DRISI

Caltrans Division of Research, Innovation and System Information

Research Results

Moving People Through Transit Stations Efficiently and Safely

Recommendations for optimizing passenger flows in rail transit stations

Modal

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Project Title:
Passenger Flows in Underground Railway Stations and Platforms

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Product Category: New or improved technical standard, plan, or specification

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WHAT WAS THE NEED?

Rail transit is the highest capacity urban transit mode, typically operating underground in subways or above ground on elevated lines. Unlike buses and light rail transit, passengers move to and from track platforms, ticketing areas, and adjacent streets. Transit stations experience high levels of pedestrian congestion during rush hour and special events but also during extreme events, such as disasters that require evacuation procedures. Crowding can occur on platforms, vertical circulation elements (stairways, escalators, elevators), ticketing machines, fare gates, and station entrances and exits. Excessive congestion can cause passenger inconvenience, delays, and at times endangerment. Because many subway and elevated transit stations have been in service for decades, they often accommodate more passengers than they originally were designed to handle. Transit system managers, planners, and designers need strategies to provide safe and comfortable movement of passengers and implement these strategies within an environment of physical and financial constraints.

WHAT WAS OUR GOAL?

The goal was to understand the infrastructural, operational, behavioral, and spatial factors that affect passenger flow in underground railway stations and identify best practices and recommendations.

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WHAT DID WE DO?

Caltrans, in partnership with the Mineta Transportation Institute, identified and compared practices for efficient and safe passenger flows in different station environments and during typical (rush hour) and atypical (evacuations, station maintenance or refurbishment) situations through a literature review and interviews with experts in transit rail station design representing transit agencies across the United States and Canada. The researchers then compiled short-, medium-, and long-term recommendations addressing four key issues: agency planning for passenger flows, data collection and forecasting, analysis, and design.

WHAT WAS THE OUTCOME?

The researchers developed the following recommendations based on their observations and interviews.

- Encourage coordination and knowledge sharing among the various specialists responsible for different aspects of the passenger experience. Planners sometimes fail to adequately account for construction needs, or builders to fully implement planners' strategies, resulting in procedures and routes not fully utilizing the designed station capacity.
- Routinely assess assumptions used to estimate passenger volumes and characteristics, such as walking speed. Ridership forecasts presented to justify new rail transit projects are often inflated. Although forecasts should be as accurate as possible, budget allocation should err on the side of overestimating passenger volumes. It is better to overdesign a station, because adding capacity later is difficult and expensive.
- Select the appropriate analysis tools and methodologies for each question requiring a solution. Deterministic models, established standards, and more-complex micro-simulation models each offer distinct advantages and disadvantages in particular situations.
- Consider the impact that a design strategy implemented in one station area will have on other areas and on the adjacent street environment. To optimize passenger flows, view the station as an entire system rather than individual parts.

WHAT IS THE BENEFIT?

Excessive station crowding prevents passengers from quickly boarding and exiting, making cars linger longer in a station, and also decreasing the attractiveness of transit for potential riders. Inadequate passenger flow can also create unsafe conditions and impede emergency evacuations. This study proposed short-, medium- and long-term strategies and changes in transit operations, messaging and wayfinding, and station design for optimizing passenger flows and queuing, improving the rail transit experience.

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To view the complete report:
http://transweb.sjsu.edu/project/1230.html