

## Appendix H: Calculation Guidance

This chapter is organized into the following major sections:

H.1 Calculation Guidance.....	H-1
H.2 Certifications.....	H-2
H.3 HAP Vouchers .....	H-6
H.4 Special Claims.....	H-12

### H.1 Calculation Guidance

Note: TRACS Implementation required for items highlighted in Yellow. Site and CA software vendors are responsible for implementing all items.

The purpose of this Appendix is to establish standard methodology for key calculations involving certifications, vouchers and special claims. All software vendors (including software developed in-house) are required to implement these algorithms. As a result, calculation differences between site, CA, and TRACS software should largely disappear. It is possible that, in **rare** situations, a calculation done on one hardware architecture using a specific compiler and floating point library will differ slightly from that done on another architecture, compiler, and library with the result that a rounded result will be different by \$1. If, on investigation, it is determined that the specific difference is due to one of these circumstances, the site submitted value should be accepted by CAs and TRACS in accord with previously stated guidance from HUD. However, such situations should be seen very rarely.

An example of such a result would be a value that calculates to 1.494999 on one machine and to 1.495000 on another. The first value becomes 1.49 and rounds to 1. The second becomes 1.50 and rounds to 2.

The rent calculation spreadsheet posted on the TRACS web site in the Documents area (**Calculating Tenant Rent-TRACS 202C.xls**), shall be considered authoritative on issues of the correctness of calculations. In situations other than the one mentioned above, when there is a difference between site and CA calculations, the subsidy paid by a CA shall be that determined by the spreadsheet. Similarly, the spreadsheets posted on the TRACS web site in the Documents area (**Non Citizen Rule Prorations-TRACS 202C.xls**, **AdjustmentCalculations-TRACS 202C.xls** and **SpecialClaimsRounding-TRACS 202C.xls**) serve as the official implementation for noncitizen rule proration, adjustment calculations and special claims calculations and should be used to resolve differences between site, CA and TRACS results in the same way as the rent calculation spreadsheet should be used for that purpose.

Implementation timeline: Vendors are expected to implement any necessary changes in their software for their TRACS 2.0.2.C releases. **During the transition to 2.0.2.C, CAs must accept calculations that differ by no more than \$1 from the 2.0.2.C algorithms or the calculations currently done by their CA software. Calculation differences of \$1 may only be considered errors in 202C files.**

## H.2 Certifications

### Changing Algorithms—Transition Rules

When changing algorithms for calculating rent and assistance along with supporting values, it is important that software vendors ensure that certifications already billed for and/or sent to TRACS do not change without being formally corrected. In other words, if a certification has been billing for \$X in subsidy, that same amount should be billed up until the point of a gross rent change, unit transfer, a correction to the certification or other new certification.

However, to ease the transition to the new algorithms and to ensure that site software, CA software and TRACS all agree on values for certifications submitted after the full transition to 202C, all corrected certifications along with gross rents and unit transfers will recalculate the certification using the 202C rules once the site or CA software or TRACS has been updated to 202C. Software will not attempt to preserve the old calculations.

One change that CAs, in particular need to be aware of is the move to the use of Section 236 basic rent instead of Section 8 contract rent in field 2 of handbook Exhibit 3-14. CAs should accept prorated certifications using either contract or basic rent through the end of the transition to 202C.

If following this advice causes the tenant rent to change (in situations when it otherwise would not) the owner/agent should give the required notice to the tenant and begin collecting the new rent on the proper date.

Any dollar differences between the old and new rules should net out over many certifications and are not expected to cause a burden on any property.

### Gross Rent Changes and Unit Transfers

Applying a gross rent change is not simply a matter of changing the assistance by the amount of the difference between the old and the new rent. The complete set of calculations outlined below under the heading **Tenant Rent Algorithms** should be completed, plugging in changed values for rents and utility allowances. For example, in Rent Supplement the TTP is the greater of 30% of monthly adjusted income or 30% of gross rent. In some cases, raising the gross rent will cause the tenant's TTP to increase. In Section 236, a gross rent change will affect tenant rent for those paying basic rent or slightly above basic.

Where a household is subject to noncitizen rule proration, the need to recalculate is even more obvious. A given rent increase will almost always affect the tenant rent—not just assistance.

Similar examples exist for unit transfers to units with different rents and/or utility allowances.

Keep in mind that, when recalculating the certification that the ages of the household members stay as they were on the full certification that the GR or UT is based on. All that is done is to update the financial calculations.

The relatively new TRACS policy of rejecting certifications with \$0 assistance will help eliminate a class of common errors. Often a gross rent change, say for \$10, for a tenant with \$0

assistance is submitted as a \$10 subsidy increase from \$0 to \$10. Instead, such a tenant should be considered a Market renter. No subsidy is involved and a gross rent change would simply increase the rent the tenant is paying. If the rent change would result in the tenant now qualifying for subsidy, a termination from Market and an initial certification to subsidy should be done.

### **Handbook Rules**

Appendix 8 of Handbook 4350.3 Rev. 1 gives explicit guidance on calculation methodology. The rules presented there can be summarized as follows:

When rounding to the nearest dollar, round up at 0.50 and down at 0.49.

Intermediate calculations (those that are not submitted in a field in a MAT record) should be calculated to a higher precision but then rounded to the nearest penny.

In a series of calculations, any result submitted in the MAT is rounded to the nearest dollar and the dollar value used in the remaining calculations.

Calculations should be done in steps—not together. The example is given where 30% of monthly adjusted income is calculated. This is not implemented as  $((\text{Adjusted} / 12) * .3)$  but rather as multiple steps:

Adjusted Income/ 12 (calculate the result to 6 or more decimal places)  
Round the result to the nearest penny to get Monthly Adjusted.

Monthly Adjusted \* .3 (calculate the result to 6 or more decimal places)  
Round the result to the nearest penny to get 30% of Monthly Adjusted.

Note: Appendix 8 does not address the rounding of negative numbers. We are adopting the convention of rounding the absolute value of a number where applicable and then restoring the sign. For example,  $-36.5$  becomes  $-37$ . This is the equivalent of ignoring sign in intermediate calculations and then restoring it for the final result.

Finally, if your library of rounding functions does banker's rounding, you may need to write your own rounding function that follows the HUD rules.

### **Financial Calculations**

For the purpose of standardization, all financial calculations involving multiplication or division must be done as follows:

1. Calculate the result to 6 or more decimal places (5.003399).
2. Round the value to the nearest penny (5.003399 becomes 5.00).
3. If applicable, round the result to the nearest dollar, rounding up at .50 (5.00 becomes 5; 5.50 becomes 6; 5.49 becomes 5).

It is extremely important to follow the spreadsheet examples exactly. Do not combine two calculations in one line of code ( $234/12*.3$ ) for example. Software implementations must agree with the published spreadsheets.

## **Tenant Rent Algorithms**

The variables feeding into rent calculations are: Total Assets, Total Income from Assets, Imputed Income from Assets, Asset Income, Annual Income Amount, Adjustments to Income, Adjusted Income Amount, Contract Rent, Basic Rent, Utility Allowance, Gross Rent, Welfare Rent, and Market Rent. From these, Total Tenant Payment, Tenant Rent, Utility Reimbursement, and Assistance Payment Amounts are calculated as applicable for each subsidy type.

### **Assets**

Each asset should be stored as a value rounded to the nearest dollar. The rounded values are what are reported in a MAT file and used in other calculations.

Income from each asset is reported as a value rounded to the nearest dollar. When calculating an asset income by multiplying its value by an interest rate, follow the Handbook Rules above. In other words, multiply the rounded asset value by the interest rate, round the result to the nearest penny, and then round to the nearest dollar.

Total Assets and Total Income from Assets are the sums of the individual rounded asset values and asset incomes. There should never be a discrepancy between the sums of the values and the reported totals. CA software and TRACS should report discrepancies of \$1 or more for these totals starting with any files in 202C format.

Imputed Income from Assets is calculated by multiplying the applicable HUD Passbook Rate (Reported Passbook Rate Percent) by the Total Assets value if it is greater than \$5,000. The result should be calculated to 6 decimals, rounded to the nearest penny and then to the nearest dollar.

### **Income**

Each income should be reported as a value rounded to the nearest dollar. The rounded values are what are reported in a MAT file and used in other calculations.

The handbook gives two conflicting rules for calculating the annual value of hourly income. Handbook paragraph 5-5.B has you multiply an hourly rate by the number of weeks worked per year (a rounding to the penny and then to the dollar should be assumed). Appendix 8 has you multiply the hourly rate by the number of hours in the week; round to the penny; then multiply by the number of weeks; and finally round to the penny and then to the dollar. Housing has been asked for guidance on this issue. In the meantime it is probably best to rely on the body of the handbook rather than on the appendix. Whatever calculations the software does should follow the rules under Financial Calculations above.

The various income totals on the 50059 (Total Employment Income, Total Pension Income, Total Public Assistance Income, Total Other Income, and Non-Asset Income) are the sums of the appropriate values. There should never be a discrepancy between the sums of the underlying values and the calculated totals. CA software and TRACS should report discrepancies of \$1 or more for these totals starting with any files in 202C format.

### **Calculating Adjusted Income**

Unlike incomes and assets, the expenses used in adjusted income calculations are calculated and stored to the nearest penny. Only the appropriate totals are rounded to the dollar.

Deductions should be calculated in the order they appear on the 50059: Allowance for Dependents, Child Care (Work), Child Care (School or Look for Work), Disability, Medical, Elderly.

See Handbook paragraph 5-10 for details.

### **TTP, Tenant Rent, and Assistance**

While Section 8, RAP, PAC, and PRAC use very similar methods for determining rent, there are differences. As a result Section 8 is presented alone; RAP and 202 PACs are presented together; and PRACs are presented together.

Noncitizen rule prorations apply only to Section 8, Rent Supplement, RAP, and Section 236. See **Noncitizen Rule Proration** below. When noncitizen rule proration applies, first calculate the TTP, rent and assistance using the rent calculation spreadsheet. Next use the appropriate values from those calculations as input to the noncitizen rule spreadsheet.

The **Calculating Tenant Rent-TRACS 202C.xls** spreadsheet published as part of this specification contains examples of calculations for each subsidy type. As mentioned above, the spreadsheet is the final arbiter with respect to the correctness of calculations. Example calculations are not shown in this document as the spreadsheet may change more quickly than the document.

CA and TRACS software should report \$1 discrepancies for certifications reported in TRACS version 202C or later.

### **Noncitizen Rule Proration**

The spreadsheet posted on the TRACS web site in the Documents area as part of the 2.0.2.C specification (**Non Citizen Rule Prorations-TRACS 202C.xls**) serves as the official implementation of these calculations and should be used to resolve differences between site, CA and TRACS in the same way as the rent calculation spreadsheet should be used for that purpose.

Prior to prorating the assistance, the full rent calculations outlined above in **TTP, Tenant Rent, and Assistance** above should be completed as certain values resulting from those calculations are used in the proration algorithms. Example calculations are not shown in this document as the spreadsheet may change more quickly than the document.

There seems to be some confusion in the industry as to which calculations apply to a Section 8, RAP or Rent Supplement tenant who resides in a Section 236 property. In these cases **DO NOT** use the calculations as outlined in Exhibit 3-12. Use the calculations outlined in Exhibit 3-14.

CA and TRACS software should report \$1 discrepancies for certifications reported in TRACS version 202C or later.

## Calculating Income Limits for Families with More Than Eight Members

Updated to reflect 2007 rules.

From the HUD FY 2007 HUD INCOME LIMITS BRIEFING MATERIAL

### Family Size Adjustments

The statutory guidance governing income limits requires that income limits are to be higher for larger families and lower for smaller families. The same family size adjustments are used for all income limits. They are as follows:

Number of Persons in Family and Percentage Adjustments

1	2	3	4	5	6	7	8
70%	80%	90%	Base	108%	116%	124%	132%

Income limits for families with more than eight persons are not included in the printed lists because of space limitations. For each person in excess of eight, multiply the four-person base by  $100 + N \times 8\%$ , where  $N$  = the number of family members above 4. (For example, the nine-person limit equals 140 percent [ $132 + 8$ ] of the relevant four-person income limit.) Income limits are rounded to the nearest \$50. Note: the Briefing document allows either rounding to the nearest \$50 or not. We are requiring rounding so that site and CA software will calculate the same values and so that there is no dispute as to whether someone is above or below the income limit at admission or initial certification.

Example: Calculate the 11 person limit where the 4-person limit = 22900.

$11 - 4 = 7$   
 $100 + 7 \times 8 = 156\%$   
 $22900 \times 156\% = 35724$   
Rounded result = 35700

## H-3 HAP Vouchers

### Voucher Creation

Keeping in mind that a CA will almost never build a voucher on the same date as does the site and given that there are differences between sites (and possibly vendors) in whether they transmit certs as they are done or batch them up as a package associated with a voucher, the following rules will help ensure that site and CA vouchers match even if sites are transmitting new certs daily. All vendors are expected to implement these rules governing exactly which certifications will appear on a voucher or be selected for adjustments.

The assumption is that the voucher date on a certification is correct (or at least the same at the site and CA level) in the sense that it accurately reflects the voucher that the site first intends to bill for or adjust the cert. If a CA were to change the cert's voucher date then, of course, the site and CA vouchers would not match as the change produces an intentional difference.

RAP and Rent Supp vouchers are billed for between the first and 10th of the month for the current month. In other words, if you bill on 8/5 you are billing for August.

All other program vouchers bill between the first and 10th of the month for the following month. In other words, if you bill on 8/5 you are billing for September.

**RAP and Rent Supp:**

When billing for a month, ignore any certifications effective after the first of that month (any cert effective after 8/1 for the August voucher). Those certs will be picked up on the following month's voucher and will cause adjustments.

In addition, do not include any move-outs or terminations occurring on the first of the voucher month.

**All other subsidy types:**

When billing for a month, ignore any certifications effective after the first of the **prior** month (8/2 or later for the September voucher) with the exception of AR, IR, and IC certifications effective on the voucher date (9/1 for the September voucher).

See the chart below for a summary of the rules.

<b>This chart shows the first month that a given cert may appear on a voucher</b>				
<b>Certification Effective</b>	<b>RAP / Rent Sup</b>		<b>Other Subsidies</b>	
	Aug First	Aug 2-31	Aug First	Aug 2-31
<b>First Possible Voucher Month</b>				
AR	Aug	NA	Aug	NA
IR	Aug	Sep	Aug	Oct
IC	Aug	Sep	Aug	Oct
MI	Aug	Sep	Sep	Oct
MO	Sep	Sep	Sep	Oct
TM	Sep	Sep	Sep	Oct
GR	Aug	Sep	Sep	Oct
UT	Aug	Sep	Sep	Oct

With this model, it does not matter when the voucher is built with the obvious exception of a cert being added after a first build with the intention that it appear on a second build and provided that it meets the guidelines above.

Under these guidelines, if you build a Section 8 September voucher on 8/2 it does not matter if a move-in occurs on 8/3 or a unit transfer on 8/4. If the voucher were rebuilt on 8/6 it would be identical to the first one. More importantly, when the CA builds it on 8/12 it will match the site voucher exactly as it will be based on the same certs even if the CA has received the MI and the UT in the meantime.

## Adjustment Calculations

Note: The final version of this section differs considerably from the 2004 original draft. Some members of the working group proposed an alternate model that is more accurate than the old one in certain cases and provides the additional advantage of a common procedure no matter how complex the set of adjustment events. HUD policy signed off on the new model and the 4350.3 will be revised accordingly. All software must switch to the new model for their 202C releases.

The spreadsheet posted on the TRACS web site in the Documents area (**AdjustmentCalculations-TRACS 202C.xls**) serves as the official proper implementation of these calculations and should be used to resolve differences between site, CA and TRACS in the same way as the rent calculation spreadsheet should be used for that purpose.

To summarize the new model, no matter what type of certification is the subject of an adjustment, you always reverse the prior billing for the tenant and unit for the period of the adjustment and then re-bill for the same period applying any new or changed certifications.

- Notes, definitions and issues
  - The certification that is considered active on a specific date is the most recent one processed.
    - For example, if you have an AR and a subsequent correction to the AR, the correction is the active certification on the AR date.
  - Starting Month--the month during which the first new or corrected certification is effective. "First" is defined as the new or corrected certification with the earliest effective date. The exception to this rule is the case where a MO or TM or UT-Out is effective on the last day of the month. Since full subsidy is earned in that month, the starting month is defined as the following month.
    - Note: If, for example, a previously transmitted MO is corrected such that its effective date is in a different month (original = 10/30; correction = 11/1) the start date needs to be the first of the month of the earliest effective date of the two MOs.
  - Ending Month--either the earlier of the month prior to the current voucher or the month during which billing changes caused by new or corrected certifications end. To give an example of the latter. Suppose we have a 1/07 AR and a 1/08 AR. After the latest AR is processed, the tenant confesses to additional income on the 1/07 cert. The change does not impact the 1/08 AR. The AR\* for 1/07 is put on the 4/08 voucher. The adjustment period for the 1/07 AR\* is defined as 1/07 to 12/31/07--not to 3/31/2008.
  - Adjustment calculations as defined below start on the first day of the Starting Month and end on the last day of the Ending Month.
  - Partial month billing is calculated in the usual way (calculate the daily rate to 6 or more decimals using the number of days in the month as the divisor; round to 2 decimals; multiply by the number of days; round to the dollar). If billing for a certification involves two partial months, the result of each partial month calculation is rounded to the dollar. All certifications are assumed to be in order by effective date
  - New and Changed certifications—A new or changed certification is defined as any certification whose anticipated voucher date is equal to that of the current voucher. We perform adjustment calculations for any new or changed certification whose effective date is less than the voucher date whether or not the new or changed certification alters the TTP, assistance or rent. For example, on

the January voucher a correction to a prior cert is reported whose only change is to add a middle initial for a household member. This certification will appear on the adjustments page giving back the old assistance and rebilling for the same amount resulting in a net adjustment of \$0. The logic in this case is to show that the software recognized that it processed or received a corrected cert for the voucher.

- All new and changed certifications for a unit and tenant combination are presented as part of what can be viewed as a single adjustment with multiple detail lines.
  - Under this model a UT is presented as two adjustments
    - Out adjustment for the old unit
    - In adjustment for the new unit
  - The date range for the adjustment consists of the months from the Starting Month through the Ending Month.
- Presentation of the adjustments will look similar to the following:

Note that the sort order is Unit Number by Household by Prior or New Billing (Prior before New) by Effective Date. A blank line separates each unit/household block of transactions. So, if a retro GR causes adjustments for two different households in unit 1, the adjustment for household 1 is separated from the adjustment for household 2 by a blank line. This sort order can result in the two parts of a UT (UT-I and UT-O) appearing on widely separated pages of the voucher.

Note also the meaning of Prior or New Billing: Prior means any certification active within the adjustment period that has appeared on a voucher earlier than the current voucher. New means any certification, including both previously billed and new certifications, active during the adjustment period.

Note: There is no requirement to print negative numbers in red.

Head of Household	Unit Number	Adjusting Certification/Activity							Calculation Detail						Requested
		Prior or New Billing ?	New Cert?	Cert. Type	Effective Date	Asst. Pmt.	Adjustment Period		Beginning Partial Month		Full Months		Ending Partial Month		
									No. of Days	Daily Rate	No. of Months	Monthly Rate	No. of Days	Daily Rate	
Normal MI	101	New	Y	MI	10/12/07	\$350	10/12/07	11/30/07	20	\$11.29	1	\$350			\$576
Normal MO	102	Prior		AR	7/1/07	\$500	10/1/07	11/30/07			2	\$500			(\$1,000)
Normal MO	102	New		AR	7/1/07	\$500	10/1/07	10/4/07	4	\$16.13					\$65
Normal MO	102	New	Y	MO	10/4/07	\$0	10/5/07	11/30/07	27	\$0.00	1	\$0			\$0
Normal TM	103	Prior		IR	3/1/07	\$125	10/1/07	11/30/07			2	\$125			(\$250)
Normal TM	103	New		IR	3/1/07	\$125	10/1/07	10/15/07	15	\$4.03					\$60
Normal TM	103	New	Y	TM	10/15/07	\$0	10/16/07	11/30/07	16	\$0.00	1	\$0			\$0
DS Term.	104	Prior		MI	9/18/07	\$380	9/18/07	11/30/07	13	\$12.67	2	\$380			(\$925)
DS Term.	104	New	Y	TM-DS	9/18/07	\$0	9/18/07	9/30/07	13	\$0.00					\$0
DS Term.	104	New	Y	IC	10/1/07	\$380	10/1/07	11/30/07			2	\$380			\$760
Normal UT	105	Prior		AR	7/1/07	\$318	10/1/07	11/30/07			2	\$318			(\$636)
Normal UT	105	New		AR	7/1/07	\$318	10/1/07	10/12/07	12	\$10.26					\$123
Normal UT	105	New	Y	UT-O	10/12/08	\$0	10/13/08	11/30/07	19	\$0.00	1	\$0			\$0
Normal GR	106	Prior		AR	2/1/07	\$415	8/1/07	11/30/07			4	\$415			(\$1,660)
Normal GR	106	New		AR	2/1/07	\$415	8/1/07	8/11/07	11	\$13.39					\$147
Normal GR	106	New	Y	GR	8/12/07	\$418	8/12/07	11/30/07	20	\$13.48	3	\$418			\$1,524
Mult. Corrections	107	Prior		AR	2/1/07	\$228	2/1/07	3/17/07			1	\$228	17	\$7.35	(\$353)
Mult. Corrections	107	Prior		GR	3/18/07	\$230	3/18/07	8/11/07	14	\$7.42	4	\$230	11	\$7.42	(\$1,106)
Mult. Corrections	107	Prior		GR	8/12/07	\$232	8/12/07	8/31/07	20	\$7.48					(\$150)
Mult. Corrections	107	Prior		IR	9/1/07	\$250	9/1/07	11/30/07			3	\$250			(\$750)
Mult. Corrections	107	New	Y	AR*	2/1/07	\$230	2/1/07	3/17/07			1	\$230	17	\$7.42	\$356

Mult. Corrections	107	New	Y	GR	3/18/07	\$232	3/18/07	8/11/07	14	\$7.48	4	\$232	11	\$7.48	\$1,115
Mult. Corrections	107	New	Y	GR	8/12/07	\$234	8/12/07	8/31/07	20	\$7.55					\$151
Mult. Corrections	107	New	Y	IR*	9/1/07	\$252	9/1/07	11/30/07			3	\$252			\$756
Normal UT	108	New	Y	UT-I	10/13/07	\$323	10/13/07	11/30/07	19	\$10.42	1	\$323			\$521

TOTAL: (\$676)

- The algorithm is:
  - Calculate and Reverse Prior Billing for the adjustment period.
    - For each certification previously billed (voucher month is < the current voucher)
      - Calculate the subsidy earned by each certification
      - Reverse the billing
  - Calculate New Billing
    - For each certification currently billed (voucher month is <= the current voucher) including new and changed certifications.
      - Calculate the subsidy earned by each certification
      - Add to the new billing
  - Adjustment = the net of the reversed prior billings and the new billings.
  - Note: since the date range is from the first of the Starting Month through the end of the Ending Month, the first certification used in the calculations may be effective prior to the Starting Month. Subsidy earned prior to the Starting Month is ignored.
    - For example: A GR is effective 2/15. The previous cert with the highest effective date is a 1/1 AR. The billing for January is ignored when calculating the adjustment.
  - Note: Partial month billing is calculated in the usual way (calculate the daily rate to 6 or more decimals; round to 2 decimals; multiply by the number of days; round to the dollar)

#### **Adjustment Calculation Implementation Issues:**

The question arises concerning what to do, after implementation of these guidelines, when a certification is corrected that was originally adjusted using other methodology (not calculated using the 202C procedures). There are three logical possibilities:

1. Recalculate the old adjustment using the old methods and calculate the new one using the new rules.
2. Pretend that the old adjustment was done using the new methods and proceed as you would when correcting a certification that was adjusted using the new methods.
3. Calculate the changed adjustment using the methods in place prior to 2.0.2.C.

The TRACS 202C working group has decided on option 2 as it is the only one that will result in common results for both site and CA software. This should eliminate a large number of manual adjustments on one side or the other. However, it is recognized that this solution may cause a burden on accounting software at the site level.

## **H.4 Special Claims**

The spreadsheet posted on the TRACS web site in the Documents area (**SpecialClaimsRounding-TRACS 202C.xls**) serves as the official proper implementation of these calculations and should be used to resolve differences between site and CA calculations in the same way as the rent calculation spreadsheet should be used for that purpose.

In addition to clarifying what values should be used in certain fields, the spreadsheet, for the first time, specifies the proper rounding for each field. All calculation and rounding rules have been approved by HUD policy.