ITEM # 23
DATE: 10-25-22

COUNCIL ACTION FORM

SUBJECT: **2021/22 TRAFFIC SYSTEM CAPACITY IMPROVEMENTS – GRAND AVENUE CORRIDOR STUDY FINDINGS**

STUDY BACKGROUND:

Forward 2045, the Ames Area MPO's latest Metropolitan Transportation Plan, identified the need for a study of the Grand Avenue corridor from 9th Street to 24th Street (see Figure 1). The study looked at current traffic operational deficiencies along this corridor and the projected growth of traffic from anticipated continued development north of Ames.

Figure 1: Study Area

The City of Ames Traffic System Capacity Improvements Program provides for the planning, design, and construction of improvements identified in Forward 2045. Therefore, the city programmed this study in 2021/22 with the anticipation that its findings will guide future corridor project programming.

STUDY FINDINGS:

For this study (See Attached), the project's engineering consultant, HDR Engineering, Inc., conducted planning and conceptual-level engineering design services along the study corridor that included assessing traffic volumes, bicycle/pedestrian volumes, origin-destination data, evaluating traffic operations, and conducting safety analyses. Using data-driven processes, initial alternatives were developed for all the identified intersections along the study corridor. **These alternatives were presented at a public open house, with a summary of the feedback in the attached project report presentation.**

Table 1 summarizes the recommended improvements at each major intersection along the corridor. Further details can be found in the attached project report.

Table 1: Summary of Recommended Key Improvements

Key Improvements	Intersection				
	Grand Avenue & 9th Street	Grand Avenue & 13th Street	Grand Avenue & 16th Street	Grand Avenue & 20th Street	Grand Avenue & 24th Street
Add Left-Turn Lanes		All Directions		Northbound & Southbound Lefts	
Restripe to Include Left-Turn Lanes				Eastbound & Westbound Lefts	Eastbound & Westbound Lefts
Raised Median			On Grand Avenue Through Intersection		
Three-Lane Road					Grand Avenue to Jensen Avenue
Shared-Use Path	Along Grand Avenue (West Side)	Along Grand Avenue (West Side)	Along Grand Avenue (West Side)	Along 20th Street (South Side)	Along 24th Street (South Side)
New Traffic Signal		New Mast Arms for All Approaches			New Mast Arms for All Approaches
Coordinate Signal System	Northbound & Southbound Progression	Northbound & Southbound Progression		Northbound & Southbound Progression	Northbound & Southbound Progression
Leading Pedestrian Interval	All Pedestrian Movements	All Pedestrian Movements		All Pedestrian Movements	All Pedestrian Movements
Update Yellow and Red Time		All Directions		Eastbound & Westbound	
Dedicated Left-Turn Signal Phasing		All Lefts		Northbound & Southbound Lefts	

Estimated Project Costs

Intersection	Construction	Design/Admin	ROW/Easement	Total
9th	$70,000	$10,500	$0	$80,500
13th	$2,800,000	$483,000	$500,000	$3,783,000
16th	$54,000	$8,100	$0	$62,100
20th	$450,000	$85,000	$0	$535,000

24th	$600,000	$90,000	$0	$690,000

STAFF COMMENTS ON STUDY FINDINGS:

The corridor study coordinated the planning and conceptual design of several intersections along Grand Avenue (US HW 69) that require improvement. By evaluating all the improvements together, staff can ensure each location's design will work with other intersections within the study area. It should be noted that the improvements identified in the study will help inform staff when proposing projects during the annual Capital Improvements Plan development. However, the final design of each project will go through the regular public improvement process and include its own public meeting and feedback process. **At this point of developing project concepts, the type of right-of-way impacts are generally known, but the exact acquisition needs from private property owners will not be determined until the detailed design plans are developed in the future.**

It should be noted that in 2007 the City staff proposed intersection improvements for 13th and Grand Ave. (See Presentation Slides). As a result of opposition from the property owners and residents who were to lose land in front of their homes, the City Council decided not to proceed with the project at that time.

The project that is currently being considered for the 13th and Grand Avenue intersection has been revised to mitigate the amount of private property that will be needed for construction. This was accomplished by modifying the alignment and profile of the roadway segments as well as minimizing lane widths.

The current CIP programs the 13th Street and Grand Avenue improvements in FY 2024/25 [design & right-of-way] and FY 2025/26 [construction of intersection and shared-use path] of the Traffic System Capacity Improvements program. The 20th Street and Grand Avenue intersection will likely be proposed for the FY 2027/28 project. The remaining projects will appear in future years of the CIP as funding allows.

The public will have an opportunity to offer input into each of the five intersection projects before they are brought to City Council for approval of plans and specifications. Therefore, Staff is not seeking specific direction from City Council at this time. All that is requested is a motion from City Council accepting the study.

ALTERNATIVES:

1. Motion accepting the study findings as summarized in the study report and implementation plan.

2. Do not approve the findings of the study.

CITY MANAGER'S RECOMMENDED ACTION:

This study was completed using transportation planning and traffic engineering best practices and presented at a public meeting. The study findings will help guide the City in the designing and programming of future projects along this corridor.

Therefore, it is the recommendation of the City Manager that the City Council adopt Alternative No. 1, as noted above.

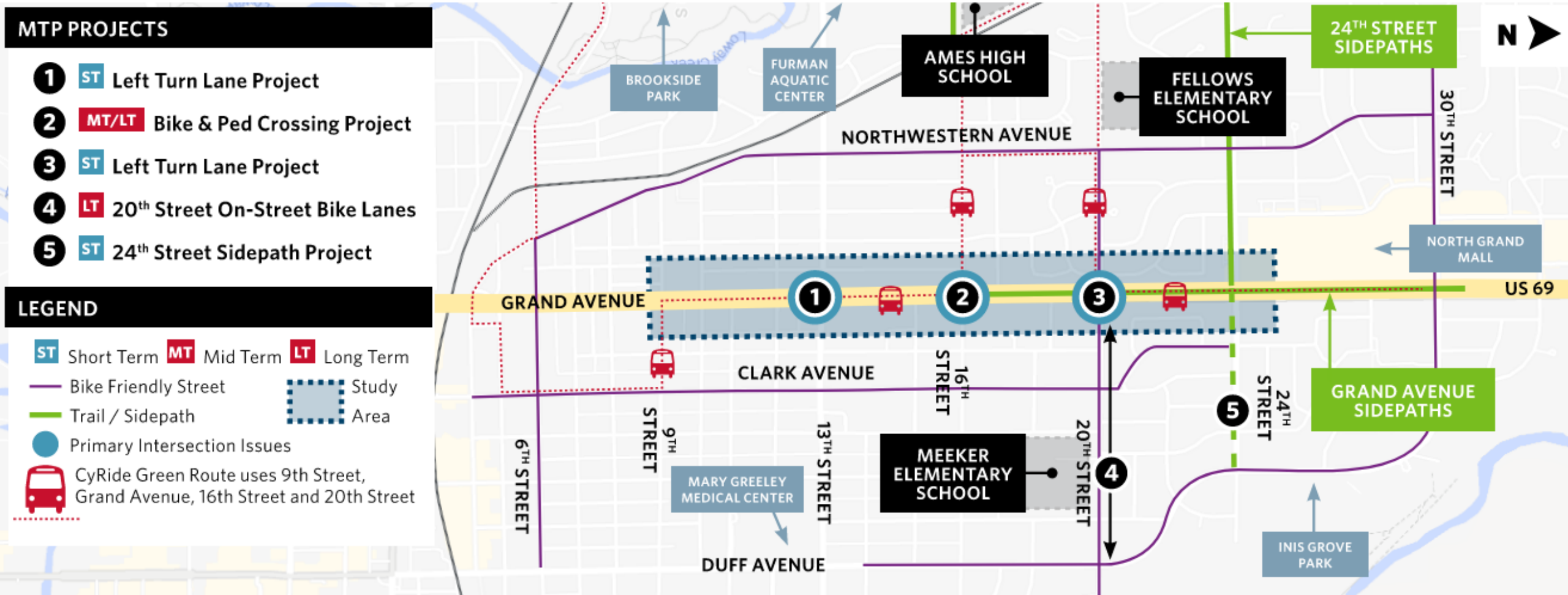
Grand Avenue Intersection Improvements Study

Mike Forsberg, HDR

10/25/2022

Study Background

- Group of Grand Ave projects – Addressing similar issues/trends
- Desire for multimodal accommodations along the corridor



Study Methodology

- 9th Street to 24th Street
- Historical safety analysis and mitigation strategies
- Operations analysis for year 2045 (AAMPO MTP horizon year)
- Improvements development / screening
- Recommended improvements
- Public Open House (4/28/22)
- Report and Implementation Plan

Grand Ave & 9th Street

No-Build Conditions

Potential for Crash Reduction (PCR)

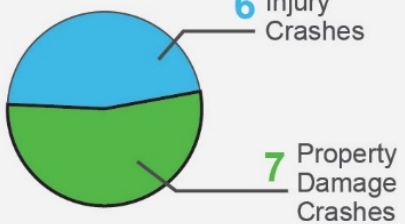
PCR Values/ Tier Classification

Injury PCR 0.01 | All crash PCR 0.61

		TIER 3 Performing Better Than Predicted	TIER 2 Potential for Safety Improvement	TIER 1 Safety Consultation
PCR Tier Thresholds	All crashes	PCR < 0	0 < PCR < 1	PCR > 1
	Injury crashes	PCR < 0	0 < PCR < 0.25	PCR > 0.25

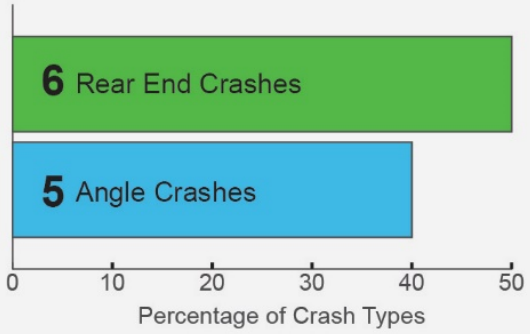
Total Crashes During Recent 5 years (2015-2019)

13 Total Crashes



0 Fatal Crashes

Primary crash types



Number of pedestrian and bicycle crashes

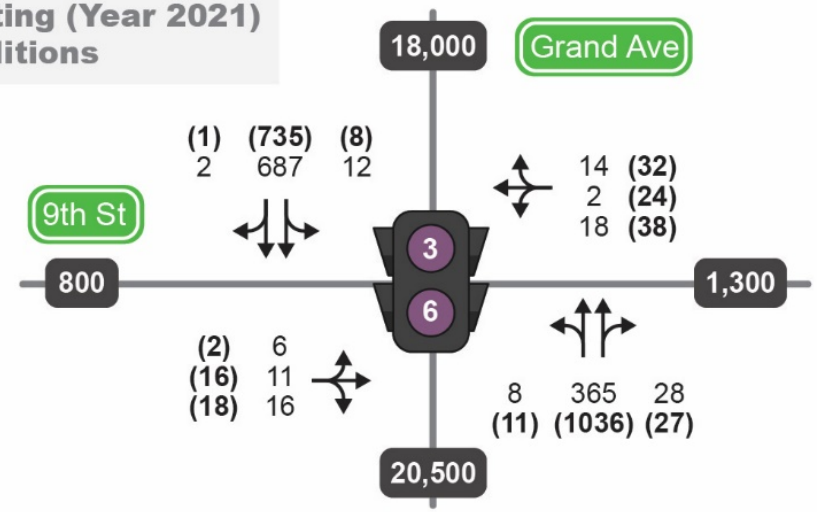
1 Bicycle Crash

0 Pedestrian Crashes

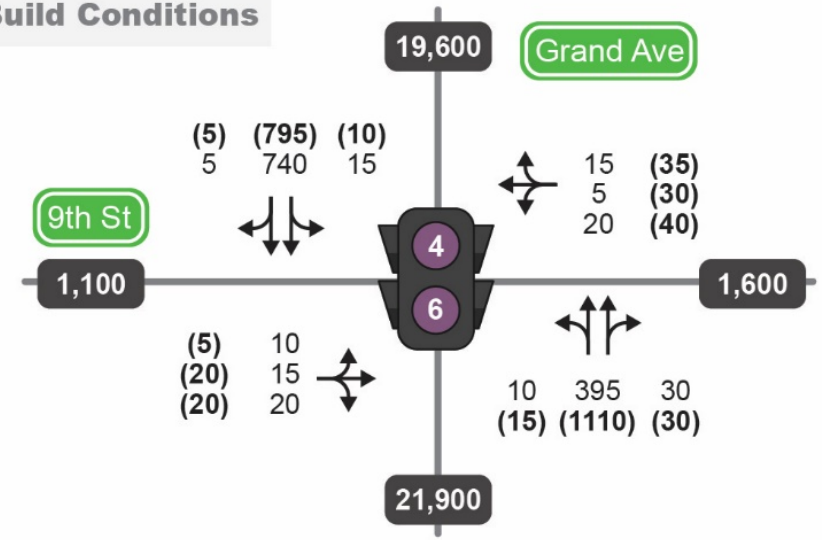
Key safety findings

- Crashes at this intersection are primarily rear end or angle crashes.
- There was one bicycle injury crash at this intersection during recent 5 years.

Existing (Year 2021) Conditions



Future (Year 2045) No-Build Conditions



LEGEND

(##) AM and **(PM)** Peak Hour Volumes

Intersection Lane Geometrics

#,### Average Annual Daily Traffic (AADT)

(All numbers in seconds)

AM Peak Hour Signalized Intersection Delay

PM Peak Hour Signalized Intersection Delay

A B C D E F

Level of Service

Grand Ave & 9th Street

Build Improvements

Key Improvements

- Leading pedestrian interval
- Shared-use path west side of Grand

Expected Benefits

- Increased bike/ped awareness in crosswalk

Grand Ave & 9th Street

Build Improvements

Public Feedback

- Mostly positive
- Concerns related to CyRide continuing to turn southbound left in shared lane

Planning-Level Cost

- $70K (construction)

Next Steps

- Program shared-use path through Shared-Use Path System Expansion in a future CIP

Grand Ave & 13th Street

No-Build Conditions

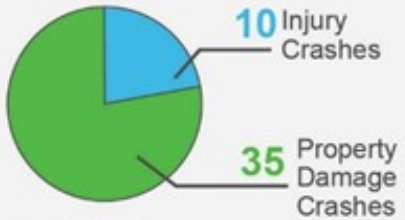
PCR Values/ Tier Classification

Injury PCR -0.15 ↓ | All crash PCR 1.82 ↓

		TIER 3 Performing Better Than Predicted	TIER 2 Potential for Safety Improvement	TIER 1 Safety Consultation
PCR Tier Thresholds	All crashes	PCR < 0	0 < PCR < 1	PCR > 1
	Injury crashes	PCR < 0	0 < PCR < 0.25	PCR > 0.25

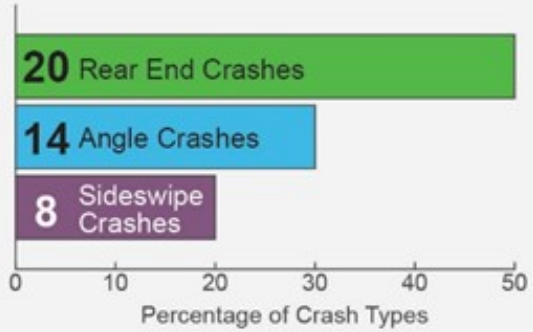
Total Crashes During Recent 5 years (2015-2019)

45 Total Crashes



0 Fatal Crashes

Primary crash types



Number of pedestrian and bicycle crashes

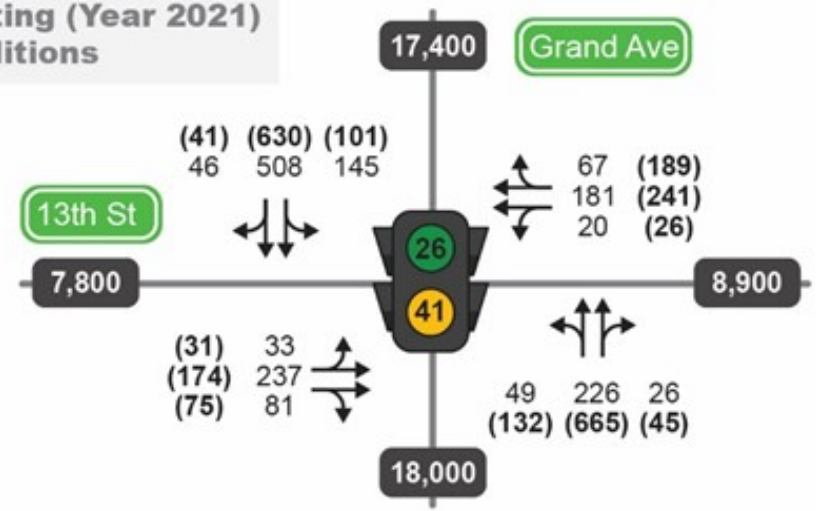
0 Bicycle Crashes

2 Pedestrian Crashes

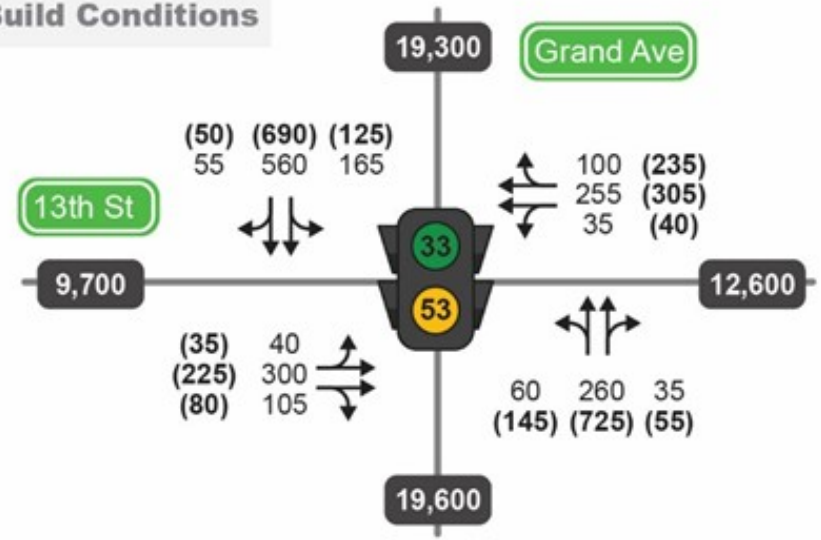
Key safety findings

- PCR in Tier 1 – Reduction to crashes expected with intersection improvements.
- Half of the crashes at this intersection are rear end crashes.
- There were two pedestrian injury crashes at this intersection during recent 5 years.

Existing (Year 2021) Conditions



Future (Year 2045) No-Build Conditions



LEGEND

(##) AM and **(PM)** Peak Hour Volumes

→ Intersection Lane Geometrics

#,### Average Annual Daily Traffic (AADT)

AM Peak Hour Signalized Intersection Delay

PM Peak Hour Signalized Intersection Delay

A B C D E F

Level of Service

Grand Ave & 13th Street

Build Improvements

Key Improvements

- Left-turns all directions
- New traffic signal
- Shared-use path west side of Grand
- Leading pedestrian interval

Expected Benefits

- Reduce crashes
- Operations at LOS C
- Improved driver expectancy
- Increased bike/ped awareness in crosswalk

Grand Ave & 13th Street

Build Improvements

Public Feedback

- Mostly positive to address east/west delay
- Concerns from adjacent residents on property impacts

Planning-Level Cost

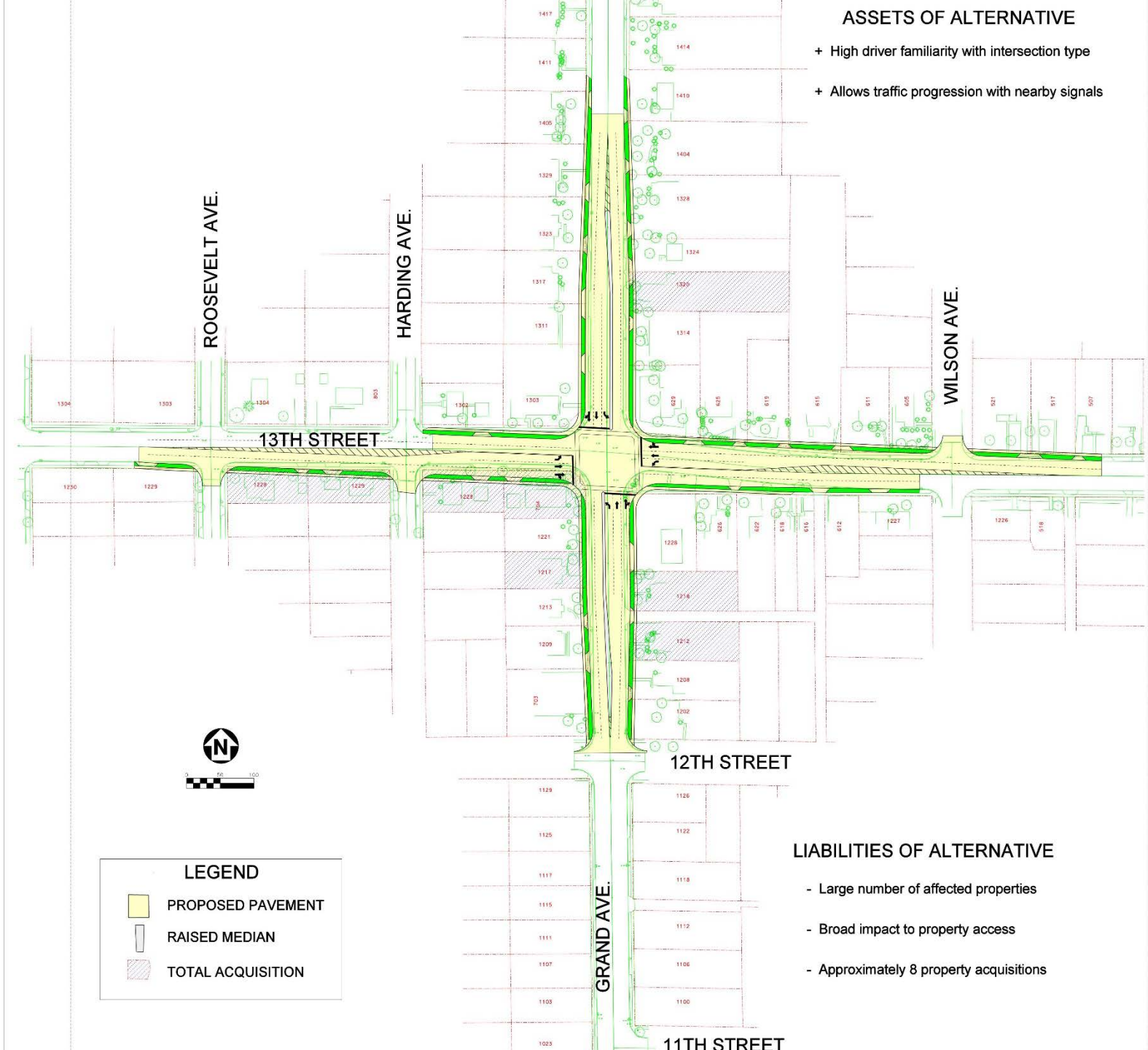
- $2.8M (ROW/acquisition and construction)

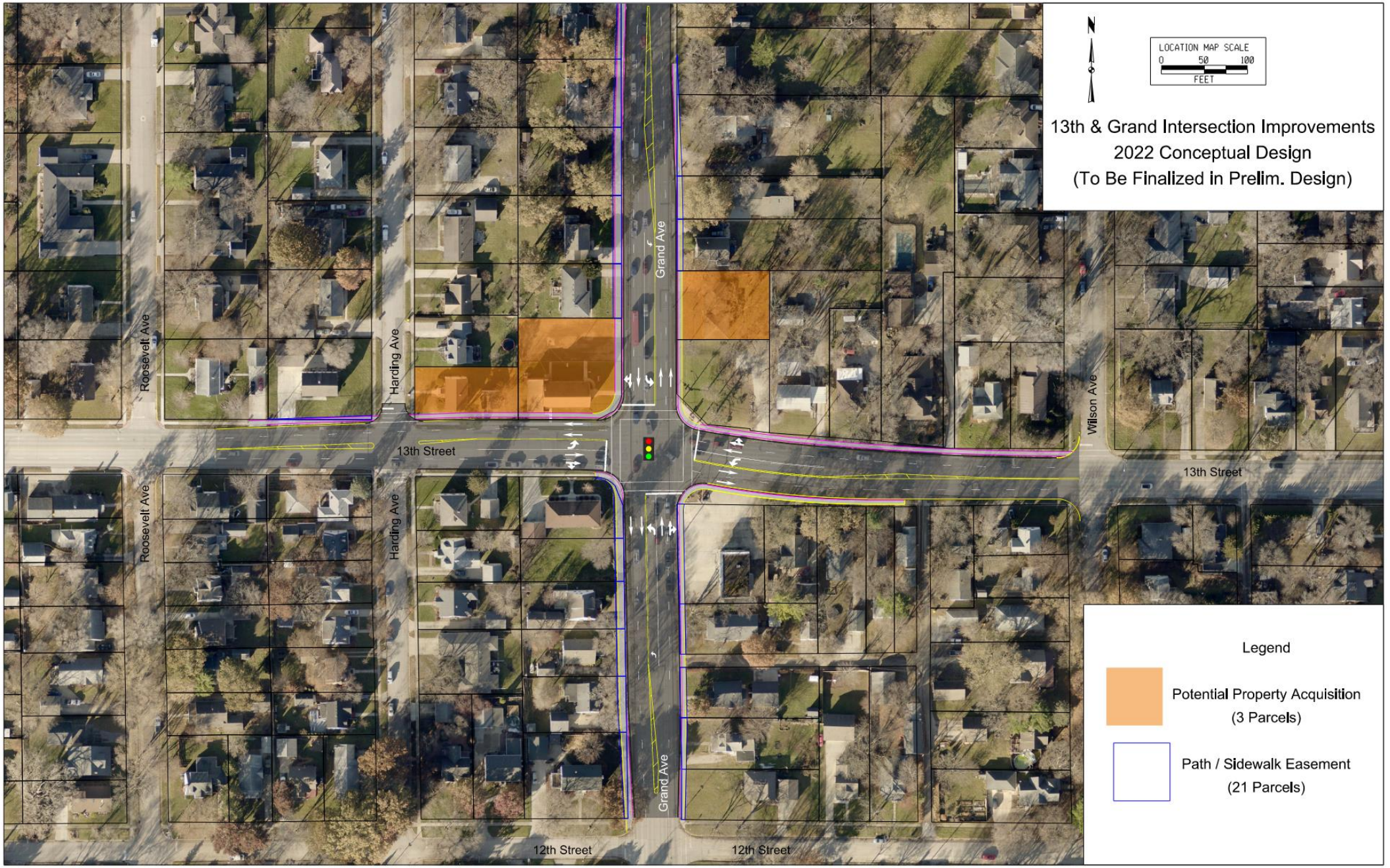
Next Steps

- Preliminary and final design; ROW acquisition
- Per CIP, design/ROW in 2024/25 and construction in 2025/26

2007 Conceptual Design

- 8 Total Property Acquisitions
- Significant front yard impacts to over 30 properties




LOCATION MAP SCALE
0 50 100
FEET
13th & Grand Intersection Improvements
2022 Conceptual Design
(To Be Finalized in Prelim. Design)
Roosevelt Ave
Harding Ave
Grand Ave
Wilson Ave
13th Street
12th Street
Legend
Potential Property Acquisition
(3 Parcels)
Path / Sidewalk Easement
(21 Parcels)

Grand Ave & 16th Street

No-Build Conditions

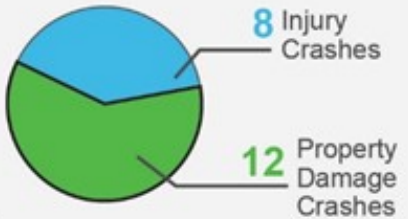
PCR Values/ Tier Classification

Injury PCR 0.29 ↓ | All crash PCR 2.50 ↓

		TIER 3 Performing Better Than Predicted	TIER 2 Potential for Safety Improvement	TIER 1 Safety Consultation
PCR Tier Thresholds	All crashes	PCR < 0	0 < PCR < 1	PCR > 1
	Injury crashes	PCR < 0	0 < PCR < 0.25	PCR > 0.25

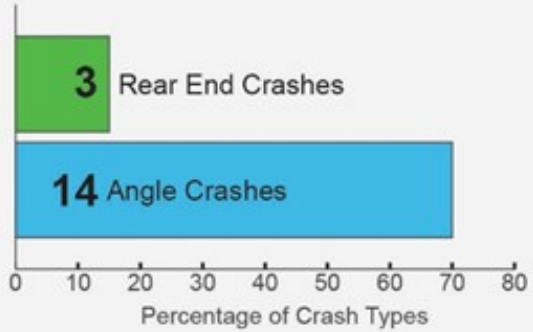
Total Crashes During Recent 5 years (2015-2019)

20 Total Crashes



0 Fatal Crashes

Primary crash types



Number of pedestrian and bicycle crashes

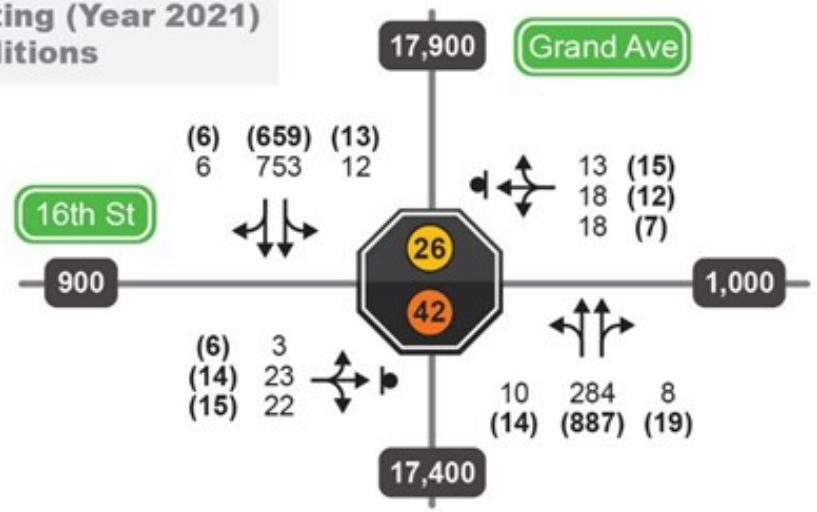
1 Bicycle Crash

0 Pedestrian Crashes

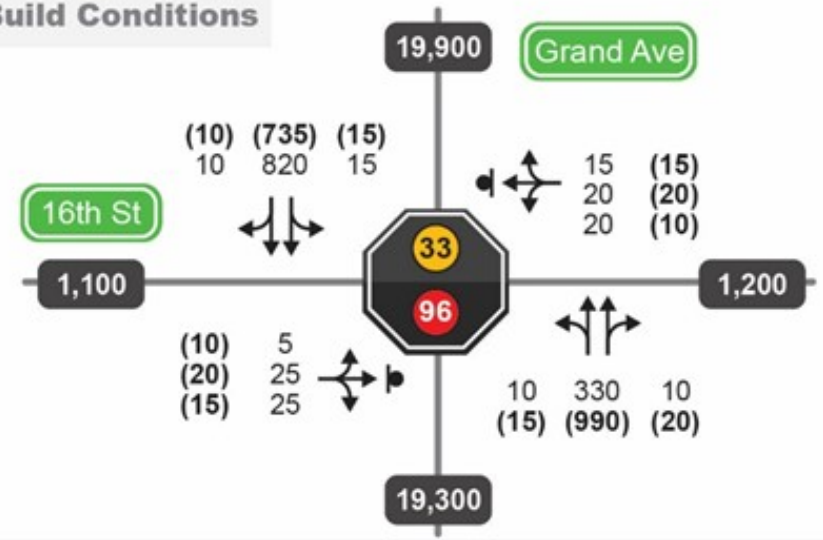
Key safety findings

- Nearly half of crashes involved injury.
- PCR in Tier 1 – Reduction to crashes expected with intersection improvements.
- A majority of the crashes at this intersection are angle crashes.
- There was one bicycle injury crash at this intersection during recent last 5 years.

Existing (Year 2021) Conditions



Future (Year 2045) No-Build Conditions



LEGEND

(##) AM and **(PM)** Peak Hour Volumes

Intersection Lane Geometrics

#,### Average Annual Daily Traffic (AADT)

Stop Sign

AM Peak Hour Minor Road Stop-Controlled Delay*

PM Peak Hour Minor Road Stop-Controlled Delay*

*Worst-Case Approach

A B C D E F

Level of Service

Grand Ave & 16th Street

Build Improvements

Key Improvements

- Raised median on Grand at 16th
- Shared-use path west side of Grand

Expected Benefits

- Reduce crashes – eliminate crossing conflicts

Public Feedback

- Opposition to build improvements
- Need to maintain east/west crossing for peds/bikes

Grand Ave & 16th Street

Build Improvements

Planning-Level Cost

- $54K (construction)

Next Steps

- Additional study following adjacent improvements
- Coordinate with CyRide and DOT for future plan consistency
- Reevaluate in next MTP
- If pursued in future, incorporate wider median for peds/bikes (cost increase to $180K)

Grand Ave & 20th Street

No-Build Conditions

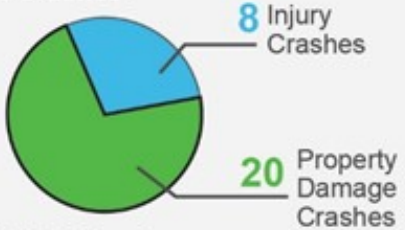
PCR Values/ Tier Classification

Injury PCR 0.13 ↓ | All crash PCR 2.36 ↓

		TIER 3 Performing Better Than Predicted	TIER 2 Potential for Safety Improvement	TIER 1 Safety Consultation
PCR Tier Thresholds	All crashes	PCR < 0	0 < PCR < 1	PCR > 1
	Injury crashes	PCR < 0	0 < PCR < 0.25	PCR > 0.25

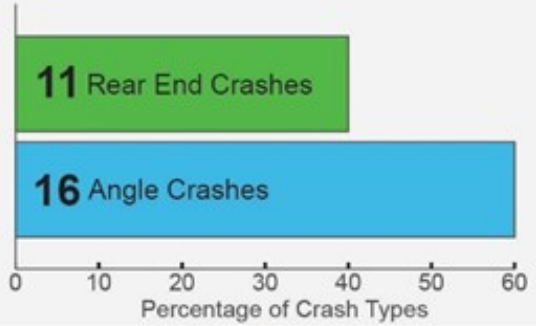
Total Crashes During Recent 5 years (2015-2019)

28 Total Crashes



0 Fatal Crashes

Primary crash types



Number of pedestrian and bicycle crashes

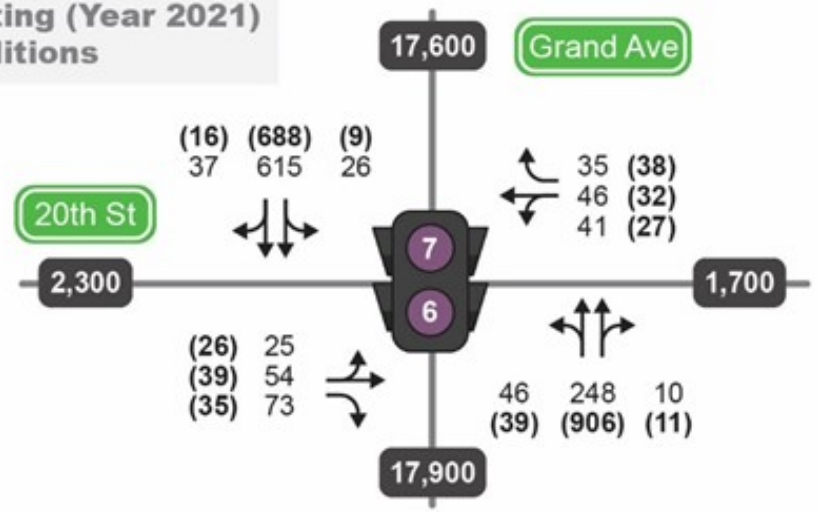
1 Bicycle Crash

0 Pedestrian Crashes

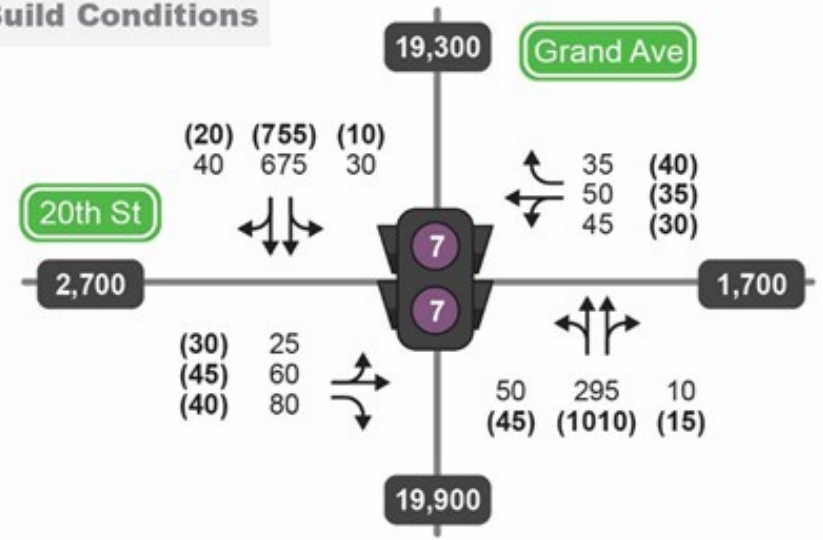
Key safety findings

- PCR in Tier 1 – Reduction to crashes expected with intersection improvements.
- Nearly all crashes at this intersection are angle or rear end crashes.
- 90% of crashes involved only vehicles traveling north/south on Grand Avenue.
- There was one bicycle injury crash at this intersection during recent 5 years.
- Several safety deficiencies have been noted at the intersection, primarily for vehicles traveling north/south.

Existing (Year 2021) Conditions



Future (Year 2045) No-Build Conditions



LEGEND

(##) AM and (PM) Peak Hour Volumes

→ Intersection Lane Geometrics

#,### Average Annual Daily Traffic (AADT)

AM Peak Hour Signalized Intersection Delay

PM Peak Hour Signalized Intersection Delay

A B C D E F

Level of Service

Grand Ave & 20th Street

Build Improvements

Key Improvements

- Left-turn lanes on Grand
- Restripe 20th for left-turn lanes
- Shared-use path south side of 20th
- Leading pedestrian interval

Expected Benefits

- Reduce crashes – eliminate crossing conflicts
- Improved driver expectancy
- Increased bike/ped awareness in crosswalk

Grand Ave & 20th Street

Build Improvements

Public Feedback

- Mostly positive
- Concern over southbound right-turning trucks/buses

Planning-Level Cost

- $450K (construction)

Next Steps

- Program roadway widening improvements through the Traffic System Capacity Improvements in CIP
- Program shared-use path through Shared-Use Path System Expansion in a future CIP

Grand Ave & 24th Street

No-Build Conditions

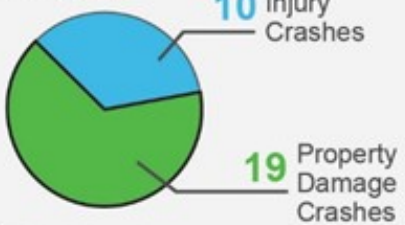
PCR Values/ Tier Classification

All crash PCR -0.34 ↓ Injury PCR 0.14 ↓

PCR Tier Thresholds		TIER 3 Performing Better Than Predicted	TIER 2 Potential for Safety Improvement	TIER 1 Safety Consultation
	All crashes	PCR < 0	0 < PCR < 1	PCR > 1
	Injury crashes	PCR < 0	0 < PCR < 0.25	PCR > 0.25

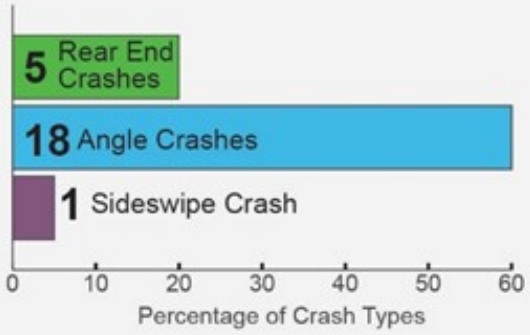
Total Crashes During Recent 5 years (2015-2019)

29 Total Crashes



0 Fatal Crashes

Primary crash types



Number of pedestrian and bicycle crashes

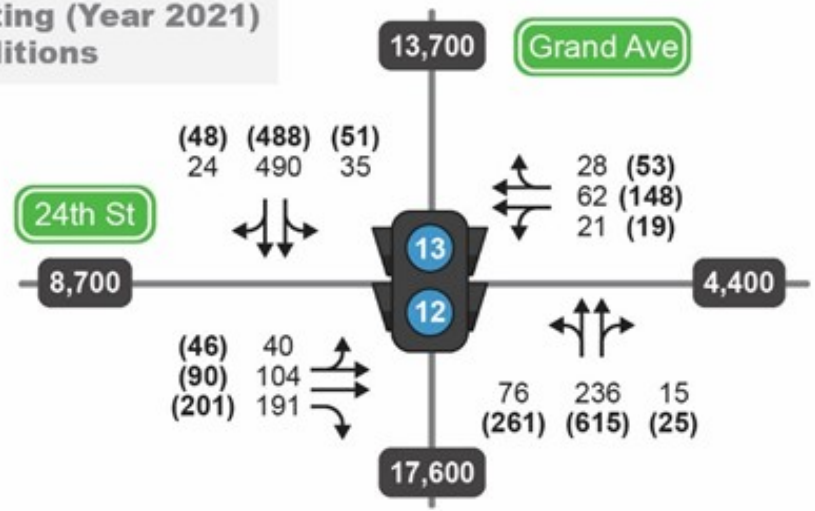
4 Bicycle Crashes

0 Pedestrian Crashes

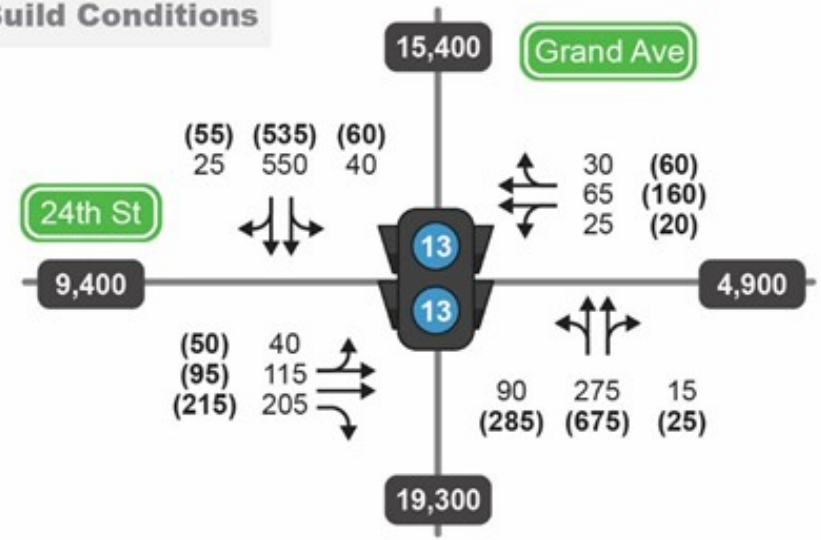
Key safety findings

- A majority of the crashes at this intersection are angle crashes.
- There were four bicycle injury crashes at this intersection during recent 5 years.

Existing (Year 2021) Conditions



Future (Year 2045) No-Build Conditions



LEGEND

(##) AM and (PM) Peak Hour Volumes

Intersection Lane Geometrics

#,### Average Annual Daily Traffic (AADT)

AM Peak Hour Signalized Intersection Delay

PM Peak Hour Signalized Intersection Delay

A B C D E F

Level of Service

Grand Ave & 24th Street

Build Improvements

Key Improvements

- Restriping 24th for dedicated left-turn lanes
- New traffic signal
- Three lanes on 24th east to Jensen Ave
- Decrease southwest corner radius
- Leading pedestrian interval

Expected Benefits

- Improved driver expectancy
- Increased bike/ped awareness in crosswalk

Grand Ave & 24th Street

Build Improvements

Public Feedback

- Mostly positive

Planning-Level Cost

- $600K (construction)

Next Steps

- Program roadway restriping and radius modification through the Traffic System Capacity Improvements in CIP
- Program shared-use path through Shared-Use Path System Expansion in a future CIP

Questions?

Report & Implementation Plan

Grand Avenue Intersection Improvements Study

September 19, 2022

HDR

CITY OF ames™

Table of Contents

List of Abbreviations

- **AAMPO**: Ames Area Metropolitan Planning Organization
- **MTP**: Metropolitan Transportation Plan
- **CIP**: Capital Improvements Plan
- **TDM**: Travel Demand Model
- **HCM**: Highway Capacity Manual
- **MUTCD**: Manual on Uniform Traffic Control Devices
- **DOT**: Department of Transportation
- **ICAT**: Iowa Crash Analysis Tool
- **PCR**: Potential for Crash Reduction
- **LPI**: Leading Pedestrian Interval
- **LOS**: Level of Service
- **ROW**: Right-of-Way

1. Introduction

The purpose of this project was to identify needs and recommended improvements at key intersections along Grand Avenue from 9th Street to 24th Street in the Ames, Iowa. Specifically, the following intersections were the primary focus for this study.

- Grand Avenue & 9th Street
- Grand Avenue & 13th Street
- Grand Avenue & 16th Street
- Grand Avenue & 20th Street
- Grand Avenue & 24th Street

The study area for this project was selected based on previously planned improvements to the Grand Avenue intersections at 13th Street, 16th Street and 20th Street identified in the AAMPO Forward 2045 MTP and the City of Ames CIP. Intersections at 9th Street and 24th Street were also included in the study. **Figure 1** shows the project study area.

This portion of Grand Avenue serves north Ames as a vital connection between commercial, residential, and educational uses. It is also part of the National Highway System and state highway system as US Highway 69. Average daily traffic volumes range between approximately 14,000 and 21,000 vehicles per day, with continued traffic growth anticipated in the future with continued residential and commercial growth to the north.

This study developed a plan for improvements that balance multimodal mobility and safety needs of this corridor with the character and quality of life for adjacent neighborhoods and property owners in accordance with the City's Complete Streets Plan and other applicable standards. Using traffic operations and safety assessments combined with local knowledge, this plan addresses existing deficiencies while also helping to position the corridor to be resilient to future demand and enhanced multimodal connections. The improvements recommended by the study were identified based on their ability to be implemented with limited impacts to surrounding properties and neighborhood character.

Figure 1. Study Area

2. Study Methodology

Traffic Volumes

Traffic counts were collected at study intersections by the City of Ames in November and December of 2021 after the opening of the Grand Avenue extension south of S 5th Street to S 16th Street. The AAMPO also provided the latest TDM which provided the basis for forecasting corridor traffic growth through the horizon year for the project, year 2045. The TDM was updated prior to developing forecasts to account for planned land uses of a new aquatic center near Lincoln Way & Oak Avenue and Lincoln Way Mixed Use Development south of downtown.

Traffic Operations

Traffic operations analysis was completed using Synchro 11 software, which replicates procedures from the HCM. Conditions were evaluated for the AM and PM peak hours under existing and year 2045 no-build and build conditions. Traffic Signal Warrants from the MUTCD were evaluated at the Grand Avenue & 16th Street intersection to identify if a signal is warranted and would be considered during concept development.

Safety Analysis

A safety analysis was conducted for the study area to determine locations with high crash frequencies and crash patterns that could be used to identify safety improvements. Crashes were collected for years 2015 through 2019 using the ICAT. This study used a methodology (still in draft format) that the Iowa DOT has developed to evaluate the relative safety performance of intersections across Iowa. The methodology uses a potential for crash reduction to evaluate safety as a function of experienced crashes per year compared to an expected number of crashes per year based on the type of intersection. With this methodology, the following three tiers of rated safety performance for intersections were used to focus on locations with the greatest potential for crash reduction following improvements:

- **Tier 1**: PCR > 1 – Likely for safety improvement with improvements
- **Tier 2**: 0 ≤ PCR ≤ 1 – Potential for safety improvement with improvements
- **Tier 3**: PCR < 0 – Performing better than predicted

3. Intersection Evaluations & Improvements

Following review and evaluation of intersections to determine improvement needs, strategies were identified for each intersection to address these needs. Initial concepts at each study intersection were developed by combining strategies. The initial concepts were reviewed with the City of Ames staff and strategies were selected to create a recommended concept for each study intersection. The recommended concepts include a combination of the following strategies:

- Spot roadway widening at intersections to add left-turn lanes
- Restriping lanes to provide dedicated left-turn lanes
- Shared-use paths
- Leading pedestrian interval – providing the walk indication to pedestrians before a vehicular green signal, to allow pedestrians to move into the intersection first and provide greater awareness of pedestrians.

A public open house was held on April 28th, 2022 where the recommended concepts were reviewed, next steps were shared, and feedback was gathered from the public.

The following sections provide an overview for each study intersection (from south to north), including background on improvements at each location, completed evaluations and recommended improvements.

Grand Avenue & 9th Street

While the 9th Street corridor does not carry high levels of vehicular traffic, the signalized intersection with Grand Avenue does see pedestrian traffic as the 9th Street corridor connects several parks, trails, and recreational facilities nearby. No operational or safety deficiencies were previously noted for improvement at this intersection. Previously planned improvements identified in the Ames MTP include a shared-use path along Grand Avenue between 6th and 16th Street. The shared-use path project was identified as a fiscally constrained bicycle and pedestrian path planned for completion in 2025-2029. This shared-use path improvement would provide a continuous path facility from Lincoln Way to Ada Hayden along with the section of shared-use path from Lincoln Way to 6th Street that is programmed for fiscal year 2022/2023 of the CIP.

Safety Analysis

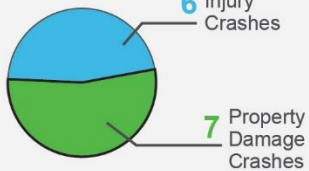
PCR Values/ Tier Classification

Injury PCR 0.01 | All crash PCR 0.61

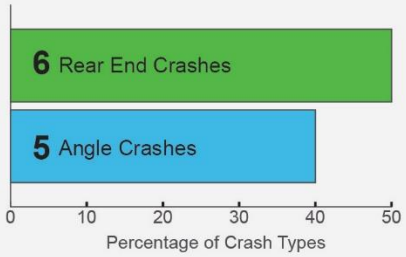
		TIER 3 – Performing Better Than Predicted	TIER 2 – Potential for Safety Improvement	TIER 1 – Safety Consultation
PCR Tier Thresholds	All crashes	PCR < 0	0 < PCR < 1	PCR > 1
	Injury crashes	PCR < 0	0 < PCR < 0.25	PCR > 0.25

Total Crashes During Recent 5 years (2015-2019)

13 Total Crashes



Primary crash types



Number of pedestrian and bicycle crashes

1 Bicycle Crash

0 Pedestrian Crashes

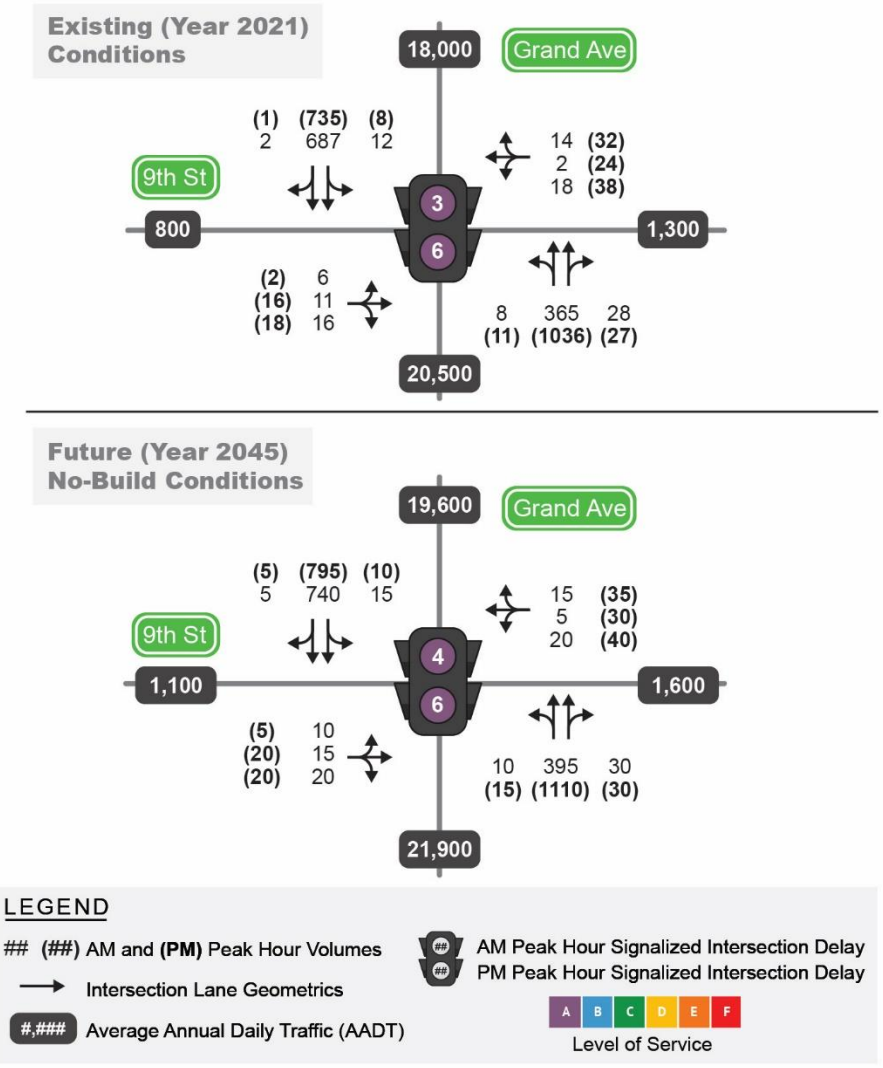
Key safety findings

- Crashes at this intersection are primarily rear end or angle crashes.
- There was one bicycle injury crash at this intersection during recent 5 years.

Source: Iowa DOT Draft Safety Analysis Guide and ICAT Crash Data (2015-2019)

Traffic Counts & Operations

Grand Avenue traffic volumes are projected to grow by 10% by year 2045 and 9th Street is projected to grow by 20%. Existing operations are LOS 'A' during AM and PM peak hours and expected to remain at LOS 'A' in year 2045 no-build conditions.



Grand Avenue & 9th Street Intersection Improvements

Project Approach: Enhance pedestrian and bicycle safety and mobility with limited impacts to adjacent properties

Key Improvements

- Leading pedestrian interval
- Shared-use path along west side of Grand Avenue
- Updated signal timings

Expected Benefits:

- Increased awareness of pedestrians and bicyclists in the crosswalk

Public Feedback

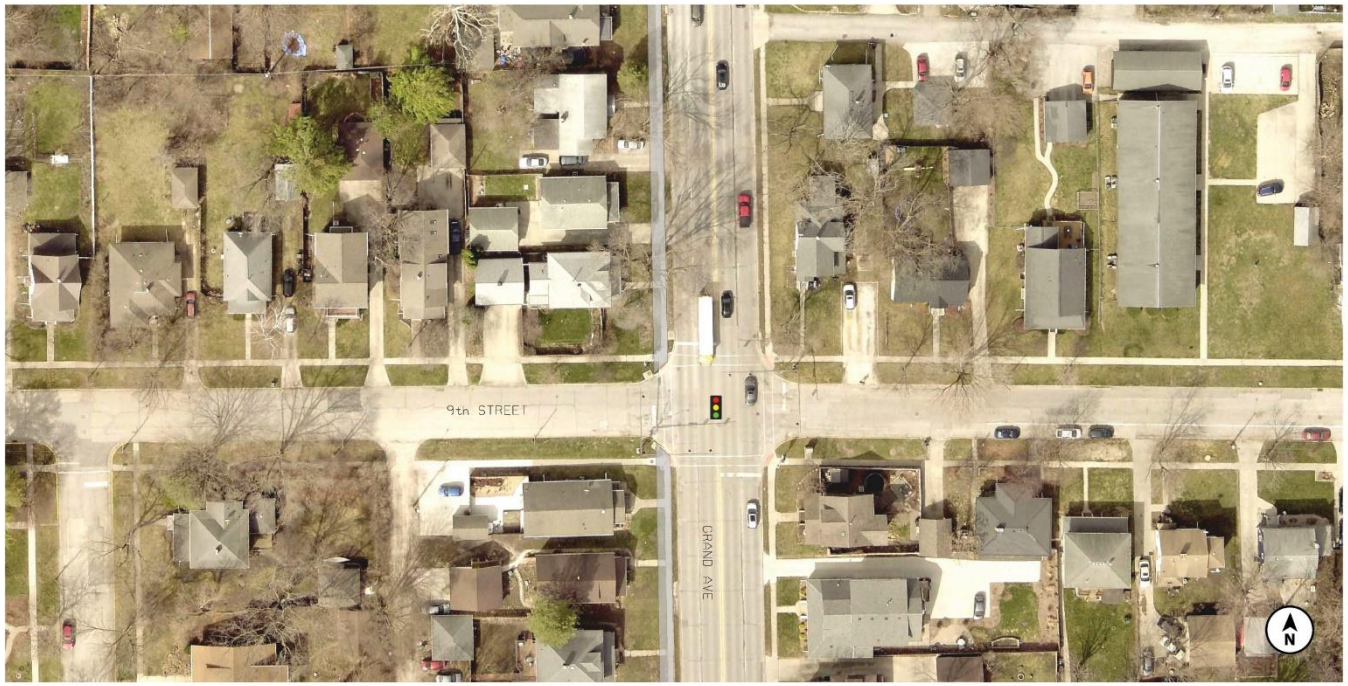
- Mostly positive public sentiment
- Concern related to CyRide on southbound Grand Avenue continuing to turn left from the shared lane

Next Steps for Improvements

- Program the shared-use path improvements on Grand Avenue through the Shared-Use Path System Expansion program in a future CIP (shared use path improvements may be completed after other Grand Avenue study intersection improvements are complete)

Planning-Level Cost Estimate

- $70,000 – Construction of shared-use path along west side of Grand Avenue from 8th Street to 10th Street
  - Shared-use path easement required along properties on west side of Grand Ave
  - No ROW acquisition required



Grand Avenue & 13th Street

The intersection of Grand Avenue & 13th Street has consistently been one of the most congested locations in the city for years. Traffic volumes are relatively high on all approaches, particularly Grand Avenue. The traffic signal operates with split signal phasing for north-south traffic because of shared through/left-turn lanes with heavy turning traffic volumes. The east-west approaches also have shared through/left-turn lanes, creating slowing/stopped traffic in the inside through lanes on 13th Street. Widening options are constrained by ROW and utilities adjacent to the street. The Traffic System Capacity Improvements section of the CIP includes the addition of turn-lanes, which are scheduled for design and ROW in years 2024/2025 and construction in years 2025/2026. Additionally, the MTP identified a shared-use path along Grand Avenue between 6th and 16th Street that was identified as a fiscally constrained bicycle and pedestrian path planned for completion in 2025-2029.

Safety Analysis

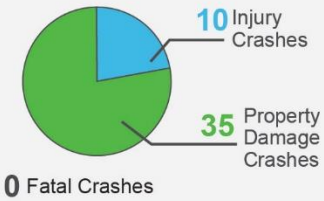
PCR Values/ Tier Classification

Injury PCR -0.15 ↓ | All crash PCR 1.82 ↓

		TIER 3 – Performing Better Than Predicted	TIER 2 – Potential for Safety Improvement	TIER 1 – Safety Consultation
PCR Tier Thresholds	All crashes	PCR < 0	0 < PCR < 1	PCR > 1
	Injury crashes	PCR < 0	0 < PCR < 0.25	PCR > 0.25

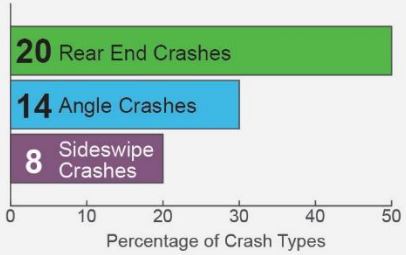
Total Crashes During Recent 5 years (2015-2019)

45 Total Crashes



0 Fatal Crashes

Primary crash types



Number of pedestrian and bicycle crashes

0 Bicycle Crashes

2 Pedestrian Crashes

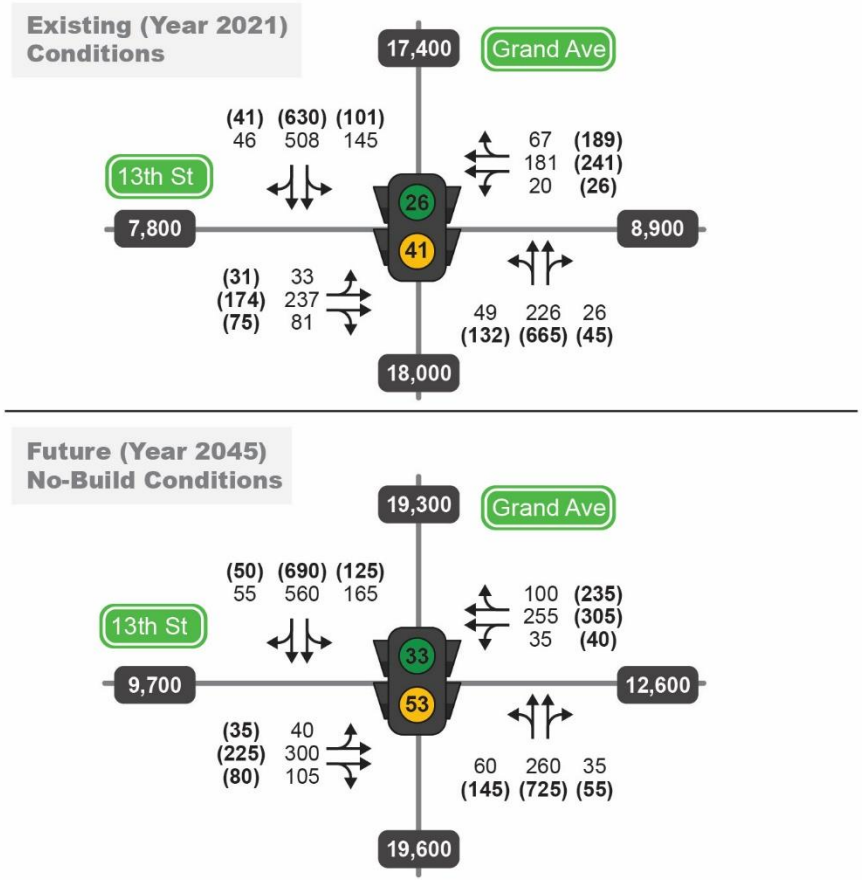
Key safety findings

- PCR in Tier 1 – Reduction to crashes expected with intersection improvements.
- Half of the crashes at this intersection are rear end crashes.
- There were two pedestrian injury crashes at this intersection during recent 5 years.

Source: Iowa DOT Draft Safety Analysis Guide and ICAT Crash Data (2015-2019)

Traffic Counts & Operations

Grand Avenue traffic volumes are projected to grow by 10% by year 2045 and 13th Street is projected to grow by 30%. Existing PM peak hour operations are LOS 'D' due to northbound/southbound split phasing. Operations are expected to degrade further by year 2045 and approach LOS 'E'. Existing queue lengths on Grand Avenue and 13th Street are expected to increase by 100' by year 2045 to ~550' on Grand Avenue and ~350' on 13th Street during the PM peak hour.



Grand Avenue & 13th Street Intersection Improvements

Project Approach: Implement a multi-modal design per the complete streets plan while minimizing impacts to adjacent properties

Key Improvements

- Adding left-turn lanes in all directions
- New traffic signal
- Dedicated left-turn signal phasing
- Coordinated signal system along Grand Avenue
- Shared-use path along west side of Grand Avenue
- Leading pedestrian interval

Expected Benefits

- Reduced crashes
  - Expected to reduce crashes by 25%
  - Create more predictable movement at the intersection for users
- Overall delay expected to be LOS 'C' or better with queue lengths less than 300 feet.
- Improved driver expectancy
- Increased awareness of pedestrians and bicyclists in the crosswalk

Public Feedback

- Mostly positive public sentiment
- Significant number of concerns regarding east/west traffic delays with current condition
- Left-turn lanes will alleviate queuing related to CyRide and left-turn traffic in through lanes
- Concerns from adjacent residents regarding impacts to properties

Next Steps for Improvements

- Preliminary and final design of improvements and ROW acquisition
- Per the CIP, design and ROW is scheduled for years 2024/2025 and construction is scheduled for years 2025/2026

Planning-Level Cost Estimate

- $2,800,000 – ROW and property acquisition, construction of left-turn lanes on all approaches, new sidewalk adjacent to widened roadways, shared-use path from 12th Street to 500' north of 13th Street and new traffic signal
  - Shared-use path/sidewalk easement required along adjacent properties
  - Two property acquisitions in the northwest quadrant of the intersection and minor ROW acquisition on the remaining quadrants

Grand Avenue & 16th Street

The 16th Street stop-controlled approaches to Grand Avenue experience high delays. 16th Street also serves as an east-west pedestrian and bicycle crossing of Grand Avenue due to vulnerable road user concerns of using the adjacent east-west corridors and signalized crossings on Grand Avenue at 13th Street and 20th Street. The Multimodal Roadway Improvements section of the CIP includes an enhanced intersection crossing planned for implementation in years 2023/2024. Additionally, the MTP identified a shared-use path along Grand Avenue between 6th and 16th Street that was identified as a fiscally constrained bicycle and pedestrian path planned for completion in 2025-2029.

Safety Analysis

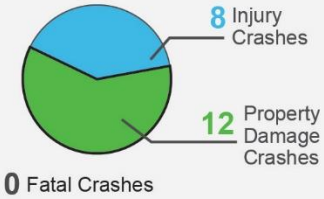
PCR Values/ Tier Classification

Injury PCR 0.29 | All crash PCR 2.50

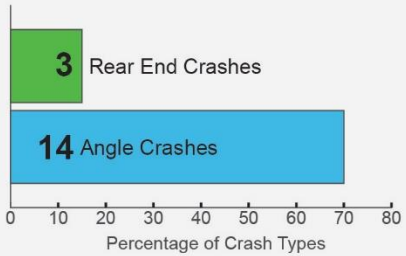
		TIER 3 – Performing Better Than Predicted	TIER 2 – Potential for Safety Improvement	TIER 1 – Safety Consultation
PCR Tier Thresholds	All crashes	PCR < 0	0 < PCR < 1	PCR > 1
	Injury crashes	PCR < 0	0 < PCR < 0.25	PCR > 0.25

Total Crashes During Recent 5 years (2015-2019)

20 Total Crashes



Primary crash types



Number of pedestrian and bicycle crashes

1 Bicycle Crash

0 Pedestrian Crashes

Key safety findings

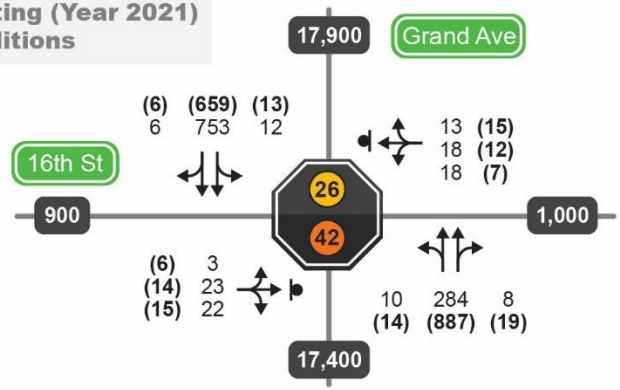
- Nearly half of crashes involved injury.
- PCR in Tier 1 – Reduction to crashes expected with intersection improvements.
- A majority of the crashes at this intersection are angle crashes.
- There was one bicycle injury crash at this intersection during recent last 5 years.

Source: Iowa DOT Draft Safety Analysis Guide and ICAT Crash Data (2015-2019)

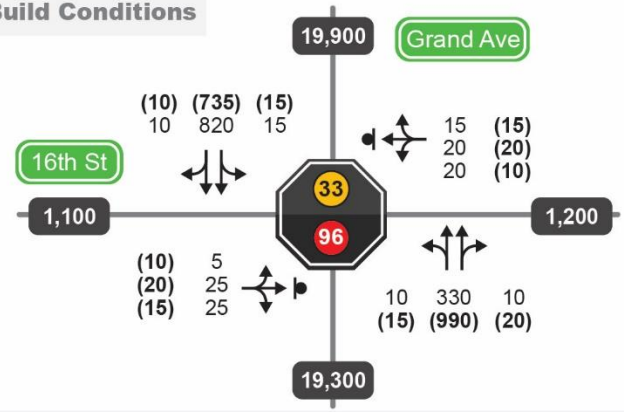
Traffic Counts & Operations

Grand Avenue traffic volumes are projected to grow by 10% by year 2045 and 16th Street is projected to grow by 20%. Existing operations are LOS 'E' for side street stopped traffic during the PM peak hour due to limited gaps in traffic on Grand Avenue to allow for 16th Street traffic to turn onto or cross Grand Avenue. Operations are expected to degrade further by year 2045 to LOS 'F' during the PM peak hour. Note that a traffic signal is not warranted at the intersection.

Existing (Year 2021) Conditions



Future (Year 2045) No-Build Conditions



LEGEND

- ## (##) AM and **(PM)** Peak Hour Volumes
- Intersection Lane Geometrics
- #,### Average Annual Daily Traffic (AADT)
- Stop Sign
- AM Peak Hour Minor Road Stop-Controlled Delay*
- PM Peak Hour Minor Road Stop-Controlled Delay*
  *Worst-Case Approach
- A B C D E F Level of Service

Grand Avenue & 16th Street Intersection Improvements

Project Approach: Identify a solution to improve intersection safety and side street delay within existing ROW

Key Improvements

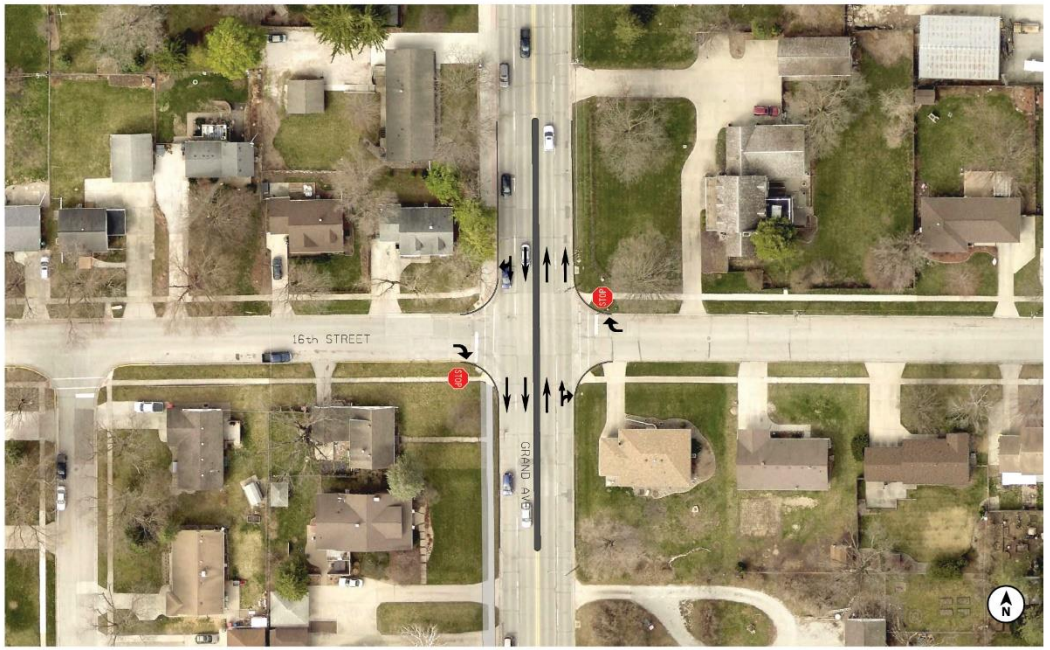
- Raised median on Grand Avenue at 16th Street
- Shared-use path along west side of Grand Avenue

Expected Benefits

- Reduced crashes - eliminate crossing conflicts that often lead to injury

Public Feedback

- Public opposition to build alternative
- Need to maintain east/west crossing for pedestrians and bicyclists
- Prefer to maintain full access for vehicles



Next Steps for Improvements

- Additional study of intersection following improvements at Grand Avenue & 13th Street and Grand Avenue & 20th Street to determine travel pattern changes for all modes resulting from adjacent intersection improvements
- Coordinate with Cyride and Iowa DOT for consistency of long-term plans at the intersection
- If pursued in the future, median needs to be wide enough to fit a pedestrian refuge (cost and ROW/easement would be impacted)
- Lowest priority project within the Grand Avenue corridor and should be considered for implementation after all other projects are complete
- Reevaluate Grand Avenue & 16th Street in the next MTP

Planning-Level Cost Estimate

- $54,000 – Construction of 4-foot median on Grand Avenue and shared-use path along west side of Grand Avenue south of 16th Street for 225 feet, as shown in the graphic
  - Shared-use path easement required along properties on west side of Grand Ave
  - No ROW acquisition required
- Improvements to create a median on Grand Avenue wide enough to fit a pedestrian refuge would require widening of Grand Avenue resulting in order-of-magnitude costs near $180,000

Grand Avenue & 20th Street

The intersection of Grand Avenue & 20th Street experiences a moderate level of pedestrian and bicycle travel. There are three schools located along the 20th Street corridor within a half mile of Grand Avenue. 20th Street is also a designated bicycle-friendly street and has bike lanes planned for the corridor in the 2045 MTP from Ames High School to Duff Avenue. Other previously planned improvements include the addition of left-turn lanes and signal improvements projected in the MTP as short-term projects (2025-2029).

Safety Analysis

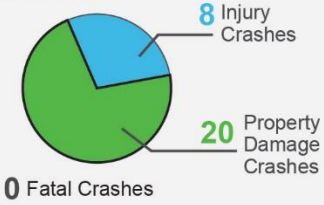
PCR Values/ Tier Classification

Injury PCR 0.13 | All crash PCR 2.36

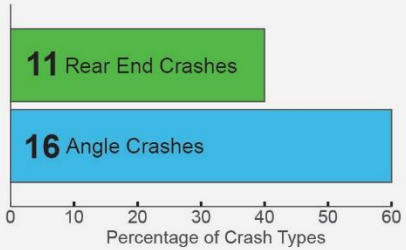
		TIER 3 – Performing Better Than Predicted	TIER 2 – Potential for Safety Improvement	TIER 1 – Safety Consultation
PCR Tier Thresholds	All crashes	PCR < 0	0 < PCR < 1	PCR > 1
	Injury crashes	PCR < 0	0 < PCR < 0.25	PCR > 0.25

Total Crashes During Recent 5 years (2015-2019)

28 Total Crashes



Primary crash types



Number of pedestrian and bicycle crashes

1 Bicycle Crash | 0 Pedestrian Crashes

Key safety findings

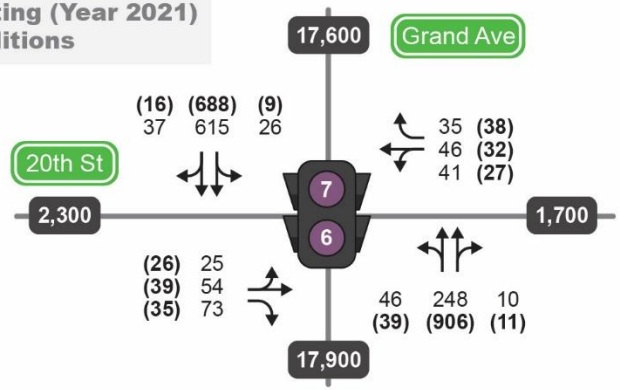
- PCR in Tier 1 – Reduction to crashes expected with intersection improvements.
- Nearly all crashes at this intersection are angle or rear end crashes.
- 90% of crashes involved only vehicles traveling north/south on Grand Avenue.
- There was one bicycle injury crash at this intersection during recent 5 years.
- Several safety deficiencies have been noted at the intersection, primarily for vehicles traveling north/south.

Source: Iowa DOT Draft Safety Analysis Guide and ICAT Crash Data (2015-2019)

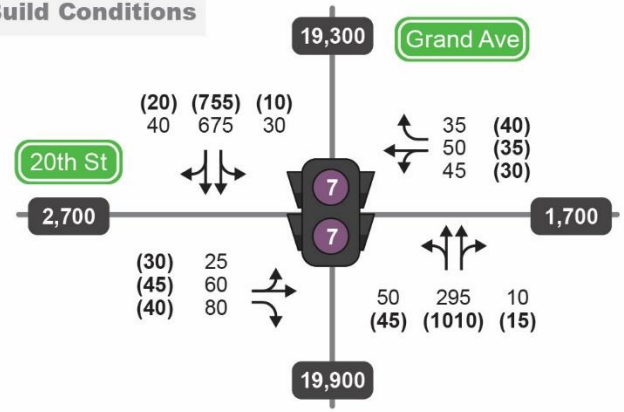
Traffic Counts & Operations

Grand Avenue traffic volumes are projected to grow by 10% by year 2045 and 20th Street is projected to grow by 20%. Existing operations are LOS 'A' during AM and PM peak hours and expected to remain at LOS 'A' in year 2045 no-build conditions.

Existing (Year 2021) Conditions



Future (Year 2045) No-Build Conditions

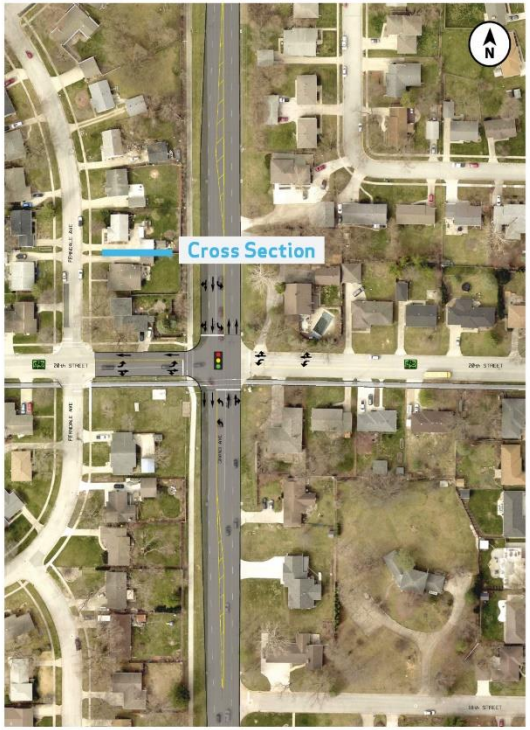


LEGEND

(##) AM and (PM) Peak Hour Volumes
Intersection Lane Geometrics
#,### Average Annual Daily Traffic (AADT)
AM Peak Hour Signalized Intersection Delay
PM Peak Hour Signalized Intersection Delay
A B C D E F
Level of Service

Grand Avenue & 20th Street Intersection Improvements

Project Approach: Implement a multi-modal design per the complete streets plan with improved geometry for driver expectancy within existing ROW



Key Improvements

- Add left-turn lanes on Grand Avenue
- Dedicated left-turn signal phasing
- Restripe 20th Street to include dedicated left-turn lanes
- Coordinated signal system along Grand Avenue
- Leading pedestrian interval
- Shared-use path along south side of 20th Street

Expected Benefits

- Reduced crashes
  - Expected to reduce crashes by 25%
  - Create more predictable movement at the intersection for users
- Improved driver expectancy
- Reduce vehicle delays/queuing
- Increased awareness of pedestrians and bicyclists in the crosswalk

Public Feedback

- Mostly positive public sentiment
- Concern over potential conflict of turning path for southbound right-turning truck/bus with stopped eastbound left-turn traffic

Next Steps for Improvements

- Program the roadway widening, restriping and traffic signal modifications through the Traffic System Capacity Improvements program in a future CIP
- Program the shared-use path improvements on 20th Street through the Shared-Use Path System Expansion program in the CIP

Planning-Level Cost Estimate

- $450,000 – Construction of left-turn lanes on Grand Avenue (widen Grand Avenue 500 feet north and south of 20th Street), shared-use path along south side of 20th Street from Ferndale Avenue to Wilson Avenue and traffic signal modifications
  - Project anticipated to fit within existing ROW due to wide area between the west curb line and existing shared-use path

Grand Avenue & 24th Street

The intersection of Grand Avenue & 24th Street has shared through/left-turn lanes for the east-west approaches, creating slowing/stopped traffic in the inside through lanes on 24th Street. On the east side of Grand Avenue, 24th Street quickly transitions from a four-lane roadway to a two-lane roadway. The intersection experiences a moderate level of pedestrian and bicycle travel as a result of the existing side path along the south side of 24th Street west of Grand Avenue and adjacent North Grand Mall. Previously planned improvements identified in the MTP include a shared-use path on the south side of 24th Street from Grand Avenue to Duff Avenue planned for completion in 2025-2029.

Safety Analysis

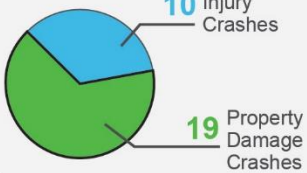
PCR Values/ Tier Classification

All crash PCR -0.34 ↓ | Injury PCR 0.14 ↓

		TIER 3 Performing Better Than Predicted	TIER 2 Potential for Safety Improvement	TIER 1 Safety Consultation
PCR Tier Thresholds	All crashes	PCR < 0	0 < PCR < 1	PCR > 1
	Injury crashes	PCR < 0	0 < PCR < 0.25	PCR > 0.25

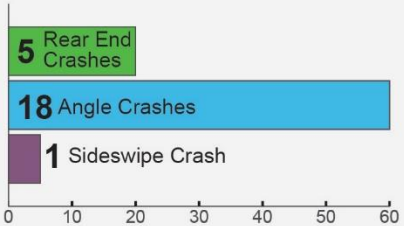
Total Crashes During Recent 5 years (2015-2019)

29 Total Crashes



0 Fatal Crashes

Primary crash types



Number of pedestrian and bicycle crashes

4 Bicycle Crashes

0 Pedestrian Crashes

Key safety findings

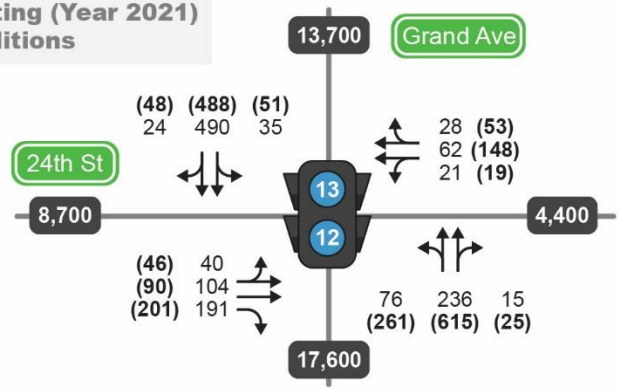
- A majority of the crashes at this intersection are angle crashes.
- There were four bicycle injury crashes at this intersection during recent 5 years.

Source: Iowa DOT Draft Safety Analysis Guide and ICAT Crash Data (2015-2019)

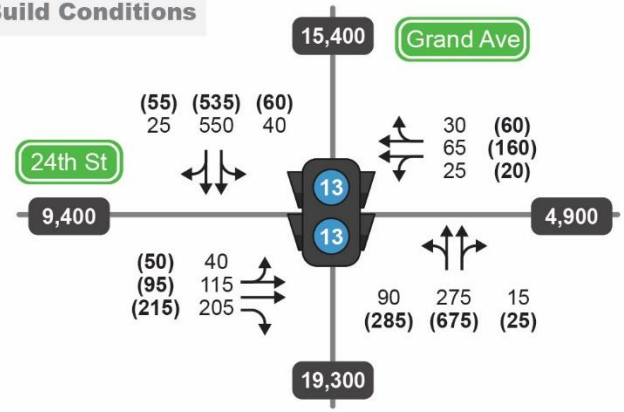
Traffic Counts & Operations

Grand Avenue and 24th Street traffic volumes are projected to grow by 10% by year 2045. Existing operations are LOS 'B' during AM and PM peak hours and expected to remain at LOS 'B' in year 2045 no-build conditions.

Existing (Year 2021) Conditions



Future (Year 2045) No-Build Conditions



LEGEND

(##) AM and **(PM)** Peak Hour Volumes

Intersection Lane Geometrics

#,### Average Annual Daily Traffic (AADT)

AM Peak Hour Signalized Intersection Delay
PM Peak Hour Signalized Intersection Delay

A B C D E F
Level of Service

Grand Avenue & 24th Street Intersection Improvements

Project Approach: Implement a multi-modal design per the complete streets plan with improved geometry for driver expectancy within existing ROW

Key Improvements

- Restriping lanes on 24th Street to provide dedicated east/west left-turn lanes
- New traffic signal
- Coordinated signal system along Grand Avenue
- Three-lane road on 24th Street between Grand Avenue and Jensen Avenue utilizing existing pavement
- Shared-use path along south side of 24th Street east of Grand Avenue
- Leading pedestrian interval
- Decrease SW corner radius to standard dimension

Expected Benefits

- Improved driver expectancy
- Reduced vehicle delays/queuing
- Increased awareness of pedestrians and bicyclists in the crosswalk

Public Feedback

- Mostly positive public sentiment

Next Steps for Improvements

- Program the intersection restriping and traffic signal replacement through the Traffic System Capacity Improvements program in a future CIP
- Program the shared-use path improvements on 24th Street through the Shared-Use Path System Expansion program in a future CIP

Planning-Level Cost Estimate

- $600,000 – Remove median on east leg, modify intersection returns, construct shared-use path along south side of 24th Street from Grand Avenue to Jensen Avenue and new traffic signal
  - Project anticipated to fit within existing ROW
  - Signal pole replacement may require traffic signal easements

4. Improvements Summary & Implementation Plan

The following Grand Avenue intersection improvements are summarized by intersection and type of improvement in **Table 1**.

Table 1. Summary of Key Improvements

Key Improvements	Intersection				
	Grand Avenue & 9th Street	Grand Avenue & 13th Street	Grand Avenue & 16th Street	Grand Avenue & 20th Street	Grand Avenue & 24th Street
Add Left-Turn Lanes		All Directions		Northbound & Southbound Lefts	
Restripe to Include Left-Turn Lanes				Eastbound & Westbound Lefts	Eastbound & Westbound Lefts
Raised Median			On Grand Avenue Through Intersection		
Three-Lane Road					Grand Avenue to Jensen Avenue
Shared-Use Path	Along Grand Avenue (West Side)	Along Grand Avenue (West Side)	Along Grand Avenue (West Side)	Along 20th Street (South Side)	Along 24th Street (South Side)
New Traffic Signal		New Mast Arms for All Approaches			New Mast Arms for All Approaches
Coordinate Signal System	Northbound & Southbound Progression	Northbound & Southbound Progression		Northbound & Southbound Progression	Northbound & Southbound Progression
Leading Pedestrian Interval	All Pedestrian Movements	All Pedestrian Movements		All Pedestrian Movements	All Pedestrian Movements
Update Yellow and Red Time		All Directions		Eastbound & Westbound	
Dedicated Left-Turn Signal Phasing		All Lefts		Northbound & Southbound Lefts	

Cost Summary & Implementation Plan

Next steps for improvements at each study intersection are summarized below. Note that each individual project is expected to go through its own public input process as part of the preliminary and final design.

9th Street and Grand Avenue

- Planning-Level Cost Estimate: $70,000 with no ROW acquisition required
- Next Steps: Program the shared-use path improvements on Grand Avenue through the Shared-Use Path System Expansion Program in a future CIP

13th Street and Grand Avenue

- Planning-Level Cost Estimate: $2.8 million, including two property acquisition in the northwest quadrant and minor ROW acquisition on the remaining quadrants
- Next Steps:
  - Preliminary and final design of improvements and ROW acquisition
  - Per the CIP, design and ROW is scheduled for years 2024/2025 and construction is scheduled for years 2025/2026

16th Street and Grand Avenue

- Planning-Level Cost Estimate: $54,000 with no ROW acquisition required for improvements illustrated in this report (with 4-foot median); Improvements to create a median on Grand Avenue wide enough to fit a pedestrian refuge would require widening of Grand Avenue resulting in order-of-magnitude costs near $180,000
- Next Steps:
  - Additional study of intersection following improvements at Grand Avenue & 13th Street and Grand Avenue & 20th Street to determine travel pattern changes for all modes resulting from adjacent intersection improvements
  - Coordinate with CyRide and Iowa DOT for consistency of long-term plans at the intersection.
  - Reevaluate Grand Ave & 16th Street in the next MTP

20th Street and Grand Avenue

- Planning-Level Cost Estimate: $450,000 with no ROW acquisition required
- Next Steps:
  - Program the roadway widening, restriping and traffic signal replacement through the Traffic System Capacity Improvements program in a future CIP
  - Program the shared-use path improvements on Grand Avenue through the Shared-Use Path System Expansion Program in a future CIP

24th Street and Grand Avenue

- Planning-Level Cost Estimate: $600,000 with no ROW acquisition required
- Next Steps:
  - Program the intersection restriping and traffic signal replacement through the Traffic System Capacity Improvements program in a future CIP
  - Program the shared-use path improvements on Grand Avenue through the Shared-Use Path System Expansion Program in a future CIP

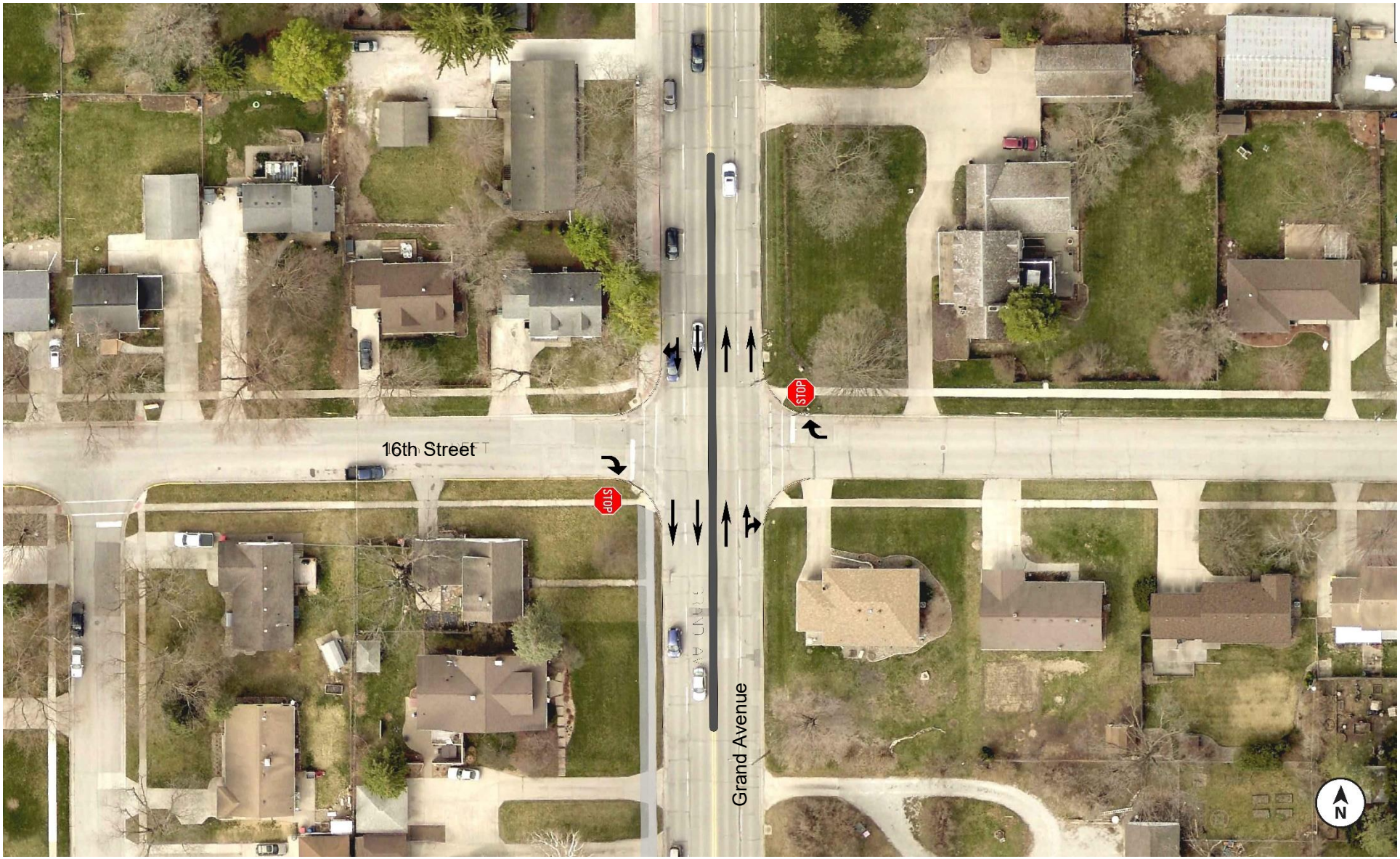
Appendix

- Grand Avenue & 9th Street Intersection Improvements
- Grand Avenue & 13th Street Intersection Improvements
- Grand Avenue & 16th Street Intersection Improvements
- Grand Avenue & 20th Street Intersection Improvements
- Grand Avenue & 24th Street Intersection Improvements

Grand Avenue & 9th Street Intersection Improvements

Grand Avenue & 13th Street Intersection Improvements

Grand Avenue & 16th Street Intersection Improvements



Grand Avenue & 20th Street Intersection Improvements

Grand Avenue & 24th Street Intersection Improvements