

## 5.0 DESIGN CONSIDERATIONS

Alternative development and analysis needs to address more than just the demands of vehicular traffic and safety. As part of this study, the design team completed a more thorough analysis of the Scenario 2 project corridors. Included with this evaluation was concept development of the two-way conversion of these streets to better analyze potential obstacles and develop high level cost estimates of such a conversion. This section of the report outlines the development of two different alternatives for the Scenario 2 two-way conversion concept design. This process is used to address unique and common design considerations such as pedestrians and bicycles, transit, and parking with each of these alternatives. Concept level plans were produced for both Scenario 2 alternatives and are called Concept 2A and Concept 2B, generally following the geometric guidelines in the Scenario 2A and Scenario 2B alternatives, respectively.

The street corridor scroll plots and before/after plots for both Concept 2A and Concept 2B can be found in **Appendix H**.

### 5.1 Parking Impacts

Parking impact is always of utmost importance when any project is being considered in downtown. This project was no different and parking impacts was a variable given highest attention during the concept development process. As is the case for any downtown area, adjacent retail and high turnover office uses place a high value on “front door” parking. On-street parking stalls can have an impact on property values and revenue generation for certain business types.

While not always possible, if a concept had significant parking impacts on a specific segment of street, opportunities to add stalls on adjacent sides streets were investigated. The concepts also incorporated the City of Lincoln Traffic Engineering Division’s current parking setback requirements from intersections for improved sight distance and increased pedestrian safety which resulted in parking stall loss across the study area. Finally, at the request of the City of Lincoln Parking Services Division, a minimum of one American with Disabilities Act (ADA) handicap accessible parking stall per block face was the goal for each concept. However, due to physical limitations, this could not always be provided or was shared amongst multiple block faces.

Concept 2A provides the most benefit to moving vehicular traffic around the network and utilizes a higher percentage of the street cross-section for vehicular mobility. The 3-lanes used on most corridors leaves less space for on street-parking. This sacrifices overall parking availability to provide better vehicular mobility within the study area. Available on-street parking space is limited, and most corridors are forced into parallel parking with the restricted space. Since operating lanes encompass more available curb to curb street width, on-street parking for this scenario should maximize lateral offset from the thru lane to minimize the interaction between thru vehicles and those making parking maneuvers. These parking maneuvers create friction with the operating

lanes and maximizing the available space between vehicles promotes safety. A summary of Concept 2A corridor parking spaces is summarized in **Table 6**.

**Table 6. Concept 2A Parking Summary**

Corridor	Existing		Concept 2A		Concept 2A Gain/Loss	
	Marked Stall	ADA Stalls	Marked Stall	ADA Stalls	Marked Stall	ADA Stalls
11th St	154	7	86	15	-68	8
12th St	146	8	123	14	-23	6
13th St	51	10	43	11	-8	1
14th St	136	6	74	11	-62	5
M St	203	6	120	16	-83	10
N St	162	5	122	8	-40	3
<b>Totals</b>	<b>852</b>	<b>42</b>	<b>568</b>	<b>75</b>	<b>-284</b>	<b>33</b>

Concept 2B de-emphasizes vehicular mobility and prioritizes pedestrian accessibility and safety. The 2-lane alternative leaves more space for on-street parking and provides a higher capacity per block face since angle parking can be utilized. Concept 2B has more availability for parking than Concept 2A but still reduces the total stall count compared to existing conditions. A summary of Concept 2B corridor parking spaces is summarized in **Table 7**.

**Table 7. Concept 2B Parking Summary**

Corridor	Existing		Concept 2B		Concept 2B Gain/Loss	
	Marked Stall	ADA Stalls	Marked Stall	ADA Stalls	Marked Stall	ADA Stalls
11th St	154	7	94	16	-60	9
12th St	146	8	129	14	-17	6
13th St	51	10	41	10	-10	0
14th St	136	6	110	10	-26	4
M St	203	6	155	16	-48	10
N St	162	5	122	8	-40	3
<b>Totals</b>	<b>852</b>	<b>42</b>	<b>651</b>	<b>74</b>	<b>-201</b>	<b>32</b>

Parking by block face for Concept 2A is illustrated in **Figures 21** and **Figure 22**. Parking by block face for Concept 2B is illustrated in **Figures 23** and **Figure 24**.

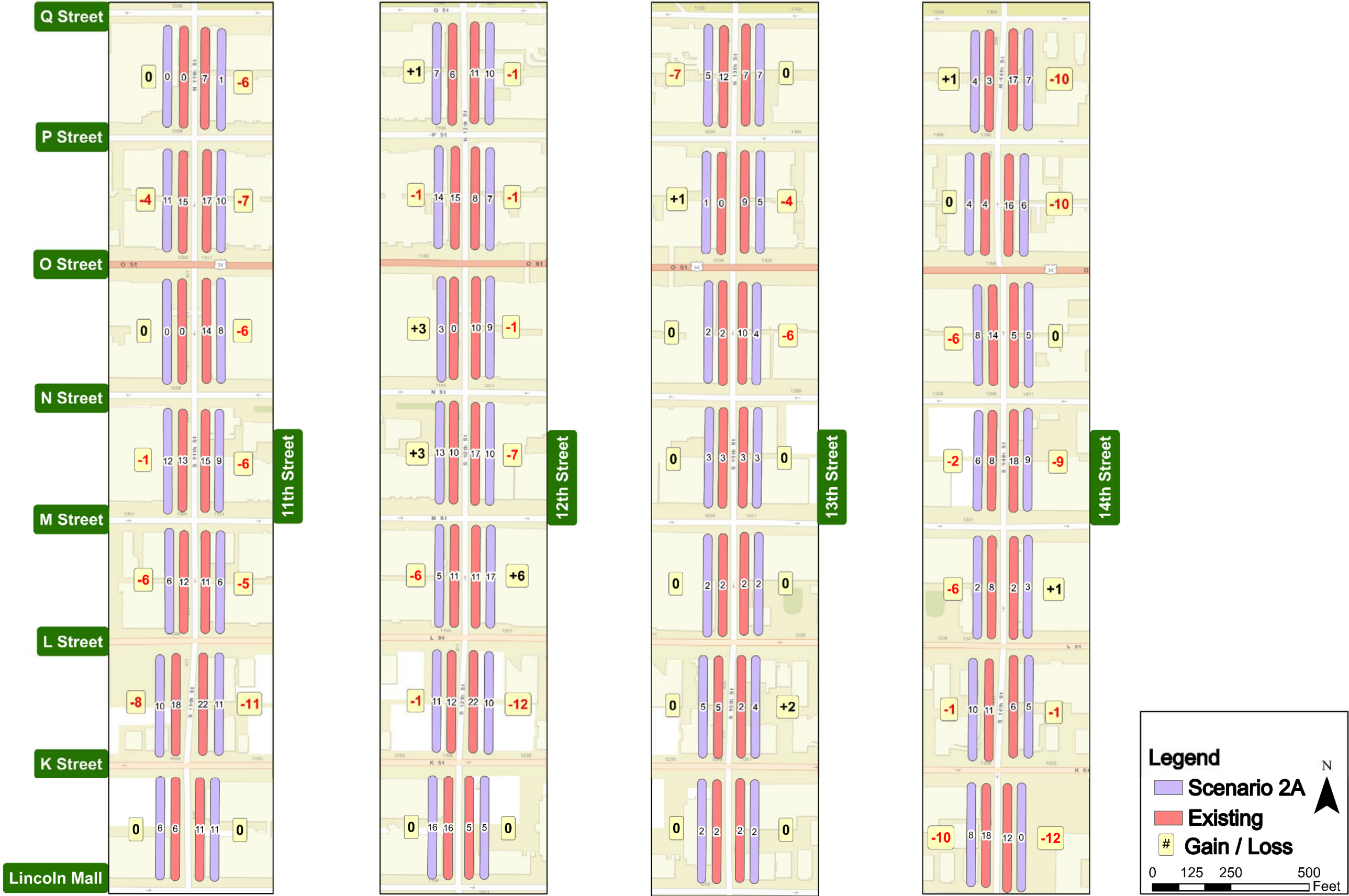


Figure 21. Parking Summary Concept 2A North/South



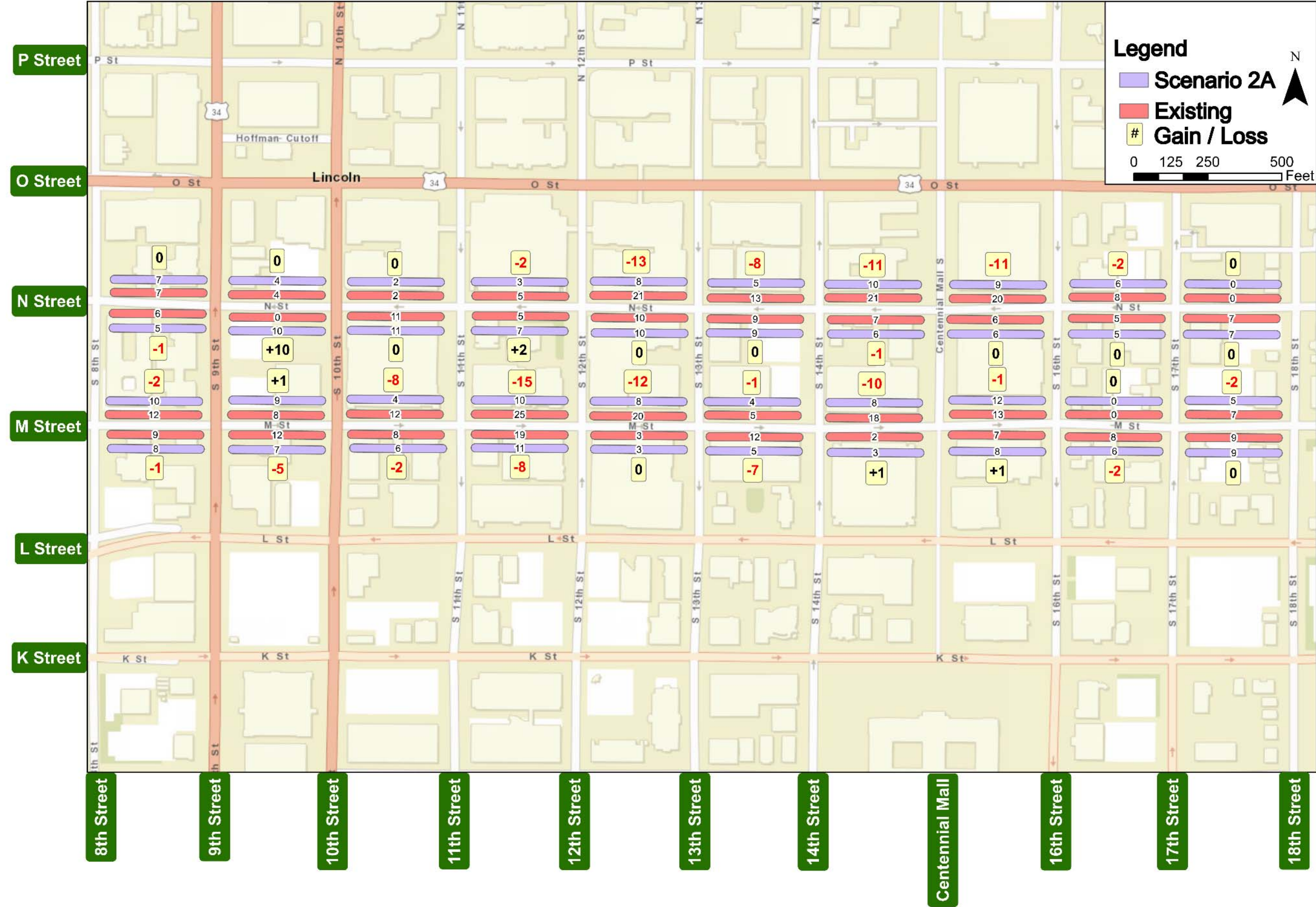


Figure 22. Parking Summary Concept 2A East/West

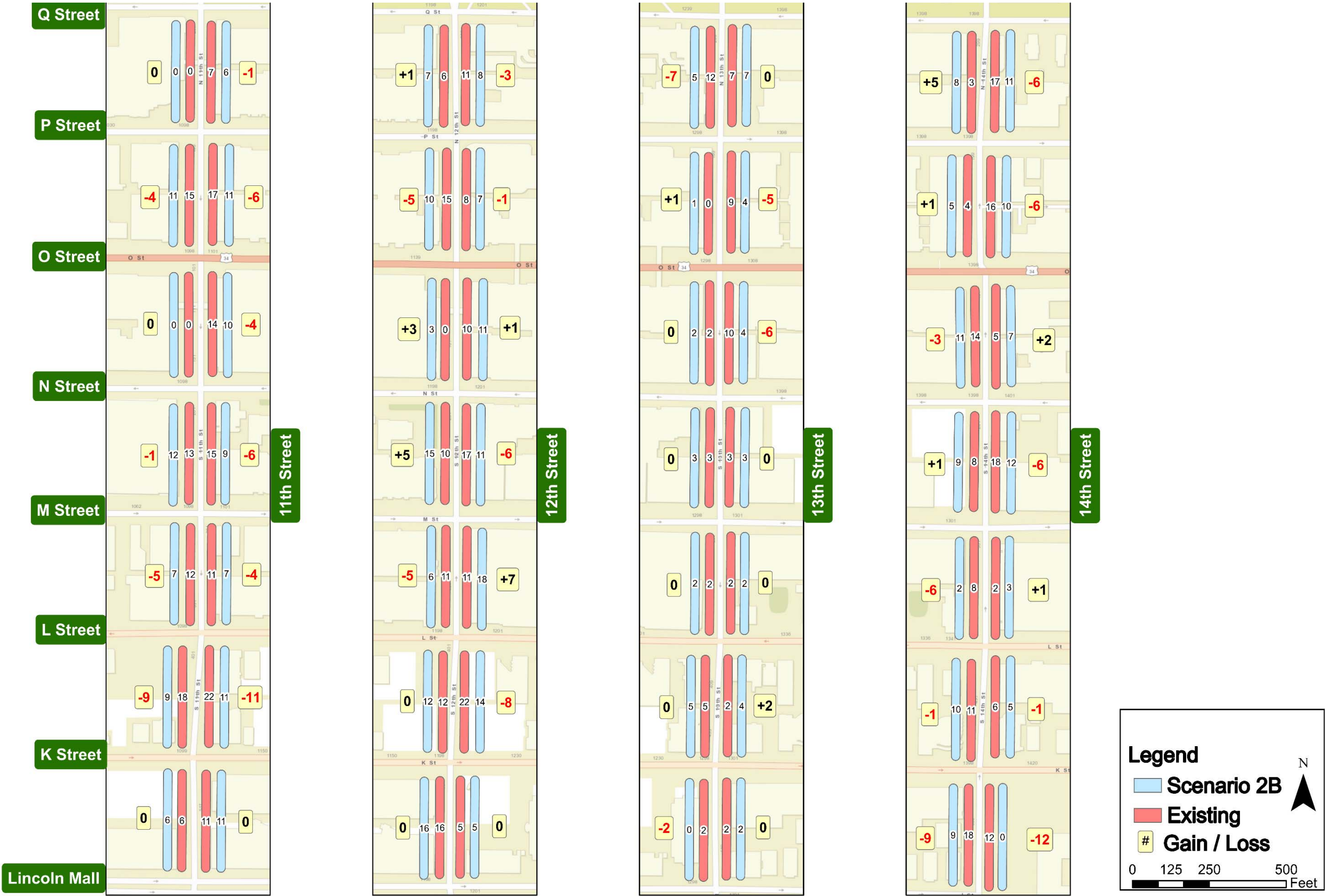


Figure 23. Parking Summary Concept 2B North/South



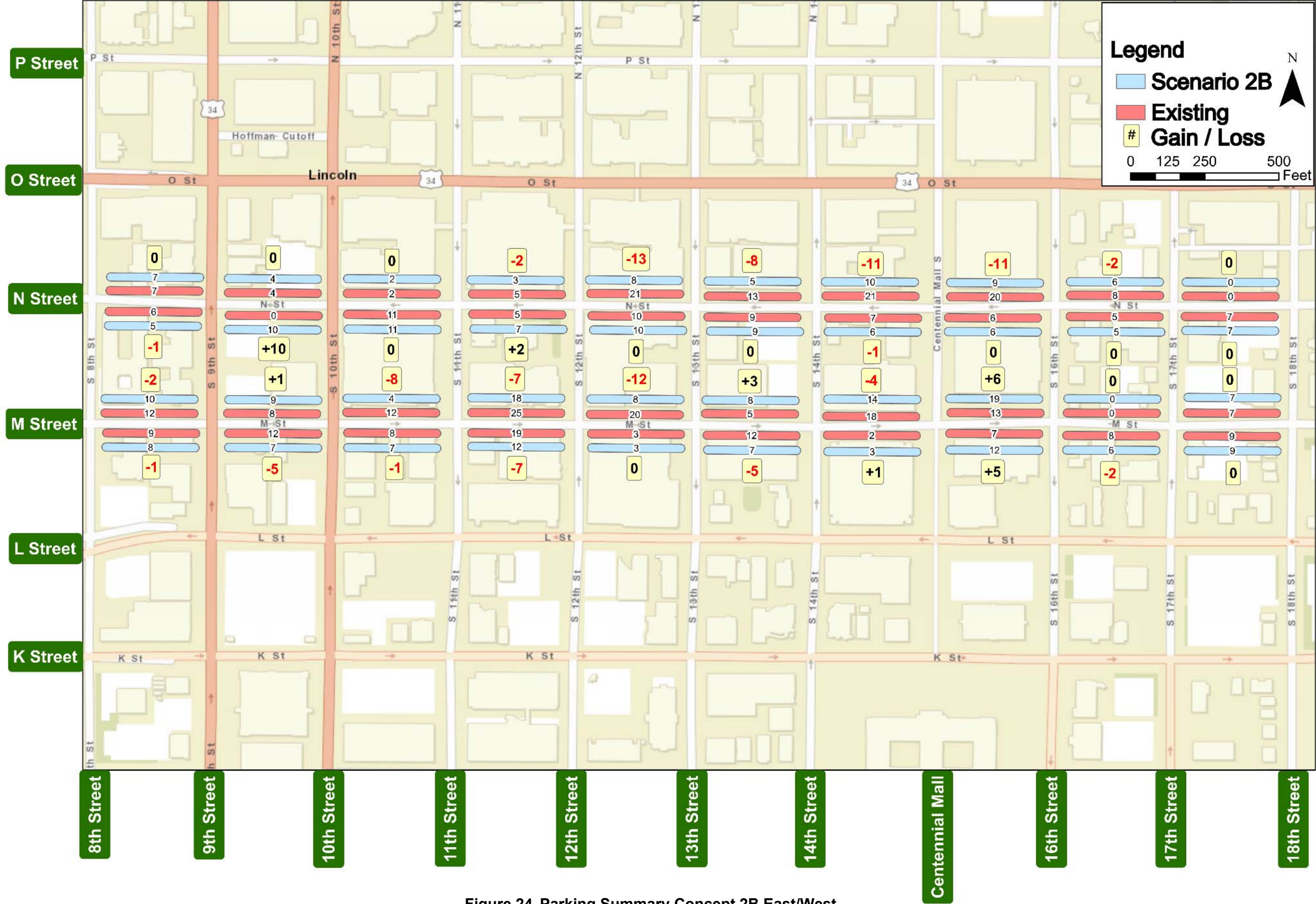


Figure 24. Parking Summary Concept 2B East/West

## 5.2 Guide/Wayfinding Signage

Scenario 2 operations would require some existing guide/wayfinding signs to be updated to reflect new preferred routing. A map illustrating the required changes to the existing signage is illustrated in **Figure 25**.

## 5.3 Pedestrian and Bicycle Facilities

Under the *Lincoln Bike Plan*, future buffered bike lanes on 13<sup>th</sup> Street are planned to connect the existing bike lanes ending at Lincoln Mall to UNL city campus. Both Concept 2A and Concept 2B incorporate these new facilities and eliminate the need for the existing one-way bike lanes on 11<sup>th</sup> and 14<sup>th</sup> streets. This would consolidate the two existing lanes into one corridor that provides continuity through the entirety of the downtown area. The N Street cycle track is not expected to be altered under any of the conversion scenarios. However, Concept 2B alternative does assume that some signal-controlled portions from 11<sup>th</sup> Street to Centennial Mall would be removed and replaced with all-way stop control.

Once 16<sup>th</sup> Street is converted under Scenario 3, buffered bike lanes should be installed from South to Q streets per the *Lincoln Bike Plan*. The current width of the street should provide sufficient space to implement those bike lanes from K to Q streets. From South to K streets, most on-street parking facilities would need to be removed.

Both Concept 2A and Concept 2B implemented the use of pedestrian nodes to minimize the exposure of pedestrians to vehicles at intersections. Concept 2B has a greater opportunity to eliminate pedestrian/vehicle exposure due to the fewer vehicle travel lanes. By extending the pedestrian node further into the intersection, crossing widths would be shorter and promote safer pedestrian transportation network. Also, intersections converted to stop-control under Concept 2B would likely promote safer operations. Under stop control, vehicles must yield to pedestrians in the crosswalk. This would mean pedestrians would be able to cross intersections with minimal delay. **Table 8** summarizes the total pedestrian crosswalk exposure time.



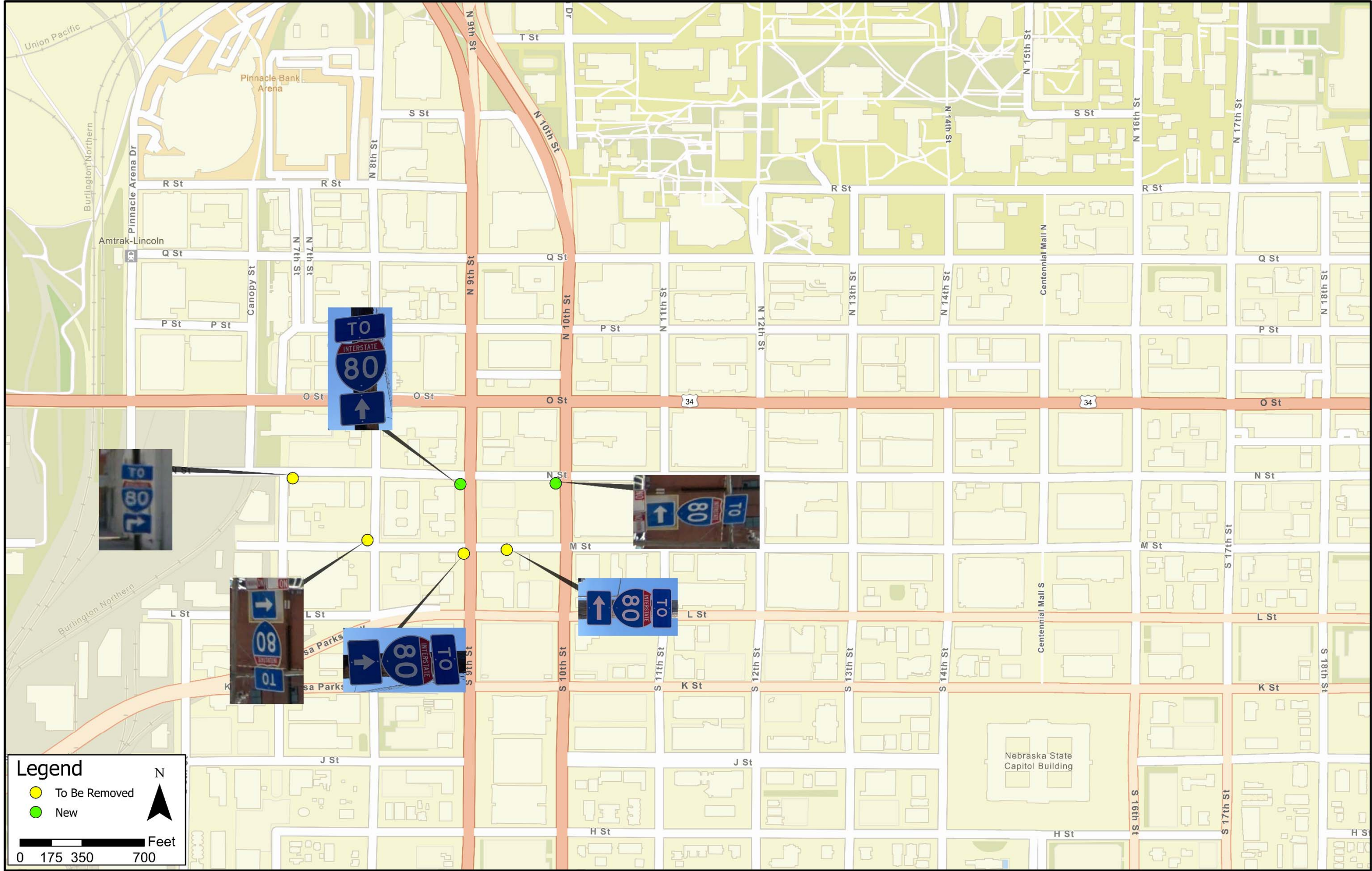


Figure 25. Scenario 2 Wayfinding and Guide Sign



**Table 8. Total Pedestrian Exposure**

Corridor	Total Crosswalk Exposure (Sec)			Net Time Reduction from Existing (Sec)	
	Existing	Concept 2A	Concept 2B	Concept 2A	Concept 2B
9th St	405	398	398	7	7
10th St	428	424	424	4	4
11th St	367	314	289	53	78
12th St	382	221	296	51	86
13th St	379	366	362	13	17
14th St	365	321	295	44	70
Centennial Mall	185	180	174	5	11
16th St	185	180	174	13	17
17th St	371	371	365	0	6
<b>Totals</b>	<b>3,259</b>	<b>3,069</b>	<b>2,963</b>	<b>190</b>	<b>296</b>

\*Based on 4 feet per second walking speed.

## 5.4 Ingress/Egress Conflicts

Parking facilities have developed in downtown Lincoln around a network of one-way streets over the last 70 years. Parking facilities whose ingress and egress are designed around the existing one-way traffic flow conditions must be evaluated to identify conflicts that would require mitigation with a conversion to two-way streets. Many parking garages experience high demand in short peaks that can cause intermittent delays or blockage of certain lanes for arrival and release of daily employees in downtown, event patrons, and other time-sensitive functions. When evaluating potential impacts two-way conversion could have, another concern is the ability of vehicular traffic to avoid queued vehicles waiting to access parking facilities.

Under Scenario 1, or existing conditions, most vehicles queue in the lane adjacent to the intended parking facility and, with multiple lanes in one direction, other vehicles can often navigate around the queue to their destination. In Scenario 2A vehicles queueing in the adjacent ingress direction would likely queue and be served at a metered rate. Parking is mostly pay on exit and a ticket or pass must be taken/swiped upon entry. The average time for entry is short but is not trivial. This may jam a street in a particular direction for the duration of peak demand and have cumulative effects on adjacent streets. In the opposite direction, the left-turn lane would likely queue and may only be served intermittently. Depending on the demand and duration, the opposite left-turn lane could become jammed, and mobility on the ingress street could be limited.

With Scenario 2B, the adjacent ingress direction would operate similar to Scenario 2A, but the opposite direction would not have a left-turn lane to separate ingress traffic. Without restrictions on ingress to facilities during high demand, Scenario 2B may have streets that become jammed

when facilities have demand that exceeds service rates for long periods of time. If multiple facilities simultaneously experience this peak demand, there is greater risk of intersections being unable to service vehicles, mobility loss on corridors, or extended periods of delay. These issues would be more likely than in the Scenario 2A and could have more cumulative impacts on the network.

Egress issues are likely to be less varied. In existing conditions, egress movements onto one-way streets are streamlined, but can be constricted by capacity if adjacent intersections experience durations of increased demand. Both Scenario 2A and Scenario 2B increase the potential strain on the driver decision making process when demand increases but gives the driver potential alternative routes to exit the area. Exiting demand would be limited to the service rate inside the garage, as drivers pay or swipe passes which keeps queueing contained within the garage. These issues with Scenario 2 would also be true for Scenario 3 converted streets.

Signing and curb work around access points at parking garages would need addressed for conversion to two-way operations. **Table 9** summarizes necessary garage changes that would be required for each conversion scenario.

**Table 9. Ingress/Egress Modifications**

Parking Garage	Scenario 2	Scenario 3
Market Place		Remove Left-Turn Only Sign (2)
		Remove One Way Sign
Que Place	11 <sup>th</sup> Street Curb Modification	Remove No Right-Turn Sign (2)
17th/R		Remove One Way Sign
		Remove Right-Turn Only Sign (3)
Rampark		Remove No Left Turn Sign
Center Park	Remove One Way Sign (2)	
	N Street Curb Modification	
Cornhusker Square	Remove One Way Sign (2)	
Wells Fargo		Remove Left Turn Only Sign

## 5.5 Curbside Management

The management of limited curb space is becoming a nationwide issue with the rise in on-demand transportation network companies (TNCs) such as Lyft or Uber, and the increase in freight delivery for both large and small deliveries from a variety of sources. As the City of Lincoln contemplates the conversion of several one-way streets to two-way facilities, the need to assess and plan for curb space management only increases. Where once there were multi-lane streets (two or more lanes in one direction), the conversion to two-way traffic will restrict travel to one-

lane in each direction. Ride-share and delivery services previously could double park and still allow traffic to circulate. Such actions now will create blockages in the street that may result in drivers traveling in the opposing lane of traffic to by-pass these stopped vehicles.

The management of curb space is largely a dynamic activity, as changes in businesses and operations can often require changes to be made over the years. The recommendations and thoughts outlined below should be developed as a potential solution that may require modifications as they are implemented.

Under Scenario 2A, the conversion of one-way streets to two-way streets will provide the opportunity to maintain a center turn lane which can be used for delivery vehicles or to by-pass double-parked vehicles. This would not be the case for Scenario 2B and operations during these activities would be of specific concern.

A developing trend in curbside management is the use of dynamic curb space for the competing demands of on-street parking, deliveries, and TNCs. Dynamic curb space can have different allotted permit uses by time of day and even day of week to provide the needs of the community. Parking spaces (ideally parallel spaces to provide the most flexibility) can be signed to permit on-street parking during certain periods of the days, deliveries during others, and potentially TNC pick-up/drop-off at other times. As these competing needs can vary from block to block, it is essential to meet with adjacent property owners and business operators to address their specific potential needs to establish the final program. Items to be considered, albeit not necessarily required on every block, include:

- Freight delivery times – many businesses find that by restricting delivery times to certain periods of the day, they are better positioned to receive or ship deliveries at times that do not compete with core business hours. An example are restaurants who can have deliveries made in periods of times when they have few, if any, customers. Others can include bars and nightclubs that may not be able to accept deliveries until the afternoon as they are not open or have limited business until the afternoon.
- TNC zones – TNCs have higher usage around certain businesses, but often peak in late afternoon or evenings in entertainment areas. The use of geofencing to control drop-off and pick-up locations is often needed to ensure compliance.
- On-street parking – On-street parking can be permitted during other periods of the days, although it may be desired in some areas to restrict overnight parking. On-street parking can also include dynamic pricing to ensure it is being utilized efficiently for short-term parking.



Examples of potential dynamic parking spaces are shown in the **Table 10**. Several arrangements are possible and can be tailored to the specific area and users.

**Table 10. Dynamic Parking Example**

Example	Freight Delivery	Metered Parking	TNC (3-minute pick-up/drop-off)	No-Parking
	(Commercial Vehicles Only)	(Varied Time Limits)		
Combined Option 1	4am to 11am	11am to 4pm	4pm to 2am	2am to 4am
Combined Option 2	4am to 7am	7am to 7pm		2am to 4am
Freight Zone	4am to 11am	11am to 2pm		
	2pm to 4pm	4pm to 9pm		
TNC Zone		7am to 4pm	4pm to 2am	2am to 4am
Commercial Zone	4am to 7am	7am to 7pm		

Defining each potential option will require meetings and conversations with the businesses, property owners, and residents/renters along each block.

## 5.6 Transit and AV Shuttle Accommodations

StarTran currently operates an on-street transfer facility located on 11<sup>th</sup> Street between N and O streets and on N Street between 10<sup>th</sup> and 11<sup>th</sup> streets. The location of this facility does not provide for ideal operations and a feasibility study is currently being developed to find a more optimal location. Accommodations for future changes to StarTran's center of operations will be required for converted streets. StarTran routes would need to be updated to reflect two-way operations, but some routes could be shortened minimizing circuitous routing through downtown.

Reliability of trips/published service times with regards to signalized intersections on Scenario 2B without an exclusive left-turn lane would need to be addressed when determining routes under two-way operations. These concerns would be mitigated when determining routes for Scenario 2A.

In 2018, the City of Lincoln rolled out a proposed autonomous shuttle project to evaluate service routes. The project outlined a potential service route in the downtown area for autonomous vehicles to transport people to landmarks and major destinations along a fixed route. The proposed route would run along 12<sup>th</sup>, 13<sup>th</sup>, N, and P streets. Shuttle operations would be impacted by available capacity, but two-way converted streets may provide opportunities to utilize more direct routes. Safety concerns related to operation speeds and space availability for vehicles to overtake autonomous shuttles need to be addressed.