JEO CONSULTING GROUP INC

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205th Street and Cumberland Drive Traffic Study - Final

Prepared for City of Omaha Public Works Department

Omaha, NE

October 27, 2021

JEO Project No. 200460.00

Omaha Project No. OPW54061

ENGINEERING ■ ARCHITECTURE ■ SURVEYING ■ PLANNING

205th Street and Cumberland Drive Appendices – Final

Omaha, NE

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Prepared for:

City of Omaha

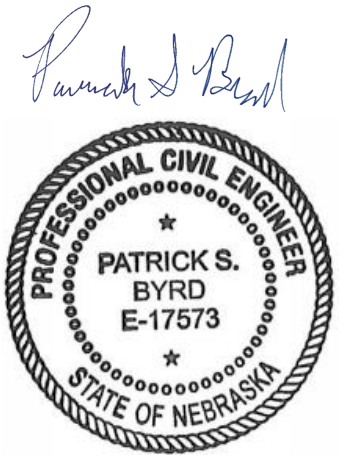
Public Works Department

Prepared by:

JEO Consulting Group

Date:

November 5, 2021



11/05/2021

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Executive Summary

With the continued expansion of commercial and sporting event development in northwest Omaha (north of US-6/West Dodge Road between Skyline Drive and 204th Street), increasing traffic demands have caused significant congestion at the 205th Street and Cumberland Drive intersection. Congestion is especially prominent during sporting events on Saturdays and Sundays, with event traffic making it difficult for vehicles to access Cumberland Drive from commercial uses between 204th and 205th Streets.

This report documents the results of the traffic study conducted for the City of Omaha for the evaluation of potential alternative intersection configurations for Cumberland Drive at 205th Street in Omaha, Nebraska.

Objective

The primary objectives of this traffic study are the following:

1. **To improve traffic operations and safety under current and forecasted traffic demands for the Cumberland Drive and 205th Street intersection.**
2. **Proposed improvements should not adversely impact operations and safety on 204th Street and the signalized intersection at 204th Street and Cumberland Drive.**

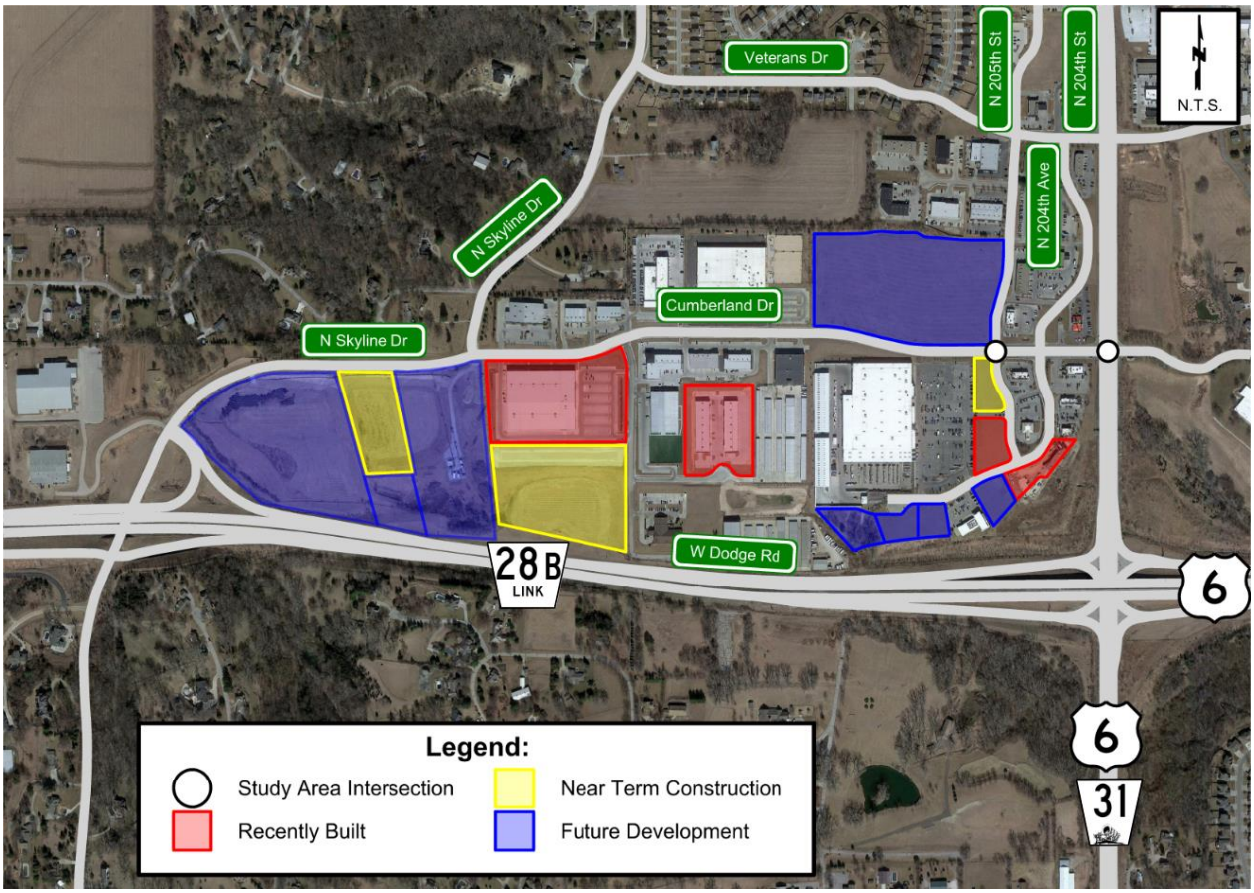
Traffic study efforts included capacity and queue analysis for adjacent study intersections impacted by the project, a safety analysis, an access assessment, event traffic management analysis, traffic demand forecasting, geometric and traffic control alternatives development, route diversion strategies, and alternatives analyses.

Project Description

The study area is located northeast of the US-6/West Dodge Road and 204th Street interchange and is surrounded by dense commercial use, including Menards, various fast-food and sit-down restaurants, and other small businesses. These businesses contribute significant daily traffic demands along Cumberland Drive, with congestion further exacerbated during weekend sporting events that occur at both the Union Bank & Trust Sports Complex and The MARK. The study area intersections included:

- Cumberland Drive and 204th Street
- Cumberland Drive and 205th Street

The US-6/West Dodge Road north and south terminals along Skyline Drive were also considered and discussed with regards to alternative route strategies. The study area is shown on the map shown below. The map includes recently built businesses shown in red, near-term construction projects shown in yellow, and future developments are shown in blue, respectively.



Vicinity Map and Study Area

Existing Conditions

The following evaluations were conducted to confirm existing traffic operations and safety conditions within the study area:

- Field review
- Turning movement data collection
- Capacity and queue analysis
- Safety review
- Signal warrant review
- Access management assessment

Based on the above evaluation, it was confirmed that there is significant existing traffic congestion within the study area, especially during weekend peak hours when sporting events occur west of the study area. Also, due to this congestion, there was an observed crash pattern that is consistent with the difficulty of vehicles' movements on both 205th Street approaches to the Cumberland Drive intersection. A signal warrant review based on the current Manual of Uniform Traffic Control Devices (MUTCD) guidance indicates that current Saturday demands would satisfy warrant thresholds at the 205th Street and Cumberland Drive intersection. Further exacerbating congestion is the poor spacing between the 204th Street and 205th Street intersections on Cumberland Drive. This is amplified even more by the fact that there are two additional access points (204th Avenue and site driveways) on both the north and south side that are also poorly spaced. Current access management methodologies recommend greater spacing.

Traffic Demand Forecasts

To analyze future conditions and properly evaluate potential street improvements, future traffic volumes were forecasted for a near-term (2026) and long-term (2041) traffic demand scenario. This was accomplished by reviewing current and future development plans, current zoning, land areas, and the Institute of Transportation Engineers (ITE) published Trip Generation Manual, 10th Edition. With a significant amount of land yet to be developed, traffic demands are expected to increase significantly in the area which will increase existing traffic congestion issues.

Alternatives Development

The following design alternatives at the 205th Street and Cumberland Drive intersection were developed to mitigate current and future congestion and analyzed to determine viability based on traffic operations and queue analysis:

1. All-way stop control
2. Restricted left-turn and through movements from 205th Street
3. Signal control
4. Roundabout control

Based on traffic operational and queue analyses, the signal and roundabout options were viable for both near-term and long-term traffic demands and were therefore carried through for more detailed analyses.

Skyline Interchange Strategies

Currently, patrons attending sporting events west of the study site appear to be routing through the 205th Street study intersection for access to and from events. An alternative route for patrons would be to head west and use the US-6/West Dodge Road interchange at Skyline Drive. This alternative route, if used, could provide relief for east Cumberland Drive. To encourage patrons to use this route, the following strategies were outlined that may encourage the use of this preferred route:

1. Communication of preferred routing to patrons at sporting events, sport complex websites, and advertisement material.
2. Placement of signs at sport complex driveways as well as the northbound approach to Cumberland Drive guiding patrons to the Skyline Drive.
3. Reduce eastbound capacity on Cumberland Drive to make the Skyline Drive interchange a more attractive route choice.
4. Improve the Skyline Drive ramp terminals, Skyline Drive/Cumberland Drive intersection, and the 210th Street/Cumberland Drive intersection to further encourage Skyline Drive use and increase capacity.

Alternative Analysis

A more detailed analysis was conducted on both signal and roundabout design alternatives at the 205th Street and Cumberland Drive intersection. Additionally, in keeping with Skyline Drive strategies already discussed, smaller footprint design alternatives were developed to cap eastbound traffic as well as reduce adjacent property impacts. Therefore, the alternatives analyses included the following design alternatives:

1. No Build
2. Signal (Small Footprint)
3. Signal (Large Footprint)
4. Roundabout (Small Footprint)

5. Roundabout (Large Footprint)

These design alternatives were evaluated, compared, and scored based on the following performance measures:

1. Area Traffic Operations
2. Safety
3. Cost
4. Property and Right-of-Way Impacts
5. Constructability

Alternative analysis results are summarized in the table below:

205th Street/Cumberland Drive Intersection Alternatives Comparison Summary

	No Build Alternative	Signal (Small Footprint)	Signal (Large Footprint)	Roundabout (Small Footprint)	Roundabout (Large Footprint)
Criterion	Weighted Score				
Traffic Operations	0	6	6	18	12
Safety	0	6	12	18	18
Cost	12	12	8	8	4
Property/ROW	6	6	6	2	2
Constructability	6	6	6	4	4
Stakeholder Outreach	2	4	4	4	4
Total	**26**	**40**	**42**	**54**	**44**

As shown, the Roundabout (Small Footprint) received the greatest score.

Conclusions and Recommendations

Neither signal option accomplishes the goal of the project of improving traffic operations at the 205th Street intersection without impacting the 204th Street intersections. For this reason, they appear less desirable than both roundabout options.

Based on the alternatives analysis, the Roundabout (Small Footprint) alternative would be the preferred option for the following reasons:

1. This alternative improves 205th Street operations without negatively impacting operations at 204th Street.
2. The smaller footprint reduces impacts to adjacent properties.
3. The smaller footprint also provides a capacity cap for eastbound traffic demands that would help encourage sports complex patrons to use Skyline Drive relieving congestion on Cumberland Drive.
4. Consideration should also be given to the following rerouting strategies to Skyline Drive:

a. Continued education from area sports complexes encouraging patrons to route to and from event sites via the Skyline Drive/West Dodge Road interchange via their respective websites, making a periodic announcement to attending patrons during sporting events, and making printed material available to attending patrons.
b. Signs installed at all exiting driveways at study area sports complexes and the northbound approach on 210th Street at Cumberland Drive directing event traffic to the Skyline Drive interchange.
c. Incorporate an eastbound Cumberland Drive capacity cap into any design alternative at the 205th Street intersection limiting eastbound traffic to encourage traffic to utilize the Skyline Drive interchange.
d. The effectiveness of Strategy c. could be increased by enhancing Skyline Drive ramp terminals, the Skyline Drive/Cumberland Drive intersection, and the 210th Street/Cumberland Drive intersection with capacity improvements such as roundabout/signal control and auxiliary lanes. Further study would be recommended to determine feasibility, need, and preferred design alternatives.
e. Signs directing arriving event traffic could be added east of the 204th Street and US-6/West Dodge Road interchange to use the Skyline Drive interchange. Negotiation between the City of Omaha and the Nebraska Department of Transportation (NDOT) should occur if guide signs are desired on this facility since any sign guidance installed on US-6/West Dodge Road will require the concurrence of NDOT.

1.0 Introduction

With the continued expansion of commercial and sporting event development in northwest Omaha (north of US-6/West Dodge Road between Skyline Drive and 204th Street, increasing traffic demands competing for capacity on Cumberland Drive have caused significant congestion at the 205th Street and Cumberland Drive intersection. Congestion is especially prominent during sporting events on Saturdays and Sundays with event traffic making it difficult for vehicles to access Cumberland Drive from commercial uses between 204th and 205th Streets.

This report documents the results of the traffic study conducted for the City of Omaha for the evaluation of potential alternative intersection configurations for Cumberland Drive at 205th Street in Omaha, Nebraska. The scope and methodology of this study were developed by JEO Consulting Group in coordination with the City of Omaha and confirmed during the kickoff meeting occurring on April 12, 2021.

1.1 Objective

The primary objectives of this traffic study are the following:

1. **To improve traffic operations and safety under current and forecasted traffic demands for the Cumberland Drive and 205th Street intersection.**
2. **Proposed improvements should not adversely impact operations and safety on 204th Street and the signalized intersection at 204th Street and Cumberland Drive.**

Traffic study efforts included capacity and queue analysis for adjacent study intersections impacted by the project, a safety analysis, an access assessment, event traffic management analysis, traffic demand forecasting, geometric and traffic control alternatives development, route diversion strategies, and alternatives analyses.

1.2 Project Description

The study area is located northeast of the US-6/West Dodge Road and 204th Street interchange and is surrounded by dense commercial use, including Menards, various fast-food and sit-down restaurants, and other small businesses. These businesses contribute significant daily traffic demands along Cumberland Drive, with congestion further exacerbated during weekend sporting events that occur at both the Union Bank & Trust Sports Complex and The MARK. The study area intersections included:

- Cumberland Drive and 204th Street
- Cumberland Drive and 205th Street

The US-6/West Dodge Road north and south terminals along Skyline Drive were also considered and discussed with regards to alternative route strategies. The study area is shown on the Vicinity Map in Figure 1, with recently built businesses shown in red, near-term construction projects shown in yellow, and future developments shown in blue, respectively. A preliminary site plan is also provided in Appendix A.

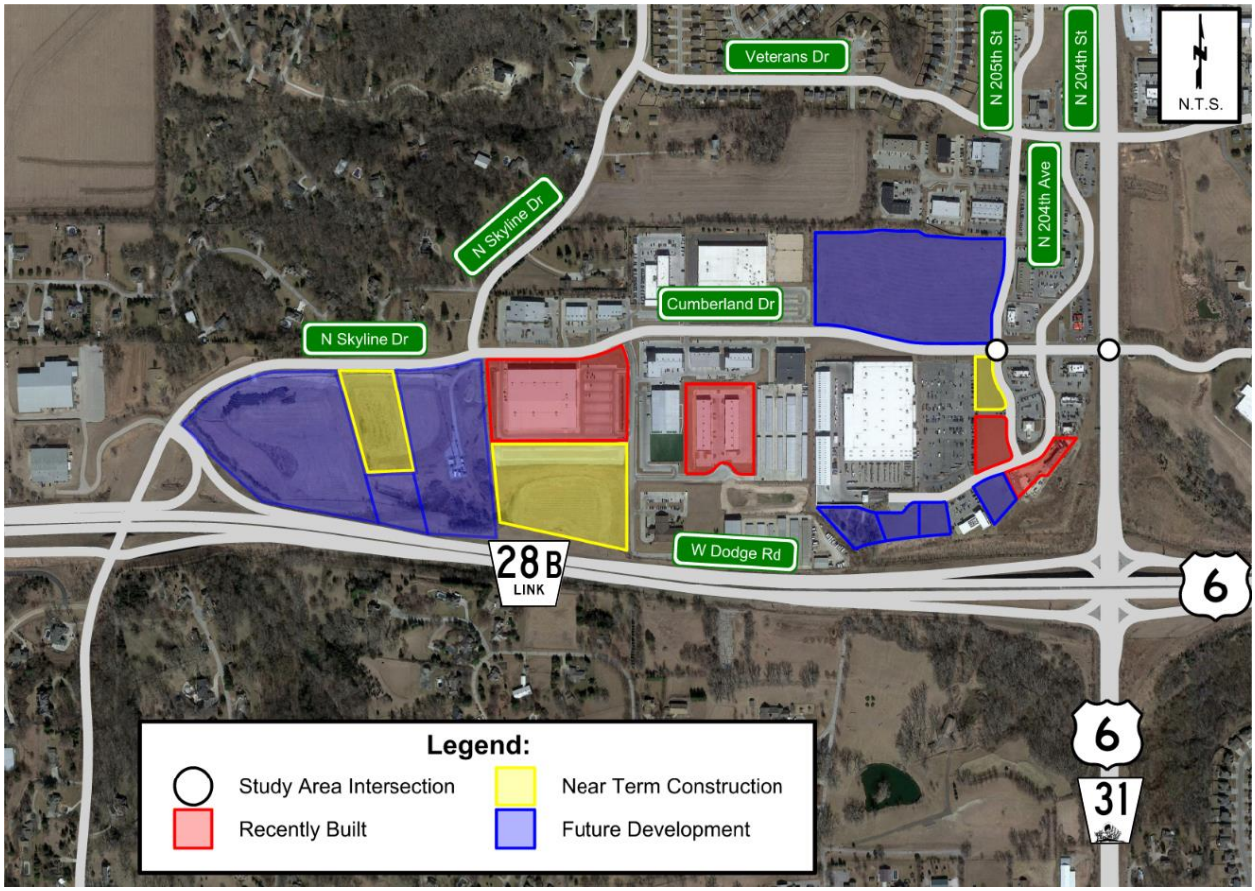


Figure 1. Vicinity Map and Study Area

1.3 Report Organization

The remainder of this report is organized as follows:

- 2.0 Existing Conditions and Capacity Analysis
- 3.0 Traffic Demand Forecasts
- 4.0 Design Alternative Development
- 5.0 Skyline Interchange Strategies
- 6.0 Alternative Analysis
- 7.0 Stakeholder Outreach
- 8.0 Conclusions and Recommendations

2.0 Existing Conditions and Capacity Analysis

The following section summarizes existing study area conditions including existing street and intersection geometrics, concurrent developments and future construction projects, existing traffic volumes, traffic operations and queue capacity analysis, safety review, signal warrant review, and an access management assessment.

2.1 Existing Street Network and Intersection Geometrics

The study area included US Highway 6, 204th Street, 204th Avenue, 205th Street, Cumberland Drive, and Skyline Drive. A detailed description of streets and intersections within the study area is provided in Appendix A. All existing lane geometrics and traffic control at study intersections are summarized in Figure 2.

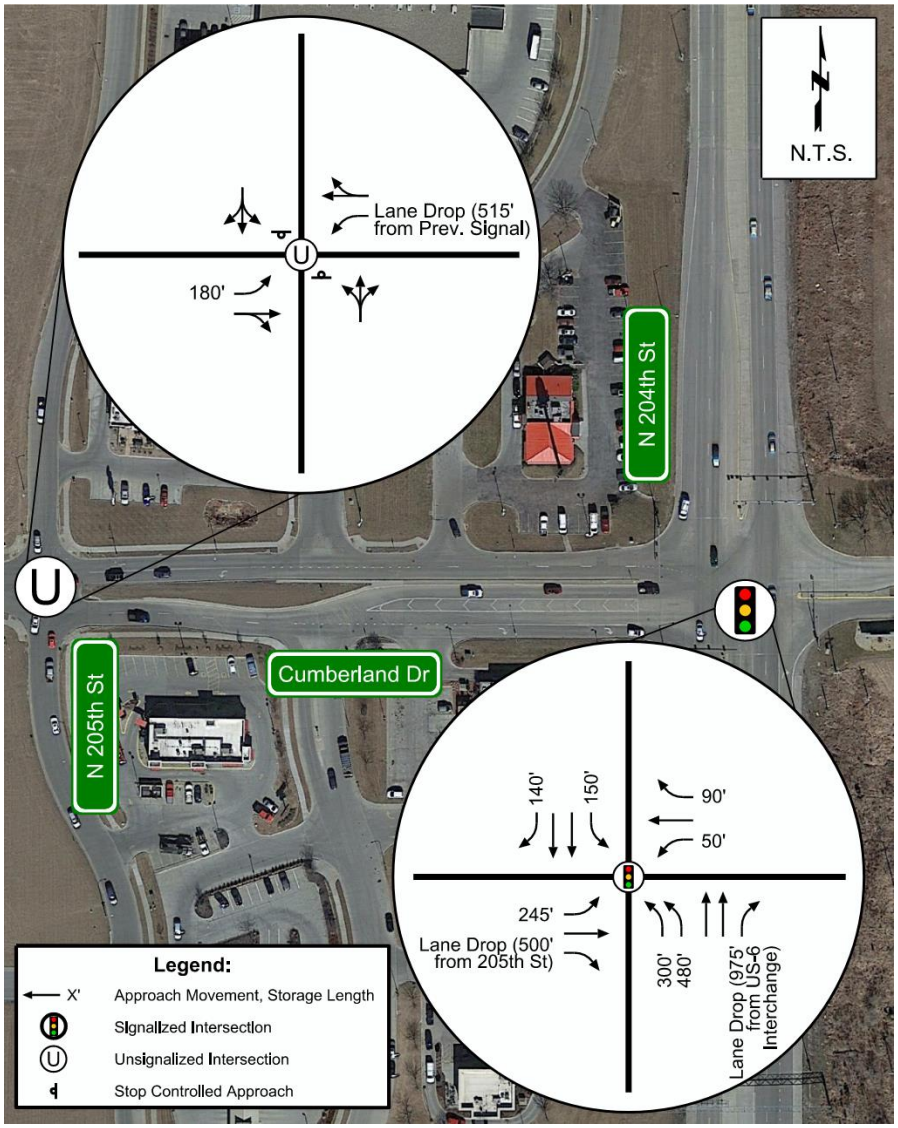


Figure 2. Existing Lane Geometrics and Traffic Control

2.2 Concurrent Developments and Future Construction Projects

Per coordination with the City of Omaha, several known developments may be occurring on similar time schedules, as well as long-term reconstruction projects that will impact area traffic patterns. These include the following:

1. A Taco Bell located in the southwest quadrant of the 205th Street and Cumberland Drive intersection,
2. A Chipotle located just north of the Taco Bell in the southwest quadrant of the 205th Street and Cumberland Drive intersection,
3. A new Summit sports facility located just south adjacent to the current facility, which is in the southeast quadrant of the Skyline Drive and Cumberland Drive intersection, and
4. A new discount store on Skyline Drive will be located just west of the Skyline Drive and Cumberland Drive intersection.

All these developments are shown on the Vicinity Map (Figure 1) in yellow and are predicted to be finished in the near term. Background information for some of the projects can also be found in Appendix B. Long-term developments are shown in blue on the Vicinity Map and are not known at this time.

2.3 Existing Traffic Volumes

Traffic counts from the years 2016, 2019, and 2020 were obtained from the City of Omaha for the 204th Street and Cumberland Drive and the 205th Street and Cumberland Drive intersections. Additionally, right-turn movement data was collected by JEO at the 204th Avenue and Cumberland Drive intersection using Miovision Scout cameras on Thursday, May 27th, 2021, and Saturday, May 29th, 2021. Traffic counts from the City of Omaha were then used to calculate through movements at the 204th Avenue and Cumberland Drive intersection. The observed AM and PM peak hours throughout the study area are summarized in Appendix C.

As indicated, traffic was collected at differing periods and therefore these counts require adjustments to reflect 2021 conditions at all study intersections including trip generation for the recently constructed Rocket Car Wash. Existing count adjustment assumptions are provided in Appendix C as well and resulting adjusted 2021 traffic demands are shown in Figure 3.

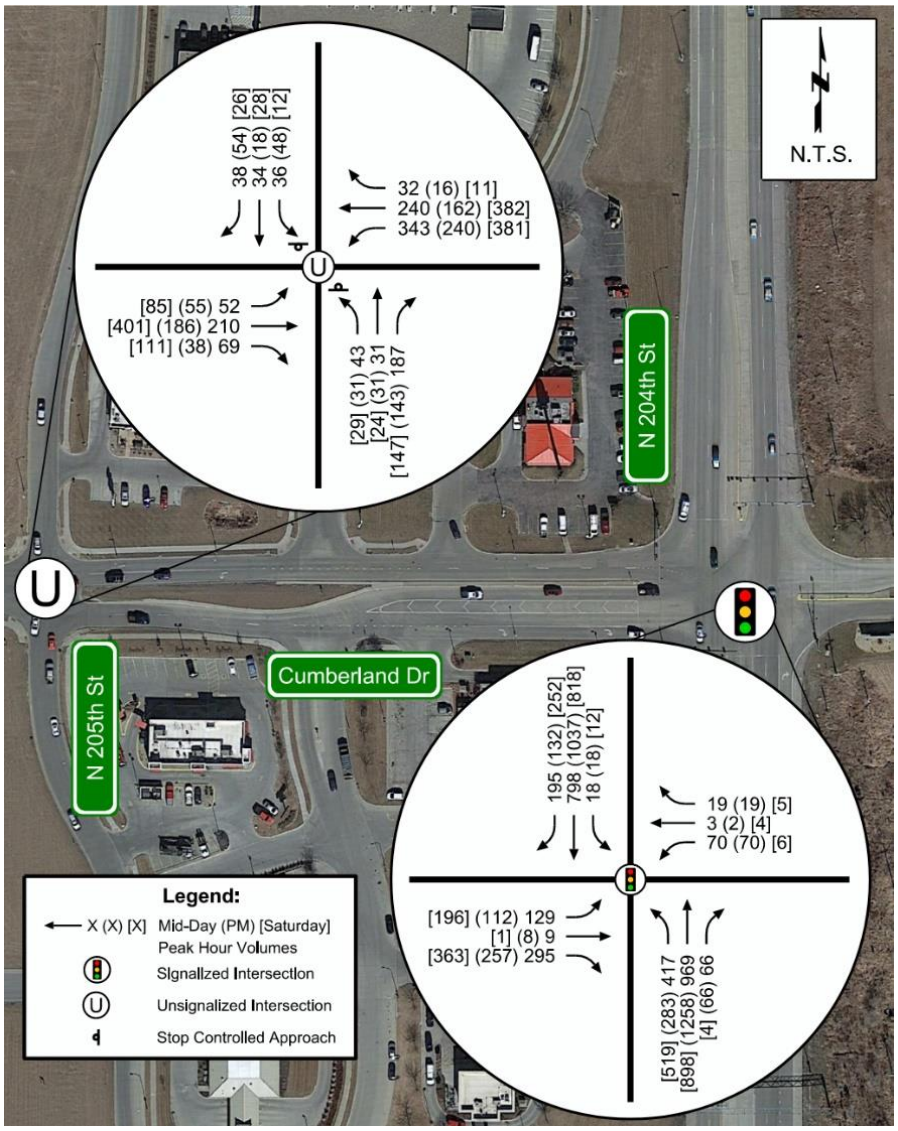


Figure 3. Adjusted Midday, PM, and Weekend Peak Hour Traffic Volumes

2.4 Existing Conditions Peak Hour Capacity Analysis

The adjusted peak hour volumes were analyzed using the unsignalized and signalized intersection capacity analysis procedures outlined in the Highway Capacity Manual (HCM 6th edition). The efficiency of each movement was then given a grade or Level of Service (LOS). The LOS indicates how well the intersection operates during the peak hour of traffic. LOS A represents free flow movement with very little to no delay, while LOS F represents congested flow at or over the capacity of the street. Further details regarding LOS methodology can be found in Appendix D.

The existing weekday AM and PM peak hour traffic conditions were analyzed using the existing intersection geometrics and traffic volumes shown in Figure 2 and Figure 3, respectively. Capacity analysis results are summarized in Figure 4. with output sheets from Synchro found in Appendix D

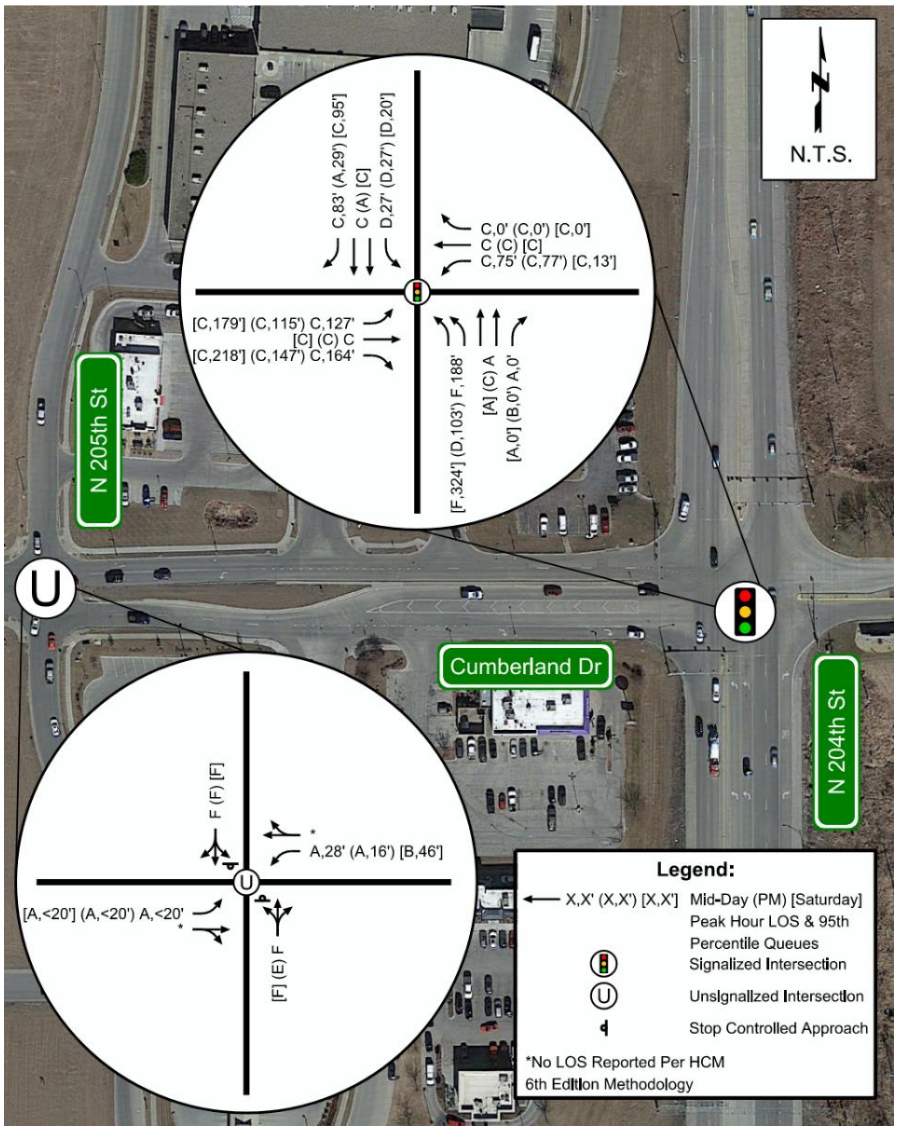


Figure 4. Existing Capacity Analysis Results

As shown, most of the study movements at each of the study intersections currently operate at an acceptable LOS D or better. The only exceptions are the Midday and Saturday peak hours of the left-turn lane on the south leg of the 204th Street and Cumberland Drive intersection and all three peak hours for the north and south legs of the 205th Street and Cumberland Drive intersection. All these movements are LOS F except the PM peak hour for the south leg of the 205th Street and Cumberland Drive intersection, which is LOS E. The north and south legs of the 205th Street and Cumberland Drive and the south leg left turn of the 204th Street and Cumberland Drive intersection are all overcapacity during both the Midday and Saturday peak hours. This is problematic because this causes queue lengths to extend and block nearby exits from adjacent side streets and businesses.

95th percentile queue lengths were also calculated for study area auxiliary lanes, with all existing storage lane lengths accommodating the calculated 95th percentile queues except the left-turn lane on the west leg of 204th Street and Cumberland Drive intersection during the Midday and PM peak hours. This, however, is not an issue since there are minimal through and right-turn movements on the same leg of the intersection during these times.

2.5 Safety Review

Crash data at the 205th Street/Cumberland Drive intersection was obtained from the City of Omaha for the most current seven-year period, spanning from the beginning of 2014 to the end of 2019. Crash data as well as a crash diagram for the 205th Street and Cumberland Drive intersection is provided in Appendix E. A summary of the crash data by type and severity for the same intersection is shown in Figure 5 and Figure 6, respectively.

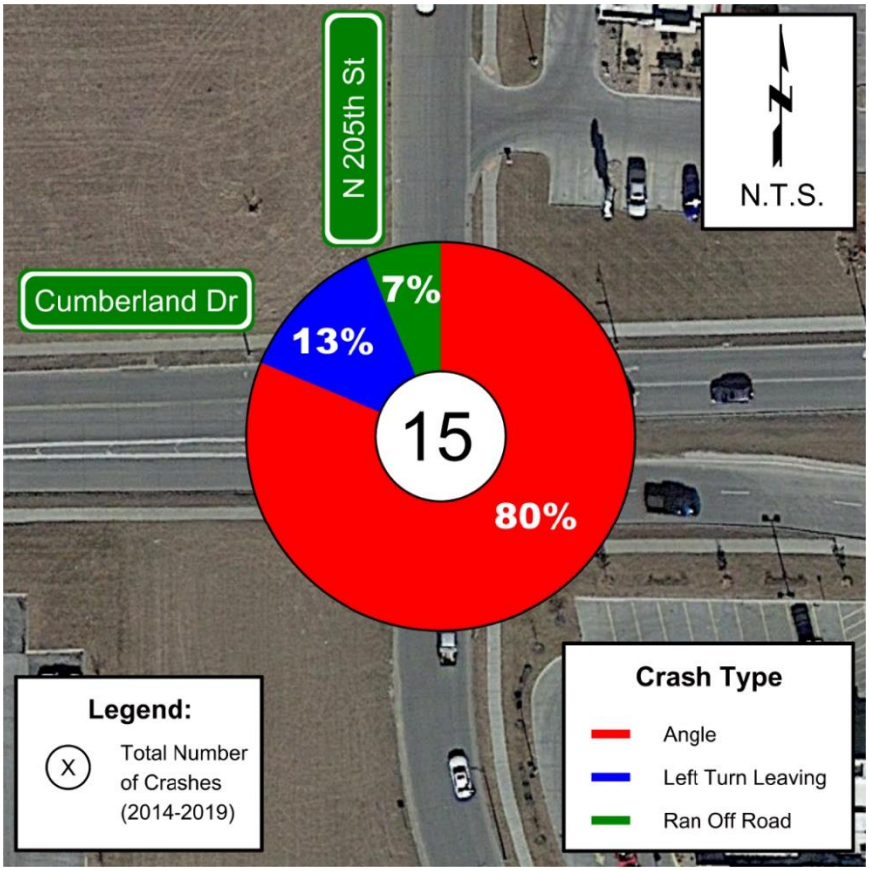


Figure 5. Crash Type at the 205th Street and Cumberland Drive Intersection

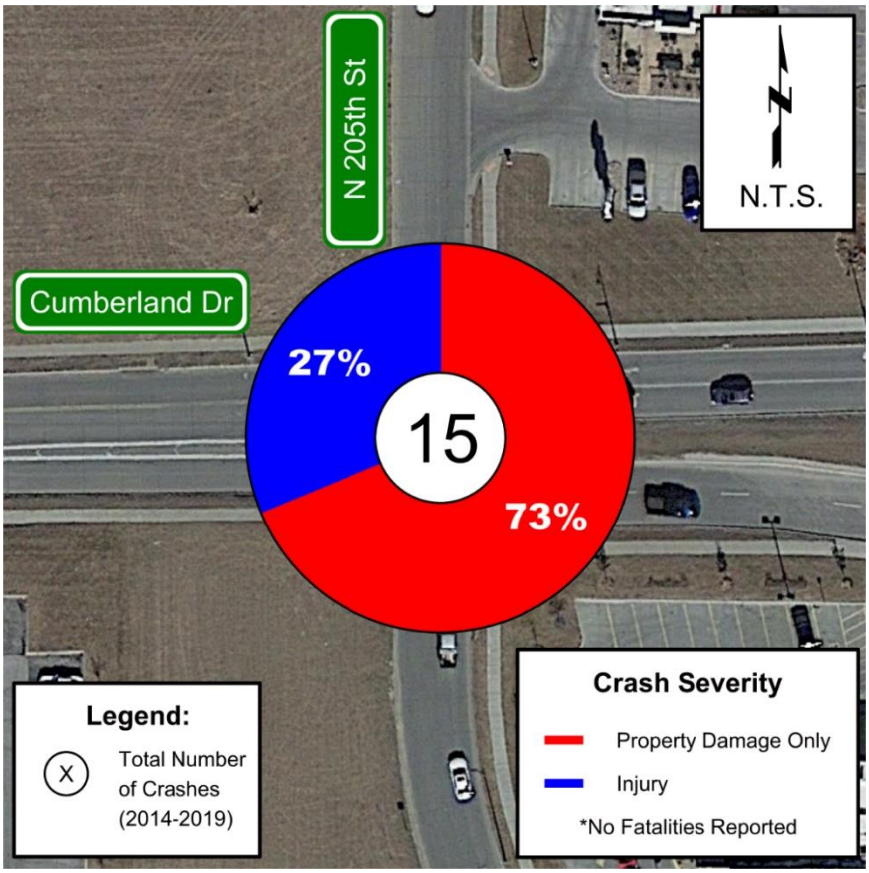


Figure 6. Crash Severity at the 205th Street and Cumberland Drive Intersection

Based on the reviewed crash data, the following observations are provided:

1. During the 6-year collection period, 15 crashes occurred at the 205th Street and Cumberland Drive intersection.
2. Eleven crashes occurred that involved eastbound and northbound traffic, with six crashes happening on the west leg and five crashes on the south leg.
3. Approximately 27% of crashes at this intersection were injury related. There were no fatal crashes reported within the data received.
4. Approximately 80% of all crashes at this intersection were angled crashes. The frequency of angle crashes is indicative of congestion on Cumberland Drive and the difficulty for a vehicle from the minor stop-controlled approach finding an appropriately safe gap to complete a left, through, or right-turn movement.
5. A crash rate between 2014 and 2019 was then calculated for the 205th Street and Cumberland Drive intersection at 0.50 crashes per million entering vehicles. This crash rate is slightly below the average crash rate of 0.63 crashes per million entering vehicles for similar intersection classifications (major collector/local) in the City of Omaha.
6. It was noted that significant development occurred in 2019, including a new car wash, Starbucks, and the UBT Sports Complex. This significant increase in development might correlate to the greater crash occurrences observed in 2019 (7 crashes).

2.6 Signal Warrant Review

Applying the 2009 Manual of Uniform Traffic Control Devices (MUTCD) signal warrants, a signal warrant review was conducted for the 205th Street and Cumberland Drive intersection for count year demands. The following warrants were considered in the analysis:

- Warrant 1 (Eight Hour Warrant)
- Warrant 2 (Four Hour Warrant)
- Warrant 3 (Peak Hour Warrant)

Signal warrant calculation sheets are provided in Appendix F. MUTCD warrant analysis results are summarized in Table 1.

Table 1. MUTCD Signal Warrant Summary

		Warrant 1 (8 Hour)	Warrant 2 (4 Hour)	Warrant 3 (Peak Hour)
205th Street and Cumberland Drive	2018 (Weekday)	No	No	No
	2020 (Weekend)	No	Yes	Yes

Per the 2009 MUTCD, the satisfaction of a signal warrant does not necessarily mean that a signal should be constructed. Other factors and engineering judgment must be considered. Current research and practice indicate that ideal spacing between signals is ½ mile to provide better operations and coordination between signals. Current practice discourages signals that are closer than a ¼ mile spacing due to queuing and coordination issues. Spacing between 204th Street and 205th Street is approximately 540 feet, much less than the ideal and minimum recommended signal spacing described.

2.7 Access Management

Based on the City of Omaha's Guidelines for Access Location, Design, and Construction, commercial access on collector roads should be placed no closer than 175 feet (from the intersection curb line to the access radius point) from a signalized intersection unless the access is a right-in-right/out on the entering approach, in which case, 100 feet is the minimum. Furthermore, the minimum spacing between commercial access should be greater than 40 feet from the end of each radius. A review of the study area indicates that the current access and intersection placement between 204th Street and 205th Street does satisfy these minimum requirements. It should be stressed, however, that these are considered minimums, and based on current access management best practices for maintaining safe and more efficient traffic operations, the current frequency and access spacing within the study area is too close and is a significant contributor to poor operations on Cumberland Drive. Per the Transportation Research Board (TRB) published Access Management Manual 2nd Edition, ideal spacing to improve safety and efficiency on a 25-MPH street near a major intersection should be spaced at a minimum of 330 feet. Additionally, to increase right-turn sign distance, access points should ideally be spaced at approximately 185 feet to avoid obstruction of another vehicle on an adjacent access approach.

It should be noted that the City has already taken steps in the past to improve access management within the study area. Originally, 204th Avenue had full movement access but has since been converted to right-in/right-out access in 2015, which would be consistent with current best practice access

management. The Cumberland Drive access to Arby's and Burger King could be eliminated for the following reasons:

1. Eastbound approach queues typically extend beyond the Burger King access, thereby blocking access frequently and reducing operational efficiency.
2. Operational efficiency of the heavy northbound left-turn movement at 204th Street is reduced with a vehicle turning in and out of the Arby's, reducing throughput. This also increases the risk of rear-end crashes.
3. Vehicles on this approach obstruct visibility for vehicles turning right at 204th Avenue.
4. Alternative access is available for both the Arby's and Burger King via 204th Avenue and 205th Street.

3.0 Traffic Demand Forecasts

Although there is development already present within the study area, there is still significant potential for future development. Figure 1 on page 2 also depicted recent development not indicated by the most recent aerial photography, known development that is expected to occur within the next year or two, and developable parcels that will occur long term.

Therefore, short-term (2026) and long-term (2041) traffic demand projections were developed to determine future traffic operations and deficiencies for both "No Build" and "Build" alternatives. The following sections summarize assumptions and procedures in the development of traffic forecast as well as document the resultant turning movement demands used for traffic operation analysis.

3.1 Near Term Projections (2026)

Short-term projections were developed using an average annual growth rate (applied over five years) developed from the MAPA regional model and trip generation of anticipated near-term development in the area using the ITS Trip Generation Manual, 10th Edition. More detailed assumptions encompassing land use, trip generation, distribution, and assignments for near-term traffic projections are included in Appendix G and H. Resultant near-term traffic demands are shown in Figure 7.

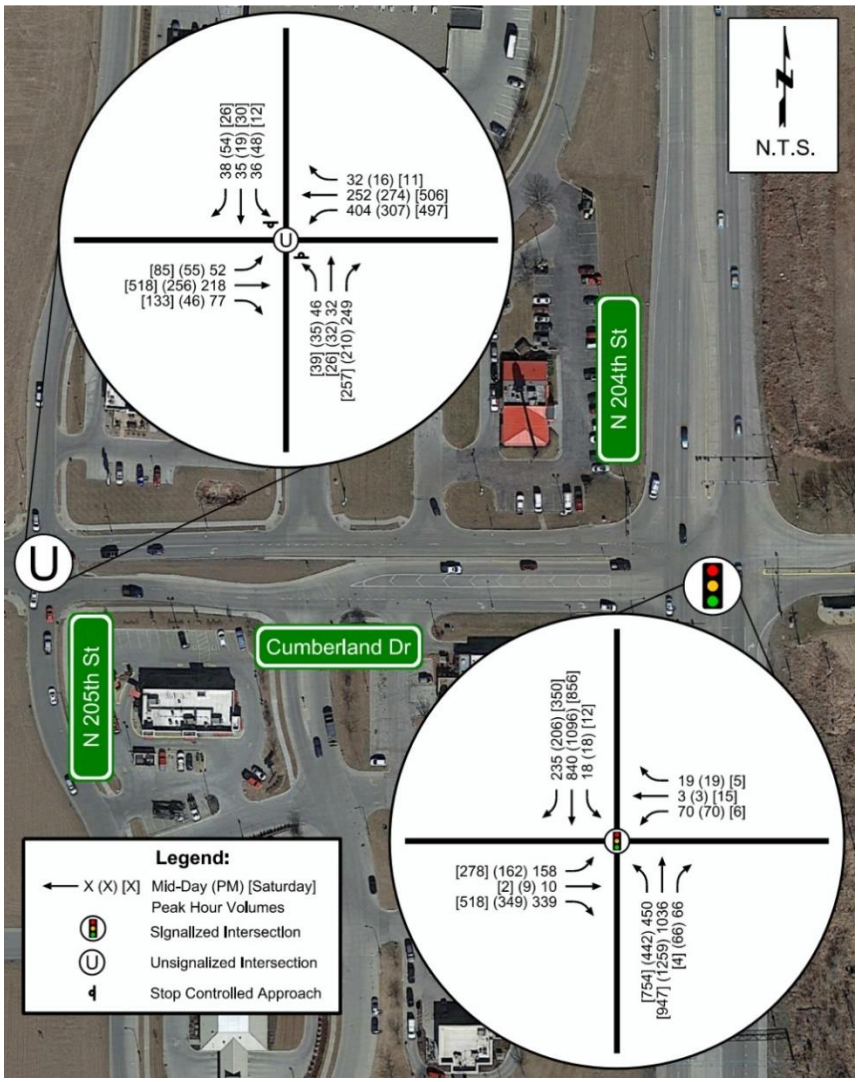


Figure 7. Near Term (2026) Traffic Volumes

3.2 Long Term Projections (2041)

Long-term projections were developed similarly to near-term forecasts with the MAPA growth rate applied for 20 years and additional trip generation of those properties identified in Figure 1 as long-term development. Again, detailed assumptions encompassing land use, trip generation, distribution, and assignments for long-term traffic projections are included in Appendix G and H. Resultant long-term traffic demands are shown in Figure 8.

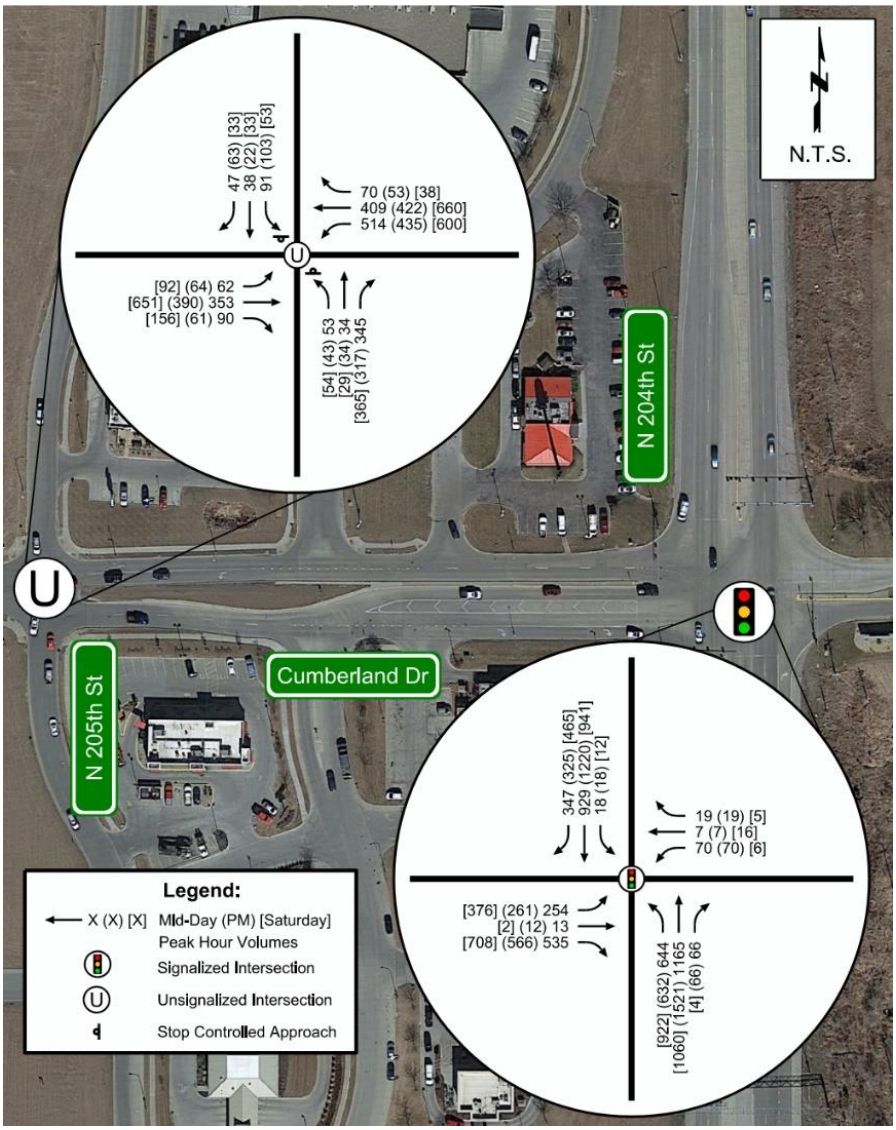


Figure 8. Long Term (2041) Traffic Volumes

4.0 Design Alternative Development

Potential alternatives were developed to improve traffic operations and safety at the 205th Street and Cumberland Drive intersection without adversely impacting operations and safety at the adjacent intersections, especially the 204th Street and Cumberland Drive intersection. The following sections document an initial analysis of the following design alternatives:

1. **No Build**
2. **All-Way Stop Control (Near Term Only)**
3. **Restricted Access**
4. **Signal Control**
5. **Roundabout Control**

All alternatives that show promise as viable mitigation for future traffic demands were retained and analyzed in greater detail and input into a decision matrix to determine a preferred option. The analysis included traffic operations calculations for both near and long-term traffic demand scenarios. However, as the worst-case condition informs design requirements, the long-term results are shown in the report. Near-term analysis summaries as well as all Synchro and SIDRA output sheets are provided in Appendix D.

4.1 No Build

Traffic operations and queue capacity analyses were calculated for both near and long-term traffic demands assuming traffic control and geometry remains as it is today. Resulting LOS and 95th percentile queue lengths for auxiliary lanes are summarized in Figure 9 for the worst-case long-term conditions.

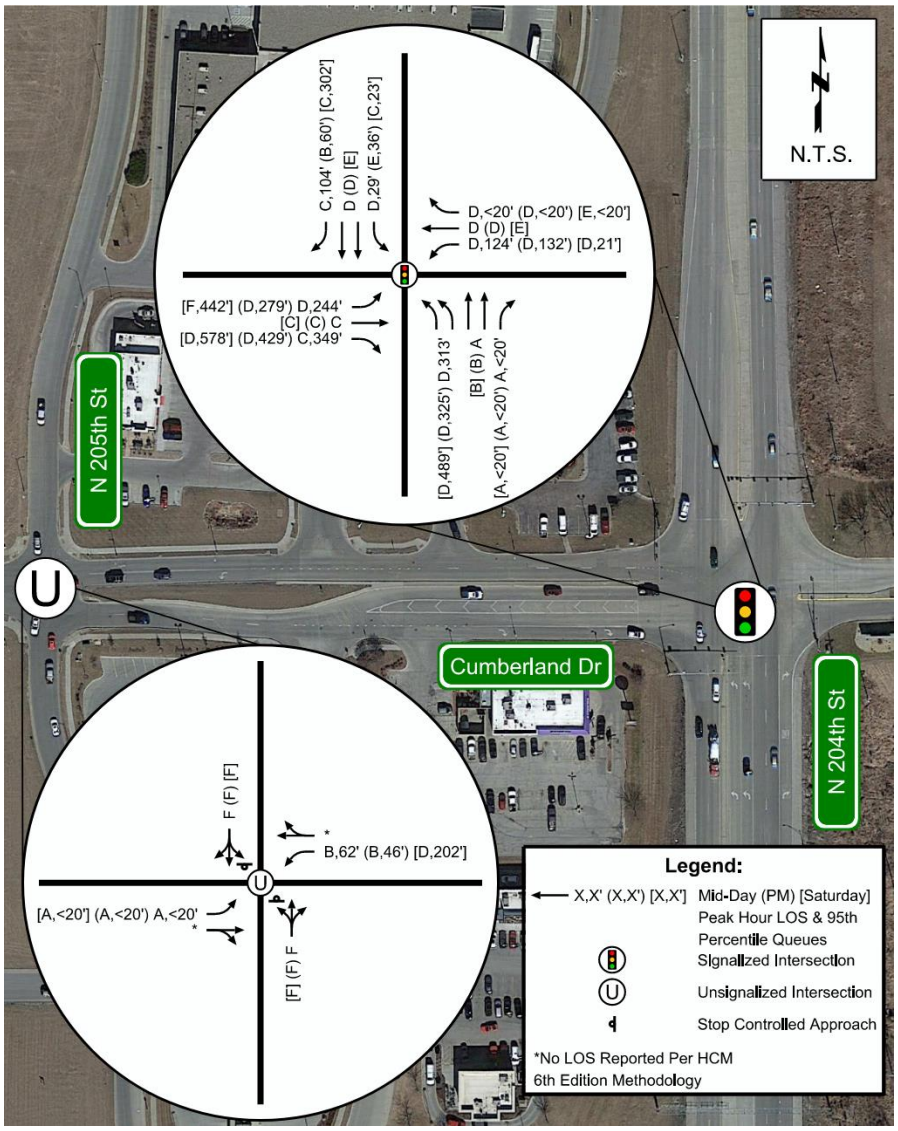


Figure 9. No Build Capacity Analysis Results (Long Term Volumes)

As indicated, current operational deficiencies will worsen under both near and long-term scenarios, including increased delays on northbound and southbound 205th Street approaches, increased queues on the eastbound right-turn movement at 204th Street, and westbound left-turn queues at 205th Street. Additionally, the eastbound left-turn at the 204th Street intersection is expected to operate at an unacceptable LOS of F for long-term demands, with eastbound queues at 204th Street also extending into the 205th Street intersection. The southbound through, southbound left-turn, westbound through, and westbound right-turn lanes also all operate at LOS E, which can be acceptable but not ideal.

4.2 All-Way Stop Control

This alternative includes the installation of stop control on both the eastbound and westbound approaches to 205th Street while maintaining existing stop control on the northbound and southbound approaches. Existing lane geometry would not be altered (see Figure 10).

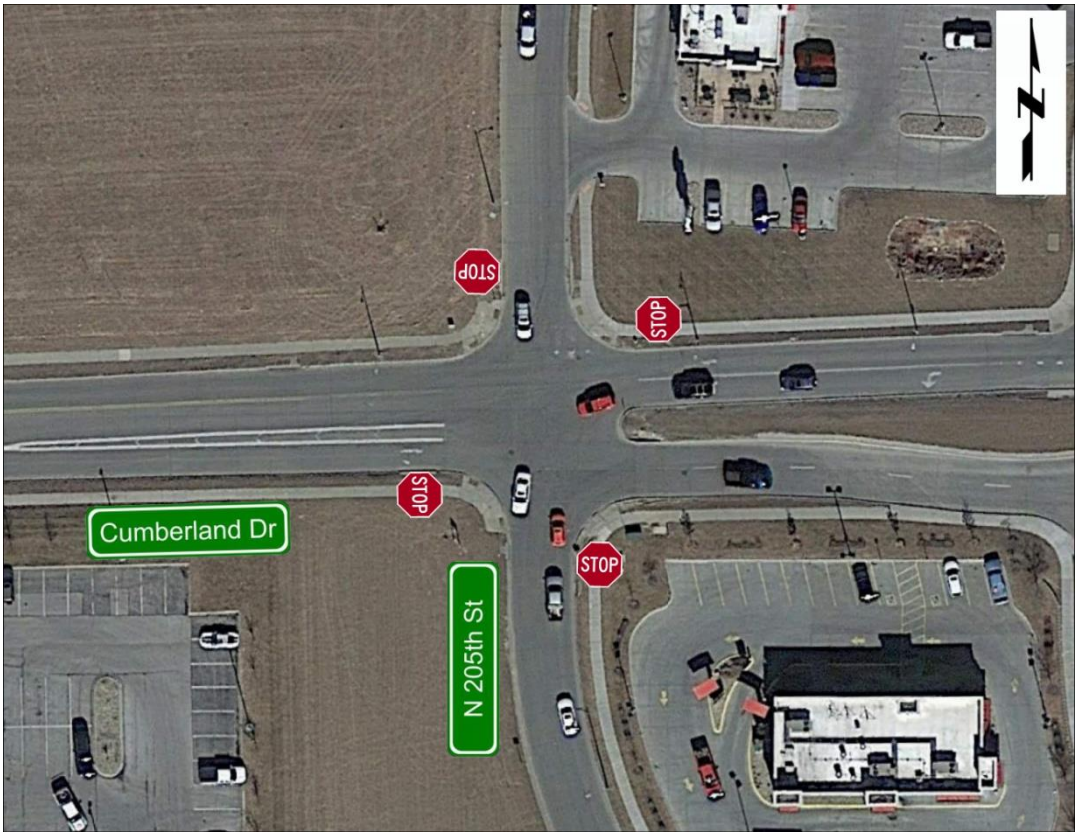


Figure 10. All-Way Stop Control Alternative (Near Term Only)

The goal of this alternative would be to provide a relatively inexpensive near-term option to improve traffic operations and safety for an interim period until long-term growth precipitated the need for a more robust solution.

To determine the feasibility of this option, traffic and queue capacity analyses were calculated applying the same methodology used to analyze existing conditions. Resulting LOS and 95th percentile queue lengths are summarized in Figure 11.

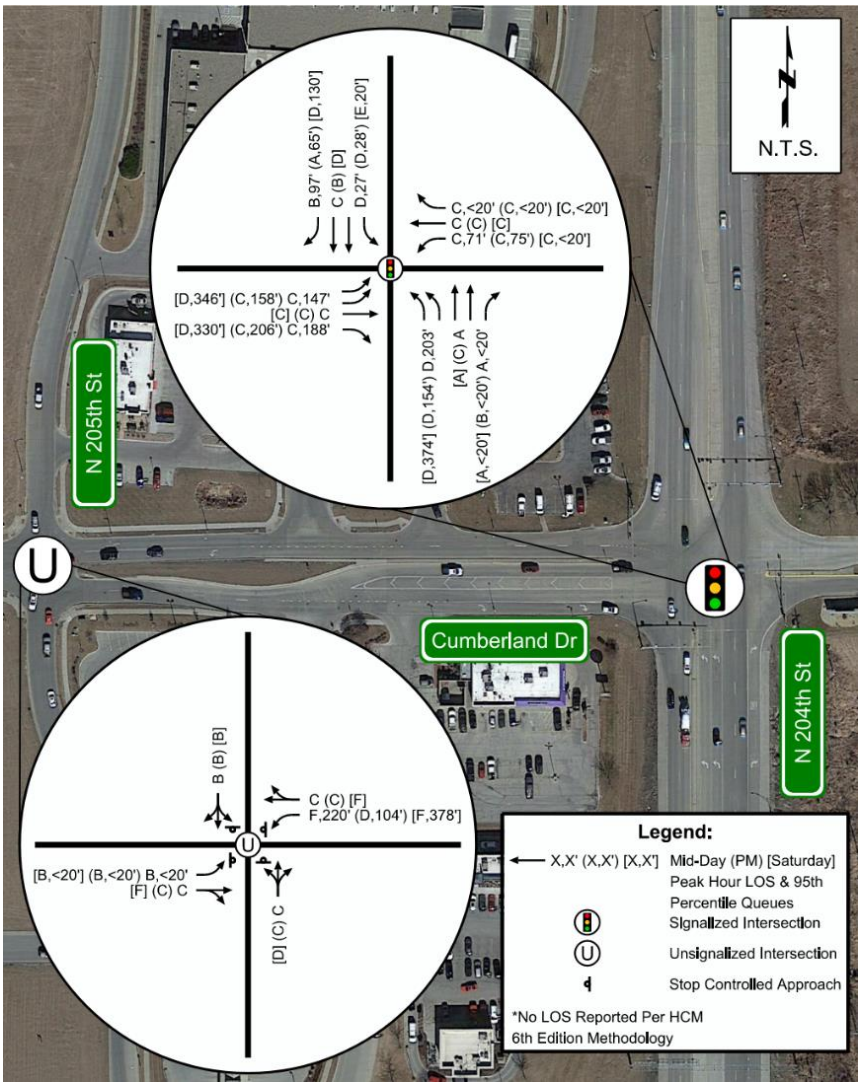


Figure 11. All-Way Stop Control Capacity Analysis Results (Near Term Volumes)

As indicated, several movements are expected to operate at an unacceptable LOS F and overcapacity including the westbound through, westbound left-turn, and eastbound through-right movements at the 205th Street intersection. Furthermore, the westbound queue lengths are expected to build extensively and ultimately encroach into 204th Street during the midday and weekend peak hours. A VISSIM model was run to confirm operational characteristics predicted by the HCM methodology. A total of five simulations were run under near-term demands with all-way stop control implemented at the 205th Street intersection. A visual review of several of the simulation runs showed extensive queues both eastbound and westbound at 205th Street. Most impactfully was the westbound queues which confirmed that queues did ultimately extend into 204th Street impacting operations at the 204th Street signalized intersection with northbound left-turn and southbound right-turn queues extending into through lanes increasing the risks for rear-end crashes.

Based on traffic operational and queue analysis, all-way stop control at 205th Street would not be recommended and is not considered as a viable interim alternative.

4.3 Restricted Turn Geometry

Another alternative could be to implement access control at the 205th Street intersection by constructing a raised median that would limit all through movements, northbound left-turn, and southbound left-turn movements on the 205th Street approaches. Right-turns from, and to, 205th Street would continue and 205th Street stop control would remain as it is today. This alternative is shown conceptually in Figure 12. It should be mentioned that with this option, left turn and through movements will need to divert to other routes, which are limited. Left turns and throughs from the north will migrate to the signalized intersection to the northwest at 204th Street and Veterans Drive. While left turns and throughs from the south will need to first take a right onto Cumberland Drive and then complete a U-Turn on the eastbound approach to 204th Street. For analysis purposes, these trips have been routed with assumed rerouted demands included in Appendix H.

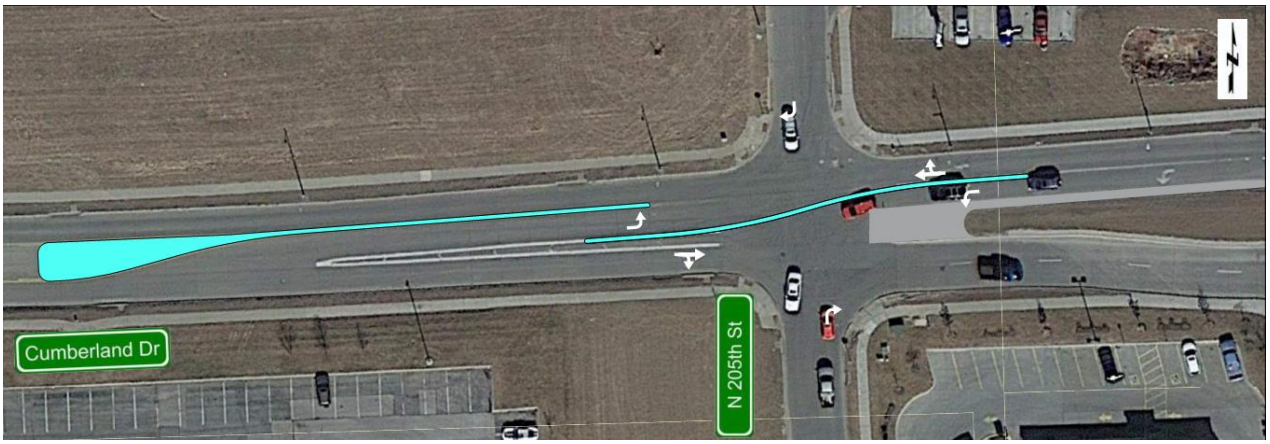


Figure 12. Restricted Turn Alternative Concept

Traffic and queue capacity analyses with resulting LOS and 95th percentile queue lengths for auxiliary lanes as well as assumed geometry are summarized in Figure 13 for long-term traffic demand scenarios at both the 204th Street and 205th Street intersections. It should be noted that dual eastbound left-turn lanes will be required for long-term traffic demands at the 204th Street intersection.

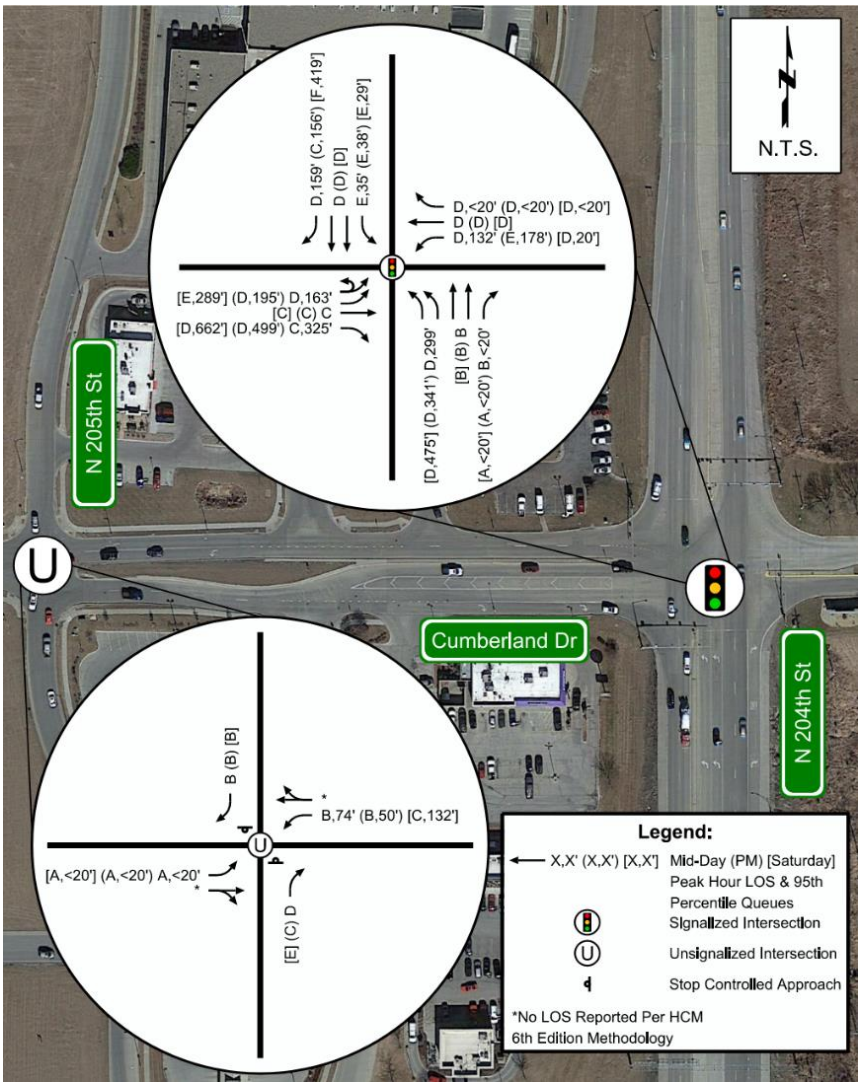


Figure 13. Restricted Turn Geometry Capacity Analysis (Long Term Volumes)

As indicated, some LOS is improved at 205th Street as difficult movements have been eliminated, however, the northbound right-turn is still expected to operate at a poor LOS of E during weekend peaks under a long-term traffic demand scenario. Furthermore, unintended impacts are evident at the 204th Street intersection due to the rerouting of left turns and throughs at 205th Street including the following:

1. With the allowance of U-turns at the eastbound approach, a southbound overlapping right-turn is not ideal and therefore is not an option to improve southbound right-turn operations. As shown, this movement operates at LOS F during weekend peak hours under a long-term demand scenario.
2. The increased U-turns increase delay at the eastbound left-turn movement causing a poor LOS E during weekend peaks.
3. 95th percentile eastbound queue lengths at 204th street, specifically associated with right-turn movements, are expected to encroach into the 205th Street intersection negatively impacting its operations, particularly the northbound right-turn movement.

Finally, while this alternative's configuration provides greater safety at 205th Street, it would likely prove unpopular with adjacent property owners as it significantly modifies existing access. Due to this fact and the degradation of operations at 204th Street, specifically the significant conflict between the eastbound left-turn and the southbound right-turn at 204th Street, this option will not be considered further as a viable option.

4.4 Signal

To reduce delay on 205th Street approaches, the next alternative proposes signal operations at the 205th Street intersection. With the construction of the signal, lane geometry modification is likely and was assumed to include the following:

1. Dual westbound left-turn lanes at 205th Street
2. Two southbound receiving lanes on the south leg of 205th Street would extend south to the Menards entrance.
3. Auxiliary right-turn lanes were assumed at both the northbound and southbound approaches.
4. An additional through lane was added on the eastbound approach.

The signalized alternative is shown conceptually in Figure 14.

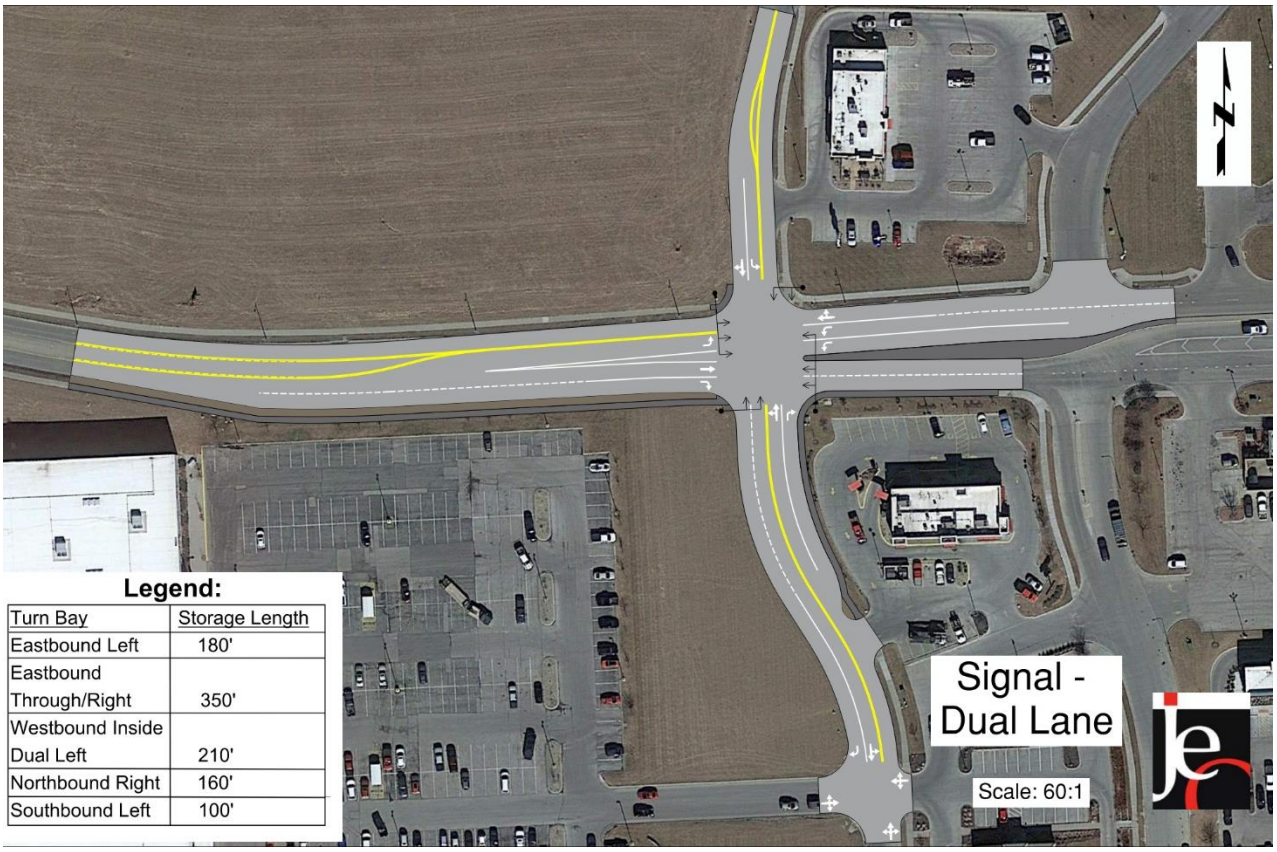


Figure 14. Signal Alternative

Traffic and queue capacity analyses were calculated applying the same methodology described in Section 2.4 of this report. Resulting LOS and 95th percentile queue lengths for auxiliary turn lanes, as

well as assumed geometry, are summarized in Figure 15 for the long-term traffic demand scenario at both the 204th Street and 205th Street intersections.

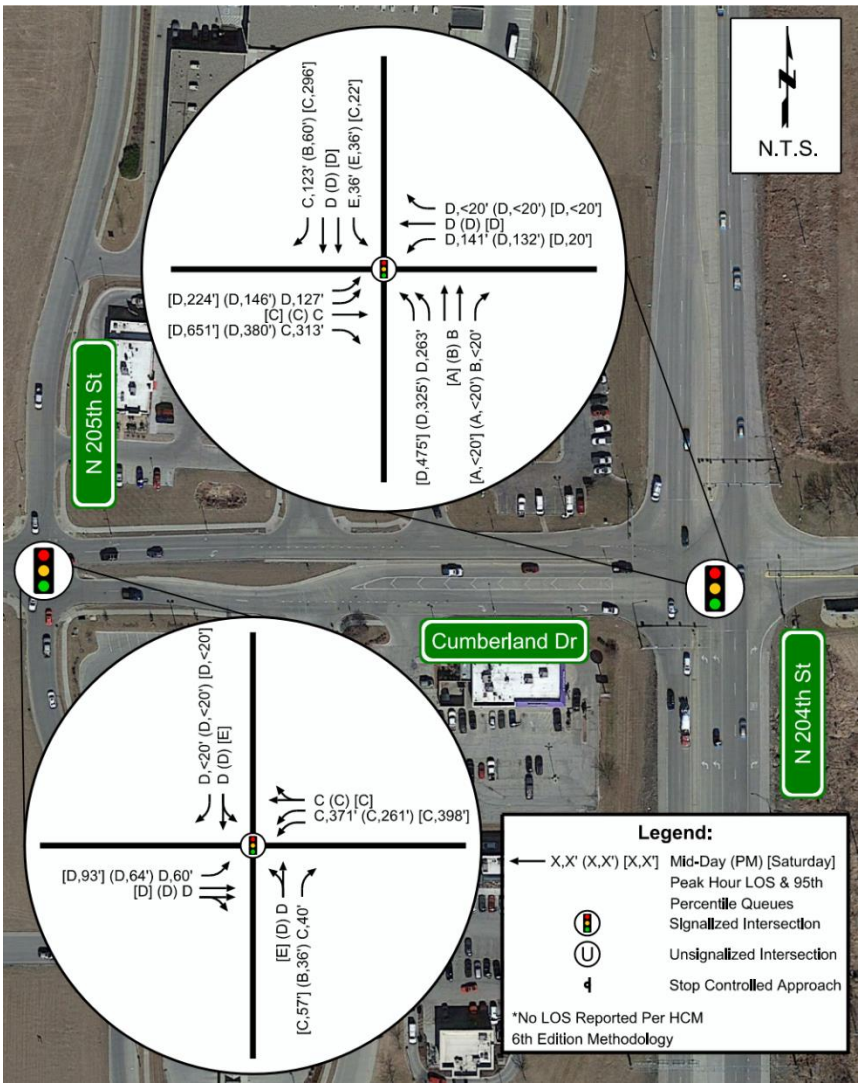


Figure 15. Signal Capacity Analysis (Long-Term Volumes)

As indicated, all intersections and movements are predicted to operate at an acceptable LOS of D or better for both near and long-term scenarios, except for the southbound left-turn movement at the 204th Street intersection, which is a very low demand movement, and the northbound and southbound left-turn/through movements at 205th Street for the Saturday peak hour, which are LOS E. Additionally, anticipated 95th queue demands appear to be acceptable. **Based on preliminary capacity analyses, a signal at the 205th Street intersection would be considered a viable alternative for further assessment.**

4.5 Roundabout

Roundabouts provide increased capacity, potential to reduce side street delays, and safety enhancements compared to traditional intersections. Therefore, this alternative assumes a two-lane roundabout at the 205th Street intersection with one lane approaches on 205th Street and two-lane approaches on Cumberland Drive. This alternative is depicted conceptually in Figure 16. It should be

noted that the roundabout shown will accommodate a WB-50 design vehicle. After the stakeholder outreach meeting, discussed in Section 6.7, Menards mentioned that WB-67 trucks access their site. Therefore, if this option is the preferred alternative, further refinement of the design will be required, including truck apron designs accommodating WB-67 vehicles.

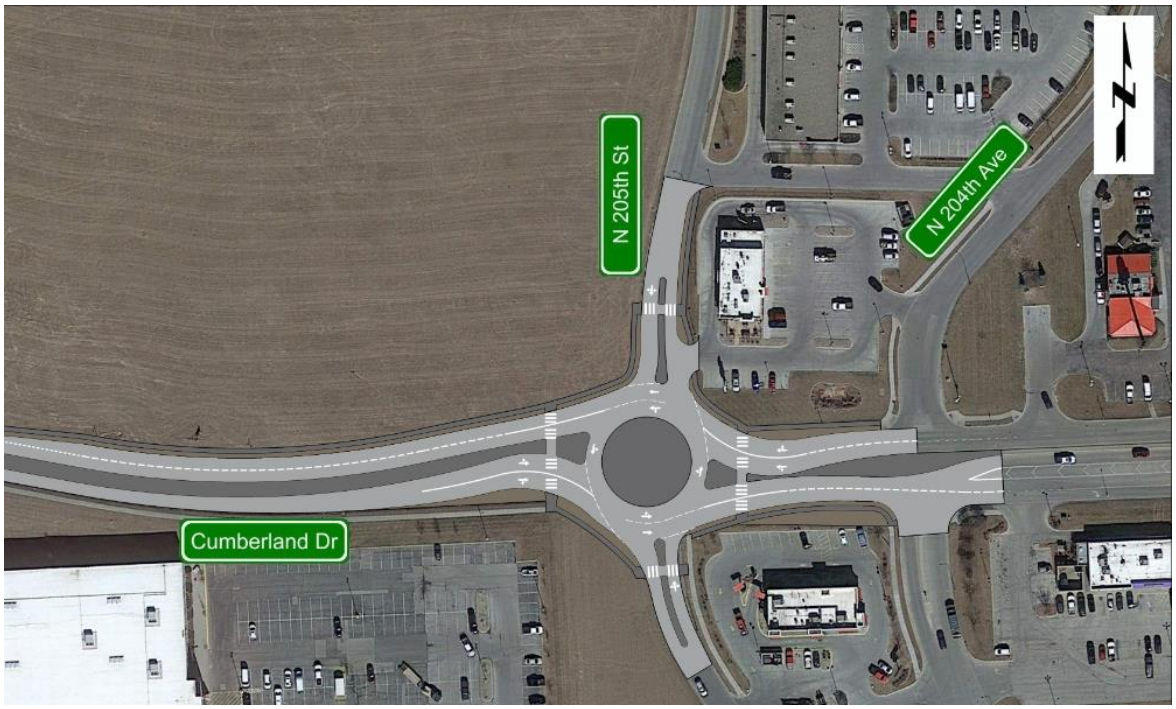


Figure 16. Roundabout Alternative

Traffic and queue capacity analyses were again calculated. Resulting LOS and 95th percentile queue lengths at auxiliary turn lanes, as well as assumed geometry, are summarized in Figure 17 for the long-term traffic demand scenarios at both the 204th Street and 205th Street intersections.

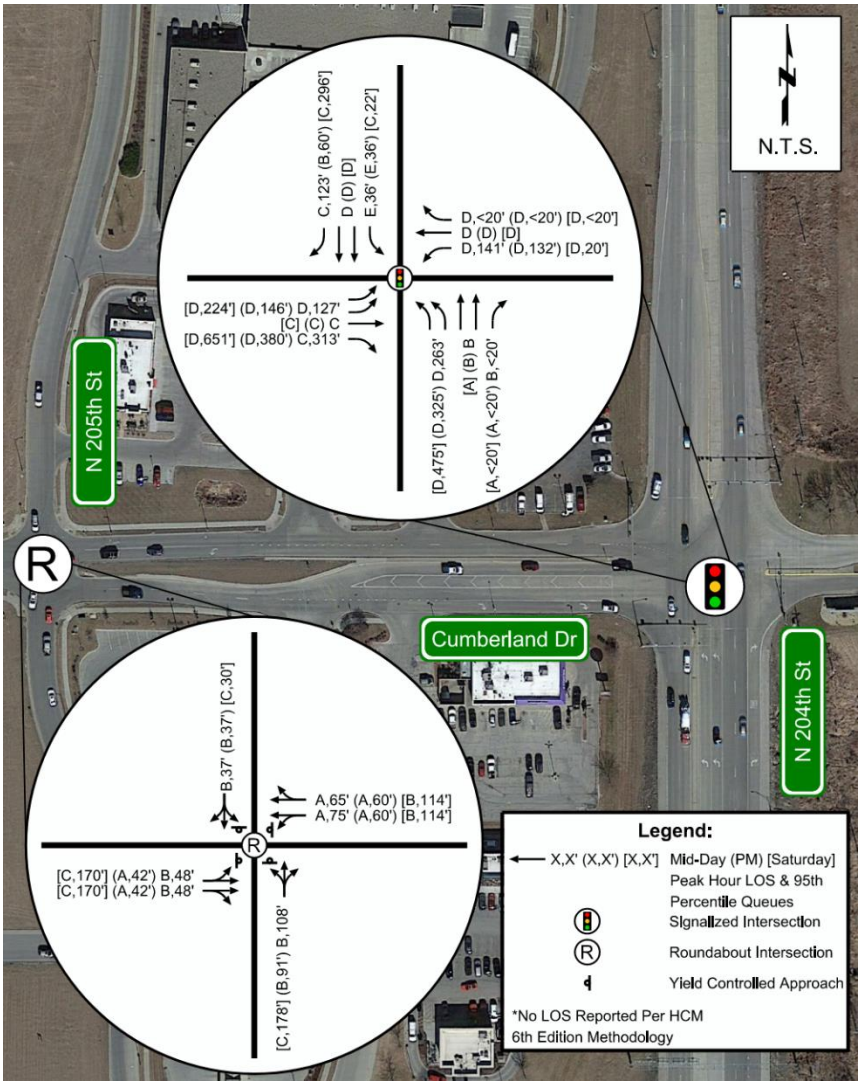


Figure 17. Roundabout Capacity Analysis (Long-Term Volumes)

As indicated, all movements at the 204th Street and 205th Street intersections are expected to operate at LOS E or better, with all movements at the roundabout operating at LOS C or better. In general, 95th percentile queues appear mitigated with available spacing and storage length accommodating calculated queues; however, anticipated 95th percentile eastbound queue lengths at 204th Street may reach 205th Street. **Based on preliminary capacity analyses, a roundabout at the 205th Street intersection would be considered a viable alternative for further assessment.**

5.0 Skyline Interchange Strategies

As mentioned, the primary source of congestion within the study area occurs with the occasion of sporting events west of the 205th Street and Cumberland Drive intersection. Intense eastbound through demands make it difficult for vehicles accessing commercial uses in the northeast and southeast quadrants of the 205th Street intersection. Ideally, commercial uses, including sporting event uses, should utilize the Skyline Drive interchange with US-6/West Dodge Road west of the study area. Figure 19 demonstrates the desired routing versus what is occurring today.

Figure 18. Preferred Sports Complex Patron Routing

This section will review potential strategies to encourage the use of Skyline Drive interchange as well as review available capacity at that facility.

5.1 Event Route Communication

Considering that many sporting event patrons are from outside the Omaha area and therefore are not familiar with the local street network, a simple approach could be to inform those attending sporting events of the preferred routing. A review of the Union Bank and Trust Sports Complex's website indicates that this is currently being done today (See Figure 20).

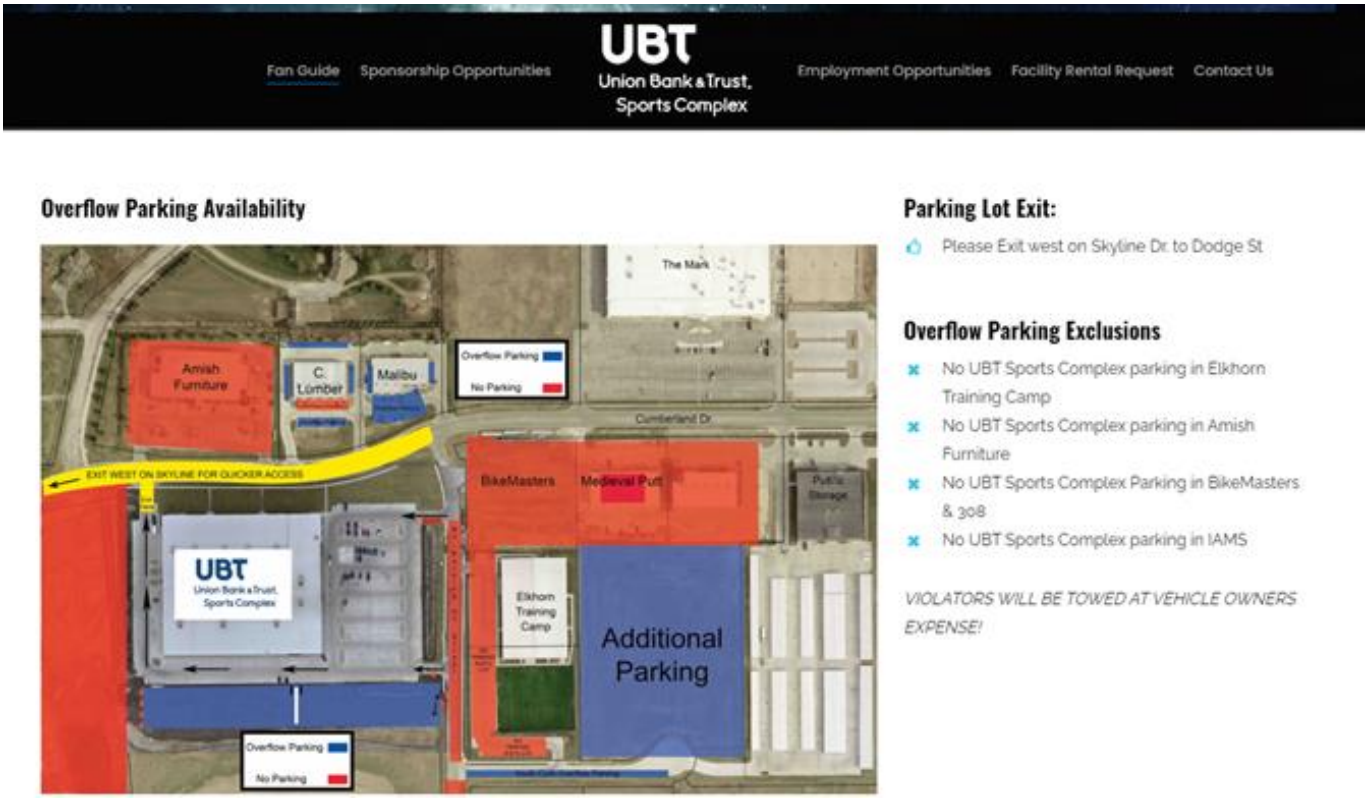


Figure 19. Preferred Routing Information Provide on UBT Sports Complex Website

Furthermore, a discussion with one of the site managers indicated that the facility also announces this information at the events as well as distributes flyers encouraging exiting to Skyline. Therefore, preferred routing is being shared with patrons and should continue. It does not appear at this time whether similar efforts are being employed at The MARK located in the northeast quadrant of the 210th Street intersection. It should be mentioned that sporting events associated with The MARK are typically much smaller in scope than those at the UBT Sports Complex.

This strategy has limitations considering that typically event patrons will be spending the entire day at the facility and between games will wish to eat and/or shop, and much of this demand is naturally supplied by commercial sites on Cumberland Drive to the east. The most natural route between the UBT Sports Complex and those target commercial sites is to route eastbound on Cumberland Drive.

5.2 Signing

Another option to inform those unfamiliar with the area would be to implement signs directing patrons to route to and from the Skyline Drive interchange. This could include signage on US-6/West Dodge Road informing drivers attending events at the UBT Sports Complex to use the Skyline Drive exit. Signs directing event traffic to exit to the west onto Cumberland Drive could also be added at all UBT sports complex driveways as well on the northbound approach to Cumberland Drive on 210th Street. It should be noted that any sign guidance installed on US-6/West Dodge Road will require the concurrence of the Nebraska Department of Transportation (NDOT). Currently, the NDOT policy is to not allow signage directing traffic to private entities. Therefore, negotiation between the City of Omaha and NDOT would need to occur and are recommended if guide signs are desired on this facility. As already discussed in the previous section, the effectiveness of this strategy has limitations for the same reasons. With so

many commercial destinations supplied east on Cumberland Drive, patrons desiring to east or shop will naturally route to the east.

5.3 Eastbound Cumberland Metering

Another strategy has the goal of making it apparent to the driver that the east Cumberland Drive route is less attractive than Skyline Drive. This could be partially achieved by "capping" available eastbound capacity on Cumberland Drive. Based on the currently viable design alternatives at 205th Street investigated in this study, this could be achieved in a couple of ways:

1. For a signalized alternative, the proportion of green time could be more favorably allotted to completing movements such as 205th Street approaches and the westbound left-turn.
2. Reduce the number of eastbound through lanes at the 205th Street intersection, thereby capping maximum eastbound throughput.

While delays and queues would increase on the eastbound approach to the 205th Street intersection, the metered eastbound demands would be reduced such that side street traffic coming from adjacent commercial uses could access Cumberland Drive more easily and provide more capacity for westbound movements. This could also reduce the likelihood of westbound queue lengths extending into the 204th Street intersection.

5.4 Skyline Drive Enhancements

In addition to making the eastbound Cumberland Drive route less attractive to event patrons, efforts could also be made to enhance the attractiveness of using Skyline Drive. Furthermore, as more demands are diverted to the Skyline Drive ramp terminals, existing excess capacity will be depleted. In anticipation of this, Saturday peak hour turning movement counts were collected at the Skyline Drive interchange on May 22, 2021 (9 AM to 5 PM). It should be noted that an annual craft fair was being held at the property located at the northeast quadrant of the Skyline Drive interchange during data collection. Therefore, to reflect a typical Saturday, traffic demands heading to and from that driveway were subtracted from the data to reflect baseline demands. Data collection sheets, as well as adjustment calculations, are provided in Appendix I. Figure 20 summarizes existing lane geometry, traffic control, traffic operations, and queue capacity calculations.

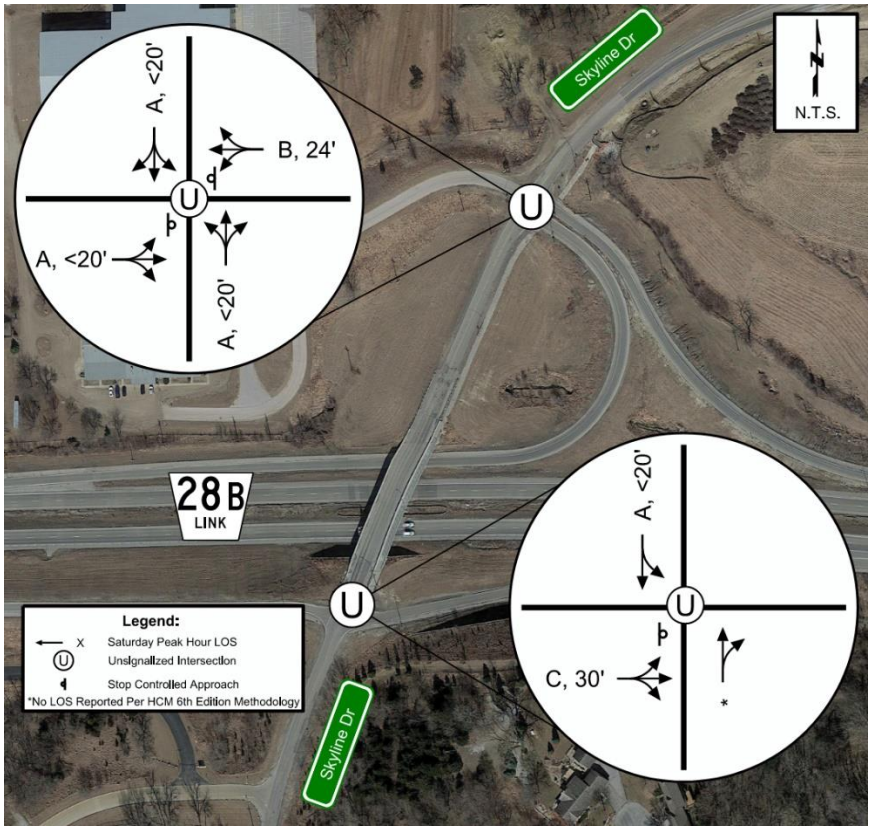


Figure 20. Existing Capacity Analysis at the Skyline Drive Interchange at US-6/West Dodge Road

As shown, both ramp terminals currently operate at an acceptable LOS C (south ramp terminal approach) or better with minimal 95th percentile queue lengths. Therefore, excess capacity is present to accommodate some traffic diversion from Cumberland Drive to the Skyline Drive interchange. To determine the magnitude of traffic that could be diverted to the Skyline Drive interchange, a sensitivity analysis was conducted. The results of that sensitivity analysis are summarized in Table 2.

Table 2. Sensitivity Analysis Results for Diversion of Traffic to Skyline Drive Interchange

Diverted Demand Threshold (Both Directions)	Traffic Operations Condition
154 vehicles	Eastbound ramp terminal approach at LOS E with 74-foot queues[1]
280 vehicles	Eastbound ramp terminal approach at LOS F and overcapacity with 166-foot queues[2]
290 vehicles	Westbound ramp terminal approach at LOS E with 158-foot queues. Eastbound ramp terminal approach still LOS F and overcapacity with 180-foot queues[1,2]
375 vehicles	Westbound ramp terminal approach at LOS F and overcapacity with 274-foot queues. Eastbound ramp terminal approach still LOS F and overcapacity with 268-foot queues[1,2]

[1]95th percentile queue lengths.
[2]For movements that are over capacity, 95th percentile queues are less predictable and are likely greater than reported.

As shown, ramp terminal approaches will operate over capacity with a diversion of 280 to 375 vehicles total in both directions. Based on this assessment, it may be required to improve these ramp terminal intersections to accommodate future diverted trips as well as enhance Skyline Drive as a desirable route choice. This route could be further enhanced by studying alternative intersection and traffic control options at both the Cumberland Drive/Skyline Drive and Cumberland Drive/210th Street intersections.

5.5 Skyline Drive Diversion Strategy Summary

Potential diversion strategies discussed in this section are summarized in Figure 21.

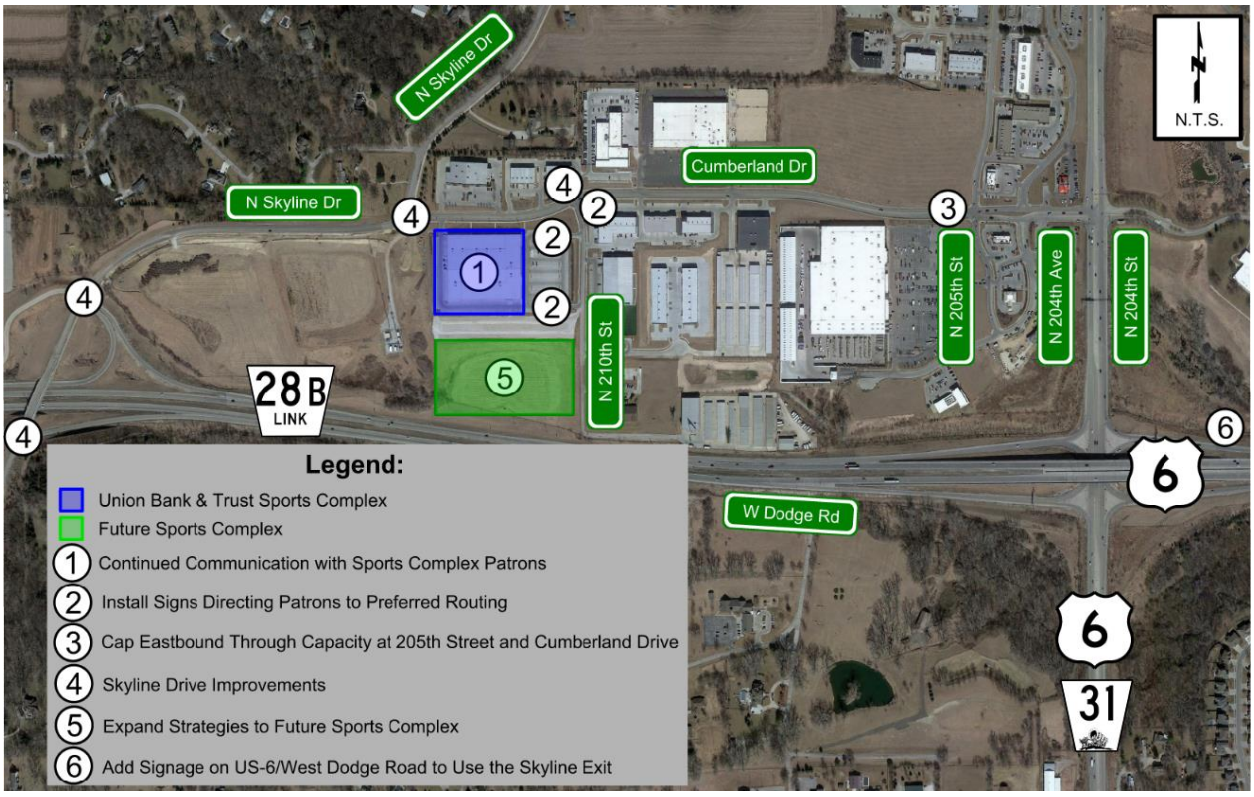


Figure 21. Summary of Event Traffic Diversion Strategies

6.0 Alternative Analysis

As identified in Section 4.0 , the following alternatives were retained for alternatives analysis to identify a preferred design alternative at the 205th Street and Cumberland Drive intersection:

1. No Build
2. Signal Alternative
3. Roundabout Alternative

The following sections will discuss in greater detail any design alternative refinements as well as compare each alternative based on the following performance criteria:

1. Traffic Operations
2. Safety
3. Property and ROW Impacts
4. Constructability
5. Cost

Performance criteria comparisons will be summarized, scored, and ranked to identify a recommended preferred alternative.

6.1 Alternative Refinements

In addition to the "No Build" and the signal and roundabout design alternatives introduced in Figure 14 (page 20) and Figure 16 (22), two additional design alternative options were developed including smaller footprint concepts of both signal and roundabout alternatives. These smaller footprint options might help fulfill event traffic rerouting strategies previously discussed, as well as be less impactful to adjacent properties. For this alternative analysis, alternatives going forward will be referred to as the following:

1. **No Build** - This alternative proposes to retain existing lane geometry and traffic control within the study area.
2. **Signal (Small Footprint)** – This signal alternative would be like the signal alternative shown previously in Figure 14 except that eastbound dual left-turn lanes at 205th Street have been reduced to one lane. Without the need to accommodate eastbound dual left-turn lanes, the southbound receiving lanes on the south leg of 205th Street are also reduced to one lane. The eastbound left-turn phase will operate as a protected-permitted. This alternative is shown in Figure 22.
3. **Signal (Large Footprint)** – This is the signal option identified in Figure 14 with no changes. Dual left-turn lanes are proposed on the eastbound approach operating under-protected only phasing. Additionally, two southbound through lanes are proposed on the south leg to receive dual left-turn lanes.
4. **Roundabout (Small Footprint)** – This would be a smaller-sized roundabout very similar to the alternative identified in Figure 16 except that the eastbound approach would be reduced to one lane only. This alternative is shown in Figure 23.
5. **Roundabout (Large Footprint)** – This is the roundabout alternative previously identified in Figure 16 with no changes.

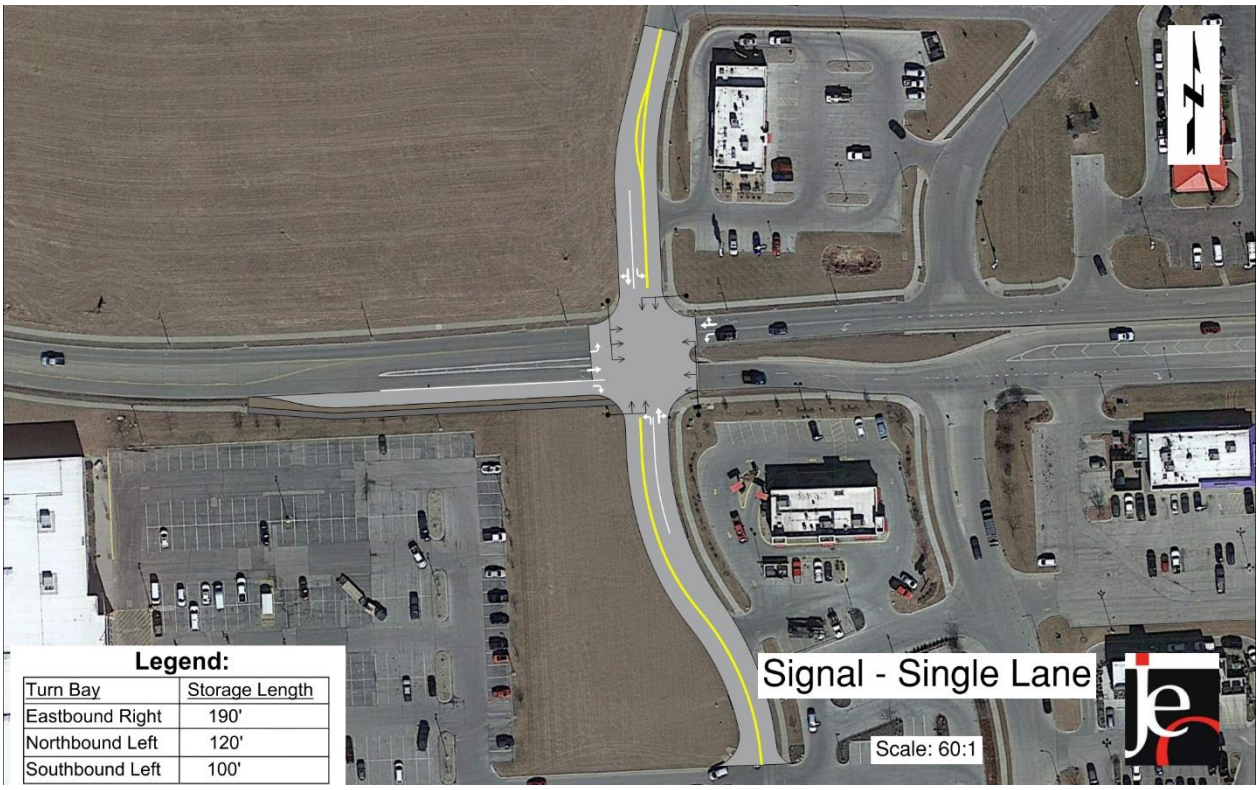


Figure 22. Signal (Small Footprint) Alternative

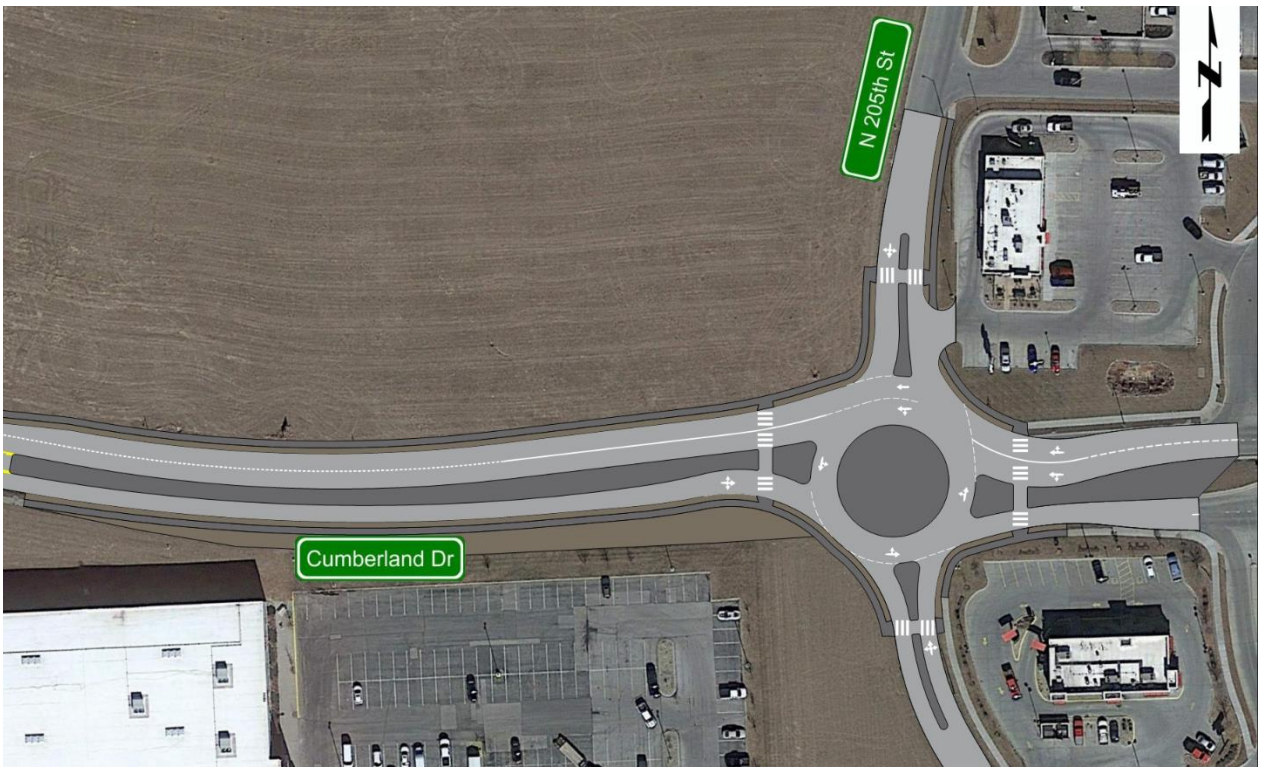


Figure 23. Roundabout (Small Footprint) Alternative

6.2 Traffic Operations

To evaluate traffic operations, all alternatives were modeled as microsimulations using the PTV VISSIM Version 2020 software. To capture worst-case traffic congestion, simulations were run under long-term Saturday peak hour traffic demands. As part of the calibration process, simulations for all alternatives were reviewed visually first to verify that operations and vehicle behavior reflect realistic conditions, including vehicle behavior and truck percentages throughout the study corridor. After visual inspection and model refinements were made, five separate simulations were run for each alternative, and observed movement delays, average queues, and maximum queues were averaged and compared between each design alternative. Raw and summary data output for each alternative is provided in Appendix J. Additionally, general observations for each alternative simulation run are also provided in Appendix J. A summary of traffic operations performance for each design alternative is shown in Table 3. Alternatives are listed in the table by the rank of performance starting with the top-performing alternative to the worst. As indicated, both Roundabout alternatives showed the greatest net operational benefits when compared to the No-Build and Signal alternatives. Westbound queues at the 205th Street intersection were observed on many occasions to encroach into the 204th Street intersections, which adversely impacted operations at 204th Street. This is counter to one of the project goals to limit adverse operation impacts to the adjacent street network.

Table 3. Summary of VISSIM Simulation Analysis and Alternative Ranking

Rank	Alternative	Summary of Observations
1	**Roundabout (Small Footprint)**	**Pros** • Displayed the lowest delay among all intersection approaches except for the Eastbound approach to 205th Street when compared to all other alternatives. • Eastbound (at 204th Street) and westbound (at 205th Street) queues (average or maximum) were never observed to encroach into the 205th Street or 204th Street intersections, respectively. • NB 205th Street approach to Cumberland Drive showed significant operations improvement over all other alternatives allowed for by metering of eastbound movements. • Adverse operational impacts to the signal 204th Street intersection were not observed. **Cons** • Delays on the eastbound approach to 205th Street are significant with extensive queuing; however, this may encourage sporting event traffic to reroute to the Skyline Drive interchange relieving congestion on Cumberland Drive.
2	**Roundabout (Large Footprint)**	**Pros** • Generally displayed the second-lowest delay at all intersection approaches except for the Eastbound approach to 205th Street when compared to all other alternatives. • Westbound queues (average or maximum) at 205th Street never encroached into the 204th Street intersections. • The eastbound approach to 205th Street slightly improves compared to the Roundabout (Small Footprint). **Cons** • Although improved over the other roundabout option, delays on the eastbound approach to 205th Street are still higher than signal options with extensive queuing. • Because of the increased throughput eastbound provided by the additional approach lane at 205th Street, delays increase on 205th Street approaches as well as movement at the 204th Street signal. • Maximum eastbound queue lengths on the eastbound approach to the 204th Street intersection were observed to extend into the 205th Street intersection.
3	**Signal (Small Footprint)**	**Pros** • Generally improves northbound and southbound 205th Street approaches to Cumberland Drive over the "No Build" alternative. **Cons** • Delays and queues are generally increased at the 204th Street intersection when compared to the roundabout alternatives. • Maximum queue lengths for the westbound approach to 205th Street encroach into the 204th Street intersections. • Delays on the eastbound approach to 205th Street are significant with extensive queuing; however, like the Roundabout (Small Footprint) alternative this may encourage sporting event traffic to reroute to the Skyline Drive interchange relieving congestion on Cumberland Drive.

Table 3. (Continued) Summary of VISSIM Simulation Analysis and Alternative Ranking

Rank	Alternative	Summary of Observations
4	**Signal (Large Footprint)**	**Pros** • Eastbound delay and queues are significantly reduced compared to both small footprint alternatives. **Cons** • Adverse delays and queues impacts are still present at the 204th Street intersection when compared to roundabout alternatives. • Maximum queue lengths for the eastbound approach to 204th Street and the westbound approach to 205th Street encroach into their respective adjacent intersections. • With greater throughput on eastbound Cumberland Drive, delays increase on 205th Street approaches.
5	**No Build**	**Pros** • With the westbound approach to 205th Street not stopped, there is no queuing extending into 204th Street **Cons** • Existing delays and queues on 205th Street approaches increase.

6.3 Safety

With the publication of the Highway Safety Manual (HSM) in 2010, research is now available in the form of crash modification/reduction factors that can help assess a mitigation measure's impact on the frequency of crashes. Based on methodology found in the 2010 HSM and the Crash Modification Factor Clearinghouse crash reduction factors were researched for each design alternative. Crash reduction factors are predicted reductions in crashes for a given mitigation measure. Researched crash reduction factors taken from the Crash Modification Factor Clearing House website are provided in Appendix E. Predicted crash reductions factors are summarized in Table 4. Design alternatives were also ranked based on the alternative that offers the greatest magnitude of crash reduction potential.

Table 4. Crash Reduction Potential of Design Alternatives

Rank	Alternative	Mitigation Measure	Predicted Crash Reduction (%)	Comments
1	Roundabout (Small Footprint)	Convert intersection with minor stop control to a modern roundabout	62%	All crashes
1	Roundabout (Large Footprint)			
3	Signal (Small Footprint)	Install Traffic Signal	39%	
3	Signal (Large Footprint)			
5	No Build	None	0%	There is no crash modification with no traffic control or geometric changes proposed.

As shown, both roundabouts offer the greatest crash reduction potential as well as a reduction in crash severity. Based on the addition of protected only dual left-turn lanes on the westbound approach to the 205th Street intersection, the Signal (Large Footprint) alternative offers slightly greater crash reduction potential than the Signal (Small Footprint) alternative. The "No Build", offering no safety benefits, was ranked last.

6.4 Property and ROW Impact

Anticipated areas of additional required right-of-way were estimated for each design alternative including permanent ROW acquisitions and temporary easements. These areas are summarized in Table 5.

Table 5. Estimated Property/ROW Impacts

Rank	Alternative	Predicted Property/ROW Impacts (SF)		
		ROW Take	Temporary Easement	Total
1	No Build	0	0	0
2	Signal (Small Footprint)	2,100	1,000	3,100
3	Signal (Large Footprint)	2,200	2,700	4,900
4	Roundabout (Small Footprint)	14,900	800	15,700
5	Roundabout (Large Footprint)	16,300	300	16,600

As shown, both signal alternatives are expected to have significantly fewer property impacts than the roundabout options. It should be noted that while the Signal (Large Footprint) alternative does have some significant widening south on 205th Street, the City required the adjacent property (Chipotle) to dedicate additional right-of-way in anticipation of accommodating westbound dual left-turn lanes. Although the Roundabout (Small Footprint) has significant property impacts, the majority of right-of-way needed for the Roundabout (Small Footprint) is found in the undeveloped northeast quadrant as opposed to already developed areas of the other quadrants.

6.5 Constructability

Constructability, for this study, is a qualitative evaluation of the relative complexity of construction phasing between design alternatives. This qualitative assessment is summarized in Table 6.

Table 6. Qualitative Constructability Review Summary

Rank	Alternative	Comments
1	No Build	No construction efforts.
2	Signal (Small Footprint)	Some reconstruction on the 205th Street approach and much of the signal construction can be constructed without operational impacts. Traffic operations should be able to be maintained at the 205th Street intersection.
3	Signal (Large Footprint)	More significant construction on 205th Street than the Signal (Small Footprint) alternative. Additionally, there will median construction on the westbound approach to accommodate dual left-turn configuration. Again, much of the signal construction can be constructed without operational impacts. Traffic operations should be able to be maintained at the 205th Street intersection.
4 (Tied)	Roundabout (Small Footprint)	Much more significant impacts to operations at the 205th Street intersection. Either complex phasing would be required to maintain movements at the 205th Street intersection or the feasibility of a temporary median opening at 204th Avenue could be evaluated.
4 (Tied)	Roundabout (Large Footprint)	

As expected, construction phasing will be much more complex for roundabout compared to signal construction.

6.6 Cost

Planning level opinions of costs have been prepared for all design alternatives with resulting estimates summarized and ranked from least to greatest in Table 7. A more detailed breakdown, including contingency assumptions, is included in Appendix K.

Table 7. Summary of Opinion of Costs

Rank	Alternative	Cost[1]
1	No Build	$0
2	Signal (Small Footprint)	$1.3 Million
3 (Tied)	Signal (Large Footprint)	$2.3 Million
3 (Tied)	Roundabout (Small Footprint)	$2.4 Million
5	Roundabout (Large Footprint)	$2.8 Million

[1]Costs in current dollars.

As shown, the Signal (Small Footprint) is expected to be the least costly "build" alternative with the smallest impact to adjacent properties and less new pavement construction. As expected, the Roundabout (Large Footprint) has the greatest pavement and ROS needs and therefore is expected to be double the cost of the Signal (Small Footprint) alternative.

6.7 Stakeholder Outreach

As part of the study effort, a contact log of adjacent property owners was developed to document contact relevant contact information. This contact log is provided in Appendix L. A letter and e-mail were sent to contacts on this list announcing the traffic study of 205th Street and Cumberland Drive. Next, all contacts on the list were invited to a stakeholder meeting held on September 2, 2021. The City of Omaha and JEO Consulting Group presented an overview of the project as well as current progress, including existing conditions analyses, design alternatives development, and preliminary alternatives analysis results. Following the presentation, the meeting was opened to questions from the stakeholders. An attendance list and summary of those questions are also provided in Appendix L. Generally, response to the presentation was positive and there was no preference for a particular alternative identified. The presentation can be viewed at the project website https://www.keepomahamoving.com/projects/205th-street-cumberland-drive-traffic-study. A formal comment period was open to area property owners to submit feedback and concerns. There were no comments received during the comment period (9/21/2021 to 9/22/2021). Although stakeholder feedback did not indicate a specific preference for any of the build design alternatives, there seemed a general consensus that No Build is not a preferred option.

6.8 Decision Matrix Summary and Preferred Alternative

To assign scoring to performance measure criteria a weighted approach was developed and is shown in Table 8.

Table 8. Performance Measure Criteria Weighting and Scoring

Criteria	Scoring	Weighting (Multiplier)	Weight (Percentage)
Area Traffic Operations	No Points Given for No Build 1 = Poorest Performing Alternative and Does not Address Project Goals 2 = Middle Performing Alternative 3 = Best Performing Alternative	6	27%
Safety	No Points Given for No Build 1 = Provides Least Safety Benefit 2 = Provides More Safety Benefit 3 = Provides the Greatest Safety Benefit	6	27%
Cost	1 = Greatest Cost 2 = Medium Cost 3 = Lowest Cost	4	19%
Property and ROW	1 = Significant Adjacent Property Impacts 2 = Moderate Adjacent Property Impacts 3 = Least Adjacent Property Impacts	2	9%
Constructability	1 = Not Constructible 2 = Moderate Constructability Challenges 3 = Minimal Constructability Challenges	2	9%
Stakeholder Outreach	1 = Negative Feedback 2 = Nuetral Feedback 3 = Positive Feedback	2	9%
Total		20	100%

As indicated, Traffic Operations and Safety were weighted the greatest with a 27% scoring weight. This weight was assigned based on project goals to improve traffic operations and safety and was identified by the City of Omaha as well as the public as major areas of concern at the 205th Street and Cumberland Drive intersection. After traffic operations and safety, the cost was considered the next greatest weighting at 19%. Finally, Property/ROW, Constructability impacts and Stakeholder Outreach were weighed at 9% each.

Using the weight and scoring system summarized in Table 8, scores were assigned and totaled to rank each alternative to identify a preliminary preferred design alternative. Scores and tallies are summarized in Table 9.

Table 9. Design Alternative Scoring

		No Build Alternative		Signal (Small Footprint)		Signal (Large Footprint)		Roundabout (Small Footprint)		Roundabout (Large Footprint)	
Criterion	Weight	Raw Score	Weighted Score	Raw Score	Weighted Score	Raw Score	Weighted Score	Raw Score	Weighted Score	Raw Score	Weighted Score
Traffic Operations	6	0	0	1	6	1	6	3	18	2	12
Safety	6	0	0	1	6	2	12	3	18	3	18
Cost	4	3	12	3	12	2	8	2	8	1	4
Property/ROW	2	3	6	3	6	3	6	1	2	1	2
Constructability	2	3	6	3	6	3	6	2	4	2	4
Stakeholder Outreach	2	1	2	2	4	2	4	2	4	2	4
Total			**26**		**40**		**42**		**54**		**44**

It should be noted that no points were assigned to the "No Build" alternative for the traffic operations and safety performance measures as this option offers no benefit. These two measures define the overall goals of the project, and it was felt that this option should not benefit from even the lowest assign score of one point. Based on scoring, design alternatives are ranked as follows:

1. Roundabout (Small Footprint)
2. Signal (Large Footprint)
3. Signal (Small Footprint)
4. Roundabout (Large Footprint)
5. No Build

Therefore, the Roundabout (Small Footprint) would be considered the preliminary preferred design alternative with the greatest operational and safety benefits offsetting cost, property, and constructability impacts. Furthermore, both traffic signal options do not satisfy the project goal of improving operations at 205th Street without degrading traffic operations and safety to the 204th Street intersection due to periods when westbound queues at 205th Street extended into the 205th Street and Cumberland Drive intersection.

7.0 Conclusions and Recommendations

Based on the results of the traffic study analyses, the following conclusions and recommendations are provided:

1. Existing capacity analysis confirms significant congestion and poor operations at the 205th Street and Cumberland Drive intersection, especially during the midday (weekday) and weekend peak hours.
2. A review of the crash history at the west study intersection indicates a crash pattern (angle and left-turn crashes) indicative of operational challenges for traffic on 205th Street approaches. It should also be mentioned that crashes have been trending upward with increasing traffic in the area due to ongoing development.
3. Saturday traffic volumes at the 205th Street and Cumberland Drive intersection, collected in 2020, appear to satisfy Warrant 2 thresholds (2009 MUTCD) justifying the inclusion of signal control as a mitigation option for analysis.
4. Based on the near-term and long-term traffic forecast for the study area, existing congestion, delays, and queueing will worsen without mitigation.
5. Several potential design alternatives for the intersection of 205th Street and Cumberland Drive were developed and reviewed for feasibility. The alternatives and their respective viability for further evaluation are as follows:
    a. No Build – **Retained to Serve as Baseline Alternative**
    b. All-Way Stop Control – **Not Retained for Further Analysis**
    c. Restricted Left Turn and Through Movements on 205th Street – **Not Retained for Further Analysis**
    d. Signal Control – **Retained for Further Analysis**
    e. Roundabout – **Retained for Further Analysis**
6. Several strategies were reviewed and recommended to encourage area sporting event patrons to route through Skyline Drive versus Cumberland Drive. These strategies include the following:
    a. Continued education from area sports complexes encouraging patrons to route to and from event sites via the Skyline Drive/West Dodge Road interchange via their respective websites, making a periodic announcement to attending patrons during sporting events, and making printed material available to attending patrons.
    b. Further coordination between the NDOT and City of Omaha is recommended to install signage on West Dodge Road directing sports complex patrons to route to the area via Skyline Drive.
    c. Signs installed at all exiting driveways at study area sports complexes and the northbound approach on 210th Street at Cumberland Drive directing event traffic to the Skyline Drive interchange.
    d. Incorporate an eastbound Cumberland Drive capacity cap into any design alternative at the 205th Street intersection limiting eastbound traffic to encourage traffic to utilize the Skyline Drive interchange.
    e. The effectiveness of Strategy c. could be increased by enhancing Skyline Drive ramp terminals, the Skyline Drive/Cumberland Drive intersection, and the 210th Street/Cumberland Drive intersection with capacity improvements such as roundabout/signal control and auxiliary lanes. Enhancements could be the addition of auxiliary turn lanes and construction of roundabouts, to name a couple of examples. Further study would be recommended to determine feasibility, need, and preferred design alternatives.

f. Signs directing arriving event traffic could be added east of the 204th Street and US-6/West Dodge Road interchange to use the Skyline Drive interchange. Negotiation between the City of Omaha and the Nebraska Department of Transportation (NDOT) should occur if guide signs are desired on this facility since any sign guidance installed on US-6/West Dodge Road will require the concurrence of NDOT.

7. To encourage traffic to the west of the study area to use the Skyline Drive interchange, a smaller footprint option for both the signal and roundabout alternatives were developed and included in the alternatives analysis for the intersection of 205th Street and Cumberland Drive.
8. Evaluated design alternatives for the 205th Steet and Cumberland Drive intersection were scored and ranked based on performance from a traffic operation, safety, property/ROW impact, constructability, and cost perspective. The resulting ranks by preference are as follows:

    1st Roundabout (Small Footprint)
    2nd Roundabout (Large Footprint)
    3rd Signal (Small Footprint)
    4th Signal (Large Footprint)
    5th No Build

    Based on these rankings, the Roundabout (Small Footprint) would be the preferred alternative and recommended at the 205th Street and Cumberland Drive intersection. Further design refinements will be needed including final design vehicle determination and truck apron design.