

25 June 2012

Charlie Stott
Leddy Maytum Stacy Architects
677 Harrison Street
San Francisco, CA 94107
Email: cstott@lmsarch.com

Subject: **Nueva High School**
Preliminary Environmental Noise Study
CSA Project: 12-0081

Dear Charlie:

This letter summarizes the results of our environmental noise study for the Nueva High School ("School"). The purpose is to develop schematic mitigation measures to reduce interior noise levels to meet the project acoustical requirements and address potential noise impacts. This report summarizes our findings.

PROJECT ACOUSTICAL CRITERIA

State of California

The California Building Code does not have interior noise criteria for non-residential projects.

City of San Mateo – Noise Element of the General Plan

The City of San Mateo Noise Element of the General Plan identifies "schools" as a "noise-sensitive" land-use and provides maximum interior noise level standards. The noise element includes the following policies related to the project (*see San Mateo General Plan for tables and figures*):

N 1.1: Interior Noise Standard. Require submittal of an acoustical analysis and interior noise insulation for all "noise sensitive" land uses listed in Table N-1 [excerpted into Table 1, below, which also includes Table N-2] which have an exterior noise level of DNL¹ 60 dB or above, as shown on Figure N-1. Maximum interior noise level shall not exceed DNL 45 dB in all habitable rooms.

N 1.2: Exterior Noise Level Standard. Require an acoustical analysis for new parks, play areas, and multi-family common open space (intended for the use and the enjoyment of residents) which have an exterior noise level of DNL 60 dB or above, as shown on Figure N-1. Require an acoustical analysis which uses Leq² for new parks and play areas. Require feasibility analysis of noise

¹ Day-Night Average Sound Level (DNL) – A descriptor established by the U.S. Environmental Protection Agency to describe the average day-night level with a penalty applied to noise occurring during the nighttime hours (10 pm - 7 am) to account for the increased sensitivity of people during sleeping hours.

² Leq--The equivalent steady-state A-weighted sound level that, in a stated period of time, would contain the same acoustic energy as the time-varying sound level during the same period.

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reduction measures for public parks and play areas. Incorporate necessary mitigation measures into residential project design to minimize common open space noise levels. Maximum exterior noise should not exceed 67 dB for residential uses and should not exceed 65 dB (Leq) during the noisiest hour for public park uses.

N 2.1: Noise Ordinance: Continue implementation of the City's existing noise control ordinance (see Municipal Code section below).

N 2.2: Minimize Noise Impact: Protect all "noise sensitive" land uses listed in tables N-1 and N-2 from adverse impacts caused by the noise generated on-site by new developments. Incorporate necessary mitigation measures into development design to minimize noise impacts. Prohibit long-term exposure increases of 3 dB (DNL) or above at the common property line, or new uses which generate noise levels of DNL 60 dB or above at the property line, excluding ambient noise levels.

City of San Mateo, California – Noise Regulation of the Municipal Code

As stated in noise element policy N 2.1 above, the project must implement the City's existing noise control ordinance. The following are noise regulations applicable to the project:

7.30.030 Designated Noise Zones

The properties hereinafter described are hereby assigned the following noise zones:

Noise Zone 1: All property in any single family residential zone (including adjacent parks and open space) as designated on the City's zoning map prepared pursuant to the provisions of Title 27, or any revisions thereto.

Noise Zone 2: All property in any commercial/mixed residential, multi-family residential, specific plan district or PUD as designated on the City's zoning map prepared pursuant to the provisions of Title 27, or any revisions thereto.

Noise Zone 3: All property in any commercial or central business district as designated on the City's zoning map prepared pursuant to the provisions of Title 27, or any revisions thereto.

Noise Zone 4: All property in any manufacturing or industrial zone as designated on the City's zoning map prepared pursuant to the provisions of Title 27, or any revisions thereto.

7.30.040 Maximum Permissible Sound Levels

(a) It is unlawful for any person to operate or cause to be operated any source of sound at any location within the city or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level when measured on any other property to exceed:

(1) The noise level standard for that property as specified in Table 7.30.040 for a cumulative period of more than thirty minutes in any hour;

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- (2) The noise level standard plus five dB for a cumulative period of more than fifteen minutes in any hour;
 - (3) The noise level standard plus ten dB for a cumulative period of more than five minutes in any hour;
 - (4) The noise level standard plus fifteen dB for a cumulative period of more than one minute in any hour; or
 - (5) The noise level standard or the maximum measured ambient level, plus twenty dB for any period of time.
- (b) If the measured ambient level for any area is higher than the standard set in Table 7.30.040, then the ambient shall be the base noise level standard for purposes of subsection (a)(1) of this section. In such cases, the noise levels for purposes of subsections (a)(2) through (a)(5) of this section shall be increased in five dB increments above the ambient.

Table 7.30.040: Noise Level Standards

Noise Zone	Time Period	Noise Level (dB)
Noise Zone 1	10 p.m. to 7 a.m.	50
	7 a.m. to 10 p.m.	60
Noise Zone 2	10 p.m. to 7 a.m.	55
	7 a.m. to 10 p.m.	60
Noise Zone 3	10 p.m. to 7 a.m.	60
	7 a.m. to 10 p.m.	65

7.30.050 Interior Noise Limits

It is unlawful for any person to operate or cause to be operated any source of sound, on multifamily residential property or multi-tenant commercial or industrial property at a noise level more than ten dB above the level allowed by Section 7.30.040 three feet from any wall, floor or ceiling inside any unit on the same property when the windows and doors of the unit are closed, except within the unit in which the noise source or sources is located. (Ord. 2004-16 § 1, 2004).

7.30.060 Special Provisions:

(e) Construction. Construction, alteration, repair or land development activities which are authorized by a valid city permit shall be allowed on weekdays between the hours of seven a.m. and seven p.m., on Saturdays between the hours of eight a.m. and five p.m., and on Sundays and holidays between the hours of noon and four p.m., or at such other hours as may be authorized or restricted by the permit, if they meet at least one of the following noise limitations:

(1) No individual piece of equipment shall produce a noise level exceeding ninety dB at a distance of twenty-five feet. If the device is housed within a structure or trailer on the property, the measurement shall be made outside the structure at a distance as close to twenty-five feet from the equipment as possible.

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(2) The noise level at any point outside of the property plane of the project shall not exceed 90 dB.

Area/Project Specific Plan Requirements

The Conditions of Approval (CoA) related to the Bay Meadows Phase II Specific Plan Amendment (PA 02-0105, dated 21 October 2005) states the following:

CoA#51 Interior Noise Analysis

Prepare an interior noise analysis as part of the final design of the proposed residential uses. The analysis shall demonstrate how interior noise levels would achieve a 45 dB DNL where the exterior noise levels would exceed 60 dB DNL. Noise control measures shall be designed according to the type of building construction and specified sound rating for each building element. The noise analysis shall be submitted to the City with the final design of the proposed residential uses for SPAR implementation of this condition shall be prior to issuance of any Certificate of Occupancy for each phase and monitored by the Building Division. (*Mitigation Measure Noise-BM3a*)

The noise limit of CoA #51 is in-line with the San Mateo Noise Element interior noise requirement.

CoA#52 Noise Analysis near Caltrain Tracks

For all proposed sensitive uses within 530 feet of the centerline of the Caltrain tracks, the project sponsor shall conduct a detailed noise analysis. The results of that analysis shall be used by the project sponsor to implement measures that would ensure interior noise level would be no higher than 45 dBA. The City shall not issue a building permit for any proposed sensitive uses (such as schools, hospitals, rest homes, long term care facilities, mental care facilities, residential uses, places of worship, libraries and passive recreation uses) on the project site where the interior noise level standard of 45 dBA would be exceeded. The analysis shall be submitted to the City prior to issuance of each building permit for each phase. The implementation of this condition shall be monitored and verified by the Building Division. The project sponsor shall provide a letter from an acoustical engineer indicating that the projects comply with the Caltrain tracks noise analysis submitted for the individual residential developments. (*Mitigation Measure Noise-BM7*)

In summary, we interpret the requirement of CoA #52 to be that the typical maximum noise intrusion from train passbys must be reduced to a slow (exponential) time-weighted and A-weighted sound pressure level of 45 decibels or quieter. This is shortened to 45 "dBA³" in the remainder of this letter. For our analysis, the statistical metric $L_{\max 30}$ ⁴ is used to quantify the typical maximum noise level of reoccurring train passbys.

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³ dBA – A-Weighted sound pressure level (or noise level) represents the noisiness or loudness of a sound by weighting the amplitudes of various acoustical frequencies to correspond more closely with human hearing. A 10-dB (decibel) increase in noise level is perceived to be a doubling of loudness. A-Weighting is specified by the U.S. EPA, OSHA, Caltrans, and others for use in noise measurements.

⁴ L_{max-30} — The energy average of the maximum levels of the loudest 30% of intrusive sounds expected to occur during a time period. It is a metric by which acoustical engineers can determine structural requirements necessary to reduce intrusive noise to an acceptable level. Reference: Max Level Intrusive Noise Limit by Rob Greene, 1982.

EXISTING AND FUTURE NOISE ENVIRONMENT

The project site is located in San Mateo and is bordered by 28th Street to the south, a future housing site (and Delaware Street) to the west, a future park to the east, and a parking lot to the north. The School building is set back approximately 500 feet from the Caltrain tracks. The environment at the site is expected to consist primarily of noise from local traffic and Caltrain passbys.

School construction is planned for two phases. The phase 2 additions would acoustically shield portions of the phase 1 building from environmental noise. Therefore, a summary analysis for phase 1 and phase 2 conditions are provided. In addition, the future housing project site located to the west of the School would also be expected to provide acoustical shielding from environmental noise. However, since the construction details of this site are not available. Therefore, our analysis, conservatively, does not account for acoustical shielding from the future housing building.

Our analysis of Caltrain passby noise is based on noise measurements conducted from 1 to 6 September 2011. Train noise was measured at a setback distance of 60 feet from the tracks just south of the 28th Street centerline. Based on these measurements, we expect the typical maximum train noise level to be 73 dBA at the School site.

Previously, a traffic analysis from Kimley-Horn and Associates (dated 11 May 2006) was provided to us for the Bay Meadows area. Based on the traffic projections, we calculated expected future traffic noise levels. The calculations are based on the Federal Highway Administration's Highway Traffic Noise Prediction Model. The model uses traffic volume, vehicle speed, truck percentage, distance to receiver, and a presumed attenuation rate to estimate the hourly average noise level. We also assumed that the DNL is equal to the peak hour average noise level, typical of these roadway categories. At a setback distance of 50 feet from the roadway centerlines, we calculated the following noise levels:

- 28th Street: DNL 58 dB
- Delaware Street: DNL 63 dB

METHODOLOGY – SIGNIFICANCE CRITERIA

The California Environmental Quality Act (CEQA) contains guidelines to evaluate whether environmental impacts are considered significant. The guidelines ask whether the proposed project would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

CEQA does not stipulate noise or vibration levels that are considered significant; rather, it is expected that noise and vibration levels will be evaluated with respect to relevant local standards. In addition to

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noise limits, the San Mateo General Plan contains standards of significance for noise increases in Policy N 2.2, restated below:

“Prohibit long-term exposure increases of 3 dB (DNL) or above at the common property line, or new uses which generate noise levels of DNL 60 dB or above at the property line, excluding ambient noise levels.”

ASSESSMENT OF NOISE AND MITIGATION MEASURES

Project Interior Noise Levels

Our analysis is based on the School SPAR Submittal plans dated 22 June 2012. To meet the project indoor noise criteria, it will be necessary for the facades to be sound-rated. Our preliminary calculations are based on a typical classroom size space with up to 50-percent glazing. The minimum exterior window and door STC⁵ ratings at noise-sensitive spaces are listed below and shown on the attached site plans for both phase 1 and phase 2 conditions. Our analysis assumes that “habitable” spaces, as referenced in the City Noise Element would apply to typically occupied or otherwise noise-sensitive rooms (e.g., classrooms, offices). We expect that hallways and other circulation space would not require sound-rated facade construction.

Most construction-grade dual-pane one-inch thick window assemblies can achieve an STC rating of 28. The construction of STC 33 window assemblies can vary between suppliers but can typically be achieved by providing dissimilar glazing thicknesses and/or laminated glass in addition to upgraded seals. It is important to note that the STC rating applies to the full window assemblies (glass and frame) rather than just the glass itself. Tested sound-rated assemblies should be used.

Our analysis accounts for an exterior wall assembly as shown in the drawings (see Details 3 and 13/A8.4) to include:

- Exterior finish: 3-coat stucco or wood siding
- Gypsum sheathing
- Rigid insulation
- Stud framing with cavity batt insulation
- One layer of interior gypsum board

Building(s) at the future housing site to the west of the School would be expected to reduce environmental noise at the west facade of the School. However, since details of future housing construction are not available, our analysis, conservatively, does not account for such noise reduction.

Mitigation Summary: Insulated facade construction with sound-rated exterior doors and windows as described above.

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⁵ Sound Transmission Class (STC) — A single-number rating derived from the sound insulation properties of building elements such as walls and windows. Increasing STC ratings indicate more sound insulation and less transmitted sound.

Project Exterior Noise Levels

The project includes two "open court" areas. Both would be shielded from transportation noise sources by the project buildings following phase 2 construction. The western open court area would remain exposed to street traffic noise prior to phase 2. Each open court is located farther than 150 feet from the adjacent roadways. Based on our measured existing and projected future noise levels at the site, environmental noise is expected to be below DNL 60 dB at that distance. Therefore, we expect noise levels at both potential outdoor use areas to meet the noise standard of the San Mateo Noise Element in both phase 1 and phase 2 constructions.

A park is to be located to the northeast of the project. Based on our experience, we expect that average daily noise levels (i.e., DNL) at the project site would not be significantly increased by typical park activities.

Mitigation Summary: None required

Project-generated Operational Noise

Potential Permanent Increase in Ambient Noise Levels

Theater noise is not expected to significantly increase ambient noise levels as it would be reduced by the building construction that would fully enclose this space. Noise from activities in the gymnasium would also not be expected to increase ambient noise levels by 3 dB (DNL) at nearby noise-sensitive receivers. We understand that windows will be provided in the gymnasium in addition to a mechanical ventilation system. If complaints occurred as a result of activities in the gymnasium, we understand that the windows could be closed to further reduce gymnasium noise emitted to the exterior.

Mitigation Summary: None required

Project-generated Mechanical Equipment Noise

Potential Permanent Increase in Ambient Noise Levels

Mechanical equipment associated with the project, such as ventilation fans, has the potential to exceed City noise standards. Specific mitigation measures cannot be determined before the equipment has been selected. Equipment should be selected and located to meet the noise standards. If necessary, additional mitigation measures, such as noise barriers, acoustical louvers, or equipment noise attenuators, should be employed. A qualified professional should be involved during the design phase of the project to advise the design team regarding effective noise reduction measures. This is in-line with the Bay Meadows Phase II Specific Plan Amendment Condition of Approval listed below:

CoA #50 Noise Control

The project sponsor shall implement noise control measures for any mechanical equipment and truck loading docks on the Bay Meadows project site as needed to reduce noise levels to DNL of 60 dB at the property line of adjacent or nearby residences, per the City's Noise Element. At a minimum, the following measures shall be implemented:

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- A. All proposed development shall be designed so that loading areas face away from the residences to minimize potential noise levels at the nearby residences.
- B. All proposed development, as feasible, shall specify equipment that meets the City's noise standard of 60 dB at the nearest receptor without special enclosures or mufflers.
- C. Mechanical equipment shall be located as far away from nearby residential land uses as feasible.
- D. As necessary a separate noise barrier or enclosure shall be constructed around mechanical equipment to block line-of-sight between the equipment and nearby residences.

The implementation of this condition shall be prior to issuance of any Certificate of Occupancy for each phase and monitored by the Building Division. (Mitigation Measure Noise – BM2)

Mitigation Summary: Mechanical system is to be designed to comply with the requirements of the San Mateo Noise Ordinance and as stated in CoA #50.

Construction Noise and Vibration

Potential Temporary Increase in Ambient Noise Levels

Construction of the project has the potential to result in temporary elevated noise levels at adjacent land uses. Construction activities might include grading, excavation, concrete foundation, structural framing, exterior finishes, interior framing, and interior finishes. The noisiest of these activities is typically during the early phases, when heavy machinery would be in use. Typical noise levels from these activities range from 80 to 90 dBA at 50 feet.

Framing involves the use of pneumatic tools such as nailing guns and other hand tools such as hammers and saws. The final phase is interior work, which tends to be less intrusive since the noise occurs indoors. Table 3 below shows typical noise levels from various construction activities:

Table 1: Typical Construction Noise Levels

Construction Phase	Noise Level (Leq) at 50 feet
Demolition	89 dBA
Ground Clearing	84 dBA
Excavation	89 dBA
Foundation	78 dBA
Erection	85 dBA
Exterior Finishing	89 dBA

Source: U.S. Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, December 1971.

To reduce the potential the likelihood of neighbors complaining about construction noise and vibration, mitigation measures outlined in the Bay Meadows Phase II Specific Plan Amendment Condition of Approval below should be implemented:

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CoA #49 Building Construction Activities and Noise Control

The following provisions to control traffic congestion, noise, and dust shall be followed during site excavation, grading and construction: The allowed hours of Building construction activities may be waived or modified through an exemption from the hours of work designated in Section 23.06.017, for limited periods, if the Building Official finds that:

1. The following criteria are met:
 - A. Permitting extended hours of construction will decrease the total time needed to complete the project thus mitigating the total amount of noise associated with the project as a whole; or
 - B. Permitting extended hours of construction are required to accommodate design or engineering requirements, such as a large concrete pour. Such a need would be determined by the project's design engineer and require acceptance by the City of San Mateo.
 - C. An emergency situation exists where the construction work is necessary to correct an unsafe or dangerous condition resulting in obvious and eminent peril to public health and safety. If such a condition exists, the City may waive any of the remaining requirements outlined below.
2. The exemption will not conflict with any other condition of approval required by the City to mitigate significant impacts.
3. The contractor or owner of the property will notify residential and commercial occupants of property adjacent to the construction site of the hours of construction activity which may impact the area. This notification must be provided three days prior to the start of the construction activity.
4. The approved hours of construction activity and contact information will be posted at the construction site in a place and manner that can be easily viewed by any interested member of the public.

The Building Official may revoke the exemption at any time if the contractor or owner of the property fails to abide by the conditions of exemption or if it is determined that the peace, comfort and tranquility of the occupants of adjacent residential or commercial properties are impaired because of the location and nature of the construction. The waiver application must be submitted to the Building Official ten (10) working days prior to the requested date of waiver.

5. The following measures are required to reduce potential noise impacts of the project to a less than significant level:
 - A. All diesel equipment shall be operated with closed engine doors and should be equipped with factory-recommended mufflers.
 - B. Pile-driving activities shall be restricted to between 8:00 a.m. to 5:00 p.m., Monday through Friday, to limit the intrusiveness of pile driving during the morning and evening hours. This measure is suggested only for construction sites that would use pile drivers within 2,000 feet of residential or sensitive land uses.
 - C. Proposed walls or barriers shall be installed as early as possible to help reduce noise from construction activities.
 - D. Stationary construction equipment shall be kept beyond 100 feet of existing residences.
 - E. Noise attenuation techniques will be employed as needed and feasible to reduce noise levels below 100 dBA Leq in commercial/industrial areas and below 80 dBA Leq at exterior

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locations in residential areas. Such techniques may include the use of sound blankets on noise generating equipment and the construction of temporary sound barriers between construction sites and affected uses. Noise attenuation techniques will be verified through measurement of noise levels.

- F. Whenever feasible, electrical power should be used to run air compressors and similar power tools.
- G. Contractors shall use "quiet" models of any conventionally noisy construction equipment such as air compressors, jackhammers and other impact tools, as feasible.
- H. Contractors shall designate an employee as the construction noise coordinator and provide an on-site sign that will identify the person and provide a contact number. The coordinator would be responsible for receiving calls from residents or businesses regarding specific construction noise-related complaints. The coordinator would then be responsible for taking appropriate measures to reduce or eliminate noise levels as appropriate.
- I. Complaints and the response should be logged and kept on file for review by the City. The construction noise coordinator would act as a liaison between the residents in the vicinity of the construction and the contractor, so perceived noisy activities are addressed as soon as possible. The implementation of this condition shall be monitored throughout construction and verified by the Public Works Department and Building Division. (PUBLIC WORKS, BUILDING) (*Mitigation Measure Noise - BM1*)

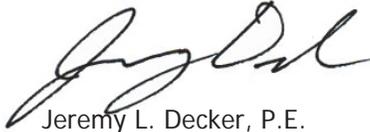
Mitigation Summary: Implement construction noise and vibration control measures as listed in CoA #49.

* * *

This concludes our preliminary environmental noise study for the Nueva High School. We plan to review the facade requirements in greater as the project develops. Should you have any questions, please give us a call.

Sincerely,

CHARLES M. SALTER ASSOCIATES, INC.



Jeremy L. Decker, P.E.
Senior Consultant

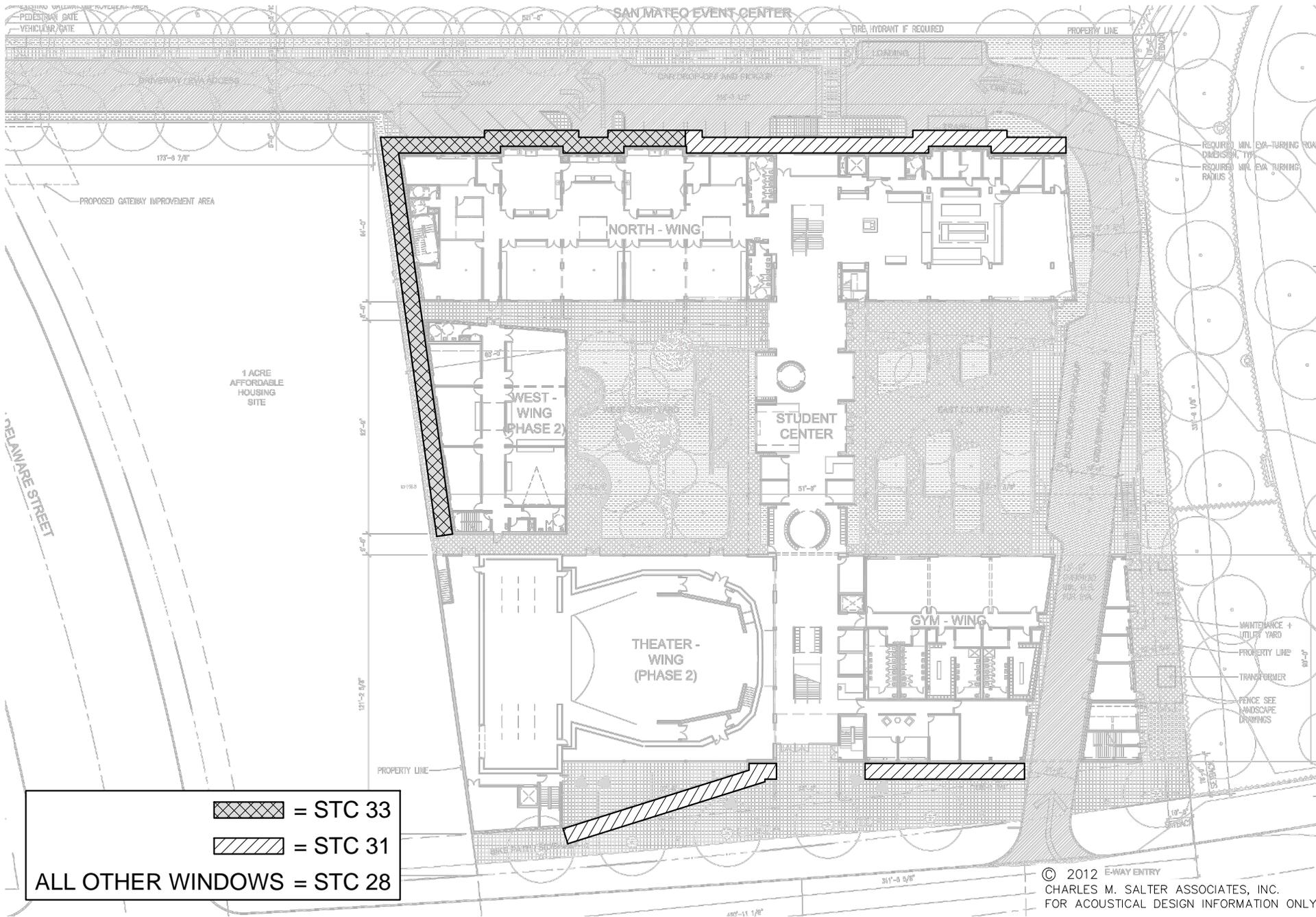


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NUEVA HIGH SCHOOL PHASE 2: SOUND-RATED WINDOWS AND EXTERIOR DOORS AT "HABITABLE" ROOMS

FIGURE 2

CSA # 12-0081 JLD 06.25.12

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1 August 2012

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Subject: **Nueva School**
CSA Project No. 12-0231

Dear Charlie:

This report addresses the noise regulation requirements promogated by the City of San Mateo that apply to the subject project.

Ordinance No. 2004-16 describes the intent of the noise regulations "...protect the inhabitants of the City against ... forms of nuisances..." and to allow for comfortable enjoyment of life. Commercial and multi-family residential have the following property line standards:

10:00 p.m. – 7:00 a.m. - 55 dB maximum
7:00 a.m. – 10:00 p.m. - 60 dB maximum

Adjustments are made to account for intermittent noise.

The noise ordinance addresses a variety of sources such as sound performances, vehicle horns, alarm systems, construction, amplified sound equipment, bands, unruly gatherings, engines, motors, mechanical devices, etc.

For this project, we must engineer the mechanical ventilation systems to not exceed the property line sound limits.

During construction, noise limits apply as outlined in Section 7.30.060 (e).

After construction, noise ordinance requirements will apply to noise generated by outdoor gatherings, parties, entertainment, music, etc.

Activities within the gymnasium are not expected to affect the neighborhood and easily meet City requirements because of the existing ambient noise and also because the room is fully enclosed.

The activities in the theater (which is a part of phase 2) are also anticipated to easily meet City requirements. Theaters, by its basic nature, need to be protected from environmental noise intrusion including train passbys, vehicular traffic aircraft flyovers, etc. This sound isolation construction will prevent theater noise from being audible or detectable at the property line.

Sincerely,

CHARLES M. SALTER ASSOCIATES, INC.



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President

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