

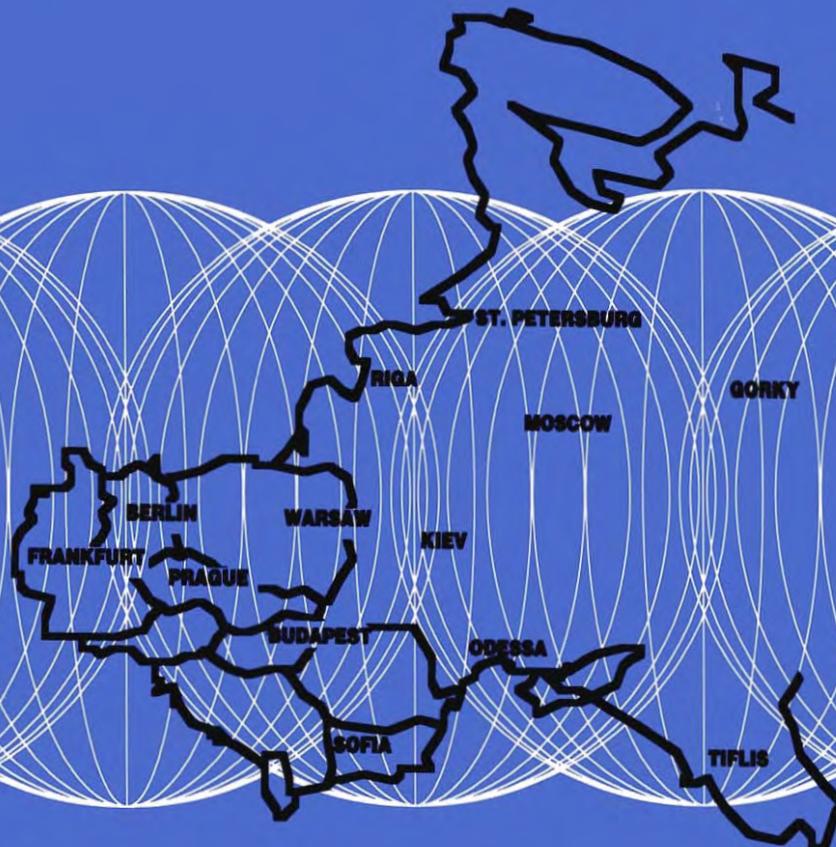
**AN INTERNATIONAL ACTIVITIES PROJECT**

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**FROM PLANNING TO MARKETS  
HOUSING IN EASTERN EUROPE**

**PROCEDURES FOR IMPLEMENTING  
THE RETIRED OFFICER HOUSING  
CERTIFICATE PROGRAM**

**DETERMINING FUNDING VALUES FOR  
NEW HOUSING UNITS**



**THE URBAN INSTITUTE**

**Prepared for the Office of Housing and Urban Programs (USAID)**

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# **PROCEDURES FOR IMPLEMENTING THE RETIRED OFFICER HOUSING CERTIFICATE PROGRAM**

## **DETERMINING FUNDING VALUES FOR EXISTING HOUSING UNITS**

### **OVERVIEW OF PRICING METHODOLOGY**

#### ***Introduction***

A certificate entitles an officer to a certain amount of money that is shown on a bank funding letter. The bank funding letter always has three prices showing how much an officer can receive to purchase a home at different dates. We shall refer to the prices which appear on bank funding letters as "bank funding values" or simply "funding values." Funding values are based on the prices of modest flats in high-rise structures. The pricing center is responsible for calculating funding values each month and transmitting these values to the bank and municipality, through the program reviewer.

At the start of the program, bank funding letters will have funding values for the end of October, the end of November, and the end of December. Before the end of each month, but not earlier than the 25th, a new third month funding value must be calculated to replace the expiring first month funding value. For example, at the end of October, a new funding value for January will be calculated and announced, and the October funding value will become invalid. The funding values previously calculated for November and December will become the new first and second month funding values.

For each month, the pricing center must calculate three funding values corresponding to one-room, two-room, and three-room units. The size of a unit that an officer may purchase (and, therefore, his funding value size) depends on the number of rooms his family is entitled to occupy according to current social norms. The funding value does not depend on the number of square meters to which the family is entitled. Therefore, two families may be entitled to different amounts of living or total space, but if their respective family compositions make them eligible for the same number of rooms, they will receive the same amount of money to purchase a unit.

The funding values appearing on the bank funding letter will be stated in dollars and cannot exceed US\$25,000. The pricing center, however, should ignore this \$25,000 limit when it computes funding values. The municipality and bank will be responsible for implementing the \$25,000 limit when they issue the bank funding letter. The responsibility of the pricing center is to transmit funding values to the municipality and bank in both dollars and rubles. Even if a funding value exceeds the limit, the value will serve as a guide as to what a typical modest unit costs and indicate how much extra money an officer may need to purchase a unit.

#### ***General Approach***

The steps for calculating funding values can be summarized as follows:

- (1) Establish a base price (in rubles) for each unit size using pricing center data by multiplying average price per square meter (of a standard unit in a high-rise multi-family structure) by total floor space.



- (2) Estimate monthly rates of inflation using the average monthly rate of inflation for the last six months (using the most recent data that is available), giving double weight to each of the most recent three months.
- (3) Inflate the base prices using inflation factors computed from the monthly rates of inflation.
- (4) Add an amount to compensate builders for the cost of construction financing. Because the units offered for sale must be nearly completed, we assume that no more than 25 percent of the value of the unit must be borrowed to finish the construction work.
- (5) Assuming the monthly rate of change in the ruble to dollar exchange rate will be half of the monthly inflation rate, estimate an exchange rate for each month for which a price was calculated.
- (6) Convert the ruble prices to dollar prices using the estimated exchange rates.

#### ***Variations In the Methodology***

In general, the method used to calculate funding values for the first three months of the program will differ from the method used for subsequent months. There are several reasons why the methods are different:

- (1) We must calculate the funding values for the first three months near the end of September at which time our most recent price data will be for August. This means the first three sets of funding values will be based on August prices and price trends. More data will be available to us, however, when we calculate funding values for subsequent months. For example, when we calculate January funding values at the end of October, September price data will be available and we will use this new data in our calculations.
- (2) We want to adjust the price to allow builders to pay for the interest charges from construction financing. As a simplification, we assume that it takes one year to complete a unit. Because an officer must finalize a sale within three months, no more than roughly a quarter of the work should be incomplete. For the first month of the program (October) we assume that no construction financing is required. For the second month of the program we assume that 15 percent of the price is borrowed to complete the unit. For the third month of the program we assume that 20 percent of the price is borrowed. For subsequent months, we assume that builders borrow 25 percent of the price calculated for three months earlier. For example, in calculating January construction finance charges, we assume 25 percent of the October price is borrowed to complete the unit; similarly, in calculating February construction finance charges, we assume 25 percent of the November price is borrowed.



## **Worksheets**

Worksheets are provided to make calculations simple. Different versions of the worksheets will be used: one set for the first three months of the program and others for the subsequent months.

Worksheet 1 is the main worksheet for calculating funding values for the first three months of the program. Worksheet 1-A is similar to Worksheet 1 but is used for calculating funding values for January onwards. Worksheets 2 and 4 are used to calculate inputs for Worksheet 1; Worksheets 2-A and 4-A are used to calculate inputs for Worksheet 1-A. Worksheets 5 and 5-A are forms for transmitting funding values to the program reviewer for the first three months and the fourth month of the program, respectively. Worksheets 6 and 6-A are for calculating exchange rates for converting the ruble calculations of Worksheet 1 and 1-A into dollars.

## **DETAILED INSTRUCTIONS FOR THE WORKSHEETS**

*IMPORTANT: You must complete the Worksheets in the following order.*

- (1) Complete Worksheet 2, Parts A, B, and C. Enter the appropriate information on Worksheet 1.
- (2) Complete calculations for Worksheet 1, Parts A and B. Enter results from lines (e), (ee) and (eee) on Worksheet 4, as indicated.
- (3) Complete Worksheet 4. Enter results on Worksheet 1.
- (4) Complete calculations of funding values on Worksheet 1. Enter funding values on Worksheet 5.
- (5) Complete Worksheet 6. Enter exchange rates on Worksheet 5 and convert funding values to their dollar equivalents.

### **Worksheet 1**

To facilitate your understanding of the following instructions, sample calculations are provided in braces {...}.

Use Worksheet 1 to calculate funding values for the first three months of the program. You must use the other worksheets to calculate numbers that you will enter on Worksheet 1. You will calculate prices for three unit sizes (i.e., one-room, two-room, and three-room units) for each of the first three months of the program (a total of nine funding values). To calculate each funding value you must go through three steps:

- *Step A.* Calculate the base price by multiplying the August price per square meter by the unit size;



- **Step B.** Multiply the base price by an inflation factor computed from monthly inflation estimates;
- **Step C.** Add construction financing costs.

Steps A through C are clearly marked on Worksheet 1.

To simplify explanations we will use the following conventions:

- Specific data items are labeled with small letters (e.g., "[a]", "[aa]", "[cc]", etc.). Each column of data items corresponds to a single month. Each row contains the same type of data. For example, from Worksheet 1 you can see that the base price for October is in the first column and is labeled "[c]"; the base price for November is in the middle column and is labeled "[cc]"; and the base price for December is labeled "[ccc]". Some data items such as the unit sizes have already been filled in for you. Most data items, however, are blank and are to be filled in by you.
- We will sometimes refer to all the data items in a single row (i.e., "[a]", "[aa]", and "[aaa]") as "row a". Therefore, when we say "multiply row a by row b," we mean multiply item [a] by item [b], item [aa] by item [bb], and item [aaa] by item [bbb].

The calculations described below are repeated for one-room, two-room, and three-room units.

To complete Step A:

- (1) Enter the August average price per square meter from Worksheet 2 {409,760} in the blank spaces marked [a], [aa], and [aaa]. You must use the August price for all three months because it is the most recent price that is available.
- (2) Compute base prices by multiplying row a by row b. Enter the results in row c.  
{409,760 x 66 = 27,044,160}

To complete Step B:

- (1) Enter the inflation factors from Worksheet 2 in row d. Note that you calculated three different inflation factors in Worksheet 2. Enter the August to October inflation factor {1.50} in item [d], the August to November inflation factor {1.78} in item [dd], and the August to December inflation factor {2.06} in item [ddd].
- (2) Compute inflated base prices by multiplying row c by row d. Enter the results in row e.  
{27,044,160 x 1.50 = 40,566,240;  
27,044,160 x 1.78 = 48,138,605;  
27,044,160 x 2.06 = 55,710,970}

To complete Step C:

- (1) Enter the November and December construction finance interest calculations from Worksheet 4 {184,576 and 874,248} in items [ff] and [fff], respectively. Note that zero



has already been entered in item [f] for October, since we are assuming there is no construction financing required for October purchases.

- (2) Compute the certificate price by adding row c and row d. Enter the results in row g.  
{40,566,240 + 0 = 40,566,240;  
48,138,605 + 184,576 = 48,323,181;  
55,710,970 + 874,248 = 56,585,218}

In the above calculations, one-room, two-room, and three-room units are assumed to be 38, 55, and 66 square meters, respectively. These figures refer to total space, and are typical unit sizes in the high-rise panel buildings that are currently being constructed.

### **Worksheet 1-A**

Use Worksheet 1-A to calculate funding values for January. The calculations are identical to those for Worksheet 1 except that you must use the most recent price per square meter that is available. For example, the average price per square meter for September will be available at the end of October and this figure should be used in the January calculations. Similarly, the average price per square meter for October will be available at the end of November and this figure should be used in the February calculations.

Just as you must complete Worksheets 2 and 4 before you can complete Worksheet 1, you must complete Worksheets 2-A and 4-A before you complete Worksheet 1-A.

### **Worksheet 2**

You must complete Worksheet 2 before you can complete Worksheet 1. Worksheet 2 has three parts:

- Base price information;
- Monthly inflation calculations; and
- Inflation factor calculations.

The base price table has two functions. First, it provides the average base price of various kinds of buildings for February 1994 through August 1994. Second, it shows the monthly percentage changes in the average base price. The monthly percentage changes are used in the monthly inflation calculations. The monthly inflation estimates are then used to compute inflation factors.

#### **Base Price Information**

- (1) Enter the average price per square meter (in thousands of rubles) for February through August 1994 in column [a].
- (2) Calculate the monthly percentage change in the price per square meter and enter the amounts in column [b]. For example, the percentage change from March to April is equal to:

$$100 \times ( ( \text{April price} / \text{March price} ) - 1 )$$

and would be entered for April in column [b].

- (3) Enter the August average base price in the blank spaces marked [a], [aa], and [aaa] on Worksheet 1.

### *Monthly Inflation Calculations*

- (1) Enter the monthly percentage change in the price from Part A into the spaces corresponding to the appropriate months in Part B.

- (2) Estimate August to September inflation using formula [1].

$$\left\{ \begin{array}{ccccccc} (24.41 + 11.05 + 47.76 + (2 \times (5.70 + 19.47 + 10.80))) / 9 = 17.24 & [1] \\ \text{March} & \text{April} & \text{May} & \text{June} & \text{July} & \text{August} & \text{September} \end{array} \right\}$$

- (3) Enter the September estimate from formula [1] into formula [2] and compute a value for October.

$$\left\{ \begin{array}{ccccccc} (11.05 + 47.76 + 5.70 + (2 \times (19.47 + 10.80 + 17.24))) / 9 = 17.73 & [2] \\ \text{April} & \text{May} & \text{June} & \text{July} & \text{August} & \text{September} & \text{October} \end{array} \right\}$$

- (4) Enter the September estimate from formula [1] and the October estimate from formula [2] into formula [3] and compute a value for November.

$$\left\{ \begin{array}{ccccccc} (47.76 + 5.70 + 19.47 + (2 \times (10.80 + 17.24 + 17.73))) / 9 = 18.27 & [3] \\ \text{May} & \text{June} & \text{July} & \text{August} & \text{Sept.} & \text{October} & \text{November} \end{array} \right\}$$

- (5) Enter the September estimate from formula [1], the October estimate from formula [2], and the November estimate from formula [3] into formula [4] and compute a value for December.

$$\left\{ \begin{array}{ccccccc} (5.70 + 19.47 + 10.80 + (2 \times (17.24 + 17.73 + 18.27))) / 9 = 15.83 & [4] \\ \text{June} & \text{July} & \text{August} & \text{Sept.} & \text{October} & \text{November} & \text{December} \end{array} \right\}$$

### *Inflation Factor Calculations*

- (1) Enter the September and October inflation estimates into formula [5] and compute the August to October 31 inflation factor. Enter this inflation factor in item [d] on Worksheet 1 for all three unit sizes.

$$\left\{ \begin{array}{ccc} (1 + (17.24/100)) \times (1 + (17.73/100)) = 1.50 & [5] \\ \text{September} & \text{October} & [A] \end{array} \right\}$$

- (2) Enter the August to October 31 inflation factor from formula [5] and the November inflation estimate into formula [6] and compute the August to November 30 inflation factor. Enter this inflation factor in item [dd] on Worksheet 1 for all three unit sizes.

$$\left\{ \begin{array}{ccc} 1.50 \times (1 + (18.27/100)) = 1.78 & [6] \\ [A] & \text{November} & [B] \end{array} \right\}$$



- (3) Enter the August to November 30 inflation factor from formula [6] and the December inflation estimate into formula [7] and compute the August to December 31 inflation factor. Enter this inflation factor in item [ddd] on Worksheet 1 for all three unit sizes.

$$\{ \begin{array}{ccc} 1.78 \times (1 + (-15.83/100)) = 2.06 & & [7] \\ [B] & \text{December} & [C] \end{array} \}$$

Note that the prices in the base price table are calculated by the pricing center using price index models developed by Gostroi. The six-month weighted moving average we have chosen to estimate future price changes has the advantage of being influenced less by highly volatile prices. Sharp changes in monthly inflation rates are partly due to seasonal factors. These include, for example, price adjustments accompanying the closing of books at the end of fiscal years and the absence of certain kinds of transactions during some parts of the year.

### **Worksheet 2-A**

Use Worksheet 2-A to determine the base price per square meter and inflation factors for January. (The same general procedure is followed for the remaining months of the program.) The calculations are identical to those for Worksheet 2 except that you must use the most recent price per square meter data that is available.

- (1) Copy the March through August prices from Part A of Worksheet 2 to Part A of Worksheet 2-A. Obtain the September price from the Pricing Center and enter this at the bottom of column [a].
- (2) Compute the percentage change in the monthly prices and enter them in column [b].
- (3) Follow the steps in Part B of Worksheet 2-A to calculate an inflation factor for September to January. Enter the inflation factor in item [d] on Worksheet 1-A.

### **Worksheet 4**

You must complete Steps A and B on Worksheet 1 before you complete Worksheet 4. The following calculations are repeated for each unit size.

The pricing center should contact the participating bank to obtain the latest interest rate for construction finance loans. The latest interest rate should be used in the equations below.

#### *October 31, 1994 Calculation*

No calculation is required for October.

#### *November 30, 1994 Calculation*

- (1) Enter in row (a) the October inflated base prices for one, two and three room units from Worksheet 1, item [e].
- (2) Multiply each item in row [a] by 15 percent and enter the results in row [c].

- (3) Enter 1 plus the monthly interest rate in row [d].
- (4) Multiply row [c] by row [d] and enter the results in row [e].
- (5) Enter in row [f] the November inflated base prices for one-, two-, and three-room units from Worksheet 1, item [ee].
- (6) Multiply row [f] by row [b] and enter the results in row [g].
- (7) Subtract row [g] from row [e] to obtain the construction finance interest charge. Enter these amounts in Worksheet 1, item [ff].

#### *December 31, 1994 Calculation*

- (1) Enter in row [a] the October inflated base prices for one, two and three room units from Worksheet 1, item [e].
- (2) Multiply each item in row [a] by 20 percent and enter the results in row [c].
- (3) Enter  $(1 + \text{the monthly interest rate}) \times (1 + \text{the monthly interest rate})$  in row [d].
- (4) Multiply row [d] by row [c] and enter the results in row [e].
- (5) Enter in row [f] the December inflated base prices for one, two and three room units from Worksheet 1, item [eee].
- (6) Multiply row [f] by row [b] and enter the results in row [g].
- (7) Subtract row [g] from row [e] to obtain the construction finance interest charge. Enter these amounts in Worksheet 1, item [fff].

#### **Worksheet 4-A**

You must complete Steps A and B on Worksheet 1-A before you complete Worksheet 4-A. The steps are similar to those for Worksheet 4.

- (1) Enter in row [a] the October inflated base prices for one, two and three room units from Worksheet 1, item [e].
- (2) Multiply each item in row [a] by 25 percent and enter the results in row (c).
- (3) Enter  $(1 + \text{the monthly interest rate}) \times (1 + \text{the monthly interest rate}) \times (1 + \text{the monthly interest rate})$  in row [d].
- (4) Multiply row [c] by row [d] and enter the results in row [e].
- (5) Enter in row [f] the January inflated base prices for one, two and three room units from Worksheet 1-A, item [e].



- (6) Multiply row [f] by row [b] and enter the results in row [g].
- (7) Subtract row [g] from row [e] to obtain the construction finance interest charge. Enter these amounts in Worksheet 1-A, item [f].

### **Worksheets 5 and 5-A**

After completing your funding value calculations each month, you must complete Worksheet 5 (5-A) and send it to the program reviewer. Worksheets 1 (1-A), 2 (2-A), 4 (4-A), and 6 (6-A) must be attached to Worksheet 5 (5-A). You must complete all other worksheets before you complete Worksheet 5 (5-A).

Look carefully at the sample Worksheet 5-A in Annex 2, which is for transmitting the January 31, 1995 funding values. Note the following:

- Worksheet 5-A is dated October 31, 1994. The January funding values should be calculated between October 25 and October 31.
- You must enter three prices (one for each unit size) in both rubles and dollars
- In converting rubles to dollars, use the exchange rate you calculated on Worksheet 6-A. Record the exchange rate in each of the spaces provided on Worksheet 5-A.
- Worksheet 1-A should be filled out only for January, 1995 at this time.

Note that the transmittal memorandum for the first three months of the program (Worksheet 5) requires that you list nine prices (one for each unit size, for each of the first three months). This memorandum should be accompanied by Worksheets 1, 2, 4, and 6.

### **Worksheet 6**

You will use this worksheet to estimate exchange rates for the first three months of the program (October, November, and December). You will use these exchange rates on Worksheet 5 to convert the ruble funding values (from Worksheet 1) into dollar values.

It is assumed that the increase in the exchange rate will equal the monthly inflation rates you estimated on Worksheet 2:

- *Step A.* The exchange rate you enter should be the central bank exchange rate in effect on the day you complete your funding value calculations. You can obtain this rate from the bank which is administering the program.
- *Step B.* Copy the appropriate monthly inflation rates from Worksheet 2.
- *Step C.* This resembles the price inflation calculations done in step C of Worksheet 2.



{September to October exchange rate inflation factor [A]:

$$(1 + ( 8.9 / 100)) = 1.089 \quad [4]$$

[1]                      [A]

September to November exchange rate inflation factor [B]:

$$1.089 \times (1 + ( 9.1 / 100)) = 1.188 \quad [5]$$

[A]                      [2]                      [B]

September to December exchange rate inflation factor [C]:

$$1.188 \times (1 + ( 7.9 / 100)) = 1.282 \quad [6]$$

[B]                      [3]                      [C]                      }

- *Step D.* Estimate future exchange rates by multiplying the September exchange rate by the exchange rate inflation factors:

{	1,742 = 1,600 x 1.089		[7]
	1,901 = 1,600 x 1.188		[8]
	2,051 = 1,600 x 1.282		[9]}

Enter the exchange rates computed in formulas [7], [8], and [9] in the appropriate places in column [b] of Worksheet 5.

### **Worksheet 6-A**

The instructions for Worksheet 6-A are basically the same as those for Worksheet 6. Worksheet 6-A is used to calculate an exchange rate for a single month. The results are entered on Worksheet 5-A.



## ANNEX 1

### EXPLANATION OF CONSTRUCTION FINANCING

The benefits of construction financing in an inflationary environment can be very difficult to understand. This note provides a simple example that shows why the use of construction financing should not have a huge effect on prices.

Suppose the price of a complete unit is Rb2,000 today, and one month from today the price will increase to Rb4,000. This means inflation is 100 percent per month.

Suppose a similar unit is only half finished today and therefore is worth only Rb1,000. If a customer purchases this half-finished unit one month from today, he will have to pay Rb2,000 for it, because inflation is 100 percent per month.

Now suppose the builder has a half-finished unit today but wants to sell a complete unit to the customer one month from now. The builder will be able to receive Rb4,000 for a complete unit one month from now. His half-finished unit will only be worth Rb2,000 one month from now if he does not complete the work, and, in any case, it may be difficult to sell a half-finished unit. The builder, however, can finish the work by borrowing Rb1,000 today (because today the cost of a completed unit is Rb2,000 and he has a half-completed unit) and repaying the loan one month from today when he receives Rb4,000 for the completed unit.

The builder, however, will have to repay the bank interest in addition to the Rb1,000 he borrowed. Suppose the bank charges 110 percent interest per month. The builder would then have to repay the Rb1,000 he borrowed plus Rb1,100 in interest charges. That is, he will have to repay the bank Rb2,100. If the builder only charges the customer Rb4,000 for the completed unit (an additional Rb2,000 over what he could have sold the half-finished unit for), he will lose Rb100. Therefore he must pass on this charge to his customer by asking for a price one month from now of at least Rb4,100. The customer will be willing to pay this extra Rb100 because he did not have to make an advance payment to the builder to complete the construction.

Note that if the interest rate for the loan is the same as the inflation rate the builder should be satisfied with a Rb4,000 price because the extra Rb2,000 the builder receives by selling a complete unit (instead of a half-finished unit) is enough to repay the borrowed amount and interest. *In general, construction financing only increases the cost of a unit in real terms when the loan interest rate is higher than the inflation rate.*

In Novgorod, the monthly interest rate currently charged by banks is very close to the inflation rate ( $260/12 = 21.7$ ); therefore the use of construction financing should only have a small effect on the price.





## **ANNEX 2**

### **SAMPLE WORKSHEETS**

- Worksheet 1:** Funding Value Worksheet (first three months of program)  
**Worksheet 1-A:** Funding Value Worksheet
- Worksheet 2:** Base Price and Inflation Factor Worksheet (first three months of program)  
**Worksheet 2-A:** Base Price and Inflation Factor Worksheet
- Worksheet 4:** Construction Finance Interest Charge Worksheet (first three months of program)  
**Worksheet 4-A:** Construction Finance Interest Charge Worksheet
- Worksheet 5:** Bank Funding Value Transmittal Memorandum (first three months of program)  
**Worksheet 5-A:** Bank Funding Value Transmittal Memorandum
- Worksheet 6:** Exchange Rate Worksheet (first three months of program)  
**Worksheet 6-A:** Exchange Rate Worksheet



**WORKSHEET 1**  
**FUNDING VALUE WORKSHEET**

(For first three months of program)

*To be completed before September 30, 1994*

The following computations are done for each unit size:

- A. Price per square meter (rb/m<sup>2</sup>) X size (m<sup>2</sup>) = base price (rb)
- B. Base price X inflation factor = inflated base price (rb)
- C. Adjusted inflated base price + construction finance interest (rb) = funding value (rb)

where:     a one (1) room unit = 38 m<sup>2</sup>;  
          a two (2) room unit = 55 m<sup>2</sup>; and  
          a three (3) room unit = 66 m<sup>2</sup>.

		One-Room Unit		
		-----	-----	-----
		October 31	November 30	December 31
A.	August price per square meter	[a] _____	[aa] _____	[aaa] _____
	Size	[b]           38	[bb]           38	[bbb]          38
	Base price	[c] _____	[cc] _____	[ccc] _____
B.	Inflation factor	[d] _____	[dd] _____	[ddd] _____
	Inflated base price	[e] _____	[ee] _____	[eee] _____
C.	Construction finance interest	[f]           0	[ff] _____	[fff] _____
	FUNDING VALUE	[g] _____	[gg] _____	[ggg] _____

		Two-Room Unit		
		-----	-----	-----
		October 31	November 30	December 31
A.	August price per square meter	[a] _____	[aa] _____	[aaa] _____
	Size	[b]           55	[bb]           55	[bbb]          55
	Base price	[c] _____	[cc] _____	[ccc] _____
B.	Inflation factor	[d] _____	[dd] _____	[ddd] _____
	Inflated base price	[e] _____	[ee] _____	[eee] _____
C.	Construction finance interest	[f]           0	[ff] _____	[fff] _____
	FUNDING VALUE	[g] _____	[gg] _____	[ggg] _____

Three-Room Unit

	October 31	November 30	December 31
A. August price per square meter	[a] _____	[aa] _____	[aaa] _____
Size	[b] _____ 66	[bb] _____ 66	[bbb] _____ 66
Base price	[c] _____	[cc] _____	[ccc] _____
B. Inflation factor	[d] _____	[dd] _____	[ddd] _____
Inflated base price	[e] _____	[ee] _____	[eee] _____
C. Construction finance interest	[f] _____ 0	[ff] _____	[fff] _____
FUNDING VALUE	[g] _____	[gg] _____	[ggg] _____

**WORKSHEET 1-A  
FUNDING VALUE WORKSHEET**

(For January 1995)

*To be completed before October 24, 1994*

The following computations are done for each unit size:

- A. Price per square meter (rb/m<sup>2</sup>) X size (m<sup>2</sup>) = base price (rb)
- B. Base price X inflation factor = inflated base price (rb)
- C. Adjusted inflated base price + construction finance interest (rb) = funding value (rb)

where:      a one (1) room unit = 38 m<sup>2</sup>;  
               a two (2) room unit = 55 m<sup>2</sup>; and  
               a three (3) room unit = 66 m<sup>2</sup>.

One-Room Unit

-----  
January

- |                                  |           |    |
|----------------------------------|-----------|----|
| A. Sept. price per square meter  | [a] _____ |    |
| Size                             | [b] _____ | 38 |
| Base price                       | [c] _____ |    |
|                                  |           |    |
| B. Inflation factor              | [d] _____ |    |
| Inflated base price              | [e] _____ |    |
|                                  |           |    |
| C. Construction finance interest | [f] _____ |    |
| FUNDING VALUE                    | [g] _____ |    |

Two-Room Unit

-----  
January

- |                                  |           |    |
|----------------------------------|-----------|----|
| A. Sept. price per square meter  | [a] _____ |    |
| Size                             | [b] _____ | 55 |
| Base price                       | [c] _____ |    |
|                                  |           |    |
| B. Inflation factor              | [d] _____ |    |
| Inflated base price              | [e] _____ |    |
|                                  |           |    |
| C. Construction finance interest | [f] _____ |    |
| FUNDING VALUE                    | [g] _____ |    |

Three-Room Unit  
-----  
January

A. Sept. price per square meter	[a] _____
Size	[b] _____ 66
Base price	[c] _____
B. Inflation factor	[d] _____
Inflated base price	[e] _____
C. Construction finance interest	[f] _____
FUNDING VALUE	[g] _____

**WORKSHEET 2**  
**BASE PRICE AND INFLATION FACTOR WORKSHEET**

(October, November, and December 1994)

**A. Base Price Information**

The following table is based on price indices estimated by the pricing center. See Annex 4 for an explanation of the index methodology. Column [a] is the average base price. Column [b] is the monthly percentage change in the average base price. For example, the April change in the price is equal to:  $100 \times ( (\text{April price} / \text{March price}) - 1 )$ .

<u>Month</u>	<u>(a)</u> <u>Average</u> <u>Price</u> <u>(000 rb/m2)</u>	<u>(b)</u> <u>Monthly %</u> <u>Change in</u> <u>Average</u>
February	_____	_____
March	_____	_____
April	_____	_____
May	_____	_____
June	_____	_____
July	_____	_____
August	_____	_____

**B. Monthly Inflation Calculations**

Monthly inflation values are estimated using a weighted moving average. This means we calculate the average monthly rate of change for the last six months, giving double weight to each of the most recent three months.

August to September inflation calculation (percent):

$$[1] \quad \left( \frac{\quad}{\text{Mar}} + \frac{\quad}{\text{Apr}} + \frac{\quad}{\text{May}} + (2 \times \left( \frac{\quad}{\text{Jun}} + \frac{\quad}{\text{Jul}} + \frac{\quad}{\text{Aug}} \right)) \right) / 9 = \frac{\quad}{\text{Sep}}$$

September to October inflation calculation (percent):

$$[2] \quad \left( \frac{\quad}{\text{Apr}} + \frac{\quad}{\text{May}} + \frac{\quad}{\text{Jun}} + (2 \times \left( \frac{\quad}{\text{Jul}} + \frac{\quad}{\text{Aug}} + \frac{\quad}{\text{Sep}} \right)) \right) / 9 = \frac{\quad}{\text{Oct}}$$

October to November inflation calculation (percent):

$$[3] \quad \left( \frac{\quad}{\text{May}} + \frac{\quad}{\text{Jun}} + \frac{\quad}{\text{Jul}} + (2 \times \left( \frac{\quad}{\text{Aug}} + \frac{\quad}{\text{Sep}} + \frac{\quad}{\text{Oct}} \right)) \right) / 9 = \frac{\quad}{\text{Nov}}$$

November to December inflation calculation (percent):

$$[4] \quad \left( \frac{\quad}{\text{Jun}} + \frac{\quad}{\text{Jul}} + \frac{\quad}{\text{Aug}} + (2 \times \left( \frac{\quad}{\text{Sep}} + \frac{\quad}{\text{Oct}} + \frac{\quad}{\text{Nov}} \right)) \right) / 9 = \frac{\quad}{\text{Dec}}$$

C. Inflation Factor Calculations

August to October inflation factor [A]:

$$[5] \quad \left(1 + \frac{\text{____}}{\text{Sep}/100}\right) \times \left(1 + \frac{\text{____}}{\text{Oct}/100}\right) = \frac{\text{____}}{[A]}$$

August to November inflation factor [B]:

$$[6] \quad \frac{\text{____}}{[A]} \times \left(1 + \frac{\text{____}}{\text{Nov}/100}\right) = \frac{\text{____}}{[B]}$$

August to December inflation factor [C]:

$$[7] \quad \frac{\text{____}}{[B]} \times \left(1 + \frac{\text{____}}{\text{Dec}/100}\right) = \frac{\text{____}}{[C]}$$

Enter the August to October, August to November, and August to December inflation factors on Worksheet 1 in items [d], [dd], and [ddd], respectively.

**WORKSHEET 2-A**  
**BASE PRICE AND INFLATION FACTOR WORKSHEET**

(January 1995)

**A. Base Price Information**

The following table is based on price indices estimated by the pricing center. See Annex 4 for an explanation of the index methodology. Column [a] is the average base price. Column [b] is the monthly percentage change in the average base price. For example, the April change in the price is equal to:  $100 \times ( (\text{April price} / \text{March price}) - 1 )$ .

<u>Month</u>	(a) Average Price (000 rb/m <sup>2</sup> )	(b) Monthly % Change in Average
February	_____	_____
March	_____	_____
April	_____	_____
May	_____	_____
June	_____	_____
July	_____	_____
August	_____	_____

**B. Monthly Inflation Calculations**

Monthly inflation values are estimated using a weighted moving average. This means we calculate the average monthly rate of change for the last six months, giving double weight to each of the most recent three months.

September to October inflation calculation (percent):

$$[1] \quad \left( \frac{\quad}{\text{Apr}} + \frac{\quad}{\text{May}} + \frac{\quad}{\text{Jun}} + (2 \times \left( \frac{\quad}{\text{Jul}} + \frac{\quad}{\text{Aug}} + \frac{\quad}{\text{Sep}} \right)) \right) / 9 = \frac{\quad}{\text{Oct}}$$

October to November inflation calculation (percent):

$$[2] \quad \left( \frac{\quad}{\text{May}} + \frac{\quad}{\text{Jun}} + \frac{\quad}{\text{Jul}} + (2 \times \left( \frac{\quad}{\text{Aug}} + \frac{\quad}{\text{Sep}} + \frac{\quad}{\text{Oct}} \right)) \right) / 9 = \frac{\quad}{\text{Nov}}$$

November to December inflation calculation (percent):

$$[3] \quad \left( \frac{\quad}{\text{Jun}} + \frac{\quad}{\text{Jul}} + \frac{\quad}{\text{Aug}} + (2 \times \left( \frac{\quad}{\text{Sep}} + \frac{\quad}{\text{Oct}} + \frac{\quad}{\text{Nov}} \right)) \right) / 9 = \frac{\quad}{\text{Dec}}$$

December to January inflation calculation (percent):

$$[4] \quad \left( \frac{\quad}{\text{Jul}} + \frac{\quad}{\text{Aug}} + \frac{\quad}{\text{Sep}} + (2 \times \left( \frac{\quad}{\text{Oct}} + \frac{\quad}{\text{Nov}} + \frac{\quad}{\text{Dec}} \right)) \right) / 9 = \frac{\quad}{\text{Jan}}$$



**WORKSHEET 4**  
**CONSTRUCTION FINANCE INTEREST CHARGE WORKSHEET**

NOTE: Complete steps A and B on Worksheet 1 before you complete this worksheet.

(A) Before proceeding with the calculations, contact the bank for the latest interest rate for construction finance loans. If there is more than one rate, use the average value. The bank will most likely give you an annual interest rate which must be divided by 12 to get a monthly rate. Enter the annual rate below and compute the monthly rate.

	Interest Rate (percent)	
	<u>Annual</u>	<u>Monthly</u>
September	_____	_____
October	_____	_____
November	_____	_____
December	_____	_____

The construction finance calculations should use the most recent interest rates available at the time the calculations are performed. For example, the January construction finance calculation, which you will perform at the end of October, should use a October interest rate.

(B) The *October 31, 1994* price will not include construction finance interest charges.

(C) The *November 30, 1994* price will include one (1) month of construction finance interest charges.

Assumptions: 15 percent of the *October* adjusted inflated base price (from Worksheet 1) is borrowed because 85 percent of the construction is completed.

	1 Room Unit	2 Room Unit	3 Room Unit
(a) October inflated base price (from Worksheet 1, [e])			
(b) Percent borrowed (%)	0.15	0.15	0.15
(c) Borrowed amount [a] x [b]			
(d) 1 + monthly interest rate			
(e) Borrowed amount plus interest [c] x [d]			
(f) November inflated base price (from Worksheet 1, [ee])			
(g) Expected future value of borrowed amount [f] x [b]			
(h) Real construction finance cost [e] - [g]			

**WORKSHEET 4**  
Page 2 of 2

If the real construction finance cost [h] is greater than zero, enter this amount on Worksheet 1 in item [ff], otherwise put 0 in item [ff].

(D) The December 31, 1994 price will include two (2) months of construction finance interest charges.

Assumptions: 20 percent of the October adjusted inflated base price (from Worksheet 1) is borrowed because 80 percent of the construction is completed. The borrowed amount plus interest due at the end of the first month becomes the borrowed amount for the second month (that is, the financing is a series of one month loans).

	1 Room Rnit	2 Room Unit	3 Room Unit
(a) October inflated base price (from Worksheet 1, [e])			
(b) Percent borrowed (%)	0.20	0.20	0.20
(c) Borrowed amount [a] x [b]			
(d) (1 + mo. interest rate) x (1 + mo. interest rate)			
(e) Borrowed amount plus interest [c] x [d]			
(f) Dec. inflated base price (from Worksheet 1, [eee])			
(g) Expected future value of borrowed amount [f] x [b]			
(h) Real construction finance cost [e] - [g]			

If the real construction finance cost [h] is greater than zero, enter this amount on Worksheet 1 in item [fff], otherwise put 0 in item [fff].

**WORKSHEET 4-A**  
**CONSTRUCTION FINANCE INTEREST CHARGE WORKSHEET**

(January 1995)

NOTE: Complete steps A and B on Worksheet 1-A before you complete this worksheet.

(A) Before proceeding with the calculations, contact the bank for the latest interest rate for construction finance loans. If there is more than one rate, use the average value. The bank will most likely give you an annual interest rate which must be divided by 12 to get a monthly rate. Enter the annual rate below and compute the monthly rate.

	Interest Rate (percent)	
	<u>Annual</u>	<u>Monthly</u>
September	_____	_____
October	_____	_____
November	_____	_____
December	_____	_____

The construction finance calculations should use the most recent interest rates available at the time the calculations are performed. For example, the January construction finance calculation, which you will perform at the end of October, should use a October interest rate.

(B) The *January 1995* price will include three (3) months of construction finance interest charges.

Assumptions: 25 percent of the *October* adjusted inflated base price (from Worksheet 1) is borrowed because 75 percent of the construction is completed.

	1 Room Unit	2 Room Unit	3 Room Unit
(a) October inflated base price (from Worksheet 1, [e])			
(b) Percent borrowed (%)	0.25	0.25	0.25
(c) Borrowed amount [a] x [b]			
(d) $(1 + \text{mo. interest rate}) \times (1 + \text{mo. interest rate}) \times (1 + \text{mo. interest rate})$			
(e) Borrowed amount plus interest [c] x [d]			
(f) January inflated base price (from Worksheet 1-A, [e])			
(g) Expected future value of borrowed amount [f] x [b]			
(h) Real construction finance cost [e] - [g]			

**WORKSHEET 4-A**  
Page 2 of 2

If the real construction finance cost [h] is greater than zero, enter this amount on Worksheet 1-A in item [f], otherwise put 0 in item [f].

**WORKSHEET 5**  
**BANK FUNDING VALUE TRANSMITTAL MEMORANDUM**

(first three months of program)

Date: \_\_\_\_\_  
To: Program Reviewer  
From: Expertise Center  
Subject: Military Housing Certificate Program Bank Funding Values

The Expertise Center has computed the following funding values for *October, November, and December 1994*:

<i>October 1994</i>	(a) Rubles	(b) Exchange Rate	(a/b) Dollars
One-room unit	_____	_____	_____
Two-room unit	_____	_____	_____
Three-room unit	_____	_____	_____

<i>November 1994</i>	(a) Rubles	(b) Exchange Rate	(a/b) Dollars
One-room unit	_____	_____	_____
Two-room unit	_____	_____	_____
Three-room unit	_____	_____	_____

<i>December 1994</i>	(a) Rubles	(b) Exchange Rate	(a/b) Dollars
One-room unit	_____	_____	_____
Two-room unit	_____	_____	_____
Three-room unit	_____	_____	_____

The following supporting documents are attached:

- (1) Worksheet 1: Funding Value Worksheet (first three months of program)
- (2) Worksheet 2: Base Price and Inflation Factor Worksheet (first three months of program)
- (3) Worksheet 4: Construction Finance Interest Charge Worksheet
- (4) Worksheet 6: Exchange Rate Worksheet (first three months of program)

**WORKSHEET 5-A**  
**BANK FUNDING VALUE TRANSMITTAL MEMORANDUM**

(January 1995)

*To be submitted no later than 24 October 1994*

Date: \_\_\_\_\_  
To: Program Reviewer  
From: Expertise Center  
Subject: Military Housing Certificate Program Bank Funding Values

The Expertise Center has computed the following funding values for January 1995:

	(a) Rubles	(b) Exchange Rate	(a/b) Dollars
One-room unit	_____	_____	_____
Two-room unit	_____	_____	_____
Three-room unit	_____	_____	_____

The following supporting documents are attached:

- (1) Worksheet 1-A: Funding Value Worksheet
- (2) Worksheet 2-A: Base Price and Inflation Factor Worksheet
- (3) Worksheet 4-A: Construction Finance Interest Charge Worksheet
- (4) Worksheet 6-A: Exchange Rate Worksheet



**WORKSHEET 6**  
Page 2 of 2

Dec. exchange rate = Sept. exchange rate x Sept. to Dec. inflation factor [C]  
[9] \_\_\_\_\_ = \_\_\_\_\_ x \_\_\_\_\_

Enter the exchange rates computed in formulas [7], [8], and [9] in the appropriate places in column (b) of Worksheet 5.

**WORKSHEET 6-A**  
**EXCHANGE RATE WORKSHEET**

(January 1995)

Note: Complete this form after finishing Worksheet 2.

A. Enter the latest Central Bank ruble-dollar exchange rate for October:

\_\_\_\_\_ Rubles per one dollar                      Date: \_\_\_\_\_

B. Assume that the increase in the exchange rate will equal the estimated monthly inflation rates. Insert below the monthly inflation estimates from Worksheet 2-A (the results of equations [2], [3], and [4]).

Monthly  
Inflation  
Rate (%)

[1] October to November: \_\_\_\_\_  
[2] November to December: \_\_\_\_\_  
[3] December to January: \_\_\_\_\_

C. Calculate exchange rate inflation factor:

October to January exchange rate inflation factor [A]:

[4]  $(1 + \frac{[1]}{100}) \times (1 + \frac{[2]}{100}) \times (1 + \frac{[3]}{100}) = \frac{[A]}{[A]}$

D. Estimate future exchange rate by multiplying the October exchange rate by the exchange rate inflation factor:

Jan. exchange rate = Oct. exchange rate x Inflation factor [A]

[5] \_\_\_\_\_ = \_\_\_\_\_ x \_\_\_\_\_

Enter the January exchange rate computed in formula [5] into column (b) of Worksheet 5-A.



## ANNEX 3

### PRICING CENTER METHODOLOGY

The prices in the base price tables appearing on Worksheets 2 and 2-A are calculated by the pricing center using price index models developed by Gostroi. The pricing center recently modified the models to make them more applicable to Novgorod. In addition, for the pilot project, the pricing center developed additional models covering more building types. As a result, the average base price is based on five price indices rather than two as of November 1993.

The pricing center approach to estimating market values is similar to the cost approach that appraisers in the United States use when the market data or income approaches to valuing properties are not feasible. In the current Russian context, this is a perfectly reasonable approach to valuing housing. The particular method used by the pricing center is similar to a technique known in the United States as the quantity survey method. According to the textbook *Modern Real Estate* by Alvin Arnold, Charles Wurtzbech, and Mike Miles (Boston: Warren, Gorham & Lamont, 1980), "The quantity survey method requires a complete itemization of all prices for materials, equipment, and labor, plus a complete list of all overhead items plus profit."

Each month, the pricing center gathers price information from construction, transportation, utility, and building material firms to update its database for its models. The center uses both printed materials (for example, industry periodicals and invoice documentation) and phone surveys as information sources.





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