

**Commonwealth of Puerto Rico**  
**DEPARTMENT OF LABOR AND HUMAN RESOURCES**  
**Hon. César J. Almodóvar Marchany - Secretary**

**REVISION OF THE HOUSEHOLD SAMPLE FOR**  
**THE LABOR FORCE SURVEY**  
**1990**

**Bureau of Labor Statistics**  
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**PROCEDURE FOR THE DESIGN AND SELECTION OF THE  
HOUSEHOLD LABOR FORCE SURVEY SAMPLE**

**INTRODUCTION**

The household sample that is used by the Puerto Rico Department of Labor and Human Resources in obtaining information related to the local labor force, was revised to be in harmony with 1990 Population Census.

This revision was conducted by the Special Economic Studies Division of the Bureau of Labor Statistics, with the technical advise of Dr. Miguel A. Valencia, Statistical Consultant for the Puerto Rico Department of Labor and Human Resources.

The Labor Force Survey, also known as the Employment and Unemployment Survey, produces estimates on employment, unemployment and other characteristics of the population. The sampling frame consists of the blocks groups defined by the 1990 Census of Population and Housing. The stratification criteria, geographical and economical, remain the same as in 1980.

**STRATIFICATION**

The seventy eight municipalities of Puerto Rico, were grouped into the following twelve geographical areas:

- |                          |                         |
|--------------------------|-------------------------|
| 1. San Juan Metropolitan | 7. Central West         |
| 2. North East            | 8. North West           |
| 3. South East            | 9. Arecibo Metropolitan |
| 4. Ponce Metropolitan    | 10. North               |
| 5. South West            | 11. Central East        |
| 6. Mayaguez Metropolitan | 12. Caguas Metropolitan |

The aforementioned geographical areas were subdivided into, urban and rural zones, as defined by the 1990 Population Census. Thereafter, twenty four strata were established, twelve for each zone. The odd numbers were assigned to the urban zone and the even numbers to the rural zone.

The above strata were subdivided by economic level. The following variables were used in the determination of the economic indicator:

- P = Proportion of owner occupied housing units
- Q = Proportion of renter occupied housing units
- R = Median contract rent for renter occupied housing units
- V = Median value of owner occupied housing units

IE = Economic indicator

The following algorithm was established:

$$IE = P \left( \frac{V}{1000} \right) + Q \left( \frac{R}{5} \right)$$

The resulting economic indicators were grouped into four economic levels in the urban areas except in San Juan Metropolitan area where five levels were used. In the rural areas only two economic levels were defined.

### NEW CONSTRUCTIONS

In order to include in the sample, representation of housing units built after April 1990, both private and public construction projects are added periodically to the sampling frame. The economic levels for the new private construction projects are determined as follows:

#### San Juan Area (Strata 1)

<u>Economic Level</u>	<u>Housing Units Sale Prices</u> <u>Ranges in dollars</u>
1	Less than 40,000
2	40,000 - 69,999
3	70,000 - 99,999
4	100,000 - 149,999
5	150,000 and over

#### Other Metropolitan Area: Ponce (Strata 7); Mayaguez (Strata 11); Arrecibo (Strata 17); and Caguas (Strata 23)

<u>Economic Level</u>	<u>Housing Units Sale Prices</u> <u>Ranges in dollars</u>
1	Less than 35,000
2	35,000 - 59,999
3	60,000 - 79,999
4	80,000 and over

#### All Other Areas (Stratas 3, 5, 9, 13, 15, 19 and 21)

<u>Economic Level</u>	<u>Housing Units Sale Prices</u> <u>Ranges in dollars</u>
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1	Less than 35,000
2	35,000 - 54,999
3	55,000 - 69,999
4	70,000 and over

For the public sector, the Economic Levels were the followings:

#### Economic Level 1

- a) Any conventional, direct purchase or section eight housing project.
- b) Low cost, Farmer's Home, semi-built or Basic habitable project.

#### Economic Level 2

- a) Any housing built project under Law 10, 72 and 141.

A new constructed housing project is included in the sampling frame if it has ten or more units. Several sources supply the necessary information in this stratum maintenance:

1. Permits and Regulations Administration
2. Puerto Rico Housing Department
3. Puerto Rico Planning Board
4. Local Offices of the Bureau of Labor Statistics
5. Private Construction Companies
6. Local Press

#### PROCEDURE OF SELECTION AND DESIGN

Data used for the selection of the household sample was obtained from the U.S. Bureau of the Census through Puerto Rico Planning Board. Census divided the Island into sectors (SC), groups of blocks and blocks within each county. The provided material consisted of:

1. 1990 Census data files STF1A and STF1B. These files were processed, and then offered for each blocks group of each census sector: the county, ward, sub-ward, place, total housing units, total occupied housing units, population and other important needed information for the selection.
2. 1990 Census County Block Maps. It is a complete set of maps to be used in the presegmenting, segmenting, and enumeration of the sample.
3. Other required materials

- a. Topographic maps
- b. Aerial photos
- c. Zoning maps

Census blocks groups were ordered for urban and rural areas, following the criteria of geographic strata, economic indicator level, county and census tract.

Each group of blocks offer this coded information: county, county name, ward, subward, place, census tract, and geographic areas (urban and rural).

For each block group a measure of size was computed and sizes were accumulated in the resulting sampling frame.

The measure of size was calculated based on the number of housing units, taking as factor an average of 6 for urbanized areas and 12 units for the rurals ones. This measure indicates the number of segments into which each block group may be divided. The accumulated size was used in the process of block group sample selection.

#### SELECTION OF BLOCK GROUPS

Systematic selection with proportional probability to size was used to obtain the primary sample of BG's. A sampling interval of 200 was determined, considering that a sample of about 6,000 housing units would be effective, from a total of 1,191,855 units enumerated in the 1990 Census.

Using a table of random numbers, a selection number between 1 and 200 was chosen. The random start numbers were 21 for urban and 199 for rural areas. To the initially selected random number a sampling interval of 200 was added to obtain the second selection number. The rest of the selected numbers were obtained by adding multiples of 200 to the random start number.

#### Example:

21 was chosen as the initial selection number in urban areas. 200 was added to obtain 221, the second selection number and added again 200 to obtain 421 as the third selection number and so on.

The BG's selected were those with an accumulated size equal or higher than the selection number. The first BG selected in the urban areas was 137-1201. It's accumulated size 26, was equal or higher than 21, the random start. The next BG to be selected should have an accumulated size of 221 or higher. The resultant BG was 137-1211 with an accumulated size of 238.

This process was continued up to the last BG in the ordered list for urban areas.

The same process was used in the rural area but starting with the random number 199.

### **SELECTION OF BLOCKS**

A block is part of a BG and it is bounded by clearly defined limits such as streets, roads, rivers, etc. For the selection of the block (or blocks), the size of the selected BG is distributed among the different blocks in proportion to their dwelling units counts. The blocks are then arrayed in geographical order and the sizes are added cumulatively. To find the random number which designates the selected block, the total size accumulated up to the previous BG is subtracted from the selection number corresponding to the selected BG.

### **PRESEGMENTING**

Presegmenting involves the procedure of doing an approximate count of housing units in different parts in which large blocks can be subdivided. Blocks with less than 100 dwelling units were not presegmented.

Whenever the number of housing units, counted in the presegmentation process, differs considerably from the figure given by the Census, the presegmentation is verified. If the difference persists a through out study using aerial photos or zoning maps is conducted in order to determine if an error of block identification exists in the census map.

### **SEGMENTING**

Each selected block, or part of it, has to be divided into as many segments as its measure of size indicates. A sketch is prepared for the selected block, or for part of the selected block using the information contained in the presegmentation. This sketch is sent to a local office. A Data Collector visits the area and makes the segmentation of the block.

Segmentation consists in counting housing units in a block or part of the block and marking them in the sketch. If the block is urbanized and the housing units follow a definite pattern within

the block, then it is enough to mark the housing unit in the sketch and write down it's postal number. The segmentation sketch should includes names of streets and other references.

If a block is part of a rural area, or a slum area, where housing units do not follow a definite pattern, then Form GT-4 is filled out and a list of housing units is prepared. The housing units are numbered consecutively, starting in the northwest corner (unless this is found inconvenient due to topographical conditions) and following a clockwise movement, when it is possible.

### SELECTION OF SEGMENT

From each selected block a segment was chosen at random, using a table of random numbers.

### SUBSTITUTION OF SEGMENTS, BLOCKS AND SC

Each segment is enumerated eight times. It involves two periods. First, four consecutive enumerations are done, one for each month. Then, the segment recesses during eight months and is enumerated four additional times. Afterward, the segment becomes inactive and is replaced, following the rotation plan. Every time a segment is replaced, two segments are skipped.

A block goes out of the sample and is replaced when it has no more segments to replace the last segment that became inactive. New blocks entering the sample are presegmented if large. Small blocks or selected parts of presegmented blocks are sent to local offices for segmentation. Thus, the process is restarted.

A BG goes out of the sample and is replaced after it's last block has no more segments for replacement. In this case, the BG that going out is substituted by the next BG within the stratum. The first block of this new BG is assigned for presegmentation (or segmentation) and the process continues.

### SPECIAL SITUATIONS

#### 1. Hypothetical segments

Hypothetical segments, without housing units, are formed whenever there has been a decrease of two thirds or more in the number of housing units given by the census, as compared with those found in the presegmentation of the block. This is done to avoid an increase in the variance

of the estimates, caused by excessively small segments. These segments will rotate in the sample without housing units.

2. Segments without housing units

Segments without housing units are also created even when there has been no considerable decrease. This will occur, for example, when regular distribution of housing units in a segment is obstructed by topographical conditions. Consequently, some segments will have more units than the average (6 or 12), while other segments will have none.

3. Cluster (grouping) of BG's

Sometimes, to neutralize effects produced by a high decrease in housing units, when boundaries are not clearly recognized, or a BG's is without housing units, two or more adjacent BG are grouped. The selection probability for the resulting cluster is proportional to the new grouped BG's added sizes.

4. Cluster (grouping) of blocks

Blocks with very few dwelling units or none at all are grouped together with adjacent blocks to give them probabilities of selection. Two or more adjacent blocks can also be grouped when land boundaries between them are not easily recognized in the field.

### SUBSAMPLING

Subsampling is done, in order to reduce field work, when a segment is too large (9 or more housing units in an urbanized area, or 19 or more in nonurbanized areas). In such cases, a segment is divided in two halves and one of them is selected at random. After enumeration, cards corresponding to these segments were duplicated so that the weights should be adjusted.

### MAINTENANCE OF SAMPLE

Monthly, a sample of segments enters for the first time. Sketches of the blocks are prepared and sent to local offices for presegmentation and segmentation. Then, selection of segments is done at Central Office.

Meanwhile, Form GT-7 (Segment Assignment Control) is prepared.

It includes segments to be enumerated in each sample and the number of housing units assigned in each segment.

#### ROTATION PLAN

A rotation plan is established to avoid continuously visiting the same households, which would adversely affect the cooperation of respondents.

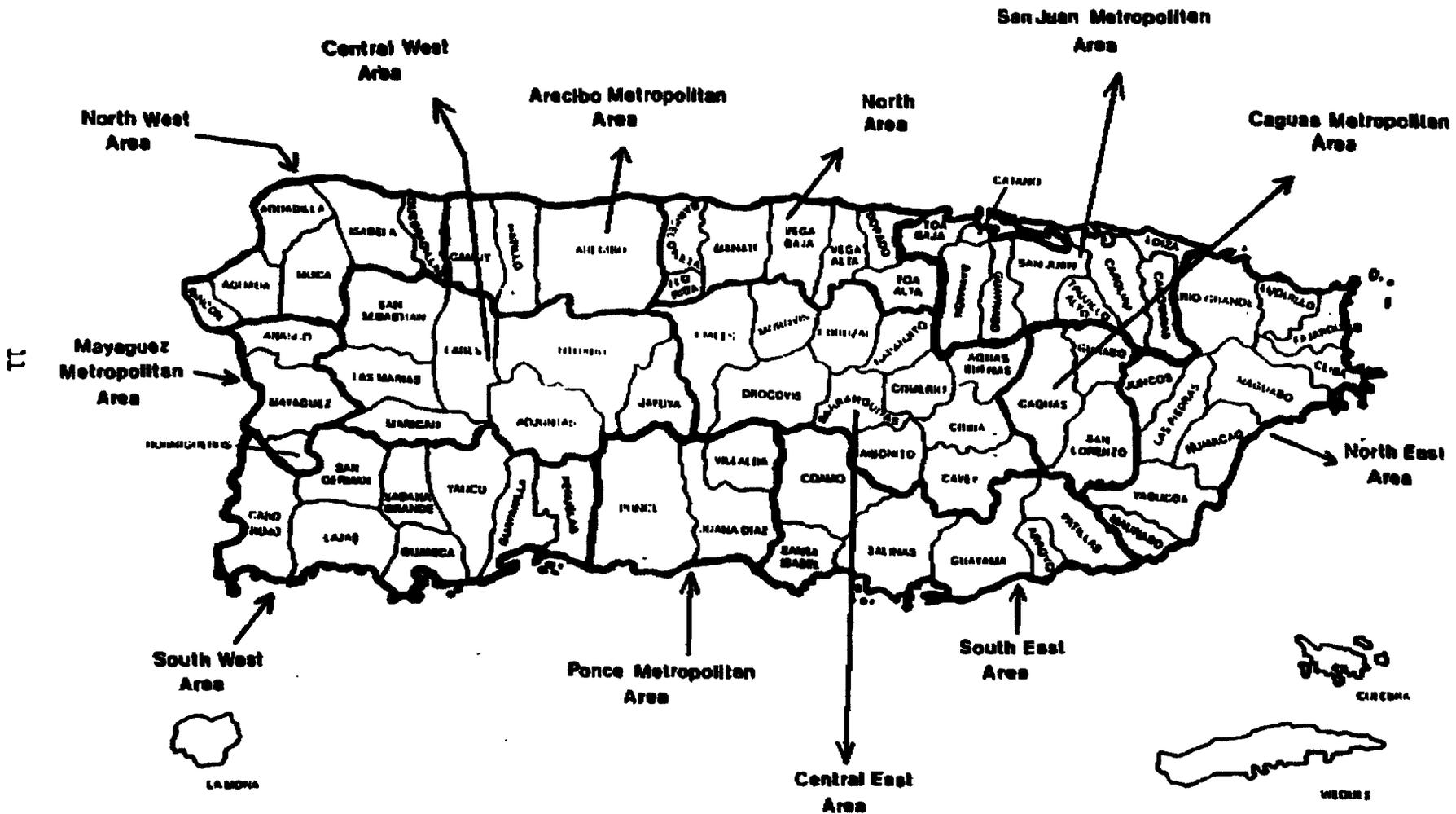
The total sample of selected segments was divided into eight rotation groups. Segments originally selected constituted samples 404, 405, 406, 407, 408, 409, 410 and 411. Where the first digit (4) means the year and the last two digits the month. Sample 404 corresponds to April 1994. When segments in a rotation group are substituted by others these are constituted by corresponding group in samples, and so on. Each segment is substituted by the third following segment in geographical order within the block (two segments are skipped).

Each month, a new rotation group enters the sample for the first time and another group returns for a second period of four months. Households are visited in four consecutive months. After eight recess months, they are visited in four additional months, then become inactive. See rotation plan included.

**APPENDICES**

**AREAS FOR STRATIFICATION  
ROTATION PLAN  
PROGRAMS DOCUMENTATION**

**AREAS FOR STRATIFICATION**



## ROTATION PLAN 1994

Year and Month	92	93	94
1994			
JANUARY	.....10.11.12	.01	10.11.12 .01
FEBRUARY	11.12	.01.02	11.12 .01.02
MARCH	12	.01.02.03	12 .01.02.03
APRIL		.01.02.03.04	.01.02.03.04
MAY		02.03.04.05	02.03.04.05
JUNE		03.04.05.06	03.04.05.06
JULY		04.05.06.07	04.05.06.07
AUGUST		05.06.07.08	05.06.07.08
SEPTEMBER		06.07.08.09	06.07.08.09
OCTOBER		07.08.09.10	07.08.09.10
NOVEMBER		08.09.10.11	08.09.10.11
DECEMBER		09.10.11.12	09.10.11.12
ROTATION GROUP			

12

Department of Labor and Human Resources  
 Bureau of Labor Statistics  
 Special Economic Studies Division

**DOCUMENTATION****Operational Procedure to produce the Geographic,  
Economic and Blocks Group Report of Census 1990****Programs Descriptions**

1. CENSUS - Selects the blocks groups, from the original data of the 1990 Census, corresponding to level 090.
2. CENSOBB - Calculates the level, economic indicator, and size; assigns economic strata, and also edits data in spaces for rural and urban zone.
3. OSORTBBS - Organizes pre-selected data of the blocks groups and orders by strata area, economic level, geographic code, censal sector, blocks group, ward, subward and place.
4. RURALBB - Produces the rural list by strata area and blocks group.
5. URBANOBB - Produces the urban list by strata area and blocks group.

**Operational Procedure to produce the Municipality and Blocks  
Group Report of Census 1990.****Program Descriptions**

1. TEST 100 - Selects the blocks groups, from the original data of the 1990 Census, corresponding to level 100.
2. OSORTBB - Organizes pre-select data of the blocks groups by municipality, censal sector, ward, subward, place, blocks group and block.
3. RURALBBS - Produces the rural list by municipality and blocks.
4. URBANBBS - Produces the urban list by municipality and blocks.
5. RURALBB1 - Produces the rural list by municipality and blocks grouped records. This list was used during the data analysis searching differences between blocks groups records level 090 and level 100.
6. URBANBB1 - Produces the urban list by municipality and blocks grouped records. This report was used during the data analysis, searching differences between blocks groups records levels 090 and 100.

These programs are in our main frame computer office of the Department of Labor Building, six (6) story, library name: PDOL201.SRCELIB.COBOL.