

# Guidebook for Airport Terminal Restroom Planning and Design

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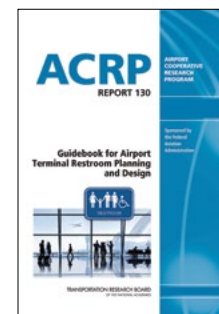
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Above: When the restrooms at Minneapolis–Saint Paul International Airport (MSP) became the top complaint among passengers, the airport created a new approach to improving their restroom facilities. This successful initiative led to an Airport Cooperative Research Program (ACRP) guidebook for other airports.

When Minneapolis–Saint Paul International Airport (MSP) set out to upgrade its restrooms in 2010, the team leading the initiative knew that a mere facelift would not solve the facilities' growing issues. Renovations had been done and redone; new restrooms, with minor tweaks to the finishes and amenities, had been added in various expansion projects; and some of the original 1960s vintage facilities remained. Across the two terminals at MSP, 100 sets, or pairs, of restrooms served the public and employees. Although paper-towel dispensers had been updated and basic retrofits had been conducted to conform with Americans with Disabilities Act of 1990 (ADA) guidelines, and even as hold rooms, concessions, and wayfinding facilities received upgrades, the restroom program had not. In fact, restrooms had become *the* problem at MSP—they were a top complaint on traveler surveys and

an ongoing operational challenge. It was clear that a new approach was required.

In 2015, the Airport Cooperative Research Program (ACRP) released *ACRP Research Report 130: Guidebook for Airport Terminal Restroom Planning and Design*. Inspired by MSP's initiative, the report compiles input from nine case studies at airports across the United States and from various local stakeholder groups. The research team was directed to bring this guidance to the aviation industry because every airport was facing similar issues:



For more information on *ACRP Research Report 130: Guidebook for Airport Terminal Restroom Planning and Design*, visit [www.trb.org/Publications/Blurbs/172507.aspx](http://www.trb.org/Publications/Blurbs/172507.aspx).

inadequate fixture counts and the resulting long lines, especially at the women's restrooms; failing plumbing fixtures, dispensers, and disposals; tired finishes that were difficult to maintain and clean; and, most significantly, travelers who vastly preferred to keep all their belongings within reach, making the building-code-minimum-sized toilet stalls even more cramped than before the tightening of security measures across the industry.

To ensure the guidebook's ease of use, the printed content was kept to 75 pages with color graphics and images. The remaining 244 pages of supporting appendices (research data, charts, forms, and more) are provided on a CD as well as PDFs on the ACRP website.

As MSP's Restroom Team (see sidebar, page 42) conducted its research, a guiding principle surfaced: "Airport restrooms are often the first and last impression travelers have of an airport." The restroom should be memorable—in a positive way.

## Project Beginnings

*ACRP Research Report 130* describes the process of initiating a restroom project through completion and beyond. The first chapter focuses on planning—the process the Re-

stroom Team used to begin their program development. Several concurrent tasks were initiated to determine what the facilities had, which was a critical step before determining a direction for the program.

The design team surveyed each restroom using a series of matrices. These addressed the quantities and types of fixtures in each restroom set, finishes, ADA compliance, construction year, and more. As this mundane—but critical—effort progressed, the team weekly conducted equally important discussions about the drivers and goals for the restroom program.

This process went on for several months before the first design ideas were drawn. Internal and external stakeholders, such as MSP's voluntary Travelers with Disabilities Advisory Committee, aired their priorities, which often conflicted with the priorities of others. These misalignments were debated and worked through until consensus was reached. The design chapter of *ACRP Research Report 130* contains a form to help facilitate decision making on which priorities should top the airport's list.

## Master Plan Required

Another piece of the puzzle was to develop a long-term master plan. Inad-



Photo courtesy Metropolitan Airports Commission

A chapter of *ACRP Research Report 130* addresses determining priorities not just for visual spaces but also for plumbing, electrical, and ventilation systems.

equate fixture counts cannot be remedied if there are no goals targeted, and it became evident early on that building code minimums are inadequate from a customer-service perspective. The planning chapter of *ACRP Research Report 130* offers equations to help determine fixture counts based on aircraft size, peak periods, level of service, and other variables. Also included is guidance for determining the fixture-count ratio for facilities for males and females by accounting for various factors and airport priorities; one of the appendices also suggests considerations for all-gender restrooms.

Recognizing that additional space was needed to provide not only the desired number of fixtures but also extra space within the restrooms—especially in the stalls, to accommodate luggage and maneuvering, and for travelers with differing mobilities—the MSP Restroom Team developed a prototype to test the viability of their new goals. Now, a decade later, the prototype continues to be tweaked in response to traveler and employee feedback, product innovations, new code requirements, and shared best practices from other airports.



Photo courtesy Metropolitan Airports Commission

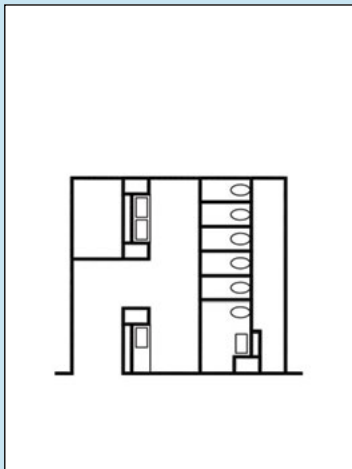
The MSP restroom design overhaul included technology to increase cleanliness and decrease odors, offer space to address passenger needs, and provide lighting and outlets to energize travelers.

A high priority of MSP and ACRP Research Report 130 was addressing compliance with Americans with Disabilities Act of 1990 guidelines.

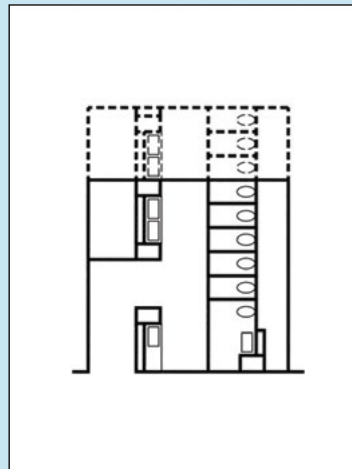
ACRP Research Report 130 navigates the development of the prototype by breaking the restroom into spatial nodes such as the entry, sink area, and toilet stalls. The desired components are situated within these nodes, including plumbing fixtures, dispensers, and more. The nodes then are arranged in one or more layout modules that can adapt to various sizes and configurations (Figure 1, at left).



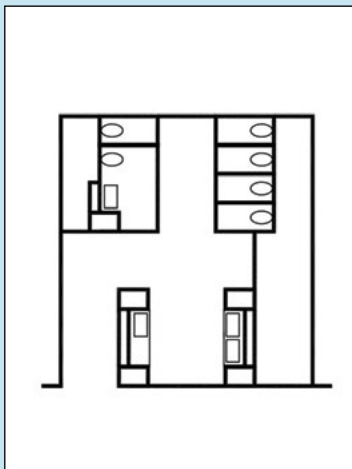
Photo courtesy Metropolitan Airports Commission



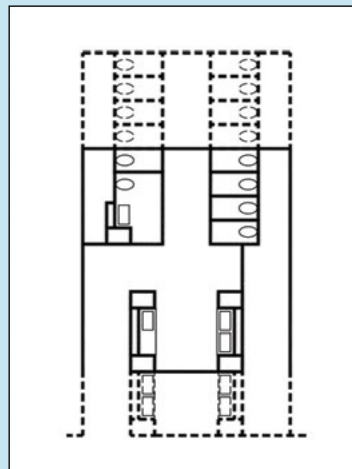
(a)



(b)



(c)



(d)

**FIGURE 1** Room and galley prototypes are shown with the preferred minimum restroom size and gender mix of fixtures: (a) basic galley prototype, (b) expanded galley prototype, (c) basic room prototype, and (d) expanded room prototype.

A section on master planning provides guidance on the ideal placement of these prototypes within the airport based on traveler catchment zones; that is, specific gates or support areas served by each set of restrooms, such as ticketing, baggage claim, or mall areas. Often, it turned out that the ideal placement of a restroom set was not in its current location at MSP. With customer service a primary consideration, concessions were shuffled around and restrooms muscled in between gates to provide facilities where they were needed—rather than using them to fill in left-over space, as had been done previously.

Also highlighted in the guidebook are the positives and negatives of renovating existing restrooms versus creating new sets.

### Prototype Design

The third chapter focuses on the design of the prototype. Addressing each component, such as signage, surfaces, and heating and air conditioning, ACRP Research Report 130 offers guidance on maintenance, sustainability, and universal design. Also included is a discussion about standardizing layouts, products, and finishes.

Airports must balance competitive bidding against generic bulk stock from the likes of multiple faucet or carpet manufacturers. At MSP, the Restroom Team determined that the cost percentage of the non-infrastructure-related components (finishes, fixtures, and the like) was small enough that most of the project's



Photo courtesy Metropolitan Airports Commission

Photo courtesy Metropolitan Airports Commission

(At left:) Surfaces, finishes, and fixtures should be selected with consideration of their durability, ease of cleaning, and timeless appeal. (At right:) Each restroom at MSP has technology to facilitate efficient and frequent cleanings.

scope could maintain an open specification and still remain competitive on the remaining project products via supplier competition.

### FIXTURES AND SURFACES

Surfaces within restrooms require careful consideration, since they require significant cleaning and repair and tend to be subjective in terms of their aesthetic appeal and the whims of taste. MSP collectively chose a timeless color palette, using materials with no or minimal joints to clean or repair and that are resistant to wear and abuse. Lighting is calming and task-oriented, designed to energize travelers fresh off long flights. Air movement is facilitated strategically to dry wet floors at the sinks and to exhaust odors above the stalls. Convenience outlets at the sinks are provided for shaving and hair drying.

To aid in the selection of finishes, plumbing fixtures, paper towel dispensers, and other elements, an appendix to *ACRP Research Report 130* features a matrix listing product types (e.g., toilet partition materials) with comparison keys for the range of durability and cost.

MSP continually fine-tunes its restroom designs as feedback is collected from travelers and employees, maintenance and cleaning crews, and other members of the Restroom Team.

### EMBRACING TECHNOLOGY

Technology is playing an increasing role in the operation and maintenance of airport restrooms. A high level of customer service is demanded. Manufacturers offer sensors to notify janitorial staff if dispensers are out of paper or if a trash receptacle is full. Indicator lights show which stalls are unoccupied. Music often is provided to temper the din in the hard-surfaced spaces as well as to provide an element of calm in the traveler's

often hectic and tiring journey. Speakers provide general terminal paging, which is required by ADA to be augmented by visual paging for hearing-impaired travelers. To further dampen the live surfaces within the restroom, a perforated metal ceiling with acoustic bags above absorbs 90% of the sound. Since the entrance areas to the restroom are open, often adjacent to hold rooms, minimizing the sound of hand dryers and flushing toilets is essential.

MSP has embraced technology, primarily through a custom restroom-management system that utilizes a direct interface with the airport's overall facility-management system. A screen is incorporated into the lighted room sign at the entry to each restroom. With the swipe of a cleaner's badge, this screen indicates the distance in each direction to the next-nearest restroom for customers approaching the bathroom. The badge swipe also doubles the exhaust level to extract cleaning-chemical smells and speed up the drying of wet surfaces. A thermal sensor in the entry ceiling tracks the number of people entering and leaving the restroom to help gauge cleaning needs.

### RELATED AMENITIES

The design chapter also addresses a variety of restroom-related amenities: baby changing, grooming, and incorporating

MSP has incorporated lactation rooms for nursing mothers. These and other amenities will be addressed in a follow-up project to *ACRP Research Report 130*.

art within and outside the restroom.

The same research team that developed *ACRP Research Report 130* is working on a follow-up report, expected to be completed later in 2019. This report will provide similar guidance for other special amenities: lactation rooms, service animal relief areas, changing table restrooms, sensory rooms, and several other spaces. This guidebook will build upon the content of the restroom book. Some amenity prototypes developed by MSP's Restroom Team will be the basis for the added content.

The design chapter concludes with a discussion on cost-estimating strategies during the planning and design phases, with the recommendation to follow the typical industry practice of conducting estimations at the completion of the schematic design and design development phases, along with a final 90% cost check.

## Implementation

The fourth and final chapter of *ACRP Research Report 130* focuses on implementation of the restroom design process. Since most restroom projects in airports take place within existing facilities, phasing is an important consideration. Not only is construction disruptive in terms of noise, dust, and odors—all of which need to be carefully planned for and managed—but during renovations, one or more restroom sets are out of service for a period of months.

Prefabricated restrooms offer a potential solution to expedite the construction process. This technique is used in health-care facilities, in which an entire headwall assembly can be brought in and installed in a few hours. Prefabricated restrooms are most practical in new construction, and bringing in wet-wall assemblies for toilets and sinks, for example, could go a long way to shorten the disruption.

The final—and very important—aspect of the process is post-occupancy evaluation. As noted in the beginning of the article, MSP continually fine-tunes its

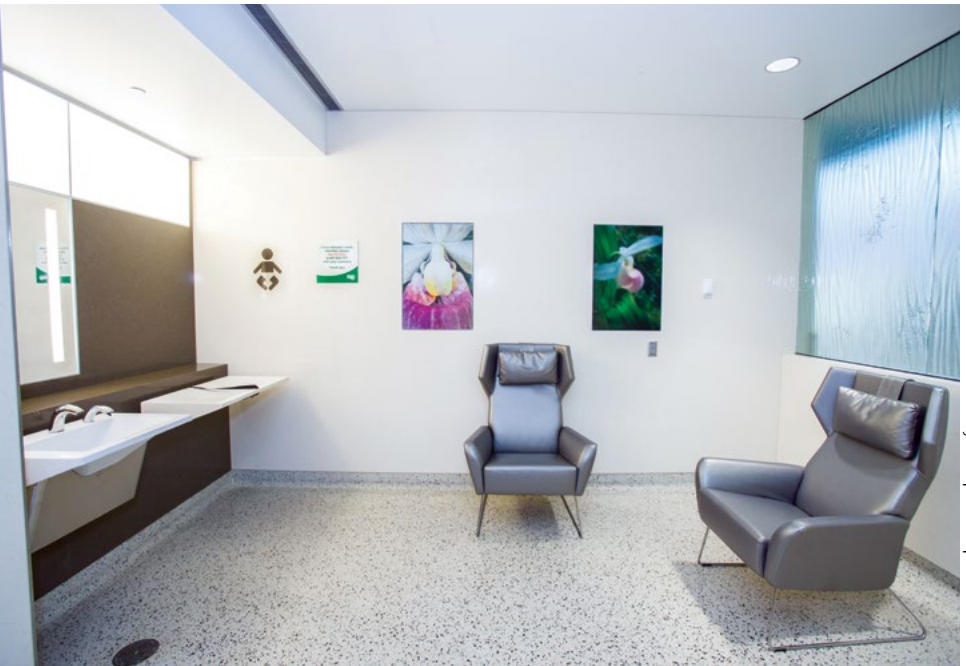


Photo courtesy Metropolitan Airports Commission

restroom designs as feedback is collected from travelers and employees, maintenance and cleaning crews, and other members of the Restroom Team, such as the Travelers with Disabilities Advisory Committee. In existing facilities, restroom sets frequently are renovated one or two at a time, so the post-occupancy evaluation is an opportunity to correct inefficient layout issues, change products that are not performing as expected, and make other modifications.

In the first few iterations of the MSP prototype, the Restroom Team periodically reviewed all these aspects and made some significant changes:

- The custom stall door hardware was replaced with a more durable, easy-to-replace, off-the-shelf hardware.
- The location of the accessible stall in the prototype plan was relocated within the restroom block, netting an additional standard stall.
- A darker wall base was integrated into the monolithic quartz wall panels to hide the mop line from cleaning.

Each set of restrooms at MSP is a bit better than the last—although stained terrazzo flooring under the urinals remains an ongoing battle for MSP and for most of the other airports surveyed.

## Related ACRP Titles

*ACRP Research Report 109: Improving Terminal Design to Increase Revenue Generation Related to Customer Satisfaction*, [www.trb.org/Publications/Blurbs/170867.aspx](http://www.trb.org/Publications/Blurbs/170867.aspx)

*ACRP Research Report 175: Improving Intelligibility of Airport Terminal Public Address Systems*, [www.trb.org/Main/Blurbs/176329.aspx](http://www.trb.org/Main/Blurbs/176329.aspx)

*ACRP Impacts on Practice: Improving Customer Experience at Airport Restroom Facilities*, [www.trb.org/Main/Blurbs/175363.aspx](http://www.trb.org/Main/Blurbs/175363.aspx)

*ACRP Web Resource 2: Airport Passenger Terminal Design Library*, [www.trb.org/Main/Blurbs/176507.aspx](http://www.trb.org/Main/Blurbs/176507.aspx)

During construction of the first two prototypes at MSP, the construction management firm's foreman remarked, "These restrooms are like a Swiss watch!" Indeed they are. Many elements are thoughtfully packed into the new restrooms. Travelers feel they should be pampered a little for

the cost of their travels, often are lugging extra bags, and are running on too little time and feeling anxious or tired.

The input of the MSP Restroom Team comfortably and intuitively accommodated all the issues, desires, and requirements related to airport restrooms—as well as

helped to make a traveler's brief stop at the airport a memorable one. These small moments are vital to an airport—especially in cities or regions that have other, competing transportation options. First and last impressions do count.

## Minneapolis–Saint Paul Airport Restroom Team

Vital to the success of any restroom project, whether constructing several sets in a new concourse or in a minor renovation, is the formation of a Restroom Team. Every manager at an airport with a stake in the planning, implementation, and maintenance of the restrooms should be included. This involves representatives, as relevant, from the following groups:

- › Facilities-planning;
- › Customer service;
- › Carpentry trades;
- › Heating, ventilation, and air conditioning trades;
- › Plumbing trades;
- › Electrical trades;
- › Information systems;
- › Cleaners;
- › Airport police; and
- › Special-interest committee liaisons from such groups as Travelers with Disabilities, Arts Foundation, and others.

Consulting experts should include the following:

- › Aviation planner,
- › Architect,
- › Interior designer,
- › Wayfinding designer,
- › Customer experience consultant,
- › Mechanical engineer,
- › Electric engineer,
- › Technology systems designer, and
- › Construction manager.

A core group of these representatives should meet regularly from the project's outset to at least its conclusion. Ideally, meetings would continue after



MSP's research team addressed less-obvious traveler needs, such as pet relief areas for service animals and traveling pets. Representatives from a variety of special-interest groups can broaden the services an airport provides.

completion, as restrooms require ongoing attention regarding maintenance issues, product performance evaluation, usage monitoring, and customer complaints. In larger airports, by the time the last restroom is updated, it likely is time to start all over again on the first. Ongoing assessment also streamlines the next startup process significantly.

Airport leadership support of the Restroom Team is essential. Participants should be encouraged to expand their expertise by attending conferences, visiting other airports, and monitoring product and system innovations. Restroom Team members need to be resilient and as open to compromise as they are tenacious about their needs and goals. A good sense of humor to weather the bumps and grinds—and the inevitable bathroom jokes—doesn't hurt either.

—Jens Vange  
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