

AIRPORT COOPERATIVE RESEARCH PROGRAM

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CRP-CD-75

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**Airport Passenger Terminal  
Planning and Design  
Spreadsheet Models**

**Quick Reference Guide**

## INTRODUCTION

The Terminal Planning Spreadsheet Models are a companion to *ACRP Report 25: Airport Passenger Terminal Planning and Design, Volume 1: Guidebook* (Guidebook). The models provide practical learning exercises, which provide users with knowledge from the industry's top planning consultants.

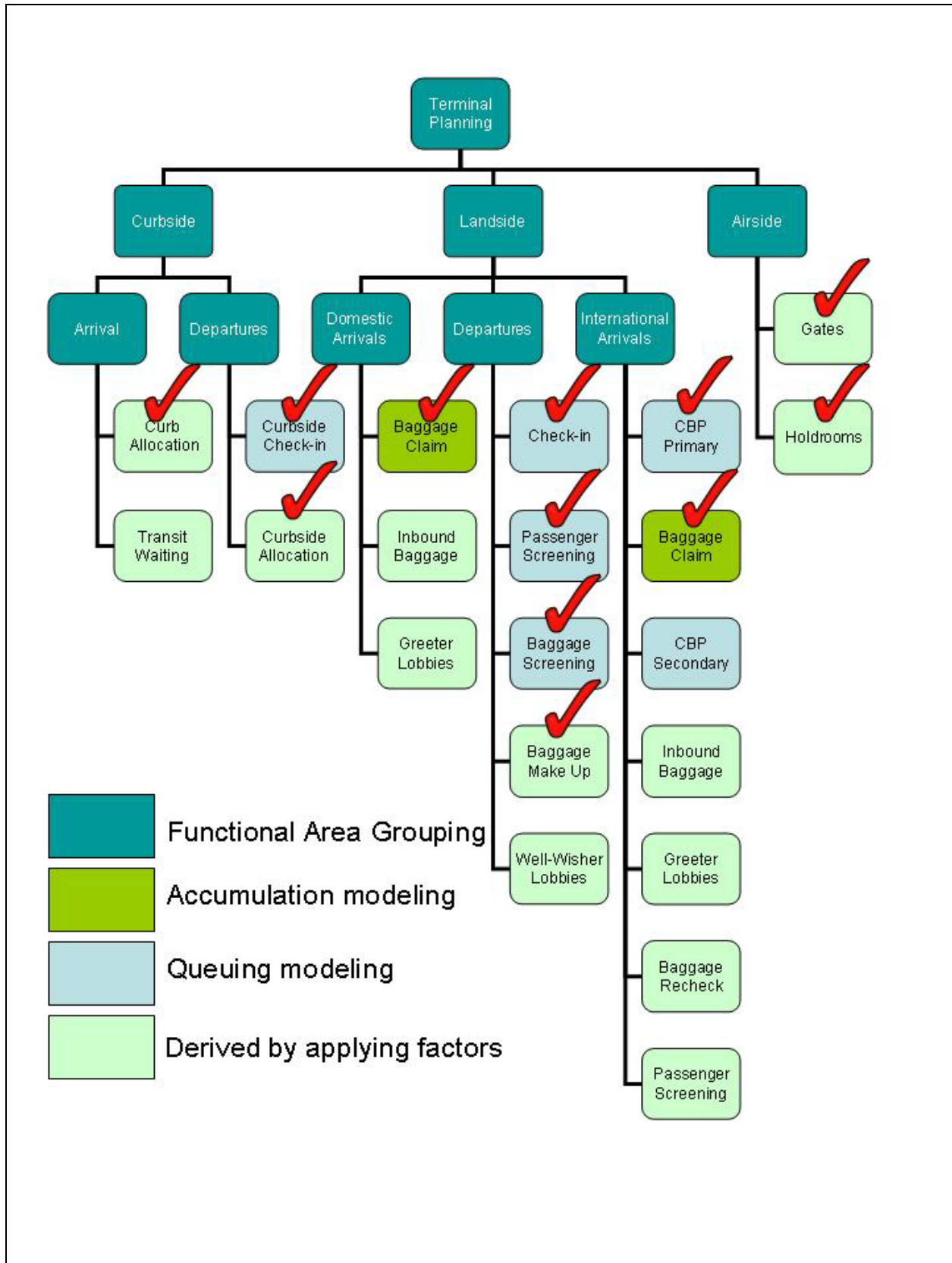
The Terminal Planning Spreadsheet Model's CD contains two primary files: the Terminal\_Planning\_Spreadsheet\_Model.xls workbook file and an electronic copy of the User's Guide. The CD also contains an installation procedure and an electronic copy of this Quick Reference Guide. The install procedure allows the user to copy the contents of the CD to a specified directory on a user's local disk drive or network. Starting work in the Terminal Planning Spreadsheet Models requires opening the Terminal\_Planning\_Spreadsheet\_Model.xls workbook file.

The Terminal Planning Spreadsheet Models require the user to enable macros in Microsoft® Excel. Enabling macros allows all of the models' features to function properly. The User's Guide also has an Excel Help section, which includes directions on how to enable macros in Excel.

The User's Guide is a reference manual that provides guidance to assist the user in the correct use of each model. While the models provide comments, diagrams, and guidance which describe the contents of various cells in each spreadsheet, the models also require decisions from the user about input values, analysis techniques, and data sources. Making these decisions provides a means to learn and understand the major issues that drive the layout and size of various airport passenger terminal facilities. All of the models have buttons (which invoke macros) that open the electronic copy to the appropriate section of the User's Guide to provide additional information and guidance. In addition, the User's Guide incorporates most of the material covered by the Guidebook. Where appropriate, the Terminal Planning Spreadsheet Models CD contains sample data sets that provide an airport-specific example for models such as the Design Hour Determination. These airport-specific examples may help the user make more informed decisions about appropriate model inputs that match their unique situations.

The User's Guide has one section for each of the main tabs in the Spreadsheet Models workbook. Each model section (tab) has information and exhibits from the Guidebook and excerpts and exhibits from the model with process explanations and commentary to help the user understand the reasoning behind the models methodology.

The models on the CD do not address every single aspect of terminal planning. Many aspects of terminal planning can be assessed by applying simple multipliers or ratios to the number of passengers or aircraft using a terminal, or by allocating a percentage of the total terminal space to a particular function. The models on the CD include those areas that require more complex analyses to support planning decisions. **Figure 1** provides an overview of the functional areas in terminal planning. Red check marks indicate the areas covered by the spreadsheet models.



**FIGURE 1 Terminal Planning Functions**

## Model Uses

The Spreadsheet Models are set up to be used as exercises with the knowledge gained from the Guidebook or with existing knowledge and supplemental information from the User’s Guide. The exercises are intended to provide understanding as to why terminal planners use certain ratios and planning factors and provide many new methodologies and not to be a “cookbook” of specific recipes. The models have been simplified to work towards the goal to enhance learning. With a strong understanding of the process and methods discussed in the Guidebook and models, users should be more prepared to develop some of their own space program components.

The process flow of the models is to gather data about an airport’s space utilization and availability, and physical components and to determine the passenger traffic design hour. The user should first use the Design Hour Determination model to estimate the demand to be used for all of the airport’s main passenger functions. With this inventory in hand and a design hour determined from real schedule data or from estimation factors, the user can go through each model exercise, starting with the Gate Demand model, following the typical path of a departing passenger and baggage through the airport, and ending with the terminating passenger retrieving his/her bags at baggage claim in the Baggage Claim model.

The spreadsheets are password protected, but the password is provided for the power users who may wish to make changes for specific needs. **THE PASSWORD IS TRBModels.** Additional help on unlocking or locking a protected workbook is provided in the Excel Help section.

## Modeling Conventions and Symbols

All of the models are formatted using a color-coded cell system (**Figure 2**). Only the white input cells are left unlocked and the blue or light green cells are locked specifically to preserve the calculations and formulae. The formulae are visible when the user places the Excel cursor on each cell.

Input Data Values	White
Calculated Values	Lt. Green
Linked or Predetermined Values	Lt. Blue

**FIGURE 2 Color Coding of Spreadsheet Cells**

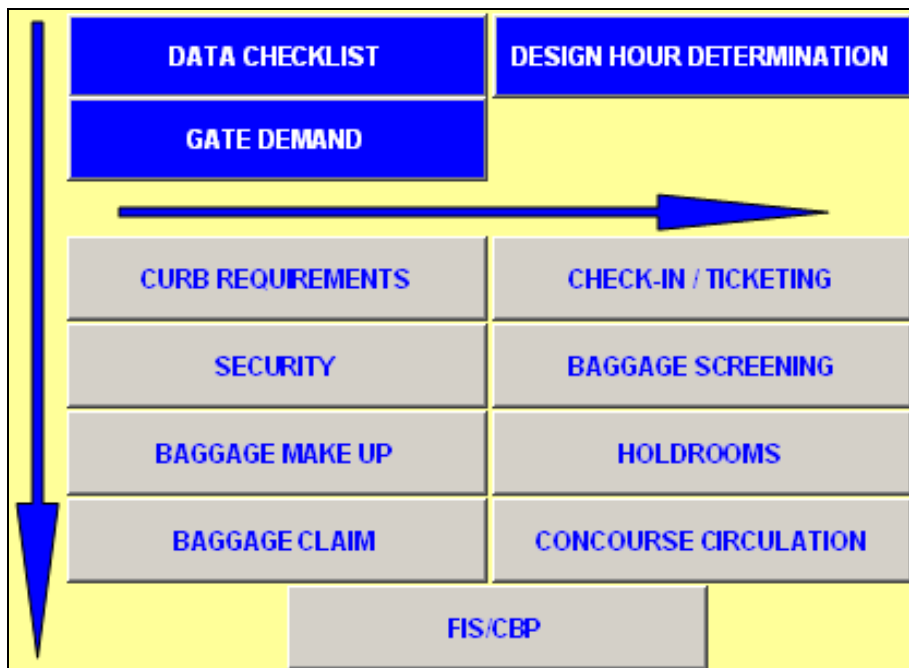
The first step after initiating the spreadsheet models workbook is to review the Table of Contents (opening tab) and to make note of the color-coding format and the use of cell comments noted with a red triangle in the upper right corner of the associated cell. These comments will give suggestions, possible input ranges, and explanations to the input or output cells’ connections to each other, as well as formula descriptions. They are used throughout each of the individual models to be a quick reference in better understanding each step within the models’ process.

The models contain some conditional formatting that may prompt the user to enter a different value, one that is more in line with a typical range of values, or to change the input format to match what a calculation in the model needs to work properly.

As described previously, macros facilitate the navigation through the Spreadsheet Models as a complete set of individual models. In addition, macros used within certain model tabs provide a way to minimize some repetitive work for the user and also performs some larger tasks much faster. Those users that wish to see what the macros are doing behind the scenes can check the Visual Basic (VBA) code that is stored within the spreadsheet by pressing the Alt key and the F11 key together to launch the Microsoft VBA program. The code is not very high level and should be easily understood by those with a moderate beginner’s level of proficiency.

Each workbook tab has a link to the User’s Guide and to return back to the Table of Contents tab. As there are many tabs in this model, and they may not all fit on the bottom of the screen depending on the size of the user’s computer monitor size, the “Return to Table of Contents” tabs makes it simple to get back to main page and follow the flow through each of the models.

The overall modeling approach is to review the data checklist, determine the design hour, and then step through each of the models while referring to the User’s Guide for additional help and information related to each of the specific areas of terminal planning. It is recommended that the user proceed in the order illustrated in **Figure 3**. This order will allow for demand values determined in the initial steps to flow into dependant calculations in later steps.



**FIGURE 3 Table of Contents Control Buttons**

## Model Sections (Tabs)

- **Design Hour Determination** - This model takes the user from data sourcing and collection through determining the peak month, choosing the average day of the peak month, and finally determining the design hour and the associated peak planning factors.
- **Gate Demand** - This model lets the user estimate future gate demand through two common approaches. The user verifies the current gate mix and determines the Narrowbody Gate Equivalent (NBEG) and Equivalent Aircraft (EQA) through the use of gate equivalency tables.
- **Curb Requirements** - This model estimates the length of terminal curb frontage required for arrival and departure curbs for private cars and various types of public vehicles.
- **Check-in/Ticketing** - This model allows the user to select the number of check-in positions among the Counter, Kiosk, and Curbside areas and adjust the processing conditions to see the effect on the processing time and required space. Mini-queue models are included to show delays and delayed passenger counts.
- **Baggage Screening** - This model helps to determine the Transportation Security Administration (TSA) Surge hourly rate of outbound baggage and estimates the required number of Explosive Detection System (EDS) and Explosive Trace Detection (ETD) units, as well as the basic spatial requirements for operation and handling.
- **Baggage Make-up** - This model estimates the make-up space required to adequately stage and prepare outbound baggage for delivery to the aircraft.
- **Security Screening** - This model determines the necessary number of TSA passenger screening lanes and space required for TSA screening operations. The model includes a mini-queue model to see the effect of processing and queuing variances on the passenger delay and unit requirements.
- **Holdrooms** - This model looks at a single holdroom and allows the user to adjust certain usage parameters to determine the current level of service (LOS) or estimate the necessary holdroom conditions to achieve a desired level of service.
- **Baggage Claim** - This model determines the necessary overall claim frontage that is necessary based on the user-defined peak period demand. The user can then size an individual claim unit and determine how many units are required for their unique aircraft fleet mix.
- **FIS/CBP** - This model provides the user with Customs and Border Protection (CBP) standards in the main functional areas of passenger processing by Federal Inspection Services (FIS). A mini-queue model helps the user determine the required number of primary processing stations and size the baggage claim frontage based on the design hour international demand.
- **Circulation** - This model allows the user to describe a single concourse design and determine the necessary circulation width (including space for moving walkways), the suggested concourse length, and total circulation area within the concourse.