

Berkley Water Transportation Pier Ferry Project  
Draft EIR Appendices (2 of 2)

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# Appendix C

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Supporting Biological Resources Information

## Special Status Plant and Lichen Species in the Regional Vicinity of the Project site

Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale <sup>1</sup>
<i>Allium peninsulare</i> var. <i>franciscanum</i> Franciscan onion	None/None G4G5T2/S2 1B.2	Perennial bulbiferous herb. Cismontane woodland, valley and foothill grassland. Clay, Serpentinite (often), volcanic. Elevations: 170-1000ft. (52-305m.) Blooms (Apr)May-Jun.	Not Expected	There are no known occurrences within five miles, cismontane woodland, valley and foothill grasslands with clay or serpentinite soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Amorpha californica</i> var. <i>napensis</i> Napa false indigo	None/None G4T2/S2 1B.2	Perennial deciduous shrub. Broadleaved upland forest, chaparral, cismontane woodland. Openings in forest or woodland or in chaparral. 30-735 m. Elevations: 165-6560ft. (50-2000m.) Blooms Apr-Jul.	Not Expected	There are no known occurrences within five miles, broadleaved upland forest, chaparral, and cismontane woodlands are not present and the Project site is largely developed with landscaped vegetation.
<i>Amsinckia lunaris</i> bent-flowered fiddleneck	None/None G3/S3 1B.2	Annual herb. Cismontane woodland, coastal bluff scrub, valley and foothill grassland. Elevations: 10-1640ft. (3-500m.) Blooms Mar-Jun.	Not Expected	There are three known occurrences within five miles; however, cismontane woodland, coastal bluff scrub, valley and foothill grasslands are not present, and the Project site is largely developed with landscaped vegetation.
<i>Aphyllon robbinsii</i> Robbins' broomrape	None/None G1/S1 1B.1	Coastal bluff scrub. Rocky, Sandy 0-100m. Blooms Apr-Jul.	Not Expected	There are no known occurrences within five miles, coastal bluff scrub is not present, and the Project site is largely developed with landscaped vegetation.
<i>Arctostaphylos franciscana</i> Franciscan manzanita	FE/None GHC/S1 1B.1	Perennial evergreen shrub. Coastal scrub. Serpentine outcrops in chaparral. Elevations: 195-985ft. (60-300m.) Blooms Feb-Apr.	Not Expected	There are no known occurrences within five miles, coastal scrub is not present, and the Project site is largely developed with landscaped vegetation.
<i>Arctostaphylos imbricata</i> San Bruno Mountain manzanita	None/SE G1/S1 1B.1	Perennial evergreen shrub. Chaparral, coastal scrub. Rocky. Elevations: 900-1215ft. (275-370m.) Blooms Feb-May.	Not Expected	There are no known occurrences within five miles, coastal scrub is not present, and the Project site is largely developed with landscaped vegetation.
<i>Arctostaphylos montana</i> ssp. <i>ravenii</i> Presidio manzanita	FE/SE G3T1/S1 1B.1	Perennial evergreen shrub. Chaparral, coastal prairie, coastal scrub. Open, rocky serpentine slopes. Elevations: 150-705ft. (45-215m.) Blooms Feb-Mar.	Not Expected	There are no known occurrences within five miles, coastal scrub and chaparral are not present, and the Project site is largely developed with landscaped vegetation.
<i>Arctostaphylos montaraensis</i> Montara manzanita	None/None G1/S1 1B.2	Perennial evergreen shrub. Chaparral, coastal scrub. Slopes and ridges. Elevations: 260-1640ft. (80-500m.) Blooms Jan-Mar.	Not Expected	There are no known occurrences within five miles, coastal scrub and chaparral are not present, and the Project site is largely developed with landscaped vegetation.
<i>Arctostaphylos pacifica</i> Pacific manzanita	None/SE G1/S1 1B.1	Evergreen shrub. Chaparral, coastal scrub. Elevations: 1085ft. (330m.) Blooms Feb-Apr.	Not Expected	There are no known occurrences within five miles, coastal scrub and chaparral are not present, and the Project site is largely developed with landscaped vegetation.
<i>Arctostaphylos pallida</i> pallid manzanita	FT/SE G1/S1 1B.1	Perennial evergreen shrub. Broadleaved upland forest, chaparral, cismontane woodland, closed-cone coniferous forest, coastal scrub. Grows on uplifted marine terraces on siliceous shale or thin chert. May require fire. Elevations: 605-1525ft. (185-465m.) Blooms Dec-Mar.	Not Expected	There is no known occurrence within five miles; however, coastal woodland, scrub, and chaparral are not present, and the Project site is largely developed with landscaped vegetation.
<i>Arenaria paludicola</i> marsh sandwort	FE/SE G1/S1 1B.1	Perennial stoloniferous herb. Marshes and swamps. Openings, sandy. Elevations: 10-560ft. (3-170m.) Blooms May-Aug.	Not Expected	There are no known occurrences within five miles, marshes and swamps are not present, and the Project site is largely developed with landscaped vegetation.
<i>Astragalus tener</i> var. <i>tener</i> alkali milk-vetch	None/None G2T1/S1 1B.2	Annual herb. Playas, valley and foothill grassland, vernal pools. Alkaline. Elevations: 5-195ft. (1-60m.) Blooms Mar-Jun.	Not Expected	There are two known occurrences within five miles; however, foothill grassland, vernal pools are not present, and the Project site is largely developed with landscaped vegetation.
<i>Calochortus pulchellus</i> Mt. Diablo fairy-lantern	None/None G2/S2 1B.2	Perennial bulbiferous herb. Chaparral, cismontane woodland, riparian woodland, valley and foothill grassland. On wooded and brushy slopes. Elevations: 100-2755ft. (30-840m.) Blooms Apr-Jun.	Not Expected	There are no known occurrences within five miles, coastal woodland, grassland, and chaparral are not present, and the Project site is largely developed with landscaped vegetation.
<i>Calochortus tiburonensis</i> Tiburon mariposa-lily	FT/ST G1/S1 1B.1	Perennial bulbiferous herb. Valley and foothill grassland. On open, rocky, slopes in serpentine grassland. Elevations: 165-490ft. (50-150m.) Blooms Mar-Jun.	Not Expected	There are no known occurrences within five miles, coastal grasslands are not present, and the Project site is largely developed with landscaped vegetation.
<i>Calystegia purpurata</i> ssp. <i>saxicola</i> coastal bluff morning-glory	None/None G4T2T3/S2S3 1B.2	Perennial herb. Coastal bluff scrub, coastal dunes, coastal scrub, north coast coniferous fores. Elevations: 0-345ft. (0-105m.) Blooms (Mar)Apr-Sep.	Not Expected	There are no known occurrences within five miles, coastal woodland, grassland, and chaparral are not present, and the Project site is largely developed with landscaped vegetation.

City of Berkeley  
**Berkeley Water Transportation Pier Ferry Project**

Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale <sup>1</sup>
<i>Carex comosa</i> bristly sedge	None/None G5/S2 2B.1	Perennial rhizomatous herb. Coastal prairie, marshes and swamps, valley and foothill grassland. Lake margins, wet places; Project site below sea level is on a Delta island. Elevations: 0-2050ft. (0-625m.) Blooms May-Sep.	Not Expected	There is one known occurrence within five miles; however, coastal woodland, grassland, and marshes are not present, and the Project site is largely developed with landscaped vegetation.
<i>Carex praticola</i> northern meadow sedge	None/None G5/S2 2B.2	Perennial herb. Meadows and seeps. Moist to wet meadows. Elevations: 0-10500ft. (0-3200m.) Blooms May-Jul.	Not Expected	There are no known occurrences within five miles, wet meadows are not present, and the Project site is largely developed with landscaped vegetation.
<i>Castilleja affinis</i> var. <i>neglecta</i> Tiburon paintbrush	FE/ST G4G5T1T2/S1S 2 1B.2	Perennial herb (hemiparasitic). Valley and foothill grassland. Rocky serpentine Project sites. Elevations: 195-1310ft. (60-400m.) Blooms Apr-Jun.	Not Expected	There are no known occurrences within five miles, valley and foothill grasslands are not present, and the Project site is largely developed with landscaped vegetation.
<i>Centromadia parryi</i> ssp. <i>congdonii</i> Congdon's tarplant	None/None G3T2/S2 1B.1	Annual herb. Valley and foothill grassland. Alkaline soils, sometimes described as heavy white clay. Elevations: 0-755ft. (0-230m.) Blooms May-Oct(Nov).	Not Expected	There are no known occurrences within five miles, valley and foothill grasslands with clay soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Centromadia parryi</i> ssp. <i>parryi</i> pappose tarplant	None/None G3T2/S2 1B.2	Annual herb. Chaparral, coastal prairie, marshes and swamps, meadows and seeps, valley and foothill grassland. Alkaline (often). Elevations: 0-1380ft. (0-420m.) Blooms May-Nov.	Not Expected	There are no known occurrences within five miles, valley and foothill grasslands with alkaline soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Chloropyron maritimum</i> ssp. <i>palustre</i> Point Reyes salty bird's-beak	None/None G4?T2/S2 1B.2	Annual herb (hemiparasitic). Marshes and swamps. Usually in coastal salt marsh with Salicornia, Distichlis, Jaumea, Spartina, etc. Elevations: 0-35ft. (0-10m.) Blooms Jun-Oct.	Not Expected	There are two known occurrences within five miles; however, pickleweed marshes are not present, and the Project site is largely developed with landscaped vegetation.
<i>Chorizanthe cuspidata</i> var. <i>cuspidata</i> San Francisco Bay spineflower	None/None G2T1/S1 1B.2	Annual herb. Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub. Sandy. Elevations: 10-705ft. (3-215m.) Blooms Apr-Jul(Aug).	Not Expected	There is one extirpated occurrence within five miles, coastal bluff scrub, coastal dunes, and coastal prairie are not present, and the Project site is largely developed with landscaped vegetation.
<i>Chorizanthe robusta</i> var. <i>robusta</i> robust spineflower	FE/None G2T1/S1 1B.1	Annual herb. Chaparral, cismontane woodland, coastal dunes, coastal scrub. Gravelly (sometimes), sandy (sometimes). Elevations: 10-985ft. (3-300m.) Blooms Apr-Sep.	Not Expected	There are no known occurrences within five miles, woodlands and dunes with sandy soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Cicuta maculata</i> var. <i>bolanderi</i> Bolander's water-hemlock	None/None G5T4T5/S2? 2B.1	Perennial herb. Marshes and swamps. In fresh or brackish water. Elevations: 0-655ft. (0-200m.) Blooms Jul-Sep.	Not Expected	There are no known occurrences within five miles, marshes and swamps are not present, and the Project site is largely developed with landscaped vegetation.
<i>Cirsium andrewsii</i> Franciscan thistle	None/None G3/S3 1B.2	Perennial herb. Broadleafed upland forest, coastal bluff scrub, coastal prairie, coastal scrub. Mesic, serpentinite (sometimes). Elevations: 0-490ft. (0-150m.) Blooms Mar-Jul.	Not Expected	There is one known occurrence within five miles; however, forest, coastal scrub, coastal prairies are not present, and the Project site is largely developed with landscaped vegetation.
<i>Cirsium hydrophilum</i> var. <i>vaseyi</i> Mt. Tamalpais thistle	None/None G2T1/S1 1B.2	Perennial herb. Broadleafed upland forest, chaparral, meadows, and seeps. Serpentine. Elevations: 785-2035ft. (240-620m.) Blooms May-Aug.	Not Expected	There are no known occurrences within five miles, forest, chaparral, and meadows with serpentine soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Cirsium occidentale</i> var. <i>compactum</i> compact cobwebby thistle	None/None G3G4T2/S2 1B.2	Perennial herb. Chaparral, coastal dunes, coastal prairie, coastal scrub. On dunes and on clay in chaparral; also in grassland. Elevations: 15-490ft. (5-150m.) Blooms Apr-Jun.	Not Expected	There are no known occurrences within five miles, chaparral, dunes and grasslands with clay soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Clarkia franciscana</i> Presidio clarkia	FE/SE G1/S1 1B.1	Annual herb. Coastal scrub, valley and foothill grassland. Serpentine outcrops in grassland or scrub. Elevations: 80-1100ft. (25-335m.) Blooms May-Jul.	Not Expected	There are no known occurrences within five miles, grasslands with serpentine soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Collinsia corymbosa</i> round-headed collinsia	None/None G1/S1 1B.2	Annual herb. Coastal dunes. Elevations: 0-65ft. (0-20m.) Blooms Apr-Jun.	Not Expected	There are no known occurrences within five miles, dunes are not present, and the Project site is largely developed with landscaped vegetation.
<i>Collinsia multicolor</i> San Francisco collinsia	None/None G2/S2 1B.2	Annual herb. Closed-cone coniferous forest, coastal scrub. Serpentine (sometimes). Elevations: 100-900ft. (30-275m.) Blooms (Feb)Mar-May.	Not Expected	There is one known occurrence within five miles; however, forest and chaparral habitat with serpentine soils are not present, and the Project site is largely developed with landscaped vegetation.

Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale <sup>1</sup>
<i>Dirca occidentalis</i> western leatherwood	None/None G2/S2 1B.2	Perennial deciduous shrub. Broadleafed upland forest, chaparral, cismontane woodland, closed-cone coniferous forest, north coast coniferous forest, riparian forest, riparian woodland. On brushy slopes, mesic Project sites; mostly in mixed evergreen and foothill woodland communities. Elevations: 80-1395ft. (25-425m.) Blooms Jan-Mar(Apr).	Not Expected	There are eleven known occurrences within five miles from the Project site, in Tilden Park; however, forest and woodland habitat with mesic Project sites are not present, and the Project site is largely developed with landscaped vegetation.
<i>Eriogonum luteolum</i> var. <i>caninum</i> Tiburon buckwheat	None/None G5T2/S2 1B.2	Annual herb. Chaparral, cismontane woodland, coastal prairie, valley and foothill grassland. Serpentine soils; sandy to gravelly Project sites. Elevations: 0-2295ft. (0-700m.) Blooms May-Sep.	Not Expected	There are no known occurrences within five miles, forest and grassland habitat with serpentine soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Eryngium jepsonii</i> Jepson's coyote-thistle	None/None G2/S2 1B.2	Perennial herb. Valley and foothill grassland, vernal pools. Clay. Elevations: 10-985ft. (3-300m.) Blooms Apr-Aug.	Not Expected	There are no known occurrences within five miles, grassland habitat with clay soils is not present, and the Project site is largely developed with landscaped vegetation.
<i>Extriplex joaquinana</i> San Joaquin sparscale	None/None G2/S2 1B.2	Annual herb. Chenopod scrub, meadows and seeps, playas, valley and foothill grassland. In seasonal alkali wetlands or alkali sink scrub with <i>Distichlis spicata</i> , <i>Frankenia</i> , etc. Elevations: 5-2740ft. (1-835m.) Blooms Apr-Oct.	Not Expected	There is one known occurrence within five miles; however, scrub, meadows and seeps, playas, valley and foothill grasslands with alkali soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Fissidens pauperculus</i> minute pocket moss	None/None G3?/S2 1B.2	Moss. North coast coniferous forest. Moss growing on damp soil along the coast. In dry streambeds and on stream banks. Elevations: 35-3360ft. (10-1024m.)	Not Expected	There is one known occurrence within five miles; however, coniferous forests are not present and the Project site is largely developed with landscaped vegetation.
<i>Fritillaria liliacea</i> fragrant fritillary	None/None G2/S2 1B.2	Perennial bulbiferous herb. Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland. Often on serpentine; various soils reported though usually on clay, in grassland. Elevations: 10-1345ft. (3-410m.) Blooms Feb-Apr.	Not Expected	There are four known occurrences within five miles; however, woodland and grassland habitats with serpentine soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Gilia capitata</i> ssp. <i>chamissonis</i> blue coast gilia	None/None G5T2/S2 1B.1	Annual herb. Coastal dunes, coastal scrub. Elevations: 5-655ft. (2-200m.) Blooms Apr-Jul.	Not Expected	There are no known occurrences within five miles, coastal dunes are not present, and the Project site is largely developed with landscaped vegetation.
<i>Gilia millefoliata</i> dark-eyed gilia	None/None G2/S2 1B.2	Annual herb. Coastal dunes. Elevations: 5-100ft. (2-30m.) Blooms Apr-Jul.	Not Expected	There is one extirpated occurrence within five miles, coastal dunes are not present, and the Project site is largely developed with landscaped vegetation.
<i>Helianthella castanea</i> Diablo helianthella	None/None G2/S2 1B.2	Perennial herb. Broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland. Azonal soils, Partial shade (often), rocky (usually). Elevations: 195-4265ft. (60-1300m.) Blooms Mar-Jun.	Not Expected	There are six known occurrences within five miles; however, woodland and grassland habitats with Azonal soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Hemizonia congesta</i> ssp. <i>congesta</i> congested-headed hayfield tarplant	None/None G5T2/S2 1B.2	Annual herb. Valley and foothill grassland. Grassy valleys and hills, often in fallow fields; sometimes along roadsides. Elevations: 65-1835ft. (20-560m.) Blooms Apr-Nov.	Not Expected	There is one known occurrence within five miles; however, this occurrence is over 100 years old, valley and foothill grasslands are not present, and the Project site is largely developed with landscaped vegetation.
<i>Hesperovax sparsiflora</i> var. <i>brevifolia</i> short-leaved evax	None/None G4T3/S3 1B.2	Annual herb. Coastal bluff scrub, coastal dunes, coastal prairie. Sandy bluffs and flats. Elevations: 0-705ft. (0-215m.) Blooms Mar-Jun.	Not Expected	There are no known occurrences within five miles, coastal dunes are not present, and the Project site is largely developed with landscaped vegetation.
<i>Hesperolinon congestum</i> Marin western flax	FT/ST G1/S1 1B.1	Annual herb. Chaparral, valley and foothill grassland. In serpentine barrens and in serpentine grassland and chaparral. Elevations: 15-1215ft. (5-370m.) Blooms Apr-Jul.	Not Expected	There are four known occurrences within five miles; however, chaparral, and valley and foothill grasslands with serpentine soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Heteranthera dubia</i> water star-grass	None/None G5/S2 2B.2	Perennial herb (aquatic). Marshes and swamps. Alkaline, still or slow-moving water. Requires a pH of 7 or higher, usually in slightly eutrophic waters. Elevations: 100-4905ft. (30-1495m.) Blooms Jul-Oct.	Not Expected	There is one known occurrence within five miles; however, marshes and swamps are not present, and the Project site is largely developed with landscaped vegetation.
<i>Hoita strobilina</i> Loma Prieta hoita	None/None G2?/S2? 1B.1	Perennial herb. Chaparral, cismontane woodland, riparian woodland. Serpentine; mesic Project sites. Elevations: 100-2820ft. (30-860m.) Blooms May-Jul(Aug-Oct).	Not Expected	There are no known occurrences within five miles, woodlands with serpentine soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Holocarpha macradenia</i> Santa Cruz tarplant	FT/SE G1/S1 1B.1	Annual herb. Coastal prairie, coastal scrub, valley and foothill grassland. Light, sandy soil or sandy clay; often with nonnatives. Elevations: 35-720ft. (10-220m.) Blooms Jun-Oct.	Not Expected	There are four known occurrences within five miles; however, three are from the vicinity of Tilden Park east of Berkeley and the fourth is extirpated, valley and foothill grasslands with sandy soils are not present, and this species was not observed during the blooming period.

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<i>Horkelia cuneata</i> var. <i>sericea</i> Kellogg's horkelia	None/None G4T1?/S1? 1B.1	Perennial herb. Chaparral, closed-cone coniferous forest, coastal dunes, coastal scrub. Old dunes, coastal sandhills; openings. Sandy or gravelly soils. Elevations: 35-655ft. (10-200m.) Blooms Apr-Sep.	Not Expected	There is one possibly extirpated occurrence within five miles; however, coniferous forest, chaparral, and coastal dunes are not present, and the Project site is largely developed with landscaped vegetation.
<i>Horkelia marinensis</i> Point Reyes horkelia	None/None G2/S2 1B.2	Perennial herb. Coastal dunes, coastal prairie, coastal scrub. Sandy flats and dunes near coast; in grassland or scrub plant communities. Elevations: 15-2475ft. (5-755m.) Blooms May-Sep.	Not Expected	There are no known occurrences within five miles, coastal prairie with sandy flats are not present, and the Project site is largely developed with landscaped vegetation.
<i>Hypogymnia schizidiata</i> island tube lichen	None/None G2G3/S2 1B.3	Foliose lichen. Chaparral, closed-cone coniferous forest. On bark and wood of hardwoods and conifers. Elevations: 1180-1330ft. (360-405m.)	Not Expected	There are no known occurrences within five miles, chaparral and closed-cone coniferous are not present, and the Project site is largely developed with landscaped vegetation.
<i>Isocoma arguta</i> Carquinez goldenbush	None/None G1/S1 1B.1	Perennial shrub. Valley and foothill grassland. Alkaline soils, flats, lower hills. On low benches near drainages and on tops and sides of mounds in swale habitat. Elevations: 5-65ft. (1-20m.) Blooms Aug-Dec.	Not Expected	There are no known occurrences within five miles, valley and foothill grasslands with Alkaline soils are not present, and this species was not observed during the blooming period.
<i>Lasthenia conjugens</i> Contra Costa goldfields	FE/None G1/S1 1B.1	Annual herb. Cismontane woodland, playas, valley and foothill grassland, vernal pools. Vernal pools, swales, low depressions, in open grassy areas. Elevations: 0-1540ft. (0-470m.) Blooms Mar-Jun.	Not Expected	There are no known occurrences within five miles, woodland, playas, valley and foothill grassland, and vernal pools are not present, and the Project site is largely developed with landscaped vegetation.
<i>Layia carnosa</i> beach layia	FT/SE G2/S2 1B.1	Annual herb. Coastal dunes, coastal scrub. On sparsely vegetated, semi-stabilized dunes, usually behind foredunes. Elevations: 0-195ft. (0-60m.) Blooms Mar-Jul.	Not Expected	There is one extirpated occurrence within five miles, coastal dunes and scrub are not present, and the Project site is largely developed with landscaped vegetation.
<i>Leptosiphon rosaceus</i> rose leptosiphon	None/None G1/S1 1B.1	Annual herb. Coastal bluff scrub. Elevations: 0-330ft. (0-100m.) Blooms Apr-Jul.	Not Expected	There is one possibly extirpated occurrence within five miles; however, coastal dunes and scrub are not present, and the Project site is largely developed with landscaped vegetation.
<i>Lessingia germanorum</i> San Francisco lessingia	FE/SE G1/S1 1B.1	Annual herb. Coastal scrub. On remnant dunes. Open sandy soils relatively free of competing plants. Elevations: 80-360ft. (25-110m.) Blooms (Jun)Jul-Nov.	Not Expected	There are no known occurrences within five miles, coastal dunes are not present, and the Project site is largely developed with landscaped vegetation.
<i>Malacothamnus arcuatus</i> var. <i>arcuatus</i> arcuate bushmallow	None/None G2Q/S2 1B.2	Chaparral, Cismontane woodland. Gravelly alluvium. 15-355m. Blooms Apr-Sep.	Not Expected	There are no known occurrences within five miles, coastal dunes are not present, and the Project site is largely developed with landscaped vegetation.
<i>Meconella oregana</i> Oregon meconella	None/None G2/S2 1B.1	Annual herb. Coastal prairie, coastal scrub. Open, moist places. Elevations: 820-2035ft. (250-620m.) Blooms Mar-Apr.	Not Expected	There are two known occurrences within five miles; however, prairie and coastal scrub are not present, and the Project site is outside this species elevation range.
<i>Microseris paludosa</i> marsh microseris	None/None G2/S2 1B.2	Perennial herb. Cismontane woodland, closed-cone coniferous forest, coastal scrub, valley and foothill grassland. Elevations: 15-1165ft. (5-355m.) Blooms Apr-Jun(Jul).	Not Expected	There are no known occurrences within five miles, coniferous forest, coastal scrub, valley and foothill grasslands are not present, and the Project site is largely developed with landscaped vegetation.
<i>Monardella sinuata</i> ssp. <i>nigrescens</i> northern curly-leaved monardella	None/None G3T2/S2 1B.2	Annual herb. Chaparral, coastal dunes, coastal scrub, lower montane coniferous forest. Sandy soils. Elevations: 0-985ft. (0-300m.) Blooms (Apr)May-Jul(Aug-Sep).	Not Expected	There are no known occurrences within five miles, coniferous forest, coastal scrub, and dunes are not present, and the Project site is largely developed with landscaped vegetation.
<i>Monolopia gracilens</i> woodland woollythreads	None/None G3/S3 1B.2	Annual herb. Broadleaved upland forest, chaparral, cismontane woodland, north coast coniferous forest, valley and foothill grassland. Grassy Project sites, in openings; sandy to rocky soils. Often seen on serpentine after burns, but may have only weak affinity to serpentine. Elevations: 330-3935ft. (100-1200m.) Blooms (Feb)Mar-Jul.	Not Expected	There are no known occurrences within five miles, coniferous forest, woodlands, valley and foothill grasslands with serpentine soils are not present, and the Project site is outside this species elevation range.
<i>Pentachaeta bellidiflora</i> white-rayed pentachaeta	FE/SE G1/S1 1B.1	Annual herb. Cismontane woodland, valley and foothill grassland. Open dry rocky slopes and grassy areas, often on soils derived from serpentine bedrock. Elevations: 115-2035ft. (35-620m.) Blooms Mar-May.	Not Expected	There are no known occurrences within five miles, coniferous forest, woodlands, valley and foothill grasslands with serpentine soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i> Choris' popcornflower	None/None G3T1Q/S1 1B.2	Annual herb. Chaparral, coastal prairie, coastal scrub. Mesic Project sites. Elevations: 10-525ft. (3-160m.) Blooms Mar-Jun.	Not Expected	There is one extirpated occurrence within five miles, coastal scrub and prairie are not present, and the Project site is largely developed with landscaped vegetation.

Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale <sup>1</sup>
<i>Plagiobothrys diffusus</i> San Francisco popcornflower	None/SE G1Q/S1 1B.1	Annual herb. Coastal prairie, valley and foothill grassland. Historically from grassy slopes with marine influence. Elevations: 195-1180ft. (60-360m.) Blooms Mar-Jun.	Not Expected	There are no known occurrences within five miles, valley and foothill grasslands are not present, and the Project site is largely developed with landscaped vegetation.
<i>Plagiobothrys glaber</i> hairless popcornflower	None/None GX/SX 1A	Annual herb. Marshes and swamps, meadows and seeps. Coastal salt marshes and alkaline meadows. Elevations: 50-590ft. (15-180m.) Blooms Mar-May.	Not Expected	There are no known occurrences within five miles, coastal salt marshes and with alkaline meadows are not present, and the Project site is largely developed with landscaped vegetation.
<i>Pleuropogon hooverianus</i> North Coast semaphore grass	None/ST G2/S2 1B.1	Perennial rhizomatous herb. Broadleaved upland forest, meadows and seeps, north coast coniferous forest. Wet grassy, usually shady areas, sometimes freshwater marsh; associated with forest environments. Elevations: 35-2200ft. (10-671m.) Blooms Apr-Jun.	Not Expected	There are no known occurrences within five miles, forests and freshwater marshes are not present, and the Project site is largely developed with landscaped vegetation.
<i>Polemonium carneum</i> Oregon polemonium	None/None G3G4/S2 2B.2	Perennial herb. Coastal prairie, coastal scrub, lower montane coniferous forest. Elevations: 0-6005ft. (0-1830m.) Blooms Apr-Sep.	Not Expected	There is one known occurrence within five miles; however, coastal prairie and scrub are not present, and the Project site is largely developed with landscaped vegetation.
<i>Sanicula maritima</i> adobe sanicle	None/SR G2/S2 1B.1	Perennial herb. Chaparral, coastal prairie, meadows and seeps, valley and foothill grassland. Moist clay or ultramafic soils. Elevations: 100-785ft. (30-240m.) Blooms Feb-May.	Not Expected	There are no known occurrences within five miles, chaparral, coastal prairie, meadows and seeps, valley and foothill grasslands are not present, and the Project site is largely developed with landscaped vegetation.
<i>Senecio aphanactis</i> chaparral ragwort	None/None G3/S2 2B.2	Annual herb. Chaparral, cismontane woodland, coastal scrub. Drying alkaline flats. Elevations: 50-2625ft. (15-800m.) Blooms Jan-Apr(May).	Not Expected	There are no known occurrences within five miles, chaparral, coastal scrub, and woodlands with alkali flats are not present, and the Project site is largely developed with landscaped vegetation.
<i>Silene scouleri</i> ssp. <i>scouleri</i> Scouler's catchfly	None/None G5T4T5/S2S3 2B.2	Perennial herb. Coastal bluff scrub, coastal prairie, valley and foothill grassland. Elevations: 0-1970ft. (0-600m.) Blooms (Mar-May)Jun-Aug(Sep).	Not Expected	There are no known occurrences within five miles, coastal prairie, and foothill grasslands are not present, and the Project site is largely developed with landscaped vegetation.
<i>Silene verecunda</i> ssp. <i>verecunda</i> San Francisco campion	None/None G5T1/S1 1B.2	Perennial herb. Chaparral, coastal bluff scrub, coastal prairie, coastal scrub, valley and foothill grassland. Often on mudstone or shale; one Project site on serpentine. Elevations: 100-2115ft. (30-645m.) Blooms (Feb)Mar-Jul(Aug).	Not Expected	There are no known occurrences within five miles, chaparral, coastal prairie, and valley and foothill grasslands on shale are not present, and the Project site is largely developed with landscaped vegetation.
<i>Spergularia macrotheca</i> var. <i>longistyla</i> long-styled sand-spurrey	None/None G5T2/S2 1B.2	Perennial herb. Marshes and swamps, meadows and seeps. Alkaline. Elevations: 0-835ft. (0-255m.) Blooms Feb-May.	Not Expected	There are no known occurrences within five miles, marshes and swamps with alkali soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Stebbinsoseris decipiens</i> Santa Cruz microseris	None/None G2/S2 1B.2	Annual herb. Broadleaved upland forest, chaparral, closed-cone coniferous forest, coastal prairie, coastal scrub, valley and foothill grassland. Open areas in loose or disturbed soil, usually derived from sandstone, shale or serpentine, on seaward slopes. Elevations: 35-1640ft. (10-500m.) Blooms Apr-May.	Not Expected	There is one known occurrence within five miles; however, forest, coastal prairie and scrub are not present, and the Project site is largely developed with landscaped vegetation.
<i>Streptanthus albidus</i> ssp. <i>peramoenus</i> most beautiful jewelflower	None/None G2T2/S2 1B.2	Annual herb. Chaparral, cismontane woodland, valley and foothill grassland. Serpentine outcrops, on ridges and slopes. Elevations: 310-3280ft. (95-1000m.) Blooms (Mar)Apr-Sep(Oct).	Not Expected	There is one known occurrence within five miles; however, woodland, valley and foothill grasslands with serpentine outcrops are not present, and the Project site is outside this species elevation range.
<i>Streptanthus glandulosus</i> ssp. <i>niger</i> Tiburon jewelflower	FE/SE G4T1/S1 1B.1	Annual herb. Valley and foothill grassland. Shallow, rocky serpentine slopes. Elevations: 100-490ft. (30-150m.) Blooms May-Jun.	Not Expected	There are no known occurrences within five miles, valley and foothill grasslands with rocky serpentine soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Stuckenia filiformis</i> ssp. <i>alpina</i> northern slender pondweed	None/None G5T5/S2S3 2B.2	Perennial rhizomatous herb (aquatic). Marshes and swamps. Shallow, clear water of lakes and drainage channels. Elevations: 985-7055ft. (300-2150m.) Blooms May-Jul.	Not Expected	There are no known occurrences within five miles, marshes and swamps are not present, and the Project site is outside this species elevation range.
<i>Suaeda californica</i> California seablite	FE/None G1/S1 1B.1	Perennial evergreen shrub. Marshes and swamps. Margins of coastal salt marshes. Elevations: 0-50ft. (0-15m.) Blooms Jul-Oct.	Not Expected	There are two known occurrences within five miles; however, marshes and swamps are not present, this species was not observed during its blooming period, and the Project site is largely developed with landscaped vegetation.
<i>Symphotrichum lentum</i> Suisun Marsh aster	None/None G2/S2 1B.2	Perennial rhizomatous herb. Marshes and swamps. Most often seen along sloughs with <i>Phragmites</i> , <i>Bolboschoenus</i> , blackberry, <i>Typha</i> , etc. Elevations: 0-10ft. (0-3m.) Blooms (Apr)May-Nov.	Not Expected	There are no known occurrences within five miles, marshes and swamps are not present, this species was not observed during its blooming period, and the Project site is largely developed with landscaped vegetation.

Scientific Name Common Name	Status Fed/State ESA CRPR	Habitat Requirements	Potential to Occur	Rationale <sup>1</sup>
<i>Trifolium amoenum</i> two-fork clover	FE/None G1/S1 1B.1	Annual herb. Coastal bluff scrub, valley and foothill grassland. Sometimes on serpentine soil, open sunny Project sites, swales. Most recently cited on roadside and eroding cliff face. Elevations: 15-1360ft. (5-415m.) Blooms Apr-Jun.	Not Expected	There are no known occurrences within five miles, valley and foothill grasslands with rocky serpentine soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Trifolium hydrophilum</i> saline clover	None/None G2/S2 1B.2	Annual herb. Marshes and swamps, valley and foothill grassland, vernal pools. Mesic, alkaline Project sites. Elevations: 0-985ft. (0-300m.) Blooms Apr-Jun.	Not Expected	There are four known occurrences within five miles; however, all are over 120 years ago and only one is presumed extant, marshes and swamps with alkaline soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Triphysaria floribunda</i> San Francisco owl's-clover	None/None G2/S2? 1B.2	Annual herb. Coastal prairie, coastal scrub, valley and foothill grassland. On serpentine and non-serpentine substrate (such as at Pt. Reyes). Elevations: 35-525ft. (10-160m.) Blooms Apr-Jun.	Not Expected	There are no known occurrences within five miles, valley and foothill grasslands with serpentine soils are not present, and the Project site is largely developed with landscaped vegetation.
<i>Triquetrella californica</i> coastal triquetrella	None/None G2/S2 1B.2	Moss. Coastal bluff scrub, coastal scrub. Grows within 30m from the coast in coastal scrub, grasslands and in open gravels on roadsides, hillsides, rocky slopes, and fields. On gravel or thin soil over outcrops. Elevations: 35-330ft. (10-100m.)	Not Expected	There are no known occurrences within five miles, coastal scrub with rocky slopes is not present, and the Project site is largely developed with landscaped vegetation.
<i>Viburnum ellipticum</i> oval-leaved viburnum	None/None G4G5/S3 2B.3	Perennial deciduous shrub. Chaparral, cismontane woodland, lower montane coniferous forest. Elevations: 705-4595ft. (215-1400m.) Blooms May-Jun.	Not Expected	There is one known occurrence within five miles; however, it is from over a century ago. Woodland and coniferous forest are not present, and the Project site is largely developed with landscaped vegetation.

Regional Vicinity refers to within a 9-quadrant search radius of Project site.

1: all occurrence data noted is from CNDDB (CDFW 2024a)

**Status (Federal/State)**

FE = Federal Endangered  
 FT = Federal Threatened  
 SE = State Endangered  
 ST = State Threatened  
 SR = State Rare

**Other Statuses**

G1 or S1 Critically Imperiled Globally or Subnationally (state)  
 G2 or S2 Imperiled Globally or Subnationally (state)  
 G3 or S3 Vulnerable to extirpation or extinction Globally or Subnationally (state)  
 G4/5 or S4/5 Apparently secure, common and abundant  
 GH or SH Possibly Extirpated – missing; known from only historical occurrences but still some hope of rediscovery

**Additional notations may be provided as follows**

T – Intraspecific Taxon (subspecies, varieties, and other designations below the level of species)  
 Q – Questionable taxonomy that may reduce conservation priority  
 ? – Inexact numeric rank

**CRPR (CNPS California Rare Plant Rank)**

1A = Presumed extirpated in California, and rare or extinct elsewhere  
 1B = Rare, Threatened, or Endangered in California and elsewhere  
 2A = Presumed extirpated in California, but common elsewhere  
 2B = Rare, Threatened, or Endangered in California, but more common elsewhere

**CRPR Threat Code Extension**

.1 = Seriously endangered in California (>80% of occurrences threatened/high degree and immediacy of threat)  
 .2 = Moderately threatened in California (20-80% of occurrences threatened/moderate degree and immediacy of threat)  
 .3 = Not very endangered in California (<20% of occurrences threatened/low degree and immediacy of threat)

## Special Status Animal Species in the Regional Vicinity of the Project Project site

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale <sup>1</sup>
<b>Invertebrates</b>				
<i>Bombus crotchii</i> Crotch's bumble bee	None/SCE G2/S2	Coastal California east to the Sierra-Cascade crest and south into Mexico. Food plant genera include <i>Antirrhinum</i> , <i>Phacelia</i> , <i>Clarkia</i> , <i>Dendromecon</i> , <i>Eschscholzia</i> , and <i>Eriogonum</i> .	Low Potential	There is one known occurrence within five miles, small mammal burrows and flowering plants are present; however, the Project site is largely developed and disturbed by recreational use.
<i>Bombus occidentalis</i> western bumble bee	None/SCE G3/S1	Once common and widespread, the species has declined precipitously from central CA to southern B.C., perhaps from disease.	Not Expected	There are five known occurrences within five miles; however, these occurrences are all over 30 years ago, and current observations of this species are limited to the Sierras and Northern California along the Oregon Border (Xerces 2004).
<i>Callophrys mossii bayensis</i> San Bruno elfin butterfly	FE/None G4T2/S2	Coastal, mountainous areas with grassy ground cover, mainly in the vicinity of San Bruno Mountain, San Mateo County. Colonies are located on steep, north-facing slopes within the fog belt. Larval host plant is <i>Sedum spathulifolium</i> .	Not Expected	There are no known occurrences within five miles, and this species is known from a population in San Mateo County.
<i>Danaus plexippus plexippus</i> pop. 1 monarch - California overwintering population	FC/None G4T1T2Q/S2	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby.	Not Expected	There are eight known occurrences from within five miles; however, large groves of wind-protected trees suitable for overwintering are not present.
<i>Euphydryas editha bayensis</i> Bay checkerspot butterfly	FT/None G4G5T1/S3	Restricted to native grasslands on outcrops of serpentine soil in the vicinity of San Francisco Bay. <i>Plantago erecta</i> is the primary host plant; <i>Orthocarpus densiflorus</i> and <i>O. purpurascens</i> are the secondary host plants.	Not Expected	There are no known occurrences within five miles, and this species is known from populations in San Mateo and Santa Clara Counties.
<i>Icaricia icarioides missionensis</i> Mission blue butterfly	FE/None G5T2/S2	Inhabits grasslands of the San Francisco peninsula. Three larval host plants: <i>Lupinus albifrons</i> , <i>L. variicolor</i> , and <i>L. formosus</i> , of which <i>L. albifrons</i> is favored.	Not Expected	There are no known occurrences within five miles, and this species is known from a population on the San Francisco Peninsula in San Mateo County.
<i>Speyeria callippe callippe</i> callippe silverspot butterfly	FE/None G5T1/S1	Restricted to the northern coastal scrub of the San Francisco peninsula. Hostplant is <i>Viola pedunculata</i> . Most adults found on E-facing slopes; males congregate on hilltops in search of females.	Not Expected	There are no known occurrences within five miles, and this species is known from populations in San Mateo, Sonoma, and Solano Counties.
<b>Fish</b>				
<i>Acipenser medirostris</i> pop. 1 green sturgeon - southern DPS	FT/None G2T1/S1 SSC	Spawning site fidelity. Spawns in the Sacramento, Feather and Yuba Rivers. Presence in upper Stanislaus and San Joaquin Rivers may indicate spawning. Non-spawning adults occupy marine/estuarine waters. Delta Estuary is important for rearing juveniles. Spawning occurs primarily in cool (54-59 °F) sections of mainstem rivers in deep pools (8-9 meters) with substrate containing small to medium sized sand, gravel, cobble, or boulder.	High Potential (non-breeding)	The Project site overlaps with a known occurrence with recent observations, and marine areas are designated critical habitat for the species.
<i>Acipenser transmontanus</i> white sturgeon -	None/SCT G3/S2 SSC	Live in estuaries of large rivers, moving into freshwater to spawn. Most abundant in brackish portions of estuaries. In estuaries adults concentrate in deep areas with soft bottoms.	High Potential (non-breeding)	The Project site is within the species' known range, and marine estuaries are present.
<i>Archoplites interruptus</i> Sacramento perch	None/None G1/S1 SSC	Historically found in the sloughs, slow-moving rivers, and lakes of the Central Valley. Prefers warm water. Aquatic vegetation is essential for young. Tolerates wide range of physio-chemical water conditions.	Not Expected	There are two known occurrences within five miles; however, these are from freshwater lakes in Tilden Park to the east.
<i>Eucyclogobius newberryi</i> tidewater goby	FE/None G3/S3 SSC	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water and high oxygen levels.	Not Expected	There is a known location at Aquatic Park approximately 0.25 miles southeast of the Project site; however, suitably shallow and sheltered lagoons are not present.
<i>Mylopharodon conocephalus</i> hardhead	None/None G3/S2 SSC	Low to mid-elevation streams in the Sacramento-San Joaquin drainage. Also present in the Russian River. Clear, deep pools with sand-gravel-boulder bottoms and slow water velocity. Not found where exotic centrarchids predominate.	Not Expected	There are no known occurrences within five miles, and suitable freshwater river and stream habitats are not present.
<i>Oncorhynchus mykiss irideus</i> pop. 8 steelhead - central California coast DPS	FT/None G5T3Q/S3	DPS includes all naturally spawned populations of steelhead (and their progeny) in streams from the Russian River to Aptos Creek, Santa Cruz County, California (inclusive). Also includes the drainages of San Francisco and San Pablo Bays.	Moderate Potential (non-breeding)	Suitable freshwater breeding habitat for the species does not occur within the Project site. However, the Bay habitat within the Project site provides migratory habitat for this species.
<i>Oncorhynchus mykiss irideus</i> pop. 11 steelhead - Central Valley DPS	FT/None G5T2Q/S2	Populations in the Sacramento and San Joaquin rivers and their tributaries.	Moderate Potential (non-breeding)	Suitable freshwater breeding habitat for the species does not occur within the Project site. However, the Bay habitat within the Project site provides migratory habitat for this species.

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale <sup>1</sup>
<i>Oncorhynchus tshawytscha</i> pop. 7 chinook salmon - Sacramento River winter-run ESU	FE/SE G5T1Q/S3	Sacramento River below Keswick Dam. Spawns in the Sacramento River, but not in tributary streams. Requires clean, cold water over gravel beds with water temperatures between 6 and 14 C for spawning.	High Potential (non- breeding)	Marine areas are designated critical habitat and the species is known to occur in the San Francisco Bay.
<i>Oncorhynchus tshawytscha</i> pop. 11 chinook salmon - Central Valley spring-run ESU	FT/ST G5T2Q/S2	Adult numbers depend on pool depth and volume, amount of cover, and proximity to gravel. Water temps >27 C are lethal to adults. Federal listing refers to populations spawning in Sacramento River and tributaries.	Moderate Potential (non- breeding)	Suitable freshwater breeding habitat for the species does not occur within the Project site. However, the Bay habitat within the Project site provides migrating habitat for this species.
<i>Spirinchus thaleichthys</i> pop. 2 longfin smelt- San Francisco Bay-Delta DPS	FE/ST G5TNRQ/S1	Pelagic and anadromous within the Sacramento-San Joaquin River Delta, San Francisco Bay, and Gulf of the Farallones. Spawns in lower freshwater reaches of Sacramento and San Joaquin Rivers. First year in Suisun Bay; later SF Bay or Gulf of the Farallones. Occurs in salinities ranging from pure freshwater to pure saltwater; typically salinities ranging from 14-28 parts per thousand (ppt). Generally occupies water temperatures from 61-68F, with spawning occurring in water temperatures from 41-58F.	High Potential	The Project site is within a known occurrence with recent observations, and marine areas are suitable habitat for the species.
<i>Thaleichthys pacificus</i> eulachon	FT/None G5/S1 SSC	Found in Klamath River, Mad River, Redwood Creek, and in small numbers in Smith River and Humboldt Bay tributaries. Spawn in lower reaches of coastal rivers with moderate water velocities and bottom of pea-sized gravel, sand, and woody debris.	Not Expected	There are no known occurrences within five miles, and suitable freshwater river and stream habitats are not present
<b>Reptiles</b>				
<i>Actinemys marmorata</i> northwestern pond turtle	FPT/None G2/SNR SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation. Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying. Occurs in northern California, south along the Sierra Nevada Mountains and the Coast Range down to Monterey and Kern Counties.	Low Potential	There are four known occurrences within five miles, but none are contiguous or hydrologically connected with the project site. While limited basking sites and suitable habitat at the mouth of Strawberry Creek are present within the Project site, this species is typically associated with freshwater habitats and not found in open, tidal waters such as those found in San Francisco Bay within the project site. This species does move through uplands; however, surrounding areas are highly developed, and include Interstate-80 as a barrier to the east of the Project site.
<i>Chelonia mydas</i> green turtle	FT/None G3/S1	Marine sea turtle. Completely herbivorous; needs adequate supply of seagrasses and algae. East Pacific DPS breeds along the coast of Mexico and Hawaii.	Not Expected	There are no known occurrences within five miles and this species typically doesn't occur within the San Francisco Bay.
<i>Masticophis lateralis euryxanthus</i> Alameda whipsnake	FT/ST G4T2/S2	Typically found in chaparral and scrub habitats but will also use adjacent grassland, oak savanna and woodland habitats. Mostly south-facing slopes and ravines, with rock outcrops, deep crevices or abundant rodent burrows, where shrubs form a vegetative mosaic with oak trees and grasses.	Not Expected	There are nine known occurrences within five miles; however, they are all from inland areas to the east, suitable rocky scrub habitat is not present, and the Project site is isolated by urban development.
<i>Thamnophis sirtalis tetrataenia</i> San Francisco gartersnake	FE/SE G5T2Q/S2 FP	Vicinity of freshwater marshes, ponds and slow-moving streams in San Mateo County and extreme northern Santa Cruz County. Prefers dense cover and water depths of at least one foot. Upland areas near water are also very important.	Not Expected	The project site is outside the current range of the species.
<b>Amphibians</b>				
<i>Ambystoma californiense</i> pop. 1 California tiger salamander - central California DPS	FT/ST G2G3T3/S3 WL	Lives in vacant or mammal-occupied burrows throughout most of the year; in grassland, savanna, or open woodland habitats. Need underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	Not Expected	There are no known occurrences within five miles, suitable grassland habitat is not present, and the Project site is isolated from known populations by urban development and open waters of the San Francisco Bay.
<i>Dicamptodon ensatus</i> California giant salamander	None/None G2G3/S2S3 SSC	Known from wet coastal forests near streams and seeps from Mendocino County south to Monterey County, and east to Napa County. Aquatic larvae found in cold, clear streams, occasionally in lakes and ponds. Adults known from wet forests under rocks and logs near streams and lakes.	Not Expected	There are no known occurrences within five miles, suitable forested habitat is not present, and the Project site is isolated from known populations by urban development and open waters of the San Francisco Bay.
<i>Rana boylei</i> pop. 4 foothill yellow-legged frog - central coast DPS	FT/SE G3T2/S2	San Francisco Peninsula and Diablo Range south of San Francisco Bay Estuary, and south through the Santa Cruz and Gabilan Mountains east of the Salinas River in the southern inner Coast Ranges. Partly shaded shallow streams and riffles with a rocky substrate in a variety of habitats. Needs at least some cobble-sized substrate for egg-laying and at least 15 weeks to attain metamorphosis.	Not Expected	There is one known occurrence within five miles; however, suitable forested habitat is not present, and the Project site is isolated from known populations by urban development and open waters of the San Francisco Bay.
<i>Rana draytonii</i> California red-legged frog	FT/None G2G3/S2S3 SSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development. Must have access to estivation habitat.	Not Expected	There is one known occurrence within five miles; however, suitable habitat is not present, and the Project site is isolated from known populations by urban development and open waters of the San Francisco Bay.

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale <sup>1</sup>
<b>Birds</b>				
<i>Accipiter cooperii</i> Cooper's hawk	None/None G5/S4 WL	Woodland, chiefly of open, interrupted or marginal type. Nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks.	Low Potential	There are two known occurrences within five miles and large trees are present; however, the Project site is largely developed and disturbed by recreational use.
<i>Aquila chrysaetos</i> golden eagle	None/None G5/S3 FP WL	Rolling foothills, mountain areas, sage-juniper flats, and desert. Cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas.	Not Expected	There are no known occurrences within five miles, suitably large nest trees are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Asio flammeus</i> short-eared owl	None/None G5/S2 SSC	Found in swamp lands, both fresh and salt; lowland meadows; irrigated alfalfa fields. Tule patches/tall grass needed for nesting/daytime seclusion. Nests on dry ground in depression concealed in vegetation.	Not Expected	There are no known occurrences within five miles, suitable marsh and grassland habitat is not present, and the Project site is largely developed and disturbed by recreational use.
<i>Athene cunicularia</i> burrowing owl	None/SC G4/S2 SSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	Low Potential	<p>Although one occurrence has been documented within five miles of the project site and burrowing owls are known to overwinter at Cesar Chavez Park, the project site itself does not provide the habitat conditions required for overwintering. The site lacks open, low-stature annual grassland and protected foraging areas with sufficient insect prey, which are essential for sustaining overwintering individuals.</p> <p>Adjacent areas, including fragmented grasslands in Shorebird Park and along University Avenue, contain limited open space but do not provide suitable overwintering habitat. While some ground squirrel burrows are present, these grassland areas are routinely mowed for park use and subject to heavy recreational use and frequent human disturbance, which reduces prey availability and limits habitat suitability. In addition, the grassland areas along University Avenue are narrow and linear, lack refuge from disturbance due to regular trail use, recreation, and the presence of dogs, and are exposed to numerous tall perching structures that support hawks and other avian predators.</p> <p>A migrating or displaced individual could briefly land on the project site or within nearby areas during movement; however, sustained overwintering use is not expected. Accordingly, neither the project site nor immediately adjacent areas, provide suitable overwintering habitat for burrowing owl.</p>
<i>Branta hutchinsii leucopareia</i> cackling (=Aleutian Canada) goose	FD/None G5T3/S3 WL	Winters on lakes and inland prairies. Forages on natural pasture or that cultivated to grain; loaf on lakes, reservoirs, ponds.	Not Expected	There are no known occurrences within five miles, this species does not typically breed in California, and the Project site is largely developed and disturbed by recreational use.
<i>Charadrius nivosus nivosus</i> western snowy plover	FT/None G3T3/S3 SSC	Sandy beaches, salt pond levees and shores of large alkali lakes. Needs sandy, gravelly or friable soils for nesting.	Not Expected	There are no known occurrences within five miles, suitable sandy beaches are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Circus hudsonius</i> northern harrier	None/None G5/S3 SSC	Coastal salt and freshwater marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas. Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	Not Expected	There is one known occurrence within five miles from the McLaughlin Eastshore State Seashore; however, suitable grassland nesting sites are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Coturnicops noveboracensis</i> yellow rail	None/None G4/S2 SSC	Summer resident in eastern Sierra Nevada in Mono County. Freshwater marshlands.	Not Expected	There are no known occurrences within five miles, suitable freshwater marshes are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Elanus leucurus</i> white-tailed kite	None/None G5/S3S4 FP	Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	Low Potential	There are two known occurrences within five miles, including from the north Berkeley Marina parking lot, suitable grassland foraging sites occur in the vicinity; however, the Project site is largely developed and disturbed by recreational use.
<i>Falco peregrinus anatum</i> American peregrine falcon	FD/SD G4T4/S3S4	Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures. Nest consists of a scrape or a depression or ledge in an open site.	Not Expected	There are two known occurrences within five miles; however, suitable cliffs or tall buildings are not present.
<i>Geothlypis trichas sinuosa</i> saltmarsh common yellowthroat	None/None G5T3/S3 SSC	Resident of the San Francisco Bay region, in freshwater and saltwater marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	Not Expected	There is one known occurrence within five miles; however, suitable marsh habitat is not present, and the Project site is largely developed and disturbed by recreational use.

City of Berkeley  
**Berkeley Water Transportation Pier Ferry Project**

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale <sup>1</sup>
<i>Haliaeetus leucocephalus</i> bald eagle	FD/SE G5/S3 FP	Ocean shore, lake margins, and rivers for both nesting and wintering. Most nests within 1 mile of water. Nests in large, old-growth, or dominant live tree with open branches, especially ponderosa pine. Roosts communally in winter.	Not Expected	There are no known occurrences within five miles, suitably large nest trees are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Laterallus jamaicensis coturniculus</i> California black rail	None/ST G3T1/S2 FP	Inhabits freshwater marshes, wet meadows and shallow margins of saltwater marshes bordering larger bays. Needs water depths of about 1 inch that do not fluctuate during the year and dense vegetation for nesting habitat.	Not Expected	There are two known occurrences within five miles; however, suitable marsh habitat is not present, and the Project site is largely developed and disturbed by recreational use.
<i>Melospiza melodia maxillaris</i> Suisun song sparrow	None/None G5T3/S2 SSC	Resident of brackish-water marshes surrounding Suisun Bay. Inhabits cattails, tules and other sedges, and Salicornia; also known to frequent tangles bordering sloughs.	Not Expected	There are no known occurrences within five miles, suitable marsh habitats are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Melospiza melodia pusillula</i> Alameda song sparrow	None/None G5T2T3/S2 SSC	Resident of salt marshes bordering south arm of San Francisco Bay. Inhabits Salicornia marshes; nests low in Grindelia bushes (high enough to escape high tides) and in Salicornia.	Low Potential	There are seven known occurrences within five miles, including from the McLaughlin Eastshore State Seashore. However, most of these occurrences are from the 1940s, suitable marsh habitat is not present, and the Project site is largely developed and disturbed by recreational use.
<i>Melospiza melodia samuelis</i> San Pablo song sparrow	None/None G5T2/S2 SSC	Resident of salt marshes along the north side of San Francisco and San Pablo bays. Inhabits tidal sloughs in the Salicornia marshes; nests in Grindelia bordering slough channels.	Not Expected	There are no known occurrences within five miles, suitable salt marsh habitats are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Nannopterum auritum</i> double-crested cormorant	None/None G5/S4 WL	Colonial nester on coastal cliffs, offshore islands, and along lake margins in the interior of the state. Nests along coast on sequestered islets, usually on ground with sloping surface, or in tall trees along lake margins.	Moderate Potential	There are no known occurrences within five miles, and the Project site is largely developed and disturbed by recreational use; however, this species is known locally to nest on man-made structures.
<i>Rallus obsoletus obsoletus</i> California Ridgway's rail	FE/SE G3T1/S2 FP	Salt water and brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay. Associated with abundant growths of pickleweed, but feeds away from cover on invertebrates from mud-bottomed sloughs.	Not Expected	There are two known occurrences within five miles; however, suitable marsh habitats are not present and the Project site is largely developed and disturbed by recreational use
<i>Riparia riparia</i> bank swallow	None/ST G5/S3	Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	Not Expected	There are no known occurrences within five miles, suitable river banks are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Rynchops niger</i> black skimmer	None/None G5/S2 SSC	Nests on gravel bars, low islets, and sandy beaches, in unvegetated sites. Nesting colonies usually less than 200 pairs. .	Not Expected	There are no known occurrences within five miles, suitable gravel bars and beaches are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Sternula antillarum browni</i> California least tern	FE/SE G4T2T3Q/S2 FP	Nests along the coast from San Francisco Bay south to northern Baja California. Colonial breeder on bare or sparsely vegetated, flat substrates: sand beaches, alkali flats, land fills, or paved areas.	Not Expected	There are no known occurrences within five miles, suitable colonial breeding sites are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Xanthocephalus xanthocephalus</i> yellow-headed blackbird	None/None G5/S3 SSC	Nests in freshwater emergent wetlands with dense vegetation and deep water. Often along borders of lakes or ponds. Nests only where large insects such as Odonata are abundant, nesting timed with maximum emergence of aquatic insects.	Not Expected	There are no known occurrences within five miles, suitable freshwater emergent wetlands are not present, and the Project site is largely developed and disturbed by recreational use.
<b>Mammals</b>				
<i>Antrozous pallidus</i> pallid bat	None/None G4/S3 SSC	Found in a variety of habitats including deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts in crevices of rock outcrops, caves, mine tunnels, buildings, bridges, and hollows of live and dead trees which must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	Not Expected	There are three known occurrences within five miles; however, these occurrences are all from the 1940s, suitable large dead trees are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Balaenoptera physalus</i> fin whale	FE/None G3/SNR MMPA	Migrate along the California coastline to warmer waters in the winter and to food rich, cold waters in the summer.	Not Expected	This species is a completely marine species and is not expected to occur immediately along the shoreline within the Project site.
<i>Corynorhinus townsendii</i> Townsend's big-eared bat	None/None G4/S2 SSC	Occurs throughout California in a wide variety of habitats. Most common in mesic sites, typically coniferous or deciduous forests. Roosts in the open, hanging from walls & ceilings in caves, lava tubes, bridges, and buildings. This species is extremely sensitive to human disturbance.	Not Expected	There is one known occurrence within five miles; however, it is from the 1930s, suitable roost habitats are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Enhydra lutris nereis</i> southern sea otter	FT/None G4T2/S3 FP	Occurs in nearshore marine environments from Ano Nuevo in San Mateo County to Point Sal in Santa Barbara County. Requires canopies of giant kelp or bull kelp for rafting and feeding. Prefers rocky substrates with abundant invertebrates to prey on.	Not Expected	There are no known occurrences within five miles and kelp forests are not present.

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale <sup>1</sup>
<i>Eschrichtius robustus</i> gray whale- Eastern North Pacific DPS	FD/None G4/SNR MMPA	Occurs throughout the California coastline during migration [Nov. thru May]. Feed primarily on mysids, amphipods, and polychaete tube worms in the northern part of their range. Often spotted within bays and harbors.	Low	This species occurs in the San Francisco Bay; however, waters in the Project site are too shallow for this species.
<i>Eumetopias jubatus</i> Steller sea lion	FD/None G3/S2	Breeds on Ano Nuevo, San Miguel and Farallon islands, Point St. George, and Sugarloaf. Hauls-out on islands and rocks. Needs haul-out and breeding sites with unrestricted access to water, near aquatic food supply and with no human disturbance.	Not Expected	There are no known occurrences within five miles, and the Project site is largely developed and disturbed by recreational use.
<i>Lasiurus frantzii</i> western red bat	None/None G4/S3 SSC	Roosts primarily in trees, 2-40 ft above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging.	Not Expected	There are no known occurrences within five miles, mixed conifer forests are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Megaptera novaeangliae</i> humpback whale - Central America DPS	FE/None G4/SNR MMPA	Inhabitants of coastal waters and migrate along the California coastline throughout the year. Filter-feeder and generalist with a broad diet of frill, copepods, fish, and cephalopods. Typically feed throughout summer in areas of prey concentration such as upwelling regions.	Low	This species is typically found off-shore in deeper waters. There is a low likelihood that whales may wander into the San Francisco Bay, and occasional sightings have been recorded.
<i>Megaptera novaeangliae</i> humpback whale - Mexico DPS	FT/None G4/SNR MMPA	Inhabitants of coastal waters and migrate along the California coastline throughout the year. Filter-feeder and generalist with a broad diet of frill, copepods, fish, and cephalopods. Typically feed throughout summer in areas of prey concentration such as upwelling regions.	Low	This species is typically found off-shore in deeper waters. There is a low likelihood that whales may wander into the San Francisco Bay, and occasional sightings have been recorded.
<i>Microtus californicus sanpabloensis</i> San Pablo vole	None/None G5T1T2/S1S2 SSC	Saltmarshes of San Pablo Creek, on the south shore of San Pablo Bay. Constructs burrow in soft soil. Feeds on grasses, sedges and herbs. Forms a network of runways leading from the burrow.	Not Expected	There are no known occurrences within five miles, this species is known from populations in San Pablo Bay, and the Project site is largely developed and disturbed by recreational use.
<i>Neotoma fuscipes annectens</i> San Francisco dusky-footed woodrat	None/None G5T2T3/S2S3 SSC	Typically found in forest habitats with moderate to dense understory. Can occur in chaparral, riparian woodlands, and coniferous forests, particularly redwood. Builds middens out of grasses, leaves, and woody debris. This subspecies is found only in the San Francisco Bay region.	Not Expected	There are no known occurrences within five miles, woodland habitats are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Nyctinomops macrotis</i> big free-tailed bat	None/None G5/S3 SSC	Low-lying arid areas in Southern California. Need high cliffs or rocky outcrops for roosting sites. Feeds principally on large moths.	Not Expected	There is one known occurrence within five miles; however, it is from the 1910s, rocky outcrops are not present, and the Project site is largely developed and disturbed by recreational use.
<i>Orcinus orca</i> killer whale - Southern Resident DPS	FE/None G4/SNR MMPA	Killer whales are found in all oceans and seas, from the ice edges to the equator, in both hemispheres; however, they appear to be more common in nearshore, cool temperate to subpolar waters. Primarily feed on fish.	Not Expected	This species rarely occurs in the San Francisco Bay; however, waters in the Project site are too shallow to provide suitable habitat.
<i>Phoca vitulina richardii</i> harbor seal	None/None G5/SNR MMPA	Confined to coastal areas of the Northern Hemisphere, from temperate to polar regions. Found in the coastal waters of the continental shelf and slope, and can be found commonly in bays, rivers, estuaries, and intertidal areas. Generalist feeders taking a wide variety of fish, cephalopods, and crustaceans.	High Potential (Non-breeding)	Haul-out sites are located throughout the Bay, and this species is known to occur in waters around the Berkeley Marina.
<i>Phocoena Phocoena</i> harbor porpoise	None/None G4/SNR MMPA	Found in cool temperate to subpolar waters of the Northern Hemisphere. They are usually found in shallow water, most often nearshore, although they occasionally travel over deeper offshore waters. Feed upon a large variety of fish and cephalopods.	Moderate Potential	Suitable foraging habitat present within the Project site and occurrences are recorded throughout Bay.
<i>Reithrodontomys raviventris</i> salt-marsh harvest mouse	FE/SE G1G2/S3 FP	Only in the saline emergent wetlands of San Francisco Bay and its tributaries. Pickleweed is primary habitat, but may occur in other marsh vegetation types and in adjacent upland areas. Does not burrow; builds loosely organized nests. Requires higher areas for flood escape.	Not Expected	There is one known occurrence within five miles; however, it is from the 1980s, suitable marsh habitat is not present, and the Project site is largely developed and disturbed by recreational use.
<i>Scapanus latimanus parvus</i> Alameda Island mole	None/None G5T1Q/SH SSC	Only known from Alameda Island. Found in a variety of habitats, especially annual and perennial grasslands. Prefers moist, friable soils. Avoids flooded soils.	Not Expected	There are no known occurrences within five miles, and this species is only known to occur on Alameda Island.
<i>Sorex vagrans halicoetes</i> salt-marsh wandering shrew	None/None G5T1/S1 SSC	Salt marshes of the south arm of San Francisco Bay. Medium high marsh 6-8 ft above sea level where abundant driftwood is scattered among Salicornia.	Not Expected	There are no known occurrences within five miles, pickleweed marshes are not present, and this species is only known from the south arm of San Francisco Bay.
<i>Taxidea taxus</i> American badger	None/None G5/S3 SSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	Not Expected	There are no known occurrences within five miles, suitable open habitat is not present, and the Project site is isolated from known populations by urban development.

Scientific Name Common Name	Status Fed/State ESA CDFW	Habitat Requirements	Potential to Occur	Rationale <sup>1</sup>
<i>Tursiops truncatus</i> common bottlenose dolphin	None/None G5/SNR MMPA	Found primarily in coastal and continental shelf waters of tropical and temperate regions. The bottlenose dolphin is a generalist regarding habitat and diet.	Moderate Potential	Suitable foraging habitat is present and occurrences are recorded throughout Bay.
<i>Zalophus californianus</i> California sea lion	None/None G5/SNR MMPA	Confined to coastal areas of the north Pacific Ocean, from Vancouver Island to Baja California and Mazatlan. Breeds on San Miguel, San Nicolas, Santa Barbara, and San Clemente islands in southern California, occasionally at South Farallon and Ano Nuevo islands off of central California. Opportunistic feeder taking a wide variety of fish and cephalopods.	High Potential (Non- breeding)	Forages throughout San Francisco Bay, and haul-out sites (docks and beaches) are present in the vicinity of the project site. Known to occur in waters around the Berkeley Marina.
<i>Zapus trinotatus orarius</i> Point Reyes jumping mouse	None/None G5T2/S2 SSC	Primarily in bunch grass marshes on the uplands of Point Reyes. Also present in coastal scrub, grassland, and meadows. Eats mainly grass seeds w/ some insects and fruit taken. Builds grassy nests on ground under vegetation, burrows in winter.	Not Expected	There are no known occurrences within five miles, bunch grass marshes are not present, and this species is only known from Point Reyes

Regional Vicinity refers to within a 9-quad search radius of Project site.

1: all occurrence data noted is from CNDDDB unless otherwise noted.

**Status (Federal/State)**

- FE = Federal Endangered
- FT = Federal Threatened
- FPT = Federal Proposed Threatened
- FD = Federal Delisted
- FC = Federal Candidate
- MMPA = Marine Mammal Protection Act
- SE = State Endangered
- ST = State Threatened
- SCE = State Candidate Endangered
- SCT = State Candidate Threatened
- SC = State Candidate for listing
- SD = State Delisted
- SSC = CDFW Species of Special Concern
- FP = CDFW Fully Protected
- WL = CDFW Watch List

**Other Statuses**

- G1 or S1 Critically Imperiled Globally or Subnationally (state)
- G2 or S2 Imperiled Globally or Subnationally (state)
- G3 or S3 Vulnerable to extirpation or extinction Globally or Subnationally (state)
- G4/5 or S4/5 Apparently secure, common and abundant
- GH or SH Possibly Extirpated – missing; known from only historical occurrences but still some hope of rediscovery

**Additional notations may be provided as follows**

- T – Intraspecific Taxon (subspecies, varieties, and other designations below the level of species)
- Q – Questionable taxonomy that may reduce conservation priority
- ? – Inexact numeric rank

# Appendix D

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Supporting Cultural Resources Information

## CONTINUATION SHEET

Property Name: Berkeley Marina and C. Chavez Park

Page 1 of 8

The subject property is a complex of buildings and structures comprised of the Berkeley Yacht Harbor, Berkeley Marina, Berkeley Pier, North Waterfront Park, and Cesar E. Chavez Park. Meta Bunse and Damany Fisher of JRP Historical Consulting, LLC recorded and evaluated the property in July 2007. The property was recommended ineligible for listing in the CRHR or NRHR for a lack of historical or archaeological significance (JRP Historical Consulting 2007). The property was not evaluated for local eligibility. Since the property was recorded in 2007, the property has remained largely unchanged.

The Berkeley Marina and Cesar E. Chavez Park property is comprised of several active and passive recreation uses and commercial uses and includes the Berkeley Marina, Cesar E. Chavez Park, Shorebird Park, Eastshore State Seashore, and the Berkeley Pier. Major features and buildings are outlined in Table 1 and Figure 1 and described in more detail below.

**Table 1 Major Features and Buildings**

Map ID	Feature	Build Date	Relationship to Study Area
<b>1</b>	<b>Cesar E. Chavez Park</b>	1991	Indirect Study Area
<b>2</b>	<b>Eastshore State Seashore</b>	1998	Indirect Study Area
<b>3</b>	<b>Berkeley Marina</b>	1935/1966	Indirect Study Area
a	Berkeley Marine Center	c. 1983	Indirect Study Area
b	Berkeley Yacht Club	1979	Indirect Study Area
c	Berkeley Marina Waterfront Office	c. 1966	Direct Study Area
d	Berkeley Marina Double Tree by Hilton	1972	Indirect Study Area
e	235 University Avenue (Hana Japan and Berkeley Sportsman)	1979	Direct Study Area
f	125 University Avenue	1971	Direct Study Area
g	Shorebird Nature Center	c. 1990/1999	Direct Study Area
h	Adventure Playground	1979	Direct Study Area
i	His Lordship's Restaurant	1971	Direct Study Area
j	Skates on the Bay	c. 1980	Direct Study Area
k	Cal Adventure and Cal Sailing Club	c. 1985	Direct Study Area
<b>4</b>	<b>Berkeley Pier</b>	1927	Direct Study Area

The property is accessed from a central route, University Avenue which continues westward from Frontage Road, terminating at the Berkeley Pier. The area north of the Berkeley Marina is accessed via Marina Boulevard, which runs perpendicular to University Avenue. The north portion of the property is occupied by the Cesar E. Chavez Park, a 90-acre former landfill that extends from the north side of the Berkeley Marina. Established in 1991, it is encircled in a paved pedestrian path with a network of interior unpaved paths that provide access to different areas of the parks – the Chavez Memorial Solar Calendar, the Protected Natural Area, the Off Leash Dog Park, and vistas and picnic areas. The park has remained essentially the same since it was last evaluated in 2007.

The area east of Marina Boulevard is occupied by a portion of the McLaughlin Eastshore State Park, a chain of waterfront lands stretching from Richmond, Albany, Berkeley, Emeryville to Oakland. The 72-acre portion in the

## CONTINUATION SHEET

Property Name: Berkeley Marina and C. Chavez Park

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Study Area is a meadowland with native plants and trails constructed on a former landfill. Completed in 1998, it is currently operated by East Bay Regional Park District.

The Berkeley Marina is 52-acres of water with about 1,000 berths, divided into several sections (A-O). Organized in a general U-shape, each section has associated docks, restroom facilities, and adjacent surface parking lots. The northwest portion of the Berkeley Marina features a gas dock and a public launch ramp. The entry to the Berkeley Marina from the bay is protected by a concrete breakwater (1980) and a rubble breakwater (1966). Buildings associated with the operation of the marina include the Berkeley Marine Center (c.1983), the Berkeley Yacht Club (1979), and the Berkeley Marina Waterfront Office (c.1966) (Figure 2).<sup>1</sup> The marina and associated buildings all appear to be unchanged since the 2007 evaluation.

The area east of the Berkeley Marina includes the Berkeley Marina Double Tree by Hilton (1972). The hotel has a sprawling footprint and is generally three stories with a port cochere entry at the east elevation. At the bayside, it fronts a dock currently used by a charter cruise company. It appears to have remained largely unchanged since the 2007 evaluation.

There are two buildings situated around a courtyard with a central art piece south of the Berkeley Marina, on the north side of University Avenue. The eastern building is currently occupied by Hana Japan Restaurant and Berkeley Sportsman's Center (1979) and the western building (1971) is occupied by several office uses, including the Berkeley Police Department Traffic Unit (Figure 3, Figure 4).<sup>2</sup> The area south of the Berkeley Marina includes several green areas with benches between buildings, including Horseshoe Park a small vista park. It remains essentially the same as described in the 2007 evaluation.

The area south of University Avenue is occupied by Shorebird Park which includes a paved, bayside path, playground, outdoor stage, and the Shorebird Park Nature Center. The Shorebird Park Nature Center includes two office buildings, one a prefabricated building (c.1990) and one a strawbale building (c.1999) (Figure 5). It also includes a concrete block restroom building (c.1980). The Adventure Playground (1979), an outdoor, hands-on "junk playground" (Figure 6). It remains unchanged since the 2007 evaluation.

There is a large surface parking lot and the former His Lordship's Restaurant (1971) west of the Shorebird Park Nature Center. The two-story building includes expansive windows overlooking the bay and is supported by 25 piles (Figure 7). The property includes a second restaurant building, north of the Berkeley Pier, Skates on the Bay (c.1980) (Figure 8). Its foundation is built entirely over the San Francisco Bay and is accessed via two elevated walkways. The restaurant has a pavilion roof and has expansive widows overlooking the bay, similar to the former His Lordship's Restaurant. Since the 2007 evaluation, His Lordships Restaurant has closed and is vacant. The adjacent surface lot is also now closed to vehicular access.

The area east of the Shorebird Park is occupied by the Cal Adventures and Cal Sailing Club, which is comprised of several prefabricated buildings and storage containers. It also includes a vehicular pass lane along the shoreline for offloading at the two adjacent docks (Figure 9). The area east of the Cal Adventures and Cal Sailing Club includes a surface parking lot, restroom building, and an additional dock along the shoreline. Since 2007, Cal Adventures and Cal Sailing Club area has been updated with a second dock and the offloading area has been improved.

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<sup>1</sup> City of Berkeley, "Berkeley Marina Specific Plan Infrastructure Assessment," May 14, 2021.

<https://berkeleyca.gov/sites/default/files/documents/2021-05-14%20Draft%20Infrastructure%20Assessment%20-%20Hargreaves%20Jones.pdf>, Accessed October 2024.

<sup>2</sup> City of Berkeley, "Lease for 235 University Avenue," May 26, 2020. <https://berkeleyca.gov/sites/default/files/documents/2020-05-26%20Item%2016%20Lease%20for%20235%20University%20Avenue.pdf>. Accessed October 2024.

# CONTINUATION SHEET

Property Name: Berkeley Marina and C. Chavez Park

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Figure 1 Annotated Site Map



Map Courtesy of City of Berkeley, Annotated by Rincon Constants, Inc.

# CONTINUATION SHEET

Property Name: Berkeley Marina and C. Chavez Park

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Figure 2 Waterfront Office, View Northeast



Figure 3 235 University Avenue, View Northeast



Figure 4 125 University Avenue, View Northeast



Figure 5 Shorebird Nature Center, View North



Figure 6 Adventure Playground, View East



Figure 7 His Lordship's Restaurant, View Southwest



## CONTINUATION SHEET

Property Name: Berkeley Marina and C. Chavez Park

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Figure 8 Skates on the Bay, View Northwest



Figure 9 Cal Adventure Docks, View Southeast



The westernmost portion of the area is occupied by the Berkeley Pier (1927). The pier, constructed on concrete pilings, extends for approximately 0.5 miles into the bay. It has a concrete deck, wood railing, and has two concrete fish cleaning benches, regularly spaced concrete benches facing the bay, and lamp posts along the north side (Figure 10). The end of the pier is capped with a wood fence with vertical slats. There is an approximately 150 foot break at the end of the pier after which an abandoned portion of the pier continues westward for an additional 1.25 miles. The remnant portion of the pier is comprised of concrete pilings and cross bars. It no longer contains any deck structure (Figure 11). Since the pier was evaluated in 2007, the pier was closed to public access in July 2015 due to concerns over structural security. There are visible gaps in the pier's concrete deck, indicating increased instability. The eastern end of the pier has been enclosed by a chain link gate to close access to the public.

Figure 10 Berkeley Pier, View West



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Property Name: Berkeley Marina and C. Chavez Park

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**Figure 11 Abandoned Portion of Berkeley Pier, View West**



### Recent Changes

The Berkeley Marina has remained largely the same in recent years since it was recorded in 2007. As described above, the Berkeley Pier was closed to public access in 2015. Berth, docks, ramps, and other marina facilities and equipment have been routinely updated as part of regular maintenance.

### Historical Resources Evaluation

As discussed above, the Berkeley Marina and Cesar E. Chavez Park property was evaluated in 2007 by JRP Historical Consulting, LLC. The property was recommended ineligible for listing in the NRHP and CRHR under all criteria finding that “these resources do not embody direct significant associations with important trends, individuals, or developments in our history, at the local, state, or national level, nor are they important for their type, period, or method of construction. Neither resource has the potential to provide important information to history.” The evaluation asserts that the property has been the subject of ongoing and constant changes and does not retain integrity of design, materials, workmanship, setting, feeling, or association. The evaluation finding recommending the property ineligible for listing in the NRHP received concurrence from OHP in May 2008.

Since the property was evaluated in 2007, there have been no major alterations. As previously described, the Berkeley Pier was evaluated for the NRHP and CRHR in 2019 by Yarbrough Architectural Resources. That evaluation recommended the Berkeley Pier eligible under Criterion A/1 for its contributions to transportation development in the San Francisco Bay Area, with a period of significance of 1926 through 1936, beginning with the

## CONTINUATION SHEET

Property Name: Berkeley Marina and C. Chavez Park

Page 7 of 8

completion of the pier until the ferry service ended. The 2019 evaluation contends that the remaining portion of the pier retains sufficient integrity to convey its historic significance. The 2007 evaluation, however, correctly states that the extant portion of the pier is largely the result of a 1950s rehabilitation for recreation use related to the development of the Berkeley Marina and no longer remains sufficiently intact to retain integrity to convey its transportation-related history. Its current physical features no longer adequately relate to its early ferry and transportation history. There is no evidence or new information to suggest the property, inclusive of the Berkeley Pier, eligible for listing in the NRHP or CRHR. The property was not, however, evaluated for local eligibility.

The property, comprised of the Berkeley Marina and its associated features and buildings and Cesar E. Chavez Park, is recommended ineligible for listing as a City of Berkeley Landmark or Structure of Merit.

Through the area was first developed beginning in the mid-19th century to support industrial and commercial development of West Berkeley and featured piers and warehouse structures, the former Golden Gate Ferry Pier was not constructed until 1926, replacing an earlier pier structure. The initial development of the Berkeley Marina followed a few years later in 1935-1937 as part of Alameda County's SERA projects during the Depression. It incorporated the former Golden Gate Ferry Pier in 1937, after ferry service ended in 1936. In the following years, the eastern portion of the pier was buried by infill development and the western portion was abandoned in the bay. The central portion, retained for a recreational pier, was substantively rebuilt in the late 1950s and repaired again in the 1990s.

The Berkeley Marina was substantially updated following the end of World-War II. In the 1960s, more of the shoreline was filled and the Berkeley Marina was configured for more berths. Between 1968 and 1975 Berkeley Marina's associated buildings, including restaurants, club buildings, and service buildings were all constructed. As such, the property is not the first, last, only or most significant property of its type in the region. Though consistently used since the mid-19th century, it is typical of post-World War II marina development throughout the state during this period, which centered mostly on recreational and leisure uses.

It is also not a prototype or outstanding example of a period, styles, architectural movement or construction. Research for this study did not identify any architect or builder of note. It is not, therefore, an example of the more notable works or the best surviving work in a region of an architect, designer, or master builder. Located on the western edge of West Berkeley and serving the whole City and not associated with any one Berkeley neighborhood, it does not include architectural examples worth preserving for the exceptional values they add as part of a neighborhood fabric. The property is therefore not eligible for listing as Berkeley Landmark under Criterion 1 (Architectural Merit).

The property is not associated with the movement or evolution of any particular religious, cultural, governmental, or social developments of the City. The property is largely the result of mid-twentieth improvements, consistent with rapid development that occurred throughout the country in the years after World War II and does not represent a particularly significant or important economic development in the City. The property is therefore not eligible for listing as a Berkeley Landmark under Criterion 2 (Cultural Value).

Most of the buildings were constructed in the period from 1968 to 1975, with some later additions and improvements and all appear to be common examples of their building type and design. Research conducted for this study and existing scholarship does not suggest that any of the structures are worth preserving for their usefulness as an educational force. The property is therefore not eligible for listing as a Berkeley Landmark under Criterion 3 (Educational Value).

## CONTINUATION SHEET

Property Name: Berkeley Marina and C. Chavez Park

Page 8 of 8

The property does not embody or express the history of Berkeley, Alameda County, California, or the United States. Research for this study did not uncover evidence of any social, cultural, economic, political, religious, or military history associated with property's use or development. The property is therefore not eligible for listing as a Berkeley Landmark under Criterion 4 (Historic Value).

The property is not listed in the NRHP. It is therefore not eligible for listing as a Berkeley Landmark under Criterion 5.

Located on the western edge of West Berkeley, and comprised of mostly infill along the shoreline, the property is not part of a particular neighborhood. Additionally, it does not contribute to a block of street frontage as part of buildings which include landmarks. Furthermore, the Berkeley Marina and Cesar E. Chavez Park property is not contemporary with another designated landmark or an historic period or event of significance. There are no designated City of Berkeley Landmarks in its immediate vicinity and as detailed above it does not include any examples of good architectural design. Finally, the property does not have any structures that are significant to the city's history. The oldest component of the property is the Berkeley Pier. Though first constructed in 1927, most of the original pier structure has been covered with infill material or abandoned in the bay. The portion that extends from the western edge of the property was updated considerably in the late 1950s and represents history related to its use as a recreational facility, typical of its time, and not its early history as a transportation pier. The property is therefore not eligible for listing as a Berkeley Structure of Merit.

# Appendix E

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Supporting Noise Information

## Noise Measurement Data

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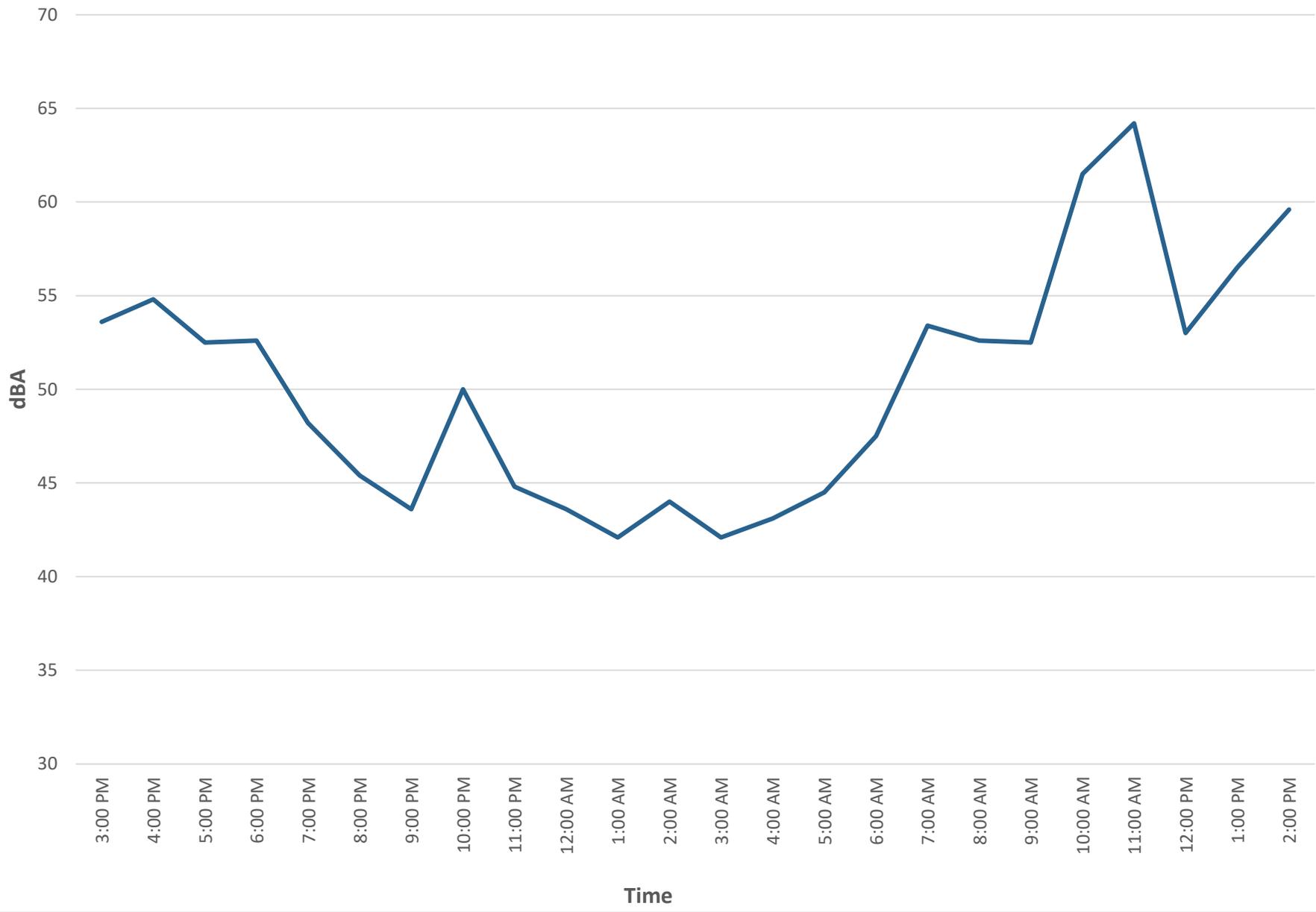
Number	Start Date	Start Time	End Time	Duration	Meas Mode	Input Range	Input Type	SPL Time Weight	LN% Freq Weight	Overload	Under Range	Sensitivity	LZeq	LCeq	LAeq	LZSmax	LCSmax	LASmax		
ST1	9/24/2024	10:23:19 AM	10:38:45 AM	0:15:26	Single	High	Mic	Slow	dBA	No	No	19.76mV/Pa	80.9	75.7	53.1	93.7	86.6	63.6		
ST2	10/24/2024	11:38:56 AM	11:54:05 AM	0:15:09	Single	High	Mic	Slow	dBA	No	Yes	19.31mV/Pa	73.5	67.7	48	81.5	75.5	63.4		
ST3	9/24/2024	11:46:12 AM	12:01:58 PM	0:15:46	Single	High	Mic	Slow	dBA	No	No	19.76mV/Pa	84.4	78.1	59	96.7	91.1	66.4		
ST4	10/24/2024	12:08:40 PM	12:23:42 PM	0:15:02	Single	High	Mic	Slow	dBA	No	No	19.31mV/Pa	65.8	62.6	51.6	75.9	68.9	62.9		
ST5	9/24/2024	12:37:51 PM	12:54:55 PM	0:17:04	Single	High	Mic	Slow	dBA	No	Yes	19.76mV/Pa	69.2	66.2	55.9	81.3	78.8	77.3		
ST6	9/24/2024	1:13:15 PM	1:29:58 PM	0:16:43	Single	High	Mic	Slow	dBA	No	No	19.76mV/Pa	76.9	71.7	62.6	92.4	87.1	85.2		
ST7	10/24/2024	12:31:36 PM	12:46:39 PM	0:15:03	Single	High	Mic	Slow	dBA	No	No	19.31mV/Pa	71.3	67.4	52.7	85.3	85	73.4		
Number	LZSmin	LCSmin	LASmin	LZE	LCE	LAE	LZpk	LCpk	LApk	LAS1%	LAS2%	LAS5%	LAS8%	LAS10%	LAS25%	LAS50%	LAS90%	LAS95%	LAS99%	
ST1	67.6	64.3	46.2	110.6	105.4	82.8	104.2	98.9	84.8	58	57.6	56.7	56	55.6	54.1	52.2	49	47.8	46.8	
ST2	64.7	60.9	42.7	103.1	97.3	77.6	97.8	98.3	95.8	56.8	54.9	51.9	50.5	49.8	47.8	46	43.9	43.5	43	
ST3	69.6	66.9	56	114.2	107.9	88.8	112.2	108.3	89.4	64.3	63.2	61.6	60.8	60.5	59.3	58.5	57.1	56.9	56.5	
ST4	63	60.2	47.1	95.4	92.2	81.2	91.9	85.8	82	59.8	58.7	56.4	55.2	54.5	50.9	49.5	48.3	48	47.6	
ST5	65.6	62.7	45	99.3	96.3	86	98.3	97.5	98.9	69.7	63.9	57.8	55.1	54	50.4	47.9	46.3	46	45.5	
ST6	65.5	62.5	49.1	106.9	101.7	92.6	109.2	108.6	107.5	75.2	71.1	64.9	58.9	57.8	55.2	53.3	50.9	50.3	49.6	
ST7	66.5	63.8	48.3	100.9	97	82.3	97	96.6	89.5	56.5	54.5	53	52.5	52.2	51.5	51	50.3	50	48.9	

### Long-Term Noise Measurement Results (LT1, September 24 – 25, 2024)

Sample Time	dBA $L_{eq}$	Sample Time	dBA $L_{eq}$	
<b>LT1, September 24–25, 2024</b>				
3:00 p.m.	54	3:00 a.m.	42	
4:00 p.m.	55	4:00 a.m.	43	
5:00 p.m.	53	5:00 a.m.	45	
6:00 p.m.	53	6:00 a.m.	48	
7:00 p.m.	48	7:00 a.m.	53	
8:00 p.m.	45	8:00 a.m.	53	
9:00 p.m.	44	9:00 a.m.	53	
10:00 p.m.	50	10:00 a.m.	62	
11:00 p.m.	45	11:00 a.m.	64	
12:00 a.m.	44	12:00 p.m.	53	
1:00 a.m.	42	1:00 p.m.	57	
2:00 a.m.	44	2:00 p.m.	60	
<b>24-hour Noise Level</b>				
			CNEL	56.1
			$L_{eq}$	55.0
			$L_{min}$	42.1
			$L_{max}$	64.2
			$L_{10}$	51.6
			$L_{50}$	47.9
			$L_{90}$	45.3

Source: Rincon Consultants, field measurements conducted on September 24–25, 2024, using ANSI Type II Integrating sound level meter.

### LT1 - September 24 - 25, 2024

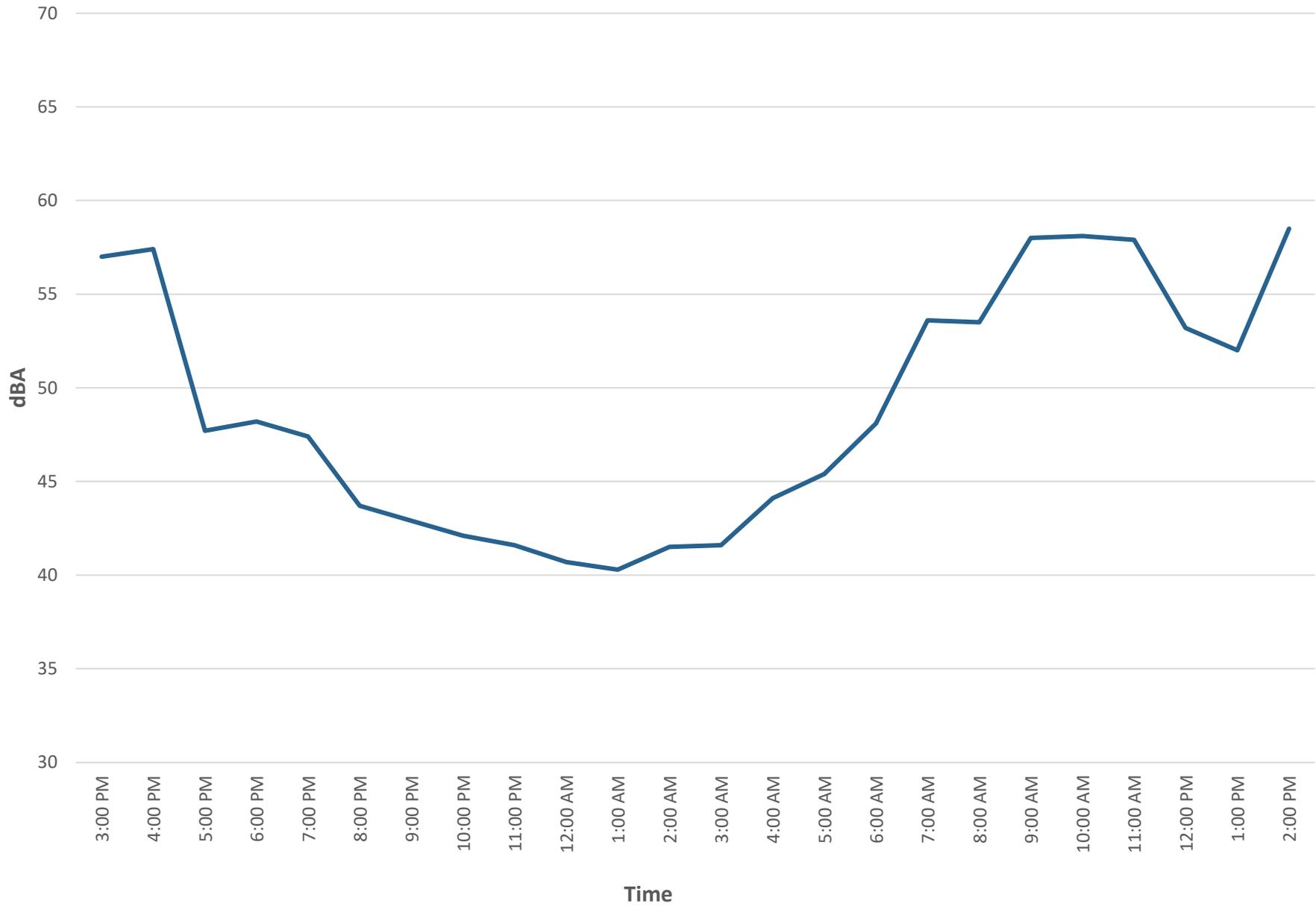


## Long-Term Noise Measurement Results (LT1, September 25 – 26, 2024)

Sample Time	dBA $L_{eq}$	Sample Time	dBA $L_{eq}$	
<b>LT1, September 25–26, 2024</b>				
3:00 p.m.	57	3:00 a.m.	42	
4:00 p.m.	57	4:00 a.m.	44	
5:00 p.m.	48	5:00 a.m.	45	
6:00 p.m.	48	6:00 a.m.	48	
7:00 p.m.	47	7:00 a.m.	54	
8:00 p.m.	44	8:00 a.m.	54	
9:00 p.m.	43	9:00 a.m.	58	
10:00 p.m.	42	10:00 a.m.	58	
11:00 p.m.	42	11:00 a.m.	58	
12:00 a.m.	41	12:00 p.m.	53	
1:00 a.m.	40	1:00 p.m.	52	
2:00 a.m.	42	2:00 p.m.	59	
<b>24-hour Noise Level</b>				
			CNEL	54.5
			$L_{eq}$	53.1
			$L_{min}$	40.3
			$L_{max}$	58.5
			$L_{10}$	51.0
			$L_{50}$	46.1
			$L_{90}$	44.1

Source: Rincon Consultants, field measurements conducted on September 25–26, 2024, using ANSI Type II Integrating sound level meter.

### LT1 - September 25 - 26, 2024

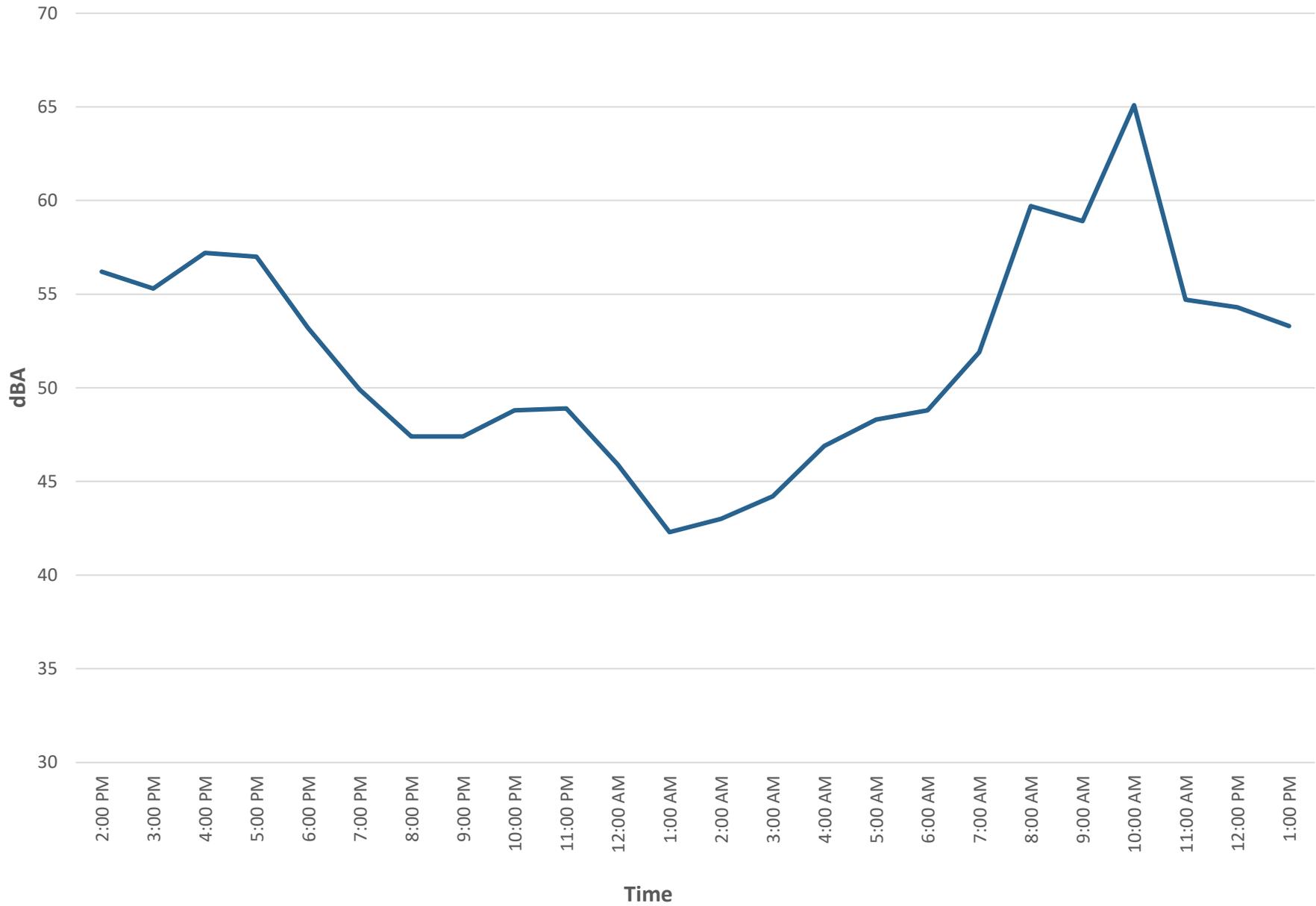


## Long-Term Noise Measurement Results (LT2, September 24 – 25, 2024)

Sample Time	dBA $L_{eq}$	Sample Time	dBA $L_{eq}$	
<b>LT2, September 24–25, 2024</b>				
2:00 p.m.	56	2:00 a.m.	43	
3:00 p.m.	55	3:00 a.m.	44	
4:00 p.m.	57	4:00 a.m.	47	
5:00 p.m.	57	5:00 a.m.	48	
6:00 p.m.	53	6:00 a.m.	49	
7:00 p.m.	50	7:00 a.m.	52	
8:00 p.m.	47	8:00 a.m.	60	
9:00 p.m.	47	9:00 a.m.	59	
10:00 p.m.	49	10:00 a.m.	65	
11:00 p.m.	49	11:00 a.m.	55	
12:00 a.m.	46	12:00 p.m.	54	
1:00 a.m.	42	1:00 p.m.	53	
<b>24-hour Noise Level</b>				
			CNEL	57.1
			$L_{eq}$	55.5
			$L_{min}$	42.3
			$L_{max}$	65.1
			$L_{10}$	53.5
			$L_{50}$	49.2
			$L_{90}$	46.2

Source: Rincon Consultants, field measurements conducted on September 24–25, 2024, using ANSI Type II Integrating sound level meter.

### LT2 - September 24 - 25, 2024

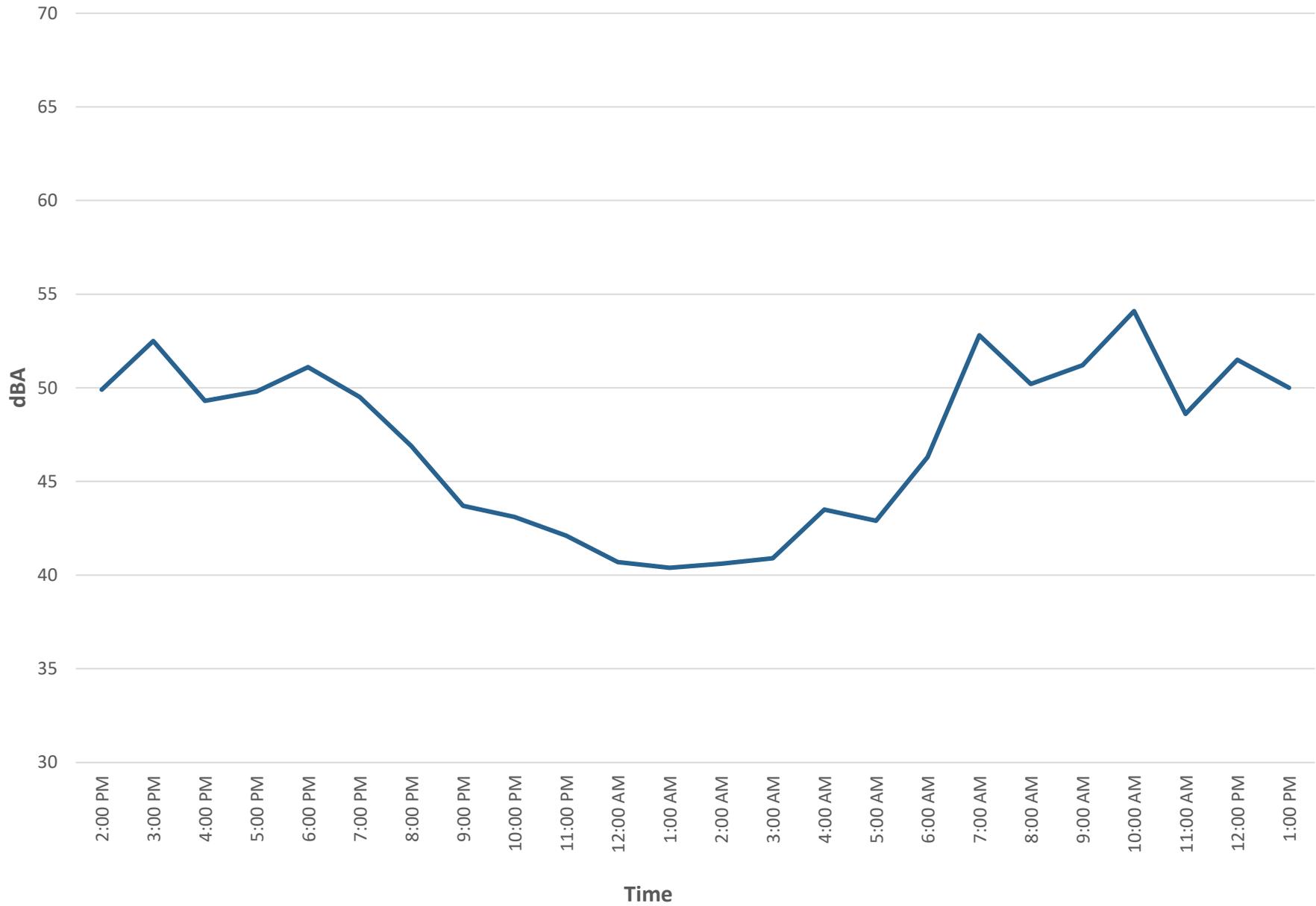


## Long-Term Noise Measurement Results (LT2, September 25 – 26, 2024)

Sample Time	dBA $L_{eq}$	Sample Time	dBA $L_{eq}$	
<b>LT2, September 25–26, 2024</b>				
2:00 p.m.	50	2:00 a.m.	41	
3:00 p.m.	53	3:00 a.m.	41	
4:00 p.m.	49	4:00 a.m.	44	
5:00 p.m.	50	5:00 a.m.	43	
6:00 p.m.	51	6:00 a.m.	46	
7:00 p.m.	50	7:00 a.m.	53	
8:00 p.m.	47	8:00 a.m.	50	
9:00 p.m.	44	9:00 a.m.	51	
10:00 p.m.	43	10:00 a.m.	54	
11:00 p.m.	42	11:00 a.m.	49	
12:00 a.m.	41	12:00 p.m.	52	
1:00 a.m.	40	1:00 p.m.	50	
<b>24-hour Noise Level</b>				
			CNEL	51.6
			$L_{eq}$	49.0
			$L_{min}$	40.4
			$L_{max}$	54.1
			$L_{10}$	48.4
			$L_{50}$	45.3
			$L_{90}$	43.5

Source: Rincon Consultants, field measurements conducted on September 25–26, 2024, using ANSI Type II Integrating sound level meter.

### LT2 - September 25 - 26, 2024

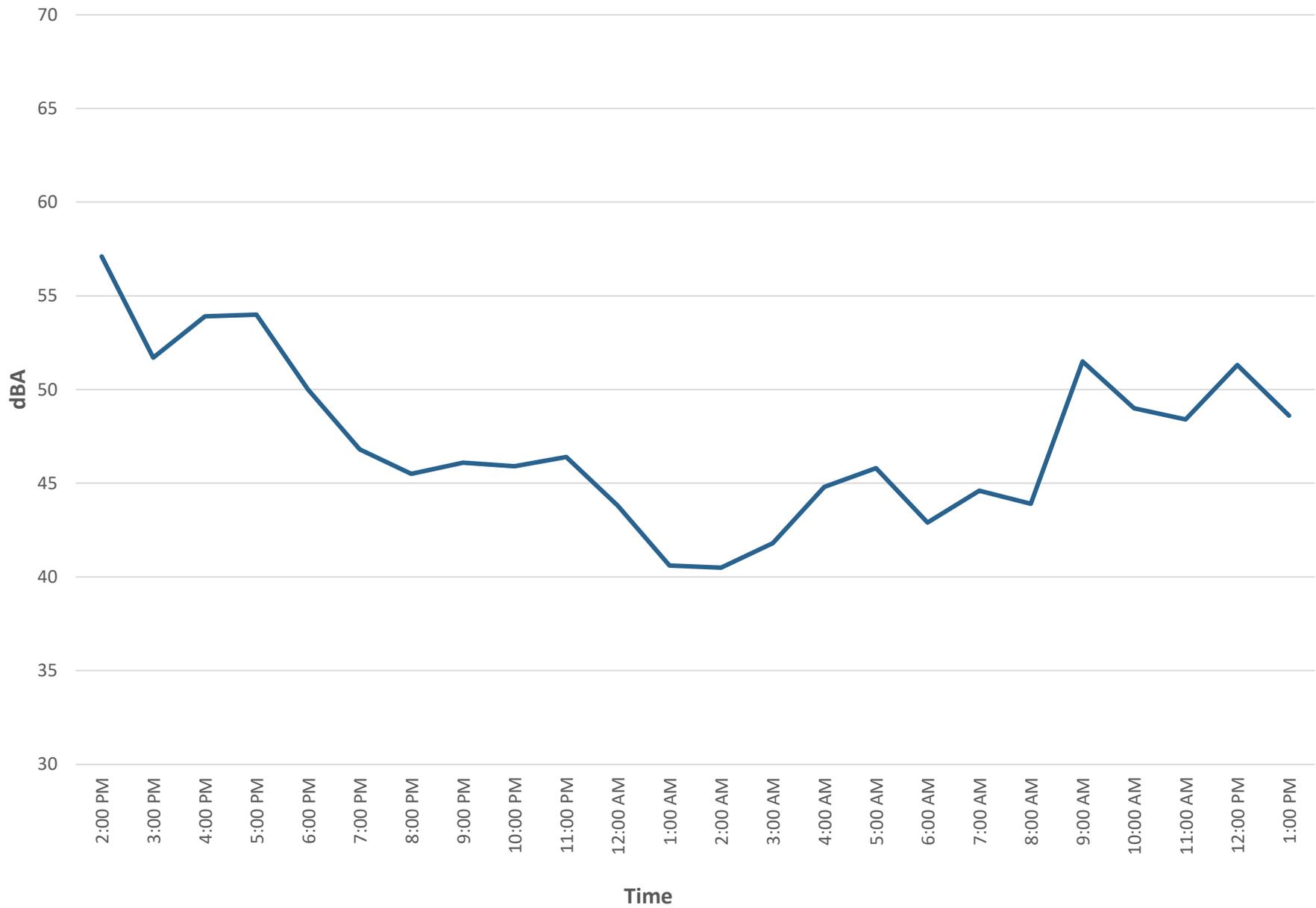


### Long-Term Noise Measurement Results (LT3, September 24 – 25, 2024)

Sample Time	dBA $L_{eq}$	Sample Time	dBA $L_{eq}$	
<b>LT3, September 24–25, 2024</b>				
2:00 p.m.	57	2:00 a.m.	41	
3:00 p.m.	52	3:00 a.m.	42	
4:00 p.m.	54	4:00 a.m.	45	
5:00 p.m.	54	5:00 a.m.	46	
6:00 p.m.	50	6:00 a.m.	43	
7:00 p.m.	47	7:00 a.m.	45	
8:00 p.m.	46	8:00 a.m.	44	
9:00 p.m.	46	9:00 a.m.	52	
10:00 p.m.	46	10:00 a.m.	49	
11:00 p.m.	46	11:00 a.m.	48	
12:00 a.m.	44	12:00 p.m.	51	
1:00 a.m.	41	1:00 p.m.	49	
<b>24-hour Noise Level</b>				
			CNEL	52.4
			$L_{eq}$	49.6
			$L_{min}$	40.5
			$L_{max}$	57.1
			$L_{10}$	48.9
			$L_{50}$	45.3
			$L_{90}$	43.0

Source: Rincon Consultants, field measurements conducted on September 24–25, 2024, using ANSI Type II Integrating sound level meter.

### LT3 - September 24 - 25, 2024

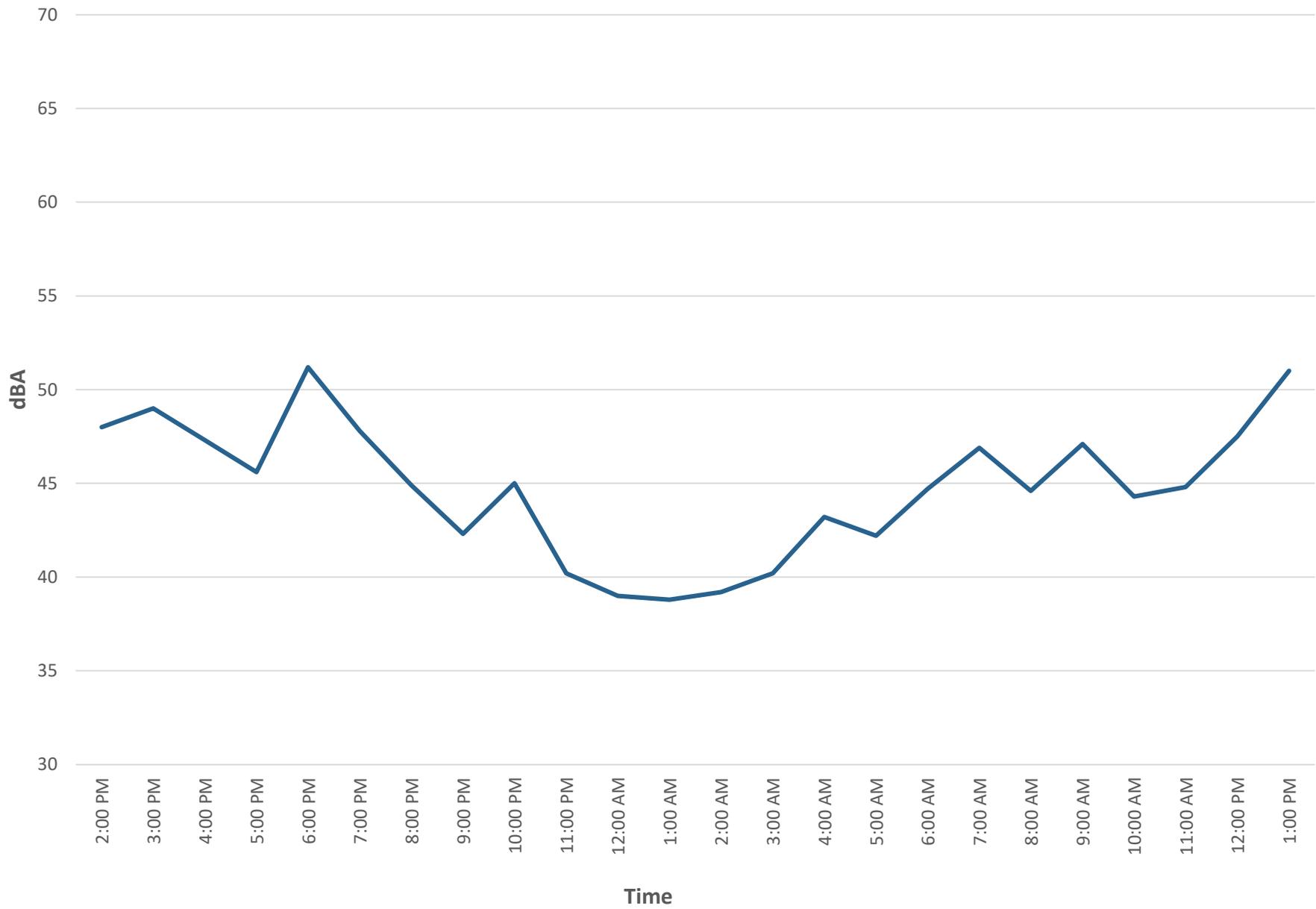


### Long-Term Noise Measurement Results (LT3, September 25 – 26, 2024)

Sample Time	dBA $L_{eq}$	Sample Time	dBA $L_{eq}$	
<b>LT3, September 25–26, 2024</b>				
2:00 p.m.	48	2:00 a.m.	39	
3:00 p.m.	49	3:00 a.m.	40	
4:00 p.m.	47	4:00 a.m.	43	
5:00 p.m.	46	5:00 a.m.	42	
6:00 p.m.	51	6:00 a.m.	45	
7:00 p.m.	48	7:00 a.m.	47	
8:00 p.m.	45	8:00 a.m.	45	
9:00 p.m.	42	9:00 a.m.	47	
10:00 p.m.	45	10:00 a.m.	44	
11:00 p.m.	40	11:00 a.m.	45	
12:00 a.m.	39	12:00 p.m.	48	
1:00 a.m.	39	1:00 p.m.	51	
<b>24-hour Noise Level</b>				
			CNEL	49.5
			$L_{eq}$	46.1
			$L_{min}$	38.8
			$L_{max}$	51.2
			$L_{10}$	46.1
			$L_{50}$	43.0
			$L_{90}$	41.2

Source: Rincon Consultants, field measurements conducted on September 25–26, 2024, using ANSI Type II Integrating sound level meter.

### LT3 - September 25 - 26, 2024



# Equipment Manufacturer Specifications



## PRODUCT SELECTION DATA

### WATER-COOLED AND CONDENSERLESS LIQUID CHILLERS WATER-SOURCED HEAT PUMPS



30WG optimized for cooling  
61WG optimized for heating  
Compact design  
Plug and play approach  
High efficiency

## 61WG/30WG/30WGA-A

**AQUASNAP**

**AQUASNAP**  
Heating

Nominal cooling capacity 25-190 kW  
Nominal heating capacity 29-230 kW

The 30WG/30WGA and 61WG units are new Carrier chillers and heat pumps designed for commercial (offices, small hotels, leisure facilities), residential and industrial applications. All units offer a unique combination of high performance and functionality in an exceptionally compact chassis.

61WG units are designed for high-temperature heating applications with hot water production possible up to 65 °C.

The 30WG, also available as a condenserless version (30WGA), is designed for air-conditioning applications with a high SEER value. As they can produce chilled water down to -12 °C they are also suitable for process applications.

A large number of options is available for the whole range:

- hydraulic modules with or without variable water flow rate,
- reinforced sound insulation,
- stacking and connection of two units
- low-temperature applications down to -12 °C (30WG only).



CARRIER participates in the ECP programme for LCP/HP  
Check ongoing validity of certificate:  
[www.eurovent-certification.com](http://www.eurovent-certification.com)

## CUSTOMER BENEFITS

### Features

- Reduced footprint
- Scroll compressors and R-410A refrigerant
- Variable-flow pump
- Low-noise option (-3 dB(A))
- Stacking of two units for increased capacity (up to size 090)
- Several communication protocols available: JBus, BacNet, MS/TP, LON
- Water connection at the top or rear (30WG/61WG only)

### Available versions

#### 61WG - optimised for heating

- High temperature up to +65 °C
- Evaporator temperature down to -5 °C
- Control of the three-way diverter valve for domestic hot water and space heating requirements
- System approach - the Heating System Manager maximises the global efficiency of complex systems where the 61WG units are combined with an auxiliary heating source to serve multi-zone space heating and domestic hot water production.

#### 30WG - optimised for air conditioning and process Heating & Cooling

- Evaporator temperature down to -12 °C
- Condenser temperature up to +60 °C
- Condensing pressure control devices available

#### 30WGA - optimised for air conditioning

- Continuous operation up to 62 °C saturated condensing temperature
- Compatible remote condensers available
- Optimised remote condenser fan control

### The right unit for any application

- The high temperature of the 61WG units makes them compatible with most heating systems, both in new and refurbished buildings and permits domestic hot water production (with a dedicated temperature setpoint).
- Option 153 "Built-in DHW and space heating control" allows control of both domestic hot water and space heating requirements:
  - Domestic hot water production: a built-in three-way valve is directed to divert the heat flow from the space heating loop to the domestic hot water loop and vice versa.
  - Space heating control: the setpoint is adjustable, based on the daily schedule or the outside air temperature (weather compensation function).
  - Control of auxiliary systems: if an alarm is detected at the 61WG/30WG or if there is insufficient heating capacity, a digital signal starts an auxiliary electric heater (1 to 4 stages) or boiler.
  - Pump control: allows control of the built-in pump as well as the pump in the secondary loop (to terminals).
- In 30WG units the pressure control signal ensures safe unit operation and maximised performance at low source-side water temperatures.

- The condenserless 30WGA units are ideal for refurbishment projects where a remote condenser exists on site, and for all projects without geothermal/natural sinks for heat rejection.
- In 61WG/30WG units the Heating System Manager (HSM) accessory allows control of systems with several heat sources and different additional systems: electric heat, boiler or for the most complex systems district heating (see pages 9 to 11).

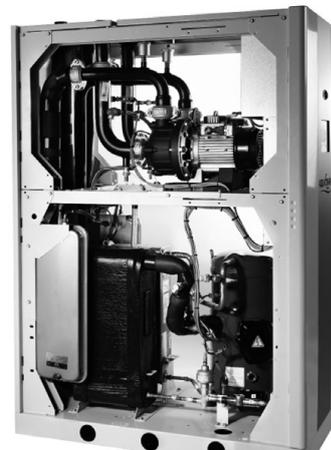
### Adaptability and simple installation

- The 30WG and 61WG units can be provided with several hydraulic module options, both on the evaporator and/or condenser side, with different levels of available pressure and variable or fixed-speed pumps (see page 7).
- If option 153 is selected domestic hot water production is controlled via a built-in three-way diverter valve (not supplied).
- 61WG and 30WG units offer water-side cooling/heating reversibility.
- Remote condenser fan control possible for 30WGA units.

### Water connections at the rear of the unit



### Internal view of 61WG unit with hydraulic module



## CUSTOMER BENEFITS

**Internal view of 30WG 170**



**Component accessibility**

See photos below.

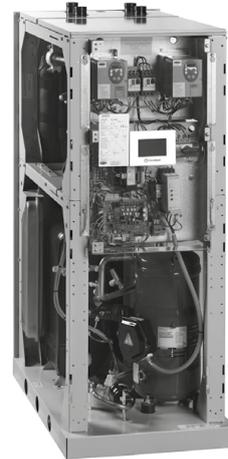
**Access to scroll compressors**



**Water connections at the top of the unit**



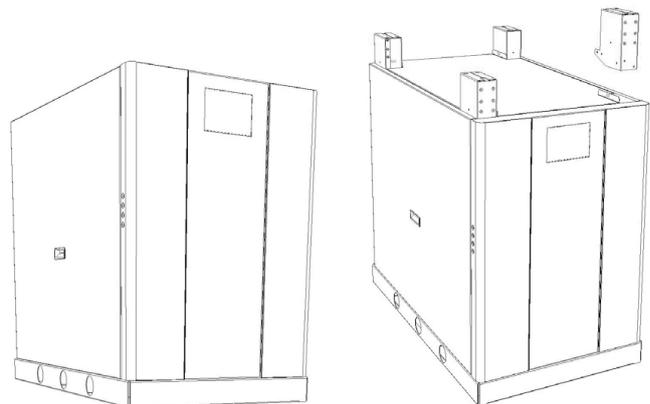
**Access to control panel**



### **A compact high-performance product range**

- Small footprint, ideal for refurbished buildings, allows access in very tight plant rooms.
- 61WG: High SCOP satisfies even the most stringent standards, with a leaving water temperature of up to 65 °C without supplementary system.
- 30WG: High SEER and SEPR
- Units optimized for process and comfort applications.
- The 30WGA is based on the 30WG design to ensure efficient operation for applications with remote air-cooled condensers.
- Variable-flow pumps reduce system energy consumption.
- The entire range offers low sound levels, allowing installation in any building type. The low-noise option ensures enhanced acoustic comfort (-3 dB(A)).
- 61WG/30WG/30WGA units are equipped with the latest generation R410A scroll compressor, optimised for typical operating conditions for water-sourced units.

### **Two-unit stacking option for reduced footprint size 020-090**



## CUSTOMER BENEFITS

### SmartVu™ control

The SmartVu™ control combines intelligence with operating simplicity. The control constantly monitors all machine parameters and precisely manages the operation of compressors, expansion devices, fans and the evaporator water pump for optimum energy efficiency.

The SmartVu™ control features advanced communication technology over Ethernet (IP) and a user-friendly and intuitive user interface with 4.3-inch colour touch screen.

- Energy management configuration
  - Internal timer: controls chiller on/off times and operation at a second setpoint
  - Setpoint offset based on the outdoor air temperature
  - Master/slave control of two chillers operating in parallel with runtime balancing and automatic changeover in case of a unit fault.
  - Innovative smart energy monitoring, providing users with smart data such as real-time electrical energy consumption and cooling capacity, and instantaneous and average energy efficiency values.
  - For further energy savings, the AquaSnap® can be monitored remotely by Carrier experts for energy consumption diagnosis and optimisation.
- Integrated features
  - Night mode: Capacity and fan speed limitation for reduced noise level
  - With hydraulic module: Water pressure display and water flow rate calculation.
- Advanced communication features
  - Easy and high-speed communication technology over Ethernet (IP) to a centralised building management system
  - Access to multiple unit parameters.
- Maintenance functions
  - F-Gas regulation leak check reminder alert
  - Maintenance alert can be configured to days, months or hours of operation
  - Display of trend curves for the main values
  - Management of a fault memory allowing a log of the last 50 incidents to be accessed, with operating readings taken when the fault occurs
  - Blackbox memory

### ■ 4"3 SmartVu™ user interface



- Intuitive and user-friendly 4"3 inch touch screen interface
- Concise and clear information is available in local languages
- Complete menu, customised for different users (end user, service personnel or Carrier engineers).

### Remote management (standard)

Units with SmartVu™ control can be easily accessed from the internet, using a PC with an Ethernet connection. This makes remote control quick and easy and offers significant advantages for service operations.

The AquaSnap® is equipped with an RS485 serial port that offers multiple remote control, monitoring and diagnostic possibilities. Carrier offers a vast choice of control products, specially designed to control, manage and supervise the operation of an air conditioning system. Please consult your Carrier representative for more information.

The AquaSnap® also communicates with other centralised building management systems via optional communication gateways.

A connection terminal allows the AquaSnap® unit to be remotely controlled by wire:

- Start/stop: Opening of this contact will shut down the unit
- Dual setpoint: closing of this contact activates a second setpoint (e.g.: unoccupied mode).
- Demand limit: Closing of this contact limits the maximum chiller capacity to a predefined value.
- Operation indication: This volt-free contact indicates that the chiller is operating (cooling load).
- Alarm indication: this volt-free contact indicates the presence of a major fault that has led to the shut-down of one or several refrigerant circuits.

# CUSTOMER BENEFITS

## 30WG/30WGA units compatible the Carrier 09 series drycoolers/remote condensers

The Carrier 09 series drycoolers and remote condensers are compatible with the 30WG and 30WGA units.

The chiller 30WG/30WGA can control the fans of the dry cooler / remote condenser via digital or analogue outputs (according to AC or EC motors) with following options :

- For chiller 30WG/30WGA : option 154
- For dry cooler / remote condenser : dedicated control cabinet with an auxiliary board.

A simple communication bus is required between the chiller and the dry cooler/ remote condenser.

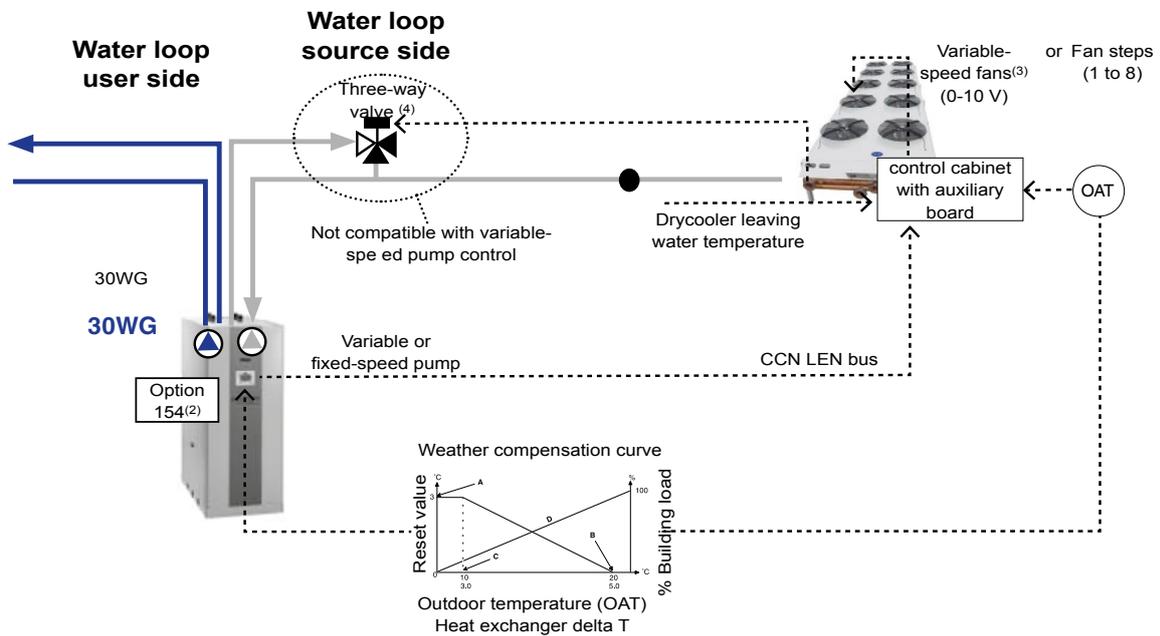
As all control components are installed and tested in the factory, installation and start-up of the unit and its associated drycooler/ remote condenser are simplified.

Control board algorithms optimise energy consumption based on:

- the chilled-water temperature and chilled-water temperature read for drycoolers
- the outside temperature and saturated refrigerant discharge temperature read for remote condensers.

A simple communication bus is required downstream to connect the control board to the unit control.

### 30WG system concept

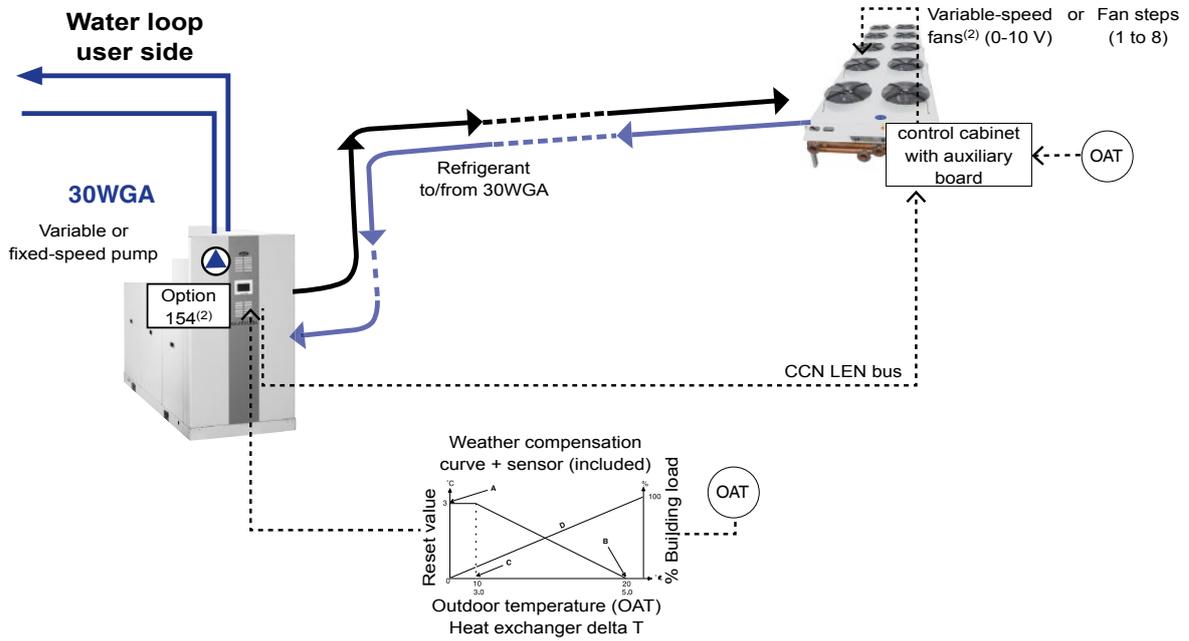


#### Legend

- CCN** Carrier Comfort Network
- LEN** Local equipment network
- OAT** Outside air temperature
- (1) Control board option on 09PE dedicated to 30WG
- (2) Option 154 for connection and communication with 09PE Drycooler
- (3) For correct operation of the unit below 0 °C variable speed fans are required.
- (4) Three-Way valve or two two-way valves optional on 09PE

# CUSTOMER BENEFITS

## 30WGA system concept



### Legend

- CCN** Carrier Comfort Network
- LEN** Local equipment network
- OAT** Outside air temperature
- (1) Control board option on 09PE dedicated to 30WG
- (2) Option 154 for connection and communication with 09PE Drycooler
- (3) For correct operation of the unit below 0 °C variable-speed fans are required.

## OPTIONS

Options	No.	Description	Advantages	Use
Medium-temperature brine solution	5B	Low temperature chilled water production down to 0°C with ethylene glycol and propylene glycol.	Covers specific applications such as ice storage and industrial processes	30WGA 020-190
Low-temperature brine solution	6B	Low temperature glycol solution production down to -12 °C with ethylene glycol	Covers specific applications such as ice storage and industrial processes	30WG 020-190
Soft Starter	25	Electronic starter on each compressor	Reduced start-up current	30WG 020-190 61WG 020-190 30WGA 020-190
Master/slave operation	58	Unit equipped with supplementary water outlet temperature sensor kit to be field-installed allowing master/slave operation of two units connected in parallel	Optimised operation of two units connected in parrallele operation with operating time equalisation	30WG 020-190 61WG 020-190 30WGA 020-190
External disconnect handle	70F	The handle of the electrical disconnect switch is on the outside of the unit	Quick access to the unit disconnect switch	30WG 020-190 61WG 020-190 30WGA 020-190
Evap. single pump power/control circuit	84	Unit equipped with an electrical power and control circuit for one pump evaporator side	Quick and easy installation: the control of fixed speed pumps is embedded in the unit control	30WG 110-190 61WG 110-190
Cond. single pump power/control circuit	84R	Unit equipped with an electrical power and control circuit for one pump condenser side	Quick and easy installation: the control of fixed speed pumps is embedded in the unit control	30WG 110-190 61WG 110-190
Condenser insulation	86	Thermal condenser insulation	Minimizes thermal dispersions condenser side (key option for heat pump or heat recovery applications) and allows compliancy with special installation criteria (hot parts insulated)	30WG 020-190 61WG 020-190
HP single-pump hydraulic module	116R	Single high-pressure water pump, water filter, electronic water flow control, pressure transducers. For more details, refer to the dedicated chapter (expansion tank not included.Option with built-in safety hydraulic components available.)	Easy and fast installation (plug & play)	30WG 110-190 61WG 110-190 30WGA 110-190
LP evap. single-pump	116T	Evaporator hydraulic module equipped with low pressure fixed-speed pump, drain valve, air vent and pressure sensors. For more details, refer to the dedicated chapter (expansion tank not included.Option with built-in safety hydraulic components available.)	Easy and fast installation (plug & play)	30WG 020-190 61WG 020-190 30WGA 020-190
HP evap. variable-speed single-pump	116V	Evaporator hydraulic module equipped with high-pressure variable-speed pump, drain valve, air vent and pressure sensors. For more details, refer to the dedicated chapter (expansion tank not included.Option with built-in safety hydraulic components available.)	Easy and fast installation (plug & play), significant pumping energy cost savings (more than two-thirds), tighter water flow control, improved sytem reliability	30WG 020-190 61WG 020-190 30WGA 020-190
HP VSD dual-pump hydraulic mod.	116W	Dual high-pressure water pump with variable speed drive (VSD), pressure transducers. Multiple possibilities of water flow control. For more details, refer to the dedicated chapter (expansion tank not included Option with built-in safety hydraulic components available)	Easy and fast installation (plug & play), significant pumping energy cost savings (more than two-thirds), tighter water flow control, improved sytem reliability	30WG 110-190 61WG 110-190 30WGA 110-190
LP VSD single-pump	116Y	Evaporator hydraulic module equipped with low -pressure variable-speed pump, drain valve, air vent and pressure sensors. For more details, refer to the dedicated chapter (expansion tank not included.Option with built-in safety hydraulic components available.)	Easy and fast installation (plug & play), significant pumping energy cost savings (more than two-thirds), tighter water flow control, improved sytem reliability	30WG 110-190 61WG 110-190 30WGA 110-190
Lon gateway	148D	Two-directional communication board complying with Lon Talk protocol	Connects the unit by communication bus to a building management system	30WG 020-190 61WG 020-190 30WGA 020-190
Bacnet over IP	149	Two-directional high-speed communication using BACnet protocol over Ethernet network (IP)	Easy and high-speed connection by ethernet line to a building management system. Allows access to multiple unit parameters	30WG 20-190 61WG 020-190 30WGA 020-190
Modbus over IP and RS485	149B	Bi-directional high-speed communication using Modbus protocol over Ethernet network (IP)	Easy and high-speed connection by ethernet line to a building management system. Allows access to multiple unit parameters	30WG 020-190 61WG 020-190 30WGA 020-190

## OPTIONS

Options	No.	Description	Advantages	Use
Built-in DHW & space heating control	153	Control board factory-installed on the unit, control using weather compensation, control of supplementary electric heater (4 stages) or boiler, needle valve for domestic hot-water production with programmable time schedule.	Permits easy control of a basic heating system	30WG 020-190 61WG 020-090
Specific dry cooler control	154	Dedicated connection and software for 09PE drycooler management. For 09PE drycooler need to select the option control cabinet manage by the chiller	Permits the use of an energy-efficient plug-and-play system	30WG 020-190
Condenser control	154	Control box for communication with the condenser via a bus. For OPERA condenser need to select the cabinet with option control cabinet manage by the chiller Connect' Touch control	Permits the use of an energy-efficient plug-and-play system	30WGA 020-190
Compliance with Russian regulations	199	EAC certification	Conformance with Russian regulations	30WG 020-190 61WG 020-190 30WGA 020-190
Insulation of the evap. in/out ref.lines	256	Thermal insulation of the evaporator entering/leaving refrigerant lines with flexible, anti-UV insulant	Prevents condensation on the evaporator entering/leaving refrigerant lines	30WG 020-190 61WG 020-190 30WGA 020-190
Low noise level	257	Compressor sound enclosure	Reduced sound emissions	30WG 020-190 61WG 020-190 30WGA 020-190
Very low sound level	258	Enhanced sound insulation of main noise sources (Material classified CD0S2 fire class according to Euroclass 13-501).	6 dB(A) quieter than standard . Refer to the physical data table for detailed values	30WG 020-090 61WG 020-090 30WGA 020-090
Evaporator screw connection sleeves kit	264	Evaporator inlet/outlet screw connection sleeves	Allows unit connection to a screw connector	30WG 020-140 61WG 020-140 30WGA 020-140
Condenser screw connection sleeves kit	265	Condenser inlet/outlet screw connection sleeves	Allows unit connection to a screw connector	30WG 020-140 61WG 020-140
Welded evaporator connection kit	266	Victaulic piping connections with welded joints	Easy installation	30WG 020-190 61WG 020-190 30WGA 020-190
Welded condenser water connection kit	267	Victaulic piping connections with welded joints	Easy installation	30WG 020-190 61WG 020-190
HP single-pump, cond. side	270R	Condenser hydraulic module equipped with high pressure fixed-speed pump, drain valve, air vent and pressure sensors. Built-in safety hydraulic components available in option.	Easy and fast installation (plug & play)	30WG 110-190 61WG 110-190
LP single-pump, cond. side	270T	Condenser hydraulic module equipped with low pressure fixed-speed pump, drain valve, air vent and pressure sensors. Built-in safety hydraulic components available in option.	Easy and fast installation (plug & play)	30WG 020-190 61WG 020-190
HP cond. variable-speed single-pump	270V	Condenser hydraulic module equipped with high-pressure variable-speed pump, drain valve, air vent and pressure sensors. (expansion tank not included) Built-in safety hydraulic components available in option.	Easy and fast installation (plug & play), reduced power consumption of the water circulation pump	30WG 020-190 61WG 020-190
HP cond. variable-speed dual-pump	270W	Condenser hydraulic module equipped with dual high-pressure variable-speed pump, drain valve, air vent and pressure sensors. (expansion tank not included) Built-in safety hydraulic components available in option.	Easy and fast installation (plug & play), reduced power consumption of the water circulation pump	30WG 110-190 61WG 110-190
LP cond. variable-speed single-pump	270Y	Condenser hydraulic module equipped with low-pressure variable-speed pump, drain valve, air vent and pressure sensors. (expansion tank not included) Built-in safety hydraulic components available in option.	Easy and fast installation (plug & play), reduced power consumption of the water circulation pump	30WG 110-190 61WG 110-190
High-temp. water prod. with glycol solution on the evap.	272	Condenser side water production up to 65 °C, with glycol solution on the evaporator side to -5 °C	Geothermal application and domestic hot-water production	61WG 020-190
Unit stackable for operation	273	Unit stackable for operation	Reduced footprint size	30WG 020-090 61WG 020-090 30WGA 020-090

## OPTIONS

Options	No.	Description	Advantages	Use
water connection at the top	274	Customer water connection at the top of the unit	Reduced footprint size	30WG 020-190 61WG 020-190 30WGA 020-190
Replaceable filter drier	277	Filter drier with cartridge to replace hermetic filter	Easy filter replacement without emptying the refrigerant circuit	30WGA 020-190
Safety hydraulic components, evap. side	293	Screen filter, expansion tank and relief valve integrated in the evaporator hydraulic module	Easy and fast installation (plug & play), operating safety	30WG 020-190 61WG 020-190 30WGA 020-190
Safety hydraulic components, cond. side	293A	Screen filter, expansion tank and relief valve integrated in the condenser hydraulic module	Easy and fast installation (plug & play), operating safety	30WG 020-190 61WG 020-190
Set point adjustment by 4-20mA signal	311	Connections to allow a 4-20mA signal input	Easy energy management, allow to adjust set point by a 4-20mA external signal	30WG 020-190 61WG 020-190 30WGA 020-190
External temperature sensor	312	External temperature sensor control for using weather compensation	Allow to adjust set point using weather compensation and define autorisation operation mode to external temperature	30WG 020-190 61WG 020-190 30WGA 020-190
Free Cooling dry cooler management	313	Control & connections to a Free Cooling Drycooler 09PE or 09VE fitted with option FC control box	Easy system management, Extended control capabilities to a drycooler used in Free Cooling mode	30WG 020-190 30WGA 020-190

# PHYSICAL DATA, 30WG UNITS , SIZES 020 TO 090

30WG	020	025	030	035	040	045	050	060	070	080	090
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## Heating

<b>Standard unit Full load performances*</b>	HW1	Nominal capacity	kW	30	35	38	44	50	56	70	77	89	101	114
		COP	kW/kW	5,53	5,53	5,49	5,52	5,49	5,51	5,58	5,48	5,53	5,46	5,50
	HW2	Nominal capacity	kW	29	33	36	43	49	54	68	74	85	97	108
		COP	kW/kW	4,34	4,37	4,35	4,36	4,40	4,35	4,39	4,35	4,32	4,40	4,32
	HW3	Nominal capacity	kW	28	33	35	41	47	52	65	73	81	93	103
		COP	kW/kW	3,59	3,63	3,61	3,60	3,67	3,61	3,58	3,62	3,54	3,70	3,56
<b>Standard unit Seasonal energy efficiency**</b>	HW1	SCOP <sub>30/35°C</sub>	kW/kW	5,46	5,45	5,36	5,40	5,35	5,38	6,12	6,08	6,09	6,11	6,09
		η <sub>s heat</sub> <sub>30/35°C</sub>	%	211	210	206	208	206	207	237	235	235	236	235
	HW3	<b>SCOP<sub>47/55°C</sub></b>	<b>kW/kW</b>	<b>4,36</b>	<b>4,37</b>	<b>4,34</b>	<b>4,37</b>	<b>4,40</b>	<b>4,34</b>	<b>4,91</b>	<b>4,96</b>	<b>4,85</b>	<b>5,08</b>	<b>4,91</b>
		<b>η<sub>s heat</sub><sub>47/55°C</sub></b>	<b>%</b>	<b>167</b>	<b>167</b>	<b>166</b>	<b>167</b>	<b>168</b>	<b>166</b>	<b>188</b>	<b>190</b>	<b>186</b>	<b>195</b>	<b>188</b>
		P <sub>rated</sub>	kW	32	37	40	47	54	59	75	83	93	106	118
		Energy labelling		A++	A++	A++	A++	A++	A++	-	-	-	-	-

## Cooling

<b>Standard unit Full load performances*</b>	CW1	Nominal capacity	kW	25	29	32	37	42	47	58	63	74	84	95
		EER	kW/kW	4,72	4,72	4,69	4,73	4,69	4,72	4,72	4,65	4,69	4,65	4,68
		Eurovent class		B	B	B	B	B	B	B	B	B	B	B
	CW2	Nominal capacity	kW	34	39	43	50	57	66	79	86	102	113	129
		EER	kW/kW	6,42	6,10	6,03	6,04	5,90	6,06	6,12	5,95	6,19	5,93	6,13
		Eurovent class		A	A	A	A	A	A	A	A	A	A	A
<b>Standard unit Seasonal energy efficiency**</b>	SEER <sub>12/7°C</sub> Comfort low temp.		kW/kW	4,94	4,94	4,83	4,87	4,85	4,88	5,70	5,62	5,58	5,72	5,68
	SEPR <sub>12/7°C</sub> Process high temp.		kW/kW	6,42	6,44	6,26	6,22	6,26	6,31	6,63	6,50	6,48	6,59	6,62
<b>Unit with option 6B Seasonal energy efficiency**</b>	SEPR <sub>2/-8°C</sub> Process medium temp.***		kWh/kWh	3,92	4,26	4,43	4,34	4,47	4,01	4,12	4,73	4,55	4,78	4,76
<b>Integrated part load value</b>	IPLV.SI		kW/kW	5,840	5,850	5,760	5,780	5,770	5,820	6,580	6,680	6,560	6,810	6,720
<b>Operating weight<sup>(1)</sup></b>			kg	191	200	200	207	212	220	386	392	403	413	441
<b>Operating weight with option 258<sup>(1)</sup></b>			kg	198	207	207	214	219	227	399	405	416	426	454
<b>Sound levels<sup>(2)</sup></b>														
Sound power level, standard unit			dB(A)	67	68	69	69	70	70	72	72	72	73	73
Sound power level, option 257			dB(A)	65	66	66	67	68	68	68	69	69	69	70
Sound power level, option 258			dB(A)	61	62	63	63	64	64	66	66	66	67	67
Sound power level, option 257 + 258			dB(A)	60	62	62	62	64	63	65	65	65	66	66
<b>Dimensions, standard unit<sup>(3)</sup></b>														
Width			mm	600	600	600	600	600	600	880	880	880	880	880
Length			mm	1044	1044	1044	1044	1044	1044	1474	1474	1474	1474	1474
Height			mm	901	901	901	901	901	901	901	901	901	901	901

\* In accordance with standard EN14511-3:2013

\*\* In accordance with standard EN14825:2016, average climate

\*\*\* With EG 30%

HW1 Heating mode conditions: Evaporator entering/leaving water temperature 10°C/7°C, condenser entering/leaving water temperature 30°C/35°C, evaporator and condenser fouling factor 0 m2. kW

HW2 Heating mode conditions: Evaporator entering/leaving water temperature 10°C/7°C, condenser entering/leaving water temperature 40°C/45°C, evaporator and condenser fouling factor 0 m2. kW

HW3 Heating mode conditions: Evaporator entering/leaving water temperature 10°C/7°C, condenser entering/leaving water temperature 47°C/55°C, evaporator and condenser fouling factor 0 m2. kW

CW1 Cooling mode conditions: Evaporator water entering/leaving temperature 12°C/7°C, condenser entering/leaving water temperature 30°C/35°C, evaporator and condenser fouling factor 0 m2.K/W

CW2 Cooling mode conditions: Evaporator water entering/leaving temperature 23°C/18°C, condenser entering/leaving water temperature 30°C/35°C, evaporator and condenser fouling factor 0 m2.K/W

η<sub>s heat</sub><sub>30/35°C</sub> & SCOP<sub>30/35°C</sub> Values calculated in accordance with EN14825:2016

**η<sub>s heat</sub><sub>47/55°C</sub> & SCOP<sub>47/55°C</sub> Bold values compliant to Ecodesign regulation: (EU) No 813/2013 for Heat Pump application**

SEER<sub>12/7°C</sub> & SEPR<sub>12/7°C</sub> Values calculated in accordance with EN14825:2016

SEPR<sub>2/-8°C</sub> Values calculated in accordance with EN14825:2016

- Not applicable

IPLV.SI Calculations according to standard performances AHRI 551-591 (SI)

(1) Weight shown is a guideline only. Please refer to the unit nameplate

(2) In dB ref=10<sup>-12</sup> W, (A) weighting. Declared dualnumber noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). Measured in accordance with ISO 9614-1.

(3) The dimensions shown are for the standard unit. For other unit types please refer to the dimensional drawings.



Eurovent certified values

## PHYSICAL DATA, 30WG UNITS , SIZES 020 TO 090

30WG	020	025	030	035	040	045	050	060	070	080	090	
<b>Compressors</b>	Hermetic scroll 48.3 r/s											
Quantity	1	1	1	1	1	1	2	2	2	2	2	
Number of capacity stages	1	1	1	1	1	1	2	2	2	2	2	
Minimum capacity	%	100	100	100	100	100	50	50	50	50	50	
<b>Refrigerant<sup>(1)</sup></b>	R410A (GWP=2088 Following ARI4)											
Charge, standard unit	kg	3,5	3,5	3,6	3,7	4,0	4,6	7,6	7,8	7,9	8,7	11,5
	teqCO <sub>2</sub>	7,2	7,3	7,4	7,6	8,2	9,5	15,9	16,3	16,5	18,2	24
<b>Capacity control</b>	SmartVu™											
<b>Evaporator</b>	Direct-expansion plate heat exchanger											
Water volume	l	3,3	3,6	3,6	4,2	4,6	5,0	8,4	9,2	9,6	10,4	12,5
Water connections	Victaulic											
Inlet/outlet	in	1,5	1,5	1,5	1,5	1,5	1,5	2	2	2	2	2
Max. water-side operating pressure without hydraulic module	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
<b>Condenser</b>	Plate heat exchanger											
Net water volume	l	3,3	3,6	3,6	4,2	4,6	5,0	8,4	9,2	9,6	10,4	12,5
Water connections	Victaulic											
Inlet/outlet	in	1,5	1,5	1,5	1,5	1,5	1,5	2	2	2	2	2
Max. water-side operating pressure without hydraulic module	kPa	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
<b>Chassis paint color</b>	Color code: RAL7035											

(1) Weight shown is a guideline only. Please refer to the unit nameplate

# PHYSICAL DATA, 30WG UNITS, SIZES 110 TO 190

30WG		110	120	140	150	170	190
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### Heating

Standard unit Full load performances*	HW1	Nominal capacity	kW	135	152	175	183	207	238
		COP	kW/kW	5,50	5,50	5,42	5,58	5,59	5,50
	HW2	Nominal capacity	kW	131	148	163	174	197	218
		COP	kW/kW	4,44	4,45	4,38	4,41	4,50	4,38
	HW3	Nominal capacity		125	140	160	166	187	214
		COP		3,56	3,45	3,54	3,55	3,44	3,53
Standard unit Seasonal energy efficiency**	HW1	SCOP <sub>30/35°C</sub>	kW/kW	6,31	6,37	6,31	6,31	6,32	6,18
		η <sub>s heat</sub> <sub>30/35°C</sub>	%	244	247	244	244	245	239
	HW3	<b>SCOP<sub>47/55°C</sub></b>	<b>kW/kW</b>	<b>5,05</b>	<b>5,09</b>	<b>5,05</b>	<b>5,02</b>	<b>5,17</b>	<b>4,96</b>
		<b>η<sub>s heat</sub><sub>47/55°C</sub></b>	<b>%</b>	<b>194</b>	<b>196</b>	<b>194</b>	<b>193</b>	<b>199</b>	<b>190</b>
		P <sub>rated</sub>	kW	143	161	178	191	216	239

### Cooling

Standard unit Full load performances*	CW1	Nominal capacity	kW	115	130	144	153	172	192
		EER	kW/kW	4,79	4,77	4,70	4,83	4,78	4,79
		Eurovent class		B	B	B	B	B	B
	CW2	Nominal capacity	kW	155	176	196	207	231	262
		EER	kW/kW	6,20	6,10	6,01	6,23	5,97	6,14
		Eurovent class		A	A	A	A	A	A
Standard unit Seasonal energy efficiency**		SEER <sub>12/7°C</sub> Comfort low temp.	kW/kW	6,12	6,24	6,17	5,97	6,06	5,96
		SEPR <sub>12/7°C</sub> Process high temp.	kWh/kWh	6,98	7,13	6,90	6,54	6,62	6,41
Unit with option 6B Seasonal energy efficiency**		SEPR <sub>2/-8°C</sub> Process medium temp.***	kWh/kWh	4,01	4,40	4,35	4,52	4,65	4,45
Integrated part load value		IPLV.SI	kW/kW	6,860	6,980	6,900	6,820	6,890	6,820
Operating weight (1)			kg	707	733	758	841	877	908
Sound levels (2)									
		Sound power level, standard unit	dB(A)	76	77	78	76	77	78
		Sound power level, option 257	dB(A)	73	74	75	73	74	75
Dimensions, standard unit (3)									
		Width	mm	880	880	880	880	880	880
		Length	mm	1583	1583	1583	1583	1583	1583
		Height	mm	1574	1574	1574	1574	1574	1574
Compressors									
		Quantity		3	3	3	4	4	4
		Number of capacity stages		3	3	3	4	4	4
		Minimum capacity	%	33	33	33	25	25	25

\* In accordance with standard EN14511-3:2013  
 \*\* In accordance with standard EN14825:2016, average climate  
 \*\*\* With EG 30%  
 HW1 Heating mode conditions: Evaporator entering/leaving water temperature 10°C/7°C, condenser entering/leaving water temperature 30°C/35°C, evaporator and condenser fouling factor 0 m2. kW/W  
 HW2 Heating mode conditions: Evaporator entering/leaving water temperature 10°C/7°C, condenser entering/leaving water temperature 40°C/45°C, evaporator and condenser fouling factor 0 m2. kW/W  
 HW3 Heating mode conditions: Evaporator entering/leaving water temperature 10°C/7°C, condenser entering/leaving water temperature 47°C/55°C, evaporator and condenser fouling factor 0 m2. kW/W  
 CW1 Cooling mode conditions: Evaporator water entering/leaving temperature 12°C/7°C, condenser entering/leaving water temperature 30°C/35°C, evaporator and condenser fouling factor 0 m2.K/W  
 CW2 Cooling mode conditions: Evaporator water entering/leaving temperature 23°C/18°C, condenser entering/leaving water temperature 30°C/35°C, evaporator and condenser fouling factor 0 m2.K/W  
 η<sub>s heat</sub><sub>30/35°C</sub> & SCOP<sub>30/35°C</sub> Values calculated in accordance with EN14825:2016  
 η<sub>s heat</sub><sub>47/55°C</sub> & SCOP<sub>47/55°C</sub> **Bold values compliant to Ecodesign regulation: (EU) No 813/2013 for Heat Pump application**  
 SEER<sub>12/7°C</sub> & SEPR<sub>12/7°C</sub> Values calculated in accordance with EN14825:2016  
 SEPR<sub>2/-8°C</sub> Values calculated in accordance with EN14825:2016  
 IPLV.SI Calculations according to standard performances AHRI 551-591 (SI).  
 (1) Weight shown is a guideline only. Please refer to the unit nameplate  
 (2) In dB ref=10<sup>-12</sup> W, (A) weighting. Declared dualnumber noise emission values in accordance with ISO 4871 (with an associated uncertainty of +/-3dB(A)). Measured in accordance with ISO 9614-1.  
 (3) The dimensions shown are for the standard unit. For other unit types please refer to the dimensional drawings.



Eurovent certified values

## PHYSICAL DATA, 30WG UNITS, SIZES 110 TO 190

30WG		110	120	140	150	170	190
<b>Refrigerant <sup>(1)</sup></b>		R410A (GWP=2088 Following ARI4)					
Charge, standard unit	kg	13,3	14,5	15,6	21,0	23,0	24,2
	teqCO <sub>2</sub>	27,8	30,3	32,6	43,8	48,0	50,5
<b>Capacity control</b>		SmartVu™					
<b>Evaporator</b>		Direct-expansion plate heat exchanger					
Water volume	l	15,18	17,35	19,04	23,16	26,52	29,05
Water connections	-	Victaulic					
Inlet/outlet	in	2 1/2	2 1/2	2 1/2	3	3	3
Max. water-side operating pressure without hydraulic module	kPa	1000	1000	1000	1000	1000	1000
<b>Condenser</b>		Plate heat exchanger					
Net water volume	l	15,18	17,35	19,04	23,16	26,52	29,05
Water connections	-	Victaulic					
Inlet/outlet	in	2 1/2	2 1/2	2 1/2	3	3	3
Max. water-side operating pressure without hydraulic module	kPa	1000	1000	1000	1000	1000	1000
<b>Chassis paint color</b>		Color code: RAL7035					

(1) Weight shown is a guideline only. Please refer to the unit nameplate

# Construction Noise Modeling Results

















Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 06/24/2025  
 Case Description: Berkeley WTPF

\*\*\*\* Receptor #1 \*\*\*\*

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Amenities (Landside)	Commercial	60.0	55.0	50.0

Description	Impact Device	Usage (%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20	90.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Crane	No	16	85.0		50.0	0.0

Results

Noise Limit Exceedance (dBA) Noise Limits (dBA)

Equipment	Night	Day	Calculated (dBA)		Day		Evening		Lmax
			Leq	Lmax	Leq	Lmax	Leq	Lmax	
Concrete Saw	N/A	N/A	90.0	83.0	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	N/A	N/A	80.0	73.0	N/A	N/A	N/A	N/A	N/A
Crane	N/A	N/A	85.0	77.0	N/A	N/A	N/A	N/A	N/A
<b>Total</b>			<b>90.0</b>	<b>84.3</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>



Roadway Construction Noise Model (RCNM), Version 1.1

Report date: 06/25/2025  
 Case Description: Berkeley WTPF

\*\*\*\* Receptor #1 \*\*\*\*

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
Dredging (Waterside)	Commercial	60.0	55.0	50.0

Description	Impact Device	Usage (%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16	85.0		50.0	0.0
Pumps	No	50	77.0		50.0	0.0
Welder / Torch	No	40	73.0		50.0	0.0

Results

Noise Limit Exceedance (dBA) Noise Limits (dBA)

Equipment	Night	Day		Calculated (dBA)		Day		Evening		Lmax
		Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	
Crane	N/A	N/A	N/A	85.0	77.0	N/A	N/A	N/A	N/A	N/A
Pumps	N/A	N/A	N/A	77.0	74.0	N/A	N/A	N/A	N/A	N/A
Welder / Torch	N/A	N/A	N/A	73.0	69.0	N/A	N/A	N/A	N/A	N/A
			Total	85.0	79.2	N/A	N/A	N/A	N/A	N/A







## Traffic Data

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## Trip Generation

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### Ferry Ridership Estimates

Year	San Francisco Only		San Francisco + Mission Bay	
	Weekday	Weekend	Weekday	Weekend
2020	1,830	1,310	2,020	1,440
2026	1,910	1,367	2,106	1,503
2035	2,036	1,457	2,241	1,602
2040	2,110	1,510	2,320	1,660

Source: WETA Business Service Plan, 2022

<sup>1</sup>2020 ridership estimates for San Francisco connection is used for year 1 travel assumptions.

<sup>2</sup>2040 ridership projections for San Francisco + Mission Bay is used for future conditions.

### Mode Share Summary - Year 1

Mode	Mode Share	Person Trips <sup>1</sup>	Base Parking Demand for Ferry Riders <sup>1</sup>	Daily Vehicle Trips
Drive Alone	40%	382	382	764
Carpool	12%	115	57	115
Kiss-and-Ride	8%	76	0	153
Transit	5%	48	0	0
Bike	16%	153	0	0
Walk	4%	38	0	0
Taxi / TNC	5%	48	0	96
Other	10%	96	0	0
<b>Total</b>	<b>100%</b>	<b>955</b>	<b>439</b>	<b>1127</b>

Source: Parking and TDM Plan

### Trip Generation

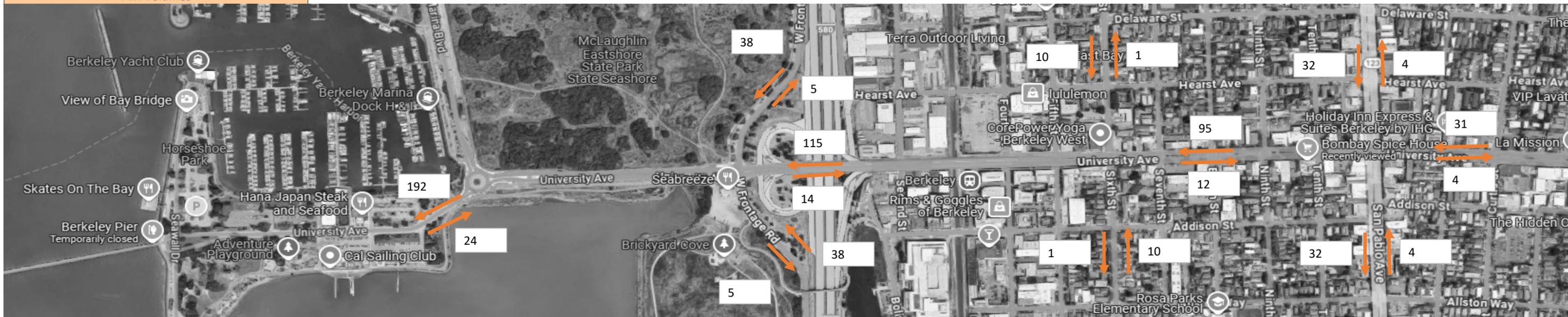
Land Use	Daily	AM		PM		Peak Hour
		In	Out	In	Out	
Ferry	1,127	201	25	25	201	40%
Pier Recreation +	-	-	-	-	-	

Per WETA Business Plan - 40%

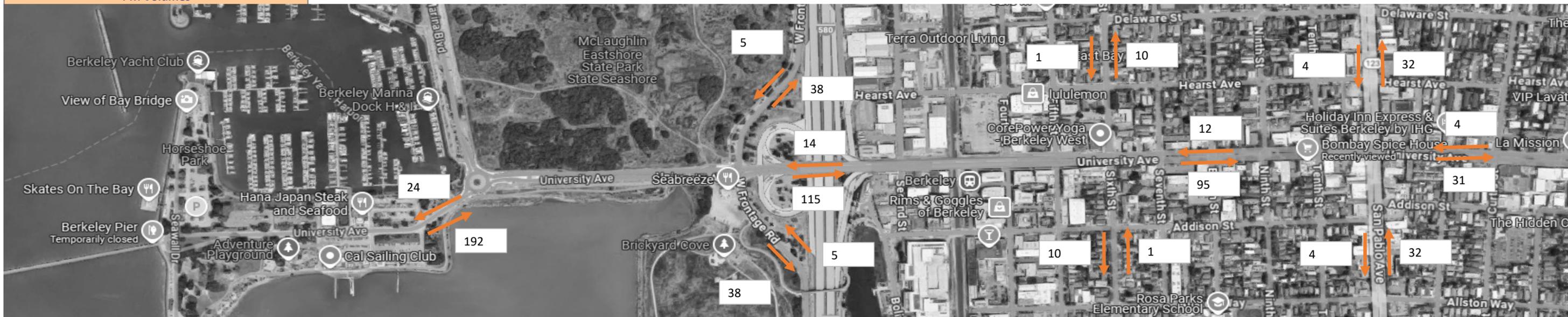
## Trip Distribution

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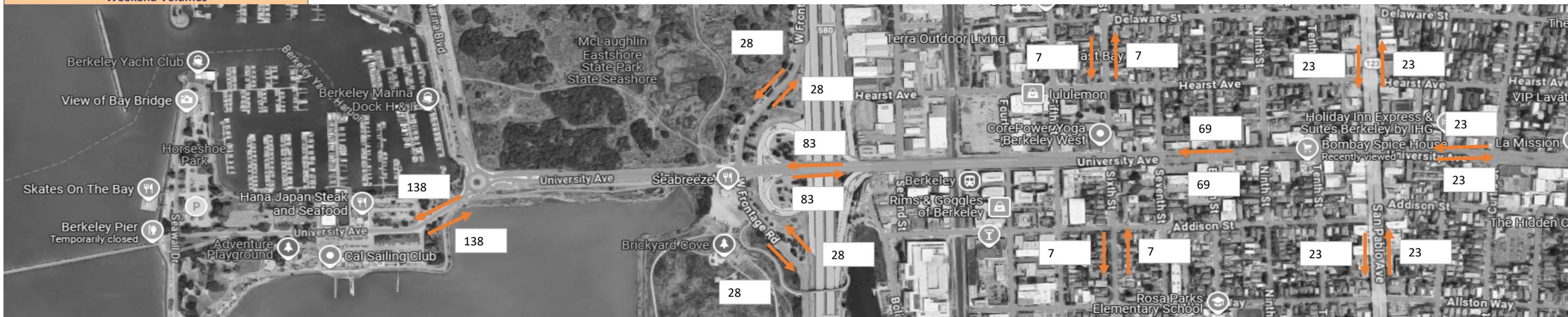
AM Volumes



PM Volumes



Weekend Volumes



## Existing Conditions

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## Existing AM Volumes

Intersection			Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum
N/S Street	E/W Street	NBL		NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	46	19	10	47	694	79	51	125	71	169	170	16	1497
2	University	Marina	2	0	0	0	127	0	8	12	0	93	155	0	111	506
4	University	Sixth	4	194	83	26	42	124	291	111	1048	226	15	863	36	3059
5	University	San Pablo	5	89	402	80	137	804	71	88	767	80	113	681	111	3423

## Project Volumes - AM

	Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound		
	N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	University	Frontage	1	38					38	5	14	5		115	
2	University	Marina	2							24				192	
4	University	Sixth	4	10					10	1	12	1		95	
5	University	San Pablo	5	32					32	4	4	4		31	

## Existing Plus Project AM Volumes

Intersection			Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum
N/S Street	E/W Street	NBL		NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	84	19	10	47	694	117	56	139	76	169	285	16	1712
2	University	Marina	2	0	0	0	127	0	8	12	24	93	155	192	111	722
4	University	Sixth	4	204	83	26	42	124	301	112	1060	227	15	958	36	3188
5	University	San Pablo	5	121	402	80	137	804	103	92	771	84	113	712	111	3530

## Existing PM Volumes

Intersection			Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum
N/S Street	E/W Street	NBL		NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	40	291	54	45	645	61	173	155	101	331	304	54	2254
2	University	Marina	2	0	0	0	129	0	31	23	0	222	176	0	128	709
4	University	Sixth	4	280	166	32	96	178	422	147	896	224	15	981	43	3480
5	University	San Pablo	5	120	827	81	144	620	75	112	682	102	98	726	144	3731

## Project Volumes - PM

	Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound		
	N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	University	Frontage	1	5					5	38	115	38		14	
2	University	Marina	2								192			24	
4	University	Sixth	4	1					1	10	95	10		12	
5	University	San Pablo	5	4					4	32	31	32		4	

## Existing Plus Project PM Volumes

Intersection			Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum
N/S Street	E/W Street	NBL		NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	45	291	54	45	645	66	211	270	139	331	318	54	2469
2	University	Marina	2	0	0	0	129	0	31	23	192	222	176	24	128	925
4	University	Sixth	4	281	166	32	96	178	423	157	991	234	15	993	43	3609
5	University	San Pablo	5	124	827	81	144	620	79	144	713	134	98	730	144	3838

Existing weekend Peak Volumes

Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum	
N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	57	144	41	59	625	92	163	200	223	239	271	50	2164
2	University	Marina	2	0	0	0	229	0	22	17	0	343	243	0	151	1005
4	University	Sixth	4	266	225	39	100	213	421	127	932	235	34	1042	44	3678
5	University	San Pablo	5	124	479	90	122	516	93	110	735	122	98	716	118	3323

Project Volumes - Weekend

Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound		
N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	University	Frontage	1	28				28	28	83	28		83	
2	University	Marina	2						138				138	
4	University	Sixth	4	7				7	7	69	7		69	
5	University	San Pablo	5	23				23	23	23	23		23	

Existing Plus Project PM Volumes

Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum	
N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	85	144	41	59	625	120	191	283	251	239	354	50	2442
2	University	Marina	2	0	0	0	229	0	22	17	138	343	243	138	151	1281
4	University	Sixth	4	273	225	39	100	213	428	134	1001	242	34	1111	44	3844
5	University	San Pablo	5	147	479	90	122	516	116	133	758	145	98	739	118	3461

## Background Conditions

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**Background AM Volumes**

Intersection			Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum
N/S Street	E/W Street	NBL		NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	48	19	10	47	959	79	51	130	71	169	171	16	1770
2	University	Marina	2	0	0	0	127	0	8	12	0	93	155	0	111	506
4	University	Sixth	4	195	83	26	42	124	303	111	1128	250	16	888	39	3205
5	University	San Pablo	5	91	402	80	137	930	71	93	877	80	119	710	113	3703

**Project Volumes - AM**

	Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound		
	N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	University	Frontage	1	38					38	5	14	5		115	
2	University	Marina	2								24			192	
4	University	Sixth	4	10					10	1	12	1		95	
5	University	San Pablo	5	32					32	4	4	4		31	

**Background Plus Project AM Volumes**

Intersection			Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum
N/S Street	E/W Street	NBL		NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	86	19	10	47	959	117	56	144	76	169	286	16	1985
2	University	Marina	2	0	0	0	127	0	8	12	24	93	155	192	111	722
4	University	Sixth	4	205	83	26	42	124	313	112	1140	251	16	983	39	3334
5	University	San Pablo	5	123	402	80	137	930	103	97	881	84	119	741	113	3810

Background PM Volumes

Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum	
N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	40	291	192	45	645	63	182	155	105	446	314	274	2752
2	University	Marina	2	0	0	0	129	0	31	23	0	222	176	0	128	709
4	University	Sixth	4	314	166	32	133	178	422	147	896	224	21	981	43	3557
5	University	San Pablo	5	120	1098	87	144	620	112	112	686	119	98	799	144	4139

Project Volumes - PM

	Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound		
	N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	University	Frontage	1	5					5	38	115	38		14	
2	University	Marina	2								192			24	
4	University	Sixth	4	1					1	10	95	10		12	
5	University	San Pablo	5	4					4	32	31	32		4	

Background Plus Project PM Volumes

Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum	
N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	45	291	192	45	645	68	220	270	143	446	328	274	2967
2	University	Marina	2	0	0	0	129	0	31	23	192	222	176	24	128	925
4	University	Sixth	4	315	166	32	133	178	423	157	991	234	21	993	43	3686
5	University	San Pablo	5	124	1098	87	144	620	116	144	717	151	98	803	144	4246

Existing weekend Peak Volumes																
Intersection			Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum
N/S Street	E/W Street	NBL		NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	57	144	179	59	625	94	172	200	227	354	281	270	2662
2	University	Marina	2	0	0	0	229	0	22	17	0	343	243	0	151	1005
4	University	Sixth	4	300	225	39	137	213	421	127	932	235	40	1042	44	3755
5	University	San Pablo	5	124	750	96	122	516	130	110	739	139	98	789	118	3731

Project Volumes - Weekend																
Intersection			Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum
N/S Street	E/W Street	NBL		NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	28					28	28	83	28		83		
2	University	Marina	2							138				138		
4	University	Sixth	4	7					7	7	69	7		69		
5	University	San Pablo	5	23					23	23	23	23		23		

Existing Plus Project PM Volumes																
Intersection			Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum
N/S Street	E/W Street	NBL		NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	85	144	179	59	625	122	200	283	255	354	364	270	2940
2	University	Marina	2	0	0	0	229	0	22	17	138	343	243	138	151	1281
4	University	Sixth	4	307	225	39	137	213	428	134	1001	242	40	1111	44	3921
5	University	San Pablo	5	147	750	96	122	516	153	133	762	162	98	812	118	3869

Note: The travel demand model does not compute weekend volumes these have been calculated based on ratio of existing weekend and weekday PM counts.

## Future (2040) Conditions

Future (2040) AM Volumes																
Intersection			Northbound			Southbound			Eastbound			Westbound			Sum	
N/S Street	E/W Street	Intx Num	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	212	34	202	194	694	81	52	206	71	169	203	16	2134
2	University	Marina	2	0	0	0	181	0	8	13	0	93	155	0	343	793
4	University	Sixth	4	259	171	40	54	184	324	197	1397	346	15	863	41	3891
5	University	San Pablo	5	92	1383	135	137	890	71	216	927	242	294	681	234	5302

Project Volumes - AM																
	Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound			
	N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	
1	University	Frontage	1	38					38	5	14	5		115		
2	University	Marina	2								24			192		
4	University	Sixth	4	10					10	1	12	1		95		
5	University	San Pablo	5	32					32	4	4	4		31		

Future (2040) Plus Project AM Volumes																
Intersection			Northbound			Southbound			Eastbound			Westbound			Sum	
N/S Street	E/W Street	Intx Num	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	250	34	202	194	694	119	57	220	76	169	318	16	2349
2	University	Marina	2	0	0	0	181	0	8	13	24	93	155	192	343	1009
4	University	Sixth	4	269	171	40	54	184	334	198	1409	347	15	958	41	4020
5	University	San Pablo	5	124	1383	135	137	890	103	220	931	246	294	712	234	5409

**Future (2040) PM Volumes**

Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum	
N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	40	365	120	237	645	148	240	381	101	331	352	77	3037
2	University	Marina	2	0	0	0	394	0	31	25	0	222	176	0	278	1126
4	University	Sixth	4	280	169	136	153	281	422	147	1126	279	166	981	115	4255
5	University	San Pablo	5	217	1073	96	144	908	75	129	716	434	290	814	144	5040

**Project Volumes - PM**

Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound		
N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
1	University	Frontage	1	5				5	38	115	38			14
2	University	Marina	2							192				24
4	University	Sixth	4	1				1	10	95	10			12
5	University	San Pablo	5	4				4	32	31	32			4

**Future (2040) Plus Project PM Volumes**

Intersection		Intx Num	Northbound			Southbound			Eastbound			Westbound			Sum	
N/S Street	E/W Street		NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	45	365	120	237	645	153	278	496	139	331	366	77	3252
2	University	Marina	2	0	0	0	394	0	31	25	192	222	176	24	278	1342
4	University	Sixth	4	281	169	136	153	281	423	157	1221	289	166	993	115	4384
5	University	San Pablo	5	221	1073	96	144	908	79	161	747	466	290	818	144	5147

Future (2040) weekend Peak Volumes																
Intersection			Northbound			Southbound			Eastbound			Westbound			Sum	
N/S Street	E/W Street	Intx Num	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	57	218	107	251	625	179	230	426	223	239	319	73	2947
2	University	Marina	2	0	0	0	494	0	22	19	0	343	243	0	301	1422
4	University	Sixth	4	266	228	143	157	316	421	127	1162	290	185	1042	116	4453
5	University	San Pablo	5	221	725	105	122	804	93	127	769	454	290	804	118	4632

Project Volumes - Weekend																
Intersection			Northbound			Southbound			Eastbound			Westbound			Sum	
N/S Street	E/W Street	Intx Num	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	28				28	28	83	28		83			
2	University	Marina	2							138			138			
4	University	Sixth	4	7				7	7	69	7		69			
5	University	San Pablo	5	23				23	23	23	23		23			

Future (2040) Plus Project PM Volumes																
Intersection			Northbound			Southbound			Eastbound			Westbound			Sum	
N/S Street	E/W Street	Intx Num	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
1	University	Frontage	1	85	218	107	251	625	207	258	509	251	239	402	73	3225
2	University	Marina	2	0	0	0	494	0	22	19	138	343	243	138	301	1698
4	University	Sixth	4	273	228	143	157	316	428	134	1231	297	185	1111	116	4619
5	University	San Pablo	5	244	725	105	122	804	116	150	792	477	290	827	118	4770

Note: The travel demand model does not compute weekend volumes these have been calculated based on ratio of existing weekend and weekday PM counts.

## Segment ADT

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#	Roadway Name	Segment Limits	Existing Weekday	Adjusted Counts	Project Trips	Background No-Project	Background Plus-Project	Cumulative No-Project	Cumulative Plus-Project
1	University Avenue	Seawall Drive to Marina Blvd	NA	1,471	1,127	1,471	2,598	4,142	5,269
2	University Avenue	Marina Blvd to Frontage Road	9,350	9,350	1,127	9,359	10,477	14,205	15,332
3	University Avenue	Frontage Road to Sixth Street	NA	27,000	648	27,005	27,653	34,935	35,583
4	University Avenue	Sixth Street to San Pablo Drive	29,753	29,753	540	29,875	30,415	40,201	40,741

Note: 1. Adjusted counts were estimated using the base year model volumes.  
2. Assumes 60 percent of the trips will travel to and from University Avenue

# Appendix F

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Transportation Impact Analysis Memorandum

# TECHNICAL MEMORANDUM

January 16, 2026

Project# 30240

To: Rincon Consultants

From: Kittelson &amp; Associates (Dhawal Kataria, Amanda Leahy, and Damian Stefanakis)

RE: Berkeley Water Transportation Pier Ferry - Transportation Impact Assessment (TIA)

## Background

Kittelison & Associates, Inc. (Kittelison) has prepared this Transportation Impact Assessment (TIA) memorandum for the City of Berkeley (City) to support the California Environmental Quality Act (CEQA) transportation assessment of the proposed Berkeley Water Transportation Pier Ferry ("Berkeley WTPF" or "Project"). A National Environmental Policy Act (NEPA) related analysis will be conducted separately.

## FERRY RIDERSHIP

The projected ridership (total rides) for the ferry service in the first year of service and the tenth year of service is included in **Table 1** below. For example, in the weekday scenario to San Francisco in 2026, a total of 1,910 rides is estimated. Assuming that an individual rider is taking a round trip, then the 1,910 total rides would represent 955 unique riders taking a round trip between Berkeley and San Francisco.

**Table 1: First Year, Tenth Year and Fifteenth Year Ridership Projections**

Destination	Weekday	Weekend Day	Special Events
<b>Projected First Year of Service<sup>1</sup></b>			
San Francisco	1,910	1,367	209
Mission Bay <sup>2</sup>	2,106	1,503	209
Larkspur <sup>3</sup>	-	515	104
<b>Estimated Tenth Year of Service<sup>1</sup></b>			
San Francisco	2,036	1,457	222
Mission Bay <sup>2</sup>	2,241	1,602	222
Larkspur <sup>3</sup>	-	556	111
<b>Estimated Fifteenth Year of Service<sup>1</sup></b>			
San Francisco	2,110	1,510	230
Mission Bay <sup>2</sup>	2,320	1,660	230
Larkspur <sup>3</sup>	-	580	115

Notes: "-" indicates not applicable

<sup>1</sup> The information presented shows the total rides. For example, in the weekday scenario to San Francisco in 2026, a total of 1,910 rides is estimated. Assuming that an individual rider is taking a round trip, then the 1,910 total rides would represent 955 unique riders taking a round trip between Berkeley and San Francisco.

<sup>2</sup> Via transfer at San Francisco Ferry Terminal (ridership estimate includes riders traveling between Berkeley and San Francisco)

<sup>3</sup> Weekend service only

Source: WETA. 2022. WETA Berkeley Ferry Service Business Plan, Version 1.0. March 17, 2022

## MODE SPLIT ASSUMPTIONS

The mode split assumptions and the methodology to obtain the mode split numbers were developed using the latest WETA onboard passenger survey and WETA Business Service Plan for Berkeley Ferry service. Kittelson reviewed updated on-board survey data from WETA, which included surveys conducted in 2022. Using the WETA Business Plan methodology and updated data, Kittelson estimated that approximately 44% of trips would be drive-alone, which is 13 percentage points higher than the WETA Business Service Plan estimate. Using the 2022 data, the results for the lower mode shares for walking (4%) and biking (11%), as well as public transit (2%), are very low, likely due to pandemic conditions, as people were avoiding public transportation.

Kittelson’s recommended baseline mode share, shown in bold in **Table 2**, references the three sources and reflects the local context and Kittelson’s understanding of the existing travel patterns at the Waterfront. These baseline values represent the estimated mode share prior to the implementation of Transportation Demand Management (TDM) strategies. TDM strategies, such as well-designed and convenient loading zones for family drop-off and rideshare vehicles, enhanced bicycle and pedestrian access, improved secure bike parking, expanded shared micromobility options (e.g., scooters, e-bikes, etc.), could further reduce the need for driving to the proposed project site.

**Table 2: Estimated Daily Trip Generation for First Year of Service (without TDM)**

Source	Drive Alone	Carpool	Passenger Drop-Off <sup>1</sup>	Public Transit	Bike	Walk Only	TNC <sup>2</sup> /Taxi	Other <sup>3</sup>
WETA Business Plan, 2017-19	31%	15%	15%	5%	16%	8%	8%	2%
Feasibility Study (Baseline)	54%	9%	8%	4%	18%	3%	3%	1%
WETA Updated Survey - 2022	44%	8%	8%	2%	11%	4%	2%	21%
<b>Baseline (without TDM)</b>	<b>40%</b>	<b>12%</b>	<b>8%</b>	<b>5%</b>	<b>16%</b>	<b>4%</b>	<b>5%</b>	<b>10%</b>

Source: WETA Business Service Plan, 2022; WETA On-board Surveys, 2022 and Feasibility Study, 2021

<sup>1</sup>Passenger drop off in personal vehicle; <sup>2</sup>TNC is transportation network or “rideshare” company, e.g., Uber/Lyft; <sup>3</sup>Other includes multiple modes and private shuttle. Note: Autonomous Vehicles (AV) have not been included.

## TRIP GENERATION

Based on the San Francisco Bay Area Water Emergency Transportation Authority’s (WETA) projected ridership and the latest mode share information available from the annual passenger survey<sup>1</sup>, the Berkeley WTPF is expected to generate approximately 1,127 daily trips at the first year of service, without the implementation of any TDM strategies, as shown in **Table 3**. The projected ridership is first converted to person trips using the mode share estimates in Table 2. A person trip is a trip taken by a ferry rider using

<sup>1</sup> WETA. 2024. Onboard ridership survey. Accessed from <https://sanfranciscobayferry.com/san-francisco-bay-ferry-releases-survey-results-showing-98-customer-satisfaction/>

any mode of transportation. These person trips are then translated into vehicle trips based on how travelers access the terminal and the timing of their trips. For example, a ferry rider driving alone generates two vehicle trips, one to the terminal and one returning. In contrast, two riders carpooling generate two person trips but only one daily vehicle trip.

The Berkeley WTPF Parking and TDM Plan<sup>2</sup> identified several strategies to reduce parking demand and the need to drive to the Ferry Terminal, many of which have been incorporated into the project:

- **TDM Strategies** (included in the project):
  - Enhanced bicycle facilities and secure bike parking
  - Improved bicycle and pedestrian access including a two-way cycle track along University Avenue and Bay Trail improvements
  - Expanded shared micromobility options
  - Designated pick-up and drop-off zones
  - Transit subsidies and timed transfers for ferry riders
- **Parking Management Strategies** (to be implemented as needed):
  - Maximizing parking capacity at 199 Seawall Drive by redesigning it accommodating more than 320 parking spaces (included in the project):
  - Providing overflow parking at Marina Boulevard lot and Skates/N lot
  - Implementing a wayfinding program that guides the ferry users and other visitors to appropriate parking lots
  - Consider paid parking to discourage driving to the Waterfront and gate lots to limit access from certain users, making it available for visitors as needed.

Hence, the trip generation provided in **Table 3** is conservative and doesn't account for the parking and TDM strategies.

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<sup>2</sup> Kittelson & Associates. 2025. Berkeley WTPF Parking and TDM Plan. Accessed from <https://berkeleyca.gov/sites/default/files/documents/Berkeley-WTPF-Parking-and-TDM-Plan-March-2025-Public-Draft.pdf>

**Table 3: Estimated Daily Trip Generation for First and Fifteenth Year of Service (without TDM)**

Mode	Mode Share	First Year		Fifteenth Year	
		Person Trips <sup>1</sup>	Daily Vehicle Trips	Person Trips <sup>1</sup>	Daily Vehicle Trips
Drive Alone	40%	382	764	422	844
Carpool	12%	115	115	127	127
Passenger DropOff <sup>2</sup>	8%	76	153	84	169
Transit	5%	48	0	53	0
Bike	16%	153	0	169	0
Walk	4%	38	0	42	0
Taxi / TNC <sup>3</sup>	5%	48	96	53	106
Other <sup>4</sup>	10%	96	0	106	0
<b>Total</b>	<b>100%</b>	<b>955</b>	<b>1,127</b>	<b>1,055</b>	<b>1,245</b>

Source: Berkeley WTPF, Parking and TDM Plan, Kittelson & Associates, Inc. 2024

Note: <sup>1</sup>A person trip is a trip taken by a ferry rider using any mode of transportation. Rounded to the nearest integer.

<sup>2</sup>Passenger drop off in personal vehicle

<sup>3</sup>TNC is transportation network or "rideshare" company, e.g., Uber/Lyft.

<sup>4</sup>Other includes multiple modes and private shuttle.

## Peak Hour Trip Generation

The WETA Berkeley Ferry Service Business Plan estimates that 40 percent of daily trips will occur during the morning and evening peak commute periods. In the morning, outbound trips are assumed to consist only of Passenger drop off in personal vehicle and Taxi/TNC vehicles returning after dropping off ferry passengers. In the evening, inbound trips will primarily include Passenger pick up in personal vehicle and Taxi/TNC vehicles arriving to pick up returning ferry passengers. **Table 4** presents the estimated trip generation for the a.m. and p.m. peak hours.

Factors such as limiting parking supply would constrain the number of trips that could be supported to the project, so while the pier may attract some new demand, overall trip levels at the Waterfront would be expected to self-regulate. Furthermore, the trips associated with pier and recreational visitors would be expected to be higher during the weekends when the ferry usage would be lower than weekdays. Hence, the estimated trip generation only shows information from the proposed ferry which as mentioned earlier is considered conservative as it doesn't account for parking and TDM strategies.

**Table 4: Peak Hour Trip Generation without Parking and TDM Strategies**

Land Use	Daily	AM Peak Hour		PM Peak Hour		Peak Hour Factor
		In	Out	In	Out	
Ferry	1,127	201	25	25	201	40%
Pier + Recreation	-	-	-	-	-	-

Notes: "-" indicates not applicable

Source: WETA. 2022. WETA Berkeley Ferry Service Business Plan, Version 1.0. March 17, 2022; Kittelson & Associates, Inc. 2025

## ROADWAY SEGMENT LOS

Roadway segment LOS was analyzed along University Avenue based on average daily traffic (ADT) volumes. Error! Reference source not found. presents the roadway segment LOS results for the four study roadway segments under project conditions. University Avenue between Seawall Drive and Frontage Road is expected to maintain an acceptable LOS (LOS D or better) under all scenarios. In Year 1, University Avenue between Sixth Street and San Pablo Avenue would continue to operate at LOS E, consistent with existing conditions. By Year 15, University Avenue between Frontage Road and San Pablo Avenue is projected to operate at LOS F. About 5 percent of the traffic increase on the roadway segment between Frontage Road and San Pablo Avenue would be attributable to the proposed project, while the remaining 95 percent would be attributed to the Waterfront Specific Plan and nearby developments. This is based on travel demand model outputs for the Year 15 in comparison with the proposed project volumes as shown in **Appendix A**. Given the proposed project’s contribution to future traffic volumes would be minimal, the project is not expected to result in queuing within the Waterfront.

**Table 5: Corridor Segment LOS Evaluation**

#	Roadway Name	Segment Limits	Existing Weekday ADT	LOS	Year 1 Project Conditions	LOS	Year 15 Project Conditions	LOS
1	University Avenue <sup>1</sup>	Seawall Drive to Marina Blvd	NA	NA	2,551	A	5,222	A
2	University Avenue	Marina Blvd to Frontage Road	9,350	D	10,439	A	15,285	A
3	University Avenue	Frontage Road to Sixth Street	NA	NA	27,653	D	35,583	<b>F</b>
4	University Avenue	Sixth Street to San Pablo Drive	29,753	E	30,415	E	40,741	<b>F</b>

Notes: ADT- Average Daily Traffic Volume; LOS – Level of Service.

<sup>1</sup>Segment 1- University Avenue between Seawall Drive to Marina Blvd is evaluated as a two-lane arterial. The remaining segments are evaluated as four-lane divided arterial.

**Bold** indicates volumes-to-capacity ratio higher than 1 i.e., volume exceeds capacity.

Source: Kittelson & Associates, Inc. 2025

## QUEUING

Kittelson conducted a focused queuing analysis to assess how vehicle trips from ferry users could generate queues that may create temporary offsite hazards associated with travel to and from the Berkeley Waterfront.

As discussed below, while LOS was summarized for all study intersections in existing conditions, the queueing analysis focused primarily on one key all-way stop controlled intersection at Frontage Road and University Avenue that operates at LOS F conditions. A more comprehensive queueing analysis at all study locations will be conducted as part of the NEPA traffic study phase.

As per the Berkeley WTPF Parking and TDM Plan, it is anticipated that more than 15% of parking spaces would be available during most hours of the day under both Year 1 and Year 15 project conditions. Therefore, even without implementing parking management or TDM strategies, adequate parking should

be available at the Waterfront to accommodate ferry users and visitors and minimize queuing issues both onsite and offsite. With the implementation of parking management measures and TDM strategies such as dynamic wayfinding, visitors to the Waterfront are expected to find parking efficiently without the need to circle in search of a space,<sup>3</sup> thus minimizing queuing on the site.

## Intersection LOS

With LOS no longer used to assess transportation impacts under CEQA, intersection LOS analysis was only conducted to determine if project-related traffic causes queuing exceedances.

## EXISTING CONDITIONS

**Table 6** presents the existing conditions intersection delay and LOS summary for weekday AM, PM, and weekend peak hour volumes. The peak hour intersection delay and corresponding LOS were calculated using Highway Capacity Manual (HCM) 7th Edition methodology; the Synchro reports are included in **Appendix B**.

The intersection of University Avenue and Frontage Road operates at an unacceptable LOS F or worse during the AM peak hour, PM peak hour, and Weekend peak hour based on the standard established by the City of Berkeley.<sup>4</sup> A Signal Warrant analysis will be required at this intersection to confirm if a signal is warranted at this intersection. Installation of a traffic signal or other intersection control will help manage queuing at this intersection.

**Table 6: Existing Conditions Intersection LOS Summary (No Project Conditions)**

#	Intersection	Control	Weekday				Weekend Peak Hour	
			AM Peak Hour		PM Peak Hour		Delay	LOS
			Delay	LOS	Delay	LOS		
1	University Avenue & Frontage Road	All Way Stop	<b>58.5</b>	<b>F</b>	<b>98</b>	<b>F</b>	<b>78.6</b>	<b>F</b>
2	University Avenue & Marina Blvd	Roundabout	3.8	A	4.4	A	5.8	A
3	University Avenue & Seawall Drive	All Way Stop	NA	NA	NA	NA	NA	NA
4	University Avenue & Sixth Street	Signal	35.2	D	39.3	D	41.4	D
5	University Avenue & San Pablo Drive	Signal	<b>59.6</b>	<b>E</b>	<b>65.5</b>	<b>E</b>	53.4	D

Notes: Bold indicates intersection is operating at unacceptable conditions (LOS E or LOS F)

NA – Data not available.

Source: Kittelson & Associates, Inc. 2025

## Project Conditions

Kittelson evaluated more detailed intersection operations under project conditions at University Avenue and Frontage Road using more recent traffic counts collected on Tuesday, December 09, 2025. Traffic counts summary sheets including bicycle and pedestrian counts are included in **Appendix C. Figure 1**

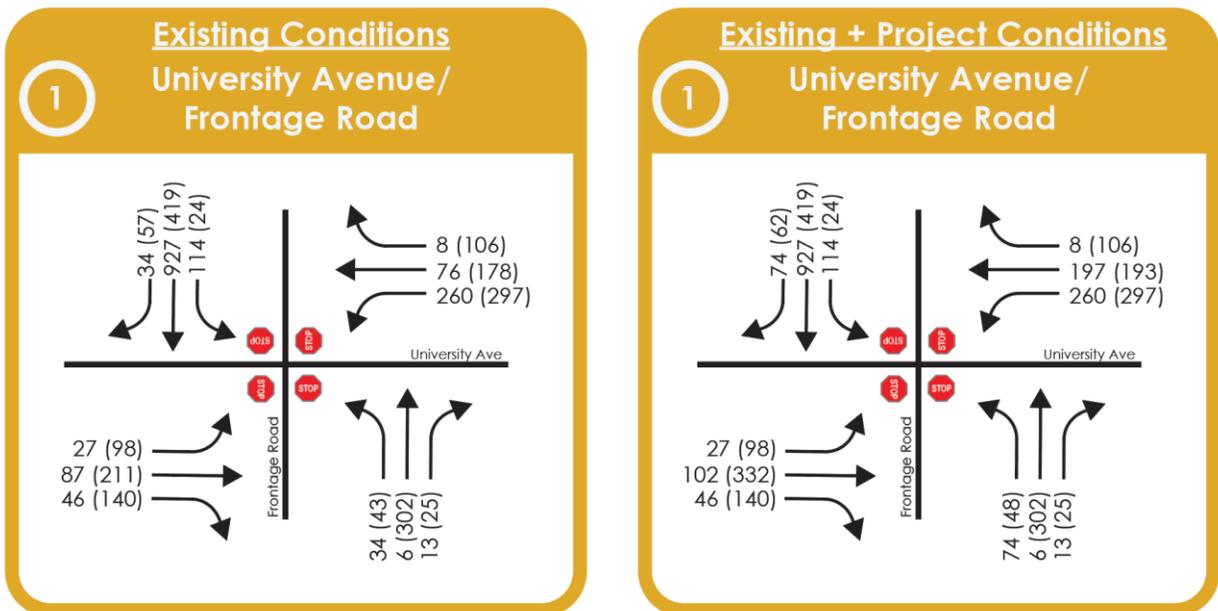
<sup>3</sup> Donald Shoup. Access. Number 30. (Spring 2007). *Cruising for Parking*. Accessed from <http://shoup.boi.ucla.edu/CruisingForParkingAccess.pdf>

<sup>4</sup> City of Berkeley. (n.d.). Guidelines for development of traffic impact reports. Retrieved from <https://berkeleyca.gov/sites/default/files/2022-02/Guidelines-for-Development-of-Traffic-Impact-Reports.pdf>

shows vehicle turning movement volumes at the intersection under existing and existing plus project conditions.

**Project Trip Distribution and Assignment:** Project trips were distributed and assigned to the intersection turn movements at University Avenue and Frontage Road based on the review of existing vehicular travel patterns and WETA Business Plan assumptions. It is anticipated that 60 percent of the project trips will be arriving from University Avenue and 40 percent from Frontage Road.

**Figure 1: Intersection Turning Movement Volumes at University Avenue and Frontage Road under Existing and Existing plus Project Conditions**



Note: XX – AM Peak Hour; (YY) – PM Peak hour  
 Source: Kittelson & Associates, Inc. 2025

The level of service (LOS) and delay results are summarized in **Table 7**. The results indicate that the intersection will continue to operate at LOS F under project conditions. The project will result in an additional 12 seconds delay in AM peak hour conditions and an additional 25 seconds delay in the PM peak hour conditions. However, since LOS is not a measure of transportation impacts under CEQA, the delay resulting due to the project is not required to be mitigated by the project. Synchro summary sheets for project conditions are included in **Appendix D**.

**Table 7: LOS and Delay Results at University Avenue and Frontage Road Intersection**

Scenario	Control	AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS
Existing Condition	AWSC	58.5	<b>F</b>	98	<b>F</b>
Existing + Project Condition	AWSC	70	<b>F</b>	123.4	<b>F</b>

Notes: **Bold** indicates unacceptable LOS; LOS – Level of Service, Delay in seconds.  
 Source: Kittelson & Associates, Inc. 2026

**Table 8** shows the 95th-percentile queuing results at the intersection of University Avenue and Frontage Road under existing and existing plus project conditions. Under existing conditions, the westbound left (WBL) turn queue exceeds the storage capacity under PM peak hour conditions. The project trips will not affect the WBL turn movement directly; however, due to overall increase in delay at this intersection, under the project condition the queue exceeds the AM queuing length by one additional vehicle.

**Table 8: Queuing Results at University Avenue and Frontage Road Intersection**

Scenario	Peak Hour	NB	EBTL	EBTR	WBL	WBT	WBTR	SBLT	SBT	SBR
<i>Existing Condition Storage</i>	-	NA	NA	NA	4	NA	8	NA	NA	NA
Existing Condition	AM	1	1	1	4	0	0	8	22	0
Existing Condition	PM	23	6	8	13	2	3	3	9	1
Existing + Project Condition	AM	1	1	1	5	1	1	10	25	1
Existing + Project Condition	PM	25	10	13	14	2	4	3	9	1

Note: Queue lengths represent the 95th-percentile queuing results, expressed as the number of vehicles, assuming an average vehicle length of 25 feet; NA represents unlimited storage capacity (typically over 100 vehicles)

Due to the short turn pocket (4 vehicles), the WBL queues do spill back into one of the two through lanes over the University Avenue bridge. However, due to the presence of an additional through lane on the University Avenue bridge, through and right-turn traffic can continue past the queue, resulting in delays but no substantial increase in traffic safety hazards.

Traffic entering from the I-80 off-ramp may also experience temporary blockages as the queue begins to spill back. Drivers making northbound left (NBL) turns from the ramp require that space be kept clear of the westbound queue on University Avenue. There is a striped stop bar on the westbound through lane nearest to the median that serves this purpose, but observations indicate vehicles tend to queue back to the stop bar from the WBL turn pocket. During the PM peak hour, queues along this lane can reach up to 14 vehicles. While the vehicle queue is long, there is no substantial increase in traffic safety hazards due to the project.

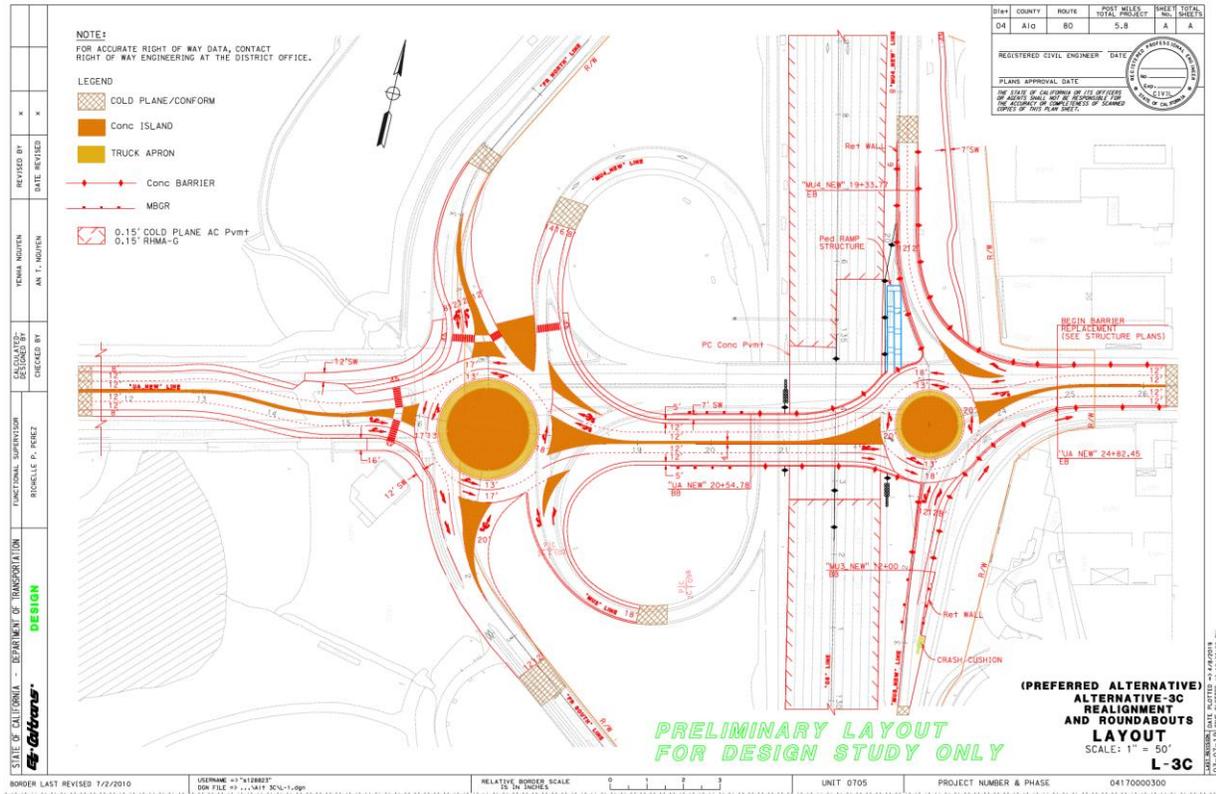
The traffic counts observed 22 vehicles making a NBL in the AM peak hour and 106 vehicles during the PM peak hour. No project trips are expected from the NBL I-80 off-ramp to the site, as the Frontage Road offers a more convenient route, especially during peak hours.

Since the queueing is a result of an existing deficiency and does not appear to pose change in traffic safety conditions, no improvements have been suggested as a part of the project. In addition, as a part of the University Avenue Overcrossing project, the intersection of University Avenue and Frontage Road is proposed to be converted into a roundabout as shown in **Figure 2**.<sup>5</sup>

The timing of this improvement is uncertain as it requires coordination with Caltrans and likely would not be implemented in time for the project opening year. However, it would likely be part of the long-range cumulative assumptions under NEPA analysis.

<sup>5</sup> Caltrans. Project Report – *University Avenue Overcrossing*. (May 2019) Project ID – 04170000300 Project Limits 04-Ala-80-PM 5.8.

**Figure 2: University Avenue Overcrossing Project (Preferred Alternative)**



While Kittelson has not evaluated the project conditions under roundabout control, it is anticipated that the roundabout will effectively reduce the queue and improve the safety conditions at the intersection. Further analysis during the NEPA phase may be required.

## Appendix A: Segment Volumes

**APPENDIX****Table 9: Year 1 and Year 15 Segment Volumes**

#	Roadway Name	Segment Limits	Lane Configuration	Posted Speed Limit (mph)	Existing Weekday ADT	Year 1		Year 15	
						No-Project	Plus-Project	No-Project	Plus-Project
1	University Avenue	Seawall Drive to Marina Blvd	2U	25	NA	1,471	2,551	4,142	5,222
2	University Avenue	Marina Blvd to Frontage Road	4D	30	9,350	9,359	10,439	14,205	15,285
3	University Avenue	Frontage Road to Sixth Street	4D	30	NA	27,005	27,653	34,935	35,583
4	University Avenue	Sixth Street to San Pablo Drive	4D	25	29,753	29,875	30,415	40,201	40,741

## Appendix B: Synchro Reports – Existing Conditions

Intersection	
Intersection Delay, s/veh	58.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔		↔	↔↔			↔			↔↔	↔
Traffic Vol, veh/h	27	87	46	260	76	8	34	6	13	114	927	34
Future Vol, veh/h	27	87	46	260	76	8	34	6	13	114	927	34
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	0	3	0	2	5	0	0	17	0	3	2	3
Mvmt Flow	28	90	47	268	78	8	35	6	13	118	956	35
Number of Lanes	0	2	0	1	2	0	0	1	0	0	2	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	3	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	1	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	3	3	2
HCM Control Delay	13.5	21.7	13.3	79.2
HCM LOS	B	C	B	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2	SBLn3
Vol Left, %	64%	38%	0%	100%	0%	0%	27%	0%	0%
Vol Thru, %	11%	62%	49%	0%	100%	76%	73%	100%	0%
Vol Right, %	25%	0%	51%	0%	0%	24%	0%	0%	100%
Sign Control	Stop								
Traffic Vol by Lane	53	71	90	260	51	33	423	618	34
LT Vol	34	27	0	260	0	0	114	0	0
Through Vol	6	44	44	0	51	25	309	618	0
RT Vol	13	0	46	0	0	8	0	0	34
Lane Flow Rate	55	73	92	268	52	34	436	637	35
Geometry Grp	6	6	6	6	6	6	5	5	5
Degree of Util (X)	0.135	0.174	0.208	0.625	0.115	0.073	0.814	1.162	0.057
Departure Headway (Hd)	9.211	9.018	8.503	8.715	8.257	7.999	6.717	6.564	5.874
Convergence, Y/N	Yes								
Cap	392	400	424	418	437	451	541	554	609
Service Time	6.911	6.718	6.203	6.415	5.957	5.699	4.457	4.304	3.614
HCM Lane V/C Ratio	0.14	0.182	0.217	0.641	0.119	0.075	0.806	1.15	0.057
HCM Control Delay	13.3	13.6	13.4	24.9	12	11.3	32.6	114.9	9
HCM Lane LOS	B	B	B	C	B	B	D	F	A
HCM 95th-tile Q	0.5	0.6	0.8	4.1	0.4	0.2	8	21.9	0.2

Intersection				
Intersection Delay, s/veh	3.8			
Intersection LOS	A			
Approach	WB		SB	NE
Entry Lanes	2		1	1
Conflicting Circle Lanes	1		1	1
Adj Approach Flow, veh/h	295		150	116
Demand Flow Rate, veh/h	300		153	118
Vehicles Circulating, veh/h	13		175	144
Vehicles Exiting, veh/h	249		138	184
Ped Vol Crossing Leg, #/h	0		0	0
Ped Cap Adj	1.000		1.000	1.000
Approach Delay, s/veh	3.5		4.3	3.9
Approach LOS	A		A	A
Lane	Left	Right	Left	Left
Designated Moves	L	TR	LR	LR
Assumed Moves	L	TR	LR	LR
RT Channelized				
Lane Util	0.583	0.417	1.000	1.000
Follow-Up Headway, s	2.535	2.535	2.609	2.609
Critical Headway, s	4.544	4.544	4.976	4.976
A (Intercept)	1420	1420	1380	1380
B (Slope)	9.101e-4	9.101e-4	1.02e-3	1.02e-3
Entry Flow, veh/h	175	125	153	118
Cap Entry Lane, veh/h	1403	1403	1154	1191
Entry HV Adj Factor	0.983	0.984	0.980	0.983
Flow Entry, veh/h	172	123	150	116
Cap Entry, veh/h	1379	1381	1132	1171
V/C Ratio	0.125	0.089	0.133	0.099
Control Delay, s/veh	3.6	3.3	4.3	3.9
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

HCM 7th Signalized Intersection Summary  
4: Sixth St & University Ave

Weekday AM Peak  
12/10/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	1048	226	15	863	36	194	83	26	42	124	291
Future Volume (veh/h)	111	1048	226	15	863	36	194	83	26	42	124	291
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.96	0.99		0.98	0.98		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	125	1178	254	17	970	40	218	93	29	47	139	327
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	238	1476	315	89	1510	647	292	577	477	399	577	683
Arrive On Green	0.13	0.51	0.51	0.03	0.28	0.28	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	1781	2903	620	1781	3554	1523	916	1870	1548	1246	1870	1529
Grp Volume(v), veh/h	125	717	715	17	970	40	218	93	29	47	139	327
Grp Sat Flow(s),veh/h/ln	1781	1777	1747	1781	1777	1523	916	1870	1548	1246	1870	1529
Q Serve(g_s), s	7.8	39.9	40.9	1.1	28.7	2.3	28.0	4.3	1.6	3.4	6.7	18.2
Cycle Q Clear(g_c), s	7.8	39.9	40.9	1.1	28.7	2.3	34.6	4.3	1.6	7.8	6.7	18.2
Prop In Lane	1.00		0.36	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	238	903	888	89	1510	647	292	577	477	399	577	683
V/C Ratio(X)	0.53	0.79	0.81	0.19	0.64	0.06	0.75	0.16	0.06	0.12	0.24	0.48
Avail Cap(c_a), veh/h	238	903	888	89	1510	647	292	577	477	399	577	683
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.45	0.45	0.45	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.5	24.3	24.6	55.6	34.9	25.5	44.0	30.2	29.3	33.0	31.0	23.8
Incr Delay (d2), s/veh	8.1	7.1	7.7	2.1	1.0	0.1	16.0	0.6	0.2	0.6	1.0	2.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	18.0	18.3	0.6	13.2	0.9	7.6	2.1	0.6	1.1	3.2	7.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	56.6	31.4	32.3	57.8	35.9	25.6	60.0	30.8	29.5	33.6	32.0	26.2
LnGrp LOS	E	C	C	E	D	C	E	C	C	C	C	C
Approach Vol, veh/h	1557			1027			340			513		
Approach Delay, s/veh	33.8			35.8			49.4			28.4		
Approach LOS	C			D			D			C		
Timer - Assigned Phs	1	2	4		5	6	8					
Phs Duration (G+Y+Rc), s	21.0	56.2	42.8		11.0	66.2	42.8					
Change Period (Y+Rc), s	5.0	5.2	5.8		5.0	5.2	5.8					
Max Green Setting (Gmax), s	16.0	51.0	37.0		6.0	61.0	37.0					
Max Q Clear Time (g_c+I1), s	9.8	30.7	36.6		3.1	42.9	20.2					
Green Ext Time (p_c), s	0.1	7.3	0.1		0.0	10.0	2.0					
<b>Intersection Summary</b>												
HCM 7th Control Delay, s/veh				35.2								
HCM 7th LOS				D								
<b>Notes</b>												
User approved changes to right turn type.												

HCM 7th Signalized Intersection Summary  
5: San Pablo Ave & University Ave

Weekday AM Peak  
12/10/2024

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	88	767	80	113	681	111	89	402	80	137	804	71
Future Volume (veh/h)	88	767	80	113	681	111	89	402	80	137	804	71
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.90	1.00		0.90	1.00		0.90	1.00		0.88
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	91	791	82	116	702	114	92	414	82	141	829	73
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	269	859	89	269	805	131	269	771	151	269	868	76
Arrive On Green	0.15	0.27	0.27	0.15	0.27	0.27	0.15	0.27	0.27	0.15	0.27	0.27
Sat Flow, veh/h	1781	3211	333	1781	3008	488	1781	2901	566	1781	3264	287
Grp Volume(v), veh/h	91	438	435	116	414	402	92	251	245	141	451	451
Grp Sat Flow(s),veh/h/ln	1781	1777	1767	1781	1777	1719	1781	1777	1690	1781	1777	1774
Q Serve(g_s), s	5.5	28.7	28.7	7.1	26.7	26.8	5.5	14.5	14.9	8.8	30.0	30.0
Cycle Q Clear(g_c), s	5.5	28.7	28.7	7.1	26.7	26.8	5.5	14.5	14.9	8.8	30.0	30.0
Prop In Lane	1.00		0.19	1.00		0.28	1.00		0.34	1.00		0.16
Lane Grp Cap(c), veh/h	269	475	473	269	475	460	269	472	449	269	472	472
V/C Ratio(X)	0.34	0.92	0.92	0.43	0.87	0.87	0.34	0.53	0.54	0.52	0.96	0.96
Avail Cap(c_a), veh/h	269	475	473	269	477	461	269	472	449	269	472	472
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.48	0.48	0.48	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.6	42.7	42.7	46.3	42.0	42.0	45.6	37.7	37.8	47.0	43.3	43.4
Incr Delay (d2), s/veh	1.6	13.4	13.5	5.0	19.3	20.0	3.4	4.2	4.7	7.2	31.7	31.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	14.4	14.3	3.6	14.3	13.9	2.7	6.9	6.8	4.5	17.3	17.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	47.2	56.1	56.2	51.3	61.3	62.0	49.1	41.9	42.5	54.1	75.0	75.1
LnGrp LOS	D	E	E	D	E	E	D	D	D	D	E	E
Approach Vol, veh/h		964			932			588			1043	
Approach Delay, s/veh		55.3			60.3			43.3			72.2	
Approach LOS		E			E			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.8	37.4	22.8	37.0	22.8	37.4	22.8	37.0				
Change Period (Y+Rc), s	4.7	* 5.3	4.7	5.1	4.7	5.3	4.7	5.1				
Max Green Setting (Gmax), s	18.1	* 32	18.1	31.9	18.1	32.1	18.1	31.9				
Max Q Clear Time (g_c+I1), s	7.5	28.8	10.8	16.9	9.1	30.7	7.5	32.0				
Green Ext Time (p_c), s	0.1	1.7	0.2	2.8	0.2	0.8	0.1	0.0				
<b>Intersection Summary</b>												
HCM 7th Control Delay, s/veh				59.6								
HCM 7th LOS				E								
<b>Notes</b>												
* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.												

Intersection	
Intersection Delay, s/veh	98
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔		↔	↔↔			↔			↔↔	↔
Traffic Vol, veh/h	98	211	140	297	178	106	43	306	25	24	419	57
Future Vol, veh/h	98	211	140	297	178	106	43	306	25	24	419	57
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	4	0	1	2	1	2	1	4	0	1	4
Mvmt Flow	115	248	165	349	209	125	51	360	29	28	493	67
Number of Lanes	0	2	0	1	2	0	0	1	0	0	2	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	3	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	1	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	3	3	2
HCM Control Delay	56.7	76.6	249.5	46.8
HCM LOS	F	F	F	E

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2	SBLn3
Vol Left, %	11%	48%	0%	100%	0%	0%	15%	0%	0%
Vol Thru, %	82%	52%	43%	0%	100%	36%	85%	100%	0%
Vol Right, %	7%	0%	57%	0%	0%	64%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	374	204	246	297	119	165	164	279	57
LT Vol	43	98	0	297	0	0	24	0	0
Through Vol	306	106	106	0	119	59	140	279	0
RT Vol	25	0	140	0	0	106	0	0	57
Lane Flow Rate	440	239	289	349	140	195	193	329	67
Geometry Grp	6	6	6	6	6	6	5	5	5
Degree of Util (X)	1.446	0.768	0.878	1.11	0.425	0.567	0.538	0.913	0.174
Departure Headway (Hd)	12.22	13.132	12.471	12.853	12.336	11.837	11.296	11.236	10.544
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	299	278	292	287	295	307	322	325	343
Service Time	9.92	10.832	10.171	10.553	10.036	9.537	8.996	8.936	8.244
HCM Lane V/C Ratio	1.472	0.86	0.99	1.216	0.475	0.635	0.599	1.012	0.195
HCM Control Delay	249.5	48.9	63.1	124.2	23.9	29	26.4	65.1	15.5
HCM Lane LOS	F	E	F	F	C	D	D	F	C
HCM 95th-tile Q	23.3	5.8	7.8	12.9	2	3.3	3	8.9	0.6

Intersection					
Intersection Delay, s/veh	4.4				
Intersection LOS	A				
Approach	WB		SB		NE
Entry Lanes	2		1		1
Conflicting Circle Lanes	1		1		1
Adj Approach Flow, veh/h	338		177		273
Demand Flow Rate, veh/h	345		181		279
Vehicles Circulating, veh/h	27		200		146
Vehicles Exiting, veh/h	398		172		235
Ped Vol Crossing Leg, #/h	0		0		0
Ped Cap Adj	1.000		1.000		1.000
Approach Delay, s/veh	3.7		4.7		5.2
Approach LOS	A		A		A
Lane	Left		Right		Left
Designated Moves	L		TR		LR
Assumed Moves	L		TR		LR
RT Channelized					
Lane Util	0.580	0.420	1.000		1.000
Follow-Up Headway, s	2.535	2.535	2.609		2.609
Critical Headway, s	4.544	4.544	4.976		4.976
A (Intercept)	1420	1420	1380		1380
B (Slope)	9.101e-4	9.101e-4	1.02e-3		1.02e-3
Entry Flow, veh/h	200	145	181		279
Cap Entry Lane, veh/h	1386	1386	1125		1189
Entry HV Adj Factor	0.980	0.979	0.978		0.978
Flow Entry, veh/h	196	142	177		273
Cap Entry, veh/h	1358	1357	1100		1163
V/C Ratio	0.144	0.105	0.161		0.235
Control Delay, s/veh	3.8	3.5	4.7		5.2
LOS	A	A	A		A
95th %tile Queue, veh	1	0	1		1

HCM 7th Signalized Intersection Summary  
4: Sixth St. & University Ave

Weekday PM Peak  
12/10/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	147	896	224	15	981	43	280	166	32	96	178	422
Future Volume (veh/h)	147	896	224	15	981	43	280	166	32	96	178	422
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.95	1.00		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	150	914	229	15	1001	44	286	169	33	98	182	431
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	238	1245	311	89	1297	552	302	689	578	418	689	789
Arrive On Green	0.13	0.45	0.45	0.03	0.24	0.24	0.37	0.37	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1781	2777	695	1781	3554	1511	806	1870	1570	1173	1870	1570
Grp Volume(v), veh/h	150	584	559	15	1001	44	286	169	33	98	182	431
Grp Sat Flow(s),veh/h/ln	1781	1777	1695	1781	1777	1511	806	1870	1570	1173	1870	1570
Q Serve(g_s), s	9.6	32.4	32.6	1.0	31.5	2.7	36.0	7.5	1.6	7.6	8.2	22.6
Cycle Q Clear(g_c), s	9.6	32.4	32.6	1.0	31.5	2.7	44.2	7.5	1.6	15.1	8.2	22.6
Prop In Lane	1.00		0.41	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	238	797	760	89	1297	552	302	689	578	418	689	789
V/C Ratio(X)	0.63	0.73	0.74	0.17	0.77	0.08	0.95	0.25	0.06	0.23	0.26	0.55
Avail Cap(c_a), veh/h	238	797	760	89	1297	552	302	689	578	418	689	789
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.35	0.35	0.35	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.2	27.2	27.2	55.6	40.7	29.8	44.8	26.3	24.5	31.6	26.5	20.5
Incr Delay (d2), s/veh	12.1	5.9	6.3	1.4	1.6	0.1	39.8	0.8	0.2	1.3	0.9	2.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	14.8	14.2	0.5	14.6	1.0	12.0	3.5	0.6	2.3	3.8	8.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	61.3	33.1	33.5	57.0	42.3	29.9	84.6	27.2	24.6	32.9	27.5	23.2
LnGrp LOS	E	C	C	E	D	C	F	C	C	C	C	C
Approach Vol, veh/h		1293			1060			488			711	
Approach Delay, s/veh		36.6			42.0			60.7			25.7	
Approach LOS		D			D			E			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	21.0	49.0		50.0	11.0	59.0		50.0				
Change Period (Y+Rc), s	5.0	5.2		5.8	5.0	5.2		5.8				
Max Green Setting (Gmax), s	16.0	43.8		44.2	6.0	53.8		44.2				
Max Q Clear Time (g_c+I1), s	11.6	33.5		46.2	3.0	34.6		24.6				
Green Ext Time (p_c), s	0.1	5.1		0.0	0.0	8.0		3.0				
<b>Intersection Summary</b>												
HCM 7th Control Delay, s/veh			39.3									
HCM 7th LOS			D									
<b>Notes</b>												
User approved changes to right turn type.												

HCM 7th Signalized Intersection Summary  
5: University Ave & San Pablo Ave

Weekday PM Peak  
12/10/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕		↖	↕	
Traffic Volume (veh/h)	112	682	102	98	726	144	120	827	81	144	620	75
Future Volume (veh/h)	112	682	102	98	726	144	120	827	81	144	620	75
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.86	1.00		0.86	1.00		0.85	1.00		0.85
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	113	689	103	99	733	145	121	835	82	145	626	76
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	269	830	124	269	787	156	269	832	82	269	810	98
Arrive On Green	0.10	0.18	0.18	0.15	0.27	0.27	0.15	0.26	0.26	0.15	0.26	0.26
Sat Flow, veh/h	1781	3028	452	1781	2870	567	1781	3211	315	1781	3124	378
Grp Volume(v), veh/h	113	404	388	99	454	424	121	462	455	145	355	347
Grp Sat Flow(s),veh/h/ln	1781	1777	1703	1781	1777	1660	1781	1777	1749	1781	1777	1725
Q Serve(g_s), s	7.1	26.3	26.4	6.0	29.9	29.9	7.4	31.1	31.1	9.0	22.2	22.4
Cycle Q Clear(g_c), s	7.1	26.3	26.4	6.0	29.9	29.9	7.4	31.1	31.1	9.0	22.2	22.4
Prop In Lane	1.00		0.27	1.00		0.34	1.00		0.18	1.00		0.22
Lane Grp Cap(c), veh/h	269	487	467	269	487	455	269	460	453	269	460	447
V/C Ratio(X)	0.42	0.83	0.83	0.37	0.93	0.93	0.45	1.00	1.00	0.54	0.77	0.78
Avail Cap(c_a), veh/h	269	487	467	269	489	457	269	460	453	269	460	447
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.61	0.61	0.61	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.0	46.3	46.3	45.8	42.4	42.5	46.4	44.5	44.5	47.1	41.2	41.2
Incr Delay (d2), s/veh	2.9	7.3	7.7	3.9	26.8	28.2	5.4	42.8	43.2	7.6	11.8	12.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	13.1	12.7	3.0	16.8	15.9	3.7	19.2	18.9	4.6	11.3	11.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	51.9	53.6	54.1	49.7	69.3	70.7	51.8	87.2	87.6	54.7	53.0	53.6
LnGrp LOS	D	D	D	D	E	E	D	F	F	D	D	D
Approach Vol, veh/h		905			977			1038			847	
Approach Delay, s/veh		53.6			67.9			83.3			53.5	
Approach LOS		D			E			F			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.8	38.2	22.8	36.2	22.8	38.2	22.8	36.2				
Change Period (Y+Rc), s	4.7	* 5.3	4.7	5.1	4.7	5.3	4.7	5.1				
Max Green Setting (Gmax), s	18.1	* 33	18.1	31.1	18.1	32.9	18.1	31.1				
Max Q Clear Time (g_c+I1), s	9.1	31.9	11.0	33.1	8.0	28.4	9.4	24.4				
Green Ext Time (p_c), s	0.2	0.6	0.2	0.0	0.1	2.1	0.2	2.5				

Intersection Summary												
HCM 7th Control Delay, s/veh											65.5	
HCM 7th LOS											E	

Notes  
\* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Intersection Delay, s/veh	78.6
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↕	↕↕			↕↕			↕↕	↕
Traffic Vol, veh/h	163	200	223	239	271	50	57	144	41	59	625	92
Future Vol, veh/h	163	200	223	239	271	50	57	144	41	59	625	92
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	173	213	237	254	288	53	61	153	44	63	665	98
Number of Lanes	0	2	0	1	2	0	0	1	0	0	2	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	3	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	1	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	3	3	2
HCM Control Delay, s/veh	88	41.2	66.5	102.2
HCM LOS	F	E	F	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2	SBLn3
Vol Left, %	24%	62%	0%	100%	0%	0%	22%	0%	0%
Vol Thru, %	60%	38%	31%	0%	100%	64%	78%	100%	0%
Vol Right, %	17%	0%	69%	0%	0%	36%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	242	263	323	239	181	140	267	417	92
LT Vol	57	163	0	239	0	0	59	0	0
Through Vol	144	100	100	0	181	90	208	417	0
RT Vol	41	0	223	0	0	50	0	0	92
Lane Flow Rate	257	280	344	254	192	149	284	443	98
Geometry Grp	6	6	6	6	6	6	5	5	5
Degree of Util (X)	0.887	0.919	1.053	0.845	0.612	0.465	0.802	1.236	0.253
Departure Headway (Hd)	12.957	12.513	11.667	12.607	12.078	11.815	10.41	10.294	9.559
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	281	291	313	290	302	308	350	355	378
Service Time	10.657	10.213	9.367	10.307	9.778	9.515	8.11	7.994	7.259
HCM Lane V/C Ratio	0.915	0.962	1.099	0.876	0.636	0.484	0.811	1.248	0.259
HCM Control Delay, s/veh	66.5	71.2	101.6	58	32.1	24.4	44.3	158.5	15.5
HCM Lane LOS	F	F	F	F	D	C	E	F	C
HCM 95th-tile Q	7.8	8.6	12.1	7.1	3.8	2.3	6.8	18.9	1

Intersection				
Intersection Delay, s/veh	5.8			
Intersection LOS	A			
Approach	WB		SB	NE
Entry Lanes	2		1	1
Conflicting Circle Lanes	1		1	1
Adj Approach Flow, veh/h	438		278	400
Demand Flow Rate, veh/h	446		283	408
Vehicles Circulating, veh/h	19		275	259
Vehicles Exiting, veh/h	648		190	299
Ped Vol Crossing Leg, #/h	0		0	0
Ped Cap Adj	1.000		1.000	1.000
Approach Delay, s/veh	4.0		6.2	7.5
Approach LOS	A		A	A
Lane	Left	Right	Left	Left
Designated Moves	L	TR	LR	LR
Assumed Moves	L	TR	LR	LR
RT Channelized				
Lane Util	0.617	0.383	1.000	1.000
Follow-Up Headway, s	2.535	2.535	2.609	2.609
Critical Headway, s	4.544	4.544	4.976	4.976
A (Intercept)	1420	1420	1380	1380
B (Slope)	9.101e-4	9.101e-4	1.02e-3	1.02e-3
Entry Flow, veh/h	275	171	283	408
Cap Entry Lane, veh/h	1396	1396	1042	1060
Entry HV Adj Factor	0.982	0.982	0.982	0.980
Flow Entry, veh/h	270	168	278	400
Cap Entry, veh/h	1370	1371	1024	1039
V/C Ratio	0.197	0.123	0.271	0.385
Control Delay, s/veh	4.3	3.6	6.2	7.5
LOS	A	A	A	A
95th %tile Queue, veh	1	0	1	2

HCM 7th Signalized Intersection Summary  
4: Sixth St. & University Ave

Weekend Peak  
12/10/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	127	932	235	34	1042	44	266	225	39	100	213	421
Future Volume (veh/h)	127	932	235	34	1042	44	266	225	39	100	213	421
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.95	1.00		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	132	971	245	35	1085	46	277	234	41	104	222	439
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	208	1249	314	89	1356	577	278	689	575	365	689	760
Arrive On Green	0.12	0.45	0.45	0.03	0.26	0.26	0.37	0.37	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1781	2787	701	1781	3554	1512	770	1870	1562	1095	1870	1562
Grp Volume(v), veh/h	132	618	598	35	1085	46	277	234	41	104	222	439
Grp Sat Flow(s),veh/h/ln	1781	1777	1711	1781	1777	1512	770	1870	1562	1095	1870	1562
Q Serve(g_s), s	8.5	35.3	35.6	2.3	34.3	2.8	34.0	10.8	2.0	9.1	10.2	24.2
Cycle Q Clear(g_c), s	8.5	35.3	35.6	2.3	34.3	2.8	44.2	10.8	2.0	19.9	10.2	24.2
Prop In Lane	1.00		0.41	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	208	797	767	89	1356	577	278	689	575	365	689	760
V/C Ratio(X)	0.64	0.78	0.78	0.39	0.80	0.08	1.00	0.34	0.07	0.29	0.32	0.58
Avail Cap(c_a), veh/h	208	797	767	89	1356	577	278	689	575	365	689	760
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.51	0.51	0.51	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.6	28.0	28.1	56.2	40.4	28.6	46.6	27.4	24.6	34.6	27.2	22.1
Incr Delay (d2), s/veh	13.9	7.3	7.7	6.5	2.6	0.1	52.9	1.3	0.2	2.0	1.2	3.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	16.3	15.9	1.2	16.1	1.0	12.5	5.1	0.8	2.6	4.8	9.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	64.5	35.3	35.8	62.7	43.0	28.8	99.6	28.7	24.8	36.5	28.4	25.3
LnGrp LOS	E	D	D	E	D	C	F	C	C	D	C	C
Approach Vol, veh/h		1348			1166			552			765	
Approach Delay, s/veh		38.4			43.0			64.0			27.7	
Approach LOS		D			D			E			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	19.0	51.0		50.0	11.0	59.0		50.0				
Change Period (Y+Rc), s	5.0	5.2		5.8	5.0	5.2		5.8				
Max Green Setting (Gmax), s	14.0	45.8		44.2	6.0	53.8		44.2				
Max Q Clear Time (g_c+I1), s	10.5	36.3		46.2	4.3	37.6		26.2				
Green Ext Time (p_c), s	0.1	5.2		0.0	0.0	7.8		3.3				
<b>Intersection Summary</b>												
HCM 7th Control Delay, s/veh			41.4									
HCM 7th LOS			D									
<b>Notes</b>												
User approved changes to right turn type.												

HCM 7th Signalized Intersection Summary  
5: University Ave & San Pablo Ave

Weekend Peak  
12/10/2024



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	735	122	98	716	118	124	479	90	122	516	93
Future Volume (veh/h)	110	735	122	98	716	118	124	479	90	122	516	93
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		0.88	1.00		0.85	1.00		0.85
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	113	758	126	101	738	122	128	494	93	126	532	96
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	269	918	152	269	919	152	269	654	122	269	660	118
Arrive On Green	0.10	0.21	0.21	0.15	0.31	0.31	0.15	0.23	0.23	0.15	0.23	0.23
Sat Flow, veh/h	1781	2984	496	1781	2987	493	1781	2897	539	1781	2920	523
Grp Volume(v), veh/h	113	451	433	101	439	421	128	301	286	126	322	306
Grp Sat Flow(s),veh/h/ln	1781	1777	1703	1781	1777	1704	1781	1777	1660	1781	1777	1666
Q Serve(g_s), s	7.1	29.2	29.2	6.1	27.3	27.3	7.9	18.9	19.4	7.8	20.6	20.9
Cycle Q Clear(g_c), s	7.1	29.2	29.2	6.1	27.3	27.3	7.9	18.9	19.4	7.8	20.6	20.9
Prop In Lane	1.00		0.29	1.00		0.29	1.00		0.33	1.00		0.31
Lane Grp Cap(c), veh/h	269	546	524	269	546	524	269	401	375	269	401	376
V/C Ratio(X)	0.42	0.83	0.83	0.38	0.80	0.80	0.48	0.75	0.76	0.47	0.80	0.81
Avail Cap(c_a), veh/h	269	546	524	269	548	525	269	401	375	269	401	376
HCM Platoon Ratio	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.56	0.56	0.56	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.0	44.6	44.6	45.9	38.2	38.2	46.6	43.3	43.5	46.6	43.9	44.1
Incr Delay (d2), s/veh	2.7	5.9	6.2	4.0	11.9	12.4	5.9	12.1	13.7	5.8	15.5	17.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	14.3	13.8	3.0	13.7	13.2	4.0	9.7	9.4	3.9	10.8	10.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	51.7	50.5	50.8	49.8	50.1	50.6	52.6	55.4	57.2	52.3	59.4	61.3
LnGrp LOS	D	D	D	D	D	D	D	E	E	D	E	E
Approach Vol, veh/h		997			961			715			754	
Approach Delay, s/veh		50.7			50.3			55.6			59.0	
Approach LOS		D			D			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.8	42.2	22.8	32.2	22.8	42.2	22.8	32.2				
Change Period (Y+Rc), s	4.7	* 5.3	4.7	5.1	4.7	5.3	4.7	5.1				
Max Green Setting (Gmax), s	18.1	* 37	18.1	27.1	18.1	36.9	18.1	27.1				
Max Q Clear Time (g_c+I1), s	9.1	29.3	9.8	21.4	8.1	31.2	9.9	22.9				
Green Ext Time (p_c), s	0.2	3.5	0.2	1.9	0.2	2.8	0.2	1.6				

Intersection Summary

HCM 7th Control Delay, s/veh	53.4
HCM 7th LOS	D

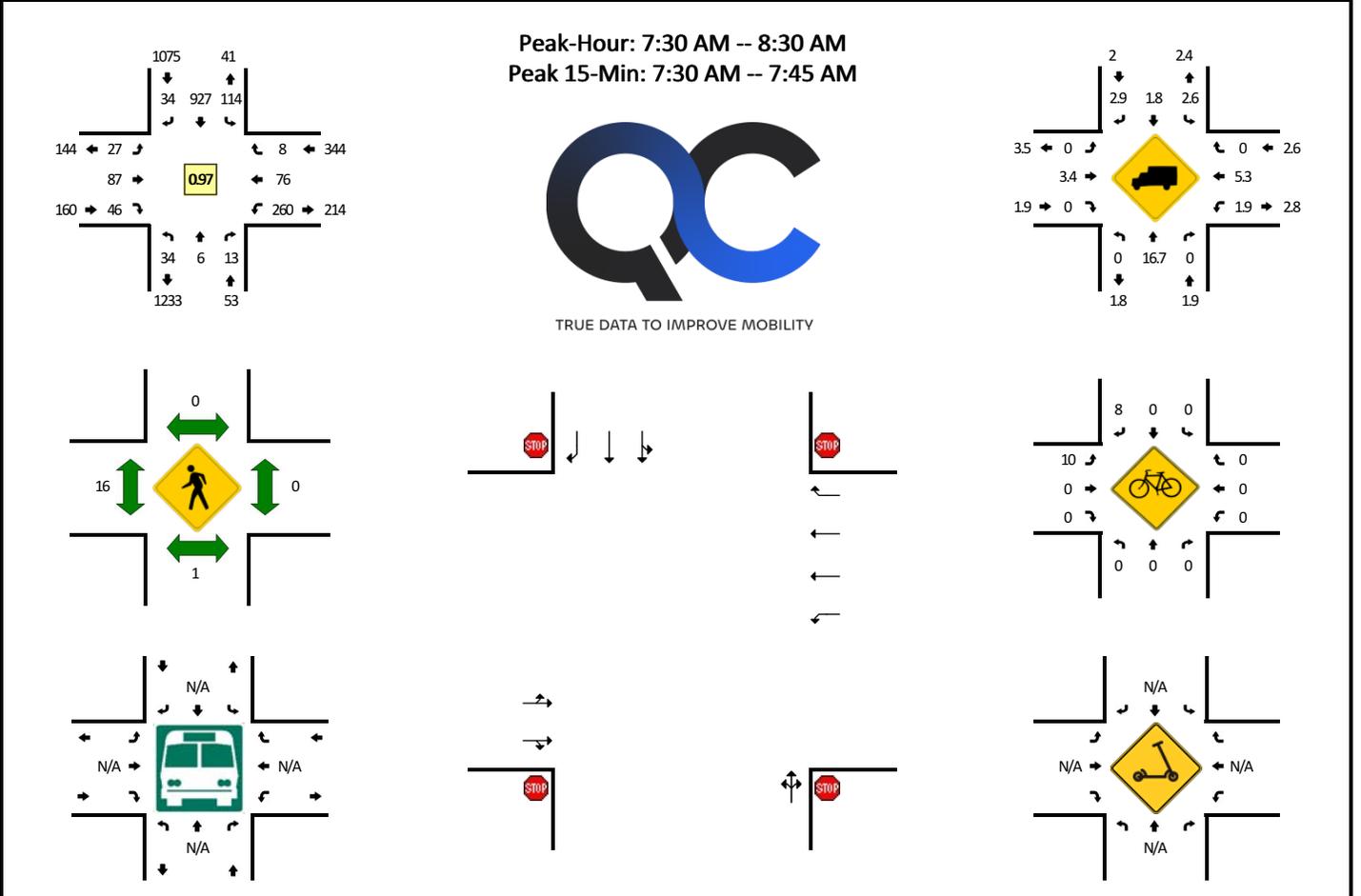
Notes

\* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

## Appendix C: Traffic Counts

**LOCATION:** W Frontage Rd -- University Ave  
**CITY/STATE:** Berkeley, CA

**QC JOB #:** 17365501  
**DATE:** Tue, Dec 9 2025

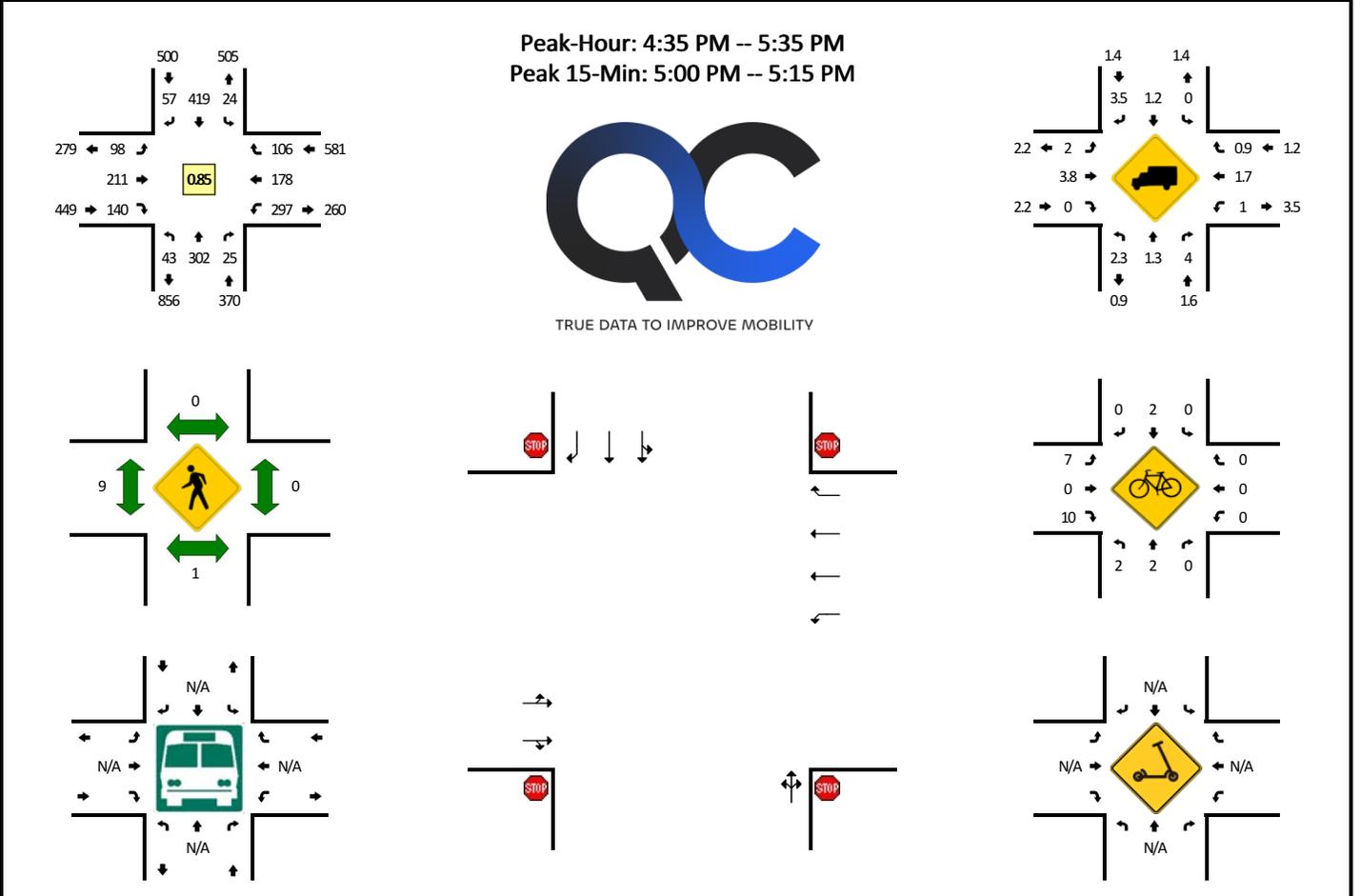


5-Min Count Period Beginning At	W Frontage Rd (Northbound)				W Frontage Rd (Southbound)				University Ave (Eastbound)				University Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U														
7:00 AM	4	0	0	0	7	45	4	0	2	3	0	0	5	9	0	0	79	
7:05 AM	4	0	0	0	9	49	3	0	2	1	4	0	8	3	0	0	83	
7:10 AM	2	0	2	0	7	49	2	0	1	7	1	0	7	5	0	0	83	
7:15 AM	1	0	0	0	12	58	3	0	4	6	1	0	7	9	0	0	101	
7:20 AM	1	0	0	0	8	52	7	0	2	3	1	0	11	5	0	0	90	
7:25 AM	3	1	0	0	5	68	7	0	1	3	1	0	12	15	0	0	116	
7:30 AM	1	1	0	0	6	76	4	0	5	7	5	0	22	14	2	0	143	
7:35 AM	2	0	0	0	8	81	4	0	0	6	6	0	28	7	0	0	142	
7:40 AM	6	0	2	0	10	82	1	0	0	9	3	0	21	2	1	0	137	
7:45 AM	3	0	1	0	8	73	2	0	4	7	2	0	22	6	0	0	128	
7:50 AM	5	0	1	0	12	73	4	0	1	9	2	0	22	7	0	0	136	
7:55 AM	2	1	1	0	17	73	7	0	3	1	5	0	27	7	0	0	144	1382
8:00 AM	3	0	1	0	5	77	2	0	2	10	5	0	15	2	0	0	122	1425
8:05 AM	1	1	2	0	7	78	2	0	2	8	5	0	18	9	2	0	135	1477
8:10 AM	2	2	2	0	5	85	4	0	3	7	2	0	23	6	0	0	141	1535
8:15 AM	2	0	2	0	14	70	2	0	4	11	2	0	16	4	1	0	128	1562
8:20 AM	2	0	1	0	14	91	1	0	1	6	5	0	14	4	0	0	139	1611
8:25 AM	5	1	0	0	8	68	1	0	2	6	4	0	32	8	2	0	137	1632
8:30 AM	7	1	0	0	11	65	3	0	3	4	4	0	18	7	0	0	123	1612
8:35 AM	0	0	4	0	11	70	1	0	5	6	3	0	18	11	1	0	130	1600
8:40 AM	3	0	0	0	11	67	2	0	3	10	4	0	17	13	0	0	130	1593
8:45 AM	2	0	1	0	9	78	5	0	1	7	2	0	19	6	0	0	130	1595
8:50 AM	7	0	0	0	11	75	4	0	2	9	3	0	17	10	1	0	139	1598
8:55 AM	3	1	1	0	9	73	3	0	1	9	1	0	12	13	0	0	126	1580
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U														
All Vehicles	36	4	8	0	96	956	36	0	20	88	56	0	284	92	12	0	1688	
Heavy Trucks	0	0	0		8	12	0		0	0	0		0	0	0		20	
Buses																		
Pedestrians		0				0				0				0			0	
Bicycles		0				0	8			0	0			0	0		12	
Scoters																		

Comments:

**LOCATION:** W Frontage Rd -- University Ave  
**CITY/STATE:** Berkeley, CA

**QC JOB #:** 17365502  
**DATE:** Tue, Dec 9 2025

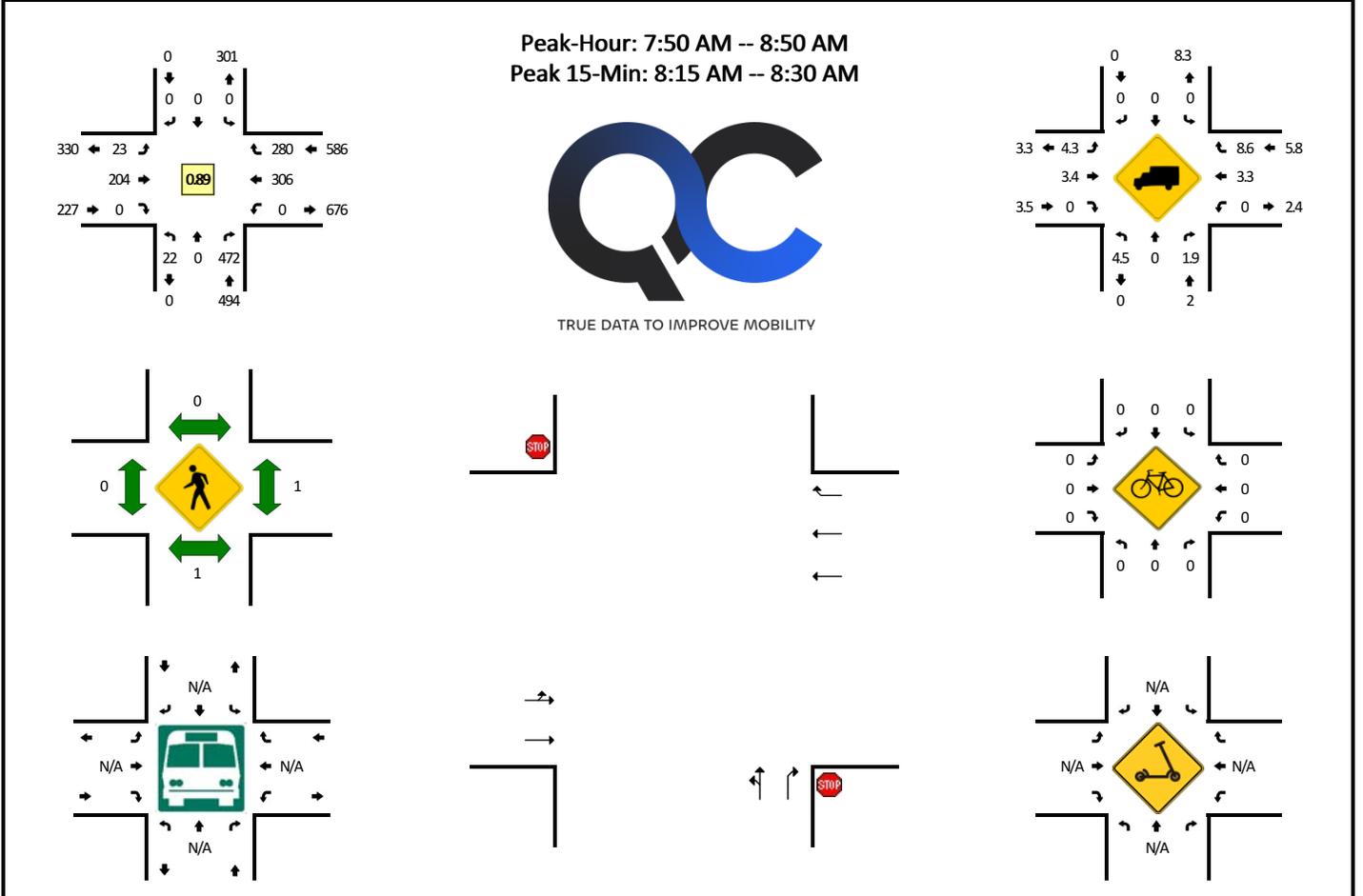


5-Min Count Period Beginning At	W Frontage Rd (Northbound)				W Frontage Rd (Southbound)				University Ave (Eastbound)				University Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U														
4:00 PM	1	29	3	0	3	29	5	0	5	17	6	0	22	19	3	0	142	
4:05 PM	4	27	2	0	2	16	2	0	5	18	9	0	24	17	2	0	128	
4:10 PM	4	29	2	0	2	21	4	0	6	17	9	0	21	13	3	0	131	
4:15 PM	5	28	1	0	0	19	2	0	7	9	6	0	24	16	8	0	125	
4:20 PM	4	31	1	0	0	16	1	0	6	10	5	0	22	21	6	0	123	
4:25 PM	4	32	4	0	1	30	4	0	4	12	3	0	18	25	5	0	142	
4:30 PM	5	28	0	0	1	27	5	0	8	10	3	0	14	25	6	0	132	
4:35 PM	3	25	1	0	3	27	8	0	4	11	9	0	25	23	7	0	146	
4:40 PM	2	29	3	0	1	32	1	0	4	19	7	0	25	15	11	0	149	
4:45 PM	4	28	1	0	3	32	5	0	8	10	6	0	22	21	9	0	149	
4:50 PM	4	23	2	0	1	41	5	0	7	17	13	0	27	23	3	0	166	
4:55 PM	5	22	1	0	2	43	5	0	4	13	11	0	29	9	7	0	151	1684
5:00 PM	5	23	4	0	0	52	6	0	8	25	13	0	27	10	7	0	180	1722
5:05 PM	2	23	1	0	2	52	3	0	13	22	21	0	26	19	14	0	198	1792
5:10 PM	5	22	2	0	1	46	5	0	11	19	21	1	24	17	9	0	183	1844
5:15 PM	3	22	1	0	3	15	2	0	12	24	15	0	24	13	9	0	143	1862
5:20 PM	3	24	3	0	5	25	6	0	12	12	10	0	26	14	9	0	149	1888
5:25 PM	1	30	0	0	2	31	7	0	8	20	5	0	20	10	9	0	143	1889
5:30 PM	6	31	6	0	1	23	4	0	6	19	9	0	22	4	12	0	143	1900
5:35 PM	4	27	0	0	4	39	8	0	3	6	5	0	19	15	13	0	143	1897
5:40 PM	2	24	3	0	3	44	5	0	5	8	6	0	29	15	6	0	150	1898
5:45 PM	4	24	5	0	2	43	5	0	1	11	3	0	30	9	5	1	143	1892
5:50 PM	4	28	0	0	3	27	4	0	1	7	6	0	31	11	9	0	131	1857
5:55 PM	3	26	2	0	1	33	3	0	1	12	9	0	28	10	8	0	136	1842
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U														
All Vehicles	48	272	28	0	12	600	56	0	128	264	220	4	308	184	120	0	2244	
Heavy Trucks	0	4	0		0	8	0		0	8	0		0	0	0		20	
Buses																		
Pedestrians		0				0				8				0			8	
Bicycles	4	8	0		0	8	0		0	0	4		0	0	0		24	
Scoters																		

Comments:

**LOCATION:** I-580 WB Ramps -- University Ave  
**CITY/STATE:** Berkeley, CA

**QC JOB #:** 17365503  
**DATE:** Tue, Dec 9 2025

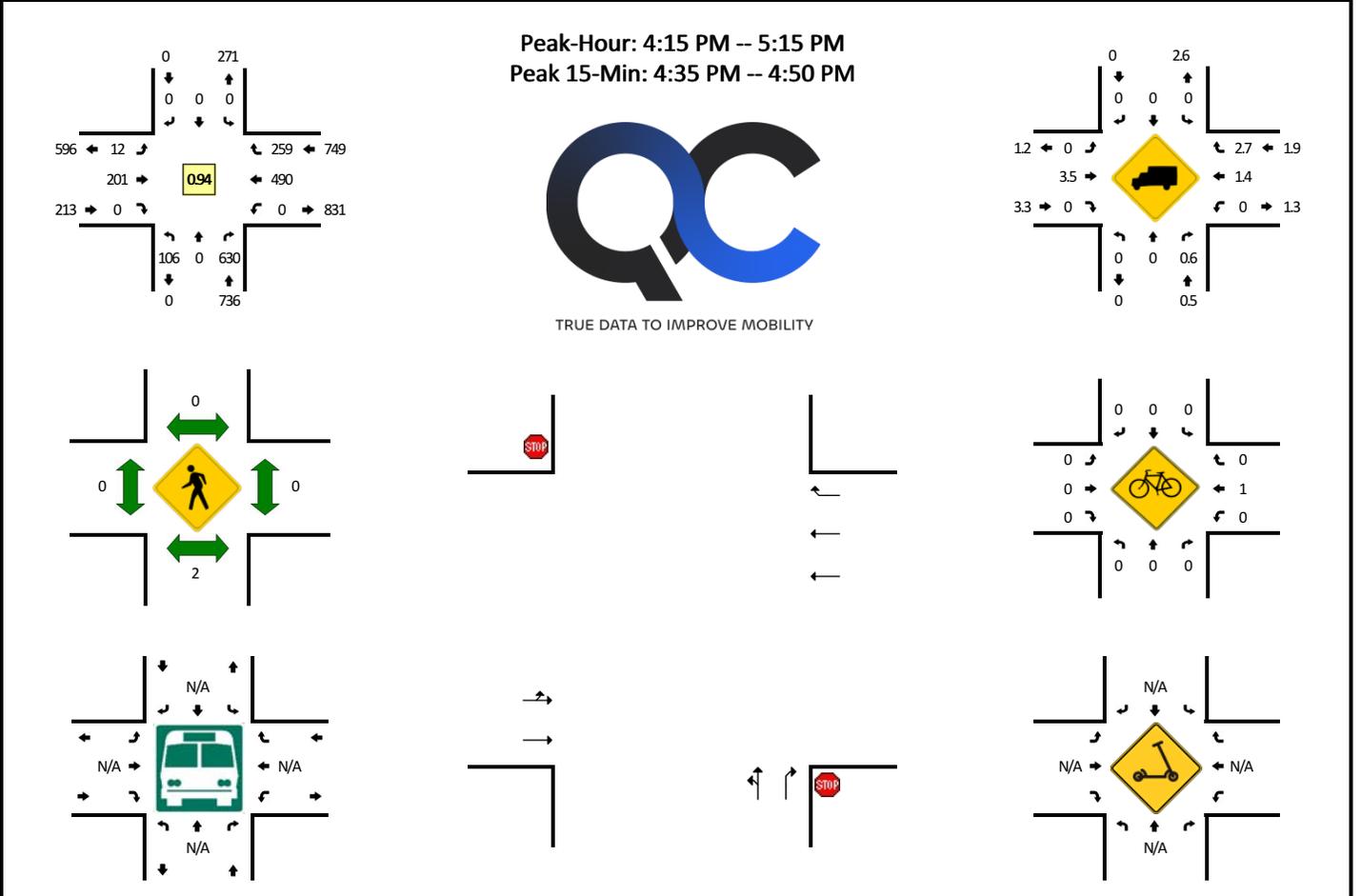


5-Min Count Period Beginning At	I-580 WB Ramps (Northbound)				I-580 WB Ramps (Southbound)				University Ave (Eastbound)				University Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	7	0	0	0	0	0	2	9	0	1	0	14	16	0	49	
7:05 AM	1	0	26	0	0	0	0	0	4	5	0	0	0	11	19	0	66	
7:10 AM	2	0	28	0	0	0	0	0	3	13	0	0	0	11	22	0	79	
7:15 AM	0	0	24	0	0	0	0	0	4	13	0	0	0	14	17	0	72	
7:20 AM	1	0	25	0	0	0	0	0	2	9	0	0	0	16	16	0	69	
7:25 AM	5	0	33	0	0	0	0	0	0	8	0	0	0	23	18	0	87	
7:30 AM	9	0	27	0	0	0	0	0	1	12	0	0	0	27	18	0	94	
7:35 AM	9	0	35	0	0	0	0	0	1	12	0	0	0	27	18	0	102	
7:40 AM	3	0	27	0	0	0	0	0	0	20	0	1	0	20	12	0	83	
7:45 AM	3	0	33	0	0	0	0	0	1	14	0	0	0	26	15	0	92	
7:50 AM	2	0	50	0	0	0	0	0	2	21	0	0	0	30	24	0	129	
7:55 AM	4	0	36	0	0	0	0	0	2	17	0	0	0	26	17	0	102	1024
8:00 AM	1	0	50	0	0	0	0	0	3	13	0	0	0	15	16	0	98	1073
8:05 AM	2	0	31	0	0	0	0	0	0	16	0	1	0	28	22	0	100	1107
8:10 AM	1	0	40	0	0	0	0	0	2	12	0	0	0	26	27	0	108	1136
8:15 AM	0	0	43	0	0	0	0	0	3	24	0	0	0	20	31	0	121	1185
8:20 AM	2	0	42	0	0	0	0	0	4	19	0	0	0	20	29	0	116	1232
8:25 AM	4	0	39	0	0	0	0	0	0	13	0	1	0	36	37	0	130	1275
8:30 AM	2	0	35	0	0	0	0	0	2	12	0	0	0	23	27	0	101	1282
8:35 AM	2	0	39	0	0	0	0	0	0	21	0	0	0	30	12	0	104	1284
8:40 AM	2	0	35	0	0	0	0	0	2	19	0	0	0	26	17	0	101	1302
8:45 AM	0	0	32	0	0	0	0	0	1	17	0	0	0	26	21	0	97	1307
8:50 AM	3	0	36	0	0	0	0	0	1	19	0	0	0	25	29	0	113	1291
8:55 AM	2	0	32	0	0	0	0	0	1	17	0	0	0	23	20	0	95	1284
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	24	0	496	0	0	0	0	0	28	224	0	4	0	304	388	0	1468	
Heavy Trucks	0	0	12	0	0	0	0	0	4	4	0	0	0	4	40	0	64	
Buses																		
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Scoters																		

Comments:

**LOCATION:** I-580 WB Ramps -- University Ave  
**CITY/STATE:** Berkeley, CA

**QC JOB #:** 17365504  
**DATE:** Tue, Dec 9 2025



5-Min Count Period Beginning At	I-580 WB Ramps (Northbound)				I-580 WB Ramps (Southbound)				University Ave (Eastbound)				University Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	0	39	0	0	0	0	0	2	22	0	0	0	43	32	0	143	
4:05 PM	2	0	44	0	0	0	0	0	1	21	0	0	0	39	22	0	129	
4:10 PM	4	0	42	0	0	0	0	0	0	21	0	0	0	36	20	0	123	
4:15 PM	7	0	51	0	0	0	0	0	0	10	0	0	0	41	31	0	140	
4:20 PM	11	0	54	0	0	0	0	0	2	9	0	0	0	35	28	0	139	
4:25 PM	8	0	55	0	0	0	0	0	0	17	0	0	0	43	23	0	146	
4:30 PM	4	0	48	0	0	0	0	0	1	10	0	0	0	42	26	0	131	
4:35 PM	6	0	64	0	0	0	0	0	3	12	0	0	0	51	35	0	171	
4:40 PM	6	0	48	0	0	0	0	0	2	21	0	0	0	39	17	0	133	
4:45 PM	6	0	55	0	0	0	0	0	1	13	0	0	0	51	21	0	147	
4:50 PM	13	0	55	0	0	0	0	0	0	19	0	0	0	39	9	0	135	
4:55 PM	13	0	45	0	0	0	0	0	2	15	0	0	0	30	16	0	121	1658
5:00 PM	11	0	51	0	0	0	0	0	0	29	0	0	0	36	18	0	145	1660
5:05 PM	13	0	61	0	0	0	0	0	1	25	0	0	0	41	12	0	153	1684
5:10 PM	8	0	43	0	0	0	0	0	0	21	0	0	0	42	23	0	137	1698
5:15 PM	14	0	42	0	0	0	0	0	1	28	0	0	0	32	22	0	139	1697
5:20 PM	16	0	53	0	0	0	0	0	2	18	0	0	0	28	18	0	135	1693
5:25 PM	9	0	61	0	0	0	0	0	1	20	0	0	0	28	18	0	137	1684
5:30 PM	4	0	46	0	0	0	0	0	1	26	0	0	0	35	13	0	125	1678
5:35 PM	12	0	39	0	0	0	0	0	0	11	0	0	0	40	23	0	125	1632
5:40 PM	17	0	53	0	0	0	0	0	0	15	0	0	0	35	22	0	142	1641
5:45 PM	14	0	55	0	0	0	0	0	0	19	0	0	0	31	16	0	135	1629
5:50 PM	16	0	41	0	0	0	0	0	1	10	0	0	0	29	17	0	114	1608
5:55 PM	12	0	35	0	0	0	0	0	2	10	0	0	0	30	12	0	101	1588
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	72	0	668	0	0	0	0	0	24	184	0	0	0	564	292	0	1804	
Heavy Trucks	0	0	4	0	0	0	0	0	0	8	0	0	0	4	8	0	24	
Buses	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Scoters	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Comments:

## Appendix D: Synchro Reports – Project Conditions

Intersection	
Intersection Delay, s/veh	70
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔			↔			↔	↔
Traffic Vol, veh/h	27	102	46	260	197	8	74	6	13	114	927	74
Future Vol, veh/h	27	102	46	260	197	8	74	6	13	114	927	74
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	0	3	0	2	5	0	0	17	0	3	2	3
Mvmt Flow	28	105	47	268	203	8	76	6	13	118	956	76
Number of Lanes	0	2	0	1	2	0	0	1	0	0	2	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	3	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	1	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	3	3	2
HCM Control Delay	15.3	22.3	16.5	103
HCM LOS	C	C	C	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2	SBLn3
Vol Left, %	80%	35%	0%	100%	0%	0%	27%	0%	0%
Vol Thru, %	6%	65%	53%	0%	100%	89%	73%	100%	0%
Vol Right, %	14%	0%	47%	0%	0%	11%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	93	78	97	260	131	74	423	618	74
LT Vol	74	27	0	260	0	0	114	0	0
Through Vol	6	51	51	0	131	66	309	618	0
RT Vol	13	0	46	0	0	8	0	0	74
Lane Flow Rate	96	80	100	268	135	76	436	637	76
Geometry Grp	6	6	6	6	6	6	5	5	5
Degree of Util (X)	0.262	0.211	0.25	0.662	0.318	0.175	0.881	1.259	0.136
Departure Headway (Hd)	10.214	9.944	9.473	9.252	8.792	8.627	7.269	7.115	6.422
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	354	363	382	394	412	418	497	510	553
Service Time	7.914	7.644	7.173	6.952	6.492	6.327	5.066	4.912	4.219
HCM Lane V/C Ratio	0.271	0.22	0.262	0.68	0.328	0.182	0.877	1.249	0.137
HCM Control Delay	16.5	15.3	15.3	28.3	15.5	13.1	43.6	154.7	10.2
HCM Lane LOS	C	C	C	D	C	B	E	F	B
HCM 95th-tile Q	1	0.8	1	4.6	1.3	0.6	9.6	25.4	0.5

Intersection	
Intersection Delay, s/veh	123.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔		↗	↕↕			↔			↔↔	↗
Traffic Vol, veh/h	98	332	140	297	193	106	48	306	25	24	419	62
Future Vol, veh/h	98	332	140	297	193	106	48	306	25	24	419	62
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	2	4	0	1	2	1	2	1	4	0	1	4
Mvmt Flow	115	391	165	349	227	125	56	360	29	28	493	73
Number of Lanes	0	2	0	1	2	0	0	1	0	0	2	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	2	3	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	1	2	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	3	3	2
HCM Control Delay	113.3	85.4	293.2	52.3
HCM LOS	F	F	F	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2	SBLn3
Vol Left, %	13%	37%	0%	100%	0%	0%	15%	0%	0%
Vol Thru, %	81%	63%	54%	0%	100%	38%	85%	100%	0%
Vol Right, %	7%	0%	46%	0%	0%	62%	0%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	379	264	306	297	129	170	164	279	62
LT Vol	48	98	0	297	0	0	24	0	0
Through Vol	306	166	166	0	129	64	140	279	0
RT Vol	25	0	140	0	0	106	0	0	62
Lane Flow Rate	446	311	360	349	151	200	193	329	73
Geometry Grp	6	6	6	6	6	6	5	5	5
Degree of Util (X)	1.545	1.008	1.121	1.152	0.479	0.609	0.556	0.944	0.196
Departure Headway (Hd)	12.911	13.462	12.945	13.509	12.99	12.503	11.938	11.878	11.183
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	285	273	284	273	280	291	304	309	323
Service Time	10.611	11.162	10.645	11.209	10.69	10.203	9.638	9.578	8.883
HCM Lane V/C Ratio	1.565	1.139	1.268	1.278	0.539	0.687	0.635	1.065	0.226
HCM Control Delay	293.2	96.1	128.1	140.8	27.1	32.9	28.6	74.1	16.6
HCM Lane LOS	F	F	F	F	D	D	D	F	C
HCM 95th-tile Q	25.4	10.2	13.1	13.6	2.4	3.7	3.2	9.4	0.7