ◆ Beijing Municipal Institute of City Planning & Design needed digital transportation prediction and simulation software to optimize planning.
- ◆ **ROI**
 - ◆ By using OpenPaths CUBE, the team shortened the project's initial work cycle from two months to three weeks.
 - ◆ Based on the digital information, Beijing Municipal Institute of City Planning & Design is expected to improve travel efficiencies by 15%.

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“By using OpenPaths CUBE software to predict the demand for transportation connection tools, we can more accurately and scientifically analyze transportation demand.”

– Xiaodong Zhang, Director of Digital Center, Beijing Municipal Institute of City Planning & Design

Leveraging OpenPaths CUBE, the team first predicted the total traffic volume, distribution, and mode of transport to and from the districts. Then, they allocated the rail transit volume to the relevant stations in the area. Integrating the planned facilities for the station connections, they obtained the proportion of each connection mode for each rail station. “For example, at Dongfeng Station, walking accounted for 68% of the total exit transfer volume, biking accounted for 27%, unmanned shuttle buses accounted for 3%, and shared cars accounted for 2%,” said Zhang. Using OpenPaths CUBE to predict the demand for transportation connection needs, the team can accurately match rail travel connection transfer needs around the rail microcenter nodes and allocate the appropriate infrastructure.

DIGITAL MODELING SUPPORTS SMART SUSTAINABLE URBAN PLANNING

Working in a predictive modeling and simulation platform, the institute was able to aggregate transport data and automatically calibrate and optimize the model, facilitating data-driven decision making and planning of a complex urban transportation system. Bentley’s application enabled the team to compare different scenarios, analyze potential benefits, and identify any issues in a digital environment, saving time and money during the planning and review process and optimizing design and construction works. “By using OpenPaths CUBE software, we saved the time required for field research and

data acquisition and analysis, [as well as] shortened the project’s initial work cycle from two months to three weeks,” said Zhang. Using OpenPaths CUBE to automate perception, prediction, and allocation data greatly reduced the time and personnel costs of the subsequent works to provide appropriate connection facilities for the rail stations.

“By using OpenPaths CUBE software to analyze traffic flow, the project provided a strong basis for the planning and construction of transportation infrastructure and the arrangement of public transportation capacity for the rail microcenters,” said Zhang. To support the smart, sustainable transportation network, the team is also developing a smart travel mobile application, providing customized travel services, ensuring smooth travel throughout residents’ final mile.

Using the digital model and data to optimize traffic flow analysis facilitated development of an integrated, intelligent rail station and connection service system, promoting smart, eco-friendly transport. The solution is expected to improve travel efficiency by 15%, save 7,600 tons of coal annually, and reduce carbon emissions by 21,000 tons. “With the help of OpenPaths CUBE software to predict traffic flow, the smart city project in the West Dongba of Beijing can build a smart travel service system that can reach the entire area within 10 minutes,” said Zhang.

OpenPaths CUBE’s predictive and automated features shortened the initial work cycle by about five weeks.

| Way | 步行 | 骑行 | 无人巴士 | 共享汽车 |
|--------------|-----|-----|------|------|
| 北京各区到东坝的流量检测 | 17% | 22% | 54% | 7% |
| 东坝各区域流量检测 | 17% | 22% | 54% | 7% |
| 东坝西区内流量检测 | 17% | 22% | 54% | 7% |

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