



ENHANCED MODEL v2.0

USER'S GUIDE

SIMULATION MODEL OF PANAMA CANAL VESSEL TRANSITS

February, 2005

Revision 1

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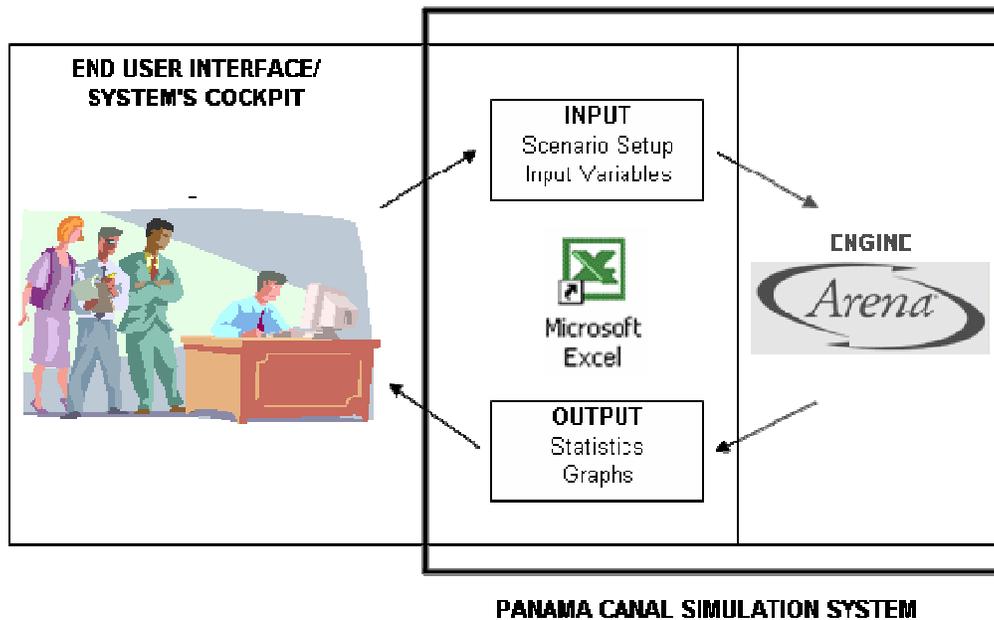
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1 Introduction

This document aims at describing how to enter data to the simulation model of the Panama Canal vessel transits and how to access the correspondent outputs generated.

2 Simulation System Concept

The simulation system design can be represented in the following diagram:



Through an excel spreadsheet the user inputs all the parameters necessary to run the model. The parameters are read by the model, which runs and exports the outputs to access database files and to the excel interface.

2.1.1 Software requirements

Operational System

Windows 98/Windows 2000/Windows XP
Regional settings adjust to English (USA)

ARENA 8.01 or above

Runs on the Windows certified platform mentioned above.

Ms Office

Despite of the fact that the RPS indicates that the Canal Simulator shall integrate with the MS Office 2000, we seriously recommend upgrades for MS Office XP edition, due to several VBA improvements. Nevertheless, the interface shall be able to communicate with MS Office 2000.

2.1.2 Hardware requirements

The minimum hardware requirements for acceptable performance of the model must be no greater than a Pentium III or equivalent running at 800 MHz with 128 Mb of RAM and 30 Mb of hard disk space.

Performance will depend on the computer design and also on the graphics board, but our team estimates that the desired speed of 5 (five) minutes to complete one day of simulation run of the Canal vessel transits will be accomplished easily using the batch run mode (no animation).

Hardware recommended by Rockwell/Paragon: Pentium IV, 2.4 Ghz or above, with at least 256 Mb RAM.

2.1.3 Installation

In order to install all correct files, user must access project CD, and RUN SETUP.EXE, activating the following screen :



Available Options (by clicking on the left menu)

A) Panama Canal Project Documentation

All necessary documents are attached, for direct access by double-clicking the file on the white board listings.

B) Install ARENA 8.01

Will start ARENA's setup, installing it locally. Please refer to ARENA installation manual.

C) Install Adobe Acrobat

Add-in for documentation viewing. Will start Adobe's setup.

D) Install ODBC

If User's PC has no ODBC pre-installed, it can be added here, starting Microsoft's Setup.exe

E) Install Project Files

Will copy all necessary files to User's PC, at C:\Simulation\Enhanced_Model folder. No icons will be created.

2.1.4 Comments about ODBC

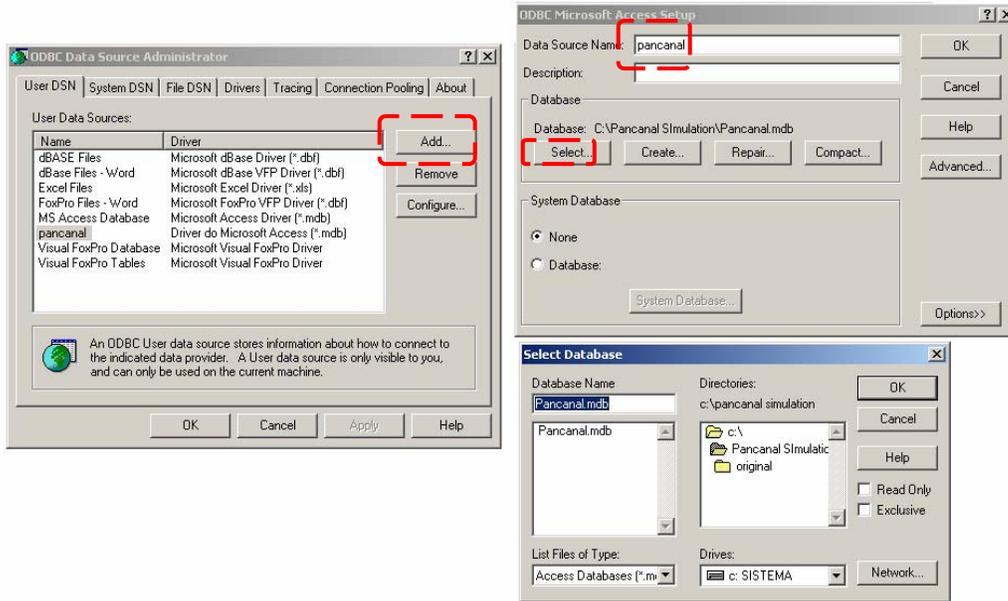
After ODBC is installed properly, database connection must be established manually, between the Simulation Model Database and Arena Simulation System.

Access <Control Panel>, <Administrative Tools> and <Data Sources ODBC>, as below:



1. Click on ADD;
2. Select a Microsoft Access Connection;
3. Type PANCANAL as name for this connection;
4. SELECT Database named PANCANAL.MDB (access file) in the folder where simulation files were placed;
5. Click OK.

Please, note that if you change files folder later, this connection to the database must be updated to the new folder.



2.1.5 System Files and Directories

The Simulation System requires that all files shall be kept in the same directory, in order to maintain relationship between them and produce results.

In order to create a new scenario, USERS shall copy the entire directory to a new directory, and renaming it, since the SCENARIO field will be used as prefix name. All files must remain with the existing names.

See directory contents on next page.

File Name	Type	Description
Scenario_PNMX.xls	Excel	User Interface loaded with Panamax data
Scenario_PPNMX.xls	Excel	User Interface loaded with Post-Panamax data
Pancanal_batch.doe	Arena	Simulation Model – batch mode
Pancanal_anima.doe	Arena	Simulation Model – animation mode
Res.tpo	Arena	Animation support file – template
Data.wks	Excel	Input data exported from the User Interface
Locks_failures.wks	Excel	Input data referred to outages exported from the User Interface
Discrete_NB.txt	Text	Input data referred to discrete arrivals exported from the User Interface
Discrete_SB.txt	Text	Input data referred to discrete arrivals exported from the User Interface
Schedule.txt	Text	Input data exported from the Pre-scheduler
bucketscount.txt	Text	Input data exported from the Pre-scheduler
Pancanal.mdb	Access	Output data from ARENA
Logfile.mdb	Access	Output data from ARENA
Schedule.xls	Excel	Scheduler
Pancanal_PNMX.doe	Arena	Simulation source code with Panamax data
Pancanal_PPNMX.doe	Arena	Simulation source code with Post Panamax data

3 Enhanced Model Interface

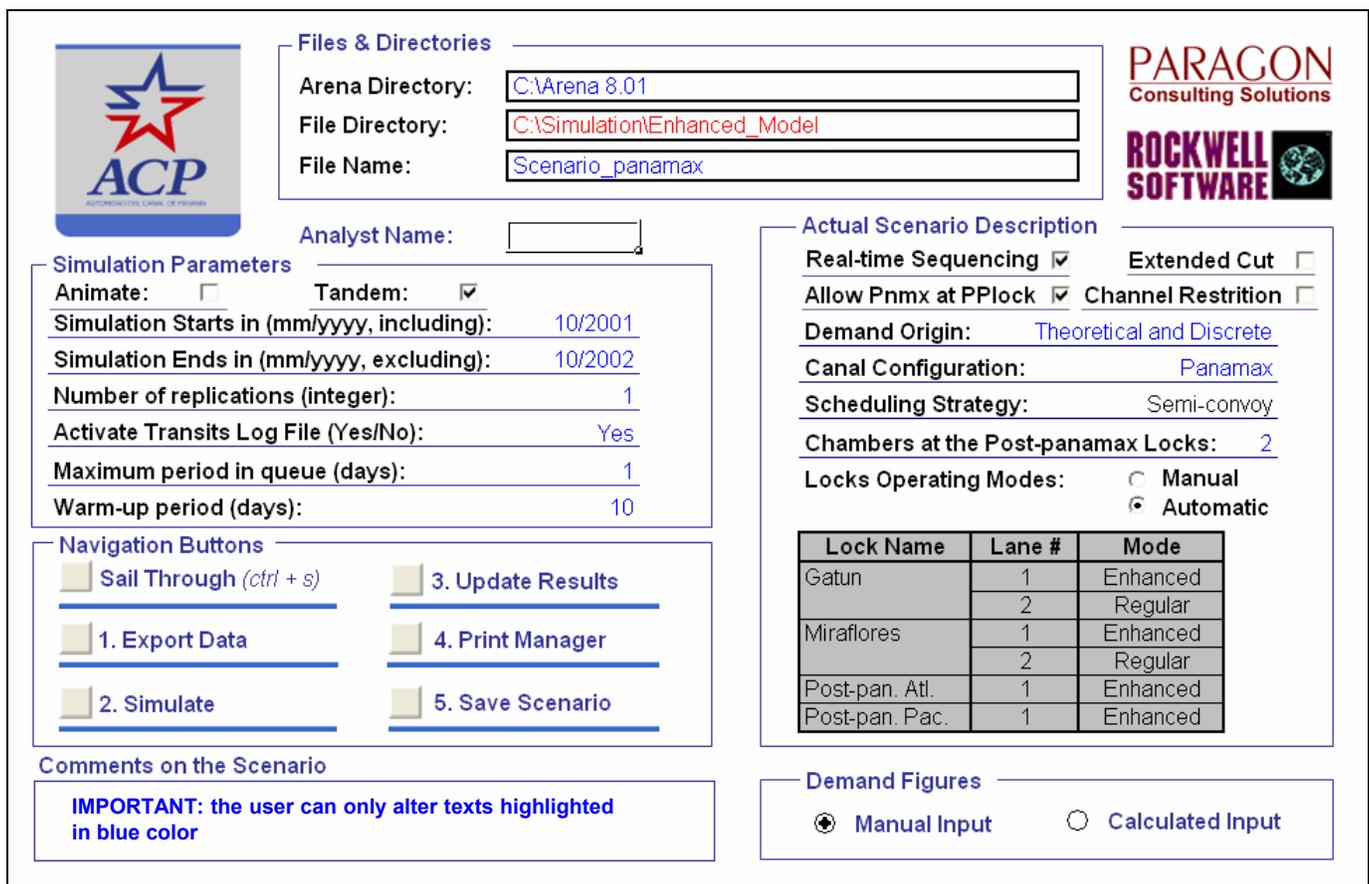
The Excel Interface file, named Scenario*.xls is the link between the ACP Analysts and the Arena Model Simulation of the Panama Canal Vessel Transits.

Through the interface, the user will be able to modify the model behavior (causes) as well as view the scenario performance key indicators.

Through this Interface, the analyst will be able to manage all input data necessary to run the model, set different parameters to run Arena, run the model and read the results of each scenario created.

3.1 Main Menu

Through the Main Menu screen, the user will be able to access all the input, output screens and other system modules to properly configure input parameters.





Files & Directories

Arena Directory:

File Directory:

File Name:




Analyst Name:

Simulation Parameters

Animate: Tandem:

Simulation Starts in (mm/yyyy, including):

Simulation Ends in (mm/yyyy, excluding):

Number of replications (integer):

Activate Transits Log File (Yes/No):

Maximum period in queue (days):

Warm-up period (days):

Navigation Buttons

Sail Through (ctrl + s)

3. Update Results

1. Export Data

4. Print Manager

2. Simulate

5. Save Scenario

Actual Scenario Description

Real-time Sequencing Extended Cut

Allow Pnmx at PPIlock Channel Restriction

Demand Origin:

Canal Configuration:

Scheduling Strategy:

Chambers at the Post-panamax Locks:

Locks Operating Modes: Manual Automatic

Lock Name	Lane #	Mode
Gatun	1	Enhanced
	2	Regular
Miraflores	1	Enhanced
	2	Regular
Post-pan. Atl.	1	Enhanced
Post-pan. Pac.	1	Enhanced

Demand Figures

Manual Input Calculated Input

Comments on the Scenario

IMPORTANT: the user can only alter texts highlighted in blue color

CTRL + m: back to Main Menu.
CTRL + i: activate Sail Through – Input Mode

CTRL + s: activate Sail Through
CTRL + o: activate Sail Through – Output Mode

3.1.1 Scenario Name & Directories

Follows a description of fields through which the user determines the Scenario name, respective data files and Arena Software directories.

3.1.1.1 Arena Directory

The correct path of current Arena’s Version is required to activate the model. Please, review if ARENA was installed using the default path, which is usually C:\Program Files\Rockwell Software\Arena 8.01\).

Without correct path, simulation model will not run.

Note that the path should have the character “\” in the end.

3.1.1.2 File Directory

Please, make sure that the file directory is inserted and corresponds to where all files were placed. The model will not automatically detect it.

Note that the path should have the character “\” in the end.

3.1.1.3 File Name

This is the scenario name and the interface file name once you save it. In the example below, the interface will receive the file name Scenario_panamax.xls.

3.1.1.4 Analyst Name

It is meant to identify the person who set-up the scenario saved under the name given.

Files & Directories

Arena Directory:	<input type="text" value="C:\Arena 8.01"/>
File Directory:	<input type="text" value="C:\Simulation\Enhanced_Model"/>
File Name:	<input type="text" value="Scenario_panamax"/>
Analyst Name:	<input type="text"/>

3.1.2 Simulation Parameters

Simulation Parameters	
Animate:	<input type="checkbox"/>
Tandem:	<input checked="" type="checkbox"/>
Simulation Starts in (mm/yyyy, including):	10/2001
Simulation Ends in (mm/yyyy, excluding):	10/2002
Number of replications (integer):	1
Activate Transits Log File (Yes/No):	Yes
Maximum period in queue (days):	1
Warm-up period (days):	10
Navigation Buttons	
<input type="checkbox"/> Sail Through (<i>ctrl + s</i>)	<input type="checkbox"/> 3. Update Results
<input type="checkbox"/> 1. Export Data	<input type="checkbox"/> 4. Print Manager
<input type="checkbox"/> 2. Simulate	<input type="checkbox"/> 5. Save Scenario

The simulation parameters basically refer to the run set-up parameters as per defined in the Run-set-up Arena screen, which, in this model, should be set through the user interface.

3.1.2.1 Animate

If this box is checked, the Schematic animation will be turned-on once you click on the Simulation button.

3.1.2.2 Tandem

If checked, vessels will tandem whenever possible.

3.1.2.3 Starting and Ending Dates

Through these fields, the user specifies the simulation starting and end month and year. Make sure simulation always starts in October, which is considered the first month of the Fiscal Year. The model outputs will not be consistent in case this rule is not respected.

3.1.2.4 Number of Replications

Amount of consecutive simulation runs for statistical analysis of the results. Rockwell/Paragon experience with the model indicates that no more than 10 (ten) replications are needed to obtain accurate results. It must be an integer number.

3.1.2.5 Activate Transits Log File

The user can activate generation of LOGFILE.MDB file, which records all vessels transit statistics, ships generation and queue data. If these files are accessed through the interface, no more than 65.000 (sixty five thousand) registers can be seen on the screen, which corresponds to a simulation of approximately 10 (ten) years and 1 (one) replication. That is due to the maximum number of lines allowed by Excel spreadsheets. If necessary, the user can read the full logs by accessing the same files straight from the database.

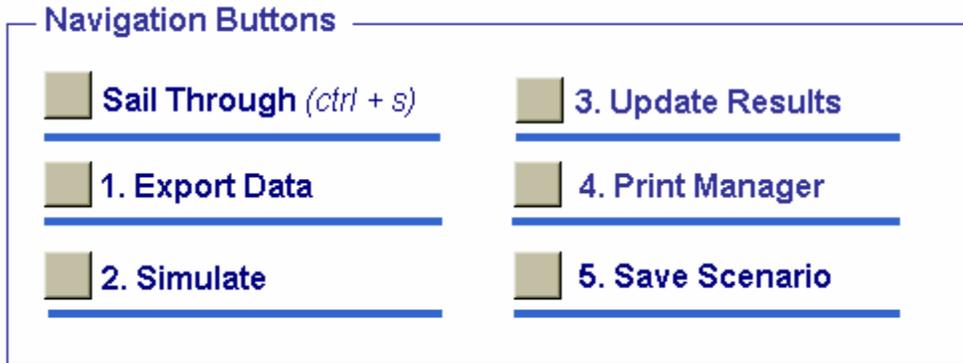
3.1.2.6 Maximum Period in Queue (at the Outer Anchorages)

The user may establishes the time in days after which non-booked vessels receive priority for entering the Canal based on their arrival time.

3.1.2.7 Warm-up Period

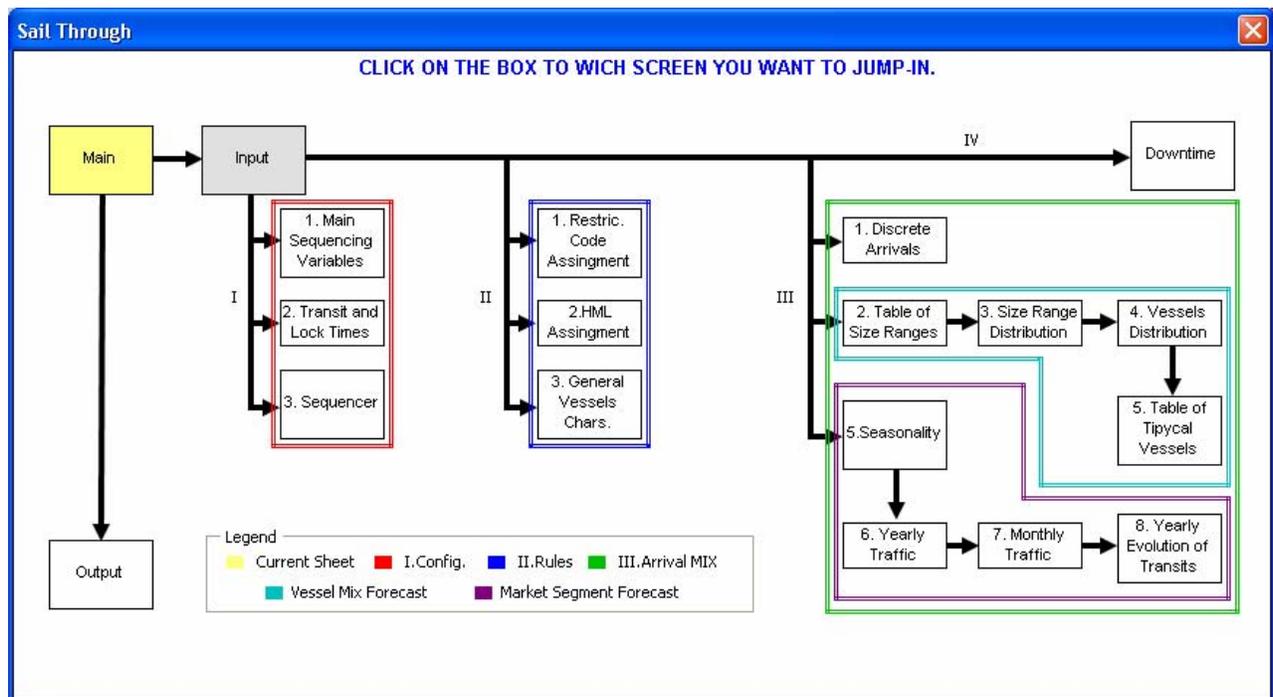
It must be a real number between 1 (one) and 20 (twenty) days. Rockwell/Paragon recommends the model should be run with a warm-up period of 10 (ten) days.

3.1.3 Navigation Buttons



3.1.3.1 Sail Through

It is the preferred way to navigate though all features of the interface. Provides the user quick and easy access to all input and output screens.

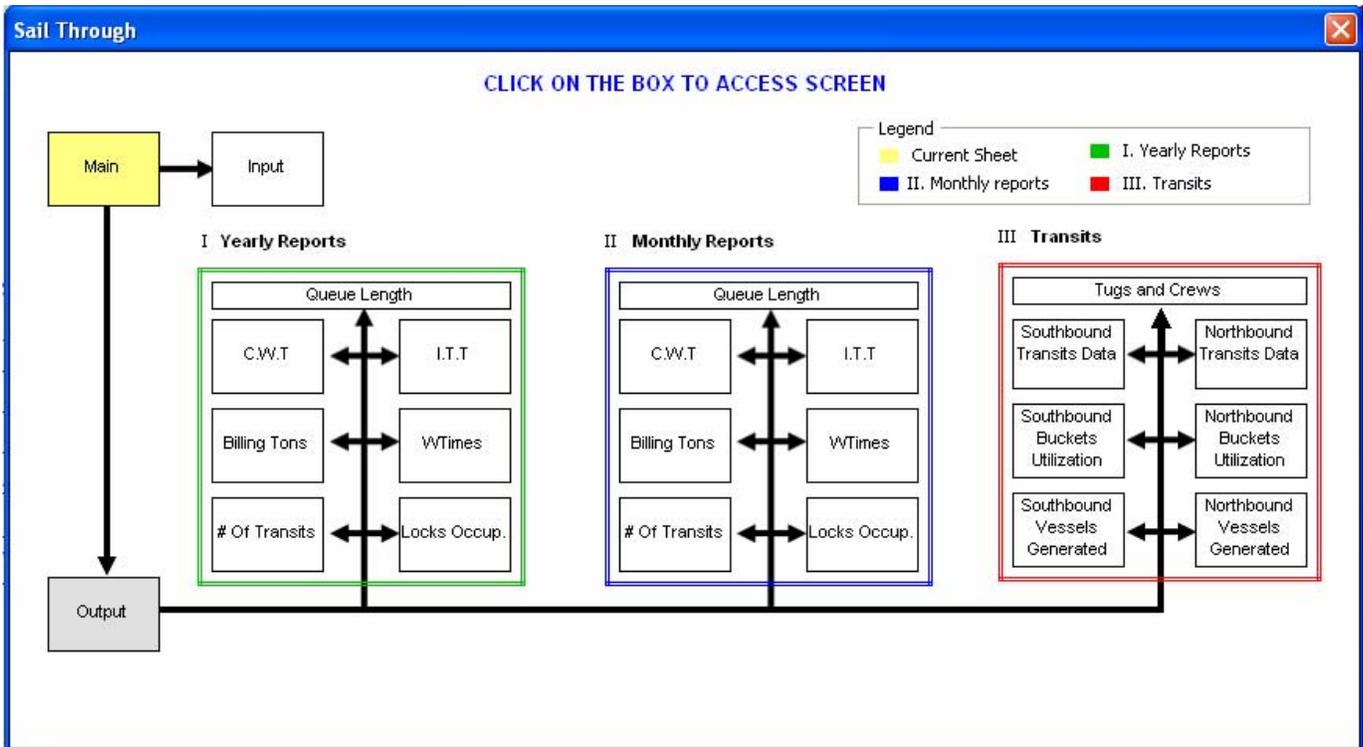


Input screens main sections:

- I – Scenario Configuration;
- II – Rules or Operational Identifiers;
- III – Arrival Mix, which are split into Vessel Mix Forecast and Market Segment Forecast;

IV – Downtimes.
Output screens main sections:

- I – Yearly Reports;
- II – Monthly Reports;
- III –Transits Data



3.1.3.2 Export Data

Used for exporting all input data to the ARENA Simulation Models.

3.1.3.3 Simulate

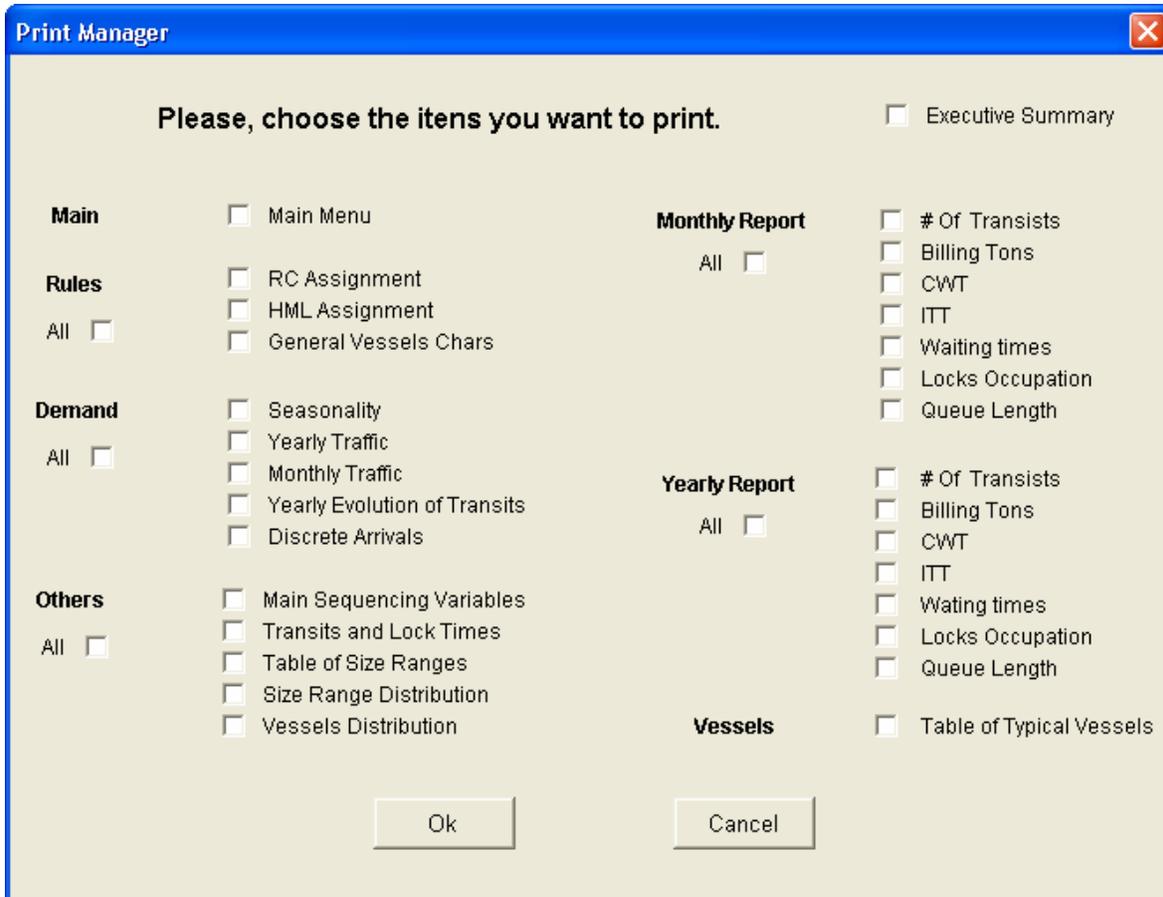
Activate ARENA Software and loads the model (animated or not). After ARENA is loaded, the user may need to activate the Run toolbar on ARENA.

3.1.3.4 Update Results

After the simulation ends, the user shall return to Excel and update the output screens.

3.1.3.5 Print Manager

The Print Manager button brings up the following screen:



Through this menu, the user will be able to specify which screens to print. In case only an Executive Summary is desired, the following screens can be printed:

- Input Screens:
 - o Main Menu;
 - o Yearly Traffic;
 - o Monthly Traffic.

- Output Screens (yearly reports):
 - o # of Transits;
 - o Billing Tons;
 - o CWT;
 - o ITT;
 - o Locks Occupation.
 - o Queue Length

Be aware that the table of typical vessels has about 6,500 lines, which would require more than 200 (two hundred) pages of printout.

3.1.3.6 Save Scenario

Pressing this button, saves the scenario with the specified name given on the File Name field and in the specified directory.

It is recommended to save the model:

- a) After modifying data before simulation;
- b) After simulation and updating results.

Please, keep in mind that if a scenario was saved after simulation and no update results were used; the scenario will have blanks or previous results.

3.1.4 Scenario Description

In this section, the user is required to configure the main scenario parameters, which will be kept fixed throughout the whole simulation run.

Actual Scenario Description

Real-time Sequencing Extended Cut
 Allow Pnmx at PPIock Channel Restriction
 Demand Origin: [Theoretical and Discrete](#)
 Canal Configuration: [Panamax](#)
 Scheduling Strategy: [Semi-convoy](#)
 Chambers at the Post-panamax Locks: [2](#)
 Locks Operating Modes: Manual
 Automatic

Lock Name	Lane #	Mode
Gatun	1	Enhanced
	2	Regular
Miraflores	1	Enhanced
	2	Regular
Post-pan. Atl.	1	Enhanced
Post-pan. Pac.	1	Enhanced

A scenario is defined based on a combination of the following parameters:

Parameter	Configuration	Internal Index
Canal Configuration	Panamax	1
	PósPanamax	2
Scheduling Strategy	Semi-convoy	1
	Convoy	2
Fog	Foggy	1
	Not Foggy	2
Panamax Locks Operating Mode	All-Regular	1
	All-Enhanced	2
	L1-Enh_L2-Reg	3
Sunrise & Sunset Sets	Sands-Set1	1
	Sands-Set2	2
	Sands-Set3	3
NB & SB Upper Bound Queue Lengths	Short-Short	1
	Short-Medium	2
	Short-Long	3
	Medium-Short	4
	Medium-Medium	5
	Medium-Long	6
	Long-Short	7
	Long-Medium	8
	Long-Long	9
Post-panamax Locks Operating Mode	All-Regular	1
	All-Enhanced	2
# or Chambers at the Post-panamax Locks	2-chambers	1
	3-chambers	2
Total number of Scenarios:		2592

For further details concerning how a scenario is composed and determined on a daily basis during a simulation run, please refer to the Pre-sequencing section in the User’s Manual.

3.1.4.1 Real Time Sequencing Option

If checked, allows vessels to be scheduled on the same day of their arrival if there are buckets available. It is not a parameter considered by the Pre-sequencer for generating the timetables.

3.1.4.2 Panamax Vessels at Post-panamax Locks Option (Allow Pnmx at PPLock)

Though this feature has not been specified by the ACP, if checked, allows Panamax vessels to utilize Post-panamax locks. It is not a parameter considered by the Pre-sequencer for generating the timetables.

3.1.4.3 Extended Cut Option

With the Extended Cut option activated, Post-panamax vessels will not be able to meet other Post-panamax vessels in these channels. It is not a parameter considered by the Pre-sequencer for generating the timetables.

3.1.4.4 Channel Restriction Option

If checked, those vessels assigned PCCHDL and PDLCC restriction codes through the Restriction Code Assignment Table will not be allowed to face opposing traffic at the Saltwater to Access Channels and at the Galliard Cut extension. If not, they will respectively behave as PCCDL and PDLCC vessels. It is not a parameter considered by the Pre-sequencer for generating the timetables.

3.1.4.5 Demand Origin

Even though it is not considered as a scenario component, as described above, the user is required to set how the demand values in this section are to be loaded, whether it is based on discrete arrivals or on theoretical distributions.

If Discrete Only option is selected, Seasonality, Yearly Traffic, Monthly Traffic and Yearly Evolution of Transits screens will be inaccessible and the model will only generate discrete arrivals.

It is not a parameter considered by the Pre-sequencer for generating the timetables.

3.1.4.6 Canal configuration

Though this field the user must define whether she wants to run a Panamax or a Post-panamax scenario. If a Post-panamax scenario is chosen, the Post-panamax locks will be turned-on. Note that if a Post-panamax scenario is to be simulated, the user must additionally update the following input data accordingly:

- Restriction Code Assignments;
- HML Assignments;
- General Vessel Characteristics;
- Vessel Arrival Mix (vessel and market segment forecast).

3.1.4.7 Scheduling Strategy

At this time, as per specified, only semi-convoy option can be simulated by the system.

3.1.4.8 # of Chambers at the Post-Panamax Locks

The system allows the user to set whether there will be 2 (two) or 3 (three) chambers in the post-Panamax locks. In case of a Panamax Canal simulation, this parameter shall be disregarded.

3.1.4.9 Locks operating modes

The user can specify whether the model will run throughout the whole simulation length in the manual mode or on the automatic mode.

In case the option is manual, the user must specify the operating modes for the locks, otherwise the model will specify the operating modes depending on the length of restricted vessels queues in the Pacific and Atlantic Anchorages.

Locks Operating Modes: **Manual**
 Automatic

Lock Name	Lane #	Mode
Gatun	1	Enhanced
	2	Regular
Miraflores	1	Enhanced
	2	Regular
Post-pan. Atl.	1	Enhanced
Post-pan. Pac.	1	Enhanced

3.1.4.10 Enhanced/Regular

Locks Operating Modes: **Manual**
 Automatic

Lock Name	Lane #	Mode
Gatun	1	Enhanced
	2	Enhanced
Miraflores	1	Enhanced
	2	Enhanced
Post-pan. Atl.	1	Enhanced
Post-pan. Pac.	1	Enhanced

If the user decides to operate the locks in the manual mode throughout the whole simulation run, then the following options for the Panamax Locks can be used:

- All lanes in Regular Mode (All-Regular);
- All lanes in Enhanced Mode (All-Enhanced);
- Lane 1 Enhanced and Lane 2 Regular (L1-Enh_L2-Reg).

Miraflores Locks operating mode is set as being always equal to the Gatun Locks operating mode.

Post-panamax Pacific Locks also operate in the same way the Post-panamax Atlantic Locks are set, which can be either:

- Enhanced or
- Regular.

Note that the Post-Panamax Locks operates with a single lane.

3.1.5 Comments

Relevant comments made by the analyst can be written in the space indicated below:

Comments on the Scenario

3.1.6 Demand Figures

Used for determining how the user wants to enter theoretical distributions.

They refer to the way the monthly number of transits and the yearly evolution of transits are inserted (whether being calculated by the interface or by the user).

Demand Figures

Manual Input

 Calculated Input

3.1.6.1 Manual Input

If the Manual Input option is chosen, the user has to calculate both the Monthly Number of Transits per Market Segment and direction for the first year, as well as the yearly increase of traffic (Yearly Evolution of Transits) up to 25 (twenty five) years. In this case, the Seasonality and the Yearly Traffic screens are disabled and disregarded.

3.1.6.2 Calculated Input

If the analyst wants to have the number of monthly transits per Market Segment and direction calculated, as well as yearly evolution of transits based on forecast breakdown, she should select the Calculated Input option.

By doing so, the user has to input, in the Market Segment Forecast section of the Interface:

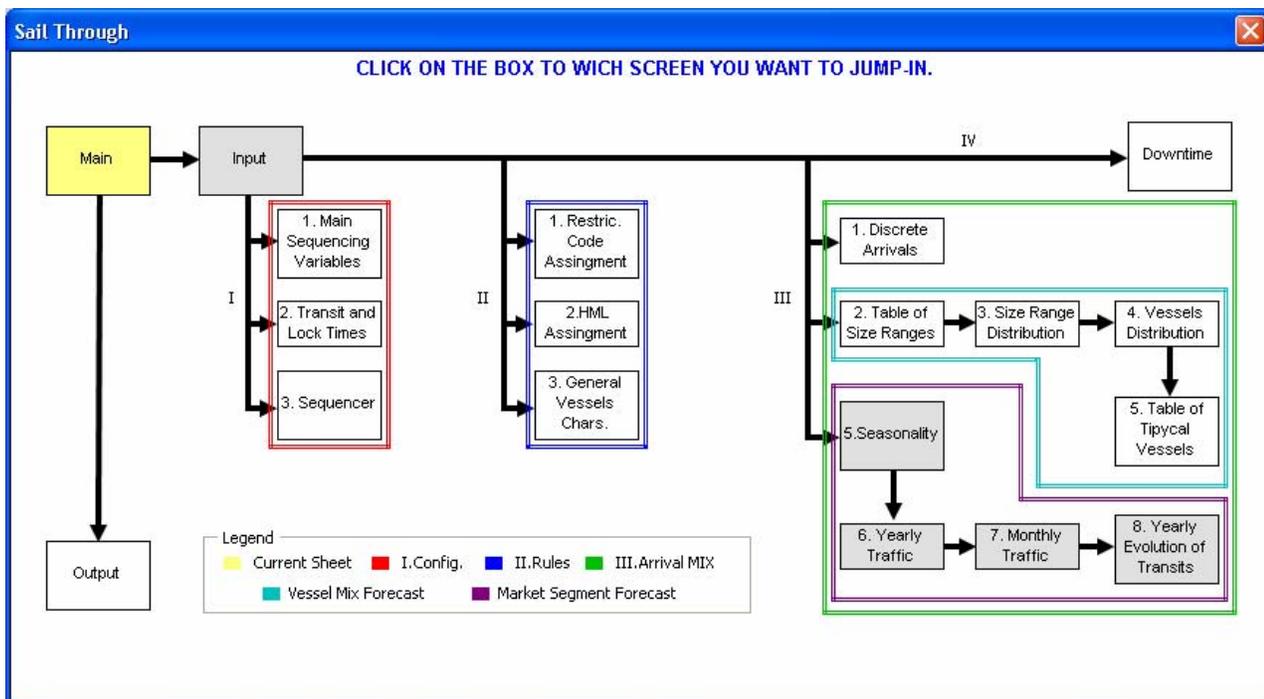
- Through the Seasonality Screen: monthly seasonality per direction and Market Segment;
- Through the Yearly Traffic: total number of transits per year and the respective share per Market Segment as well as the percentage of traffic that flows on each direction.

3.2 Data Input

Data input are the heart of this simulation model. The quality of the input data will dramatically impact the simulation results. If low quality data is used, low quality outputs will be generated.

The user should follow the input data hierarchy indicated in the Sail Through screen-illustrated below in order to properly enter the data necessary to run the model. Apart from that, tug requirement parameters should be input straight into the mode, as per described on item xxx of this guide.

Press CTRL + “i” for fast access to the inputs or go to the Sail Through from the Main Menu and then click on the input box.



Basically, the following steps should be considered, when entering the data:

I – Configuring Sequencing Variables:

- Main sequencing variables;
- Transit and Lockage Times;
- Run the Sequencer.

II – Rules setup (Operational Identifiers)

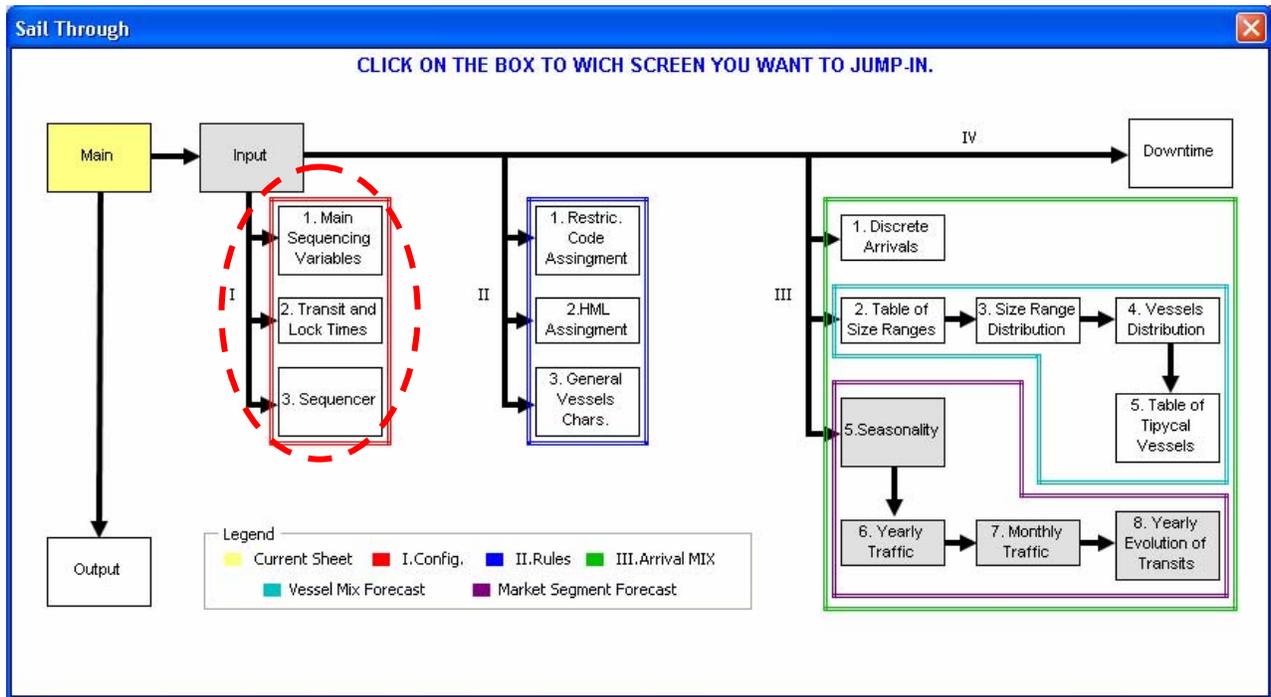
- Restriction Code Assignment;
- HML Assignment;
- General Vessel Characteristics.

III – Demand Input (Arrival Mix)

- Discrete Arrivals;
- Vessel Mix Forecast;
- Market Segment Forecast.

IV – Downtimes

3.2.1 Configuring Main Sequencing Variables



On this screen, the user specifies the sunrise and sunset times, the fog probability and the booking slots, and the Time Boundaries necessary to run the Sequencer.

These data are also exported to the model.



Main Sequencing Variables

(restricted area)

Sail Through

Main




Sunrise And Sunset Times

Month	Sunrise	Sunset
Jan	6:30	18:00
Feb	6:30	18:00
Mar	6:15	18:30
Apr	6:15	18:30
May	6:00	19:00
Jun	6:00	19:00
Jul	6:00	19:00
Aug	6:00	19:00
Sep	6:15	18:30
Oct	6:15	18:30
Nov	6:30	18:00
Dec	6:30	18:00

Fog Probability

Month	Prob
Jan	6.5%
Feb	1.5%
Mar	2.4%
Apr	6.7%
May	18.3%
Jun	28.6%
Jul	16.9%
Aug	21.5%
Sep	38.1%
Oct	48.7%
Nov	31.9%
Dec	13.4%

of Booking Slots Beam Limit: **91**

Operation	Direction	< 91	≥ 91
Regular	Northbound	5	3
	Southbound	5	3
Outage	Northbound	5	3
	Southbound	6	3

Time Boundaries

Note that only text highlighted in blue can be changed.

January sunrise and sunset times specifies sunrise and sunset set #1, which is copied into February, November and December months. The March sunrise and sunset (set #2) is copied into April, September and October and the May sunrise and sunset (set #3) into June, July and August.



Main Sequencing Variables (restricted area)

Sail Through

Main




[Back](#)

Canal Pattern >	Panamax	Panamax	Panamax	Panamax	P-panamax	P-panamax	P-panamax	P-panamax
Canal Cross. Strat. >	Semi-convoy	Semi-convoy	Convoy	Convoy	Semi-convoy	Semi-convoy	Convoy	Convoy
Fog >	Not foggy	Foggy	Not foggy	Foggy	Not foggy	Foggy	Not foggy	Foggy
Latest Miraflores Locks Turnaround Tim			2:30	2:30			2:30	2:30
Latest Gaillard Cut Turnaround Time	13:00	13:00			14:00	14:00		
Latest GT Locks Turnaround Time	13:00	13:00	1:30	1:30	16:30	16:30	1:30	1:30
Latest PP Pac Locks Turnaround Time							2:30	2:30
Latest PP Atl Locks Turnaround Time					4:00	4:00	2:00	2:00
Time Allow 1st NB Restricted at MF	3:20	3:20	3:20	3:20	3:20	3:20	3:20	3:20
Time Allow 1st SB Restricted at GT	4:00	4:00	4:00	4:00	4:00	4:00	4:00	4:00
Time Allow 1st NB Restricted at PP Pac					3:20	3:20	3:20	3:20
Time Allow 1st SB Restricted at PP Atl					4:00	4:00	4:00	4:00
Latest Time last SB must clear PM Lock	2:00	0:00	2:00	0:00	2:00	0:00	2:00	0:00
Latest Time last NB must pass Gamboa	2:00	0:00	2:00	0:00	2:00	0:00	2:00	0:00
CUT Opening Time during Fog	0:00	7:45	0:00	7:45	0:00	7:45	0:00	7:45

Time boundaries are aligned to the Restriction Codes meaning and used for cutting the flow of vessels depending on their restriction and on other scenario parameters.

3.2.2 Transit and Lockage Times

On the following screen, the user can setup transit and lockage times for vessels heading south and north. The beam and draft limits are exported to Arena, but she must copy the cells with white background into Arena. The message boxes that appear after clicking any of the copy buttons will guide the user to the correct place to paste each of the data columns into the Arena model.

The cells with yellow background are averages used by the Pre-sequencer to generate timetables.

Transit Times

(restricted area)

Sail Through
 Main

>>

Northbound

	Beam		Draft		Block Coef.	Pac Anch	B15	B26	MF Locks	PM Locks	Cucaracha Tie-	Chagress
	min	max	min	max		B15	B26	MF Locks	PM Locks	St2035	Chagress	B79
1	0	60	0	1000	low	TRIA(37,43,56)	TRIA(10,12,16)	TRIA(13,15,20)	TRIA(15,16,26)	TRIA(5,6,7)	TRIA(39,43,50)	TRIA(18,19,25)
2	0	60	0	1000	high	TRIA(41,48,62)	TRIA(12,14,18)	TRIA(15,18,23)	TRIA(17,18,30)	TRIA(6,6,7)	TRIA(44,47,56)	TRIA(20,21,27)
3	60	70	0	1000	low	TRIA(40,41,56)	TRIA(12,12,16)	TRIA(15,15,21)	TRIA(15,15,25)	TRIA(5,6,6)	TRIA(39,43,49)	TRIA(17,22,24)
4	60	70	0	1000	high	TRIA(45,46,62)	TRIA(13,13,18)	TRIA(17,17,23)	TRIA(16,16,28)	TRIA(6,6,7)	TRIA(43,47,54)	TRIA(19,24,26)
5	70	80	0	1000	low	TRIA(40,43,57)	TRIA(12,13,17)	TRIA(15,16,21)	TRIA(15,15,25)	TRIA(5,6,7)	TRIA(39,44,49)	TRIA(17,21,23)
6	70	80	0	1000	high	TRIA(45,48,63)	TRIA(13,14,18)	TRIA(17,18,23)	TRIA(16,16,28)	TRIA(6,7,7)	TRIA(44,49,55)	TRIA(19,23,26)
7	80	90	0	36	low	TRIA(47,53,65)	TRIA(14,15,19)	TRIA(17,20,24)	TRIA(17,19,26)	TRIA(6,7,7)	TRIA(44,50,54)	TRIA(19,22,24)
8	80	90	0	36	high	TRIA(52,58,72)	TRIA(15,17,21)	TRIA(19,22,27)	TRIA(18,21,29)	TRIA(6,7,8)	TRIA(48,56,60)	TRIA(21,24,27)
9	80	90	36	1000	low	TRIA(53,78,78)	TRIA(15,23,23)	TRIA(20,29,29)	TRIA(18,18,26)	TRIA(6,6,8)	TRIA(47,47,61)	TRIA(21,23,28)
10	80	90	36	1000	high	TRIA(58,87,87)	TRIA(17,25,25)	TRIA(22,32,32)	TRIA(19,19,29)	TRIA(7,7,9)	TRIA(52,52,68)	TRIA(23,25,31)
Average	Non-restricted					0:55	0:16	0:20	0:17	0:06	0:48	0:22
11	90	100	0	30	low	TRIA(47,49,66)	TRIA(14,14,19)	TRIA(17,18,25)	TRIA(17,19,24)	TRIA(6,6,8)	TRIA(45,49,58)	TRIA(20,20,28)
12	90	100	0	30	high	TRIA(52,54,73)	TRIA(15,16,21)	TRIA(19,20,27)	TRIA(18,22,27)	TRIA(7,7,9)	TRIA(50,54,64)	TRIA(22,22,31)
13	90	100	30	36	low	TRIA(47,47,63)	TRIA(14,14,18)	TRIA(17,17,23)	TRIA(18,19,24)	TRIA(6,7,8)	TRIA(47,55,58)	TRIA(20,23,27)
14	90	100	30	36	high	TRIA(52,52,70)	TRIA(15,15,20)	TRIA(19,19,26)	TRIA(19,21,27)	TRIA(7,8,9)	TRIA(52,61,64)	TRIA(22,25,30)
15	90	100	36	39.5	low	TRIA(50,51,67)	TRIA(15,15,20)	TRIA(19,19,25)	TRIA(19,19,26)	TRIA(7,7,8)	TRIA(49,51,62)	TRIA(22,24,28)
16	90	100	36	39.5	high	TRIA(55,56,74)	TRIA(16,16,22)	TRIA(21,21,28)	TRIA(21,21,29)	TRIA(7,8,9)	TRIA(55,57,68)	TRIA(25,26,31)
17	100	107	0	30	low	TRIA(48,53,64)	TRIA(14,15,19)	TRIA(18,20,24)	TRIA(16,17,23)	TRIA(6,6,8)	TRIA(46,48,57)	TRIA(21,29,29)
18	100	107	0	30	high	TRIA(53,58,71)	TRIA(15,17,21)	TRIA(20,22,27)	TRIA(17,18,26)	TRIA(7,7,8)	TRIA(51,53,63)	TRIA(24,32,32)
19	100	107	30	36	low	TRIA(49,52,66)	TRIA(14,15,19)	TRIA(18,19,25)	TRIA(15,15,24)	TRIA(6,7,8)	TRIA(46,50,56)	TRIA(22,29,29)
20	100	107	30	36	high	TRIA(54,58,73)	TRIA(16,17,21)	TRIA(20,21,27)	TRIA(16,16,27)	TRIA(7,7,8)	TRIA(51,56,62)	TRIA(24,32,32)
21	100	107	36	38	low	TRIA(49,55,65)	TRIA(14,16,19)	TRIA(18,20,24)	TRIA(16,18,24)	TRIA(6,7,8)	TRIA(47,50,57)	TRIA(22,25,29)
22	100	107	36	38	high	TRIA(54,60,72)	TRIA(16,18,21)	TRIA(20,22,27)	TRIA(17,19,27)	TRIA(7,7,8)	TRIA(52,56,63)	TRIA(25,27,32)
23	100	107	38	40	low	TRIA(51,51,66)	TRIA(15,15,19)	TRIA(19,19,25)	TRIA(17,20,25)	TRIA(6,7,8)	TRIA(48,52,59)	TRIA(23,24,28)
24	100	107	38	40	high	TRIA(56,56,73)	TRIA(16,16,21)	TRIA(21,21,27)	TRIA(18,23,28)	TRIA(7,8,9)	TRIA(53,57,66)	TRIA(25,27,31)
Average	Restricted					0:54	0:16	0:20	0:19	0:07	0:53	0:26
25	107	140	0	38	low	TRIA(51,57,69)	TRIA(15,17,20)	TRIA(19,21,26)	TRIA(16,18,25)	TRIA(7,7,8)	TRIA(49,53,60)	TRIA(24,26,31)
26	107	140	0	38	high	TRIA(57,63,76)	TRIA(17,19,22)	TRIA(21,24,28)	TRIA(18,20,28)	TRIA(7,8,9)	TRIA(54,58,66)	TRIA(26,29,34)

IMPORTANT: whenever entering distributions never leave blank spaces at the end of the string. Otherwise, the model will not run. Also, try not to leave blank spaces between characters in the strings, so that it will be less probable to have errors during model running.

On the same section, the user shall enter the Time Between Vessels, the Locomotive Return Times and the block coefficient level per vessel Market Segment:



Transit And Lock Times (restricted area)

Sail Through
 Main



Time Between Vessels

Vessel Type	Time
Smaller than PP.	0:10
Post-Panamax	0:15

Note: The table above does not have to be pasted into the model.

Locomotive Return Times

Lock Name	# of Chambers	Operation	Return Time	Average
GT Locks	3	Regular	TRIA(12.0,14.0,16.0)	00:14
GT Locks	3	Enhanced	X	00:00
PM Locks	1	Regular	TRIA(8.0,10.0,12.0)	00:10
MF Locks	2	Regular	TRIA(10.0,12.0,14.0)	00:12
MF Locks	2	Enhanced	X	00:00
PP Atl Locks	2	Regular	TRIA(12.0,14.0,16.0)	00:14
PP Atl Locks	2	Enhanced	X	00:00
PP Atl Locks	3	Regular	TRIA(14.0,16.0,18.0)	00:16
PP Atl Locks	3	Enhanced	X	00:00
PP Pac Locks	2	Regular	TRIA(12.0,14.0,16.0)	00:14
PP Pac Locks	2	Enhanced	X	00:00
PP Pac Locks	3	Regular	TRIA(14.0,16.0,18.0)	00:16
PP Pac Locks	3	Enhanced	X	00:00

Market Seg.	Block Coef.
Container	Low
Dry Bulk	High
General Cargo	High
Others	High
Passengers	Low
Refrigerated	Low
Tankers	High
Vehicle Carriers	Low

Every ship will have stamped the attribute *BlockC* either equals to #1, in case it is a high block coefficient (coefficient) ship or #0 otherwise. The Block Coefficient assignment table is automatically exported to the model when the user presses the Export Data button.

3.2.3 The Pre-sequencer

Next is described the way the user should handle the Pre-sequencer.

3.2.3.1 Settings and Data Input

Open the Pre-sequencer by clicking on the Sequencer Block on the Sail Through Map in the User Interface.

Files & Directories

File Directory: C:\Simulation\Enhanced_Model\
 Data Source File: Scenario_PNMx.xls
 Schedule File: C:\Simulation\Enhanced_Model\Schedule.txt
 C:\Simulation\Enhanced_Model\BucketsCount.txt

Restricted Vessels Queue Length

	Long	Medium	Short
Panamax	10	9	7
Post-Panamax	20	16	12

CR Buckets per Total of Unrestricted Buckets

% of CR Buckets: 40%

Navigation Buttons

Change Data Source View Timetables
 Run Pre-Sequencer View Buckets Count

T.B.V. for Unrestricted Vessels

	hours	minutes
Northbound	0.45	26.93
Southbound	0.62	36.90

Figures for reference only:
 NB Bottle-neck to GT Lake: 0.90 hours
 SB Bottle-neck to GT Lake: 1.23 hours
 Actual T.B.V.: 0.17 hours

Comments on the Pre-Sequencer:

First, the user must specify the File Directory path and the User Interface file that shall be used by the Pre-sequencer. Click on the “Change Data Source” button, in the Pre-sequencer Main Screen and then select file as indicated by the red dashed ellipse in the picture above.

The next step is to define what is the short, medium and long restricted vessels queue lengths upper limits both for the Panamax and Post-Panamax Canal scenarios (indicated by the blue dashed ellipse in the picture above). The short and medium queues upper limits are exported to the model through the first line of the Bucketscount.txt file. The long queue limit is not used by the model.

Note that the maximum queue length for restricted vessels that should be sent through the Post-Panamax locks is equal to the difference between the Post-Panamax and Panamax Canal queue lengths.

In the example indicated in the picture above, no more than 10 (ten) restricted vessels will be sent through the Post-Panamax Canal in the Long Queue scenarios, while not more than 5 (five) will be sent through it in the Short Queue scenarios.

The user must also determine the percentage of non-restricted buckets that are to be assigned to the vessels with Combined Beam restriction (CR code).

Note that, buckets assigned to Combined Beam vessels can be used by Regular ships, but only Regular ships can use Regular buckets.

Additionally, in order to calibrate the time interval that non-restricted ships are to enter the canal, the user can also set the Time Between Vessels for the non-restricted vessels in the section of the main screen illustrated below.

The times spent by the ships on both directions up to Gatun Lake are shown for reference only. The longer the T.B.V., the less buckets for non-restricted vessels will be generated.

The shorter the T.B.V., the more non-restricted vessels will be allowed to enter the Canal, but that might dramatically interfere in the time-boundaries of restricted vessels.

T.B.V. for Unrestricted Vessels

	hours	minutes
Northbound	0.45	26.93
Southbound	0.62	36.90

Figures for reference only:

NB Bottle-neck to GT Lake:	0.90 hours
SB Bottle-neck to GT Lake:	1.23 hours
Actual T.B.V.:	0.17 hours

Remember that as more restricted vessels are allowed through the canal, there will be less space for non-restricted vessels.

The parameters that are entered through the User Interface can only be changed in the User Interface. They are, as per described in the previous items:

- Average transit and lockage times;
- Average minimum time between vessels (T.B.V.);
- Locomotives return times;
- Sunrise and sunset times for each set;
- Time boundaries.

3.2.3.2 Running the Pre-sequencer

Once all the parameters have been set, the user can finally run the Pre-sequencer by pressing the “Run Pre-Sequencer” button.

Panama Canal Transits Pre-sequencer

Files & Directories

File Directory:
 Data Source File:
 Schedule File: C:\Simulation\Enhanced_Model\Schedule.txt
 C:\Simulation\Enhanced_Model\BucketsCount.txt

Restricted Vessels Queue Length

	Long	Medium	Short
Panamax	10	9	7
Post-Panamax	20	16	12

T.B.V. for Unrestricted Vessels

	hours	minutes
Northbound	0.45	26.93
Southbound	0.62	36.90

Figures for reference only:
 NB Bottle-neck to GT Lake: 0.90 hours
 SB Bottle-neck to GT Lake: 1.23 hours
 Actual T.B.V.: 0.17 hours

CR Buckets per Total of Unrestricted Buckets

% of CR Buckets:

Navigation Buttons

Comments on the Pre-Sequencer:

Preliminary tests has shown that it takes about 2 (two) hours to generate all the 2.592 timetables, depending on how powerful is the computer used. Therefore, we highly recommend running it in a powerful machine.

A progress bar in a message box will appear on the screen. Press ESC to stop running the Sequencer before it finishes. This action might not allow all the timetables to be exported and printed. See next section for further details.

3.2.3.3 Outputs

By clicking on the View buttons, also in the Main Screen, you will be able to verify the Timetables and the Number of Buckets per restriction code generated in each scenario.

1) Timetables

A maximum of 55 (fifty five) vessel positions or Buckets can be generated per scenario and per direction, being the last 30 (thirty) for restricted vessels, 10 (ten - yellow) for SV vessels and 15 (fifteen - orange) reserved for CR's and NR's. The Pre-sequencer does not take into account CCNT vessels which are allocated into buckets through the model logic.

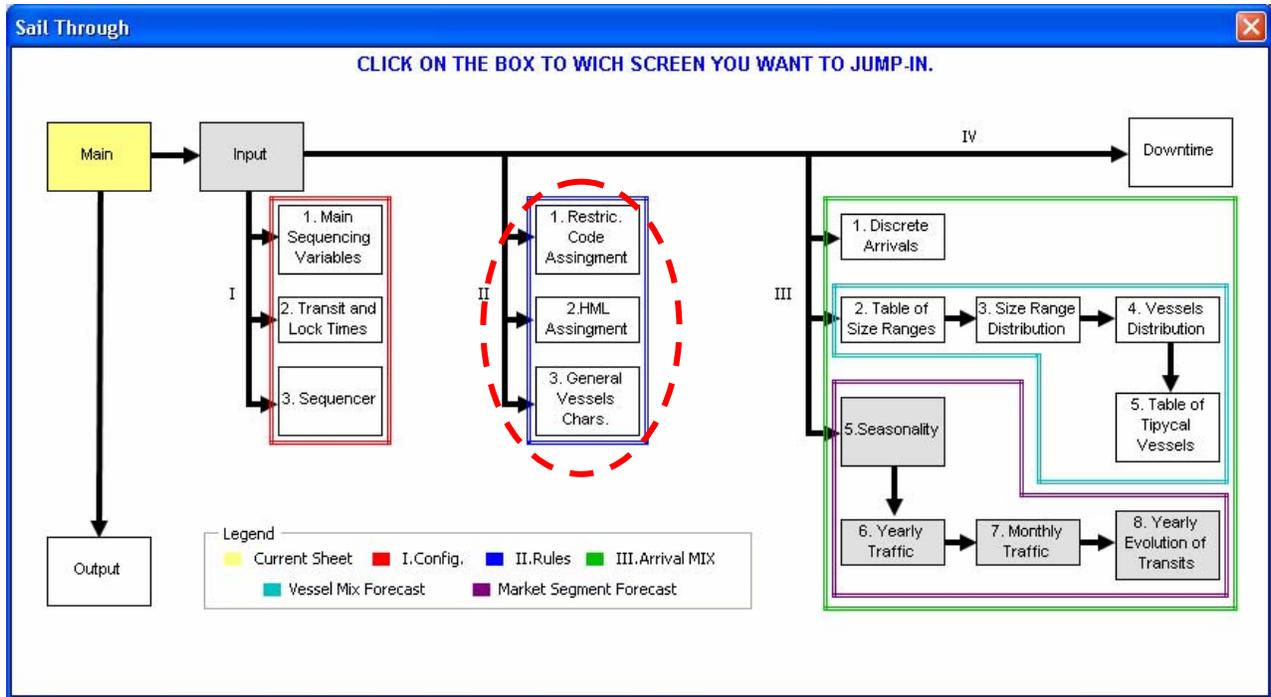
For each bucket and travel direction, the table lists:

- Underway time (in hours) from the Pacific or the Atlantic Anchorage;
- Underway time from the Gatun Lake;
- Designated restriction code;
- The first lock lane suggested.

Figures are in hours.

NB Bucket	UWayPac	UWayGT	RC	SB Bucket	UWayAtl	UWayGT	RC
1	2.17	12.02	2	1	2.75	13.05	2
2	3.07	17.68	2	2	3.80	13.95	2
3	2.48	17.52	2	3	3.17	13.58	2
4	3.98	18.63	2	4	4.83	12.22	1
5	3.77	19.35	2	5	5.00	12.38	1
6	4.90	14.47	1	6	5.88	14.88	2
7	5.07	13.42	1	7	6.85	14.72	2
8	5.82	13.85	1	8	7.02	15.78	2
9	6.35	15.50	1	9	8.68	17.47	3
10	6.72	15.68	1	10	7.97	16.17	3
11	7.65	16.55	1	11	10.52	18.75	3
12	7.48	21.20	2	12	9.02	16.70	3
13	2.85	10.38	6	13	2.98	15.05	6
14	4.40	11.93	7	14	3.15	16.58	8
15	4.65	13.47	7	15	4.52	11.80	7
16	6.18	15.02	7	16	4.68	11.97	7
17	7.73	16.55	7	17	6.07	13.50	7
18	9.27	18.10	6	18	6.23	18.13	8
19	0.00	0.00	0	19	7.62	19.68	8
20	0.00	0.00	0	20	7.78	21.22	8
21	0.00	0.00	0	21	0.00	0.00	0
22	0.00	0.00	0	22	0.00	0.00	0
23	0.00	0.00	0	23	0.00	0.00	0
24	0.00	0.00	0	24	0.00	0.00	0
25	0.00	0.00	0	25	0.00	0.00	0
26	0.00	0.00	0	26	0.00	0.00	0
27	0.00	0.00	0	27	0.00	0.00	0
28	0.00	0.00	0	28	0.00	0.00	0
29	0.00	0.00	0	29	0.00	0.00	0
30	0.00	0.00	0	30	0.00	0.00	0
31	8.05	18.27	5	31	0.23	9.02	5
32	8.45	18.67	5	32	0.78	9.57	5
33	8.85	19.07	5	33	1.33	10.12	5
34	9.25	19.47	5	34	1.88	10.67	5
35	9.65	19.87	5	35	2.43	11.22	5
36	10.05	20.27	5	36	2.98	11.77	5
37	10.45	20.67	5	37	0.00	0.00	0
38	0.00	0.00	0	38	0.00	0.00	0
39	0.00	0.00	0	39	0.00	0.00	0
40	0.00	0.00	0	40	0.00	0.00	0
41	21.78	29.92	4	41	17.17	20.72	5
42	21.95	29.74	4	42	17.33	21.52	5
43	22.18	30.32	4	43	17.72	21.27	5
44	22.35	30.14	4	44	17.88	22.07	5
45	22.58	30.72	4	45	18.27	21.82	5
46	22.75	30.54	4	46	18.43	22.62	5
47	22.98	31.12	4	47	18.82	22.37	5
48	23.15	30.94	4	48	18.98	23.17	5
49	23.38	31.52	5	49	19.37	22.92	5
50	23.55	31.34	5	50	19.53	23.72	5
51	23.78	31.92	5	51	19.92	23.47	5
52	23.95	31.74	5	52	20.08	24.27	5
53	24.18	32.32	5	53	20.47	24.02	4
54	24.35	32.14	5	54	20.63	33.00	4
55	24.58	33.00	5	55	21.02	24.42	4

3.2.4 Configuring Rules and Restrictions



3.2.4.1 Restriction Code Assignment

The user must specify the Restriction Code and its respective the minimum and the maximum length, Beam, Draft, HML and PD limits.

For the Beam, Draft and Length ranges, the lower bound is included in the range, while the upper bound is excluded.

For the HML and PD codes, the upper bound is included in the range.

Figures in ft.

CODE	Length		Beam		Draft		HML		PD	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
CCDL	0	900	91	95	0	39.51	D	D	Yes	Yes
CCDL	0	900	95	107	0	39.51	D	D	No	Yes
CCDL	900	965.1	0	107	0	39.51	N	D	No	Yes
DLCC	0	900	95	107	0	39.51	Y	Y	No	Yes
CC	0	900	95	107	0	39.51	C	C	No	Yes
CC	0	900	0	91	0	39.51	N	D	Yes	Yes
CR	0	900	80	91	38.01	39.51	N	D	No	Yes
CR	0	900	91	95	0	39.51	Y	Y	No	Yes
CR	0	900	91	95	0	39.51	D	D	No	No
CR	0	900	91	95	0	39.51	C	C	No	Yes
PCCHDL	1100	1200	0	1000	0	1000	N	D	No	Yes
PCCHDL	0	10000	150	180	0	1000	N	D	No	Yes
PCCHDL	0	1100	107	150	0	1000	N	D	Yes	Yes
PCCHDL	1000	1100	0	1000	0	1000	D	D	No	Yes
PCCHDL	0	10000	140	150	0	1000	D	D	No	Yes
PDLCCH	1000	1100	0	1000	0	1000	Y	Y	No	Yes
PDLCCH	0	10000	140	150	0	1000	Y	Y	No	Yes
PPCCDL	0	965.1	0	107	39.51	1000	D	D	No	Yes
PCCDL	0	10000	107	1000	0	1000	D	D	No	Yes
PCCDL	965.1	10000	0	1000	0	1000	D	D	No	Yes
PPDLCC	0	965.1	0	107	39.51	1000	N	C	No	Yes
PDLC	0	10000	107	1000	0	1000	N	C	No	Yes
PDLC	965.1	10000	0	1000	0	1000	N	C	No	Yes
NR	Assign this code to all vessels that do not qualify for any other restriction code									

When filling the blanks, make sure the lower bound is lower than the upper bound. Also remember that the model will assign the code to which the ship characteristics first matches the criteria by searching from top to bottom of the table.

This table is exported to the model through the Data.wks file when pressing the Export Data button.

The behavior of the vessels under each Restriction Code are explained in User's Manual.

Below are the indexes used by the model for PD and HML codes.

PD	Index
Yes	1
No	0

HML Code	Index
D	4
Y	3
C	2
N	1

3.2.4.2 HML Assignment



ACP
AUTORIDAD DEL CANAL DE PANAMA

HML Assignment

Sail Through

Main




CODE	Length		Beam		Draft		PD		Market Segment	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
D	800	965	91	107	0	1000	No	Yes	Container	Vehicle Carriers
D	0	10000	0	107	0	1000	No	Yes	Passengers	Passengers
Inspect.	0	800	91	107	0	1000	No	Yes	Container	Vehicle Carriers
N	Assign this code to all vessels that do not qualify for any other restriction code									

NOTE:
If a vessel is not denied according to the assignment rules stated above, she will follow inspection and be assigned an HML code based on the HML distributions input in the General Vessels Characteristics Screens.

When filling the blanks, make sure the lower bound is lower than the upper bound. Also remember that the model will assign the code to which the ship characteristics first matches the criteria by searching from top to bottom of the table.

This table is exported to the model through the Data.wks file when pressing the Export Data button.

3.2.4.3 General Vessel Characteristics (PD, Booking and Draft Status)

The user must copy each of the columns of the spreadsheet below into the Arena model by using the Copy Buttons Area:

General Vessel Characteristics
(restricted area)

Sail Through
 Main

Market Segment	PD	Northbound		Southbound	
		Draft Status	Booking Status	Draft Status	Booking Status
Container	0	DISC(0.99,1,1,100)	DISC(0.89,0,1,1)	DISC(0.99,1,1,100)	DISC(0.89,0,1,1)
Dry Bulk	0	DISC(0.88,1,1,100)	DISC(0.23,0,1,1)	DISC(0.99,1,1,100)	DISC(0.2,0,1,1)
General Cargo	DISC(0.02,1,1,0)	DISC(0.93,1,1,100)	DISC(0.28,0,1,1)	DISC(0.88,1,1,100)	DISC(0.2,0,1,1)
Others	DISC(0.02,1,1,0)	DISC(0.83,1,1,100)	DISC(0.29,0,1,1)	DISC(0.83,1,1,100)	DISC(0.27,0,1,1)
Passengers	0	DISC(0.96,1,1,100)	DISC(0.96,0,1,1)	DISC(0.99,1,1,100)	DISC(0.98,0,1,1)
Refrigerated	0	DISC(0.99,1,1,100)	DISC(0.6,0,1,1)	DISC(0.39,1,1,100)	DISC(0.5,0,1,1)
Tankers	DISC(0.35,1,1,0)	DISC(0.52,1,1,100)	DISC(0.29,0,1,1)	DISC(0.89,1,1,100)	DISC(0.35,0,1,1)
Vehicle Carriers	0	DISC(0.98,1,1,100)	DISC(0.65,0,1,1)	DISC(0.46,1,1,100)	DISC(0.64,0,1,1)

If Vessel is not HML Denied, HML is sorted as below:

Market Segment	HML Distribution
Container	DISC(0.092, 2, 0.292, 4, 1,
Dry Bulk	DISC(0.113, 2, 0.287, 4, 1,
General Cargo	DISC(0, 2, 0.551, 4, 1, 3)
Others	DISC(0.027, 2, 0.475, 4, 1,
Passengers	4
Refrigerated	1
Tankers	DISC(0.079, 2, 0.504, 4, 1,
Vehicle Carriers	DISC(0.019, 2, 0.495, 4, 1,

Copy Area

Draft :	NB_D	SB_D
Booking :	NB_B	SB_B
Others :	HML	PD

The message boxes that appear after clicking any of the copy buttons will guide the user to the correct place to paste each of the data columns into the Arena model.

Other types of discrete probabilistic distributions can be used, though we recommend using the one described below:

DISC (prob(1), index(1), prob(2), index(2), ..., prob(n), index(n))

Where “prob(1)” to “prob(n)” is the cumulative probabilistic distribution for “index(1)” to “index(n)” respectively, being “prob(n)” no greater than 1 and “prob(1)” no smaller than 0. Additionally, “prob(i-1)” must be no greater than “prob(i)”, where (i) is the index number

The characteristics of the vessel are translated into indexes read by the model as below:

Draft Status	Index
Laden	1
Ballast	100

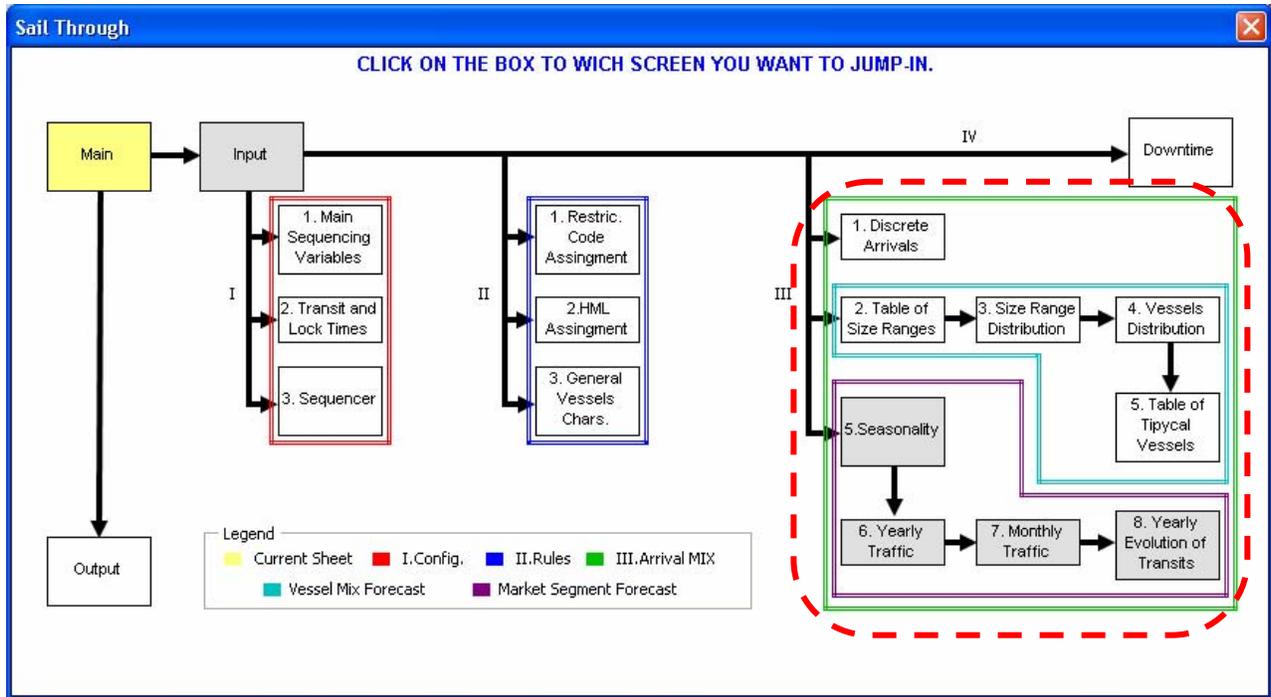
Booking Status	Index
Booked	0
Non-booked	1

PD	Index
Yes	1
No	0

HML Code	Index
D	4
Y	3
C	2
N	1

The same indexes should be used by the user in order to set the distributions.

3.2.5 Loading Demand



The demand can be defined as being either discrete only, theoretical or both theoretical and discrete. In case the user defines the demand as being partially discrete, the discrete arrivals must be filled up with vessels.

In case the user wants to input theoretical demand, both the Vessel Mix and the Market Segment Forecasts must be introduced.

3.2.5.1 Discrete Arrivals

Through this screen, the user may specify the date and time the vessels should arrive at discrete moments to the Canal heading either northbound or southbound. Additionally, the user must enter the number of the vessel from the Table of Typical Vessels.

Both the number of the vessel and the arrival date and time are exported to the model. The Post-Panamax vessels are highlighted in red.



Discrete Arrivals

Sail Through
 Main




Post-panamax highlighted in red (for vessel no. greater than #3744)

NORTHBOUND					SOUTHBOUND				
#	Vessel No.	Est. Arrival Date Time	Market Segment	Vessel Name	#	Vessel No.	Est. Arrival Date Time	Market Segment	Vessel Name
1	3745	10/06/02 00:00	Others	DB Oceanbuilder	1	2	12/05/02 23:59	Others	550--1
2	2	10/06/02 03:00	Others	550--1	2	72	10/06/02 23:00	General Cargo	ALCHIBA
3					3				
4					4				
5					5				
6					6				
7					7				
8					8				
9					9				
10					10				
11					11				
12					12				
13					13				
14					14				
15					15				
16					16				
17					17				
18					18				
19					19				
20					20				
21					21				
22					22				

3.2.5.2 Theoretical Demand

- **Table of Size Ranges**

Vessels are distributed in terms of their dimensions based on the range limits as defined below:



ACP
AUTORIDAD DEL CANAL DE PANAMA

Beam and Length Ranges
(restricted area)

Sail Through



Main



Table of Size Ranges

Beam Ranges

BR#	Up. Bounds
1	25
2	30
3	35
4	40
5	45
6	50
7	55
8	60
9	65
10	70
11	75
12	80
13	85
14	90
15	91
16	95
17	100
18	107
19	110
20	120
21	130
22	140
23	150

Length Ranges

LR#	Up. Bounds
1	100
2	200
3	300
4	400
5	500
6	570
7	600
8	700
9	800
10	900
11	1,000
12	1,100
13	1,200
14	1,300
15	1,400
16	1,500

Changes in these tables do not automatically change the vessel size ranges distributions. This must separately be done by the User.

The user can set up to 16 (sixteen) upper bounds for Length Range limits and up to 30 (thirty) upper bounds for Beam Ranges.

ACP 		Table Of Size Ranges (restricted area)		Sail Through		PARAGON Consulting Solutions	
				Main		ROCKWELL SOFTWARE 	
Size Ranges							Beam and Legth Ranges
Range #	Range	#	Limits	#	Limits		
1	1-1	1	25 - 30	1	100 - 200		
2	1-2	1	25 - 30	2	200 - 300		
3	1-3	1	25 - 30	3	300 - 400		
4	1-4	1	25 - 30	4	400 - 500		
5	1-5	1	25 - 30	5	500 - 570		
6	1-6	1	25 - 30	6	570 - 600		
7	1-7	1	25 - 30	7	600 - 700		
8	1-8	1	25 - 30	8	700 - 800		
9	1-9	1	25 - 30	9	800 - 900		
10	1-10	1	25 - 30	10	900 - 1000		
11	1-11	1	25 - 30	11	1000 - 1100		
12	1-12	1	25 - 30	12	1100 - 1200		
13	1-13	1	25 - 30	13	1200 - 1300		
14	1-14	1	25 - 30	14	1300 - 1400		
15	1-15	1	25 - 30	15	1400 - 1500		
16	1-16	1	25 - 30	16	1500 - 10000		
17	2-1	2	30 - 35	1	100 - 200		
18	2-2	2	30 - 35	2	200 - 300		
19	2-3	2	30 - 35	3	300 - 400		
20	2-4	2	30 - 35	4	400 - 500		
21	2-5	2	30 - 35	5	500 - 570		
22	2-6	2	30 - 35	6	570 - 600		
23	2-7	2	30 - 35	7	600 - 700		

The combination of the Beam and Size Range generates a total of 480 possible Size Ranges, which can be read in the first page of the Table of Size Ranges.

- Size Ranges Distribution



ACP
AUTORIDAD DEL CANAL DE PANAMA

Size Range Distribution
(restricted area)

Sail Through
 Main




Year #	Year	Container	Dry Bulk	General Cargo	Others	Passengers	Refrigerated	Tankers	Vehicle Carriers	
1	2002	DISC(0,014,	DISC(0,004,	DISC(0,013,	DISC(0,015,	DISC(0,004,	DISC(0,057,	DISC(0,004,	DISC(0,013,	Copy
2	2003	0	0	0	0	0	0	0	0	
3	2004	0	0	0	0	0	0	0	0	
4	2005	0	0	0	0	0	0	0	0	
5	2006	0	0	0	0	0	0	0	0	
6	2007	0	0	0	0	0	0	0	0	
7	2008	0	0	0	0	0	0	0	0	
8	2009	0	0	0	0	0	0	0	0	
9	2010	0	0	0	0	0	0	0	0	
10	2011	0	0	0	0	0	0	0	0	
11	2012	0	0	0	0	0	0	0	0	
12	2013	0	0	0	0	0	0	0	0	
13	2014	0	0	0	0	0	0	0	0	
14	2015	0	0	0	0	0	0	0	0	
15	2016	0	0	0	0	0	0	0	0	
16	2017	0	0	0	0	0	0	0	0	
17	2018	0	0	0	0	0	0	0	0	
18	2019	0	0	0	0	0	0	0	0	
19	2020	0	0	0	0	0	0	0	0	
20	2021	0	0	0	0	0	0	0	0	
21	2022	0	0	0	0	0	0	0	0	
22	2023	0	0	0	0	0	0	0	0	
23	2024	0	0	0	0	0	0	0	0	
24	2025	0	0	0	0	0	0	0	0	

Through this screen, the User is able to specify the vessels size ranges arrival distributions for each Market Segment for up to 25 (twenty five) years. It is also on this screen that the user establishes the first year of data to be input in the remaining tables.

To copy these distributions to the model, just press on the copy button and follow the instructions.

- **Table of Typical Vessels**

The vessel population list is in the Typical Vessels Table, where the following information is supplied for each vessel:

1. Internal number of the vessel (integer);
2. Vessel name (text string);
3. Her market segment (text string);
4. Beam range number (integer based on the table of beam ranges);
5. Length range number (integer based on the table of length ranges);
6. Size range number (integer based on the table of size ranges);
7. Beam (real);
8. Length (real);
9. Laden draft distribution;
10. Ballast draft distribution;
11. PCUMS (real).

ACP		Table Of Typical Vessels (restricted area)		Sail Through		PARAGON Consulting Solutions				
				Main		ROCKWELL SOFTWARE				
Upper Dimension Limits (ft)			Panamax	Post-panamax						
LOA			966	1200						
Beam			107	180						
Draft			39.5	46						
Copy										
Internal No.	NAME	Market Segment	BR#	LR#	SR#	Beam	Length	Laden Draft	Ballast Draft	PCUMS
1	18 DE MARZO	Tankers	17	7	263	105.94	680.54	Tri(36.34, 37.92, 39.50)	26.67	25201
2	550--1	Others	10	5	149	74.08	501.25	Tri(26.58, 26.58, 26.58)	17.22	9370
3	550--1	Others	10	5	149	74.08	501.25	Tri(22.75, 22.75, 22.75)	17.22	9370
4	AALSMEEGRACHT	General Cargo	8	4	116	62.11	425.85	Tri(30.25, 30.25, 30.25)	17.87	6429
5	ABAVA	Refrigerated	8	4	116	63.06	408.46	Tri(22, 22, 22)	18.75	5208
6	ABRA	Dry Bulk	12	5	181	80.84	526.18	Tri(20.92, 20.92, 20.92)	19.10	11974
7	ABSALON	Others	12	7	183	83.19	604.82	Tri(27.92, 31.36, 33.75)	20.36	15316
8	ACACIA N	Dry Bulk	12	5	181	80.78	524.39	Tri(22.25, 30.76, 33.67)	20.91	11810
9	ACTIVE	Dry Bulk	9	4	132	69.65	420.08	Tri(24.5, 25.38, 26.25)	17.84	6700
10	JOYOUS LAND	Dry Bulk	17	8	264	105.77	738.12	Tri(38.42, 38.83, 39.25)	27.71	29707
11	ACHILLES	Dry Bulk	17	8	264	105.77	738.19	Tri(37.17, 38.58, 39.33)	22.77	30618
12	ACHTERGRACHT	General Cargo	8	4	116	62.07	425.85	Tri(23.17, 23.17, 23.17)	17.87	6611
13	ACTIVE	Dry Bulk	9	4	132	69.65	420.08	Tri(22.92, 25.75, 27.92)	17.84	6700
14	ACUSHNET	Tankers	16	6	246	99.84	587.93	Tri(31.5, 32.67, 33.83)	22.82	18145
15	AD ASTRA	Dry Bulk	17	8	264	105.91	738.22	Tri(39.33, 39.33, 39.33)	28.95	31893
16	ADAMAS	Others	17	9	265	105.75	831.69	Tri(39.33, 39.33, 39.33)	30.75	36157
17	ADAMO	General Cargo	6	2	82	51.26	214.81	Tri(15.08, 15.08, 15.08)	8.33	1566
18	ADMIRAL	General Cargo	12	5	181	82.12	506.89	Tri(32, 33.13, 34.25)	20.36	11203
19	ADVANTAGE	Others	13	5	197	86.47	561.06	Tri(23, 27.5, 36.58)	21.00	16416
20	ADYGEJA	Tankers	17	8	264	105.75	738.19	Tri(36.83, 38.43, 39.5)	23.17	28046
21	ADYGEJA	Tankers	17	8	264	105.75	738.19	Tri(36.83, 38.43, 39.5)	23.17	28046

Additionally, the user must specify the maximum allowed dimensions for both a Panamax and a Post-Panamax Canal vessel to be read by the model.

A maximum of 6500 (six thousand and five hundred) vessels can be created and loaded into the model.

To copy the table of typical vessels to the model, just press the copy button and follow the instructions.

- **Vessels Distribution**



Vessels Distribution (restricted area)

Sail Through
 Main




Size Range #	Beam Range	Length Range	Container	Dry Bulk	General Cargo	Others	Passengers	Refrigerated	Tankers	Vehicle Carriers
1	25 - 30	100 - 200	0	0	0	DISC(0.05, 4	0	0	0	0
2	25 - 30	200 - 300	0	0	0	0	0	0	0	0
3	25 - 30	300 - 400	0	0	0	0	0	0	0	0
4	25 - 30	400 - 500	0	0	0	0	0	0	0	0
5	25 - 30	500 - 570	0	0	0	0	0	0	0	0
6	25 - 30	570 - 600	0	0	0	0	0	0	0	0
7	25 - 30	600 - 700	0	0	0	0	0	0	0	0
8	25 - 30	700 - 800	0	0	0	0	0	0	0	0
9	25 - 30	800 - 900	0	0	0	0	0	0	0	0
10	25 - 30	900 - 1000	0	0	0	0	0	0	0	0
11	25 - 30	1000 - 1100	0	0	0	0	0	0	0	0
12	25 - 30	1100 - 1200	0	0	0	0	0	0	0	0
13	25 - 30	1200 - 1300	0	0	0	0	0	0	0	0
14	25 - 30	1300 - 1400	0	0	0	0	0	0	0	0
15	25 - 30	1400 - 1500	0	0	0	0	0	0	0	0
16	25 - 30	1500 - 10000	0	0	0	0	0	0	0	0
17	30 - 35	100 - 200	0	0	0	DISC(0.143,	0	0	167	0
18	30 - 35	200 - 300	0	0	DISC(0.5, 90	DISC(0.333,	0	0	DISC(0.875,	0
19	30 - 35	300 - 400	0	0	0	0	0	0	0	0
20	30 - 35	400 - 500	0	0	0	0	0	0	0	0
21	30 - 35	500 - 570	0	0	0	0	0	0	0	0
22	30 - 35	570 - 600	0	0	0	0	0	0	0	0
23	30 - 35	600 - 700	0	0	0	0	0	0	0	0

Once the Yearly Size Ranges Distributions per Market Segment are entered, the User must then specify how frequent the vessels listed in the Table of Typical Vessels appear on each Size Range throughout the simulation.

To copy the distributions in the model, just press on the copy button and follow the instructions.

IMPORTANT: the length of the distributions should be no longer than 2.600 (two thousand and six hundred) characters. This is a limit imposed by Excel, so try not to leave blank spaces between characters neither use more than 3 (three) decimals in the number format.

- **Seasonality**

Through this table, the user specifies the market segments monthly seasonality to be applied to the yearly number of transits.

It is only used in case the user specifies that the interface will calculate the demand figures to be exported to the Arena Model.

Note that the first month of the table is October, which is by definition the first month of the fiscal year.



Seasonality

Sail Through
 Main




	Northbound	Container	Dry Bulk	General Cargo	Others	Passengers	Refrigerated	Tankers	Vehicle Carriers
NORTHBOUND	Oct	9%	8%	6%	9%	1%	7%	9%	8%
	Nov	10%	9%	8%	9%	0%	6%	7%	11%
	Dec	9%	8%	9%	8%	1%	7%	7%	7%
	Jan	8%	8%	9%	8%	13%	6%	8%	8%
	Feb	7%	9%	7%	9%	4%	6%	10%	9%
	Mar	7%	9%	8%	8%	11%	7%	9%	10%
	Apr	8%	9%	9%	8%	10%	9%	8%	7%
	May	8%	7%	8%	8%	20%	9%	7%	8%
	Jun	8%	9%	9%	8%	22%	13%	8%	8%
	Jul	8%	8%	10%	8%	14%	12%	8%	9%
Aug	9%	8%	9%	9%	3%	11%	10%	8%	
Sep	9%	8%	7%	8%	0%	7%	8%	8%	
Total NB	100%	100%	100%	100%	100%	100%	100%	100%	100%
SOUTHBOUND	Oct	9%	10%	10%	11%	1%	7%	8%	7%
	Nov	10%	8%	8%	9%	0%	6%	7%	10%
	Dec	9%	7%	6%	7%	0%	6%	8%	8%
	Jan	8%	8%	7%	7%	3%	5%	8%	8%
	Feb	7%	9%	8%	8%	8%	8%	9%	9%
	Mar	7%	8%	9%	9%	14%	8%	8%	9%
	Apr	8%	10%	8%	9%	20%	11%	8%	8%
	May	8%	8%	8%	8%	13%	10%	7%	7%
	Jun	8%	8%	8%	8%	19%	13%	10%	8%
	Jul	8%	7%	9%	8%	16%	12%	11%	8%
Aug	9%	8%	9%	9%	5%	8%	8%	9%	
Sep	9%	9%	8%	10%	1%	8%	8%	9%	
Total SB	100%	100%	100%	100%	100%	100%	100%	100%	100%

- Yearly Traffic (per fiscal year)



Yearly Traffic

Sail Through
 Main



Percentage of Yearly Transits per Market Segment Coef. of Variation (T.B.A.): Type of Distribution:

Year #	Year	Container	Dry Bulk	General Cargo	Others	Passengers	Refrigerated	Tankers	Vehicle Carriers	Total	Total Yearly Traffic
1	2002	16.80%	22.70%	8.50%	10.70%	2.30%	17.80%	14.90%	6.30%	100.00%	11860
2	2003	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	13046
3	2004	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	14046
4	2005	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	15046
5	2006	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	16046
6	2007	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	17046
7	2008	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	18046
8	2009	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	19046
9	2010	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	20046
10	2011	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	21046
11	2012	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	22046
12	2013	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	23046
13	2014	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	24046
14	2015	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	25046
15	2016	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	26046
16	2017	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	27046
17	2018	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	28046
18	2019	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	29046
19	2020	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	30046
20	2021	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	31046
21	2022	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	32046
22	2023	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	33046
23	2024	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	34046
24	2025	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	35046
25	2026	16.96%	22.56%	8.31%	10.71%	1.74%	18.00%	15.20%	6.52%	100.00%	36046

It is only used in case the user specifies that the interface will calculate the demand figures to be exported to the Arena Model.

In this table, the user must distribute the percentage of the total yearly traffic that is assigned to each of the market segments, the total number of transits for up to 25 fiscal years and the type of distribution to be used by the model to create the vessels as well as the Time Between Arrivals coefficient of variation.

The first (fiscal) year of the table is setup by the user through the Size Ranges Distribution Table.

On the same screen, the user must also distribute the percentage of traffic and market segment that shall head southbound and northbound :



Yearly Traffic

Sail Through

Main



Percentage of Southbound Transits per Market Segment

Year #	Year	Container	Dry Bulk	General Cargo	Others	Passengers	Refrigerated	Tankers	Vehicle Carriers	Total Yearly
1	2002	50.54%	56.69%	45.39%	51.20%	64.86%	49.05%	53.40%	55.14%	11860
2	2003	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	13046
3	2004	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	14046
4	2005	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	15046
5	2006	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	16046
6	2007	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	17046
7	2008	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	18046
8	2009	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	19046
9	2010	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	20046
10	2011	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	21046
11	2012	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	22046
12	2013	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	23046
13	2014	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	24046
14	2015	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	25046
15	2016	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	26046
16	2017	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	27046
17	2018	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	28046
18	2019	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	29046
19	2020	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	30046
20	2021	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	31046
21	2022	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	32046
22	2023	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	33046
23	2024	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	34046
24	2025	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	35046
25	2026	50.45%	56.02%	45.18%	50.08%	64.56%	48.52%	53.02%	55.11%	36046

- **Monthly Traffic**

This table is either filled up by the user, if the Manual Input option for demand figures was chosen or calculated by the interface. It is exported to Arena in case the user has specified it will use Theoretical Demand distributions. The first month per direction is also October, the first month of the fiscal year.

		<div style="text-align: center;">Monthly Traffic</div> <div style="float: right;"> <input type="checkbox"/> Sail Through <input type="checkbox"/> Main </div> <div style="float: right; text-align: right;"> </div>									
Manual Input		Month	Container	Dry Bulk	General Cargo	Others	Passengers	Refrigerated	Tankers	Vehicle Carriers	Total
N O R T H B O U N D	Oct	84	102	49	50	10	102	70	23	489	
	Nov	83	80	45	48	19	98	63	27	463	
	Dec	79	112	50	50	21	144	66	28	550	
	Jan	84	94	55	52	14	135	68	30	531	
	Feb	86	99	52	57	3	116	83	28	524	
	Mar	87	94	42	53	0	79	71	26	451	
	Apr	93	94	35	56	1	73	73	28	453	
	May	97	113	43	55	0	67	62	37	474	
	Jun	90	92	50	48	1	72	61	24	438	
	Jul	80	95	53	54	13	70	69	29	462	
Aug	69	112	42	58	4	63	82	32	462		
Sep	75	107	47	52	11	80	74	33	478		
Total 2002		1007	1191	563	633	98	1099	841	343	5775	
S O U T H B O U N D	Oct	86	150	39	57	36	114	74	32	588	
	Nov	85	120	39	40	24	109	67	29	513	
	Dec	81	131	39	55	34	134	96	36	605	
	Jan	86	114	43	51	28	123	103	34	581	
	Feb	88	126	44	61	9	86	82	39	534	
	Mar	89	142	38	67	1	88	77	37	538	
	Apr	95	151	46	71	2	78	81	31	554	
	May	99	131	39	60	0	60	64	43	496	
	Jun	92	110	28	43	0	64	76	33	446	
	Jul	82	119	32	47	6	53	77	33	448	
Aug	71	139	39	51	14	65	88	40	506		
Sep	77	130	42	61	25	84	80	37	535		
Total 2002		1029	1560	468	664	181	1058	964	421	6344	
Total Year 2002		2036	2751	1030	1297	279	2157	1806	763	12119	

In the table above, the figures were specified by the user, rather than being calculated by the interface.

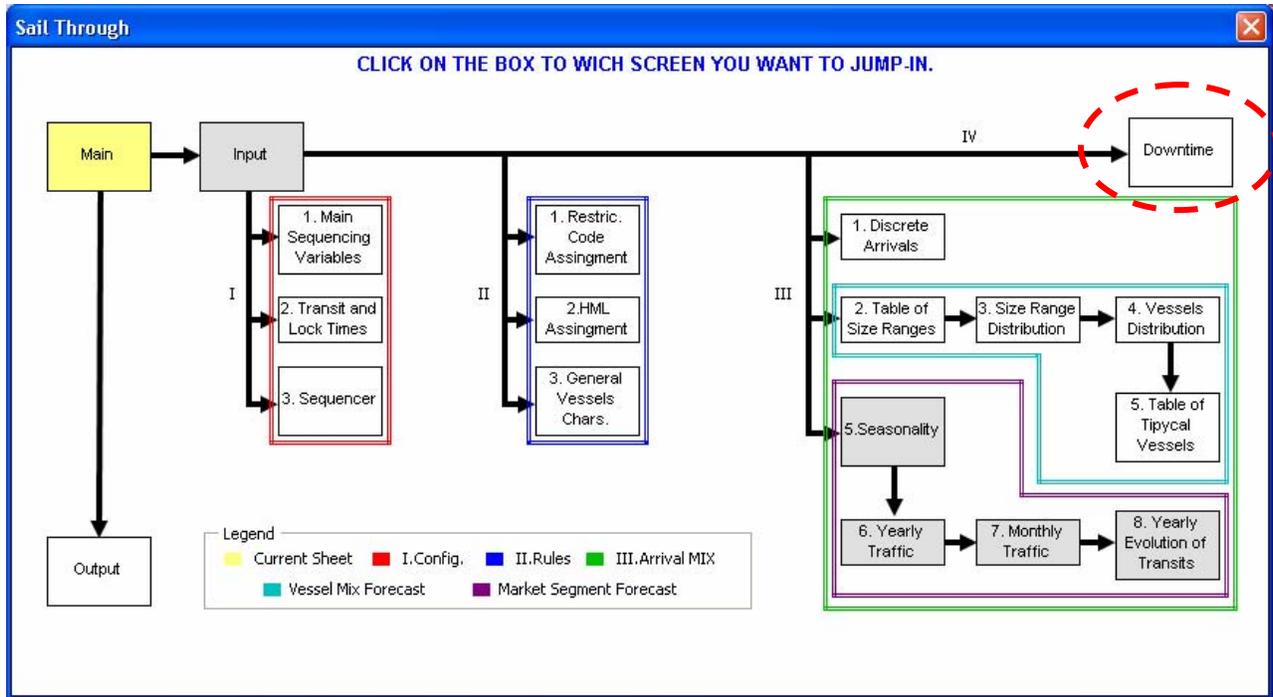
- Yearly Evolution of Transits

This table is either filled by the user, if the Manual Input option for demand figures was chosen or calculated by the interface. It is exported to Arena in case the user has specified it will use Theoretical Demand distributions.

ACP		Yearly Evolution of Transits								<input type="checkbox"/> Sail Through <input checked="" type="checkbox"/> Main	
AFOROS DEL CANAL DE PANAMA										 	
Calculated Input											
Year #	Year	Container	Dry Bulk	General Cargo	Others	Passengers	Refrigerated	Tankers	Vehicle Carriers		
1	2002	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
2	2003	1.11	1.09	1.08	1.10	0.83	1.11	1.12	1.14		
3	2004	1.20	1.18	1.16	1.19	0.90	1.20	1.21	1.23		
4	2005	1.28	1.26	1.24	1.27	0.96	1.28	1.29	1.31		
5	2006	1.37	1.34	1.32	1.35	1.02	1.37	1.38	1.40		
6	2007	1.45	1.43	1.41	1.44	1.09	1.45	1.47	1.49		
7	2008	1.54	1.51	1.49	1.52	1.15	1.54	1.55	1.57		
8	2009	1.62	1.60	1.57	1.61	1.21	1.62	1.64	1.66		
9	2010	1.71	1.68	1.65	1.69	1.28	1.71	1.72	1.75		
10	2011	1.79	1.76	1.73	1.78	1.34	1.79	1.81	1.84		
11	2012	1.88	1.85	1.82	1.86	1.41	1.88	1.90	1.92		
12	2013	1.96	1.93	1.90	1.94	1.47	1.97	1.98	2.01		
13	2014	2.05	2.01	1.98	2.03	1.53	2.05	2.07	2.10		
14	2015	2.13	2.10	2.06	2.11	1.60	2.14	2.15	2.19		
15	2016	2.22	2.18	2.15	2.20	1.66	2.22	2.24	2.27		
16	2017	2.30	2.27	2.23	2.28	1.73	2.31	2.33	2.36		
17	2018	2.39	2.35	2.31	2.37	1.79	2.39	2.41	2.45		
18	2019	2.47	2.43	2.39	2.45	1.85	2.48	2.50	2.53		
19	2020	2.56	2.52	2.48	2.54	1.92	2.56	2.58	2.62		
20	2021	2.64	2.60	2.56	2.62	1.98	2.65	2.67	2.71		
21	2022	2.73	2.69	2.64	2.70	2.04	2.73	2.76	2.80		
22	2023	2.81	2.77	2.72	2.79	2.11	2.82	2.84	2.88		
23	2024	2.90	2.85	2.81	2.87	2.17	2.90	2.93	2.97		
24	2025	2.98	2.94	2.89	2.96	2.24	2.99	3.01	3.06		
25	2026	3.07	3.02	2.97	3.04	2.30	3.07	3.10	3.15		

The specified multipliers refer to how much higher or lower will be the transits for future (fiscal) years when compared to the first year of the table.

3.2.6 Downtimes



The user is allowed to setup only scheduled downtimes for Miraflores, Pedro Miguel, Gatun, Pacific and Atlantic locks, by determining the resource, start date of downtime, and the duration in hours. When during outage, only the west lane will be put down. The time before (T.B.D.) and after (T.A.D.) downtime during which a traffic reduction should be applied (T.R.) should also be setup. The traffic reduction will always be applied during downtime. The total downtime entered is summed up solely for guidance.

3.2.7 Tug Requirements Setup

First, the ships receive the value for the attribute *ind_tug*, which corresponds to the line number in the table below, which is built into decide blocks named “*decide index tug SB*” and “*decide index tug NB*”.

Line Index	Length Range		Beam Range		Market Segment	
	From	To	From	To	From	To
<i>ind_tug</i>	>	<	>	<	>	≤
1	0	1200	140	180	1	1
2	0	1200	107	140	1	1
3	0	1200	140	180	2	2
4	0	1200	107	140	2	2
5	0	1200	140	180	5	5
6	0	1200	107	140	5	5
7	0	1200	140	180	7	7
8	0	1200	107	140	7	7
9	900	965	0	107	1	8
10	700	900	91	107	1	8
11	700	900	0	91	1	8
12	570	700	91	107	1	8
13	570	700	0	91	1	8
14	0	570	0	80	1	8

Then the Tug Requirements Assignment Table specified below is designated to the vessels through the assign Arena modules associated to the decide blocks specified above.

The next table also indicates the names of the expressions which values should be changed in case of necessity when the vessel is using a Post-panamax lock, when it is transiting through the Gaillard Cut or when entering or departing the Panamax locks:

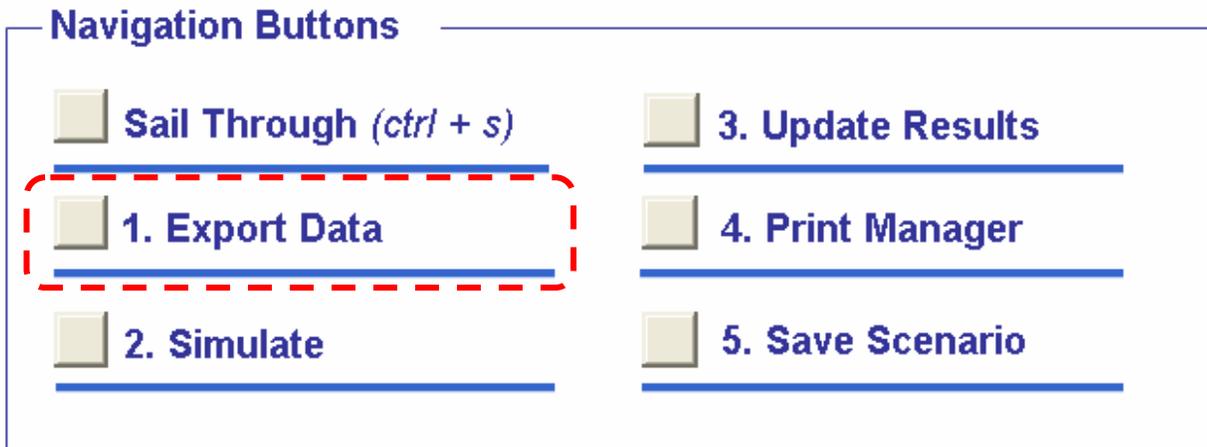
Line Index	Tug Requirements			
	Post-Panamax Locks	Panamax Locks		Cut
		In	Out	
<i>ind_tug</i>	<i>expression_tug_3_per_ship</i>	<i>expression_tug_1_per_ship</i>	<i>expression_tug_2_per_ship</i>	<i>expression_tug_4_per_ship</i>
1	2	0	0	1
2	DISC(.92,2,1,3)	0	0	1
3	DISC(.06,2,1,3)	0	0	1
4	DISC(.54,2,1,3)	0	0	1
5	3	0	0	1
6	2	0	0	1
7	DISC(.16,2,1,3)	0	0	1
8	DISC(.65,2,1,3)	0	0	1
9	2	2	1	1
10	2	2	0	1
11	2	2	0	0
12	2	2	0	1
13	2	1	0	0
14	2	0	0	0

3.2.8 Counter of Number of Ships per Restriction

Find below the names of the counters per each lock and vessel type as per described in the User's Manual.

COUNTER #	Counter Description	Counter Internal
1	Miraflores – Regular vessels	crew_1
2	Miraflores – Restricted vessels	crew_2
3	Pedro Miguel – Regular vessels	crew_3
4	Pedro Miguel – Restricted vessels	crew_4
5	Gatún – Regular vessels	crew_5
6	Gatún – Restricted vessels	crew_6
7	PPMax Pacific – Regular vessels	crew_7
8	PPMax Pacific – Restricted vessels	crew_8
9	PPMax Pacific – Post-Panamax vessels	crew_9
10	PPMax Atlantic – Regular vessels	crew_10
11	PPMax Atlantic – Restricted vessels	crew_11
12	PPMax Atlantic – Post-Panamax vessels	crew_12

3.3 Exporting Data



After all the input data have been inserted, it must be exported to Arena model, by pressing the Export Data button.

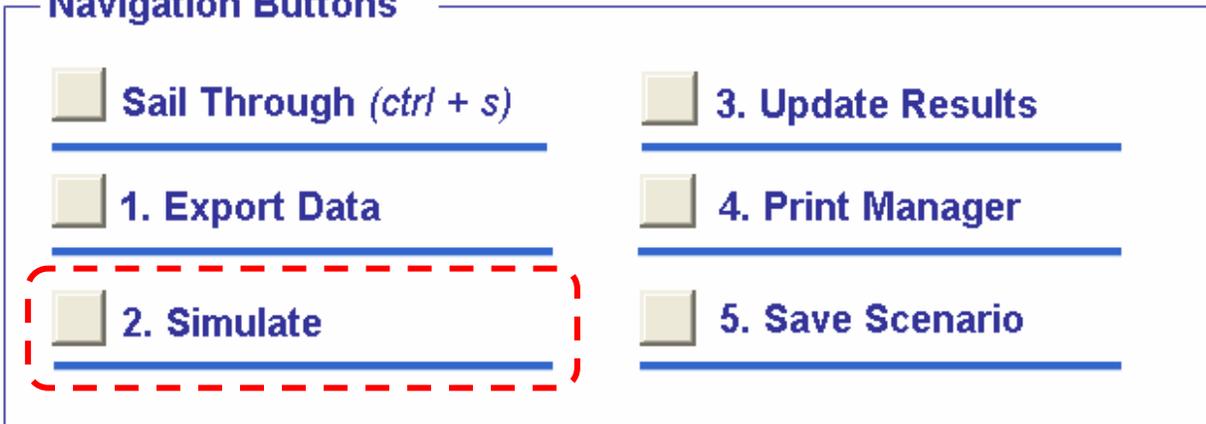
This operation generates files data.wks, locks_failures.wks, Discrete_NB.txt and Discrete_SB.txt in the specified folder.

3.4 Simulation

The user may simulate the scenario with or without animation. However, the second option may dramatically reduce simulation time and speed up analysis.

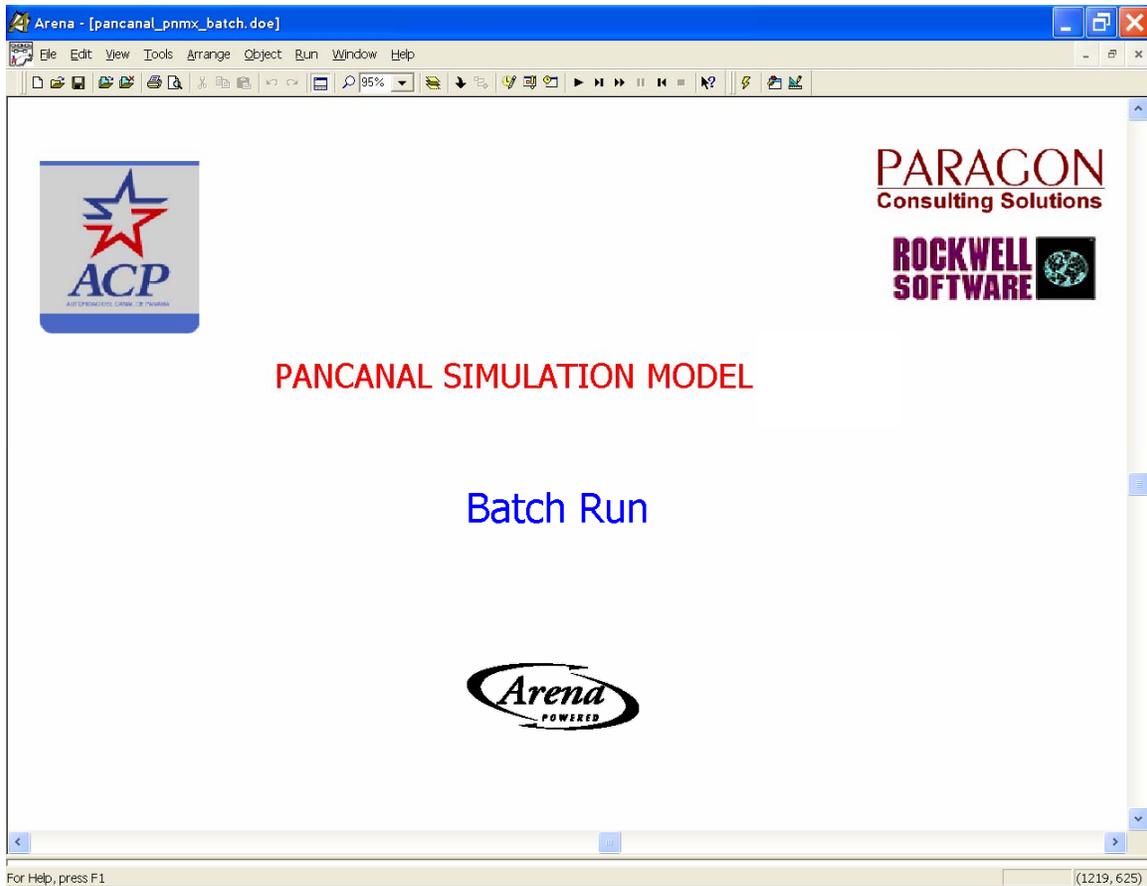


Navigation Buttons



3.4.1 Batch Simulation (no animation)

This option will load ARENA into memory, start simulation automatically, and immediately quit ARENA application upon finishing model run.



3.4.2 Animate (animated Model)

This option will load ARENA into memory, ask for simulation start. It will not quit ARENA application upon finishing model run.

3.4.2.1 Changing Speed

The user can speed up / slow down simulation speed by using CTRL > and CTRL < during simulation run.

3.4.2.2 Altering zoom and Views

Several zooms and views are available, and can be accessed by hotkeys.

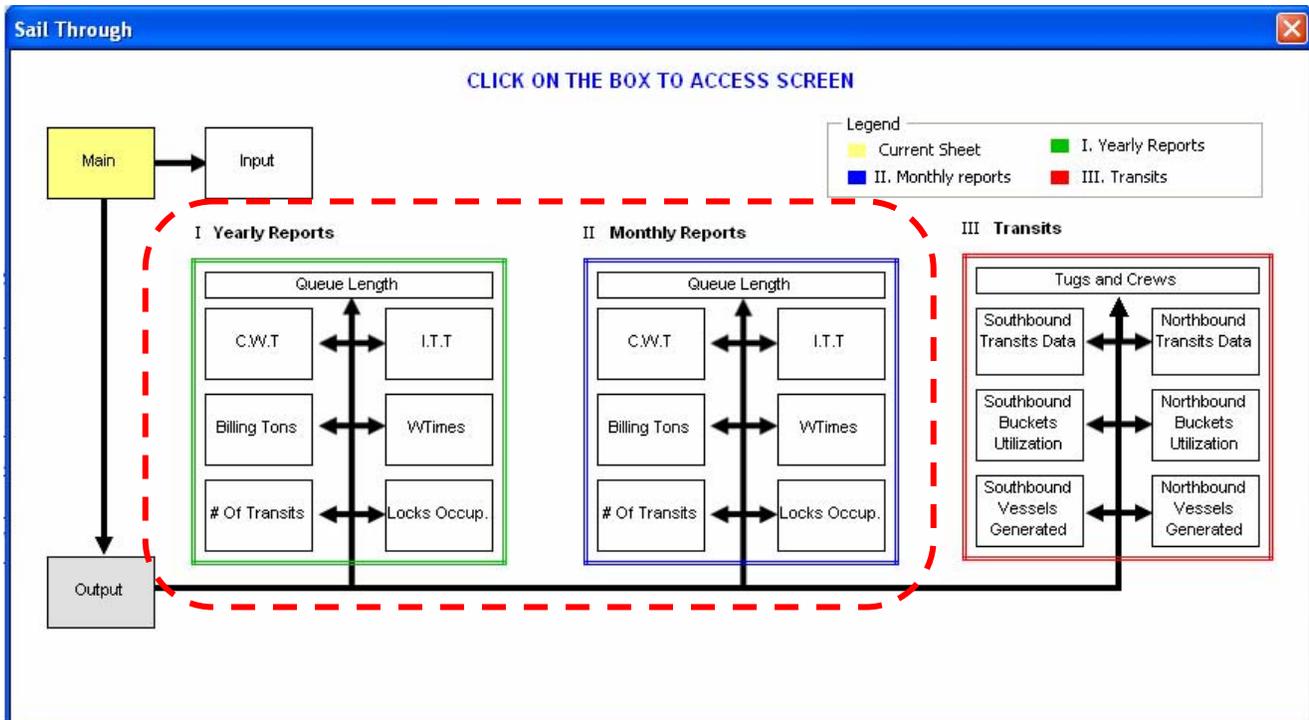
3.4.2.3 Using Toolbar

Standard ARENA toolbar allows the user to save, print, run, stop and operate a simulation model, within a familiar environment.

3.5 Scenario Results

After the scenario is simulated, any user may review the output tables indicated in the Sail Through screen below.

Press CTRL + “o” for fast access to the outputs or go to the Sail Through from the Main Menu and then click on the output box.



Through the output tables, circled, the user is able to access averages and standard deviation of the key performance parameters obtained from the simulated scenario, aggregated per year, per month, and per transit for ships heading southbound and northbound, this data, also, can be find in database file pancanal.mdb :

- Canal Waters Time per Restriction Code;
- In-transit Time per Restriction Code;
- Waiting Times at anchorages and tie-ups;
- Billing Tons per Market Segment;
- # of Transits per Market Segment;
- Locks Occupation;
- Average Queue Length.

Yearly results can be accessed in the Yearly Reports section of the output screens, the monthly results, in the Monthly Reports section and the transits data, in the Transits section.

Note that the standard deviation will only be calculated in case more than one replication was requested.

The interface also supplies consolidated average figures per year or month for the outputs listed above except for Queue Length and Locks Occupation.

3.5.1 Canal Waters Time (CWT)

Below is the next the CWT tables layout for up to 25 (twenty five) years.

Figures in hours are merely illustrative.

Canal Waters Time is equal to the span of time starting from ready time until the ship passes buoy 1 on the other side of the Canal.

Year #		NR		CC		DLCC		CCDL		CR		PDLCC		PCCDL		PCC	
		Avg	StD	Avg	StD												
2002		23.89		27.89		25.04		67.43		25.76		0.00		0.00		0.00	
2003		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2005		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2006		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2007		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2008		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2009		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2010		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2011		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2012		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2013		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2014		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2015		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2016		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2017		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2018		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2019		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2020		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2021		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2022		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2023		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2024		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2025		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2026		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	

The following is the first page of the CWT monthly averages table.

They can be calculated for up to 300 (three hundred) months (12 months for each of the 25 years):



Yearly Report of CWT NORTHBOUND

Sail Through



Main



Consolidate

Southbound

Year #	NR		CC		DLCC		CCDL		CR		PDLCC		PCCDL		PCC	
	Avg	StD	Avg	StD												
2002	23.89		27.89		25.04		67.43		25.76		0.00		0.00		0.00	
2003	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2005	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2006	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2007	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2008	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2009	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2010	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2011	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2012	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2013	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2014	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2015	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2016	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2017	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2018	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2019	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2020	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2021	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2022	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2023	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2024	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2025	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2026	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	

3.5.2 In-transit Times (I.T.T.)

Below is the ITT tables layout for up to 25 (twenty five) years.

Figures in hours are merely illustrative.

In-transit Time is equal to the span of time that starts from Arrival at the first lock until from last lock.



Yearly Report of ITT NORTHBOUND

Sail Through

Main




Consolidate

Southbound

Year #	NR		CC		DLCC		CCDL		CR		PDLCC		PCCDL		PCC	
	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD
2002	12.42		13.33		12.44		8.83		13.22		0.00		0.00		0.00	
2003	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2005	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2006	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2007	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2008	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2009	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2010	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2011	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2012	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2013	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2014	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2015	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2016	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2017	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2018	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2019	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2020	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2021	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2022	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2023	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2024	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2025	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2026	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	

The following is the first page of the ITT monthly averages table.

They can be calculated for up to 300 (three hundred) months (12 months for each of the 25 years):

		Monthly Report of ITT NORTHBOUND <div style="float: right; text-align: right;"> Sail Through Main </div> <div style="clear: both;"></div> <div style="text-align: right; margin-top: 5px;"> </div>															
		<input type="button" value="Consolidate"/> <input type="button" value="Southbound"/>															
Year #	Month	NR		CC		DLCC		CCDL		CR		PDLCC		PCCDL		PCC	
		Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD
2002	out	12.80		14.04		12.85		8.94		14.13		0.00		0.00		0.00	
2002	nov	12.88		14.73		13.16		9.01		14.30		0.00		0.00		0.00	
2002	dez	11.01		10.93		11.07		8.55		9.74		0.00		0.00		0.00	
2002	jan	10.85		12.29		11.47		8.64		14.47		0.00		0.00		0.00	
2002	fev	13.04		13.96		12.86		9.33		13.58		0.00		0.00		0.00	
2002	mar	12.02		13.50		12.57		9.17		12.56		0.00		0.00		0.00	
2002	abr	13.02		14.35		12.98		9.18		12.76		0.00		0.00		0.00	
2002	mai	10.93		13.04		11.45		8.45		13.07		0.00		0.00		0.00	
2002	jun	13.80		13.75		12.86		8.59		12.44		0.00		0.00		0.00	
2002	jul	13.43		12.41		12.30		8.50		13.75		0.00		0.00		0.00	
2002	ago	13.23		13.91		13.02		8.65		14.51		0.00		0.00		0.00	
2002	set	11.99		13.00		12.75		8.98		13.35		0.00		0.00		0.00	
2003	out	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	nov	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	dez	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	jan	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	fev	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	mar	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	abr	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	mai	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	jun	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	jul	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	ago	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	set	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	out	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	nov	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	

Expected output is calculated both based on the first year monthly number of transits and on the yearly traffic increase input or calculated in the Yearly Evolution of Transits table (see Sailing Through Inputs).



Monthly Report of # of Transits (in x out)
NORTHBOUND

Sail Through

Main




<< Back

Year #	Month	Container		Dry Bulk		General Cargo		Others		Passengers		Refrigerated		Tankers		Vehicle Carriers	
		Abs	%	Abs	%	Abs	%	Abs	%	Abs	%	Abs	%	Abs	%	Abs	%
2002	Jan	-3.0	-3.3%	-3.8	-4.1%	-2.2	-6.5%	-4.2	-7.6%	-1.0	-100.0%	-5.4	-7.6%	-3.4	-4.8%	-1.2	-4.4%
2002	Feb	-1.9	-2.0%	-1.4	-1.2%	-2.0	-4.9%	-0.3	-0.5%	1.0	0.0%	0.4	0.7%	-1.6	-2.7%	-1.9	-5.4%
2002	Mar	-0.1	-0.1%	1.2	1.3%	0.1	0.2%	2.1	4.4%	-1.0	-100.0%	0.5	0.8%	1.3	2.2%	0.7	2.9%
2002	Apr	1.7	2.2%	-0.8	-0.8%	0.2	0.3%	-1.5	-2.8%	-0.8	-6.6%	-0.5	-0.7%	-1.5	-2.2%	0.8	2.9%
2002	May	0.5	0.7%	-0.4	-0.3%	0.9	2.3%	-0.1	-0.1%	1.0	26.5%	1.3	2.2%	-0.2	-0.2%	-0.1	-0.3%
2002	Jun	-0.4	-0.5%	-0.5	-0.5%	-1.0	-2.1%	1.4	2.7%	0.1	1.2%	-2.3	-2.9%	2.6	3.6%	-0.1	-0.2%
2002	Jul	-1.2	-1.5%	0.4	0.4%	1.1	2.3%	-0.8	-1.6%	0.1	1.2%	-0.8	-0.8%	-2.5	-3.6%	0.7	2.9%
2002	Aug	0.8	1.0%	1.9	2.4%	-1.0	-2.3%	1.1	2.3%	-1.8	-9.5%	0.1	0.1%	1.4	2.2%	-0.2	-0.9%
2002	Sep	0.7	0.9%	-4.4	-4.0%	0.1	0.2%	-0.8	-1.6%	0.2	1.2%	-3.9	-2.8%	1.5	2.2%	-0.2	-0.7%
2002	Oct	-2.2	-2.7%	4.2	4.6%	-0.8	-1.5%	-0.6	-1.2%	0.2	1.2%	2.9	2.2%	-2.5	-3.8%	-0.1	-0.5%
2002	Nov	0.8	1.0%	-1.7	-1.7%	0.2	0.3%	-0.1	-0.2%	1.0	34.9%	0.5	0.4%	-1.2	-1.4%	-0.2	-0.7%
2002	Dec	-0.1	-0.2%	0.2	0.2%	1.9	4.7%	1.5	2.9%	1.0	0.0%	2.7	3.5%	1.6	2.2%	-0.3	-1.0%

3.5.7 Queue Length

The rate (%) of occupation of each lock is calculated per year and per month for up to 25 (twenty five) years and per direction of travel.

The queue lengths are measured every 30 (thirty) minutes.



**Yearly Report of Queue Length
NORTHBOUND**

Sail Through
 Main



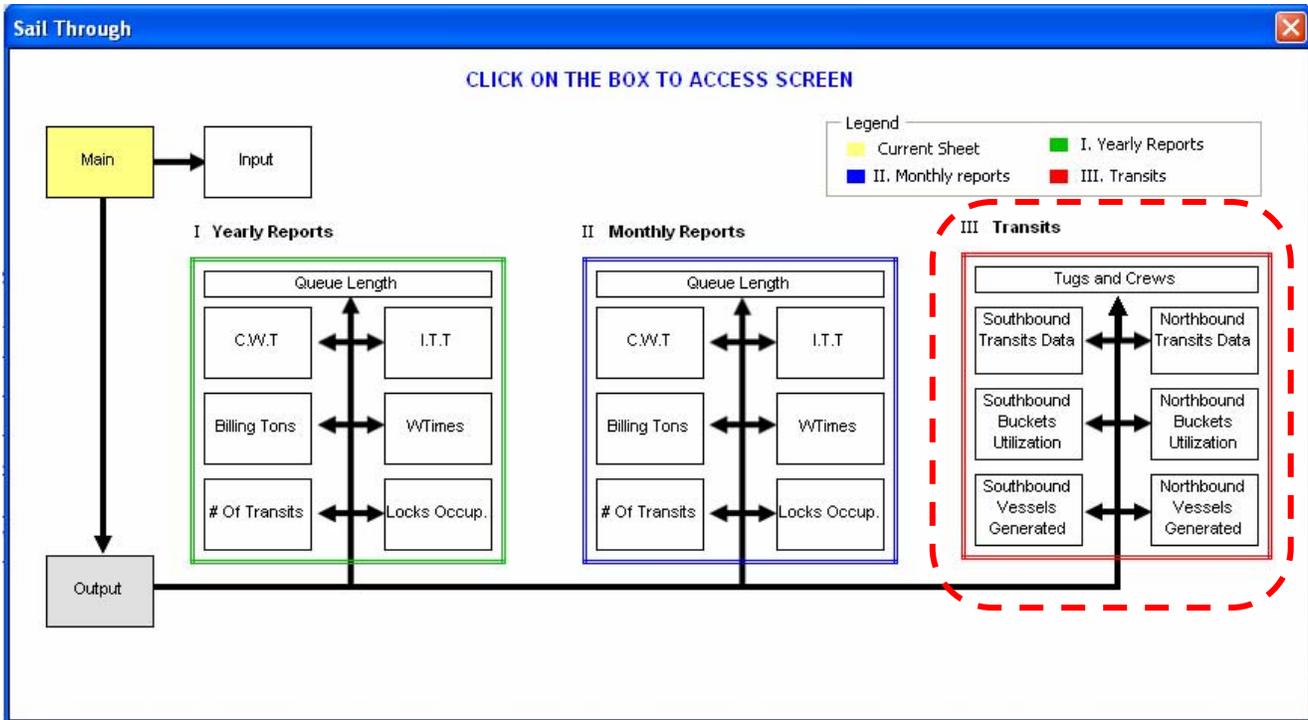
Year #	Pac_moor		MF_lock		MF_TU		TU_MF_PM		TU_PM		PM_lock		Aux_PM_Lock		Cut		Cue_moor.		Gatun_anc		
	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	
2015	1.19		0.00		0.00		0.00		0.00		0.01		0.00		0.00		0.00		0.00		0.00
2016	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2017	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2018	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2019	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2020	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2021	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2022	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2023	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2024	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2025	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2026	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2027	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2028	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2029	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2030	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2031	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2032	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2033	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2034	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2035	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2036	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2037	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2038	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
2039	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00

The following is the first page of the Locks Occupation Monthly Report.

They can be calculated for up to 300 (three hundred) months (12 months for each of the 25 years):

		Monthly Report of Queue Length NORTHBOUND																			
		<input type="button" value="Southbound"/> <input type="button" value=">>"/>																			
Year #	Month	Pac moor		MF lock		MF TU		TU MF PM		TU PM		PM lock		Aux PM Lock		Cut		Cuc moor		Gatun_anc	
		Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD	Avg	StD
2002	Jan	1.31		0.00		0.00		0.00		0.00		0.02		0.00		0.00		0.00		0.00	
2002	Feb	1.52		0.01		0.00		0.00		0.00		0.03		0.00		0.00		0.00		0.00	
2002	Mar	1.37		0.01		0.00		0.00		0.00		0.02		0.00		0.00		0.00		0.00	
2002	Apr	1.41		0.01		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2002	May	1.27		0.01		0.00		0.00		0.00		0.02		0.00		0.00		0.00		0.00	
2002	Jun	1.33		0.00		0.00		0.00		0.00		0.06		0.00		0.00		0.00		0.00	
2002	Jul	1.38		0.01		0.00		0.00		0.00		0.03		0.00		0.00		0.00		0.00	
2002	Aug	1.29		0.00		0.00		0.00		0.00		0.05		0.00		0.00		0.00		0.00	
2002	Sep	1.61		0.02		0.00		0.00		0.00		0.08		0.00		0.00		0.00		0.00	
2002	Oct	1.63		0.02		0.00		0.00		0.00		0.07		0.00		0.00		0.00		0.00	
2002	Nov	1.58		0.02		0.00		0.00		0.00		0.08		0.00		0.00		0.00		0.00	
2002	Dec	1.36		0.00		0.00		0.00		0.00		0.04		0.00		0.00		0.00		0.00	
2003	Jan	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	Feb	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	Mar	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	Apr	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	May	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	Jun	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	Jul	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	Aug	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	Sep	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	Oct	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	Nov	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2003	Dec	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	Jan	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	Feb	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	Mar	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	Apr	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	May	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	Jun	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	Jul	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
2004	Aug	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	

3.6 Transits Data



The log files may be accessed by the user through the boxes circled in the picture above, if the logs were generated. If opened through the interface, not more than 65,000 (sixty thousand lines) will be shown on the screen due to Excel spreadsheet limitations. If the full log is to be analyzed, it should be opened straight from the logfile.mdb file.

3.6.1 Tugs and Lock Crews (count of # of ships per lock shift)

File: Tug_Crew

This file contains information about tug requirements and count of number of ships that locked during the simulation, including:

- Average and Maximum number of tugs utilized per shift and tug area for up to 300 (three hundred) months (25 years x 12 months);
- Count of number of Non-restricted, Panamax Restricted and Post-panamax vessels that locked per lock and shift for up to 300 (three hundred) months (25 years x 12 months), being NR and CR ships as Regular ships, Restricted CC, DLCC and CCDL ships and Post-panamax PCC, PCCDL, PDLCC, PCCHDL and PDLCCH ships;
- Replication number.

Headings	Example
AVG_Balboa_Tugs_A_S1	1,11
MAX_Balboa_Tugs_A_S1	8,00
AVG_Balboa_Tugs_A_S2	0,01
MAX_Balboa_Tugs_A_S2	4,00
AVG_Balboa_Tugs_A_S3	0,12
MAX_Balboa_Tugs_A_S3	3,00
AVG_Lake_Tugs_A_S1	0,02
MAX_Lake_Tugs_A_S1	2,00
AVG_Lake_Tugs_A_S2	0,15
MAX_Lake_Tugs_A_S2	2,00
AVG_Lake_Tugs_A_S3	0,00
MAX_Lake_Tugs_A_S3	0,00
AVG_PAC_PP_Tugs_A_S1	0,00
MAX_PAC_PP_Tugs_A_S1	0,00
AVG_PAC_PP_Tugs_A_S2	0,00
MAX_PAC_PP_Tugs_A_S2	0,00
AVG_PAC_PP_Tugs_A_S3	0,00
MAX_PAC_PP_Tugs_A_S3	0,00
AVG_PAC_PP_Tugs_B_S1	0,00
MAX_PAC_PP_Tugs_B_S1	0,00
AVG_PAC_PP_Tugs_B_S2	0,00
MAX_PAC_PP_Tugs_B_S2	0,00
AVG_PAC_PP_Tugs_B_S3	0,00
MAX_PAC_PP_Tugs_B_S3	0,00
AVG_CUT_Tugs_A_S1	0,14
MAX_CUT_Tugs_A_S1	3,00
AVG_CUT_Tugs_A_S2	0,83
MAX_CUT_Tugs_A_S2	5,00
AVG_CUT_Tugs_A_S3	0,01
MAX_CUT_Tugs_A_S3	1,00

Northbound Headings	Example
AVG CUT Tugs B S1	0,00
MAX CUT Tugs B S1	0,00
AVG CUT Tugs B S2	0,00
MAX CUT Tugs B S2	0,00
AVG CUT Tugs B S3	0,00
MAX CUT Tugs B S3	0,00
AVG ATL GT Tugs A S1	1,06
MAX ATL GT Tugs A S1	2,00
AVG ATL GT Tugs A S2	0,01
MAX ATL GT Tugs A S2	10,00
AVG ATL GT Tugs A S3	0,11
MAX ATL GT Tugs A S3	8,00
AVG PP Tugs A S1	0,00
MAX PP Tugs A S1	0,00
AVG PP Tugs A S2	0,00
MAX PP Tugs A S2	0,00
AVG PP Tugs A S3	0,00
MAX PP Tugs A S3	0,00
AVG PP Tugs B S1	0,00
MAX PP Tugs B S1	0,00
AVG PP Tugs B S2	0,00
MAX PP Tugs B S2	0,00
AVG PP Tugs B S3	0,00
MAX PP Tugs B S3	0,00
MF_Reg_S1	6,37
MF_Reg_S2	0,87
MF_Reg_S3	6,40
MF_Rest_S1	7,53
MF_Rest_S2	2,90
MF_Rest_S3	6,73
PM_Reg_S1	7,63
PM_Reg_S2	1,13
PM_Reg_S3	4,87
PM_Rest_S1	4,10
PM_Rest_S2	8,50
PM_Rest_S3	4,57

Northbound Headings	Example
GT_Reg_S1	2,00
GT_Reg_S2	4,20
GT_Reg_S3	7,47
GT_Rest_S1	7,87
GT_Rest_S2	8,40
GT_Rest_S3	0,90
PP_PAC_Reg_S1	0,00
PP_PAC_Reg_S2	0,00
PP_PAC_Reg_S3	0,00
PP_PAC_Rest_S1	0,00
PP_PAC_Rest_S2	0,00
PP_PAC_Rest_S3	0,00
PP_PAC_PP_S1	0,00
PP_PAC_PP_S2	0,00
PP_PAC_PP_S3	0,00
PP_ATL_Reg_S1	0,00
PP_ATL_Reg_S2	0,00
PP_ATL_Reg_S3	0,00
PP_ATL_Rest_S1	0,00
PP_ATL_Rest_S2	0,00
PP_ATL_Rest_S3	0,00
PP_ATL_PP_S1	0,00
PP_ATL_PP_S2	0,00
PP_ATL_PP_S3	0,00
NREP	1

3.6.2 Transits Data

Files: *NB_Traffic* and *SB_Traffic*

These files contain detailed information about finished transits per direction, including:

- Transit number;
- Vessel characteristics;
- Time at which the vessel passed by each point or mark of the Canal;
- Spans of time between consecutive marks;
- Replication and scenario numbers;
- Old and New CWT calculations;
- ITT;
- If vessel was scheduled on the same day of her arrival (*flow_traffic*);
- If channel restricted (*restch*).

The next table indicates examples of outputs per each heading for northbounds. Similar headings are used for southbound transits.

Northbound Headings	Example
transit_number	134
transit_number_t	0
day	1
month	1
year	1
week	40
category	132
vessel	3278
N_MS_NB	6
Lenght	456,17
Beam	69,05
draft	21,50
ballast	1
booking	0
booking_ori	0
pd	0
Billing_tons	6.640,00
hml	1
restriction	1
itl	2
lane	2
Atr_scenario	82

Northbound Headings	Example
T_arrival/1440+T_INIT	29/9/01 14:59
T_underway/1440+T_INIT	30/9/01 16:26
t_real_underway/1440+T_INIT	30/9/01 20:04
t_real_arrival_buoy_15/1440+T_INIT	30/9/01 20:47
t_real_leave_buoy_15/1440+T_INIT	30/9/01 20:47
t_real_arrival_buoy_26/1440+T_INIT	30/9/01 21:04
t_real_leave_buoy_26/1440+T_INIT	30/9/01 21:04
t_real_arrival_MF_northbound/1440+T_INIT	30/9/01 21:21
t_real_enter_MF_northbound/1440+T_INIT	30/9/01 21:21
t_real_clear_MF_northbound/1440+T_INIT	30/9/01 22:10
t_real_leave_MF_northbound/1440+T_INIT	30/9/01 22:10
t_real_arrival_tieup_MF_PM/1440+T_INIT	30/9/01 22:21
t_real_leave_tieup_MF_PM/1440+T_INIT	30/9/01 22:21
t_real_arrival_PM_northbound/1440+T_INIT	30/9/01 22:31
t_real_enter_PM_northbound/1440+T_INIT	30/9/01 22:31
t_real_clear_PM_northbound/1440+T_INIT	30/9/01 23:03
t_real_leave_PM_northbound/1440+T_INIT	30/9/01 23:03
T_real_arrival_PPMAX_Pac_NB/1440+T_INIT	21/9/01 0:00
T_real_enter_PPMAX_Pac_NB/1440+T_INIT	21/9/01 0:00
T_real_clear_PPMAX_Pac_NB/1440+T_INIT	21/9/01 0:00
T_real_leave_PPMAX_Pac_NB/1440+T_INIT	21/9/01 0:00
t_real_arrival_st_2035/1440+T_INIT	30/9/01 23:10
t_real_leave_st_2035/1440+T_INIT	30/9/01 23:10
t_real_arrival_cucachara_NB/1440+T_INIT	30/9/01 23:13
t_real_leave_cucachara_NB/1440+T_INIT	30/9/01 23:13
t_real_arrival_gamboa_moorings/1440+T_INIT	30/9/01 23:56
t_real_leave_gamboa_moorings/1440+T_INIT	30/9/01 23:56
t_real_arrival_buoy_79/1440+T_INIT	1/10/01 0:17
t_real_leave_buoy_79/1440+T_INIT	1/10/01 0:17
t_real_arrival_gt_anchor/1440+T_INIT	1/10/01 1:41
t_real_leave_gt_anchor/1440+T_INIT	1/10/01 1:41
t_leave_gtl/1440+T_INIT	1/10/01 0:13
t_real_arrival_gt_northbound/1440+T_INIT	1/10/01 1:58
t_real_enter_gt_northbound/1440+T_INIT	1/10/01 1:58
t_real_clear_gt_northbound/1440+T_INIT	1/10/01 3:15

Northbound Headings	Example
t_real_leave_gt_northbound/1440+T_INIT	1/10/01 3:15
T_real_arrival_PPMAX_Atl_NB/1440+T_INIT	21/9/01 0:00
T_real_enter_PPMAX_Atl_NB/1440+T_INIT	21/9/01 0:00
T_real_clear_PPMAX_Atl_NB/1440+T_INIT	21/9/01 0:00
T_real_leave_PPMAX_Atl_NB/1440+T_INIT	21/9/01 0:00
t_real_arrival_buoy_13/1440+T_INIT	1/10/01 3:26
t_real_leave_buoy_13/1440+T_INIT	1/10/01 3:26
t_real_arrival_buoy_7/1440+T_INIT	1/10/01 3:33
t_real_leave_buoy_7/1440+T_INIT	1/10/01 3:33
t_real_arrival_buoy_Atl_NB/1440+T_INIT	1/10/01 3:45
t_real_underway/60-t_underway/60	3,64
t_real_underway/60-T_arrival/60	29,09
t_real_arrival_buoy_15/60-t_real_underway/60	0,72
t_real_leave_buoy_15/60-t_real_arrival_buoy_15/60	0,00
t_real_arrival_buoy_26/60-t_real_leave_buoy_15/60	0,27
t_real_leave_buoy_26/60-t_real_arrival_buoy_26/60	0,00
t_real_arrival_MF_northbound/60-t_real_leave_buoy_26/60	0,29
t_real_enter_MF_northbound/60-t_real_arrival_MF_northbound/60	0,00
t_real_clear_MF_northbound/60-t_real_enter_MF_northbound/60	0,82
t_real_leave_MF_northbound/60-t_real_clear_MF_northbound/60	0,00
t_real_arrival_tieup_MF_PM/60-t_real_leave_MF_northbound/60	0,17
t_real_leave_tieup_MF_PM/60-t_real_arrival_tieup_MF_PM/60	0,00
t_real_arrival_PM_northbound/60-t_real_leave_tieup_MF_PM/60	0,17
t_real_enter_PM_northbound/60-t_real_arrival_PM_northbound/60	0,00
t_real_clear_PM_northbound/60-t_real_enter_PM_northbound/60	0,54
t_real_leave_PM_northbound/60-t_real_clear_PM_northbound/60	0,00
t_real_arrival_st_2035/60-t_real_leave_PM_northbound/60	0,11
T_real_arrival_PPMAX_Pac_NB/60-t_real_leave_buoy_26/60	-237,07
T_real_enter_PPMAX_Pac_NB/60-T_real_arrival_PPMAX_Pac_NB/60	0,00
T_real_clear_PPMAX_Pac_NB/60-T_real_enter_PPMAX_Pac_NB/60	0,00
T_real_leave_PPMAX_Pac_NB/60-T_real_clear_PPMAX_Pac_NB/60	0,00
t_real_arrival_st_2035/60-T_real_leave_PPMAX_Pac_NB/60	239,17
t_real_leave_st_2035/60-t_real_arrival_st_2035/60	0,00
t_real_arrival_cucachara_NB/60-t_real_leave_st_2035/60	0,06
t_real_leave_cucachara_NB/60-t_real_arrival_cucachara_NB/60	0,00
t_real_arrival_gamboa_moorings/60-t_real_leave_cucachara_NB/60	0,71
t_real_leave_gamboa_moorings/60-t_real_arrival_gamboa_moorings/60	0,00
t_real_arrival_buoy_79/60-t_real_leave_gamboa_moorings/60	0,35
t_real_leave_buoy_79/60-t_real_arrival_buoy_79/60	0,00
t_real_arrival_gt_anchor/60-t_real_leave_buoy_79/60	1,41

Northbound Headings	Example
t_real_leave_gt_anchor/60-t_real_arrival_gt_anchor/60	0,00
t_real_arrival_gt_northbound/60-t_real_leave_gt_Anchor/60	0,27
t_real_enter_gt_northbound/60-t_real_arrival_gt_northbound/60	0,00
t_real_clear_gt_northbound/60-t_real_enter_gt_northbound/60	1,29
t_real_leave_gt_northbound/60-t_real_clear_gt_northbound/60	0,00
t_real_arrival_buoy_13/60-t_real_leave_gt_northbound/60	0,18
T_real_arrival_PPMAX_Atl_NB/60-t_real_leave_gt_Anchor/60	-241,70
T_real_enter_PPMAX_Atl_NB/60-T_real_arrival_PPMAX_Atl_NB/60	0,00
T_real_clear_PPMAX_Atl_NB/60-T_real_enter_PPMAX_Atl_NB/60	0,00
T_real_leave_PPMAX_Atl_NB/60-T_real_clear_PPMAX_Atl_NB/60	0,00
t_real_arrival_buoy_13/60-T_real_leave_PPMAX_Atl_NB/60	243,44
t_real_leave_buoy_13/60-t_real_arrival_buoy_13/60	0,00
t_real_arrival_buoy_7/60-t_real_leave_buoy_13/60	0,11
t_real_leave_buoy_7/60-t_real_arrival_buoy_7/60	0,00
t_real_arrival_buoy_Atl_NB/60-t_real_leave_buoy_7/60	0,21
NQ(Q3_NB_queue)+NQ(Q4_NB_queue)+NQ(Q2_NB_queue)+NQ(Q1_NB_queue) +	0,00
NQ(Q3_NB_queue)+NQ(Q4_NB_queue)+NQ(Q2_NB_queue)	0,00
NQ(Q7_NB_queue)+NQ(Q6_NB_queue)	0,00
NQ(Q1_NB_queue)+NQ(Q5_NB_queue)	0,00
t_real_leave_GT_northbound/60+t_real_leave_PPMAX_Atl_NB/60-t_rea	5,89
t_real_arrival_buoy_atlantic_NB/60-T_arrival_old/60	36,78
t_real_arrival_buoy_Atl_NB/60-T_arrival/60	36,78
t_real_leave_gt_anchor/60-t_leave_gtl/60	1,47
NREP	1
Flow traffic	0
Restch	0
Sub_restriction	0

3.6.3 Ships Generation Data

Files: *Ships_NB* and *Ships_SB*

These files contain detailed information about the ships generated, but that had not necessarily completed the transit, which includes:

- Transit number;
- Vessel characteristics;
- Arrival time (in days) starting from beginning of day one (corrected if booked);
- Replication number;
- If channel restricted (restch).

The next table indicates examples of outputs per each heading for northbounds. Similar headings are used for southbound transits.

Northbound Headings	Example
transit_number	1
t_arrival/1440	10,07
category	262
vessel	1371
N_MS_NB	8
Lenght	587,80
Beam	105,94
draft	28,92
ballast	1
booking	1
pd	0
Billing_tons	50.242,00
hml	4
restriction	4
itl	9
NREP	1
year	1
month	1
Restch	0
Sub_restriction	0

3.6.4 Buckets Utilization Data

Files: *NB_Queue* and *SB_Queue*

These files contain detailed information ships utilized the buckets available when entering the Canal:

- Transit number;
- Vessel main characteristics utilized for scheduling the ship;
- Scenario and Replication numbers;
- Number of ships waiting for entering the Canal per restriction and whether restricted or not;
- Arrival, Underway from Outer and Gatun Anchorages, and in/out_of_queue times;
- If channel restricted (restch);
- The bucket restriction number utilized (islot).

The next table indicates examples of outputs per each heading for northbounds. Similar headings are used for southbound transits.

Northbound Headings	Example
transit_number	124
N_MS_NB	5
Restriction	4
Lane	1
booking	0
scenario	81
Total_Restr_In_Q	0
Total_In_Q	0
nq(Q3_SB_queue)	0
nq(Q4_SB_queue)	3
nq(Q2_SB_queue)	7
nq(Q5_SB_queue)	0
nq(Q1_SB_queue)	0
nq(Northbound_Queue_Queue)	8
T_arrival/1400	0,00
T_in_queue/1440	10,48
T_out_queue/1440	8,10
T_underway/1440	10,00
t_leave_gtl/1440	10,19
NREP	11
year	1
month	1
flow traffic	1
islot	4
Restch	0
Sub_restriction	0

3.7 ITT and CWT Reports in the Logfile.mdb

Detailed reports per restriction code and booking status can be obtained from the logfile.mdb database by running the macro named “Generate Time Reports per Direction”. See tables exemplified below under the next items.

3.7.1 ITT Per Booking Status and Restriction

Direction	Booking St.	Restriction	ITT
NB	0	1	9,84
NB	0	2	9,69
NB	0	3	9,63
NB	0	4	9,68
NB	0	5	11,17
NB	1	1	11,69
NB	1	2	9,99
NB	1	3	10,09
NB	1	4	9,72
NB	1	5	12,69
SB	0	1	9,02
SB	0	2	15,06
SB	0	3	13,89
SB	0	4	9,61
SB	0	5	9,84
SB	1	1	10,05
SB	1	2	13,94
SB	1	3	13,52
SB	1	4	9,79
SB	1	5	11,96

3.7.2 New CWT per Booking Status and Restriction

Direction	Booking St.	Restriction	New CWT
NB	0	1	13,28
NB	0	2	11,87
NB	0	3	11,88
NB	0	4	11,98
NB	0	5	14,40
NB	1	1	28,26
NB	1	2	28,24
NB	1	3	28,16
NB	1	4	31,89
NB	1	5	35,85
SB	0	1	10,86
SB	0	2	17,42
SB	0	3	16,29
SB	0	4	12,03
SB	0	5	12,56
SB	1	1	27,64
SB	1	2	37,68
SB	1	3	37,24
SB	1	4	37,69
SB	1	5	37,06

3.7.3 Old CWT per Booking Status and Restriction

Direction	Booking St.	Restriction	Old CWT
NB	0	1	37,71
NB	0	2	25,85
NB	0	3	26,92
NB	0	4	41,66
NB	0	5	36,48
NB	1	1	28,26
NB	1	2	28,24
NB	1	3	28,16
NB	1	4	51,89
NB	1	5	35,85
SB	0	1	40,26
SB	0	2	33,63
SB	0	3	32,39
SB	0	4	30,08
SB	0	5	41,43
SB	1	1	27,64
SB	1	2	37,68
SB	1	3	37,24
SB	1	4	37,69
SB	1	5	37,06