



Attachment A

SCOPE OF WORK

North Bayshore District Monitoring and Near-Term Growth Assessment in Mountain View, California (April 9, 2019)

ANALYSIS APPROACH

City staff will use this North Bayshore District Monitoring and Near-Term Growth Assessment to evaluate how North Bayshore development is conforming to the North Bayshore Precise Plan gateway trip targets. This scope of work is to conduct, analyze and report the results of the Fall 2019 and Spring 2020 North Bayshore District Monitoring and Near-Term Growth Assessment. The Fall 2019 gateway counts and mode share observations will be reported in a technical memorandum, while the Spring 2020 counts and mode share observations will be reported in a technical report with a report chapter titled Near-Term Growth Assessment that describes planned developments in the near future, the estimated completion of the planned transportation improvements, and an estimate of the future trip demand from the near-term developments and their contribution to each gateway. Both the technical memorandum and technical report will be reported to City Council as part of the North Bayshore District monitoring of traffic congestion and land development.

SCOPE OF WORK

PHASE 1: FALL 2019 AND SPRING 2020 NORTH BAYSHORE DISTRICT MONITORING

The base scope of services for this phase of work will evaluate and present travel data at the North Bayshore gateways for the morning peak period (7:00 to 11:00 AM) and evening peak period (3:00 to 7:00 PM) for Fall 2019 and Spring 2020 conditions, using the data sources and collection techniques that have been used in previous monitoring efforts. Optional tasks are presented that would collect additional travel data using “big data” sources and/or the North Bayshore travel model.

Task 1.1: Daily Count Observations

With guidance from Fehr & Peers, a count vendor will collect daily roadway and shared-use path segment counts at the North Bayshore gateways; Santiago Villa; and the Shoreline at Mountain View Regional Park. This daily data will be collected for two consecutive weeks. The morning peak period (7:00 to 11:00 AM) and

the evening peak period (3:00 to 7:00 PM) average for a typical mid-week day (e.g., Tuesday, Wednesday or Thursday) will be reported. The North Bayshore gateway street locations include:

1. San Antonio Road between Bayshore Parkway and Casey Avenue
2. Bayshore Parkway between San Antonio Road and Garcia Avenue
3. Rengstorff Avenue between US 101 Northbound Ramps and Garcia Avenue-Charleston Road
4. Shoreline Boulevard between US 101 Northbound Ramps-La Avenida and Pear Avenue
5. La Avenida between Shoreline Boulevard and Inigo Way

The shared-use path locations include:

6. Permanente Creek Trail between Old Middlefield Way and Charleston Road
7. Stevens Creek Trail between Moffett Boulevard and La Avenida

Additional count locations for Santiago Village and the Shoreline at Mountain View Regional Park include:

8. Shoreline Boulevard north of North Road
9. Space Park Way at the entrance to Santiago Villa
10. Armand Avenue at the entrance to Santiago Villa

Task 1.2: Gateway Vehicle Classification Observations

For one day at the North Bayshore Gateway locations 1 through 7 listed above vehicle classification counts will be collected by the count vendor for the inbound direction during the morning peak period and outbound direction during the evening peak period. The vehicle classification will include: single occupant vehicles, carpool vehicles by vehicle occupancy (1 person, 2 persons, 3 persons, and 4+ persons), transportation network company vehicles (e.g., Uber and Lyft) by vehicle occupancy (1 person, 2 persons, 3 persons, and 4+ persons), trucks, transit vehicles, bicyclists and pedestrians.

Task 1.3: Bus Occupancy Observations

Bus occupancy of employer commuter shuttles and VTA buses will be observed at 17 bus stops for one day during the morning and evening peak periods. Some of the data will be collected from the appropriate agencies in spreadsheet format, while other data will be collected via in-person field observations. For all of the in-person field observations, a local count vendor will collect the data. For VTA buses, staff will board the bus at bus stops and count the number of riders on board. For employer commuter shuttles, staff will be stationed at bus stops recording the bus license plate number, the type of bus and the number of persons boarding and alighting; this will be focused on inbound buses during the morning peak period and outbound buses during the evening peak period. Using this bus occupancy data, Fehr & Peers will determine the number

of persons entering North Bayshore on buses during the morning peak period and exiting during the evening peak period.

Task 1.4: Summary of Existing Travel Patterns

The vehicle traffic counts and vehicle classification data will be summarized in tables and figures to show vehicle travel patterns by time of day, and mode share and vehicle usage for the morning and evening peak periods. This information will describe the current usage of the three North Bayshore Gateways. The mode share data will be summarized for the inbound direction during the morning peak period and outbound direction during the evening peak period. The other performance measures will be summarized for both directions during the morning and evening peak periods.

Task 1.5: Gateway Operations Observations

Vehicle queues will increase under conditions where the gateway demand exceeds capacity. Peak period observations of vehicle queues will be observed at the Shoreline Boulevard and Rengstorff Boulevard gateways during the morning and evening peak periods for one day. Queue lengths, start time of queue formation, start time of queue dissipation, and the maximum queue length will be reported to help understand when the demand exceeds capacity at the observed locations, and the extent of the vehicle queue formed by unserved vehicles. Noting the extent of the queues, and times at which the queues begin to increase and decrease in length, will help describe the North Bayshore gateway operations throughout the morning and evening peak periods.

These queue observations will be conducted using 15 camera locations, recording the queues during the peak periods. Fehr & Peers' staff will then watch the recorded videos to determine queue extents and times at which the queues begin to increase and decrease in size. The cameras will be used to record the inbound and outbound queues for eight locations at the Rengstorff gateway and seven locations at the Shoreline gateway.

PHASE 2: NEAR-TERM GROWTH ASSESSMENT AND DOCUMENTATION

Task 2.1: Near-Term Growth Assessment by North Bayshore Gateways

For the Spring 2019 monitoring, Fehr & Peers described the Near-Term Growth developments planned for North Bayshore, the estimated change in the gateway vehicle demand with occupancy of these new developments in the near future, and the estimated completion of the planned transportation improvements. As part of the Spring 2020 monitoring, Fehr & Peers will update the Near-Term Growth Assessment to include any new developments since the Spring 2019 monitoring. In addition, the Near-Term Growth demand volumes by each gateway will be developed using distributions from published Site Specific Transportation Analysis reports and supplemented by the North Bayshore VISUM travel model. The Near-Term growth trip estimates will be reported by gateway.

Task 2.2: Spring 2020 North Bayshore District Monitoring and Near-Term Growth Assessment Documentation

A North Bayshore District Monitoring and Near-Term Growth Assessment report will be prepared that summarizes the person and vehicle trips for each North Bayshore gateway, and person mode share during the morning peak period (7:00 to 11:00 AM) and the evening peak period (3:00 to 7:00 PM) for Spring 2020 (Fall 2019 counts and mode share will be summarized in the historical graphics and appendix). This report will also compare the gateway observations to several trip target options during the morning and evening peak periods. The Near-Term Growth Assessment will also be documented. The draft report will be submitted to the City staff for review and comment. Review comments will be incorporated into the final report and submitted to City staff. Our fee estimate includes 40 staff hours to respond to comments on the draft and prepare a final report. Responding to comments requiring additional technical analysis or requiring more than 40 staff hours will be conducted as an additional service.

Deliverable: *Draft and Final Report documenting the North Bayshore District Monitoring and Near-Term Growth Assessment report.*

Task 2.3: Fall 2019 Technical Memorandum Summary Deliverable

The Fall 2019 monitoring will be documented using a brief technical memo format with tables and figures to present the Fall 2019 gateway volume and mode share monitoring results. Our fee estimate includes up to 12 staff hours to respond to comments on the draft and prepare a final memo. Responding to comments requiring additional technical analysis or requiring more than 12 staff hours will be conducted as an additional service.

Deliverable: *Draft and Final Memorandum documenting the Fall 2019 North Bayshore District Monitoring results.*

Task 2.4: Project Coordination and Public Hearings

Fehr & Peers will be available to attend two project conference calls and two public hearing meetings without a presentation role as part of this effort. We have included 8 hours to assist staff in the preparation of materials for the hearings. Additional meetings or hearings can be accommodated on an as-needed basis, subject to scope and budget amendments.

OPTIONAL TASKS

Recent North Bayshore District Monitoring reports summarize traffic volumes and mode share at the gateways. As residential development is added to the North Bayshore area in the near future, and as new sources of travel data become available, the monitoring efforts could expand to observe and report a broader range of travel behavior performance measures. Options described here, such as a districtwide personal travel survey or mobile device-based "Big Data" sources, could be used to generate a more comprehensive

understanding of travel patterns within the North Bayshore District. Further, the tools used to analyze future traffic patterns could be expanded to include multimodal operations and capacity evaluation techniques that can more accurately evaluate congestion hotspots and test the effects of multimodal infrastructure enhancements like cycle tracks and bus lanes. The optional tasks listed below highlight additional data sources and gateway analysis methods that could generate additional performance measures that could be tracked and reported as a part of the future North Bayshore monitoring efforts.

OPTIONAL TASK: GATEWAY VEHICLE CLASSIFICATION OBSERVATIONS FOR THE NON-PEAK DIRECTIONS

The North Bayshore Gateway vehicle classifications will be collected by the count vendor for the outbound direction during the morning peak period and inbound direction during the evening peak period. The vehicle classification will include: single occupant vehicles, carpool vehicles by vehicle occupancy (1 person, 2 person, 3 person, and 4+ person), transportation network company vehicles (Uber and Lyft) by vehicle occupancy (1 person, 2 person, 3 person, and 4+ person), trucks, transit vehicles, bicyclists and pedestrians.

OPTIONAL TASK: ENHANCED DATA VISUALIZATION OR WEBSITE

The North Bayshore monitoring effort has been underway since 2015, and is accumulating a database of travel data. Some of this data has been presented in tables as a part of the gateway monitoring reports, but much of the data has not been formally presented. More comprehensive data visualization could help staff, decision makers and members of the public understand travel patterns and see the trends being observed over time. As part of the Fall 2019 and Spring 2020 NBS Monitoring report, Fehr & Peers could develop a dedicated website to contain the observed data and allow users to query the data and create their own graphics.

OPTIONAL TASK: DISTRICT WIDE PERSON TRAVEL SURVEY

An annual districtwide personal travel survey could be administered to collect information about employee and resident trip making by time of day, resident location, and mode. A survey would complement the North Bayshore District gateway monitoring by providing a more in-depth understanding of travel choices broken down by population type (e.g., employee, resident, etc.) and residence location (e.g., North Bayshore and non-North Bayshore). It could also gauge interest in other travel choices by asking respondents to state their preferences for future modes.

The survey could be administered by the Mountain View Transportation Management Agency (TMA), or developed by aggregating employee travel surveys that may already be conducted by individual employers.

OPTIONAL TASK: NORTH BAYSHORE DISTRICT AND REGIONAL PERFORMANCE MEASURES

Fehr & Peers can assist the City of Mountain View with performance measures such as Vehicle Miles Traveled (VMT) and Greenhouse Gas (GHG) Emissions estimates, compared between the North Bayshore District and regional averages. These estimates would be prepared using the City of Mountain View travel model and/or the VTA travel model and a GHG emissions model. The City could also report the portion of residents living and working in the District. These performance measures could be integrated into the District Monitoring report.

OPTIONAL TASK: COLLECT DATA FOR NORTH BAYSHORE USING BIG DATA SOURCES

Origin-Destination Data

Fehr & Peers could collect origin-destination (OD) data specific to North Bayshore (or to the City of Mountain View as a whole) to inform City staff and decision-makers about travel patterns and to support the on-going North Bayshore gateway monitoring. The primary purpose of the OD data would be to identify the locations where the trips to/from North Bayshore come from. The traditional approach to collecting this information would involve conducting a license plate-matching study whereby the license plates of vehicles entering or leaving North Bayshore are matched to plates observed at a few important roadway locations nearby. This type of study is time-consuming and expensive, and can only identify general directional patterns rather than the specific communities where the trips originate. This type of data can now be collected more efficiently using data from mobile devices.

Recently, some mobile device data providers have developed the capabilities of producing OD data with enough spatial and temporal accuracy to be useful in transportation planning applications. The City can choose to purchase such OD data in order to better understand the travel patterns of vehicles entering and leaving the North Bayshore gateways.

Freeway and Major Street Speed Data

The operations of the US 101 and SR 85 freeways have a direct influence on the flow of vehicles to/from the North Bayshore gateways. Freeway bottleneck hotspots can be observed over multiple days by using a Big Data provider that collects roadway travel speed from in-vehicle GPS devices or smart phone applications. The speeds for passenger and commercial vehicles can be reported separately. Level of aggregation can be at the roadway segment or corridor level, and can range from individual minutes of a single day to a typical day within a full year. Weather, collision, and construction notifications are also included so non-recurring congestion locations can be identified separately from recurring congestion. Accessing freeway big data would require coordination with the VTA to purchase a data set that meets the data provider's minimum purchase requirements. Depending on reliability, it may be possible to collect speed data on major streets into and out of North Bayshore.

Using mobile device data, Fehr & Peers can gather information regarding employee's trips to and from North Bayshore. This information can be used to pinpoint locations with the longest delays which City staff can use for prioritization of transportation improvements or further studies. This information can also be used to compare to and calibrate the City of Mountain View NBS VISUM model, which (as noted in the next section) can be used to conduct enhanced multimodal tests like gateway reliability of travel (travel time variability) and speed consistency tests (percent congested links).

Reliability of Travel Time (travel time reliability) and Speed Consistency (percent congested links)

Using mobile device data, Fehr & Peers can gather information regarding travel time and speeds on roadways and highways that provide access to/from North Bayshore such as US-101, Shoreline Boulevard, Middlefield Road, and more. This information can be used to identify locations with highest delays which City staff can use for prioritization of transportation improvements or further studies, and can also be used to compare to and calibrate the City of Mountain View NBS VISUM model which (as noted in the next section) can be used to conduct enhanced multimodal tests like gateway reliability of travel time (travel time variability) and speed consistency tests (percent congested links). If this data is collected over multiple monitoring cycles, the data will be available for comparing to previous cycles to determine how travel time and speed has varied compared to previous monitoring cycle time periods.

OPTIONAL TASK: PEDESTRIAN, BICYCLE AND TRANSIT ANALYSIS

As more developments and improvements are constructed in the North Bayshore Area, the access for pedestrians, bicyclists and transit modes of transportation may change. As an optional task, Fehr & Peers can conduct transit access, walk shed, and/or bike shed analysis to determine what areas have good multimodal access to North Bayshore within a specified time-frame or within desired walking or bicycling levels of stress. In doing so, City staff can see how these transit, walk or bike sheds change over time and what areas need improvements.

In this same task, Fehr & Peers can also document the bicycle facility type mileage and other metrics such as number of pedestrian and/or bicycle collisions and fatalities to assist the City in prioritizing locations for multimodal improvements, and for comparing to previous monitoring cycles to see any changes or trends over time.

OPTIONAL TASK: EVALUATION OF PERMANENT COUNT LOCATIONS

With the North Bayshore District monitoring occurring regularly, it may be useful for City staff to establish permanent count locations. Fehr & Peers will evaluate different equipment options for establishing permanent count locations, and summarize the costs and capabilities of the different options. By installing permanent count locations, City staff can save time on the coordination and preparation of temporary count locations. The results of this comparison would be summarized in a brief memorandum.

OPTIONAL TASK: ENHANCED GATEWAY OPERATIONS AND CAPACITY EVALUATION MODELING METHODS

As more projects are approved and the demand approaches or exceeds the gateway capacity, there will be a need to conduct additional gateway capacity analysis that will require new travel demand and multimodal operations modeling.

The North Bayshore District Monitoring data can be paired with the City of Mountain View travel model, the North Bayshore VISUM travel forecasting model, and the VISSIM multimodal microsimulation traffic operations model to conduct sensitivity tests of different demand strategies and transportation improvements. Pairing the North Bayshore data with the travel forecasting and multimodal operations models could help City staff answer challenging questions such as:

- How does freeway congestion influence North Bayshore Gateway operations and design solutions?
- How can intersections be designed to best accommodate increased pedestrian and bicycle activity?
- What would be the benefit of an additional North Bayshore gateway, and what would be the most effective location?
- Can changes in origin-destination patterns improve North Bayshore gateway operations?
- How will autonomous vehicles and ride-hailing services such as Lyft and Uber change the performance of street operations?

These more sensitive analytical techniques would be helpful so as to understand the interactions of vehicles, pedestrians, bicyclists and transit passengers as they move along the corridors, and would be helpful in developing a common understanding of the benefits of the priority transportation improvements as additional land development is constructed in North Bayshore. This task would incorporate the additional data to prepare an updated version of the North Bayshore VISUM and VISSIM travel models and used to prepare performance measures such as reliability of travel time (travel time variability), speed consistency (percent of congested links), vehicle hours of travel (total and per service population), and person hours of travel (total and per service population).

**Attachment B: North Bayshore Precise Plan
Fall 2019 and Spring 2020 North Bayshore District Monitoring and Near-Term Growth Assessment Fee Estimate (April 2019)**

Task	Principal-In-Charge	Associate-in-Charge	Project Manager	Engineer	Graphics	Support	Total Hours	Total Labor	Direct Costs	Counts	Task Total
Billing Rate-->	\$320	\$245	\$160	\$145	\$130	\$135					
Phase 1 - Fall 2019 and Spring 2020 North Bayshore District Monitoring											
1.1. Daily Count Observations	0	2	4	16	0	2	24	\$3,720	\$180	\$15,400	\$19,300
1.2. Gateway Vehicle Classification Observations	0	2	4	16	0	2	24	\$3,720	\$180	\$9,600	\$13,500
1.3. Bus Occupancy Observations	0	2	4	8	0	2	16	\$2,560	\$140	\$23,100	\$25,800
1.4. Summary of Existing Travel Patterns	0	8	12	52	48	14	134	\$19,550	\$950	\$0	\$20,500
1.5. Gateway Operations Observations	0	2	8	32	0	6	48	\$7,220	\$380	\$9,900	\$17,500
Phase 2 - Near-Term Growth Assessment and Documentation											
2.1. Near-Term Growth Assessment by North Bayshore Gateway	0	12	24	40	0	10	86	\$13,930	\$670	\$0	\$14,600
2.2. Prepare North Bayshore District Monitoring and Near-Term Growth Documentation											
	Draft Report	2	8	56	24	16	120	\$19,010	\$990	\$0	\$20,000
	Final Report	2	4	16	2	4	32	\$5,530	\$270	\$0	\$5,800
2.3. Spring 2019 Interim Deliverable											
	Draft Summary Memorandum	2	4	32	8	16	70	\$11,060	\$540	\$0	\$11,600
	Final Summary Memorandum	0	2	8	0	0	12	\$2,040	\$160	\$0	\$2,200
2.4. Attend Meetings/Hearings											
	Conference Calls (2)	0	4	4	0	0	10	\$1,890	\$110	\$0	\$2,000
	Public Hearings with Staff Support (2)	0	14	10	0	0	26	\$5,300	\$400	\$0	\$5,700
Total (without optional task)	6	64	182	198	84	68	602	\$95,530	\$4,970	\$58,000	\$158,500
Optional Tasks											
Gateway Vehicle Classification Observations for the Non-Peak Directions											\$10,000 to \$15,000
Enhanced Data Visualization or Website											\$10,000 to \$20,000
District Wide Person Travel Survey											\$10,000 to \$20,000
North Bayshore District and Regional Performance Measures											\$10,000 to \$70,000
Collect Data for NBS Using Big Data Sources											\$50,000 to \$100,000
Pedestrian, Bicycle and Transit Analysis											\$5,000 to \$20,000
Evaluation of Permanent Count Locations											\$10,000 to \$15,000
Enhanced Gateway Operations and Capacity Evaluation Modeling Methods											\$25,000 to \$75,000
Notes:											
Other Direct Costs / Reimbursable expenses are invoiced at cost plus 10% for handling.											
Personal auto mileage is reimbursed at the then current IRS approved rate (58 cents per mile as of Jan 2019).											
Voice & Data Communications (Telephone, fax, computer, e-mail, etc.) are invoiced at cost as a percentage of project labor.											
Fehr & Peers, April 2019.											