**EXHIBIT 21**

# TRANSPORTATION ANALYSIS

**Cooper Mountain Transportation Impact Analysis (plus Addendum)**

DATE: February 16, 2023

TO: Cooper Mountain Project Management Team

FROM: Carl Springer, Kevin Chewuk and Anders Hart | DKS Associates

SUBJECT: Beaverton Cooper Mountain Community Plan
Transportation Analysis (Task C.5) #20035-000

This memorandum summarizes the future transportation conditions under the preferred land use scenario and transportation framework associated with the Beaverton Cooper Mountain Community Plan. Included is documentation of the assumptions and methodologies, an analysis of future 2040 motor vehicle conditions, and an identification of multimodal improvements needed to support future growth within the Cooper Mountain Community Plan study area.

## FUTURE GROWTH

Land use is a key factor in developing a functional transportation system. The amount of land that is planned to be developed, the type of land uses, and how the land uses are mixed together have a direct relationship to the expected demands on the transportation system. Understanding the amount and type of land use is critical to maintaining or enhancing the transportation system for all users.

The 1,232 acres in the Cooper Mountain Community Plan study area are being evaluated together to create a cohesive vision for the area and identify appropriate areas for urbanization, natural resource protection, and infrastructure. Prior to establishing and as a part of adopting the needed zoning to allow for development in suitable areas, the City is required to update all public facilities plans, including the Transportation System Plan (TSP). The land within the Cooper Mountain Community Plan study area will be addressed in a community plan that will describe its intended zoning and development implementation.

In addressing changing transportation needs in the area with the Community Plan growth, the impact of the increased demand for vehicle, pedestrian and bicyclists on the surrounding transportation system, as a result of full build-out over the long term, will be evaluated through the year 2040. The new information obtained from this system analysis will be used to develop a set of transportation improvements and standards that will serve to inform the creation of the preferred Community Plan Scenario, on-going infrastructure funding analysis, and updates to the Transportation System Plans for the study area.

## BASELINE TRANSPORTATION SYSTEM IMPROVEMENTS

The starting point for the 2040 performance analysis relied on the list of improvement projects in the Metro Regional Transportation Plan, Beaverton (including the South Cooper Mountain Addendum), and Washington County Transportation System Plans. These projects represent only those that are expected to be funded, and therefore can be used in the baseline traffic analysis for 2040. Additional transportation projects will be needed to support growth in the Cooper Mountain Community Plan study area; however, they cannot be assumed for the baseline transportation analysis. The improvements that were assumed include:

- SW Scholls Ferry Road widened to five lanes with bike lanes and sidewalks from SW Roy Rogers Road to SW Tile Flat Road (RTP ID: 11915)
- New North-South Collector Road at South Cooper Mountain from SW Scholls Ferry Road to the UGB (RTP ID: 11893). Will include sidewalks and bike lanes.
- SW Barrows Road Extension from Tile Flat Road to Loon Drive with sidewalks and bike lanes; will be a three-lane connector (RTP ID: 11892)
- SW Tile Flat Road Improvements: three-lane collector with north-side pedestrian/bicycle improvements from SW Scholls Ferry Road to the UGB (RTP ID: 11919).
- SW 175th Avenue improvements (sidewalks, bike lanes, and turn lanes where appropriate between SW Rigert Road and SW Kemmer Road (RTP ID: 12066).
- SW Farmington Road Widening: Widen roadway between SW 185th Avenue and SW 209th Avenue to five lanes with bike/ped facilities; new signal at 209th Ave; widen to four lanes between 170th Avenue and SW 185th Avenue with turn lanes at major intersections, bike lanes, sidewalks, access management, realignment of Rosa/179th intersection (RTP ID: 11285, 11284, and 10560). The widening of Farmington Road was assumed to extend to just west of the intersection with SW 209th Avenue.
- SW Roy Rogers Road widening to five lanes south of the UGB Road with bike lanes and sidewalks north of OR-99W (RTP ID: 11903 and 11914). This project will improve the SW Roy Rogers Road/Beef Bend Road study intersection.
- SW 185th Avenue widening to five lanes with bike lanes and sidewalks from SW Farmington Road to SW Blanton Street (RTP ID: 10582).
- SW 209th Avenue widening to five lanes with bike lanes and sidewalks from SW Farmington Road to SW Vermont Street (RTP ID: 11753).

The extension of SW Mountainside Road was also assumed from SW Scholls Ferry Road south to the UGB through Tigard's River Terrace West area. This project was included in Tigard's River Terrace West and South TSP addendum. This will create a new south leg at the SW Scholls Ferry Road/SW Mountainside Road study intersection.

## ESTIMATING TRIPS

A determination of future street network needs requires the ability to accurately forecast travel demand resulting from estimates of future population and employment for the Cooper Mountain Community Plan study area, and the rest of the City and Metro region. The objective of the transportation planning process is to provide the information necessary for making decisions about how and where improvements should be made to create a connected, safe and efficient transportation system that provides travel options.

The travel demand forecasting process generally involves estimating travel patterns for new development based on the decisions and preferences demonstrated by existing residents, employers, and institutions around the region. Travel demand models are mathematical tools that help us understand future commuter, school, and recreational travel patterns including information about the length, mode, and time of day a trip will be made. The latest travel models are suitable for motor vehicle and transit planning purposes and can produce total volumes for autos, trucks, and buses on each street and highway in the system. Model forecasts are refined by comparing outputs with observed counts and behaviors in the local system. This refinement step is completed before any evaluation of system performance is made. Once the traffic forecasting process is complete, the 2040 volumes are used to determine the areas of the street network that are expected to be congested and that may need future investments to accommodate growth.

Washington County has a travel demand model that is based on Metro's Regional travel demand model. For the Cooper Mountain Community Plan study area, the Washington County travel demand model was refined to reflect the preferred land use and roadway network envisioned as part of the Community Plan.

### LAND USE ASSUMPTIONS

As shown in Table 1, the Cooper Mountain Community Plan includes 5,200 housing units and about 460 employees in the preferred scenario. Vehicle trips that would be generated by the Community Plan area were estimated by applying travel demand model trip generation rates by land use type, which were developed by Washington County staff based on westside trip patterns in the Metro model. Overall, the Cooper Mountain Community Plan area is expected to generate about 4,465 motor vehicle trips during the p.m. peak hour, or about 2,500 more than what was assumed in the Baseline scenario.

**TABLE 1: DEVELOPMENT ASSUMPTIONS FOR THE COOPER MOUNTAIN COMMUNITY PLAN**

| SCENARIO | HOUSING UNITS | EMPLOYEES | PM PEAK HOUR VEHICLE TRIPS ENDS |
|---|---|---|---|
| 2040 Baseline* | 2,205 | 226 | 1,911 |
| 2040 with Cooper Mountain Community Plan Update | 5,200 | 460 | 4,465 |
| **Change** | **+2,995** | **+234** | **+2,554** |
| *Based on the disaggregated Washington County Model | | | |

## 2040 MOTOR VEHICLE OPERATIONS

Future traffic forecasts were prepared for 2040 for the following scenarios:

- **2040 Baseline** – this assumes the land use and transportation network currently within Washington County's version of Metro's 2040 Financially Constrained Regional Travel Demand Model, and the baseline transportation improvements. This scenario includes 2,205 households and 226 employees in the Cooper Mountain Community Plan area and is assumed to match the forecast of the current Beaverton Transportation System Plan. It includes the improvement projects listed in the "Baseline Transportation System Improvements" section earlier in this document and the traffic volumes shown in Figures 1a and 1b.

- **2040 with Cooper Mountain updates** - this scenario assumes the preferred levels of potential development within the Cooper Mountain area, with 5,200 households and 460 employees. It also includes the improvement projects listed in the "Baseline Transportation System Improvements" section earlier in this document and the traffic volumes shown in Figures 2a and 2b. In addition, it includes projects 1 to 12 as part of the preferred transportation framework improvements with the Cooper Mountain updates scenario shown in Table 2 and Figure 3 that would be needed before development could occur. These transportation improvements include various street extensions with associated pedestrian and bicycle facilities, in addition to a trail network.

In addition, a sensitivity scenario was evaluated that assumed project 24 as part of the preferred transportation framework improvements shown in Table 2 and Figure 3. This proposed street would connect the Cooper Lowlands and Grabhorn Meadow areas and provide an alternative route to SW Tile Flat Road to/from SW Grabhorn Road. The purpose of the sensitivity scenario is to identify system benefits from this street extension and whether it reduces the need for transportation improvements when compared to the scenario without the extension.

**TABLE 2: TRANSPORTATION IMPROVEMENTS IN 2040 WITH COOPER MOUNTAIN UPDATES AND SENSITIVITY SCENARIOS**

| # | IMPROVEMENT |
|---|---|
| **Project included as part of the Preferred Transportation Framework Improvements** | |
| 1 | Realign the curve along SW Grabhorn Road near SW Stone Creek Drive, as a 3-lane County arterial. |
| 2 | Realign the curve along SW Grabhorn Road north of Tile Flat Road, as a 3-lane County arterial. |
| 3 | Realign SW Grabhorn Road east to provide a through connection with SW Tile Flat Road, as a 3-lane County arterial, or add a roundabout. |
| 4 | Realign SW 175th Avenue between SW Outlook Lane and Cooper Mountain Lane, as a 3-lane County arterial. |
| 5 | Extend SW 185th Avenue from SW Gassner Road to SW Kemmer Road as a 3-lane County arterial. |
| 6 | Create a new 2-lane City collector street between SW Kemmer Road and the SW Siler Ridge Lane extension. |
| 7 | Extend SW Weir Road from SW 170$^{th}$ Avenue to the new north-to-south collector street (Project #6), as a 3-lane City collector street. |
| 8 | Extend SW Siler Ridge Lane from SW 175th Avenue to the new north-to-south collector street (Project #6), as a 3-lane City collector street. |
| 9 | Extend SW Siler Ridge Lane from the new north-to-south collector street (Project #6) to SW Tile Flat Road, as a 3-lane City collector street. |
| 10 | Extend SW Mountainside Way to the SW Siler Ridge Lane extension, as a 3-lane City collector street. |
| 11 | Create a new 2-lane City neighborhood route between the SW Siler Ridge Lane extension and SW Alvord Lane extension. |
| 12 | Extend SW Bittern Lane to SW Alvord Lane, as a 2-lane City neighborhood route. |
| **Project included in the Sensitivity Scenario only (not part of the Preferred Transportation Framework Improvements)** | |
| 24 | Extend SW Mountainside Way from the SW Siler Ridge Lane extension to SW Grabhorn Road, as a 3-lane City collector street. |

## TRANSPORTATION FRAMEWORK ANALYSIS RESULTS

Motor vehicle conditions were evaluated during the 2040 p.m. peak hour at the 27 study intersections, in addition to the new on-site intersections of arterial and/or collector roadways under the preferred transportation framework (shown in Table 3). The evaluation utilized the Highway Capacity Manual (HCM) 6th Edition methodology, except where intersection geometry required the use of HCM 2000 Edition methodology.

As shown in Table 3, 11 of the 27 study intersections are expected to exceed mobility targets under 2040 scenarios. These are indicated by the red text in the last two columns. Many of these are unsignalized intersections along major streets where side street traffic is causing these intersections to exceed their mobility targets. Many of the study intersections along SW Roy Rogers Road, SW Scholls Ferry Road and SW Farmington Road are forecasted to operate just under their mobility target by 2040, with these intersections operating satisfactorily due to the assumed widening of the corridors to five lanes.

**TABLE 3: INTERSECTION OPERATIONS (2040 PM PEAK)**

| # | INTERSECTION | MOBILITY TARGET | 2040 BASELINE | 2040 WITH COOPER MOUNTAIN UPDATES |
|---|---|---|---|---|
| **Study Intersections** | | | | |
| 1 | Bany Road/ 170th Avenue (signalized) | 0.99 v/c | 0.91 | 0.93 |
| 2 | Bany Road/ 185th Avenue (unsignalized) | 0.99 v/c | 0.83 | 0.83 |
| 3 | Farmington Road/ 185th Avenue (signalized) | 0.99 v/c | 0.94 | 0.96 |
| 4 | Farmington Road/ Grabhorn Road-209th Avenue (signalized) | 0.99 v/c | **1.07** | **1.09** |
| 5 | Farmington Road/ Miller Hill Road (unsignalized) | 0.99 v/c | 0.99 | **1.09** |
| 6 | Farmington Road/ Clark Hill Road (unsignalized) | 0.90 v/c | 0.88 | **1.06** |
| 7 | Gassner Road/ 190th Avenue (all-way stop) | 0.99 v/c | 0.83 | 0.91 |
| 8 | Gassner Road/ Grabhorn Road (unsignalized) | 0.99 v/c | **2.02** | **2.55** |
| 9 | Kemmer Road/ 175th Avenue (roundabout) | 0.99 v/c | **1.40** | **1.54** |
| 10 | Murray Boulevard/ Beard Road-Brockman Road (signalized) | 0.99 v/c | **1.33** | **1.37** |
| 11 | Murray Boulevard/ Weir Road (signalized) | 0.99 v/c | 0.88 | 0.92 |
| 12 | Rigert Road/ 170th Avenue (all-way stop) | 0.99 v/c | **1.67** | **1.75** |
| 13 | Scholls Ferry Road/ Mountainside Way (signalized) | 0.99 v/c | 0.69 | 0.74 |
| 14 | Roy Rogers Road/ Beef Bend Road (signalized) | 0.90 v/c | 0.85 | 0.85 |
| 15 | Roy Rogers Road/ Bull Mountain Road (signalized) | 0.99 v/c | 0.85 | 0.84 |
| 16 | Roy Rogers Road/ Scholls-Sherwood Road (signalized) | 0.90 v/c | 0.77 | 0.77 |
| 17 | Scholls Ferry Road/ Barrows Road (signalized) | 0.99 v/c | 0.89 | 0.94 |
| 18 | Scholls Ferry Road/ Clark Hill Road (unsignalized) | 0.90 v/c | 0.61 | 0.79 |

| # | INTERSECTION | MOBILITY TARGET | 2040 BASELINE | 2040 WITH COOPER MOUNTAIN UPDATES |
|---|---|---|---|---|
| 19 | Scholls Ferry Road/ Horizon-Teal Boulevard (signalized) | 0.99 v/c | 0.96 | **1.01** |
| 20 | Scholls Ferry Road/ Murray Boulevard (signalized) | 0.99 v/c | **1.01** | **1.06** |
| 21 | Scholls Ferry Road/ River Road (roundabout) | 0.90 v/c | 0.50 | 0.53 |
| 22 | Scholls Ferry Road/ Roy Rogers Road-175th Avenue (signalized) | 0.99 v/c | **1.03** | **1.04** |
| 23 | Scholls Ferry Road/ Tile Flat Road (signalized) | 0.99 v/c | 0.66 | 0.65 |
| 24 | Scholls Ferry Road/Strobel Road (signalized) | 0.99 v/c | 0.47 | 0.47 |
| 25 | Tile Flat Road/ Grabhorn Road (unsignalized) | 0.90 v/c | **2.06** | **2.23** |
| 26 | Tile Flat Road/ Clark Hill Road (all-way stop) | 0.90 v/c | 0.71 | 0.82 |
| 27 | Weir Road/ 155th Avenue (all-way stop) | 45 second delay | 17 seconds | 22 seconds |
| **New On-Site Intersections under Preferred Transportation Framework (unsignalized)** | | | | |
| A | Kemmer Road/ Future Collector (Project #6) | 0.99 v/c | * | 0.56 |
| B | 175th Avenue/ SW Weir Road extension (Project #7) | 0.99 v/c | * | **>2.75** |
| C | 175th Avenue/ SW Siler Ridge Lane extension (Project #8) | 0.99 v/c | * | **2.08** |
| D | Tile Flat Road/ SW Siler Ridge Lane extension (Project #8) | 0.99 v/c | * | 0.34 |
| E | Future Collector (Project #6)/ SW Weir Road extension (Project #7) | 45 second delay | * | 11 seconds |
| F | SW Siler Ridge Lane extension (Project #8)/ Future Collector (Project #6) | 45 second delay | * | 10 seconds |
| G | SW Siler Ridge Lane extension (Project #8)/ SW Mountainside Way extension (Project #10) | 45 second delay | * | 9 seconds |

Notes: **Red shading** indicates an intersection that exceeds the mobility target

* Intersection does not exist in the baseline scenario.

## RECOMMENDED INTERSECTION IMPROVEMENTS

As shown in Table 3, 11 of the study intersections and two of the new on-site intersections under preferred transportation framework are expected to exceed mobility targets under the With Cooper Mountain Updates scenario. Recommended improvements for these locations are shown in Table 4, with the resulting intersection operations.

No feasible improvements were identified for the Scholls Ferry Road intersections with Horizon-Teal Boulevard, Murray Boulevard and Roy Rogers Road-175th Avenue, and the Murray Boulevard/ Beard Road-Brockman Street intersections. These intersections are expected to carry a significant amount of traffic and would require large-scale widening or alternative routes to meet mobility targets. Given the complexity of this type of improvement, each location would need more extensive study to consider all possible options and weigh the benefits and shortfalls. Further, the 2022 changes to the Oregon Transportation Planning Rule (OAR 660-012) suggest that policy alternatives should be considered prior to major system improvements. These intersections are key regional bottlenecks since multiple travel routes to the north of the study area merge into a few continuous north-to-south routes via SW Roy Rogers Road and SW Murray Boulevard south of the study area. Improving street connectivity surrounding these intersections and providing alternative routes for drivers will help pull some traffic away from these intersections, but they will continue to operate substandard without a more substantial parallel facility.

No feasible improvement was also identified at the Farmington Road/ Miller Hill Road intersection. This unsignalized intersection does not meet signal warrants and would need turn restrictions at the side street approach or local connectivity improvements to allow circulation to nearby signalized intersections.

### Regional Corridor Improvements

The existing roadways surrounding the study area are significantly constrained by the sloping topography, which leads to high grades, narrow roads, and sharp turns. The topography combined with the rural development patterns significantly limits existing roadway connectivity in the Plan area. North-south regional vehicle traffic through the area is limited to indirect routes via SW Tile Flat Road, SW Grabhorn Road, SW 175th Avenue, and SW Roy Rogers Road. East-west routes, including SW Farmington Road and SW Scholls Ferry Road, are more direct through the area and are planned to be widened to five-lane cross-sections.

SW 175th Avenue currently includes a five-lane cross-section from SW Scholls Ferry Road to SW Barrows Road and maintains a two-lane cross-section north of SW Barrows Road. SW Grabhorn and SW Tile Flat Road both maintain two-lane cross-sections adjacent to the study area. These north-south regional corridors are expected to carry a significant amount of traffic, with up to 26,000 average daily trips along SW 175th Avenue between SW Barrows Road and SW Kemmer Road, and up to 14,000 average daily trips along the SW Tile Flat Road and SW Grabhorn Road corridors between SW Scholls Ferry Road and SW Gassner Road by 2040.

The recommended widening of the SW Tile Flat Road and SW Grabhorn Road corridors to three-lane cross-sections will be expected to adequately accommodate the forecasted motor vehicle

volumes, however, the expected volumes along SW 175th are on the high end for a three-lane cross-section. Average daily traffic volumes are forecasted to be around 22,000 south of the SW Siler Ridge Lane extension to SW Barrows Road and around 25,000 north of it to SW Kemmer Road. Intersections along this segment are forecasted to approach or exceed their mobility targets with the three-lane section, including the existing SW Kemmer Road intersection (Intersection ID #9) and new SW Weir Road (Intersection ID #B) and SW Siler Ridge Lane (Intersection ID #C) intersections with SW 175th Avenue. Widening SW 175th Avenue to a five-lane cross-section between the SW Barrows Road and SW Kemmer Road intersections allows for the mobility targets to be met at these intersections, but that would detract from the livability objectives of the study area. There are several planned commercial and mixed-use nodes along this segment, and a five-lane cross-section with steep downhill grades will potentially allow for higher motor vehicle travel speeds. Traffic turning from the corridor onto side streets at higher speeds could lead to unsafe conflicts with pedestrians and bicyclists, and a wider cross-section will lead to difficult crossings of SW 175th Avenue for these users between neighborhoods on either side. The five-lane widening requires a significant investment and a decision, either way, should be deferred until further study of the livability trade-offs is considered.

It is also possible that after providing a five-lane cross-section, the available capacity will be mostly back-filled with other regional traffic. In other words, future congestion on parallel arterials routes (such as Murray Boulevard) could potentially cause drivers to re-route through the study area, and therefore, the traffic operational results may be similar with a three and five-lane cross-section along the corridor.

**TABLE 4: INTERSECTION OPERATIONS WITH RECOMMENDATIONS (2040 PM PEAK)**

| # | INTERSECTION | MOBILITY TARGET | RECOMMENDED IMPROVEMENT | V/C WITH RECOMMENDED IMPROVEMENT |
|---|---|---|---|---|
| **Study Intersections** | | | | |
| 4 | Farmington Road/ Grabhorn Road-209th Avenue | 0.99 v/c | Extend 5-lane widening of 209th Avenue to just south of Farmington Road | 0.89 |
| 5 | Farmington Road/ Miller Hill Road | 0.90 v/c | None* | N/A |
| 6 | Farmington Road/ Clark Hill Road | 0.90 v/c | Westbound left-turn lane | 0.81 |
| 8 | Gassner Road/ Grabhorn Road | 0.99 v/c | Southbound and westbound left-turn lanes | 0.91 |
| 9 | Kemmer Road/ 175th Avenue | 0.99 v/c | Widen SW 175th to 5-lanes through the intersection** | 0.85 |
| 10 | Murray Boulevard/ Beard Road-Brockman St | 0.99 v/c | None* | N/A |
| 12 | Rigert Road/ 170th Avenue | 0.99 v/c | Roundabout | 0.95 |
| 19 | Scholls Ferry Road/ Horizon-Teal Boulevard | 0.99 v/c | None* | N/A |
| 20 | Scholls Ferry Road/ Murray Boulevard | 0.99 v/c | None* | N/A |
| 22 | Scholls Ferry Road/ Roy Rogers Road-175th Avenue | 0.99 v/c | None* | N/A |
| 25 | Tile Flat Road/ Grabhorn Road | 0.90 v/c | Realign the east leg of Tile Flat Road to become the free through movement with the north leg of Grabhorn Road; the west leg of Tile Flat Road becomes a stop-controlled approach | 0.57 |
| | | | Roundabout | 0.39 |
| **New On-Site Intersections under Preferred Transportation Framework** | | | | |
| B | 175th Avenue/ SW Weir Road extension (Project #7) | 0.99 v/c | Traffic signal (SW 175th Avenue with a 3-lane cross-section)** | **1.10** |
| | | | Roundabout (SW 175th Avenue with a 3-lane cross-section)** | **1.58** |
| C | 175th Avenue/ SW Siler Ridge Lane extension (Project #8) | 0.99 v/c | Traffic signal (SW 175th Avenue with a 3-lane cross-section)** | 0.96 |
| | | | Roundabout (SW 175th Avenue with a 3-lane cross-section)** | **1.28** |

Notes: * See "Recommended Intersection Improvements" discussion preceding Table 4.
** See "Regional Corridor Improvements" discussion preceding Table 4.

## SENSITIVITY SCENARIO WITH PROJECT #24

Table 5 shows the study intersections where the street extension associated with the preferred transportation framework improvement #24 will redistribute motor vehicle trips and impact intersection operations. The street extension is estimated to attract around 6,500 average daily trips from the SW Tile Flat Road and SW Grabhorn Road route adjacent to the Cooper Mountain Community Plan study area. Intersection operations are expected to improve at four of the five nearby study intersections, with the greatest benefit to operations occurring at the SW Scholls Ferry Road/ SW Clark Hill Road and Tile Flat Road/ Grabhorn Road intersections. The SW Tile Flat Road/ SW Grabhorn Road intersection will still be expected to exceed its mobility target, although the v/c improves from 2.23 to 1.10. This intersection will still require either the roundabout or realignment improvement as it would without Project #24. The remaining intersections will be expected to meet their respective mobility targets with or without Project #24.

**TABLE 5: SENSITIVITY SCENARIO INTERSECTION OPERATIONS WITH PROJECT #24 (2040 PM PEAK)**

| # | STUDY INTERSECTION | MOBILITY TARGET (V/C) | 2040 WITH COOPER MOUNTAIN UPDATES (V/C) | SENSITIVITY SCENARIO WITH PROJECT #24 (V/C) | RECOMMENDED IMPROVEMENT WITH PROJECT #24 | V/C WITH RECOMMENDED IMPROVEMENT AND PROJECT #24 |
|---|---|---|---|---|---|---|
| 13 | Scholls Ferry Road/ Mountainside Way (signalized) | 0.99 | 0.74 | 0.79 | N/A | - |
| 18 | Scholls Ferry Road/ Clark Hill Road (unsignalized) | 0.90 | 0.79 | 0.59 | N/A | - |
| 23 | Scholls Ferry Road/ Tile Flat Road (signalized) | 0.99 | 0.65 | 0.61 | N/A | - |
| 24 | Scholls Ferry Road/Strobel Road (signalized) | 0.99 | 0.47 | 0.45 | N/A | - |
| 25 | Tile Flat Road/ Grabhorn Road (unsignalized) | 0.90 | **2.23** | **1.10** | Realign intersection* | 0.48 |
| | | | | | Roundabout | 0.48 |

Notes: **Red shading** indicates an intersection that exceeds the mobility target
* See project description in Table 4.

**FIGURE 1A: 2040 BASELINE SCENARIO TRAFFIC VOLUMES**

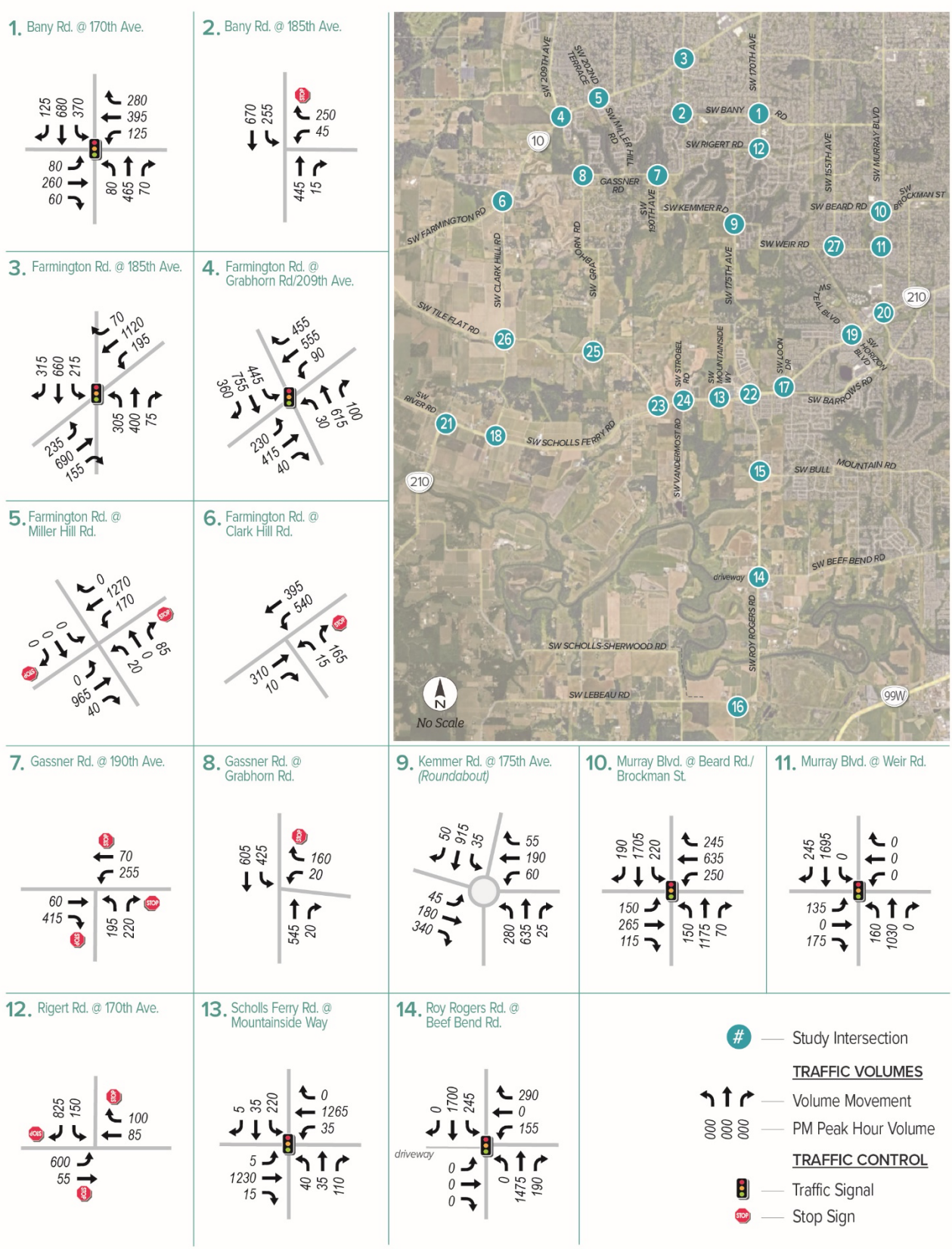


**FIGURE 1B: 2040 BASELINE SCENARIO TRAFFIC VOLUMES**

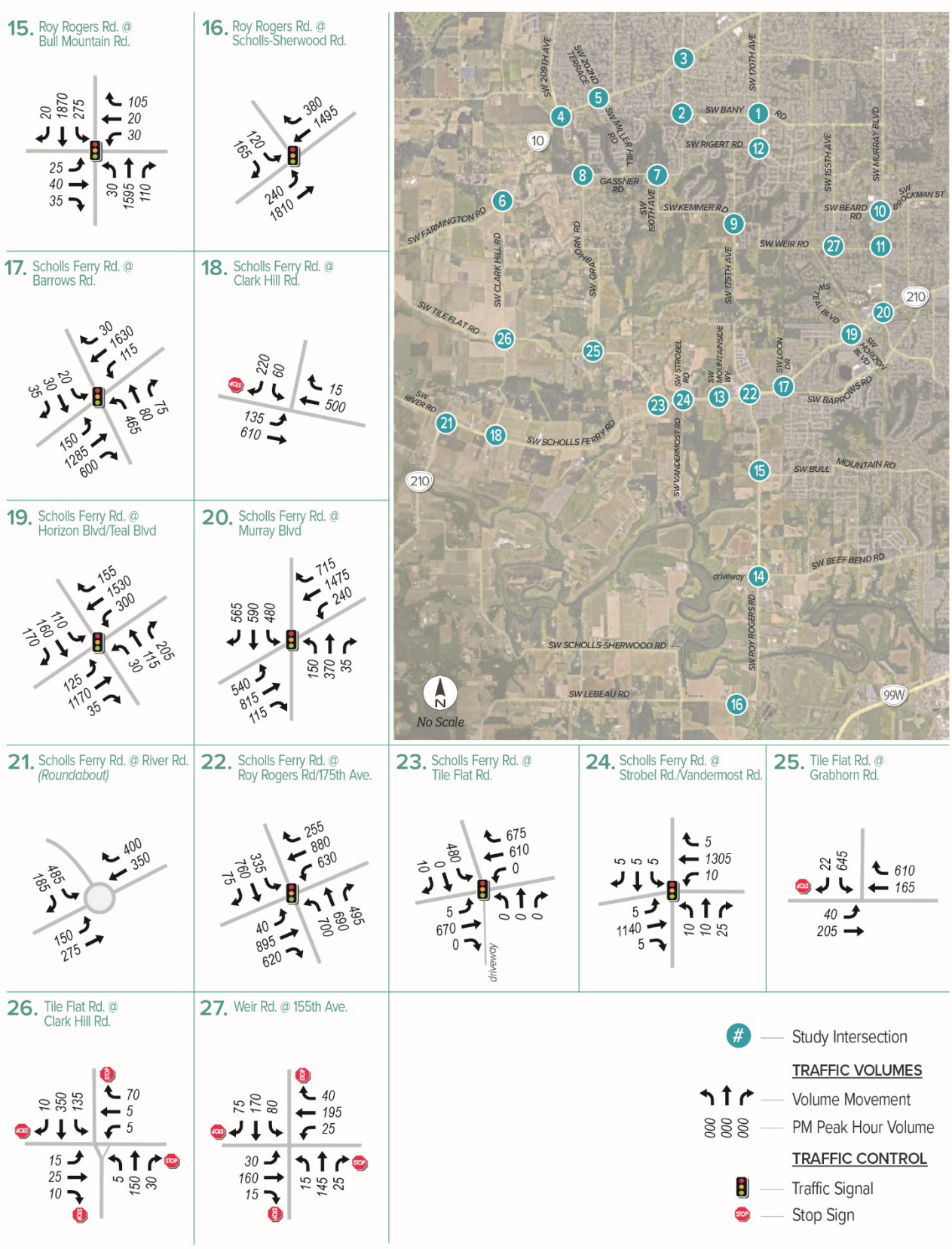


**FIGURE 2A: 2040 WITH COOPER MOUNTAIN UPDATES SCENARIO TRAFFIC VOLUMES**

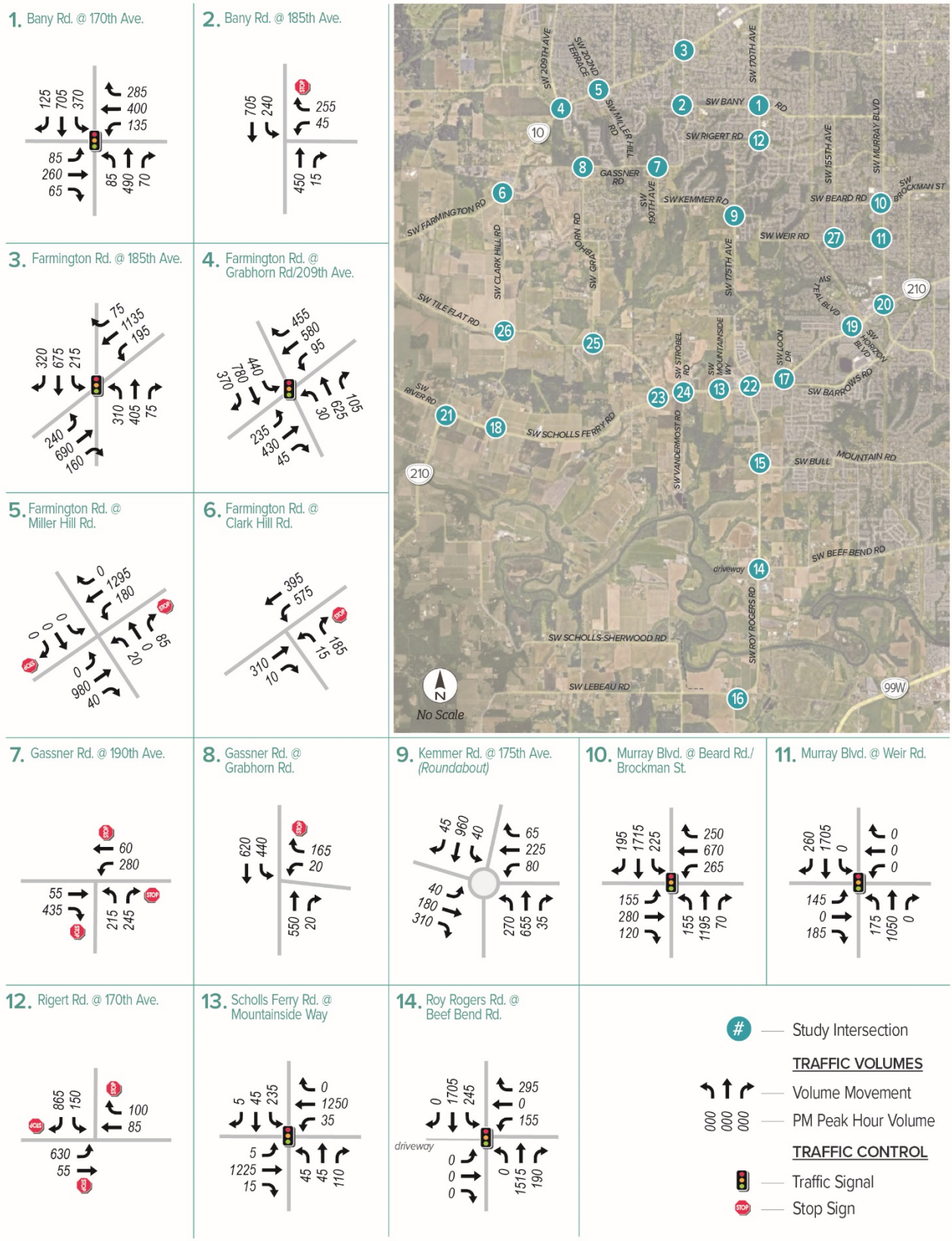
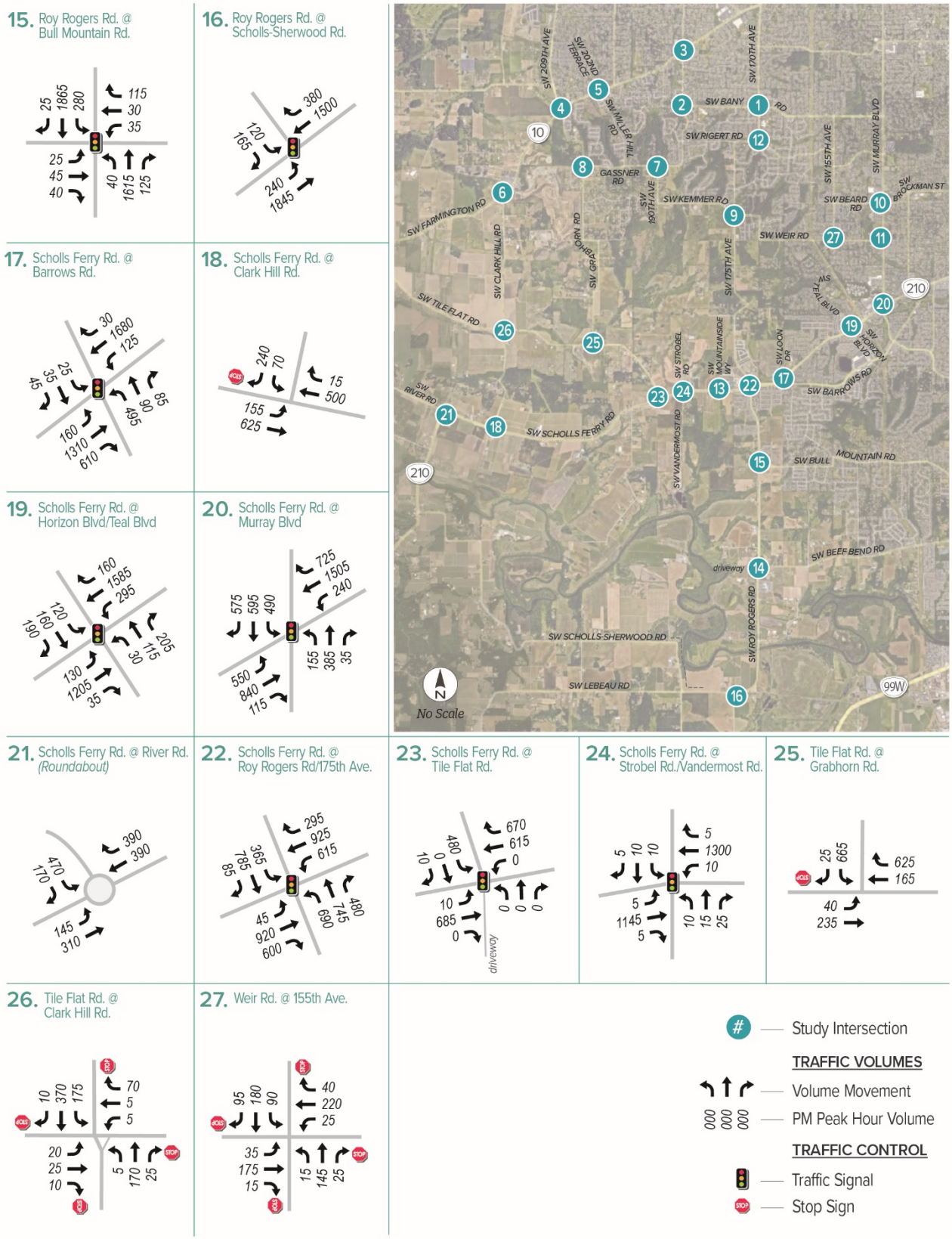


**FIGURE 2B: 2040 WITH COOPER MOUNTAIN UPDATES SCENARIO TRAFFIC VOLUMES**



## LOCAL STREET SYSTEM CONNECTIVITY

There is limited east-west local street connectivity beyond the SW Farmington Road and SW Scholls Ferry Road corridors. The limited street connectivity also creates longer trip distances for users that walk or bike. The South Cooper Mountain Community Plan included roadway extensions to complete the network and fill the connectivity gaps. Some of these roadways have been constructed with new development and many others are conditioned to be constructed with development in the near future (see Figure 3 later in this document for the general locations of these roadways). The Cooper Mountain Community Plan provides for further extensions of these roadways into and through the area. This network will allow local trips to occur without traveling on the major regional roadway network but should be designed to fit seamlessly into the neighborhood and not become a barrier for pedestrian or bicycle travel.

The functional classifications for the new streets planned in the study area were designated and are shown later in this document in Figure 3. In Beaverton, the functional classification of a roadway determines the level of mobility for all travel modes, defining its design characteristics (such as minimum amount of travel lanes and accommodations for people walking and riding bikes), level of access and usage within the City and region. The street functional classification system recognizes that individual streets do not act independently of one another but instead form a network that works together to serve travel needs on a local and regional level. From highest to lowest intended usage, the classifications are arterials, collectors, neighborhood routes, and local streets. Roadways with a higher intended usage generally provide more efficient motor vehicle traffic movement (or mobility) through the City, while roadways with lower intended usage provide greater access for shorter trips to local destinations.

This includes new collector streets such as a new north-to-south route between SW Kemmer Road and the SW Siler Ridge Lane extension, the SW Siler Ridge Lane extension between SW 175th Avenue to SW Tile Flat Road and the SW Mountainside Way extension and neighborhood routes such as the SW Siler Ridge Lane and SW Alvord Lane extensions east of SW 175$^{th}$ Avenue, and local streets which includes most streets in the Cooper Mountain Community Plan area.

The classifications of existing arterial streets (including SW Scholls Ferry Road, SW 175$^{th}$ Avenue, SW Grabhorn Road, and SW Kemmer Road), collector streets (including SW Weir Road) and neighborhood routes adjacent to and surrounding the Community Plan area will be maintained with this Plan.

## WALKING AND BIKING

Residents in the study area will be able to travel between destinations safely and efficiently by walking, biking, or using other wheeled mobility devices. A system of on-street sidewalks and bikeways, shared use paths and off-street trails will provide high-quality access to destinations—improving the overall health and livability of the neighborhood.

### WALKING AND BIKING FACILITIES

The study area is largely rural today, characterized by high-speed roadways that have not been improved to urban standards and generally lack accommodation for pedestrian and bicycle users. Significant segments of major streets connecting the study area to nearby services and amenities, including Scholls Ferry Road, 175th Avenue, Tile Flat Road and Grabhorn Road, lack pedestrian and bicycle accommodations.

Segments of Scholls Ferry Road and 175th Avenue have recently been improved to include pedestrian and bicycle facilities along the frontage of new development, and a short segment along Kemmer Road between 190th Avenue and 175th Avenue also provides a sidewalk on one side of the street, near the Cooper Mountain Nature Park. However, most existing roadways in the Plan area require users to walk or bike along the edge of the roadway due to the lack of facilities. The posted speeds along many of these roadways often range between 45 and 55 miles per hour and are generally not conducive to shared walking and biking travel.

The expansion of pedestrian and bicycle facilities near the study area will continue to incrementally occur over time as new development occurs and facilities are required as part of all new or reconstructed roadways. This includes the buildout of the pedestrian and bicycle networks planned as part of the South Cooper Mountain Community Plan, such as the on-street facilities associated with the Barrows Road extension to SW Tile Flat Road and SW Mountainside Way extension (see Figure 3 later in this document for more details).

The study area will establish a high-quality pedestrian and bicycle network to support access to residents' basic needs through safe, comfortable, and convenient facilities. The network will focus on the movement of people over the movement of vehicles and allow residents of all income levels equitable access to opportunities provided by the transportation system. This network of on-street pedestrian and bicycle facilities, off-street trails and shared use paths, and street crossing opportunities will allow all users to seamlessly reach destinations, including transit stops, schools, critical services, parks, open spaces and natural areas, and areas of employment. For pedestrians, sidewalks will be provided on all proposed streets—separate from the motor vehicle travelway. For bicyclists, dedicated facilities will vary based on roadway classification. Arterial streets, collector streets and neighborhood routes will have physically separated facilities, such as cycle tracks, protected bike lanes, or shared-use paths, or will have accommodations on adjacent routes. However, the majority of streets in the Cooper Mountain Community Plan area will be local streets, with lower traffic speeds and volumes where bicyclists can share the roadway. Wayfinding signage should also be developed to highlight key destinations, such as parks and shopping, and the best

routes for pedestrians and bicyclists. These signs will improve destination and route finding for residents and visitors alike, encouraging exploration and activity.

### SHARED USE PATHS AND TRAILS

The emphasis of the shared-use path and trails alignments identified is on connecting residents to existing and future trails, as defined in the Metro Regional Trail and Greenways Plan and the Tualatin Hills Park & Recreation District Trails Functional Plan, as well as key destinations within and near to the study area. Trail access to important viewsheds will also be taken advantage of such as following creeks outside of vegetated corridors, including the McKernan Creek Trail. The types of trails that are provided will vary by context—anything from pervious paver walking paths to concrete shared-use paths for pedestrians and bicyclists. On many streets, there is also the potential to designate a path through an adjacent shared-use path (as identified in Table 6). User comfort on these trails will be maximized due to the physical distance and separation from motor vehicle traffic.

## TRANSIT

Transit service is not currently provided in the Plan area, and the nearest stop is located nearly two miles away at SW Scholls Ferry Road/SW Teal Boulevard/SW Horizon Boulevard intersection (greater than the typical trip length for the average walking or biking trip). TriMet Line 56 currently connects Washington Square Mall, Raleigh Hills, Hillsdale and Portland City Center. TriMet's 2015 Southwest Service Enhancement Plan calls for the expansion of Line 56 to Progress Ridge and South Cooper Mountain. With passage of the 2017 state transportation package, TriMet moved forward with plans to expand their service boundary and implement new services to Progress Ridge and South Cooper Mountain. In March 2020, the City Council approved a Resolution supporting a proposed service boundary expansion into South Cooper Mountain. However, the impacts on transit due to the COVID-19 pandemic delayed TriMet's plans.

COVID-19 caused a steep drop in transit ridership that has been returning gradually, but it also changed the shape of transit demand. TriMet's Forward Together concept released in fall 2022 will guide how the agency restores bus service over the next 5 years as they continue to address operator shortages. The Line 56 extension is in the concept and continues to have support, although the timing of the extension is not known.

Park and ride facilities are provided for transit users at several locations in Beaverton, with the closest to the study area being along Davis Road near Murray Boulevard and along Scholls Ferry Road, just north of Highway 217.

The future transit service expansion brings service closer to existing and future Cooper Mountain residents. This service extension will allow users to connect with other regional transit services at the Washington Square Transit Center, making more goods and services throughout the Portland metropolitan area accessible. Although most Cooper Mountain residents will still be more than ¼ mile from transit stops associated with the service expansion into the South Cooper Mountain neighborhood, all residents will have direct, safe, and convenient access to transit. Any

improvements should not preclude additional expansion of transit service into the Cooper Mountain Community Plan area and should be coordinated with bicycle and pedestrian improvements.

In addition to TriMet service plans, Washington County's Transit Development Plan includes a shuttle concept to connect Progress Ridge and South Cooper Mountain to Aloha and TriMet MAX service. Potential funding for this service would come through regional coordination and discretionary grants, including HB 2017's Statewide Transportation Improvement Fund (STIF).

## SUMMARY OF TRANSPORTATION SYSTEM RECOMMENDATIONS

Transportation improvements needed to support future growth and new development within the Cooper Mountain Community Plan area are summarized in Table 6. Overall, an estimated $176 million in transportation system improvements are expected to be needed to support the growth conceptually planned for the full planning area (see Table 6). Regional traffic is responsible for about 65 percent of the total costs of these improvements (approximately $114 million). Forecasted traffic growth associated with development in the Cooper Mountain Community Plan area is expected to drive the need for about $61 million worth of the total project costs.

Several of these projects were identified in previous studies or plans to improve arterial roadway segments surrounding the Cooper Mountain Community Plan area. This updated system analysis reaffirmed the need for improvements at many of these locations. However, the need for these improvements is generally driven by regional traffic issues and is only partially caused by growth within the Cooper Mountain Community Plan area. Overall, an estimated $39 million worth of improvements were previously identified, with about $8.3 million worth of the total improvement costs (or about 21 percent) driven by growth within the Cooper Mountain Community Plan area.

The recommended improvements can be seen in Figure 3, with the project numbers corresponding with those in Table 6. Not all recommended improvements are required to be in place prior to developing land within the Cooper Mountain Community Plan area. The need to extend or upgrade streets will be driven by the multimodal access needs of the adjacent properties.

Table 6 illustrates the relative proportion of future traffic growth for the Cooper Mountain Community Plan area and other Regional Traffic growth (including growth from South Cooper Mountain), in relation to overall transportation improvement costs. Using the Regional Travel Demand Model, percentages of total traffic volume and/or growth using specific streets or intersections were derived for each of the recommended transportation system improvements. These percentages were used to estimate the share of the improvement costs for the Cooper Mountain Community Plan area, since they will likely develop to and through the planning horizon of 2040.

**TABLE 6: TRANSPORTATION SYSTEM IMPROVEMENTS INCLUDED IN THE FUNDING PLAN**

| ID | PROJECT DESCRIPTION | TOTAL ESTIMATED COST (2023) | SHARE OF TOTAL PROJECT COST BY AREA | |
|---|---|---|---|---|
| | | | COOPER MOUNTAIN SHARE | REGIONAL TRAFFIC SHARE |
| Projects Realigning or Constructing New Streets | | | | |
| 1 | Realign the curve along SW Grabhorn Road near SW Stone Creek Drive, as a 3-lane County arterial with a shared-use path. | $6,900,000 | $1,035,000 | $5,865,000 |
| 2 | Realign the curve along SW Grabhorn Road north of SW Tile Flat Road, as a 3-lane County arterial with a shared-use path. | $3,610,000 | $555,000 | $3,055,000 |
| 3 | Realign SW Grabhorn Road east to provide a through connection with SW Tile Flat Road, as a 3-lane County arterial, or add a roundabout. Cost assumes roundabout. | $5,880,000 *($6,470,000 for realignment)* | $960,000 *($1,055,000 for realignment)* | $4,920,000 *($5,415,000 for realignment)* |
| 4 | Realign SW 175th Avenue between SW Outlook Lane and Cooper Mountain Lane, as a 3-lane County arterial with a shared-use path. | $7,630,000 | $1,665,000 | $5,965,000 |
| 5 | Extend SW 185th Avenue from Gassner Road to Kemmer Road as a 3-lane County arterial with a shared-use path. | $10,290,000 | $2,025,000 | $8,265,000 |
| 6 | Create a new 2-lane City collector street between SW Kemmer Road and the SW Siler Ridge Lane extension. | $19,450,000 | $9,760,000 | $9,690,000 |
| 7 | Extend SW Weir Road from SW 170th Avenue to the new north-to-south collector street, as a 3-lane City collector street with a shared-use path. | $8,250,000 | $3,750,000 | $4,500,000 |
| 8 | Extend SW Siler Ridge Lane from SW 175th Avenue to the new north-to-south collector street, as a 3-lane City collector street with a shared-use path. | $8,230,000 | $4,405,000 | $3,825,000 |
| 9 | Extend SW Siler Ridge Lane from the new north-to-south collector street to SW Tile Flat Road, as a 3-lane City collector street. | $28,710,000 | $15,360,000 | $13,350,000 |
| 10 | Extend SW Mountainside Way to the SW Siler Ridge Lane extension, as a 3-lane City collector street with a shared-use path. | $2,110,000 | $1,180,000 | $930,000 |
| 11 | Create a new 2-lane City neighborhood route between the SW Siler Ridge Lane extension and SW Alvord Lane extension with a shared-use path. | $10,390,000 | $5,820,000 | $4,570,000 |
| 12 | Extend SW Bittern Lane to SW Alvord Lane, as a 2-lane City neighborhood route. | $1,510,000 | $845,000 | $665,000 |

| ID | PROJECT DESCRIPTION | TOTAL ESTIMATED COST (2023) | SHARE OF TOTAL PROJECT COST BY AREA | |
|---|---|---|---|---|
| | | | COOPER MOUNTAIN SHARE | REGIONAL TRAFFIC SHARE |
| | **Subtotals** | **$112,960,000** | ***$47,360,000*** | ***$65,600,000*** |
| | **Percent share of subtotal cost** | | ***42%*** | ***58%*** |
| Projects Upgrading Existing Streets to Urban Standards | | | | |
| 13 | Improve SW Tile Flat Road from SW Scholls Ferry Road to SW Grabhorn Road, as a 3-lane County arterial with a shared-use path. | $6,170,000 | $805,000 | $5,365,000 |
| 14A | Improve SW Grabhorn Road north of SW Tile Flat Road, as a 3-lane County arterial with a shared-use path. | $4,030,000 | $640,000 | $3,390,000 |
| 14B | Improve SW Grabhorn Road south of SW Stonecreek Drive, as a 3-lane County arterial with a shared-use path. | $3,770,000 | $565,000 | $3,205,000 |
| 15A | Improve SW 175th Avenue from SW Barrows Road to SW Cooper Mountain Lane, as a 3-lane County arterial with a shared-use path. | $3,750,000 | $865,000 | $2,885,000 |
| 15B | Improve SW 175th Avenue from SW Outlook Lane to SW Kemmer Road, as a 3-lane County arterial with a shared-use path. | $8,060,000 | $1,945,000 | $6,115,000 |
| 16 | Improve SW Kemmer Road from SW 175th Avenue to the SW 185th Avenue extension, as a 3-lane County arterial with a shared-use path. | $9,240,000 | $2,010,000 | $7,230,000 |
| 17 | Improve SW Weir Road from SW 170th Avenue to SW Mt Adams Drive, as a 3-lane City collector street. | $4,060,000 | $1,435,000 | $2,625,000 |
| | **Subtotals** | **$39,080,000** | ***$8,265,000*** | ***$30,815,000*** |
| | **Percent share of subtotal cost** | | ***21%*** | ***79%*** |
| Projects Improving Intersections | | | | |
| 18 | Improve the SW 175th Avenue intersection with SW Weir Road by installing a roundabout or traffic signal (when warrants are met). | $6,040,000 | $2,275,000 | $3,765,000 |
| 19 | Improve the SW 175th Avenue intersection with SW Siler Ridge Lane by installing a roundabout or traffic signal (when warrants are met). | $6,320,000 | $2,185,000 | $4,135,000 |
| 20 | Improve the SW Grabhorn Road intersection with SW Gassner Road by adding southbound and westbound left-turn lanes. | $1,400,000 | $240,000 | $1,160,000 |

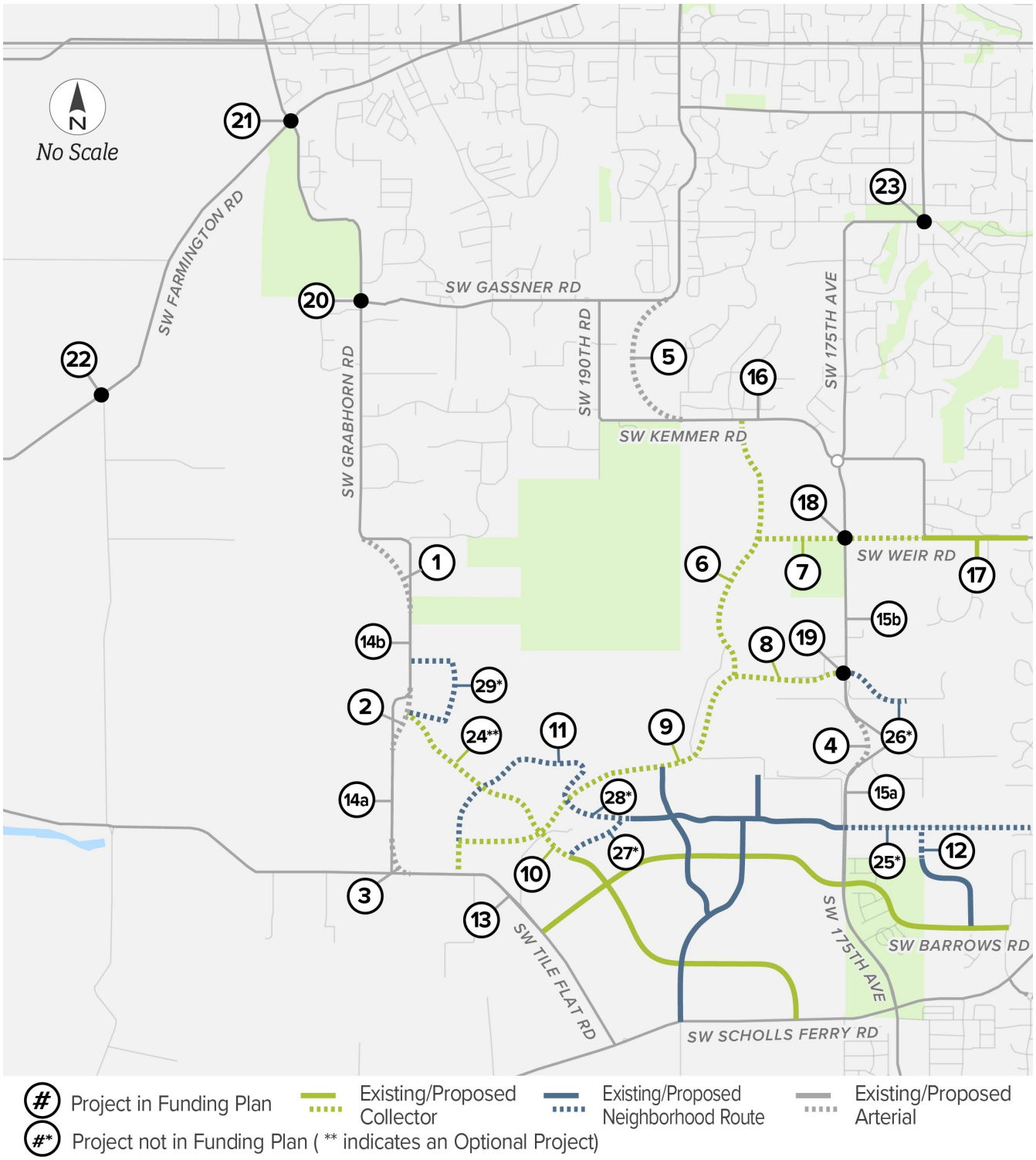
| ID | PROJECT DESCRIPTION | TOTAL ESTIMATED COST (2023) | SHARE OF TOTAL PROJECT COST BY AREA | |
|---|---|---|---|---|
| | | | COOPER MOUNTAIN SHARE | REGIONAL TRAFFIC SHARE |
| 21 | Improve the SW Farmington Road intersection with SW Grabhorn Road by extending the 5-lane widening of SW 209th Avenue to just south of Farmington Road. | $2,270,000 | $190,000 | $2,080,000 |
| 22 | Improve the SW Farmington Road intersection with SW Clark Hill Road by adding a westbound left-turn lane. | $700,000 | $15,000 | $685,000 |
| 23 | Improve the SW 170th Avenue intersection with SW Rigert Road by installing a roundabout. | $6,520,000 | $1,090,000 | $5,430,000 |
| | **Subtotals** | **$23,250,000** | ***$5,995,000*** | ***$17,255,000*** |
| | **Percent share of subtotal cost** | | ***26%*** | ***74%*** |
| | **Total Cost of Recommended Improvements** | **$175,880,000** | ***$61,715,000*** | ***$114,165,000*** |
| | **Percent share of total cost** | | ***35%*** | ***65%*** |

In addition, Table 7 includes Project 24 as an optional connectivity improvement. This project is not recommended as part of the preferred network or Funding Plan but might be considered in the future for its local circulation and connectivity benefits. Projects 25-29 are also shown in Table 7, although they are Neighborhood Routes and therefore not included in the Funding Plan and instead will be built as frontage improvements are made as part of individual new developments.

**TABLE 7: TRANSPORTATION SYSTEM IMPROVEMENTS NOT INCLUDED IN THE FUNDING PLAN**

| ID | PROJECT DESCRIPTION | TOTAL ESTIMATED COST (2023) | SHARE OF TOTAL PROJECT COST BY AREA | |
|---|---|---|---|---|
| | | | COOPER MOUNTAIN SHARE | REGIONAL TRAFFIC SHARE |
| Projects Realigning or Constructing New Streets | | | | |
| 24 | Extend SW Mountainside Way from the SW Siler Ridge Lane extension to SW Grabhorn Road, as a 3-lane City collector street with a shared-use path. | $16,210,000 | $4,045,000 | $12,165,000 |
| 25 | Improve/Extend SW Alvord Lane from SW 175th Avenue to SW Siskin Terrace, as a 2-lane City neighborhood route. | $5,540,000 | - | - |
| 26 | Improve SW Siler Ridge Lane east of SW 175th Avenue, as a 2-lane City neighborhood route. | $2,640,000 | - | - |
| 27 | Create a new 2-lane City neighborhood route between the SW Alvord Lane extension and the SW Mountainside Way extension. | $2,650,000 | - | - |
| 28 | Extend SW Alvord Lane to the SW Siler Ridge Lane extension, as a 2-lane City neighborhood route. | $3,010,000 | - | - |
| 29 | Create a new 2-lane City neighborhood route loop connecting to SW Grabhorn Road. | $5,600,000 | - | - |

**FIGURE 3: TRANSPORTATION SYSTEM IMPROVEMENTS**



# ADDENDUM

# Cooper Mountain Transportation Analysis - 2035 Analysis for Three Intersections

Prepared by DKS Associates Aug. 28, 2024

**TABLE 1: INTERSECTION OPERATIONS (2035 PM PEAK)**

| # | INTERSECTION | MOBILITY TARGET | 2035 BASELINE | 2035 WITH COOPER MOUNTAIN UPDATES |
|---|---|---|---|---|
| **Study Intersections** | | | | |
| 5 | Farmington Road/ Miller Hill Road (unsignalized) | 0.99 v/c | 0.70 | 0.75 |
| 19 | Scholls Ferry Road/ Horizon-Teal Boulevard (signalized) | 0.99 v/c | 0.91 | 0.93 |
| **New On-Site Intersections under Preferred Transportation Framework (unsignalized)** | | | | |
| B | 175th Avenue/ SW Weir Road extension (Project #7) | 0.99 v/c | * | **2.69** |

Notes: **Red shading** indicates an intersection that exceeds the mobility target
* Intersection does not exist in the baseline scenario.

**TABLE 2: INTERSECTION OPERATIONS WITH RECOMMENDATIONS (2035 PM PEAK)**

| # | INTERSECTION | MOBILITY TARGET | RECOMMENDED IMPROVEMENT | V/C WITH RECOMMENDED IMPROVEMENT |
|---|---|---|---|---|
| **New On-Site Intersections under Preferred Transportation Framework** | | | | |
| B | 175th Avenue/ SW Weir Road extension (Project #7) | 0.99 v/c | Traffic signal (SW 175th Avenue with a 3-lane cross-section) | 0.93 |

Notes: **Red shading** indicates an intersection that exceeds the mobility target

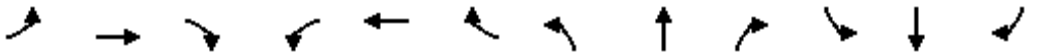
| Intersection | |
|---|---|
| Int Delay, s/veh | 3.5 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 0 | 895 | 35 | 155 | 1150 | 5 | 20 | 0 | 85 | 0 | 0 | 0 |
| Future Vol, veh/h | 0 | 895 | 35 | 155 | 1150 | 5 | 20 | 0 | 85 | 0 | 0 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 150 | - | - | - | - | 300 | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 0 | 2 | 6 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mvmt Flow | 0 | 973 | 38 | 168 | 1250 | 5 | 22 | 0 | 92 | 0 | 0 | 0 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1255 | 0 | 0 | 1018 | 0 | 0 | 1960 | 2590 | 513 | 2076 | 2607 | 628 |
| Stage 1 | - | - | - | - | - | - | 999 | 999 | - | 1589 | 1589 | - |
| Stage 2 | - | - | - | - | - | - | 961 | 1591 | - | 487 | 1018 | - |
| Critical Hdwy | 4.1 | - | - | 4.1 | - | - | 7.5 | 6.5 | 6.9 | 7.5 | 6.5 | 6.9 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.5 | 5.5 | - | 6.5 | 5.5 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.5 | 5.5 | - | 6.5 | 5.5 | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 | - | - | 3.5 | 4 | 3.3 | 3.5 | 4 | 3.3 |
| Pot Cap-1 Maneuver | 561 | - | - | 689 | - | - | 39 | 26 | 512 | 32 | 25 | 431 |
| Stage 1 | - | - | - | - | - | - | 265 | 324 | - | 115 | 169 | - |
| Stage 2 | - | - | - | - | - | - | 279 | 169 | - | 536 | 317 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 561 | - | - | 685 | - | - | 31 | 20 | 509 | 21 | 19 | 431 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 31 | 20 | - | 21 | 19 | - |
| Stage 1 | - | - | - | - | - | - | 263 | 322 | - | 115 | 128 | - |
| Stage 2 | - | - | - | - | - | - | 211 | 128 | - | 439 | 315 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 1.4 | 59.9 | 0 |
| HCM LOS | | | F | A |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 31 | 509 | 561 | - | - | 685 | - | - | - |
| HCM Lane V/C Ratio | 0.701 | 0.182 | - | - | - | 0.246 | - | - | - |
| HCM Control Delay (s) | 256.8 | 13.6 | 0 | - | - | 12 | - | - | 0 |
| HCM Lane LOS | F | B | A | - | - | B | - | - | A |
| HCM 95th %tile Q(veh) | 2.3 | 0.7 | 0 | - | - | 1 | - | - | - |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 115 | 1050 | 35 | 295 | 1375 | 150 | 30 | 115 | 200 | 105 | 160 | 160 |
| Future Volume (veh/h) | 115 | 1050 | 35 | 295 | 1375 | 150 | 30 | 115 | 200 | 105 | 160 | 160 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 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 | 1885 | 1870 | 1885 | 1900 | 1885 | 1885 | 1870 | 1870 | 1856 |
| Adj Flow Rate, veh/h | 122 | 1117 | 37 | 314 | 1463 | 160 | 32 | 122 | 213 | 112 | 170 | 170 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 1 | 2 | 1 | 0 | 1 | 1 | 2 | 2 | 3 |
| Cap, veh/h | 203 | 1930 | 64 | 342 | 1848 | 200 | 49 | 122 | 214 | 89 | 194 | 194 |
| Arrive On Green | 0.04 | 0.55 | 0.54 | 0.07 | 0.57 | 0.57 | 0.03 | 0.20 | 0.20 | 0.05 | 0.23 | 0.22 |
| Sat Flow, veh/h | 1781 | 3509 | 116 | 1795 | 3232 | 350 | 1810 | 612 | 1068 | 1781 | 854 | 854 |
| Grp Volume(v), veh/h | 122 | 565 | 589 | 314 | 799 | 824 | 32 | 0 | 335 | 112 | 0 | 340 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1849 | 1795 | 1777 | 1805 | 1810 | 0 | 1680 | 1781 | 0 | 1707 |
| Q Serve(g_s), s | 3.5 | 25.2 | 25.2 | 8.0 | 42.0 | 43.2 | 2.1 | 0.0 | 23.9 | 6.0 | 0.0 | 23.1 |
| Cycle Q Clear(g_c), s | 3.5 | 25.2 | 25.2 | 8.0 | 42.0 | 43.2 | 2.1 | 0.0 | 23.9 | 6.0 | 0.0 | 23.1 |
| Prop In Lane | 1.00 | | 0.06 | 1.00 | | 0.19 | 1.00 | | 0.64 | 1.00 | | 0.50 |
| Lane Grp Cap(c), veh/h | 203 | 977 | 1017 | 342 | 1016 | 1032 | 49 | 0 | 336 | 89 | 0 | 387 |
| V/C Ratio(X) | 0.60 | 0.58 | 0.58 | 0.92 | 0.79 | 0.80 | 0.65 | 0.00 | 1.00 | 1.26 | 0.00 | 0.88 |
| Avail Cap(c_a), veh/h | 212 | 977 | 1017 | 342 | 1016 | 1032 | 75 | 0 | 336 | 89 | 0 | 387 |
| 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 | 22.6 | 17.8 | 17.8 | 23.4 | 20.0 | 20.2 | 57.8 | 0.0 | 48.0 | 57.0 | 0.0 | 44.9 |
| Incr Delay (d2), s/veh | 3.6 | 2.5 | 2.4 | 28.4 | 6.1 | 6.5 | 9.3 | 0.0 | 48.3 | 179.6 | 0.0 | 19.5 |
| 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 | 1.9 | 10.4 | 10.7 | 8.1 | 17.6 | 18.4 | 1.1 | 0.0 | 14.5 | 7.1 | 0.0 | 11.7 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 26.2 | 20.3 | 20.3 | 51.8 | 26.1 | 26.7 | 67.0 | 0.0 | 96.3 | 236.6 | 0.0 | 64.4 |
| LnGrp LOS | C | C | C | D | C | C | E | A | F | F | A | E |
| Approach Vol, veh/h | | 1276 | | | 1937 | | | 367 | | | 452 | |
| Approach Delay, s/veh | | 20.8 | | | 30.5 | | | 93.7 | | | 107.1 | |
| Approach LOS | | C | | | C | | | F | | | F | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 12.0 | 70.0 | 7.3 | 30.7 | 9.4 | 72.6 | 10.0 | 28.0 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 8.0 | 65.0 | 5.0 | 25.0 | 6.0 | 67.0 | 6.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 10.0 | 27.2 | 4.1 | 25.1 | 5.5 | 45.2 | 8.0 | 25.9 |
| Green Ext Time (p_c), s | 0.0 | 18.9 | 0.0 | 0.0 | 0.0 | 18.2 | 0.0 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 41.8 |
| HCM 6th LOS | D |

| Intersection | |
|---|---|
| Int Delay, s/veh | 870.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 10 | 30 | 35 | 125 | 50 | 40 | 40 | 785 | 85 | 65 | 1065 | 35 |
| Future Vol, veh/h | 10 | 30 | 35 | 125 | 50 | 40 | 40 | 785 | 85 | 65 | 1065 | 35 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 11 | 32 | 37 | 132 | 53 | 42 | 42 | 826 | 89 | 68 | 1121 | 37 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 2278 | 2275 | 1140 | 2265 | 2249 | 871 | 1158 | 0 | 0 | 915 | 0 | 0 |
| Stage 1 | 1276 | 1276 | - | 955 | 955 | - | - | - | - | - | - | - |
| Stage 2 | 1002 | 999 | - | 1310 | 1294 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 | 4.12 | - | - | 4.12 | - | - |
| Critical Hdwy Stg 1 | 6.12 | 5.52 | - | 6.12 | 5.52 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.12 | 5.52 | - | 6.12 | 5.52 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 | 2.218 | - | - | 2.218 | - | - |
| Pot Cap-1 Maneuver | 28 | 40 | 245 | ~ 29 | ~ 42 | 350 | 603 | - | - | 745 | - | - |
| Stage 1 | 205 | 238 | - | 310 | 337 | - | - | - | - | - | - | - |
| Stage 2 | 292 | 321 | - | 196 | 233 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | | - | - |
| Mov Cap-1 Maneuver | - | 34 | 245 | ~ 4 | ~ 35 | 350 | 603 | - | - | 745 | - | - |
| Mov Cap-2 Maneuver | - | 34 | - | ~ 4 | ~ 35 | - | - | - | - | - | - | - |
| Stage 1 | 191 | 216 | - | 288 | 313 | - | - | - | - | - | - | - |
| Stage 2 | 199 | 299 | - | ~ 129 | 212 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | | $ 9574.6 | 0.5 | 0.6 |
| HCM LOS | - | F | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 603 | - | - | - | 63 | 4 | 58 | 745 | - | - |
| HCM Lane V/C Ratio | 0.07 | - | - | - | 1.086 | 32.895 | 1.633 | 0.092 | - | - |
| HCM Control Delay (s) | 11.4 | - | - | - | 249 | $ 716 | 132.5 | $ 466.4 | 10.3 | - | - |
| HCM Lane LOS | B | - | - | - | F | F | F | B | - | - |
| HCM 95th %tile Q(veh) | 0.2 | - | - | - | 5.4 | 18.6 | 8.7 | 0.3 | - | - |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

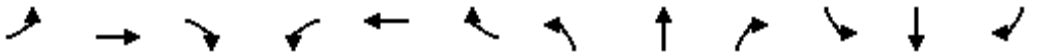
| Intersection | |
|---|---|
| Int Delay, s/veh | 3.7 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 0 | 905 | 35 | 165 | 1170 | 5 | 20 | 0 | 85 | 0 | 0 | 0 |
| Future Vol, veh/h | 0 | 905 | 35 | 165 | 1170 | 5 | 20 | 0 | 85 | 0 | 0 | 0 |
| Conflicting Peds, #/hr | 0 | 0 | 7 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 150 | - | - | 150 | - | - | - | - | 300 | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 0 | 2 | 6 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mvmt Flow | 0 | 984 | 38 | 179 | 1272 | 5 | 22 | 0 | 92 | 0 | 0 | 0 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1277 | 0 | 0 | 1029 | 0 | 0 | 2004 | 2645 | 518 | 2125 | 2662 | 639 |
| Stage 1 | - | - | - | - | - | - | 1010 | 1010 | - | 1633 | 1633 | - |
| Stage 2 | - | - | - | - | - | - | 994 | 1635 | - | 492 | 1029 | - |
| Critical Hdwy | 4.1 | - | - | 4.1 | - | - | 7.5 | 6.5 | 6.9 | 7.5 | 6.5 | 6.9 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.5 | 5.5 | - | 6.5 | 5.5 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.5 | 5.5 | - | 6.5 | 5.5 | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 | - | - | 3.5 | 4 | 3.3 | 3.5 | 4 | 3.3 |
| Pot Cap-1 Maneuver | 550 | - | - | 683 | - | - | 36 | 24 | 508 | 29 | 23 | 424 |
| Stage 1 | - | - | - | - | - | - | 261 | 320 | - | 108 | 161 | - |
| Stage 2 | - | - | - | - | - | - | 267 | 161 | - | 532 | 314 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 550 | - | - | 679 | - | - | 29 | 18 | 505 | 19 | 17 | 424 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 29 | 18 | - | 19 | 17 | - |
| Stage 1 | - | - | - | - | - | - | 259 | 318 | - | 108 | 118 | - |
| Stage 2 | - | - | - | - | - | - | 197 | 118 | - | 435 | 312 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 1.5 | 65.4 | 0 |
| HCM LOS | | | F | A |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 29 | 505 | 550 | - | - | 679 | - | - | - |
| HCM Lane V/C Ratio | 0.75 | 0.183 | - | - | - | 0.264 | - | - | - |
| HCM Control Delay (s) | 285.1 | 13.7 | 0 | - | - | 12.2 | - | - | 0 |
| HCM Lane LOS | F | B | A | - | - | B | - | - | A |
| HCM 95th %tile Q(veh) | 2.4 | 0.7 | 0 | - | - | 1.1 | - | - | - |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 120 | 1075 | 35 | 290 | 1415 | 155 | 30 | 115 | 200 | 110 | 160 | 175 |
| Future Volume (veh/h) | 120 | 1075 | 35 | 290 | 1415 | 155 | 30 | 115 | 200 | 110 | 160 | 175 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 0.99 | 1.00 | | 0.99 | 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 | 1885 | 1870 | 1885 | 1900 | 1885 | 1885 | 1870 | 1870 | 1856 |
| Adj Flow Rate, veh/h | 128 | 1144 | 37 | 309 | 1505 | 165 | 32 | 122 | 213 | 117 | 170 | 186 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 1 | 2 | 1 | 0 | 1 | 1 | 2 | 2 | 3 |
| Cap, veh/h | 196 | 1932 | 62 | 335 | 1843 | 200 | 49 | 122 | 214 | 89 | 184 | 202 |
| Arrive On Green | 0.05 | 0.55 | 0.54 | 0.07 | 0.57 | 0.57 | 0.03 | 0.20 | 0.20 | 0.05 | 0.23 | 0.22 |
| Sat Flow, veh/h | 1781 | 3512 | 114 | 1795 | 3231 | 351 | 1810 | 612 | 1068 | 1781 | 812 | 888 |
| Grp Volume(v), veh/h | 128 | 579 | 602 | 309 | 821 | 849 | 32 | 0 | 335 | 117 | 0 | 356 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1777 | 1849 | 1795 | 1777 | 1805 | 1810 | 0 | 1680 | 1781 | 0 | 1700 |
| Q Serve(g_s), s | 3.6 | 26.1 | 26.1 | 8.0 | 44.3 | 45.8 | 2.1 | 0.0 | 23.9 | 6.0 | 0.0 | 24.6 |
| Cycle Q Clear(g_c), s | 3.6 | 26.1 | 26.1 | 8.0 | 44.3 | 45.8 | 2.1 | 0.0 | 23.9 | 6.0 | 0.0 | 24.6 |
| Prop In Lane | 1.00 | | 0.06 | 1.00 | | 0.19 | 1.00 | | 0.64 | 1.00 | | 0.52 |
| Lane Grp Cap(c), veh/h | 196 | 977 | 1017 | 335 | 1013 | 1029 | 49 | 0 | 336 | 89 | 0 | 386 |
| V/C Ratio(X) | 0.65 | 0.59 | 0.59 | 0.92 | 0.81 | 0.82 | 0.65 | 0.00 | 1.00 | 1.31 | 0.00 | 0.92 |
| Avail Cap(c_a), veh/h | 203 | 977 | 1017 | 335 | 1013 | 1029 | 75 | 0 | 336 | 89 | 0 | 386 |
| 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 | 24.3 | 18.0 | 18.0 | 23.5 | 20.6 | 20.9 | 57.8 | 0.0 | 48.0 | 57.0 | 0.0 | 45.5 |
| Incr Delay (d2), s/veh | 6.2 | 2.6 | 2.5 | 30.0 | 7.0 | 7.5 | 9.3 | 0.0 | 48.3 | 200.7 | 0.0 | 27.2 |
| 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 | 2.3 | 10.7 | 11.1 | 8.1 | 18.8 | 19.7 | 1.1 | 0.0 | 14.5 | 7.6 | 0.0 | 13.1 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 30.5 | 20.7 | 20.6 | 53.5 | 27.6 | 28.4 | 67.0 | 0.0 | 96.3 | 257.7 | 0.0 | 72.7 |
| LnGrp LOS | C | C | C | D | C | C | E | A | F | F | A | E |
| Approach Vol, veh/h | | 1309 | | | 1979 | | | 367 | | | 473 | |
| Approach Delay, s/veh | | 21.6 | | | 32.0 | | | 93.7 | | | 118.4 | |
| Approach LOS | | C | | | C | | | F | | | F | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 12.0 | 70.0 | 7.3 | 30.7 | 9.6 | 72.4 | 10.0 | 28.0 |
| Change Period (Y+Rc), s | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 8.0 | 65.0 | 5.0 | 25.0 | 6.0 | 67.0 | 6.0 | 24.0 |
| Max Q Clear Time (g_c+I1), s | 10.0 | 28.1 | 4.1 | 26.6 | 5.6 | 47.8 | 8.0 | 25.9 |
| Green Ext Time (p_c), s | 0.0 | 19.2 | 0.0 | 0.0 | 0.0 | 16.6 | 0.0 | 0.0 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 44.1 |
| HCM 6th LOS | D |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Vol, veh/h | 15 | 35 | 45 | 145 | 70 | 45 | 55 | 840 | 90 | 65 | 1085 | 40 |
| Future Vol, veh/h | 15 | 35 | 45 | 145 | 70 | 45 | 55 | 840 | 90 | 65 | 1085 | 40 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None | - | - | None | - | - | None | - | - | None |
| Storage Length | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 16 | 37 | 47 | 153 | 74 | 47 | 58 | 884 | 95 | 68 | 1142 | 42 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 2407 | 2394 | 1163 | 2389 | 2368 | 932 | 1184 | 0 | 0 | 979 | 0 | 0 |
| Stage 1 | 1299 | 1299 | - | 1048 | 1048 | - | - | - | - | - | - | - |
| Stage 2 | 1108 | 1095 | - | 1341 | 1320 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 | 4.12 | - | - | 4.12 | - | - |
| Critical Hdwy Stg 1 | 6.12 | 5.52 | - | 6.12 | 5.52 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.12 | 5.52 | - | 6.12 | 5.52 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 | 2.218 | - | - | 2.218 | - | - |
| Pot Cap-1 Maneuver | 23 | ~ 34 | 237 | ~ 23 | ~ 35 | 323 | 590 | - | - | 705 | - | - |
| Stage 1 | 199 | 232 | - | 275 | 305 | - | - | - | - | - | - | - |
| Stage 2 | 255 | 290 | - | 188 | 226 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | | - | - |
| Mov Cap-1 Maneuver | - | ~ 28 | 237 | - | ~ 29 | 323 | 590 | - | - | 705 | - | - |
| Mov Cap-2 Maneuver | - | ~ 28 | - | - | ~ 29 | - | - | - | - | - | - | - |
| Stage 1 | 179 | 210 | - | 248 | 275 | - | - | - | - | - | - | - |
| Stage 2 | 144 | 262 | - | ~ 112 | 204 | - | - | - | - | - | - | - |

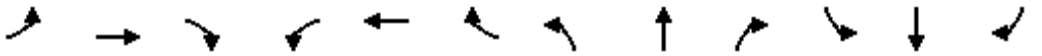
| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | | | 0.7 | 0.6 |
| HCM LOS | - | - | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 590 | - | - | - | 56 | - | 45 | 705 | - | - |
| HCM Lane V/C Ratio | 0.098 | - | - | - | 1.504 | - | 2.69 | 0.097 | - | - |
| HCM Control Delay (s) | 11.8 | - | - | - | $ 420 | - | $ 956.6 | 10.7 | - | - |
| HCM Lane LOS | B | - | - | - | F | - | F | B | - | - |
| HCM 95th %tile Q(veh) | 0.3 | - | - | - | 7.7 | - | 13 | 0.3 | - | - |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

# HCM 6th Signalized Intersection Summary
## 29: 175th Avenue & Project #6

08/28/2024



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 15 | 35 | 45 | 145 | 70 | 45 | 55 | 840 | 90 | 65 | 1085 | 40 |
| Future Volume (veh/h) | 15 | 35 | 45 | 145 | 70 | 45 | 55 | 840 | 90 | 65 | 1085 | 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 | | 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 | 16 | 37 | 47 | 153 | 74 | 47 | 58 | 884 | 95 | 68 | 1142 | 42 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 25 | 51 | 65 | 181 | 167 | 106 | 65 | 1055 | 113 | 87 | 1162 | 43 |
| Arrive On Green | 0.01 | 0.07 | 0.07 | 0.10 | 0.16 | 0.16 | 0.04 | 0.64 | 0.64 | 0.05 | 0.65 | 0.65 |
| Sat Flow, veh/h | 1781 | 748 | 951 | 1781 | 1069 | 679 | 1781 | 1660 | 178 | 1781 | 1793 | 66 |
| Grp Volume(v), veh/h | 16 | 0 | 84 | 153 | 0 | 121 | 58 | 0 | 979 | 68 | 0 | 1184 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 0 | 1699 | 1781 | 0 | 1748 | 1781 | 0 | 1838 | 1781 | 0 | 1858 |
| Q Serve(g_s), s | 1.0 | 0.0 | 5.3 | 9.3 | 0.0 | 6.9 | 3.6 | 0.0 | 45.8 | 4.2 | 0.0 | 68.1 |
| Cycle Q Clear(g_c), s | 1.0 | 0.0 | 5.3 | 9.3 | 0.0 | 6.9 | 3.6 | 0.0 | 45.8 | 4.2 | 0.0 | 68.1 |
| Prop In Lane | 1.00 | | 0.56 | 1.00 | | 0.39 | 1.00 | | 0.10 | 1.00 | | 0.04 |
| Lane Grp Cap(c), veh/h | 25 | 0 | 116 | 181 | 0 | 273 | 65 | 0 | 1169 | 87 | 0 | 1205 |
| V/C Ratio(X) | 0.64 | 0.00 | 0.72 | 0.84 | 0.00 | 0.44 | 0.90 | 0.00 | 0.84 | 0.78 | 0.00 | 0.98 |
| Avail Cap(c_a), veh/h | 81 | 0 | 247 | 194 | 0 | 365 | 65 | 0 | 1169 | 97 | 0 | 1213 |
| 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 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 | 1.00 | 0.00 | 1.00 |
| Uniform Delay (d), s/veh | 54.1 | 0.0 | 50.4 | 48.7 | 0.0 | 42.2 | 52.9 | 0.0 | 15.6 | 51.9 | 0.0 | 18.8 |
| Incr Delay (d2), s/veh | 24.0 | 0.0 | 8.2 | 26.1 | 0.0 | 1.1 | 76.9 | 0.0 | 5.5 | 30.0 | 0.0 | 21.6 |
| 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 | 0.0 | 2.5 | 5.4 | 0.0 | 3.1 | 2.9 | 0.0 | 17.7 | 2.5 | 0.0 | 30.8 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 78.1 | 0.0 | 58.6 | 74.8 | 0.0 | 43.3 | 129.8 | 0.0 | 21.2 | 81.8 | 0.0 | 40.3 |
| LnGrp LOS | E | A | E | E | A | D | F | A | C | F | A | D |
| Approach Vol, veh/h | | 100 | | | 274 | | | 1037 | | | 1252 | |
| Approach Delay, s/veh | | 61.7 | | | 60.9 | | | 27.2 | | | 42.6 | |
| Approach LOS | | E | | | E | | | C | | | D | |

| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Phs Duration (G+Y+Rc), s | 9.4 | 74.1 | 15.2 | 11.5 | 8.0 | 75.5 | 5.5 | 21.2 |
| Change Period (Y+Rc), s | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| Max Green Setting (Gmax), s | 6.0 | 70.0 | 12.0 | 16.0 | 4.0 | 72.0 | 5.0 | 23.0 |
| Max Q Clear Time (g_c+I1), s | 6.2 | 47.8 | 11.3 | 7.3 | 5.6 | 70.1 | 3.0 | 8.9 |
| Green Ext Time (p_c), s | 0.0 | 7.6 | 0.0 | 0.2 | 0.0 | 1.5 | 0.0 | 0.5 |

| Intersection Summary | |
|---|---|
| HCM 6th Ctrl Delay | 39.2 |
| HCM 6th LOS | D |