

**Components of
Inventory Change
And Rental Dynamics:
Denver
1995-2004**

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Components of Inventory Change and Rental Market Dynamics: Denver 1995-2004

Overview

Components of Inventory Change (CINCH) and rental market dynamics are two techniques for explaining how changes that take place in a housing market over time came about in physical (bricks and mortar) terms. CINCH focuses first on the overall number and then the characteristics of units at different times. Using CINCH methods, analysts answer such question as: “What happened to the x units that disappeared from the housing stock between the beginning and the end of the period?” or “Where did the increase in owner-occupied units come from?” Rental market dynamics, which is really a type of CINCH analysis, focuses on the rental market with particular emphasis on the affordability of rental housing. Using rental market dynamics techniques, analysts answer such questions as: “Have the number of rental units affordable to households with very low incomes increased or decreased over the period?” or “What happened to the rental units that were affordable to low-income households at the beginning of the period?”

This report focuses on the Denver metropolitan housing market over the period between 1995 and 2004. It is one of 13 reports based on local American Housing Surveys conducted in 2004; these 13 metropolitan areas were previously surveyed in either 1995 or 1996.¹

CINCH and rental market dynamics have both forward-looking and backward-looking components. The forward-looking component starts with the housing stock available at the beginning of the period and then, looking at the end of the period, attempts to explain what happened to those units. Possible answers include some units still exist and serve the same market, some units still exist but serve a different market, some units have been demolished or destroyed in natural disasters, or some units are being used for nonresidential purposes. The backward-looking component starts with the housing stock available at the end of the period and, looking at the beginning of the period, attempts to explain where those units came from. Possible answers include some units existed at the beginning of the period and served the same market, some units existed at the beginning of the period but served a different market, some units were newly constructed over the period, or some units were being used for nonresidential purposes at the beginning of the period. Neither CINCH nor rental market dynamics try to track the experience of a unit over the entire period; both are interested only in the beginning and the end of the period. For example, a housing unit in 1995 may have become a medical office in 1997 but returned to being a housing unit in 2000. CINCH would record this unit as having

¹ See <http://www.huduser.org/datasets/cinch.html> for examples of previous CINCH and rental dynamics studies.

undergone no change over the period from 1995 to 2004. In research jargon, CINCH and rental market dynamics are *comparative static* analyses.

Ideally one would want to combine the forward-looking and backward-looking analyses to produce a complete accounting that can explain the beginning and the end consistently in terms of units that existed in both periods, losses from the stock over the period, and additions to the stock over the period. The research in this report uses the AHS, which is a sample of units at both points in time, and previous research has shown that creating sample weights that take both periods into account can generate some inconsistent or inaccurate results. For this reason, recent CINCH and rental market dynamics studies have separated the forward-looking and backward-looking components. This paper will do the same. (Weighting is explained briefly in Appendix B and more fully in a separate paper referenced in that appendix.)

The remainder of this report consists of four sections:

- An explanation of how to read the CINCH tables.
- Two sets of four tables each: a set of forward-looking tables tracing the movement of units from 1995 to 2004 and identifying how units were lost to the housing stock; and a set of backward-looking tables tracing where 2004 units came from and distinguishing between units that were part of the stock in 1995 and units that were additions to the stock since 1995.
- Two tables and accompanying discussion that highlight interesting changes in the Denver housing stock between 1995 and 2004.
- A brief discussion of the rental market dynamics results using CINCH-like tables.

Two appendices explain how the results were tested and how the weights were created.

How to Read CINCH Tables

Rows and columns serve different purposes in CINCH tables. The rows identify classes of units to be analyzed. The columns trace those units either forward or backward.

The forward-looking tables are concerned with what happened to the 1995 housing stock by 2004. There are three basic dispositions of 1995 units: units that continue to exist in 2004 with the same characteristics (or serving the same market), units that continue to exist in 2004 but with different characteristics (or serving a different market), and units that were lost to the stock.

The backward-looking tables are concerned with where the 2004 housing stock came from in reference to 1995. There are three basic sources of 2004 units: units that existed in 1995 with the same characteristics (or serving the same market),

units that existed in 1995 but with different characteristics (or serving a different market), and units that are additions to the housing stock.

The essence of the CINCH analysis lies in the columns because they specify the state of a unit in the other time period.

Columns Common to both Forward-Looking and Backward-Looking Tables:

- The first and last columns contain the row numbers. The row numbers are identical for the same tables in the forward-looking and backward-looking sets.

Columns A through E set up the analysis and track units that exist in both periods.

- Column A specifies the characteristic that defines the subset of the stock that is being tracked forward or backward in a particular row. For example, row 2 of Table 1 focuses on occupied units; row 15 focuses on units built in 1985 through 1989.
- Column B gives the estimate published in the AHS report for the number of units that satisfy the conditions specified in column A. For example, the 1995 AHS report for Denver counted 725,700 occupied units (row 2, column B, forward-looking Table 1); the 2004 AHS report counted 855,700 occupied units (row 2, column B, backward-looking Table 1).
- Column C gives the CINCH estimate of the number of units that satisfy two conditions: (a) being part of the housing stock in the relevant year (1995 for the forward-looking tables and 2004 for the backward-looking tables), and (b) satisfying the condition in column A. CINCH uses different weights than those used in preparing the published AHS reports. Therefore, CINCH estimates can differ from AHS estimates for particular subsets of the housing stock. As explained in the appendix, the weights were created to match AHS published totals for rows 2 through 4 of Table 1 and rows 2 and 4 of Table 4. This perfect match will not be true of other rows.²
- Column D is the CINCH estimate of the number of units from column C that (a) are also part of the housing stock in the *other* year, and (b) continue to belong to the subset defined by column A. For example, column D of row 2 of forward-

² Columns B and C will also match, except for rounding, in row 1 of Table 1 because row 1 is defined as the sum of rows 2 through 4. Categories for which the CINCH weights seem consistently to have trouble matching the published numbers were: the number of mobile homes, units built between 2000-2004, units built between 1995-1999, rental units that do not have a cash rent, and monthly housing costs less than \$350 for owners. In a few other cases, the weighted numbers consistently fail to match the published totals, but the authors believe the differences result because the Census Bureau created the published totals using information not available on the public use files or because of coding differences. These cases are: the reasons for incomplete plumbing and households receiving welfare or SSI payment.

looking Table 1 estimates that 648,100 of the occupied units from 1995 were also occupied in 2004.

- Column E is the CINCH estimate of the number of units from column C that (a) are also part of the housing stock in the *other* year, but (b) no longer belong to the subset defined by column A. Column E of row 2 indicates that 68,800 units that were occupied in 1995 are still part of the housing stock in 2004 but are no longer occupied. In some cases, the analysis will not allow a unit to change characteristics between the base year and the other year. Examples include type of structure, year built, and number of stories; these are characteristics that are considered impossible or unlikely to change.

Columns Unique to Forward-Looking Tables

In forward-looking tables, columns F through K track what happened to units that were lost from 1995 to 2004.

- Column F is the CINCH estimate of the number of units from column C that are not in the 2004 housing stock because they were merged with other units or converted into multiple units. Among occupied units, 700 were lost to mergers and conversions.
- Column G is the CINCH estimate of the number of mobile homes from column C that were moved out during the period. Among occupied units, 200 mobile homes were moved out.³
- Column H is the CINCH estimate of the number of units that from column C that became nonresidential at the end of the period. For example, a real estate firm, a tax preparation office, a palm reader, or some other business might buy or rent a house to use for business rather than residential purposes.⁴ Among occupied units, 900 became nonresidential.
- Column I is the CINCH estimate of the number of units from column C that were demolished or were destroyed by fires or natural disasters by 2004. In this case, 4,900 units were demolished or destroyed.
- Column J is the CINCH estimate of the number of units from column C that by 2004 were condemned or that were no longer usable for housing because of extensive damage. Denver is unique among the 2004 AHS survey sites in that no

³ The AHS does not trace where the mobile home is moved to. The move may be within the metropolitan area or outside the metropolitan area. Similarly, column G in the backward-looking tables does not distinguish between move-ins from within or from outside the metropolitan area.

⁴ If the owner or tenant both lives in a unit and conducts business out of the unit, the AHS considers the unit to be residential. So nonresidential means strictly no residential use.

units are recorded as having been temporarily lost because of damage or similar cause.

- Column K is the CINCH estimate of the number of units from column C that were lost by 2004 for other reasons. These include units that the Census Bureau eliminated for sampling purposes and other miscellaneous losses. Among occupied units, there were 2,200 units lost for these miscellaneous reasons.

The columns form a closed system. Column C counts the number of units tracked; columns D through K account for all the possible outcomes. Therefore, column C minus the sum of columns D through K always equals zero, except for rounding.⁵

Columns Unique to Backward-Looking Tables

In backward-looking tables, columns G through K track where units came from that are part of the housing stock in 2004 but were not part of the 1995 housing stock.⁶

- Column G is the CINCH estimate of the number of mobile homes from column C that were moved in during the period. Among occupied units, 600 mobile homes were moved in (row 2, column G, of backward-looking Table 1).⁷
- Column H is the CINCH estimate of the number of units from column C that had been nonresidential in 1995. Among occupied units, 1,100 had been nonresidential.
- Column I is the CINCH estimate of the number of units from column C that were newly constructed between 1995 and 2004. Among occupied units, 132,600 units were newly constructed.
- Column J is the CINCH estimate of the number of units from column C that were added by 2004 by the recovery of units that had been temporarily lost to the housing stock because occupancy was prohibited in 1995, or the interior of the unit was exposed to the elements, or for reasons “not classified.” The 2004 occupied housing stock includes 1,100 recovered units.
- Column K includes units added by the Census Bureau as sample adjustments. Sample adjustments represent 400 occupied units in 2004.⁸

⁵ The weighted numbers are rounded to the nearest 100 to match practices used by the Census Bureau in the AHS publications.

⁶ The backward-looking tables do not contain a column F for units added through mergers and conversions. In 2004, the Census Bureau did not code the variable that would normally identify units created from mergers and conversions (REUAD=7 or 8).

⁷ In 2004, the Census Bureau did not code the variable that would normally identify mobile home move-ins (REUAD=4). We estimated these from another variable (NOINT=13).

⁸ In 2004, the Census Bureau added two units to the AHS sample for Denver as a sample adjustment. Weighted, these two units represent 426 units, which Table 1 rounds to 400 units.

Table 1

Table 1 focuses on the general housing characteristics of the stock. Row 1 provides the highest level CINCH overview of the stock. For this row, column A specifies no conditions other than being part of the stock in the relevant year.

Rows 2-4 divide the housing stock by use. By Census Bureau definition, the number of occupied non-seasonal units equals the number of households. Because households are the basis for all the analyses in Tables 2 through 4, it is important to get a good starting point for these estimates. For this reason, the weights are designed to match published AHS totals for occupied units (by owner-occupied and renter-occupied), vacant units, and seasonal units.

Rows 5-12 divide the housing stock by type of structure to see what type of units account for losses.⁹ Column E is forced to be zero on the grounds that changes in structure types are extremely rare and that any observed changes are most likely data errors.

Rows 13-24 divide the housing stock by year built.¹⁰ The published reports use the categories 1990-1994, 1995-1999, and 2000-2004; this report uses 1990-1995 and 1995-1999, and 2000-2004 to isolate units newly constructed since the previous AHS survey.¹¹ Column E is again forced to be zero.

Rows 25-31 and 32-36 divide the housing stock by two different measures of interior space, the number of rooms and the number of bedrooms.¹²

Rows 37-42 focus on multiunit structures only and divide them by number of stories. Column E is forced to be zero and, depending on the metropolitan area, the Census Bureau may suppress information, forcing some rows to be zero. For the 1995 Denver AHS public use file, the Census Bureau reported all units in structures with 7 or more stories in row 41 and reported no units in row 42. The published reports contain matching data for row 37 only.

Rows 43-44 divide the housing stock between central cities units and suburban residences to see how the observed changes vary by location. Rows 45-46 divide the housing stock by whether or not the occupants have moved in within the last 2 calendar years to see if certain units consistently have high turnover, and to see if high turnover units are more susceptible to loss.

⁹ In general, the CINCH estimates exceed published AHS estimates for single-family detached units and fall short of the published AHS estimates for manufactured homes by roughly equal amounts.

¹⁰ Rows 13 and 14 are not included in Forward-Looking Table 1, because the 1995 housing stock cannot contain units built after 1995.

¹¹ We use REUAD=3 and not year built to identify new construction. For this reason, there are units built after 1995 that are not considered new construction. Year built is obtained from the respondent and may be inaccurate.

¹² Because of small sample sizes in the losses and additions columns, we combined room categories that the published reports list separately.

Table 2

This table looks at issues related to the physical quality of units. Row 1 repeats the analysis from row 2 in Table 1. All the subsequent rows are based on row 1.

Rows 2-3 look at whether the units have complete kitchens, that is, have an installed sink with piped water, a mechanical refrigerator, and built-in burners for the exclusive use of the occupants. Rows 4-5 look at whether the units have complete plumbing facilities, that is, hot and cold piped water, a flush toilet, and a bathtub or shower inside the structure for the exclusive use of the occupants. Rows 6-9 look at each of these requirements separately.¹³ In the 1995 AHS, the published reports separate out the “exclusive use” category; in the data used for this report, these units show up in row 8. Rows 2-3, 4-5, and 6-9 separate out good units from the least desirable units based on kitchen and bath equipment.

Rows 10-15 look at how units obtain water and dispose of sewage.

Rows 16-21 look at units with severe physical problems. Rows 17-21 identify specific types of serious deficiencies. Row 16 counts the units having one or more of these deficiencies. Rows 22-27 look at units with moderate problems. Rows 23-27 identify specific types of deficiencies. Row 22 counts the units having one or more of these deficiencies.¹⁴ These rows are in the analysis to answer two questions: whether poor-quality units in one year are also poor-quality units in the other year, and whether poorer quality units are more likely to be lost.

Table 3

This table pertains to the characteristics of occupants. Row 1 repeats the analysis from row 2 in Table 1. All the subsequent rows are based on row 1. In all cases, the analysis seeks to find out how stable occupancy characteristics are over time, and what part of the market was served by units that were lost between 1995 and 2004.

Rows 2-3 look at the age of the householder. Rows 4-5 look at whether or not the household includes children. Rows 6-11 look at the race or ethnicity of the householder.¹⁵ Rows 12-14 look at three possible sources of household income.

¹³ Row 9 is not included in Forward-Looking Table 2, because the public use file does not contain the information needed to identify facilities available “for exclusive use” of the household.

¹⁴ For definitions of serious and moderate problems, see pages 990 and 991 of the AHS Codebook, version 1.78, at http://www.huduser.org/intercept.asp?loc=/Datasets/ahs/AHS_Codebook.pdf.

¹⁵ In compliance with new federal guidelines, the 2004 AHS used different categories for recording race. For 2004, this paper defined “White” as “White only”; Black as “Black only”; and “other” as all other answers.

Table 4

Table 4 pertains to tenure, income, and housing costs. Row 1 repeats the analysis from row 2 in Table 1. All the subsequent rows are based on row 1.

Rows 2-4 focus on tenure to see the extent to which units change tenure characteristics and whether rental or owner-occupied units are more likely to be lost.

Rows 5-10 characterize the rental stock using 6 categories based on monthly housing costs. Row 10 identifies units provided to tenants for no cash rents, e.g., units provided to maintenance or management personnel or units provided to relatives. Rows 16-20 identify owner-occupied units by total monthly housing costs.

Rows 11-15 track rental units by household income; rows 21-25 track owner-occupied units by household income.¹⁶

¹⁶ The published reports list more categories for both monthly housing costs and household income. This report combined categories for two reasons. First, the sample size in each metropolitan area is small, and therefore larger categories provide more stable measurement of the various types of losses and additions. Second, columns D and E track whether the units in each category remain occupied and stay in the same cost or income category. The combined categories create more interesting analysis because bigger changes in monthly housing costs or income are needed to move between broader categories.

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

Forward-Looking Table 1: Structural and Location Characteristics – All Housing Units

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	Total	773,900	773,900	762,400	0	900	200	900	6,300	0	3,200	1
	Occupancy Status											
2	Occupied	725,700	725,700	648,100	68,800	700	200	900	4,900	0	2,200	2
3	Vacant	46,200	46,200	9,600	34,100	200	0	0	1,400	0	800	3
4	Seasonal	2,000	2,000	700	1,100	0	0	0	0	0	200	4
	Units in Structure											
5	1, detached	456,900	462,000	457,600	0	0	0	700	2,800	0	800	5
6	1, attached	76,600	76,700	75,000	0	0	0	0	1,300	0	400	6
7	2 to 4	30,100	31,200	29,700	0	200	0	0	600	0	600	7
8	5 to 9	25,400	24,900	23,800	0	400	0	0	400	0	200	8
9	10 to 19	65,400	63,400	62,300	0	200	0	200	400	0	200	9
10	20 to 49	61,800	62,700	62,700	0	0	0	0	0	0	0	10
11	50 or more	40,200	40,100	39,200	0	0	0	0	400	0	400	11
12	Mobile Home/Trailer	17,400	12,900	12,000	0	0	200	0	200	0	400	12
	Year Built											
15	1990-1995	57,200	56,600	56,600	0	0	0	0	0	0	0	15
16	1985-1989	61,400	59,100	58,500	0	0	0	0	600	0	0	16
17	1980-1984	75,000	76,500	76,000	0	0	0	200	0	0	200	17
18	1970-1979	253,200	256,300	253,700	0	200	0	200	1,300	0	900	18
19	1960-1969	103,900	106,000	104,700	0	0	200	0	400	0	700	19
20	1950-1959	100,700	102,100	100,000	0	0	0	0	1,300	0	800	20
21	1940-1949	41,400	38,400	37,500	0	0	0	200	400	0	200	21
22	1930-1939	15,100	14,700	13,700	0	0	0	0	900	0	200	22
23	1920-1929	23,800	22,600	22,200	0	0	0	0	400	0	0	23
24	1919 or earlier	42,100	41,700	39,700	0	700	0	200	900	0	200	24

Components of Inventory Change and Rental Market Dynamics:
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Forward-Looking Table 1 (continued): Structural and Location Characteristics – All Housing Units

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
	Rooms											
25	1 – 4 rooms	229,000	226,100	181,700	38,100	400	200	400	3,200	0	1,900	25
26	5 rooms	117,700	114,100	47,000	65,200	200	0	200	900	0	600	26
27	6 rooms	113,700	115,400	41,600	72,500	0	0	0	1,300	0	0	27
28	7 rooms	107,700	106,400	35,100	70,400	0	0	0	700	0	200	28
29	8 rooms	96,800	99,100	28,900	69,900	0	0	0	0	0	200	29
30	9 rooms	61,500	64,200	15,200	48,400	200	0	200	0	0	200	30
31	10 rooms or more	47,700	48,600	23,700	24,700	0	0	0	200	0	0	31
	Bedrooms											
32	None	10,500	10,700	3,400	6,200	0	0	0	400	0	600	32
33	1	121,300	117,700	97,700	17,600	200	200	200	1,500	0	200	33
34	2	218,300	218,900	175,100	39,100	400	0	400	2,400	0	1,500	34
35	3	237,300	235,100	174,200	58,700	200	0	0	1,500	0	400	35
36	4 or more	186,400	191,600	161,100	29,400	0	0	200	400	0	400	36
37	Multiunit Structures	222,900	222,400	217,800	0	900	0	200	2,000	0	1,500	37
	Stories in Structures											
38	1	NA	9,200	8,600	0	0	0	0	200	0	400	38
39	2	NA	61,300	59,100	0	200	0	0	1,100	0	900	39
40	3	NA	107,000	105,600	0	600	0	200	200	0	200	40
41	4 to 6	NA	44,900	44,500	0	0	0	0	400	0	0	41
42	7 or more	NA	0	0	0	0	0	0	0	0	0	42
	Metro Status											
43	In central cities	NA	241,400	235,500	0	700	0	0	3,700	0	1,500	43
44	In suburbs	NA	532,500	526,900	0	200	200	900	2,600	0	1,700	44
	Mover Status											
45	Moved in last 2 years	NA	198,900	65,600	129,700	200	200	200	2,000	0	900	45
46	Not a Recent Mover	NA	526,800	521,500	0	400	0	700	2,900	0	1,300	46

Components of Inventory Change and Rental Market Dynamics:
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Forward-Looking Table 2: Condition of Unit – All Occupied Units

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	Occupied Units	725,700	725,700	648,100	68,800	700	200	900	4,900	0	2,200	1
	Kitchen											
2	With complete kitchen	720,600	721,300	626,600	85,900	700	200	900	4,900	0	2,200	2
3	Lacking complete kitchen facilities	5,100	4,400	200	4,100	0	0	0	0	0	0	3
	Plumbing											
4	With all plumbing facilities	722,400	722,400	639,900	73,700	700	200	900	4,900	0	2,200	4
5	Lack some plumbing	200	3,300	200	3,000	0	0	0	0	0	0	5
6	No hot piped water	0	200	200	0	0	0	0	0	0	0	6
7	No bathtub/shower	200	500	200	200	0	0	0	0	0	0	7
8	No flush toilet	3,200	3,300	200	3,000	0	0	0	0	0	0	8
	Water											
10	Public/private water	707,000	706,600	626,700	71,800	700	200	700	4,600	0	2,000	10
11	Well	18,600	18,800	16,300	1,900	0	0	200	200	0	200	11
12	Other water source	200	200	0	200	0	0	0	0	0	0	12
	Sewer											
13	Public sewer	701,300	701,500	623,400	70,200	700	200	700	4,400	0	2,000	13
14	Septic tank/cesspool	24,400	24,200	21,400	1,900	0	0	200	400	0	200	14
15	Other or none	0	0	0	0	0	0	0	0	0	0	15
	Severe Problems											
16	Severe Problems	6,300	6,100	200	5,600	0	0	0	200	0	0	16
17	Plumbing	3,400	3,300	200	3,000	0	0	0	0	0	0	17
18	Heating	2,900	2,800	0	2,600	0	0	0	200	0	0	18
19	Electric	200	200	0	200	0	0	0	0	0	0	19
20	Upkeep	0	0	0	0	0	0	0	0	0	0	20
21	Hallways	0	0	0	0	0	0	0	0	0	0	21
	Moderate problems											
22	Moderate problems	12,100	11,300	200	10,200	0	0	0	900	0	0	22
23	Plumbing	1,400	1,400	0	1,200	0	0	0	200	0	0	23
24	Heating	0	0	0	0	0	0	0	0	0	0	24
25	Kitchen	4,600	4,400	200	4,100	0	0	0	0	0	0	25
26	Upkeep	6,400	7,200	200	6,300	0	0	0	700	0	0	26
27	Hallways	400	0	0	0	0	0	0	0	0	0	27

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

Forward-Looking Table 3: Household Characteristics – All Occupied Units

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	Occupied units	725,700	725,700	648,100	68,800	700	200	900	4,900	0	2,200	1
	Age of Householder											
2	Under 65	614,900	611,700	496,800	107,600	400	200	700	3,800	0	2,200	2
3	65 or older	110,800	114,000	62,000	50,400	200	0	200	1,100	0	0	3
	Children											
4	Some	256,700	259,300	135,200	121,900	0	0	200	1,300	0	700	4
5	None	469,000	466,400	317,300	142,500	700	200	700	3,500	0	1,500	5
	Race/Origin of Householder											
6	White	659,700	657,600	544,800	105,800	700	200	700	4,000	0	1,500	6
7	Hispanic	68,700	64,800	31,500	32,300	400	0	0	400	0	200	7
8	NonHispanic	590,900	592,800	432,400	154,400	200	200	700	3,500	0	1,300	8
9	Black	37,300	39,400	16,800	21,700	0	0	200	700	0	0	9
10	Other	28,800	28,700	4,700	23,100	0	0	0	200	0	700	10
11	Total Hispanics	80,300	77,200	40,500	34,600	400	0	0	700	0	900	11
	Income Source											
12	Wages and salaries	597,600	595,000	469,800	118,600	700	200	700	3,300	0	1,800	12
13	Welfare or SSI	157,500	161,600	81,100	79,000	0	0	200	1,100	0	200	13
14	Social security or pension	28,100	28,000	1,600	25,000	0	0	0	900	0	400	14

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

Forward-Looking Table 4: Market Dynamics and Affordability – All Occupied Units

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	Occupied units	725,700	725,700	648,100	68,800	700	200	900	4,900	0	2,200	1
	Tenure											
2	Owner occupied	473,800	473,800	413,500	56,800	200	200	400	1,300	0	1,300	2
3	Percent own occpd	65.3%	65.3%									3
4	Renter occupied	251,900	251,900	154,100	92,500	400	0	400	3,600	0	900	4
	Renter Monthly Housing Costs											
5	Less than \$350	40,100	40,700	12,400	25,400	400	0	200	1,300	0	900	5
6	\$350 to \$599	111,500	111,300	25,600	84,800	0	0	200	700	0	0	6
7	\$600 to \$799	59,700	60,500	14,600	45,300	0	0	0	700	0	0	7
8	\$800 to \$1,249	28,400	30,300	8,000	21,800	0	0	0	400	0	0	8
9	\$1,250 or more	6,500	4,200	700	3,300	0	0	0	200	0	0	9
10	No cash rent	5,800	4,900	700	4,000	0	0	0	200	0	0	10
	Renter Hsd Income											
11	Less than \$15,000	65,400	65,600	20,900	42,300	400	0	0	1,300	0	700	11
12	\$15,000 to \$29,999	81,500	79,800	13,900	64,300	0	0	400	1,100	0	0	12
13	\$30,000 to \$49,999	67,700	69,500	11,700	56,800	0	0	0	700	0	200	13
14	\$50,000 to \$99,999	33,100	32,400	5,900	26,300	0	0	0	200	0	0	14
15	\$100,000 or more	4,300	4,700	200	4,200	0	0	0	200	0	0	15
	Owner Monthly Housing Costs											
16	Less than \$350	99,000	100,400	32,100	66,800	0	200	200	900	0	200	16
17	\$350 to \$599	75,900	78,200	13,700	64,100	0	0	0	0	0	400	17
18	\$600 to \$799	76,500	74,300	10,200	63,200	200	0	0	400	0	200	18
19	\$800 to \$1,249	140,600	142,700	35,000	107,300	0	0	0	0	0	400	19
20	\$1,250 or more	81,600	78,300	55,200	22,900	0	0	200	0	0	0	20
	Owner Hsd Income											
21	Less than \$15,000	29,200	29,000	5,100	23,400	0	0	200	200	0	0	21
22	\$15,000 to \$29,999	86,900	86,200	19,000	66,100	200	200	0	700	0	0	22
23	\$30,000 to \$49,999	127,400	129,000	25,600	102,100	0	0	0	400	0	900	23
24	\$50,000 to \$99,999	175,100	176,800	65,600	111,000	0	0	0	0	0	200	24
25	\$100,000 or more	55,200	52,800	29,200	23,200	0	0	200	0	0	200	25

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

Backward-Looking Table 1: Structural and Location Characteristics – All Housing Units

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
1	Total	949,100	949,100	795,200	0	1,000	1,400	149,800	1,200	400	1
	Occupancy Status										
2	Occupied	855,700	855,700	681,200	38,800	600	1,100	132,600	1,100	400	2
3	Vacant	91,000	91,000	9,600	63,600	400	400	16,900	200	0	3
4	Seasonal	2,400	2,400	700	1,300	0	0	400	0	0	4
	Units in Structure										
5	1, detached	565,600	573,300	482,600	0	0	800	89,000	800	0	5
6	1, attached	93,400	92,000	70,900	0	0	0	21,100	0	0	6
7	2 to 4	35,200	36,100	32,100	0	0	0	3,500	200	200	7
8	5 to 9	41,500	41,000	33,800	0	0	0	7,000	200	0	8
9	10 to 19	68,300	68,300	58,400	0	0	400	9,500	0	0	9
10	20 to 49	80,500	78,900	64,900	0	0	0	14,000	0	0	10
11	50 or more	44,400	43,600	38,300	0	0	200	4,900	0	200	11
12	Mobile Home/Trailer	20,100	16,000	14,100	0	1,000	0	900	0	0	12
	Year Built										
13	2000-2004	108,200	91,100	4,300	0	200	0	86,700	0	0	13
14	1995-1999	86,700	74,400	15,600	0	800	200	57,900	0	0	14
15	1990-1994	54,400	54,100	48,400	0	0	400	5,300	0	0	15
16	1985-1989	62,900	65,400	64,800	0	0	400	0	200	0	16
17	1980-1984	80,200	84,100	84,100	0	0	0	0	0	0	17
18	1970-1979	225,100	236,000	235,600	0	0	0	0	400	0	18
19	1960-1969	109,900	116,600	116,400	0	0	0	0	0	200	19
20	1950-1959	103,400	108,000	107,800	0	0	0	0	0	200	20
21	1940-1949	40,400	41,500	41,500	0	0	0	0	0	0	21
22	1930-1939	14,300	14,300	14,300	0	0	0	0	0	0	22
23	1920-1929	25,900	25,400	25,200	0	0	200	0	0	0	23
24	1919 or earlier	37,600	38,100	37,200	0	0	200	0	600	0	24

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

Backward-Looking Table 1 (continued): Structural and Location Characteristics – All Housing Units

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
	Rooms										
25	1 – 4 rooms	268,400	266,800	188,400	46,200	400	600	30,300	400	400	25
26	5 rooms	143,800	141,500	49,000	67,300	600	0	24,600	0	0	26
27	6 rooms	131,200	132,100	43,400	65,900	0	0	22,500	200	0	27
28	7 rooms	126,000	128,000	36,700	71,200	0	200	19,600	200	0	28
29	8 rooms	101,400	104,500	30,300	59,800	0	200	14,200	0	0	29
30	9 rooms	70,000	70,500	16,000	41,500	0	200	12,800	0	0	30
31	10 rooms or more	108,200	105,800	24,800	54,500	0	200	25,900	400	0	31
	Bedrooms										
32	None	6,600	6,800	3,600	3,000	0	0	200	0	0	32
33	1	137,900	134,700	101,300	15,100	0	600	16,800	400	400	33
34	2	249,100	249,500	182,000	30,500	600	0	36,400	0	0	34
35	3	289,100	289,100	182,200	53,800	400	200	52,300	200	0	35
36	4 or more	266,500	269,100	168,600	55,100	0	600	44,100	600	0	36
37	Multiunit Structures	269,900	267,800	227,500	0	0	600	38,900	400	400	37
	Stories in Structures										
38	1	NA	19,700	17,500	0	0	0	1,700	200	200	38
39	2	NA	74,100	62,800	0	0	0	11,100	200	0	39
40	3	NA	124,200	101,900	0	0	400	21,900	0	0	40
41	4 to 6	NA	27,400	24,800	0	0	0	2,400	0	200	41
42	7 or more	NA	22,400	20,500	0	0	200	1,700	0	0	42
	Metro Status										
43	In central cities	NA	261,900	244,900	0	0	800	15,100	800	200	43
44	In suburbs	NA	687,200	550,300	0	1,000	600	134,700	400	200	44
	Mover Status										
45	Moved in last 2 years	NA	231,700	69,300	105,800	0	0	56,000	200	400	45
46	Not a Recent Mover	NA	624,000	412,900	132,000	600	1,100	76,600	800	0	46

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

Backward-Looking Table 2: Condition of Unit – All Occupied Units

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
1	Occupied Units	855,700	855,700	681,200	38,800	600	1,100	132,600	1,100	400	1
	Kitchen										
2	With complete kitchen	832,400	833,000	658,600	41,100	600	1,100	130,400	1,100	200	2
3	Lacking complete kitchen facilities	23,300	22,700	200	20,100	0	0	2,100	0	200	3
	Plumbing										
4	With all plumbing facilities	848,500	848,900	672,600	41,000	600	1,100	132,200	1,100	400	4
5	Lack some plumbing	7,200	6,800	200	6,100	0	0	400	0	0	5
6	No hot piped water	500	500	200	200	0	0	0	0	0	6
7	No bathtub/shower	300	200	200	0	0	0	0	0	0	7
8	No flush toilet	300	200	200	0	0	0	0	0	0	8
9	No exclusive use	6,700	6,300	0	5,900	0	0	400	0	0	9
	Water										
10	Public/private water	834,000	829,100	658,700	39,300	600	1,100	127,900	1,100	400	10
11	Well	20,800	25,700	17,100	4,100	0	0	4,400	0	0	11
12	Other water source	900	900	0	700	0	0	200	0	0	12
	Sewer										
13	Public sewer	825,600	824,000	655,300	38,500	600	1,100	127,000	1,100	400	13
14	Septic tank/cesspool	30,100	31,700	22,500	3,700	0	0	5,500	0	0	14
15	Other	0	0	0	0	0	0	0	0	0	15
	Severe Problems										
16	Severe Problems	12,900	12,600	200	11,600	0	0	800	0	0	16
17	Plumbing	7,200	6,800	200	6,100	0	0	400	0	0	17
18	Heating	5,700	5,800	0	5,400	0	0	400	0	0	18
19	Electric	200	200	0	200	0	0	0	0	0	19
20	Upkeep	300	200	0	200	0	0	0	0	0	20
21	Hallways	0	0	0	0	0	0	0	0	0	21
	Moderate problems										
22	Moderate problems	29,200	28,700	200	25,900	200	0	2,100	0	200	22
23	Plumbing	1,200	1,700	0	1,500	200	0	0	0	0	23
24	Heating	500	500	0	500	0	0	0	0	0	24
25	Kitchen	22,000	22,700	200	20,100	0	0	2,100	0	200	25
26	Upkeep	5,500	7,100	200	6,900	0	0	0	0	0	26
27	Hallways	200	200	0	200	0	0	0	0	0	27

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

Backward-Looking Table 3: Household Characteristics – All Occupied Units

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
1	Occupied units	855,700	855,700	681,200	38,800	600	1,100	132,600	1,100	400	1
	Age of Householder										
2	Under 65	729,200	727,200	522,200	78,600	600	1,100	123,200	1,100	400	2
3	65 or older	126,600	128,500	65,200	54,000	0	0	9,400	0	0	3
	Children										
4	Some	315,200	316,000	142,000	113,900	0	200	59,600	200	0	4
5	None	540,700	539,700	333,500	130,500	600	800	72,900	800	400	5
	Race/Origin of Householder										
6	White	761,400	760,700	572,300	65,800	600	1,100	119,900	800	200	6
7	Hispanic	128,000	129,900	33,100	84,200	200	200	12,000	200	0	7
8	Non-Hispanic	633,400	630,700	454,000	66,800	400	800	107,800	600	200	8
9	Black	43,800	43,600	17,700	21,500	0	0	4,200	0	200	9
10	Other	50,400	51,400	6,600	36,100	0	0	8,500	200	0	10
11	Total Hispanics	145,700	148,700	42,600	92,100	200	200	13,300	200	0	11
	Income Source										
12	Wages and salaries	721,200	722,000	452,100	145,800	600	800	121,400	800	400	12
13	Welfare or SSI	176,000	178,600	85,100	79,300	0	0	13,800	400	0	13
14	Social security or pension	36,200	12,800	1,700	10,100	0	0	1,000	0	0	14

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

Backward-Looking Table 4: Market Dynamics and Affordability – All Occupied Units

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
1	Occupied units	855,700	855,700	681,200	38,800	600	1,100	132,600	1,100	400	1
	Tenure										
2	Owner occupied	600,600	600,600	433,400	63,500	400	600	102,000	600	0	2
3	Percent own occpd	70.2%	70.2%								3
4	Renter occupied	255,100	255,100	163,200	59,900	200	400	30,500	400	400	4
	Renter Monthly Housing Costs										
5	Less than \$350	24,500	24,800	13,200	10,200	0	0	1,200	200	0	5
6	\$350 to \$599	50,500	50,300	27,100	20,900	0	0	1,900	0	400	6
7	\$600 to \$799	70,000	72,400	15,400	51,700	0	200	5,100	0	0	7
8	\$800 to \$1,249	71,600	73,100	8,500	48,200	200	0	16,200	0	0	8
9	\$1,250 or more	30,300	30,700	700	23,900	0	0	5,800	200	0	9
10	No cash rent	8,200	3,800	700	2,500	0	200	400	0	0	10
	Renter Hsd Income										
11	Less than \$15,000	61,800	61,800	22,100	35,600	0	0	3,700	200	200	11
12	\$15,000 to \$29,999	60,300	60,400	14,700	40,500	200	0	5,000	0	0	12
13	\$30,000 to \$49,999	62,800	62,300	12,400	41,500	0	200	7,900	0	200	13
14	\$50,000 to \$99,999	58,000	58,700	6,200	41,800	0	200	10,400	0	0	14
15	\$100,000 or more	12,400	11,900	200	8,000	0	0	3,500	200	0	15
	Owner Monthly Housing Costs										
16	Less than \$350	78,000	78,500	33,600	40,100	0	0	4,800	0	0	16
17	\$350 to \$599	69,500	72,500	14,300	51,700	0	0	6,200	200	0	17
18	\$600 to \$799	39,600	44,800	10,700	30,400	200	0	3,600	0	0	18
19	\$800 to \$1,249	140,600	129,900	36,600	74,400	200	200	18,300	200	0	19
20	\$1,250 or more	272,800	274,800	57,800	147,200	0	400	69,100	200	0	20
	Owner Hsd Income										
21	Less than \$15,000	44,200	43,700	5,300	34,000	200	200	3,900	0	0	21
22	\$15,000 to \$29,999	58,400	59,400	19,900	35,200	200	0	4,000	0	0	22
23	\$30,000 to \$49,999	97,600	98,800	26,800	61,800	0	0	10,200	0	0	23
24	\$50,000 to \$99,999	227,600	228,300	68,800	115,900	0	0	43,000	600	0	24
25	\$100,000 or more	172,700	170,500	30,600	98,500	0	400	41,000	0	0	25

Changes in the Denver Housing Stock: 1995-2004

Forward-looking Table 5 looks at how losses affected certain portions of the Denver housing stock. The rows were selected because of their inherent interest or because an examination of losses in all 13 metropolitan areas showed that these categories typically had high loss rates. In most cases, if a category had a high loss rate, then a category with the opposite characteristic would have a low loss rate, e.g., units with 1-4 rooms and units with 10 or more rooms.

Forward-Looking Table 5: Selected Loss Rates

Category	Based on Columns in Tables 1-4		
	All Losses 1995-2004 (F+G+H+I+J+K)/C	Permanent Losses (I/C)	Potentially Reversible Losses (F+G+H+J+K)/C
All units¹⁷	1.5%	0.8%	0.7%
Vacant units	5.2%	3.0%	2.2%
Units in structures with 2-4 units	4.5%	1.9%	2.6%
Units in structures with 5-9 units	4.0%	1.6%	2.4%
Mobile homes/trailers	6.2%	1.6%	4.7%
Units built 1930-1939	7.5%	6.1%	1.4%
Units built 1920-1929	1.8%	1.8%	0.0%
Units built in 1919 or earlier	4.8%	2.2%	2.6%
Units with 1-4 rooms	2.7%	1.4%	1.3%
Units with no bedrooms	9.3%	3.7%	5.6%
Units in central cities	2.4%	1.5%	0.9%
Units outside of central city	1.1%	0.5%	0.6%
Occupied units¹⁸	1.2%	0.7%	0.6%
Units with severe problems	3.3%	3.3%	0.0%
Units with moderate problems	8.0%	8.0%	0.0%
Units with a White householder	1.1%	0.6%	0.5%
Units with a Black householder	2.3%	1.8%	0.5%
Units with Hispanic householder	2.6%	0.9%	1.7%
Household receives welfare/SSI	4.6%	3.2%	1.4%
Owner-occupied units	0.7%	0.3%	0.4%
Renter-occupied units	2.1%	1.4%	0.7%
Renter-occupied – monthly housing costs less than \$350	6.9%	3.2%	3.7%
Renter-occupied – household income less than \$15,000	3.7%	2.0%	1.7%

¹⁷ All the rows above “Occupied units” refer to portions of the entire housing stock.

¹⁸ All the rows below “Occupied units” refer to portions of the occupied housing stock.

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

By 2004, 1.5 percent of the units in the 1995 housing stock was no longer part of the housing stock; 0.8 percent were permanent losses—that is, the units had either been demolished or destroyed by fire or natural disasters—while 0.7 percent were lost in ways that could be reversed, such as nonresidential use.

Units that were vacant in 1995 had a loss rate more than 3 times greater than the overall lost rate. Units in small structures and mobile homes also had high loss rates. About three-quarters of the overall loss rate for mobile homes and trailers was potentially reversible. Units built prior to 1940 had a mix of loss rates. Those built between 1930 and 1939 and those built in 1919 or earlier had high loss rates, while units built between 1920 and 1929 had about average loss rates. Small units had higher loss rates. The central city loss rate was more than twice the loss rate in the rest of the metropolitan area.

Among units occupied in 1995, 1.2 percent were lost by 2004. The loss rate was higher for units with physical problems; all of these losses were permanent losses. The loss rate for units occupied by Black or Hispanic householders was more than twice the rate of those occupied by White householders. Units with households on welfare or SSI had high loss rates.

The loss rate among rental units was 3 times the loss rate among owner-occupied units. Low cost rental units and rental units occupied by the lowest income households had high loss rates.

Backward-looking Table 5 presents addition rates for selected areas of the Denver housing stock. The rows were selected because of their inherent interest or because an examination of additions in all 13 metropolitan areas showed that these categories typically had high addition rates. In most cases, if a category had a high addition rate, then a category with the opposite characteristic would have a low addition rate, e.g., units with 10 or more rooms and units with no bedrooms.

Of all the units in the Denver housing stock in 2004, 16.2 percent were not in the 1995 housing stock. Most of the new units came from new construction; the return to the housing stock of units that were not available in 1995 accounted for a small percentage of the total units in 2004.

Single units in attached structures had a higher than average addition rate, while mobile homes and trailers had a lower than average addition rate. More than half of the new mobile homes were move-ins from other locations. Large units had high addition rates, while units with no bedrooms had a very low addition rate. The addition rate in central cities was one-third of the addition rate in the rest of the metropolitan area.

New construction formed a higher proportion of the units occupied by White householders than the proportions occupied by Black or Hispanic householders. There was a substantial number of additions in both the owner-occupied and renter-occupied stock, but the owner-occupied stock had a higher percentage of additions. The addition rates were high for rental units with monthly housing costs of \$800 to \$1,250, for owner-

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

occupied units with monthly housing costs greater than \$1,250, and owner-occupied units with households with income of \$100,000 or more.

Backward-Looking Table 5: Selected Addition Rates

Category	Based on Columns in Tables 1-4		
	All Additions (G+H+I+J+K)/C	New Construction I/C	Other Additions G+H+J+K/C
All units ¹⁹	16.2%	15.8%	0.4%
Single-unit, attached structure	22.9%	22.9%	0.0%
Mobile homes/trailers	11.9%	5.6%	6.3%
Units with 9 rooms	18.4%	18.2%	0.3%
Units with 10 or more rooms	25.0%	24.5%	0.6%
Units with no bedrooms	2.9%	2.9%	0.0%
Units in central cities	6.5%	5.8%	0.7%
Units outside of central city	19.9%	19.6%	0.3%
Occupied units ²⁰	15.9%	15.5%	0.4%
Units with a white householder	16.1%	15.8%	0.4%
Units with a Black householder	10.1%	9.6%	0.5%
Units with Hispanic householder	9.3%	8.9%	0.4%
Owner-occupied units	17.2%	17.0%	0.3%
Renter-occupied units	12.5%	12.0%	0.5%
Renter-occupied – monthly housing costs \$800 to \$1,249	22.4%	22.2%	0.3%
Owner-occupied – monthly housing costs \$1,250 or more	25.4%	25.1%	0.2%
Owner-occupied – household income \$100,000 or more	24.3%	24.0%	0.2%

Rental Market Dynamics

Tables A and B present the rental market dynamics analysis. Rental market dynamics differs from the analysis in rows 5-10 in the forward-looking and backward-looking tables in two ways. First, rental market dynamics uses categories (rows) based on affordability instead of absolute dollar amount. Affordability is defined relative to local area median income measured at the same time that monthly housing costs are measured. Tables A and B use the following seven categories:

- Non-market (either no cash rent or a subsidized rent).
- Extremely low rent (monthly housing costs affordable to renters with incomes less than or equal to 30 percent of local area median income).²¹

¹⁹ All the rows above “Occupied units” refer to portions of the entire housing stock.

²⁰ All the rows below “Occupied units” refer to portions of the occupied housing stock.

²¹ “Affordable” is defined as monthly housing costs less than or equal to 30 percent of the highest income in the category.

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

Table A: Forward-Looking Rental Dynamics Analysis, Counts: 1995-2004

Affordability Groups	A Total in 1995	B Non- Market in 2004	C Extremely Low Rent in 2004	D Very Low Rent in 2004	E Low Rent in 2004	F Moderate Rent in 2004	G High Rent in 2004	H Very or Extremely High Rent in 2004	I Owner Occupied in 2004	J Seasonal or Vacant in 2004	K Lost to Stock in 2004
Non-market	28,600	8,500	6,100	5,900	700	500	0	200	2,800	2,600	1,300
Extremely Low Rent	25,700	700	8,900	5,200	0	200	0	0	1,900	6,800	2,000
Very Low Rent	108,500	4,900	12,900	45,100	3,100	1,400	200	0	16,200	24,000	700
Low Rent	38,500	700	900	16,400	3,100	2,300	0	0	8,200	6,100	700
Moderate Rent	33,100	900	700	7,500	4,200	5,200	700	0	8,500	5,200	200
High Rent	12,900	200	0	900	500	1,400	1,400	900	4,700	2,600	200
Very or Extremely High Rent	4,700	0	200	0	0	500	700	0	2,600	500	200
Total	251,900	16,000	29,800	81,000	11,500	11,500	3,100	1,200	44,900	47,700	5,300

Table B: Backward-Looking Rental Dynamics Analysis, Counts: 2004-1995

Affordability Groups	A Total in 2004	B Non- Market in 1995	C Extremely Low Rent in 1995	D Very Low Rent in 1995	E Low Rent in 1995	F Moderate Rent in 1995	G High Rent in 1995	H Very or Extremely High Rent in 1995	I Owner Occupied in 1995	J Seasonal or Vacant in 1995	K New Construc- tion	L Other Additions
Non-market	24,700	9,000	700	5,200	700	1,000	200	0	3,700	1,500	2,300	200
Extremely Low Rent	37,800	6,500	9,500	13,700	1,000	700	0	200	1,700	2,500	1,400	600
Very Low Rent	114,800	6,200	5,500	47,800	17,400	8,000	1,000	0	8,200	10,900	9,600	200
Low Rent	24,600	700	0	3,200	3,200	4,500	500	0	3,700	3,200	5,200	200
Moderate Rent	35,200	500	200	1,500	2,500	5,500	1,500	500	12,900	1,700	8,300	0
High Rent	11,700	0	0	200	0	700	1,500	700	4,700	1,000	2,700	0
Very or Extremely High Rent	6,400	200	0	0	0	0	1,000	0	3,200	700	1,000	200
Total	255,100	23,100	15,900	71,600	24,900	20,400	5,700	1,500	38,300	21,600	30,500	1,500

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

- Very low rent (monthly housing costs affordable to renters with incomes greater than 30 percent but less than or equal to 50 percent of local area median income).
- Low rent (monthly housing costs affordable to renters with incomes greater than 50 percent but less than or equal to 60 percent of local area median income).
- Moderate rent (monthly housing costs affordable to renters with incomes greater than 60 percent but less than or equal to 80 percent of local area median income).
- High rent (monthly housing costs affordable to renters with incomes greater than 80 percent but less than or equal to 100 percent of local area median income).
- Very high rent or extremely high rent (monthly housing costs affordable to renters with incomes greater than 100 percent of local area median income).²²

The second difference is that rental market dynamics uses different columns in order to highlight changes in availability and affordability. Columns A through H duplicate the rows so that one can trace how rental units change their affordability status. Columns I and J track movement into or out of the owner-occupied stock or the seasonal or vacant stock, respectively. In Table A, the various types of losses are combined in column K, while, in Table B, new construction is recorded in column K and all other additions in column L.

Table A shows that there were 251,900 rental units in the Denver metropolitan area in 1995. In 2004, 97,900 of those units were no longer rental; 44,900 were owner-occupied, 47,700 were either vacant or being used seasonally, and 5,300 had been lost to the stock. Taken as a proportion of the units in 1995, movement into owner-occupancy was concentrated among units in the three highest rent categories, and losses to the stock were concentrated among non-market units and extremely low rent units.

Table B shows there were 255,100 rental units in the Denver metropolitan area in 2004, of which 91,900 were not rental units in 1995. The new units came from units that had been owner-occupied (38,300), units that had been vacant or in seasonal use (21,600), newly constructed units (30,500), and other additions (1,500). Most of the formerly owner-occupied units went to the moderate rent and very low rent categories; most of the newly constructed rental units went to moderate rent, low rent, and very low rent categories.

Looking at both tables, we see that the overall number of rental units increased by approximately 3,000 units. The number of extremely low rent and very low rent units combined grew from approximately 135,000 in 1995 to over 150,000 in 2004.

²² Ideally this final category would be two separate categories with a boundary of 120 percent of local area median income. However, the Census Bureau uses top coding of variables to prevent data users from being able to identify specific units. At the metropolitan area level, top coding of the variables used to calculate housing costs results in monthly housing costs never exceeding the 120-percent boundary in one or both years.

Components of Inventory Change and Rental Market Dynamics:
Denver 1995–2004

Tables A and B paint an interesting picture of the evolution of the rental market in Denver between 1995 and 2004. Overall, the number of rental units increased by approximately only 1 percent, but the totals conceal considerable movement into and out of the rental market. The gross flows sum to almost 200,000 units. Tables A and B also show that there was considerable movement by individual units across the affordability categories. The net effect of the gross flows into and out of the rental stock and the movement across rental categories was a substantial increase in the number of units affordable to the lowest income renters.

Appendix A – Internal and External Checks

For the CINCH analysis, we performed two tests of internal consistency:

- For each row, we tested whether the sum of possible outcomes (columns D through K) equaled the number of units present in the base year (column C). In every case, exact equality was achieved prior to rounding.
- Throughout the tables, various sets of rows are related to each other. For example, the year-built rows (13-24) in Table 1 are a disaggregation of the total stock in row 1. Similarly, rows 6 (Whites), 9 (Blacks), and 10 (Other race) in Table 3 are a disaggregation of row 1 (occupied households). In these cases, there should be equality between the parent row and the sum of the break-out rows for all columns except D and E. The difference between column D in the parent row and the sum of column D for the break-out rows should equal the negative of the difference between column E in the parent row and the sum of column E for the break-out rows. In every case, exact equality was achieved prior to rounding.

Column B provides an external check of how well the CINCH weighting performed. In general, the CINCH estimates are within 5 percent of the AHS published totals, and many of the CINCH estimates are very close to the AHS estimates. Footnote 2 indicates where the CINCH weights or coding used for individual rows does not seem to produce the same results as the published estimates.

Appendix B – Weighting

CINCH separates the AHS samples in 1995 and 2004 into three components: units that exist and are part of the housing stock in both years (SAMES), units that are part of the 1995 housing stock but are not part of the 2004 housing stock (LOSSES), and units that are not part of the 1995 housing stock but are part of the 2004 housing stock (ADDITIONS). ADDITIONS are segmented into NEW CONSTRUCTION and RECOVERIES (structures that existed in 1995 but were not in the housing stock).

Because CINCH looks at various subsets of the housing stock, we need to know the characteristics of units and their occupants. Therefore, we can use only those SAMES observations that were interviewed in both years. For the same reason, we can use only those LOSSES that were interviewed in 1995 and those ADDITIONS that were interviewed in 2004.

For the forward-looking analysis, we started with the AHS pure weights and used the AHS weighted count in 1995 of SAMES to create weights for the interviewed SAMES. We used the AHS weighted count in 1995 of LOSSES to create weights for interviewed LOSSES. We then adjusted the weights of SAMES and LOSSES to equal the AHS published totals for owner-occupied units, renter-occupied units, vacant units, and seasonal units in 1995.

For the backward-looking analysis, we started with the AHS pure weights and used the AHS weighted count in 2004 of SAMES to create weights for the interviewed SAMES. We used the AHS weighted counts in 2004 for NEW CONSTRUCTION and for RECOVERIES to create weights for interviewed NEW CONSTRUCTION and interviewed RECOVERIES. We then adjusted the weights for SAMES, NEW CONSTRUCTION, and RECOVERIES to equal AHS published totals for owner-occupied units, renter-occupied units, vacant units, and seasonal units in 2004.

The logic behind the weighting and the procedures used to create the weights are explained in *Weighting Strategy for 2004 Metropolitan CINCH and Rental Dynamics Analysis*.