FEHR PEERS

# Site-Wide Focused LTA

Date: April 16, 2021

To: Manjit Banwait and Florin Lapustea, City of San Jose

From: Franziska Church, Fehr & Peers

**Subject: Focused Local Transportation Analysis for the Vesting Tentative Map to verify Right-of-Way for the Internal Roadway Network for the Downtown West Mixed-Use Project – Admin Draft**

*SJ19-1951*

The Local Transportation Analysis (LTA), which was included as Appendix J2 to the Downtown West Mixed-Use Project (DTW Project) Draft EIR includes an analysis of a total of over 50 intersections within the cities of San Jose and Santa Clara. The LTA in the Draft EIR focused on study intersections external to the DTW Project area to evaluate potential adverse intersection effects for vehicles traveling to/from the project area. This site-wide focused LTA (FLTA) presents an analysis to verify that the vesting tentative map (VTM) right-of-way for internal roadways are sufficient and no added roadway width is needed to provide additional capacity to address any operational constraints. Specifically, this site-wide FLTA evaluates intersection queuing within the DTW Project area under Background plus Project conditions at full buildout of the project consistent with Council Policy 5-1 and guidelines outlined in the City's *Transportation Analysis Handbook* (2018). This site-wide Focused LTA studies all roadway changes proposed by the DTW Project. If the project sponsor proposes material deviations from the VTM that were not analyzed in this memo then supplemental FLTA would be needed. Future FLTAs, prepared to provide additional building-specific analysis, would refine the considerations addressed in this site-wide FLTA and provide specific recommendations about intersection control types, lane geometries, turn pocket lengths, and other operational considerations.

## Analysis Scenario

The DTW Project area encompasses approximately 80 acres in downtown San José, west of State Route (SR) 87, north of Interstate (I) 280 in the vicinity of the Diridon Station and future Bay Area Rapid Transit District (BART) station, and future High-Speed Rail (HSR) facility, as shown in **Figure 1**.

To evaluate operation of the proposed internal roadway network, traffic volumes from the Background Plus Project Buildout scenario (LTA Scenario 2c) were modified to account for the full trip reductions due to the Transportation Demand Management (TDM) commitment required by mitigation measure AQ-2h, *Enhanced Transportation Demand Management Program*.[1]

In addition, the Background volumes were modified to include up to one million square feet of office development on the Caltrain parcels bounded by Post Street to the north, Montgomery Street to the east, San Fernando Street to the south, and Cahill Street to the west. The amount of development for the Caltrain parcels is a general assumption, since there currently are no approved or pending development applications. While background scenarios typically only include approved developments, we assume these parcels will be developed at some point in the future. Specifically, we included traffic assumptions for these vacant Caltrain parcels because they are located in center of the DTW Project area and traffic generated by these parcels will affect overall circulation within the DTW Project area.

The background no project volumes (to which traffic from Downtown West are added) represent existing volumes plus traffic from "approved but not yet built" and "not occupied" developments in the area per the City's Approved Trip Inventory (ATI). It should be noted that the existing volumes, as well as trips from the City's ATI and Caltrain parcels do not account for any shifts from non-single occupancy vehicles (non-SOV) that would occur in the project area with the planned investments in pedestrian, bicycle, and transit infrastructure and services by DTW, the City, Caltrain, and BART. Ultimately, the project area would need to achieve a achieve a 75 percent non-SOV mode split to achieve the City's full vision of *Envision San José.* Thus, traffic volumes are likely overstated and represent a conservative analysis.

**Figure 2** illustrate the AM and PM peak hour volumes along with the lane geometry assumptions for the intersection within DTW Project area.

[1] The analysis presented in the external LTA attached to the Draft EIR accounted for an approximately 18 percent trip reduction due a basic TDM program and did not include the additional nine percent reduction required by the EIR TDM mitigation measure.

## Analysis Software Tools

The TRAFFIX software is typically used to evaluate City of San Jose intersection operations. TRAFFX is a macro simulation tool used to determine intersection level of service (LOS) per the Highway Capacity Manual and identify adverse effects per Council Policy 5-1. TRAFFIX evaluates intersections in isolation without considering the operations of adjacent or nearby intersections. Therefore, to capture the interaction between closely spaced intersections, the simulation module of the Synchro software, SimTraffic, was used to evaluate the internal roadway network.

SimTraffic is a microsimulation tool used to model the behavior of individual vehicles on the roadway and identify operational constraints that can occur at an intersection, or between multiple intersections, such as queuing and queue spillback. SimTraffic is not used by the City to determine LOS. However, per City request, SimTraffic modeling is included in the internal roadway FLTA for informational purposes to support the City in identifying operational constraints within the DTW Project area.

All the internal intersections are within the Downtown Core and do not have established LOS thresholds per Council Policy 5-3. Therefore, the Synchro/SimTraffic analysis software was used to evaluate intersection turn-lane queuing and intersection LOS is not analyzed.

## Intersection Queueing Analysis

The results of the turn-lane queuing analysis for the twelve internal intersections are presented below in **Table 3**. **Attachment A** includes the detailed output sheets from SimTraffic.

In SimTraffic, the average queue is the average of the maximum queues every 2 minutes observed during the simulation. The 95th percentile queue length is a factor (1.65) times the average queue length (assumes queue length is normally distributed).

**Table 1: Intersection Queuing Analysis – Background Plus Project Buildout – with Full TDM**

| Intersection | | Movement[1] | Control[2] | Available Storage[3] | Queue Estimates in Feet[4] | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | AM | | PM | |
| | | | | | Average | 95th | Average | 95th |
| 1 | Autumn St/St. John Street | EBTL | AWSC | 260 | 100 | 200 | 100 | 220 |
| | | WBTL | AWSC | 820 | 620 | 720 | 180 | 380 |
| | | NBTL | AWSC | 580 | 380 | **660** | 300 | **600** |
| | | SBTL | AWSC | 140 | 140 | **200** | 120 | **240** |
| 2 | | EBT | Signal | 440 | 440 | **460** | 140 | 240 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Cahill St/Santa Clara St | WBL | Protected | 220 | 200 | **260** | 140 | 220 |
| | | WBT | Signal | 220 | 220 | **260** | 120 | 200 |
| | | NBL | Protected | 160 | 120 | **200** | **200** | **260** |
| | | NBT | Signal | 300 | 120 | 220 | 260 | **360** |
| | | SBL | Protected | 160 | 80 | **180** | 60 | 140 |
| | | SBT | Signal | 240 | 240 | **260** | 80 | 140 |
| 3 | Montgomery St/Santa Clara St | EBT | Signal | 220 | 200 | **280** | 20 | 80 |
| | | WBT | Signal | 240 | 100 | 220 | 20 | 100 |
| 4 | Autumn St/ Santa Clara St | EBL | Protected | 60 | 60 | **120** | 40 | **80** |
| | | EBT | Signal | 240 | **260** | **320** | 200 | **280** |
| | | WBL | Protected | 220 | **240** | **260** | 180 | **260** |
| | | WBT | Signal | 260 | **340** | **360** | 220 | **320** |
| | | NBL | Protected | 300 | 120 | 200 | 120 | 220 |
| | | NBT | Signal | 300 | 200 | **340** | 280 | **360** |
| | | SBL | Protected | 160 | 100 | **220** | 60 | 160 |
| | | SBT | Signal | 580 | 400 | 560 | 220 | 400 |
| 5 | Delmas Ave/ Santa Clara St | EBT | Uncontrolled | 200 | 20 | 60 | 20 | 40 |
| | | WBL | Yield | 120 | **140** | **220** | 60 | 100 |
| | | WBT | Uncontrolled | 340 | **400** | **440** | n/a | n/a |
| | | NBTL | SSSC | 160 | 160 | 160 | 40 | 80 |
| 6 | Autumn St/ Post Ave | EBL | Signal | 100 | 100 | **120** | **160** | **180** |
| | | NBTL | Permitted | 320 | 320 | **400** | 280 | **400** |
| | | SBT | Signal | 300 | 140 | 260 | 160 | 300 |
| 7 | Cahill St/San Fernando St | WBTL | Stop | 80 | 60 | **100** | 80 | **120** |
| | | NBTL | Uncontrolled | 180 | 20 | 60 | n/a | n/a |
| | | SBTL | Uncontrolled | 640 | 60 | 200 | 640 | 80 |
| 8 | Autumn St/ San Fernando St | EBTL | Permitted | 140 | 120 | **160** | 140 | 140 |
| | | WBTL | Permitted | 240 | 160 | 240 | 160 | 240 |
| | | NBL | Protected | 120 | 100 | **160** | 120 | **160** |
| | | NBT | Signal | 120 | **260** | **380** | **280** | **380** |
| | | SBL | Protected | 120 | 100 | **140** | 40 | 100 |
| | | SBT | Signal | 240 | 180 | **280** | 220 | **300** |
| 9 | Cahill St/New Street | WBTL | SSSC | 340 | 60 | 80 | 60 | 80 |
| | | SBTL | Uncontrolled | 300 | 60 | 120 | 60 | 140 |
| | | NBT | Uncontrolled | 140 | n/a | n/a | 20 | 60 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10 | Autumn St/ New Street | EBTL | SSSC | 340 | 80 | 180 | 100 | 220 |
| | | NBL | Yield | 160 | 80 | 160 | 80 | 160 |
| | | NBT | Uncontrolled | 320 | 140 | 320 | 120 | 300 |
| | | SBT | Uncontrolled | 280 | 120 | 240 | 180 | **380** |
| 11 | Park Ave/ Cahill St | EBL | Protected | 520 | 480 | **720** | 240 | 480 |
| | | EBTR | Permitted | 690 | **900** | **940** | 440 | 680 |
| | | WBTL | Permitted | 260 | 200 | **320** | 180 | **280** |
| | | NBTL | Permitted | 160 | 20 | 40 | 40 | 60 |
| | | SBTL | Permitted | 160 | 140 | **200** | 120 | **200** |
| 12 | Park Ave/Bird Ave-Autumn St | EBL | Permitted | 260 | 260 | 260 | 240 | **300** |
| | | EBT | Signal | 260 | 100 | 180 | 100 | 180 |
| | | WBL | Protected | 120 | 100 | **180** | **160** | **200** |
| | | WBT | Signal | 900 | 220 | 440 | 460 | 780 |
| | | NBL | Protected | 220 | **300** | **360** | 140 | 220 |
| | | NBT | Signal | 220 | **280** | **380** | **240** | **260** |
| | | SBL | Protected | 120 | 40 | 100 | 120 | **200** |
| | | SBT | Signal | 320 | 320 | **360** | 320 | **380** |

Notes:
1. NBL = northbound left-turn; SBL = southbound left-turn, EBL = eastbound left-turn WBL = westbound left-turn, NBR = northbound left-turn, SBR = southbound right-turn, EBR = eastbound right-turn, WBR = westbound right-turn.
2. SSSC = side-street stop controlled; AWSC = all-way stop controlled; permitted = permitted left-turns; protected = protected left-turns.
3. Storage length is the length of the longest left turn lane.
4. Queue length is measured in feet for average and longest 95$^{th}$ percentile queue length based on SimTraffic analysis results.

**Bold/underlined** text indicates projected queue length exceeds available storage length.
Source: Fehr & Peers, April 2021.

## Queuing Results Summary

To address potential queue spillback at the intersections identified in **Table 1,** ITS improvements, such as adaptive signal control, advanced signal loop detectors or video image detectors, could be implemented to improve signal operations and queuing. Most turn-pockets that exceed storage capacity cannot be extended due intersection spacing constraints. However, there are several locations where future LTAs would evaluate appropriate intersection controls and/or turn-pockets lengths within the existing and/or DTW VTM right-of-way to improve overall intersection operations:

1. Autumn Street[2]/St. John Street
2. Cahill Street/Santa Clara Street
4. Autumn Street/Santa Clara Street
5. Driveway Access (formally Delmas Avenue)/Santa Clara Street
6. Autumn Street/Post Street
11. Park Avenue/Cahill Street
12. Park Avenue/Bird Street-Autumn Street

Overall, the analysis demonstrates that the vesting VTM right-of-way for internal roadways are sufficient and no added roadway width is needed to provide additional capacity to address any operational constraints.

The section below provided a detailed discussion of each intersection and initial considerations for each of the locations. As noted earlier, Future FLTAs, prepared to provide additional building-specific analysis, would refine the considerations addressed in this site-wide FLTA and provide specific recommendations about intersection control types, lane geometries, turn pocket lengths, and other operational considerations.

## Queuing Discussion

This section discusses each intersection where the average and/or 95$^{th}$ percentile queues exceed available storage capacity. The Highway Capacity Manual recommends that turn pockets be designed to accommodate the 95$^{th}$ percentile queue, to the extent possible. Average queues are presented for informational purposes to illustrate whether, on average, the provided turn pockets can accommodate projected queues. Ideally, all average queues can be accommodated within available storage capacity, otherwise it would indicate consistent queuing and queue spillback issues at a given location.

### *1. Autumn Street/St. John Street*

At this all-way stop controlled intersection, the average queues can be accommodated within the provided storage capacity for all movements during both peak hours. For the 95$^{th}$ percentile queues, the northbound and southbound queues exceed available storage capacity by a minimum of 100 feet in each the morning and evening peak hours. Review of the SimTraffic simulation model shows that the queues cause substantial back-up and result in many vehicles not being able to access their destinations to the north and south. Future FLTAs would determine the appropriate intersection control (i.e., side-street stop, all-way stop, roundabout, or signal

[2] It should be noted that San Jose City Council in January 2021 renamed Autumn Street to Barack Obama Boulevard.

control), lane geometries, turn pocket lengths, and other operational considerations to facilitate efficient movement of vehicles within and through the DTW project area. It should be noted that this intersection is outside of the DTW project area.

*2. Cahill Street/Santa Clara Street*

At this signalized intersection, the average queues can be accommodated within the provided storage capacity for all movements during both peak hours. During the morning peak hour, the 95$^{th}$ percentile queues are estimated to exceed the available lengths at all movements, except for the northbound through lane. The 95$^{th}$ percentile queues exceed available storage capacity are less than 25 feet (i.e., less than a car length) at the eastbound through, southbound left-turn, and southbound through movements and no queuing concerns are identified.

For the westbound left-turn and westbound through, the 95$^{th}$ percentile queues are estimated to exceed the available storage of 220 feet by 40 feet (i.e., queue of 260 feet). The 220 feet storage represents the full length on Santa Clara between Cahill Street and Montgomery Street.

For the northbound left-turn, the 95$^{th}$ percentile queues during the AM peak hour are estimated to be 200 feet with 160 feet of available storage. The need for added storage capacity for the northbound left-turn is further supported by the estimated 95$^{th}$ percentile queues for the PM peak hour, which are projected to be 260 feet. Future analysis would evaluate and finalize the final intersection design within VTM right-of-way, including signal control, the lane geometries, turn pocket lengths, and other operational considerations.

For the evening peak hour, the northbound left-turn and northbound through lanes exceed available storage capacity. Considerations for the northbound left-turn are discussed in previous paragraph. For the northbound through, the available storge capacity of 300 feet represents the full length of Cahill Street between Santa Clara Street and Post Street; thus, to additional right-of-way is available and not further capacity can be provided.

*3. Montgomery Street/Santa Clara Street*

At this signalized intersection, the average queues can be accommodated within the provided storage capacity for all movements during both peak hours. For the 95$^{th}$ percentile queues, all movements can be accommodated within the provided storage capacity during the AM and PM peak hours, except for the eastbound through during the AM peak hour, where the 95$^{th}$ percentile queues are estimated at 280 feet for a 220-foot storage capacity. For the eastbound through, the available storge capacity of 220 feet represents the full length of Santa Clara Street between Montgomery Street and Cahill Street; thus, to additional right-of-way is available and not further capacity can be provided.

*4. Autumn Street/Santa Clara Street*

At this signalized intersection, the average queues can be accommodated within the provided storage capacity for all movements during both peak hours, except for the eastbound through, westbound left-turn, and westbound through lanes during the AM peak hour. The average queues exceed available storage by about 20 feet at the eastbound through and westbound left-turn movements; and 80 feet for the westbound through movement. For these same three locations, the 95$^{th}$ percentile queues exceed available storage by 40, 60, and 100 feet, respectively. Storage for the eastbound through movement cannot be extended, since it represents the full length to adjacent intersections at Montgomery Street. For the westbound through, the storage length represents the distance to proposed at-grade pedestrian crossing at the Guadalupe River. Ideally, the final design of the pedestrian crossing would be as far to the east as possible.

The 95$^{th}$ percentile queues for the eastbound left-turn exceed available storage capacity by 60 and 20 feet during the AM and PM peak hours, respectively. There is not additional right-of-way to lengthen the turn-pocket, without reducing the westbound left-turn pocket length at Montgomery Street.

Future FLTAs would evaluate and finalize the final intersection design within VTM right-of-way, including signal control, the lane geometries, turn pocket lengths, and other operational considerations. The intersection design would need to be coordinated with the proposed pedestrian crossing at the Guadalupe River.

*5. Driveway Access (formally Delmas Avenue)/Santa Clara Street*

At this side street stop-controlled intersection with driveway access from Santa Clara Street to Block E of DTW, the westbound through and left-turns exceed available storage capacity during the AM peak hour for both the average and 95$^{th}$ percentile queues. The westbound through cannot be extended, since it represents the full length to adjacent intersections at the northbound SR 87 off-ramp. The average and 95$^{th}$ percentile queues are 140 and 220 feet, respectively, for the 120-foot turn pocket. The westbound left-turn pocket could be extended based on review of aerial photography; though the final design would need to be coordinated with the final driveway location.

All queues can be accommodated in the available storage during the PM peak hour.

Future FLTAs would evaluate and finalize the final intersection design, including signal control, the lane geometries, turn pocket lengths, and other operational considerations. The intersection design would need to be coordinated with the proposed pedestrian crossing at the Guadalupe River. This intersection is partially inside of the DTW project area and not subject to the VTM.

*6. Autumn Street/Post Street*

At this signalized intersection, the average queues can be accommodated within the provided storage capacity for all movements during both peak hours, except for the eastbound shared left-/right-turn movement during the PM peak hour. The 95th percentile queues also exceed available storage during the AM and PM peak hours at this intersection by 20 and 80 feet, respectively. The 100-foot storage represents the distance to the garage intersection to the west.

The northbound left-/through-lane exceed available storage capacity by 80 feet during both the AM and PM peak hours for the 95th percentile queues. The northbound demand is for about 230 vehicles during the AM peak hour and 150 vehicles during the PM peak hour. Based on Review of the SimTraffic simulation model, the provision of a dedicated left-turn lane would facilitate efficient movement of vehicles along the Autumn Parkway corridor within DTW. Future FLTAs would evaluate and finalize the final intersection design within the VTM right-of-way, including signal control (for the purpose of this analysis this new intersection was assumed to be signalized, but would be confirmed in future FLTAs), the lane geometries, turn pocket lengths, use of dynamic lanes along Autumn Parkway, and other operational considerations.

*7. Cahill Street/San Fernando Street*

At this side-street stop-controlled intersection, the average and 95th percentile queues can be accommodated within the provided storage capacity for all movements during both peak hours, except for the 95th queue for the westbound left-turn from San Fernando Street onto southbound Cahill Street. The estimated queues are 100 feet and 120 feet during the AM and PM peak hours, respectively. The 80-foot storage represents the distance to the garage intersection to the east. It should be noted that the average queue of 60 and 80 feet for the AM and PM peak hours, respectively, can be accommodated by the available storage.

*8. Autumn Street/San Fernando Street*

At this signalized intersection, the average queues can be accommodated within the provided storage capacity for all movements during both peak hours, except for the northbound through lane during the AM and PM peak hours. Average queues exceed available storage by 140 feet and 160 feet during the AM and PM peak hours. The 120-foot storage represents the distance to the "New Street" intersection to the south.

*9. Cahill Street/New Street*

The average and 95th percentile queues at this side-street stop-controlled intersection can be accommodated within the provided storage capacity for all movements during both peak hours; no storage enhancements are needed.

*10. Autumn Street/New Street*

The average and 95th percentile queues at this side-street stop-controlled intersection can be accommodated within the provided storage capacity for all movements during both peak hours; except for the 95th queue for the southbound through movement along Autumn Parkway during the PM peak hour. The queues are estimated to exceed available storage by 100 feet. The 280-foot storage represents the distance to the "New Street" intersection to the north. It should be noted that the average queue of 180 feet can be accommodated by the available storage.

*11. Park Avenue/Cahill Street*

At this signalized intersection, the average queues can be accommodated within the provided storage capacity for all movements during both peak hours, except for the eastbound through movement during the AM hour. The average queues exceed available storage by at 210 feet and the 95th queues by 250 feet. Based on Review of the SimTraffic simulation model, the queues at the eastbound approach are mostly due to the queues from the downstream intersection at Park Avenue/Bird Street-Autumn Street, which is discussed in the next section.

During the AM peak hour, the estimated 95th percentile queues exceed available storage at all movements, expect for the northbound approach, which is a driveway. The queues on the eastbound approach, are due to the queues from the downstream intersection at Park Avenue/Bird Street-Autumn Street, which is discussed in the next section. The southbound queues for the shared left-/through/right-turn exceed available storage for both the AM and PM peak hours.

Future FLTAs would evaluate and finalize the final intersection design within the VTM right-of-way, including signal control (for the purpose of this analysis this new intersection was assumed to be signalized, but would be confirmed in future FLTAs), the lane geometries, turn pocket lengths, use of dynamic lanes along Cahill Street, and other operational considerations.

*12. Park Avenue/Bird Street-Autumn Street*

At this signalized intersection, the average queues can be accommodated within the provided storage capacity for all movements during both peak hours, except for:

- Northbound left-turn (220 feet storage): 300 feet during AM peak hour
- Northbound through (220 feet storage): 280 feet during AM peak hour and 240 feet during PM peak hour
- Westbound left-turn (120 feet storage): 160 feet during PM peak hour

The 95th percentile queues exceed available storage as discussed below:

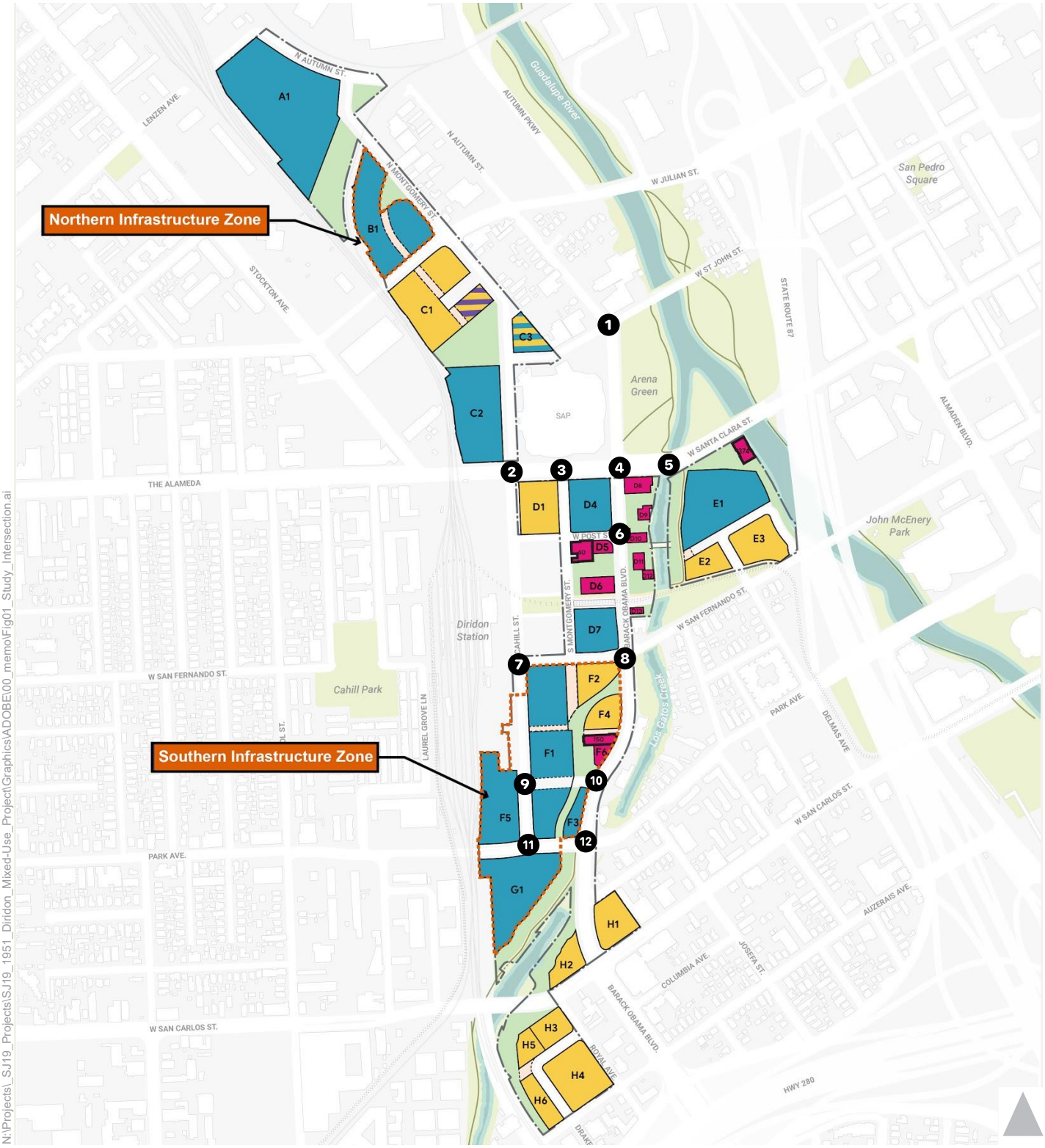
- Northbound left-turn (220 feet storage): 360 feet during AM peak hour

- Northbound through (220 feet storage): 380 feet during AM peak hour and 260 feet during PM peak hour
- Westbound left-turn (120 feet storage): 180 feet during AM peak hour and 200 during PM peak hour
- Southbound left-turn (120 feet storage): 200 feet during PM peak hour
- Southbound through (320 feet storage): 360 feet during AM peak hour and 380 feet during PM peak hour

Overall, based on Review of the SimTraffic simulation model, this intersection does not operate very efficiently. Future FLTAs would evaluate and finalize the final intersection design, including signal control, the lane geometries, turn pocket lengths, and other operational considerations. This intersection is outside of the DTW project area and not subject to the VTM.

## Right-Turn Lanes

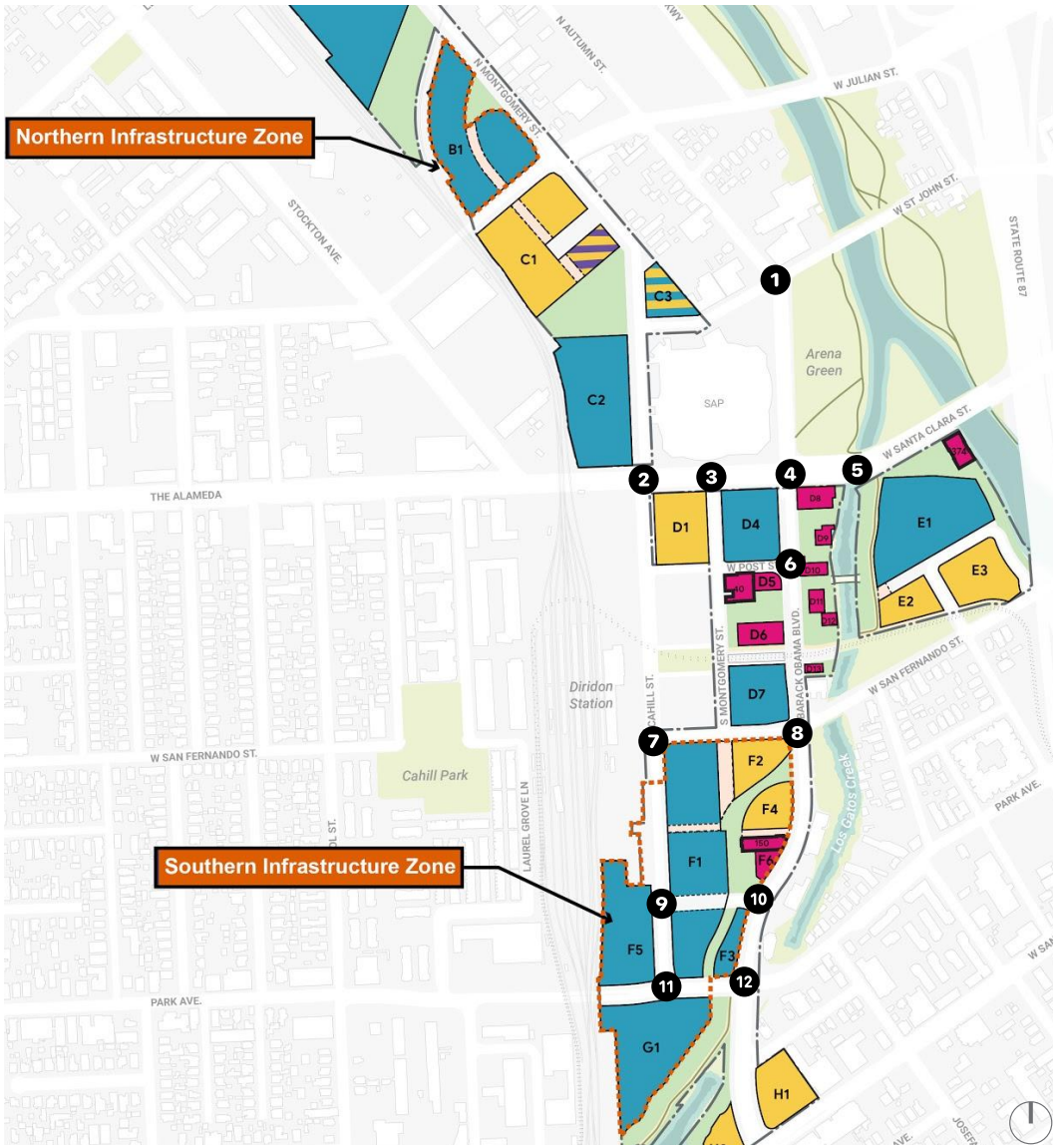
Most intersections include shared through/right-turn lanes on all approaches. Generally, dedicated right-turn lanes may need to be considered at volumes between 150 and 300 cars, depending on the number of through lanes and through vehicles. Future FLTA would evaluate the need for dedicated right-turn lanes at intersections, while balancing the need for reduced pedestrian crossing distance consistent with overall project goal to provide good pedestrian access and circulation.

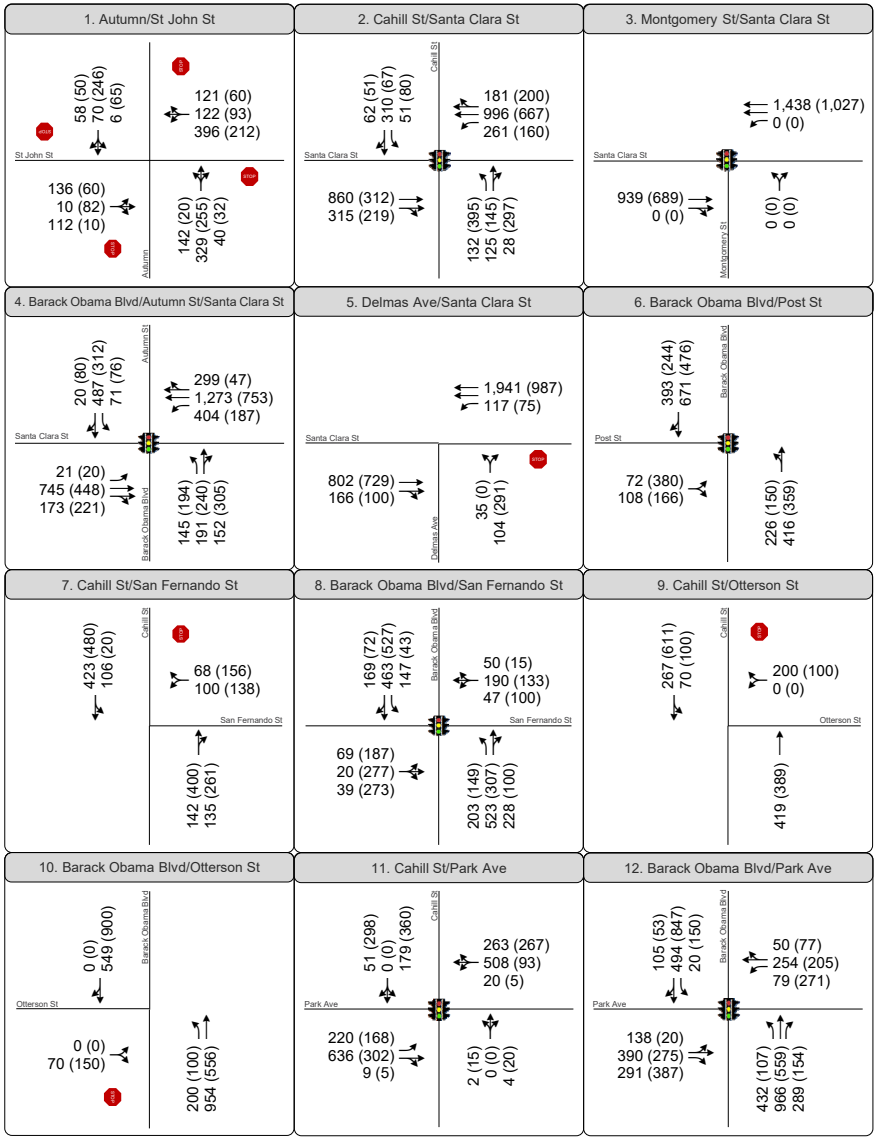



- Study Intersection
- Project boundary
- Approximate location of pedestrian mid-block passage
- Office
- Residential
- Hotel
- Active uses (including commercial retail/restaurant, arts, cultural, institutional, child care and education, maker spaces, non-profit, small-format office space)
- Historic resources to remain
- Centralized utility plant and logistics hub areas

Figure 1

## Study Intersections




XX (YY) AM (PM) Peak Hour Traffic Volumes  Signalized Intersection  Stop Sign

Project Boundary  # Study Intersection

Figure 2

# Background with Project Buildout (65% TDM) Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls

...\Graphics\QuickFigure\SJ19-1951_1_Vol-EBPbuild