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# TECHNICAL MEMORANDUM

**TO:** Mr. Todd Tipton, City of Culver City

**FROM:** Srinath Raju, P.E.
Bruce Chow

DRAFT

**SUBJECT:** 8777 Washington Boulevard Project
Traffic Evaluation - TUP

**DATE:** January 20, 2018

**REF:** RA 542

This technical memorandum documents an evaluation of the construction traffic in support of the Temporary Use Permit (TUP) for the 8777 Washington Boulevard Project in the City of Culver City, California. The Project is located on the northeast corner of the National Boulevard and Washington Boulevard intersection.

## BACKGROUND

The City allowed construction work hours per *Chapter 9.07 Noise Regulation, Section 9.07.035 Construction* are:

- 8:00 a.m. and 8:00 p.m. Mondays through Fridays
- 9:00 a.m. and 7:00 p.m. Saturdays
- 10:00 a.m. and 7:00 p.m. Sundays

As part of the TUP, the Proposed Project requests that the construction work hours be extended to 6:00 AM to 8:00 PM to expedite the construction schedule. In addition, the TUP requests that construction be allowed all day, for six days over a one-month time period that the foundation pour activity would take place.

## CONSTRUCTION HAUL ROUTES

The construction haul route is shown on Figures 1 and 2. The key haul route involves access to and from the Santa Monica Freeway (I-10 Freeway) located north of the project site. The two main roadways, Washington Boulevard and National Boulevard, serve as the primary access to the project site.

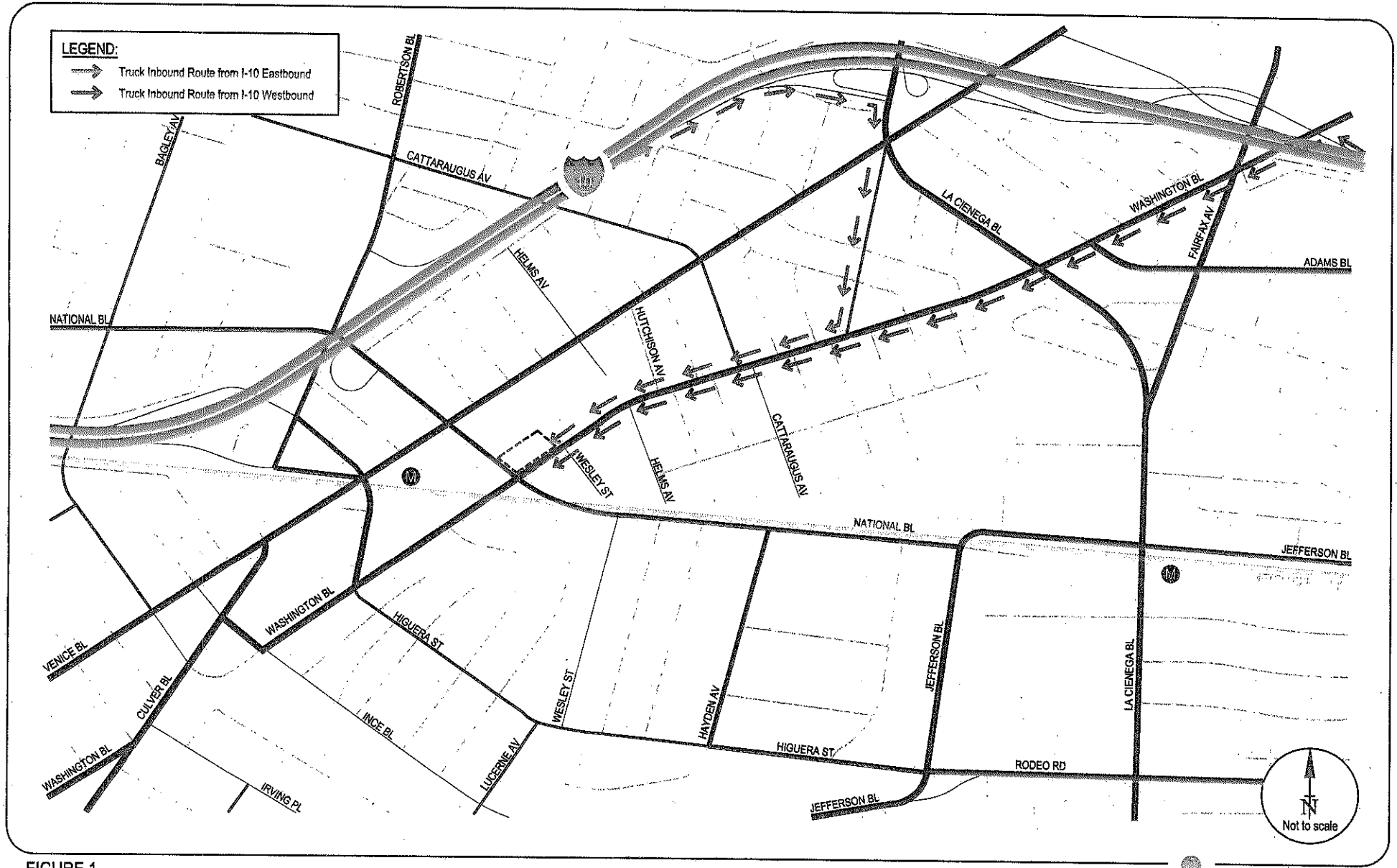


FIGURE 1
HAUL ROUTE TO JOBSITE

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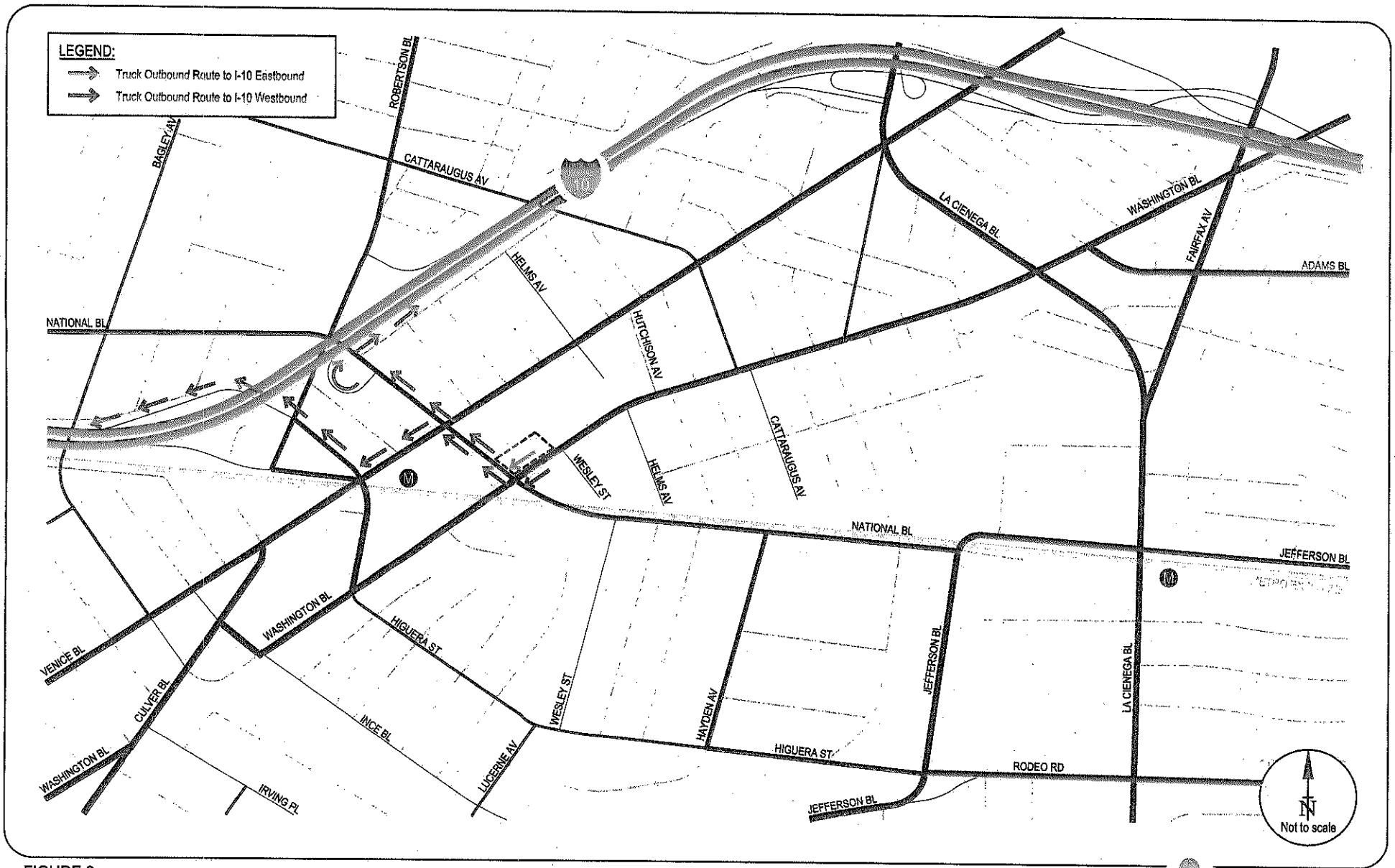


FIGURE 2
HAUL ROUTE LEAVING JOBSITE

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Construction truck traffic approaching the Project Site would gain access via Washington Boulevard and La Cienega Avenue from the I-10 westbound and I-10 eastbound, respectively. Construction traffic leaving the Project Site would travel to I-10 westbound via Washington Boulevard to National Boulevard to Venice Boulevard and to Robertson Boulevard to the I-10 westbound on-ramp. Construction traffic leaving the Project Site would travel to the I-10 eastbound via Washington Boulevard to National Boulevard to the I-10 eastbound on-ramp.

A brief description of description of these access roadways within the City of Culver City follows:

- Washington Boulevard – Washington Boulevard is classified as a primary arterial roadway within the City of Culver City. Washington Boulevard traverses in an east-west direction and generally offers four travel lanes, two lanes per direction, with a central left-turn lane or median. On-street parking is generally allowed along this roadway in the vicinity of the study area.
- National Boulevard – National Boulevard is a secondary arterial/roadway that runs in a southeast-northwest direction. It generally offers two lanes in each direction and provides a connection to the I-10 (Santa Monica) Freeway north of the Project site. On-street parking is available along many stretches of this roadway north of the project site, generally, except at major intersections where turn lanes are provided.

Daily traffic counts were conducted at five roadway segments in November 2017 along the key construction traffic routes. The five roadway segments include:

1. National Boulevard, north of Venice Boulevard
2. National Boulevard, south of Venice Boulevard
3. National Boulevard, south of Washington Boulevard
4. Washington Boulevard, east of Higuera Street
5. Washington Boulevard, east of Wesley Street

**BASELINE CONDITIONS**

The diurnal distribution of traffic volumes along these roadway segments by time of day is shown in Figure 3. An examination of the roadway counts at the hours of 6:00 AM, 8:00 AM, and 8:00 PM was conducted to evaluate the traffic volumes during the extended construction time period as compared to the original construction time period. Additionally, during the foundation pour time period for a month, the 24-hour traffic distribution was also examined and evaluated.

As shown on Table 1, the existing traffic volumes are lower during the time period requested by the TUP prior to the morning peak period as compared to the City Standard construction time period (8:00 AM-8:00 PM) per the applicable City Ordinance.

Figure 3 indicates that the traffic volumes at 6:00 AM of the extended construction period are lower along all key roadways (construction haul routes) as compared to the traffic volumes at 8:00 AM (allowed by the applicable City Ordinance) along the same segments. The peak period of congestion occurs during the 7:00 to 9:00 AM and 4:00 to 6:00 PM time periods.

FIGURE 3
ROADWAY AVERAGE DAILY TRAFFIC

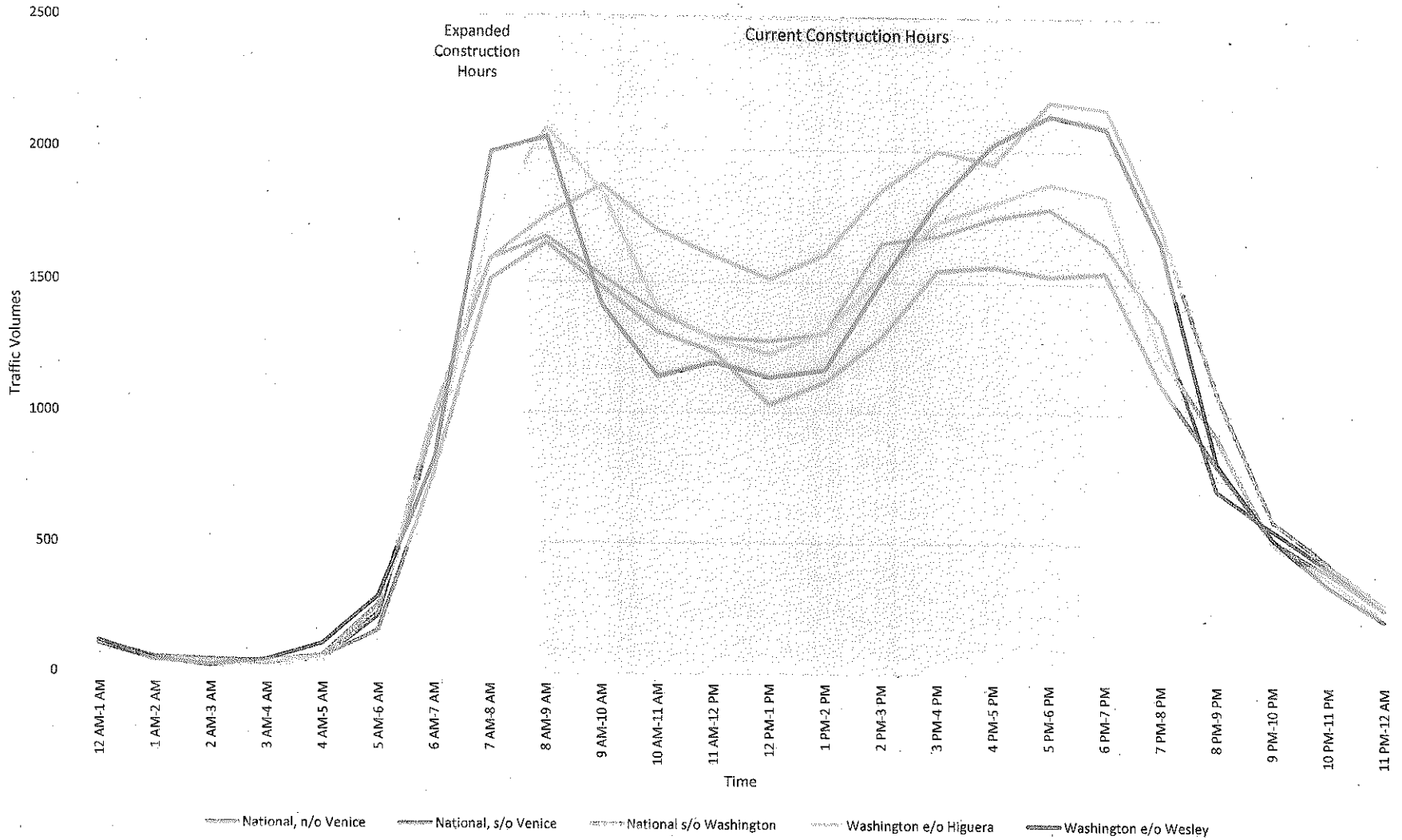


**TABLE 1**
**ROADWAY SEGMENT COUNTS DURING CONSTRUCTION HOURS**

| ROADWAY SEGMENT | HOURLY TRAFFIC VOLUMES AT 6:00 AM | HOURLY TRAFFIC VOLUMES AT 8:00 AM | HOURLY TRAFFIC VOLUMES AT 8:00 PM |
|---|---|---|---|
| National Boulevard, north of Venice Boulevard | 769 | 1643 | 807 |
| National Boulevard, south of Venice Boulevard | 949 | 1667 | 714 |
| National Boulevard, south of Washington Boulevard | 1005 | 1746 | 1078 |
| Washington Boulevard, east of Higuera Street | 821 | 2085 | 918 |
| Washington Boulevard, east of Wesley Street | 815 | 2048 | 817 |

For the six days within the one-month construction period when all day construction is requested, there is less traffic during the early morning and late-night hours and construction traffic would be spread out over the day thereby reducing the amount of construction traffic during the peak congestion periods.

Therefore, it was noted from the actual observed traffic counts that there would be less traffic during the extended construction period for the construction trucks and workers that would arrive during the early morning hours compared to their arrival during the peak period per the City Standard time period (8:00 AM-8:00 PM). Extending the construction period would in effect substantially lower the additional traffic during morning peak commute periods thereby affecting the traffic conditions during the congested peak hours of travel, to a much lower extent.

An evaluation of the effects of construction traffic with the extended hours, as well as all day construction for six days over a one-month time period, is provided below.

## CONSTRUCTION TRIP GENERATION

Information provided by Morley Builders indicates that the Proposed Project construction would occur in three main phases. Construction of the project is expected to take a total of approximately 26 months to complete. No phases of construction would overlap. A description of the phases of construction follows.

- **Phase 1 – Demolition and Excavation**: The first phase of the Proposed Project construction includes removing the existing building and surface parking area and excavation. The excavation phase includes heavy construction equipment which would be located on-site during excavation and would not travel to and from the project site on a daily basis. It is anticipated that equipment needs associated with excavation activities would include loaders, excavator, crane, haul trucks, and dump trucks. On an average, a total of 80 haul trucks and 30 employees per day are anticipated during this phase of construction.

- **Phase 2 – Concrete**: The second phase of the Proposed Project construction includes placement of mat foundation and subsequent slabs for three subterranean parking levels and four levels of above grade office. Building construction of the project consists of the sub-grade and above grade building construction. It is anticipated that equipment needs associated with these building construction activities would include a crane, fork-lifts, concrete pump, electric concrete placing boom, and concrete trucks. During the peak period of the building construction phase, a work force of 50 construction workers would be necessary. A total of 32 construction trucks per day are anticipated during all periods of construction.

- **Phase 3 – Exterior Skin Building Enclosure and Interior Finishing:** The third phase of the Proposed Project construction includes exterior building construction and finishing construction. Building and finishing construction of the project consists of exterior construction such as the glass enclosure for the office and sealing of floors, and interior construction activities such as flooring, dry-walling, tiling, painting, plumbing, electrical, and installing cabinets and shelving, and fixtures. This phase includes all the necessary improvements for tenant move-in. During the peak period of the finishing construction phase, a workforce of 100 construction workers would be necessary. A total of 50 material delivery trucks per day are anticipated during all periods of construction.

Construction traffic generation includes trips associated with construction trucks, delivery trucks, and construction worker vehicles. Table 2 summarizes the estimated maximum trip generation during each phase of construction. In the City Standard time period of construction scenario, the project construction traffic would add 73 trips in the morning peak period and 11 trips during the evening peak period. In the expanded construction hours (as requested by TUP), the project construction traffic would add 11 trips during both the morning and evening peak periods of commuter travel.

Therefore, the expanded construction period has less construction trips during the AM peak hour as compared to the same under the City Standard construction time period. The expanded construction period results in a shifting of construction worker trips to outside of the AM peak hours of commuter traffic.

Additionally, during the six days within the one-month time period when all day construction is being requested, the construction-related traffic would be spread out the entire day thereby minimizing the effect during the peak periods of traffic. Further, existing traffic during 8:00 PM to 6:00 AM (i.e., additional time-period that is being requested for all day construction for six days over a 1-month time period by the TUP), is less than approximately 600 vehicles/hour/lane along all construction routes indicating that there is much less traffic congestion and more available capacity along all these routes during the late-night time periods that expanded hours construction traffic would be utilizing. Therefore, from a traffic operations perspective, the all-day construction activity for the six days during the 1-month construction period being requested by the TUP would not substantially affect traffic conditions and can be accommodated on the roadway system.

**CUMULATIVE CONSTRUCTION TRAFFIC EVALUATION**

The Ivy Station Project that is currently under construction, was also granted a TUP. The Technical Memorandum dated October 9, 2017, titled *Ivy Station TOD, Culver City, CA – Construction Hauling Traffic Evaluation*, prepared by Kimley-Horn and Associates, Inc. was reviewed to examine the potential cumulative construction traffic effects of both the Ivy Station and 8777 Washington Boulevard Projects. The following key observations and analysis are presented below.

- The Ivy Station's construction site is located at the Expo Line Metro Station in Culver City at the northwest corner of National Boulevard and Washington Boulevard and includes construction of a mix of commercial retail, office, residential and hotel uses with parking provided in the site's subterranean garage.
- Per the Ivy Station's Transportation Management Plan (TMP), construction vehicles and trucks access the site from Venice Boulevard and National Boulevard. For trucks accessing the site along Venice Boulevard, trucks would travel from I-10 freeway to Robertson Boulevard southbound to proceed to Venice Boulevard eastbound to access the site. The trucks egressing the site would travel eastbound along Venice to northbound National Boulevard to the I-10 freeway, or continue traveling eastbound on Venice Boulevard to access the I-10 freeway at the La Cienega Boulevard interchange. For site access from National Boulevard, trucks would travel southbound on National Boulevard and enter from the southwest corner of Venice and National Boulevards. Trucks leaving the site would egress by traveling southbound on National Boulevard, proceed westbound on Washington Boulevard, and northbound on Robertson Boulevard.
- Based on these travel paths, the Ivy Station construction trucks would not be traveling on any of the roadway segments that the construction trucks to and from the 8777 Washington Boulevard construction site would be traveling on, except the short segment

**TABLE 2**
**ESTIMATED CONSTRUCTION PEAK TRIP GENERATION**

| | Number per Day | City Standard Per Ordinance (8:00 AM-8:00 PM) | | | | | | Requested per TUP (6:00 AM-8:00 PM) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AM Peak Hour | | | PM Peak Hour | | | AM Peak Hour | | | PM Peak Hour | | |
| | | IN | OUT | TOTAL | IN | OUT | TOTAL | IN | OUT | TOTAL | IN | OUT | TOTAL |
| **Phase 1** | | | | | | | | | | | | | |
| **Shoring and Excavation** | | | | | | | | | | | | | |
| Construction Trucks | 80 | 4 | 3 | 7 | 4 | 3 | 7 | 3 | 3 | 6 | 3 | 3 | 6 |
| Construction Workers | 30 | 21 | 0 | 21 | 0 | 2 | 2 | 2 | 0 | 2 | 0 | 2 | 2 |
| Shoring and Excavation - Trip Generation Total | | 25 | 3 | 28 | 4 | 5 | 9 | 5 | 3 | 8 | 3 | 5 | 8 |
| **Phase 2** | | | | | | | | | | | | | |
| **Concrete** | | | | | | | | | | | | | |
| Construction Trucks | 32 | 2 | 1 | 3 | 2 | 2 | 3 | 1 | 1 | 2 | 1 | 1 | 2 |
| Construction Workers | 50 | 35 | 0 | 35 | 0 | 3 | 3 | 3 | 0 | 3 | 0 | 3 | 3 |
| Concrete - Trip Generation Total | | 37 | 1 | 38 | 2 | 5 | 6 | 4 | 1 | 5 | 1 | 4 | 5 |
| **Phase 3** | | | | | | | | | | | | | |
| **Exterior Skin and Interior Building** | | | | | | | | | | | | | |
| Construction Trucks | 50 | 2 | 2 | 4 | 2 | 2 | 4 | 2 | 2 | 4 | 2 | 2 | 4 |
| Construction Workers | 100 | 69 | 0 | 69 | 0 | 7 | 7 | 7 | 0 | 7 | 0 | 7 | 7 |
| Exterior Skin and Interior Building - Trip Generation Total | | 71 | 2 | 73 | 2 | 9 | 11 | 9 | 2 | 11 | 2 | 9 | 11 |

of National Boulevard from Venice Boulevard to the I-10 freeway interchange.

- An analysis and evaluation of the cumulative effects of construction traffic from the 8777 Washington Boulevard and Ivy Station construction sites at this segment of National Boulevard was conducted. The cumulative trips generated from the construction sites at 8777 Washington Boulevard and the Ivy Station Projects during the extended time period of construction (6 AM to 8 AM) indicate that in addition to the existing traffic, they would both be able to be accommodated along this stretch of National Boulevard between Venice and I-10 freeway. The cumulative construction traffic along this stretch of roadway would also be less than 600 vehicles per hour per lane. With the extended construction hours, the benefit of reducing construction traffic during the AM peak period would continue to be realized due to the shifting of construction worker traffic (to the 8777 Washington Boulevard construction site) to a timeframe when the existing traffic is lower prior to the morning peak period.
- Additionally, during the six days within the one-month time period when all day construction is being requested, the construction-related cumulative traffic would be spread out the entire day thereby minimizing the effect during the peak periods of traffic. Further, existing traffic during 8:00 PM to 6:00 AM (i.e., additional time-period that is being requested for all day construction for six days over a 1-month time period by the TUP), is less than approximately 600 vehicles/hour/lane along all construction routes including the National Boulevard segment between Venice and the I-10 freeway, indicating that there is much less traffic congestion and more available capacity along all these routes during the late-night time periods that expanded hours construction traffic would be utilizing. Therefore, from a traffic operations perspective, the all-day construction activity for the six days during the 1-month construction period being requested by the 8777 Washington Boulevard TUP would not substantially affect traffic conditions and can be accommodated on the roadway system.

**SUMMARY AND CONCLUSIONS**

As part of the TUP, the Proposed Project intends to expand the construction work hours to 6:00 AM to 8:00 PM from the City Standard 8:00 AM-8:00 PM hours per the applicable ordinance. Additionally, the TUP is requesting that all day construction be allowed for six days within a 1-month time period during the foundation pour activity. The following highlight the findings from this evaluation:

- There would be less traffic during the extended construction period for the construction trucks and workers along the key routes in the early morning hours.
- The expanded construction period results in a shifting of construction worker trips to outside of the AM peak hour of commuter traffic compared to the City Standard construction hours.
- Extending the construction period would therefore affect the traffic conditions during the congested morning peak hours of travel to a much lower extent.
- During the all-day construction scenario (six days within a 1-month time period) requested by the TUP, the existing traffic volumes along all the key routes would be less than approximately 600 vehicles/hour in the extended hours (8:00 PM-6:00 AM) indicating that there is available capacity along these routes during that extended time period.
- Given that the construction traffic would be spread out over the entire day during the all-day construction requested under the TUP for the six days within the 1-month time period, the construction traffic along the access routes would not substantially affect traffic

conditions and that additional construction traffic between 8:00 PM - 6:00 AM can be accommodated.

- Cumulative effects of construction traffic associated with both the Ivy Station and 8777 Washington Boulevard Projects were analyzed and evaluated. The construction haul routes of these two projects use mostly different roadway segments and directions and consequently, would not have overlapping effects. The one segment of National Boulevard between Venice Boulevard and the I-10 freeway that would be utilized by construction trucks departing from both project construction sites, would be able to accommodate the cumulative additional traffic during the expanded hours, since the traffic along that segment is lower than 600 vehicles per hour per lane in the expanded timeframe, both in the timeframe (6 AM to 8 AM) prior to the AM peak period, as well as during nighttime/early morning (8PM to 6AM) time period. The benefits relative to traffic circulation noted above, will continue to be realized with the expanded construction time period under cumulative conditions.

# ATTACHMENT 1

## ROADWAY SEGMENT DAILY TRAFFIC COUNTS

Thursday, November 02, 2017 Location: Culver PROJECT: SC1520

**ADT1 National north of Venice** **Prepared by AimTD tel. 714 253 7888**

| AM Period | NB | | SB | | EB | WB | | PM Period | NB | | SB | | EB | WB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0:00 | 23 | | 12 | | | | | 12:00 | 184 | | 90 | | | | |
| 0:15 | 15 | | 11 | | | | | 12:15 | 153 | | 92 | | | | |
| 0:30 | 14 | | 10 | | | | | 12:30 | 146 | | 98 | | | | |
| 0:45 | 21 | 73 | 10 | 43 | | | 116 | 12:45 | 159 | 642 | 109 | 389 | | | 1031 |
| 1:00 | 10 | | 14 | | | | | 13:00 | 148 | | 147 | | | | |
| 1:15 | 11 | | 0 | | | | | 13:15 | 109 | | 115 | | | | |
| 1:30 | 4 | | 4 | | | | | 13:30 | 158 | | 145 | | | | |
| 1:45 | 7 | 32 | 6 | 24 | | | 56 | 13:45 | 141 | 556 | 152 | 559 | | | 1115 |
| 2:00 | 6 | | 6 | | | | | 14:00 | 161 | | 145 | | | | |
| 2:15 | 5 | | 3 | | | | | 14:15 | 144 | | 138 | | | | |
| 2:30 | 8 | | 5 | | | | | 14:30 | 146 | | 177 | | | | |
| 2:45 | 6 | 25 | 7 | 21 | | | 46 | 14:45 | 177 | 628 | 198 | 658 | | | 1286 |
| 3:00 | 6 | | 3 | | | | | 15:00 | 191 | | 195 | | | | |
| 3:15 | 4 | | 3 | | | | | 15:15 | 166 | | 225 | | | | |
| 3:30 | 8 | | 5 | | | | | 15:30 | 183 | | 221 | | | | |
| 3:45 | 5 | 23 | 7 | 18 | | | 41 | 15:45 | 142 | 682 | 224 | 865 | | | 1547 |
| 4:00 | 3 | | 4 | | | | | 16:00 | 166 | | 205 | | | | |
| 4:15 | 6 | | 4 | | | | | 16:15 | 164 | | 244 | | | | |
| 4:30 | 15 | | 10 | | | | | 16:30 | 179 | | 216 | | | | |
| 4:45 | 9 | 33 | 7 | 25 | | | 58 | 16:45 | 158 | 667 | 230 | 895 | | | 1562 |
| 5:00 | 19 | | 8 | | | | | 17:00 | 175 | | 197 | | | | |
| 5:15 | 16 | | 11 | | | | | 17:15 | 167 | | 213 | | | | |
| 5:30 | 31 | | 10 | | | | | 17:30 | 170 | | 228 | | | | |
| 5:45 | 46 | 112 | 20 | 49 | | | 161 | 17:45 | 192 | 704 | 186 | 824 | | | 1528 |
| 6:00 | 59 | | 13 | | | | | 18:00 | 177 | | 196 | | | | |
| 6:15 | 113 | | 23 | | | | | 18:15 | 204 | | 194 | | | | |
| 6:30 | 210 | | 34 | | | | | 18:30 | 206 | | 213 | | | | |
| 6:45 | 274 | 656 | 43 | 113 | | | 769 | 18:45 | 167 | 754 | 185 | 788 | | | 1542 |
| 7:00 | 275 | | 54 | | | | | 19:00 | 165 | | 163 | | | | |
| 7:15 | 302 | | 77 | | | | | 19:15 | 123 | | 149 | | | | |
| 7:30 | 280 | | 123 | | | | | 19:30 | 121 | | 166 | | | | |
| 7:45 | 230 | 1087 | 168 | 422 | | | 1509 | 19:45 | 90 | 499 | 138 | 616 | | | 1115 |
| 8:00 | 244 | | 153 | | | | | 20:00 | 103 | | 143 | | | | |
| 8:15 | 279 | | 163 | | | | | 20:15 | 67 | | 138 | | | | |
| 8:30 | 215 | | 155 | | | | | 20:30 | 89 | | 109 | | | | |
| 8:45 | 248 | 986 | 186 | 657 | | | 1643 | 20:45 | 87 | 346 | 71 | 461 | | | 807 |
| 9:00 | 256 | | 168 | | | | | 21:00 | 85 | | 62 | | | | |
| 9:15 | 263 | | 122 | | | | | 21:15 | 70 | | 53 | | | | |
| 9:30 | 241 | | 111 | | | | | 21:30 | 78 | | 58 | | | | |
| 9:45 | 195 | 955 | 124 | 525 | | | 1480 | 21:45 | 80 | 313 | 36 | 209 | | | 522 |
| 10:00 | 223 | | 95 | | | | | 22:00 | 69 | | 44 | | | | |
| 10:15 | 236 | | 82 | | | | | 22:15 | 59 | | 34 | | | | |
| 10:30 | 253 | | 86 | | | | | 22:30 | 45 | | 42 | | | | |
| 10:45 | 240 | 952 | 93 | 356 | | | 1308 | 22:45 | 65 | 238 | 42 | 162 | | | 400 |
| 11:00 | 229 | | 87 | | | | | 23:00 | 59 | | 25 | | | | |
| 11:15 | 224 | | 86 | | | | | 23:15 | 34 | | 29 | | | | |
| 11:30 | 225 | | 87 | | | | | 23:30 | 31 | | 23 | | | | |
| 11:45 | 189 | 867 | 103 | 363 | | | 1230 | 23:45 | 35 | 159 | 25 | 102 | | | 261 |
| **Total Vol.** | | 5801 | | 2616 | | | **8417** | | | 6188 | | 6528 | | | **12716** |

**Daily Totals**

| NB | SB | EB | WB | Combined |
|---|---|---|---|---|
| 11989 | 9144 | | | **21133** |

| | AM | | | PM | | |
|---|---|---|---|---|---|---|
| **Split %** | 68.9% | 31.1% | **39.8%** | 48.7% | 51.3% | **60.2%** |
| **Peak Hour** | 6:45 | 8:15 | **8:15** | 17:45 | 16:00 | **17:45** |
| **Volume** | 1131 | 672 | **1670** | 779 | 895 | **1568** |
| **P.H.F.** | 0.94 | 0.90 | **0.94** | 0.95 | 0.92 | **0.94** |

cs@aimtd.com Tell. 714 253 7888

Thursday, November 02, 2017 | Location: Culver | PROJECT: SC1520

**ADT2 National south of Venice** | **Prepared by AimTD tel. 714 253 7888**

| AM Period | NB | | SB | | EB | WB | | PM Period | NB | | SB | | EB | WB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0:00 | 12 | | 20 | | | | | 12:00 | 185 | | 99 | | | | |
| 0:15 | 14 | | 12 | | | | | 12:15 | 186 | | 120 | | | | |
| 0:30 | 9 | | 13 | | | | | 12:30 | 184 | | 145 | | | | |
| 0:45 | 17 | 52 | 11 | 56 | | | 108 | 12:45 | 186 | 741 | 167 | 531 | | | 1272 |
| 1:00 | 6 | | 10 | | | | | 13:00 | 158 | | 156 | | | | |
| 1:15 | 5 | | 0 | | | | | 13:15 | 148 | | 167 | | | | |
| 1:30 | 7 | | 7 | | | | | 13:30 | 153 | | 178 | | | | |
| 1:45 | 3 | 21 | 4 | 21 | | | 42 | 13:45 | 162 | 621 | 180 | 681 | | | 1302 |
| 2:00 | 3 | | 8 | | | | | 14:00 | 155 | | 230 | | | | |
| 2:15 | 5 | | 3 | | | | | 14:15 | 172 | | 210 | | | | |
| 2:30 | 5 | | 2 | | | | | 14:30 | 199 | | 230 | | | | |
| 2:45 | 6 | 19 | 5 | 18 | | | 37 | 14:45 | 190 | 716 | 260 | 930 | | | 1646 |
| 3:00 | 7 | | 2 | | | | | 15:00 | 215 | | 268 | | | | |
| 3:15 | 3 | | 2 | | | | | 15:15 | 174 | | 241 | | | | |
| 3:30 | 3 | | 5 | | | | | 15:30 | 187 | | 207 | | | | |
| 3:45 | 5 | 18 | 5 | 14 | | | 32 | 15:45 | 154 | 730 | 230 | 946 | | | 1676 |
| 4:00 | 4 | | 4 | | | | | 16:00 | 198 | | 273 | | | | |
| 4:15 | 4 | | 5 | | | | | 16:15 | 176 | | 245 | | | | |
| 4:30 | 11 | | 10 | | | | | 16:30 | 207 | | 240 | | | | |
| 4:45 | 8 | 27 | 8 | 27 | | | 54 | 16:45 | 164 | 745 | 243 | 1001 | | | 1746 |
| 5:00 | 17 | | 11 | | | | | 17:00 | 210 | | 258 | | | | |
| 5:15 | 23 | | 18 | | | | | 17:15 | 209 | | 248 | | | | |
| 5:30 | 32 | | 20 | | | | | 17:30 | 217 | | 235 | | | | |
| 5:45 | 59 | 131 | 36 | 85 | | | 216 | 17:45 | 210 | 846 | 195 | 936 | | | 1782 |
| 6:00 | 79 | | 29 | | | | | 18:00 | 191 | | 206 | | | | |
| 6:15 | 141 | | 33 | | | | | 18:15 | 229 | | 225 | | | | |
| 6:30 | 250 | | 45 | | | | | 18:30 | 211 | | 196 | | | | |
| 6:45 | 309 | 779 | 63 | 170 | | | 949 | 18:45 | 198 | 829 | 191 | 818 | | | 1647 |
| 7:00 | 287 | | 91 | | | | | 19:00 | 199 | | 198 | | | | |
| 7:15 | 300 | | 96 | | | | | 19:15 | 184 | | 196 | | | | |
| 7:30 | 263 | | 136 | | | | | 19:30 | 136 | | 178 | | | | |
| 7:45 | 218 | 1068 | 194 | 517 | | | 1585 | 19:45 | 119 | 638 | 138 | 710 | | | 1348 |
| 8:00 | 231 | | 190 | | | | | 20:00 | 123 | | 102 | | | | |
| 8:15 | 248 | | 170 | | | | | 20:15 | 79 | | 94 | | | | |
| 8:30 | 206 | | 165 | | | | | 20:30 | 96 | | 64 | | | | |
| 8:45 | 242 | 927 | 215 | 740 | | | 1667 | 20:45 | 80 | 378 | 76 | 336 | | | 714 |
| 9:00 | 240 | | 180 | | | | | 21:00 | 82 | | 72 | | | | |
| 9:15 | 262 | | 170 | | | | | 21:15 | 70 | | 100 | | | | |
| 9:30 | 235 | | 120 | | | | | 21:30 | 61 | | 68 | | | | |
| 9:45 | 206 | 943 | 111 | 581 | | | 1524 | 21:45 | 52 | 265 | 58 | 298 | | | 563 |
| 10:00 | 235 | | 104 | | | | | 22:00 | 57 | | 69 | | | | |
| 10:15 | 251 | | 117 | | | | | 22:15 | 50 | | 56 | | | | |
| 10:30 | 231 | | 98 | | | | | 22:30 | 43 | | 49 | | | | |
| 10:45 | 242 | 959 | 101 | 420 | | | 1379 | 22:45 | 49 | 199 | 48 | 222 | | | 421 |
| 11:00 | 224 | | 89 | | | | | 23:00 | 53 | | 45 | | | | |
| 11:15 | 235 | | 93 | | | | | 23:15 | 30 | | 33 | | | | |
| 11:30 | 222 | | 99 | | | | | 23:30 | 32 | | 21 | | | | |
| 11:45 | 222 | 903 | 102 | 383 | | | 1286 | 23:45 | 29 | 144 | 27 | 126 | | | 270 |
| Total Vol. | | 5847 | | 3032 | | | 8879 | | | 6852 | | 7535 | | | 14387 |

Daily Totals

| NB | SB | EB | WB | Combined |
|---|---|---|---|---|
| 12699 | 10567 | | | 23266 |

| | AM | | | PM | | |
|---|---|---|---|---|---|---|
| Split % | 65.9% | 34.1% | 38.2% | 47.6% | 52.4% | 61.8% |
| Peak Hour | 6:45 | 8:00 | 8:30 | 17:30 | 16:00 | 16:45 |
| Volume | 1159 | 740 | 1680 | 847 | 1001 | 1784 |
| P.H.F. | 0.94 | 0.86 | 0.92 | 0.93 | 0.92 | 0.95 |

cs@aimtd.com Tell. 714 253 7888

Thursday, November 02, 2017 Location: Culver PROJECT: SC1520

**ADT3 Washington between Higuera and Landmark** **Prepared by AimTD tel. 714 253 7888**

| AM Period | NB | SB | EB | | WB | | | PM Period | NB | SB | EB | | WB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0:00 | | | 19 | | 16 | | | 12:00 | | | 121 | | 157 | | |
| 0:15 | | | 24 | | 10 | | | 12:15 | | | 148 | | 170 | | |
| 0:30 | | | 13 | | 10 | | | 12:30 | | | 138 | | 172 | | |
| 0:45 | | | 14 | 70 | 8 | 44 | 114 | 12:45 | | | 159 | 566 | 158 | 657 | 1223 |
| 1:00 | | | 19 | | 2 | | | 13:00 | | | 160 | | 174 | | |
| 1:15 | | | 7 | | 5 | | | 13:15 | | | 159 | | 161 | | |
| 1:30 | | | 5 | | 4 | | | 13:30 | | | 174 | | 177 | | |
| 1:45 | | | 3 | 34 | 6 | 17 | 51 | 13:45 | | | 164 | 657 | 141 | 653 | 1310 |
| 2:00 | | | 3 | | 3 | | | 14:00 | | | 181 | | 167 | | |
| 2:15 | | | 2 | | 4 | | | 14:15 | | | 196 | | 168 | | |
| 2:30 | | | 2 | | 3 | | | 14:30 | | | 215 | | 179 | | |
| 2:45 | | | 4 | 11 | 2 | 12 | 23 | 14:45 | | | 245 | 837 | 171 | 685 | 1522 |
| 3:00 | | | 8 | | 7 | | | 15:00 | | | 238 | | 197 | | |
| 3:15 | | | 0 | | 4 | | | 15:15 | | | 259 | | 160 | | |
| 3:30 | | | 9 | | 7 | | | 15:30 | | | 284 | | 166 | | |
| 3:45 | | | 3 | 20 | 4 | 22 | 42 | 15:45 | | | 261 | 1042 | 164 | 687 | 1729 |
| 4:00 | | | 3 | | 4 | | | 16:00 | | | 269 | | 169 | | |
| 4:15 | | | 5 | | 6 | | | 16:15 | | | 291 | | 156 | | |
| 4:30 | | | 4 | | 14 | | | 16:30 | | | 277 | | 190 | | |
| 4:45 | | | 9 | 21 | 19 | 43 | 64 | 16:45 | | | 271 | 1108 | 179 | 694 | 1802 |
| 5:00 | | | 11 | | 17 | | | 17:00 | | | 256 | | 215 | | |
| 5:15 | | | 12 | | 40 | | | 17:15 | | | 258 | | 208 | | |
| 5:30 | | | 21 | | 54 | | | 17:30 | | | 264 | | 195 | | |
| 5:45 | | | 28 | 72 | 76 | 187 | 259 | 17:45 | | | 287 | 1065 | 196 | 814 | 1879 |
| 6:00 | | | 27 | | 96 | | | 18:00 | | | 205 | | 208 | | |
| 6:15 | | | 41 | | 113 | | | 18:15 | | | 262 | | 213 | | |
| 6:30 | | | 65 | | 190 | | | 18:30 | | | 234 | | 239 | | |
| 6:45 | | | 83 | 216 | 206 | 605 | 821 | 18:45 | | | 249 | 950 | 222 | 882 | 1832 |
| 7:00 | | | 118 | | 248 | | | 19:00 | | | 71 | | 195 | | |
| 7:15 | | | 149 | | 274 | | | 19:15 | | | 135 | | 163 | | |
| 7:30 | | | 181 | | 295 | | | 19:30 | | | 202 | | 124 | | |
| 7:45 | | | 183 | 631 | 291 | 1108 | 1739 | 19:45 | | | 205 | 613 | 132 | 614 | 1227 |
| 8:00 | | | 251 | | 319 | | | 20:00 | | | 186 | | 127 | | |
| 8:15 | | | 227 | | 268 | | | 20:15 | | | 144 | | 95 | | |
| 8:30 | | | 219 | | 281 | | | 20:30 | | | 95 | | 86 | | |
| 8:45 | | | 220 | 917 | 300 | 1168 | 2085 | 20:45 | | | 109 | 534 | 76 | 384 | 918 |
| 9:00 | | | 200 | | 285 | | | 21:00 | | | 92 | | 60 | | |
| 9:15 | | | 176 | | 341 | | | 21:15 | | | 67 | | 59 | | |
| 9:30 | | | 154 | | 295 | | | 21:30 | | | 71 | | 49 | | |
| 9:45 | | | 138 | 668 | 252 | 1173 | 1841 | 21:45 | | | 63 | 293 | 49 | 217 | 510 |
| 10:00 | | | 129 | | 253 | | | 22:00 | | | 55 | | 52 | | |
| 10:15 | | | 124 | | 215 | | | 22:15 | | | 51 | | 39 | | |
| 10:30 | | | 110 | | 238 | | | 22:30 | | | 53 | | 38 | | |
| 10:45 | | | 115 | 478 | 213 | 919 | 1397 | 22:45 | | | 38 | 197 | 51 | 180 | 377 |
| 11:00 | | | 129 | | 213 | | | 23:00 | | | 47 | | 43 | | |
| 11:15 | | | 113 | | 211 | | | 23:15 | | | 26 | | 27 | | |
| 11:30 | | | 141 | | 151 | | | 23:30 | | | 26 | | 25 | | |
| 11:45 | | | 136 | 519 | 186 | 761 | 1280 | 23:45 | | | 21 | 120 | 12 | 107 | 227 |
| **Total Vol.** | | | 3657 | | 6059 | | **9716** | | | | 7982 | | 6574 | | **14556** |

**Daily Totals**

| NB | SB | EB | WB | Combined |
|---|---|---|---|---|
| | | 11639 | 12633 | **24272** |

| | AM | | | PM | | |
|---|---|---|---|---|---|---|
| **Split %** | 37.6% | 62.4% | **40.0%** | 54.8% | 45.2% | **60.0%** |
| **Peak Hour** | 8:00 | 8:45 | **8:00** | 16:00 | 16:00 | **17:00** |
| **Volume** | 917 | 1221 | **2085** | 1108 | 882 | **1879** |
| **P.H.F.** | 0.91 | 0.90 | **0.91** | 0.95 | 0.92 | **0.97** |

cs@aimtd.com Tell. 714 253 7888

Thursday, November 02, 2017 Location: Culver PROJECT: SC1520

**ADT4 Washington east of Wesley** **Prepared by AimTD tel. 714 253 7888**

| AM Period | NB | SB | EB | | WB | | | PM Period | NB | SB | EB | | WB | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0:00 | | | 19 | | 21 | | | 12:00 | | | 110 | | 156 | | |
| 0:15 | | | 20 | | 15 | | | 12:15 | | | 119 | | 178 | | |
| 0:30 | | | 16 | | 11 | | | 12:30 | | | 114 | | 162 | | |
| 0:45 | | | 7 | 62 | 11 | 58 | 120 | 12:45 | | | 149 | 492 | 146 | 642 | 1134 |
| 1:00 | | | 9 | | 0 | | | 13:00 | | | 127 | | 162 | | |
| 1:15 | | | 9 | | 7 | | | 13:15 | | | 140 | | 151 | | |
| 1:30 | | | 6 | | 6 | | | 13:30 | | | 124 | | 166 | | |
| 1:45 | | | 3 | 27 | 7 | 20 | 47 | 13:45 | | | 159 | 550 | 134 | 613 | 1163 |
| 2:00 | | | 6 | | 2 | | | 14:00 | | | 179 | | 154 | | |
| 2:15 | | | 2 | | 4 | | | 14:15 | | | 175 | | 175 | | |
| 2:30 | | | 2 | | 3 | | | 14:30 | | | 208 | | 187 | | |
| 2:45 | | | 3 | 13 | 2 | 11 | 24 | 14:45 | | | 234 | 796 | 192 | 708 | 1504 |
| 3:00 | | | 6 | | 10 | | | 15:00 | | | 255 | | 186 | | |
| 3:15 | | | 0 | | 5 | | | 15:15 | | | 262 | | 186 | | |
| 3:30 | | | 9 | | 10 | | | 15:30 | | | 283 | | 174 | | |
| 3:45 | | | 0 | 15 | 6 | 31 | 46 | 15:45 | | | 287 | 1087 | 176 | 722 | 1809 |
| 4:00 | | | 2 | | 17 | | | 16:00 | | | 319 | | 194 | | |
| 4:15 | | | 3 | | 16 | | | 16:15 | | | 301 | | 209 | | |
| 4:30 | | | 5 | | 24 | | | 16:30 | | | 282 | | 197 | | |
| 4:45 | | | 8 | 18 | 35 | 92 | 110 | 16:45 | | | 295 | 1197 | 231 | 831 | 2028 |
| 5:00 | | | 7 | | 45 | | | 17:00 | | | 293 | | 216 | | |
| 5:15 | | | 10 | | 39 | | | 17:15 | | | 304 | | 211 | | |
| 5:30 | | | 17 | | 64 | | | 17:30 | | | 323 | | 264 | | |
| 5:45 | | | 24 | 58 | 87 | 235 | 293 | 17:45 | | | 308 | 1228 | 219 | 910 | 2138 |
| 6:00 | | | 28 | | 107 | | | 18:00 | | | 341 | | 242 | | |
| 6:15 | | | 34 | | 145 | | | 18:15 | | | 328 | | 205 | | |
| 6:30 | | | 44 | | 178 | | | 18:30 | | | 292 | | 182 | | |
| 6:45 | | | 70 | 176 | 209 | 639 | 815 | 18:45 | | | 319 | 1280 | 182 | 811 | 2091 |
| 7:00 | | | 111 | | 245 | | | 19:00 | | | 364 | | 179 | | |
| 7:15 | | | 145 | | 346 | | | 19:15 | | | 288 | | 140 | | |
| 7:30 | | | 152 | | 387 | | | 19:30 | | | 238 | | 109 | | |
| 7:45 | | | 172 | 580 | 431 | 1409 | 1989 | 19:45 | | | 249 | 1139 | 83 | 511 | 1650 |
| 8:00 | | | 188 | | 360 | | | 20:00 | | | 210 | | 60 | | |
| 8:15 | | | 190 | | 371 | | | 20:15 | | | 146 | | 73 | | |
| 8:30 | | | 187 | | 311 | | | 20:30 | | | 113 | | 57 | | |
| 8:45 | | | 154 | 719 | 287 | 1329 | 2048 | 20:45 | | | 99 | 568 | 59 | 249 | 817 |
| 9:00 | | | 167 | | 245 | | | 21:00 | | | 96 | | 70 | | |
| 9:15 | | | 133 | | 213 | | | 21:15 | | | 68 | | 55 | | |
| 9:30 | | | 147 | | 198 | | | 21:30 | | | 69 | | 56 | | |
| 9:45 | | | 129 | 576 | 178 | 834 | 1410 | 21:45 | | | 65 | 298 | 51 | 232 | 530 |
| 10:00 | | | 111 | | 156 | | | 22:00 | | | 48 | | 43 | | |
| 10:15 | | | 96 | | 199 | | | 22:15 | | | 41 | | 38 | | |
| 10:30 | | | 102 | | 201 | | | 22:30 | | | 54 | | 39 | | |
| 10:45 | | | 84 | 393 | 187 | 743 | 1136 | 22:45 | | | 42 | 185 | 44 | 164 | 349 |
| 11:00 | | | 137 | | 189 | | | 23:00 | | | 54 | | 28 | | |
| 11:15 | | | 105 | | 167 | | | 23:15 | | | 31 | | 16 | | |
| 11:30 | | | 117 | | 173 | | | 23:30 | | | 20 | | 19 | | |
| 11:45 | | | 121 | 480 | 182 | 711 | 1191 | 23:45 | | | 25 | 130 | 23 | 86 | 216 |
| Total Vol. | | | | 3117 | | 6112 | 9229 | | | | | 8950 | | 6479 | 15429 |

| | Daily Totals | | | |
|---|---|---|---|---|
| NB | SB | EB | WB | Combined |
| | | 12067 | 12591 | 24658 |

| | AM | | | PM | | |
|---|---|---|---|---|---|---|
| Split % | 33.8% | 66.2% | 37.4% | 58.0% | 42.0% | 62.6% |
| Peak Hour | 7:45 | 7:30 | 7:30 | 18:15 | 17:15 | 17:30 |
| Volume | 737 | 1549 | 2251 | 1303 | 936 | 2230 |
| P H F. | 0.97 | 0.90 | 0.93 | 0.89 | 0.89 | 0.95 |

cs@aimtd.com Tell. 714 253 7888

Thursday, November 02, 2017 Location: Culver PROJECT: SC1520

**ADT5 National south of Washington** **Prepared by AimTD tel. 714 253 7888**

| AM Period | NB | | SB | | EB | WB | | PM Period | NB | | SB | | EB | WB | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0:30 | 12 | | 22 | | | | | 12:00 | 220 | | 136 | | | | |
| 0:15 | 9 | | 17 | | | | | 12:15 | 225 | | 151 | | | | |
| 0:30 | 9 | | 14 | | | | | 12:30 | 219 | | 163 | | | | |
| 0:45 | 12 | 42 | 18 | 71 | | | 113 | 12:45 | 214 | 878 | 185 | 635 | | | 1513 |
| 1:00 | 7 | | 18 | | | | | 13:00 | 200 | | 204 | | | | |
| 1:15 | 6 | | 4 | | | | | 13:15 | 170 | | 191 | | | | |
| 1:30 | 4 | | 9 | | | | | 13:30 | 171 | | 248 | | | | |
| 1:45 | 3 | 20 | 5 | 36 | | | 56 | 13:45 | 165 | 706 | 257 | 900 | | | 1606 |
| 2:00 | 4 | | 7 | | | | | 14:00 | 184 | | 225 | | | | |
| 2:15 | 7 | | 4 | | | | | 14:15 | 179 | | 286 | | | | |
| 2:30 | 4 | | 0 | | | | | 14:30 | 211 | | 250 | | | | |
| 2:45 | 6 | 21 | 8 | 19 | | | 40 | 14:45 | 236 | 810 | 279 | 1040 | | | 1850 |
| 3:00 | 8 | | 9 | | | | | 15:00 | 230 | | 266 | | | | |
| 3:15 | 2 | | 0 | | | | | 15:15 | 195 | | 299 | | | | |
| 3:30 | 3 | | 6 | | | | | 15:30 | 221 | | 297 | | | | |
| 3:45 | 4 | 17 | 6 | 21 | | | 38 | 15:45 | 193 | 839 | 298 | 1160 | | | 1999 |
| 4:00 | 5 | | 4 | | | | | 16:00 | 216 | | 278 | | | | |
| 4:15 | 5 | | 5 | | | | | 16:15 | 187 | | 293 | | | | |
| 4:30 | 12 | | 7 | | | | | 16:30 | 229 | | 289 | | | | |
| 4:45 | 7 | 29 | 5 | 21 | | | 50 | 16:45 | 192 | 824 | 265 | 1125 | | | 1949 |
| 5:00 | 14 | | 17 | | | | | 17:00 | 285 | | 274 | | | | |
| 5:15 | 31 | | 16 | | | | | 17:15 | 243 | | 259 | | | | |
| 5:30 | 35 | | 23 | | | | | 17:30 | 275 | | 299 | | | | |
| 5:45 | 63 | 143 | 31 | 87 | | | 230 | 17:45 | 262 | 1065 | 293 | 1125 | | | 2190 |
| 6:00 | 96 | | 35 | | | | | 18:00 | 304 | | 271 | | | | |
| 6:15 | 148 | | 37 | | | | | 18:15 | 289 | | 239 | | | | |
| 6:30 | 287 | | 50 | | | | | 18:30 | 298 | | 248 | | | | |
| 6:45 | 294 | 825 | 58 | 180 | | | 1005 | 18:45 | 293 | 1184 | 224 | 982 | | | 2166 |
| 7:00 | 298 | | 88 | | | | | 19:00 | 278 | | 211 | | | | |
| 7:15 | 265 | | 122 | | | | | 19:15 | 252 | | 239 | | | | |
| 7:30 | 248 | | 126 | | | | | 19:30 | 174 | | 204 | | | | |
| 7:45 | 220 | 1031 | 218 | 554 | | | 1585 | 19:45 | 156 | 860 | 196 | 850 | | | 1710 |
| 8:00 | 221 | | 204 | | | | | 20:00 | 130 | | 214 | | | | |
| 8:15 | 171 | | 217 | | | | | 20:15 | 91 | | 190 | | | | |
| 8:30 | 192 | | 266 | | | | | 20:30 | 90 | | 164 | | | | |
| 8:45 | 206 | 790 | 269 | 956 | | | 1746 | 20:45 | 84 | 395 | 115 | 683 | | | 1078 |
| 9:00 | 221 | | 249 | | | | | 21:00 | 74 | | 116 | | | | |
| 9:15 | 267 | | 271 | | | | | 21:15 | 66 | | 100 | | | | |
| 9:30 | 241 | | 222 | | | | | 21:30 | 51 | | 90 | | | | |
| 9:45 | 187 | 916 | 207 | 949 | | | 1865 | 21:45 | 43 | 234 | 61 | 367 | | | 601 |
| 10:00 | 264 | | 206 | | | | | 22:00 | 53 | | 84 | | | | |
| 10:15 | 281 | | 148 | | | | | 22:15 | 38 | | 64 | | | | |
| 10:30 | 256 | | 156 | | | | | 22:30 | 41 | | 55 | | | | |
| 10:45 | 235 | 1036 | 146 | 656 | | | 1692 | 22:45 | 55 | 187 | 48 | 251 | | | 438 |
| 11:00 | 256 | | 141 | | | | | 23:00 | 42 | | 50 | | | | |
| 11:15 | 256 | | 121 | | | | | 23:15 | 28 | | 35 | | | | |
| 11:30 | 268 | | 151 | | | | | 23:30 | 32 | | 33 | | | | |
| 11:45 | 245 | 1025 | 159 | 572 | | | 1597 | 23:45 | 29 | 131 | 29 | 147 | | | 278 |
| Total Vol. | | 5895 | | 4122 | | | 10017 | | | 8113 | | 9265 | | | 17378 |

| Daily Totals | | | | |
|---|---|---|---|---|
| NB | SB | EB | WB | Combined |
| 14008 | 13387 | | | 27395 |

| | AM | | | | | PM | | |
|---|---|---|---|---|---|---|---|---|
| Split % | 58.8% | 41.2% | | | 36.6% | 46.7% | 53.3% | 63.4% |
| Peak Hour | 6:30 | 8:30 | 0:30 | 0:30 | 8:45 | 18:00 | 15:15 | 17:30 |
| Volume | 1144 | 1055 | | | 1946 | 1184 | 1172 | 2232 |
| P.H.F | 0.96 | 0.97 | | | 0.90 | 0.98 | 0.98 | 0.97 |

cs@aimtd.com Tell. 714 253 7888

# LIGHTING CALCULATION REPORT

Date:2/7/2018

8777 WASHINGTON CULVER CITY
CONSTRUCTION SITE LIGHTING
ILLUMINANCE LIGHT TRESPASS ANALYSIS AT ADJACENT RESIDENTIAL PROPERTY
VERTICAL PLANE 1: NATIONAL BOULEVARD
VERTICAL PLANE 2: WASHINGTON BOULEVARD

ANALYSIS CRITERIA:
LIGHT TRESPASS ILLUMINANCE: MAX 0.74 fc
CALGREEN LZ3, IESNA TABLE 26.4 LIGHTING ZONE 3
CONSTRUCTION AREA ILLUMINANCE: 10 fc AVERAGE
IESNA 10TH EDITION HANDBOOK

Luminaire Schedule

| Symbol | Qty | Label | Total Lamp Lumens | LLF | Description | Lum. Watts |
|---|---|---|---|---|---|---|
| ⊙ | 16 | 84521 | N.A. | 1.000 | | 336 |

Calculation Summary

| Label | CalcType | Units | Avg | Max | Min | Avg/Min | Max/Min |
|---|---|---|---|---|---|---|---|
| CalcPts_Site_8777 Washington | Illuminance | Fc | 15.04 | 189 | 0.5 | 30.08 | 377.40 |
| CalcPts_Site_Ivy Station | Illuminance | Fc | 0.00 | 0.0 | 0.0 | N.A. | N.A. |
| Vertical Plane_North_Washington_ | Illuminance | Fc | 0.41 | 0.5 | 0.0 | N.A. | N.A. |
| Vertical Plane_West_National_Sid | Illuminance | Fc | 0.00 | 0.0 | 0.0 | N.A. | N.A. |


The Lighting Calculation evaluated the illuminance light trespass from the Project with the following assumptions:
1 – Four 20 ft high poles were located on the project site, approximate 20 to 60 ft from each corner of the project boundary;
2 – Each pole consisted of 4 LED narrow beam floodlights, each at 303 watts, 40,861 lumens. Fixtures are tilted 50 to 70 degrees above nadir;
3 – The construction area was illuminated to an average illuminance of 10 footcandles or higher.

Temporary fencing around the construction area was not considered in this analysis. If different pole or light fixture are specified for the Project, height of pole should be no higher than 20 ft, and light fixture total output should not exceed the total output in this analysis.

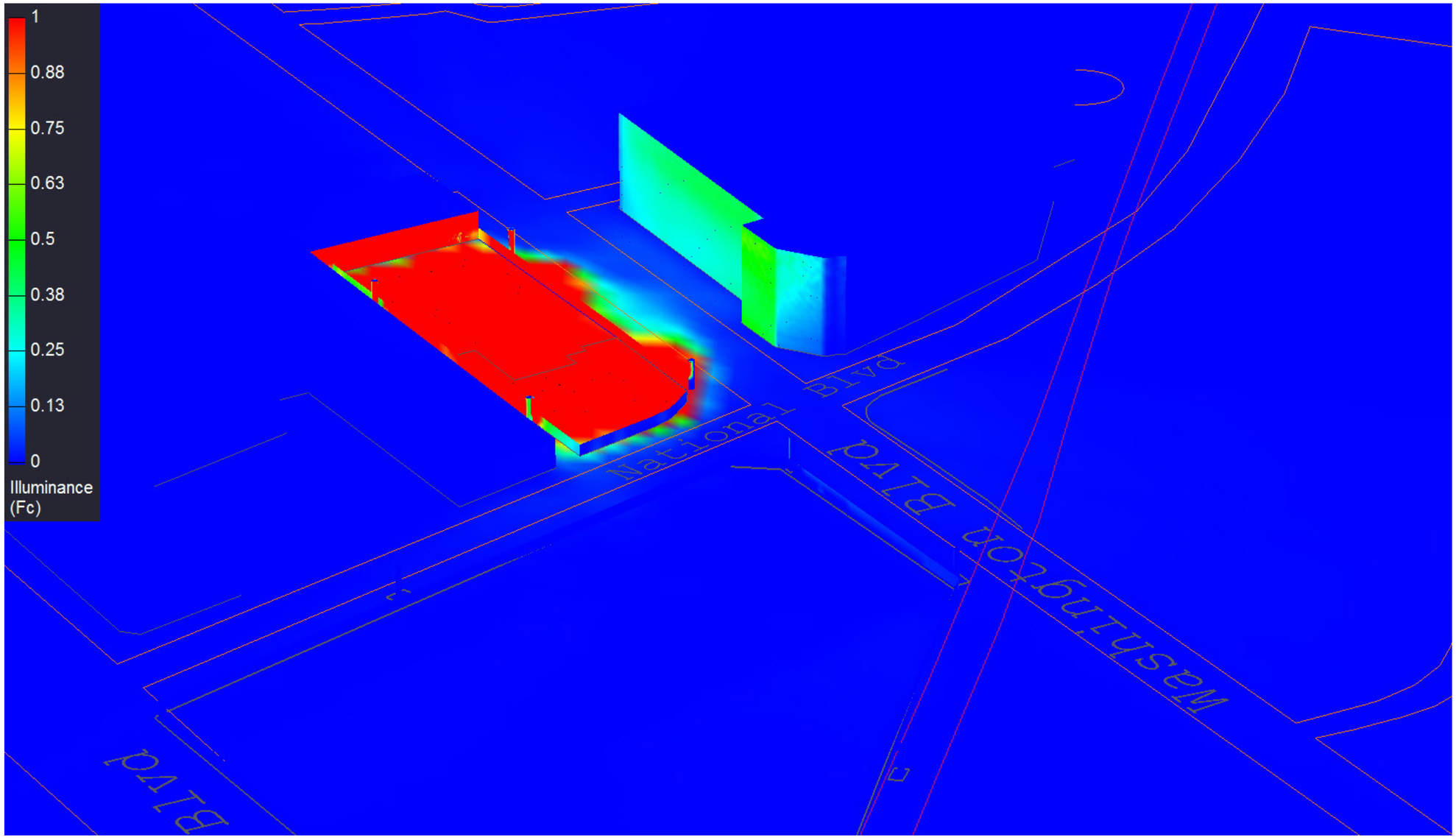
# LIGHTING CALCULATION REPORT

Date:2/7/2018

8777 WASHINGTON CULVER CITY
CONSTRUCTION SITE LIGHTING
ILLUMINANCE LIGHT TRESPASS ANALYSIS AT ADJACENT RESIDENTIAL PROPERTY
VERTICAL PLANE 1: NATIONAL BOULEVARD
VERTICAL PLANE 2: WASHINGTON BOULEVARD

ANALYSIS CRITERIA:
LIGHT TRESPASS ILLUMINANCE: MAX 0.74 fc
CALGREEN LZ3, IESNA TABLE 26.4 LIGHTING ZONE 3
CONSTRUCTION AREA ILLUMINANCE: 10 fc AVERAGE
IESNA 10TH EDITION HANDBOOK

Date:2/7/2018




RENDERED VIEW

# 8777 WASHINGTON BOULEVARD DEVELOPMENT PROJECT – OFF-HOURS CONSTRUCTION

## DRAFT Noise & Lighting Technical Report

Prepared for
LPC West, LLC
915 Wilshire Boulevard, Suite 2050
Los Angeles, California 90017

March 2018

# 8777 WASHINGTON BOULEVARD DEVELOPMENT PROJECT – OFF-HOURS CONSTRUCTION

## Noise & Lighting Technical Report

Prepared for
LPC West, LLC
915 Wilshire Boulevard, Suite 2050
Los Angeles, California 90017

March 2018

80 S Lake Avenue
Suite 570
Pasadena, CA 91101
626.204.6170
www.esassoc.com

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Portland
Sacramento
San Diego
San Francisco
Seattle
Tampa
Woodland Hills
140525

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## 8777 Washington Boulevard Development Project, Off-Hours Construction - Noise & Lighting Technical Report

## Figures



## Tables

# Executive Summary

LPC West, LLC is proposing to submit an off-hours construction work plan to Culver City (City) to obtain a temporary use permit that functions as a variance to the City's noise ordinance allowing construction activities outside of the allowable construction hours (off-hours) of City's Municipal Code Noise Ordinance for the proposed 8777 Washington Development Project (Project) in Culver City, CA. The purpose of this Noise Technical Report is to evaluate the potential short-term, temporary noise impacts resulting from implementation of the proposed off-hours Project construction.

The overall Project consists of the proposed redevelopment of an approximately 42,660 square-foot (0.98-acre) property located at 8777 Washington Boulevard north of the intersection at Washington Boulevard and National Boulevard in Culver City, just south of the City of Los Angeles. The Project would create 132,500 square feet of commercial development within a four-story building located over three levels of subterranean parking, which would require soil excavation and foundation concrete pouring. In 2017, ESA prepared a Noise and Vibration Technical Report for the Project's Mitigated Negative Declaration (MND), in accordance with the California Environmental Quality Act (CEQA). The report included a noise analysis of the Project's overall construction, which was originally to occur entirely within the allowable construction hours of the City's noise ordinance from 8:00 A.M. and 8:00 P.M. Mondays through Fridays; 9:00 A.M. and 7:00 P.M. Saturdays; 10:00 A.M. and 7:00 P.M. Sundays.

This technical noise report has been prepared for LPC West, LLC to support the Culver City environmental review process regarding potential impacts to ambient noise associated with the proposed Project's request for construction outside of the allowable hours of the City's noise ordinance. This noise study is required by the City as part of the Project's proposed off-hours construction work plan to the City to obtain a temporary use permit to the Culver City Noise Ordinance.

LPC West, LLC proposes that Project construction activities start early during the City's off-hours, prior to 8:00 a.m. on weekdays; ideally, a 6:00 a.m. start (i.e., an "early start" to the weekday workday). In addition, Project construction would require approximately six concrete pours, each of which will require up to 18 continuous hours (during allowable hours and off-hours), and all of which will take place within a single month.

The proposed off-hours construction activities on the Project site would generate noise, which would potentially impact the nearest mixed-use development (commercial-residential) in the City. Off-hours Project construction activities include the following four phases: 1) onsite soil excavation and off-site truck hauling of excavated soil, 2) onsite concrete and pouring from off-site concrete truck trips, 3) exterior skin installation (including drywall studs, glazing, caulking, roofing, etc), and 4) exterior/interior activities related to the buildout of the interior of the building and the installation of site work (such as sidewalks and landscaping). These phases would occur consecutively during the weekday early start hours of 6:00 a.m. to 8:00 a.m., and during six non-consecutive days of concrete pours (up to 18 hours per pour).

The Project's off-hours construction activities would generate noise primarily from the operation of heavy equipment (e.g., concrete pumps and trucks, excavation equipment, and soil hauling trucks). Project off-hours construction noise would attenuate with distance at the nearest noise sensitive receptor (e.g., residential) in Culver City, which is the new mixed-use commercial - multifamily residential development (Access), located adjacent to and south of the Project site across Washington Boulevard at the intersection of National and Washington Boulevards.

This report summarizes the Project noise levels generated on-site and experienced at the noise sensitive receptor off-site, and the potential for the Project to conflict with the applicable Culver City noise regulations, standards, and thresholds. The findings of the analyses are as follows:

- The Project's maximum unmitigated off-hours construction noise levels would exceed the Culver City maximum noise level standards at the nearest residence in Culver City. Implementation of the proposed mitigation measures (e.g., noise barriers) would reduce maximum noise levels slightly above (by up to 3 dBA) the City's off-hours maximum noise limits of 65 dBA $L_{max}$ during early start off-hour of 6:00 to 7:00 a.m. and the concrete pours during the night hours (10:00 p.m. to 7:00 a.m.); but would not exceed the City's off-hours maximum noise limits of 70 dBA $L_{max}$ during early start off-hour of 7:00 to 8:00 a.m.
- The Project's hourly average unmitigated off-hours construction noise levels would exceed the existing ambient nighttime noise levels at the nearest residence in Culver City. Implementation of the proposed noise barriers and not operating all equipment simultaneously for all off-hours construction phases would result in a mitigated off-hours construction noise level, which would be approximate to the ambient noise level average over the nighttime hours at the residence, resulting in a less than perceptible increase in ambient noise levels. During the quietest hour of 3:00 a.m, the ambient night noise level would be lower, and with the addition of the Project's night construction noise during the concrete pours, the resultant ambient noise level would be a perceptible increase during the quietest hour. Therefore, the ambient increase would range from barely perceptible to perceptible during the night concrete pours.

The Project's off-hours construction would potentially occur during the off-hours construction of the adjacent Ivy Station Project on National Boulevard adjacent to the Project site across National Boulevard to the northeast, and adjacent to the Access Apartments to the east across the intersection of National and Washington Boulevards. The excavation/hauling and concrete pours of both projects would potentially occur simultaneously during certain off-hours in 2018. However, the Ivy Station off-hours noise levels when combined with the 8777 off-hours noise levels does not measurably increase the Project's off-hours noise level at the nearest noise sensitive receptor. Therefore, the cumulative off-hours noise impact at the nearest noise sensitive receptor would be less than significant.

The Project construction lighting equipment may generate light trespass and/or glare; however, the light trespass illuminance at the nearest residence in Culver City is very low, and is not significant, and the glare from the construction lighting equipment is not visible at the residence. Therefore, a variance to the Culver City Noise Ordinance for the Project's night construction would not result in adverse noise impacts.

# 1. Introduction

LPC West, LLC proposes off-hours construction activities for the proposed 8777 Washington Development Project (Project) at 8777 Washington Boulevard in Culver City (City), California. This technical report has been prepared to support the City's environmental review process regarding potential noise impacts to associated with the proposed off-hours Project's construction. This noise study is required as part of the Project's proposed off-hours construction work plan to be submitted to the City to obtain a temporary use permit allowing a variance to the City' Noise Ordinance, which limits construction to between the hours of 8:00 A.M. and 8:00 P.M. Mondays through Fridays; 9:00 A.M. and 7:00 P.M. Saturdays; 10:00 A.M. and 7:00 P.M. Sundays.

This report identifies applicable City noise regulations, and evaluates potential noise impacts associated with the proposed off-hours construction of the Project. Where applicable, measures to mitigate or minimize noise impacts associated with the Project are included. Information used to prepare this analysis included the noise analysis in the Project's Mitigated Negative Declaration (MND), prepared in accordance with the California Environmental Quality Act (CEQA), the City's General Plan Noise Element and Municipal Code Noise Ordinance including meetings with City representatives, Project off-hours construction data provided by Morley Builders (the applicant's general contractor), and other sources identified herein.

## 1.1 Project Location

The Project site is located at 8777 Washington Boulevard in Culver City, California, at the intersection at Washington Boulevard and National Boulevard, as shown in **Figure 1**. The surrounding land uses include private development to the north and east; Access Apartments, Culver City (a mixed-use development) and commercial uses to the south; and the Ivy Station Mixed-Use Development Project (currently under construction) to the west, as shown in **Figure 2**. The boundary of Culver City and the City of Los Angeles is located directly north of the Project site. Interstate 10 (I-10) is located approximately 0.3 miles northwest of the Project site.

## 1.2 Project Background

The overall Project consists of the proposed redevelopment of an approximately 42,660 square-foot (0.98-acre) property. The proposed commercial development would include a mix of office, commercial and pedestrian serving retail. The Project would create 132,500 square feet of commercial development composed primarily of office uses within a four-story building (up to 56 feet in height) located over three levels of subterranean parking, which would require soil excavation and foundation concrete pouring. **Figure 3** identifies the Project Site Plan.

In 2017, ESA prepared a Noise and Vibration Technical Report for the Project's MND, in accordance with CEQA. The report and MND included a noise analysis of the Project's construction, which was originally to occur during the allowable construction hours of the City's noise ordinance.

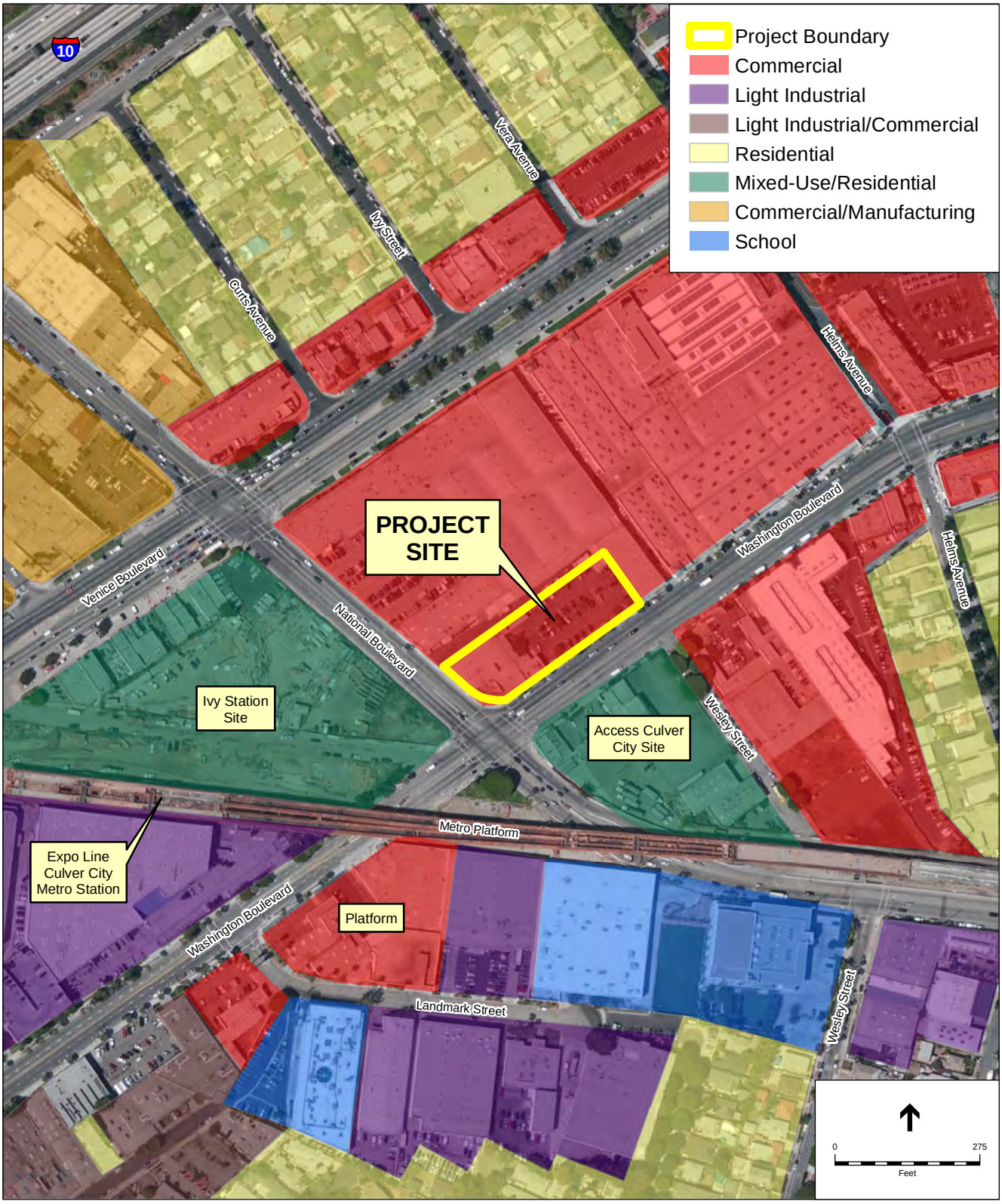

SOURCE: Google Maps, 2015.

8777 Washington

**Figure 1**

Regional and Project Vicinity Locations

ESA




SOURCE: Google Map, 2015 (Aerial).

8777 Washington

**Figure 2**

Aerial Photograph with Surrounding Land Uses

ESA

This technical report has been prepared for LPC West, LLC to support the Culver City environmental review process regarding potential impacts to ambient noise associated with the proposed Project's construction outside of the allowable construction hours of the City's noise ordinance (off-hours). This noise study is required as part of the Project's proposed off-hours work plan to the City to obtain a temporary use permit allowing a variance to the Culver City Noise Ordinance. The proposed off-hours construction activities on the Project site and adjacent roadways, which would generate noise potentially impacting nearby residences primarily include: soil excavation and hauling (heavy equipment and haul trucks), and concrete pouring activities concrete trucks and pumps) on the Project site.

In addition, adjacent to west of the Project, across National Boulevard, is the site of the Ivy Station Mixed-Use Development Project, currently under construction. The Ivy Station Project has been approved to conduct off-hours construction work (i.e., concrete pours and soil hauling).

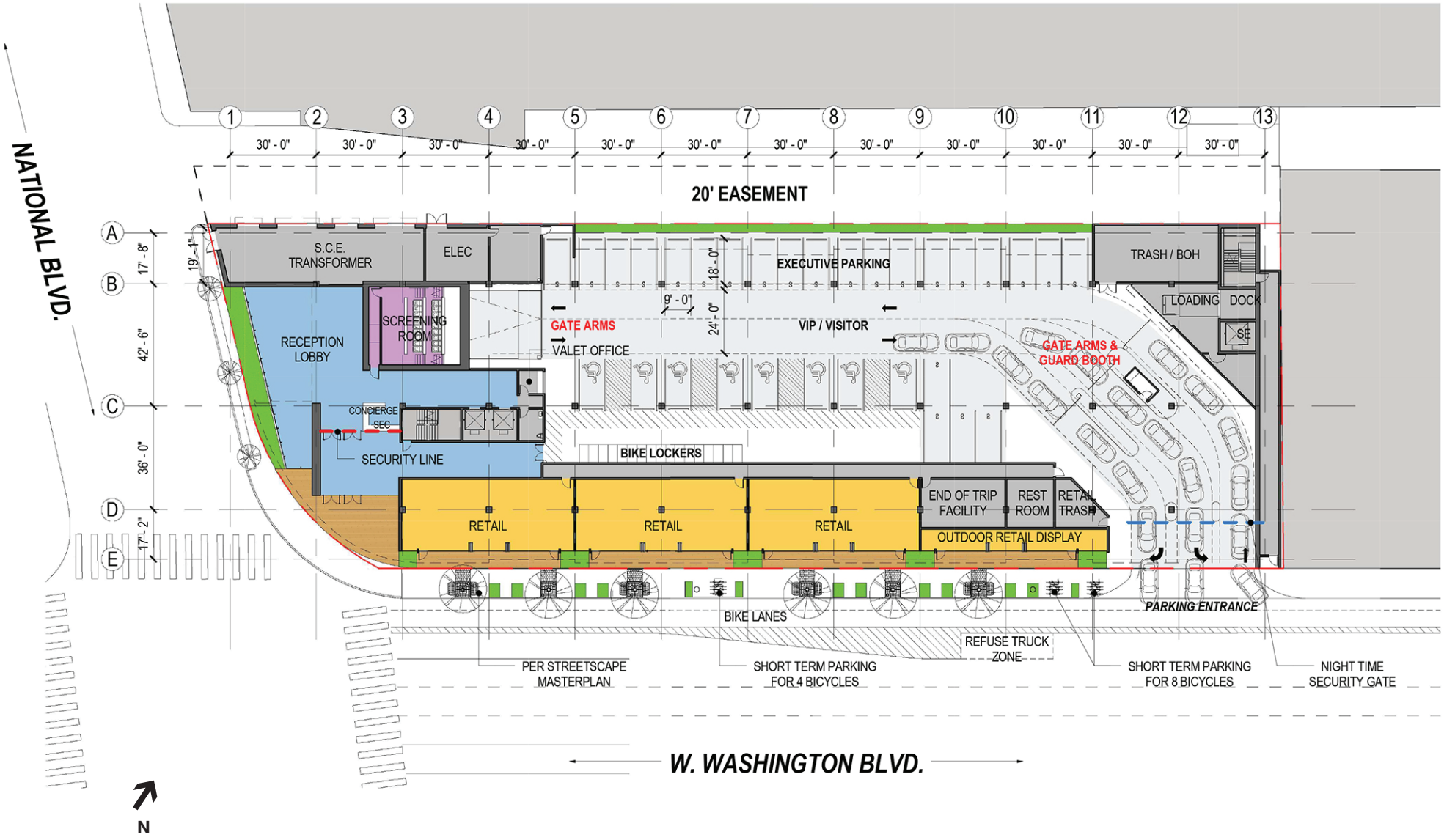
# 2. Project Description

## 2.1 Project Understanding

LPC West, LLC is proposing to submit a temporary use permit to Culver City to obtain a variance to its noise ordinance to conduct project construction activities outside of the allowable construction hours of the noise ordinance. LPC West, LLC requested that ESA assist in this submittal with the preparation of the noise and lighting studies of the Project's proposed off-hours construction work. ESA utilized the Project's 2017 noise technical report and MND in the preparation of the noise and lighting studies, as well as the example noise and lighting studies provided by Culver City, of a previous project (C3) off-hours construction work plan submitted to Culver City for a variance to its noise ordinance.

The Project's proposed off-hours construction activities at the Project site are based on data provided to ESA from Morley Builders, the applicant's general contractor, via email and phone conversations. The Project's off-hours construction work would occur on the Project site (soil excavation and concrete pouring) and on roadways adjacent to the Project site (concrete and soil truck hauling trips). The focus of this study is the impact of the Project's off-hours construction activities on the nearest noise sensitive receptor within Culver City to the Project site (i.e., the mixed-use commercial multifamily residence development adjacent and to the south across Washington Boulevard).

The City established an off-hours nighttime (10:00 p.m. to 7:00 a.m.) and daytime (7:00 a.m. to 8:00 a.m.) noise level limit of 65 dBA $L_{max}$ and 70 dBA $L_{max}$ at the property line of the noise sensitive receptor. The 65 and 70 dBA $L_{max}$ limits are based on the City's operation noise standards in the Noise Element of the City's 1975 General Plan, which establishes a nighttime and daytime levels of 65 and 70 dBA Leq, respectively for a duration of one minute (i.e., 65 dBA and 70 dBA $L_{max}$) at the property line of the noise sensitive receptor (City 1975).




SOURCE: Gensler, 2017

8777 Washington

**Figure 3**
Ground Level Plan

ESA

## 2.2 Project Description

The Project's proposed off-hours construction activities on the Project site and adjacent roadways would be limited to the following four phases:

1) shoring and onsite soil excavation and off-site truck hauling of excavated soil,

2) onsite concrete and pouring from off-site concrete truck trips,

3) exterior skin installation (including drywall studs, glazing, caulking, roofing, etc), and

4) exterior/interior activities related to the buildout of the interior of the building and the installation of site work (such as sidewalks and landscaping).

Project construction requires an "early start" for the Project's construction weekdays (Monday – Friday) (i.e., starting the work day at 6:00 a.m. for the entire duration of the Project). Therefore, the Project's "early start" at 6:00 a.m. to 8:00 a.m. would occur outside of the allowable construction hours of the City's noise ordinance of between 8:00 A.M. and 8:00 P.M. Mondays through Fridays; 9:00 A.M. and 7:00 P.M. Saturdays; and 10:00 A.M. and 7:00 P.M. Sundays. In addition, Project construction requires six continuous concrete pouring shifts (up to 18 hours per day, on six non-consecutive days during a one-month period).

The Project construction's off-hours early start would occur for the entire duration of the Project's construction, approximately 24 months, with month 1 -shoring activities, month 1-2, and 3-5 - earthwork, month 3 - piles, month 6 - working in the bottom of the excavation hole, month 7-17- concrete activities, months 18-23 – Exterior Skin, and months 18-24 - Interior/Site. Concrete foundation mat pours should occur in or around month 8. The off-hours Project construction is anticipated to start in early 2018, and end in 2020.

During soil excavation, haul trucks would constantly circulate (anticipate approximately 1,400 CY/day of hauling), and an excavator would likely be located on the southern property edge of the Project site, once excavation is below 15 feet. The soil hauling trucks would use Washington Boulevard to National Boulevard to depart the Project site and access I-10 in the City of Los Angeles.

The concrete pouring and staging activities would include the operation of a concrete pump and concrete truck deliveries. All of the staging and pouring activities would occur along Washington Boulevard against the Project site's southern fence line. Two concrete trucks are anticipated at the concrete pump onsite for each pour duration, as shown in **Figures 4** and **5**.

# 3. Environmental Setting

## 3.1 Noise Characteristics and Descriptors

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air). Noise is generally defined as unwanted sound (i.e., loud, unexpected, or annoying sound). Acoustics is defined as the physics of sound. In acoustics, the fundamental scientific model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or

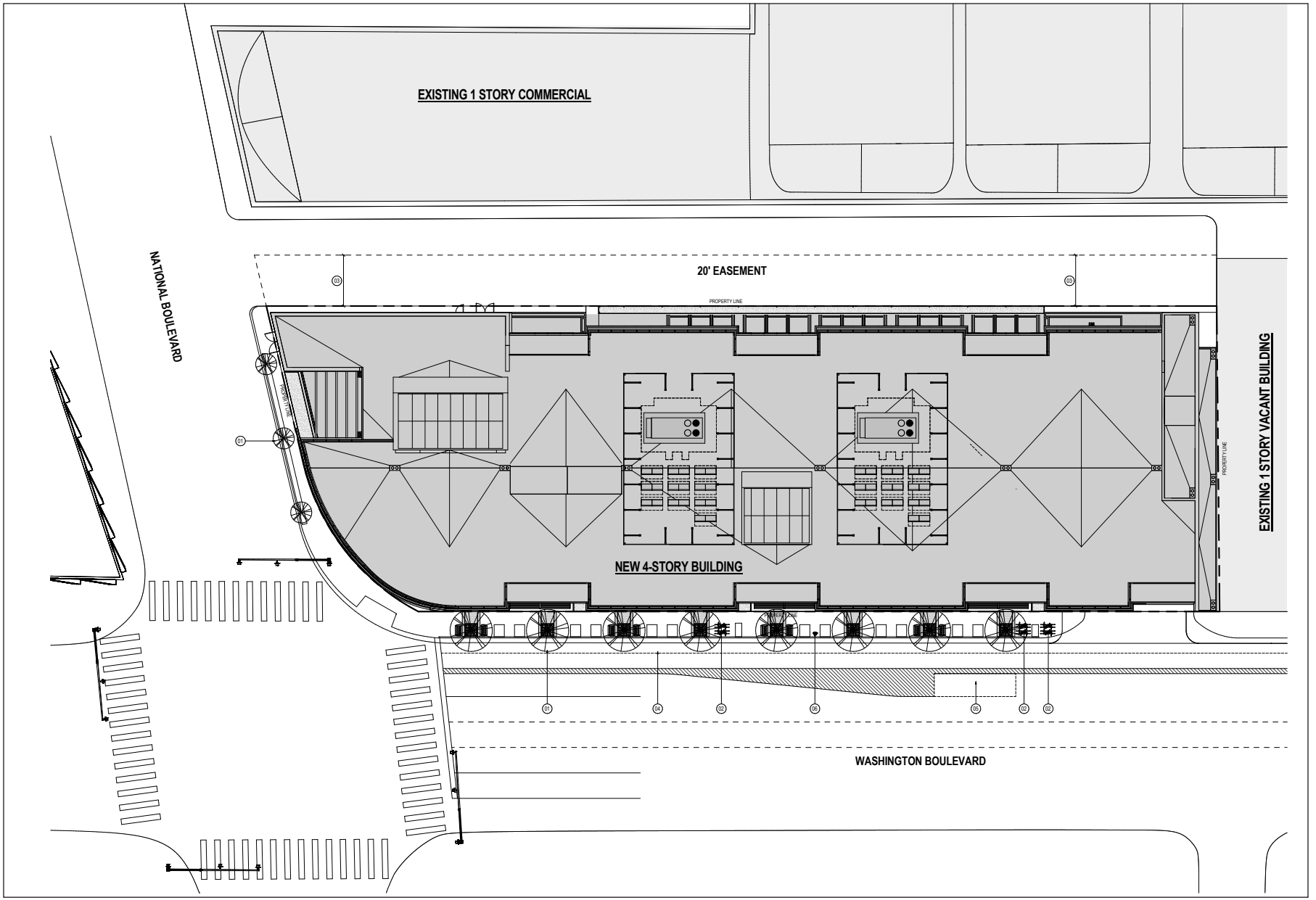
atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. Acoustics addresses primarily the propagation and control of sound.

Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) that is measured in decibels (dB), which is the standard unit of sound amplitude measurement. The dB scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound, with 0 dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound. Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude. When all the audible frequencies of a sound are measured, a sound spectrum is plotted, consisting of a range of frequency from 20 to 20,000 Hz.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. Sound is measured using an electronic filter that deemphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to extremely low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements.

## Noise Exposure and Community Noise

An individual's noise exposure is a measure of noise over a period of time. A noise level is a measure of noise at a given instant in time. The noise levels are representative of measured noise at a given instant in time; however, they rarely persist consistently over a long period of time. Rather, community noise varies continuously over a period of time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic. What makes community noise variable throughout a day, besides the slowly changing background noise, is the addition of short-duration, single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.



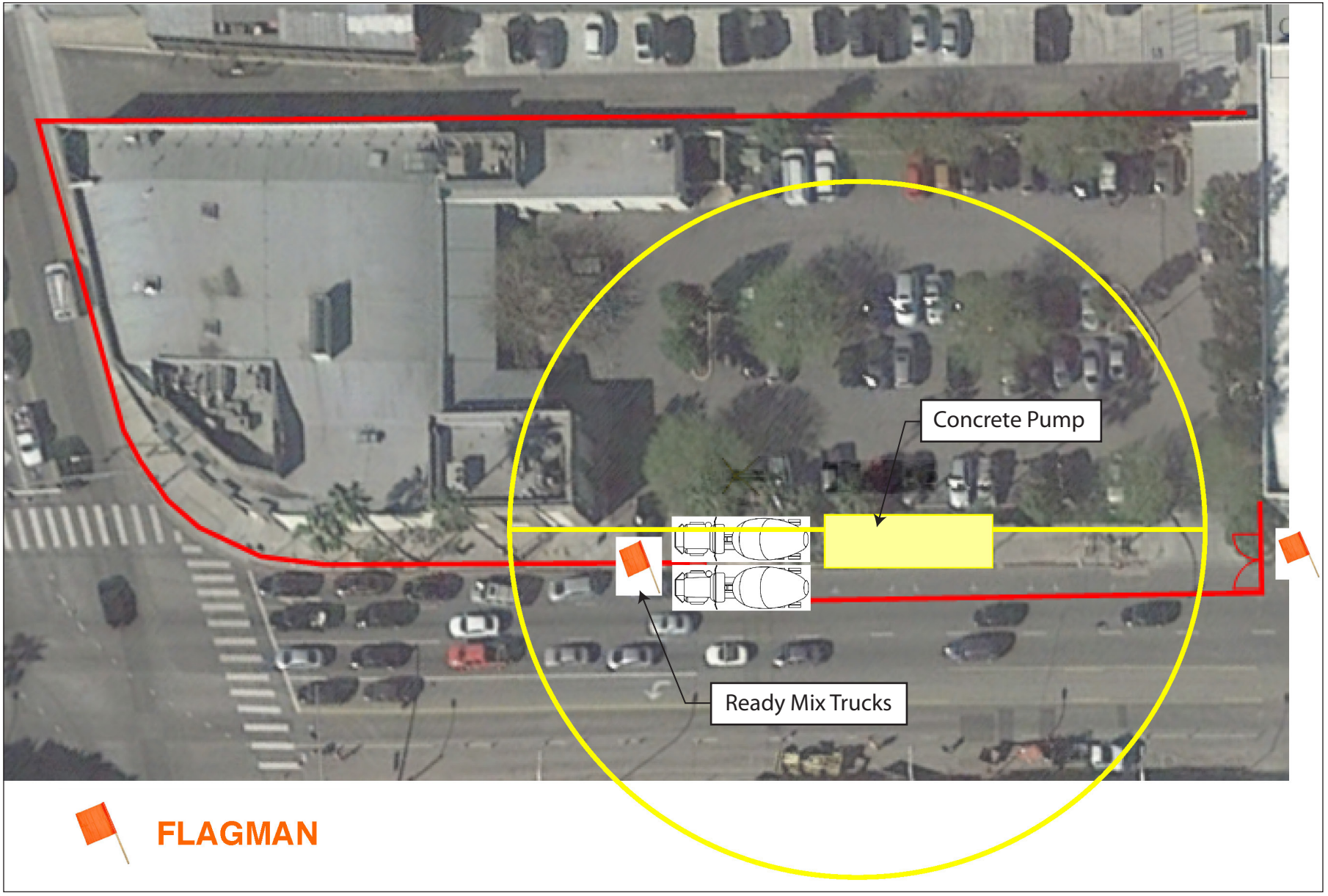

SOURCE: Gensler, 2017

8777 Washington

**Figure 4**

Off-Hours Concrete Pour Site Plan

ESA




SOURCE: Morley Builders

8777 Washington

**Figure 5**

Off-Hours Concrete Pump and Trucks Locations

ESA

These successive additions of sound to the community noise environment change the community noise level from instant to instant, requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

$L_{eq}$: The equivalent sound level used to describe noise over a specified period of time in terms of a single numerical value; the $L_{eq}$ of a time-varying signal and that of a steady signal are the same if they deliver the same acoustic energy over a given time. The $L_{eq}$ may also be referred to as the average sound level.

$L_{max}$: The maximum, instantaneous noise level experienced during a given period of time.

CNEL: The Community Noise Equivalent Level, is the average A-weighted noise level during a 24-hour day that is obtained after an addition of 5 dB to measured noise levels between the hours of 7:00 a.m. to 10:00 p.m. and after an addition of 10 dB to noise levels between the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively.

## Noise Effects on People

Noise is generally loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity that is a nuisance or disruptive. The effects of noise on people can be placed into four general categories:

- Subjective effects (e.g., dissatisfaction, annoyance);
- Interference effects (e.g., communication, sleep, and learning interference);
- Physiological effects (e.g., startle response); and
- Physical effects (e.g., hearing loss).

Although exposure to high noise levels has been demonstrated to cause physical and physiological effects, the principal human responses to typical environmental noise exposure are related to subjective effects and interference with activities. Interference effects of environmental noise refer to those effects that interrupt daily activities and include interference with human communication activities, such as normal conversations, watching television, telephone conversations, and interference with sleep. Sleep interference effects can include both awakening and arousal to a lesser state of sleep. With regard to the subjective effects, the responses of individuals to similar noise events are diverse and are influenced by many factors, including the type of noise, the perceived importance of the noise, the appropriateness of the noise to the setting, the duration of the noise, the time of day and the type of activity during which the noise occurs, and individual noise sensitivity.

Overall, there is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction on people. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual's past experiences with noise. Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which

one has adapted (i.e., comparison to the ambient noise environment). In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships generally occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3 dBA change in noise levels is considered to be a barely perceivable difference;
- A change in noise levels of 5 dBA is considered to be a readily perceivable difference; and
- A change in noise levels of 10 dBA is subjectively heard as doubling of the perceived loudness.

These relationships occur in part because of the logarithmic nature of sound and the dB scale. The human ear perceives sound in a non-linear fashion hence the dB was developed. Because the dB scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but rather logarithmically. Under the dB scale, a doubling of sound energy corresponds to a 3 dBA increase. In other words, when two sources are each producing sound of the same loudness, the resulting sound level at a given distance would be approximately 3 dBA higher than one of the sources under the same conditions. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA. Under the dB scale, three sources of equal loudness together produce a sound level of approximately 5 dBA louder than one source, and ten sources of equal loudness together produce a sound level of approximately 10 dBA louder than the single source.

## Noise Attenuation

When noise propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on factors such as the type of noise source and the propagation path. Noise from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern; therefore, this type of propagation is referred to as “spherical spreading.” Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate between 6 dBA for acoustically “hard” sites and 7.5 dBA for acoustically “soft” sites for each doubling of distance from the reference measurement as their energy is continuously spread out over a spherical surface. Hard sites are those with a reflective surface between the source and the receiver, such as asphalt or concrete surfaces or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the changes in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dBA (per doubling distance) is normally assumed for soft sites.

Roadways and highways consist of several localized noise sources on a defined path, and hence are treated as “line” sources, which approximate the effect of several point sources. Noise from a line source propagates over a cylindrical surface, often referred to as “cylindrical spreading.” Line sources (e.g., traffic noise from vehicles) attenuate at a rate between 3 dBA for hard sites

and 4.5 dBA for soft sites for each doubling of distance from the reference measurement.[1] Therefore, noise due to a line source attenuates less with distance than that of a point source with increased distance.

Additionally, receptors located downwind from a noise source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects.

## 3.2 Existing Conditions

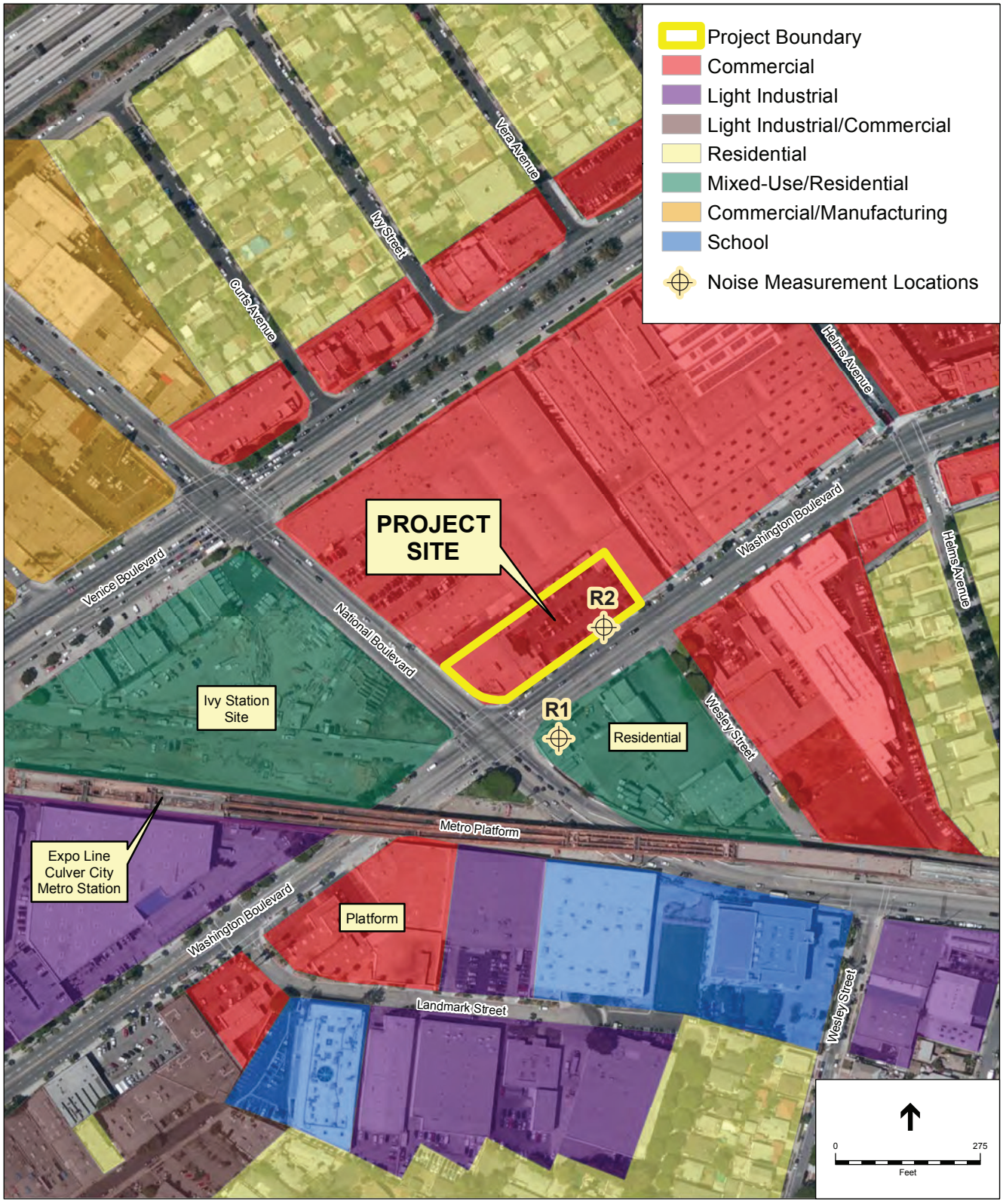
The Project site is currently prepared for Project construction, within the allowable hours of the City ‘s noise ordinance. The Project site is bounded by the intersection at Washington Boulevard and National Boulevard the Access Culver City Mixed-Use Development and commercial uses to the south; the Ivy Station Mixed-Use Development Project (under construction) to the west; commercial uses to the north and east. The Metrorail right-of-way is located approximately 250 feet south of the Project site with the Culver City Metrorail Station located to the southwest in proximity to the Project site. I-10 is located approximately 0.3 miles northwest of the Project site. The areas adjacent to the Project site are primarily commercial and light industrial. Therefore, the predominant noise source surrounding the Project site is vehicle traffic noise on the adjacent roadways and nearby I-10. Secondary noise sources are Metrorail traffic; aircraft flyovers; existing general commercial activities including loading dock/delivery truck activities, trash compaction, and refuse service activities; and residential landscape maintenance activities.

### Existing Ambient Noise Levels

Ambient noise measurements were previously conducted on the Project site southern boundary on May 5-6, 2016 for the Project’s 2017 MND, and as the measurement at Receptor (R)2 on **Figure 6**, was utilized to characterize the ambient noise levels at the adjacent property line of the Access mixed-use development located opposite the Project site on Washington Boulevard. In addition, for comparison, more recent ambient noise measurements were conducted in connection with the adjacent Ivy Station Development and its request for a temporary use permit. The noise measurements were conducted continuously over a weekend for the adjacent Ivy Station Development, as off-hours construction is proposed to occur daily during the evening, night, and early morning hours. The continuous weekend measurement was conducted from Friday evening, August 25, 2017 to Sunday morning, August 27, 2017 at the southeastern corner of the Project site (i.e., adjacent to the mixed-use development), identified as R1 on **Figure 6**. The results of the ambient off-hours noise measurement are summarized in **Table 1**.

The noise measurements were conducted with Larson Davis model LxT Type 2 sound level meter (SLM). During the measurement, the microphone for the SLM was placed approximately five feet above the ground surface. The SLM was calibrated with a Larson Davis model CAL 200

[1] California Department of Transportation (Caltrans), *Technical Noise Supplement* (TeNS). September, 2013.




SOURCE: Google Map, 2015 (Aerial).

8777 Washington

**Figure 6**

Ambient Noise Measurement Locations

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**TABLE 1**
**SUMMARY OF AMBIENT NOISE MEASUREMENTS**

| Location, Day of the Week, Date, and Hours | Average Night Noise Levels, dBA $L_{eq}$ |
|---|---|
| R2 | |
| Thursday Morning, 5/6/16, | |
| 6:00 a.m. to 7:00 a.m. | 67.4 |
| 7:00 a.m. to 8:00 a.m. | 69.9 |
| R1 | |
| Friday Night, 8/25/17 to Saturday Morning, 8/26/17 | |
| 7:00 p.m. to 8:00 p.m. | 69.4 |
| 8:00 p.m. to 9:00 p.m. | 68.7 |
| 9:00 p.m. to 10:00 p.m. | 66.7 |
| 10:00 p.m. to 11:00 p.m. | 65.8 |
| 11:00 p.m. to 12:00 p.m. | 64.5 |
| 12:00 p.m. to 1:00 a.m. | 65.4 |
| 1:00 a.m. to 2:00 a.m. | 62.5 |
| 2:00 a.m. to 3:00 a.m. | 58.6 |
| 3:00 a.m. to 4:00 a.m. | 57.4 |
| 4:00 a.m. to 5:00 a.m. | 59.0 |
| 5:00 a.m. to 6:00 a.m. | 63.0 |
| 6:00 a.m. to 7:00 a.m. | 65.0 |
| 7:00 a.m. to 8:00 a.m. | 67.5 |
| 7:00 p.m. to 7:00 a.m. (12-hour period) | 65.4 |
| R1 | |
| Saturday Night 8/26/17, to Sunday Morning | |
| 7:00 p.m. to 8:00 p.m. | 68.6 |
| 8:00 p.m. to 9:00 p.m. | 66.5 |
| 9:00 p.m. to 10:00 p.m. | 65.9 |
| 10:00 p.m. to 11:00 p.m. | 66.6 |
| 11:00 p.m. to 12:00 p.m. | 65.5 |
| 12:00 p.m. to 1:00 a.m. | 62.4 |
| 1:00 a.m. to 2:00 a.m. | 62.3 |
| 2:00 a.m. to 3:00 a.m. | 60.9 |
| 3:00 a.m. to 4:00 a.m. | 56.3 |
| 4:00 a.m. to 5:00 a.m. | 59.7 |
| 5:00 a.m. to 6:00 a.m. | 61.6 |
| 6:00 a.m. to 7:00 a.m. | 63.8 |
| 7:00 a.m. to 8:00 a.m. | 64.8 |
| 7:00 p.m. to 7:00 a.m. (12-hour period) | 64.5 |

SOURCE: ESA, 2017.

before and after the measurement. Following the calibration, a wind screen was placed over the microphone, and the frequency weighting on the SLM was set at "A" and "slow response".

As shown in Table 1, during the Project's proposed weekday "early start" hours of 6:00 a.m. to 8:00 a.m., the ambient noise levels measured at R2 from 6:00 to 7:00 a.m were approximately 68 dBA $L_{eq}$, and from 7:00 to 8:00 a.m. were approximately 70 dBA $L_{eq.}$ In addition, for comparison,

the ambient noise levels measured on Saturday and Sunday mornings at R1 from 6:00 to 7:00 a.m were approximately 66 and 65 dBA $L_{eq}$, and from 7:00 to 8:00 a.m. were approximately 68 and 65 dBA $L_{eq,}$ respectively. The primary noise source during the measurements was vehicle traffic along the roadways adjacent to the Project site. Therefore, the ambient noise measurements on the weekday were higher due to the higher traffic volumes of the weekday morning traffic rush hour.

In addition, as shown in Table 1, on the night of Friday, August 25, 2017 to Saturday morning, August 26, 2017, the measured evening/night hourly average noise levels at location R1 ranged from a high of 69.4 dBA $L_{eq}$ at 7:00 p.m. to a low of 57.6 dBA $L_{eq}$ at 3:00 a.m. Overall, for the 12-hour evening/night period (7:00 p.m. to 7:00 a.m.), the average noise level was 65.4 dBA $L_{eq}$. On the night of Saturday August 26 to Saturday morning, August 26, 2017, the measured evening/night hourly average noise levels at location R1 ranged from a high of 68.6 dBA $L_{eq}$ at 7:00 p.m to a low of 56.3 dBA $L_{eq}$ at 3:00 a.m. Overall, for the 12-hour evening/night period (7:00 p.m. to 7:00 a.m.), the average noise level was 64.5 dBA $L_{eq}$. The primary noise source during the measurements was vehicle traffic along the roadways adjacent to the Project site.

## Noise Sensitive Receptors

Noise sensitive receptors are defined as those specific land uses that have associated indoor and/or outdoor human activities that may be subject to stress and/or significant interference from noise produced by community sound sources. Typically, residences, hospitals and schools are considered noise sensitive, as their land uses of sleeping, recuperation, and concentration, can be adversely affected by noise.

The noise sensitive use in Culver City closest to the Project site is the mixed-use commercial-residential (Access Apartments) at the eastern corner of the intersection of National and Washington Boulevards, whose property line is located approximately 70 feet south of the Project site property line across National Boulevard. Access is a 4-story building with the ground floor as commercial development and residential floors above. This mixed-use development represents the nearest sensitive receptor (i.e., residence) to the Project site, and, therefore, illustrates the worst-case scenario for potential noise impacts from the Project's off-hours construction activities in Culver City.

# 3.3 Regulatory Setting

## Local

### Culver City General Plan Noise Element

The Noise Element of the General Plan identifies noise-sensitive land uses and noise sources, defines areas of noise impact, and establishes goals, policies, and programs to ensure that City residents are protected from excessive noise (Culver City 1995). The noise goals and policies of the Noise Element applicable to the Project's off-hours construction includes:

**Policy 2.A** Create a comprehensive ordinance establishing noise regulation criteria, and standards for noise sources and receptors to include but not be limited to the following:

- Noise reduction features during site planning to mitigate anticipated noise impacts on affected noise sensitive land uses, such as schools, hospitals, convalescent homes, and libraries.
- Temporary sound barrier installation at construction site if construction noise is impacting nearby noise sensitive land uses.
- Noise abatement and acoustical design criteria for construction and operation of any new development.

The City's noise standards are contained in the City's 1995 General Plan Noise Element, which establishes a daytime (7:00 a.m. to 10:00 p.m.) level of 55 dBA Leq and a nighttime (10:00 p.m. to 7:00 a.m.) level of 50 dBA Leq for a duration of 30 minutes; and 70 dBA Leq (daytime) and 65 dBA Leq (nighttime) for a duration of one minute at the property line of the noise sensitive receptor, as shown in **bold** in **Table 2** (City 1995).

**TABLE 2**
**CULVER CITY NOISE STANDARDS**

| Daytime levels 7:00 AM – 10:00 PM | Nighttime Levels 10:00 PM – 7:00 AM | Duration |
|---|---|---|
| **55 dBA - Leq** | **50 dBA - Leq** | **30 minute** |
| 60 dBA - Leq | 55 dBA - Leq | 15 minute |
| 65 dBA - Leq | 60 dBA - Leq | 5 minute |
| **70 dBA - Leq** | **65 dBA - Leq** | **1 minute** |
| 75 dBA - Leq | 70 dBA - Leq | Never |

Source: City 1995.

Based on these noise standards in Table 2, the City has established maximum noise level limits of 70 dBA $L_{max}$ and 65 dBA $L_{max}$ for off-hours construction noise during off-hour daytime and nighttime periods, respectively. (i.e. 70 and 65 dBA $L_{max}$ at the property line of the nearest residence).

## Culver City Municipal Code

Chapter 9.07 of the City of Culver City Municipal Code (CCMC) provides specific noise restrictions and exemptions for noise sources within Culver City. Culver City's noise regulations state that construction activity shall be prohibited, except between the hours of 8:00 A.M. and 8:00 P.M. Mondays through Fridays; 9:00 A.M. and 7:00 P.M. Saturdays; 10:00 A.M. and 7:00 P.M. Sundays.

# 4. Impacts and Mitigation Measures

This section describes the impact analysis relating to noise and vibration impacts for the project. It describes the methods and applicable thresholds used to determine the impacts of the project.

## 4.1 Methodology

Project construction noise levels were estimated using the FHWA's Roadway Construction Noise Model (RCNM) and construction equipment information provided by Morley Builders. Potential construction noise levels from the Project site were identified at the nearest sensitive receptor located offsite in Culver City based on their respective distance from the Project site. The noise levels within each phase (e.g., excavation) were calculated for the number of each type of equipment operating separately and as well as operating simultaneously for each phase (i.e., either the concrete hauling and pouring, or the soil excavation and hauling), and located within the construction area nearest to the affected receptor (i.e., the southern portion of the Project site adjacent to the residence). These assumptions represent the worst-case noise scenario because, typically, construction activities are spread out throughout a project site, located further away from affected receptors. The estimated Project off-hours construction noise levels at the affected receptor were then analyzed against the off-hours construction noise standards established by Culver City, to determine whether an exceedance of allowable noise levels would occur.

## 4.2 Impact Thresholds

Off-hours construction noise limits are based on Culver City noise standards. The proposed Project's off-hours maximum construction noise ($L_{max}$), estimated at the property line of the nearest noise sensitive receptor in Culver City, shall not exceed 65 dBA $L_{max}$ during the off-hour of 6:00 – 7:00 a.m., and 70 dBA $L_{max}$ during the off-hours of 7:00 – 8:00 a.m.

In addition, the proposed Project's off-hours average construction noise ($L_{eq}$), estimated at the property line of the nearest noise sensitive receptor in Culver City, shall not exceed the daytime standard (7:00 a.m. to 10:00 p.m.) level of 55 dBA $L_{eq}$, and the nighttime (10:00 p.m. to 7:00 a.m.) level of 50 dBA $L_{eq}$ (City 1995), as shown in Table 2. However, the existing hourly average ambient levels measured at the Project and receptor property lines, are currently already greater than these standards. Therefore, this analysis assumes that the existing ambient levels plus 3 dBA (i.e., the increase that results from doubling a noise source) are assumed to be the proposed Project's off-hours average construction noise level ($L_{eq}$) limit at the property line of the nearest noise sensitive receptor. For example, as shown in Table 1, the measured existing ambient noise levels of approximately 68 dBA $L_{eq}$ at 6:00 – 7:00 a.m., already exceed the City's nighttime standard; therefore, the assumed limit would be 71 dBA $L_{eq}$ for this hour at this location.

## 4.3 Project Impact Analysis

The proposed off-hours construction of the Project would include either soil excavation and truck hauling of excavated soils, or concrete pouring of building structure, both requiring the use of heavy equipment including excavators, loaders, and haul trucks, and concrete trucks, booms, and pumps, respectively. During either the soil hauling or the concrete pours, a different mix of

equipment would be used. As such, construction activity noise levels on the Project site and at the nearest receptor would vary depending on the particular type, number, duration of use, and location (distance and elevation) of the equipment for the soil excavation/hauling or concrete hauling/pours.

As shown in Table 3, the construction equipment anticipated during Project's off-hours construction produce maximum noise levels of approximately 75 to 81 dBA $L_{max}$ at a reference distance of 50 feet from the noise source (FHWA 2006). These maximum noise levels would occur when equipment is operating at full power, and includes estimated usage factors for the equipment, which are based on FHWA's RNCM User's Guide.[2] Table 3 shows the equipment type and number, noise level, usage factor, and distance to the property line of the nearest off-site noise sensitive receptor.

**TABLE 3**
**CONSTRUCTION EQUIPMENT NOISE LEVELS AT SOURCE AND DISTANCE TO OFFSITE NOISE-SENSITIVE USES**

| ***Construction Phase*** **Equipment Type** | **No. of Equip.** | **Reference Noise Level at 50ft, $L_{max}$** | **Acoustical Usage Factor (%)** | **Distance (ft)** |
|---|---|---|---|---|
| ***Shoring*** | | | | |
| Drill Rig Truck | 1 | 79 | 20 | 90 |
| ***Earthwork*** | | | | |
| Semi-Trucks | 2 | 76 | 20 | 65 |
| Excavator/Loader | 1 | 80 | 45 | 65 |
| ***Concrete/Shotcrete*** | | | | |
| Concrete Pump | 1 | 81 | 20 | 75 |
| Concrete Trucks on Washington | 1 | 79 | 40 | 90 |
| ***Exterior Skin*** | | | | |
| Forklift | 1 | 75 | 10 | 75 |
| Boom Lift | 1 | 75 | 20 | 75 |
| Man Lift | 1 | 75 | 20 | 90 |
| ***Interior/Site*** | | | | |
| Forklift | 1 | 75 | 10 | 75 |
| Man Lift | 1 | 75 | 20 | 90 |

Source: FHWA 2006.

During off-hours Project construction, the nearest offsite noise sensitive receptor in Culver City that would be exposed to the Project's off-hours construction noise would be the new Access Apartments located south of the Project site. During the construction activities, the highest noise levels would be generated when multiple pieces of construction equipment are being operated

[2] Federal Highway Administration (FHWA), Roadway Construction Noise Model User's Guide, 2006.

simultaneously. As discussed previously, the Project's estimated construction noise levels were calculated for the maximum equipment required to operate simultaneously within a phase, as shown in Table 3 (i.e., the worst-case scenario). The estimated noise levels at the offsite sensitive receptors were calculated using FHWA's RCNM, and the overall results are shown Table 4 and detailed in Appendix A.

**Table 4** shows the estimated unmitigated construction noise levels that would occur at the nearest offsite sensitive use during the Project's off-hours construction activities at the Project site, based on noise attenuation by distance (i.e., without the implementation of any noise reduction measures, e.g., noise barriers). Details for the construction noise calculations for each construction phase are shown in Appendix A.

**TABLE 4**
**UNMITIGATED OFF-HOURS CONSTRUCTION NOISE LEVELS AT OFFSITE NOISE-SENSITIVE USES**

| Construction Phases | Estimated Maximum Construction Noise Levels (dBA $L_{max}$) | Estimated Average Construction Noise Levels (dBA $L_{eq}$) |
|---|---|---|
| Shoring/Soil Excavation & Hauling | 78 | 76 |
| Concrete Hauling & Pours | 77 | 73 |
| Exterior Skin/Exterior/Interior | 71 | 68 |
| --- | --- | --- |
| *City Off-Hours Noise Standards* | | |
| *10:00 p.m. to 7:00 a.m.* | *65* | *50 ** |
| *7:00 a.m. to 10:00 p.m.* | *70* | *55 ** |

*Existing measured ambient levels at the project and receptor site boundaries, as shown in Table 1, already exceed these standards; therefore, the existing ambient levels (plus 3 dBA) are assumed to be the standards not to exceed.

SOURCE: ESA, 2017.

As shown in Table 4, the Project's unmitigated maximum off-hours construction noise levels (with all equipment of each phase operating), attenuated by distance alone (i.e., no barrier mitigation), at the nearest offsite noise sensitive receptor in Culver City (i.e., Access), would exceed the City's night and day off-hours noise limits of 65 dBA $L_{max}$ and 70 dBA $L_{max}$ respectively during all phases.

In addition, as shown in Table 4, the Project's average off-hours construction noise levels (with all equipment of each phase operating) attenuated by distance alone (no mitigation) at the nearest offsite sensitive receptor in Culver City would exceed Culver City's off-hours noise daytime and nighttime limits of 55 and 50 dBA $L_{eq}$, respectively, at the nearest multi-family residential use in Culver City. However, as shown in Table 1, the measured existing ambient noise levels already exceed these City standards at this location, with early start ambient noise levels averaging approximately 68 dBA $L_{eq}$ at 6:00 – 7:00 a.m., and 70 dBA $L_{eq}$ at 7:00 – 8:00 a.m. However, during the nighttime period (10:00 p.m. to 7:00 a.m.) for potential concrete pours, the measured

ambient noise levels at the residence ranged from as high as 65 dBA $L_{eq}$ at 7:00 p.m. to as low as 56 dBA $L_{eq}$ at 3:00 a.m, with an average ambient noise level over this night period of approximately 65 dBA $L_{eq}$. Therefore, the Project's unmitigated average off-hours construction noise at the nearest multi-family residential use would exceed the average ambient night noise level at the residence.

Therefore, the following noise reduction measures that shall be implemented to further reduce maximum and average construction noise levels at the adjacent sensitive receptor during off-hours Project construction:

> **Noise Reduction Measure NOISE-1:** A temporary sound barrier at least 10 feet in height shall be erected adjacent to the construction equipment locations on the Project site, to block the line-of-sight between the equipment and the residence, with a performance standard of achieving a minimum 10 dBA noise level reduction.
>
> **Noise Reduction Measure NOISE-2**: All mobile off-road construction equipment operating at the Project site shall be equipped with properly operating mufflers. Idling equipment shall be turned off when not in use.
>
> **Noise Reduction Measure NOISE-3:** The construction contractor(s) shall ensure that the concrete pump is muffled and partially enclosed within temporary insulation barriers (e.g., noise walls) to block line-of-sight with residence, or other measures to the extent feasible.

With the implementation of noise reduction measures NOISE-1 through NOISE-3, off-hours construction noise levels would be reduced, as shown in Table 5.

**TABLE 5**
**MITIGATED OFF-HOURS CONSTRUCTION NOISE LEVELS AT OFFSITE NOISE-SENSITIVE USES**

| Construction Phases | Estimated Maximum Construction Noise Levels (dBA $L_{max}$) | Estimated Average Construction Noise Levels (dBA $L_{eq}$) |
|---|---|---|
| Shoring/Soil Excavation & Hauling | 68 | 66 |
| Concrete Hauling & Pours | 67 | 63 |
| Exterior Skin/Exterior/Interior | 61 | 58 |
| ---------- | ------- | -------- |
| *City Noise Ordinance Off-Hours Noise Standards* | | |
| *10:00 p.m. to 7:00 a.m.* | *65* | |
| *7:00 a.m. to 8:00 a.m.; 8:00 p.m. to 10:00 p.m.* | *70* | |
| *City General Plan Noise Standards* | | |
| *Nighttime Residential (10:00 p.m. to 7:00 a.m.)* | | *50** |
| *Daytime Residential (7:00 a.m. to 10:00 p.m.)* | | *55** |

*Existing measured ambient levels at the project and receptor site boundaries, as shown in Table 1, already exceed these standards; therefore, the existing ambient levels (plus 3 dBA) are assumed to be the standards not to exceed. SOURCE: ESA, 2017.

As shown in Table 5, with the implementation of noise reduction measures NOISE-1 through NOISE-3, maximum construction noise levels would slightly exceed (by up to 3 dBA) the City's off-hours maximum noise limits of 65 dBA $L_{max}$ during early start off-hour of 6:00 to 7:00 a.m. and the concrete pours during the night hours (10:00 p.m. to 7:00 a.m.); and would not exceed the City's off-hours maximum noise limits of 70 dBA $L_{max}$ during early start off-hour of 7:00 to 8:00 a.m. The Project's off-hours construction noise at the multi-family residential use would be less than the average ambient night noise level of approximately 68 dBA $L_{eq}$ at 6:00 – 7:00 a.m., and 70 dBA $L_{eq}$ at 7:00 – 8:00 a.m. at the residence, resulting in a less than perceptible increase in ambient noise levels.

The Project's night construction noise during continuous concrete pours of 63 dBA $L_{eq}$ at the multi-family residential use would be slightly below the average ambient night noise level approximately 65 dBA $L_{eq}$ during the night period. The combined resultant ambient noise level would increase ambient levels by approximately 3 dBA to 68 dBA $L_{eq}$, which would be a less than perceptible increase. However, during the quietest hour of 3:00 a.m, the ambient night noise level would be lower, measured at approximately 56 dBA $L_{eq}$. Therefore, the Project's night construction noise of 63 dBA $L_{eq}$ at the multi-family residential use would be higher than the existing quietest hour ambient level, and when combined would be approximately 64 dBA $L_{eq}$, which would be an increase ambient levels of approximately 8 dBA, which would be a perceptible increase. Therefore, the night hourly ambient increase would range from approximately 3 to 8 dBA (barely perceptible to perceptible) during the concrete pours during the night period.

## 4.4 Cumulative Impact Analysis

This section presents a cumulative noise analysis of the proposed Project's off-hours construction activities in combination with the Ivy Station Development Project off-hours construction activities, operating simultaneously, and any potential cumulative noise impacts to the nearest noise sensitive receptor (Access Apartments).

### Ivy Station Project Off-hours Noise Analysis Summary

As discussed in Section 1.1, the Ivy Station Mixed-Use Development Project is located at 8824 National Boulevard adjacent to the Project site across National Boulevard to the northeast, and adjacent to the Access Apartments to the east across the intersection of National and Washington Boulevards, as shown in **Figure 2**. The Ivy Station Project consists of the development of three 5- to 6-story buildings to be built over a 3-level subterranean parking structure, which would require soil excavation and hauling, and foundation concrete pouring to occur outside the allowable construction hours of the City Noise Ordinance. The Ivy Station Project is currently under construction, and has been approved by the City to conduct off-hours construction work (i.e., concrete pours and soil hauling), based on the *Ivy Station Transit Oriented Mixed Use Development Project – Night Construction Noise and Lighting Technical Report*, November 2017, prepared for Bernards Builders & Management Services by ESA.

The Ivy Station off-hours soil hauling and mass excavation and concrete pouring would occur, though not simultaneously, outside of Culver City's allowable construction hours (off-hours),

potentially on weekdays, Saturdays, and holidays. The Ivy Station off-hours construction activities would generate elevated noise levels primarily from the usage of heavy equipment (i.e., concrete pumps) and trucks (i.e., concrete trucks and soil hauling trucks). Construction noise generated on-site would attenuate off-site due to below grade soil excavation on-site for concrete pouring (i.e., earthen walls of the excavated pit serving as noise barriers), and attenuate with distance from location of the equipment operating on-site (i.e., concrete pumps and trucks) to the nearest residential land use off-site, i.e., Access Apartments, adjacent to and southeast of the Ivy Station site.

The Ivy Station report shows the estimated off-hours construction noise levels that would occur at the nearest offsite sensitive use during off-hours construction activities at the Ivy Station Site, including the implementation of noise reduction measures, as shown here in Table 6.

**TABLE 6**
**IVY STATION OFF-HOURS CONSTRUCTION NOISE LEVELS AT OFFSITE NOISE-SENSITIVE USES**

| Construction Phase | Estimated Maximum Construction Noise Levels (dBA $L_{max}$) | Estimated Average Construction Noise Levels (dBA $L_{eq}$) |
|---|---|---|
| Soil Excavation & Hauling | 64 | 62 |
| Concrete Pours: | | |
| P3-1 & P3-2 and P3-3 | 61 | 64 |
| G-4 | 61 | 64 |
| *Culver City Night Noise Standards* | *65* | *50* |

SOURCE: ESA, 2017.

## 8777 Washington and Ivy Station Projects Cumulative Noise Analysis

The Ivy Station Project's off-hours construction started in November 2017, and is estimated to end in November 2018. The 8777 Washington Project's off-hours construction is anticipated to start in early 2018, and end in 2020. Therefore, there is the potential for simultaneous off-hours construction to occur from both projects in 2018.

The Ivy Station Project's off-hours construction work would include truck soil hauling for 6 months during excavation, and 13 months for concrete pours, which would occur during the off-hours on any day (weekdays, weekends, and holidays). The 8777 Washington Project off-hours construction would include an early start 6:00 a.m. to 8:00 a.m. on weekdays for the entire duration of the Project's construction, approximately 24 months, with earthwork during month 1-2, and 3-5, concrete activities during month 7-17. Therefore, there is the potential for simultaneous off-hours excavation/hauling and concrete pours from 6:00 a.m. to 8:00 a.m. on weekdays from both projects in 2018. In addition, 8777 Washington Project off-hours construction requires six continuous concrete pouring shifts (up to 18 hours per day, on six non-consecutive days during a one-month period). Therefore, there is also the potential for simultaneous off-hours concrete pours from both projects during the evening and night hours

(7:00 p.m. to 7:00 a.m.) on any day (weekdays, weekends, and holidays) on six non-consecutive days during a one-month period in 2018.

The cumulative off-hours construction noise analysis, therefore, focuses on noise level at the sensitive receptor during soil excavation/ hauling or concrete pours from both projects occurring simultaneously. Table 7 provides the mitigated noise levels from each project separately (from Tables 5 and 6) and the combined cumulative noise level of adding the noise levels of both projects.

**TABLE 7**
**ESTIMATED CUMULATIVE OFF-HOURS CONSTRUCTION NOISE LEVELS AT OFFSITE NOISE-SENSITIVE USES**

| Projects and Construction Phase | Estimated Maximum Construction Noise Levels (dBA $L_{max}$) | Estimated Average Construction Noise Levels (dBA $L_{eq}$) |
|---|---|---|
| **8777 Washington** | | |
| Shoring/Soil Excavation & Hauling | 78 | 76 |
| Concrete Hauling & Pours | 77 | 73 |
| Exterior Skin/Exterior/Interior | 71 | 68 |
| Ivy Station | | |
| Soil Excavation & Hauling | 64 | 62 |
| Concrete Pours: | | |
| P3-1 & P3-2 and P3-3 | 61 | 64 |
| G-4 | 61 | 64 |
| **Cumulative (8777 Washington plus Ivy Station)** | | |
| Shoring/Soil Excavation & Hauling | 78 | 76 |
| Concrete Hauling & Pours | 77 | 73 |
| Exterior Skin/Exterior/Interior | 71 | 68 |
| *Culver City Night Noise Standards* | *65* | *50* |

SOURCE: ESA, 2018.

As shown in Table 7, the noise level generated by Ivy Station does not measurably increase the noise level from 8777 Washington for any phase of construction. This modeled calculation is supported by the principle of the logarithmic decibel scale, that adding two noise levels, where the difference exceeds 10 dBA, results in an increase of 0 dBA over the highest noise level (i.e., 78 dB + 64 dB = 78 dB). Therefore, the cumulative off-hours noise impact at the nearest noise sensitive receptor would be less than significant.

# 5. Conclusion

The Project's maximum unmitigated off-hours construction noise levels would exceed the Culver City maximum noise level standards at the nearest residence in Culver City. Implementation of the proposed noise reduction measures NOISE-1 through NOISE-3 (e.g., noise barriers) would reduce maximum noise levels slightly above (by up to 3 dBA) the City's off-hours maximum noise limits of 65 dBA $L_{max}$ during early start off-hour of 6:00 to 7:00 a.m. and the concrete pours

during the night hours (10:00 p.m. to 7:00 a.m.); and would not exceed the City's off-hours maximum noise limits of 70 dBA $L_{max}$ during early start off-hour of 7:00 to 8:00 a.m.

The Project's hourly average unmitigated off-hours construction noise levels would exceed the ambient noise levels at the nearest residence in Culver City. Implementation of the proposed noise reduction measures NOISE-1 through NOISE-3 (e.g., noise barriers) would result in noise levels approximate to the average ambient night noise level at the residence, resulting in a less than perceptible increase in ambient noise levels. However, during the quietest hour of 3:00 a.m, the ambient night noise level would be lower, measured at approximately 56 dBA $L_{eq}$. The Project's night concrete pour noise level of 63 dBA $L_{eq}$ at the multi-family residential use, when combined with the quietest hour ambient, would be approximately 64 dBA $L_{eq}$, which would increase ambient levels by approximately 8 dBA, which would be a perceptible increase. Therefore, the ambient increase would range from 3 to 8 dBA $L_{eq}$ at (barely perceptible to perceptible) during the concrete pours during the night period.

The Project's off-hours construction would occur during the off-hours construction of the adjacent Ivy Station Project, with excavation/hauling and concrete pours potentially occurring simultaneous during off-hours from both projects in 2018. However, the Ivy Station noise level when combined with the Project's off-hours noise level does not measurably increase the Project's off-hours noise level at the nearest noise sensitive receptor. Therefore, the cumulative off-hours noise impact at the nearest noise sensitive receptor would be less than significant.

# 6. References

Culver City (Culver City), 1995 General Plan Noise Element. 1995.

Environmental Science Associates (ESA), *Ivy Station Transit Oriented Mixed Use Development Project – Night Construction Noise and Lighting Technical Report*, November 2017.

Federal Highway Administration (FHWA), Roadway Construction Noise Model User's Guide, 2006.

Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment, May, 2006.

U.S. Environmental Protection Agency (USEPA), *EPA Identifies Noise Levels Affecting Health and Welfare*, April 1974.

# Lighting

In addition to noise, the Project's off-hours construction would include the appropriate lighting equipment (i.e., tower portable lights) associated with the off-hours construction activities (i.e. concrete pours and soil excavation) during hours of darkness, as needed.

**Lighting Terminology**

Lighting is defined as the state of illumination. Illuminance is the measure of emitted light falling on a surface; luminance is the measure of light reflected or emitted by it. The intensity of outdoor

artificial lighting is selected based on its designed use (i.e., security, safety, visibility, or construction/maintenance) during periods of low or no natural light. Illuminance is typically measured in units of light intensity as foot-candles (fc)—the illuminance of one candle on a one square foot surface, located one foot away.

Glare is defined as offensive or undesirable light resulting from an excessively high contrast between a light source and its surrounding background. Glare can result in visual discomfort and reduce the ability to see objects. Glare usually results from a direct line-of-sight with an unshielded lighting source (lamp) from vehicles, streets, parking areas, building and site security, or entertainment/sporting venues. Glare can be controlled by proper design, location, and height of light fixtures and their light output.

Light trespass or spill light is unwanted light outside of the area intended to be illuminated by the lighting source. Light trespass is typically an undesirable condition, where surface illumination extends beyond the designed area of illumination; e.g., light spills from the source property onto an adjacent property. Like glare, light trespass can be controlled by the location and height of the lighting pole in addition to the shielding and glare control of the light source.

**Project Lighting Design Considerations**

The proposed lighting design contains design performance measures to reduce glare and light trespass, including appropriate lighting pole height and location, and lamp shielding. Pole heights for the Project's night construction would meet industry standards for lighting this type of activity. Strategic placement of the poles in relation to the activities (concrete pouring) is key to the proper lighting of the site in relation to the neighboring properties. Lamp sources would vary in multiple combinations based on the luminance level requirements of the site facilities. The proposed lighting would include external shielding reflectors to provide light shielding and glare control, decreasing the visibility of these high intensity lamps. The reflector and visor system would reduce light spill by 50 percent. Lighting would be strategically located and aimed toward the targeted construction areas of the project site with visor shields.

The Project lighting calculation evaluated the illuminance light trespass from the project based on the following assumptions. Four 20-foot high lighting poles would be located on the Project site, approximately 20 to 60 feet from each corner of the of the project boundary. Each pole consists of four LED narrow beam floodlights, each at 303 watts, 40,861 lumens. Fixtures are tilted 50 to 70 degrees above nadir. The construction area area would be illuminated to an average illuminance of 10 fc or higher. The Lighting Calculation Graphics for the Project are provided in Appendix B.

**Project Lighting Analysis**

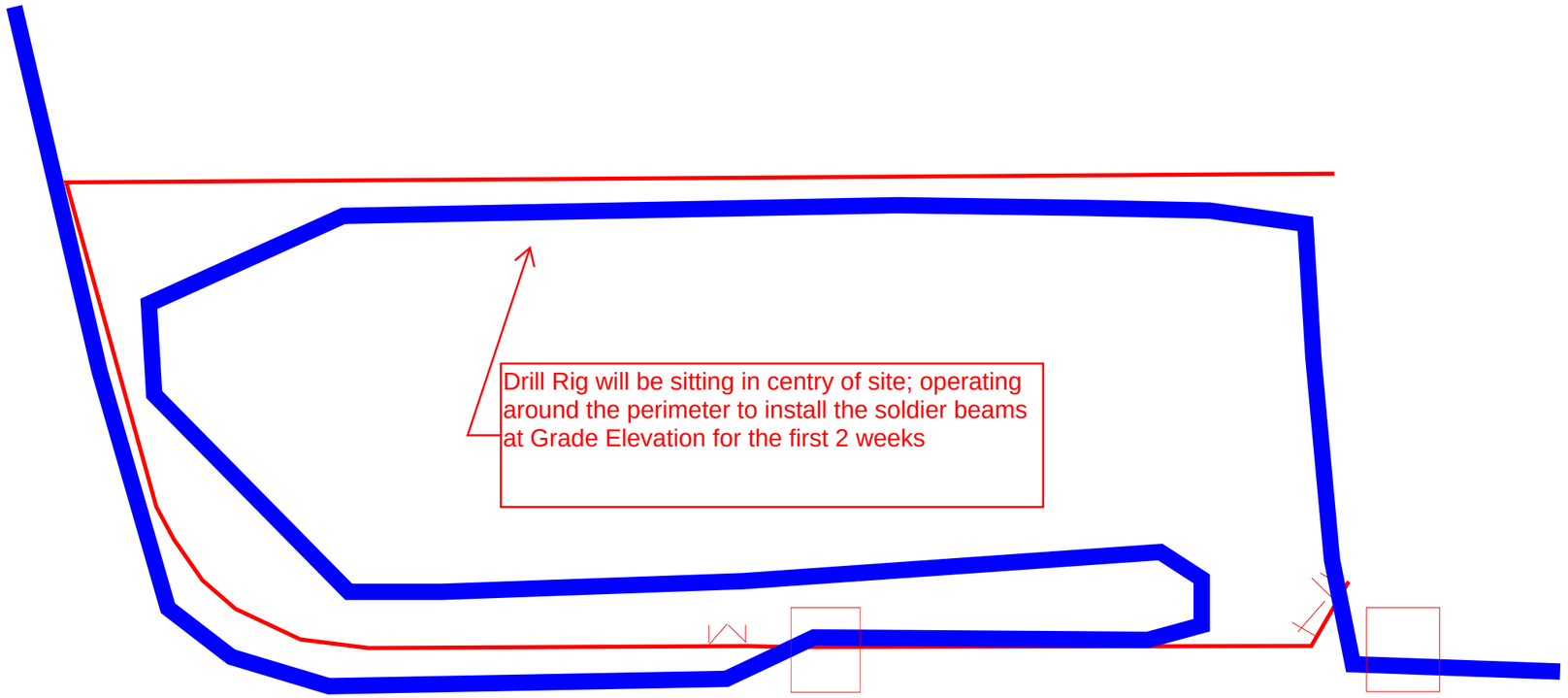
The proposed lighting plan would use appropriate lighting design controls including lamp type, pole location and height, and light shields and visors would reduce the potential for light trespass and glare off-site. Project lighting fixtures would direct light toward the interior of the site. The lighting design would prevent disability glare (i.e., reduction of the ability to see or identify objects). Glare and light spill would be minimized based on the design criteria.

The Project's construction lighting equipment may generate light trespass and/or glare on the project site; however, the light trespass and illuminance at the nearest residence in Culver City would be very low, and not significant, and the glare from the construction lighting equipment would not be visible at the residence. Appendix B includes the project lighting calculations and graphics. Construction lighting at only 8777 Washington site is considered (i.e., no lighting at the adjacent Ivy Station project site). In addition, construction lighting is considered occurring simultaneously at both the Ivy Station and 8777 Washington construction sites. For both conditions, the light trespass is below CalGreen threshold of 0.74 fc at the adjacent residential property. Therefore, a variance to the Culver City Noise Ordinance for the Project's night construction would not result in adverse lighting impacts.

# Appendix A

## Project Off-Hours Construction Activities and Noise Calculations

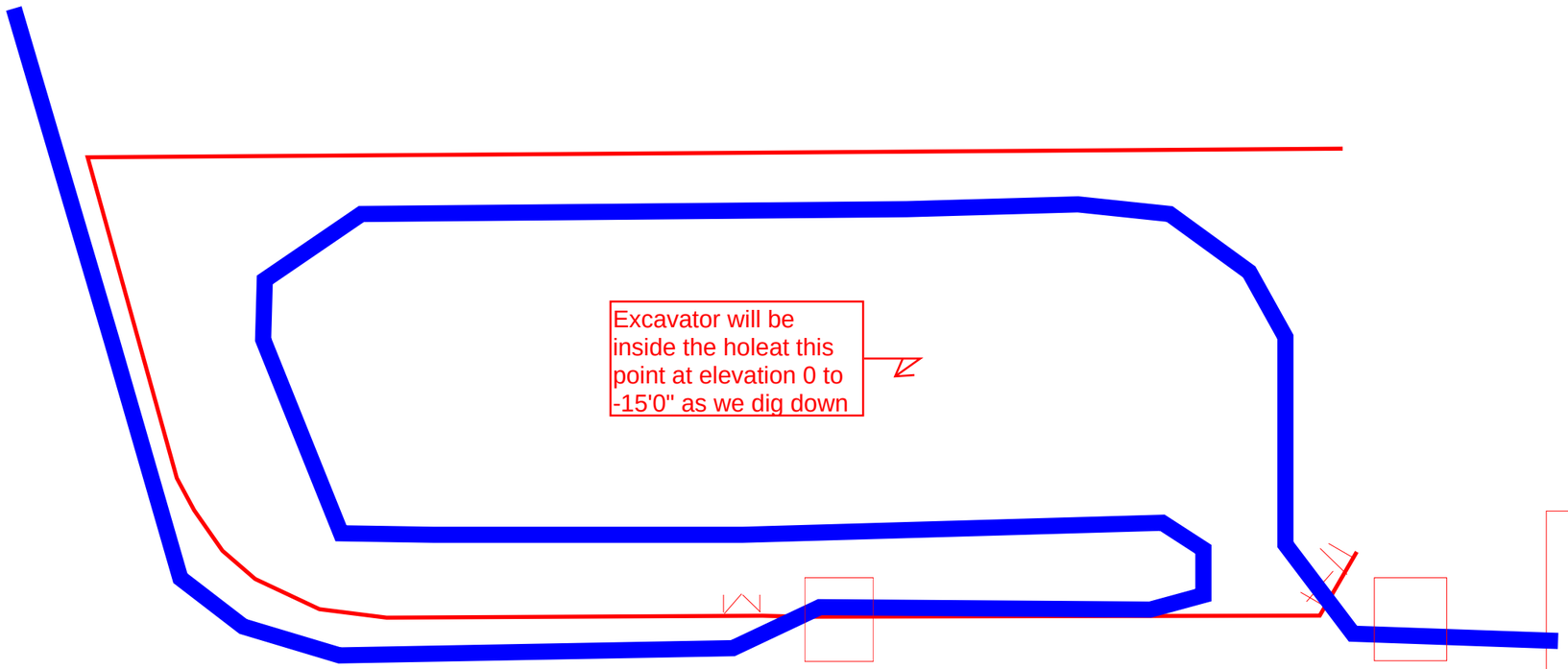
# EXHIBIT A.1
# Shoring (Drill Rig)




Excavation Truck Access

FLAGMAN

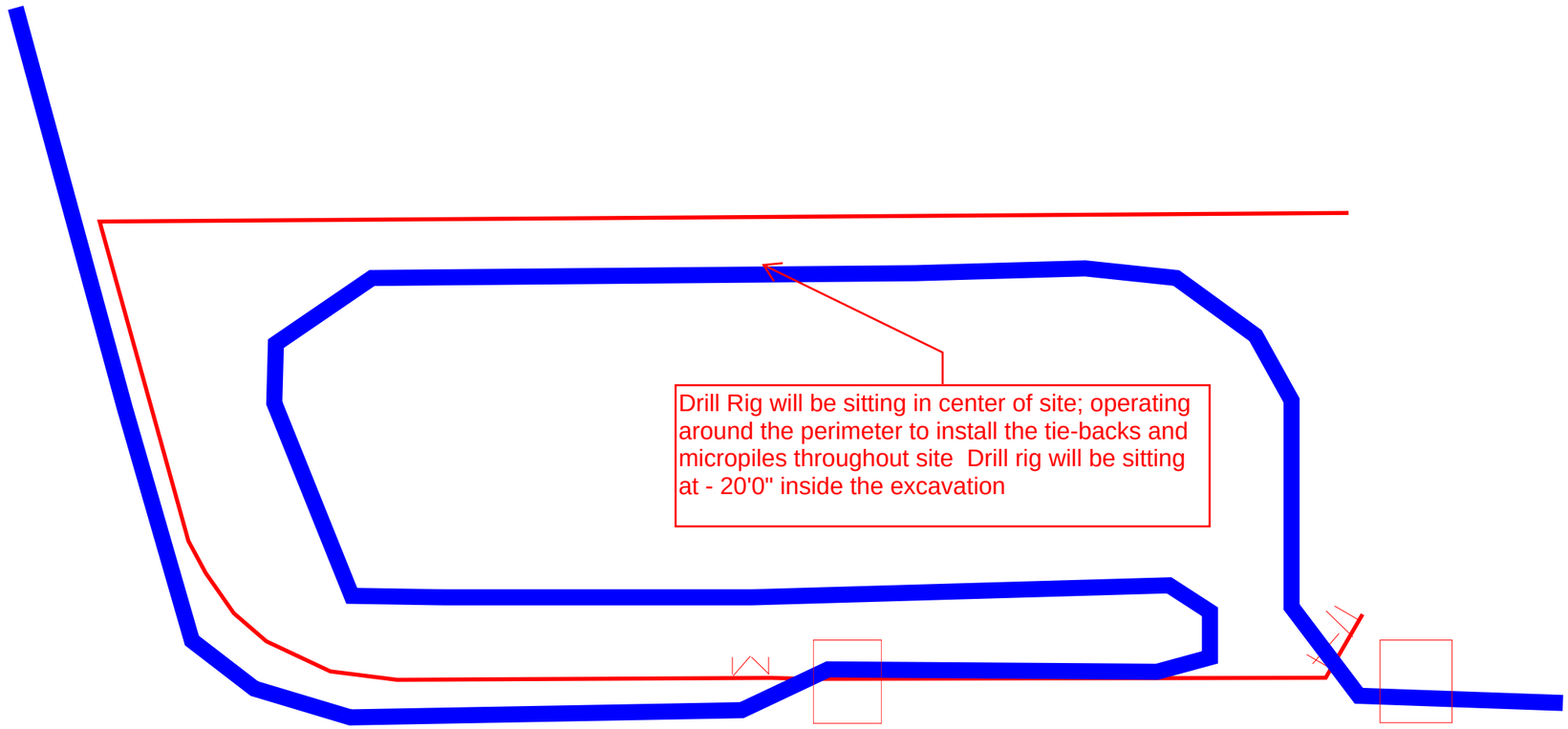
# EXHIBIT A.2 - Hauling from Grade Level to -15'0"




Excavation Truck Access

FLAGMAN

# EXHIBIT A.3 - Micropile Installation




Excavation Truck Access

FLAGMAN

# EXHIBIT A.4
# Earthwork from -15'0" to -35'0"

Excavator will sit at edge of excavation to haul remaining dirt

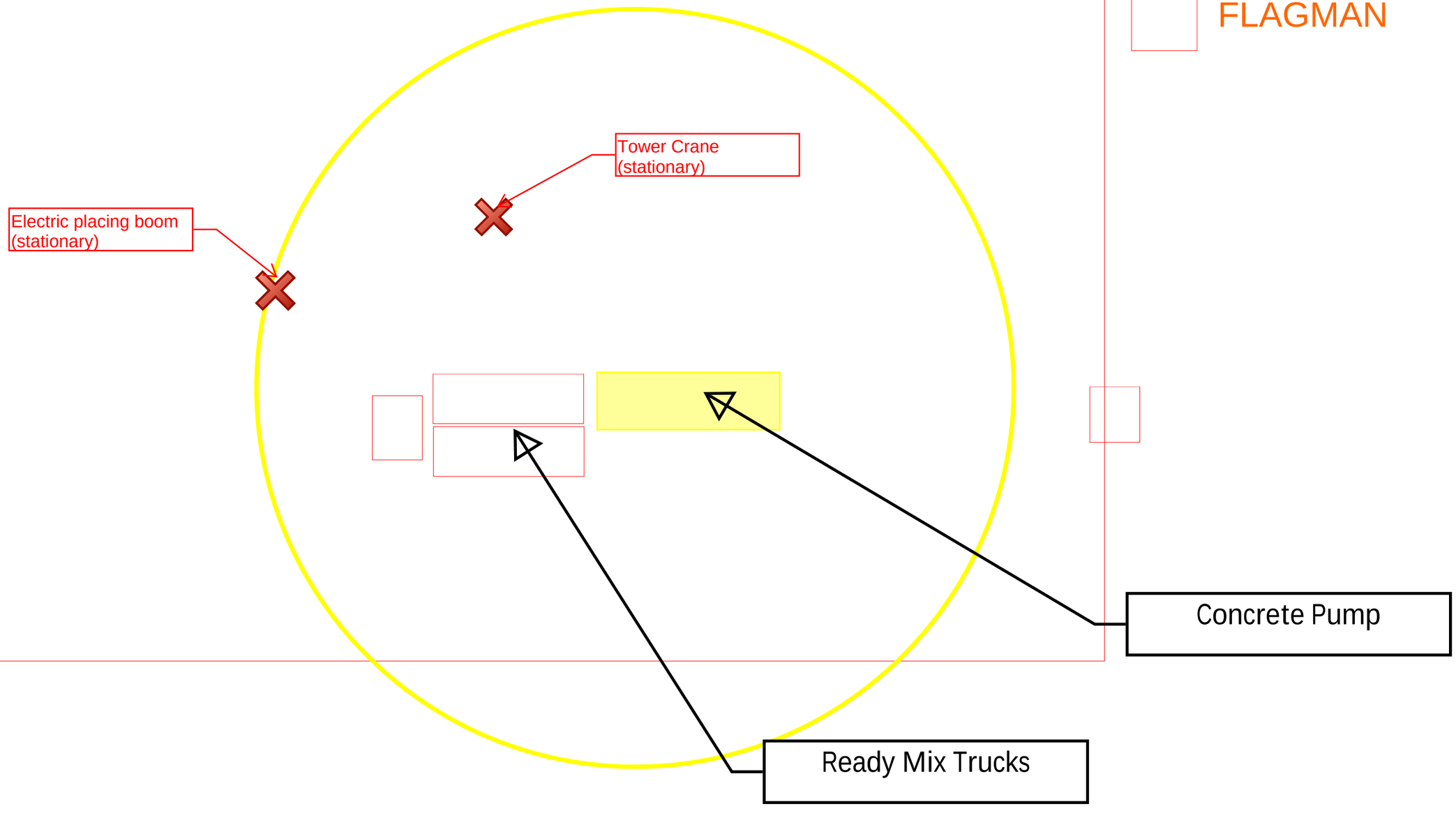
Excavation Truck Access

FLAGMAN

# EXHIBIT A.5
# Concrete Work

Concrete Truck & Pumping

FLAGMAN



## Project: 8777 Washington Boulevard Development Project – Night Construction

**Construction Noise Impact on Sensitive Receptors**

***Parameters***

| | | |
|---|---|---|
| **Construction Hours:** | 8 | Daytime hours (7 am to 7 pm) |
| | 0 | Evening hours (7 pm to 10 pm) |
| | 0 | Nighttime hours (10 pm to 7 am) |
| **Leq to L10 factor** | 3 | |

| | | | | Sensitive Receptor | | | | |
|---|---|---|---|---|---|---|---|---|
| ***Construction Phase***<br>**Equipment Type** | **No. of Equip.** | **Reference Noise Level at 50ft, Lmax** | **Acoustical Usage Factor** | **Distance (ft)** | **Lmax** | **Leq** | **L10** | **Estimated Noise Shielding, dBA** |
| ***Shoring*** | | | | | **78** | ***76*** | | |
| Drill Rig Truck | 1 | 79 | 20% | 90 | 74 | 67 | 70 | 0 |
| ***Earthwork*** | | | | | **78** | ***76*** | | |
| Semi Trucks | 2 | 76 | 20% | 65 | 77 | 70 | 73 | 0 |
| Excavator/Loader | 1 | 80 | 45% | 65 | 78 | 74 | 77 | 0 |
| ***Concrete/Shotcrete*** | | | | | **77** | ***73*** | | |
| Concrete Pump | 1 | 81 | 20% | 75 | 77 | 70 | 73 | 0 |
| Concrete Trucks on Washington | 1 | 79 | 40% | 90 | 74 | 70 | 73 | 0 |
| ***Exterior Skin*** | | | | | **71** | ***68*** | | |
| Forklift | 1 | 75 | 10% | 75 | 71 | 61 | 64 | 0 |
| Boom Lift | 1 | 75 | 20% | 75 | 71 | 64 | 67 | 0 |
| Man Lift | 1 | 75 | 20% | 90 | 70 | 63 | 66 | 0 |
| ***Interior/Site*** | | | | | **71** | ***65*** | | |
| Forklift | 1 | 75 | 10% | 75 | 71 | 61 | 64 | 0 |
| Man Lift | 1 | 75 | 20% | 90 | 70 | 63 | 66 | 0 |

## Project: 8777 Washington Boulevard Development Project – Night Construction

**Construction Noise Impact on Sensitive Receptors**

***Parameters***

| | | |
|---|---|---|
| **Construction Hours:** | 8 | Daytime hours (7 am to 7 pm) |
| | 0 | Evening hours (7 pm to 10 pm) |
| | 0 | Nighttime hours (10 pm to 7 am) |
| **Leq to L10 factor** | 3 | |

| | | | | Sensitive Receptor | | | | |
|---|---|---|---|---|---|---|---|---|
| ***Construction Phase***<br>**Equipment Type** | **No. of Equip.** | **Reference Noise Level at 50ft, Lmax** | **Acoustical Usage Factor** | **Distance (ft)** | **Lmax** | **Leq** | **L10** | **Estimated Noise Shielding, dBA** |
| ***Shoring*** | | | | | **68** | ***66*** | | |
| Drill Rig Truck | 1 | 79 | 20% | 90 | 64 | 57 | 60 | 10 |
| ***Earthwork*** | | | | | **68** | ***66*** | | |
| Semi Trucks | 2 | 76 | 20% | 65 | 67 | 60 | 63 | 10 |
| Excavator/Loader | 1 | 80 | 45% | 65 | 68 | 64 | 67 | 10 |
| ***Concrete/Shotcrete*** | | | | | **67** | ***63*** | | |
| Concrete Pump | 1 | 81 | 20% | 75 | 67 | 60 | 63 | 10 |
| Concrete Trucks on Washington | 1 | 79 | 40% | 90 | 64 | 60 | 63 | 10 |
| ***Exterior Skin*** | | | | | **61** | ***58*** | | |
| Forklift | 1 | 75 | 10% | 75 | 61 | 51 | 54 | 10 |
| Boom Lift | 1 | 75 | 20% | 75 | 61 | 54 | 57 | 10 |
| Man Lift | 1 | 75 | 20% | 90 | 60 | 53 | 56 | 10 |
| ***Interior/Site*** | | | | | **61** | ***55*** | | |
| Forklift | 1 | 75 | 10% | 75 | 61 | 51 | 54 | 10 |
| Man Lift | 1 | 75 | 20% | 90 | 60 | 53 | 56 | 10 |

# Appendix B

## Project Off-Hours Construction Lighting Graphics

# LIGHTING CALCULATION REPORT

Date:2/7/2018

8777 WASHINGTON CULVER CITY
CONSTRUCTION SITE LIGHTING
ILLUMINANCE LIGHT TRESPASS ANALYSIS AT ADJACENT RESIDENTIAL PROPERTY
VERTICAL PLANE 1: NATIONAL BOULEVARD
VERTICAL PLANE 2: WASHINGTON BOULEVARD

ANALYSIS CRITERIA:
LIGHT TRESPASS ILLUMINANCE: MAX 0.74 fc
CALGREEN LZ3, IESNA TABLE 26.4 LIGHTING ZONE 3
CONSTRUCTION AREA ILLUMINANCE: 10 fc AVERAGE
IESNA 10TH EDITION HANDBOOK

Luminaire Schedule

| Symbol | Qty | Label | Total Lamp Lumens | LLF | Description | Lum. Watts |
|---|---|---|---|---|---|---|
| ⊙ | 16 | 84521 | N.A. | 1.000 | | 336 |

Calculation Summary

| Label | CalcType | Units | Avg | Max | Min | Avg/Min | Max/Min |
|---|---|---|---|---|---|---|---|
| CalcPts_Site_8777 Washington | Illuminance | Fc | 15.04 | 189 | 0.5 | 30.08 | 377.40 |
| CalcPts_Site_Ivy Station | Illuminance | Fc | 0.00 | 0.0 | 0.0 | N.A. | N.A. |
| Vertical Plane_North_Washington_ | Illuminance | Fc | 0.41 | 0.5 | 0.0 | N.A. | N.A. |
| Vertical Plane_West_National_Sid | Illuminance | Fc | 0.00 | 0.0 | 0.0 | N.A. | N.A. |


The Lighting Calculation evaluated the illuminance light trespass from the Project with the following assumptions:
1 – Four 20 ft high poles were located on the project site, approximate 20 to 60 ft from each corner of the project boundary;
2 – Each pole consisted of 4 LED narrow beam floodlights, each at 303 watts, 40,861 lumens. Fixtures are tilted 50 to 70 degrees above nadir;
3 – The construction area was illuminated to an average illuminance of 10 footcandles or higher.

Temporary fencing around the construction area was not considered in this analysis. If different pole or light fixture are specified for the Project, height of pole should be no higher than 20 ft, and light fixture total output should not exceed the total output in this analysis.

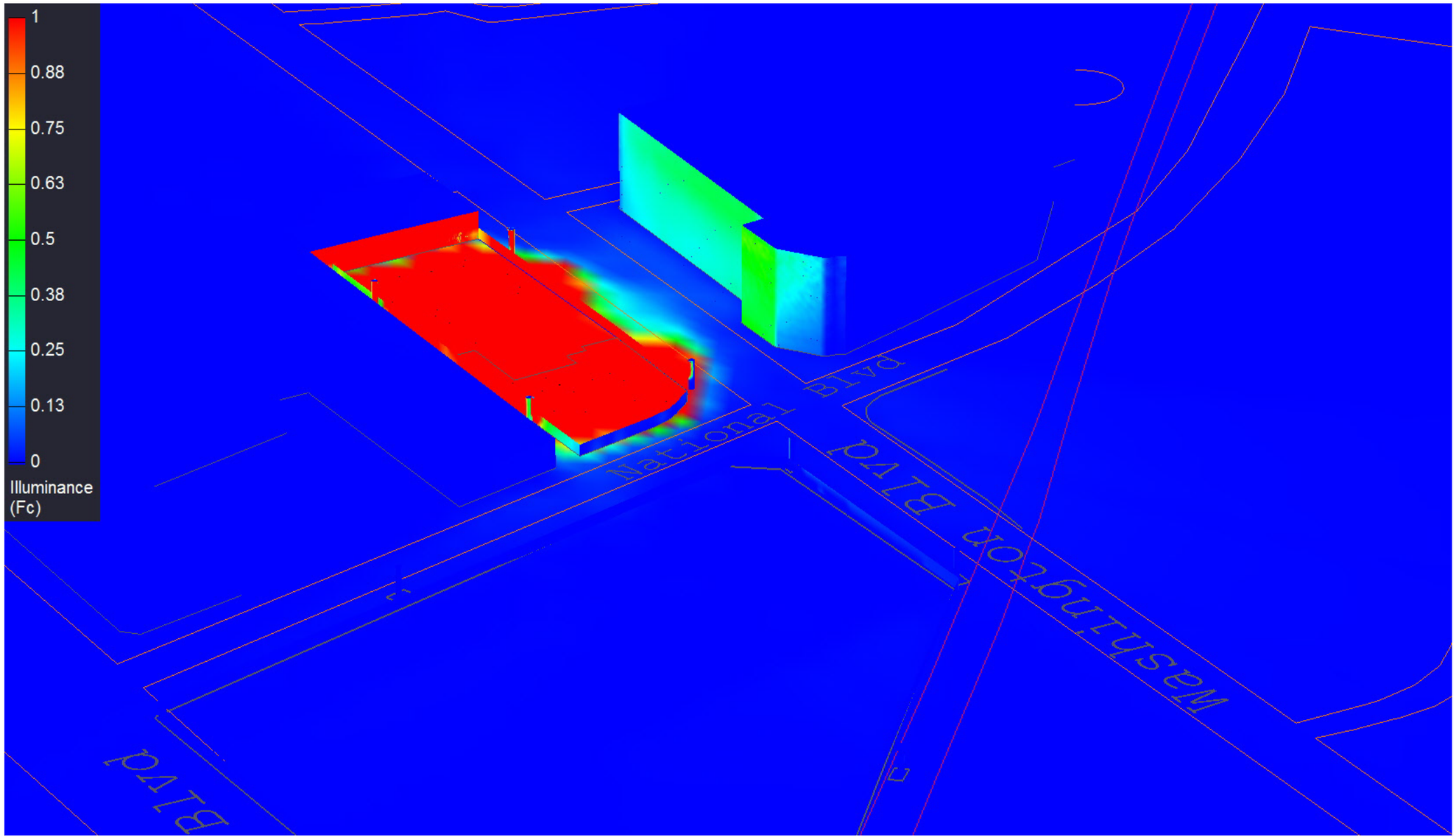
# LIGHTING CALCULATION REPORT

Date:2/7/2018

8777 WASHINGTON CULVER CITY
CONSTRUCTION SITE LIGHTING
ILLUMINANCE LIGHT TRESPASS ANALYSIS AT ADJACENT RESIDENTIAL PROPERTY
VERTICAL PLANE 1: NATIONAL BOULEVARD
VERTICAL PLANE 2: WASHINGTON BOULEVARD

ANALYSIS CRITERIA:
LIGHT TRESPASS ILLUMINANCE: MAX 0.74 fc
CALGREEN LZ3, IESNA TABLE 26.4 LIGHTING ZONE 3
CONSTRUCTION AREA ILLUMINANCE: 10 fc AVERAGE
IESNA 10TH EDITION HANDBOOK

Date:2/7/2018




RENDERED VIEW

# LIGHTING CALCULATION REPORT

Date:2/7/2018

8777 WASHINGTON WITH IVY STATION
CONSTRUCTION SITE LIGHTING
ILLUMINANCE LIGHT TRESPASS ANALYSIS AT ADJACENT RESIDENTIAL PROPERTY
VERTICAL PLANE 1: NATIONAL BOULEVARD
VERTICAL PLANE 2: WASHINGTON BOULEVARD

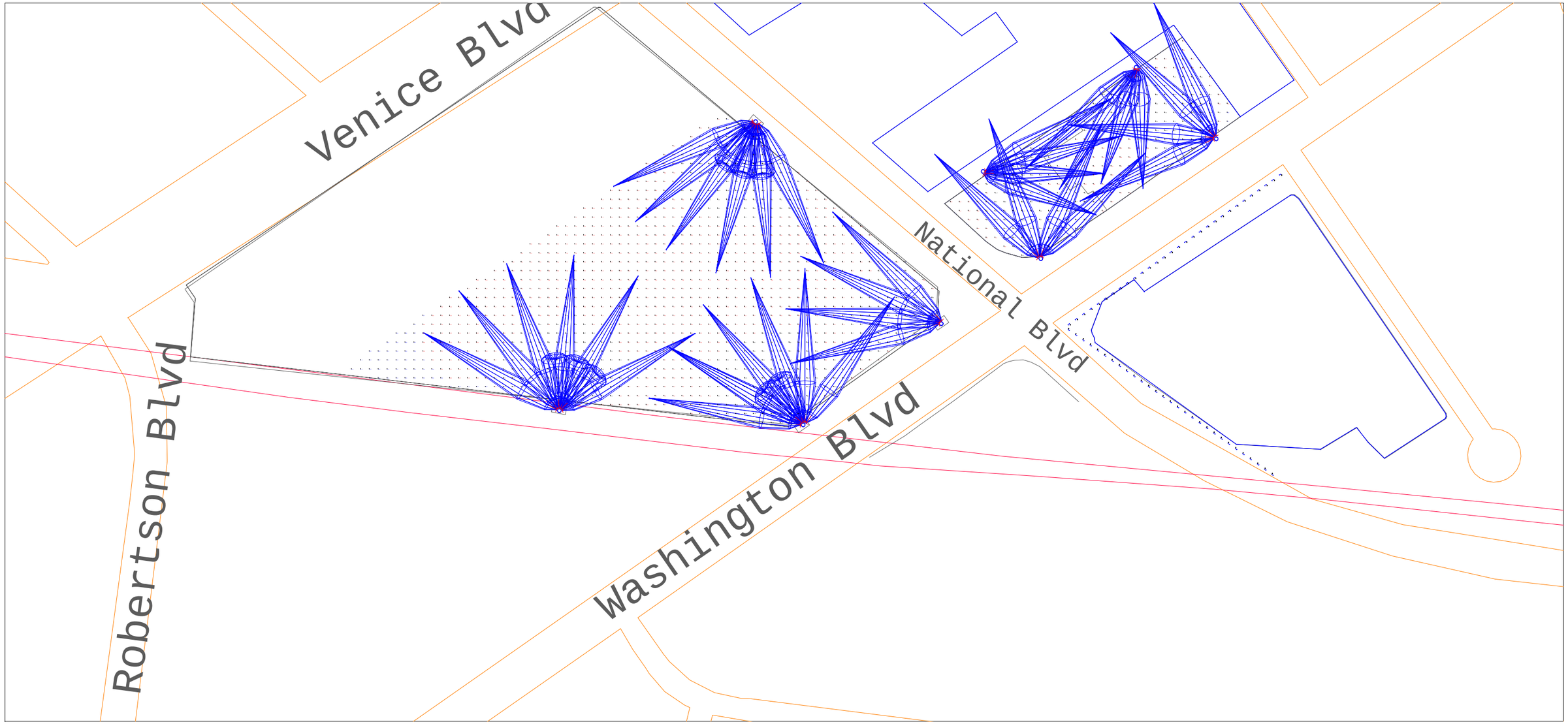
ANALYSIS CRITERIA:
LIGHT TRESPASS ILLUMINANCE: MAX 0.74 fc
CALGREEN LZ3, IESNA TABLE 26.4 LIGHTING ZONE 3
CONSTRUCTION AREA ILLUMINANCE: 10 fc AVERAGE
IESNA 10TH EDITION HANDBOOK

Luminaire Schedule

| Symbol | Qty | Label | Total Lamp Lumens | LLF | Description | Lum. Watts |
|---|---|---|---|---|---|---|
| ⊙ | 8 | 84522 | N.A. | 1.000 | | 336 |
| ⊙ | 39 | 84521 | N.A. | 1.000 | | 336 |

Calculation Summary

| Label | CalcType | Units | Avg | Max | Min | Avg/Min | Max/Min |
|---|---|---|---|---|---|---|---|
| CalcPts_Site_8777 Washington | Illuminance | Fc | 15.06 | 189 | 0.5 | 30.12 | 377.40 |
| CalcPts_Site_Ivy Station | Illuminance | Fc | 6.50 | 85.6 | 0.1 | 65.00 | 856.00 |
| Vertical Plane_North_Washington_ | Illuminance | Fc | 0.45 | 0.6 | 0.0 | N.A. | N.A. |
| Vertical Plane_West_National_Sid | Illuminance | Fc | 0.02 | 0.1 | 0.0 | N.A. | N.A. |



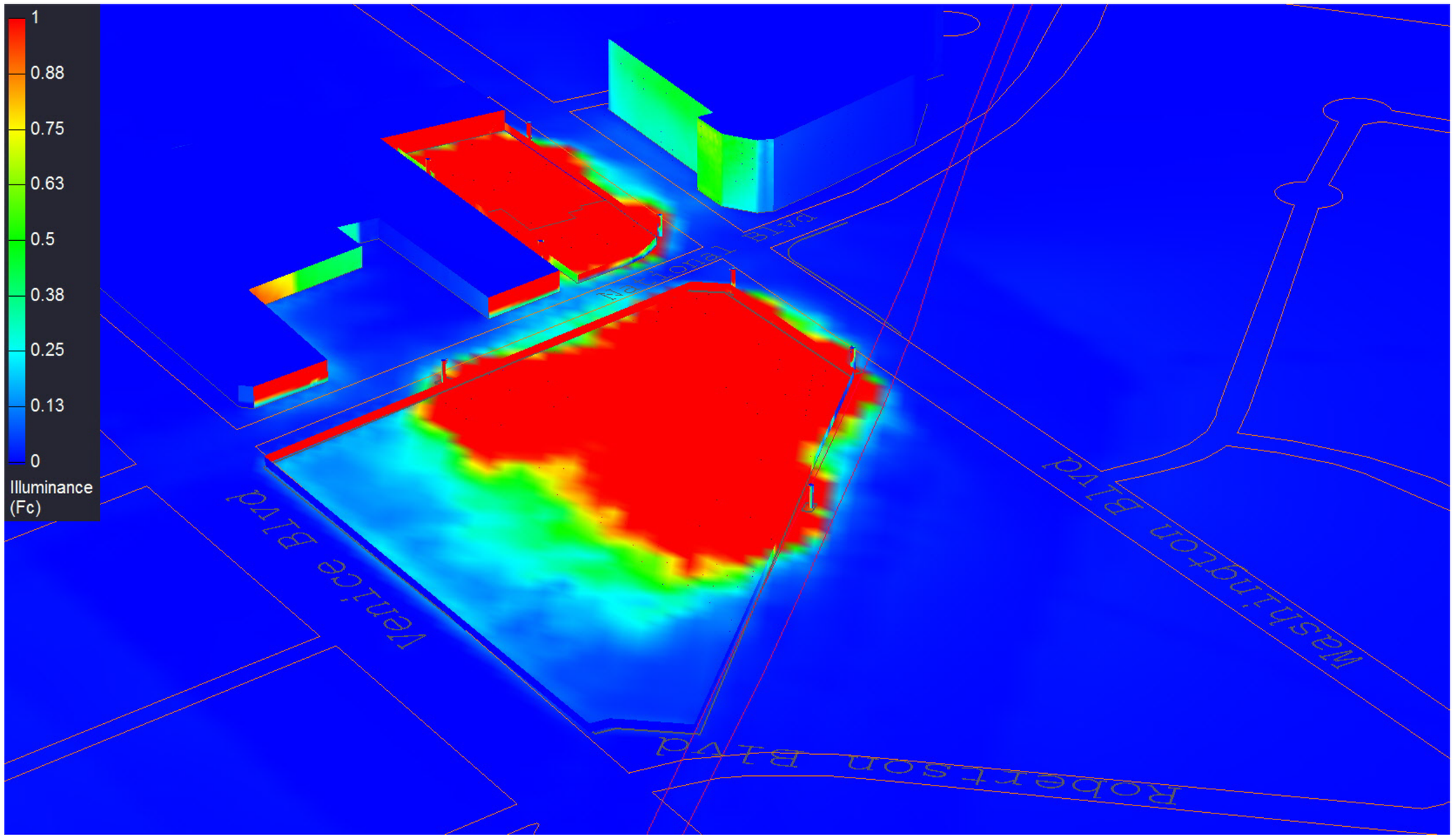
# LIGHTING CALCULATION REPORT

Date:2/7/2018

8777 WASHINGTON WITH IVY STATION
CONSTRUCTION SITE LIGHTING
ILLUMINANCE LIGHT TRESPASS ANALYSIS AT ADJACENT RESIDENTIAL PROPERTY
VERTICAL PLANE 1: NATIONAL BOULEVARD
VERTICAL PLANE 2: WASHINGTON BOULEVARD

ANALYSIS CRITERIA:
LIGHT TRESPASS ILLUMINANCE: MAX 0.74 fc
CALGREEN LZ3, IESNA TABLE 26.4 LIGHTING ZONE 3
CONSTRUCTION AREA ILLUMINANCE: 10 fc AVERAGE
IESNA 10TH EDITION HANDBOOK

Date:2/7/2018




RENDERED VIEW