

ITE- North Dakota State University Chapter

Presenting

Enhancing Network Traffic Flow
by Connecting Railroad
Preemption with Advanced
Traveler Information System

Current System Overview

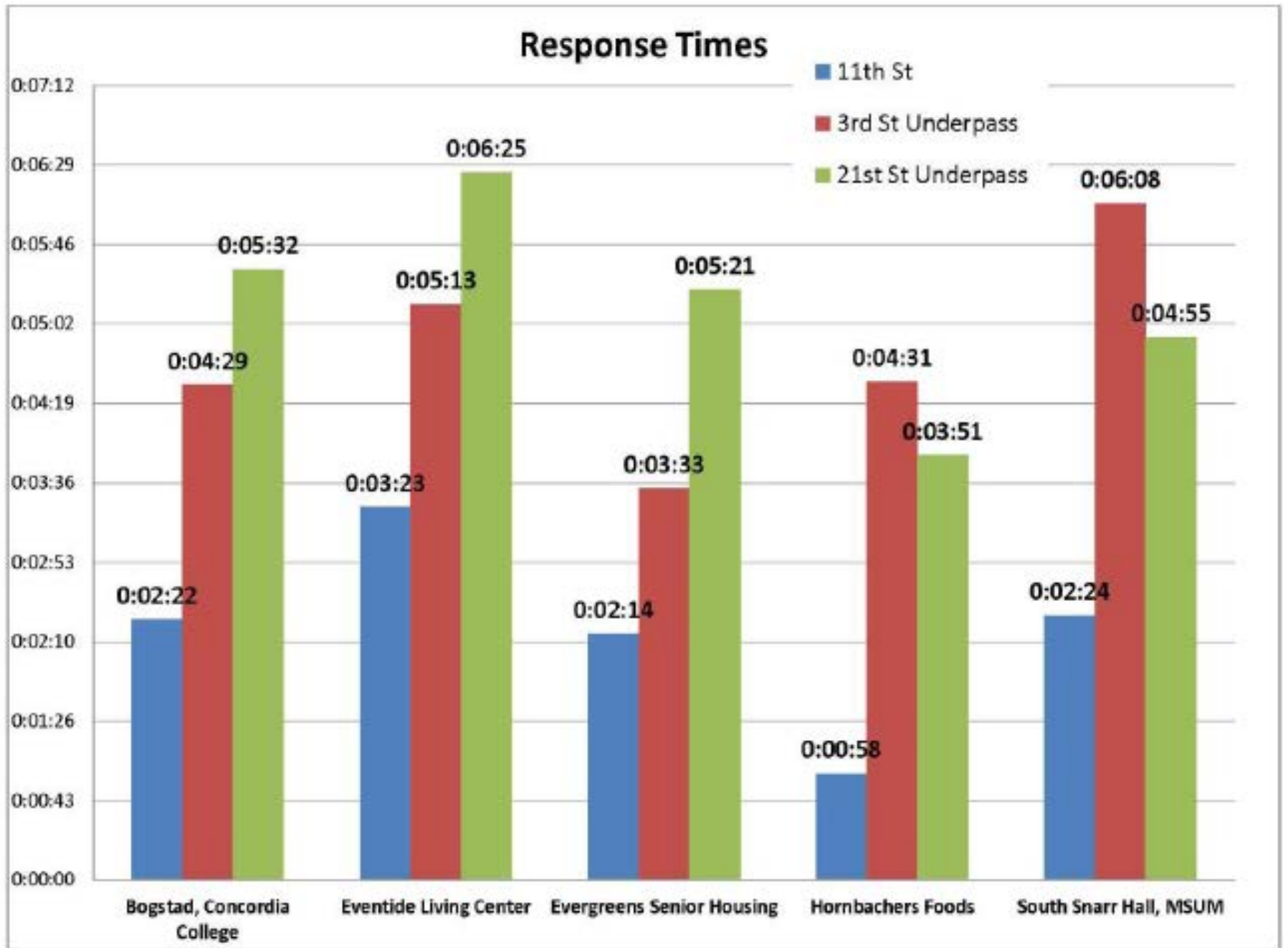


The Problems

22 At Grade Rail Crossings

Four Options for Drivers:

- i. Find an Alternative Route
- ii. Abrupt Lane Change
- iii. Wait for the Train to Leave
- iv. Block the Principal Arterial

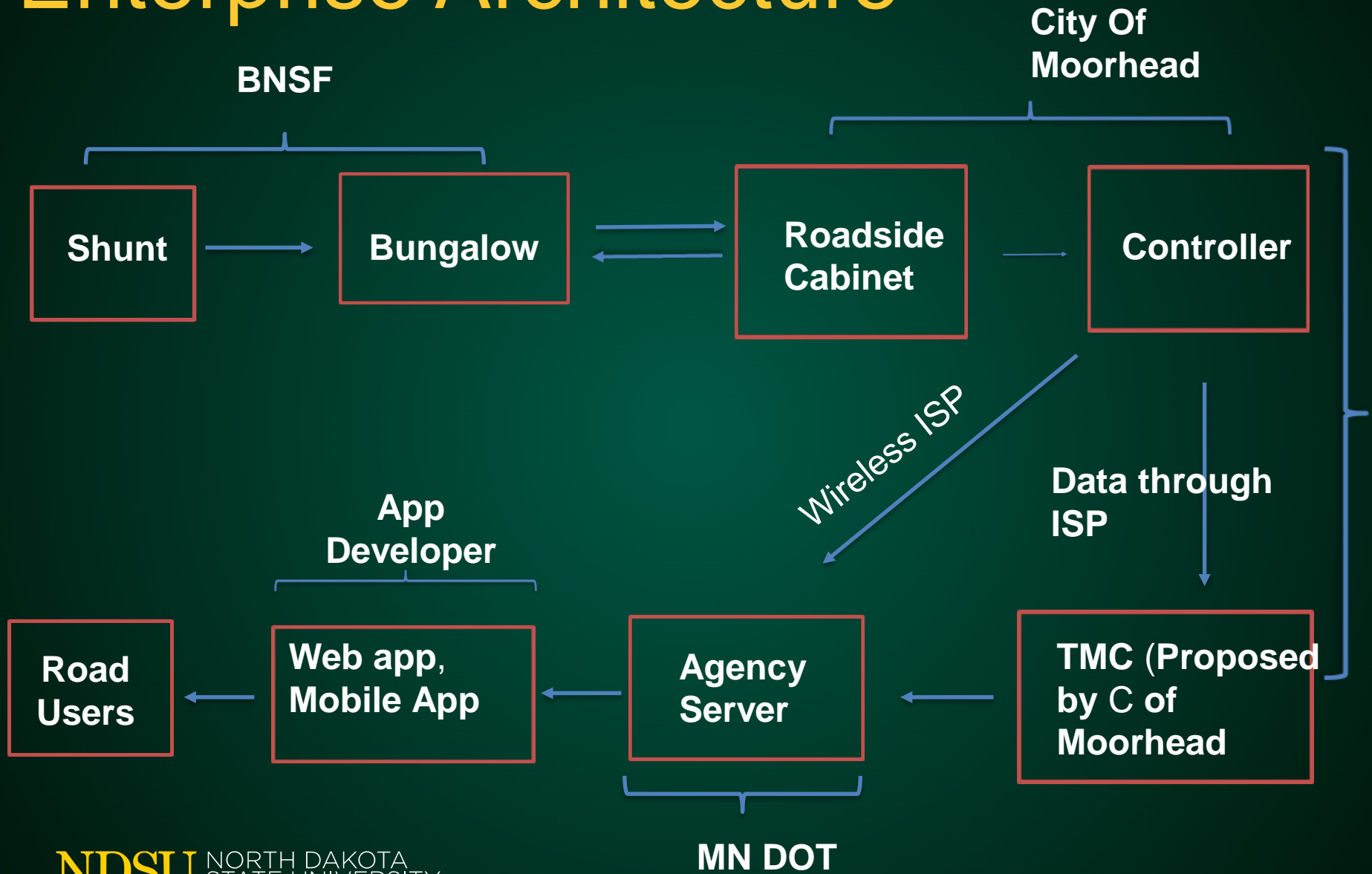


Source: City of Moorhead Fire Department 2015

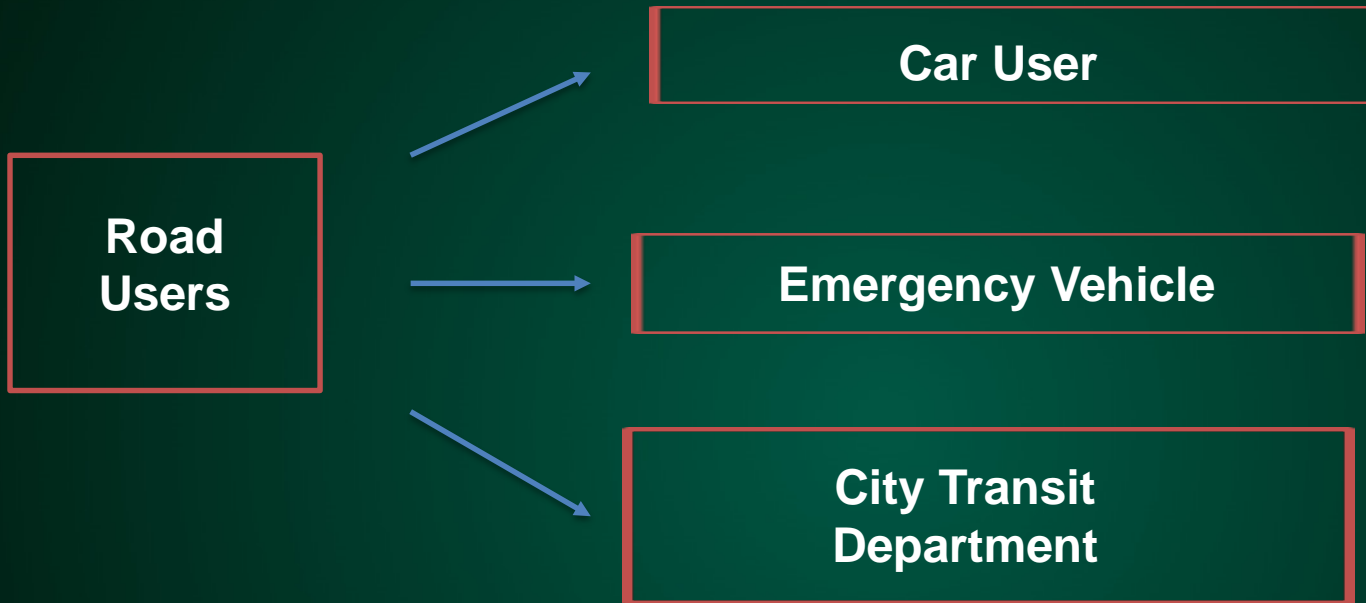
Proposed Solution

- Provide Travelers Information
 - Pre-trip
 - En-route
- Web application
- Mobile Application
 - Android
 - IOS

Enterprise Architecture



Enterprise Architecture (Cont.)



Physical Architecture

Shunt



BNSF
Bungalow



Cabinet



App



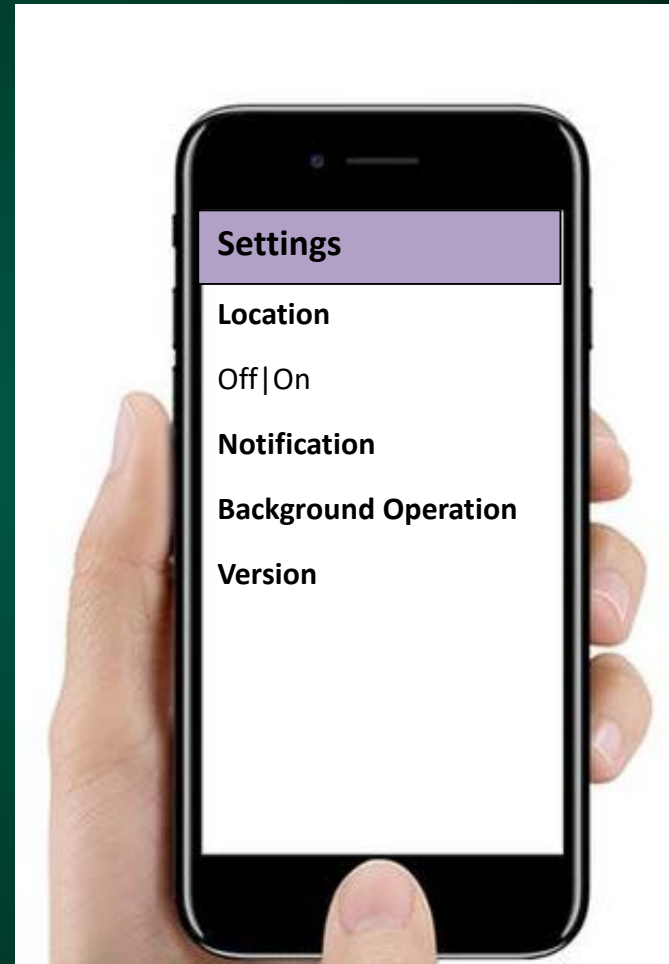
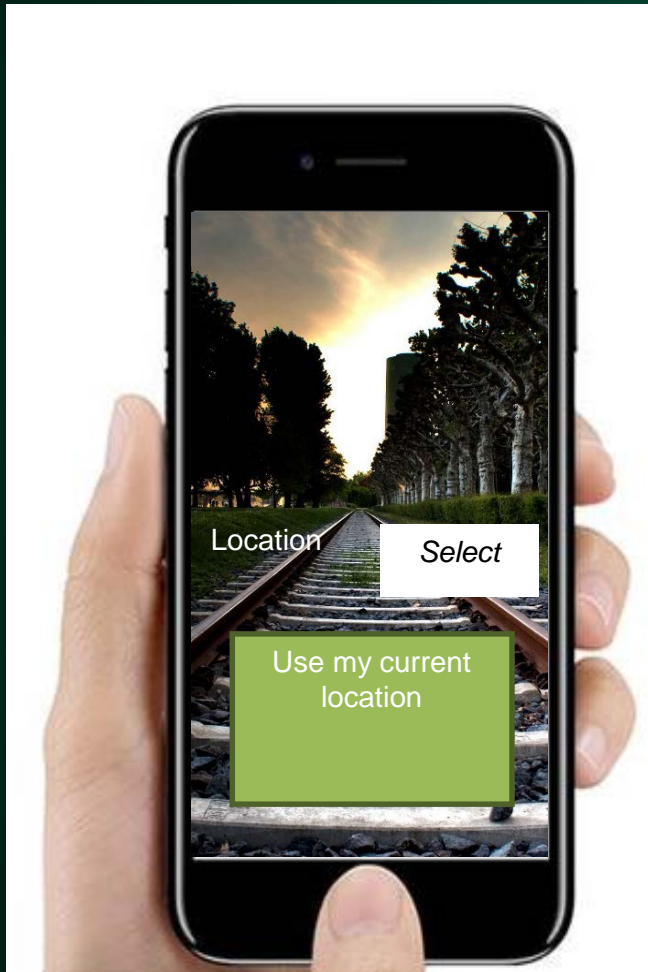
Server



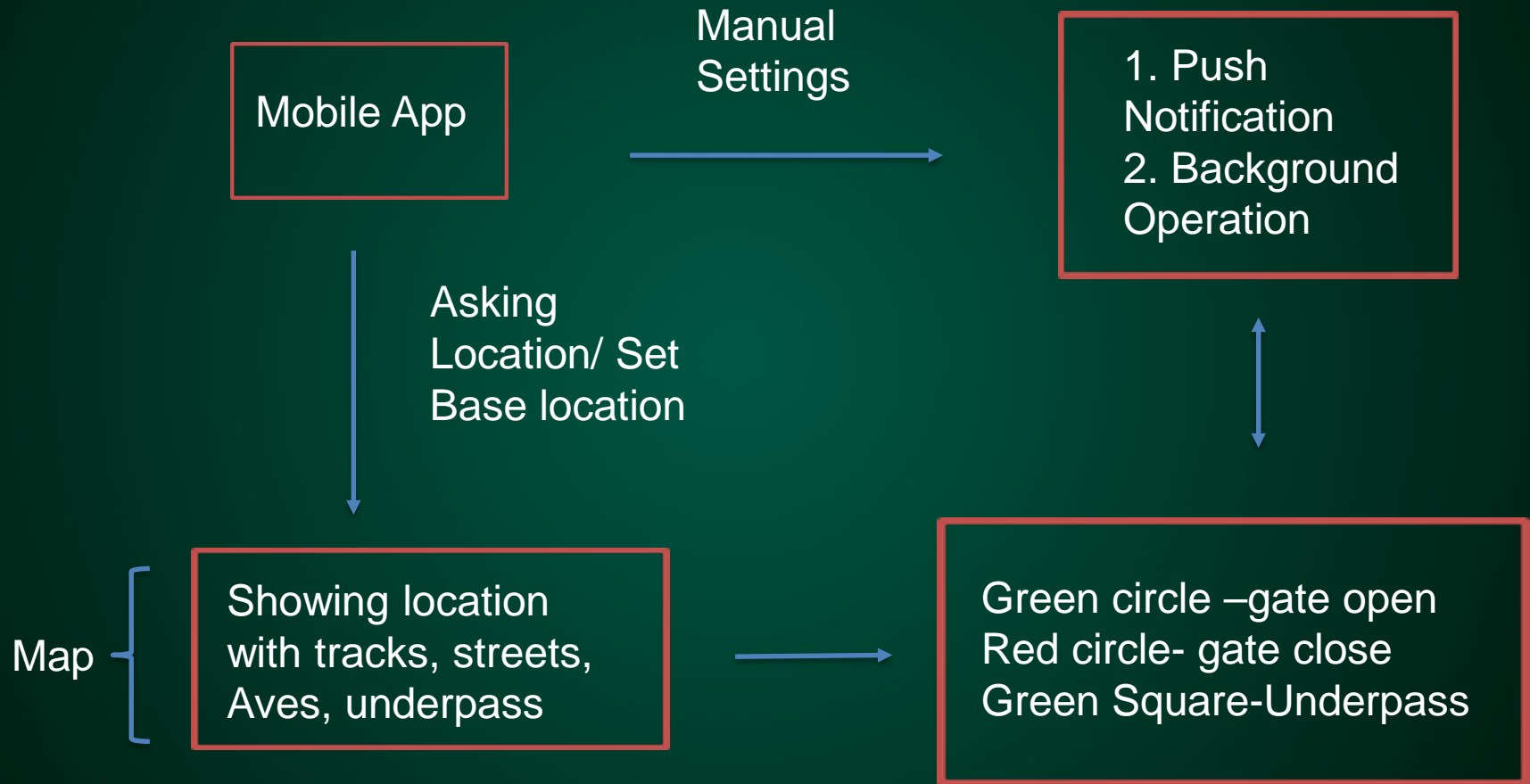
Controller



Physical Architecture (Cont.)



Physical Architecture (Cont.)



Physical Architecture (Cont.)



- = Closed Gate
- = Open Gate
- = Underpass

Functional Architecture

- Shunt
 - Track Circuitry
 - Train incoming Relay
- Roadside Cabinet
 - Advance Preemption Relay
 - Controller notification
- Agency Server
 - TMC
 - Wireless ISP
- Application
 - RESTful API

Work and Budget Estimation

ITS Device Type	Installation Cost (\$)	O&M Cost (\$ per year)
Transportation Management Center	2,471,000	371,000
Wireless ISP (for each)	<u>2,500</u>	<u>200</u>
Strip heater	<u>200</u>	<u>500</u>

Source: ITS JPO Costs Database 2015
(<https://www.itscosts.its.dot.gov/its/benecost.nsf/CostHome>)

Adaptability, Flexibility, and Utility of the System

- Use of Existing Structure
- Deals with Real-time Data
- Cost Effective (Access with a Smartphone)
- Minimum Physical Maintenance
- Safe One-way Communication
- Environment Friendly
- Potential for Future Integration

Question

