



Exterior Noise Assessment

AAPS - Thurston Elementary School

IMEG #24001204.05

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Exterior Noise Assessment
for
AAPS - Thurston Elementary School
Ann Arbor, Michigan

IMEG #24001204.05
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A. Introduction

1. IMEG conducted exterior site noise measurements at Thurston Elementary School, located in suburban Ann Arbor, Michigan, to establish existing site noise levels for future building design and CHPS maximum allowable exterior noise levels.

B. Executive Summary

1. The Thurston Elementary School property exhibited sound levels typical of suburban environment with residential activity noise, automobile traffic, trees rustling, wind, and the addition of semi active small animal wildlife between 40-50 dBA.
2. Window air conditioning units that were seen in nearly every classroom at the school. One running unit was measured at 70 dBA at the source. These units are loud and when all are turned on will create a louder environment, particularly in the courtyard where many units were located in close proximity and a semi enclosed environment.
3. Mechanical exhaust louvres on the addition produced loud noise levels up to 66 dBA at the building façade. These are the loudest sounds near the building addition.
4. Mechanical units located on the addition were not running at time of site survey but will generate the predominate sound source near the building when turned on.
5. New design and construction does not require exterior to interior acoustical testing for building façade, so long that noise generated from building support equipment is acoustically quiet or addressed with acoustical abatement.

C. CHPS Standards

1. CHPS EQ P15.0.2 states "In Core Learning Spaces and in spaces designated as [Inter-Classroom Workspaces] and [Special Education Rooms], the total background noise from the combination of building HVAC systems and exterior noise shall not exceed 40 dBA."
2. For Enhanced Acoustical Performance, CHPS EQ C15.1.2 requires HVAC systems and exterior noise to not exceed 35 dBA for enhanced acoustical performance.

D. Acoustical Analysis

1. AAPS Thurston Elementary School is nestled in a suburban area of Ann Arbor immediately surrounded by single family homes and the Thurston Nature Center with wooded area and pond with waterfowl. The main road nearby features commercial businesses and the University of Michigan North Campus Research Center, which includes the Transportation Research Institute with simulated roadway test center.
2. Highway 23 is within two-thirds of a mile from the school façade was not clearly noticeable and was masked from mechanical noise and nearby suburban traffic noises.
3. The Ann Arbor Municipal Airport (ARB) is 6 miles southwest of the school. ARB has voluntary Flight and Noise Abatement program with instructions to pilots on reducing noise in the residential areas around the airport. A small single engine propellor plane passed overhead during site survey and was measured at 50 dBA. The nearby larger airports, Willow Run Airport (YIP) and Detroit Metropolitan Wayne County Airport (DTW), are 9 miles and 18 miles away, respectively. The occasional modest flight noise from possible flyovers, the large distance to the airports, and flight paths oriented away from the school do not indicate flight aviation noise to be an issue for classrooms.
4. The nearest railroad track is 1 mile away. The Train horn blasts and passing trains were not heard during site survey but may be present and present a brief period of noise. This is not a sustained source of noise and it is anticipated to be very occasional and not commonplace during school hours and as such, not imposing to classroom interiors.



5. Window air conditioning units were in nearly all rooms throughout the building, as seen in Figure 2. One window unit was running during the site survey and measured 70 dBA at the source on the exterior side, as seen in Figure 1. This is a very high noise level, particularly outside primary education rooms. Noise from the exterior will flank into the building through the glazing and window frames.



Figure 1: Measured Air Conditioning Unit in Courtyard



Figure 2: Courtyard with Air Conditioning Units in Every Classroom



6. Thurston Elementary School had a detached building addition to the north of the main building, connected by a covered exterior walkway. This addition had dedicated building support services including heating and cooling mechanical unit both on the interior and exterior of the building. These units generated a large amount of noise exterior to the building. The northwest side of the addition featured two (2) mechanical units mounted high on the exterior wall, as seen in Figure 3. The southeast side of the addition featured three (3) similar units mounted in the same fashion, as seen in Figure 4 and Figure 5. These were not running during time of site survey but may produce occasional or continuous noise during operation.



Figure 3: Mechanical Units on Northwest Addition Exterior



Figure 4: Single Mechanical Unit on Southeast Addition Exterior



Figure 5: Double Mechanical Unit on Southeast Addition Exterior



7. The north corner of the addition featured two (2) mechanical exhaust louvres from interior mechanical units, as seen in Figure 6 and Figure 7. These produced sound levels up to 66 dBA and overpowered all other sound sources in the area.



Figure 6: First Loud Exhaust Louvres



Figure 7: Second Loud Exhaust Louvre



8. Exterior noise above 57 dBA requires a verification measurement of the façade that exterior noise is abated to attain maximum interior background noise levels (40 dBA total). Measurements near the building and building support equipment readily surpassed this level. New design and construction should include attention to noise generated by building support equipment, the location of the equipment, and acoustical abatement design for the equipment. Generated noise levels may require verification measurements at project completion to confirm attenuation metrics (STC or OITC). ASNI S12.60 recommends STC and OITC metrics for façade abatement.



9. The measured sound levels at the school are shown below in Figure 8: Measured Exterior Sound Levels.



Figure 8: Measured Exterior Sound Levels

E. Conclusions

1. This concludes IMEG's exterior noise assessment.

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