

## **ACRP Problem No. 12-07-07**

### *Public Restroom Design for Airport Terminals*

**ACRP Staff Comments:** The proposed research will likely provide more detail for terminal restroom planning than the general guidance found in ACRP Report 25: Airport Passenger Terminal Planning and Design. The budget appears to be high; suggest lowering to \$350,000.

**TRB Aviation Group Committees Comments:** AIRPORT TERMINALS AND GROUND ACCESS CMTE - We support this statement. We suggest the project focus not only on design but also on maintenance, particularly cleaning. Airport washrooms do present unique challenges related to flight schedules, security issues, dwell times, etc. and merit special attention. However, the budget seems high; we recommend \$250,000.

**Review Panel Comments:** **Recommended** — Guidance and best practices would improve airport restroom facilities and result in better customer service.

**AOC Disposition:** No funds allocated. There was a consensus that, despite available guidance and planning practices, restroom design, function, and maintenance continue to be significant issues. Mention was also made of studying the needs of service animal relief areas. There was, however, a concern that, given the current climate of political austerity, ACRP should not be directly involved in this research, but could assist ACC. It was therefore agreed that the ACC would come back at the AOC's January meeting if they needed assistance, perhaps in the form of a quick response project.

# AIRPORT COOPERATIVE RESEARCH PROGRAM PROBLEM STATEMENT



## I. PROBLEM TITLE

Public Restroom Design for Airport Terminals

## II. RESEARCH PROBLEM STATEMENT

Designers of airport public restrooms must address a combination of issues that are unique to the airport environment. Restroom facilities need to accommodate a concentration of deplaning passengers that can vary significantly depending on the number of gates served, flight schedules, load factors, flight durations, and the location of restrooms along the path of travel. Restrooms can be in continuous use for long periods of time. Passengers may be traveling with companions who need assistance. Restroom users may be burdened with luggage and outerwear. Travelers can be anxious about flying, missing a flight, or being in an unfamiliar environment.

Airport architects and planners have no industry-wide accepted standard upon which to base their designs of restroom facilities and airport operators do not have a standard against which they can evaluate their own facilities. Some airport operators and designers have developed their own restroom standards but there is little research information specific to airports available to them. The minimum number of fixtures required by most codes is not adequate to accommodate the concentration of passengers deplaning from a large aircraft or multiple aircraft at the same time. FAA and IATA terminal planning guidelines do not address restroom design issues in detail. Standard public restroom layouts do not provide sufficient space and amenities for passengers carrying luggage nor do they accommodate maintenance activity while the restroom is in use. Facilities that are difficult to maintain are less likely to be kept clean.

The result of poor restroom design can be increased maintenance cost, customer dissatisfaction, increased anxiety for the traveler, and a negative impression of the airport.

## III. OBJECTIVE

Create a uniform set of criteria for airport restroom design that can be used by airport operators and designers to provide a high level of service and satisfaction for airline passengers. Develop a methodology for calculating the number of required toilet fixtures of each type based on the number of passengers served, passenger profiles, and the dynamics of passenger movement. Develop standards for the location and spacing of restrooms. Set recommended dimensions for entry vestibules, toilet stalls, and the spacing of urinals and lavatories. Develop design recommendations that increase personal privacy and security. Establish standards for sustainable plumbing fixtures. Develop recommendations for features to facilitate maintenance activities. Establish recommendations for signs, fixtures, accessories, materials, finishes, and amenities.

## IV. RESEARCH PROPOSED

The research would include the following tasks:

- Research existing studies and current applicable standards
- Identify airports to be surveyed that include a cross-sectional representation of different types and sizes

- Conduct observational surveys of real time airport restroom usage including percentage of total passengers using restroom facilities and time spent using each fixture by passenger type.
- Develop and conduct surveys of passenger experiences, preferences and complaints.
- Develop formulas for the number of fixtures required to accommodate passengers at a specified level of service. Include factors for passenger profiles that may vary from airport to airport; e.g. percentage of male vs. female, age distribution, average flight duration, business vs. vacation travelers, number of transfer passengers, number of greeters/well-wishers per passenger.
- Use computer modeling to test formulas on hypothetical restroom layouts.
- Compile fixture calculation spreadsheets and design guidelines for airport restrooms.

## **V. ESTIMATE OF THE PROBLEM FUNDING AND RESEARCH PERIOD**

**Recommended Funding:** \$500,000

### **Research Period:**

Establish survey methodology – 1 month

Gather survey data – 1 month

Compile and analyze data - 2 months

Develop formulas and typical restroom layouts - 3 months

Create computer model and run scenarios – 1 month

Develop design guidelines and fixture calculation spreadsheets – 3 months

Review and revise draft final report – 3 months

## **VI. URGENCY AND PAYOFF POTENTIAL**

Restroom facilities are a major contributor to the passengers' satisfaction opinion of an airport. Customer satisfaction creates a competitive edge for the airlines and generates revenue for the airport. J.D. Power and Associates reported in their 2010 North America Airport Satisfaction Study that when passengers reported high levels of satisfaction with the airport, they tended to increase their retail spending. Passengers who report that they are “disappointed” with the airport only spend on average about \$14.12 during their visit. However, passengers who report being “delighted” spend an average of \$20.55 at the facility—a 45-percent jump in retail spending. On the other hand, over design of restroom facilities can result in unnecessary fixtures that take up valuable real estate and are costly to construct and maintain. Restrooms that are well designed, incorporate principles of sustainability, and are easy to maintain will promote a more efficient use airport resources.

## **VII. RELATED RESEARCH**

“Port Authority Bus Terminal – Restroom Turnover Data”

Project for Public Spaces, Inc.

March 18, 1991

“The Use of Washroom Facilities in a Theatre Complex”

D. N. Henning

National Research Council of Canada

February 1975

Restroom Usage in Selected Public Buildings and Facilities: A Comparison of Females and Males.

S. K. Rawls, Ph.D. Dissertation, Dept. of Housing, Virginia Polytechnic Institute and State University  
1988.

Guidelines for Public Terminal Toilets  
Dallas/Fort Worth International Airport  
05/04/07

LAWA Public Restroom Design Guidelines and Specifications  
Construction and Maintenance Division and Airports & Facilities Planning Division  
Updated Version July 7, 2008

#### **VIII. PERSON(S) DEVELOPING THE PROBLEM**

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#### **IX. PROCESS USED TO DEVELOP PROBLEM STATEMENT**

This problem statement is the product of an individual. I am an architect licensed in Texas with 35 years of experience designing airport terminals in the United States and overseas including projects at Ronald Reagan Washington National Airport, JFK International Airport, and LaGuardia Airport. McCarran International Airport, Dallas/Fort Worth International Airport, William P. Hobby Airport, Honolulu International Airport, and Tucson International Airport. During the course of my professional career I have observed shortcomings in existing airport restroom facilities, documented the concerns and priorities of airport operators and maintenance personnel, and reviewed studies of restroom design. Whereas airport planning guides address most every function of a terminal design, they do not address aspects of restroom design that are unique to airports.

#### **X. DATE AND SUBMITTED BY**

March 4, 2011  
Dean N. Schuerman, AIA, NCARB, LEED AP BC+D