



Pipe Down: Plumbing and Noise Abatement

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Safety and security are fundamental imperatives that drive justice facility design. However, less explicit elements such as environmental quality, acoustics and noise abatement, should also be considered elemental factors in the planning of correctional facilities.

While facilities are often designed with environmental quality and building occupant comfort in mind, acoustic quality is frequently overlooked, marginalized or falls victim to budgetary constraints.

Noise abatement is frequently one of the prime targets for value engineering initiatives that often fail to consider post-occupancy retrofit costs and ignore soft costs such as the long-run impact on staff performance, staff retention rates and inmate behavior and management.



Sacrificing noise abatement measures can significantly impact noise levels and acoustic quality in correctional environments and negatively affect the wellbeing, performance and behavior of building occupants.

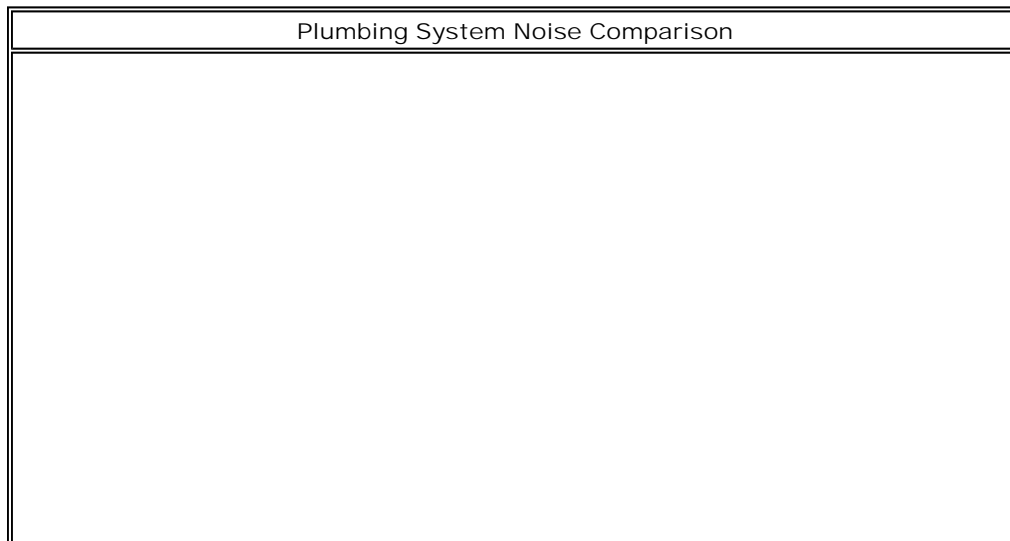
Noise levels in inmate housing units should not exceed 70 decibels during daytime hours and should stay below 45 decibels at night, according to the American Correctional Association's noise standard. However, the U.S. Environmental Protection Agency recommends a safe noise level of no more than 55 decibels, which is the equivalent to normal speech heard at a distance of one meter.

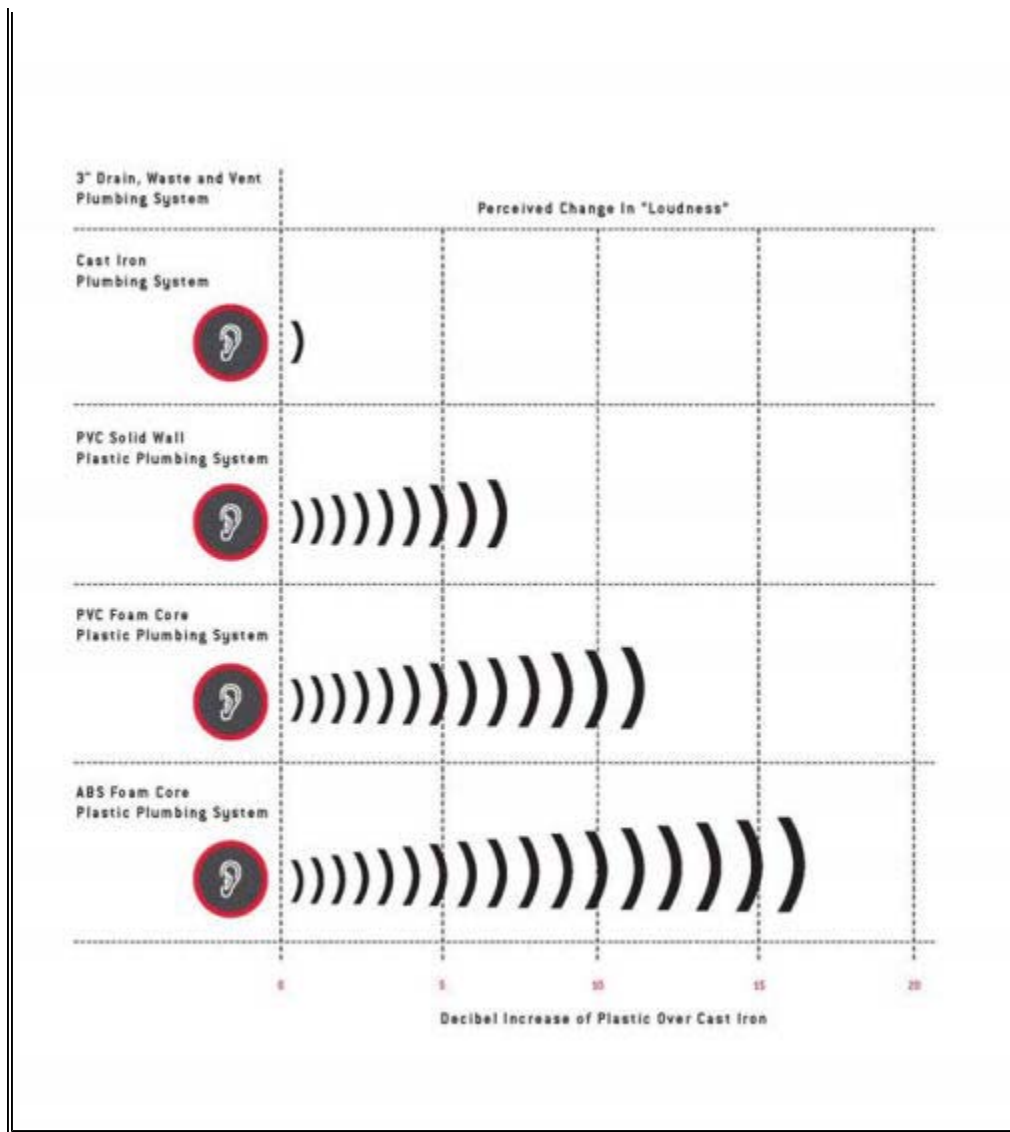
Noise and Stress

Excessive noise levels in correctional settings are associated with increased levels of stress and heightened safety and security concerns among staff. The elevated blood pressure and rapid heart and respiratory rates produced by heightened stress are a fundamental component of our most basic survival instincts. The body's release of hormones such as epinephrine and cortisol are part of the normal human fight-or-flight response to stressful situations.

Excessive levels of noise and heightened stress levels are associated with sleep disturbance and fatigue, and reduced concentration and memory capacity among building occupants, according to research findings. However, the impact of noise and chronic stress on the human body over an extended period is not limited to fatigue and cognitive deficits.

Exposure to continuous or rapidly cycling stressful situations and environments, and the prolonged presence of elevated levels of these "response" hormones, has been linked to a range of negative physiological effects and neurological deficits from decreased immune system function to hypertension, vascular and cardiac problems.





Excessive noise levels are also associated with patterns of increased irritability and aggression and decreased cooperation, according to researchers at the National Institute for Occupational Safety and Health.

The importance of acoustics and noise abatement to the quality of a building’s interior environment and to occupant comfort is also recognized by the USGBC, with noise mitigation credits available in several LEED rating system tracks.

In correctional facilities, a host of verbal communications and physical activities interact with architectural and structural elements to create variable degrees of environmental noise.

Plumb Solution

The noise associated with plumbing systems is generated by the transport of materials and system vibration as sound waves travel through the system and pass through the pipe wall. A 2001 study by Canadian acoustical consultants MJM found cast iron soil pipe, when installed with rubber gasket joints, proved 750 percent more effective in reducing plumbing noise than alternative plumbing materials, such as PVC and ABS pipes.

The MJM research study, which was sponsored by the American Cast Iron Soil Pipe Institute, compared the acoustical performance of various piping material solutions under laboratory conditions at Quebec’s Domtar Research Center. Hub and spigot cast iron pipe achieved vibration reductions up to 12 decibels per joint, while hubless pipe with elastometric gaskets and stainless steel shields yielded reductions up to 9 decibels, according to study.

In addition to the cast iron system’s cross-joint vibration reduction, the dense molecular structure of the cast iron mitigates the transfer or amplification of sound waves beyond the system. Cast iron pipe and fittings dampen the airborne noise produced by flowing water and inhibit noise transfer through the pipe wall.

Acoustic quality can impact the operational safety and security of correctional facilities, and the health, well being, performance and satisfaction of staff and inmates alike. From this perspective, noise abatement should be an integral action item in the planning and design of new facilities and retrofit projects.

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