

Module 01:

Transportation Industry Overview



1

1

Pre-Assessment

<https://www.surveymonkey.com/r/TWR-Pre-Assessment>



2

2

Learning Objectives

- ▶ Identify modes & list components of the U.S. transportation system
- ▶ Describe key characteristics of public transportation & transportation networks
- ▶ List public transportation modes, describe the LA County transportation network, it's modes, providers, ridership, services
- ▶ Describe challenges and benefits of public transportation

3

Learning Objectives

- ▶ Discuss key elements of public transportation management
 - Governance
 - Funding
 - Operational Areas
 - Functions
 - Unions
- ▶ Describe Intelligent Transportation Systems and provide examples of their purpose, use, solutions

4

What is Transportation?

- ▶ Transportation is the movement of people, animals, and goods from one place to another
- ▶ Each mode has its own components:
 - Infrastructure
 - Vehicles
 - Operations
- ▶ Supports sustained economic growth of the U.S. because it enables trade and commerce between people, entities, countries

5

Transportation Modes

- ▶ What modes (means, types) of transportation can you think of?



6

6

Transportation Modes



Air



Space



Road



Pipeline



Rail



Human-powered



Water



Animal-powered

7

Components that Make Up Transportation Systems

- ▶ Pavement
- ▶ Barriers
- ▶ Bridges
- ▶ Canals
- ▶ Rails
- ▶ Pipes
- ▶ Signals
- ▶ Vehicles
- ▶ Stations/Terminals

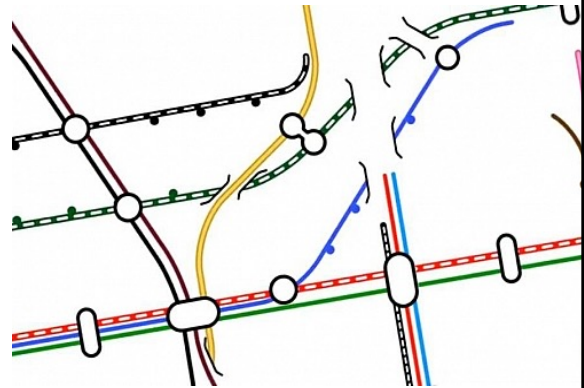
Can you name other components?

8

8

What is a Transportation Network?

- ▶ Integrated pattern of nodes for onloading and offloading of people and goods that are linked by routes
- ▶ Connected through:
 - Roads and streets
 - Railways
 - Pipes
 - Aqueducts
 - Power lines



9

9

Public Transportation: Overall Context

- ▶ Center of a community's ability to function, not just in recent time, but across decades
- ▶ As the population moved from rural to urban areas, public transportation allowed for larger urban areas to be efficiently connected
- ▶ Public transportation helps promote economic prosperity and competitiveness through the movement of goods and people
- ▶ It increases an individual's mobility and quality of life
- ▶ Promotes environmental sustainability

10

What is Public Transportation?

- ▶ Public transportation is the transport of passengers by group travel systems available for use by the general public, typically managed on a schedule, operated on established routes, and fee is charged for each trip (or may be waived)



11

Public Transportation Modes

- ▶ Bus (including bus rapid transit and commuter bus)
- ▶ Demand Response
- ▶ Ferryboat
- ▶ Commuter Rail
- ▶ Heavy Rail
- ▶ Light Rail (including streetcar and hybrid rail)
- ▶ High Speed Rail
- ▶ Intermodal
- ▶ And more...



12

Bus

- ▶ Most common mass transit service provided in the United States
- ▶ Operate on fixed routes and schedules over existing roadways
- ▶ Buses must be in compliance with mass transit rules including Americans with Disabilities Act (ADA)



13

Demand Response Paratransit

- ▶ Service (passenger cars, vans or small buses) provided upon request to pick up and transport passengers to and from their destinations
- ▶ May be dispatched to pick up several passengers at different pick-up points before taking them to their respective destinations
 - May be interrupted en route to these destinations to pick up other passengers



14

Bus Rapid Transit (BRT)

- ▶ Is an innovative, high capacity, lower cost public transit solution that can significantly improve urban mobility
- ▶ Number of BRT sites are increasing



15

Ferries

- ▶ Vessels carrying passengers, and in some cases vehicles, over a body of water
- ▶ They are generally steam or diesel-powered



16

Commuter Rail

- ▶ Local (short-distance) travel operating between a central city and adjacent suburbs
- ▶ Service is provided on regular schedules, moving commuters within urbanized areas or between urbanized areas and outlying areas
- ▶ Multi-trip tickets and specific station-to-station fares characterize commuter rail service, with one or two stations in the central business district



17

Heavy Rail

- ▶ Characterized by high-speed and rapid acceleration passenger rail cars operating singly or in multi-car trains on fixed electric rails, with separate rights-of-way from which all other traffic is excluded
- ▶ Sophisticated signaling, high platform loading and a heavy passenger volume



18

Light Rail

- ▶ An electric railway that operates local service in mixed traffic with road vehicles, or has grade crossings with roadways
- ▶ Characterized by short trains of one to four cars and by relatively short distances between stops for local service within a city and the immediate suburbs



19

High Speed Rail



- ▶ The U.S. gov considers high-speed rail service to be 110 mph (180 km/h) or higher
- ▶ Only operational high-speed train in the U.S. is Amtrak's Acela Express
- ▶ A \$8 billion for high-speed rail projects in 2009 stimulus package
- ▶ The first dedicated high-speed rail in the U.S. will be in California

20

Other

21



21

Intermodal - Transit and Autos



Harpers Ferry, WV

22

Intermodal - Transit and Bicycles

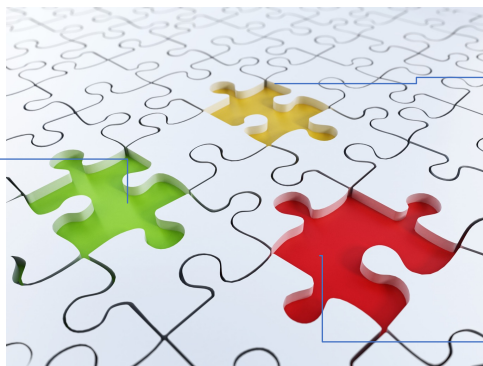


23

LA County Public Transit Network

Metro

Provides the majority of service in LA County and operates multiple transit modes including light rail, heavy rail, bus rapid transit, fixed route bus, and trunk routes



Municipal Operators of Transit (Munis)

Munis offer fixed route services within and between jurisdictions

Specialized & Local Operators

A variety of agencies provide local circulator and demand response services

24

24

LA County Public Transit Network - Munis

Agency	Service Area
Arcadia Transit	City of Arcadia
Antelope Valley Transit Authority	Lancaster-Palmdale UZA
Beach Cities Transit	Western Southbay Subregion
Claremont Dial-a-Ride	Pomona Valley
Commerce Municipal Bus Lines	City of Commerce and Surrounding Communities
Culver City Municipal Bus Lines	City of Culver City and Surrounding Communities
Foothill Transit	San Gabriel Valley Subregion
Gardena Municipal Bus Lines	Northern Gateway Cities, Near City of La Mirada
Los Angeles Department of Transportation	City of Los Angeles
La Mirada Transit	Northern Gateway Cities Near City of La Mirada
Long Beach Transit	Southern Gateway Cities
Montebello Bus Lines	Northwestern Gateway Cities
Norwalk Transit System	Eastern Gateway Cities
Santa Clara Transit	Santa Clarita UZA
Santa Monica's Big Blue Bus	Cities of Santa Monica, Culver City, and Los Angeles (Westside Cities Region)
Torrance Transit System	Southern South Bay Cities

Have you been a passenger of any of these transit providers...how many?

25

25

LA County Transit Network Size and Use

- ▶ **Metro is the 3rd largest transit agency in U.S. for passenger trips and miles**
 - 479,654 passenger trips
 - 2,339,177 passenger miles
- ▶ Metrolink #21 in U.S. for passenger trips
- ▶ Other large operators based on passenger trips
 - Long Beach Transit - #45 in U.S.
 - City of Los Angeles Department of Transportation - #50 in U.S.

26

26

LA Metro Services

- ▶ Besides bus and rail, what other modes of transit does LA Metro provide?



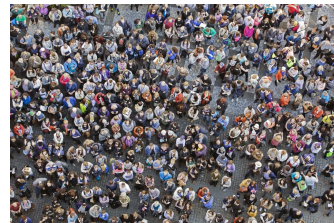
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27

Today's Transportation Challenges

Population growth

- ▶ U.S. Census: 420 million people by 2060
- ▶ LA and Orange Counties: 1 million new residents by 2030



Aging Population

- ▶ Americans age 65+ will double from 43.1 million (2012) to 92.0 million (2060)
- ▶ In LA & Orange Counties, residents 65+ will grow by 75% and comprise 26% of the population by 2040
- ▶ 1 in 5 Americans age 65+ do not drive



28

LA's Transportation Challenges

- ▶ **Affordability**
 - Incomes not on pace with rising housing & expenses
 - Poverty has increased
 - Lower vehicle access and higher public transportation needs amongst low-income households
 - 3rd most zero car households in U.S (10%)
- ▶ Higher energy prices/higher gas prices
- ▶ Congestion
- ▶ Environmental sustainability



29

Benefits of Public Transportation



**Reduced
Congestion**

**Saves Riders
Money**

**Conserves
Energy**

**Increases
Mobility**

**Economic
Vitality**

**Increases
Safety**

**Reduces
Greenhouse
Gases**

30



31

Economic Vitality

32

- ▶ 87% of public transit trips directly impact the economy through connecting people to employers
- ▶ 89% of transit riders are in the most economically active age group - ages 25-64 - compared with 53% of the U.S. population
- ▶ 63% of transit riders ride 5 days a week, another 13% ride 6 or 7 days a week



32

Economic Vitality

33



33

Saves Riders Money

- Individuals who switch from driving to public transit can save \$9,854 a year
- Access to bus & rail reduces driving by 4,400 miles per household per year
- Save 785 million hours in travel time and 640 million gallons of fuel
- Without public transportation, congestion costs would be an additional \$19 billion



34

Reduces Greenhouse Gases

35

- ▶ Reduces U.S. carbon emissions by 37 million metric tons per year
- ▶ One person switching to public transit can reduce daily carbon emissions by 20 pounds (4,800 pounds in a year)
- ▶ Eliminating a 2nd car & switching to public transportation reduces household carbon emissions by 10% - 30% (10 x more than other household actions)



35

Increases Mobility

36

- ▶ Not just a mobility option for many people - it is the only option
- ▶ People with limited/no auto access
 - Seniors
 - People with disabilities - more than 40 million in U.S.
 - Historically disadvantaged populations
 - Low-income household
- ▶ Access to school & other destinations is important, access to employment is a critical piece of mobility



36

Promotes Safety

37

- National Safety Council (NSC) estimated 40,000 deaths in private passenger vehicle crashes in 2017
- Another 4.57 million people were injured seriously enough to require medical attention
- Associated costs including wage and productivity losses, medical expenses, and property damage was estimated at \$413.8 billion



37

Governance



- ▶ Every transit agency has some form of governing board
- ▶ LA Metro has 13 members who represent various areas throughout Los Angeles County
 - LA City Council Members
 - Area City Mayors
 - County Supervisors
 - City of LA Appointee
 - Governor Appointee



38

Primary Board Responsibilities

- ▶ Set policies
- ▶ Approve budget
- ▶ Approve major purchases
- ▶ Selects the chief executive officer
- ▶ Guides the agency's priorities, projects and activities
- ▶ LA Metro Board Committees
 - Operations, Safety, and Customer Experience
 - Planning and Programming
 - Finance, Budget, Audit
 - Executive Management
 - Construction
 - Sustainability
 - Congestion, Highways, and Roads

39

Funding Sources



- ▶ Federal Funds primarily from the Federal Transit Administration but also from Federal Highway Administration
- ▶ State Funds
- ▶ Local Funds
- ▶ State and Local Sources
 - Sales tax and property tax
 - Tolls
- ▶ Multiple funding sources
- ▶ Funding can be unpredictable based on the economy

40

3 Primary Organizational Areas

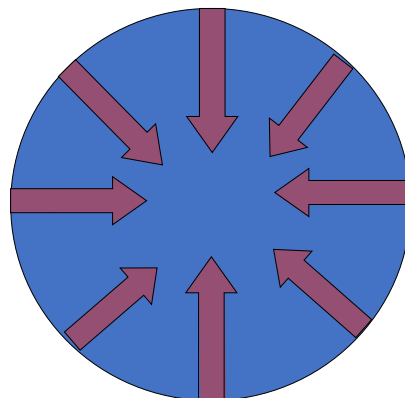


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41

Internal Functions

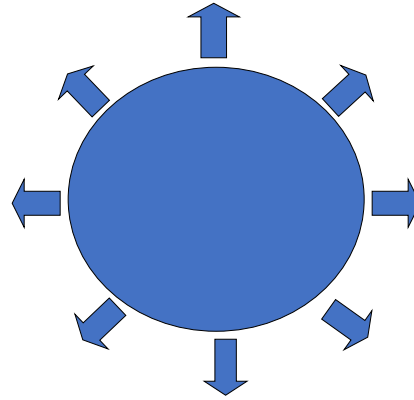
- ▶ Maintenance
- ▶ Finance
- ▶ Purchasing
- ▶ Transportation
- ▶ Human Resource
- ▶ Training
- ▶ Information Technology



42

External Functions

- ▶ Landscape Assessment
- ▶ Marketing
- ▶ Community Interaction Planning
- ▶ Public Relations
- ▶ Service Delivery



43

Unions in Transit

- ▶ Transit is historically a highly unionized industry
- ▶ Union contracts across U.S. are highly diverse, reflecting long histories between management and unions
- ▶ Union leadership is elected employees

44

Key Collective Bargaining Issues of Unions

- ▶ Wages
- ▶ Overtime and other premium pay provisions
- ▶ Seniority and work assignment practices
- ▶ Group insurance
- ▶ Other fringe benefits
- ▶ Part-time employees and full-time pay guarantees
- ▶ Retirement benefits
- ▶ Management rights; discipline and grievance rights
- ▶ Work rules

45

Intelligent Transportation Systems (ITS)

- ▶ ITS refers to the use of technologies such as Electronics, Computers, Communications, Sensors applied to transportation vehicles and infrastructure to improve:

- Safety
- Productivity
- Reliability
- Informed Travel Choices
- Sustainability
- And much more...



46

Safety: Security Cameras

- ▶ Provides evidence for accidents
- ▶ Reduces false injury claims
- ▶ Deters crime
- ▶ Protects passengers and drivers

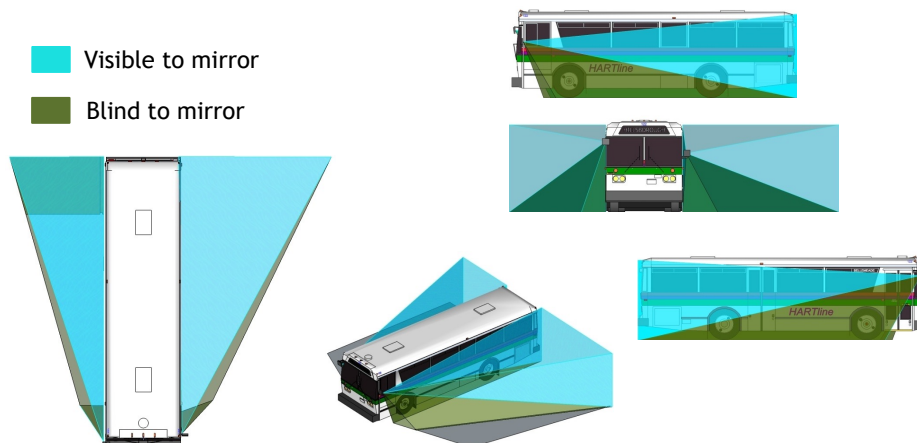


Video footage released by TriMet in Portland, OR after a near-miss of a bicyclist

47

Safety: Hazard Detection Cameras

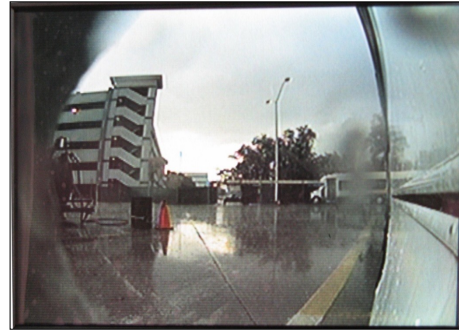
- ▶ Side mounted cameras allow buses to reduce blind spots



48

Safety: Threat Detection Cameras

- Improves visibility at night and during inclement weather



49

Safety: Cameras at Stations

- Helps deter crime while passengers wait for transit vehicles



Camera outside WMATA subway station



Camera outside WMATA Subway Station



Camera on a NYC subway platform

50

Sustainability: Hybrid and CNG Vehicles

- ▶ Hybrid - can use diesel, compressed natural gas, hydrogen, or gasoline
- ▶ Higher MPG than traditional diesel buses
- ▶ Can offer lower cost and more stable pricing for fuels
- ▶ Provides positive “clean” public image for the agency
- ▶ Compressed Natural Gas - uses natural gas which is cheaper than diesel
- ▶ Emits fewer pollutants than diesel



51

Sustainability: Electric Vehicles

- ▶ No tailpipe emissions
- ▶ Can be powered using renewable energy
- ▶ Can be wired or wireless
- ▶ Lower maintenance costs, higher purchasing costs
- ▶ More research needed on battery development for broader wireless deployment



All Electric Bus



Seattle Trolley Bus (wired)

52

Customer Convenience: Electronic Payment

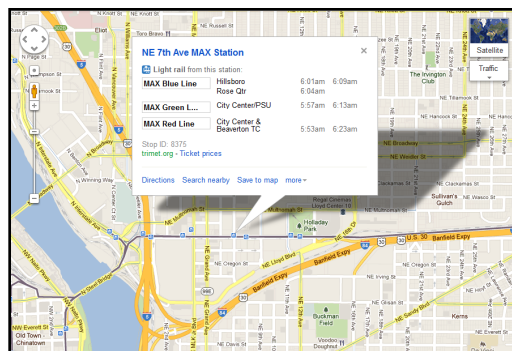
- ▶ Passengers can load payment on smart cards for use with multiple regional transit agencies
- ▶ Can store electronic transfers
- ▶ Reload cards at ticket machines or online
- ▶ Some systems allow direct fare payment with credit/debit cards or cell phones



53

Customer Convenience: Real-Time Publishing

- ▶ Publish arrival information online to allow for easy trip planning

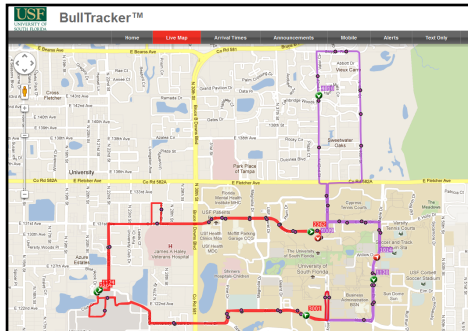


TriMet's MAX arrival times on Google Maps

54

Customer Convenience: Real-Time Bus/Train Information

- ▶ Reduces passenger waiting time at stops
- ▶ Enhances passenger satisfaction/comfort



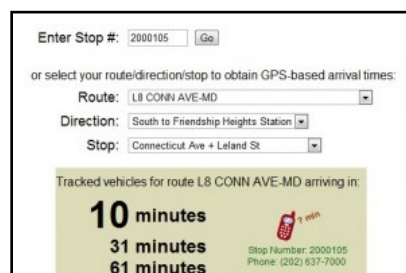
Univ. of S. Florida's bus tracking system



BART's platform arrival signs

55

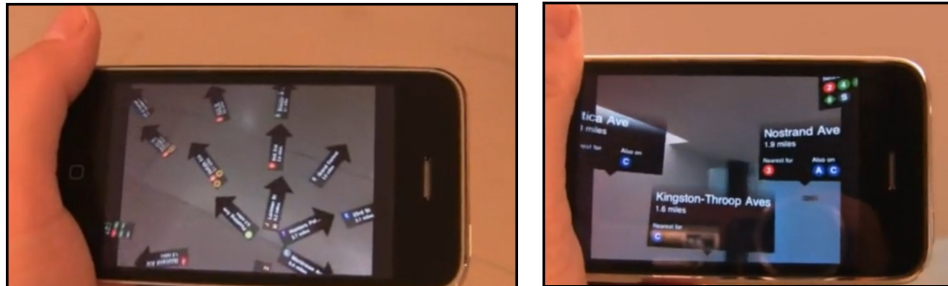
Customer Convenience: Mobile Applications



56

Customer Convenience: Augmented Reality

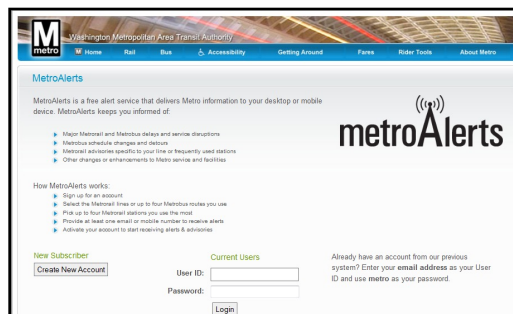
- ▶ New York's Nearest Subway
- ▶ Makes it easier to use system



57

Customer Convenience: Real-Time Alerts

- ▶ Alerts passengers via email or text message of service delays
- ▶ Allows customers to make alternate plans



58

Customer Convenience: Next-Stop Announcements

- ▶ Automated audio/visual announcements help the disabled and those unfamiliar with the area



Seattle next stop display

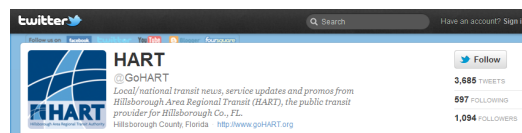


NYC Transit subway stop display

59

Customer Convenience: Social Media

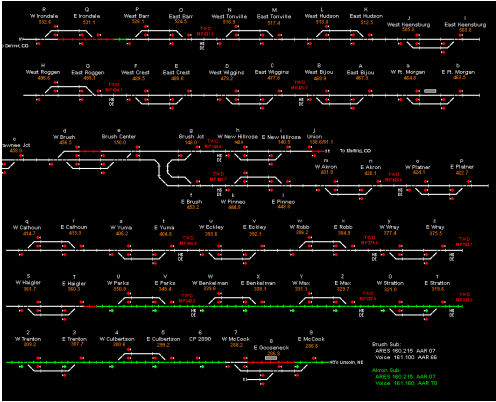
- ▶ Allows agencies to connect with riders



60

Efficiency/Productivity: Train Control Technology

- ▶ Reduces space between trains to increase capacity
- ▶ Allows trains to run driver-less saving on operating costs

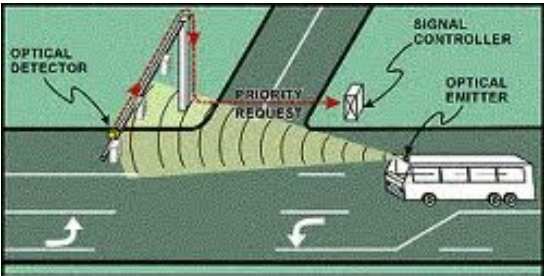


Sample rail
system
traffic
control
display

61

Efficiency/Productivity: Transit Signal Priority

- ▶ Buses or trains running in mixed traffic can request priority treatment at an intersection
- ▶ Signals can grant extra green time or a shorter red time to get transit vehicle through intersection quicker
- ▶ Some systems will request priority only when bus is late



62

Efficiency/Productivity: Vehicle Navigation

- Some buses deploy technology to automatically drive the bus and dock buses a correct distance from stops



Cameras follow the lines that steer the vehicle



Magnets embedded in the ground guide vehicles along the roadway

63

Smarter Transportation - Smarter Cities



64

64

Re-Cap

- ▶ Definition of Transportation
- ▶ Modes of Transportation
- ▶ Transportation Network
- ▶ Definition of Public Transportation
- ▶ Public Transportation Modes
- ▶ LA County Public Transit Network
- ▶ LA County Network Size and Use
- ▶ General History of Transit
- ▶ Transportation Challenges
- ▶ Benefits of Public Transportation
- ▶ Transportation Management
 - Governance
 - Funding
 - Organizational Areas
 - Functions
 - Unions
- ▶ Intelligent Transportation Systems
- ▶ The Future of Transportation

65

65

Reflection/Discussion Questions

- ▶ What new things did you learn about transportation/transit?
- ▶ Did anything surprise you about transportation/transit?
- ▶ Even though we interact with transportation on a daily basis, what did you learn that you've never noticed before?
- ▶ Now that you've learned more about public transportation, what did you learn that appeals to you about a career in transit?

66

66

End

67

67