

City of Plano – Diamond Safety Improvements

Jacob Shelton P.E.

April 10th, 2026

PAPE – DAWSON



Jacob Shelton, P.E.
Project Engineer
6 years of experience



Background

- 6 years of experience (Pape-Dawson for 3 years)
- Oregon Institute of Technology Civil Engineering Undergraduate ('19)
- TexITE Dallas Chapter Member
- Professional Engineer – ('24)

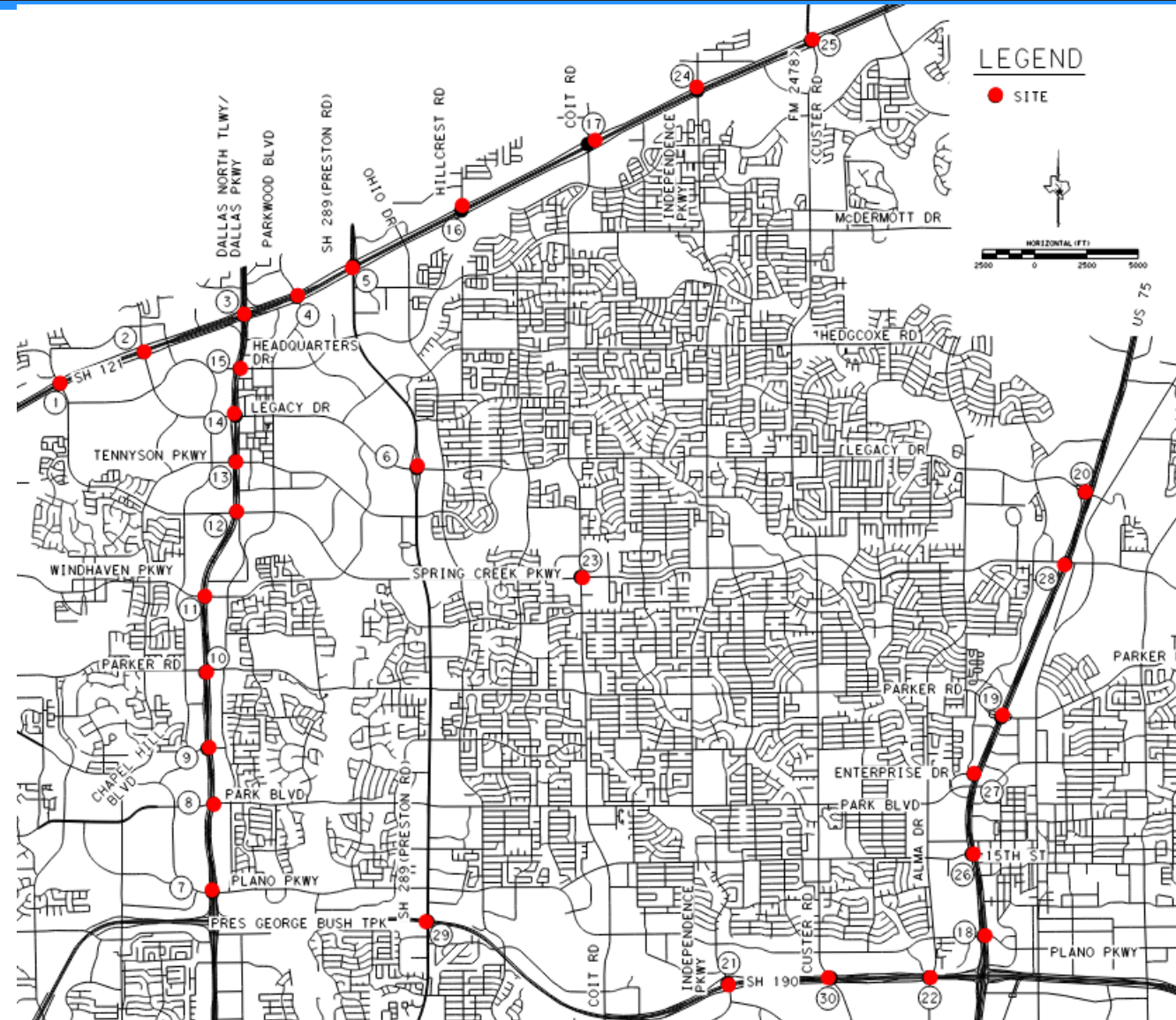


My Experience

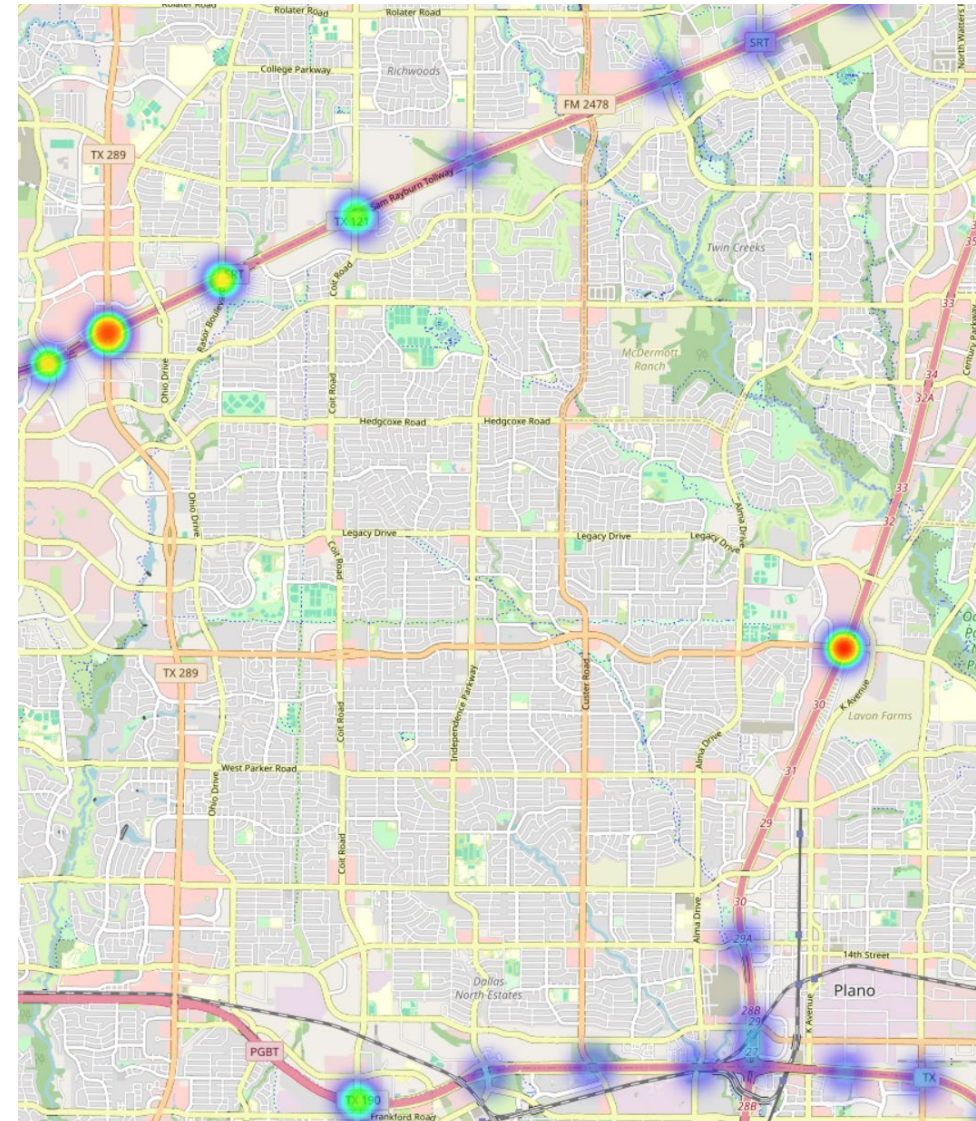
- **Analysis**
 - Corridor Studies, Signal Timing, Safety, Schools
- **Design**
 - Signing, Pavement Markings, ITS, Traffic Signals, Minor Roadway Design
- **Clients**
 - TxDOT – San Antonio, Corpus, Houston, Dallas, Fort Worth
 - Municipal - City of New Braunfels, San Antonio, Corpus, Austin, Dallas, Plano, Frisco, Bexar County Highway Safety Improvement Program
 - Private – Home Builders, Commercial Developers, Event Venues

Project Background

- Citywide safety initiative across 30 diamond interchanges
- Aligned with TxDOT and NCTCOG wrong-way driving prevention standards
- Need for a unified, standardized design approach
- Focus on safety, driver expectancy, and operational consistency



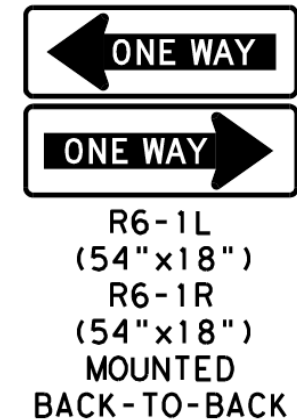
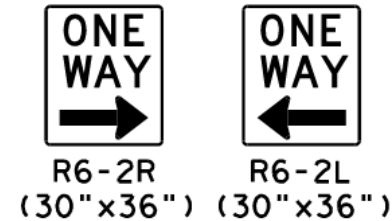
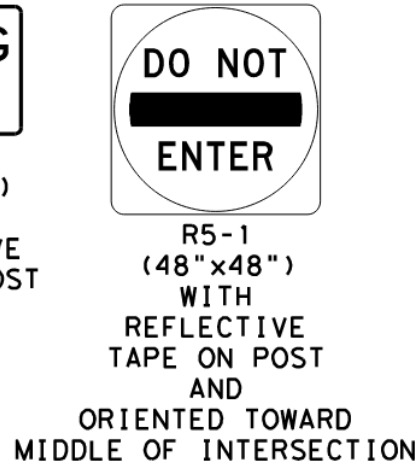
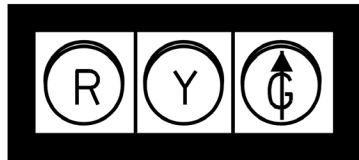
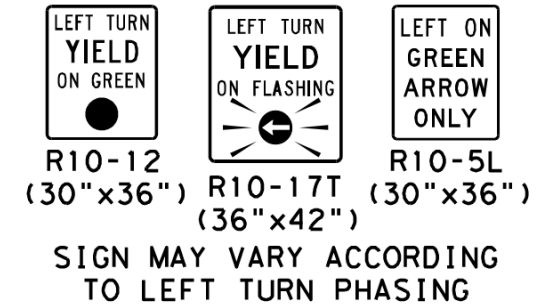
- **Patterns at diamond intersections**
 - Sub searched for wrong way and wrong lane related intersection crashes
 - Some intersections are showing eight or more crashes over the past five years with just this criteria
- **Systemic issue across Plano and diamond intersections in the area**



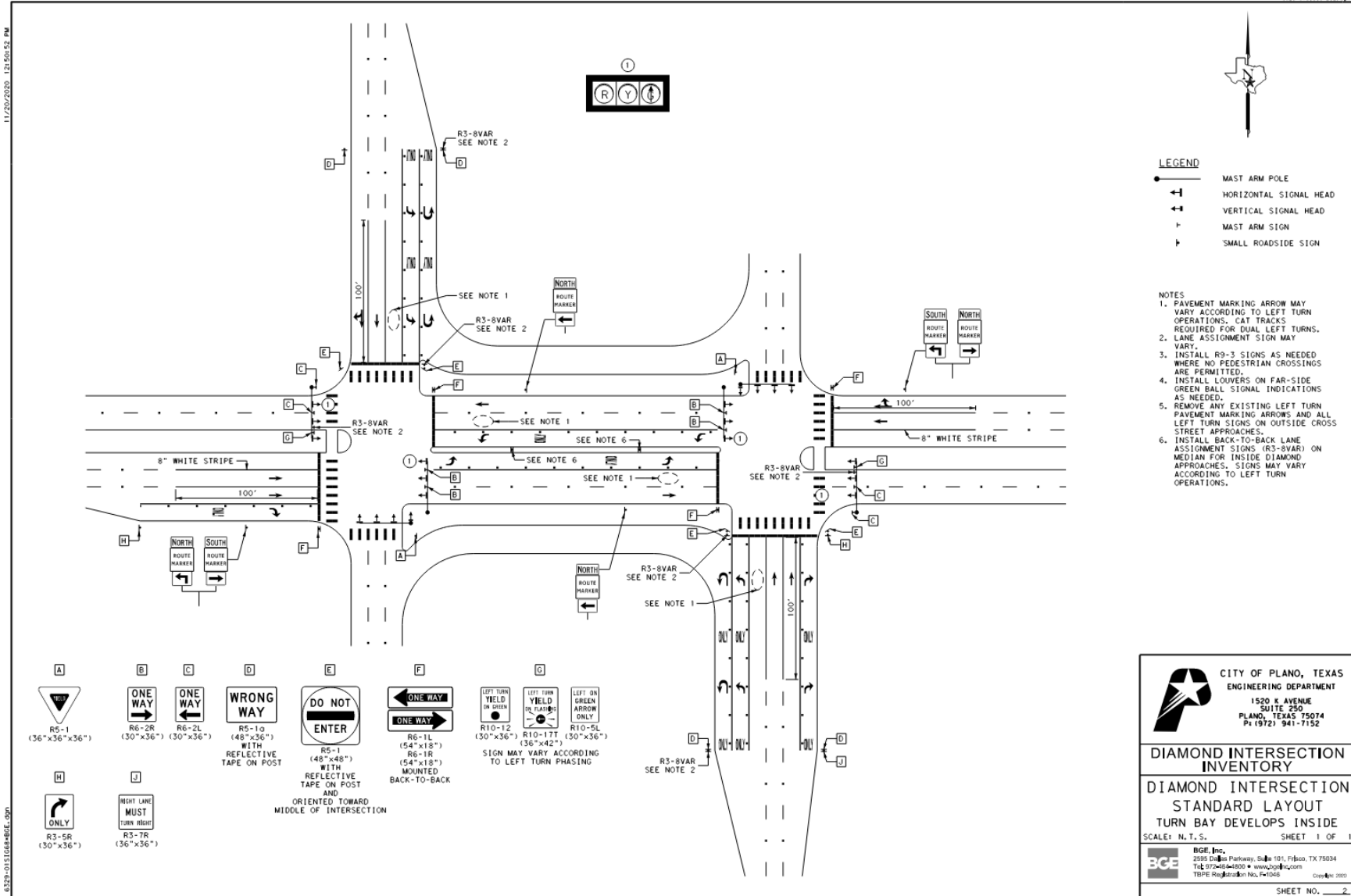
Creating The Template

Standardization Approach

- Developed two standard layouts
- Consistent driver expectancy across all sites
 - Signal Head Assignments
 - One Way Signage
 - Wrong Way Signage
 - Pavement Markings



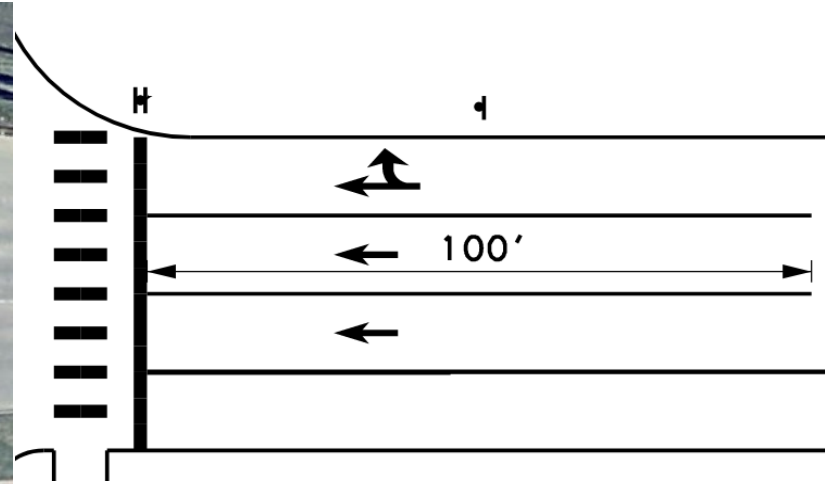
Standard Layouts



Changes from Today

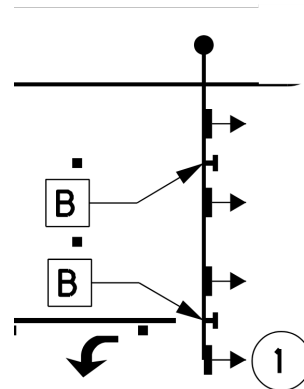
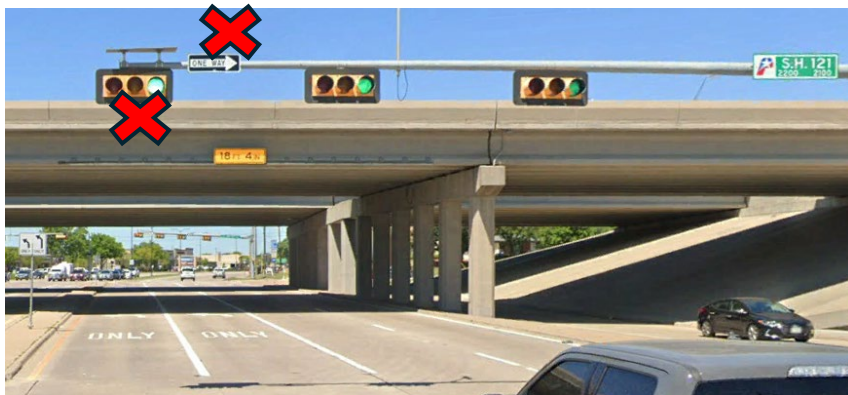
Lane Use Arrows

- Left Turn Lanes on Approaches no longer have Arrow Markings
- Thru movements marked with arrows throughout diamond



Signal Heads and Signage

- Lanes to proceed through intersection receive a Green Up arrow to further indicate vehicles to travel straight through intersection.



Project Approach

- **Wrong-way driving risk at diamond interchanges**
- **Inconsistent signing, markings, and signals**
- **Driver confusion due to varying layouts**
- **Crash patterns tied to wrong-way movements and lane assignments**

- **Field reviews at all locations**
- **Validated existing conditions efficiently**
- **Confirm existing conditions against as built**
- **Well Documented Findings**

SH 121 at Preston Road – Field Notes and Recommendations

SH 121 SBFR at NB Preston Road:

- Westbound (SH 121) Approach
 - Missing Wrong Way sign assembly near beginning of U-turn lane
 - U-turn pavement arrow and “ONLY” closest to stop bar faded due to construction
- Northbound (Preston) Approach
 - Missing left-side Wrong Way sign assembly near beginning of channelized left
 - “ONLY” markings for left turn lane are faded.
 - Yield line for channelized left turn is faded.

SH 121 NBFR at NB Preston Road:

- Eastbound (SH 121) Approach
- Northbound (Preston) Approach
 - Missing Right Only sign for right turn lane.

SH 121 NBFR at SB Preston Road:

- Eastbound (SH 121) Approach
 - Missing Wrong Way sign on back side of U-turn Only sign
- Southbound (Preston) Approach

SH 121 SBFR at SB Preston Road:

- Westbound (SH 121) Approach
- Southbound (Preston) Approach
 - Missing Right Only sign for right turn lane.

Field Verification Approach

- BGE 360 Camera video feed enabled rapid systemwide review



Existing Conditions (Field Findings)

- **Missing or poorly placed Wrong Way / Do Not Enter signs**
- **Missing One Way signage**
- **Inconsistent signal indications (green ball vs arrow)**
- **Lack of clear lane assignments**
 - Faded/ Missing Arrows
 - Missing lane use signage

Signals

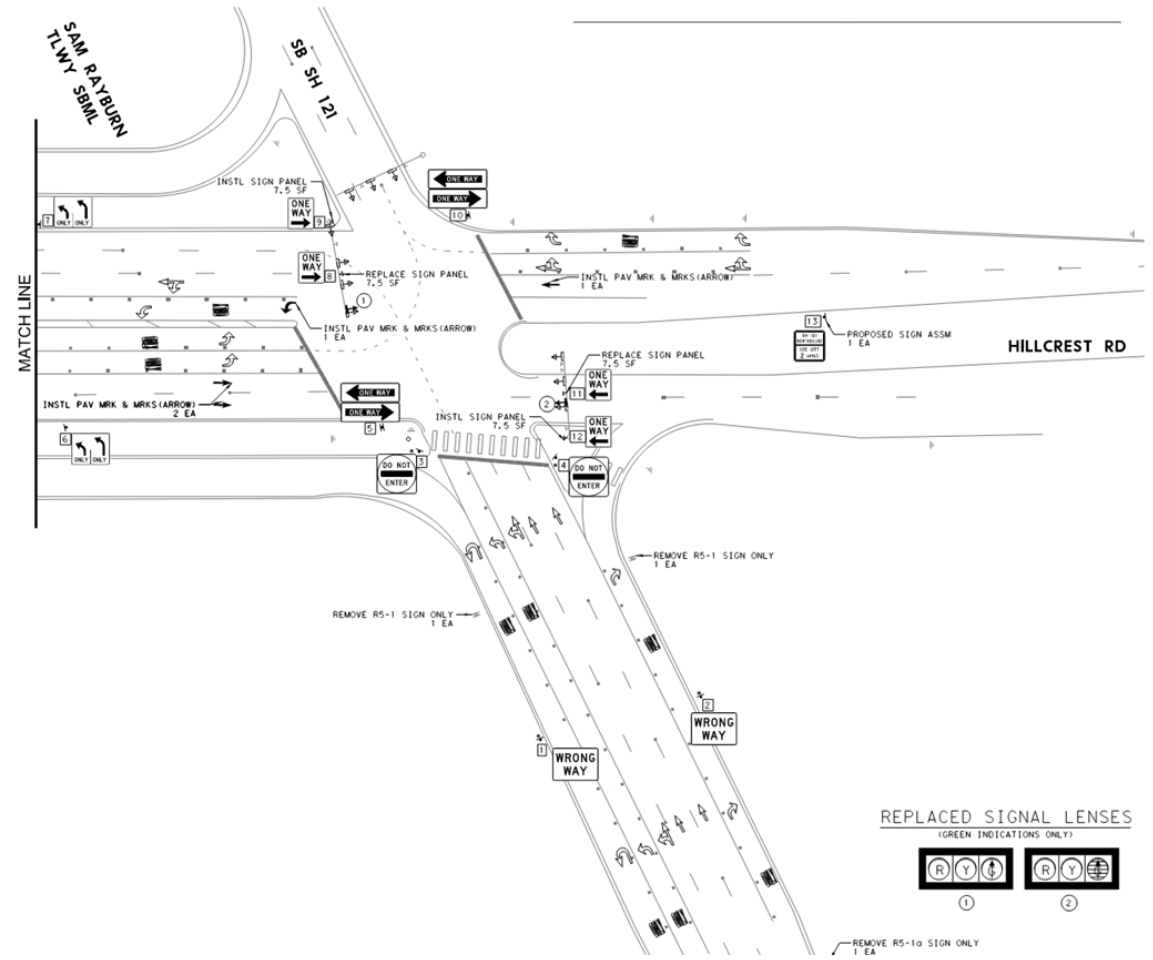
- Flashing yellow arrows
- Replace green ball indications with arrows
- Improved visibility and understanding

Signing & Pavement Markings

- Enhanced Wrong Way / Do Not Enter signage
- Advance guide signage
- RPMs and reflective elements
- Clear lane assignment

Geometric & pedestrian Enhancements

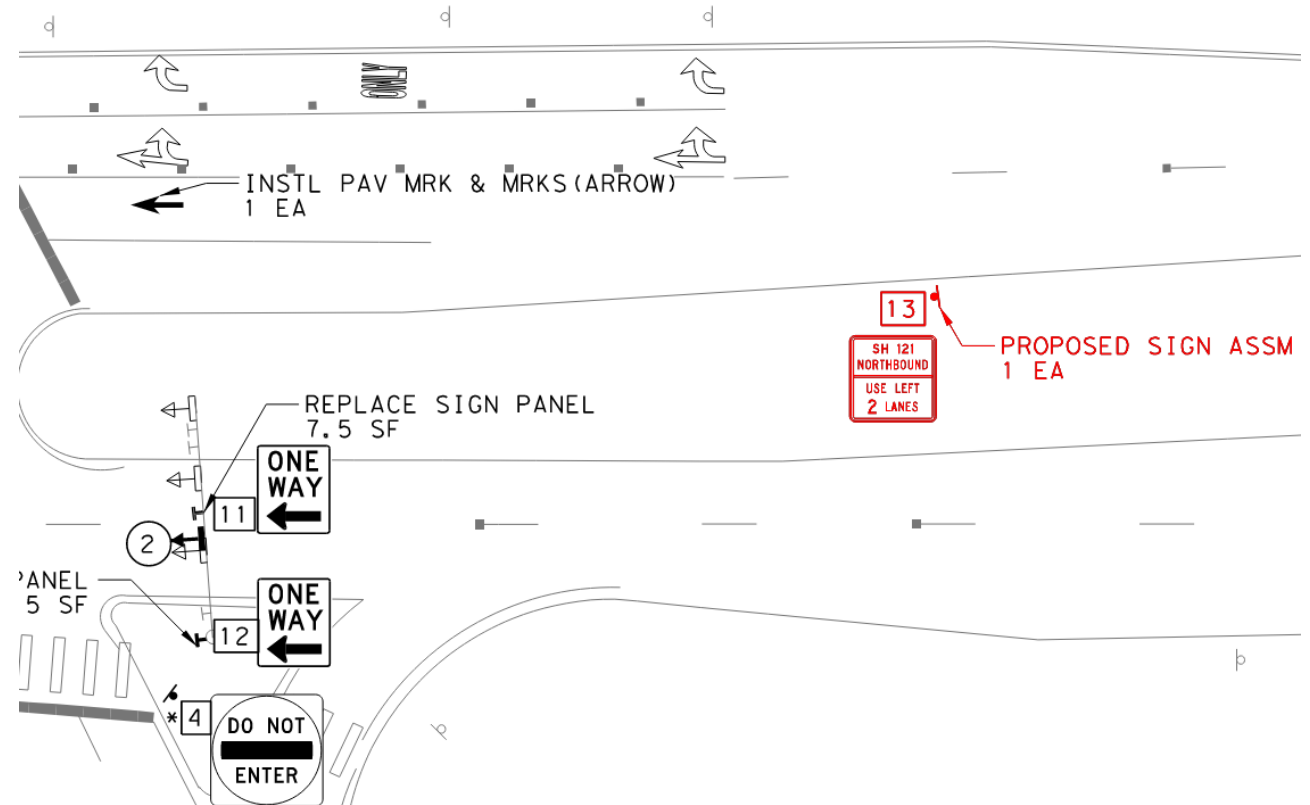
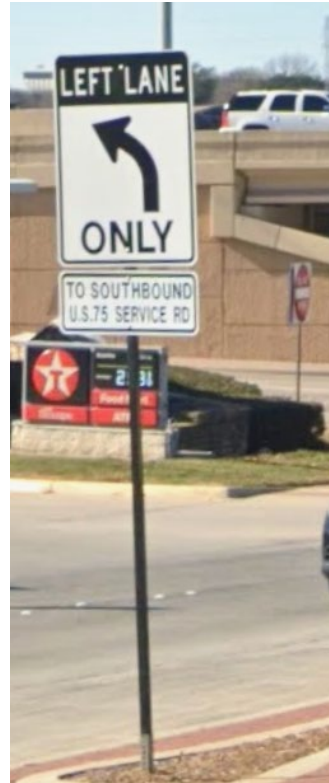
- Reduce lane drops and improve alignment
- Add right-turn signalization
- ADA upgrades and crossings



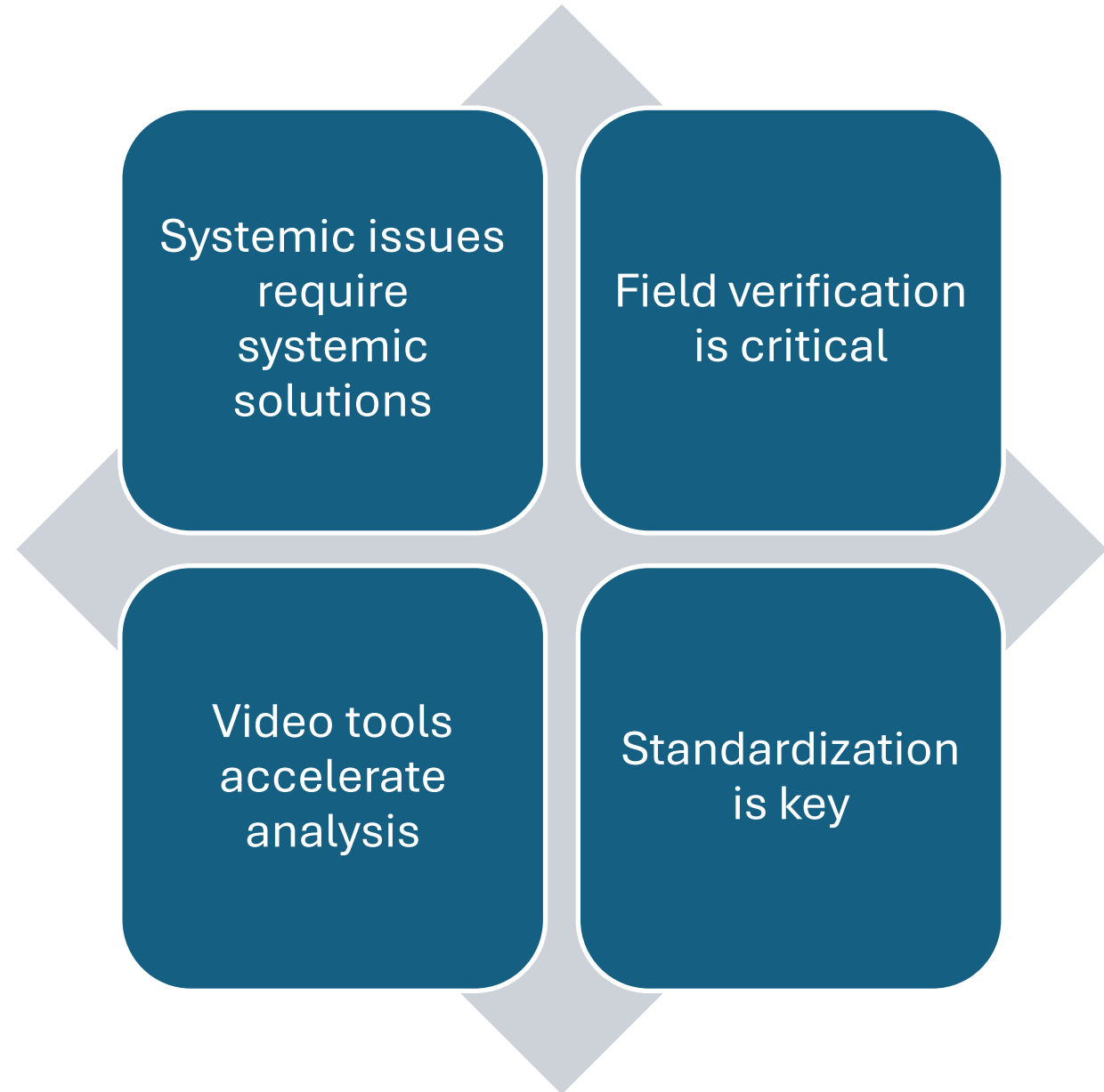
Additions During Design Stage

- **Advanced Guide Signs**

- Removal of conflicting signage



Lessons Learned





Thank you!

City of Plano – Diamond Safety Improvements

PAPE – DAWSON

