

# Cheyenne Lincolnway Placemaking Downtown Pedestrian and Urban Design Plan DRAFT 1/16



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Fehr + Peers

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The Cheyenne Lincolnway Placemaking Downtown Pedestrian and Urban Design Plan is focused on creating a more pedestrian friendly, comfortable and aesthetic streetscape that complements Cheyenne’s ‘Main Street’ and improves the likelihood of revenue increases, new businesses and redevelopment in Downtown.

The plan identifies needs and prioritizes improvements to make it easier, safer and more appealing to walk within and through the Downtown Corridor. Key stakeholders and downtown businesses were engaged through a comprehensive Public Outreach process. The outreach included individual business interviews, a walking tour of the corridor, on-line surveys, three community outreach workshops, and a Public Open House as well as presentations to the Cheyenne DDA. The public outreach component of this project helped identify preferences for aesthetics, design strategies and evaluated alternative designs for the Corridor.

**EXISTING CONDITIONS**

The vehicular Level of Service analysis indicates that the intersections along the corridor are operating without significant delay. Pedestrians face significant challenges currently due to crossing distances, narrow sidewalks relative to other Downtown environments and vehicle speeds. In addition, a high number of trucks use the corridor and reduce overall pedestrian comfort. Issues that were identified by stakeholders include:

- Limited on street parking
- Vehicle speeds on Lincolnway too high - (Posted speed limit 20 MPH)
- Lack of street trees
- Lack of perceived pedestrian crossing opportunities
- Insufficient lighting, particularly pedestrian-scale
- Lack of street furniture
- Narrow and attached sidewalks

**CORRIDOR IMPROVEMENTS**

Based on results from the existing conditions analysis and community outreach, a number of improvements were identified to address basic pedestrian and bicycle safety and mobility in the corridor, and were considered in the development of all concept alternatives:

Implement street trees, protected bulbouts with planting and seatwalls and additional pedestrian-scale lighting

- Widen sidewalks and add a landscaped buffer wherever feasible
- Decrease crossing distances whenever possible through extended bulb-outs
- Develop a gateway intersection at Warren and Central Ave. Intersections with reconstructed wayfinding signage, elimination of pork-chop islands (free right turns) and gateway medians
- Provide pedestrian refuges at medians wherever possible
- Add additional on-street parking wherever possible

Two alternative corridor plans were developed including a three lane and a five lane option:

- The five lane option includes east/west extended bulb-outs with planting and seatwalls, medians and pedestrian refuges, street trees, gateway treatments at Warren/Central Ave. intersections.
- The three lane option includes on-street parking, north/south/east/west extended bulb-outs with planting and seatwalls, medians and pedestrian refuges, wider sidewalks, street trees with buffer planting and gateway treatments at Warren/Central Ave intersections.

**LEVEL OF SERVICE (LOS)/VEHICULAR DELAY ANALYSIS**

The two alternative corridor plans were analyzed using both Sychro modeling and VISSIM modeling. Synchro is recognized as the industry standard for LOS analysis, while VISSIM provides overall visualization of traffic patterns as well as pedestrian movements. The VISSIM models depict a decrease in delay as compared to the Synchro results.

It should be noted that specific intersections LOS results are less meaningful in this analysis due to the close intersection spacing and interdependency of coordinated signals. Travel time is provided in the analysis to give a sense of the delay seen along Lincolnway over our study segment. Also, this analysis assumes that all traffic will remain on Lincolnway and that there will continue to be a conservative growth of one

percent annually. This analysis focused on the PM peak hour, which is the worst case scenario and these delays will occur only during peak times and not throughout the rest of the day. Overall vehicular delay analysis is as followed:

1. The existing scenario was simulated to validate the simulation model and provide a baseline to compare future year scenarios.
2. The five lane option analysis indicates that all intersections and approaches will operate at acceptable LOS.
3. The three lane option analysis indicates:
  - In 2035 the westbound left movement at Capitol Ave is failing with 85 seconds of delay. A protected left turn phase would reduce this delay and minimally impact eastbound progression along Lincolnway.
  - In 2035 the non-signalized intersections (O’neil Ave., Bent Ave., Thomes Ave.) are failing with a rating of LOS E or lower depending on signal timing adjustments. These intersections should be evaluated for their potential as signalized intersections if there is a desire to implement the three lane option in the future. However it should be noted that the signalization of these intersections may affect vehicle progression along Lincolnway.

**ADDITIONAL ALTERNATIVES EVALUATION**

Beyond vehicular operational analysis, the alternatives were evaluated relative to one another based on other metrics derived from the initial goals of the project including Downtown Business Enhancements, Pedestrian and Safety Experience, Downtown Gateway Effectiveness, Cost Effectiveness and Public/Stakeholder Preferences. Most of these criteria are immediately measurable such as crossing distances, sidewalk width, number of parking spaces, etc.:

1. The five lane option ranks lower than the three lane option in terms of Downtown Business Enhancements and Pedestrian Safety and Experience, similar to the three lane option for Downtown Gateway Effectiveness, higher than the three lane option in cost effectiveness, and lower than the three lane option in Public/Stakeholder preferences.
2. The three lane option ranks higher than the five lane option in terms of Downtown Business Enhancements, Pedestrian Experience, Downtown Gateway Effectiveness and Public/Stakeholder preferences, and lower than the five lane option in terms of cost effectiveness.

Corridor Alternative	Downtown Business Enhancements			Pedestrian Safety and Experience			Downtown Gateway			Vehicular			Other	
	Streetscape Opportunities, i.e. café seating	Streetscape Enhancements	Parking Availability	Crossing Distance and Convenience	Pedestrian Refuge	Sidewalk Width and Comfort	Welcoming Intersections	Gateway Treatments	Street Trees/ Medians	Vehicular Travel Time	Traffic Calming	Level of Service	Cost Effectiveness	Public/ Stakeholder Input
<b>Existing Roadway</b>	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Higher	Lower	Higher	N/A	N/A
<b>Alternative A - 3 Lane Plan</b> <small>Proposes to remove 2 existing lanes of traffic, turn lanes and medians and add intersection bulb-outs with on-street parking.</small>	Higher	Higher	Higher	Higher	Higher	Higher	Higher	Higher	Higher	Lower	Higher	Lower	Lower	Higher
<b>Alternative B - 5 Lane Plan</b> <small>Retain 5 lanes of travel with turn lanes and medians and add intersection bulb-outs.</small>	Average	Average	Lower	Average	Average	Average	Higher	Higher	Average	Higher	Average	Higher	Average	Average

**RECOMMENDATION**

The three lane and the five lane options both represent viable alternative concepts for Lincolnway, with clear trade-offs for each. The intent of this plan is to fully represent each option. This document is intended to be used as a guide for future decisions as Downtown Cheyenne continues to grow and change over time. The first phase of the project can be implemented at any time, as it is flexible in its adaptation to both options, requiring restriping only to adapt to the three lane or 5 lane alternative.

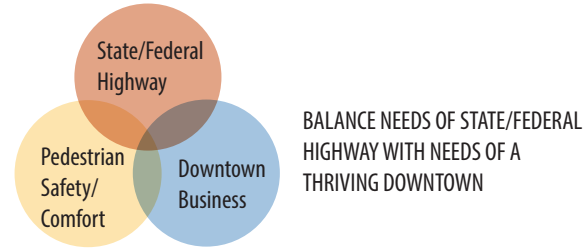
**IMPLEMENTATION**

The costs of implementing and maintaining these longer term improvements identified within this document are significant and would require phasing over time. The plan breaks out these potential future improvements into phases which can be implemented through a variety of creative public and private funding sources in the future. The intent is however to have a plan or a road map for this area so that if and when funding opportunities arise, the City and community leaders have a vision and corresponding design ideas that they can utilize to move forward. No funding is currently available for construction of the improvements represented in this document.

# INTRODUCTION

## PROJECT GOALS AND OBJECTIVES

1. Activate ground floors to inspire business development. This will be done by;
  - Improving the overall character and 'sense of place';
  - Creating outdoor gathering and seating areas and;
  - Utilizing alley connections where appropriate
2. Improve comfort and safety for pedestrians
  - Expand sidewalks where possible
  - Develop 'edge' at pedestrian spaces
3. Balance needs and traffic demands of Federal/State Highway with needs of a thriving downtown
4. Highlight/Celebrate history of Lincolnway
5. Create an environment to inspire more diverse land-uses



## PROJECT CRITERIA

1. Accessibility
2. Visibility and effective lighting for safety
3. Facilitate safe pedestrian movement
4. Community identity and 'sense of place'
5. Respect and celebrate historic context
6. Allow for flexibility and change
7. Capacity for gathering and event areas
8. Year round appeal and use
9. Ease of maintenance
10. Create balance of vehicular and pedestrian spaces
11. Support and stimulate business growth

## PROJECT CHARACTER

The images below reflect generalized aspects of the project character that are desirable including enhanced pedestrian streetscape conditions, a consistent street tree canopy, intersection/bulbout enhancements, medians along streetscapes, pedestrian lighting and safety enhancements and design elements from Downtown Cheyenne and the Depot Plaza at Lincolnway and Capitol Ave.



# PROCESS

## STAKEHOLDER INTERVIEWS AND WORKSHOPS

Design concepts within this document were developed through a collaborative process of stakeholder interviews and discussions, walk throughs and workshops incorporating input from the City of Cheyenne Staff, MPO Staff, WYDOT Staff, Boards and Commissions members and property owners. Beyond regular meetings with MPO and City Staff, the stakeholder and public involvement process is represented below.

### SITE WALKTHROUGH - STAKEHOLDERS AND MPO/CITY STAFF

The process began with a series of individual discussions and a site walk-through from which feedback was incorporated into preliminary issues and opportunities diagrams and image boards reflecting project character and examples. This material became the foundation for the first workshop.

### WORKSHOP 1

Stakeholder/public meeting to review project goals, purpose, issues and opportunities diagrams, with visual preferencing exercise to begin to establish character preferences.

1. Early in project process - feedback on opportunities, issues, concepts.
2. Focus on pedestrian realm/traffic and potential to improve safety, comfort, and 'sense of place'.
3. Parking - assuming no net change.

### WORKSHOP 1 SUMMARY COMMENTS

1. Celebrate Lincolnway Anniversary.
2. Tie with Westedge Project.
3. Like outdoor gathering/sense of place.
4. Medians on Lincolnway could be replicated.
5. Free right turn at Lincolnway from Warren unsafe.
6. Median should - unify north and south sides of Lincolnway.
7. Consider pedestrian safety during events.
8. Left turn at Capitol and Lincolnway during events is an issue.
9. Like idea of extending the plaza space on to Capitol Ave.
10. Like idea of enhancing alleyways.
11. Diagonal parking should be explored on Carey, Pioneer or Thomes. Maybe back in diagonal parking?
12. Need for benches/seating and bike racks is critical.

### WORKSHOP 2

Community meeting, design concept workshops identifying proposed alternative with open discussion and live survey polling results.

1. Feedback on alternative design concepts
2. Feedback on project details, i.e. lighting, seating, street trees, etc.
3. Determine preferred alternative.

### WORKSHOP 2 SUMMARY COMMENTS

The results of the survey from Workshop 2 are provided in the Design Alternatives section of this document.

### FARMERS MARKET AND ON-LINE SURVEY

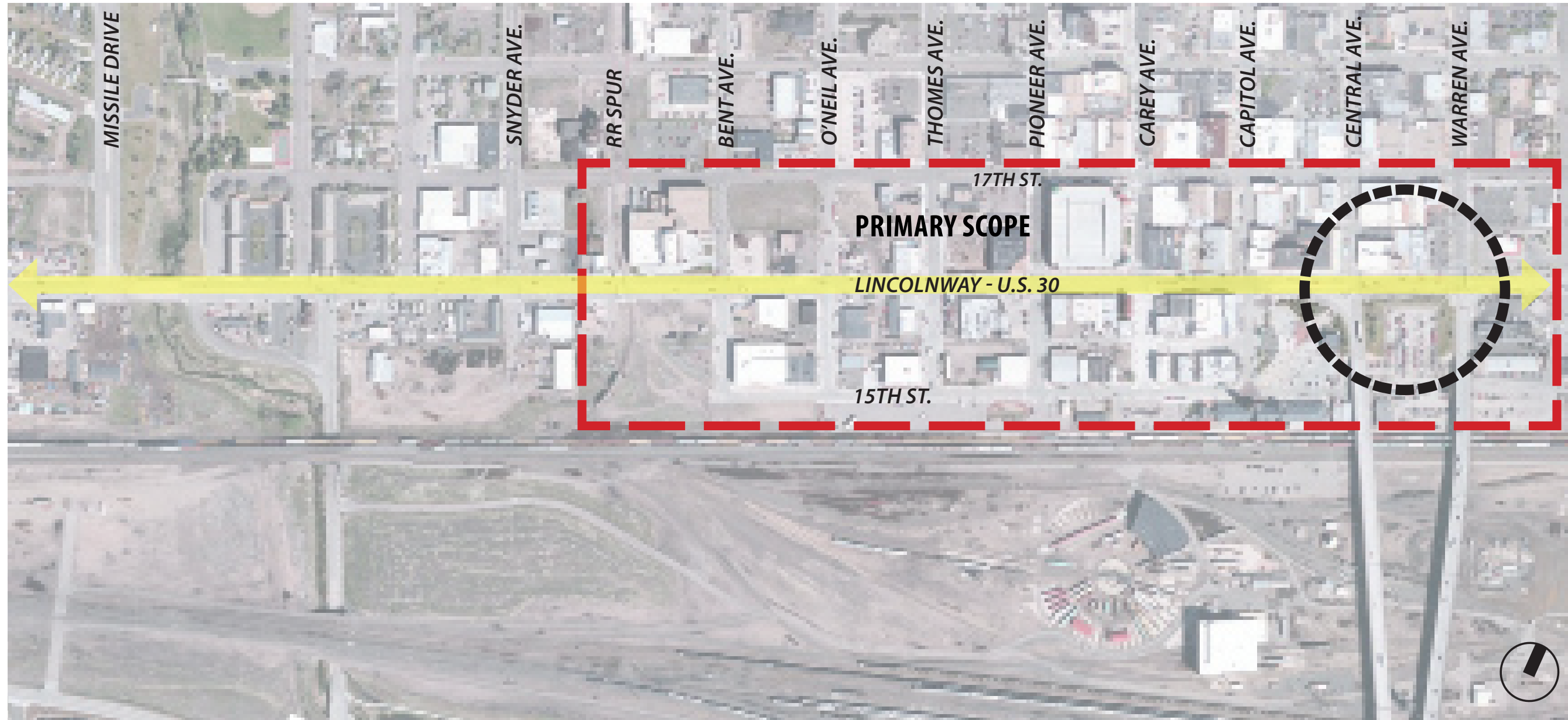
The survey provided during Workshop 2 was also provided during a Farmers Market event at the Depot Plaza as well as on-line. Results of the survey are combined with Workshop 2 results and provided in the Design Alternatives section of this document.

### WORKSHOP 3

Community meeting, design concept workshops for 17th and 18th Streets and review of alternatives for Lincolnway.

### PUBLIC OPEN HOUSE

Open house format meeting intended to solicit final feedback on Lincolnway alternatives and design concepts for 17th and 18th Streets.



**PRIMARY SCOPE**

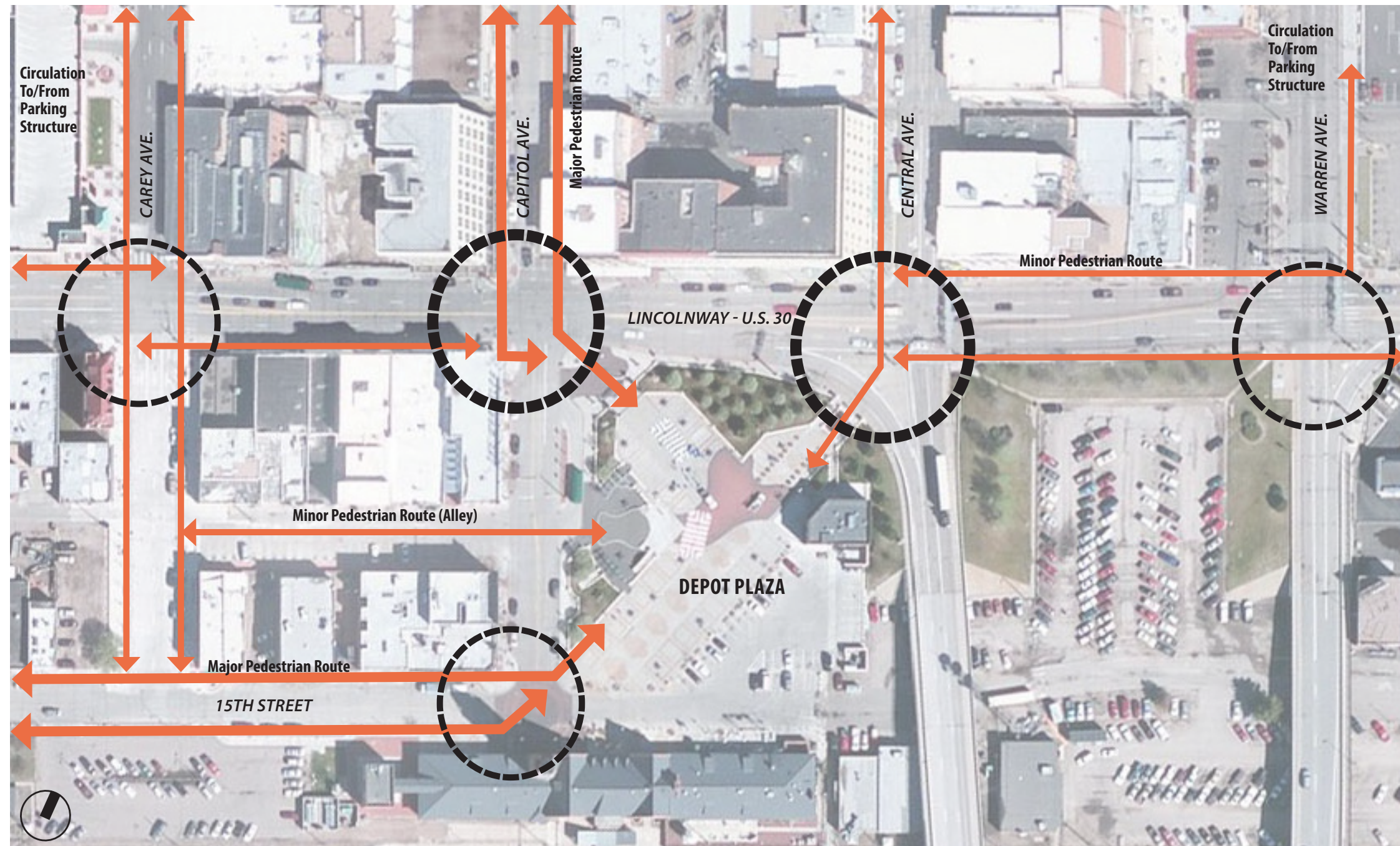
The primary scope of the project extends along Lincolnway (U.S. 30) from Warren Ave to the railroad, approximately 1/2 of a mile in length. Within this area, the Depot Plaza and existing Downtown Core play a key role in the character and uses that influence streetscape design.



Lincolnway (U.S. 30) runs in an east-west through the historic downtown of Cheyenne. At the project's eastern edge I-80 feeds traffic into the downtown area. Along the southern portion of the site the Union Pacific Railroad (UPRR) runs. Crow Creek and natural area surrounding the creek make up the western edge of the project boundary.

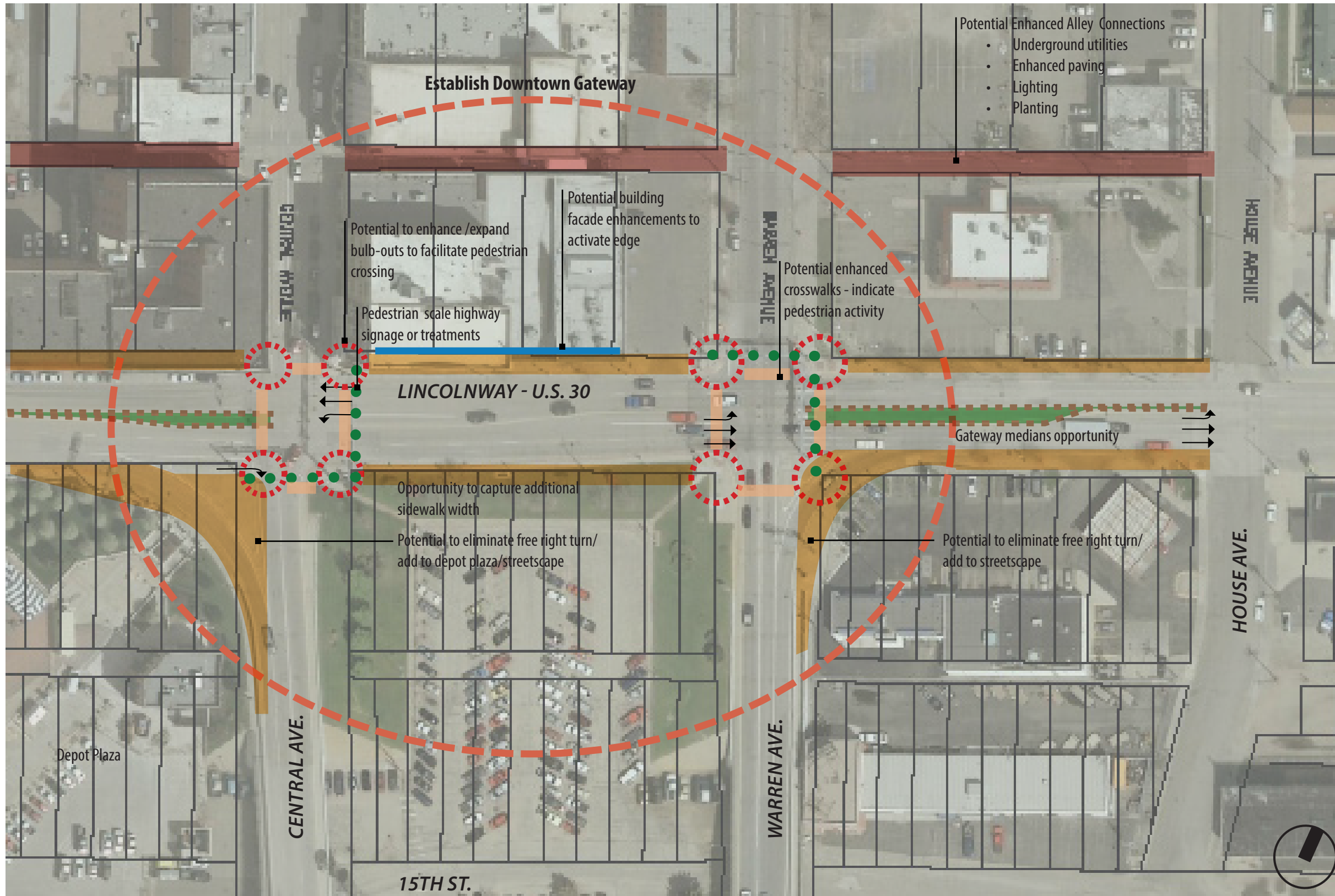
Opportunities for enhanced gateway conditions exist at the intersection of Warren/Central and Lincolnway near the Depot Plaza and at Bent Ave. near the intersection of Lincolnway and the future West Edge project.

Potential for redevelopment exists to the west of Pioneer with the goal of expanding the Downtown Core to the west. Intersections at all north south streets should be enhanced in order to facilitate safe and effective pedestrian crossings throughout the project extents.



During public events at the Depot Plaza pedestrian traffic flows from the north along Capital Ave. and Central Ave. Pedestrian flow from the west along 15th Street is another key factor to consider for events. The existing parking structure at Lincolnway and Carey Ave. feeds additional pedestrian flow from the north and along Lincolnway. This north-south movement implies a need for a potentially enhanced alley connection from Carey Ave. to Capitol Ave. as an additional pedestrian corridor with the potential for event use with vendor tents along the alley.

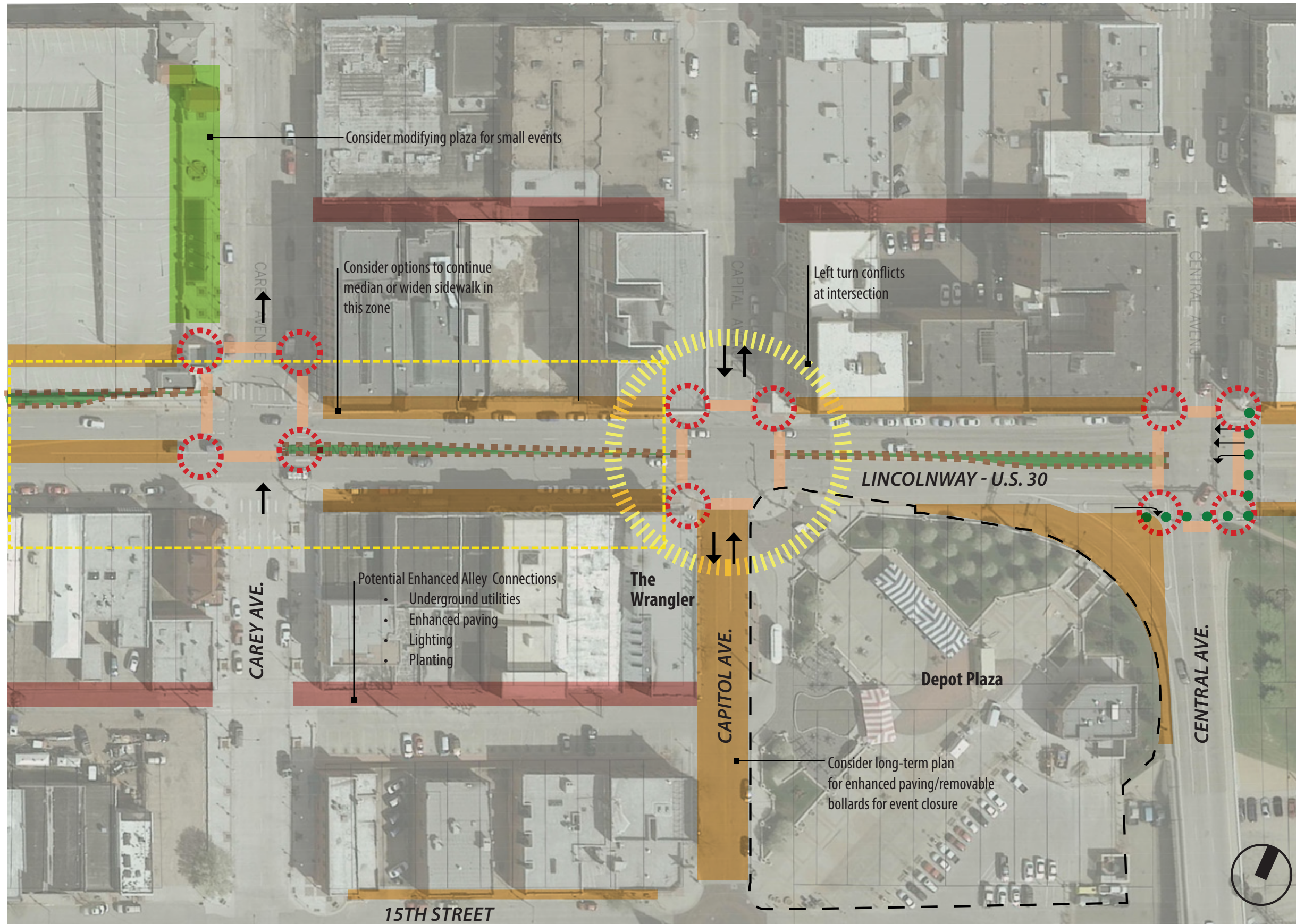




- QUESTIONS**
1. Should existing bulbouts be improved?
  2. Are medians appropriate as gateway element?
  3. Should sidewalks be improved/widened if possible?
  4. Should alleys be enhanced?

**LEGEND-  
POTENTIAL STRATEGIES AND OPPORTUNITIES**

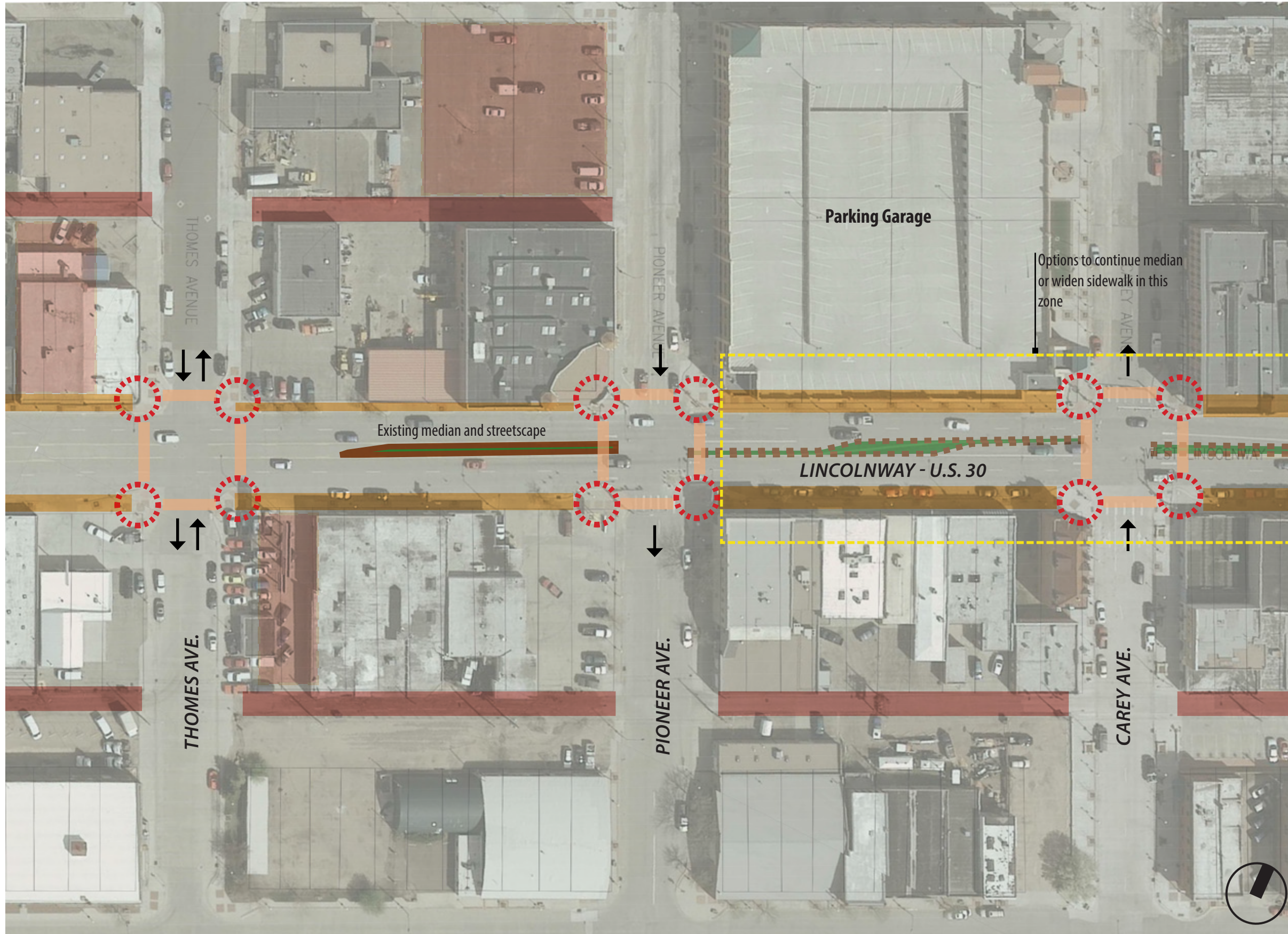
- Potential To Enhance Streetscape
- Street trees
  - Lighting enhancements
  - Enhanced paving
  - Widen sidewalks if possible
- Potential To Enhance Bulbouts
- Planting
  - Seatwalls
  - Paving
  - Increase width if possible
- Potential Median
- Replication or variation of existing design
  - Minimal planting
  - Narrow trees where possible
- Potential Enhanced Alley Connections
- Underground utilities
  - Enhanced paving
  - Lighting
  - Planting



- QUESTIONS**
1. Should left turns continue to be allowed onto Capitol?
  2. Are medians desirable west of Capitol?
  3. Should sidewalks be improved/widened if possible?
  4. Should capitol be improved near depot plaza?

**LEGEND-  
POTENTIAL STRATEGIES AND OPPORTUNITIES**

- Potential To Enhance Streetscape
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- Underground utilities
  - Enhanced paving
  - Lighting
  - Planting



**QUESTIONS**

1. Should more street trees be added?
2. Are medians desirable west of capitol?
3. Should sidewalks be improved/widened if possible?
4. Should crosswalks be paved w/colored concrete/asphalt?

**LEGEND-  
POTENTIAL STRATEGIES AND OPPORTUNITIES**

Potential To Enhance Streetscape

- Street trees
- Lighting enhancements
- Enhanced paving
- Widen sidewalks if possible



Potential To Enhance Bulbouts

- Planting
- Seatwalls
- Paving
- Increase width if possible



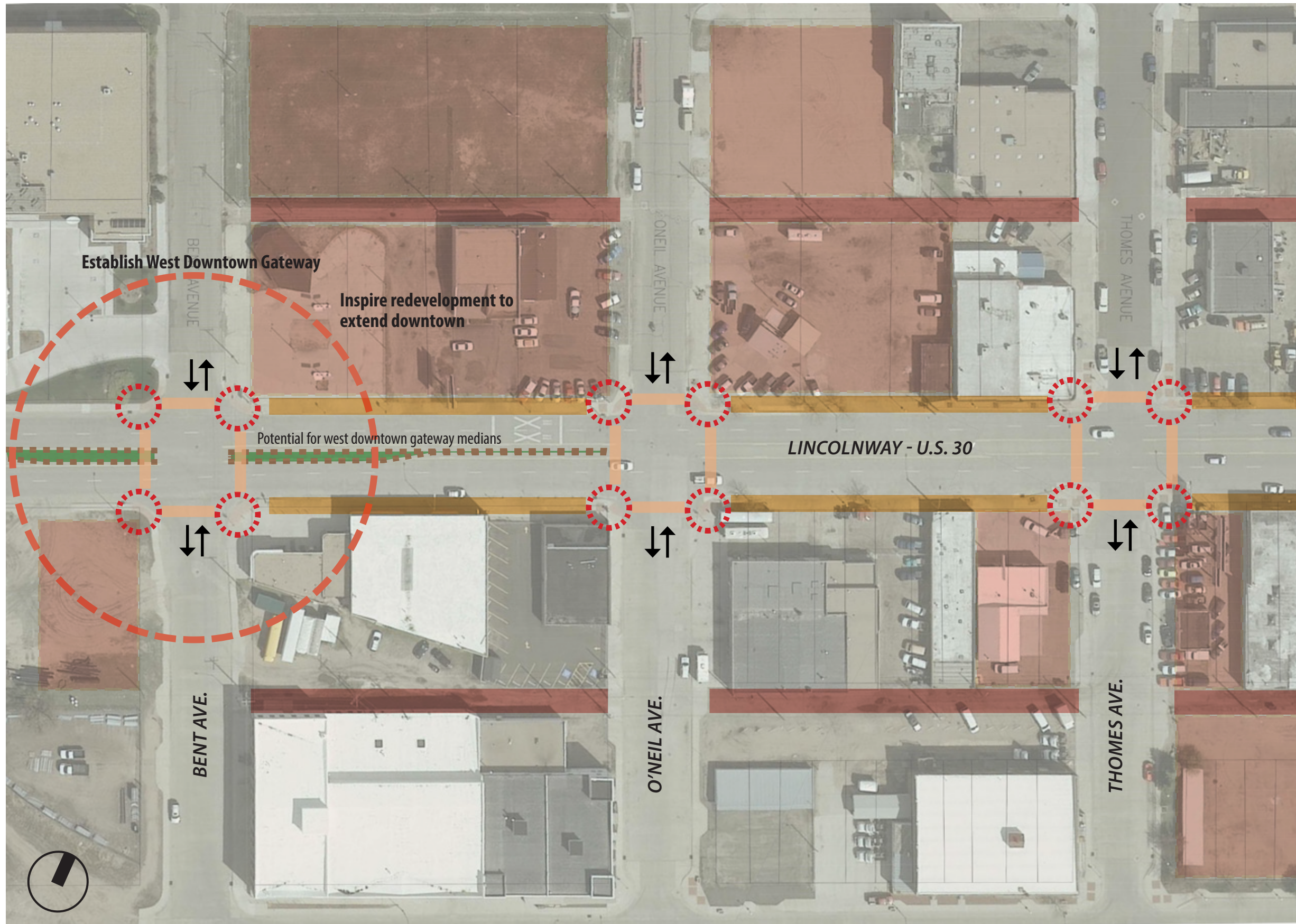
Potential Median

- Replication or variation of existing design
- Minimal planting
- Narrow trees where possible



Potential Enhanced Alley Connections

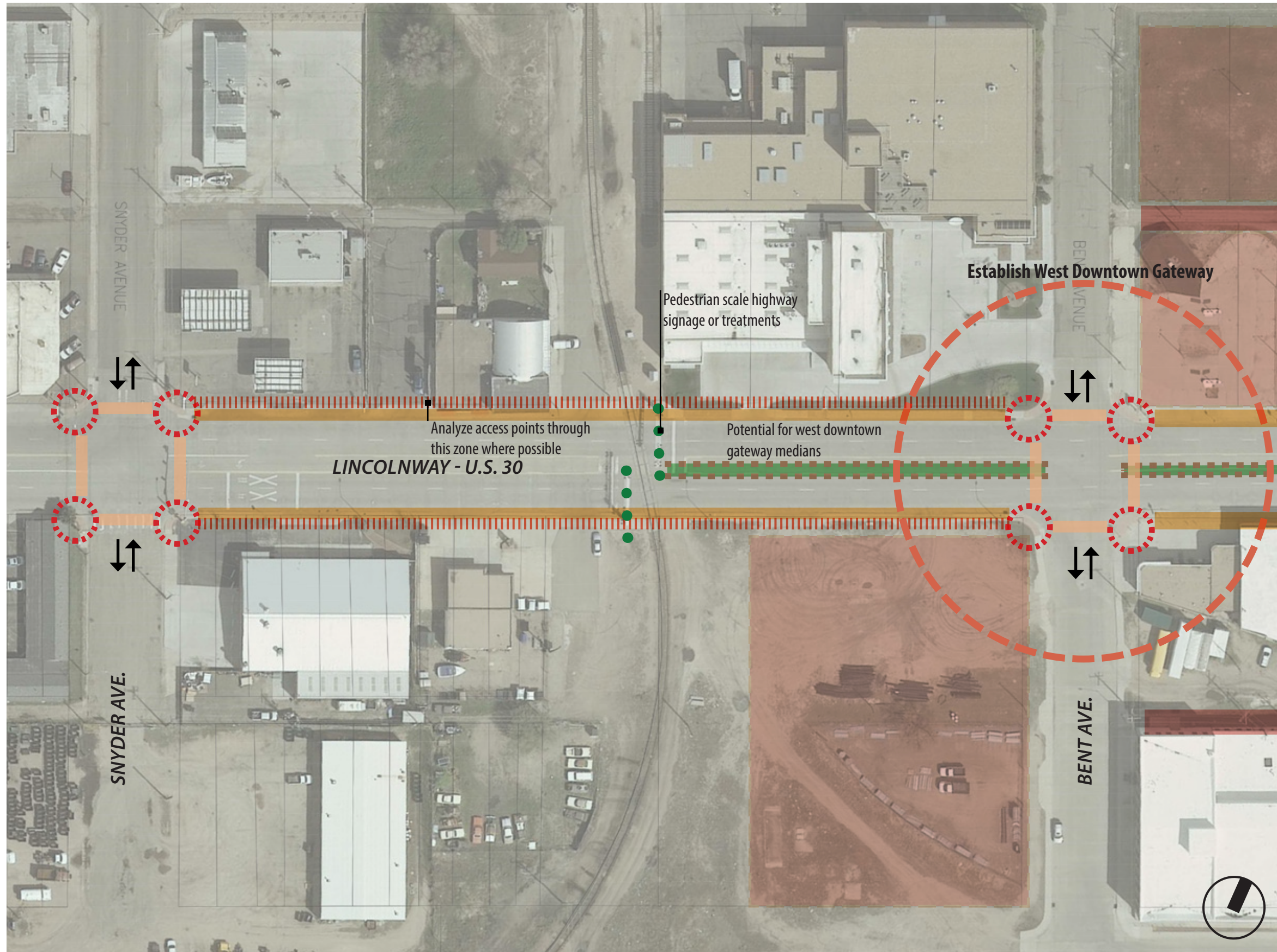
- Underground utilities
- Enhanced paving
- Lighting
- Planting



- QUESTIONS**
1. West downtown gateway at bent?
  2. Are gateway medians appropriate here?
  3. Should alleys be enhanced here?
  4. Should sidewalks be improved/widened if possible?

**LEGEND-  
POTENTIAL STRATEGIES AND OPPORTUNITIES**

- Potential To Enhance Streetscape**
  - Street trees
  - Lighting enhancements
  - Enhanced paving
  - Widen sidewalks if possible
- Potential To Enhance Bulbouts**
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**QUESTIONS**

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**LEGEND-  
POTENTIAL STRATEGIES AND OPPORTUNITIES**

Potential To Enhance Streetscape

- Street trees
- Lighting enhancements
- Enhanced paving
- Widen sidewalks if possible



Potential To Enhance Bulbouts

- Planting
- Seatwalls
- Paving
- Increase width if possible



Potential Median

- Replication or variation of existing design
- Minimal planting
- Narrow trees where possible



Potential Enhanced Alley Connections

- Underground utilities
- Enhanced paving
- Lighting
- Planting



LINCOLNWAY CROSSING AT CAPITOL AVE.



CAPITOL AVE. CROSSING



LINCOLNWAY CROSSING AT CENTRAL AVE.



FARMERS' MARKET

The above photos taken during public events at the Depot Plaza illustrate the need for safe, enhanced pedestrian crossings at Lincolnway and Capitol Ave., Lincolnway and Central Ave. while considering potentially closing Capitol Ave. for events, to ease pedestrian flow along 15th street while expanding vendor opportunities onto Capitol Ave.



CROSSING AT DEPOT

CHEYENNE CHARACTER IMAGES



**GROUND FLOOR ACTIVATION**



**PARKING AS EDGE AND SEPARATOR**



**LIGHTING - FULL CUT-OFF LED**



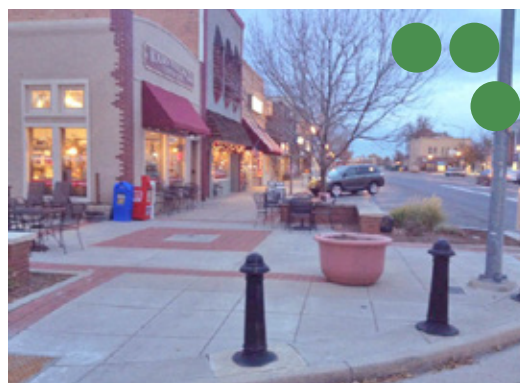
**PEDESTRIAN DOMAIN/HUMAN SCALE ELEMENTS**



**PAVEMENT TYPES**



**MEDIANS FOR HUMAN SCALE IN ROADWAY**



**BULB-OUTS AND EDGES AT STREET CROSSINGS**



**BENCHES**



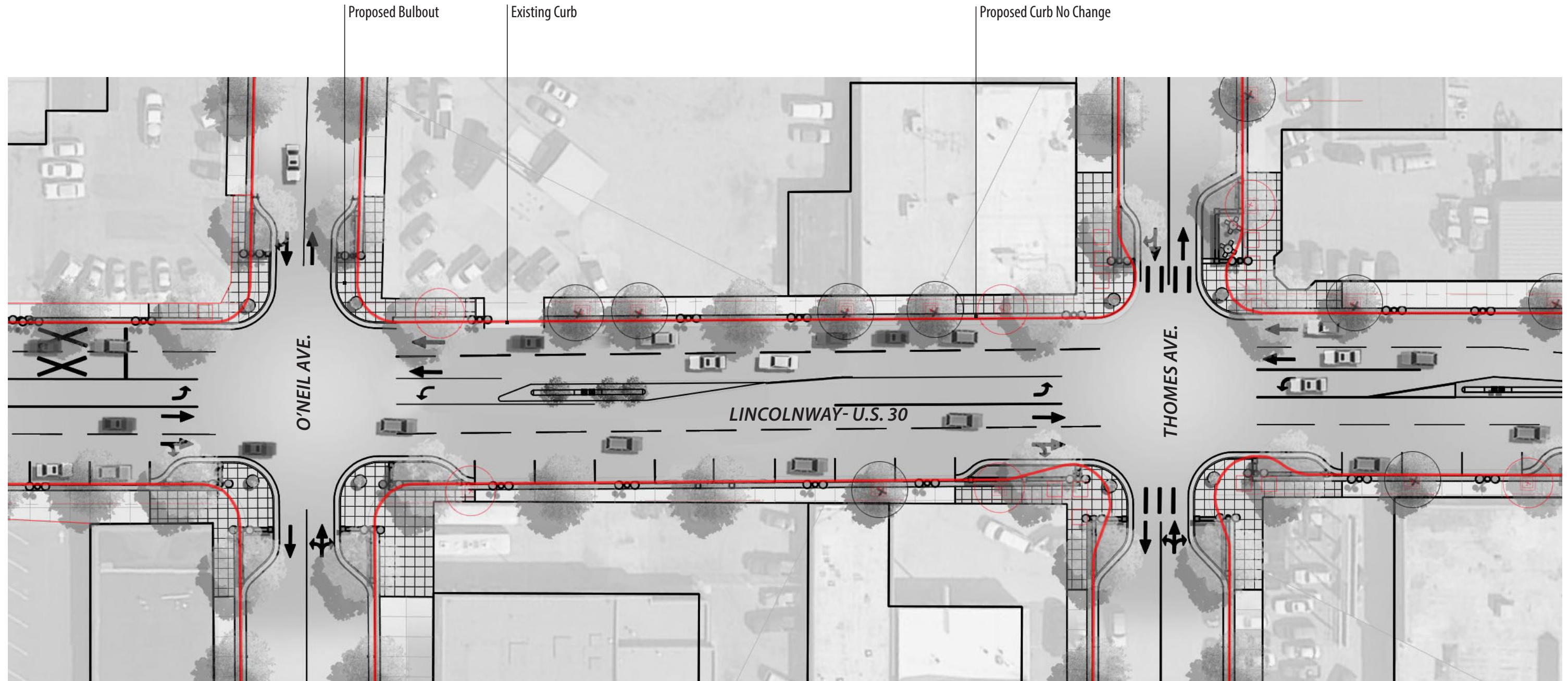
**SEAT WALLS / WALLS**



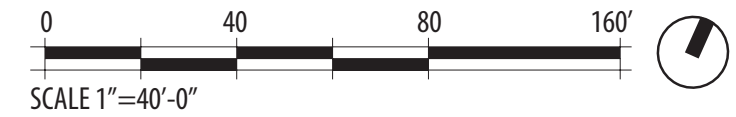
**REMOVABLE BOLLARDS**



The images above summarize the results from the Visual Preferencing exercise provided during Workshop 1. Attendees were asked to place a limited number of red and green dots on images they find most appropriate or inappropriate. In general, traditional streetscape elements were preferred as well as elements consistent with current Downtown streetscapes and spaces.

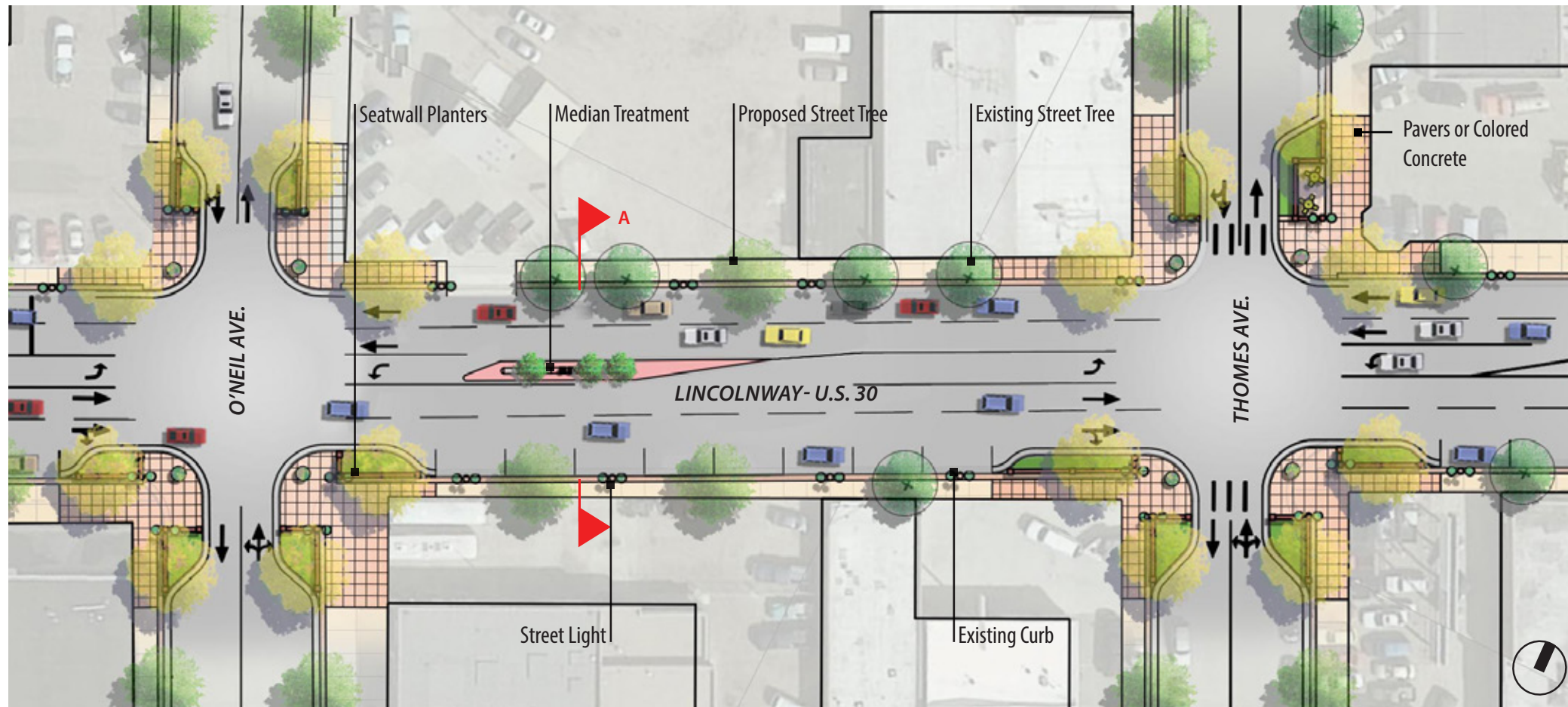


The 5 Lane Plan proposes to retain the existing 5 lanes of traffic along Lincolnway (U.S. 30). Intersections are enhanced with bulb-outs while the existing east-west curbs remain in their existing locations. Mid block bulb-outs are added along the south side of Lincolnway within the parallel parking zone. To the north of Lincolnway parking (some parallel and some diagonal) are added to the north-south feeder streets to help alleviate parking issues for the downtown area. This alternative retains existing tree locations with additional trees to be added for a more uniform effect. Irrigation to trees would be bored through existing tree root zones in a shared trench with electric lines at the back of curb.

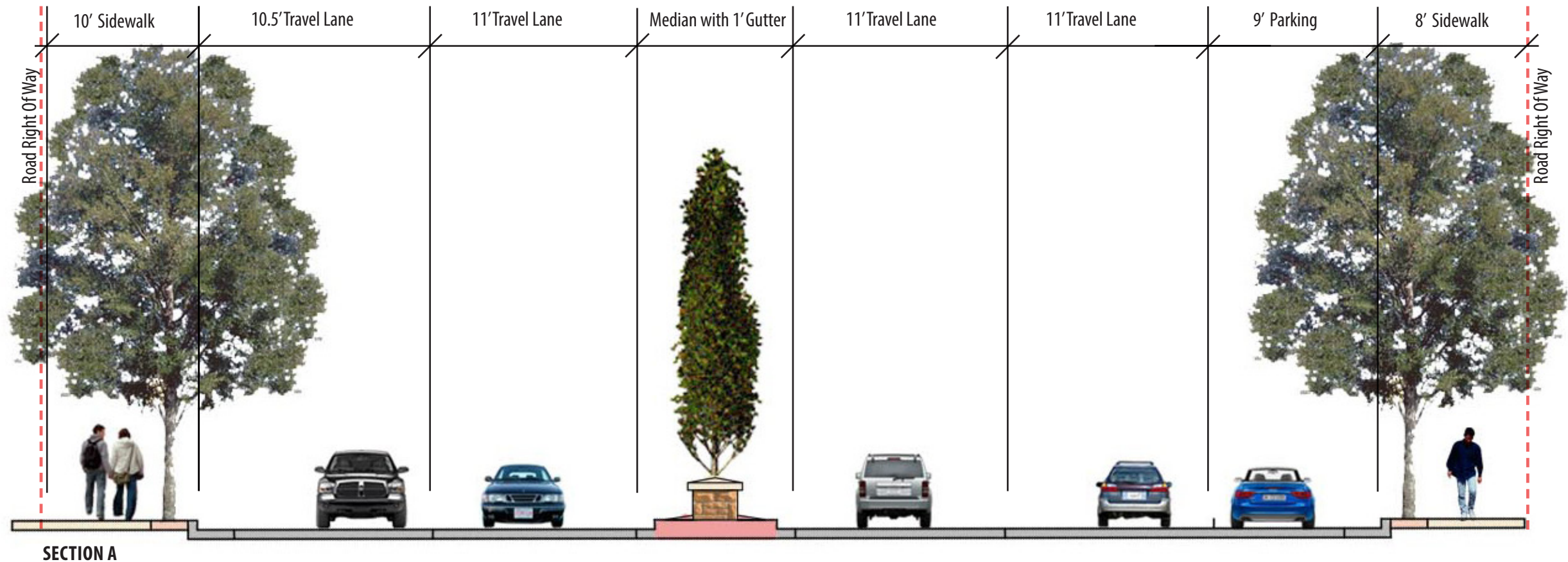


**5 LANE PLAN**  
**BASIC FRAMEWORK (O'NEIL TO THOMES)**



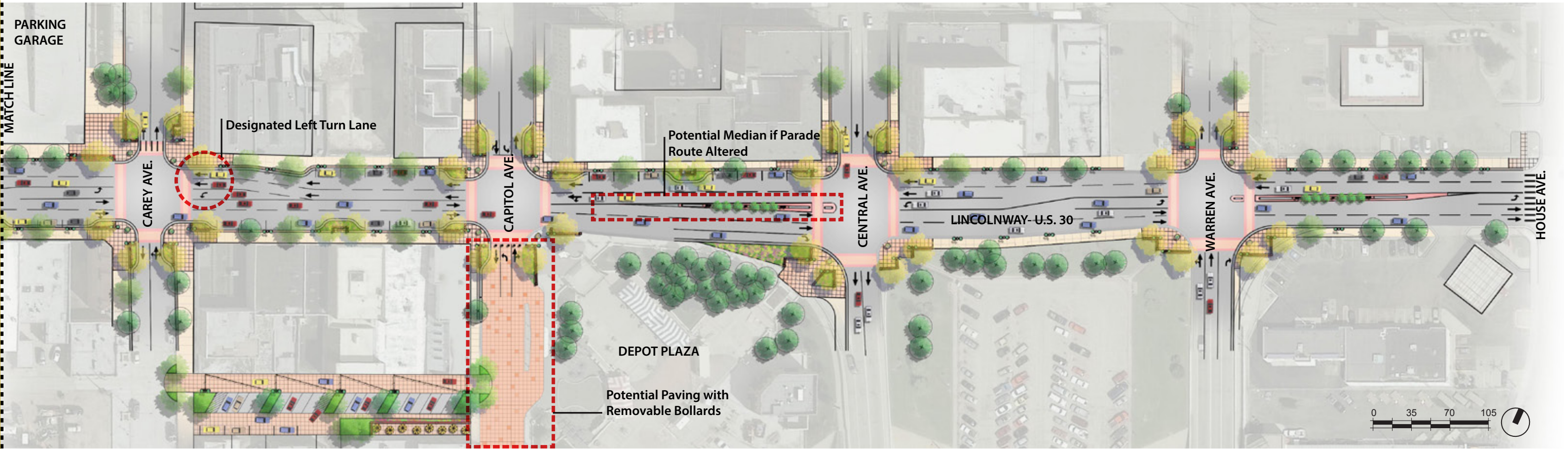
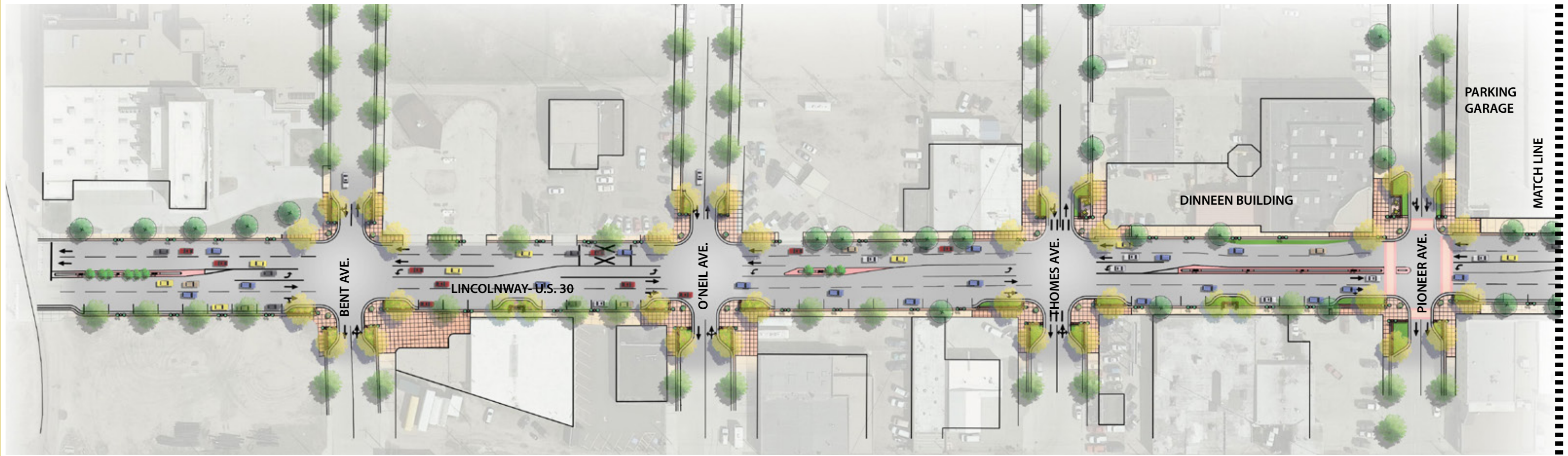


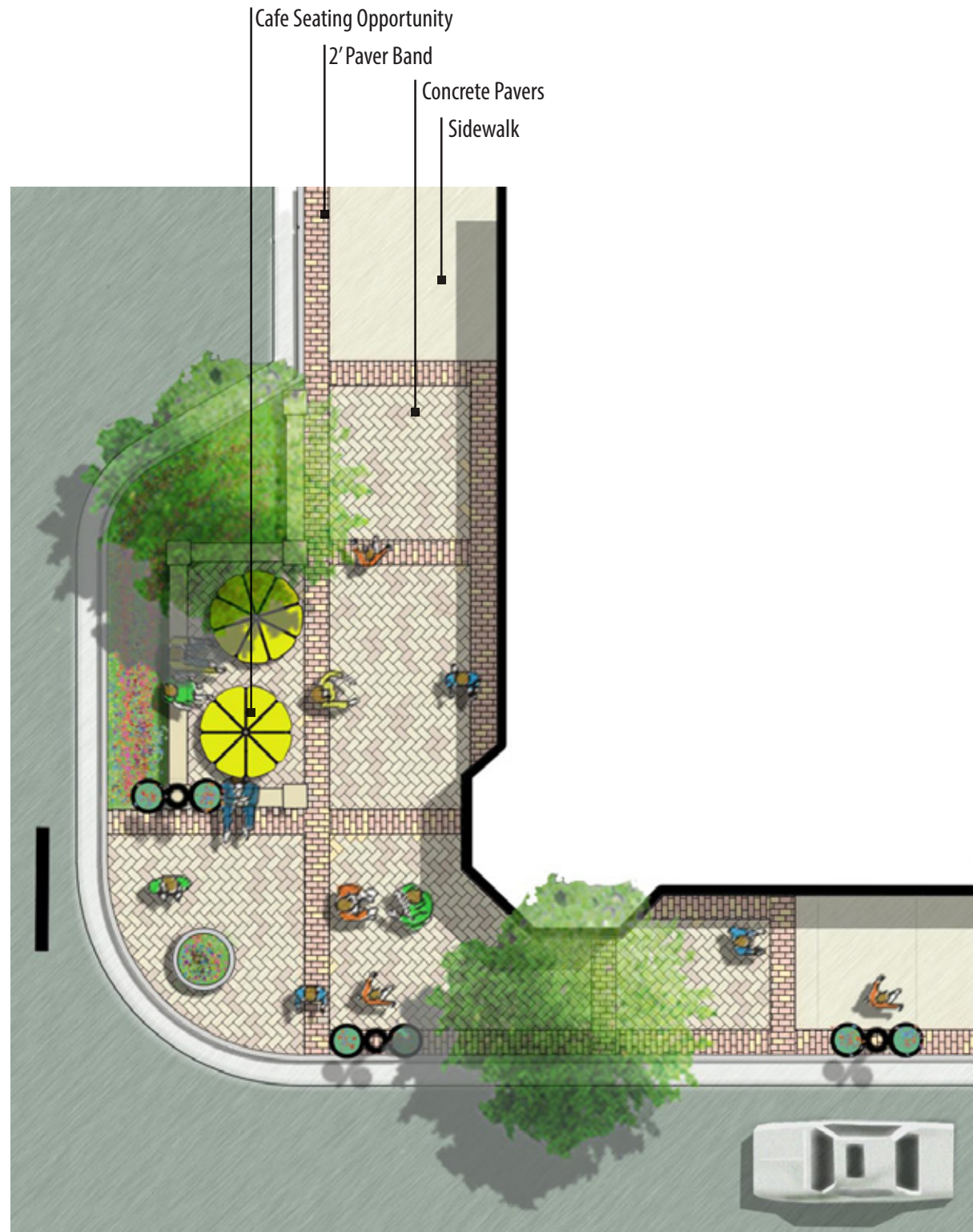
PLAN



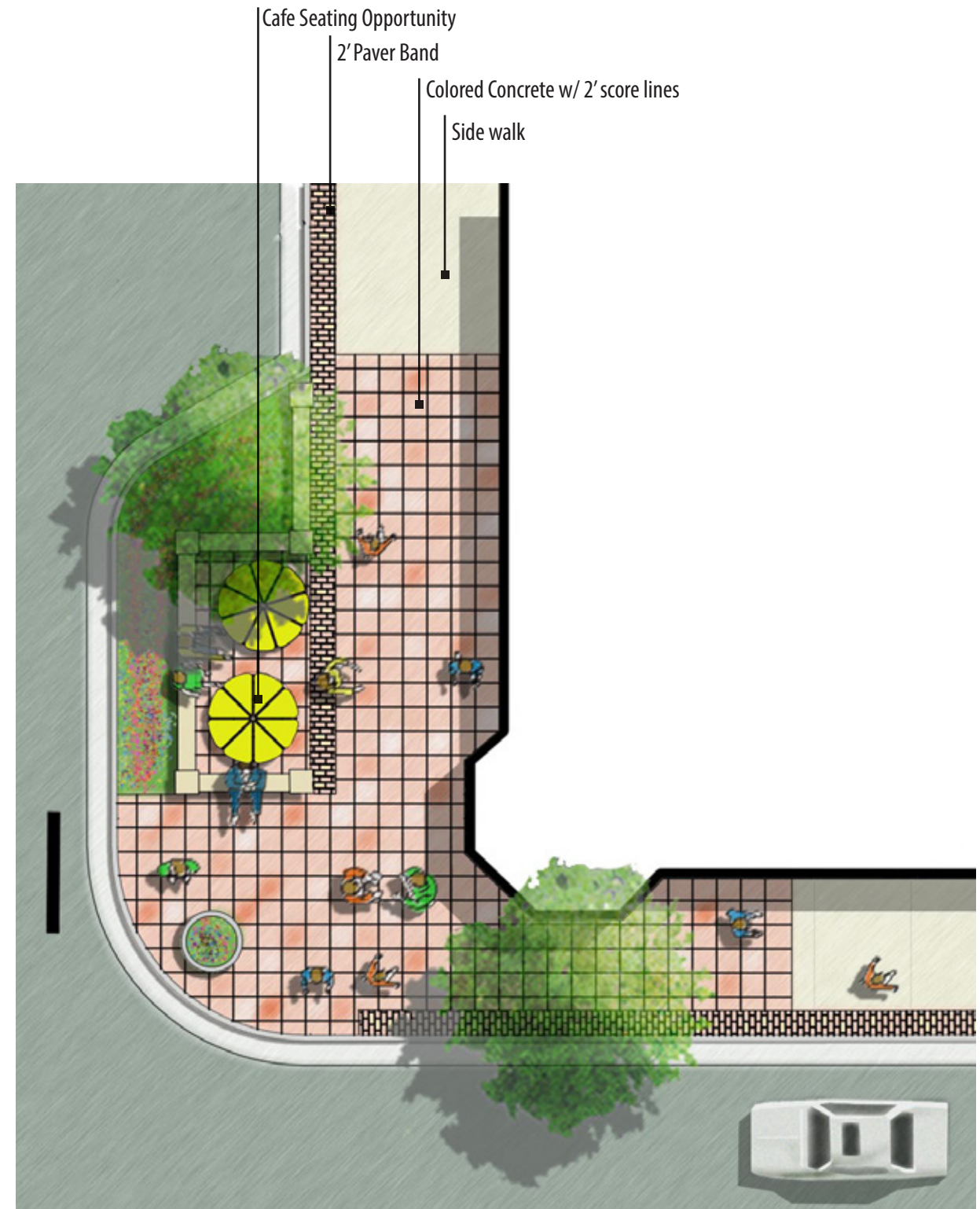
SECTION A

**5 LANE PLAN**  
**BASIC FRAMEWORK (O'NEIL TO THOMES)**



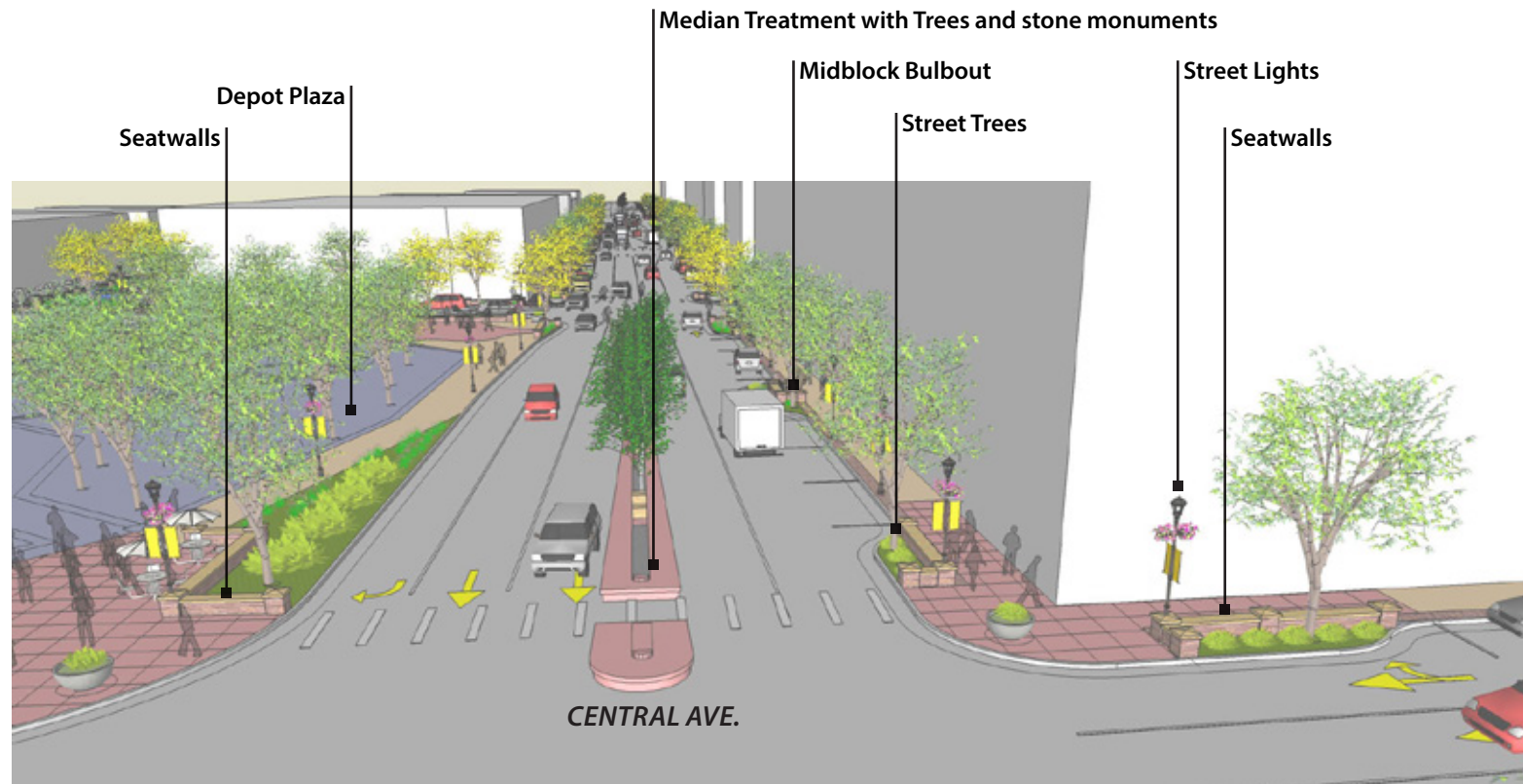


PAVEMENT OPTION 1

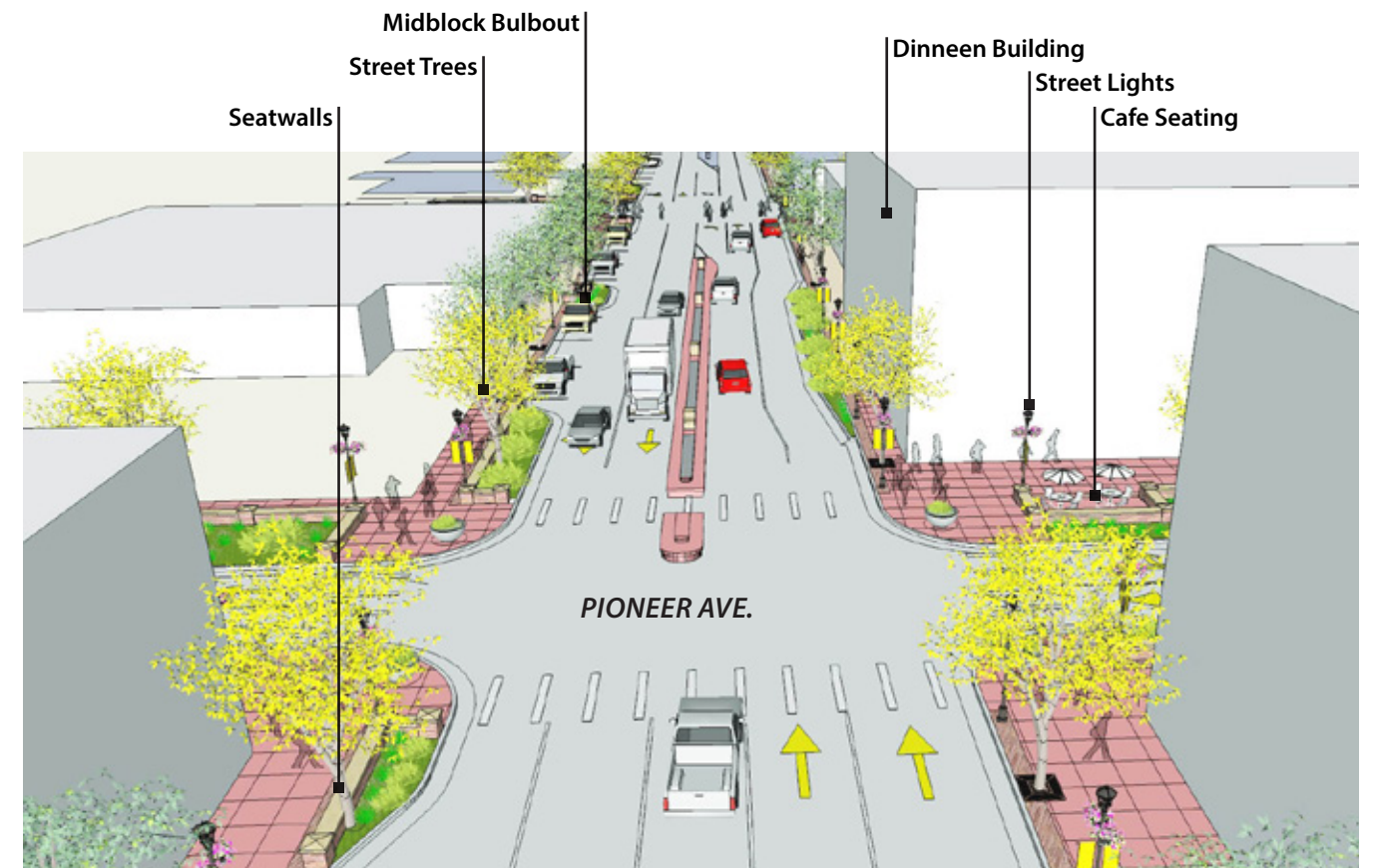


PAVEMENT OPTION 2



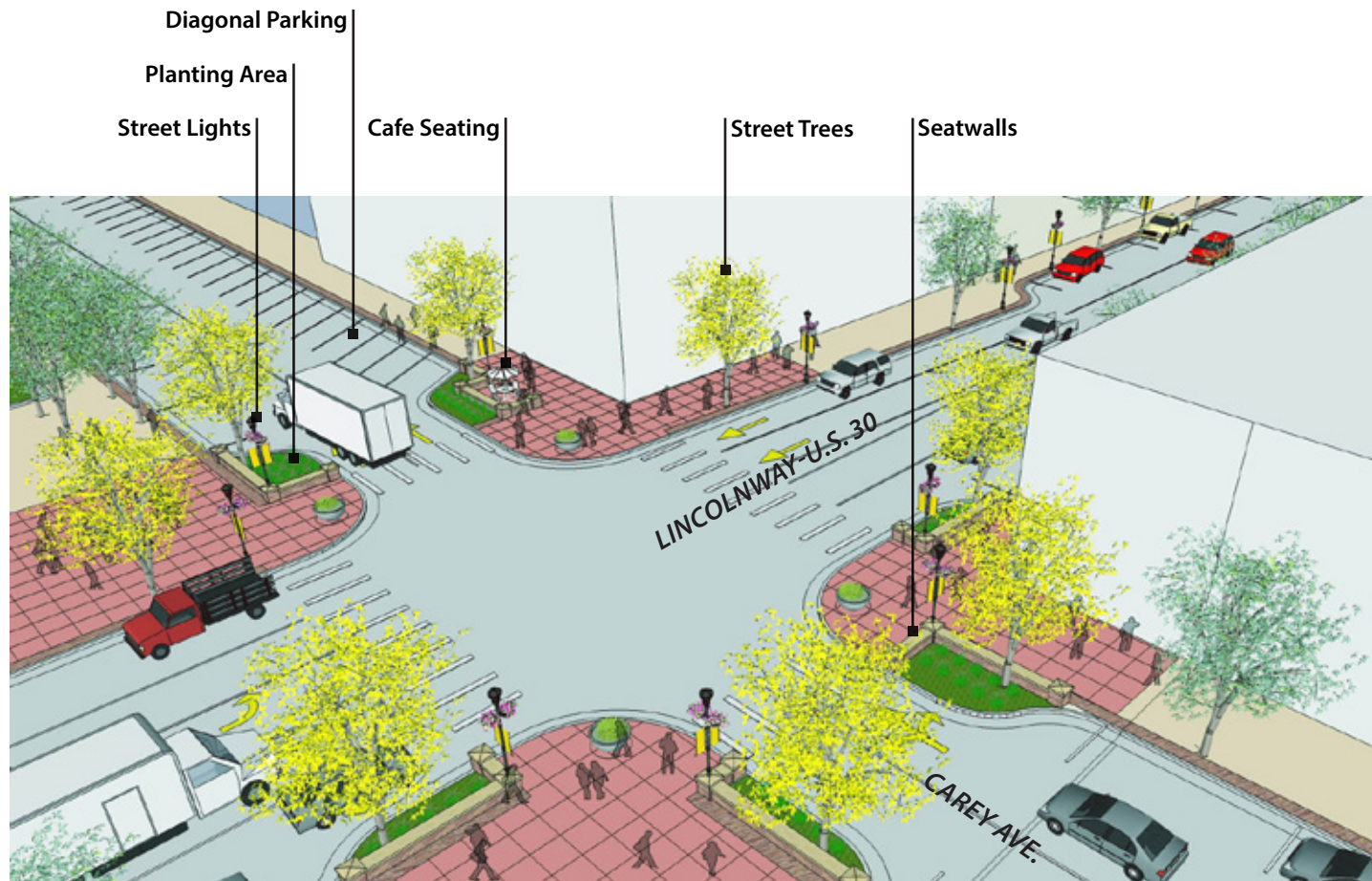


CENTRAL AVE. LOOKING WEST ALONG LINCOLNWAY U.S. 30

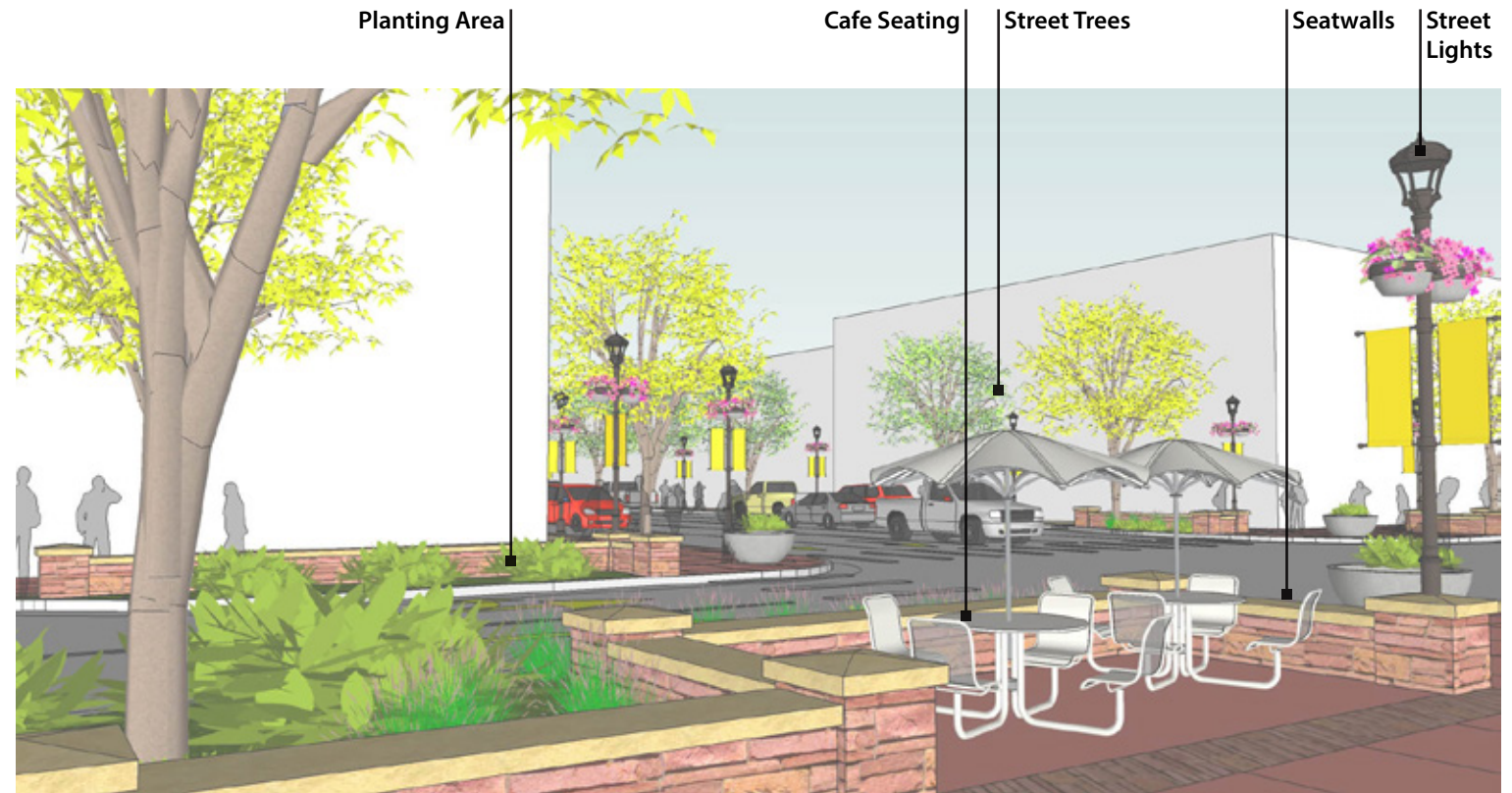


PIONEER AVE. LOOKING WEST ALONG LINCOLNWAY U.S. 30

The above renderings depict the addition of medians at pioneer and central, acting as a pedestrian refuge for street crossings. Stone seatwalls, similar to those in the Depot Plaza, with planting beds facing roadways are added at bulbouts, for seating and to create the perception of safety and separation from roadways. Where possible, permanent umbrellas, tables and chairs are added for cafe type seating, creating additional corner activation. Pedestrian scale, LED, full cut-off streetlights with fixed hanging baskets and adjustable banners are added for safety, and streetscape uniformity, while allowing banners to be changed according to events or seasons as needed.



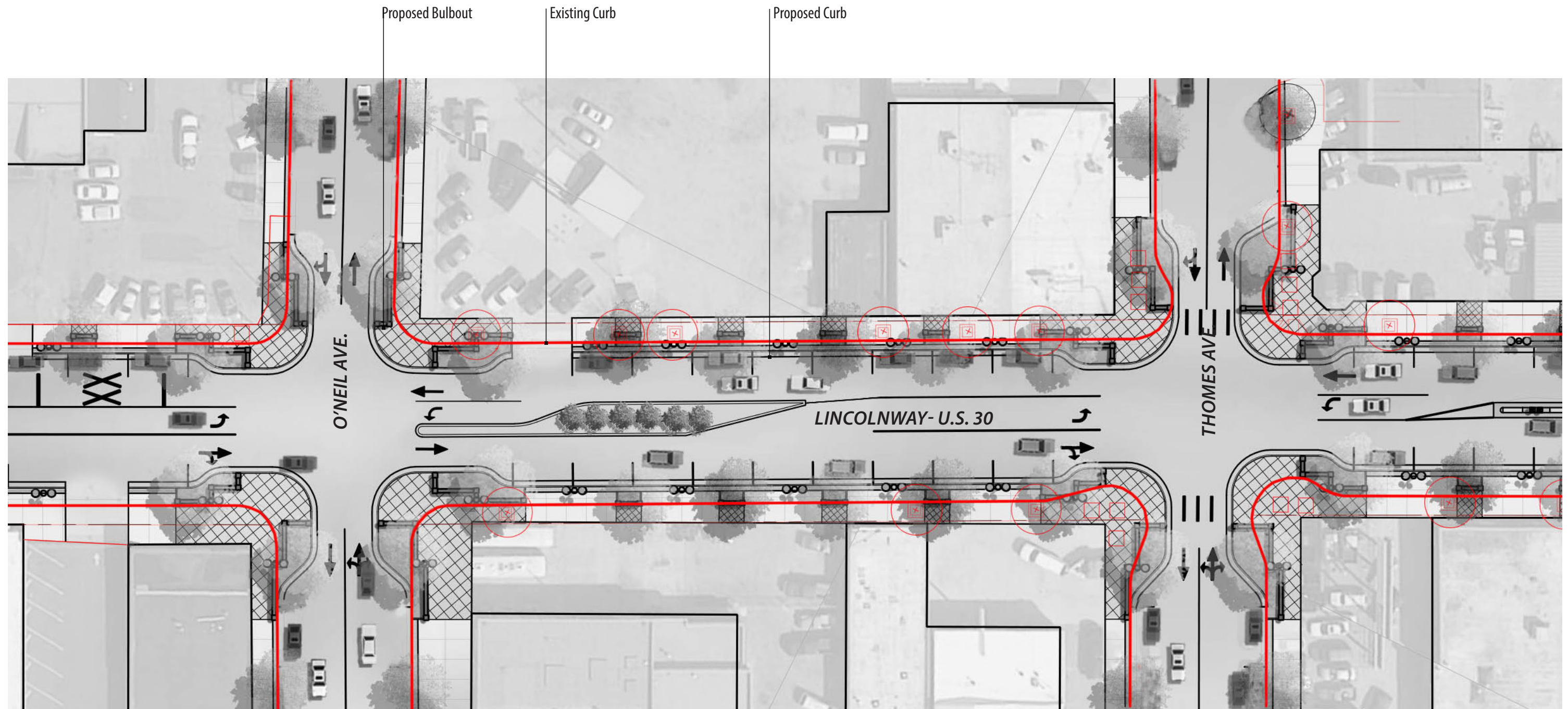
CAREY AVE. LOOKING NORTH AT THE LINCOLNWAY U.S. 30 INTERSECTION



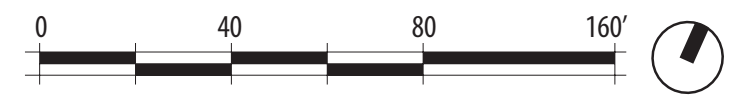
STREET VIEW LOOKING AT A CAFE SEATING AREA

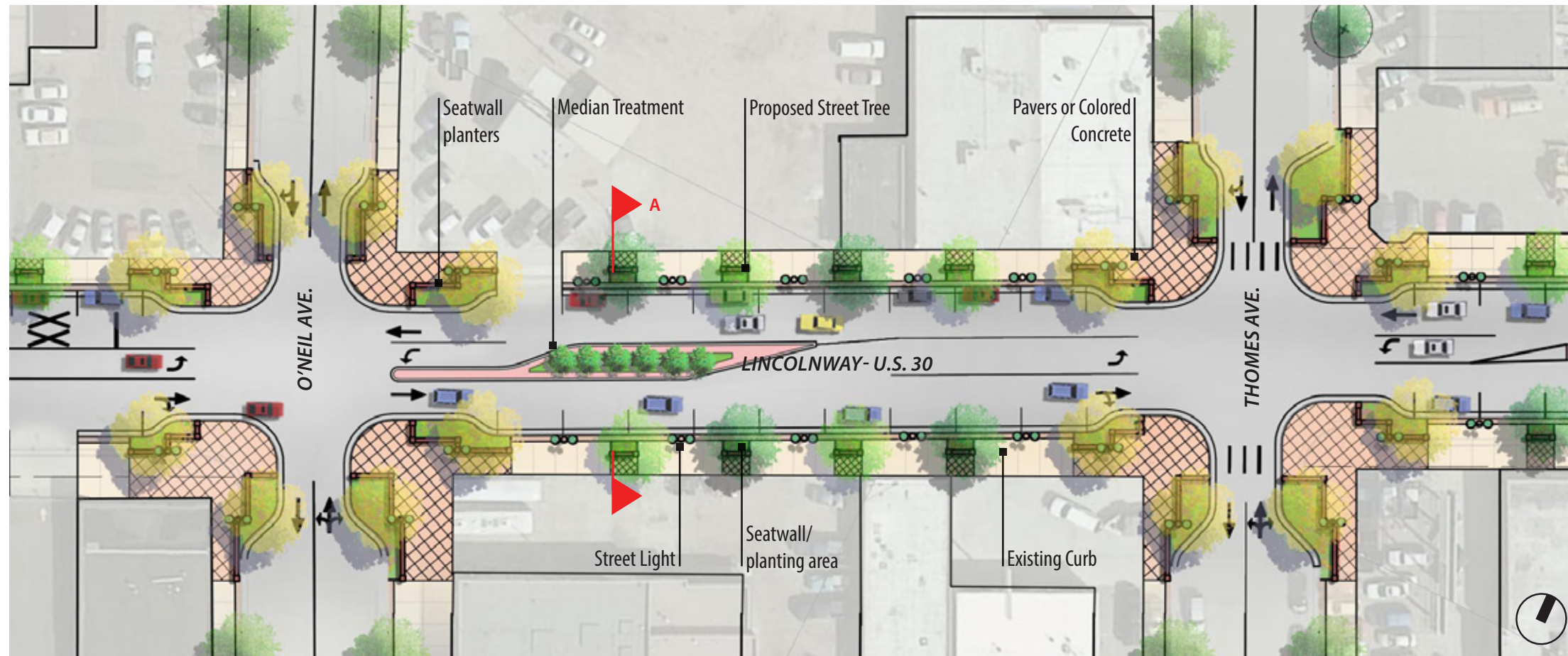


**5 LANE PLAN**  
VIEW LOOKING EAST AT CAREY AVE.

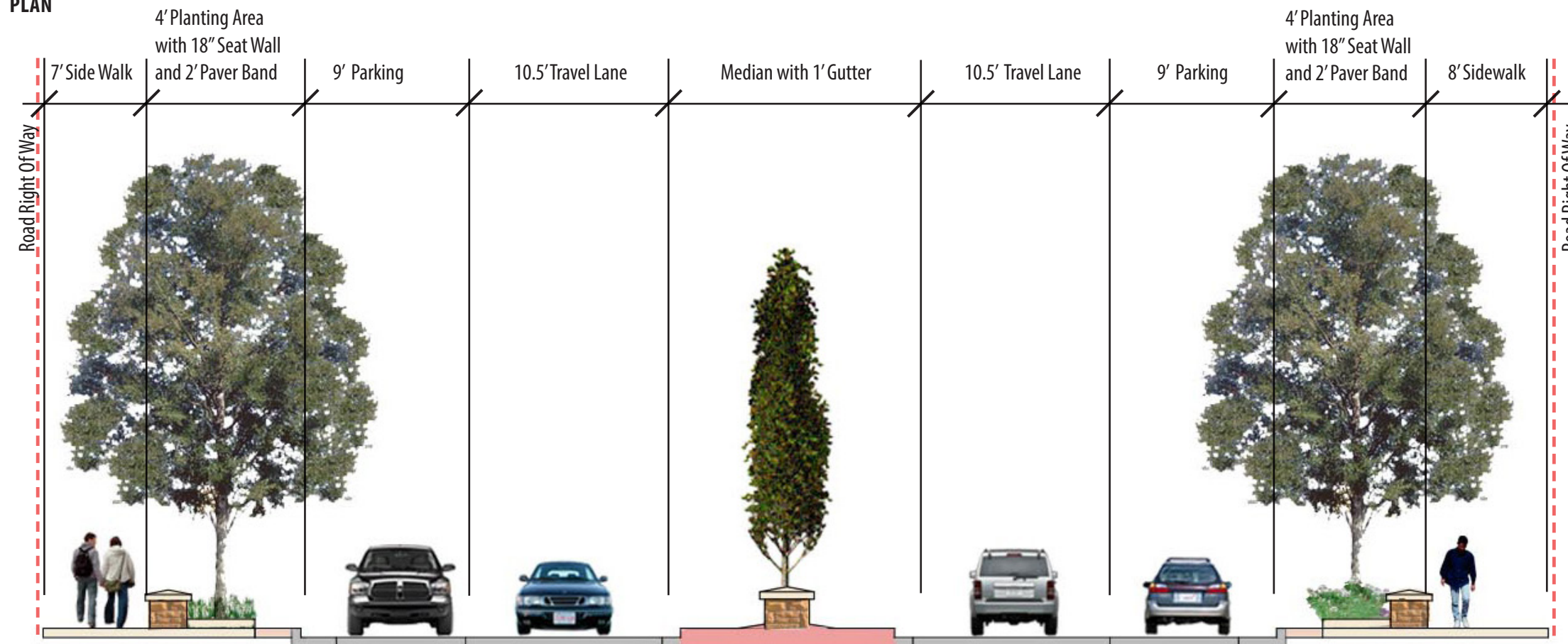


The 3 Lane Plan proposes to remove two of the existing lanes traffic along Lincolnway (U.S. 30). Intersections are enhanced with bulb-outs to provide for pedestrian space, reduce pedestrian crossing time and create additional seating. Sidewalks increase in width by approximately four feet on either side of Lincolnway, creating additional opportunities for seating and planting. A consistent tree canopy adds character, provides structure and shade, and softens the street edges. Parallel parking is added to the north and south sides of Lincolnway to serve downtown businesses and increase the potential for additional retail. To the north of Lincolnway parking (some parallel and some diagonal) is shown along the north-south feeder streets.





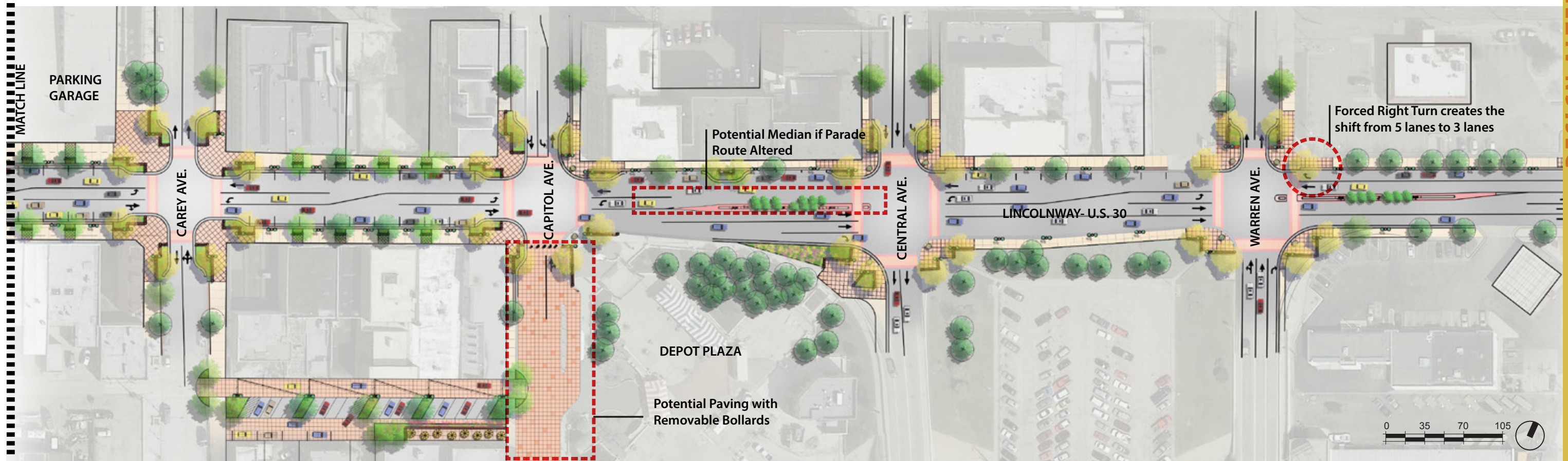
PLAN



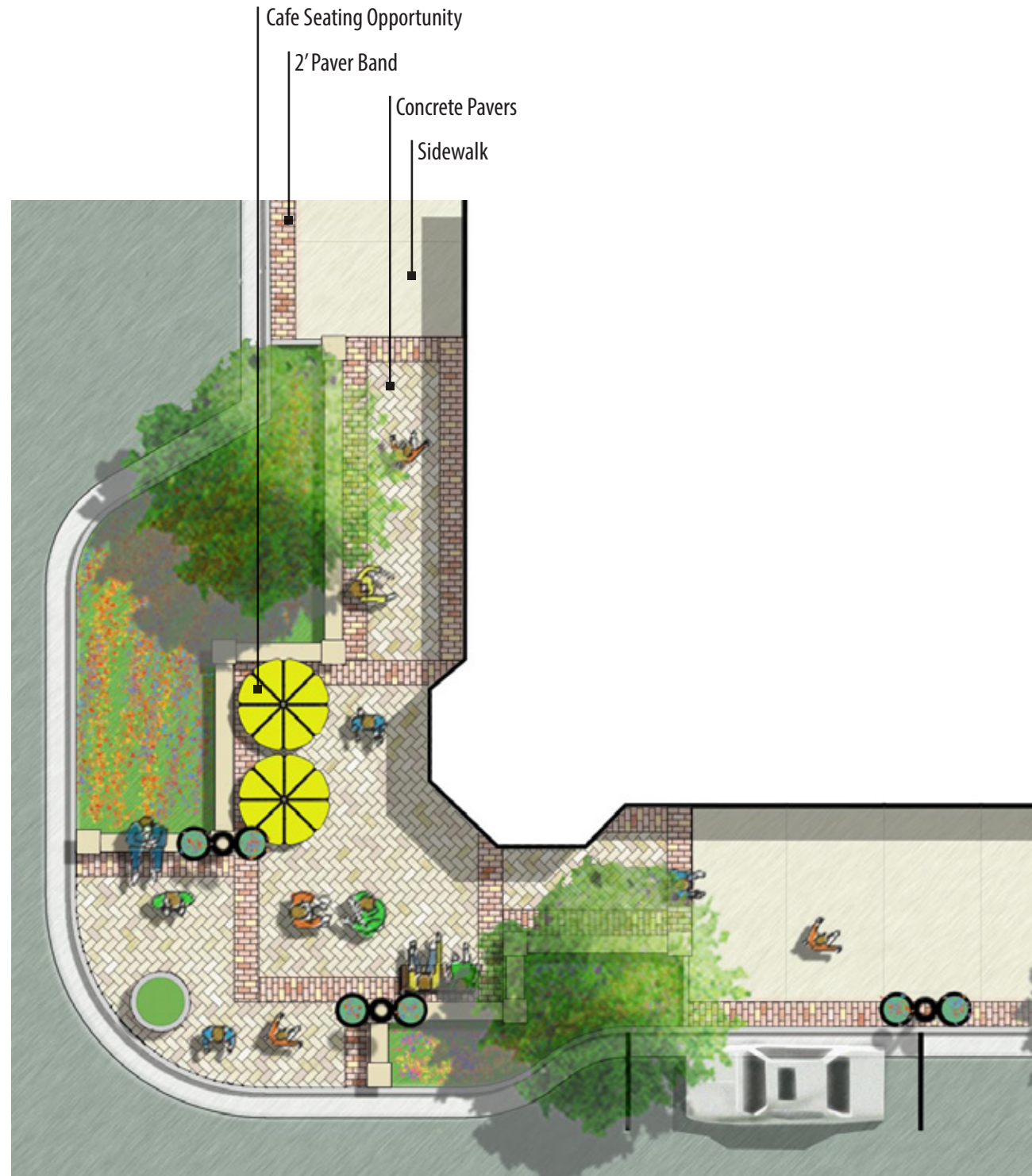
SECTION A

**3 LANE PLAN**  
**BASIC FRAMEWORK (O'NEIL TO THOMES)**

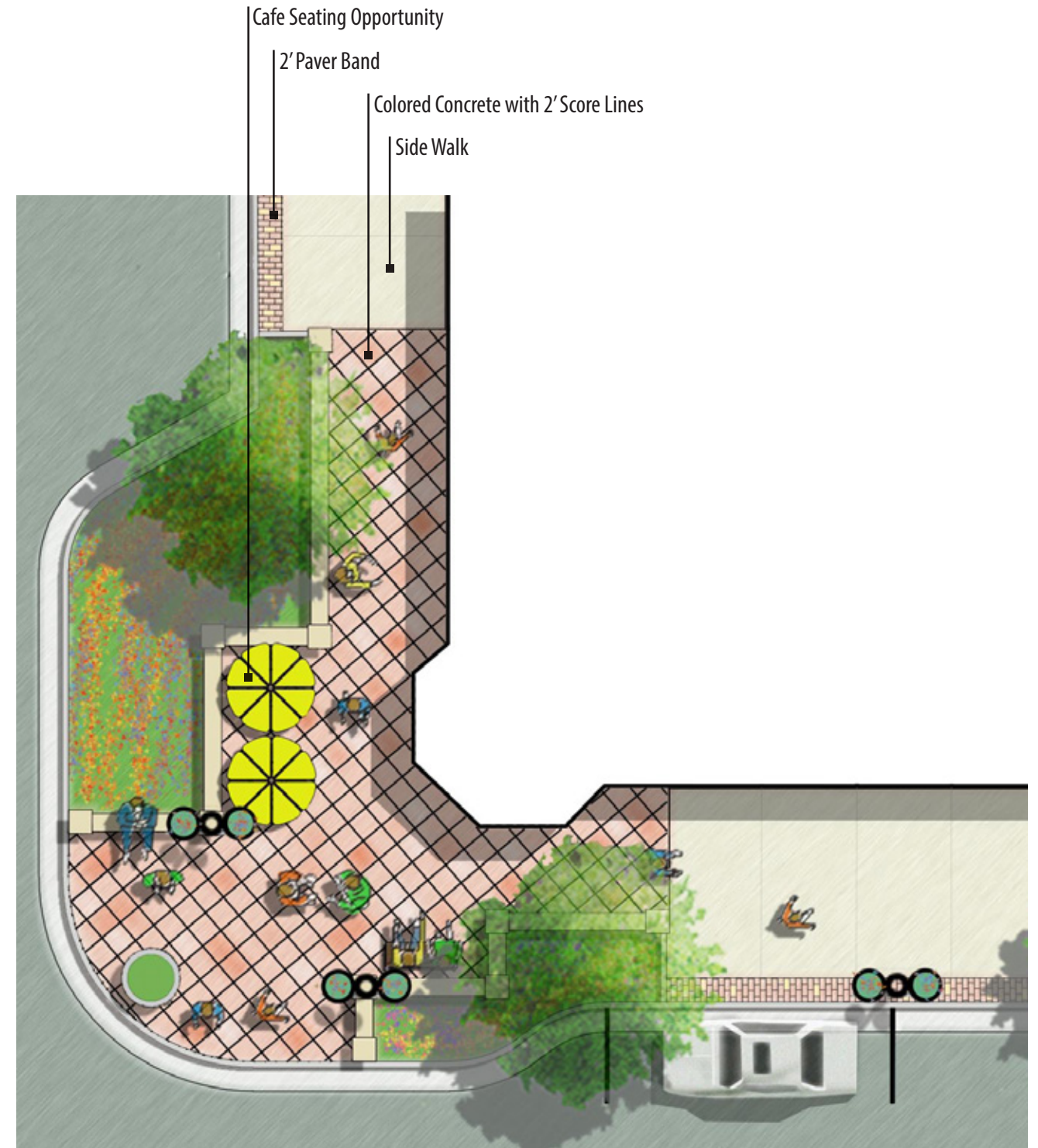




**3 LANE PLAN - HOUSE AVE. TO RAILROAD TRACKS**

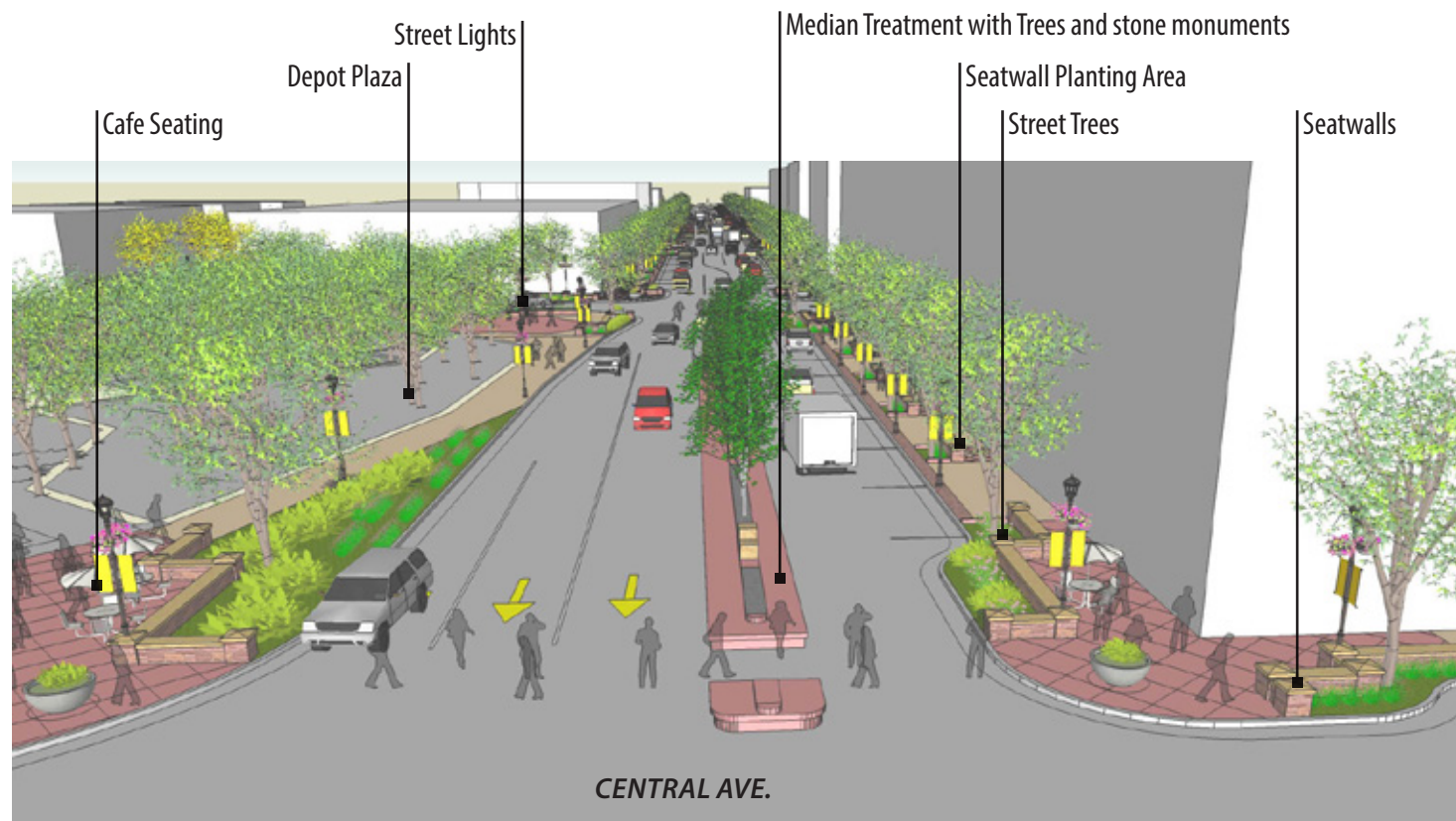


PAVEMENT OPTION 1

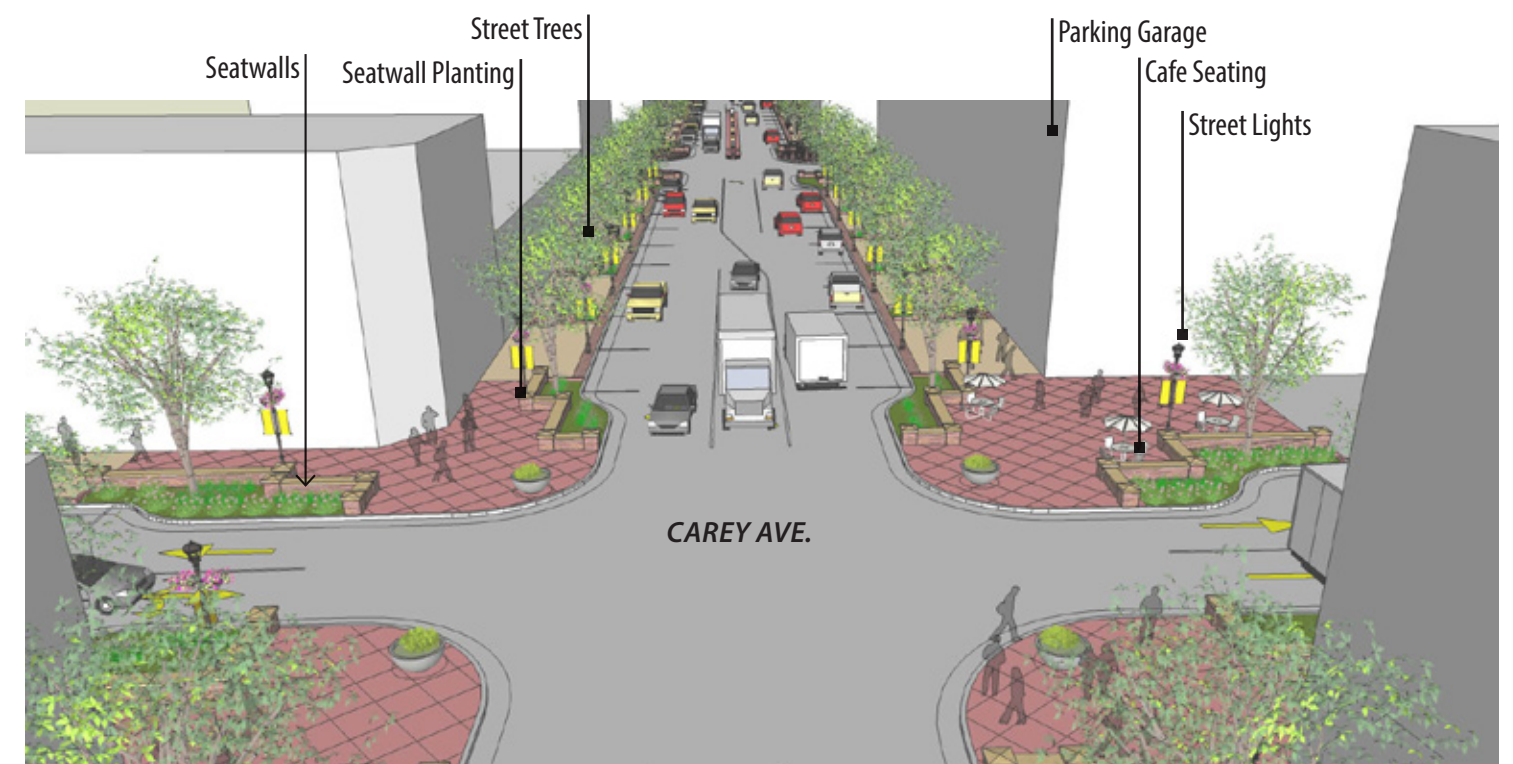


PAVEMENT OPTION 2



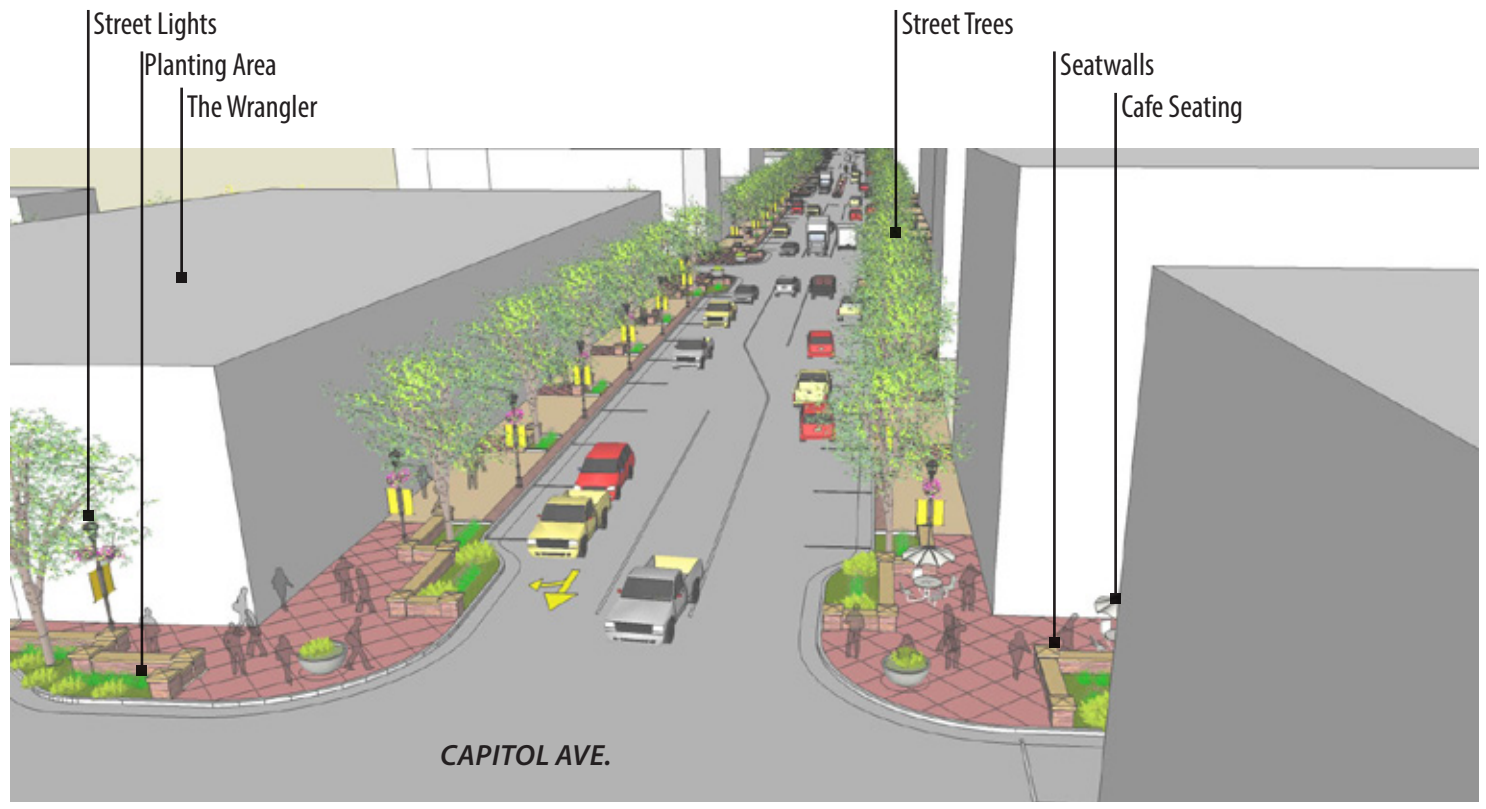


**CENTRAL AVE. LOOKING WEST ALONG LINCOLNWAY U.S. 30**

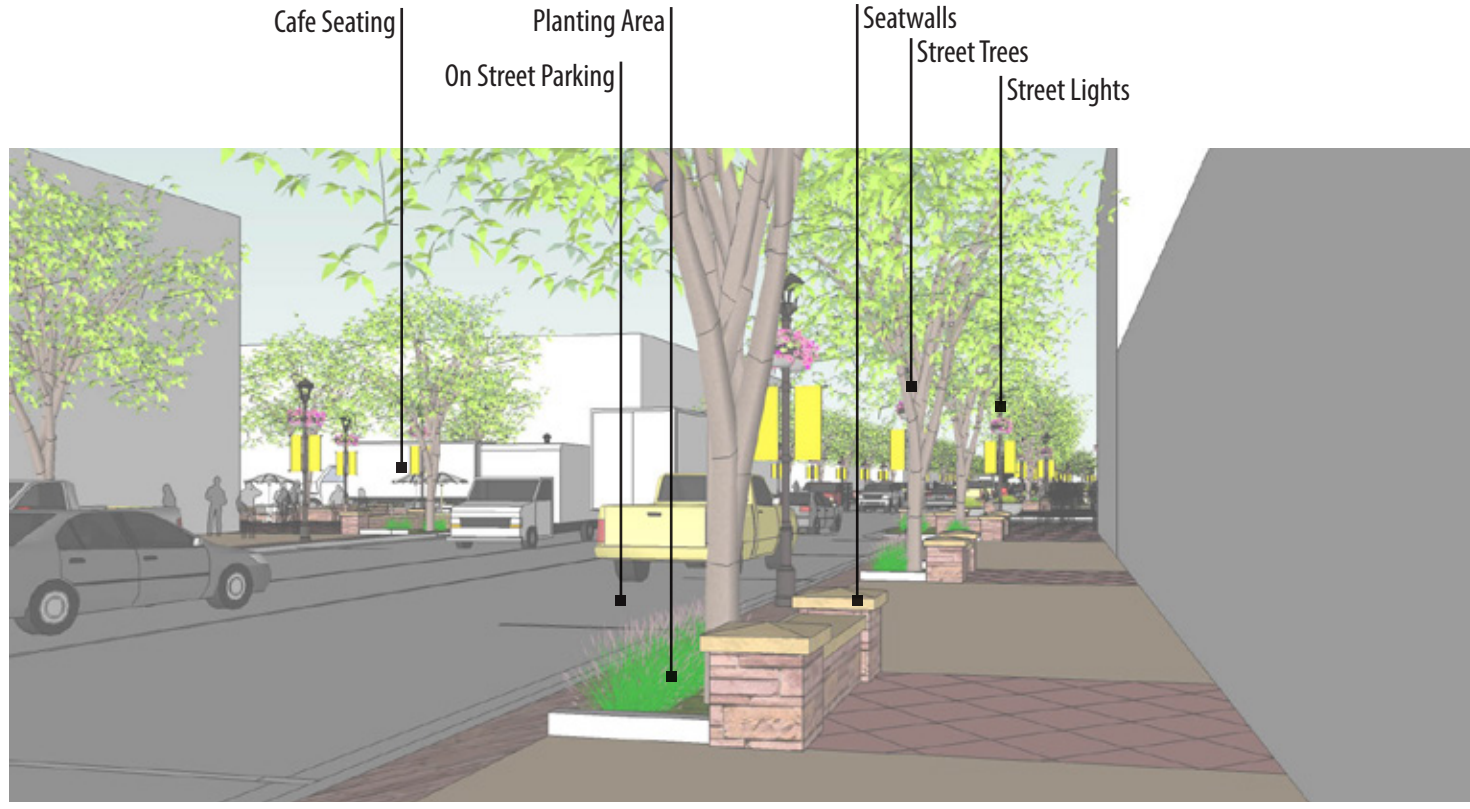


**CAREY AVE. LOOKING WEST ALONG LINCOLNWAY U.S. 30**

The above renderings depict the addition of medians, acting as a pedestrian refuge for street crossings. Bulbouts are significantly enlarged in comparison to the 5-Lane plan, with more opportunity for social seating in nooks and additional cafe seating opportunities. Corner activation potential is significantly greater in this alternative with the creation of true pedestrian scale intersections that provides a safe environment and reduces pedestrian crossing time at intersections. In this alternative, pedestrian scale, LED, full cut-off streetlights are again shown with fixed hanging baskets and adjustable banners are added for safety, and streetscape uniformity, while allowing banners to be changed according to events or seasons as needed.



CAPITOL AVE. LOOKING WEST ALONG LINCOLNWAY U.S. 30



STREET VIEW LOOKING EAST ALONG LINCOLNWAY U.S. 30





CAPITOL AVE. - BEFORE



CENTRAL AVE. - BEFORE



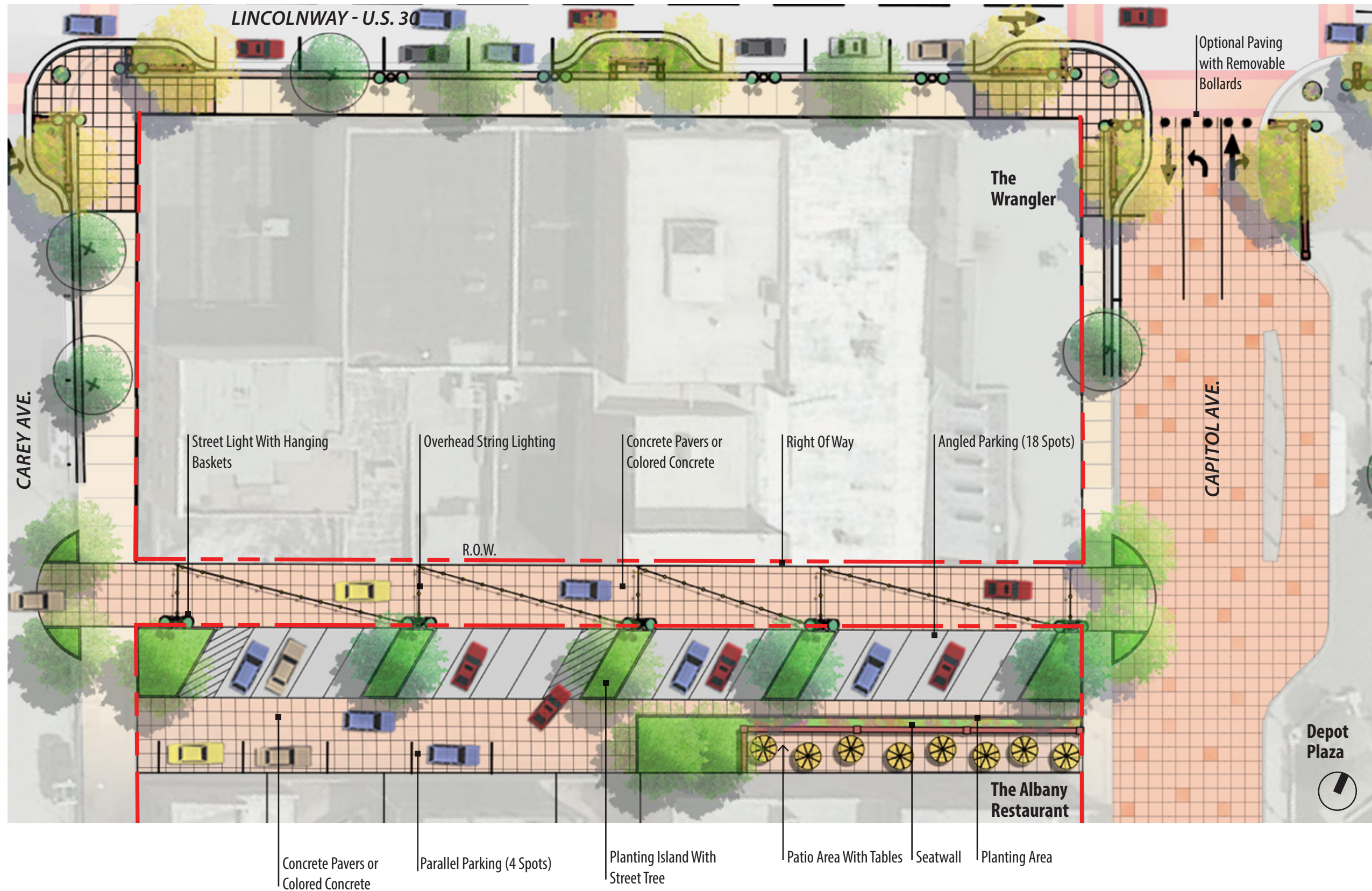
CAPITOL AVE. - AFTER



CENTRAL AVE. - AFTER

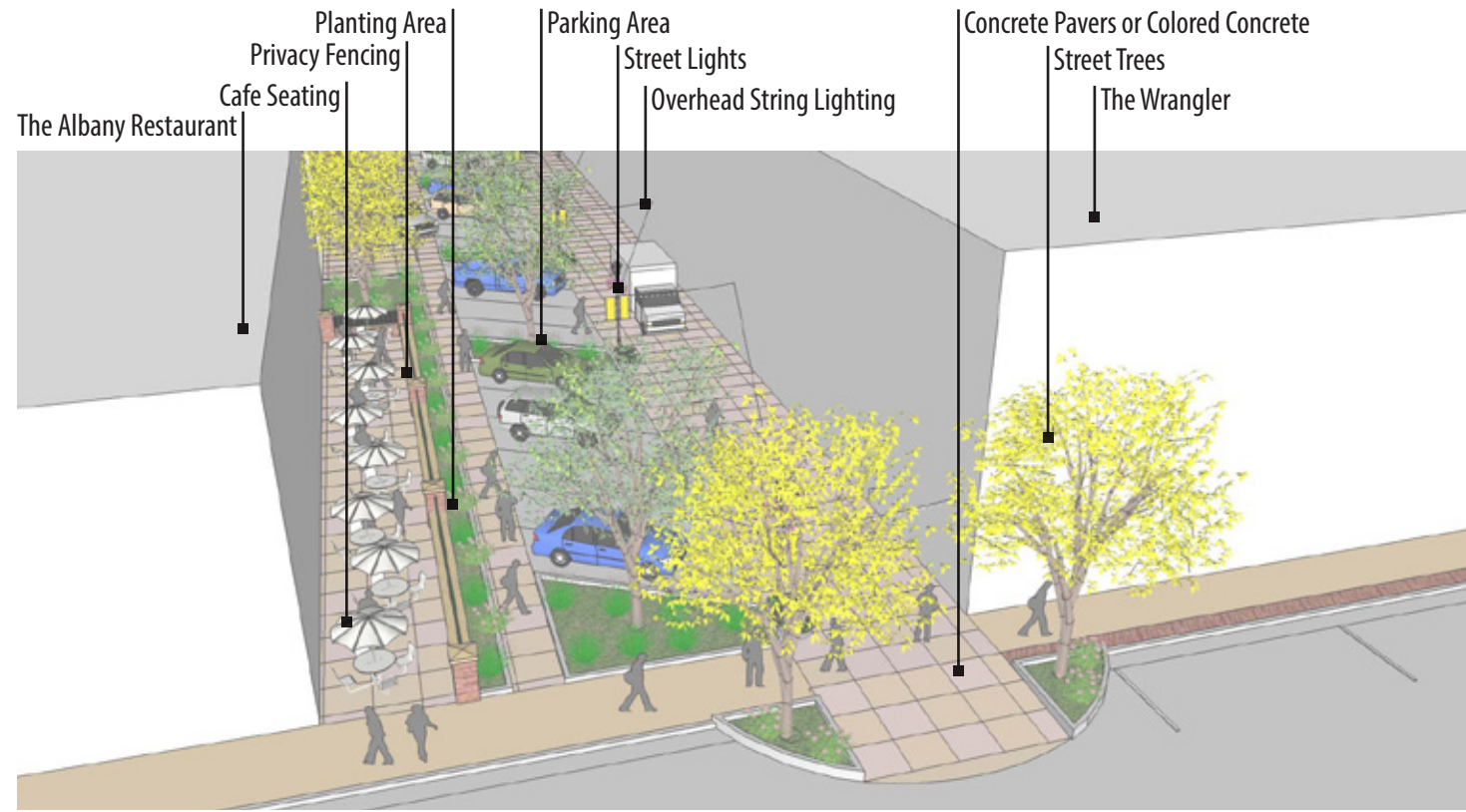
Additional 3d views of the corridor can be seen at [http://www.dhmdesign.com/WE/LW/West\\_Edge\\_Tour.html](http://www.dhmdesign.com/WE/LW/West_Edge_Tour.html)

**5 LANE PLAN - HOUSE AVE. TO RAILROAD TRACKS**

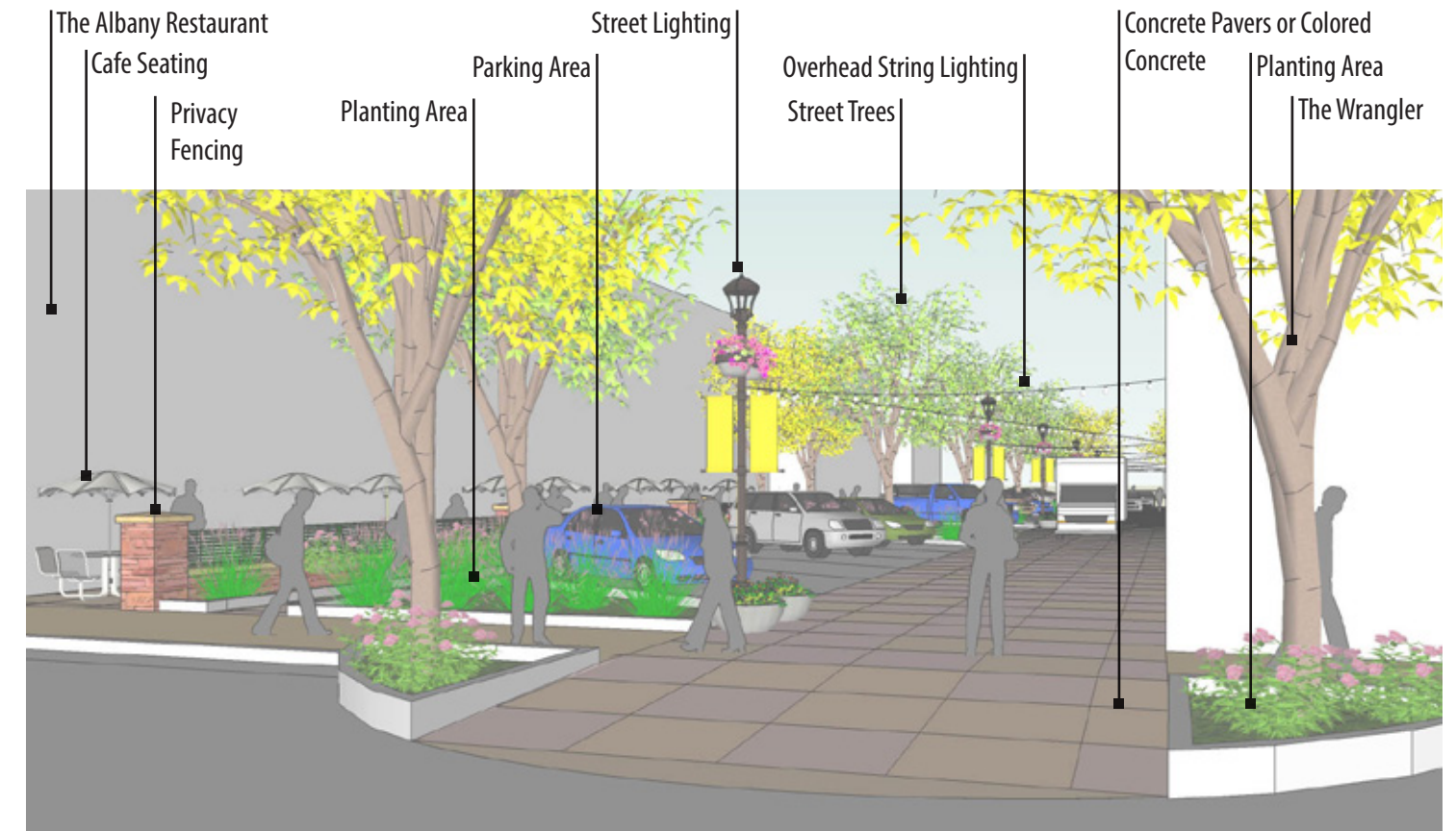


The above plan shows a potential plan for an enhanced multi-use alley from Carey Ave. to Capitol Ave. Diagonal parking is provided outside of the ROW to accommodate the needs of property owners. During events at the Depot Plaza, the parking spaces could be used for vendor tents with the alley closed for pedestrian use only. A courtyard with cafe seating is shown to the north of the Albany restaurant and parking is depicted along the remainder of the private property edge. Striped access

points are shown for vehicular access to this area. The alley ROW is enhanced with concrete or pavers, streetlights with hanging baskets and string lights spanning the ROW. Removable bollards at the intersection of Lincolnway and Capitol Ave. allow this segment of roadway to be closed during events, providing additional vendor space and enhancing east west pedestrian safety with a permeable crossing condition.



AERIAL VIEW FROM CAPITOL AVE. LOOKING WEST DOWN ALLEY



CAPITOL AVE. LOOKING WEST DOWN ALLEY

This hybrid plan depicts a 3-lane roadway configuration from Bent Ave. to Carey Ave. and a 5-lane configuration from Carey Ave. extending to the east. This concept allows for a 5-lane condition in the signalized zone to enhance traffic flow. Forced right turns that facilitate the 3-lane condition are shown at Bent Ave. and Carey Ave.

**ALLEY DESIGN**  
(CAPITOL AVE. TO CAREY AVE.)



	Downtown Business Enhancements			Pedestrian Safety and Experience			Downtown Gateway			Vehicular			Other	
Corridor Alternative	Streetscape Opportunities, i.e. café seating	Streetscape Enhancements	Parking Availability	Crossing Distance and Convenience	Pedestrian Refuge	Sidewalk Width and Comfort	Welcoming Intersections	Gateway Treatments	Street Trees/Medians	Vehicular Travel Time	Traffic Calming	Level of Service	Cost Effectiveness	Public/Stakeholder Input
<b>Existing Roadway</b>	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Higher	Lower	Higher	N/A	N/A
<b>Alternative A - 3 Lane Plan</b> <small>Proposes to remove 2 existing lanes of traffic, turn lanes and medians and add intersection bulb-outs with on-street parking.</small>	Higher	Higher	Higher	Higher	Higher	Higher	Higher	Higher	Higher	Lower	Higher	Lower	Lower	Higher
<b>Alternative B - 5 Lane Plan</b> <small>Retain 5 lanes of travel with turn lanes and medians and add intersection bulb-outs.</small>	Average	Average	Lower	Average	Average	Average	Higher	Higher	Average	Higher	Average	Higher	Average	Average
<b>Legend</b>														
	Higher	Higher Relative Rating												
	Average	Average Relative Rating												
	Lower	Lower Relative Rating												

**VISSIM SIMULATION**

Fehr & Peers conducted a simulation analysis of Lincolnway between Pioneer and Warren Avenue to determine the potential for redevelopment of the roadway. The analysis included the following intersections:

1. Carey Avenue (signalized)
2. Capitol Avenue (signalized)
3. Central Avenue (signalized)

Balanced volumes for existing and future scenarios were drawn from previous analysis of the corridor. Scenarios The following scenarios were evaluated and compared for the PM Peak Hour:

**Scenario 1. Existing (2014)**

(A) With the existing lane configuration, signal timing, and counts.

**Scenario 2. Future (2035)**

- (A) With the existing lane configuration, 60 second cycle length, optimized signal timing, and future projected counts.  
 (B) 3-Lane configuration with the future projected counts, 75 second cycle length, and optimized signal timing.

**Simulation Analysis**

The simulation analysis of Lincolnway modeled in VISSIM (version 7) was conducted to give a sense of the relative traffic conditions now and in the future under alternative scenarios. The analysis also provides intersection levels-of-service (LOS) and travel time with the existing conditions and proposed redevelopment options. The LOS results from this analysis generally agreed with the Synchro results reported before, with an overall decrease in delay in the simulation versus the deterministic Synchro approach. The study intersections in all three scenarios had previously been reported with acceptable intersection LOS although some approaches reported LOS E conditions.

It should be noted that specific intersections LOS results are less meaningful in this analysis due to the close intersection spacing and interdependency of coordinated signals. That is why travel time is also provided to give a sense of the delay seen along Lincolnway over our study segment. Also, this analysis assumes that all traffic will remain on Lincolnway and that there will continue to be a conservative growth of one percent annually. This analysis focused on the PM peak hour, which is the worst case scenario and these delays will occur only during peak times and not throughout the rest of the day.

**Findings**

Level of Service

Table 1 details the LOS for each of the listed scenarios for each intersection and approach. Here are a few highlights from the capacity analysis:

**Scenario 1. Existing (2014)**

The existing scenario was simulated to validate the simulation model and provide a baseline to compare future year scenarios.

**Scenario 2. Future (2035)**

With the 60-second cycle length, all intersections and approaches will operate at acceptable LOS.

The 3-Lane configuration is a viable option with optimization of the signal timing. In 2035 the westbound left movement at Capitol Ave is failing with 85 seconds of delay. A protected left turn phase would reduce this delay and minimally impact eastbound progression along Lincolnway.

**Travel Time**

The travel time segments for this analysis stretch from Pioneer to Warren Avenue. With eastbound and westbound segments defined as:

- Eastbound - the segment is from just east of Pioneer to just east of Central Avenue
- Westbound - the segment is from just west of Warren to just west of Carey Avenue.

These segments were chosen to most accurately capture delay seen on the three study intersections. Compared to existing conditions average peak hour travel time through the segments could increase by 4 seconds in the 2035 5 lane cross-section and 25 seconds in the 2035 3-lane cross-section (36 seconds EB, 14 seconds WB).

**Table 2: Average Travel Time (minutes)**

Direction	2014 Existing - PM	2035 Future: Existing Roadway-PM	2035 Future: 3-lane Option - PM
	Existing Timing 60 seconds Travel Time	Optimized 60 seconds Travel Time	Optimized 75 seconds Travel Time
Eastbound	0.86	0.93	1.46
Westbound	0.88	0.93	1.12

**Simulation Video**

A snapshot of the Existing Scenario can be seen at the following link – <http://youtu.be/1U-aiWdH1QE> and the 2035 Road Diet Scenario at <http://youtu.be/CMoC-38fPTI>.

As seen in the three lane option snapshot queues do extend into upstream intersections at times and will cause delays for side-street approaches.

**Table 1: Intersection Delay and Level of Service**

No.	Intersection	Control	Approach	2014 Existing - PM		2035 Future: Existing Roadway-PM		2035 Future: 3-lane Option - PM	
				Existing Timing 60 seconds Delay	LOS	Optimized 60 seconds Delay	LOS	Optimized 75 seconds Delay	LOS
1	Carey Avenue	Signal	Overall	7	A	8	A	17	B
			EB	6	A	7	A	21	C
			WB	8	A	8	A	9	A
			NB	16	B	15	B	33	C
			SB	-	-	-	-	-	-
2	Capitol Avenue	Signal	Overall	7	A	8	A	15	B
			EB	3	A	4	A	12	B
			WB	7	A	9	A	12	B
			NB	16	B	19	B	21	C
			SB	24	C	24	C	37	D
3	Central Avenue	Signal	Overall	17	B	22	C	32	C
			EB	9	A	10	B	23	C
			WB	12	B	16	B	30	C
			NB	-	-	-	-	-	-
			SB	27	C	37	D	39	D

### Lincolnway Intersection Level-of-Service Comparison Table

Summary: Lincolnway was analyzed with the existing lane configuration and with a 3-lane option between Pioneer Avenue and Warren Avenue (downtown). The analysis also evaluated various cycle length options for the 3-lane option.

Intersection	Ex. Config.	2014 Existing – PM Peak Hour				2035 Future – PM Peak Hour			
		Ex. Timing 60-65 sec	Ex. Timing 60-65 sec	Optimized 75 sec	Optimized 90 sec	Ex. Timing 60-65 sec	Ex. Timing 60-65 sec	Optimized 75 sec	Optimized 90 sec
1 Bent Avenue	SS	●	●	●	●	●	●	●	●
2 O'Neil Avenue	SS	●	●	●	●	●	●	●	●
3 Thomes Avenue	SS	●	●	●	●	●	●	●	●
4 Pioneer Avenue		●	●	●	●	●	●	●	●
5 Carey Avenue		●	●*	●	●	●	●	●	●
6 Capitol Avenue		●	●	●	●	●	●	●	●
7 Central Avenue		●	●	●	●	●*	●*	●*	●
8 Warren Avenue		●	●	●*	●*	●	●	●	●
9 House Avenue	SS	●	●	●	●	●	●	●	●
10 Evans Avenue		●	●	●	●	●	●	●	●
11 Morrie Avenue		●	●	●	●	●	●	●	●
12 Dunn Avenue		●	●	●	●	●	●	●	●
13 Logan Avenue		●	●	●	●	●	●	●	●

**Legend:**

PM Peak LOS

- LOS A or B
- LOS C
- LOS D
- LOS E
- LOS F

SS= Side Street

Stop Controlled intersection LOS is the worse approach.

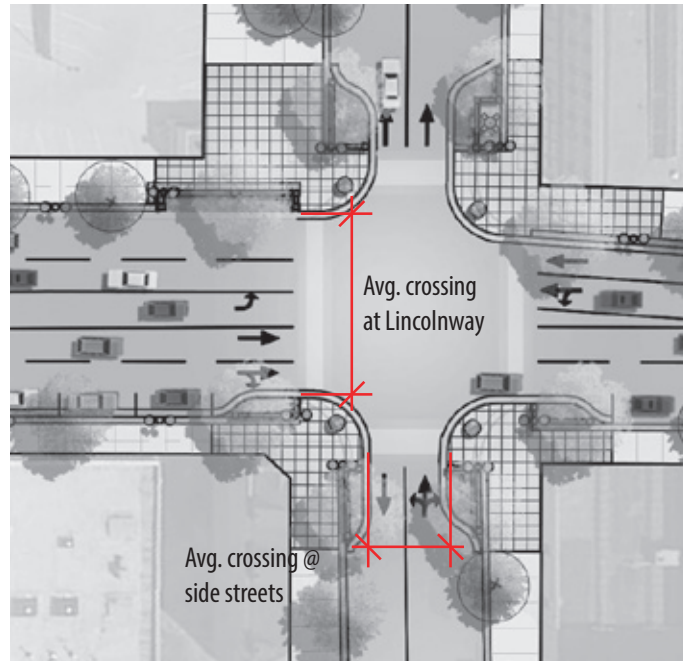
Signalized intersection LOS is overall performance.

\*The intersection operates acceptably; however, there is one approach that operates at LOS E.

### Key Level of Service Findings

- The capacity analysis focused on the PM Peak Hour since the volumes were the highest and this would be the most critical time period.
- The 3-lane configuration is a viable option with optimization of the signal timing:
  - In 2014 with either the 75-second or 90-second cycle length, all intersections and approaches will operate at acceptable LOS except for the following:
    - O'Neil Avenue: The side-street stop-controlled intersection will have LOS E on the southbound approach with both cycle lengths. The 95th percentile queue will be two cars in the peak hour.
    - Warren Avenue (westbound approach): This approach will operate at LOS F with either cycle length since the lane drop occurs here. The delay is reduced with the 90-second cycle length. The overall intersection operates at LOS D with both cycle lengths.
  - In 2035 with either the 75-second or 90-second cycle length, all intersections and approaches will operate at acceptable LOS except for the following:
    - Bent Avenue: The side-street stop-controlled intersection will have LOS E on the southbound approach with both cycle lengths. The 95th percentile queue will be two cars in the peak hour.
    - O'Neil Avenue: The side-street stop-controlled intersection will have LOS F on the southbound approach with both cycle lengths. The 95th percentile queue will be four cars in the peak hour.
    - Thomes Avenue: The side-street stop-controlled intersection will have LOS F on the southbound approach with both cycle lengths. The 95th percentile queue will be two cars in the peak hour.
    - Warren Avenue: This intersection will operate at LOS E with either cycle length since the lane drop occurs here. The westbound and northbound approaches experience the highest delays.

To estimate the 20-year horizon volumes, data from U.S. Census and WYDOT were collected and compared. Recent traffic counts and population estimates show a 1 percent annual growth rate over the past ten years. This was applied to the existing counts to estimate the future volumes. The existing and future volumes are shown in Figures 1 and 2. Lincolnway was modeled in Synchro (version 7.0) to determine the intersection and movement levels-of-service (LOS) with the existing conditions and proposed redevelopment options. The City of Cheyenne's Synchro models for the downtown area were updated with the most recent signal timing plans (provided by WYDOT), lane assignments, storage lengths, adjacent parking maneuvers, Peak Hour Factor (PHF), and balanced turning movement counts.



**AVG. CROSSING @ LINCOLNWAY**

Existing	59'
5 Lane	57'
3 Lane	46'

**AVG. CROSSING @ SIDE STREETS**

Existing	38.8'
5 Lane	30'
3 Lane	29'



**AVG. SIDEWALK WIDTH**

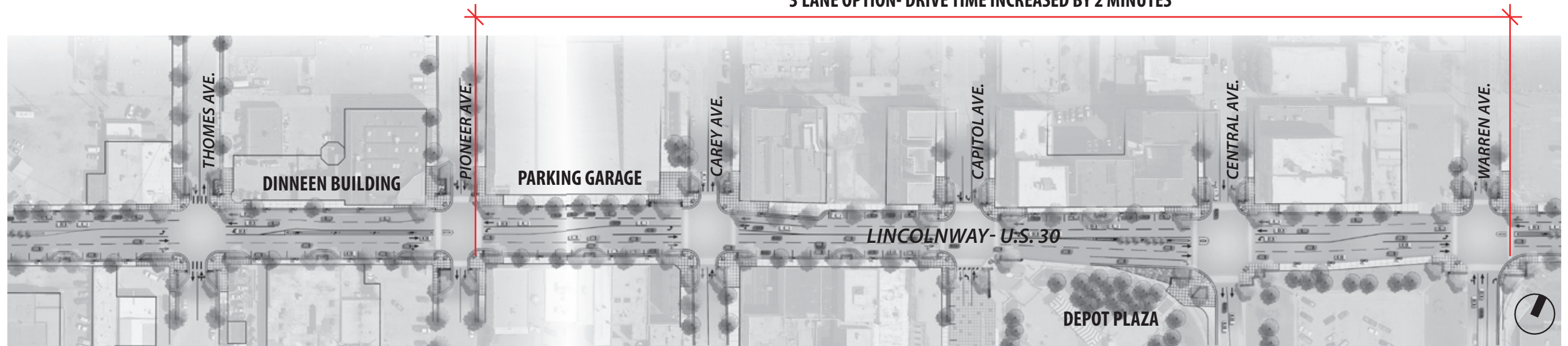
Existing	11.6'
5 Lane	12.3'
3 Lane	16.5'



**TOTAL PARKING SPOTS**

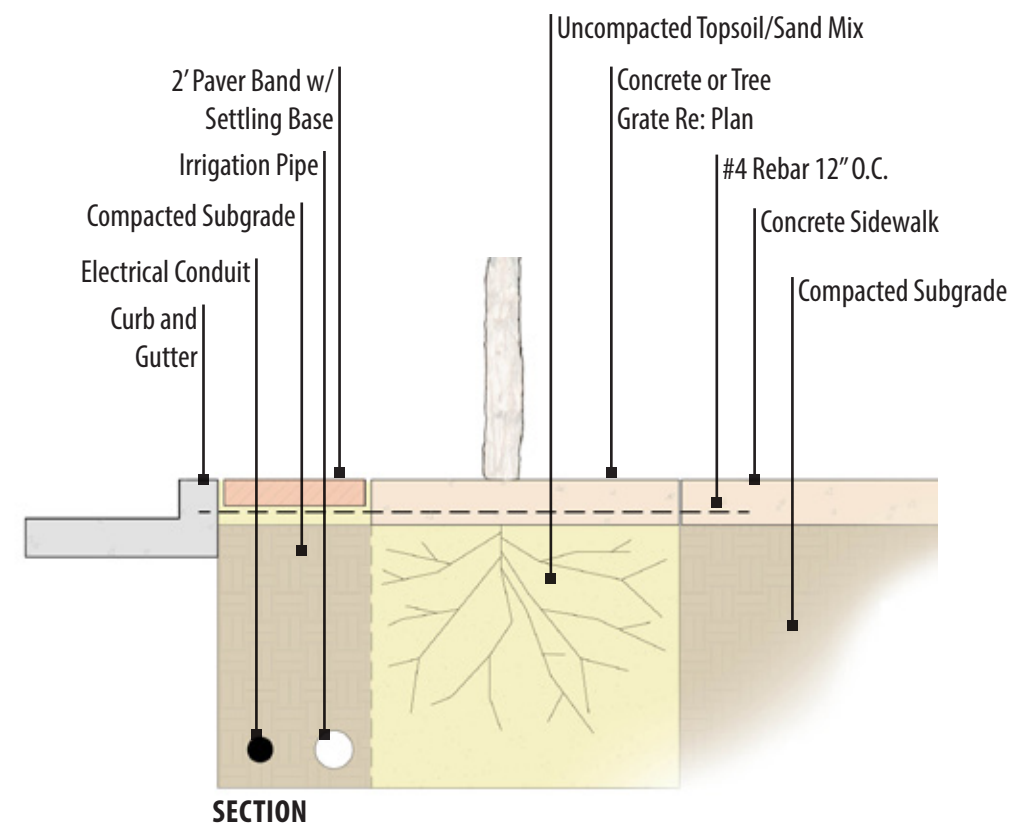
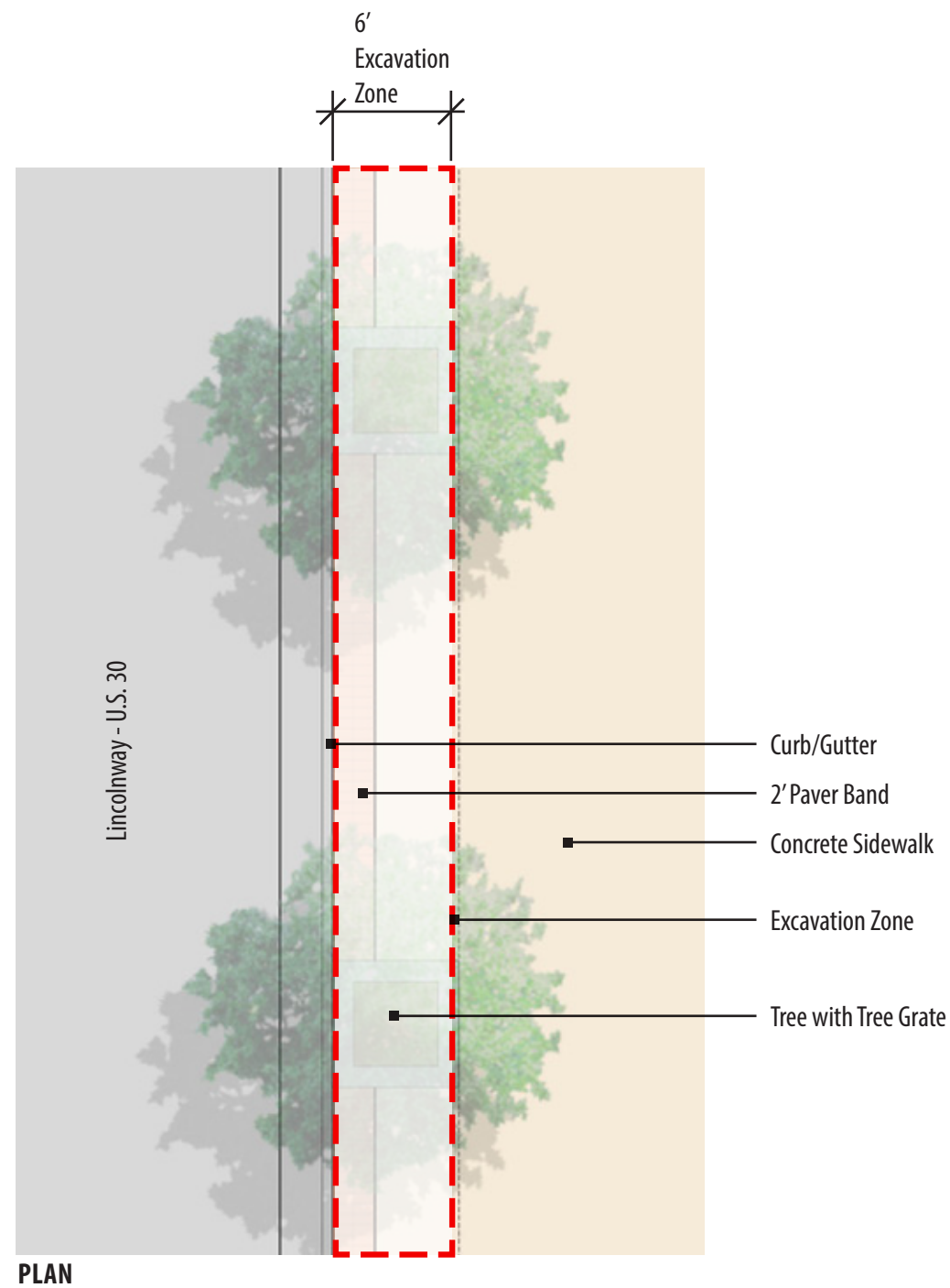
Existing	68
5 Lane	54 (-14)
3 Lane	99 (+31)

**3 LANE OPTION- DRIVE TIME INCREASED BY 2 MINUTES**



The 5 Lane Plan option expands average sidewalk widths along Lincolnway by a marginal amount (< 1'). Additional pedestrian spaces are only gained at intersection bulb-outs. This option also provides an additional 40 parking spaces along Lincolnway to serve downtown business and event parking.

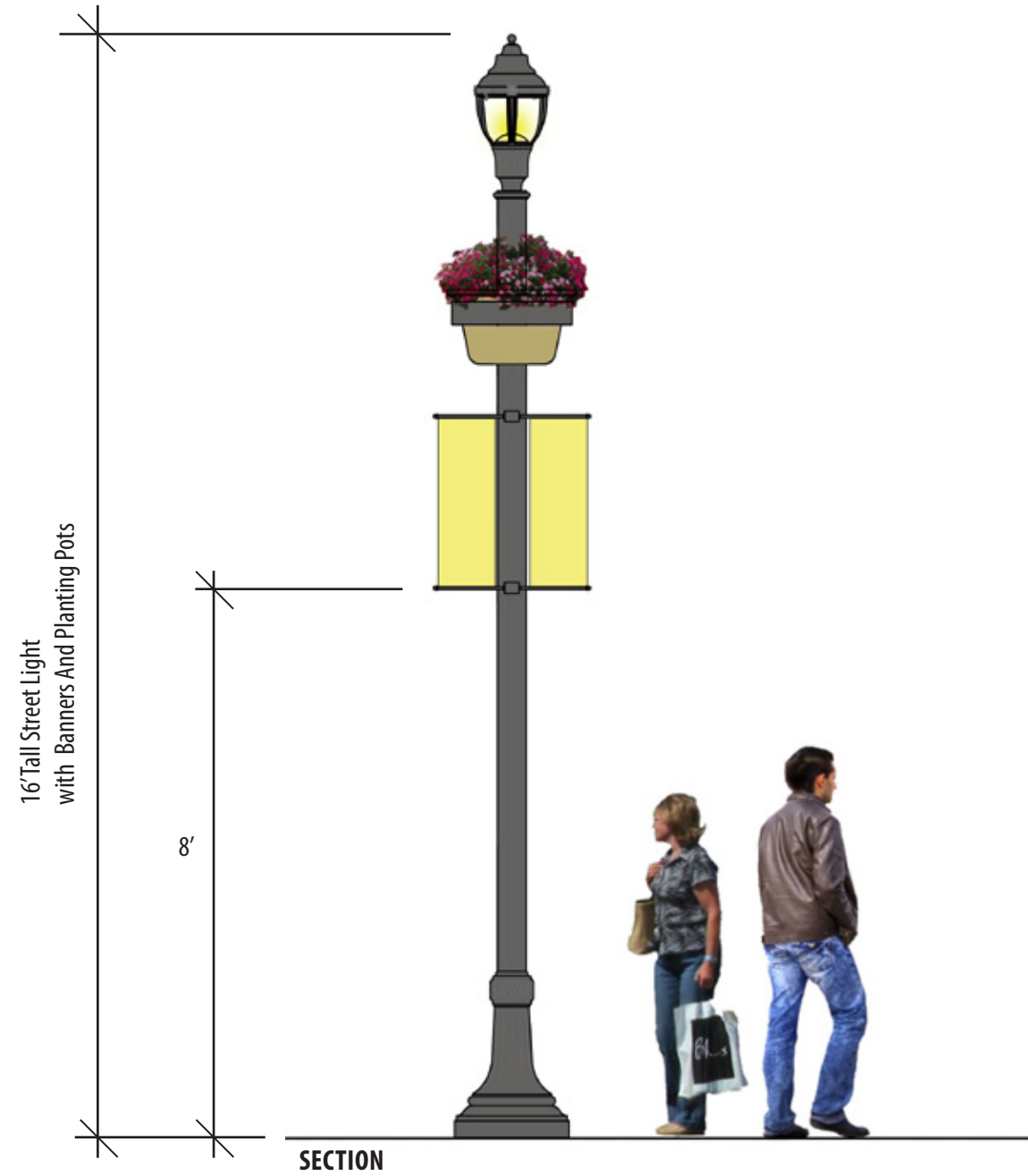
The 3 Lane Plan option expands average sidewalk widths along Lincolnway by 5', thus creating more area for amenities such as benches, planters and cafe seating along bulb-outs at intersections. The drive time for this option would be increased by an estimated 2 minutes from Pioneer Ave. to Warren Ave. This option also provides an additional 61 parking spaces along Lincolnway to serve downtown business and event parking.



Additional street trees are to be planted along Lincolnway in both the 5 Lane and 3 Lane options. A 6' wide excavation zone will be cleared to accommodate the tree root ball and non compacted topsoil where new trees are proposed. Concrete above this zone is proposed to be reinforced at 12" O.C., creating a 'bridge' effect. Aeration pipes may be included as well to provide additional oxygen to roots. Between this additional oxygen to roots, the prevention of root binding and irrigation, the street trees should reach full growth potential, unlike the existing trees, which have likely become root bound, do not receive adequate oxygen to roots and do not likely receive adequate and consistent irrigation.

A 2' wide paver band will be installed between the tree grate and curb & gutter of Lincolnway. All of the street trees will have a tree grate to protect tree from soil compaction due to pedestrian activity.

## STREET TREE PLANTING DIAGRAM



FULL CUT-OFF LED STREET LIGHT

Street lighting is a key streetscape element both for safety and aesthetics. New street lighting is proposed along Lincolnway that will help create a sense of place with banners and hanging baskets while adding consistency, repetition and rhythm to the downtown streetscape. Full cut-off LED street lighting will both provide cost effective lighting for the city and light surfaces rather than the sky beyond, eliminating most of the point source lighting effect that currently dominates the downtown area.

## SURVEY RESULTS

### PROCESS

A series of survey questions were provided to assess public and stakeholder opinions regarding use frequency, interest in the project, perception of the current conditions along Lincolnway and agreement or disagreement with concepts within the overall plan alternatives. Respondents were then asked to state which alternative they feel is most appropriate - the 5 Lane Plan or 3 Lane Plan.

The survey was provided at several times throughout the project including a Farmer's Market event at the Depot Plaza, at Workshop #2, in a live polling format, and it was available on-line for several months.

Information was gathered from a total of eighty one respondents, although not all respondents answered all survey questions.

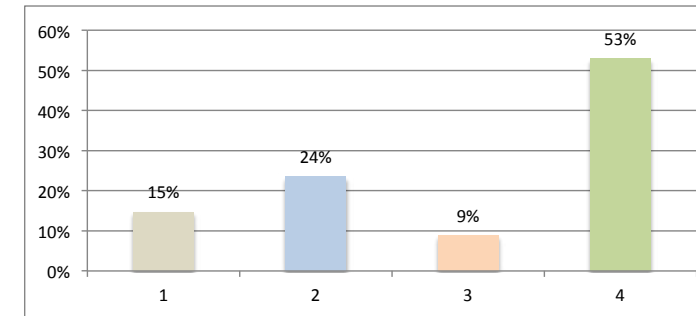
### SUMMARY

The numerical results of the survey are shown on the following pages. They can be summarized with the following statements:

1. Most respondents feel that as residents, they would like to see Lincolnway better reflect Cheyenne's history, values and civic pride.
2. Most respondents travel through the Downtown section of Lincolnway 3-5 times per week.
3. Most respondents feel that the travel and Main Street functions of Lincolnway are equally important.
4. Most respondents feel moderately safe/comfortable when walking along or crossing Lincolnway.
5. Most respondents feel it is very important to provide additional street trees, benches, plantings and other pedestrian amenities in the Downtown area along Lincolnway.
6. Most respondents are very willing would you be to spend 2 additional minutes driving down Lincolnway in order to improve pedestrian comfort and safety in the Downtown area.
7. Most respondents feel it is very important to provide additional parking along Lincolnway in the Downtown area.
8. Most respondents feel it is very important to foster business growth and economic vitality along Lincolnway in the Downtown area.
9. Most respondents feel that more stores and a stronger retail environment would most likely to encourage you to come Downtown more often.
10. Most respondents feel that they would most like to see the 3-lane cross section implemented along Downtown Lincolnway.

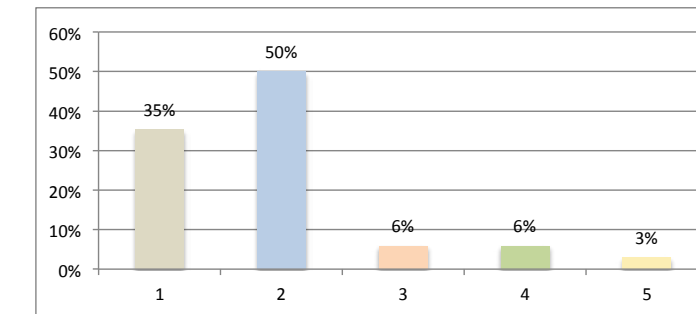
**What is your main interest in the Downtown section of Lincolnway? (Multiple Choice)**

	Responses	
	Percent	Count
1. I own a business along the corridor or in Downtown	15%	5
2. I frequently patronize Downtown restaurants and businesses	24%	8
3. I like to come Downtown for events	9%	3
4. As a resident I would like to see Lincolnway better reflect Cheyenne's history, values, and civic pride	53%	18
<b>Totals</b>	<b>100%</b>	<b>34</b>



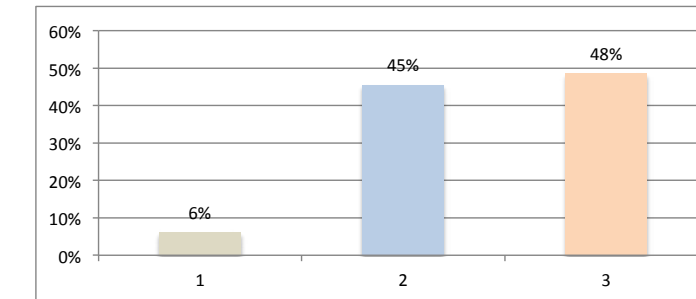
**On average, how often do you travel to or through the Downtown section of Lincolnway? (Multiple Choice)**

	Responses	
	Percent	Count
1. Daily (or multiple times each day)	35%	12
2. 3-5 times per week	50%	17
3. Once a week	6%	2
4. Once a month	6%	2
5. Almost never	3%	1
<b>Totals</b>	<b>100%</b>	<b>34</b>



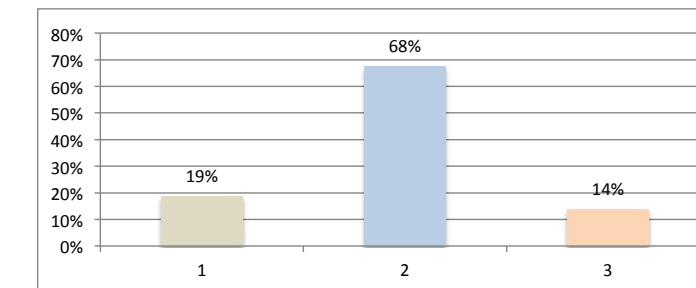
**Which of the following statements best describes how you feel about the Downtown Lincolnway corridor? (Multiple Choice)**

	Responses	
	Percent	Count
1. Lincolnway is/should remain primarily a "through" or "travel" corridor – a way to get from point A to point B	6%	2
2. Lincolnway should function more like a Main Street, with a "park once" or "stop and shop" environment	45%	15
3. The travel and Main Street functions of this corridor are equally important	48%	16
<b>Totals</b>	<b>100%</b>	<b>33</b>



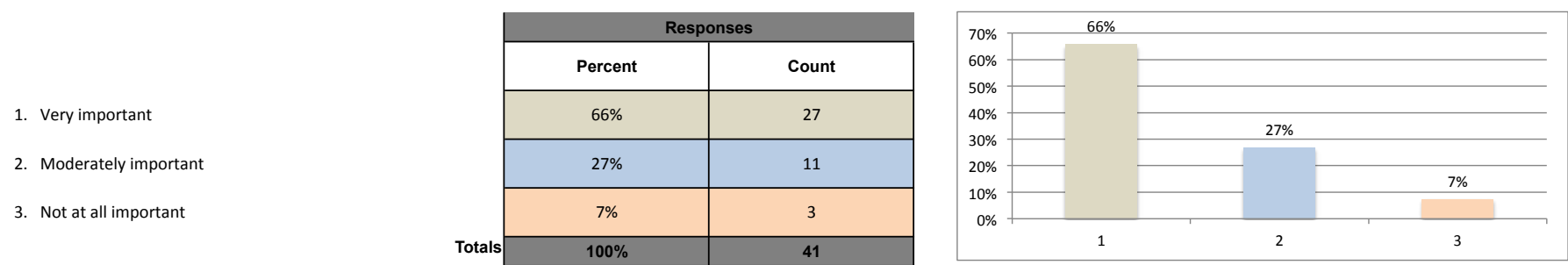
**How safe/comfortable do you feel when walking along or crossing Lincolnway in the Downtown area? (Multiple Choice)**

	Responses	
	Percent	Count
1. Very safe/comfortable	19%	15
2. Moderately safe/comfortable	68%	54
3. Not at all safe/comfortable	14%	11
<b>Totals</b>	<b>100%</b>	<b>80</b>

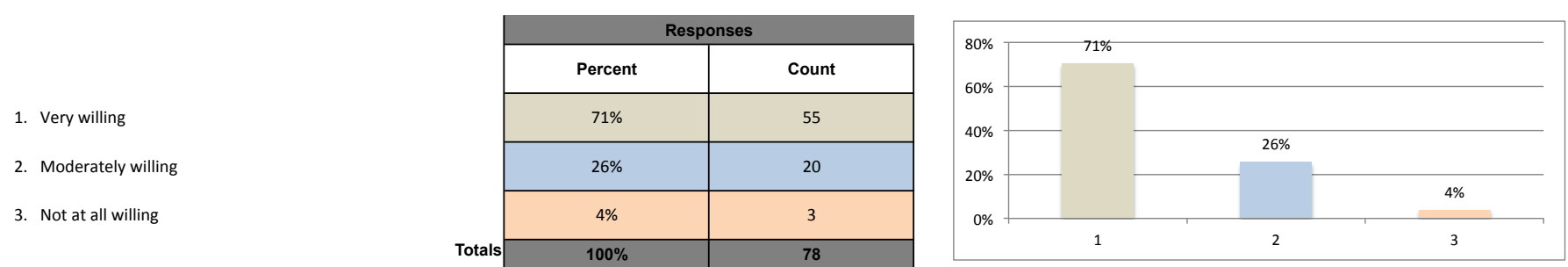




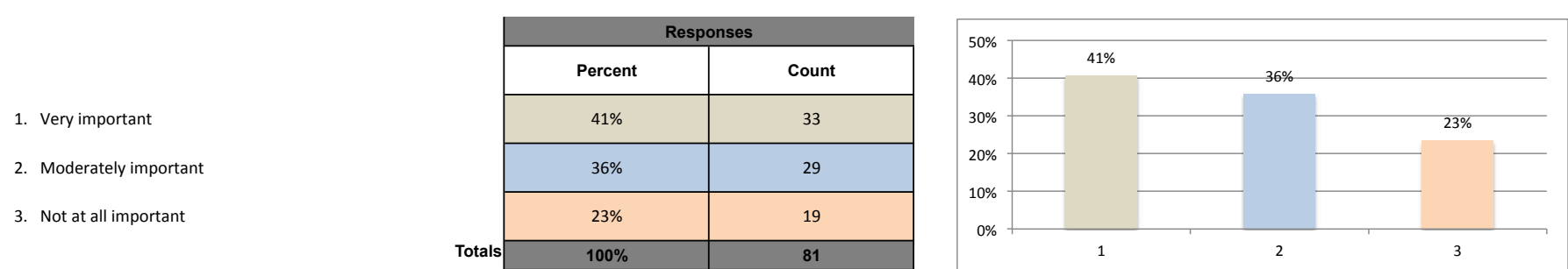
**How important is it to provide additional street trees, benches, plantings and other pedestrian amenities in the Downtown area along Lincolnway? (Multiple Choice)**



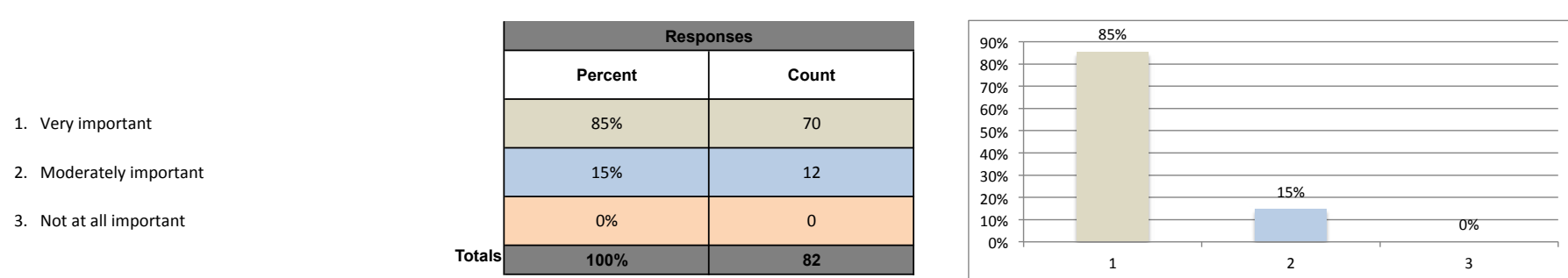
**How willing would you be to spend 2 additional minutes driving down Lincolnway in order to improve pedestrian comfort and safety in the Downtown area? (Multiple Choice)**



**How important is providing additional parking along Lincolnway in the Downtown area? (Multiple Choice)**

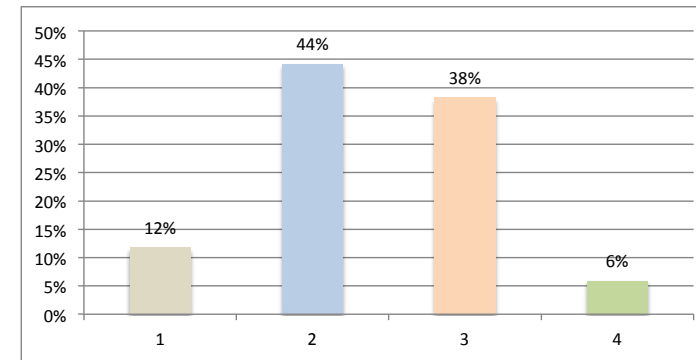


**How important is it to foster business growth and economic vitality along Lincolnway in the Downtown area? (Multiple Choice)**



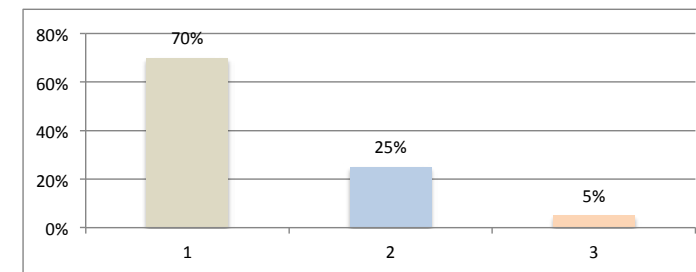
**Which of the following factors would be most likely to encourage you to come Downtown more often? (Multiple Choice)**

	Responses	
	Percent	Count
1. An enhanced pedestrian environment (safer, more comfortable, more attractive)	12%	4
2. More stores/stronger retail environment	44%	15
3. Greater selection of restaurants	38%	13
4. More events (e.g. Farmers Market, Fridays on the Plaza)	6%	2
<b>Totals</b>	<b>100%</b>	<b>34</b>

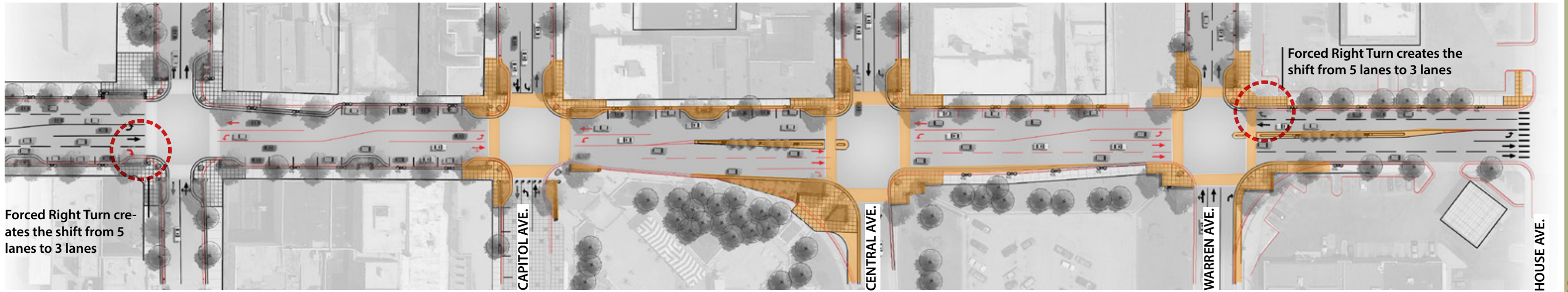


**Which of the following cross sections would you most like to see implemented along Downtown Lincolnway? (Multiple Choice)**

	Responses	
	Percent	Count
1. The Proposed 3 Lane Alternative	70%	14
2. The Proposed 5 Lane Alternative	25%	5
3. Make no changes to the existing roadway	5%	1
<b>Totals</b>	<b>100%</b>	<b>20</b>

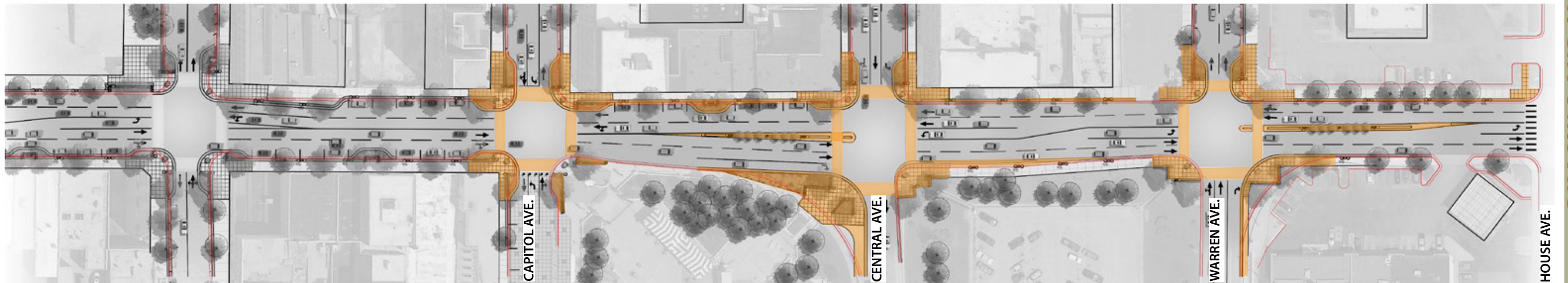


Public Survey Results  
 May 7, 2013  
 Keypad Polling and On-Line Survey



### 3 Lane Striping Implementation

- Remove Warren and Central Ave. porkchop turn lanes
- Gateway medians
- Gateway wayfinding structure
- Corner treatments and bulb-outs
- New Street Furniture
- Striping

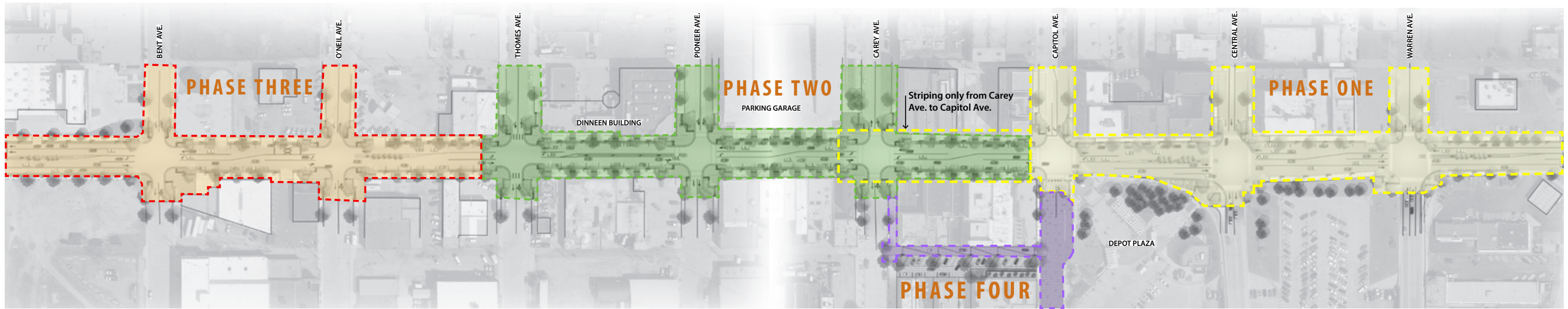


### 5 Lane Striping Implementation

- Remove Warren and Central Ave. porkchop turn lanes
- Gateway medians
- Gateway wayfinding structure
- Corner treatments and bulb-outs
- New Street Furniture
- Striping

In an effort to develop a flexible phase I plan for Lincolnway that will allow either the three lane or five lane alternatives to be implemented west of Capitol Ave. , the above diagram depicts features that are consistent with both plans. All intersection, median, and sidewalk improvements can be made to accommodate either alternative, with modifications in lane striping only, to allow for either alternative. This concept allows an adaptability as downtown conditions change over time or funding becomes available.

## FLEXIBLE PHASE 1 IMPLEMENTATION - FUNCTIONAL W/ 3 OR 5 LANE ALTERNATIVE



### Phase Three

- 3 Lane: \$2,344,455
- 5 Lane: \$1,511,153

### Phase Three:

#### 3 Lane - \$2,344,455

- Utility relocation.
- Curb and gutter.
- Corner bulb-outs w/ planters.
- Median treatment.
- New sidewalks.
- Lane and Parking striping.
- Street trees and Planting beds.
- Site furnishings and new street lighting.

#### 5 Lane - \$1,511,153

- Remove and reconstruct corner blub-outs.
- Remove lighting.
- Utility relocation.
- Mid-block blub-outs.
- Crosswalk enhancements.
- Median treatment.
- Corner walls and enhancement features.
- Lane and Parking striping.
- Street trees and Planting beds.
- Site furnishings and new street lighting.

### Phase Two

- 3 Lane: \$3,142,693
- 5 Lane: \$2,518,466

### Phase Two:

#### 3 Lane - \$3,142,693

- Utility relocation.
- Curb and gutter.
- Corner bulb-outs w/planters.
- Median treatment.
- New sidewalks.
- Crosswalk enhancements.
- Lane and Parking striping
- Street trees and planting beds.
- Site furnishings and new street lighting.

#### 5 Lane - \$2,518,466

- Remove and reconstruct corner blub-outs.
- Remove lighting.
- Utility relocation.
- Mid-block blub-outs.
- Crosswalk enhancements.
- Median treatment.
- Corner walls and enhancement features.
- Lane and parking striping.
- Street trees and planting beds.
- Site furnishings and new street lighting.

### Phase Four

- TOTAL \$871,569

### Phase One

- 3 Lane: \$2,658,461
- 5 Lane: \$2,658,461

### Phase One:

#### 3 Lane and 5 Lane - \$2,658,461

- Remove Porkchop @ Warren Ave. and Central Ave.
- Reconstruct corner blub-outs.
- Utility relocations.
- Median treatment.
- Gateway Wayfinding structure.
- Mid-block blub-outs.
- Crosswalk enhancements.
- Lane and Parking striping.
- Street trees and Planting beds.
- Site furnishings and new street lighting.
- Corner enhancement features.

### Short Term Improvements:

- Pedestrian Signal Timing

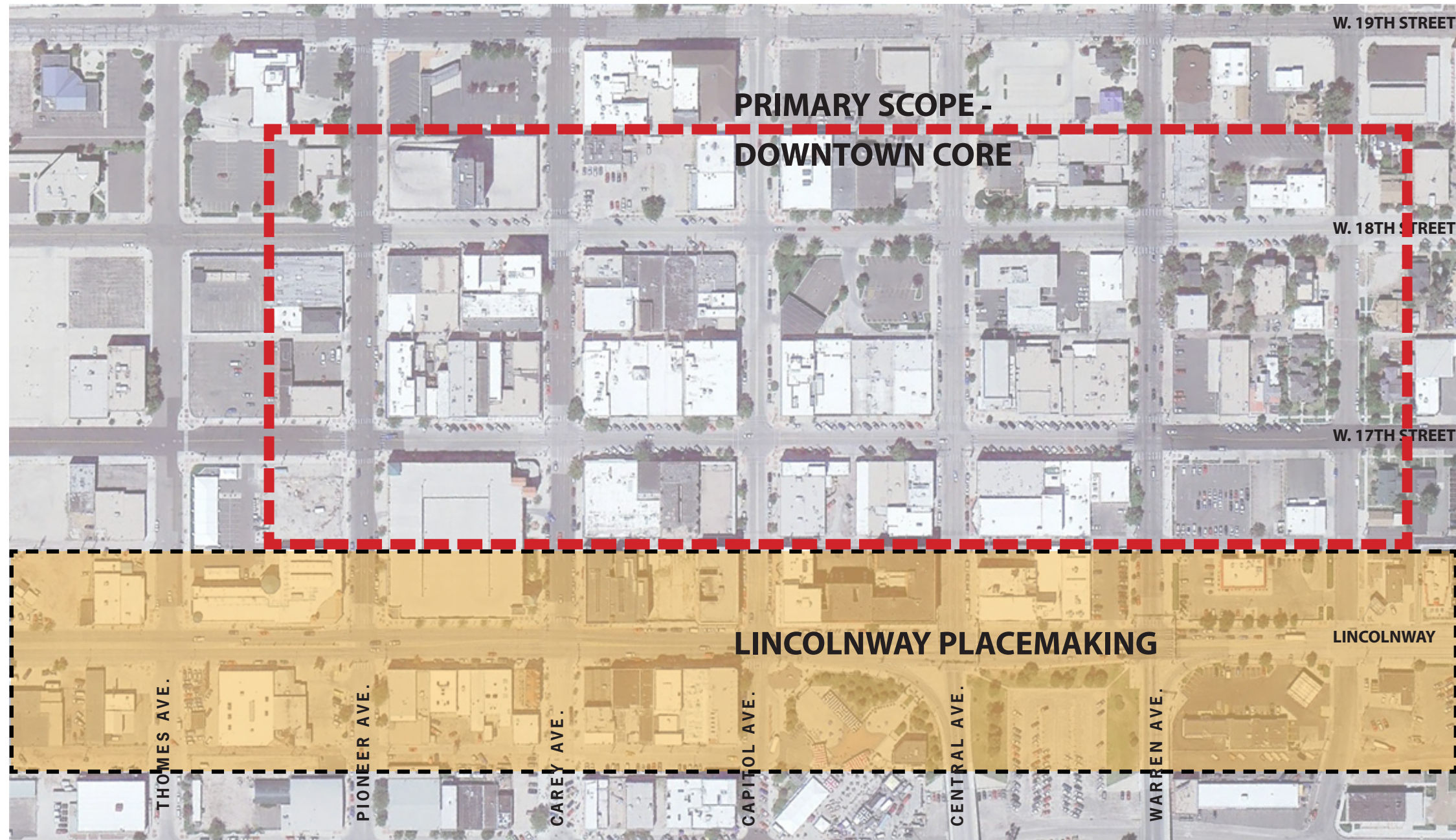
### Total Costs:

**3 Lane = \$8,856,166**

**5 Lane = \$6,688,080**

**Alley = \$871,569**

The phasing plan above depicts implementation of the Lincolnway improvements over time as funding becomes available. Phase 1 is designed as a flexible condition that can allow Phase 2-Phase 4 to be built out in either a three or 5 Lane condition. Phasing of the project is envisioned in three block increments, with prioritization near and around the Depot Plaza, and gradually developing to the west, with Phase 4 being lower priority alley improvements and plaza improvements. Costs for each phase are shown above per alternative in addition to key features that each alternative provides. An immediate short term improvement that can be completed with little or no investment includes pedestrian signal time modifications to allow for greater crossing times for pedestrians.



**SCOPE OF PROJECT - Downtown Core**

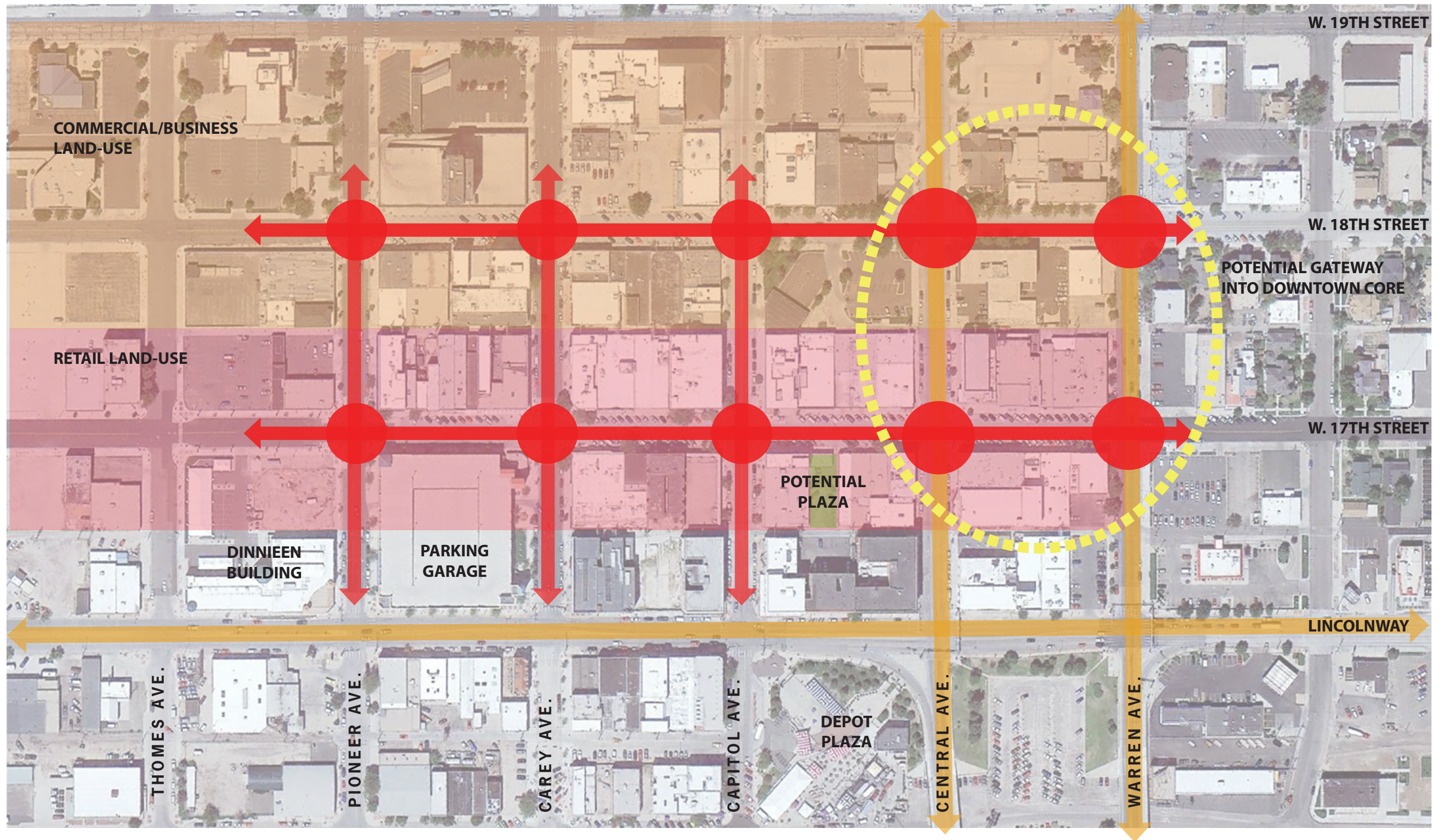
- **Primary Scope - Extend concepts from Phase 1 to streetscapes along 17th/18th streets and North/South Connectors.**
- **Identify gateways into the Downtown Core.**

The Downtown Core streetscapes along 17th and 18th Streets from Warren Ave. to Pioneer Ave. were analyzed in terms of extending recommended streetscape improvements for Lincolnway into these streets in order to enhance potential for pedestrian activity and promote successful business development and increase the viability of this area for retail use. The analysis included streetscape enhancements on 17th, 18th and north/south streets, as well as identifying gateway locations and concepts at the intersections of Warren Ave. and Central Ave.

### **POTENTIAL FUNDING SOURCES FOR 17th and 18th STREET STREETSCAPES**

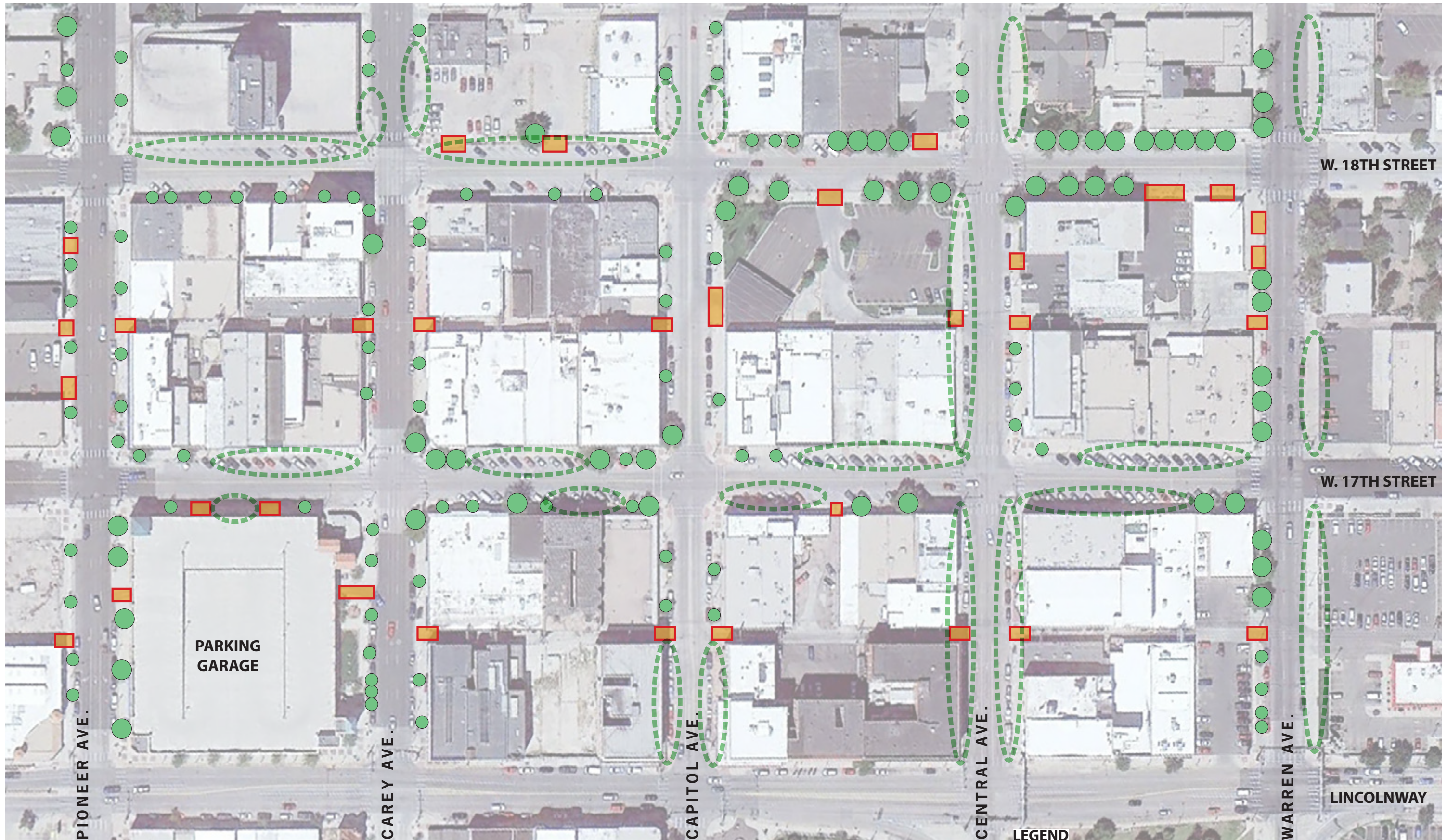
- **Downtown stakeholders such as DDA or Visit Cheyenne**
- **6th Penny/ 5th Penny Funding**
- **State/Federal Grants**
- **State Consensus Funds**
- **Wyoming Business Council's Downtown Development Grant**
- **Dinneen Model**

A variety of funding sources are possible to achieve streetscape improvements along 17th and 18th streets, and it is likely that a combination of the above strategies will need to be employed to implement the overall project. Funding is currently available to construct most of the 17th Street improvements. A business district or DDA based maintenance program should be established to maintain improvements in the Downtown Core and along Lincolnway.



Land uses within the Downtown Core include primarily retail uses along 17th Street and primarily Commercial/Business with some retail along 18th Street. An identifiable gateway should be established with enhanced corner treatments at the intersections of Warren and Central with 17th and 18th Streets. Streetscape improvements should focus on enhancing corner treatments at all north/south intersections and filling in gaps in existing street trees throughout the project extents. Potential locations for pedestrian plazas should be investigated as well, possibly as a public/private partnership on underutilized private land.

## DOWNTOWN CORE DESIGN INFLUENCES



The diagram above shows locations of gaps within current street tree locations within the Downtown Core. Significant gaps exist along 17th Street and Central Avenue. Additional gaps are located along 18th Street and other north/south connectors. A number of curb cuts exist along 18th Street and side streets, which should be consolidated if possible to increase safety for pedestrians.

**LEGEND**

- EXISTING TREE
- CURB CUT/ENTRY
- STREET TREE GAPS

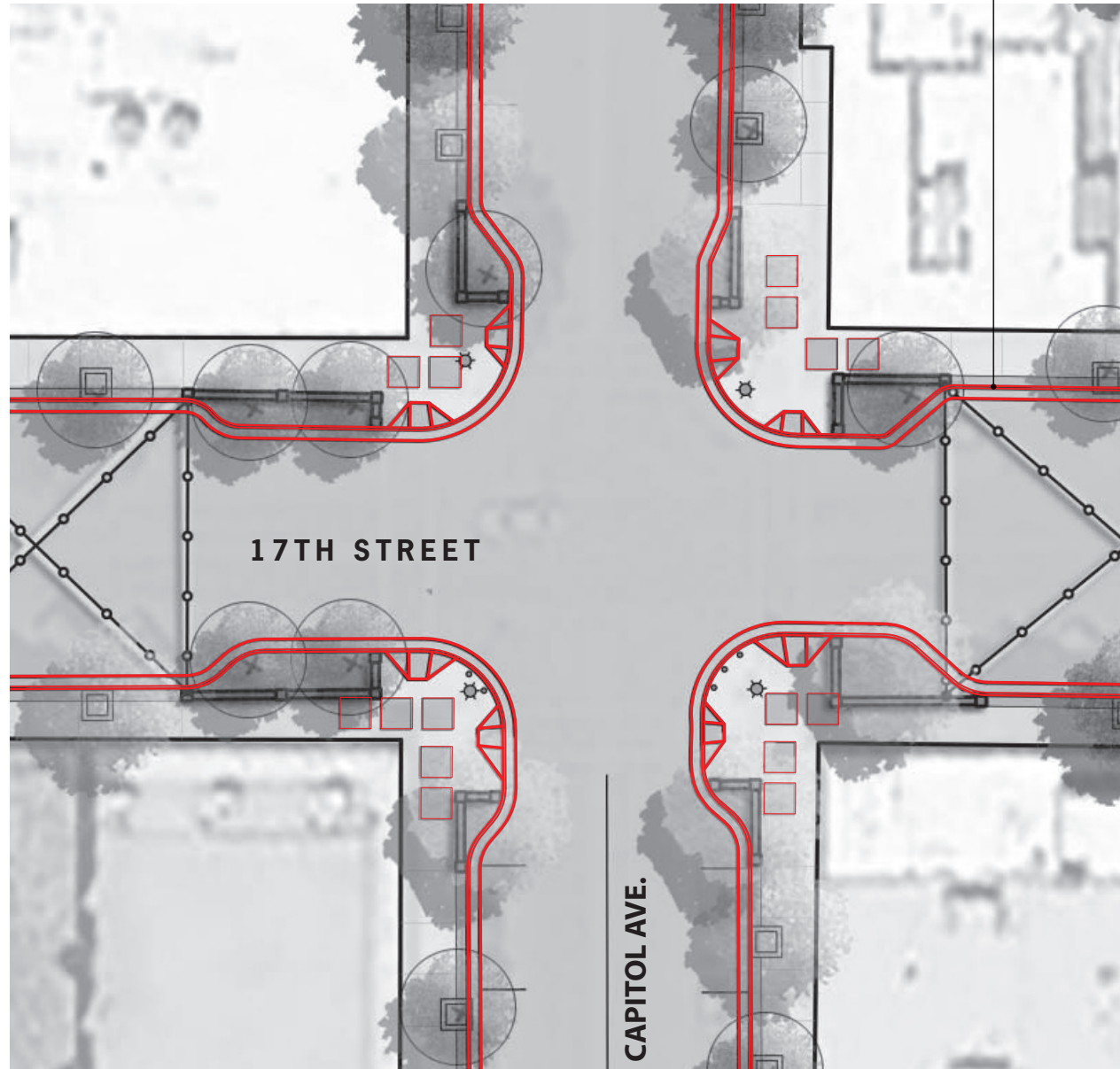
**DOWNTOWN CORE DESIGN INFLUENCES - STREET TREE GAPS AND EXISITING CURB CUTS**





The above photos capture a summary of existing conditions within the general area of 17th and 18th Streets. There are currently major gaps in street tree locations, a general lack of site furnishings and pedestrian separation from the street and pavement is in need of repair or replacement in some cases. The overall street framework is effective and can be modified slightly to create a safer, more pedestrian friendly environment with a greater level of pedestrian amenities that are conducive to retail land uses. This is especially important along 17th street, which is primarily retail in it's use.

Existing Street Conditions



Additive/Retrofit Intersection Diagram

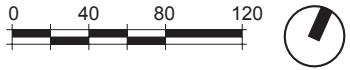
Existing Street Conditions



Reconstructed Intersection Enlargement

The diagrams above illustrate two concepts for intersection improvements including an additive/retrofit concepts, which utilizes existing curb and gutter, while incorporating seatwalls, plantings and street trees, as well as a reconstruction option that utilizes existing north/south street curbs with additional pedestrian space provided on the north and south sides of the corner bulb-out. The reconstruction option decreases crossing distances for pedestrians and provides more pedestrian space, however, represents a higher cost.

**ADDITIVE AND RECONSTRUCTION COMPARISON TO EXISTING CONDITIONS**



**ADDITIVE/RETROFIT FRAMEWORK PLAN**



EXISTING CONDITION



PROPOSED CONDITION

**ADDITIVE/RETROFIT CAPITOL AVE. AND 17TH STREET**



W. 18TH STREET

W. 17TH STREET

PIONEER AVE.

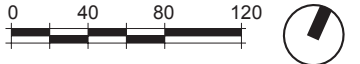
CAREY AVE.

CAPITOL AVE.

CENTRAL AVE.

WARREN AVE.

LINCOLNWAY



**RECONSTRUCTED FRAMEWORK PLAN**

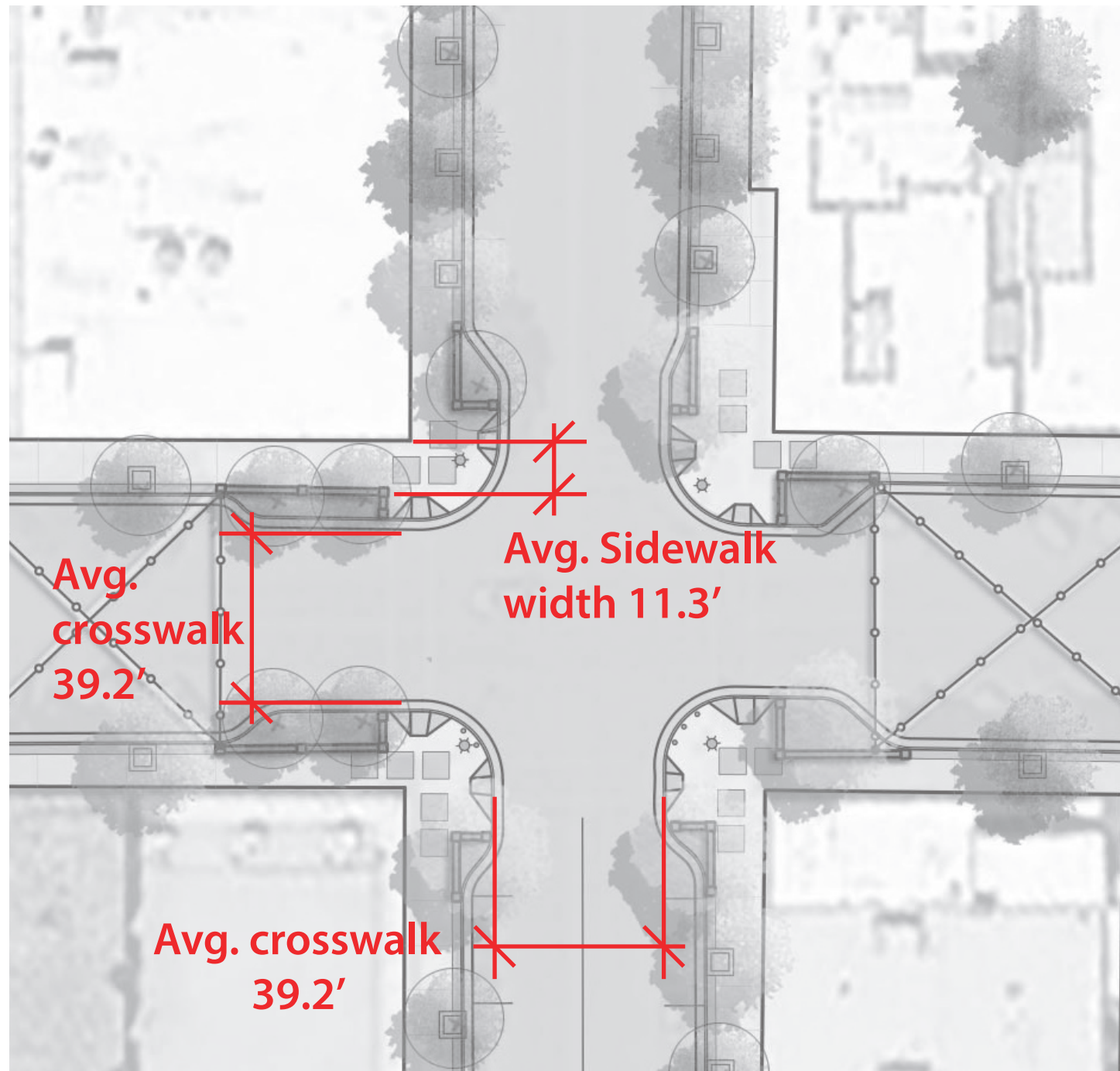


EXISTING CONDITION

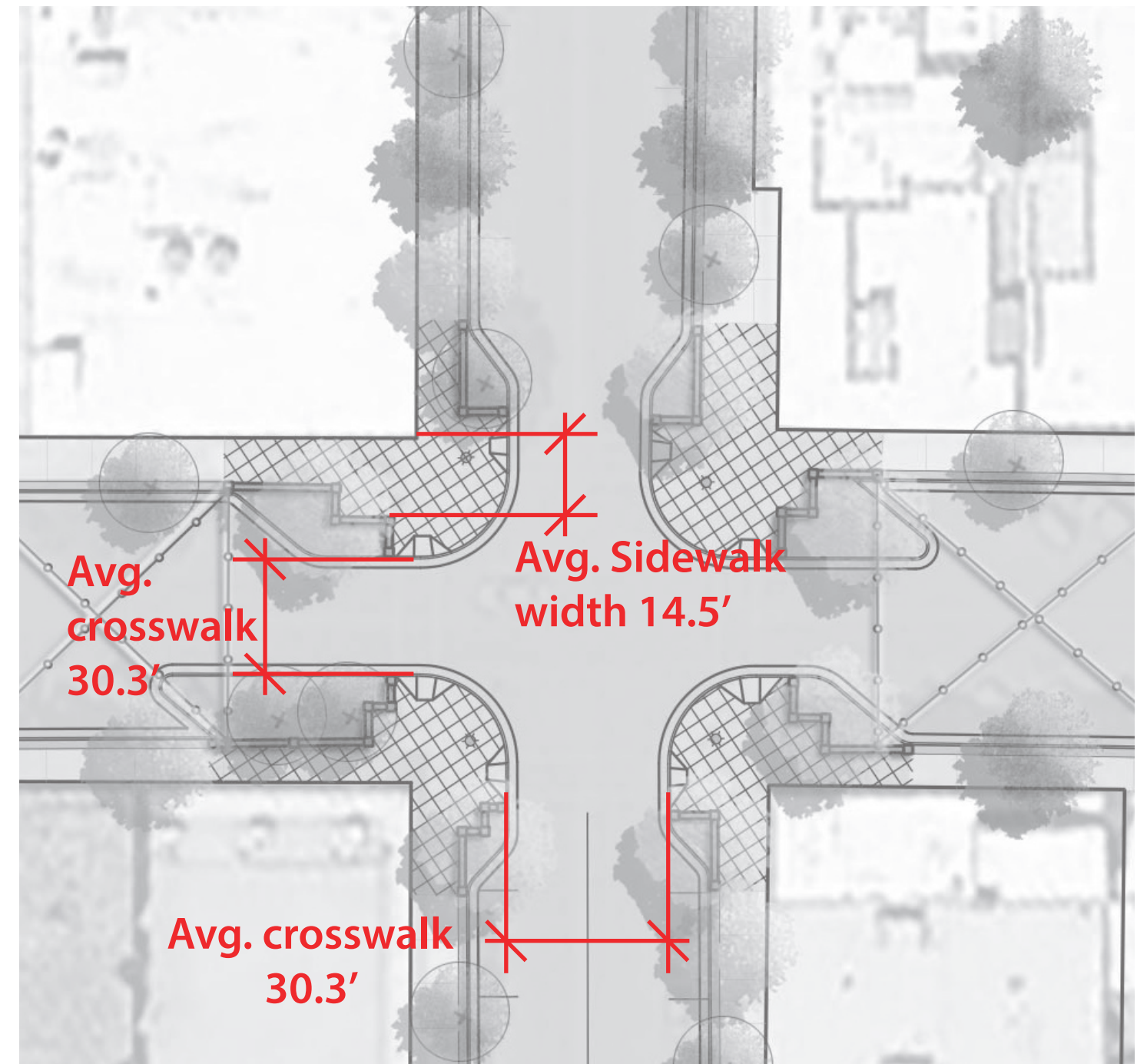


PROPOSED CONDITION

**RECONSTRUCTED CAPITOL AVE. AND 17TH STREET**



**ADDITIVE/RETRO-FIT OPTION:**



**RECONSTRUCTION OPTION:**

Note: Turning radii should be analyzed further for final design.

**ADDITIVE AND RECONSTRUCTION COMPARISON DIAGRAM**

Fehr & Peers conducted a capacity analysis on Lincolnway in Cheyenne, WY to determine the potential for redevelopment of the roadway. The redevelopment area extends from Bent Avenue to Logan Avenue. Previously traffic counts for stop-controlled intersections were not available and from the previous results WYDOT requested further analysis for signalized intersections on Lincolnway to the east of the project. Cheyenne MPO provided updated turning movement counts for the following intersections:

- |                                    |                                   |
|------------------------------------|-----------------------------------|
| 1. Bent Avenue (stop-controlled)   | 8. Warren Avenue (signalized)     |
| 2. O'Neil Avenue (stop-controlled) | 9. House Avenue (stop-controlled) |
| 3. Thomes Avenue (stop-controlled) | 10. Evans Avenue (signalized)     |
| 4. Pioneer Avenue (signalized)     | 11. Morrie Avenue (signalized)    |
| 5. Carey Avenue (signalized)       | 12. Dunn Avenue (signalized)      |
| 6. Capitol Avenue (signalized)     | 13. Logan Avenue (signalized)     |
| 7. Central Avenue (signalized)     |                                   |

Volumes were balanced between intersections where necessary. The existing volumes were significantly unbalanced between Pioneer Avenue and Carey Avenue; therefore, the volumes were compared to the 2013 counts and balanced by increasing the appropriate movement volumes.

To estimate the 20-year horizon volumes, data from U.S. Census and WYDOT was collected and compared. Recent traffic counts and population estimates show a one percent annual growth rate over the past ten years. This was applied to the existing counts to estimate the future volumes. The existing and future volumes are shown in **Figures 1 and 2**.

### Capacity Analysis

Lincolnway was modeled in Synchro (version 8.0) to determine the intersection and movement levels-of-service (LOS) with the existing conditions and proposed redevelopment options. The City of Cheyenne's Synchro models for the downtown area were updated with the most recent signal timing plans (provided by Cheyenne MPO), lane assignments, storage lengths, adjacent parking maneuvers, intersection Peak Hour Factor (PHF), and balanced turning movement counts.

The capacity analysis focused on the PM Peak Hour since the volumes were the highest and this would be the most critical time period.

The following scenarios were evaluated and compared for the PM Peak Hour:

#### Scenario 1. Existing (2014)

- (A) With the existing lane configuration, signal timing, and counts.
- (B) 3-Lane configuration with the existing signal timing and counts.
- (C) 3-Lane configuration with the existing counts and optimized signal timing.

#### Scenario 2. Future (2035)

- (A) With the existing lane configuration, signal timing, and future projected counts.
- (B) 3-Lane configuration with the existing signal timing and future projected counts.
- (C) 3-Lane configuration with the future projected counts and optimized signal timing.

### Findings

**Table 1** provides the LOS for each of the listed scenarios for each intersection and approach. Here are a few highlights from the capacity analysis:

#### Scenario 1. Existing (2014)

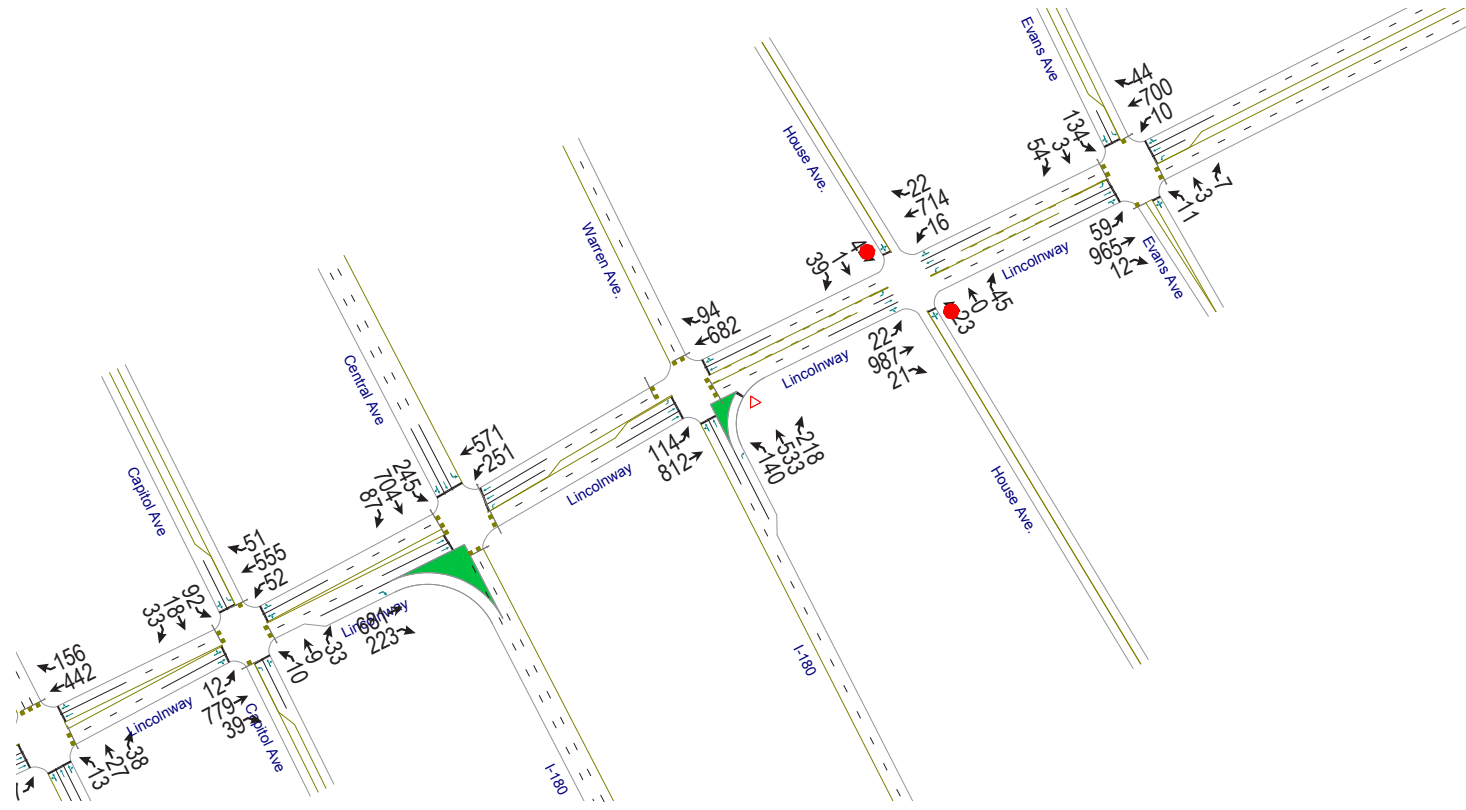
- With either the 75-second or 90-second cycle length, all intersections and approaches will operate at acceptable LOS except for the following:
  - **O'Neil Avenue:** The side-street stop-controlled intersection will have LOS E on the southbound approach with both cycle lengths. The 95<sup>th</sup> percentile queue will be two cars in the peak hour.
  - **Warren Avenue (westbound approach):** This approach will operate at LOS F with either cycle length since the lane drop occurs here. The delay is reduced with the 90-second cycle length. The overall intersection operates at LOS D with both cycle lengths.
- Travel time could increase by 2 minutes through the study area in the PM peak hour.

#### Scenario 2. Future (2035)

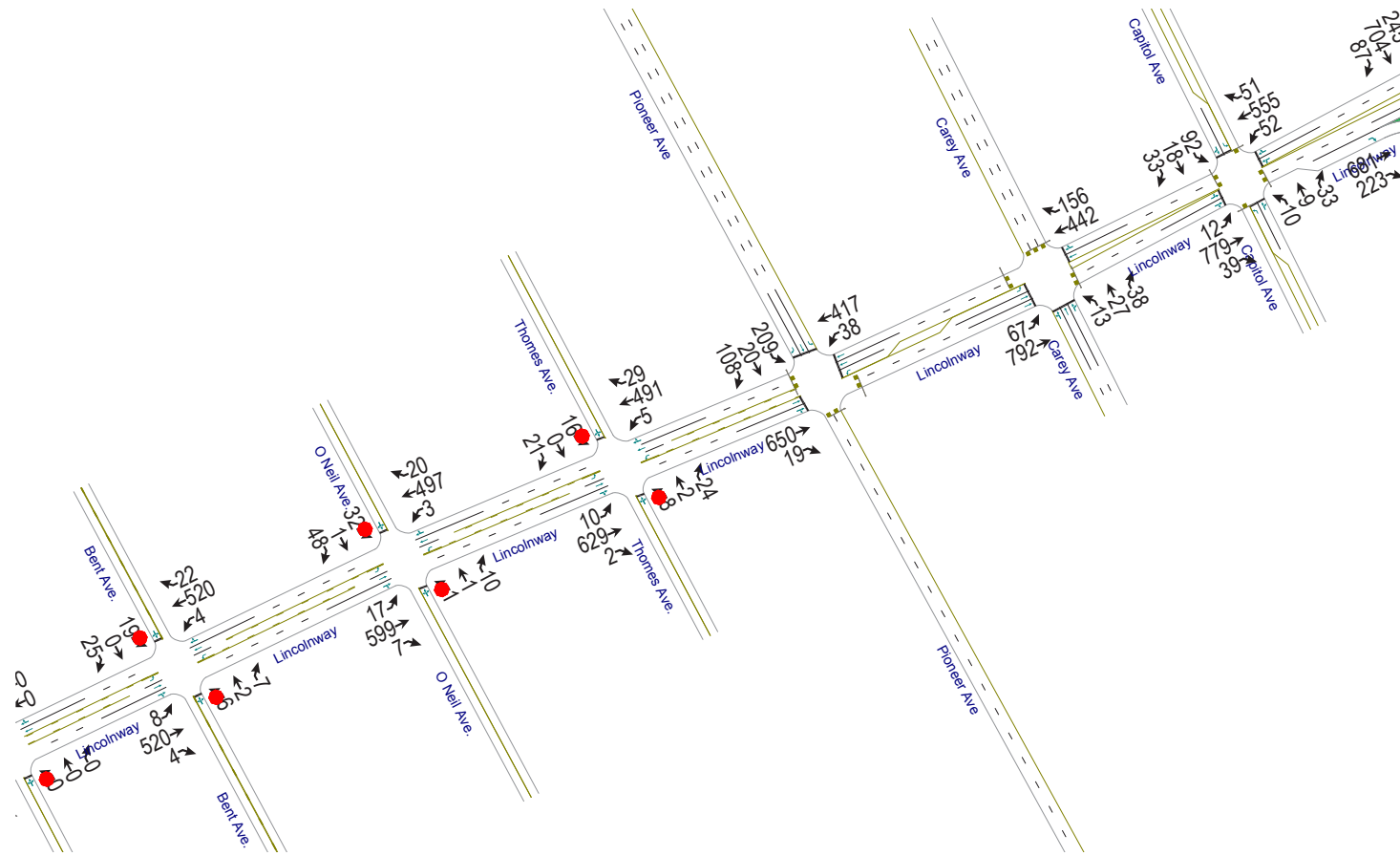
- With either the 75-second or 90-second cycle length, all intersections and approaches will operate at acceptable LOS except for the following:
  - **Bent Avenue:** The side-street stop-controlled intersection will have LOS E on the southbound approach with both cycle lengths. The 95<sup>th</sup> percentile queue will be two cars in the peak hour.
  - **O'Neil Avenue:** The side-street stop-controlled intersection will have LOS F on the southbound approach with both cycle lengths. The 95<sup>th</sup> percentile queue will be four cars in the peak hour.
  - **Thomes Avenue:** The side-street stop-controlled intersection will have LOS F on the southbound approach with both cycle lengths. The 95<sup>th</sup> percentile queue will be two cars in the peak hour.
  - **Warren Avenue:** This intersection will operate at LOS E with either cycle length since the lane drop occurs here. The westbound and northbound approaches experience the highest delays.
- Travel time could increase by 3 minutes through the study area in the PM peak hour.



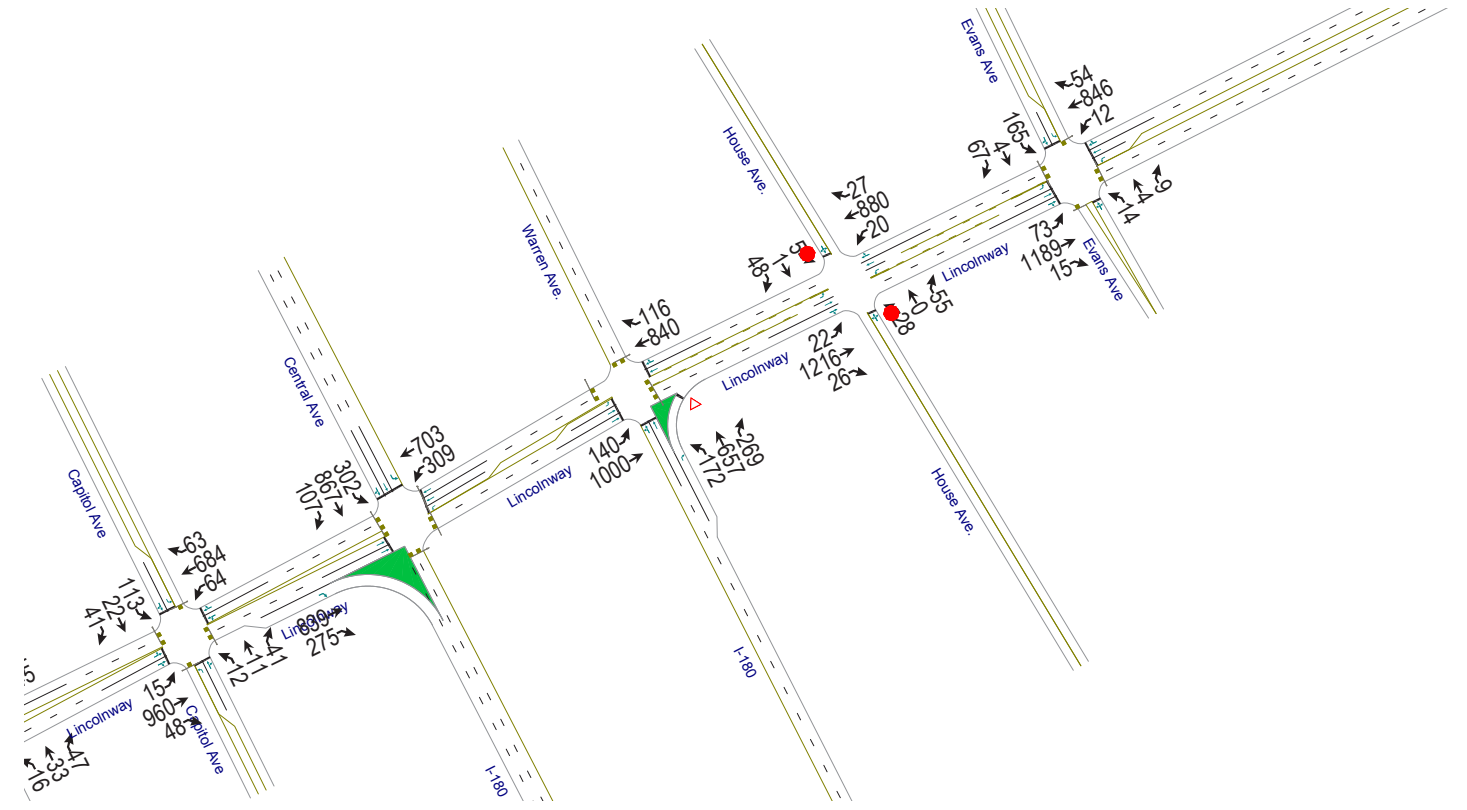
EXISTING 2014 TRAFFIC VOLUMES  
FIGURE 1.1



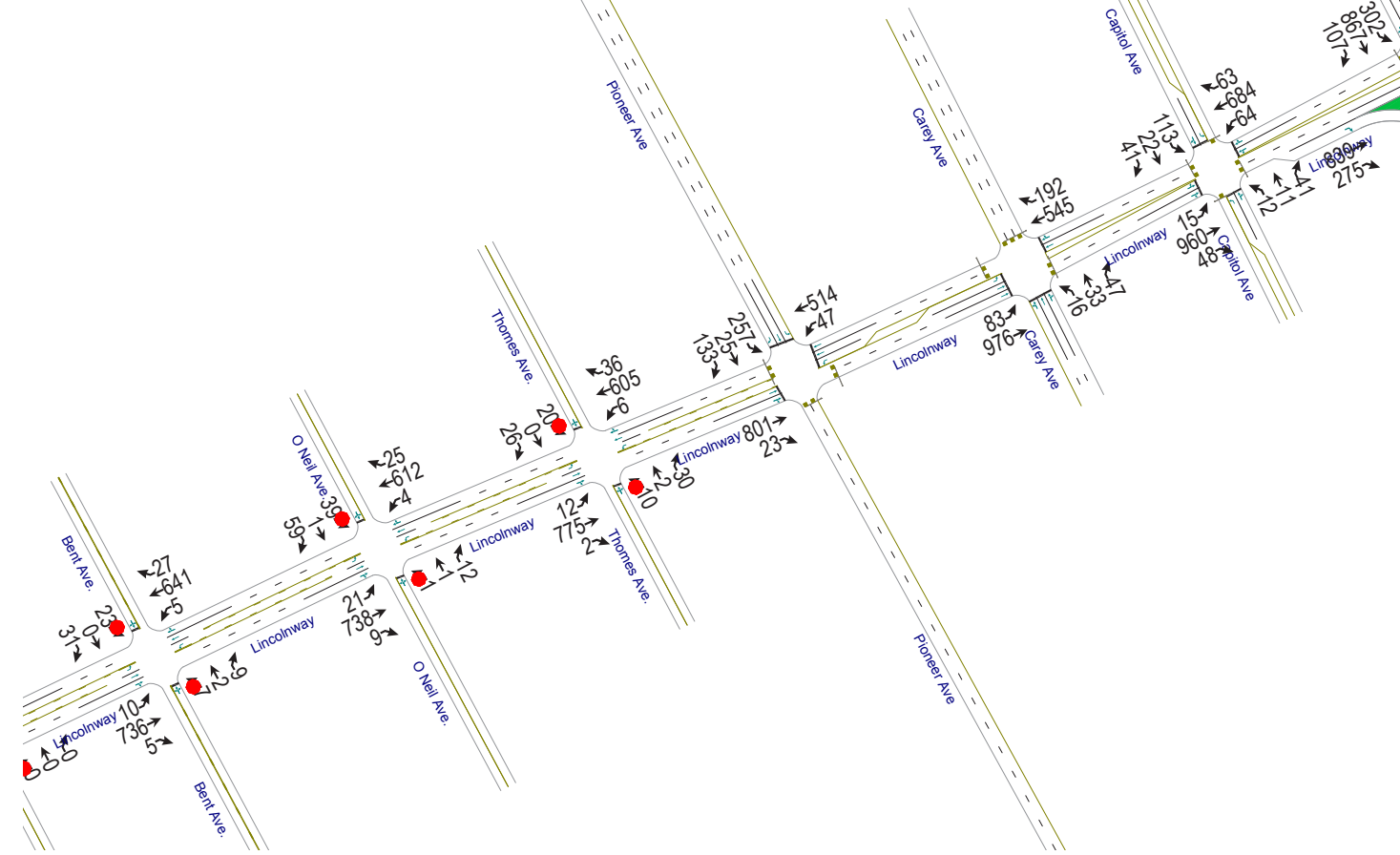
EXISTING 2014 TRAFFIC VOLUMES  
FIGURE 1.2



FUTURE 2035 TRAFFIC VOLUMES  
FIGURE 2.1



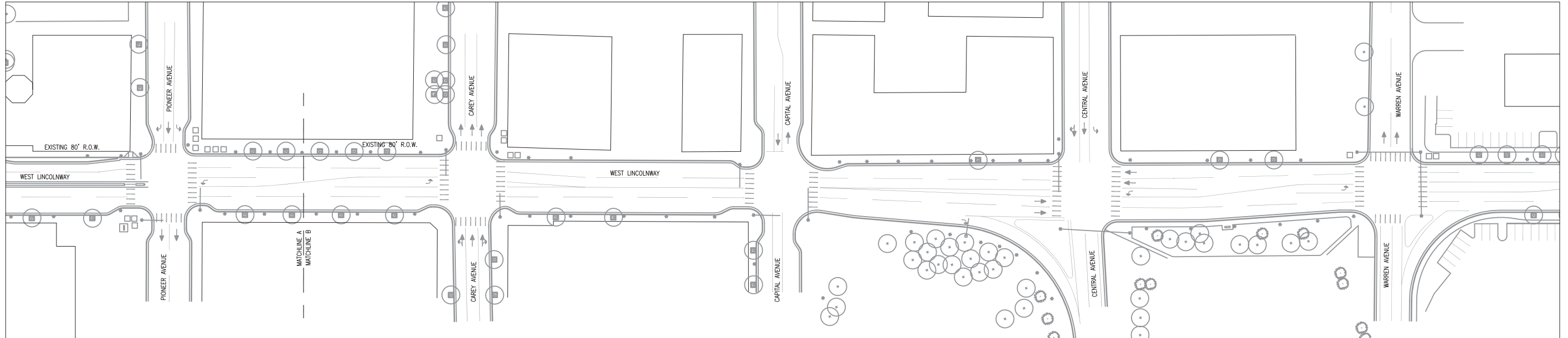
FUTURE 2035 TRAFFIC VOLUMES  
FIGURE 2.2



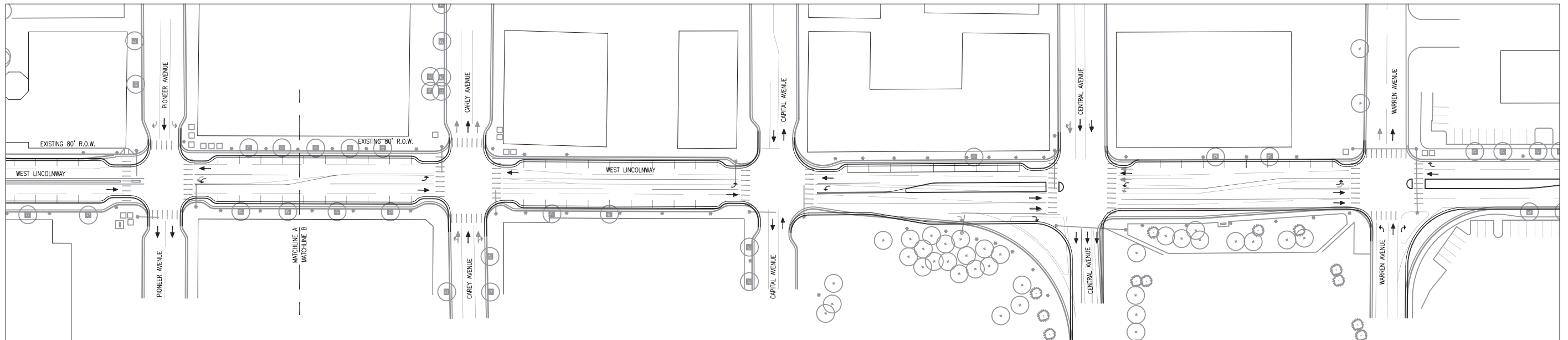
# Lincolnway Placemaking Project

## Comparison of Current and 3-Lane Configurations

### Existing Configuration



### Proposed 3-lane Configuration



**Table 1**  
**Lincolnway Intersection Delay and Level-of-Service Comparison Table**  
for Each Scenario

No.	Intersection	Control	Approach	2014 Existing - PM		2014 Existing: 3-lane Option - PM				2035 Future - PM		2035 Existing: 3-lane Option - PM							
				Existing Timing 60-65 seconds		Existing Timing 60-65 seconds		Optimized 75 seconds		Optimized 90 seconds		Existing Timing 60-65 seconds		Existing Timing 60-65 seconds		Optimized 75 seconds		Optimized 90 seconds	
				Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
4	Pioneer Avenue	Signal	<b>Overall</b>	<b>10</b>	<b>A</b>	<b>18</b>	<b>B</b>	<b>15</b>	<b>B</b>	<b>18</b>	<b>B</b>	<b>11</b>	<b>B</b>	<b>29</b>	<b>C</b>	<b>20</b>	<b>B</b>	<b>22</b>	<b>C</b>
			EB	7	A	26	C	15	B	14	B	8	A	51	D	22	C	19	B
			WB	1	A	3	A	4	A	9	A	1	A	4	A	4	A	8	A
			NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			SB	27	C	20	B	32	C	40	D	31	C	21	C	36	D	48	D
5	Carey Avenue	Signal	<b>Overall</b>	<b>9</b>	<b>A</b>	<b>41</b>	<b>D</b>	<b>19</b>	<b>B</b>	<b>13</b>	<b>B</b>	<b>9</b>	<b>A</b>	<b>73</b>	<b>E</b>	<b>35</b>	<b>C</b>	<b>23</b>	<b>C</b>
			EB	6	A	55	E	19	B	17	B	6	A	106	F	46	D	31	C
			WB	12	B	24	C	16	B	6	A	12	B	34	C	20	C	8	A
			NB	17	B	18	B	28	C	37	D	17	B	19	B	28	C	38	D
			SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Capitol Avenue	Signal	<b>Overall</b>	<b>12</b>	<b>B</b>	<b>32</b>	<b>C</b>	<b>18</b>	<b>B</b>	<b>11</b>	<b>B</b>	<b>13</b>	<b>B</b>	<b>61</b>	<b>E</b>	<b>33</b>	<b>C</b>	<b>24</b>	<b>C</b>
			EB	14	B	51	D	27	C	10	A	15	B	109	F	54	D	36	D
			WB	7	A	12	B	3	A	3	A	9	A	12	B	4	A	4	A
			NB	18	B	18	B	26	C	33	C	18	B	18	B	26	C	31	C
			SB	22	C	22	C	36	D	51	D	23	C	23	C	39	D	45	D
7	Central Avenue	Signal	<b>Overall</b>	<b>25</b>	<b>C</b>	<b>28</b>	<b>C</b>	<b>31</b>	<b>C</b>	<b>34</b>	<b>C</b>	<b>44</b>	<b>D</b>	<b>47</b>	<b>D</b>	<b>50</b>	<b>D</b>	<b>51</b>	<b>D</b>
			EB	21	C	17	B	28	C	29	C	34	C	23	C	45	D	50	D
			WB	19	B	33	C	23	C	25	C	38	D	58	E	35	C	51	D
			NB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
			SB	34	C	34	C	41	D	44	D	58	E	59	E	67	E	53	D
8	Warren Avenue	Signal	<b>Overall</b>	<b>20</b>	<b>B</b>	<b>67</b>	<b>E</b>	<b>51</b>	<b>D</b>	<b>49</b>	<b>D</b>	<b>28</b>	<b>C</b>	<b>95</b>	<b>F</b>	<b>73</b>	<b>E</b>	<b>75</b>	<b>E</b>
			EB	16	B	16	B	14	B	14	B	18	B	18	B	25	C	17	B
			WB	22	C	179	F	105	F	90	F	33	C	255	F	105	F	126	F
			NB	23	C	23	C	44	D	50	D	34	C	34	C	96	F	91	F
			SB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

**Notes:** LOS and delay results for signalized intersections are reported for the overall  
LOS and delay results for stop-controlled intersections are reported for the  
Delay is reported as the average delay per vehicle in seconds.

**WYDOT/CITY ENGINEERING REVIEW COMMENTS**

WYDOT and City Engineering Office have expressed some concerns on certain recommendation scenarios in the Plan. Attached are WYDOT's official comments on this project




Matthew H. Mead  
Governor

**Wyoming**  
**Department of Transportation**  
*"Providing a safe, high quality, and efficient transportation system"*  
5300 Bishop Boulevard  
Cheyenne, Wyoming 82009-3340



William T. Panos  
Interim Director

**MEMORANDUM**

To: Tom Mason, MPO Director  
From: Jeffrey E. Brown, P.E., Assistant State Traffic Engineer   
Date: November 23, 2015  
Re: Downtown Lincolnway Pedestrian and Urban Design Plan (Traffic Analysis Files)

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WYDOT has reviewed Phase I & Phase II of the traffic analysis performed by Fehr & Peers as well as the overall plan in general. We offer the following comments.

Although not part of the consultant's scope, it is important to note the study does not define the overall impacts to the state highway system. Delays to Lincolnway were shown however the additional delays to Central & Warren north of Lincolnway are not addressed.

The proposed 3 lane concept increases delay at several movements throughout the system and has significant impacts to the Warren Avenue intersection as shown in Table 1 of the study. As shown in Phase II of the report, the VISSIM model shows a 5 fold increase in travel time just on the 3 intersections simulated. The proposed 3 lane with a 90 second cycle length is not acceptable and does not meet WYDOT mobility goals.

WYDOT acknowledges the benefits of some concepts presented in the plan and support improving the pedestrian environment as well as the community as a whole. We would support removal of the free right turns at Central & Warren as well as some of the other enhancements shown on the 5 lane option at the public meetings.

We support the idea of increasing pedestrian clearance times in the downtown area. Increasing pedestrian clearance times on Lincolnway will require a cycle length change. WYDOT has agreed to work with the City to have the core CBD area analyzed for coordination based on a new cycle length.

We appreciate the opportunity to comment.

Cc:  
Pat Persson, District Engineer, WYDOT  
Randy Griesbach, District Traffic Engineer, WYDOT  
Tom DeHoff, District Construction Engineer, WYDOT  
Joel Meena, State Traffic Engineer, WYDOT  
File

## FHWA ROAD DIET GUIDELINE- 29% reduction of vehicle crashes when roadway travel lanes are reduced

CASE STUDY	LOCATION	PROJECT FACTS	PEDESTRIAN SAFETY	VEHICLE SPEED	VEHICLE CRASHES	ECONOMIC BENEFITS
Fourth Plain Boulevard	Vancouver, WA	<ul style="list-style-type: none"> <li>Principal Arterial</li> <li>Posted Speed 30 MPH</li> <li>1 mile</li> <li>Residential/Res.</li> </ul>	<ul style="list-style-type: none"> <li>Crossings safer</li> </ul>	<ul style="list-style-type: none"> <li>Decreased by 18%</li> <li>No traffic diversion</li> </ul>	<ul style="list-style-type: none"> <li>Decreased by 52%</li> </ul>	<ul style="list-style-type: none"> <li>Economic growth in gross revenue of 3.1%</li> </ul>
U.S. 18	Clear Lake, IA	<ul style="list-style-type: none"> <li>State Highway</li> <li>Posted Speed 45 MPH</li> <li>1.1 miles</li> <li>Commercial/Res.</li> </ul>	<ul style="list-style-type: none"> <li>No data</li> </ul>	<ul style="list-style-type: none"> <li>Decreased vehicles over the speed limit by 32%</li> <li>Decreased aggressive speeding by 52%</li> </ul>	<ul style="list-style-type: none"> <li>Decreased by 65%</li> </ul>	<ul style="list-style-type: none"> <li>No data</li> </ul>
U.S. Route 62	Hamburg, NY	<ul style="list-style-type: none"> <li>State Highway</li> <li>Main Street</li> <li>1 mile</li> <li>Commercial</li> </ul>	<ul style="list-style-type: none"> <li>More street crossings</li> <li>Decreased crossing distances</li> </ul>	<ul style="list-style-type: none"> <li>Speed limit reduced</li> </ul>	<ul style="list-style-type: none"> <li>Decreased by 66%</li> <li>Decreased injuries by 60%</li> </ul>	<ul style="list-style-type: none"> <li>Business owners spent \$ 7 Million on 33 building projects</li> <li>Building permits increased from 15 to 96 in 5 yrs.</li> <li>Property values doubled in 5 yrs.</li> </ul>
W. Lancaster Boulevard	Lancaster, CA	<ul style="list-style-type: none"> <li>Major Arterial</li> <li>.6 miles</li> <li>Commercial</li> </ul>	<ul style="list-style-type: none"> <li>Improved ped. safety</li> </ul>	<ul style="list-style-type: none"> <li>Speed limit reduced</li> </ul>	<ul style="list-style-type: none"> <li>Decreased by 50%</li> </ul>	<ul style="list-style-type: none"> <li>49 new local businesses</li> <li>Addition of 800 jobs</li> <li>New housing</li> <li>Revitalized buildings</li> </ul>
Bridgeport Way	University Place, WA	<ul style="list-style-type: none"> <li>Principal Arterial</li> <li>1.5 miles</li> <li>Commercial/Res.</li> </ul>	<ul style="list-style-type: none"> <li>More street crossings</li> <li>Wider sidewalks</li> <li>Increase in ped. use</li> </ul>	<ul style="list-style-type: none"> <li>Decreased by 13%</li> </ul>	<ul style="list-style-type: none"> <li>Decreased by 60%</li> </ul>	<ul style="list-style-type: none"> <li>Sales revenue increased by 7% compared to 5% city wide</li> <li>New business developed</li> <li>Existing business redevelopment</li> </ul>

The above matrix illustrates five case studies where road diets/three lane cross sections have been implemented throughout the U.S. and subsequent results have been documented including pedestrian safety and use increases, speed reduction, vehicle crash decreases and economic growth increases. In general, the case studies outline a pattern of decreased vehicle speeds and decreased vehicle crashes as well as increased pedestrian safety and increased economic benefits. The FHWA has documented an overall average of a 29% reduction of vehicle crashes where roadway travel lanes are reduced.