# *LOS ALTOS AQUATIC CENTER NOISE STUDY*
# *LOS ALTOS, CALIFORNIA*

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## INTRODUCTION

The proposed project includes the construction of a community swimming pool at Covington Park, on Rosita Avenue, within the City of Los Altos. Existing homes abut the park on all sides. Nearby existing noise sources include a small sport field with a baseball diamond, multi-use building, surface parking, and tennis courts, and two schools. Neighborhood motor vehicle traffic also creates some noise, with all nearby streets posted at 25 miles per hour.

The proposed community pool facility will consist of two units; a competition pool approximately 75 ft. by 83 ft. in size, and a teaching pool, approximately 75 ft. by 60 ft. in size. Vehicles will access the site from Rosita Avenue.

## SETTING

### Fundamental Concepts of Environmental Acoustics

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. Its pitch or its loudness could cause the objectionable nature of a sound. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales that are used to describe noise in a particular location. *A decibel (dB)* is a unit of measurement that indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10-decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level or dBA*. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called $L_{eq}$. The most common averaging period is hourly, but $L_{eq}$ can describe any series of noise events of arbitrary duration.
The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus

or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level, CNEL*, is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level,* $L_{dn}$, is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

| TERM | DEFINITIONS |
|---|---|
| Decibel, dB | A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter). |
| Frequency, Hz | The number of complete pressure fluctuations per second above and below atmospheric pressure. |
| A-Weighted Sound Level, dBA | The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise. |
| $L_{01}$, $L_{10}$, $L_{50}$, $L_{90}$ | The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period. |
| Equivalent Noise Level, $L_{eq}$ | The average A-weighted noise level during the measurement period. |
| Community Noise Equivalent Level, CNEL | The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am. |
| Day/Night Noise Level, $L_{dn}$ | The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am. |
| $L_{max}$, $L_{min}$ | The maximum and minimum A-weighted noise level during the measurement period. |
| Ambient Noise Level | The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location. |
| Intrusive | That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level. |

**Definitions Of Acoustical Terms** | **Table 1**

| At a Given Distance From Noise Source | A-Weighted Sound Level in Decibels | Noise Environments | Subjective Impression |
|---|---|---|---|
| | 140 | | |
| Civil Defense Siren (100') | | | |
| | 130 | | |
| Jet Takeoff (200') | | | |
| | 120 | | |
| | 110 | | Pain Threshold |
| Diesel Pile Driver (100') | | | |
| | 100 | Rock Music Concert | |
| Freight Cars (50') | 90 | | Very Loud |
| Pneumatic Drill (50') | | | |
| Freeway (100') | 80 | Boiler Room | |
| Vacuum Cleaner (10') | | Printing Press Plant | |
| | 70 | | |
| | | In Kitchen With | |
| | 60 | Garbage Disposal | Moderately Loud |
| Light Traffic (100') | | Running | |
| Large Transformer (200') | 50 | | |
| | | Data Processing Center | |
| | 40 | | |
| Soft Whisper (5') | | Department Store | |
| | 30 | | Quiet |
| | | Private Business Office | |
| | 20 | | |
| | | Quiet Bedroom | |
| | 10 | | |
| | | Recording Studio | |
| | 0 | | Threshold of Hearing |

**Typical Sound Levels Measured In The Environment And Industry**

**Table 2**

**Significance Criteria/Regulatory Background**

The State of California and the City of Los Altos have established plans and policies designed to limit noise exposure at noise sensitive land uses. These plans and policies are contained in the following documents: (1) the State CEQA Guidelines, Appendix G, and (2) the City of Los Altos General Plan Noise Element.

The California Environmental Quality Act (CEQA) asks the following questions regarding potential noise effects to evaluate the significance of potential project impacts. Potential noise effects from a project could be considered significant if the project would cause any of the following to occur:

(a) expose 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;

(b) expose persons to or generation of excessive ground-borne vibration or ground-borne noise levels;

(c) create a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

(d) cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

(e) for a project located within an airport land use plan, or where such a plan has not been adopted within two miles of a public airport, private airstrip, or public use airport; expose people residing or working in the project area to excessive noise levels.

Of these guidelines, items (a), (c), and (d) are applicable to the proposed project. Item b is not applicable because there are no known producers of groundborne vibration in the project vicinity. Items (e) of the CEQA guidelines is not applicable because the project is not located within the vicinity of a public airport or private airstrip.

CEQA does not define what noise level increase would be considered substantial. Typically, an increase in the DNL noise level resulting from the project at noise sensitive land uses of 5 dBA or greater would be considered substantial even though projected noise levels remain below those considered acceptable for the affected land use.

**City of Los Altos Noise Ordinance**

The City updated its General Plan in November 2002. The Noise Element contains a land use compatibility chart that shows acceptance levels for various noise volumes at different land uses. For residential areas, 50 to 60 Ldn or CNEL is considered acceptable, and 61 to 70 $L_{dn}$ or CNEL is

considered *conditionally acceptable*. *Conditionally acceptable* means that, "New construction or development shall be undertaken only after a detailed noise analysis is made and noise reduction measures are identified and included in the project design."

The City Noise Ordinance further limits acceptable sound levels for various land uses. The relevant text of this ordinance is provided below:

**6.16.050 Exterior Noise Limits**

A. Maximum permissible sound levels by receiving land use.

1. The noise standards for the various categories of land use identified by the noise control office as presented in Table A of this section, unless otherwise specifically indicated, shall apply to all such property within a designated zone.

2. No person shall 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, either incorporated or unincorporated, to exceed:

    a. The noise standard for that land use as specified in Table A for a cumulative period of more than thirty (30) minutes in any hour; or
    b. The noise standard plus five dB for a cumulative period of more than fifteen (15) minutes in any hour; or
    c. The noise standard plus ten (10) dB for a cumulative period of more than five minutes in any hour; or
    d. The noise standard plus fifteen (15) dB for a cumulative period of more than one minute in any hour; or
    e. The noise standard plus twenty (20) dB or the maximum measured ambient for any period of time.

3. If the measured ambient level exceeds that permissible within any of the first four noise limit categories above, the allowable noise exposure standard shall be increased in five dB increments in each category as appropriate to encompass or reflect such ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.
4. If the noise measurement occurs on a property adjacent to a zone boundary, the noise level limit applicable to the lower noise zone, plus five dB, shall apply.

5. If possible, the ambient noise shall be measured at a consistent location on the property with the alleged offending noise source inoperative. If for any reason the alleged offending noise source cannot be shut down, the ambient noise shall be estimated by performing a measurement in the same general area of the source but at a sufficient distance such that the noise from the source is at least ten (10) dB below the ambient in order that only the ambient level be measured. If the difference between the ambient and the noise source is five to ten (10) dB, then the level of the ambient itself can be reasonably determined by subtracting a one decibel correction to account for the contribution of the source.

B. Corrections for character of sound. In the event the alleged offensive noise contains a steady, audible tone, such as a whine, screech, or hum, or contains music or speech conveying informational content, the standard limits set forth in Table A shall be reduced by five dB.

**TABLE A**
**EXTERIOR NOISE LIMITS**
(Levels not to be exceeded more than 30 minutes in any hour)

| Receiving Land Use Category | Time Period | Noise Level ($L_{50}$ dBA) |
|---|---|---|
| All R1 Zoning Districts | 10:00 pm -- 7:00 am | 45 |
| | 7:00 am -- 10:00 pm | 55 |
| All R3 and PCF Zoning Districts | 10:00 pm -- 7:00 am | 50 |
| | 7:00 am -- 10:00 pm | 55 |
| All OA Zoning Districts | 10:00 pm -- 7:00 am | 55 |
| | 7:00 am -- 10:00 pm | 60 |
| All C Zoning Districts | 10:000 pm -- 7:00 am | 60 |
| | 7:00 am--10:00 pm | 65 |

(Prior code § 10-5.05)

**Existing Noise Environment**

A noise study was prepared for this project by EIP in 2001 as part of an Initial Study. This study found that the ambient sound level at La Prenda Road, south of Rosita, was 53 dBA CNEL. Illingworth & Rodkin, Inc. conducted spot sound level measurements at the site at 3:00 p.m. on Thursday, September 11, 2003. Ambient sounds during this spot measurement were from children's voices, air conditioning units on portable buildings, and distant aircraft. No athletic competition or practice was occurring on nearby fields when the measurement was taken. This measurement was 48 dBA $L_{eq}$ and generally shows agreement with the CNEL level reported by EIP in the Initial Study.

**Future Noise Levels**

In August 2003, Illingworth & Rodkin, Inc. conducted long-term sound level measurements at the Petaluma community pool, a facility similar to the one proposed for Covington Park. Measurements at the Petaluma facility were conducted at a location about 75 feet from the near edge of the pool. The distances to the farthest points of the pools were about 140 feet for the shallow pool, and 170 feet for the large (lap) pool. The measurement period at Petaluma occurred from August 24 to August 26, 2003. Table 3, below, shows the Petaluma pool activity and its corresponding measured sound levels.

**Table 3**
**Sound Levels Measured at Petaluma Community Pool – dBA**

| Activity | Time of Day | Sound Level ($L_{50}$) |
|---|---|---|
| AM Pool closed - background sounds | 05:00 – 06:00 | 56 |
| PM Pool closed - background sounds | 20:30 – 22:00 | 55 |
| PM Lap Swim | 18:45 - 20:00 | 56 |
| AM Lessons | 09:30 – 11:45 | 55 |
| Mid-day Water Fitness | 12:00 – 13:00 | 62 |
| Mid-day Lap Swim | 11:30 – 12:30 | 57 |
| Sunday Recreation Swim | 14:00 – 16:15 | 67 |
| Tuesday Recreation Swim | 13:00 – 16:15 | 66 |
| PM Lessons | 16:30 – 19:00 | 58 |
| PM Water Fitness | 19:00 – 20:00 | 59 |

Source: Illingworth & Rodkin, August 2003

The two types of activities which generated noise above background ambient levels were water fitness and recreation swim. Lap swimming and lessons are not noisy activities.

## IMPACTS AND MITIGATION MEASURES

**Impact 1: The yard areas of nearest neighboring homes would be exposed to noise levels above those specified in the Los Altos Noise Ordinance and substantially above ambient levels.** ***This is a significant impact.***

The City of Los Altos Noise Ordinance (described previously) establishes maximum permissible sound levels based on the use of the receiving land use. The nearest sensitive receivers are residences located along Rosita Avenue. The allowable limits are based on the sound levels not to be exceeded more than 30 minutes in any hour. This is equivalent to the $L_{50}$ noise metric. Based on a review of data gathered at the Petaluma swimming pool, the $L_{50}$ noise metric is the most restrictive noise metric for assessing compliance with the noise ordinance. The noise ordinance provides for correcting the allowable limits based on the existing ambient noise level. Noise measurements in the

area indicate that no correction is necessary for the ambient noise level. The ordinance further provides correction for the character of sound. Because the sounds from the swimming pool area would contain speech, the allowable limits are reduced by 5 dBA. The daytime noise limit would, therefore, be an $L_{50}$ of 50 dBA and the nighttime limit would be an $L_{50}$ of 40 dBA as measured at any residential property boundary.

The pool would operate under two schedules for Monday through Saturday activities; summer, and non-summer. Sunday operations would be the same year round. The pool would operate, both in summer and non-summer on one schedule for Monday – Friday use, and a different schedule for Saturday. Thus, there are five activity schedules proposed, and the specific hours for each activity are presented in tabular form in Appendix A. Discussed below are the potential neighborhood noise impacts for each of these activity schedules. Note that all information reported below is the *potential worst-case impact*, which would be the nearest residence located about 150-200 feet away from the pool area.

(1) ***Sunday - Year Round.*** The pool would open at 8 am, with lap swimming programmed until 11:30. Most of the lanes in the competition pool would be available for Masters (competitive age graded) training. Presumably a coach would guide this group. This activity is not expected to increase noise levels in the area. Recreational swim would occur from noon to 4:30 pm in both pools. When the pool is full, as in summer, recreational swimming can produce sounds of about 63-64 dBA $L_{50}$ at a distance of 150 feet. Noise would substantially exceed existing ambient levels and the 50 dBA limit.

(2) ***Monday to Friday – Summer.*** Masters and adult swimming take place early in the morning, from 6 am to about 7:15 (see above). Youth swim team starts at 7:15 and goes until 9:30. Based on experience with youth swim teams, this activity could produce noise levels equivalent to the water fitness classes that were measured at Petaluma. Thus, sound levels would be an $L_{50}$ of about 50 dBA at the nearest residence. Lessons and master's swim would occur from about 10 am to 1 pm. Sound levels would not be substantial in this three-hour block. Youth programs and recreational swim begin at about 1:15 pm, and continue until about 6 pm. Sound levels would be as described above for these activities. Masters swimming and lessons would occur from about 6 pm to 7:30 pm. Kayak and/or scuba instruction could occur from about 7:15 pm to 8:30 pm. This is generally a quiet activity and sound levels would not exceed background at nearby residences.

(3) ***Monday to Friday – Non-Summer.*** The youth swim team would practice from about 6 am to 7:30 am. During swim practice, sound levels are proposed to be up to an $L_{50}$ of about 50 dBA at the nearest residence. Recreational swim would start at 8 am, and go until 3:30 pm. On busy days, noise levels could be as high as described above for these activities. In reality, for much of the non-summer period, sound levels would be less than this. Youth swim team would resume about 4 pm, and end about 7:15 pm. Noise levels for afternoon swim team would be the same as the morning period. Kayak and/or scuba instruction could occur from about 7:15 to 8:30 pm.

(4) ***Saturday – Summer.*** Youth swim team practice would be held from about 6 am to 8:30 am. Sound levels would be as described above. In the afternoon, recreational swimming would be held from noon to 5:30 pm. The effects of recreational swim are as described above.

(5) ***Saturday – Non-Summer.*** Youth swim team practice would be held from about 6 am to 8:30 am. Sound levels would be as described above. Masters, lessons, and adult lap swimming would occur from about 8 am, to noon. Recreational swim would occur from noon to 5:30 pm non-summer.

Sound levels would substantially exceed the 40 dBA nighttime limit and 50 dBA daytime limit at the nearest residence intermittently each day. Use of the pool would cause a significant noise impact.

***Mitigation Measure:***

(1) Construct a noise barrier along the south property line of the Aquatic Center. Recreational swim is projected to exceed the allowable daytime noise limit by 13 to 14 dBA. Early morning youth swim team practices is projected to exceed the nighttime noise limit by up to 18 dBA.
a) A 10-foot high sound wall is predicted to provide about 11 dBA of noise reduction. A 15-foot high sound wall would provide the maximum practical attenuation of 15 dBA. A sound wall at least 10 feet in height is recommended. The highest practical sound wall up to 15 feet should be considered.
b) Revise the site plan to locate the building(s) along the south property line. Connect the buildings with a wall , if necessary, to form a sold barrier.

(2) Prohibit youth swim practice before7:00 am unless noise levels can be controlled so as not to exceed 40 dBA or the existing ambient at the nearest residence. If complaints are received and noise levels are determined to exceed the 40 dBA limit or the ambient noise level, whichever is applicable, take steps necessary to control noise within the allowable limits. Such steps may include, but not be limited to, prohibition of use of whistles, no loud speech, etc.

**Summary:**

**A sound wall in combination with scheduling noise monitoring and implementation of administrative controls would mitigate this impact to a less-than-significant level.**

**Impact 2: The project would expose nearby residents to vibration or ground-borne noise. No Impact.**

The project does not include machines or activities that create vibration or ground-borne noise detectable beyond the property line.

**Impact 3: The project-generated traffic would cause a substantial increase in noise levels along Rosita Avenue west of Campbell Avenue.** ***This is a significant impact.***

According to the traffic analysis done for the project, the traffic to and from the project will increase traffic volumes on Rosita Avenue from about 720 ADT to 2260 ADT in the summer, and from about 830 ADT to 1960 ADT non-summer. This traffic increase would raise traffic noise levels on Rosita Avenue by about 5 dBA $L_{dn}$ above the current level during the summer and by about 4 dBA $L_{dn}$ during the non-summer. Hourly average daytime noise levels during summer could increase from 48 dBA $L_{eq}$ (measured) to up to 56 dBA $L_{eq}$, an 8 dBA increase. The resultant daily average noise level would remain within the Acceptable Range of 50-60 dB $L_{dn}$, but the increase in noise would be substantial. Increased traffic would cause a significant noise impact along Rosita Avenue west of Campbell Avenue. Noise levels would not increase substantially along other streets in the area.

***Mitigation Measure:***

There are no reasonable or feasible measures to mitigate the noise impact resulting from project-generated traffic along Rosita Avenue west of Campbell Avenue. Rosita Avenue is a low-speed residential street with unlimited access. Construction of noise barriers is not practical. There are no other available noise attenuation measures. This impact is significant and unavoidable.

**Impact 4:** **Noise-generating activities associated with the construction of the proposed project would temporarily elevate noise levels at noise sensitive receptors adjacent to the project site. The duration of the noise-generating activities that would potentially be significant outside the adjacent housing is expected to take less than one year.** ***This is a less-than-significant impact.***

Construction equipment sounds would temporarily increase noise levels at adjacent receptors. Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, timing, duration of each noise-generating activities, and the distance between construction noise sources and noise-sensitive receptors. Tables 4 and 5 show typical noise levels generated by construction equipment at a distance of 50 feet from the source and at a distance of 50 feet from the construction activity centers, respectively. At 100 to 150 feet (nearest residence from the center of construction activity), noise levels drop about 6 dB lower than they are at 50 feet.

The highest maximum noise levels generated by project construction would typically range from about 90-98 dBA at a distance of 50 feet from the noise source. Typical hourly average noise levels are about 81-89 dBA measured at a distance of 50 feet from the site during busy construction periods.

While these are expected to be the worst case noise levels, during the vast majority of time, the noise levels would be expected to be 20 dBA or more lower. However, since the noisiest construction phases are expected to last for less than one year, this impact would not be considered significant. The following mitigation measures are suggested to minimize construction noise intrusion.

***Mitigation Measures:***

***Construction Noise Reduction Measures.*** Implementing the following measures would reduce the impact to less-than-significant.

- Noise-generating activities at the construction site or in areas adjacent to the construction site associated with the project in any way should be restricted to the hours of 7:00 a.m. to 5:00 p.m., Monday through Friday.

- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.

- Unnecessary idling of internal combustion engines should be strictly prohibited.

- Utilize "quiet" air compressors and other stationary noise sources where technology exists.

- Control noise from construction workers' radios to the point where they are not audible at existing residences bordering the project site.

- Notify adjacent residents to the project site of the construction schedule.

- Designate a "noise disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaints (e.g., starting too early, bad muffler, etc.) and would require that reasonable measures warranted to correct the problem be implemented. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule. (The City should be responsible for designating a noise disturbance coordinator and the individual project sponsor should be responsible for posting the phone number and providing construction schedule notices).

| | A-Weighted Noise Level (dB) at 50 Feet |
|---|---|
| | 60 70 80 90 100 110 |
| ***Earth Moving***: | |
| Compactors (Rollers) | |
| Front Loaders | |
| Backhoes | |
| Bulldozers | |
| Scrapers, Graders | |
| Pavers | |
| Trucks | |
| ***Materials Handling:*** | |
| Concrete Mixers | |
| Concrete Pumps | |
| Cranes (Movable) | |
| Cranes (Derrick) | |
| ***Stationary:*** | |
| Pumps | |
| Generators | |
| Compressors | |
| ***Impact Equipment:*** | |
| Pneumatic Wrenches | |
| Jackhammers & Rock Drill | |
| Pile Drivers (Peak) | |
| ***Others:*** | |
| Vibrators | |
| Saws | |

Source: Handbook of Noise Control, Cyril M. Harris, 1979

**Construction Equipment Noise Level Range** | **Table 4**

**Typical Ranges of Energy Equivalent Noise Levels at 50 Feet, $L_{eq}$ in dBA, at Construction Sites**

| | Domestic Housing | | Office Building, Hotel, Hospital, School, Public Works | | Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station | | Public Works Roads & Highways, Sewers, and Trenches | |
|---|---|---|---|---|---|---|---|---|
| | I | II | I | II | I | II | I | II |
| Ground Clearing | 83 | 83 | 84 | 84 | 84 | 83 | 84 | 84 |
| Excavation | 88 | 75 | 89 | 79 | 89 | 71 | 88 | 78 |
| Foundations | 81 | 81 | 78 | 78 | 77 | 77 | 88 | 88 |
| Erection | 81 | 65 | 87 | 75 | 84 | 72 | 79 | 78 |
| Finishing | 88 | 72 | 89 | 75 | 89 | 74 | 84 | 84 |

I - All pertinent equipment present at site.

II - Minimum required equipment present at site.

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

**Noise Levels by Construction Phases** | **Table 5**