HOUSTON PUBLIC WORKS

CITY OF HOUSTON

Intelligent Transportation Systems (ITS) Master Plan

Presented By:

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Kimley»Horn

Expect More. Experience Better.

AGENDA

- Introduction & Vision
- History of Project
- Goals & Objectives
- CIP Implementation
- Conclusion & Next Steps

Introduction & Vision

ITS Master Plan

▶ The Purpose

The Plan evaluates current infrastructure, identifies critical gaps, and charts a strategic, actionable path forward.

▶ Strategic Goals

- Safety (Vision Zero)
- Reliability
- Smart Analytics (Data)
- Future-Proofing

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Why This Plan Matters

- Houston is the 4th largest city in the U.S.
- Growing population and increasing congestion
  - 9.8% population increase from 2010 to 2020 (Census)
- Aging Infrastructure
- Increasing weather events
- Need for safer, smarter mobility

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Houston Transportation at a Glance

6,000+ Lane Miles	**2,400+** Traffic Signals	**600** Bluetooth Readers
92 Dynamic Message Signs	**141** Mid-Block Counters	**163** CCTV Cameras

Communications Network
Fiber and Cellular

Central ATMS

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Regional Synergy Through Houston TranStar

TMCs serve as a central location for everything traffic related

▶ Houston TranStar

Partnership of representatives from the regional consortium of City of Houston, Harris County, METRO, and TxDOT.

▶ 2200 Patterson Street

Acts as the City of Houston's secondary Traffic Management Center: backup location.

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Major Issues Identified

1. **Unreliable Communications Infrastructure**
   Wireless dependency & network gaps
2. **Critical Detection Deficiencies**
   Outdated or missing
3. **Limited Real-Time Monitoring**
   Lack automated alerts
4. **Performance Tracking Gaps**
   Insufficient data collection
5. **Data Limitation**

Project Goals & Objectives

1

Provide and improve safety and mobility to the high injury network

2

Promote travel information technology

3

Rely upon a combination of technologies for communications required to interface with field devices

4

Establish a strategic plan for moving forward

5

Identify how the City can implement Smart Work Zones

6

Identify connected and automated vehicle (CAV) investment opportunities


Performance Measurement
06
Reporting to provide feedback for maintenance, improvement, and ongoing operations
Communication
01
Communicate about the transportation network with COH, public, partners and third parties
Manage ITS
05
Manage the ITS System and databases to ensure uptime and performance
The ITS System
Monitoring
02
Collect data from devices and sensors regarding current conditions
Manage Traffic
04
Under normal conditions, special events and construction activities
Controlling
03
Control field devices to operate systems

CIP Implementation

Top 10 Projects:

1. Communications Master Plan
2. Model Corridor
3. Houston TranStar/Patterson Network Redundancy & Failover Upgrades
4. Fiber Expansion
5. Detector Upgrades
6. Data Management Improvements
7. High Water Detection & Warning System
8. Performance Measures Plan
9. Railroad Crossing Detection & Warning System
10. CAV Pilot - Smart Work Zones

PROJECT 1

Communications Master Plan

HIGH

Develop comprehensive Communications Master Plan

PROJECT 2

Model Corridor

HIGH

Develop, implement, and assess complete and integrated Active Arterial Management System on a select corridor

Model Corridor

Mainlane Detection System

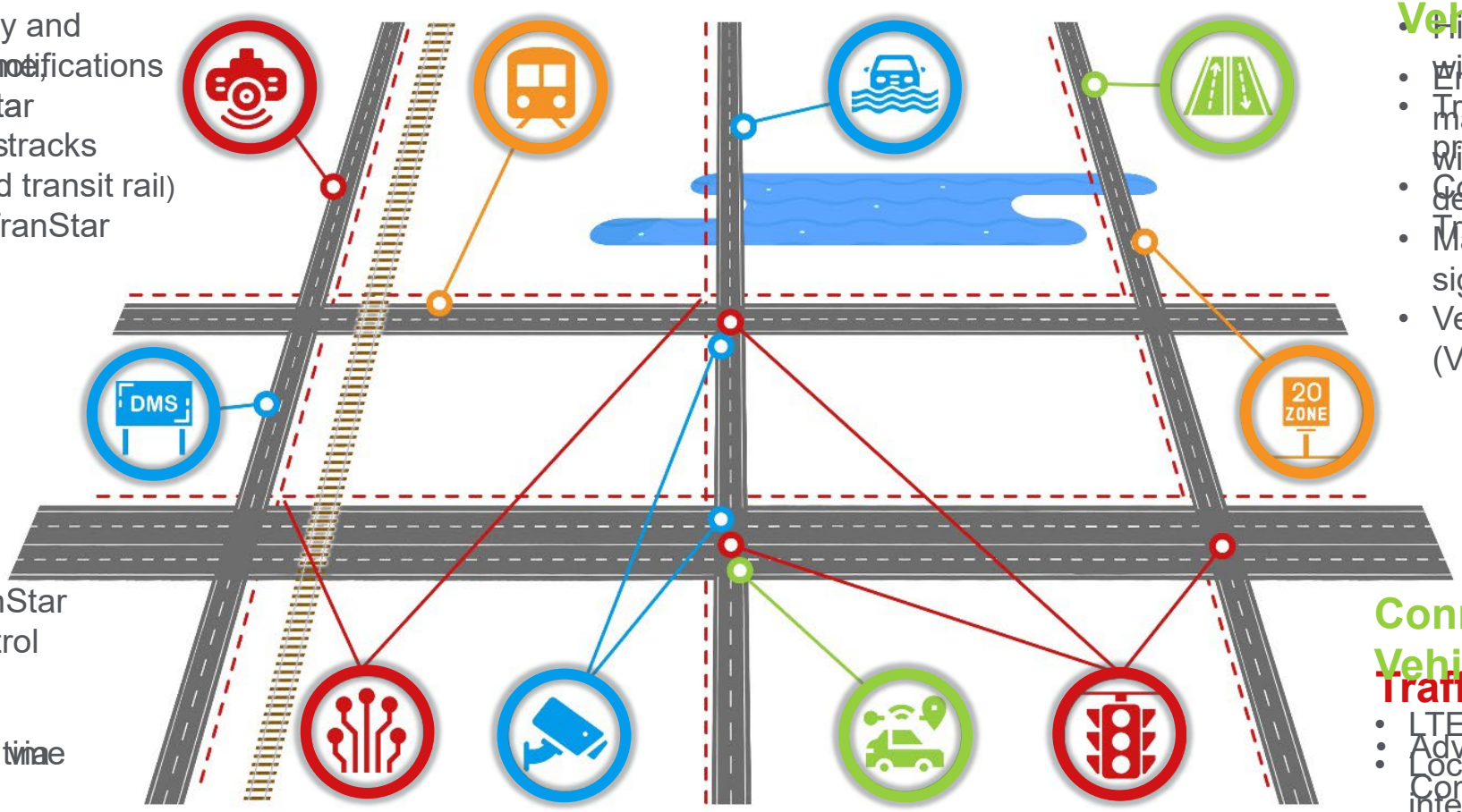
- Monitors traffic volume, speed, and occupancy
- Collects real-time data and sends to TranStar
- Applies to all active tracks (controlled by City and transit rail)
- Communicates to TranStar

Dynamic Message Signs

- Used to communicate directly to motorists
- Advanced traveler information
- Communicates to TranStar for command and control
- Located at signalized intersections
- All field devices are connected to TranStar via fiber optic
- Used for motorist traffic, operations can be managed

Closed-Circuit TV Cameras

Communication



Flood Detection

Automated Vehicle Support

- High water monitoring with alarms
- Triggers gates to prevent entry
- Communicates to TranStar

Enhanced pavement markings per TMUTCD with high visibility to clearly define lanes

- Machine-readable traffic signs
- Vehicle-to-Infrastructure (V2I) communication

School Zone Flasher

- Located near active schools
- Monitored and controlled by TranStar

Connected Vehicle Support

Traffic Signal

- LTE-based CV2X technology
- Advanced Traffic Signal Controller
- Located at signalized intersections
- Provides operations
- Disperses SPaT, MAP, and TIM data
- Collects performance measure data
- Communicates with local traffic signal and TranStar

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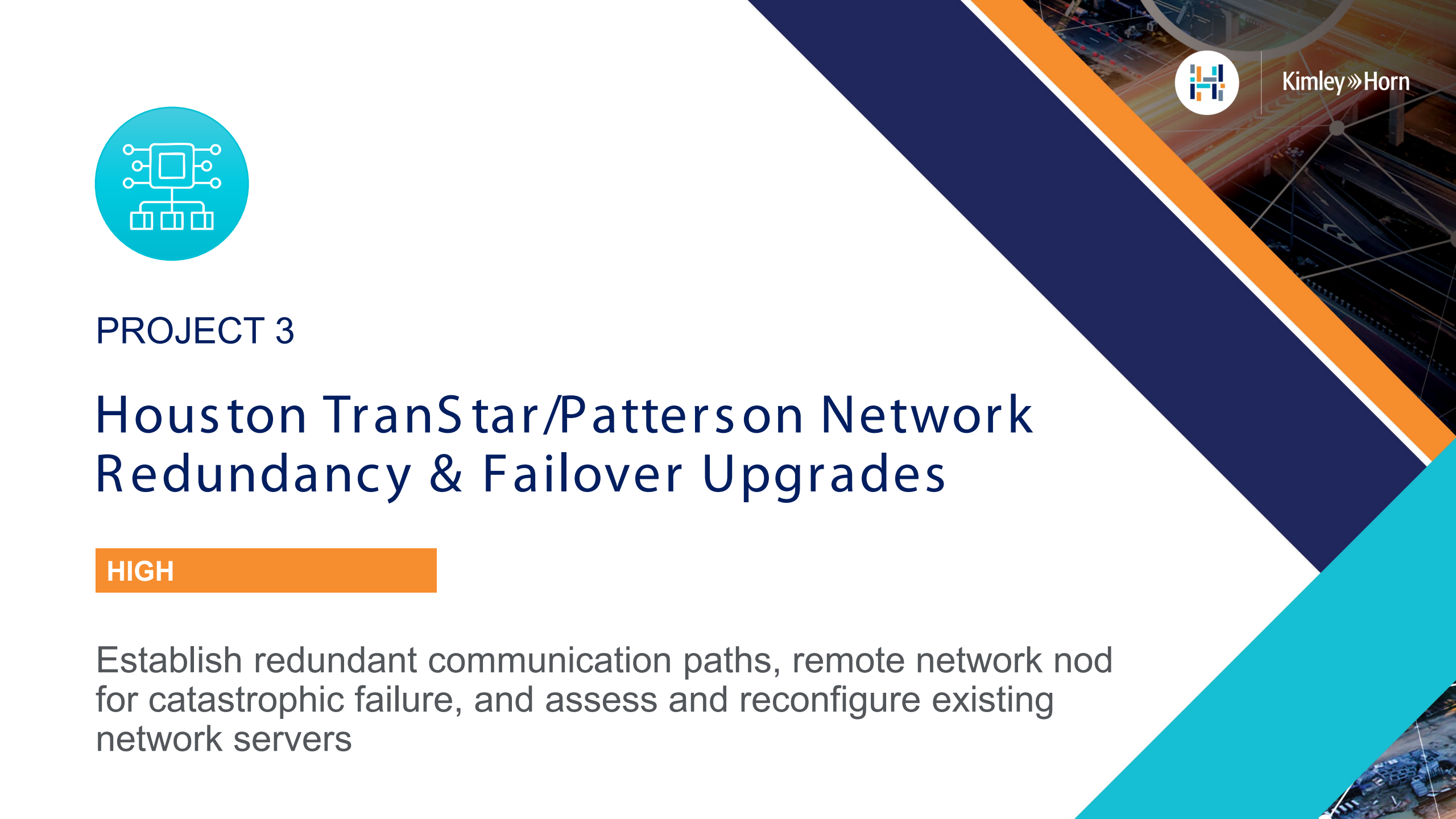

PROJECT 3

Houston TranStar/Patterson Network Redundancy & Failover Upgrades

HIGH

Establish redundant communication paths, remote network nod for catastrophic failure, and assess and reconfigure existing network servers

Recommended Best Practices

- Standard Operating Procedures (SOPs)
- Travel Information Dissemination
- Cybersecurity Audit & Policy with Monitoring & Quality Assurance
- Formalize Inter-Agency Agreements
- CAV Preparedness

Conclusion & Next Steps

- Amended IDM: Fiber Expansion
  - New signalized intersections or Rebuilds: tie into existing fiber requirement
- Deploying new communications switch
  - The new switch is more reliable
  - Field hardened equipment
- Connected Vehicle Partnership
  - Saving Lives with Connectivity federal grant
  - TTI & Paradigm
  - Early Stages

Thank you!

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Questions?

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PROJECT 4

Fiber Expansion

MEDIUM

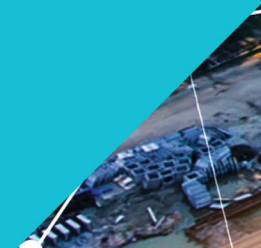
Plans, Specifications, and Estimates (PS&E) for design and installation of fiber optic cable, ethernet communications equipment, and integration of existing devices

PROJECT 5

Detector Upgrades

MEDIUM

Establish condition status criteria for intersections, rank in order of need, develop multi-year upgrade/replacement plan



PROJECT 6

Data Management Improvements

MEDIUM

Create a database to store and manage data

PROJECT 7

High Water Detection & Warning System

MEDIUM

Install flood warning systems at identified locations across the Houston area

PROJECT 8

Performance Measures Plan

LOW

Develop the following:

1. Data Collection Plan
2. Safety Performance Measures Plan
3. Operations Performance Measures Plan
4. Maintenance Performance Plan

PROJECT 9

Railroad Crossing Detection & Warning

LOW

Study and PS&E development for the installation of train monitoring system to enhance operations near railroad crossings

PROJECT 10

CAV Pilot – Smart Work Zones

LOW

Optimize AI Glance functionality for driver alerts