## Appendix 1

## SIMMONS ENUMERATION 1789 - 90

Source: Gorels Directory, 1790, pp. 237-56.

This enumeration ("Names of the streets and lanes, etc., within the liberties of Liverpool with the number of persons in each"), was undertaken by M. Simmons, (he is presumably the Makin Simmons listed in the 1790 directory, who resided at 9 Commutation Row), between October 13, 1789 and January 13, 1790. He lists 413 streets, etc., arranged on a geographical basis in the form of a series of 'excursions'. As there are 13 of these geographically contiguous segments and as approximately that number of weeks as taken by the enumerator(s), it is likely that each of these excursions represents a week's work.

The labour needed for the survey was indeed remarkable and it was considered at the time to be a very accurate enumeration. Hallace refers to it as "a general lustrum or scrutiny . . . known to be perfect"6so and that "certain reliancel could be placed upon it "by reason it arises from a personal scrutiny . . . ."651 No assistants are mentioned, so it is possible that it represents the work of Simmons himself. If

[^0]this is the case, its statistical dependability would be increased, as he would have employed standard criteria and methods of evaluation. The information for each street, etc., gives the total of front houses, 'back or cottage' [houses], together with the number of inhabited houses, empty houses and the total number of persons in both front and back houses. The number of inhabited cellars and the number of cellar occupants is also given.

In analysing these data, the following steps were
taken:

1. The streets, etc., were mapped and the data key punched. 2. The streets were grouped into 49 districts (Figure A1.1). 3. The area of each of the districts was calculated.
2. A computer program summed the street data into these districts (indicated in Figure Al. CO ).
3. A computer program then calculated 10 averages and indices from this district data.
4. Maps were produced showing various indices. (Figures 2.3 to 2.8 and 2.11).
5. A correlation program calculated multiple correlations between the 10 variables (Table 2.5) using first all 49 districts, then only those 31 districts havng more than 10 back houses and cellars.
6. An 'analysis of variance' computer program using the (a) 5 variables of occupancy (b) 5 variables of dwelling characteristics, calculated the ratio of within - to between group variance, using a stepwise grouping procedure.

7. Occupancy and dwelling characteristic linkage trees of districts, iteratively grouped, were used to determine variously a 6 and 8 region taxonomy for the toun (see figures 2.12, 2.13, 2.14).

Notes on the above procedures:

1. All but 7 of the 413 streets, etc., could be precisely located using the following maps, Eyes (1765), Eyes (1785), Horwood (1803), Cole and Roper (1807), Okill (1832) and Ordnance Survey Five Foot Plans (1848). The seven unidentifiable courts were known to be located off particular streets, so their approximate location was known.
2. Districts approximating in area and population to the later census enumeration districts vere assembled. Difficulty was found in some instances through Simmons' use of the total street as a data unit, rather than giving information for each side separately. This meant that district boundaries do not follow streets but lie midway between them. In some respects, however, the street unit is more meaningful than the 'block' often used in the census as it does not separate into two districts opposite sides of a similar street. Six long streets were made districts in their own right, as the data did not allow them to be divided into segments.
3. No map of the town exists for c. 1790 , with enough detail to allow the separation of residential from non-residential land uses. Density figures are, therefore, 'gross' and this accounts for a number of the very low densities, especially on the edge of the town.
4. It was felt desirable to remove those streets having few cellar and court houses from a number of the statistical procedures to ensure that the results were not unduly influenced by possibly uncharacteristic scores from a few houses.

## Appendix 2

## REFERENCE TABLES, fig URES AND MAPS

Figure A2.1 Borough of Liverpool. Administrative Divisions .: 1835-95

Figure A2.2 Borough of Liverpool. Administrative Divisions 1835 (key)

| Table | 2.1 The Court Builders of Crosbie-Jordan Streets, 1770 |
| ---: | :--- |
|  | -1807 |

Table A2. 2 Variables used in Factor Analysis
Table A2.3 Factor Analysis and Correlational Matrix . 5

Maps - See inside back cover

## BOROUGH OF LIVERPOOL ADMINISTRATIVE DIVISIONS 1835-1895



The Court Builders of Crosbie-Jordan Streets, 1770-1807
These names were checked from the Gore's Directories of 1781 and 1787 and 1790. In some instances more than one entry is given under the same name. The names are listed by socio-economic group.

|  | Court <br> es | Name of Builder Merchant, etc. | Occupation | Address |
| :---: | :---: | :---: | :---: | :---: |
| 13 | 22 | Edward Chaffers | Merchant | 11 St. Pauls Square |
| 8 | 78 | Foster Cunliffe | Baronet |  |
| 22 | 7 | Thomas Dwyer | Merchant |  |
| 1 | 2 | Margaret Graham | Lady | 10 Birkett St. |
| 4 | 15 | Heywood \& Yates | Heywood the Gentleman, | kers (?) \& John Yates on Hall (?) |
| 18 | 29 | John Parr | Gentleman | 7 Wolstenholme Sq. |
| 3 | 0 | Wm. Rathbone | Merchant |  |
| 13 | 34 | John Yates | see above |  |
| 4 | 2 | Robert Bonsall | Captain | Highfield St. |
| 5 | 12 | John Hale | Captain |  |
| 8 | 6 | Lee Kewley | Linen Draper | Richmond St. |
|  |  | BUILDERS |  |  |
| 9 | 17 | William Birkett | House Builder <br> \& Joiner | $\begin{aligned} & 46 \text { Duke St. } 1781 \\ & \text { Kent Sq. } \\ & 1787 \end{aligned}$ |
| 16 | 27 | Bolton \& Bibby | Bricklayers. |  |
| 10 | 15 | Thomas Bolton | Bricklayer | Sparling St. 1781,87 |
| 1 | 6 | J. Maxwell | Builder |  |
| 8 | 20 | James \& John Orme | Timber Mercha <br> \& Joiner | 84 Park Lane |
| 12 | 9 | Thomas Watkinson | Builder | Blundell St. |



6 Barton \& Large
Joiner 29 Norfolk St.
Thos. Large
Slater \& Plaster 9 Charles St.

8 Thomas Bibby
3 Robert Brown
0 James Crossfield
Joiner Norfolk St.
8

2

2Henry Crouchley
Joiner Norfolk St.
Joiner $\quad 1$ Dawson St.
Bricklayer Tithebarn St.
Plumber \& Rochill St.,Glazier St. Annes

Slater \& Plasterer

1 F.S. Lloyd
8. Caesar Lowry either or

Carpenter Park Lane
Plumber \& Glazier Leece St. Shoemaker Hurst St.

Edward Williams
Joiner
Back of 7 Norfolk St. Shop Mason St.

| Street Court Houses |  | Name of Builder |
| :---: | :---: | :---: |
|  |  | UNKNOWN |
| 1 | 2 | Henry Bowker |
| 5 | 8 | J. N. Buckley |
| 1 | 1 | John Clarke |
| 7 | 16 | S. Cooper |
| 4 | 3 | Roger Cowley |
| 4 | 0 | A. Gardiner |
| 4 | 6 | James Hale |
| 1 | 0 | Evan Jones |
| 4 | 4 | A Mungy |
| 7 | 5 | John Radcliffe |
| 1 | 0 | James Rylands |
| 1 | 1 | E. Simpson |
| 2 | 4 | Richard Wilson |

TABLE A2. 2
Variables Used in Factor Analysis


( ) Negative Loading

Sources: 1. Liverpool District Surveyors, 1842
2. Liverpool Medical Officer of Health, 1851
3. Census Enumerators' Books, Summaries, 1851
4. Sample of Census Enumerators' Books, 1851













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## Appendix 3

LIVERPOOL MORTALITY RATES 1700-1866

## A3.1 Sources

1. Enfield, 1773, p. 19
2. Haygarth, 1793, p. 139
3. [Wallace], i797, p. 69
4. Gregson, 1817, p. 151
5. Smithers, 1825, p. 195
6. Census Report, 1801 Parish Abstracts p. 149
7. Census Report, 1811 Parish Registers p. 75
8. Census Report, 1821 Parish Registers p. 60
9. Census Report, 1831 Parish Abstracts p. 155
10. Census Report, 1849 Parish Abstracts p. 104
11. . Registrar General's Reports especially ㄹ.g., 1847-8, XXV,

12. Liverpool Parish [ Eills of Mortality] 1774-1839. Incomplete series (33 years)

Variously titled, "An Account of all the Christenings, Burials and Marriages .....", "The Bill of Mortality for the Parish of Liverpool. . .". "A General and Accurate Bill of Mortality ....". "A General Bill of Mortality ....". etc.

## A3. 2 Sumpary of Information Sources

1. Enfield (1700 to 1779).

This important series was "taken from the registers in the several churches" (p. 18). From a remark on p. 26 it can be taken that this figure represents burials in Anglican graveyards. There are two independent checks on this series:-

- Parish abstract returns sent to the census office by the rector and published in the 9801 census.
- The series printed in the 1785 (1660 to 1703) and 1786 (1702 86) Bills of Mortality and Gregson's presumed reprint of these (see later) for unavailable years.

2. Haygarth (1772-1774, 3 years).

John Haygarth of Chester, a pioneer of local epidemiological studies, probably used the Bills of Mortality. His statistic for '1774' is the same as the statistic in the 1774 - 5 Bill. If the Bills were his source, this indicates the existence of Bills earlier than the oldest surviving (1774-5).
3. Wallace (average annual burials by 9 period periods for 1700

- 1790 [1700-9, 1710-18, etc.] and average for 1791-3). These are apparently either taken from Enfield or the Bills of Mortality.

4. Gregson (First year of decade to 1780, then 18 years between

1780 and 1806$)$
Almost certainly taken from the Bills of Mortality as the figures correspond exactly for those years for which the Bills are available.
5. Smithers.

Almost certainly taken from Enfield. (The 1760 figure of 509 is probably a misprint for 599.)
6. Census Reports, Parish Abstracts, 1801 - 1841. End of decade totals of burials 1700 to 1780 , thence yearly to 1840 .
7. Bills of Mortality (33 surviving Bills for the years between 1774 and 1839).

A remarkably detailed series giving total burials for each church and also those within the vicinity (i.e., approximately the area to be included in the 1835 Borough). Burials in Dissenting graveyards were included from 1784 onwards. These bills uere presumably derived from a count of the entries in the burial registers. The totals compare well with the independent count of the registers made by Enfield.
8. Registrar-General's Reports, 1838 - 66.

Some early under-enumeration but improved rapidly. . Reporting of deaths probably better than birth reportings. Coverage to 1848 is by registration district, thereafter by registration subdistrict. . West Derby Registration District includes parts
outside the Borough, so no direct figures on the Borough's mortality are available from this source.
9. Liverpool Medical Officer of Health Reports, 1847-66.

All the reports of the Liverpool Medical Officer of Health give the number of deaths by ward and total by Parish and Borough. However, six reports in this period have not been traced (1851, 1853-5, 1857, 1862).

## A3. 3 Discussion of Sources

The two series contained in Enfield and in the Bill of Mortality for $1786-7652$ provide a fairly complete and apparently independent coverage of the numbers of burials in Liverpool in the pre-registration period. They thus provide a substitute for and a check on the much criticized abstracts of Parish records6s3 that have provided the basis for most estimates of population change in the $18 t h$ century.

The historic series contained in the Bills of Mortality 1785 - 6 and 1786 - 7 summarise the Liverpool registers from their commencement in 1660 the year of the establishment of a separate Parish of Liverpool) and duplicate the table contained in Enfield which he states was "taken from the registers in the several churches" (p. 18).

The two series are very close - Enfield's totals
are usually smaller than those of the Bill of Mortality's but not by much - in the $1740^{\prime \prime}$ s by 0.2 per cent, 1750 's by 5.4 per cent, and the 1760's by 0.8 per cent. There was little to choose between them. The Bill of Mortality series was selected because, firstly, the totals were higher and as burial statistics usually

[^1]understate the number of deaths, it was felt this would prove a better estimate. Secondly, the series was a slightly longer one.

The period 1774 - 1784 is complicated as there are no fewer than five series available for certain years (two of which duplicate each other) - (a) The "Dissenters excluded" series (a duplicate of the annual totals in the Bills of Mortality prior to this point) and (b) "Dissenters included" series both contained in the Bills of 1783 - 4 and (c) "The Parish Abstract" series from the 1801 census (d) "The Series in the 1786 - 7 Bill".

In a numerical comparison, they ranked in ascending order (a), (c). (b), and (d). Again, because of its larger total and for the sake of consistency, the series in the 1786-7 Bill was selected. 654 The comparison indicates the proportion of Dissenting Burials in the town at this time (6.5 per cent). It also indicated that the Parish abstract of the census may have excluded these burials. 655

After 1787, coverage by the Bills of Mortality becomes patchy. (Only 21 Bills have survived for the period between 1787 and 1837.) However, a detailed comparison with Gregson indicates that his estimates were apparently based on the Bills and use of Gregson's statistics gives us coverage for

[^2]another 10 years.

The period between 1780 and the commencement of civil registration has proved a contentious one for historical demographers. 656 Strong, well-argued objections have been made against the acceptance of Parish records/Census Abstracts as reliable data sources. Two main objections to the parish Register abstracts have been put forward - firstly, the increasing importance of burials (especially of Dissenters) in non-Anglican burial grounds; second $\perp$ y, the growing frequency of extra-parochial burials. Krause has argued that both these factors led to extreme underestimation of death rates, particularly in the period 1780 to 1830 - an underestimate, he feels, was sufficient to 'explain' the apparent decline in mortality rates during this period. 657

The parish abstracts for Liverpool certainly confirm a number of the suspicions held about the source in general. The 18 th century figures were low in comparison with the Bills of Mortality. . In the years between 1780 and 1785, for instance, the Parish abstract total is very close to the figure given in the "Dissenters excluded" series ( 0.6 per cent greater) and 6.0 per cent below the 1786 - 7 series. In the period 1801 7, the Abstract totals are 8. 3 per cent below those of Gregson (i.e., Bills of Mortality). 658 The Parish Abstract of 1821

656 See Krause, 1959 (a), 1959 (b), 1963, 1965, also Razzel1, 1965, 1974, Mckeown and Brown, 1955.
657 Krause, 1965.
658 Though the difference is probably due to the exclusion of extra-parochial burials in the Abstract.
covering the period 1811 - 20 appears to have been a fairly thorough enumeration for it contains a list of all the buildings used for worship in the Parish including 27 non-Anglican establishments. Mention is made of Dissenting chapels in the return of 1831 but in the return of 1841 non-Anglican burials appear to have been totally excluded.

Adding to the inaccuracy of the Parish Abstracts due to under-registration was the growing practice of extraparochial burial. Between 1783 and 1826, five neu burial grounds were opened lying just outside the Parish of Liverpool,659 though the Anglicans were better provided for after the opening of intra-parochial St. James cemetery in 1829.660

The parish limits were strictly adhered to in the Rector's returns to the Census Office, so no account is taken of the effect of this suburban trend in burials. Finally, the returns for 1831 - 40 apparently omit not only Dissenters but also burials at the parish Workhouse and at St. James

659 St. James, Toxteth Park, 1783; St. Mary's, Edge Hill, 1813; St. Georges, Everton, 1815; St. Michaels, Toxteth Pk., 1815. Toxteth Chapel on Park Rd. also had an old burial ground attached. In 1825 the Necropolis on Low Hill was opened. This was established by a private company and was popular with the Dissenters who had had previously only three small burial grounds in the town at Byrom St., Renshay St., and Newington. The size of the community can be judged by considering that in 181011.6 per cent of all baptisms were to Dissenters (see Walker, 1968, p. 202).
660 The preamble to the Act indicates something of the state of 'intra-mural' burial grounds in the town. It states that the "graves are filled in many parts near to the surface of the . . burial ground [of St. Peters and St. Michaels]. Being situated in very populous parts of the town, it is very desirable with a vieu to the health of the inhabitants in general that no part of the ground be disturbed (4 Geo IV (1823) c. 89).

## Cemetery. 661

The fortunate survival of the Bills of Mortality
allows many of the statistical shortcomings of the Parish Abstracts to be assessed and overcome. After 1783, the Bills List the burials by Church and 'Chapel' including those in the vicinity of the town. 662 The only statistical difficulty with the Bills is their slightly unusual 'accounting years'. Before 1800, the period is Christmas Day to Christmas Day (though in two years it is for the 'fiscal year'). After 1800, however, the calendar year is used. .

The internal openness of the data in these Bills is attractive663 and for the years 1838 and 1839 when they overlap with the Registrar General's figures, they can be crosschecked. The Bills for those years total only 6.3 per cent less burials than deaths were registered in the Borough of Liverpool. This is a reassuring coincidence, though these early registration years may themselves have somewhat understated

661 This conclusion is based on the close agreement between the totals found in the Bills of Mortality and the Abstracts after burials by Dissenters, and at the Workhouse Chapel and St. James have been subtracted.
662 With the exception of one year, 1831.
663 They could presumably be cross-checked against surviving parish registers.
mortality. 664 The only real drawback to the use of the Bills is the incompleteness of the series, though with the addition of Gregson's figures, 31 of the 65 years (1774-1839) are covered.

The Bills of Mortality are, therefore, regarded here as a reliable source that could be used to improve the quality of the Parish Abstracts. For missing years, the Parish Abstract totals were compared with the totals contained in the nearest set of statistics from the Bills or Gregson. A factor was then applied to the Parish Abstract figures to increase them to the level of the Bills. The growing size of this factor indicates the increasing unreliability of the Abstracts if the latter are not corrected. $66 s$ By the 1830 s the parish Abstracts, for instance, appeared to represent only about half the burials in the parish and a third of those in the Borough.

One problem which cannot be overcome utilising burial statistics of any kind honever accurate or all inclusive is that burials are not deaths and it is likely that significant numbers of deaths - of unbaptised or illegitimate children for instance - went unrecorded. In a town where as many as a fifth

[^3]of the men were at sea at any one time666 there would also have been significant numbers of deaths of Liverpool residents away from home. It is important to realise, therefore, that the mortality rates given here are under-estimates and perhaps a factor of 10 per cent might need to be added to account for unrecorded burials.

The Registrar General's returns for the Registration Districts of Liverpool and West Derby were also utilised. As there is no separate return for Liverpool Borough, the deaths for the Borough were estimated. To approximate this, the deaths in West Derby Registration District were reduced by the same proportion as the population in West Derby Registration District inside Liverpool Borough uas to the total West Derby Registration District (about 50 per cent in 1845).

From 1847 onwards, the Liverpool Medical Officer of Health's annual returns for the Borough were utilised where these are available. For the missing years, the Registrar's death statistics for Liverpool and hest Derby Registration Districts were reduced proportionately to the population of the two Registration Districts living in the Borough. .

A3.4_Population

In calculating these mortality rates, it was felt important to attempt to produce figures for the whole of the town. The grouth of suburban burials was to some extent a

666 Enfield, 1773, p. 26.

TABLE A3. 1
Parish of Liverpool
Eighteenth Century Population Estimates

There appears to have been two separate attempts to determine population trends in 18th Century Liverpool; that of Enfield, 1773, and that of Gregson, 1817. By and large Smithers, 1825, and [Troughton], 1810 both reproduced Enfield's estimates. It is not clear how these estimates were made but it is probable that they were based on Parish baptismal and burial records and later on Parish rating records.

| Year | Houses | Population | Source | Persons Per House |
| :---: | :---: | :---: | :---: | :---: |
| 1700 | - | 5145 | 3,2 |  |
|  |  | 5174 | 1,7 |  |
|  |  | 4240 |  |  |
| 1710 |  | 8168 | 1,7 |  |
|  |  | 7134 | 3.2 |  |
| 1720 |  | 10446 | 1 |  |
|  |  | 11833 | 3,2,7 |  |
|  |  | 10673 | 1 |  |
| 1730 |  | 12074 | 1,7 |  |
|  |  | 11932 | 3,2 |  |
|  |  | 'Upwards 12000' | 4 |  |
| 1740 |  | 18086 | 1 |  |
|  |  | 14847 | 3,2 |  |
| 1750 |  | 22099 | 1 |  |
|  |  | 18400 | 2 |  |
| 1753 | 3700 | 20000 | 2 | 5.40 |
| 1760 |  | 25737 | 1,7 |  |
|  | 4200 | 25579 | 2,3 | 6.09-6.14 |
| 1770 | (5100 est.) | 34004 | 1 | (6.67-6.98) |
|  |  | 34050 | 2,3 |  |
|  |  | 35600 | 7 |  |
|  |  | 35000 | 4 | . |
| 1773 | 6340 (total) | 34407 | 2,4 | 5.8 |
|  | 5928 (inhabited) | . |  |  |
| 1780 |  | 40000 | 3 |  |
| 1783 | 6819 | (47297 est.) | 1 | (6.98) |
| 1783 | 7690 | (53742 est.) | 1 | (6.99) |
| 1789-90 | 9002 (total) |  | 1 |  |
|  | 8148 (Inhabited) | 53853 | 4 | 6.07-6.83 |
|  | 8865 | 55732 | 5,7 |  |
| 1801 | 11446 | 77653 | 6 | 6.78 |
| Sources: | 1. Gregson, 1817 <br> 2. Enfield, 1773 <br> 3. Smithers, 1825 <br> 4. [Troughton], 1 | 5. Simmons, <br> 6. Census, <br> 7. Appendix | verpool | ```\because: Corporation Inquiry, 1833``` |

reflection of the suburbanization of the population. The base population figures were, therefore, adjusted to take this into account. Population estimates for individual years were calculated by a straight line projection. The following bases were utilised:

Pre 1801 - Parish of Liverpool; totals in Enfield, 1773, and Gregson, 1817 (Figure A3.1).

1801 - 1810 - Parish of Liverpool plus Toxteth Park. (From Census)

1811-1830 - Approximation of a 'Borough' figure attained by the formula: Parish plus [Five Townships (divided by two) minus Parish 1 From Census.
1831-1871 - Borough (from census)

## A3.5. Sumpary of Trends

In the century and a half under observation there were a series of major and minor peaks of mortality, interspersed with troughs and valleys of varying gradation (Figure 2.15). The major periods seem to be the following:

1. $1700-1750$

A series of extreme fluctuations gradually rising in intensity to the peak 18 th century mortality year of 1750.
2. $1750-1771$

Lesser but still severe annual fluctuations, the
average mortality trend being downwards.

The 1700 - 70 period illustrates the importance of smallpox. There were 13 peak years above 30 deaths per thousand occurring at roughly 5 yearly intervals. 667
3. $1771-97$

A general secular upturn with considerably reduced annual fluctuations followed by a slow decline in mortality. It has been suggested that inoculation against smallpox was responsible for a considerable reduction in mortality at this time. In a town where the disease was virulent and accounted for over a fifth of all deaths in the 1770 s, where "all infants . . . who survive the first months must have gone thru' the smallpox. 668 A widespread inoculation program would have had a substantial effect on death rates. Haygarth gives 1781 as the commencement year for inoculation and the benefits were quick to take effect. Hriting only 12 years later, he commented "the disease formerly raged in the town with much violence and was very fatal. "669 That the overall decline in death rates was not more substantial, it is argued, was a result of rising mortality from typhus.

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4. 1797-1810
```

[^4]A sharp upturn with the onset of the most severe annual fluctuations of mortality experienced since the 1760 s, the 1801 peak being the highest since 1750. This was Largely the effect of the work of a typhus epidemic brought from Ireland. The fluctuations declined somewhat in amplitude during this period.

## 5. 1810 - 1829

This period of reduced annual fluctuations and of the lowest general mortality levels since the 1720s. This would appear to correspond with the period of declining mortality noted elsewhere670 and would appear to support the 'classical' vieupoint of an early 19th century 'healthy' period rather than a mere statistical illusion. 671 No doubt, this was the period referred to by health reformers of the 1840 s looking back to better times.
6. 1829-1843

This period saw the notorious cholera epidemic a sharp upturn in mortality in 1832 that was the highest in 30 years and one of the highest in the 18 th or 19 th centuries. A sharp downturn in rates followed.
7. $1843-51$

[^5]Another sharp upturn led to the highest death rate of the $98 t h$ or $19 t h$ centuries during the terrible epidemic years of typhus and cholera in 1847 and 1849. A sharp downturn afterwards. The period is one of the Health of Towns debate and it is evident that the 'new medical men' with innovative (if erroneous) vieus of disease and its relation to the environment were themselves in part a product of the urban health crises of the 1830 s and 40 s. 672
8. $1851-65$

A trough with some fluctuations (includng the smaller cholera epidemic of 1854) that ended once more in the steeply climbing death rates of the typhus epidemic brought on by the unemployment and indigence of the cotton Famine when death rates rose to the century's second highest, and Liverpool and Fest Derby combined to account for 12 per cent of national mortality. 673

[^6]
## Appendix 4

## ESTIMATES OF LIVERPOOL'S COURT AND CELLAR POPULATION, 1833 -

1846

## A4.1. Major Documentary Sources

1. Dr. Duncan's evidence to the Liverpool Corporation Inquiry, 1833. pp. $400-2,470$.

Duncan defended his calculations of the number of cellar dwellers by pointing to the fact that a third of his patients lived in them. He did not explain how this statistic was translated into a population of 20,000 but presumably he estimated the town's working population and divided it by three.

He was on firmer ground with his estimate of court populations. Apparently, he counted the names of courts listed in Gore's Directory. Then he multiplied this by four to estimate the number of court houses (though pointing out that eight houses per court would be nearer the mark). This figure he multiplied by five (the estimated persons per house) though again he felt this 'much below the truth'.
2. The Manchester Statistical Society's interest in Liverpool housing stemmed from an investigation into the state of education in the town. While conducting the inquiry, the agent took an account of "the number of inhabitants, etc., and of the cellars occupied as duellings in the borough." The figures are
contained in Report of a Commission of the Manchester
Statistical Society on the Conditions of the Horking classes in
 1838, pp. 8 - 10 fn. These figures were also mentioned at the Liverpool meeting of the British Association meeting in 1837 (British Association for the Advancement of Science ́﹎ㅇㅡㅡeedings. Vol. 6 (1837) p. 143). I discovered, by chance, a breakdoun of these statistics by police district (Table A4.2) in the parliagentary Gazeteer of England and Hales, Vol. 3, 1842, p. 132. However, although the description of the districts is given, the exact boundaries cannot be discovered without finding a contemporary map of police districts. No such map has yet been encountered.
3. The Statistical Society report caused 'much surprise' and 'an examination immediately instituted' by Mr. Whitty, the Liverpool Chief Constable utilizing the services of his Inspectors of police. The return confirmed the accuracy of the earlier count and Mr. Whitty confessed "he did not believe until this morning that so great a number of persons resided in such objectionable places". This state of ignorance was no doubt widespread among the town's elite. The letter containing these statistics is given in the M.S.S. Report of 1838, cited above.
4. The Corporation's survey was ordered following the evidence given by Duncan to the parliamentary inquiry chaired by Robert Slaney (Duncan, 1840) and to Chaduick's Sanitary Inquiry (Duncan, 1842) in the spring and summer of 1840. Almost
certainly as a consequence, the Health of the Town Committee of Council was formed on November 9, 1840 and the committee immediately ordered a report on court and cellar dwellings. Planned to be completed in three months; the report took five. The return is contained in Health of the Town Committee 'Minute Books', Vol. 1, 1st April, 1841 and it was also published later, together with the accompanying accounts by the two District Surveyors, as an appendix to the evidence given by the Borough Surveyor; J. Franklin, to the Select Committee on Regulation of Buildings and Improvement of Boroughs (́.g., 1842, X, pp. 132 5) .

The Corporation Surveyors' returns are unusual in that they appear to lack internal consistency in the presentation of their statistics. The South District Surveyor's column of 'cellars with back rooms' was additional to 'cellars
5. The Inspector of Nuisances, Inspector Fresh, in the Health of

674 Duncan, 1845 , Table 12, p. 152. This misinterpretation introduced a series of errors on pp. 126-127 and 152. He also reproducea a series of small errors in addition made in the original report. 675 Treble, 1979, pp. 218 - 9 and hence his ratios on page 178 are miscalculated.
the Town Committee Minutes on June 2, 1846 reported the District Surveyors' totals of 31 March 1841 (7,325 occupied cellars in . streets containing 24,072 inhabitants together with an . 24 additional 1252 cellars in courts containing about 5008 . 5 inhabitants). However, in repeating these figures, he also erred . $\mathfrak{Z}$ by adding the sub-totalled column of the North District. The . 4 'true' total in 1841 was 6410 street cellars with an additional . 5 1252 cellars in courts. The 'Sanatory' Act's provision against . 6 cellars in courts became effective on 1 November, 1842 and 6 subsequently "nearly all the cellars in courts were cleared of inmates". 1058 cellars in streets were also cleared (Health of . 8 the Toun Committee Minutes, 24 February, 1845). The clause . 9 relating to cellars in streets came into effect on 1st July 1844 and at that time a total of 6630 cellars were separately occupied of which only 619 were comformable with the act, containing approximately 23,205 inhabitants of whom about 21,038 . 2 were liable to expulsion. In the period between July, 1844 and . June, 1846,2391 cellars were cleared of about 8368 inhabitants, 4 leaving about 3620 cellars and 12,670 persons to be dealt with.
a total of 14,084 cellars had been measured of Which 12,877 were illegal for habitation under the new Act which came into force on January 1, 1847. (Duncan, 1851, p. 99).

A summary of these various estimates is given in
Table A4. 1.

A4.2. Analysis of Estimates

The different estimates of court and cellar

Table A4.1

Liverpool Borough

Detailed Comparison of Manchester Statistical Society, Mr. Whitty, and the Corporation Surveys of Courts and Inhabited Cellars.

|  | M.S.S. Survey |  | $\begin{aligned} & \text { Mr. Whitty's } \\ & \frac{\text { Survey }}{1837} \end{aligned}$ | Corporation Survey |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Cellars | Courts | Cellars | Cellars ${ }^{*}$ | Courts |
| Liverpool North | 4,761 | 1,551 |  | 3,656 | 1,389 |
| Liverpool South | 1,745 | 413 |  | 2,350 | 593 |
| Liverpool Parish | 6,506 | 1,964 |  | 6,006 | 1,982 |
| Toxteth Park | 874 | 251 |  | 1,524 | 326 |
| West Derby | 95 | 38 |  | 104 | 53 |
| Everton | 15 | 13 |  | ( |  |
| Kirkdale | 3 | 5 |  | 28 | 37 |
|  | 987 | 307 |  | 1,656 | 416 |
| Liverpool Borough | 7,493 | 2,271 | 7,862 | 7,667 | 2,398 |

Mr. Whitty's total was made up of a North Division ( 4,004 cellars) and
a South Division ( 3,858 cellars) of the Borough.

* Corrected totals. North District sub-total not included.

Source:See Text
dwellings and their populations confused many contemporary observers. Playfair referred to the "many contradicting statements made with respect to the cellar population of Liverpool", and he expressed some reservations over what he felt were low estimates given by the Surveyors. 676 Indeed, the chairman of the Liverpool Health Committee himself, James Aspinall, in a confusing exchange before a parliamentary inquiry appeared to contradict the Surveyors' evidence by agreeing during questioning to a figure of 45,000 cellar residents. 677 The Corporation's oun uritten answers to questions put the total number of cellars in street houses at 'about 8,000' with an additional 700 cellars in courts. 678 Duncan was uneasy with the Surveyors' returns. He said he was "inclined to think these numbers, both of the court and cellar population, to be under the mark, but as they profess to be from actual enumeration, [he was] of course bound to take them." He footnoted that "possibly casual lodgers have been omitted in the enumeration.679

Nationally it was the larger estimates that were publicised. Whitty's figures were quoted in Slaney's tract, 680 and also in the Weekly Dispatch's article on the subject,681 which in turn was apparently the source of Engel's statement about Liverpool's cellar population. 682

[^7]
## A. Ce11ars

The difference between the totals of cellars given by the M.S.S. and Whitty was accounted for at the time, by the varying dates of survey. In the two intervening years, an extension of building had taken place, especially in the Toxteth area, where "a cellar dwelling is attached to almost every new house in the streets inhabited by the working class". (M.S.S., 1838, p. 9) Both counts were probably fairly exact but as they did not enumerate Iesidents the size of the cellar population was a matter of justifying estimated occupancy rates. Duncan stated that Mr. Thitty had "no doubt five was a proper estimate"6su and even this Duncan felt might be an underestimate. This ratio produced a cellar population of 38,000, a figure for which Duncan had "no doubt of the correctness of that calculation". 684

The District Surveyors' returns present some puzzling features. only 197 court house cellars vere reported for the North District compared with 1,055 for the South (a ratio of 2.5 cellars per 100 court houses in the North compared with 19.0 per 100 in the South), differences which would require some explanation in terms of a drastic variation in either court house morphology or in the living styles between these two arbitrarily defined districts. No such explanation appears logical or forthcoming. It is far more likely that there was a

[^8]difference in the interpretation of working definitions between the two districts.

Evidence of a possible underestimation of courtcellar duellings through administrative differences in definition comes from the Chairman of the Health Committee, James Aspinall, who estimated the court-cellar population as 21,000-22,000, (which implied the existence of about 5,600 cellars in courts), but observed that "although that number reside in cellars in courts, yet there are only 1,252 cellars containing about 5,000 souls which are let independently of the hounses, according to the returns of the surveyors."68s Although Aspinall at times gave confusing evidence, it is certain that he thought there were 21,000 or 22,000 cellar residents in courts, because in $Q 34$ of his evidence, he agreed that this number would have to be expelled under the terms of the act forbididing court cellar habitation. 686 Aspinall's statement seems to imply that he considered the Surveyors to have enumerated sub-let cellars, excluding cellars also slept in by members of the household occupying rooms above. 687

Table A4. 2 compares the breakdown of the M.S.S.'s

[^9]
## Table A4. 2

Liverpool Parish

Manchester Statistical Society Survey of Courts and Inhabited Cellars, 1835-6

Inhabited
Cellars
Courts

|  | Number | Percent <br> Total | Number | Percent <br> Total |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Police 'Divisions' |  |  |  |  |

Source: See Text
figures by police districts with the figures for the corporation survey. No contemporary map of Police Districts has yet been found,688 so the division of the town into comparable 'North' and 'South Districts' may be slightly inaccurate. Nevertheless, the fact that the M.S.S. enumerated 500 more celiars in the Parish than did the Corporation's later survey, indicates that the latter (despite its statistical inflation due to the miscounted sub-total) may have been an underestimate. The greater number of cellars in the M.S.S.'s survey of the North District may point to the source of underestimation by the Corporation Surveyor (although the influence of a difference in comparability of boundaries cannot be discounted).

If the ratio of 19 cellars per 100 court houses is applied to the North District, the Parish total of occupied cellars in courts rises to 2,533. With 3.8 persons per cellar (Borough average) this yields a court-cellar population of 9,624 and a total cellar population for the town of about 33.700-a figure more closely in line with the other estimates.

If these calculations are correct, the cellar dwelling to court house ratio in the Borough appears to have been only slightly smaller than was the ratio of inhabited street cellars to street houses (one cellar in 5.2 court houses,

[^10]compared with one in 4.6 street houses). 689 Cellar dwellings in courts may well, therefore have been much more common than was implied in the Corporation statistics. As these figures (now shown to have been possibly erroneous), formed the basis of the court-cellar clearance policy begun in 1844, the Corporation's difficulties in affecting this policy may in part have been caused by its statistical underestimation of the problem. On the other hand, the usuakly reliable Duncan thought the proportion of cellars in courts "very small",690 so the evidence on this question is not entirely conclusive.

## B. Courts

The number of courts was easier to establish. Whitty's figure was judged "quite correct" by Duncan who had himself counted the courts named in Gore's Directory. 691 Whitty's figure, Duncan felt, could be revised upuarās to about 2,400 in 1840 - a figure remarkably close to that finally estimated by the Corporation's inquiry the following year $(2,398)$.

The Corporation Surveyors in 1841 totalled 13,320

[^11]court houses in the Borough with a population of 68,345 inhabitants (5.13 per house). By 1862, this had increased to 19,637 court houses 692 in 3173 courts. No population count was undertaken but a conservative estimate would put Liverpool's court population at this time (probably the peak period) at approximately 100,000 residents. By 1884 inner area demolition had reduced the number of courts to 2,531 and the number of court houses to 14,472 with an estimated population of 70,000.693 There was a decline of 35 per cent in the number of courts between 1884 and 1895 and a further drop of 41 per cent between 1895 and 1904.694 Most of this decline was due to commercial redevelopment but some, particularly in the first decade of the 20 th century, was attributable to an active clearance and rehousing programme. 695

## A4. 3 Conclusion

Taking all the evidence into account, it seems Likely that by the early 1840's the Borough of Liverpool had rather more than 8,000 inhabited cellars of which perhaps up to a third were in courts, together with 2,400 courts containing 15,320 court houses.

In estimating the number of cellar duellers, some weight must be placed on the Corporation's estimated occupancy

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692 Newlands, 1863, Table No. 11.
693 Forward, 1884, p. 595.
694 Liverpool, Medical Officer of Health Reports especially
1904, p. 73.
695 See Taylor, 1974, p. 80.
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Levels since neither Duncan, Whitty nor the M.S.S. had conducted an enumeration of cellar inhabitants and all appeared to have tended to overestimate the average number of cellar occupants.696 The average cellar occupancy level in 1841 was 3.75 (for the Borough), a figure slightly higher than the 3.67 given in Simmons' census 50 years previously. Applied to the 8,000 cellars mentioned above, Liverpool's cellar population numbered approximately 34,000 in the early 1840's, though this figure probably rose up until 1846 when the Corporation began clearing the cellars under the terms of its 'Sanatory' Act. 697

The estimated court population of 68,000 slightly 'overlaps' the cellar population total as the estimated courtcellar population of about 10,000 is common to both. In total, however, the court and cellar population of Liverpool can be fairly well established at around 90,000 in the early $1840^{\circ} \mathrm{s}$. By mid decade, this figure could have risen to approximately 100,000 - equivalent to about a third of the Borough's population in 1845 . Though the cellar component of this figure must have subsequently decrined, the Corporation survey of 1862 indicates that about the same number of people continued to live in court housing for the next 20 years. Thereafter, the number of court houses and the court population declined - though more

696 Some enumerators distinguished cellar populations in the Census of 1841. In one of these enumeration districts randomly chosen (Dale Street, 14), there were 50 occupied cellars. Thirty-three percent of houses had occupied cellars and they housed 16 percent of the population with an average occupancy of 3.48 persons per cellar. This figure should be compared with the Surveyor's figure of 3.90 for St. Paul's ward in which the enumeration district was situated.
than a thousand courts with about 30,000 inhabitants still remained at the century's end. 698

698 When they continued to make up the bulk of Liverpool's overcrouded housing problem. The census of 1891 enumerated 9,348 duellings ('small tenements') containing 56,720 persons with over two persons per room in the Borough of Liverpool (27.0 per cent of the total 'small tenement' population).

## Appendix 5

## PROCEDORES AND CLASSIFICATIONS

## A5.1 Classification procedures for published Census Tables

There has been considerable interest in recent years in attempts to use the wealth of occupational material contained in the 19th century censuses to derive occupational and even social structures of various communities in a manner permitting comparisons between different places. The debate has divided into two sections, the first concerned with attempts to classify and reorganise the large and changing schemes of tabulation utilised by the census from 1831 onwards, the second to attempt to derive from the occupational structure a picture of the sociail structure of the community. The two problems are separate, though related. Problems of terminology and ambiguity of occupational description may affect the certainty with which people can be classified occupationally and how they can be socially classified. This section will examine the problems of the occupational classification of published census data as they apply to Liverpool, 1831-1851.

Prior to 1831, only the broadest four-fold scheme of classification was utilised by the census.699 In 1801, enumerators were required to answer the question "What number of persons in your parish, township or place are chiefly employed

[^12]in agriculture, how many in trade, manufacture, or handicraft, how many are not comprised in any of the preceding classes?". The question was repeated in 1811 and 1821 but the return was required of families rather than individuals.

In 1831, adult males were placed by the enumerator into nine major categories and a detailed return for those in retail trade or handicraft made for counties and large boroughs. In Liverpool, 114 occupations in this category uere tabulated.

From 1841, householders' schedules were utilised and the responsibility for the consistent codification and categorisation of the thousands of occupational descriptions passed to the census office. The published figures for England and Wales in 1841 listed 877 occupational categories into which the census office had placed the thousands of occupational descriptions contained in the census schedules. At this time, an occupational index probably came into use at the census office which was later to form the basis for successively more elaborate listings, as each additional census added new occupational terms (see later, section B). Of the 877 occupations listed for the country as a whole in 1841, about 700 of these were included in occupational listings for boroughs (including Liverpool).

The 1851 census began the first grouping of
occupations. In this, 17 classes and 91 sub-classes of occupations were created. In later censuses, these were termed 'orders' and 'sub-orders'. Similar general principles of

Categorisation were followed to 1911, however there were radical changes in the number of sub-orders and shifts of occupational category from one sub-order to another which severely affect any long run comparisons that can be made directly from the census categories.

These occupational groupings were structured neither on a truly occupational basis nor on a consistently industrial basis for the occupational categories adopted by the census appeared to be a compromise of both schemes. Thus, when Booth wished to examine changes in the occupational structure of the country in the period 1801-1881700 he set out to retabulate the printed census returns in a more uniform and systematic fashion. In particular, he tried, insofar as the material allowed, to recast the census tables by industry and thus outflank the problems of changing classification. He operated only at the level of the printed abstract however. Without access to the decennial census work sheets he could not know the detailed composition of the individual census occupations and how the composition of these may have changed over time. By preserving his work sheets, Booth has allowed posterity to check the accuracy and consistency of his allocations, a test passed with flying colours. ${ }^{01}$ A republication of his attribution list for 1861702 itself the longest census occupation listing, allows contemporary workers

700 Booth, 1886.
701 Armstrong, 1972, p. 247.
702 i.e., the nine groups and 79 sub-groups into which he allocated the census occupations.


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the opportunity to classify occupations according to a consistent and comparable scientific system.


Booth's scheme, republished by Armstrong, was utilized here to classify occupations both in the sample taken from the enumerators' books and to reclassify the published census occupational tables for 1831 to 1851. Although the attribution list covers the 1861 occupations. 703 all but a handful of the earlier census occupation terms from the Liverpool sample could be located. These unlisted occupations were allocated to their closest 1861 counterpart by use of the Clerk's Occupational Dictionary for 1861.?04

Liverpool Occupational Tables

Warnings have been made concerning the 1831 and 1841 occupational censuses. 705 At the national level, there were discrepancies between the proportions of those employed to the total population. But while this may preclude exact comparisons in terms of magnitude, it would not necessarily affect comparisons based on proportions in various occupational categories.

The Liverpool statistics would appear to substantiate these fears about the under-enumeration of occupations in the two earlier censuses. The 'increasing'

[^13]proportion of persons employed probably indicates improved census efficiency rather than substantial changes in participation rates. 706 Furthermore, the 1831 occupational returns were not comprehensive, attempting only to classify that proportion in retail trade and handicrafts' - 47.4 per cent of adult males. The census also required less exactitude in its placement of 'labourers'. The 16,095 labourers returned for Liverpool and Toxteth Park in 1831 included large numbers who were more exactly defined in 1841, when the 'general labourer' class totalled only $14,581$.

The 1831 Census use of the term 'manufacture' was atypical. It probably referred specifically to large-scale factory operations ${ }^{707}$, as compared with smaller-scale domestic 'handicraft' manufacturing. Taking these matters into consideration, it has been thought advisable to treat the 1831 statistics separately and not to attempt comparisons with the Later returns.

The 1841 - 1851 census occupational returns were very much more comprehensively treated and are far more amenable to classification and analysis. Nevertheless, at the level of individual occupations, discrepancies occur between the two

[^14]censuses which point either to changes in the specificity of answers required by enumerators or to changed operating definitions in the census office. For instance, the 'general labourer' category in 1851 is considerably reduced from that of 1841 (itself less than 1831), largely one suspects by the appearance of a large category of 'others connected with ocean navigation' (presumably ãock labourers). After 'labourer', of the eleven most common occupational terms encountered in the Parish in 1841, only three had increased in size in 1851. The remainder saw falls of between 13.0 per cent (boot and shoemaker) and 52.3 per cent (commercial clerk) ; 'merchant' dropped from rank twelve in 1841 entirely out of the top 25 in 1851. These probably do not reflect real shifts in the occupational structure of the community but are more likely associated with greater precision in terminology. The blacksmith enumerated in 1841 often became the moulder or toolmaker of 1851. The doubled frequency of the term 'porter' (probably partly subsumed under labourer in 1841) may well have been as a result of this increased specificity.

It is at this stage that application of the Booth classification repays the time spent on it. By grouping the individual occupational headings into subclasses, greater comparability is assured (Table A5.1). For instance, general Labour/ocean navigation combined, account for 26.6 per cent of the Borough labour force in 1841, 27.4 per cent in 1851. The building - operative (10.3 per cent and 9.1 per cent) and manufacturing - dress subclasses ( 8.7 per cent and 7.2 per cent) show similar consistencies between the two censuses. With this

type of mutual support, we are on much firmer statistical ground in defining the economic base of the community's economy.

## A5.2_The_Sample_from_the_Census_Enumerators'_Books

## A. Sampling procedures

When plans were made for the sampling of the household schedules of the 1851 census, it was at first unclear how useful the summary statistics of the enumeration books might be in providing data on dwelling standards. When it became apparent that these summary tables could be used to provide a considerable number of spatial indices (see Appendix 6), the necessity for as comprehensive a sample as was originally planned lessened. The sampled area was then restricted to the Parish of Liverpool and an overall sample size of 5 per cent was decided upon.

The rationale for these modifications was twofold. The indices from the enumerators' tables provided sufficient detail for analysis of the spatial patterns of housing and class-related matters at the enumeration district level for the entire Borough. The material from the household schedules was then more important for providing data for the cross-tabulations of social characteristics examined in Chapter 5, and for the correlational/factor analysis of Chapter 9, than it was for providing spatial data at the enumeration district Level.
which might result from sampling only the parish rather than the entire Borough was carefully examined. The Census enumerators' summaries provided complete spatial coverage of the Borough and the sample, therefore, needed only to be representative rather than spatially all-inclusive. Provided that the parish Largely fulfilled this criterion, the sample from the smaller area could be justified.

The Parish population represented 68 per cent of the Borough total and was in 1851 still statistically the most important part of the Borough - as indeed it was of the urban region as a whole. While the parish was the 'inner core' to this region, Liverpool's social geography meant that the parish at this time was not unrepresentative of the wole Borough. In 1851, the Parish still contained a considerable social mix, indeed probably the wealthiest neighbourhoods in the Borough lay within its boundaries. The out-townships the area of the Borough lying outside the Parish) were also diverse and contained (especially in Toxteth Park) a considerable area of poor housing with a Low socio-economic status.

In 1851, average house occupancy in the Parish was 6.99 and in the Borough 6.77; the female/male sex ratio in the parish was 103.2, in the Borough 106.5. By and large, therefore, the Parish was not unrepresentative of the Borough, With the proviso that its statistics tend to a modest overestimation of 'lower-class' qualities and under-estimation of 'upper-class' qualities by about 10 per cent compared with the

Borough. 708 Comparison of these characteristics allowed the conclusion that the Parish could be considered a reasonable sample of the Borough with the slight reservations mentioned.

An overall sample size of 5 per cent was decided upon but it was felt desirable to allow for the possibility of future case studies by including, in addition, 14 enumeration districts to be sampled in depth (100 per cent). 709 The variable sample size yas alloued for by differentially weighting each card.

The systematic sample was drawn by selecting every nth schedule number in the enumeration district (in the case of the 5 per cent sample, every twentieth household). 710 The commencing schedule number to be sampled was altered for each enumeration district. The first sampled household in the first enumeration district was schedule number one, the first in the second enumeration district was schedule number two and so on, up to the twenty-first enumeration district when the

708 It yould not be possible to defend generalizing from the Parish to the Borough after 1851. By 1861, the Parish's portion of the Borough population had declined to 58 per cent and the out-tounships had taken on social characteristics distinctly different from the Parish.
709 Twenty-eight enumeration districts in Scotland Ward were 10 per cent sampled before it was decided to sample at the lower population.
710 The standard of enumeration in the Registration District of Liverpool was such that, in all but very few enumeration districts, the highest schedule number was the same as the total of households enumerated. It was not, therefore, felt necessary to check each household in each enumeration district and renumber consecutively.
commencement number reverted to schedule number one again. 711 Quasi-institutional households were excluded from the general analysis, where the numbers of inhabitants exceeded 14.712

The total number of households sampled amounted to 4,141 which, when weighted by their sample size, represented 44,793 households the true total for the parish as given in the enumerators' summaries was 46,056 ). The sample unit was a household; one coding card was completed for each household (see Figure $\mathbf{A} 5.1$ ) and the data transferred to punch cards, stored in computer files, tested for internal consistency by running cross-checks comparing the population totals in the age categories against those in the birthplace groups and errors rectified.

A test of sample representativeness was performed by checking the populations of household heads born in different birthplace groups against the birthplace of the population over 20 as given in the published census (Table A5.2). In all cases, the ranges of error for the sample proportions included within them the figure for the parish as given in the Census. In only one case, the Irish, did the sample seem unrepresentative of the birthplace distribution for the Borough. It was not possible to

711 A secondary sample of multi-occupied houses was taken, and a card was completed for every household in each multi-occupied house encountered during the sample. This sample was utilised together with the main sample only for the analysis of selected occupational categories.
712 Eighteen such quasi-institutional households were encountered consisting of six emigrant lodging houses, five nightly lodging houses, a police station, three shops with resident assistants, and a school.

TABLE A5.1
Liverpool, 1841-51
Classification of Occupations

| Booth's Classes | Borough, 1841 |  |  |  | Borough, 185i |  |  |  | Parish, 1851 |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | \# |  | \% |  | 1 |  | 2 |  | $\theta$ |  | \% |  |
|  | M | $\underline{F}$ | M | $\underline{F}$ | M | - F | M | F | M | F | $\underline{M}$ | F |
| 1. Agriculture | 1670 | 34 | 2.3 | 0.2 | 2271 | 303 | 2.3 | 0.7 | 1494 | 141 | 2.1 | 0.5 |
| 2. Mining | 67 | 8 | - | - | 1124 | 50 | 1.1 | 0.1 | 473 | 42 | 0.7 | 0.1 |
| 3. Building | 7604 | 17 | 10.5 | - | 9147 | 7 | 9.4 | - | 5799 | 6 | 8.3 | - |
| 4. Manufacture | : 22615 | 4107 | 31.3 | 20.0 | 27787 | 11413 | 28.5 | 27.9 | 19496 | 8741 | 27.9 | 29.7 |
| 5. Transport | 8139 | 51 | 11.2 | 0.2 | 23273 | 105 | 23.8 | 0.3 | 18828 | 98 | 26.9 | 0.3 |
| 6. Dealing | 8101 | 2176 | 11.2 | 10.6 | 11793 | 7359 | 12.1 | 18.0 | 8557 | 5904 | 12.2 | 20.1 |
| 7. Industrial Scrvice | 17538 | 190 | 24.3 | 0.9 | 13685 | 119 | 14.0 | 0.3 | 9849 | 93 | 14.1 | 0.3 |
| 8. Public and Professional | 3890 | 755 | 5.4 | 3.7 | 6268 | 1326 | 6.4 | 3.2 | 3949 | 755 | 5.6 | 2.6 |
| 9. Domestic Service | 2153 | 13029 | 3.0 | 63.5 | 1850 | 19593 | 1.9 | 47.9 | 1352 | 13352 | 1.9 | 45.4 |
| 10. Independent | 37 | 2 | - | - | 374 | 585 | 0.4 | 1.4 | 171 | 283 | 0.2 | 1.0 |
| 11. Uncertain | 490 | 144 |  |  | 1 | - | $\begin{gathered} 7 \\ \text { Total } \\ \text { Population } \end{gathered}$ |  | 1 | - |  | $a 1$ <br> tion |
| $>20$ years employed | 72304 | 20513 | 92.1 | 23.6 | 97573 | 40860 | 96.2 | 36.4 | 69969 | 29415 | 96.7 | 38.2 |
| < 20 years cmployed | 10080 | 7164 | 17.0 | 11.6 | 19216 | 12141 | 23.8 | 14.9 |  |  |  |  |
| - Total employed | B2384 | 26677 | 59.8 | 18.6 | 116789 | 53001 | 64.1 | 27.3 |  |  |  |  |
| Population $>20$ years | 78490 | 87029 |  |  | 101408 | 112359 |  |  | 73102 | 77083 |  |  |
| Population $<20$ years | 59269 | 61699 |  |  | 80650 | 81538 |  |  |  |  |  |  |
| Total Population | 137759 | 148728 |  |  | 182058 | 193897 |  |  | 127212 | 131124 |  |  |

TABLE A5. 2
Test of Sample Representativeness

| Birthplace Group | 1851 Census <br> Sample | $95 \%$ Confidence <br> Limit | Population over 21 <br> 1851 Census |  |
| :--- | :---: | :---: | :---: | :---: |
| Liverpool |  |  | Parish | Borough |

Note: Confidence (limits) calculated according to the formula given in Armstrong, 1974, p. 206.
test the sample's representativeness for the distribution of occupational groups because no occupational tables yere published for household heads. Table A5.3 compares the distribution of sampled household heads with the occupational distribution of the total labour force, with the exception of 'dealing' (over-represented in the sample) and 'domestic service' (heavily under-represented in the sample).?13

The sample proportions were broadly similar to those of the workforce as a whole. The sample was, therefore, considered to be representative.

## B. Occupational Coding of Sample

The occupational coding system used for the sample was based on the 'industrial' scheme devised by Booth for his paper on the changing occupational structure of the 19th century population of England and Hales. 714 This system has been carefully investigated by Armstrong715 and recommended as a basis for comparable studies of $19 t h$ century occupational distributions. The scheme has some obvious limitations. Because it is a 'Linnean'-type scheme based on a formal division of work into production, transformation and distribution of raw material and goods (primary, secondary, tertiary), it does not take into account the degree of skill and the manner of industrial

[^15]TABLE A5. 3
Liverpool Parish, 1851
Occupational Groups

|  | Sampled <br> Household <br> Heads | Booth's Occupational Groups |
| :---: | :---: | :--- | :---: |$\quad$| Tabour Force |
| :---: |

[^16]organization involved in each process. For instance, providing they worked on similar materials, artisans are lumped with factory workers. For these reasons, Foster, Anderson and Gray have utilised combined industrial-skill/social status schemes in their work. Foster's eight-fold scheme has categories for magnates, professional, clerical, small master craft, semiskilled and labourers. 716 Anderson uses a ten-fold scheme based on three parameters, size of income, regularity of employment, and 'employment status'. The scheme consists of professional and managerial, clerical, trade, higher factory, artisan, lower factory, labourer, etc., hand-loom weaver, unclassified, not employed. ${ }^{717}$ Gray718 in a study of the position of artisans in Edinburgh society utilised a 15-fold class/occupational grouping: professional, business, clerical and commercial, supervisory and minor officials, retail and warehouse employees, manual-skilled, manual-semi and unskilled, manual/unclassifiable, domestic service, miscellaneous personal service, police, armed forces, agriculture, etc., farmers, other and miscellaneous. These three schemes are unique and derived to help answer particular questions. It was decided here that comparability of results was desirable and that the Booth scheme would be best able to achieve that end.719

## Booth's allocations of the 1861 Census abstract

[^17]
#### Abstract

of occupations has been listed by Armstrong720 and contains 1;333 separately listed occupations. 721


As the Census uas concerned with only the employed population, the property owning and dependent population were not included in Booth's classification. In the Liverpool sample, 23 non-employed 'occupations' were encounterad and allocated to two new groups and ten new sub-groups (Table A5.4).722 mh total occupational scheme as utilised here represented eleven groups, 89 sub-groups and up to 1,357 occupations. Each household head was coded according to this three-part, seven-digit coding system.

Allocation of Occupational Descriptions

The occupational coding used here was based on the 1861 Census abstract of occupations as retabulated by Armstrong from Booth's worksheets and described above. 723 Even this extensive list was a consolidation of "thousands of names by which people designate their own occupations". 724 To ensure standardization of allocation, the census office compiled an

720 Armstrong, 1972, pp. 296-310.
721 The list omitted four occupations given in the 1861 Census (cutler, other mixed metals, other county and local officers and upholsterers) and five occupations are out of alphabetic order (bargeman, basket maker, stone digger, stone waller, stove maker).
722 Group 10 - Property owners and independent. Subgroup 1 Owners of Real Estate; 2, Owners of mines, factories, ships, etc., 3, owners of shares and receivers of interest; 4, private means and independent. Group 11 - Dependent. Sub-group 1, domestic; 2, aged; 3, infirm; 4, destitute; 5, indefinite; 6, criminal.
723 See Armstrong, 1972.
724 Census, 1861, Vol. 3, p. 27.

EXTENSION OF BOOTH TYPE CLASSIFICATION TO NON-EMPLOYED

## 10 PROPERTY OWNING AND INDEPENDENT

01 OWNERS OF REAL ESTATE
House proprietor, landowner, proprietor, landed proprietor.

02 OWNERS OF MINES, FACTORIES, SHIPS, ETC.
Boat owner, coal owner, copper, iron, lead mine proprietor, quarry owner, shipowner.

03 OWNERS OF SHARES ETC AND RECEIVERS OF INTEREST
Annuitant, Capitalist, Shareholder, interest.

04 PRIVATE MEANS AND INDEPENDENT
Gentleman, independent, magistrate, M.P., Peer, agent, lady, gentlewoman.

11 DEPENDENT (Note: 'wife of . . .' coded for husband's job)

01 DOMESTIC
Housewife, widow, housekeeper (not a servant and without lodgers), husband away, etc.
Wife - domestic affairs, duties et:., householder

02 AGED
Retired, Pensioner, Chelsea and Greenwich Pensioner (with no other jobs)

03 INFIRM
Infirm, lunatic, ill, disabled, crippled.

04 DESTITUTE
Alms person, pauper, beggar, mendicant, parish relief, labour for parish, unemployed, refugee.

Q5 INDEFINITE
Not stated, no occupation. Household head absent (i.e. master away - see above if female)
alphabetic index begun presumably in the course of tabulating the 1841 or 1851 censuses and this index was printed for the use of clerks working on the 1861 Census. 725

The Liverpool sample was allocated to Booth's 1861 census abstract occupational list as retabulated by Armstrong (Table A5.5)., Most stated occupations could be allocated to direct reference to Armstrong's list. This list was numerically coded and these served as occupational codes for the sample. Four examples of occupations encountered are given in Table A5. 6 to demonstrate allocation procedures. In the case of a 'blind maker', the occupation is given in the Booth listing (in Armstrong) under Building, operative (B2). It is 109th in the consolidated listing and this number can be allocated to it as a unique occupational code.
'Cart and van proprietor' is not encountered in the Booth list but it is found in the 'Instructions to Clerks' as placed by the Census authorities in the 1861 Occupational category 7:2 (Order 7 'Engaged in conveyance', sub-order 2 'carriers on roads'). The occupation was not separately listed in the Census table, so must have been subsumed in the residual class (containing occupations too infrequent to warrant separate tabulation) 'others in conveyancing'. On re-checking the Booth listing, this group is encountered and placed in Transport, Roads (T5) with a unique code of 825.
'Managing Director' is not encountered in either

TABLE A5. 5
Allocation of Occupational Descriptions Encountered in 1851 Census Enumerators' Books to their Equivalent 1861 'Census' Occupation,

Question

1. In Booth list
republished by Armstrong?
2. In Booth list republished by Armstrong?
3. In 'Instructions to Clerks'?

3a. Is it pseudonym?

3b. Is it given a Census Code?
3c. Is the 'census' occupation listed in 1861 Census?

Yes Go to 1.

No Go to 1 and place "in others in" category in census group.
Check for word recombination. Check a dictionary for possible pseudonyms.
มәโеәр әхеM LTEmS
Manager director
Blind maker
Cart and van proprietor
 $\begin{gathered}\text { Booth List } \\ \text { (in Armstrong) }\end{gathered}$
$\begin{gathered}\text { Occupation } \\ \text { Group }\end{gathered}$
Code
B2
Not in list
MF31
No
"see' Hawker"
1861 Census Group
$Z \cdot L$ 1
Some Worked Examples of Occupational Allocation
$9^{\circ} \mathrm{SV}$ GTGVJ
the Booth or the 'Instructions to Clerks' listing. The pseudonym 'manager' can be safely utilised and placed in Booth category (MF 31, unique code 694).
'Small ware dealer' is not present in the Booth list and is considered a pseudonym for 'hawker' in the 'Clerks Instructions'. The latter occupation is contained in the Booth listing.

## c. Coding of $\operatorname{dsocial}$ Class'

There has been considerable discussion of the utilization of occupational descriptions to assign individuals to a hierarchical system of status. There have been two questions at issue; whether it is valid to assign particular occupations to particular social classes and whether it is valid to adapt and utilize twentieth century schemes of occupationally derived class hierarchies to nineteenth century data. Concerning the first question, while there are many occupations which involve a range of possible social esteem (often in the important small dealer - manufacturer category), Armstrong's statement would appear to be defensible.
"We may assume that there would be in practice high correlations between •... occupational strata and levels of education, social esteem and deference, authority, etc., to name just a few of the criteria which sociologists belieye to be important in gauging social class. 11726

Where these alternate measures of social class are unavailable (and this is usually the case in British social data), it is

726 Armstrong, 1972, p. . 203. .
only possible to infer social class from occupational descriptions. Armstrong has argued for an adaptation of the five-class social division utilised in current Registrar General's statistics727 and an adaptation of this system was utilised here. The adaptation involved the splitting of the Registrar General's and Armstrong's Class III into Classes 3 and 4 thus creating separate classes for manual and non-manual workers (see Table A5.7). Specific occupational allocations which were different from the Registrar General are given in a list below.

Certain independent evidence exists to support the defensibility of generalising social class from occupation and for the six group system utilised. Even at its broadest Level, the occupational classification proposed by Booth has an inherent social class characteristic. Scores on four social variables (Table A5.8) produces a six ranking hierarchy of major occupational groups which broadly corresponds with the six-fold scheme of social classes actually adopted.

Differing literacy rates by occupation in the 1830 s also produced a gradation confirming the relative positions of occupations on an unskilled/semi-skilled/skilled

727 Dyos, 1968, p. 146 passim and Armstrong, 1972, pp. 200-14.

## Social Class Divisions Employed

| Class 1 | Capitalists, manufacturers, professional classes, etc. |
| :--- | :--- |
| Class 2 | Small shopkeepers, lower professionals, etc. |
| Class 3 | Petty entrepreneurial, clerical |
| Class 4 | Skilled manual (apprenticeship usually required) |
| Class 5 | Semi-skilled workers. |
| Class 6 | Unskilled labourers, domestic servants. |
| Class 7 | Residual (Housewives, retired, undeclared). |

Note: This classification is taken from and is a slight modification of that employed by the Registrar General, 1951. Essentially, it preserves the Registrar General's scheme as described by Armstrong (1972, p.202) but splits Class III into two.

TABLE A5. 8
Liverpool, 1851
Social Ranking of Booth's Occupational Groups

Rank

1
Independent
Score 40 (10/10/10/10)
Public and Professional Score 35 (9/9/8/9)

Dealing
Score 28 ( $8 / 7 / 7 / 5$ )

4 . Dependent Score 23 (6/8/5/4)

5

6 Industrial Service Score 8 ( $3 / 1 / 2 / 2$ )

Manufacture
23 (5/6/6/6)
Domestic Service
Score 16 ( $1 / 3 / 5 / 7$ )
Transport Agriculture
$9(2 / 1 / 3 / 3) \quad 10(4 / 4 / 1 / 1)$

Note: Based on combined ranking of 4 variables:

1 - \% No servants
2 - \% More than 1 servant
3-\% In court houses
4-\% Irish
(Reversed rank order)
(Reversed rank order)
(Reversed rank order)
(Reversed rank order)
manual scale. ${ }^{28}$ For instance, watch makers (Class 4) had a literacy rate of 89.3 per cent, Carters (Class 5), 40.9 per cent; Labourers (Class 6), 33.6 per cent. . 2

Finally, several social variables - house type, . 2
servant possession and presence of lodgers - vary closely with the class ranking system utilised here (Table A5.9). Occupational Allocations made that were different from those of the Registrar General Classification

Several occupations were apparently of higher social status in 1951 than earlier. The allocations made in the 1921 classification were reviewed to revise the social class allocations of certain occupations. The following occupations were assigned to Class 5 (semi-skilled). Original Registrar General classes are indicated in parentheses. Brewer (IV), Carter (IV), Flax and linen manufacturer (IV), Mariner (III), Pavior (IV) , Railway pofter (V), Rope maker (IV), Seamstress (IV), Ship keeper (IV), Waiter (III), Warehouseman (III).

Certain occupations were difficult to classify as entrepreneurial or artisanal. There were, for instance, 36 types of 'dealer' and nine types of 'merchant' encountered. All 'merchants' were allocated to Class 2. Those dealers engaged in

[^18]TABLE A5. 9
Parish of Liverpool, 1851
Characteristics of Social Classes

| $\mathrm{N}=$ | Household Head <br> Social Class | In Court <br> Housing \% | One or More <br> Servants \% | Average <br> of Lodge |
| ---: | :---: | :---: | :---: | :---: |
| . |  |  | . | . |

## Source: 1851 Census Sample.

trading products requiring larger capital investment were allocated to Class 3 or 2 (dependent on whether there were two or more employees and/or servants present). Smallware and petty fruit and vegetable dealers were allocated to Class 5 (though it was often apparent that economically they were often closer to Class 6). Store ouners were classified as social Class 2 if their premises were found in main streets. Cow-keepers and milk sellers uere assigned to Class 3 if there were signs that they owned the business but Class 5 if they did not.

Purveyors of alcoholic drinks came in a variety of social hues and various occupational descriptions were assigned different social levels. ${ }^{729}$ Wine and spirit merchants, inn-keepers, beer, ale agents, licensed victuallers (Class 2), Publican (Class 3), Beer seller, beer housekeeper (Class 5). . Lodging housekeepers could also be of several classes. They were assigned to Class 2 if there were two or more servants, Class 3 otherwise. However, if they were obviously 'lou Irish' or found in court housing, they were placed in Class 5.
'Master' coopers were raised to Class 2 from Class 4 as their occupation implied ownership. 'Master' carters were assigned to Class 4, as the term implied skill.

The scheme is, therefore, essentially the same as that proposed by Armstrong. Some observations might be made about it. The assignment of many trades to Class 4 (skilled) is

729 In consultation with Robert Thorne of Leicester University, see Thorne, 1973.
probably generous. It is often uncertain how skilled many tradesmen were in the mid $19 t h$ century and we cannot be sure that we are referring to apprenticed trades. Class 4 is, therefore, far less exclusive than Hobsbaw's labour aristocracy though it certainly contains that group within it. A few examples will suffice. Many building trades were subject to casual working as the trade cycle fluctuated. The Morning Chronicle accounts support this as they do the questionable allocation of tailors and boot and shoe makers to the rank of skilled trades. 730 Agricultural Labourers (particularly those of Irish origin) yould probably be better placed in Class 6 rather than 5.

The scheme is, in the Liverpool context at least, a conservative one. It allocates many occupations of questionable skill to a higher social group than might be warranted. Despite this, Liverpool's proportions of unskilled Labour as calculated by these conservative definitions were still extremely high.

## A5.3 Evidence from Secondary Sources

The broad range of the topics discussed in this work necessitated an extensive search of the literature relating to social and environmental questions in 19 th century Liverpool. The coverage of this search is believed to have been relatively
complete for certain classes of documents such as published and unpublished parliamentary papers $\mathbf{7 3 1}^{31}$ and for pamphlet literature. 732 All available $18 t h$ and $19 t h$ century maps of Liverpool were searched out and examined, including a number of important, but hitherto unlisted, sets held in the working files of several Corporation Departments. 733 There was a Less extensive and systematic search undertaken of the voluminous Corporation and Parish records734 and of the many 18 th and 19 th century Liverpool newspapers.

Social scientists are conscious of the danger of generalising from unique cases and this fear is particularly strong when using historical records.735 It was hoped to avoid these pitfalls by a number of techniques, firstly by crosschecking, wherever possible, authorities against each other; or against census enumeration material.736

Secondly, by extensive use of a subject/date card file, reference could be made to evidence key-word coded for

731 See a preliminary list published during the course of this research in Taylor, 1972.
732 It is believed this investigation has been the first to explore systematically the rich pamphlet holdings of material relating to Liverpool in the Cohen Library, University of Liverpool; the Liverpool Atheneum Library; the Liverpool Medical Institution; and British Library.
733 For instance, a unique state of the Five Foot Series and the Okill Leasehold Estate Plans.,
734 The 144 volumes of Liverpool workhouse records 1843-1921 were investigated and calendared but not utilised in this research. A copy of this calendar is held by Liverpool Record office.
735 Anderson, 1971, p. 180.
736 This was especially productive in the case of the court and cellar evidence (see Appendix 4). It also proved the accuracy of much of Duncan's statistical work.
social and environmental topics. 737 As far as possible, photocopies of all important evidence were obtained. The keyword index and the copy of the original document thus allowed all the evidence encountered on a particular topic to be accessible at the time of writing. This technique also enabled the evidence to be cross-checked and compared for typicality. Quotations and citations in the text were, therefore, only included if they were deemed to be a fair representation of the particular question under study (given the understandable tendency for some topics to attract more literary attention than others).

[^19]
## Appendix 6

ANALYSING URBAN STRUCTORE PROM CENSUS ENUMERATORS' SUMMARIES

## A6.1. Census Data, General

The present-day urban geographer studying 19thcentury populations is at once faced with a dearth and plethora of useful census material. The published census returns are admirable for inter-urban comparisons, once standardisation of groupings is made and changes in boundaries are taken into account. But below the registration district level, all the data on birthplace and occupation is absent. At the sub-district Level, only the bare population totals survive, though net migration movements can be calculated by comparison between the Registrar General's annual reports (which give birth and death statistics for sub-districts) and the census totals. Subdistricts were relatively large, Liverpool's had populations between 20,000 to 60,000 in 1851, and they are larger than the ward - a unit for which municipal data is often available.73s Smaller touns would rarely contain more than one registration sub-district (e.g. Birkenhead) and so it can be said that the published $19 t h$-century censuses provide very little of interest to the geographer concerned uith internal variations in the urban structure.

[^20]Turning to the census enumerators' books now available for the censuses 1841-1871, one is faced with an overuhelming body of data on the individual person - too much to be used in its entirety by the average researcher and difficult to reconstruct into notions of urban space.

There is, however, a narrow step in the steep ladder of descent from the paucity of detail in published data to the barely usable riches of the manuscript census, which may provide a delicate foothold from which to view certain aspects of the 19th-century urban scene. This appendix considers the reliability and application of the enumerators' summaries as a data source utilised in this thesis for the study of urban spatial structure.

Published 19th-century census tables were derived from two different tabulations of the individual census returns contained in enumerators' books.?39 The first was the totalling of occupiers (census 'families'), houses (inhabited, uninhabited, building) male, female, and total population, undertaken by the enumerator himself after he had copied out the original schedules into the enumerator's book. These results were recorded on page iii of each enumerator's book. The books were then dispatched to the London census office where the enumerators' tabulations were checked and, if found in error, corrected by an official. These enumerators' totals were then

[^21]added one to another and the resultant grand totals went to form the basis of the published population figures for civil areas and registration districts. .

All other counts of population characteristics tabulated in the published census - marital condition, birthplace, occupation, etc. were the results of a separate tabulation of the individual entries by the census clerks counting and entering the results on precoded tally sheets. These sheets are no longer extant but the memory of the checkers' work is retained by the colour pencil marks in the enumerators' books themselves. 740

There are some instances where the covers of the enumerators' books contain certain summations for each enumeration district. The covers of the enumerators' books for the 1851 census in Liverpool, for instance, apparently contain counts of unmarried females741 and the covers of the 1849 books contain counts of employed population (again not labelled as such) which permit the calculation of labour participation rates. The 1841 enumerators' books for the Wirral in Cheshire contain summaries of age breakdouns of the occupied population. 742 These are the only examples, to the author's knowledge, of enumeration district summations of data other than

[^22]the basic population and housing tallies given on p. iii, though further work in other parts of the country may reveal other such summations.

Enumeration district summaries of age, birth place, occupation, marital condition, etc. do not exist743 and can only be derived by summation of the individual returns.

743 And probably never did as they were presumably entered on tally sheets already designated by census registration districts.

## A6.2. Accuracy of Census Enumeratorsi Sumparies

Before considering what can be gleaned from the little data that was summarized, the accuracy of the enumerators' efforts should be examined. They were called upon first to differentiate households and houses in their books by drawing dividing lines. They were then to perform seemingly simple arithmetic tasks by totalling the numbers of houses (inhabited, uninhabited, 'building') census families and individuals. To do this accurately, the enumerators should have clearly understood the definitions employed by the census for each of these termis.

The definition of houses and households used in the 1851 census apparently presentea certain problems of interpretation for the enumerators and Anderson has noted the variations in procedure adopted. 744 Changes of definition also ocicurred between censuses. For instance, the 1861 census definition of a household had the effect of including large numbers of lodgers as separate households, whereas the 1841 and 1851 censuses generally included them as part of the main household.

Both Anderson and Tillott have felt that the definition of $a$ house was more readily understood $b y$ the enumerator than that of a household, though there were difficulties in areas of tenement housing. Anderson has provided a systematic basis for tabulating households and houses in the

[^23]enumerators' books, and his procedures were followed in analysing the Liverpool sample. 745

There are several possible sources of error in the summaries. The first lies in the arithmetic abilities of the enumerators. Tillot has noted that mistakes crept into the totals in 5 of the 18 districts in Doncaster and 2 out of 15 in Sheffield, and he concludes that the enumerators' summaries must be treated with "the greatest caution". 746

I do not entirely concur with this point of view. One hundred percent accuracy can rarely be expected in any enumeration, so it is the range of error that is more important to determine. These details are unfortunately not provided by Tillot. Had he done so, we might have been able to judge whether the enumerators' totals for the sheffield region fell within an acceptable margin of error or not. The totals of houses and population may not be perfect, but as they apparently provided the statistical basis for the local and national totals, we must treat them with the same order of 'caution' we would the published census (with the provision that, in aggregate, random errors at the enumeration district level would often tend to be self-cancelling).

A second source of possible error lies in the inclusion of quasi-institutional populations in the enumerators' books summaries. Although larger institutions (over 200 inmates)

[^24]were separately enumerated, there are a number of 'quasiinstitutions' enumerated by the household census and it has been customary to remove these from general analysis of 'ordinary' households. The arbitrary figure of 14 persons was selected in the Liverpool sample as the size above which the household was carefully examined for institutionality. 747 Commercial lodging houses, hotels, gaols, hospitals, schools, military barracks, orphanages, asylums, almshouses, an institution, a convent, and a drapery shop residence were sampled in the Liverpool's enumerators' books and the total inmates extracted from the enumeration district summary.

Since the figure for such households is contained in the enumeration district summaries, it could be said that their presence will also adversely affect the summary totals. While this is true, only a small number of such establishments was encountered with a total population of only 2051. This figure is not entirely complete, but it is probably fairly reliable as the presence of this type of household is fairly easy to see, even on the microfilmed page. Their geographic distribution tended to be localised $160 \%$ of all quasiinstitutional population uas contained in two sub-districts, Mt. pleasant and Islington). Charitable establishments were mainly concentrated in the middle class areas; hotels, and residential shops in the toun centre; commercial and emigrant lodging houses close to the passenger serving docks. Nevertheless, their

[^25]
Notes: 1. Anderson's Standard Tabulation procedures used to define households.

influence on derived social indices in particular enumeration districts could be quite important if they were not removed, especially if they are single sex or single generational institutions. As examples, 160 female orphans in Mt. Pleasant E.E. E.D. constituted $16 \%$ of the total population; 107 Polish cavalry temporarily quartered in T. district of Great Howard made up 11\% of its 'population'.

Finally, if the enumerators' definitions of houses, households, etc. is at variance with the more refined versions suggested by Anderson, 748 other inaccuracies would result. To assess the overall reliability of the enumeration summaries, a comparison was made between them and the recalculated totals for 12 enumeration districts. Table A6. 1 shows that, on the whole, the 'purified' summary data compares fairly closely with the 'raw' summaries provided by the enumerators. Hith one exception, households were clearly defined and accorded well with Anderson's household definitions. The count for 11 of the 12 districts differed by only 13 households in a total of 2218. Before assuming that these summaries can be used in other parts of the country, it would be as well for researchers to carry out random checks on the data.

Mt. , Pleasant G. differs significantly in that the enumerator adopted the 1861 pattern of separately issuing schedules to lodgers as if they were separate households. 749 The result was that 17 more schedules were issued than there were

748 Anderson, 1972, p. 140.
749 See also Anderson, 1972, pp. 141-2.
true households. Houses were similarly fairly well defined and counted by the enumerators (a difference of 27 in 1657, 1.6\%). These spot checks on population counts revealed only small differences and very often the census counts provided reliable tests of the accuracy of the sample rather than the reverse.

The comparison indicates that the overall reliability of the enumerators' summaries was established within acceptable limits and that they could be improved in census sampling by noting:
a) and excluding quasi-institutional households;
b) especially high sex ratios as possible indicators of quasiinstitutional households:
c) signs of poor or eccentric enumeration techniques (usually apparent from an examination of a few pages in each book).

## A6.3. Enumeration Districts

Spatial analysis of enumeration data depends on the accurate identification of the districts within which the enumerator worked. The 1851 national census was organized through 30,610 districts which were defined by the census office as an area which would be covered by a single enumerator in one or two days.

In the Registration District of Liverpool, the Registrars for each sub-district appear to have been responsible for assigning the enumeration districts and completing the descriptions on the first page of each enumerator's book. 750 While their prime concern was the enumeration of people, not areas, in a closely built town the most efficient way for a Registrar to divide up enumeration responsibilities was by thinking in spatial terms. If all the enumeration district jigsaw pieces fitted, then presumably no one could be left out. 751

In Liverpool, the instructions to the enumerator assigning his territory usually took one of two forms, a description by itinerary or a description of the area's bounds.

[^26]The first described the route to be taken by the enumerator which streets or sides of streets were to be considered. Often, it told the enumerator how many houses to expect and this indicated that the Registrar had himself already walked the route. $\mathbf{l S}^{52}$ For instance, the description for Dale Street $G$. district begins "From Midghall Street East side of Vauxhall Road to Marlborough Street 6 houses ...." Other Registrars assigned a block of territory, e.g., St. Thomas L. district "All that part bounded by the west side of Great George Street and the south side of Hardy Street ... [etc.]. ... including part of Grenville Street both sides ....!" The enumerator could then pick his own route through the district.

The use of these discrete spatial blocks with complete itinerary or area descriptions enables the exact reconstruction of enumeration district boundaries (Figures A6. 1 and A6.2). St. Thomas' Registrar even went to the trouble of cutting up a copy of Gage's plan and pasting it to the description page. Other Registrars drew sketch plans of the district for their enumerators.

## In Contrast, Toxteth Park, outside the

 Liverpool's Registration District and under the West Derby Superintendent Registrar, had a chaotic E.D. system which appeared to defy logic and common sense by fragmenting districts752 Notes to enumerators from the Dale Street Registrar included the following: "In a court with no. 54 over entrance, running to upper Milk Street - take no notice, it yill be taken in district $1 \mathrm{K"}$ and "The enumerator must pay particular attention to the various courts in the District."


into several detached portions whose descriptions were vague in the extreme. ("... along to Harry Midgely's.....!")

Reconstruction of these districts is extremely tedious, timeconsuming and probably inaccurate in places. The contrasts between the enumeration districts in Liverpool and Toxteth Park illustrate how dependent the organization of the census, and our subsequent use of it, is on the whim of the individual Registrar.

Fixing enumeration district boundaries on the map allows us to generate area measurements. Coincidentally Liverpool has two excellent cartographic sources which can be used in association with the 1841 and 1851 censuses. The Gage Plan of 1835 and the Five-Foot Ordnance Survey series of 1848 allow non-residential land to be identified and measured. Total (gross) and residential (net) acreages were calculated for the 379 enumeration districts in Liverpool in 1841 and the 357 enumeration districts in 1851. .

A6.4. Derivable Measures of Urban Structure From the Enumerators' Books

The enumerators' summaries allow a number of measures to be calculated which, when mapped, prove extremely useful measures of urban structure (see Plates 33-40).
A. Sex Ratio (Female to Male) - derived from the population totals of males and females. This index was found in practice to be especially sensitive to the presence of servants and by extension to the delineation of middle and upper class districts. The possession of a servant was almost a prerequisite of the middle class household and was used by Rowntree as a division line between the working classes "and those of a higher social scale". 753 It distinguished households with incomes of at Least 150 pounds to 200 pounds per annum, 754 in a society where the constantly employed skilled artisan rarely earned more than 80 pounds per annum.

An additional female to the household had the effect of raising the sex ratio in middle class enumeration districts with families of five to six persons by 30 to 40 percent. The distribution of scores for Liverpool indicates that sex ratios of 115 to 130 females per 100 males characterised mixed class or marginal middle class districts; those between 130 to 160 females per 100 males, fully middle class districts; those over 160 females per 100 males indicate a preponderance of

[^27]upper middle class households having two or more servants per household.

Enumeration districts having less males than females were usually areas having large numbers of single male lodgers. They were concentrated in areas close to sources of male-dominated employment.
B. Net/Gross Population Per Acre - These were derived from the areas of enumeration districts measured for both residential and non-residential areas (figures 00 and 00). . Areas smaller than about one-fifth of an acre were excluded from consideration, $75 s$ and regarded as residential. Excluded were docks, railways, canals, warehouses, industrial and public buildings, large squares (but not streets), parks, cemeteries, undeveloped land. 756 Building had taken place in a few enumeration districts around the periphery in the intervals between map survey date and the census. These vere easily spotted by abnormally high 'densities' and adjustments made. In a few instances, demolition had also taken place in the interim (for Exchange Station for instance).

The considerable differences between the net and gross densities indicates the far greater precision which is gained if the tedious task of differentiation of residential

[^28]land use is undertaken.
C. Inhabitants per House - Until 1891 no census enumeration of rooms was undertaken and we must, therefore, rely on the measure of inhabitants per house as the best available expression of overcrowding derivable from the earlier censuses. In Liverpool, the majority of working class houses had only three rooms. Middle class houses were larger and in only a few instances had large numbers of middle class housing been 'passed down' and thus overly influenced the assessment of overcrowding. 757

As discrete, identifiable houses predominated in Liverpool, in contrast to the 'houses' (i.e., flats) in the tenement blocks of North-east England and Scotland, no confusion was encountered over defining a dwelling in the census. Indeed, in these circumstances, where whole families occupied single rooms, separated from each other only by open stairs, the house represents an especially meaningful grouping of inhabitants.?ss
D. Households per House - Multi-occupation (the joint occupation of an individual house by more than one

[^29]household ${ }^{59} \mathrm{~L}$ was considered a matter of some concern by 19thcentury social investigators. The census in 1851 commented:
"The possession of an entire house is.....strongly desired by every Englishman: for it throws a sharp uell-defined circle around his family and hearth - the shrine of his sorrows, joys, and meditations."760

Multi-occupancy was commonly accepted as an evil
and its presence an indicator of social distress. The census itself used the criterion of 110 occupiers to 100 houses as 'a statistic of interest' to those concerned with the problem, 761 and districts having more than this ratio were thought to be 'overcrowded'. The ratio for the whole of the Parish of Liverpool was 130 households per 100 houses, probably one of the highest in the country, considering the average size of the houses.

In this study, ratios between 100 and 115
households per 100 houses were considered as indicating a high degree of single family occupation, between 115 and 145 as high multi-occupancy (i.e., Liverpool average multi-occupancy) and above 145 as very high multi-occupancy.
E. Persons per Household - Variations in the average number of persons per household tended to lie uithin fairly confined limits. Large numbers of inhabitants per house

759 Anderson has suggested the term 'co-residing group' is preferable to 'household' as the latter suggests the notion of commensality which was not used as a definitional criteria in $19 t h$ century censuses., As $I$ am not overly concerned with the social structure of the family, I have preferred to use the more common term, accepting the fact that it does not precisely compare with modern usage.
760 Census, 1851 [Condensed Ed.] p. 8.
761 Census, 1851 [Condensed Ed.] Tables 10 and 11.
were the result more of multi-occupancy than large households. In Liverpool Parish, the average household size was 5.3. Values below 4.5 were rare and indicated non-servant ouning families with few children; those above 6 were usually working class families with lodgers. The size of middle class households lay around the parish average, for the presence of servants was offset by a lack of lodgers and fewer children than in working class households.

## F. Net and Gross Housing Density, percentage

 Residential - Many of the comments from section B apply here., The low proportions of residential land in many enumeration districts means that realistic housing densities can only be obtained if non-residential land is excluded. Smaller nonresidential blocks were included, so the values are conservative estimates of true housing densities.The earliest housing built under civic building regulation (containing yards and outside privies) was built at densities of about 60 per acre. Densities above this indicate areas of back to back court property. The most densely packed districts reached densities of between 90 to 120 houses to the acre.

Houses with gardens were uncommon at densities higher than 20 per acre and mansions in outer areas could include up to half an acre of grounds around them (e.g., Toxteth Park, PPD enumeration district had 91 houses on plots of an average one-fifth of an acr.e.)

## G. Vacancy and House Construction Rates - These

were derived from the totals of unoccupied houses and houses 'building'. While most houses listed as vacant yere dwellings, an appreciable number in the inner town were apparently commercial premises. This was probably more a misinterpretation of the instructions than genuine ignorance on the part of the enumerator as to whether the building was an unoccupied dwelling or not. For example, St. George F's enumerator recorded 174 unoccupied 'houses' and 99 occupied. Both of these districts included parts of the inner financial and warehouse district.

Elsewhere, high vacancy rates appear to be indicators of middle class housing for there was little market pressure on such duellings. Enumeration districts with housing under construction were largely peripheral and the data indicates the growing edges of the toun in 1851.

1841

No household counts were made in the 1841
summaries but the Liverpool books contain totals of numbers employed, apparently a count of those with a returned occupation. The 1841 summaries and measured enumeration district areas allow the calculation of the following data:

1. Sex ratios
2. Labour participation rates
3. Population densities
4. Inhabitants per house
5. Proportion residential
6. Vacancy rates
7. House building rates
8. Housing densities

Methods of calculation of all but variable number
2 have been discussed for the 1851 census.

Labour Participation Rate

The 'labour participation rate' was calculated
from the 'numbers employed' totals. This is a fairly crude measure as these totals included all those with any occupational entry alongside their name - including 'housewife', 'scholar.' As the totals are not differentiated by sex, they tend, in Liverpool at least, to reflect the influence of middle class servant ounership. In working class areas, there was little female employment and this tended to depress participation rates in these enumeration districts.?62

[^30]
## A6.5 Conclusion

The accuracy and reliability of definitions used by the census enumerators of 1841 and 1851 in completing their books and entering their schedules has been assessed and was found to be within acceptable limits. Suggestions have been made about how the quality of the summary totals might be improved somewhat by the exclusion of quasi-institutional households.

It was found that with some notable exceptions, it is possible to re-create enumeration districts on the map and derive average calculations of residential land. This has allowed the computation of a number of social indices (Table A6.2)763 which have been used in this thesis and their significance is discussed more fully in the main text.

While the existence of inaccuracy and misinterpretation in the summaries is not denied, the results when mapped speak for themselves. In aggregate, the patterns make sense, confirm documentary evidence about the divisions of the social classes and the nature of 19 th -century urban structure. The ratios also appear statistically related in a logical and meaningful way.

The discussion has not covered the enumeration summaries of later censuses but as the enumeration book and its summary remained substantially the same in form, at least until

763 A standard computer program was developed which is easily adapted to suit the needs of most 19 th-century enumeration summary data.

1911, these techniques are widely applicable on urban data throughout the 19th-century. 764 Investigations into elements of the social structure of large 19 th -century towns 765 should be possible at the enumeration district level that could not be undertaken with the mass of individualised data. Indeed, such a preliminary analysis at the enumeration district level of large towns might be recommended as providing important contextual data to anyone contemplating use of enumerators' books for sampling purposes.

764 With the added advantage that, as these summaries do not affect the confidentiality of later censuses, it has proved possible in several cases to obtain copying privileges of these summary pages from the census office. This significantly extends the range of comparative urban research for the 19 th -century. It should be added that the employment of varying definitions of the 'household' may preclude inter-censal comparisons of some measures. It remains to be seen whether these definitions were uniformly applied by enumerators. If they were, the households per house measures in 1861 and 1871 would express the varying frequency of lodger households within the urban area. 765 With an average of 1,000 persons per enumeration district, touns of 40,000 and more will begin to include a sufficient number of enumeration districts to allou spatial variation at the enumeration district level to become evident. Robson, 1973, p. 53, gives 36 urban groupings of that size in 1851, 104 in 1911.

Borough of Liverpoo1, 1851
Female to Male Ratio

See A.6.4A. .


## Borough of Liverpool, 1841

## Net Population Density

See A.6.4B.


Borough of Liverpool, 1851
Inhabitants Per Occupied House

See A.6.4C:


Borough of Liverpool, 1851
Multiple Occupation of Houses

See A.6.4D.


## Borough of Liverpool, 1851

## Net Population Density

See A.6.4F.


## Borough of Liverpool, 1851

Net Housing Density

See A. 6.4F.


Borough of Liverpool, 1851
Proportion of Unoccupied Houses

See A.6.4, G.


Parish of Liverpool, 1851
Proportion of Population Irish-Born

Totals of birthplace categories cannot be derived from enumerators' books. These figures were kindly supplied by John R. Flamson, a former student of the Geography Department, Liverpool University.


## TABLE A6. 2

Enumeration District Summary Tables 1841 and 1851

|  | $10^{\circ} 0$ | $20^{\circ} 1$. | 8109 | $2 \varepsilon^{\circ} \mathrm{C}$ | $10^{065}$ | 18.2 | －sez | ก9＊10¢ | 2＜＇sst | $20^{\circ} \mathrm{so}$ | －9E8 | 92＂＊0 | 0564 | Eヶ\％ 6 | E6Es： | $9 \varepsilon^{\circ} \mathrm{c}$ ¢ | $66^{\circ} 09$ |  |
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| 181 | $00^{\circ} 0$ | $00^{\circ} \mathrm{O}$ | $45^{\circ} 5$ | $20 \cdot 0$ | $69^{\circ 61}$ | $9 ャ^{\circ} \mathrm{L}$ | 921 | 26＂99 | $98.9+1$ | $16^{\circ} 19$ | H8\％ | 20＊18 | 22 | 815 |  |  |  |  |
| 081 | $00^{\circ} 0$ | ＋9：1 | 00.09 | $16^{\circ} \mathrm{zs}$ | 21．48 | $260 \%$ | ERi | Ot， 20 | 8.10629 | $4{ }^{1} 28$ | 119 | $\angle 0^{\circ} 98$ | 28 $\square$ | 815 514 | Oro | ${ }^{0+1}{ }^{\circ} 9$ | 50.71 95.8 | 181 |
|  | $00^{\circ} 0$ | $00^{\circ} 0$ | $00^{\circ} 001$ | ع605 | co．sp | 19.6 | ＜ 21 | －L＊2b | 91．2ロ号 | 20＇15 | e：z | E2＊16 | 929 | 102 | $\angle 1 p$ i | ${ }_{0} \mathrm{OL}^{\circ} \mathrm{c}$ | 95 08 | 081 621 |
| 21 21 | $00^{\circ} \mathrm{O}$ | ${ }^{6} 1^{\circ} \mathrm{E}$ | 00．0s | O1：ワع | 61．89 | $99^{\circ} \mathrm{L}$ | 8 PI | n9＊652 | 61\％615 | くどい | 119 | $20^{\circ} 16$ | －02 | ELL | くくッ1 | ${ }^{\circ} 8^{\circ} \mathrm{z}$ | 69.5 | 821 |
| 921 | $00 \%$ | $+1{ }^{\circ} 2$ | $92^{\circ} 81$ | $1<098$ | 89.6 | ${ }_{4} L^{\circ} \mathrm{C}$ | 251 291 | nLeczz | $12.0 ¢ 8$ 29.645 | 22．45 | 289 | $12{ }^{\circ} \mathrm{E} 8$ | 095 | E19 | と¢z！ | $\varepsilon \iota^{\circ} \mathrm{E}$ | $15^{\circ} 5$ | ＜21 |
| 521 | $00^{\circ} 0$ | $5{ }^{\circ}{ }^{\text {a }}$ | $96^{\circ} 98$ | $0^{8 \cdot} \mathrm{E} 5$ | 18．19 | $\mathrm{BO}_{0} \mathrm{~S}_{5}$ | 912 | － $2 \cdot 89$ | ${ }^{29} 0^{\circ} 6085$ | 9109\％ | 688 | ${ }_{29}{ }^{2} \cdot 46$ | －68 | ¢26 | C2\％ 6 | $02^{\circ} \mathrm{E}$ | $60^{\circ} \%$ | 921 |
| 221 | 00\％ | $1{ }^{\circ} \mathrm{i}$ | 2108 | 95＊ 11 | SL－SE | $00^{\circ} \mathrm{L}$ | 921 | gs．iz： | $20^{\circ} \mathrm{Cb}$ 2 | －8．54 | －${ }^{\text {a }}$ | 8，${ }^{\circ} 60$ | －19 | ¢ 619 | 2621 | $95^{\circ} \mathrm{E}$ | $60^{\circ}$ | 521 |
| 901 | $00^{\circ} 0$ | 020 | 00．0nl | －2．101 | ャで101 | $9 L^{\circ} \mathrm{L}$ | Eri | 18．08L | LE．arL | L2．58： | 16 E |  | ${ }_{3}$ | 619 | 2 l 21 | $86^{\circ}$ | ع10， | 221 |
| 501 | $00^{\circ} 0$ | E8＇1 | $00^{\circ} 001$ | $90^{\circ} \mathrm{rol}$ | so．tol | $91^{\circ} \mathrm{E} 1$ | 601 | 12＊カ¢ ${ }^{\text {a }}$ |  | 89020 |  |  | C2L | 025 | 0111 | 281 | 2r： | 901 |
| 101 | $00^{\circ} \mathrm{O}$ | $00^{\circ} 0$ | $00^{\circ} 001$ | c＜${ }^{\circ} 981$ | ع $4^{\circ} 981$ | \＆ $2{ }^{\circ} \mathrm{L}$ | 991 | 06.0981 | G6．USEI | 21.88 | ¢9\％ | ${ }_{81}^{00} 80$ |  | 502 909 | PEP1 | 20．1 | $10^{\circ} 1$ | 501 |
| col | 00， | $00^{\circ} 1$ | $00^{\circ} 001$ | $70^{\circ} \mathrm{COI}$ | 25＊OO | 22＊＊ | $8 \mathrm{~Pa}_{1}$ | 25．648 | $25^{\circ}$ ¢ 698 | ／10\％ | ${ }_{2 S 4}$ | 50.901 | $\mathrm{cos}_{5}$ | 908 | 1021 | $68^{\circ} \mathrm{O}$ | 68. | 701 |
| 201 | $00^{\circ} \mathrm{O}$ | E $L^{\circ}{ }^{\circ} 1$ | 72.88 | E2＇85 | 66.59 | $\angle 2^{\circ} \mathrm{L}$ | \＆ 1 | $18^{\circ} \mathrm{GlV}$ | 28．1くV | 146．50 | 8＜6 | $1{ }^{10} 96$ | 419 | － 089 | 9551 2521 | 82.1 | $82^{\circ} 1$ | E01 |
|  | $05^{\circ}$ | 00.0 | 00.001 | $5 \varepsilon^{\circ} 08$ | SE＊04 | $2 \mathrm{H}^{\circ} \mathrm{S}$ | 0 O 2 | －0，z\％ | $80^{\circ} \mathrm{z} 20$ | 91－5t | LES | 28990 | H／g | 165 | ¢L11 | $6{ }^{\circ}$ | ${ }_{60}{ }^{\circ} \frac{8}{2}$ | 201 |
| 1כ！ | 3174 | 31v4 | $7 \mathrm{Fl117}$ |  | Эy 3 \％．d | $3 \mathrm{SO}^{\mathrm{H}}$ | $57 \mathrm{SnO}_{4}$ | 3¢：\％v•d | 78.2804 | 07. | 03－ | U1／8y |  |  |  |  |  |  |
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| 1510 |  |  | ${ }^{\text {did3agu }}$ | Ss\％os |  | －${ }^{\text {andi }}$ | 439：0nn | SS | 17 | 1673049 | 23 ${ }^{\text {d．m }}$ \％ | ‘ ${ }^{\text {• }}$ | 118：7」 |  | $\mathrm{THP}_{1} \mathrm{O}_{1}$ |  | $7 \mathrm{Fr}_{1} \mathrm{O}_{1}$ | 150 |


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| 221 | $00 \%$ | 020 | $44^{\circ} \mathrm{OE}$ | $155^{\circ} 51$ | 29005 | ${ }_{6} 0^{\circ} 9$ | E\％1 | je ${ }^{\circ} \mathrm{ont}$ | 12.928 | 69.50 | 22\％ | $00^{\circ} 001$ | 9p | －9\％ | 826 | ＋80\％ | $52^{\circ} 6$ | 21 |
| ¢21 | 00\％ 0 | $120^{\circ} \mathrm{E}$ | $000^{\circ} \mathrm{O}$ | $10^{\circ} \cdot 2$ | $82^{\circ} 5$ | $86 \cdot 9$ | 961 | $210.6 s t$ | －20．9nE | $0^{2020}$ | 598 |  | －09 | 585 | 6801 |  | 1102 | $\varepsilon 21$ |
| 121 | $00^{\circ} 0^{\circ}$ | $0^{001}$ |  | $28^{\circ} \mathrm{O}$ | 990．ta | $19^{\circ}{ }^{\circ} 1$ | ${ }^{86} \square_{1}$ | 209160 |  | E2 ${ }^{\circ} \mathrm{E}$ | O25 | 60 ${ }^{\circ} 18$ | $\begin{array}{r}\text { O99 } \\ \hline 15 \\ \hline 15\end{array}$ | cr9 | E0211 | ${ }^{56} 0^{\circ} 0^{\circ}$ | $190^{\circ} 2$ 60.2 | 121 |
| O21 | 000 | 00 120 0 | ${ }_{2 C}^{25} 9$ | ${ }^{* 2}$ | ${ }^{9} 96.04$ | $9{ }_{6} 9.8$ | 851 411 |  | ${ }_{96}^{21} 9$ |  | $\xrightarrow[\substack{98 p \\ 8 \rightarrow p}]{\text { a }}$ | O2：${ }_{0}$ |  | 809 208 | ${ }_{988}^{981}$ | 960.1 49.2 | $63^{\circ} 0^{\circ}$ | cri |
| P11 | $00 \%$ | 22.0 | 29098 | 21.29 | ${ }_{01} 109$ | $4{ }^{\circ}$ | 9e． |  | ～は12\％ | ${ }_{4} 1^{\circ} 18$ | 20\％ | $0^{\circ} \cdot{ }^{\circ} \mathrm{Ent}$ | cos | 984 | 686 |  | ${ }_{20} 20$ | 611 811 |
| 411 | $00^{\circ}$ | $00^{\circ}$ | 19.99 |  | $12^{\circ}{ }^{\circ}{ }^{\text {P }}$ | $99^{\circ} 9$ | $0 \% 1$ | ${ }_{99} 9^{\circ} 0_{12}$ | $10^{\circ} 128$ | $1_{10}{ }^{\circ}$ | EED | $6_{60} 8_{86}$ | 290 | 1140 | ¢ 6 | $)_{-8} 8_{2}$ | ＜2\％${ }^{\text {\％}}$ | 41 |
| 911 | 00\％\％ | $8{ }^{0} 8$ |  |  | C2\％．85 | ${ }_{5}^{22}{ }_{5}^{\circ}{ }^{\circ}$ | ¢6\％ |  |  | ${ }^{\circ 2} 80$ | cos | sE：${ }^{\text {Po }}$ | 105 <br> 185 <br> 15 | 185 | 2601 | $49^{\circ}{ }^{\circ}$ | $95^{\circ} \mathrm{E}$ | 911 |
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| cil | $090^{\circ}$ | $00^{\circ} 1$ | 120．08 | a1．9r | 20．bs | $42^{\circ} 8$ | bal | Ffore |  | 84.28 | 910 | $1<^{\circ} 201$ | ¢99 | 929 | ع＜2！ | 18.2 |  |  |
| 211 | $0^{00} 0^{\circ}$ | $0^{00} 0^{\circ}$ | $00^{\circ} 00^{\circ 8}$ | 20.201 | $8_{2}{ }^{\circ} 0^{\circ} \mathrm{El}$ | $18^{\circ} 9$ | 161 | c． $1^{\circ} 1219$ | $41^{\circ} \cdot 158$ | $20^{\circ}$ | 414 | oesto | ${ }^{* 85}$ | 419 | 5021 | $20^{1} 1$ | $81^{\circ} 1$ | 211 |
| 111 | $00^{\circ} \mathrm{O}$ |  | $00 \cdot 001$ | ${ }^{60} 49$ | ${ }^{60} 40$ | ${ }^{40} 0^{\circ} 8$ | $\square \square_{1} 1$ | $0_{0} 0.984$ | 30.485 | ＋2．98 | 149 | $00^{1} 16$ | $2{ }^{265}$ | $<99$ | ${ }_{6} \chi^{2} 1$ | $1 E^{\circ} \mathrm{C}$ | $18 \cdot 2$ | 111 |
| 911 | ${ }_{00}^{00} 0^{\circ}$ | $55^{50} 0^{\circ}$ | $00^{\circ} 9001$ | ${ }_{18.19}{ }^{9.59}$ | 29．59 | ${ }^{016}{ }^{\circ}$ | 88.1 | $5 ¢ 0$ | $55^{\circ} 5.545$ | $52^{\circ} 68$ | 280 | ${ }^{\circ} \mathrm{E}$ ¢ ${ }^{\text {co }}$ | ${ }^{\text {cos }}$ |  | 8221 | $\mathrm{El}^{\circ} \mathrm{z}$ | E1＇z | 011 |
| 801 | 000 | 9 | ${ }_{05} 5^{\circ} \times 8$ | ${ }_{85}{ }^{\text {\％}}$－ | $56 \cdot{ }^{\text {b }}$ | ${ }^{92} 0^{\circ} \mathrm{C}$ | ${ }^{6} 91$ | n¢． 128 |  |  | 122 | Ei．g\％ | cos | 198 | 049 | $6^{\circ}{ }^{\circ}$ | $80^{\circ} 1$ | 601 |
| 201 | $00^{\circ}$ | $00^{\circ}$ | $0_{0} 0001$ | ${ }_{\sim 2}{ }^{\circ} 9$ | ${ }^{26} 2^{9} \mathrm{~s}$ | 88.9 | 02.1 | ${ }_{70 \% 69}$ | 20.658 | 91.98 |  | ${ }_{10}$ | $\stackrel{\sim 2}{*}$ | sce $26 \varepsilon$ | 899 992 | ${ }^{60} 0_{0} 0^{2}$ | ${ }_{80} 0^{\circ} 0^{\circ}$ | 801 201 |
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| OgSt | Total | PESIO． <br> ENTiAL AREA | total | Mate | FE：ALE | $\begin{aligned} & \text { F'". } \\ & \text { sEx } \\ & \text { FAT10 } \end{aligned}$ | MLHzER <br> と候品 －-D | $\begin{array}{r} \text { EEKCLIT } \\ \text { ELOY } \\ \text {-ED } \end{array}$ | $\begin{aligned} & \text { IEI } \\ & \text { POH. } \\ & P O \Delta C R E \end{aligned}$ | $\begin{aligned} & \text { GROSS } \\ & \text { POP, } \\ & \text { POACKE } \end{aligned}$ | NUNBER <br> UCC． HuUSES | $\begin{aligned} & \text { INHAH. } \\ & \text { MER } \\ & \text { HQUSE } \end{aligned}$ | $\begin{gathered} \text { MET } \\ H \cup U S E S \\ P O A C R E \end{gathered}$ | GRoSs hoUSES P．ACRE | $\begin{aligned} & \text { PEFCENT } \\ & \text { RESID } \\ & \text { ENTIAL } \end{aligned}$ |  | HoUSE COHSTR fate |  |
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| 201 | 1.78 | 1．79 | 1377 | 6.1 | 69\％ | 102．20 | 044 | 32.53 | 774.47 | 774．1！ | 177 | 7.78 | 100.67 | 100.67 | 100.00 | 1.13 | 0.00 | 201 |
| 202 | 2.31 | 2.31 | 1589 | 794 | H05 | 102．38 | 8 531 | 33.42 | $6 \times 7.16$ | 681．40 | 162 | 9.0 Hi | 73.98 | 73.98 | 100．00 | 5.50 | 0.00 | 202 |
| 203 | 1.60 | 1.65 | 1248 | 643 | 605 | 21．09 | 376 | 30.13 | 779．90 | 779．90 | 117 | 7.05 | 110.61 | 110.61 | 100．00 | 0.00 | 0.00 | 203 |
| 204 | 2.49 | 2.31 | 56， | 283 | 270 | 94．59 | 278 | 49.47 | 243．14 | 225．7in | 85 | 6.61 | 37.64 | 34.93 | 92.86 | 2.35 | 0.00 | 204 |
| 205 | 3.73 | 3．20 | 931 | 512 | 410 | 81.04 | 446 | 47.01 | 290.90 | 249.34 | 156 | 5.97 | 50.62 | 43.39 | 85.71 | 3．85 | 3.70 | 205 |
| 206 | 2.13 | 1.78 | 767 | 395 | 372 | 94.18 | 27H | 35.25 | 431.38 | 359.45 | 128 | 5.99 | 73.68 | 61.40 | 83.33 | 2.34 | 0.00 | 205 |
| 207 | 1.42 | 1.42 | 740 | 378 | 362 | 95.77 | 7252 | 14.05 | 500．23 | 9＜0．20 | 104 | 7.12 | 73.82 | 73.82 | 100．00 | 0.96 | 27.62 | 207 |
| 208 | 3.56 | 2.49 | 1307 | 652 | 65 | 103．41， | 122 | 32.29 | $5<5.07$ | 367．55 | 188 | 6.95 | 77.94 | 54.56 | 71.00 | 3.19 | 0.00 | 208 |
| 209 | 7.65 | 1.78 | 691 | 353 | 33 B | 95．75 | 5264 | 38． 21 | 3¢8．64 | 90．3i） | 89 | 7.76 | 51．18 | 11.90 | 23.26 | 2.25 | 0.00 | $20 \%$ |
| 210 | 3.56 | 0.71 | 971 | 466 | 505 | 108.37 | 7 378 | 38．93 | 1365．30 | 273.05 | 132 | 7.36 | 188.41 | 37.68 | 20.00 | 1.52 | 0.00 | 210 |
| 211 | 3.91 | 2.13 | 1509 | 761 | 748 | 08.29 | 9 3ヶ | 25.31 | 707．26 | 385．70 | 145 | 7.74 | 91.86 | 50.11 | 54.55 | 0.51 | 0.00 | 211 |
| 212 | 2.31 | 1.07 | 947 | 492 | 455 | 92.48 | 840 | 35.90 | 807.70 | 409．7！ | 149 | 6.36 | 143．42 | 66.19 | 46.15 | 2.60 | 1.31 | 212 |
| 213 | 2.84 | 1.96 | 764 | 382 | $3 \mathrm{H}^{2}$ | 100．00 | 297 | 38．87 | 390．43 | 208.50 | 119 | 6.42 | 63.40 | 43.54 | 68.75 | 4.20 | 0.00 | 213 |
| 214 | 1，96 | 1.96 | 1166 | 585 | $n 01$ | 106.37 | 7598 | 51．29 | 597．10 | 596．10 | 140 | 8.33 | 72.60 | 72.50 | 100.00 | 1.43 | 0.00 | 214 |
| 215 | 2.47 | 1.42 | 1380 | 713 | 667 | 93.55 | 553 | 40.07 | 970.19 | 354．37 | 145 | 9.52 | 101.94 | 58.25 | 57.14 | 0.00 | 0.00 | 215 |
| 216 | 14.94 | 3.02 | 822 | 447 | 375 | 83，89 | $9 \quad 340$ | 41.30 | 271.95 | 55， $0=$ | 122 | 6.74 | 40.36 | 8.17 | 20.24 | 0.00 | 0.82 | 216 |
| 217 | 2.49 | 1.22 | 653 | 349 | 314 | 80.77 | 7220 | 33.18 | 532.70 | 266.35 | 114 | 5.82 | 91.60 | 45.80 | 50.00 | 0.00 | 0.00 | 217 |
| 210 | 1.96 | 1.42 | 1219 | 587 | 632 | 107．57 | 7327 | 26.83 | ¢57．00 | 623.21 | 155 | 7.86 | 108.97 | 79.25 | 72.73 | 0.00 | 0.00 | 218 |
| 219 | 16．71 | 2.13 | 805 | 394 | 411 | 104．31 | 1319 | 39.63 | 377.30 | $48.1 \%$ | 136 | 5.92 | 67．02 | 8.56 | 12.77 | 5.15 | 0,00 | 210 |
| 220 | 15.11 | 7.29 | 1407 | 897 | 710 | 101．87 | 7711 | 30.53 | 193.01 | 93.10 | 181 | 7.77 | 24.83 | 11.98 | 48.24 | 0.00 | 0.00 | 220 |
| 221 | 3.56 | 1.70 | 1406 | 886 | 600 | 67.72 | 2641 | 43.14 | 835.77 | 417.84 | 167 | 8.90 | 25.61 | 47.81 | \＄0．00 |  | 0.00 | 221 |
| 222 | 14.40 | 1.96 | 863 | 418 | 445 | 106．46 | 348 | 40，32 | 441：25 | 59.92 | 136 | 6.35 | 69.54 | 9.44 | 13．53 | 0，00 | 0.00 | 222 |
| 223 | 1.42 | 1.42 | 1043 | 534 | son | 05，32 | 231 | 34.61 | 733.27 | 733.21 | 134 | 7.78 | 95.61 | 95.61 | 100.00 | 1.49 | 0.00 | 223 |
| 224 | 3.56 | 1.07 | 924 | 468 | 456 | 97.44 | 4317 | 34．31 | 806．14 | 259．0］ | 144 | 6.42 | 135.92 | 40.78 | 30．00 | 0.69 | 0.00 | 224 |
|  | 117.80 | 19.25 | 25181 | 12840 | 12341 | 96.11 | 19430 | 37．43 | 511.28 | 213．6！ | 3435 | 7.33 | 70.92 | 29.63 | 41．78 | 1.69 | 1.09 |  |


|  | $98^{\circ} 0$ | 22＊9 | 96＊ 4 | $\triangle E^{\circ} O E$ | －5＊0 | $16^{\circ} 5$ | 6918 | A1＊A91 |  | c．1＊ 2 | Ec48 | ＊S＊ 211 | 5260 | 9188 | $1+281$ | $E 0^{\circ} \varepsilon^{8}$ | ［＜011 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 612 | $00^{\circ} 0$ | $50^{\circ} 12$ | $59^{\circ} 0^{\circ}$ | $70^{\circ} \mathrm{s}$ | So＇IE | $6 E^{\circ} 9$ | ¢11 | $00^{\circ} \mathrm{ZE} 1$ | Q2＊E91 | $96^{\circ} 05$ | 12 E | 190911 | $z^{6} \varepsilon$ |  |  |  |  |  |
| 916 | $89{ }^{\circ}$ | 10.5 | $00^{\circ} 001$ | $90^{\circ} 1 \%$ | $90^{\circ} 1$ | $9 E^{\circ} \mathrm{S}$ | 6Et | ${ }^{\circ} \mathrm{S} 602$ | 150602 | 96 <br> $69^{\circ} \mathrm{C}$ | 128 $00 \%$ | 29 50 0 111 | $26 E$ 168 | 9EE LSE | 224 $5 \% 1$ | 76 $95^{\circ} \mathrm{C}$ | $15^{\circ} 5$ $95^{\circ} \mathrm{E}$ | 615 818 |
| $41 E$ | $00^{\circ} 0$ | $\vdash \nabla^{*} \downarrow 2$ | $*^{*}+6$ | $6 z^{\circ} 92$ | $6 L^{\circ} \mathrm{LZ}$ | $61^{\circ} \mathrm{L}$ | SEI | ${ }_{6} 5^{\circ} 151$ | $90^{\circ} 091$ | $20^{\circ}+5$ | 075 | L＊＊） | 425 | ¢ | $0<6$ | $50^{\circ} 9$ | $\begin{array}{r}95 \\ 0 \% \\ \hline 8\end{array}$ | Q18 Lic |
| 91 C | $00^{\circ} 0$ | $\cup^{\circ} 0^{\circ} 1$ | $10^{\circ} 62$ | $60^{\circ} 8$ | $\angle 8^{\circ} 8$ | $\rightarrow \varepsilon^{\circ} 2$ | 621 | 22\％ 25 | $\rightarrow 5^{\circ}<11$ | 6E＊8 6 | ESS | 20.08 | 4V\％ | 105 | 246 | 50.9 $E E$ | $0 * 9$ $* 1 * 91$ | LIE 91E |
| Sic | $00 \%$ | $10^{\circ} \mathrm{E}$ ！ | ${ }^{6} E^{\circ} 8$ | $09^{\circ} 51$ | $52 * 2 \varepsilon$ | 016 | 151 | $\mathrm{OS}^{\circ} \mathrm{CL}$ | $5 \varepsilon^{\circ} \mathrm{Z}^{9} 1$ | $10^{\circ} \mathrm{EG}$ | $99 \%$ | 61.901 | 980 | 027 | 998 | EE＊S | $20^{\circ} 11$ | ¢1E |
| 1 lc | $00^{\circ} 0$ | $09^{\circ} 01$ | $00 \cdot 001$ | 80 $0^{\circ} \mathrm{OH} 1$ | $86^{\circ} 6+1$ | $9 p^{\circ} 9$ | Liz | $39^{\circ} 9<8$ | $25^{\circ} 519$ | $36 \cdot \mathrm{ED}$ | 419 | 48．101 | LOL | ＋69 | 1001 | 09\％1 | 209\％1 | ¢1E |
| CIE | $00^{\circ} 0$ | 2 ${ }^{\circ} \mathrm{E}$ | $00^{\circ} 001$ | － $0^{\circ} 92$ | $6 \checkmark^{\circ} 92$ | $00^{*} 9$ | 1EI | nc ${ }^{\circ} \mathrm{LLb}$ | $36^{\circ} \mathrm{LLD}$ | $12^{\circ}$ | ¢9\％ | $50^{\circ} 011$ | c．9\％ | 9 FE | 688 | $8_{2}{ }^{\circ} 1$ | 810 | Eic |
| 215 | $82^{\circ} 1$ | $00^{\circ} 1$ | $00^{\circ} 001$ | $\angle E^{\circ} \mathrm{E} 9$ | LE＇EG | $49^{\circ} 9$ | $\angle 91$ | ociege | As ${ }^{\circ} \mathrm{EGE}$ | $r .9{ }^{\circ} \mathrm{E}$ ¢ | 49E | $98^{\circ} \mathrm{ZO1}$ | 146 | 998 | ct6 | $\angle 4^{\circ} 2$ | $19^{\circ} 2$ | CiE |
| 115 | $00^{\circ} 0$ | $00^{\circ} 0$ | $05^{\circ} 29$ | $91^{\circ} 62$ | $89^{\circ} 9$ | $G_{2}{ }^{\circ}$ | 991 | ＞E EM： | $1 c^{*}$ Éz | 210\％ | 950 | $96^{\circ} 001$ | －25 | 615 | E®OI | $99^{\circ} \mathrm{E}$ | $69^{\circ} \mathrm{S}$ | 118 |
| 015 | $00 \%$ | $69^{\circ} 1$ | $69^{\circ} \mathrm{E} 9$ | $69^{\circ} \mathrm{LE}$ | $\mathrm{ECO}_{5}$ | $61^{\circ} 5$ | LEZ | is＊ 12 | G1＊Sf．E | $42^{\circ} 05$ | 069 | －0．001 | －1L | －59 | E＜E1 | $60^{\circ}$ |  | O1E |
| ${ }^{6} 08$ | $00^{\circ} 0$ | $0^{\circ} 2^{\circ} \mathrm{E}$ | $00^{\circ} 001$ | く $0^{\circ} 9$ | くッ＊${ }^{\circ}$ | $02^{\circ} \mathrm{G}$ | 2G1 | $41^{\circ}+\varepsilon z$ | $51^{\circ} \mathrm{ycz}$ | $59^{\circ} 9$ | 64 E | Es sil | － 2 | $\angle 9 E$ | 162 | $4 c^{\circ}{ }^{\circ}$ | $\begin{aligned} & 0 t^{\circ} 9 \\ & 9 \mathrm{C}^{\circ} \mathrm{C} \end{aligned}$ | 015 608 |
| $8 O E$ $\angle O E$ | $00^{\circ} 0$ | $\nabla 0^{\circ} \mathrm{El}$ | $0^{\circ} 18$ | $00^{\circ} 12$ | くを＊ゆて | $6 E^{\circ} 9$ | QEI | タ6\％ 21 | $00^{\circ} \mathrm{Lrl}$ | く1＊${ }^{\circ}$ | 916 | 2E．くて1 | \％O\％ | SEE | 288 | $00^{-9}$ | $62^{\circ} \mathrm{L}$ | cuc |
| $\angle O E$ GOE | $02^{\circ} 1$ | $09^{\circ} 0$ | $00^{\circ} \mathrm{OOR}$ 1 |  | $\rightarrow 2^{\circ}<{ }^{\circ}$ | $60^{\circ}$ 909 | 491 | $10^{\circ} 162$ | $1 \mathrm{H}^{\circ} \mathrm{LEz}$ | $00^{\circ} \mathrm{So}$ | EIt | $40^{\circ} 021$ | 205 | 510 | 416 | $95^{\circ} \mathrm{C}$ | $95^{\circ} \mathrm{E}$ | LOE |
| SOE | 500 $0^{\circ}$ | $122^{\circ} \mathrm{E}$ | E2004 | $n 2^{\circ} 92$ $r .2009$ | $\bigcirc 0^{\circ} \mathrm{LE}$ | $99^{\circ} 5$ $6 \varepsilon^{\circ}$ | 591 602 | なぐEも | $520 c c z$ $84.6 L$ | \％ $0^{\circ} 5$ | $2<0$ | $41^{\circ} 021$ | $2<5$ | 940 | 8301 | $71^{\circ} 5$ | $62^{\circ} 2$ | 908 |
| TOE | $00^{\circ} 0$ | $10^{\circ} 1$ | $00^{\circ} 001$ | $\angle E^{\circ} \mathrm{O}$ | $\angle E^{\circ} O$ | $\rightarrow 6.5$ | 661 |  | E． $0^{\circ}$ Le | $90^{\circ} \mathrm{c}$ | $0<0$ 605 | $10^{\circ} \mathrm{O} 11$ | S\％ |  | ＋601 | $16^{\circ} \mathrm{E}$ | $12^{\circ}$ | $50 \%$ |
| COE | $00^{\circ} 0$ | 21＊1 | $00^{\circ} \mathrm{O} 01$ | $11^{\circ} \mathrm{OE}$ | $41^{\circ}$ OE | 2009 | 011 | $16^{\circ} 161$ | $16^{\circ} 161$ | VE＊EV | 880 | $20^{\circ} \mathrm{L21}$ | GE9 | gep | 421 | $16^{\circ}$ |  | OOE |
| 208 | $00^{\circ} 0$ | ＊9＊＊ | $00^{\circ} 001$ | Cs ${ }^{\circ} \mathrm{SE}$ | $5 s^{\circ} 5^{\circ}$ | $00^{\circ} \mathrm{S}$ | 141 | －\％E61 |  | $46^{\circ} \mathrm{E}$ | $8<8$ | $40^{\circ} 011$ | いc\％ | lop | 098 | 20 |  | Eこと |
| 10E | $00^{\circ} 0$ | $61^{\circ} 1$ | $00^{\circ} 001$ | 790\％ | 99＊マ | $18^{\circ} \mathrm{C}$ | H91 | $\dot{C} L^{\circ} 0 \times 1$ | ¢10は） | 20＊て | 110 | ¢0＊sil | ع25 | ES\％ | 916 | 16 $6^{\circ}{ }^{\circ}$ | 16\％9 | 20E IJE |
| 1218 | $\begin{aligned} & 3 \& y \\ & 415: 00 \end{aligned}$ | $\begin{gathered} 7 \perp \forall y \\ x ว y \vee J y \end{gathered}$ | $\begin{array}{r} 781143 \\ 0153 y \end{array}$ | $\begin{aligned} & 3 \times 3 r^{\circ} d \\ & \text { S3snoti } \end{aligned}$ | $\begin{aligned} & 3 y 9 y_{0}^{\circ} d \\ & 5.15 n c i n \end{aligned}$ | $\begin{gathered} 3 \sin _{n} h \\ n \neq H \end{gathered}$ | $\begin{gathered} \operatorname{sisn} 0_{H} \\ 270 \end{gathered}$ | $\begin{aligned} & \text { } \begin{array}{l} \text { it } 3 V^{4} \\ . \mathrm{dO}_{4} \end{array} \end{aligned}$ | $\begin{gathered} \exists: J v^{\circ} d \\ 4 \alpha d \end{gathered}$ | 17＊ $107 \mathrm{di} \cdot \mathrm{~J}$ | $\begin{aligned} & 03^{\circ} \\ & 107 \text { d. } \end{aligned}$ | $\begin{array}{r} u 117 c \\ \times \neq 5 \end{array}$ |  | 37ワ์ | ${ }^{-1} 0^{d}$ | $\begin{aligned} & 5387 \\ & 781113 \end{aligned}$ | $\forall 3 y Y$ | 1218 |
| 1510 | $35 i 10 \mathrm{M}$ |  | 1473 ¢3d | 5sox0 | $1^{\frac{1}{1}}$ 。 | －HVn＇」！ | － 78.10 n | 55045 | 13 | 11.73 .43 |  | －$\cdot 11$ | ¥7v．jı |  |  |  |  | $15: 0$ |


|  | 2E＊ | $29^{\circ} 2$ | $15^{\circ} 06$ | $42^{\circ} 9$ | $96^{* 9} \varepsilon$ | 019 | 260E | 49 ${ }^{\circ} 602$ | c． 18.2 | $92^{\circ} 0$ | －6， 6 | $10^{\circ} 601$ | $55 * 0$ | 2006 | 29821 | $E \vdash^{*}{ }^{8}$ | $26^{\circ 68}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| LEE | $00^{*} 0$ | $80^{\circ} \mathrm{E}$ | $00^{\circ} 001$ | $25^{\circ} \mathrm{CL}$ | $25^{\circ} \varepsilon_{L}$ | $0<^{\circ} 5$ | 911 | $56^{\circ} 200$ | －6020r | －6＊2E | OCE | $99^{\circ} \mathrm{LO1}$ | 025 | Eタヶ | cool | $69^{\circ} 2$ | $69^{\circ} \mathrm{z}$ | LEE |
| 9 CE | $50^{\circ} \mathrm{E}$ | $64^{\circ} 9$ | 00.001 | $7 \varepsilon^{\circ} 85$ | $2 \varepsilon^{\circ} 85$ | 00.4 | 581 | 190\％ 2 | $18^{\circ} \mathrm{ELZ}$ | $90^{\circ} \mathrm{t}$ | 20\％ | $00^{\circ} \mathrm{LOL}$ | 4 46 | 9\％\％ | 526 | ${ }^{8} \varepsilon^{\circ} \varepsilon$ | $8 \varepsilon^{4} \varepsilon$ | 9EE |
| SCE | $00^{\circ} \mathrm{O}$ | $9 E^{\circ} 1$ | $12^{\circ} 88$ | $98^{\circ} 6$ | L1＊ 1 | $15^{\circ} 9$ | L\％1 | $>\varepsilon^{\circ} \mathrm{E}$ ． 9 | L14 | $98^{\circ} 0$ | 16 E | G6＊EE1 | ＊ 4 | 6 gr | 456 | $\varepsilon \varepsilon^{*} \varepsilon!$ | $11^{\circ} 51$ | SEE |
| PEE | $01^{\circ} \mathrm{z}$ | $19^{\circ} \mathrm{Z}$ | 62＊6 | －$<^{\circ}+1$ | $65^{\circ} 51$ | $8 \square^{*}$ | $8<1$ | $\rightarrow{ }^{\circ} \mathrm{HL}$ | $11^{\circ} \mathrm{c}$ | ع6\％9\％ | Qs\％ | SL＇CE！ | 295 | －1\％ | 946 | EL＊ 1 | らザで | ¢عE |
| CCE | $00^{\circ} 0$ | EE＊ | $61^{\circ} 26$ | L0．61 | $69^{\circ} 02$ | 28．9 | 802 | －く＊って1 | L2＊5F1 | $66^{\circ} \angle 0$ | 189 | OS＊ HzI | $4{ }^{4}$ | 129 | $61+1$ | $60^{\circ} 01$ | $8 E^{\circ} 11$ | EEE |
| 2EC | $20^{\circ} 2$ | $\varepsilon \varepsilon^{\circ} \varepsilon$ | $00^{\circ} 56$ | $18^{\circ} \downarrow$ ¢ | 14＊9E | R2＊9 | 021 | $60^{\circ} 217$ | 02＊ 272 | G6＊Or | 60 c | $66^{\circ} \mathrm{VOI}$ | 4HE | 848 | FGL | Ece $\underbrace{\circ}$ | $95^{\circ} \mathrm{E}$ | 2E\＆ |
| 1EE | $00^{\circ} 0$ | $77^{\circ} 0$ | $10^{\circ} 0^{\circ}$ | GE Ot | Eが吅 | $90^{\circ} \mathrm{G}$ | LG1 | 大0＇612 | On 142 | 29＊5 | 168 | ぐャ6 | 418 | $0 \%$ | 458 | $55^{\circ} \mathrm{E}$ | $16^{\circ} \mathrm{E}$ | 1¢ $ع$ |
| OCE | $00^{\circ} \mathrm{C}$ | c0 ${ }^{\circ} \mathrm{O}$ | $00^{\circ} 001$ | Cl $\square^{\circ} \mathrm{E} 6$ | $50^{\circ} \mathrm{C} 6$ | 5．4＊5 | ＋12 | ！2＊214 | －2＊215 | L6＇s¢ | 020 | $25^{\circ} 26$ | 095 | 519 | －811 | $1 \varepsilon^{*}$ z | $1 \varepsilon^{\circ} \mathrm{Z}$ | OEE |
| 628 | $00^{\circ} 2$ | E200 | 06\％19 | 9609\％ | $01^{\circ} 65$ | C209 | LEI | －¢＊9ヵて | Gu＊Hete | $10^{\circ} \mathrm{Z}$ | 16 c | － $0^{\circ} \mathrm{EOL}$ | 498 | $\checkmark 5 \%$ | 226 | $1 \varepsilon^{\circ}$ 2 | EL＊$\underbrace{\text { ¢ }}$ | OZE |
| 828 | $00^{\circ} 0$ | $00^{\circ} 0$ | $00^{\circ} 001$ | $61^{\circ} 51$ | 6105L | $29^{\circ} 9$ | E¢2 | 520120 | c2＊120 | ¢゙で | $\square 09$ | Et＇ti | cr 2 | － 29 | とで！ | $8 \varepsilon^{*} \varepsilon$ | $8 \varepsilon^{\circ} \mathrm{E}$ | B2E |
| $12 E$ $92 E$ | $05^{\circ} 0$ 000 | $10^{\circ} \mathrm{C}$ | $\rightarrow 208$ | $79^{\circ} \mathrm{O}$ | $E \nabla^{\circ} \mathrm{ES}$ $68 \cdot 85$ | $80^{\circ} 5$ | 991 | $99^{\circ} \varepsilon^{\circ} \mathrm{C}$ | 96\％Arie | 2806E | cec | $0^{\circ} 0^{\circ} 00$ | cty | 16\％ | 266 | $02^{\circ} \mathrm{E}$ |  | L2E |
| 928 528 | $00^{\circ} 0$ | $71^{\circ} 1$ | ＊＊＊6 | $79^{\circ} 55$ | $68^{\circ 85}$ | $\rightarrow \varepsilon^{\circ}$ | 921 | へ10\％0t | $50^{\circ} 270$ | $90^{*} \mathrm{P}$ ¢ | $0 \rightarrow 6$ | $90^{\circ} 001$ | 029 | 819 | 2621 | $20^{\circ} \mathrm{E}$ | OでE | ¢ 2 E |
| S2E $+2 E$ | $500^{\circ} 0$ | $86^{6} 6^{\circ} \mathrm{Z}$ | $00^{\circ} 001$ 000 | 18909 4895 | 18009 48.95 | 0209 26.9 | 891 |  | 1H＊Seg | $90 \cdot 98$ 80.10 | 980 280 | 25＊＊01 | 485 505 | 085 $\angle 95$ | 9211 | ${ }^{+2} 2^{\circ}$ | －8 ${ }^{\circ}$ | ¢2E |
|  | 000\％ | $\begin{aligned} & 95^{\circ} 0 \\ & 00^{\circ} 0 \end{aligned}$ | $\begin{gathered} E z 0^{\circ} 69 \\ 8 y^{\circ} 10 \end{gathered}$ | 7 $75^{\circ}<2$ | 98.111 $20^{\circ} 96$ | 810 8.5 | 81 081 |  |  |  | 2815 615 615 | 50.801 $49^{\circ} 901$ 00001 | 565 459 $66 \%$ | 295 519 868 | 2411 1221 966 | $02^{\circ} \mathrm{C}$ $09{ }^{\circ} 1$ $16^{\circ}$ | $02^{\circ} \mathrm{E}$ $1 \varepsilon^{\circ} \mathrm{Z}$ | E2E cze |
| $\begin{aligned} & 12 \varepsilon \\ & 0 \geq \varepsilon \end{aligned}$ |  | $00 \% 9$ 9400 |  | $92^{\circ}<\mathrm{LE}$ $6^{\circ} \mathrm{OE}$ | $11^{\circ}{ }^{\circ} \mathrm{O}$ $5 \varepsilon^{\circ} \mathrm{S}$ |  | 091 181 |  | 17 90 0 | $10^{\circ} 67$ 9100 | b 42 208. | \％ 14.911 1411 | 198 158 | Q6E OSE | $\begin{aligned} & 460 \\ & 298 \\ & 102 \end{aligned}$ | $\begin{aligned} & 16^{\circ} \varepsilon \\ & 95^{\circ} \varepsilon \\ & E L^{\circ} \varepsilon \end{aligned}$ | $\begin{aligned} & 08^{\circ} \\ & \angle 2^{\circ} \\ & \angle 2^{\circ} \end{aligned}$ | $\begin{aligned} & 22 E \\ & 12 E \\ & O 2 E \end{aligned}$ |
| 1218 1510 | $\begin{aligned} & 3178 \\ & 115803 \\ & 35 n 0 \mathrm{H} \end{aligned}$ | $\begin{gathered} 7188 \\ 1.3!1 \% J 8 \wedge \end{gathered}$ | $\begin{aligned} & \text { 7rilin } \\ & 01534 \\ & 1430404 \end{aligned}$ | $\begin{aligned} & 3 y כ \mathrm{Y} \cdot \mathrm{~d} \\ & \text { S } 3 \mathrm{SnOH} \\ & \text { SSOHD } \end{aligned}$ |  |  | $\begin{gathered} 57 \mathrm{snOH}_{4} \\ 930 n \\ \text { a } 3 \text { HinN } \end{gathered}$ |  | $\begin{gathered} 7+y_{0} \cdot d \\ \bullet \text { dud }^{2} \\ 17: \end{gathered}$ | 07－ <br> 107d． 9 <br> よッフコンタa | 07－ <br> 107（1） <br> 上7竍行。 | $\begin{aligned} & 01 \& 74 \\ & \times \geq 5 \\ & \because 1 \end{aligned}$ | 178．14 | 37814 | $\begin{aligned} & . d 000 \\ & 7 \times 101 \end{aligned}$ | Yay <br> 7ッ114？ <br> －－1s sa | Var $7+1 C_{1}$ | 1314 1510 |

$\begin{array}{rr}m & m \\ m & m \\ m & 0 \\ m & 0 \\ m & 0\end{array}$
$\begin{array}{ll}0 \\ 0 \\ 0 \\ 0 & -1 \\ 0 \\ 5\end{array}$

7

$\square$


MALE SEX ENPLOY CPROY
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bit
GHOSS NJIHER IMHAH NET GROSS PEFCET,T
HOUSE DIST

| 414 | 4.62 | 4.08 | $88 \%$ | 379 | 501 | 132.19 | 441 | 50.43 | 215.19 | 190.36 | 186 | 5.30 | 40.59 | 35.91 | 88.46 | 0.00 | 0.00 | 414 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 415 | 3.73 | 3.73 | 1310 | 618 | 607 | 111.97 | 324 | 40.00 | 350.05 | 350.45 | 194 | 6.73 | 52.49 | 52.49 | 100.00 | 1.03 | 0.00 | 415 |
| 416 | 4.09 | 4.09 | 1032 | 530 | 502 | 04.72 | 382 | 37.02 | 2.32 .36 | 232.30 | 184 | 5.61 | 45.97 | 45.97 | 100.00 | 2.17 | 7.45 | 416 |
| 417 | 6.22 | 5.87 | 1394 | 626 | 758 | 121.09 | 653 | 47.10 | 235.88 | 222.40 | 211 | 6.56 | 36.13 | 34.07 | 94.29 | 0.47 | 0.00 | 417 |
| 418 | 13.33 | 3.02 | 1171 | 548 | 623 | 1:3.64 | 4\%6 | 41.56 | 3.7.41 | 87. H ! | 201 | 5.43 | 68.48 | 15.52 | 22.67 | 2.99 | 0.97 | 415 |
| 419 | 5.51 | 5.51 | 1129 | 535 | 503 | 110.84 | 4-1 | 42.64 | 241.63 | 204.65 | 202 | 5.58 | 37.92 | 37.92 | 100.00 | 3.47 | 0.00 | 419 |
| 420 | 8.89 | 7.65 | 1220 | 56b | 6ta | 117.52 | 465 | 37.84 | 160.75 | 138.25 | 212 | 5.80 | 29.43 | 25.31 | 86.00 | 6.13 | 2.67 | 420 |
| 421 | 15.47 | 4.55 | 545 | 369 | 476 | 120.70 | 143 | 47.69 | 99.01 | 54.65 | 154 | 3.49 | 18.75 | 10.34 | 55.17 | 3.80 | 11.25 | 421 |
| 422 | 11.91 | 7.11 | 821 | 325 | 493 | 152.42 | 474 | 60.17 | 113.44 | 68.94 | 149 | 3.51 | 22.08 | 13.10 | 59.70 | 5.37 | 5.10 | 422 |
| 423 | 3.73 | 2.31 | 1693 | 754 | 930 | 124.34 | 800 | 47.23 | 732.46 | 453.43 | 210 | 8.06 | 91.29 | 56.51 | 61.90 | 0.40 | 0.00 | 423 |
| 424 | 28.63 | 10.49 | 820 | 329 | 401 | 140.24 | 483 | 58.90 | 78.17 | 20.63 | 160 | 5.12 | 15.82 | 5.80 | 36.65 | 3.75 | 0.00 | 424 |
| 425 | 26.85 | 17.96 | 1360 | 552 | 804 | 146.38 | 1029 | 75.68 | 75,73 | 50.60 | 241 | 3.64 | 13.70 | 9.16 | 66.89 | 2.07 | 6.01 | 425 |
| 426 | 28.09 | 6.76 | 1114 | 470 | 614 | 137.02 | 522 | 46.86 | 164.88 | 39.6. | 185 | 6.02 | 28.12 | 6.76 | 24.05 | 2.70 | 3.68 | 426 |
| 427 | 15.16 | 7.11 | 885 | 330 | 555 | 158.18 | 462 | 32.20 | 124.44 | 67.20 | 145 | 6.10 | 20.81 | 11.23 | 54.05 | 2.07 | 6.08 | 427 |
|  | 174.24 | 94.23 | 15672 | 6930 | 8742 | 126.15 | 7628 | $4 \pi .67$ | 166.31 | 89.94 | 2614 | 6.00 | 28.45 | 15.34 | 54.08 | 2.56 | 3.02 |  |


| DIST | TOTAL | $\begin{aligned} & \text { DESID- } \\ & \text { E.TIAL } \\ & \text { AREA } \end{aligned}$ | total PcP. | MALE | Firiolf | $\begin{aligned} & \text { Bi: } \\ & \text { SEX } \\ & \text { RATIO } \end{aligned}$ | $\begin{array}{r} \text { MBNQRK } \\ \text { LiPLOY } \\ -E D \end{array}$ | $\begin{gathered} \text { FLFCLHT } \\ \text { C•FLOT } \\ -6.1 \end{gathered}$ | Rit POP PACRE | $\begin{array}{r} G R_{0} S S \\ \text { POF } \\ \text { P.ACRE } \end{array}$ | NUMBER UCL. huUSES | $\begin{aligned} & \text { IWHAB. } \\ & \text { HEK } \\ & \text { HUUSE } \end{aligned}$ | lie't HCUSES F.ACKE | GFOSS HoUSES P.ACRE | $\begin{aligned} & \text { PFRCFNT } \\ & \text { RESID } \\ & \text { ENTIAL } \end{aligned}$ | $\begin{aligned} & \text { VACAIICY } \\ & \text { RATE } \end{aligned}$ | $\begin{array}{r} \text { MOUSE } \\ \text { CORSTR } \\ \text { RATE } \end{array}$ | $\begin{aligned} & \text { OIST } \\ & \text { RICT } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 134 | 2.13 | 2.13 | 1120 | 583 | 545 | 93.14 | 458 | 40.65 | 528.68 | 528.60 | 134 | 0.42 | 65.62 | $65.6{ }^{2}$ | 100.00 | 4.4n | 2.86 | 134 |
| $\begin{gathered} 532 \\ 533 \end{gathered}$ | 4.80 2.84 | 3.54 2.84 | 1162 | 556 | 676 | 108.47 | 307 | 43.63 | 326.77 | 242.05 | 191 | 6.08 | 55.96 | 41.45 | 74.07 | 4.19 | 0.50 | 532 533 |
| 535 | 3.38 | 3.02 | 1051 | 542 | 500 | 03.91 | 525 | 49.45 | 347 | 311. | 13 |  |  |  |  |  |  |  |
| 536 | 3.38 | 3.20 | 1486 | 742 | 744 | 100.27 | 700 | 47.111 | 464.32 | 439.80 | 154 | 0.65 | 48 | 46.18 | 04.74 | 1.30 | 14.10 | 535 536 |
| 537 | 3.20 | 2.84 | 870 | $\pm 06$ | 464 | 114.79 | 404 | \$6.44 | 3145.82 | 271.84 | 130 | 5.80 | 64.33 | 57.10 | 88.89 | 22.40 | 0.00 | 536 537 |
| 538 | 4.98 | 3.91 | 950 | 514 | 436 | 84.82 | 428 | 45.05 | 242.87 | 190.85 | 117 | 8.12 | 31.19 | 24.51 | 78.57 | 4.27 | 0.82 | 53 A |
| 539 | 10.67 | 7.65 | 609 | 308 | 301 | 97.73 | 425 | 69.79 | 79.66 | 57.07 | 85 | 7.16 | 13.47 | 9.66 | 71.67 | 21.18 | 6.80 | 539 |
| 540 | 13.51 | 7.47 | 690 | 330 | 360 | 100.09 | 352 | 31.01 | 92.40 | 51.0\% | 45 | 7.26 | 12.72 | 7.03 | 55.26 | 0.00 | 0,00 | 540 |
|  | 48.90 | 36.63 | 9701 | 4977 | 4804 | 96.52 | 461 H | 47.21 | 267.04 | 200.04 | 1247 | 7.84 | 36.28 | 27.10 | 74.91 | 6.50 | 2.63 |  |


| $015 T$ <br> RIC ${ }^{T}$ | TOTAL | $\begin{array}{r} \text { RESID- } \\ \text { E:IIAL } \\ \text { ANEA } \end{array}$ | total FのP。 | Male | fecalt | $\begin{aligned} & \text { F: } \\ & \text { SFX } \\ & \text { WATIn } \end{aligned}$ | $\begin{aligned} & \text { WJMEI:ia } \\ & E!P L O Y \\ & -\mid D D \end{aligned}$ | $\begin{gathered} \text { EtRCLAT } \\ \text { ESPLBY } \\ \text { OEN } \end{gathered}$ | $\begin{aligned} & \ddots t T \\ & P r, P \cdot \\ & \text { POACRE } \end{aligned}$ | $\begin{gathered} G H O S S \\ \text { Po } 0^{\prime \prime} \\ \text { POACKE } \end{gathered}$ | $\begin{aligned} & \text { HHBE: } \\ & \text { UCC } \\ & \text { HUSES } \end{aligned}$ | $\begin{aligned} & \text { IUHAH. } \\ & \text { PER } \\ & \text { HUSE } \end{aligned}$ | $\begin{aligned} & \text { NET } \\ & \text { HUUSES } \\ & \text { FOACRE } \end{aligned}$ | gross HoUSES P．ACKE | $\begin{aligned} & \text { PEECENT } \\ & \text { RESIDV } \\ & \text { E!TIAL } \end{aligned}$ | $\begin{aligned} & \text { YCANCY } \\ & \text { RATE } \end{aligned}$ | $\begin{array}{r} \text { HOUSE } \\ \text { COUSTR } \\ \text { RATE } \end{array}$ | DIST <br> RICT |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 543 | 4.44 | 4.09 | 543 | 253 | 20＇； | 114.82 | 422 | 77．72 | 132.78 | 122.10 | 71 | 7.65 | 19.81 | 18.22 | 92.00 | 14．0 ${ }^{\text {a }}$ | 0.00 | 543 |
| 544 | 3.91 | 1.42 | 545 | 280 | 2．ヶ5 | 94．64 | $2<3$ | 41.29 | 303.16 | 139.33 | 93 | S．H6 | 67.49 | 24.54 | 36.36 | 3.23 | 0.00 | 344 |
| 545 | 7.29 | 3.3 m | 757 | 313 | 41. | 120．70 | 167 | 53.76 | 274.10 | 103．84 | 114 | 0.64 | 34.63 | 16.03 | 46.34 | 2．43 | 0.00 | 545 |
| 546 | 7.82 | 3.73 | 875 | 440 | 435 | 9月，cb | 36.2 | 41.37 | 234.33 | 111．85 | 110 | 7.93 | 30.26 | 14.44 | 47.73 | 2.73 | 0.00 | 346 |
| 547 | 5.51 | 3.13 | 631 | 2 Pb | 345 | 129.33 | 345 | 54.50 | 122．38 | 114.40 | 107 | 5.90 | 22.30 | 20.36 | 93.55 | 7.48 |  |  |
| 540 | 2.34 | 2．13 | 535 | 267 | 260 | 100.75 | 247 | $4 \mathrm{h.}^{0} \mathrm{H}$ | 25：． 22 | 188.41 | 81 | 0.62 | 10.31 | 30.23 | 75.00 | 6.17 | 0.00 | 540 540 |
| 549 | 6.76 | 3.91 | 662 | 335 | 327 | 97．61 | 311 | 46.98 | 109.24 | $97.40{ }^{\text {9 }}$ | 89 | 7.44 | 23.26 | 13.47 | 57.89 | 2.25 | 0.00 | 540 550 |
| 550 | 3.91 | 3.02 | 510 | 231 | 270 | 12＇J．78 | 344 | 47.84 | 15 Ec 73 | 130.30 | 82 | 6.22 | 27.13 | 20.96 | 77.27 | 0.00 | 0.00 | 550 |
| 551 | 2.13 | 2.13 | 473 | 245 | 22月 | 23.06 | 241 | 50．95 | 27.1 .69 | 221.64 | 69 | 6．86 | 32.34 | 32.34 | 100.00 | 0.00 | 0.00 | 551 |
| 552 | 1.24 | 1.24 | 863 | 458 | 410 | 80.52 | 373 | 43.53 | 697.41 | 697．1！ | 69 | 12.58 | 56.24 | 56.24 | 100.00 | 1.45 | 0.00 | 552 |
| 553 | C． 59 | C． 80 | 466 | 210 | 256 | 121.90 | 185 | 39.74 | 524.18 | $324.10^{\circ}$ | 49 | 4.51 | 79.87 | 79．87 | 100．00 | 44.90 | 0.00 | 553 |
| 554 | 4.62 | 3.55 | 841 | 444 | 307 | 80.41 | 360 | 42.81 | 236.50 | 181．4\％ | 76 | 11.07 | 21．37 | 16.44 | 76.92 | ． 00 | 0.00 | 554 |
| 555 | 5.33 | 5.16 | 190 | 101 | 95 | 04.06 | － 107 | 54.59 | 38．01 | 36．75 | 32 | t． 12 | 6.21 | 6.04 | 96.67 | 0.00 | 0.00 | 555 |
| 556 | 2.49 | 2.13 | 48 A | 249 | 230 | 95.9 H | H 229 | 46.93 | 220.72 | 196.13 | 73 | 6.68 | 36.09 | 30.93 | 85.71 | 5.48 | 0.00 | 556 |
| 557 | 3.38 | 2.67 | 612 | 312 | 300 | 06.15 | 312 | 50.98 | 229.47 | 181.10 | 81 | 7.56 | 31.50 | 24.87 | 78.95 | 3.70 | 0.00 | 557 |
|  | 02.59 | 44.63 | 9003 | 4454 | 4540 | 102．13 | 34375 | 48.58 | 201.74 | 143．43 | 1196 | 7.53 | 28.23 | 20.13 | 71.31 | 5.35 | 0.00 |  |


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| 1314 1510 | $\begin{aligned} & 31 \mathrm{Yy} \\ & 815+103 \\ & 35: 10_{H} \end{aligned}$ |  | $\begin{aligned} & 3 y 3 Y^{\circ} \mathrm{d} \\ & \text { S } 3 \mathrm{SnOH} \\ & \text { SSOy } \end{aligned}$ | $\begin{gathered} 343 y^{\circ} \mathrm{d} \\ 53507 \mathrm{~h} \\ 131 \end{gathered}$ | $\begin{aligned} & 35 n_{0 H} \\ & 874 \\ & 0.18401 \end{aligned}$ |  | $\begin{aligned} & \text { zajv*d } \\ & \text { 40d } \\ & \text { ssong } \end{aligned}$ | $\begin{gathered} \text { 7y } 7 V_{0} d \end{gathered}$ | 17－ <br> 407d：3 <br> 1：3041t | $\begin{aligned} & 07 * \\ & \text { 207d, } \end{aligned}$ M juwnt | $\begin{gathered} i I_{\perp} \forall x \\ x .15 \end{gathered}$ |  | 378： | ${ }^{4} 0_{d}$ <br> $1+501$ | $\begin{aligned} & \text { Y 3yt } \\ & \text { 7४11:3 } \end{aligned}$ - CISEx | $\forall 3 i r$ <br> 78101 | 1318 <br> 1510 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1510 | $35: 10 \mathrm{H}$ | 1433ald | 55089 | 1711 |  |  |  |  |  |  |  | 178． 34 |  |  |  |  | 1510 |

\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|c|c|c|c|c|c|c|c|}
\hline \& $\angle E^{\circ} 0$ \& $1^{* *} 2$ \& $90^{\circ}+2$ \& $16^{\circ} 28$ \& 610\％ \& $9 E^{*}$ L \& 6292 \& 99＊scz \& ns ${ }^{\circ} 91 \mathrm{E}$ \& ns＊＊ \& －198 \& $0<1001$ \& －cool \& 02E6 \& $\because 5 C 61$ \& 91019 \& $11^{\circ} 2^{\circ}$ <br>
\hline 1 Cl \& $00^{\circ} 0$ \& $00^{\circ} 0$ \& $00^{\circ} \mathrm{SL}$ \& $21^{\circ 9}$ \& $6 \%^{\circ} \mathrm{LL}$ \& cl＊6 \& －21 \& きて＇494 \& $99^{\circ} \mathrm{fr} 51$ \& $99^{\circ} 5 \mathrm{E}$ \& OCO \& SE＊201 \& 014 \& 965 \& 9021 \& $09^{\circ} 1$ \& $E 1^{\circ} 2$ <br>
\hline OCL \& $00^{\circ} 0$ \& $00^{\circ}$ \& 14＊58 \& $6 E^{\circ} \mathrm{C}$ \& $29^{\circ} 05$ \& $0<10$ \& 801 \& －て＇ャロ \& C6\％ 6 AE \& 96．16 \& GVE \& L0＊＊ \& OUE \& 256 \& 2ct \& と1＊ \& $6 *^{\circ} 2$ <br>
\hline 622 \& $00^{\circ} 0$ \& $\angle E^{\circ} \mathrm{E}$ \& $95^{\circ} 55$ \& $6 \vdash^{\circ} \mathrm{LS}$ \& $6 \square^{\circ} \mathrm{COL}$ \& $02^{\circ} 9$ \& 68 \& ctiole \&  \& L0．6E \& HEZ \& 10\％06 \& COE \& EOE \& EOY \& C＊＊ \& 69＊！ <br>
\hline 824 \& $00 \%$ \& $16^{\circ} 0$ \& $68^{\circ} 88$ \& O5 ${ }^{\circ} \mathrm{C}$ \& $95^{\circ} 9 \mathrm{c}$ \& $19^{\circ} 8$ \& E0t \& C1． 212 \& $00^{\circ} 115$ \& 12＊ \& $0<\mathrm{E}$ \& $62^{\circ} 511$ \& 540 \& 21\％ \& LHE \& $9^{\circ} \mathrm{C}$ \& ง2＊$\underbrace{\circ}$ <br>
\hline 422 \& $00^{\circ} 0$ \& $96^{\circ} \%$ \& $02^{\circ}+11$ \& GE＊SE \& $\varepsilon^{6} 0 \mathrm{OE}$ \& $0^{082}$ \& 68 \& $\cdots 1^{\circ} \mathrm{E9z}$ \& ャて＂0عて \& \＆6＊10 \& 4く2 \& 95＊211 \& LbE \& H0E \& c59 \& $38^{\circ} \mathrm{Z}$ \& $60^{\circ} 2$ <br>
\hline 926 \& $00^{\circ} 0$ \& $00^{\circ} 1$ \& $49^{\circ} 10$ \& －¢ ${ }^{\text {L }}$ \& $19^{\circ} \mathrm{E} 11$ \& $10^{\circ} 9$ \& 001 \& $09^{\circ} 182$ \& $00^{\circ} 919$ \& 92＊${ }^{\circ}$ \& －G2 \& $00^{\circ} 101$ \& 208 \& $6 \in 2$ \& $10^{4}$ \& $68^{\circ} \mathrm{J}$ \& Et＇z <br>
\hline 526 \& $00^{\circ} 0$ \& $00^{\circ} 0$ \& $19^{\circ} 90$ \& 18＊19 \& $0^{\circ} 26$ \& $98^{\circ} 5$ \& zeI \& 12029E \& $41^{\circ} \mathrm{vos}$ \& 2＊＊ \& $\angle 98$ \& 50.40 \& 18E \& EtE \& $\bigcirc 16$ \& で1 \& E1＇2 <br>
\hline －2L \& $00^{\circ} 0$ \& OV＊ \& $11^{\circ} \mathrm{LS}$ \& $6 L^{\circ} 0^{6}$ \& 60．85t \& $21^{\circ} 8$ \& 111 \& －60 czL \& L4．9721 \& $\checkmark L^{\circ} \mathrm{EE}$ \& －0E \& OC＇90 \& 2\％\％ \& $65 \%$ \& 106 \& $12^{\circ} 0$ \& $\nabla^{*}$－ <br>
\hline C2L \& $00^{\circ} \mathrm{O}$ \& S1＊ \& $00^{\circ} 001$ \& $14^{\circ} 02$ \& $11^{\circ} 02$ \& $94^{\circ} 8$ \& 48 \& －20219 \& －2＇219 \& L5＇ど \& 2EE \& $\rightarrow L^{\circ} \mathrm{EOL}$ \& －8E \& $\checkmark \angle E$ \& 292 \& －2＊ \& ャ2＊ <br>
\hline 222 \& $00^{\circ} 0$ \& EE＊${ }^{\circ}$ \& $00^{\circ} \mathrm{OE}$ \& 2109\％ \& c＜icsl \& $22^{\circ}$ \& 52 \& 69＊92E \& $60^{\circ} 5 \mathrm{Hol}$ \& $57^{\circ} \mathrm{S}$ \& ごて \& $60^{\circ} \mathrm{Z11}$ \& 408 \& ELZ \& 645 \& cs ${ }^{\circ}$ \& －$\iota^{\circ} \mathrm{l}$ <br>
\hline 122 \& 2\％\％ \& 20\％\％ \& $00{ }^{\circ} 001$ \& 66\％ 6 \& $66^{\circ} 65$ \& 95＊＊ \& 221 \& ic＊n8\％ \& 15068y \& $40^{\circ} \mathrm{LE}$ \& L8E \& $86^{\circ} 96$ \& $\checkmark 15$ \& OES \& $\rightarrow 0 \mathrm{Ol}$ \& $C 1^{\circ} 2$ \& $E 1^{*} \mathrm{z}$ <br>
\hline 022 \& $00^{\circ} 0$ \& $12^{\circ}$ \& EE＊Ey \& ct ${ }^{\circ} \mathrm{E}$ \& $11^{\circ} 001$ \& $90^{\circ} 6$ \& 58 \& Q9 $9^{\circ} \mathrm{ESI}$ \& 6EPTO6 \& ＊10 ${ }^{\circ}$ \& 09E \& 18.001 \& 02\％ \& －4E \& 508 \& $69^{\circ} 0$ \& C0＇ <br>
\hline 612 \& $00^{\circ} 0$ \& $00^{\circ} 0$ \& $00^{\circ} 001$ \& c．$\nabla^{\circ} 89$ \& cr＊89 \& －$\nabla^{\circ} 6$ \& EL \& － $0^{\circ} \mathrm{CbO}$ \& $9 \mathrm{H}^{\circ} \mathrm{S}$ ¢9 \& ce． 8 \％ \& EEE \& Sticol \& 1SE \& REE \& 689 \& $20^{\circ} 1$ \& 20．1 <br>
\hline 816 \& $00^{\circ} 0$ \& $00^{\circ} 0$ \& E $\varepsilon^{\bullet} \varepsilon^{\circ}$ \& $19^{\circ} 56$ \& $\rightarrow L^{\circ}+11$ \& $50^{\circ} \mathrm{L}$ \& 201 \& 比でし \& $68^{\circ}+98$ \& －く \％ \& ロヶと \& 1でと01 \& 985 \&  \& 092 \& $38^{\circ} 0$ \& $\angle 0^{\circ} 1$ <br>
\hline 112 \& $00^{\circ} 0$ \& $09^{\circ} 01$ \& $49^{\circ} \mathrm{E}$ \& Et＊＊ \& $60^{\circ} \angle 9$ \& $58^{\circ} 5$ \& 151 \& pe．${ }^{\circ} 197$ \& E2＊＊GE \& f19\％ \& G78 \& ャで111 \& 598 \& 810 \& ce\％ \& $6 \%^{\circ} \mathrm{z}$ \& $8 \varepsilon^{\circ} \mathrm{E}$ <br>
\hline 914 \& $00^{\circ} 0$ \& $21^{\circ} \mathrm{E}$ \& 00＊00t \& $20^{\circ} 68$ \& $10^{\circ} \mathrm{B}$ E \& $5 L^{\circ} \mathrm{s}$ \& 821 \& 74．412 \& ぐく」2 \& 60．25 \& $0^{685}$ \& $60^{\circ} 001$ \& －8E \& 25E \& 9EL \& $8 \varepsilon^{\circ} \varepsilon$ \& $8 E^{\circ} \mathrm{E}$ <br>
\hline 512 \& $00^{\circ} 0$ \& $10^{\circ} 2$ \& $55^{\circ} \mathrm{rc}$ \& $\rightarrow 1^{\circ} \mathrm{O}$ \& $80^{\circ} \mathrm{lc}$ \& $29^{\circ} 9$ \& 201 \& 50.69 \& 190601 \& EE：It \& 617 \& $50^{\circ}<6$ \& －$E \varepsilon$ \& 108 \& 519 \& $8 \varepsilon^{\circ} \varepsilon$ \& 9106 <br>
\hline 102 \& $00^{\circ} 0$ \& $10^{\circ} 2$ \& $00^{\circ} 02$ \& 4 $L^{\circ} 81$ \& $8 L^{-92}$ \& $02 \cdot 11$ \& 86 \& CA． $0^{\circ} \mathrm{OZ}$ \& Lnconz \& cs．cs \& 885 \& L5＊911 \& 105 \& 405 \& $4 \leq 01$ \& E1＊E \& EE＇s <br>
\hline 904 \& $00 \%$ \& ${ }^{6} \varepsilon^{\circ}{ }^{\circ}$ \& ع2．69 \& $+<^{\circ} 52$ \& 91． $1^{\text {c }}$ \& 68.9 \& P11 \& c0．0＜1 \& 65＊ $5^{\circ} \mathrm{b}$ \& かけ＊ \& E ¢ \& － $0^{*} 101$ \& 908 \& cos \& 982 \& $02^{\circ} \mathrm{E}$ \& 29.6 <br>
\hline 504 \& $00 \%$ \& $25^{\circ} 1$ \& －$\% 69$ \& $\mathrm{c}^{6} 02$ \& $s 1^{\circ} 0 \varepsilon$ \& $98^{\circ} 9$ \& 2EI \& ！ $1^{\circ} 021$ \& 06＊とく1 \& 22＊${ }^{\circ}$ \& c9E \& L1＊221 \& cıV \& いと \& ELL \& ＋5＊ \& 90\％9 <br>
\hline P02 \& $00^{\circ} 0$ \& $9 \varepsilon^{\circ} \mathrm{E}$ \& $00^{\circ} 001$ \& $\rightarrow 2^{\circ} \mathrm{E}$ \& $\chi^{*}{ }^{\circ} \mathrm{E}$ \& $60^{\circ} 2$ \& 611 \& 90\％OEE \& 80＊uEE \& LE＊O4 \& ELb \& $66^{\circ} \mathrm{bll}$ \& 115 \& Rで \& CE6 \& 50\％ \& $88^{\circ} 2$ <br>
\hline EJL \& $00^{\circ} 0$ \& $00^{\circ} 0$
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70121 \& CE $\underbrace{\circ} \mathrm{YFL}$ \& $21^{\circ} 25$ \& L1\％ \& $89^{\circ}<61$ \& LLV \& とてE \& CO8 \& $28^{\circ} 5$ \& $85^{\circ} 9$ <br>
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\end{tabular}

|  | $05^{\circ} 0$ | $50^{\circ} 2$ | $20^{\circ} 29$ | $59^{\circ} \mathrm{\varepsilon z}$ | $62^{\circ} \mathrm{s}$ | $52^{\circ} 8$ | 6－61 | i2＇161 | OE＇syz | 29＊20 | Ec89 | 1c＊e0 | 1く17 | 6062 | 09091 | 9E＊9¢ | 01090 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 241 | 00\％ | $5 z^{\circ} 2$ | $92^{\circ} 92$ | c2 ${ }^{\circ} 22$ |  | $20^{\circ} 01$ | 68 | i19612 | 16．012 | 980．${ }^{\circ}$ | $\varepsilon^{6} \varepsilon$ | E0．901 | ع9\％ | EEr | 968 | $02^{\circ} \mathrm{E}$ | $60^{\circ}$ | 2ヶ4 |
| 174 | $00^{\circ} \mathrm{O}$ | $00 \%$ | $00^{\circ} 001$ | 06．02 | $0^{606}$ | $26^{\circ} 9$ | 101 | 1＜${ }^{\circ} 999$ | $11^{\circ} 992$ | ก0＊9¢ | 82 E | $\checkmark z^{\circ} \mathrm{sol}$ | 29p | $6{ }_{6}$ | $10^{6}$ | $\underbrace{\circ} \varepsilon^{\circ} \varepsilon$ | $8 \varepsilon^{\circ} \varepsilon$ | $1+2$ |
| orl | $00^{\circ} 0$ | $00^{\circ} 0$ |  | 9198 | 00051 | $0 L^{\circ} \mathrm{S}$ | 08 | －909b | 6r＊${ }^{\text {ch }}$ | 92＊59 | 242 | $00^{\circ} 001$ | Hzz | 822 | 958 | ¢ $\varepsilon^{\circ} \mathrm{s}$ | 84.6 | OrL |
| ${ }_{6}^{6} \mathrm{c} /$ | 90， | $11^{\circ} \mathrm{C}$ | $90^{\circ}, 26$ | 68.12 | $09^{\circ} \varepsilon^{\circ}$ | $59^{\circ} 8$ | Sol | $\mathrm{AE}^{\circ} 2^{8} 1$ | 2r＊961 | $92^{\circ} \mathrm{s}$ | $11 \%$ | $00^{\circ} 501$ | 190 | 100 | 806 | 29\％ | $86^{\circ}$ | 6ed |
| 9¢L | $91^{\circ} 1$ | $19^{\circ} \mathrm{E}$ | $11^{\circ} 25$ | E0 $0^{\circ} \varepsilon z$ | $1 \varepsilon^{\circ} 0$ | $99^{\circ} 11$ | ${ }^{8}$ | $C^{C} \cdot 65$ | $69^{\circ} \mathrm{E} 58$ | $99^{\circ} 50$ | 200 | $0^{\circ}{ }^{\circ} \mathrm{se}$ | 240 | 908 | 896 | ह1\％ 2 | E $\iota^{\circ} \mathrm{E}$ | QeL |
| $1{ }^{1}$ | $00^{\circ} 0$ | $00^{\circ} \mathrm{O}$ | $00^{\circ} 001$ | $65^{\circ} \mathrm{C} 49$ | $65^{\circ}<89$ | $1 \varepsilon^{\circ} 9$ | 021 | －1：¢ ${ }^{\text {¢ }}$ | 910．52\％ | －20．pe | c¢2 | 010.56 | c98 | Que | 492 | $8<^{\circ} 1$ | $82^{\circ} 1$ | LEL |
| $9 E L$ | $00^{\circ} 0$ | $010^{\circ}$ | EE＇cy | 50.69 | $98^{\circ} 901$ | $\because 2001$ | 56 | 51.946 | $9 \varepsilon^{\circ}<{ }^{\circ} 11$ | $84^{\circ} \mathrm{OD}$ | 916 | $20^{\circ} \mathrm{E}$ | －0\％ | 925 | 0201 | $69^{\circ} 0$ | $20 \cdot 1$ | 9 E ¢ |
| SEL | $00^{\circ} 0$ | $8{ }^{\circ}{ }^{\circ} \mathrm{s}$ | $41^{\circ} \mathrm{zs}$ | $15^{\circ} 98$ | $29^{\circ 0} 5$ | ＜E＇6 | 201 | －1．Eとて | $20^{\circ} \mathrm{Gtb}$ | 8ぐで | 60\％ | 2808 | くロッ | 605 | 956 | E1＇z | $60^{\circ}$ | cel |
| EEL | c¢ ${ }^{\circ}$ | ${ }^{8} \varepsilon^{\circ} \mathrm{z}$ | $22^{\circ} 22$ | $51{ }^{\circ} 02$ | $69^{\circ} 06$ | $\square^{\circ} 9$ | 921 | cl＇821 | ne．0 0 S | ${ }^{1} 2 z^{\circ} 68$ | £ 28 | \＆2．111 | －Ev | 008 | －2\％ | 25＇1 | －19 | DEL |
| EEL | $00 \%$ | $00^{\circ} \mathrm{O}$ | EEE ${ }^{\text {c }}$ | F60．5E |  | 60001 | 911 | crizas | S6．1．e．t | E6． $2 ¢$ | $0 \pm \square$ | $62^{\circ} 96$ | 255 | 809 | 0911 | $49^{\circ} 2$ | $02^{\circ} \mathrm{E}$ | EcL |
| －11 | $8{ }^{\circ} \mathrm{O}$ | $\bigcirc 5.1$ | ${ }_{98}{ }^{\text {¢ }} 8$ | －$\square^{\circ} \mathrm{c}$ ¢ | 29．51 | 92 <br> 81 <br> 18 | 921 921 | SV 0.901 | 16\％ 698 | 5200 ctila | 618 | 21－801 | $0 ¢ 5$ $z \varepsilon 5$ | 115 $\varepsilon<8$ | 1701 506 | ¢ $1^{\circ}{ }^{\circ} \mathrm{z}$ | 82.6 52.6 | 2EL |
| cil | $80^{\circ} \mathrm{O}$ | EL＊\％ | 81.10 | $69^{\circ} \mathrm{*} 1$ | 05020 | $90^{\circ} \mathrm{L}$ | 011 | $10^{\circ} \mathrm{CE} 1$ | cosabl | $10^{\circ} \mathrm{O}$ | 058 |  | 2C\％ | 685 | 129 |  | $50^{\circ} 9$ | ¢12 |
| 216 | $91{ }^{1}$ | 88： | $000^{\circ} 02$ | 81．02－ | $5 s^{\circ} \mathrm{P}$ c | 90.01 | 29 | ก0＇2¢2 | Er＊iec | Ho ${ }^{\circ}$ | C4E | G2．901 | 52\％ | Oor | $5{ }^{2}$ | $60^{\circ} 2$ |  | Eil |
| 112 | 00\％ | 85＊ | 810 21 | 86.86 | $95^{\circ}{ }^{8} 21$ | ¢ $\square^{\circ} 9$ | $\varepsilon ¢ 1$ | 360029 | $26 \cdot 8.78$ |  | ＜$\downarrow$ E | 61.901 | 515 | S旳 | 0001 | －2＊ | $00 \cdot 1$ | 112 |
| 014 | 00， | $90^{\circ} 0$ | $22^{\circ} 22$ | 18.28 | Er ${ }^{\circ} \mathrm{S}$ | $10^{\circ} \mathrm{A}$ | －01 | c1．292 |  | Ec．st | $\mathrm{z}^{\mathrm{H}} \mathrm{E}$ | ¢ $\underbrace{\circ}+6$ | 415 | とで | ¢E8 | $11^{\circ} 2$ | $02^{\circ} \mathrm{\varepsilon}$ | 012 |
| 602 | $59^{\circ} 1$ | $\checkmark 901$ | C7\％${ }^{\circ} \mathrm{OR}$ | $240^{4} 5$ | 80\％${ }^{\circ}$ | $12^{\circ} \mathrm{L}$ | 611 |  | 8c．ene | $90^{\circ} \mathrm{BE}$ | 6pt： | 6y＊ 0 Ol | く\％ | － | Lic | $20^{\circ} \mathrm{E}$ | ${ }_{8 E}{ }^{\circ} \mathrm{E}$ | 8012 |
| 802 | $20^{\circ} 0$ | L201 | 87＊${ }^{\text {P }}$ | $90^{\circ} \mathrm{Ez}$ | $\mathrm{ar}^{\circ 6}$ | $78^{\circ} \mathrm{L}$ | E！ | $99^{\circ} 081$ | $15^{\circ} \mathrm{C}, 22$ | －2・ャ | 208 | 40.001 | $19 \%$ | 220 | 488 | $16^{\circ} \mathrm{E}$ | $00^{\circ}$ | ROL |
| 1כ14 | 31 ry | 3178 | 7r1siv3 | 3ヶアV•d |  | $350{ }^{011}$ |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 815\％03 | 人3ッチア7 | $\wedge$ als ${ }^{\text {a }}$ | $\mathrm{SaSNOH}^{\text {S }}$ | $535 \mathrm{II}^{\circ} \mathrm{H}$ |  | 53.30 | ${ }^{3} \mathrm{~s}_{0} \mathrm{C}^{4}$ | $\cdot{ }^{1017} \mathrm{~d}$ | $107 d .17$ | 147d47 | $0.75$ |  | 378： | ${ }^{40} 0^{\text {d }}$ |  | $\forall 3 y \checkmark$ | 1314 |
| 1510 | $35^{\text {non }}$ |  | 1035iga | 5s080 | $1^{\text {did }}$ | － Hralal $^{\text {a }}$ | н7hann | s5040 | 17 F | 11873．4．d |  |  | 378.13 |  | $7 \times 101$ | －0：530 | $7 \gamma_{1} O_{1}$ | 1510 |

DIST TOTAL FESIC TGTAL
RICT ANEA AREA POE:
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 Male SFX fiploy fiploy pop. P.ACFE P.ACFE HUUSES HBUSF PUUSES HOUSES RESID VACAHCY

HoUSE DIST RIC AEA AREA PoE:

| 4.27 | 2.45 | 369 |
| :---: | :---: | :---: |
| 0.71 | -. 71 | 762 |
| 0.36 | 0.3. | 490 |
| C. 36 | 0.36 | 487 |
| 1.42 | 1.07 | cis |
| 1.42 | 1.07 | 422 |
| 0.59 | O.HS | 531 |
| C. 36 | 0.35 | 489 |
| 0.89 | O.H5 | 421 |
| 0.39 | 3.AF | 3 Pl |
| 0.53 | 0.53 | 416 |
| 0.53 | c. 53 | 495 |
| 1.42 | 1.42 | 340 |
| 3,20 | 3.20 | 282 |
| 2.13 | 2.13 | 137. |
| 4.27 | 3.73 | 553 |
| 1.75 | 1.24 | 426 |
| 2.49 | 2.49 | 30.6 |
| 3.20 | 2.13 | 512 |
| 1.24 | 1.24 | 453 |
| 4.44 | 4.09 | 4.84 |
| 3.56 | 0.71 | 653 |
| 1.78 | 1.78 | 334 |
| 1.96 | 1.34 | 403 |
| 2.31 | 2.13 | 415 |
| 1.60 | 1.37 | 411 |
| 0.71 | 0.71 | 435 |
| 2.49 | 1.78 | 551 |
| 5.33 | 1.07 | 3.2 |
| 3.73 | 2.86 | 370 |
| 19.38 | 9.79 | 339 |
| 15.82 | 9.25 | 387 |
| 14.22 | e. 22 | 331 |
| 22.53 | 13.87 | 329 |
| 19.91 | 9.3, | 261 |
| 22.58 | 4.44 | 350 |
| 1.42 | 1.42 | 353 |
| 7.65 | 6.59 | 591 |
| 14.05 | 5.87 | 545 |
| 71.12 | 8.71 | 139 |
| 0.71 | 0.71 | 762 |
| 0.36 | 2.36 | 393 |
| 0.71 | 0.71 | 575 |
| 1.76 | 0.71 | 643 |
| 1.42 | 1.24 | 572 |
| 2.13 | C. 33 | 53: |
| 2.34 | 2.84 | 310 |


| 177 | 192 | 10 H .6 |
| :---: | :---: | :---: |
| 380 | 374 | 96 |
| 242 | 248 | 102 |
| 249 | 234 | 05 |
| 258 | 247 | 05.9 |
| 204 | 218 | 106 |
| 260 | 2.71 | 104.2 |
| 275 | 203 | r9.020 |
| 196 | 223 | 114.8 |
| 212 | 16 l | 70.7 |
| 219 | 197 | но |
| 332 | $33^{3}$ | 100 |
| 154 | IAB | 120. |
| 136 | 146 | 107 |
| 213 | 215 | 102 |
| 217 | 336 | 154 |
| 173 | 253 | 146 |
| 135 | 171 | 126. |
| 222 | 20 | 130.4 |
| 201 | 252 | 125.3 |
| 187 | 257 | 137 |
| 308 | 345 | 112 |
| 141 | 193 | 135. |
| 179 | 224 | 123 |
| 182 | 23.3 | 128 |
| 201 | 210 | 104 |
| 203 | 232 | 114 |
| 242 | 30 n | 127 |
| 176 | 163 | 94. |
| 173 | 197 | 113.8 |
| 114 | 225 | 197 |
| 180 | 207 | 115.0 |
| 162 | 160 | 104 |
| 147 | 182 | 123 |
| 110 | 151 | 137.2 |
| 180 | 170 | 01 |
| 173 | $1 \times 0$ | 104 |
| 297 | 264 | 91 |
| 212 | 333 | 157 |
| 71 | $6{ }^{*}$ | 95 |
| 332 | 430 | 120.5 |
| $1{ }^{3} 5$ | 20. | 112.13 |
| 267 | 309 | 115 |
| 305 | $33 \mu$ | 115 |
| $2 \mathrm{A4}$ | 2R4 | 101. |
| 201 | 287 | 25. |
| 244 | 266 | 100 |


| 4 H | 40.11 | 148.24 | 86.41 |
| :---: | :---: | :---: | :---: |
| 278 | 36.45 | 1071.43 | 1071.43 |
| 115 | 23.47 | 1377.45 | 1377.97 |
| 176 | 36.14 | 13 ¢ワ.52. | 1364.52 |
| 190 | 37.62 | 473.38 |  |
| 184 | 43.66 | 393.58 | 296.60 |
| 224 | 42.18 | 547.30 | 397.30 |
| 147 | 36.013 | 1147.36 | 1147.30 |
| 144 | 34.20 | 173.57 | 473.27 |
| 153 | 40.16 | 428.57 | 428.51 |
| 164 | 37.42 | 779.90 | 779.90 |
| 256 | 36.83 | 1302.96 | 1302.40 |
| 118 | 34.71 | 239.03 | 239.03 |
| 118 | 41.84 | 48.11 | 8 nc 11 |
| 173 | 40.03 | 202.47 | 202.47 |
| 288 | ¢2.000 | 14.4.11 | 129.54 |
| 180 | 42.25 | 342.28 | 239.80 |
| 100 | 32.64 | 122.93 | 122.93 |
| 252 | 49.22 | 239.47 | 134.90 |
| 180 | 39.74 | 363.97 | 363.91 |
| 180 | 40.54 | 165.57 | 99.87 |
| 231 | 38.44 | 91H,17 | 183.65 |
| 166 | 49.70 | 107.n3 | 187. fi |
| 167 | 41.44 | 20f.03 | 206.05 |
| 172 | 41.45 | 194.51 | 179.54 |
| 151 | 36.74 | 385.26 | 256.13 |
| 183 | 42.07 | 611.61 | 611.04 |
| 228 | 41.34 | 3159.40 | 221.30̄ |
| 159 | 46.49 | 320.38 | 64.12 |
| 171 | 46.22 | 139.00 | y |
| 183 | 53.98 | 31.67 | 17.44 |
| 137 | 35.49 | $41 . A B$ | $24 .<6$ |
| 97 | 29.31 | 53.19 | 23.21 |
| 140 | 12.35 | 23.72 | 14.51 |
| 111 | 42.53 | 31.23 |  |
| 133 | 38.00 | 7H.74 |  |
| 148180 | $41.0 n$ | 248.17 | 240,1i |
| 187 | 33.94 | :3,76 | 72.01 |
| 292 | 33.58 | y2,89 | 3n. 10 |
| 73 | 32.52 | 15,95 | 1.40 |
| 266 | 37.53 | 1071.43 | 1071.4 |
| 176 | 44.10 | 1115.17 | 1105.11 |
| 223 | 39.34 | nia.49 | $\mathrm{SOBCO}_{4} 4$ |
| 371 | 37.7\% | 934.11 | 128.71 |
| 295 | 31.57 | 139.59 | 402.19 |
| 224 | 38.7: | 1102.36 | 275.94 |
| 194 | 3\%.04 | 179.77 | 179.21 |


| 72 | 5.12 | 30.13 | 17.58 | 38.33 | 4.17 | 2.67 | 201 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 01 | 4.52 | 112.49 | 112.49 | 100.00 | 0.00 | 0.00 | CO2 |
| 79 | 6.20 | 224.97 | 224.97 | 100.00 | 1.27 | 0.00 | 803 |
| 74 | 6.50 | 210.91 | 2.10 .91 | 100.00 | 1.35 | 0.00 | CO4 |
| 77 | 6.56 | 75.93 | 56.95 | 75.00 | 5.10 | 1.23 | 005 |
| 66 | 6.39 | 61.87 | 46.40 | 75.00 | 0.00 | 0.00 | ${ }_{4} \mathrm{CO}_{6}$ |
| 77 | 6.90 | 91.11 | 91.11 | 100.00 | 5.10 | 2.47 | 807 |
| 69 | 5.91 | 194.04 | 194.04 | 100.00 | 0.10 | 0.00 | $0{ }^{0} 8$ |
| 72 | 5.85 | 82.11 | 82.11 | 100.00 | 1.39 | 0.00 | 80 |
| 66 | 5.77 | 76.49 | 76.49 | 100.00 | 3.03 | 0.00 | 810 |
| 75 | 3.55 | 148.11 | 148.11 | 100.00 | 5.33 | 0.00 | 811 |
| 103 | 6,75 | 196.85 | 196.85 | 100.00 | 1.94 | 0.00 | 012 |
| 61 | 3.57 | 44.29 | 44.29 | 100.00 | 3.28 | 0.00 | 813 |
| 42 | 6.71 | 13.75 | 13.75 | 100.00 | 4.76 | 0.00 | 814 |
| 79 | 5.47 | 37.50 | 37.50 | 100.00 | 1.27 | 0.00 | 015 |
| 101 | 5.48 | 27.05 | 23.67 | 87.30 | 0.00 | 0.00 | 816 |
| 84 | 5.07 | 69.10 | 48.37 | 70.00 | 2.38 | 0.00 | 817 |
| 61 | 3.02 | 24.51 | 24.51 | 100.00 | 0.40 | 1.64 | 818 |
| 89 | 3.75 | 44.06 | 29.37 | 66.67 | 5.62 | 4.26 | 010 |
| 74 | 6.12 | 61.6 | 61.06 | 100.00 | 2.70 | 3.95 | 820 |
| 76 | 5.84 | 19.56 | 18.00 | 92.00 | 5.26 | 0.00 | 821 |
| 107 | 6.10 | 154.67 | 30.93 | 20.00 | 2.80 | 10.00 | -22 |
| 61 | 5.48 | 34.87 | 34.87 | 100.00 | 1.64 | 4.84 | 823 |
| 71 | 3.68 | 38.35 | 38.35 | 100.00 | 5.63 | 0.00 | 024 |
| 77 | 5.39 | 37.03 | 34.10 | 92.31 | 2.60 | 0.00 | 825 |
| 78 | 3.27 | 74.05 | 49.37 | 66.67 | 1.28 | 0.00 | 826 |
| 79 | 5.51 | 118.11 | 118.11 | 100.00 | 6.33 | 15.48 | 827 |
| 99 | 3.51 | 60.18 | 42.99 | 71.43 | $\cdots .08$ | 4.67 | 820 |
| 37 | 6.00 | 54.37 | 10.87 | 20.00 | 1.75 | 31.03 | 820 |
| 60 | 6.17 | 21.44 | 16.34 | 76.19 | 1.67 | 0.00 | 830 |
| 52 | 6.52 | 5.73 | 2.89 | 50.46 | 7.69 | 3.57 | 831 |
| 64 | 6.05 | 7.57 | 4.42 | 53.43 | 9.37 | 0.00 | 032 |
| 71 | 4.66 | 11.57 | 5.06 | 43.75 | 1.41 | 0.00 | 833 |
| 62 | 3.31 | 4.54 | 2.79 | 61.42 | 1.31 | 0.00 | 834 |
| 41 | 6.37 | 4.91 | 2.00 | 41.96 | 0.00 | 0.00 | 835 |
| 65 | 3.30 | 15.97 | 3.14 | 19.69 | 0.23 | 0.00 | 036 |
| 65 | 5.43 | 45.70 | 45.74 | 100.00 | 0.00 | 0.00 |  |
| 81 | 6.89 | 12.62 | 10.80 | 86.05 | 3.75 | 0.00 | 830 |
| 81 | 6.73 | 15.00 | 6.21 | 41.77 | 9.64 | 0.00 | 839 |
| 16 | 0.69 | 1.84 | 0.22 | 12.25 | 0.00 | 0.00 | 840 |
| 134 | 5.69 | 188.41 | 188.41 | 100.00 | 0.00 | 0.00 | 874 |
| 82 | 4.79 | 230.60 | 230.60 | 100.00 | 0.00 | 0.00 | 880 |
| 115 | 3.00 | 168.73 | 168.73 | 100.00 | 4.35 | 0.00 | 881 |
| $\square 2$ | 7,34 | 115.30 | 41.93 | 36.36 | 0.00 | 0.00 | cay |
| 77 | 7.43 | 62.67 | 34.84 | e7.50 | 1.30 | 0.00 | 308 |
| 85 | 0.92 | 161.23 | 40.31 | 25.00 | 1.18 | 0.00 | 889 |
| 81 | 0.30 | 29.53 | 29.53 | 100.00 | 3.70 | 0.00 | Co 0 |
| 3519 | 6.02 | 20.42 | 12.90 | 45.67 | 2.96 | 1.70 |  |



























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|  | $02^{\circ} 9$ | 590． | or＊${ }^{\circ}$ | $1 c^{\circ} \mathrm{E}$ | E9．6 | $10^{\circ} 5$ | 2r4 | $90 \cdot 91$ | os．zs | S0\％2r | 081\％ | $50^{\circ} \mathrm{V21}$ | －05s | Letr | 1066 | ${ }^{0} \varepsilon^{\circ} 681$ | ＜－0sc |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 226 | 5001 | 08.1 | re9az | －ro 0 | 1901 | $55^{\circ} 9$ | $\underbrace{}_{9}$ | jo ${ }^{\circ}$ | 22001 | $65 \cdot 15$ | 621 | r900 ${ }^{1}$ |  | ¢E1 | $\stackrel{48}{ }$ |  | 98.221 | 286 |
| 156 | $00^{\circ} \mathrm{O}$ | $00^{\circ} \mathrm{O}$ | ${ }^{\text {ce }}{ }^{\circ}{ }^{\circ} \mathrm{C}$ ¢ | ${ }^{0.0} 0$ | 0102 | 05.9 | 9 C | crach | ${ }^{55}{ }^{\circ} \times 1$ | ${ }^{92} 2^{\circ} 9$ | ${ }^{161}$ | 00．522 | ${ }_{28}^{29}$ | 22 22 | pez |  |  | 186 086 |
| Of6 | ${ }^{122^{\circ} \mathrm{E}} \mathrm{C}$ |  | 19.91 05019 | ${ }_{5}^{18.5}$ | 28.18 $2100 \%$ | ${ }^{00} 0^{\circ}{ }^{\circ}{ }^{\circ} \mathrm{C}$ | $\stackrel{92}{28}$ |  |  |  | ${ }_{5}^{54}$ | 19.911 98.26 | 10 | 26 | 451 |  | $\stackrel{c c}{8 ¢} \times 1$ | 086 |
| 926 | $1{ }_{1-1}$ | ${ }_{0} 0^{\circ} \cdot{ }^{\circ}$ | ${ }^{0} 0^{\circ} 001$ |  | $11 \cdot 811$ | ${ }_{89}{ }^{5}$ | 18 |  | 61.489 | ع1．62 | － 51 | $5<101$ | $2 \varepsilon<$ | 922 | 098 | 120 | $12 \cdot 0$ | \＆20 |
| 126 | $25^{\circ} \mathrm{O}$ | 00． 5 | $00 \cdot 51$ | ， $8 \cdot 6$ | $21^{\circ} \varepsilon_{1}$ | E2 ${ }^{\circ} \mathrm{L}$ | 09 | －${ }^{8 .} 19$ | $10^{\circ} 06$ | ع0．0．62 | 921 | $5 L^{\circ} \mathrm{E} 0$ | 012 | ＋22 | －c！ | $08^{\circ} \mathrm{y}$ | $0 \cdot 9$ | 226 |
| 920 | oric | $50^{\circ} \mathrm{c}$ | 00.001 | 90.45 | $96^{\circ} \mathrm{L}$ | $86^{\circ} 5$ | 25 | ＋90．912 | v9＊＊して | $80^{\circ} \mathrm{PE}$ | 901 | $56^{\circ} 101$ | ＜s1 | －s | 118 | $28^{\circ} \mathrm{l}$ | $27^{\circ} \mathrm{P}$ | 926 |
| 526 | $00^{\circ} \mathrm{O}$ | ${ }^{8} 0^{\circ} \mathrm{E}$ | 22： 21 |  | ${ }^{6 \varepsilon^{\circ}}$ | $12^{\circ} 9$ | ع | $29^{\circ} 1$ | $1 \square^{\circ} \mathrm{P}$ | S0．1r | 48 |  | E11 | 26 | 502 | $22^{\circ} 91$ | $12 \cdot 111$ | 526 |
| 128 | EE ${ }^{\circ} \mathrm{Cl}$ |  |  | $10^{\circ} \mathrm{E}$ | 28.51 | 56.5 | $1 \%$ | F2．91 | 21．98 | ¢6． 8 ¢ | 56 |  | SE1 | 801 | P12 | ${ }^{28} 8^{\circ} \mathrm{F}$ | ＋0\％1 | 726 826 |
| 220 220 | ${ }^{000} 0$ |  | 000001 |  |  | ${ }_{29}{ }^{20}{ }^{\circ} \mathrm{L}$ | 9 | －0．081 | － |  | ${ }_{801} 8$ |  | \％ $\begin{aligned} & 181 \\ & \text { ¢ }\end{aligned}$ | 261 091 | ¢ع¢ |  | 18220 | 226 226 |
| 120 | $00^{\circ}$ | $90^{\circ} 9$ | $85^{\circ} 22$ | ¢ $\varepsilon^{\circ} 9$ | 21.82 | $90^{\circ} \mathrm{s}$ | 99 | 1\％ 08 | $94 \cdot 251$ | 91.85 | 291 |  | 412 | E9： | 68E | $\mathrm{Sr}^{\circ} \mathrm{P}$ | $20^{\circ} 11$ | 126 |
| 026 | $00^{\circ} \mathrm{O}$ | $10 \cdot 5$ | ع0：92 | $99 \cdot 1$ | $8^{0.5}$ | 08.01 | L | r2．91 | $20^{20.45}$ | E2：${ }^{\text {a }}$ | 651 | cs．001 | $1{ }^{161}$ | 0.9 | 188 | 95.9 | $40 \cdot 6$ | c20 |
| 816 | $20^{\circ}$ | 4.5 | Po | $90^{\circ} \mathrm{E}$ |  | $9 \varepsilon^{\circ}{ }^{\circ}$ | 86 | 29.51 | 22．0\％ | 91.10 | 421 | 10.611 | 59 | $9{ }^{4}$ | 116 | 85.9 | 16.01 | 316 |
| 810 410 | 00\％ | $00^{\circ} 0$ | 00.001 | ${ }^{68} 8^{\circ} 1$ | 58.51 | $91 \cdot 9$ | 29 | $49^{\circ} 16$ | 99：06 | 91：16 | 251 | ع0．28： | ${ }^{\text {Hiz }}$ | ＋41 | 288 | $16^{\circ} \mathrm{E}$ | $16^{\circ} \mathrm{E}$ | 816 16 |
| 910 | ${ }^{00} 0^{\circ} 9$ | ${ }^{70} 0^{\circ} \mathrm{C}$ | 00.001 | $11.0{ }^{10}$ | 4100 | 70.2 | 6 | n2． 142 | n2＊142 |  | 221 | 18.10 | 591 | 081 | ste | $5^{\circ}{ }^{\circ}$ | ＋2．${ }^{\text {\％}}$ | 16 9 |
| 516 | $00^{\circ} \mathrm{O}$ | 09.2 | H1：29 | $90^{\circ} \mathrm{E}$ | 26.0 | $09 \cdot 9$ | 25 | $\cdots$ | H0e | $26 \cdot 19$ | H4： | $90^{\circ} \mathrm{C}<1$ | 912 | Lit |  | ${ }_{9 \cdot}^{c_{8} \cdot 11}$ | ${ }_{18}$ | 516 |
| 110 | 00\％ | $00^{\circ} 0$ | $6{ }^{-69}$ | Er ${ }^{\circ} \mathrm{E}$ | $p 0^{\circ}$ | －99 | 98 | ？1＇z2 | E日＇ts． | $88 . \mathrm{cs}$ | 521 | siluz | 241 | 89 | 2 c | $0^{\circ}{ }^{\circ} \mathrm{L}$ | 60.01 | 116 |
| E16 | $92 \cdot 11$ | $00^{\circ} \mathrm{C}$ | 0104 | $52 \cdot 6$ | 29.01 | $22^{\circ} \mathrm{s}$ | 05 | ${ }^{-1} 40$ | ${ }^{85}{ }^{\circ}$ | 50.85 | bel | $25^{\circ} \mathrm{op} 1$ | ＜si | 501 | 242 | $00^{\circ}$ ． | 15.5 | $81^{6}$ |
| 216 | $99^{\circ} \mathrm{O}$ | $05^{\circ} 21$ | 00\％ 0 | $60^{\circ} \mathrm{L}$ | 15.4 | 96. | 96 | ！ $2^{\circ 18}$ | L2．es | 20．5c | v1 | $12^{\circ} \mathrm{HDI}$ | 491 | 211 | 612 | $9 \varepsilon^{\circ} 8$ | 68.8 | 216 |
| 110 | $40^{\circ} \mathrm{O}$ | $220^{\circ}$ | $4 \square^{\circ} \mathrm{E}$ ¢ | $88^{\circ} 9$ | $00^{\circ} \square_{4}$ | Er： | ${ }^{89}$ | $\cdots{ }^{\circ} \mathrm{O}$ | 69.662 | $18 \cdot 50$ | 691 | 50.601 | 101 | 281 | ¢LE | ${ }^{\circ} 2^{\circ}$ | 52．6 | 110 |
| 010 | $00^{\circ} \mathrm{O}$ | $\mathrm{cos}^{\circ} \mathrm{O}$ | 000001 | 2200 | 22.01 | 190 | 95 | c0．c9 | ¢0． $0^{\circ} 9$ | 32.29 | 561 | co． 5 ¢ 1 | －12 | 151 | cos | 69.5 |  | 210 |
| 8006 | E5：01 | 80201 | $02 \cdot 5$ | 21.2 06 0 | $59^{\circ} \mathrm{P}$ | $1 r^{\circ} \mathrm{s}$ | 95 | 4.2011 | 020.02 | 55.11 | 58 | 45.021 | 14 | 2 El | عo¢ | $12^{\circ} 21$ | 56.92 | 600 |
| 200 | $00 \%$ | $9 \mathrm{C} \cdot \stackrel{5}{9}$ | $9 \mathrm{C} \cdot 0$ | ${ }^{0} 51$ | $1{ }^{\circ} \mathrm{C}$ | ${ }^{12} \cdot{ }^{\circ}$ | 9 c | － | ${ }^{\text {co }}$ | Rc．${ }^{\text {a }}$ | ${ }^{\text {cti }}$ | 22． | 181 | 11 | 202 | 20.8 | 16 | 806 |
| 900 | $00 \%$ | $92 \cdot 5$ | ¢く，98 | ${ }_{\text {cs }}$－1 | $4 \cdot{ }_{4}$ | 26.5 | $8{ }^{\text {c }}$ | $8.4 \cdot 8$ | ${ }_{\square 9} 96.8$ | \％ 4.8 | 961 86 | ${ }_{61} 90 \cdot 991$ | 22 | 501 | 262 422 |  |  | 208 906 |
| 506 | $00^{\circ}$ | $92^{\circ}$ | ＜E＇p ${ }^{\circ}$ | $19 \cdot 8$ | $12^{\circ} \mathrm{O}$ | $\mathrm{F} 2^{\circ} 9$ | $4{ }^{\circ}$ | $4^{89} 15$ | $50^{\circ} 14$ | $21 \cdot \angle$ | cel | ＋50．0．1 | $2<1$ | E21 | $\mathrm{SS}_{2}$ | $08^{\circ}$ | $65 \cdot \mathrm{~s}$ | $50^{6}$ |
| 100 | 00\％ | $00^{\circ} 0$ | $0^{0} 0^{\circ} 9$ | ${ }^{9} 91$ | $0^{0.12}$ | ET＊ 5 | 96 | 48．89 | $66^{\circ} \mathrm{E} 11$ | 85.95 | 241 | os 2 ＜e： | 421 | 821 | Vog | $29^{\circ} 2$ |  | $\checkmark 0{ }^{\circ}$ |
| coi | 00\％ | 20.1 | $99^{\circ} 5$ | 2188 | $2{ }^{9} \cdot{ }^{6}$ | $\mathrm{A} 2 \cdot 9^{\circ}$ | 25 | $\mathrm{CFP}^{1 / 21}$ | － $\mathrm{C}^{\circ} \mathrm{O}, \mathrm{E}$ |  | 911 | 12．121 | $\mathrm{rl}_{1}$ | ＋2！ | $5<2$ | $\square_{6-0}$ | $0 \cdot 1$ | E06 |
| 200 | 00， | $11^{\circ} \mathrm{c}$ $0^{\circ} \mathrm{E}$ | $22^{\circ} 99$ 659 | $5{ }^{50.2}$ | ${ }^{\circ} 10 \cdot{ }^{\circ} 1$ | ${ }^{68.5}$ | ¢9 | OEC50 | 56.04 |  | 681 | $8^{\circ} 4^{\circ} 102$ | ky | E2！ | $1<\varepsilon$ | $\varepsilon \varepsilon^{\circ}{ }^{\text {s }}$ | $21 \cdot 8$ | 206 |
| 100 | $28 \cdot 92$ | $8_{0}{ }^{\circ} \mathrm{c}$ | $69^{\circ} \mathrm{o}$ | 8100 | $12 \cdot 01$ | $25^{\circ} 6$ | 59 | 19.5 | － 19 | 31\％${ }^{\text {a }}$ | E＜1 | 96.481 | 402 | 151 | $6_{68}$ | $22^{\circ} 9$ | 85.9 | 106 |
| 1318 | $3{ }_{1}{ }^{\text {y }}$ | 31 \％ | 701143 | 7yวred | 340r．d | 7s $\mathrm{n}^{\mathrm{n}} \mathrm{H}$ | $\mathrm{S}_{3} \mathrm{SO}^{\text {OH}}$ | ＋hJor ${ }^{\text {d }}$ | 3dכי．d | 17－ | 07－ |  |  |  | ． $8^{8} \mathrm{O}_{4}$ |  | Y3er | 1214 |
|  | 415903 | A．7473 | －1574 | S3snor | sasno．4 |  | חככ | － $\mathrm{slad}^{\text {d }}$ | $\mathrm{dog}^{\text {d }}$ | 207 di． 7 | 207 ¢117 | $\times 3 \mathrm{~S}$ |  | 374．＂ |  | 7 T 11.3 |  |  |
| 1510 | $3 \mathrm{Sn}^{\mathrm{CH}}$ |  | 1430ヶ4」 | Ss0yo | $1^{39}$ | － hram $^{\text {a }}$ | ชアตロกn | s50ys | $1 \%$ | 11173 ¢7．d |  |  | 3า＊＊） |  | 77101 | －a1s？c | $7 \mathrm{Fr}_{1} \mathrm{O}_{1}$ | 1510 |


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| $9 \cdot 89$ | L20 | $29^{\circ} 122$ | 20．8 | 5128 | $81^{\circ} \mathrm{O}$ | \＄$<^{\circ} \mathrm{E}$ | عャ・14 | 0botr | $96^{\circ} 25$ | $86^{\circ} 5$ | 26.281 | 8282 | 52•8 | 9802 | $1 \varepsilon^{\circ} 028$ | 80．19\％ | 92＊56 | 8688 | 9108 | r12＜1 | $42^{\circ} \mathrm{z}$ S | $\checkmark \varepsilon^{\circ}<\varepsilon$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 08.98 | 99.0 | 0000 | 20．8i | ＋！ | $00 \cdot 0$ | S0．0 | $90 \cdot 58$ | ¢ $<\cdot L$ | $80^{\circ} \mathrm{zz}$ | $\checkmark 5.2$ | 56.001 | 901 | 19.1 | sot | $9 \varepsilon^{\circ} 85$ | ＋60991 | 89＊96 | 698 | Ot\％ | 652 | 020\％ | 690 cl | S28 |
| 68.95 | 25.1 | ＋0．761 | $82^{\text {c }} 1$ | E8t | 00\％ |  | عE＇c6 | 66.29 | $60^{\circ} 29$ | 58.5 | 2と・rて1 | 002 | L2．L | 191 | 0ぐめE | ع0．02\％ | scid | pis | 959 | 0211 | －¢0\％ | $49^{\circ} \mathrm{z}$ | ษ2¢ |
| 910 ¢ | 18： | 02．201 | $\varepsilon \varepsilon^{\circ 9} \varepsilon^{\circ}$ | 02\％ | $00^{\circ} \mathrm{O}$ | 19.0 | عa＇s6 | 68．se | 26＂98 | 50.5 | L902s 1 | 628 | $12 \cdot 2$ | 051 | $06^{\circ} 022$ | $89^{\circ} \mathrm{z} 32$ | 9L－06 | oss | 909 | 9511 | $60^{\circ} 4$ | 230\％ | くこと |
| 22.69 | 2「1 |  | $50^{\circ} 88$ | Lss | $00^{\circ} \mathrm{O}$ | $6^{\circ} \mathrm{Z}$ | عと・85 | 17－17 | OE 02 | 05．5 | ？10ヶst | 292 | $3 \square^{\circ} 8$ | $0<1$ | $69^{\circ}$ Leع | 06•8LS | LE•38 | 929 | 592 | tori | 080 ${ }^{\circ}$ | Lご． | 92 E |
| 91009 | 65．1 | で・とて！ | $11 \cdot{ }_{1}$ | $23 t$ | $00^{\circ} 0$ | 88.5 | $1 く$－ッタ | 02.92 | 20it | 02．s | 2500t 1 | 512 | 18.1 | Es！ | $76^{\circ} \mathrm{P} 81$ | 28.503 | 53•a8 | 925 | 255 | 8111 | $16^{\circ} \mathrm{E}$ | $50 \cdot 9$ | 52 c |
| 60.601 | 02．1 | $11^{\circ} \mathrm{O}$ ¢ | $11 \cdot 9$ | Lt | $00 \cdot 0$ | $25 \cdot 5$ | co．s ${ }^{\circ}$ | ＋1．29 | $25^{\circ} 68$ | $12 \cdot 9$ | 0290t | 192 | 56.8 | 181 | $99^{\circ} 695$ | $32 \cdot 654$ | 630001 | ＋18 | 908 | 0291 | ع10\％ | $+3 \cdot 2$ | ヶてE |
| 05065 | 61.1 | 12.001 | 20028 | 268 | $00 \cdot 0$ | ＋6．2 | $00 \cdot 001$ | 51025 | $51^{\circ} \mathrm{zs}$ | S6．t | 01.621 | r8 | $07 \cdot 9$ | 681. | $80^{\circ} 60 \varepsilon$ | $80 \cdot 60 \varepsilon$ | spevol | 629 | 035 | 80.1 | $16 \cdot 6$ | $16^{\circ} \mathrm{E}$ | とてを |
| 0：9\％ | 58．1 | $52^{\circ} 251$ | E8 ${ }^{\circ} 9$ ¢ | 9 18 | $00^{\circ} \mathrm{O}$ | $05 \cdot 1$ | $00 \cdot 001$ | 80.69 | 80．69 | $9 r^{\circ} \mathrm{s}$ | 3900ヶ1 | 281 | 89.2 | EEI | to z2s | po－zzs | $65 \cdot 001$ | 215 | 605 | 1201 | $95 \cdot 1$ | $95^{\circ} 1$ | 30¢ |
| 83.45 | 02•1 | $08^{\circ} 281$ | 85 ${ }^{\circ}$ を | Spr | E8．0 | $920^{\circ} \mathrm{s}$ | 25902 | 25.15 | 8t ${ }^{\circ} \mathrm{L9}$ | $28 \cdot 5$ | $v 8.9 \mathrm{l}$ | 951 | 09.9 | ¢1t | $\bigcirc \varepsilon^{\circ} \mathrm{sze}$ | 5s•z2t | 680．s | 2＜8 | O8S | 2c1 | 32－1 | $1 \varepsilon^{*} \boldsymbol{z}$ | 905 |
| cs．09！ | $12 \cdot 2$ | 59.276 | $20 \cdot 92$ | 1101 | 00．0 | $00 \cdot 0$ | $00 \cdot 001$ | $0 \mathrm{c} \cdot 001$ | $00^{\circ} 001$ | 28.6 | 1202E！ | $2{ }^{2}$ | 9 c 2 z | 201 | 91.0121 | $191 \cdot 0 \div 2$ | L2： 901 | s29 | dr9 | Ezc1 | 20.1 | 20.1 | soc |
| 51974 | $6{ }^{\circ} \mathrm{C}$ | E9＊559 | r2．9s | 918 | $00 \cdot 0$ | $\leq L^{\circ} \mathrm{E}$ | $00 \cdot 001$ | 8 e ¢¢ | 9E＇EE | $20 \cdot 9$ |  | 682 | 20.6 | 091 | ¢8．5911 | －8．591 | 35•\％01 | 072 | 112 | $15+1$ | 52－i | ¢－1 | ¢0¢ |
| 88.811 | 52•2 | 8¢．ast | 02－19 | 816 | 0191 | ع2•S | 00001 | Efッャ | Ey＊${ }^{\text {cos }}$ | 58.5 | 2L0．0s 1 | عく2 | $62 \cdot 6$ | 221 | $26^{\circ} \mathrm{Br} 2$ | 260802 | LF•عor | E18 | 98． | 8051 | ct－z | $\mathrm{Cl}^{\circ} \mathrm{z}$ | soc |
| re20 | $41^{\circ} \mathrm{z}$ | Ss．88E | 26.85 | 528 | 00.0 | $09 \cdot 0$ | $00^{\circ} \mathrm{OB}$ | Lع•عя | 12.62 | 68.5 | $28 \cdot 6$ ¢ 1 | sez | LE．8 | 891 | $99^{\circ} \mathrm{Lzs}$ | 5＊＊S99 | ＋1－301 | pOL | c02 | Lor1 | cioz | $49^{\circ} \mathrm{S}$ | 23 S |
| 59.48 | 550\％ |  | 61009 | $¢_{6 L}$ | $84^{\circ} 0$ | 38.6 | $00 \cdot 001$ | leor | 18．0t | 16.8 | e8．ral | 621 | $\rightarrow \varepsilon \cdot 6$ | E21 | $20.65 \varepsilon$ | $20.6{ }^{\circ} \mathrm{j}$ | 0L・こと | 580 | 59 | orti | uz＊E | $0 \geq \bullet \varepsilon$ | 108 |
| x30n！ | $\times 3041$ | nStyl | hslat | Hstal | 3174 | 318」 | 781143 | 30゙ち゚d | 3u5y－d | 070 H | 3Snord |  | 1SnOH | Sasnn ${ }^{\text {chen }}$ | 3サア5•d |  |  |  |  | jo |  | V3ıy | 13：3 |
| $2: 1$ | －93403s |  | 1113 | 10 | yisnos | Ronror | $\wedge$－153y | sasnoh | s3snoh | $3 \mathrm{SnOH}^{-d}$ |  | ${ }_{3 S 10}$ | y 1 d | －350 | －${ }^{\text {dod }}$ | －${ }^{\text {dad }}$ | xjs |  | 3า\％ |  | 741：13 |  | 10： |
| 0.047 | Hslay | A1Isn30 | $y \geq d$ | － 01 | $35^{\text {nor }}$ |  | 1：1ココソコd | ¢ 5080 | 13 | SNOSy3d | d 3snor | $10^{\circ} \mathrm{ON}$ | －gymar |  | ssoys | 13：1 | －${ }^{\text {－}}$ 」 | 378 |  | 71101 | －נ15．y | 74101 |  |


|  | TOPiL | $\begin{aligned} & \text { Rrsibi } \\ & \text { EH:TiLi } \end{aligned}$ | TOTAL | MaLE. | Fchale | $F=M_{\bullet}$ $\operatorname{sex}$ |  | Gross POP' | Number. UCC. | IHHAB. PER | HO.OF HOUSE | HOUSE <br> HOLDS | rersins P.HOUSE | $\begin{aligned} & \text { HET } \\ & \text { HOUSES } \end{aligned}$ | GROSS HOUSES | PERCEIT RESID | vacalicy | HOJSE COHSTR | $\begin{aligned} & 1100 \\ & \text { OF } \end{aligned}$ | $\begin{aligned} & \text { FER } \\ & \text { CEHT } \end{aligned}$ | ${ }^{T Y}$ | 1FISH <br> EGREG. | $\begin{array}{rl} C R O & 0 \\ : & =G \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | afra |  | por. |  |  | RATIO |  | P.ACre | Housts | HoUSE | HOL DS | PHCUSE | HOLD |  | P.AC?E | Efital | fate. | fate | ${ }_{\text {IRISH }}$ | lRISH | 1 FISH | SEGEG. I'dex | $\begin{array}{r} 1 . G \\ \text { INDEX } \end{array}$ |
| 307 | 2.49 | 1.96 | 771 | 390 | 381 | 97.69 | 304.21 | 309.74 | 118 | 6.53 | 161 | 136.44 | 4.79 | 61.36 | 48.21 | $7 \varepsilon .57$ | 1.69 |  |  |  |  |  |  |
| 309 | 2.13 | 2.13 | $5 \times 5$ | 302 | 293 | 97.02 | 278.87 | 278.87 | 115 | 5.17 | 128 | 111.30 | 4.65 | 55.77 | 55.77 | 100.00 | 1.69 | 0.00 | 268 120 | 34.76 20.17 | 137.03 | . 28 | 53.79 |
| 210 | 1.42 | 1.42 | 733 | 453 | 480 | 105.076 | 655.93 | 655.93 | 128 | 7.29 | 200 | 156.25 | 4.66 | 92.10 | 92.10 | 100.00 | 2.34 | 0.00 | 246 | 20.37 | 56.24 | 0.74 | 31.64 162.19 |
| 211 | 2.31 | 2.13 | 1045 | 509 | 536 | 105.30 | 4r7.7E | 452.11 | 157 | 6.66 | 278 | 177.07 | 3.76 | 74.52 | 68.79 | 92.31 | 1.27 | 0.00 | 307 | 29.38 | 12.95 | 0.97 | 102.19 |
| 312 | 2.29 | 2.21 | 980 | 494 | 436. | 90.33 | 423.99 | 393.70 | 132 | 7.42 | 206 | 156.06 | 4.76 | 58.41 | 54.23 | 92.96 | 2.27 | c.00 | 250 |  | 43.58 | 1.08 | 86.73 |
| 313 | 2.84 | 2.31 | 1274 | 638 | 636 | 90.69 | 551.10 | 447.83 | 171 | 7.45 | 271 | 158.48 | 4.70 | 77.87 | 63.27 | 81.25 | E. 26 | 0.00 | 622 | 28.57 43.82 | 121.14 269.10 | 1.05 1.80 | 66.17 87.35 |
| 314 | 2.13 | 2.13 | 246 | 502 | 464 | 92.43 | 452.76 | 452.76 | 148 | 6.53 | 194 | 131.08 | 4.90 | 72.65 | 72.65 | 100.00 | 4.73 | 0.00 | 120 | 12.42 | 56.24 | ! 0.46 |  |
| 315 316 | 1.78 10.75 | 1.07 | 629 | 303 | 326 | 107.59 | 589.61 | 353.77 | 95 | 6.62 | 128 | 134.74 | 4.91 | 96.55 | 57.93 | 60.00 | 8.42 | 0.00 | 68 | 12.81 | 63.74 | 0.40 | 59.35 79.44 |
| 317 | 3.20 | 7.11 3.02 | 1236 809 | 439 | 597 496 | 53.43 | 173.79 | 113.96 | 198 | 6.24 | 210 | 106.06 | 5.89 | 28.26 | 18.53 | 65.57 | 1.52 | 0.00 | 192 | 15.53 | 27.00 | 0.57 | 18.43 |
| 318 | 2.13 | 1.60 | 771 | 302 | 389 | 101.83 | 4F1.81 | 361.36 | 119 | 6.86 6.48 | 193 128 | 147.33 107.56 | 4.66 6.02 | 47.97 76.24 | 45.31 57.18 | 94.44 75.00 | 10.69 2.52 | 0.00 | 189 | 21.02 2057 | 62.53 | 0.77 | 43.02 |
| 319 | 3.73 | 3.02 | 834 | 445 | 369 | 87.42 | 275.92 | 223.36 | 132 | 6.32 | 159 | 120.45 | 5.25 | 44.00 | 35.62 | 750.95 | 2.52 0.76 |  | 128 | 29.57 14.15 | 42.48 | 1.09 | 51.93 |
| 320 | 7.29 | 5.51 | 950 | 901 | 469 | 97.51 | 172.36 | 130.32 | 151 | 6.29 | 181 | 119.87 | 5.25 | 27.76 | 20.99 | 75.61 | 1.32 | 0.00 | 96 |  |  | 0.52 | 33.24 20.66 |
| 321 | 8.53 | 3.38 | 929 | 478 | 451 | 9.4 .35 | 275.00 | 108.85 | 129 | 7.20 | 154 | 119.38 | 6.03 | 42.03 | 16.64 | 39.53 | 10.08 | 0.70 | 205 | 10.15 22.07 | 17.42 60.68 | 0.37 | 20.66 32.33 |
| 322 | 6.76 | 1.78 | 902 | 458 | 444 | 96.94 | 507.31 | 133.50 | 126 | $7 \cdot 16$ | 158 | 125.40 | 5.71 | 72.55 | 19.09 | 26.32 | 2.38 | c. 00 | 155 | 17.18 | 87.18 | 0.63 | 63.62 |
|  | 40.89 | 60.10 | 13714 | 6927 | 6787 | 97.98 | 335.35 | 228.20 | 2050 | 6.69 | 2749 | 134.10 | 4.99 | 52.01 | 35.39 | 68.05 | 3.76 | 0.05 | 3214 | 23.44 | 78.59 | 0. | 44.97 |


| 88.62 | 1600 | 22009 | $95 \cdot 52$ | 9812 | 00\％0 | LP•L2 | 1s．ct | 20.18 | $96^{\circ} \mathrm{ir}$ | $59 \cdot 5$ | 2L•921 | Eisi | 91.2 | 661！ | $62^{\circ} \mathrm{\square}<1$ | $18 \cdot 582$ | L20z01 | ce | 2120 | Es58 | 20．6\％ | $\angle 2098$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $E 106$ | SEPO | 06\％ | 19.6 | 99 | $00 \cdot 0$ | E6026 | 7a＇19 | عا•力 | $93^{\circ} \mathrm{zz}$ | sz＊9 | 110111 | 011 | －6．9 | 66 | －8．0s | $12^{\circ} \mathrm{z}$ | 150．21 | 18 c | 908 | 439 | $98 \cdot 8$ | 150］ | 20\％ |
| Ez－6 | ErPo | 09＊＊ | ELOIt | 82 | $00^{\circ} 0$ | $010<81$ | Ej•1L | 51．12 | ＋962 | 89.5 | 120521 | 211 | 5102 | E6 | $89^{\circ} 25$ | マと・と | 280¢z1 | OLE | 562 | 599 | 20.6 | 290\％ | $93 \%$ |
| Es＊2y | 6＞0 0 | －1209 | $2 \varepsilon^{\circ} \mathrm{E} 1$ | 851 | $00^{\circ} 0$ | $1<\cdot 5$ | 2s．c9 | $88 \cdot 58$ | 920ヶ5 | $65 \cdot 5$ | －19121 | 212 | $82 \cdot 9$ | 541 | $10^{\circ} \mathrm{JEz}$ | 20．158 | عャ・col | c09 | E85 | 9211 | צE＊$¢$ | 91.5 | 50\％ |
| L60．p | 58．0 | $21^{\circ} \mathrm{E}$ L | L6．22 | $1 s \mathrm{E}$ | 00.0 | SL＊z | Lع・ヶ口 | L8－28 | $56^{\circ} 88$ | $99^{\circ} \mathrm{s}$ | S8．851 | 082 | Or＊ 8 | 281 | 95．892 | 62•81ع | 18－st | عzL | 503 | 92s 1 | 08．\％ | $69^{\circ} 5$ | ＋3： |
| $10 \cdot 15$ | 11.1 | －L．811 | $90 \cdot 08$ | $28 \varepsilon$ | 00．0 | 21.01 | $00 \cdot 001$ | 18.25 | 18.25 | $28 \cdot 5$ | 410.621 | 12 | 25.2 | 891 | 56＊per | $56^{\circ} \mathrm{\square} 68$ | 28.28 | 165 | $\varepsilon<7$ | －921 | 02＊8 | $0 z^{\circ} \mathrm{E}$ | cor |
| 01019 | 2ril | 96.981 | 05．98 | 869 | 00.0 | P100 | $00^{\circ} 001$ | 2108L | 210cL | $2 \varepsilon^{\circ} \mathrm{s}$ | E－9．ct | 1v¢ | 69.9 | 122 | 95＊584 | 75054 | $10^{\circ} \mathrm{LO}$ | 1 10 | 220 | Eisi | ciec | $\varepsilon_{\sim}{ }^{*} \varepsilon$ | －0． |
| $9208 \%$ | 610： | $98^{\circ} 121$ | $\angle 2^{\circ} \mathrm{Z}$ | sst | $00^{\circ} 0$ | 65.81 |  |  | 29029 | L6．s | 9 sebl | 9Ez | 88.9 | 902 | $95^{\circ} \mathrm{C}<2$ | E9－LLE | $\pm 1 . \% 01$ | 922 | 589 | oirt | $\varepsilon 2 \cdot 6$ | 91.5 | 104 |
| x 30 nl | $\times 30$ | HSidi | hslat | hsial | 317d | 318： | 7v1183 | 3\％コサ・d | 3y3y．d | व70\％ | Isnohd | S970H | 3SnOH | S3Snor | 3\＃Jvod | 3¢JY0d | 0ilry |  |  | －${ }^{\text {O }}$ d | Y3i4 | ソ3y | 131 |
| 9.1 | －938 |  | 1135 | 10 | 8151103 | 131，7ว\％＾ | $\wedge$ alsja | sistion | s3sinor | 3snohe | S 5070 H | 35 OH | ¢．3d | － 3 O？ | －dod | －dod | x．35 |  | 374 |  | 7\％11：1］ |  |  |
| $0 \times 0 \pm 0$ | HSI | A1tst3 | と3¢ | － OH | $35^{70}$ |  | 1435838 | S5089 | 13 H | SNOSa3 | 3 SrOH | $10 \cdot 011$ | －gyln！ | บว9：กก1 | ssoys | 1314 | $\bullet{ }^{+} \cdot \pm$ | 37 |  | 78.01 | －1153 | 11 | $15:$ |


| $9 \times 022$ | 2900 | $10^{\circ} 68$ | sc：zz | \＄ 202 | 210 | scitz | 0202L | 9E02z | S1＊08 | 95＊5 | 010921 | 2991 | －0．2 | 8181 | $8{ }^{\circ} 621$ | 01884 | 60＇901 | 9くく | 20st | 8126 | S9014 | 01025 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $82 \cdot 12$ | 72•1 | 0＜609 | 99＊EE | $\varepsilon 1 \varepsilon$ | $00^{\circ} \mathrm{O}$ | L90ヶE | Sc＊é | S909E | 81.68 | sz＊s | 00.811 | 421 | $02 \cdot 9$ | OSt | ع＜${ }^{\circ} 891$ | LE．081 | SL－s0t | 82b | 25 | 086 | 91.5 | 1505 | 9is |
| is．ez | 69.0 | E $\square^{\circ} \mathrm{Sc}$ | $99 \cdot 81$ | 681 | $00^{\circ} 0$ | 69.81 | 6E•8p | $880+1$ | $5 L^{\circ} 08$ | E9＊s | Le 0 ¢zi | 081 | $80 \cdot 2$ | Ert | $68^{\circ} 16$ | 169681 | 95．56 | 56 | 915 | ciot | $\varepsilon \varepsilon^{*}{ }^{\text {s }}$ | 20.11 | sis |
| 62.25 | 99.1 | $26^{\circ} \mathrm{c} 51$ | 20．5 | ャャ9 | $00^{\circ} \mathrm{O}$ | $26 \cdot \varepsilon \varepsilon$ | ts．19 | $20 \cdot \varepsilon \varepsilon$ | L9＇8s | scos | －109s 1 | 492 | $9 \mathrm{P} \cdot \mathrm{B}$ | 121 | $80^{\circ} 902$ | 88．＞ce | 0ع•sb | 212 | 412 | －251 | 12\％ | Es＇9 | ： 15 |
| EJ002 | 1900 | E19．92 | 19.91 | trl | 00．0 | 05092 | $6{ }^{\circ} 06$ | － $2 \cdot 12$ | 58.92 | 28.5 | Sc゙くで | 601 | 170 | 415 | ع0．s21 | 0ع． 251 | 10．36 | 2Ep | ser | $\angle 92$ | $15 \cdot 5$ | E099 | cit |
| $96 \cdot 58$ | 98.0 | 98.1 | $92^{\circ} \mathrm{E} 2$ | 052 | $00 \%$ | 290ヶE | teezL | く1．ヶて | 1508 | $16^{\circ} \mathrm{b}$ | 000971 | 612 | 21.2 | 051 | \＄90＊${ }^{\circ}$ | E8－LL1 | $90 \cdot 501$ | c95 | 215 | scot | 50.9 | $98^{\cdot 1}$ | 217 |
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## Appendix 7

SEWERS AND WATER SUPPLIES IN LIVERPOOL

## A7.1 Seugers

For most of the first half of the 19 th century, Liverpool lacked any adequate means for the transport of sewage. Storm sewers were probably first laid at the time of the reclamation of the pool in the early 18 th century and there is a reference to their inadequacy in carrying off rainwater in the Whitechapel area in 1791.766 The Watch Committee of Council later called for a report by the Borough Surveyor in 1816.767 Little work was done until John Foster's period of office as Borough Surveyor in 1829.768 He supervised a town survey and Levelling and a special purpose board (variously called 'the Highway Board' and the 'Commissioners of Sewers') was formed to carry out the work in 1830.769 The Board inherited 29 miles of sewers and 'surface drainage' (presumably surface gullies) and in the following 13 years, constructed 19 miles of new sewers at a cost of 100,000 pounds. 770 The work was expensive (four times the cost of Manchester's sewers) and presumably of the old

766 picton, 1907, Vol. 2, p. 261.
767 Given in Kaleidoscope, Volume 5 (New Series), 1824-1825, pp. 336a, 336b, 344a. The introduction mentions that it was reprinted for the interest of "all the owners of property affected by the present defective state of the sewers in this town". It would appear that few of Rennie's recommendations had been adopted in the intervening nine years.
768 Foster, 1829.
76911 George IV (1830) C. 15.
770 Playfair, 1845, p. 92.
square brick-built type, large enough to allow a man to enter. The work represented "a heavy charge upon the parishioners and in consideration of them can only be done gradually". 771

The sewers of Toxteth Park (within the Borough) began to be built by a separate commission established in 1842,772 although the tounship had had a 'Surveyor of Highways' since 1836.773 The other out-tounships had no separate commissioners of sewers, though Everton and Kirkdale had Surveyors of Highways from 1835 to 1846. The Corporation of Liverpool was made responsible for all paving, cleansing and sewering for the whole of the Municipal Borough by its act of 1846.774 The other boards and commissions were dissolved by this act.

## A7.2 Water77s

Prior to the Corporation's assumption of power in 1847, water had been supplied by private companies formed in the late 18 th century. Up to then, the town had no piped water at

772 5 and 6 Vic (1842) c. 102.
773 Apparently under the Highways Act, 5 and 6 Will IV (1835) c.
7749 and 10 Vic (1846) c. 127.
775 The following account is derived from the 'water pamphlets'

- a whelter of charge and countercharge that erupted in the period 1845 to 1847. This debate produced over 600 pages of printed text (and four reels of microfilmed Lords' Committee testimony) and is a classic example of 19 th century debate on public policy. See Holme, 1843a, 1843b; House of Commons Committee, 1843, Vol. 12; Fairburn, 1844; Liverpool Highway Board, 1845; Banner, 1845a, Holme, 1845; Banner, 1845b; [Herbert and Page ], 1847; House of Commons Committee, 1847, Vols. 135-7; [Anon], 1849; Simpsom and Newlands, 1849.
all and water had since medieval times been brought from wells such as the Fall Well in St., John's Lane or purchased from travelling water carts. In 1786 , an act was passed776 giving the Corporation power to dig wells and to collect and distribute water within the town. The act remained a 'dead letter' and nothing was apparently done to implement it until 1799, when powers were granted to the private 'Iiverpool Waterworks Company' (commonly called the 'Bootle Company') for "better supplying the town and port of Liverpool with water from certain springs in the Parish of Bootle".?77

Spurred by the possibility of losing a commercial operation, the Corporation's oligarchic council decided to cash in its powers of supplying water by creating a rival company. Four hundred shares were offered at 100 pounds each and subscriptions closed in five hours! 778 The action was quite illegal, for parliamentary powers granted to a corporation could not be auctioned off to third parties. Nevertheless, the socalled 'Corporation Waterworks Company' was formed and wells dug at Copperas Hill and Bevington Bush. This water, together with that brought by pipe from the Bootle springs, formed the town's only supply for the next 40 years. The Bootle company's powers were twice extended by Parliament in 1810779 and in 1813780 to allow the extension of supplies to Bootle, Kirkdale, Everton and West Derby. In 1822, the 'Corporation' waterworks were placed on
a legal footing by a new act78i which repealed the original act and renamed the company the 'Proprietors of the Liverpool Corporation Waterworks'. The name was again altered by an act of parliament in 1827 to the 'Liverpool and Harrington water Company'. This actis2 also extended their power to allow the supplying of Toxteth Park. Despite the apparent rivalry in their origins, the two companies appear to have settled into a compatible working relationship. The town was divided into areas to be supplied by one company alone, thus effecting a monopoly of supply. By 1845, when their shares were returning 30 per cent on their original capital, the companies' mode and reliability of supply were coming under the fierce criticisms that resulted in their dissolution (see above, chapter 6).

7813 George IV (1822) c. 77. 7827 and 8 George IV (1827) c. 36.

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indicated by a reference to the Library in which the material was found.

Abbreviations are as follows:

BM - British Museum (now British Library)
BPI - Birkenhead Public Library
HL - House of Lords Library
IA - Atheneum Library, Liverpool
IMI - Medical Institution, Liverpool
LMOH - Office of the Liverpool Medical Officer of Health
LP - Lambeth palace Library, London
LRO - Liverpool Record Office
LU - Cohen Library, Liverpool University
IUG - Goldsmith Library, London Oniversity
MPL - Manchester Public Library
pp - Parliamentary Papers (House of Commons, unless stated otheruise)
PRO - Public Record Office
SC - Select Committee
In Parliamentary Papers, page references are to the printed page numbers, not the MS page numbers. It should be noted that the MS page numbers are the official pagination and that used by the Readex microprint edition. However, the MS numbers are often obliterated or not present and are consequently difficult to utilise. The Irish University Press reprint does not use the MS numbering but retains the original printed numbers and, in addition, has added a separate pagination sequence of its oun.

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## APPENDIX TWO (continued)

1. J. J"Chadwick's, Map ot Liverpools 1/25.
2. Derivation from Chadwick's map, apparently by Eyes.
3. Charles Eyes', Phan of Liverpool, 1785.
4.. S.D.U.K. (1844?) reduction of Gage's Plan, 1836.
4. Tallis map, 1852 (?)
5. Benson's Plan c. 1861





[^0]:    650 ऊallace, 1797, p. 58.
    651 ibid. p. 68.

[^1]:    652 These Bills were kindly brought to my attention by professor David Glass who knew of their hiding place only feet from where I had worked for tuo years!
    653 The Parish Abstracts were required by Rickman in each of the first four censuses and the returns were foruarded to the census office by the Rector. The 1801 census required the clergy to list the numbers of baptisms and burials for each tenth year from 1700 to 1780 and thereafter for each year including 1800, lists of numbers of marriages yere also required (See Glass, 1973, p. 91).

[^2]:    654 However, the reason for the slight differences between this series and the "Dissenters included" series is unexplained. There may have been some difference in the 'accounting year' betveen the two.
    655 The Parish Abstract was 4.1 per cent in excess of the "Dissenters excluded" series but still 3 per cent less than the "Dissenters included" series.

[^3]:    664 Burials were 38.8 per cent less than deaths in the parish but this is explainable by recalling that deaths were registered by place of former residence rather than by place of burial. The opposite applies to the burial registers. For the Borough as a whole 15,390 burials are recorded against an estimated 16,360 registered deaths. The latter figure is an estimate because of the unavailability of registration statistics relating to the Borough and derived by taking 90 per cent of the total deaths in Liverpool and Hest Derby Registration Districts. (Ninety per cent of the population of these registration districts lived inside the Borough.)
    665 The Parish Abstract figures were increased by $5.6 \%, 1787$ to 1794; 7.0\%, 7796 and 1797; 9.3\%, 1808 and 1809, 10.0\%, 1819 to 1821; 15\%, 1823 to 1826; 22.6\%, 1829 and 1830 .

[^4]:    667 London's peak years for smallpox were also at 5 yearly intervals (Howe, 1972, p. 143).
    668 Haygarth quoted by Creighton, 1894, p. 139.
    669 Haygarth, 1793, p. . 453.

[^5]:    670 Armstrong, 1974 , p. 115.
    671 See Flinn, 1965, p. 12.

[^6]:    672 See Ackerknecht, 1948, pp. 578-9. 673 In 1849 Liverpool and West Derby Registration Districts combined accounted for 10 per cent of the national deaths.

[^7]:    676 Playfair, 1845, p. 21. He noted that Aspinall had stated 23,000 residents were to be expelled from cellars of the vorst kind.
    677 Aspinall, 1845, p. 78, q. 23. 678 Playfair, 1845, p. 87, q. 47. 679 Duncan, 1844, p. 127. 680 Slaney, 1840 , pp. 17 - 18. 681 Heekly Dispatch, 5 May, 1844, p. 4.

[^8]:    682 Engels, 1844, pp. 43-4. 683 Duncan, i840, p. 141.
    684 ibid. This was the figure referred to by Arnott and Kay, 1840, p. 74.

[^9]:    685 Aspinal1, 1845, p. 78, q. 21. Ky italics.
    686 playfair had shrewdy noted this discrepancy (see note 9 above). Aspinall may not have been very good with figures, witness this concluding question and its unusual reply - "Have you paid any attention, as Chairman of the Health committee, to vital statistics? - No, I have paid none." (Aspinal1, 1845, p. 86, g. 182).
    687 For confirmation of this, see also Fresh's statement that "a great number of cellars are likewise known to be occupied jointly uith rooms in the houses above..." Minutes, Health of the Toun Committee, 2 June 1846.

[^10]:    688 As police records indicate the presence of only two 'divisions' in 1835, these districts were probably 'beats' (Personal Communication, Asst. Chief Constable Lancaster, 17/6/74) •

[^11]:    689 This calculation is based on Table 7.5 The total street houses for the North District was incomplete because the boundary cut both Lime Street and W. Derby Wards into half. As the street house total is derived from the 1841 Census ward figures, minus the Corporation's count of court houses, an estimation of the distribution of street houses between the four halves had to be made. It was estimated by dividing the street house total according to the distribution of court houses between the four halves as given in the Surveyors' return. 690 Duncan, 1840, p. 143, q. 2411. 691 Duncan, 1833, p. 470.

[^12]:    699 This discussion is based on Armstrong, 1972.

[^13]:    703 Dr. Armstrong generously made available a printer's page proof listing of the 1861 attribution list prior to publication. 704 Census of England and Wales, 1862.
    705 Bellamy, forthcoming. .

[^14]:    706 Increases were recorded in all categories. The adult male participation rate rose from 92.1 per cent to 96.2 per cent, the adult female rate from 23.6 per cent to 36.3 per cent, juvenile males from 17.0 per cent to 23.8 per cent, and juvenile females from 11.6 per cent to 15.0 per cent. The improvement was greatest, therefore, in the recording of adult female occupations, those most likely to have been carelessly omitted in earlier censuses (Table A. 5.1).
    707 Compare the 359 males in this class in Liverpool and Toxteth Park with the 15,342 in Manchester and Salford.

[^15]:    713 For the probable reason that many 'dealers' were women and children and because few servants headed households of their own.
    714 Booth, 1886.
    715 Armstrong, 1972.

[^16]:    Source: 1851 Census Sample
    1851 Census Recalculations of Occupational Tables. .

[^17]:    716 Foster, 1974, p. 292.
    717 Anderson, 1971, pp., 25-6.
    718 Gray, 1973.
    719 As the individual occupations have been coded, it is possible to recombine them into new groupings at a later date if desired.

[^18]:    728 Sanderson, 1972, p. 90. Use was made of signatures on marriage registers in various parishes in Lancłashire. Literacy can be seen as an important surrogate for a whole range of social attributes. Though it should be added that high literacy rates could be found in 'declining' occupations such as shoemaking (a traditionally radical trade, see Thompson, 1964, p. 193), tailoring and hand loom weavers. It should also be noted that Sanderson's sample was of Anglican registers and there is some evidence in Liverpool at least that Irish shoemakers and tailors were of lower status and probably more illiterate than their English counterparts.

[^19]:    737 Ma jor subject headings included:- builders, Catholics, cellars, cemeteries, children, cholera, class (social), comfort, Corporate Estate, courts, crime, demolition, drunkenness, education, emigration, employment, fever, food, health, housing, 'improvements', Irish, land, lodging houses, migrants, mortality, nuisances, occupations, parks, paving, personal hygiene, planning, population, poverty, prostitution, religion, rents, residential change, sanitation, scavenging, Scottish, sewers, streets, suburbanization, tenements, vagrancy, water, Welsh. The geographic file was maintained by district and street name reference.

[^20]:    738 Fortunately, in Liverpool, the registration sub-districts were made up of whole wards and in two cases utilized a single ward.

[^21]:    739 For the organization of 19 th-century censuses and the availability and use of enumerators' books, see:A.J. Taylor, 1951; Beresford, 1963; [Anon], 1951; Barke, 1973; Hector, 1953; Armstrong, 1968; Drake; 1972.

[^22]:    740 "Destroyed as soon as was practicable after a report was published" (Personal Communication, Mrs. M. Havord, 10/8/71 office of population Census and Surveys).
    741 No title to these figures is given - but the totals tally with check marks against unmarried females. 742 Work undertaken by W.D. Jacobsen, Department of Geography, Liverpool University.

[^23]:    744 Anderson, 1972, p. 139.

[^24]:    745 Anderson, 1972, p. 138 ff .
    746 Tillott, 1972, p.. 130 .

[^25]:    747 (Non-sampled quasi-institutional households were also noted while extracting the sample and the enumeration district summary data reduced accordingly.)

[^26]:    750 The 1851 Census for Liverpool Registration District (with a few minor exceptions) appears to have been exceptionally well managed. No cases of overlapping boundaries or confused description occurred in the 1851 census. The E.D. structure of this census was better than that of 1841 and it may have improved as a consequence of the earlier experiance. 751 In the outer suburban fringes and rural areas, the tendency was to think of people in clusters or settlements. Hence, boundaries were frequently not given in the description of the enumeration district.

[^27]:    753 Rowntree, 1922, p. 35; Banks, 1954, p. 70.
    754 Banks, 1954, p. 74.

[^28]:    755 An area of $1 / 100 \mathrm{sq}$. inch is equivalent to 0.178 acres at the scale of $6^{\prime \prime}$ mile - the final scale at which the nonresidential land was mapped.
    756 Shops and small warehouses proved particularly difficult to differentiate from housing. This would account for the apparently low population and housing densities in some inner area enumeration districts.)

[^29]:    757 These instances were in any case visible by the ratio of householders per house, see later. The overcrowding yardstick adopted in this study was seven persons per house. This was derived by multiplication of 3.5 rooms per house by the commonly held standard of overcrozding as two or more persons per room (see footanotennal162.).
    758 I, therefore, disagree with the comment that "the house has little value as a unit of analysis." Tillot, 1972, p. 94.

[^30]:    762 If these counts of employment are discovered for manufacturing areas where the female labour force was more important, it would prove a useful overall index of factory employment.

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