Los Angeles Light Rail Transit

Then and Now

Bienvenue à Los Angeles

Los Angeles has a rich history of Light Rail Transit (LRT) service, which emerged from the Interurban and Tram systems of the early twentieth century to the Metro Rail system of today. This presentation will provide the following:

- *An overview of Los Angeles LRT then and now*
- *A case example of LRT policy and project development by Los Angeles Metro*
- *Discussion regarding Urban Insertion topics in the case study example*

Metro

Los Angeles, California

Then and Now

Located on the west coast of the United States of America

Part of the Southern California Region

Los Angeles County is 4083 square miles/10575 square kilometers

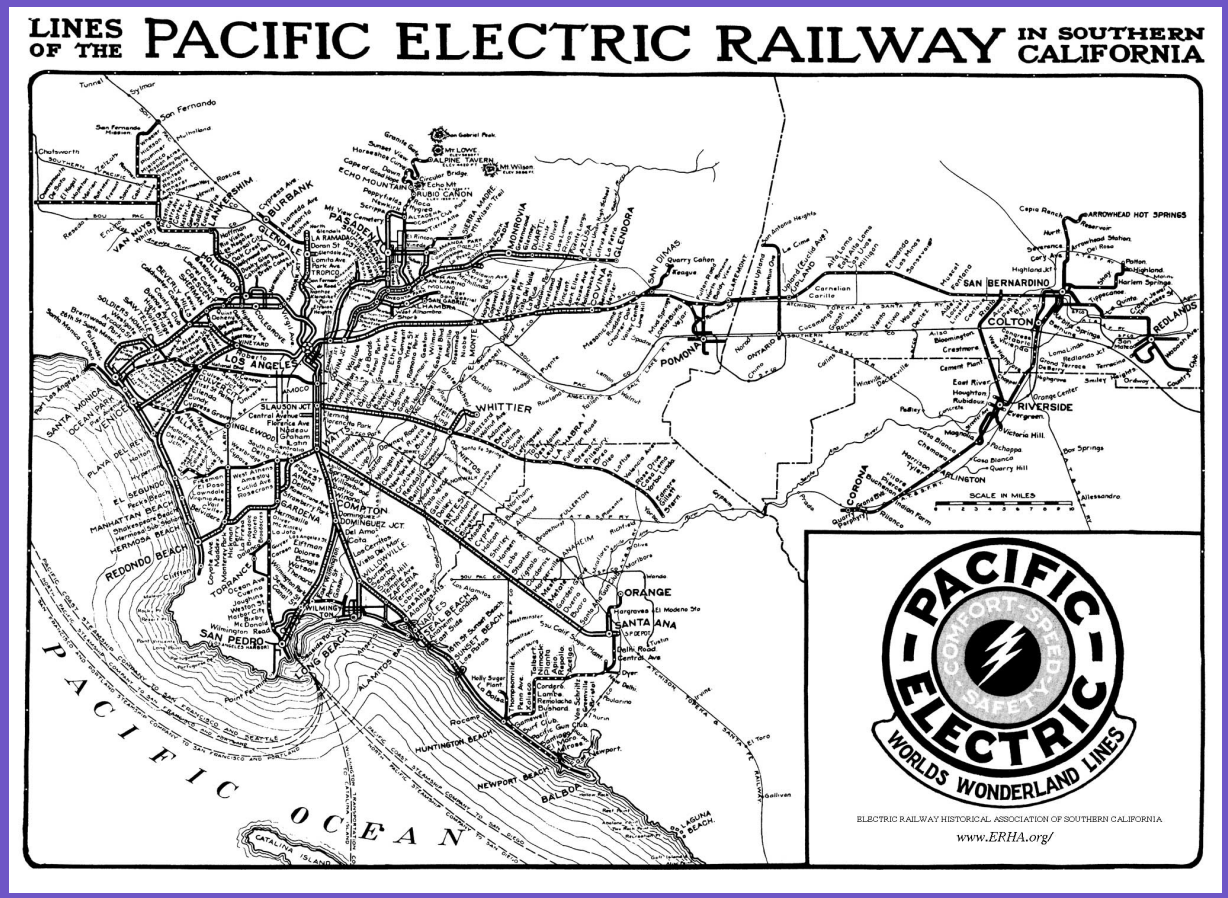
88 municipalities

9.8 million people

Metro

Light Rail Transit Then

Pacific Electric Railway



Service from 1901 to 1961

World's largest system with 1167 route miles/1878 route kilometers

2160 daily trains

10,000 daily trains in World War II

Metro

Light Rail Transit Then

Pacific Electric Railway

Used many different types of interurban and street tram vehicles

Electric power using trolley wire

Invented the “wig wag” crossing signal

Metro

Light Rail Transit Then

Pacific Electric Railway

Metro

Light Rail Transit Now

Los Angeles County Metropolitan Transportation Authority

Formed in 1993 via a merger of two agencies

Urban bus and urban rail service, with heavy rail transit and light rail transit

2438 buses

1433 square mile/3711 square kilometer service area

105 route miles/168 route kilometers of Metro Rail service

93 stations

1.1 million daily boardings

Metro

Light Rail Transit Now

Los Angeles County Metropolitan Transportation Authority

Railway/city line operations in Metro Rights of Way

High floor vehicles with up to three car consists

Metro

Light Rail Transit Now

Los Angeles County Metropolitan Transportation Authority

Limited street running operations

Electric power using pantograph and overhead contact system

Stations accommodate high floor light rail vehicles

Metro

Exposition Corridor Case Study

Los Angeles County Metropolitan Transportation Authority

Downtown Los Angeles to Downtown Santa Monica

Metro

Mid-City Segment

Exposition Corridor

Downtown Los Angeles to Culver City

Metro

Mid-City Segment

Exposition Corridor

Downtown Los Angeles to Culver City

Metro

Grade Crossing Policy

Exposition Corridor

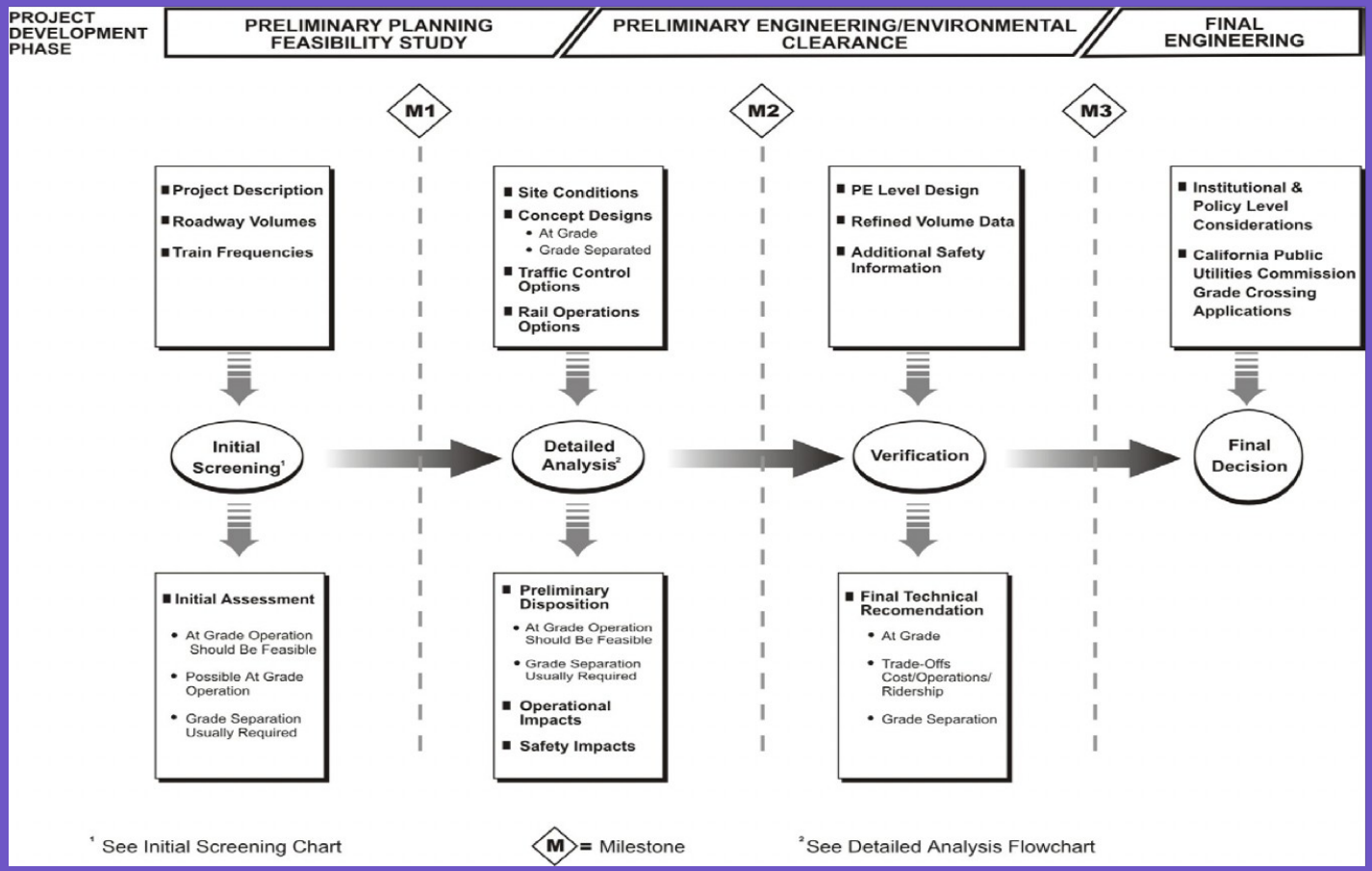
The Grade Crossing Policy is intended to provide a structured process for the evaluation of potential grade separations vs. at grade operation along light rail lines. The policy recognizes the operational and safety issues of at-grade versus grade-separated solutions as well as the institutional and monetary implications. It is recognized that local, state and federal government officials are involved in the process as well as the communities along the light rail line.

- *Developed as a response to concerns regarding both cross street vehicular safety and pedestrian crossing safety.*
- *Accident statistics along other rail lines were cited as cause for concern, particularly in areas where the line passes in close proximity to schools, parks and other community facilities.*
- *Special studies were conducted to identify best practices for light rail safety to inform the design of the Mid-City/Exposition project.*

Metro

Grade Crossing Policy

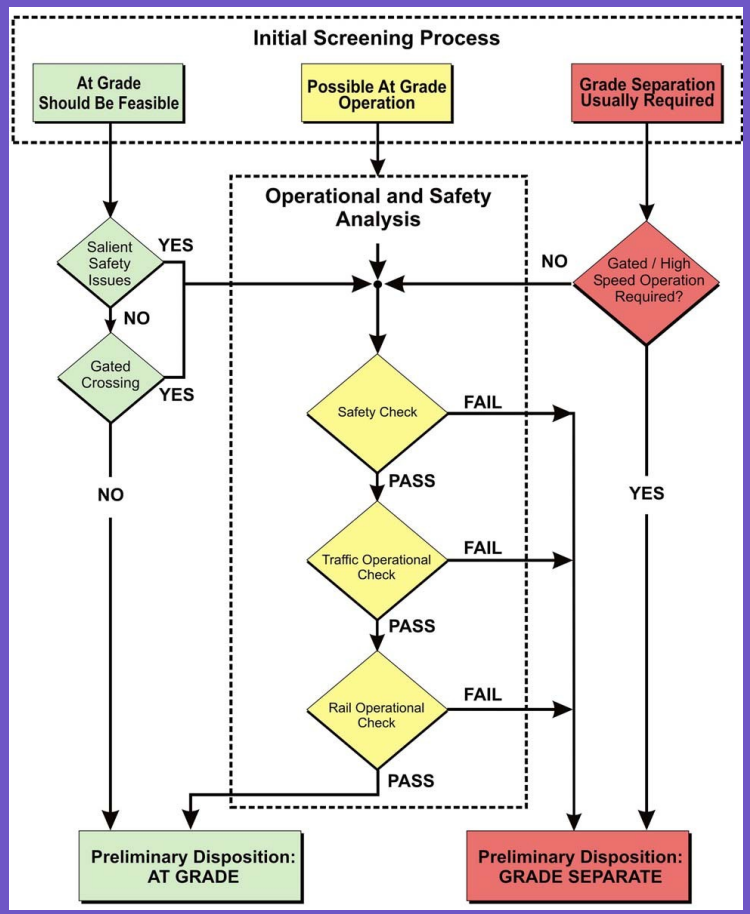
Exposition Corridor – Light Rail Crossing Review Process



Metro

Grade Crossing Policy

Exposition Corridor – Grade Crossing Review Methodology



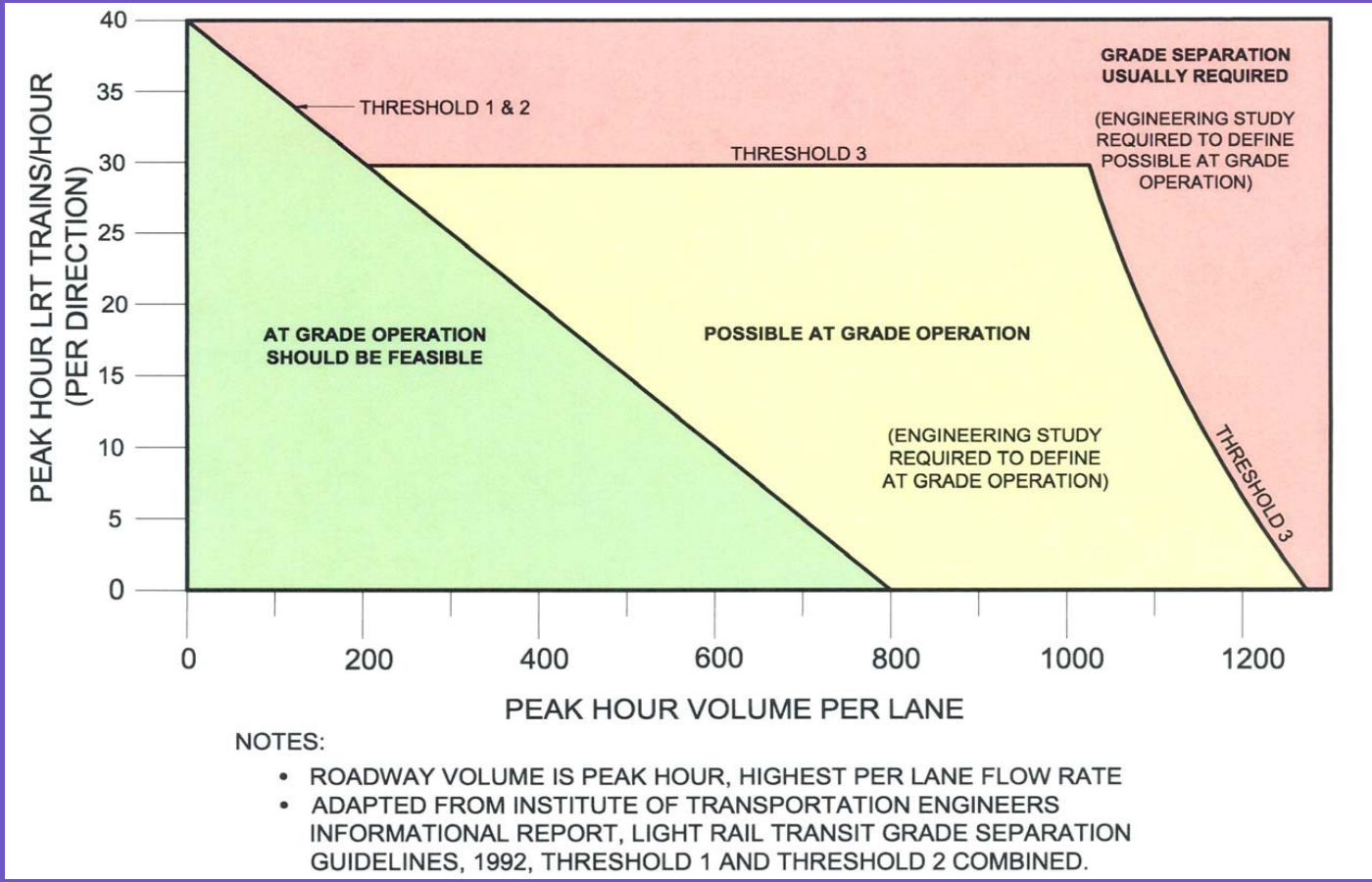
The results of the initial screening in Milestone 1 will result in one of three outcomes:

- *At Grade Operation should be feasible*
- *Possible At Grade Operation*
- *Grade Separation Usually Required*

Metro

Grade Crossing Policy

Exposition Corridor – Nomograph of Initial Screening



NOTES:

- ROADWAY VOLUME IS PEAK HOUR, HIGHEST PER LANE FLOW RATE
- ADAPTED FROM INSTITUTE OF TRANSPORTATION ENGINEERS INFORMATIONAL REPORT, LIGHT RAIL TRANSIT GRADE SEPARATION GUIDELINES, 1992, THRESHOLD 1 AND THRESHOLD 2 COMBINED.

Metro

Grade Crossing Policy

Exposition Corridor – Safety Concerns and Potential Mitigation

Safety Concern	Mitigation
Traffic Queuing	Anti-Queuing Traffic Control Measures; Grade Separation if None Feasible
Approach and Corner Sight Distance	Supplemental Active Warning Devices Reduce Allowable Train Speed
Visual Confusion/Sign or Signal Clutter	Removal of Unnecessary Signs/Signals
Prevailing High Traffic Speed	Control Traffic Speed with Traffic Signal Control or Enforcement
Large Truck Percentage	Restrict Truck Traffic. Improve Signing or Traffic Signal Timing to Keep Trucks Off Tracks
Heavy Pedestrian Volumes	Channelization, Active Warning Devices and Pedestrian Control Devices, Traffic Control Officers for Events
School Access Route	Channelization, Active Warning Devices and Pedestrian Control Devices, Education, and Crossing Guards
Emergency Vehicle Route	Identify and/or Provide Alternative Route Provide Remote Notification of Crossing Status
Accident History	Remedy Specific to the Accident Cause
Gate Drive Around Potential	Photo Enforcement, Medians, Four Quadrant Gates
Delineation and Roadway Marking	Increase Contrast at Crossing or Improve Delineation
Traffic Control Observance	Install Active Signs. Increase Enforcement

Safety concerns and potential mitigation will emerge as the result of the Initial Screening

Metro

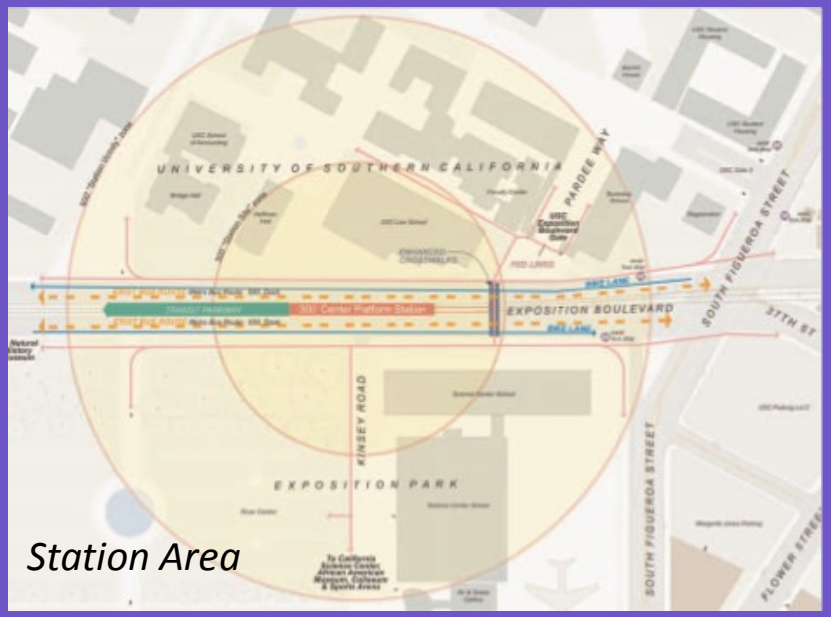
Street Running

Exposition Corridor Mid-City Segment

Metro

Street Running

Exposition Corridor Mid-City Segment



Station Area

At USC Exposition Park

Project Alignment

Metro

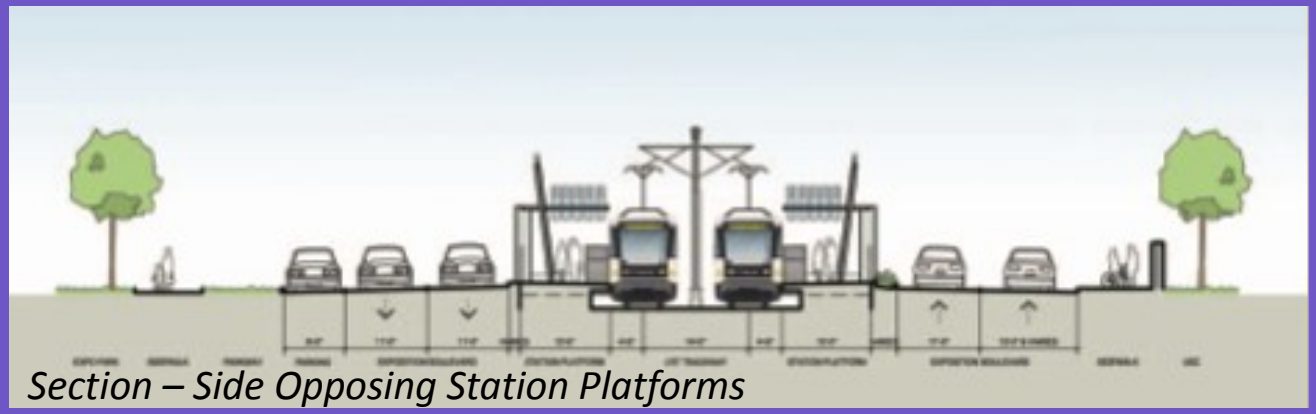
Street Running

Exposition Corridor Mid-City Segment

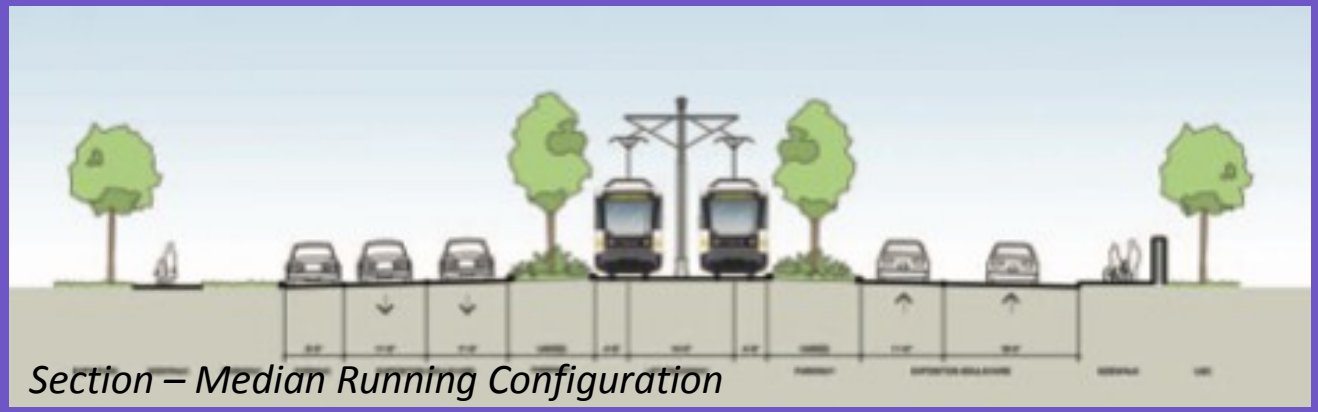
Metro

Street Running

Exposition Corridor Mid-City Segment



Section – Side Opposing Station Platforms



Section – Median Running Configuration

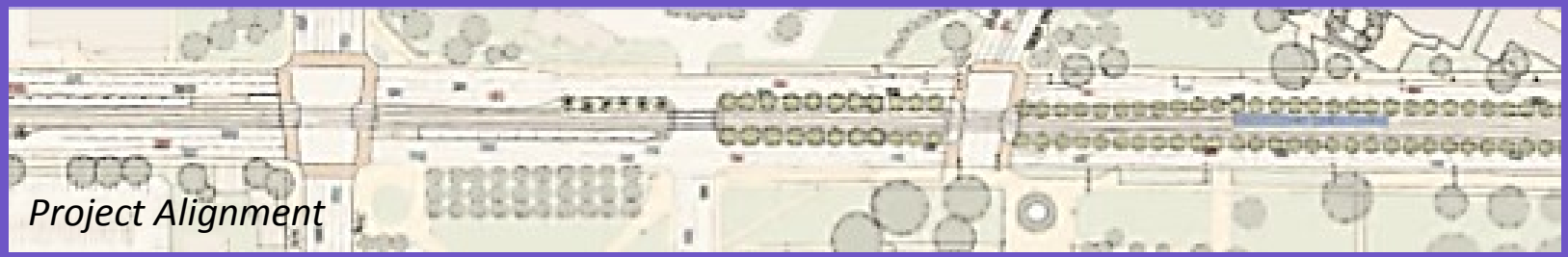
Metro

Street Running

Exposition Corridor Mid-City Segment

Station Area

At Vermont Station

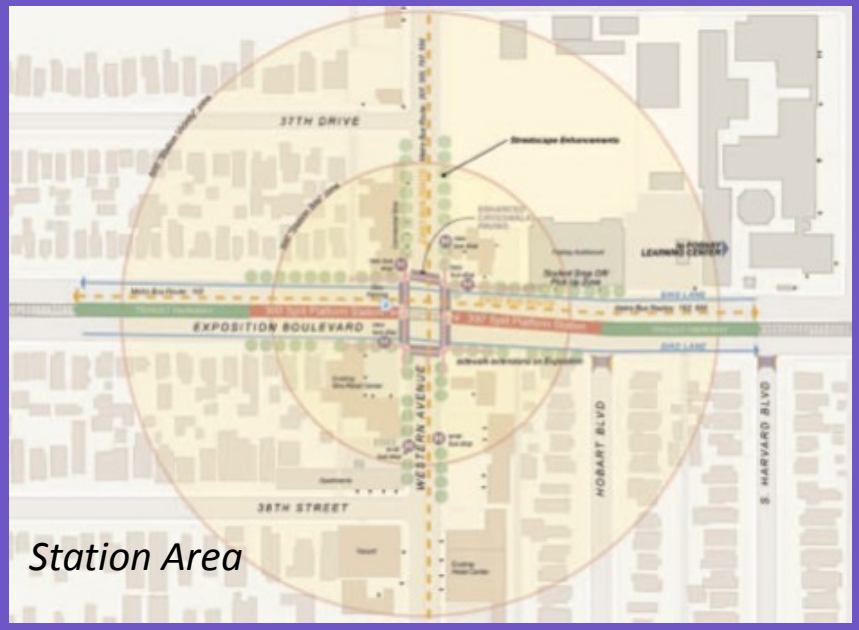


Project Alignment

Metro

Street Running

Exposition Corridor Mid-City Segment



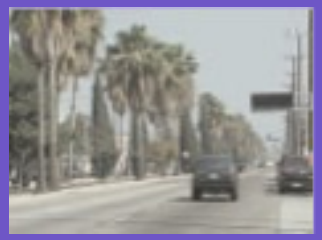
Station Area

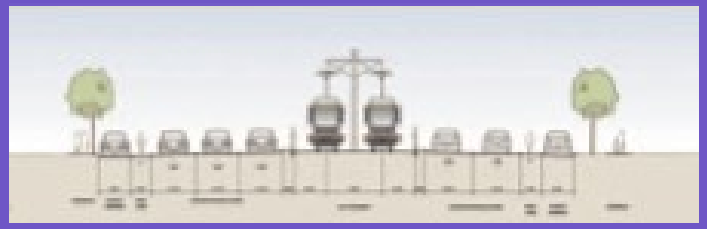
At Western Station

Metro

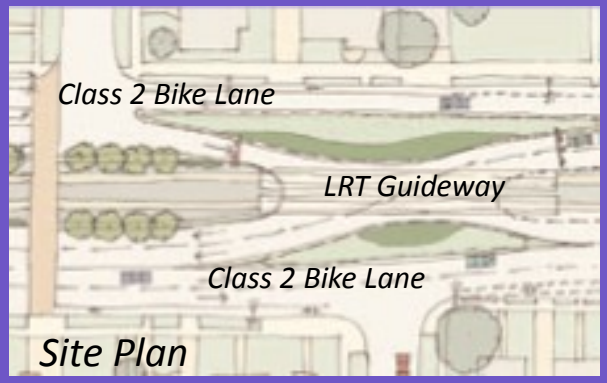
Street Running

Exposition Corridor Mid-City Segment





Between Western Station and Gramercy Place



Removal of two vehicular traffic lanes to allow for double track LRT alignment, bike lanes and transit parkway

Metro

Multimodal Safety, At-Grade Crossings

Exposition Corridor Mid-City Segment

A variety of techniques are available for enhancing pedestrian safety at light rail at-grade crossings.

The Project incorporates passive signing, pavement marking, and barrier channelization, including active warning devices, swing gates, and pedestrian gates into its pedestrian safety approach.

Metro

At-Grade Crossings, Signals and Gate Protection

Exposition Corridor Mid-City Segment

Four Quadrant Gates, typically located in Cab Signal Segment

Bar Signals and other city traffic and transit priority devices

Motorist Safety Signals

Metro

Standardized Station Design

Exposition Corridor

Factory Built Modular Station Canopies

High Floor Platforms with under platform refuge area

Metro

Operations Comparisons

Exposition Corridor – Line features and State of California requirements

Street Running Operations

- Operations governed by city traffic signal/transit priority control at grade crossings
- Non gated grade crossings
- LRT operations at 35 miles per hour/56 kilometers per hour or lower
- Green band transit signal priority to enable nonstop operations from station to station

Cab Signal Operations

- Operator call the gates down at each grade crossing
- Operations governed by railroad signal control
- Gated grade crossings
- LRT operations above 35 miles per hour/56 kilometers per hour
- Used in either pre-emption or priority mode

Metro

Summary

Exposition Corridor Mid-City Segment

- Street running operations for five miles from Downtown Los Angeles to Gramercy Place
- Grade Crossing Policy determined that out of 27 grade crossings, three crossings were warranted for grade separation
- Removal of two traffic lanes due to existing low traffic volume allows for double track LRT alignment and parkway
- Class 2 bike lanes built parallel to LRT alignment

- Signal and train delays due to frequent station stops from Vermont eastbound to Downtown Los Angeles
- Less signal priority than anticipated upstream and complications from having a downtown terminal resulted in slower speeds and delay

- Forty one accidents in the entire corridor from 2014 to 2017
- Out of the total, 19 accidents occurred in the Mid-City segment from Flower St. to Gramercy Place, 13 were Metro and vehicle collisions, and 6 were Metro and pedestrian collisions

Metro

Vision for the future

I look forward to your input on lessons learned for Urban Insertion best practices for Light Rail Transit

Metro

Merci

Anthony Loui
Metro Operations Liaison Office
Los Angeles Metro
One Gateway Plaza
Los Angeles, California 90012-2952 USA
+1 213-418-3273
louia@metro.net

Metro