

## Urban Development Directed by LRT-A Case Study of Dalian

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## Overview

- Introduction
- Dalian's Background
- Comparison With Other International Cities
- Development Paths
- Strategic Roles of LRT System
- Summary

## Introduction

- China has entered into the age of mass car consumption.
- Building more roads induced more vehicles on the roads
- A few metropolitan cities in China turned to rapid rail transit as a healthy, sustainable solution

## Location



## Dalian's Background

- Ranking 8<sup>th</sup> among Chinese cities in terms of overall strength
- Neighboring Japan, Korea and the far eastern part of Russia with a non-frozen harbor
- Double digit growth in GDP in the past ten years
- From 1986-1996, automobiles increased by 22% annually, while total road construction increase by 20% during the entire period

## City's Overview



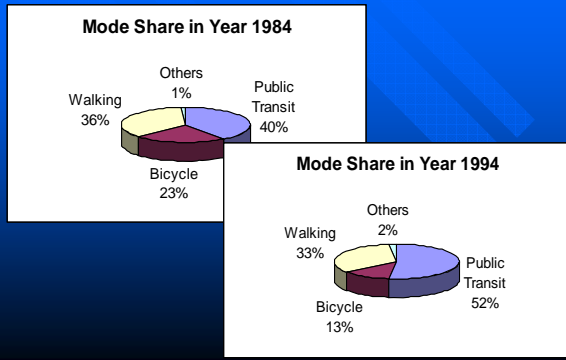
## Dalian's Transit System

- 101 Bus routes, including trams + 1 LRT
- Bus operating length 1420 km
- Total 3799 buses
- Annual ridership 1.1 billion

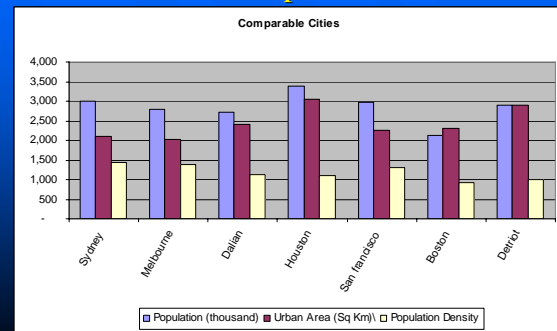
## Dalian's Transit System



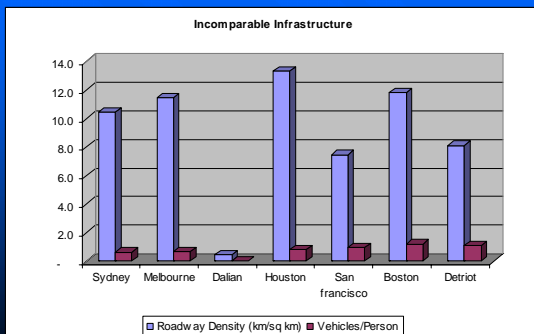
## Mode Share in 1984 and 1994



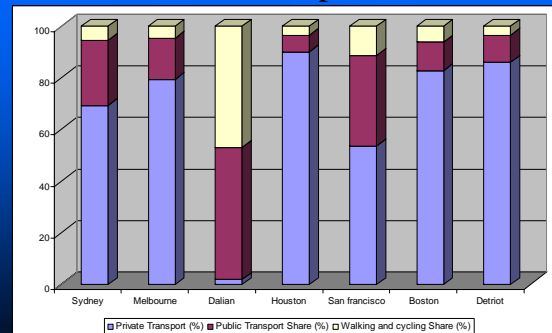
## Comparison With Other International Cities – Comparable Cities



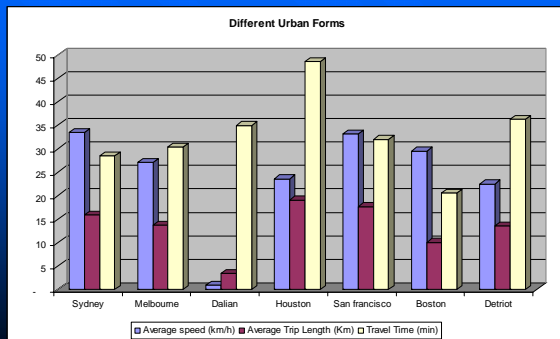
## Incomparable Infrastructure



## Mode Split



## Speed, Trip Length, Travel Time



## Development Paths

- Old city: heavily industrial city – causing tough problem of environmental pollution
- Long term plan - “Greater Dalian” integrating the urban and rural area

## The Plan of “Greater Dalian”



## Functionalities of the cities

- Old City
  - Administrative and culture center
  - Highlighting the city’s grace and elegance
- New City
  - Expand the city’s space
  - Expand overall scale of the economy (Economic and technological zone, double-D zone, bonded zone, Golden Pebble Beach tourism resort and Dayaowan Port area)
  - Improve integrated urban functions
  - Improve environmental quality

## Roles of LRT System - Map



## The Need for LRT

- Old city: 18 universities or colleges, over 100 research institutions and 18 state academicians, turning over a lot of high level professionals
- New city: composed of the high-tech parks, logistics center, free trade zones, is in great need of well educated people.

## Travel Condition Before & After

- Before
  - The few connectors were congested.
  - Average travel time: 90 minutes
  - Public transit operated by 12 companies, served by mini buses, 19-people capacity, no fixed schedule
- After
  - Average travel time: 40 minutes
  - Safer, faster, reliable and comfortable
  - Market share of LRT and improved bus services: 87%

## Positive Interaction



## Main Line

- Mainline, 49 kilometers, 11 stations, cost \$232 million. Covers old and new city. Opened in 2003
- Connects the railroad station, downtown old city and the new city, including economic development zone, high tech zone, and a world class recreational zone
- Max. speed 100 km, average speed 60 km
- Max. capacity 16,000/hour
- Operating time 6:30 am – 6:30 pm, with 20 minute headway
- Daily ridership about 40,000

## Extension

- 14 kilometers, 9 stations, cost \$125 million.
- Connects new city and an industrial development zone, agriculture zone, and a regional logistics center
- Currently under construction, expected operating by the end of 2006
- 'V' shape, which coincides with the urban development blueprint

## Summary

- The LRT extension is under construction
- The new city is under fast development
- Dalian received "Global 500 Award" by United Nation Environment Program
- The interaction between the LRT and urban development is further to be explored