Ms. Claire Han  
City Ventures  
444 Spear Street  
Suite  
San Francisco, CA  94105

Subject: Traffic Noise Assessment Study for the Planned “100 Enterprise Way” Condominium Development, Highway 17, Scotts Valley

Dear Ms. Han:

This report presents the results of a noise assessment study for the planned “100 Enterprise Way” condominium development along Highway 17 in Scotts Valley, as shown on the Site Plan, Ref. (a). The noise exposures at the site were evaluated against the standards of the City of Scotts Valley General Plan Noise Element, Ref. (b), and the State of California Code of Regulations, Title 24, Ref. (c). The analysis of the on-site sound level measurements indicates that the existing noise environment is due primarily to vehicular traffic sources on Highway 17. The results of the analysis reveal that the exterior noise exposure at the common area of the site will be within the limits of the standards. The interior noise exposures will exceed the limits of the standards. Noise mitigation measures for the interior living spaces will be required.

Sections I and II of this report contain a summary of our findings and recommendations, respectively. Subsequent sections contain the site, traffic and project descriptions, analyses, and evaluations. Attached hereto are Appendices A, B and C, which include the list of references, descriptions of the applicable standards, definitions of the terminology, descriptions of the acoustical instrumentation used for the field survey, general building shell controls, and the on-site noise measurement data and calculation tables.
I. **Summary of Findings**

**City of Scotts Valley Noise Element**

The noise assessment results presented in the findings are shown in reference to the City of Scotts Valley Noise Element, which utilizes the Day-Night Level (DNL) 24-hour noise descriptor to define community noise impacts, and specifies that exterior noise exposures at residential areas are limited to 60 dB DNL. Because of the close proximity of the project to Highway 17 and the limited use of upper floor balconies, the exterior noise requirements are not applied to the balconies. The exterior noise limits are applied to the common open spaces areas. The interior noise exposures are limited to 45 dB DNL.

**State of California Code of Regulations, Title 24**

The State of California Code of Regulations, Title 24 (CBC) standards use the DNL descriptor (to be consistent with local standards) and specify an interior noise exposure limit of 45 dB DNL from exterior noise sources.

The Title 24 standards also specify minimum sound insulation ratings for common partitions separating different dwelling units and dwelling units from interior common spaces. The standards specify that common walls must have a design Sound Transmission Class (STC) rating of 50 or higher. Note that there are no common floor/ceiling assemblies associated with this project. As the design details of the common interior partitions were not available at the time of this study, an evaluation of the interior partitions has not been performed.

The noise exposures shown below are without the application of mitigation measures and represent the noise environment for existing and proposed site conditions.
A. **Exterior Noise Exposures**

- The existing exterior noise exposure at the most impacted planned building setback from Highway 17 at the southerly end of the site, 155 ft. from the centerline of the road, is 74 dB DNL. Under future traffic conditions, the noise exposure is predicted to remain at 74 dB DNL.

- The existing exterior noise exposure at the most impacted planned building setback from Highway 17 at the northerly end of the site, 110 ft. from the centerline of the road, is 76 dB DNL. Under future traffic conditions, the noise exposure is predicted to remain at 76 dB DNL.

- The exterior noise exposure at the most impacted common area of the project at the northerly end of the site ranges from 58 to 60 dB DNL under existing and future traffic conditions. Thus, the noise exposures will be within the 60 dB DNL limit of the City of Scotts Valley Noise Element standards.

- The exterior noise exposure at the most impacted common area of the project at the southerly end of the site between Buildings 6 and 7 ranges from 58 to 60 dB DNL under existing and future traffic conditions. Thus, the noise exposures will be within the 60 dB DNL limit of the City of Scotts Valley Noise Element standards.

The exterior noise exposures at the planned building setbacks will be within the 60 dB DNL limit of the City of Scotts Valley Noise Element standard. Noise mitigation measures for exterior areas of the site will not be required.
B. **Interior Noise Exposures**

- The interior noise exposures in the most impacted living spaces closest to Highway 17 at the northerly end of the site will be 59 dB DNL under existing and future traffic conditions.

- The interior noise exposures in the most impacted living spaces closest to Highway 17 at the southerly end of the site will be 61 dB DNL under existing and future traffic conditions.

The interior noise exposures will exceed the 45 dB DNL limit of the City of Scotts Valley Noise Element standards. Noise mitigation measures for the interior living spaces will be required. The recommended measures are provided in Section II, below.

II. **Recommendations**

To achieve compliance with the 45 dB DNL interior noise standard of the City of Scotts Valley Noise Element and Title 24, the following window controls will be required. In addition, general building shell controls, as described in Appendix C, are also recommended.

- Maintain closed at all times all windows and glass doors of living spaces Buildings 1-6 with a direct or side view of Highway 17 (north, west and south facades) including the facades in between the buildings.

- At livings spaces within 110 ft. of the west property line, install windows and glass doors rated minimum Sound Transmission Class (STC) 36 and entry doors rated minimum STC 32.

- At living spaces between 110 ft. and 185 ft. of the west property line, install windows and glass doors rated minimum STC 32 and entry doors rated minimum STC 28.
- 5 -

- At living spaces between 185 ft. and 245 ft. of the west property line, install windows, glass doors and entry doors rated minimum STC 28.

Please see Figure 1 for the locations and recommended STC ratings for the noise controlled livings spaces.

When windows are maintained closed for noise control, some form of mechanical ventilation which brings in fresh air from the outside of the unit should be provided to conform to Mechanical Code requirements. The windows specified above to be maintained closed are to be operable as the requirement does not imply a “fixed” condition.

To ensure that the sound insulation features of project windows will be maintained, the window frames at impacted living spaces must be caulked to the wall opening around their entire perimeter with an acoustical sealant. The sliding window panels must form an air-tight seal with the frame when in the closed position. All other windows of the development and all bathroom windows may use any type of glazing and may be kept open as desired with the exception of bathroom windows that are an integral part of a living space and not separated by a closeable door.

Please be aware that many dual-pane window assemblies have inherent noise reduction problems in the traffic noise frequency spectrum due to resonance that occurs within the air space between the window lites, and the noise reduction capabilities vary from manufacturer to manufacturer. Therefore, the acoustical test report of all sound rated windows should be reviewed by a qualified acoustician to ensure that the chosen windows will adequately reduce traffic noise to acceptable levels.

The use of the above recommended windows will reduce interior noise exposures to 45 dB DNL or lower.
III. **Site, Traffic and Project Descriptions**

The planned development site is a vacant parcel located on the east side of Highway 17 in Scotts Valley at the former Santa’s Village site. The site slopes down gradually to the east. Surrounding land uses include vacant land adjacent to the east and north, R&D/commercial uses adjacent to the south and single-family residential across Highway 17 to the west.

The on-site noise environment is controlled primarily by traffic sources on Highway 17, which carries an Average Daily Traffic (ADT) volume of 55,000 vehicles, as reported by CalTrans, Ref. (d).

The planned project includes the construction of 54 townhouse style (side by side) condominium units in nine three story buildings. The common exterior areas of the project will be located on the east side of the central north/south project street and north of Building 9, and between Buildings 6 and 7. Ingress and egress to the site will be by way of a connection of Santa’s Village Lane to Orchard Run. The Site Plan (Preliminary Landscape Plan) is shown in Figure 2 on page 8.
III. Analysis of the Noise Levels

A. Existing Noise Levels

To determine the existing noise environment at the site, continuous recordings of the sound levels were made at two locations. Location 1 was 175 ft. from the centerline of Highway 17 at the southerly end of the project buildings. Location 2 was 110 ft. from the centerline of Highway 17 near the north end of the site. The measurement locations are shown on Figure 3, below. The measurements were made on November 6-7, 2014. The noise levels were recorded and processed using Larson-Davis LDL 812 Precision Integrating Sound Level Meters. The meters yield, by direct readout, a series of descriptors of the sound levels versus time, as described in Appendix B.

FIGURE 3 – Noise Measurement Locations
The measured descriptors include the $L_1$, $L_{10}$, $L_{50}$, and $L_{90}$, i.e., those levels that are exceeded 1%, 10%, 50%, and 90% of the time. Also measured were the maximum and minimum levels, and the continuous equivalent-energy levels ($L_{eq}$), which are used to calculate the DNL. The measurements were made for a total period of 24 hours at each location and included recordings of the noise levels during representative hours of the daytime and nighttime periods of the DNL index. The results of the measurements are shown on the data tables in Appendix C.

As shown in the data tables, the $L_{eq}$'s at measurement Location 1, 175 ft. from the centerline of Highway 17, ranged from 65.3 to 71.3 dBA during the daytime and from 58.9 to 71.4 dBA at night.

The $L_{eq}$'s at the measurement Location 2, 110 ft. from the centerline of Highway 17 ranged from 67.8 to 73.7 dBA during the daytime and from 61.0 to 74.8 dBA at night.

**B. Future Noise Levels**

Future traffic volume data for Highway 17 were not available from CalTrans. Therefore, reference was made to historical traffic volume data from CalTrans to determine the annual growth rate over the last 20 years. The 1993 volume was reported to be 63,000 vehicles ADT, Ref. (e). The 2013 traffic volume was 55,000 vehicles ADT. As the traffic volumes have decreased over the past 20 years, we expected a less than 15% growth over the next 20 years. A less than 15% growth in traffic volume yields a less than 1 decibel increase in the traffic noise levels. Therefore, the future traffic noise levels are predicted to remain similar to current levels.
V. **Evaluation of the Noise Exposures**

A. **Exterior Noise Exposures**

To evaluate the on-site noise exposures against the 60 dB DNL standard of the City of Scotts Valley Noise Element, the DNLS’ for the survey locations were calculated as decibel averages of the measured $L_{eq}$’s as they apply to the daily subperiods of the DNL index. A nighttime weighting factor was applied to account for the increased human sensitivity to noise during nighttime hours. Adjustments were made to the measured noise levels to account for the differences in the setback distances from the measurements locations using methods established by the Highway Research Board, Ref. (f). The DNL’s were calculated using the standard formula shown in Appendix B and the results are shown in Appendix C.

The results of the calculations reveal that the existing noise exposure at measurement Location 1, 175 ft. from the centerline of Highway 17, is 73 dB DNL. At the planned building setback of 155 ft. from the centerline of Highway 17, the noise exposure is 74 dB DNL. Under future conditions, the noise exposure is estimated to remain at 74 dB DNL.

The existing noise exposure at measurement Location 2 and the planned minimum setback of 110 ft. from the centerline of Highway 17 is 76 dB DNL. Under future traffic conditions, the noise exposure is estimated to remain at 76 dB DNL.

At the planned large common area near the northeasterly portion of the site, the noise exposures were calculated to be 60 dB DNL at the north end and 58 dB DNL near the east end of the parking strip across from Building 9. Thus, the noise exposures will be within the 60 dB DNL limit of the City of Scotts Valley Noise Element standards.

At the planned small common area between Buildings 6 and 7, the noise exposures were calculated to be 60 dB DNL at the south end and 58 dB DNL at the south end. Thus, the noise exposures will be within the 60 dB DNL limit of the City of Scotts Valley Noise Element standards.
The exterior noise exposures at the site are within the 60 dB DNL limit of the City of Scotts Valley Noise Element standards. Noise mitigation measures for the exterior areas will not be required.

B. **Interior Noise Exposures**

To determine the interior noise exposures, a 15 dB reduction was applied to the exterior noise exposures to represent the attenuation provided by a typical building shell under *annual-average* conditions. This condition assumes that residential living units will have standard dual-pane thermal insulating windows that are kept open up to 50% of the time for natural ventilation.

The interior noise exposures in the most impacted living spaces closest to Highway 17 at the south end of the project will be 59 dB DNL under existing and future traffic conditions. The interior noise exposures in the most impacted living spaces closest to Highway 17 at the north end of the project (Buildings 1 and 2) will be up to 61 dB DNL under existing and future traffic conditions. Thus, the interior noise exposures will be up to 16 dB in excess of the 45 dB DNL standards of the City of Scotts Valley Noise Element and Title 24. Noise mitigation measures for the interior living spaces will be required. The recommended measures are described in Section II of this report.
The above report presents a noise assessment study for the planned “100 Enterprise Way” condominium development along Highway 17 in Scotts Valley. The study findings for present conditions are based on field measurements and other data and are correct to the best of our knowledge. Future noise exposures were based on estimates made by Edward L. Pack Associates, Inc. from information provided by CalTrans. However, significant deviations in the future traffic volumes, changes in motor vehicle technology, speed limits, noise regulations, or other future changes beyond our control may produce long-range noise results different from our estimates.

If you have any questions or would like an elaboration on this report, please call me.

Sincerely,

EDWARD L. PACK ASSOC., INC.

Jeffrey K. Pack
President

Attachments: Appendices A, B, and C
APPENDIX A

References:

(a) Tentative Grading Plan, Enterprise Way, by C2G/Civil Consultants Group, April 23, 2015

(b) Noise Element of the General Plan, City of Scotts Valley, 1993

(c) California Code of Regulations, Title 24, Chapter 2, Section 1207 “Sound Transmission”, Subsection 1207.4 (Allowable Interior Noise Levels), Revised 2013

(d) http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/2013all/Route16-20.htmlCalTrans

(e) 1993 Traffic Volumes of California State Highways, State of California Department of Transportation, Division of Traffic Operations, July 1994

APPENDIX B

Noise Standards, Terminology, Instrumentation, and
General Building Shell Controls

1. Noise Standards

A. City of Scotts Valley Noise Element Standards

The Noise Element of the Scotts Valley General Plan specifies the use of the Day-Night Level (DNL) 24-hour noise descriptor to describe the noise environment for residential land use.

The noise standards specify a limit of 60 dB DNL for exterior areas at residential locations. For interior living spaces of residences, a limit of 45 dB DNL is specified.
B. **Title 24 Noise Standards**

The California Code of Regulations, Title 24, Part II, Section 1207.4, “Sound Transmission” applies to all new multi-family dwellings including condominiums, townhouses, apartments, hotels and motels. The standards, which utilize the Day-Night Level (CNEL) descriptor, establish an exterior reference or criterion level of 60 dB CNEL, and specify that multi-family buildings to be located within an annual CNEL zone of 60 dB or greater require an acoustical analysis. The analysis report must show that the planned buildings provide adequate attenuation to limit intruding noise from exterior sources to an annual CNEL of 45 dB or less in any habitable space. The Community Noise Equivalent Level (CNEL) descriptor, which is similar to the CNEL, may also be used, as the CNEL and CNEL are considered to be equivalent.

The Title 24 standards also establish minimum sound insulation requirements for interior partitions separating different dwelling units from each other and dwelling units from common spaces such as garages, corridors, equipment rooms, etc. The common interior walls and floor/ceiling assemblies must achieve a minimum Sound Transmission Class (STC) rating of 50 for airborne noise. Common floor/ceiling assemblies must achieve an Impact Insulation Class (IIC) rating of 50 for impact noise. These ratings are based on laboratory tested partitions. Field tested partitions must achieve ratings of NIC and FIIC 45.
2. **Terminology**

A. **Statistical Noise Levels**

Due to the fluctuating character of urban traffic noise, statistical procedures are needed to provide an adequate description of the environment. A series of statistical descriptors have been developed which represent the noise levels exceeded a given percentage of the time. These descriptors are obtained by direct readout of the Sound Level Meters. Some of the statistical levels used to describe community noise are defined as follows:

- \( L_1 \) - A noise level exceeded for 1% of the time.
- \( L_{10} \) - A noise level exceeded for 10% of the time, considered to be an "intrusive" level.
- \( L_{50} \) - The noise level exceeded 50% of the time representing the "mean" sound level.
- \( L_{90} \) - The noise level exceeded 90% of the time, designated as a "background" noise level.

- \( L_{eq} \) - The continuous equivalent-energy level is that level of a steady-state noise having the same sound energy as a given time-varying noise. The \( L_{eq} \) represents the decibel level of the time-averaged value of sound energy or sound pressure squared and is used to calculate the DNL and CNEL.
B. **Day-Night Level (DNL)**

Noise levels utilized in the standards are described in terms of the Day-Night Level (DNL). The DNL rating is determined by the cumulative noise exposures occurring over a 24-hour day in terms of A-Weighted sound energy. The 24-hour day is divided into two subperiods for the DNL index, i.e., the daytime period from 7:00 a.m. to 10:00 p.m., and the nighttime period from 10:00 p.m. to 7:00 a.m. A 10 dBA weighting factor is applied (added) to the noise levels occurring during the nighttime period to account for the greater sensitivity of people to noise during these hours. The DNL is calculated from the measured $L_{eq}$ in accordance with the following mathematical formula:

$$DNL = 10\log_{10} \left( \frac{(L_d) \& (L_n+10))}{24} \right)$$

where:

- $L_d = L_{eq}$ for the daytime (7:00 a.m. to 10:00 p.m.)
- $L_n = L_{eq}$ for the nighttime (10:00 p.m. to 7:00 a.m.)
- 24 indicates the 24 hour period
- $\&$ denotes decibel addition

C. **A-Weighted Sound Level**

The decibel measure of the sound level utilizing the "A" weighted network of a sound level meter is referred to as "dBA". The "A" weighting is the accepted standard weighting system used when noise is measured and recorded for the purpose of determining total noise levels and conducting statistical analyses of the environment so that the output correlates well with the response of the human ear.
3. Instrumentation

The on-site field measurement data were acquired by the use of one or more of the sound analyzer listed below. The instrumentation provides a direct readout of the L exceedance statistical levels including the equivalent-energy level (L<sub>eq</sub>). Input to the meters was provided by microphones extended to a height of 5 ft. above the ground. The “A” weighting network and the “Fast” response setting of the meters were used in conformance with the applicable standards. The Larson-Davis meters were factory modified to conform to the Type 1 performance standards of ANSI S1.4. All instrumentation was acoustically calibrated before and after field tests to assure accuracy.

- Bruel & Kjaer 2231 Precision Integrating Sound Level Meter
- Larson Davis LDL 812 Precision Integrating Sound Level Meter
- Larson Davis 2900 Real Time Analyzer

4. Building Shell Controls

The following additional precautionary measures are required to assure the greatest potential for exterior-to-interior noise attenuation by the recommended mitigation measures. These measures apply at those units where closed windows are required.

- Unshielded entry doors having a direct or side orientation toward the primary noise source must be 1-5/8” or 1-3/4” thick, insulated metal or solid-core wood construction with effective weather seals around the full perimeter. Mail slots should not be used in these doors or in the wall of a living space, as a significant noise leakage can occur through them.

- If any penetrations in the building shell are required for vents, piping, conduit, etc., sound leakage around these penetrations can be controlled by sealing all cracks and clearance spaces with a non-hardening caulking compound.

- Ventilation devices or openings shall not compromise the acoustical integrity of the building shell.
APPENDIX C

On-Site Noise Measurement Data and Calculation Tables
## DNL Calculations

**Client:** CITY VENTURES
**File:** 46-084
**Project:** SCOTTS VALLEY 1
**Date:** 11/6-7/2014
**Source:** HIGHWAY 17

### Location 1: Highway 17

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**Daytime Level=** 81.5

**Nighttime Level=** 85.1

**DNL=** 73

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**Daytime Level=** 83.6

**Nighttime Level=** 88.2

**DNL=** 76

**24-Hour Leq=** 68.6

**Ln=** 75.1

**Daytime Level=** 83.6

**Nighttime Level=** 88.2

**DNL=** 76

**24-Hour Leq=** 70.8