Operations and Maintenance Facility South

Draft Environmental Impact Statement

Appendix G1: Transportation Technical Report

SoundTransit

March 2021

Appendix G1 prepared by:
Parametrix

Summary

The following technical report discusses the anticipated construction and operation transportation impacts of the proposed Operations and Maintenance Facility (OMF) South. The report was prepared to support the Draft Environmental Impact Statement (EIS). In addition to the build alternatives described, the Draft Environmental Impact Statement will also evaluate the No-Build Alternative as required by the State Environmental Policy Act (SEPA).

This report includes an analysis evaluating the transportation impacts associated with construction and operation of the facility. Impacts are evaluated for multiple modes, including automobile, transit, bicycle, pedestrian, and freight. Operational impacts were forecast based on estimated employee volumes accessing the site during peak travel periods. Each alternative assumes an equal number of employees; however, the built transportation infrastructure, planned jurisdictional improvements, growth projections, and preliminary site layouts result in different impacts for each site. Construction impacts were qualitatively evaluated based on the number of estimated truck trips as a percentage of daily traffic volumes along anticipated haul routes.

Operational traffic impacts were determined for arterials and local streets by comparing the overall intersection level of service (LOS) for the project alternatives. Impacts would occur if a Build Alternative result in traffic operations performing below the acceptable LOS when the intersection or roadway segment would operate at or above the acceptable LOS for the roadway under the No-Build Alternative. Impacts may also occur if the build alternative traffic operations reduce the LOS from E to F or if the delay in an LOS F condition is worsened by more than 10 seconds. This approach outlines the process for consideration of mitigation to address possible impacts.

Operational impacts for state highways of statewide significance, such as State Route (SR) 99, would occur if the roadway segment in the build alternatives would increase traffic operations to a LOS E or worse condition when the roadway segment would operate at LOS D or better under the No-Build Alternative. Impacts may also occur if the build alternative traffic operations reduce the LOS from E to F or if the delay in an LOS F condition is worsened by more than 10 seconds. This approach outlines the process for consideration of mitigation to address possible impacts.

For all alternatives, the operational impacts to arterials, local streets, and state highway operations are forecast to be minimal. During the AM peak period, 48 vehicles are forecast to travel to the facility and nine are forecast to leave it. Similar activity is forecast for the PM peak period, with 39 vehicles leaving the site and zero vehicles arriving. Almost all ingress and egress activity was assumed to occur at a single point for each alternative. The only location forecast to result in impacts is the entrance to the Midway Landfill Alternative at SR 99 and S 246th Street during the AM peak period. These impacts could be mitigated through modifications to the intersection or by allowing employees to access the site through all three access points rather than only two.

During construction, the greatest impacts to transportation would be from truck trips to export and import fill material for the Midway Landfill Alternative during site preparation. Depending on the subsurface construction design option, there could be up to 564 round trip truck trips daily. These truck trips would would range from 7.7 percent to 12.8 percent of existing single direction traffic along arterials of the anticipated haul route, but up to 22.7 percent of single direction traffic on I-5 on- and off-ramps. While I-5 and the arterials surrounding the Midway Landfill Alternative should accommodate the additional truck traffic, the number of daily truck trips could exacerbate existing congestion in some locations.

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Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
AASHTO	American Association of State and Highway Transportation Officials
ADA	Americans with Disabilities Act
BAT	business access transit
BPA	Bonneville Power Administration
CIP	capital improvement program
CTMP	construction transportation management plan
EIS	environmental impact statement
FWLE	Federal Way Link Extension
GMA	Growth Management Act
HCM	Highway Capacity Manual
I-5	Interstate 5
LOS	level of service
Metro	King County Metro
MOW	maintenance of way
OMF	operations and maintenance facility
PCE	passenger car equivalent
PSRC	Puget Sound Regional Council
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
SR	State Route
ST3	Sound Transit 3
TWSC	two-way stop controlled
v/c	volume-to-capacity
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

1 INTRODUCTION

1.1 Project Description

Sound Transit proposes to construct and operate an operations and maintenance facility in its South Corridor (OMF South) to meet agency needs for an expanded fleet of light rail vehicles (LRVs). The need to expand LRV maintenance capacity was identified in Sound Transit 3: The Regional Transit System Plan for Central Puget Sound (Sound Transit 3). OMF South would be used to store, maintain, and deploy about 144 LRVs for daily service. It would provide facilities for vehicle storage, inspections, maintenance and repair, interior vehicle cleaning, and exterior vehicle washing. Additionally, the facility would receive, test, and commission new LRVs for the entire light rail system.

OMF South would also be used to accommodate administrative and operational functions, such as serving as a report base for LRV operators. Included is a Maintenance of Way (MOW) building for maintenance and storage of spare parts for tracks, vehicle propulsion equipment, train signals, and other infrastructure, in addition to storage facilities for the entire Link system. Other facility elements would include employee and visitor parking, operations staff offices, maintenance staff offices, dispatcher work stations, an employee report room, and areas with lockers, showers, and restrooms for both operators and maintenance personnel.

OMF South would need to have tracks connecting to a light rail line that will be operating when the facility is planned to open, which in southern King County is the Federal Way Link Extension (FWLE). The length and location of these connecting tracks varies by alternative.

Three site alternatives for the OMF South project are evaluated in the Draft Environmental Impact Statement: one in Kent and two in Federal Way (Figure G1.1-1). These alternatives are named the Midway Landfill Alternative, South 336th Street Alternative, and South 344th Street Alternative, respectively (Figures G1.1-2 through G1.1-4). Figure G1.1-5 shows the mainline track options.

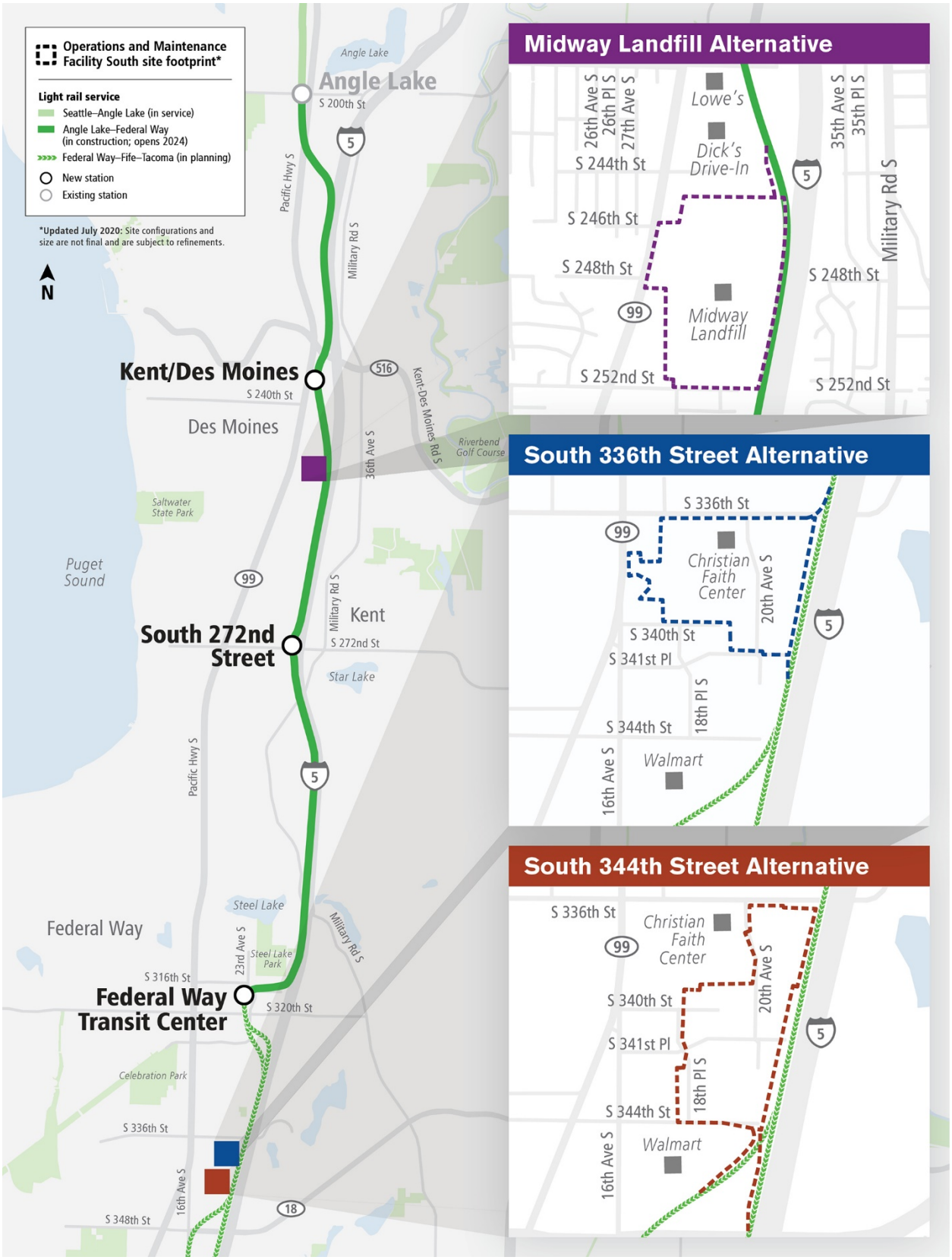
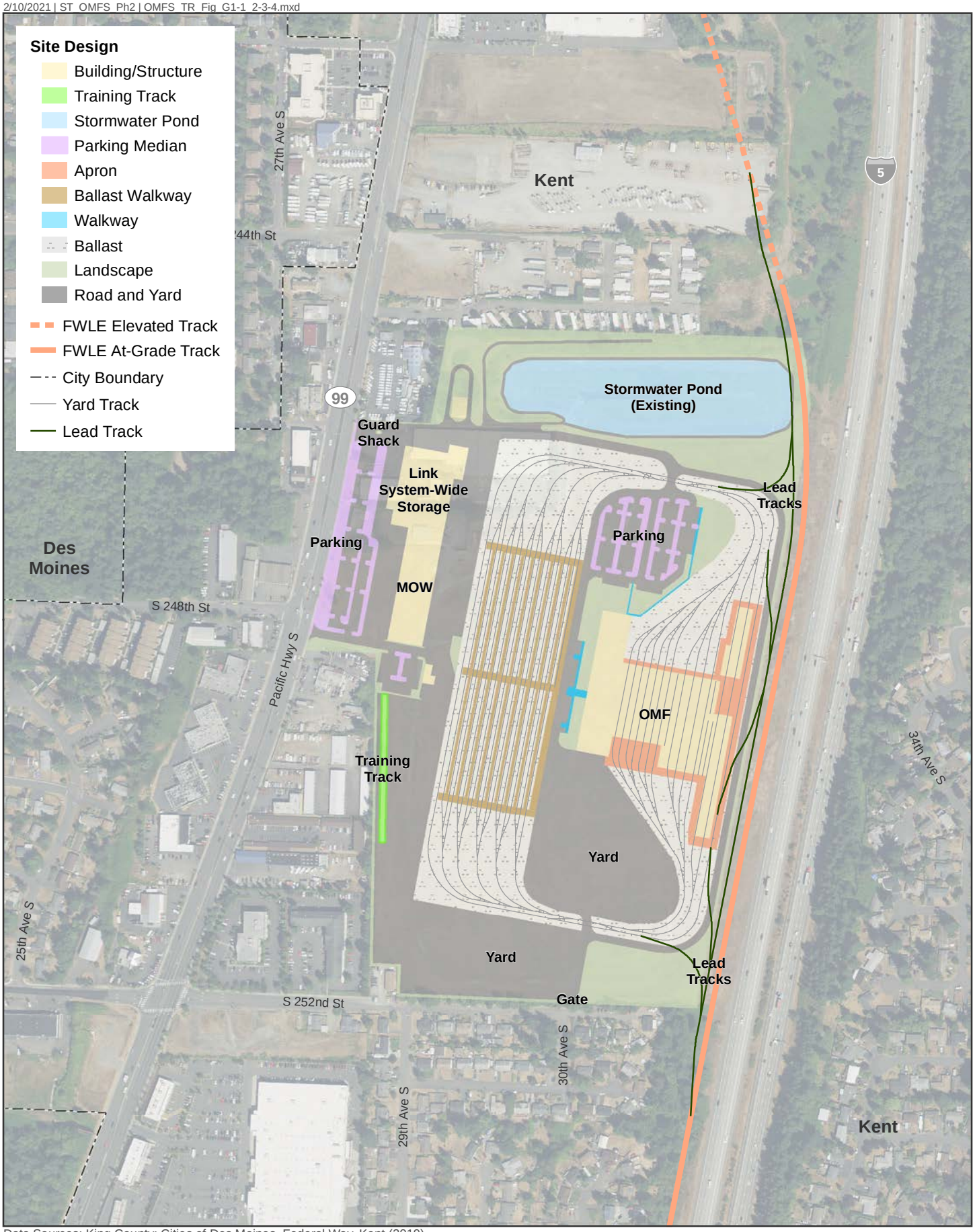


Figure G1.1-1 Project Vicinity: OMF South Alternatives



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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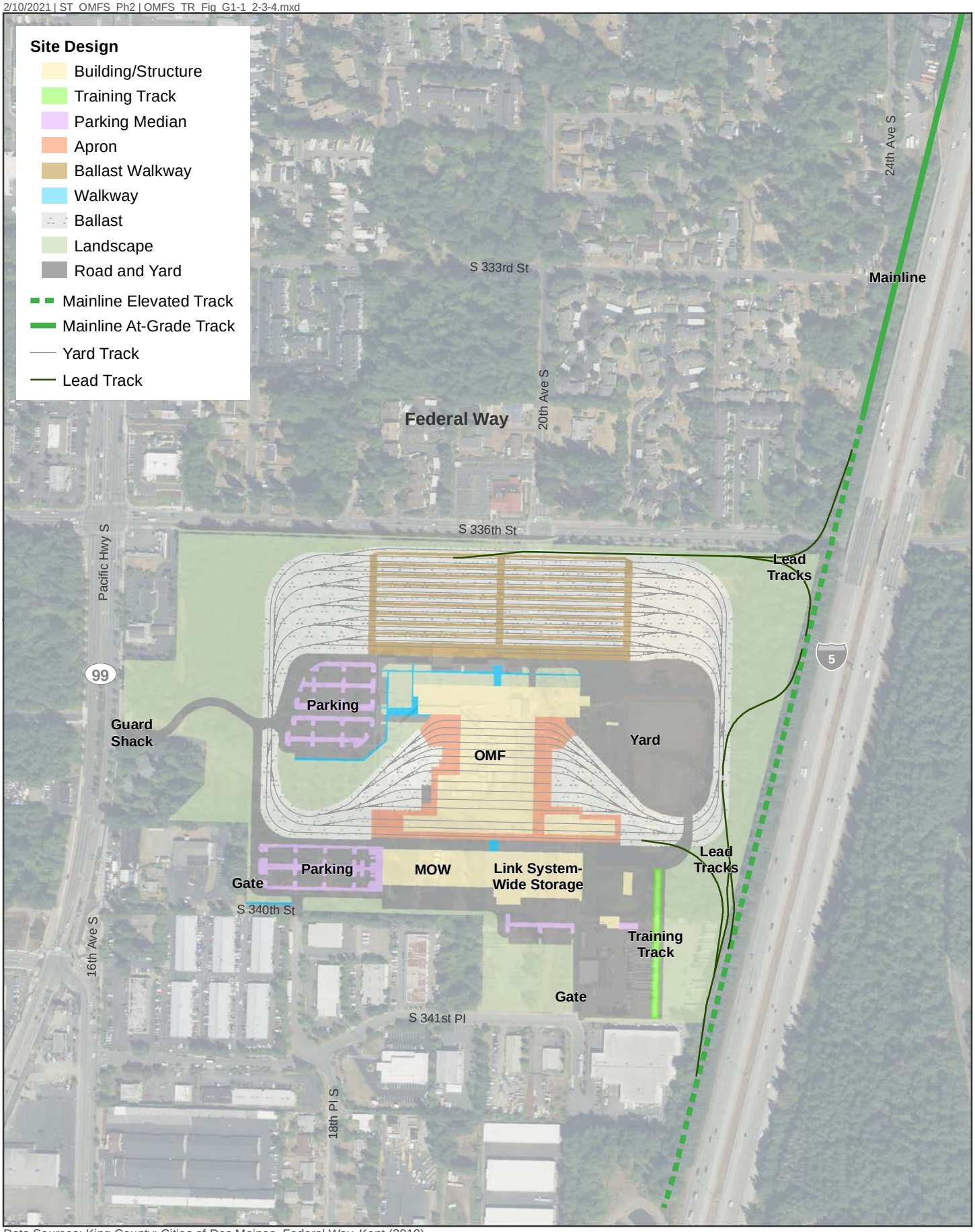
FIGURE G1.1-2
Conceptual Layout
Midway Landfill Alternative

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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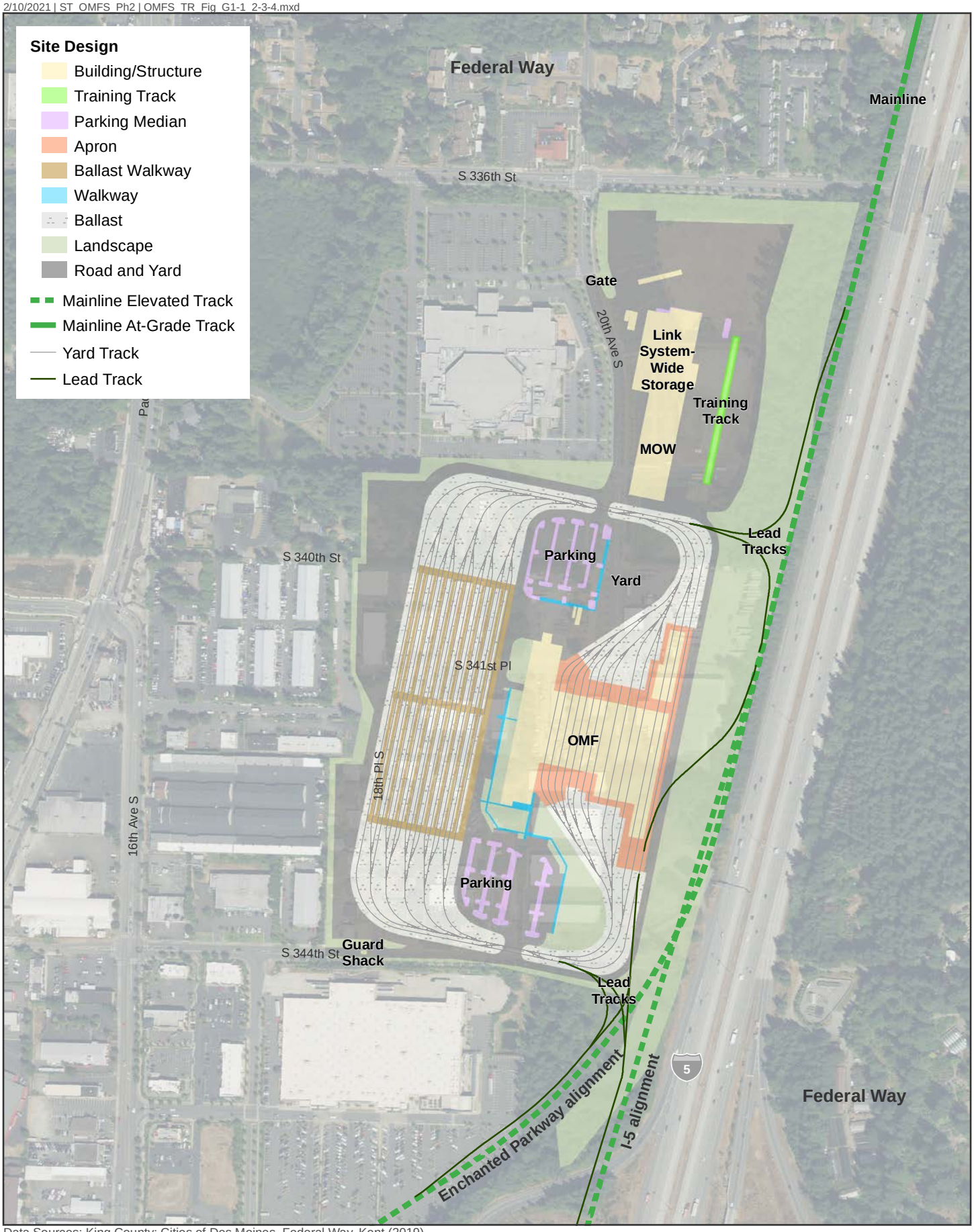
FIGURE G1.1-3
Conceptual Layout
South 336th Street Alternative

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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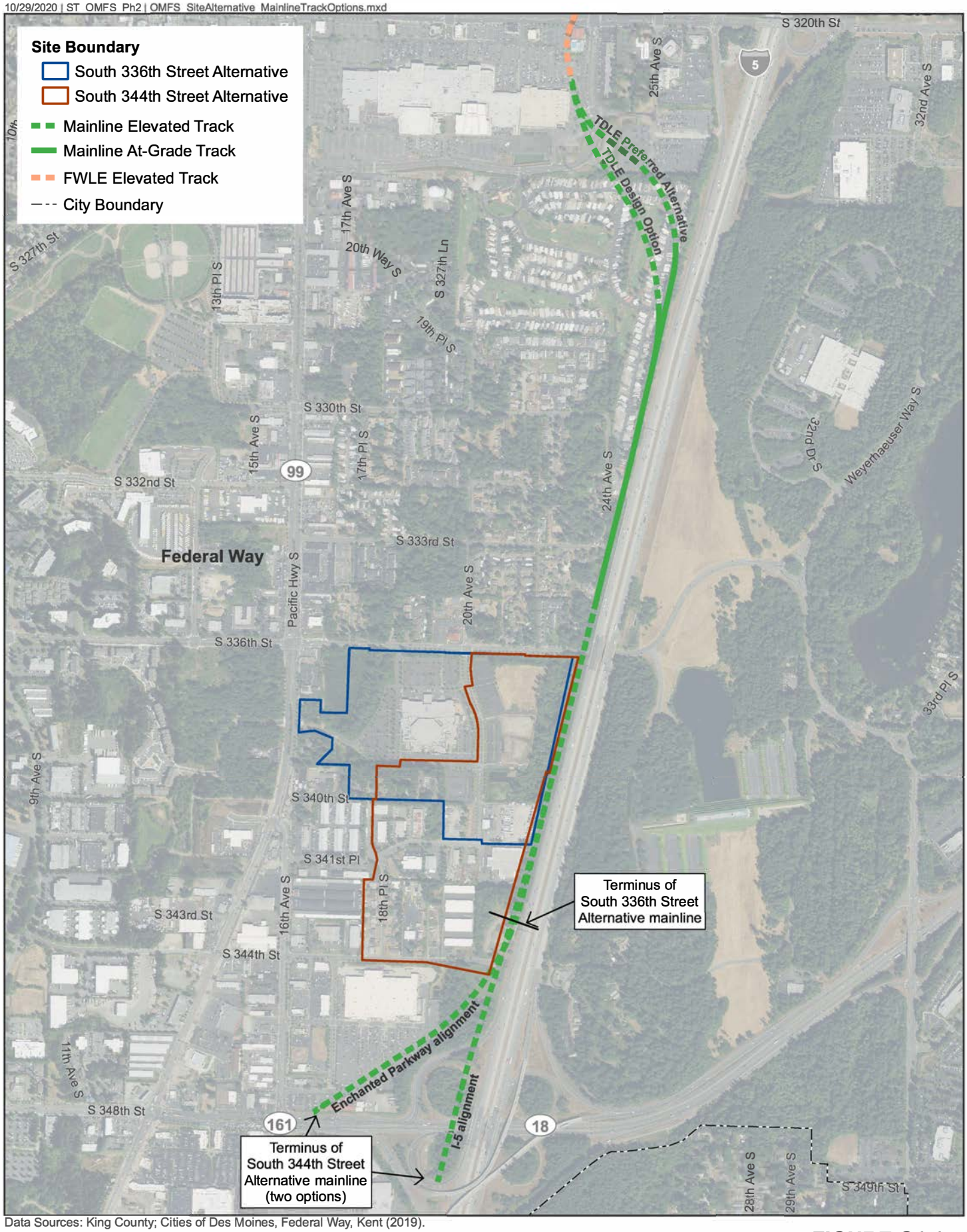
FIGURE G1.1-4
Conceptual Layout
South 344th Street Alternative

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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FIGURE G1.1-5
Mainline Track Options
South 336th Street and South 344th Street Alternatives

OMF South

1.2 Organization of this Technical Report

In addition to Section 1, Introduction, this report includes the following chapters:

Section 2, Methods and Assumptions, summarizes the analysis methods used to assess the build alternatives in this report, and includes a section on guiding regulations, plans, and policies, including agency participation in the planning and analysis process.

Section 3, Affected Environment, discusses the existing 2019 transportation conditions.

Section 4, Impacts, describes:

- long-term impacts on all modes of travel – for the No-Build Alternative and for the build alternatives for the design year (2042)
- expected impacts due to project construction activities
- indirect impacts
- cumulative impacts

Section 5, Potential Mitigation Measures, describes the measures that could be implemented to mitigate the potential effects of the project.

2 APPROACH AND METHODS

The methodology and assumptions used to analyze the transportation impacts for the alternatives are discussed in detail in the Transportation Technical Analysis Methodology Memorandum (Attachment G1-1). The Environmental Methodology Report (Sound Transit 2020a) includes the following information concerning the transportation analysis:

- Summary of the transportation methodology, including study area selection, years of analysis, intersections analyzed, and study time periods
- Description of the relevant policies, laws, and regulations that governed or influenced the transportation analysis
- Description of data collected to establish the affected environment
- Description of the analysis methods (qualitative and/or quantitative) used to assess property access and local circulation, nonmotorized facilities and modes, transit, construction, and safety
- Summary of traffic operations analysis methods, including agency level of service (LOS) thresholds, and analysis tools
- Description of the thresholds used to identify mitigation measures

2.1 Relevant Plans, Policies, and Coordination

2.1.1 Guiding Regulations, Plans, and/or Policies

The transportation analysis was guided by the following laws and regulations:

- SEPA and rules for implementing it (Washington Administrative Code [WAC] 197-11) in accordance with Revised Code of Washington (RCW) 43.21C and RCW 43.21C.030
- Washington State Growth Management Act (GMA) (RCW 36.70A)
- Sound Transit SEPA rules (Board Resolution No. R2018-17) and Sound Transit Environmental Policy (Board Resolution No. R2004-06)
- Sound Transit 3 (ST3), the Regional Transit System Plan for Central Puget Sound
- Washington State Department of Transportation (WSDOT) environmental policies and SEPA rules (WAC 468-12)
- City of Kent and City of Federal Way environmental policies and comprehensive plans

In addition to the laws and regulations identified above, analysis of the local transportation impacts was guided by the policy direction established in the numerous plans or policy documents adopted by jurisdictions within the project corridor. These include, but are not limited to:

- WSDOT Synchro and SimTraffic Protocol (WSDOT 2018a)
- WSDOT Traffic Analysis Guidebook (WSDOT 2019a)
- City of Kent Transportation Plan (City of Kent 2008) and City of Federal Way Comprehensive Plan (City of Federal Way 2015) and Capital Improvement Programs (CIPs)

- Level of Service Standards for the City of Kent (Comprehensive Plan, Chapter 4), the City of Federal Way (Comprehensive Plan, Chapter 3) (City of Kent 2015), and Washington State Highways (RCW 47.06.140(2))
- Washington Transportation Plan, Phase 2 – Implementation 2017–2040 (WSDOT 2018b)
- WSDOT Traffic Manual M 51-02 (WSDOT 2018c)
- Transportation Research Board Highway Capacity Manual (Transportation Research Board 2016)
- American Association of State and Highway Transportation Officials (AASHTO) Highway Safety Manual (AASHTO 2014)
- WSDOT Protocol for Vissim Simulation (WSDOT 2014)
- WSDOT Sidra Policy Settings (WSDOT 2019b)
- FHWA Guidelines for Applying Traffic Microsimulation Modeling Software (FHWA 2019)
- WSDOT Design Manual (WSDOT 2019c)
- Puget Sound Regional Council (PSRC), VISION 2040 (PSRC 2009)
- King County Metro, Strategic Plan for Public Transportation, 2011–2021 (King County Metro 2015)
- Pierce Transit Strategic Plan 2015–2020 (Pierce Transit 2015)

2.1.2 Agency Coordination

The transportation planning and analysis process involved local jurisdictions, state agencies, federal agencies, transit agencies, PSRC, and other interested parties. The cities of Kent and Federal Way were consulted to confirm planned improvements in the study areas.

3 AFFECTED ENVIRONMENT

This chapter discusses the affected environment for the transportation analysis by defining the study area and describing the 2019 existing transportation conditions.

3.1 Study Areas

The focus of the transportation analysis was evaluation of potential operational and construction impacts at the facility, inlcluding the traffic activity resulting from employees coming to and departing the site and truck trips and haul routes needed during construction. For the transportation analysis, two study areas were defined: the Midway Landfill Alternative study area and the South 336th Street and South 344th Street alternatives study area. The study areas are shown in Figures G1.3-1 and G1.3-2.

The Midway Landfill Alternative study area encompasses nine key intersections between SR 99 to the west, I-5 to the east, S 240th Street to the north, and S 260th Street to the south. Due to their close proximity and anticipated impacts to similar intersections, a single study area was identified for the South 336th Street and South 344th Street alternatives. The study area for the South 336th Street and South 344th Street alternatives encompasses nine key intersections between SR 99 to the west, I-5 to the east, S 336th Street to the north, and S 344th Street to the south.

The boundaries of the study areas were defined based on standard transportation and traffic impact analysis practices and determined in consultation with WSDOT, King County, and the cities of Kent and Federal Way. The approach to the analysis and study areas for each build alternative reflects federal, state, and local laws and regulations. The analysis of transportation impacts associated with construction included the boundaries of the study area and the mainline tracks where applicable.

3.2 Arterial and Local Street Operations

This section describes the existing transportation facilities, service types, and conditions in the study areas, including:

- Roadway network (intersections, traffic volumes, and operations)
- Freight
- Transit
- Nonmotorized facilities
- Parking
- Safety

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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FIGURE G1.3-1
Transportation Study Area
Midway Landfill Alternative

OMF South

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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FIGURE G1.3-2
Transportation Study Area
South 336th Street and
South 344th Street Alternatives
OMF South

3.2.1 Roadway Network

The street network and classifications in the study areas include arterial, collector, and local streets, which are summarized in Tables G1.3-1 and G1.3-2 and Figures G1.3-3 and G1.3-4. Although S 244th Street is located in the City of Des Moines, the intersection of S 244th Street and SR 99, which is one of the intersections evaluated, is located in the City of Kent. All streets in the South 336th Street and South 344th Street alternatives study area are in the City of Federal Way.

Table G1.3-1 Midway Landfill Alternative Study Area Street Network Classifications

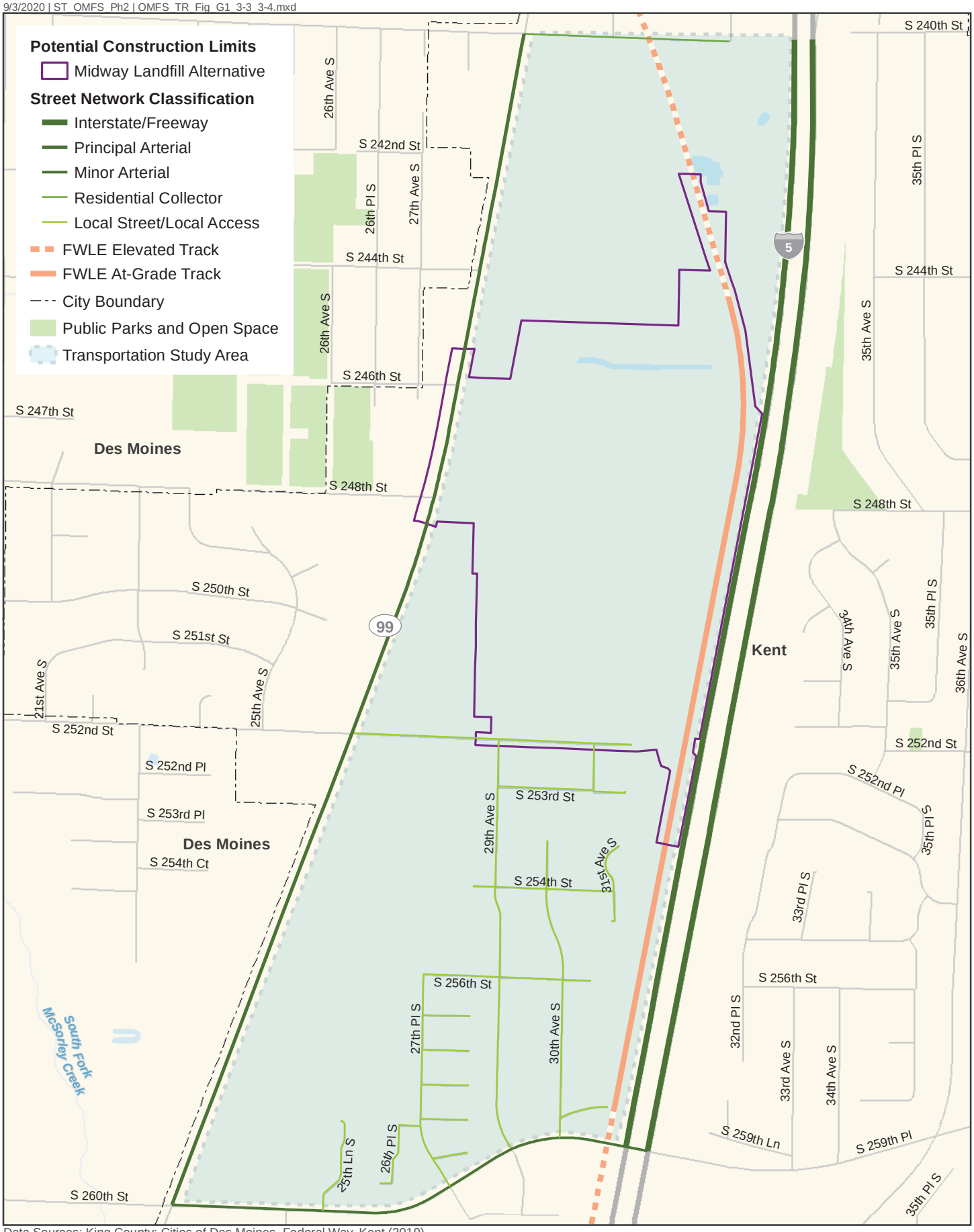
Roadway	Arterial Classification	Number of Lanes	Speed Limit (mph)
S 240th Street	Residential Collector/Local Access	2	25
S 242nd Street	Local Access	2	25
S 244th Street	Local (City of Des Moines)	2	25
S 246th Street	Local Access	2	25
S 248th Street	Local Access	2	25
S 252nd Street	Local Access	2	25
S 253rd Street	Local Access	2	25
S 254th Street	Local Access	2	25
S 256th Street	Local Access	2	25
S 257th Place	Local Access	2	25
S 258th Street	Local Access	2	25
S 258th Place	Local Access	2	25
S 259th Street	Local Access	2	25
S 259th Place	Minor Arterial	2	35
S 260th Street	Minor Arterial	2	35
Pacific Highway S (SR 99 and SR 509)	Principal Arterial and Highway of Statewide Significance	6	45
27th Place S	Local Access	2	25
29th Avenue S	Local Access	2	25
30th Avenue S	Local Access	2	25
Interstate 5	Interstate/Freeway	10	60

Sources: City of Kent (2008); City of Des Moines (2009); Google Maps (2020).

Table G1.3-2 South 336th Street and South 344th Street Alternatives Study Area Street Network Classifications

Roadway	Arterial Classification	Number of Lanes	Speed Limit (mph)
S 336th Street	Minor Arterial	3	35
S 340th Street	Local Street	2	25
S 341st Place	Minor Collector	2	25
S 344th Street	Minor Collector	2	25
SR 99	Principal Arterial	6	40
16th Avenue S	Principal Arterial	4	35
18th Place S	Local Street	2	25
20th Avenue S	Minor Collector	2	25
21st Avenue S	Local Street	2	25
Interstate 5	Interstate/Freeway	11	60

Sources: City of Federal Way (2015); Google Maps (2020).



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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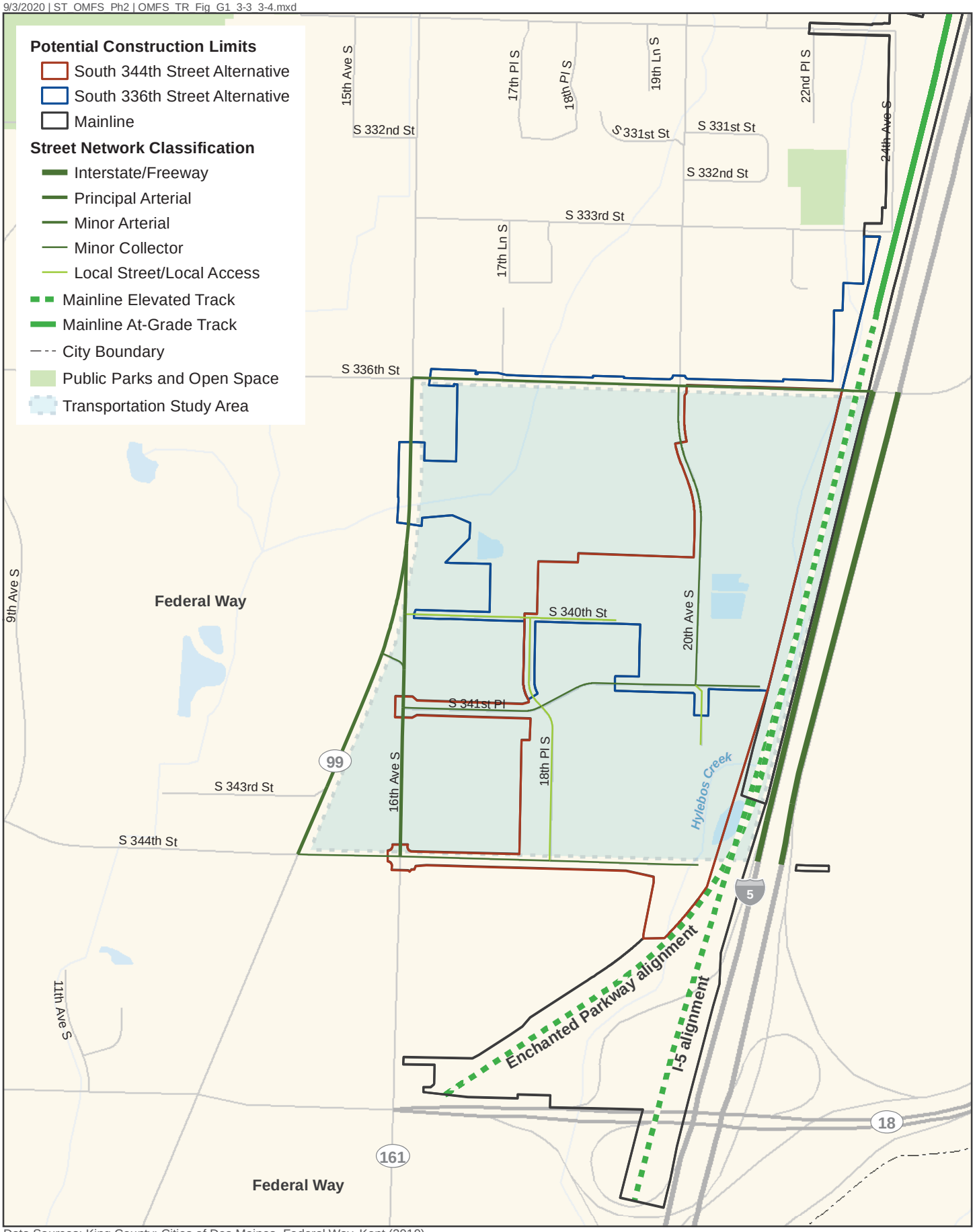
FIGURE G1.3-3
Street Network Classifications
Midway Landfill Alternative

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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FIGURE G1.3-4
Street Network Classifications
South 336th Street and
South 344th Street Alternatives
OMF South

3.2.2 Study Intersections

A total of 18 intersections (nine in each study area) were analyzed for this technical report. In the Midway Landfill Alternative study area, seven intersections are located on SR 99. In the South 336th Street and South 344th Street alternatives study area, four intersections are located on SR 99. The intersections are listed in Tables G1.3-3 and G1.3-4 and are shown in Figures G1.3-5 and G1.3-6. Tables G1.3-3 and G1.3-4 indicate whether the intersection is controlled by a traffic signal or stop signs or whether it is uncontrolled. Intersections with stop signs were all classified as two-way stop controlled (TWSC), meaning that only one street comprising the intersection is stop controlled. There are no intersections that are four-way stop controlled in either of the study areas. Intersections were chosen based on their potential to be directly affected, such as by a change in channelization, signal control, or OMF trips, as well as their potential to be indirectly affected by changes in volume due to trips accessing the system. All intersection peak hour operations were analyzed in the AM and PM peak periods.

Table G1.3-3 Midway Landfill Alternative Study Area Intersections

ID	Intersection Location	Existing Control
1	SR 99/S 240th Street	Signal
2	SR 99/S 244th Street	TWSC
3	SR 99/Midway Mobile Home Park Driveway	TWSC
4	SR 99/S 246th Street	TWSC
5	SR 99/S 248th Street	TWSC
6	SR 99/S 252nd Street	Signal
7	SR 99/S 260th Street	Signal
8	29th Avenue S/S 252nd Street	TWSC
9	29th Avenue S/S 259th Street	TWSC

Source: Google Maps street (2020).

Table G1.3-4 South 336th Street and South 344th Street Alternatives Study Area Intersections

ID	Intersection Location	Existing Control
1	S 336th Street/20th Avenue S	Signal
2	SR 99/S 336th Street	Signal
3	SR 99/S 340th Street	TWSC
4	SR 99/16th Avenue S	Signal
5	16th Avenue S/S 341st Place	TWSC
6	18th Avenue S/S 341st Place	Uncontrolled
7	SR 99/S 344th Street	Signal
8	S 344th Street/16th Avenue S	Signal
9	S 344th Street/18th Place S	Uncontrolled

Source: Google Maps (2020).

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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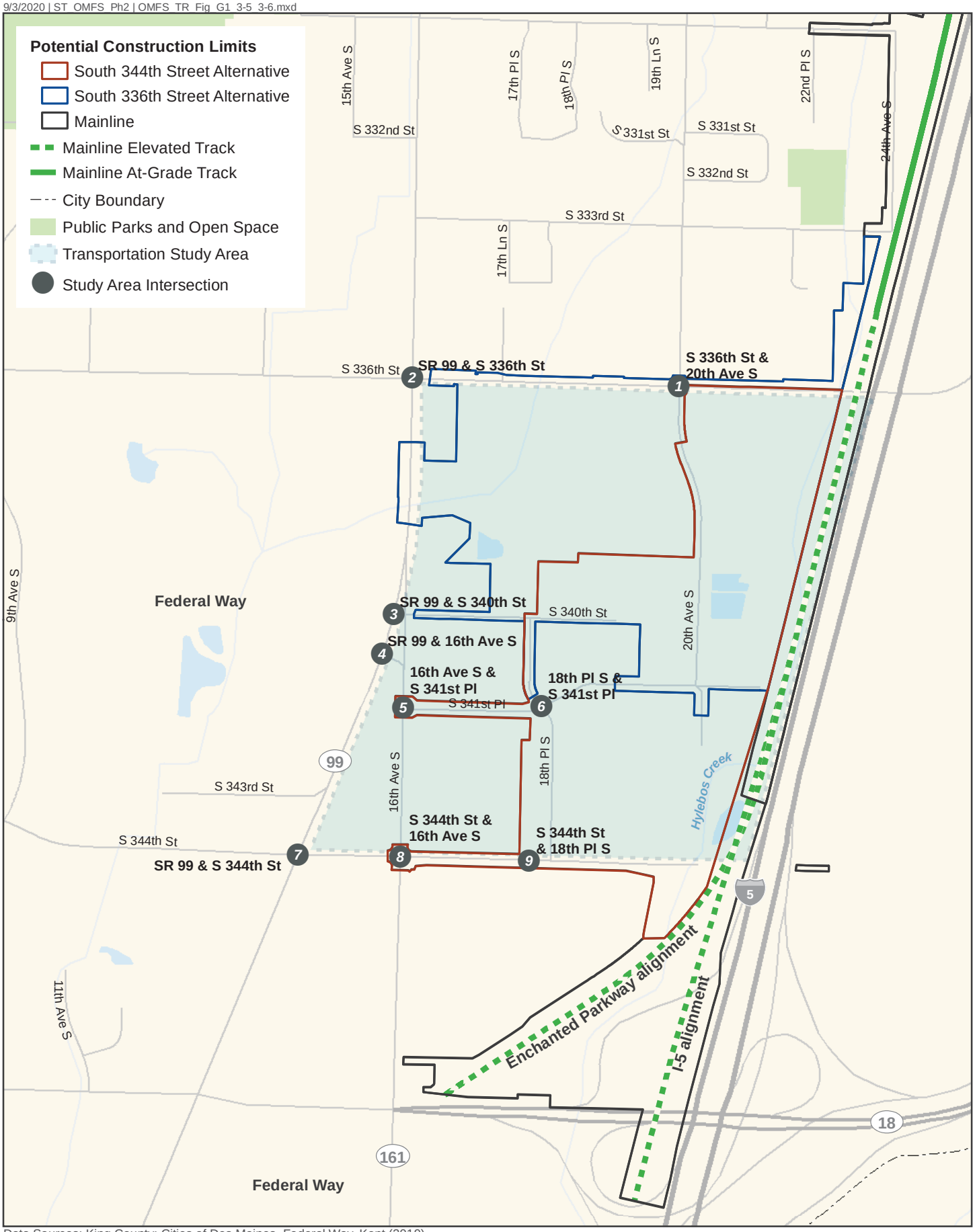
FIGURE G1.3-5
Study Area Analysis Intersections
Midway Landfill Alternative

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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FIGURE G1.3-6
Study Area Analysis Intersections
South 336th Street and
South 344th Street Alternatives
OMF South

3.2.3 Traffic Volumes

This section describes the existing AM and PM peak period daily counts as well as weekday turning movement counts at intersections. Daily (24-hour) traffic counts were provided by the cities of Kent and Federal Way. Table G1.3-5 and Table G1.3-6 summarize the average daily traffic volumes. This data informed the decision regarding times to collect turning movement count data for more detailed traffic operations analysis.

Weekday turning movement counts were collected over a 1-day period (September 24, 2019) in the AM peak period between 6 and 9 a.m. and in the PM peak period between 3 and 6 p.m. The turning movement counts included the total number of general-purpose vehicles, medium and large freight vehicles, pedestrians, and bicycles.

Figures G1.3-7 and G1.3-8 show existing AM and PM peak hour intersection turning movements for the common peak hours of 7:15 to 8:15 a.m. and 4:30 to 5:30 p.m. in the Midway Landfill Alternative study area and 7:45 to 8:45 a.m. and 4:30 to 5:30 p.m. for the South 336th Street and South 344th Street alternatives study area.

Table G1.3-5 Midway Landfill Alternative Study Area Average Daily Traffic Volumes

Location	Average Daily Traffic Volumes
SR 99: S 240th Street to S 260th Street	37,000
29th Avenue S: S 256th Street to S 259th Street	1,000

Source: City of Kent 2019 – personal communication.

Table G1.3-6 South 336th Street and South 344th Street Alternatives Study Area Average Daily Traffic Volumes

Location	Average Daily Traffic Volumes
S 336th Street: East of SR 99	11,900
SR 99: South of S 336th Street	31,300
16th Avenue S: South of S 344th Street	25,700
20th Avenue S: S 336th Street to S 344th Street[1]	2,040

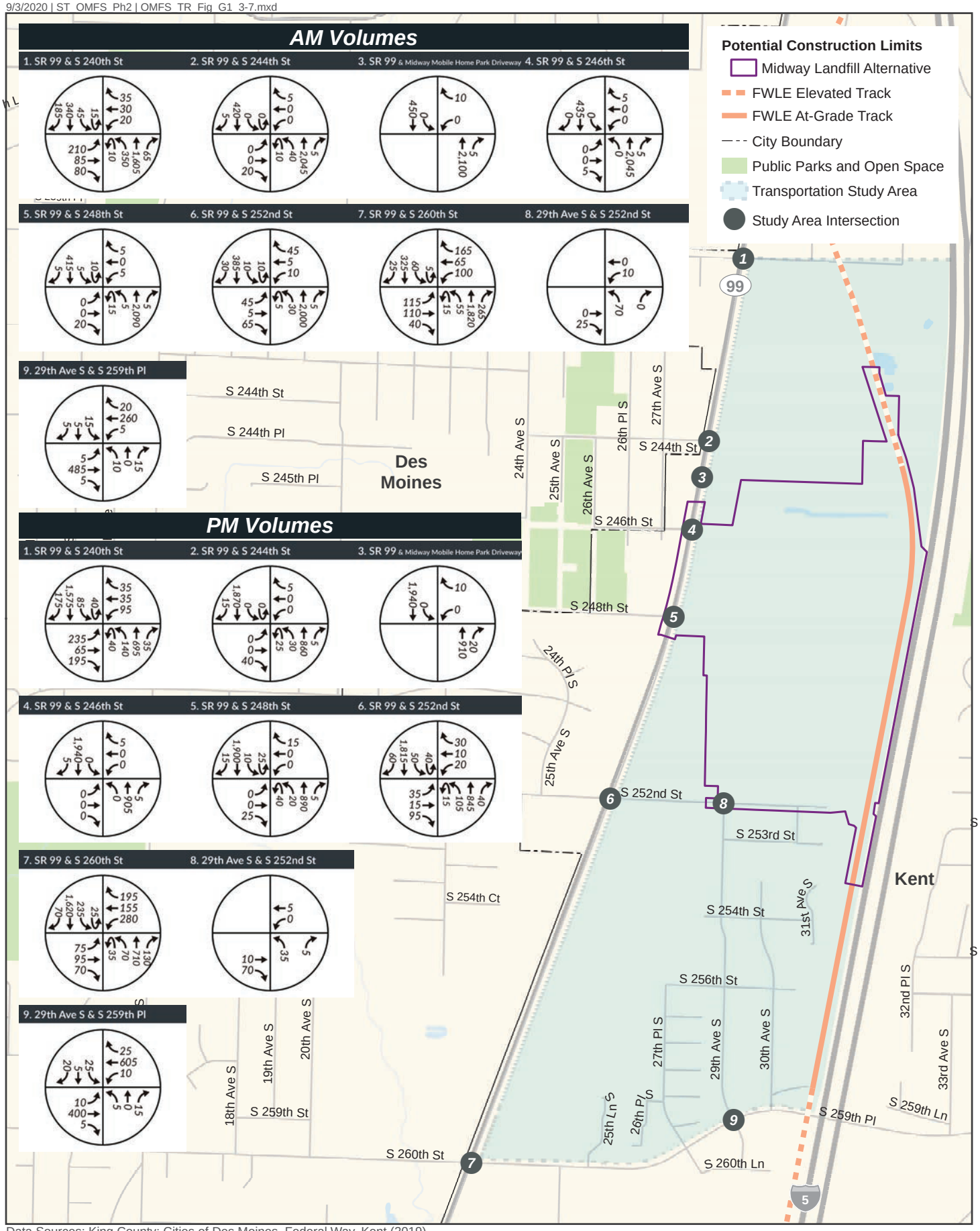
Source: City of Federal Way 2019 – personal communication.

Note:

(1) Daily traffic for 20th Avenue S estimated using field data counts at 20th Avenue S combined with daily distribution from adjacent corridor.

3.2.3.1 Intersection Operations

Traffic operations are commonly measured using the LOS method, which is defined in terms of average intersection delay on a scale ranging from A to F, depending on the delay conditions at the intersection. LOS A represents the best conditions with minimal delay, and LOS F represents the worst conditions with severe congestion. Two factors determine delay: (1) the capacity of the intersection as defined by the number of lanes, traffic volumes, lane widths, pedestrian volumes, and other features; and (2) signal timing. Capacity, delay, and LOS are calculated for each traffic movement or group of traffic movements at an intersection. The weighted average delay across all traffic movements determines the overall LOS for a signalized intersection.



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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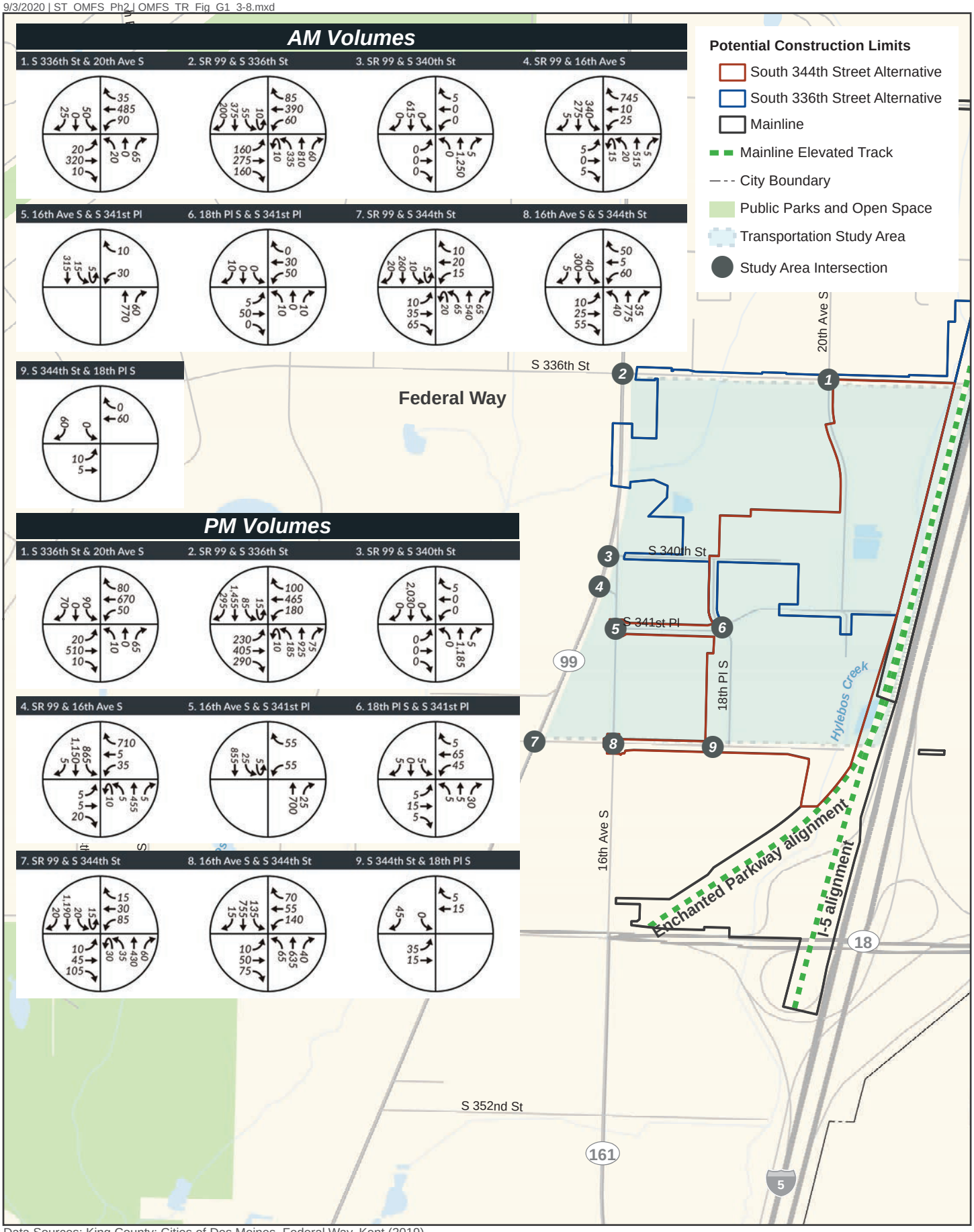
FIGURE G1.3-7
Existing AM and PM Traffic Volumes
Midway Landfill Alternative

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

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FIGURE G1.3-8
Existing AM and PM Traffic Volumes
South 336th Street Alternative and
South 344th Street Alternatives
OMF South

The LOS at unsignalized intersections that are stop controlled on one or two approaches is also defined in terms of delay, but only for the worst stop-controlled approach, which is typically the minor street. For unsignalized intersections that are stop controlled on each approach, the average intersection delay is reported. The delay thresholds are lowered for stop-controlled intersections because driver behavior considerations make delays at stop-controlled intersections more onerous. For example, at signalized intersections, drivers may relax during the red interval while waiting for the green interval, but drivers on the stopped approach of a stop-controlled intersection must remain attentive to identifying acceptable gaps in traffic. Table G1.3-7 summarizes the criteria used to define LOS.

Table G1.3-7 Average Control Delay Used in Level of Service

LOS[1]	Signalized Intersections (seconds per vehicle)	Unsignalized Intersections (seconds per vehicle)	Traffic Flow Characteristics (seconds per vehicle)
A	< 10	< 10	Virtually free flow; completely unimpeded
B	> 10 and < 20	> 10 and < 15	Stable flow with slight delays; less freedom to maneuver
C	> 20 and < 35	> 15 and < 25	Stable flow with delays; less freedom to maneuver
D	> 35 and < 55	> 25 and < 35	High density but stable flow
E	> 55 and < 80	> 35 and < 50	Operating conditions at or near capacity; unstable flow
F	> 80	> 50	Forced flow; breakdown conditions

Source: Transportation Research Board (2016).

Note:

(1) The LOS criteria are based on control delay, which includes initial deceleration delay, final deceleration delay, stopped delay, and queue move-up time.

Another common method of measuring traffic operations is volume-to-capacity (v/c) ratio, defined as a fraction representing the ratio of traffic volume to the capacity of a given roadway. The v/c ratio is measured on a decimal scale, with 0.0 representing excessive capacity and anything greater than 1.0 representing congestion, as volume has exceeded roadway capacity. A v/c ratio can be calculated for either the intersection as a whole or by approach. Table G1.3-8 shows the relationship between v/c ratio and the aforementioned LOS analysis procedure by average vehicle delay.

Table G1.3-8 Planning and Operational Level of Service

Analysis Procedure	A	B	C	D	E	F
Planning (v/c ratio)	0.00-0.60	0.61-0.70	0.71-0.80	0.81-0.90	0.91-1.00	>1.00
Operational delay (seconds per vehicle)	0-10	10-20	20-40	40-60	60-80	>80

Source: Transportation Research Board (1980, 2016).

An analysis was prepared using Synchro (version 10.0) software for the existing AM and PM peak-hour LOS at signalized and unsignalized intersections and reviewed against LOS standards to determine whether the intersections operate at an acceptable LOS. The Highway Capacity Manual (HCM) report from the Synchro software was used to summarize average intersection delay, LOS, and critical queue lengths. The LOS at a signalized intersection was defined in terms of average intersection delay. To provide consistent comparison between build alternatives, the signal timing was optimized in the Synchro software to provide optimal levels of delay. Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.[1]

[1] Uncontrolled intersections were analyzed as two-way stop-controlled intersections.

Impact Thresholds

Traffic impacts were determined for arterials and local streets by comparing the overall intersection LOS for the No-Build Alternative and the build alternatives. Impacts would occur if the build alternatives would result in traffic operations performing below the acceptable LOS when the intersection or roadway segment would operate at or above the acceptable LOS under the No-Build Alternative. Impacts may also occur if traffic operations under the build alternative reduce the LOS from E to F or if the delay in an LOS F condition is worsened by more than 10 seconds.

Washington State Department of Transportation

Impacts for state highways of statewide significance (e.g., SR 99) would occur if the roadway segment in the build alternatives would increase traffic operations to a LOS E or worse condition when the roadway segment would operate at LOS D or better under the No-Build Alternative. Impacts may also occur if the build alternative traffic operations reduce the LOS from E to F or if the delay in an LOS F condition is worsened by more than 10 seconds.

City of Kent

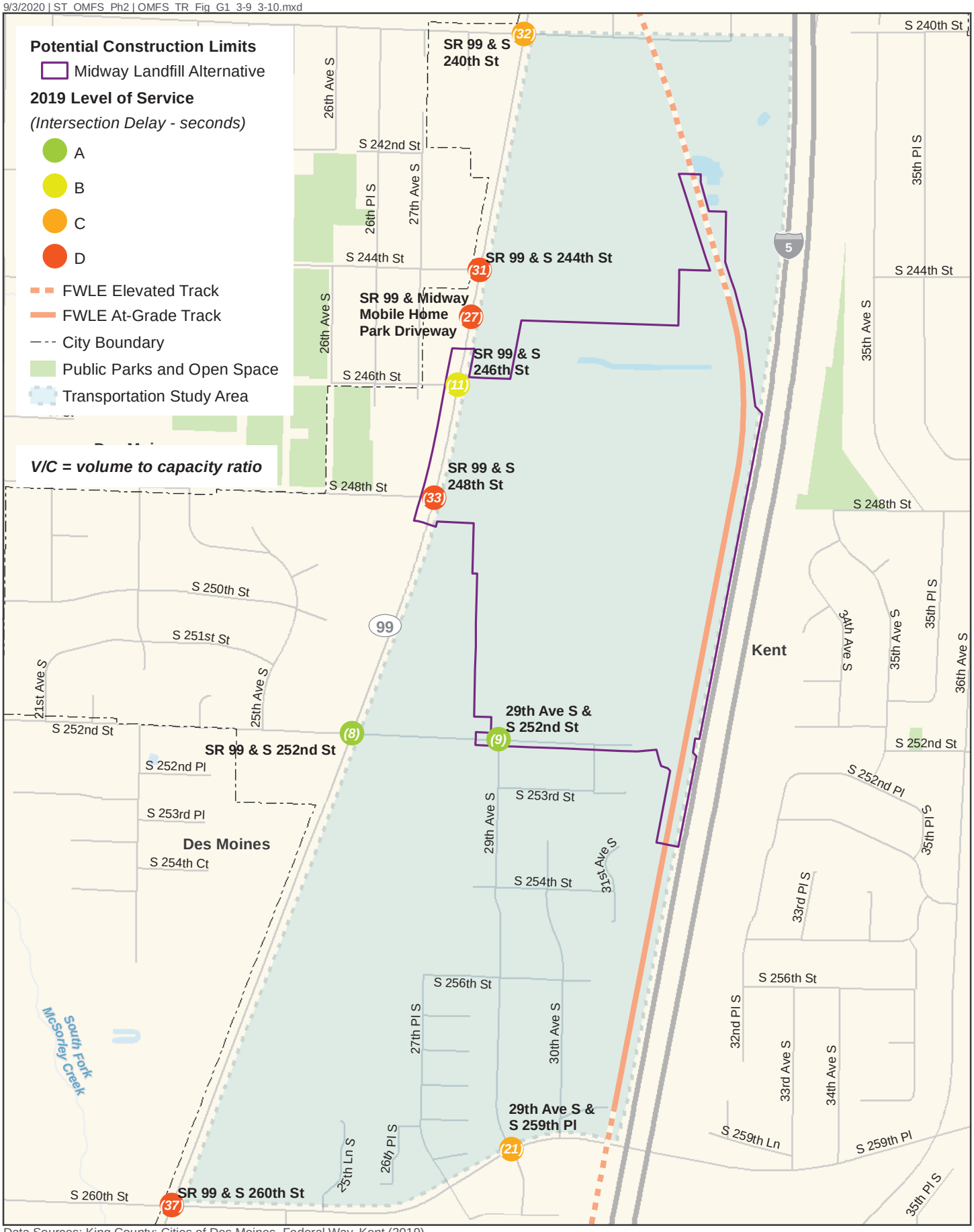
Within the Midway Landfill Alternative study area, Kent evaluates LOS at the roadway corridor level. The City of Kent calculates the LOS operation for key corridor intersections (in seconds of delay) during the PM peak period and then calculates an average based on a weighting of the corridor intersection volumes. This method provides a corridor-wide result, allowing some intersections to operate at a congested LOS as long as the overall corridor operation is maintained. The City of Kent's adopted LOS standard requires that all corridors operate at LOS E or better during the PM peak hour, with the exception of the SR 99 corridor and the Downtown zone, which are allowed to operate at LOS F (City of Kent, 2008). One intersection, #9 in the Midway Landfill Alternative study area, is located on a key corridor. If operations at this intersection were to degrade below LOS E and change by a full LOS step below the No-Build as a result of the project, the entire corridor would then need to be evaluated. No intersections evaluated as part of this analysis are located in the Kent Downtown zone.

City of Federal Way

Within the South 336th Street and South 344th Street alternatives study area, the City of Federal Way has adopted the following level of service standards for its street and highway system (City of Federal Way, 2015):

- Signalized intersections outside of City Center will experience a 1.2 or lower v/c ratio.
- Unsignalized intersections outside of City Center will experience a 1.0 or lower v/c ratio.
- The City Center area will experience an average of 1.1 or lower v/c ratio.

No intersections evaluated as part of this analysis are located in the Federal Way City Center. Figures G1.3-9 through G1.3-12 show existing AM and PM peak hour operations at the study intersections.



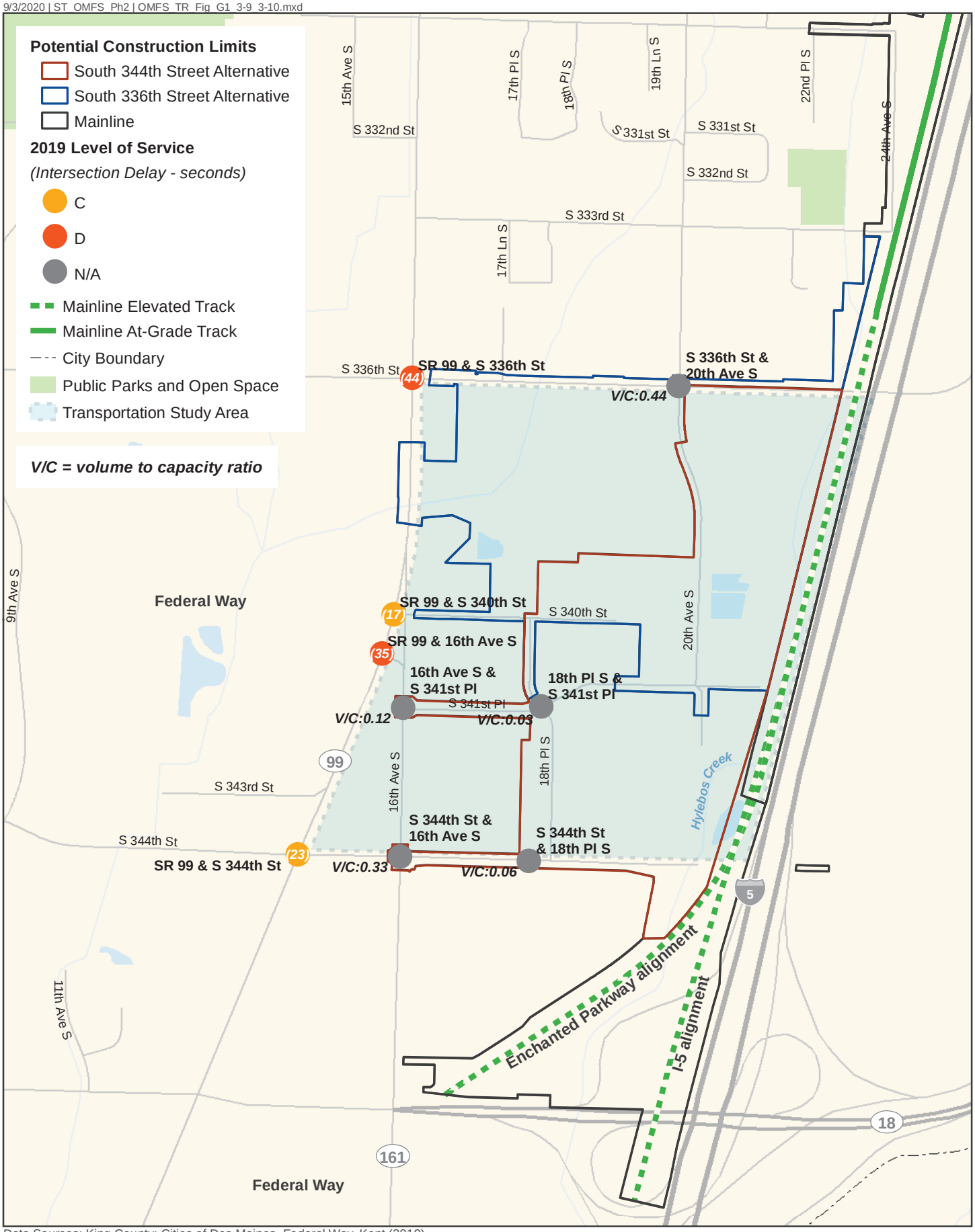
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-9
Existing AM Peak Hour Traffic Operations
Midway Landfill Alternative

OMF South

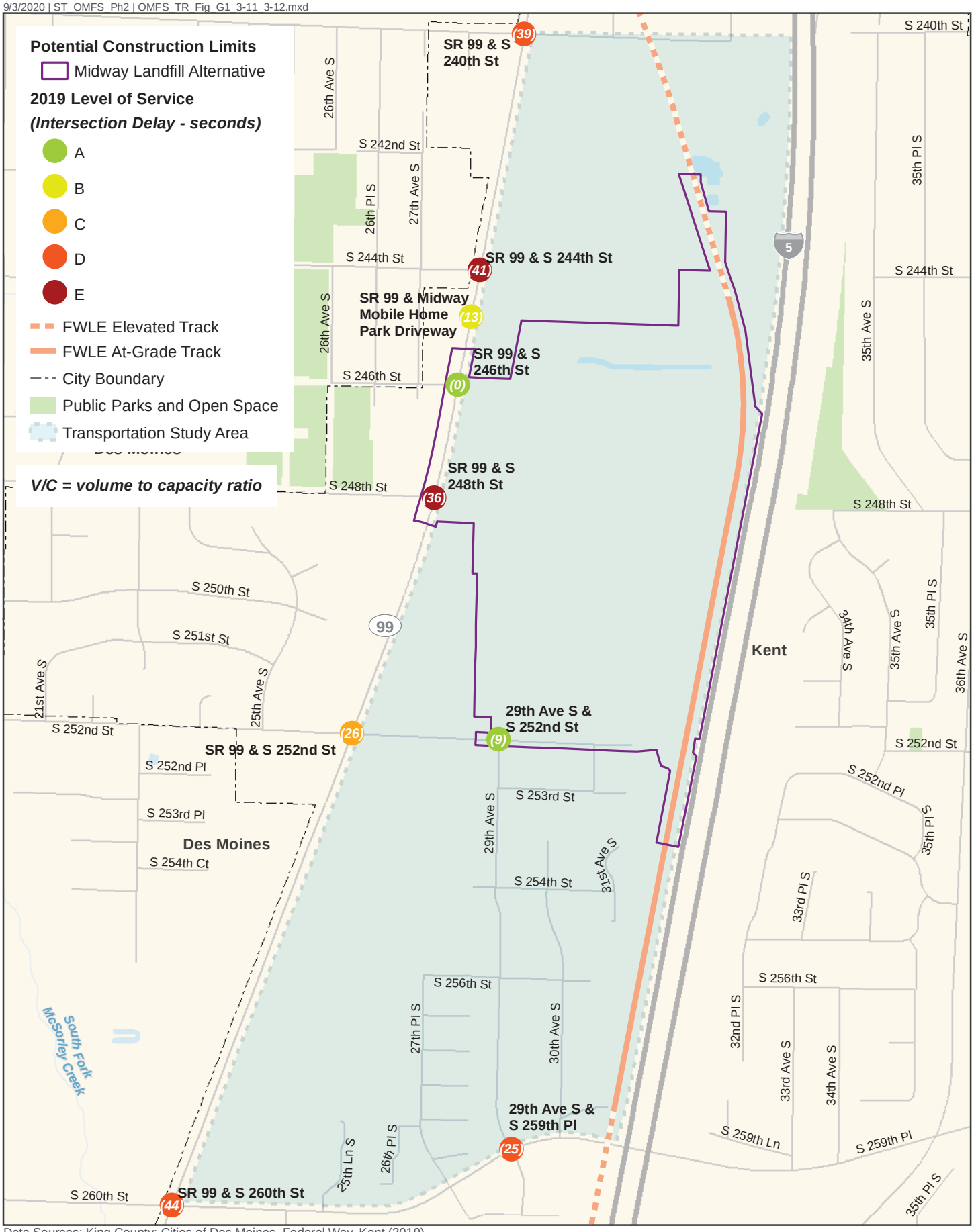


Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-10
Existing AM Peak Hour Traffic Operations
South 336th Street and
South 344th Street Alternatives
OMF South



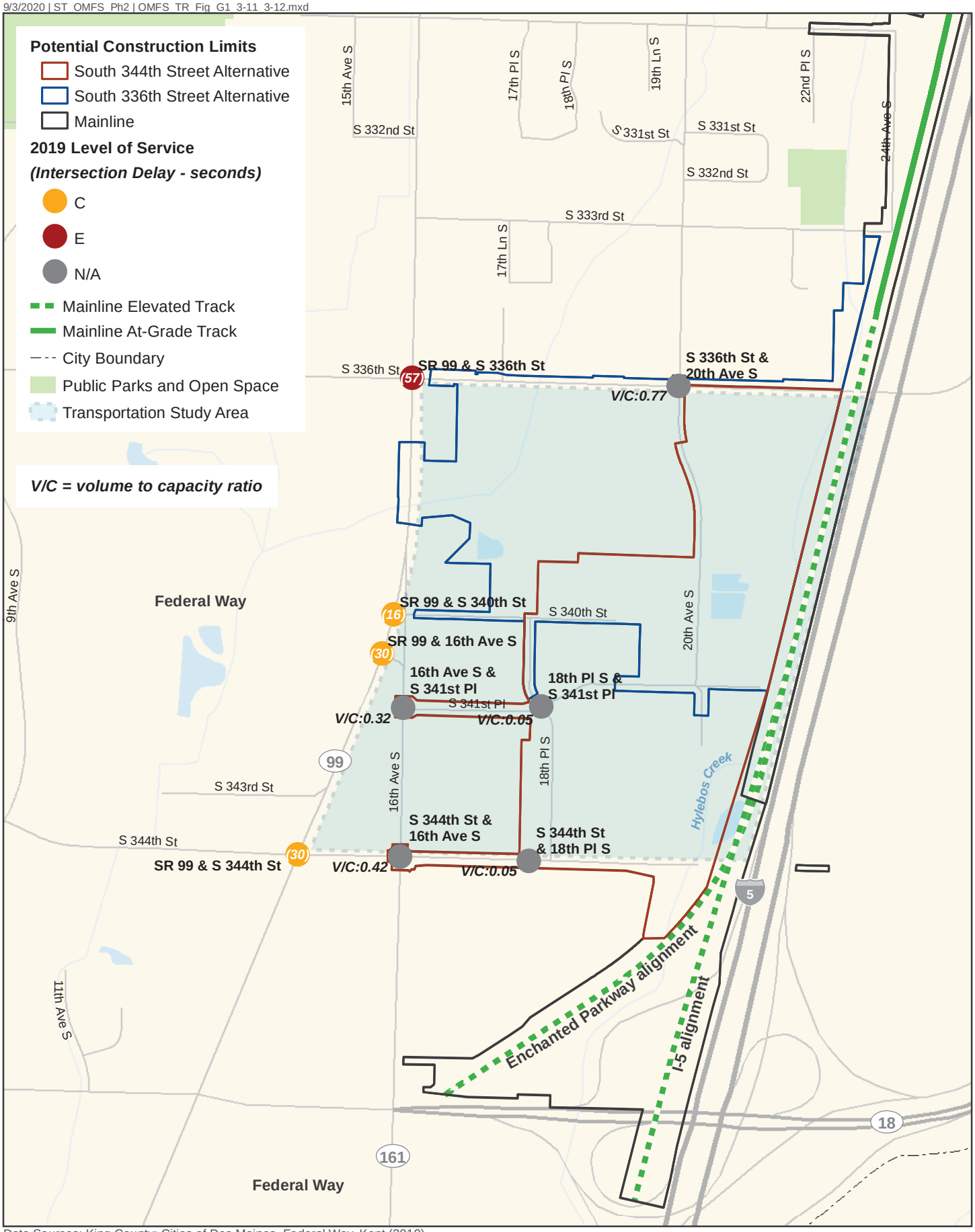
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-11
Existing PM Peak Hour Traffic Operations
Midway Landfill Alternative

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-12
Existing PM Peak Hour Traffic Operations
South 336th Street and
South 344th Street Alternatives
OMF South

3.2.3.2 AM Analysis

The existing AM peak hour LOS and delay for the study area intersections evaluated are shown in Table G1.3-9 and Table G1.3-10. All intersections in the Midway Landfill Alternative study area operate at or better than the standards for the roadway in the AM peak hour. Because the City of Kent's adopted LOS standard applies only to the PM peak hour, those intersections located in the city but not on a state highway are exempt from LOS requirements in the AM peak hour. In the South 336th Street and South 344th Street alternatives study area, all intersections operate at or better than the standards for the roadway.

Table G1.3-9 Existing AM Peak Hour Traffic Operations for Midway Landfill Alternative Study Area Intersections

ID	Intersection	Control Type	Agency (Standard)	AM Peak[1, 2, 3] LOS	AM Peak[1, 2, 3] Delay (seconds)
1	SR 99/S 240th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	C	32
2	SR 99/S 244th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	D	31
3	SR 99/Midway Mobile Home Park Driveway	TWSC	WSDOT Highways of Statewide Significance (LOS D)	D	27
4	SR 99/ S 246th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	B	11
5	SR 99/ S 248th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	D	33
6	SR 99/ S 252nd Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	A	8
7	SR 99/S 260th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	37
8	29th Avenue S/ S 252nd Street	TWSC	City of Kent (LOS E)	A	9
9	29th Avenue S/ S 259th Street	TWSC	City of Kent (LOS E)	C	21

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using HCM 6th Edition (Transportation Research Board 2016) for signalized and unsignalized intersections except where HCM 6th Edition limitations necessitated use of HCM 2000 methodology (Transportation Research Board 2000).

(3) At signalized intersections utilizing HCM 6th Edition methodology, U-turn movements were added to left-turn movements to allow for analysis.

Table G1.3-10 Existing AM Peak Hour Traffic Operations for South 336th Street and South 344th Street Alternatives Study Area Intersections

ID	Intersection	Control Type	Agency (Standard)	AM Peak[1, 2, 3] LOS	AM Peak[1, 2, 3] Delay (seconds)	V/C Ratio [1, 2, 3]
1	S 336th Street/ 20th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.44
2	SR 99/S 336th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	44	N/A
3	SR 99/S 340th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	C	17	N/A
4	SR 99/16th Avenue S	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	35	N/A
5	16th Avenue S/ S 341st Place	TWSC	City of Federal Way (v/c 1.2)	N/A	N/A	0.12
6	18th Avenue S/ S 341st Place	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.03
7	SR 99/ S 344th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	C	23	N/A
8	S 344th Street/ 16th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.33
9	S 344th Street/ 18th Place S	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.06

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using HCM 6th Edition (Transportation Research Board 2016) for signalized and unsignalized intersections except where HCM 6th Edition limitations necessitated use of HCM 2000 methodology (Transportation Research Board 2000).

(3) At signalized intersections utilizing HCM 6th Edition methodology, U-turn movements were added to left-turn movements to allow for analysis.

3.2.3.3 PM Analysis

The existing PM peak hour LOS and delay for the study area intersections evaluated are shown in Table G1.3-11 and Table G1.3-12. In the Midway Landfill Alternative study area, intersection #2 (SR 99/S 244th Street) and intersection #5 (SR 99/S 248th Street) operate below standard in the PM peak hour. The worst movement at both intersections is the northbound left-turn movement, which conflicts with a heavy southbound through volume.

Table G1.3-11 Existing PM Peak Hour Traffic Operations for Midway Landfill Alternative Study Area Intersections

ID	Intersection	Control Type	Agency (Standard)	PM Peak[1, 2, 3, 4] LOS	PM Peak[1, 2, 3, 4] Delay (seconds)
1	SR 99/S 240th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	39
2	SR 99/S 244th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	***E***	***41***
3	SR 99/Midway Mobile Home Park Driveway	TWSC	WSDOT Highways of Statewide Significance (LOS D)	B	13
4	SR 99/S 246th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	A	0
5	SR 99/S 248th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	***E***	***36***
6	SR 99/S 252nd Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	C	26
7	SR 99/S 260th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	44
8	29th Avenue S/S 252nd Street	TWSC	City of Kent (LOS E)	A	9
9	29th Avenue S/S 259th Street	TWSC	City of Kent (LOS E)	D	25

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using HCM 6th Edition (Transportation Research Board 2016) for signalized and unsignalized intersections except where HCM 6th Edition limitations necessitated use of HCM 2000 methodology (Transportation Research Board 2000).

(3) At signalized intersections utilizing HCM 6th Edition methodology, U-turn movements were added to left-turn movements to allow for analysis.

(4) Cells highlighted in ***gray bold and italicized*** identify intersections that operate below the LOS standard for the roadway/highway.

Table G1.3-12 Existing PM Peak Hour Traffic Operations for South 336th Street and South 344th Street Alternatives Study Area Intersections

ID	Intersection	Control Type	Agency (Standard)	PM Peak[1, 2, 3, 4] LOS	PM Peak[1, 2, 3, 4] Delay (seconds)	V/C Ratio[1, 2, 3, 4]
1	S 336th Street/ 20th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.77
2	SR 99/ S 336th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	***E***	***57***	***N/A***
3	SR 99/ S 340th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	C	16	N/A
4	SR 99/ 16th Avenue S	Signal	WSDOT Highways of Statewide Significance (LOS D)	C	30	N/A
5	16th Avenue S/ S 341st Place	TWSC	City of Federal Way (v/c 1.2)	N/A	N/A	0.32
6	18th Avenue S/ S 341st Place	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.05
7	SR 99/ S 344th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	C	30	N/A
8	S 344th Street/ 16th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.42
9	S 344th Street/ 18th Place S	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.05

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using HCM 6th Edition (Transportation Research Board 2016) for signalized and unsignalized intersections except where HCM 6th Edition limitations necessitated use of HCM 2000 methodology (Transportation Research Board 2000).

(3) At signalized intersections utilizing HCM 6th Edition methodology, U-turn movements were added to left-turn movements to allow for analysis.

(4) Cells highlighted in ***gray bold and italicized*** identify intersections that operate below the LOS standard for the roadway/highway.

In the South 336th Street and South 344th Street alternatives study area, only intersection #2 (SR 99/S 336th Street) operates below standard in the PM peak hour. Volumes along each approach of intersection #2 (SR 99/S 336th Street) are high, and two approaches operate at LOS E (westbound and southbound), while the other two operate at LOS D (eastbound and northbound).

3.3 Freight

Freeways, arterials, and local streets are important to moving freight and goods in the study area. Freight is transported only via the roadway network in the study area; no other transportation modes provide freight movement.

WSDOT has designated roadways as freight routes that are classified based on the amount of annual tonnage that is transported along a road in a particular year. This classification system is called the Freight Goods Transportation System. The classifications range from roadways that carry more than 20,000 tons in 60 days to more than 10 million tons annually, as summarized in Table G1.3-13.

Table G1.3-13 Freight Goods Transportation System Classification System

Freight Goods Transportation System Classification	Annual Gross Tonnage
T-1	Over 10,000,000
T-2	4,000,000 to 10,000,000
T-3	300,000 to 4,000,000
T-4	100,000 to 300,000
T-5	Over 20,000 in 60 days

Source: (WSDOT 2020b).

In the study areas, there are several designated freight routes, which include:

- I-5: T-1 route
- SR 99: T-3 route
- S 259th Place: T3 route
- S 260th Place: T3 route

SR 99 is a designated truck/freight route by the cities of Kent and Federal Way. The City of Federal Way has also designated 16th Avenue S as a freight route.

The primary freight access routes in the study areas are shown on Figure G1.3-13 and Figure G1.3-14.

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-13
Existing Freight Access Routes
Midway Landfill Alternative

OMF South

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-14
Existing Freight Access Routes
South 336th Street and
South 344th Street Alternatives
OMF South

3.4 Transit

King County Metro Transit (Metro), Sound Transit, and Pierce Transit provide transit service in the study area, with regional and local bus fixed route service to transit centers, park-and-rides, and bus stops.

Six bus routes provide service to the study areas.[2] Table G1.3-14 summarizes the service provider, route number, weekday frequency, and routing. Figure G1.3-15 and Figure G1.3-16 show the fixed route transit services provided in the study area. In addition to fixed route bus service, Metro also provides paratransit (Access) and various rideshare services, such as vanpool and ride matching services. Neither light rail nor commuter rail service is currently provided in the study areas. Bus stops in the study areas are located primarily on SR 99. There are no transit centers or park-and-rides within the study areas.

Table G1.3-14 Study Areas Transit Service

Service Provider	Route	Weekday Frequency	Routing
King County Metro Transit	RapidRide A Line	10-15 minutes all day	Federal Way Transit Center to Tukwila International Boulevard Station
King County Metro Transit	166	30 minutes all day	Kent Station to Highline College to Des Moines to Burien Transit Center
King County Metro Transit	182	20-30 minutes during the AM and PM peak periods; 60 minutes midday	Northeast Tacoma to Federal Way Transit Center
Pierce Transit	402	30 minutes all day	Meridian to Federal Way Transit Center
Pierce Transit	500	30 minutes all day	Tacoma to Federal Way Transit Center
Pierce Transit	501	60 minutes all day	Milton to Federal Way Transit Center

Sources: King County Metro (2019); Pierce Transit (2019).

The City of Federal Way designates transit priority corridors that are welcoming to transit and have appropriate supportive amenities that encourage ridership. SR 99 and 16th Avenue S are transit priority corridors in the South 336th Street and South 344th Street alternatives study area. The City of Kent does not have designated transit streets or priority corridors.

[2] Additionally, several Metro and Sound Transit routes provide service on I-5 through the study areas.

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-15
Existing Transit Routes
Midway Landfill Alternative

OMF South

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-16
Existing Transit Routes
South 336th Street and
South 344th Street Alternatives
OMF South

3.5 Nonmotorized Network

In general, the opportunities for nonmotorized (bicycle and pedestrian) circulation in the study areas are limited. East-west circulation within the study areas is limited by the presence of I-5. Each study area has only one crossing of I-5: S 259th Street in the Midway Landfill Alternative study area and S 336th Street in the South 336th Street and South 344th Street alternatives study area. As a result, most east-west streets in the study areas are dead ends.

The presence of the Midway Landfill and other large developments restrict north-south nonmotorized circulation in the Midway Landfill Alternative study area north of S 252nd Street, and SR 99 provides the only north-south pedestrian connection in the study area between S 240th Street and S 252nd Street. The street network south of S 252nd Street has a more developed grid and offers better opportunities for nonmotorized circulation. East-west circulation is similarly restricted.

In the South 336th Street and South 344th Street alternatives study area, north-south circulation is provided via SR 99, 16th Avenue S, 18th Place S, and 20th Avenue S. East-west travel is facilitated by S 336th Street, S 340th Street, S 341st Street, and S 344th Street.

Nonmotorized facilities are inventoried in the following sections. Figure G1.3-17 and Figure G1.3-18 display the existing pedestrian and bicycle facilities within the study areas and their vicinities.

3.5.1 Pedestrian Facilities

Sidewalks are provided on most arterial streets in the study areas. Exceptions include a short segment of S 259th Street west of I-5 in the Midway Landfill Alternative study area as well as a portion of the north side of S 336th Street and S 344th Street between SR 99 and 16th Avenue S in the South 336th Street and South 344th Street alternatives study area. Sidewalks are also present on some nonarterial streets in the study areas. Marked crosswalks are provided at signalized intersections in the study areas and provide opportunities to access pedestrian facilities west of the study areas. I-5 restricts most opportunities for pedestrian connections east of the study areas.

3.5.2 Bicycle Facilities

There are no designated bicycle facilities in the Midway Landfill Alternative study area. Bicycle lanes are on some nearby roadways, and the nearest regional trail is the Green River Trail east of I-5. However, there are no existing bicycle connections from the Midway Landfill Alternative study area to these facilities.

The only existing bicycle facilities in the South 336th Street and South 344th Street alternatives study area are east- and westbound bicycle lanes on S 336th Street east of 20th Avenue S, which provide connections to facilities east of I-5 on Weyerhaeuser Way S. The Bonneville Power Administration (BPA) Trail, a shared-use trail, is located to the west of the study area, but there are no dedicated bicycle facilities that provide connections to it. The bicycle lanes on S 336th Street provide connections to facilities east of I-5 on Weyerhaeuser Way S.

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-17
Existing Bicycle and Pedestrian Facilities
Midway Landfill Alternative

OMF South

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-18
Existing Bicycle and Pedestrian Facilities
South 336th Street and
South 344th Street Alternatives
OMF South

3.5.3 Pedestrian and Bicycle Volumes

Along with the weekday turning movement counts, bicycle and pedestrian counts were collected for the same 1-day period in the AM and PM peak period (September 24, 2019). Weather is sometimes a variable for consideration when looking at pedestrian and bicycle counts. On the day of the count, the weather was partly sunny with a high of 70 degrees Fahrenheit; therefore, the weather was conducive to both modes. Tables G1.3-15 through G1.3-18 show the existing AM and PM peak hour bicycle and pedestrian counts at the study area intersections for the common peak hours.

As shown in the tables, the highest pedestrian volumes in the Midway Landfill Alternative study area are at intersections #1, #6, and #7 in the AM and PM peak hours. Pedestrian volumes were relatively low in at the South 336th Street and South 344th Street alternatives study area during the AM and PM peak hours. The highest pedestrian volumes in this study area were at intersection #2 in the AM peak hour and intersections #3, #5, and #8 in the PM peak hour. The pedestrian volumes are all within serviceable levels for signalized intersections.

There were almost no bicycle trips through intersections in either study area, both in the AM and PM peak hours.

Table G1.3-15 Existing AM Peak Hour Pedestrian and Bicycle Volumes for Midway Landfill Alternative Study Area Intersections

ID	Intersection	Bicycle Eastbound	Bicycle Westbound	Bicycle Northbound	Bicycle Southbound	Pedestrian East	Pedestrian West	Pedestrian North	Pedestrian South
1	SR 99/ S 240th Street	0	0	0	0	39	52	38	63
2	SR 99/ S 244th Street	0	0	0	0	6	6	0	2
3	SR 99/Midway Mobile Home Park Driveway	N/A	0	0	0	6	N/A	2	0
4	SR 99/ S 246th Street	0	0	0	0	3	8	0	0
5	SR 99/ S 248th Street	0	0	0	0	1	3	1	0
6	SR 99/ S 252nd Street	0	0	0	0	14	3	7	8
7	SR 99/ S 260th Street	1	0	0	0	6	5	12	15
8	29th Avenue S/ S 252nd Street	0	0	1	N/A	1	0	N/A	0
9	29th Avenue S/ S 259th Street	2	0	0	0	1	1	6	0

Note: Data obtained from IDAX traffic study, September 2019.

Table G1.3-16 Existing PM Peak Hour Pedestrian and Bicycle Volumes for Midway Landfill Alternative Study Area Intersections

ID	Intersection	Bicycle Eastbound	Bicycle Westbound	Bicycle Northbound	Bicycle Southbound	Pedestrian East	Pedestrian West	Pedestrian North	Pedestrian South
1	SR 99/ S 240th Street	0	0	0	0	21	45	35	36
2	SR 99/ S 244th Street	0	0	0	0	6	7	0	5
3	SR 99/Midway Mobile Home Park Driveway	N/A	0	0	0	10	N/A	2	2
4	SR 99/ S 246th Street	0	0	1	1	2	7	0	1
5	SR 99/ S 248th Street	0	0	0	0	4	11	0	0
6	SR 99/ S 252nd Street	0	0	0	0	30	18	13	32
7	SR 99/ S 260th Street	0	0	0	0	17	6	4	26
8	29th Avenue S/ S 252nd Street	0	0	0	N/A	2	1	N/A	0
9	29th Avenue S/ S 259th Street	0	0	0	1	0	0	6	0

Note: Data obtained from IDAX traffic study, September 2019.

Table G1.3-17 Existing AM Peak Hour Pedestrian and Bicycle Volumes for South 336th Street and South 344th Street Alternatives Study Area Intersections

ID	Intersection	Bicycle Eastbound	Bicycle Westbound	Bicycle Northbound	Bicycle Southbound	Pedestrian East	Pedestrian West	Pedestrian North	Pedestrian South
1	S 336th Street/ 20th Avenue S	0	2	0	0	0	2	3	0
2	SR 99/ S 336th Street	0	0	0	0	7	3	7	4
3	SR 99/ S 340th Street	0	0	0	0	3	0	0	0
4	SR 99/ 16th Avenue S	0	0	0	0	0	2	1	0
5	16th Avenue S/ S 341st Place	N/A	0	0	0	0	N/A	0	0
6	18th Avenue S/ S 341st Place	0	0	0	0	0	0	0	0
7	SR 99/ S 344th Street	0	0	0	0	0	0	2	0
8	S 344th Street/ 16th Avenue S	0	0	0	0	1	0	1	2
9	S 344th Street/ 18th Place S	0	0	0	0	1	0	1	0

Note: Data obtained from IDAX traffic study, September 2019.

Table G1.3-18 Existing PM Peak Hour Pedestrian and Bicycle Volumes for South 336th Street and South 344th Street Alternatives Study Area Intersections

ID	Intersection	Bicycle Eastbound	Bicycle Westbound	Bicycle Northbound	Bicycle Southbound	Pedestrian East	Pedestrian West	Pedestrian North	Pedestrian South
1	S 336th Street/ 20th Avenue S	0	1	0	0	2	1	0	2
2	SR 99/ S 336th Street	0	0	0	0	6	2	4	0
3	SR 99/ S 340th Street	0	0	0	0	15	7	0	0
4	SR 99/ 16th Avenue S	0	0	0	1	3	4	0	1
5	16th Avenue S/ S 341st Place	N/A	0	0	0	10	N/A	0	0
6	18th Avenue S/ S 341st Place	0	0	0	0	0	0	0	1
7	SR 99/ S 344th Street	1	0	0	0	2	6	0	0
8	S 344th Street/ 16th Avenue S	0	0	0	0	7	1	1	2
9	S 344th Street/ 18th Place S	0	0	0	0	0	0	0	0

Note: Data obtained from IDAX traffic study, September 2019.

3.6 Parking

Unrestricted (free, with no time restrictions) on-street parking is permitted on most residential streets south of the landfill property in the Midway Landfill Alternative study area. On-street parking is not permitted on SR 99, S 240th Street, S 259th Street, or S 260th Street, or on 18th Place S south of S 341st Place. Unrestricted on-street parking is limited in the South 336th Street and South 344th Street alternatives study area and is available only on 18th Place S north of S 341st Place, 21st Avenue S, S 341st Place, and S 344th Street east of 18th Place S.

All private parking is associated with businesses in the project area, and there are no pay-for-parking facilities within the project area. Several off-street private business parking lots are available for use by employees and patrons within the study areas.

3.7 Safety

Historical intersection collision data was collected from WSDOT for the 3-year period from January 2016 to December 2018. This data was then reviewed to identify if any of the study area intersections or roadway segments have existing safety concerns that could be exacerbated by the project, as described in the following sections.

3.7.1 Intersection Collisions by Severity

Tables G1.3-19 and G1.3-20 summarize collisions by severity and include total collisions over the specified 3-year period at both study area intersections and roadway segments.

The majority of collisions at the study intersections and roadway segments resulted in property damage only (approximately 65 percent in the Midway Landfill Alternative study area and nearly 69 percent in the South 336th Street and South 344th Street alternatives study area). Almost all remaining collisions (approximately 30 percent in each study area) resulted in minor or possible injuries.[3]

In both study areas, no notable mitigating factors were provided for the fatal and serious injury crashes other than two due to driver inattention and one due to driver disregard for a traffic signal.

Figure G1.3-19 and Figure G1.3-20 show the location of collisions by severity in the study areas.

Table G1.3-19 Existing Collisions by Severity for Midway Landfill Alternative Study Area Intersections and Roadway Segments

ID	Intersection/Roadway Segment Name	Intersection/Roadway Segment Average Daily Traffic	Fatality	Serious Injury	Minor or Possible Injury	Property Damage Only	Other	Total
	Intersection							
1	SR 99/S 240th Street	45,750	2	2	13	39	0	56
2	SR 99/S 244th Street	37,810	0	0	1	2	0	3
3	SR 99/Midway Mobile Home Park Driveway	38,230	0	0	0	0	0	0
4	SR 99/S 246th Street	37,910	0	0	1	1	0	2
5	SR 99/S 248th Street	39,120	0	0	1	6	0	7
6	SR 99/S 252nd Street	42,190	1	2	12	32	0	47
7	SR 99/S 260th Street	50,080	0	0	17	40	0	57
8	29th Avenue S/S 252nd Street	1,280	0	1	0	1	0	2
9	29th Avenue S/S 259th Street	11,950	0	0	2	2	0	4
	Intersection Collision Total		**3**	**5**	**47**	**123**	**0**	**178**
	Roadway Segment							
1	SR 99 Segment S 240th Street to S 260th Street	37,000	1	1	25	36	0	63
2	S 252nd Street Segment SR 99 to 29th Avenue S	1,600	0	0	2	2	0	4
3	S 260th Segment SR 99 to 29th Avenue S	11,000	0	0	5	11	0	16
	Roadway Segment Total		**1**	**1**	**32**	**49**	**0**	**83**

Source: WSDOT Transportation Data and GIS Office, January 2016 to December 2018.

Disclaimer: Under 23 U.S. Code § 409, safety data, reports, surveys, schedules, or lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

[3] WSDOT defines minor injury as “One or more persons in a crash had a non life threatening injury such as: lump on the head, abrasion, bruise, or minor laceration” and possible injury as “One or more persons in a crash had: momentary unconsciousness, claim of injury, limping, complaint of pain, or nausea. These injuries are those reported by the person or indicated by their behavior, but where no wounds or injuries are readily evident”. (WSDOT 2020)

Table G1.3-20 Existing Collisions by Severity South 336th Street and South 344th Street Alternatives Study Area Intersections and Roadway Segments

ID	Intersection/ Roadway Segment Name	Intersection/ Roadway Segment Average Daily Traffic	Fatality	Serious Injury	Minor or Possible Injury	Property Damage Only	Other	Total
	Intersection							
1	20th Avenue S/S 336th Street	14,500	0	0	1	6	0	7
2	SR 99/S 336th Street	59,590	0	1	25	38	0	64
3	SR 99/S 340th Street	40,690	0	0	1	3	0	4
4	SR 99/S 340th Place	41,340	0	0	13	32	0	45
5	16th Avenue S/S 341st Place	24,440	0	0	0	3	0	3
6	18th Avenue S/S 341st Place	2,480	0	0	0	0	0	0
7	SR 99/S 344th Street	26,400	0	0	12	21	0	33
8	S 344th Street/16th Avenue S	29,320	0	0	8	12	0	20
9	S 344th Street/18th Avenue S	1,570	0	0	1	1	0	2
	Intersection Total		**0**	**1**	**61**	**116**	**0**	**178**
	Roadway Segment							
1	SR 99 Segment from S 336th to S 344th Street	31,300	0	1	1	18	0	20
2	S 336th Segment SR 99 to 20th Avenue S	11,900	0	0	3	3	0	6
3	341st Segment 16th Avenue S to 18th Place S	1,500	0	0	0	0	0	0
4	344th Street Segment SR 99 to 18th Place S	5,000	0	0	0	4	0	4
5	16th Avenue S Segment SR 99 to S 344th Street	25,700	0	0	3	12	0	15
6	18th Place S Segment S 341st Street to S 344th Street	800	0	0	0	1	0	1
	Roadway Segment Total		**0**	**1**	**7**	**38**	**0**	**46**

Source: WSDOT Transportation Data and GIS Office, January 2016 to December 2018.

Disclaimer: Under 23 U.S. Code § 409, safety data, reports, surveys, schedules, or lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

Data Sources: King County, Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-19
Collision Locations by Severity
Midway Landfill Alternative

OMF South

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-20
Collision Locations by Severity
South 336th Street and
South 344th Street Alternatives
OMF South

3.7.2 Collisions by Type

In addition to summarizing the collision data by severity, study area intersection collisions are summarized by type in Tables G1.3-21 and G1.3-22. The most common types of collisions in the study areas were rear-end; angle (T-bone) collisions represented the second most common type of collision. Rear-end collisions made up the highest percentage (approximately 39 percent) of all collisions at intersections and roadway segments on SR 99, while angle collisions made up 21 percent of all crashes in the area.

Table G1.3-21 Existing Collisions by Type (January 2016 to December 2018) for Midway Landfill Alternative Study Area Intersections

ID	Intersection/ Roadway Segment Name	Approach Turn	Rear-End	Sideswipe	Angle (T-Bone)	All Others	Head-On	Fixed Object	Bicyclist	Pedestrian	Total
	Intersection										
1	SR 99/ S 240th Street	4	24	9	13	3	0	0	0	3	56
2	SR 99/ S 244th Street	0	0	2	1	0	0	0	0	0	3
3	SR 99/Midway Mobile Home Park Driveway	0	0	0	0	0	0	0	0	0	0
4	SR 99/ S 246th Street	1	1	0	0	0	0	0	0	0	2
5	SR 99/ S 248th Street	3	3	0	0	1	0	0	0	0	7
6	SR 99/ S 252nd Street	3	31	3	5	1	0	0	1	3	47
7	SR 99/ S 260th Street	3	27	10	12	1	0	3	0	1	57
8	29th Avenue S/ S 252nd Street	0	0	1	0	0	0	0	0	1	2
9	29th Avenue S/ S 259th Street	2	0	0	1	0	0	1	0	0	4
	Intersection Total	**16**	**86**	**25**	**32**	**6**	**0**	**4**	**1**	**8**	**178**
	Roadway Segment										
1	SR 99 Segment S 240th Street to S 260th Street	6	23	13	8	4	1	3	1	4	63
2	S 252nd Street Segment SR 99 to 29th Avenue S	0	0	0	0	3	0	1	0	0	4
3	S 260th Segment SR 99 to 29th Avenue S	6	5	2	3	0	0	0	0	0	16
	Roadway Segment Total	**12**	**28**	**15**	**11**	**7**	**1**	**4**	**1**	**4**	**83**

Source: WSDOT Transportation Data and GIS Office, January 2016 to December 2018.

Disclaimer: Under 23 U.S. Code § 409, safety data, reports, surveys, schedules, or lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

Table G1.3-22 Existing Collisions by Type (January 2016 to December 2018) for South 336th Street and South 344th Street Alternatives Study Area Intersections

ID	Intersection/ Roadway Segment Name	Approach Turn	Rear-End	Sideswipe	Angle (T-Bone)	All Others	Head-On	Fixed Object	Bicyclist	Pedestrian	Total
	Intersection										
1	S 336th Street/ 20th Avenue S	0	4	1	2	0	0	0	0	0	7
2	SR 99/ S 336th Street	12	23	8	12	3	0	1	2	3	64
3	SR 99/ S 340th Street	0	3	0	0	0	1	0	0	0	4
4	SR 99/ 16th Avenue S	3	14	12	10	4	0	2	0	0	45
5	16th Avenue S/ S 341st Place	0	0	1	2	0	0	0	0	0	3
6	18th Avenue S/ S 341st Place	0	0	0	0	0	0	0	0	0	0
7	SR 99/ S 344th Street	1	4	1	26	0	0	0	1	1	33
8	S 344th Street/ 16th Avenue S	5	11	2	2	0	0	0	0	0	20
9	S 344th Street/ 18th Place S	0	0	0	1	0	0	1	0	0	2
	Intersection Total	**21**	**59**	**25**	**55**	**7**	**1**	**4**	**4**	**4**	**178**
	Roadway Segment										
1	SR 99 Segment S 336th Street to S 344th Street	2	5	9	1	1	1	1	0	0	20
2	S 336th Street Segment SR 99 to 20th Avenue S	0	3	1	1	1	0	0	0	0	6
3	341st Segment 16th Avenue S to 18th Place S	0	0	0	0	0	0	0	0	0	0
4	344th St Segment SR 99 to 18th Place S	1	0	0	1	1	0	1	0	0	4
5	16th Avenue S Segment SR 99 to S 344th	0	7	3	3	1	0	0	0	0	15
6	18th Place S Segment S 341st Street to S 344th Street	0	0	0	0	1	0	0	0	0	1
	Roadway Segment Total	**2**	**15**	**13**	**6**	**5**	**1**	**2**	**0**	**0**	**46**

Source: WSDOT Transportation Data and GIS Office, January 2016 to December 2018.

Disclaimer: Under 23 U.S. Code § 409, safety data, reports, surveys, schedules, or lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a federal or state court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

Sideswipe collisions made up 16 percent of collisions in both study areas. Of the 12 serious injury or fatality collisions described in Section 3.7.1, eight involved either pedestrians or bicyclists. Collisions occurred in the business access transit (BAT) lanes in both study areas, although at a much lower rate than those in the innermost lanes. Collision locations by type are shown in Figure G1.3-21 and Figure G1.3-22.

3.7.2.1 Midway Landfill Alternative

During the 3-year period (January 2016 to December 2018), four fatal crashes and six serious injury crashes occurred in the Midway Landfill Alternative study area. Of these, two fatal crashes and two serious injury crashes occurred at the intersection of SR 99 and S 240th Street. A total of 261 collisions occurred at intersections and roadway segments in the Midway Landfill Alternative study area. The intersections at SR 99/S 240th Street and SR 99/S 260th Street had the highest number of collisions over the 3-year period, with 56 and 57 collisions, respectively, equating to a rate of approximately 19 collisions per year at each intersection. The intersection at SR 99/S 252nd Street had the next highest number of collisions (47) and a rate of approximately 16 collisions per year. Collisions at these three intersections comprise 61 percent of the total collisions in the study area. SR 99 between S 240th Street and S 260th Street had the highest number of roadway segment collisions (63) and a rate of approximately 21 collisions per year. Two collisions involved a bicyclist, and 12 involved a pedestrian.

One collision in the Midway Landfill Alternative study area involved a school bus. It occurred along the S 260th Street roadway segment (SR 99 to 29th Avenue S) and resulted from a sideswipe collision.

Eleven collisions occurred in the SR 99 BAT lane, representing 17 percent of total collisions along roadway segments in the Midway Landfill Alternative study area.

3.7.2.2 South 336th Street and South 344th Street Alternatives

During the 3-year period (January 2016 to December 2018), no fatal crashes and two serious injury crashes occurred in the South 336th Street and South 344th Street alternatives study area. A total of 224 collisions occurred at intersections and roadway segments in the study area. The intersection at SR 99/S 336th Street had the highest number of collisions (64), equating to a rate of more than 21 collisions per year. The next highest number of collisions (45) occurred at the SR 99/16th Avenue S intersection, resulting in a rate of 15 collisions per year. Collisions at these two intersections comprise almost 49 percent of the total collisions in the study area. Collisions on SR 99 and 16th Avenue S accounted for more than 75 percent of all roadway segment collisions in the study area. Rear-end and sideswipe collisions accounted for more than 56 percent of all collisions on roadway segments in the study area. The numbers of angle (T-bone) collisions and rear-end collisions were almost the same. Bicyclists and pedestrians were involved in four collisions each. One of the two serious injury collisions in the South 336th Street and S 344th Street Alternatives study area involved a bicyclist.

Three collisions involving buses occurred in the South 336th Street and South 344th Street Alternatives study area. They include one involving a school bus at the SR 99/S 344th Street intersection and two involving transit buses at the SR 99/16th Avenue S and SR 99/S 336th Street intersections. The three collisions were rear-end, angle, and approach turn collisions, respectively. One of the bus collisions resulted in minor injuries, and the other two bus collisions had no injuries.

In the South 336th Street and South 344th Street Alternatives study area, 19 collisions occurred in the SR 99 BAT lane, representing 30 percent of all roadway segment collisions.

Data Sources: King County, Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-21
Collision Locations by Type
Midway Landfill Alternative

OMF South

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.3-22
Collision Locations by Type
South 336th Street and
South 344th Street Alternatives
OMF South

4 TRANSPORTATION IMPACTS

This chapter discusses impacts for the future forecast year of 2042 for the No-Build Alternative and the build alternatives.

4.1 No-Build Alternative

Under the No-Build Alternative, impacts to transportation from construction or operation of OMF South would not occur. However, for the purposes of this Draft Environmental Impact Statement the No-Build Alternative assumes that by the design year 2042, all planned Sound Transit 3 projects, including FWLE and TDLE, are built along with the other public and private projects planned within the study area. Because TDLE would open after OMF South, transportation impacts associated with TDLE that would overlap with OMF South, such as the mainline tracks that would connect to the South 336th Street and South 344th Street alternatives, are addressed within the build alternative impacts discussion below. All other TDLE-related impacts are addressed in Chapter 4, Cumulative Impact Analysis.

4.1.1 Arterial and Local Street Operations

4.1.1.1 Roadway Network and Intersection Modifications

Sound Transit reviewed agency and jurisdictional long-range plans to identify planned and funded transportation projects. The following list of future projects was developed through coordination with WSDOT, City of Kent, and City of Federal Way staff. Very few improvements are planned by the cities of Kent and Federal Way that would alter the roadway network and intersections in the study area for the No-Build Alternative. In the Midway Landfill Alternative study area, the following projects are planned by the City of Kent. Only the first project listed has secured funding.

- Construct two new streets, 32nd Avenue S from S 240th Street to S 244th Street and S 244th Street from SR 99 to 32nd Avenue S, including sidewalks and bike lanes
- Change the signal phasing at the S 260th Street/SR 99 intersection to include flashing yellow arrows on the eastbound and westbound approaches as part of FWLE
- Change the signal phasing at the S 240th Street/SR 99 intersection
- Add westbound dual left-turn lanes and an eastbound right turn pocket at the S 260th Street/SR 99 intersection

The following projects are planned by the City of Federal Way in the South 336th Street and South 344th Street alternatives study area. Only the first project listed has secured funding.

- Add a southbound auxiliary lane on 16th Avenue S from S 344th Street to S 348th Street
- Extend 20th Avenue S to S 344th Street

4.1.1.2 Traffic Volumes

Future (2042) no-build volumes at the study intersections were forecast using growth rates specific to both the City of Kent and the City of Federal Way. For the Midway Landfill Alternative study area, growth rates of 1.11 and 1.12 percent per year derived from the FWLE Final Environmental Impact Statement (Sound Transit 2016) were applied to AM and PM peak hour existing volumes, respectively. For the South 336th Street and South 344th Street alternatives

study area, a singular growth rate of 0.8 percent per year, consistent with assumptions used for analyzing traffic impacts associated with TDLE was applied to existing volumes.

Traffic volumes are forecast to increase throughout the study area between existing conditions and the 2042 AM and PM peak hours. Figure G1.4-1 and Figure G1.4-2 show the forecasted 2042 AM and PM peak hour turning movements under the No-Build Alternative.

Intersection Operations

The traffic operations analysis compares the No-Build Alternative at the same study intersections analyzed under existing conditions. The existing and No-Build Alternative AM and PM peak hour LOS and delay for the study area intersections evaluated are shown in Tables G1.4-1 through G1.4-4. Figures G1.4-3 through G1.4-6 show 2042 AM and PM peak hour operations at the study intersections under the No-Build Alternative.

2042 AM Analysis

As shown in Table G1.4-1 and Table G1.4-2, intersection #2 (SR 99/S 244th Street), intersection #3 (SR 99/Midway Mobile Home Park Driveway), and intersection #5 (SR 99/S 248th Street) in the Midway Landfill Alternative study area are forecast to operate below the LOS standards for the roadway during the 2042 AM peak hour for the No-Build Alternative due to increased congestion in 2042 compared with existing 2019 conditions. These intersections would experience an increase in delay of 12, 11, and 20 seconds per vehicle compared to the existing condition, respectively. The delays can be attributed to the expected population and employment growth in Kent and surrounding cities. In 2042, some intersections operate with a decrease in delay compared with existing conditions. This could happen because of signal optimization, addition of a municipal project, or a combination of the two.

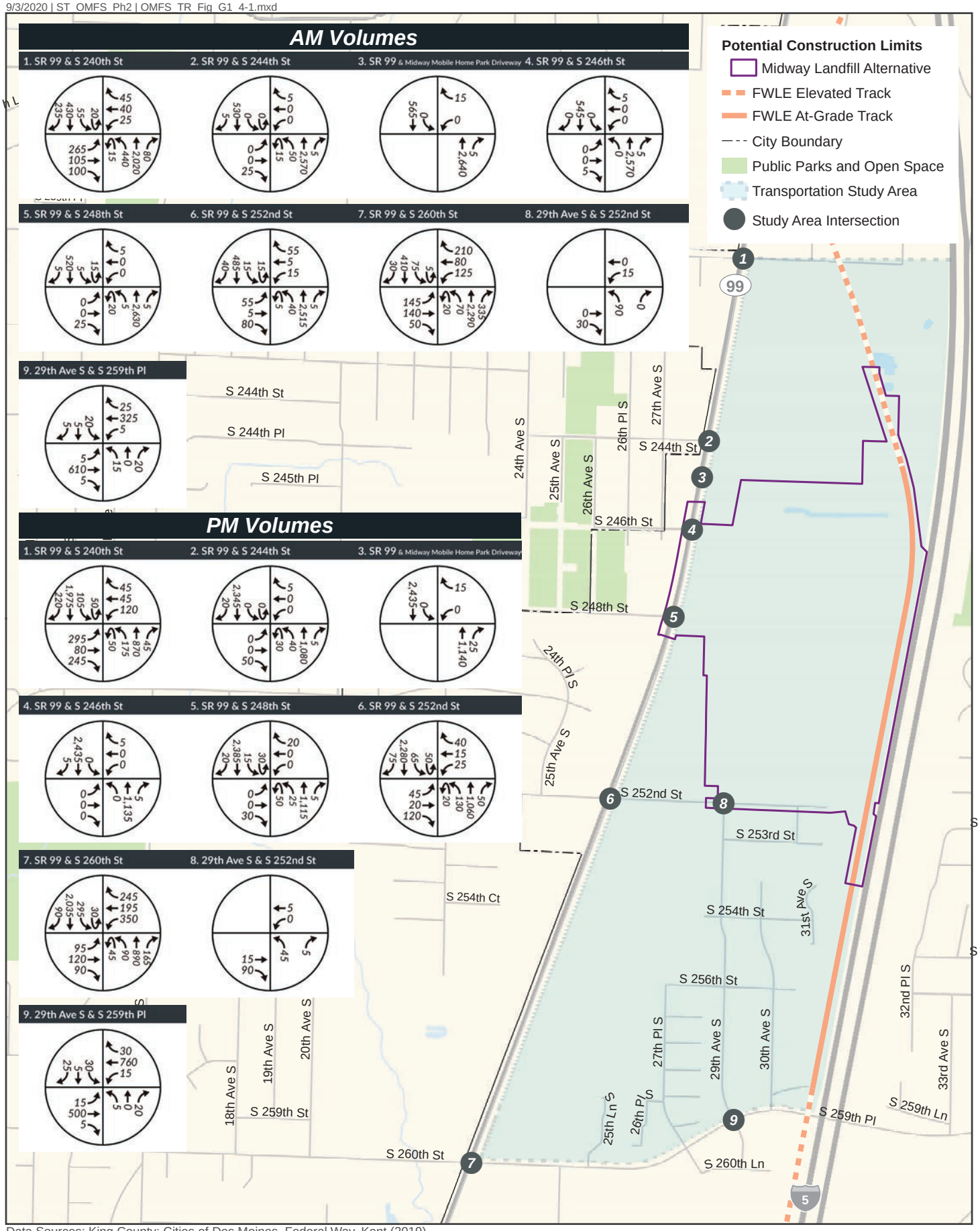
No intersections in the South 336th Street and South 344th Street alternatives study area are forecast to operate below the LOS standards for the roadway during the 2042 AM peak hour for the No-Build Alternative.

2042 PM Analysis

As described for the 2042 AM peak hour, the No-Build Alternative would experience more congestion in 2042 than under existing 2019 conditions. This can be attributed to expected population and employment growth in Kent, Federal Way, and other nearby communities. For similar reasons as outlined for the morning traffic operations, some intersections will show an operational improvement compared with existing conditions in both study areas.

During the 2042 PM peak hour, two of the Midway Landfill Alternative study area intersections are forecast to operate below the LOS standards for the study area. Intersection #2 (SR 99/S 244th Street) and intersection #5 (SR 99/S 248th Street) would experience increases in delay of 81 and 61 seconds, respectively. In the South 336th Street and South 344th Street alternatives study area, intersection #2 (SR 99/S 336th Street) would experience a decrease in delay from 57 seconds to 53 seconds during the 2042 PM peak hour and would no longer operate below the LOS standard for the intersection.

Table G1.4-3 and Table G1.4-4 show the intersections that are forecast to operate below the LOS standards.



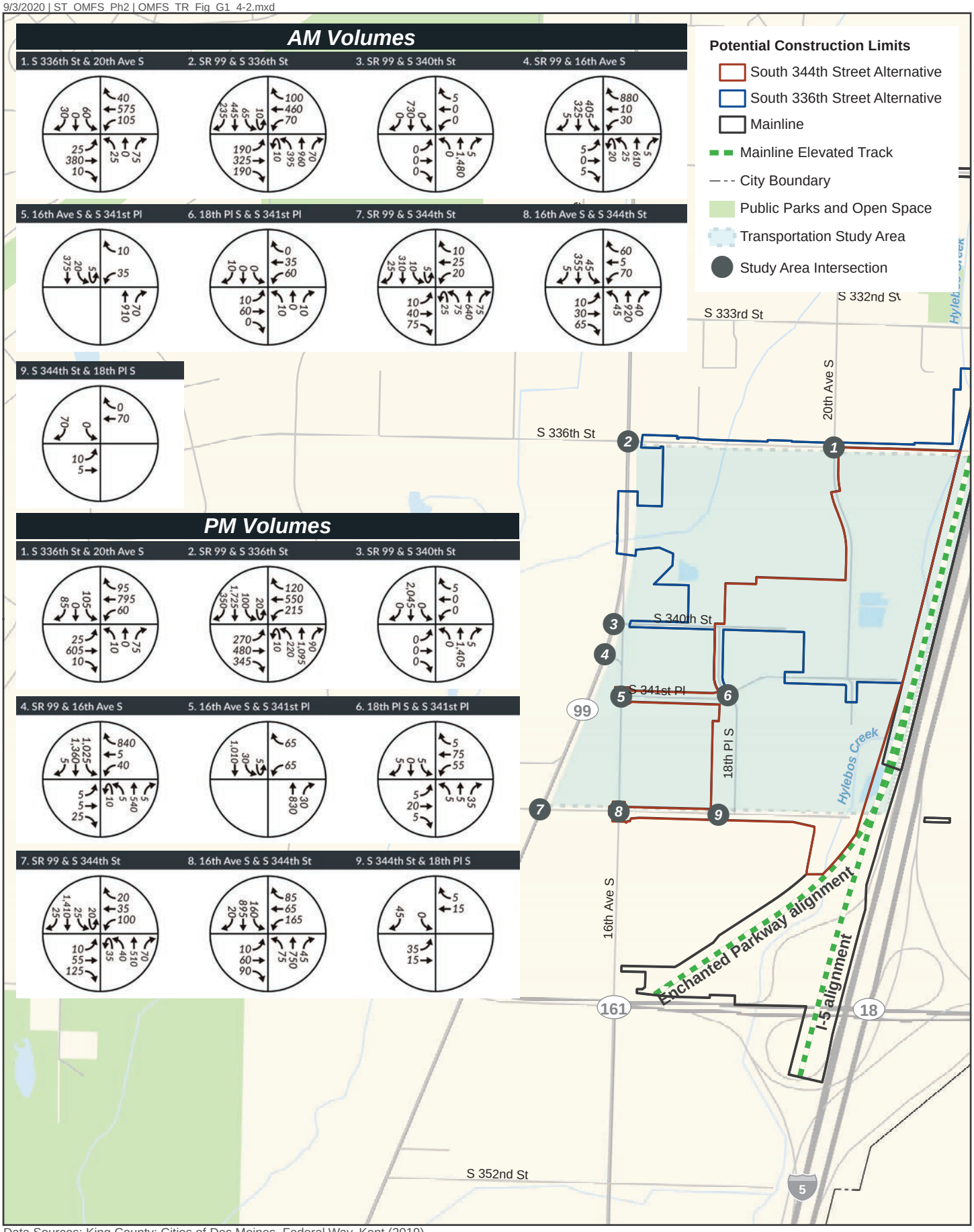
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

FIGURE G1.4-1
2042 No-Build Alternative AM and PM Traffic Volumes
Midway Landfill Alternative

OMF South

N

0 500 1,000 Feet



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-2
2042 No-Build Alternative AM and PM Traffic Volumes
South 336th Street and
South 344th Street Alternatives
OMF South

Table G1.4-1 Midway Landfill Alternative Study Area No-Build Alternative 2042 AM Peak Hour Traffic Operations

ID	Intersection	Control Type	Agency Standard	Existing LOS [1, 2, 3, 4]	Existing Delay (seconds) [1, 2, 3, 4]	No-Build Alternative LOS [1, 2, 3, 4]	No-Build Alternative Delay (seconds) [1, 2, 3, 4]
1	SR 99/ S 240th Street	Signal	WSDOT Highways of Statewide Significance (LOS D))	C	32	C	23
2	SR 99/ S 244th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	D	31	***E***	***43***
3	SR 99/Midway Mobile Home Park Driveway	TWSC	WSDOT Highways of Statewide Significance (LOS D)	D	27	***E***	***38***
4	SR 99/ S 246th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	B	11	B	11
5	SR 99/ S 248th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	D	33	***F***	***53***
6	SR 99/ S 252nd Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	A	8	A	7
7	SR 99/ S 260th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	37	D	47
8	29th Avenue S/ S 252nd Street	TWSC	City of Kent (LOS E)	A	9	A	9
9	29th Avenue S/ S 259th Street	TWSC	City of Kent (LOS E)	C	21	C	22

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using HCM 6th Edition (Transportation Research Board 2016) for signalized and unsignalized intersections except where HCM 6th Edition limitations necessitated use of HCM 2000 methodology (Transportation Research Board 2000).

(3) At signalized intersections utilizing HCM 6th Editionmethodology, U-turn movements were added to left-turn movements to allow for analysis.

(4) Cells highlighted in ***gray bold and italicized*** identify intersections that operate below the LOS standard for the roadway/highway.

Table G1.4-2 South 336th Street and South 344th Street Alternatives Study Area No-Build Alternative 2042 AM Peak Hour Traffic Operations

ID	Intersection	Control Type	Agency Standard	Existing LOS [1, 2, 3]	Existing Delay (seconds) [1, 2, 3]	Existing V/C Ratio [1, 2, 3]	No-Build Alternative LOS [1, 2, 3]	No-Build Alternative Delay (seconds) [1, 2, 3]	No-Build Alternative V/C Ratio [1, 2, 3]
1	S 336th Street/ 20th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.44	N/A	N/A	0.52
2	SR 99/ S 336th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	44	N/A	D	44	N/A
3	SR 99/ S 340th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	C	17	N/A	C	20	N/A
4	SR 99/ 16th Avenue S	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	35	N/A	C	28	N/A
5	16th Avenue S/ S 341st Place	TWSC	City of Federal Way (v/c 1.2)	N/A	N/A	0.12	N/A	N/A	0.15
6	18th Avenue S/ S 341st Place	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.03	N/A	N/A	0.04
7	SR 99/ S 344th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	C	23	N/A	B	18	N/A
8	S 344th Street/ 16th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.33	N/A	N/A	0.39
9	S 344th Street/ 18th Place S	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.06	N/A	N/A	0.07

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using HCM 6th Edition (Transportation Research Board 2016) for signalized and unsignalized intersections except where HCM 6th Edition limitations necessitated use of HCM 2000 methodology (Transportation Research Board 2000).

(3) At signalized intersections utilizing HCM 6th Edition methodology, U-turn movements were added to left-turn movements to allow for analysis.

Table G1.4-3 Midway Landfill Alternative Study Area No-Build Alternative 2042 PM Peak Hour Traffic Operations

ID	Intersection	Control Type	Agency Standard	Existing LOS [1, 2, 3, 4]	Existing Delay (seconds) [1, 2, 3, 4]	No-Build Alternative LOS [1, 2, 3, 4]	No-Build Alternative Delay (seconds) [1, 2, 3, 4]
1	SR 99/ S 240th Street	Signal	WSDOT Highways of Statewide Significance (LOS D))	D	39	D	37
2	SR 99/ S 244th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	***E***	***41***	***F***	***122***
3	SR 99/Midway Mobile Home Park Driveway	TWSC	WSDOT Highways of Statewide Significance (LOS D)	B	13	C	15
4	SR 99/ S 246th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	A	0	A	0
5	SR 99/ S 248th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	***E***	***36***	***F***	***97***
6	SR 99/ S 252nd Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	C	26	D	36
7	SR 99/ S 260th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	44	D	41
8	29th Avenue S/ S 252nd Street	TWSC	City of Kent (LOS E)	A	9	A	9
9	29th Avenue S/ S 259th Street	TWSC	City of Kent (LOS E)	D	25	E	38

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using HCM 6th Edition (Transportation Research Board 2016) for signalized and unsignalized intersections except where HCM 6th Edition limitations necessitated use of HCM 2000 methodology (Transportation Research Board 2000).

(3) At signalized intersections utilizing HCM 6th Edition methodology, U-turn movements were added to left-turn movements to allow for analysis.

(4) Cells highlighted in ***gray bold and italicized*** identify intersections that operate below the LOS standard for the roadway/highway.

Table G1.4-4 South 336th Street and South 344th Street Alternatives Study Area No-Build Alternative 2042 PM Peak Hour Traffic Operations

ID	Intersection	Control Type	Agency Standard	Existing LOS [1, 2, 3, 4]	Existing Delay (seconds) [1, 2, 3, 4]	Existing V/C Ratio [1, 2, 3, 4]	No-Build Alternative LOS [1, 2, 3, 4]	No-Build Alternative Delay (seconds) [1, 2, 3, 4]	No-Build Alternative V/C Ratio [1, 2, 3, 4]
1	S 336th Street/ 20th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.77	N/A	N/A	0.66
2	SR 99/ S 336th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	***E[4]***	***57***	***N/A***	***D***	***53***	***N/A***
3	SR 99/ S 340th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	C	16	N/A	C	16	N/A
4	SR 99/ 16th Avenue S	Signal	WSDOT Highways of Statewide Significance (LOS D)	C	30	N/A	D	36	N/A
5	16th Avenue S/ S 341st Place	TWSC	City of Federal Way (v/c 1.2)	N/A	N/A	0.32	N/A	N/A	0.39
6	18th Avenue S/ S 341st Place	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.05	N/A	N/A	0.05
7	SR 99/ S 344th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	C	30	N/A	B	15	N/A
8	S 344th Street/ 16th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.42	N/A	N/A	0.50
9	S 344th Street/ 18th Place S	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.05	N/A	N/A	0.05

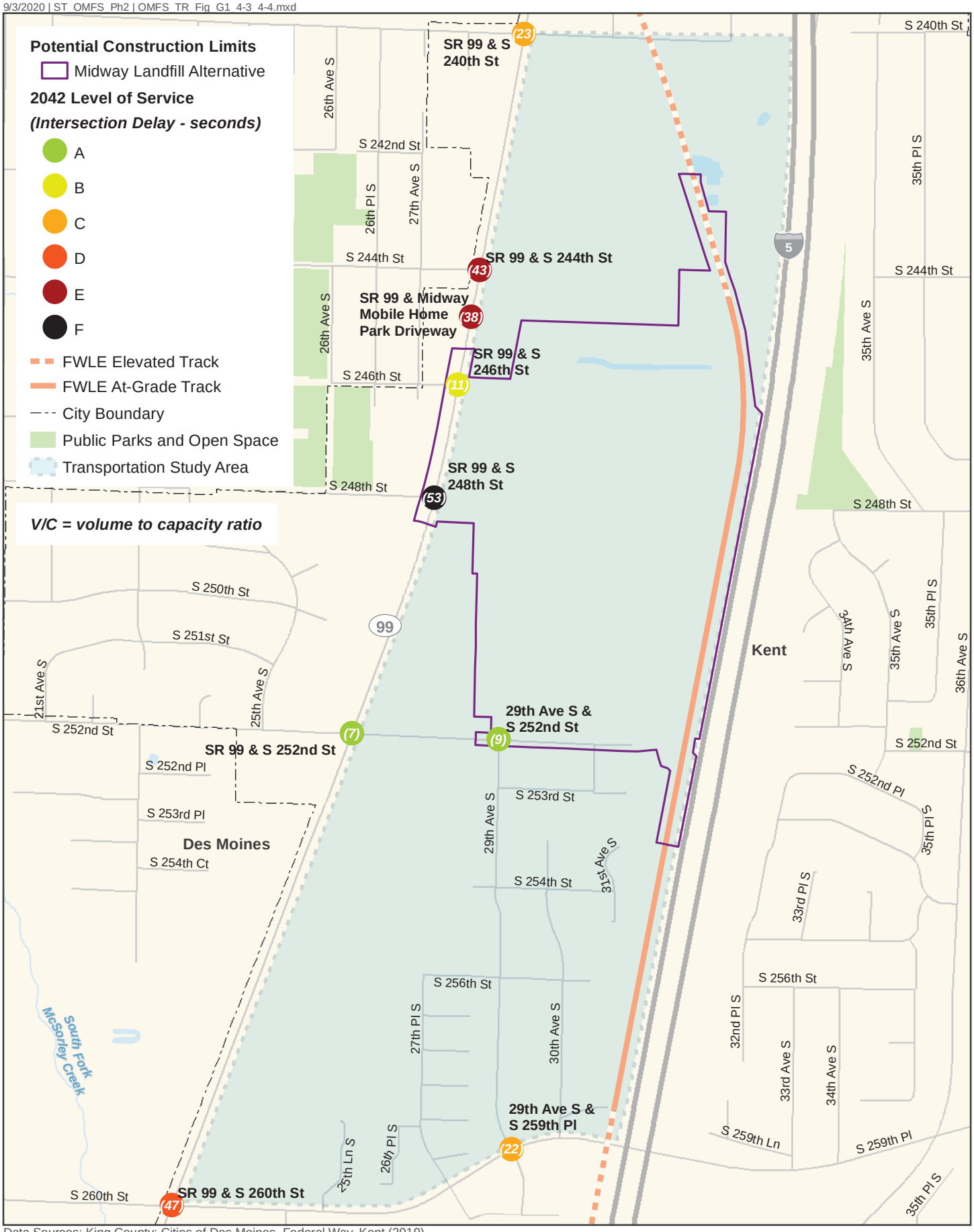
Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using HCM 6th Edition (Transportation Research Board 2016) for signalized and unsignalized intersections except where HCM 6th Edition limitations necessitated use of HCM 2000 methodology (Transportation Research Board 2000).

(3) At signalized intersections utilizing HCM 6th Edition methodology, U-turn movements were added to left-turn movements to allow for analysis.

(4) Cells highlighted in ***gray bold and italicized*** identify intersections that operate below the LOS standard for the roadway/highway.



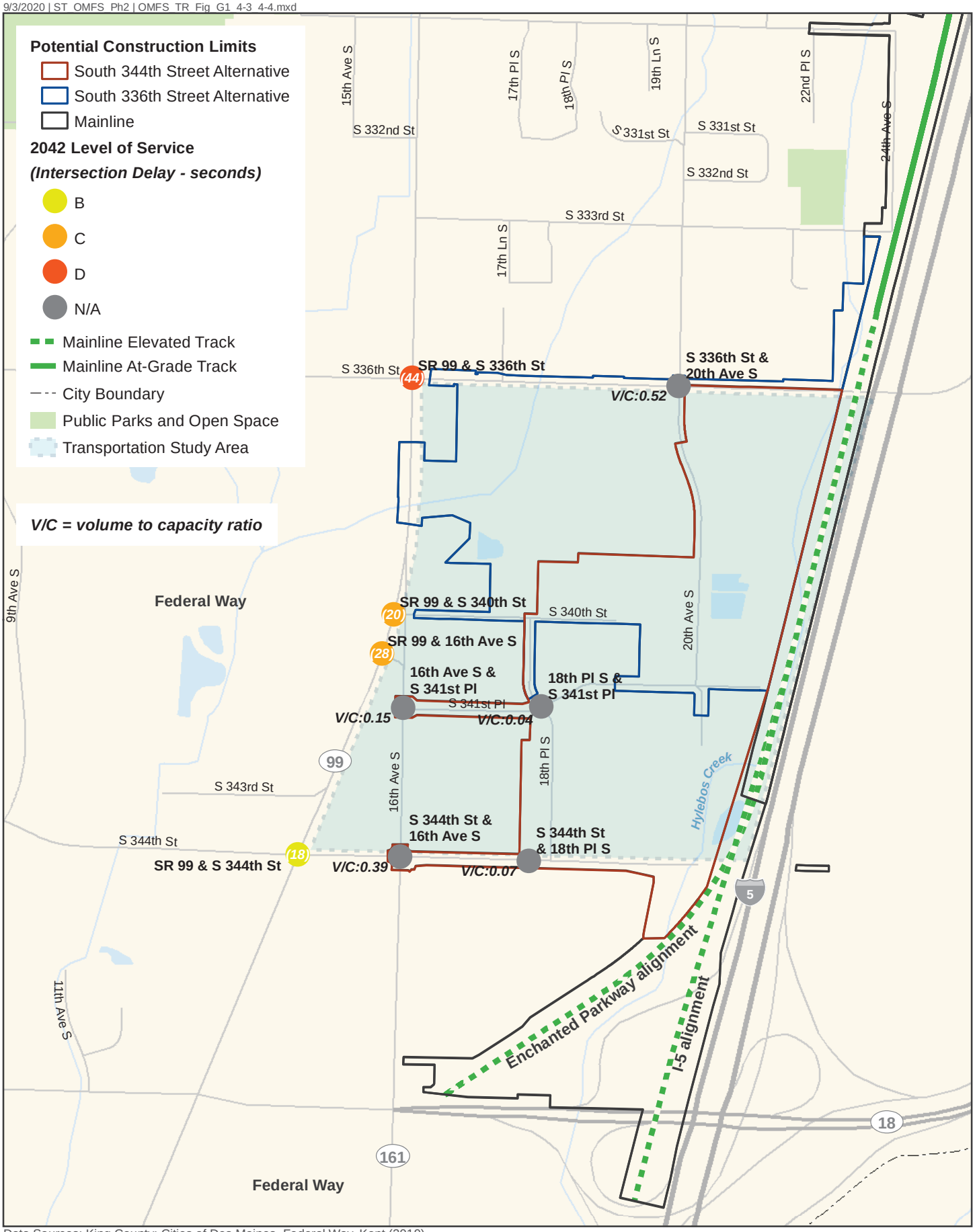
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

FIGURE G1.4-3
2042 No-Build Alternative AM Peak Hour Traffic Operations
Midway Landfill Alternative

N

0 500 1,000 Feet

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-4

2042 No-Build Alternative AM Peak Hour Traffic Operations
South 336th Street and
South 344th Street Alternatives

OMF South

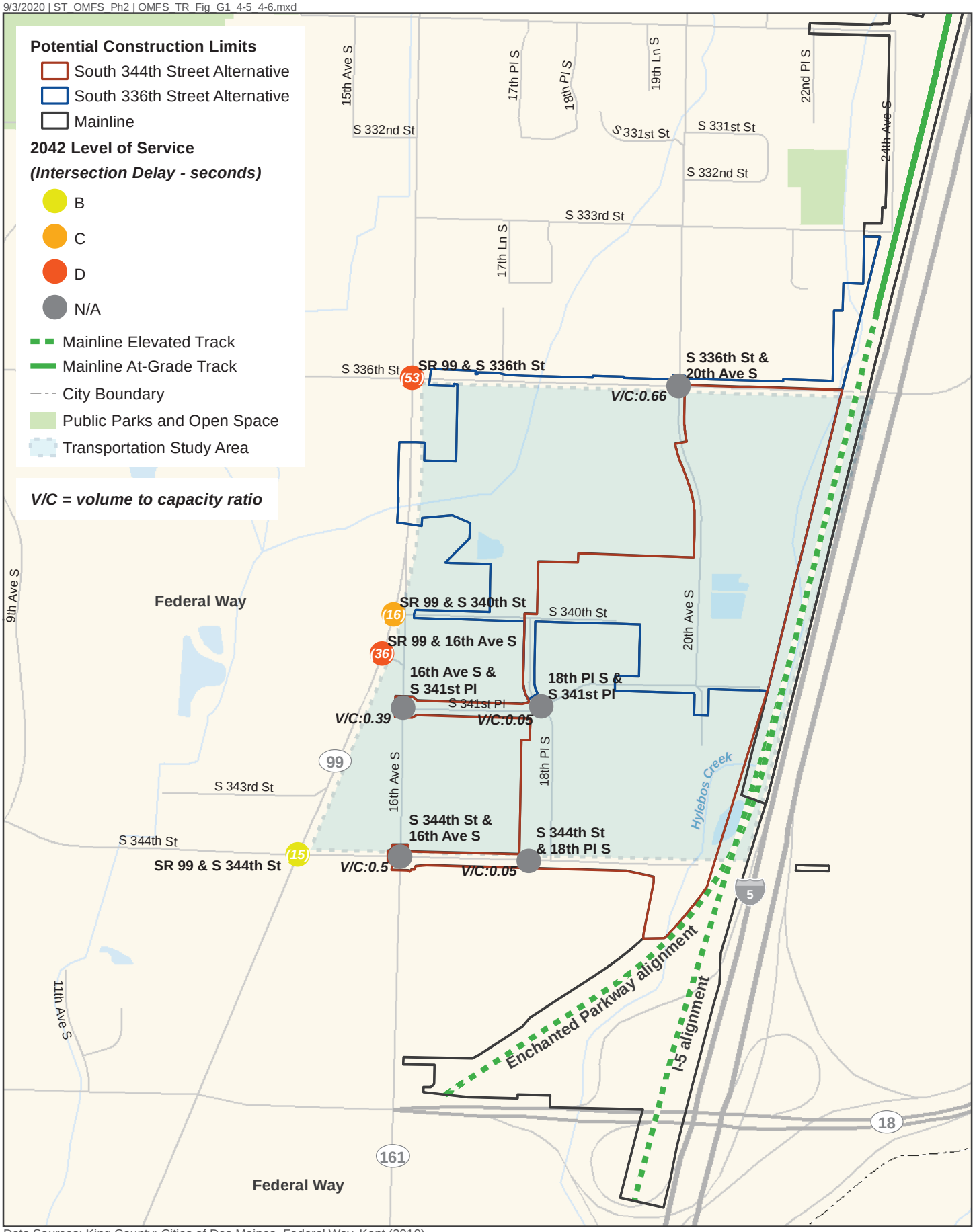
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

FIGURE G1.4-5
2042 No-Build Alternative PM Peak Hour Traffic Operations
Midway Landfill Alternative

N

0 500 1,000 Feet

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-6
2042 No-Build Alternative PM Peak Hour Traffic Operations
South 336th Street and
South 344th Street Alternatives
OMF South

4.1.2 Freight

Under the No-Build Alternative, freight traffic is expected to be affected similarly to general-purpose traffic. Freight would experience the same levels of delay as general-purpose traffic on roadways and at intersections with increased congestion.

4.1.3 Transit

In the No-Build Alternative, Link light rail service will extend to Tacoma through the study areas, as well as to Redmond, downtown Seattle, West Seattle, Ballard, University District, Northgate, Lynnwood, Everett, south Kirkland, and Issaquah. As described in Metro's Long Range Plan, METRO CONNECTS, bus service on the north end and south boundaries of the Midway Landfill Alternative study area is expected to increase with the opening of the Kent/Des Moines station near Highline College as part of the FWLE (King County Metro 2016). No additional service is planned on SR 99. The bus stops at S 240th Street and SR 99 may be closed, with new RapidRide stops developed at the Link station. Some additional bus service is planned along 16th Avenue S in the South 336th Street and South 344th Street alternatives study area. Metro plans to provide less peak-oriented bus service on I-5 through the study areas in 2042.

It is assumed Sound Transit will reduce bus service levels on I-5 through the study areas in 2042, as Link light rail will replace much of the current north-south service from south Puget Sound cities to downtown Seattle and the University District. Existing Sound Transit routes that currently provide service to cities north of Tacoma will be truncated at the Tacoma Dome and Fife Link stations, where riders will transfer to or from Link. It is also assumed Pierce Transit will continue to provide bus service via Routes 402 and 500 in the South 336th Street and South 344th Street alternatives study area at frequencies comparable to those under existing conditions. Route 501 would no longer provide service in the South 336th Street and South 344th Street alternatives study area.

Under the No-Build Alternative, Sound Transit would not have the capacity to receive, test, commission, store, maintain, and deploy the expanded fleet of LRVs needed to support existing and planned future expansions of the light rail system at planned service levels. As a result, light rail operations would be less efficient than they would otherwise be with the facility, and Sound Transit would not be able to meet expected ridership demand.

4.1.4 Nonmotorized Facilities

In the No-Build Alternative, pedestrian and bicycle facilities would be improved in accordance with adopted local plans. Nonmotorized volumes are expected to increase in the Midway Landfill Alternative study area as a result of land use regulations that encourage mixed uses and higher residential densities in the City of Kent's Midway Subarea. The Midway Subarea Plan (City of Kent 2011) envisions an expanded, conceptual pedestrian and bike path framework in the study area, including a bridge over I-5 near S 240th Street and a north-south path connecting S 244th Street to S 252nd Street. 29th Avenue S, S 244th Street, S 252nd Street, S 259th Street, and S 260th Street are envisioned as complete streets, meaning that they would add pedestrian and bicycle facilities.

The Transportation Element of the City of Federal Way Comprehensive Plan calls for installation of shared lane marking for bicycles on the following streets; however, funding for their implementation has not been identified:

- 20th Avenue S south of S 336th Street
- S 341st Place from 18th Place S to 20th Place S

- 18th Place S from S 341st Place to S 344th Street
- S 344th Street from 18th Place S to out of the study area to the west.

4.1.5 Parking

In the No-Build Alternative, the quantity of on-street parking along streets within the study areas described in Section 3.6 is not assumed to change. On-street parking use is expected to stay the same as well because the land uses within the study areas are not expected to change (the comprehensive plans for Kent and Federal Way show the underlying zoning remaining the same). Any new developments within the study areas would be expected to provide adequate off-street parking for their use.

4.1.6 Safety

As noted in the Arterials and Operations section, traffic and nonmotorized volumes in the study area are expected to increase by 2042. This could increase collision frequencies for both motor vehicle and nonmotorized users in the study area. The planned roadway and intersection projects previously described could improve safety through rechannelization, improved sight lines, or the addition of turn lanes. The construction of new bicycle and pedestrian facilities would improve safety for nonmotorized users and motor vehicles in the study area. Dedicated pedestrian and bicycle facilities would improve predictability at conflict points between motor vehicles, pedestrians, and cyclists, and would reduce the likelihood of collisions because potential conflict points would be clearly identifiable by all users.

4.2 Long-Term Impacts

4.2.1 Long-Term Impacts Common to all Build Alternatives

This section analyzes the operational impacts common to all the build alternatives within the study areas for the 2042 forecast year. In both study areas, all track crossings of existing or planned roadways would be elevated. Because there would be no impacts to traffic operations, these track crossings were not included in the intersections evaluated in this analysis.

For each alternative, all access points to the OMF South sites would be controlled by fenced rolling gates, one of which would be located at a guardhouse. Access to the OMF South site would be granted via approval by staff stationed at the guardhouse or by an automated system, such as electronic key cards.

The operations analysis was performed using a two-pronged approach. The first assumed access to a site would be granted via approval by staff stationed at the guardhouse or by an automated system, such as electronic key cards. It is important to note the traffic operations presented in the following sections assume free-flow movement into each OMF South site. They do not consider the effect of the opening and closing of the rolling gate.

The second approach calculated the capacity for vehicles to enter a site based on estimated timing for each gate opening and closing. With the presence of gate-controlled access, the actual delay and queuing could be worse than described for operations without the gate. However, if 75 percent of inbound and outbound vehicles arrive at gate-managed driveways during a peak 15-minute period either before shift change (AM peak hour) or after shift change (PM peak hour), the second analysis indicates that delay from the access gates would

accommodate the inbound and outbound vehicles trips without additional queueing and delays. These impacts are discussed in Section 4.2.1.2, Gate Operations.

This evaluation was completed without the use of the Synchro software because staffed guardhouses and gate operations cannot be evaluated with the software. The two scenarios were evaluated to help understand whether there would be operational flexibility at the gates through the peak hour. The peak hour vehicle trips generated at the facility were assigned to study area roadways and intersections based on existing travel patterns. Traffic volumes are forecast to increase throughout the study areas during both the 2042 AM peak hours and the 2042 PM peak hours. An estimated 475 people would be employed at the facility over the course of three shifts. Within the individual shifts, staff would access the facility during various times. Table G1.4-5 details the estimated staff levels for OMF South, maintenance of way (MOW), and Link System-Wide Storage facilities across three shifts. All employees were assumed to arrive in single-occupancy vehicles.

Table G1.4-5 OMF South, MOW, and Link System-Wide Storage Facility Staffing Calculations

	Day	Swing	Graveyard	Total
	3:30 a.m. to 4 p.m.	**11 a.m. to 11:30 p.m.**	**6:30 p.m. – 7:30 a.m.**	
Staff Totals	192	146	137	475

Source: Sound Transit (2020b)

All trips forecast to and from the facility were assumed to be single-occupancy vehicle trips. No transit or nonmotorized trips were assumed.

4.2.1.1 Traffic Volumes

The system peak hours used for analysis in the cities of Kent and Federal Way are summarized in Table G1.4-6 and are consistent with existing data trends.

Table G1.4-6 System Peak Hours for the Cities of Kent and Federal Way

	AM Peak Hour	PM Peak Hour
Kent	7:15-8:15 a.m.	4:30-5:30 p.m.
Federal Way	7:45-8:45 a.m.	4:30-5:30 p.m.

Based on the shift times provided for the staffing as shown in Table G1.4-5, there would be overlap among employees from different shifts arriving and departing the site. A portion of the day and graveyard shifts staffing estimates would apply to the AM and PM peak hour analyses. Due to the staggered arrival and departure times within the shifts, only 48 of the 192 day shift employees would arrive during the AM peak hour. The overlap of shifts would also result in nine departures during the AM peak hour. During the PM peak hour, 39 employees are forecast to depart, with no arrivals forecast. Because each employee is assumed to arrive or depart in a single-occupancy vehicle, forecast auto volumes match the employee arrival and departure activity. Auto volumes for the build alternatives during the 2042 AM and PM peak hours are shown in Table G1.4-7.

Table G1.4-7 Forecast Auto Volumes for the Build Alternatives 2042 AM and PM Peak Hours

	Inbound AM	Inbound PM	Outbound AM	Outbound PM
Midway Landfill Alternative	48	0	9	39
South 336th Street and South 344th Street Alternatives	48	0	9	39

Source: Sound Transit (2020b).

4.2.1.2 Gate Operations

Guardhouse access driveways at each site would also have a rolling gate for security purposes. The traffic operations do not account for the presence of rolling gates that would close between vehicles entering the sites at the proposed driveway access locations, if the facility chooses to operate the site in such a manner. With the presence of gate-control driveway access, the actual delay and queueing could be worse than reported above.

Example calculations for the time required for the gate to open and close and the associated vehicles per hour capacity are shown in Table G1.4-8. Assuming that 75 percent of inbound and outbound vehicles arrive at gate-managed driveways during a peak 15-minute period either before shift change (AM peak hour) or after shift change (PM peak hour), the access gates should have sufficient capacity to accommodate the inbound and outbound vehicles trips without additional queueing and delays.

Depending on the location of the gate, the driveway could potentially accommodate some number of queuing vehicles.

Table G1.4-8 Forecast Gate Capacity

	Time Required	Gate Capacity (vehicles/ 15 minutes)	Inbound Vehicles Using Gate Accesses	Outbound Vehicles Using Gate Accesses
Midway Landfill Alternative	15 seconds	60 vehicles	36	17
South 336th Street Alternative	15 seconds	60 vehicles	48	39
South 344th Street Alternative	15 seconds	60 vehicles	48	39

Note:
(1) Vehicle volumes at SR 99 Midway gate access represent the vehicles using SR 99/S 246th Street entrance, as vehicles using the S 248th Street entrance would not use the gate.

4.2.1.3 Freight

The build alternatives are not anticipated to negatively affect truck circulation or truck routes on the local street network in the study area. There are no at-grade light rail track profiles that would result in additional crossings or delays for trucks. Freight would experience the same levels of delay as general-purpose traffic on roadways and at intersections throughout the study area.

4.2.1.4 Transit

It is assumed the bus service network under the build alternatives would be the same as the No-Build Alternative. Additional bus service levels or rerouting to the facility are not anticipated for any alternatives. The existing pair of Metro RapidRide stops at SR99/S 246th Street would need to be relocated in order to accommodate development of the Midway Landfill Alternative.

Development of OMF South would provide Sound Transit with additional capacity to receive, test, commission, store, maintain, and deploy an expanded fleet of LRVs for planned Link service. This capacity would provide for more efficient operations of existing and planned future expansions of the light rail system than would occur without the facility.

4.2.1.5 Parking

Under the build alternatives, existing off-street parking would be removed associated with parcel acquisitions in order to accommodate development of the facility. For the build alternatives, on-street parking would be eliminated as follows:

- Midway Landfill Alternative: S 252nd Street
- South 336th Street Alternative: 21st Avenue S east of 20th Avenue S
- South 344th Street Alternative: 21st Avenue S, S 341st Place east of 18th Place S, and S 344th Street east of 21st Avenue S

The loss of on-street parking in the study areas is likely to result in minimal impacts. Off-street parking that would be lost would be associated with parcel acquisitions. The loss of on-street parking on S 252nd Street under the Midway Landfill Alternative could impact adjacent single-family residences; however, there appears to be available capacity along the roadway. On-street parking loss associated with the South 336th Street and South 344th Street alternatives is adjacent to development that likely use it but would also be acquired as part of the project.

It is estimated that up to 450 spaces will be needed for on-site parking for employees, visitors, and nonrevenue vehicles. Table G1.4-9 summarizes the estimated on-site parking need for employees, visitors, and nonrevenue vehicles. The estimated employee parking need was calculated as follows:

- OMF South: 150 percent of the total number of day shift employees
- MOW: 150 percent of the total number of employees during the largest shift
- Link System-Wide Storage: 150 percent of the total number of employees during the largest shift

The day shift is forecast to be the largest shift for the MOW and Link System-Wide Storage.

Table G1.4-9 Estimated On-Site Parking Needed for Build Alternatives

	Estimated Parking Need
OMF Building Parking	
OMF Building Day Shift Staff Total + 50%	182
Visitor Spaces	16
Accessible Spaces	6
Nonrevenue Vehicle Spaces	27
Total OMF Building Parking	**231**
MOW and Facilities Building Parking	
MOW and Facilities Building Day Shift Staff Total + 50%	98
Visitor Spaces	12
Accessible Spaces	4
Nonrevenue Vehicle Spaces	54
Total MOW and Facilities Building Parking	**168**

Table G1.4-9 Estimated On-Site Parking Needed for Build Alternatives (continued)

	Estimated Parking Need
Link System-Wide Storage Building Parking	
Link System-Wide Storage Building Day Shift Staff Total + 50%	14
Visitor Spaces	4
Accessible Spaces	2
Nonrevenue Vehicle Spaces	9
Total Link System-Wide Storage Building Parking	**29**
Total Site Parking	**427**

Source: Sound Transit (2020b).

Note:

(1) Employee and visitor parking includes accessible spaces.

The conceptual layouts for each alternative (see Section 1.2) identify sufficient on-site parking to accommodate forecast demand. Parking quantities identified for each site are:

- Midway Landfill Alternative: approximately 450 spaces
- South 336th Street Alternative: approximately 435 spaces
- South 344th Street Alternative: approximately 435 spaces

4.2.1.6 Safety

As with the No-Build Alternative, traffic and nonmotorized volumes in the study area are forecast to increase by 2042, which could increase collision frequencies for both motor vehicles and nonmotorized users in the study area. The roadway, intersection, and nonmotorized improvements identified under the No-Build Alternative would similarly improve safety for motor vehicles and nonmotorized users in the study areas under the build alternatives.

With the exception of site driveways, OMF South would be located outside transportation facilities, including roadways, highways, sidewalks, bicycle lanes, and nonmotorized trails. All tracks connecting to the site would be elevated over transportation facilities and would not present conflicts for drivers, buses, freight, pedestrians, or cyclists. All vertical support elements, such as walls and columns, would be sited to comply with transportation safety requirements for fixed objects, vertical and horizontal clearances, and other infrastructure-related safety elements.

4.2.2 Midway Landfill Alternative

4.2.2.1 Roadway Network and Intersection Modifications

Development of the Midway Landfill Alternative would not change the existing roadway network or interfere with the potential for development of planned improvements within the study area as described for the No-Build Alternative.

Three driveways to the site would be provided, including a visitor/employee access with a guardhouse from SR 99 at S 246th Street and employee-only access at SR 99/S 248th Street and S 252nd Street/30th Avenue S. Left-turn access into or out of the site at the S 246th Street driveway is currently prohibited by a c-curb. However, the project would modify it to allow left turns by southbound drivers. Left turns into the site at S 248th Street are permitted via a southbound left-turn pocket, but left turns out of the site are prohibited by a c-curb. These would be unsignalized access points. Access at S 252nd Street is signalized, and left turns are

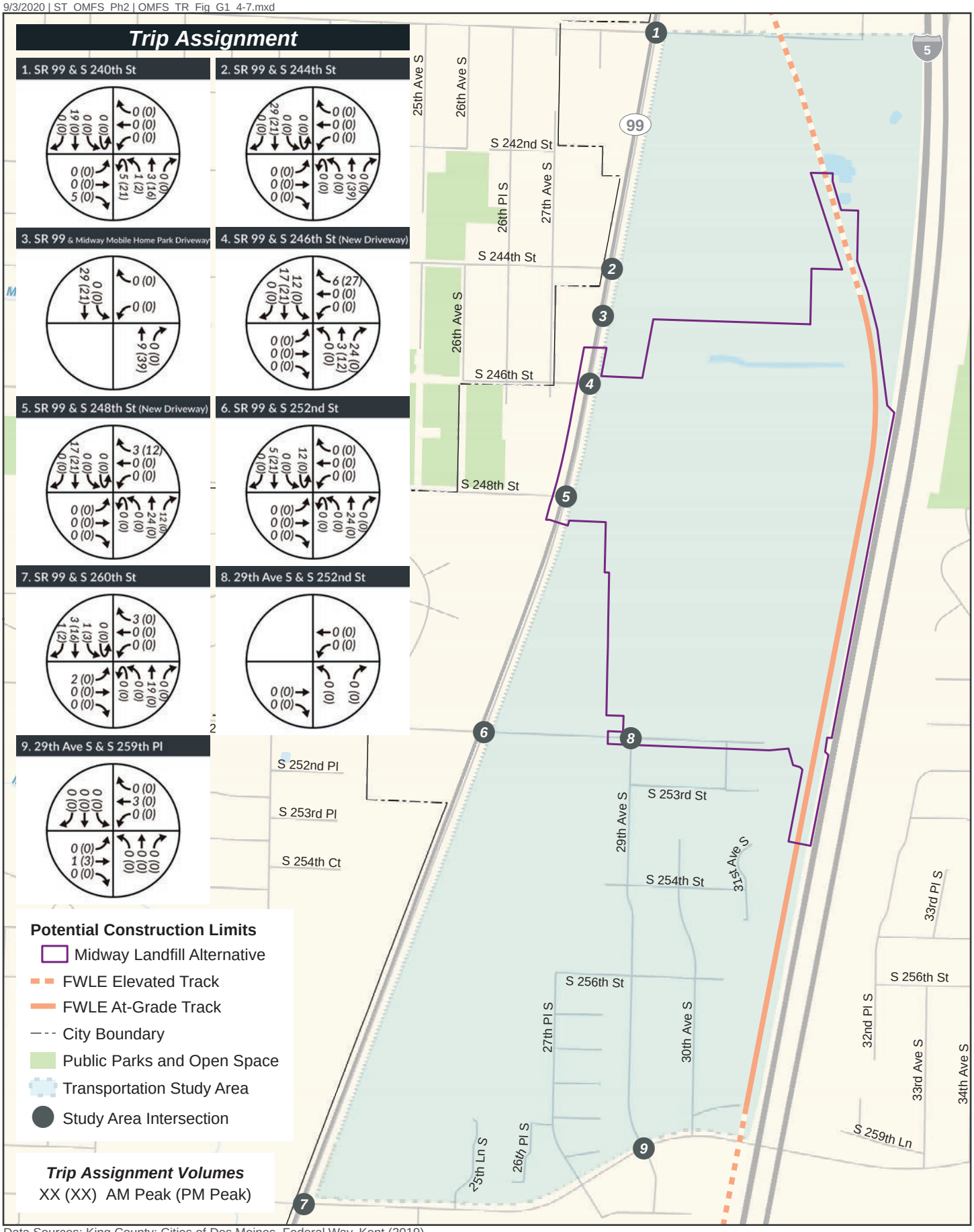
permitted at the intersection. The northern and southern driveways on SR 99 would be located at intersections #4 and #5, respectively. Intersection #10, the south driveway at 30th Avenue S and S 252nd Street, was not evaluated under the No-Build Alternative.

For the Midway Landfill Alternative, there are two driveways that are accessible from SR 99. Some drivers arriving or departing during the peak time period will use the parking area that is closest to the MOW and Link System-Wide Storage facilities and will enter using the southernmost driveway. Drivers who are required to enter the gate controlled area will use the driveway to the north.

4.2.2.2 Traffic Volumes

The peak hour vehicle trips generated by the Midway Landfill Alternative facility, as described in 4.2.1.1 and shown in Table G1.4-7, were assigned to study area roadways and intersections based on existing travel patterns and are summarized in Figure G1.4-7.

As discussed under the No-Build Alternative, traffic volumes are forecast to increase throughout the study area during both the 2042 AM and PM peak hours as a result of planned population and employment growth by local jurisdictions. Figure G1.4-8 shows the forecast 2042 AM and PM peak hour turning movements under the Midway Landfill Alternative.



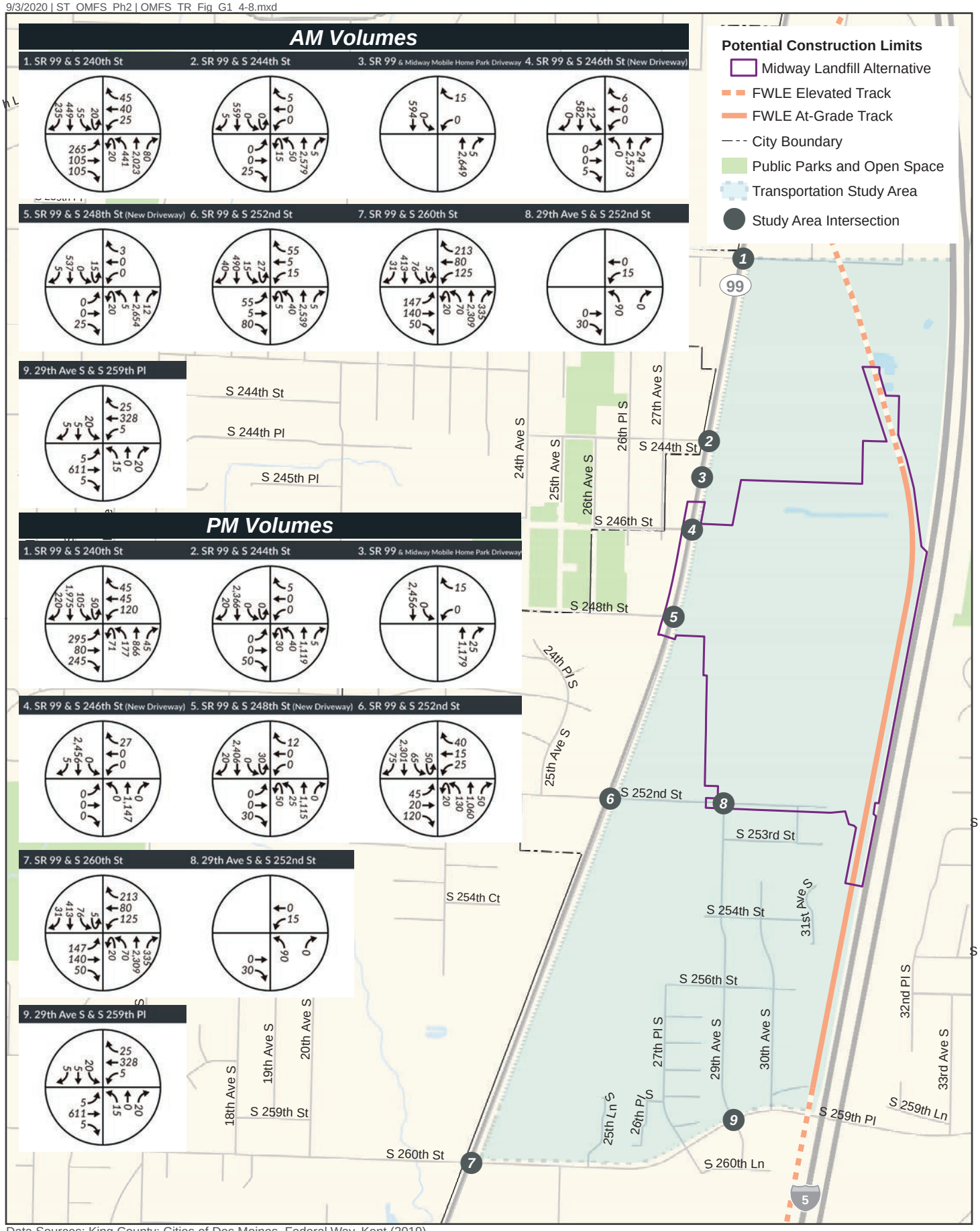
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-7
2042 Build Alternative AM and PM Vehicle Trips
Midway Landfill Alternative

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-8
2042 Build Alternative AM and PM Traffic Volumes
Midway Landfill Alternative

OMF South

4.2.2.3 Intersection Operations

The forecast project alternatives for the 2042 AM and PM peak hour LOS as well as delay for the study area intersections evaluated are discussed below.

Midway Landfill Alternative 2042 AM analysis

As shown in Table G1.4-10, four intersections are forecast to operate below the LOS standards for the Midway Landfill Alternative study area during the AM peak period. The four intersections are intersection #2 (SR 99/S 244th Street), intersection #3 (SR 99/Midway Mobile Home Park Driveway), intersection #4 (SR 99/S 246th Street), and intersection #5 (SR 99/S 248th Street). While intersections #2, #3, and #5 are forecast to operate below the LOS standard for the highway under the No-Build Alternative, the project would add only 1 second or less of delay at these intersections, equating to an increase in delay of less than 3 percent above no-build conditions. This level of change in LOS does not warrant further consideration of mitigation.

Intersection #4 is not forecast to operate below the LOS standard for the highway under the No-Build Alternative because it is a t-intersection with right-in/right-out access for the southbound direction only. With the build alternative, the configuration would be changed to allow southbound left turns that must cross three lanes of traffic to access the site. This change in intersection configuration would result in LOS F operations. There are only 12 vehicles forecast to cross the northbound traffic for access into the Midway Landfill site, but the opposing northbound morning peak hour traffic volume of over 2,570 vehicles using three lanes of traffic is high enough that the southbound left turn delay would exceed the LOS F threshold. The remaining legs of the intersection operate within an acceptable LOS.

For intersections #4 and #5 (the driveway entrances to the site), southbound queueing at the intersections is not anticipated to extend beyond the current and constructed storage lengths of the left-turn lanes. While still operating below the LOS standard for SR 99 with the project, operations at intersection #5 would improve with the project, as trips currently using the driveway would no longer do so in the future.

Figure G1.4-9 shows the 2042 AM peak hour operations at the Midway Landfill Alternative study intersections.

Table G1.4-10 Midway Landfill Alternative 2042 AM Peak Hour Traffic Operations

ID	Intersection	Control Type	Agency Standard	No-Build Alternative LOS [1, 2, 3, 4]	No-Build Alternative Delay (seconds) [1, 2, 3, 4]	Midway Landfill Alternative LOS [1, 2, 3, 4]	Midway Landfill Alternative Delay (seconds) [1, 2, 3, 4]
1	SR 99/ S 240th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	C	23	C	23
2	SR 99/ S 244th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	***E***	***43***	***E***	***43***
3	SR 99/Midway Mobile Home Park Driveway	TWSC	WSDOT Highways of Statewide Significance (LOS D)	***E***	***38***	***E***	***39***
4	SR 99/ S 246th Street (New Driveway)	TWSC	WSDOT Highways of Statewide Significance (LOS D)	B	11	***F***	***77***
5	SR 99/ S 248th Street (New Driveway)	TWSC	WSDOT Highways of Statewide Significance (LOS D)	***F***	***53***	***E***	***39***
6	SR 99/ S 252nd Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	A	7	A	7
7	SR 99/ S 260th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	47	D	49
8	29th Avenue S/ S 252nd Street	TWSC	City of Kent (LOS E)	A	9	A	9
9	29th Avenue S/ S 259th Street	TWSC	City of Kent (LOS E)	C	22	C	22

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Cells highlighted in ***gray bold and italicized*** identify intersections that operate below the LOS standard for the roadway/highway.

(3) Intersections were analyzed using the Synchro outputs for signalized intersections and 2010 Highway Capacity Manual (Transportation Research Board 2010) outputs for unsignalized intersections.

(4) At signalized intersections utilizing HCM 6th Edition methodology (Transportation Research Board 2016), U-turn movements were added to left-turn movements to allow for analysis.

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-9
2042 Build Alternative AM Peak Hour Traffic Operations
Midway Landfill Alternative

OMF South

Midway Landfill Alternative 2042 PM Analysis

As shown in Table G1.4-11, Intersections #2 (SR 99/S 244th Street) and #5 (SR 99/S 248th Street) are forecast to operate below the LOS standard for the highway in the project alternatives, with forecast increases in delay of 7 and 6 seconds, respectively. No other intersections under the Midway Landfill Alternative are forecast to operate below the LOS standard for the roadway or highway.

Figure G1.4-10 shows the 2042 PM peak hour operations at the Midway Landfill Alternative study intersections.

Table G1.4-11 Midway Landfill Alternative 2042 PM Peak Hour Traffic Operations

ID	Intersection	Control Type	Agency Standard	No-Build Alternative LOS [1, 2, 3, 4]	No-Build Alternative Delay (seconds) [1, 2, 3, 4]	Midway Landfill Alternative LOS [1, 2, 3, 4]	Midway Landfill Alternative Delay (seconds) [1, 2, 3, 4]
1	SR 99/ S 240th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	37	D	40
2	SR 99/ S 244th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	***F***	***122***	***F***	***129***
3	SR 99/Midway Mobile Home Park Driveway	TWSC	WSDOT Highways of Statewide Significance (LOS D)	C	15	C	15
4	SR 99/ S 246th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	A	0	C	15
5	SR 99/ S 248th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	***F***	***97***	***F***	***103***
6	SR 99/ S 252nd Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	36	D	37
7	SR 99/ S 260th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	41	D	41
8	29th Avenue S/ S 252nd Street	TWSC	City of Kent (LOS E)	A	9	A	9
9	29th Avenue S/ S 259th Street	TWSC	City of Kent (LOS E)	E	38	E	39

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using the Synchro outputs for signalized intersections and 2010 Highway Capacity Manual (Transportation Research Board 2010) outputs for unsignalized intersections.

(3) At signalized intersections utilizing HCM 6th Edition methodology (Transportation Research Board 2016), U-turn movements were added to left-turn movements to allow for analysis.

(4) Cells highlighted in ***gray bold and italicized*** identify intersections that operate below the LOS standard for the roadway/highway.

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-10
2042 Build Alternative PM Peak Hour Traffic Operations
Midway Landfill Alternative

OMF South

4.2.2.4 Nonmotorized Facilities

Nonmotorized volumes would increase similarly to the No-Build Alternative. Pedestrian and bicycle facilities would generally be developed in a manner comparable to the No-Build Alternative. However, facilities that were planned to cross through the site could not be developed. These include the unfunded north-south improvements connecting S 244th Street to S 252nd Street facilities that were planned to cross through the conceptual layout areas, as described in the No-Build Alternative, within the Midway Landfill Alternative study area.

Right-of-way improvements, which may include the development of new pedestrian and/or bicycle facilities are planned for each alternative. These areas include SR 99 between approximately S 244th Street and S 248th Street.

Impacts on nonmotorized facilities included a qualitative assessment of the potential for the build alternatives to alter operations of pedestrian and bicycle facilities in the study area. There are limited nonmotorized facilities in the Midway Landfill Alternative study area, none of which are eliminated by the project. The project also would not impact circulation through or connections to existing nonmotorized facilities in the study area, as the Midway Landfill currently serves as a barrier. Pedestrians and cyclists could continue to use the existing facilities on SR 99. The planned nonmotorized improvements within the project footprint, including the north-south path and internal pedestrian and bike paths, could not be developed. S 244th Street could be developed as a complete street along a part of its length. The project would not impact the potential to develop a bicycle-pedestrian bridge across I-5 at S 240th Street.

4.2.3 South 336th Street Alternative

4.2.3.1 Roadway Network and Intersection Modifications

The roadway network would be modified for the South 336th Street Alternative. The alternative would not interfere with the potential to add a southbound auxiliary lane on 16th Avenue S from S 344th Street to S 348th Street, as described for the No-Build Alternative.

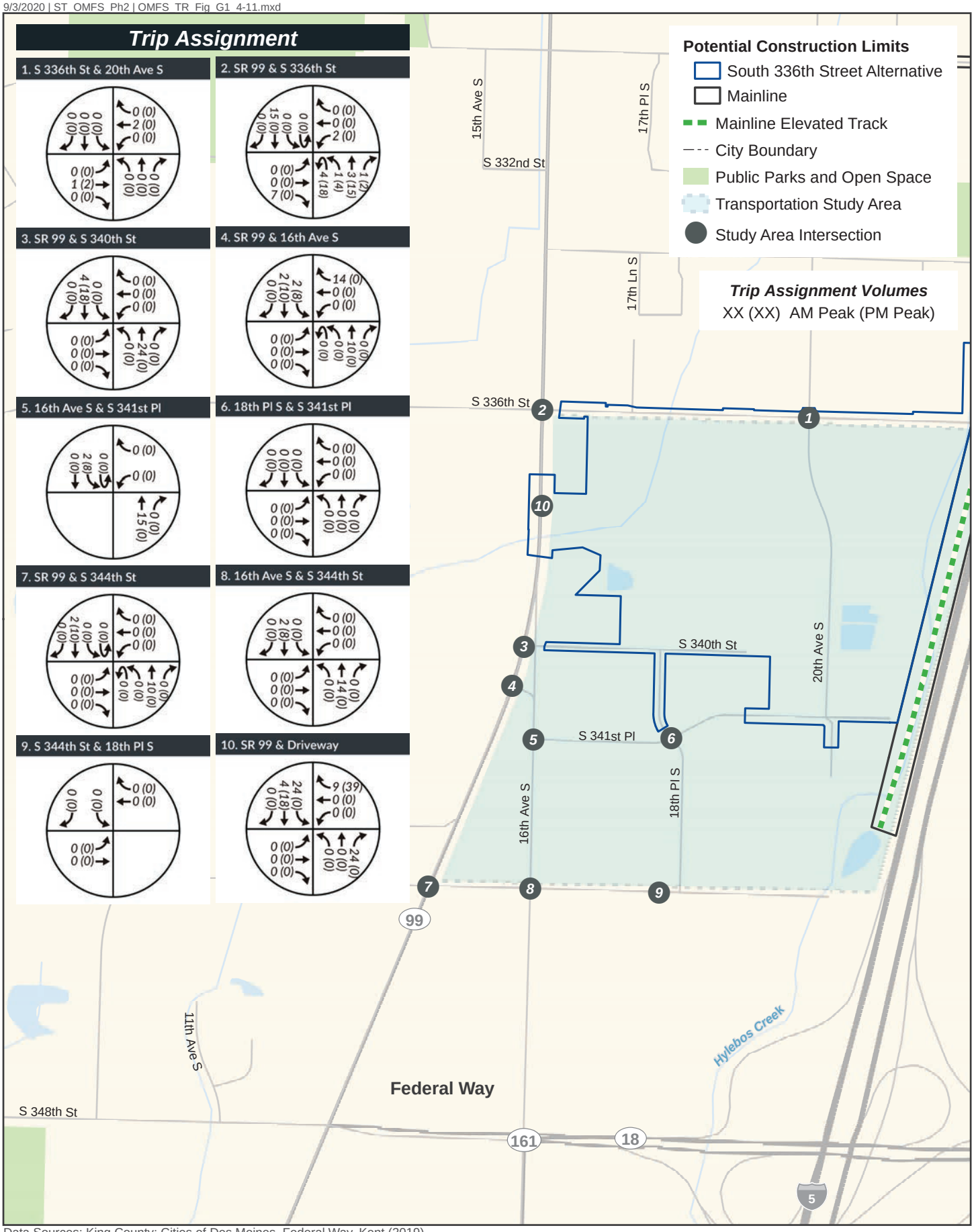
The South 336th Street Alternative would have two access points. The first would be a visitor/employee entrance with a guardhouse at SR 99 south of S 336th Street, at the existing location of the driveway to the Christian Faith Center. The current proposal is for all employees to access the site at this location. Access would remain as left- and right-in and right-out at SR 99. A second access would be provided at the intersection of S 341st Place and 21st Avenue S; however, the entrance would not be used for daily employee access to the site. There would be no turn restrictions at this location. Access to SR 99 would be available via 16th Avenue S or S 344th Street.

20th Avenue S from S 336th Street to S 341st Street would be closed. This was identified as a concern by the City of Federal Way as it would eliminate an alternative route to SR 99 to access properties north and south of the proposed site. However, development of the South 336th Street Alternative would not preclude extension of 20th Avenue S from S 341st Street to S 344th Street by the City of Federal Way as described for the No-Build Alternative.

4.2.3.2 Traffic Volumes

The peak hour vehicle trips generated by the S 336th Street facility, as described in 4.2.1.1 and shown in Table G1.4-7, were assigned to study area roadways and intersections based on existing travel patterns and are summarized in Figure G1.4-11.

As discussed under the No-Build Alternative, traffic volumes are forecast to increase throughout the study area during both the 2042 AM and PM peak hours as a result of planned population and employment growth by the local jurisdictions. Figure G1.4-12 show the forecast 2042 AM and PM peak hour turning movements under the South 336th Street Alternative.



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

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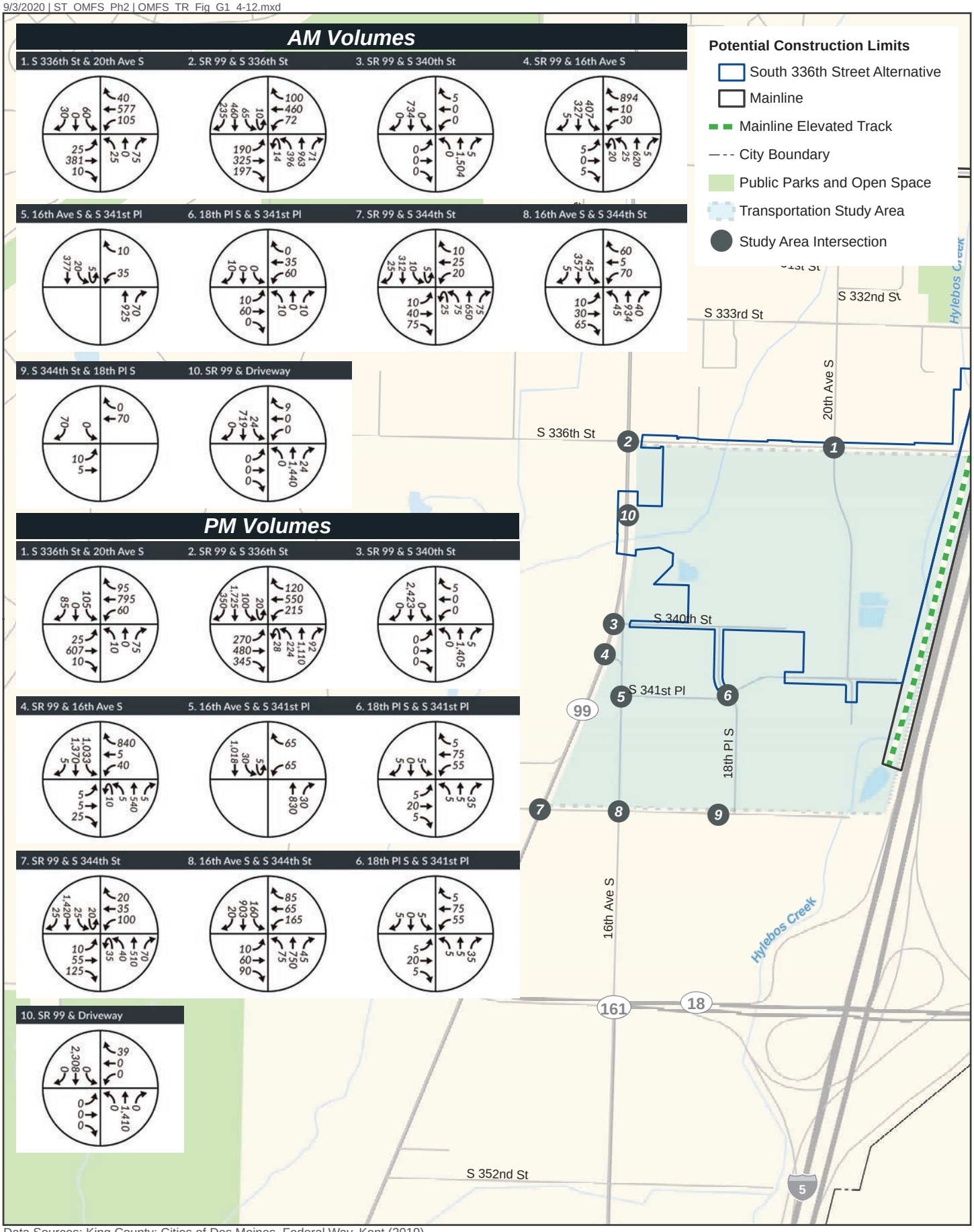
FIGURE G1.4-11
2042 Build Alternative AM and PM Vehicle Trips
South 336th Street Alternative

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

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FIGURE G1.4-12
2042 Build Alternative AM and PM Traffic Volumes
South 336th Street Alternative

OMF South

4.2.3.3 Intersection Operations

The forecast project alternatives for the 2042 AM and PM peak hour LOS as well as delay for the study area intersections evaluated are discussed below.

South 336th Street Alternative 2042 AM Analysis

Under the South 336th Street Alternative, no intersections are forecast to operate below the LOS standard for the roadway or highway, as shown in Table G1.4-12. Figure G1.4-13 shows the 2042 AM peak hour operations at the South 336th Street Alternative study intersections.

Table G1.4-12 South 336th Street Alternative 2042 AM Peak Hour Traffic Operations

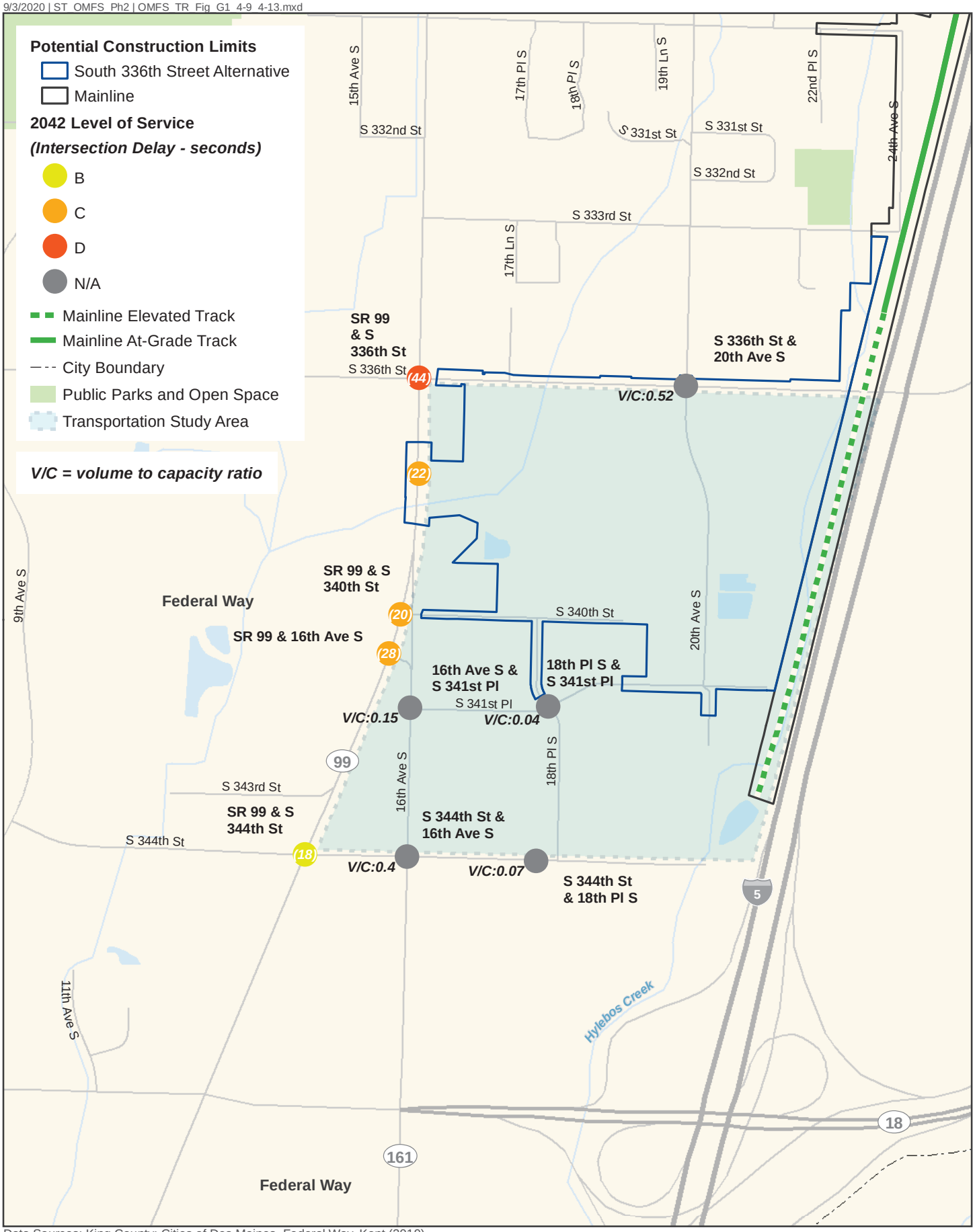
ID	Intersection	Control Type	Agency Standard	No-Build Alternative LOS [1, 2, 3]	No-Build Alternative Delay (seconds) [1, 2, 3]	No-Build Alternative V/C Ratio [1, 2, 3]	South 336th Street Alternative LOS [1, 2, 3]	South 336th Street Alternative Delay (seconds) [1, 2, 3]	South 336th Street Alternative V/C Ratio [1, 2, 3]
1	S 336th Street/ 20th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.52	N/A	N/A	0.52
2	SR 99/ S 336th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	44	N/A	D	44	N/A
3	SR 99/ S 340th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	C	20	N/A	C	20	N/A
4	SR 99/ 16th Avenue S	Signal	WSDOT Highways of Statewide Significance (LOS D)	C	29	N/A	C	28	N/A
5	16th Avenue S/ S 341st Place	TWSC	City of Federal Way (v/c 1.2)	N/A	N/A	0.15	N/A	N/A	0.15
6	18th Avenue S/ S 341st Place	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.04	N/A	N/A	0.04
7	SR 99/ S 344th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	B	18	N/A	B	18	N/A
8	S 344th Street/ 16th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.39	N/A	N/A	0.40
9	S 344th Street/ 18th Place S	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.07	N/A	N/A	0.07
10	SR 99/ Driveway	TWSC	WSDOT Highways of Statewide Significance (LOS D)	-	-	-	C	22	N/A

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using the Synchro outputs for signalized intersections and 2010 Highway Capacity Manual (Transportation Research Board 2010) outputs for unsignalized intersections.

(3) At signalized intersections utilizing HCM 6th Edition methodology (Transportation Research Board 2016), U-turn movements were added to left-turn movements to allow for analysis.



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-13
2042 Build Alternative AM Peak Hour Traffic Operations
South 336th Street Alternative

OMF South

South 336th Street Alternative 2042 PM analysis

Under the South 336th Street Alternative, no intersections would operate below the LOS standard for the roadway or highway during the PM peak hour. Table G1.4-13 and Figure G1.4-14 show the 2042 PM peak hour operations at the South 336th Street Alternative study intersections.

Table G1.4-13 South 336th Street Alternative 2042 PM Peak Hour Traffic Operations

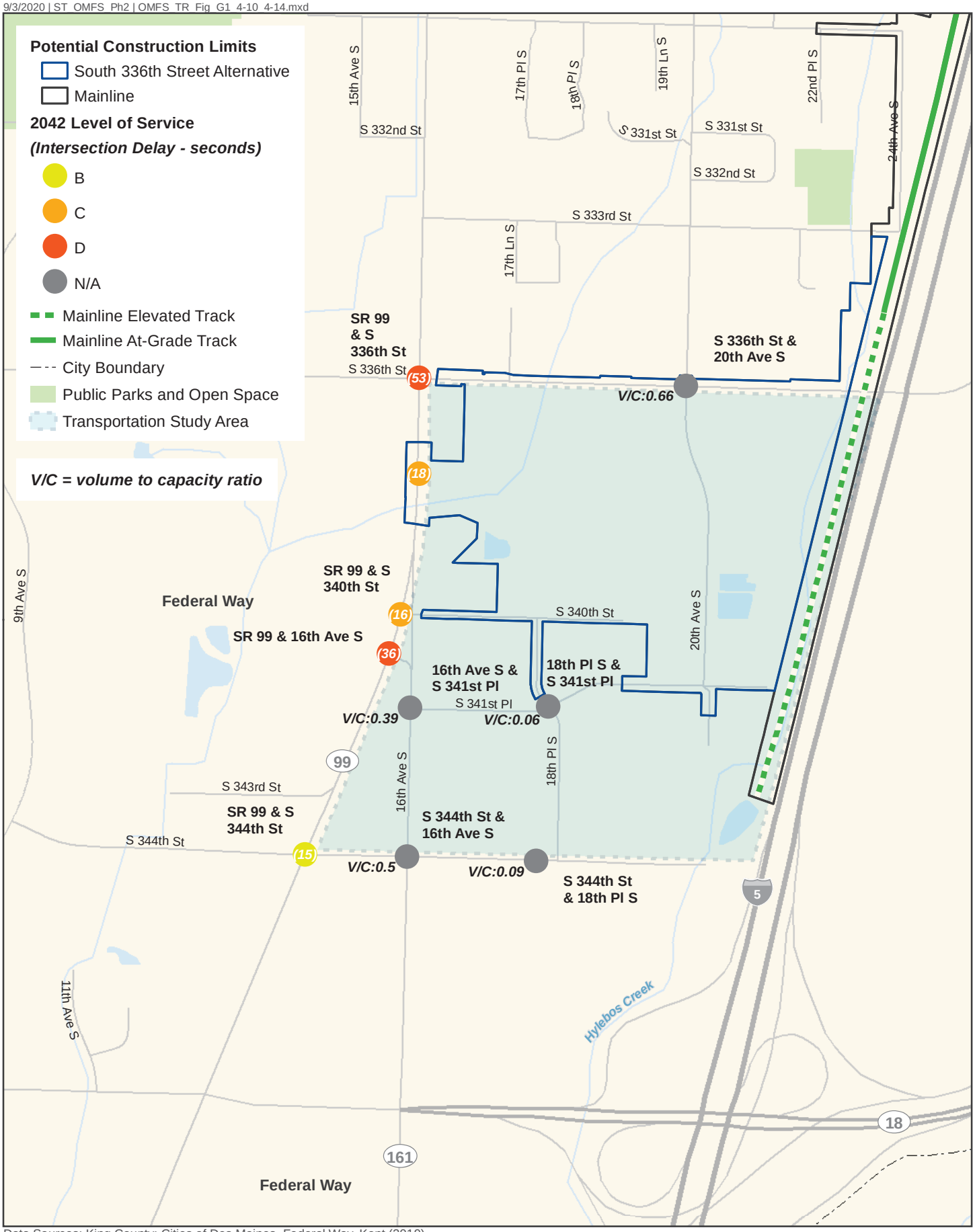
ID	Intersection	Control Type	Agency Standard	No-Build Alternative LOS [1, 2, 3]	No-Build Alternative Delay (seconds) [1, 2, 3]	No-Build Alternative V/C Ratio [1, 2, 3]	South 336th Street Alternative LOS [1, 2, 3]	South 336th Street Alternative Delay (seconds) [1, 2, 3]	South 336th Street Alternative V/C Ratio [1, 2, 3]
1	S 336th Street/ 20th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.66	N/A	N/A	0.66
2	SR 99/ S 336th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	53	N/A	D	53	N/A
3	SR 99/ S 340th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	C	16	N/A	C	16	N/A
4	SR 99/ 16th Avenue S	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	36	N/A	D	36	N/A
5	16th Avenue S/ S 341st Place	TWSC	City of Federal Way (v/c 1.2)	N/A	N/A	0.39	N/A	N/A	0.39
6	18th Avenue S/ S 341st Place	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.05	N/A	N/A	0.05
7	SR 99/ S 344th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	B	15	N/A	B	15	N/A
8	S 344th Street/ 16th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.50	N/A	N/A	0.50
9	S 344th Street/ 18th Place S	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.05	N/A	N/A	0.06
10	SR 99/ Driveway	TWSC	WSDOT Highways of Statewide Significance (LOS D)	–	–	–	C	18	N/A

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using the Synchro outputs for signalized intersections and 2010 Highway Capacity Manual (Transportation Research Board 2010) outputs for unsignalized intersections.

(3) At signalized intersections utilizing HCM 6th Edition methodology (Transportation Research Board 2016), U-turn movements were added to left-turn movements to allow for analysis.



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-14
2042 Build Alternative PM Peak Hour Traffic Operations
South 336th Street Alternative

OMF South

4.2.3.4 Nonmotorized Facilities

Under the South 336th Street Alternative, nonmotorized volumes would increase similarly to the No-Build Alternative. Pedestrian and bicycle facilities would generally be developed in a manner comparable to the No-Build Alternative. However, this alternative would eliminate the north-south connection currently provided via 20th Avenue S and the planned, but unfunded, shared lane markings on 20th Avenue S from S 336th Street to S 341st Street could not be developed.

Alternative facilities could be developed to replicate the connectivity and function of the eliminated north-south connection. With the development of the South 336th Street Alternative, there would be no access points to the project site from S 336th Street, thereby eliminating the need for left-turn access for westbound drivers between SR 99 and 20th Avenue S. Bike lanes are present on S 336th Street between I-5 and 20th Avenue S. Between SR 99 and 20th Avenue S, eastbound left turns provide access to one business, one dead-end residential street, a motel, a single-family residence, a multifamily development, and a church. The two-way left-turn lane along this segment is not likely to be needed; therefore, S 336th Street could be rechannelized to provide bicycle lanes.

Alternatively, this segment of S 336th Street could be widened to provide sufficient space for the two-way turn lane and bicycle lanes. Cyclists could travel on SR 99 via the existing sidewalks between S 336th Street and S 340th Street. S 340th Street between SR 99 and 18th Place S and 18th Place S between S 340th Street and S 341st Street are nonarterial streets that could be signed or rechannelized to provide bicycle facilities that connect to the planned facilities at S 341st Place. The diversion for pedestrians and cyclists would be approximately 0.25 mile longer for people originating on 20th Ave S north of the site or S 336th Street east of the site.

Right-of-way improvements, which may include the development of new pedestrian and/or bicycle facilities, are planned for the South 336th Street Alternative. These areas include SR 99 near the driveway, S 336th Street from SR 99 to I-5, S 340th Street from SR 99 to the programmed site area boundary, S 341st Street beginning east of 18th Place S to the programmed site area boundary, 18th Place S from S 340th Street to S 341st Place, and approximately 150 feet along 21st Avenue S south of S 341st Place.

4.2.3.5 Safety

Beginning south of S 324th Street, the mainline tracks connecting the South 336th Street Alternative to FWLE would be constructed in the I-5 right-of-way directly adjacent to the clear zone—which is the unobstructed, relatively flat area beyond the edge of the roadway to allow drivers to stop safely or regain control of a vehicle if needed. While portions of the mainline alignment would maintain clear zone standards, there may be locations where the minimum widths cannot be met. In such instances, deviations from clear zone distances require approval from WSDOT or FHWA. Failure to meet the standard width of the clear zone could result in impacts to safety conditions and an increase in crash rates. In areas where minimum clear zone conditions cannot be maintained, guardrails, barriers, or impact attenuators, such as water-filled jersey barriers or sand filled barrels, would be provided to shield vehicles from roadside hazards. As a result, the mainline along I-5 is not anticipated to have any quantifiable impact to safety along I-5.

4.2.4 South 344th Street Alternative

4.2.4.1 Roadway Network and Intersection Modifications

The roadway network would be modified under the South 344th Street Alternative. The alternative would not interfere with the potential to add a southbound auxiliary lane on 16th Avenue S from S 344th Street to S 348th Street, as described for the No-Build Alternative.

The South 344th Street Alternative would have two access points. The first is a visitor/employee access with a guardhouse would be provided at the intersection of S 344th Street and 18th Place S, allowing for access to SR 99 via 16th Avenue S or S 344th Street. The current proposal is for all employees to access the site at this location. A second access would be provided at 20th Avenue S, south of S 336th Street, with direct access to the signalized intersection at S 336th Street; however, it would not be for daily employee access to the site. The design of two study intersections would be modified as part of the South 344th Street Alternative. At intersection #6 (18th Avenue S/S 341st Place), the south and east legs would be removed, as they would be occupied by OMF South. The resulting traffic volumes using these legs were therefore removed from the South 344th Street Alternative analysis at this intersection.

The alternative would close 20th Avenue S just south of S 336th Street and preclude the planned extension of 20th Avenue S from S 341st Street to 344th Street, as described under the No-Build Alternative. Drivers and nonmotorized travelers wishing to access the remaining streets in the southern part of the study area would be required to do so via 16th Avenue S or SR 99.

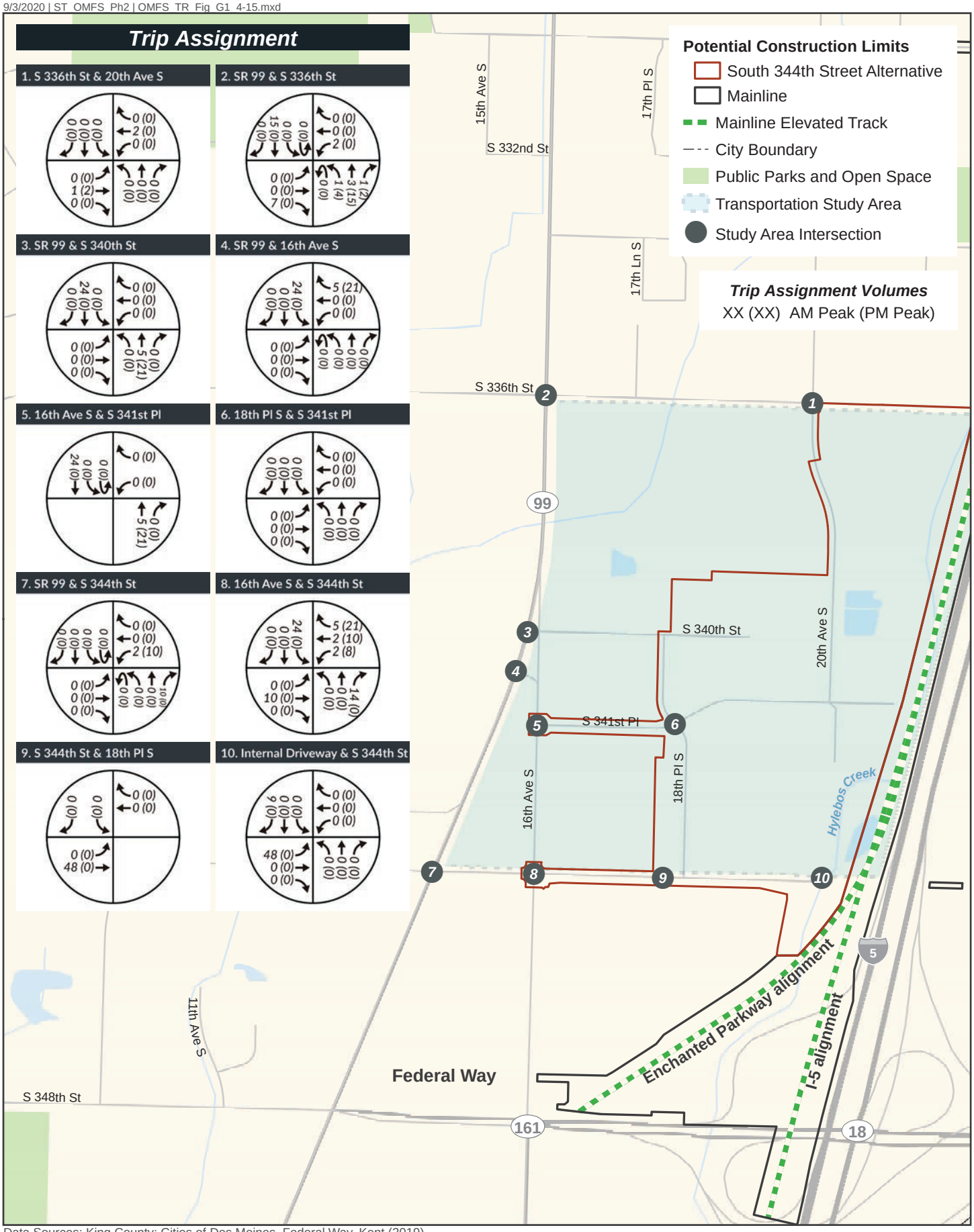
4.2.4.2 Traffic Volumes

The peak hour vehicle trips generated by the S 344th Street facility, as describe in 4.2.1.1 and shown in Table G1.4-7, were assigned to study area roadways and intersections based on existing travel patterns and are summarized in Figure G1.4-15.

As discussed under the No-Build Aternative, traffic volumes are forecast to increase throughout the study area during both the 2042 AM and PM peak hours as a result of planned population and employment growth by the local jurisdictions. Figure G1.4-16 show the forecast 2042 AM and PM peak hour turning movements under the South 344th Street Alternative.

4.2.4.3 Intersection Operations

The forecast project alternatives for the 2042 AM and PM peak hour LOS as well as delay for the study area intersections evaluated are discussed below. Nearby uses, such as the Christian Faith Center, generate large traffic volumes outside of the weekday AM or PM peak hours. Given the planned arrival and departure times for staff at the facility, traffic generated by the facility is not anticipated to exacerbate existing conditions associated with church events.



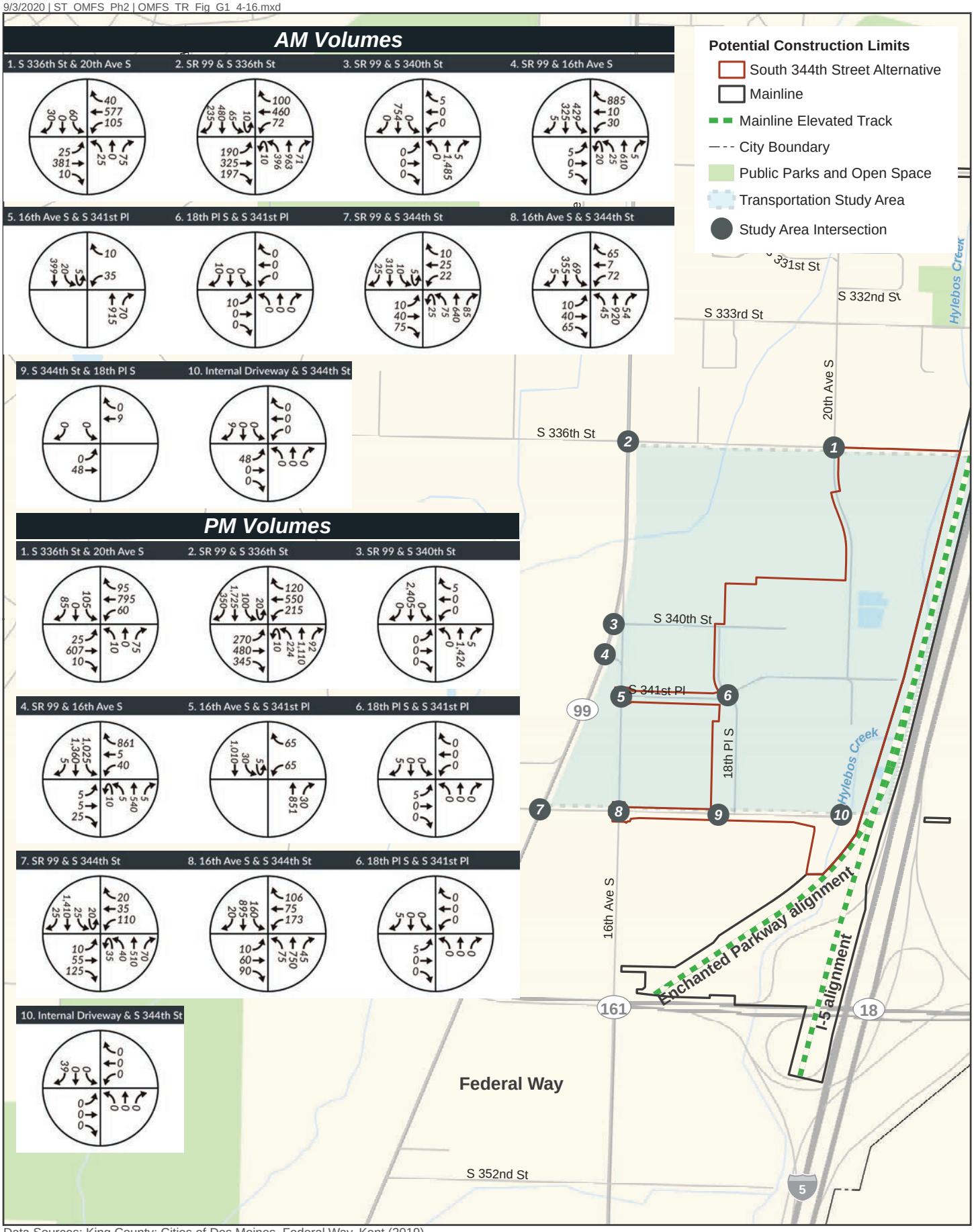
Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-15
2042 Build Alternative AM and PM Vehicle Trips
South 344th Street Alternative

OMF South



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-16
2042 Build Alternative AM and PM Traffic Volumes
South 344th Street Alternative

OMF South

South 344th Street Alternative 2042 AM Analysis

As shown in Table G1.4-14, no intersections under the South 344th Street Alternative are forecast to operate below the LOS standard for the roadway or highway. Figure G1.4-17 shows the 2042 AM peak hour operations at the South 344th Street Alternative study intersections.

Table G1.4-14 South 344th Street Alternative 2042 AM Peak Hour Traffic Operations

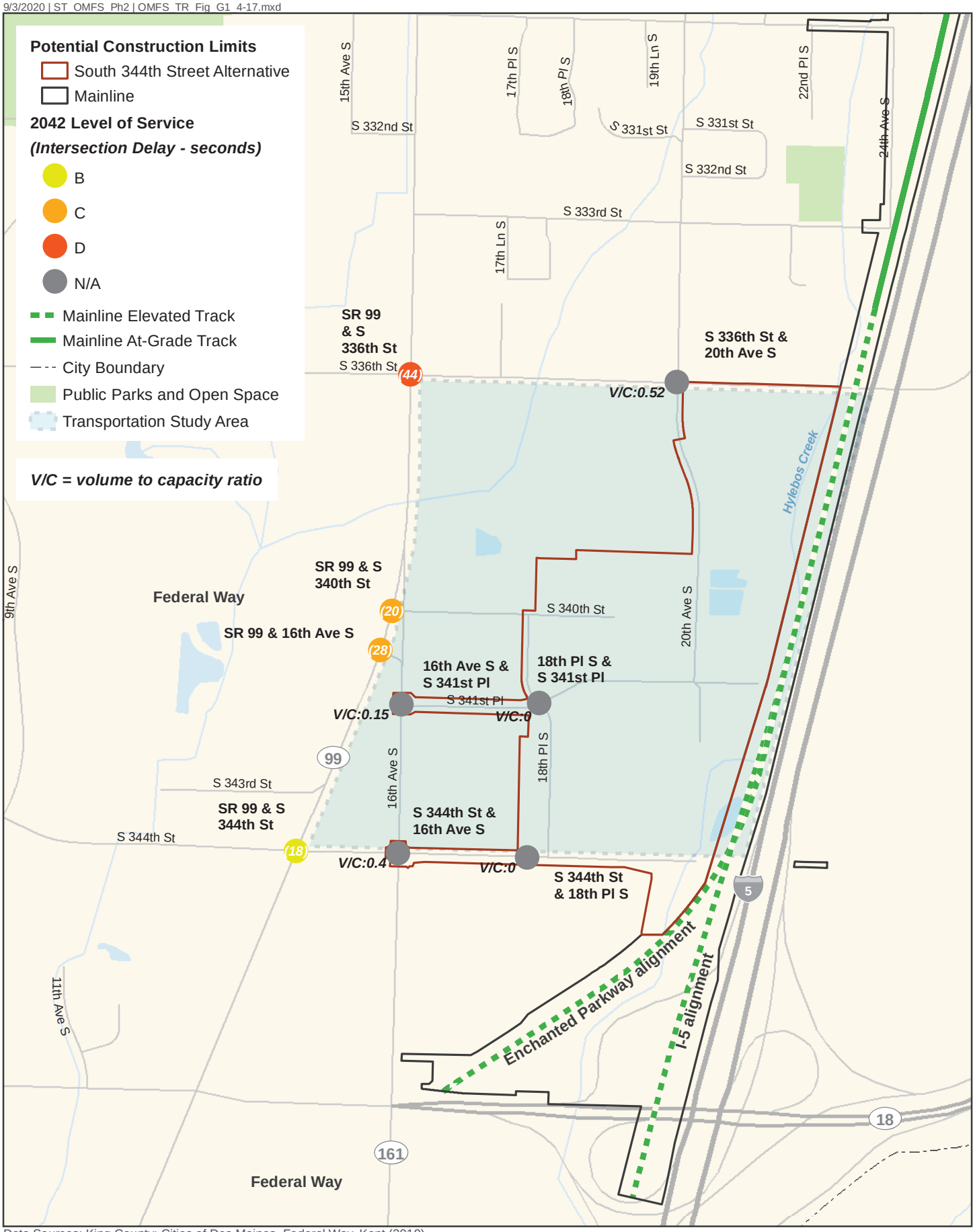
ID	Intersection	Control Type	Agency Standard	No-Build Alternative LOS [1, 2, 3]	No-Build Alternative Delay (seconds) [1, 2, 3]	No-Build Alternative V/C Ratio [1, 2, 3]	South 344th Street Alternative LOS [1, 2, 3]	South 344th Street Alternative Delay (seconds) [1, 2, 3]	South 344th Street Alternative V/C Ratio [1, 2, 3]
1	S 336th Street/ 20th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.52	N/A	N/A	0.52
2	SR 99/ S 336th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	44	N/A	D	44	N/A
3	SR 99/ S 340th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	C	20	N/A	C	20	N/A
4	SR 99/ 16th Avenue S	Signal	WSDOT Highways of Statewide Significance (LOS D)	C	29	N/A	C	28	N/A
5	16th Avenue S/ S 341st Place	TWSC	City of Federal Way (v/c 1.2)	N/A	N/A	0.15	N/A	N/A	0.15
6	18th Avenue S/ S 341st Place	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.04	N/A	N/A	0.00
7	SR 99/ S 344th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	B	18	N/A	B	18	N/A
8	S 344th Street/ 16th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.39	N/A	N/A	0.40
9	S 344th Street/ 18th Place S	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.07	N/A	N/A	0.00

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using the Synchro outputs for signalized intersections and 2010 Highway Capacity Manual (Transportation Research Board 2010) outputs for unsignalized intersections.

(3) At signalized intersections utilizing HCM 6th Edition methodology (Transportation Research Board 2016), U-turn movements were added to left-turn movements to allow for analysis.



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-17
2042 Build Alternative AM Peak Hour Traffic Operations
South 344th Street Alternative

OMF South

South 344th Street Alternative 2042 PM Analysis

Similar to the South 336th Street Alternative, no intersections would operate below the LOS standard for the roadway or highway during the PM peak hour. Table G1.4-15 and Figure G1.4-18 show the 2042 PM peak hour operations at the South 344th Street Alternative study intersections.

Table G1.4-15 South 344th Street Alternative 2042 PM Peak Hour Traffic Operations

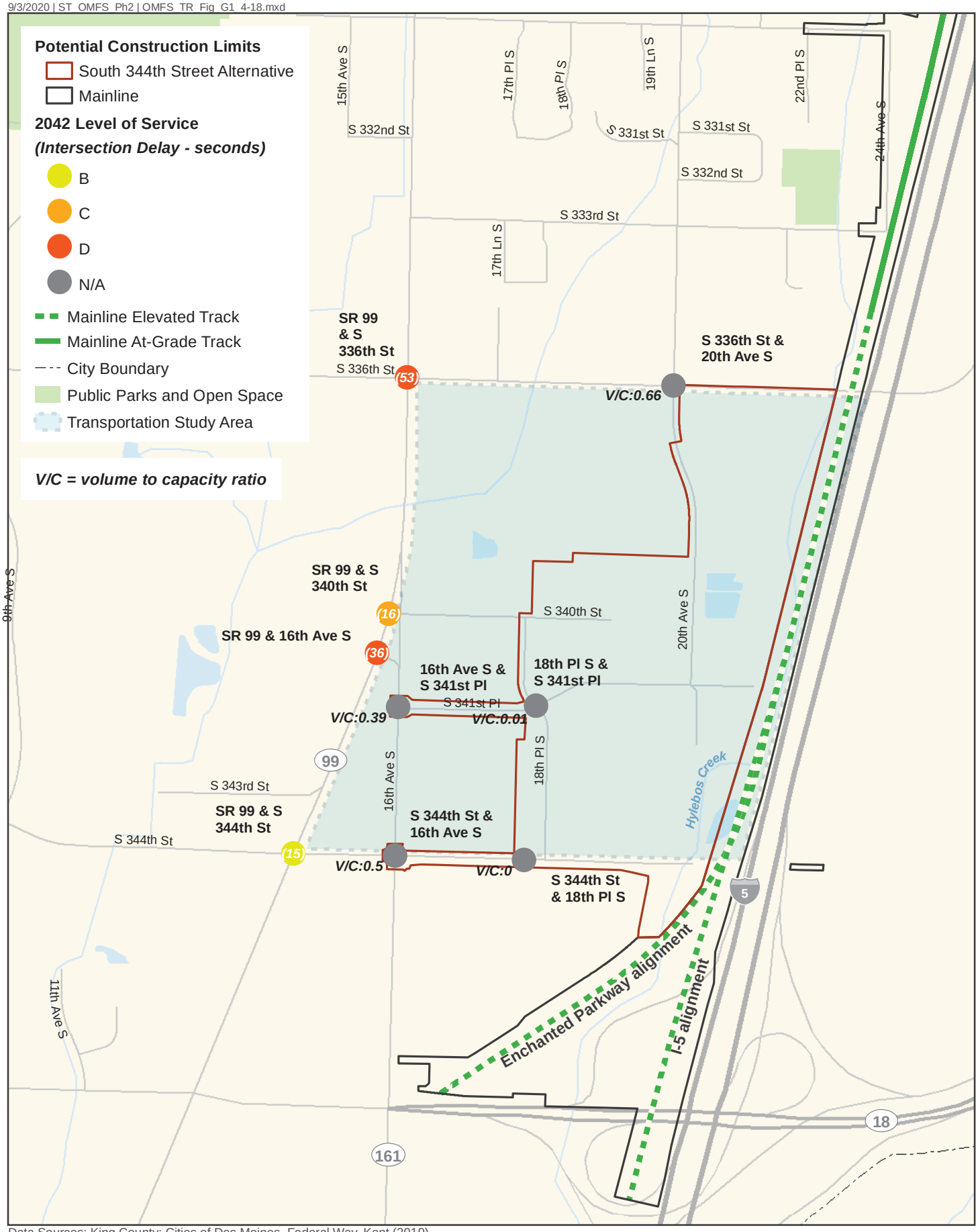
ID	Intersection	Control Type	Agency Standard	No-Build Alternative LOS [1, 2, 3]	No-Build Alternative Delay (seconds) [1, 2, 3]	No-Build Alternative V/C Ratio [1, 2, 3]	South 344th Street Alternative LOS [1, 2, 3]	South 344th Street Alternative Delay (seconds) [1, 2, 3]	South 344th Street Alternative V/C Ratio [1, 2, 3]
1	S 336th Street/ 20th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.66	N/A	N/A	0.66
2	SR 99/ S 336th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	53	N/A	D	53	N/A
3	SR 99/ S 340th Street	TWSC	WSDOT Highways of Statewide Significance (LOS D)	C	16	N/A	C	16	N/A
4	SR 99/ 16th Avenue S	Signal	WSDOT Highways of Statewide Significance (LOS D)	D	36	N/A	D	36	N/A
5	16th Avenue S/ S 341st Place	TWSC	City of Federal Way (v/c 1.2)	N/A	N/A	0.39	N/A	N/A	0.39
6	18th Avenue S/ S 341st Place	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.05	N/A	N/A	0.01
7	SR 99/ S 344th Street	Signal	WSDOT Highways of Statewide Significance (LOS D)	B	15	N/A	B	15	N/A
8	S 344th Street/ 16th Avenue S	Signal	City of Federal Way (v/c 1.2)	N/A	N/A	0.50	N/A	N/A	0.50
9	S 344th Street/ 18th Place S	Uncontrolled	City of Federal Way (v/c 1.2)	N/A	N/A	0.05	N/A	N/A	0.00

Notes:

(1) Synchro analyzes intersections in isolation and does not take into account downstream congestion. Actual intersection operations may have more delay based on intersection interactions and queuing propagating upstream and downstream between intersections.

(2) Intersections were analyzed using the Synchro outputs for signalized intersections and 2010 Highway Capacity Manual (Transportation Research Board 2010) outputs for unsignalized intersections.

(3) At signalized intersections utilizing HCM 6th Edition methodology (Transportation Research Board 2016), U-turn movements were added to left-turn movements to allow for analysis.



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-18
2042 Build Alternative PM Peak Hour Traffic Operations
South 344th Street Alternative

OMF South

4.2.4.4 Nonmotorized Facilities

Under the South 344th Street Alternative, nonmotorized volumes would increase similarly to the No-Build Alternative. Pedestrian and bicycle facilities would generally be developed in a manner comparable to the No-Build Alternative. However, the alternative would eliminate the north-south connection currently provided via 20th Avenue S and the following planned but unfunded shared lane markings :

- 20th Avenue S south of S 336th Street
- S 341st Place from 18th Place S to 20th Place S
- 18th Place S from S 341st Place to S 344th Street
- S 344th Street from 18th Place S to out of the study area to the west

The South 344th Street Alternative would also close portions of 18th Place S and S 341st Place, effectively eliminating much of the existing street grid network in the southern part of the study area. Pedestrians and cyclists could continue travel on the existing sidewalks on S 336th Street between SR 99 and S 344th Street.

Right-of-way improvements, which may include the development of new pedestrian and/or bicycle facilities are planned for the South 344th Street Alternative. These areas include S 341st Street and S 344th Street from SR 99 to the programmed site area boundary and 18th Place S from S 340th Street to S 341st Place.

4.2.4.5 Safety

The South 344th Street Alternative mainline would have the same safety impacts as described above for the South 336th Street Alternative for the majority of its length, the only difference being for the mainline tail tracks.

The Enchanted Parkway alignment would turn southwest away from the I-5 right-of-way between S 344th Street and S 359th Street. It would be elevated for this entire section and cross public streets and property access points with grade-separated crossings. For the I-5 alignment, the tail tracks would remain elevated as they travel over the I-5/S 348th St interchange right-of-way. Both tail track alignments would adhere to current design standards and would not be expected to result in safety impacts.

4.3 Construction Impacts

All the build alternatives would require some preparatory demolition activities and earthwork that would generate truck trips. Material delivery and general construction vehicle activity would also contribute to construction-related traffic. As most of this activity would occur during import and export of material to and from the site during site preparation, the estimated volumes of truck traffic presented in the following sections focus on that early period of peak construction traffic to present the worst-case scenario.

4.3.1 Midway Landfill Alternative

The development of OMF South at the Midway Landfill site would include design considerations to mitigate landfill factors that would not typically be present at the South 336th Street and South 344th Street alternatives. Three subsurface construction design options for site

preparation have been prepared, each of which would have different construction and transportation impacts. The options generally have the same horizontal layout and above-grade features but vary in subgrade and foundation approaches. The options include: Platform, Hybrid, and Full Excavation and are discussed briefly below. The construction impact area for the site associated with all subsurface construction design options is shown in Figure G1.4-19.

Platform

Under this subsurface construction design option, OMF South would be built on a 6-inch thick, cast-in-place concrete slab supported on drilled shafts. The drilled shafts would be 10 feet in diameter, distributed on a 35-foot by 70-foot grid under the buildings, track, and drainage vault area. Average shaft lengths would range from 130 feet to 180 feet deep below finished grade. No new fill material is anticipated to be imported for this subsurface construction design option.

Hybrid

Under this subsurface construction design option, the entire landfill cap system would be removed and replaced. Approximately 4.3 million cubic yards of loose landfill material would be excavated, and a ground improvement process called deep dynamic compaction would be used to prepare the site for construction. A concrete slab like the one described for the Platform subsurface construction design option would be built beneath buildings sensitive to settlement, to provide additional support where needed. Tracks, parking, and roads would be built on a slab without underlying drilled shafts. Approximately 1.2 million cubic yards of loose material would need to be brought to the site.

Full Excavation

This subsurface construction design option was designed to completely excavate the landfill, which would produce roughly 4.9 million cubic yards of loose material, 3.0 million cubic yards of which would be hauled off site. Roughly 1.6 million cubic yards of competent soil would be imported. The OMF South site would be constructed on the new, imported soil.

9/3/2020 | ST_OMFS_Ph2 | OMFS_TR_Fig_G1_4-19.mxd

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-19
Construction Impact Area
Midway Landfill Alternative

OMF South

4.3.1.1 Estimation of Construction Truck Traffic

Depending on which subsurface construction design option is chosen, site preparation at the Midway Landfill Alternative could take up to approximately 5 years and 7 months, assuming 12-hour workdays, 6 days per week. For all the subsurface construction design options, excavated material for export off site is assumed to be loaded into 20-foot intermodal containers on waiting trucks. The intermodal containers would be loaded only to a maximum capacity of 30 tons due to roadway load restrictions. The containers would be transported off site for direct load onto rail at an intermodal facility, from which they would then travel to a Subtitle D landfill. The site is assumed to be able to accommodate four active truckloading locations with an on-site load time of 10 minutes each. Each load station at the Midway Landfill would be able to accommodate up to 10 trucks, for a total of up to 40 trucks operating throughout the day, including AM and PM peak periods.

The estimated total round-trip time for a truck exporting material from the site would be 100 minutes. Based on a 12-hour workday, each truck could make seven trips per day. At 40 operating trucks, there would be as many as 280 truck trips per day associated with excavation. This is an approximate value that does not account for irregularity at the beginning and end of the day.

Imported material would need to be delivered separately from the export operation. Trucks would need to be dump trucks with trailers with an assumed capacity of 20 cubic yards, and the export trucks with their intermodal containers would not be compatible with the backfill operation. It is estimated that up to 284 additional truck trips (Hybrid) would be needed to provide import material.

The estimated total round-trip time for import trucks is 100 minutes, consistent with export trucks. This assumption is not based on a particular location. When on site, trucks would dump either in the fill area or at a stockpile location. The demand for import material is expected to be less than the export effort for each subsurface construction design option. The total number of import trucks is assumed to be equally distributed throughout the export duration.

Concrete import for shafts and slabs is assumed to arrive in 9 cubic yard truckloads. The import is assumed to be equally distributed throughout the landfill preparation. Concrete will be locally sourced from an unknown location and is expected to be imported following the same site access requirements as other import and export operations.

Table G1.4-16 summarizes the quantity of export and import material estimated for each subsurface construction design option, the associated truck trips, and the estimated durations of work. Depending on the subsurface construction design option chosen, there could be up to 564 round trip truck trips per day during site preparation work. The estimates of truck traffic are conservative because at this time it is unknown how much excavated material could be used as fill material elsewhere on the same site.

Table G1.4-16 Truck Activity Associated with Site Preparation for Midway Landfill Alternative Subsurface Construction Design Options

Subsurface Construction Design Options	Export Material (ton)	Total Export Truck Trips per Day	Soil Import (cubic yards)	Concrete Import	Total Import Truck Trips per Day	Total Truck Trips per Day	Total Site Preparation Duration (years, months)
Platform	678,000	20	0	531,000	51	71	4 yrs, 1 mo
Hybrid	2,592,000	280	1,240,000	165,000	284	564	5 yrs, 7 mos
Full Excavation	2,956,500	280	1,610,000	0	274	554	4 yrs, 4 mos

4.3.1.2 Potential construction access and truck haul routes

Construction access to the site would be limited to a single driveway at SR 99 and S 246th Street. Outbound trucks exiting the site to transport excavated materials would travel north on SR 99 and access I-5 via Kent-Des Moines Road (SR 516) to reach the intermodal terminal. Inbound trucks would travel south on I-5, exiting at S 272nd Street. They would travel westbound on S 272nd Street to SR 99, where they would turn north and travel to the site. Access to the site for outbound and inbound trucks would be via right turns into and out of the site. No left turns into or out of the site are assumed. Trucks importing material would follow the same routes, although the assumed origin for import material is unknown.

Construction access and truck routes are shown on Figure G1.4-20.

4.3.1.3 Changes to Roadway Capacity

Trucks would traverse the haul routes during the entirety of the 12-hour daily construction period, including both directions during AM and PM peak periods. As described in Section 4.3.1.1, the maximum number of export trucks operating at the site is 40, each performing 7 round trips per day, for a total of 280 daily truck trips. With 280 truck trips during the daily construction period, the average number of truck trips per hour would be 23 to 24. The maximum forecast daily truck trip volume associated with soil and/or concrete import is estimated at 284 trips per day, which equates to 24 additional trucks operating at the site each day.

Each truck round trip includes an outbound and inbound segment, resulting in a total of 700 passenger car equivalent (PCE) daily trips in the study area associated with export activity (280 truck trips x 2.5 PCE). Import activity would result in up to 710 PCE daily trips in the study area (284 truck trips x 2.5 PCE).

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

FIGURE G1.4-20
Construction Access and Truck Routes
Midway Landfill Alternative

OMF South

To estimate traffic impacts, the truck trips are assumed to be distributed evenly throughout the daily site preparation period and are based on the ability of the yard and receiving facility to process the trucks.[4] This information was developed to inform the Conceptual Landfill Site Reuse Plan, part of a preliminary engineering effort for the site (Sound Transit 2020c). A similar 2.5 PCE factor is applied to the truck volume to estimate the number of new trips that would need to be accommodated along the truck routes. Table G1.4-17 summarizes the number of peak hour trucks and associated PCEs for each construction scenario.

Table G1.4-17 Hourly Truck Activity Associated with Midway Landfill Alternative Subsurface Construction Design Options

Subsurface Construction Design Option	Hourly Trucks Export	Hourly Trucks Import	Hourly Trucks Total	Hourly PCE
Platform	2	5	7	18
Hybrid	24	24	48	120
Full Excavation	24	24	48	120

Source: Sound Transit (2020c).

The PCEs shown in the table would be distributed with half exiting the site and half entering the site during the peak hour. The Hybrid and Full Excavation subsurface construction design option would have the same daily truck traffic, with 120 PCE per hour.

The haul routes would be located predominantly on state facilities, including SR 99, SR 516, and I-5, as well as S 272nd Street. Trucks would travel in a single direction on roadways along the haul routes. Because the location of the intermodal facility and the origin of the import material are unknown at this time, the volumes forecast on the I-5 on- and off-ramps represent the maximum forecast for a given direction and would not be present on all ramps. For example, if the intermodal facility and the origin of the import material are located to the north of the Midway Landfill Alternative, there would be no truck activity on the southbound I-5 on-ramp from SR 516 or the S 272nd Street off ramp from northbound I-5. The estimated daily PCE truck trips associated with site preparation for the Platform option would represent no more than 2.9 percent of the existing single direction annual average daily traffic (AADT) for all roadway segments. For the Hybrid and Full Excavation options, estimated daily PCE truck trips on all segments of the haul route, except I-5 and the ramps, would range from 7.7 percent to 12.8 percent of existing single direction AADT. Daily PCE truck trips would range from 11.5 percent to 22.7 percent of single direction AADT on I-5 on- and off-ramps. Table G1.4-18 summarizes AADT on streets that are part of the Midway Landfill Alternative haul routes as well as the estimated truck trips as a percentage of AADT. Figure G1.4-21 displays the location of AADT counts.

[4] Irregularity or bunching at the beginning and end of the day is possible.

Table G1.4-18 Estimated Daily Truck Activity for the Midway Landfill Alternative Compared with Existing AADT

Intersection /Roadway Segment	AADT (Both Directions)[1]	AADT (Single Direction)[1]	Daily Truck Trips as a Percentage of Single Direction AADT – Platform Option	Daily Truck Trips as a Percentage of Single Direction AADT – Hybrid Option	Daily Truck Trips as a Percentage of Single Direction AADT – Full Excavation Option
SR 99: South of SR 516	35,000	17,500	1.0%	8.1%	7.9%
SR 516: East of SR 99	35,000	17,500	1.0%	8.1%	7.9%
SR 516: East of 30th Avenue S	36,000	18,000	1.0%	7.8%	7.7%
I-5 On-Ramp: Eastbound SR 516 to I-5 Southbound	N/A	10,000	1.8%	14.1%	13.9%
I-5 On-Ramp: Eastbound SR 516 to I-5 Northbound	N/A	6,800	2.6%	20.7%	20.4%
I-5: S 240th Street	215,000	107,500	0.2%	1.3%	1.3%
I-5: S 224th Street	225,000	112,500	0.2%	1.3%	1.2%
I-5: S 252nd Street	215,000	107,500	0.2%	1.3%	1.3%
I-5: S 265th Street	215,000	107,500	0.2%	1.3%	1.3%
I-5 Off-Ramp: I-5 SB to S 272nd Street	N/A	12,000	1.5%	11.8%	11.5%
I-5 Off-Ramp: I-5 NB to S 272nd Street	N/A	6,200	2.9%	22.7%	22.3%
S 272nd Street: I-5 to SR 99	22,100	11,050	1.6%	12.8%	12.5%
SR 99: North of S 272nd Street	32,000	16,000	1.1%	8.8%	8.7%
SR 99: South of 252nd Street	29,000	14,500	1.2%	9.7%	9.6%

Sources: WSDOT Traffic GeoPortal (2020a); City of Kent Average Daily Traffic Volume (2009).

Note:

(1) WSDOT and the City of Kent report annual average daily trips (AADT) for roadways. Where roadways are bi-directional, the AADT reported reflects both directions. Single-direction volumes were determined by dividing bi-directional volumes in two.

4.3.1.4 Impacts to Property Access

Impacts to property access for sites in the vicinity of the Midway Landfill Alternative would be minimal. Trucks entering or exiting the site are not expected to block driveways along the haul routes. Properties with access to SR 99 between approximately S 244th Street and S 248th Street and with access to S 252nd Street from 29th Avenue S to the eastern terminus of the street would experience intermittent impacts to access associated with right-of-way improvements constructed as part of the project. Access to properties fronting SR 99 and S 252nd Street would be impacted during construction of right-of-way improvements in these areas.

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 1,000 2,000 Feet

FIGURE G1.4-21

Existing Annual Average Daily Traffic Along Truck Haul Routes
Midway Landfill Alternative

OMF South

4.3.1.5 Impacts to Pedestrian or Bicycle Facilities

Because all construction activity, including staging, is expected to occur within the boundaries of the Midway Landfill Alternative study area, minimal impacts to pedestrian and bicycle facilities are anticipated. The only existing pedestrian or bicycle facilities in the Midway Landfill Alternative study area are on SR 99 along the project frontage. This frontage is expected to remain open during construction. Pedestrians or cyclists may experience additional delay waiting for trucks to enter or exit the property. Pedestrians and cyclists traveling on SR 99 between approximately S 244th Street and S 248th Street and with access to S 252nd Street from 29th Avenue S to the eastern terminus of the street would experience intermittent impacts access associated with right-of-way improvements constructed as part of the project.

4.3.1.6 Impacts to On-Street Parking Supply

Because all construction activity, including staging, is expected to occur within the boundaries of the Midway Landfill site, no impacts to on-street parking supply are anticipated.

4.3.2 South 336th Street Alternative

Only one development scenario is assumed for the South 336th Street Alternative OMF site. It would require demolition of existing structures, export of building debris and excavated material, and import of in-place fill material. This development scenario assumes reuse of 80 percent of on-site material, resulting in lower truck volumes than if all excavated material is exported and all fill material is imported.[5] The construction impact area for the South 336th Street Alternative would extend from the Federal Way Transit Center and include portions of the S 320th Street Park and Ride and the Belmor Park Golf and Country Club as well as other properties near I-5. It would include the entirety of the permanent impact area. The construction impact area for the site associated is shown in Figure G1.4-22.

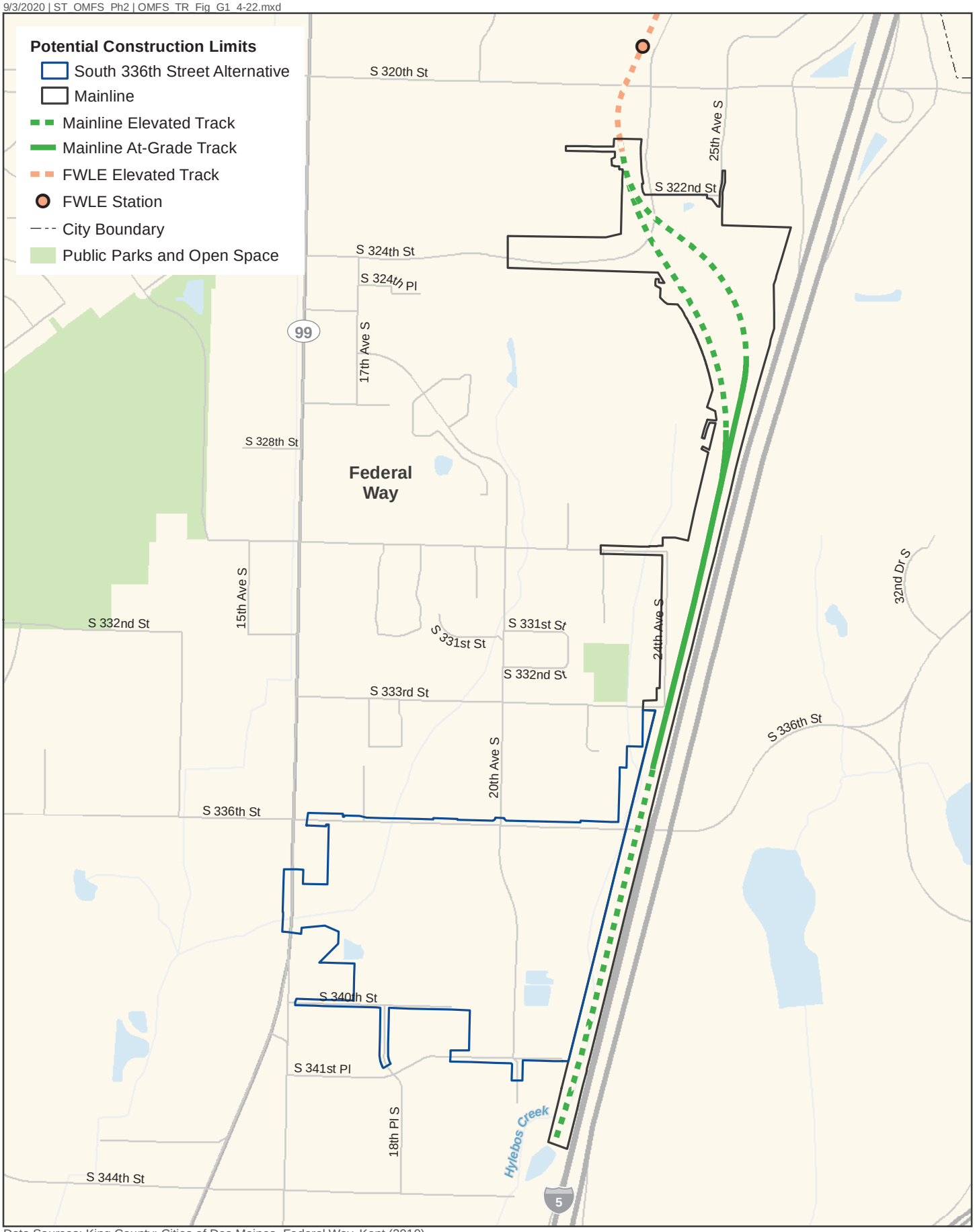
4.3.2.1 Estimation of Construction Truck Traffic

Site preparation work is expected to last approximately 1 year and 5 months, assuming 12-hour workdays, 6 days per week. All export and import material would be transported to and from the site in dump trucks with trailers with an assumed capacity of 20 cubic yards. Export activity would result in approximately 53 truck trips per day, and import activity would result in approximately 20 truck trips per day. Table G1.4-19 summarizes the quantity of export and import material estimated for development of the South 336th Street Alternative, the associated truck trips, and the estimated durations of work.

Table G1.4-19 Truck Activity Associated with Site Preparation for the South 336th Street Alternative

Export Material (ton)	Export Total Truck Trips per Day	Export Total Project Truck Trips	Import In-Place (cubic yards)	Import Total Truck Trips per Day	Import Total Project Truck Trips	Site Preparation Duration
330,000	53	16,500	120,000	20	6,000	1 yr, 5 mos

[5] Does not include excavation associated with columns for aerial mainline tracks, repaving roadways (mostly at grade), or other construction-related quantities. Import volumes assume importation of 60,000 cubic yards of fill material.



Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-22
Construction Impact Area
South 336th Street Alternative

OMF South

4.3.2.2 Potential Construction Access and Truck Haul Routes

Construction access at the South 336th Street Alternative would be provided at three locations: S 336th Street at 20th Avenue S, SR 99 at the existing driveway to the Christian Faith Center, and S 341st Street at 20th Avenue S. Construction access for the potential lead track construction from the Federal Way Transit Center to S 344th Street would occur at S 324th Street, S 330th Street, and S 336th Street. Trucks would access northbound and southbound I-5 at the S 320th Street and S 348th Street interchanges via SR 99. Construction access and truck routes are shown on Figure G1.4-23.

4.3.2.3 Changes to Roadway Capacity

Trucks would traverse the haul routes during the entirety of the 12-hour daily construction period, to and from the site during AM and PM peak periods. As described in Section 8.1.1, this equates to approximately 53 round trips per day associated with export and 20 round trips per day associated with import. With 73 truck trips during the daily construction period, the average number of truck trips per hour would be 6 to 7.

Each truck round trip includes an outbound and inbound segment, resulting in a total of 183 PCE daily trips in the study area associated with export activity (73 truck trips x 2.5 PCE).

To estimate traffic operation impacts, the truck trips are assumed to be distributed evenly throughout the daily construction period and are based on the ability of the yard and receiving facility to process the trucks.[6] A similar 2.5 PCE factor is applied to the truck volume to estimate the number of new trips that would need to be accommodated along the truck routes. Table G1.4-20 summarizes the number of peak hour trucks and associated PCEs for each construction scenario.

Table G1.4-20 Hourly Truck Activity Associated with South 336th Street Alternative Development Approaches

Hourly Trucks Export	Hourly Trucks Import	Hourly Trucks Total	PCE
5	1-2	6-7	15-18

The PCEs shown in the table would be distributed with half exiting the site and half entering the site during the peak hour.

The haul routes would be located on state facilities, including SR 99, SR 18 (S 348th Street), and I-5, as well as several collector and arterial streets. Because the construction staging, origin of the import material, and destination for export material are unknown at this time, the volumes forecast on each roadway segment represent the highest possible volumes for all daily construction activity. A single potential roadway identified as a haul route could be used for all daily truck trips or the total daily volumes could be distributed among multiple roadways. Trucks would travel in a single direction on roadways along the haul routes. The estimated daily truck PCE trips associated with site preparation would represent up to 36.6 percent of existing single direction traffic on collector and arterial roadways. Estimated daily truck PCE trips would represent up to 3.1 percent of the existing single direction AADT for all state facilities, with the highest percentages at on- and off-ramps. Table G1.4-21 summarizes AADT on streets that are part of the haul routes as well as the estimated truck trips as a percentage of AADT.

[6] Irregularity or bunching at the beginning and end of the day is possible.

Figure G1.4-24 displays the location of AADT counts.

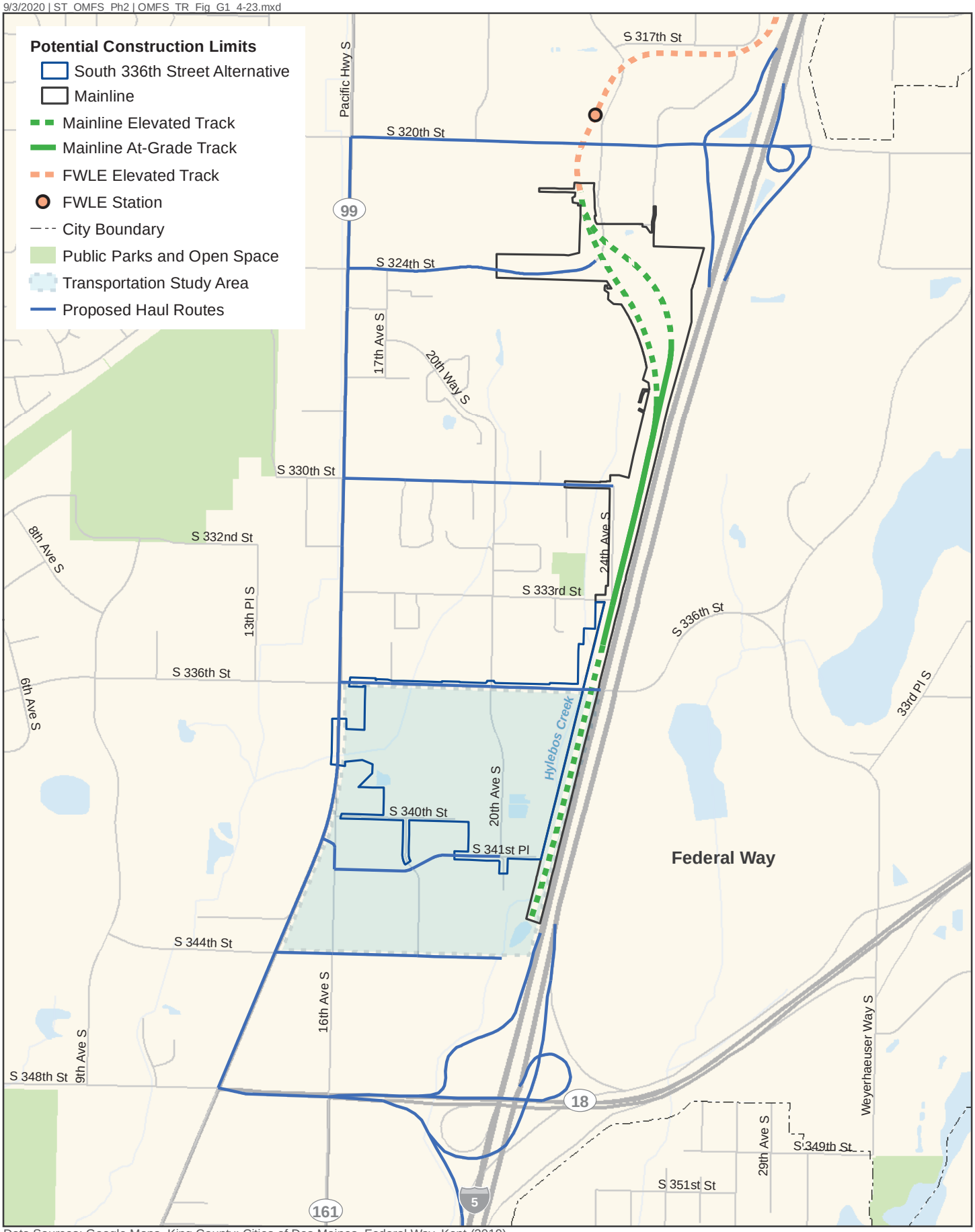
Table G1.4-21 Estimated Hourly Truck Activity at the South 336th Street Alternative Compared with Existing AADT

Intersection /Roadway Segment	AADT (Both Directions)1	AADT (Single Direction)1	Daily Truck Trips as a Percentage of Single Direction AADT
S 320th Street: SR 99 to I-5	>35,000	>17,500	<1.0%
S 324th Street: SR 99 to 23rd Avenue S	5,000-15,000	2,500-7,500	2.4-7.3%
S 330th Street: SR 99 to 24th Avenue S	1,000-5,000	500-2,500	7.3-36.6%
S 336th Street: SR 99 to I-5	5,000-15,000	2,500-7,500	2.4-7.3%
S 344th Street: SR 99 to I-5	<1,000	<500	>36.6%
I-5 Off-Ramp: I-5 SB to SW 320th Street	N/A	15,000	1.2%
I-5 On-Ramp: EB SW 320th to NB I-5	N/A	9,900	1.8%
I-5 On-Ramp: EB SW 320th to SB I-5	N/A	9,400	1.9%
I-5 Off-Ramp: NB I-5 to SW 320th	N/A	9,100	2.0%
I-5: S 330th Street	191,000	95,500	0.2%
I-5: S 336th Street	191,000	95,500	0.2%
I-5 On-Ramp: S 348th Street and SR 18 to NB I-5	N/A	24,000	0.8%
I-5 Off-Ramp: NB I-5 to S 348th Street	N/A	6,100	3.0%
I-5 On-Ramp: S 348th Street to I-5 NB	N/A	14,000	1.3%
I-5 On-Ramp: S 348th Street to I-5 SB	N/A	5,900	3.1%
I-5 On-Ramp: S 348th Street to I-5 SB	N/A	20,000	0.9%
S 348th Street: East of 16th Avenue S	70,000	35,000	0.5%
SR 99: North of S 348th Street	19,000	9,500	1.9%
SR 99: North of 18th Avenue S	32,000	16,000	1.1%
SR 99: North of S 333rd Street	32,000	16,000	1.1%
SR 99: North of S 324th Street	26,000	13,000	1.4%

Sources: WSDOT Traffic GeoPortal (2020a);. City of Federal Way 2010 Estimated Weekday Average Daily Traffic. (2011).

Note:

(1) WSDOT and the City of Federal Way report annual average daily trips (AADT) for roadways. Where roadways are bi-directional, the AADT reported reflects both directions. Single-direction volumes were determined by dividing bi-directional volumes in two.



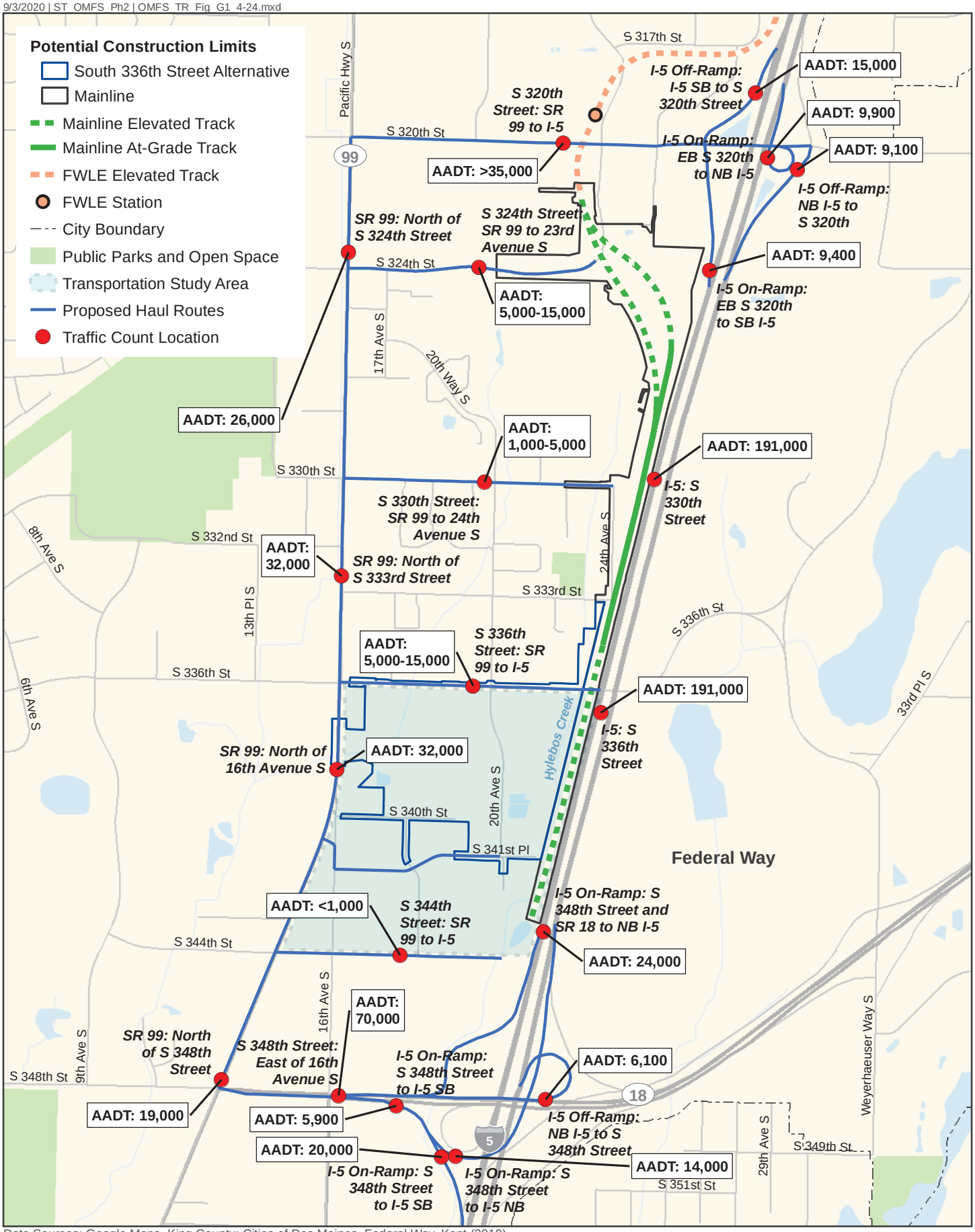
Data Sources: Google Maps, King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 1,000 2,000 Feet

FIGURE G1.4-23
Construction Access and Truck Routes
South 336th Street Alternative

OMF South



Data Sources: Google Maps, King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 1,000 2,000 Feet

FIGURE G1.4-24

Existing Annual Average Daily Traffic Along Truck Haul Routes
South 336th Street Alternative

OMF South

4.3.2.4 Mainline Construction

Mainline construction, including the mainline tail tracks, is expected to take 15 months. Construction of the mainline would require temporary full and/or partial closures to streets that travel beneath the mainline. As with site construction, all export and import material would be transported to and from the site in dump trucks with trailers with an assumed capacity of 20 cubic yards. Peak truck trips during mainline construction are estimated to be up to 10 trucks per hour for concrete delivery, or up to 120 trips per day (300 PCE), assuming 12 hours per day of active construction, some of which may occur at night. A similar level of truck activity is expected for earthwork activities, but this would be focused on trucks hauling material during excavation and would not overlap with concrete delivery trucks. Haul routes for mainline construction are anticipated to be the same as described above for OMF site construction.

Truck trips on roadways would be expected to increase proportionately above those associated with site construction should mainline and site construction occur concurrently. Streets with the lowest existing AADT, such as S 336th Street and S 344th Street, would experience the highest relative growth in traffic compared to existing volumes. If driveway closures are required, access to these properties would be maintained to the extent practical. If access to a business could not be maintained during construction, the specific construction activity would be reviewed to determine whether it could occur during non-business hours.

4.3.2.5 Impacts to Property Access

Impacts to property access for sites in the vicinity of the South 336th Street Alternative would be minimal. Trucks entering or exiting the site are not expected to block driveways along the haul routes. Access to properties fronting SR 99, S 336th Street, S 340th Street, S 341st Street, 18th Place S, and 21st Avenue S would be impacted during construction of right-of-way improvements in these areas.

4.3.2.6 Impacts to Pedestrian or Bicycle Facilities

Because the construction area includes all of the S 336th Street programmed site area, the impacts to pedestrian and bicycle facilities during construction and upon completion of the facility would be the same. The current north-south connection provided via 20th Avenue S would be closed. Pedestrian and bicycle facilities on SR 99, S 336th Street, S 340th Street, S 341st Street, 18th Place S, and 21st Avenue S would be impacted during construction of right-of-way improvements in these areas.

4.3.2.7 Impacts to On-Street Parking Supply

Because all construction activity, including staging, is expected to occur within the boundaries of the S 336th Street Project Area, no impacts to on-street parking supply are anticipated.

4.3.3 South 344th Street Alternative

Only one development scenario is assumed for the South 344th Street Alternative OMF site. It would require demolition of existing structures, export of building debris and excavated material, and import of in-place fill material.[7] This development scenario assumes reuse of 80 percent of

[7] Does not include excavation associated with columns for aerial mainline tracks, repaving roadways (mostly at grade), or other construction-related quantities. Import volumes assume importation of 60,000 cubic yards of fill material.

on-site material, resulting in lower truck volumes than if all excavated material is exported and all fill material is imported. The construction impact area for the South 344th Street Alternative would extend from the Federal Way Transit Center and include portions of the S 320th Street Park and Ride and Belmor Park as well as other properties near I-5. It would include the entirety of the permanent impact area. The construction impact area for the site is shown in Figure G1.4-25.

4.3.3.1 Estimation of Construction Truck Traffic

Site preparation work is expected to last approximately 1 year and 6 months, assuming 12-hour workdays, 6 days per week. All export and import material would be transported to and from the site in dump trucks with trailers with an assumed capacity of 20 cubic yards. Export activity would result in approximately 67 truck trips per day, and import activity would result in approximately 10 truck trips per day. Table G1.4-22 summarizes the quantity of export and import material estimated for development of the South 344th Street Alternative, the associated truck trips, and the estimated durations of work.

Data Sources: King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 500 1,000 Feet

FIGURE G1.4-25
Construction Impact Area
South 344th Street Alternative

OMF South

Table G1.4-22 Truck Activity Associated with Site Preparation for South 344th Street Alternative Development Approaches

Export Material (ton)	Export Total Truck Trips per Day	Export Total Project Truck Trips	Import In-Place (cubic yards)	Import Total Truck Trips per Day	Import Total Project Truck Trips	Site Preparation Duration
420,000	67	21,000	60,000	10	3,000	1 yr, 6 mos

4.3.3.2 Potential Construction Access and Truck Haul Routes

Construction access at the South 344th Street Alternative would be provided at two locations: S 336th Street at 20th Avenue S and via direct access from S 344th Street. Construction access for the potential lead track construction from the Federal Way Transit Center to S 344th Street would occur at S 324th Street, S 330th Street, and S 336th Street. Trucks would access northbound and southbound I-5 at the S 320th Street and S 348th Street interchanges via SR 99. Construction access and truck routes are shown on Figure G1.4-26.

4.3.3.3 Changes to Roadway Capacity

Trucks would traverse the haul routes during the entirety of the 12-hour daily construction period, to and from the site during AM and PM peak periods. As described in Section 8.1.1, this equates to approximately 67 round trips per day associated with export and 10round trips per day associated with import. With 77 truck trips during the daily construction period, the average number of truck trips per hour would be 7.

Each truck round trip includes an outbound and inbound segment, resulting in a total of 193 PCE daily trips in the study area associated with export activity (77 truck trips x 2.5 PCE).

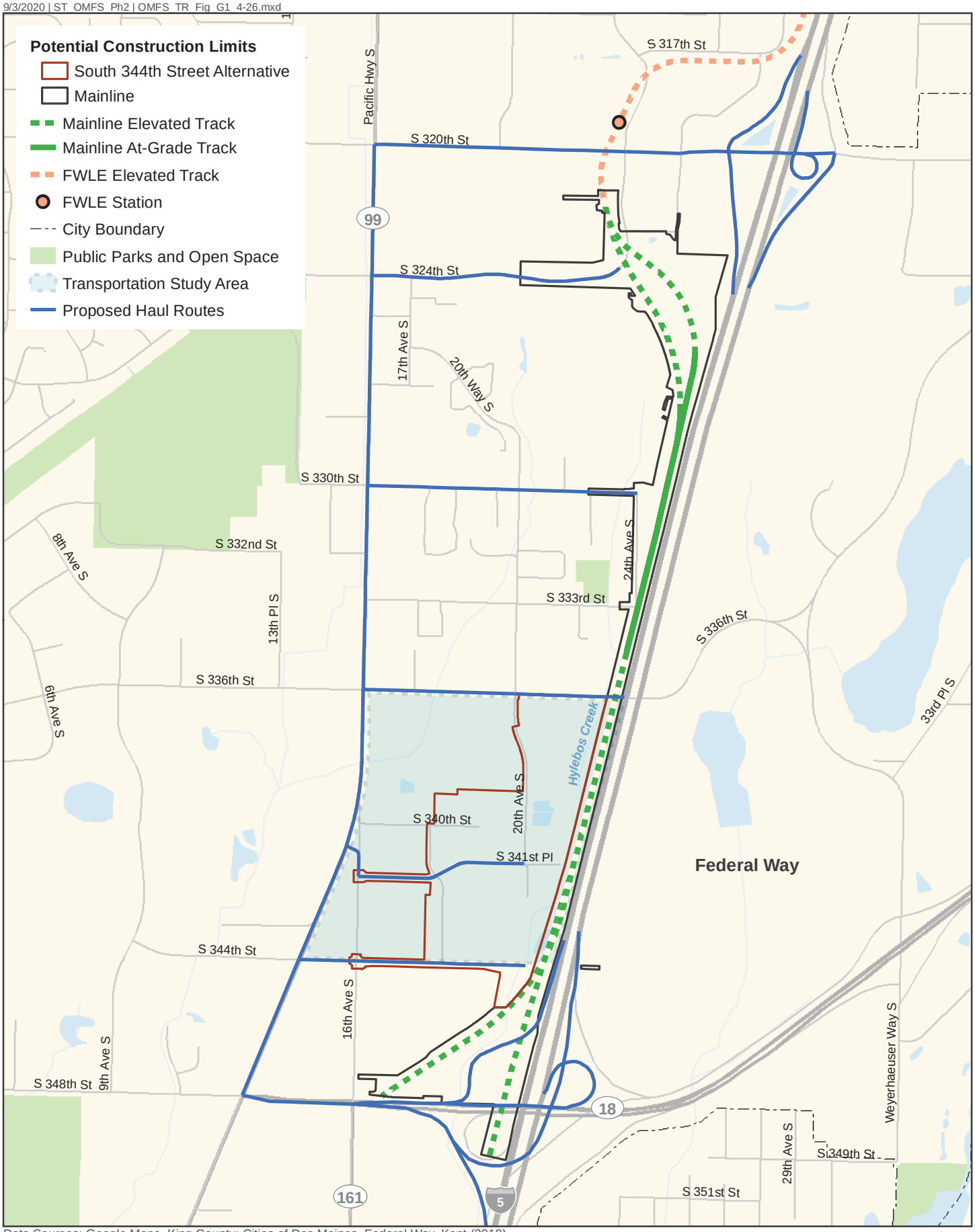
To estimate traffic operation impacts, the truck trips are assumed to be distributed evenly throughout the daily construction period and are based on the ability of the yard and receiving facility to process the trucks.[8] A similar 2.5 PCE factor is applied to the truck volume to estimate the number of new trips that would need to be accommodated along the truck routes. Table G1.4-23 summarizes the number of peak hour trucks and associated PCEs for each construction scenario.

Table G1.4-23 Hourly Truck Activity Associated with South 344th Street Alternative Development Approaches

Hourly Trucks Export	Hourly Trucks Import	Hourly Trucks Total	PCE
6	1	7	18

The PCEs shown in the table would be distributed with half exiting the site and half entering the site during the peak hour.

[8] Irregularity or bunching at the beginning and end of the day is possible.



Data Sources: Google Maps, King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 1,000 2,000 Feet

FIGURE G1.4-26
Construction Access and Truck Routes
South 344th Street Alternative

OMF South

The haul routes would be located on state facilities, including SR 99, SR 18 (S 348th Street), and I-5, as well as several collector and arterial streets. Because the construction staging, origin of the import material, and destination for export material are unknown at this time, the volumes forecast on each roadway segment represent the highest possible volumes for all daily construction activity. A single potential roadway identified as a haul route could be used for all daily truck trips or the total daily volumes could be distributed among multiple roadways. The estimated daily truck PCE trips associated with site preparation could represent up to 38.6 percent of existing traffic on collector and arterial roadways. Daily truck PCE trips could represent as much as 3.2 percent of the existing single day AADT for all state facilities, with the highest percentages at on- and off-ramps. Table G1.4-24 summarizes AADT on streets that are part of the haul routes as well as the estimated truck trips as a percentage of AADT. Figure G1.4-27 displays the location of AADT counts.

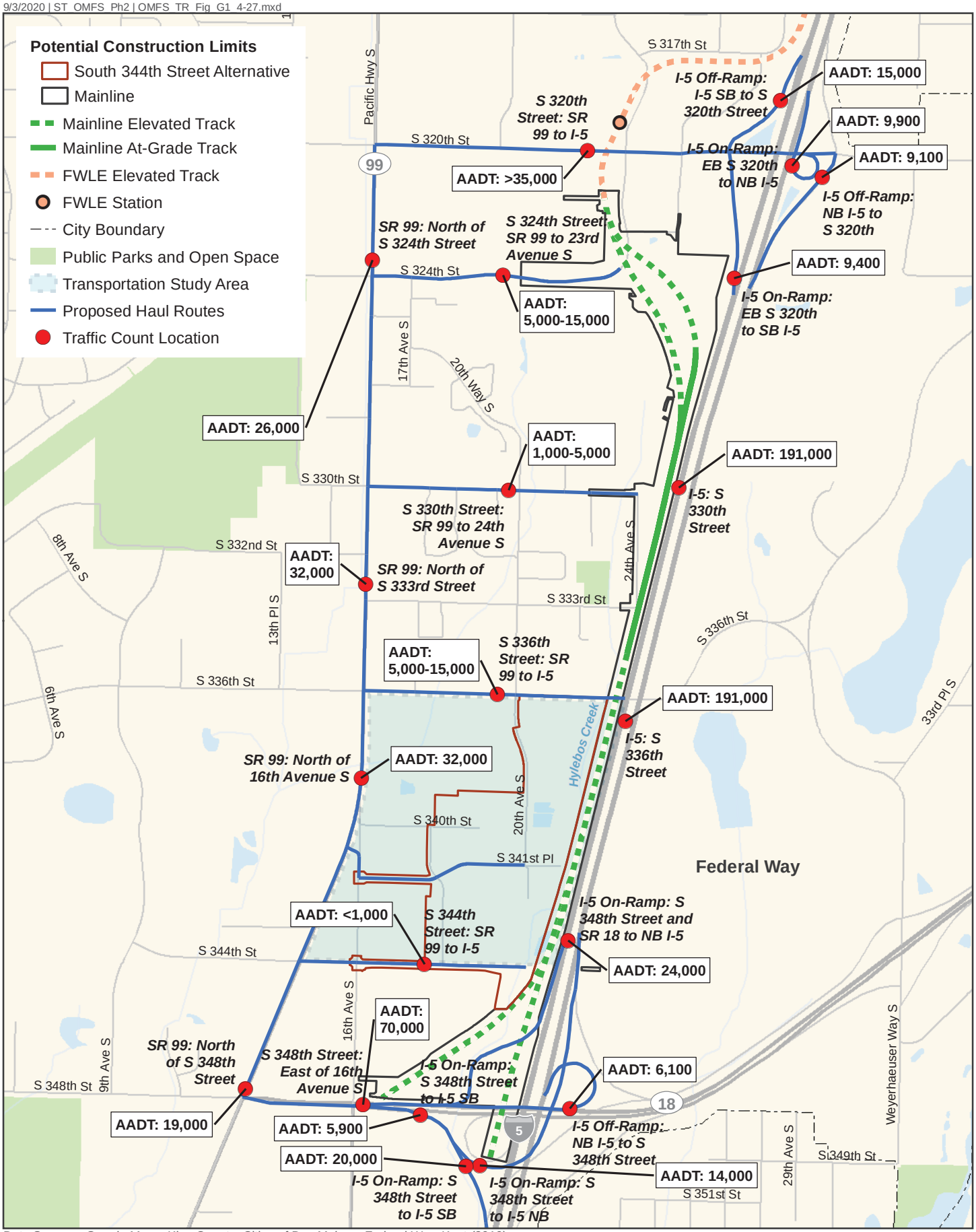
Table G1.4-24 Estimated Hourly Truck Activity at the South 344th Street Alternative Compared with Existing AADT

Intersection /Roadway Segment	AADT (Both Directions)	AADT (Single Direction)	Daily Truck Trips as a Percentage of Single Direction AADT
S 320th Street: SR 99 to I-5	>35,000	>17,500	<1.1%
S 324th Street: SR 99 to 23rd Avenue S	5,000-15,000	2,500-7,500	2.3-7.7%
S 330th Street: SR 99 to 24th Avenue S	1,000-5,000	500-2,500	7.7-38.6%
S 336th Street: SR 99 to I-5	5,000-15,000	2,500-7,500	2.3-7.7%
S 344th Street: SR 99 to I-5	<1,000	<500	>38.6%
I-5 Off-Ramp: I-5 SB to SW 320th Street	N/A	15,000	1.3%
I-5 On-Ramp: EB SW 320th to NB I-5	N/A	9,900	1.9%
I-5 On-Ramp: EB SW 320th to SB I-5	N/A	9,400	2.1%
I-5 Off-Ramp: NB I-5 to SW 320th	N/A	9,100	2.1%
I-5: S 330th Street	191,000	95,500	0.2%
I-5: S 336th Street	191,000	95,500	0.2%
I-5 On-Ramp: S 348th Street and SR 18 to NB I-5	N/A	24,000	0.8%
I-5 Off-Ramp: NB I-5 to S 348th Street	N/A	6,100	3.2%
I-5 On-Ramp: S 348th Street to I-5 NB	N/A	14,000	1.4%
I-5 On-Ramp: S 348th Street to I-5 SB	N/A	5,900	3.3%
I-5 On-Ramp: S 348th Street to I-5 SB	N/A	20,000	1.0%
S 348th Street: East of 16th Avenue S	70,000	35,000	0.6%
SR 99: North of S 348th Street	19,000	9,500	2.0%
SR 99: North of 18th Avenue S	32,000	16,000	1.2%
SR 99: North of S 333rd Street	32,000	16,000	1.2%
SR 99: North of S 324th Street	26,000	13,000	1.5%

Sources: WSDOT Traffic GeoPortal (2020a); City of Federal Way 2010 Estimated Weekday Average Daily Traffic (2011).

Note:

(1) WSDOT and the City of Federal Way report annual average daily trips (AADT) for roadways. Where roadways are bi-directional, the AADT reported reflects both directions. Single-direction volumes were determined by dividing bi-directional volumes in two.



Data Sources: Google Maps, King County; Cities of Des Moines, Federal Way, Kent (2019).

N

0 1,000 2,000 Feet

FIGURE G1.4-27

Existing Annual Average Daily Traffic Along Truck Haul Routes
South 344th Street Alternative

OMF South

4.3.3.4 Mainline Construction

Mainline construction, including the mainline tail tracks, is expected to take 15 months. Construction of the mainline would require temporary full and/or partial closures to streets that travel beneath the mainline. As with site construction, all export and import material would be transported to and from the site in dump trucks with trailers with an assumed capacity of 20 cubic yards. Peak truck trips during mainline construction are estimated to be up to 10 trucks per hour for concrete delivery, or up to 120 trips per day (300 PCE), assuming 12 hours per day of active construction, some of which may occur at night. A similar level of truck activity is expected for earthwork activities, but this would be focused on trucks hauling material during excavation and would not overlap with concrete delivery trucks. Haul routes for mainline construction are anticipated to be the same as described above for OMF site construction.

Truck trips on roadways would be expected to increase proportionately above those associated with site construction should mainline and site construction occur concurrently. Streets with the lowest existing AADT, such as S 336th Street and S 344th Street, would experience the highest relative growth in traffic compared to existing volumes. If driveway closures are required, access to these properties would be maintained to the extent practical. If access to a business could not be maintained during construction, the specific construction activity would be reviewed to determine whether it could occur during non-business hours.

4.3.3.5 Impacts to Property Access

Impacts to property access for sites in the vicinity of the South 344th Street Alternative would be minimal. Trucks entering or exiting the site are not expected to block driveways along the haul routes. Access to properties fronting S 341st Street, S 344th Street, and 18th Place S would be impacted during construction of right-of-way improvements in these areas.

4.3.3.6 Impacts to Pedestrian or Bicycle Facilities

Because the construction area includes all of the South 344th Street Alternative, the impacts to pedestrian and bicycle facilities during construction and upon completion of the facility would be the same. The current north-south connection provided via 20th Avenue S would be closed. The South 344th Street Alternative would also close portions of 18th Place S and S 341st Place, effectively eliminating much of the existing street grid network in the southern part of the study area. Pedestrian and bicycle facilities on S 341st Street, S 344th Street, and 18th Place S would be impacted during construction of right-of-way improvements in these areas.

4.3.3.7 Impacts to On-Street Parking Supply

Because all construction activity, including staging, is expected to occur within the boundaries of the South 344th Street Alternative, no impacts to on-street parking supply are anticipated.

4.4 Indirect Impacts

Indirect impacts are reasonably foreseeable impacts that could occur as a result of an action at some future time and in areas beyond the action’s direct impacts. As an example, indirect impacts often relate to additional changes in land use that could occur beyond those changes immediately caused by a development’s construction and operation, which could result in a change to overall traffic patterns. The OMF South alternatives are not expected to cause future land use changes beyond their respective sites, which could otherwise result in indirect impacts to transportation. Development of OMF South would provide Sound Transit with capacity to

receive, test, commission, store, maintain, and deploy the fleet of light rail vehicles to support the Sound Transit 3 expanded light rail system. This capacity would provide for more efficient operations of existing and future expansions of the light rail system than would occur without the facility. This would have positive indirect impacts to transportation to the extent that people choose to use the light rail system for trips instead of driving in general traffic.

4.5 Cumulative Impacts

The transportation access analysis presented in the previous sections reflects conditions with assumed growth between existing conditions and the design year (2042). The traffic growth assumptions also reflect changes in traffic volumes that are projected in the traffic forecasts prepared for the FWLE and TDLE. As a result, the traffic analyses reflect the cumulative impacts of these Link extensions as well as other planned and foreseen developments as well as associated increases in traffic within the study areas for each build alternative. In addition, future trips that would otherwise be generated by the existing uses at the project sites were not subtracted from the future traffic forecasts; therefore, the analysis represents a worst-case condition in terms of cumulative effects on transportation.

Design and construction for the FWLE is planned to occur from 2019 to 2023, and design and construction for OMF South is planned from 2022 to 2029. Should OMF South be located at the Midway Landfill Alternative, the FWLE construction period may overlap the planned construction period for OMF South. Based on information from the FWLE Final Environmental Impact Statement (Sound Transit 2016), both projects could use the same construction staging areas and truck haul routes, including an area just to the north of the landfill and the future mainline area adjacent to I-5. There is also a potential for construction period overlap with TDLE, which is currently planned to start construction in the mid to late 2020s.

The COVID-19 crisis is reducing the tax revenue Sound Transit relies on to expand the regional transit system. Through a process called realignment, the Board of Directors is working to determine which plans and timelines for Sound Transit 3 projects will need to change. The Board decisions on realignment, influenced by COVID-19 and increased project cost estimates, may have an impact on the future project schedule.

4.6 Potential Mitigation Measures

This chapter discusses potential mitigation measures for transportation mobility impacts caused by the build alternatives. It also describes measures that Sound Transit proposes to take that require agreement of other parties. For instance, Sound Transit has identified certain intersection improvements, but the agency does not have the sole authority to make those improvements when the facilities are owned and managed by others. Others may also have alternative plans or projects to address future conditions with or without the build alternatives. In these cases, Sound Transit would coordinate with these other agencies to further define and implement improvements to mitigate the impacts of these projects.

4.6.1 Arterials and Local Streets

Traffic impacts were determined for arterials and local streets by comparing the overall intersection LOS for the No-Build Alternative and the build alternatives. Impacts would occur if the build alternatives would result in traffic operations performing below the acceptable LOS when the intersection or roadway segment would operate at or above the acceptable LOS for

the roadway or highway under the No-Build Alternative. Impacts may also occur if the build alternative traffic operations reduce the LOS from E to F or if the delay in an LOS F condition is worsened by more than 10 seconds. This approach outlines the process for consideration of mitigation to address possible impacts.Impacts for state highways of statewide significance (SR 99) would occur if the roadway segment in the build alternatives would increase traffic operations to a LOS E or worse condition when the roadway segment would operate at LOS D or better under the No-Build Alternative. Impacts may also occur if the build alternative traffic operations reduce the LOS from E to F or if the delay in an LOS F condition is worsened by more than 10 seconds. This approach outlines the process for consideration of mitigation to address possible impacts.

Across all three alternatives, the only location forecast to result in impacts is the entrance to the Midway Landfill Alternative at SR 99 and S 246th Street during the AM peak period. The project would add more than 60 seconds of delay due to installation of a new southbound left turn. Because the site has three vehicle access points, these impacts could be mitigated through requirements for employees to access the site through all access points rather than only two. Mitigation could be to require employees to use the south entrance via S 252nd Street or to use the S 252nd Street intersection to make a U-turn and access the site by making a northbound right turn. The S 252nd street intersection has available capacity in the year 2042 to accommodate all project trips from the north in the AM peak hour, which is the primary cause for delay. Mitigation could also include signalization of the intersection of SR 99 and S 246th Street.

If the Midway Landfill Alternative is chosen, Sound Transit would work with Kent during the project permitting process to determine Sound Transit's contribution to develop, fund, and contruct improvements at the S 246th Street intersection or other measures as described above. This may include contributing a proportionate share of costs to improve intersections affected by the project.

4.6.2 Freight

Freight movement would experience impacts similar to general-purpose traffic; therefore, the build alternatives do not require freight mitigation beyond the mitigation identified at the intersections above.

4.6.3 Transit

Mitigation for transit service would not be required for the build alternatives, as they would not result in a need for additional transit.

4.6.4 Nonmotorized Facilities

Should future nonmotorized facilities be developed north of the Midway Landfill Alternative site, a north-south shared-use path, parallel to I-5,could be developed east of OMF South (between I-5 and OMF South) to provide a connection to the area south of the project site. This is not part of the OMF South project and could be funded and constructed by third parties.

For the South 336th Street Alternative, bicycle lanes could be developed on S 336th Street between SR 99 and 20th Avenue S. In areas where streets would be constructed, they would include new bicycle and pedestrian facilities meeting local jurisdictional standards and Americans with Disabilities Act (ADA) accessibility.

4.6.5 Parking

The loss of on-street parking in the study areas is likely to result in minimal or no impacts; therefore, mitigation would not be required.

4.6.6 Safety

In locations where the mainline tracks to the South 336th Street or South 344th Street alternatives reduce the available clear zone below standards and relocation of the mainline is not feasible, Sound Transit would work with WSDOT and FHWA to meet roadway standards, such as regrading to reestablish a clear zone or installing guardrails, barriers, or impact attenuators. These measures would not adversely affect transportation safety in the study area.

4.7 Construction Mitigation Measures

For all build alternatives, a construction transportation management plan addressing site access, traffic control, hauling routes, construction employee parking, impacts to businesses, and pedestrian and bicycle control in the area would be prepared per city of Kent or city of Federal Way requirements, and in coordination with WSDOT and FHWA, as applicable. If driveway closures are required, access to these properties would be maintained to the extent practical. If access to a business could not be maintained during construction, the specific construction activity would be reviewed to determine whether it could occur during non-business hours or if the parking and users of this access could be accommodated at an alternative location.

For the Midway Landfill Alternative, to minimize potential impacts to mainline traffic on SR 99 at the access point, a short acceleration lane could be constructed to accommodate outbound trucks and a short deceleration lane could be constructed to accommodate inbound trucks. Additional strategies to reduce impacts to local traffic could include limiting truck activity during the peak traffic hours, which could extend the construction duration, or providing a direct connection to the I-5 corridor from the construction site.

Other measures could include:

- Install advance warning signs and highly-visible construction barriers and use flaggers where needed.
- Clearly sign and provide reasonable detour routes when cross streets are closed
- Use lighted or reflective signage to direct drivers to truck haul routes to ensure visibility during nighttime work hours. Use special lighting for work zones and travel lanes, where required.
- Communicate public information through tools such as print, radio, posted signs, websites, and email to provide information regarding street closures, hours of construction, business access, and parking impacts.
- Post advance notice signs prior to construction in areas where construction activities would affect access to surrounding businesses.
- Schedule traffic lane closures and high volumes of construction truck traffic during off-peak hours to minimize delays, where practical.
- Cover potholes and open trenches, where possible, and use protective barriers to protect drivers from open trenches.

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ATTACHMENT G1-1

Transportation Technical Analysis Methodology Memorandum

1 TRANSPORTATION

1.1 Introduction

This technical analysis methodology memorandum describes the methods and assumptions for preparing the transportation element of the Operations and Maintenance Facility South (OMF South) Environmental Impact Statement (EIS). The analysis of local transportation and system-wide light rail transit impacts will identify and evaluate the impacts of the project alternatives on the following:

- Design year traffic service levels at key intersections affected by the project alternatives
- Short-term impacts to vehicular, bicycle, and pedestrian traffic resulting from construction activities
- Property access, freight and local traffic flow changes caused by street closures and/or modifications
- Safety
- Bicycle and pedestrian circulation
- Transit service

1.2 Guiding Regulations, Plans, and/or Policies

Relevant policies, laws, and regulations that govern or influence the transportation impact analysis include the following:

- Washington State Department of Transportation (WSDOT) Synchro and SimTraffic Protocol, 2018
- WSDOT Traffic Analysis Guidebook
- Cities of Kent and Federal Way Transportation Plans and Capital Improvement Programs
- Level of Service Standards for the City of Kent (Comprehensive Plan, Chapter 4) and City of Federal Way (Comprehensive Plan, Chapter 3), King County (Comprehensive Plan, Chapter 8), and Washington State Highways (Revised Code of Washington [RCW] 47.06.140(2))
- Washington Transportation Plan, Phase 2—Implementation 2017–2040 (WSDOT 2019)
- WSDOT Design Manual
- WSDOT Traffic Manual M 51-20
- Transportation Research Board Highway Capacity Manual (2010)
- AASHTO Highway Safety Manual
- WSDOT Protocol for Vissim Simulation, 2014
- WSDOT Sidra Policy Settings, 2015
- FHWA Guidelines for Applying Traffic Microsimulation Modeling Software
- Puget Sound Regional Council (PSRC), VISION 2040 (PSRC 2009)

- King County Metro Transit, Strategic Plan for Public Transportation, 2011–2021 (King County Metro Transit 2015)
- Pierce Transit Strategic Plan 2015–2020 (Pierce Transit 2015)

1.3 Data Needs and Sources

A variety of data will be collected and assembled to analyze the transportation-related effects of the project alternatives. These data sets will include the following:

- Existing peak-hour turning-movement counts at the intersections identified below under "Intersections to be Studied." These counts will be collected from the City of Kent, City of Federal Way, King County, and WSDOT for the PM peak hour for all locations, and for the AM peak hour for selected locations where AM peak-hour operations are determined to be as, or more, critical than PM peak-hour operations. If, for project construction impacts, data from I-5 is needed, the volume data from WSDOT's loop counters will be used to generate existing mainline and ramp volumes. If year 2016 or more recent turning movement counts are not available from the agencies listed above, new counts will be taken for a 3-hour period during the PM peak hour. The new counts will include automobiles; trucks classified by light, medium, and heavy types; buses; pedestrians; and bicyclists. AM peak-hour turning-movement counts will also be collected where AM peak-hour volumes are the highest or the existing and future traffic issues are considered critical during the AM time period (e.g., if an intersection provides access to a regional facility). These locations will be chosen based on area knowledge, a comparison of available AM versus PM peak-hour traffic volumes, and/or if identified by Sound Transit and local or state agency staff. All peak-hour turning-movement counts will be factored to a common base analysis year (2019) based on available historical data trends.
- Daily traffic counts in the study area, as available from local jurisdictions. These counts will be factored to a common base analysis year (2019).
- Physical characteristics of the existing street system that may be affected by project alternatives.
- Existing transit route information along the proposed project alternatives will be obtained from local transit agencies and compiled. This task will include information on selected bus routes that serve the vicinity of the project alternatives as well as light rail mainline operations.
- Accident data for the most recent available 5-year period will be obtained for the potentially affected intersections in the study area.
- Local, regional, and state agency Six-Year Transportation Improvement Plans/Capital Improvement Programs or Transportation Facilities Plans, as well as other planned improvements in proximity to the project alternatives, will be reviewed and summarized. This effort will include identification of all "committed" improvements assumed for the No-Build Alternative.

1.4 Study Area and Area of Effect

The transportation analysis will include evaluation measures that consider system-wide light rail transit operations as well as localized street intersection impacts in proximity to the project alternatives. Analysis of system-wide light rail transit impacts will address the effects of the project alternatives on light rail transit reliability and operations. The arterial and local street analysis will focus on locations assumed to be most likely affected by the project alternatives. The intersections that will be analyzed are those directly affected, such as by a change in

channelization or signal control resulting from light rail lead track crossings and those affected by OMF South traffic volumes near each site.

1.5 Affected Environment

The affected environment for transportation includes components of the transportation system within the affected area. These components include traffic-related operations and performance on roadway facilities; transit, both road-based and light rail; bicycles; and pedestrians in the vicinity of the project alternatives. Effects on the regional light rail transportation system will also be considered. Measures for assessing impacts on these transportation elements, discussed in the following sections, will be both quantitative and qualitative and will be displayed both graphically and in a tabular format as appropriate. Primary issues of concern include impacts on overall mobility for these various modes (e.g., travel times, speeds, and accessibility) as well as reliability and safety. These issues need to be assessed for the construction stages of the proposed project as well as after completion, when the project is fully operational.

1.6 Environmental Impact Analysis

1.6.1 Direct Impacts

Transportation Analysis Years

Based on the project's schedule and available traffic forecasting data, the transportation analysis will focus on two distinct periods:

- Existing—2019.
- Design Year—2042. This year has been identified as the design year for analysis. The 2042 analysis will include evaluation of the No-Build Alternative.

In the absence of available traffic forecasting data, an estimated annual growth in traffic volume consistent with regional and local area plans and historic data will be developed and applied to existing traffic counts to generate reasonable future traffic volumes.

Local Surface Streets

The surface street system analysis will focus on intersection operations and safety analysis. Impacts on property access and circulation, parking, nonmotorized facilities, construction, and safety will be addressed. The methodologies proposed to analyze the surface street system will be described in this section.

Intersection Operations

Effects on intersection operations will be evaluated based on the calculated design year 2042 peak-hour intersection level of service (LOS). LOS measures the quality of traffic operations at an intersection in terms of both operational conditions and motorists' perceptions. LOS ratings range from "A" to "F." LOS A represents the best operation and LOS F the poorest operation.

Agency Thresholds

As part of each agency's comprehensive planning efforts, agency transportation goals and LOS standards are developed. While each agency accepts different levels of congestion, a delay-based intersection LOS analysis has been preliminarily accepted by each agency. Delay is expressed in terms of average delay per vehicle, in seconds, experienced due to the intersection operations. LOS definitions for signalized and unsignalized intersections are included in Table 1-1. Overall, if a given intersection's operations are better than the LOS standard for each agency with the build alternative, then that intersection is considered to meet the agency's standard and does not require mitigation. In situations where the intersection operates worse than the agency's LOS standard without the build alternative, then mitigation is only required if the intersection delay and/or LOS degrades further with the build alternative.

Table 1-1 Agency Level of Service Standards

Agency	LOS Standard
WSDOT	LOS D
Kent	LOS E
Des Moines	LOS D
Federal Way	Signalized v/c < 1.2 Unsignalized v/c < 1.0
King County	LOS E

v/c = volume-to-capacity ratio

Trip Generation

Information on 2042 trip generation for the OMF South facility will reflect employee ingress and egress and deliveries. These traffic volumes will be added to the future No-Build Alternative traffic volumes as the basis on which to analyze the project alternatives. However, employee trips to and from the facility are expected to occur outside of the peak-hour period. Therefore, traffic impacts from vehicular trips generated by the project are expected to be negligible. In locations where the facility will replace an existing land use that generates trips, the Institute of Transportation Engineers Trip Generation Manual will be used to estimate the change in peak trips for the existing land use.

Level of Service Analysis

Synchro (version 10.0) software will be used to determine the projected 2042 AM and PM peak-hour LOS at signalized and unsignalized intersections identified below, under "Intersections to be Studied." The Highway Capacity Manual (HCM) report from the Synchro software will be used to summarize average intersection delay, LOS, and critical queue lengths. The LOS at a signalized intersection will be defined in terms of average intersection delay. Delay is dependent on two factors: 1) the capacity of the intersection as defined by the number of lanes, lane widths, pedestrian volumes, and other features; and 2) signal timing. To provide consistent comparison between project alternatives, the signal timing will be optimized in the Synchro software to provide optimal levels of delay. Capacity, delay, and LOS are calculated for each

traffic movement or group of traffic movements at an intersection. The weighted average delay across all traffic movements determines the overall LOS for a signalized intersection.

The LOS at an unsignalized intersection is also defined in terms of delay, but only for the approach that is stop-controlled, which is typically the minor street. For unsignalized intersections that are stop controlled on each approach, the average intersection delay is reported. LOS definitions for signalized and unsignalized intersections are provided in Table 1-2. Default values for the analysis will be developed for intersections where actual values are not available. These will include assumptions with respect to saturation flow rates, geometry, traffic, and signalization conditions.

Table 1-2 Level of Service Thresholds

LOS Rating	Average Delay for Signalized Intersections (seconds/vehicle)	Average Delay for Stop-Controlled Intersections (seconds/vehicle)
A	0 – 10	0 – 10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

Intersections to be Studied

A preliminary list of intersection locations has been identified for analysis based on the project alternatives and associated lead track. Each of the intersections listed will be modeled for both the No Build Alternative and the project alternatives. Exhibits 1-1 and 1-2 show the locations of these intersections. The exhibits below represent a preliminary layout of the potential site locations and were developed to illustrate the intersections for analysis relative to possible site access locations. These exhibits should not be used to determine any right-of-way or other impacts.

Kent (Midway location):

- SR 99/S 240th Street
- SR 99/S 244th Street
- SR 99/Driveway (if easement pursued for access)
- SR 99/S 246th Street (if easement pursued for access)
- SR 99/S 248th Street (if access at this location)
- SR 99/S 252nd Street
- SR 99/S 260th Street
- S 252nd Street/29th Ave S (if access at this location)
- S 260th Street/29th Ave S (if access at 29th Street)

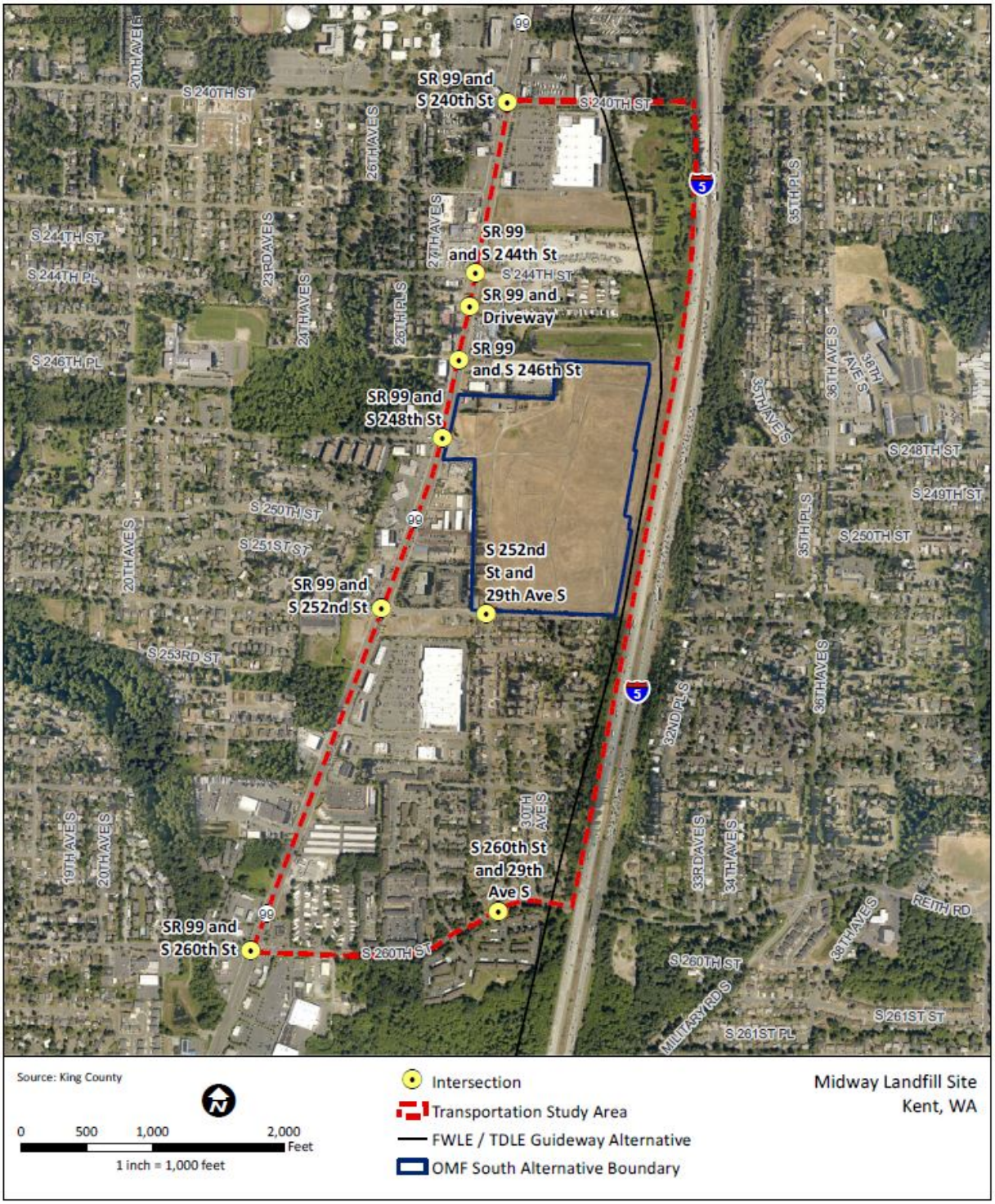

Exhibit 1-1 Midway Landfill Site Preliminary Study Area and Intersections

Federal Way (same intersections for both sites in Federal Way):

- S 336th Street/20th Ave S
- SR 99/S 336th Street
- SR 99/S 340th Street
- SR 99/S 341st Street
- 16th Ave S/S 341st Place
- S 341st Place/18th Ave S
- SR 99/S 344th Street
- S 344th Street/16th Ave S
- S 344th Street/18th Place S

Exhibit 1-2 Federal Way Sites Preliminary Study Area and Intersections

Property Access and Local Circulation

This area of evaluation will assess local area traffic impacts, including access to properties. The focus will be on impacts during both construction and full build out of the project (2042). The evaluation criteria will include any physical change in access to properties resulting from lead track alternative alignments. In addition to the analysis of intersection LOS and delay impacts, traffic impacts on local circulation will be assessed qualitatively.

Nonmotorized Facilities and Modes

The project alternatives will be qualitatively assessed regarding existing and future pedestrian and bicycle facilities. Specific issues to be discussed and assessed include the following:

- Direct (physical) effects on pedestrian and bicycle facilities in proximity to each project alternative and associated lead track.
- Barriers to nonmotorized (pedestrian and bicycle) traffic movement introduced by the project alternatives.

Transit

The project alternatives will be qualitatively assessed to evaluate:

- System-wide effects on regional light rail operations (e.g., service reliability).
- Local effects to bus or other rail transit services in proximity to the project alternatives.

Construction

Two primary sources of construction impacts on local traffic will be considered from a generally qualitative standpoint:

- Impacts on traffic operations, property access, and parking supply related to potential road, sidewalk, bicycle, or other transportation facility closures during construction.
- Impacts of construction-related traffic on traffic operations.

Construction traffic analysis will consider the following:

- Identification of changes in roadway capacity, including potential lane closure requirements, parking restrictions, pedestrian or bicycle facility impacts, areas of construction activity adjacent to travel lanes, or other reductions to capacity due to transit facility construction activity.
- Impacts on transit and emergency services.
- Impacts on school transportation services during construction.
- Impacts of construction-related activity on on-street parking supply.
- Identification of potential construction staging areas, including access and impact on roadway operations.
- Identification of potential construction access and truck routes and the impact of construction related traffic on these routes.
- Estimation of construction truck traffic.
- Development of mitigation measures.

The analysis will be summarized in a tabular format to identify the following:

- Impact location(s).
- Street characteristics.
- Type of construction activity, including likely duration of impact (short-term versus long-term).
- Level of construction traffic (characterized as high, moderate, or low). High truck traffic is associated with major fill, excavation, and concrete work such as with tunneling. Moderate truck traffic generally refers to activities not associated with major fill or excavation work. Low truck traffic occurs when none of the construction activities associated with moderate or high truck traffic occurs.
- Full or partial road closures.
- Availability of detour routes.
- Potential for detoured traffic to affect a residential neighborhood. This is characterized as high, medium, or low and is related to both potential for road closure and options for traffic detour.
- Loss of on-street parking. This may be characterized as “yes” for parking loss and “no” for no parking loss. Additionally, there may be some temporary loss of off-street parking due to the location and operation of construction staging, as well as construction worker parking.

Safety

Potential effects of the project on safety will be assessed qualitatively for all modes within the study area including general traffic, transit, bicycle, and pedestrian modes. The safety (accident/crash) analysis will use quantitative data to understand existing conditions and locations with potential issues to understand how future alternatives might affect those conditions. The safety analysis will be used to assess accidents currently occurring within the project limits in terms of type, cause, and frequency. Accident data from the latest 3 years will be compiled and summarized to identify any current safety deficiencies. Unique accident patterns (e.g., high frequency of a specific pattern) will be noted. The accident data will be collected for any directly affected local intersections and roadways. An intersection and roadway safety analysis will be conducted only where the project alternatives 1) include at grade lead track in semi-exclusive right-of-way, 2) include elevated track within or immediately adjacent to the road right-of-way, or 3) results in a physical change to a roadway. No accident analysis or safety conclusions for project alternatives proposed to operate outside the roadway right-of-way (exclusive right-of-way) will be conducted other than where (or if) the alternative physically changes the geometry of a roadway. Safety effects on bicycle and pedestrian travel will be assessed based on change in potential conflicts with motorized modes, as well as change in facilities provided for their travel.

1.6.2 Indirect Impacts

Indirect impacts are project effects that occur later in time or some distance from the project. Typical indirect impacts are those associated with changes in land use development patterns, typically consistent with adopted plans and zoning, and those associated with changes in transportation accessibility over time. These effects are described in the land use and specific resource reports, but the potential changes in transportation access that could lead to these effects will be discussed qualitatively.

1.6.3 Cumulative Impacts

The assessment of cumulative impacts related to transportation will include a qualitative evaluation and discussion of past, present, and reasonably foreseeable future actions that could interact with the project alternatives and that were not included in the traffic modeling. These may include, but are not limited to, consideration of effects from actions such as the following:

- Construction activities from other transportation projects that could affect or be influenced by the project construction activities.
- Local developments and public infrastructure projects that could contribute to cumulative traffic delays on local arterial streets over the construction period.

The discussion of cumulative impacts will be developed in coordination with the Federal Way Link Extension project, which is assumed to be part of the No-Build Alternative, and the Tacoma Dome Link Extension project, which is a reasonably foreseeable future project. Other projects that are reasonably foreseeable and will be considered in the cumulative impacts analysis are the SR 509 Completion project and the Federal Way City Center Access project.

1.7 Mitigation Measures

Potential mitigation measures will be described to address potential transportation impacts associated with the project alternatives.

Based on the design year (2042) traffic analysis, opportunities for mitigation of long-term impacts will be identified for intersections that do not meet the established LOS standards. These measures might include operational changes such as signal phasing or timing, or physical modification such as added lanes. For intersections that do not meet the established LOS standards in the No-Build Alternative, the project alternatives are only obligated to bring the operating conditions back to the No-Build condition. Determining if an intersection meets the agency LOS standards will be based on the conditions at each individual intersection. Mitigation measures related to other elements of the transportation analysis such as nonmotorized, parking, and safety will also be described. Mitigation measures aimed at addressing the local construction traffic impacts identified above will be developed and reviewed.

1.8 Proposed Exhibits, Maps, or Other Data

The EIS section will include exhibits illustrating LOS analysis for potentially affected intersections.

1.9 Documentation

For this element, the following documentation will be developed:

- A Transportation EIS section
- A technical report detailing the technical analyses discussed in this memorandum

1.10 Data Developed for Use by Other Disciplines

Noise Effect Analysis Data

If the project alternatives would result in roadway modifications that would increase roadway traffic capacity or move roadway travel lanes closer to sensitive receivers, the following types of data will be produced by the transportation team to support the noise effect analysis:

- AM and PM peak-hour Synchro model files for affected roadway intersections (including vehicle classes).
- The above information will be provided for existing conditions and the design year (2042).

1.11 References

King County Metro Transit. 2015. *Strategic Plan for Public Transportation, 2011–2021*. 2015 Update. Seattle, WA. April 27, 2016.

Pierce Transit. 2015. *Pierce Transit Strategic Plan 2015–2020*. Lakewood, WA. April 2015.

PSRC (Puget Sound Regional Council). 2009. *VISION 2040: The Growth Management, Environmental, Economic, and Transportation Strategy for the Central Puget Sound Region*. Seattle, WA. December 2009.

WSDOT (Washington State Department of Transportation). 2018. *Washington Transportation Plan, Phase 2—Implementation 2017–2040*. Olympia, WA. April 30, 2018.

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Email omfsouth@soundtransit.org

Call 206-398-5453

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