



MEMORANDUM

To: Justin Poulos, Streetworks Development (SWD)

From: Adam Gibson, P.E.
Lisa Juan, P.E. (MA)

Date: February 3, 2023
Updated February 23, 2023

Subject: Revised Preliminary Traffic Engineering Assessment
One Westfield Place Transit Oriented Development (TOD)
Town of Westfield
Union County, New Jersey

EXECUTIVE SUMMARY

This revised preliminary traffic study will be submitted for review to the Authorities Having Jurisdiction and may be subject to change based on comments from the same.

One Westfield Place is a proposed Transit Oriented Development (TOD) that will consist of a mix of retail/restaurant, residential, and office uses spread across three (3) general areas (“zones”) in the vicinity of the Westfield Train Station. The zones are made up of the former Lord & Taylor property, along with parcels that the Town of Westfield (Town) determined would be beneficial to have redeveloped in June 2020. This proposed redevelopment, including elements of a new mobility hub within the North Zone and South Zone (immediately adjacent to the train station), will provide balanced transportation options and support a diverse, mixed-use downtown neighborhood. The three (3) zones are described below with the associated land use types (the “Project”).

The One Westfield Place West Zone is comprised of multiple lots located along the north and south sides of North Avenue/CR 610, bounded to the east by Broad Street, to the west by Charles Street, and to the south by the railroad tracks. The West Zone will consist of approximately 13,300 square feet of commercial retail, 170 residential dwelling units (mix of townhomes, multi-family, and age restricted 55+), 40,000 square feet of general office space, 60,000 square feet of medical office space, and associated parking for each land use. The existing Lord & Taylor building will be repurposed (for the office and medical office uses) as part of the proposed development.

The North Zone is located along the south side of North Avenue/Route 28, bounded to the east by Central Avenue, to the west by Elm Street, and to the south by the railroad tracks, and where it is proposed to redevelop the Town’s existing surface parking lots (Lot 2 and Lot 8). The existing commercial buildings and employee/customer parking will remain. The proposed redevelopment will include creating public open space (Town Square) opposite Elm Street on the south side of North Avenue. The North Zone will include a +/-352 space parking garage (317 public parking spaces and 35 private residential parking spaces) located adjacent to the proposed loft residential building (which

will contain 35 multi-family dwelling units and 2,110 square feet of commercial retail) and approximately 93 public surface lot parking spaces.

The South Zone is located along the north side of South Avenue/CR 610, bounded to the east by Central Avenue, to the west by Summit Avenue, and to the north by the railroad tracks, and where it is proposed to redevelop the Town's existing surface parking lots (Lot 3). The proposed redevelopment will include creating public open space (Town Green) opposite the intersection of Summit Avenue with South Avenue, and general office buildings (210,000 square feet) with retail (12,000 square feet) and associated garage parking. The South Zone will also include a +/-208 space public parking garage and up to 109 public surface lot parking spaces. The parking garages associated with the office/retail buildings will provide public parking on nights, weekends, and holidays.

Based on local and industry data, the proposed development, which will eliminate the as-of-right permitted retail use of the Lord & Taylor building, will generate a net increase of 282 vehicles during the busiest hour, PM peak hour¹. These additional new trips, which will be divided between the three zones, West Zone, North Zone, and South Zone, will not be added all at one location but will be dispersed throughout the study area roadways and intersections. Significant traffic control, safety, pedestrian, and bicycle improvements are proposed to offset the addition of this traffic to the surrounding roadways. The results of the detailed intersection analyses conducted for this study indicate that, with the proposed improvements and the additional Project traffic, the study intersections will generally operate at overall LOS D or better during both the weekday AM and PM peak hours and the Saturday Midday peak hour.

The unsignalized site access points to the West Zone, North Zone, and South Zone are expected to have adequate capacity to accommodate entering and exiting project traffic without interfering with passing traffic. The site access and internal circulation via the signalized intersections at the North Zone and South Zone will continue to be evaluated and refined, in coordination with the Applicant, Town, and other AHJs to provide efficient vehicular flows and sufficient space for all modes of transportation.

Signal timing modifications at several study intersections will generally improve the operating conditions but will not resolve all the operational issues. Additional capacity would be beneficial at select intersections to improve traffic flows through the area; however, the right-of-way is limited and the Town's desire to create a more pedestrian/bicycle-friendly downtown may make these types of improvements infeasible. Where physical improvements to an intersection may not be feasible, alternative analysis was performed with priority given to improving the pedestrian and bicycle infrastructure/safety.

¹ Area traffic volumes are greatest during the afternoon peak hour, resulting in the longest traffic delays during this hour, when the Project is expected to add 282 new trips to the surrounding roadway network. The Project is expected to add 310 new trips to the surrounding roadways during the weekday AM peak hour and to result in a net reduction of 82 trips during the Saturday Midday peak hour (when area traffic volumes are lower).

A summary of the recommended mitigations is provided below. Coordination with other stakeholders will be necessary to discuss the operating conditions of intersections that are maintained by either Union County or New Jersey Department of Transportation (NJDOT).

- Expanded Multi-Use Trail along Route 28
 - Proposed multi-use trail expansion from 8.0 feet to 14.0 feet.
 - Evaluate the need for additional pedestrian-friendly lighting beneath the overpass.
 - Provide connection from existing multi-use trail to future bicycle/pedestrian infrastructure along North Avenue and South Avenue.
 - Provide signing, marking, and intersection control at the connections to the existing multi-use trail.
- Intersection ID #1. Crossway Place/Scotch Plains Avenue & South Avenue
 - Modify signal timings.
- Intersection ID #4. Summit Avenue & South Avenue
 - Replace the existing traffic signal with a new signal.
 - Reconfigure the intersection to a standard, 4-way intersection.
 - Modify signal phase for an exclusive eastbound and westbound left-turn phase. Convert the eastbound approach to consist of an exclusive eastbound left-turn lane and shared eastbound through/right-turn lane. Install an exclusive westbound left-turn lane. Remove the northbound and southbound split-phase operation.
 - Road diet along South Avenue from Westfield Avenue/roundabout to Central Avenue, which would reduce the number of westbound lanes from two (2) to one (1).
 - Implement a leading pedestrian interval (LPI), which gives pedestrians the opportunity to enter the crosswalk before vehicles.
- Intersection ID #5. South Avenue & Boulevard
 - Road diet along South Avenue from traffic circle/roundabout to Central Avenue.
 - Reduce the number of traffic lanes and distance to be negotiated by pedestrians crossing South Avenue at this location.
- Intersection ID #6. South Avenue & Eastern Site Driveway
 - Install a new traffic signal.
 - Implement an LPI.
 - This intersection will include signal coordination with Intersection ID #4. South Avenue & Summit Avenue and Intersection ID #7 Ross Place & Central Avenue & South Avenue.
 - As part of the road diet, reduce the westbound through travel lanes from two to one, with the outside most travel lane used as a right-turn lane into the site.
- Intersection ID #7. Ross Place & Central Avenue & South Avenue
 - Modify signal timings.
 - Restrict westbound right-turn on red movement.
 - Add ergonomic crosswalks on the southbound and westbound approaches.
 - Construct curb extension at the corner of South Avenue & Ross Place to shorten the pedestrian crossing distance.
 - Adjust the pedestrian signal phasing so pedestrians cross Ross Place when South Avenue has a green light.
- Intersection ID #8. Crossway Place/Edgewood Avenue & North Avenue
 - Modify signal timings.

- Intersection ID #9. North Avenue & Clark Street
 - Construct curb extensions with ADA-compliant ramps at the northeast and northwest corners at Clark Street. This treatment will shorten the pedestrian crossing distance.
 - Install a new traffic signal.
 - This intersection will include signal coordination with Intersection ID#11. Route 28/Broad Street & North Avenue.
 - Restrict the westbound right-turn on red movement.
 - Implement an LPI.
- Intersection ID #11. Route 28/Broad Street & North Avenue
 - Stripe the shoulders along the eastbound right-turn lane, slip ramp to narrow down the travel lane.
 - Use high visibility crosswalk markings.
 - Provide pedestrian crossing warning signs on both sides of the slip ramp. RRFBs could be provided to further enhance safety at the crossings.
 - Declutter and/or relocate existing signs as much as possible. For example, the yield sign at the southern end could be relocated further south such that it is placed adjacent to the yield markings.
 - Modify signal timings.
 - Install a no right turn for trucks sign at the northeast corner for westbound right-turn truck movements.
 - Additional bicycle and pedestrian improvements (wider sidewalk/multi-use trail, streetscape) will need to be further evaluated with the Town and NJDOT.
- Intersection ID #12. North Avenue & Elm Street
 - Replace the existing traffic signal with a new signal.
 - Reconfigure the intersection to a standard, 4-way intersection.
 - Maintain existing intersection lane geometry; however, convert to a typical four-legged intersection.
 - Modify signal timings.
 - Upgrade pedestrian crosswalk signals as part of traffic signal redesign.
 - Implement an LPI.
- Intersection ID #13. Central Avenue & North Avenue
 - Install a new traffic signal. Add ADA curb ramps and pedestrian signals
 - Add ergonomic crosswalks on all approaches
 - Modify signal timings.
- Intersection ID #14. Prospect Street & Broad Street
 - Install a new traffic signal.
 - Construct curb extensions on the east leg of the intersection (Prospect Street).
 - Implement an LPI.
- Intersection ID #16. Central Avenue & Broad Street
 - Install a flashing yellow arrow (FYA) for westbound left-turn movements (Broad Street to Central Avenue).
- Intersection ID #17. Broad Street & Mountain Avenue
 - Install a FYA for eastbound left-turn movements (Broad Street to Mountain Avenue).
- Intersection ID #23. North Avenue & Eastern North Zone Parking Site Driveway
 - New driveway for only right-turn in/right-turn out movements.

The Project is consistent with current State and County practices as indicated by New Jersey Future² in their January 30, 2023 press release where it is noted that compact, walkable, mixed-use centers produce a host of societal benefits. These include:

- Enabling people to take at least some of their trips on public transit, or by non-motorized means, shortening travel distances for those trips that are still taken by car;
- Reducing the state's greenhouse gas emissions;
- Reducing traffic congestion;
- Improving pedestrian and bicyclist safety;
- Reducing the expenses involved in owning a vehicle (especially important for lower-income households);
- Allowing people to spend less time in the car commuting and running errands;
- Improving public health as a result of more people using more active modes of transportation; and
- Reducing per-capita infrastructure needs and the public expenditures they engender.

² A nonprofit, nonpartisan organization that promotes sensible and equitable growth, redevelopment, and infrastructure investment.

INTRODUCTION

Kimley-Horn prepared this memorandum to detail the results of the Traffic Engineering Assessment for the proposed redevelopment (One Westfield Place) in the Town of Westfield (Town), Union County, New Jersey. One Westfield Place is a proposed Transit Oriented Development (TOD) that will consist of a mix of commercial, residential, and office uses spread across three (3) zones in the vicinity of the Westfield Train Station and the former Lord & Taylor department store building. The zones are made up of parcels that the Town of Westfield declared as an area in need of redevelopment in June 2020. This proposed redevelopment, including elements of a new mobility hub within the North Zone and South Zone, will provide balanced transportation options and support a diverse, mixed-use downtown neighborhood.

The scope of this *Revised Preliminary Traffic Engineering Assessment* was developed as part of on-going coordination with the Town of Westfield's Traffic Engineering Professional (WSP).

PROJECT DESCRIPTION

The proposed redevelopment is a mix of commercial, residential, and office uses spread across three (3) zones in the vicinity of the Westfield Train Station and the former Lord & Taylor department store building. The three (3) zones are listed below with the associated land use types and shown in the concept plan in [Appendix A](#).

- West Zone – commercial retail (13.3 ksf), residential (170 dus), and office (40 ksf general and 60 ksf medical office)
- North Zone – residential (35 dus) and commercial retail (2.1 ksf)
- South Zone – commercial retail (12 ksf) and office (210 ksf general)

This proposed redevelopment is being planned to provide balanced transportation options, including elements of a new mobility hub within the North Zone and South Zone. Vehicle trips may shift to walking, cycling, or taking public transit especially because the downtown redevelopment key principles include the development of great streets and fostering a unique, organic, urban environment with an emphasis on green environments and state-of-the-art green technologies.

The Project is consistent with current State and County practices as indicated by New Jersey Future³ in their January 30, 2023 press release where it is noted that compact, walkable, mixed-use centers produce a host of societal benefits. These include:

- Enabling people to take at least some of their trips on public transit, or by non-motorized means, shortening travel distances for those trips that are still taken by car;
- Reducing the state's greenhouse gas emissions;
- Reducing traffic congestion;
- Improving pedestrian and bicyclist safety;

³ A nonprofit, nonpartisan organization that promotes sensible and equitable growth, redevelopment, and infrastructure investment.

- Reducing the expenses involved in owning a vehicle (especially important for lower-income households);
- Allowing people to spend less time in the car commuting and running errands;
- Improving public health as a result of more people using more active modes of transportation; and
- Reducing per-capita infrastructure needs and the public expenditures they engender.

EXISTING CONDITIONS

Study Area

The West Zone is comprised of multiple lots located along the north and south sides of North Avenue/CR 610, bounded to the east by Broad Street, to the west by Charles Street, and to the south by the railroad tracks. The West Zone will consist of approximately 13,300 square feet of commercial retail, 170 residential dwelling units (mix of townhomes, multi-family, and age restricted 55+), 40,000 square feet of general office space, 60,000 square feet of medical office space, and associated parking for each land use. Of the 170 residential dwelling units, 154 will be age restricted to 55+, and 27 will be affordable housing. The existing Lord & Taylor building will be repurposed (for the office and medical office uses) as part of the proposed development.

The North Zone is located along the south side of North Avenue/Route 28, bounded to the east by Central Avenue, to the west by Elm Street, and to the south by the railroad tracks and will redevelop the Town's existing surface parking lots (Lot 2 and Lot 8). The existing commercial buildings and employee/customer parking will remain. The proposed redevelopment will include creating public open space (Town Square) at the intersection with Elm Street. The loft residential (35 dwelling units), including six (6) affordable units, and retail are located at the southwest corner of North Avenue/Route 28 & Central Avenue. The North Zone will also include a +/-352 space parking garage (317 public parking spaces and 35 private residential parking spaces) located adjacent to the loft residential building and approximately 93 public surface lot parking spaces.

The South Zone is located along the north side of South Avenue/CR 610, bounded to the east by Central Avenue, to the west by Summit Avenue, and to the north by the railroad tracks, and where it is proposed to redevelop the Town's existing surface parking lots (Lot 3). The proposed redevelopment will include creating public open space (Town Green) opposite the intersection of Summit Avenue with South Avenue, and general office buildings (210,000 square feet) with retail (12,000 square feet) and associated garage parking. The South Zone will also include a +/-208 space public parking garage and up to 109 public surface lot parking spaces. The parking garages associated with the office/retail buildings will provide public parking on nights, weekends, and holidays.

The following 17 existing intersections were identified for study (existing intersection traffic control) based upon discussions and agreements with the Town:

- Intersection ID #1. Crossway Place/Scotch Plains Avenue & South Avenue (traffic signal)
- Intersection ID #2. Broad Street & South Avenue (traffic signal)
- Intersection ID #3. Route 28 & South Avenue (Yield control roundabout)

- Intersection ID #4. Summit Avenue & South Avenue (traffic signal)
- Intersection ID #5. South Avenue & Boulevard (STOP control)
- Intersection ID #6. South Avenue & Lot #3 East Driveway (STOP control)
- Intersection ID #7. Ross Place & Central Avenue & South Avenue (traffic signal)
- Intersection ID #8. Crossway Place/Edgewood Avenue & North Avenue (traffic signal)
- Intersection ID #9. North Avenue & Clark Street (STOP control)
- Intersection ID #10. Clark Street & Ferris Place (STOP control)
- Intersection ID #11. Route 28/Broad Street & North Avenue (traffic signal)
- Intersection ID #12. North Avenue & Elm Street (traffic signal)
- Intersection ID #13. Central Avenue & North Avenue (traffic signal)
- Intersection ID #14. Prospect Street & Broad Street (STOP control)
- Intersection ID #15. Elm Street & Broad Street (traffic signal)
- Intersection ID #16. Central Avenue & Broad Street (traffic signal)
- Intersection ID #17. Broad Street & Mountain Avenue (traffic signal)

Intersection capacity analyses were performed at study intersections for weekday AM and PM peak hours and Saturday Midday peak hour under existing, future no-build and future build-out conditions (the year 2027).

Data Collection

Traffic volumes used in this study included a combination of data provided from StreetLight Data (StreetLight) and collected turning movement counts (TMCs). The existing conditions analyses were based on the existing traffic volumes, existing lane uses, and existing traffic controls at the study area intersections.

Historical automated traffic recorder (ATR) data from NJDOT's Traffic Count Stations were reviewed to understand the peak characteristics during the weekday AM and PM peak hours. The historical counts identified that the typical commuter peak periods were within 7:00 – 9:00 AM and 4:00 – 6:00 PM as shown in [Appendix B](#).

Weekday

StreetLight is an online platform for transportation analytics and traffic counts based upon crowdsourced mobile device data. StreetLight samples from cell phone apps that use location-based services. Rather than collecting counts for a single day, StreetLight can aggregate and average data across several months. This analysis began during the COVID-19 pandemic. Therefore, StreetLight was queried for four (4) months in 2019 on a typical weekday (Tuesday, Wednesday, or Thursday) AM peak period (7:00– 8:00 AM and 8:00– 9:00 AM) and PM peak period (4:00– 5:00 PM and 5:00– 6:00 PM). Two (2) of the months queried were in the Spring (March and April) and the other two (2) months were in the Fall (September and October) while school was in session. Based upon the data queried, the network AM peak hour was identified as 7:00 – 8:00 AM and the PM peak hour was identified as 5:00 – 6:00 PM. Daily count data, such as 48-Hour Volume Counts from the NJDOT Traffic Count Stations and historical peak hour TMCs provided by the Town of Westfield in the study area were utilized as calibration data inputs in StreetLight. The daily count and historical peak hour TMC data was used by the StreetLight algorithm to calibrate volume estimates internally. After

obtaining the raw 2019 TMCs from StreetLight, post-processing outside of StreetLight was conducted to obtain (pre-COVID-19) 2021 TMCs. The following adjustments were made:

- The NJDOT Traffic Count Stations data provided sub-daily count data (provided in 1-hour bins for some or all locations); these hourly volumes were grown to the year 2021. These volumes were held fixed, if available for study area intersections, similarly to the historic TMCs.
- The remaining study area intersection volumes were derived by proportionally adjusting the 2019 StreetLight TMCs to balance with the fixed historic count data at all available locations. In this way, the StreetLight volumes were used as a “starting point” for traffic volumes but adjusted to align with known, historical volumes.
- If no historic TMC data was available, the StreetLight volumes were utilized at all intersections but balanced to be held fixed with the available midblock hourly data from NJDOT.

The traffic volume data at the following study intersections were based upon StreetLight.

- Intersection ID #1. Crossway Place/Scotch Plains Avenue & South Avenue (traffic signal)
- Intersection ID #2. Broad Street & South Avenue (traffic signal)
- Intersection ID #7. Ross Place & Central Avenue & South Avenue (traffic signal)
- Intersection ID #8. Crossway Place/Edgewood Avenue & North Avenue (traffic signal)
- Intersection ID #13. Central Avenue & North Avenue (traffic signal)
- Intersection ID #14. Prospect Street & Broad Street (STOP control)
- Intersection ID #15. Elm Street & Broad Street (traffic signal)
- Intersection ID #16. Central Avenue & Broad Street (traffic signal)
- Intersection ID #17. Broad Street & Mountain Avenue (traffic signal)

StreetLight provides hourly volume data thus, a peak-hour factor (PHF), which relies on a 15-minute breakdown of volumes, could not be calculated by StreetLight at the time this data was queried. Industry PHF defaults of 0.92 and 0.95 were used for the existing conditions and future conditions, respectively. StreetLight does not provide vehicle classifications; thus, heavy vehicle percentages (HV%) could not be calculated from the raw data. The HV% was calculated by averaging the HV% utilizing the existing traffic volumes based upon current TMCs – a 5 percent (5%) HV% was assumed for the AM peak hour and a 2 percent (2%) HV% was assumed for the PM peak hour.

Manual TMCs were conducted on Wednesday, November 17, 2021, between 7:00 – 9:00 AM and 4:00 – 6:00 PM at the following study intersections. The PHF and HV% were based on existing counts.

- Intersection ID #3. Route 28 & South Avenue (Yield control roundabout)
- Intersection ID #11. Route 28/Broad Street & North Avenue (traffic signal)

Manual TMCs were conducted on Tuesday, April 5, 2022, between 6:00 – 10:00 AM and 3:00 – 7:00 PM at the following study intersections. The PHF and HV% were based on existing counts.

- Intersection ID #4. Summit Avenue & South Avenue (traffic signal)

- Intersection ID #5. South Avenue & Boulevard (STOP control)
- Intersection ID #6. South Avenue & Lot #3 East Driveway (STOP control)
- Intersection ID #12. North Avenue & Elm Street (traffic signal)

TMC data for the following intersections were based on the *Proposed Mixed-Use Development Traffic & Parking Assessment Report*, prepared by Stonefield Engineering (April 26, 2022). Traffic counts for these intersections were conducted on Thursday, October 21, 2021, from 7:00 – 9:00 AM and 4:00 – 7:00 PM.

- Intersection ID #9. North Avenue & Clark Street (STOP control)
- Intersection ID #10. Clark Street & Ferris Place (STOP control)

Saturday

Manual TMCs were conducted on Saturday, June 18, 2022, between 11:00 AM – 2:00 PM at the following study intersections. The PHF and HV% were based on existing counts. The traffic counts are included in **Appendix B**.

Additionally, the TMC data for one (1) intersection (North Avenue & Clark Street) was based upon data from the *Proposed Mixed-Use Development Traffic & Parking Assessment Report*, prepared by Stonefield Engineering (April 26, 2022). The traffic count for this intersection was conducted on Saturday, October 16, 2022, from 11:00 AM – 2:00 PM. **Figure 1** illustrates the study intersections.

- Intersection ID #1. Crossway Place/Scotch Plains Avenue & South Avenue (traffic signal)
- Intersection ID #2. Broad Street & South Avenue (traffic signal)
- Intersection ID #3. Route 28 & South Avenue (Yield control roundabout)
- Intersection ID #4. Summit Avenue & South Avenue (traffic signal)
- Intersection ID #5. South Avenue & Boulevard (STOP control)
- Intersection ID #6. South Avenue & Lot #3 East Driveway (STOP control)
- Intersection ID #7. Ross Place & Central Avenue & South Avenue (traffic signal)
- Intersection ID #8. Crossway Place/Edgewood Avenue & North Avenue (traffic signal)
- Intersection ID #9. North Avenue & Clark Street (STOP control) ⁴
- Intersection ID #10. Clark Street & Ferris Place (STOP control)
- Intersection ID #11. Route 28/Broad Street & North Avenue (traffic signal)
- Intersection ID #12. North Avenue & Elm Street (traffic signal)
- Intersection ID #13. Central Avenue & North Avenue (traffic signal)
- Intersection ID #14. Prospect Street & Broad Street (STOP control)
- Intersection ID #15. Elm Street & Broad Street (traffic signal)
- Intersection ID #16. Central Avenue & Broad Street (traffic signal)
- Intersection ID #17. Broad Street & Mountain Avenue (traffic signal)

⁴ Per the *Proposed Mixed-Use Development Traffic & Parking Assessment Report*, prepared by Stonefield Engineering, dated April 26, 2022

Additional data was collected at existing site driveways to the parcels where the proposed development will occur. These volumes were used to estimate the amount of traffic generated by the existing parcels.

- North Avenue & L&T Parking Lot (west of Clark Street) (STOP control)
- North Avenue & L&T Parking Lot (east of Charles Street) (STOP control)
- North Avenue & Columbia Bank Driveway (STOP control)
- North Avenue & Limani Seafood Grill Driveway (STOP control)
- North Avenue & Verizon Driveway (STOP control)
- South Avenue & Lot #3 Driveway west of Summit Avenue Driveway (STOP control)

Figure 2 presents the existing peak hour background traffic volumes during the weekday AM and PM peak hours and Figure 3 presents the existing Saturday Middy peak hour.

FUTURE BACKGROUND TRAFFIC

Future background traffic conditions are defined as expected traffic conditions on the roadway network in the year 2027 without the construction of the proposed redevelopment. Future background traffic volumes used in the analysis are the sum of the existing traffic, an additional amount of traffic generated by growth in the study area, and committed development traffic in the Town of Westfield. Additionally, since the Lord & Taylor building (~143,000 square feet) could be re-occupied with another department store as an “as-of-right” use, these trips were also included as background traffic and the analysis was used as the reference point for which the proposed redevelopment was compared. Figure 4 presents the 2027 peak hour background traffic volumes during the weekday AM and PM peak hours and Figure 5 presents the Saturday Middy peak hour.

Background Area Growth

A background growth rate was applied to existing traffic volumes to project traffic volumes in the year 2027. The growth rate was developed based on the sociodemographic projections from the North Jersey Transportation Planning Authority (NJTPA) for 2035 along with NJTPA’s regional travel model (North Jersey Regional Transportation Model Enhanced) as documented in the *Town of Westfield Unified Land Use + Circulation Element (ULUC)*, June 2021. A compounded annual growth rate (CAGR) of 0.26 percent (0.26%) per year between 2021 and 2027 or 2022 and 2027 was applied to the existing traffic volumes.

Committed Development

The *Town of Westfield ULUC* (June 2021) created a Buildout Analysis, which was intended to show how development could affect the downtown as a whole and different areas of the downtown in particular. The following committed development projects were included in the analysis and can be found in [Appendix C](#).

- The Parker (439 West Broad St)
 - 31-dwelling units
- The Bentley (501 South Ave West)
 - 30-dwelling units and 7,055 sf of retail/restaurant
- 409 Westfield Avenue (adjacent to “Roots Building”)

- 3-dwelling units and 2,100 sf of restaurant
- Former Jolly Trolley (411 North Ave West)
 - 20-dwelling units and 1,200 sf of restaurant
- Flatiron Building (44 Elm St)
 - 2-dwelling units and 1,300 sf of retail/restaurant
- 226 North Avenue West
 - 4-dwelling units and 5,070 sf of retail/restaurant
- 333 Central Avenue
 - 70-dwelling units
- Savannah Condos (111 Prospect St)
- 53-dwelling units
- The Sophia (located in the southwest corner of Prospect Street & Ferris Place, also designated as Block 2504, Lot 12, 13, and 13 as depicted on the Township of Westfield Tax Map)
 - 64-dwelling units and 500 square feet of first-floor retail space
- Westfield Crossing (located at South Avenue, Block 3307, Lots 1 and 2)
 - 193-dwelling units
- Adoni Property Group Development (located along the south side of North Avenue in the vicinity of Euclid Avenue)
 - 30-dwelling units
- Needle Point Homes Development (located along the south side of North Avenue in the vicinity of Euclid Avenue)
 - 15-dwelling units

Lord & Taylor As-of-Right Use

Trip generation calculations for the Lord & Taylor as-of-right use were performed using the Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 11th Edition*. The trip generation for the department store as-of-right use was estimated using ITE Land Use Code (LUC) 875 (Department Store) for the weekday AM and PM peak hours and Saturday Midday peak hour. The trip generation for the as-of-right use was projected to be 64 new trips during the AM peak hour, 211 trips during the PM peak hour, and 378 trips during the Saturday Midday peak hour. The detailed worksheets are included in [Appendix E](#).

PROJECT TRAFFIC

Project traffic used in this analysis is defined as:

- the redistribution of vehicle trips associated with the commuter parking lots being redeveloped;
- vehicle trips expected to be generated by the project; and
- the distribution and assignment of that traffic over the study roadway network.

Public Parking Lots

The proposed redevelopment will modify how the surface parking lots exist today, which will impact users such as Commuters, Employees, and Shoppers. It is anticipated that as part of this redevelopment, the Town will construct two (2) public garages; one (1) in the North Zone, located at the southwest corner of North Avenue/Route 28 & Central Avenue, and one (1) in the South Zone, located at the northwest corner of South Avenue & Summit Avenue.

Inventory and Access

The North Zone consists of Lot 2, which is Pay Station Parking: Maximum of 4 hours, and Lot 8, which is a combination of Permit Parking for Employees and Commuters, and Reserved Business Parking (for the existing businesses located in this area and their customers/Shoppers).

The South Zone consists of Lot 3, which is a combination of Permit Parking for Commuters and 12-Hour Parking: Numbered Spaces.

The number of existing parking spaces/supply has been compiled based on recent data collection efforts in April 2022 and the *Town of Westfield Public Parking Plan* (dated September 20, 2022, as developed by THA).

Parking will be modified for Lot 2 and Lot 8 in the North Zone and for Lot 3 in the South Zone. The *Westfield Public Parking Plan* includes both Primary and Contingency strategies to replace the parking spaces being displaced as part of the redevelopment. Per Town staff, it is intended that the number of commuter parking spaces in the North Zone and South Zone will be replaced one-for-one within the Town.

The redevelopment site access to the lots in the North Zone and South Zone is summarized below.

- North Zone: North Avenue & Elm Street – existing signalized full-access driveway
- North Zone: North Avenue & Limani Seafood Grill Driveway – existing ingress only driveway
- North Zone: North Avenue & Verizon Driveway – existing full-access driveway
- North Zone: North Avenue & west of Central Avenue Driveway – proposed right-in/right-out (RIRO) only driveway
- South Zone: South Avenue & Lot 3 East Driveway – existing full-access driveway
- South Zone: South Avenue & Summit Avenue – existing signalized full-access driveway

As part of the redevelopment, the current site plan (**Appendix A**) indicates the net change of commuter/public parking spaces/supply within the North Zone and South Zone. There are on-going discussions between the Town and the Applicant regarding the future number of commuter parking spaces in these areas.

The Town provided geodata to review the origin-destination (O-D) data for the commuter lot permits located at Lot 8, which is in the North Zone (south of North Avenue) and Lot 3, which is in the South Zone (north of South Avenue). The information was used to determine potential travel routes between those origins and the commuter lots. Based upon the geodata for Lot 8 (North Zone), approximately 57 percent (57%) of the trips are coming to/from the residential areas south of the tracks and 43 percent (43%) of the trips are coming to/from the residential areas north of the tracks. Based upon the geodata for Lot 3 (South Zone), approximately 10 percent (10%) of the trips are coming to/from the residential areas south of the tracks and 90 percent (90%) of the trips are coming to/from the residential areas north of the tracks. The distribution for commuter trips associated with Lot 8 (North Zone) and Lot 3 (South Zone) are illustrated in [Figure 4](#) and [Figure 5](#), respectively. The geodata was utilized to understand the routes commuters may travel between the train station and their home. The general distribution for Lot 8 (North Zone) and Lot 3 (South Zone) for commuter travel patterns is shown in [Appendix D](#).

Weekday

A comparison of recent parking occupancy data and data collected previously on Tuesday, June 6, 2019, as part of the *Town of Westfield Master Plan Re-Examination Parking Planning Plan Element* (November 2019) was performed to understand the current trend in parking occupancy due to the ongoing effects of the COVID-19 pandemic. Recent parking occupancy data collected for Lot 2, Lot 3, and Lot 8 occurred on Tuesday, April 5, 2022, from 10:00 AM to 8:00 PM and was collected at 2-hour intervals to be consistent with the previous data collection efforts. Overall, the parking occupancy trended lower in April 2022 between 10:00 AM and 4:00 PM, while the parking occupancy at 6:00 PM was very similar to the previous data collected and the parking occupancy at 8:00 PM was higher. The data comparison for Lot 2, Lot 3, and Lot 8 is shown in [Appendix D](#).

On the same day of the parking occupancy data collection efforts (Tuesday, April 5, 2022), TMCs were collected at the individual commuter parking lot driveways (Lot 2, Lot 3, and Lot 8) to understand the number of commuter and public trips being generated currently. The TMCs were collected from 6:00 AM – 10:00 AM and 3:00 PM – 7:00 PM. The data utilized in this study was 7:00 AM – 8:00 AM and 5:00 PM – 6:00 PM to be consistent with the analysis time period for other data collection efforts associated with this project. Since the parking occupancy trended lower when compared between post-pandemic (April 2022) and pre-pandemic (June 2019), the TMCs at the individual commuter parking lots were scaled by a factor of 1.11 for both AM and PM peak hours to adjust the volumes to pre-pandemic levels. This factor represented the average difference in parking occupancy among the data collection intervals between 10:00 AM and 6:00 PM.

To account for the redevelopment of public parking lot spaces, the TMCs at the individual commuter parking lot driveways were scaled accordingly. The additional trips associated with the increase in commuter parking spaces in the North Zone were evenly split between the residential areas located north and south of the railroad tracks as shown in [Figure 6](#) and [Figure 7](#). The net change in trips associated with the decrease in commuter parking spaces in the South Zone were removed from the driveways and study area intersections based upon the geodata provided by the Town and the routes commuters may travel between the train station and their home as shown in [Figure 8](#). The calculation of the TMCs at the individual commuter parking lot driveways with the factors described above is included in [Appendix D](#).

Saturday

Trips being generated to/from the commuter lots on a Saturday were assumed to remain unchanged in the build conditions since the number of available parking spaces in these lots will be similar to or greater than the existing conditions. Additionally, the user of these parking spaces on a weekend is associated more with public use versus commuter use. In the build conditions, the assignment of these trips may be redistributed to another site driveway due to the reconfiguration of the site driveways (e.g., North Avenue & Columbia Bank Driveway (right-out only driveway located east of North Avenue & Elm Street) trips were redistributed to North Avenue & Elm Street).

Project Access

Based upon the concept plan provided in [Appendix A](#), access to the proposed redevelopment (by zone) is listed below. Each of the site access points should be coordinated with the approving jurisdiction.

- West Zone – Multifamily Residential: Access will be provided by one (1) left-in and left-out-access driveway located along Ferris Place, east of Clark Street. Ferris Place is a one-way in the southbound direction.
- West Zone – Office Building & Multifamily Residential: Access will be provided by two (2) full-access driveways along North Avenue/CR 610, west of Clark Street and east of Charles Street.
 - The existing Lord & Taylor driveway along North Avenue, immediately east of Charles Street, will be closed and the other two (2) existing accesses will remain.
- West Zone – Townhouses: Access will be provided by one (1) full-access driveway located along Clark Street, north of North Avenue/CR 610.
- North Zone: Access will be provided by one (1) full-access driveway at the signalized intersection of North Avenue/Route 28 & Elm Street and one (1) RIRO only driveway proposed along North Avenue/Route 28, west of Central Avenue.
 - The intersection of North Avenue/Route 28 & Columbia Bank Driveway (right-out only driveway) will be closed and the other two (2) existing accesses along North Avenue/Route 28 near the Verizon store will remain.
- South Zone: Access will be provided by one (1) full-access driveway at the existing signalized intersection of South Avenue & Summit Avenue, one (1) right-out only driveway proposed along South Avenue, east of Summit Avenue, and one (1) existing full-access driveway that is proposed to be signalized along South Avenue, west of Central Avenue.
 - The existing site driveway at the intersection of South Avenue & Boulevard is anticipated for non-vehicular modes of travel (e.g., pedestrian, bicycle, scooter, etc.), emergency vehicles, and delivery vehicles during events at this plaza. This access is not intended to be primary access for passenger vehicles.
 - The existing site driveway at the intersection of South Avenue & Lot 3 East Driveway is proposed to be signalized to better facilitate vehicles associated with the office buildings to utilize this access over the access at Summit Avenue. Utilizing this additional access will improve the operational efficiency of vehicles accessing the public parking garage and for pick-up/drop-off of passengers at the train station.

The traffic circulation, pick-up/drop-off locations, parking garage access and operations, bicycle parking, etc. within the North Zone and South Zone are continuing to evolve in coordination with the Town.

Trip Generation

Trip generation calculations for the proposed redevelopment were performed using the ITE *Trip Generation Manual, 11th Edition*, and NJDOT's Highway Access Permit System (HAPS) which is based upon the ITE's *Trip Generation Manual, 10th Edition*. The trip generation for the proposed redevelopment was estimated using ITE Land Use Code (LUC) 215 (Single-Family Attached Housing), 221 (Multifamily Housing Mid-Rise), 710 (General Office Building), 720 (Medical-Dental Office), 822 (Strip Retail Plaza <40ksf), and 931 (Fine Dining Restaurant)⁶ for the weekday AM and PM peak hours and Saturday Midday peak hour. The multifamily residential units in the West Zone and North Zone include affordable housing and/or age restricted (55+) units. However, as a conservative approach, the residential trip generation rates for LUC 221 (Multifamily Housing Mid-Rise) were used since these rates are higher than the rates for LUC 223 (Affordable Housing) and LUC 252 (Senior Adult Housing – Multifamily).

For the commercial retail land uses within the redevelopment, the trip generation was based upon "Street Retail" (LUC 822) and Restaurant (LUC 931). These land uses were chosen to be consistent with the land use types identified in the *Shared Parking Analysis Technical Memorandum*, prepared by DESMAN (July 28, 2021). Street Retail was defined as traditional goods and services.

Multimodal Reduction

A multimodal (e.g., public transit, bicycle, pedestrian, worked at home, etc.) factor was identified based on US Census *Means of Transportation to Work* data for Census Tract 366 and *Transit Friendly Planning – A Guide for New Jersey Communities*. The Census Tract 366 data indicated approximately 2.2 percent (2.2%) walked and 6 percent (6%) worked at home for the 2019 5-Year Estimates. Per the *Transit Friendly Planning – A Guide for New Jersey Communities*, the percent reduction at a 'Town Center' for office use is 25 percent (25%), commercial use is 20 percent (20%), and residential use is 30 percent (30%).

It is projected that a portion of employees, residents, and visitors will choose to walk, bike, or take public transit to the proposed redevelopment due to the availability/planned availability of sidewalks and bicycle facilities, NJ TRANSIT bus routes (Route 59 and Route 113) in the vicinity, and the proximity of the Westfield Train Station (Raritan Valley Line). Per the NJ TRANSIT website, the Raritan Valley Line provides weekday service from High Bridge, Raritan, and Plainfield to Newark Penn Station, with trains extended to/from New York during midday and evening hours. On weekends and holidays, service operates between Raritan and Newark Penn Station, with connecting service to/from New York. Between 6:30 AM and 9:30 AM, there are seven (7) trains heading towards NYC which stop in Westfield and three (3) trains heading toward Raritan which stop in Westfield. Between 4:00 PM and 7:30 PM, there are five (5) trains heading toward NYC and six (6) trains heading toward

⁶ The ITE's *Trip Generation Manual, 10th Edition*, LUC 931 is Quality Restaurant.

Raritan. There are 13 stops between High Bridge and Westfield and seven (7) stops between Westfield and New York Penn Station. The municipalities located in New Jersey with a stop along the Raritan Valley Line (excluding Hoboken), west and east of Westfield, have a combined working age (18+) population of approximately 465,000 people (Source: US Census Bureau, Census 2020). This data supports the use of NJ TRANSIT train trips.

The general office (LUC 710) and residential (LUC 215 and LUC 221) land uses utilized the setting/location of “dense multi-use urban” and land use subcategory of “close to rail transit,” if these variables were provided in the ITE *Trip Generation Manual, 11th Edition*. The trip generation rates provided by ITE when using these variables already considers the effect of non-vehicular modes of transportation; thus, a separate multimodal factor was not applied for these land uses. It should be noted that the trip generation for the North Zone Lofts Residential and Retail was based upon NJDOT’s HAPS since this portion of the redevelopment will directly access a State roadway and will need to follow NJDOT methodology. The HAPS data does not provide the setting/location and land use subcategory variables; thus, the previously described multimodal factors were applied to the residential and retail uses in the North Zone. Additionally, ITE does not provide the setting/location and land use subcategory variables for the medical office (LUC 720) and commercial retail land uses (LUC 822 and LUC 931). Therefore, the general urban/suburban setting/location variable was utilized along with applying the previously described multimodal factors.

The ITE *Trip Generation Manual, 11th Edition*, LUC 215 (Single-Family Attached Housing) and LUC 221 (Multifamily Housing Mid-Rise) do not include trip rates for a Saturday time period with “dense multi-use urban” as the Setting/Location. Thus, the trip rate for the Saturday time period was proportioned by using the average trip rate of the weekday AM and PM peak hour of adjacent street with “dense/multi-use urban” over the trip rate of the weekday AM and PM peak hour of adjacent street with “general urban/suburban”. Then, the calculated average trip rate for the AM and PM peak hour of adjacent street was multiplied by the Saturday average rate with “general urban/suburban” as the Setting/Location to determine the trip rate for the Saturday time period with “dense multi-use urban.” The calculations for the Saturday trip rate under “dense multi-use urban” are included in [Appendix E](#).

The following multimodal factors were applied to the different land uses based upon a combination of the sources identified above.

- Residential Multimodal Factor (for North Zone Lofts Residential only): 38.2 percent (38.2%) (combination of walking (2.2%), working at home (6%), and taking public transit (30%))
- Retail Multimodal Factor: 22.2 percent (22.2%) (combination of walking (2.2%) and taking public transit (20%))
- Medical Office Multimodal Factor: 33.2 percent (33.2%) (combination of walking (2.2%), working at home (6%), and taking public transit (25%))

Internal Capture and Community Capture

A portion of the trips generated by the proposed redevelopment is expected to be captured internally within each zone. Internal capture trips for each zone were determined based upon the methodology contained in the ITE's, *Trip Generation Handbook, 3rd Edition* for the weekday AM and PM peak periods. The Saturday Midday peak period was based upon the PM peak period rates and the three (3) time periods are summarized in **Table 1**.

Table 1. Internal Capture Rates

Time Period	West Zone	North Zone	South Zone
AM Peak Hour	7.3%	13.3%	8.0%
PM Peak Hour	13.4%	18.2%	6.3%
Saturday Midday Peak Hour	16.5%	14.8%	16.3%

A community capture rate of 6.07 percent (6.07%) during the weekday AM peak hour and 7.37 percent (7.37%) during the weekday PM peak hour was applied to account for trips between the three (3) zones and the downtown area (residences, places of employment, and businesses). The Saturday Midday peak hour community capture rate was based upon an average of the weekday AM and PM peak hours, which is calculated to 6.72 percent (6.72%). The weekday AM and PM peak hours community capture rates were based upon the Mixed-Use Trip Generation Model ITE/EPA documented in the *Town of Westfield ULUC* (June 2021).

Pass-by Capture

Pass-by trips represent site patrons who would already be traveling along study roadways whose primary destination is somewhere other than the site. The pass-by rates were applied only to the retail land uses and were based upon the NJDOT's approved passed-by rates, which are based upon the ITE's, *Trip Generation Handbook, 3rd Edition*. The average pass-by rate for the retail land use is 34 percent (34%) and the restaurant land use is 44 percent (44%) during the weekday AM and PM peak hours and Saturday Midday peak hour. However, as a conservative analysis for the restaurant land use, the pass-by rate of 10 percent (10%) was utilized instead of the 44 percent (44%)

Net, New Project Trips

Net, new project trips are equal to the gross project trips minus the multimodal reduction factor, internal/community capture, and pass-by capture. The net, new project trips represent the additional vehicles on the roadway network. The project's trip generation for the entire redevelopment during the weekday AM and PM peak hours and Saturday Midday peak hour is shown in **Table 2**. As shown in **Table 2**, the proposed redevelopment is expected to generate 370 net, new trips during the weekday AM peak hour, 479 net, new trips during the weekday PM peak hour, and 271 net, new trips during the Saturday midday peak hour. The detailed worksheets are included in **Appendix E**.

Table 2. Proposed Net, New Trip Generation

Land Use (ITE Code)	Scale	AM Peak Hour			PM Peak Hour			Saturday Midday Peak Hour		
		Net External Trips	Entering Trips	Exiting Trips	Net External Trips	Entering Trips	Exiting Trips	Net External Trips	Entering Trips	Exiting Trips
West Zone										
Single-Family Attached Housing (215) ¹	16 dus	6	2	4	3	2	1	4	2	2
Multifamily Housing (Mid-Rise) (221) ²	138 dus	31	5	26	23	18	5	23	12	11
Single-Family Attached Housing (215) ³	16 dus	6	2	4	3	2	1	4	2	2
General Office Building (710) ⁴	40,000 sf	49	43	6	37	6	31	7	1	6
Medical-Dental Office Building (720) ⁵	60,000 sf	92	73	19	144	42	102	109	62	47
Strip Retail Plaza (822) ⁶	2,500 sf	3	2	1	8	4	4	3	2	1
Fine Dining Restaurant (931) ⁷	10,800 sf	4	3	1	40	31	9	37	23	14
West Zone Net, New Project Trips		191	130	61	258	105	153	187	104	83
North Zone										
Multifamily Housing (Mid-Rise) (221) ⁸	35 dus	6	2	4	6	4	2	7	4	3
Quality Restaurant (931) ⁹	2,100 sf	5	3	2	9	6	3	14	9	5
North Zone Net, New Project Trips		11	5	6	15	10	5	21	13	8
South Zone										
General Office Building (710) ¹⁰	210,000 sf	159	142	17	166	27	139	32	2	30
Strip Retail Plaza <40ksf (822) ¹¹	9,000 sf	8	5	3	29	14	15	23	11	12
Fine Dining Restaurant (931) ¹²	3,000 sf	1	1	0	11	8	3	8	5	3
South Zone Net, New Project Trips		168	148	20	206	49	157	63	18	45
Total Net, New Project Trips		370	283	87	479	164	315	271	135	136

¹ Multimodal Factor – ITE *Trip Generation Manual, 11th Edition* Setting/Location of dense multi-use urban | Community Capture
² Multimodal Factor – ITE *Trip Generation Manual, 11th Edition* Setting/Location of dense multi-use urban and land use subcategory of close to rail transit | Community Capture
³ Multimodal Factor – ITE *Trip Generation Manual, 11th Edition* Setting/Location of dense multi-use urban | Community Capture
⁴ Multimodal Factor – ITE *Trip Generation Manual, 11th Edition* Setting/Location of dense multi-use urban | Community Capture
⁵ Multimodal Factor – NJ TRANSIT and Means of Transportation to Work | Community Capture
⁶ Multimodal Factor – NJ TRANSIT and Means of Transportation to Work | Community Capture | Pass-By
⁷ Multimodal Factor – NJ TRANSIT and Means of Transportation to Work | Community Capture | Pass-By
⁸ NJDOT’s HAPS | Multimodal Factor – NJ TRANSIT and Means of Transportation to Work | Community Capture
⁹ NJDOT’s HAPS | Multimodal Factor – NJ TRANSIT and Means of Transportation to Work | Community Capture | Pass-By
¹⁰ Multimodal Factor – ITE *Trip Generation Manual, 11th Edition* Setting/Location of dense multi-use urban | Community Capture
¹¹ Multimodal Factor – NJ TRANSIT and Means of Transportation to Work | Community Capture | Pass-By
¹² Multimodal Factor – NJ TRANSIT and Means of Transportation to Work | Community Capture | Pass-By

For comparison purposes, **Table 3** summarizes the Project’s trip generation projections versus the as-of-right Department Store use⁸. As shown in **Table 3**, the Project is expected to generate an additional 310 net, new trips during the weekday AM peak hour, an additional 282 net, new trips during the weekday PM peak hour, and a reduction of 82 net, new trips during the Saturday Midday peak hour compared to the trip generation potential if a new department store re-occupied the Lord & Taylor building.

Table 3. Proposed Net, New Project Trips for Lord & Taylor

Land Use (ITE Code)	Scale	AM Peak Hour			PM Peak Hour			Saturday Midday Peak Hour		
		Net External Trips	Entering Trips	Exiting Trips	Net External Trips	Entering Trips	Exiting Trips	Net External Trips	Entering Trips	Exiting Trips
<i>Previously Approved Development</i>										
Department Store (875) ¹	143,836 sf	60	38	22	197	99	98	353	187	166
<i>Proposed Development</i>										
Proposed Development ²		370	283	87	479	164	315	271	135	136
Total Net, New Project Trips		+310	+245	+65	+282	+65	+217	-82	-52	-30

¹ Multimodal Factor – NJ TRANSIT and Means of Transportation to Work | Community Capture

² Total Net, New Project Trips of the Proposed Development as shown in **Table 2**.

⁸ Retail, as defined in the Town Code, is a permitted use for the existing 143,836 sf building. ITE data indicates that general retail space generates traffic at a higher rate than department store space. Even though the existing building could be legally reoccupied for general retail businesses (which would generate more traffic), to provide a conservative analysis, the trip generation potential for the existing building was based on the lower, department-store rates.

Trip Distribution and Assignment

Site generated trips were assigned to the study area intersections based upon the existing roadway network surrounding the site, proposed site access, and a review of the nearby municipal populations. Primary trip distribution percentages were calculated using a gravity model, dividing each surrounding municipality’s population (US Census Bureau, Census 2010) by the squared distance from the center of the municipality to the proposed site. Google Maps was used to identify routes vehicles may take to and from the project site. Reviewing aerial views of the surrounding municipalities revealed areas of high concentrations of housing units. Routes were traced from those areas to the project site with an emphasis on minimizing distance, travel time, and delays due to potential traffic congestion or traffic control.

The distribution of pass-by trips and subsequent assignment to the road network was based upon the existing directional distribution of trips on study roadways during each period of study. The distributions are summarized in **Table 4**.

Table 4. Distribution Percentages

Directions (To/From)	Primary Trip Percentage	Pass-By Trip Percentage
North via Mountain Avenue	10%	--
North via Broad Street	10%	--
South via Scotch Plains Avenue	10%	--
South via Summit Avenue	5%	--
South via Central Avenue	25%	--
East via North Avenue	15%	50% ¹
East via South Avenue	10%	
West via North Avenue	10%	50% ¹
West via South Avenue	5%	

¹ The pass-by trip distribution for the West Zone and South Zone To/From the West is 50% and To/From the East is 50%.

The project’s net, new trip distribution and trip assignment during the weekday AM and PM peak hours and Saturday Midday peak hour for each zone/redevelopment area are presented in the following figures:

- **Figure 16 to Figure 18:** West Zone Residential (Int. ID# 21)
- **Figure 19 to Figure 21:** West Zone Office, Residential, and Retail (Int. ID# 19 & 20)
- **Figure 22 to Figure 24:** West Zone Townhouses (Int. ID# 22)
- **Figure 25 to Figure 27:** North Zone Residential Lofts and Retail (Int. ID# 12 & 23)

- **Figure 28 to Figure 30:** South Zone Office and Retail (Int. ID# 4, 5, 6 & 18)
- **Figure 31 to Figure 32:** Site Generated

Figure 33 and **Figure 34** present the total traffic conditions, which is defined as the expected traffic conditions in the year 2027 after the opening of the project for the weekday AM and PM peak hours and Saturday Midday peak hour, respectively.

CAPACITY ANALYSIS

Capacity analyses were performed for the AM and PM peak hours at the study intersections to determine the operating characteristics at the signalized and unsignalized intersections of the adjacent street network and to evaluate the impacts of the proposed redevelopment. These analyses were performed according to the methodologies contained in the *Highway Capacity Manual (HCM)*, 6th Edition, using Synchro Version 11 software. HCM 6th Edition Two-Way Stop Controlled (TWSC) procedures were used to analyze the operations at the unsignalized intersections. The Synchro program was used to analyze the operations at the signalized intersections. SIDRA roundabout analysis software was used to evaluate the operating conditions of the roundabout at Route 28 & South Avenue. Capacity is defined as the maximum number of vehicles that can pass over a particular road segment, or through a particular intersection, within a specified period of time under prevailing operational, geometric, and controlling conditions within a set time duration.

The HCM defines Level of Service (LOS) as a “quantitative stratification of a performance measure or measures representing the quality of service” and is used to “translate complex numerical performance results into a simple A-F system representative of travelers’ perceptions of the quality of service provided by a facility or service”. The HCM defines six levels of service, LOS A through LOS F, with A having the best operating conditions from the traveler’s perspective and F having the worst. However, it must be understood that “the LOS letter result hides much of the complexity of facility performance”, and that “the appropriate LOS for a given system element in the community is a decision for local policy makers”. According to the HCM, “for cost, environmental impact, and other reasons, roadways are typically designed not to provide LOS A conditions during peak periods but instead to provide some lower LOS that balances individual travelers’ desires against society’s desires and financial resources. Nevertheless, during low-volume periods of the day, a system element may operate at LOS A.”

LOS for a two-way stop-controlled (TWSC) intersection is determined by the control delay at the side-street approaches. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. With respect to field measurements, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue to the time the vehicle departs from the stop line. It is typical for stop sign-controlled side streets and driveways intersecting major streets to experience long delays during peak hours, particularly for left-turn movements. The majority of the traffic moving through the intersection on the major street experiences little or no delay. The LOS thresholds for unsignalized intersections are summarized in **Table 5**.

LOS for signalized intersections is reported for the intersection as a whole and for the individual movements and approaches. One or more movements at an intersection may experience a low level-

of-service, while the intersection as a whole may operate acceptably. The LOS thresholds for signalized intersections are summarized in **Table 6**.

Table 5. Level of Service Control Delay Thresholds for Unsignalized Intersections

Level of Service	Average Control Delay per Vehicle (sec/veh)	
A	≤ 10	Short Delays
B	> 10 – 15	
C	> 15 – 25	
D	> 25 – 35	Moderate Delays
E	> 35 – 50	
F	> 50	Long Delays

Table 6. Level-of-Service Control Delay Thresholds for Signalized Intersections

Level of Service	Average Control Delay per Vehicle (sec/veh)
A	≤ 10
B	> 10 – 20
C	> 20 – 35
D	> 35 – 55
E	> 55 – 80
F	> 80

Capacity analyses were performed for the following traffic condition scenarios:

- Existing Traffic Conditions
- 2027 No-Build Conditions (Build-out year without proposed development but with occupied Lord & Taylor with as-of-right Department Store use)
- 2027 Build Conditions (Build-out year with proposed development)
- 2027 Build Conditions + Mitigation (Build-out year with proposed development)

Traffic signal timing information and data were obtained from multiple sources for the signalized intersections, which were used in the development of the no-build and build-out conditions Synchro network. Capacity analysis reports generated by Synchro Version 11 software are included in **Appendix F** for Existing Conditions, 2027 No-Build Conditions, 2027 Build Conditions, and 2027 Build + Mitigation Conditions.

Per the *New Jersey Administrative Code 16:47, Appendix F*, movements at signalized intersections accessing a State Highway (e.g., Route 28) that operate at LOS E or better in the No-Build condition may experience an increase in delay of up to 25 percent (25%) of the difference between the No-Build delay and maximum delay considered LOS E (80 seconds for signalized and 50 seconds for unsignalized). No increase in volume-to-capacity (v/c) ratio is permitted for movements operating at LOS F under the no-build conditions.

According to the Land Development Standards of [Union County](#), the County references the ITE's *Traffic Access and Impact Studies for Site Development* resource, which indicates that the intersection LOS should be LOS D and that any intersection which currently operates worse than LOS D should require mitigation back to the non-project operating conditions.

Per the *Town of Westfield ULUC* (June 2021), *Appendix A*, "an intersection with an overall LOS D or lower is generally considered as operating acceptably, while LOS E and F indicate conditions that are at or above capacity and experience excessive delays. However, it is critical to understand the limitations of using LOS as a performance metric. As an auto-oriented metric, LOS does not fully describe the value and function of a street or intersection that needs to serve multiple users – including pedestrians, bicyclists, and transit users – and is often at odds with community goals related to walkability, place-making, and urban design. Even the Highway Capacity Manual emphasizes that LOS is a part of a bigger picture and neither LOS nor any other single performance measure tells the full story of roadway performance. Furthermore, there is growing recognition that a certain level of congestion is acceptable, particularly in vibrant transit-friendly communities, and that congestion mitigation must be balanced with Westfield's other multimodal travel and community goals."

The 95th percentile queue length, provided via Synchro, is defined as the queue length that has only a 5 percent (5%) probability of being exceeded during the analysis time period. The mean queue length is a more accurate characterization of what the average driver would experience.

Existing Conditions

The existing conditions analyses were based on the existing traffic volumes with existing lane use and traffic controls at the study area intersections. The PHF for the existing conditions was 0.92 for the AM and PM peak hours. The PHF for the Saturday Midday peak hour was based upon the TMC data collected. The results of the existing intersection capacity analyses are summarized in **Table 7** for Existing AM peak hour, **Table 8** for Existing PM peak hour, and **Table 9** for Existing Saturday Midday peak hour attached to this memorandum. Analysis results show the level of service and delay information for each movement, approach, and overall intersection. **Appendix F** includes the intersection capacity analysis worksheets.

For the intersection of North Avenue & Clark Street, field data collected and utilized as part of the intersection analysis for The Sophia project was incorporated into the analysis for this project. In addition to the TMC data collected, vehicular gap acceptance observations and data were collected during the AM, PM, and Saturday peak periods to determine local operator characteristics at this intersection. This information was utilized to determine the critical gap, which is the minimum time-gap in traffic that a motorist will accept to complete a turning movement. The gap acceptance analysis indicated that left-turning vehicles require a critical gap of 4.4 seconds and right-turning vehicles require a critical gap of 4.3 seconds. These values were utilized in the unsignalized intersection capacity analyses for this intersection.

During the weekday AM and PM peak hours and Saturday Midday peak hour, the signalized intersections in the study area study intersections operate at an overall intersection LOS C or better. However, there are individual movements that perform at LOS E or LOS F at the following intersections.

- Intersection ID #1. Crossway Place/Scotch Plains Avenue & South Avenue
 - Southbound left-turn movement during the AM peak hour
- Intersection ID #3. Route 28 & South Avenue
 - Eastbound approach during the AM peak hour
- Intersection ID #4. Summit Avenue & South Avenue
 - Northbound left-turn movement and approach during the AM peak hour
- Intersection ID #9. North Avenue & Clark Street
 - Southbound left-turn movement during the PM peak hour
- Intersection ID #14. Prospect Street & Broad Street
 - Northbound approach during the AM and PM peak hours and Saturday Midday peak hour
 - Southbound approach during the PM peak hour
- Intersection ID #17. Broad Street & Mountain Avenue
 - Eastbound left-turn movement during the AM peak hour
 - Westbound approach during the PM peak hour

2027 No-Build Conditions

The 2027 no-build conditions analyses were based on the future no-build traffic volumes with occupied Lord & Taylor with as of-right Department Store use with existing lane use and traffic controls at the study area intersections. The PHF for the 2027 no-build conditions was 0.95 for the AM and PM peak hours. The PHF for the Saturday Midday peak hour was based upon the TMC data collected. The results of the 2027 no-build intersection capacity analyses are summarized in **Table 7** for No-Build AM peak hour, **Table 8** for No-Build PM peak hour, and **Table 9** for No-Build Saturday Midday peak hour attached to this memorandum. Analysis results show the level of service and delay information for each movement, approach, and overall intersection. **Appendix F** includes the intersection capacity analysis worksheets.

During the weekday AM and PM peak hours and Saturday Midday peak hour, the study intersections operate at an overall intersection LOS D or better, with the exception of the roundabout at Route 28 & South Avenue during the AM and PM peak hours. However, there are individual movements that perform at LOS E or LOS F at the following intersections.

- Intersection ID #1. Crossway Place/Scotch Plains Avenue & South Avenue
 - Southbound left-turn movement during the AM peak hour
- Intersection ID #3. Route 28 & South Avenue
 - Eastbound approach during the AM peak hour
- Intersection ID #4. Summit Avenue & South Avenue
 - Northbound left-turn movement and approach during the AM peak hour
- Intersection ID #7. Ross Place & Central Avenue & South Avenue
 - Northbound left-turn movement during the PM peak hour
 - Southbound left-turn movement during the Saturday Midday peak hour
- Intersection ID #9. North Avenue & Clark Street
 - Southbound left-turn movement and approach during the PM peak hour
- Intersection ID #11. Route 28/Broad Street & North Avenue
 - Northbound left-turn movement during the PM peak hour
- Intersection ID #13. Central Avenue & North Avenue
 - Northbound and westbound approaches during the PM peak hour
- Intersection ID #14. Prospect Street & Broad Street
 - Northbound approach during the AM and PM peak hours and Saturday Midday peak hour
 - Southbound approach during the PM peak hour
- Intersection ID #17. Broad Street & Mountain Avenue
 - Eastbound left-turn movement during the AM and PM peak hours
 - Westbound approach during the PM peak hour

2027 Build Conditions

Intersection capacity analyses were conducted for future build traffic volumes for the study area intersections in the year 2027. The future build conditions analyses were based on the future build traffic volumes with existing lane uses and traffic controls at the study area intersections. Peak hour factors and heavy vehicle percentages were the same as those used in the future no-build analyses.

The results of the 2027 build intersection capacity analyses are summarized in **Table 7** for Build AM peak hour, **Table 8** for Build PM peak hour, and **Table 9** for Build Saturday Midday peak hour attached to this memorandum. Analysis results show the level of service and delay information for each movement, approach, and overall intersection. **Appendix F** includes the intersection capacity analysis worksheets.

Under build-out conditions, the study intersections operate at an overall intersection LOS D or better, with the exception of the roundabout at Route 28 & South Avenue during the AM peak hour. The individual movements that perform at a LOS E or LOS F, a volume-to-capacity (v/c) greater than 1.0, or exceed *New Jersey Administrative Code 16:47, Appendix F*, operating thresholds at the intersections along a state highway are identified below.

- Intersection ID #1. Crossway Place/Scotch Plains Avenue & South Avenue
 - Southbound left-turn movement during the AM peak hour
- Intersection ID #3. Route 28 & South Avenue
 - Eastbound approach during the AM peak hour
- Intersection ID #4. Summit Avenue & South Avenue
 - Northbound left-turn movement and approach during the AM peak hour
- Intersection ID #6: South Avenue & Eastern South Site Driveway
 - Southbound left-turn movement and approach during the PM peak hour
- Intersection ID #7. Ross Place & Central Avenue & South Avenue
 - Northbound left-turn movement and approach during the AM peak hour and PM peak hour
 - Southbound left-turn during the PM peak hour and Saturday Midday peak hour
- Intersection ID #9. North Avenue & Clark Street
 - Southbound left-turn movement and approach during the AM and PM peak hours
- Intersection ID #11. Route 28/Broad Street & North Avenue
 - Northbound left-turn movement during the AM and PM peak hour
- Intersection ID #13. Central Avenue & North Avenue
 - Northbound and westbound approaches during the PM peak hour
- Intersection ID #14. Prospect Street & Broad Street
 - Northbound approach during the AM and PM peak hours and Saturday Midday peak hour
 - Southbound approach during the PM peak hour
- Intersection ID #16. Central Avenue & Broad Street
 - Eastbound through movement and approach during the PM peak hour
- Intersection ID #17. Broad Street & Mountain Avenue
 - Eastbound left-turn during the AM and PM peak hours
 - Westbound approach during the PM peak hour

2027 Build Mitigated Conditions

Based upon the results of the Build Conditions analysis, various alternatives were evaluated to determine their effectiveness and the mitigation measures listed below are recommended at the study intersections to improve the intersection operations, site access and circulation, and user experience. The results of the 2027 build mitigated intersection capacity analyses are summarized in **Table 7** for Build Mitigated AM peak hour, **Table 8** for Build Mitigated PM peak hour, and **Table 9** for Build Mitigated Saturday Midday peak hour attached to this memorandum. **Appendix F** includes the intersection capacity analysis worksheets. **Appendix G** includes the traffic improvements by zones and the intersection concepts.

Analysis results show the level of service and delay information for each movement, approach, and overall intersection. Additionally, multimodal streets help to make municipalities more efficient because repurposing street space increases the total street capacity for travel modes while reducing dependency on personal automobile usage. The Town prepared the following documents to promote alternative modes of transportation.

- *Bicycle and Pedestrian Plan* (November 2019): A framework for planning and implementing both short-term and long-term bicycle and pedestrian improvements to make bicycling and walking more comfortable, accessible, and safer for residents and visitors alike.
- *Town of Westfield ULUC* (June 2021): Holistic approach to planning that elevates the focus from singular parcels and intersections to a system of relationships between the use of land and space and the ability to create places and neighborhoods that are enjoyable and enhance the human experience.

Staff at the Alan M. Voorhees Transportation Center (VTC) at Rutgers prepared the following document and it was reviewed by Sustainable Jersey and the North Jersey Transportation Planning Authority (NJTPA).

- *North Avenue Walkable Community Workshop* (2019) Report: Recommendations to promote walking as a means of travel and to improve walkability along North Avenue.

- Expanded Multi-Use Trail along Route 28
 - Proposed multi-use trail expansion from 8.0 feet to 14.0 feet.
 - Evaluate the need for additional pedestrian-friendly lighting beneath the overpass.
 - Provide connection from existing multi-use trail to future bicycle/pedestrian infrastructure along North Avenue and South Avenue.
 - Provide signing, marking, and intersection control at the connections to the existing multi-use trail.
- Intersection ID #1. Crossway Place/Scotch Plains Avenue & South Avenue
 - Modify signal timings.
- Intersection ID #4. Summit Avenue & South Avenue
 - Replace the existing traffic signal with a new signal.
 - Reconfigure the intersection to a standard, 4-way intersection.
 - Modify signal phase for an exclusive eastbound and westbound left-turn phase. Convert the eastbound approach to consist of an exclusive eastbound left-turn lane and shared eastbound through/right-turn lane. Install an exclusive westbound left-turn lane. Remove the northbound and southbound split-phase operation.
 - Road diet along South Avenue from Westfield Avenue/roundabout to Central Avenue, which would reduce the number of westbound lanes from two (2) to one (1).
 - Implement a leading pedestrian interval (LPI), which gives pedestrians the opportunity to enter the crosswalk before vehicles.
- Intersection ID #5. South Avenue & Boulevard
 - Road diet along South Avenue from traffic circle/roundabout to Central Avenue.
 - Reduce the number of traffic lanes and distance to be negotiated by pedestrians crossing South Avenue at this location.
- Intersection ID #6. South Avenue & Eastern Site Driveway
 - Install a new traffic signal.
 - Implement an LPI.
 - This intersection will include signal coordination with Intersection ID #4. South Avenue & Summit Avenue and Intersection ID #7 Ross Place & Central Avenue & South Avenue.
 - As part of the road diet, reduce the westbound through travel lanes from two to one, with the outside most travel lane used as a right-turn lane into the site.
- Intersection ID #7. Ross Place & Central Avenue & South Avenue
 - Modify signal timings.
 - Restrict westbound right-turn on red movement.
 - Add ergonomic crosswalks on the southbound and westbound approaches.
 - Construct curb extension at the corner of South Avenue & Ross Place to shorten the pedestrian crossing distance.
 - Adjust the pedestrian signal phasing so pedestrians cross Ross Place when South Avenue has a green light.
- Intersection ID #8. Crossway Place/Edgewood Avenue & North Avenue
 - Modify signal timings.
- Intersection ID #9. North Avenue & Clark Street
 - Construct curb extensions with ADA-compliant ramps at the northeast and northwest corners at Clark Street. This treatment will shorten the pedestrian crossing distance.
 - Install a new traffic signal.

- This intersection will include signal coordination with Intersection ID#11. Route 28/Broad Street & North Avenue.
- Restrict the westbound right-turn on red movement.
- Implement an LPI.
- Intersection ID #11. Route 28/Broad Street & North Avenue
 - Stripe the shoulders along the eastbound right-turn lane, slip ramp to narrow down the travel lane.
 - Use high visibility crosswalk markings.
 - Provide pedestrian crossing warning signs on both sides of the slip ramp. RRFBs could be provided to further enhance safety at the crossings.
 - Declutter and/or relocate existing signs as much as possible. For example, the yield sign at the southern end could be relocated further south such that it is placed adjacent to the yield markings.
 - Modify signal timings.
 - Install a no right turn for trucks sign at the northeast corner for westbound right-turn truck movements.
 - Additional bicycle and pedestrian improvements (wider sidewalk/multi-use trail, streetscape) will need to be further evaluated with the Town and NJDOT.
- Intersection ID #12. North Avenue & Elm Street
 - Replace the existing traffic signal with a new signal.
 - Reconfigure the intersection to a standard, 4-way intersection.
 - Maintain existing intersection lane geometry; however, convert to a typical four-legged intersection.
 - Modify signal timings.
 - Upgrade pedestrian crosswalk signals as part of traffic signal redesign.
 - Implement an LPI.
- Intersection ID #13. Central Avenue & North Avenue
 - Install a new traffic signal.
 - Add ADA curb ramps and pedestrian signals
 - Add ergonomic crosswalks on all approaches
 - Modify signal timings.
- Intersection ID #14. Prospect Street & Broad Street
 - Install a new traffic signal.
 - Construct curb extensions on the east leg of the intersection (Prospect Street).
 - Implement an LPI.
- Intersection ID #16. Central Avenue & Broad Street
 - Install a flashing yellow arrow (FYA) for westbound left-turn movements (Broad Street to Central Avenue).
- Intersection ID #17. Broad Street & Mountain Avenue
 - Install a FYA for eastbound left-turn movements (Broad Street to Mountain Avenue).
- Intersection ID #23. North Avenue & Eastern North Zone Parking Site Driveway
 - New driveway for only right-turn in/right-turn out movements.

Coordination with other stakeholders will be necessary to discuss the operating conditions of intersections that are maintained by either Union County or New Jersey Department of Transportation (NJDOT). For example, the proposed traffic signal at the intersections of Intersection ID #9. North Avenue & Clark Street and Intersection ID #14. Prospect Street & Broad Street will need to be coordinated with Union County and the roundabout at Intersection ID #3. Route 28 & South Avenue will need to be coordinated with NJDOT.

Signal timing modifications at several study intersections will generally improve the operating conditions but may not resolve all the operational issues. Additional capacity could be desirable at select intersections to improve vehicular traffic flows through the area; however, the right-of-way is limited and the Town's desire to create a more pedestrian/bicycle-friendly downtown may make these types of improvements infeasible. The extension of turn lane lengths would be beneficial, but the feasibility needs to be further evaluated based upon available right-of-way. Where physical improvements to an intersection may not be feasible, alternative analysis was performed with priority given to improving the pedestrian and bicycle infrastructure/safety.

Under the Build Mitigated conditions, the study intersections are expected to operate at an overall intersection LOS D or better, with the exception of the roundabout at Route 28 & South Avenue during the AM peak hour, when the eastbound Route 28 approach is projected to operate at LOS F (no change from the No-Build condition with delay increased by only 5.5 seconds). All other movements at this intersection will experience LOS C or better conditions during all peak hours.

Under build-out, with-mitigation conditions, the following individual movements are projected to perform at a LOS E or LOS F, a volume-to-capacity (v/c) greater than 1.0, or exceed *New Jersey Administrative Code 16:47, Appendix F*, operating thresholds at the intersections along a state highway:

- Intersection ID #3. Route 28 & South Avenue
 - Eastbound Approach – During the AM peak hour the delay on the eastbound approach is projected to increase from 70.8 to 76.3 seconds, the v/c will increase from 1.108 to 1.126 and the Level of service will remain unchanged at F. The Applicant has committed to review this condition with NJDOT to determine what measures, if any, could be implemented to restore delays to the No-Build condition.
- Intersection ID #5. South Avenue & Boulevard
 - Northbound Approach – During the AM peak hour the delay on the northbound approach is projected to increase from 26.1 to 36.5 seconds. This increase is due, largely, to the elimination of the second westbound through movement on South Avenue. The elimination of that lane will slow traffic, shorten the crossing distance on South Avenue for pedestrians, eliminate the condition where two vehicles are approaching the intersection on westbound South Avenue and one stops for pedestrians while the second doesn't. It is the applicant's opinion that the all-day safety benefits for pedestrians at this location outweigh the modest increase in delay during this peak one-hour period.

CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis with the mitigations identified and the recommended improvements indicate during the weekday AM and PM peak hours and Saturday Midday peak hours, the study intersections are expected to operate at an overall intersection LOS D or better with the proposed redevelopment, except on two intersection approaches during one peak hour. This condition, which is the result of the considerable financial investment in the numerous mitigation measures identified herein, represents a considerable improvement over the No-Build condition, where 14 movements or approaches operated at suboptimal levels. In general, the unsignalized site access points to the West Zone, North Zone, and South Zone will be adequate and operate as expected given the minor street (site driveway) stop-controlled intersection control. The egress movements at the site access locations may experience moderate to long delays due to the level of traffic volumes along the major street approaches. The site access and circulation via the signalized intersections at the North Zone and South Zone will continue to be evaluated and refined, in coordination with the Applicant and Town, to provide efficient vehicular flows and sufficient space for all modes of transportation.

The Applicant will continue to coordinate with other stakeholders as necessary to discuss the operating conditions of intersections that are maintained by either Union County or New Jersey Department of Transportation (NJDOT). The traffic study will be revised, where necessary, should significant comments or changes be recommended by the Agencies Having Jurisdiction..

LIST OF APPENDICES

Appendix A: Concept Plan	Page 1 of 962
Appendix B: Data Collection	Page 4 of 962
Appendix C: Volume Development	Page 193 of 962
Appendix D: Commuter Parking Lots	Page 201 of 962
Appendix E: Trip Generation	Page 220 of 962
Appendix F: Intersection Capacity Analysis Worksheets	Page 241 of 962
Appendix G: Intersection/Location Improvement Concepts	Page 911 of 962
Appendix H: Westfield Roundabout Analysis memo	Page 921 of 962
Appendix I: Signal Warrant Analysis	Page 954 of 962