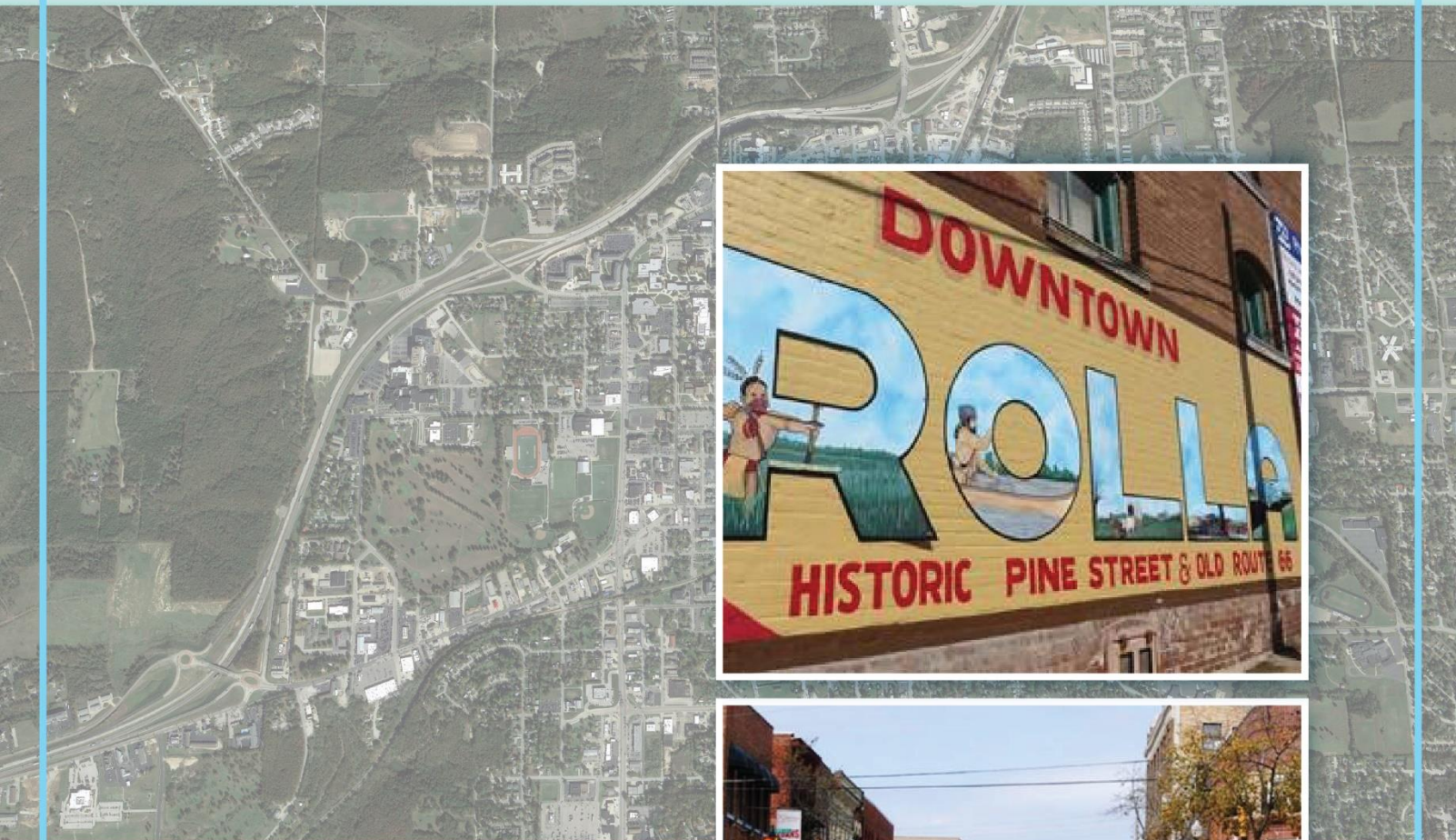




Move Rolla TDD Pine Street / Downtown Circulation Study

October 22, 2021

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This report was prepared for:

City of Rolla
Rolla Transportation Development District Board

This report was prepared by:

HNTB Corporation

Executive Summary

A transportation analysis of Rolla Street and Pine Street between 6th Street and 12th Street in downtown Rolla, Missouri was performed as part of the Move Rolla Transportation Development District Program. The purpose of the study was to evaluate the parking, circulation and intersection control for the downtown transportation system to meet the needs of the downtown residents, visitors and business owners. The improvements to the downtown transportation system provide are a complete multi-modal transportation system that address the needs of all users, enhance the

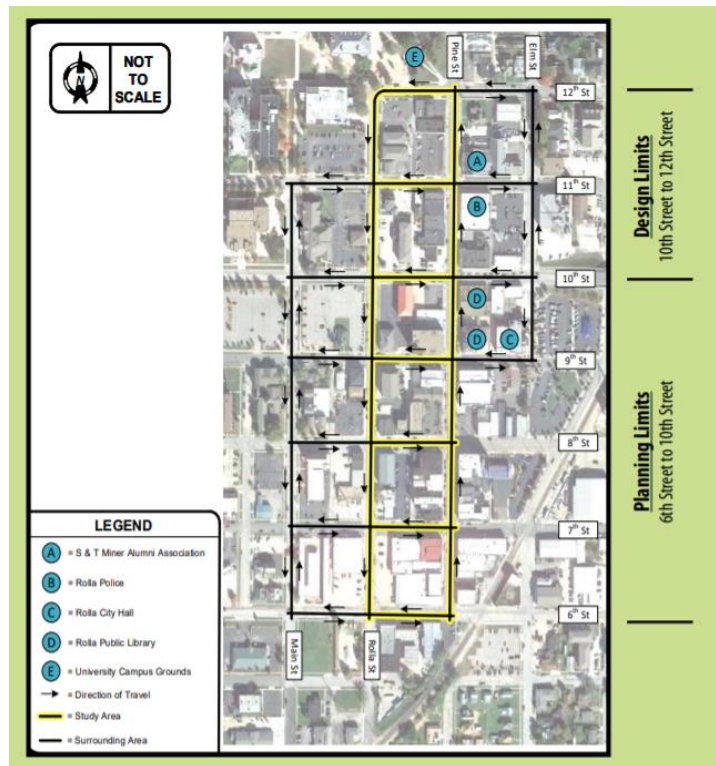
economic conditions of downtown businesses and maximize the Downtown Rolla experience. The City currently plans to convert Pine Street from one-way to two-way between 10th Street and 12th Street as shown in the figure within the design limits.

Four alternatives plus the existing configuration were identified for evaluation within the planning limits. The evaluation analyzed traffic, safety, economic, construction cost, as well as public and downtown stakeholder input.

Pine Street and Rolla Street Alternatives

Pine Street Stays One-Way	Alternative 1a (Existing)	Pine St. 2-Lanes, 1-way NB, Rolla St. 2-Lanes, 1-way SB
	Alternative 1b	Pine St. 2-Lanes, 1-way SB, Rolla St. 2-Lanes, 2-way
Pine Street Stays One-Way with Angled Parking	Alternative 2a	Pine St. 1-Lane, 1-way NB, Rolla St. 2-Lane, 2-way
	Alternative 2b	Pine St. 1-Lane, 1-way SB, Rolla St. 2-Lane, 2-way
Pine Street Is converted to Two-Way	Alternative 3	Pine St. 2-lane, 2-way Rolla St. 2-lane, 2-way

Note: Alternative 1a keeps Rolla St. one-way. Alternatives 1b, 2 and 3 convert Rolla St. to two-way.



On July 29th, 2021 a downtown stakeholder meeting was held. Approximately 55 people signed in. Alternative 3 garnered the most votes with 13 votes out of 25 cast. On September 15th, 2021 a public meeting was held. Approximately 35 people signed in. Alternative 2a and 3 garnered the most votes with 6 votes each out of 14 cast. Finally, an electronic survey was sent out to the Move Rolla TDD database which totals more than 300 people. Alternative 3 garnered the most votes with 46 votes out of 85 cast.

As a result of the technical evaluation, the following conclusions were generated.

- One-way streets generally provide improved mobility while two-way streets provide improved accessibility to businesses.
- No fatal flaws were identified between the alternatives. Each alternative provided similar traffic and safety results, that will adequately serve downtown Rolla.
- Four Pine Street traffic signals no longer meet signal warrants and could be removed. These traffic signals are Pine Street at the 11th, 9th, 8th, and 7th Street intersections.
- Capital costs range from approximately \$1.4 to \$1.8M for the non-existing alternatives.
- Alternatives 2a and 2b, which include angled parking, require a reduction down to one-lane if parking remains on both sides. The fire department expressed safety concerns with this.
- Public outreach indicated that most people wanted a more pedestrian friendly environment which could include: parklets, wider sidewalks, streetscaping, street furniture, bicycle amenities and lighting.

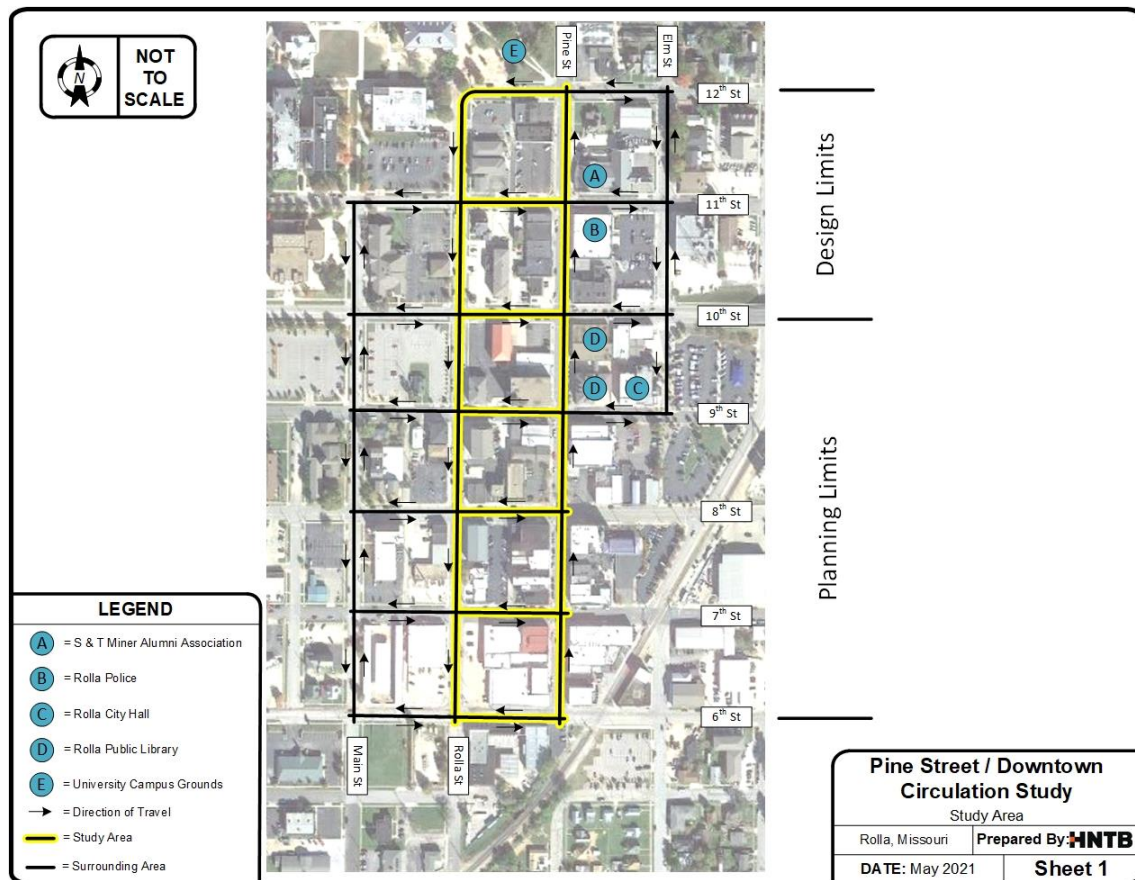
Alternative 1a (Existing)	\$0
Alternative 1b	\$1,404,000
Alternative 2a	\$1,478,400
Alternative 2b	\$1,778,400
Alternative 3	\$1,810,800

Based on the technical analysis and stakeholder and public input it is recommended that the City of Rolla move forward with Alternative 3 which converts both Rolla Street and Pine Street to two-way traffic with one-lane in each direction.

1.0 Introduction

The purpose of this report is to present the methodology and results used to evaluate transportation alternatives in Downtown Rolla. The study area, as shown in Figure 1, encompasses Pine and Rolla streets from 12th Street to 6th Street. Five different circulation alternatives were developed and analyzed. Each alternative was evaluated for traffic operations, safety, engineering, economic impacts, and public/stakeholder input.

Figure 1: Pine Street / Downtown Circulation Study Area



Design limits and planning Limits are shown on Figure 1. Within the design limits, the City is currently working on plans to convert Pine Street and Rolla Street to two-way traffic between 10th Street and 12th Street. Within the planning limits, five different alternatives were analyzed and presented to downtown business stakeholders and the public to receive feedback.

The five alternatives that were developed, analyzed, and presented are shown in **Appendix A** in a typical section format.

- **Alternative 1a** – Existing Conditions
- **Alternative 1b** – Pine Street Two Lanes, One Way Southbound and Rolla Street Two Lanes Two-Way
- **Alternative 2a** – Pine Street One Lane, One-Way Northbound and Rolla Street Two Lanes, Two Way
- **Alternative 2b** - Pine Street One Lane, One-Way Southbound and Rolla Street Two Lanes, Two Way
- **Alternative 3** – Pine Street and Rolla Street Two-Lane, Two Way

2.0 Methodology

The study methodology was reviewed with the project team made up of the City's Public Works leadership, Missouri University of Science and Technology (MS&T) and their planning consultant SWT and the Move Rolla TDD Program Manager Consultant, HNTB. The study methodology incorporated analysis of the following elements:

- Traffic Volumes
- Traffic Operational Analysis
- Traffic and Pedestrian Safety
- Economic
- Engineering
- Stakeholder and Public Input

A detailed description of the study methodology is provided in **Appendix B**.

3.0 Stakeholder and Public Outreach

The City of Rolla hosted two meetings to provide information about the Pine Street / Downtown Circulation Project (Pine Street and Rolla Street) and gather feedback. Both meetings were open house format and members of the project team were available to answer questions.

The same exhibits were used for both meetings and are included in **Appendix C**. Exhibits provided information on:

- Purpose and benefits of the project
- Existing conditions of Pine and Rolla Streets
- Parking alternatives
- Traffic circulation alternatives
- Alternatives evaluation
- Requested feedback

The first meeting was held on July 29, 2021 from 4:00 p.m. to 6:00 p.m. at the MS&T Miner Alumni Association. The City invited downtown stakeholders, such as property owners, business owners and business managers. The stakeholders were notified of the event by email and door hangers. Nearly 50 people were in attendance.

The second meeting was held on September 15, 2021 from 4:00 p.m. to 6:00 p.m. at the MS&T Alumni Association. This was a Public Meeting so all members of the community and interested stakeholders were invited to attend. The public was notified via electronic invitations that were distributed to the Project database that has over 300 contacts. Approximately 35 people attended the meeting.

An electronic survey was sent out to the Move Rolla TDD database which totals more than 300 people. The survey was open from September 16, 2021 through September 29, 2021.

At the meeting, attendees were asked to select the alternative that they liked the best and place a colored dot on the exhibit board. This question was also asked in the electronic survey. Table 1 provides the results of the non-scientific informal surveys.

Stakeholder Meeting - At the Stakeholder meeting thirteen (13) people selected Alternative 3, followed by four people selecting Alternative 2a, three selecting 1b and 2b each, and two people selecting Alternative 1a. Comments heard during the meeting and left by comment form included:

- Two-way is preferred on Rolla Street.
- Parking improvements are important and prefer not to see a reduction in parking supply.

Public Meeting - At the Public Meeting, both Alternative 2a and Alternative 3 had 6 votes each, followed by Alternative 1a with two votes. Comments heard during the meeting and left by handwritten notes on the comment board included:

- Consider keeping the 8th Street traffic signal.
- Either a stop sign or traffic signal should be located at 11th Street and Rolla Street for safety.
- Bikes and pedestrian facilities are important to students and visitors.
- Parklets should be considered.
- Keep downtown as it is and don't change it.

Electronic Survey – In coordination with the Public Meeting, an electronic survey was promoted at the event, on the project website as well as sent electronically to the project email distribution. The survey was five questions in regard to the downtown improvements. Forty-six (46) people completed the survey.

Nearly 70 percent of participants go downtown at least a few times per week and the primary reasons are for shopping and dining.

When asked what improvements are most important regarding transportation, the top two responses were increased parking and improved traffic circulation. Nearly 40 percent also selected other and specified that pedestrian improvements such as better lighting, improved safety and improved sidewalks are additional priorities.

Over 40 percent or 20 survey participants voted for Alternative 1a, followed by Alternative 3 with 30 percent or 14 votes. When asked if there are other considerations the team should potentially incorporate, 32 people provided comments with the following themes:

- Several comments in regard to concerns about parking in front of the Chi Omega sorority house, as well as they would like to see lighting improvements.
- Would like to see additional parking.
- Parklets or improvements to draw people to downtown.

Table 1: Stakeholder, Public and Electronic Survey Input

Alternative	Business / Stakeholder Votes	General Public Votes	Electronic Survey Votes	Total Votes
Alternative 1a (existing) Pine St. 2-Lanes, 1 way NB Rolla St. 2-Lanes, 1 way SB	2 votes	2 votes	20 votes	24 votes
Alternative 1b Pine St. 2-Lanes, 1 way SB Rolla St. 2-Lanes, 2 way	3 votes	0 votes	2 votes	5 votes
Alternative 2a Pine St. 1-Lane, 1 way NB Rolla St. 1-Lane, 2 way	4 votes	6 votes	9 votes	19 votes
Alternative 2b Pine St. 1-Lane, 1 way SB Rolla St. 1-Lane, 2 way	3 votes	0 votes	1 vote	4 votes
Alternative 3 Pine St. 2-Lane, 2 way Rolla St. 2-Lane, 2 way	13 votes	6 votes	14 votes	33 votes
Votes Cast	25 votes	14 votes	46 votes	85 votes

4.0 Study Results

Each of the five alternatives were evaluated from a technical perspective. The technical evaluation included traffic operations, safety, engineering and economic factors. An evaluation matrix is provided at the end of this chapter that brings all of the analysis together.

4.1 Traffic

A quantitative traffic analysis was performed based for level of service, vehicle queues, and signal warrants. The methodology used can be found in Appendix B.

Level of Service

Traffic level of service (LOS) was calculated based on the Highway Capacity Manual (HCM) 6th edition methodology for signalized and unsignalized intersections in the study area. The reported LOS for signalized intersections reflects the operation of the intersection as a whole. However,

LOS for unsignalized intersections is based on the movement or movement grouping which is required to stop or yield to other traffic, or the movement with the longest delay. Table 2 displays the number of intersections within each alternative that receive LOS ratings A-C, D, E, and F for both existing and future volumes with both the current traffic control plan and stop control on Pine Street. There are a total of 14 intersections that were analyzed in the study area. Figures showing the overall LOS at each intersection can be found in **Appendix D**. For both existing and future conditions, LOS A – D is considered acceptable to the City, while LOS E or F is considered undesirable.

Table 2: Study Area Intersection Level of Service Summary

	Existing 2020 with Existing Traffic Control			Future Scenario with Existing Traffic Control			Existing 2020 with Stop Control on Pine Street			Future Scenario with Stop Control on Pine Street		
	AM	Mid- Day	PM	AM	Mid- Day	PM	AM	Mid- Day	PM	AM	Mid- Day	PM
	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS	LOS
Alt 1a												
LOS A-C	14	14	14	12	13	13	14	14	14	12	13	12
LOS D				2						2		1
LOS E												
LOS F					1	1					1	1
Alt 1b												
LOS A-C	14	14	13	12	13	12	14	14	13	12	13	12
LOS D				1		1				1		1
LOS E			1						1			
LOS F				1	1	1				1	1	1
Alt 2a												
LOS A-C	14	14	13	12	13	13	14	14	13	12	13	13
LOS D			1	2					1	2		
LOS E												
LOS F					1	1					1	1
Alt 2b												
LOS A-C	14	14	13	12	13	12	14	14	13	12	13	12
LOS D				1		1				1		1
LOS E			1						1			
LOS F				1	1	1				1	1	1
Alt 3												
LOS A-C	14	14	13	12	13	13	14	14	13	12	13	13
LOS D				1						1		
LOS E			1						1			
LOS F				1	1	1				1	1	1

Source: HNTB, HCM analysis

With the existing 2020 volumes, Alternative 1a has all intersections performing at a LOS C or better during all peak periods both with the existing and modified traffic control plans. The only intersection in Alternatives 1b, 2a, 2b, and 3 that performs below a LOS C is 6th and Rolla during the PM peak period as an all-way-stop-controlled intersection.

The future volumes cause the LOS performance across all alternatives to decrease slightly. The most notable result is the intersection of 6th and Rolla which consistently performs at a LOS E/F across all alternatives, peak periods, and traffic control plans. This intersection was only analyzed in its existing all-way stop control configuration, however the future volumes would warrant a traffic signal. All other intersections in the future volume scenario operate at LOS D or better for all alternatives in each time period.

Implementing the stop control plan only decreased the overall LOS at the one intersection of 12th and Pine during the PM peak period for alternative 1a. This is due to the fact that the new stop sign at 11th and Pine changed the timing of arrival of vehicles to 12th and Pine, thus increasing the delay by 3.8 seconds and decreasing the LOS at 12th and Pine to a LOS D. Otherwise the stop control plan generally reduced the delays experienced at the intersections of Pine street with 11th, 9th, 8th, and 7th streets by two to three seconds when modeled using both existing and future volumes. These intersections were already operating at a LOS C or better, so the decreased delay is not noticeable in Table 1, but can be seen in Appendix D.

Queue Lengths

The complete results of the vehicle queue analysis is provided in **Appendix E**. The queue length reported is the 95th percentile. For existing traffic volumes and the existing traffic control plan, there was only one location that experienced queue issues. Queue issues were observed at 10th and Rolla in the eastbound and westbound directions.

The future volumes with the existing traffic control plan caused alternatives to experience anywhere from 5 to 18 approaches with queue lengths longer than the available storage. The range of affected intersections expanded to include 10th and Pine and 6th and Rolla in addition to 10th and Rolla.

Implementing the stop-control traffic plan did not cause any new locations where queues exceeded the available storage during any time period for all alternatives. The queues at several locations decreased as a result of the signal removal. These changes to queue lengths are minor and not reflected on figures in the appendix.

Signal Warrants

None of the signal-controlled study area intersections in any of the five alternatives require a traffic signal with the 2020 traffic volumes according to the MUTCD peak hour signal warrant. With the future volumes, the intersections of Rolla and 6th, Rolla and 10th, and Pine and 10th meet the

warrant criteria for a signal in all the alternatives. The signal warrant graphs can be found in **Appendix F**.

4.2 Safety

A qualitative pedestrian and vehicle safety analysis was performed based on the roadway geometry of each alternative. The methodology used can be found in **Appendix B**.

Pedestrian

There is an inverse relationship between safety and the number of lanes of traffic a pedestrian must cross to get to the other side of the road. This relationship is most evident in Alternative 1a, Alternative 1b, and Alternative 3 where pedestrians would have to cross four total lanes of traffic between Pine and Rolla streets, making these alternatives the least safe from the pedestrian perspective.

Vehicle

Vehicular safety was measured based on the possible collision types and conflict points introduced by the roadway geometry of each alternative. One-way roads generally have fewer angle crashes and no head on collisions. Two-way roads introduce the possibility for more angle crashes from left turning vehicles and introduce the potential for head on collisions. Therefore, the alternatives with a higher number of two-way roads were assumed to be slightly less safe than alternatives with one-way roads. The safest alternatives were determined to be Alternative 2a and Alternative 2b from a vehicular perspective.

4.3 Engineering

A high-level engineering assessment was performed for each alternative. The purpose of the engineering assessment was to develop a typical section for each alternative and develop a high-level cost estimate. Alternative plan plates are found in **Appendix G**.

The estimated construction costs for improvements ranges from \$1.4M to \$1.8M depending on the alternative. The costs for the curb and gutter, asphalt replacement, sidewalk improvements, pavement marking, and corridor street lighting is almost identical for Alternatives 2 and 3. The larger variability in costs comes from the need for traffic signal additions which is dependent upon the final direction of travel for traffic within each typical section/alternative. In all proposed alternatives, a new signal is required at the intersection of 6th and Rolla due to the conversion of

Rolla from one-way southbound to two-way. An additional signal is required at the intersection of 6th and Pine Street for the alternatives where Pine Street has southbound traffic (Alternatives 1b, 2b, and 3).

Table 3 provides the summary of engineering costs for the five alternatives.

Table 3: Study Area Construction Cost Estimate by Alternative

Pine & Rolla St (6th St - 10th St)												
Construction Cost Estimate by Alternative												
Improvements ¹	Unit	Unit Cost	Alternatives									
			1a (Exist.)		Alt. 1b		Alt. 2a		Alt. 2b		Alt. 3	
			Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost	Quantity	Cost
Curb-Line Improvements ²	LF	\$ 30.00	0	\$ -	0	\$ -	2,500	\$ 75,000.00	2,500	\$ 75,000.00	2,500	\$ 75,000.00
Asphalt Replacement	SY	\$ 10.00	0	\$ -	0	\$ -	4,940	\$ 49,400.00	4,940	\$ 49,400.00	4,590	\$ 45,900.00
Sidewalk Improvements	SY	\$ 65.00	0	\$ -	0	\$ -	2,330	\$ 151,450.00	2,330	\$ 151,450.00	2,750	\$ 178,750.00
Street Lighting Improvements	LS	\$ 400,000.00	0	\$ -	1	\$ 400,000.00	1	\$ 400,000.00	1	\$ 400,000.00	1	\$ 400,000.00
Pavement Marking Improvements ³	LF	\$ 20.00	0	\$ -	3,500	\$ 70,000.00	5,285	\$ 105,700.00	5,285	\$ 105,700.00	5,457	\$ 109,140.00
Signal Removals	EA	\$ 50,000.00	0	\$ -	4	\$ 200,000.00	4	\$ 200,000.00	4	\$ 200,000.00	4	\$ 200,000.00
Signal Additions	EA	\$ 250,000.00	0	\$ -	2	\$ 500,000.00	1	\$ 250,000.00	2	\$ 500,000.00	2	\$ 500,000.00
Subtotals:				\$ -		\$ 1,170,000.00		\$ 1,232,000.00		\$ 1,482,000.00		\$ 1,509,000.00
20% Contingency:				\$ -		\$ 234,000.00		\$ 246,400.00		\$ 296,400.00		\$ 301,800.00
Totals ⁴ :				\$ -		\$ 1,404,000.00		\$ 1,478,400.00		\$ 1,778,400.00		\$ 1,810,800.00

Notes:

1. Assumes no curb line, asphalt replacement, sidewalk, or street lighting improvements on Rolla St
2. Assumes 1,250 LF of curb on each side of Pine from 6th St to 10th St
3. Assumes no parking spot pavement marking on Rolla St.
4. Totals do not include the following: potential reimbursable utility relocation costs or storm sewer modifications or improvements

4.4 Economic

A qualitative assessment of the economic impact to downtown Rolla was performed for each alternative. The rating focused on the impacts to downtown parking, delivery, and access to businesses.

- **Parking** – No alternatives reduced existing parking. Alternatives 2a and 2b increased parking by five spaces per block on average with angled parking.
- **Delivery** – Today, delivery vehicles often block one of the two existing travel lanes with one-way traffic on Pine Street. Alternatives 2a and 2b which have one travel lane on Pine

Street as well as Alternative 3 which has one travel lane in each direction proposes delivery zones either taking up two of the additional angled parking spots or locating delivery parking zones to the cross streets.

- **Access to Businesses** – Access to businesses downtown is enhanced with Alternative 3 providing more direct access to all businesses and less out of direction travel associated with one-way travel.

In summary, each alternative has trade-offs between parking, delivery and access to businesses. However, all alternatives were rated as High Achievement or Substantial Achievement indicating that there are no fatal economic flaws to any of the alternatives.

4.5 Evaluation Matrix

A transportation analysis of traffic, safety, economic and engineering was performed to help identify the best circulation configuration of Pine Street/Downtown Rolla from a technical perspective. Table 4 provides a qualitative rating for each of the factors analyzed based primarily on quantitative data. The table also includes the results of the public engagement outreach.

The rating system used is described at the bottom of the table. In summary, a full green circle or $\frac{3}{4}$ green circle represents good conditions. The half grey circle represents areas of moderate impact / moderate achievement. The $\frac{1}{4}$ or full red circles represent more significant concern.

In summary, all alternatives are expected to operate at a substantial or high achievement with no fatal flaws. Only Alternatives 2b and Alternative 3 had a rating of the half grey circle of moderate impact / moderate achievement. The results of these two ratings are discussed below.

- Alternative 2b – This alternative received a half grey rating for future vehicle queues. The 95th percentile queues for this alternative exceeded the available storage bay length at 11 locations for at least one of the peak hours analyzed in the future year scenario.
- Alternative 3 – This alternative received a half grey rating for vehicle safety. In this alternative both Rolla and Pine Streets are converted to two-way facilities, as a result there are new potential conflicts for left turning and head on collisions.

The matrix also shows that if improvements are made the cost is expected to be in the \$1.4 to \$1.8 million range. Finally, the public outreach effort concluded that while there are different opinions and thoughts how to improve downtown, the public does want to see improvements.

The top choice, particularly by those that had the opportunity to speak with the project team, preferred Alternative 3.

Table 4: Evaluation Matrix

Downtown Rolla Improvements													
Alternatives Screening													
Alternative	Transportation Evaluation												
	Traffic				Safety		Economic			Engineering	Support		
	Existing Traffic Operations	Future Traffic Operations ¹	Existing Vehicle Queues	Future Vehicle Queues	Pedestrian Impact	Vehicular Impact ²	Parking Impact	Delivery Impact	Access to Businesses	Construction Costs	Downtown Stakeholder Input	Public Input	Public Input (Electronic Survey)
Alternative 1a (Existing) Pine St. 2-Lanes, 1-way NB, Rolla St. 2-Lanes, 1-way SB										\$0	2 votes	2 votes	20 votes
Alternative 1b Pine St. 2-Lanes, 1-way SB, Rolla St. 2-Lanes, 2-way										\$ 1,404,000	3 votes	0 votes	2 votes
Alternative 2a Pine St. 1-Lane, 1-way NB, Rolla St. 1-Lane, 2-way										\$ 1,478,400	4 votes	6 votes	9 votes
Alternative 2b Pine St. 1-Lane, 1-way SB, Rolla St. 1-Lane, 2-way										\$ 1,778,400	3 votes	0 votes	1 votes
Alternative 3 Pine St. & Rolla St. 2-lane, 2-way										\$ 1,810,800	13 votes	6 votes	14 votes
High Impact/No or Low Achievement Substantial Impact/Slight Achievement Moderate Impact/Moderate Achievement Slight Impact/Substantial Achievement No or Low Impact/High Achievement													

¹Ratings assume no additional improvements or changes in traffic control, however with 11th, 9th, 8th, and 7th Street intersections on Pine Street converted to AWSC the operations are anticipated to stay the same or improve.

²Converting traffic signals to stop control is assumed to increase the crash modification factor for vehicular accidents.

5.0 Recommendation

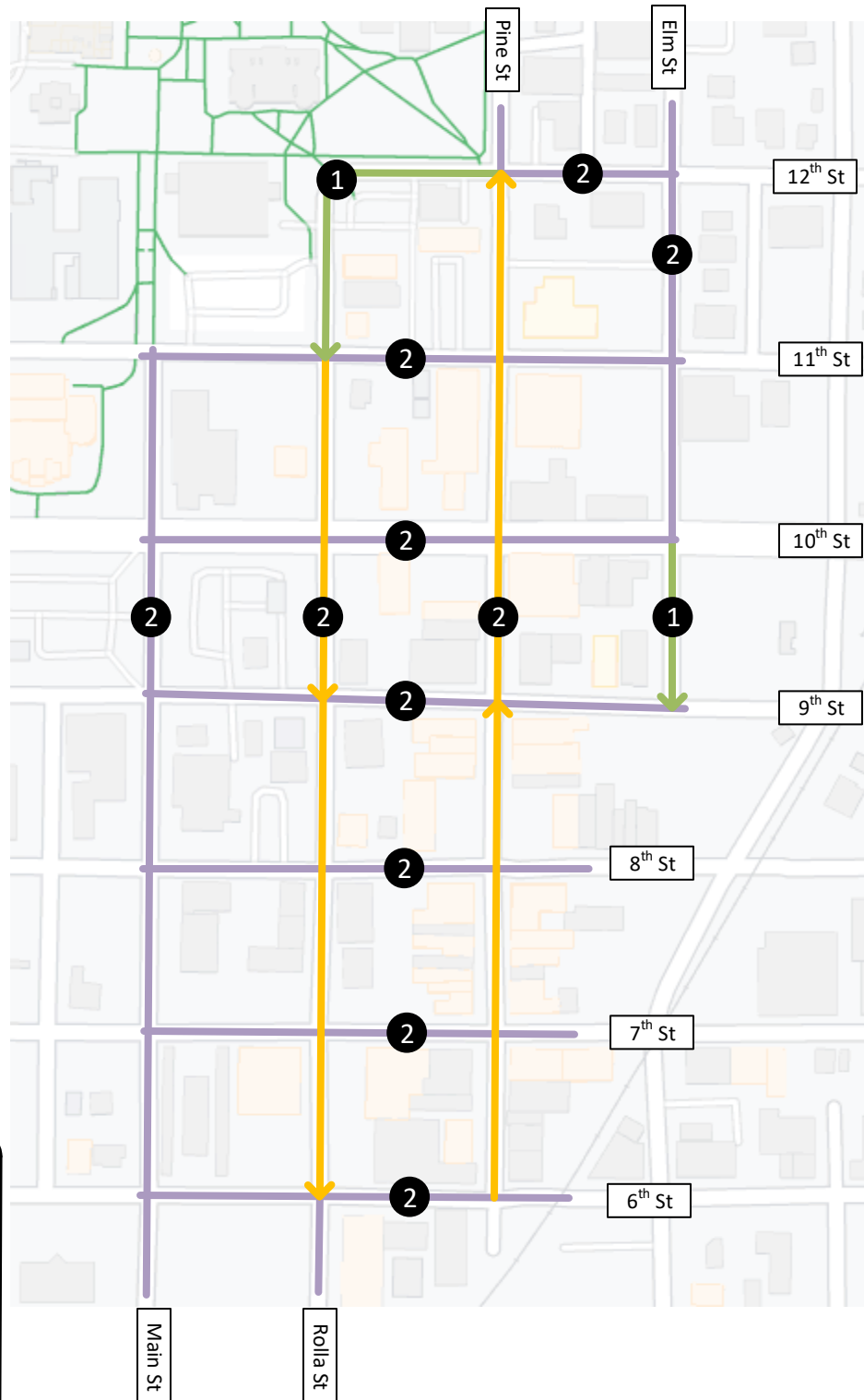
As a result of the transportation analysis, the traffic, safety, and economic factors have minimal differentiation between the five different alternatives. The least expensive alternative is to maintain the existing facility with Alternative 1a, resulting in zero construction costs. The other four alternatives construction costs range from \$1.4 to \$1.8 million dollars. Input from the stakeholder engagement meeting favored Alternative 3 by a 3:1 margin of support to the next highest ranked alternative. The public outreach efforts had Alternative 3 and 1b as the highest rated alternatives. The electronic survey results indicated Alternative 3 and 1a as the highest rated alternatives.

In conclusion Alternative 3 received the most overall support and is anticipated to have acceptable traffic and safety operations while providing positive economic impact and accessibility to businesses in the study area. The next step is to present the result of this report to the City Council for approval.

Appendix

- A – Alternatives Analyzed
- B – Study Methodology
- C – Meeting Boards and Survey Results
- D - LOS Results
- E - Queue Results
- F - Signal Warrant Graphs
- G - Engineering

Appendix A – Alternatives Analyzed



LEGEND

- = One Lane, One-Way
- = Two Lanes, One-Way
- = Two Lanes, Two-Way
- = Pedestrian Pathways
- = Number of Lanes

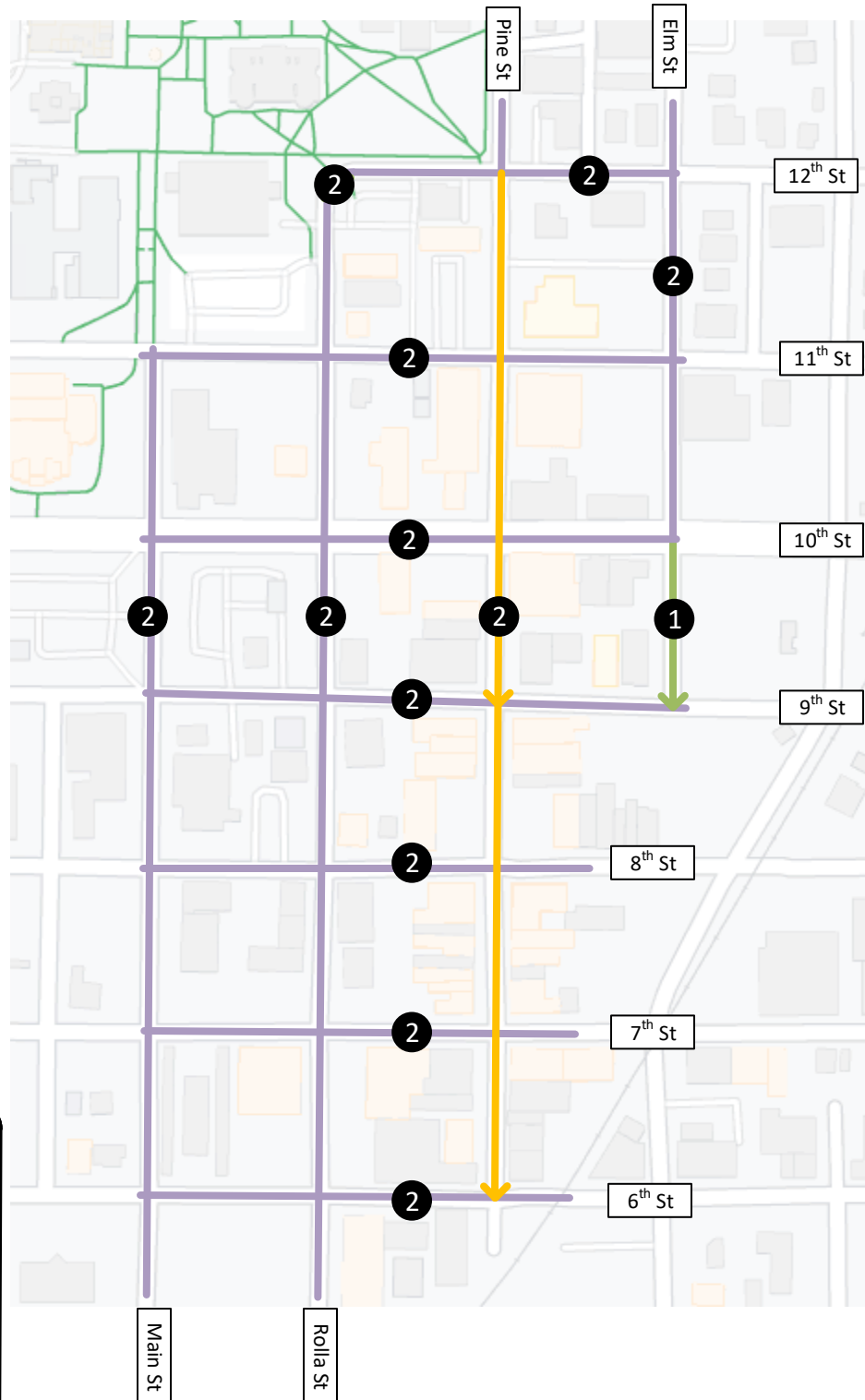
Pine Street / Downtown Circulation Study

Alt 1a: Existing

Rolla, Missouri

Prepared By: **HNTB**

DATE: May 2021



LEGEND

- = One Lane, One-Way
- = Two Lanes, One-Way
- = Two Lanes, Two-Way
- = Pedestrian Pathways
- = Number of Lanes
- = Direction of Travel

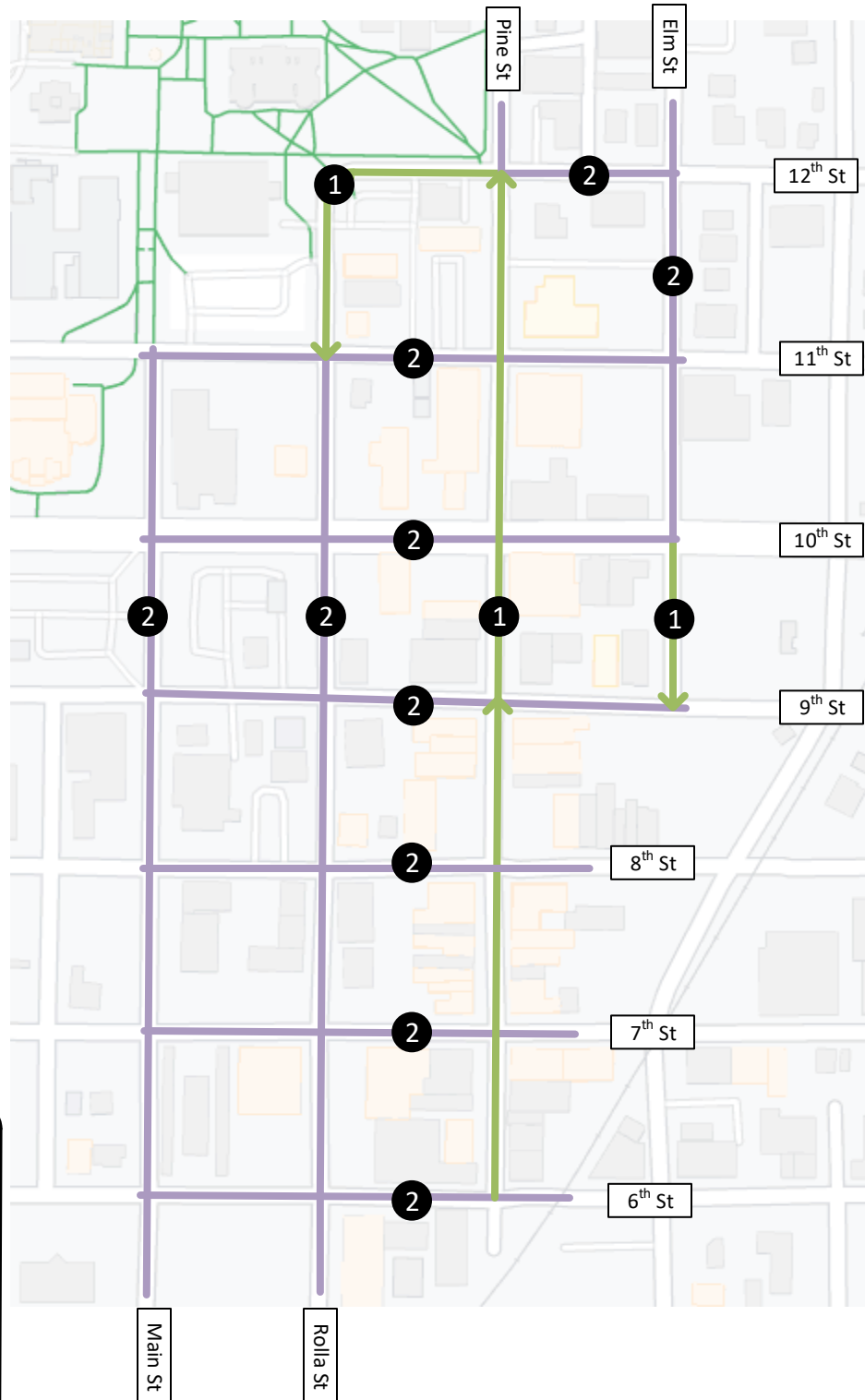
Pine Street / Downtown Circulation Study

Alt 1b: Pine St Two Lanes, One Way (SB)
Rolla St Two Lanes, Two-Way

Rolla, Missouri

Prepared By: **HNTB**

DATE: May 2021



LEGEND

- = One Lane, One-Way
- = Two Lanes, One-Way
- = Two Lanes, Two-Way
- = Pedestrian Pathways
- = Number of Lanes
- = Direction of Travel

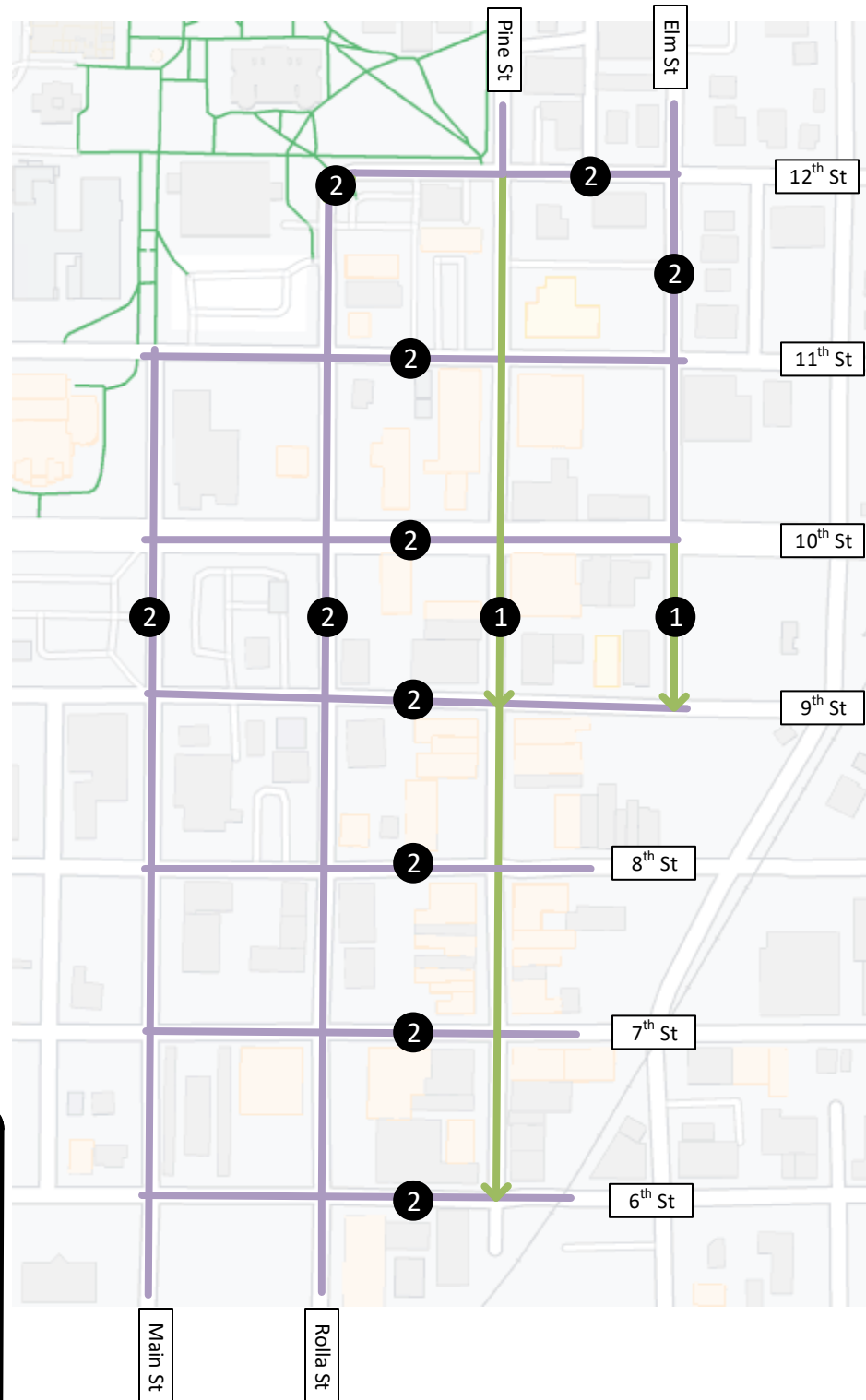
Pine Street / Downtown Circulation Study

Alt 2a: Pine St One Lane, One-Way (NB)
Rolla St Two Lanes, Two-Way

Rolla, Missouri

Prepared By: **HNTB**

DATE: June 2021



LEGEND

- = One Lane, One-Way
- = Two Lanes, One-Way
- = Two Lanes, Two-Way
- = Pedestrian Pathways
- = Number of Lanes
- = Direction of Travel

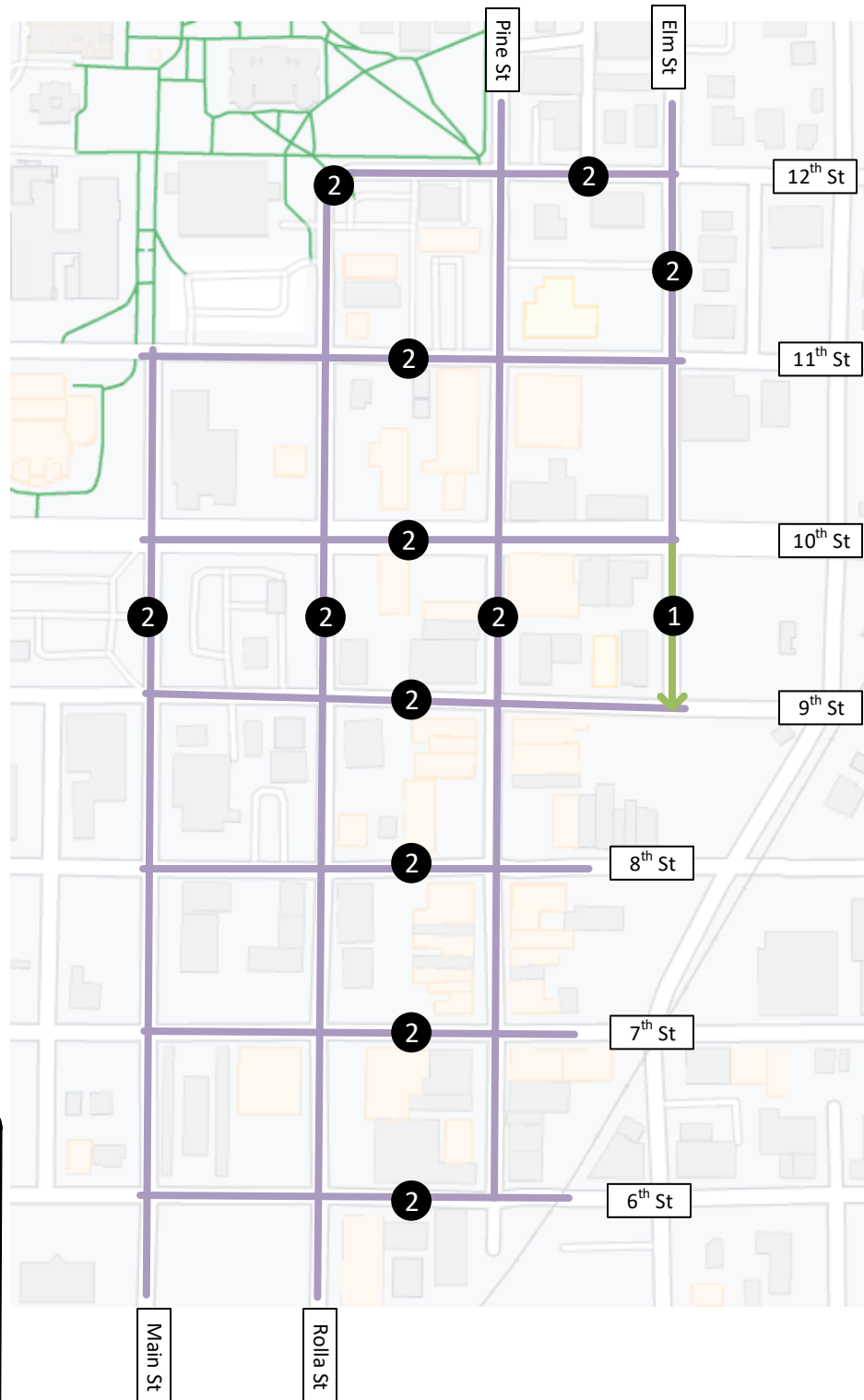
Pine Street / Downtown Circulation Study

Alt 2b: Pine St One Lane, One-Way (SB)
Rolla St Two Lanes, Two-Way

Rolla, Missouri

Prepared By: **HNTB**

DATE: June 2021



LEGEND

-  = One Lane, One-Way
-  = Two Lanes, One-Way
-  = Two Lanes, Two-Way
-  = Pedestrian Pathways
-  = Number of Lanes
-  = Direction of Travel

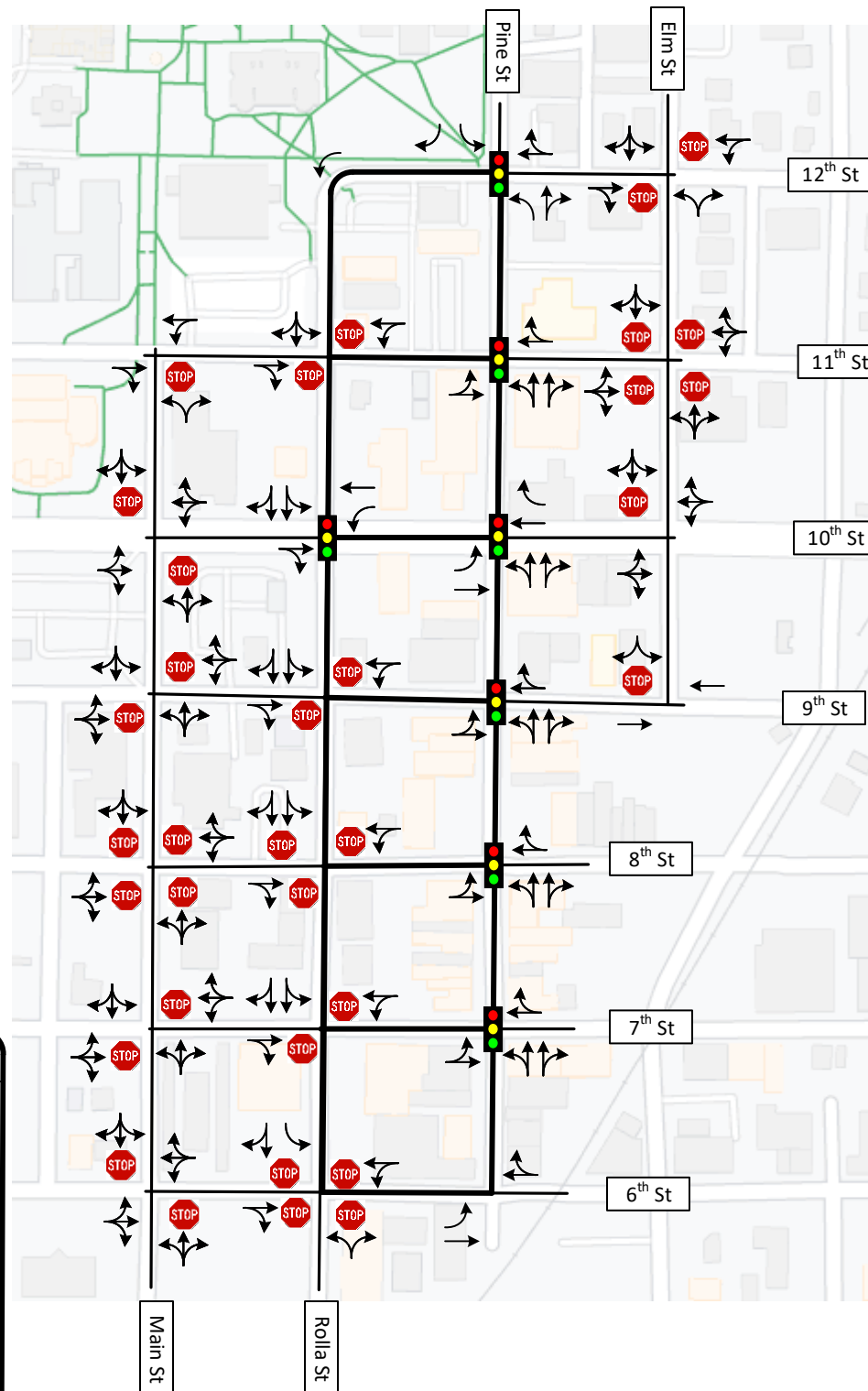
Pine Street / Downtown Circulation Study

Alt 3: Pine St & Rolla St Two Lane, Two-Way

Rolla, Missouri

Prepared By: **HNTB**

DATE: May 2021



LEGEND

- = Unsignalized Intersection
- = Signalized Intersection
- = Turning Movement
- = Turning Movement
- = Study Area
- = Surrounding Area
- = Pedestrian Pathways

**Pine Street / Downtown
Circulation Study**

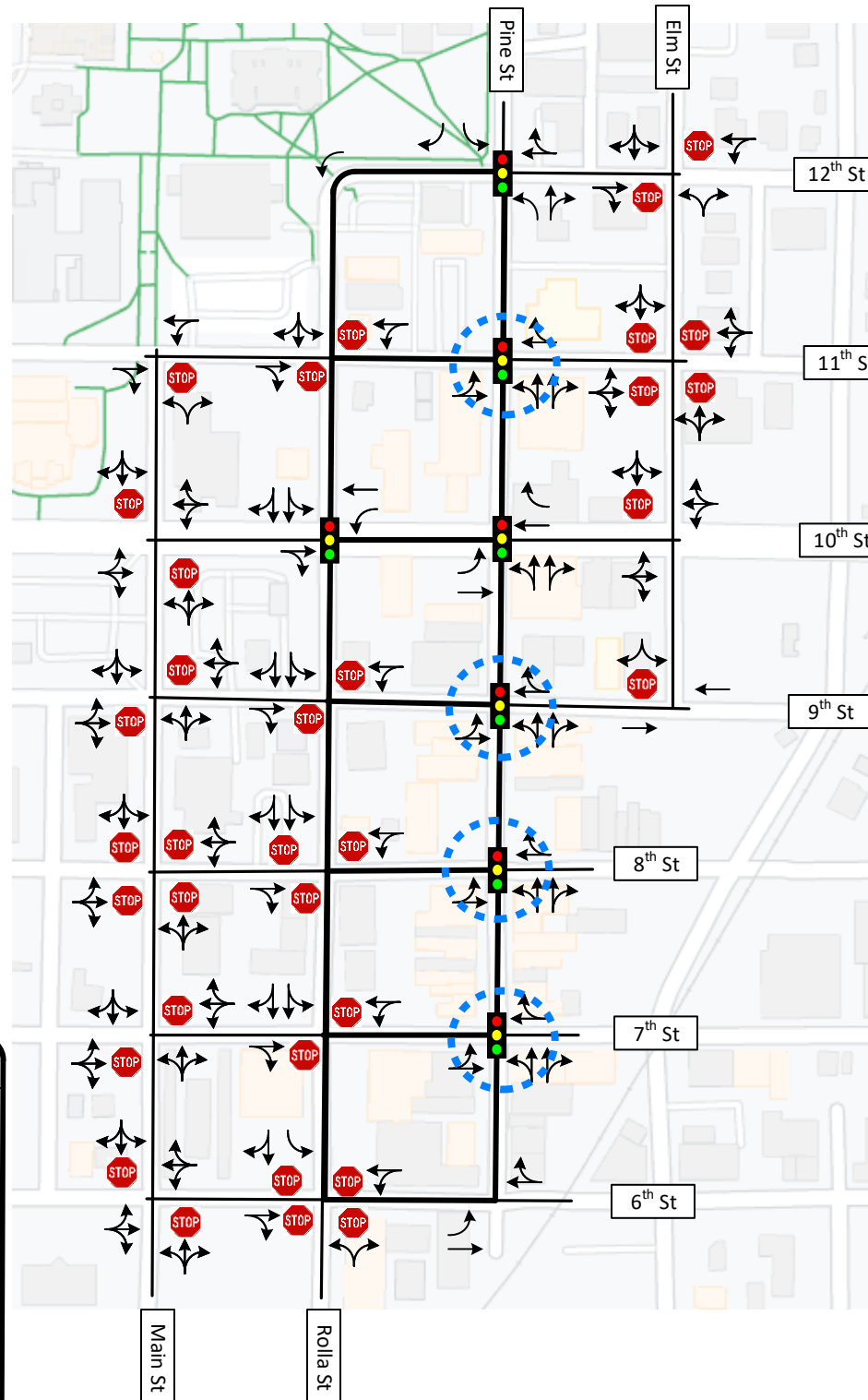
Intersection Control & Turning Movements

Rolla, Missouri

Prepared By: **HNTB**

DATE: May 2021

Sheet 2



Intersections Converted to All-Way-Stop-Control for Pine Street Stop Control Alternative Analysis

LEGEND

- = Unsignalized Intersection
- = Signalized Intersection
- = Turning Movement
- = Study Area
- = Surrounding Area
- = Pedestrian Pathways

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Sheet 2

Downtown Improvements Project (Pine St. and Rolla Street)

Typical Section Images

Figure 1: Alternative 1a and 1b – Existing Typical (2 lanes, 1 way)

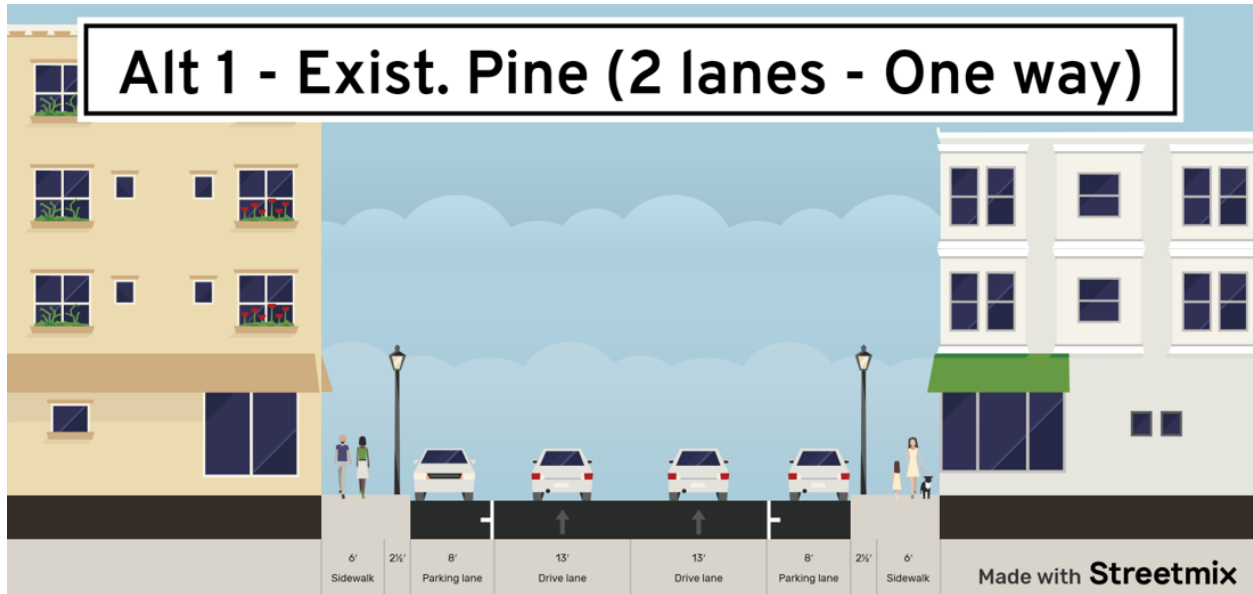


Figure 2: Alternative 2a and 2b (1 lane, 1 way – Angled parking)

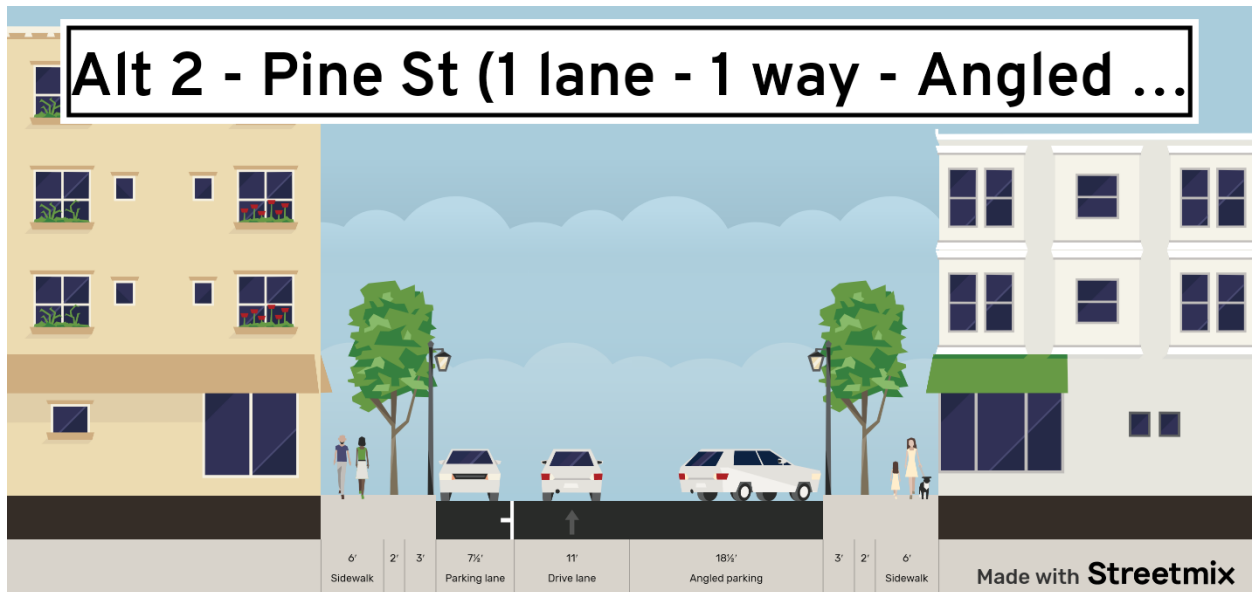
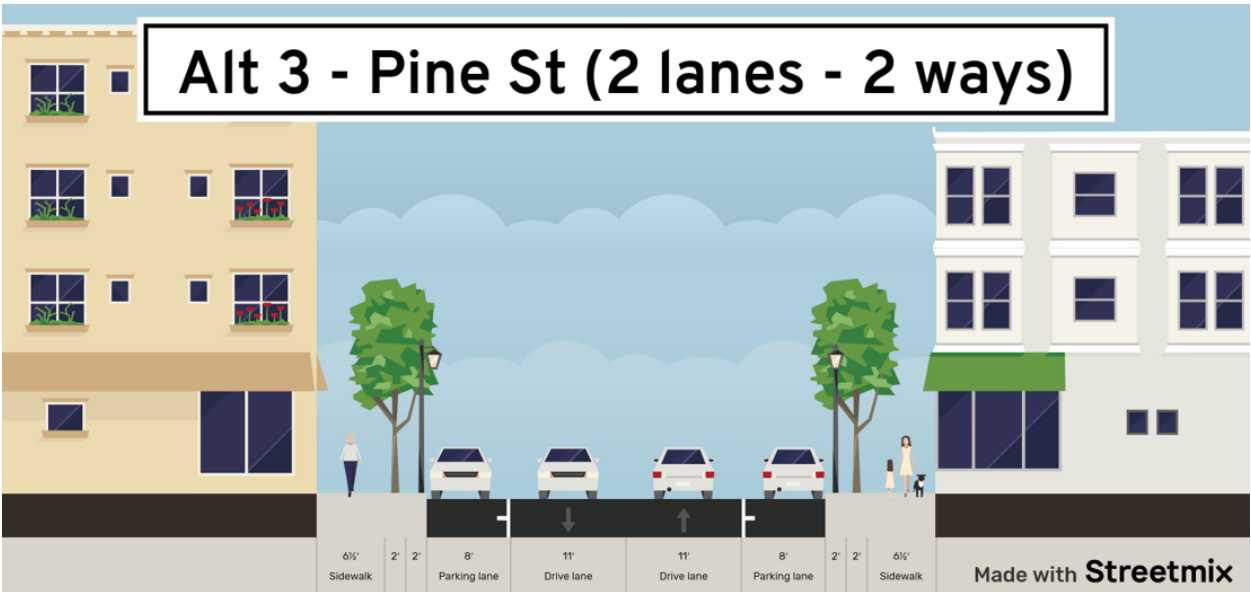


Figure 3: Alternative 3 (2 lanes, 2 ways)



Appendix B – Study Methodology

Appendix B

Study Methodology

The following provides the study methodology used for traffic, safety, economic, and engineering. The document also discusses how each analysis factor was rated in the final evaluation matrix.

Traffic

Volumes

The volumes at the intersections Pine Street with 12th Street, 11th Street, and 10th Street and Rolla Street with 11th Street and Pine Street were counted in January 2020. Additional traffic counts taken in April of 2021 at the Rolla and Pine Street intersection with 10th Street, 9th Street, 8th Street, 7th Street, and 6th Street. To account for the differences in travel behavior between 2020 and 2021 due to COVID-19, a COVID factor was applied to the volumes counted in 2021 to adjust them to early 2020 levels. To do this the counts at 10th Street in 2021 were compared to the counts taken at 10th Street in 2020. Factors of 1.10, 1.13, and 1.08 were applied to the volumes collected in April 2021 AM, Mid-Day, and PM peak periods respectively.

The volumes captured for the existing configuration, alternative 1a, were manually re-distributed for each of the additional alternatives for all three peak periods. The total number of vehicles entering and leaving the network was maintained across all alternatives, but the volumes of the individual movements changed based on the configuration of the alternative. In general, traffic was shifted by 50% between Rolla and Pine Streets for new directional travel patterns, except where engineering judgement warranted further adjustments. The change in volume between each intersection was tracked to ensure the number of vehicles lost or gained between intersections did not exceed the number of existing available parking spaces.

The future volumes were developed based on an ADT of 4,000 vehicles per discussion with the City of Rolla regarding their historical traffic trends. The PM peak period volumes were used to calculate the growth factor. A separate growth factor was developed for both Rolla Street and Pine Street based on the existing estimated ADTs of 3,340 and 2,250, respectively. The volumes for traffic originating at or turning onto Pine were grown by the Pine growth factor of 1.60. The volumes for traffic originating at or turning onto Rolla were grown by the Rolla growth factor of 1.20. This process was applied to all alternatives.

Analysis

The study team used Synchro version 11 to analyze the LOS for both existing and future volumes across all alternatives. Two different traffic control plans were modeled for each alternative. The first traffic control plan used the existing intersection control. Alternative 1a (existing) utilized the existing signal controller information provided by the City. In each additional alternative the signal splits and offsets were optimized throughout the network to minimize delays and improve network performance. In addition to this analysis each alternative used a second traffic control plan with a stop-controlled scenario which kept the traffic signals at 12th Street and Pine Street, 10th Street and Pine Street, and 10th Street and Rolla Street, but changed the intersections at Pine Street with 11th, 9th, 8th and 7th Street to all-way stop control. The splits and offsets on 10th street were then optimized again. In both traffic control plan scenarios, the intersection of 12th and Pine was analyzed when the pedestrian only phase was called, and when it wasn't called.

The 95th percentile queue lengths were calculated at each intersection. Both the existing and stop control intersection plans were modeled and analyzed for each alternative and peak period. Each simulation was run 5 times, and then results were reported based on the averages.

Signal Warrants

A signal warrant analysis was performed at all intersections within the study area according to the 2009 MUTCD Warrant 3, Peak Hour criteria. The PM peak period volumes for both existing and 4,000 ADT scenarios were used in the analysis.

Safety

The safety for each alternative was analyzed at a high level for pedestrian and vehicular traffic. Pedestrian safety was compared for each alternative based on the total number of lanes a pedestrian must cross to get from one side of the street to the other, comparing potential conflicts. Vehicular traffic safety compared the potential traffic conflict types and severity for each alternative. In both pedestrian and vehicular safety comparisons, only the roadway geometrics were considered.

Engineering

The Pine Street corridor from 6th Street to 10th Street was analyzed to determine engineering impacts from three basic alternatives:

- Alternative 1:
 - 1a – Existing Conditions – two lanes in the northbound direction
 - 1b – Two lanes in the southbound direction

- Alternative 2: Pine St one-lane, one-way
 - 2a – One lane in the northbound direction
 - 2b – One lane in the southbound direction
- Alternative 3: Pine Street two lanes, two-way

The impacts of each alternative were analyzed at a high level for basic construction impacts. In general, curb and gutter impacts, pavement marking, resurfacing, and potential storm sewer impacts were considered during analysis. Utility impacts were only generally considered during the study.

Evaluation Matrix Methodology

The criteria used in the evaluation matrix uses a combination of numerical results and public feedback as well as a qualitative rating using Harvey Balls. For the Harvey Ball ratings, the highest rating represents “No or Low Impact/High Achievement” rating. The middle rating was three out of the four quadrants shaded green representing “Slight Impact/Substantial Achievement”. The lowest rating given in this project was two out of the four quadrants shaded gray representing “Moderate Impact/Moderate Achievement”. The same rating was sometimes given to multiple alternatives.

Traffic

The alternatives were rated separately based their LOS and queue lengths. The rating system considered the results across all three peak time periods: AM, Mid-Day, and PM. The same scale was used to rank both the existing and future results within each metric.

Based on the LOS analysis, any alternative with all intersections operating at a LOS D or better received the highest rating. Alternatives with 1-3 intersections operating at a LOS E or lower received a middle rating.

From the queue length results, any alternative that had 0-4 approaches whose 95th percentile queue length exceeded the available storage capacity received the highest rating. Any alternative that had 5-9 approach queues exceeding the storage capacity received a middle rating. Alternative 2B had 18 instances where the 95th percentile queue exceeded the available storage, and for that it received the lowest rating.

Although the performance of an alternative under the stop control plan was not factored into the evaluation matrix, the stop control plan was generally found to function better than the existing traffic control plan with respect to LOS and queue length for all alternatives.

Safety

From the pedestrian safety perspective, alternatives were rated based on the number of lanes that a pedestrian would have to cross to reach the other side of the road. In each alternative, Rolla will have two lanes of traffic, therefore alternatives that required a pedestrian to cross 2 lanes of traffic on Pine St received a middle rating. Alternatives 2a and 2b only require pedestrians to cross one lane on Pine St, so they received the highest rating.

From the perspective of vehicular safety, alternatives were rated based on the possible collision types introduced by the geometry. Since one-way roads were found to have the potential for fewer crashes than two-way roads, if both Pine and Rolla are one-way, the alternative was rated the highest. If there was a both a one-way and a two-way street, the alternative was rated in the middle. In the instance of Alternative 3 where both Pine and Rolla are two-way, the lowest rating was given.

Economic

A qualitative assessment of economic impact to downtown Rolla was performed for each alternative. The rating focused on the impacts to downtown parking, delivery, and access to businesses.

- **Parking** – Assessment of the alternatives impact on existing parking.
- **Delivery** – Assessment of the alternatives impact on existing delivery.
- **Access to Businesses** – Assessment of the alternatives impact on access to businesses.

Based on the assessment of each of the three factors, a rating was identified in the evaluation matrix.

Engineering

The criteria used in the evaluation matrix for Engineering was estimated construction cost. This was based on the estimated costs to construct the typical section for each alternative and included curb and gutter improvements, asphalt replacement, sidewalk improvements, pavement marking, corridor lighting, and potential signal replacements/modifications/removals.

Appendix C – Meeting Boards and Survey Results

Station 1

Downtown Rolla Improvements Study (Pine Street and Rolla Street)



Purpose of the project:

The MoveRolla TDD will evaluate the parking, circulation and intersection control for the downtown transportation system to meet the needs of the downtown residents, visitors and business owners.

Benefits of project:

The benefits of the improvements to the downtown transportation system are a complete multi-modal transportation system that addresses the needs of all users, enhances the economic conditions of downtown businesses and maximizes the Downtown Rolla experience.

Improvements may include:

- Update traffic circulation
- Update parking configuration
- New ADA compliant sidewalks
- Update or remove traffic signals
- New curb and gutter
- Repave existing road

This study does not include analysis of urban design, streetscape, lighting or other non-transportation elements of downtown.

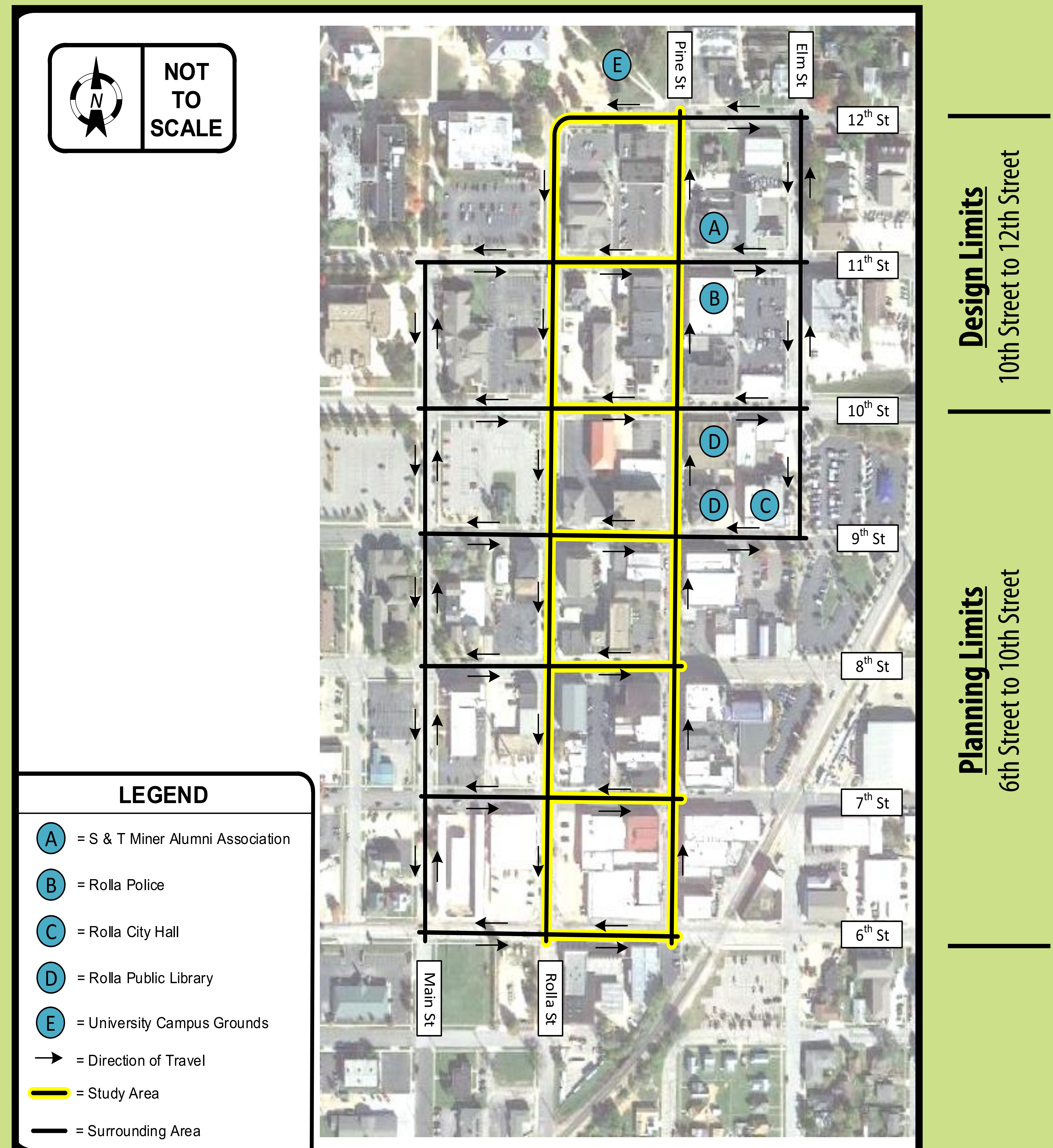
Schedule for project:

Downtown stakeholder meeting: Summer 2021

Public meeting: Fall 2021

Design complete: Winter 2022

Construction start: To be determined

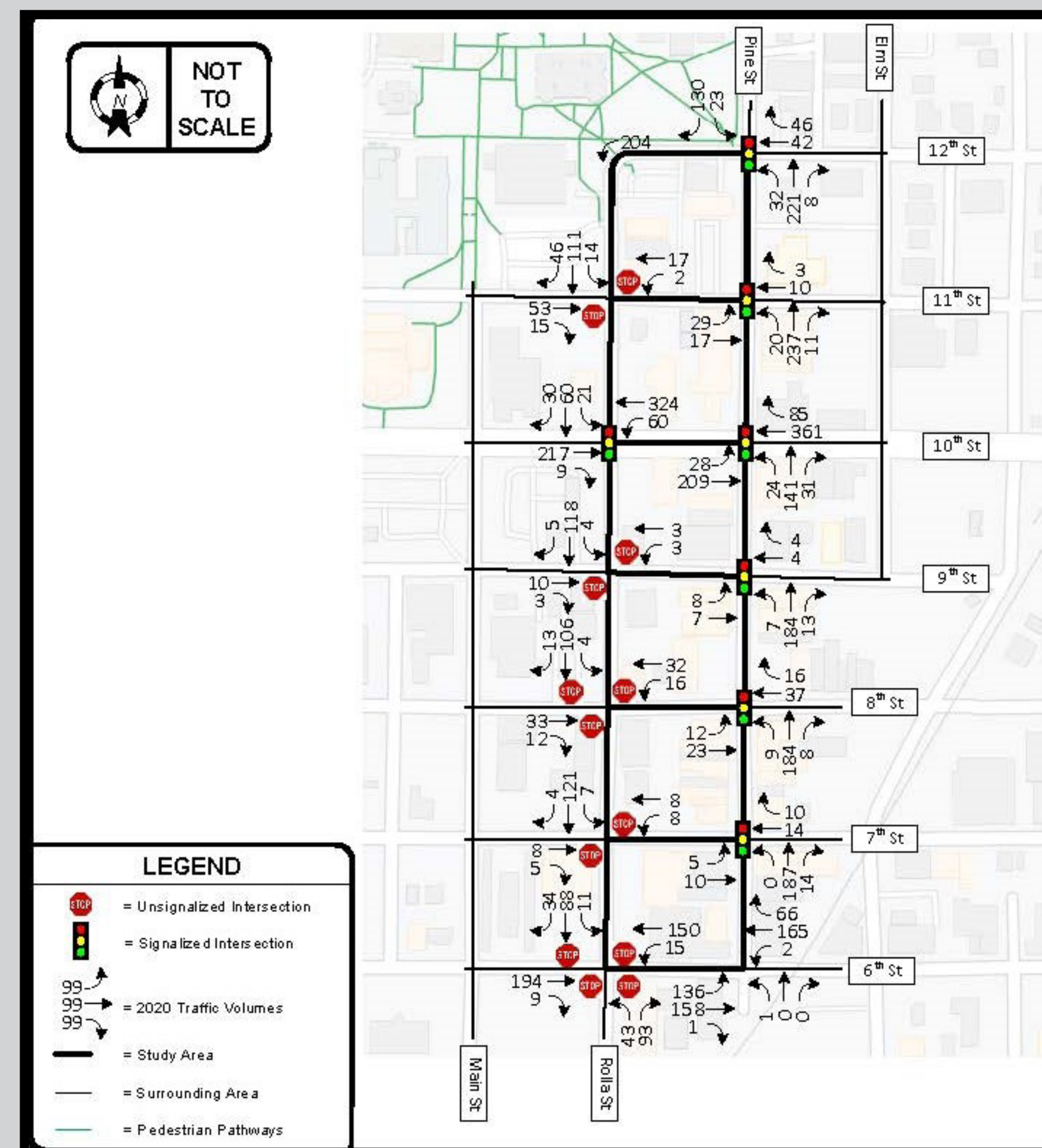


Station 2 Existing Conditions

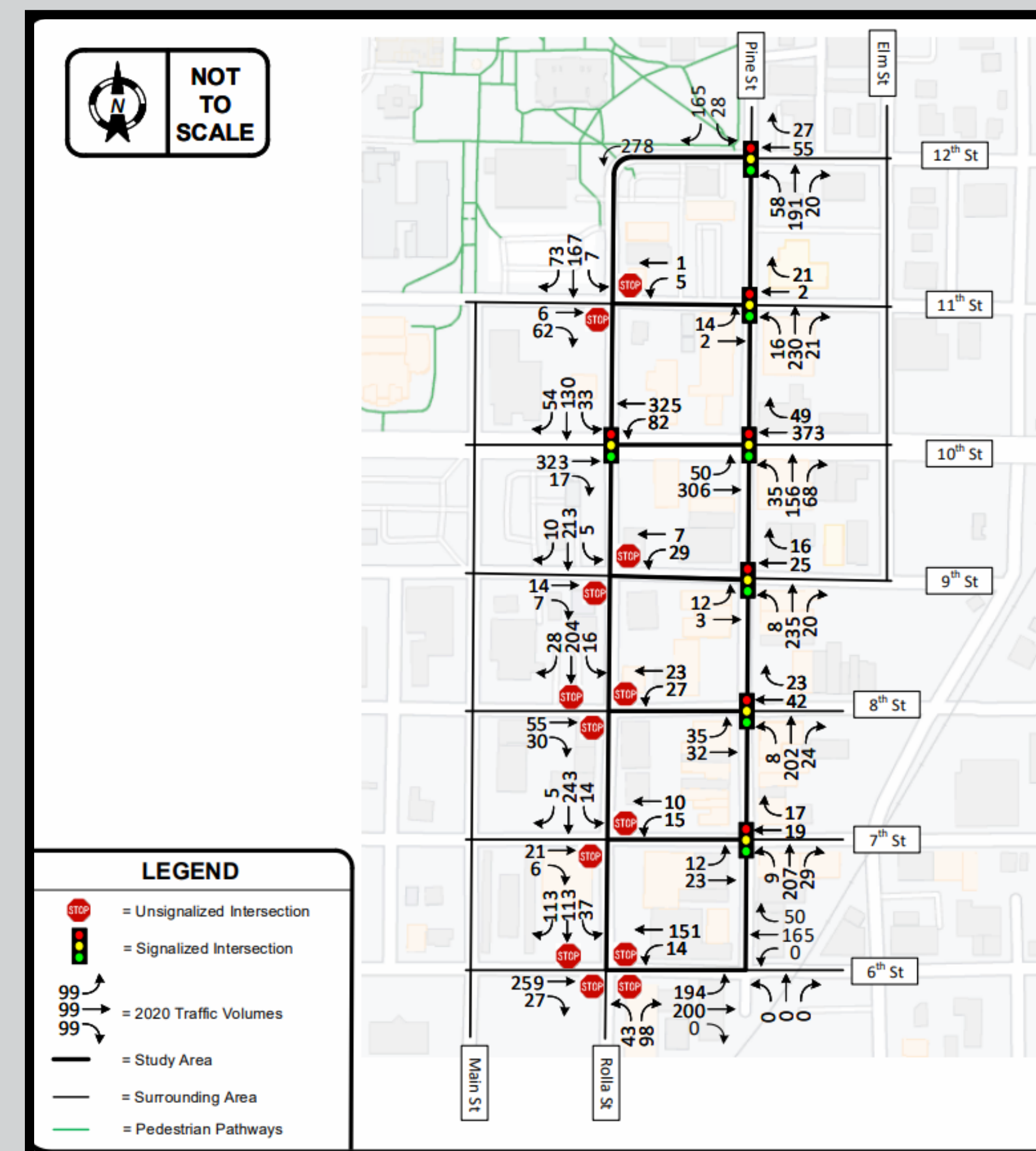


Traffic (2020)

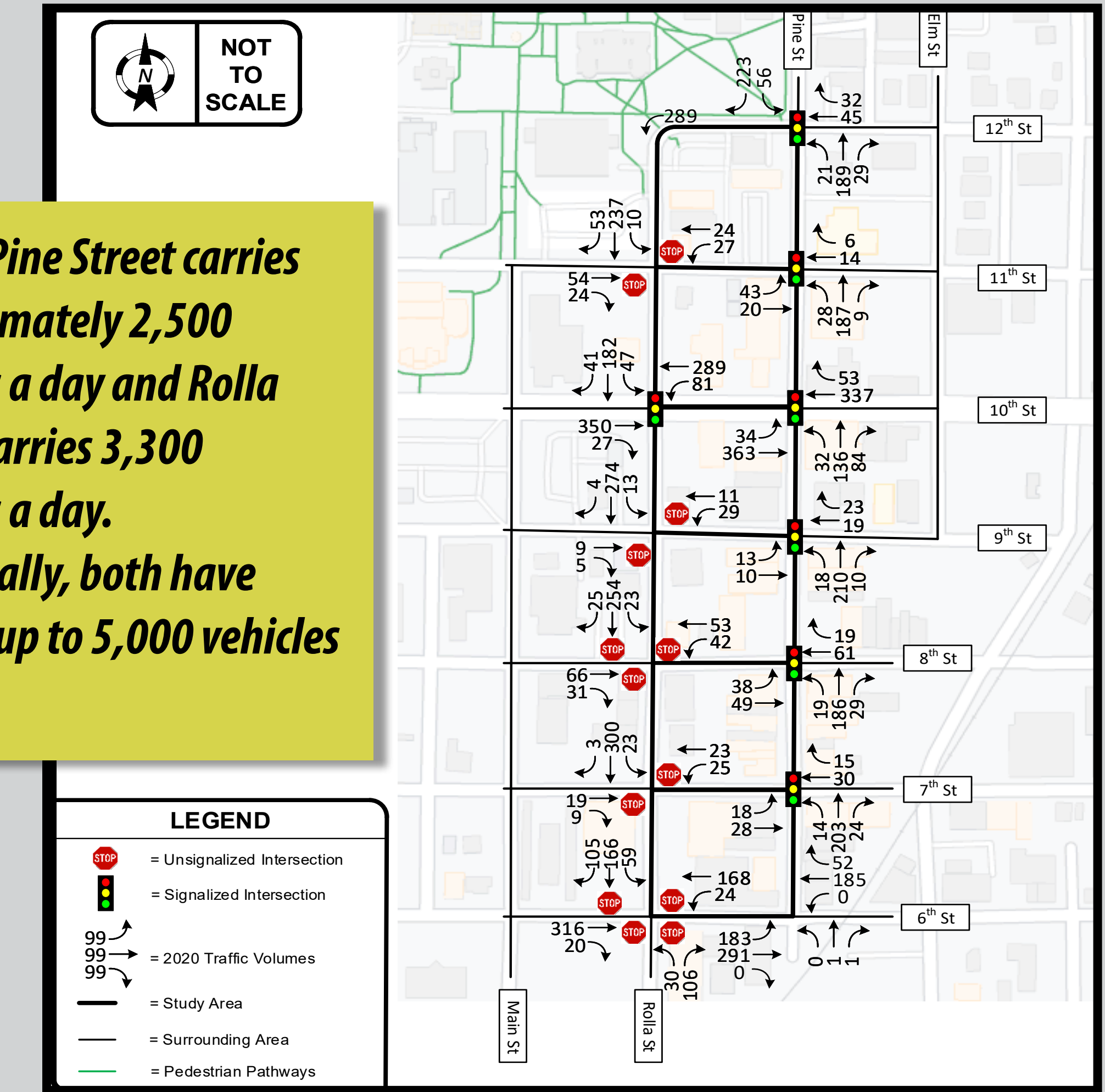
Morning Peak Traffic Volumes



Mid-day Peak Traffic Volumes

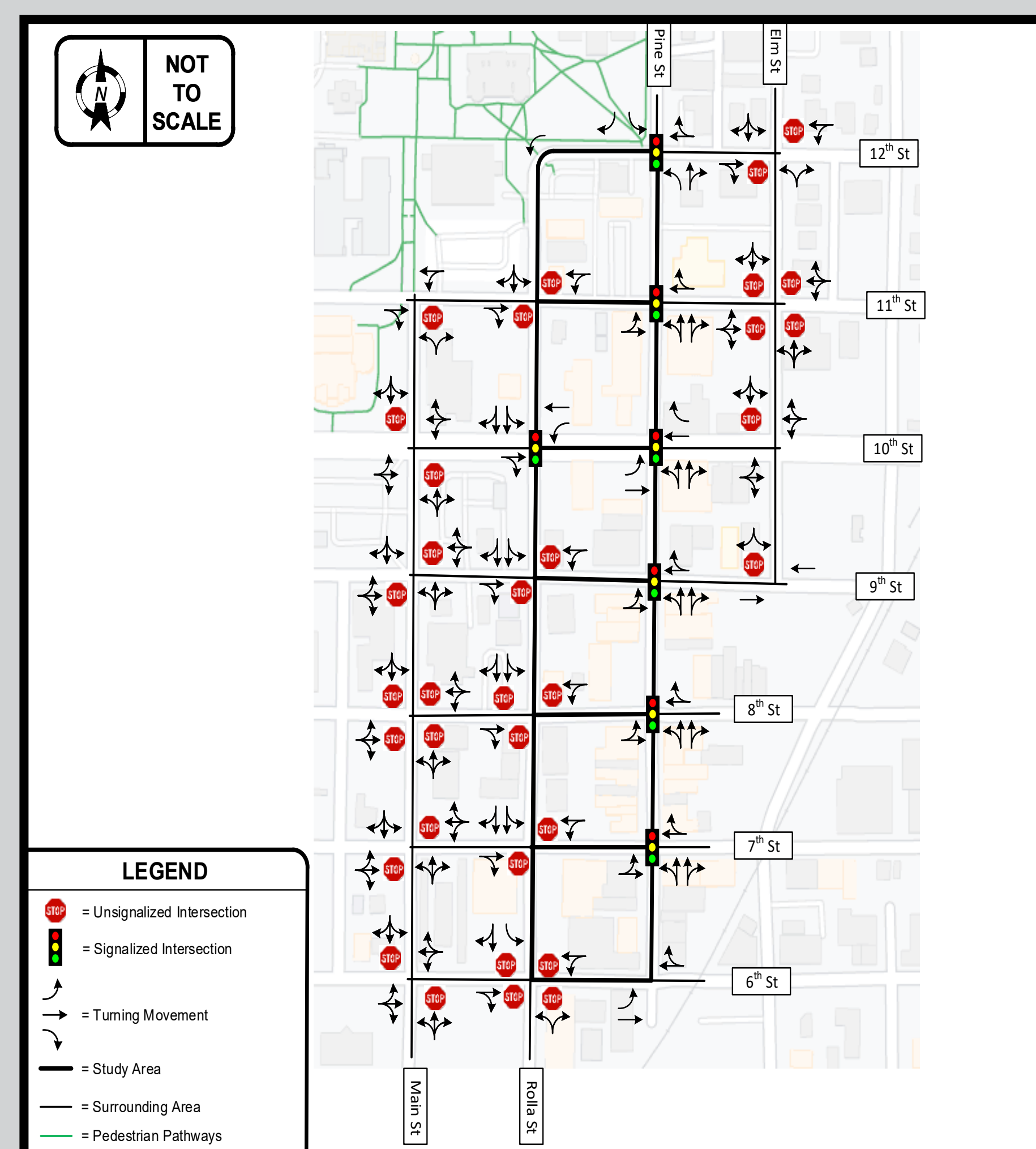


Afternoon Peak Traffic Volumes

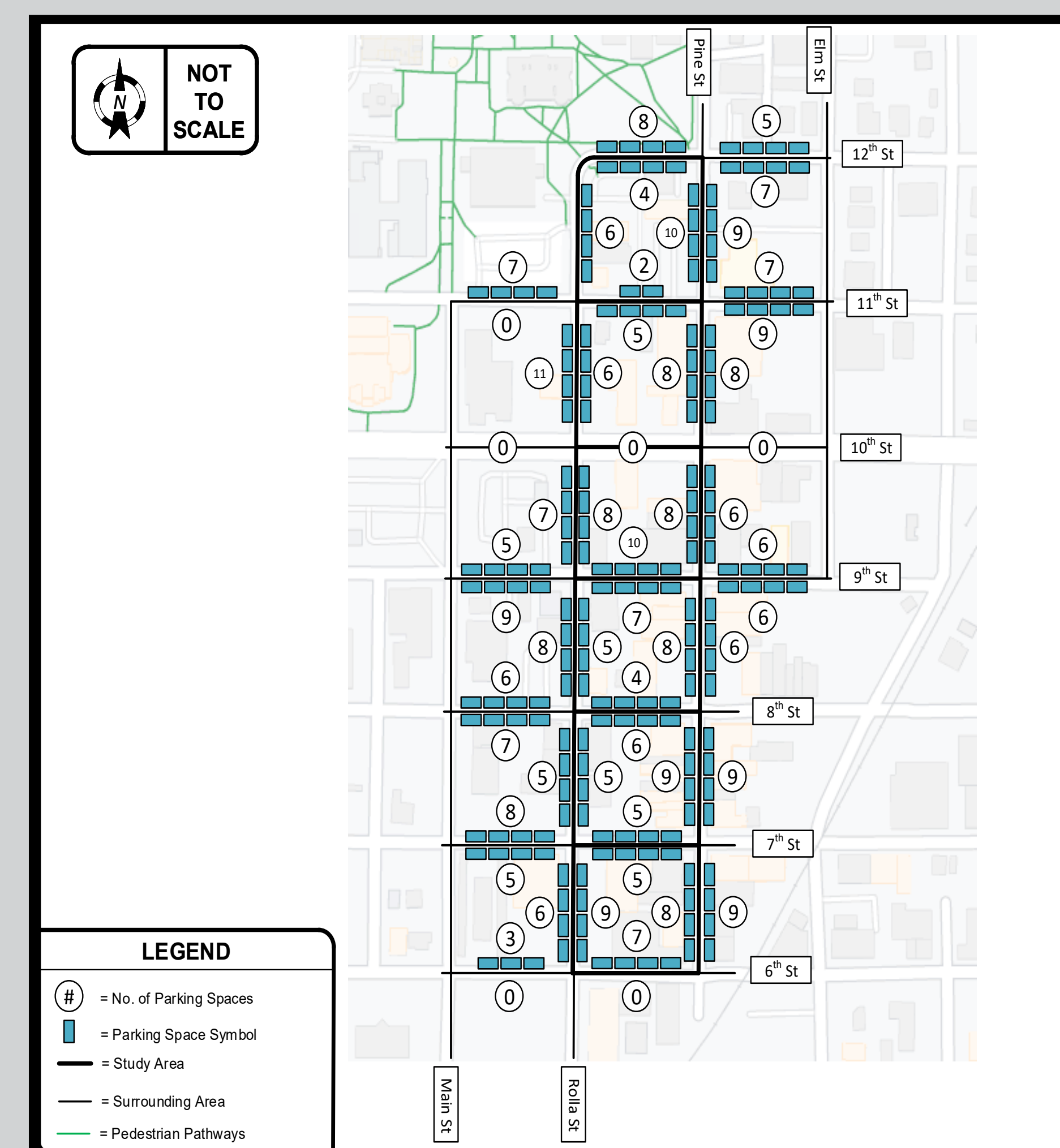


Today, Pine Street carries approximately 2,500 vehicles a day and Rolla Street carries 3,300 vehicles a day. Historically, both have carried up to 5,000 vehicles a day.

Intersection Control



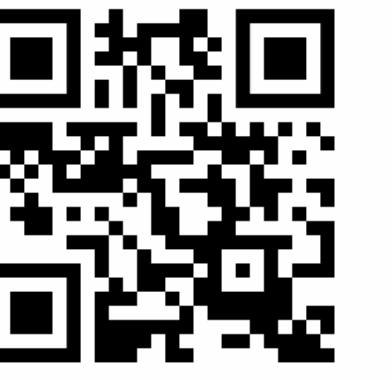
Parking



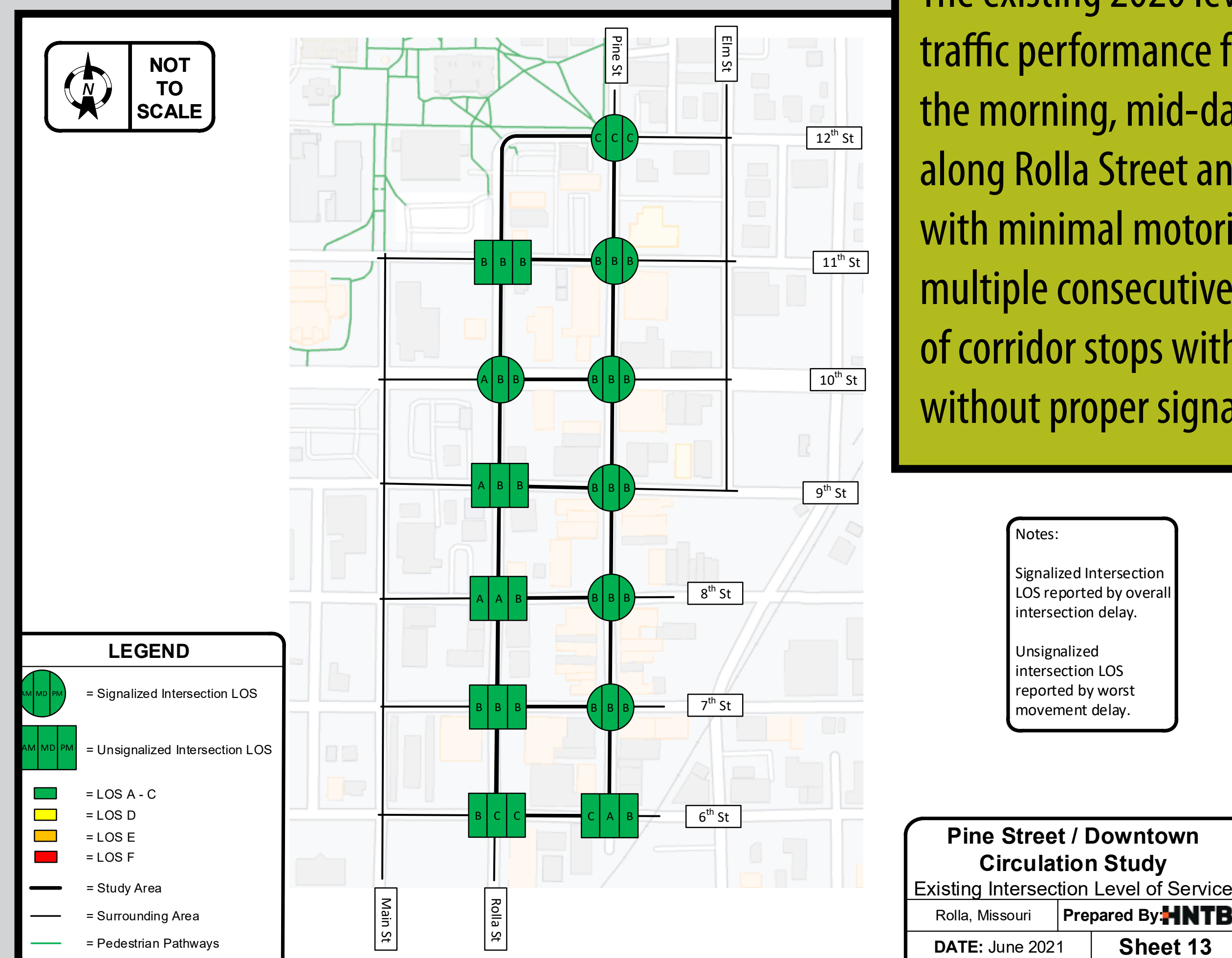
This board shows existing traffic volumes, intersection control and parking supply. Each of these transportation elements plays an important role downtown.

Station 2

Existing Conditions

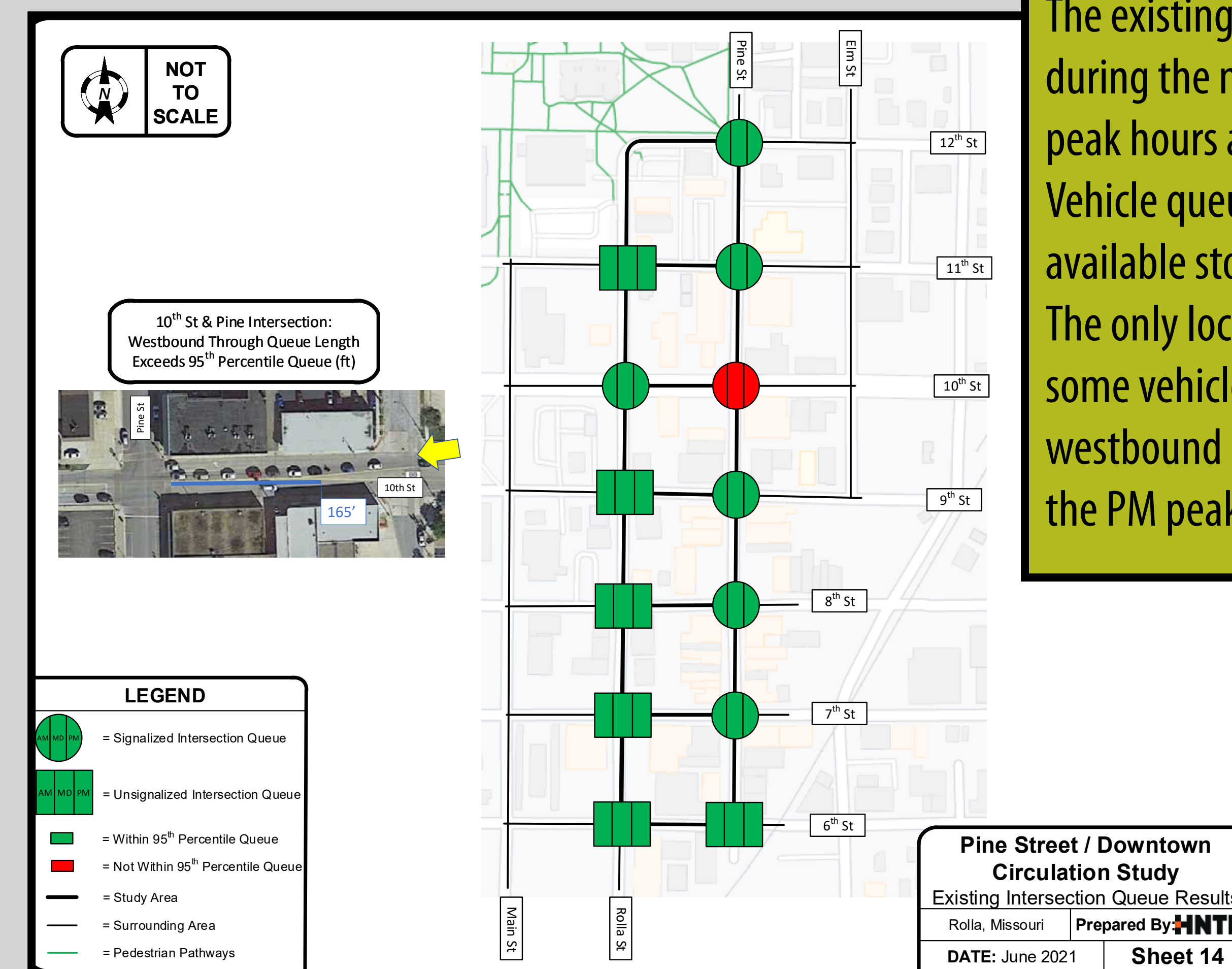


Existing 2020 Intersection Level of Service (LOS)



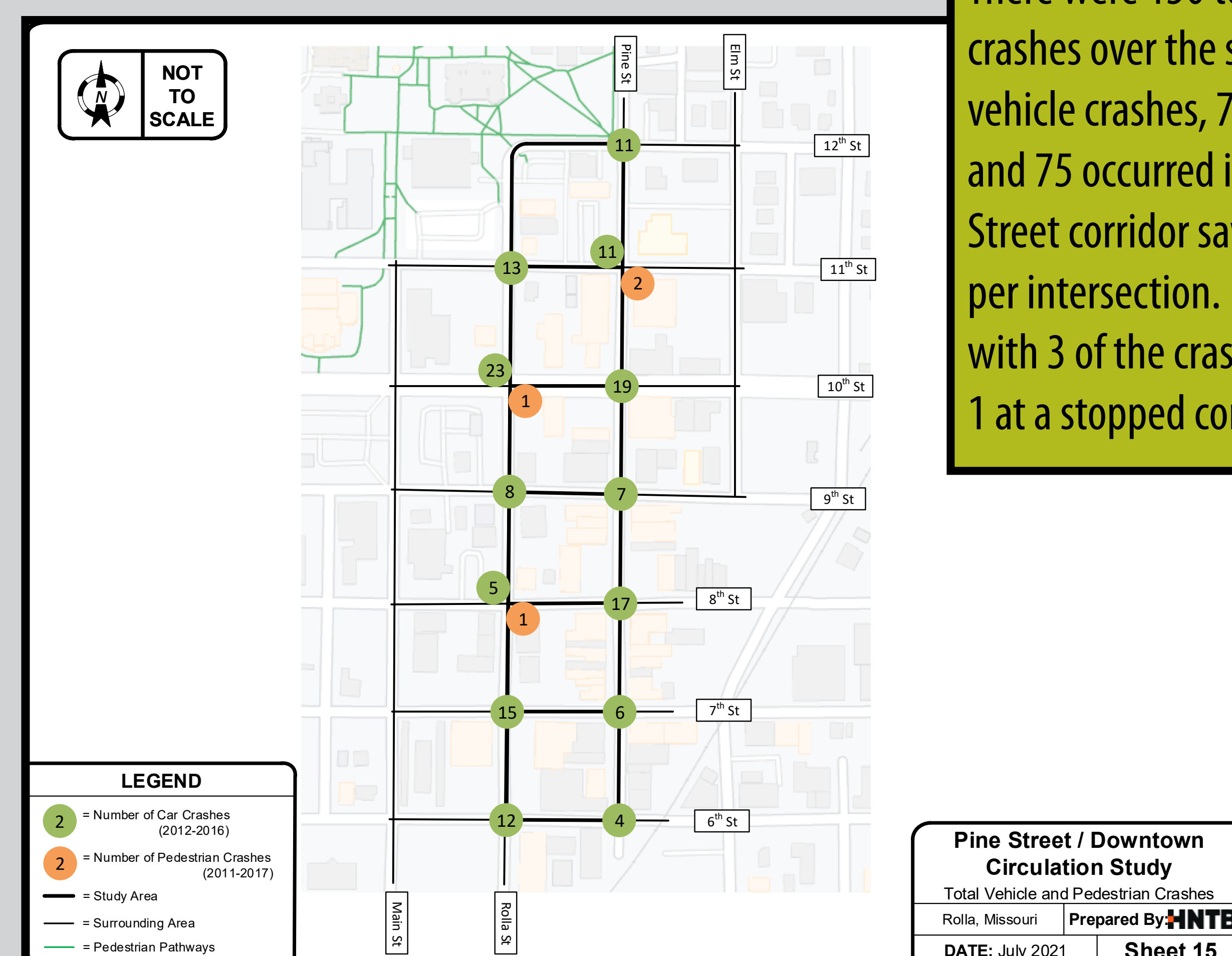
The existing 2020 level of service, which measures traffic performance for vehicular traffic during the morning, mid-day and afternoon peak hours along Rolla Street and Pine Street is very good with minimal motorists delay. However, with multiple consecutive traffic signals, a high number of corridor stops with minimal delay could occur without proper signal progression.

Existing 2020 Intersection Queue Results

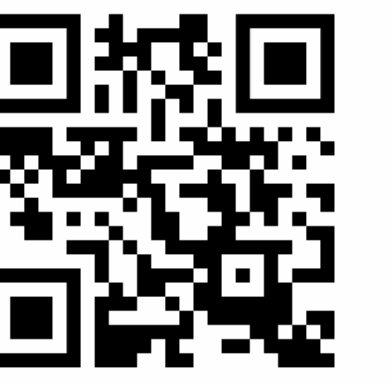


The existing 2020 vehicle queues were analyzed during the morning, mid-day and afternoon peak hours along Rolla Street and Pine Street. Vehicle queues were found to be within the available storage during most peak hours. The only location that was found to have some vehicle queue storage problems was the westbound direction at 10th and Pine Street in the PM peak hour.

Safety - Crash Data

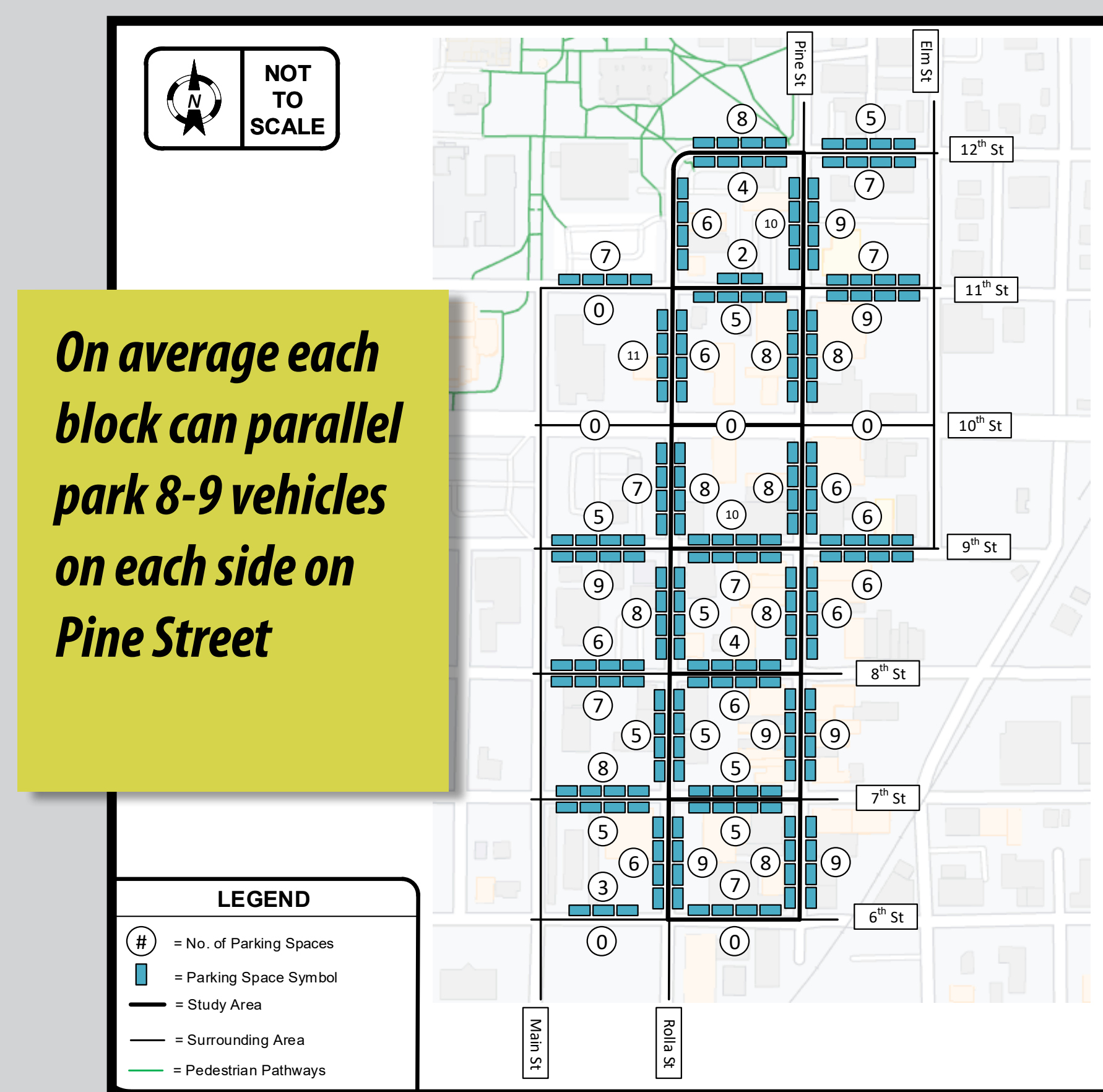
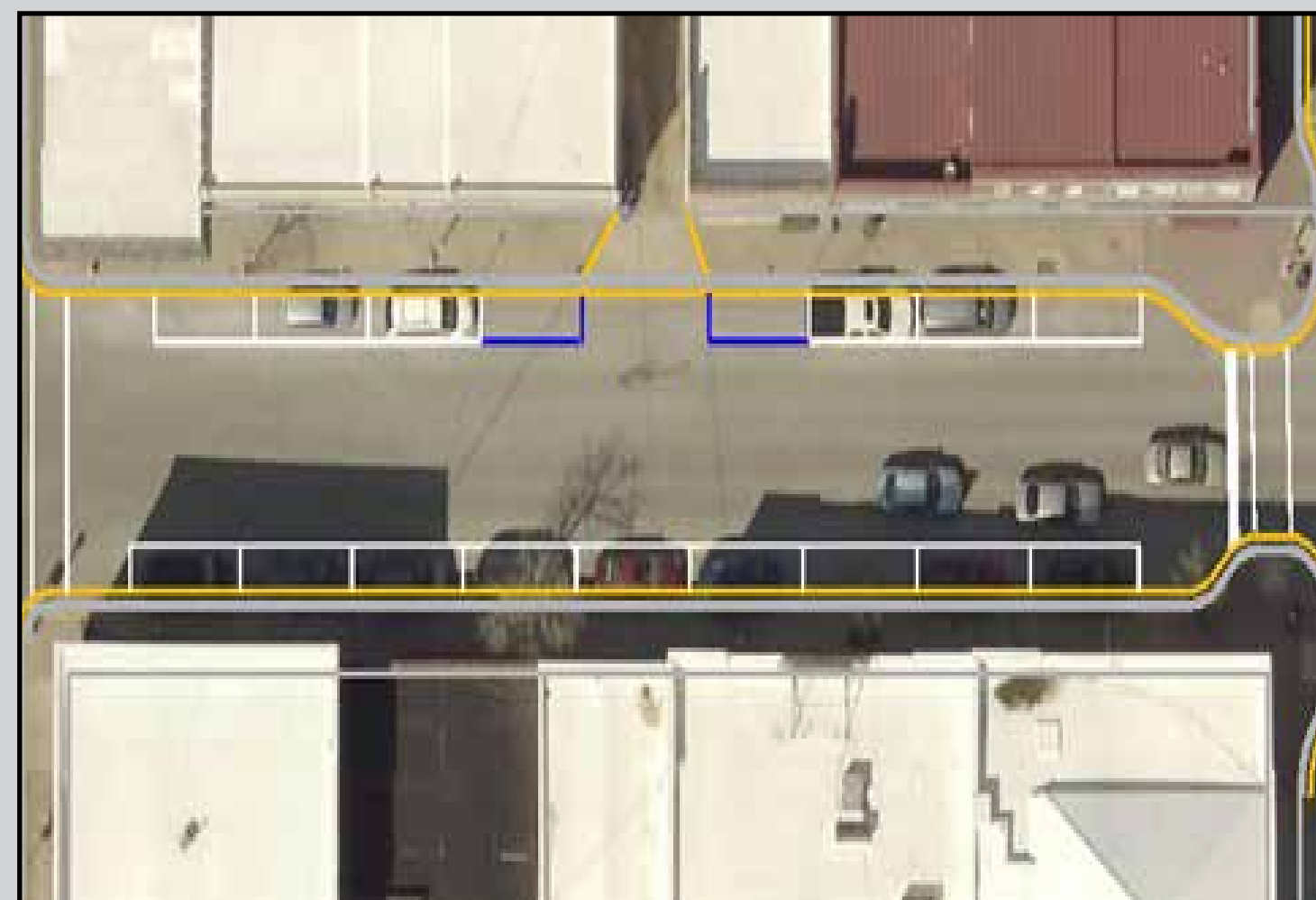


There were 150 total vehicle crashes and 4 pedestrian crashes over the study period. Of the 150 total vehicle crashes, 75 occurred in the Pine St. corridor and 75 occurred in the Rolla St. corridor. The 10th Street corridor saw the greatest number of crashes per intersection. Pedestrian crashes were spread out with 3 of the crashes occurring at a traffic signal and 1 at a stopped controlled intersection.



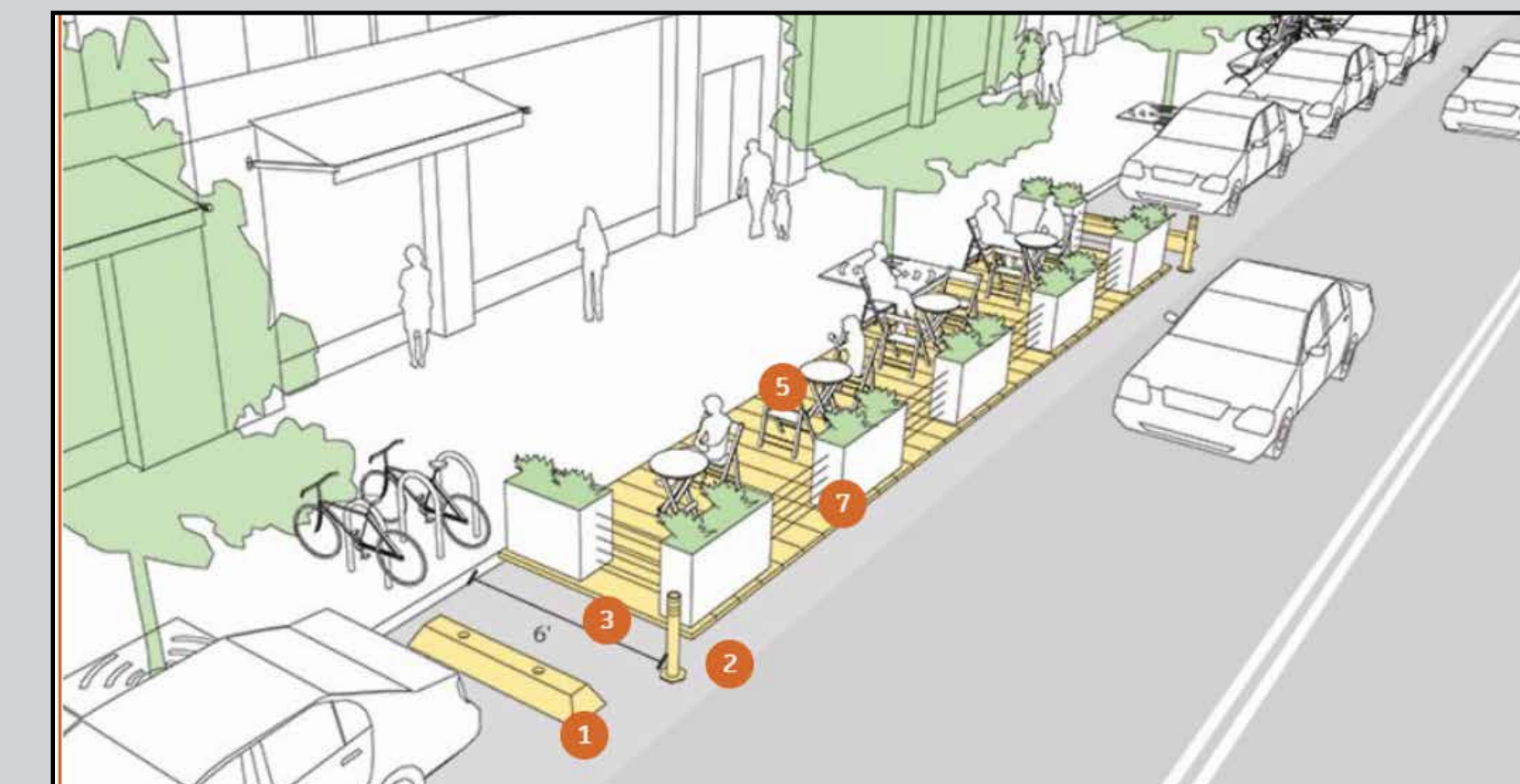
Parallel /Current Parking:

The current parallel parking configuration on Pine Street primarily allows nine parking spaces on each side of a typical block. Some blocks have more, some blocks have less. Within the study area there are a total of 327 on-street parking spaces available today per the exhibit below.



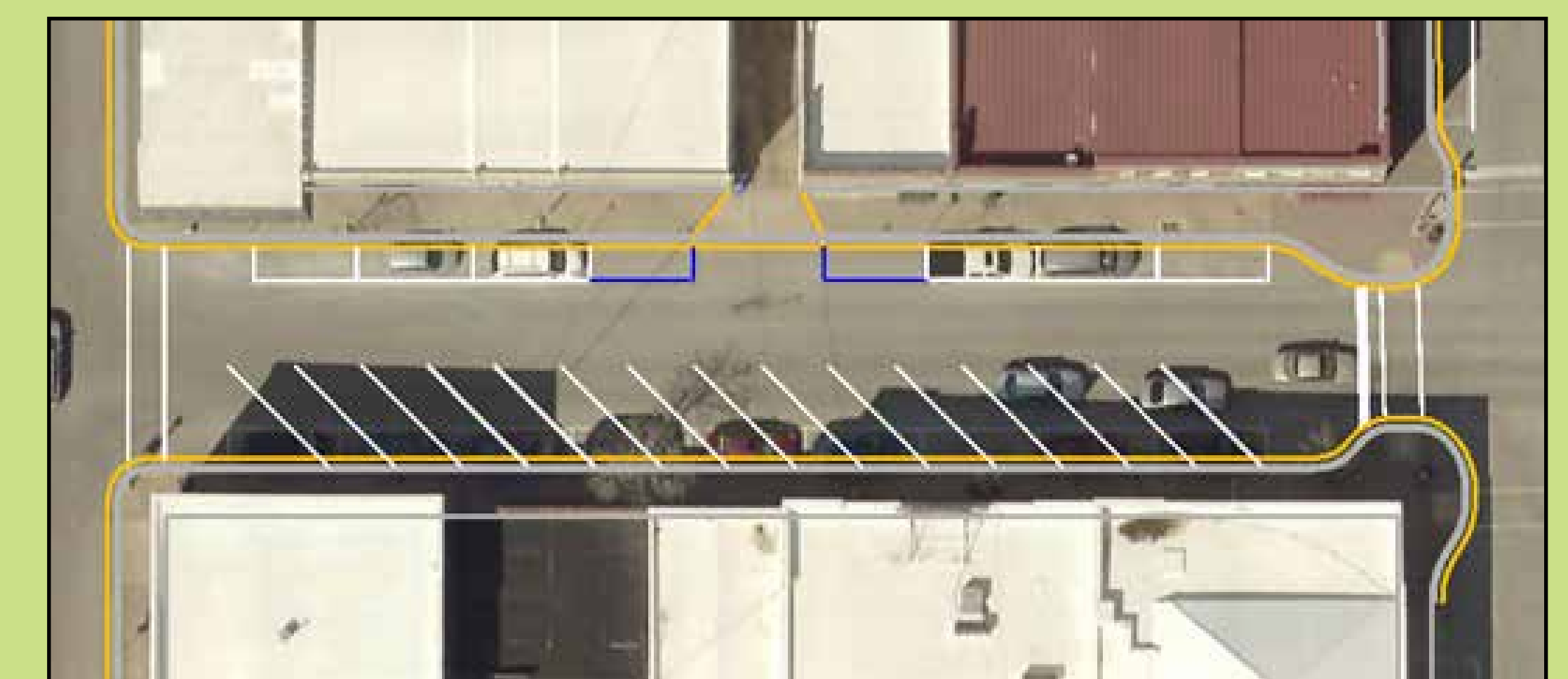
Potential Parklet Concept:

Parklets are a small public area that aim to improve pedestrian experience and create a safer, more walkable community. While parklets do use existing parking spots, they provide businesses the opportunity to create an outdoor patio experience that could be temporary based on the season.

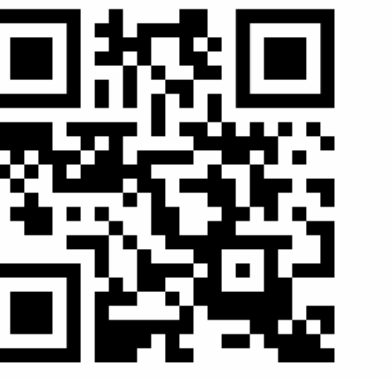


Potential Mixed Parking (Parallel and Angle):

An additional option is to maintain parallel parking on one side of the street and modify the other side of the street to angle. This would require reducing traffic to one lane, one way and **add 5 parking spots** on a typical block. In order to increase the parking stalls, 45 degree angle parking would be utilized.

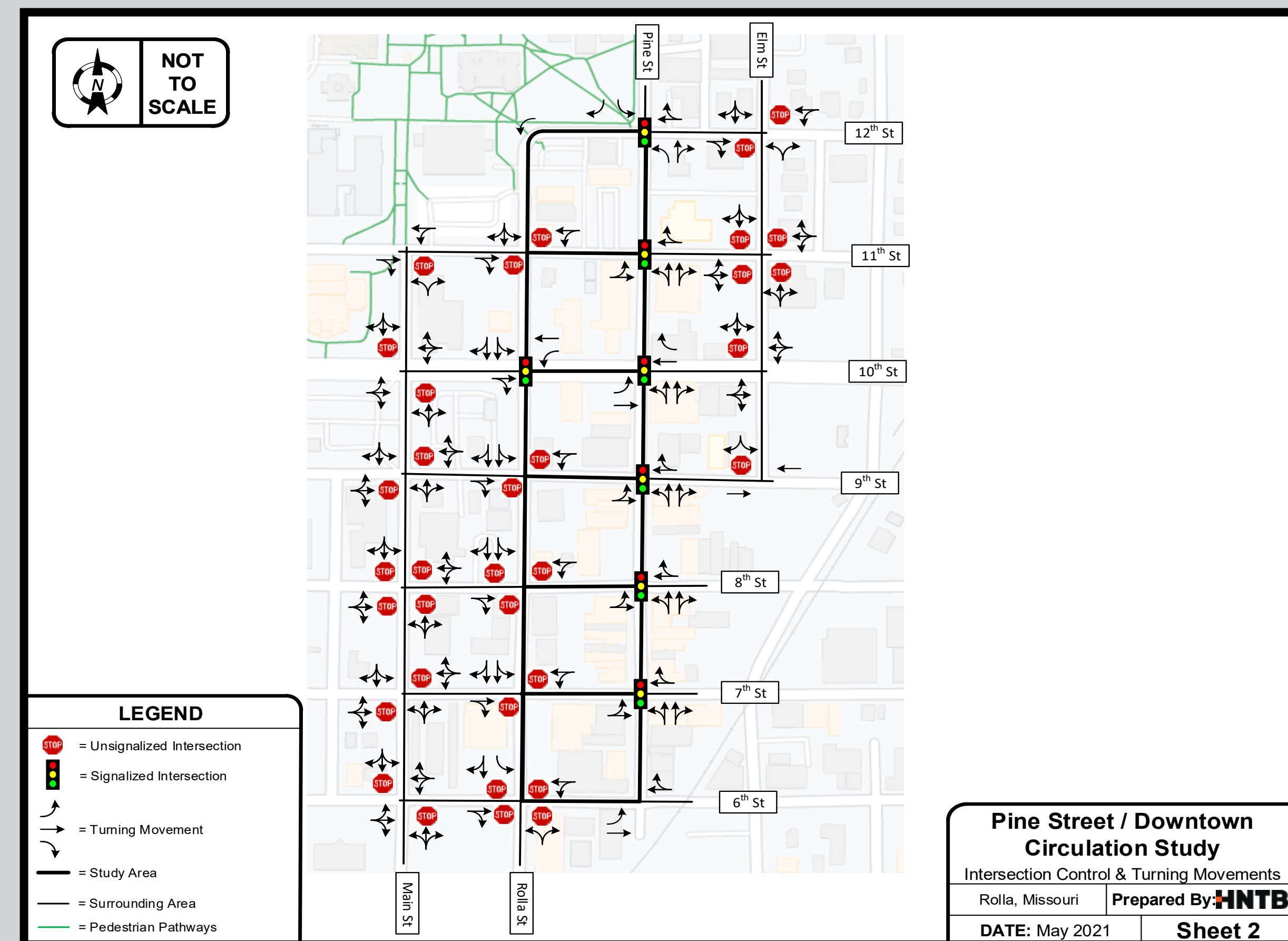


Angle parking is easier for people to pull into versus parallel parking. One drawback may be blind spots while backing out when leaving the parking spot.



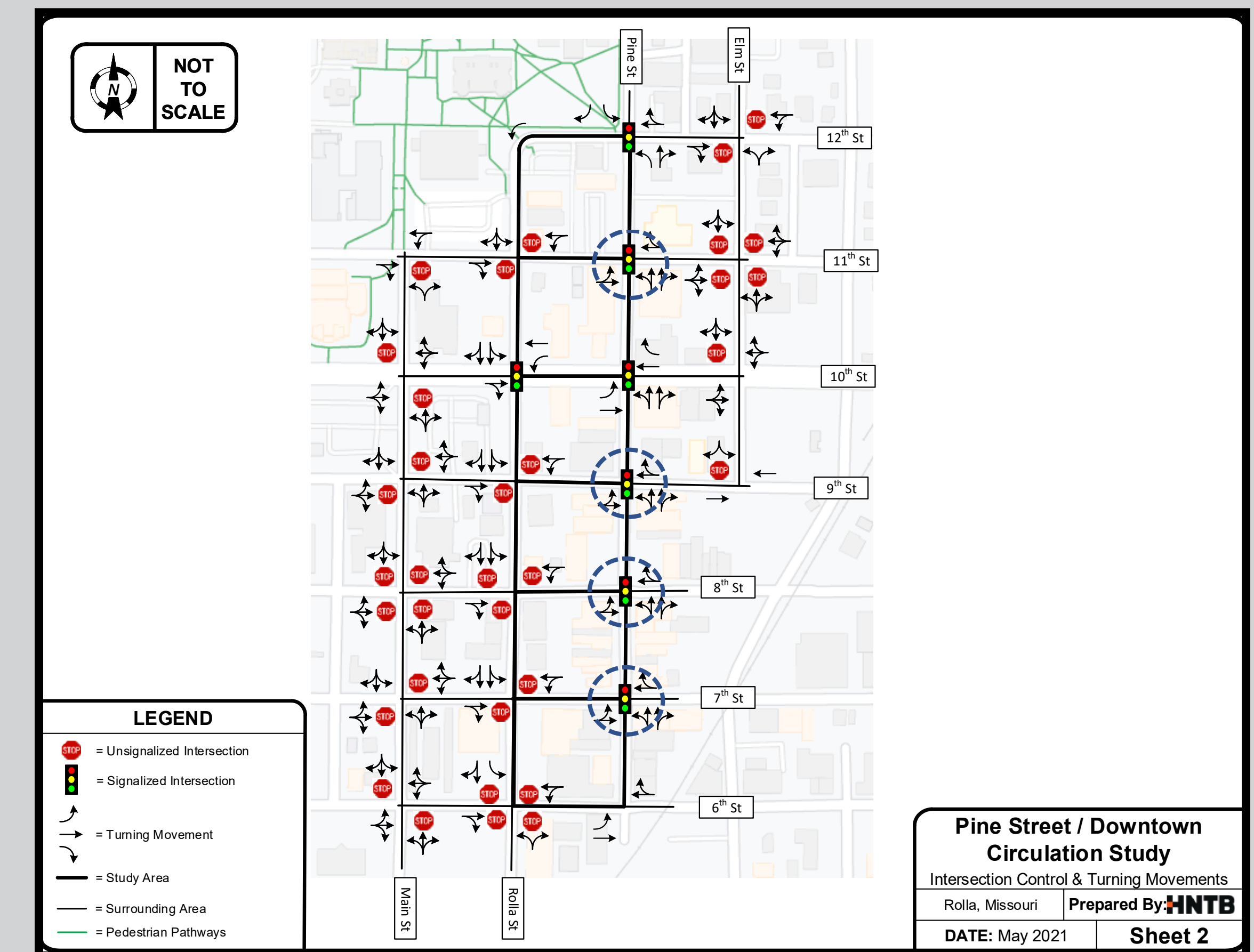
Existing Intersection Control:

Today, Pine Street has a traffic signal at every intersection between 7th Street and 12th Street. The only other traffic signal in the study area is at 10th and Rolla St.



Potential Signal Removal:

Based on reduced traffic volumes today and the goal of making downtown a more walkable area, the four intersections that are circled are locations of potential traffic signal removal.



Existing Signal Warrants (Pine Street and Rolla Street):

The locations where signals are recommended based on existing traffic and pedestrian volumes are :

- 12th Street and Pine Street
- 10th Street and Pine Street
- 10th Street and Rolla Street

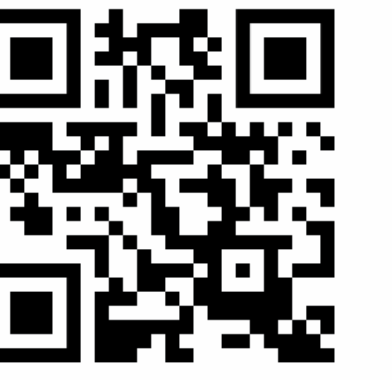
Future Signal Warrants (Pine Street and Rolla Street):

When future traffic is considered, a traffic signal is also warranted and recommended at the 6th Street and Rolla Street intersection due to anticipated traffic volumes.

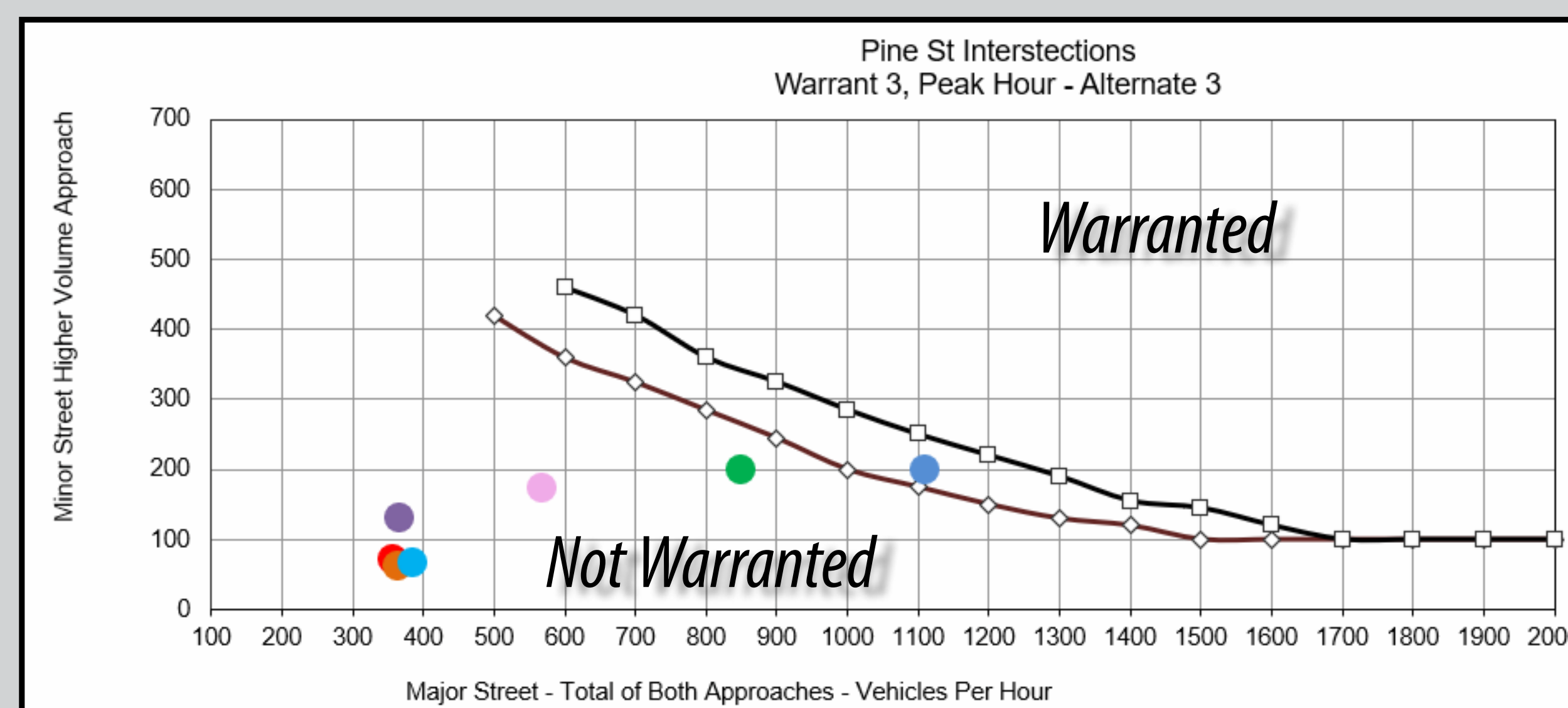
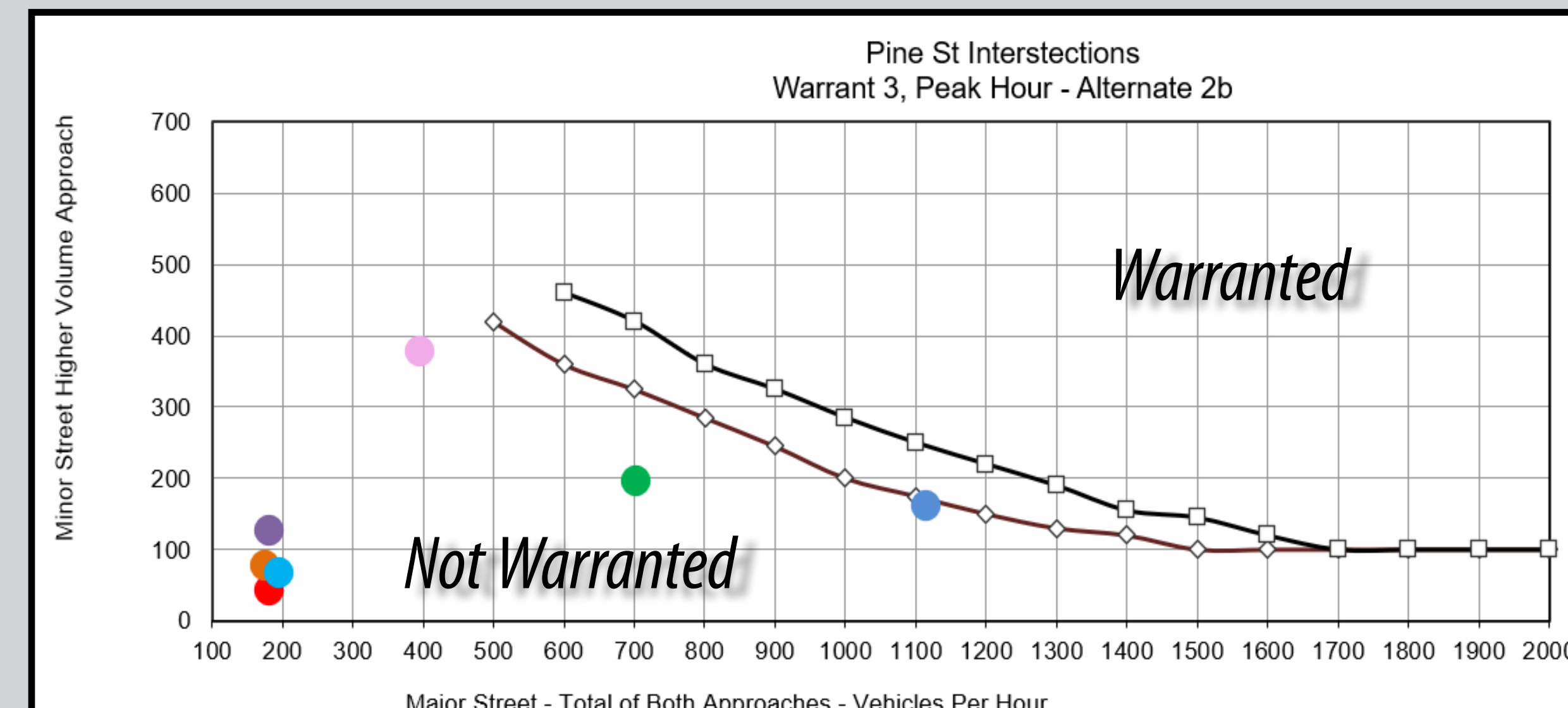
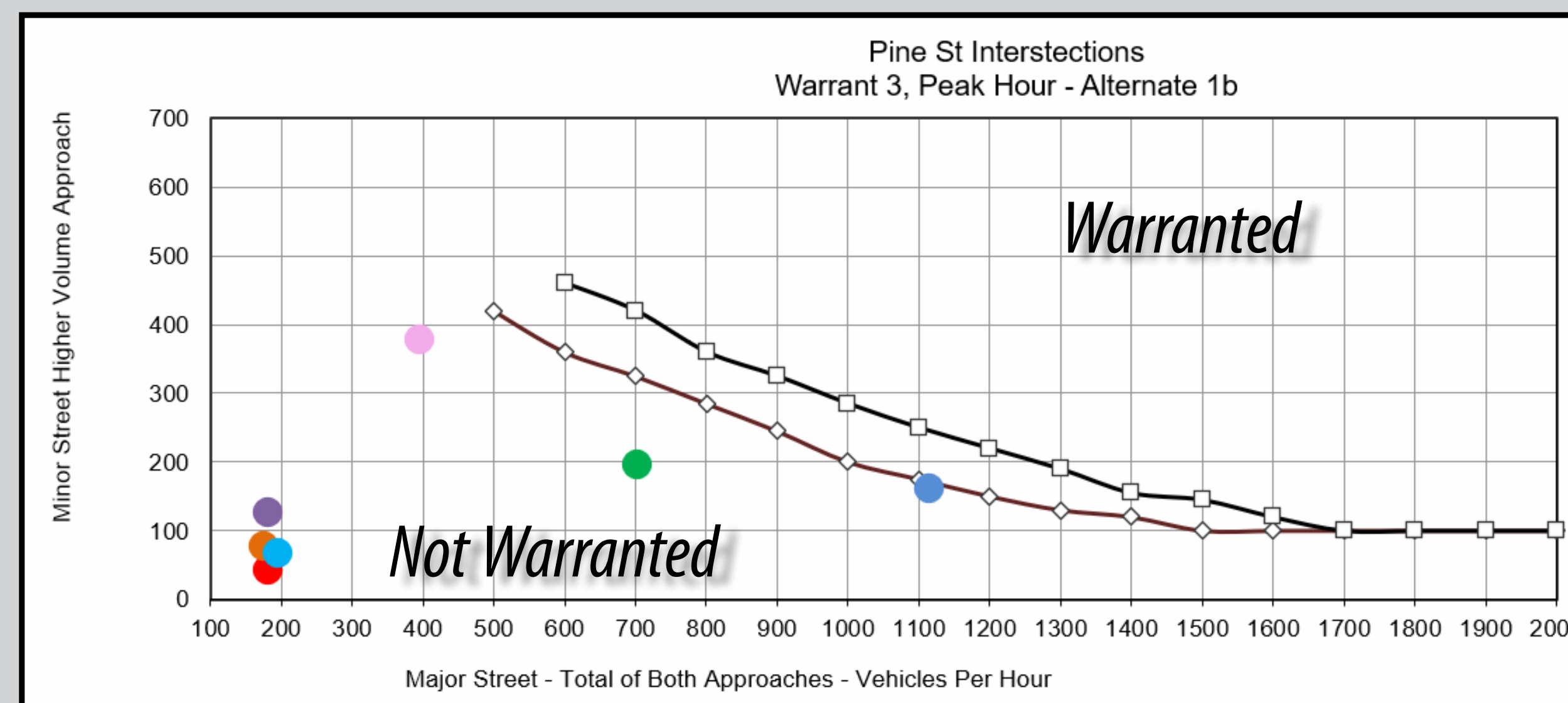
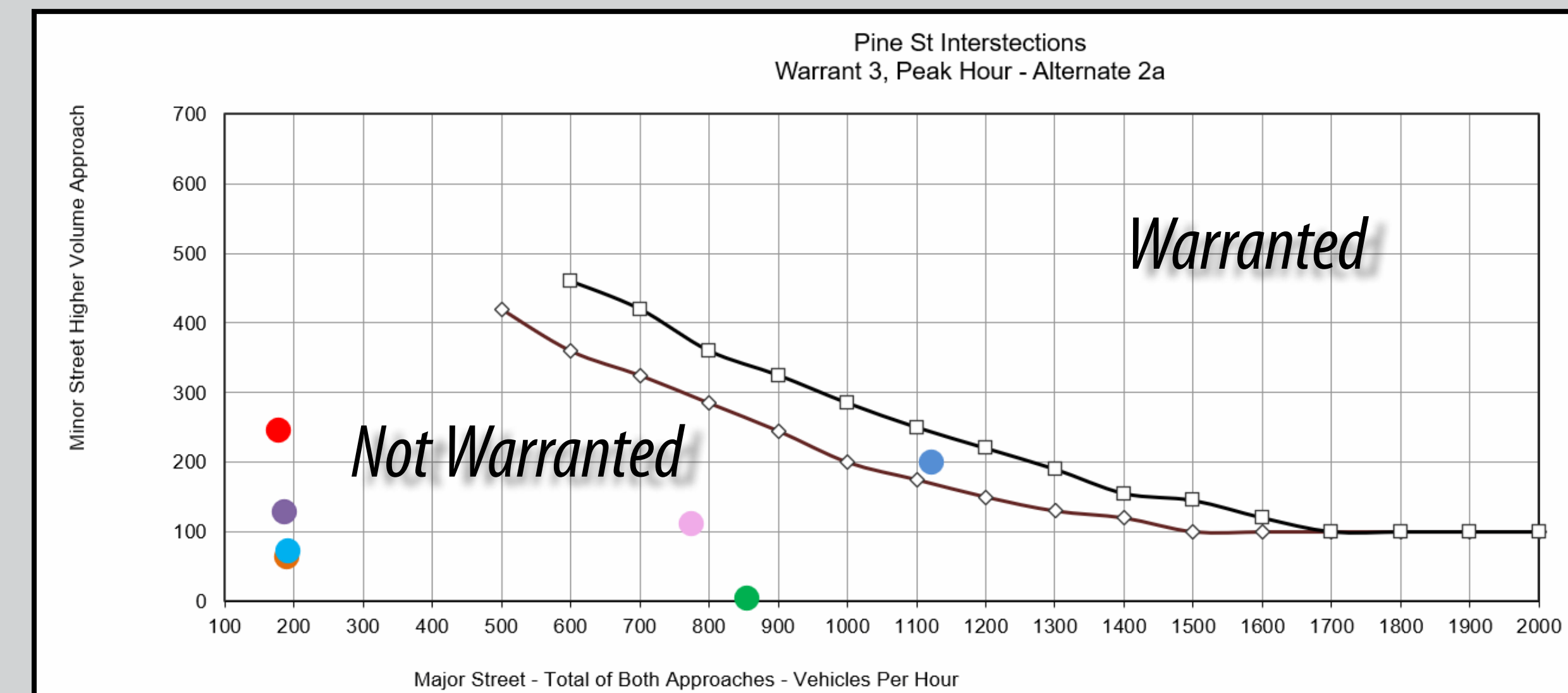
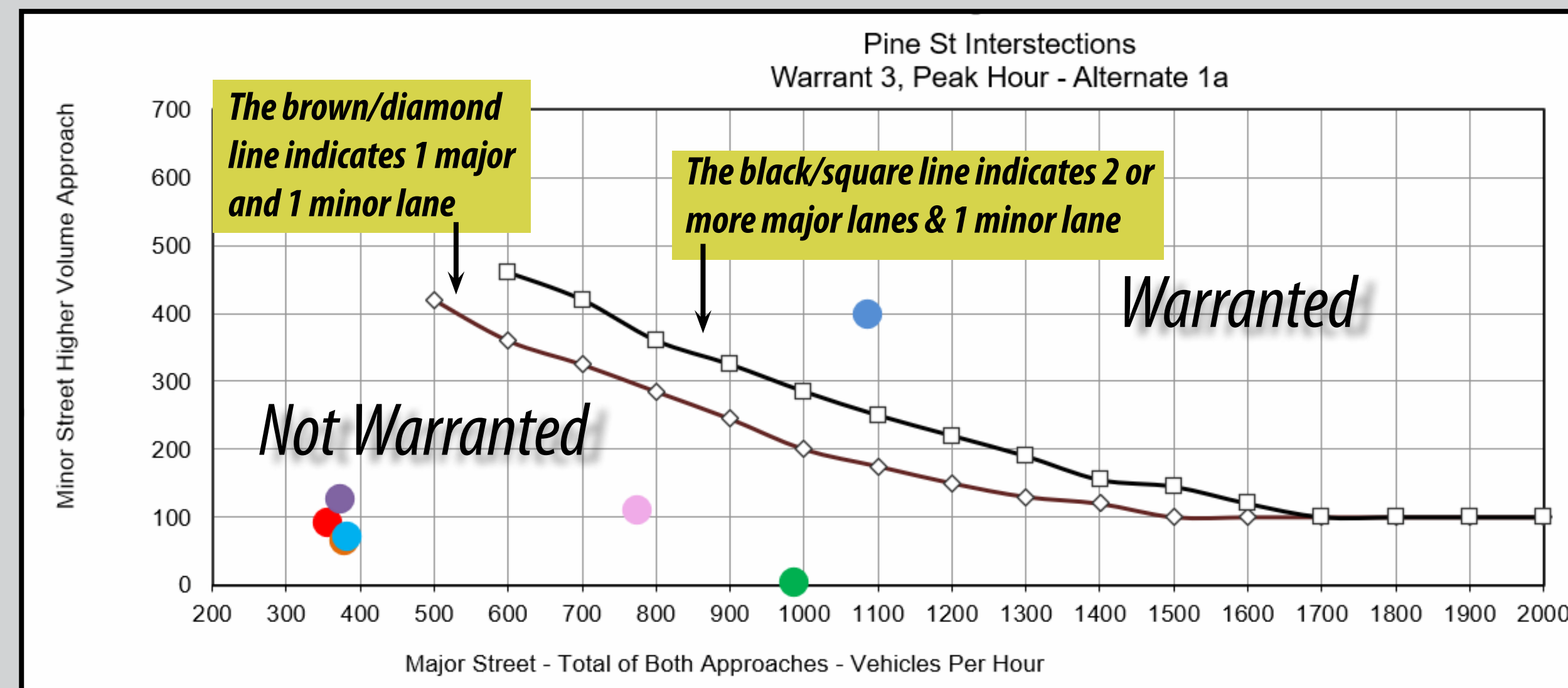
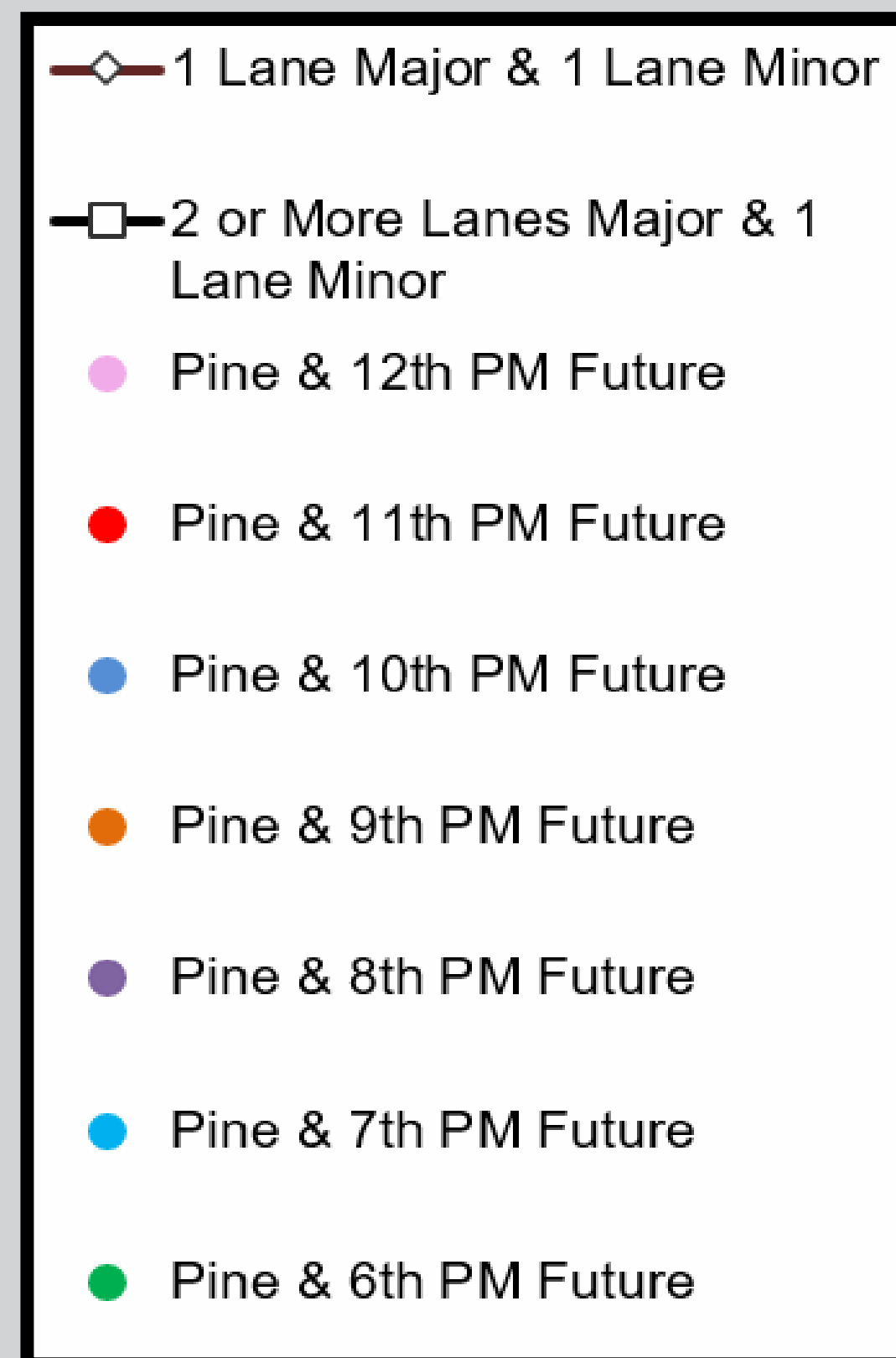
Future Signal Removal Considerations:

Due to anticipated future volumes, traffic signal removals may be considered at the following intersections:

- 11th Street and Pine Street
- 9th Street and Pine Street
- 8th Street and Pine Street
- 7th Street and Pine Street



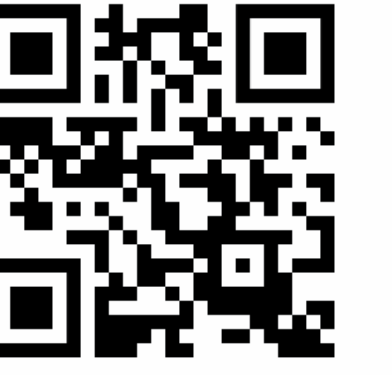
Pine Street Future Signal Warrants:



The graphs show if an intersection warrants a traffic signal based on future peak hour volumes using national traffic standards.

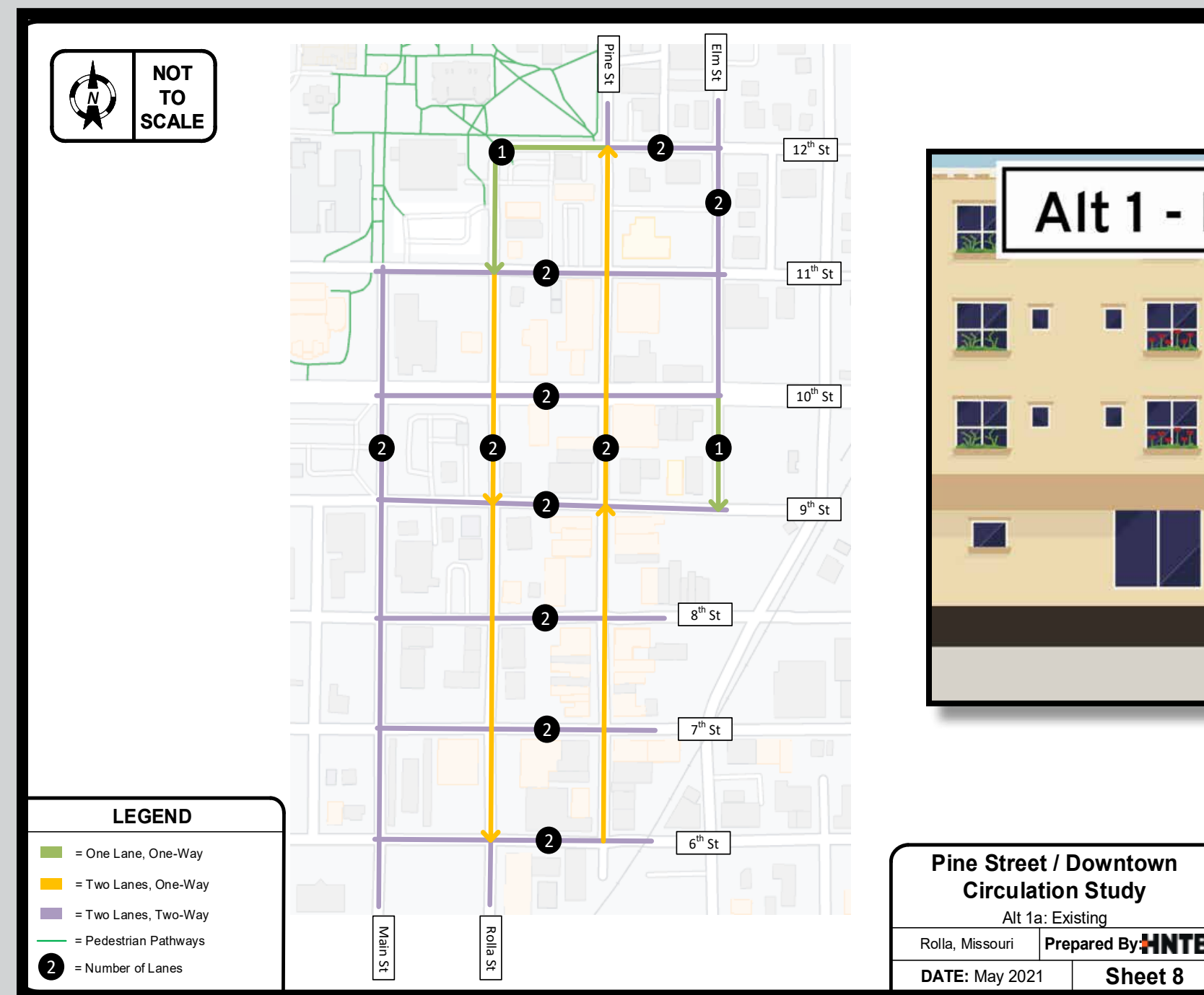
Only Pine Street and 10th Street warrants a traffic signal based on traffic demand. On Rolla Street, only 6th Street warrants a traffic signal in the future.

* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.



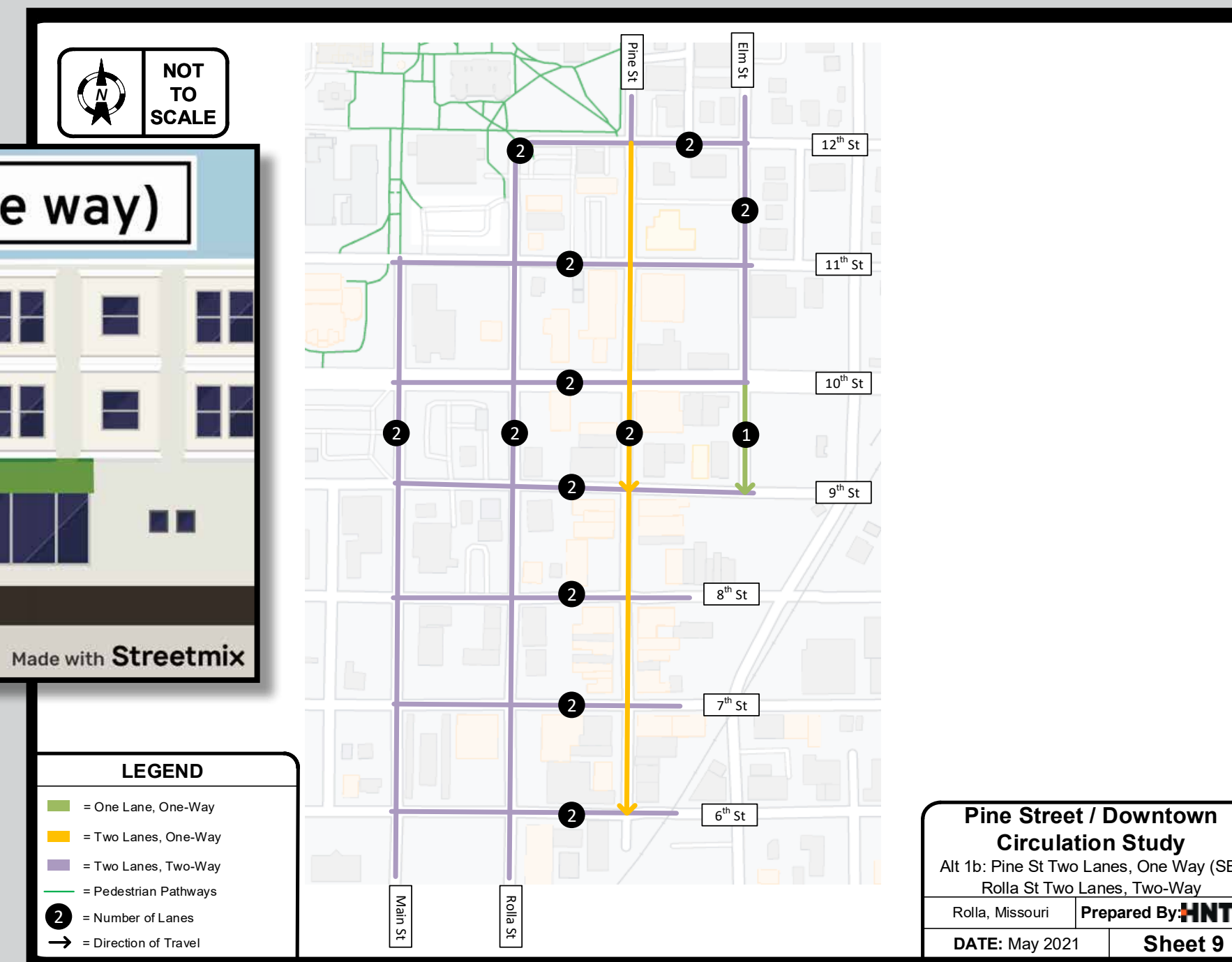
Alternative 1a (existing):

Existing circulation - Pine Street two lane, one-way northbound and Rolla Street two lane, one-way southbound.



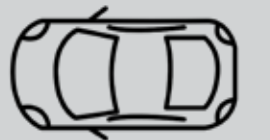
Alternative 1b:

Pine Street two lane, one-way southbound and Rolla Street two lane, two-way.



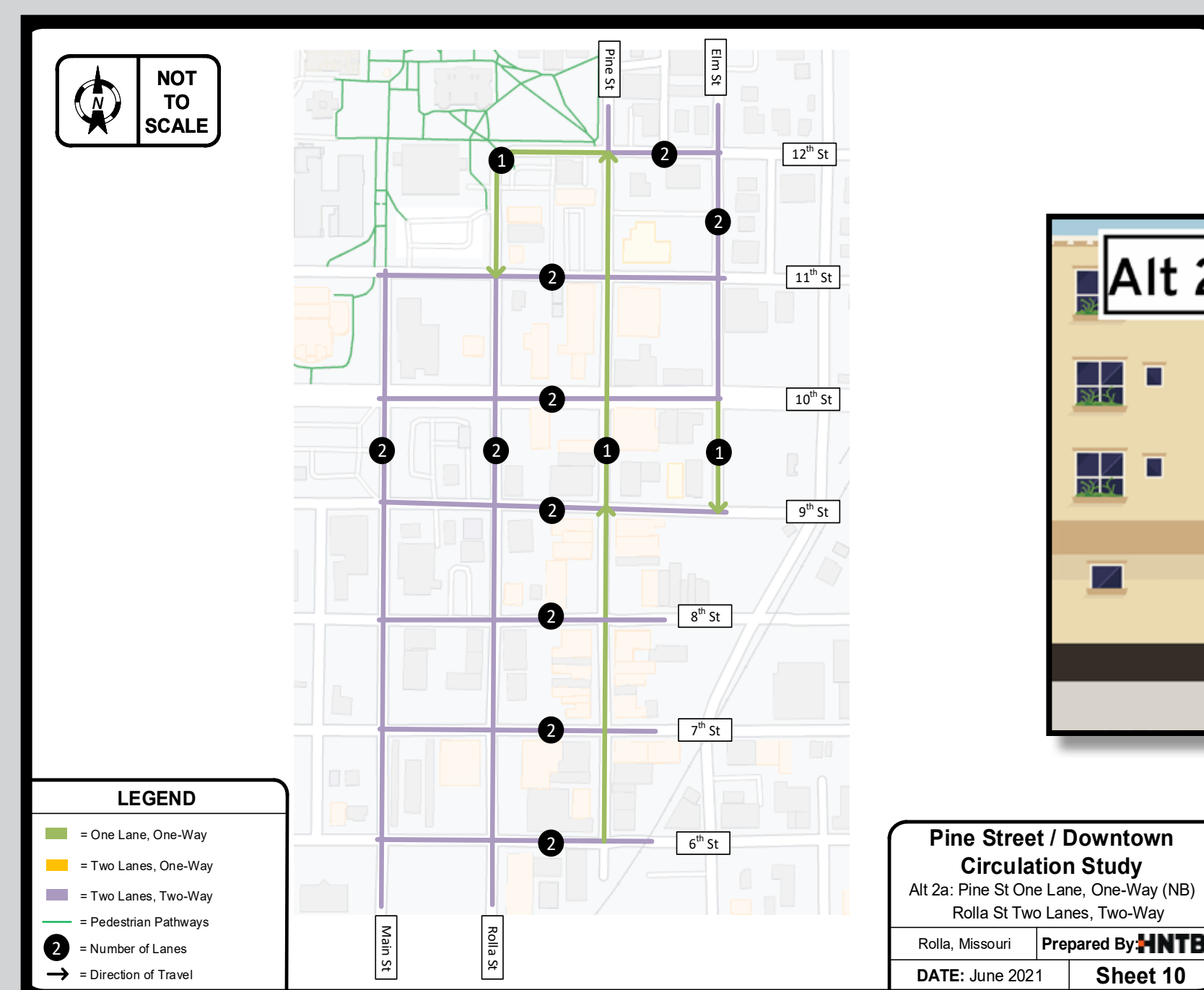
Other Considerations:

The following are additional considerations that can be incorporated into the Alternatives.

-  Designated Bike Lanes
-  Wider Sidewalks
-  Parklets
-  Back-in Parking

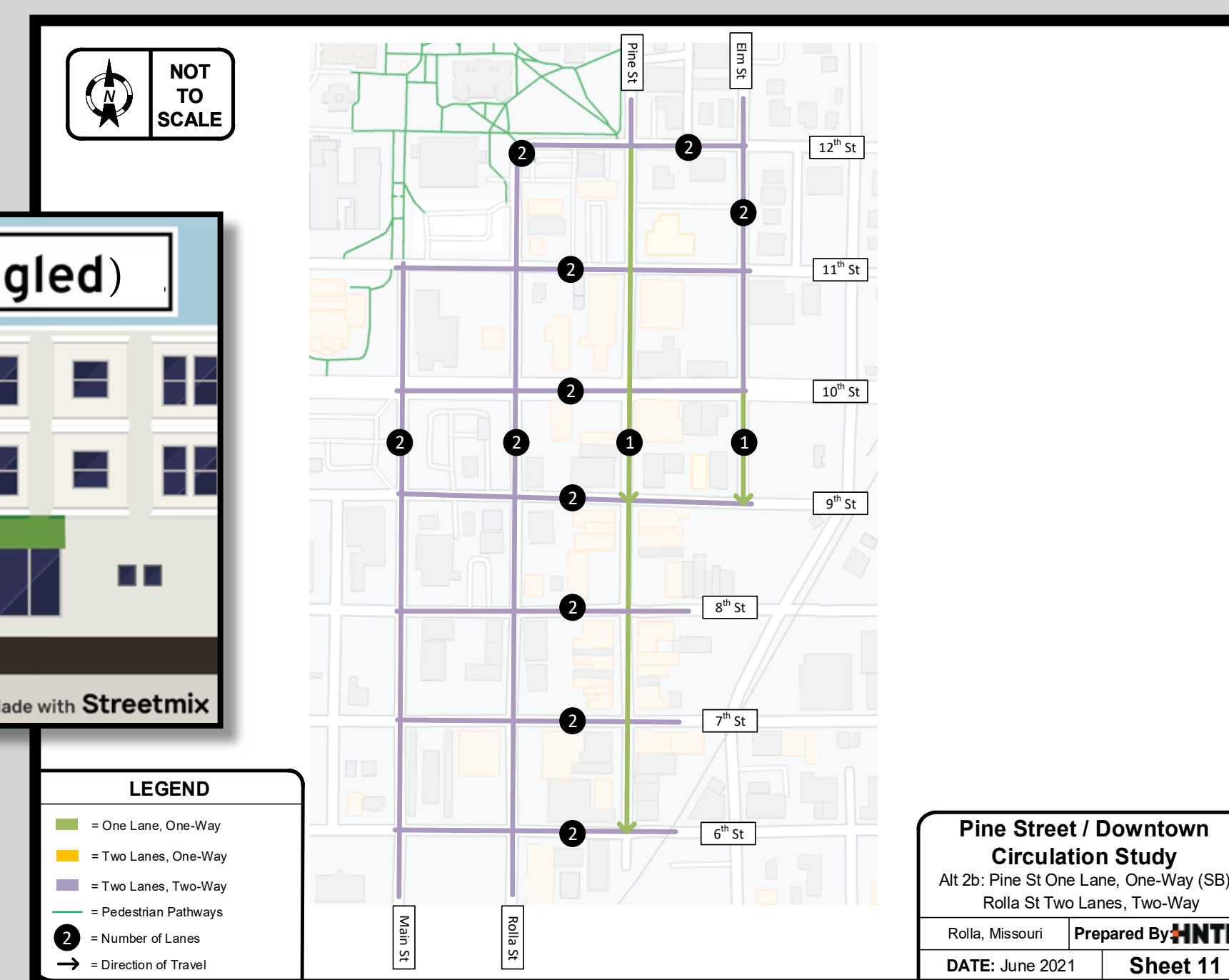
Alternative 2a

Pine Street one lane, one-way northbound and Rolla Street two lanes, two-way.



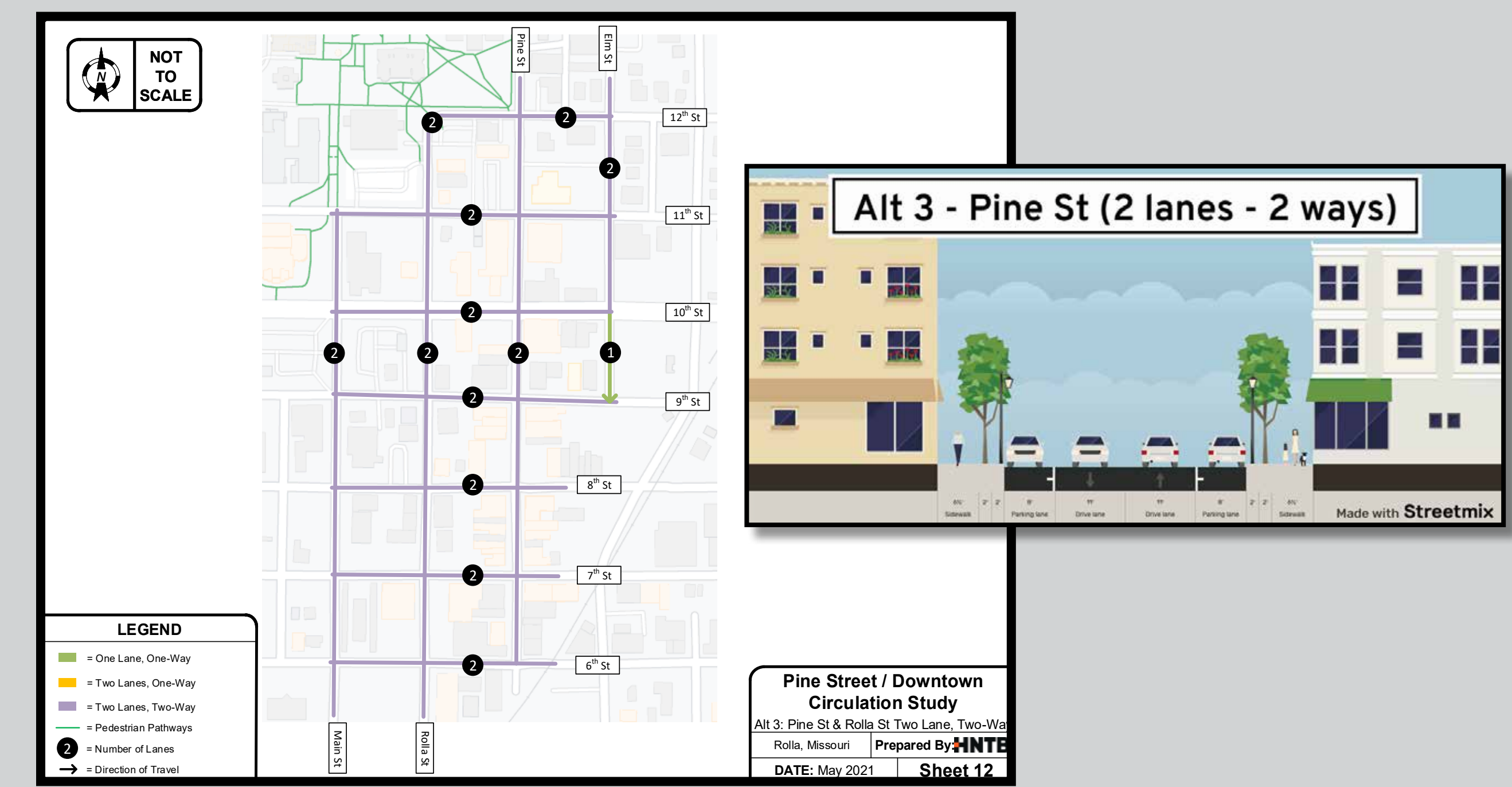
Alternative 2b:

Pine Street one lane, one-way southbound and Rolla Street two lanes, two-way.

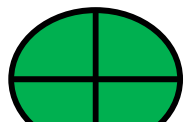
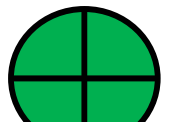
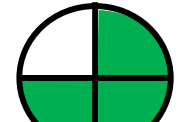
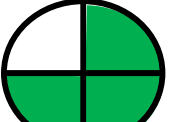
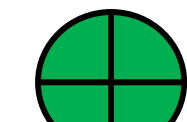
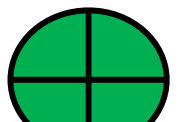
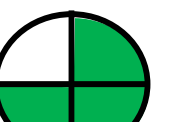
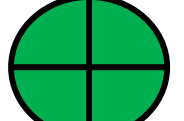
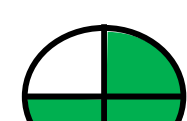
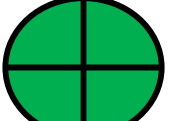
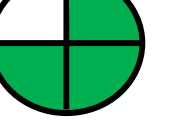
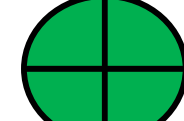
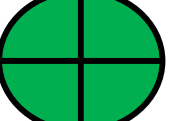
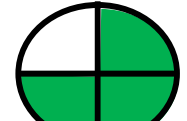
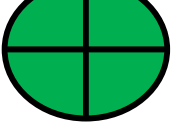
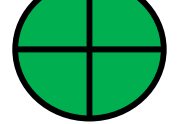
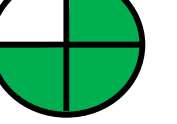
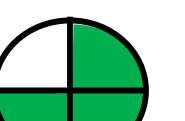
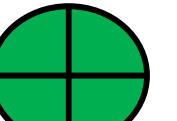
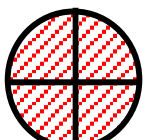
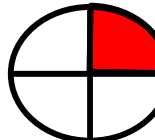
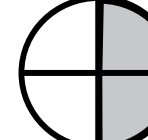
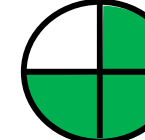
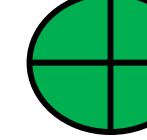


Alternative 3:

Pine Street and Rolla Street two lane, two-way.



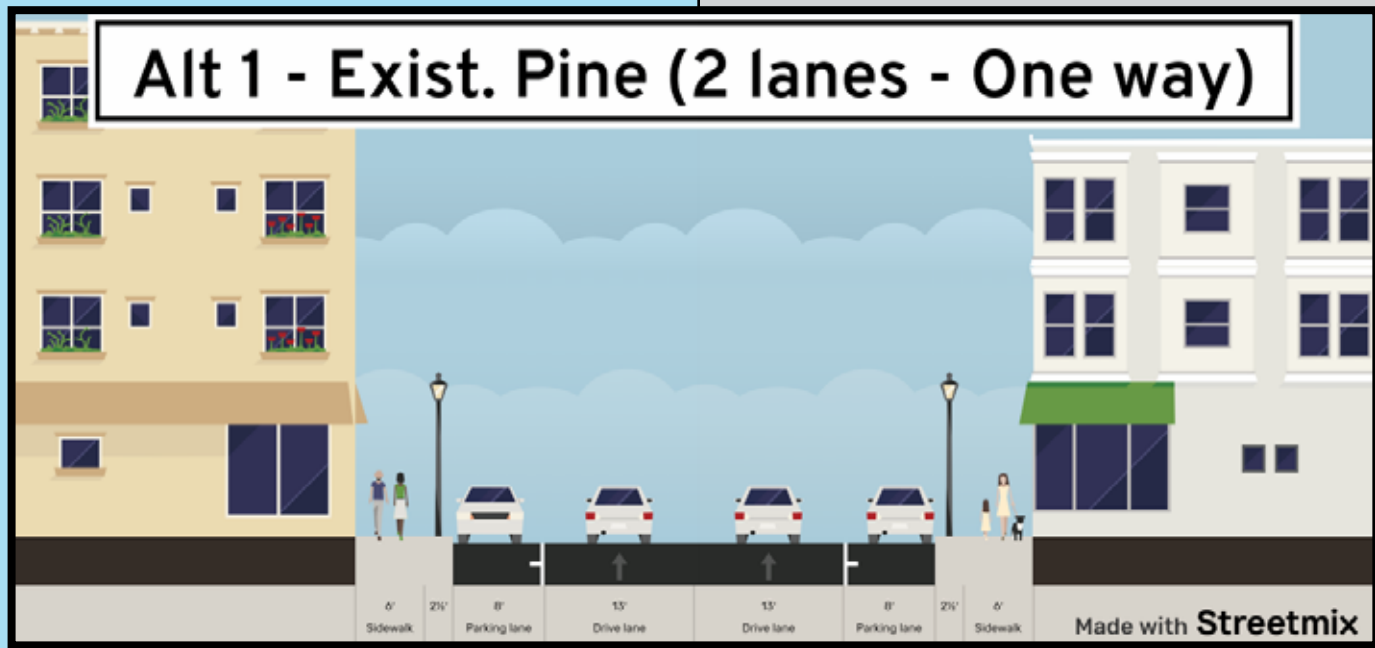


Downtown Rolla Improvements												
Alternatives Screening												
Alternative	Transportation Evaluation											
	Traffic				Safety		Economic			Engineering	Support	
	Existing Traffic Operations	Future Traffic Operations ¹	Existing Vehicle Queues	Future Vehicle Queues	Pedestrian Impact	Vehicular Impact ²	Parking Impact	Delivery Impact	Access to Businesses	Construction Costs	Downtown Stakeholder Input	Public Input
Alternative 1a (Existing) Pine St. 2-Lanes, 1-way NB, Rolla St. 2-Lanes, 1-way SB										\$0		
Alternative 1b Pine St. 2-Lanes, 1-way SB, Rolla St. 2-Lanes, 2-way										\$1,405,000		
Alternative 2a Pine St. 1-Lane, 1-way NB, Rolla St. 1-Lane, 2-way										\$1,255,000		
Alternative 2b Pine St. 1-Lane, 1-way SB, Rolla St. 1-Lane, 2-way										\$1,505,000		
Alternative 3 Pine St. & Rolla St. 1-lane, 2-way										\$1,510,000		
 High Impact/No or Low Achievement  Substantial Impact/Slight Achievement  Moderate Impact/Moderate Achievement  Slight Impact/Substantial Achievement  No or Low Impact/High Achievement												
¹Ratings assume no addition improvements or changes in traffic control, however with 11th, 9th, 8th, and 7th Street intersections on Pine converted to AWSC the operations are anticipated to stay the same or improve ²Converting traffic signals to stop control is assumed to increase the crash modification factor for vehicular accidents												
Engineering Cost Estimate Assumptions: 1. Approximately 1,250 linear feet of curb on each side of Pine from 6th Street to 10th Street 2. Assumes no curb-line or sidewalk improvements on Rolla Street 3. Assumes no parking spot pavement marking on Rolla Street												

Tell us what you think about each of the five alternatives. What do you like? What do you not like? Do you have a different idea?

Alternative 1a:

Existing circulation - Pine Street two lane, one-way northbound and Rolla Street two lane, one-way southbound.

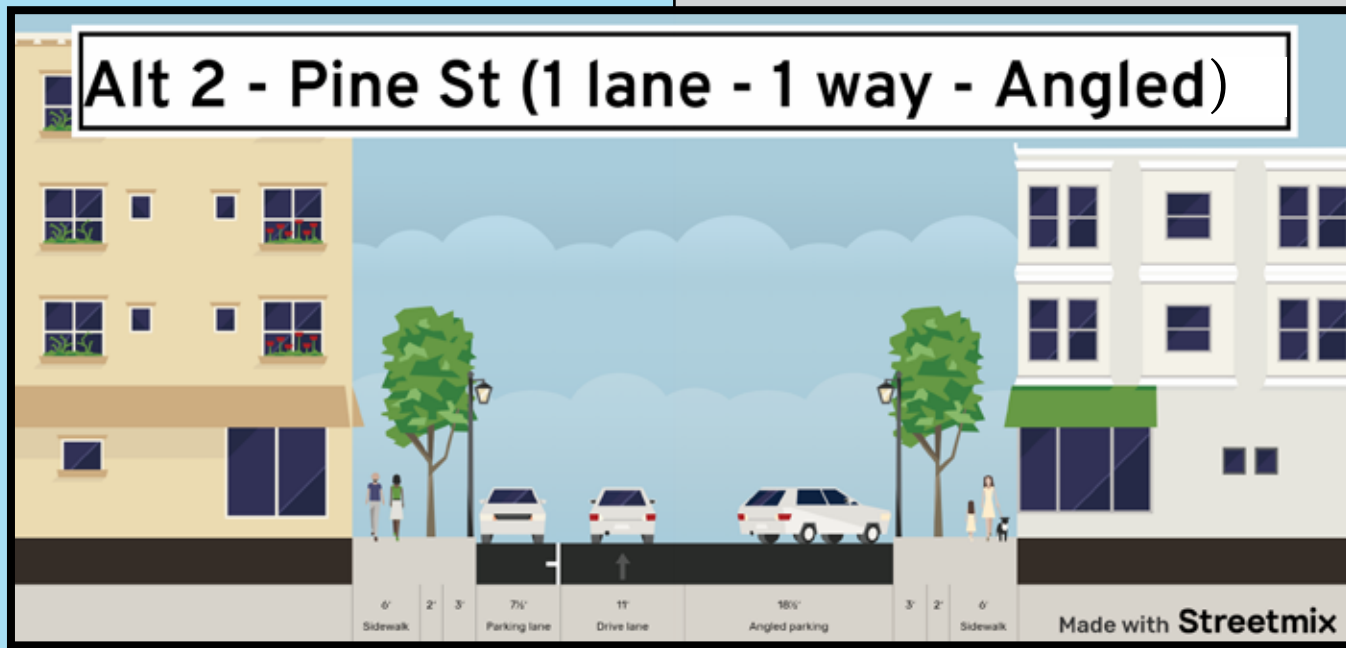


Alternative 1b:

Pine Street two lane, one-way converting to southbound and Rolla Street two lane, two-way.

Alternative 2a:

Pine Street one lane, one-way northbound and Rolla Street two lanes, two-way.

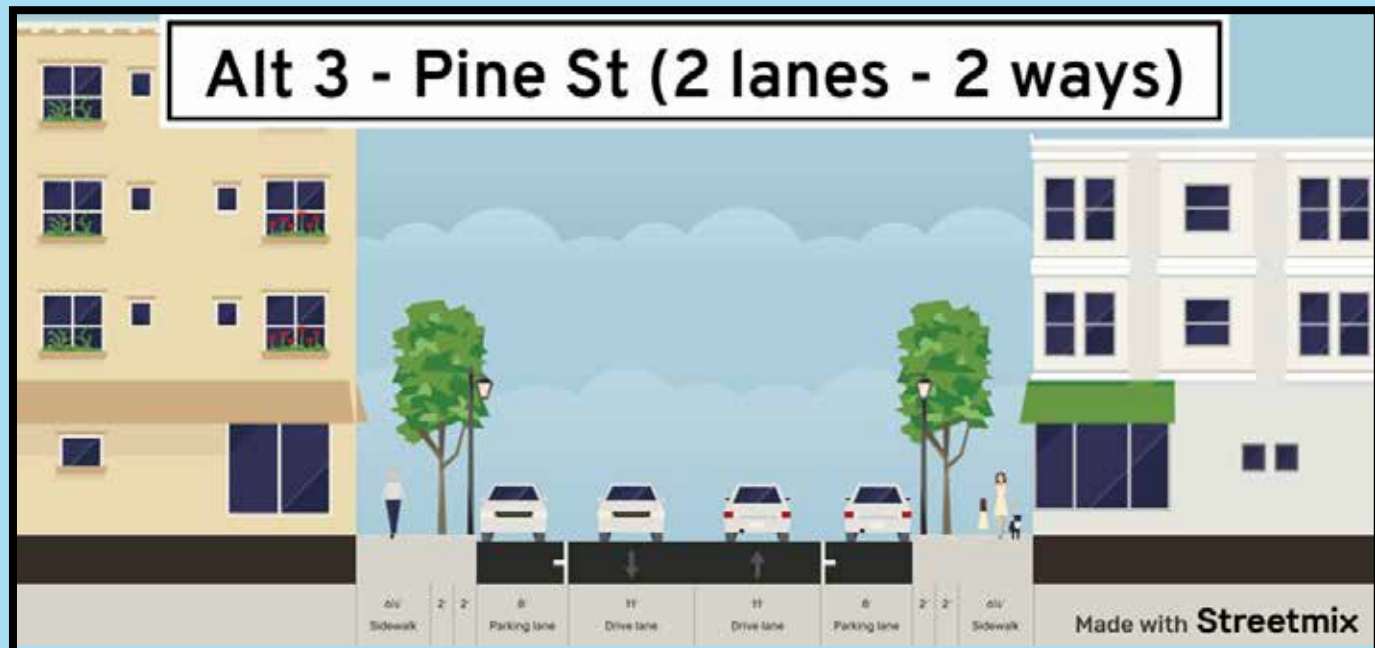


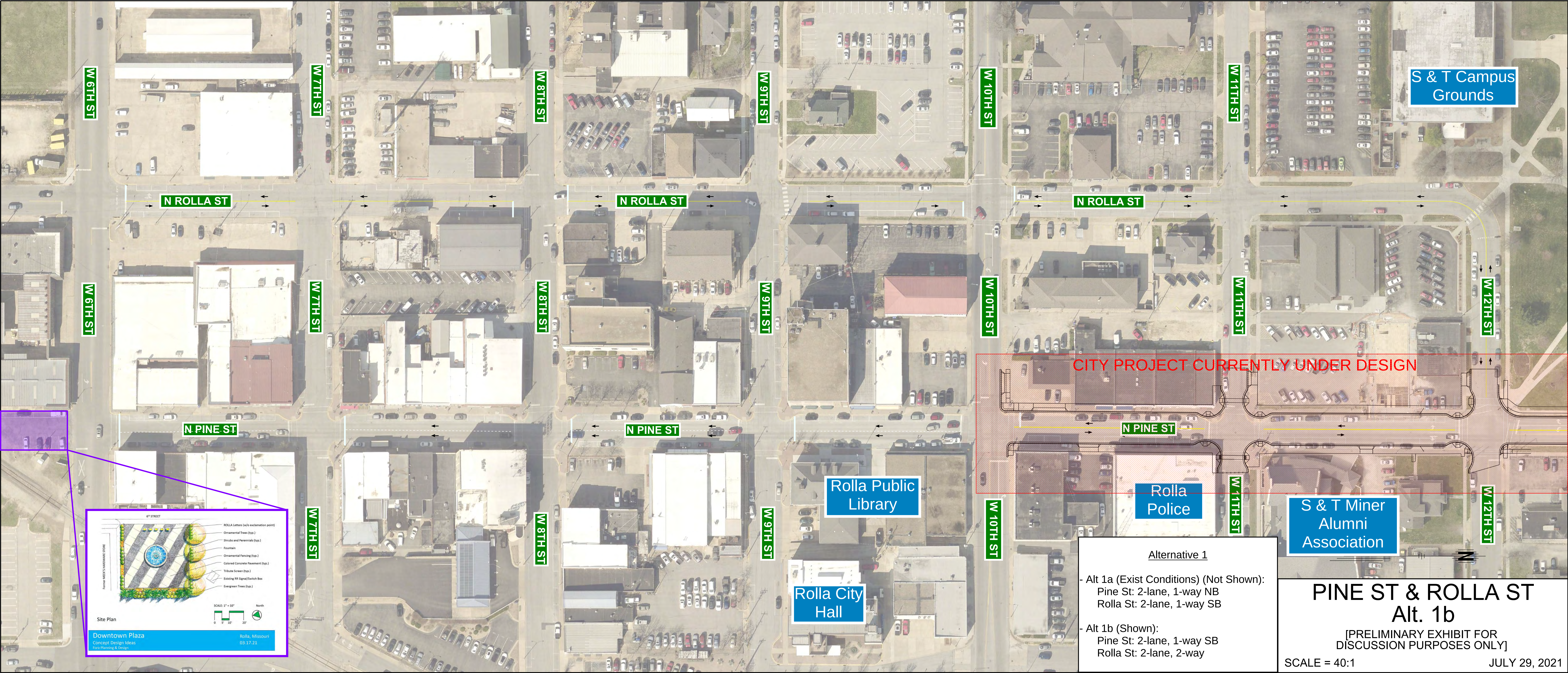
Alternative 2b:

Pine Street one lane, one-way southbound and Rolla Street two lanes, two-way.

Alternative 3:

Pine Street and Rolla Street two lane, two-way.





S & T Campus
Grounds

W 6TH ST

W 7TH ST

W 8TH ST

W 9TH ST

W 10TH ST

W 11TH ST

N ROLLA ST

N ROLLA ST

N ROLLA ST

W 12TH ST

W 11TH ST

W 10TH ST

W 9TH ST

W 8TH ST

W 7TH ST

W 6TH ST

N PINE ST

N PINE ST

N PINE ST

Rolla Public
Library

Rolla
Police

S & T Miner
Alumni
Association

Rolla City
Hall

CITY PROJECT CURRENTLY UNDER DESIGN

Alternative 1

- Alt 1a (Exist Conditions) (Not Shown):
Pine St: 2-lane, 1-way NB
Rolla St: 2-lane, 1-way SB
- Alt 1b (Shown):
Pine St: 2-lane, 1-way SB
Rolla St: 2-lane, 2-way

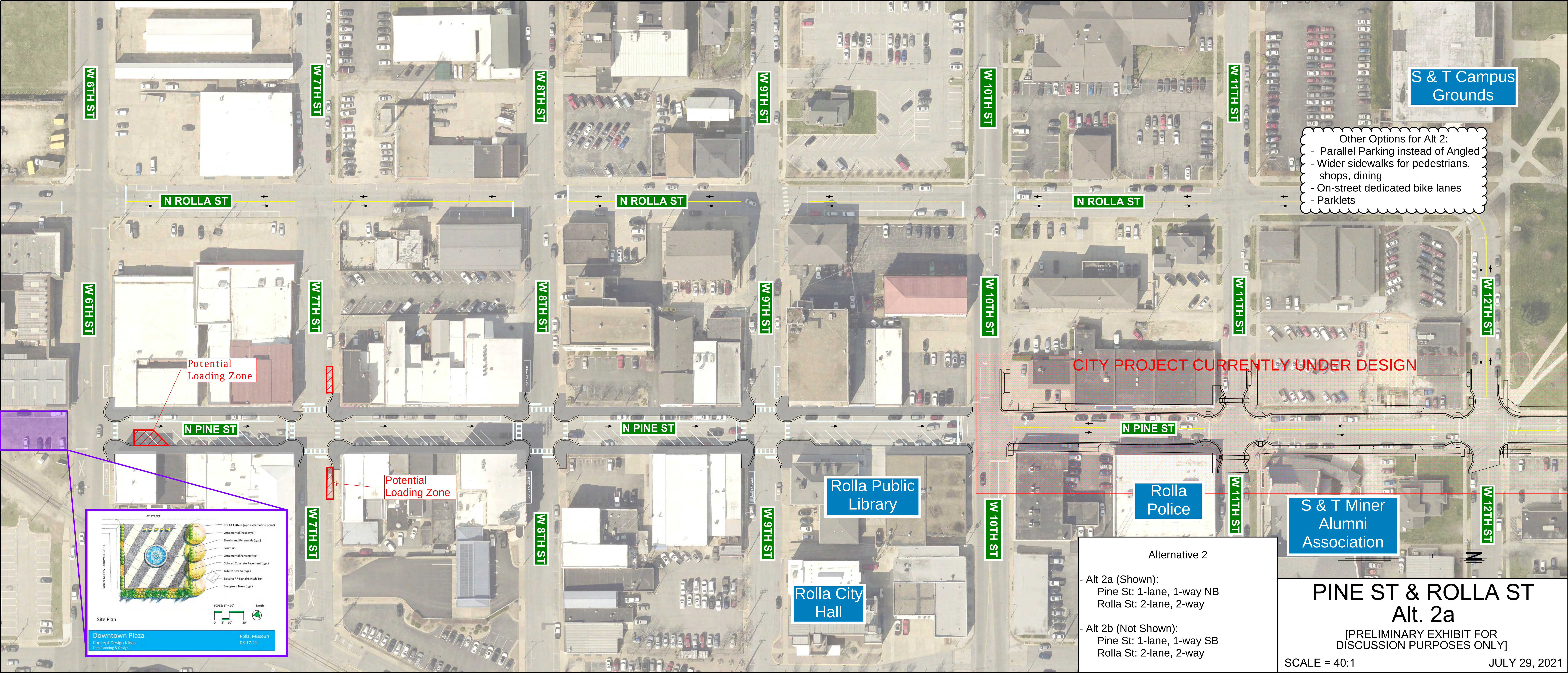
PINE ST & ROLLA ST Alt. 1b

[PRELIMINARY EXHIBIT FOR
DISCUSSION PURPOSES ONLY]

SCALE = 40:1

JULY 29, 2021





S & T Campus Grounds

- Other Options for Alt 2:
- Parallel Parking instead of Angled
 - Wider sidewalks for pedestrians, shops, dining
 - On-street dedicated bike lanes
 - Parklets

CITY PROJECT CURRENTLY UNDER DESIGN

Rolla Public Library

Rolla Police

S & T Miner Alumni Association

Rolla City Hall

Alternative 2

- Alt 2a (Shown):
Pine St: 1-lane, 1-way NB
Rolla St: 2-lane, 2-way

- Alt 2b (Not Shown):
Pine St: 1-lane, 1-way SB
Rolla St: 2-lane, 2-way

PINE ST & ROLLA ST
Alt. 2a

[PRELIMINARY EXHIBIT FOR DISCUSSION PURPOSES ONLY]

SCALE = 40:1

JULY 29, 2021

Downtown Plaza
Concept Design Ideas
Ford Planning & Design

Rolla, Missouri
03.17.21

Site Plan

SCALE: 1" = 10'

North

Rolla Letters (w/o exclamation point)
Ornamental Trees (typ.)
Shrubs and Perennials (typ.)
Fountain
Ornamental Fencing (typ.)
Colored Concrete Pavement (typ.)
Tribute Screen (typ.)
Existing RR Signal/Switch Box
Evergreen Trees (typ.)



S & T Campus
Grounds

W 10TH ST

W 11TH ST

W 12TH ST

W 10TH ST

W 11TH ST

W 10TH ST

W 11TH ST

W 12TH ST

Rolla Public
Library

Rolla City
Hall

Rolla
Police

S & T Miner
Alumni
Association

Potential
Loading Zone

Potential
Loading Zone

CITY PROJECT CURRENTLY UNDER DESIGN

PINE ST & ROLLA ST
Alt. 3

[PRELIMINARY EXHIBIT FOR
DISCUSSION PURPOSES ONLY]

SCALE = 40:1

JULY 29, 2021



Downtown Rolla Improvements Study

(Pine Street and Rolla Street)

Scan the QR Code to take a survey to help the team gather input on the Downtown Improvements Project.



Purpose of the project:

As part of the Move Rolla Transportation Development District (TDD) Program, the City of Rolla is evaluating the parking, circulation and intersection control for the downtown transportation system to meet the needs of the downtown residents, visitors and business owners.

Benefits of the project:

The benefits of the improvements to the downtown transportation system are a complete multi-modal transportation system that addresses the needs of all users, enhances the economic conditions of downtown businesses and maximizes the Downtown Rolla experience.

Project Area:

Schedule and next steps:

- Downtown stakeholder meeting: Summer 2021
- Public meeting: Fall 2021
- Design complete: Winter 2022
- Construction start: To be determined

Improvements may include:

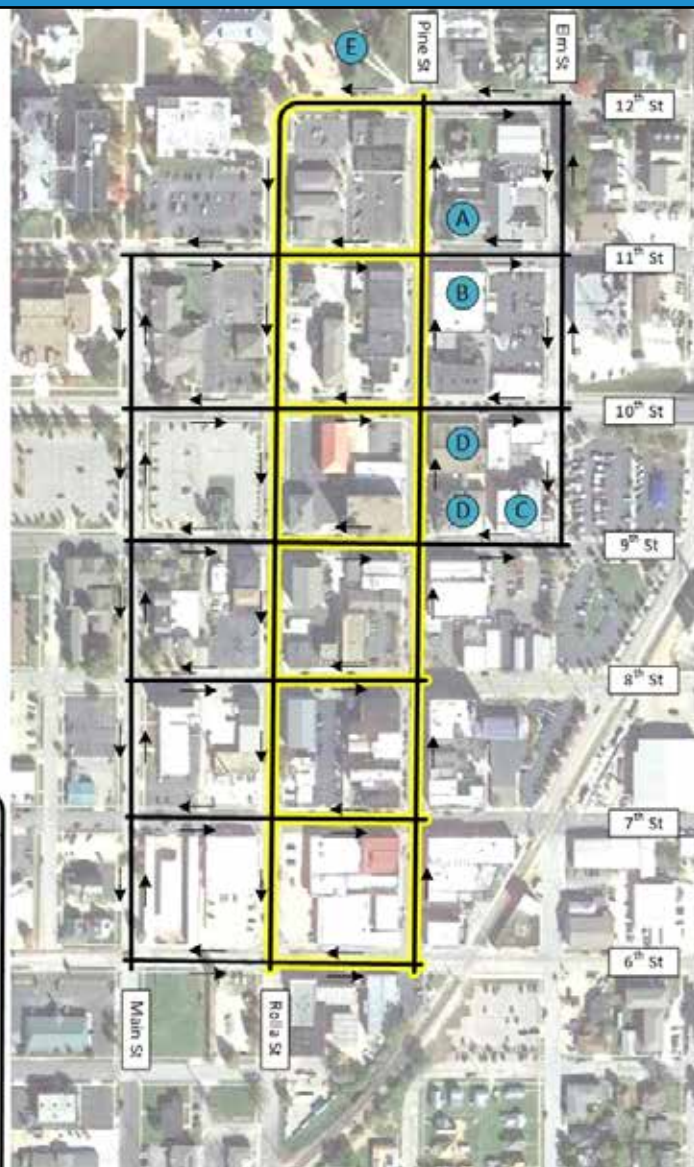
- Update traffic circulation
- Update parking configuration
- New ADA compliant sidewalks
- Update or remove traffic signals
- New curb and gutter
- Repave existing road

This study does not include analysis of urban design, streetscape, lighting or other non-transportation elements of downtown.



LEGEND

- = S & T Miner Alumni Association
- = Rolla Police
- = Rolla City Hall
- = Rolla Public Library
- = University Campus Grounds
- = Direction of Travel
- = Study Area
- = Surrounding Area



Design Limits

10th St. to 12th St.

Planning Limits

6th Street to 11th Street



Downtown Business Stakeholder Meeting:

Thank you for joining the City of Rolla and project team for a Downtown Stakeholder Open House Meeting. The purpose of the meeting is for the project team to provide information and gather input on the Downtown Improvements Project. Your feed back is essential to the success of this project.

The list of stations are listed below. Representatives from the City and project team are available to discuss the project and answer questions. A public meeting is planned for Fall 2021.

Downtown Business Stakeholder Stations:

Station 1: Project Purpose, Benefits, Project Area, Previous Downtown Studies and Recommendations

Station 2: Existing Conditions - Traffic Volumes, Intersection Control, Parking, Intersection Level of Service, Intersection Queues and Safety Crash Data

Station 3: Parking - Current Parking and Potential Parking Alternatives

Station 4: Intersection Control - Existing traffic signals and potential signal removals, warranted traffic signals

Station 5: Traffic Circulation - Existing Circulation and Circulation Alternatives

Station 6: Evaluation Matrix - Evaluation factors, ratings and input station**

Station 7: Alternatives Comment Station**

Roll Plot Stations: Aerial engineering drawing views of potential Alternatives**

***Stop by these stations to leave input. All stations will have team members that can provide information and answer questions.*

Scan the QR Code to take a survey to help the team gather input on the Downtown Improvements Project.



STAY CONNECTED

To stay up to date with the latest program information or sign up for electronic newsletters, visit:

www.moverollatdd.com

If you have questions or concerns regarding the TDD Program and projects, please contact:

Steve Hargis, PE
City of Rolla Public Works Director
573-364-8659 or shargis@rollacity.org

VOTE
HERE!

Engineering Cost Estimate Assumptions:

1. Approximately 1,250 linear feet of curb on each side of Pine from 6th Street to 10th Street
2. Assumes no curb-line or sidewalk improvements on Rolla Street
3. Assumes no parking spot pavement marking on Rolla Street

M TRAN
a TRICT

Station 7 Alternative Comments

TELL US WHAT YOU THINK!

Tell us what you think about each of the five alternatives. What do you like? What do you not like? Do you have a different idea?

Alternative 1a:	Alternative 1b:	Alternative 2a:	Alternative 2b:	Alternative 3:
Existing circulation – Pine Street two lane, one-way northbound and Rolla Street two-lane, one-way southbound.	Pine Street two lane, one-way converting to southbound and Rolla Street two lane, two-way.	Pine Street one lane, one-way northbound and Rolla Street two lanes, two-way.	Pine Street one lane, one-way southbound and Rolla Street two lanes, two-way.	Pine Street and Rolla Street two lane, two-way.

AIRT 1 - Exist. Pine (2 lanes - One way)

AIRT 2 - Pine St (1 lane - 1 way - Angled)

AIRT 3 - Pine St (2 lanes - 2 ways)

Comments:

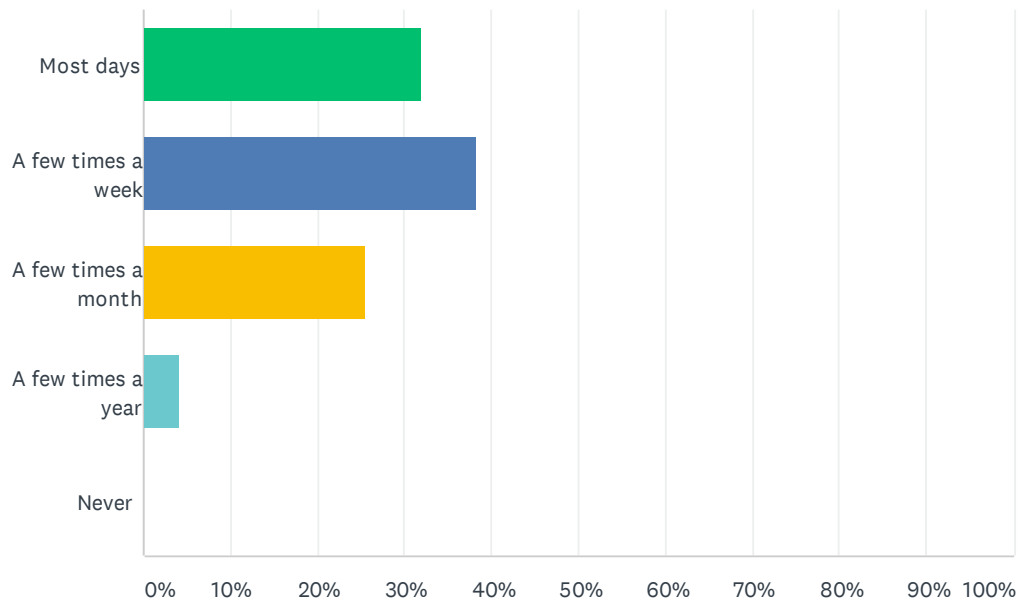
- Use sticky notes to place comments here →
- I like alleyway slip lane remove traffic signals
- Please let's please! keep it a pedestrian way important for children & seniors
- I would love to see more trees along the street to make it safer for pedestrians
- Likely Traffic is too narrow
- Add Traffic lights for Pedestrians
- The current design is very unsafe... I'm worried about the safety of my child walking home from school every day... Please consider adding crosswalk markings and maybe some bollards or planters at the intersection to protect them.





Q1 How often do you go downtown? (chose the one that best fits)

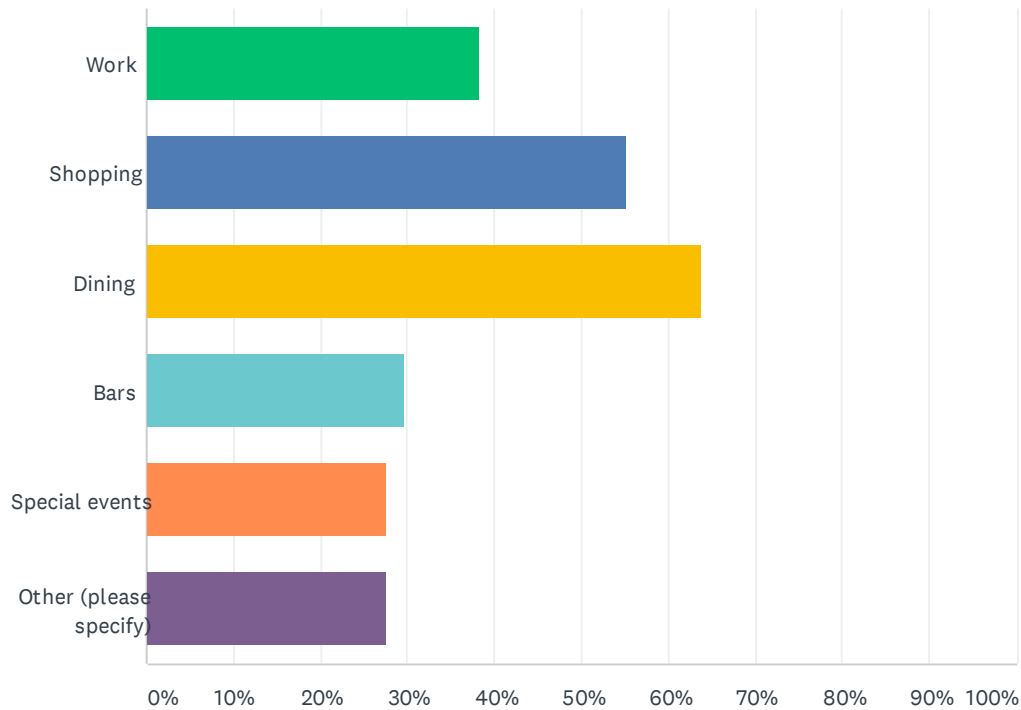
Answered: 47 Skipped: 0



ANSWER CHOICES	RESPONSES	
Most days	31.91%	15
A few times a week	38.30%	18
A few times a month	25.53%	12
A few times a year	4.26%	2
Never	0.00%	0
TOTAL		47

Q2 What are your primary reasons for going downtown? (check all that apply)

Answered: 47 Skipped: 0



ANSWER CHOICES	RESPONSES	
Work	38.30%	18
Shopping	55.32%	26
Dining	63.83%	30
Bars	29.79%	14
Special events	27.66%	13
Other (please specify)	27.66%	13
Total Respondents: 47		

#	OTHER (PLEASE SPECIFY)	DATE
1	Barbershop	9/27/2021 5:00 PM
2	I work on the edge of downtown and travel Rolla St. and Pine St. every day.	9/27/2021 10:16 AM
3	Just checking what is still there	9/27/2021 10:08 AM
4	To get around campus	9/21/2021 1:46 PM
5	Small business owner.	9/17/2021 11:35 AM
6	I'm downtown working with the businesses as the President of the Rolla Downtown Business Association. I coordinate the events, work on revitalization efforts and give guidance to	9/17/2021 11:01 AM

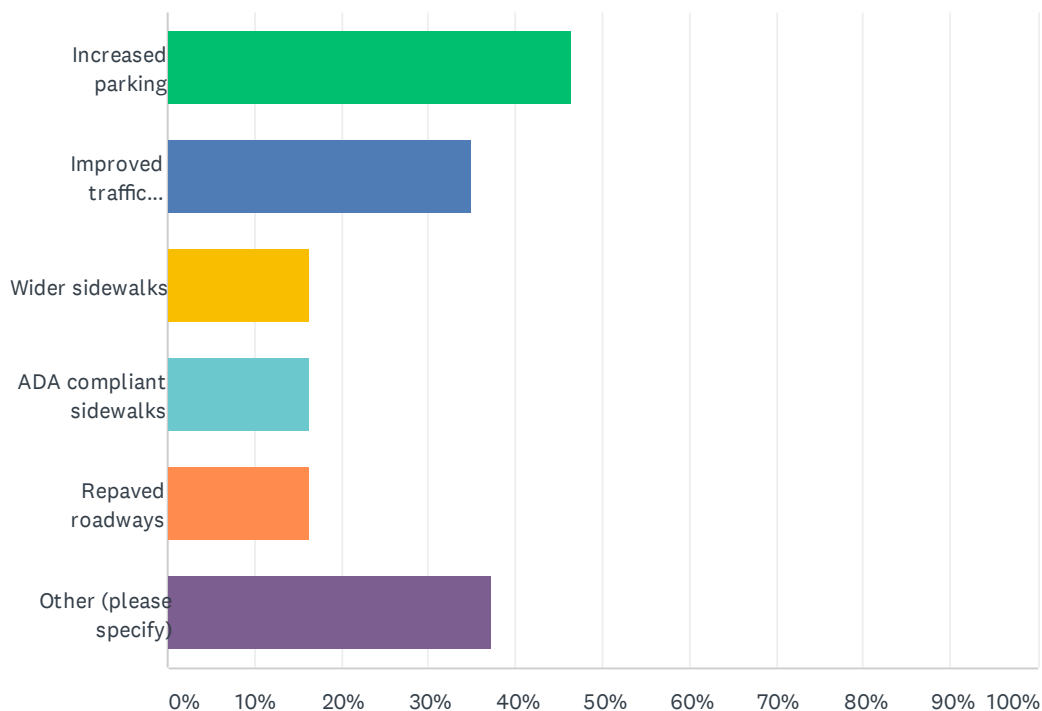
MoveRolla TDD - Downtown Improvements (Rolla & Pine Streets)

businesses with their various concerns & collaborate with our partners at the City of Rolla and other community organizations.

7	pick up mail at Post Office	9/16/2021 4:36 PM
8	Commute (pass through) across town.	9/16/2021 3:39 PM
9	Bank, library, barber, Alex's, pay RMU bill, some shopping	9/16/2021 2:59 PM
10	Barbershop	9/16/2021 12:11 PM
11	cc MEETINGS	9/16/2021 11:31 AM
12	Walking through.	9/15/2021 7:55 PM
13	Business owner	9/15/2021 6:56 PM

Q3 What improvements are most important to you regarding downtown transportation improvements? (check all that apply)

Answered: 43 Skipped: 4



ANSWER CHOICES	RESPONSES	
Increased parking	46.51%	20
Improved traffic circulation (i.e., convert to two-way)	34.88%	15
Wider sidewalks	16.28%	7
ADA compliant sidewalks	16.28%	7
Repaved roadways	16.28%	7
Other (please specify)	37.21%	16
Total Respondents: 43		

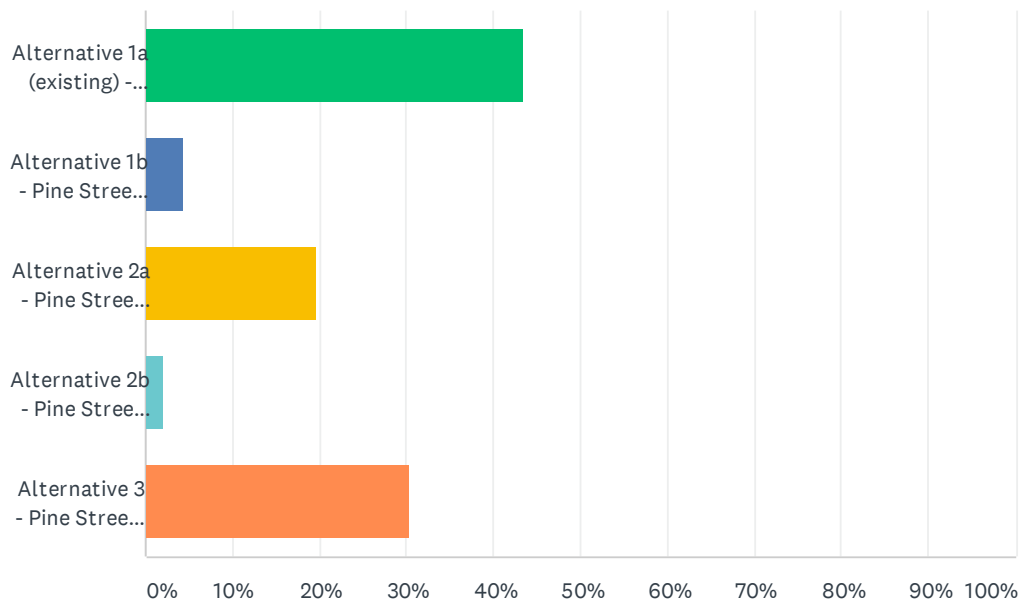
#	OTHER (PLEASE SPECIFY)	DATE
1	more bicycle parking	9/27/2021 2:28 PM
2	I would love to see the parklets and would support whichever option would allow for this new design.	9/27/2021 10:16 AM
3	Better lighting to feel safer	9/21/2021 2:28 PM
4	I think downtown is fine for the most part	9/21/2021 1:46 PM
5	Safety for pedestrians	9/21/2021 12:56 PM
6	Lighting in downtown and area neighborhoods.	9/21/2021 12:05 PM
7	more walkable, more bike-able, more livable!	9/21/2021 11:20 AM

MoveRolla TDD - Downtown Improvements (Rolla & Pine Streets)

8	Downtown is fine how it is	9/21/2021 9:08 AM
9	Improve sidewalks. They are uneven and difficult to sweep off debris	9/19/2021 6:18 AM
10	pull in parking.	9/17/2021 5:37 PM
11	More space for pedestrians (patio areas for restaurants, etc)	9/17/2021 11:39 AM
12	We need more parking but NOT on the streets themselves. Do NOT institute 45-degree parking or "parklets" both of which would make things worse.	9/17/2021 11:35 AM
13	Brining traffic all the way from North Pine Street & Bishop to 10th Street and beyond into our downtown to 6th Street.	9/17/2021 11:01 AM
14	Clean up or remove blighted storefronts and buildings. Add awnings as rain shelters to building fronts. Add bicycle parking racks, preferably with overhead weather protection.	9/16/2021 3:39 PM
15	I am satisfied as is. Why spend a bunch of money that the city does not have	9/16/2021 11:31 AM
16	Ramps must be in line with sidewalks and not below grade to puddle whenever it rains. The crossing at 11th behind the Police station is an abomination. Both sides of 11th are off line so pedestrians step over a curb and then a deep curb.	9/15/2021 7:55 PM

Q4 On the Project Website, the team has provided multiple Alternatives. What Alternative do you prefer? (pick one)

Answered: 46 Skipped: 1



ANSWER CHOICES	RESPONSES	
Alternative 1a (existing) - Pine Street two lane, one-way northbound and Rolla Street two lane, one-way south-bound	43.48%	20
Alternative 1b - Pine Street two lane, one-way southbound and Rolla Street two lane, two-way	4.35%	2
Alternative 2a - Pine Street one lane, one-way northbound and Rolla Street two lanes, two-way	19.57%	9
Alternative 2b - Pine Street one lane, one-way southbound and Rolla Street two lanes, two-way	2.17%	1
Alternative 3 - Pine Street and Rolla Street two lane, two-way	30.43%	14
TOTAL		46

#	PLEASE PROVIDE COMMENTS	DATE
1	Pine Street would feel more like a street in this Alternative. More on-street parking with wider sidewalks. I hope this Alternative will make Pine St and Rolla St feel more like a destination rather than a thoroughfare.	9/27/2021 2:28 PM
2	I like the concept whether it be 1A or 2A to have temporary barriers placed in the street, certain time of the year, to allow for the eating establishments to have outdoor eating/drinking	9/27/2021 1:00 PM
3	I like the configuration as it currently exists, but would be open to any change that the city professionals feel would improve the flow of traffic. I trust that they know what the best option will be. However, I love the idea of the parklets and would like to see that option brought to fruition.	9/27/2021 10:16 AM
4	Downtown traffic flow is the least of my worries. As someone who lives on pine street I am constantly paranoid of people hiding behind cars and in dimly lit areas waiting to attack someone walking by. I have never had issues finding parking and adding parking to the W side of pine street will do much more harm then good. It would make it harder to cross the road and easier to lurk on the street outside houses.	9/21/2021 2:28 PM
5	For both Theta Xi and the Chi Omega, it would be very beneficial to not have two way parking	9/21/2021 2:24 PM

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on Pine St. Two way parking makes it very dangerous for crossing the street to make it to our houses and for possible people to hide between cars and potentially attack people walking past. We highly recommend against doing this for our safety.

6	For years, all you hear from downtown is WE NEED MORE CARS, MORE PARKING! CRAM AS MANY CARS AS YOU CAN INTO THE SMALLEST POSSIBLE AREA. How well has that worked out? Nothing is improving with that mindset. Time to go another direction. Go for walkable livable space. Make the traffic as slow and quiet as possible.	9/21/2021 11:20 AM
7	Hello, I have concerns surrounding the safety of pedestrians crossing Pine Street if there were parking on the West side. The cars would make it more dangerous to cross the street (hindering visibility of pedestrians to on-coming traffic) and provide more shelter for potential attackers as there are many young students who live in this area.	9/21/2021 9:29 AM
8	While the alternatives to the existing plan are creative, the present plan works and is no need of alteration. Consider spending the money (if you must spend) on purchasing downtown property for more parking. I don't see that option here. Why not?	9/17/2021 2:06 PM
9	The current street configuration works just fine. No reason to change it. Switching to two-direction traffic would probably cause congestion and accidents.	9/17/2021 11:35 AM
10	This will greatly improve traffic flow and eliminate those very confused folks who visit our downtown from other parts of the country trying to figure out the one way streets.	9/17/2021 11:01 AM
11	Add "tourist" signage, especially "You are HERE" maps, illustrating that the two roads form a "loop" around Downtown, also indicating municipal parking and other facilities.	9/16/2021 3:39 PM
12	The visibility from the side streets is too poor to turn onto Pine Street, if it is two way, unless there is a stop light at every side street (which there may be, I don't remember). Two lanes, going in the same direction seems to move the traffic faster and more predictably, and therefore, more safely. People crossing the street only have to look in one direction before crossing; whereas, if there is traffic going in two directions a pedestrian has to be looking both ways, and probably has a shorter window of time in which to cross, as he/she must consider oncoming traffic from two directions. Eliminating a lane will only contribute to slower moving traffic down Pine Street. Also, please consider truck deliveries, if you want to be considerate of drivers and shop owners who depend upon those deliveries. There are no alleys, so trucks must stop on Pine street. It will be dangerous trying to pass them, when parked, if a person has to pass into oncoming traffic. Also dangerous, as someone could pull out from a side street, as someone is passing the truck. Visibility is not good enough to have cars going in multiple directions.	9/16/2021 2:59 PM
13	Myself and all my staff all really like the concept with angled parking on one side. Most drivers hate to parallel park and they drive around the block multiple times trying to find somewhere this is 2 parallel parking spots that they can drive into. Some tell me they choose to just not stop and come back a different day because of parking With angled parking, it is so much easier to park and it gives us a few more spaces in each block. I think all the businesses would benefit if parking was easier. I know there are concerns about backing out into traffic, but downtown Branson has angled parking that you back out into the traffic. That is a very busy downtown and the drivers just pause and let the car back out. Deliveries could be made on the side streets (many already are) or UPS/Fed Ex could pull into a parking spot (thats often what they already do) Many restaurants get their deliveries in the alley behind. I do not like the idea of two way on pine with parallel parking- I think everyone having to try to parallel park while are cars waiting behind them will be a nightmare. (it takes most drivers a few tries to parallel park) If one way with angled parking isn't an option, I am in favor of just leaving it just the way it is- one way, 2 lane, going northbound. I am not in favor of making the sidewalks wider. I have never had anyone complain that the sidewalks aren't wide enough. I love the idea of using a parallel parking spot for outdoor dine or whatever a business wants to do seasonally. Very fun idea! You have talked about getting rid of stop lights- I just want to make sure they are replaced with stop signs? For parking, there has to be a pause in traffic to give people a chance to park. And after school lets out each day, pine street is filled with young drivers "racing". Stop signs would make them have to stop.	9/16/2021 12:04 PM
14	My only concern is that this would leave Pine street as one of the only 1 way routes in the area. It seems that people function better when its all or nothing. That being said, I don't see any reason Rolla St. can't function as a two lane route.	9/16/2021 11:37 AM
15	Remaining stoplights in Pine Street should be synced below the speed limit so motorists are	9/15/2021 7:55 PM

MoveRolla TDD - Downtown Improvements (Rolla & Pine Streets)

incentivized to drive safely. Current synchronization incentivizes speeding to get through all the lights.

Q5 Are there other considerations the team should potentially incorporate into the Alternatives? (examples include designated bike lanes, wider sidewalks, parklets, etc.)

Answered: 32 Skipped: 15

#	RESPONSES	DATE
1	I like the idea of parklets. This may only be possible with one-way traffic.	9/29/2021 8:55 AM
2	Provide bike racks along the way.- in front of businesses so people feel comfortable leaving bikes (when locked or unlocked if people do that these days) outside businesses while shopping, dining, attending events. Many students ride bikes, as do may if the rest of us. These should be trendy, artsy looking. Not conventional bike racks, if at all possible. I'm not crazy about the bump outs. Although I understand there are statistics that say pedestrians feel safer using them. They're dangerous to vehicles and have a way of making the roadway smaller/narrower. Install a couple of free-use cellphone charging stations along Pine Street. There are some that look like trees and they are encircled by benches people can sit on and visit with others as they wait. Be sure to get the kind that have built-in cables or those that make it so people do not have to bring their own charging cable. Place more benches along the sidewalks to encourage people to spend time outside on Pine Street. Also, consider one in the festival area, near the train, etc. Build a really cool rock couch. Considering the university has a rich mining education history, this would be very fitting. It is possible a student group could build it and a benefactor with the University or a Missouri quarry company would foot the bill. Their business name could be carved in the stone as having donated the stone or a plate placed on the couch. Add a stone table and footstool and everyone is extra-happy. :-) After all, Rolla rocks! Ohh. That's off the top of my head. - a decent slogan that could be used, at least at the couch. :-) I can provide examples of the couch and tree chargers, if you're interested. Thank you for the opportunity to comment. I already made a couple of these suggestions when I attended the last community meeting. Thanks again ,Hylan Hylan Beydler, Rolla hylan007@gmail.com	9/28/2021 10:39 PM
3	Additional parking	9/27/2021 5:00 PM
4	Bump out for seasonal dining. Hanging baskets on lamp posts with water lines run to flowers(if sidewalks are torn up for ADA. Also electric outlets run to lamps for Xmas decorations) Pedestrian crosswalk with flashing lights if stop lights are removed.	9/27/2021 4:00 PM
5	Designated bike lanes, wider sidewalks, use Strong Towns approach	9/27/2021 2:28 PM
6	I am not at all in favor of angled parking on Pine or Rolla streets. It think it is dangerous and not needed	9/27/2021 1:00 PM
7	Please do not add on-street parking on the west side of Pine Street between 16th and 18th. This is where girls from Chi Omega cross the street and we feel that having parked cars there will decrease the ability of the girls to cross safely. In addition, any efforts to provide increased lighting in this area would be appreciated. Thank you.	9/27/2021 11:58 AM
8	Parklets	9/27/2021 10:16 AM
9	No parking allowed in front of chi omega due to safety concerns	9/21/2021 7:23 PM
10	Please do not add parking on both sides of pine street.	9/21/2021 4:09 PM
11	Please do not add parking in front of the Chi Omega house because it makes it less safe for girls to check for potential weirdos trying to take them. Please add extra lighting in this area.	9/21/2021 2:29 PM
12	Downtown does not need more street parking. There is only a lack of parking because the university lacks it. Not because downtown is popular. Larger sidewalks may be more beneficial but I know I do not go downtown because of poor lighting and safety issues.	9/21/2021 2:28 PM
13	More lights on pine st. Would increase the safety for people walking on the streets such as students	9/21/2021 2:24 PM

MoveRolla TDD - Downtown Improvements (Rolla & Pine Streets)

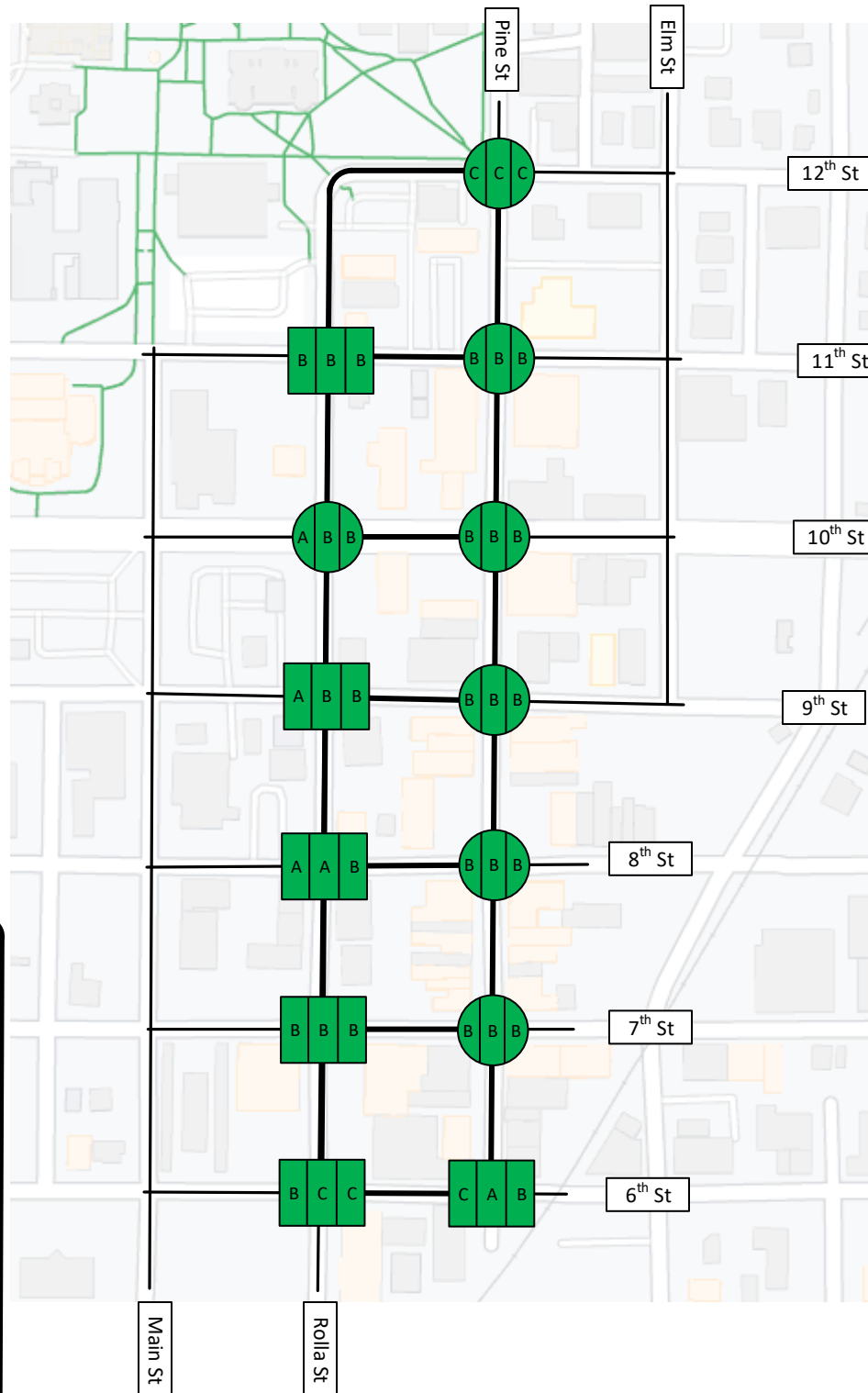
14	I live in the Chi Omega house at 16th and Pine and we are concerned about lighting and safety. We fear allowing parking on both sides of the road would make crossing pine street more dangerous. We don't have very much parking so almost all of our girls have to cross pine to get to their cars. We also worry that allowing parking on the west side (in front of our house) could create more places for attackers to hide and more blind spots for cars driving. Many girls are very frightened about this area already due to the apartments nearby (behind our house) that cause us continual problems for us and house many drug addicts.	9/21/2021 1:46 PM
15	No parking should be added to the west side of Pine street (in front of the Chi Omega sorority house). Additional parking here would reduce visibility for pedestrians crossing the street and would increase the possibility for pedestrians to be struck by cars.	9/21/2021 12:56 PM
16	It is important to include parking options on Pine Street as multiple sororities and fraternities are located in that area and do not have enough parking for their members to fit into. This means that a majority of people parking on Pine Street also live on Pine Street. If you take away parking, you're making it more difficult for those that live there to find a place to park that is close to their homes, hopefully in a safe location as well.	9/21/2021 12:46 PM
17	I am not in favor of parking on both sides of Pine Street north of the University. As a Alumnae member of Chi Omega Sorority located on the west side of N. Pine Street, I am opposed to any parking on the west side of the street directly in front of the Chapter house. This would be a true safety hazard for our members in two ways. Many of our members who own cars must cross Pine Street to find parking. Having cars parked directly in front of the house and poor street lighting could provide a hiding place for someone who would want to assault one of our members or anyone else walking by. Having cars parked directly in front of the house would create a situation of poor visibility of pedestrians trying to cross Pine Street. We have distracted drivers and pedestrians already. With the west side of the street open, both drivers and pedestrians are able to see each other clearly...at least during the daytime. Another issue which needs to be addressed is street lighting. With the University scheduling more night classes, students are driving, parking and/or walking more than ever after dark. There really is a need for lighting improvements all along Pine Street and around the apartment complex drive next to Chi Omega Sorority located at 1607 N. Pine Street, as well as all the neighborhoods surrounding the MS&T campus. Rolla is a wonderful community! Let's keep it safe for anyone who wants to live or visit here!	9/21/2021 12:05 PM
18	Love more bike infrastructure and parklets. It's progressive forward thinking. Things can't be the same forever. It's not working. Most of those downtown buildings are about two cars wide. So they all get enough parking for two cars worth of customers. So the on street parking is essentially worthless to any business there. It's not needed. No one will miss it.	9/21/2021 11:20 AM
19	Additionally, increased lighting is needed to provide better visibility and improved safety to the area as well. Thank you.	9/21/2021 9:29 AM
20	Do NOT put street parking in front of the Chi Omega house. The women of Missouri S&T feel unsafe every day due to the demographics of campus and such. Allowing any cars to sit in front of our home would make vulnerable women feel very unsafe. The city putting public parking on the street in front of our home would further reiterate that the campus and city don't value women. Please take this seriously.	9/21/2021 9:08 AM
21	Sidewalks are wide enough but definitely need replaced. Don't agree that they need to be wider as that would get into the street area	9/19/2021 6:18 AM
22	As I said, the present plan works; add parking off Pine if you can/must, but leave the existing plan in place.	9/17/2021 2:06 PM
23	I love the idea of parklets.	9/17/2021 11:39 AM
24	If you want to get more people into downtown, you should create more NEARBY parking and NEARBY places for people to hang out and enjoy themselves to generate synergy. Suggestion: Persuade Hermann Lumber to move, tear down all those buildings and warehouses, and install parking lots and nice outdoor parks in those locations adjacent to Pine/Rolla streets.	9/17/2021 11:35 AM
25	Wider & shared sidewalks would allow for walking and cycling. The wider sidewalks would also allow for our restaurants to be able to offer outside dining options.	9/17/2021 11:01 AM
26	NO bike lanes; no need given width and speed of traffic lanes. Consider building awnings along buildings as rain shelters. Parklets are problematic. Makes sense in front of restaurants as an	9/16/2021 3:39 PM

MoveRolla TDD - Downtown Improvements (Rolla & Pine Streets)

extension of dining areas but otherwise could become areas for loitering and vagrants. Will the parklets be leased to the using restaurants by the city, or will they be "City Park property"? Who will be responsible for maintenance and upkeep in addition to daily cleaning? Probably not a good idea.

27	Downtown needs more character and more outdoor seating restaurants. Both of these things are what makes people want to come to the downtown area.....then, they see shops they decide to go into. Areas in the city which draw people to them in great numbers are those with outdoor seating restaurants. Also, spend some of the money on helping owners replace store facades. Currently, it is just a mishmash of styles, detracting from the historical ones which have been restored. There needs to be some conformity, which has a historic feel to it. The library and some of the buildings are a good start, but you need to help those who want to make improvements in the character of their buildings. Did I say outdoor seating restaurants???? Let me say it again. There are few of these in Rolla, but they are even more popular since covid. Do something to attract service businesses as well as retail. People might come to the bank, such as I do, then decide to run into The Red Door, while they are already parked. People have to come to businesses, and that gets them in the vicinity of the retail shops. They will go in and buy something they didn't even know they needed. Oh and did I say the downtown area needs character?? Yes, it needs it. Cool, old buildings have been torn down (the movie theater, old hotel, train station, etc.). So you need to create some. The road has little to do with it, as long as people can drive down the street and find a parking place. If you want to improve some roads, do so in the area of 63, from university drive to 44. It needs to be a consistent 4 lanes there.	9/16/2021 2:59 PM
28	I would like water lines added in while everything is ripped up for big hanging flower baskets, big planters, if trees get planted they need water lines.	9/16/2021 12:04 PM
29	I like the parklet idea. Those are popular in other cities I've visited. I think it also allows businesses to add seating and exposure to the public. I know that it takes parking, but I've honestly never had an issue finding a spot to park. I most often park on a side street, but I have a 3/4 ton truck and parking can be difficult in any location. Again, never had an issue that forced me to walk more than a block which seems very reasonable to me.	9/16/2021 11:37 AM
30	Nothing	9/16/2021 11:31 AM
31	Designated bike lanes are counterproductive in Rolla. Motorists give cyclists the most room anywhere in Rolla on Bridge School Road, a 30 foot wide road with no stripes. Rolla motorists prefer to pass cyclists six or more feet away when not constrained by stripes. Many roads were safe then motorists began passing inches away when bike lanes were added.	9/15/2021 7:55 PM
32	No designated bike lanes, side walks are fine as they are. More parking	9/15/2021 6:56 PM

Appendix D – LOS Results



LEGEND

-  = Signalized Intersection LOS
-  = Unsignalized Intersection LOS
-  = LOS A - C
-  = LOS D
-  = LOS E
-  = LOS F
-  = Study Area
-  = Surrounding Area
-  = Pedestrian Pathways

Notes:

Signalized Intersection
LOS reported by overall
intersection delay.

Unsignalized
intersection LOS
reported by worst
movement delay.

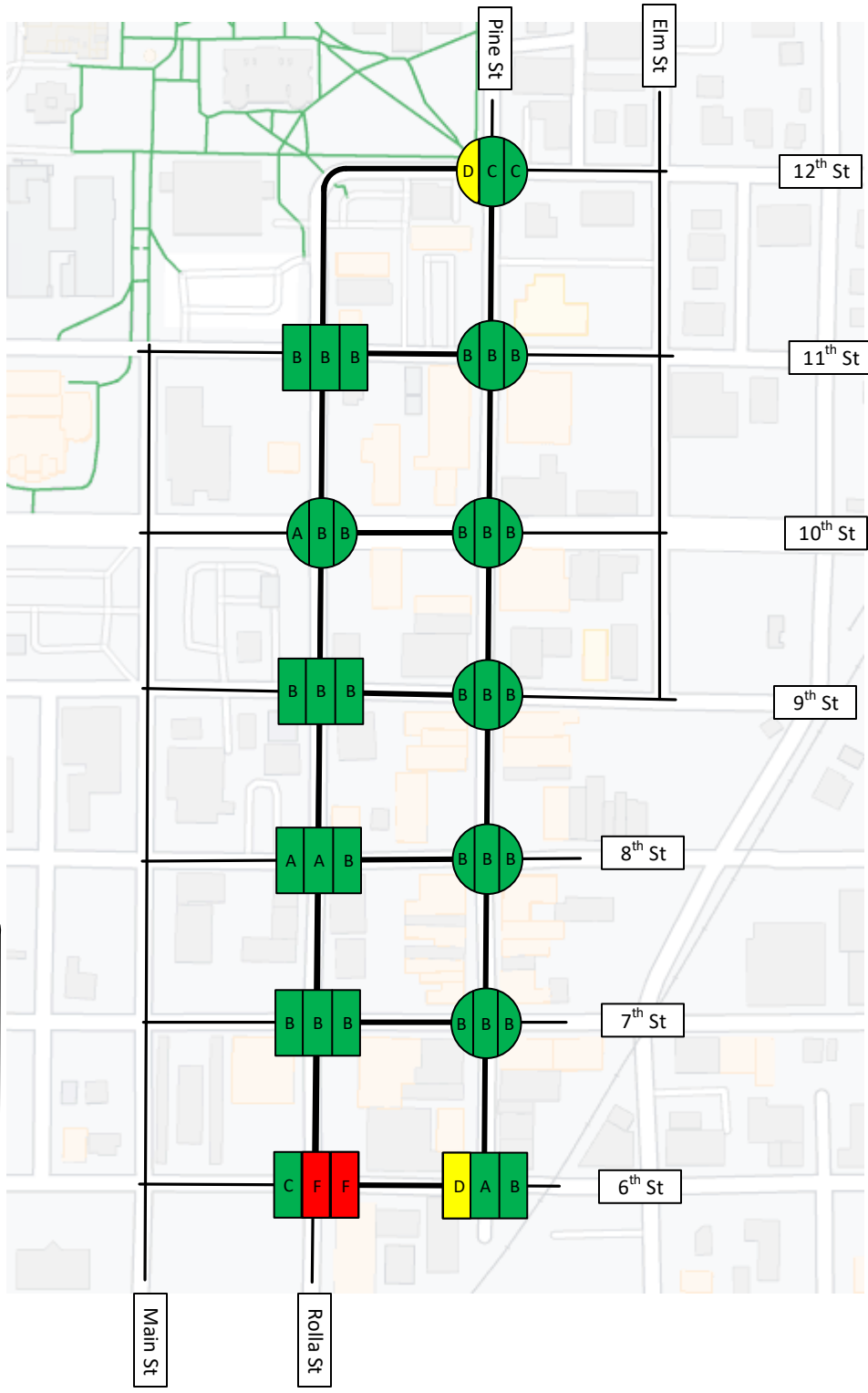
Pine Street / Downtown Circulation Study

Existing Alt 1A Intersection Level of
Service

Rolla, Missouri

Prepared By: **HNTB**

DATE: July 2021



LEGEND

- = Signalized Intersection LOS
- = Unsignalized Intersection LOS
- = LOS A - C
- = LOS D
- = LOS E
- = LOS F
- = Study Area
- = Surrounding Area
- = Pedestrian Pathways

Notes:

Signalized Intersection LOS reported by overall intersection delay.

Unsignalized intersection LOS reported by worst movement delay.

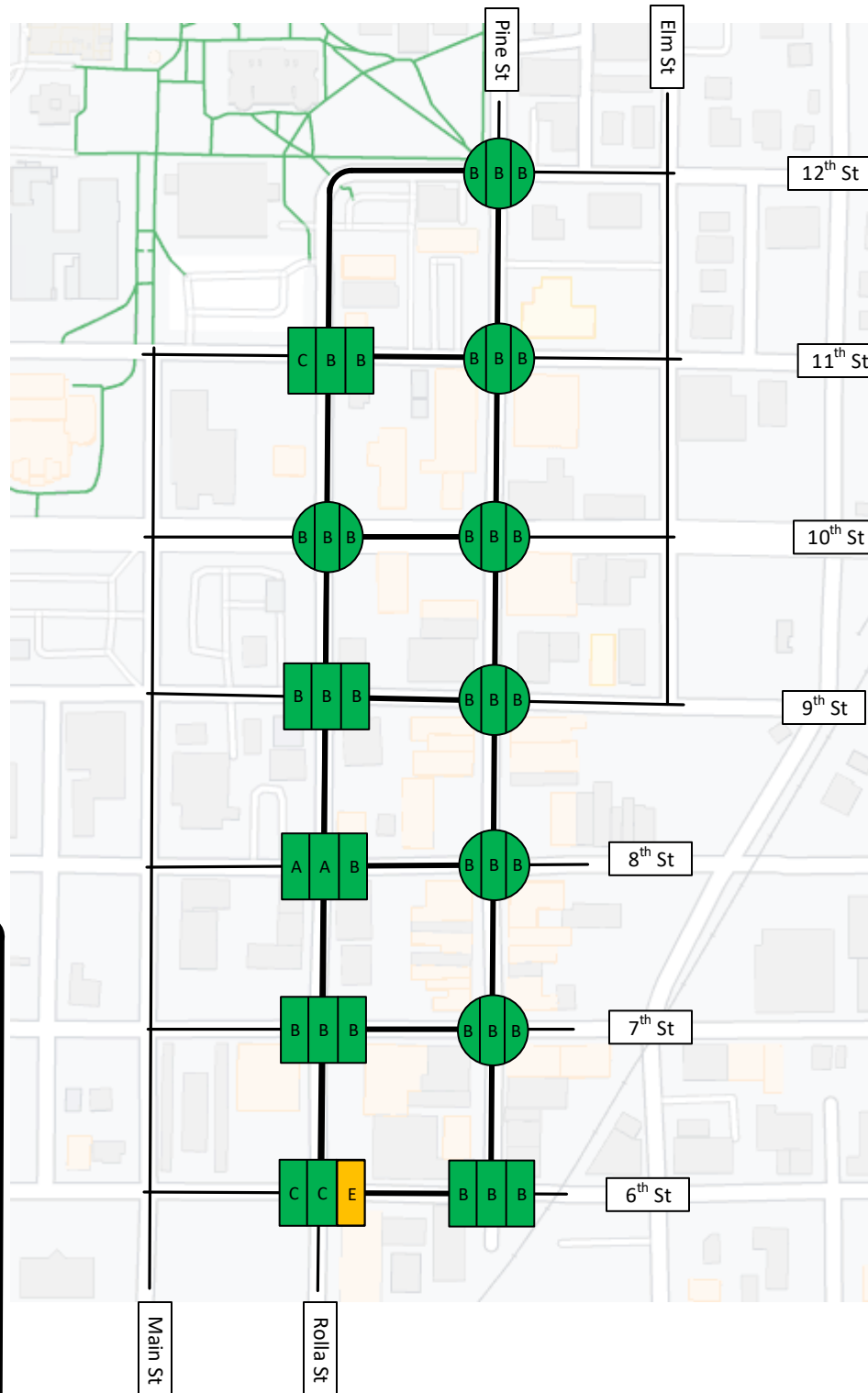
Pine Street / Downtown Circulation Study

Future Alt 1A Intersection Level of Service

Rolla, Missouri

Prepared By: **HNTB**

DATE: July 2021



Notes:

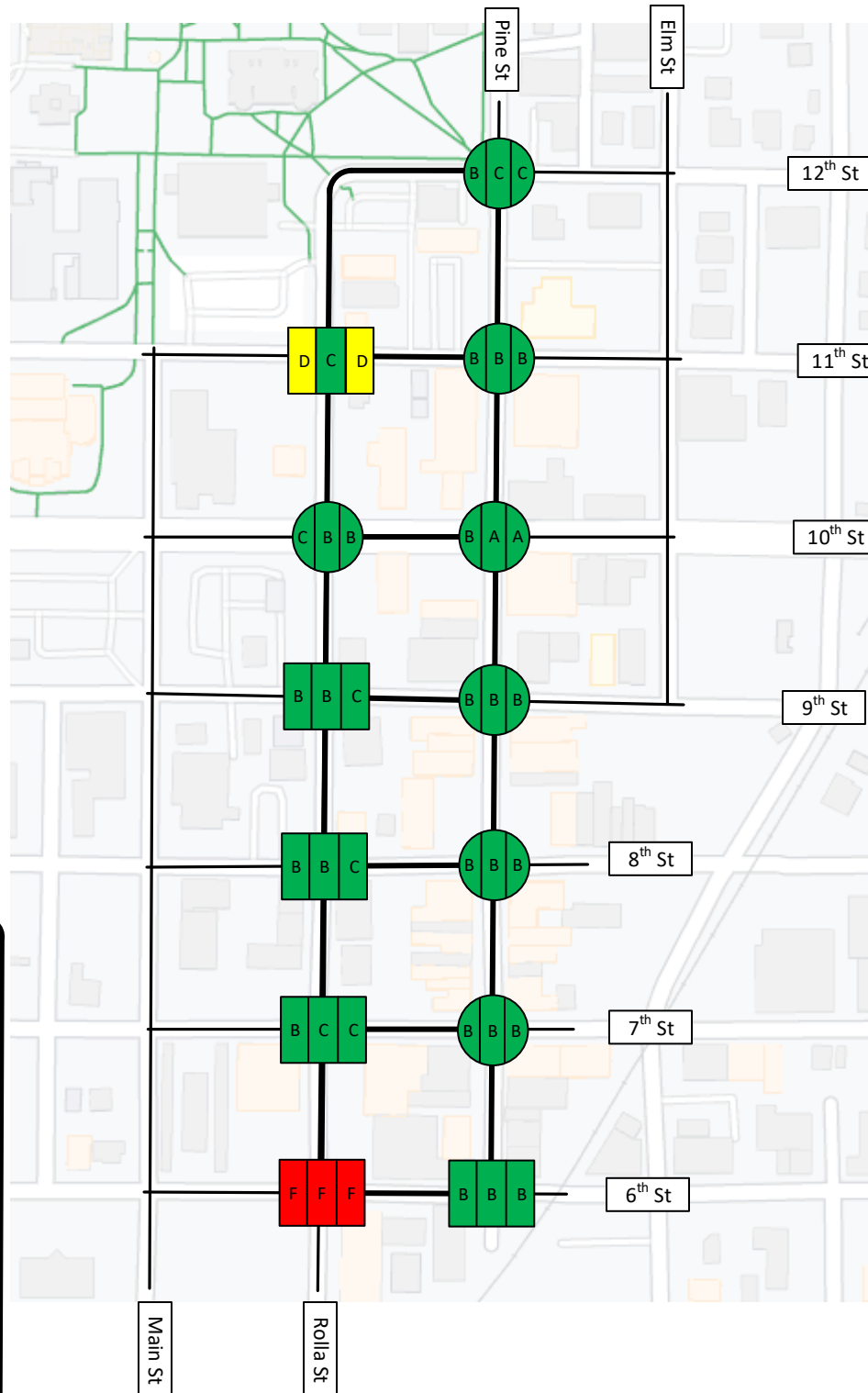
Signalized Intersection LOS reported by overall intersection delay.

Unsignalized intersection LOS reported by worst movement delay.

Pine Street / Downtown Circulation Study

Existing Alt 1B Intersection Level of Service

Rolla, Missouri	Prepared By: HNTB
DATE: July 2021	



Notes:

Signalized Intersection
LOS reported by overall
intersection delay.

Unsignalized
intersection LOS
reported by worst
movement delay.

LEGEND

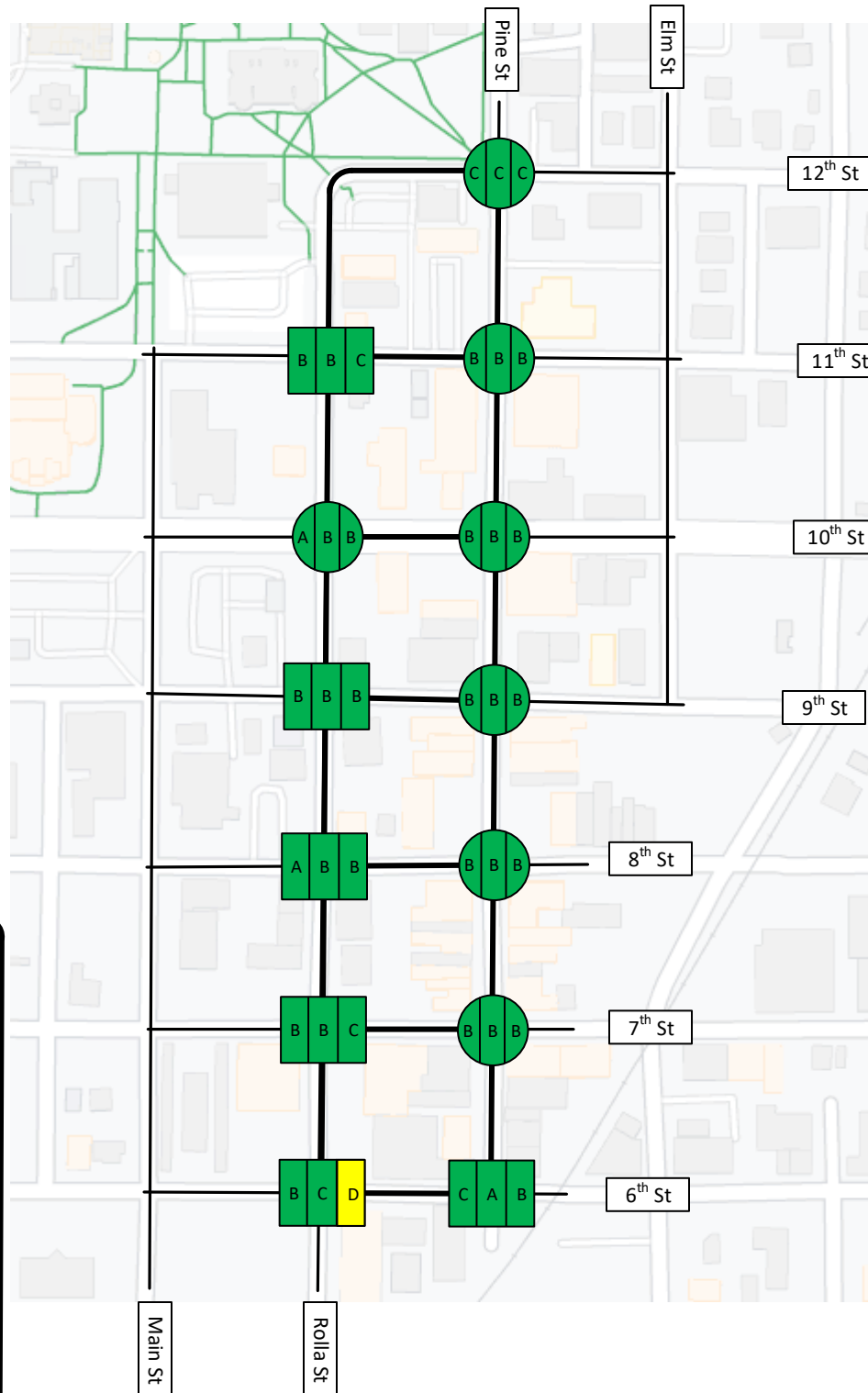
- = Signalized Intersection LOS
- = Unsignalized Intersection LOS
- = LOS A - C
- = LOS D
- = LOS E
- = LOS F
- = Study Area
- = Surrounding Area
- = Pedestrian Pathways

**Pine Street / Downtown
Circulation Study**
Future Alt 1B Intersection Level of
Service

Rolla, Missouri

Prepared By: **HNTB**

DATE: July 2021



LEGEND

-  = Signalized Intersection LOS
-  = Unsignalized Intersection LOS
-  = LOS A - C
-  = LOS D
-  = LOS E
-  = LOS F
-  = Study Area
-  = Surrounding Area
-  = Pedestrian Pathways

Notes:

Signalized Intersection
LOS reported by overall
intersection delay.

Unsignalized
intersection LOS
reported by worst
movement delay.

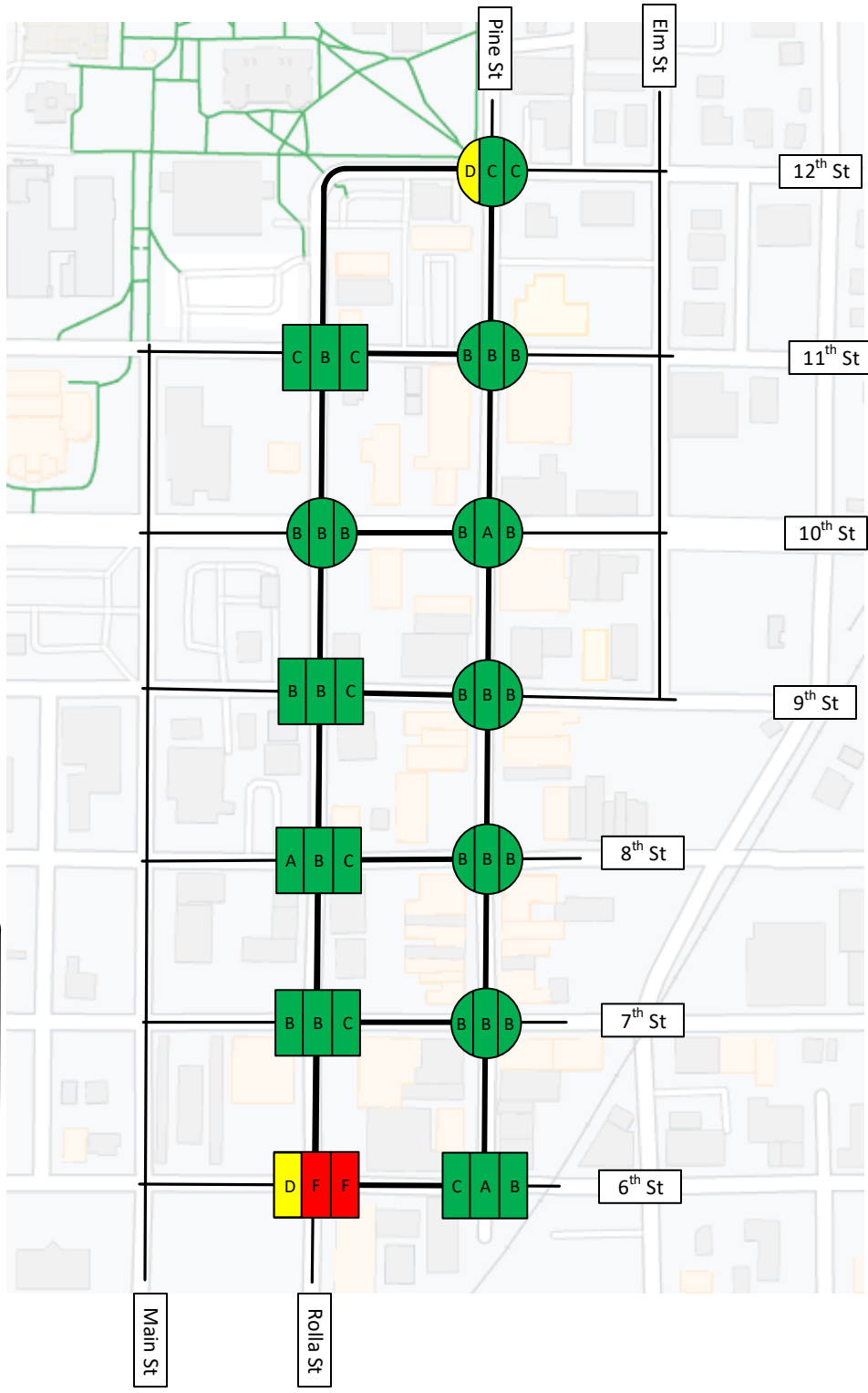
Pine Street / Downtown Circulation Study

Existing Alt 2A Intersection Level of
Service

Rolla, Missouri

Prepared By: **HNTB**

DATE: July 2021



Notes:

Signalized Intersection
LOS reported by overall
intersection delay.

Unsignalized
intersection LOS
reported by worst
movement delay.

LEGEND

= Signalized Intersection LOS

= Unsignalized Intersection LOS

= LOS A - C

= LOS D

= LOS E

= LOS F

= Study Area

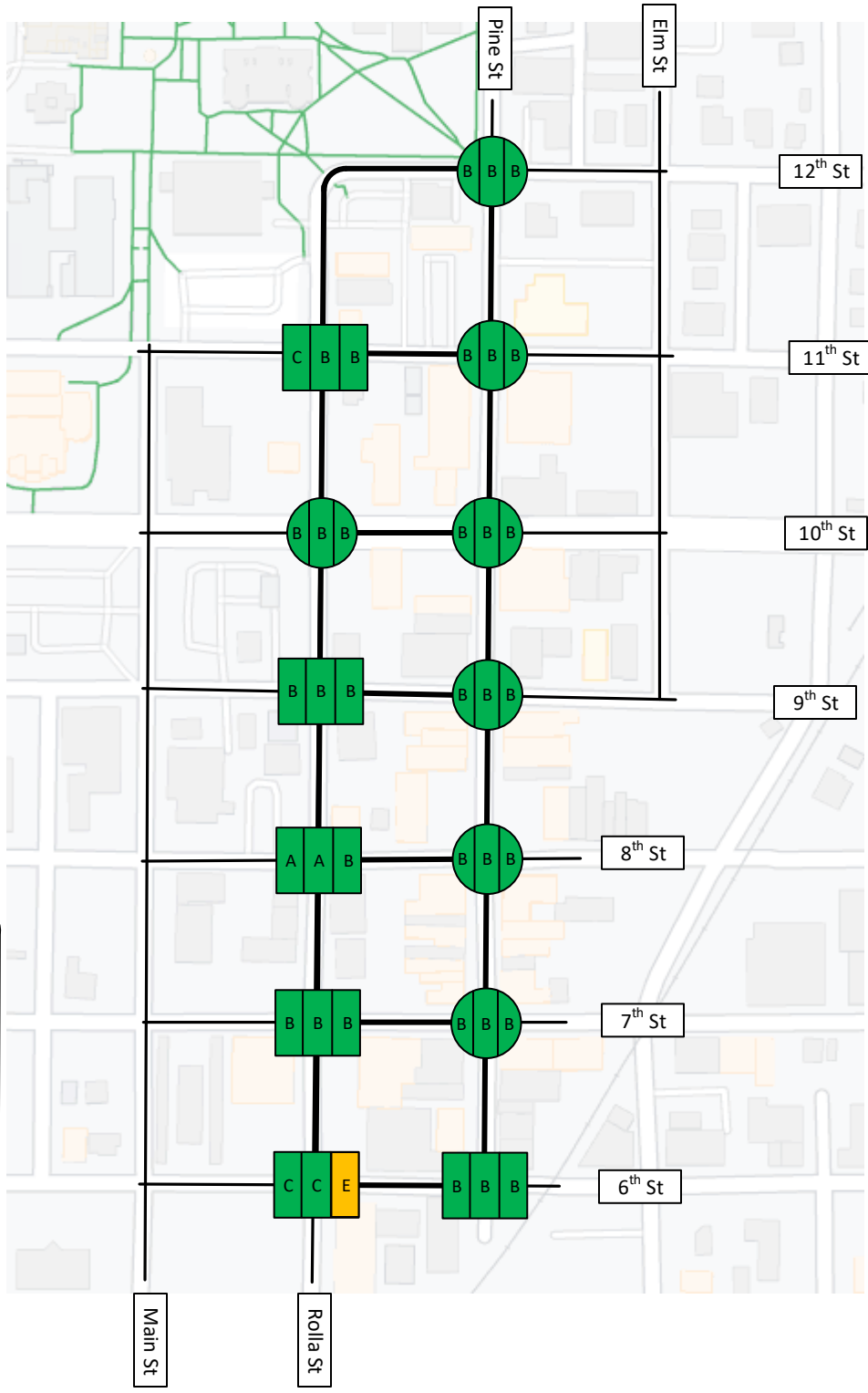
= Surrounding Area

= Pedestrian Pathways

Pine Street / Downtown Circulation Study

Future Alt 2A Intersection Level of
Service

Rolla, Missouri	Prepared By: HNTB
DATE: July 2021	



LEGEND

-  = Signalized Intersection LOS
-  = Unsignalized Intersection LOS
-  = LOS A - C
-  = LOS D
-  = LOS E
-  = LOS F
-  = Study Area
-  = Surrounding Area
-  = Pedestrian Pathways

Notes:

Signalized Intersection
LOS reported by overall
intersection delay.

Unsignalized
intersection LOS
reported by worst
movement delay.

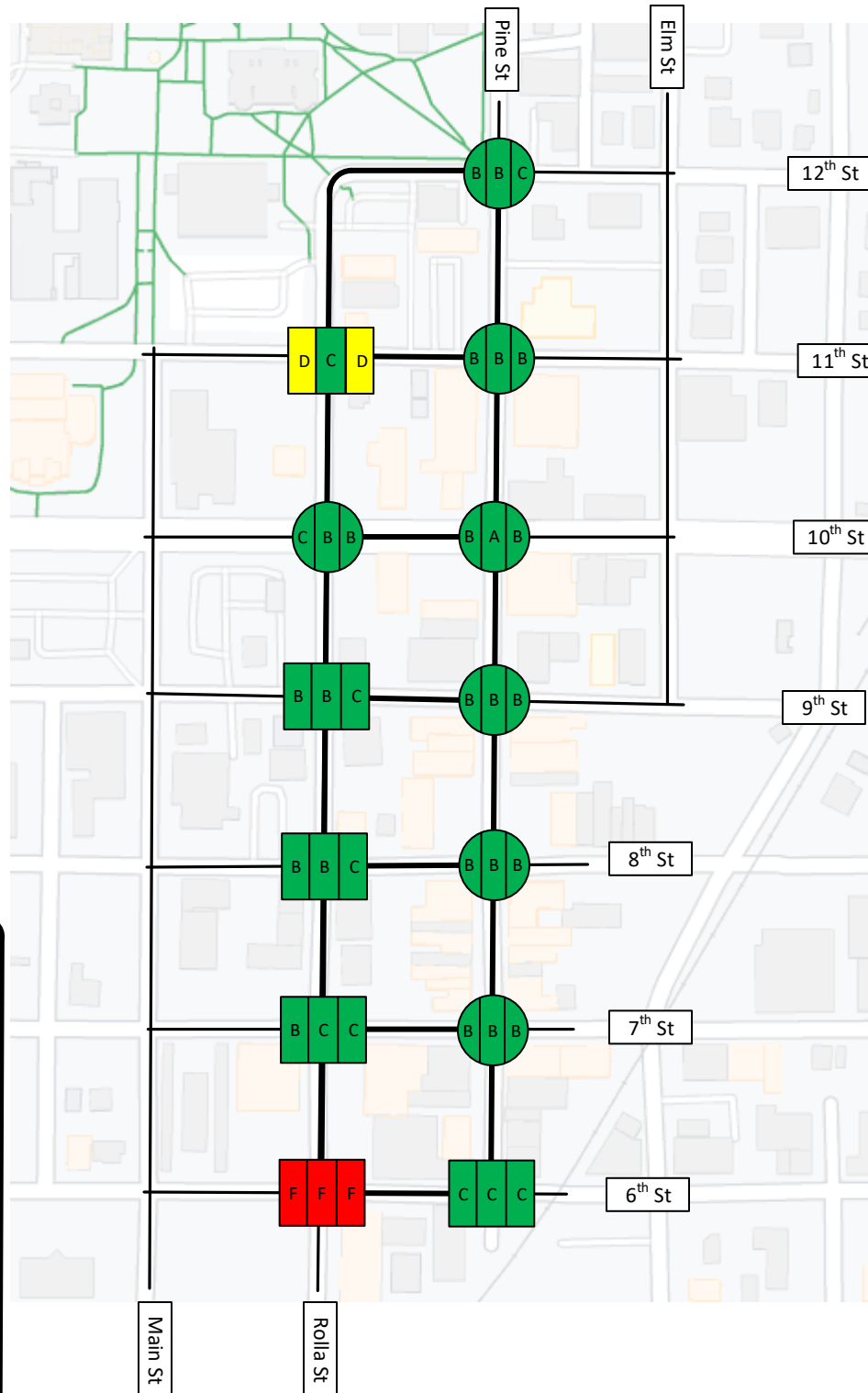
Pine Street / Downtown Circulation Study

Existing Alt 2B Intersection Level of
Service

Rolla, Missouri

Prepared By: **HNTB**

DATE: July 2021



Notes:

Signalized Intersection
LOS reported by overall
intersection delay.

Unsignalized
intersection LOS
reported by worst
movement delay.

LEGEND

- = Signalized Intersection LOS
- = Unsignalized Intersection LOS
- = LOS A - C
- = LOS D
- = LOS E
- = LOS F
- = Study Area
- = Surrounding Area
- = Pedestrian Pathways

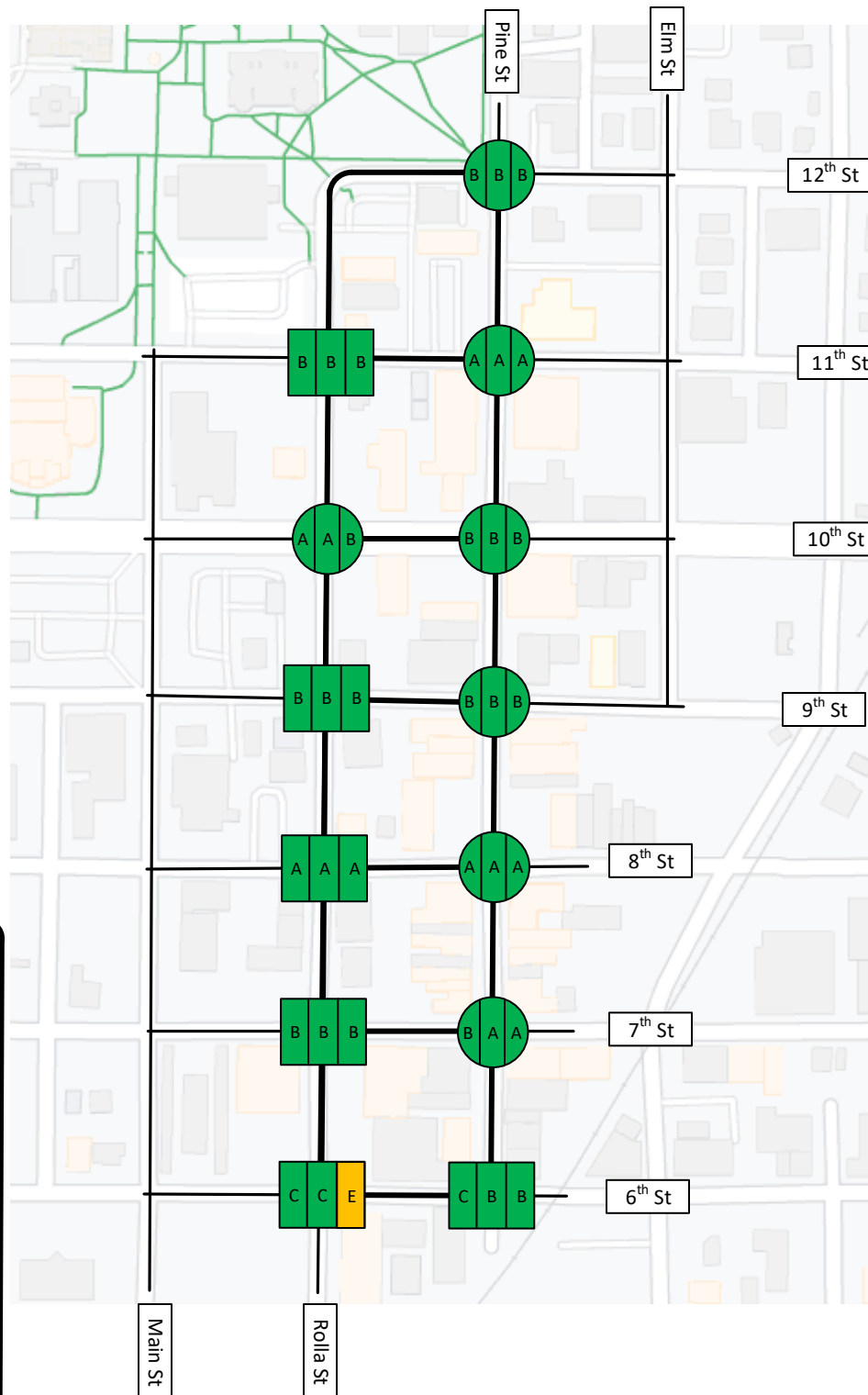
Pine Street / Downtown Circulation Study

Future Alt 2B Intersection Level of
Service

Rolla, Missouri

Prepared By: **HNTB**

DATE: July 2021



Notes:

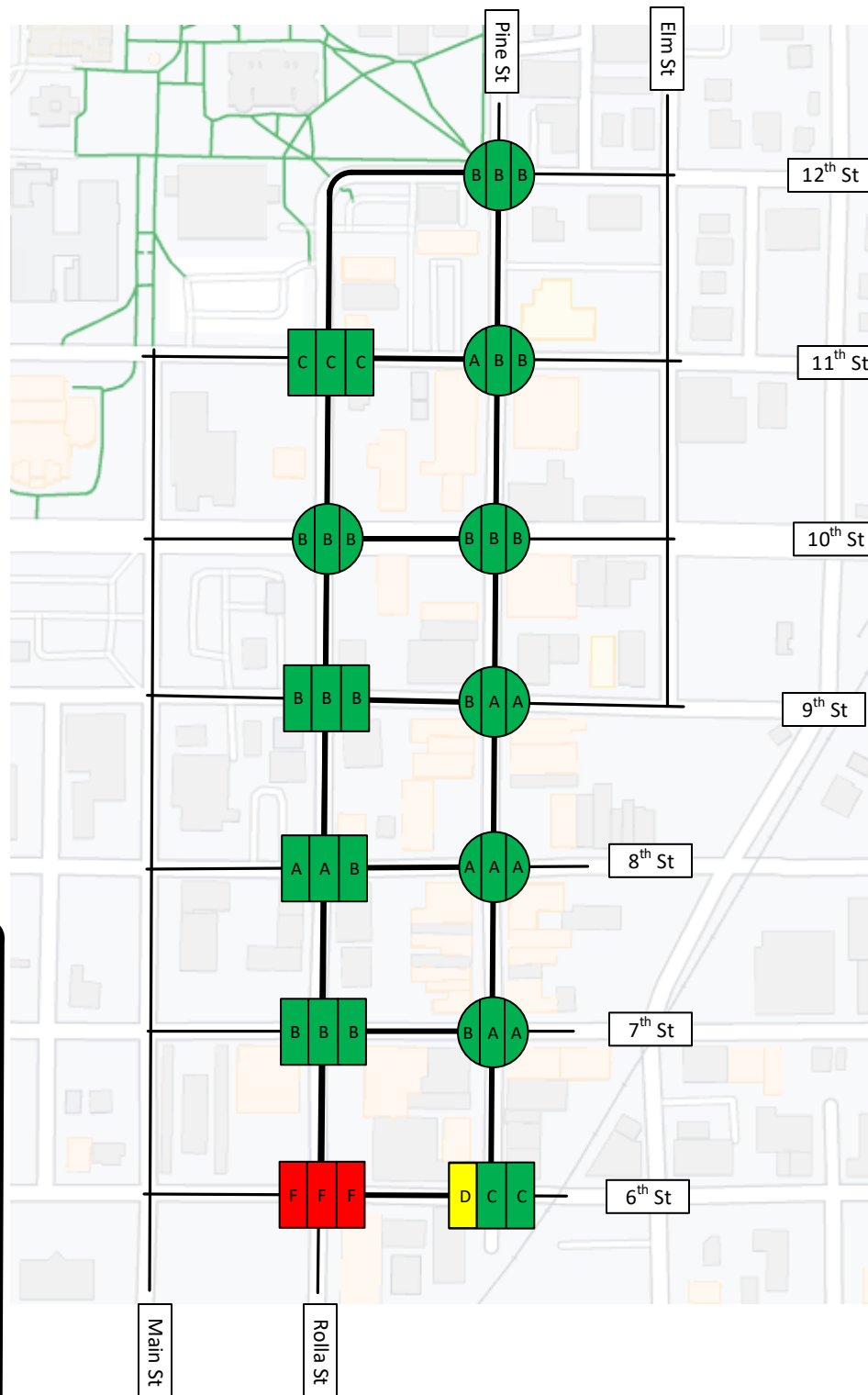
Signalized Intersection LOS reported by overall intersection delay.

Unsignalized intersection LOS reported by worst movement delay.

Pine Street / Downtown Circulation Study

Existing Alt 3 Intersection Level of Service

Rolla, Missouri	Prepared By: HNTB
DATE: July 2021	



Notes:

Signalized Intersection
LOS reported by overall
intersection delay.

Unsignalized
intersection LOS
reported by worst
movement delay.

Pine Street / Downtown Circulation Study

Future Alt 3 Intersection Level of
Service

Rolla, Missouri	Prepared By: HNTB
DATE: July 2021	

LEGEND

= Signalized Intersection LOS

= Unsignalized Intersection LOS

= LOS A - C

= LOS D

= LOS E

= LOS F

= Study Area

= Surrounding Area

= Pedestrian Pathways

Appendix E – Queue Results

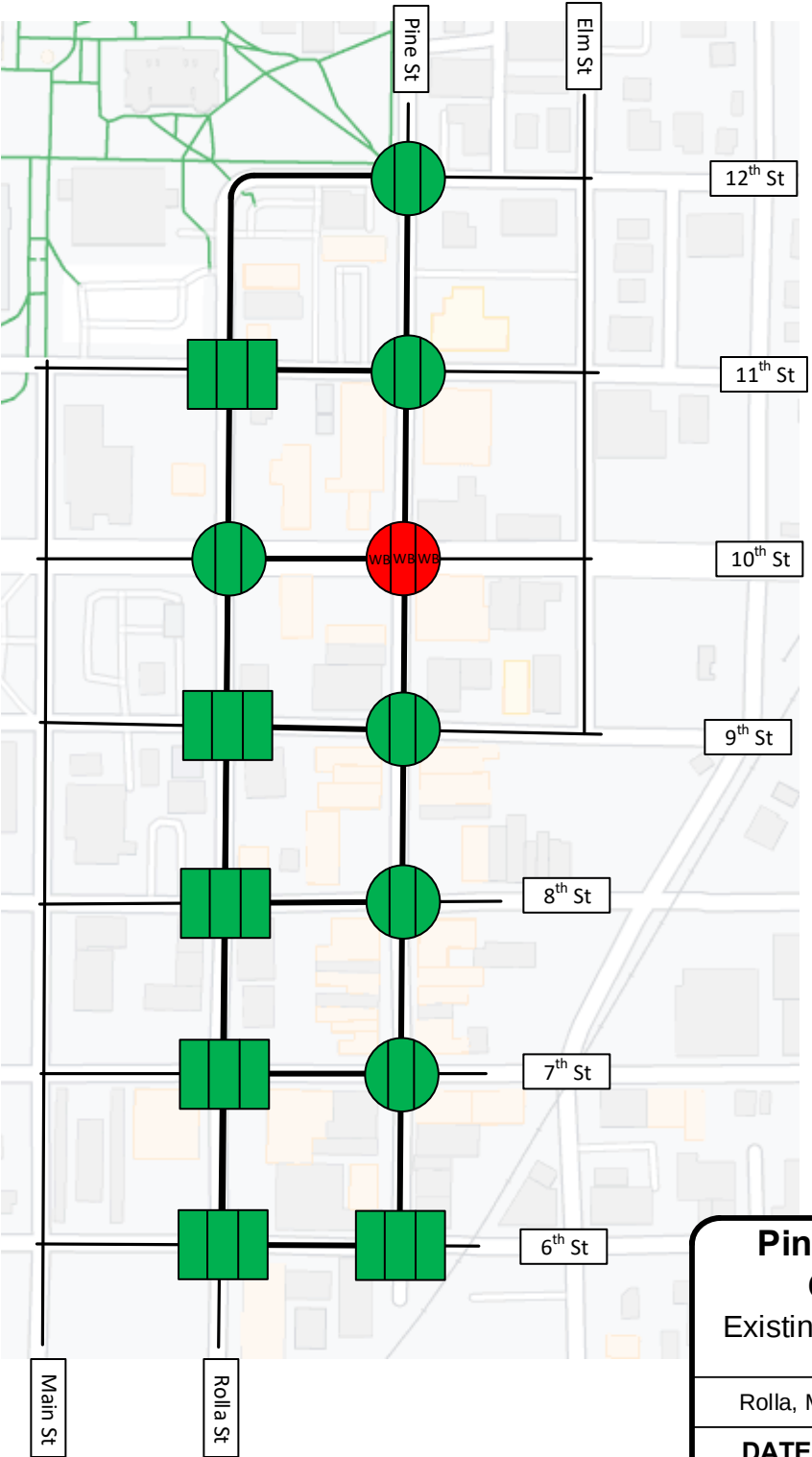


10th St & Pine Intersection:
Westbound Through Queue Length
Exceeds 95th Percentile Queue (ft)



LEGEND

-  = Signalized Intersection Queue
-  = Unsignalized Intersection Queue
-  = 95th % Queue Within Available Storage
-  = 95th % Queue Not Within Available Storage
-  = Study Area
-  = Surrounding Area
-  = Pedestrian Pathways



**Pine Street / Downtown
Circulation Study**
Existing Alt 1A Intersection Queue
Results

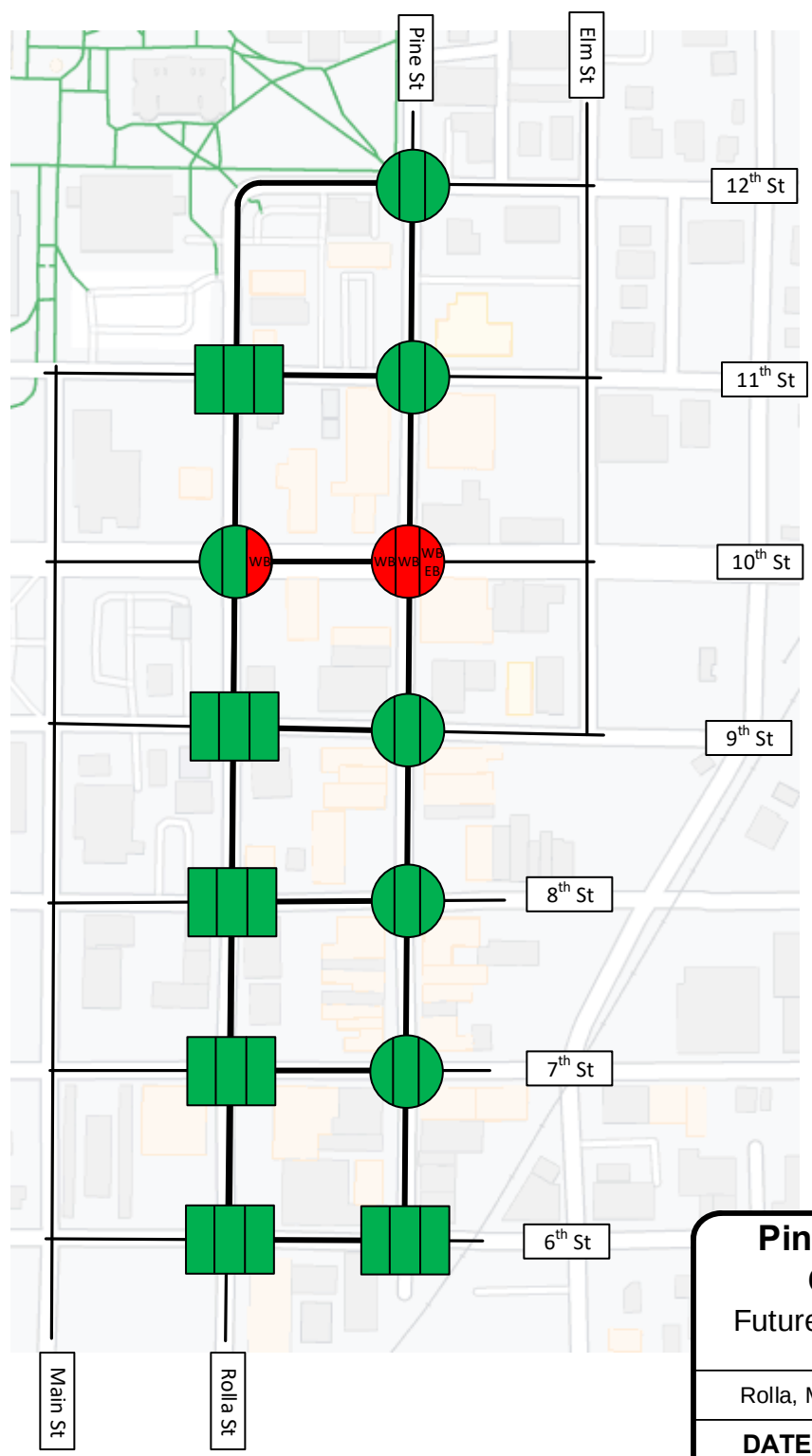
Rolla, Missouri Prepared By: **HNTB**

DATE: July 2021 Sheet 11



LEGEND

-  = Signalized Intersection Queue
-  = Unsignalized Intersection Queue
-  = 95th % Queue Within Available Storage
-  = 95th % Queue Not Within Available Storage
-  = Study Area
-  = Surrounding Area
-  = Pedestrian Pathways



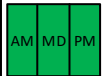
Pine Street / Downtown Circulation Study	
Future Alt 1A Intersection Queue Results	
Rolla, Missouri	Prepared By: HNTB
DATE: July 2021	Sheet 12



LEGEND



= Signalized Intersection Queue



= Unsignalized Intersection Queue



= 95th % Queue Within Available Storage

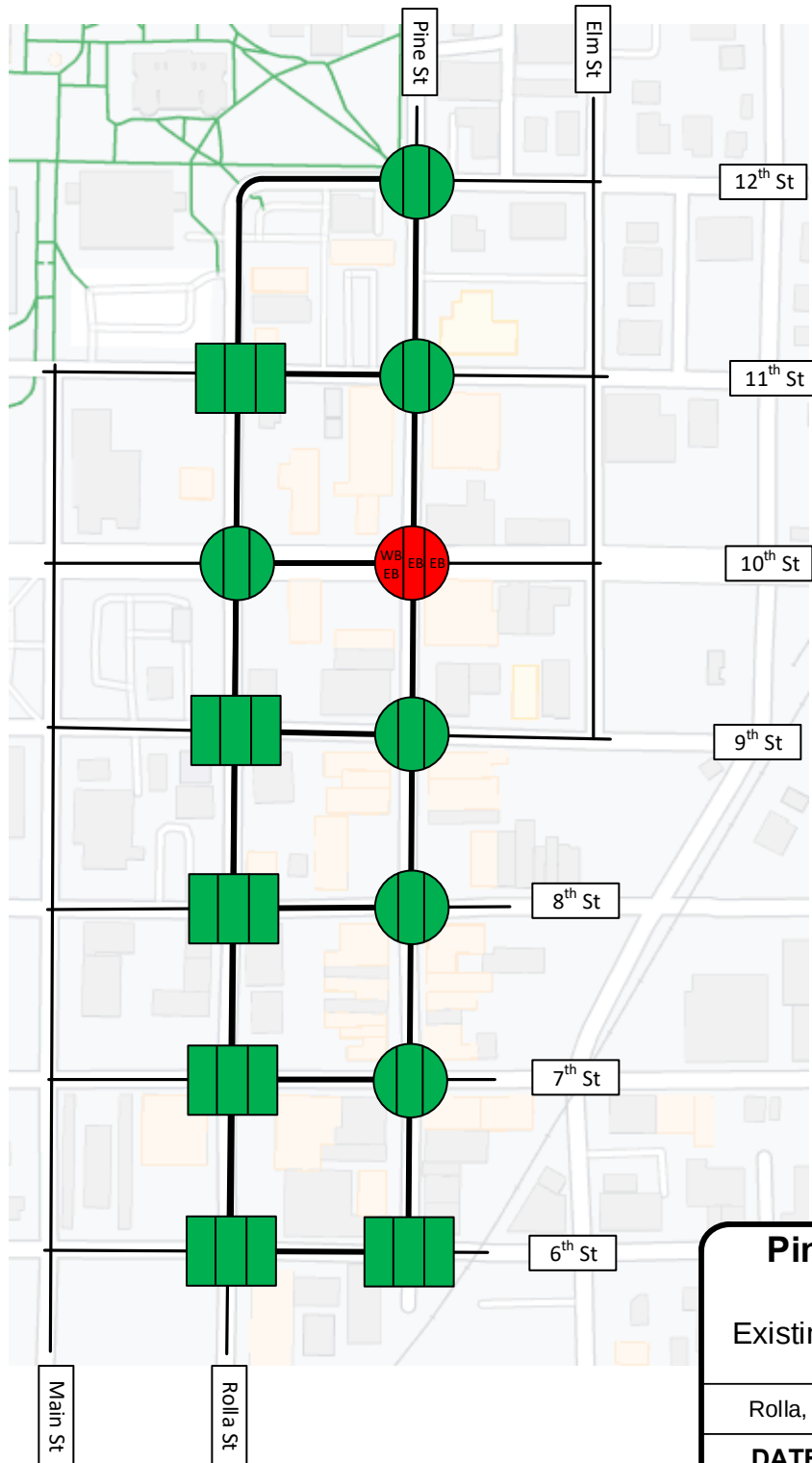


= 95th % Queue Not Within Available Storage

= Study Area

= Surrounding Area

= Pedestrian Pathways



**Pine Street / Downtown
Circulation Study**
Existing Alt 1B Intersection Queue
Results

Rolla, Missouri

Prepared By: **HNTB**

DATE: July 2021

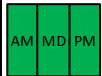
Sheet 13



LEGEND



= Signalized Intersection Queue



= Unsignalized Intersection Queue



= 95th % Queue Within Available Storage

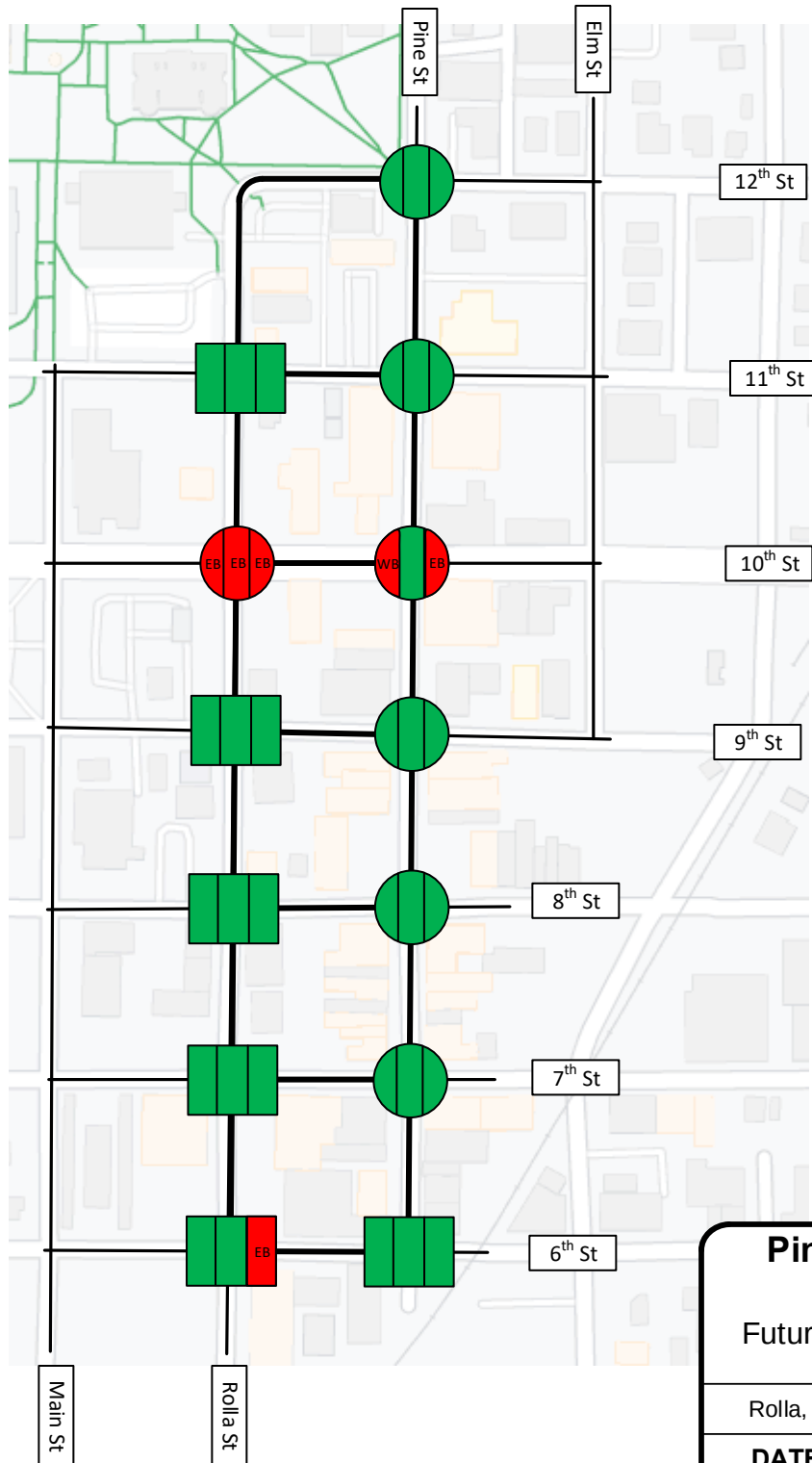


= 95th % Queue Not Within Available Storage

= Study Area

= Surrounding Area

= Pedestrian Pathways



Pine Street / Downtown Circulation Study

Future Alt 1B Intersection Queue
Results

Rolla, Missouri

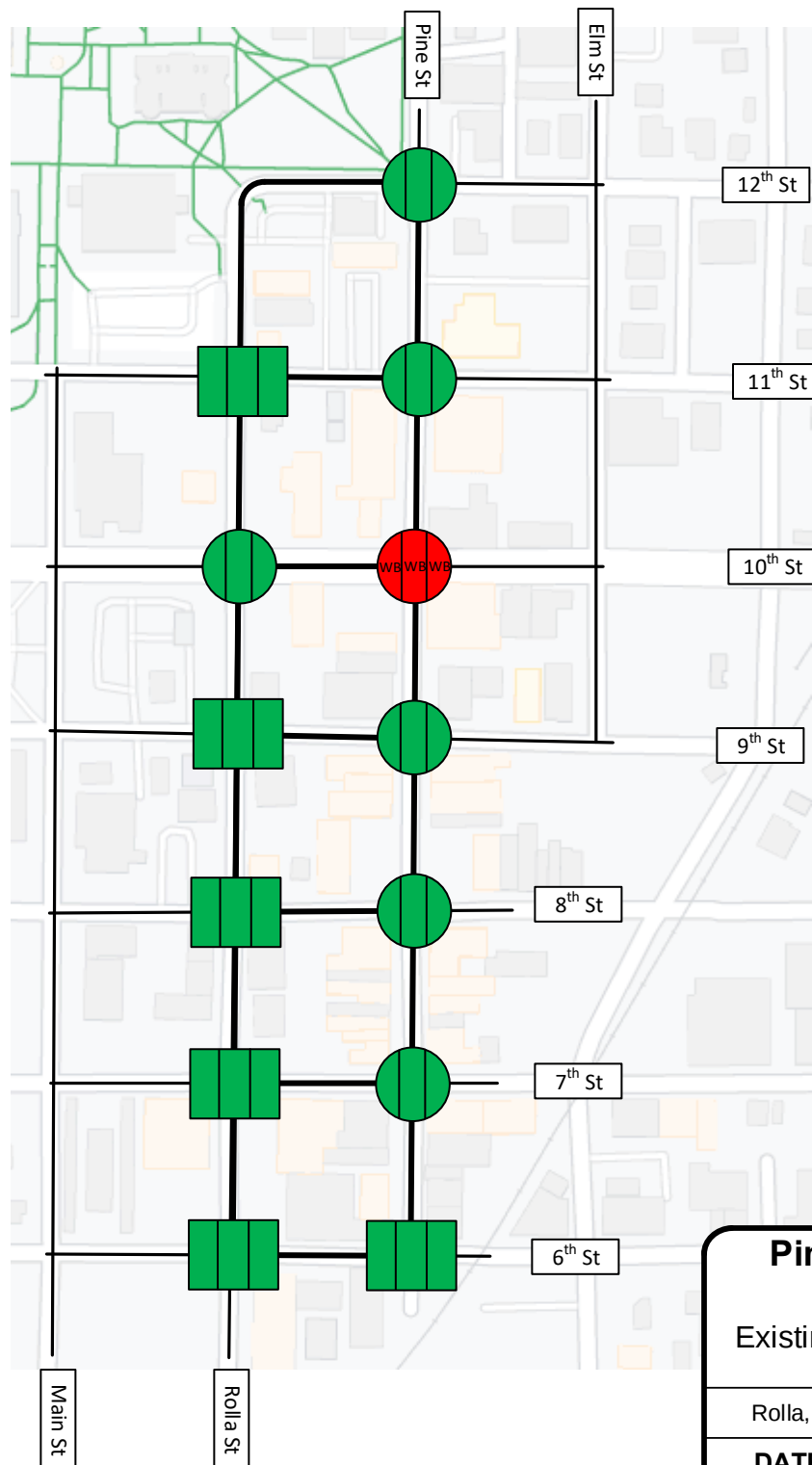
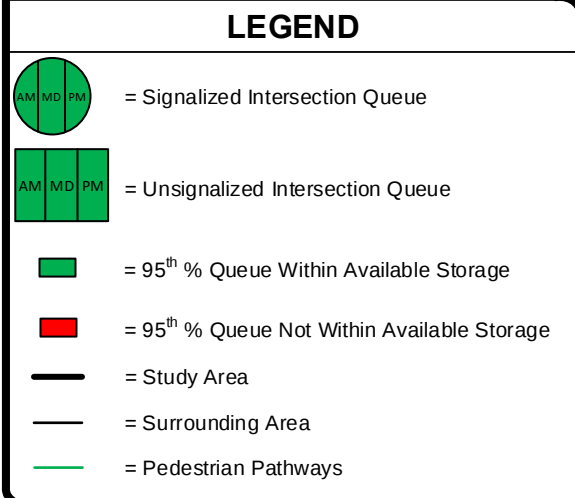
Prepared By: **HNTB**

DATE: July 2021

Sheet 14



**NOT
TO
SCALE**



Pine Street / Downtown Circulation Study

Existing Alt 2A Intersection Queue Results

Rolla, Missouri

Prepared By: **HNTB**

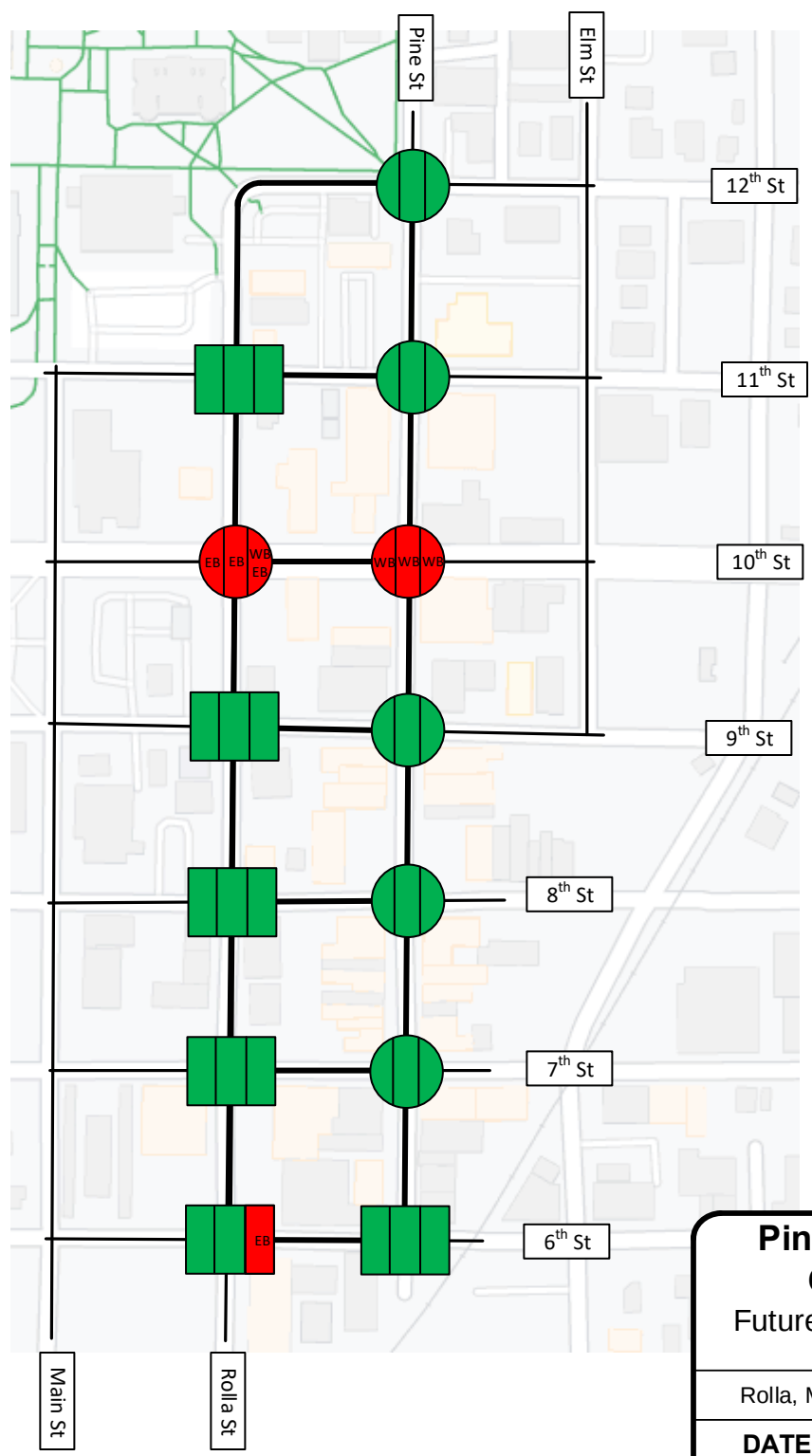
DATE: July 2021

Sheet 15



LEGEND

-  = Signalized Intersection Queue
-  = Unsignalized Intersection Queue
-  = 95th % Queue Within Available Storage
-  = 95th % Queue Not Within Available Storage
-  = Study Area
-  = Surrounding Area
-  = Pedestrian Pathways



Pine Street / Downtown Circulation Study

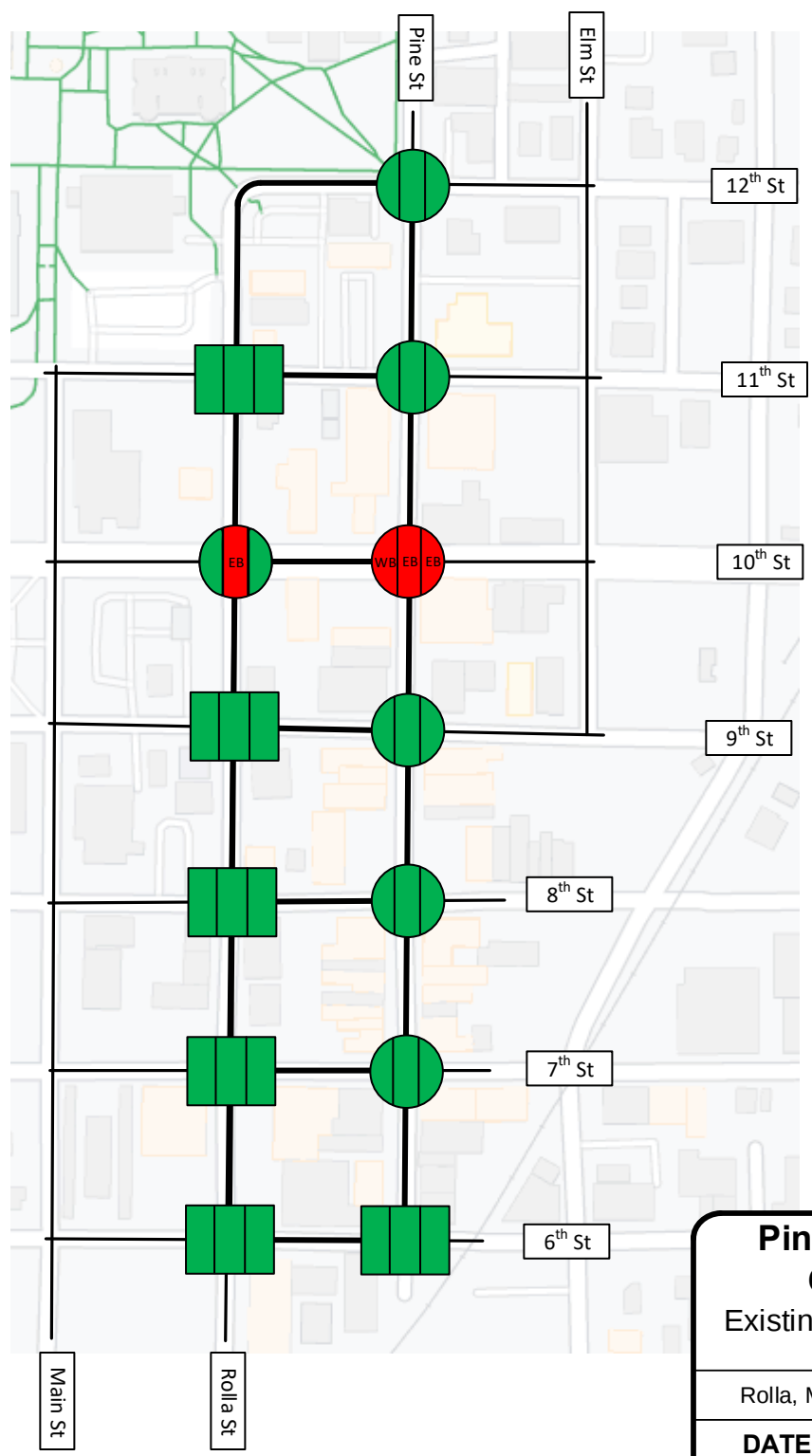
Future Alt 2A Intersection Queue
Results

Rolla, Missouri	Prepared By: HNTB
DATE: July 2021	Sheet 16



LEGEND

-  = Signalized Intersection Queue
-  = Unsignalized Intersection Queue
-  = 95th % Queue Within Available Storage
-  = 95th % Queue Not Within Available Storage
-  = Study Area
-  = Surrounding Area
-  = Pedestrian Pathways



**Pine Street / Downtown
Circulation Study**

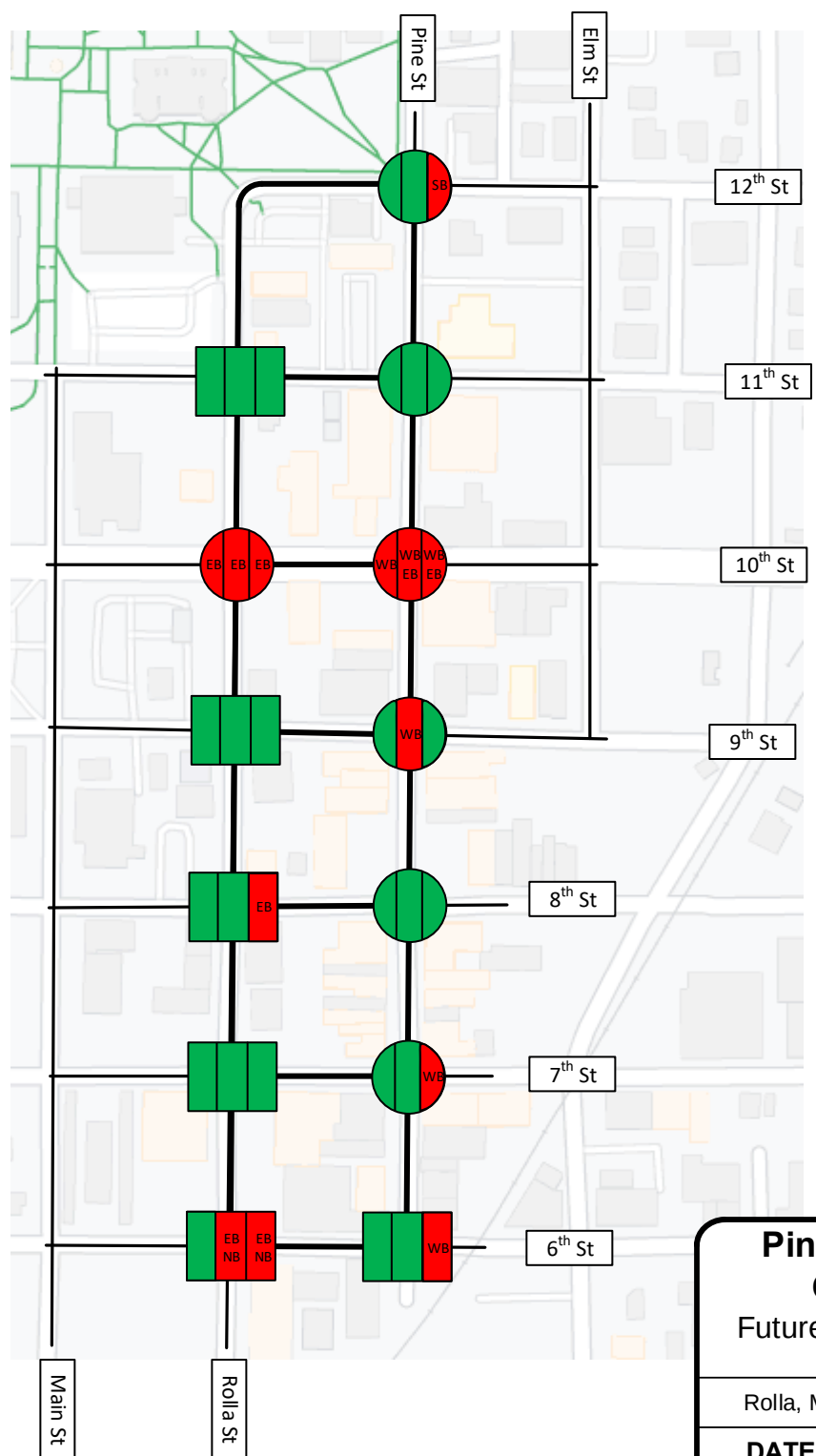
Existing Alt 2B Intersection Queue
Results

Rolla, Missouri	Prepared By: HNTB
DATE: July 2021	
Sheet 17	



LEGEND

- = Signalized Intersection Queue
- = Unsignalized Intersection Queue
- = 95th % Queue Within Available Storage
- = 95th % Queue Not Within Available Storage
- = Study Area
- = Surrounding Area
- = Pedestrian Pathways



Pine Street / Downtown Circulation Study

Future Alt 2B Intersection Queue
Results

Rolla, Missouri

Prepared By: **HNTB**

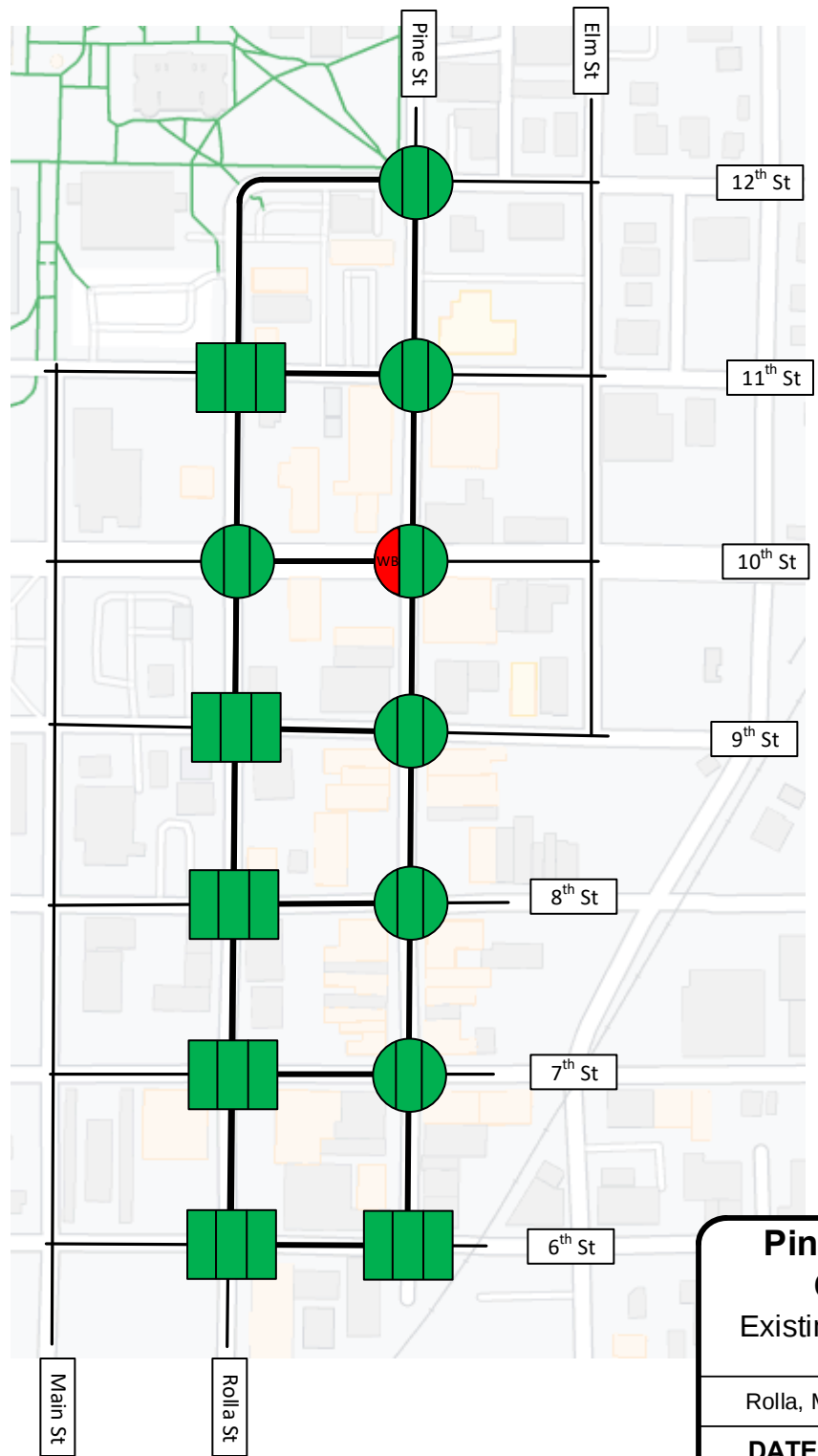
DATE: July 2021

Sheet 18



LEGEND

- = Signalized Intersection Queue
- = Unsignalized Intersection Queue
- = Within 95th Percentile Queue
- = Not Within 95th Percentile Queue
- = Study Area
- = Surrounding Area
- = Pedestrian Pathways

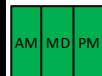


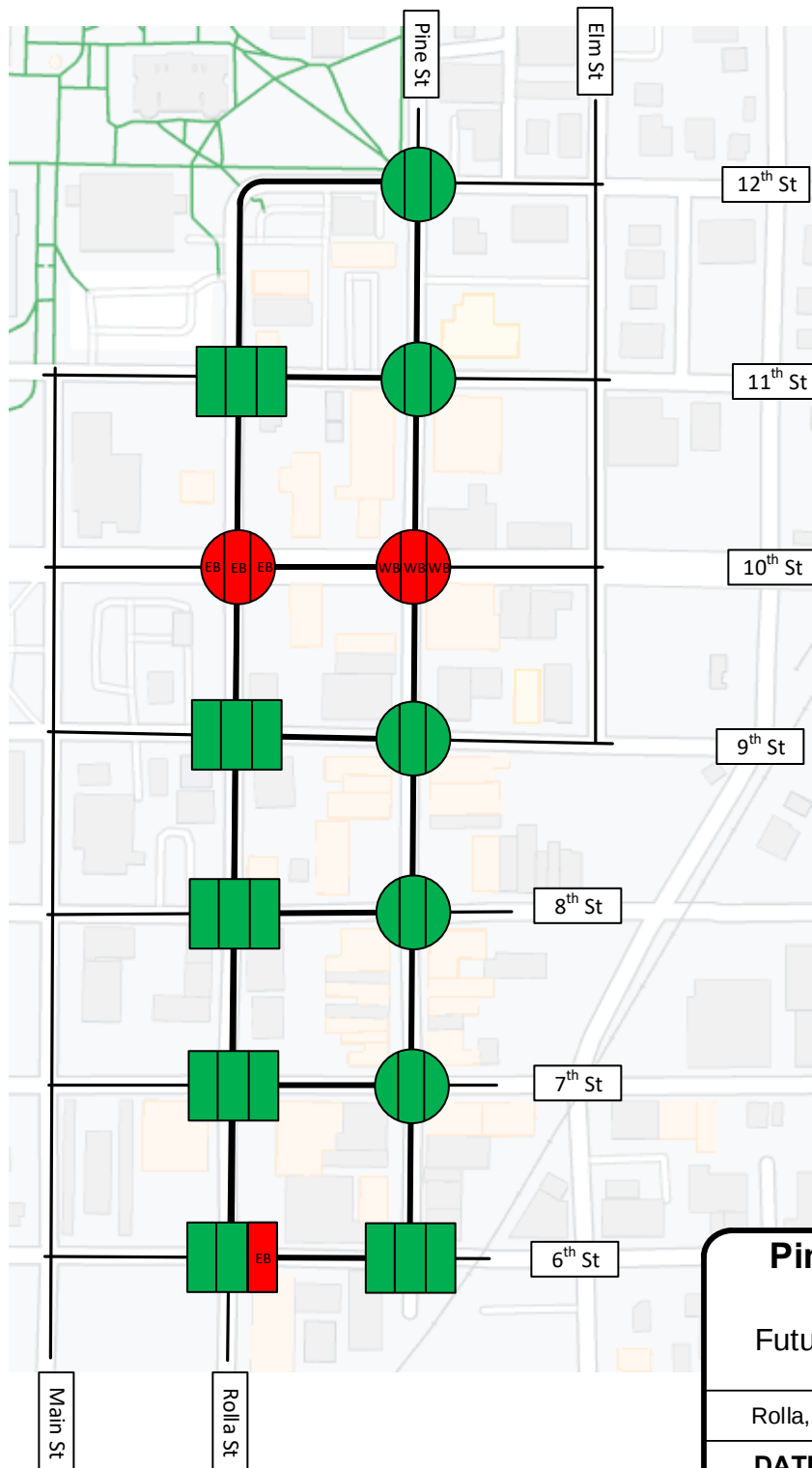
**Pine Street / Downtown
Circulation Study**
Existing Alt 3 Intersection Queue
Results

Rolla, Missouri	Prepared By: HNTB
DATE: July 2021	Sheet 19



LEGEND

-  = Signalized Intersection Queue
-  = Unsignalized Intersection Queue
-  = Within 95th Percentile Queue
-  = Not Within 95th Percentile Queue
-  = Study Area
-  = Surrounding Area
-  = Pedestrian Pathways



Pine Street / Downtown Circulation Study Future Alt 3 Intersection Queue Results

Rolla, Missouri

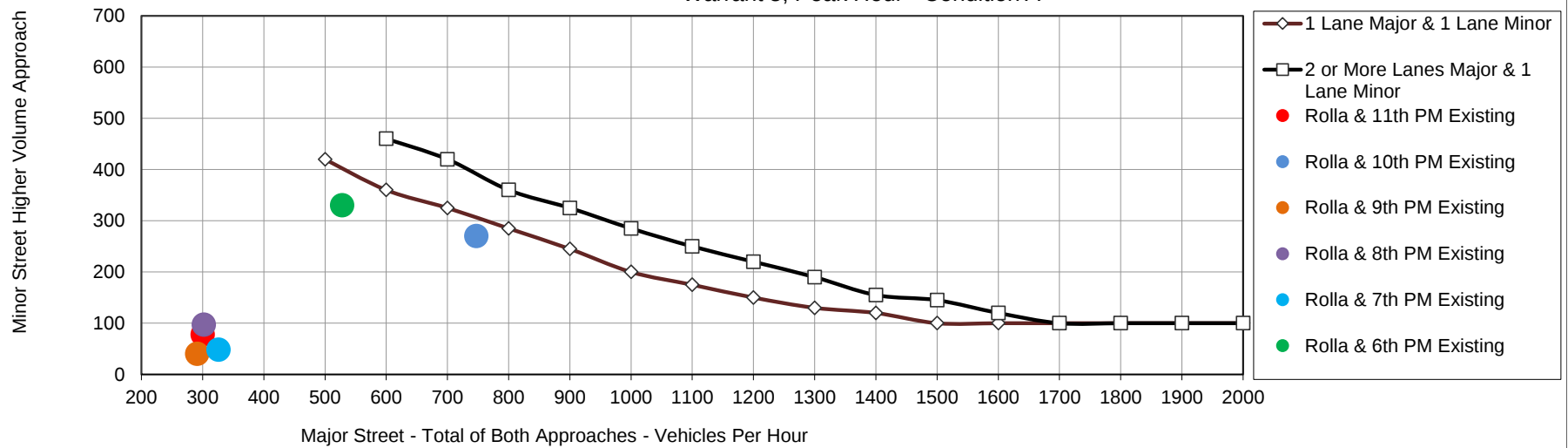
Prepared By: **HNTB**

DATE: July 2021

Sheet 20

Appendix F – Signal Warrant Graphics

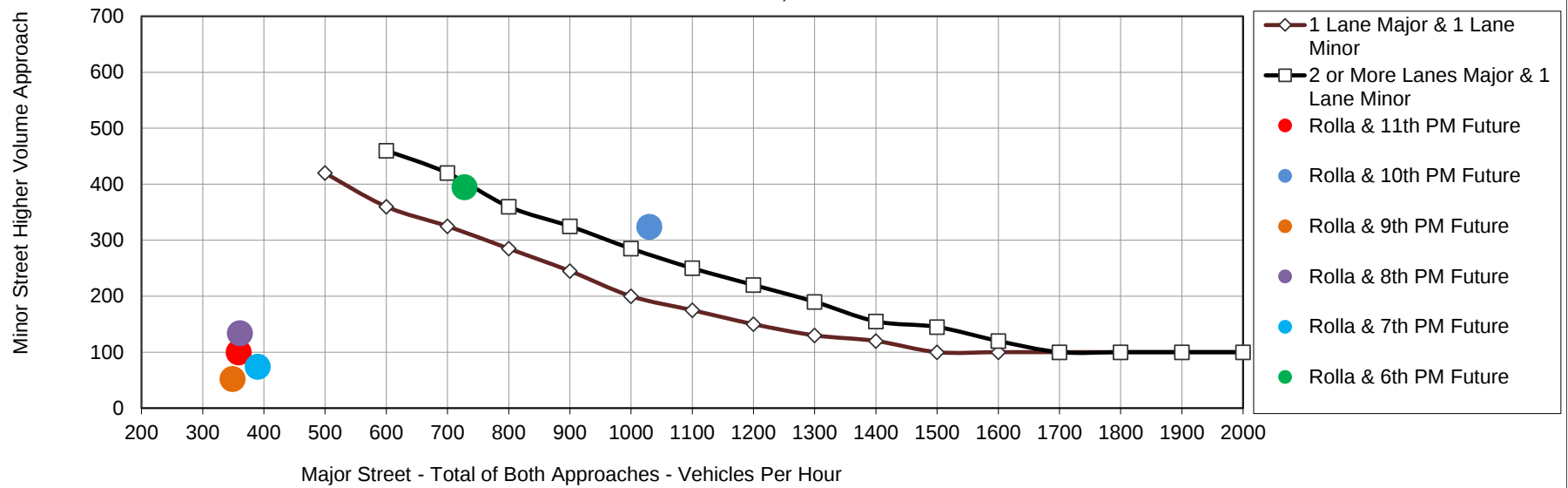
Alternative 1a - Existing Rolla St Intersections Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

Alternative 1a - Future Rolla St Intersections Warrant 3, Peak Hour - Condition A

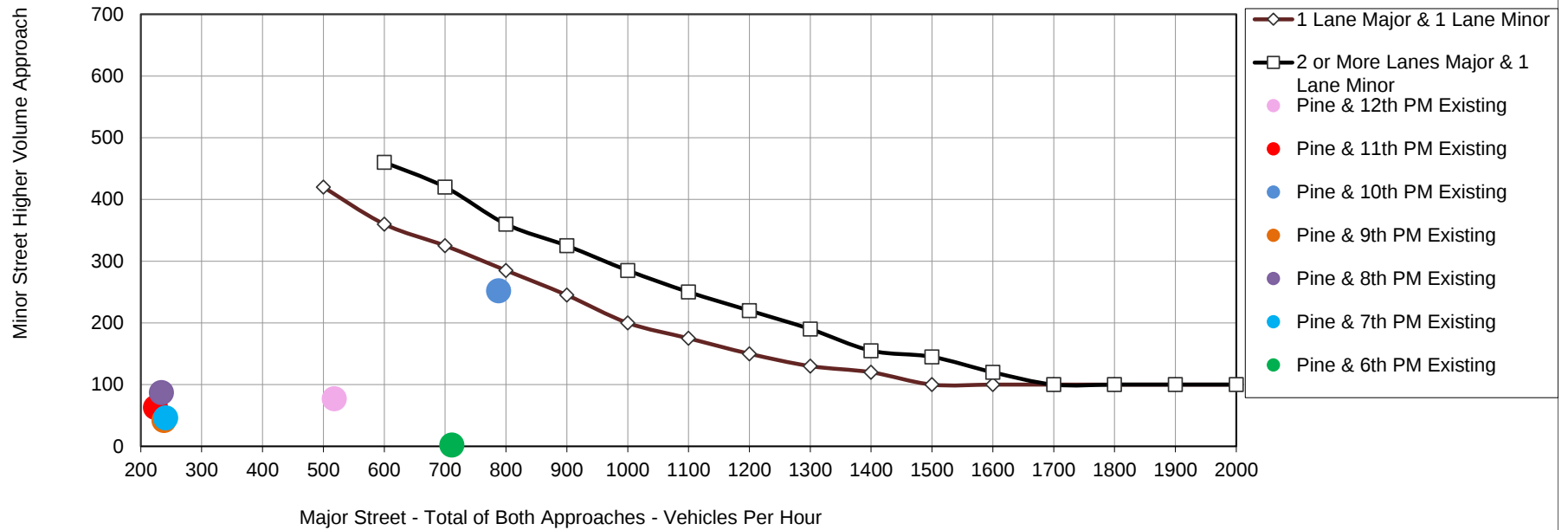


* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

Alternative 1a - Existing Pine St Intersections

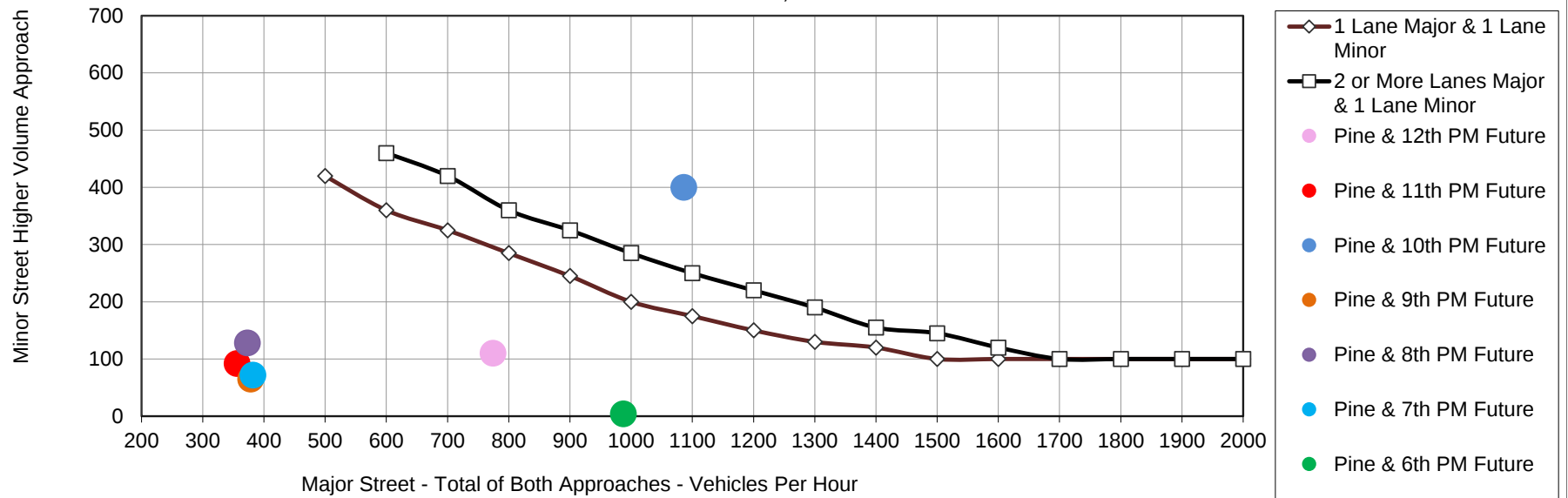
Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

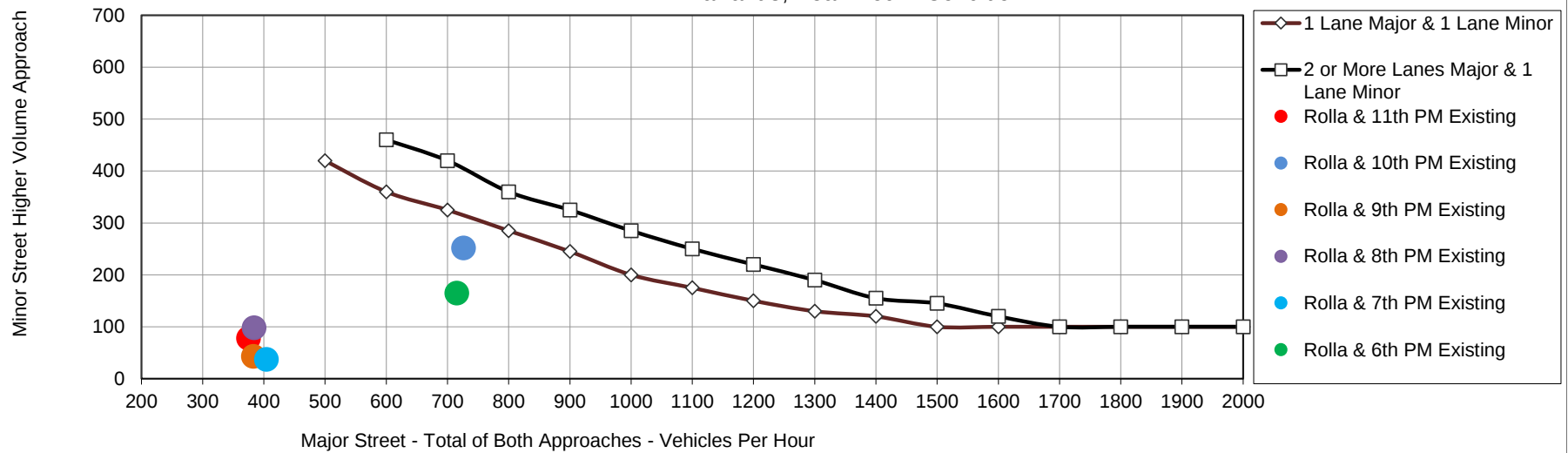
Alternative 1a - Future Pine St Intersections Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source:
MUTCD 2009

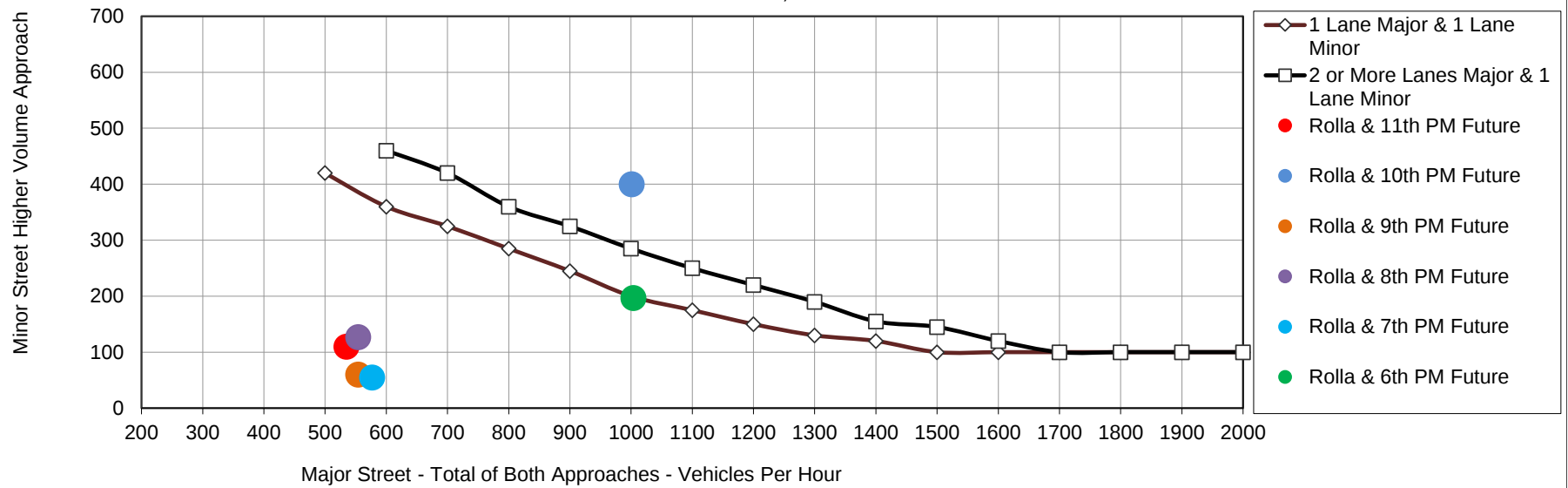
Alternative 1b - Existing Rolla St Intersections Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

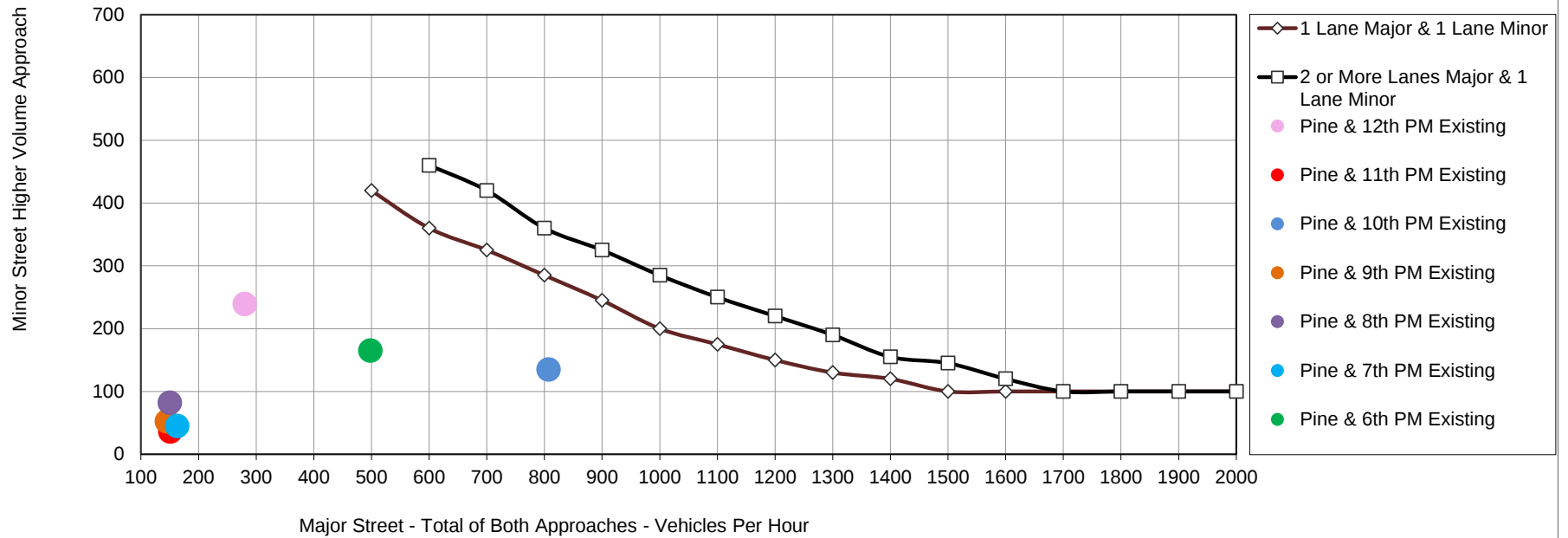
Alternative 1b - Future Rolla St Intersections Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

Alternative 1b - Existing Pine St Intersections Warrant 3, Peak Hour - Condition A

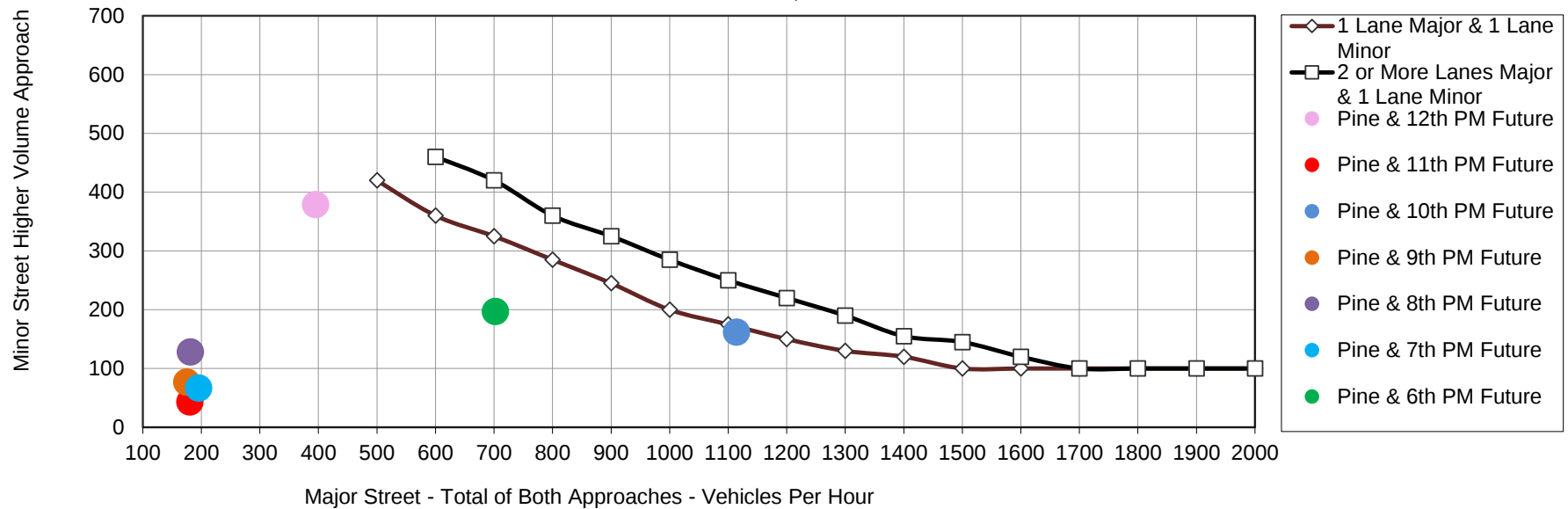


* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

Alternative 1b - Future Pine St Intersections

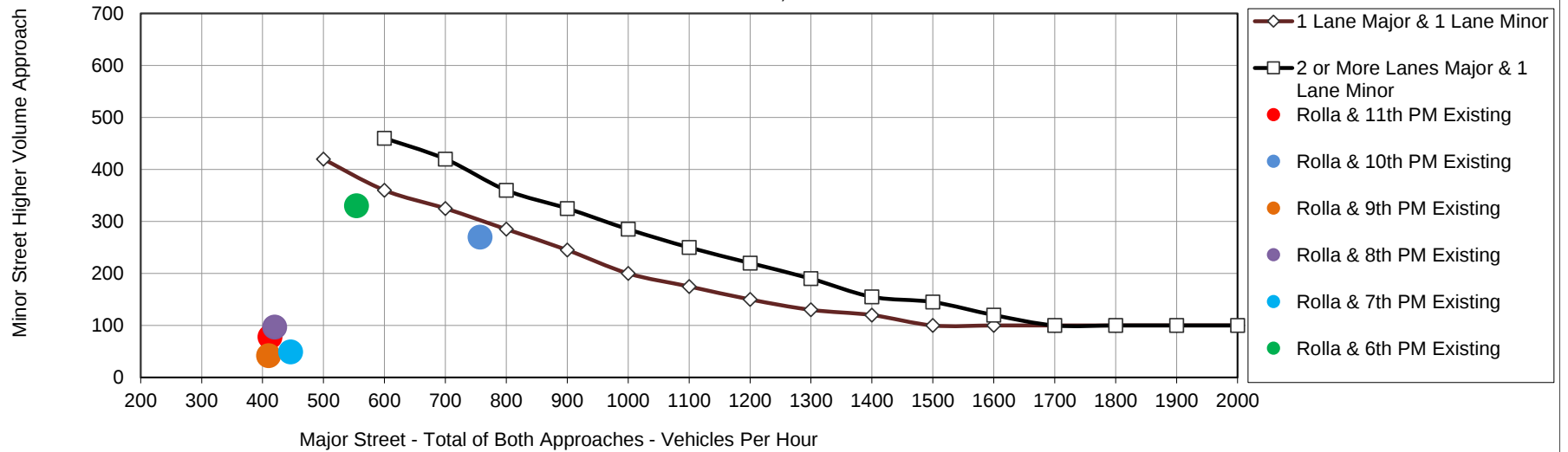
Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

Alternative 2a - Existing Rolla St Intersections Warrant 3, Peak Hour - Condition A

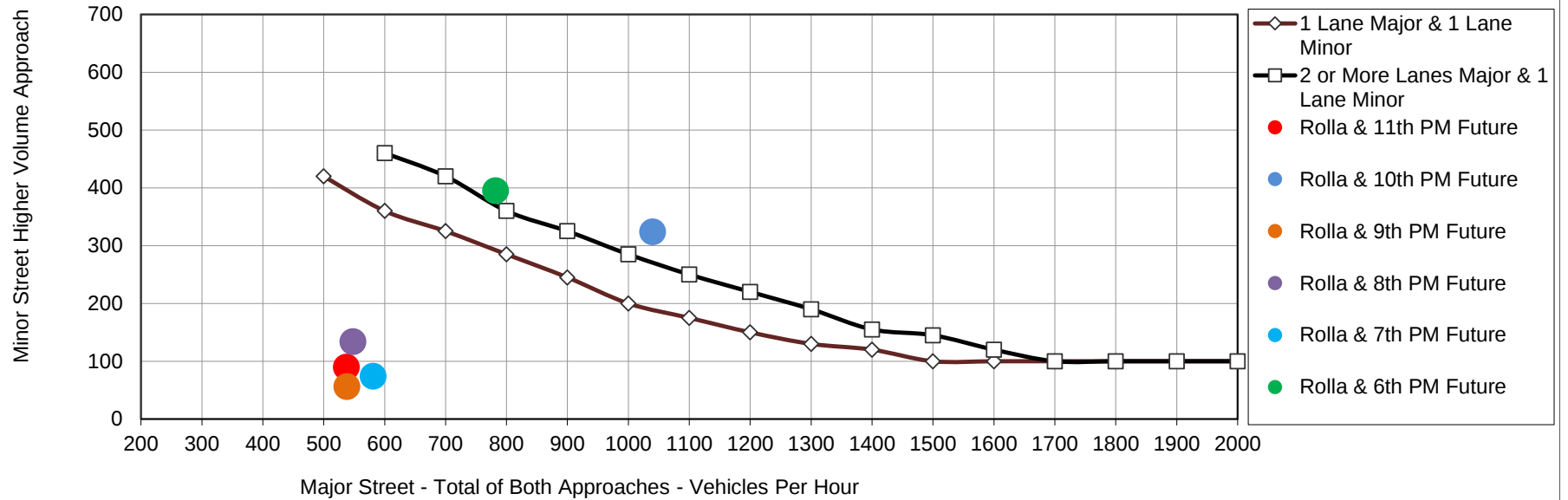


* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

Alternative 2a - Future Rolla St Intersections

Warrant 3, Peak Hour - Condition A

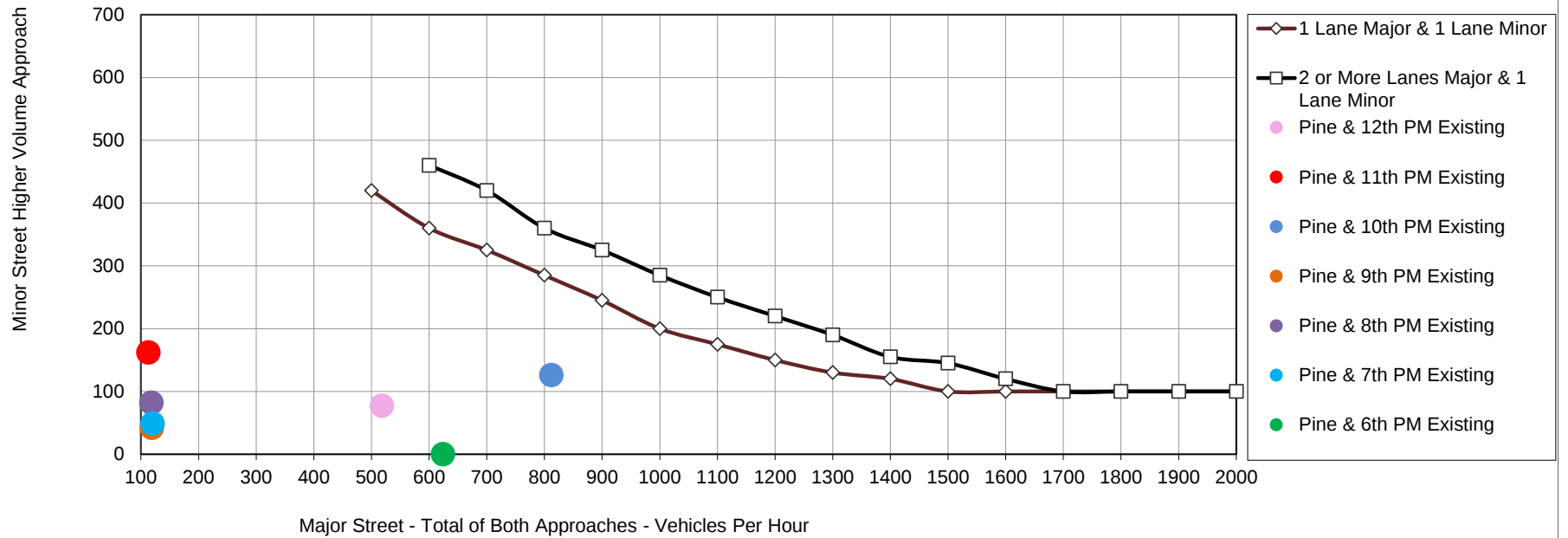


* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

Alternative 2a - Existing Pine St Intersections

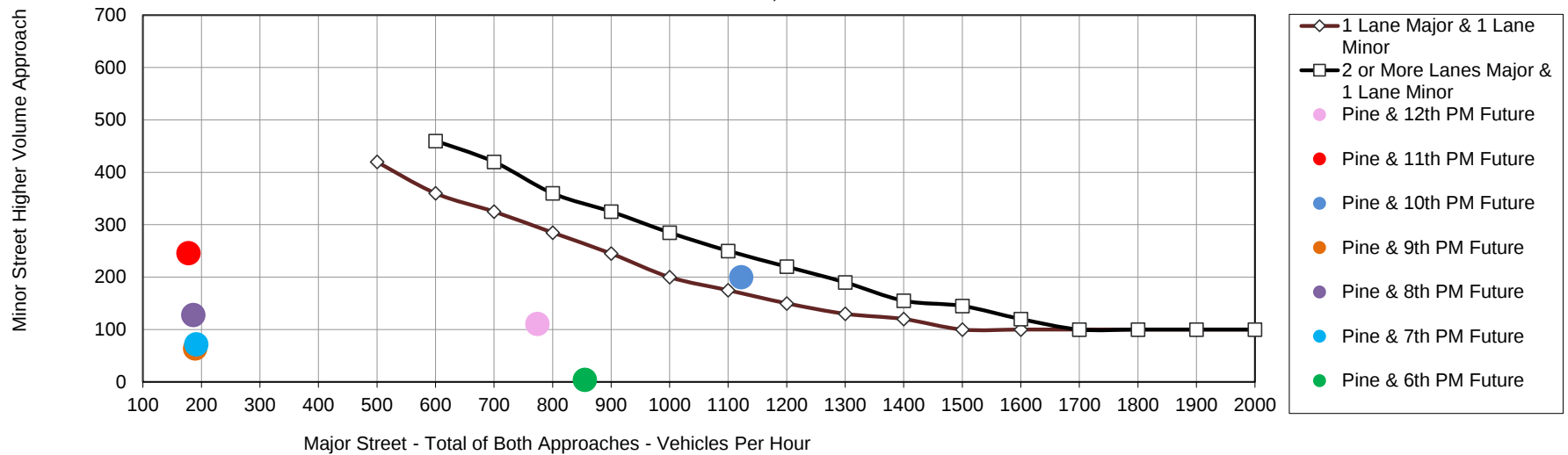
Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

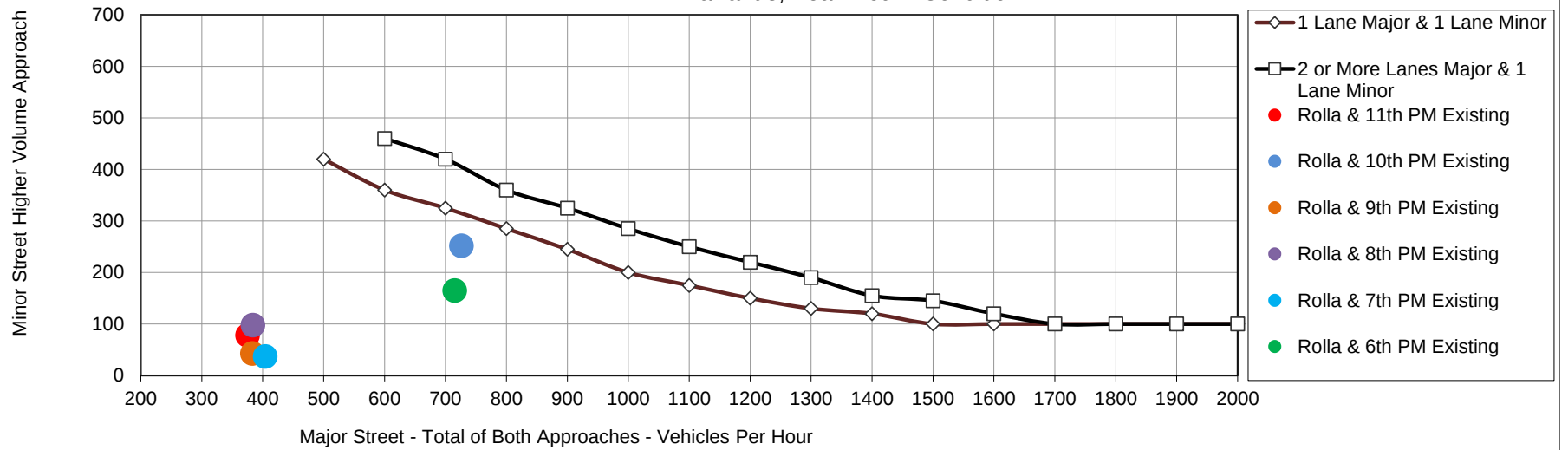
Alternative 2a - Future Pine St Intersections Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source:
MUTCD 2009

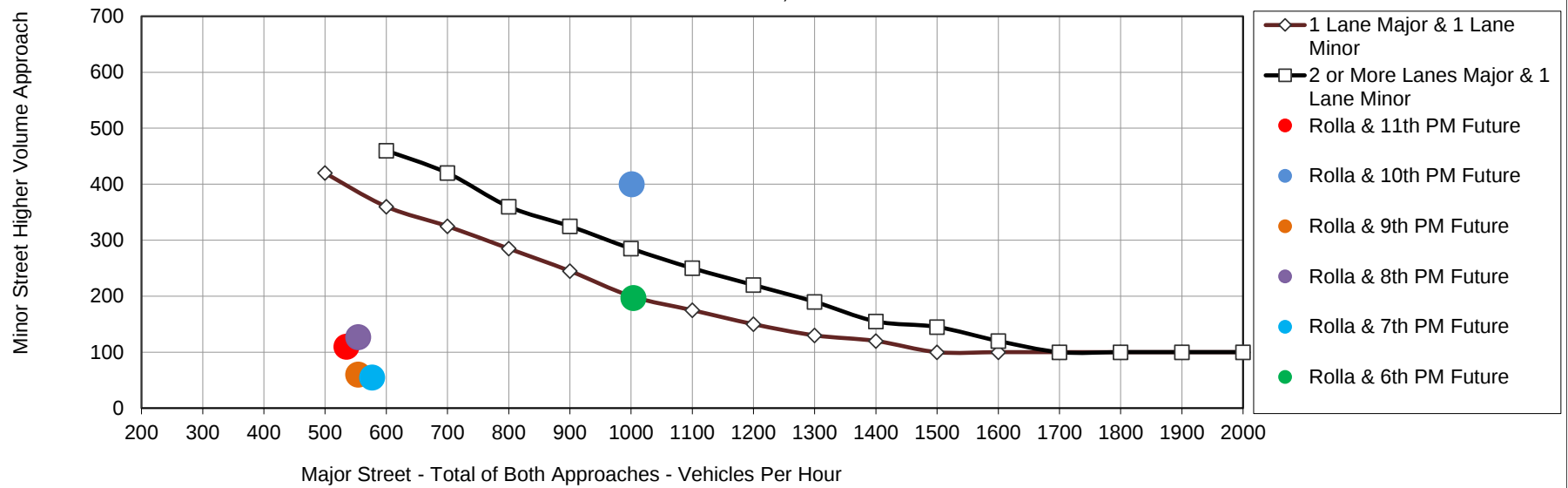
Alternative 2b - Existing Rolla St Intersections Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

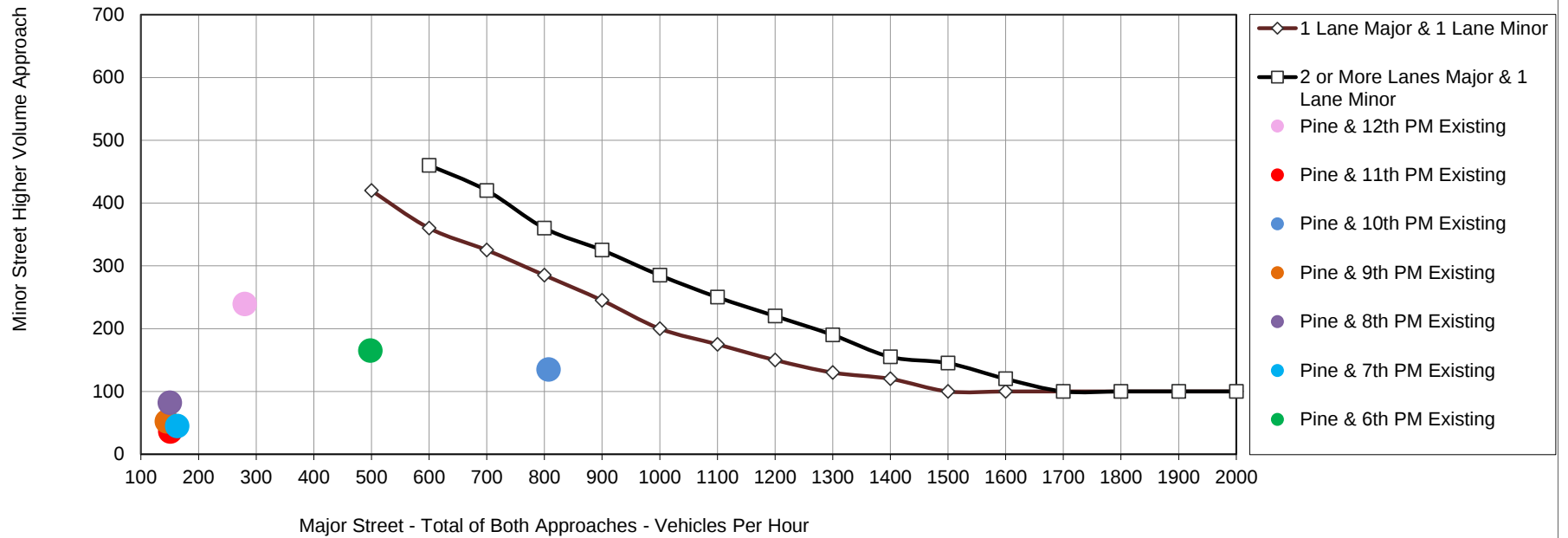
Alternative 2b - Future Rolla St Intersections Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.
Source: MUTCD 2009

Alternative 2b - Existing Pine St Intersections

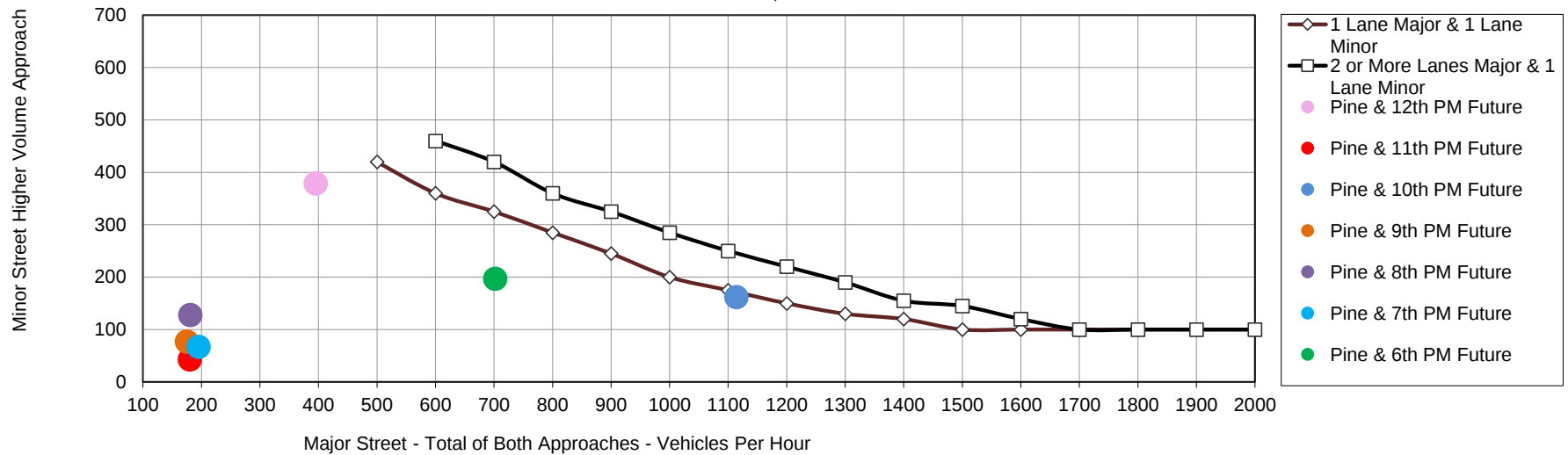
Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

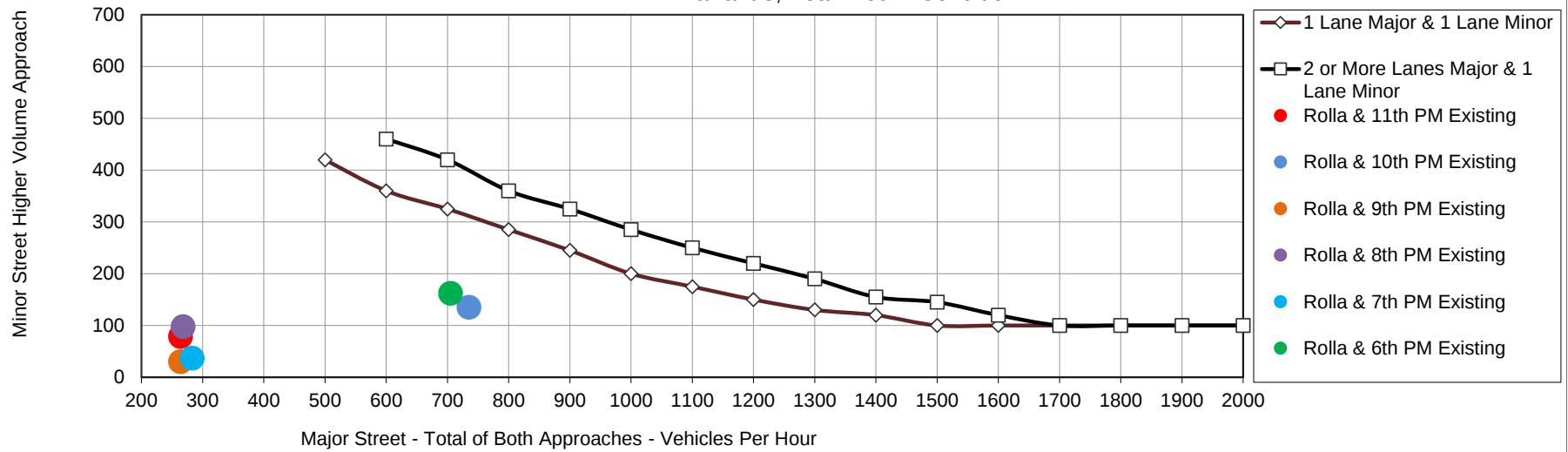
Alternative 2b - Future Pine St Intersections Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

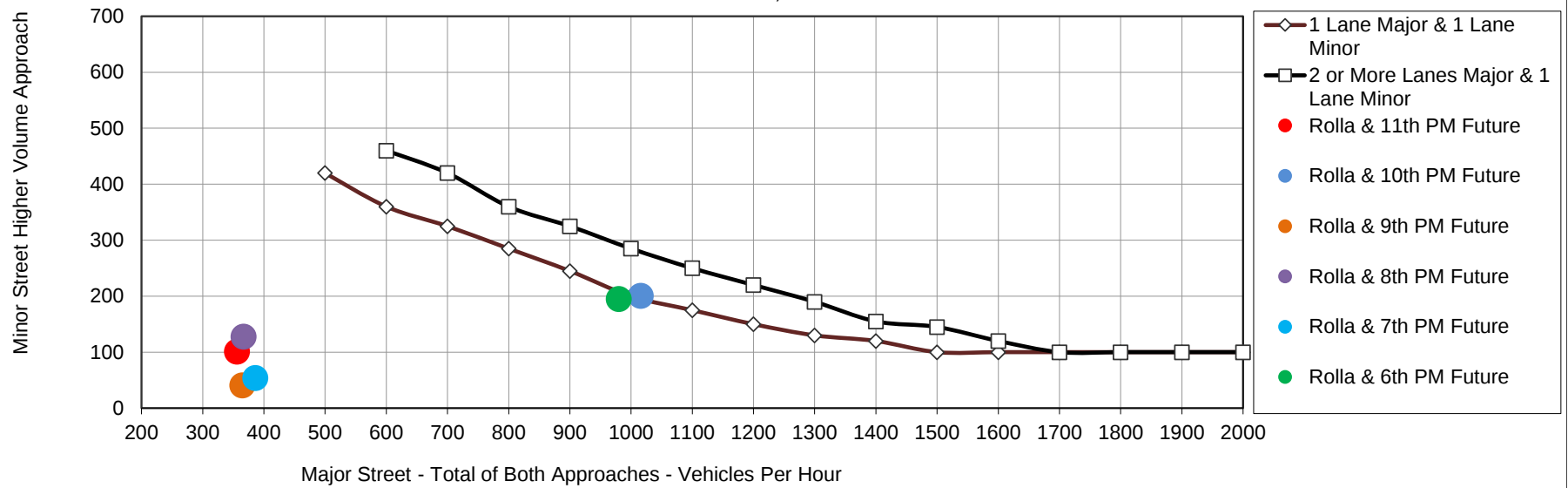
Alternative 3 - Existing Rolla St Interstections Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

Alternative 3 - Future Rolla St Intersections Warrant 3, Peak Hour - Condition A

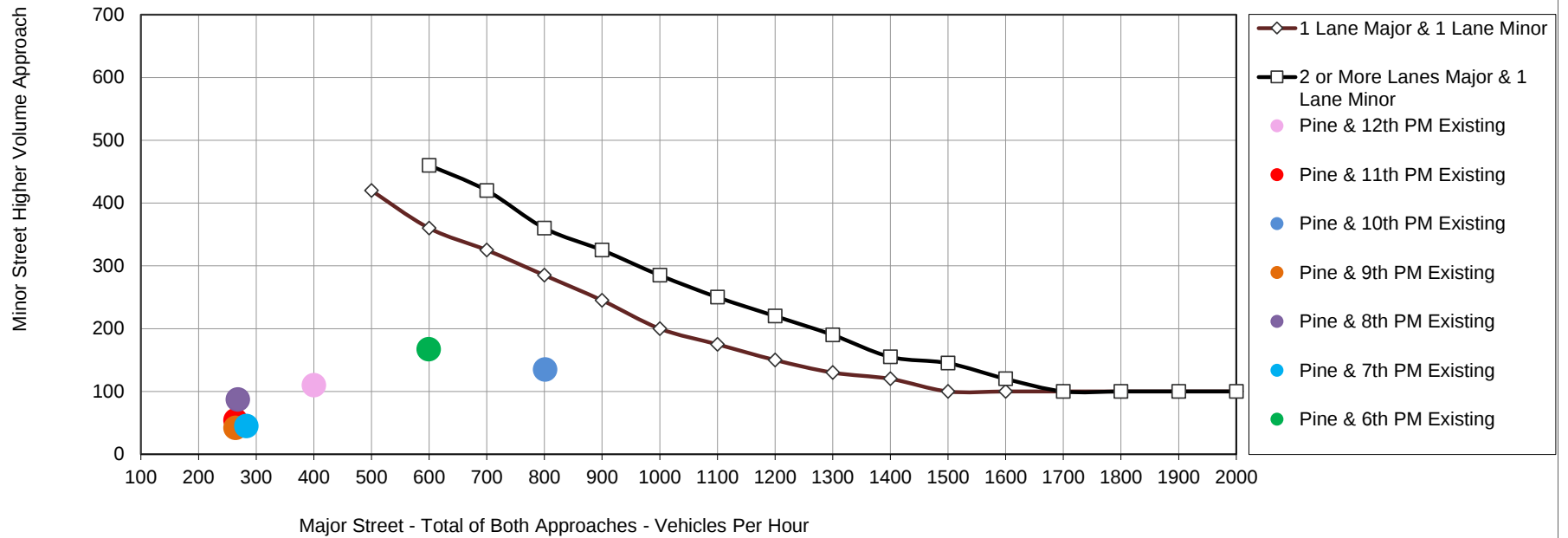


* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

Alternative 3 - Existing Pine St Intersections

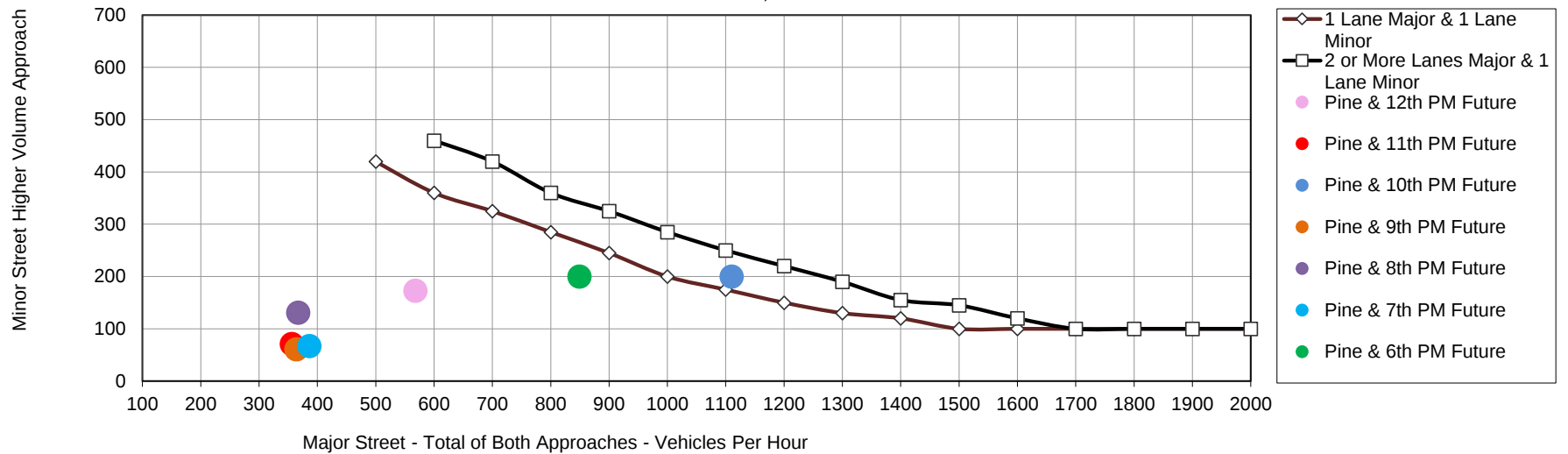
Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

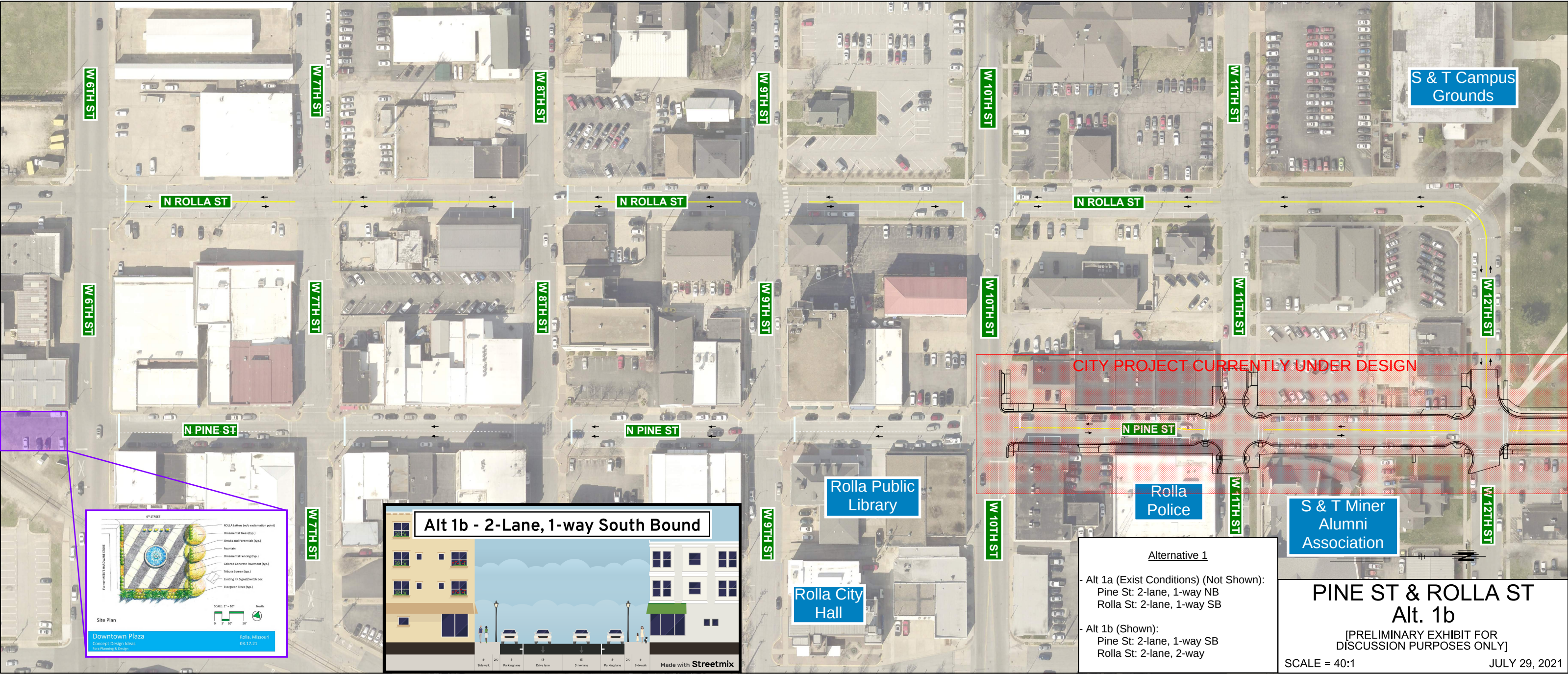
Alternative 3 - Future Pine St Intersections Warrant 3, Peak Hour - Condition A



* Note: 150 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor street approach with one lane.

Source: MUTCD 2009

Appendix G – Engineering



W 6TH ST

W 7TH ST

W 8TH ST

W 9TH ST

W 10TH ST

W 11TH ST

W 12TH ST

N ROLLA ST

N ROLLA ST

N ROLLA ST

N PINE ST

N PINE ST

N PINE ST

Rolla Public Library

Rolla City Hall

Rolla Police

S & T Miner Alumni Association

S & T Campus Grounds

CITY PROJECT CURRENTLY UNDER DESIGN

Site Plan

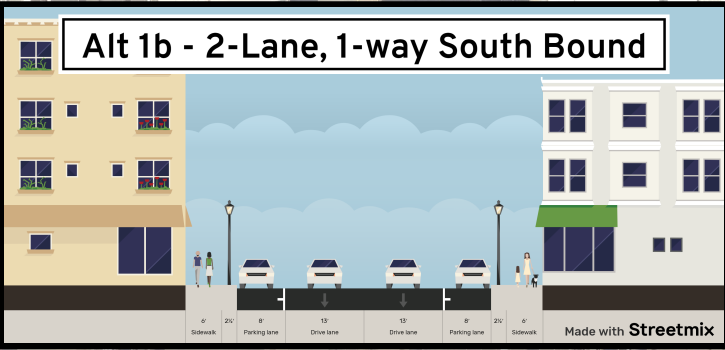
Downtown Plaza
Concept Design Ideas
Jana Plummer & Design

Rolla, Missouri
03.17.21

SCALE: 1" = 100'

North

- ROLLA Letters (Arch endowment point)
- Ornamental Trees (Top)
- Shrubs and Perennials (Top)
- Fountain
- Ornamental Fencing (Top)
- Colored Concrete Pavement (Top)
- Tribute Screen (Top)
- Existing RR Signal/Switch Box
- Evergreen Trees (Top)



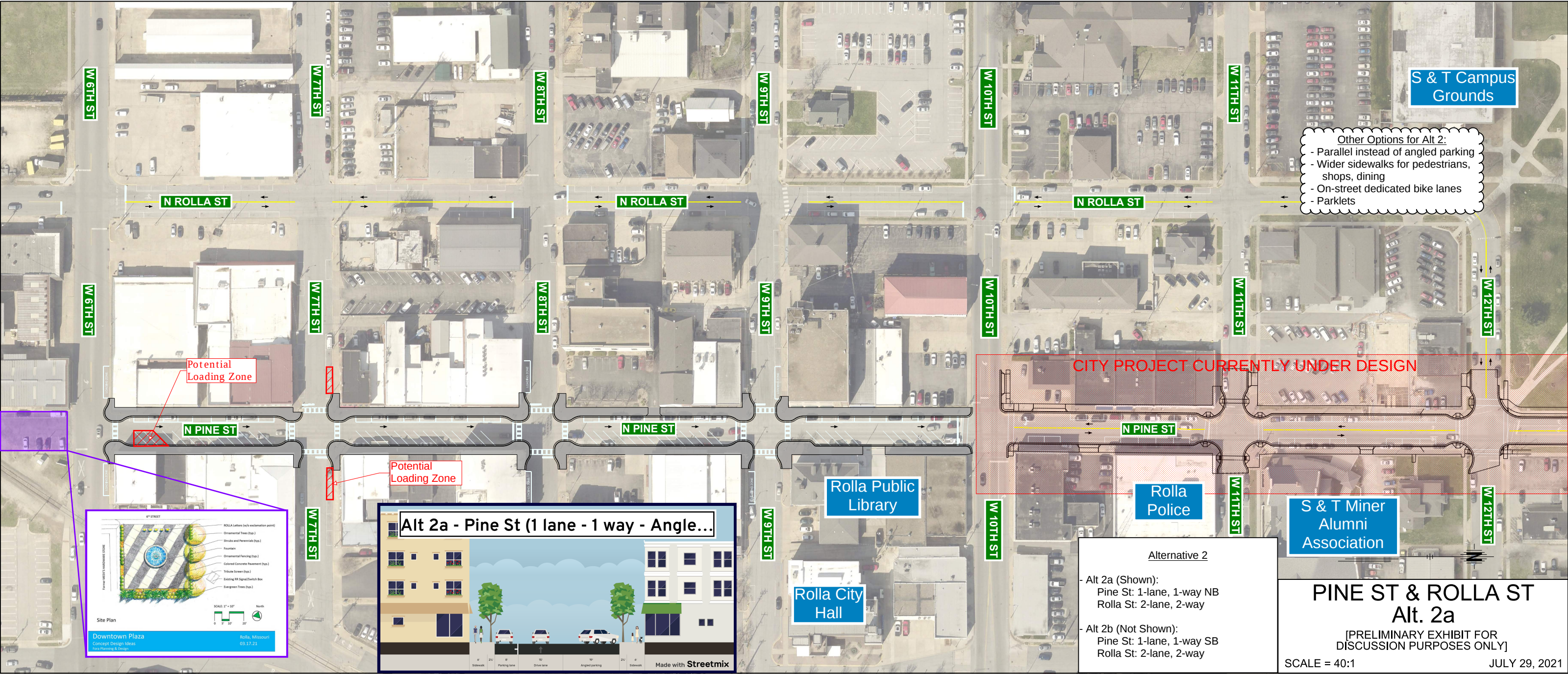
- Alternative 1
- Alt 1a (Exist Conditions) (Not Shown):
Pine St: 2-lane, 1-way NB
Rolla St: 2-lane, 1-way SB
 - Alt 1b (Shown):
Pine St: 2-lane, 1-way SB
Rolla St: 2-lane, 2-way

PINE ST & ROLLA ST
Alt. 1b

[PRELIMINARY EXHIBIT FOR DISCUSSION PURPOSES ONLY]

SCALE = 40:1

JULY 29, 2021



Other Options for Alt 2:

- Parallel instead of angled parking
- Wider sidewalks for pedestrians, shops, dining
- On-street dedicated bike lanes
- Parklets

CITY PROJECT CURRENTLY UNDER DESIGN

Alternative 2

- Alt 2a (Shown):
Pine St: 1-lane, 1-way NB
Rolla St: 2-lane, 2-way

- Alt 2b (Not Shown):
Pine St: 1-lane, 1-way SB
Rolla St: 2-lane, 2-way

PINE ST & ROLLA ST
Alt. 2a

[PRELIMINARY EXHIBIT FOR DISCUSSION PURPOSES ONLY]

SCALE = 40:1

JULY 29, 2021

