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# memorandum

date September 2, 2016

to Richard Rich, City of Sacramento; Jeffrey Dorso, Pioneer Law Group

from Brian Boxer and Christina Erwin, ESA

subject **Proposed Major League Soccer Stadium Noise Contours – Revised**

## 1.0 INTRODUCTION

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Based on direction provided by the City of Sacramento Planning and Design Commission on August 11, 2016, ESA used the most current available information to remodeled noise contours for the proposed MLS Stadium within the Railyards Specific Plan Area (RSP Area).

Planning Commissioners requested additional information regarding noise levels expected from the proposed MLS Stadium. They requested two data sets:

- 1) Assume some development in the RSP Area and show noise contours down to the 50 dBA level to reflect the City's nighttime exterior noise standard.
- 2) Assume no other development in the RSP Area (essentially a Day One analysis for the MLS Stadium) and show noise contours down to the 50 dBA.

For both data sets, we modeled the same three scenarios previously analyzed:

- a) soccer game,
- b) pre-game events at outside stages, and
- c) music concert in the Stadium.

This technical memorandum describes the methodology used for the assessment and presents the results with noise contour maps. The information in this memorandum updates and augments information provided in the Railyards DSEIR and the noise technical memorandum provided on July 15, 2016.

## 2.0 METHODOLOGY

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This section describes methodologies used for this MLS Stadium noise impact assessment. The noise model used and the model validation methodology remain identical to that described in the July 15, 2016 noise technical memorandum.

### 2.1 Noise Model

The Computer Aided Noise Abatement (CadnaA) noise propagation program (Version 4.6.155) was used to estimate the propagation of noise from the proposed MLS Stadium.

CadnaA is a Windows-based software program that predicts and assesses noise levels in the vicinity of noise sources based on International Organization for Standardization 9613-2 algorithms for noise propagation calculations. The calculations account for classical sound wave divergence plus attenuation factors resulting from air absorption, basic ground effects, and barrier/shielding.

### 2.2 Model Validation

The dominant noise sources from a soccer game include crowd shouting and public address announcement. In order to establish the noise sources in the model, noise measurement data collected from the soccer game between the Sacramento Republic Football Club (Sac Republic FC) and Colorado Rapids at Bonney Field on February 13, 2015 was used to validate the model.

Section 4.10 of the Draft Subsequent Environmental Impact Report (DSEIR) for the Railyards Specific Plan Update stated that the noise level during the soccer game was 72.3 dBA  $L_{eq}$  at 272 feet from the center of Bonney Field. Note that the noise level of 72.3 dBA  $L_{eq}$  was based on 30-minute averages and included both crowd and public address system noise.

The model validation task is to develop the noise model to re-create the same measurement environment. The Bonney Field seating areas were used as the noise source, which generate noise level of 72.3 dBA at the actual measurement location. The result of the validated noise source was used for the proposed MLS Stadium noise model.

### 2.3 Assumptions

Several key assumptions were made for the model. Below describes each assumption. The following bulleted list applies to both data sets – both with surrounding development in the RSP Area and without that development.

- The proposed MLS Stadium capacity is 25,000 for a soccer game and 27,000 for a music concert.
- Three temporary stage locations within the plaza, but outside of the MLS Stadium, were evaluated. Each temporary stage would have amplified sound. Noise source levels at each of these stages were assumed to be 100 dBA at 5 feet, as described in Mitigation Measure 4.10-2(b) in Section 4.10 of the DSEIR.
- Music events within the MLS Stadium would take place on a stage at the southern end of the pitch. Noise source levels at this stage were assumed to be 98dBA at 150 feet, consistent with City Municipal Code section 8.68.160.
- Noise sources other than Stadium-related events were not considered for the noise contour development. Those potential noise sources would include rail, vehicular traffic, and KP Medical Center helicopter operations.

- Existing building footprints were obtained from Sacramento County GIS Data Library.
- Topographic data outside of the proposed MLS Stadium was obtained from USGS The National Map GIS Data.

For the first data set, we assumed some development in the RSP Area. Future structures within the RSP Area were included as “Built-Up Area” in the model using the following assumptions:

- Lot 47ab – Height would be 85 feet and 50% of the parcel would be developed.
- Lot 48ab – Height would be 205 feet and 50% of the parcel would be developed.
- Lot 49ab – Height would be 120 feet and 50% of the parcel would be developed.
- Lot 50 – Height would be 115 feet and 50% of the parcel would be developed.
- Lot 51a – Height would be 40 feet and 25% of the parcel would be developed.
- Lot 51b – Height would be 30 feet and 50% of the parcel would be developed.
- Lot 56abcd – Height would be 125 feet and 50% of the parcel would be developed.
- Lot 57bcd – Height would be 155 feet and 90% of the parcel would be developed.
- Lot 69abcd – Height would be 125 feet and 50% of the parcel would be developed.
- Lot 70abd – Height would be 85 feet and 90% of the parcel would be developed.

For the second data set, we did not assume development in the RSP Area beyond the existing Central Shops buildings. Zero development was assumed on the lots listed above.

This noise modeling accounts for the proposed design of the MLS Stadium including the structure height, building materials, locations of entries and exits, roof structure design, and site grading and topography. This analysis also takes into account the capacity of the stadium for all types of anticipated events, noise anticipated from those crowds, and specific locations of event stages. Further, the model inputs include details about the topography of the surrounding area, as well as surrounding existing and proposed building heights, locations, and site coverage.

### 3.0 FINDINGS

Figures 1a, 1b, and 1c represent the noise contours that can be expected during a soccer game, pre-game events outside of the Stadium from three stages operating concurrently, and a music concert with a stage inside the MLS Stadium, respectively. These figures assume some levels of development on surrounding RSP lots as described above in the Methodology and Assumptions section. Noise contours down to 50 dBA  $L_{eq}$  are presented, which is the threshold for the nighttime noise level as it is described in the City of Sacramento Noise Ordinance.

Figures 2a, 2b, and 2c represent the noise contours that can be expected during a soccer game, pre-game events outside of the Stadium from three stages operating concurrently, and a music concert with a stage inside the MLS Stadium, respectively. These figures assume no development on surrounding RSP lots, and represent a Day One scenario for the MLS Stadium. Noise contours down to 50 dBA  $L_{eq}$  are presented, which is the threshold for the nighttime noise level as it is described in the City of Sacramento Noise Ordinance.

Noise resulting from proposed events at the MLS Stadium would affect different areas of the surrounding parcels to varying degrees. Due to building design and other factors described above, areas to the southwest, west, and north of the MLS Stadium would be affected by amplified and crowd noise the most. Noise would travel along unobstructed corridors such as local roadways and between existing and proposed buildings, creating somewhat defined noise contours along those linear pathways. Sound from a music event inside the

MLS Stadium would travel the farthest, followed by noise from a soccer game and noise from amplified noise at the outdoor stages.

For each of the events that could be held at the MLS Stadium, the noise contours between the with-development and zero development data sets are not very different, particularly close to the MLS Stadium. Differences can be seen much farther away from the MLS Stadium, but the differences are relatively minor.

Attachments:

Figure 1a – MLS Stadium – Soccer Game Noise Contour Map – With Development

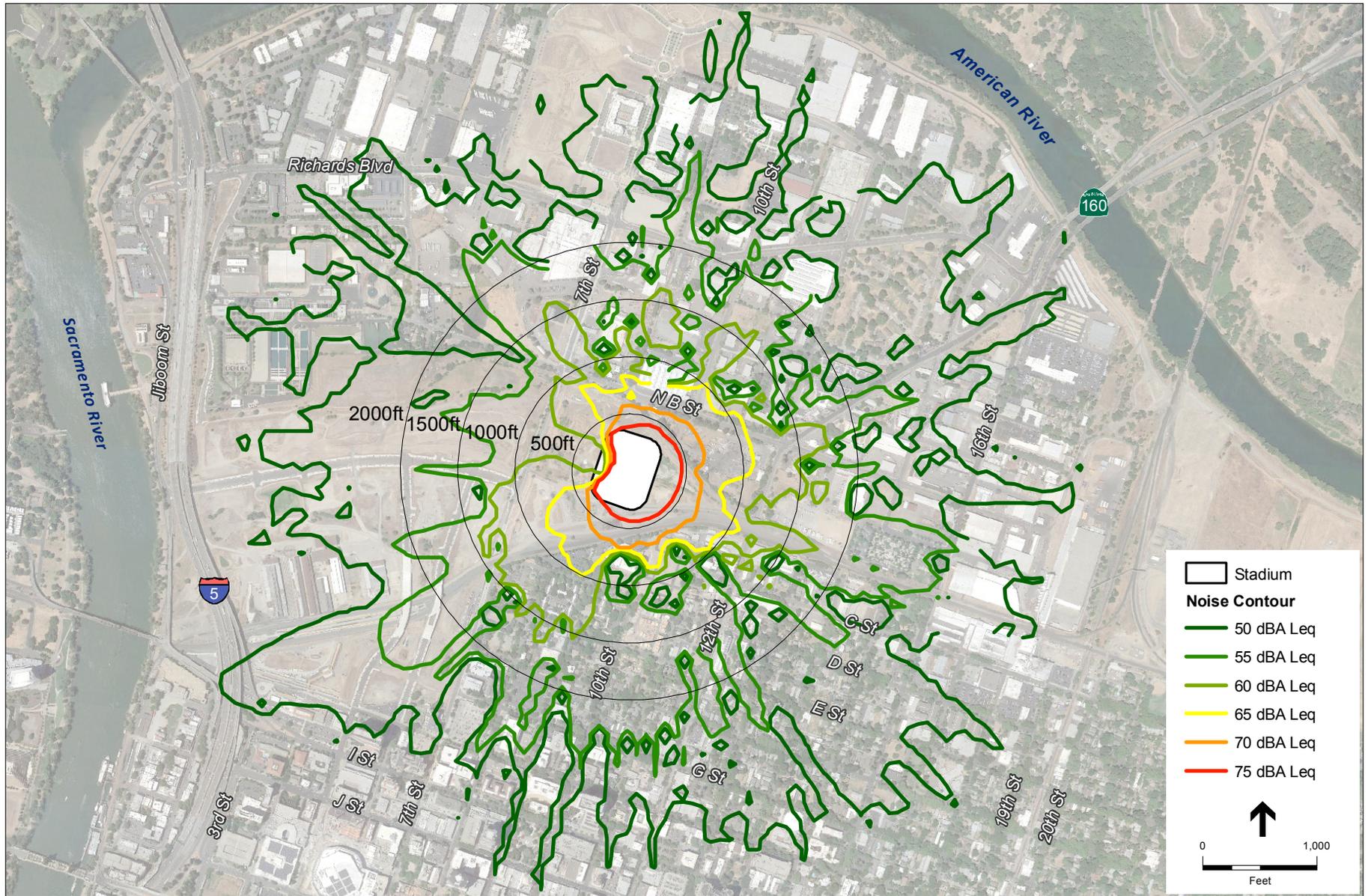
Figure 1b – MLS Stadium – Outside Stages Noise Contour Map – With Development

Figure 1c – MLS Stadium – Music Concert Noise Contour Map – With Development

Figure 2a – MLS Stadium – Soccer Game Noise Contour Map – Zero Development

Figure 2b – MLS Stadium – Outside Stages Noise Contour Map – Zero Development

Figure 2c – MLS Stadium – Music Concert Noise Contour Map – Zero Development

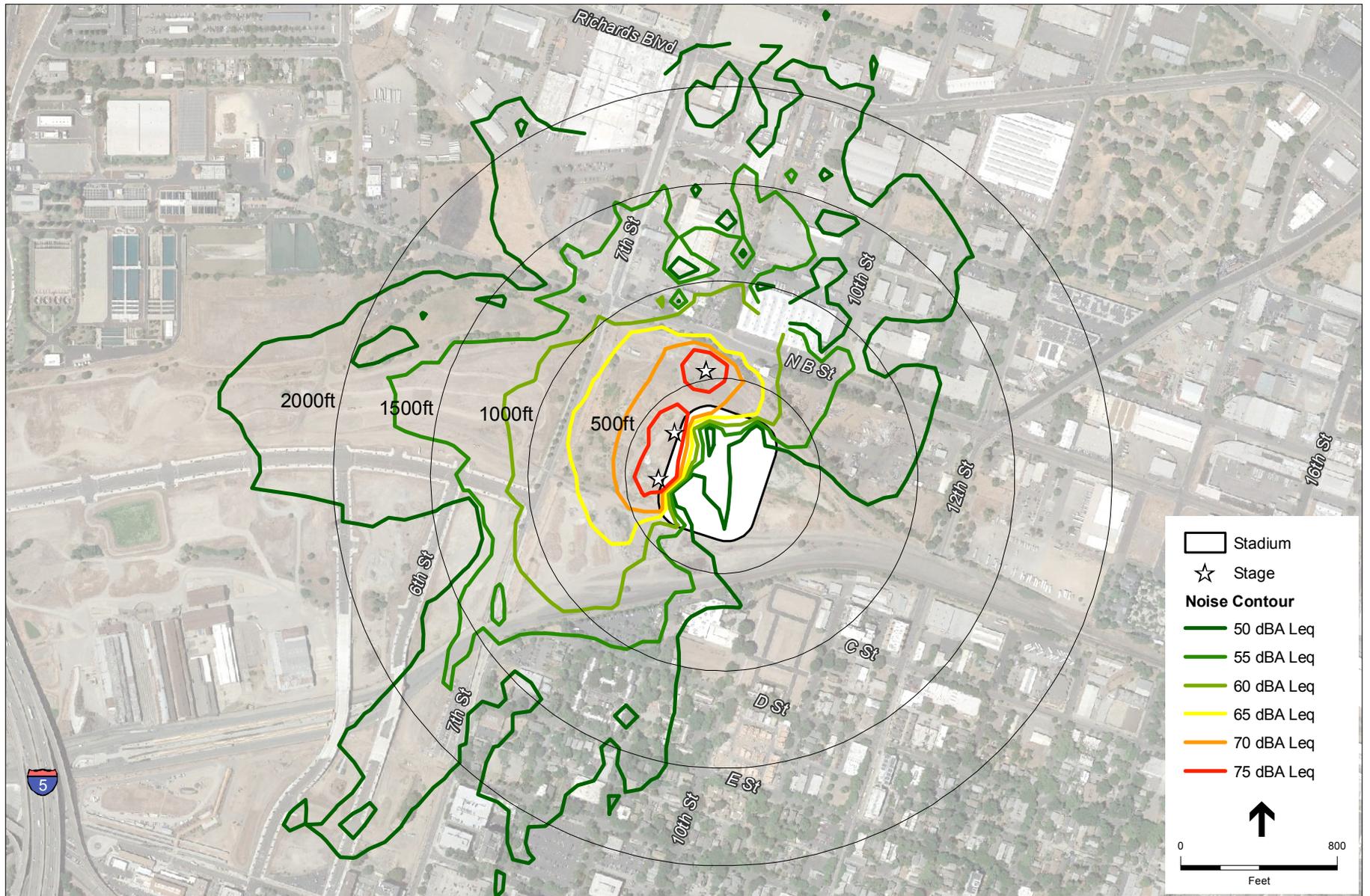


SOURCE: Google, 2016; Kimley Horn, 2015; HNTB, 2016; ESA, 2016

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**Figure 1a**

MLS Stadium - Soccer Game  
Noise Contour Map - With Development



SOURCE: Google, 2016; Kimley Horn, 2015; HNTB, 2016; ESA, 2016

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**Figure 1b**

MLS Stadium - Outside Stages  
Noise Contour Map - With Development

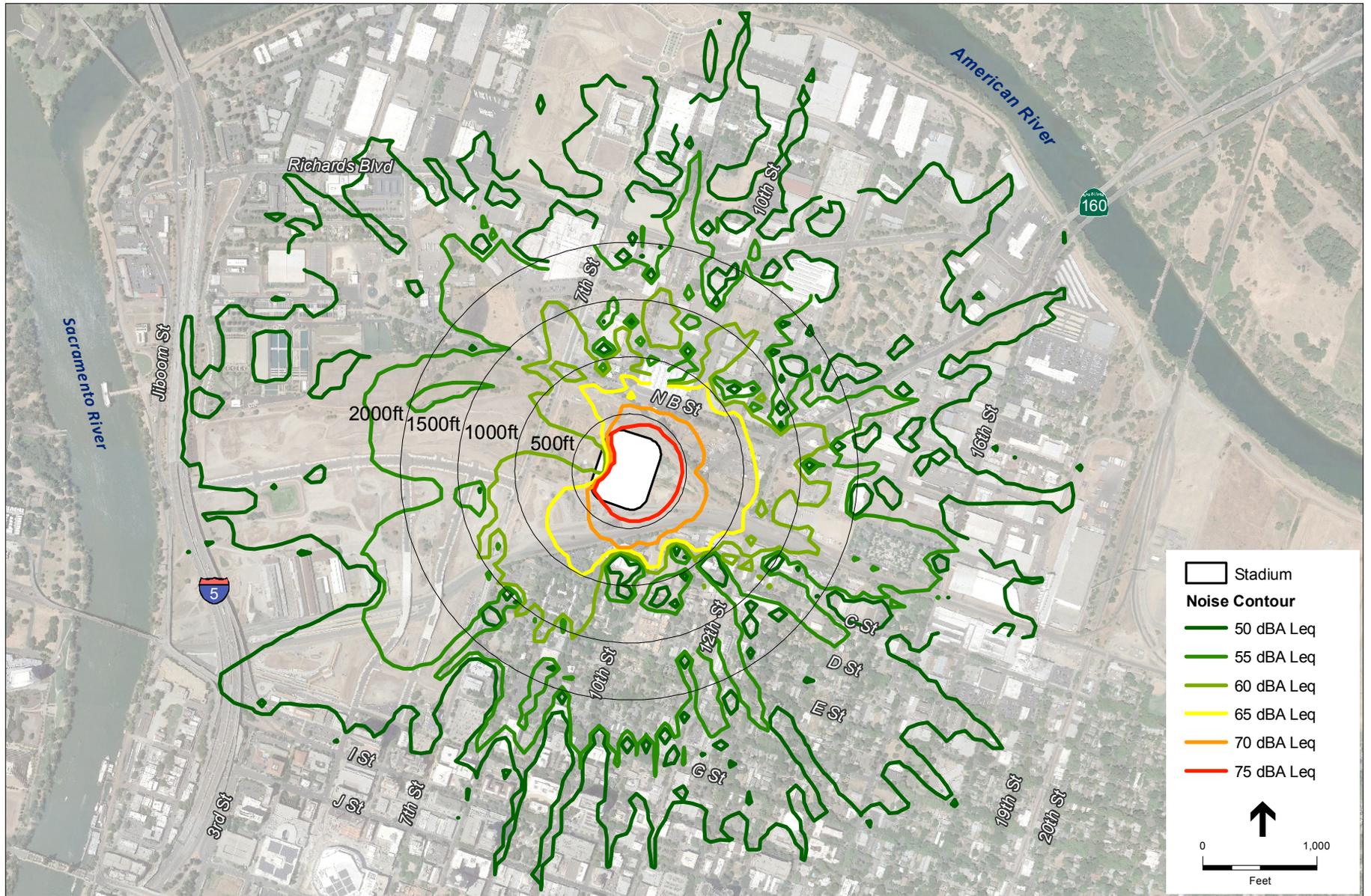


SOURCE: Google, 2016; Kimley Horn, 2015; HNTB, 2016; ESA, 2016

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**Figure 1c**

MLS Stadium - Music Concert  
Noise Contour Map - With Development

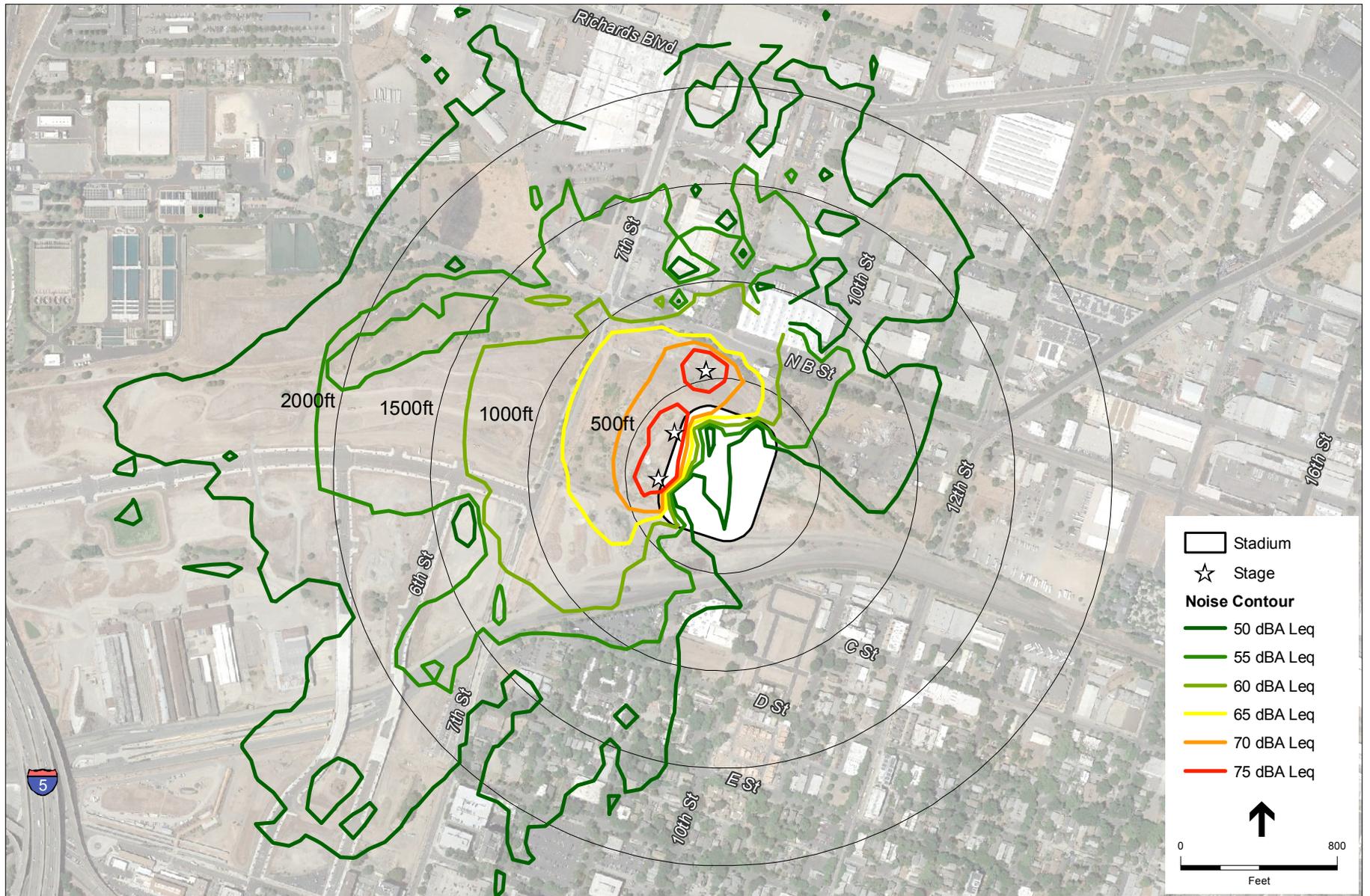


SOURCE: Google, 2016; Kimley Horn, 2015; HNTB, 2016; ESA, 2016

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**Figure 2a**

MLS Stadium - Soccer Game  
Noise Contour Map - Zero Development



SOURCE: Google, 2016; Kimley Horn, 2015; HNTB, 2016; ESA, 2016

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**Figure 2b**

MLS Stadium - Outside Stages  
Noise Contour Map - Zero Development



SOURCE: Google, 2015; Kimley Horn, 2016; HNTB, 2016; ESA, 2016

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**Figure 2c**

MLS Stadium - Music Concert  
Noise Contour Map - Zero Development