

Appendices





WESTMINSTER | EST. 1870 |
72nd AVENUE
 CORRIDOR STUDY

NOVEMBER 2023
EXISTING CONDITIONS REPORT

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Existing Conditions

1.1 Introduction

Project Purpose

The 72nd Avenue Corridor Study is to evaluating opportunities for enhancing multimodal infrastructure to deliver increased safety and comfort for people walking, biking, riding transit, and driving along, to, and from 72nd Avenue between Pierce and Zuni Streets. The project is also identifying opportunities to enrich public spaces, recommend appropriate enhancements based on the variety of character areas present and make 72nd Avenue into a gateway for the Westminster Station Area that is welcoming to residents, commuters and visitors alike.

Existing Conditions Process

The first phase of the planning process comprised an analysis of existing conditions, which included review of previous relevant planning documents from the City of Westminster, a physical assessment, a mobility and operational assessment and a review of safety data, which culminated in a comprehensive needs assessment. Simultaneously, targeted engagement with business and property owners, the general public and a community advisory committee informed the needs analysis.

1.2 Existing Plans Summary

Summary

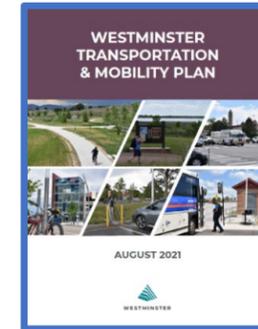
The project team reviewed City of Westminster plans relevant to the study area to inform the existing conditions analysis. The goal of this review is to understand priorities and principles related to multi-modal transportation planning and garner important recommendations to inform the future of the 72nd Avenue corridor.

Westminster Station Area Specific Plan (2017)



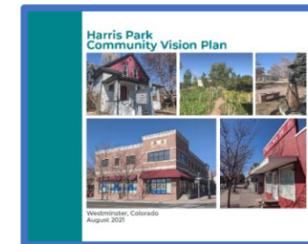
- Calls for enhancing pedestrian crossings, plus reevaluating crossing times along 72nd Avenue given it acts as a “northern gateway” to Westminster Station.
- References the 2009 72nd Avenue Streetscape Plan (Utica Street to Meade Street) which called for wider sidewalks, tree lawns/street trees, decorating lighting, a planted median between Raleigh Street and Newton Street and enhanced crossings.

Westminster Transportation & Mobility Plan (2021)



- Identifies 72nd Avenue as one of seven priority transit corridors recommended for stop and station enhancements.
- The 72nd Avenue corridor is noted as an area of high pedestrian demand, particularly the areas directly east and west of Federal Boulevard.
- Mapped future recommended transportation improvements:
 - *Near Term Projects (0-5 years):* Conduct a corridor study, implement traffic signal infrastructure and ITS signal coordination improvements and evaluate bus stop amenity upgrades.
 - *Mid-Term Projects (6-10 years):* Complete the missing sidewalk between Clay Street and Eliot Street (south side).
 - *Long-Term Projects (11+ Years):* Upgrade on-street bike lanes to buffered bike lanes and widen sidewalks to be multiuse paths.

Harris Park Community Vision Plan (2021)



- Calls for installing intersection improvements and gateway elements (signage, landscaping) along 72nd Avenue at Bradburn Boulevard and Lowell Boulevard.
- Calls for detached sidewalks, trees/landscaping and additional lighting in multiple areas along the corridor.
- Calls for an enhanced connection to the Little Dry Creek Trail along 72nd Avenue between Bradburn Boulevard and Newton Street.
- Calls for speed mitigation measures along the corridor.

Federal Boulevard Multimodal Transportation Study (2021)



- The 72nd Avenue stops are the busiest within the entire Federal Boulevard study area (52nd Avenue to 120th Avenue).
- Within “Zone A” (52nd Avenue to 73rd Avenue), a new west-side BRT stop is planned south of the 72nd Avenue intersection, in addition to median refuge islands, red left-turn arrows, and separate turns lanes (where appropriate).
- 72nd Avenue is noted as the cross-street experiencing the highest number of KSI pedestrian crashes within Zone A.
- Federal Boulevard between 72nd Avenue and 76th Avenue is an Opportunity Zone, given the adjacency to the RTD B-Line route.
- 72nd Avenue stops have the longest bus dwell times in the study area – a stop’s physical infrastructure, passenger loading needs (such as wheelchairs), and rider questions impact dwell time.

1.3 Physical Assessment

1.3.1 Land Use and Zoning

Future Framework

The City of Westminster's 2040 Comprehensive Plan (approved in March 2023) outlines a future-thinking framework to support thriving communities citywide. Chapter 4: Transportation, Mobility and Connections focuses on transportation-supportive goals and policies. Two strong connection and safety-oriented goals bolstering this study's importance include:

- **Goal TM-1:** Develop a comprehensive multimodal transportation network that includes convenient, safe, and accessible transportation options for all and integrates land use."
- **Goal TM-3:** Reduce traffic-related deaths and injuries by improving the safety and comfort for all modes of transportation.

An eastern portion of the 72nd Avenue corridor study area (just west of Lowell Boulevard to just east of Federal Boulevard) is considered the Westminster Station neighborhood. The neighborhood's focal point is Westminster Station, located along Little Dry Creek and the Little Dry Creek Trail (see **Figure 1** below).

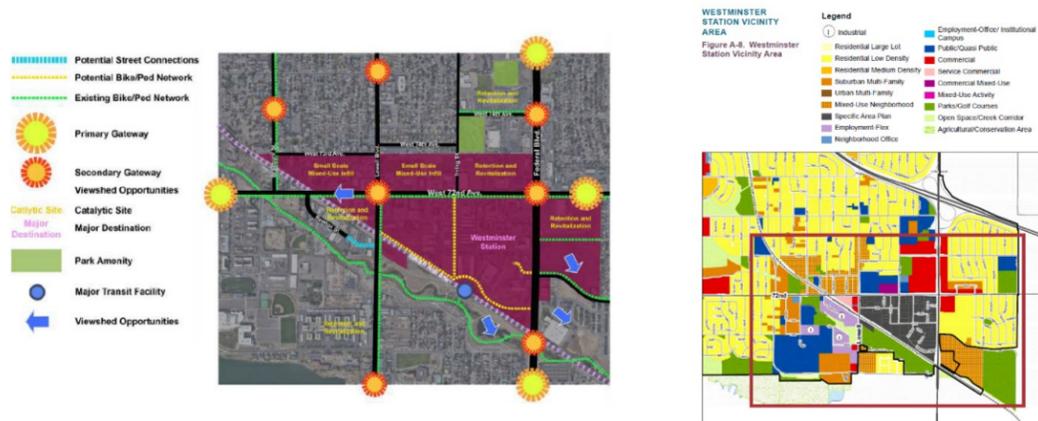


Figure 1: Westminister Station Transition Area Framework (City of Westminster 2040 Comprehensive Plan).

Corridor Demographics

Demographics data is from U.S. Census Bureau American Community Survey (ACS) 5 Year Estimates for 2012-2016 and 2017-2021. Population and household data encompasses a ¼ mile radius (buffer) north and south along the corridor study area. Other demographic information for the corridor reflects data from the Block Groups encompassed within the ¼ mile corridor buffer.

Population

Approximately 21,500 people in over 8,000 households live within the ¼ mile buffered corridor study area. The study area accounts for 19% of the City's population and 18% of the households. Median household sizes in the study area are approximately 2.7 persons per household, which is slightly larger than the City's median of 2.46 persons per household.

The median age in the study area (37 years) and in the City (38 years) is about the same, however, the corridor tends to be slightly younger. The exception is the oldest age group of over 75 years. A greater concentration of older seniors can be found in the study area (see **Figure 2** below).

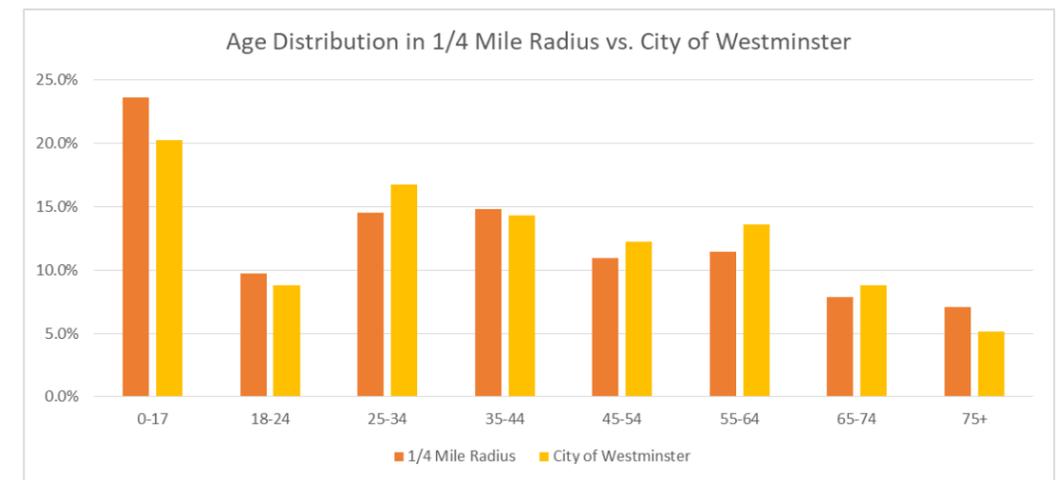


Figure 2: Age Distribution for Corridor Area vs. City of Westminster (2012-2016 and 2017-2021 ACS Data)

Race & Ethnicity

The majority of the City is Non-Hispanic White. The study area is home to a higher percentage of Hispanic or Latino residents compared to the City, at 40% of the study area population compared to 20% citywide (see **Figure 3** below).

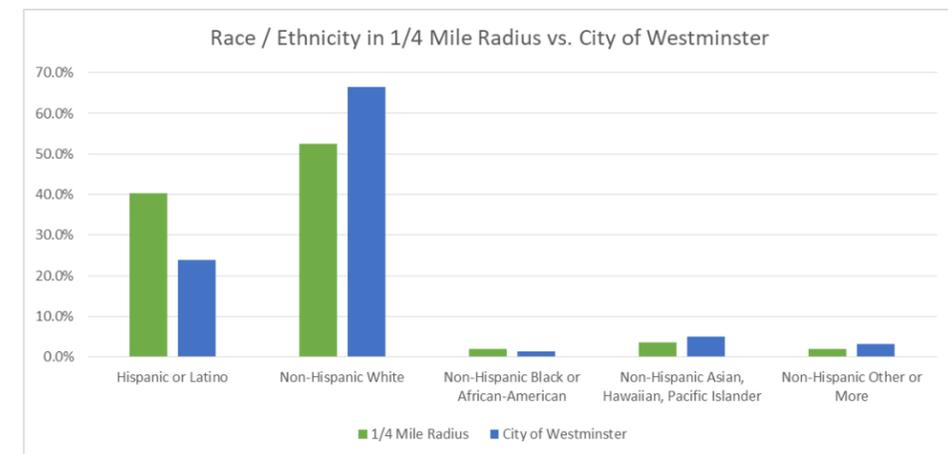


Figure 3: Race and Ethnicity for Corridor Area vs. City of Westminster (2012-2016 and 2017-2021 ACS Data)

Education

Most of the adults (the population aged 25 and over) in the study area and the City have a high school diploma (80-90% of the population). The bachelor's degree attainment rate in the City as a whole is about 40% among adults compared to the study area, which has a 20% bachelor's degree educational attainment rate.

Housing

Housing units in the study area are approximately 59% owner-occupied while units in the City of Westminster as a whole are approximately 65% owner-occupied.

Income

The median household income in the study area is about \$58,500 while the City's median household income is estimated at \$80,000. Most households in the study area have incomes in the \$50,000 – \$74,999 range, while most City households have household incomes over \$150,000 (see **Figure 4** and **Figure 5** below).

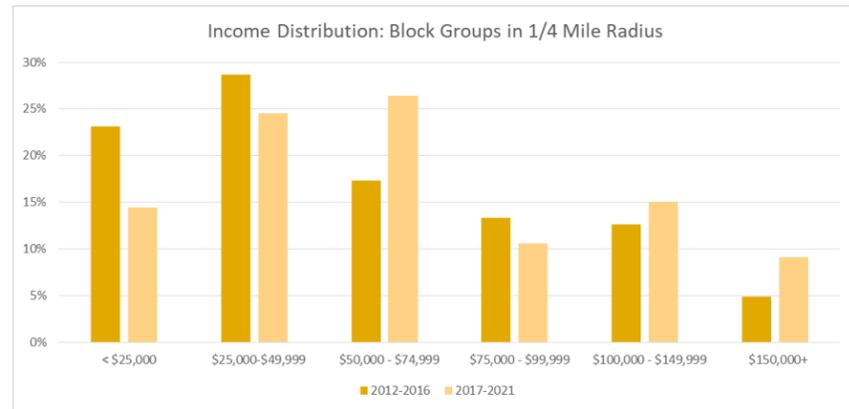


Figure 4: Income Distribution Data (2012-2016 and 2017-2021 ACS Data)



Figure 5: Income Distribution Data (2012-2016 and 2017-2021 ACS Data)

1.3.2 Urban Design

Summary

Adjacent land uses, whether residential, commercial or mixed-use, influence the urban design elements and existing infrastructure present along 72nd Avenue. Currently, the high-speed conditions and lack of continuous facilities for bicyclists and pedestrians create a high-stress environment for those navigating the corridor.

Character Zones

The varying conditions of the study area are characterized by a total of nine identifiable zones. There are five zone areas within three primary zone categories – residential corridor (2), commercial corridor (2), and open space gateway (1). Additionally, there are four transitional zones – two that are primarily residential, and two that are primarily commercial. See the character areas map below for a visual representation.

Residential Corridors

The two residential corridor zones bookend the study area, at the western end between Pierce Street and Ingalls Court (**Figure 6**), and at the eastern end between Canosa Court and Zuni Street (**Figure 7**).



Figure 6 (left): Western End Residential Corridor Zone between Pierce Street and Ingalls Court (MIG)
 Figure 7 (right): Eastern End Residential Corridor Zone between Canosa Court and Zuni Street (MIG)

The western residential corridor is enclosed by high brick walls on either side of the road and narrow sidewalks. In particular, the southern edge has no pedestrian facility and the adjacent wall blocks sunlight in the winter, leaving the bicycle facility snow-covered. The frontage road condition, which exists along much of the southern edge of this zone, should provide pedestrian access, but navigation is illegible.

The point of connection between the frontage road and 72nd Avenue at Ingalls Street is hidden and narrow (see **Figure 8** and **Figure 9** below). Crosswalks are infrequent and the curvature of the road may make it difficult to introduce others.

These conditions create a tunnel effect and, along with the middle turn lane, contribute to this segment's feel as a high-speed, high-volume corridor, which is compounded by the use of a crash barrier along part of the northern edge. Additionally, the walls significantly limit permeability into the surrounding neighborhoods. The area is largely comprised of single-family homes. Faversham Park is integrated at the northeast corner.



Figure 8: Existing wall on 72nd Avenue west of Ingalls Street

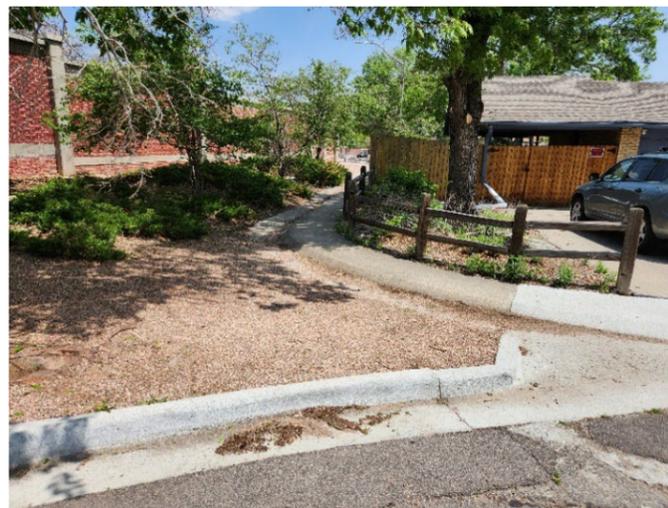


Figure 9: Dead end to sidewalk at the corner of Ingalls Street and 72nd Avenue Frontage Road

The eastern residential corridor feels more like a neighborhood collector, as houses and yards are clearly visible from, and at times oriented towards, the street. Sidewalks are still narrow and attached. The lack of buffer, either through a bicycle facility or vegetation, is consistent on both sides, placing pedestrians close to adjacent traffic (see **Figure 10** below). Unlike the western residential corridor, there is not a consistent material palette unifying the aesthetic. The lack of uniformity and the varied nature of the adjacent residence's orientation toward the street changes the 'feel' of the corridor. Crosswalks are also infrequent here. Again, the primary land-use is single-family housing and Skyline Vista Park forms a significant portion of the northern street frontage. The park provides one unique condition with a parallel, detached path providing a meandering, alternative to the street's attached sidewalk (**Figure 11**).



Figure 10 (left): Bus stop boarding area



Figure 11 (right): Existing multiuse path in Skyline Vista Park

Commercial Corridors

The two commercial corridors zones are internal to the study area, to the west between Depew Street and Xavier Street (**Figure 12**), and to the east between Lowell Boulevard and Federal Boulevard (**Figure 13**).



Figure 12 (left): Western End Commercial Corridor Zone between Depew Street and Xavier Street

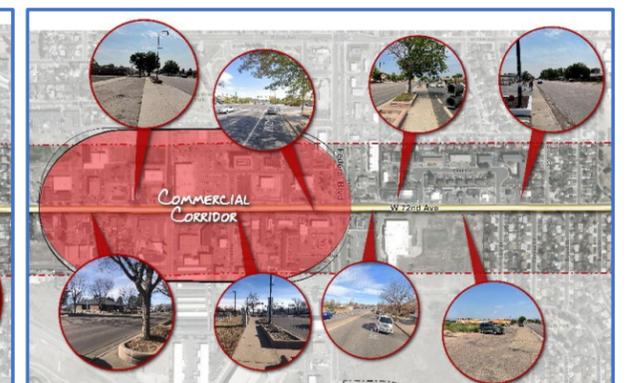


Figure 13 (right): Eastern End Commercial Corridor Zone between Lowell Boulevard and Federal Boulevard

The western commercial corridor is characterized by modern suburban shopping center and strip mall style big box designs with larger, contiguous parking structures. Many of these businesses are regional or national chains. This area is dominated by single-story buildings, set back significantly from the street with parking or formally landscaped areas.

The road widens in this area to accommodate turn lanes and sidewalks are wider with green buffers between Depew Street and Sheridan Boulevard. While the sidewalks narrow east of Sheridan, most of the pedestrian facilities are detached from the road, and some near 10' in width (see **Figure 14** below).

The high brick wall characteristic is again present on the south side of the street, east of Sheridan where the single-family neighborhood abuts these busy roads. The southeast corner is in contrast with the more porous edges of the opposing three corners commercial uses. Though, while visually porous, access is often limited due to some minor grade changes, unbroken parking, and large areas for stormwater detention (especially in the northwest section of the intersection at 72nd Avenue and Sheridan Boulevard – see **Figure 15** below).

A narrow vacant lot separates the commercial activity from single-family residential at the northeast edge of this zone, and the high brick walls separate residential areas to the west. Modest, low-rise multifamily also serves as a transition to the single-family neighborhood to west.



Figure 14 (left): Pedestrian refuge median at driveway entrance to Hidden Lakes Shopping Center, east of Sheridan Boulevard
 Figure 15 (right): Detached sidewalk approaching Sheridan Boulevard

The eastern commercial corridor, conversely, is somewhat more traditional in its design and development patterns, with greater diversity and individuality in the building stock, much of which orients to 72nd Avenue. While this area is also dominated by single-story buildings with some strip mall conditions and modest setbacks (parking or landscaped), the overall feel is more local. The diversity of the commercial use and building style is balanced by the uniformity of the public realm, with consistent furnishings, raised planters, and colored concrete (see **Figure 16** below). Though dated, uniformity provides a strong foundation for further augmentation of the public realm.

Commercial activity is also mixed in this area, with local and chain retail and service businesses, office buildings, and some civic uses, such as the Colorado STEM Academy (see **Figure 17** below). This area also includes some vacant buildings, which provide an opportunity for redevelopment.



Figure 16: Planters east of Federal Boulevard



Figure 17: Sidewalks near Colorado STEM Academy

Open Space Gateway

The open space gateway is central to the study area, between Tennyson Street and Orchard Court (**Figure 18**). This area is characterized primarily by the Little Dry Creek canal and surrounding green space that runs northwest to southeast across the study area.

Additionally, the train tracks run parallel to the creek on the east, with interspersed development between the two. The confluence of the creek and the train tracks, one in an underpass and the other at grade, create a unique opportunity to leverage the atypical land use pattern to introduce area identity elements. The topography slopes upward to the east and north in this section between the creek and tracks.

To the western portion of this zone, the creek is abutted by residential single-family and modest low-rise multifamily uses, while the western portion is mostly abutted by commercial uses. Although the open space is currently unprogrammed and largely inaccessible to the public, England Park’s ongoing master planning process will support upgrades in this area. The sidewalks in the western portion are wider and offer green buffers, while they remain relatively narrow and unprotected on the eastern side.

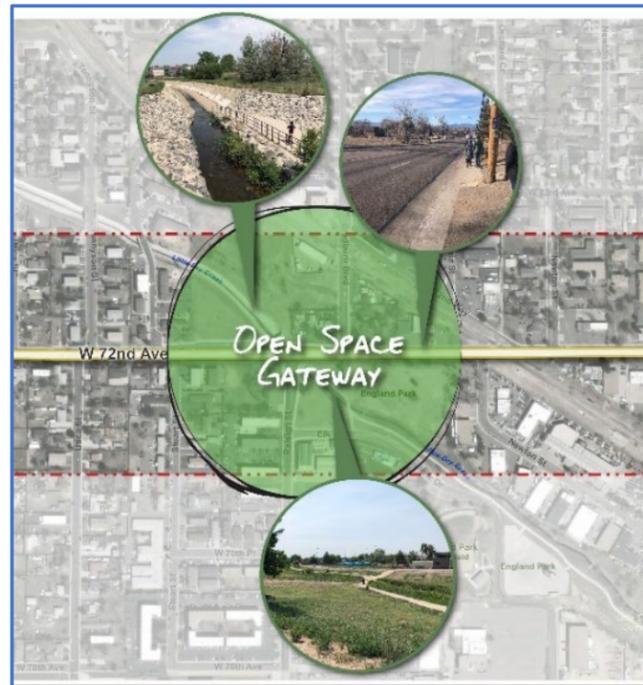


Figure 18: Open Space between Tennyson Street and Orchard Court (MIG)

Residential Transition Zones

These two zones sit on either side of the western commercial corridor, to the west between Ingalls Street and Depew Street (**Figure 19**), and to the east between Xavier Street and Tennyson Street (**Figure 20**).

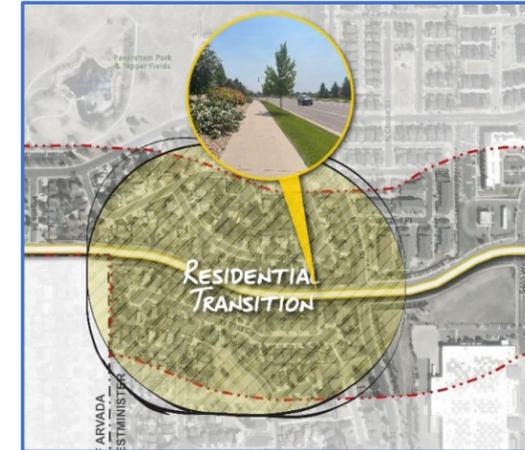
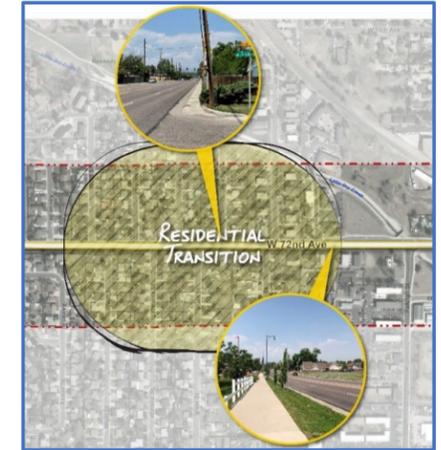


Figure 19 (left): Western Residential Transition Zone between Ingalls Street and Depew Street (MIG)
 Figure 20 (right): Eastern Residential Transition Zone between Xavier Street and Tennyson Street (MIG)



The western zone continues the characteristics of the residential primary zone to the west, with high brick walls enclosing the street and surrounding single-family neighborhood. However, both sides of the street maintain a detached sidewalk (see **Figure 21**), the north of which manages a grade differential from the street providing a greater buffer. This is one of the only zones where a curve is introduced in the roadway. The conceal/reveal nature of the curve may provide an opportunity for identifying the transition with an aesthetic treatment. Faversham Park is integrated to the north and modest, low-rise multifamily serves as a transition to the commercial corridor to the east.



Figure 21: Detached sidewalk west of Depew Street

The eastern zone is a mix between the characteristics of the western and eastern residential primary zones, however, is most analogous with the eastern residential zone. The high brick wall along the south side of the street continues east about a block into this area, enclosing the neighborhood. The surrounding use on both sides is residential, with more permeable street frontages to the north and western portion of the area, including yards and intermittent fencing on individual lots.

The neighborhood transitions from single-family to modest, low-rise multifamily toward the west, adjacent to the open space gateway. A narrow vacant lot separates the single-family residential at the northwest edge of this zone where it abuts the commercial corridor. Sidewalks are narrow and attached, with limited crosswalks, and thus opportunities in the existing right-of-way may be limited (see **Figure 22** below).

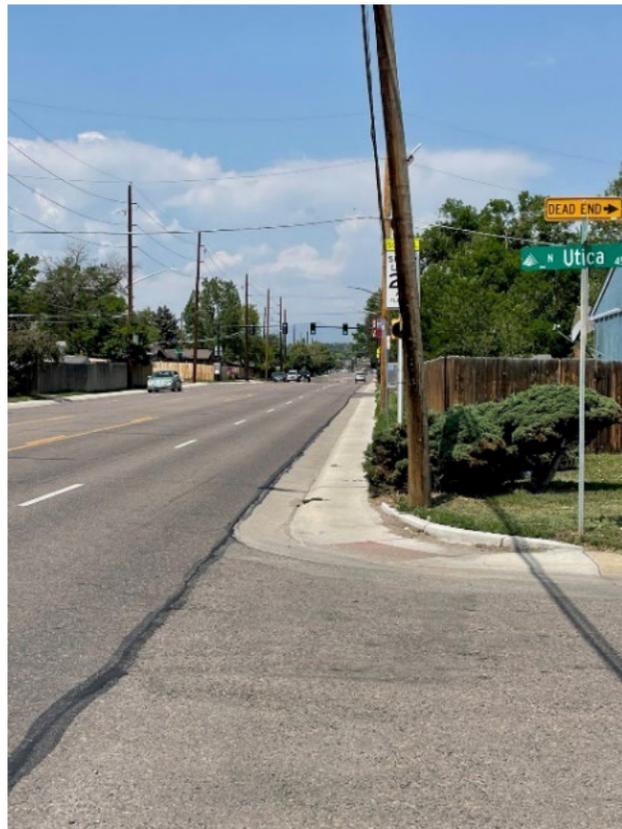


Figure 22: Narrow sidewalk at Utica Street

Commercial Transition Zones

The two commercial transition zones sit on either side of the eastern commercial corridor zone, to the west between Orchard Court and Lowell Boulevard (**Figure 23**), and to the east between Federal Boulevard and Canosa Court (**Figure 24**).

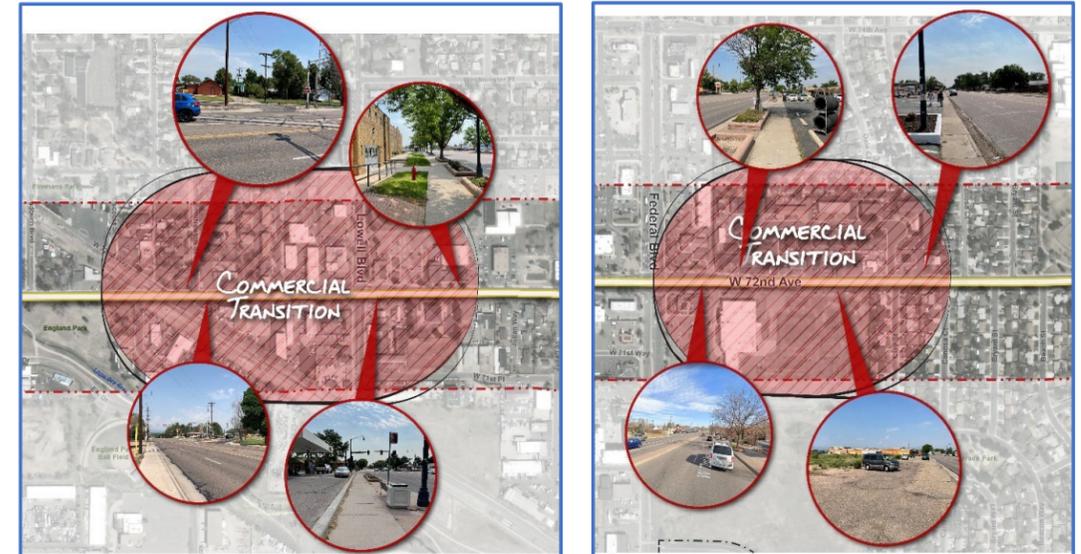


Figure 23: (left) Western Commercial Transition Zone between Orchard Court and Lowell Boulevard (MIG)
 Figure 24: (right) Eastern Commercial Transition Zone between Federal Boulevard and Canosa Court (MIG)

The western zone shares characteristics with the adjacent commercial corridor to the east, with small scale service and retail businesses and varied architectural styles and setbacks. Both separated and strip mall style conditions exist. However, both parallel and perpendicular to the corridor, challenging grade changes present some difficulties in ease of access (see **Figure 25** below).



Figure 25: Sidewalk near railroad tracks near Orchard Court

Navigating contiguous vehicular access for some businesses as a pedestrian is dangerous and currently restricts the opportunity to extend some of the consistent urban design elements westward from the adjacent commercial zone. Furthermore, residences are interspersed occasionally along the street frontage and modest, low-rise multifamily extends beyond the commercial activity to the north. Sidewalks are narrow with frequent and/or expansive curb cuts. Small planters provide minimal buffering to the east end of the area.

The eastern zone changes quite abruptly from single family residential to commercial, just west of Canosa Court. Modest, low-rise multifamily serves as a minor transition on the north side of the street, behind street-front businesses. On the southern side of the street, a large vacant lot of mixed concrete and overgrown grass creates a vast expanse between the residential neighborhood to the east and big box commercial to the west, which provides opportunity for new development (see **Figure 26** below). In general, the commercial development pattern in this area transitions east to west from older small-scale local to newer big-box shopping center. Sidewalks are narrow, with small planters that provide minimal buffering in some places, while in others, private landscaping pushes the pedestrian very close to traffic (see **Figure 27** below). Crosswalks are limited. The road narrows to the east end of this zone, transitioning from the wider commercial area with a center turn lane to the residential corridor.

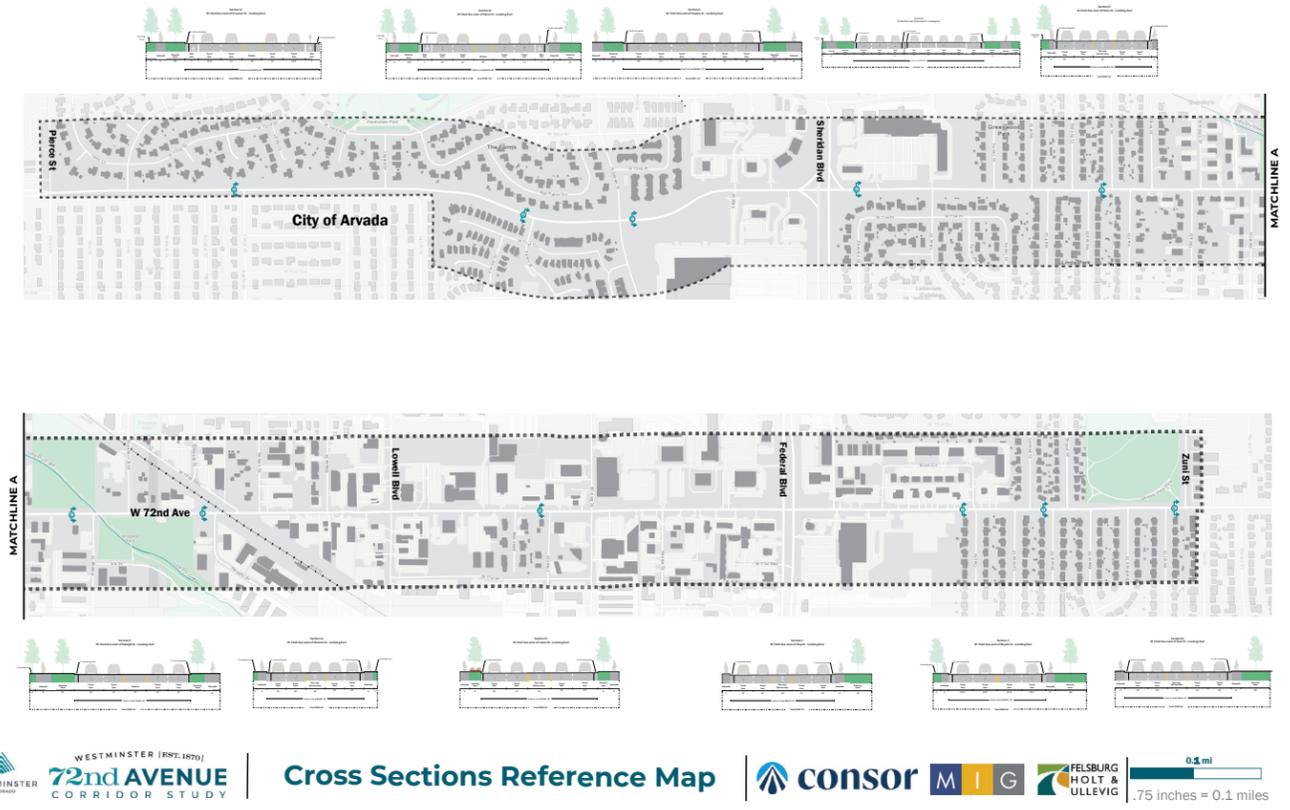


Figure 26: Vacant lot across from Eliot Circle



Figure 27: Narrow sidewalks near Guadalajara Restaurant

Cross Sections

Roadway configurations along the three-mile 72nd Avenue study area vary dramatically. The curb-to-curb width varies from 50-feet to nearly 100-feet with a variation between two and three lanes present in each direction. Portions of the corridor contain two-way center turn lanes or medians. The presence of sidewalks, and whether they are attached or detached, also varies throughout the corridor. Bicycle facilities are present in the western portion of the corridor but not elsewhere. The urban design varies too, including the presence or lack thereof of a planted buffer. The following cross sections show typical exhibits of the roadway at various locations along the corridor (also see **Figure 28**).

Figure 29: Section A (72nd Avenue West of N Lamar Street – Looking East)

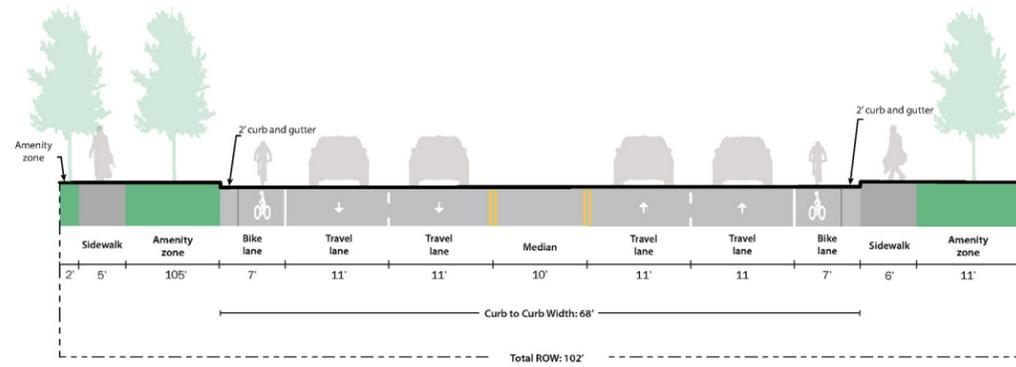


Figure 30: Section B (72nd Avenue West of Eaton Street – Looking East)

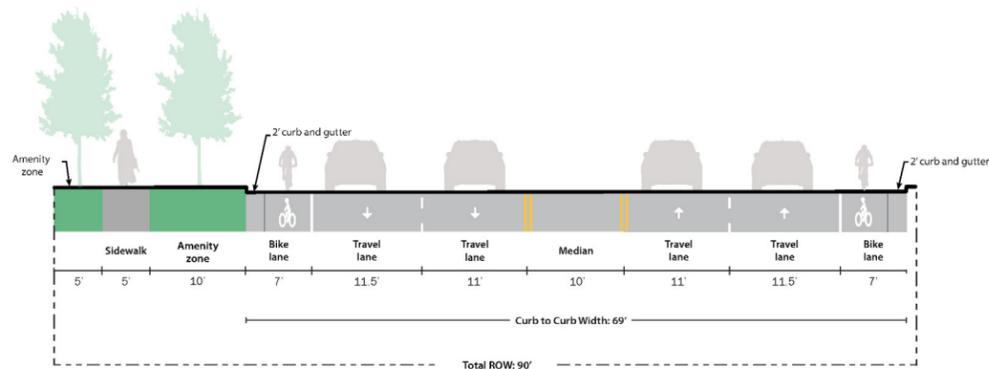


Figure 31: Section C (72nd Avenue East of Depew Street – Looking East)

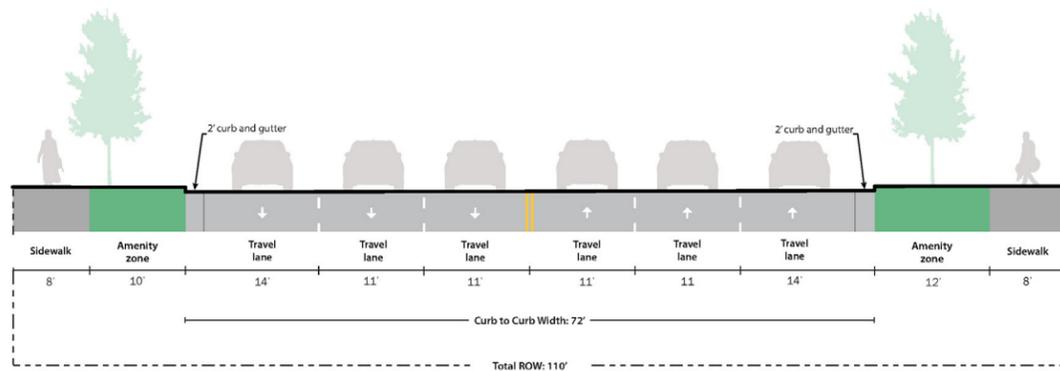


Figure 32: Section D (72nd Avenue West of Sheridan Boulevard – Looking East)

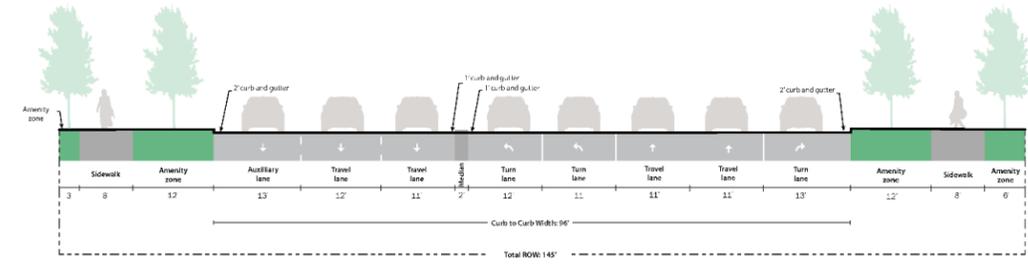


Figure 33: Section E (72nd Avenue West of Vrain Street – Looking East)

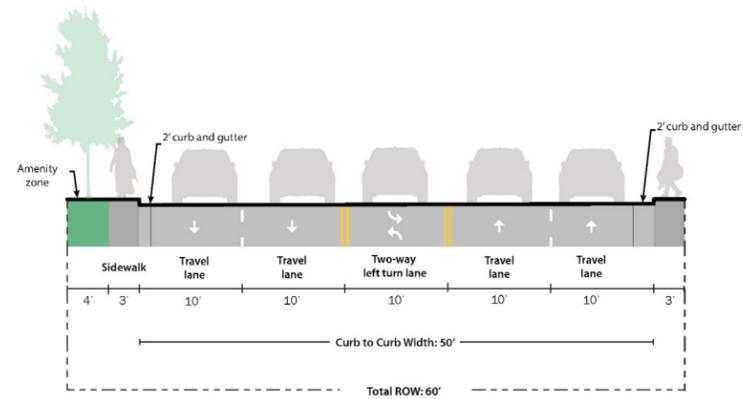


Figure 34: Section F (72nd Avenue West of Raleigh Street – Looking East)

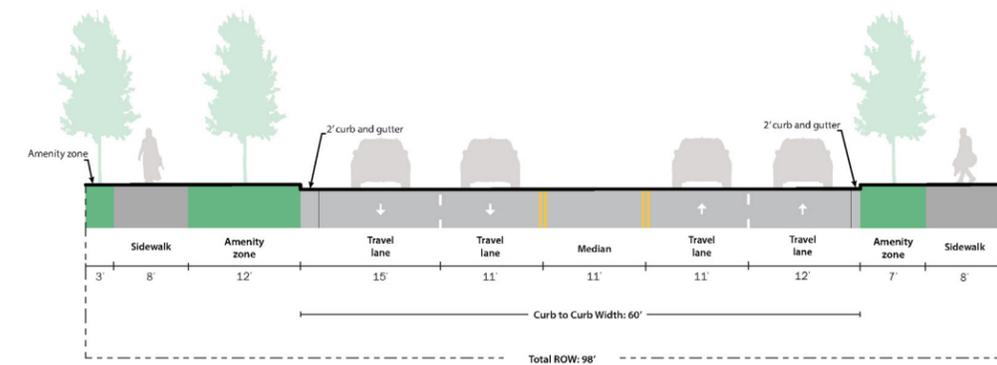


Figure 35: Section G (72nd Avenue West of Newton Street – Looking East)

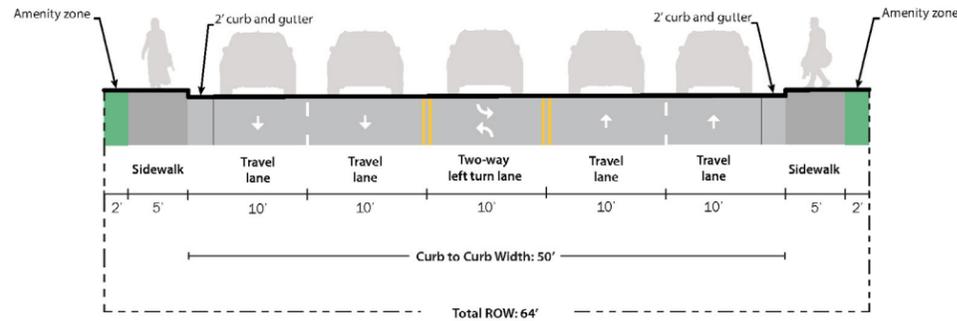


Figure 36: Section H (72nd Avenue West of Julian Street – Looking East)

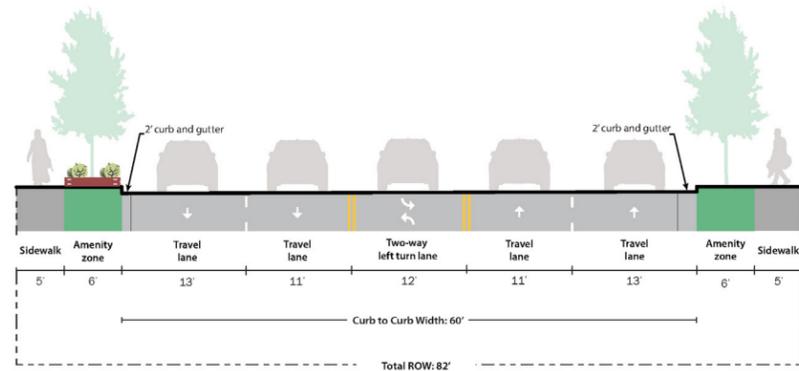


Figure 37: Section I (72nd Avenue West of Clay Street – Looking East)

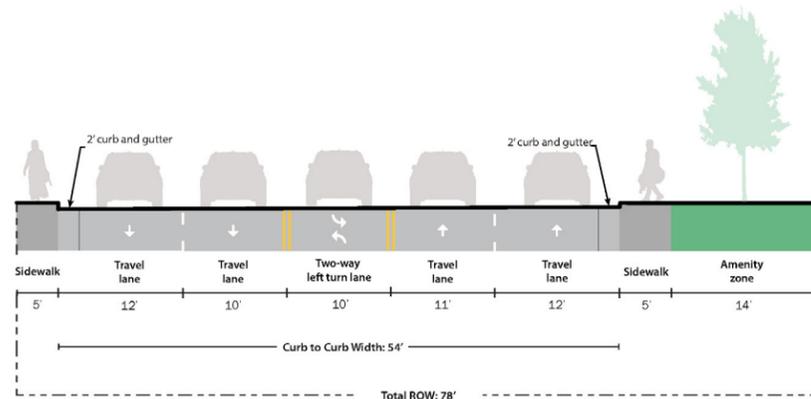


Figure 38: Section J (72nd Avenue West of Bryant Street – Looking East)

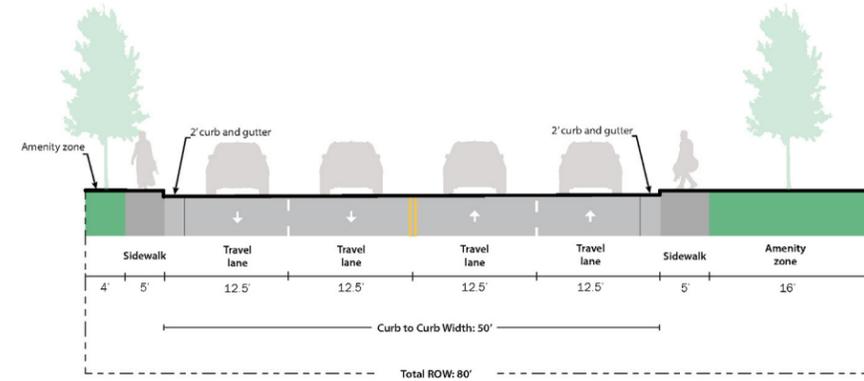
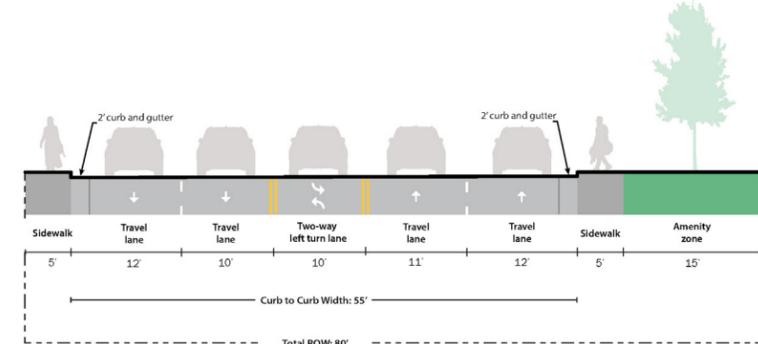


Figure 39: Section K (72nd Avenue West of Zuni Street – Looking East)



1.3.3 Environmental Overview

An Environmental Overview was completed to identify environmental resources that may affect the alternatives development and evaluation process and/or have major impacts to future environmental clearances and permitting processes. The review relied upon readily available existing data and “windshield” survey findings. The following environmental resources were reviewed and summarized:

- Threatened and endangered species, species of concern, migratory birds
- Historic and archaeological resources
- Environmental Justice communities
- Parks, open spaces, trails, recreational resources, and Section 6(f)
- Traffic noise
- Visual resources
- Hazardous materials

Relevant information is included for each resource including maps, photographs, and next steps to consider as this project advances from planning to implementation. The full overview is attached as **Appendix A**.

1.4 Mobility Assessment

1.4.1 People Walking

Summary

Adjacent land uses, whether residential, commercial or mixed-use, influence the current urban design elements and existing infrastructure present along 72nd Avenue. Currently, the high-speed conditions along the corridor may dissuade users from traveling on foot where existing facilities are lacking. A summary map of existing pedestrian facilities conditions is shown below in **Figure 40**.

Sidewalks

The majority of the 72nd Avenue corridor features sidewalks on both sides of the street, with a checkered pattern of detached and attached sidewalks present. A sidewalk gap does exist on the south side of 72nd Avenue between Elliot Circle and Clay Street. The sidewalks along the corridor range from 4 to 8 feet in width. Detached sidewalks are more common in two portions of the corridor: in a primarily residential portion on the western end (between Sheridan and Pierce Streets) and in a more commercial zone between Meade Street and just east of Federal Boulevard.

Crosswalks

In the residential portions of the corridor, crosswalks are non-existent or few and far between, creating challenging conditions for those accessing bus stops, parks and other amenities. Crossing at the Sheridan Boulevard intersections involves a two-staged crossing, including waiting at corner islands before navigating through traffic turning from or turning onto Sheridan Boulevard.

Curb Ramps

Though most curb ramps at major intersections are ADA compliant, many of the curb ramps at corners where residential intersections meet 72nd Avenue are non-compliant. Lack of compliance compromises the ability of those using mobility devices, pushing strollers or navigating with packages or suitcases. Findings and guidance from the City of Westminster’s 2019 Americans with Disabilities Act Transition Plan may support future accessibility upgrades along corridors such as 72nd Avenue.

Pedestrian Volumes

The project team collected pedestrian and bicyclist counts (including people in crosswalks) at intersections along 72nd Avenue on Saturday, February 25, 2023 and Tuesday, February 28, 2023. These counts are summarized in **Table 1** and **Table 2** below. Not surprisingly, the signalized intersections experienced the highest pedestrian and bicyclist volumes, especially at Hooker Street, Pierce Street, and Raleigh Street.

Table 1: Weekday (Tuesday) Peak Hour AM and PM Counts

Intersection	Peak Hour	Ped/Bike Peak Hour Counts
72nd Avenue & Zuni Street	7:30 – 8:30 am	5
72nd Avenue & Zuni Street	4:00 – 5:00 pm	8
72nd Avenue & Federal Boulevard	7:30 – 8:30 am	18
72nd Avenue & Federal Boulevard	5:00 – 6:00 pm	14
72nd Avenue & Hooker Street	7:45 – 8:45 am	11
72nd Avenue & Hooker Street	4:00 – 5:00 pm	27
72 nd Avenue & Irving Street	7:45 – 8:45 am	9
72nd Avenue & Irving Street	4:00 – 5:00 pm	16
72nd Avenue & Raleigh Street	7:45 – 8:45 am	21
72nd Avenue & Raleigh Street	4:00 – 5:00 pm	13
72nd Avenue & Winona Street	7:45 – 8:45 am	3
72nd Avenue & Winona Street	4:45 – 5:45 pm	7
72nd Avenue & Yates Street	7:45 – 8:45 am	7
72nd Avenue & Yates Street	5:00 – 6:00 pm	10
72nd Avenue & Sheridan Boulevard	7:15 – 8:15 am	13
72nd Avenue & Sheridan Boulevard	4:45 – 5:45 pm	9
72nd Avenue & 5400 West	7:30 – 8:30 am	2
72nd Avenue & 5400 West	4:30 – 5:30 pm	8
72nd Avenue & Depew Street	7:30 – 8:30 am	7
72nd Avenue & Depew Street	4:30 – 5:30 pm	7
72nd Avenue & Lamar Street	7:45 – 8:45 am	0
72 nd Avenue & Lamar Street	4:45 – 5:45 pm	2
72nd Avenue & Pierce Street	7:15 – 8:15 am	22
72nd Avenue & Pierce Street	3:15 – 4:15 pm	14

Table 2: Weekend (Saturday) Peak Hour Counts

Intersection	Peak Hour	Ped/Bike Peak Hour Counts
72nd Avenue & Hooker Street	11:45 am – 12:45 pm	19
72nd Avenue & Yates Street	12:00 – 1:00 pm	5
72nd Avenue & 5400 West	12:00 – 1:00 pm	9

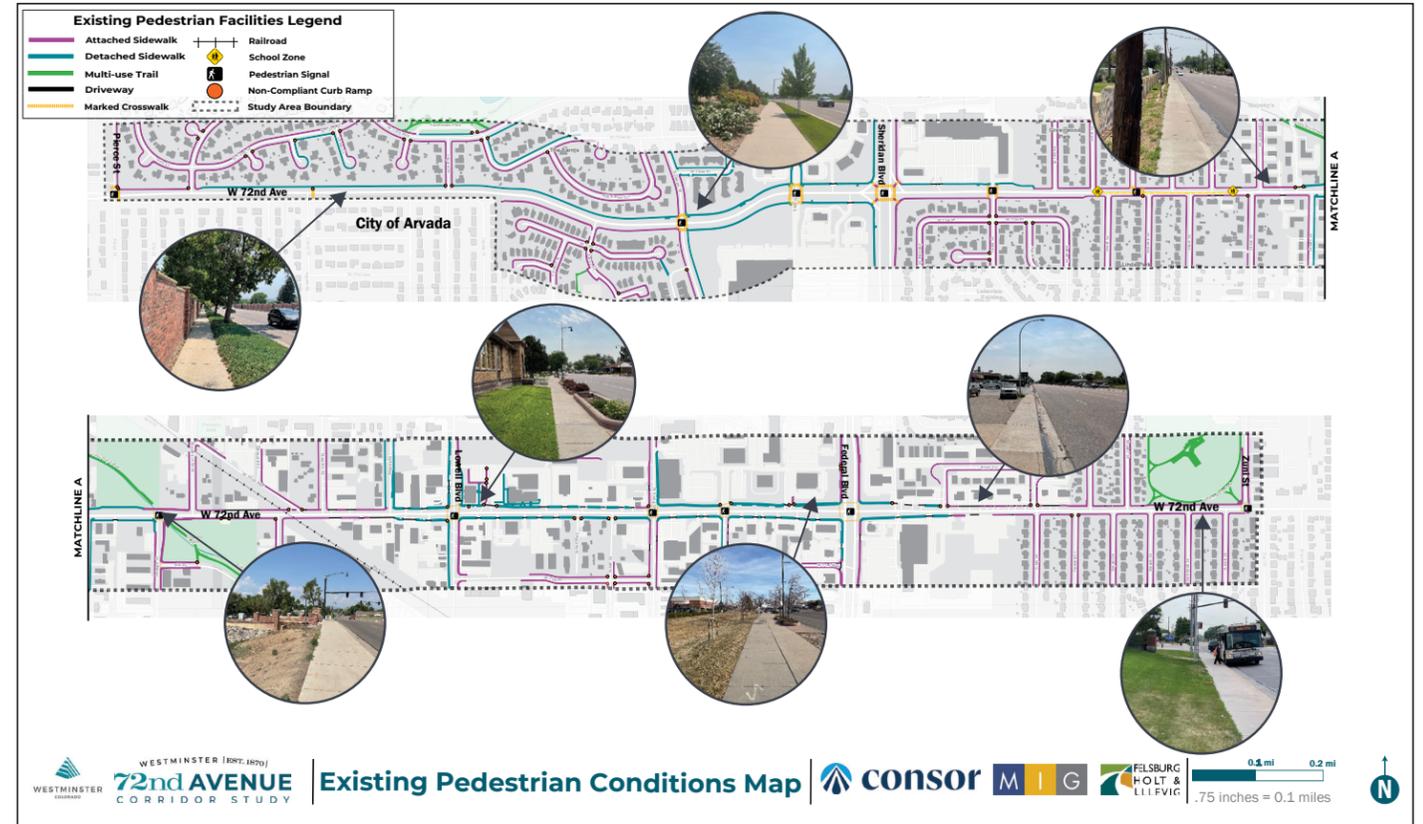


Figure 40: Existing Pedestrian Conditions Map

1.4.2 People Biking

Summary

Currently, 72nd Avenue lacks a continuous network of safe bicycling facilities along the corridor. People bicycling may choose to utilize the sidewalks and sidepaths rather than ride with vehicular traffic. Those approaching 72nd Avenue from parallel routes with existing facilities (such as Lowell Boulevard) typically meet challenging crossing conditions at intersections.

Existing & Planned Bicycle Facilities

A mix of bicycle facilities currently exist along the corridor. An on-street, seven-foot wide bicycle lane is present between Pierce Street and Depew Street. Detached multiuse paths exist between Depew Street and Sheridan Boulevard. No other bicycle facilities exist on 72nd Avenue in the study area. Bicycle facilities cross the corridor at Lowell Boulevard, Irving Street and Bradburn Boulevard.

The 2021 Transportation & Mobility Plan developed a future conditions assessment for 72nd Avenue, including calling for widening sidewalks to multiuse sidewalks along both sides of 72nd Avenue from Sheridan Boulevard to Zuni Street and upgrading the existing bike lanes between Pierce Street and Depew Street to buffered bike lanes. A summary map of both existing bicycle facilities and those proposed based on Westminster's 2021 Transportation & Mobility Plan is shown below in **Figure 41**.

A Level of Traffic Stress (LTS) developed for the corridor mapped ranges from 1 (little traffic stress) to 4 (the highest traffic stress). The majority of the study area is categorized as a Level 4 LOS (from Depew St to Zuni St) with the remainder a Level 3 (Pierce St to Depew St). View the LTS map on Page B-41 in the [Current and Future Conditions Report](#).

1.4.3 Trail Users

There are over 150-miles of multi-use trails within Westminster. Little Dry Creek Trail is one of the city's important regional routes, and trail users travel the trail via an underpass at 72nd Avenue. Little Dry Creek extends from Clear Creek Trail to the south, alongside Westminster Station, north to Standley Lake Regional Park. 72nd Avenue corridor users can also connect with the Skyline Vista Park trail system between Beach Street and Zuni Street.

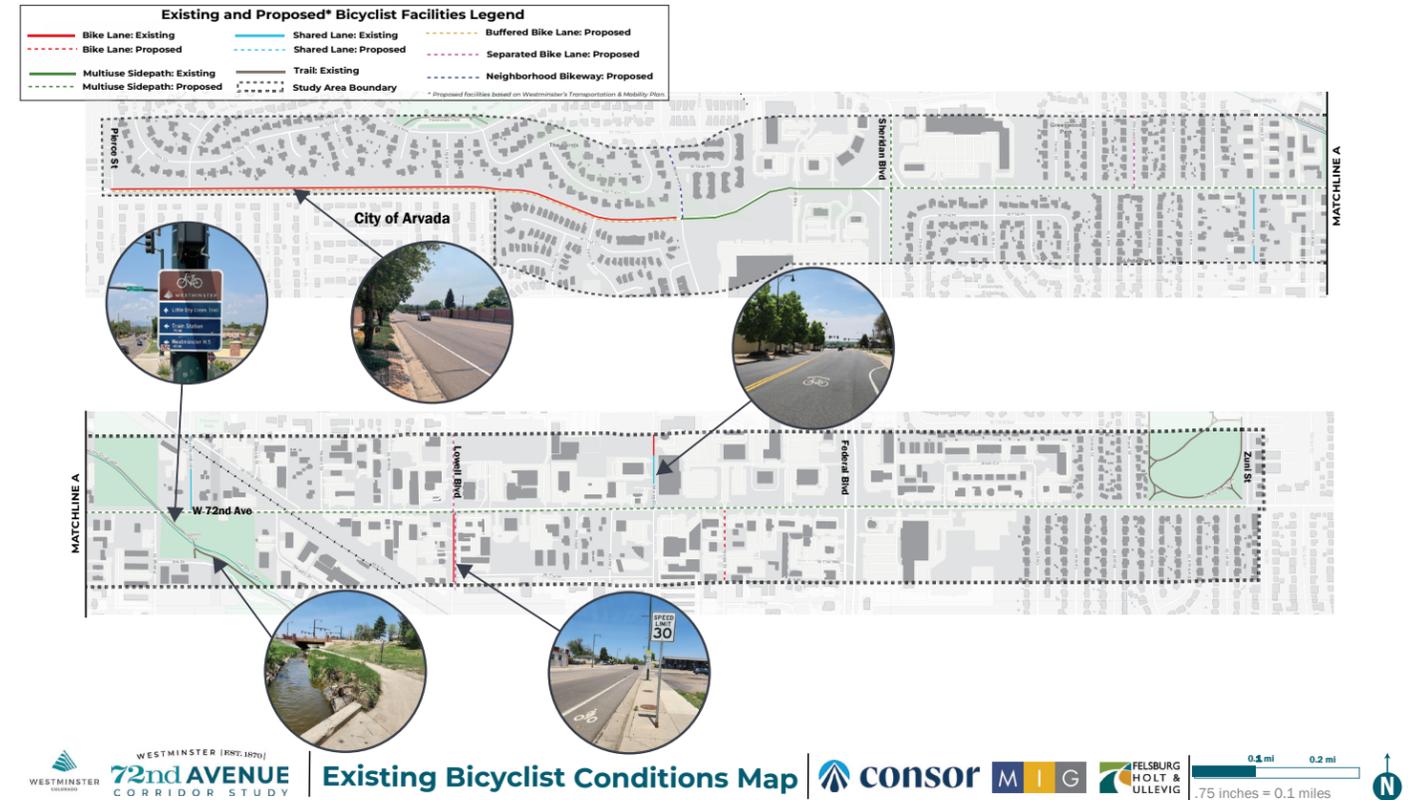


Figure 41: Bicyclist Conditions Map

1.4.4 Transit Operations and Amenities

Summary

Three RTD bus routes service the 72nd Avenue study area. Route 72 runs along 72nd Avenue from Arvada to Commerce City. Route 51 runs along Sheridan Boulevard to Englewood. Route 31 extends north on Federal Boulevard to Front Range Community College and south to the Decatur-Federal Station W line connection. Westminster Station is located just south of the corridor, between Lowell Boulevard and Federal Boulevard, and offers access via the B Line commuter rail daily, on an hourly frequency, to Union Station in downtown Denver. A summary map of existing transit conditions is shown below in **Figure 42**.

Bus Service

Table 3 summarizes the current service levels for the three aforementioned routes that serve the 72nd Avenue study area.

Table 3: Bus Service at Stops in the 72nd Avenue Study Area

Route	Name	Days of Operation	Peak Frequency
72	72nd Avenue	Monday – Saturday	1-hour
51	Sheridan Boulevard	Monday – Sunday	30-minutes
31	Federal Boulevard	Monday – Sunday	10-minutes

* Route 31 runs along Federal Boulevard and Route 51 runs along Sheridan Boulevard, both within the study area.

Bus Stops

The 2021 Transportation & Mobility Plan recommends conducting a bus stop conditions inventory and corridor study to identify needed stop amenity upgrades, including both physical additions such as shelters and first and final mile connections.

Bus Stop Amenities

- There are 24 bus stops along 72nd Avenue in the study area:
 - Only two of the stops contain shelters.
 - 18 of the 24 stops (75%) contain only signs.
 - Five stops have trash cans and benches.
- Bus stops between Pierce Street and Sheridan Boulevard have no amenities, except for the 72nd Avenue and Sheridan Boulevard eastbound stop.

Bus Stop Access Challenges

- Multiple stops present challenges for users with mobility devices (such as wheelchairs), and small sidewalk widths may force users to travel on-street.
- Legibility of access points is also a challenge, as at 72nd Avenue and Ingalls Street westbound, where the sidewalk is hidden behind a brick wall.

Ridership

- Though not included in the study area, Westminster Station Gate D has a 2022 Average Weekday Daily *Boardings* (passengers entering the bus) of 10 (eastbound) and 12 (westbound), and an Average Weekday Daily *Alightings* (passengers exiting the bus) of 9 (eastbound) and 13 (westbound).
- The stops at Sheridan, Federal and 5400 Block have the highest ridership in the study area. View **Table 4** below for a full ridership summary by stop.

Table 4: Bus Stops, Amenities, and Ridership in the 72nd Avenue Study Area

Stop	Amenities	2022 Average Weekday Daily Boardings/Alightings
72nd Avenue & Lamar Street (Eastbound)	None	.2 / .6
72nd Avenue & Ingalls Street (Eastbound)	None	.1 / .2
72nd Avenue & Ingalls Street (Westbound)	None	.1 / .3
72nd Avenue & Depew Street (Eastbound)	None	.2 / .1
72nd Avenue & Depew Street (Westbound)	None	.5 / .2
72nd Avenue & 5400 Block (Eastbound)	None	10 / 4
72nd Avenue & Sheridan Boulevard (Eastbound)	Trash can, bench, shelter	10 / 1
72nd Avenue & Sheridan Boulevard (Westbound)	None	3 / 18
72nd Avenue & Yates Street (Westbound)	Bus pad	.1 / .5
72nd Avenue & Xavier Street (Eastbound)	None	.3 / .1
72nd Avenue & Xavier Street (Westbound)	None	1 / 7
72nd Avenue & Utica Street (Eastbound)	None	1 / .7
72nd Avenue & Utica Street (Westbound)	None	1 / 1
72nd Avenue & Raleigh Street (Eastbound)	None	5 / 2
72nd Avenue & Bradburn Street (Westbound)	None	3 / 5

72nd Avenue & Newton Street (Eastbound)	None	.3 / 3
72nd Avenue & Newton Street (Westbound)	None	1 / 1
72nd Avenue & Lowell Boulevard (Eastbound)	Trash can, bench	5 / 3
72nd Avenue & Lowell Boulevard (Westbound)	Trash can, bench	4 / 4
72nd Avenue & Irving Street (Eastbound)	None	1 / 6
72nd Avenue & Irving Street (Westbound)	Trash can, bench	5 / 2
72nd Avenue & Federal Boulevard (Eastbound)	Trash can, bench, shelter	9 / 4
72nd Avenue & Federal Boulevard (Westbound)	None	6 / 12
72nd Avenue & Clay Street (Eastbound)	None	1 / 1
72nd Avenue & Eliot Street (Westbound)	None	1 / 4
72nd Avenue & Berthoud Street	None	.4 / 3
72nd Avenue & Alcott Street (Westbound)	None	3 / 1

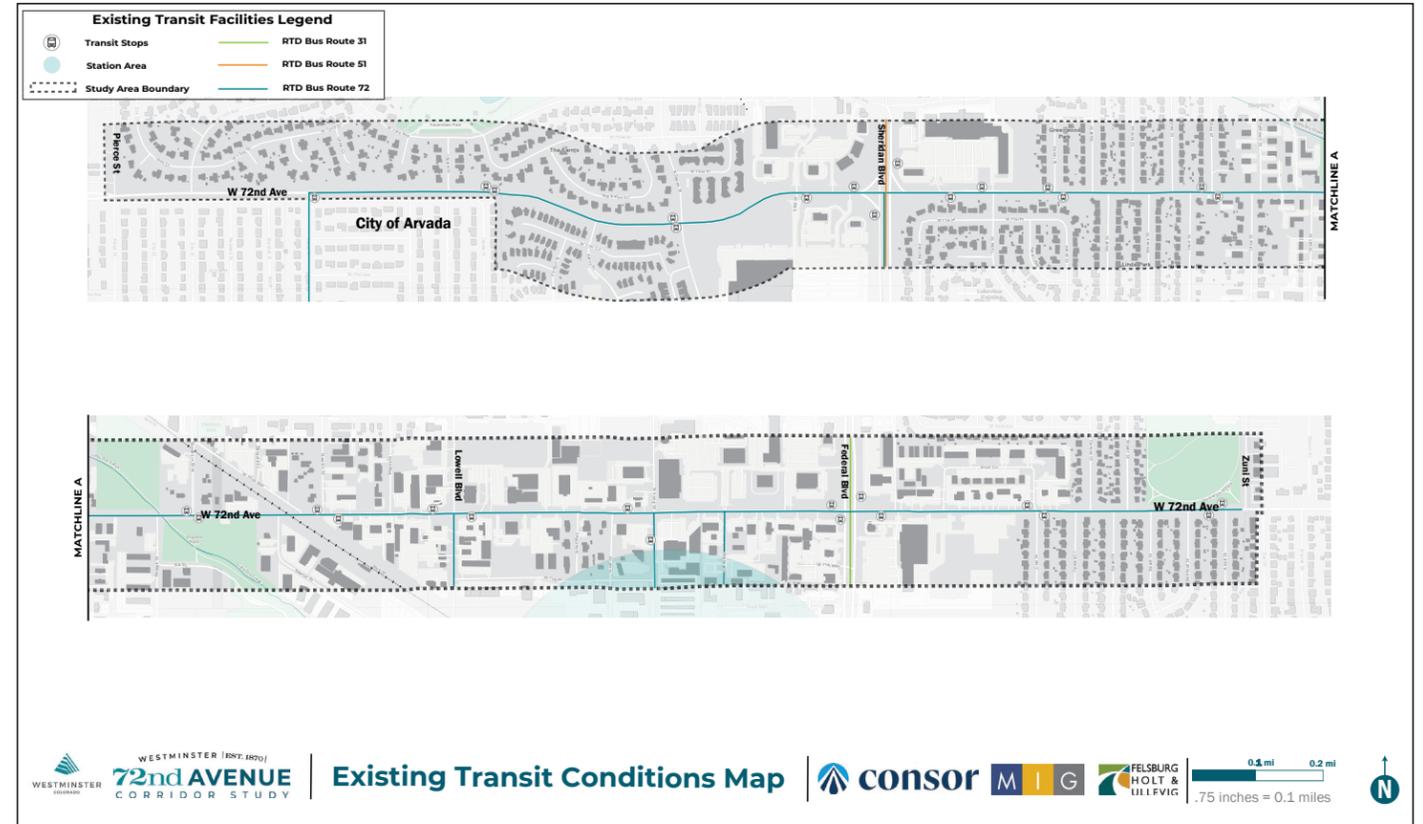


Figure 42: Existing Transit Conditions Map

1.4.5 People Driving

Summary

72nd Avenue is owned and managed by the City of Westminster. The corridor’s traffic signals are operated either by the City of Westminster, City of Arvada, or the Colorado Department of Transportation (CDOT). The posted speed limit varies from 25 MPH (in a school zone) to 40 MPH throughout the study area. Speed limit signs exist on both sides of the roadway. Traffic volumes along the corridor are between 5,178 and 10,574 vehicles per day. See **Figure 44** for a summary map of existing driving conditions.

Traffic Volumes & Speeds

The project team collected average daily traffic (ADT) and speeds at five locations in the study area on Tuesday, February 29 and Wednesday, March 1 (view Table 5 below). The results suggest that volumes are highest (over 10,000) west of Julian Street and 85th percentile speeds are consistently between 5 to 8 mph above the speed limit throughout the corridor. Additionally, westbound speeds tended to be slightly higher than eastbound.

The majority of vehicles reported at the four locations below were Class 2 – Passenger Cars (80-84%), with the remainder of vehicles classified as either Class 3 – Other Two-Axle, Four-Tire Single Unit Vehicles (including pickups, vans, campers, motor homes and ambulances, representing 13-15%), larger axle vehicles/trailers (3-4%) and motorcycles (under 1%).

Table 5: Weekday (Tuesday & Wednesday) Traffic Speeds and Volumes

Location on 72nd Avenue	Eastbound Speed (85 th percentile)	Westbound Speed (85 th percentile)	Eastbound Average Daily Traffic (ADT)	Westbound Average Daily Traffic (ADT)
West of Eaton Street	40 mph	41 mph	5,868	5,729
West of Wolff Street	35 mph	36 mph	7,856	8,342
West of Julian Street	36 mph	37 mph	10,375	10,574
East of Canosa Court	38 mph	36 mph	6,406	6,401

Access

The majority of driveways along the corridor provide access to a variety of businesses in the commercial areas. However, there are also a handful of access points in residential segments, such as between Vrain Street and Stuart Street. Driveway pans can prove problematic to safe pedestrian travel, particularly in locations of attached and narrow sidewalks, or where sidewalk gaps exist (see **Figure 43**). Those using mobility devices are particularly inconvenienced by large and frequent driveway pans, which can be challenging to navigate, force users closer to traffic and introduce potential conflicts between vehicles entering or existing the access point and those navigating sidewalks.



Figure 43: Driveway entrances near Guadalajara Restaurant east of Federal Boulevard

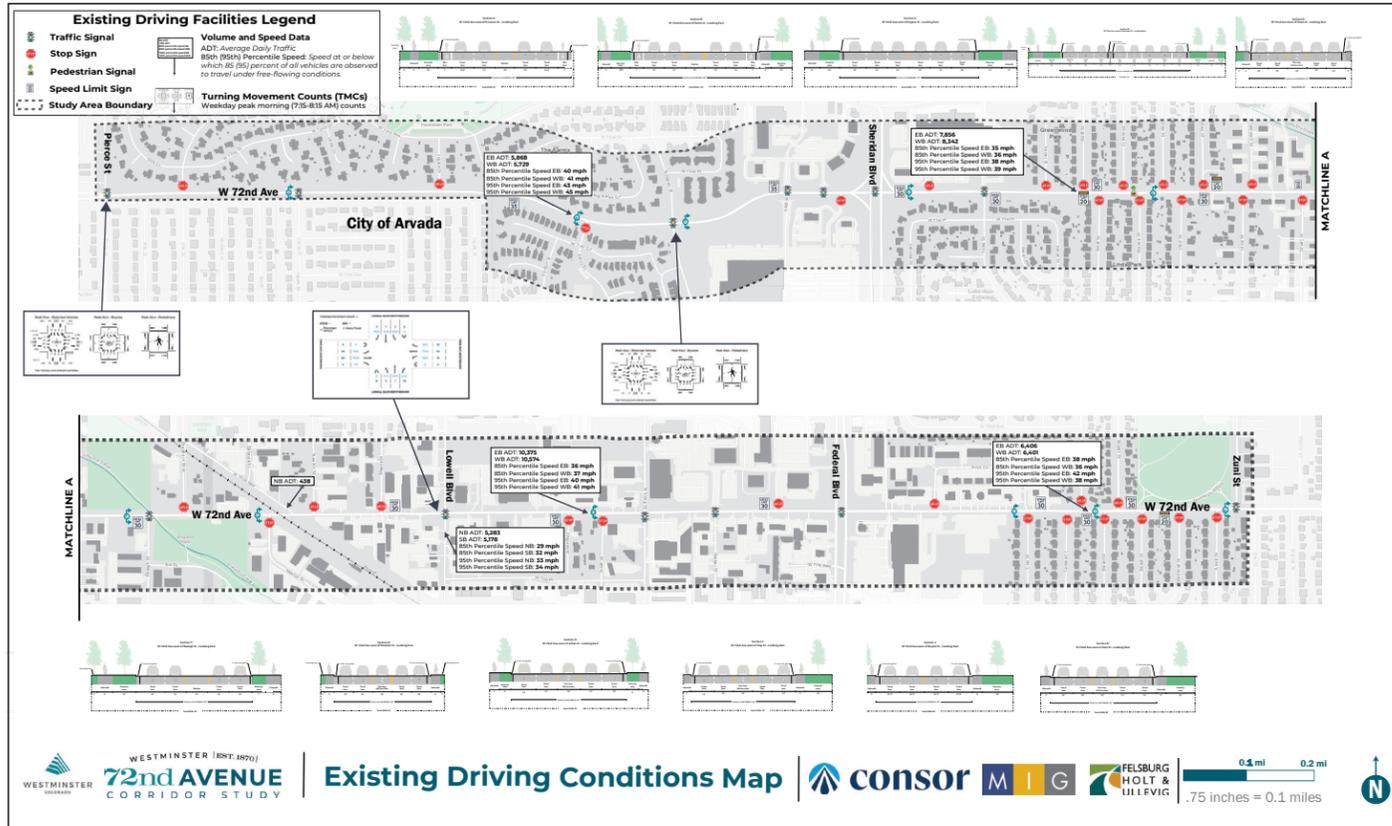


Figure 44: Existing Driving Conditions Map

1.4.6 Turning Movement Counts

The following diagrams show the turning movements collected for vehicles at 13 intersections along 72nd Avenue. Data for all modes was collected on Tuesday, February 28, 2023 during the AM and PM peak hours. See **Table 1** and **Table 2** above for pedestrian and bicycle counts summaries.

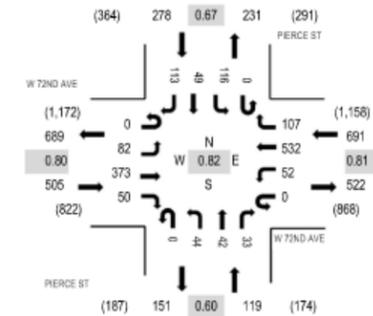


Figure 45: 72nd & Pierce St AM Peak Hour TMC

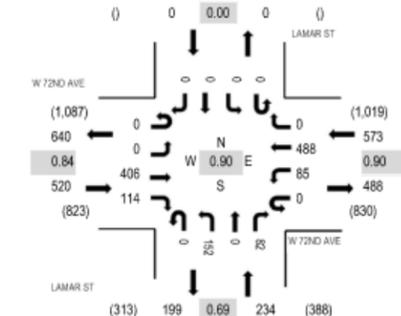


Figure 46: 72nd & Lamar St AM Peak Hour TMC

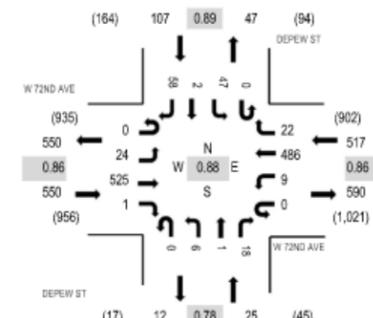


Figure 47: 72nd & Depew St AM Peak Hour TMC

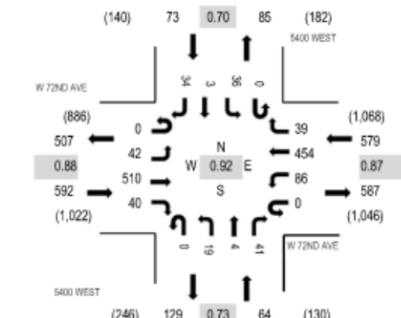


Figure 48: 72nd & 5400 West AM Peak Hour TMC

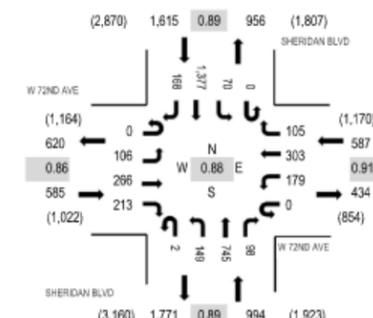


Figure 49: 72nd & Sheridan Blvd AM Peak Hour TMC

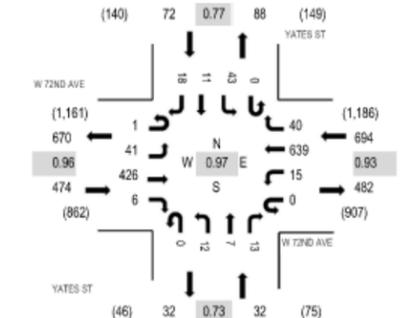


Figure 50: 72nd & Yates St AM Peak Hour TMC

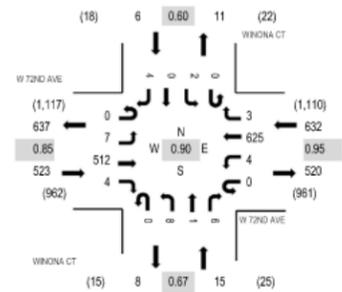


Figure 51: 72nd & Winona Ct AM Peak Hour TMC

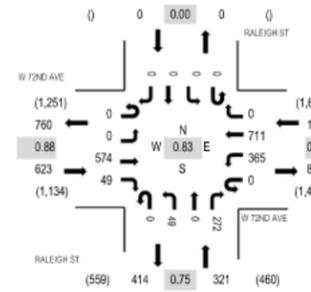


Figure 52: 72nd & Raleigh St AM Peak Hour TMC

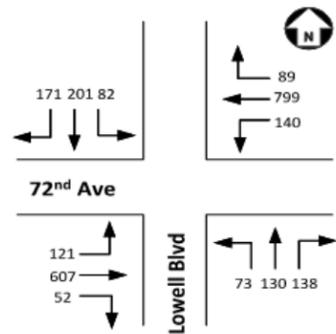


Figure 53: 72nd & Lowell Blvd AM Peak Hour TMC

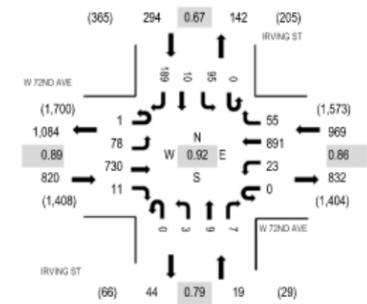


Figure 54: 72nd & Irving St AM Peak Hour TMC

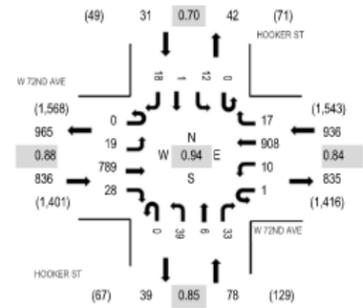


Figure 55: 72nd & Hooker St AM Peak Hour TMC

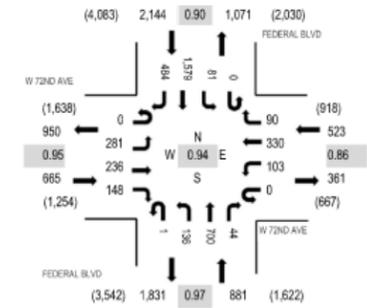


Figure 56: 72nd & Federal Blvd AM Peak Hour TMC

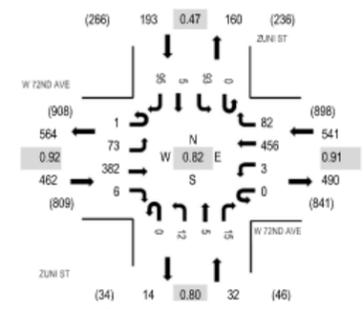


Figure 57: 72nd & Zuni St AM Peak Hour TMC

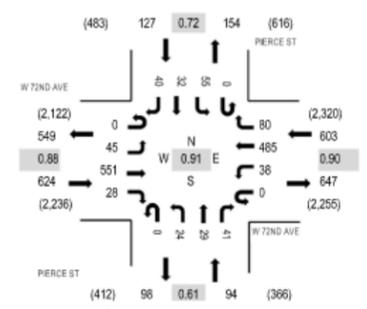


Figure 58: 72nd & Pierce St PM Peak Hour TMC

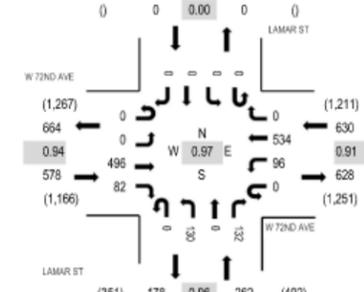


Figure 59: 72nd & Lamar St PM Peak Hour TMC

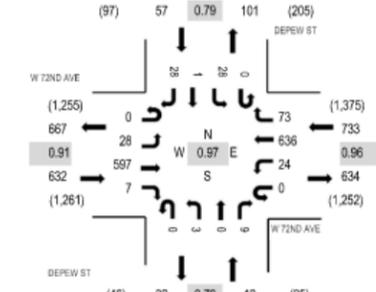


Figure 60: 72nd & Depew St PM Peak Hour TMC

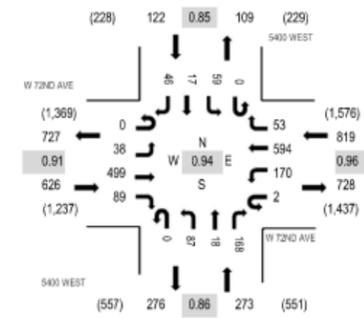


Figure 61: 72nd & 5400 West PM Peak Hour TMC

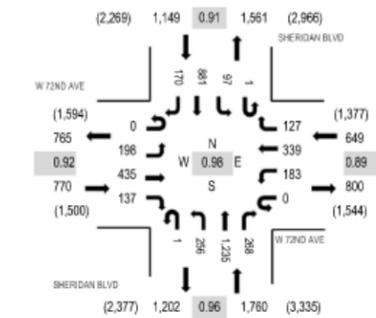


Figure 62: 72nd & Sheridan Blvd PM Peak Hour TMC

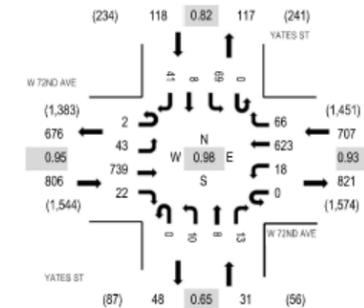


Figure 63: 72nd & Yates St PM Peak Hour TMC

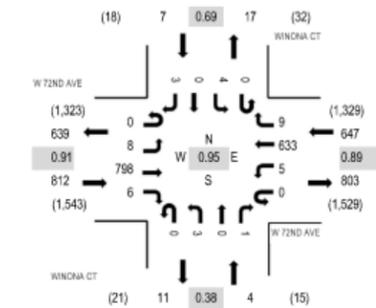


Figure 64: 72nd & Winona Ct PM Peak Hour TMC

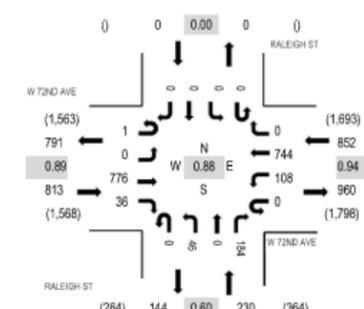


Figure 65: 72nd & Raleigh St PM Peak Hour TMC

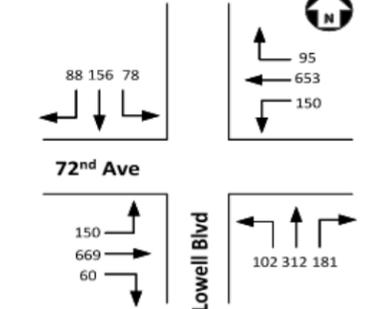


Figure 66: 72nd & Lowell Blvd PM Peak Hour TMC

Table 7: Average Vehicle Control Delay (seconds)

Intersection	AM Peak LOS (Delay in seconds/vehicle)	PM Peak LOS (Delay in seconds/vehicle)
72nd Avenue & Pierce Street	C (23.3)	B (13.7)
EB Left	A(8.5)	A (7.0)
EB Through	B (11.7)	B (10.9)
EB Right	B (10.7)	A (9.0)
WB Left	A (8.1)	A (7.0)
WB Through	A (0.3)	A (0.2)
WB Right	A (0.3)	A (0.2)
NB Left/Through/Right	E (72.9)	E (61.4)
SB Left/Through	F (89.2)	E (57.5)
SB Right	E (66.6)	D (53.2)
72nd Avenue & Lamar Street	A (7.6)	B (13.6)
EB Through/Right	A (3.7)	B (15.1)
WB Left	A (4.0)	A (5.6)
WB Through	A (3.6)	A (4.2)
NB Left/Right	C (26.1)	C (32.1)
72nd Avenue & Depew Street	A (6.0)	A (4.3)
EB Left	A (3.8)	A (3.9)
EB Through/Right	A (3.5)	A (3.3)
WB Left	A (3.7)	A (3.7)
WB Through	A (3.2)	A (3.1)
WB Right	A (2.7)	A (2.5)
NB Left	C (27.0)	C (26.7)
NB Through/Right	C (25.4)	C (26.0)
SB Left	C (26.7)	C (26.7)
SB Through/Right	C (27.8)	C (27.2)
72nd Avenue & 5400 West	A (9.4)	B (12.6)
EB Left	A (2.7)	A (7.2)
EB Through/Right	A (4.0)	B (10.1)
WB Left	A (2.6)	A (6.7)
WB Through	A (3.8)	A (8.8)
WB Right	A (3.3)	A (7.3)
NB Left	E (58.0)	C (25.8)
NB Through	D (53.7)	C (21.7)
NB Right	E (59.5)	C (29.7)
SB Left	E (56.4)	C (23.5)
SB Through/Right	E (58.1)	C (22.8)
72nd Avenue & Sheridan Boulevard	C (31.6)	D (38.2)
EB Left	E (58.7)	E (57.1)

EB Through	E (59.0)	E (72.5)
EB Right	Free	Free
WB Left	E (57.5)	E (62.9)
WB Through	D (50.2)	E (67.6)
WB Right	Free	Free
NB Left	E (77.7)	D (49.3)
NB Through	C (21.0)	B (17.3)
NB Right	Free	Free
SB Left	D (44.7)	E (60.6)
SB Through	B (16.8)	C (24.0)
SB Right	Free	Free
72nd Avenue & Yates Street	A (4.9)	A (6.0)
EB Left	A (3.5)	A (4.6)
EB Through	A (2.7)	A (4.1)
EB Right	A (2.3)	A (3.1)
WB Left	A (3.1)	A (5.3)
WB Through/Right	A (2.9)	A (3.9)
NB Left/Through/Right	C (26.7)	C (24.1)
SB Left/Through/Right	C (28.1)	C (26.8)
72nd Avenue & Winona Court	A (3.1)	A (3.3)
EB Through	A (3.1)	A (3.4)
WB Through	A (3.2)	A (3.2)
72nd Avenue & Raleigh Street	B (13.3)	A (9.8)
EB Through/Right	B (16.0)	B (14.7)
WB Left	C (28.1)	A (7.2)
WB Through	A (3.3)	A (3.5)
NB Left	D (40.6)	D (39.5)
NB Right	A (8.4)	A (8.1)
72nd Avenue & Lowell Boulevard	B (19.0)	C (30.0)
EB Left	A (9.4)	B (12.3)
EB Through	A (0.4)	B (19.9)
EB Right	A (0.1)	A (1.0)
WB Left	A (9.0)	C (21.7)
WB Through	A (7.4)	D (35.6)
WB Right	A (6.1)	B (12.1)
NB Left	D (42.7)	C (33.1)
NB Through/Right	D (51.5)	D (46.9)
SB Left	D (41.9)	C (34.8)
SB Through	D (54.2)	D (54.4)
SB Right	E (56.0)	A (3.8)
72nd Avenue & Irving Street	B (12.1)	A (6.6)
EB Left	A (5.5)	A (3.0)
EB Through/Right	A (2.3)	A (4.5)

WB Left	A (5.6)	A (1.2)
WB Through	A (0.5)	A (2.4)
WB Right	A (0.1)	A (0.0)
NB Left	D (44.9)	E (56.1)
NB Through/Right	D (44.8)	C (24.2)
SB Left	D (49.9)	E (60.1)
SB Through	D (44.5)	D (49.2)
SB Right	F (88.0)	B (15.9)
72nd Avenue & Hooker Street	A (3.7)	A (5.2)
EB Left	A (2.2)	A (4.0)
EB Through/Right	A (0.5)	A (0.8)
WB Left	A (2.4)	A (4.2)
WB Through	A (0.2)	A (0.3)
WB Right	A (0.0)	A (0.1)
NB Left	E (55.4)	D (47.7)
NB Through/Right	E (58.1)	D (49.5)
SB Left/Through/Right	E (55.5)	D (54.6)
72nd Avenue & Federal Boulevard	C (32.9)	C (33.1)
EB Left	E (68.8)	E (63.9)
EB Through	D (50.3)	D (40.9)
EB Right	D (53.5)	D (40.3)
WB Left	E (59.8)	E (56.9)
WB Through	E (64.1)	D (48.4)
WB Right	D (36.5)	D (43.9)
NB Left	E (67.5)	E (63.4)
NB Through	B (16.7)	C (27.2)
NB Right	A (7.4)	B (12.6)
SB Left	D (53.4)	D (47.7)
SB Through	C (20.3)	C (21.0)
SB Right	C (22.9)	A (9.3)
72nd Avenue & Zuni Street	A (8.2)	A (3.7)
EB Left	A (6.9)	A (2.4)
EB Through	A (5.4)	A (2.3)
WB Through/Right	A (3.2)	A (3.0)
SB Left	D (43.0)	C (30.7)
SB Right	B (12.2)	B (14.5)

All intersections operate at an overall LOS “D” or better during both the morning and evening peak hours. Detailed LOS and queuing reports can be found in **Appendix B**.

The following intersections have one or more movements that operate at or below a LOS “E” during either of the peak hours studied:

- 72nd Avenue & Pierce Street

- 72nd Avenue & 5400 West
- 72nd Avenue & Sheridan Boulevard
- 72nd Avenue & Lowell Boulevard
- 72nd Avenue & Irving Street
- 72nd Avenue & Hooker Street
- 72nd Avenue & Federal Boulevard

1.4.8 Travel Demand Modeling

Background

The Denver Regional Council of Governments (DRCOG) Focus 2.3.1 Travel Demand Model was used to develop long-range travel demand forecasts for the project corridor. The travel demand modeling process used a comparison of existing traffic counts with the 2020 base year model volume to adjust 2050 model forecasts according to procedures described in the National Cooperative Highway Research Program Report (NCHRP) 765. These forecasts were used to develop 2050 average annual daily traffic (AADT) and peak hour traffic volumes for the project corridor.

Model Transportation Network

In the travel demand model, the 2020 and 2050 transportation network is reflected as follows:

- Principal Arterial
- Four-lane (two lanes per direction)

Table 8 summarizes daily traffic volumes on 72nd Avenue obtained from the travel demand model for 2020 and 2050. The 2050 Forecasts are adjusted using NCHRP 765 methodology. Traffic growth between 2020 and 2050 is generally 1% per year.

Table 8: Daily Forecasts

Location	2023 Counts	2050 Forecasts
East of Canosa Street	12,800	18,900
West of Julian Street	20,900	25,800
West of Wolff Street	16,200	21,200
West of Eaton Street	11,600	17,500

Model Socioeconomics

Model socioeconomics were evaluated to verify expected population and employment growth. The maps in **Appendix C** depict 2020 and 2050 model population and employment within the project corridor vicinity, and the model population and employment growth between 2020 and 2050 within the project corridor vicinity.

1.5 Safety Assessment

1.5.1 Crash Analysis

Analysis Tools & Methodology

Crash data for the years 2015-2019 was provided by CDOT. There were 736 crashes during the 2015-2019 analysis period, with a breakdown of crashes by year shown in **Figure 71**. Both fatal crashes that occurred during the analysis period involved bicyclists or pedestrians. Crashes most commonly occurred on weekdays (see **Figure 72**), during Winter, Spring and Fall (see **Figure 73**) and during typical periods of rush hour traffic, such as between 7:00 – 8:00 AM and between 3:00 – 5:00 PM (see **Figure 74**).

72nd Avenue is considered a DRCOG High Injury Network (HIN) Corridor (see [HIN map](#)), with the portion of the study area between Sheridan Boulevard and Federal Boulevard considered a Critical Corridor. Critical Corridors identify the top 50% of killed and seriously injured (KSI) crash density corridors along the regional HIN. Locations with the highest crash frequency are highlighted in further detail below. Also see **Figure 75** for a map of all reported crashes during the analysis period.

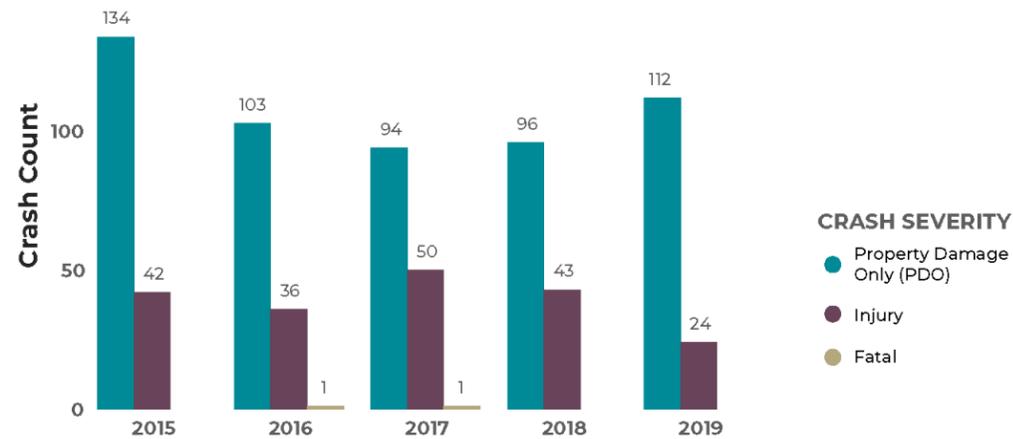


Figure 71: Crash Counts by Year and Severity

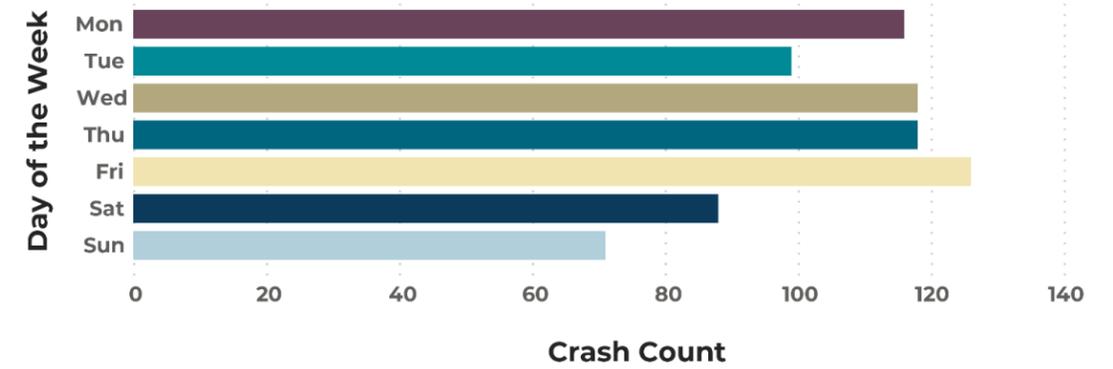


Figure 72: Crash Counts by Day of Week

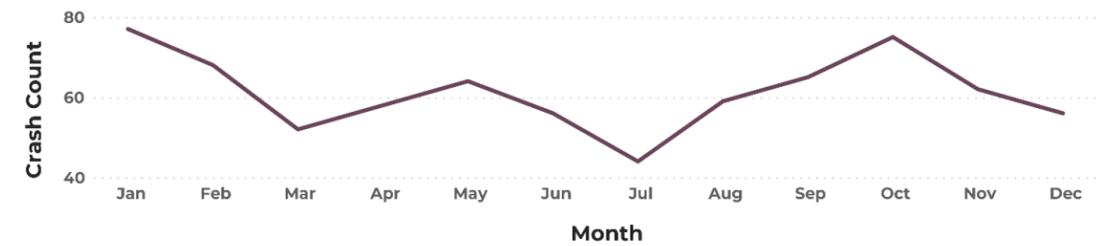


Figure 73: Crash Counts by Month

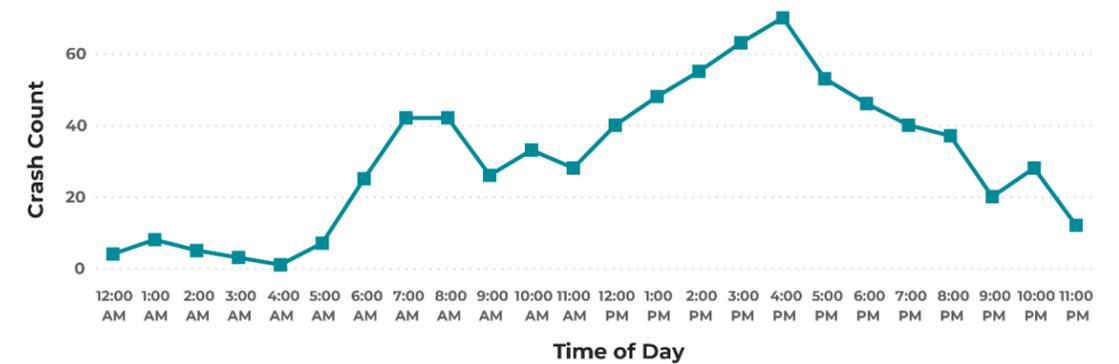


Figure 74: Crash Counts by Time of Day

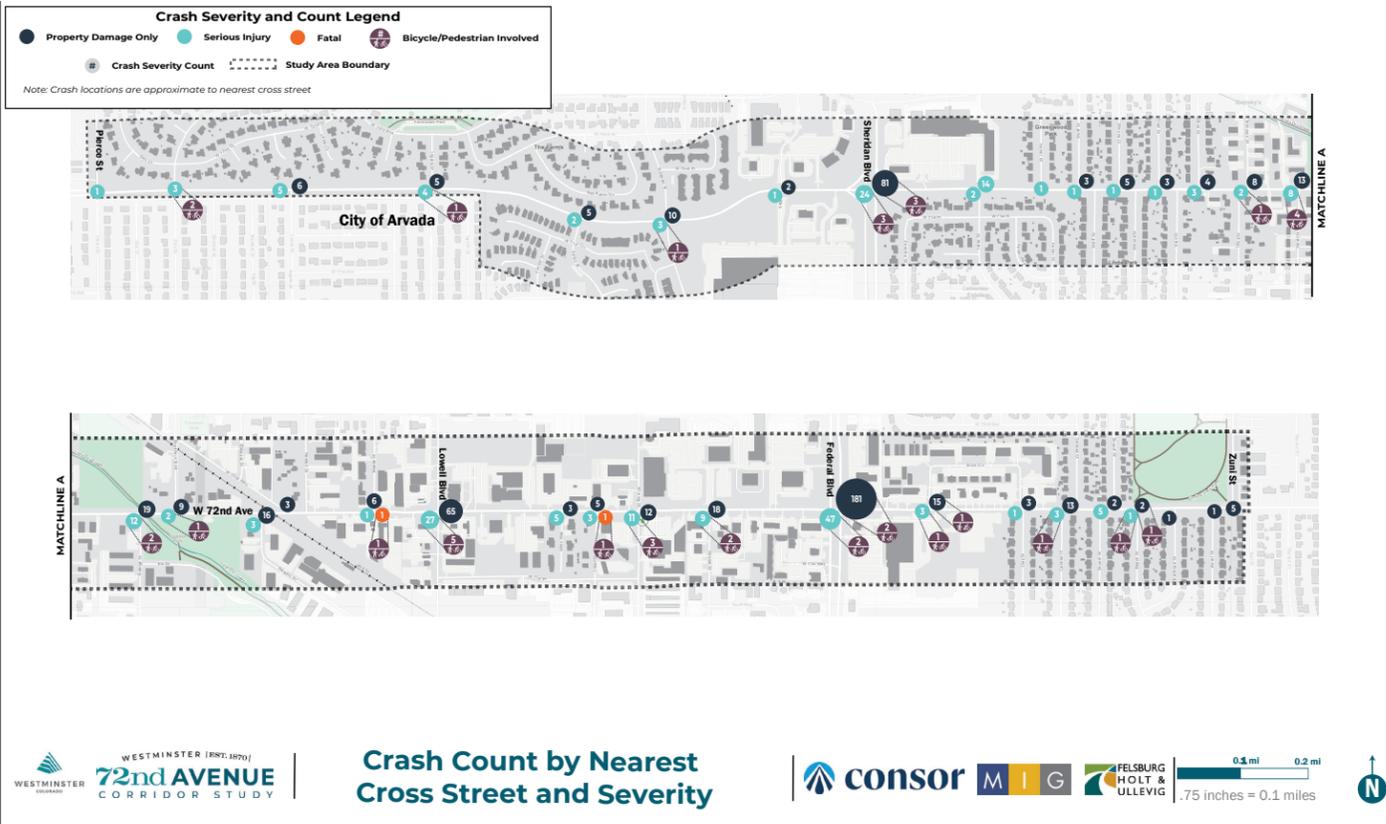


Figure 75: Crash Count by Nearest Cross Street and Severity

Federal Boulevard & 72nd Avenue



Figure 76: The intersection of 72nd Avenue and Federal Boulevard, looking east from 72nd Avenue

Of all intersections along the three-mile corridor, the Federal Boulevard intersection had the highest crash count during the 2015-2019 analysis period, at 228 total crashes. Though 181 (79%) of these were Property Damage Only (PDO) crashes, the remaining 47 crashes did result in injuries. Bicyclists/pedestrians were involved in four crashes at this intersection. Furthermore, according to the 2020 Transportation & Mobility Plan, the 72nd Avenue and Federal Boulevard intersection is within the top 10 intersections in Westminster with the highest number of crashes between 2015 and 2017.

Sheridan Boulevard & 72nd Avenue



Figure 77: The intersection of 72nd Avenue and Sheridan Boulevard, looking west from 72nd Avenue

The Sheridan Boulevard intersection had the second highest crash count of project area intersections during the 2015-2019 analysis period, at 105 total crashes. 23% (24) of these crashes resulted in injuries. Bicyclists/pedestrians were involved in five crashes at this intersection.

Lowell Boulevard & 72nd Avenue



Figure 78: The intersection of 72nd Avenue and Lowell Boulevard, looking east from 72nd Avenue. The Lowell Boulevard intersection had the third highest crash count during the 2015-2019 analysis period, at 92 total crashes. 29% (27) of these crashes resulted in injuries. Bicyclists/pedestrians were involved in five crashes at this intersection.

Crash Types

Review of the most common crash types revealed that more than a third (35%) of the 736 crashes that occurred along the study area during the 2015-2019 analysis period were rear-end crashes. Common crash types are defined below, and listed by most to least common for the 72nd Avenue study area data set. See **Figure 79** for a breakdown on crashes by crash type.

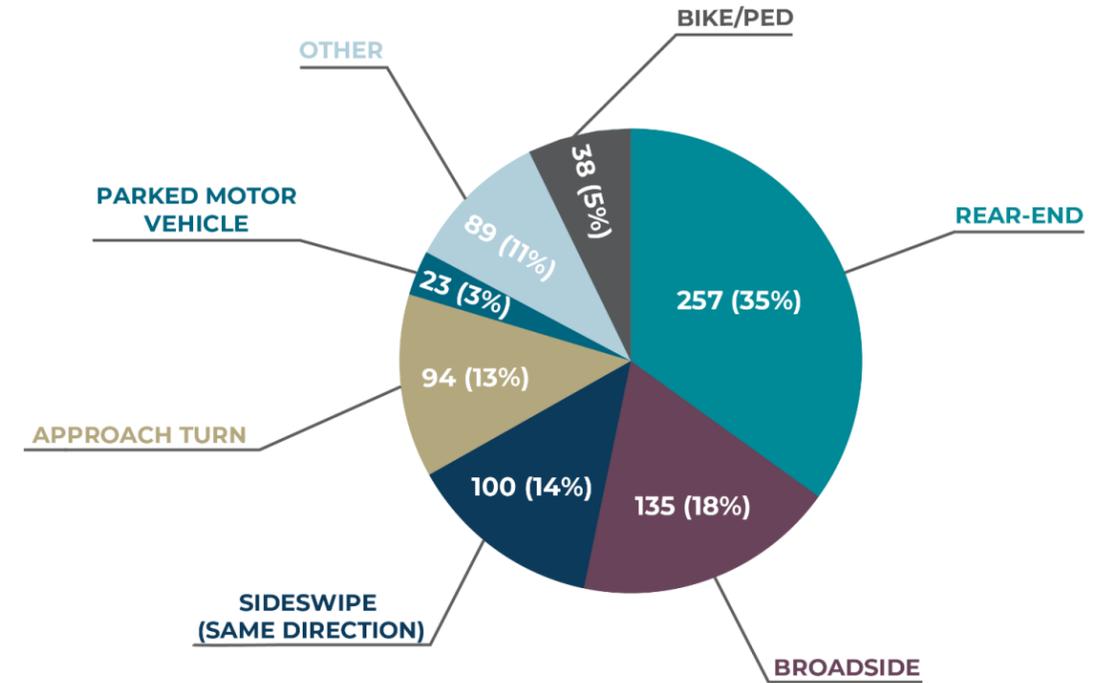


Figure 79: 2015-2019 72nd Avenue crashes by crash type

Rear-End

A crash type that involves two vehicles in a position of one behind the other and collide, regardless of what movements(s) either vehicle was in the process of making with the exception of one or both vehicles backing

Broadside

A crash type that involves two vehicle approaching from nonopposing angular directions (i.e. T-bone)

Sideswipe (same direction)

A crash type that involves two vehicles moving alongside each other and collide, with at least one of the vehicles being struck on the side

Approach Turn

A crash type that involves two vehicles in the opposite direction, one turns into the path of the other

Parked Motor Vehicle

A crash type in which a vehicle in motion collides with a parked motor vehicle, whether occupied or not.

Other

Crash types in the “Other” category included pedestrian or bicycle crashes, sidewalk (opposite direction) crashes and those involving fixed objects such as signs, light/utility poles, wall/buildings, guard rails, trees/shrubbery, bridge trails, traffic signal poles, concrete barriers, fences, etc.

Bike/Ped

Crash involving either a bicyclist or pedestrian. **Table 9** displays the percentage of crashes involving a bicyclist or pedestrian by intersection (sorted by west to east).

Table 9: Percentage of Overall Crashes Involving a Bicyclist or Pedestrian

Nearest Intersecting Street	Percent of Overall Crashes Involving a Bicyclist or Pedestrian
Pierce Street	0%
Otis Street	67%
Lamar Street	0%
Ingalls Street	11%
Eaton Street	0%
Depew Street	8%
5400 Block	0%
Sheridan Boulevard	5%
Yates Street	0%
Xavier Street	0%
Wolff Street	0%
Winona Court	0%
Vrain Street	0%
Utica Street	14%
Tennyson Street	0%
Stuart Street	19%
Raleigh Street	6%

Bradburn Boulevard	9%
72nd Way	0%
Newton Street	0%
Meade Street	13%
Lowell Boulevard	5%
Julian Way	0%
Julian Street	11%
Irving Street	13%
Hooker Street	7%
Federal Boulevard	2%
Eliot Circle	11%
Clay Street	0%
Canosa Court	6%
Bryant Street	0%
Beach Street	67%
Berthoud Street	0%
Alcott Street	0%
Zuni Street	0%

1.6 Needs Assessment

1.6.1 Needs Assessment Mapping

Overview

The needs assessment is a summary of gaps and barriers related to multimodal transportation within the study area. These mobility challenges were identified during the existing conditions phase and plan review performed by the project team as well as during the stakeholder engagement efforts. Reference **Figure 80** which aligns with the numbers below.

Place-Specific Recommendations

- 1 Complete sidewalk gaps on the south side of the corridor between Pierce Street and Ingalls Street.
- 2 Upgrade wayfinding to orient corridor users to area amenities such as Faversham Lake/Park to the north on Ingalls Street.
- 3 Provide better connections to 72nd Avenue amenities (such as bus stops) from 72nd Frontage Road and Ingalls Street (south side of corridor).
- 4 Install aesthetic treatments along curve between Ingalls Street and Depew Street.
- 5 Improve transit stop amenities and comfort at the eastbound 72nd Avenue & 5400 Block stop.
- 6 At Sheridan Boulevard intersection, install raised crossings at bypass lanes to reduce exposure time for vulnerable users.
- 7 Install traffic calming measures to reduce speeds in the school zone between Wolff Street and Utica Street.
- 8 Improve connections and wayfinding from 72nd Avenue to Little Dry Creek Trail.
- 9 Install concrete curb extensions at the Lowell Boulevard intersection to decrease vehicle turning radii and reduce exposure time for vulnerable users.
- 10 Install a Station Area gateway sign structure on the south side of 72nd Avenue at Irving Street, noting this as the primary TOD entrance to Westminster Station.
- 11 Improve maintenance of trees and plants in existing amenity zone planters between Meade Street and Eliot Circle.
- 12 Improve ADA accessibility and installed raised driveway crossings at major driveways between Newton Street and Canosa Court.

- 13 Install secondary Station Area gateway signage and landscaping at Hooker Street and 72nd Avenue.
- 14 Crossing improvements are needed at the Federal Boulevard intersection to reduce exposure time for vulnerable users.
- 15 Improve transit stop amenities and comfort at westbound 72nd Avenue & Federal Boulevard stop.
- 16 Install additional crosswalk between Federal Boulevard and Canosa Court.
- 17 Complete missing sidewalk gap on south side of 72nd Avenue between Elliot Circle and Clay Street.
- 18 Install crosswalk at Beach Street (where a high percentage of bicyclist/pedestrian involved crashes occurred) to connect with Skyline Vista Park path, which has been identified as an important route for students accessing area schools.

Corridor Wide Recommendations

-  Increase winter clearance of sidewalks and bicycle facilities, given the existence of snow and ice inhibit safe multimodal travel.
-  Upgrade all corridor facilities to be ADA compliant, including curb ramps, access routes to bus stops and bus stop landing pads.
-  Ensure prioritization of pedestrian and transit rider infrastructure upgrades during development and redevelopment.
-  Provide a continuous bicycle facility throughout the corridor that provides appropriate protection for users.
-  Implement traffic calming measures to reduce overall vehicle corridor speeds.
-  Implement countermeasures to help remove 72nd Avenue from the DRCOG High-Injury Network.



Needs Assessment Map



Figure 80: Needs Assessment Map

ENVIRONMENTAL OVERVIEW

Westminster 72nd Avenue Corridor Study

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FHU Reference No. 121120

April 2023

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Environmental Overview

The following environmental resources were reviewed in the context of the West 72nd Avenue corridor:

- ▶ Threatened and endangered species, species of concern, migratory birds
- ▶ Historic and archaeological resources
- ▶ Environmental Justice communities
- ▶ Parks, open spaces, trails, recreational resources, and Section 6(f)
- ▶ Traffic noise
- ▶ Visual resources
- ▶ Hazardous materials

Threatened and Endangered Species, Species of Concern, Migratory Birds

Threatened and endangered species, species of special concern, migratory birds, and eagles are specific wildlife resources that exist or have the potential to exist within the project area. These resources must be evaluated when using federally funded projects or operating along highway right-of-way (ROW). Wildlife or wildlife habitat can include wetlands, riparian areas, native shortgrass prairie, prairie dog colonies, or other areas that host species of avian, terrestrial, or aquatic species of interest. In the project corridor there is very little natural habitat remaining for wildlife. Trees in residential areas, parks, and along Little Dry Creek provide potential habitat for migratory birds. No known raptor nests are located within the vicinity of the project.

Table I identifies existing wildlife habitat resources in the environmental study area.

Table I. Existing Wetlands/Other Waters of the US Resources and Areas of High Quality Wildlife Habitat

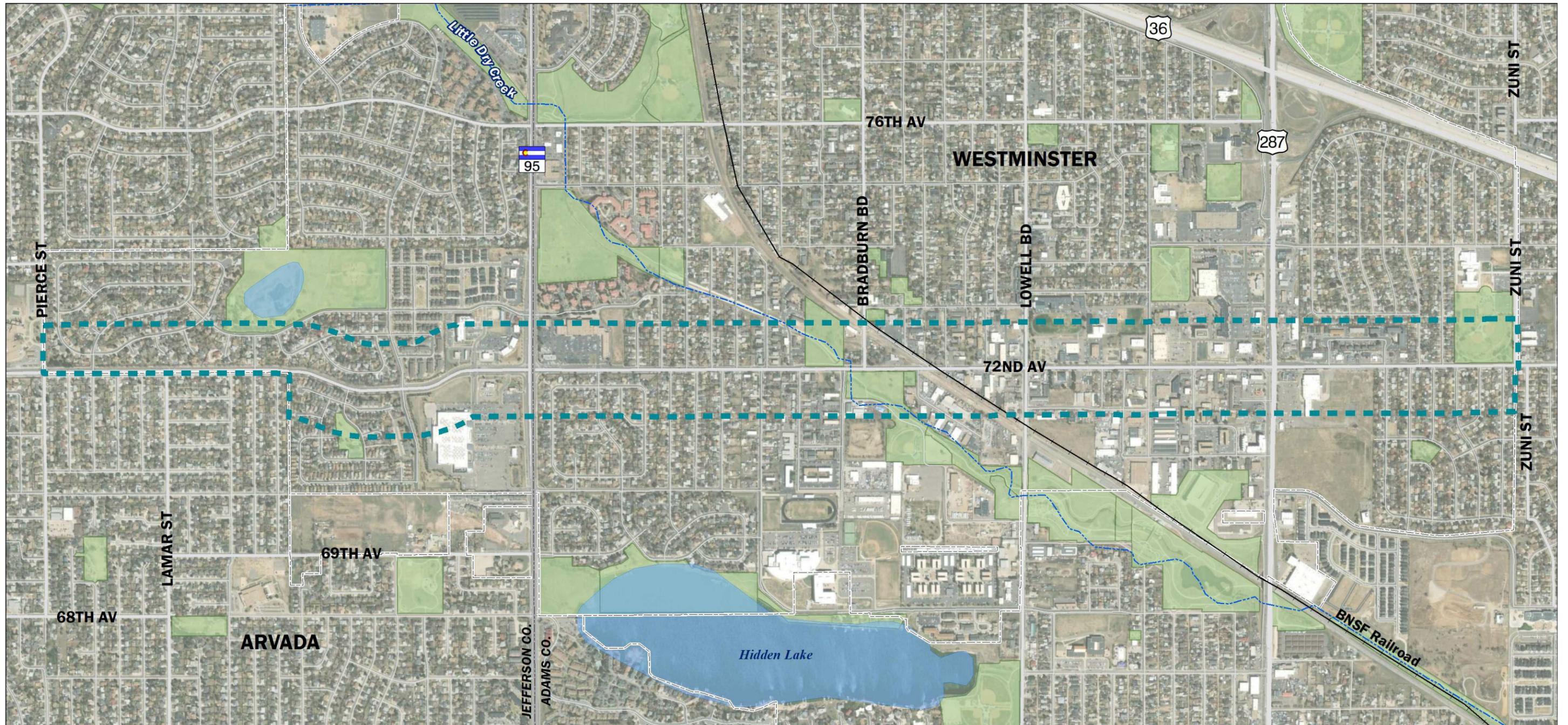
Site	Stream/Habitat Type	Within Environmental Study Area	Habitat Quality	Jurisdictional	Wildlife Corridor
Little Dry Creek	<ul style="list-style-type: none"> ▪ Riverine wetlands and palustrine emergent wetlands. Includes aquatic species present in ditch channel ▪ Potential for raptor nests along creek 	Yes	Medium	Yes	Yes
Isolated wetlands – unassociated with any named feature	<ul style="list-style-type: none"> ▪ Palustrine emergent wetlands, freshwater ponds 	Yes	Low	No	<ul style="list-style-type: none"> ▪ Limited use as wildlife corridor possible

Next Steps for Implementation

Who	Potential agency and stakeholder involvement	<ul style="list-style-type: none"> ▪ Federal Highway Administration (FHWA) ▪ Colorado Department of Transportation (CDOT) ▪ US Army Corps of Engineers (USACE) 	<ul style="list-style-type: none"> ▪ State Historic Preservation Officer (SHPO) ▪ US Fish and Wildlife Service (USFWS) ▪ Colorado Parks and Wildlife (CPW)
When	Critical schedule considerations	Construction seasonal wildlife restrictions <ul style="list-style-type: none"> ▪ Migratory Birds/Song Birds: April 1 to August 31 or in presence of active nests. ▪ Raptors: October 15 to July 31 or within various radii of active nests. ▪ Ute Ladies'-tresses Orchid: Survey for presence between late July/early August. ▪ Reptiles/Amphibians: Spring, if habitat is present for Common Garter Snake and Northern Leopard Frog. ▪ Fish: Coordinate with CPW to identify latest sampling records for species of concern. May impact bridge construction schedules. 	
Why	Regulatory setting and general context	<ul style="list-style-type: none"> ▪ Section 7 of the Endangered Species Act: Provides regulatory oversight when impacts may occur to species listed under the federal Endangered Species Act. Requires coordination with the USFWS and resource agencies, such as CPW, when impacts occur to wildlife species. ▪ Migratory Bird Treaty Act: Provides regulatory protection of native migratory birds, eggs, and young and requires coordination with the USFWS and CPW. ▪ Bald and Golden Eagle Protection Act: Provides regulatory protection of Bald and Golden Eagles, their nests, eggs, and young and requires coordination with USFWS and CPW. ▪ Senate Bill 40 (SB 40) Wildlife Certification: Occurs when a state agency plans project construction activities that impact riparian resources. It is based on an agreement between CPW and CDOT. 	
How	NEPA pre-scoping considerations	<ul style="list-style-type: none"> ▪ Biological Resources Report: Documents biological resources present in a project area, such as land cover, wetlands, waterways, wildlife, riparian, noxious weeds, and special status species. Defines the existing biological resources present to aid in decision-making and to identify required permitting. 	
Next Steps	Funding, design, construction implications	When wetland and wildlife impacts are expected, build adequate time into the design schedule to consider temporary and permanent impacts and allow time for a wetland delineation, Biological Resources Report, SB 40 reporting, consultation, and consequent permitting. Development of wildlife crossings or fencing may be considered with future projects.	

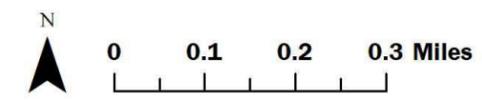
Figure I shows the location of parks and streams in the corridor where migratory bird and wildlife habitat is most likely to be present.

Figure 1. Existing and Potential Wildlife Habitat



- Legend**
- Railroad
 - Stream
 - Waterbody
 - Parks
 - Environmental Study Area
 - Cities_Selection
 - County Boundary

Source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



72nd Avenue Corridor Evaluation
Biological Resources

Westminister, Colorado

Historic and Archaeological Resources

Historic resources are any prehistoric or historic district, site, building, structure, or object included in, or eligible to, the National Register of Historic Places (NRHP). Historic resources encountered along the corridor include buildings, structures, a railroad, highways, and post-World War II residential subdivisions. For projects with a federal nexus, the responsible federal agency must comply with Section 106 of the National Historic Preservation Act of 1966, as amended [36 CFR 800]. The federal agency first determines whether an undertaking (i.e., the project) has the potential to affect historic resources. If so, the agency defines the Area of Potential Effects (APE), the area in which an undertaking may directly or indirectly cause changes in the character or use of historic resources. Once the APE has been defined, the agency then identifies historic resources and properties consistent with 36 CFR 800.4. The agency then consults with the appropriate SHPO and/or Tribal Historic Preservation Officer (THPO) on determinations of NRHP eligibility and proposed project effects to historic or potentially historic resources located within the APE. If only state funding (no federal) is applied to projects, the project will be subject to the Colorado State Historic Register Act, implemented through Colorado Revised Statute (CRS) 24-80.1-101 to 24-80.1-108. The Colorado State Historic Register Act authorizes the State Historical Society/SHPO to prepare and promulgate rules and procedures by which properties shall be determined to be eligible for, nominated to, and included in, or removed from the State Register of Historic Properties.

To create an understanding of the types of historic resources that may be included in the APE for future projects, this section identifies all existing (previously recorded) and potential (non-surveyed) historic resources located within the environmental study area. **Table 2** identifies existing historic resources, including properties either listed on the NRHP or officially eligible for the NRHP, and **Table 3** identifies additional properties within the study area with a high potential for being eligible to the NRHP.

Table 2. Known Historic Resources

(Site ID) Resource Name	Address/ Location	Year Built	Resource Type/ Description	NR Eligibility
(N/A) US Highway 287	0.5-miles west of Zuni Street	ca.1880	Early roadway from Wyoming south through Colorado. Important as a trade route during the late nineteenth century, eventually being designated as US 287 in 1935. No previous segments of US Highway 287 have been surveyed in Adams County.	Significant under Criterion A in the area of Transportation as a Cultural Route for its earliest use as the Overland Trail, used by indigenous groups, European and European-American explorers, emigrants and later stagecoach lines in the early and mid-19th century. The road was also an early project of the Colorado Highway Department (CHD) with improvements as early as 1912. Lastly, the road is significant as an important connector between farms and ranches in the high plains desert of southeastern Colorado.

(Site ID) Resource Name	Address/ Location	Year Built	Resource Type/ Description	NR Eligibility
(SAM.64) The Bowles House	3924 West 72 nd Avenue, Westminster, CO 80003	ca.1877	Late-nineteenth century Italianate-style residence of Edward Bowles, a pioneer resident who came to the area when it was called DeSpain Junction. The name was later changed to Harris in the 1890s and eventually Westminster by 1911.	NRHP Listed, 11/03/1988
(SAM.442) Harris Park School	7200 Lowell Boulevard, Westminster, CO 80003	1892–1899	One-story school building with a rectangular plan, brick siding, gabled entrances and large double-hung windows. Originally designed in the Romanesque Revival style, the building was later remodeled into its current form with Craftsman style detailing.	NRHP Listed, 8/30/1990
(SAM.895) Union High School	3455 West 72 nd Avenue, Westminster, CO 80003	1928	Two-story Art Deco style high school facility with an irregular plan, brick cladding, flat roof, and stepped parapet.	NRHP Listed, 1/14/2000
(SAM. 464.10) Denver Utah & Pacific, Colorado and Southern Railroad	West 72 nd Avenue at Newton St	1930	Railroad siding for the Denver, Utah, & Pacific and later Colorado and Southern Railroad. The line was eventually purchased by BNSF before being abandoned.	NRHP Eligible, 6/8/2022
(SAM.1744) Skelly Oil Station	3750 West 72 nd Avenue, Westminster, CO 80003	1927	Cottage style gas station with a rectangular plan, multiple roof forms, one-story with vertical siding and a decorative cornice.	NRHP Eligible, 5/25/2009
(SAM.2836) Penguin Building	7265 Lowell Boulevard, Westminster, CO 80003	1951	Two-story commercial building with brick façade and stepped parapet.	NRHP Eligible, 6/5/2012
(SAM.2841) Westminster Shopping Center	7200 Meade Street, Westminster, CO 80003	1955	Commercial building, one-story, in the modern style. Rectangular floor plan with brick cladding and a flat roof.	Officially Needs Data, 6/5/2012
(SAM.2842) Westminster Post Office	7262 Meade Street, Westminster, CO 80003	1960	International style, one-story post office with a rectangular plan and brick cladding.	NRHP Eligible, 6/5/2012

(Site ID) Resource Name	Address/ Location	Year Built	Resource Type/ Description	NR Eligibility
(5AM.2843) Westminster High School	7300 Lowell Boulevard, Westminster, CO 80003	1949–1951	Two-story school with an irregular plan, brick cladding and flat roof. The building has elements of the modern movement.	Officially Needs Data, 6/5/2012
(5AM.4140) Colorado State Highway 95	1-mile east of Pierce Street	ca. 1920s	Colorado State Highway 95, locally known as Sheridan Boulevard, is a nearly 15-mile-long thoroughfare running north-south through the west metro Denver area. The highway, designated in the 1920s, served as an important traffic artery that facilitated suburban development in Denver in the early twentieth century, as well as post-World War II development in the northern suburbs.	Significant under Criterion A in the area of Transportation and Community Planning and Development at the local level as an important early project of the CHD due to its early connectivity to the suburbs of Denver during the 1920s and later post-World War II development of the northern suburbs.

Table 3. Non-Surveyed Properties Meeting the 45-Year Threshold (1978 and prior) for Potential NRHP Eligibility

Address/ Location	Year Built	Owner/Property Name	Property Type	Status
Properties Located in Adams County				
7190 Alcott Street	1959	Vo/Ho Residence	Single-Family Residence	Unsurveyed
7191 Alcott Street	1958	Gutierrez Residence	Single-Family Residence	Unsurveyed
7190 Beach Street	1958	Johnson/Ortiz Residence	Single-Family Residence	Unsurveyed
7191 Beach Street	1958	Maddox Residence	Single-Family Residence	Unsurveyed
7190 Berthoud Street	1958	Burnett Residence	Single-Family Residence	Unsurveyed
7191 Berthoud Street	1958	Briones/Sanchez Residence	Single-Family Residence	Unsurveyed
7215 Bradburn Boulevard	1897	Feltis Residence	Single-Family Residence	Unsurveyed
7190 Bryant Street	1958	Conniff Residence	Single-Family Residence	Unsurveyed
7191 Bryant Street	1958	Simental Residence	Single-Family Residence	Unsurveyed
7200 Bryant Street	1954	Rodriguez Residence	Single-Family Residence	Unsurveyed
7201 Bryant Street	1954	Posada Residence	Single-Family Residence	Unsurveyed
7190 Canosa Court	1958	Wodark Residence	Single-Family Residence	Unsurveyed
7191 Canosa Court	1959	Kruger Residence	Single-Family Residence	Unsurveyed
7200 Canosa Court	1954	Kuhne Residence	Single-Family Residence	Unsurveyed
7201 Canosa Court	1954	Robles Residence	Single-Family Residence	Unsurveyed

Address/ Location	Year Built	Owner/Property Name	Property Type	Status
7190 Clay Street	1958	Lucero/Sanchez Residence	Single-Family Residence	Unsurveyed
7191 Clay Street	1957	Arroyo/Zavaleta Residence	Single-Family Residence	Unsurveyed
7110 Federal Boulevard	1962	NGC Development LLC Property	Commercial Retail Building	Unsurveyed
7120 Federal Boulevard	1972	Westminster Station Northgate LLC	Commercial Restaurant	Unsurveyed
7190 Julian Way	1953	Pergola Property	Commercial Office Building	Unsurveyed
7191 Julian Way	1955	Pergola Property	Single-Family Residence	Unsurveyed
7185 Lowell Boulevard	1902	Smith Living Trust Property	Single-Family Residence	Unsurveyed
7205 Meade Street	1952	7205 Meade LLC Property	Commercial Retail Building	Unsurveyed
7190 Newton Street	1970	Ram Auto Repair Inc. Property	Automotive Service Garage	Unsurveyed
7215 Newton Street	1932	Chea Residence	Single-Family Residence	Unsurveyed
7193 Stuart Street	1962	Trujillo Property	Multi-Family Residential Apartment, 2-Story	Unsurveyed
7200 Tennyson Street	1962	Humble Avenue Capital LLC Property	Multi-Family Residential Apartment, 2-Story	Unsurveyed
7160 Utica Street	1951	Burns/Harris Residence	Single-Family Residence	Unsurveyed
7161 Utica Street	1957	Hahn/Knox Residence	Single-Family Residence	Unsurveyed
7201 Utica Street	1960	BB 6 LLC Property	Single-Family Residence	Unsurveyed
7160 Vrain Street	1953	Fazzi Residence	Single-Family Residence	Unsurveyed
7195 Vrain Street	1957	Hunter Residence	Single-Family Residence	Unsurveyed
7200 Vrain Street	1962	Santitago/Eugenio Residence	Single-Family Residence	Unsurveyed
7201 Vrain Street	1960	Bustillos Residence	Single-Family Residence	Unsurveyed
7193 Winona Court	1956	Gurule Residence	Single-Family Residence	Unsurveyed
7194 Winona Court	1956	2018-1 IH Borrower LP Property	Single-Family Residence	Unsurveyed
7200 Winona Court	1959	Carmona Residence	Single-Family Residence	Unsurveyed
7201 Winona Court	1959	Thomas Residence	Single-Family Residence	Unsurveyed
7191 Wolff Street	1956	Grant Property	Single-Family Residence	Unsurveyed
7192 Wolff Street	1956	Atencio Residence	Single-Family Residence	Unsurveyed
7200 Wolff Street	1962	Investment Corporation Inc. Property	Single-Family Residence	Unsurveyed
7205 Wolff Street	1965	Johnson Residence	Single-Family Residence	Unsurveyed
4911 West 71 st Place	1977	Aramayo Residence	Single-Family Residence	Unsurveyed
4921 West 71 st Place	1977	Mullins Residence	Single-Family Residence	Unsurveyed
4931 West 71 st Place	1977	Piccone Residence	Single-Family Residence	Unsurveyed
4941 West 71 st Place	1977	O'Rourke Residence	Single-Family Residence	Unsurveyed

Address/Location	Year Built	Owner/Property Name	Property Type	Status
4951 West 71 st Place	1977	Saynourat Residence	Single-Family Residence	Unsurveyed
4961 West 71 st Place	1977	Phantharangsy Residence	Single-Family Residence	Unsurveyed
4971 West 71 st Place	1977	Finkiewicz Residence	Single-Family Residence	Unsurveyed
5021 West 71 st Place	1978	Hadzic Residence	Single-Family Residence	Unsurveyed
5031 West 71 st Place	1978	Miguel Mendoza-Hall Residence	Single-Family Residence	Unsurveyed
5041 West 71 st Place	1978	Givens Residence	Single-Family Residence	Unsurveyed
5051 West 71 st Place	1978	Sawaqed Residence	Single-Family Residence	Unsurveyed
5061 West 71 st Place	1978	Martinez Residence	Single-Family Residence	Unsurveyed
5071 West 71 st Place	1978	Albert Residence	Single-Family Residence	Unsurveyed
2387 West 72 nd Avenue	1966	Colafllo LLC Property	Commercial Retail Building	Unsurveyed
2735 West 72 nd Avenue	1962	Hagos/Gaze Property	Commercial Retail Building	Unsurveyed
2755 West 72 nd Avenue	1961	Correa Property	Commercial Restaurant	Unsurveyed
2785 West 72 nd Avenue	1962	Villanueva-Macias Property	Automotive Service Garage	Unsurveyed
2827 West 72 nd Avenue	1964	Montes Property	Commercial Retail Building	Unsurveyed
2835 West 72 nd Avenue	1964	Montes Property	Commercial Restaurant	Unsurveyed
2895 West 72 nd Avenue	1961	Montes Property	Commercial Bar/Tavern	Unsurveyed
2935 West 72 nd Avenue	1962	Auyeung Property	Automotive Service Garage	Unsurveyed
2955 West 72 nd Avenue	1961	Boerstler Farms Property	Automotive Service Garage	Unsurveyed
2957 West 72 nd Avenue	1962	Mission Valley Shoppette LLC	Community Center	Unsurveyed
3006 West 72 nd Avenue	1972	Baez/Romero Property	Commercial Bar/Tavern	Unsurveyed
3010 West 72 nd Avenue	1963	Hondrogiannis Property	Commercial Restaurant	Unsurveyed
3086 West 72 nd Avenue	1966	True Property	Office Building	Unsurveyed
3190 West 72 nd Avenue	1964	Norman Property	Commercial Restaurant	Unsurveyed
3200 West 72 nd Avenue	1963	72 nd Corner LLC Property	Office Building	Unsurveyed
3250 West 72 nd Avenue	1977	7160 Irving Street LLC Property	Commercial Warehouse	Unsurveyed
3290 West 72 nd Avenue	1973	Dollar Tree	Commercial Retail	Unsurveyed
3295 West 72 nd Avenue	1975	McDermott Athletic Center (MAC)	Community Center	Unsurveyed
3300 West 72 nd Avenue	1974	Citizens Bank	Commercial Bank	Unsurveyed
3305 West 72 nd Avenue	ca.1965	3305 West 72 nd Avenue LLC	Commercial Gas Station (vacant)	Unsurveyed
3315 West 72 nd Avenue	1965	Amalgamated Transit Union Local 1001	Commercial Office Building	Unsurveyed
3380 West 72 nd Avenue	1960	Love Property	Commercial Medical Offices	Unsurveyed
3400 West 72 nd Avenue	1929	Diverse Blue QOF LLC Property	Single-Family Residence	Unsurveyed

Address/Location	Year Built	Owner/Property Name	Property Type	Status
3434 West 72 nd Avenue	1965	Peerless Tyre Co.	Automotive Service Garage	Unsurveyed
3454 West 72 nd Avenue	1976	Robert J. Landgraf Center for Teaching Excellence	Educational Facility	Unsurveyed
3485 West 72 nd Avenue	1973	Joshnik Co LLLP Property	Commercial Gas Station	Unsurveyed
3489 West 72 nd Avenue	1975	BSF Investment Group LLC Property	Commercial Office Building, 2-Story	Unsurveyed
3580 West 72 nd Avenue	1955	Bohan Family Limited Partnership Property	Commercial Office Building	Unsurveyed
3590 West 72 nd Avenue	1967	Bohan Property	Automotive Service Garage	Unsurveyed
3686 West 72 nd Avenue	1964	Relay Hill A LLC Property	Office Building, Automotive Service Garage	Unsurveyed
3698 West 72 nd Avenue	1926/1974	Relay Hill A LLC Property	Office Building, Automotive Service Garage	Unsurveyed
3710 West 72 nd Avenue	1972	Speedy A LLC Property	Commercial Retail Building	Unsurveyed
3791 West 72 nd Avenue	1957	RTF LLC Property	Automotive Service Garage and Car Wash	Unsurveyed
3949 West 72 nd Avenue	1964	Dags LLC Property	Automotive Service Garage	Unsurveyed
3959 West 72 nd Avenue	1954	Schofield Property	Single-Family Residence	Unsurveyed
4070 West 72 nd Avenue	1974	4070 W 72 nd LLC Property	Commercial Medical Offices	Unsurveyed
4183 West 72 nd Avenue	1973	Orchard Crossing East LLC Property	Multi-Family Residential Apartment Complex	Unsurveyed
4195 West 72 nd Avenue	1902	Adams County Housing Authority Property	Single-Family Residence	Unsurveyed
4250 West 72 nd Avenue	1962	Alvarez Property	Multi-Family Residential Apartment, 2-Story	Unsurveyed
4280 West 72 nd Avenue	1962	Mogo Realty LLC Property	Multi-Family Residential Apartment, 2-Story	Unsurveyed
4330 West 72 nd Avenue	1962	Heavey/Latimer Property	Multi-Family Residential Apartment, 2-Story	Unsurveyed
4346 West 72 nd Avenue	1964	Nicks Property	Multi-Family Residential Apartment, 1-Story	Unsurveyed
4440 West 72 nd Avenue	1973	Wozny Property	Multi-Family Residential Apartment, 2-Story	Unsurveyed
4455 West 72 nd Avenue	1962	LM Thomas Family LLC Property	Multi-Family Residential Apartment, 2-Story	Unsurveyed
4499 West 72 nd Avenue	1927	Weston Property	Single-Family Residence	Unsurveyed
4544 West 72 nd Avenue	1964	Lombardi Property	Residential Duplex	Unsurveyed
7150 Xavier Street	1977	Than Residence	Single-Family Residence	Unsurveyed
7200 Xavier Street	1968	Mandzic Residence	Single-Family Residence	Unsurveyed
7205 Xavier Street	1968	Davis Residence	Single-Family Residence	Unsurveyed
7151 Zenobia Street	1978	Castillo Residence	Single-Family Residence	Unsurveyed

Address/Location	Year Built	Owner/Property Name	Property Type	Status
7181 Zuni Street	1955	Ramirez Residence	Single-Family Residence	Unsurveyed
Properties Located in Jefferson County				
7162 Ingalls Street	1969	Riggs Residence	Single-Family Residence	Unsurveyed
7163 Ingalls Street	1970	Bahlenhorst Residence	Single-Family Residence	Unsurveyed
7164 Ingalls Street	1969	Slicker Residence	Single-Family Residence	Unsurveyed
7165 Ingalls Street	1969	Gawlik Residence	Single-Family Residence	Unsurveyed
7157 Jay Street	1969	Burciaga Residence	Single-Family Residence	Unsurveyed
7166 Jay Street	1967	Driggers Residence	Single-Family Residence	Unsurveyed
7150 Lamar Street	1968	Montoya Residence	Single-Family Residence	Unsurveyed
7151 Lamar Street	1970	Mackey Residence	Single-Family Residence	Unsurveyed
7152 Marshall Street	1969	Scherer Residence	Single-Family Residence	Unsurveyed
7155 Newland Street	1970	Mandolini Residence	Single-Family Residence	Unsurveyed
7232 NW Eaton Circle	1978	Harris Residence	Single-Family Residence	Unsurveyed
7234 NW Eaton Circle	1978	Evans Residence	Single-Family Residence	Unsurveyed
7236 NW Eaton Circle	1978	Nguyen Residence	Single-Family Residence	Unsurveyed
7238 NW Eaton Circle	1977	Eaton Residence	Single-Family Residence	Unsurveyed
7242 NW Eaton Circle	1978	Gonzalez Residence	Single-Family Residence	Unsurveyed
7244 NW Eaton Circle	1977	Eaton Residence	Single-Family Residence	Unsurveyed
7248 NW Eaton Circle	1977	Jia Residence	Single-Family Residence	Unsurveyed
7259 NW Eaton Circle	1978	Elyashevich Residence	Single-Family Residence	Unsurveyed
7201 Otis Court	1975	Phalen Residence	Single-Family Residence	Unsurveyed
7211 Otis Court	1975	Sawaked Residence	Single-Family Residence	Unsurveyed
7221 Otis Court	1975	Miaskiewicz/Myers Residence	Single-Family Residence	Unsurveyed
7231 Otis Court	1975	Gallo Residence	Single-Family Residence	Unsurveyed
7241 Otis Court	1975	Bautista/Beggs Residence	Single-Family Residence	Unsurveyed
7161 Pierce Street	1969	Lee Residence	Single-Family Residence	Unsurveyed
7285 Pierce Street	1962	North Arvada Middle School	School Facility	Unsurveyed
5619 West 71 st Circle	1978	Galkova/Truesdale Residence	Single-Family Residence	Unsurveyed
5631 West 71 st Circle	1978	SRP Sub LLC Property	Single-Family Residence	Unsurveyed
5639 West 71 st Circle	1978	Diehl Residence	Single-Family Residence	Unsurveyed
5641-5643 West 71 st Circle	1975	Mendoza/Bills Property	Residential Duplex	Unsurveyed
5645-5647 West 71 st Circle	1975	Vecchiarelli/Jaakkola Property	Residential Duplex	Unsurveyed
5651-5653 West 71 st Circle	1975	Grab/Trujillo Property	Residential Duplex	Unsurveyed
5655-5669 West 71 st Circle	1975	Hosek/Metzroth Property	Residential Duplex	Unsurveyed
5679 West 71 st Circle	1978	Flores Residence	Single-Family Residence	Unsurveyed
5689 West 71 st Circle	1978	Harvey Residence	Single-Family Residence	Unsurveyed
5699 West 71 st Circle	1978	Goerke Residence	Single-Family Residence	Unsurveyed
6224 West 72 nd Avenue	1968	Viburg Residence	Single-Family Residence	Unsurveyed
6244 West 72 nd Avenue	1976	Edyhbelle/Bettger Residence	Single-Family Residence	Unsurveyed

Address/Location	Year Built	Owner/Property Name	Property Type	Status
6264 West 72 nd Avenue	1970	Duff Residence	Single-Family Residence	Unsurveyed
6314 West 72 nd Avenue	1971	Aviado Residence	Single-Family Residence	Unsurveyed
6334 West 72 nd Avenue	1968	Neu Residence	Single-Family Residence	Unsurveyed
6354 West 72 nd Avenue	1972	Ortvez Residence	Single-Family Residence	Unsurveyed
6524 West 72 nd Avenue	1972	Mapes Residence	Single-Family Residence	Unsurveyed
6544 West 72 nd Avenue	1963	Steinwagner Residence	Single-Family Residence	Unsurveyed
6664 West 72 nd Avenue	1967	Ochoa Residence	Single-Family Residence	Unsurveyed
6724 West 72 nd Avenue	1965	Cronce Residence	Single-Family Residence	Unsurveyed
6744 West 72 nd Avenue	1963	Biesk Residence	Single-Family Residence	Unsurveyed
6774 West 72 nd Avenue	1963	Steinwagner Property	Single-Family Residence	Unsurveyed
6784 West 72 nd Avenue	1965	Mendoza Residence	Single-Family Residence	Unsurveyed
5910 West 72 nd Drive	1978	Castaneda/Romero Residence	Single-Family Residence	Unsurveyed
5930 West 72 nd Drive	1978	McKercher Residence	Single-Family Residence	Unsurveyed
5940 West 72 nd Drive	1978	Mancha/Trujillo Residence	Single-Family Residence	Unsurveyed
6680 West 72 nd Drive	1978	Doyle Residence	Single-Family Residence	Unsurveyed

Next Steps for Implementation

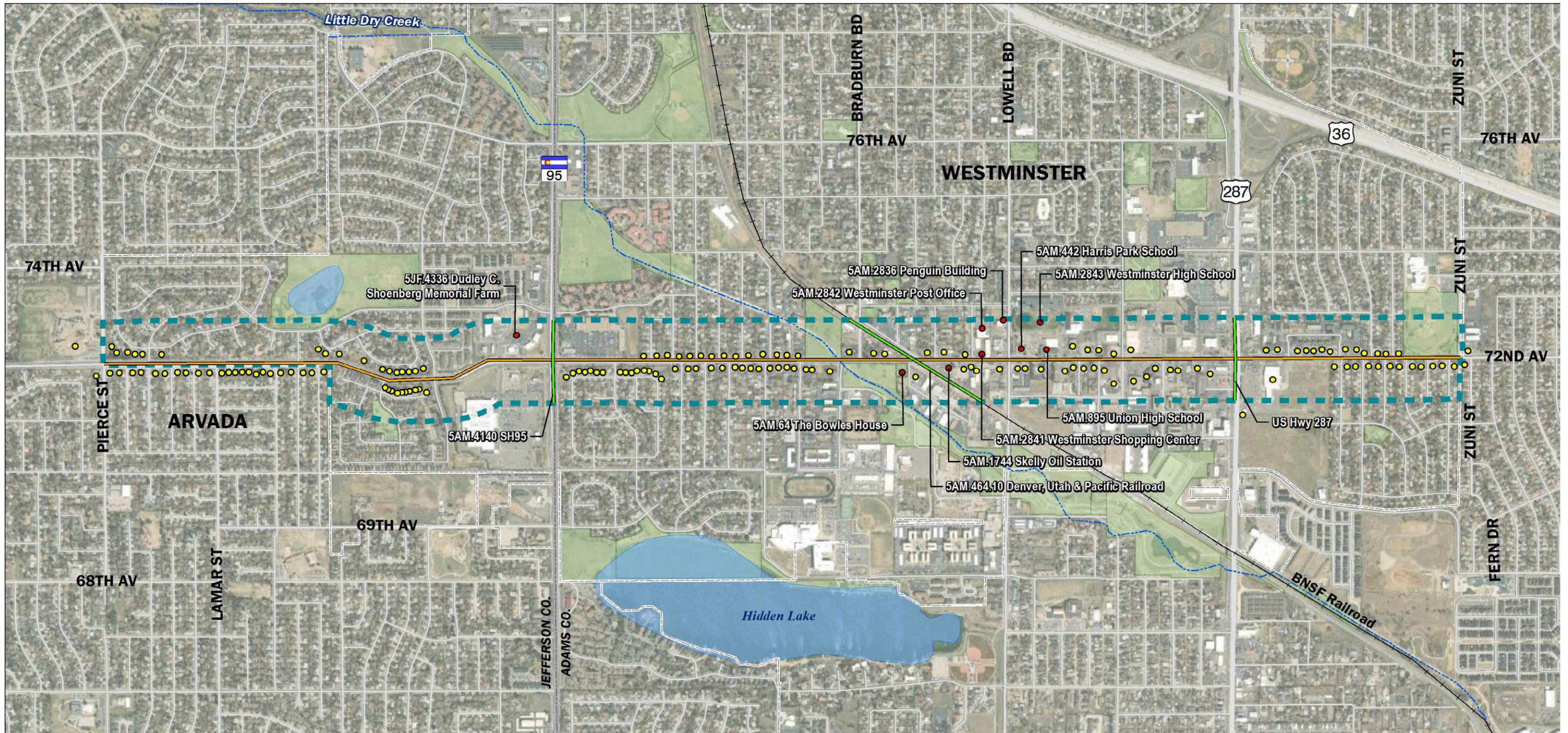
Who	Potential agency and stakeholder involvement	<ul style="list-style-type: none"> FHWA / CDOT Advisory Council on Historic Preservation (ACHP) SHPO/THPO 	<ul style="list-style-type: none"> USACE Local municipalities Public stakeholders
When	Critical schedule considerations	<ul style="list-style-type: none"> SHPO/THPO Review: The SHPO/THPO is granted a 30-day review period for initial agency consultation on determinations of eligibility and proposed project effects. If a project is determined to have an adverse effect to historic resources, the agency begins consultation to seek ways to avoid, minimize, or mitigate adverse effects. Resolving adverse effects can take up to six additional months. 	
Why	Regulatory setting and general context	<ul style="list-style-type: none"> Colorado State Historic Register Act (CRS) 24-80.1-101 to 24-80.1-108: For projects with state funding and no federal nexus, projects are subject to historic review under the Colorado State Historic Register Act, implemented through CRS 24-80.1-101 to 24-80.1-108, including SHPO review. Section 106 of the National Historic Preservation Act (NHPA) of 1966: For projects with a federal nexus, federal agencies must comply with Section 106 of the NHPA of 1966, which requires agencies to consider the effects of their undertakings on historic properties and afford the ACHP a reasonable opportunity to comment. Section 4(f) of the Department of Transportation Act of 1966 (DOT Act): Includes a special provision stipulating that FHWA/CDOT, Federal Transit Administration, or other operating administrations of the US Department of Transportation (USDOT) cannot approve the use of land from public or private historical sites unless there is no feasible or prudent avoidance alternative to the use or the agency determines that the use will have a de minimis (minimal) impact. In addition to federal and state laws and regulations, local jurisdictions may have ordinances and regulations that must be followed. 	

How	NEPA pre-scoping considerations	CDOT evaluates the potential footprint of the alternative for all transportation projects to find ways to avoid, minimize, or mitigate impacts to known historic resources.
Next Steps	Funding, design, construction, and mitigation implications	Design solutions should seek ways to avoid or minimize impacts to historic resources in any way possible. For alternatives with significant impacts, provide a discussion of practicable alternatives or mitigation. Sites identified here as potential historic resources should be evaluated for NRHP eligibility to determine historic status and coordinate with the SHPO.

Figure 2 shows all existing historic resources and potential resources along the West 72nd Avenue corridor study area identified as part of this historic resources analysis. For confidential reasons, any known archaeological resources are not shown on **Figure 2**.

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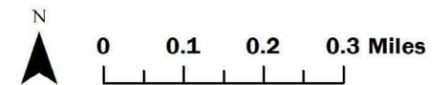
Figure 2. Existing and Potential Historic Resources



Legend

- NRHP Eligible and/or Listed Property
- Potential Historic Property
- NRHP Eligible and/or Listed Roadway
- Potential Historic Roadway
- Railroad
- Stream
- Waterbody
- Parks and Open Space
- Municipality Boundary
- County Boundary
- Environmental Study Area

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, SHPO, Compass Database



**72nd Avenue Corridor Evaluation
Historic Resources**

Westminister, Colorado

Environmental Justice

Consideration of low-income, minority, and limited English proficiency (LEP) populations along this corridor is important to stay in compliance with Executive Order 12898 and other federal and state laws and orders with non-discrimination statutes. FHWA and CDOT have established guidelines for identifying these populations, potential impacts, and potential mitigation measures.

The first step in the NEPA process for evaluating Environmental Justice is to define the area of potential impact in the Community Study Area. This area typically includes all communities within and adjacent to the project that may be affected. A community can be chosen from Census tracts, block groups, physical barriers, land-use patterns, political divisions, selected demographic characteristics, historical backgrounds, resident perceptions, and subdivisions and neighborhoods recognized by name and tradition. Census block groups adjacent to the project corridor were selected for the Community Study Area to illustrate the Environmental Justice populations adjacent to the project.

For this evaluation, data from the Denver Regional Council of Governments (DRCOG) Environmental Justice Dataset (2023), using the American Community Survey (ACS) 2017–2021 5-Year Estimates, was used to determine the number and distribution of minority residents and the number and distribution of residents with incomes below poverty levels. **Table 4** summarizes minority and low-income populations in the Community Study Area.

Table 4. Overview of Low-Income and Minority Populations in the Community Study Area

Location	Land Use/Housing	Overall Description
Minority Populations		
Under Executive Order 12898, minority, as it applies to Environmental Justice, is defined as a person who is Black: a person having origins in any of the Black racial groups of Africa; Hispanic or Latino: a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture of origin, regardless of race; Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent; American Indian and Alaskan Native: a person having origins in any of the original people of North America, South America (including Central America), and who maintains cultural identification through tribal affiliation or community recognition; Native Hawaiian or Pacific Islander: people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.		
CT 102.08 BG 4, CT 102.09 BG 4, CT 102.08 BG 1	Residential medium- to high-density single-family housing, open space/park, church, school, and limited multi-dwelling units and commercial areas.	There are no census block groups with a minority percentage of 30% or greater. Commercial areas are located on the southwest corner of Colorado SH 95 and West 72 nd Avenue. Area includes North Arvada Middle School, Red Rocks Church, and Grace Church.
CT 102.09 BG 3	Residential medium- to high-density single-family housing and multi-dwelling unit residential, open space/park, and limited commercial.	This census block group has a minority percentage of 47.63%. Multi-dwelling units and commercial areas lie east of Depew Street, south of 74 th Avenue. Faversham Park is also located within the census block group.
CT 96.04 BG 2, CT 96.04 BG 3, CT 96.04 BG 4, CT 96.07 BG 1, CT 96.07 BG 3	Light industrial, mixed-use business district, medium- to high-density residential and multi-dwelling unit residential, commercial, schools, churches, retirement communities, and parks.	These block groups are located between Colorado SH 95 and Lowell Boulevard. The minority percentage in these block groups ranges from 48.51% to 69.1%. This area includes the BNSF Railroad, Westminster High School, San Marino retirement community, and England Park.

Location	Land Use/Housing	Overall Description
CT 96.04 BG 1, CT 96.06 BG 1	Commercial areas, residential medium- to high-density single-family housing and multi-dwelling unit residential, library, schools, parks and recreation areas, and churches.	These block groups are located between Lowell Boulevard and US 287. The minority percentage in these block groups ranges from 31.11% to 51.44%. This area includes the BNSF Railroad, Boys and Girls Club, Baker Elementary School, Irving Street Library, Westminster Municipal Court, Tay Do Asian Grocery, and Clear Creek Care Center.
CT 95.01 BG 1, CT 95.01 BG 2, CT 95.02 BG 1, CT 95.02 BG 2	Residential medium- to high-density single-family housing and multi-dwelling unit residential, open space/park, and limited commercial along US 287, West 72 nd Avenue, and Pecos Street.	These block groups are located between US 287 and Pecos Street. The minority percentage in these block groups ranges from 51.4% to 72.78%. This area includes Adams County Fire Station #11, Skyline Vista Park, Orchard Park Academy, and First United Hmong Alliance.

Low-Income Populations		
Under FHWA Order 6640.23A, low-income populations are defined as any readily identifiable group of low-income persons (household income is at or below the Department of Health and Human Services [HHS] poverty guidelines) who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers, or Native Americans) who will be affected by a proposed DOT program, policy, or activity. Low-income for this analysis is defined as a household income at or below 200% of the federal poverty level. In 2021, 200% of the federal poverty level for a family of four was equal to \$53,000.		
CT 102.08 BG 4, CT 102.09 BG 4	Residential medium- to high-density single-family housing, tennis courts, church, school, and limited multi-dwelling units.	Both block groups have less than 20% low-income populations. CT 102.08 BG 4 has 17.76% and CT 102.09 BG 4 has 7.27%.
CT 102.09 BG 1, CT 102.09 BG 3	Residential medium- to high-density single-family housing and multi-dwelling unit residential, open space/park, and limited commercial.	CT 102.09 BG 1 has a total of 40.68% low-income, which is designated as an Environmental Justice Zone due to the percentage of people with low-income being 1 standard deviation or more above the regional average.
CT 96.04 BG 2, CT 96.04 BG 3, CT 96.04 BG 4, CT 96.07 BG 1, CT 96.07 BG 3	Light industrial, mixed-use business district, medium- to high-density residential and multi-dwelling unit residential, commercial, schools, churches, retirement communities, and parks.	CT 96.04 BG 3 has a total of 84.15% low-income and CT 96.07 BG 3 has a total of 42.82%, which are both designated as an Environmental Justice Zone due to the percentage of people with low-income being 1 standard deviation or more above the regional average.
CT 96.04 BG 1, CT 96.06 BG 1	Commercial areas, residential medium- to high-density single-family housing and multi-dwelling unit residential, library, schools, parks and recreation areas, and churches.	Both block groups have less than 1 standard deviation above the regional average. CT 96.04 BG 1 has 22.48% and CT 96.06 BG 1 has 16.44%.
CT 95.01 BG 1, CT 95.01 BG 2, CT 95.02 BG 1, CT 95.02 BG 2	Residential medium- to high-density single-family housing and multi-dwelling unit residential, open space/park, and limited commercial along US 287, West 72 nd Avenue, and Pecos Street.	CT 95.01 BG 1 has a total of 56.22% low-income and CT 95.02 BG 1 has a total of 39.8%, which are both designated as an Environmental Justice Zone due to the percentage of people with low-income being 1 standard deviation or more above the regional average.

The ACS 2016–2020 5-Year Estimates was used to determine the LEP populations. LEP is defined as individuals who do not speak English as their primary language and have a limited ability to read, write, speak, and understand English. LEP populations are identified to make sure that they can effectively participate in and

benefit from federally assisted projects and that project actions do not violate the Title VI prohibition against national origin discrimination.

USDOT LEP guidance establishes a “safe harbor,” regarding the requirement to translate vital documents. The guidance states that LEP individuals must be provided “meaningful access,” where oral language services are needed and are reasonable. CDOT provides written translation of vital documents for each eligible LEP language group that constitutes 5 percent or 1,000, whichever is less, of the population of persons eligible to be served or likely to be affected or encountered. If there are fewer than 50 persons in a language group that reaches the 5 percent trigger, vital written materials do not need to be translated. Rather, CDOT staff may provide written notice in the primary language of the LEP group of the right to receive competent oral interpretation of those written materials, free of cost. **Table 5** summarizes LEP populations in the community study area.

Table 5. Overview of LEP Populations in the Community Study Area

Census Block Group	Total Population	Total LEP	Percent LEP
Adams County			
CT 95.01 BG 1	1,289	317	25.86%
CT 95.01 BG 2	1,884	167	10.15%
CT 95.02 BG 1	1,277	259	20.65%
CT 95.02 BG 2	1,873	128	7.22%
CT 96.04 BG 1	1,158	37	3.32%
CT 96.04 BG 2	1,368	75	5.9%
CT 96.04 BG 3	6,18	98	17.07%
CT 96.04 BG 4	1,002	93	10.06%
CT 96.06 BG 1	1,503	162	11.38%
CT 96.07 BG 1	1,405	93	7.88%
CT 96.07 BG 3	1,648	304	20.19%
Jefferson County			
CT 102.08 BG 1	1,799	59	3.46%
CT 102.08 BG 4	865	58	7.44%
CT 102.09 BG 3	2,727	243	9.13%
CT 102.09 BG 4	1,207	141	12.53%

DRCOG has also created a dataset to display the Disproportionately Impacted Communities as defined by the Environmental Justice Act (HB21-1266) within the state of Colorado. This dataset includes census block groups where greater than 40 percent of households are (1) low-income, (2) housing cost-burdened, or (3) include people of color (minority). **Table 6** summarizes disproportionately impacted communities within the Community Study Area.

Table 6. Overview of Disproportionately Impacted Communities

Census Block Group	Total Population	% People of Color	% Low-Income	% Housing Cost-Burdened	Disproportionately Impacted Community
Adams County					
CT 95.01 BG 1	1,078	62.43	56.22	49.55	Low-Income, People of Color, Housing Cost-Burdened
CT 95.01 BG 2	2,011	54.1	14.73	48.17	People of Color, Housing Cost-Burdened
CT 95.02 BG 1	1,128	72.78	39.8	40.18	People of Color, Housing Cost-Burdened
CT 95.02 BG 2	1,904	71.8	34.93	41.21	People of Color, Housing Cost-Burdened
CT 96.04 BG 1	1,048	31.11	22.48	31.35	None
CT 96.04 BG 2	1,472	61.75	34.78	41.97	People of Color, Housing Cost-Burdened
CT 96.04 BG 3	738	48.51	84.15	50.61	Low-Income, People of Color, Housing Cost-Burdened
CT 96.04 BG 4	1,142	51.93	12.22	31.91	People of Color
CT 96.06 BG 1	1,320	51.44	16.44	53.61	People of Color, Housing Cost-Burdened
CT 96.07 BG 1	1,434	50	26.29	38.6	People of Color
CT 96.07 BG 3	1,534	69.1	42.82	64.41	Low-Income, People of Color, Housing Cost-Burdened
Jefferson County					
CT 102.08 BG 1	2,065	16.17	40.68	37.6	Low-Income
CT 102.08 BG 4	929	14.53	17.76	39.77	None
CT 102.09 BG 3	2,534	47.63	37.21	47.85	People of Color, Housing Cost-Burdened
CT 102.09 BG 4	1,196	10.79	7.27	11.62	None

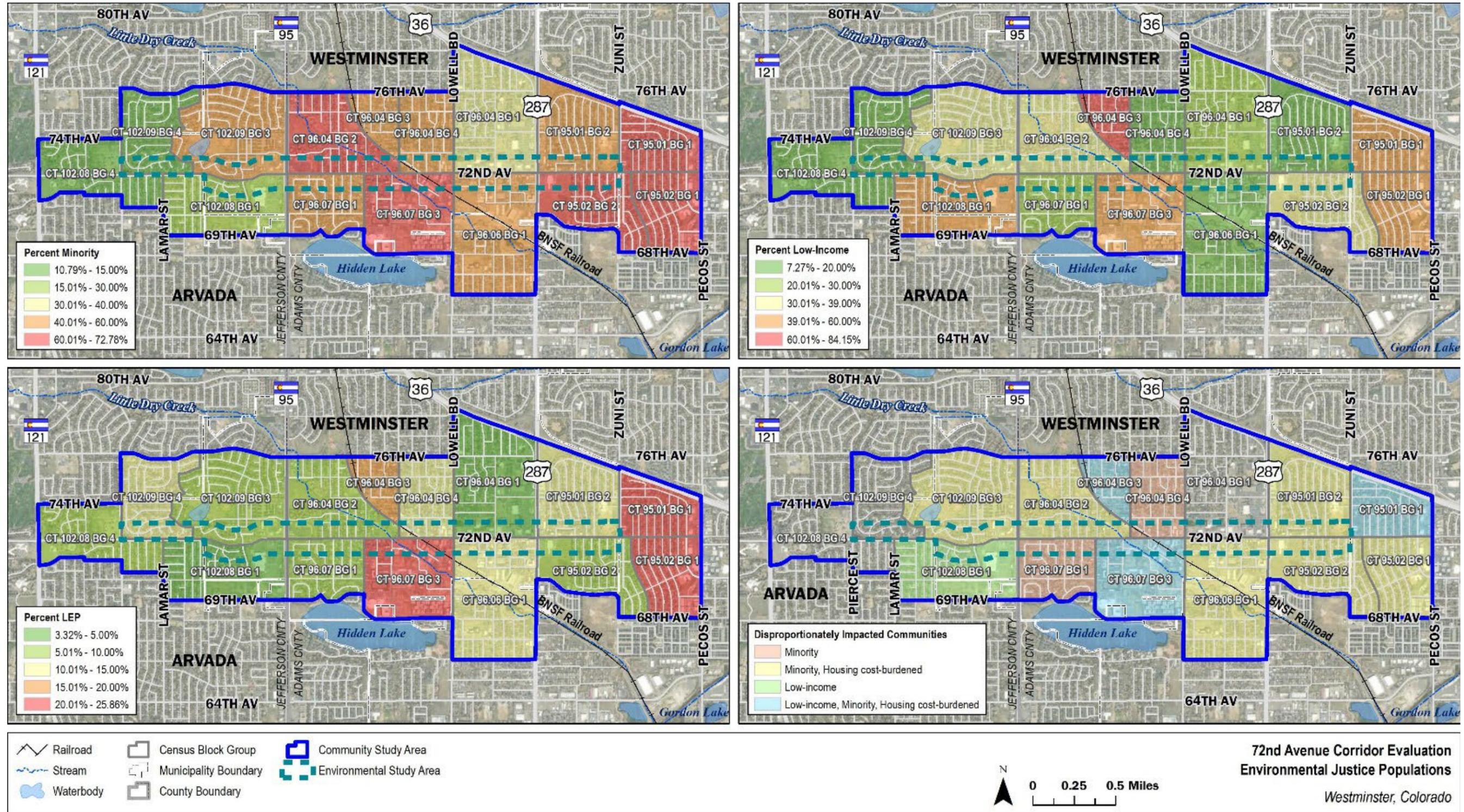
Next Steps for Implementation

Who	Potential agency and stakeholder involvement	<ul style="list-style-type: none"> FHWA CDOT Adams County 	<ul style="list-style-type: none"> Jefferson County City of Arvada City of Westminster 	<ul style="list-style-type: none"> Housing and Urban Development General public
When	Critical schedule considerations	Outreach to low-income, minority, and LEP populations should occur early to avoid schedule impacts because input from these populations could influence alternative and impact analyses.		
Why	Regulatory setting and general context	<ul style="list-style-type: none"> Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations: CDOT is required to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. Title VI of the Civil Rights Act prohibits recipients of federal financial assistance from discriminating based on race, color, or national origin in their programs or activities. Executive Order 13166: Requires federal agencies to provide services so that LEP persons will have meaningful access to those services. FHWA Order 6640.23A, FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations: Establishes policies and procedures for FHWA to use in complying with Executive Order 12898. 		

		<ul style="list-style-type: none"> ▪ USDOT Order 5610.2, Order to Address Environmental Justice in Minority Populations and Low-Income Populations: CDOT must consider Environmental Justice principles in all (USDOT) programs, policies, and activities and describe steps to prevent and address disproportionately high and adverse effects to minority or low-income populations. ▪ Senate Bill 260 (SB21-260): Section 28 requires CDOT's Environmental Justice and equity branch to identify and address technological, language, and information barriers that may prevent disproportionately impacted communities from participating fully in transportation decisions that affect health, quality of life, and access for disadvantaged and minority businesses in project delivery. ▪ Environmental Justice Act (HB21-1266): Includes important provisions to redress the effects of environmental injustice on disproportionately impacted communities, reduce climate pollution across several large sources of emissions, and create a new source of funding for implementing climate rules.
How	NEPA pre-scoping considerations	<p>Under the NEPA process, the collection and evaluation of minority, low-income, and LEP populations is usually structured as a four-step process:</p> <ol style="list-style-type: none"> 1. Define the area of potential impact (i.e., Community Study Area). 2. Identify minority, low-income, LEP populations within the Community Study Area, as well as disproportionately impacted communities. 3. Evaluate impacts/benefits to determine if there are any adverse and disproportionate impacts on the population and identify benefits. 4. Identify mitigation (if needed) and any need for specialized outreach.
Next Steps	Funding, design, construction, and mitigation implications	<p>It is important to identify low-income, minority, and LEP populations, as well as any disproportionately impacted communities, early so that these populations can become involved and have a meaningful opportunity to participate during every project phase. Specialized outreach may be necessary based on the extent of anticipated impacts and stakeholder concerns. In addition, the project team will need to determine whether language assistance measures are needed to ensure meaningful access to the process. Consideration of businesses and community facilities important to low-income, minority, and LEP populations is also critical.</p>

Figure 3 identifies locations with higher concentrations of low-income, minority, and LEP populations, as well as disproportionately impacted communities. As illustrated, portions of the Community Study Area include higher concentrations of these populations and may require specific outreach for future projects along West 72nd Avenue.

Figure 3. Environmental Justice Populations



Parks, Open Spaces, Trails, Recreational Resources and Section 6(f)

Publicly owned parks and trails warrant Section 4(f) consideration during federally funded projects. Section 6(f) protections apply to lands or facilities developed or purchased using Land and Water Conservation Funds (LWCF) through the National Park Service and CPW. Section 4(f) resources may include publicly owned parks, recreational areas, open space areas, and wildlife/waterfowl refuges. These resources must have a recreational use. Section 6(f) resource regulations apply when state and local governments obtain grants through LWCF to develop or make improvements to parks and outdoor recreation areas. **Table 7** lists existing parks and trails locations within the environmental study area, including LWCF status. The environmental study area does not include wildlife or have waterfowl refuges.

An evaluation is required to determine whether a publicly owned park, recreation area, or wildlife/waterfowl refuge is determined to be significant. If the resource is determined to be significant, a “use” of the Section 4(f) resource may occur. A use occurs when (1) land is permanently incorporated into a transportation project; (2) when there is a temporary occupancy of land that is adverse in terms of the statute’s preservation purpose; or (3) when there is a constructive use.

Table 7. Parks and Trails Resources

Resource Name	LWCF	Resource Description
Parks		
Faversham Park and Tepper Fields	No	Neighborhood Park: Located north of West 73 rd Avenue, west of Depew Street. Several amenities including basketball court, four (4) softball fields, playground, fishing pond, multiuse field, trail, and picnic facilities.
Local Park (Eaton Street)	No	Neighborhood Park: Northwest corner of 71 st Place and Eaton Street in the Patio neighborhood.
Future Park Site	No	Proposed Park: Northwest corner of West 72 nd Avenue and Bradburn Boulevard in the Quimby’s neighborhood.
England Park	No	Community Park: South of West 72 nd Avenue between Raleigh Street and Newton Street. Includes basketball court, picnic facilities, Little Dry Creek Trail, playground, baseball/softball field, and multiuse turf field.
Skyline Vista Park	No	Community Park: Northwest corner of West 72 nd Avenue and Zuni Street. An open park with facilities for softball, volleyball & skating, plus a play area & picnic shelter.
Trails		
Faversham Park Trail	No	Local Trail: This trail is a 0.6-mile loop trail around Lake Faversham at Faversham Park.
West 72 nd Avenue Trail	No	Local Trail: Parallels West 72 nd Avenue on both sides. The sidewalk on both sides connects to the Sheridan Boulevard Trail and Sheridan Boulevard.
Sheridan Boulevard Trail	No	Local Trail: The sidewalk parallels Sheridan Boulevard on both sides and connects to Little Dry Creek Open Space north of West 72 nd Avenue and Hidden Lake Open Space south of West 72 nd Avenue.
Little Dry Creek Trail	No	Regional Trail: Parallels creek within Little Dry Creek Greenway and crosses West 72 nd Avenue near Bradburn Boulevard.

Resource Name	LWCF	Resource Description
Bradburn Boulevard Trail	No	Local Trail: The sidewalk parallels Bradburn Boulevard and connects to West 72 nd Avenue at Bradburn Boulevard.
Lowell Boulevard Trail	No	Local Trail: The sidewalk parallels Lowell Boulevard and crosses West 72 nd Avenue at Lowell Boulevard and connects to Little Dry Creek Open Space.

Wildlife and Waterfowl Refuges

There are no designated wildlife or waterfowl refuges in the corridor or Section 4(f) properties.

Next Steps for Implementation

Who	Potential agency and stakeholder involvement	<ul style="list-style-type: none"> FHWA CDOT City of Westminster Jefferson and Adams Counties National Park Service CPW
When	Critical schedule considerations	The Section 4(f) evaluations and a determination of use should be initiated during the initial development of alternatives for the Proposed Action. Coordination with FHWA, CDOT, and the official with jurisdiction over the Section 4(f) resource may be required. An individual Section 4(f) approval could take up to a year or more to process.
Why	Regulatory setting and general context	<p>The DOT Act of 1966 includes a special provision, Section 4(f), stipulating that FHWA and other DOT agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless the following conditions apply:</p> <ul style="list-style-type: none"> There is no feasible and prudent avoidance alternative to the use of land; and the action includes all possible planning to minimize harm to the property resulting from such use; OR The Administration determines that the use of the property will have a de minimis impact. <p>Recreational resources developed with federal funding through LWCF are protected under Section 6(f) of the Land and Water Conservation Act, which prohibits conversion of these properties to anything other than public outdoor recreation uses.</p>
How	NEPA pre-scoping considerations	Regardless of whether a project uses federal funding, if a Proposed Action would affect a Section 6(f) site, then a Section 6(f) evaluation may be required. Section 6(f) prohibits conversion of property acquired or developed with these grants to a non-recreational purpose without approval of the National Park Service. Section 4(f) and Section 6(f) evaluations include collection and analysis of baseline information and alternatives, coordination with the resource owner and/or agencies, supporting documentation, and public involvement.
Next Steps	Funding, design, construction implications	When Section 4(f) and Section 6(f) evaluations are necessary, adequate time must be incorporated into the design schedule to avoid construction delays. Design modifications and/or mitigation considerations may be necessary in the Section 4(f) process. If a Section 6(f) conversion of land is necessary, CDOT must replace the land. The local agency, CPW, and National Park Service must approve the replacement land. Typically, replacement occurs at a one-to-one ratio.

Figure 4 shows existing parks and trails within the environmental study area and adjacent communities and highlights resources with LWCF.

Figure 4. Park and Trail Resources

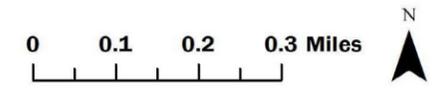


Legend

Trails	Stream	Parks and Open Space	Municipality Boundary	Environmental Study Area
Railroad	Waterbody	Section 6(f) Property	County Boundary	

72nd Avenue Corridor Evaluation
Study Area

Source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community; City of Arvada GIS Data; Adams County GIS Data; DRCOG GIS Data



Westminister, Colorado

Traffic Noise

Consideration of traffic noise along this corridor is important because many nearby properties have noise-sensitive activities. Noise is generally defined as unwanted or excessive sound. FHWA established a national standard, and both FHWA and CDOT have established related guidelines for evaluating noise levels, potential impacts, and potential abatement measures. Noise analyses must be performed on Type I projects if noise-sensitive receptors are present within the noise study zone. Type I projects include increasing the number of through traffic lanes or significantly changing the horizontal or vertical position of a road. **Table 8** summarizes existing noise-sensitive areas in the project area.

Table 8. CDOT Noise Abatement Criteria and Noise-Sensitive Areas

Location	Noise-Sensitive Area Summaries	Potential Noise Impact and Abatement Evaluation Areas
Land Use Category B – 66 dBA Exterior (Leq(h))		
Residential		
Pierce Street to Sheridan Boulevard	Single-family homes are along this segment west of Depew Street. Multi-family homes are at the northeast corner of Depew Street and West 72 nd Avenue.	Existing noise barriers are already constructed along West 72 nd Avenue for residences. Additional noise abatement is not likely to be recommended.
Sheridan Boulevard to Federal Boulevard	Primarily single-family homes with some multi-family homes west of Raleigh Street. Scattered mixed-density housing from Raleigh Street to Federal Boulevard.	Residences adjacent to West 72 nd Avenue where existing noise barriers are not present. Residences along Lowell Boulevard.
Federal Boulevard to Zuni Street	Single-family and multi-family homes are present along this segment of the West 72 nd Avenue corridor.	Residences adjacent to West 72 nd Avenue where existing noise barriers are not present.
Land Use Category C – 66 dBA Exterior (Leq(h))		
Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.		
Pierce Street to Sheridan Boulevard	Faversham Park, a residential playground, and park benches at the southwest corner of West 72 nd Avenue and Sheridan Boulevard.	Park benches at the southwest corner of West 72 nd Avenue and Sheridan Boulevard.
Sheridan Boulevard to Federal Boulevard	Schools and sporting areas from Lowell Boulevard to Irving Street. Trail along Little Dry Creek.	Schools and sporting areas adjacent to West 72 nd Avenue, Lowell Boulevard, or Irving Street. Trail along Little Dry Creek.
Federal Boulevard to Zuni Street	Orchard Park trails, baseball fields, and sporting areas.	Orchard Park trails and baseball fields.
Land Use Category E – 71 dBA Exterior (Leq(h))		
Hotels, motels, time-share resorts, vacation rental properties, offices, restaurants/bars, and other developed lands, properties or activities not included in Categories A–D or F.		
Pierce Street to Zuni Street	Restaurants with patios scattered along the corridor. Bowles House museum. Westminster greenhouse patio.	Restaurants with patios west of Sheridan Boulevard and from Hooker Street to Canosa Street and the Bowles House museum.

Location	Noise-Sensitive Area Summaries	Potential Noise Impact and Abatement Evaluation Areas
----------	--------------------------------	---

Notes:

The following land use categories are excluded from this table: A (serene lands), D (interior public spaces), F (agricultural and industrial lands), and G (lands not permitted for development).

dBA = A-weighted decibels

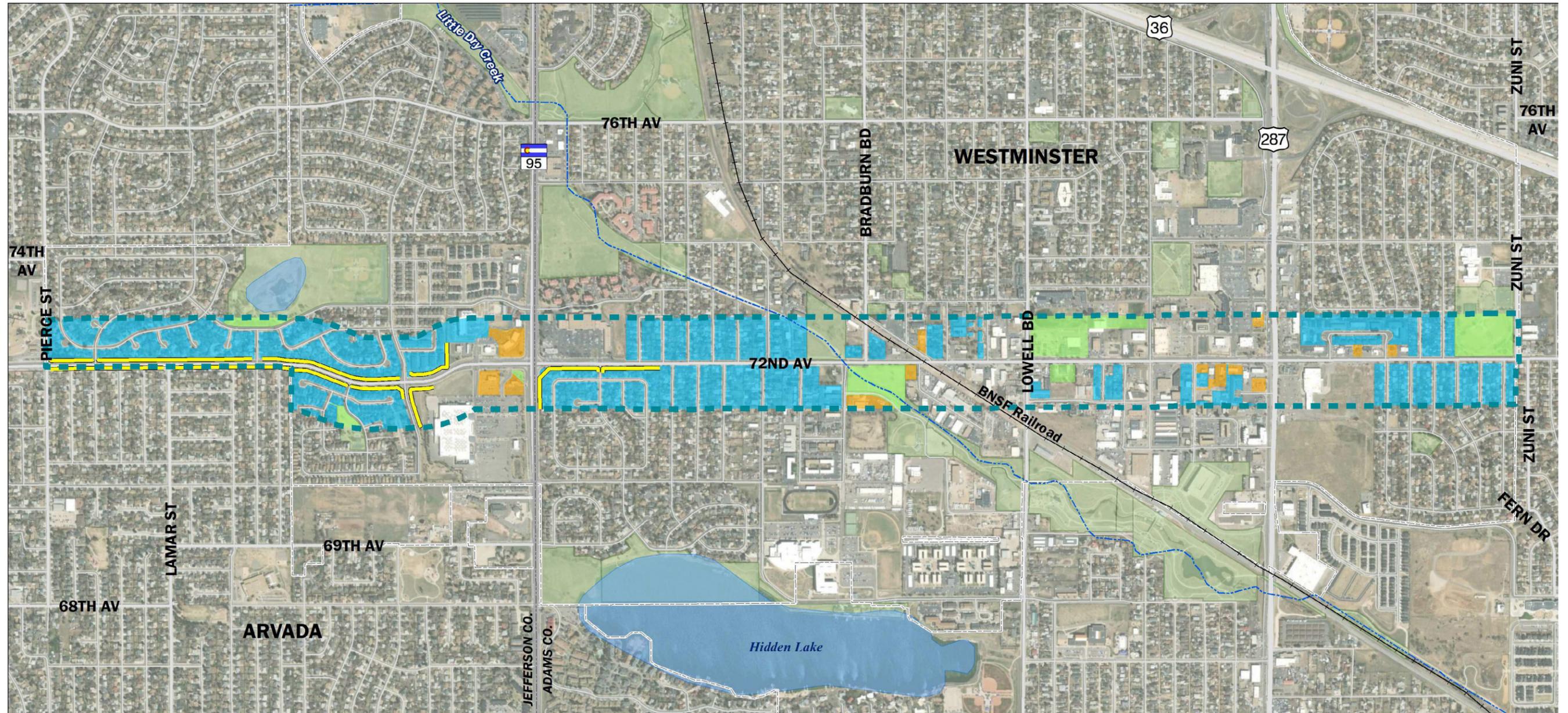
Leq(h) = one-hour equivalent sound level

Next Steps for Implementation

Who	Potential agency and stakeholder involvement	<ul style="list-style-type: none"> FHWA CDOT 	<ul style="list-style-type: none"> Local governments and agencies Local property owners and tenants
When	Critical schedule considerations	Noise evaluations should be performed once: <ul style="list-style-type: none"> Proposed improvements for project alternatives have been identified Traffic projections are available 	
Why	Regulatory setting and general context	<ul style="list-style-type: none"> 23 CFR Part 772: Procedures for Abatement of Highway Traffic Noise and Construction Noise identifies the federal highway noise standard that must be followed in evaluating and abating highway traffic noise pertaining to FHWA projects. This regulation required states to prepare and adopt state-specific noise guidelines. CDOT Noise Analysis and Abatement Guidelines provide the Colorado procedural and technical requirements for evaluating highway project traffic noise and considering noise mitigation actions where noise impacts are identified. The goal of these guidelines is to develop highway projects in a compatible relationship with noise-sensitive land uses. 	
How	NEPA pre-scoping considerations	Noise evaluation is conducted for Type I projects to determine if traffic noise would have an impact on any receptors (e.g., homes, schools, parks, patios; either existing or permitted for development). "Impact" is defined as meeting or exceeding Noise Abatement Criteria or an increase in noise of at least 10 decibels. Receptors are typically identified as exterior areas of frequent human use. Other Type III projects do not require noise analysis. The evaluation includes identifying land uses and receptors, measuring and modeling existing traffic noise levels, modeling future traffic noise levels, determining future traffic noise impacts, and (if needed) identifying/evaluating abatement measures. For FHWA/CDOT to recommend noise abatement, the mitigation must be shown to be feasible and reasonable.	
Next Steps	Funding, design, construction, and mitigation implications	A traffic noise impact and abatement analysis will be considered through NEPA. If prospective noise abatement appears likely, the Benefited Receptor Preferences Survey can be completed after the Final Office Review but during the NEPA process (for Categorical Exclusions) or during final design for Environmental Assessments or Environmental Impact Statements. If all of the Noise Abatement Criteria are found to be feasible and reasonable, then the project becomes committed to constructing and funding those abatement measure(s). Noise walls may cost about \$2 million per mile. The likelihood for abatement to be feasible and reasonable increases with a higher density of impacted receptors.	

Figure 5 highlights noise sensitive areas and existing noise abatement within the environmental study area. During NEPA analysis, the minimum noise study zone would include a 300-foot area in all directions from the proposed edge of travelled lanes throughout the extent of the project. For noise evaluations, the study zone may be expanded if warranted.

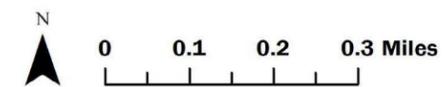
Figure 5. Noise Sensitive Areas



Legend

- | | | | |
|---------------------|-----------------|--------------------------|---------------------------------|
| Railroad | Waterbody | Environmental Study Area | Noise Abatement Criteria |
| Stream | Parks | Cities_Selection | |
| Existing Noise Wall | County Boundary | Activity Category B | |
| | | | Activity Category C |
| | | | Activity Category E |

Source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



72nd Avenue Corridor Evaluation
Noise

Westminister, Colorado

Visual Resources

The characterization of visual resources for the West 72nd Avenue corridor focuses on the visual character of corridor streetscapes, and visual compatibility with goals and policies in the City of Westminster 2040 Comprehensive Plan. This approach is intended to identify the variable conditions of corridor streetscapes in context to planning goals and establish a framework for visual resource assessments in future project implementation phases.

The late nineteenth century to early-to-mid-twentieth century corridor transportation network, community residences, schools, city buildings, farms, service stations, and shops define a distinctive “historic sense of place.” In contrast, contemporary commercial centers, residential development, and corridor streetscapes create the image of an “area of change.”

The following project planning goals and themes capture the context and distinct identity of the corridor:

- ▶ The West 72nd Avenue (also known as Wyoming Street) corridor is a unique 3-mile section of the City of Westminster that boasts a long history and has the potential to be a defining community connector.
- ▶ West 72nd Avenue is at the heart of the historic Westminster community, as it falls within the original boundary of Harris Park (later incorporated into the Town of Westminster) and is one of the City’s first transportation corridors.
- ▶ The corridor spans historic areas and some of the most diverse areas of the city.
- ▶ West 72nd Avenue is characterized by numerous land uses, including a mix of commercial and retail spaces, schools, community destinations, underused parking lots, and residential areas.

The West 72nd Avenue Historic and Archaeological section provides site descriptions and mapping of historic resources, including several NRHP Eligible and/or Listed properties, as well as many unsurveyed sites.

Table 9 lists visual resource-related goals and policies for corridor gateways, streetscapes, public art, and aesthetics from sections of the Westminster Comprehensive Plan.

Table 9. Goals and Policies for Visual Resources

Section 4.0 Transportation, Mobility, and Connections (TM)	
Thrive	
Goal TM-2: Support the community’s economic resilience, environment, public health, and quality of life for all community members.	
2.4	Create a strong sense of entry into and passage through the city at key locations and along key corridors identified on Map 7-1 .
2.5	Develop and maintain enhanced, cohesive streetscaping along major corridors, with consideration of the visual and physical character.
Map 4-1 Westminster’s Master Street Network (West 72 nd Avenue—Major Arterial)	
Map 4-2 Bicycle Network and Improvements (West 72 nd Avenue—Multiuse Sidepath)	
Map 4-3 Priority Transit Corridors for Stop and Station Enhancements (72 nd Westminster Station)	
Section 5.0 Health, Wellness, and Community Services (HWS)	
Arts and Culture	
Goal HWS-5: Reflect the diversity of the community through public art and cultural programming.	
5.1	Encourage the appropriate placement of public art, in key public locations, including plazas, gateways into the city, streetscapes, and individual developments.
5.2	Integrate public art and visually distinct designs into infrastructure that visually connect with nearby districts or neighborhoods.

Section 7.0 Housing and Neighborhoods (HN)

Established gateways and vibrant streetscapes can provide a clear and welcoming entry into the community by reflecting shared values and civic pride. The preservation of scenic views, as well as cultural and historical landmarks, add to a community’s collective sense of history and character.

Streetscape and Public Realm

Goal HN-5: Maintain and enhance Westminster’s positive image and character through attractive streetscapes.

- 5.1 Continue to develop and support enhanced streetscape, development continuity, and revitalization of key commercial corridors.
- 5.2 Improve the visual and physical character of residential corridors throughout the city, to include provisions to support multimodal transportation.
- 5.3 Create a strong sense of entry into and passage through the city at key locations, identified on **Map 7-2**, through gateway elements, streetscape enhancements, development scale and orientation, lighting, signage, and public art.

Views

Goal HN-6: Preserve views to the mountains, natural amenities, and scenic skylines from the public realm.

- 6.1 Maintain scenic vistas from rights of way, public facilities and public lands to Open Space, the mountains, Downtown Denver, and the Front Range area, as shown on **Map 7-2**.

Community Heritage

Goal HN-7: Identify, recognize, and protect Westminster’s unique and irreplaceable historic and cultural heritage and diversity.

- 7.1 Protect historic and cultural resources for the aesthetic, cultural, educational, environmental, and economic contribution they make to maintaining and building Westminster’s identity and quality of life.

Map 7-1. City Structure

- West 72nd Avenue: Multimodal Corridor
- Elements Adjacent to 72nd Avenue:
 - Suburban
 - Mixed-use Neighborhood
 - Specific Area Plan
 - Parks and Open Space
 - Specific Area Plan

Map 7-2. Viewshed, Gateways, and Historic Context

- Adjacent to West 72nd Avenue:
 - National Register of Historic Places
 - Parks and Open Space
 - Primary Views (south from Westminster Station)

Section 8.0 Community Places

8.1 Focus and Transition Areas

Westminster Station Transition Area	North side of West 72 nd Avenue: Federal Boulevard to Bradburn/BNSF South side: Zuni Street to BNSF
Westminster Station Focus Area	South side of West 72 nd Avenue: Federal Boulevard to Lowell Blvd
Harris Park Community Vision Plan	North side of West 72 nd Avenue: Irving Street to England Park South side of West 72 nd Avenue: Lowell Boulevard to BNSF

Source: City of Westminster Comprehensive Plan, February 2023

Criteria to evaluate the visual compatibility of corridor streetscapes with planning goals and policies include:

- ▶ **Intactness:** The integrity and condition of the corridor streetscapes
- ▶ **Unity:** Visual continuity of streetscapes with West 72nd Avenue travel lanes and adjacent development patterns

- ▶ **Focal Points:** Distinctive features that attract attention and leave a memorable impression or sense of place
- ▶ **Visual Compatibility:** Visually intact and unified streetscape conditions
- ▶ **Visual Incompatibility:** Visually contrasting streetscape conditions
- ▶ **Mixed Compatibility:** Variable or moderately contrasting streetscape conditions

The characterization of corridor streetscapes and views is organized into a sequence of eight segments (A–H) between Zuni Street and Pierce Street, as highlighted on **Figure 6**.

Segments A–E (Zuni Street to Stuart Street)

Visual Compatibility: Local patterns of West 72nd Avenue streetscape compatibility between Zuni Street and Stuart Street are the most variable in the corridor, with contrasting patterns of compatible, mixed, and incompatible streetscape conditions.

Gateways: The West 72nd Avenue and Zuni Street intersection is a recognized corridor gateway in the Westminster 2040 Plan, as shown on **Figure 6** and in **Table 10**. The West 72nd Avenue and Federal Boulevard intersection creates a gateway into visually harmonious streetscape and development patterns.

Focal Points: Historic properties between Irving Street and BNSF are visual points of interest and create a concentrated sense of place within the corridor, including:

- ▶ 1 – Harris Park School
- ▶ 2 – Union High School
- ▶ 3 and 4 – Westminster Shopping Center and Westminster Post Office
- ▶ 5 – Skelly Oil Station
- ▶ 6 – Bowles House

Parks and Open Space: The West 72nd Avenue corridor is unified with England Park, and local gateway walls and columns create a focal point at the Little Dry Creek stream crossing.

Segment F (Stuart Street to Sheridan Boulevard)

Visual Compatibility: The corridor streetscape between Stuart Street and Sheridan Boulevard represents contrasting compatibility, with:

- ▶ Visually incompatible sections west of Stuart Street to Wolf Street, continuing along the north side to near Yates Street, and
- ▶ Visually compatible sections along the walled section along the south side of West 72nd Avenue between Wolf Street and Sheridan Boulevard, and the shopping center gateway at West 72nd Avenue and Sheridan Boulevard intersection.

Focal Point: The Shoenberg Farm at West 73rd Avenue and Sheridan Boulevard is a historic landmark.

Segment G (Sheridan Boulevard to Depew Street)

Visual Compatibility: The West 72nd Avenue treelined streetscape is unified with the shopping center between Sheridan Boulevard and Depew Street.

Segment H (Depew Street to Pierce Street)

Visual Compatibility: West 72nd Avenue is enclosed by brick walls with street tree-lined sections, creating a unified streetscape.

Table 10 provides representative photographs along the corridor.

Table 10. Corridor Photographs



West 72nd Avenue & Zuni Street: Skyline Vista Park – Westminster Gateway



West 72nd Avenue & Zuni Street – View to the West



West 72nd Avenue & Beach Street – View to the West



West 72nd Avenue & Clay Street – View to the West



Union High School



Harris Park School



West 72nd Avenue – Bowles House – View to the South



Little Dry Creek Bridge



West 72nd Avenue & Tennyson Street – View to the West



West 72nd Avenue & Sheridan Boulevard – View to the East



West 72nd Avenue & Depew Street – View to the West



West 72nd Avenue & Pierce Street – View to the East

Table II summarizes the visual compatibility of corridor streetscapes. The inventory and visual compatibility characterizations are based on field observations and interpretations in context to the City’s vision and goals for visual resources. The inventory mapping also includes the presence of street-edge walls, historic property focal points, and intersection gateways. The Front Range foothills are partially visible to westbound travelers along the corridor between Zuni Street and Sheridan Boulevard.

Table II. Visual Resource Characteristics

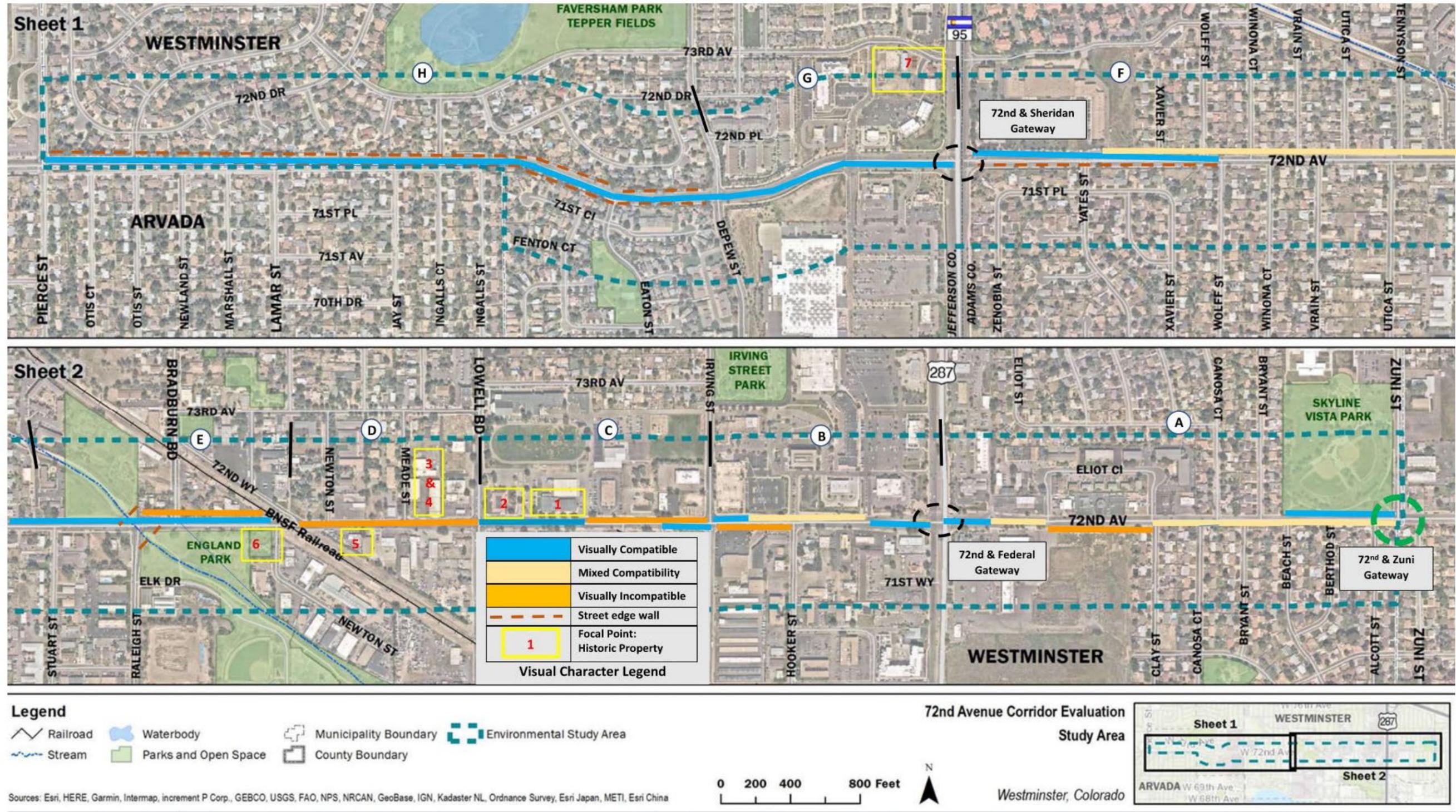
72 nd Avenue Corridor Segments	Streetscape Compatibility	Walls	Focal Points & Gateways	72 nd Avenue Streetscape Compatibility Summary
A. Zuni St to Federal				
Zuni St – Beach St (north)	Compatible		72 nd & Zuni	Intact & unified gateway image
Zuni St – Beach St (south)	Mixed Compatibility			Partially intact Streetscape
Beach St to Clay St (north)	Mixed Compatibility			Partially intact Streetscape
Beach St to Clay St (south)	Compatible			Intact & unified streetscape
Clay St to Federal (sequence)	Mixed Compatibility			Visually intact at 72 nd & Federal
B. Federal to Irving St				
North Side of 72 Ave (sequence)	Mixed Compatibility		72 nd & Federal	Variable intactness & unity – Compatible at 72 nd Ave gateway
South side of 72 Ave (sequence)	Mixed Compatibility			
C. Irving St to Lowell Blvd				
North Side of 72 Ave (sequence)	Mixed Compatibility			Variable intactness & unity – historic context
South side of 72 Ave (sequence)	Mixed Compatibility			
D. Lowell Blvd to BNSF				
North Side of 72 Ave	Incompatible			Lacking intactness or unity – Historic context
South side of 72 Ave	Incompatible			
E. BNSF to Stuart St				
North Side of 72 Ave (sequence)	Mixed Compatibility	---		Partially intact – Aesthetic wall
South side of 72 Ave	Compatible	---		Intact & unified – Aesthetic wall
F. Stuart St to Sheridan				
Stuart St to Yates St (north)	Mixed Compatibility		72 nd & Sheridan	Partially intact streetscape
Stuart St to Wolf St (south)	Mixed Compatibility			Intact & unified gateway image w/aesthetic wall on south side
Yates St to 95 (north)	Compatible			
Wolf St to 95 (south)	Compatible	---		
G. Sheridan to Depew St				
North Side of 72 Ave	Compatible		72 nd & Sheridan	Intact & unified gateway image – Historic context at 73 rd
South side of 72 Ave	Compatible			
H. Depew St to Pierce St				
North Side of 72 Ave	Compatible	---		Intact & unified streetscapes – aesthetic walls
South side of 72 Ave	Compatible	---		
Legend: Compatibility of 72nd Avenue Streetscapes with Westminster Comprehensive Plan Goals & Policies				
Compatible	Compatible	Mixed Compatibility	Incompatible	Incompatible

Next Steps for Implementation

Who	Agency and stakeholder involvement	Westminster CDOT Adams County	Regional Transportation District Jefferson County Community stakeholders
When	Critical schedule considerations	None associated with visual resources	
Why	Regulatory setting and general context	<ul style="list-style-type: none"> CDOT Visual Impact Assessment (VIA) Guidelines (CDOT, 2020) Applying the City of Westminster Comprehensive Plan goals and policies related to visual resources, aesthetic design, and gateway image Coordination with Section 4(f) and Section 106 resources 	
How	NEPA pre-scoping considerations	<ul style="list-style-type: none"> CDOT Visual Impact Assessment (VIA) scoping process provides a framework for establishing the environmental study area, appropriate level of study, and NEPA documentation. CDOT’s VIA process includes four steps: Establishment, Inventory, Analysis, and Mitigation. 	
Next Steps	Funding, design, construction, and mitigation implications	<p>The role of visual mitigation in the NEPA and design process includes:</p> <ul style="list-style-type: none"> Developing measures to avoid or minimize visual contrast of transportation improvements Conforming to local agency aesthetic design and visual management guidelines Establishing project design guidelines to achieve visual compatibility and continuity with landscape settings and viewsheds Creating opportunities for establishing context sensitive gateway images and coordinating with local planning goals for aesthetic improvements 	

Figure 6 highlights the visual compatibility of streetscapes, street-edge walls, historic property focal points, and intersection gateways.

Figure 6. Visual Character



Hazardous Materials

The acquisition of property for ROW requires the evaluation of hazardous material concerns to protect worker health and safety, to provide liability due diligence for the purchasing entity, and to improve project alternatives analysis based on potential hazardous material impacts. Hazardous materials include substances or materials that the Environmental Protection Agency (EPA) has determined to be capable of posing an unreasonable risk to health, safety, or property. Hazardous materials may exist within the environmental study area at facilities that generate, store, or dispose of these substances, or at locations of past releases of these substances. Hazardous materials include asbestos, lead-based paint, heavy metals, dry cleaning solvents, and petroleum hydrocarbons (such as gasoline and diesel fuel), all of which could be harmful to human health and the environment.

Hazardous materials are regulated by various state and federal regulations. NEPA, as amended (42 US Code [USC] 4321 et seq., Public Law 91-190, 83 Stat. 852), mandates that decisions involving federal funds and approvals consider environmental effects from hazardous materials. Other applicable regulations include the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 USC 9601 et seq.), which provides federal authority for the identification, investigation, and cleanup of sites throughout the United States that are contaminated with hazardous substances (as specifically designated in the CERCLA) and the Resource Conservation and Recovery Act of 1976 (RCRA) (42 USC 321 et seq.), which establishes a framework for the management of both solid and hazardous waste. The federal Hazardous and Solid Waste Amendments of 1984 established a new comprehensive regulatory program for underground storage tanks (USTs) containing petroleum products and hazardous chemicals regulated under CERCLA. In 2016, EPA retired the CERCLA Information System database, replacing it with a more modern system called the Superfund Enterprise Management System (SEMS).

Sites historically known to have released regulated materials into the ground (i.e., soil), groundwater, or surface water are typically automotive fueling stations, automotive sales/service stations, and dry cleaning facilities. Facilities that likely use petroleum products and/or hazardous materials daily are also considered properties with a high contamination potential.

The environmental study area is developed with a mix of commercial, residential, and recreational development, as well as undeveloped property. Facilities that use hazardous materials are dispersed throughout the environmental study area. Most facilities identified in the environmental records search have been identified in the UST, leaking underground storage tank (LST), LUST TRUST and voluntary cleanup and redevelopment program (VCP) databases. UST and LST sites are typically associated with petroleum hydrocarbon use (e.g., automotive fueling stations) and potential releases.

Hazardous materials may exist along the West 72nd Avenue study corridor at facilities that generate, store, or dispose of these substances, or at locations of past releases of these substances. An environmental database records search conducted for the environmental study area (ERIS, 2023) was completed in accordance with the search radii specified in ASTM International (ASTM) Designation E 1527-21, "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process" (ASTM, 2021). For this assessment, ASTM-required databases with respect to the status of the listing and its location within the environmental study area boundaries were evaluated; non-ASTM required databases were not evaluated or listed within the results. Numerous facilities were identified in the environmental study area and several of



UST site along the 72nd Avenue corridor

these facilities were identified with multiple database listings (ERIS, 2023). Generally, if a facility identified in the records database report is active with an event that had the potential to contaminate the environmental study area, or groundwater flow could cause migration of the contaminants into the environmental study area, then the facility may be considered to be a potential impact.

Summary of Hazardous Material Sites and Concerns

Figure 7 identifies the following sites with potential and hazardous materials concerns in the environmental study area:

- ▶ Fifty-two (52) facilities were listed within the LST database. LST facilities are ones that have had releases from their UST(s) and have applied for reimbursement of costs related to assessment and cleanup of petroleum contaminated sites. Of the 52 facilities, 18 facilities were listed under the LUST TRUST database, in which a responsible party may or may not have been identified. Many of the releases have been closed; however, there are facilities in which a corrective action plan is being implemented. Further evaluation and information will be needed depending on the extent of improvements associated with the alternatives under evaluation.
- ▶ Thirty-eight (38) facilities were listed within the UST database. These facilities have at least one UST installed on-site. These facilities typically coincide with the LST database. The presence of a UST does not indicate a release has occurred.
- ▶ Twenty-one (21) listings were included in the VCP database. VCP's objective is to facilitate the redevelopment and transfer of contaminated properties. One of the VCP listings was also included in the Hazardous Waste Sites Generator (HAZ GEN) database. Further evaluation and information will be needed depending on the extent of improvements associated with the alternatives under evaluation.
- ▶ Twelve (12) facilities were identified as RCRA very small quantity generators (VSQG) or a RCRA small quantity generators (SQG). Further evaluation and information will be needed depending on the extent of improvements associated with the alternatives under evaluation.
 - A RCRA VSQG property is any person or site whose processes and actions create hazardous waste and generate 100 kilograms or less per month of hazardous waste, or one kilogram or less per month of acutely hazardous waste. Additionally, VSQG may not accumulate more than 1,000 kilograms of hazardous waste at any time.
 - A RCRA SQGs property generates more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month.
- ▶ Twelve (12) facilities were listed within the solid waste facilities and landfill (SWF/LF) database. These facilities may consist of automotive repair facilities, registered tire haulers, and/or generators of medical waste. Additionally, five (5) historical landfills were listed with the database report. No detailed information for the historical landfills was available. Further evaluation and information will be needed depending on the extent of improvements associated with the alternatives under evaluation.
- ▶ Five (5) facilities were listed in the Emergency Response Notification System (ERNS) database. The ERNS database includes oil (including petroleum products) and hazardous substances spill reports controlled by the National Response Center. Further evaluation and information will be needed depending on the extent of improvements associated with the alternatives under evaluation.
- ▶ Four (4) facilities were listed that had registered aboveground storage tanks (ASTs), which may include facilities with backup generators or automotive services. ASTs are typically within a secondary containment and, depending on the size, are typically inspected each year by the Colorado Department of Labor and Employment – Division of Oil and Public Safety (CDLE – OPS).
- ▶ Four (4) facilities were listed in the RCRA Corrective Action (RCRA CORRACTS) database. The Corrective Action Program has identified these sites to ensure that cleanups occur. EPA and state regulators work with facilities and communities to design remedies based on the contamination,

geology, and anticipated use unique to each site. Further evaluation and information will be needed depending on the extent of improvements associated with the alternatives under evaluation.

- ▶ Two (2) facilities were listed with Activity and Land Use (AUL) and Covenant restrictions. These types of restrictions can indicate that previous remediation activities were not cleaned up completely. Further evaluation and information will be needed depending on the extent of improvements associated with the alternatives under evaluation.
- ▶ Two (2) facilities were included within the Colorado Brownfields database, which may indicate that there is real and/or perceived subsurface contamination. Nine (9) facilities were included in the Federal Brownfields database; one (1) of the Colorado Brownfields property was included in the federal database. These properties may have a potential presence of a hazardous substance, pollutant, or contaminant. Further evaluation and information will be needed depending on the extent of improvements associated with the alternatives under evaluation.
- ▶ One (1) facility was listed within the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) and the CERCLIS No Further Remedial Action Planned (NFRAP) databases. It was also listed in the SEMS Archived Site Inventory. The CERCLIS database includes potential and confirmed hazardous waste sites at which the EPA has some involvement. The CERCLIS NFRAP and the SEMs Archive Inventory include archived sites for which EPA has determined that assessment has been completed and no further remedial action is planned at that time.

This facility was also listed in the Hazardous Waste Sites – Corrective Action (HAZ CORRACTS) database, which lists hazardous waste generators with corrective actions under the Colorado Department of Public Health and Environment (CDPHE), and in the Hazardous Waste Sites – Treatment, Storage, and Disposal (HAZ TSD) database, which includes facilities that treat, store, dispose, or recycle hazardous waste on-site.

Further evaluation and information will be needed depending on the extent of improvements associated with the alternatives under evaluation.

Hazardous materials are most likely to be encountered during ground-disturbing activities near sites with recognized or potential environmental conditions. LST sites that are closed still have the potential to have residual contamination present and should be investigated more thoroughly during any future project.

Figure 7. Hazardous Materials – Sites with Potential Recognized Environmental Conditions



Next Steps for Implementation

Who	Potential agency and stakeholder involvement	<ul style="list-style-type: none"> ▪ FHWA ▪ CDOT ▪ Local government agencies ▪ Local property owners and tenants <ul style="list-style-type: none"> ▪ CDPHE Hazardous Materials and Waste Management Division ▪ CDLE – OPS
When	Critical schedule considerations	<ul style="list-style-type: none"> ▪ Modified Environmental Site Assessment (MESA) or a Phase I Environmental Site Assessment (Phase I ESA): A MESA or a Phase I ESA can be conducted and completed in a relatively short time, approximately one to two months. ▪ Phase II Limited Subsurface Investigation (Phase II LSI): If an ISA or a Phase I ESA reveals potential or recognized on-site contamination, a Phase II LSI may be required. A Phase II LSI can be completed within two to three months provided the necessary subsurface sampling and sampling analysis can be conducted without delay and right-of-entry to the property is granted. ▪ Remedial Actions: If a Phase II LSI reveals the need for remedial actions, the project could be significantly delayed. Remedial action does not have a standard timetable but is influenced by contaminants, extent of contamination, and physical setting. It requires coordination with relevant regulatory agencies, which may cause delays. ▪ Validity of MESA or Phase I ESA: MESAs and Phase I ESAs are valid for only 180 days. The report can be updated between 180 days and 1 year. After 1 year, the report may be used only as a reference for a future MESA or Phase I ESA due to the potential for changes in on-site conditions.
Why	Regulatory setting and general context	<p>A MESA should be conducted at site-specific locations to evaluate hazardous materials that may require remediation prior to acquisition or development based on ASTM standards E1527-21, which provide requirements for conducting a Phase I ESA with all appropriate inquiries.</p> <p>Compliance with all appropriate inquiries will allow protection from potential liability under CERCLA as an innocent landowner, a contiguous property owner, or a bona fide prospective purchaser.</p>
How	NEPA pre scoping considerations	<p>CDOT requires a MESA or a Phase I ESA for Categorical Exclusion projects or acquisition of properties with potential hazardous materials concerns for ROW.</p>
Next Steps	Funding, design, construction, and mitigation implications	<p>If a Phase II LSI and/or remediation activities are required based on the MESA or Phase I ESA findings, there may be substantial delays for property acquisition or construction in the vicinity. Also, a Phase II LSI and remedial activities could require additional funding. These activities are associated with the acquisition of properties.</p> <p>During the design process, this information can be used to identify avoidance options, when possible, and to develop specific contaminated soils/groundwater material management or mitigation measures such as a Materials Management Plan (MMP) to detail the Standard Operating Procedures for handling potentially contaminated media, specifically soil and/or groundwater. The MMP will be designed to minimize worker exposure to potentially contaminated material, prevent releases to the environment, and ensure proper disposal.</p>

Limitations and Exceptions

FHU’s assessment of findings presented herein is based on observations of current environmental study area conditions and a review of reasonably ascertainable standard record resources. This assessment did not attempt to detect the presence of environmental contamination that may exist in areas that could not be visually inspected. Sampling of soils, groundwater, surface waters, and structures for lead-based paint and

asbestos was beyond the scope of this Corridor Conditions Report. A subsurface investigation of the environmental study area was not conducted. The assessment was limited to areas accessible along the public ROW and did not include access to fenced-in areas, interiors of buildings, rear lots, or areas not visible from public ROW in the environmental study area.

FHU’s findings and opinions are based on information available from public sources on specific dates (e.g., databases). This information is updated continually and can be incomplete. FHU does not assume any liability for information that has been misrepresented for use or for items not visible, accessible, or present in the environmental study area at the time of the visual reconnaissance.

FHU conducted a “windshield” survey of properties adjoining the environmental study area on March 10, 2023, to evaluate the potential presence of regulated materials sources by driving the environmental study area via access roads but did not access any of the properties adjoining the environmental study area or properties that were occupied within the environmental study area.

FHU cannot warrant or guarantee that not finding indicators of hazardous materials means that hazardous materials do not exist within the environmental study area. No investigation is thorough enough to preclude the presence of materials in the environmental study area, which currently, or in the future, may be considered hazardous or may require management as a regulated material.

Opinions and judgment expressed herein, which are based on FHU’s understanding and interpretation of current regulatory standards, should not be construed as legal opinion.

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https://gis.colorado.gov/compass_oahp/
- Jefferson County ASPIN Property Records Database
- Online database for individual property reports, land sale transactions, and building permits:
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<https://www.cityofwestminster.us/Government/Departments/CommunityDevelopment/Planning/LongRangePlanningandUrbanDesign/ComprehensivePlan>
- US Geological Survey (USGS): <https://ngmdb.usgs.gov/topoview/viewer/#15/39.8304/-105.0526>

HCM 6th Signalized Intersection Summary
1: Pierce St & W 72nd Ave

AM Existing
08/15/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Traffic Volume (veh/h)	82	373	50	52	532	107	44	42	33	116	49	113
Future Volume (veh/h)	82	373	50	52	532	107	44	42	33	116	49	113
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	89	405	54	57	578	116	48	46	36	126	53	123
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	583	2089	931	640	2089	931	60	58	45	141	59	170
Arrive On Green	0.05	0.59	0.59	0.09	1.00	1.00	0.09	0.09	0.09	0.11	0.11	0.11
Sat Flow, veh/h	1781	3554	1584	1781	3554	1584	641	615	481	1272	535	1538
Grp Volume(v), veh/h	89	405	54	57	578	116	130	0	0	179	0	123
Grp Sat Flow(s),veh/h/ln	1781	1777	1584	1781	1777	1584	1737	0	0	1807	0	1538
Q Serve(g_s), s	2.3	6.4	1.7	1.4	0.0	0.0	8.8	0.0	0.0	11.7	0.0	9.3
Cycle Q Clear(g_c), s	2.3	6.4	1.7	1.4	0.0	0.0	8.8	0.0	0.0	11.7	0.0	9.3
Prop In Lane	1.00		1.00	1.00		1.00	0.37		0.28	0.70		1.00
Lane Grp Cap(c), veh/h	583	2089	931	640	2089	931	163	0	0	200	0	170
V/C Ratio(X)	0.15	0.19	0.06	0.09	0.28	0.12	0.80	0.00	0.00	0.89	0.00	0.72
Avail Cap(c_a), veh/h	583	2089	931	640	2089	931	192	0	0	200	0	170
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.94	0.94	0.94	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.5	11.5	10.6	8.1	0.0	0.0	53.2	0.0	0.0	52.7	0.0	51.6
Incr Delay (d2), s/veh	0.0	0.2	0.1	0.0	0.3	0.3	19.6	0.0	0.0	36.6	0.0	15.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	2.5	0.6	0.5	0.1	0.1	4.7	0.0	0.0	7.3	0.0	4.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.5	11.7	10.7	8.1	0.3	0.3	72.9	0.0	0.0	89.2	0.0	66.6
LnGrp LOS	A	B	B	A	A	A	E	A	A	F	A	E
Approach Vol, veh/h		548			751			130			302	
Approach Delay, s/veh		11.1			0.9			72.9			80.0	
Approach LOS		B			A			E			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.0	76.0		16.0	10.0	76.0		18.0				
Change Period (Y+Rc), s	4.5	5.5		* 4.7	4.5	5.5		4.7				
Max Green Setting (Gmax), s	5.5	68.5		* 13	5.5	68.5		13.3				
Max Q Clear Time (g_c+I1), s	4.3	2.0		10.8	3.4	8.4		13.7				
Green Ext Time (p_c), s	0.0	3.7		0.2	0.0	2.4		0.0				
Intersection Summary												
HCM 6th Ctrl Delay	23.3											
HCM 6th LOS	C											
Notes												
User approved pedestrian interval to be less than phase max green.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

AM Existing 2:46 pm 05/15/2023 Baseline

Synchro 11 Report
Page 1

HCM 6th Signalized Intersection Summary
2: Lamar St

AM Existing
08/15/2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗	↘	↖	↗	↖	↗
Traffic Volume (veh/h)	406	114	85	488	152	82
Future Volume (veh/h)	406	114	85	488	152	82
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	441	124	92	530	165	89
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1613	450	638	2444	198	107
Arrive On Green	0.78	0.78	0.03	0.69	0.18	0.18
Sat Flow, veh/h	2838	765	1781	3647	1105	596
Grp Volume(v), veh/h	284	281	92	530	255	0
Grp Sat Flow(s),veh/h/ln	1777	1733	1781	1777	1708	0
Q Serve(g_s), s	2.7	2.7	1.1	3.3	8.6	0.0
Cycle Q Clear(g_c), s	2.7	2.7	1.1	3.3	8.6	0.0
Prop In Lane		0.44	1.00		0.65	0.35
Lane Grp Cap(c), veh/h	1044	1018	638	2444	306	0
V/C Ratio(X)	0.27	0.28	0.14	0.22	0.83	0.00
Avail Cap(c_a), veh/h	1044	1018	638	2444	512	0
HCM Platoon Ratio	1.33	1.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.99	0.99	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	3.0	3.0	4.0	3.4	23.8	0.0
Incr Delay (d2), s/veh	0.6	0.7	0.0	0.2	2.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.8	0.3	0.7	3.4	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	3.6	3.7	4.0	3.6	26.1	0.0
LnGrp LOS	A	A	A	A	C	A
Approach Vol, veh/h	565			622	255	
Approach Delay, s/veh	3.6			3.7	26.1	
Approach LOS	A			A	C	
Timer - Assigned Phs	1	2		6	8	
Phs Duration (G+Y+Rc), s	6.0	39.3		45.3	14.7	
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	
Max Green Setting (Gmax), s	2.0	28.0		34.0	18.0	
Max Q Clear Time (g_c+I1), s	3.1	4.7		5.3	10.6	
Green Ext Time (p_c), s	0.0	3.4		3.7	0.2	
Intersection Summary						
HCM 6th Ctrl Delay	7.6					
HCM 6th LOS	A					
Notes						
User approved pedestrian interval to be less than phase max green.						

AM Existing 2:46 pm 05/15/2023 Baseline

Synchro 11 Report
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HCM 6th Signalized Intersection Summary
3: Depew St & W 72nd Ave

AM Existing
08/15/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement												
Lane Configurations	↖	↖↗		↖	↖↗	↖	↖	↖		↖	↖	↖
Traffic Volume (veh/h)	24	525	1	9	486	22	6	1	18	47	2	58
Future Volume (veh/h)	24	525	1	9	486	22	6	1	18	47	2	58
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	0.99		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	26	571	1	10	528	24	7	1	20	51	2	63
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	680	2568	4	667	2508	1118	193	7	141	233	5	142
Arrive On Green	0.71	0.71	0.71	0.71	0.71	0.71	0.09	0.09	0.09	0.09	0.09	0.09
Sat Flow, veh/h	856	3640	6	840	3554	1585	1330	75	1491	1383	48	1510
Grp Volume(v), veh/h	26	279	293	10	528	24	7	0	21	51	0	65
Grp Sat Flow(s),veh/h/ln	856	1777	1869	840	1777	1585	1330	0	1565	1383	0	1558
Q Serve(g_s), s	0.6	3.3	3.3	0.3	3.1	0.3	0.3	0.0	0.7	2.1	0.0	2.4
Cycle Q Clear(g_c), s	3.7	3.3	3.3	3.5	3.1	0.3	2.7	0.0	0.7	2.8	0.0	2.4
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.95	1.00		0.97
Lane Grp Cap(c), veh/h	680	1254	1319	667	2508	1118	193	0	148	233	0	147
V/C Ratio(X)	0.04	0.22	0.22	0.01	0.21	0.02	0.04	0.00	0.14	0.22	0.00	0.44
Avail Cap(c_a), veh/h	680	1254	1319	667	2508	1118	325	0	303	370	0	301
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	3.7	3.1	3.1	3.7	3.1	2.6	26.9	0.0	24.9	26.2	0.0	25.7
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.0	0.2	0.0	0.1	0.0	0.4	0.5	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.8	0.8	0.0	0.7	0.1	0.1	0.0	0.3	0.7	0.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.8	3.5	3.5	3.7	3.2	2.7	27.0	0.0	25.4	26.7	0.0	27.8
LnGrp LOS	A	A	A	A	A	A	C	A	C	C	A	C
Approach Vol, veh/h		598			562			28			116	
Approach Delay, s/veh		3.5			3.2			25.8			27.3	
Approach LOS		A			A			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		47.9		12.1		47.9		12.1				
Change Period (Y+Rc), s		* 5.6		6.4		* 5.6		6.4				
Max Green Setting (Gmax), s		* 36		11.6		* 36		11.6				
Max Q Clear Time (g_c+I1), s		5.7		4.8		5.5		4.7				
Green Ext Time (p_c), s		3.9		0.2		4.0		0.0				
Intersection Summary												
HCM 6th Ctrl Delay				6.0								
HCM 6th LOS				A								
Notes												
User approved pedestrian interval to be less than phase max green.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

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HCM 6th Signalized Intersection Summary
4: 5400 West

AM Existing
08/15/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement												
Lane Configurations	↖	↖↗		↖	↖↗	↖	↖	↖		↖	↖	↖
Traffic Volume (veh/h)	42	510	40	86	454	39	19	4	41	36	3	34
Future Volume (veh/h)	42	510	40	86	454	39	19	4	41	36	3	34
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	46	554	43	93	493	42	21	4	45	39	3	37
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	756	3689	284	732	2736	1196	104	106	88	134	7	84
Arrive On Green	0.03	0.76	0.76	0.04	0.77	0.77	0.06	0.06	0.06	0.06	0.06	0.06
Sat Flow, veh/h	1781	4835	372	1781	3554	1553	1367	1870	1560	1356	120	1483
Grp Volume(v), veh/h	46	389	208	93	493	42	21	4	45	39	0	40
Grp Sat Flow(s),veh/h/ln	1781	1702	1803	1781	1777	1553	1367	1870	1560	1356	0	1603
Q Serve(g_s), s	0.7	3.7	3.7	1.3	4.4	0.8	1.8	0.2	3.4	3.4	0.0	2.9
Cycle Q Clear(g_c), s	0.7	3.7	3.7	1.3	4.4	0.8	4.7	0.2	3.4	3.6	0.0	2.9
Prop In Lane	1.00		0.21	1.00		1.00	1.00		1.00	1.00		0.93
Lane Grp Cap(c), veh/h	756	2597	1376	732	2736	1196	104	106	88	134	0	91
V/C Ratio(X)	0.06	0.15	0.15	0.13	0.18	0.04	0.20	0.04	0.51	0.29	0.00	0.44
Avail Cap(c_a), veh/h	875	2597	1376	839	2736	1196	245	298	248	273	0	255
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.85	0.85	0.85	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	2.6	3.8	3.8	2.5	3.7	3.3	57.1	53.5	55.0	55.2	0.0	54.8
Incr Delay (d2), s/veh	0.0	0.1	0.2	0.1	0.1	0.0	0.9	0.1	4.5	1.2	0.0	3.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.1	1.2	0.3	1.3	0.2	0.7	0.1	1.4	1.2	0.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	2.7	3.9	4.0	2.6	3.8	3.3	58.0	53.7	59.5	56.4	0.0	58.1
LnGrp LOS	A	A	A	A	A	A	E	D	E	E	A	E
Approach Vol, veh/h		643			628			70			79	
Approach Delay, s/veh		3.9			3.6			58.7			57.3	
Approach LOS		A			A			E			E	
Timer - Assigned Phs		1	2		4	5	6		8			
Phs Duration (G+Y+Rc), s		8.8	97.5		13.7	7.9	98.4		13.7			
Change Period (Y+Rc), s		4.0	* 6		6.9	4.0	* 6		6.9			
Max Green Setting (Gmax), s		12.0	* 72		19.1	12.0	* 72		19.1			
Max Q Clear Time (g_c+I1), s		3.3	5.7		5.6	2.7	6.4		6.7			
Green Ext Time (p_c), s		0.1	4.2		0.2	0.0	3.7		0.1			
Intersection Summary												
HCM 6th Ctrl Delay								9.4				
HCM 6th LOS								A				
Notes												
User approved pedestrian interval to be less than phase max green.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

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HCM 6th Signalized Intersection Summary
5: Sheridan Blvd

AM Existing
08/15/2023

	↖	→	↗	↙	←	↖	↗	↙	↘	↖	↗	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↖	↖↖	↖	↖↖	↖↖	↖	↖↖	↖↖↖	↖	↖↖	↖↖↖	↖
Traffic Volume (veh/h)	106	266	213	179	303	105	151	745	98	70	1377	168
Future Volume (veh/h)	106	266	213	179	303	105	151	745	98	70	1377	168
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	115	289	0	195	329	0	164	810	0	76	1497	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	170	353		257	486		202	2362		509	2879	
Arrive On Green	0.08	0.17	0.00	0.10	0.18	0.00	0.06	0.46	0.00	0.15	0.56	0.00
Sat Flow, veh/h	3456	3554	1585	3456	3554	1585	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	115	289	0	195	329	0	164	810	0	76	1497	0
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1585	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	3.9	9.4	0.0	6.6	10.4	0.0	5.6	12.2	0.0	2.3	21.7	0.0
Cycle Q Clear(g_c), s	3.9	9.4	0.0	6.6	10.4	0.0	5.6	12.2	0.0	2.3	21.7	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	170	353		257	486		202	2362		509	2879	
V/C Ratio(X)	0.68	0.82		0.76	0.68		0.81	0.34		0.15	0.52	
Avail Cap(c_a), veh/h	374	429		461	489		202	2362		509	2879	
HCM Platoon Ratio	1.67	1.67	1.67	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.99	0.99	0.00	0.99	0.99	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	54.1	49.0	0.0	53.0	46.6	0.0	55.9	20.6	0.0	44.6	16.1	0.0
Incr Delay (d2), s/veh	4.6	10.0	0.0	4.5	3.6	0.0	21.9	0.4	0.0	0.1	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	4.4	0.0	2.9	4.6	0.0	3.0	4.7	0.0	1.0	7.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.7	59.0	0.0	57.5	50.2	0.0	77.7	21.0	0.0	44.7	16.8	0.0
LnGrp LOS	E	E		E	D		E	C		D	B	
Approach Vol, veh/h		404			524			974			1573	
Approach Delay, s/veh		58.9			53.0			30.6			18.2	
Approach LOS		E			D			C			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.0	74.2	15.4	18.4	24.2	62.0	10.9	22.9				
Change Period (Y+Rc), s	5.0	6.5	6.5	* 6.5	6.5	* 6.5	5.0	6.5				
Max Green Setting (Gmax), s	7.0	59.5	16.0	* 15	11.0	* 56	13.0	16.5				
Max Q Clear Time (g_c+I1), s	7.6	23.7	8.6	11.4	4.3	14.2	5.9	12.4				
Green Ext Time (p_c), s	0.0	13.2	0.3	0.5	0.1	5.9	0.2	0.7				
Intersection Summary												
HCM 6th Ctrl Delay											31.6	
HCM 6th LOS											C	
Notes	User approved pedestrian interval to be less than phase max green. * HCM 6th computational engine requires equal clearance times for the phases crossing the barrier. Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.											

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HCM 6th Signalized Intersection Summary
6: Yates St

AM Existing
08/15/2023

	↖	→	↗	↙	←	↖	↗	↙	↘	↖	↗	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖	↖	↖	↖↖↖			↖↖			↖↖	↖↖
Traffic Volume (veh/h)	42	426	6	15	639	40	12	7	13	43	11	18
Future Volume (veh/h)	42	426	6	15	639	40	12	7	13	43	11	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	46	463	7	16	695	43	13	8	14	47	12	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	611	2584	1126	753	3570	220	116	41	50	162	19	29
Arrive On Green	0.73	0.73	0.73	0.73	0.73	0.73	0.07	0.07	0.07	0.07	0.07	0.07
Sat Flow, veh/h	720	3554	1549	923	4910	302	465	561	684	913	262	398
Grp Volume(v), veh/h	46	463	7	16	481	257	35	0	0	79	0	0
Grp Sat Flow(s),veh/h/ln	720	1777	1549	923	1702	1808	1711	0	0	1574	0	0
Q Serve(g_s), s	1.3	2.5	0.1	0.3	2.7	2.7	0.0	0.0	0.0	1.7	0.0	0.0
Cycle Q Clear(g_c), s	4.0	2.5	0.1	2.8	2.7	2.7	1.1	0.0	0.0	2.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.17	0.37		0.40	0.59		0.25
Lane Grp Cap(c), veh/h	611	2584	1126	753	2475	1314	207	0	0	210	0	0
V/C Ratio(X)	0.08	0.18	0.01	0.02	0.19	0.20	0.17	0.00	0.00	0.38	0.00	0.00
Avail Cap(c_a), veh/h	611	2584	1126	753	2475	1314	388	0	0	385	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.86	0.86	0.86	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	3.2	2.6	2.2	3.0	2.6	2.6	26.3	0.0	0.0	27.0	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.1	0.0	0.1	0.2	0.3	0.4	0.0	0.0	1.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.5	0.0	0.0	0.5	0.6	0.5	0.0	0.0	1.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.5	2.7	2.3	3.1	2.8	2.9	26.7	0.0	0.0	28.1	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	C	A	A	C	A	A
Approach Vol, veh/h		516			754			35			79	
Approach Delay, s/veh		2.8			2.8			26.7			28.1	
Approach LOS		A			A			C			C	
Timer - Assigned Phs		2			4			6			8	
Phs Duration (G+Y+Rc), s		49.0			11.0			49.0			11.0	
Change Period (Y+Rc), s		* 5.4			6.6			* 5.4			6.6	
Max Green Setting (Gmax), s		* 37			11.4			* 37			11.4	
Max Q Clear Time (g_c+I1), s		6.0			4.9			4.8			3.1	
Green Ext Time (p_c), s		3.8			0.2			5.5			0.1	
Intersection Summary												
HCM 6th Ctrl Delay											4.9	
HCM 6th LOS											A	
Notes	User approved pedestrian interval to be less than phase max green. * HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.											

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Lanes, Volumes, Timings
7: Winona Ct & W. 72nd Ave

AM Existing
08/15/2023

	↖	→	↘	↙	←	↖	↙	↑	↘	↙	↓	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑							
Traffic Volume (vph)	0	516	0	0	628	0	0	0	0	0	0	0
Future Volume (vph)	0	516	0	0	628	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	3539	0	0	3539	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	3539	0	0	3539	0	0	0	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		861			1614			270			311	
Travel Time (s)		19.6			36.7			6.1			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	561	0	0	683	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	561	0	0	683	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2			2							
Detector Template		Thru			Thru							
Leading Detector (ft)		100			100							
Trailing Detector (ft)		0			0							
Detector 1 Position(ft)		0			0							
Detector 1 Size(ft)		6			6							
Detector 1 Type		Cl+Ex			Cl+Ex							
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0							
Detector 1 Queue (s)		0.0			0.0							
Detector 1 Delay (s)		0.0			0.0							
Detector 2 Position(ft)		94			94							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type		NA			NA							
Protected Phases		1			1							
Permitted Phases												
Detector Phase		1			1							
Switch Phase												
Minimum Initial (s)		25.0			25.0							

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Lanes, Volumes, Timings
7: Winona Ct & W. 72nd Ave

AM Existing
08/15/2023

Lane Group	Ø2
Lane Configurations	
Traffic Volume (vph)	0
Future Volume (vph)	0
Ideal Flow (vphpl)	0
Lane Util. Factor	0
Frt	
Flt Protected	
Satd. Flow (prot)	0
Flt Permitted	
Satd. Flow (perm)	0
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	30
Link Distance (ft)	861
Travel Time (s)	19.6
Peak Hour Factor	0.92
Adj. Flow (vph)	0
Shared Lane Traffic (%)	
Lane Group Flow (vph)	0
Enter Blocked Intersection	No
Lane Alignment	Left
Median Width(ft)	12
Link Offset(ft)	0
Crosswalk Width(ft)	16
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	15
Number of Detectors	2
Detector Template	Thru
Leading Detector (ft)	100
Trailing Detector (ft)	0
Detector 1 Position(ft)	0
Detector 1 Size(ft)	6
Detector 1 Type	Cl+Ex
Detector 1 Channel	
Detector 1 Extend (s)	0.0
Detector 1 Queue (s)	0.0
Detector 1 Delay (s)	0.0
Detector 2 Position(ft)	94
Detector 2 Size(ft)	6
Detector 2 Type	Cl+Ex
Detector 2 Channel	
Detector 2 Extend (s)	0.0
Turn Type	NA
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	20.0

AM Existing 2:46 pm 05/15/2023 Baseline

Synchro 11 Report
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Lanes, Volumes, Timings
7: Winona Ct & W. 72nd Ave

AM Existing
08/15/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		31.0			31.0							
Total Split (s)		31.0			31.0							
Total Split (%)		51.7%			51.7%							
Maximum Green (s)		25.0			25.0							
Yellow Time (s)		3.5			3.5							
All-Red Time (s)		2.5			2.5							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		6.0			6.0							
Lead/Lag		Lead			Lead							
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0							
Recall Mode		None			None							
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		31.8			31.8							
Actuated g/C Ratio		0.89			0.89							
v/c Ratio		0.18			0.22							
Control Delay		3.1			3.2							
Queue Delay		0.0			0.0							
Total Delay		3.1			3.2							
LOS		A			A							
Approach Delay		3.1			3.2							
Approach LOS		A			A							
Queue Length 50th (ft)		0			0							
Queue Length 95th (ft)		85			106							
Internal Link Dist (ft)		781			1534			190			231	
Turn Bay Length (ft)												
Base Capacity (vph)		3159			3159							
Starvation Cap Reductn		0			0							
Spillback Cap Reductn		0			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.18			0.22							

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 35.6
 Natural Cycle: 65
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.22
 Intersection Signal Delay: 3.1
 Intersection LOS: A
 Intersection Capacity Utilization 25.8%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 7: Winona Ct & W. 72nd Ave



AM Existing 2:46 pm 05/15/2023 Baseline

Synchro 11 Report
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Lanes, Volumes, Timings
7: Winona Ct & W. 72nd Ave

AM Existing
08/15/2023

Lane Group	Ø2
Minimum Split (s)	30.0
Total Split (s)	29.0
Total Split (%)	48%
Maximum Green (s)	26.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	3
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 35.6
 Natural Cycle: 65
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.22
 Intersection Signal Delay: 3.1
 Intersection LOS: A
 Intersection Capacity Utilization 25.8%
 ICU Level of Service A
 Analysis Period (min) 15

AM Existing 2:46 pm 05/15/2023 Baseline

Synchro 11 Report
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Lanes, Volumes, Timings
8: Raleigh St & W. 72nd Ave

AM Existing
08/15/2023

	→	↘	↙	←	↖	↗	Ø4
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Lane Configurations	↑↑		↘	↑↑	↘	↗	
Traffic Volume (vph)	574	49	365	711	49	272	
Future Volume (vph)	574	49	365	711	49	272	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	100		180	180	
Storage Lanes		0	1		1	0	
Taper Length (ft)			25		25		
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00	
Ped Bike Factor	1.00		1.00		0.99	0.99	
Fr _t	0.988					0.850	
Flt Protected			0.950		0.950		
Satd. Flow (prot)	3489	0	1770	3539	1770	1583	
Flt Permitted			0.326		0.950		
Satd. Flow (perm)	3489	0	606	3539	1744	1560	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	11					296	
Link Speed (mph)	30			30	30		
Link Distance (ft)	1614			1960	301		
Travel Time (s)	36.7			44.5	6.8		
Confl. Peds. (#/hr)		3	3		10	1	
Confl. Bikes (#/hr)						1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	624	53	397	773	53	296	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	677	0	397	773	53	296	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(ft)	12			12	12		
Link Offset(ft)	0			0	0		
Crosswalk Width(ft)	16			16	16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)		9	15		15	9	
Number of Detectors	2		1	2	1	1	
Detector Template	Thru		Left	Thru	Left	Right	
Leading Detector (ft)	100		20	100	20	20	
Trailing Detector (ft)	0		0	0	0	0	
Detector 1 Position(ft)	0		0	0	0	0	
Detector 1 Size(ft)	6		20	6	20	20	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0	
Detector 2 Position(ft)	94			94			
Detector 2 Size(ft)	6			6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			

AM Existing 2:46 pm 05/15/2023 Baseline

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
8: Raleigh St & W. 72nd Ave

AM Existing
08/15/2023

	→	↘	↙	←	↖	↗	Ø4
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø4
Turn Type	NA		pm+pt	NA	Prot	Perm	
Protected Phases	2		1	6	8		4
Permitted Phases			6			8	
Detector Phase	2		1	6	8	8	
Switch Phase							
Minimum Initial (s)	10.0		4.0	10.0	4.0	4.0	4.0
Minimum Split (s)	70.0		20.0	90.0	30.0	30.0	30.0
Total Split (s)	70.0		20.0	90.0	30.0	30.0	30.0
Total Split (%)	58.3%		16.7%	75.0%	25.0%	25.0%	25%
Maximum Green (s)	64.2		15.5	84.2	24.5	24.5	24.0
Yellow Time (s)	3.6		3.0	3.6	3.0	3.0	3.5
All-Red Time (s)	2.2		1.5	2.2	2.5	2.5	2.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8		4.5	5.8	5.5	5.5	
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max		None	C-Max	Max	Max	None
Walk Time (s)	5.0				9.0	9.0	9.0
Flash Dont Walk (s)	13.0				16.0	16.0	16.0
Pedestrian Calls (#/hr)	3				8	8	0
Act Effct Green (s)	65.4		85.5	84.2	24.5	24.5	
Actuated g/C Ratio	0.54		0.71	0.70	0.20	0.20	
v/c Ratio	0.36		0.70	0.31	0.15	0.53	
Control Delay	16.0		28.1	3.3	40.6	8.4	
Queue Delay	0.0		0.0	0.0	0.0	0.0	
Total Delay	16.0		28.1	3.3	40.6	8.4	
LOS	B		C	A	D	A	
Approach Delay	16.0			11.7	13.3		
Approach LOS	B			B	B		
Queue Length 50th (ft)	150		128	54	34	0	
Queue Length 95th (ft)	192		249	37	71	76	
Internal Link Dist (ft)	1534			1880	221		
Turn Bay Length (ft)			100		180	180	
Base Capacity (vph)	1906		582	2483	361	554	
Starvation Cap Reductn	0		0	0	0	0	
Spillback Cap Reductn	0		0	0	0	0	
Storage Cap Reductn	0		0	0	0	0	
Reduced v/c Ratio	0.36		0.68	0.31	0.15	0.53	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 21 (18%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 13.3
 Intersection LOS: B

AM Existing 2:46 pm 05/15/2023 Baseline

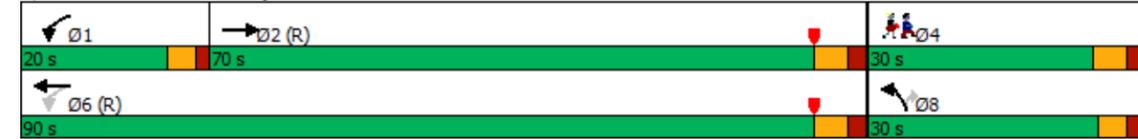
Synchro 11 Report
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Lanes, Volumes, Timings
8: Raleigh St & W. 72nd Ave

AM Existing
08/15/2023

Intersection Capacity Utilization 71.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 8: Raleigh St & W. 72nd Ave



HCM 6th Signalized Intersection Summary
9: Lowell Blvd & W. 72nd Ave

AM Existing
08/15/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	↖	→	↗	↖	→	↗	↖	→	↗	↖	→	↗
Lane Configurations	↖	↖↗	↖↗	↖	↖↗	↖↗	↖	↖↗	↖↗	↖	↖↗	↖↗
Traffic Volume (veh/h)	121	607	52	140	799	89	73	130	138	82	201	171
Future Volume (veh/h)	121	607	52	140	799	89	73	130	138	82	201	171
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No				No
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	132	660	57	152	868	97	79	141	150	89	218	186
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	439	2052	912	579	2066	920	189	260	230	221	285	239
Arrive On Green	0.10	1.00	1.00	0.07	0.77	0.77	0.05	0.15	0.15	0.06	0.15	0.15
Sat Flow, veh/h	1781	3554	1580	1781	3554	1582	1781	1777	1569	1781	1870	1569
Grp Volume(v), veh/h	132	660	57	152	868	97	79	141	150	89	218	186
Grp Sat Flow(s),veh/h/ln	1781	1777	1580	1781	1777	1582	1781	1777	1569	1781	1870	1569
Q Serve(g_s), s	3.7	0.0	0.0	4.2	9.8	1.8	4.5	8.8	10.8	5.0	13.4	13.7
Cycle Q Clear(g_c), s	3.7	0.0	0.0	4.2	9.8	1.8	4.5	8.8	10.8	5.0	13.4	13.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	439	2052	912	579	2066	920	189	260	230	221	285	239
V/C Ratio(X)	0.30	0.32	0.06	0.26	0.42	0.11	0.42	0.54	0.65	0.40	0.76	0.78
Avail Cap(c_a), veh/h	440	2052	912	721	2066	920	189	370	327	284	405	340
HCM Platoon Ratio	2.00	2.00	2.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.94	0.94	0.94	0.91	0.91	0.91	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	9.0	0.0	0.0	8.8	6.8	5.9	41.3	47.5	48.3	40.7	48.8	48.9
Incr Delay (d2), s/veh	0.4	0.4	0.1	0.2	0.6	0.2	1.5	1.8	3.1	1.2	5.4	7.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.1	0.0	1.6	3.2	0.7	2.0	4.0	4.4	2.3	6.7	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.4	0.4	0.1	9.0	7.4	6.1	42.7	49.2	51.5	41.9	54.2	56.0
LnGrp LOS	A	A	A	A	A	A	D	D	D	D	D	E
Approach Vol, veh/h		849			1117			370			493	
Approach Delay, s/veh		1.8			7.5			48.8			52.6	
Approach LOS		A			A			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.4	75.3	10.0	24.3	9.9	75.8	10.7	23.6				
Change Period (Y+Rc), s	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0				
Max Green Setting (Gmax), s	16.0	48.0	6.0	26.0	6.0	48.0	11.0	25.0				
Max Q Clear Time (g_c+I1), s	6.2	2.0	6.5	15.7	5.7	11.8	7.0	12.8				
Green Ext Time (p_c), s	0.3	5.5	0.0	1.4	0.0	7.8	0.1	1.3				

Intersection Summary	
HCM 6th Ctrl Delay	19.0
HCM 6th LOS	B

HCM 6th Signalized Intersection Summary
10: Irving St

AM Existing
08/15/2023

	↖	→	↗	↖	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗	↖	↖	↖		↖	↖	↖
Traffic Volume (veh/h)	79	730	11	23	891	55	3	9	7	95	10	189
Future Volume (veh/h)	79	730	11	23	891	55	3	9	7	95	10	189
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	86	793	12	25	968	60	3	10	8	103	11	205
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	487	2470	37	542	2405	1070	219	136	109	245	265	225
Arrive On Green	0.04	0.92	0.92	0.04	1.00	1.00	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	1781	3582	54	1781	3554	1580	1165	962	770	1395	1870	1585
Grp Volume(v), veh/h	86	393	412	25	968	60	3	0	18	103	11	205
Grp Sat Flow(s),veh/h/ln	1781	1777	1859	1781	1777	1580	1165	0	1732	1395	1870	1585
Q Serve(g_s), s	1.8	3.1	3.1	0.5	0.0	0.0	0.3	0.0	1.1	8.3	0.6	15.3
Cycle Q Clear(g_c), s	1.8	3.1	3.1	0.5	0.0	0.0	0.9	0.0	1.1	9.4	0.6	15.3
Prop In Lane	1.00		0.03	1.00		1.00	1.00		0.44	1.00		1.00
Lane Grp Cap(c), veh/h	487	1225	1282	542	2405	1070	219	0	245	245	265	225
V/C Ratio(X)	0.18	0.32	0.32	0.05	0.40	0.06	0.01	0.00	0.07	0.42	0.04	0.91
Avail Cap(c_a), veh/h	535	1225	1282	612	2405	1070	219	0	245	245	265	225
HCM Platoon Ratio	1.33	1.33	1.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.95	0.95	0.95	0.95	0.95	0.95	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	5.3	1.7	1.7	5.5	0.0	0.0	44.8	0.0	44.7	48.7	44.5	50.8
Incr Delay (d2), s/veh	0.2	0.7	0.6	0.0	0.5	0.1	0.0	0.0	0.1	1.1	0.1	37.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	1.1	1.1	0.2	0.2	0.0	0.1	0.0	0.5	3.0	0.3	8.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	5.5	2.3	2.3	5.6	0.5	0.1	44.9	0.0	44.8	49.9	44.5	88.0
LnGrp LOS	A	A	A	A	A	A	D	A	D	D	D	F
Approach Vol, veh/h		891			1053			21				319
Approach Delay, s/veh		2.6			0.6			44.8				74.2
Approach LOS		A			A			D				E
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.3	88.7		24.0	8.8	87.2		24.0				
Change Period (Y+Rc), s	5.0	6.0		7.0	5.0	6.0		7.0				
Max Green Setting (Gmax), s	7.0	78.0		17.0	7.0	78.0		17.0				
Max Q Clear Time (g_c+I1), s	2.5	5.1		17.3	3.8	2.0		3.1				
Green Ext Time (p_c), s	0.0	6.1		0.0	0.0	9.5		0.0				
Intersection Summary												
HCM 6th Ctrl Delay	12.1											
HCM 6th LOS	B											
Notes												
User approved pedestrian interval to be less than phase max green.												

HCM 6th Signalized Intersection Summary
11: Hooker St

AM Existing
08/15/2023

	↖	→	↗	↖	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗	↖	↖	↖		↖	↖	↖↗
Traffic Volume (veh/h)	19	789	28	11	908	17	39	6	33	12	1	18
Future Volume (veh/h)	19	789	28	11	908	17	39	6	33	12	1	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.98		0.96	0.98		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	21	858	30	12	987	18	42	7	36	13	1	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	533	2789	98	574	2809	1225	151	15	78	60	14	47
Arrive On Green	0.03	1.00	1.00	0.02	1.00	1.00	0.06	0.06	0.06	0.06	0.06	0.06
Sat Flow, veh/h	1781	3502	122	1781	3554	1550	1365	255	1313	310	243	791
Grp Volume(v), veh/h	21	435	453	12	987	18	42	0	43	34	0	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1848	1781	1777	1550	1365	0	1569	1344	0	0
Q Serve(g_s), s	0.3	0.0	0.0	0.2	0.0	0.0	0.0	0.0	3.2	0.1	0.0	0.0
Cycle Q Clear(g_c), s	0.3	0.0	0.0	0.2	0.0	0.0	2.8	0.0	3.2	3.3	0.0	0.0
Prop In Lane	1.00		0.07	1.00		1.00	1.00		0.84	0.38		0.59
Lane Grp Cap(c), veh/h	533	1415	1472	574	2809	1225	151	0	93	121	0	0
V/C Ratio(X)	0.04	0.31	0.31	0.02	0.35	0.01	0.28	0.00	0.46	0.28	0.00	0.00
Avail Cap(c_a), veh/h	622	1415	1472	673	2809	1225	264	0	222	242	0	0
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.94	0.94	0.94	0.71	0.71	0.71	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	2.2	0.0	0.0	2.4	0.0	0.0	54.4	0.0	54.6	54.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.5	0.5	0.0	0.2	0.0	1.0	0.0	3.5	1.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.2	0.2	0.0	0.1	0.0	1.3	0.0	1.4	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	2.2	0.5	0.5	2.4	0.2	0.0	55.4	0.0	58.1	55.5	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	E	A	E	E	A	A
Approach Vol, veh/h		909			1017			85				34
Approach Delay, s/veh		0.6			0.3			56.8				55.5
Approach LOS		A			A			E				E
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.3	101.6		13.1	6.0	100.9		13.1				
Change Period (Y+Rc), s	4.0	6.0		6.0	4.0	6.0		6.0				
Max Green Setting (Gmax), s	8.0	79.0		17.0	8.0	79.0		17.0				
Max Q Clear Time (g_c+I1), s	2.2	2.0		5.3	2.3	2.0		5.2				
Green Ext Time (p_c), s	0.0	7.0		0.1	0.0	9.5		0.2				
Intersection Summary												
HCM 6th Ctrl Delay	3.7											
HCM 6th LOS	A											
Notes												
User approved pedestrian interval to be less than phase max green.												

HCM 6th Signalized Intersection Summary
12: Federal Blvd & W. 72nd Ave

AM Existing
08/15/2023

	↖	→	↗	↙	←	↖	↗	↖	↗	↖	↗	↖
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↖	↖↖	↖	↖↖	↖↖	↖	↖↖	↖↖↖	↖	↖↖	↖↖↖	↖
Traffic Volume (veh/h)	281	236	148	103	330	90	137	700	44	81	1579	484
Future Volume (veh/h)	281	236	148	103	330	90	137	700	44	81	1579	484
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	305	257	161	112	359	98	149	761	48	88	1716	526
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	363	640	284	166	438	194	202	2638	818	248	2749	838
Arrive On Green	0.03	0.06	0.06	0.02	0.04	0.04	0.06	0.52	0.52	0.07	0.54	0.54
Sat Flow, veh/h	3456	3554	1577	3456	3554	1577	3456	5106	1583	3456	5106	1557
Grp Volume(v), veh/h	305	257	161	112	359	98	149	761	48	88	1716	526
Grp Sat Flow(s),veh/h/ln	1728	1777	1577	1728	1777	1577	1728	1702	1583	1728	1702	1557
Q Serve(g_s), s	10.5	8.4	11.9	3.9	12.0	5.9	5.1	10.2	1.3	2.9	28.0	28.3
Cycle Q Clear(g_c), s	10.5	8.4	11.9	3.9	12.0	5.9	5.1	10.2	1.3	2.9	28.0	28.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	363	640	284	166	438	194	202	2638	818	248	2749	838
V/C Ratio(X)	0.84	0.40	0.57	0.67	0.82	0.50	0.74	0.29	0.06	0.35	0.62	0.63
Avail Cap(c_a), veh/h	403	640	284	317	503	223	202	2638	818	248	2749	838
HCM Platoon Ratio	0.33	0.33	0.33	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.96	0.96	0.96	0.98	0.98	0.98	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.9	50.2	51.9	58.1	56.2	35.7	55.6	16.5	7.3	53.0	19.3	19.3
Incr Delay (d2), s/veh	11.9	0.1	1.6	1.7	7.9	0.7	11.9	0.3	0.1	0.3	1.1	3.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	3.9	5.2	1.8	6.2	2.4	2.5	3.9	0.7	1.3	10.6	10.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	68.8	50.3	53.5	59.8	64.1	36.5	67.5	16.7	7.4	53.4	20.3	22.9
LnGrp LOS	E	D	D	E	E	D	E	B	A	D	C	C
Approach Vol, veh/h		723			569			958			2330	
Approach Delay, s/veh		58.8			58.5			24.2			22.2	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.6	68.0	10.8	26.6	12.0	70.6	17.6	19.8				
Change Period (Y+Rc), s	6.0	* 6	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	6.0	* 62	11.0	20.0	7.0	61.0	14.0	17.0				
Max Q Clear Time (g_c+I1), s	4.9	12.2	5.9	13.9	7.1	30.3	12.5	14.0				
Green Ext Time (p_c), s	0.0	12.4	0.0	0.8	0.0	28.8	0.1	0.6				
Intersection Summary												
HCM 6th Ctrl Delay	32.9											
HCM 6th LOS	C											
Notes												
User approved pedestrian interval to be less than phase max green.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

AM Existing 2:46 pm 05/15/2023 Baseline

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Lanes, Volumes, Timings
13: W. 72nd Ave & Zuni St

AM Existing
08/15/2023

	↖	→	←	↖	↗	↖	Ø4
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4
Lane Configurations	↖	↖↖	↖↖		↖	↖	
Traffic Volume (vph)	74	388	456	82	98	95	
Future Volume (vph)	74	388	456	82	98	95	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	50			0	100	100	
Storage Lanes	1			0	1	0	
Taper Length (ft)	25				25		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	1.00		1.00			0.98	
Frt			0.977			0.850	
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1770	3539	3446	0	1770	1583	
Flt Permitted	0.431				0.950		
Satd. Flow (perm)	802	3539	3446	0	1770	1550	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			67			103	
Link Speed (mph)		30	30		25		
Link Distance (ft)		2630	378		264		
Travel Time (s)		59.8	8.6		7.2		
Confl. Peds. (#/hr)	2			2		3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	80	422	496	89	107	103	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	80	422	585	0	107	103	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		24	24		12		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (ft)	20	100	100		20	20	
Trailing Detector (ft)	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0		0	0	
Detector 1 Size(ft)	20	6	6		20	20	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94	94				
Detector 2 Size(ft)		6	6				
Detector 2 Type		CI+Ex	CI+Ex				
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0				
Turn Type	Perm	NA	NA		Prot	Perm	

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Synchro 11 Report
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Lanes, Volumes, Timings
13: W. 72nd Ave & Zuni St

AM Existing
08/15/2023

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4
Protected Phases		2	2		3		4
Permitted Phases	2					3	
Detector Phase	2	2	2		3	3	
Switch Phase							
Minimum Initial (s)	20.0	20.0	20.0		5.0	5.0	1.0
Minimum Split (s)	44.0	44.0	44.0		12.0	12.0	7.0
Total Split (s)	44.0	44.0	44.0		12.0	12.0	4.0
Total Split (%)	73.3%	73.3%	73.3%		20.0%	20.0%	7%
Maximum Green (s)	38.0	38.0	38.0		6.0	6.0	-2.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0	
Lead/Lag					Lead	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max		None	None	None
Walk Time (s)							10.0
Flash Dont Walk (s)							15.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	44.8	44.8	44.8		6.0	6.0	
Actuated g/C Ratio	0.75	0.75	0.75		0.10	0.10	
v/c Ratio	0.13	0.16	0.23		0.61	0.42	
Control Delay	6.9	5.4	3.2		43.0	12.2	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	6.9	5.4	3.2		43.0	12.2	
LOS	A	A	A		D	B	
Approach Delay		5.6	3.2		27.9		
Approach LOS		A	A		C		
Queue Length 50th (ft)	15	43	26		38	0	
Queue Length 95th (ft)	56	111	55		#99	38	
Internal Link Dist (ft)		2550	298		184		
Turn Bay Length (ft)	50				100	100	
Base Capacity (vph)	598	2642	2590		177	247	
Starvation Cap Reductn	0	0	0		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.13	0.16	0.23		0.60	0.42	

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 20 (33%), Referenced to phase 2:EBWB, Start of Yellow
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.61
 Intersection Signal Delay: 8.2
 Intersection Capacity Utilization 53.8%
 Intersection LOS: A
 ICU Level of Service A

AM Existing 2:46 pm 05/15/2023 Baseline

Synchro 11 Report
Page 2

Lanes, Volumes, Timings
13: W. 72nd Ave & Zuni St

AM Existing
08/15/2023

Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 13: W. 72nd Ave & Zuni St



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Synchro 11 Report
Page 3

HCM 6th Signalized Intersection Summary
1: Pierce St & W 72nd Ave

PM Existing
08/15/2023

	↖	→	↘	↙	←	↖	↗	↘	↙	↖	↗	↘	↙		
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖		↖↗			↖↗	↖	↖		
Traffic Volume (veh/h)	45	551	28	38	485	80	24	29	41	55	32	40			
Future Volume (veh/h)	45	551	28	38	485	80	24	29	41	55	32	40			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		0.97			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Work Zone On Approach		No			No			No			No				
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870			
Adj Flow Rate, veh/h	49	599	30	41	527	87	26	32	45	60	35	43			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2			
Cap, veh/h	640	2194	977	572	2194	977	37	46	65	101	59	135			
Arrive On Green	0.05	0.62	0.62	0.09	1.00	1.00	0.09	0.09	0.09	0.09	0.09	0.09			
Sat Flow, veh/h	1781	3554	1582	1781	3554	1582	430	529	744	1145	668	1531			
Grp Volume(v), veh/h	49	599	30	41	527	87	103	0	0	95	0	43			
Grp Sat Flow(s),veh/h/ln	1781	1777	1582	1781	1777	1582	1703	0	0	1813	0	1531			
Q Serve(g_s), s	1.1	9.3	0.9	0.9	0.0	0.0	7.1	0.0	0.0	6.0	0.0	3.2			
Cycle Q Clear(g_c), s	1.1	9.3	0.9	0.9	0.0	0.0	7.1	0.0	0.0	6.0	0.0	3.2			
Prop In Lane	1.00		1.00	1.00		1.00	0.25		0.44	0.63		1.00			
Lane Grp Cap(c), veh/h	640	2194	977	572	2194	977	148	0	0	160	0	135			
V/C Ratio(X)	0.08	0.27	0.03	0.07	0.24	0.09	0.70	0.00	0.00	0.59	0.00	0.32			
Avail Cap(c_a), veh/h	670	2194	977	601	2194	977	231	0	0	246	0	208			
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	1.00	0.93	0.93	0.93	1.00	0.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	7.0	10.6	9.0	7.0	0.0	0.0	53.3	0.0	0.0	52.6	0.0	51.3			
Incr Delay (d2), s/veh	0.0	0.3	0.1	0.0	0.2	0.2	8.1	0.0	0.0	4.9	0.0	1.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.4	3.6	0.3	0.3	0.1	0.0	3.4	0.0	0.0	3.0	0.0	1.3			
Unsig. Movement Delay, s/veh															
LnGrp Delay(d),s/veh	7.0	10.9	9.0	7.0	0.2	0.2	61.4	0.0	0.0	57.5	0.0	53.2			
LnGrp LOS	A	B	A	A	A	A	E	A	A	E	A	D			
Approach Vol, veh/h		678			655			103				138			
Approach Delay, s/veh		10.5			0.7			61.4				56.2			
Approach LOS		B			A			E				E			
Timer - Assigned Phs	1	2		4	5	6		8							
Phs Duration (G+Y+Rc), s	10.0	79.6		15.1	10.0	79.6		15.3							
Change Period (Y+Rc), s	4.5	5.5		* 4.7	4.5	5.5		4.7							
Max Green Setting (Gmax), s	7.5	60.5		* 16	7.5	60.5		16.3							
Max Q Clear Time (g_c+I1), s	3.1	2.0		9.1	2.9	11.3		8.0							
Green Ext Time (p_c), s	0.0	3.3		0.3	0.0	3.7		0.5							
Intersection Summary															
HCM 6th Ctrl Delay				13.7											
HCM 6th LOS				B											
Notes															
User approved pedestrian interval to be less than phase max green.															
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.															

PM Existing 8:58 pm 06/15/2023

Synchro 11 Report
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HCM 6th Signalized Intersection Summary
2: Lamar St

PM Existing
08/15/2023

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↖↗		↖	↖↗	↖	↖
Traffic Volume (veh/h)	496	82	96	534	130	132
Future Volume (veh/h)	496	82	96	534	130	132
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	539	89	104	580	141	143
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1730	285	509	2369	166	168
Arrive On Green	0.19	0.19	0.03	0.67	0.20	0.20
Sat Flow, veh/h	3148	503	1781	3647	829	840
Grp Volume(v), veh/h	313	315	104	580	285	0
Grp Sat Flow(s),veh/h/ln	1777	1780	1781	1777	1675	0
Q Serve(g_s), s	9.1	9.2	1.4	3.9	9.8	0.0
Cycle Q Clear(g_c), s	9.1	9.2	1.4	3.9	9.8	0.0
Prop In Lane		0.28	1.00		0.49	0.50
Lane Grp Cap(c), veh/h	1007	1008	509	2369	335	0
V/C Ratio(X)	0.31	0.31	0.20	0.24	0.85	0.00
Avail Cap(c_a), veh/h	1007	1008	509	2369	447	0
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.97	0.97	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	14.3	14.3	5.5	4.0	23.1	0.0
Incr Delay (d2), s/veh	0.8	0.8	0.1	0.2	9.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	3.9	0.3	0.9	4.4	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.1	15.1	5.6	4.2	32.1	0.0
LnGrp LOS	B	B	A	A	C	A
Approach Vol, veh/h	628			684	285	
Approach Delay, s/veh	15.1			4.4	32.1	
Approach LOS	B			A	C	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	6.0	38.0			44.0	16.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0
Max Green Setting (Gmax), s	2.0	30.0			36.0	16.0
Max Q Clear Time (g_c+I1), s	3.4	11.2			5.9	11.8
Green Ext Time (p_c), s	0.0	3.6			4.1	0.2
Intersection Summary						
HCM 6th Ctrl Delay			13.6			
HCM 6th LOS			B			
Notes						
User approved pedestrian interval to be less than phase max green.						

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HCM 6th Signalized Intersection Summary
3: Depew St & W 72nd Ave

PM Existing
08/15/2023

	↖	→	↗	↙	←	↖	↗	↙	↘	↖	↗	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗	↖	↖	↗		↖	↗	
Traffic Volume (veh/h)	28	597	7	24	636	73	3	0	9	28	1	28
Future Volume (veh/h)	28	597	7	24	636	73	3	0	9	28	1	28
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	30	649	8	26	691	79	3	0	10	30	1	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	579	2599	32	634	2569	1144	200	0	121	219	4	117
Arrive On Green	0.72	0.72	0.72	0.72	0.72	0.72	0.08	0.00	0.08	0.08	0.08	0.08
Sat Flow, veh/h	699	3595	44	776	3554	1583	1365	0	1571	1389	51	1525
Grp Volume(v), veh/h	30	321	336	26	691	79	3	0	10	30	0	31
Grp Sat Flow(s),veh/h/ln	699	1777	1862	776	1777	1583	1365	0	1571	1389	0	1576
Q Serve(g_s), s	0.9	3.7	3.7	0.7	4.0	0.9	0.1	0.0	0.4	1.2	0.0	1.1
Cycle Q Clear(g_c), s	4.9	3.7	3.7	4.4	4.0	0.9	1.2	0.0	0.4	1.6	0.0	1.1
Prop In Lane	1.00		0.02	1.00		1.00	1.00		1.00	1.00		0.97
Lane Grp Cap(c), veh/h	579	1285	1347	634	2569	1144	200	0	121	219	0	121
V/C Ratio(X)	0.05	0.25	0.25	0.04	0.27	0.07	0.02	0.00	0.08	0.14	0.00	0.26
Avail Cap(c_a), veh/h	579	1285	1347	634	2569	1144	359	0	304	380	0	305
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	3.7	2.8	2.8	3.5	2.9	2.4	26.7	0.0	25.7	26.5	0.0	26.1
Incr Delay (d2), s/veh	0.2	0.5	0.4	0.1	0.3	0.1	0.0	0.0	0.3	0.3	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.8	0.9	0.1	0.8	0.2	0.0	0.0	0.1	0.4	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	3.9	3.3	3.3	3.7	3.1	2.5	26.7	0.0	26.0	26.7	0.0	27.2
LnGrp LOS	A	A	A	A	A	A	C	A	C	C	A	C
Approach Vol, veh/h		687			796			13			61	
Approach Delay, s/veh		3.3			3.1			26.2			27.0	
Approach LOS		A			A			C			C	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		49.0		11.0		49.0		11.0				
Change Period (Y+Rc), s		* 5.6		6.4		* 5.6		6.4				
Max Green Setting (Gmax), s		* 36		11.6		* 36		11.6				
Max Q Clear Time (g_c+I1), s		6.9		3.6		6.4		3.2				
Green Ext Time (p_c), s		4.7		0.1		5.9		0.0				
Intersection Summary												
HCM 6th Ctrl Delay	4.3											
HCM 6th LOS	A											
Notes												
User approved pedestrian interval to be less than phase max green.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

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HCM 6th Signalized Intersection Summary
4: 5400 West

PM Existing
08/15/2023

	↖	→	↗	↙	←	↖	↗	↙	↘	↖	↗	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗	↖	↖	↗		↖	↗	
Traffic Volume (veh/h)	38	499	89	172	594	53	87	18	168	59	17	46
Future Volume (veh/h)	38	499	89	172	594	53	87	18	168	59	17	46
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	0.99		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	41	542	97	187	646	58	95	20	183	64	18	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	502	2098	369	586	1852	825	278	292	245	292	68	188
Arrive On Green	0.04	0.48	0.48	0.08	0.52	0.52	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1781	4368	767	1781	3554	1584	1325	1870	1573	1173	435	1207
Grp Volume(v), veh/h	41	420	219	187	646	58	95	20	183	64	0	68
Grp Sat Flow(s),veh/h/ln	1781	1702	1731	1781	1777	1584	1325	1870	1573	1173	0	1642
Q Serve(g_s), s	0.7	4.4	4.5	3.0	6.4	1.1	4.1	0.5	6.7	3.0	0.0	2.2
Cycle Q Clear(g_c), s	0.7	4.4	4.5	3.0	6.4	1.1	6.3	0.5	6.7	3.5	0.0	2.2
Prop In Lane	1.00		0.44	1.00		1.00	1.00		1.00	1.00		0.74
Lane Grp Cap(c), veh/h	502	1635	831	586	1852	825	278	292	245	292	0	256
V/C Ratio(X)	0.08	0.26	0.26	0.32	0.35	0.07	0.34	0.07	0.75	0.22	0.00	0.27
Avail Cap(c_a), veh/h	666	1635	831	677	1852	825	361	408	343	365	0	359
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.77	0.77	0.77	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.2	9.2	9.3	6.5	8.4	7.1	25.1	21.6	24.2	23.1	0.0	22.3
Incr Delay (d2), s/veh	0.1	0.4	0.8	0.2	0.4	0.1	0.7	0.1	5.5	0.4	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.4	1.6	0.9	2.0	0.3	1.3	0.2	2.7	0.8	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.2	9.6	10.1	6.7	8.8	7.3	25.8	21.7	29.7	23.5	0.0	22.8
LnGrp LOS	A	A	B	A	A	A	C	C	C	C	A	C
Approach Vol, veh/h		680			891			298			132	
Approach Delay, s/veh		9.6			8.3			27.9			23.2	
Approach LOS		A			A			C			C	
Timer - Assigned Phs		1	2		4	5	6		8			
Phs Duration (G+Y+Rc), s		8.9	34.8		16.3	6.5	37.3		16.3			
Change Period (Y+Rc), s		4.0	* 6		6.9	4.0	* 6		6.9			
Max Green Setting (Gmax), s		8.0	* 22		13.1	8.0	* 22		13.1			
Max Q Clear Time (g_c+I1), s		5.0	6.5		5.5	2.7	8.4		8.7			
Green Ext Time (p_c), s		0.1	3.6		0.3	0.0	3.7		0.4			
Intersection Summary												
HCM 6th Ctrl Delay	12.6											
HCM 6th LOS	B											
Notes												
User approved pedestrian interval to be less than phase max green.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

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HCM 6th Signalized Intersection Summary
5: Sheridan Blvd

PM Existing
08/15/2023

	↖	→	↗	↙	←	↖	↗	↙	↘	↖	↗	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↖	↖↖	↖	↖↖	↖↖	↖	↖↖	↖↖↖	↖	↖↖	↖↖↖	↖
Traffic Volume (veh/h)	198	435	137	183	339	127	257	1235	268	98	881	170
Future Volume (veh/h)	198	435	137	183	339	127	257	1235	268	98	881	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	215	473	0	199	368	0	279	1342	0	107	958	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	271	493		262	439		497	2791		163	2234	
Arrive On Green	0.16	0.28	0.00	0.02	0.04	0.00	0.14	0.55	0.00	0.05	0.44	0.00
Sat Flow, veh/h	3456	3554	1585	3456	3554	1585	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	215	473	0	199	368	0	279	1342	0	107	958	0
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1585	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	7.2	15.7	0.0	6.9	12.3	0.0	9.0	19.4	0.0	3.7	15.6	0.0
Cycle Q Clear(g_c), s	7.2	15.7	0.0	6.9	12.3	0.0	9.0	19.4	0.0	3.7	15.6	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	271	493		262	439		497	2791		163	2234	
V/C Ratio(X)	0.79	0.96		0.76	0.84		0.56	0.48		0.66	0.43	
Avail Cap(c_a), veh/h	374	493		374	489		497	2791		432	2234	
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.96	0.96	0.00	0.99	0.99	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	49.6	43.0	0.0	57.4	56.4	0.0	47.8	16.7	0.0	56.2	23.4	0.0
Incr Delay (d2), s/veh	7.5	29.5	0.0	5.5	11.2	0.0	1.4	0.6	0.0	4.4	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	7.8	0.0	3.3	6.6	0.0	3.9	7.2	0.0	1.7	6.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.1	72.5	0.0	62.9	67.6	0.0	49.3	17.3	0.0	60.6	24.0	0.0
LnGrp LOS	E	E		E	E		D	B		E	C	
Approach Vol, veh/h		688			567			1621			1065	
Approach Delay, s/veh		67.7			65.9			22.8			27.7	
Approach LOS		E			E			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.8	59.0	14.1	23.2	10.7	72.1	15.9	21.3				
Change Period (Y+Rc), s	6.5	* 6.5	5.0	6.5	5.0	6.5	6.5	* 6.5				
Max Green Setting (Gmax), s	15.0	* 53	13.0	16.5	15.0	52.5	13.0	* 17				
Max Q Clear Time (g_c+I1), s	11.0	17.6	8.9	17.7	5.7	21.4	9.2	14.3				
Green Ext Time (p_c), s	0.3	7.1	0.2	0.0	0.2	10.8	0.2	0.5				
Intersection Summary												
HCM 6th Ctrl Delay	38.2											
HCM 6th LOS	D											
Notes												
User approved pedestrian interval to be less than phase max green.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [NBR, EBR, WBR, SBR] is excluded from calculations of the approach delay and intersection delay.												

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HCM 6th Signalized Intersection Summary
6: Yates St

PM Existing
08/15/2023

	↖	→	↗	↙	←	↖	↗	↙	↘	↖	↗	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖	↖	↖	↖↖↖							↖↖
Traffic Volume (veh/h)	45	739	22	18	623	66	10	8	13	69	8	41
Future Volume (veh/h)	45	739	22	18	623	66	10	8	13	69	8	41
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	0.99		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	49	803	24	20	677	72	11	9	14	75	9	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	569	2431	1060	512	3202	337	114	81	81	187	22	61
Arrive On Green	0.68	0.68	0.68	0.68	0.68	0.68	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	712	3554	1549	662	4679	493	301	702	702	794	191	528
Grp Volume(v), veh/h	49	803	24	20	491	258	34	0	0	129	0	0
Grp Sat Flow(s),veh/h/ln	712	1777	1549	662	1702	1768	1705	0	0	1513	0	0
Q Serve(g_s), s	1.6	5.5	0.3	0.8	3.2	3.2	0.0	0.0	0.0	3.8	0.0	0.0
Cycle Q Clear(g_c), s	4.9	5.5	0.3	6.3	3.2	3.2	1.1	0.0	0.0	4.9	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.28	0.32		0.41	0.58		0.35
Lane Grp Cap(c), veh/h	569	2431	1060	512	2329	1210	277	0	0	270	0	0
V/C Ratio(X)	0.09	0.33	0.02	0.04	0.21	0.21	0.12	0.00	0.00	0.48	0.00	0.00
Avail Cap(c_a), veh/h	569	2431	1060	512	2329	1210	392	0	0	379	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.76	0.76	0.76	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.4	3.9	3.0	5.1	3.5	3.5	23.9	0.0	0.0	25.5	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.3	0.0	0.1	0.2	0.4	0.2	0.0	0.0	1.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.3	0.1	0.1	0.7	0.9	0.4	0.0	0.0	1.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	4.6	4.1	3.1	5.3	3.7	3.9	24.1	0.0	0.0	26.8	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	C	A	A	C	A	A
Approach Vol, veh/h		876			769			34			129	
Approach Delay, s/veh		4.1			3.8			24.1			26.8	
Approach LOS		A			A			C			C	
Timer - Assigned Phs		2			4			6			8	
Phs Duration (G+Y+Rc), s		46.5			13.5			46.5			13.5	
Change Period (Y+Rc), s		* 5.4			6.6			* 5.4			6.6	
Max Green Setting (Gmax), s		* 37			11.4			* 37			11.4	
Max Q Clear Time (g_c+I1), s		7.5			6.9			8.3			3.1	
Green Ext Time (p_c), s		7.0			0.2			5.6			0.1	
Intersection Summary												
HCM 6th Ctrl Delay	6.0											
HCM 6th LOS	A											
Notes												
User approved pedestrian interval to be less than phase max green.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

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Lanes, Volumes, Timings
7: Winona Ct & W. 72nd Ave PM Existing
08/15/2023

	↖	→	↘	↙	←	↖	↙	↑	↘	↙	↓	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑							
Traffic Volume (vph)	0	804	0	0	642	0	0	0	0	0	0	0
Future Volume (vph)	0	804	0	0	642	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	3539	0	0	3539	0	0	0	0	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	3539	0	0	3539	0	0	0	0	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		861			1614			270			311	
Travel Time (s)		19.6			36.7			6.1			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	874	0	0	698	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	874	0	0	698	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2			2							
Detector Template		Thru			Thru							
Leading Detector (ft)		100			100							
Trailing Detector (ft)		0			0							
Detector 1 Position(ft)		0			0							
Detector 1 Size(ft)		6			6							
Detector 1 Type		Cl+Ex			Cl+Ex							
Detector 1 Channel												
Detector 1 Extend (s)		0.0			0.0							
Detector 1 Queue (s)		0.0			0.0							
Detector 1 Delay (s)		0.0			0.0							
Detector 2 Position(ft)		94			94							
Detector 2 Size(ft)		6			6							
Detector 2 Type		Cl+Ex			Cl+Ex							
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0							
Turn Type		NA			NA							
Protected Phases		1			1							
Permitted Phases												
Detector Phase		1			1							
Switch Phase												
Minimum Initial (s)		25.0			25.0							

PM Existing 8:58 pm 06/15/2023

Synchro 11 Report
Page 1

Lanes, Volumes, Timings
7: Winona Ct & W. 72nd Ave PM Existing
08/15/2023

Lane Group	Ø2
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	2
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	20.0

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Synchro 11 Report
Page 2

Lanes, Volumes, Timings
7: Winona Ct & W. 72nd Ave

PM Existing
08/15/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		31.0			31.0							
Total Split (s)		31.0			31.0							
Total Split (%)		51.7%			51.7%							
Maximum Green (s)		25.0			25.0							
Yellow Time (s)		3.5			3.5							
All-Red Time (s)		2.5			2.5							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		6.0			6.0							
Lead/Lag		Lead			Lead							
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0							
Recall Mode		None			None							
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		31.8			31.8							
Actuated g/C Ratio		0.89			0.89							
v/c Ratio		0.28			0.22							
Control Delay		3.4			3.2							
Queue Delay		0.0			0.0							
Total Delay		3.4			3.2							
LOS		A			A							
Approach Delay		3.4			3.2							
Approach LOS		A			A							
Queue Length 50th (ft)		0			0							
Queue Length 95th (ft)		142			108							
Internal Link Dist (ft)		781			1534			190			231	
Turn Bay Length (ft)												
Base Capacity (vph)		3159			3159							
Starvation Cap Reductn		0			0							
Spillback Cap Reductn		0			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.28			0.22							

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 35.6
 Natural Cycle: 65
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.28
 Intersection Signal Delay: 3.3
 Intersection LOS: A
 Intersection Capacity Utilization 27.2%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 7: Winona Ct & W. 72nd Ave



PM Existing 8:58 pm 06/15/2023

Synchro 11 Report
Page 3

Lanes, Volumes, Timings
7: Winona Ct & W. 72nd Ave

PM Existing
08/15/2023

Lane Group	Ø2
Minimum Split (s)	30.0
Total Split (s)	29.0
Total Split (%)	48%
Maximum Green (s)	26.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	3
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 35.6
 Natural Cycle: 65
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.28
 Intersection Signal Delay: 3.3
 Intersection LOS: A
 Intersection Capacity Utilization 27.2%
 ICU Level of Service A
 Analysis Period (min) 15

PM Existing 8:58 pm 06/15/2023

Synchro 11 Report
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Lanes, Volumes, Timings
7: Winona Ct & W. 72nd Ave

PM Existing
08/15/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)		31.0			31.0							
Total Split (s)		31.0			31.0							
Total Split (%)		51.7%			51.7%							
Maximum Green (s)		25.0			25.0							
Yellow Time (s)		3.5			3.5							
All-Red Time (s)		2.5			2.5							
Lost Time Adjust (s)		0.0			0.0							
Total Lost Time (s)		6.0			6.0							
Lead/Lag		Lead			Lead							
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0			3.0							
Recall Mode		None			None							
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		31.8			31.8							
Actuated g/C Ratio		0.89			0.89							
v/c Ratio		0.28			0.22							
Control Delay		3.4			3.2							
Queue Delay		0.0			0.0							
Total Delay		3.4			3.2							
LOS		A			A							
Approach Delay		3.4			3.2							
Approach LOS		A			A							
Queue Length 50th (ft)		0			0							
Queue Length 95th (ft)		142			108							
Internal Link Dist (ft)		781			1534			190			231	
Turn Bay Length (ft)												
Base Capacity (vph)		3159			3159							
Starvation Cap Reductn		0			0							
Spillback Cap Reductn		0			0							
Storage Cap Reductn		0			0							
Reduced v/c Ratio		0.28			0.22							

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 35.6
 Natural Cycle: 65
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.28
 Intersection Signal Delay: 3.3
 Intersection LOS: A
 Intersection Capacity Utilization 27.2%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 7: Winona Ct & W. 72nd Ave



PM Existing 8:58 pm 06/15/2023

Lanes, Volumes, Timings
7: Winona Ct & W. 72nd Ave

PM Existing
08/15/2023

Lane Group	Ø2
Minimum Split (s)	30.0
Total Split (s)	29.0
Total Split (%)	48%
Maximum Green (s)	26.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lag
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	13.0
Pedestrian Calls (#/hr)	3
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 35.6
 Natural Cycle: 65
 Control Type: Semi Act-Uncoord
 Maximum v/c Ratio: 0.28
 Intersection Signal Delay: 3.3
 Intersection LOS: A
 Intersection Capacity Utilization 27.2%
 ICU Level of Service A
 Analysis Period (min) 15

PM Existing 8:58 pm 06/15/2023

Lanes, Volumes, Timings
8: Raleigh St & W. 72nd Ave

PM Existing
08/15/2023

	→	↘	↙	←	↖	↗	∅4
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	∅4
Lane Configurations	↑↑		↘	↑↑	↘	↗	
Traffic Volume (vph)	776	36	108	744	46	184	
Future Volume (vph)	776	36	108	744	46	184	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)		0	100		180	180	
Storage Lanes		0	1		1	0	
Taper Length (ft)			25		25		
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00	
Ped Bike Factor	1.00		1.00		0.99	0.98	
Frt	0.993					0.850	
Flt Protected			0.950		0.950		
Satd. Flow (prot)	3511	0	1770	3539	1770	1583	
Flt Permitted			0.251		0.950		
Satd. Flow (perm)	3511	0	467	3539	1759	1552	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	6					200	
Link Speed (mph)	30			30	30		
Link Distance (ft)	1614			1960	301		
Travel Time (s)	36.7			44.5	6.8		
Confl. Peds. (#/hr)		1	1		4	4	
Confl. Bikes (#/hr)						2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	843	39	117	809	50	200	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	882	0	117	809	50	200	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Left	Left	Right	
Median Width(ft)	24			12	12		
Link Offset(ft)	0			0	0		
Crosswalk Width(ft)	16			16	16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)		9	15		15	9	
Number of Detectors	2		1	2	1	1	
Detector Template	Thru		Left	Thru	Left	Right	
Leading Detector (ft)	100		20	100	20	20	
Trailing Detector (ft)	0		0	0	0	0	
Detector 1 Position(ft)	0		0	0	0	0	
Detector 1 Size(ft)	6		20	6	20	20	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0	
Detector 2 Position(ft)	94			94			
Detector 2 Size(ft)	6			6			
Detector 2 Type	Cl+Ex			Cl+Ex			
Detector 2 Channel							
Detector 2 Extend (s)	0.0			0.0			

PM Existing 8:58 pm 06/15/2023

Synchro 11 Report
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Lanes, Volumes, Timings
8: Raleigh St & W. 72nd Ave

PM Existing
08/15/2023

	→	↘	↙	←	↖	↗	∅4
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	∅4
Turn Type	NA		pm+pt	NA	Prot	Perm	
Protected Phases	2		1	6	8		4
Permitted Phases			6			8	
Detector Phase	2		1	6	8	8	
Switch Phase							
Minimum Initial (s)	10.0		4.0	10.0	4.0	4.0	4.0
Minimum Split (s)	74.0		15.0	89.0	31.0	31.0	31.0
Total Split (s)	74.0		15.0	89.0	31.0	31.0	31.0
Total Split (%)	61.7%		12.5%	74.2%	25.8%	25.8%	26%
Maximum Green (s)	68.2		10.0	83.2	25.5	25.5	25.0
Yellow Time (s)	3.6		3.5	3.6	3.0	3.0	3.5
All-Red Time (s)	2.2		1.5	2.2	2.5	2.5	2.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.8		5.0	5.8	5.5	5.5	
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max		None	C-Max	Max	Max	None
Walk Time (s)	5.0				9.0	9.0	9.0
Flash Dont Walk (s)	13.0				16.0	16.0	16.0
Pedestrian Calls (#/hr)	1				6	6	5
Act Effct Green (s)	70.2		84.0	83.2	25.5	25.5	
Actuated g/C Ratio	0.58		0.70	0.69	0.21	0.21	
v/c Ratio	0.43		0.28	0.33	0.13	0.41	
Control Delay	14.7		7.2	3.5	39.5	8.1	
Queue Delay	0.0		0.0	0.0	0.0	0.0	
Total Delay	14.7		7.2	3.5	39.5	8.1	
LOS	B		A	A	D	A	
Approach Delay	14.7			4.0	14.4		
Approach LOS	B			A	B		
Queue Length 50th (ft)	186		15	73	32	0	
Queue Length 95th (ft)	243		37	32	67	62	
Internal Link Dist (ft)	1534			1880	221		
Turn Bay Length (ft)			100		180	180	
Base Capacity (vph)	2055		435	2453	376	487	
Starvation Cap Reductn	0		0	0	0	0	
Spillback Cap Reductn	0		0	0	0	0	
Storage Cap Reductn	0		0	0	0	0	
Reduced v/c Ratio	0.43		0.27	0.33	0.13	0.41	
Intersection Summary							
Area Type:	Other						
Cycle Length:	120						
Actuated Cycle Length:	120						
Offset:	0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow						
Natural Cycle:	120						
Control Type:	Actuated-Coordinated						
Maximum v/c Ratio:	0.43						
Intersection Signal Delay:	9.8			Intersection LOS: A			

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APPENDIX A

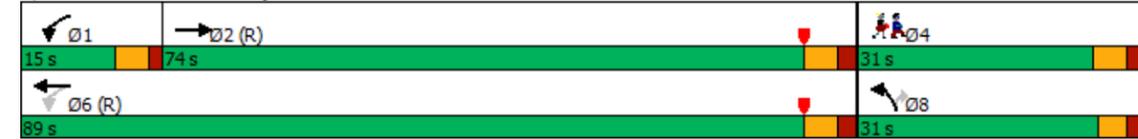
EXISTING CONDITIONS REPORT

Lanes, Volumes, Timings 8: Raleigh St & W. 72nd Ave

PM Existing
08/15/2023

Intersection Capacity Utilization 63.0% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 8: Raleigh St & W. 72nd Ave



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Synchro 11 Report
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Lanes, Volumes, Timings 9: Lowell Blvd & W. 72nd Ave

PM Existing
08/15/2023

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Traffic Volume (vph)	150	669	60	150	653	95	102	312	181	78	156	88
Future Volume (vph)	150	669	60	150	653	95	102	312	181	78	156	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	235		135	185		180	255		0	200		0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96	1.00		0.98	1.00	0.99		1.00		0.98
Frt			0.850			0.850		0.945				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3321	0	1770	1863	1583
Flt Permitted	0.323			0.306			0.440			0.238		
Satd. Flow (perm)	601	3539	1527	568	3539	1559	816	3321	0	442	1863	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			100			136		87				136
Link Speed (mph)		30			30			30				30
Link Distance (ft)		1960			1340			378				311
Travel Time (s)		44.5			30.5			8.6				7.1
Confl. Peds. (#/hr)	2		6	6		2	5		5	5		5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	727	65	163	710	103	111	339	197	85	170	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	163	727	65	163	710	103	111	536	0	85	170	96
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	20
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex				CI+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA	custom	pm+pt	NA	custom	pm+pt	NA		pm+pt	NA	custom

PM Existing 8:58 pm 06/15/2023

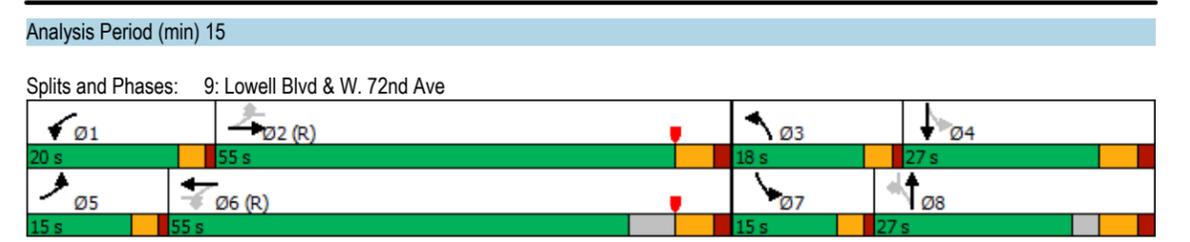
Synchro 11 Report
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Lanes, Volumes, Timings
9: Lowell Blvd & W. 72nd Ave PM Existing
08/15/2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		6	6		2	8			4		8
Detector Phase	5	2	6	1	6	2	3	8		7	4	8
Switch Phase												
Minimum Initial (s)	6.0	15.0	15.0	6.0	15.0	15.0	6.0	8.0		6.0	8.0	8.0
Minimum Split (s)	15.0	55.0	55.0	20.0	55.0	55.0	18.0	27.0		15.0	27.0	27.0
Total Split (s)	15.0	55.0	55.0	20.0	55.0	55.0	18.0	27.0		15.0	27.0	27.0
Total Split (%)	12.5%	45.8%	45.8%	16.7%	45.8%	45.8%	15.0%	22.5%		12.5%	22.5%	22.5%
Maximum Green (s)	11.0	49.0	49.0	16.0	49.0	49.0	14.0	21.0		11.0	21.0	21.0
Yellow Time (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0		1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	6.0	4.0	6.0	6.0	4.0	6.0		4.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	None
Walk Time (s)		5.0	5.0		5.0	5.0		5.0			5.0	5.0
Flash Dont Walk (s)		18.0	18.0		18.0	18.0		20.0			20.0	20.0
Pedestrian Calls (#/hr)		4	6		6	4		5			5	5
Act Effct Green (s)	71.5	60.0	60.7	72.9	60.7	60.0	33.9	22.5		30.3	18.9	22.5
Actuated g/C Ratio	0.60	0.50	0.51	0.61	0.51	0.50	0.28	0.19		0.25	0.16	0.19
v/c Ratio	0.36	0.41	0.08	0.36	0.40	0.12	0.35	0.77		0.40	0.58	0.24
Control Delay	12.3	19.9	1.0	21.7	35.6	12.1	33.1	46.9		34.8	54.4	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	12.3	19.9	1.0	21.7	35.6	12.1	33.1	46.9		34.8	54.4	3.8
LOS	B	B	A	C	D	B	C	D		C	D	A
Approach Delay		17.3			30.8			44.5			35.8	
Approach LOS		B			C			D			D	
Queue Length 50th (ft)	50	176	0	80	260	16	62	176		47	120	0
Queue Length 95th (ft)	82	223	7	137	353	52	105	238		84	194	19
Internal Link Dist (ft)		1880			1260			298			231	
Turn Bay Length (ft)	235		135	185		180	255			200		
Base Capacity (vph)	472	1769	821	521	1788	847	352	733		239	333	419
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.35	0.41	0.08	0.31	0.40	0.12	0.32	0.73		0.36	0.51	0.23

Intersection Summary
 Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 99 (83%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 30.0
 Intersection Capacity Utilization 64.7%
 Intersection LOS: C
 ICU Level of Service C

Lanes, Volumes, Timings
9: Lowell Blvd & W. 72nd Ave PM Existing
08/15/2023



Lanes, Volumes, Timings
10: Irving St

PM Existing
08/15/2023

	↖	→	↘	↙	←	↖	↖	↑	↘	↙	↓	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖	↖	↖	↖		↖	↖	↖
Traffic Volume (vph)	72	925	18	24	772	23	31	9	32	40	13	93
Future Volume (vph)	72	925	18	24	772	23	31	9	32	40	13	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	85		0	200		145	0		0	150		150
Storage Lanes	1		0	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00		0.97		0.98		0.99		
Frt		0.997				0.850		0.883				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3526	0	1770	3539	1583	1770	1619	0	1770	1863	1583
Flt Permitted	0.312			0.261			0.748			0.728		
Satd. Flow (perm)	580	3526	0	484	3539	1542	1393	1619	0	1345	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				77		35				101
Link Speed (mph)		30			30			25				25
Link Distance (ft)		1340			476			286				312
Travel Time (s)		30.5			10.8			7.8				8.5
Confl. Peds. (#/hr)	2		7	7		2			6	6		
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	1005	20	26	839	25	34	10	35	43	14	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	1025	0	26	839	25	34	45	0	43	14	101
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2		1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100		20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

PM Existing 8:58 pm 06/15/2023

Synchro 11 Report
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Lanes, Volumes, Timings
10: Irving St

PM Existing
08/15/2023

	↖	→	↘	↙	←	↖	↖	↑	↘	↙	↓	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA	custom	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8				4
Permitted Phases	2			6		2	8			4		4
Detector Phase	5	2		1	6	2	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	5.0	15.0		5.0	15.0	15.0	5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	12.0	84.0		12.0	84.0	84.0	24.0	24.0		24.0	24.0	24.0
Total Split (s)	12.0	84.0		12.0	84.0	84.0	24.0	24.0		24.0	24.0	24.0
Total Split (%)	10.0%	70.0%		10.0%	70.0%	70.0%	20.0%	20.0%		20.0%	20.0%	20.0%
Maximum Green (s)	7.5	78.0		7.5	78.0	78.0	17.0	17.0		17.0	17.0	17.0
Yellow Time (s)	3.5	4.0		3.5	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		1.0	2.0	2.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	6.0		4.5	6.0	6.0	7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max		None	Max	C-Max	None	None		None	None	None
Walk Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)		14.0			14.0	14.0	20.0	20.0		20.0	20.0	20.0
Pedestrian Calls (#/hr)		6			2	6	6	6		0	0	0
Act Effct Green (s)	96.3	90.6		94.3	88.0	90.6	10.0	10.0		10.0	10.0	10.0
Actuated g/C Ratio	0.80	0.76		0.79	0.73	0.76	0.08	0.08		0.08	0.08	0.08
v/c Ratio	0.15	0.38		0.06	0.32	0.02	0.29	0.27		0.38	0.09	0.45
Control Delay	3.0	4.5		1.2	2.3	0.0	56.1	24.2		60.1	49.2	15.9
Queue Delay	0.0	0.0		0.0	0.1	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	3.0	4.5		1.2	2.4	0.0	56.1	24.2		60.1	49.2	15.9
LOS	A	A		A	A	A	E	C		E	D	B
Approach Delay		4.4			2.3		37.9				30.9	
Approach LOS		A			A		D				C	
Queue Length 50th (ft)	10	89		1	37	0	25	7		32	10	0
Queue Length 95th (ft)	m22	111		m4	45	m0	56	42		67	30	51
Internal Link Dist (ft)		1260			396		206				232	
Turn Bay Length (ft)	85			200		145				150		150
Base Capacity (vph)	541	2663		465	2596	1183	197	259		190	263	310
Starvation Cap Reductn	0	0		0	580	0	0	0		0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.14	0.38		0.06	0.42	0.02	0.17	0.17		0.23	0.05	0.33
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	120											
Offset:	27 (23%), Referenced to phase 2:EBTL, Start of Yellow											
Natural Cycle:	120											
Control Type:	Actuated-Coordinated											
Maximum v/c Ratio:	0.45											
Intersection Signal Delay:	6.6						Intersection LOS: A					

PM Existing 8:58 pm 06/15/2023

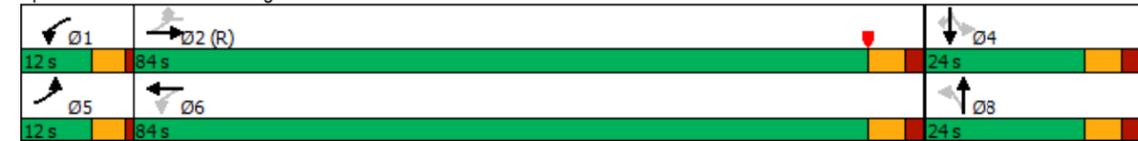
Synchro 11 Report
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Lanes, Volumes, Timings
10: Irving St

PM Existing
08/15/2023

Intersection Capacity Utilization 55.5% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: Irving St



HCM 6th Signalized Intersection Summary
11: Hooker St

PM Existing
08/15/2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↕	↘	↙	↕	↘	↙	↕	↘	↙	↕	↘
Traffic Volume (veh/h)	69	909	20	28	755	56	23	6	52	53	2	39
Future Volume (veh/h)	69	909	20	28	755	56	23	6	52	53	2	39
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	0.98		0.96	0.98		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	75	988	22	30	821	61	25	7	57	58	2	42
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	564	2577	57	496	2543	1106	202	20	166	113	15	57
Arrive On Green	0.06	1.00	1.00	0.04	1.00	1.00	0.12	0.12	0.12	0.12	0.12	0.12
Sat Flow, veh/h	1781	3553	79	1781	3554	1545	1341	170	1383	548	125	471
Grp Volume(v), veh/h	75	494	516	30	821	61	25	0	64	102	0	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1856	1781	1777	1545	1341	0	1552	1144	0	0
Q Serve(g_s), s	1.4	0.0	0.0	0.5	0.0	0.0	0.0	0.0	4.5	6.6	0.0	0.0
Cycle Q Clear(g_c), s	1.4	0.0	0.0	0.5	0.0	0.0	2.4	0.0	4.5	11.2	0.0	0.0
Prop In Lane	1.00		0.04	1.00		1.00	1.00		0.89	0.57		0.41
Lane Grp Cap(c), veh/h	564	1289	1346	496	2543	1106	202	0	187	185	0	0
V/C Ratio(X)	0.13	0.38	0.38	0.06	0.32	0.06	0.12	0.00	0.34	0.55	0.00	0.00
Avail Cap(c_a), veh/h	629	1289	1346	578	2543	1106	230	0	220	215	0	0
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.93	0.93	0.93	0.75	0.75	0.75	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	3.9	0.0	0.0	4.1	0.0	0.0	47.5	0.0	48.4	52.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.8	0.8	0.0	0.3	0.1	0.3	0.0	1.1	2.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.3	0.3	0.2	0.1	0.0	0.7	0.0	1.8	3.1	0.0	0.0
Unsig. Movement Delay, s/veh	4.0	0.8	0.8	4.2	0.3	0.1	47.7	0.0	49.5	54.6	0.0	0.0
LnGrp Delay(d),s/veh	A	A	A	A	A	A	D	A	D	D	A	A
Approach Vol, veh/h	1085			912			89			102		
Approach Delay, s/veh	1.0			0.4			49.0			54.6		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.5	93.0		20.4	7.7	91.9		20.4				
Change Period (Y+Rc), s	4.0	6.0		6.0	4.0	6.0		6.0				
Max Green Setting (Gmax), s	8.0	79.0		17.0	8.0	79.0		17.0				
Max Q Clear Time (g_c+I1), s	2.5	2.0		13.2	3.4	2.0		6.5				
Green Ext Time (p_c), s	0.0	8.5		0.1	0.1	7.5		0.2				

Intersection Summary	
HCM 6th Ctrl Delay	5.2
HCM 6th LOS	A

Notes
User approved pedestrian interval to be less than phase max green.

HCM 6th Signalized Intersection Summary
12: Federal Blvd & W. 72nd Ave

PM Existing
08/15/2023

	↖	→	↘	↙	←	↖	↗	↖	↗	↘	↙	↖
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↖	↖↖	↖	↖↖	↖↖	↖	↖↖	↖↖↖	↖	↖↖	↖↖↖	↖
Traffic Volume (veh/h)	344	304	112	70	341	118	213	1221	79	162	1117	364
Future Volume (veh/h)	344	304	112	70	341	118	213	1221	79	162	1117	364
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	374	330	122	76	371	128	232	1327	86	176	1214	396
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	429	763	340	122	447	197	287	2213	686	461	2511	774
Arrive On Green	0.12	0.21	0.21	0.07	0.25	0.25	0.08	0.43	0.43	0.13	0.49	0.49
Sat Flow, veh/h	3456	3554	1583	3456	3554	1563	3456	5106	1584	3456	5106	1574
Grp Volume(v), veh/h	374	330	122	76	371	128	232	1327	86	176	1214	396
Grp Sat Flow(s),veh/h/ln	1728	1777	1583	1728	1777	1563	1728	1702	1584	1728	1702	1574
Q Serve(g_s), s	12.8	9.6	7.9	2.6	11.8	8.8	7.9	23.9	3.0	5.6	19.0	11.8
Cycle Q Clear(g_c), s	12.8	9.6	7.9	2.6	11.8	8.8	7.9	23.9	3.0	5.6	19.0	11.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	429	763	340	122	447	197	287	2213	686	461	2511	774
V/C Ratio(X)	0.87	0.43	0.36	0.62	0.83	0.65	0.81	0.60	0.13	0.38	0.48	0.51
Avail Cap(c_a), veh/h	490	770	343	346	622	274	346	2213	686	461	2511	774
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.93	0.93	0.93	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.6	40.8	40.1	55.0	43.7	42.5	54.1	26.0	12.3	47.5	20.3	6.8
Incr Delay (d2), s/veh	12.3	0.1	0.2	1.9	4.7	1.3	9.4	1.2	0.4	0.2	0.7	2.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	4.2	3.1	1.1	4.9	3.2	3.8	9.5	1.5	2.4	7.4	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.9	40.9	40.3	56.9	48.4	43.9	63.4	27.2	12.6	47.7	21.0	9.3
LnGrp LOS	E	D	D	E	D	D	E	C	B	D	C	A
Approach Vol, veh/h		826			575			1645			1786	
Approach Delay, s/veh		51.3			48.5			31.6			21.0	
Approach LOS		D			D			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.0	58.0	9.2	30.8	15.0	65.0	19.9	20.1				
Change Period (Y+Rc), s	6.0	* 6	5.0	5.0	5.0	6.0	5.0	5.0				
Max Green Setting (Gmax), s	9.0	* 52	12.0	26.0	12.0	49.0	17.0	21.0				
Max Q Clear Time (g_c+I1), s	7.6	25.9	4.6	11.6	9.9	21.0	14.8	13.8				
Green Ext Time (p_c), s	0.0	17.6	0.0	1.4	0.1	22.4	0.1	1.2				
Intersection Summary												
HCM 6th Ctrl Delay	33.1											
HCM 6th LOS	C											
Notes												
User approved pedestrian interval to be less than phase max green.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

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Lanes, Volumes, Timings
13: W. 72nd Ave & Zuni St

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	↖	→	←	↖	↘	↙	Ø4
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4
Lane Configurations	↖	↖↖	↖↖		↖	↖	
Traffic Volume (vph)	33	575	518	40	36	22	
Future Volume (vph)	33	575	518	40	36	22	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	50			0	100	100	
Storage Lanes	1			0	1	0	
Taper Length (ft)	25				25		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	1.00		1.00			0.98	
Frt			0.989			0.850	
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1770	3539	3495	0	1770	1583	
Flt Permitted	0.423				0.950		
Satd. Flow (perm)	788	3539	3495	0	1770	1553	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			24			24	
Link Speed (mph)		30	30		25		
Link Distance (ft)		2630	378		264		
Travel Time (s)		59.8	8.6		7.2		
Confl. Peds. (#/hr)	1			1		2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	36	625	563	43	39	24	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	36	625	606	0	39	24	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(ft)		24	24		12		
Link Offset(ft)		0	0		0		
Crosswalk Width(ft)		16	16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15			9	15	9	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (ft)	20	100	100		20	20	
Trailing Detector (ft)	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0		0	0	
Detector 1 Size(ft)	20	6	6		20	20	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94	94				
Detector 2 Size(ft)		6	6				
Detector 2 Type		CI+Ex	CI+Ex				
Detector 2 Channel							
Detector 2 Extend (s)		0.0	0.0				
Turn Type	Perm	NA	NA		Prot	Perm	

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Lanes, Volumes, Timings
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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø4
Protected Phases		2	2		3		4
Permitted Phases	2					3	
Detector Phase	2	2	2		3	3	
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0		5.0	5.0	1.0
Minimum Split (s)	43.0	43.0	43.0		11.0	11.0	7.0
Total Split (s)	43.0	43.0	43.0		11.0	11.0	6.0
Total Split (%)	71.7%	71.7%	71.7%		18.3%	18.3%	10%
Maximum Green (s)	37.0	37.0	37.0		5.0	5.0	0.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0	
Lead/Lag					Lead	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	C-Max	C-Max	C-Max		None	None	None
Walk Time (s)							10.0
Flash Dont Walk (s)							15.0
Pedestrian Calls (#/hr)							3
Act Effct Green (s)	48.6	48.6	48.6		5.0	5.0	
Actuated g/C Ratio	0.81	0.81	0.81		0.08	0.08	
v/c Ratio	0.06	0.22	0.21		0.27	0.16	
Control Delay	2.4	2.3	3.0		30.7	14.5	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	2.4	2.3	3.0		30.7	14.5	
LOS	A	A	A		C	B	
Approach Delay		2.3	3.0		24.5		
Approach LOS		A	A		C		
Queue Length 50th (ft)	1	11	28		14	0	
Queue Length 95th (ft)	m18	106	65		39	19	
Internal Link Dist (ft)		2550	298		184		
Turn Bay Length (ft)	50				100	100	
Base Capacity (vph)	638	2866	2835		147	151	
Starvation Cap Reductn	0	0	0		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.06	0.22	0.21		0.27	0.16	

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 16 (27%), Referenced to phase 2:EBWB, Start of Yellow
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.27
 Intersection Signal Delay: 3.7
 Intersection Capacity Utilization 39.8%
 Intersection LOS: A
 ICU Level of Service A

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Lanes, Volumes, Timings
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Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 13: W. 72nd Ave & Zuni St



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