APPENDIX E:

DRAFT NO_2 Near-Road Monitoring Station Siting Requirements and Selection Process for the Fresno Core Based Statistical Area

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1. INTRODUCTION

In 2010, the U.S. Environmental Protection Agency (EPA) established a new 1-hour standard and new minimum monitoring requirements for nitrogen dioxide (NO_2). Additionally, EPA promulgated new NO_2 monitoring network design requirements which consist of three distinct NO_2 air monitoring networks. The first network is the near-road monitoring network which is aimed at capturing the higher NO_2 concentrations that occur near roadways. The second network is the area-wide monitoring network which will represent NO_2 concentrations characteristic of large neighborhood or urban areas. The third network, which is called the Regional Administrator Required Monitoring Network requires Regional Administrators to work with states to site a network of 40 NO_2 monitors throughout the nation in locations aimed at protecting susceptible and vulnerable communities.

The monitoring requirements for the first two monitoring networks mentioned above for the new NO_2 1-hour standard are based upon the population of Core Based Statistical Areas (CBSAs) as well as the annual average daily traffic (AADT) counts. The intent of the NO_2 near-road network is to place the monitoring stations near major roads where maximum hourly NO_2 concentrations are expected. As noted in Section 4.3 of Appendix D of 40 CFR Part 58, one microscale near-road NO_2 monitoring station is required in each CBSA with a population of 500,000 or more. Data such as traffic volumes, fleet mix, roadway design, traffic congestion patterns, and characteristics such as local terrain or topography, and meteorology are among the criteria that must be considered when determining areas which have the highest NO_2 concentrations. Additionally, population exposure, near-road siting criteria, safety, surrounding land use, and other factors are also considered during the location selection process. NO_2 monitors under this new standard were originally required to be operational by January 1, 2013; however on March 7, 2013, EPA amended on to the rule that moves this date to January 1, 2017. To assist agencies with the siting selection process, EPA provided the Near-Road NO_2 Monitoring Technical Assistance Document (TAD) which outlines recommendations and ideas on how to successfully meet the revised NO_2 near-road monitoring requirements[1.]

EPA requires air monitoring agencies to submit a report which describes the site selection process for each NO_2 near-road monitoring station that will be established. The San Joaquin Valley Air Pollution District (District) is required to install four near-road air monitoring stations, one in each of the following CBSAs: Stockton, Modesto, Fresno, and Bakersfield. Accordingly, a report of the site selection process will be submitted by the District for each of the aforementioned stations.
With considerable assistance provided by the California Air Resources Board (CARB), the District carried out a detailed process of selecting a site for a near-road monitoring

[1] Near-Road NO_2 Monitoring Technical Assistance Document (TAD) – A document that provides state and local air agencies with recommendations and ideas on how to successfully implement near-road NO2 monitors in order to meet the NO_2 minimum monitoring requirements that were revised in 2010. http://www.epa.gov/ttnamti1/files/nearroad/NearRoadTAD.pdf

station in the Fresno CBSA. This report describes the site selection process conducted by the District and CARB for the purpose of establishing a new NO_2 near-road monitoring station.

2. SITE SELECTION PROCESS

The District conducted a site selection process that involved assistance from the CARB in gathering traffic count data, and determining candidate road segments and the positive and negative attributes of each. Road design, and wind direction associated with each road segment were also considered during the process. Once the acceptable land parcels were prioritized, the District began corresponding with the property owners in the highest ranked segment and is now negotiating a lease with a landowner who is willing to have a near-road monitoring site on his property. In addition to following the guidance provided in the TAD, the District also considered PM2.5 so the site could potentially accommodate a PM2.5 monitor in the future.

2.1 Traffic Count Data

In order to determine the road segments that theoretically have the highest NO_2 concentrations, CARB and the District assessed all available traffic count data available from the California Department of Transportation (Caltrans) for Fresno County. The data included AADT, Fleet mix, and congestion data. Following the guidance found in the TAD, the District and CARB calculated FE-AADT to determine and rank the road segments.

2.1.1 AADT

Traffic counts represent AADT which is the total traffic volume for one year divided by the number of days in the year. AADT usually depicts the traffic volume along a given road segment. All traffic count figures listed include traffic in both directions. Ahead AADT typically refers to traffic north and east of a traffic count location, and Back AADT typically refers to traffic south and west of a traffic location. To avoid overlapping data, the Ahead AADT was used in the District’s site selection process.

Caltrans typically collects traffic counts on freeways. The majority of continuous traffic count sampling is conducted by moving the electronic counting instruments from location to location throughout the state. Traffic counts are adjusted estimates of AADT which compensate for seasonal influence, weekly variation, and other variables.

2.1.2 AADTT

Truck traffic is classified by the number of axles trucks have. For example, 1½ -ton trucks with dual rear tires are included in the two-axle class but pickups and vans with only four tires are not. Annual average daily truck traffic (AADTT) is the total truck traffic volume for one year divided by the number of days in the year. Continuous truck count sampling consists of vehicle classification counts that are conducted throughout California. This program includes partial day and 24-hour counts on high volume, urban freeways, and 7-day counts on low volume, rural freeways. Truck counts are adjusted estimates of AADTT which compensate for seasonal influence, weekly variation, and other variables.

2.1.3 Fleet Mix

Fleet mix pertains to a specific count or percentage of the total volume of traffic and differentiates between light-duty (LD) vehicles and heavy-duty (HD) vehicles. Differences between LD and HD vehicles include the type of fuel they run on (gasoline vs. diesel), and the vehicle's weight, length, or number of axles. NO_2 emissions vary for all vehicles depending on vehicle type; load, speed, and freeway grade, however, diesel fueled HD vehicles typically emit far higher amounts of NO_2 than do gasoline fueled LD vehicles. Fleet mix is important in determining where the emission differences occur.

2.1.4 Fleet Equivalent AADT

FE-AADT is a metric[2] that accounts for total traffic volume and fleet mix in order to compare road segments, especially when the amount of total traffic volume and HD vehicle volume on those road segments varies. FE-AADT gives a better indication of estimated NO2 emissions than does AADT. The FE-AADT values shown in Table 1 below were determined using Ahead AADT and AADTT in the equation below:

$$\text{FE-AADT} = (\text{Ahead AADT} - \text{AADTT}) + (\text{AADTT}*10)$$

This equation gives truck traffic 10 times the weight of non-truck traffic in determining rank because the NO_2 emissions are approximately 10 times as great as non-truck traffic. The segments with the highest levels of NO_2 should be those with the greatest truck traffic.

2.1.5 Postmile

Caltrans has identified Postmile values as breakpoints on Freeways that usually increase from South to North or West to East depending on the direction the route follows within the county. Postmile values increase from the beginning of the route to the next county line and then start over. The total AADT values shown in the tables below apply to the freeway immediately ahead of the Postmile.

[2] For more information on the equation that defines FE-AADT, go to http://www.epa.gov/ttnamti1/files/nearroad/NearRoadTAD.pdf.

2.1.6 Traffic Congestion

Traffic congestion can lead to stop-and-go traffic conditions and per-vehicle emissions may increase as a result. A notable and constant reduction in speed between two points on a freeway is defined as a bottleneck. The congestion values shown the tables below are annual vehicle hourly delay (AVHD) in thousand hours and represent the sum of the delay from the morning and evening peak periods and from the midday period.

2.2 Physical Characteristics of Near-Road Sites

The physical characteristics of candidate road segments must be considered in order to determine which segments are adequate for near-road monitor placement. The characteristics to be assessed and accounted for include roadway design, roadside structures and vegetation, terrain, and meteorology.

2.2.1 Roadway design or configuration and clear zones

Road design or configuration is important in determining acceptable locations for near-road monitors because it can impact the dispersion and transport of pollutants. Road designs can be characterized as above-grade, below-grade, or at-grade. Additionally, road designs that contain features such as interchanges and toll plazas can influence vehicle acceleration and deceleration rates which in turn affect pollutant concentrations and plumes.

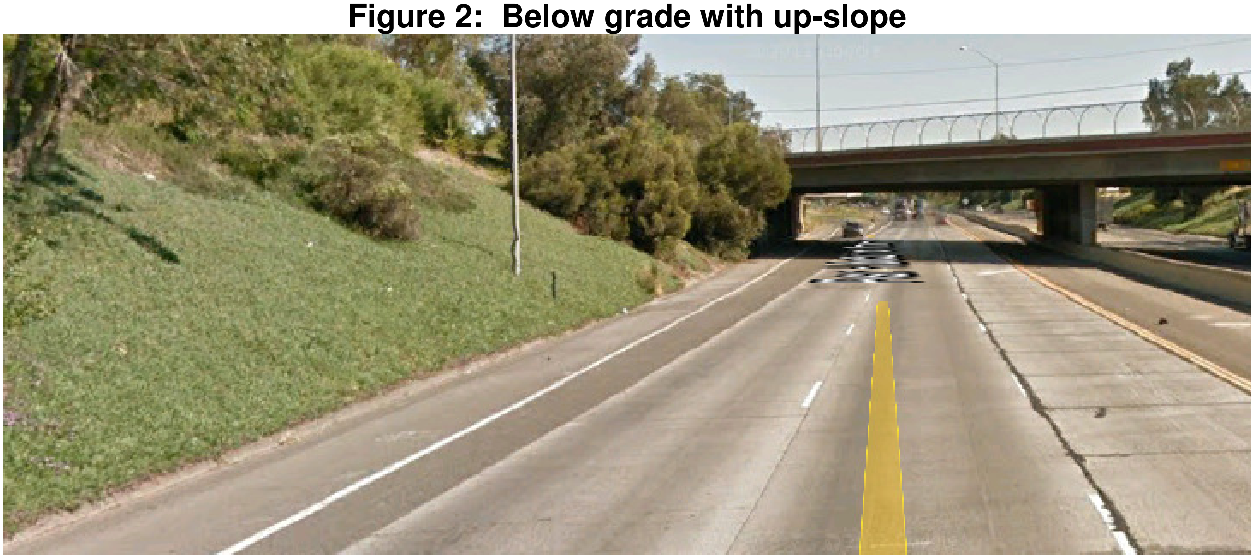
Above-grade or elevated road configurations can be open or have solid fill material beneath them (see Figure 1). Roads that are open underneath are subject to wind from all directions, increased dispersion, turbulence, and dilution of the air as it flows over and under the road. These affects can cause pollutant concentrations to be lower downwind of the elevated roadway. Roads that are over solid fill material can have winds normal with the road and forces that keep the traffic plume near at the surface while others can cause the plume to loft above the ground when it meets the vertical filled material or wall beneath.

Figure 1: Above Grade Road

Source: Google Earth

Roads that are configured below-grade can have vertical or sloped walls that facilitate the funneling of air parallel to the road (see Figure 2). As the air streams through the corridor it can cause pollutant plumes to loft and be carried away as the air flows through, up, and out of the below-grade roadway.

Figure 2: Below grade with up-slope



Source: Google Earth

Roadways that are generally at the same elevation as the immediate surrounding terrain are referred to as at-grade roadways (see Figure 3). Other than structures or obstacles near the roadside, at-grade roadways pose the least amount of impact on pollutant dispersion. As stated in the TAD, at-grade or near at-grade roads are the most desirable road configurations for siting near-road monitors.

Figure 3: At grade roadway

Source: Google Earth

As stated above, EPA requires that NO_2 near-road monitoring stations be placed in areas representative of high NO_2 levels. According to the TAD, road areas that go uphill or downhill, and roads that contain on-ramps and off-ramps, interchanges, or unique features such as toll plazas, and tunnel entrances and exits should not be considered for NO_2 near-road monitor placement because they are designed for rapid vehicle accelerations and decelerations (see examples in Figure 4). These areas and road designs do not produce representative NO_2 concentrations. The most suitable place to locate an NO_2 near-road monitoring station is one that is at grade with immediate flat surrounding terrain.

Figure 4: Junction, interchange, on-ramp, and off-ramp

Source: Google Earth

Clear zones denote roadside areas that are available to drivers who need to pull over and stop safely or regain control if a vehicle leaves the road. Such zones extend from the road's outside traffic edge to an obstacle further off the road. The roadway's traffic volume, design speeds, and the slope of the terrain adjacent to and beneath the roadway are used to determine the width of the clear zone. Near-road monitoring stations are placed outside of clear zones.

2.2.2 Roadside structures and vegetation

Roadside structures such as sound walls or noise barriers can affect dispersion by blocking it or causing turbulence which can mix pollutants. Roadside structures can channel pollutants downwind and inhibit or reduce normal dispersion along the roadway. Vegetation can also affect pollutant transport and dispersion by mixing and diluting air as it blows through the branches and leaves of trees, and by blocking wind and slowing dispersion down. Additionally, pollutant concentrations in traffic plumes can decrease when particulate pollutants get deposited onto the surfaces of branches and leaves. Locations that are void of roadside structures and vegetation are therefore more acceptable for near-road monitor placement.

2.2.3 Terrain

Local terrain can affect dispersion and pollutant transport so it is important to have a good understanding of the large scale terrain features that characterize the air basin when considering locations for near-road monitor placement. For example, valleys may be more susceptible to high NO_2 concentrations because the surrounding terrain and temperature inversions tend to inhibit dispersion whereas open terrain areas allow for better air flow which can aid in lower pollutant concentrations.

2.2.4 Meteorology

The TAD states that evaluating historical meteorological data can be helpful in determining locations that may be directly impacted by traffic emissions from particular road segments due to local winds. Understanding the local meteorology can also indicate which side of a road segment may be more impacted by the traffic emissions. Research studies have shown that locations very close to the roadway on the downwind side of a given road segment can adequately capture peak pollutant concentrations.

2.3 Spatial scales and population exposure

40 CFR Part 58 Appendix D requires that the spatial scale of a NO_2 near-road air monitoring site be classed as a microscale site. Microscale sites measure peak concentrations in an area with of a radius 100 meters. Concentrations decrease significantly as distance increases outside of this area. This being the case, EPA requires near-road monitoring stations to be placed as close as practicable but no further than 50 meters from the target road segment. Additionally, EPA requires that the sampling inlet be within 2 to 7 meters from the road’s surface.

As specified in 40 CFR Part 58 Appendix D, Section 4.3.2(a)(1), state and local air monitoring agencies shall consider the potential for population exposure when making their final near-road monitoring site selections when there are multiple acceptable sites in the same ranked segment.

2.4 Safety

As specified in the TAD, NO_2 near-road monitoring stations must be safely sited for motorists traveling the roadway and for the monitoring station operators. The sites are required to be safely and legally accessible to station operators and pose no safety hazards to drivers as well as people walking or living nearby. In addition, some sites will require the installation of permanent safety barriers, such as guardrails.

3. SITE SELECTIONS FOR FRESNO CBSA

3.1 Introduction

As stated in Section 2.0 above, the District started with traffic count data to select the freeway segments that were to be considered for a site. Meteorology, terrain, road structures, parcels with locations acceptable for building a site on, and landowner willingness to host a site on their property all played a role determining site selection. The segments through the Fresno CBSA were generally intermittent rather than continuous and it became apparent that the most of the ranked segments near the urban core did not have any available land for constructing a site. These segments in central Fresno were typically above or below grade with mixed vegetation and trees which prevented placement of the site close enough to the edge of the freeway to capture peak values. In fact, the District found that there are only a few locations along the top ten segments that could meet all of EPA's siting criteria.

At this juncture, the District decided to contact all landowners of parcels with acceptable locations in the top ten segments and prioritize working with the landowners who responded positively within the highest ranked segments before moving further down the list.

The District process in locating a NO_2 near-road site can be summed as follows:

- Rank all road segments
- Determine the top 10 segments
- Find locations were a site can be built (acceptable locations or parcels)
    - Take into account near-road exposure.
    - Take into account meteorology, structures, obstacles, grade, and other criteria.
- Contact property owners by sending a letter
- Contact those property owners that are willing to work with us starting with those in the highest ranked segments
- Negotiate a lease with a willing property owner in the highest ranked segment
- Present site selection to the Governing Board for approval, and include the opportunity for public comments.

3.2 Traffic Count Data

Traffic count data determined which road segments would likely have the highest NO_2 concentrations in the Fresno CBSA. Because truck traffic accounts for the highest NO_2 emissions, the road segments were ranked by Fleet Equivalent Annual Average Truck Traffic (FE-AADT) counts. Areas that did not have recent truck traffic counts had to be estimated.

Even though the percentage of statewide annual vehicle hours of delay caused by traffic congestion is far less in the San Joaquin Valley than in other areas of the state, the District included traffic congestion with the traffic count data as per the requirements outlined in the TAD. Caltrans District 6, which includes the Fresno CBSA, has less than 2% of the statewide annual vehicle hours of delay due to traffic congestion in the entire district. The highest ranking bottleneck locations where freeway speed dropped and remained below 60 mph are shown in Table 1 in below. Because so little traffic congestion occurs in the Fresno CBSA, congestion did not factor into site selection.

3.2.1 Road Segment Ranking

After the traffic data was examined, each road segment was ranked by FE-AADT from the highest traffic count to the lowest for the CBSA. The list was narrowed to the top 32 road segments (see Appendix A) then reduced to the top 10 segments (see Table 1 below). District staff surveyed the areas within each segment, and identified which locations could support a near-road monitoring station.

Table 1: Fresno County Top Road Segments by Fleet Equivalent (AADT)[4].

Route	Postmile[6]	Description	Total Ahead AADT[2]	AADT Rank	Truck AADT	AADTT Rank	Congestion[3]	FE AADT[7]	FE AADT Rank
99	22.16	JCT RTE 180S	128,500	2	14,300	6	-	257,200	1
99	22.735	BELMONT AVE	122,500	4	14,300	7	-	251,200	2
99	23.304	OLIVE AVE	117,500	8	14,300	8	-	246,200	3
99	18.544	JENSEN AVE	93,000	16	14,945	2	-	227,505	4
99	24.416	CLINTON AVE	93,000	17	14,303	5	-	221,727	5
99	23.852	MC KINLEY AVE[5]	108,000	10	12,384	17	-	219,456	6
99	15.491	CHESTNUT AVE	73,500	38	16,170	1	-	219,030	7
99	26.224	DAKOTA AVE	91,000	19	14,000	11	3	217,000	8
99	25	SHIELDS AVE	89,500	20	14,000	12	-	215,500	9
99	9.164	MANNING AVE	83,500	28	14,245	9	-	211,705	10

[1] Road segments with no Truck AADT (AADTT) are given substitution with the following:

Route 99 – The top 3 route 99 AADT segments substituted with 14,300 truck AADT data from an adjacent road segment.

- Segments ranked 8 and 9 were estimated with 14,000 Truck AADT. The data for all of the truck segments on Route 99 that were not estimated ranged between 11,000 and 16,000 Truck AADT and the calculated average was 14,000 Truck AADT which was used as the estimate.

[2] The Total AADT numbers shown apply to the freeway immediately ahead of the postmile.

[3] Congestion data is in annual vehicle delay in thousand hours. Caltrans District 6 (which includes Fresno County) has less 2% of the statewide annual vehicle hours of delay.

[4] The Annual Average Daily Traffic (AADT) is defined as the total volume for the year divided by 365 days. Very few locations in California are actually counted continuously. Traffic Counting is generally performed by electronic counting instruments that are moved from location to location throughout the state in a program of continuous traffic count sampling. The resulting counts are adjusted to an estimate of annual average daily traffic by compensating for seasonal influence, weekly variation and other variables which may be present. All traffic volume figures that are listed include traffic in both directions.

[5] AADT did not match Truck data table.

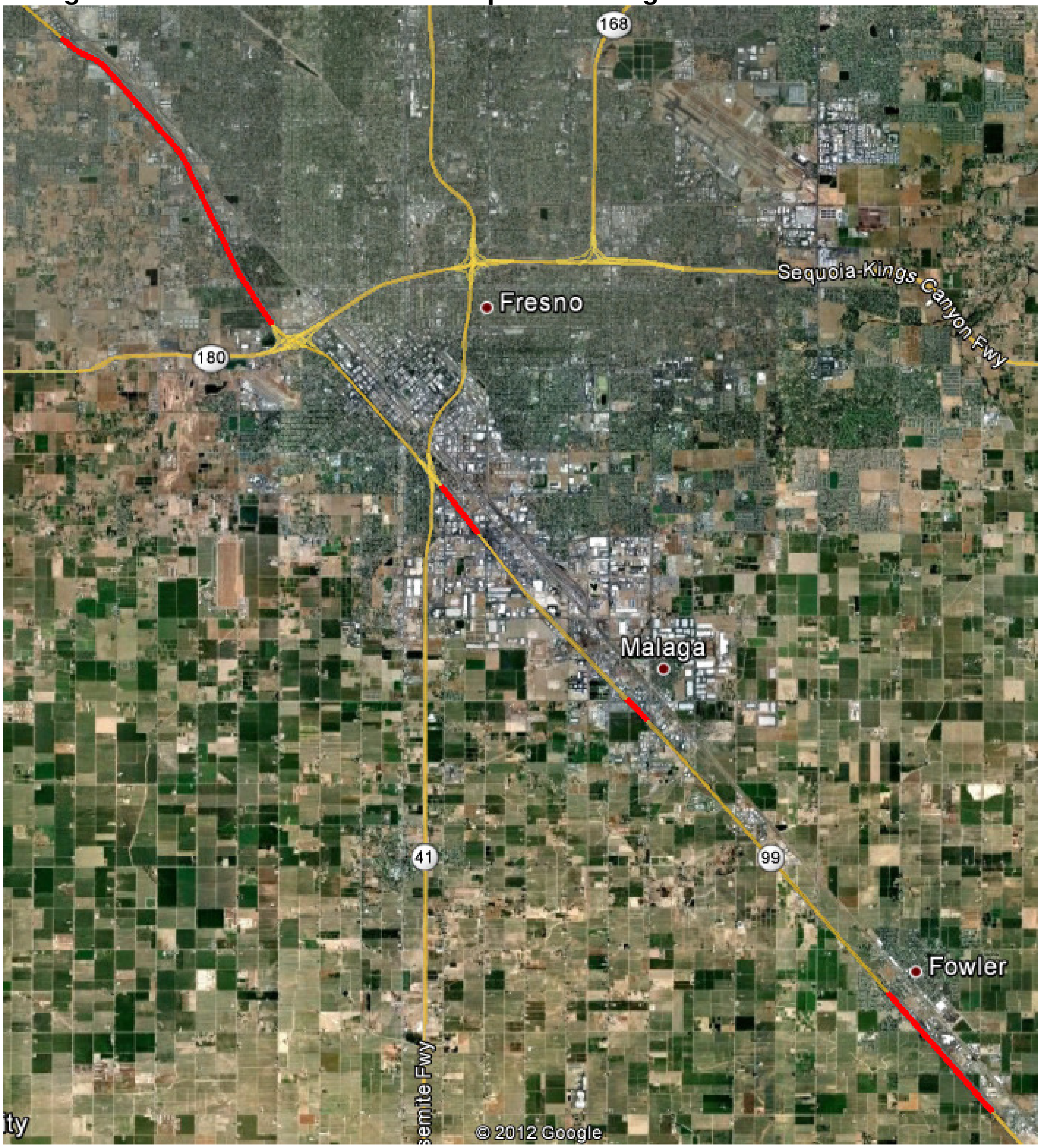
[6] Postmile – Each breakpoint is identified by the postmile value corresponding to that point on the freeway. Caltrans has identified that the postmile values increase from the beginning of a route within a county to the next county line. The postmile values start over again at each county line. Postmile values usually increase from South to North or West to East depending upon the general direction the route follows within the state.

[7] The equation FE AADT = (Ahead AADT-AADTT)+(AADTT*10) is defined in the TAD: http://www.epa.gov/ttnamti1/files/nearroad/NearRoadTAD.pdf

3.2.2 The top 10 road segments

The top 10 road segments are located along Freeway 99 through Fresno. The red lines in Figure 5 below demark the general location of the top 10 road segments. Gaps between the red lines along Freeway 99 depict locations of road segments that were ranked outside of the top ten and were not considered during the site selection process.

Figure 5: General location of the top 10 road segments in the Fresno CBSA.



Source: Google Earth

As shown in the TAD Matrix in Appendix A, road segment evaluations were based on many categories of criteria, however some of the categories were more critical to the decision-making process than others. In addition to meteorological considerations, the most important criteria included road design, road structures, and available space for an air monitoring site.

Below are descriptions of the 10 road segments and the reasons why they were acceptable or unacceptable for site consideration. Images of the segments are provided in Appendix B.

3.2.2.1 Segment 1: Jct. Rte. 180

This segment is located along Freeway 99 from Nielson Avenue northward to Belmont Avenue. The southern end of segment is above grade and the northern end of the segment is primarily below grade. The middle portion of segment is below grade with upward slopes and mixed vegetation and trees lining this entire portion of the segment. The slopes and vegetation present air flow obstruction and space limitations, and the above grade portion at the southern end of the segment is an overpass. The issues with this segment made it unacceptable for siting a near-road monitor.

3.2.2.2 Segment 2: Belmont Avenue

This segment is located along Freeway 99 from Belmont Avenue northward to Olive Avenue. The southern and northern ends of the segment are below grade with upward slopes and mixed vegetation and trees lining these portions of the segment. The middle portion of the segment is at grade with dense vegetation and a sound wall lining the east side of the freeway and a frontage road and businesses lining the west side of the freeway. These characteristics of this segment made it unacceptable for siting a near-road monitor.

3.2.2.3 Segment 3: Olive Avenue

This segment is located along Freeway 99 from Olive Avenue northward to McKinley Avenue. The southern end of the segment is below grade with upward slopes and vegetation lining both sides of the freeway. The northern end of the segment is above grade and comprises an overpass. The middle of the segment is at grade with trees lining this entire portion of the segment. These characteristics of this segment made it unacceptable for siting a near-road monitor.

3.2.2.4 Segment 4: Jensen Avenue

This segment is located along Freeway 99 from Jensen Avenue northward to Church Avenue. The southern end of the segment is above grade and comprises an overpass. The northern end of the segment descends into junction Highway 41 where upward slopes and vegetation align both sides of the freeway. The middle portion of the segment is at grade and industrial and commercial business with sizeable lots line both sides of the freeway. Air flow obstruction from vegetation and structures is minimal and there were two or three potential locations for siting a near-road monitor.

3.2.2.5 Segment 5: Clinton Avenue

This segment is located along Freeway 99 from Clinton Avenue northward to Shields Avenue. The entire segment is at grade with trees, bushes, and shrubs intermittently aligning much of the segment causing some space limitations and air flow obstruction.

A railroad yard is located on the east side of the freeway throughout the segment, and a frontage road, businesses and some vacant lots comprise the west side of the freeway. The District determined that there were several acceptable parcels for near-road monitor placement along this segment and at least one landowner was willing to discuss the possibility with the District. However, the parcels will be in the path of the high-speed rail project when the portion of Freeway 99 in this segment gets moved 100 yards to the west which eliminated them from further consideration.

3.2.2.6 Segment 6: McKinley Avenue

This segment is located along Freeway 99 from McKinley Avenue northward to Clinton Avenue. The southern end of the segment is an above grade overpass that gently descends to the at grade configuration which makes up most of the segment. The east side of the north end of the segment becomes an upward slope due to an on/off ramp. Although some vacant lots are located on both sides of the freeway, trees and mixed vegetation aligning both sides of the freeway and intermittent sound walls pose obstruction to air flow. These characteristics made it unacceptable for near-road monitor placement.

3.2.2.7 Segment 7: Chestnut Avenue

Segment 7 is located along Freeway 99 from Chestnut Avenue northward to Central Avenue. The segment is essentially at grade except for the northbound on-ramp at the southern end of the segment. Bushes intermittently align both sides of the freeway. The west side of the freeway is occupied by agriculture and a mobile home park. The east side of the freeway is occupied by businesses with large lots. The District determined that there were good potential locations for near-road monitor placement along this segment.

3.2.2.8 Segment 8: Dakota Avenue

Segment 8 is located along Highway 99 from Dakota Avenue northward to Ashlan Avenue. This segment is entirely below grade with upward slopes and mixed vegetation and trees aligning both sides of the freeway. These characteristics made it unacceptable for near-road monitor placement.

3.2.2.9 Segment 9: Shields Avenue

This segment is located along Freeway 99 from Shields Avenue northward to North Brawley Avenue. This segment is entirely at grade with intermittent bushes and trees aligning the road side but. A railroad yard occupies the east side of the freeway while a frontage road and businesses occupy the west side of the freeway. There were several vacant lots along the frontage road that are good potential locations for a near-road monitoring site. However, the parcels will be in the path of the high-speed rail project when the portion of Freeway 99 in this segment gets moved100 yards to the west.

3.2.2.10 Segment 10: Manning Avenue

This segment is located along Freeway 99 from Manning Avenue northward to Merced Street. The segment is essentially at grade with exception of the northern end which becomes an overpass associated with on/off-ramps. Trees and bushes intermittently align the segment. Agricultural fields occupy the entire west side of the freeway in this segment. Most of the east side of the freeway is comprised of industrial businesses and vacant fields with minimal obstructions. There are many potential locations on the east side of the freeway.

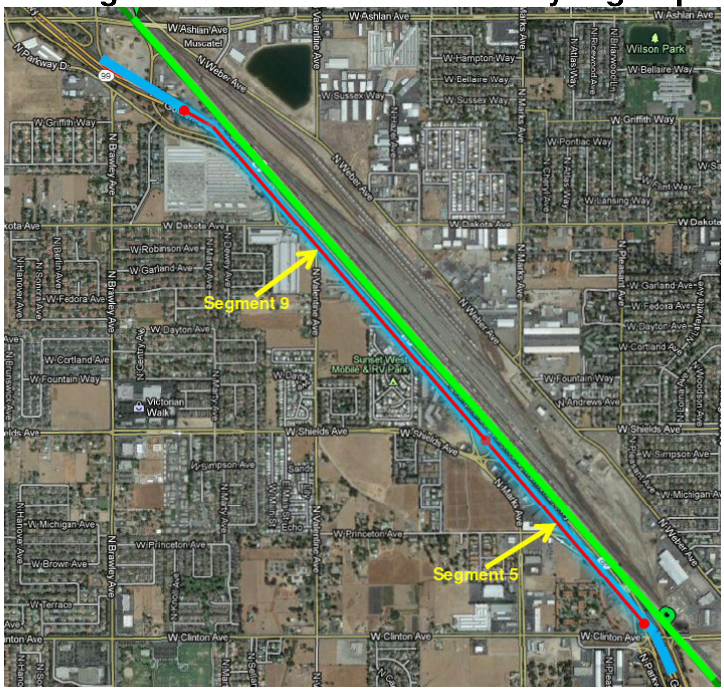
3.2.3 California High Speed Rail Project

In 2011, the California High-Speed Rail Authority began the procurement process of California's future high speed rail project[3]. The purpose of the project is to help meet the state's increasing transportation demands and will be designed to service those traveling from San Francisco to Los Angeles via the Central Valley, and eventually add routes from Sacramento to San Diego.

Construction of the Merced to Fresno route is scheduled to begin in 2013 and the portion of the route through Fresno will extend from the San Joaquin River to downtown Fresno. Part of this stretch of track will run parallel to Freeway 99 and North Parkway Drive beginning near North Brawley Avenue and extending southward to Clinton Avenue. Construction of the track will involve moving this section of Freeway 99 about 100 yards to the west and displacing North Parkway Drive and the businesses located there. Segments 9 and 5 are in this section and acceptable parcels are in the path of the high-speed rail construction. Given these circumstances, the District was reluctant to place a near-road monitoring site in the path of the high-speed rail route. Figure 6 shows the high-speed rail route (green line) as it relates to Segments 9 and 5.

[3] For more information on the California High-Speed Rail Project, visit http://www.cahighspeedrail.ca.gov/home.aspx

Figure 6: Segments that will be affected by High Speed Rail

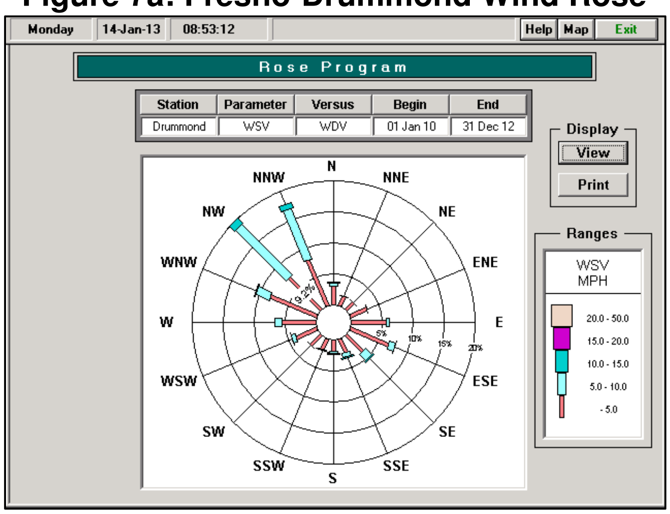


Source: Google Earth

3.3 Meteorological Considerations

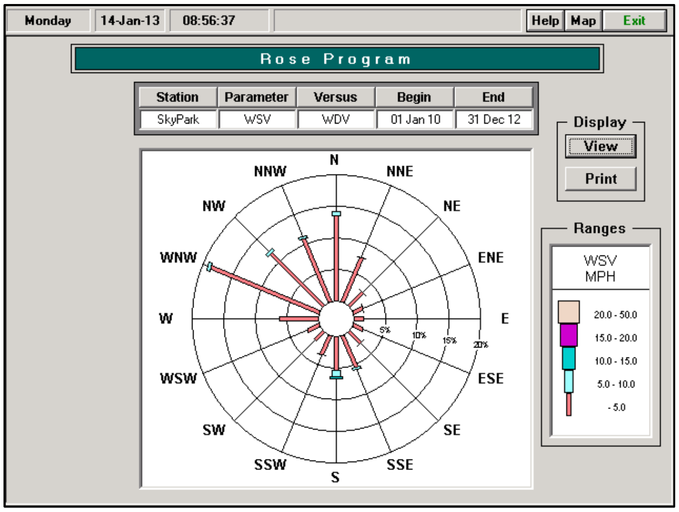
As shown in the wind roses below, local winds in Fresno blow primarily from the northwest to the southeast. The Freeway 99 corridor runs through the city of Fresno in a northwest-southeast orientation. Given that the prevailing winds basically flow parallel to the freeway, the District determined that locations on both sides of Freeway 99 were appropriate for near-road monitor placement.

Figure 7a: Fresno-Drummond Wind Rose



Source: District EMC Data Program

Figure 7b: Fresno-Sierra Sky Park Wind Rose

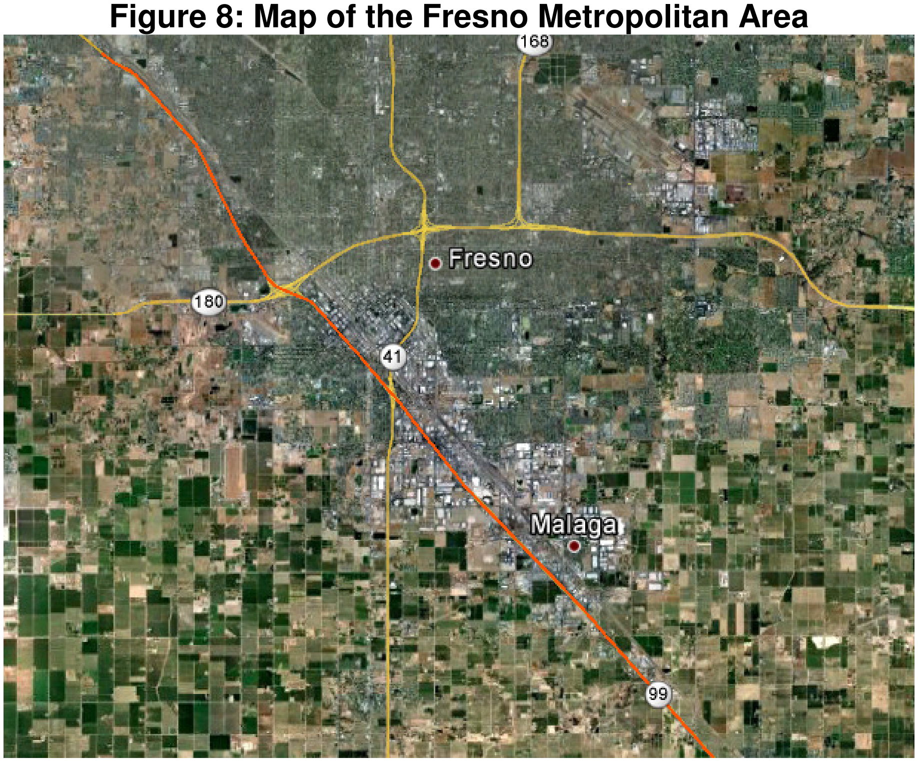


Source: District EMC Data Program

3.4 Terrain through Fresno CBSA

The terrain through Fresno CBSA is generally flat with agricultural lands located beyond the city limits. Freeway 99 is generally at grade at the northern and southern limits of the city of Fresno and either elevated or below grade in the urban area of city. Figure 8 shows a satellite image of the area under consideration in the city of Fresno.

Figure 8: Map of the Fresno Metropolitan Area

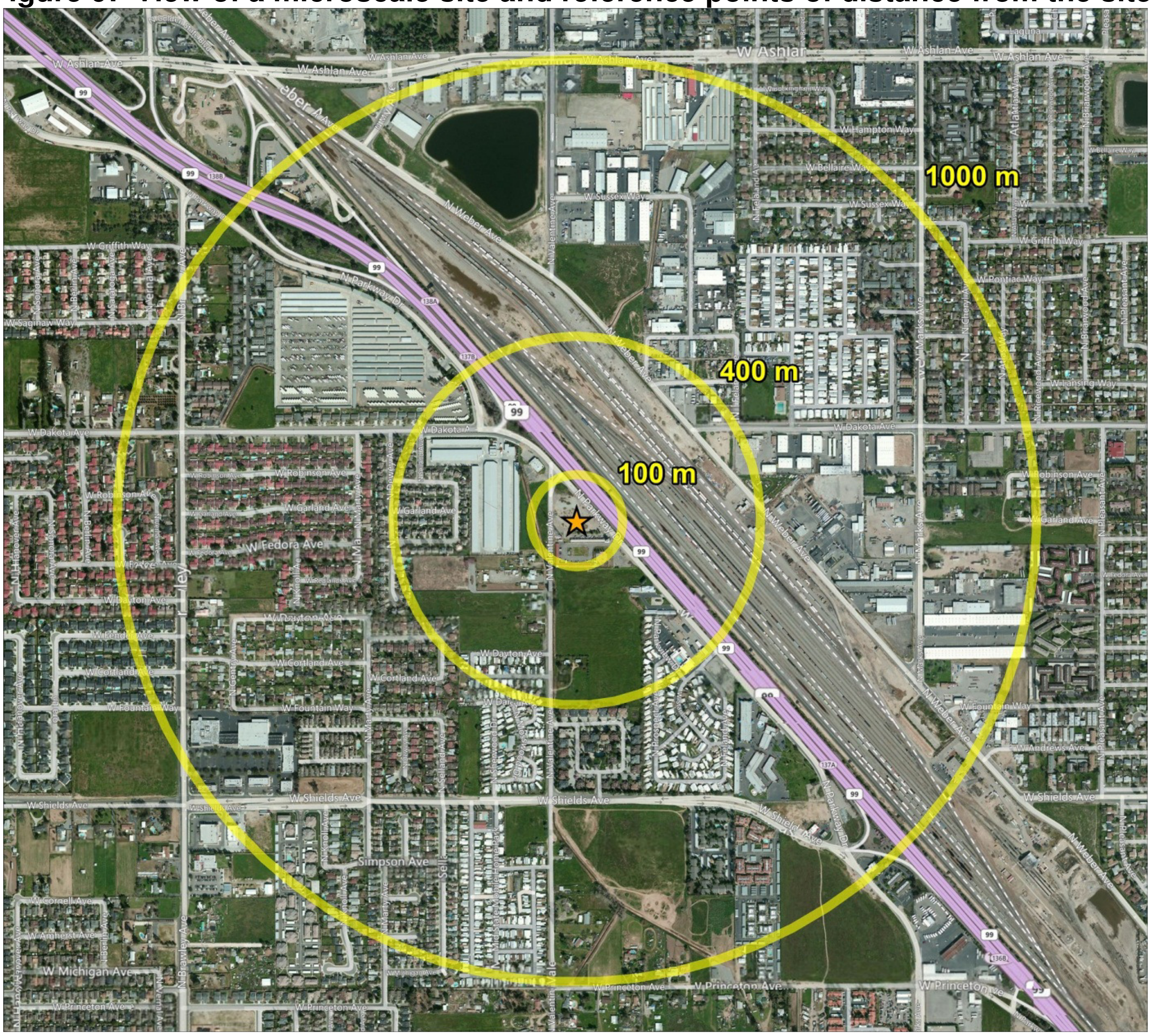


Source: Google Earth

3.5 Spatial scales and population exposure

As stated above, NO_2 near-road sites are intended to be microscale sites. This means that these sites measure representative concentrations within 100 meters. Figure 9 shows a microscale site with a maximum 100 meter radius for reference, and 400 and 1,000 meter radii shown for informational purposes. Maps showing locations that the District investigated in some detail are provided in Appendix D.

Figure 9: View of a microscale site and reference points of distance from the site.



Source: Arc GIS

The TAD states that the highest concentrations can be found within 20 meters of the freeway, so the District focused efforts on locations that can handle an air monitoring site within 20 meters. Additionally, the required range for the station's probe height is 2 to 7 meters in order to capture the highest NO_2 concentrations. While the preferred probe height is 2 meters, it will not be possible due to the structure and orientation of the monitoring station so, the District will place the probe as close to the 2 meter height as possible.

For the Fresno CBSA, the District determined that Segments 4, 5, 7, 9 and 10 had potential multiple acceptable sites. Sites in Segments 5, 7, and 9, were eventually eliminated for reasons explained in Section 3.6 below. Segment 10 was eliminated because the District opted to pursue an acceptable location with a higher FE-AADT ranking found in Segment 4.

3.6 Correspondence with property owners

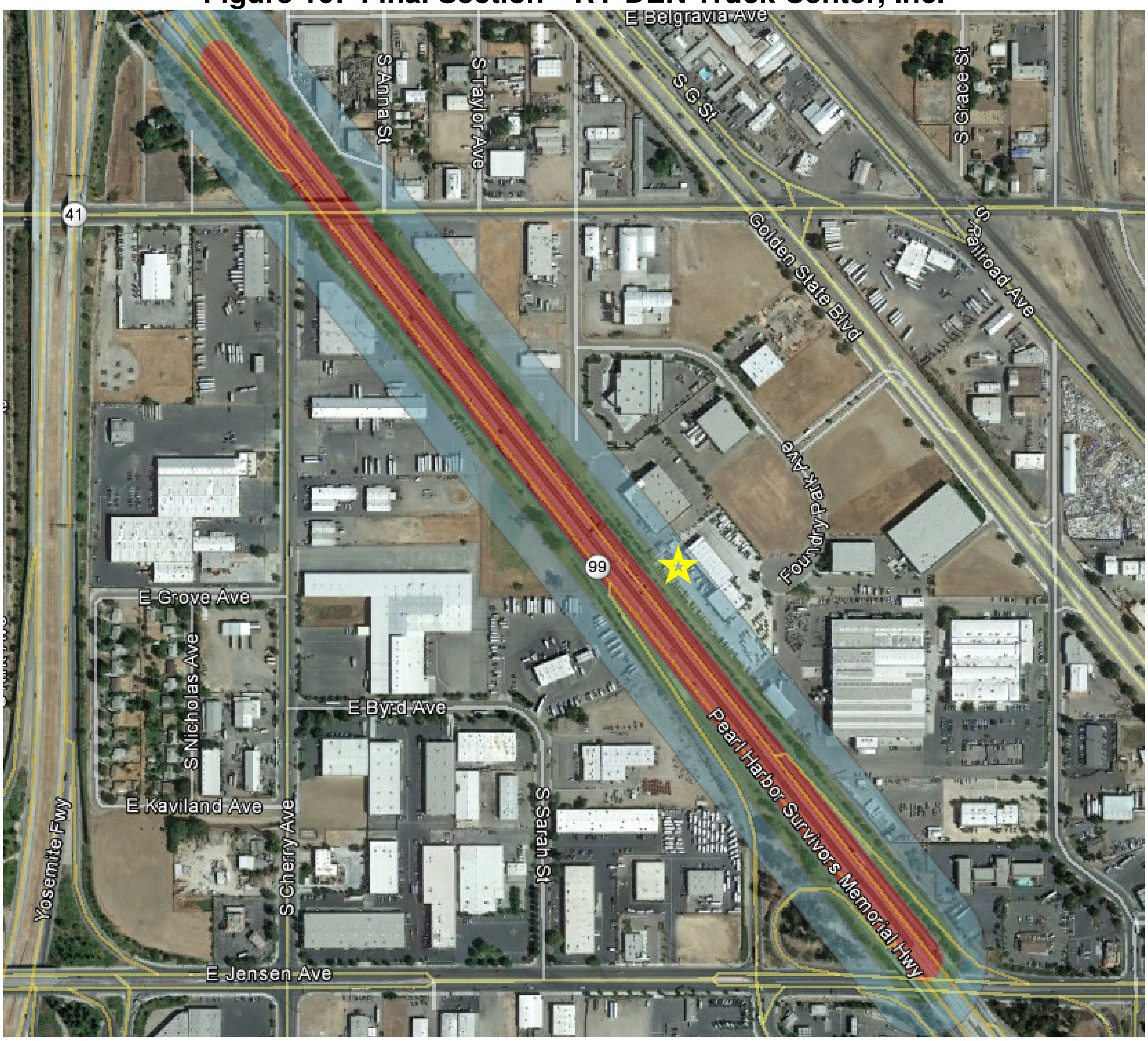
The District found 11 acceptable parcels along Freeway 99 so letters were sent to 10 of the property owners and one property owner was contacted by phone. Eight responses were received, and five of the property owners initially expressed interest. The District then began direct correspondence with the five interested landowners from Segments 9, 5, and 4 respectively. In addition to concerns about the future construction of high-speed rail, other factors lead to the elimination of Segments 9 and 5 from consideration. Two potential locations in Segment 9 were located at motels. One of the landowners offered use of one of the motel rooms for a monitoring station but the District determined that the space was unsuitable for station placement so the option was not pursued. The interested landowner in Segment 5 consented to placing a monitoring station in a specific place on the property however the location was more than 50 meters from the Freeway 99 roadside so it was eliminated from consideration. There were two interested landowners in Segment 4 who were willing to negotiate a lease with the District but one was eliminated because of vegetation obstructions on the property. The District is currently negotiating a lease with the landowner of the acceptable parcel.

4.0 FINAL SITE SELECTION

After everything was considered, a parcel in the road segment with the 4th highest FE-AADT was selected as the location of the Fresno NO_2 near-road monitoring site. The site's address is 2482 Foundry Park Avenue. The selected site meets the siting criteria listed in the CFR, and is also acceptable for accommodating placement of a PM2.5 and other air pollution analyzers in the future.

Figure 10 is a map of the final site selection located on Foundry Park Avenue in Segment 4. Any of the parcels adjacent to these would have similar characteristics.

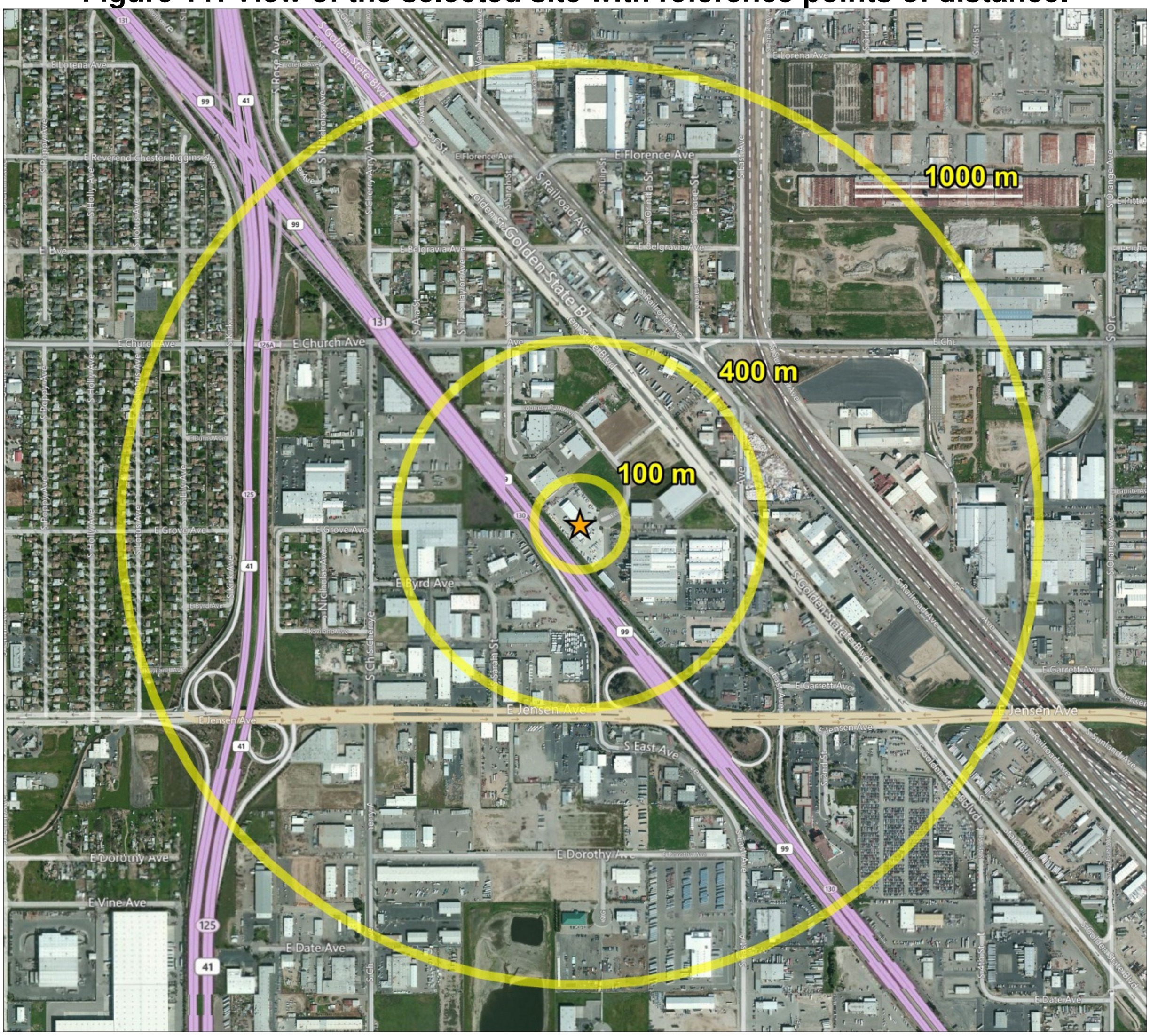
Figure 10: Final Section—RY-DEN Truck Center, Inc.



Source: Google Earth

Figure 11 shows the selected microscale site with concentric circles depicting 100, 400, and 1,000 meters radii around the parcels in the segment. The 100 meter circle is the maximum extent of the microscale site. The concentric circles show the land uses around the parcels.

Figure 11: View of the selected site with reference points of distance.



Source: Arc GIS

Figures 12a and 12b show roadside views of the selected site for the NO_2 near-road air monitoring station. The site will be as close to the freeway as practicable and the monitoring station will be placed in the corner of the truck lot.

Figures 12a and 12b: Selected site located at 2482 Foundry Park Avenue in Segment 4

12a.

Source: Google Earth

12b.

Source: Google Earth

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APPENDICES

Appendix A: Traffic Data Tables

Below is the list of the top 32 segments in the Fresno CBSA based on Caltrans data.

Table 1: Fresno County Top Road Segments by Fleet Equivalent (AADT)[4]

Route	Postmile[6]	Description	Total Ahead AADT[2]	AADT Rank	Truck AADT	AADTT Rank	Congestion[3]	FE AADT[7]	FE AADT Rank
99	22.16	JCT RTE 180S	128,500	2	14,300	6	-	257,200	1
99	22.735	BELMONT AVE	122,500	4	14,300	7	-	251,200	2
99	23.304	OLIVE AVE	117,500	8	14,300	8	-	246,200	3
99	18.544	JENSEN AVE	93,000	16	14,945	2	-	227,505	4
99	24.416	CLINTON AVE	93,000	17	14,303	5	-	221,727	5
99	23.852	MC KINLEY AVE[5]	108,000	10	12,384	17	-	219,456	6
99	15.491	CHESTNUT AVE	73,500	38	16,170	1	-	219,030	7
99	26.224	DAKOTA AVE	91,000	19	14,000	11	3	217,000	8
99	25	SHIELDS AVE	89,500	20	14,000	12	-	215,500	9
99	9.164	MANNING AVE	83,500	28	14,245	9	-	211,705	10
99	5.321	SELMA, SECOND ST	67,000	41	14,740	3	-	199,660	11
99	21.012	NORTH JCT. RTE. 180	80,000	34	13,176	14	-	198,584	12
99	19.29	NORTH JCT. RTE. 41	63,000	46	14,490	4	-	193,410	13
99	31.609	HERNDON AVE	62,500	48	14,003	10	-	188,527	14
180	58.664	JCT RTE 41	143,000	1	5,000	21	-	188,000	15
99	28.102	SHAW AVE	61,000	49	13,347	13	-	181,123	16
99	6.431	JCT. RTE. 43 SOUTH	76,500	36	11,613	18	-	181,017	17
99	20.19	SOUTH JCT. RTE. 180	63,000	47	12,600	16	-	176,400	18
99	0.951	KINGSBURG, JCT. RTE 201 E	58,000	52	13,033	15	-	175,297	19
41	26.461	SHIELDS AVE	126,000	3	4,500	27	6	166,500	20
41	24.527	JCT. RTE. 180S	122,000	6	4,880	25	2	165,920	21
41	25.266	MC KINLEY AVE	121,000	7	4,840	26	18	164,560	22
41	27.471	ASHLAN AVE	122,000	5	4,500	28	2	162,500	23
41	28.469	SHAW JCT. RTE. 168	110,000	9	4,500	29	3	150,500	24
180	58.036	DIANA ST	102,000	11	5,000	22	-	147,000	25
180	57.843	BLACKSTONE AVE	102,000	12	5,000	23	-	147,000	26
180	57.242	FULTON ST	94,000	14	5,000	24	-	139,000	27
5	17.964	RTE. 33 S., RTE. 145 N.	37,500	57	11,085	19	-	137,265	28
5	14.873	JCT. RTE. 198	37,500	59	11,081	20	-	137,229	29
41	23.736	DIVISADERO ST	96,000	13	4,500	30	-	136,500	30
41	22.798	M ST	93,500	15	4,500	31	-	134,000	31
41	29.463	FRESNO	93,000	18	4,500	32	-	133,500	32

[1] Road segments with no Truck AADT (AADTT) are given substitution with the following:

Route 99 – The top 3 route 99 AADT segments substituted with 14,300 truck AADT data from an adjacent road segment.

- Segments ranked 8 and 9 were estimated with 14,000 Truck AADT. The data for all of the truck segments on Route 99 that were not estimated ranged between 11,000 and 16,000 Truck AADT and the calculated average was 14,000 Truck AADT which was used as the estimate.

Route 180 - 5,000 Truck AADT. Segments substituted with Truck AADT data from the only road segment with similar AADT data.

Route 41 - 4,500 Truck AADT. Calculated the average of the top 4 Truck AADT road segments with similar total AADT.

[2] The Total AADT numbers shown apply to the freeway immediately ahead of the postmile.
[3] Congestion data is in annual vehicle delay in thousand hours. Caltrans District 6 (which includes Fresno County) has less 2% of the statewide annual vehicle hours of delay.
[4] The Annual Average Daily Traffic (AADT) is defined as the total volume for the year divided by 365 days. Very few locations in California are actually counted continuously. Traffic Counting is generally performed by electronic counting instruments that are moved from location to location throughout the state in a program of continuous traffic count sampling. The resulting counts are adjusted to an estimate of annual average daily traffic by compensating for seasonal influence, weekly variation and other variables which may be present. All traffic volume figures that are listed include traffic in both directions.
[5] AADT did not match Truck data table.
[6] Postmile – Each breakpoint is identified by the postmile value corresponding to that point on the freeway. Caltrans has identified that the postmile values increase from the beginning of a route within a county to the next county line. The postmile values start over again at each county line. Postmile values usually increase from South to North or West to East depending upon the general direction the route follows within the state.
[7] The equation FE AADT = (Ahead AADT-AADTT)+(AADTT*10) is defined in the TAD: http://www.epa.gov/ttnamti1/files/nearroad/NearRoadTAD.pdf

Appendix B: Site Details

Below are the site details for the selected site and the sites that were ruled out for various reasons.

Table 2: Site Details Matrix

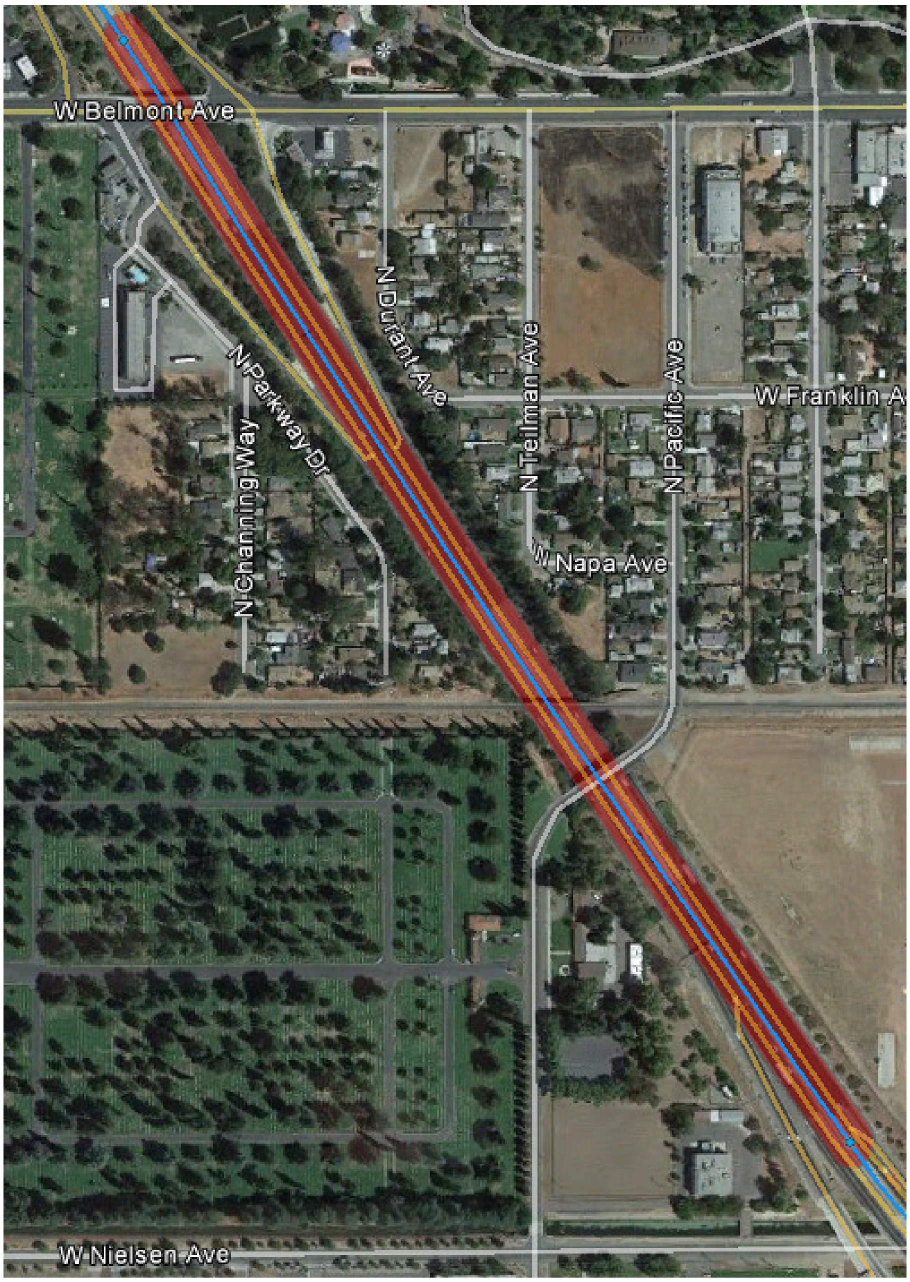
Site/Segment Parameter	Segment 4 RY-DEN	Segment 4 Tuff Shed	Segment 5 Multiple Sites	Segment 9 Multiple Sites
Road segment name	Segment 4	Segment 4	Segment 5	Segment 9
Road segment end points	Jensen Ave to Church Ave	Jensen Ave to Church Ave	Clinton Ave to Shields Ave	Shields Ave to N. Brawley Ave
Road type	Controlled access highway	Controlled access highway	Controlled access highway	Controlled access highway
Interchanges	On-ramp nearby	On-ramp nearby	None	None
Frontage roads	None	None	None	Yes
Roadside design	At grade	At grade	At grade	At grade
Terrain	Flat	Flat	Flat	Flat
Current road construction	None	None	None	None
Future road construction	Not aware of any	Not aware of any	High Speed Rail Project	High Speed Rail Project
Roadside structures	Some vegetation	Some vegetation	Some vegetation	Some vegetation
AADT	93,000	93,000	93,000	89,500
HD counts	14,945	14,945	14,303	14,000
FE-AADT	227,505	227,505	221,727	215,500
Congestion information	No congestion	No congestion	No congestion	No congestion
Infrastructure	Freeway sign	Freeway sign	Light poles, billboard	Cell tower, power poles
Surrounding land use	Light Commercial/ Industrial	Light Commercial/ Industrial	Light Commercial	Light Commercial
Nearby sources	Freeway	Freeway	Freeway	Freeway
Meteorology	Acceptable	Acceptable	Acceptable	Acceptable
Population exposure	Non-residential area.	Non-residential area.	Commercial and nearby residential area.	Commercial and nearby residential area.
Available space – site footprint	1000 square feet	1000 square feet	1000 square feet	1000 square feet
Safety features	Will need to be installed.	None.	None.	None.
Property type	Private Property	Private Property	Private Property	Private Property
Property owner	Landowner is willing to work with the District.	District provided lease but landowner did not respond.	Landowner would not provide suitable location.	Landowner is willing to work with the District.
Likelihood of access	Easy access	Easy access	Easy access	Easy access
Other details/local knowledge				Selected higher ranked segment.

Appendix C: Maps of Segments

Beginning on the following page, aerial maps show the top 10 segments, their end points in detail, and the surrounding land use of each segment.

Segment 1

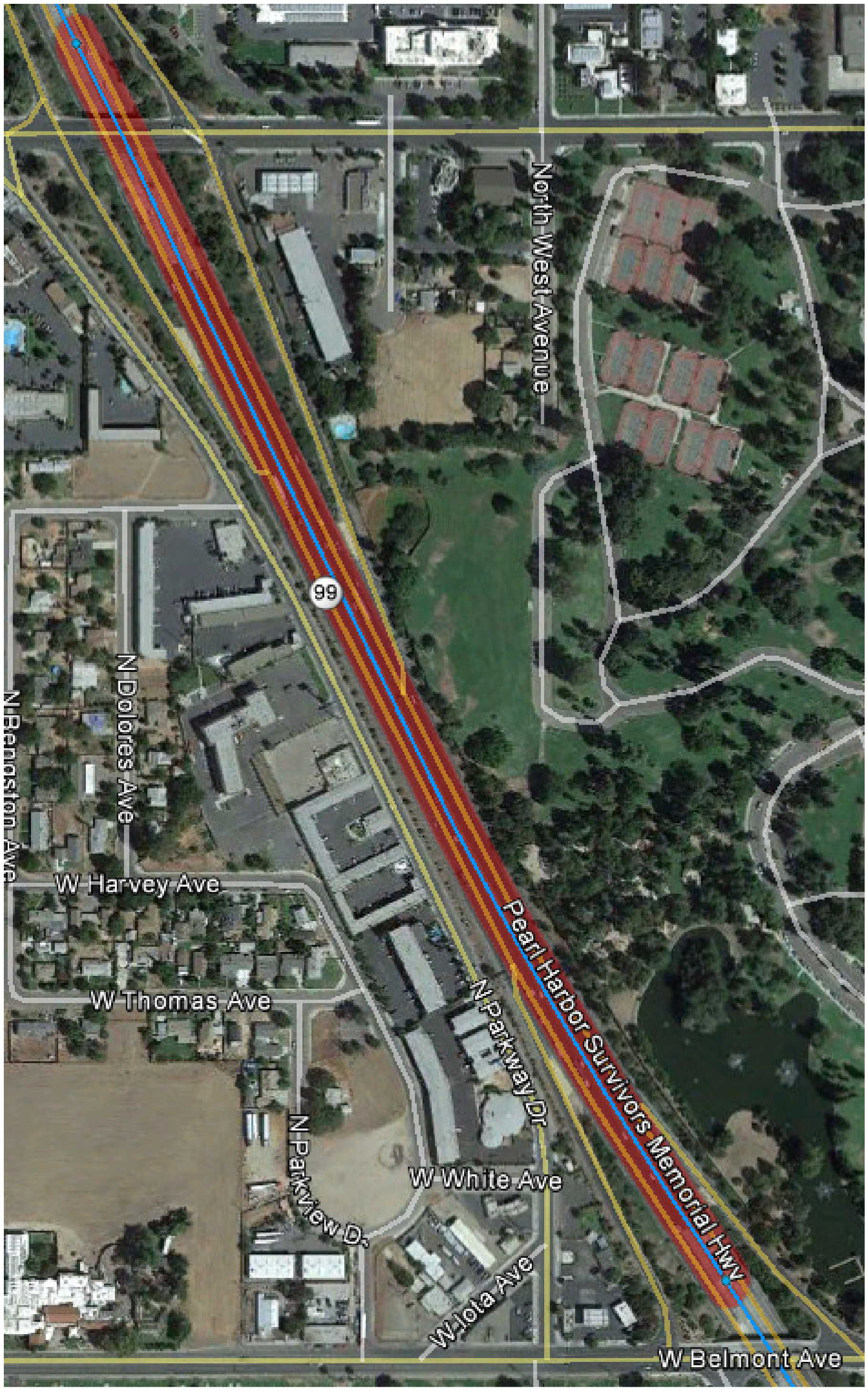
This segment is located along Freeway 99 from Nielson Avenue northward to Belmont Avenue.



Source: Google Earth

Segment 2

This segment is located along Freeway 99 from Belmont Avenue northward to Olive Avenue.



Source: Google Earth

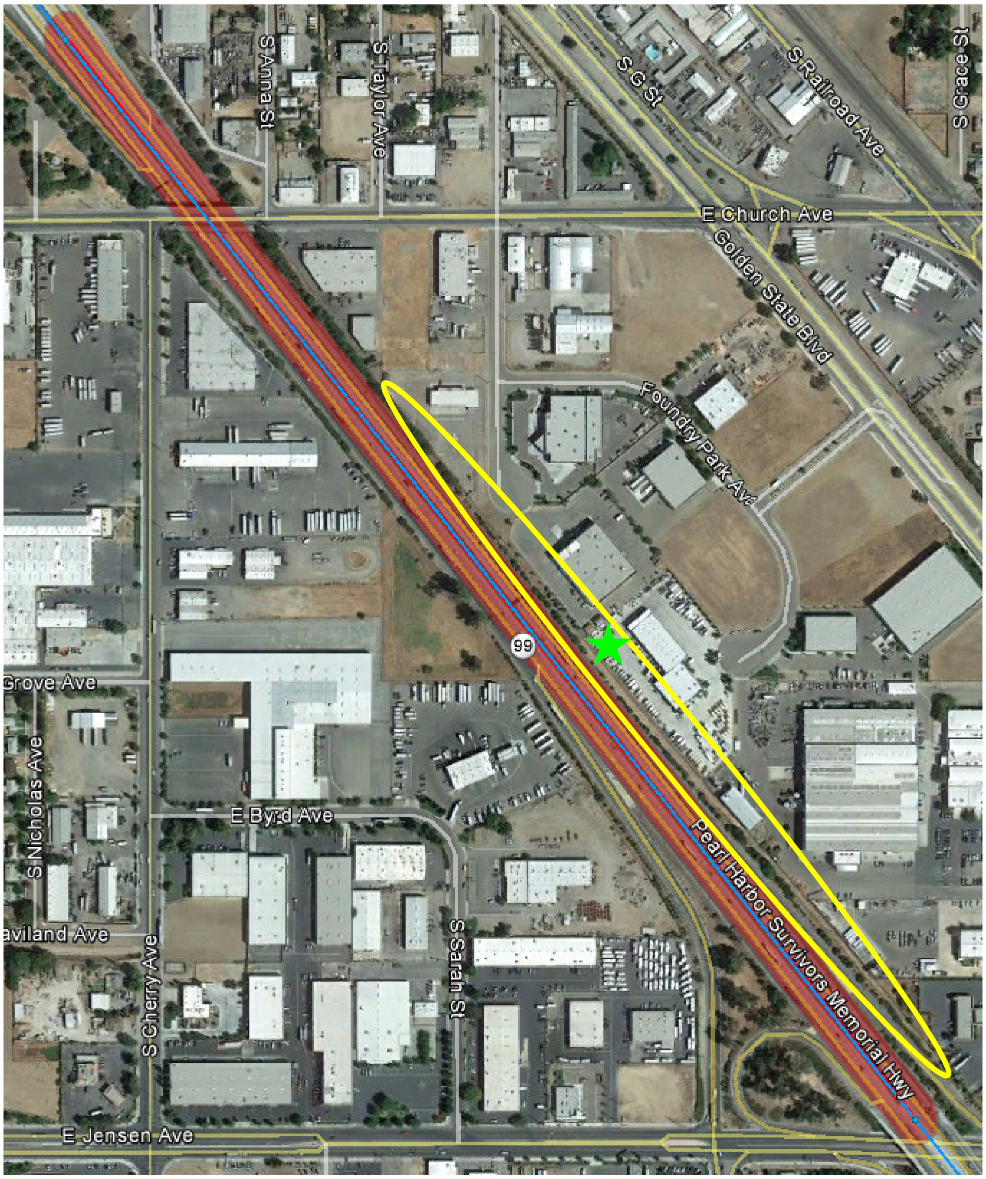
Segment 3

This segment is located along Freeway 99 from Olive Avenue northward to McKinley Avenue.

Source: Google Earth

Segment 4

This segment is located along Freeway 99 from Jensen Avenue northward to Church Avenue. The yellow ellipse demarks the location of suitable parcels the District investigated. The green star demarks the parcel that was selected.



Source: Google Earth

Segment 5

This segment is located along Freeway 99 from Clinton Avenue northward to Shields Avenue. The yellow ellipse demarks the location of suitable parcels the District investigated but eventually eliminated from consideration for various reasons.

Source: Google Earth

Segment 6

This segment is located along Freeway 99 from McKinley Avenue northward to Clinton Avenue.

Source: Google Earth

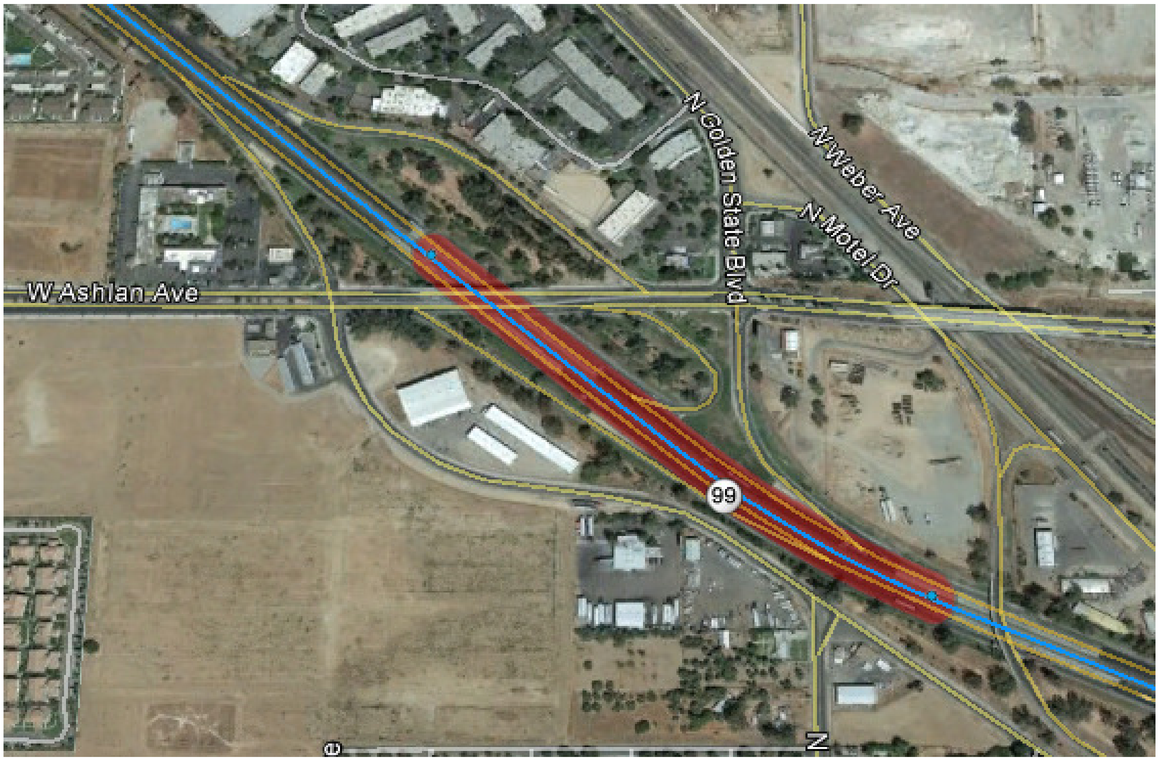
Segment 7

Segment 7 is located along Freeway 99 from Chestnut Avenue northward to Central Avenue.

Source: Google Earth

Segment 8

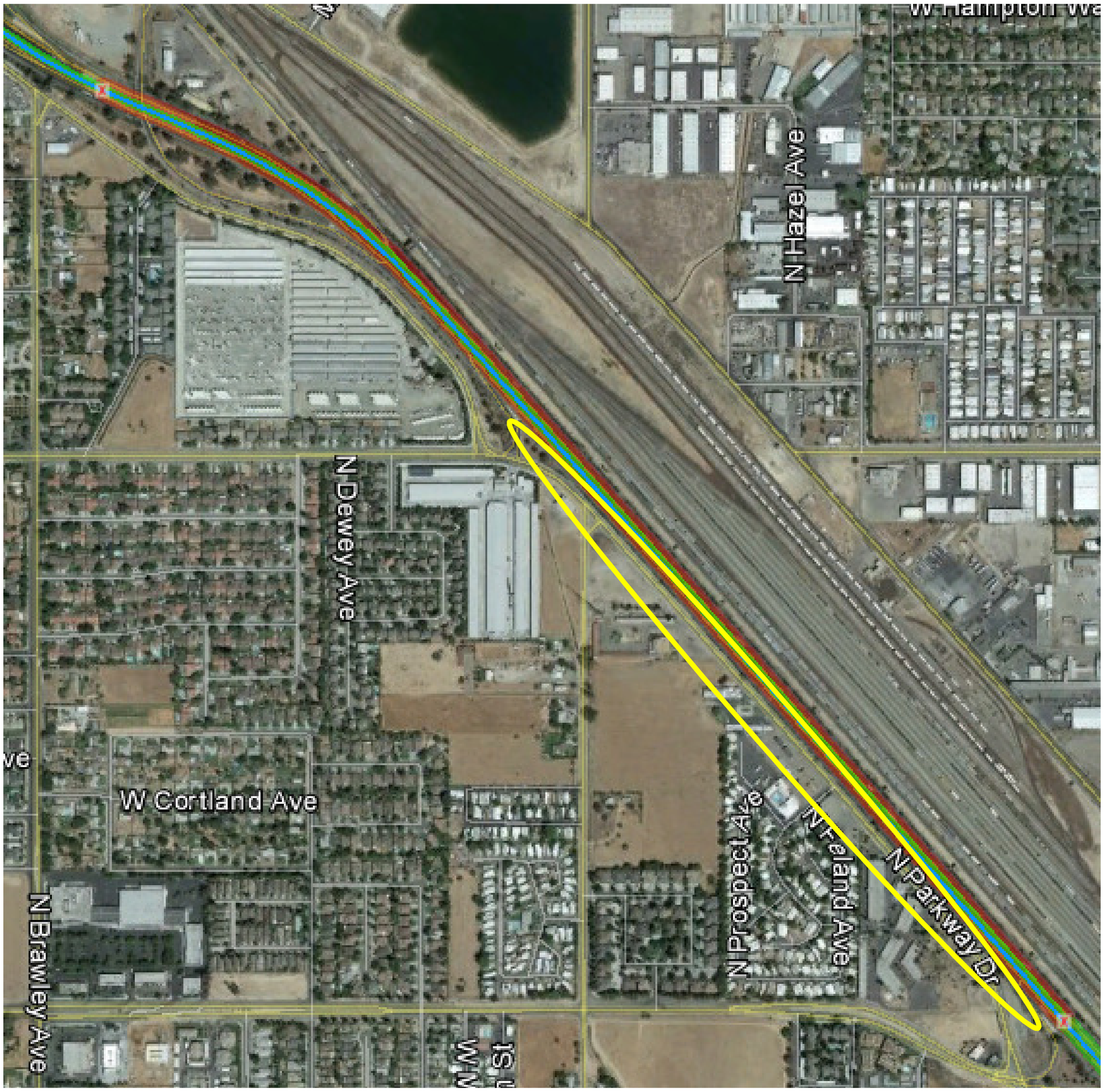
Segment 8 is located along Highway 99 from Dakota Avenue northward to Ashlan Avenue.



Source: Google Earth

Segment 9

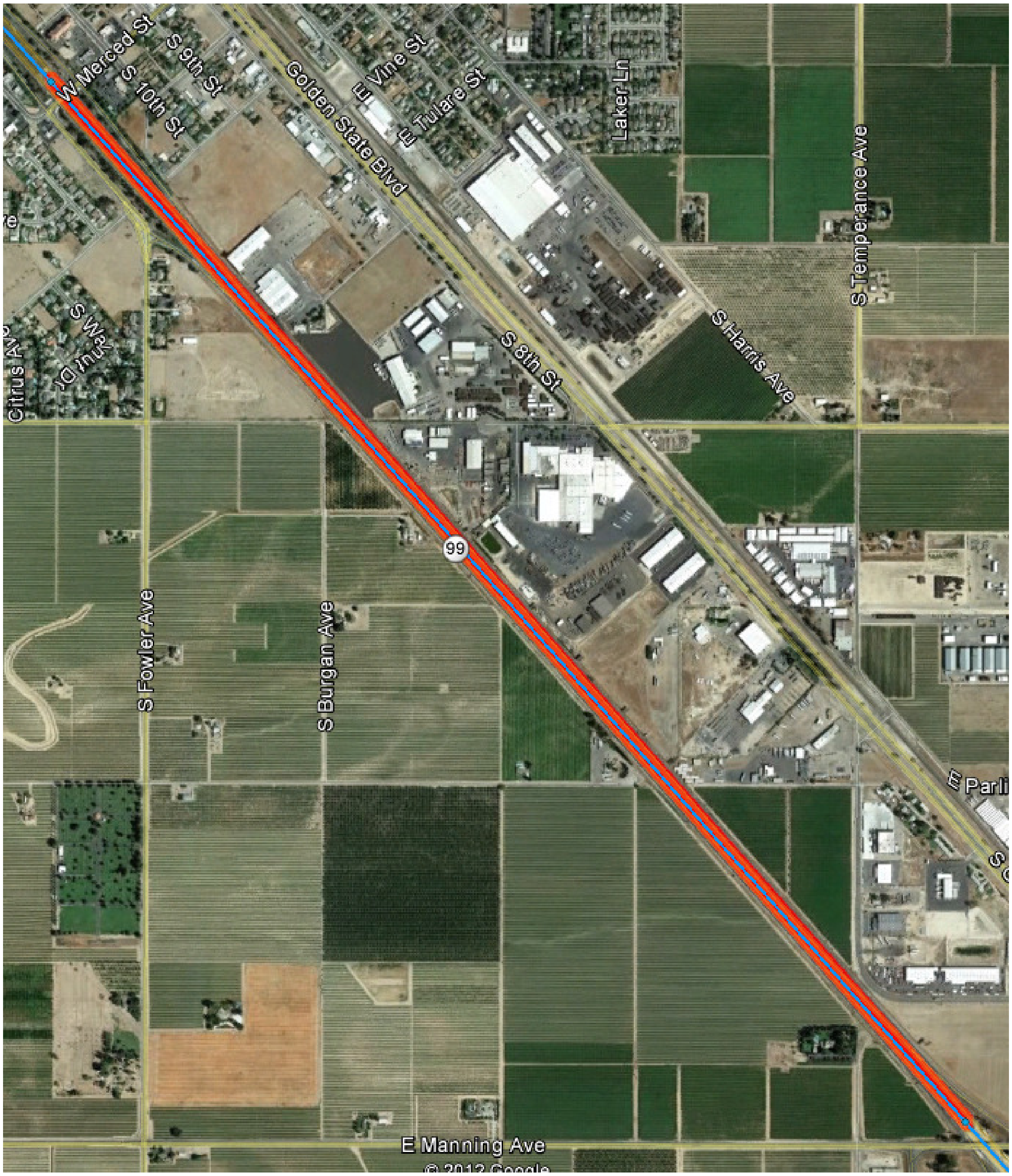
This segment is located along Freeway 99 on Parkway Avenue from Shields Avenue northward to North Brawley Avenue. The yellow ellipse demarks the location of suitable parcels the District investigated but eventually eliminated from consideration for various reasons.



Source: Google Earth

Segment 10

This segment is located along Freeway 99 from Manning Avenue northward to Merced Street.

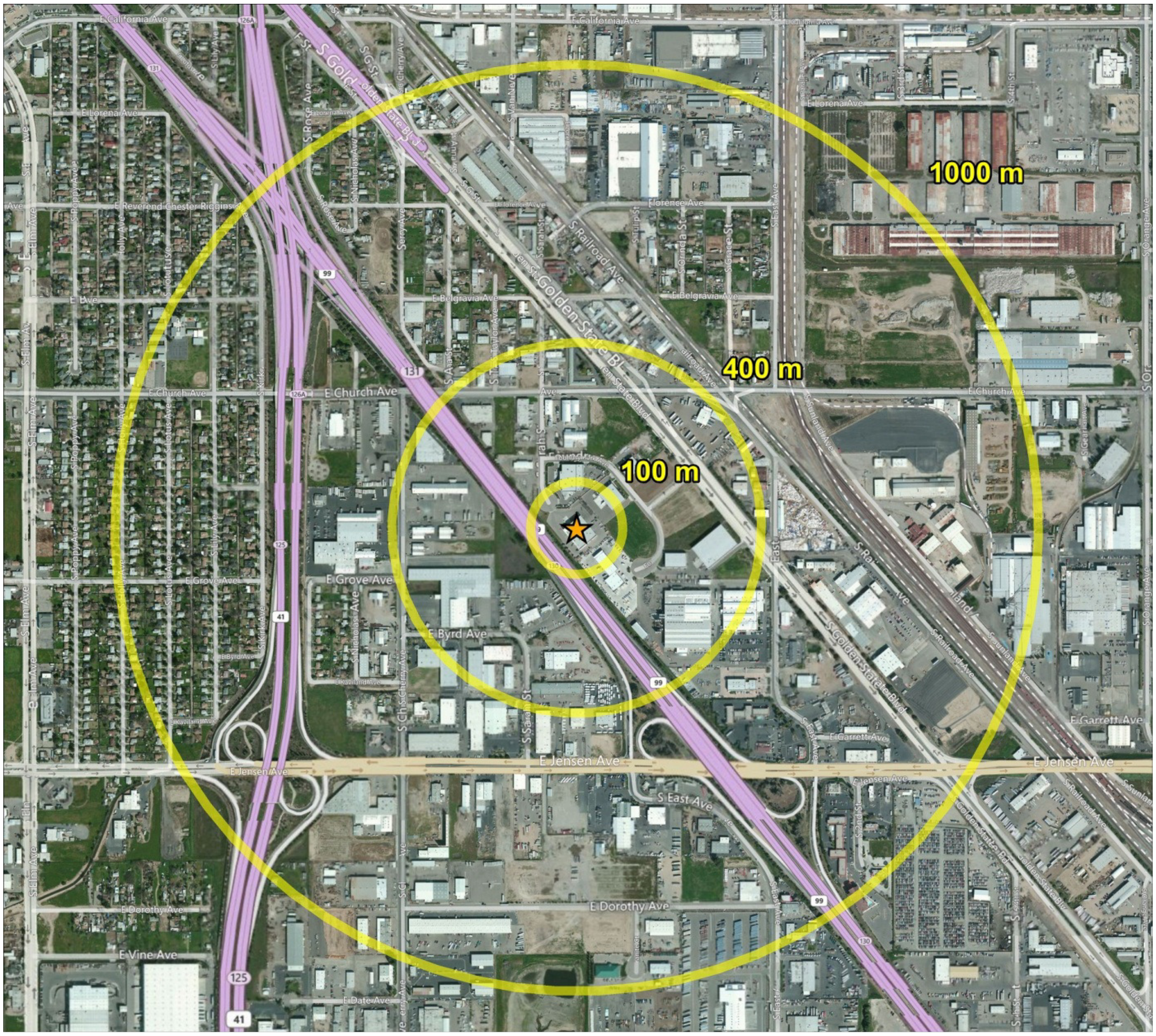


Source: Google Earth

Appendix D: Sample sites with reference points of distance

Segment 4

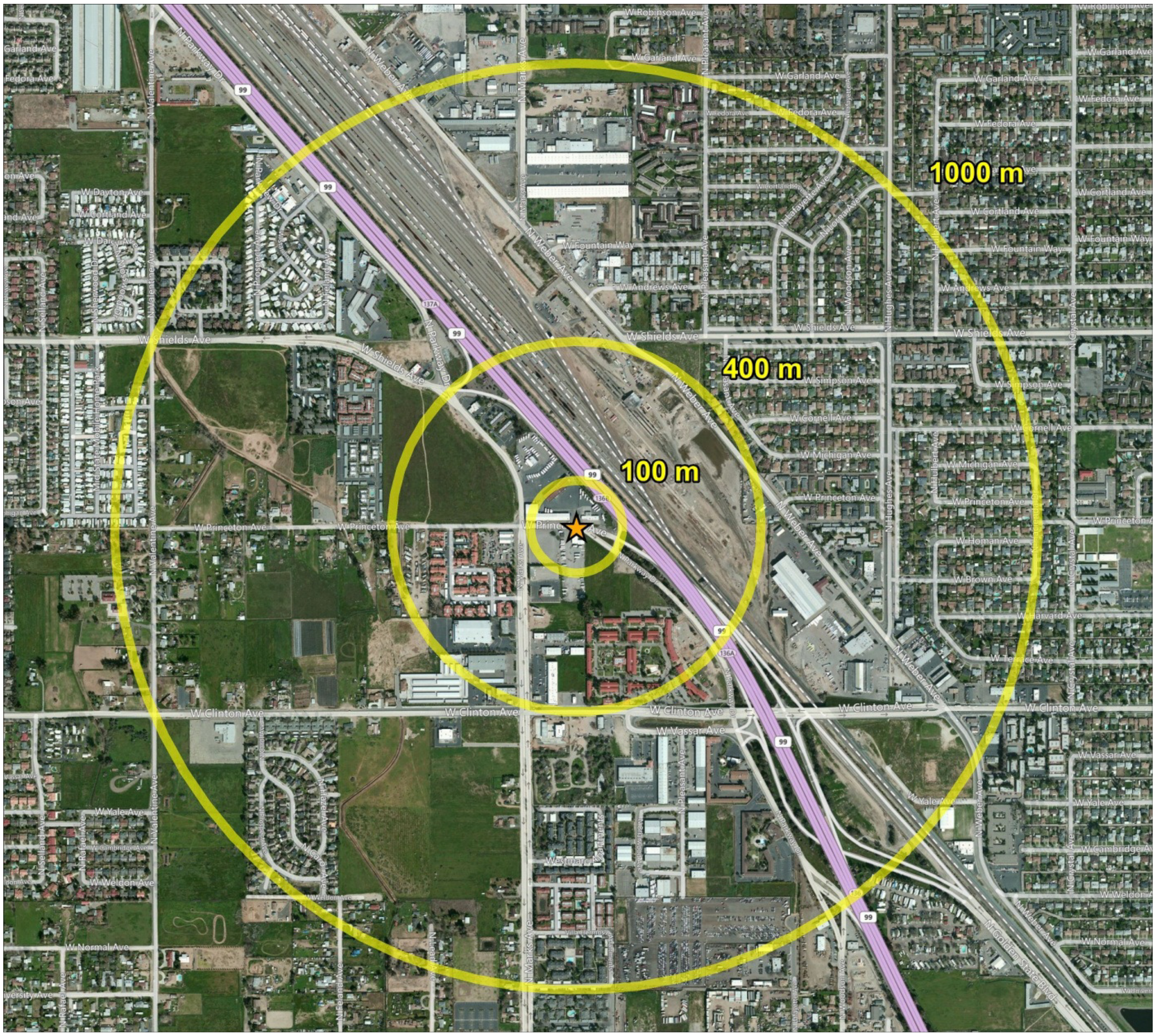
View of one of the microscale sites that the District investigated in some detail. The 100 meter circle is the maximum extent of the microscale site. The concentric circles show the land uses around the parcels. This site was not pursued because the property owner stopped corresponding with the District.



Source: Arc GIS

Segment 5

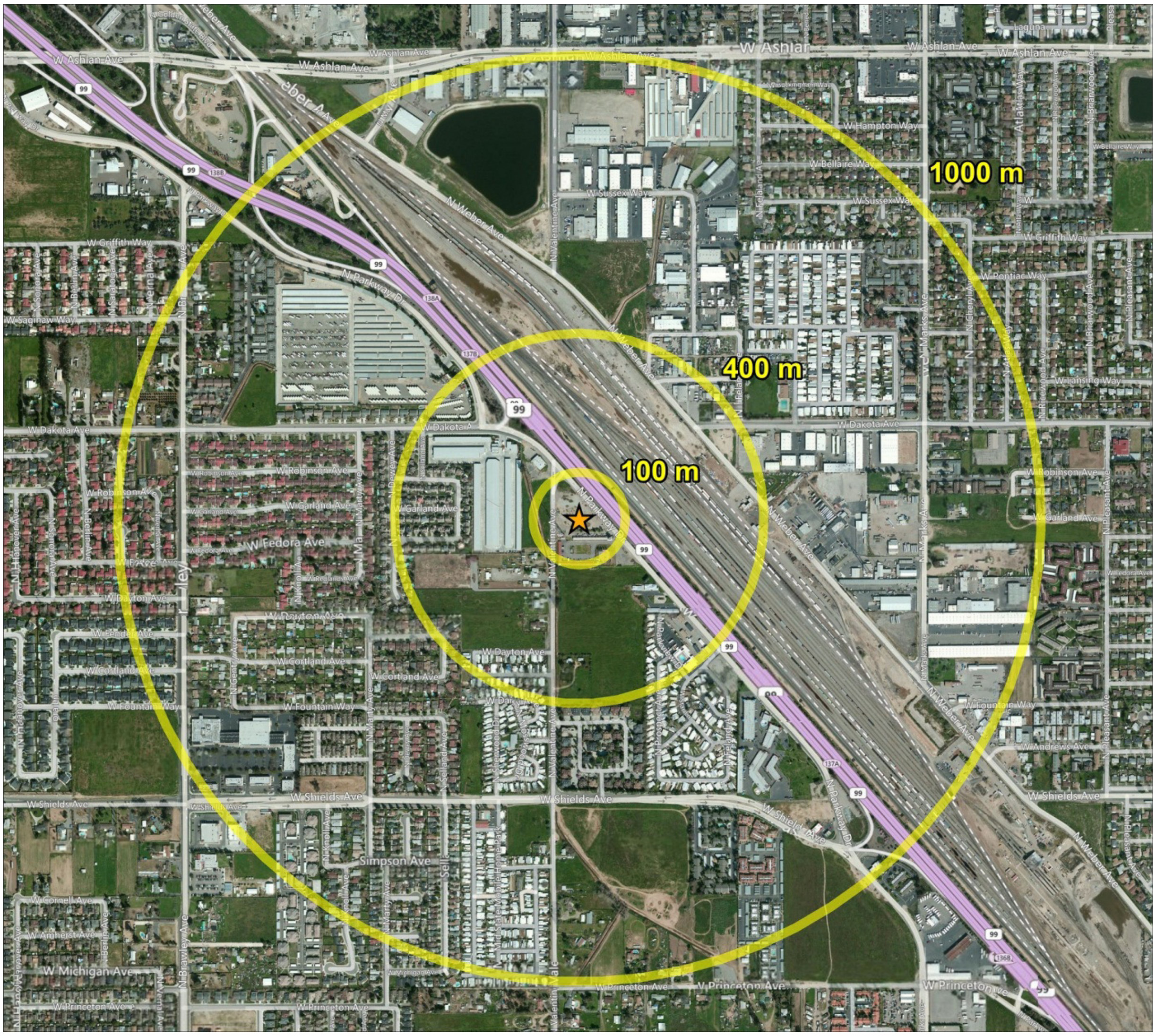
View of one of the microscale sites that the District investigated in some detail. The 100 meter circle is the maximum extent of the microscale site. The concentric circles show the land uses around the parcels. This site was not pursued because the property owner did not respond to the District's letter of interest.



Source: Arc GIS

Segment 9

View of one of the microscale sites that the District investigated in some detail. The 100 meter circle is the maximum extent of the microscale site. The concentric circles show the land uses around the parcels. This site was not pursued because of complications between multiple owners of the property as well as concerns about the future construction of high-speed rail.



Source: Arc GIS