



## WHITE PAPER

### **County Law Enforcement Center Plumbing Design**

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## Introduction

All county law enforcement centers are not alike. Although general operations may be very similar as dictated by State and local codes, the operation is often influenced by the available resources of Sheriff 's Department staff and facilities maintenance personnel.

The placement and detailed planning of building plumbing infrastructure to accommodate maintenance, security and architectural requirements are at the forefront of design challenges.

Our design process begins with a tour of the existing facility and interviews with the Sheriff's Department staff, as well as maintenance staff, to determine current and future needs. This includes, but is not limited to, current operations, level of housing unit fixture control (manual or electronic), and plumbing product manufacturer preferences such as valves, fixtures and equipment.



## 1 Access to Building Plumbing Infrastructure

One of the first priorities occurring in schematic design is to work closely with the architect to determine plumbing chase locations and configurations.

Accessible chases are important for maintenance staff to be able to reach security fixture controls, shut-off valves, hot water mixing valves and sanitary cleanouts.

Continuous perimeter chases around the boundary of inmate housing unit areas have proven to be most successful in lieu of triangular chases between cells with access doors from Day Rooms. The continuous perimeter chases allow maintenance access in most cases without having to travel through secure areas.



## 2 Sanitary Drainage Systems

In all correctional facilities, the placement of sanitary cleanouts is extremely important. As mentioned previously, these cleanouts should be located within piping chases readily accessible by maintenance staff. It is recommended that each security toilet fixture is provided with a dedicated cleanout on an individual stack or branch to isolate the origin of contraband introduced into the drainage system. Cleanouts can be provided with pins or hooks as directed by Sheriff's Department staff. Hooks tend to be more efficient in catching contraband, but have proven to be very maintenance intensive. Our experience has been that in most cases cleanout pins perform effectively and are preferred by maintenance staff.

- Floor drains within inmate housing units are typically located within plumbing chases, outside of groups of cells and within shower areas. Floor drains and cleanouts within inmate accessible areas cannot always be avoided and should be specified with vandal resistant fasteners.
- Floor drains are also located within staff and public toilet rooms areas, staff locker rooms, mechanical rooms, kitchen and laundry areas.
- Sanitary drainage piping material can be schedule 40 PVC or cast iron. PVC is typically specified and has been proven to be successful in this application.
- Catch basins and trench drains are typically provided within vehicle storage areas as well as the Sally Port garage.

An alternate method of sanitary drainage that may be considered is a vacuum drainage system. While the initial cost is more expensive than a gravity drainage system, the water saving cost may offset this investment. A careful analysis for cost/benefit/payback would need to be performed with the facilities maintenance facilities staff in early design stages to determine whether it would be feasible to implement this system. The cost of municipal water is obviously a large factor in decision making.



Water shut-off valves behind cell within perimeter plumbing chase



Tamper proof drain

### 3 Water Distribution Systems

#### Zoning

Water distribution system design should consider the various functions of a County Law Enforcement facility and be zoned accordingly.

Separate water distribution zones would include public/staff areas, kitchen/laundry and inmate housing areas. This piping arrangement allows isolating each area with shut-off valves for maintenance and security considerations.

The placement of water heating equipment would follow the same pattern, resulting in a decentralized hot water distribution system containing a water heating plant for each zone. While slightly more costly, multiple zones with decentralized water heating allow more flexibility. Any required maintenance shutdown of one zone would not affect the others, thus avoiding disruption of facility operations. Also, when designing the hot water distribution systems, redundancy should be considered to maintain the ability to support 60 to 75% of the demand in any given zone.

#### System Control

*“Control of water to inmate housing units can be as simple as utilizing manual shut-off valves in chases, master solenoid shutoff valves on mains in chases to isolate housing unit quadrants, or individual electronic control of each fixture.”*

The opening and closing of master solenoid valves would be controlled from the centrally located housing unit guard station. Another option would be individual electronic control of fixtures to provide an on/off capability, adjustment of metering time or adjusting lockout times. All of these options should be discussed with the facility staff during the schematic and design development phase of building design.

#### Other Considerations

Hose bibbs should be provided within the Vehicle Sally Port, intake, and adjacent to inmate shower areas. Hose bibbs should be located within flush access boxes with lockable doors. Other hose bibb locations to consider are mechanical rooms.

Water pressure in correction facilities should be a minimum 35-40 PSI delivered to the remote security fixture as well as emergency fixtures. Booster pumps should be considered when available municipal water pressure cannot accommodate these criteria.

A water quality report with iron and hardness data should be obtained from the local water utility to determine the requirement for water treatment. Hardness above 4-5 grains may have an impact on kitchen and laundry equipment as well as hot water mixing valves.



## 4 Exposed Piping Systems

Piping located within inmate housing units, which cannot be concealed within architectural elements or plumbing chases, should be concealed behind premanufactured steel soffit systems for vandal resistance. This condition is especially prevalent in areas of exposed concrete beams, columns and precast plank where coordination with the building structure is critical.



## 5 Plumbing Fixtures

General use areas – staff/public water closets, lavatories and urinals are typically specified to be constructed of vitreous china. Faucets and flush valves can be specified as manually or sensor operated as directed by facility staff. Lavatories are also commonly solid surface material integral with countertops.

Miscellaneous sinks in medical, kitchen, laundry, and break areas are typically specified to be constructed of stainless steel.

Inmate housing units would contain security fixtures constructed of 12 to 14 gauge stainless steel. This includes lavatories, water closets, combi units and shower panels. Operation can be air operated push button or electronic push button. Inmate toilets are typically specified with an anti-flooding option to automatically disable a water closet when contraband causes clogging of the drain, avoiding a flooding condition.

Shower operation is typically electronic to allow adjustable run time.

Areas such as medical, special needs or intake are specified with anti-ligature fixtures, which modifies the fixture profile to reduce the likelihood of suicide or other injury.

Emergency eye wash fixtures with thermostatic mixing valves are provided within the Sally Port, kitchen, laundry and medical areas.



## 6 Conclusion

While all building types have specific plumbing design problems to solve, law enforcement facilities pose unique and critical challenges to the plumbing designer.



*“The main objective in county law enforcement plumbing design is to create systems that are accessible for maintenance, deter vandalism and keep inmates and staff safe. ”*



For more information on **County Law Enforcement Center Plumbing Design** or other Plumbing/Fire Protection topics, please contact:

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### About Harwood

Harwood Engineering Consultants, Ltd. has a dedicated team of engineers who have mastered their crafts. We are a full service engineering consulting firm that provides civil, electrical, fire protection, HVAC, lighting, plumbing, structural, and technology/security design services. We also offer LEED and commissioning services.

If a project involves a partnership with a contractor for a design assist, a traditional architecturally run project, or a direct system design with a building owner, our strategy has always been, and will continue to be, to provide client satisfaction. We believe a custom approach should be taken with every aspect of a project we are involved with. In doing so, it allows for innovative functional designs and making sure the client's goals are understood, are met, and are within budget.

In 2013, Harwood Engineering Consultants, Ltd. celebrated its 30th anniversary and is very proud to be a part of the Milwaukee community. We look around the city, throughout the state of Wisconsin, and other parts of the country and reminisce over all the building projects we have been involved with. We take great pride in knowing that our designs have provided comfortable hospitals, secure detention facilities, safe police and fire stations, schools and universities for our children to learn, places to worship, and fun places for families to vacation.



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