```
import json
import requests
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import geopandas as gpd
import seaborn as sns
import numpy as np
pd.set_option('display.max_columns', None)
```

```
df = pd.read table("https://www2.census.gov/econ/bps/Place/Midwest
%20Region/mw2015a.txt", sep=",",
                  skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
df["Unnamed 41"] = np.nan
df = df.shift(1, axis=1)
df.Survey = df.index
df.index = np.arange(len(df))
dict names = \{\}
second = df.iloc[0].fillna("")
for i in range(len(df.columns)):
    first = df.columns[i]
    if first.startswith("Unnamed"):
        if df.columns[i-1].startswith("Unnamed"):
            first = df.columns[i+1]
        else:
            first = df.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[df.columns[i]] = new
df = df.rename(columns = dict names).drop([0])
# show the first five records
df.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
                      17
                                                               0005
         2015
                              001000
                                             095
2
         2015
                      17
                              002800
                                             043
                                                               0015
3
         2015
                      17
                              004900
                                             195
                                                               0025
         2015
                      17
                                             027
                                                               0030
                              005200
```

5	2015	17 00	06100	131		0040
	PS Place Code F	FIPS MCD Code	e Pop (CSA Code CE	BSA Code F	ootnote
Code 1	00113	11891	3319.0	999	99999	
NaN 2	00243	00250	36942.0	176	16980	
NaN 3	00516	00529	891.0	999	99999	
NaN 4	00555	44667	1190.0	476	41180	
NaN 5	00646	48398	3640.0	209	19340	
NaN						
Ce Rep	ntral City	Zip Code Reg	gion Code D	ivision Cod	de Number	of Months
1 12	NaN 614	110	2		3	
2	NaN 601	1012786	2		3	
3	NaN 612	230	2		3	
12 4	NaN 622	215	2		3	
12 5	NaN 612	231	2		3	
12	D1 N	D1 D1 d	1	1	/-1··- 2···-	ita Didaa
\		Place Bldgs	1-unit Uni			
1	Abingdon	0		0	0	Θ
	ddison village	4			25000	0
	Albany village	1		1 15	50000	0
4	Albers village	0		0	0	0
5	Aledo	1		1 25	50000	0
2-	units Units 2-u	units Value 3	3-4 units B	ldgs 3-4 ur	nits Units	3-4
unit 1	s Value \ 0	0		Θ	0	
0 2	0	0		0	0	
0 3	0	0		0	0	
0 4		0			0	
4	0	U		0	U	

0 5	0	0	0	0
0 5+ units Bl	.dgs 5+ unit	s Units 5+ ur	nits Value 1-unit	rep Bldgs \
1 2 3 4 5	0 0 0 0	0 0 0 0 0	0 0 0 0	0 4 1 0 1
1-unit rep Units \	Units 1-uni	t rep Value 2	2-units rep Bldgs	2-units rep
1	0	0	0	
0 2	4	1225000	0	
0	1	150000	0	
0			O	
4 0	0	0	0	
5	1	250000	0	
0				
2-units rep 1 2 3 4 5	0 Value 3-4 0 0 0 0 0 0	units rep Blo	dgs 3-4 units rep 0 0 0 0 0	Units \ 0
3-4 units r	ep Value 5+	units rep Bl	ldgs 5+ units rep	Units 5+ units
1 0	0		0	0
2	0		0	0
0	0		Θ	Θ
0				
4 0	0		0	0
0 5 0	0		0	0
0				

Two types of housing units:

- Single-family units: 1-unit rep Units
- Multifamily units: > 1 (need to add those fields up)
 - 2-units rep Units
 - 3-4 units rep Units

```
df1 = pd.read table("https://www2.census.gov/econ/bps/Place/Midwest
%20Region/mw2016a.txt", sep=",",
                  skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
df1["Unnamed 41"] = np.nan
df1 = df1.shift(1, axis=1)
df1.Survey = df1.index
df1.index = np.arange(len(df1))
dict names = \{\}
second = df1.iloc[0].fillna("")
for i in range(len(df1.columns)):
    first = df1.columns[i]
    if first.startswith("Unnamed"):
        if df1.columns[i-1].startswith("Unnamed"):
            first = df1.columns[i+1]
        else:
            first = dfl.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[df1.columns[i]] = new
df1 = df1.rename(columns = dict names).drop([0])
# show the first five records
df1.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
                       17
                              001000
                                              095
                                                               0005
         2016
2
                       17
                                                               0015
         2016
                              002800
                                              043
3
         2016
                       17
                              004900
                                              195
                                                               0025
4
         2016
                       17
                              005200
                                              027
                                                               0030
5
                       17
         2016
                              006100
                                              131
                                                               0040
  FIPS Place Code FIPS MCD Code
                                     Pop CSA Code CBSA Code Footnote
Code \
                                                999
1
           00113
                          11891
                                   3319.0
                                                        99999
NaN
           00243
                          00250
                                  36942.0
                                                176
                                                        16980
2
NaN
                                                999
3
           00516
                          00529
                                    891.0
                                                        99999
NaN
                                                476
           00555
                          44667
                                   1190.0
                                                        41180
NaN
```

5 NaN	00646	48398 3	640.0 20	09 19340	
Central Rep \	City Zip	Code Region	Code Divisio	n Code Number	of Months
1	NaN 61410		2	3	
12 2	NaN 601012	786	2	3	
12 3	NaN 61230		2	3	
12 4	NaN 62215		2	3	
12					
5 12	NaN 61231		2	3	
Р	lace Name Pla	ce Bldas 1-un	it Units 1-u	nit Value 2-u	nits Bldas
1	Abingdon	0	0	0	0
	_				
	n village	3	3	950000	0
3 Alban	y village	0	0	0	0
4 Alber	s village	1	1	60000	0
5	Aledo	0	0	0	0
2		W 1 2 4	51 . 5	4 '	2.4
2-units units Val	Units 2-unit ue \	s value 3-4 u	nits Blags 3	-4 units Units	5 3-4
1 0	0	0	0		9
2	0	Θ	0		9
0 3	0	Θ	0	(9
0 4	0	0	0	(9
0					
5 0	0	0	0		9
1 2 3 4	s Bldgs 5+ un 0 0 0 0	its Units 5+ 0 0 0 0	units Value 1 0 0 0 0	1-unit rep Blo	dgs \ 0 3 0 1
5	0	0	0		0
1-unit	rep Units 1-u	nit rep Value	2-units rep	Bldgs 2-units	s rep

```
Units \
                                      0
                                                           0
1
0
2
                                 950000
                                                           0
0
3
                                                           0
                                      0
0
4
                                  60000
                                                           0
0
5
                                      0
                                                           0
0
  2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \
1
                    0
2
                                           0
                                                                  0
3
                    0
                                           0
                                                                  0
4
                    0
                                           0
                                                                  0
5
                    0
                                                                  0
                                           0
  3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units
rep Value
                      0
                                                                  0
1
0
2
                      0
                                                                  0
0
3
                      0
                                                                  0
0
4
                      0
                                                                  0
0
5
                      0
                                                                  0
0
```

```
if first.startswith("Unnamed"):
        if df2.columns[i-1].startswith("Unnamed"):
            first = df2.columns[i+1]
        else:
            first = df2.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[df2.columns[i]]= new
df2 = df2.rename(columns = dict names).drop([0])
# show the first five records
df2.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2017
                       17
                              001000
                                             095
                                                               0005
2
         2017
                       17
                              002800
                                              043
                                                               0015
3
         2017
                       17
                              004900
                                              195
                                                               0025
4
                       17
                                                               0030
         2017
                              005200
                                              027
5
         2017
                       17
                              006100
                                              131
                                                               0040
  FIPS Place Code FIPS MCD Code
                                     Pop CSA Code CBSA Code Footnote
Code \
1
           00113
                          11891
                                   3319.0
                                                999
                                                        99999
NaN
           00243
                          00250
                                  36942.0
                                                176
                                                        16980
NaN
3
           00516
                          00529
                                    891.0
                                                999
                                                        99999
NaN
4
           00555
                          44667
                                   1190.0
                                                476
                                                        41180
NaN
                          48398
                                   3640.0
                                                209
                                                        19340
5
           00646
NaN
  Central City Zip Code Region Code Division Code Number of Months
Rep \
                                       2
                                                      3
1
           NaN 61410
12
2
           NaN
                601012786
                                                      3
12
3
           NaN 61230
                                       2
                                                      3
12
4
           NaN
                62215
                                                      3
12
5
           NaN 61231
                                       2
                                                      3
12
        Place Name Place Bldgs 1-unit Units 1-unit Value 2-units Bldgs
1
          Abingdon
                              0
                                                         0
                                                                        0
```

2	Addican vi	11000	16		16	20500	.00		0
2	Addison vi	Litage	16		16	38500			0
3	Albany vi	illage	2		2	5600	00		0
4	Albers vi	illage	0		0		0		0
5		Aledo	0		0		0		0
			nits Value 3	3-4 units	Bldgs 3	-4 unit	s Units	3-4	
un: 1	its Value	0	0		Θ		0		
0									
2		0	0		0		0		
3		0	Θ		0		0		
0 4		Θ	0		Θ		0		
0		0	0		0		0		
5 0		0	0		0		0		
	5⊥ unite R1	das 5±	units Units	: 5⊥ unite	. Value	1 _{-uni} +	ren Blde	as \	
1	or unites be	0	0		o vacue	1-41111		0	
2		0 0	0		0 0		-	16 2	
4		0	Θ		0			0	
5		0	0		0			0	
		Units :	1-unit rep V	alue 2-un	its rep	Bldgs	2-units	rep	
Un: 1	its \	0		0		0			
0			205						
2		16	385	0000		0			
3		2	56	0000		Θ			
0 4		0		Θ		0			
0									
5 0		0		0		0			
			2.4	D1 1	2.4				
1	z-units rep	value 0	3-4 units r	ep Blags 0	3-4 uni	ts rep	Units v	\	
2		0		0			0		
3 4		0 0		0 0			0 0		
5		0		0			Ö		

	rep Value	5+ units	rep Bldgs	5+ units	rep Units	5+ units
rep Value						
1	0		0		0	
0						
2	0		0		0	
0						
3	0		0		0	
0						
4	0		0		0	
0						
5	0		0		0	
0						

```
df3 = pd.read_table("https://www2.census.gov/econ/bps/Place/Midwest
%20Region/mw2018a.txt", sep=",",
                  skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
df3["Unnamed 41"] = np.nan
df3 = df3.shift(1, axis=1)
df3.Survey = df3.index
df3.index = np.arange(len(df3))
dict names = {}
second = df3.iloc[0].fillna("")
for i in range(len(df3.columns)):
    first = df3.columns[i]
    if first.startswith("Unnamed"):
        if df3.columns[i-1].startswith("Unnamed"):
            first = df3.columns[i+1]
        else:
            first = df3.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[df3.columns[i]] = new
df3 = df3.rename(columns = dict names).drop([0])
# show the first five records
df3.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2018
                      17
                             001000
                                             095
                                                               0005
2
         2018
                      17
                             002800
                                             043
                                                               0015
3
         2018
                      17
                             004900
                                             195
                                                               0025
4
         2018
                      17
                             005200
                                             027
                                                               0030
```

5	2018	17 00616	00 1	131	0040
	S Place Code FIPS	MCD Code	Pop CSA	Code CBSA Code	e Footnote
1	00113	11891	3319.0	999 99999	9
NaN 2	00243	00250 3	36942.0	176 16980	9
NaN 3	00516	00529	891.0	999 99999	9
NaN 4	00555	44667	1190.0	476 41180	9
NaN 5	00646	48398	3640.0	209 1934	9
NaN					
Cent Rep \	tral City Zip N	Code Regior	n Code Divis	sion Code Numbe	er of Months
1 12	NaN 61410		2	3	
2	NaN 601012	786	2	3	
3	NaN 61230		2	3	
4	NaN 62215		2	3	
12 5	NaN 61231		2	3	
12	Diana Nama Dia	D1 d 1	on the Hartha of	1	Di dan
\				l-unit Value 2	
1	Abingdon	0	0	0	0
	dison village	30	30	7175000	0
	lbany village	0	0	0	0
4 A	lbers village	0	0	0	0
5	Aledo	0	0	0	0
2 - ur	nits Units 2-unit	s Value 3-4	units Bldgs	s 3-4 units Un	its 3-4
units 1	Value \ 0	0	(9	0
0	0	0	6	9	0
0	0	0	(0
0 4		0			0
4	0	U		9	U

```
0
5
                0
                                0
                                                                    0
0
  5+ units Bldgs 5+ units Units 5+ units Value 1-unit rep Bldgs \
1
2
                 0
                                  0
                                                   0
                                                                     30
3
                 0
                                                   0
                                  0
                                                                      0
4
                 0
                                                   0
                                  0
                                                                      0
5
                 0
                                  0
                                                   0
                                                                      0
  1-unit rep Units 1-unit rep Value 2-units rep Bldgs 2-units rep
Units \
1
                                                           0
0
2
                  30
                                7175000
                                                           0
0
3
                                      0
                                                           0
0
4
                                                           0
                                      0
0
5
                                                           0
0
  2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \
1
2
                    0
                                           0
                                                                  0
3
                    0
                                           0
                                                                  0
4
                    0
                                           0
                                                                  0
5
                    0
                                           0
                                                                  0
  3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units
rep Value
                      0
                                                                  0
1
0
2
                      0
                                                                  0
0
3
                                                                  0
0
4
                                                                  0
0
5
                      0
                                                                  0
0
```

```
# the web data table has some format issue, this block of code is to
address that issue
df4["Unnamed 41"] = np.nan
df4 = df4.shift(1, axis=1)
df4.Survey = df4.index
df4.index = np.arange(len(df4))
dict names = {}
second = df4.iloc[0].fillna("")
for i in range(len(df4.columns)):
    first = df4.columns[i]
    if first.startswith("Unnamed"):
        if df4.columns[i-1].startswith("Unnamed"):
            first = df4.columns[i+1]
        else:
            first = df4.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[df4.columns[i]]= new
df4 = df4.rename(columns = dict names).drop([0])
# show the first five records
df4.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2019
                       17
                              001000
                                             095
                                                               0005
2
         2019
                       17
                              002800
                                             043
                                                               0015
3
                       17
         2019
                              004900
                                             195
                                                               0025
4
         2019
                       17
                              005200
                                             027
                                                               0030
5
                       17
                                             131
         2019
                              006100
                                                               0040
                                     Pop CSA Code CBSA Code Footnote
  FIPS Place Code FIPS MCD Code
Code \
                                                999
1
           00113
                          11891
                                   3319.0
                                                        99999
NaN
           00243
                          00250
                                  36942.0
                                                176
                                                        16980
2
NaN
           00516
                          00529
                                    891.0
                                                999
                                                        99999
3
NaN
                                                476
           00555
                          44667
                                   1190.0
                                                        41180
NaN
5
           00646
                          48398
                                   3640.0
                                                209
                                                        19340
NaN
                   Zip Code Region Code Division Code Number of Months
  Central City
Rep \
1
           NaN 61410
                                       2
                                                      3
12
```

2	NaN 60101	2786	2	3	
12 3	NaN 61230		2	3	
12 4	NaN 62215		2	3	
12 5	NaN 61231		2	3	
12					
\	Place Name Pl	ace Bldgs 1-unit	Units 1-unit	Value 2-unit	s Bldgs
ì	Abingdon	0	0	0	Θ
2	Addison village	28	28 63	350625	Θ
3	Albany village	1	1 '	427000	0
4	Albers village	0	0	0	0
5	Aledo	0	0	0	0
-) unito Unito 2 uni	to Volue 2 4 uni-	+a D]daa 2 4 .	unito Unito 2	4
uni	?-units Units 2-uni .ts Value \		-		-4
1 0	Θ	Θ	0	0	
2	0	0	0	0	
3	0	0	0	0	
4 0	0	Θ	0	0	
5	0	0	0	0	
	5+ units Bldgs 5+ u	nito Unito 51 un	ito Valua 1 m	nit ron Pldas	\
1	0	0	0	Θ	
2	0 0	0	0	28 1	
4 5	0 0	0 0	0 0	0 0	
	l-unit rep Units 1-	unit rep Value 2	-units rep Blo	dgs 2-units r	ер
Uni 1	.ts \ 0	0		0	
0 2	28	6350625		0	
0	1	427000		0	
0	1	427000		J	

4	0		0	0	
0 5	0		0	0	
0					
2-units re 1 2 3 4 5	p Value 3-4 u 0 0 0 0 0	units rep	Bldgs 3-4 0 0 0 0 0 0	l units rep	Units \ 0 0 0 0 0 0
3-4 units rep Value	rep Value 5+	units re	p Bldgs 5+	units rep	Units 5+ units
1	0		0		0
0 2	0		0		0
0 3	0		0		Θ
0					
4 0	0		0		0
5 0	0		0		0
#combining a vertical_con					
#concatenated dfmw=vertical		dwest reg	ion for 20	015-2019	
dfmw=dfmw.re	set_index()				
# Drop a sped	<i>cific column,</i> drop(columns=			ي ا	
dfmw					
	Date State (Code 6-Di	git ID Cou	unty Code Ce	nsus Place Code
0	2015	17	001000	095	0005
1	2015	17	002800	043	0015
2	2015	17	004900	195	0025
3					

4	2015	17	0061	L00	131		0040
			•				
40022	2019	55	9796	000	043		NaN
40023	2019	55	9795	500	081		2880
40024	2019	55	9805	500	021		2885
40025	2019	55	9820	900	019		NaN
40026	2019	55	9840	000	103		2890
FIPS	5 Place Code F Code \	IPS MCD	Code	Pop	CSA Code	CBSA Code	
0	00113	11	1891	3319.0	999	99999	
NaN 1 NaN	00243	00)250	36942.0	176	16980	
2 NaN	00516	00)529	891.0	999	99999	
3 NaN	00555	44	1667	1190.0	476	41180	
4	00646	48	398	3640.0	209	19340	
NaN							
40022	00000	89	9250	346.0	999	99999	
NaN 40023	00000		9275	147.0	999	99999	
NaN							
40024 NaN	00000	89	9300	768.0	357	31540	
40025 NaN	00000	89	9425	886.0	999	99999	
40026 NaN	00000	89	9625	74.0	999	99999	
	Land City	7: - 6 - 4	D			·	
Cent 0 1 2 3 4	NaN 614	10 012786 30 15	e Regio	on Code I 2 2 2 2 2 2	Division C	ode \ 3 3 3 3 3	
40022 40023 40024	NaN 538 NaN 546 NaN 539	71		2 2 2		3 3 3	

40025 40026	NaN NaN	54446 54634		2 2	3	
	Number of Mon	nths Rep	Pla	ace Name	Place Bldgs	1-unit Units
0		12	ļ	Abingdon	0	0
1		11	Addison	village	4	4
2		12	Albany	village	1	1
3		12	Albers	village	9	0
4		12		Aledo	1	1
40022		12	Wyalusi	ing town	4	4
40023		12	Wyeville	village	0	0
40024		12	Wyocena	village	1	1
40025		0	Yo	ork town	0	0
40026		12	Yuba	village	0	0
	1-unit Value	2-units	Bldgs 2-ur	nits Unit	s 2-units Va	lue 3-4 units
Bldgs 0	0		0		0	0
0 1	1225000		Θ		0	0
0	150000		0		0	0
0	0		0		0	0
3 0 4	250000		0		0	0
0	250000		U		U	U
40022 0	949000		0		0	0
40023 0	0		0		0	0
40024 0	178000		0		0	0
40025 0	Θ		0		0	0

40026			0		(9		0			0		
0													
	2 1		lloite.	2 4	ni+c	Value	г.		D1 das	г.		lloi+o	\
0	3-4	units	Units 0	3-4 u	IIILLS	vatue 0) +	units	Brugs 0	5+	units	011113	\
1			0			0			0			0	
2			0			0			0			0	
3			0			0			0			0	
4			0			0			0			0	
40022			0			0			0			0	
40023			0			0			0			0	
40024			0			0			0			0	
40025			0			0			0			0	
40026			0			0			0			0	
	5+ ı	units '	Value 1	l-unit	rep	Bldgs	1-ι	ınit re	ep Uni	ts :	l-unit	rep	
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2	, ,		0			1				1			
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250000)		U							1			
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0			U			U				U			
40024			0			1				1			
178000)												
40025			0			0				0			
0 40026			0			0				0			
0			U			U				U			
0	2-ur	nits r	ep Bldg	_	nits	rep U	_		its rep	o Va		١	
0				0			6				0 0		
1 2 3 4				0			6				0		
3				0			e				0		
4				0			6)			0		
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      5+ units rep Bldgs 5+ units rep Units 5+ units rep Value
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                                                                  0
40024
                         0
                                              0
                                                                  0
40025
                         0
                                              0
                                                                  0
40026
[40027 rows x 41 columns]
import pandas as pd
# Assuming your data is in a CSV file named 'data.csv'
data = dfmw
# Select the columns of interest
selected columns = ['FIPS Place Code', 'Zip Code', 'Survey Date', '1-
unit rep Units', 'Place Name']
# Extract the desired data
extracted datas = data[selected columns]
```

filtering the column with 1-unit rep unit data

```
#choosing the column with 1-unit rep unit data
extracted datas
      FIPS Place Code
                           Zip Code Survey Date 1-unit rep Units \
0
                00113
                        61410
                                             2015
1
                00243
                                                                  4
                        601012786
                                            2015
2
                00516
                        61230
                                             2015
                                                                  1
3
                                                                  0
                00555
                        62215
                                            2015
4
                00646
                        61231
                                            2015
                                                                  1
                00000
40022
                        53801
                                             2019
                                                                  4
40023
                00000
                        54671
                                            2019
                                                                  0
                                            2019
                                                                  1
40024
                00000
                        53969
                                                                  0
40025
                00000
                        54446
                                            2019
40026
                00000
                        54634
                                            2019
                                                                  0
              Place Name
0
                Abingdon
1
        Addison village
2
         Albany village
3
         Albers village
4
                   Aledo
40022
         Wyalusing town
      Wyeville village
40023
40024
       Wyocena village
40025
              York town
40026
           Yuba village
[40027 rows x 5 columns]
# Group by 'Zip Code', 'FIPS Place Code', and 'Place Name', and sum
'1-unit rep Units'
grouped df = extracted datas.groupby(['Zip Code', 'FIPS Place Code',
'Place Name', 'Survey Date'])['1-unit rep Units'].sum().reset_index()
# Pivot the DataFrame to have years as columns
pivot_df = grouped_df.pivot_table(index=['Zip Code', 'FIPS Place
Code', 'Place Name'], columns='Survey Date', values='1-unit rep
Units', fill value=0)
# Reset the index to have 'Zip Code', 'FIPS Place Code', and 'Place
Name' as columns
pivot df.reset index(inplace=True)
# Rename the columns
pivot_df.columns = ['Zip Code', 'FIPS Place Code', 'Place Name',
'2015', '2016', '2017', '2018', '2019']
```

# Disr	olav t	he piv	ot Data	aFrame	
print					
2015	Zi	p Code	FIPS	Place Code	Place Name
0	15454			48855	Manilla
0 1	19372			00000	Tiffin township
0 2	42112			00000	Milton township
14 3	43003			00000	Westfield township
0					·
4 9	43011			00000	Hilliar township
8494 0	69358			32830	Morrill village
8495	69360			42775	Rushville
0 8496	69360	0039		99990	Sheridan County Unincorporated Area
0 8497	69361			44245	Scottsbluff
9 8498	69367			52925	Whitney village
0					
0	2016	2017 0	2018 1	2019 0	
1	0	0	3	0	
2	11 0	15 0	11	12 6	
4	10 	11	10	14	
8494 8495	1 0	0 0	1 0	0 0	
8496 8497	0 10	0 10	0 8	0 5	
8498	0	0	0	0	
[8499	rows	x 8 co	lumns]		

Building permits for midwest region fips place code for single units from 2015-2019

pivot_df

	Zip	Code	FIPS F	Place	Code					Place	e Name
2015 0	\ 15454			15	3855					M	anilla
0											
1 0	19372			00	0000				Tiff	fin to	wnship
2	42112			00	0000				Milt	ton to	wnship
14 3	43003			00	0000				Westfie	eld to	wnship
0	43011			0.0	0000						
4 9	43011			96	0000				птст	Lar LOV	wnship
8494	69358			32	2830				Morr	rill v	illage
0 8495	69360			42	2775					Rusl	hville
0 8496	6936000	939		99	9990	Sherid	lan Cou	nty	Unincorp	orate	d Area
0 8497	69361			1/	1245					Scotte	sbluff
9											
8498	69367			52	2925				Whit	tney v	illage
0											
		2017	2018	2019							
Θ	2016 2 0 0	2017 0 0	2018	2019 0 0							
0 1 2	0 0 11	0 0 15	1 3 11	0 0 12							
Θ	0 0	0 0	1 3	0 0							
0 1 2 3 4	0 0 11 0 10	0 0 15 0 11	1 3 11 0 10	0 0 12 6 14							
0 1 2 3 4 8494 8495	0 0 11 0 10 	0 0 15 0 11 0	1 3 11 0 10 1	0 0 12 6 14 0							
0 1 2 3 4 8494 8495 8496	0 0 11 0 10	0 0 15 0 11 0 0	1 3 11 0 10 1 0	0 0 12 6 14 0 0							
0 1 2 3 4 8494 8495	0 0 11 0 10 1 0	0 0 15 0 11 0	1 3 11 0 10 1	0 0 12 6 14 0							
0 1 2 3 4 8494 8495 8496 8497 8498	0 0 11 0 10 1 0 0	0 0 15 0 11 0 0 0 10	1 3 11 0 10 1 0 0 8	0 0 12 6 14 0 0							
0 1 2 3 4 8494 8495 8496 8497 8498	0 0 11 0 10 1 0 0 10	0 0 15 0 11 0 0 0 10	1 3 11 0 10 1 0 0 8	0 0 12 6 14 0 0							
0 1 2 3 4 8494 8495 8496 8497 8498 [8499 dfmw	0 0 11 0 10 1 0 0 10 0	0 0 15 0 11 0 0 0 10 0	1 3 11 0 10 1 0 0 8 0	0 0 12 6 14 0 0 5	6-Dig:	it ID C	County	Code	Census	Place	Code
0 1 2 3 4 8494 8495 8496 8497 8498	0 0 11 0 10 1 0 0 10 0	0 0 15 0 11 0 0 0 10 0	1 3 11 0 10 1 0 0 8 0	0 0 12 6 14 0 0 5	_	it ID C 91000	County	Code 095		Place	Code 0005
0 1 2 3 4 8494 8495 8496 8497 8498 [8499 dfmw	0 0 11 0 10 1 0 0 10 0	0 0 15 0 11 0 0 0 10 0 8 co	1 3 11 0 10 1 0 0 8 0	0 0 12 6 14 0 0 0 5 0	00	91000	County	095		Place	0005
0 1 2 3 4 8494 8495 8496 8497 8498 [8499 dfmw	0 0 11 0 10 1 0 0 10 0	0 0 15 0 11 0 0 0 10 0	1 3 11 0 10 1 0 0 8 0	0 0 12 6 14 0 0 0 5 0	00		County			Place	

3	2015	17	00520	9	027		0030
4	2015	17	00610	9	131		0040
40022	2019	55	97900	9	043		NaN
40023	2019	55	97950	9	081		2880
40024	2019	55	98050	9	021		2885
40025	2019	55	98200	9	019		NaN
40026	2019	55	98400	9	103		2890
Footnote Code				•	A Code CB		
0 NaN	00113	118	91	3319.0	999	99999	
1 NaN	00243	002	:50 3	6942.0	176	16980	
2 NaN	00516	005	29	891.0	999	99999	
3	00555	446	67	1190.0	476	41180	
NaN 4	00646	483	98	3640.0	209	19340	
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40022	00000	892	:50	346.0	999	99999	
NaN 40023	00000	892	275	147.0	999	99999	
NaN 40024	00000	893		768.0	357	31540	
NaN 40025	00000	894		886.0	999	99999	
NaN							
40026 NaN	00000	896	23	74.0	999	99999	
Central 0 1 2 3 4	NaN 61416 NaN 60103 NaN 61236 NaN 62215 NaN 61233) 12786) 5 L	Region	Code Div 2 2 2 2 2 2		3 3 3 3	
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40023 40024 40025 40026	NaN NaN NaN NaN	54671 53969 54446 54634		2 2 2 2		3 3 3 3	
	Number of Mor	nths Rep	Pla	ace Name	Place Bldg	gs 1-unit	Units
0		12	Į.	Abingdon		0	0
1		11	Addison	village		4	4
2		12	Albany	village		1	1
3		12	Albers	village		0	0
4		12		Aledo		1	1
40022		12	Wyalusi	ing town		4	4
40023		12	Wyeville			Θ	Θ
40024		12	Wyocena			1	1
40025		0	-	ork town		0	9
40026		12		village		0	9
40020		12	Tuba	victage		U	U
D1 d = =	1-unit Value	2-units	Bldgs 2-ur	nits Unit	ts 2-units	Value 3-	4 units
Bldgs 0	0		0		Θ	Θ	
0 1	1225000		0		0	0	
0							
2	150000		0		0	Θ	
0 3	0		0		0	0	
0 4	250000		0		Θ	Θ	
0	230000		U		U	U	
40022	949000		0		0	Θ	
0							
40023 0	0		0		0	0	
40024 0	178000		0		0	0	

40025		0	()	0		0	
0 40026		0	(•	0		0	
0								
0 1 2 3 4	3-4 units	S Units 3 0 0 0 0 0	3-4 units	Value 0 0 0 0	5+ units	Bldgs 5- 0 0 0 0	+ units	Units \ 0 0 0 0 0
40022 40023 40024 40025 40026		0 0 0 0 0		0 0 0 0		0 0 0 0 0		0 0 0 0 0
		Value 1-	-unit rep	Bldgs	1-unit re	ep Units	1-unit	rep
Value 0	\	0		0		0		
0 1		0		4		4		
122500	90							
2 150000	a	0		1		1		
3	5	0		0		0		
0		0		1		1		
4 250000	9	0		1		1		
40022		0		4		4		
949000	9	U		4		4		
40023		0		0		0		
0 40024		0		1		1		
178000	9							
40025 0		0		0		0		
40026		0		Θ		0		
0								
0 1 2 3 4	2-units		9	rep Ur	nits 2-un: 0 0 0 0 0	its rep '	Value \ 0	

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40022
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       3-4 units rep Bldgs 3-4 units rep Units 3-4 units rep Value \
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40025
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                           0
       5+ units rep Bldgs 5+ units rep Units 5+ units rep Value
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40024
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40025
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40026
[40027 rows x 41 columns]
```

Filtering for multiple units for midwest region

```
import pandas as pd

data = dfmw

# Select the columns of interest
selected_columnsm = ['FIPS Place Code','Zip Code','Survey Date', '2-units rep Units','3-4 units rep Units','5+ units rep Units', 'Place Name']

# Extract the desired data
extracted_datam = data[selected_columnsm]
```

```
extracted datam
      FIPS Place Code
                           Zip Code Survey Date 2-units rep Units \
0
                00113
                        61410
                                            2015
1
                00243
                        601012786
                                            2015
                                                                   0
2
                                                                   0
                00516
                        61230
                                            2015
3
                00555
                        62215
                                            2015
                                                                   0
4
                                            2015
                                                                   0
                00646
                        61231
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                                 . . .
40022
                00000
                        53801
                                             2019
                                                                   0
                                                                   0
40023
                00000
                        54671
                                             2019
40024
                00000
                        53969
                                            2019
                                                                   0
40025
                00000
                        54446
                                            2019
                                                                   0
40026
                00000
                                                                   0
                        54634
                                            2019
      3-4 units rep Units 5+ units rep Units
                                                       Place Name
0
                                                         Abingdon
1
                         0
                                              0
                                                  Addison village
2
                         0
                                                   Albany village
                                              0
3
                         0
                                              0
                                                   Albers village
4
                         0
                                              0
                                                            Aledo
. . .
40022
                         0
                                             0
                                                   Wyalusing town
                                                 Wyeville village
40023
                         0
                                              0
                         0
                                              0
                                                  Wyocena village
40024
40025
                         0
                                              0
                                                        York town
40026
                         0
                                              0
                                                     Yuba village
[40027 \text{ rows } x 7 \text{ columns}]
# Group by 'Zip Code,' 'FIPS Place Code,' 'Place Name,' and 'Survey
Date, ' and sum the units columns
grouped dfm = extracted datam.groupby(['Zip Code', 'FIPS Place Code',
'Place Name', 'Survey Date']).agg({
    '2-units rep Units': 'sum',
    '3-4 units rep Units': 'sum',
    '5+ units rep Units': 'sum'
}).reset_index()
# Create a new column 'multi unit' by summing the '2-units rep Units,'
'3-4 units rep Units,' and '5+ units rep Units'
grouped dfm['multi unit'] = grouped dfm['2-units rep Units'] +
grouped_dfm['3-4 units rep Units'] + grouped_dfm['5+ units rep Units']
# Display the grouped DataFrame
print(grouped dfm)
```

## A0005 69367 52925 Whitney village 2016 ## 40006 69367 52925 Whitney village 2017 ## 40007 2000 2000 ## 40008 69367 52925 Whitney village 2018 ## 40008 69367 52925 Whitney village 2019	0 1 2 3 4 	Zip 15454 15454 15454 15454 15454	Code FIPS	Place Code 48855 48855 48855 48855 48855 	Place Name Manilla Manilla Manilla Manilla Manilla Manilla Whitney village	Survey Date \ 2015 2016 2017 2018 2019 2015
unit 0	40006 40007	69367 69367 69367		52925 52925 52925	Whitney village Whitney village Whitney village	2017 2018 2019
0000 1		2-units	•	3-4 units	•	•
1			Θ		0	0
2	1		0		0	Θ
3			Θ		0	0
0000 4 0 0 0 0 0 0000			۵		0	٥
000			в		U	U
			0		0	0
40004 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0						
40005 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			0		0	0
000 40006			0		Θ	O
000 40007	000					
40007 0 0 0 0 000 40008 0 0 0 0 [40009 rows x 8 columns] grouped_dfm			0		0	0
40008 0 0 0 0 [40009 rows x 8 columns] grouped_dfm Zip Code FIPS Place Code Place Name Survey Date \ 0 15454 48855 Manilla 2015 1 15454 48855 Manilla 2016 2 15454 48855 Manilla 2017 3 15454 48855 Manilla 2017 3 15454 48855 Manilla 2018 4 15454 48855 Manilla 2019	40007		0		0	0
[40009 rows x 8 columns] grouped_dfm Zip Code FIPS Place Code Place Name Survey Date \ 0 15454 48855 Manilla 2015 1 15454 48855 Manilla 2016 2 15454 48855 Manilla 2017 3 15454 48855 Manilla 2017 3 15454 48855 Manilla 2018 4 15454 48855 Manilla 2019			0		0	Θ
grouped_dfm Zip Code FIPS Place Code Place Name Survey Date \ 0 15454 48855 Manilla 2015 1 15454 48855 Manilla 2016 2 15454 48855 Manilla 2017 3 15454 48855 Manilla 2018 4 15454 48855 Manilla 2019			_		•	-
Zip Code FIPS Place Code Place Name Survey Date \ 0 15454 48855 Manilla 2015 1 15454 48855 Manilla 2016 2 15454 48855 Manilla 2017 3 15454 48855 Manilla 2018 4 15454 48855 Manilla 2019	[40009	rows x	8 columns]		
0 15454 48855 Manilla 2015 1 15454 48855 Manilla 2016 2 15454 48855 Manilla 2017 3 15454 48855 Manilla 2018 4 15454 48855 Manilla 2019	groupe	ed_dfm				
	1 2 3 4	15454 15454 15454 15454	Code FIPS	48855 48855 48855 48855	Manilla Manilla Manilla Manilla	2015 2016 2017 2018 2019
		69367		52925	Whitney village	

40005 40006 40007 40008	69367 69367		52925 52925 52925 52925	Whitney Whitney	village village village village	2016 2017 2018 2019
	2-units	rep Units	3-4 units	rep Units	5+ units	rep Units multi
unit 0		0		0		0
000 1		0		0		0
000		U		9		в
2 000		0		0		0
3		0		0		0
000		0		0		0
4 000		О		0		0
40004		Θ		0		0
000		0		0		0
40005 000		0		0		0
40006		0		0		0
000 40007		0		0		0
000		0		0		0
40008 000		0		0		0
[4000) rowe v	8 columns	1			
_			_			
pivot_ Code'	$_{dfm} = g$	rouped_dfm	.pivot_tab	rs as colum le(index=[rvey Date'	'Zip Code	', 'FIPS Place 'multi unit',
Name'	as colu	mns	<i>ve 'Zip Coo</i> nplace= <mark>Tru</mark>		Place Cod	de', and 'Place
pivot	ame the d _dfm.cold ', '2016	umns = ['Z]	ip Code', '2018', '	'FIPS Place 2019']	e Code',	'Place Name',
pivot			ame to a C ing_permit	SV file s_grouped_2	2015 - 2019	.csv',

# Disp	olay t	he piv	ot Data	aFrame	
print(
2015	Zi	p Code	FIPS	Place Code	Place Name
0	15454			48855	Manilla
0 1	19372			00000	Tiffin township
0 2	42112			00000	Milton township
0 3	43003			00000	Westfield township
0					
4 0	43011			00000	Hilliar township
				• • • •	
8494 0	69358			32830	Morrill village
8495	69360			42775	Rushville
0 8496	69360	0039		99990	Sheridan County Unincorporated Area
0 8497	69361			44245	Scottsbluff
0 8498	69367			52925	Whitney village
0					
0	2016	2017 0	2018 0	2019 0	
1	0	0	0	Θ	
2	0 0	0 0	0 0	0 0	
4	0	0	0	0	
8494 8495	0 0	0 0	0 0	0 0	
8496 8497	0 12	0 200	0 0	0 0	
8498	0	0	0	0	
[8499	rows	x 8 co	lumns]		

Building permits for fips place code for multi units for midwest region from 2015-2019

 ${\tt pivot_dfm}$

		p Code	FIPS	Place Code	Place Name
2015 0	\ 15454			48855	Manilla
0					
1 0	19372			00000	Tiffin township
2	42112			00000	Milton township
0 3	43003			00000	Westfield township
0					
4 0	43011			00000	Hilliar township
8494	69358			32830	Morrill village
0 8495	69360			42775	Rushville
0	09300			42113	
8496 0	69360	0039		99990	Sheridan County Unincorporated Area
8497	69361			44245	Scottsbluff
0 8498	69367			52925	Whitney village
0					
	2016	2017	2018	2019	
0	0	0	0	0	
1	0 0	0 0	0 0	0 0	
2 3 4	0	0	0	0	
4	0	0	0	0	
8494	0	0	0	0	
8495 8496	0 0	0 0	0 0	0 0	
8497	12	200	0	0	
8498	0	0	0	0	
[8499	rows	x 8 co	lumns]		

#Obtain and read the building permit data set for all the places in Northeast Region

#https://www2.census.gov/econ/bps/Place/Northeast%20Region/ne2015a.txt

```
dfn1 = pd.read table("https://www2.census.gov/econ/bps/Place/Northeast
%20Region/ne2015a.txt", sep=",",
                  skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfn1["Unnamed 41"] = np.nan
dfn1 = dfn1.shift(1, axis=1)
dfn1.Survey = dfn1.index
dfn1.index = np.arange(len(dfn1))
dict names = \{\}
second = dfn1.iloc[0].fillna("")
for i in range(len(dfn1.columns)):
    first = dfn1.columns[i]
    if first.startswith("Unnamed"):
        if dfn1.columns[i-1].startswith("Unnamed"):
            first = dfn1.columns[i+1]
        else:
            first = dfn1.columns[i-1]
    #
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfn1.columns[i]]= new
dfn1 = dfn1.rename(columns = dict names).drop([0])
# show the first five records
dfn1.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2015
                      09
                              001000
                                             013
                                                                NaN
2
         2015
                      09
                              005000
                                             009
                                                               0010
3
                      09
         2015
                              009000
                                             015
                                                                NaN
4
         2015
                      09
                              013000
                                             003
                                                                NaN
5
                      09
         2015
                              021000
                                             005
                                                                NaN
  FIPS Place Code FIPS MCD Code
                                     Pop CSA Code CBSA Code Footnote
Code \
1
           00000
                          01080
                                   3303.0
                                               278
                                                        25540
NaN
                                               408
2
           01150
                          01220
                                  19249.0
                                                        35300
2
3
           00000
                          01430
                                   4317.0
                                               148
                                                        49340
NaN
4
           00000
                          02060
                                  18098.0
                                               278
                                                        25540
NaN
                          02760
                                   3799.0
                                               999
                                                        99999
           00000
NaN
  Central City
                   Zip Code Region Code Division Code Number of Months
```

Rep	\					
1 12	NaN	06232		1	1	
2	NaN	06401185	5	1	1	
0 3	NaN	06278		1	1	
12	INGIN			1		
4 12	NaN	06001		1	1	
5 12	NaN	06063334	0	1	1	
D7 1		Name Plac	e Bldgs 1-un	it Units 1-0	unit Value	2-units
Bldgs 1	\ Andover	town	4	4	754900	
0 2	Λn	sonia	0	0	0	
0						
3 0	Ashford	town	2	2	281500	
4	Avon	town	31	31	10995334	
0 5 Ba	rkhamsted	town	3	3	1035150	
0	r Kridiii 5 eed	comi	3	J	1033130	
units	Value \		Value 3-4 un	_	-4 units Ur	
1 0	(9	0	0		0
2	(9	0	0		0
0 3	(9	0	0		0
0	(9	0	0		0
4 0	(9	U	U		0
5 0	(9	0	0		0
				_		
5+ 1 2 3 4 5	units Bldo	gs 5+ unit 0 0 0 0 0	s Units 5+ u 0 0 0 0 0	nits Value 1 0 0 0 0 0	l-unit rep	Bldgs \ 4 0 2 31 3
					D1 1 2	
		nits 1-uni	t rep Value	2-units rep	Blags 2-ur	nits rep
Units		nits 1-uni 4		2-units rep	Blags 2-ur	iits rep
Units			754900 0	2-units rep		iits rep

```
0
3
                              281500
                                                       0
0
4
                 31
                            10995334
                                                       0
0
5
                                                       0
                             1035150
0
  2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units
1
2
                   0
                                        0
                                                             0
3
                   0
                                        0
                                                             0
4
                   0
                                        0
                                                             0
5
                   0
                                        0
                                                             0
  3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units
rep Value
                     0
                                                             0
1
0
2
                     0
                                                             0
0
3
                                                             0
0
4
                     0
                                                             0
0
5
                     0
                                                             0
0
dfn2 = pd.read table("https://www2.census.gov/econ/bps/Place/Northeast
%20Region/ne2016a.txt", sep=",",
                   skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfn2["Unnamed 41"] = np.nan
dfn2 = dfn2.shift(1, axis=1)
dfn2.Survey = dfn2.index
dfn2.index = np.arange(len(dfn2))
dict names = {}
second = dfn2.iloc[0].fillna("")
for i in range(len(dfn2.columns)):
    first = dfn2.columns[i]
    if first.startswith("Unnamed"):
        if dfn2.columns[i-1].startswith("Unnamed"):
            first = dfn2.columns[i+1]
        else:
            first = dfn2.columns[i-1]
              new = first+second[i]
    # else:
```

```
new = first+" "+second[i]
    dict names[dfn2.columns[i]]= new
dfn2 = dfn2.rename(columns = dict names).drop([0])
# show the first five records
dfn2.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
                              001000
                                             013
                                                                NaN
         2016
                       09
2
                              005000
         2016
                       09
                                             009
                                                               0010
3
         2016
                       09
                              009000
                                             015
                                                                NaN
                       09
4
         2016
                              013000
                                             003
                                                                NaN
5
         2016
                      09
                              021000
                                             005
                                                                NaN
  FIPS Place Code FIPS MCD Code Pop CSA Code CBSA Code Footnote
Code \
1
           00000
                          01080
                                   3303.0
                                               278
                                                        25540
NaN
                                                408
           01150
                          01220
                                  19249.0
                                                        35300
2
2
3
           00000
                          01430
                                                148
                                                        49340
                                   4317.0
NaN
4
           00000
                          02060
                                  18098.0
                                                278
                                                        25540
NaN
           00000
                          02760
                                   3799.0
                                                999
                                                        99999
5
NaN
 Central City Zip Code Region Code Division Code Number of Months
Rep \
           NaN
                06232
                                       1
                                                      1
1
12
2
           NaN
                064011855
                                                      1
0
3
           NaN
                06278
                                                      1
12
4
           NaN
                06001
                                                      1
12
                060633340
                                                      1
5
           NaN
12
         Place Name Place Bldgs 1-unit Units 1-unit Value 2-units
Bldgs
       Andover town
                                            3
                                                     945000
                               3
1
0
2
            Ansonia
0
3
       Ashford town
                               5
                                                    1004883
1
4
          Avon town
                              19
                                           19
                                                    6756493
0
```

5 Barkha 0	msted town	Θ	0	0	
2-units units Val		s Value 3-4	units Bldgs 3	-4 units Unit	s 3-4
units vat	0	0	0		0
0					
2	0	Θ	0		0
0 3	2	145000	0		0
0	_	5000	•		
4	0	Θ	0		0
0 5	0	0	0		0
0	•	•	•		
5± unit	c Rldac 5± un	ite Unite 5±	units Value	1-unit ren Rl	das \
1	9 Drugs 5+ un	0	0	1-dille lep be	3
2	0	0	0		0
3 4	0 0	0 0	0 0		5 19
5	0	0	0		0
1	11			D1 des 2	
I-unit Units \	rep units 1-u	nıt rep valu	e 2-units rep	Blags 2-unit	s rep
1	3	94500	0	0	
0	0		0	0	
2 0	0		0	Θ	
3	5	100488	3	1	
2	10	675640		0	
4 0	19	675649	3	0	
5	0		0	0	
0					
2-units	rep Value 3-	4 units rep	Bldgs 3-4 uni	ts rep Units	\
1	0	·	0	0	
2 3	0 145000		0 0	0 0	
4	0		0	ő	
5	0		Θ	0	
3-4 uni	ts rep Value	5+ units rep	Bldgs 5+ uni	ts rep Units	5+ units
rep Value			_	·	
1	0		0	0	
0 2	0		0	Θ	
0					
3	0		0	0	

```
0
4
                    0
                                                            0
0
5
                    0
                                                            0
0
dfn3 = pd.read_table("https://www2.census.gov/econ/bps/Place/Northeast
%20Region/ne2017a.txt", sep=",",
                  skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfn3["Unnamed 41"] = np.nan
dfn3 = dfn3.shift(1, axis=1)
dfn3.Survey = dfn3.index
dfn3.index = np.arange(len(dfn3))
dict names = {}
second = dfn3.iloc[0].fillna("")
for i in range(len(dfn3.columns)):
    first = dfn3.columns[i]
    if first.startswith("Unnamed"):
        if dfn3.columns[i-1].startswith("Unnamed"):
            first = dfn3.columns[i+1]
        else:
            first = dfn3.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfn3.columns[i]]= new
dfn3 = dfn3.rename(columns = dict names).drop([0])
# show the first five records
dfn3.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
                                                                NaN
         2017
                       09
                              001000
                                             013
2
         2017
                       09
                              005000
                                             009
                                                               0010
3
         2017
                       09
                              009000
                                             015
                                                                NaN
4
         2017
                       09
                              013000
                                             003
                                                                NaN
                       09
         2017
                              021000
                                             005
                                                                NaN
                                     Pop CSA Code CBSA Code Footnote
  FIPS Place Code FIPS MCD Code
Code \
1
           00000
                          01080
                                   3303.0
                                                278
                                                        25540
NaN
           01150
                          01220
                                  19249.0
                                                408
                                                        35300
2
2
3
           00000
                          01430
                                   4317.0
                                                148
                                                        49340
NaN
```

4 NaN	0000	00	02060	18098.0	278	25540	
5	0000	00	02760	3799.0	999	99999	
NaN							
		Zip (Code Regi	on Code Di	vision C	ode Number	of Months
Rep '	\ NaN	06232		1		1	
12	NaN			1		1	
2 12	NaN	06401185	כס	T		ı	
3 12	NaN	06278		1		1	
4	NaN	06001		1		1	
7 5	NaN	06063334	10	1		1	
12							
	Place	Name Plac	ce Bldgs	1-unit Uni	ts 1-uni	t Value 2-	units
Bldgs 1	\ Andover	town	3		3	835000	
0							
2	Ans	sonia	0		0	0	
3 0	Ashford	town	8		8	1395000	
4	Avon	town	20		20	6555963	
0 5 Ba	rkhamsted	town	0		0	0	
0							
		2-units	Value 3-	4 units Bl	dgs 3-4	units Unit	s 3-4
units 1	Value \)	0		0		0
0 2	6	: 4	597000		0		0
0					-		
3 0	0)	0		Θ		0
4	6)	0		0		0
0 5	6)	0		0		0
0							
	units Bldg	^	_	5+ units V	_	nit rep Bl	_
1 2		0	Θ Θ		Θ Θ		3 0
3 4		0 0	0 0		0 0		8 10
5		0	ő		0		0

```
1-unit rep Units 1-unit rep Value 2-units rep Bldgs 2-units rep
Units \
1
                  3
                              835000
                                                       0
0
2
                                   0
                                                       3
6
3
                             1395000
                                                       0
0
4
                 10
                             2999913
                                                       0
0
5
                                                       0
                  0
                                   0
0
  2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \
1
2
             697000
                                        0
                                                             0
3
                                        0
                                                             0
                   0
4
                   0
                                        0
                                                             0
5
                   0
                                        0
                                                             0
  3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units
rep Value
                     0
                                                             0
1
0
2
                                                             0
                     0
0
3
                                                             0
0
4
                     0
                                                             0
0
5
                     0
                                         0
                                                             0
0
dfn4 = pd.read table("https://www2.census.gov/econ/bps/Place/Northeast
%20Region/ne2018a.txt", sep=",",
                   skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfn4["Unnamed 41"] = np.nan
dfn4 = dfn4.shift(1, axis=1)
dfn4.Survey = dfn4.index
dfn4.index = np.arange(len(dfn4))
dict names = {}
second = dfn4.iloc[0].fillna("")
for i in range(len(dfn4.columns)):
    first = dfn4.columns[i]
    if first.startswith("Unnamed"):
```

```
if dfn4.columns[i-1].startswith("Unnamed"):
            first = dfn4.columns[i+1]
        else:
            first = dfn4.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfn4.columns[i]] = new
dfn4 = dfn4.rename(columns = dict names).drop([0])
# show the first five records
dfn4.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2018
                       09
                              001000
                                              013
                                                                 NaN
2
         2018
                       09
                              005000
                                              009
                                                                0010
3
                       09
                              009000
                                              015
         2018
                                                                NaN
4
         2018
                       09
                              013000
                                              003
                                                                NaN
5
                       09
                              021000
                                              005
         2018
                                                                NaN
  FIPS Place Code FIPS MCD Code
                                     Pop CSA Code CBSA Code Footnote
Code \
           00000
                          01080
                                   3303.0
                                                278
                                                        25540
1
NaN
                          01220
                                  19249.0
                                                408
2
           01150
                                                        35300
2
3
           00000
                          01430
                                   4317.0
                                                148
                                                        49340
NaN
           00000
                          02060
                                                278
4
                                  18098.0
                                                        25540
NaN
                                                999
           00000
                          02760
                                   3799.0
                                                        99999
NaN
  Central City
                   Zip Code Region Code Division Code Number of Months
Rep \
           NaN
                06232
                                                      1
12
           NaN
                064011855
2
12
3
           NaN
                06278
                                                      1
12
                06001
4
           NaN
12
                                                      1
5
           NaN
                060633340
12
         Place Name Place Bldgs 1-unit Units 1-unit Value 2-units
Bldgs
       Andover town
                                             5
                                                     973000
1
0
```

2 1				
	Ansonia	2	2	300000
3	Ashford town	9	9	1945000
0 4	Avon town	13	13	3163450
0				
5 Bark 0	chamsted town	2	2	552000
	ts Units 2-units	s Value 2 4 unis	ts Pldgs 2 4	unito Unito 2 4
units V			_	
1 0	0	0	0	0
2	2	150000	0	0
0 3	Θ	Θ	0	0
0	ð	U	0	U
4	0	0	0	0
0 5	0	0	0	0
0				
	nits Bldgs 5+ uni	its Units 5+ un	its Value 1-u	
1 2	0 0	0 0	0 0	5 2
3	0	0	0	9
4 5	0 0	Θ Θ	0 0	13 2
	·	•		
1-uni Units	.t rep Units 1-ur \	iit rep value 2	-units rep Bi	ags 2-units rep
1	5	973000		0
0				
2	2	300000		1
2				
2	2 9	300000 1945000		1 0
2 3 0 4				
2 3 0 4 0	9	1945000		0
2 3 0 4	9 13	1945000 3163450		0 0
2 3 0 4 0 5 0	9 13	1945000 3163450 552000	gs 3-4 units	0 0 0
2 3 0 4 0 5 0 2-uni	9 13 2 .ts rep Value 3-4	1945000 3163450 552000	0	0 0 0 rep Units \ 0
2 3 0 4 0 5 0 2-uni 1 2	9 13 2 .ts rep Value 3-4 0 150000 0	1945000 3163450 552000	0 0 0	0 0 0 rep Units \ 0 0 0
2 3 0 4 0 5 0 2-uni 1 2 3 4	9 13 2 .ts rep Value 3-4 0 150000 0	1945000 3163450 552000	0 0 0 0	0 0 0 rep Units \ 0 0 0
2 3 0 4 0 5 0 2-uni 1 2 3 4 5	9 13 2 .ts rep Value 3-4 0 150000 0 0	1945000 3163450 552000 4 units rep Bldg	0 0 0 0	0 0 0 rep Units \ 0 0 0

```
rep Value
                    0
                                                            0
1
0
2
                                                            0
0
3
                    0
                                                            0
0
4
                    0
                                                            0
0
5
                    0
                                                            0
0
dfn5 = pd.read table("https://www2.census.gov/econ/bps/Place/Northeast
%20Region/ne2019a.txt", sep=",",
                  skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfn5["Unnamed 41"] = np.nan
dfn5 = dfn5.shift(1, axis=1)
dfn5.Survey = dfn5.index
dfn5.index = np.arange(len(dfn5))
dict names = {}
second = dfn5.iloc[0].fillna("")
for i in range(len(dfn5.columns)):
    first = dfn5.columns[i]
    if first.startswith("Unnamed"):
        if dfn5.columns[i-1].startswith("Unnamed"):
            first = dfn5.columns[i+1]
        else:
            first = dfn5.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfn5.columns[i]]= new
dfn5 = dfn5.rename(columns = dict names).drop([0])
# show the first five records
dfn5.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2019
                      09
                              001000
                                             013
                                                                NaN
2
         2019
                      09
                              005000
                                             009
                                                               0010
3
         2019
                      09
                              009000
                                             015
                                                                NaN
4
                      09
         2019
                              013000
                                             003
                                                                NaN
5
         2019
                      09
                              021000
                                             005
                                                                NaN
  FIPS Place Code FIPS MCD Code
                                     Pop CSA Code CBSA Code Footnote
Code \
```

1	00000	01080	3303.0	278	25540
NaN					
2	01150	01220	19249.0	408	35300
3	00000	01430	4317.0	148	49340
NaN	2222	00000	10000	270	255.40
4 NaN	00000	02060	18098.0	278	25540
5	00000	02760	3799.0	999	99999
NaN					
Cent	ral City Zin	Code Regio	on Code Divis	ion Code	Number of Months
Rep ∖					
1 12	NaN 06232		1	1	
2	NaN 064011	.855	1	1	
12	N N 06270		1	3	
3 12	NaN 06278		1	1	
4	NaN 06001		1	1	
12	N-N 060633	2.40	1	1	
5 12	NaN 060633	340	1	1	
	D] N D]	D 3 1 1		.	1 2 '.
Bldgs	Place Name Pl	ace Blags .	I-unit Units	1-unit Va	ilue 2-units
1	Andover town	7	7	1673	8875
0	Anconio	1	1	0.0	1000
2 0	Ansonia	1	1	96	0000
3	Ashford town	5	5	1054	500
0 4	Avon town	13	10		
	AVOII LOWII		1 3	375/	1638
0		13	13	3754	.638
5 Bar	khamsted town	3	3		.638 .380
	khamsted town				
5 Bar 0 2-un	its Units 2-unit	3	3	924	1380
5 Bar 0 2-un units	its Units 2-unit Value \	3 ss Value 3-4	3 4 units Bldgs	924 3-4 unit	380 s Units 3-4
5 Bar 0 2-un units 1	its Units 2-unit	3	3	924 3-4 unit	1380
5 Bar 0 2-un units 1 0 2	its Units 2-unit Value \	3 ss Value 3-4	3 4 units Bldgs	924 3-4 unit	380 s Units 3-4
5 Bar 0 2-un units 1 0 2	its Units 2-unit Value \ 0 0	3 ss Value 3-4 0 0	3 4 units Bldgs 6	924 3-4 unit	3380 s Units 3-4 0 0
5 Bar 0 2-un units 1 0 2	its Units 2-unit Value \ 0	3 s Value 3-4 0	3 4 units Bldgs 0	924 3-4 unit	380 s Units 3-4 0
5 Bar 0 2-un units 1 0 2 0 3 0 4	its Units 2-unit Value \ 0 0	3 ss Value 3-4 0 0	3 4 units Bldgs 6	924 3-4 unit	3380 s Units 3-4 0 0
5 Bar 0 2-un units 1 0 2 0 3 0 4	its Units 2-unit Value \ 0 0 0	3 s Value 3-4 0 0 0 0	3 4 units Bldgs 6 6	924 3-4 unit	380 s Units 3-4 0 0 0
5 Bar 0 2-un units 1 0 2 0 3 0 4	its Units 2-unit Value \ 0 0 0	3 s Value 3-4 0 0	3 4 units Bldgs 6 6	924 3-4 unit	380 s Units 3-4 0 0

5+ units Blo 1 2 3 4 5	dgs 5+ units 0 0 0 0 0	Units 5+ units V 0 0 0 0 0	/alue 1-unit re 0 0 0 0 0 0	ep Bldgs \
	-	rep Value 2-unit 1673875 90000 1054500 3754638 924380	-	
2-units rep 1 2 3 4 5	Value 3-4 un 0 0 0 0 0	oits rep Bldgs 3- 0 0 0 0 0	·4 units rep Un	nits \ 0 0 0 0 0
rep Value 1 0 2 0 3 0 4 0 5	0 0 0 0 0 atne = pd.con	nits rep Bldgs 5 0 0 0 0 cat([dfn1,dfn2,		0 0 0 0
dfne				

		Date	State	Code	6-Digit	ID	Count	y Code	Census	Place	
Code 1	\	2015		09	001	000		013			NaN
2		2015		09	005	കെ		009			0010
3		2015		09	009	000		015			NaN
4		2015		09	013	000		003			NaN
5		2015		09	021	000		005			NaN
5572		2019		50	591	000		015			NaN
5573		2019		50	593	000		023			NaN
5574		2019		50	595	000		003			NaN
5575		2019		50	597	000		027			NaN
5576		2019		50	599	രെ		027			1500
1	iote co		900		01080	33	303.0	2	78	25540	
Footr	FIPS P note Co		Code FI	IPS MO	CD Code		Pop	CSA Co	de CBSA	Code	
NaN		011	IEO		01220	107	249.0	4	98	25200	
2		011	150		01220	192	249.0	4	90 .	35300	
3		000	900		01430	43	317.0	1	48	49340	
NaN 4		000	900		02060	186	98.0	2	78	25540	
NaN											
5 NaN		000	900		02760	37	799.0	9	99	99999	
		000	200		05275	1.0	576 0	0	00	00000	
5572 NaN		000	900		85375	10	576.0	9	99	99999	
5573		000	900		85525	Ç	906.0	9	99	99999	
NaN											
5574		000	900		85675	4	124.0	9	99	99999	
NaN 5575		000	900		85975	2	L48.0	Q	99	99999	
NaN		000			33313	۷.	. 1010	9			
5576 NaN		859	900		85975	g	0.00	9	99	99999	
	Centra	l (i+v	, -	7in Ca	ode Regi	on (ode D)ivicio	n Code	Numhar	of
	centra	CIC	, 2	-Th C	ouc negri	011	Jue D	, T A T 2 T O	i code	TAGIIID C I	O I

	s Rep \	. 06222		1		1	
1 12	NaM	N 06232		1		1	
2	NaN	N 06401	1855	1		1	
0 3	NaN	N 06278		1		1	
12	Ivai	W 00270		1		1	
4	NaN	N 06001		1		1	
12 5	NaN	N 06063	3340	1		1	
12							
	• • •	•					
5572	NaN	N 05680		1		1	
12 5573	NaN	N 05683		1		1	
0							
5574 12	NaM	N 05201	9410	1		1	
5575	NaN	N 05091		1		1	
12 5576	NaN	N 05091		1		1	
12		. 05051		_		_	
	Plac	ce Name	Place Bldgs	1-unit	Units	1-unit Value	2-units
Bldgs	· \		_				
1 0	Andove	er town	4		4	754900	
2	,	Ansonia	0		0	Θ	
0 3	Ashfor	rd town	2		2	281500	
0							
4 0	Avo	on town	31		31	10995334	
5	Barkhamste	ed town	3		3	1035150	
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5572 0	Wolcot	tt town	5		5	220000	
5573	Woodbui	ry town	4		4	984063	
0 5574	Woodfor	cd town	0		0	0	
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5575 0	Woodstoo	ck town	4		4	1128930	
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5574	0	0	0	0
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[27892 rows x 41 columns]
dfne=dfne.reset index()
# Drop a specific column, e.g., 'Place Name'
dfne = dfne.drop(columns=['index'])
dfne
      Survey Date State Code 6-Digit ID County Code Census Place Code
\
```

0	2	2015		09	0010	000	013		NaN
1	2	2015		09	0050	000	009		0010
2	2	2015		09	0096	000	015		NaN
3	2	2015		09	0130	000	003		NaN
4	2	2015		09	0216	000	005		NaN
27887	5	2019		50	5910		015		NaN
27888		2019		50	5936		023		NaN
27889		2019		50	5950		003		NaN
27890		2019		50	5976		027		NaN
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0 NaN 1 2 2 NaN 3 NaN 4 NaN 27887 NaN 27888 NaN 27889 NaN 27890 NaN 27891	ote Code	\ 00000 01150 00000 00000 00000 00000 00000 85900		010 012 014 020 027 853 855 856 859	220 330 660 775 225 775	3303.0 19249.0 4317.0 18098.0 3799.0 1676.0 906.0 424.0 2148.0 900.0	408 148 278 999 999 999	35300 49340 25540 99999 99999 99999 99999	
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	Number of Mor	nths Rep		Place	Name	Place Bl	dgs	1-unit	Units
0		12		Andover	town		4		4
1		Θ		Ans	onia		0		0
2		12		Ashford	town		2		2
3		12		Avon	town		31		31
4		12	Bark	hamsted	town		3		3
27887		12		Wolcott	town		5		5
27888		Θ	W	oodbury	town		4		4
27889		12	W	loodford	town		0		Θ
27890		12	Wo	odstock	town		4		4
27891		12	Woods	tock vil	lage		1		1
Bldgs 0 0 1 0 2 0 3	1-unit Value 754900 0 281500 10995334	2-units I	Bldgs 0 0 0	2-units	Units))	Val	0 0 0 0	units
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0				
27888 98 0	84063	0	0	0
27889	0	0	0	0
0 27890 112	28930	0	0	0
0				
27891 28 0	32232	0	0	0
0 1 2 3 4 27887 27888 27889	ts Units 3-4 unit 0 0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0 0
27890 27891	0 0	0 0	0 0	0 0
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1035150				
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27888 0	0	0		9
27889	0	0		9
0 27890	0	4	,	4
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27891
[27892 rows x 41 columns]
import pandas as pd
# Assuming your data is in a CSV file named 'data.csv'
datane = dfne
# Select the columns of interest
selected_columnsne = ['FIPS Place Code','Zip Code','Survey Date', '1-
unit rep Units', 'Place Name']
```

Extract the desired data extracted datasne = datane[selected columnsne] #choosing the column with 1-unit rep unit data extracted datasne FIPS Place Code Zip Code Survey Date 1-unit rep Units \ Place Name Andover town Ansonia Ashford town Avon town Barkhamsted town Wolcott town Woodbury town Woodford town Woodstock town 27891 Woodstock village [27892 rows x 5 columns] # Group by 'Zip Code', 'FIPS Place Code', and 'Place Name', and sum '1-unit rep Units' grouped dflne = extracted_datasne.groupby(['Zip Code', 'FIPS Place Code', 'Place Name', 'Survey Date'])['1-unit rep Units'].sum().reset index() # Pivot the DataFrame to have years as columns pivot_dflne = grouped_dflne.pivot_table(index=['Zip Code', 'FIPS Place Code', 'Place Name'], columns='Survey Date', values='1-unit rep Units', fill value=0) # Reset the index to have 'Zip Code', 'FIPS Place Code', and 'Place Name' as columns pivot dflne.reset index(inplace=True)

```
# Rename the columns
pivot_dflne.columns = ['Zip Code', 'FIPS Place Code', 'Place Name',
'2015', '2016', '2017', '2018', '2019']
# Display the pivot DataFrame
print(pivot df1ne)
         Zip Code FIPS Place Code
                                                     Place Name 2015
2016
0
      01001
                            00840
                                                    Agawam Town
                                                                   12
16
1
      01002
                            00000
                                                   Amherst town
                                                                     0
0
2
      01002
                            00000
                                                    Pelham town
1
3
      01005
                            00000
                                                     Barre town
                                                                    7
14
4
      01007
                            00000
                                              Belchertown town
65
. . .
5970 19608
                            00000
                                     South Heidelberg township
5971 19608
                            00000
                                               Spring township
                                                                    12
13
5972 19608
                                        Sinking Spring borough
                            70880
                                                                     0
5973 19610
                            86880
                                            Wyomissing borough
                                                                    1
                                          West Reading borough
5974 19611
                            83928
                                                                     0
      2017
            2018
                   2019
               19
0
        31
                      8
1
         0
               25
                      0
2
         2
                      1
               1
3
         7
               10
                      9
4
        39
               58
                     41
5970
         3
               6
                     17
5971
         2
               12
                      6
5972
         0
                0
                      1
5973
         1
                3
                      1
5974
         0
                6
                      6
[5975 rows x 8 columns]
pivot dflne
```

2016		Code	FIPS	Place	Code			Ρl	ace	Nam	ne 20	15	
0	01001			00	840			Aga	wam	Tow	n :	12	
16 1	01002			00	000			Amhe	erst	tow	/n	0	
0 2	01002			00	000			Pel	.ham	tow	/n	0	
1 3	01005			00	000			Ва	rre	tow	/n	7	
14 4 65	01007			00	000		Ве	lchert	own	tow	ın 3	35	
5970	19608			00	000	South	n Heide	lberg	towr	nshi	.p	0	
2 5971	19608			00	000		S	pring	towr	nshi	.p :	12	
13 5972	19608			70	880	Si	inking	Spring	, boı	roug	ıh	0	
0 5973	19610			86	880		Wyom	issing	boı	roug	ıh	1	
0 5974 0	19611			83	928		West R	eading	, boı	roug	ıh	0	
		2018	2019										
0 1	31 0	19 25	8										
	2	23 1	1										
2 3 4	7	10	9										
4	39	58	41										
5970	3	6	17										
5971 5972	2 0	12 0	6 1										
5973	1	3	1										
5974	0	6	6										
[5975	rows x	8 co	lumns]										
dfne													
	Survey	Date	State	Code	6-Digi	t ID	County	Code	Cens	sus	Place	Cod	e
0		2015		09	00	1000		013				Na	N
1		2015		09	00	5000		009				001	0
2		2015		09	00	9000		015				Na	N

3	2015	09	01300	0	003		NaN
4	2015	09	02100	0	005		NaN
27887	2019	50	59100	0	015		NaN
27888	2019	50	59300	0	023		NaN
27889	2019	50	59500	0	003		NaN
27890	2019	50	59700	0	027		NaN
27891	2019	50	59900	0	027		1500
Footnote Code					CSA Code CB		
0 NaN	00000	010	980	3303.0	278	25540	
1 2	01150	012	220 1	9249.0	408	35300	
2 NaN	00000	014	430	4317.0	148	49340	
3 NaN	00000	020	960 1	8098.0	278	25540	
4	00000	02	760	3799.0	999	99999	
NaN 							
27887	00000	853	375	1676.0	999	99999	
NaN 27888	00000	85!	525	906.0	999	99999	
NaN 27889	00000	850	575	424.0	999	99999	
NaN 27890	00000	859	975	2148.0	999	99999	
NaN 27891	85900		975	900.0	999	99999	
NaN	03300	05.	<i>313</i>	300.0	333	33333	
Central 0 1 2 3 4	NaN 062 NaN 064 NaN 062 NaN 060	32 011855 78 01 633340	Region	Code Di		e \ 1 1 1 1	
27887	NaN 056	80		1	•	1	

27888 27889 27890 27891	NaN NaN NaN NaN	05683 0520194 05091 05091	10	1 1 1	1 1 1 1		
	Number of Mor	nths Rep	Place	Name	Place Bldgs	1-unit	Units
0		12	Andover	town	4		4
1		0	Ans	sonia	0		0
2		12	Ashford	town	2		2
3		12	Avon	town	31		31
4		12	Barkhamsted	town	3		3
27887		12	Wolcott		5		5
27888		0	Woodbury		4		4
			Woodford				
27889		12			0		0
27890		12	Woodstock		4		4
27891		12	Woodstock vi	llage	1		1
	1-unit Value	2-units	Bldgs 2-units	Units	: 2-units Val	lue 3-4	units
Bldgs 0			0	e		Θ	
0			-				
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2	281500		0	e		0	
3	10995334		0	e		0	
4	1035150		0	e)	0	
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 27887	220000		0	e		0	
0 27888	984063		0	e		Θ	
0							
27889 0	0		0	C		0	

27890 112 0	28930	0	0	0
27891 28	32232	0	0	0
0				
3-4 unit 0 1 2 3 4	s Units 3-4 unit 0 0 0 0 0 0	S Value 5+ 0 0 0 0 0	units Bldgs ! 0 0 0 0 0	5+ units Units \ 0 0 0 0 0
27887 27888 27889 27890 27891	0 0 0 0 0	0 0 0 0 0	 0 0 0 0	0 0 0 0 0
	Value 1-unit re	ep Bldgs 1-ı	nit rep Unit	s 1-unit rep
Value \ 0	0	4		4
754900				
1	0	0		9
2 281500	0	2		2
3	0	31	3:	1
10995334 4	0	3		3
1035150	Ü	J		
27887	0	5	!	5
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27889 0	0	0		9
27890	0	4	4	4
1128930 27891 282232	0	1		1
2-units 0 1 2 3 4	rep Bldgs 2-unit 0 0 0 0	es rep Units 6 6 6 6 6		Value \ 0 0 0 0 0

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27891
[27892 rows x 41 columns]
import pandas as pd
# Assuming your data is in a CSV file named 'data.csv'
datane2 = dfne
# Select the columns of interest
selected columnsne2 = ['FIPS Place Code', 'Zip Code', 'Survey Date', '2-
units rep Units', '3-4 units rep Units', '5+ units rep Units', 'Place
Name']
# Extract the desired data
extracted datamne2 = datane2[selected columnsne2]
extracted datamne2
      FIPS Place Code
                            Zip Code Survey Date 2-units rep Units \
0
                00000
                         06232
                                             2015
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1
                        064011855
                                            2015
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               01150
2
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                        06278
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4
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                        060633340
                                           2015
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27887
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                        05680
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27888
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                        05683
27889
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                                           2019
27890
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                        05091
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27891
               85900
                        05091
                                           2019
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      3-4 units rep Units 5+ units rep Units
                                                       Place Name
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                                                     Andover town
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27890
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                                                   Woodstock town
27891
                         0
                                               Woodstock village
[27892 rows x 7 columns]
# Group by 'Zip Code,' 'FIPS Place Code,' 'Place Name,' and 'Survey
Date,' and sum the units columns
grouped dfmne = extracted datamne2.groupby(['Zip Code', 'FIPS Place
Code', 'Place Name', 'Survey Date']).agg({
    '2-units rep Units': 'sum',
    '3-4 units rep Units': 'sum',
    '5+ units rep Units': 'sum'
}).reset index()
# Create a new column 'multi unit' by summing the '2-units rep Units,'
'3-4 units rep Units,' and '5+ units rep Units'
grouped dfmne['multi unit'] = grouped dfmne['2-units rep Units'] +
grouped dfmne['3-4 units rep Units'] + grouped dfmne['5+ units rep
Units'l
# Display the grouped DataFrame
print(grouped dfmne)
          Zip Code FIPS Place Code
                                               Place Name Survey
Date \
```

0	01001		00840		Agaw	am Town		2015	
1	01001		00840		Agaw	am Town		2016	
2	01001		00840		Agaw	am Town		2017	
3	01001		00840		Agaw	am Town		2018	
4	01001		00840		_	am Town		2019	
	01001				, rigan	idiii 10Wii			
27850	19611		83928	West Re	eading	borough		2015	
27851	19611		83928	West Re	eading	borough		2016	
27852	19611		83928	West Re	eading	borough		2017	
27853	19611		83928	West Re	eading	borough		2018	
27854	19611		83928	West Re	eading	borough		2019	
	2-units	rep Units	3-4 units	rep Units	s 5+ un	its rep	Units	multi	
unit 0		20		(Θ		0		
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8316									
2 200		2		(0		0		
3		4		(0		0		
400									
4 600		6		(0		0		
27850		0		(0		0		
000 27851		Θ		,	0		0		
000		U		(ט		U		
27852 000		0		(0		0		
27853		9		(0		0		
000 27854		0		(0		0		
000									
[27855	ō rows x	8 columns]							

grouped_dfmne

Date	Zip	Code	FIPS	Plac	e Code	9			Ρl	ace I	Name	Surve	/
0	01001				00840				Aga	wam ⁻	Town		2015
1	01001				00840				Aga	wam ⁻	Town		2016
2	01001				00840				Aga	wam ⁻	Town		2017
3	01001				00840				Aga	wam ⁻	Town		2018
4	01001				00840				Aga	wam ⁻	Town		2019
									J				
27850	19611				83928		c+	Pos	dina	bor			2015
									_		-		
27851					83928				J	bor			2016
27852	19611				83928	We	st	Rea	ding	bor	ough		2017
27853	19611				83928	We	st	Rea	ding	bor	ough		2018
27854	19611				83928	We	st	Rea	ding	bor	ough		2019
	2			2 4					_				2
unit	2-units	rep	Units	3-4	units	rep	unı	.ts	5+ u	nits	rep	Units	multi
0 2000			20					0				0	
1			8					3				16	
8316 2			2					0				0	
200 3			4					0				0	
400 4			6					0				0	
600			U									Ū	
							•	• •				• • •	
27850 000			0					0				0	
27851 000			0					0				0	
27852			0					0				0	
000 27853			0					0				0	
			-										
000 27854			0					0				0	

```
[27855 rows x 8 columns]
# Pivot the DataFrame to have years as columns
pivot dfmne = grouped dfmne.pivot table(index=['Zip Code', 'FIPS Place
Code', 'Place Name'], columns='Survey Date', values='multi unit',
fill value=0)
# Reset the index to have 'Zip Code', 'FIPS Place Code', and 'Place
Name' as columns
pivot dfmne.reset index(inplace=True)
# Rename the columns
pivot_dfmne.columns = ['Zip Code', 'FIPS Place Code', 'Place Name',
'2015<sup>-</sup>', '2016', '2017', '2018', '2019']
# Display the pivot DataFrame
print(pivot dfmne)
         Zip Code FIPS Place Code
                                                    Place Name 2015
2016
      01001
0
                            00840
                                                   Agawam Town 2000
8316
1
      01002
                            00000
                                                  Amherst town
0
2
      01002
                            00000
                                                   Pelham town
0
3
      01005
                            00000
                                                    Barre town
                                                                 200
200
                            00000
                                             Belchertown town
4
      01007
0
5970 19608
                                    South Heidelberg township
                            00000
5971 19608
                            00000
                                              Spring township
5972 19608
                            70880
                                       Sinking Spring borough
                                                                   0
5973 19610
                            86880
                                           Wyomissing borough
                                                                   0
5974 19611
                                         West Reading borough
                            83928
             2018
      2017
                   2019
0
       200
              400
                    600
1
            80126
                      0
         0
2
                      0
         0
                0
3
         0
                0
                      0
```

4 5970 5971 5972 5973 5974	0 0 400 0 0	0 0 0 0 84 0	0 0 210 0 0				
[5975	rows >	x 8 col	umns]				
pivot_	_dfmne						
	Zi	Code	FIPS Pl	ace Code	Place Name	2015	
2016 0	01001			00840	Agawam Town	2000	
8316							
1 0	01002			00000	Amherst town	0	
2	01002			00000	Pelham town	0	
0 3	01005			00000	Barre town	200	
200					Dolchortour tour	0	
4 0	01007			00000	Belchertown town	0	
5970	19608			00000	South Heidelberg township	0	
0 5971	19608			00000	Spring township	0	
0 5972	19608			70880	Sinking Spring borough		
0							
5973 0	19610			86880	Wyomissing borough	0	
5974	19611			83928	West Reading borough	0	
0							
0 1 2 3 4 5970 5971 5972 5973	2017 200 0 0 0 0 0 400 0	2018 400 80126 0 0 0 0 0 84	2019 600 0 0 0 0 210 0				

```
5974 0 0
[5975 rows x 8 columns]
#extra
import pandas as pd
# Assuming you have the 'grouped dfmne' DataFrame
# List of unique survey years in the dataset
survey years = ['2015', '2016', '2017', '2018', '2019']
# Initialize an empty DataFrame to store the pivoted data
pivoted dfsne = []
# Loop through each survey year and pivot the DataFrame
for year in survey_years:
   # Filter the DataFrame for the current year
   filtered dfne = grouped dfmne[grouped dfmne['Survey Date'] ==
year]
   # Pivot the filtered DataFrame
   pivot dfne = filtered dfne.pivot table(index=['Zip Code', 'FIPS
Place Code', 'Place Name'],
                                       columns='Survey Date',
values='multi unit', fill value=0)
   # Reset the index to have 'Zip Code', 'FIPS Place Code', and
'Place Name' as columns
   pivot dfne.reset index(inplace=True)
   # Rename the columns
   pivot dfne.columns = ['Zip Code', 'FIPS Place Code', 'Place Name',
year]
   # Append the pivoted DataFrame to the list
   pivoted dfsne.append(pivot dfne)
# Merge the individual pivoted DataFrames on 'Zip Code', 'FIPS Place
Code', and 'Place Name'
final_pivot_dfne = pivoted dfsne[0]
for i in range(1, len(pivoted dfsne)):
    final_pivot_dfne = final_pivot_dfne.merge(pivoted_dfsne[i],
on=['Zip Code', 'FIPS Place Code', 'Place Name'], how='outer')
# Display the final pivoted DataFrame
print(final pivot dfne)
         Zip Code FIPS Place Code
                                             Place Name
                                                           2015
2016 \
```

0	01001		00840	Agawam Town	2000.0	
8316. 1	01002		00000	Amherst town	0.0	
0.0 2	01002		00000	Pelham town	0.0	
0.0 3	01005		00000		200.0	
200.0				Barre town		
4 0.0	01007		00000	Belchertown town	0.0	
5970 NaN	18801		00000	Forest Lake township	NaN	
5971	18854		00000	Wysox township	NaN	
NaN 5972 NaN	19018		15432	Colwyn borough	NaN	
5973 NaN	193204	950	00000	Londonderry township	NaN	
5974 NaN	19526		00000	Charlestown township	NaN	
#extr	rows x	2018 400.0 80126.0 0.0 0.0 NaN NaN NaN NaN NaN	2019 600.0 0.0 0.0 0.0 0.0 0.0 0.0 400.0 80.0			
			S Place Code	Place Name	2015	
2016	01001		00840	Agawam Town	2000.0	
8316. 1	01002		00000	Amherst town	0.0	
0.0	01002		00000	Pelham town	0.0	
0.0 3	01005		00000	Barre town	200.0	

200.0								
4	01007		000	000	Belcher	town town	0.0	
0.0								
	10001		000		Frank Laba	the same to the	NI - NI	
5970	18801		000)00	Forest Lake	townsnip	NaN	
NaN 5971	18854		000	100	Mycoy	township	NaN	
NaN	10034		000	000	WySUX	township	Ivaiv	
5972	19018		154	133	Colwy	n borough	NaN	
NaN	19010		134	132	COLWY	ii borougii	IVAIN	
5973	193204	950	000	000	Londonderry	townshin	NaN	
NaN	133201	330	000	, 0 0	Londonaerry	comisiiip	Hall	
5974	19526		000	000	Charlestown	township	NaN	
NaN								
	2017	2018	2019					
0	200.0	400.0	600.0					
1	0.0	80126.0	0.0					
2	0.0	0.0	0.0					
3 4	0.0	0.0	0.0					
4	0.0	0.0	0.0					
5970	 NaN	 NaN	0.0					
5970	NaN	NaN	0.0					
5971	NaN	NaN	0.0					
5973	NaN	NaN	400.0					
5974	NaN	NaN	80.0					
3377	Hall	Hall	00.0					
[5975	rows x	8 column	s]					

South region

Repeating all steps for south region

```
dfso1["Unnamed 41"] = np.nan
dfso1 = dfso1.shift(1, axis=1)
dfso1.Survey = dfso1.index
dfsol.index = np.arange(len(dfsol))
dict names = \{\}
second = dfso1.iloc[0].fillna("")
for i in range(len(dfso1.columns)):
    first = dfso1.columns[i]
    if first.startswith("Unnamed"):
        if dfsol.columns[i-1].startswith("Unnamed"):
            first = dfso1.columns[i+1]
        else:
            first = dfsol.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfso1.columns[i]] = new
dfso1 = dfso1.rename(columns = dict names).drop([0])
# show the first five records
dfso1.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2015
                       01
                              001000
                                              067
                                                                0020
2
                       01
                                              073
                                                                0030
         2015
                              002000
3
                       01
                                              117
                                                                0025
         2015
                              005000
4
         2015
                       01
                              006000
                                              095
                                                                0030
5
                       01
         2015
                              007000
                                              123
                                                                0035
  FIPS Place Code FIPS MCD Code
                                     Pop
                                          CSA Code CBSA Code Footnote
Code \
1
           00124
                          00000
                                   2688.0
                                                222
                                                        20020
NaN
                          00000
                                                142
2
           00460
                                   4522.0
                                                        13820
NaN
3
           00820
                          00000
                                  30352.0
                                                142
                                                        13820
NaN
                          00000
                                                999
4
           00988
                                  21160.0
                                                        99999
NaN
5
           01132
                          00000
                                  14875.0
                                                999
                                                        99999
NaN
  Central City
                   Zip Code Region Code Division Code Number of Months
Rep \
1
           NaN 36310
                                        3
                                                      6
12
2
                                        3
                                                      6
           NaN
                35005
12
3
           NaN 35007
                                       3
                                                      6
```

12					
4	NaN 35950		3	6	
12	NaN 2501105	F2	3	G	
5 12	NaN 3501105	52	3	6	
\	Place Name Place	Bldgs 1-uni	t Units 1-	unit Value 2	-units Bldgs
1	Abbeville	0	0	Θ	0
2	Adamsville	1	1	200506	0
2	Adamsvitte	T	1	200596	0
3	Alabaster	109	109	33075811	0
4	Albertville	0	0	0	Θ
- A	Mariandan Citr	10	10	4124422	0
5 A	Alexander City	18	18	4124433	0
	units Units 2-units	Value 3-4 u	ınits Bldgs	3-4 units U	nits 3-4
1	0	0	0		0
0 2	0	0	0		0
0					
3	0	0	0		0
4	0	Θ	0		0
0	0	0	0		0
5 0	0	0	0		0
	- units Bldgs 5+ uni 0 0 0 0 0	ts Units 5+ 0 0 0 0 0		ne 1-unit rep 0 0 0 0 0	Bldgs \ 0 1 109 0 18
1- Unit	unit rep Units 1-un	it rep Value	e 2-units r	ep Bldgs 2-u	nits rep
1	0	e)	Θ	
0 2	1	200596		Θ	
0					
3	109	33075811		Θ	
4	0	e)	Θ	
0	10	4124422		0	
5	18	4124433)	0	

```
0
  2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \
1
2
                  0
                                       0
                                                            0
3
                  0
                                       0
                                                            0
4
                  0
                                       0
                                                            0
5
                  0
                                       0
                                                            0
  3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units
rep Value
                    0
                                                            0
1
0
2
                    0
                                                            0
0
3
                                                            0
0
4
                                                            0
0
5
                    0
                                                            0
0
dfso2 = pd.read table("https://www2.census.gov/econ/bps/Place/South
%20Region/so2016a.txt", sep=",",
                  skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfso2["Unnamed 41"] = np.nan
dfso2 = dfso2.shift(1, axis=1)
dfso2.Survey = dfso2.index
dfso2.index = np.arange(len(dfso2))
dict names = \{\}
second = dfso2.iloc[0].fillna("")
for i in range(len(dfso2.columns)):
    first = dfso2.columns[i]
    if first.startswith("Unnamed"):
        if dfso2.columns[i-1].startswith("Unnamed"):
            first = dfso2.columns[i+1]
        else:
            first = dfso2.columns[i-1]
    #
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfso2.columns[i]]= new
dfso2 = dfso2.rename(columns = dict names).drop([0])
# show the first five records
dfso2.head()
```

1 2 3 4 5	Survey	Date 5 2016 2016 2016 2016 2016	State	Code 01 01 01 01	(i (i (i	git I 001000 002000 005000 006000	9 9 9 9	_	ode C 067 073 117 095 123	ensus	Place	Code 0020 0030 0025 0030 0035	\
	FIPS P	lace Co	de FI	PS MO	CD Cod	le	Pop	CSA	Code	CBSA	Code F	ootno	te
Co 1	de \	0012	0.4		00000) '	2688.0	1	222	2	20020		
Nal	N	0012	. т		00000	,	2000.0	•	222		.0020		
2	N I	0046	0		00000) ,	4522.0		142	1	.3820		
Nal 3	N	0082	20		00000) 3(0352.0		142	1	.3820		
Nal	N	0002	. •		00000	, ,	033210		- '-	_	.5020		
4	N I	0098	88		00000) 2	1160.0		999	9	9999		
Nal 5	N	0113	32		00000) 1,	4875.0		999	Q	9999		
Nal	N	0110	, <u> </u>		00000	_	107510		333	_	.5555		
	Control	l C++	7	in C	ada Da	. a i o n	Codo	Divi	a i an	Cada N	lumban	of Mo	a+b c
Re	Centra ^l p \	t CITY	Z	тр с	oue Re	egron	code	ρτντ	STOII	code N	lumber	וטויו ויט	ILIIS
1	,	NaN	3631	.0			3			6			
0		NI - NI	2500				2			C			
2 12		NaN	3500	5			3			6			
3		NaN	3500	7			3			6			
12			2505				_			6			
4 12		NaN	3595	0			3			6			
5		NaN	3501	10552	2		3			6			
12													
	P ⁻	lace Na	me Pl	ace E	Bldas	1-un:	it Uni	ts 1	-unit	Value	2-uni	ts Blo	das
\													
1	ı	Abbevil	.le		0			0		0			0
2	Ad	damsvil	.le		0			0		0			0
3		Alabast	er		132		1	.32	32	974365			0
4	۸۱۱	pertvil	ا م		2			2		404000	1		0
7					۷			2		707000			U
5	Alexar	nder Ci	.ty		12			12	3	607770			0
	2-units its Va		2-un	its \	/alue	3-4	units	Bldg	s 3-4	units	Units	3-4	
1	ICS Va	cue ()		0				0		0		
0													
2		e			0				0		0		

0				
3	0	0	0	0
0		_		_
4	0	0	0	0
0 5	0	0	0	0
0	U	U	U	U
J				
5+ units B 1 2 3 4 5	8ldgs 5+ units 0 0 0 0 0	S Units 5+ un 0 0 0 0 0	its Value 1-u 0 0 0 0 0	nit rep Bldgs \ 0 0 132 2 12
1-unit rep Units \	Units 1-unit	t rep Value 2	-units rep Bl	dgs 2-units rep
1	0	Θ		0
0				
2	0	0		0
0	132	32974365		0
0	132	32974303		U
4	2	404000		0
0				
5	12	3607770		0
0				
2-units re 1 2 3 4 5	ep Value 3-4 (0 0 0 0 0	units rep Bld	gs 3-4 units 0 0 0 0	rep Units \
3-4 units	ren Value 5+	units ren Bl	das 5+ units	rep Units 5+ units
rep Value			- 92	
1	0		0	0
0 2	Θ		0	0
0	U		U	0
3	0		0	0
0				
4	0		0	0
0 5	Θ		0	0
0	U		U	U
dfso3 = pd.r	read_table("ht 2017a.txt", s	ttps://www2.c sep=",",	ensus.gov/eco	n/bps/Place/South

```
skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfso3["Unnamed 41"] = np.nan
dfso3 = dfso3.shift(1, axis=1)
dfso3.Survey = dfso3.index
dfso3.index = np.arange(len(dfso3))
dict names = \{\}
second = dfso3.iloc[0].fillna("")
for i in range(len(dfso3.columns)):
    first = dfso3.columns[i]
    if first.startswith("Unnamed"):
        if dfso3.columns[i-1].startswith("Unnamed"):
            first = dfso3.columns[i+1]
        else:
            first = dfso3.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfso3.columns[i]]= new
dfso3 = dfso3.rename(columns = dict names).drop([0])
# show the first five records
dfso3.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2017
                       01
                              001000
                                             067
                                                               0020
2
         2017
                       01
                              002000
                                             073
                                                               0030
3
         2017
                       01
                              005000
                                             117
                                                               0025
4
                       01
                                                               0030
         2017
                              006000
                                             095
5
         2017
                       01
                              007000
                                             123
                                                               0035
  FIPS Place Code FIPS MCD Code
                                     Pop CSA Code CBSA Code Footnote
Code \
                          00000
                                   2688.0
                                               222
                                                        20020
1
           00124
NaN
2
           00460
                          00000
                                   4522.0
                                                142
                                                        13820
NaN
                                                142
3
           00820
                          00000
                                  30352.0
                                                        13820
NaN
           00988
                          00000
                                  21160.0
                                                999
                                                        99999
4
NaN
                                                999
5
           01132
                          00000
                                  14875.0
                                                        99999
NaN
                   Zip Code Region Code Division Code Number of Months
  Central City
Rep \
                                                      6
                36310
                                       3
1
           NaN
```

12							
2	NaN 3	35005		3	6		
12	NI-NI 3	25.007		2	C		
3 12	NaN 3	35007		3	6		
4	NaN 3	35950		3	6		
12 5	NaN 3	350110552		3	6		
12	waiv .	30110332		5	J		
	Place Name	e Place Bldg	s 1-unit l	Jnits 1	-unit Value	2-units Bld	lgs
1	Abbeville	2	1	1	350000		0
2	Adamsville	2	0	0	0		0
3	Alabaste	r 9	2	92	22168266		0
4	Albertville	e 2	3	23	3707000		0
5 A	Alexander City	/ 1	.4	14	3247000		0
	-units Units 2 ts Value \	2-units Valu	e 3-4 uni	ts Bldgs	s 3-4 units	Units 3-4	
1	0		0	(9	Θ	
0 2	0		0	(9	0	
0							
3	0		0	(9	0	
4	0		0	(9	0	
0 5	0		0	(9	0	
0	· ·		U	`	3	Ü	
1	+ units Bldgs 0 0	5+ units Un	0 0	its Valı	ue 1-unit re 0 0	1 0	
2 3 4 5	0 0		0 0		0	92 23	
5	0		0		0	14	
	-unit rep Unit	ts 1-unit re	p Value 2	units	rep Bldgs 2-	units rep	
1	(1	350000		0		
0 2		0	0		Θ		
			U		J		
0 3		92 2	2168266		0		

```
0
4
                23
                             3707000
                                                      0
0
5
                14
                             3247000
                                                      0
0
  2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units
1
2
                   0
                                       0
                                                            0
3
                   0
                                        0
                                                             0
4
                   0
                                        0
                                                             0
5
                   0
                                        0
                                                             0
  3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units
rep Value
                     0
                                                             0
1
0
2
                                                             0
0
3
                                                             0
0
4
                     0
                                                             0
0
5
                     0
                                                             0
0
dfso4 = pd.read_table("https://www2.census.gov/econ/bps/Place/South
%20Region/so2018a.txt", sep=",",
                   skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfso4["Unnamed 41"] = np.nan
dfso4 = dfso4.shift(1, axis=1)
dfso4.Survey = dfso4.index
dfso4.index = np.arange(len(dfso4))
dict names = {}
second = dfso4.iloc[0].fillna("")
for i in range(len(dfso4.columns)):
    first = dfso4.columns[i]
    if first.startswith("Unnamed"):
        if dfso4.columns[i-1].startswith("Unnamed"):
            first = dfso4.columns[i+1]
        else:
            first = dfso4.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfso4.columns[i]]= new
```

```
dfso4 = dfso4.rename(columns = dict names).drop([0])
# show the first five records
dfso4.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2018
                       01
                              001000
                                              067
                                                                0020
2
         2018
                       01
                              002000
                                              073
                                                                0030
3
                       01
                                              117
                                                                0025
         2018
                              005000
4
         2018
                       01
                              006000
                                              095
                                                                0030
5
                       01
                              007000
                                              123
                                                                0035
         2018
  FIPS Place Code FIPS MCD Code
                                     Pop CSA Code CBSA Code Footnote
Code \
1
           00124
                          00000
                                   2688.0
                                                222
                                                         20020
NaN
           00460
                          00000
                                   4522.0
                                                142
                                                         13820
2
NaN
           00820
                          00000
                                  30352.0
                                                142
                                                         13820
3
NaN
           00988
                          00000
                                  21160.0
                                                999
                                                         99999
NaN
5
           01132
                          00000
                                  14875.0
                                                999
                                                         99999
NaN
                   Zip Code Region Code Division Code Number of Months
  Central City
Rep \
           NaN
                36310
                                        3
                                                       6
1
12
2
           NaN
                35005
                                        3
                                                       6
8
3
           NaN
                35007
                                                       6
10
4
           NaN
                35950
                                                       6
12
5
           NaN
                350110552
                                                       6
12
       Place Name Place Bldgs 1-unit Units 1-unit Value 2-units Bldgs
/
        Abbeville
                                           0
                                                                       0
                                                                        0
       Adamsville
                                           0
        Alabaster
                            65
                                          65
                                                 19967174
                                                                        0
      Albertville
                            34
                                          34
                                                  4997000
                                                                       0
5 Alexander City
                            13
                                          13
                                                  3177319
                                                                       0
```

2-units Un	its 2-units	: Value 3-4 uni	ts R1das 3-4	units Units 3-4
units Value	\	vacue 5 + uni	.cs blugs 5 +	diffes onless 5 4
	•	0	Λ	0
1	0	0	0	0
0		_		
2	0	0	0	0
0				
3	0	0	0	Θ
0				
4	0	0	0	0
0		•	•	•
5	Θ	0	0	0
0	U	U	U	O
0				
				57.1
	_	ts Units 5+ un	ııts Value I-ı	_
1	0	0	0	0
2	0	0	0	0
3	0	0	0	52
4	0	Θ	0	34
5	0	0	0	13
3	· ·	V	V	13
1_unit ren	Unite 1-un	it ren Value 2	-unite ron R1	dgs 2-units rep
Units \	UIIILS I-UI	iic rep vacue z	-units rep bi	lugs 2-units rep
1	0	0		0
0				
2	0	0		0
0	O	· ·		O
	F2	16024702		0
3	52	16834702		0
0				_
4	34	4997000		0
0				
5	13	3177319		0
0				
2-units re	n Value 3-4	units rep Bld	las 3-4 units	ren Units \
1	0	united rep bed	0	0
2	_			
2	0		0	0
3 4	0		0	0
4	0		0	0
5	0		0	0
3-4 units	rep Value 5	+ units rep Bl	dgs 5+ units	rep Units 5+ units
rep Value	•	•	J	
1	0		0	0
	U		U	· ·
0	0		0	0
2	0		0	0
0				
3	0		0	0
0				
4	Θ		0	0
	ū		-	•

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0
5
                     0
                                        0
                                                            0
0
dfso5 = pd.read table("https://www2.census.gov/econ/bps/Place/South
%20Region/so2019a.txt", sep=",",
                   skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfso5["Unnamed 41"] = np.nan
dfso5 = dfso5.shift(1, axis=1)
dfso5.Survey = dfso5.index
dfso5.index = np.arange(len(dfso5))
dict names = {}
second = dfso5.iloc[0].fillna("")
for i in range(len(dfso5.columns)):
    first = dfso5.columns[i]
    if first.startswith("Unnamed"):
        if dfso5.columns[i-1].startswith("Unnamed"):
            first = dfso5.columns[i+1]
        else:
            first = dfso5.columns[i-1]
    #
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfso5.columns[i]]= new
dfso5 = dfso5.rename(columns = dict names).drop([0])
# show the first five records
dfso5.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2019
                       01
                              001000
                                              067
                                                               0020
2
                       01
                                                               0030
         2019
                              002000
                                              073
3
                       01
                                              117
                                                               0025
         2019
                              005000
4
                       01
                                                               0030
         2019
                              006000
                                              095
5
         2019
                       01
                              007000
                                              123
                                                               0035
  FIPS Place Code FIPS MCD Code
                                     Pop CSA Code CBSA Code Footnote
Code \
1
           00124
                          00000
                                   2688.0
                                                222
                                                        20020
NaN
2
           00460
                          00000
                                   4522.0
                                                142
                                                        13820
NaN
           00820
                          00000
                                  30352.0
                                                142
3
                                                        13820
NaN
           00988
                          00000
                                  21160.0
                                                999
                                                        99999
4
NaN
```

5 Na		132	00000	14875.0	999 9	9999	
Re		/ Zip	Code Regi	on Code Divis	sion Code N	Number of M	onths
1	Nal	N 36310		3	6		
12 2	NaN	N 35005		3	6		
12		1 33003		3	U		
3	NaN	N 35007		3	6		
12 4	NaN	N 35950		3	6		
12							
5 12	NaN	N 3501105	52	3	6		
12							
\	Place N	Name Place	Bldgs 1-	unit Units 1-	unit Value	e 2-units B	ldgs
1	Abbevi	ille	0	Θ	()	0
2	Adamsvi	illa	0	9	(1	0
3	Alabas	ster	47	47	15849853	3	0
4	Albertvi	ille	29	29	5553000)	0
5	Alexander (City	17	17	3637837	7	0
	2-units Unit	ts 2-units	Value 3-	4 units Bldgs	3-4 units	Units 3-4	
un 1	its Value \	•	0	0	1	0	
0		0	U	C)	U	
2		0	0	0)	0	
0 3		0	Θ	G)	0	
0							
4 0		0	0	0)	0	
5		0	0	G)	0	
0							
1	5+ units Blo	dgs 5+ uni 0	ts Units ! 0	5+ units Valu	ue 1-unit u 0	0	\
2		0	0		0	0 47	
4		0 1	0 5	26400	0)0	47 29	
5		0	0		0	17	
	1-unit rep l	Jnits 1-un	it rep Va	lue 2-units r	rep Bldgs 2	2-units rep	

Units \				
1	0	0	0	
0	· ·	v	· ·	
2	0	0	0	
0 3	47	15849853	0	
0				
4	29	5553000	0	
0	4.7	2627027	•	
5	17	3637837	0	
0				
2-units re 1 2 3	ep Value 3-4 u 0 0 0	nits rep Bldgs 3-4 0 0 0	units rep Uni	ts \ 0 0 0
4	Õ	0		0
5	Õ	Õ		0
	-	-		_
3-4 units rep Value	rep Value 5+	units rep Bldgs 5+	units rep Uni	ts 5+ units
1	Θ	0		0
0				
2	Θ	0		0
0				
3	0	0		0
0	•	7		-
4	0	1		5
264000 5	0	0		0
0	U	U		U
O				
vertical_cor axis=0)	ncatso = pd.co	ncat([dfso1,dfso2,	dfso3,dfso4,d	fso5],
dfso=vertica	al concatso			
	_			
dfso				
Survey Code \	Date State Co	de 6-Digit ID Count	ty Code Census	Place
1	2015	01 001000	067	0020
2	2015	01 002000	073	0030
_		- 002000	0,0	0050

3	2015	01	0050	900	117		0025
4	2015	01	0060	900	095		0030
5	2015	01	0070	900	123		0035
4461	2019	54	5770	900	079		1730
4462	2019	54	5790	900	105		NaN
4463	2019	54	5830	900	107		NaN
4464	2019	54	5850	900	049		1745
4465	2019	54	5870	900	109		NaN
FIPS P Footnote Cod 1 NaN	lace Code FIP de \ 00124		Code 0000	Pop 2688.0	CSA Code CE	3SA Code 20020	
2 NaN	00460	0	0000	4522.0	142	13820	
3	00820	0	0000	30352.0	142	13820	
NaN 4	00988	0	0000	21160.0	999	99999	
NaN 5 NaN	01132	0	0000	14875.0	999	99999	
4461	87988	0	0000	2301.0	170	26580	
NaN 4462	00000	0	0000	4894.0	425	37620	
NaN 4463	99990	0	0000	40975.0	425	37620	
NaN 4464	88708	0	0000	158.0	999	99999	
NaN 4465 NaN	99990	0	0000	20175.0	999	99999	
Centra Months Rep	\	•	e Regio		Division Cod		of
1 12	NaN 36310			3		6	
2 12	NaN 35005			3		6	

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3 12	Na	aN 3	35007		3		6	
4	Na	aN 3	35950		3		6	
12	.10		.5550		J			
5	Na	aN 3	350110552		3		6	
12								
		• •		•				
4461	Na	aN 2	252130596		3		5	
12								
4462 0	Na	aN 2	26143		3		5	
4463	Na	aN 2	26101		3		5	
12			.0101		J		J	
4464	Na	aN 2	26591		3		5	
0 4465	Na	ъМ 2	24874		3		5	
0	IVC	aiv Z	.4074		J		J	
1				Place Name	Place		l-unit	
1				Abbeville Adamsville		0 1		0 1
2 3 4 5				Alabaster		109		109
4			A	lbertville		0		0
5			Alex	ander City		18		18
4461 4462				field town Tirt County		3 9		3 9
4463	Wood Co	ountv		rated Area		43		43
4464		,		ngton town		0		0
4465	Wyoming Co	ounty	/ Unincorpo	rated Area		0		0
	1-unit Valu	ıa 2.	units Rldo	ıs 2-units U	Inits	2-units	Value	3-4 units
Bldgs		ic Z	diffes beag	13 Z-UIIIC3 (DITES	2 - unii C3	vacuc	J-+ units
1	·	0		0	0		0	
0	20050	٠.		0	0		0	
0 2 0 3 0 4	20059	90		0	0		0	
3	3307581	11		0	0		0	
0								
4		0		0	0		Θ	
0 5 0	412443	33		0	0		0	
0	7147				U		0	
4461	40500	20		0	0		0	
4461 0	49500	90		0	0		0	
4462	136800	90		0	0		0	
_					-			

0 4463	98225	556	1	2	90000	
12 4464		0	0	0	0	
0						
4465 0		0	0	0	0	
1 2 3 4 5 4461 4462 4463 4464	3-4 units	0 0 0 0 0 0 48	units Value 5- 0 0 0 0 0 3840000	+ units Bld	0 0 0 0 0 0 0	0 0 0 0 0 0
4465		0	0		0	0
	5+ units \	/alue 1-uni	t rep Bldgs 1	-unit rep U	nits 1-unit	rep Value
1		0	0		0	0
2		0	1		1	200596
3		0	109		109	33075811
4		0	0		0	0
5		0	18		18	4124433
4461		0	3		3	495000
4462		0	0		0	0
4463		0	43		43	9822556
4464		0	0		Θ	0
4465		0	0		Θ	0
1 2 3 4	2-units re		units rep Uni	ts 2-units 0 0 0		

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5
                       0
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4461
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4462
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                       1
4463
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     3-4 units rep Bldgs 3-4 units rep Units 3-4 units rep Value
1
2
                         0
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4461
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4462
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                        12
                                                               3840000
4463
                                               48
4464
                         0
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                                                                      0
4465
                         0
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                                                                      0
     5+ units rep Bldgs 5+ units rep Units 5+ units rep Value
1
2
                        0
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3
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5
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4461
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4462
                        0
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4463
                        0
                                             0
                                                                   0
                                                                   0
4464
                        0
                                             0
4465
[22341 rows x 41 columns]
dfso=dfso.reset_index()
# Drop a specific column, e.g., 'Place Name'
dfso = dfso.drop(columns=['index'])
dfso
      Survey Date State Code 6-Digit ID County Code Census Place Code
0
              2015
                             01
                                    001000
                                                                        0020
                                                     067
1
              2015
                             01
                                    002000
                                                     073
                                                                        0030
2
              2015
                             01
                                                                        0025
                                    005000
                                                     117
```

3	2015	01 00	96000	095	0030
4	2015	01 00	97000	123	0035
22336	2019	54 57	77000	079	1730
22337	2019	54 57	79000	105	NaN
22338	2019	54 58	33000	107	NaN
22339	2019	54 58	35000	049	1745
22340	2019	54 58	37000	109	NaN
FIPS PI Footnote Code	lace Code FI	PS MCD Code	e Pop (CSA Code CBS	5A Code
0 NaN	00124	00000	2688.0	222	20020
1 NaN	00460	00000	4522.0	142	13820
2	00820	00000	30352.0	142	13820
NaN 3	00988	00000	21160.0	999	99999
NaN 4	01132	00000	14875.0	999	99999
NaN					
22336	87988	00000	2301.0	170	26580
NaN 22337	00000	00000	4894.0	425	37620
NaN 22338	99990	00000	40975.0	425	37620
NaN 22339	88708	00000	158.0	999	99999
NaN 22340	99990	00000	20175.0	999	99999
NaN	99990	00000	20173.0	999	99999
Central 0 1 2 3	NaN 3631 NaN 3500 NaN 3500 NaN 3595 NaN 3501	0 5 7	gion Code D: 3 3 3 3 3	(((e \ 5 5 6 6 6
22336	NaN 2521	30596	3		5

22337 22338 22339 22340		NaN NaN NaN NaN	26143 26101 26591 24874			3 3 3 3	5 5 5 5		
	Number	of Mon	ths Rep				Place	Name	Place
Bldgs 0	\		12				Abbey	/ille	
0			12				Abbe	7100	
1			12				Adams	/ille	
1 2			12				Alaba	aster	
109									
3			12				Alberty	/ille	
4			12				Alexander	City	
18									
								• • •	
22336 3			12				Winfield	town	
22337			0				Wirt Co	ounty	
9 22338			12	Mood	County	lln i	ncorporated	1 500	
43			12	wood	County	נווט	ncorporated	Area	
22339			0				Worthington	town	
0 22340			0	Wvomina	County	Uni	.ncorporated	Area	
0				,		0		7 00.	
	1-unit	Units	1-unit Va	lue 2-u	nits Blo	das	2-units Unit	ts 2-i	ınits
Value	\		I dille va				Z dilles one		
0 0		0		0		0		0	
1		1	200	596		0		0	
0 2		100				•		•	
2		109	33075	811		0		0	
0 3		0		0		0		0	
0		10	4124	422		0		0	
4 0		18	4124	433		0		U	
22336		3	495	000		0		0	
0									
22337 0		9	1368	000		0		0	
22338		43	9822	556		1		2	

90000		0	0	0		0
22339 0		0	0	0		9
22340 0		0	0	0		9
U	2 4	Dl doo 1	2 4		Val	
Bldgs	3-4 units	Blags :	3-4 units Unit		value 5+ ui	nits
0		0		0	0	0
1		0		0	0	0
2		0		0	0	0
3		0		0	0	0
4		0		0	0	0
22336		0		0	0	0
22337		0		0	0	0
22338		12	4	.8 38	840000	0
22339		0		0	0	0
22340		0		0	0	0
\	5+ units	Units 5-	+ units Value	1-unit rep	Bldgs 1-uni [.]	t rep Units
Ô		0	0		0	0
1		0	0		1	1
2		0	Θ		109	109
3		0	9		0	0
4		0	0		18	18
22336		0	0		3	3
22330						
		0	0		0	0
2233722338		0	0		0 43	0 43

22339	0		0		Θ		0
22340	0		0		0		0
Valua	1-unit rep Value	2-units	rep Bldgs	2-units	rep Units	2-units	rep
Value 0	0		0		0		
0 1	200596		0		Θ		
0	200390		U		0		
2	33075811		0		0		
0 3	0		0		0		
0							
4 0	4124433		0		0		
22336	495000		0		0		
0							
22337 0	0		0		0		
22338	9822556		1		2		
90000 22339	Θ		0		0		
0							
22340 0	0		0		0		
	2 4	d		l. ' l	4		,
0 1 2 3	3-4 units rep Bl	dgs 3-4 u 0 0 0 0	inits rep l	Jnits 3-4 0 0 0 0	1 units re	p Value 0 0 0 0	\
4		0		0		Θ	
22336 22337 22338 22339 22340		0 0 12 0		0 0 48 0		 0 0 3840000 0 0	
	5+ units rep Bld	as 5+ uni	ts rep Uni	its 5+ ur	nits rep V	alue	
0 1 2 3 4		9		0 0 0 0 0 0		0 0 0 0 0	

```
22336
                        0
                                            0
                                                                0
22337
                        0
                                            0
                                                                0
22338
                        0
                                            0
                                                                0
22339
                        0
                                            0
                                                                0
22340
                        0
                                                                0
[22341 rows x 41 columns]
import pandas as pd
# Assuming your data is in a CSV file named 'data.csv'
dataso = dfso
# Select the columns of interest
selected columnsso = ['FIPS Place Code','Zip Code','Survey Date', '1-
unit rep Units', 'Place Name']
# Extract the desired data
extracted datasso = dataso[selected columnsso]
#choosing the column with 1-unit rep unit data
extracted datasso
      FIPS Place Code
                           Zip Code Survey Date 1-unit rep Units \
0
               00124
                        36310
                                            2015
1
                                                                 1
               00460
                        35005
                                            2015
2
                        35007
                                                               109
               00820
                                            2015
3
               00988
                        35950
                                            2015
                                                                 0
4
               01132
                        350110552
                                            2015
                                                                18
                                             . . .
                                                               . . .
. . .
                        252130596
22336
               87988
                                            2019
                                                                 3
22337
               00000
                        26143
                                            2019
                                                                 0
                                                                43
22338
               99990
                        26101
                                            2019
22339
                        26591
                                            2019
                                                                 0
               88708
22340
                        24874
                                            2019
                                                                 0
               99990
                                Place Name
0
                                 Abbeville
1
                                Adamsville
2
                                 Alabaster
3
                               Albertville
4
                            Alexander City
                             Winfield town
22336
22337
                               Wirt County
          Wood County Unincorporated Area
22338
22339
                          Worthington town
22340 Wyoming County Unincorporated Area
```

```
[22341 rows x 5 columns]
# Group by 'Zip Code', 'FIPS Place Code', and 'Place Name', and sum
'1-unit rep Units'
grouped df1so = extracted datasso.groupby(['Zip Code', 'FIPS Place
Code', 'Place Name', 'Survey Date'])['1-unit rep
Units'].sum().reset index()
# Pivot the DataFrame to have years as columns
pivot dflso = grouped dflso.pivot table(index=['Zip Code', 'FIPS Place
Code', 'Place Name'], columns='Survey Date', values='1-unit rep
Units', fill value=0)
# Reset the index to have 'Zip Code', 'FIPS Place Code', and 'Place
Name' as columns
pivot df1so.reset index(inplace=True)
# Rename the columns
pivot dflso.columns = ['Zip Code', 'FIPS Place Code', 'Place Name',
'2015', '2016', '2017', '2018', '2019']
# Display the pivot DataFrame
print(pivot df1so)
         Zip Code FIPS Place Code
                                                               Place
Name \
                                                          Middletown
      19709
                           47030
town
      19711
                           50670
1
Newark
      19720
                           50800
                                                               New
Castle
      19720
                           99990
                                   New Castle County Unincorporated
Area
      197300111
                           54050
                                                              0dessa
town
. . .
4710 79855
                           75032
                                                            Van Horn
town
4711 79901
                           24000
                                                                  Εl
Paso
4712 79927
                           68636
Socorro
4713 79928
                           34832
                                                             Horizon
City
4714 983822530
                           62804
```

	ort									
Nockp										
0	2015 128	2016 112	2017 158	2018 188	2019 149					
0 1	120	21	120	20	51					
1 2 3	5	8	1	3	4					
3	1021 0	952 0	928 1	837 0	1046 0					
4710	1	3	6	7	1072					
4711 4712	2282 126	2014 73	2020 173	1588 112	1873 316					
4713	68	101	33	45	234					
4714	88	0	0	0	0					
[4715	rows	х 8 со	lumns]							
nivot	df1so									
pivot.	_		ETDC	D.I	6 1				D 1	
Name	\ \	p Code	FIPS	Place	Code				Place	
0	19709			47	030				Middletown	
town 1	19711			50	670					
Newar				30	070					
2	19720			50	800				New	
Castl	e									
3				99	990	New	Castle	County	Unincorporated	
3 Area	19720				990	New	Castle	County	Unincorporated	
Area 4					990 050	New	Castle	County	Unincorporated Odessa	
Area	19720					New	Castle	County		
Area 4 town 	19720 19730	0111		54	050	New	Castle	County	0dessa	
Area 4 town 4710	19720	0111		54		New	Castle	County		
Area 4 town 4710 town 4711	19720 19730	0111		54 75	050	New	Castle	County	0dessa	
Area 4 town 4710 town 4711 Paso	19720 19730 79855 79901	0111		54 75 24	050 032 000	New	Castle	County	Odessa Van Horn	
Area 4 town 4710 town 4711	19720 19730 79855 79901 79927	0111		54 75 24	050 	New	Castle	County	Odessa Van Horn	
Area 4 town 4710 town 4711 Paso 4712 Socor 4713	19720 19730 79855 79901 79927	0111		54 75 24 68	050 032 000	New	Castle	County	Odessa Van Horn	
Area 4 town 4710 town 4711 Paso 4712 Socor 4713 City	19720 19730 79855 79901 79927 ro 79928	0111		54 75 24 68 34	050 032 000 636 832	New	Castle	County	Odessa Van Horn El	
Area 4 town 4710 town 4711 Paso 4712 Socor 4713	19720 19730 79855 79901 79927 ro 79928 98382	0111		54 75 24 68 34	050 032 000 636	New	Castle	County	Odessa Van Horn El	٠
Area 4 town 4710 town 4711 Paso 4712 Socor 4713 City 4714	19720 19730 79855 79901 79927 ro 79928 98382 ort	0111 	2017	54 75 24 68 34 62	050 032 000 636 832 804	New	Castle	County	Odessa Van Horn El	
Area 4 town 4710 town 4711 Paso 4712 Socor 4713 City 4714 Rockp	19720 19730 79855 79901 79927 ro 79928 98382 ort 2015 128	0111 2530 2016 112	2017	54 75 24 68 34 62 2018 188	050 032 000 636 832 804 2019 149	New	Castle	County	Odessa Van Horn El	
Area 4 town 4710 town 4711 Paso 4712 Socor 4713 City 4714 Rockp	19720 19730 79855 79901 79927 ro 79928 98382 ort 2015 128 19	2530 2016 112 21	158 8	54 75 24 68 34 62 2018 188 20	050 032 000 636 832 804 2019 149 51	New	Castle	County	Odessa Van Horn El	
Area 4 town 4710 town 4711 Paso 4712 Socor 4713 City 4714	19720 19730 79855 79901 79927 ro 79928 98382 ort 2015 128	0111 2530 2016 112	158	54 75 24 68 34 62 2018 188	050 032 000 636 832 804 2019 149	New	Castle	County	Odessa Van Horn El	

4710 4711 4712 4713	 1 2282 126 68	 3 2014 73 101	 6 2020 173 33	7 1588 112 45	 8 1873 316 234						
4714 [4715	88 rows x	0 : 8 co	0 Lumns1	0	0						
dfso			_								
	Survey	Date	State	Code	6-Digit	ID	County	Code	Census	Place	Code
0		2015		01	001	000		067			0020
1		2015		01	002	000		073			0030
2		2015		01	005	000		117			0025
3		2015		01	006	000		095			0030
4		2015		01	007			123			0035
•		2013		01	007	000		123			
22336		2019		54	577	000		079			1730
22337		2019		54	579			105			NaN
22338		2019		54	583			107			NaN
22339		2019		54	585	000		049			1745
22340		2019		54	587	000		109			NaN
Footna	FIPS P		Code F1	IPS MO	CD Code		Pop CS	SA Cod	le CBSA	Code	
0	re cou	-	124		00000	26	88.0	22	22 2	20020	
NaN 1		004	460		00000	45	22.0	14	12 :	13820	
NaN 2		008	320		00000	303	52.0	14	12	13820	
NaN 3			988		00000		60.0	99		99999	
NaN											
4 NaN		ΘI.	132		00000	148	75.0	99	99 (99999	
22336		879	988		00000	23	01.0	17	70 2	26580	

NaN 22337		0000	۵	00000	4894.0	425	37620
NaN							
22338 NaN		9999	9	00000	40975.0	425	37620
22339		8870	8	00000	158.0	999	99999
NaN 22340		9999	9	00000	20175.0	999	99999
NaN							
0	Central	City NaN	Zip 36310	Code Regi	on Code Div		
0 1		NaN	35005		3 3 3	6	5
2		NaN NaN	35007 35950		3 3	6	
4		NaN	3501105	52	3	6	
22336		 NaN	2521305	 96	 3		
22337		NaN	26143		3 3	5	5
22338 22339		NaN NaN	26101 26591		3)
22340		NaN	24874		3		5
D1 data	Number	of Mon	ths Rep			Place	e Name Place
Bldgs 0	\		12			Abbe	eville
0 1			12			Adams	sville
1 2			12				
109			12				paster
3 0			12			Albert	ville
4			12			Alexander	⁻ City
18 							
22336			12			Winfield	t town
3							
22337 9			0			Wirt (Lounty
22338 43			12	Wood	County Unin	corporated	d Area
22339			Θ		W	<i>l</i> orthingtor	n town
0 22340			Θ	Wyoming	County Unin	corporated	d Area
0				-	•		
V/ - 7		Units	1-unit V	alue 2-ur	its Bldgs 2	?-units Uni	its 2-units
Value	\						

1							
1	0	0	0		0	0	
109 33075811 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1	1	200596		Θ	Θ	
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0						
18	2	109	33075811		0	0	
18	3	0	0		0	0	
22336							
22336	4 0	18	4124433		0	Θ	
9 22337 9 1368000 0 9 22338 43 9822556 1 2 90000 0 22339 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0							
9 22337 9 1368000 0 9 22338 43 9822556 1 2 90000 0 22339 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		•	105000		•	•	
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22338	22337	9	1368000		0	0	
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22339		43	9822550		1	Z	
22340 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	22339	0	0		0	0	
3-4 units Bldgs 3-4 units Units 3-4 units Value 5+ units Bldgs 0 0 0 0 0 0 0 1 0 0 0 0 0 2 0 0 0 0 0 0 3 0 0 0 0 0 0 4 0 0 0 0 0 0 22336 0 0 0 0 0 0 0 22337 0 0 0 0 0 0 0 22338 12 48 3840000 0 22339 0 0 0 0 0 0 0 22340 0 0 0 0 0 0	0	0	۵		0	0	
3-4 units Bldgs 3-4 units Units 3-4 units Value 5+ units Bldgs 0 0 0 0 0 0 0 1 0 0 0 0 0 2 0 0 0 0 0 0 3 0 0 0 0 0 4 0 0 0 0 0 4 0 0 0 0 0 22336 0 0 0 0 0 0 22337 0 0 0 0 0 0 22338 12 48 3840000 0 22339 0 0 0 0 0 0 22340 0 0 0 0 0	0	U	U		U	О	
Bldgs \		2 4 unita Didaa	2 4	Unita 2	1	lua Er und	+0
9 0 0 0 0 1 0 0 0 0 2 0 0 0 0 3 0 0 0 0 4 0 0 0 0 22336 0 0 0 0 22337 0 0 0 0 22338 12 48 3840000 0 22339 0 0 0 0 22340 0 0 0 0	Bldas		3-4 units	UNITES 3	-4 units va	rue 5+ uni	. L S
2 0 0 0 0 3 0 0 0 0 4 0 0 0 0 22336 0 0 0 0 22337 0 0 0 0 22338 12 48 3840000 0 22339 0 0 0 0 22340 0 0 0 0	0	0		0		0	0
3 0 0 0 0 4 0 0 0 0 22336 0 0 0 0 22337 0 0 0 0 22338 12 48 3840000 0 22339 0 0 0 0 22340 0 0 0 0	1	0		0		0	0
3 0 0 0 0 4 0 0 0 0 22336 0 0 0 0 22337 0 0 0 0 22338 12 48 3840000 0 22339 0 0 0 0 22340 0 0 0 0	2	Θ		0		0	0
4 0 0 0 0 0 22336 0 0 0 0 0 22337 0 0 0 0 0 22338 12 48 3840000 0 22339 0 0 0 0 22340 0 0 0 0							
.	3	0		U		U	U
22337 0 0 0 0 22338 12 48 3840000 0 22339 0 0 0 0 22340 0 0 0 0	4	0		0		0	0
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22338 12 48 3840000 0 22339 0 0 0 0 22340 0 0 0 0	22336	0		0		0	0
22338 12 48 3840000 0 22339 0 0 0 0 22340 0 0 0 0	22337	0		Θ		0	Θ
22339 0 0 0 0 22340 0 0 0 0					3840		
22340 0 0 0 0					20400		
				U		U	U
5+ units Units 5+ units Value 1-unit rep Bldgs 1-unit rep Units	22340	0		0		0	0
5+ units Units 5+ units Value 1-unit rep Bldgs 1-unit rep Units							
	\	5+ units Units !	5+ units Va	alue 1-u	nit rep Bld	gs 1-unit	rep Units

0		0			0				0			0
1		0			0				1			1
2		0			0			-	109			109
3		0			0				0			0
4		0			0				18			18
22336		0			0				3			3
22337		0			0				0			0
22338		0			0				43			43
22339		0			0				0			0
22340		0			0				0			0
Value	1-unit	rep Val	ue 2-	units	rep E	Bldgs	2-un:	its	rep	Units	2-units	rep
0	`		0			0	1			0		
0												
1		2005	96			0				0		
0												
0 2		330758	11			0				0		
0												
0 3 0			0			0				0		
0						-						
4		41244	33			0				0		
0												
22336		4950	00			0				0		
0												
22337			0			0				0		
0		00005	F.C.			-				2		
22338		98225	56			1				2		
90000			^			^				0		
22339			0			0				0		
0			0			0				0		
22340 0			0			0				0		
U												
0	3-4 uni	its rep	Bldgs 0		units	rep	Units 0	3-4	uni	ts re	p Value 0	\

1 2 3 4 22336 22337 22338 22339 22340	0 0 0 0 0 12 0	0 0 0 0 0 48 0	0 0 0 0 0 3840000 0
5+ units 0 1 2 3 4 22336 22337 22338 22339 22340	rep Bldgs 5+ unit 0 0 0 0 0 0 0 0 0 0 0 0	s rep Units 5+ units 0 0 0 0 0 0 0 0 0 0 0 0	s rep Value 0 0 0 0 0 0 0 0
[22341 rows x 4	1 columns]		
import pandas a	s pd		
# Assuming your dataso2 = dfso	data is in a CSV	file named 'data.c	SV'
selected_column		ce Code','Zip Code' Units','5+ units re	
<pre># Extract the d extracted_datam</pre>	<i>esired data</i> so2 = dataso2[sel	ected_columnsso2]	
extracted_datam	so2		
1 2 3 4 22336	e Code Zip Co 00124 36310 00460 35005 00820 35007 00988 35950 01132 350110552 87988 252130596 00000 26143		its rep Units \ 0 0 0 0 0 0

```
22338
               99990
                        26101
                                            2019
                                                                  2
                        26591
22339
                                            2019
               88708
                                                                  0
22340
               99990
                        24874
                                            2019
                                                                  0
      3-4 units rep Units 5+ units rep Units \
0
1
                         0
                                             0
2
                         0
                                             0
3
                         0
                                             0
4
                         0
                                             0
. . .
                                             0
22336
                         0
22337
                         0
                                             0
22338
                        48
                                             0
22339
                                             0
                         0
22340
                                             0
                                Place Name
0
                                 Abbeville
1
                                Adamsville
2
                                 Alabaster
3
                               Albertville
4
                            Alexander City
22336
                             Winfield town
22337
                               Wirt County
22338
          Wood County Unincorporated Area
22339
                          Worthington town
22340
      Wyoming County Unincorporated Area
[22341 rows x 7 columns]
# Group by 'Zip Code,' 'FIPS Place Code,' 'Place Name,' and 'Survey
Date,' and sum the units columns
grouped_dfmso = extracted_datamso2.groupby(['Zip Code', 'FIPS Place
Code', 'Place Name', 'Survey Date']).agg({
    '2-units rep Units': 'sum',
    '3-4 units rep Units': 'sum',
    '5+ units rep Units': 'sum'
}).reset index()
# Create a new column 'multi unit' by summing the '2-units rep Units,'
'3-4 units rep Units,' and '5+ units rep Units'
grouped dfmso['multi unit'] = grouped dfmso['2-units rep Units'] +
grouped dfmso['3-4 units rep Units'] + grouped dfmso['5+ units rep
Units'l
# Display the grouped DataFrame
```

```
print(grouped dfmso)
          Zip Code FIPS Place Code
                                          Place Name Survey Date \
0
       19709
                             47030
                                     Middletown town
                                                             2015
                            47030
1
       19709
                                                             2016
                                     Middletown town
2
       19709
                             47030
                                     Middletown town
                                                             2017
3
                             47030
                                     Middletown town
                                                             2018
       19709
4
       19709
                             47030
                                     Middletown town
                                                             2019
22333
      79928
                             34832
                                        Horizon City
                                                             2016
22334
      79928
                             34832
                                        Horizon City
                                                             2017
                                        Horizon City
22335
      79928
                             34832
                                                             2018
       79928
22336
                             34832
                                        Horizon City
                                                             2019
22337 983822530
                             62804
                                                             2015
                                            Rockport
      2-units rep Units 3-4 units rep Units 5+ units rep Units multi
unit
                                           0
                                                              96
0
4096
                                                             120
60120
                                                             144
40144
3
                                                              28
2028
                                                             168
60168
                                                               0
22333
000
22334
                                                               0
000
22335
                                                               0
000
22336
                                                               0
000
22337
000
[22338 rows x 8 columns]
grouped_dfmso
          Zip Code FIPS Place Code
                                          Place Name Survey Date \
       19709
                             47030
                                     Middletown town
                                                             2015
0
1
       19709
                                     Middletown town
                             47030
                                                             2016
```

2 3 4	19709 19709 19709		47030 47030 47030	Middletow	n town	2017 2018 2019	
22333 22334 22335 22336 22337	79928 79928 79928 79928 983822530		34832 34832 34832 34832 62804	Horizo Horizo Horizo	on City on City on City on City ockport	2016 2017 2018 2019 2015	
unit	2-units re		units	•	+ units	rep Units multi	
0 4096		4		0		96	
1		6		Θ		120	
60120 2		4		0		144	
40144		4		9		144	
3		2		0		28	
2028 4		6		0		168	
60168		O		Ū		100	
22333		Θ		Θ		0	
000							
22334 000		0		0		0	
22335		0		0		Θ	
000		0		0		0	
22336 000		0		0		0	
22337		0		0		0	
000							
[22338	rows x 8	columns]					
pivot_c Code',	dfmso = gr		.pivot_	table(index	=['Zip (Code', 'FIPS Place 'multi unit',	е
Name'	as columns		•		Place Cod	de', and 'Place	
pivot_					ce Code',	, 'Place Name',	

```
# Display the pivot DataFrame
print(pivot dfmso)
         Zip Code FIPS Place Code
                                                                 Place
Name \
      19709
                            47030
                                                           Middletown
town
      19711
                            50670
1
Newark
      19720
                            50800
                                                                 New
Castle
      19720
                            99990
                                    New Castle County Unincorporated
3
Area
4
      197300111
                            54050
                                                                0dessa
town
. . .
                            75032
                                                              Van Horn
4710 79855
town
                            24000
4711 79901
                                                                    Εl
Paso
4712 79927
                            68636
Socorro
4713 79928
                            34832
                                                               Horizon
City
4714 983822530
                            62804
Rockport
          2015
                   2016
                              2017
                                        2018
                                                  2019
0
          4096
                  60120
                             40144
                                         2028
                                                 60168
1
             0
                    224
                               320
                                            0
                                                     0
2
                                            0
             0
                       0
                               120
                                                     0
3
                                            0
           269
                     120
                               138
                                                    60
4
             0
                                 0
                                            0
                                                     0
. . .
4710
             0
                     0
                                 0
                                                     0
4711 64361869
                8471674 46187664
                                    11822481
                                               4824341
4712
            40
                    600
                                 5
                                        3680
                                                161560
4713
             0
                       0
                                 0
                                            0
                                                     0
4714
             0
[4715 rows x 8 columns]
pivot dfmso
         Zip Code FIPS Place Code
                                                                 Place
Name \
```

0	19709		47030				Middletown	
town 1	19711		50670					
Newark								
2 Castle	19720		50800				New	
3	19720		99990	New	Castle	County	Unincorporated	
Area						,	•	
4	197300111		54050				0dessa	
town								
								-
4710	79855		75032				Van Horn	
town 4711	79901		24000				El	
Paso								
4712	79927		68636					
Socori 4713	79928		34832				Horizon	
City								
4714	983822530)	62804					
Rockpo	JI L							
•	2015	2016	2017		2018	2019		
0 1	4096 0	60120 224	40144 320		2028	60168 0		
2	0	0	120		0	0		
3	269	120	138		0	60		
4	0	0	0		0	0		
4710	0	0	0		0	0		
4711 4712	64361869	8471674 600	46187664	1182	2481 4 3680	4824341		
4712 4713	40 0	0	5 0		0	161560 0		
4714	0	Ö	0		Õ	0		
[4715	rows x 8	columns]						

Repeating all steps for West Region

```
dfwo1["Unnamed 41"] = np.nan
dfwo1 = dfwo1.shift(1, axis=1)
dfwo1.Survey = dfwo1.index
dfwo1.index = np.arange(len(dfwo1))
dict names = \{\}
second = dfwo1.iloc[0].fillna("")
for i in range(len(dfwo1.columns)):
    first = dfwo1.columns[i]
    if first.startswith("Unnamed"):
        if dfwo1.columns[i-1].startswith("Unnamed"):
            first = dfwo1.columns[i+1]
        else:
            first = dfwo1.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfwo1.columns[i]]= new
dfwo1 = dfwo1.rename(columns = dict names).drop([0])
# show the first five records
dfwo1.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2015
                       02
                              009000
                                              013
                                                                0070
2
                       02
                                              020
                                                                0140
         2015
                              041000
3
                       02
         2015
                              049000
                                              105
                                                                0160
4
         2015
                       02
                              085000
                                              050
                                                                0310
5
                       02
         2015
                              097000
                                              060
                                                                 NaN
  FIPS Place Code FIPS MCD Code
                                      Pop CSA Code CBSA Code Footnote
Code \
                                    1027.0
                                                 999
                                                         99999
1
           01090
                          00000
NaN
                          00000
                                                 999
2
           03000
                                  291826.0
                                                         11260
NaN
                                                 999
3
           03440
                          00000
                                     459.0
                                                         99999
NaN
                          00000
                                    6080.0
                                                 999
4
           06520
                                                         99999
NaN
5
           99990
                          00000
                                     997.0
                                                 999
                                                         99999
NaN
  Central City
                   Zip Code Region Code Division Code Number of Months
Rep \
1
           NaN
                99503
                                        4
                                                      9
0
2
                                                      9
                995196650
             1
0
3
           NaN
                998200189
                                        4
                                                      9
```

0						
4 NaN 12	99559		4	9		
5 NaN	996330189		4	9		
12						
3	Place Nam Akuta y of Anchorag Angoo Bethe ol Bay Boroug	n e n l	Bldgs 1-unit 0 648 0 6 3	Units 1 0 648 0 6 3	-unit Value \ 0 202797264 0 1300000 401500	
	s 2-units Uni	ts 2-uni	ts Value 3-4	units B	ldgs 3-4 units	
Units \ 1	0	0	0		0	
0						
2 36	1	2	322399		12	
3	0	0	0		0	
0 4	2	4	700000		0	
0	0	0	0		0	
5 0	U	U	U		U	
1	lue 5+ units	0	e)	0	
2 6272 3	178 0	17 0	148 6		3398143 0	
4	0	0	e)	0	
5	0	Θ	0		Θ	
	ldgs 1-unit r	ep Units	1-unit rep	Value 2-	units rep Bldgs	5
1	0	0		0	(9
2	0	0		0	(9
3	0	0		0	(9
4	6	6	13	800000	-	2
5	3	3	4	101500	(9
2-units reprep Units \	Units 2-units	rep Val	ue 3-4 units 0	rep Bld	lgs 3-4 units	
0						

```
2
                                     0
                                                          0
0
3
                                     0
                                                          0
0
4
                                700000
                                                          0
0
5
                                     0
                                                          0
                   0
0
  3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units
rep Value
1
                     0
                                                             0
0
2
                     0
                                                             0
0
3
                     0
                                                             0
0
4
                     0
                                                             0
0
5
                     0
                                                             0
0
dfwo2 = pd.read table("https://www2.census.gov/econ/bps/Place/West
%20Region/we201\overline{6}a.txt", sep=",",
                   skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfwo2["Unnamed 41"] = np.nan
dfwo2 = dfwo2.shift(1, axis=1)
dfwo2.Survey = dfwo2.index
dfwo2.index = np.arange(len(dfwo2))
dict names = {}
second = dfwo2.iloc[0].fillna("")
for i in range(len(dfwo2.columns)):
    first = dfwo2.columns[i]
    if first.startswith("Unnamed"):
        if dfwo2.columns[i-1].startswith("Unnamed"):
            first = dfwo2.columns[i+1]
        else:
            first = dfwo2.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfwo2.columns[i]]= new
dfwo2 = dfwo2.rename(columns = dict names).drop([0])
# show the first five records
dfwo2.head()
```

1 2 3 4 5	Survey	Date 3 2016 2016 2016 2016 2016	State	Code 02 02 02 02 02	041 049 085	ID 9000 1000 9000 5000 7000	Count	y Cod 01 02 10 05 06	3 0 5 0	us Pl	.ace	Code 0070 0140 0160 0310 NaN	\
ı	FIPS P	Lace Co	ode FI	PS MO	D Code		Pop	CSA	Code C	BSA (ode	Footn	ote
Cod 1 Nal		0109	90		00000		1027.0		999	99	999		
2	•	0300	90		00000	292	1826.0		999	11	260		
Nal	V												
3		0344	40		00000		459.0		999	99	999		
4		0652	20		00000	6	5080.0		999	99	999		
Nal	V												
5		9999	90		00000		997.0		999	99	999		
Nal	V												
		City	Z	ip Co	de Regi	ion (Code D	ivisi	on Cod	e Nun	ber	of Mo	nths
Rep	o \	NaN	9950	12			4			9			
1 1		IVAIN	9956	13			4			9			
2		1	9951	.96650)		4			9			
0 3		NaN	0000	200189)		4			9			
12		IVAIN	9902	.00105	,		4			9			
4		NaN	9955	9			4			9			
12			0000	20100						•			
5 12		NaN	9963	30189)		4			9			
12													
1	Munici	ipality		Αkι	lame Pla Itan Tage		_			0		Value 0 284620	
3					joon		0			0		0	
4		Doiota	al Day		hel		6 2			6		300000	
5		Bristo	ос вау	BOLC	ougn		Z			2	2	450000	
	2-units its \	Bldgs	s 2-un	its l	Jnits 2	unit	ts Val	ue 3-	4 unit	s Blo	lgs 3	3-4 un	its
1		(9		0			0			0		
0 2		(9		0			0			12		
37			,		U			J			12		
3		(9		0			0			0		
0			1		2		4F00	00			0		
4 0		-	1		2		4500	00			0		
J													

5	0	0	0 0	
3-4 t 1 2 3 4 5	units Value 5+ units 0 6422957 0 0 0	Bldgs 5+ units 0 18 0 0 0	174 2750862 0 0	0
1-uni	it rep Bldgs 1-unit	rep Units 1-uni	t rep Value 2-units	rep Bldgs
1	0	0	0	0
2	0	0	0	0
3	0	0	0	Θ
4	6	6	1800000	1
5	2	2	450000	0
rep Uni 1 0 2 0 3 0 4 0 5	0 0 0 0 2 0	0 0 0 450000 0	units rep Bldgs 3-4 0 0 0 0 0	
3-4 trep Val	Lue		5+ units rep Units 5	+ units
1	0	0	0	
0 2	0	0	0	
0	0	0	0	
0 4	0	Θ	Θ	
0				
5 0	0	0	Θ	

```
dfwo3 = pd.read_table("https://www2.census.gov/econ/bps/Place/West
%20Region/we2017a.txt", sep=",",
                  skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfwo3["Unnamed 41"] = np.nan
dfwo3 = dfwo3.shift(1, axis=1)
dfwo3.Survey = dfwo3.index
dfwo3.index = np.arange(len(dfwo3))
dict names = \{\}
second = dfwo3.iloc[0].fillna("")
for i in range(len(dfwo3.columns)):
    first = dfwo3.columns[i]
    if first.startswith("Unnamed"):
        if dfwo3.columns[i-1].startswith("Unnamed"):
            first = dfwo3.columns[i+1]
        else:
            first = dfwo3.columns[i-1]
    #
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfwo3.columns[i]]= new
dfwo3 = dfwo3.rename(columns = dict names).drop([0])
# show the first five records
dfwo3.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
         2017
                       02
                              009000
                                             013
                                                               0070
2
         2017
                       02
                              041000
                                             020
                                                               0140
3
         2017
                       02
                              049000
                                             105
                                                               0160
4
         2017
                       02
                              085000
                                             050
                                                               0310
5
                      02
         2017
                              097000
                                             060
                                                                NaN
  FIPS Place Code FIPS MCD Code
                                      Pop CSA Code CBSA Code Footnote
Code \
           01090
                          00000
                                    1027.0
                                                 999
                                                         99999
1
NaN
                                  291826.0
                                                 999
2
           03000
                          00000
                                                         11260
NaN
           03440
                          00000
                                     459.0
                                                 999
                                                         99999
3
2
4
                                                 999
           06520
                          00000
                                    6080.0
                                                         99999
NaN
           99990
                          00000
                                     997.0
                                                 999
5
                                                         99999
NaN
  Central City
                   Zip Code Region Code Division Code Number of Months
```

Rep \								
1	NaN	99503		4		9		
12 2	1	995196650		4		9		
0 3								
3 0	NaN	998200189		4		9		
4	NaN	99559		4		9		
12 5	NaN	996330189		4		9		
11								
1 2 Munici 3 4 5		Place Na Akut of Anchora Ango Beth I Bay Borou	an ge on el	Bldgs 0 800 0 15	1-unit	Units 0 800 0 15	1-unit Val 2505997 35221	0 715 0
2-units	s Bldas	2-units Un	its 2-un	nits Val	ue 3-4	units	Bldas 3-4	units
Units \								
1 0	0		0		0		0	
2 47	0		0		0		14	
3	0		0		0		0	
0 4	0		0		0		0	
0			0		0		0	
5 0	0		U		U		U	
3-4 uni 1 2 3 4 5	its Valu 816523	ue 5+ units 0 31 0 0	Bldgs 5 0 19 0 0	+ units	Units 0 172 0 0	5+ un:	its Value 0 27192436 0 0 0	\
	rep Blo	dgs 1-unit	rep Unit	s 1-uni	t rep \	/alue 2	2-units rep	Bldgs
1		0		0		0		0
2		0		0		0		0
3		0		0		0		0
4		15	1	.5	352	22104		0
5		0		0		0		0
J		J		•		U		J

```
2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units
rep Units \
                                      0
                                                           0
1
                   0
0
2
                                      0
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0
3
                                      0
                                                           0
0
4
                                      0
                                                           0
0
5
                                      0
                                                           0
0
  3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units
rep Value
                     0
                                                             0
1
                                         0
0
2
                     0
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0
3
                                                             0
0
4
                     0
                                                             0
0
5
                     0
                                                             0
0
dfwo4 = pd.read table("https://www2.census.gov/econ/bps/Place/West
%20Region/we201\overline{8}a.txt", sep=",",
                   skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfwo4["Unnamed 41"] = np.nan
dfwo4 = dfwo4.shift(1, axis=1)
dfwo4.Survey = dfwo4.index
dfwo4.index = np.arange(len(dfwo4))
dict names = {}
second = dfwo4.iloc[0].fillna("")
for i in range(len(dfwo4.columns)):
    first = dfwo4.columns[i]
    if first.startswith("Unnamed"):
        if dfwo4.columns[i-1].startswith("Unnamed"):
            first = dfwo4.columns[i+1]
        else:
            first = dfwo4.columns[i-1]
              new = first+second[i]
    # else:
```

```
new = first+" "+second[i]
    dict names[dfwo4.columns[i]] = new
dfwo4 = dfwo4.rename(columns = dict names).drop([0])
# show the first five records
dfwo4.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
                                             013
1
         2018
                       02
                              009000
2
                       02
                                              020
         2018
                              041000
                                                               0140
3
         2018
                       02
                              049000
                                              105
                                                               0160
                       02
4
         2018
                              085000
                                              050
                                                               0310
5
         2018
                       02
                              097000
                                             060
                                                                NaN
  FIPS Place Code FIPS MCD Code
                                      Pop CSA Code CBSA Code Footnote
Code \
           01090
                          00000
                                    1027.0
                                                 999
                                                         99999
1
NaN
           03000
                          00000
                                  291826.0
                                                 999
                                                         11260
2
NaN
           03440
                          00000
                                     459.0
                                                 999
                                                         99999
3
2
4
           06520
                          00000
                                    6080.0
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NaN
           99990
                          00000
                                     997.0
                                                 999
                                                         99999
5
NaN
  Central City Zip Code Region Code Division Code Number of Months
Rep \
                                                      9
                99503
1
           NaN
12
                                                      9
2
                995196650
0
3
                998200189
           NaN
0
4
           NaN
                99559
                                                      9
12
                                                      9
                996330189
5
           NaN
10
                  Place Name Place Bldgs 1-unit Units 1-unit Value \
                       Akutan
2
   Municipality of Anchorage
                                                    869
                                      869
                                                           272231334
3
                      Angoon
                                        0
                                                      0
4
                       Bethel
                                        1
                                                              269793
                                                      1
                                        2
                                                      2
         Bristol Bay Borough
                                                              310000
  2-units Bldgs 2-units Units 2-units Value 3-4 units Bldgs 3-4 units
Units \
              0
                                                            0
1
                                           0
```

2	0				
3	2	0	0	0	13
0		0	0	0	0
4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		U	U	U	U
5	4	0	0	0	0
3-4 units Value 5+ units Bldgs 5+ units Units 5+ units Value \ 1		0	0	A	O
1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9	0	U	U	U
1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 4	Malua E	a Didaa E	. Našta E	ta Value \
2 8337474 19 166 26243863 3 0 0 0 0 0 5 0 0 0 0 0 1-unit rep Bldgs 1-unit rep Units 1-unit rep Value 2-units rep Bldgs 1 0 0 0 0 0 0 2 0 0 0 0 0 0 3 0 0 0 0 0 4 1 1 1 1 269793 0 5 2 2 310000 0 2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units 1 0 0 0 0 0 2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units 1 0 0 0 0 3 0 0 0 0 0 3 -4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units rep Value 1 0 0 0 0 2 0 0 0 0 0		value 5+ unit	is Blags 5+ unit 0	^	ts value \ 0
1-unit rep Bldgs 1-unit rep Units 1-unit rep Value 2-units rep Bldgs 1 0 0 0 0 0 2 0 0 0 0 0 3 0 0 0 0 0 4 1 1 1 269793 0 5 2 2 310000 0 2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units 1 0 0 0 0 2 0 0 0 0 0 0 3 0 0 0 0 0 0 0 3 0 0 0 0 0	2 83	337474	19	166	26243863
1-unit rep Bldgs 1-unit rep Units 1-unit rep Value 2-units rep Bldgs 1 0 0 0 0 0 0 2 0 0 0 0 0 0 3 0 0 0 0 0 0 4 1 1 1 269793 0 5 2 2 310000 0 2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units 1 0 0 0 0 2 0 0 0 0 0 3 0 0 0 0 0 3 0 0 0 0 0 3 0 0 0 0	3	•			
1-unit rep Bldgs 1-unit rep Units 1-unit rep Value 2-units rep Bldgs 1 0 0 0 0 0 0 2 0 0 0 0 0 0 3 0 0 0 0 0 0 4 1 1 1 269793 0 5 2 2 310000 0 2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units 1 0 0 0 0 2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units 1 0 0 0 0 2 0 0 0 0 3 0 0 0 0 3 0 0 0 0 4 0 0 0 5 0 0 0 0 3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units rep Value 1 0 0 0 0 2 0 0 0 0					
1 0 0 0 0 0 0 2 0 0 0 0 0 0 3 0 0 0 0 0 0 4 1 1 1 269793 0 5 2 2 310000 0 2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \ 1 0 0 0 0 0 2 0 0 0 0 0 3 0 0 0 0 0 4 0 0 0 0 5 0 0 0 0 0 3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units rep Value 1 0 0 0 0 2 0 0 0 0	5	U	U	0	в
1 0 0 0 0 0 2 0 0 0 0 0 3 0 0 0 0 0 0 4 1 1 1 269793 0 5 2 2 310000 0 2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \ 1 0 0 0 0 0 2 0 0 0 0 0 3 0 0 0 0 4 0 0 0 5 0 0 0 0 0 0 0 3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units rep Value 1 0 0 0 0 2 0 0 0 0		o Bldgs 1-unit	rep Units 1-un	it rep Value 2	-units rep Bldgs
2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		A	A	Θ	0
3 0 0 0 0 0 4 1 1 1 269793 0 5 2 2 310000 0 2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \ 1 0 0 0 0 0 0 2 0 0 0 0 0 3 0 0 0 0 4 0 0 0 0 5 0 0 0 0 0 5 0 0 0 0 0 3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units rep Value 1 0 0 0 0 2 0 0 0 0	1	U	U	0	O
4 1 1 269793 0 5 2 2 310000 0 2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \ 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2	0	0	0	0
5 2 2 310000 0 2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \ 1	3	0	0	0	0
2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \ 1	4	1	1	269793	0
2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \ 1	_	2	2	210000	0
rep Units \ 1	5	Z	Z	310000	U
rep Units \ 1	2 '.			4 '. 51	
1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2-units re	ep Units 2-uni N	its rep value 3-	4 units rep Blo	dgs 3-4 units
2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			Θ		0
0					
3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0	0		0
0 4 0 0 0 0 5 0 0 0 0 3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units rep Value 1 0 0 0 0 0 2 0 0 0		0	Θ		0
4 0 0 0 0 0 0 0 5 0 0 0 0 0 0 0 0 0 0 0		· ·	· ·		•
5	4	0	0		0
3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units rep Value 1 0 0 0 0 0 2 0 0	0	0	•		0
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rep Value 1 0 0 0 0 0 2 0 0 0	U				
1 0 0 0 0 2 0 0 0	3-4 units	rep Value 5+	units rep Bldgs	5+ units rep	Units 5+ units
0 0 0 0		0	0		0
2 0 0		U	U		U
	2	0	0		0
0	0				
3 0 0	3	0	0		0

```
0
4
                    0
                                                            0
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5
                    0
                                                            0
0
dfwo5 = pd.read_table("https://www2.census.gov/econ/bps/Place/West
%20Region/we2019a.txt", sep=",",
                  skipinitialspace=True) #read the online table
# the web data table has some format issue, this block of code is to
address that issue
dfwo5["Unnamed 41"] = np.nan
dfwo5 = dfwo5.shift(1, axis=1)
dfwo5.Survey = dfwo5.index
dfwo5.index = np.arange(len(dfwo5))
dict names = {}
second = dfwo5.iloc[0].fillna("")
for i in range(len(dfwo5.columns)):
    first = dfwo5.columns[i]
    if first.startswith("Unnamed"):
        if dfwo5.columns[i-1].startswith("Unnamed"):
            first = dfwo5.columns[i+1]
        else:
            first = dfwo5.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfwo5.columns[i]]= new
dfwo5 = dfwo5.rename(columns = dict names).drop([0])
# show the first five records
dfwo5.head()
  Survey Date State Code 6-Digit ID County Code Census Place Code \
1
                                                               0070
         2019
                       02
                              009000
                                             013
2
         2019
                       02
                              041000
                                             020
                                                               0140
3
         2019
                       02
                              049000
                                             105
                                                               0160
4
         2019
                       02
                              085000
                                             050
                                                               0310
                       02
         2019
                              097000
                                             060
                                                                NaN
  FIPS Place Code FIPS MCD Code
                                      Pop CSA Code CBSA Code Footnote
Code \
                                    1027.0
1
           01090
                          00000
                                                 999
                                                         99999
NaN
                                                 999
2
           03000
                          00000
                                  291826.0
                                                         11260
NaN
           03440
                          00000
                                     459.0
                                                 999
                                                         99999
3
2
```

4 NaN	06520	9	00000	6080.0	999	99999
5 NaN	99990	9	00000	997.0	999	99999
Central	City	Zip C	ode Regio	n Code Div	ision Code	Number of Months
Rep \ 1	NaN	99503		4	9	
12 2	1	99519665	0	4	9	
0 3	NaN	99820018	9	4	9	
0 4			.5		9	
12	NaN	99559		4		
5 12	NaN	99633018	9	4	9	
3 4	-	Ak of Ancho An	utan rage goon thel	e Bldgs 1- 0 838 0 8 8	unit Units 0 838 0 8	1-unit Value \ 0 262513354 0 2267366 925000
2-units Units \	Bldgs	2-units	Units 2-u	nits Value	3-4 units	Bldgs 3-4 units
1 0	0		0	0		0
2 48	0		0	0		13
3	0		0	0		0
0 4	3		6	1037349		1
3 5	0		0	0		0
0						
3-4 uni 1 2 3 4 5	833812 37275	0 26 0	ts Bldgs ! 0 20 0 0	5+ units U	nits 5+ uni 0 173 0 0 0	its Value \
	rep Blo	dgs 1-uni	t rep Uni	ts 1-unit	rep Value 2	2-units rep Bldgs
1		0		0	0	0
2		0		0	0	Θ

2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \	3	0	0	0	Θ
2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \	4	8	8	2267366	3
2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units rep Units \					
rep Units \ 1	5	0	0	923000	U
1			s rep Value 3-4 u	nits rep Bldgs 3-4	units
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			Θ	Θ	
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0	0	0		
3		U	U	0	
3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units rep Value 1	3	0	0	0	
3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units rep Value 1	0 1	6	10373/10	1	
3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units rep Value 1	3	U	1037349	1	
3-4 units rep Value 5+ units rep Bldgs 5+ units rep Units 5+ units rep Value 1	5	0	0	0	
rep Value 1	Θ				
1			nits rep Bldgs 5+	units rep Units 5	+ units
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			۵	۵	
0 3 0 0 0 4 372759 0 0 0 0 vertical_concatwo = pd.concat([dfwo1,dfwo2, dfwo3,dfwo4,dfwo5], axis=0) dfwo=vertical_concatwo Survey Date State Code 6-Digit ID County Code Census Place Code \ 1 2015 02 009000 013 0070		U	U	U	
<pre>0 4</pre>	2	0	Θ	0	
<pre>0 4</pre>	0	0	0	0	
<pre>4</pre>	0	U	U	U	
<pre>5</pre>	4	372759	0	0	
<pre>vertical_concatwo = pd.concat([dfwo1,dfwo2, dfwo3,dfwo4,dfwo5], axis=0) dfwo=vertical_concatwo dfwo Survey Date State Code 6-Digit ID County Code Census Place Code \ 1</pre>	0 5	۵	A	A	
<pre>dfwo=vertical_concatwo dfwo Survey Date State Code 6-Digit ID County Code Census Place Code \ 1 2015 02 009000 013 0070</pre>	0	U	U	O	
dfwo Survey Date State Code 6-Digit ID County Code Census Place Code \ 1 2015 02 009000 013 0070	verti		cat([dfwo1,dfwo2,	dfwo3,dfwo4,dfwo5	5],
dfwo Survey Date State Code 6-Digit ID County Code Census Place Code \ 1 2015 02 009000 013 0070	dfwo=	vertical concatwo			
Survey Date State Code 6-Digit ID County Code Census Place Code \ 1 2015 02 009000 013 0070					
Survey Date State Code 6-Digit ID County Code Census Place Code \ 1 2015 02 009000 013 0070					
Code \ 1	dfwo				
1 2015 02 009000 013 0070			e 6-Digit ID Coun	ty Code Census Pla	ice
		•	2 009000	013	0070
2 2015 02 041000 020 0140					
	_	2013 02	2 041000	020	0140

3	2015	02	049000		105		0160
4	2015	02	085000		050		0310
			003000		030		
5	2015	02	097000		060		NaN
2043	2019	56	457000		037		0465
2044	2019	56	469000		031		0478
2045	2019	56	473000		043		0487
2046	2019	56	477000		005		0490
2047	2019	56	481000		015		0495
	S Place Code F	IPS MCD (Code	Pop C	SA Code CB	SA Code	
Footnote 1	Code \ 01090	0.00	900	1027.0	999	99999	
NaN	01030	00.		102710	333	33333	
2	03000	000	000 29	1826.0	999	11260	
NaN 3	03440	000	900	459.0	999	99999	
NaN	03440	000	000	439.0	999	99999	
4	06520	000	999	6080.0	999	99999	
NaN							
5	99990	000	900	997.0	999	99999	
NaN							
	• • •						
2043	81300	000	000	451.0	999	99999	
NaN							
2044	83040	000	900	3627.0	999	99999	
NaN 2045	84925	0.00	900	5487.0	999	99999	
NaN	04323	001		J+07.0	333	33333	
2046	85015	000	000	1807.0	999	99999	
NaN							
2047	86665	000	900	151.0	999	99999	
NaN							
Cen	tral City	Zip Code	Region	Code Div	ision Code	Number	of
Months R	ep \						
1	NaN 995	03		4	9		
0 2	1 995	196650		4	9		
_	1 393	150050		T	9		

0									
3	NaN	99820018	39		4		9		
0 4	NaN	99559			4		9		
12 5	NaN	99633018	39		4		9		
12									
2043	NaN	82336			4		8		
12									
2044 0	NaN	82201			4		8		
2045 12	NaN	82401			4		8		
2046 12	NaN	82732007	70		4		8		
2047 12	NaN	82244			4		8		
		Place	Name	Place	Bldgs	1-unit	Units	1-unit	Value
1		Al	kutan		0		0		Θ
2	Municipality	of Ancho	rage		648		648	202	797264
3		Ar	ngoon		0		0		0
4		Вє	ethel		6		6	1.	300000
5	Bristo	l Bay Bor	ough		3		3	4	401500
2043	W	amsutter	town		0		0		0
2044		heatland			2		2		382500
2045	"		land		1		1		275000
2045		Wright			0		0	•	0
		_							
2047		Yoder	town		0		0		0
1 2 3 4	2-units Bldgs 0 1 0 2		Units) <u>2</u>)	its Val 3223 7000	0 399 0	units	Bldgs 0 12 0	\

5	0	0	0	0
2043		 0		0
2044	Θ	0	0	0
2045 2046	0 0	0 0	0 0	0 0
2047	0	0	0	0
1 2 3	3-4 units Units 3-4 0 36 0	units Value 5+ uni 0 6272178 0	ts Bldgs 5+ unit. 0 17 0	s Units \ 0 148 0
4 5	0 0	0 0	0 0	0 0
2043 2044 2045 2046 2047	0 0 0 0 0	0 0 0 0 0	 0 0 0 0 0	0 0 0 0 0
	5+ units Value 1-un:	it rep Bldgs 1-unit	rep Units 1-uni	t rep Value
\ 1	Θ	Θ	Θ	0
	•		-	
2	23398143	0	0	0
3	0	0	0	Θ
4	0	6	6	1300000
5	0	3	3	401500
2043	0	0	0	0
2044	0	0	Θ	0
2045	0	1	1	275000
2046	0	0	0	0
2047	0	0	0	0
1	2-units rep Bldgs 2-	-units rep Units 2- 0	units rep Value 0	\
1 2 3 4	0	0	0	
4	0 2	0 4	0 700000	

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5
                       0
                                           0
                                                                0
2043
                       0
                                           0
                                                                0
2044
                       0
                                           0
                                                                0
                       0
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                                                                0
2045
2046
                       0
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2047
                       0
                                           0
                                                                0
     3-4 units rep Bldgs 3-4 units rep Units 3-4 units rep Value
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2
                         0
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3
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5
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2043
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2044
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                                                                       0
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2045
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2046
                         0
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2047
                         0
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     5+ units rep Bldgs 5+ units rep Units 5+ units rep Value
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2
                        0
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3
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4
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                                                                   0
                                              0
5
                                                                   0
                        0
                                              0
. . .
2043
                        0
                                              0
                                                                   0
2044
                        0
                                              0
                                                                   0
2045
                        0
                                              0
                                                                   0
                                                                   0
2046
                        0
                                              0
2047
[10293 rows x 41 columns]
dfwo=dfwo.reset_index()
# Drop a specific column, e.g., 'Place Name'
dfwo = dfwo.drop(columns=['index'])
dfwo
      Survey Date State Code 6-Digit ID County Code Census Place Code
0
              2015
                             02
                                                      013
                                                                         0070
                                     009000
              2015
                             02
                                     041000
                                                      020
                                                                         0140
1
2
              2015
                             02
                                                      105
                                     049000
                                                                         0160
```

3	2015	02	085000	050	0310
4	2015	02	097000	060	NaN
10288	2019	56	457000	037	0465
10289	2019	56	469000	031	0478
10290	2019	56	473000	043	0487
10291	2019	56	477000	005	0490
10292	2019	56	481000	015	0495
0 1 2 3 4 10288 10289 10291 10292 Code 0 9 1 9 2 9 3 9 4 9 10288 8 10289	FIPS Place Code	0000 0000 0000 0000 0000 0000 0000 0000	1027.0 291826.0 459.0 00 459.0 00 6080.0 997.0 00 451.0 00 3627.0 5487.0 1807.0 00 151.0	CSA Code CBS 999 999 999 999 999 999 999 999 999 9	99999 11260 99999 99999 99999 99999 99999 99999 Division
8 10290 8	NaN	NaN	82401	4	

10291 8		NaN	Na	aN 827	320070		4	
10292		NaN	Na	aN 822	44		4	
8		Nan	140	JII 022			·	
0 1 2 3 4	Number o	f Months	Ō	·	Pla ity of An stol Bay	Angoon Bethel	Place	Bldgs \ 0 648 0 6 3
10288 10289 10290 10291 10292			12 0 12 12 12		Wheatla Wrig	er town and town Worland Jht town ler town		0 2 1 0
		nits 1-u	unit Value	e 2-uni	ts Bldgs	2-units	Units	2-units
Value	\	0		1	0		0	
0 0		0		9	0		0	
1		648	202797264	4	1		2	
322399)							
2		0	(9	0		0	
0			120000	`	2		4	
3 700000	١	6	1300000	9	2		4	
4	,	3	401500	9	0		0	
10288		0	(9	0		0	
0 10289		2	382500	a a	0		0	
0		2	302300	,	0		U	
10290		1	275000	9	0		0	
0 10291		0		9	0		0	
0		U	(9	U		U	
10292		0	(9	0		0	
0								
Bldgs		s Bldgs	3-4 units	s Units	3-4 unit	s Value	5+ uni	lts
0		0		0		0		0
1		12		36		6272178		17
2		0		0		0		0
2		U		U		U		U

3	6		0	0	Θ
4	e		0	0	0
10288	e		0	0	0
10289	e		0	0	0
10290	e		0	0	0
10291	e		0	0	0
10292	G		0	0	0
				57.1	
\			1-unit	rep Bldgs 1-unit	
0	0	0		0	0
1	148	23398143		0	0
2	0	0		Θ	0
3	0	0		6	6
4	0	0		3	3
10288	0	0		0	0
10289	0	0		0	0
10290	0	0		1	1
10291	0	0		0	0
10292	0	0		0	0
			-1.		
Value	\			units rep Units 2	2-units rep
0 0 1		0	0	0	
1 0		0	0	0	
0 2 0		0	0	0	
U					

3 700000	1300000	2	4
4	401500	0	0
0		-	-
10288	0	0	0
0 10289	0	0	0
0 10290	275000	0	0
0 10291	0	0	0
0 10292 0	0	0	0
U			
0	3-4 units rep Bldgs 3- 0	0	Θ
1	0 0	0 0	0 0
2 3 4	0 0	9 9	9 9
10288 10289	0 0	0 0	0 0
10209	0	0	0
10291	0 0	0 0	0 0
10292	U	0	Ü
	5+ units rep Bldgs 5+	units rep Units 5+	_
0 1	Θ Θ	0	0 0
2	0	9	o O
3	0	0	0
4	0	0	0
10288	0	9	0
10289	0	0	0
10290 10291	0 0	0 0	0 0
10291	0	0	0
[10293	rows x 41 columns]		
import	pandas as pd		
# Assum datawo	ning your data is in a = dfwo	a CSV file named 'd	ata.csv'

```
# Select the columns of interest
selected columnswo = ['FIPS Place Code','Zip Code','Survey Date', '1-
unit rep Units', 'Place Name']
# Extract the desired data
extracted dataswo = dataso[selected columnswo]
#choosing the column with 1-unit rep unit data
extracted dataswo
      FIPS Place Code
                          Zip Code Survey Date 1-unit rep Units \
0
               00124
                       36310
                                           2015
1
               00460
                                           2015
                                                               1
                       35005
2
               00820
                       35007
                                           2015
                                                             109
3
               00988
                       35950
                                           2015
                                                               0
4
               01132
                       350110552
                                           2015
                                                               18
               87988
                       252130596
22336
                                           2019
                                                               3
                       26143
                                           2019
                                                               0
22337
               00000
22338
                       26101
                                                               43
               99990
                                           2019
22339
                       26591
                                           2019
                                                               0
               88708
22340
               99990
                       24874
                                           2019
                                                               0
                                Place Name
0
                                 Abbeville
1
                                Adamsville
2
                                 Alabaster
3
                               Albertville
4
                            Alexander City
. . .
22336
                            Winfield town
22337
                              Wirt County
          Wood County Unincorporated Area
22338
22339
                         Worthington town
22340 Wyoming County Unincorporated Area
[22341 rows x 5 columns]
# Group by 'Zip Code', 'FIPS Place Code', and 'Place Name', and sum
'1-unit rep Units'
grouped df1wo = extracted dataswo.groupby(['Zip Code', 'FIPS Place
Code', 'Place Name', 'Survey Date'])['1-unit rep
Units'].sum().reset index()
```

Pivot the DataFrame to have years as columns

```
pivot df1wo = grouped df1wo.pivot table(index=['Zip Code', 'FIPS Place
Code', 'Place Name'], columns='Survey Date', values='1-unit rep
Units', fill value=0)
# Reset the index to have 'Zip Code', 'FIPS Place Code', and 'Place
Name' as columns
pivot_df1wo.reset_index(inplace=True)
# Rename the columns
pivot df1wo.columns = ['Zip Code', 'FIPS Place Code', 'Place Name',
'2015<sup>'</sup>, '2016', '2017', '2018', '2019']
# Display the pivot DataFrame
print(pivot df1wo)
         Zip Code FIPS Place Code
                                                                 Place
Name
0
      19709
                            47030
                                                            Middletown
town
1
      19711
                            50670
Newark
                            50800
      19720
                                                                 New
Castle
                            99990
3
      19720
                                    New Castle County Unincorporated
Area
      197300111
                            54050
                                                                0dessa
town
. . .
. .
4710 79855
                            75032
                                                              Van Horn
town
4711 79901
                            24000
                                                                    Εl
Paso
4712 79927
                            68636
Socorro
4713 79928
                            34832
                                                               Horizon
City
4714 983822530
                            62804
Rockport
                         2018
      2015
            2016 2017
                               2019
0
       128
             112
                    158
                          188
                                149
1
        19
              21
                      8
                           20
                                 51
2
         5
               8
                      1
                            3
                                  4
3
      1021
             952
                    928
                          837
                               1046
4
                      1
                            0
                                  0
         0
               0
4710
         1
               3
                      6
                            7
                                  8
```

4711 4712 4713 4714	2282 126 68 88	2014 73 101 0	2020 173 33 0	1588 112 45 0	1873 316 234 0					
[4715	rows	х 8 со	lumns]							
pivot_	_df1wo									
Name	Zi \	p Code	FIPS	Place	Code				Place	
0	19709			47	030				Middletown	
town 1	19711									
Newarl 2	19720			50	800				New	
Castle 3	e 19720			99	990	New	Castle	County	Unincorporated	
Area 4	19730	0111		54	050				0dessa	
town										
 4710	79855			75	032				Van Horn	
town 4711	79901			24	000				El	
Paso 4712	79927				636					
Socori 4713					832				Horizon	
City	98382				804				1101 12011	
Rockpo		2330		02	004					
0 1 2 3	19 5 1021	21 8 952	2017 158 8 1 928	2018 188 20 3 837	51 4 1046					
4	0	0	1	0	0					
4710 4711 4712 4713 4714	1 2282 126 68 88	3 2014 73 101 0	6 2020 173 33 0	7 1588 112 45 0	8 1873 316 234 0					
[4715	rows	х 8 со	lumns]							
dfwo										

\	Survey	Date	State	Code	6-Dig	jit ID	County	/ Code	Census	Place	Code
Ò		2015		02	e	09000		013			0070
1		2015		02	e	41000		020			0140
2		2015		02	e	49000		105			0160
3		2015		02	e	85000		050			0310
4		2015		02	e	97000		060			NaN
10288		2019		56	/	57000		037			0465
10289		2019		56		69000		031			0478
10290		2019		56		73000		043			0487
10291		2019		56	4	77000		005			0490
10292		2019		56	4	81000		015			0495
0 1 2 3 4	FIPS P	016 036 034 065 999)90)00 40 20	IPS MO	OD Cod 00006 00006 00006 00006) 29;) ()	Pop 1027.0 1826.0 459.0 6080.0 997.0	(<u>)</u>	ode CBS 999 999 999 999	A Code 99999 11260 99999 99999	\
10288 10289 10290 10291 10292		813 836 849 856 866)40)25		00000 00000 00000 00000)) :	451.0 3627.0 5487.0 1807.0 151.0	<u>(</u>	999 999 999 999	99999 99999 99999 99999	
Cada		te Cod	de Cent	ral (City	Zi	o Code	Region	n Code	Divisi	on
Code 0	\	Na	aN		NaN	99503			4		
9 1		Na	aN		1	99519	5650		4		
9		Nā	aN		NaN	99820	9189		4		
9 2 9 3		Na			NaN	99559			4		
9											
4 9		Na	aN		NaN	99633	9189		4		

10288	NaN	NaN	82336	4
8 10289	NaN	NaN	82201	4
8				
10290	NaN	NaN	82401	4
8 10291	NaN	NaN	827320070	4
8				
10292 8	NaN	NaN	82244	4
O				
	of Month	•		Place Bldgs \
0		0 0 Muni	Akutan cipality of Anchorage	0 648
1 2 3 4		0	Angoon	0
3		12	Bethel	6
		12	Bristol Bay Borough	3
10288		12	Wamsutter town	0
10289		0	Wheatland town	
10290		12	Worland	2 1
10291		12 12	Wright town	0 0
10292		12	Yoder town	U
	Units 1-	unit Value 2	2-units Bldgs 2-units	Units 2-units
Value \ 0	0	Θ	0	0
0	U	U	U	U
1	648	202797264	1	2
322399 2	0	0	Θ	0
0	U	U	U	U
3	6	1300000	2	4
700000 4	3	401500	Θ	0
0	3	401300	U	U
10288	0	0	Θ	0
0	U	9	U	U
10289	2	382500	0	0
0	1	275000	0	0
10290 0	1	275000	0	0
10291	Θ	0	0	0
0		0	0	0
0 10292 0	0	0	Θ	0

Bldgs		3-4 units Units	3-4 units Value	5+ units
0	0	0	0	0
1	12	36	6272178	17
2	0	Θ	Θ	Θ
3	0	0	0	0
4	0	0	0	0
10288	0	0	0	0
10289	0	0	0	0
10290	0	0	0	0
10291	0	Θ	Θ	Θ
10292	0	0	0	0
\	5+ units Units 5	+ units Value 1	unit rep Bldgs 1	-unit rep Units
0	0	0	0	0
1	148	23398143	0	0
2	0	0	0	Θ
3	Θ	Θ	6	6
4	0	0	3	3
10288	0	0	0	0
10289	0	0	0	0
10290	0	Θ	1	1
10291	0	0	0	0
10292	0	Θ	0	0
Value	1-unit rep Value	2-units rep Blo	dgs 2-units rep U	nits 2-units re

0	0	0	0
0 1	0	0	0
0	v	· ·	· ·
2	0	0	0
0 3	1300000	2	4
700000	130000	2	4
4	401500	0	0
0			
• • •			
10288 0	0	0	0
10289	0	0	0
0 10290	275000	0	0
0	273000	U	U
10291	0	0	0
0	0	^	2
10292 0	0	0	0
0 1 2 3 4 10288 10289 10290 10291 10292	0 0 0 0 0 0 0	units rep Units 3-4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0
10292	0	0	0
[10293 rows x 4	1 columns]		

```
import pandas as pd
# Assuming your data is in a CSV file named 'data.csv'
datawo2 = dfwo
# Select the columns of interest
selected_columnswo2 = ['FIPS Place Code','Zip Code','Survey Date', '2-
units rep Units', '3-4 units rep Units', '5+ units rep Units', 'Place
Name'1
# Extract the desired data
extracted datamwo2 = datawo2[selected columnswo2]
extracted datamwo2
      FIPS Place Code
                           Zip Code Survey Date 2-units rep Units \
                        99503
0
               01090
                                            2015
1
               03000
                        995196650
                                            2015
                                                                  0
2
                                                                  0
               03440
                        998200189
                                            2015
3
                        99559
                                            2015
                                                                  4
               06520
4
               99990
                        996330189
                                            2015
                                                                  0
                                            . . .
                                                                 . .
10288
               81300
                        82336
                                            2019
                                                                  0
                       82201
10289
               83040
                                            2019
                                                                  0
10290
               84925
                        82401
                                            2019
                                                                  0
10291
                        827320070
                                                                  0
               85015
                                            2019
10292
               86665
                        82244
                                            2019
                                                                  0
      3-4 units rep Units 5+ units rep Units
                                                                Place
Name
Akutan
                                                Municipality of
                         0
Anchorage
                         0
                                             0
Angoon
                         0
3
                                             0
Bethel
                                                      Bristol Bay
Borough
10288
                         0
                                                           Wamsutter
                                             0
town
                         0
                                                           Wheatland
10289
town
10290
                         0
                                             0
Worland
10291
                                             0
                                                              Wright
town
```

```
10292
                         0
                                            0
                                                               Yoder
town
[10293 \text{ rows } x 7 \text{ columns}]
# Group by 'Zip Code,' 'FIPS Place Code,' 'Place Name,' and 'Survey
Date,' and sum the units columns
grouped_dfmwo = extracted_datamwo2.groupby(['Zip Code', 'FIPS Place
Code', 'Place Name', 'Survey Date']).agg({
    '2-units rep Units': 'sum',
    '3-4 units rep Units': 'sum',
    '5+ units rep Units': 'sum'
}).reset index()
# Create a new column 'multi unit' by summing the '2-units rep Units,'
'3-4 units rep Units,' and '5+ units rep Units'
grouped dfmwo['multi unit'] = grouped dfmwo['2-units rep Units'] +
grouped_dfmwo['3-4 units rep Units'] + grouped_dfmwo['5+ units rep
Units']
# Display the grouped DataFrame
print(grouped dfmwo)
```

	Zip	Code FIPS	Place Code	Place Name Survey
Date	\			
0	59007		04300	Bearcreek town
2015			0.4000	
1	59007		04300	Bearcreek town
2016 2	59007		04300	Bearcreek town
2017	29007		04300	bear creek town
3	59007		04300	Bearcreek town
2018	33001		0 1500	Bear er eek town
4	59007		04300	Bearcreek town
2019				
	00000		06000	
10285	99929		86380	Wrangell city and borough
2015 10286	99929		06200	Wrangell city and berough
2016	99929		86380	Wrangell city and borough
10287	99929		86380	Wrangell city and borough
2017	55525		20300	agozz czzy aa boroagn
10288	99929		86380	Wrangell city and borough
2018				

10289	99929		86380	Wrangell ci	ity and borough	
2019						
	2-units	rep Units	3-4 units	rep Units 5+	units rep Units	multi
unit		•		·	•	
0		0		0	0	
000		0		0	0	
1 000		0		0	Θ	
2		0		0	9	
000		ŭ		v	ŭ	
3		0		0	0	
000						
4		0		0	0	
000						
10285		0		0	0	
000		_		_	-	
10286		0		0	0	
000				_	_	
10287 000		0		0	0	
10288		2		Θ	Θ	
200		2		0	U	
10289		0		0	0	
000						

[10290 rows x 8 columns]

grouped_dfmwo

	Zip	Code FIPS	Place Code	Place Name Survey
Date	\			
0	59007		04300	Bearcreek town
2015				
1	59007		04300	Bearcreek town
2016				
2	59007		04300	Bearcreek town
2017	50007		0.4200	B
3	59007		04300	Bearcreek town
2018	50007		04200	Deemanale tour
4 2019	59007		04300	Bearcreek town
10285	99929		86380	Wrangell city and borough
2015				
10286	99929		86380	Wrangell city and borough
2016				

10287 2017	99929		86380	Wrangell cit	y and borough	
10288 2018	99929		86380	Wrangell cit	y and borough	
10289 2019	99929		86380	Wrangell cit	y and borough	
	2-units	rep Units 3	-4 units	rep Units 5+ u	nits rep Unit	s multi
unit 0 000		0		0		0
1		0		0		0
000		0		0		0
000 3		0		Θ		0
000 4		Θ		Θ		0
000						
10205					••	
10285 000		0		0		0
10286 000		0		0		Θ
10287 000		0		0		0
10288 200		2		0		0
10289		0		0		0
000						
_		8 columns]				
<pre>pivot_ Code',</pre>	dfmwo =	grouped_dfm	wo.pivot_	rs as columns _table(index=[' rvey Date', val		
Name'	as colum		-	de', 'FIPS Plac rue)	e Code', and	'Place
pivot_				'FIPS Place C 2019']	ode', 'Place	Name',

```
# Display the pivot DataFrame
print(pivot dfmwo)
         Zip Code FIPS Place Code
                                                      Place Name 2015
2016
0
      59007
                             04300
                                                 Bearcreek town
0
                                                     Big Timber
1
      590116850
                             06475
                                                                      0
0
2
                                                   Bridger town
      590147789
                             09475
                                                                     0
0
3
                                                  Columbus town
      59019
                             16825
                                                                      0
0
4
      59029
                             29575
                                                  Fromberg town
0
      998400415
                                       Municipality of Skagway
2143
                             70760
                                                                   200
2144
      998410052
                             76260
                                                Tenakee Springs
                                                                     0
2145 999016059
                             99990
                                     Ketchikan Gateway Borough
                                                                   240
600
2146 99921
                             17740
                                                           Craig
                                                                   200
230
                                     Wrangell city and borough
2147
      99929
                             86380
            2018
                   2019
      2017
0
         0
                0
                      0
1
         0
                0
                    200
2
         0
                0
                      0
3
                      0
         0
                0
4
         0
                0
                      0
2143
                   1200
       600
             6011
2144
2145
       800
             1200
                    670
2146
      1200
              200
                    600
2147
         0
              200
[2148 rows x 8 columns]
pivot dfmwo
         Zip Code FIPS Place Code
                                                     Place Name 2015
2016
      59007
                             04300
                                                 Bearcreek town
                                                                      0
```

0						
1	59011	.6850		06475	Big Timber	0
0	E001.	7700		00.475	D : 1	•
2	59014	.//89		09475	Bridger town	0
0 3	59019	1		16825	Columbus town	0
0	39019			10023	Co cambas cown	U
4	59029			29575	Fromberg town	0
0					, .	
 2143	99840	0415		70760	Municipality of Skagway	200
0	99040	0415		70700	nunicipatity of Skagway	200
2144	99841	.0052		76260	Tenakee Springs	Θ
0					. ea	
2145	999016059			99990	Ketchikan Gateway Borough	240
600						
2146	99921			17740	Craig	200
230 2147	99929	\		86380	Wrangell city and borough	0
0	99929			00300	wrangett city and borough	U
J						
	2017	2018	2019			
0	0	0	0			
1	0	0	200			
2	0 0	0 0	0 0			
4	0	0	0			
2143	600	6011	1200			
2144	0	0	0			
2145	800	1200	670			
2146	1200	200	600			
2147	0	200	0			
[2148	rows	x 8 co	lumnsl			
-						

Concatenating all regions data

```
vertical_concatall = pd.concat([pivot_df, pivot_dflne,
pivot_dflwo ,pivot_dflso], axis=0)
vertical_concatall=vertical_concatall.reset_index()
vertical_concatall
```

2016	index	Zi	p Code	FIPS	Place Code	PΊ	lace Name	2015
2016	0	15454			48855		Manilla	0
0	1	19372			00000	Tiffin	township	0
0 2 11	2	42112			00000	Milton	township	14
3	3	43003			00000	Westfield	township	0
4 10	4	43011			00000	Hilliar	township	9
23899 3	4710	79855			75032	Van H	Horn town	1
23900 2014	4711	79901			24000		El Paso	2282
23901 73	4712	79927			68636		Socorro	126
23902 101	4713	79928	}		34832	Hori	izon City	68
23903 0	4714	98382	2530		62804		Rockport	88
0	2017 0	2018	2019					
1 2 3 4	0 15 0 11	3 11 0 10	0 12 6 14					
23899 23900 23901 23902 23903	6 2020 173 33 0	7 1588 112 45 0	8 1873 316 234 0					
[23904	1 rows >	< 9 col	umns]					

All regions single unit bps for 2014,2015,2016,2017,2018,2019 and csv for it

```
# Drop a specific column, e.g., 'Place Name'
vertical_concatall = vertical_concatall.drop(columns=['index'])
```

all regions single unit bps for 2014,2015,2016,2017,2018,2019
vertical_concatall

2017	Zi	p Code	FIPS	Place	Code		Pla	ce Name	2015	2016	
2017	15454			48	8855			Manilla	0	0	
0 1 0	19372			00	9000	Tiffi	in t	ownship	Θ	0	
2 15	42112			00	9000	Milto	n t	ownship	14	11	
3	43003			00	9000	Westfiel	ld t	ownship	Θ	0	
4 11	43011			00	9000	Hillia	ar t	ownship	9	10	
23899 6	79855			75	5032	Var	ı Ho	rn town	1	3	
23900	79901			24	4000			El Paso	2282	2014	
2020 23901 173	79927			68	8636			Socorro	126	73	
23902 33	79928			34	4832	Нс	riz	on City	68	101	
23903 0	98382	2530		62	2804		R	ockport	88	0	
0 1 2 3 4 23899 23900 23901 23902 23903	2018 1 3 11 0 10 7 1588 112 45 0	2019 0 0 12 6 14 8 1873 316 234 0									
[23904	1 rows	x 8 co	lumns]								

Building permits for All regions fips place code single unit for 2015,2016,2017,2018,2019 and csv for it

```
# Save the pivot DataFrame to a CSV file
vertical_concatall.to_csv('lbuilding_permitssingleunit
all_grouped_2015-2019.csv', index=False)

vertical_concatallmu = pd.concat([pivot_dfmwo,pivot_dfmso,pivot_dfmne,
pivot_dfm], axis=0)
vertical_concatallmu=vertical_concatallmu.reset_index()
```

Building permits for All regions fips place code multi unit for 2015,2016,2017,2018,2019 and csv for it

vertic	al_conc	atallmu					
0 1 2 3 4 21332 21333 21334 21335 21336	index 0 1 2 3 4 8494 8495 8496 8497 8498	Zip Code 59007 590116850 590147789 59019 59029 69358 69360 693600039 69361 69367	FIPS Place Code 04300 06475 09475 16825 29575 32830 42775 99990 44245 52925				
2019			Place Name	2015	2016	2017	2018
0			Bearcreek town	0	0	0	0
1 200			Big Timber	0	0	0	0
2 0			Bridger town	Θ	0	0	0

3		Columbus town	0	0	0	0
0			0	•	0	0
4 0		Fromberg town	0	0	0	Θ
21332		Morrill village	0	0	0	0
0 21333		Rushville	0	0	0	0
0 21334	Sheridan County	Unincorporated Area	0	0	0	0
0 21335 0		Scottsbluff	0	12	200	0
21336 0		Whitney village	0	0	0	0
[21337	′rows x 9 columns	s]				
		mn, e.g., 'Place Name' vertical_concatallmu.		olumns	s=['inde	ex'])
vertic	al_concatallmu					
Name	Zip Code FIPS	S Place Code			Pl	lace
0 town	59007 0	04300			Bearci	reek
1 Timber	590116850	06475			Bi	ig
2 town	590147789 0	09475			Brio	dger
3 town	59019 0	16825			Colum	nbus
4 town	59029 0	29575			Fromb	perg
21332 villag	69358 ie 0	32830			Morrill	L
	69360	42775				
	693600039	99990 Sheridar	Count	y Unir	ncorpora	ated
	69361	44245				
	69367	52925			Whitney	/
	2016 2017 2018	8 2019				

```
0
1
           0
                 0
                        0
                             200
2
           0
                 0
                        0
                               0
3
           0
                 0
                        0
                               0
4
           0
                 0
                        0
                               0
. . .
21332
           0
                        0
                               0
                 0
21333
           0
                        0
                               0
                        0
                               0
21334
          0
                 0
21335
         12
               200
                        0
                               0
                               0
21336
[21337 rows x 8 columns]
# Save the pivot DataFrame to a CSV file
vertical concatallmu.to csv('2building permitsmultipleunit
all grouped 2015-2019.csv', index=False)
```

Gathering county data for all years 2015-2019

County

```
#https://www2.census.gov/econ/bps/County/co2014a.txt
dfco1 =
pd.read table("https://www2.census.gov/econ/bps/County/co2015a.txt",
sep=",",
                  skipinitialspace=True) #read the online table
                  # the web data table has some format issue, this
block of code is to address that issue
dfco1["Unnamed 41"] = np.nan
dfco1 = dfco1.shift(1, axis=1)
dfco1.Survey = dfco1.index
dfco1.index = np.arange(len(dfco1))
dict names = {}
second = dfco1.iloc[0].fillna("")
for i in range(len(dfco1.columns)):
    first = dfcol.columns[i]
    if first.startswith("Unnamed"):
        if dfcol.columns[i-1].startswith("Unnamed"):
            first = dfcol.columns[i+1]
        else:
            first = dfcol.columns[i-1]
              new = first+second[i]
```

```
# else:
    new = first+" "+second[i]
    dict names[dfco1.columns[i]]= new
dfco1 = dfco1.rename(columns = dict names).drop([0])
# show the first five records
dfco1.head()
  Survey Date FIPS State FIPS.1 County Region Code Division Code \
1
         2015
                       01
                                     001
                                                    3
2
         2015
                       01
                                     003
                                                                   6
3
         2015
                       01
                                     005
                                                    3
                                                                   6
4
         2015
                       01
                                     007
                                                    3
                                                                   6
                                                    3
                       01
                                     009
         2015
                       County Name County Bldgs 1-unit Units 1-unit
Value \
   Autauga County
                                              158
                                                           158
39749354
                                                           1622
   Baldwin County
                                             1622
302576607
3 Barbour County
                                               10
                                                             10
3292300
                                                9
                                                              9
4 Bibb County
2222180
5 Blount County
                                                9
                                                              9
1573173
  2-units Bldgs 2-units Units 2-units Value 3-4 units Bldgs 3-4 units
Units \
1
               0
                              0
                                                              0
0
2
              11
                            22
                                      2232258
                                                             29
109
3
               0
0
4
               0
                              0
                                                              0
0
5
               0
                              0
                                                              0
0
  3-4 units Value 5+ units Bldgs 5+ units Units 5+ units Value \
1
                                 0
2
         12724884
                                31
                                               450
                                                         43856188
3
                 0
                                 0
                                                 0
                                                                 0
4
                 0
                                 0
                                                 0
                                                                 0
5
                                 2
                 0
                                                40
                                                          3831302
  1-unit rep Bldgs 1-unit rep Units 1-unit rep Value 2-units rep Bldgs
```

```
1
                158
                                 158
                                              39749354
                                                                        0
2
              1336
                                1336
                                             238194418
                                                                       11
3
                 10
                                   10
                                               3292300
                                                                        0
                                   8
                                               2108180
                                                                        0
5
                                    9
                                               1573173
                                                                        0
  2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units
rep Units \
                                                           0
1
0
2
                  22
                               2232258
                                                          29
109
3
                                      0
                                                           0
0
4
                                      0
                                                           0
0
5
                   0
                                      0
                                                           0
  3-4 units rep Value 5+units rep Bldgs 5+units rep Units 5+units rep
Value
                     0
                                        0
                                                           0
1
0
2
             12724884
                                       31
                                                         450
43856188
3
                     0
                                                           0
0
4
                     0
                                        0
                                                           0
0
5
                     0
                                        2
                                                          40
3831302
dfco2 =
pd.read_table("https://www2.census.gov/econ/bps/County/co2016a.txt",
sep=",",
                   skipinitialspace=True) #read the online table
                   # the web data table has some format issue, this
block of code is to address that issue
dfco2["Unnamed 41"] = np.nan
dfco2 = dfco2.shift(1, axis=1)
dfco2.Survey = dfco2.index
dfco2.index = np.arange(len(dfco2))
dict names = \{\}
second = dfco2.iloc[0].fillna("")
```

```
for i in range(len(dfco2.columns)):
    first = dfco2.columns[i]
    if first.startswith("Unnamed"):
        if dfco2.columns[i-1].startswith("Unnamed"):
            first = dfco2.columns[i+1]
        else:
            first = dfco2.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfco2.columns[i]]= new
dfco2 = dfco2.rename(columns = dict names).drop([0])
# show the first five records
dfco2.head()
  Survey Date FIPS State FIPS.1 County Region Code Division Code \
1
         2016
                                     001
                                                   3
                       01
                                                                  6
2
         2016
                       01
                                     003
                                                   3
                                                                  6
3
                                                   3
         2016
                       01
                                     005
                                                                  6
                                                   3
4
         2016
                       01
                                     007
                                                                  6
5
                                                   3
                       01
                                     009
                                                                  6
         2016
                       County Name County Bldgs 1-unit Units 1-unit
Value \
                                             169
                                                           169
1 Autauga County
45256130
   Baldwin County
                                            2137
                                                          2137
399000143
   Barbour County
                                               3
                                                             3
686200
4 Bibb County
                                              10
                                                            10
2355940
                                              14
                                                            14
5 Blount County
2815172
  2-units Bldgs 2-units Units 2-units Value 3-4 units Bldgs 3-4 units
Units \
              0
1
                                                             0
0
2
             17
                            34
                                      4525229
                                                            37
137
3
              0
                                                             0
0
4
               0
                                                             0
0
5
              0
                             0
                                                             0
0
  3-4 units Value 5+ units Bldgs 5+ units Units 5+ units Value \
```

1 2 3 4 5	0 15089250 0 0			0 17 0 0		0 212 0 0		7161267	0 77 0 0 0	
	rep Bldg	s 1-u	ınit re	p Units	: 1-unit	rep Va	alue	2-units	rep	Bldgs
1	16	9		169)	45256	5130			0
2	199	6		1996	5	364360	9481			17
3		3		3	3	686	5200			0
4		0		()		0			0
5	1	4		14	1	281	5172			0
2-units rep Units 1 0 2 137 3 0 4 0 5		ts 2- 0 34 0 0	units	rep Val	0	units	rep B	0 37 0 0	l un:	its
	ts rep V	alue 0	5+unit	s rep E	3ldgs 5+ 0	-units	rep U	nits 5+u 0	units	s rep
0 2	1508	9250			17			212		
71612677 3		0			0			0		
0 4		0			0			0		
0 5		0			0			0		
0										
dfco2										
Surv 1 2	vey Date 2016 2016	FIPS	State 01 01	F1PS.1	001 003	Reg1on	Code 3		on Co	ode \ 6 6

3 4 5	2	2016 2016 2016	01 01 01		005 007 009		3 3 3		6 6 6
3035 3036 3037 3038 3039	4	2016 2016 2016 2016 2016 2016	56 56 56 56 56		037 039 041 043 045		4 4 4 4 4		8 8 8 8 8
Value 1 45256	Autauga	a County	County	Name	County	Bldgs 169	1-unit	Units 169	1-unit
2 Baldwin County 399000143								2137	
3 Barbour County 3 686200 4 Bibb County 10								3 10	
5	2355940 5 Blount County					14		14	
	2815172 · · ·								
3035	3035 Sweetwater County 19513641					70		70	
3036	Teton (51427	County		138		138			
3037 Uinta County 8079400						34		34	
3038 Washakie County 2 2 200000									
3039 Weston County 3 3 815000									
1 2 3 4 5 3035 3036 3037 3038 3039	2-units	Bldgs 2- 0 17 0 0 0 1 4 0 1		s 2-ui 0 4 0 0 0 2 8 0 2	2900 2000	0 229 0 0 0 000 000	units	Bldgs 0 37 0 0 0 0 0	
1	3-4 uni	ts Units 0	3-4 units	Value 0	5+ unit	ts Bldg	js 5+ ui 0	nits Ur	nits \ 0

2 3 4 5 3035 3036 3037 3038 3039	137 0 0 0 0 0 0	15089250 0 0 0 0 0 0	17 0 0 0 0 2 1 0	212 0 0 0 0 17 12 0 0
\	5+ units Value 1	-unit rep Bldgs	1-unit rep Units	1-unit rep Value
ì	0	169	169	45256130
2	71612677	1996	1996	364360481
3	0	3	3	686200
4	0	0	0	0
5	0	14	14	2815172
3035	0	70	70	19513641
3036	3296081	138	138	223351427
3037	960000	34	34	8079400
3038	0	2	2	200000
3039	0	3	3	815000
1 2 3 4 5 3035 3036 3037 3038 3039		Js 2-units rep Ur 0 .7 0 0 0 1 4 0 1	0 0 0 2 29 8 539	/alue \ 0 25229 0 0 0 90000 0 00000 0
1	3-4 units rep Bl	dgs 3-4 units re. 0	ep Units 3-4 units 0	s rep Value \ 0

```
2
                       37
                                            137
                                                            15089250
3
                        0
                                              0
                                                                   0
4
                        0
                                              0
                                                                   0
5
                        0
                                              0
                                                                   0
3035
                        0
                                              0
                                                                   0
                        0
                                              0
                                                                   0
3036
3037
                        0
                                              0
                                                                   0
3038
                        0
                                              0
                                                                   0
3039
                        0
                                              0
                                                                   0
     5+units rep Bldgs 5+units rep Units 5+units rep Value
1
2
                     17
                                       212
                                                     71612677
3
                      0
                                         0
4
                      0
                                         0
                                                             0
5
                      0
                                         0
                                                             0
. . .
                     . .
3035
                      0
                                         0
                                                             0
3036
                      2
                                        17
                                                      3296081
                      1
3037
                                         12
                                                       960000
                      0
3038
                                         0
                                                             0
3039
                      0
                                         0
                                                             0
[3039 rows x 30 columns]
dfco3 =
pd.read table("https://www2.census.gov/econ/bps/County/co2017a.txt",
sep=",",
                   skipinitialspace=True) #read the online table
                   # the web data table has some format issue, this
block of code is to address that issue
dfco3["Unnamed 41"] = np.nan
dfco3 = dfco3.shift(1, axis=1)
dfco3.Survey = dfco3.index
dfco3.index = np.arange(len(dfco3))
dict names = \{\}
second = dfco3.iloc[0].fillna("")
for i in range(len(dfco3.columns)):
    first = dfco3.columns[i]
    if first.startswith("Unnamed"):
        if dfco3.columns[i-1].startswith("Unnamed"):
            first = dfco3.columns[i+1]
        else:
            first = dfco3.columns[i-1]
               new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict_names[dfco3.columns[i]]= new
```

```
dfco3 = dfco3.rename(columns = dict names).drop([0])
# show the first five records
dfco3.head()
  Survey Date FIPS State FIPS.1 County Region Code Division Code \
1
         2017
                       01
                                     001
2
         2017
                       01
                                     003
                                                    3
                                                                    6
3
                                                    3
                       01
                                     005
                                                                    6
         2017
4
                                                     3
         2017
                       01
                                     007
                                                                    6
                                                     3
5
         2017
                       01
                                     009
                       County Name County Bldgs 1-unit Units 1-unit
Value \
1 Autauga County
                                              188
                                                            188
51711467
2 Baldwin County
                                             2207
                                                           2207
449821615
                                                3
                                                              3
   Barbour County
901000
                                               10
                                                             10
4 Bibb County
2551290
5 Blount County
                                               18
                                                             18
4265412
  2-units Bldgs 2-units Units 2-units Value 3-4 units Bldgs 3-4 units
Units
1
               0
                              0
                                             0
                                                              0
0
2
              46
                             92
                                      4240286
                                                             32
98
3
                                                              0
0
4
                                                              0
0
5
               0
                                                              0
0
  3-4 units Value 5+ units Bldgs 5+ units Units 5+ units Value \
1
2
          4034508
                                 3
                                                20
                                                           2091690
3
                                 0
                 0
                                                 0
                                                                 0
4
                 0
                                 0
                                                                 0
                                                 0
5
                 0
                                 0
                                                 0
                                                                 0
  1-unit rep Bldgs 1-unit rep Units 1-unit rep Value 2-units rep Bldgs
1
                188
                                  188
                                               51711467
                                                                          0
2
               2160
                                 2160
                                              443998177
                                                                         46
```

```
3
                                   3
                                                901000
                                                                        0
                  3
                                   2
                                                490000
                                                                        0
                 18
                                  18
5
                                               4265412
                                                                        0
  2-units rep Units 2-units rep Value 3-4 units rep Bldgs 3-4 units
rep Units \
                   0
                                                          0
1
0
2
                  92
                               4240286
                                                          32
98
3
                   0
                                     0
                                                          0
0
4
                                     0
                                                          0
                   0
0
5
                   0
                                     0
                                                          0
0
  3-4 units rep Value 5+units rep Bldgs 5+units rep Units 5+units rep
Value
                     0
                                                          0
1
0
2
              4034508
                                                          20
2091690
                     0
                                        0
                                                          0
3
0
4
                     0
                                                          0
0
5
                     0
                                                          0
import pandas as pd
import numpy as np
dfco4 =
pd.read table("https://www2.census.gov/econ/bps/County/co2018a.txt",
sep=",",
                   skipinitialspace=True) #read the online table
                   # the web data table has some format issue, this
block of code is to address that issue
dfco4["Unnamed 41"] = np.nan
dfco4 = dfco4.shift(1, axis=1)
dfco4.Survey = dfco4.index
dfco4.index = np.arange(len(dfco4))
dict names = {}
second = dfco4.iloc[0].fillna("")
for i in range(len(dfco4.columns)):
```

```
first = dfco4.columns[i]
    if first.startswith("Unnamed"):
        if dfco4.columns[i-1].startswith("Unnamed"):
            first = dfco4.columns[i+1]
        else:
            first = dfco4.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfco4.columns[i]]= new
dfco4 = dfco4.rename(columns = dict names).drop([0])
# show the first five records
dfco4.head()
  Survey Date FIPS State FIPS.1 County Region Code Division Code \
1
         2018
                       01
                                    001
2
         2018
                       01
                                    003
                                                   3
                                                                  6
3
                                                   3
         2018
                       01
                                    005
                                                                  6
                                                   3
4
         2018
                       01
                                    007
                                                                  6
                                                   3
5
                       01
                                    009
         2018
                       County Name County Bldgs 1-unit Units 1-unit
Value \
1 Autauga County
                                             185
                                                          185
56148262
                                            2459
2 Baldwin County
                                                         2459
502077608
3 Barbour County
                                               6
                                                            6
1536900
4 Bibb County
                                              13
                                                            13
2422591
5 Blount County
                                                            7
1280871
  2-units Bldgs 2-units Units 2-units Value 3-4 units Bldgs 3-4 units
Units \
              0
                                            0
                                                            0
1
0
2
              3
                                      393370
                                                            3
12
3
                                                            0
0
4
                                                            0
0
5
                                                            1
  3-4 units Value 5+ units Bldgs 5+ units Units 5+ units Value \
1
```

2 3 4 5	1870926 0 0 223080	28 0 0 0	570 1109 0 0 0	903040 0 0 0
	rep Bldgs 1-unit	rep Units 1-unit	rep Value 2-u	nits rep Bldgs
1	185	185	56148262	Θ
2	2303	2303	463282763	3
3	6	6	1536900	0
4	4	4	165500	Θ
5	7	7	1280871	0
2-units rep Units		ts rep Value 3-4	units rep Bldg	s 3-4 units
1	` 0	0	(9
0 2	6	393370	3	3
12				
3 0	0	0		9
4	0	0		9
0				
5 4	0	0		1
3-4 uni Value	ts rep Value 5+u	nits rep Bldgs 5+	units rep Unit	s 5+units rep
vacue 1	0	Θ		9
Ō	· ·	· ·		
2	1870926	28	570	9
110903040		_		
3	0	0		9
0 4	0	0	(9
0	· ·	· ·	`	
5	223080	0		9
0				
<pre>dfco5 = pd.read_t sep=",",</pre>	•	w2.census.gov/eco tialspace= <mark>True</mark>) #		•
block of		eb data table has		

```
dfco5["Unnamed 41"] = np.nan
dfco5 = dfco5.shift(1, axis=1)
dfco5.Survey = dfco5.index
dfco5.index = np.arange(len(dfco5))
dict names = \{\}
second = dfco5.iloc[0].fillna("")
for i in range(len(dfco5.columns)):
    first = dfco5.columns[i]
    if first.startswith("Unnamed"):
        if dfco5.columns[i-1].startswith("Unnamed"):
            first = dfco5.columns[i+1]
        else:
            first = dfco5.columns[i-1]
              new = first+second[i]
    # else:
    new = first+" "+second[i]
    dict names[dfco5.columns[i]]= new
dfco5 = dfco5.rename(columns = dict names).drop([0])
# show the first five records
dfco5.head()
  Survey Date FIPS State FIPS.1 County Region Code Division Code \
1
         2019
                       01
                                    001
                                                                  6
2
         2019
                       01
                                    003
                                                   3
                                                                  6
3
                       01
                                                   3
         2019
                                    005
                                                                  6
4
                                                   3
         2019
                       01
                                    007
                                                                  6
5
                                    009
                                                   3
         2019
                       01
                                                                  6
                       County Name County Bldgs 1-unit Units 1-unit
Value \
                                                          242
   Autauga County
                                             242
69003879
                                                         2740
   Baldwin County
                                            2740
571399246
                                               9
                                                            9
3 Barbour County
2261600
4 Bibb County
                                              14
                                                           14
2925717
5 Blount County
                                              25
                                                           25
4341017
  2-units Bldgs 2-units Units 2-units Value 3-4 units Bldgs 3-4 units
Units \
              0
1
                             0
                                                            0
0
2
             21
                            42
                                     5607750
                                                            6
22
3
              0
                             0
                                            0
                                                            0
```

0					
4	0	0	0		1
3	•	•			
5 4	Θ	0	0		1
4					
3-4 uni 1 2 3 4 5	its Value 5+ u 0 2574702 0 280000 175000	nits Bldgs 5+ 0 10 0 0	units Units 0 346 0 0	4238	/alue \ 0 86042 0 0 0
1-unit	rep Bldgs 1-u	nit rep Units	1-unit rep	Value 2-uni	its rep Bldgs
\	2.42	2.42	600	02070	0
1	242	242	690	03879	Θ
2	2740	2740	5713	99246	21
3	9	9	22	61600	0
4	14	14	29	25717	0
5	25	25	43	41017	0
2-units	s rep Units 2-	units rep Valu	e 3-4 units	rep Bldgs	3-4 units
1	0		0	0	
Θ					
2	42	560775	0	6	
22 3	0		0	0	
0	0		J	Ü	
4	0		0	1	
3	0		0	1	
5 4	0		0	1	
	its rep Value	5+units rep Bl	dgs 5+units	rep Units	5+units rep
Value 1	0		0	0	
0	U		U	0	
2	2574702		10	346	
42386042			_		
3 0	0		0	0	
4	280000		Θ	0	
4	/ ()(//////////////////////////////////				
0	200000				

5	175000	0	0
0			

Concatenating all years data

```
vertical concatcounty = pd.concat([dfco1,dfco2, dfco3,dfco4,dfco5],
axis=0)
# Drop a specific column, e.g., 'Place Name'
vertical concatcounty =vertical concatcounty.reset index()
vertical concatcounty=vertical concatcounty.drop(columns=['index'])
vertical concatcounty
      Survey Date FIPS State FIPS.1 County Region Code Division
Code
              2015
                           01
                                         001
                                                        3
                                                                       6
                                         003
                                                                       6
1
              2015
                           01
                                                        3
                                                                       6
2
              2015
                           01
                                         005
                                                        3
                                         007
                                                                       6
              2015
                            01
                                                        3
              2015
                           01
                                         009
                                                                       6
                                                        3
                                         037
                                                                       8
15189
              2019
                            56
15190
              2019
                            56
                                         039
                                                                       8
15191
              2019
                            56
                                         041
                                                        4
                                                                       8
15192
              2019
                            56
                                         043
                                                                       8
              2019
                                         045
                                                                       8
15193
                            56
                           County Name County Bldgs 1-unit Units 1-unit
Value
       Autauga County
                                                  158
                                                                158
39749354
       Baldwin County
                                                 1622
                                                               1622
302576607
                                                   10
       Barbour County
                                                                 10
3292300
                                                                  9
       Bibb County
2222180
```

4 Blount Count 1573173	y		9	9
 15189 Sweetwater C 19672418	County		68	68
15190 Teton County 185477431	1		122	122
15191 Uinta County 8549000	1		42	42
15192 Washakie Cou 415000	inty		2	2
15193 Weston Count 0			0	0
2-units Bldgs 0 0 1 11 2 0 3 0	22 0 0	2-units Value 0 2232258 0 0	3-4 units Bl	Ldgs \
15189 6 15190 7 15191 6 15192 6 15193 6	0 0 14 0 0 0	4363233 0 0 0 0		 0 3 0 0
0	ts 3-4 units Va 0 .09 1272 0 0	0	3ldgs 5+ unit 0 31 0 0 2	us Units \ 0 450 0 450 40
15189 15190 15191 15192 15193	0 9 349 0 0 0	0 9497 0 0 0	0 2 0 0 0	0 10 0 0 0
5+ units Valu	ue 1-unit rep B	ldgs 1-unit rep	o Units 1-uni	it rep
0 39749354	0	158	158	
1 4385618 238194418		1336	1336	
2 3292300	0	10	10	
3	0	8	8	

210818			•	0	
4	3831302	Ç	9	9	
157317	/3				
			1		• •
15100	0		<u> </u>	6.0	
15189	0	68	3	68	
196724		0.0	-	0.0	
15190	2080796	99	9	99	
173455		2		2.4	
15191	0	34	4	34	
678900					
15192	0	4	2	2	
415000		,	•		
15193	0	(9	0	
0					
	2	. 2	1.11. 2		
0	2-units rep Bldg	_	_	_	
0		0	0	0	
1		1	22	2232258	
2		0	0	0	
3		0	0	0	
4		0	0	0	
15100					
15189		0	0	0	
15190		0	0	0	
15191		0	0	0	
15192		0	0	0	
15193		0	0	0	
	2 / units ron D1	dac 2 / units	ron Unite 2 1	unite ron Value	\
0	3-4 units rep Bl		_	onitis rep value	\
		0 29	0 109	12724884	
2		0	0	12724884	
1 2 3					
4		0 0	0 0	0 0	
		U	U	O	
15189		0	0		
15199			0	0	
15190		0 0	0	0	
TOTAT		0	0	0	
		U			
15192		0	(A)		
		0	0	0	
15192	5+units ron Rlda		-		
15192 15193	5+units rep Bldg	s 5+units rep l	Jnits 5+units	rep Value	
15192 15193 0		s 5+units rep l 0	Jnits 5+units	rep Value 0	
15192 15193 0 1	3	s 5+units rep l 0 1	Jnits 5+units 0 450	rep Value 0 43856188	
15192 15193 0 1	3	s 5+units rep l 0 1 0	Jnits 5+units 0 450 0	rep Value 0 43856188 0	
15192 15193 0 1	3	s 5+units rep l 0 1 0 0	Jnits 5+units 0 450 0	rep Value 0 43856188 0 0	
15192 15193 0	3	s 5+units rep l 0 1 0	Jnits 5+units 0 450 0	rep Value 0 43856188 0 0 3831302	
15192 15193 0 1		s 5+units rep l 0 1 0 0	Jnits 5+units 0 450 0	rep Value 0 43856188 0 0	

```
15190
                       0
                                          0
                                                             0
                       0
                                          0
                                                             0
15191
15192
                       0
                                          0
                                                             0
15193
                                                             0
[15194 rows x 30 columns]
import pandas as pd
datacounty = vertical concatcounty
# Select the columns of interest
selected columnscounty = ['FIPS.1 County', 'Survey Date', '1-unit rep
Units', 'County Name']
# Extract the desired data
extracted datacounty = datacounty[selected columnscounty]
extracted datacounty
      FIPS.1 County Survey Date 1-unit rep Units \
0
                001
                            2015
                                               158
1
                                              1336
                003
                            2015
2
                005
                            2015
                                                10
3
                007
                            2015
                                                 8
4
                            2015
                                                 9
                009
15189
                037
                            2019
                                                68
                039
                                                99
15190
                            2019
                                                34
15191
                041
                            2019
                            2019
                                                 2
15192
                043
15193
                045
                            2019
                                                 0
                           County Name
       Autauga County
0
1
       Baldwin County
2
       Barbour County
3
       Bibb County
4
       Blount County
. . .
15189 Sweetwater County
15190 Teton County
15191 Uinta County
15192 Washakie County
15193 Weston County
[15194 rows x 4 columns]
# Group by 'FIPS.1 County', 'Survey Date', 'County Name', and sum '1-
unit rep Units'
```

```
grouped dflcounty = extracted datacounty.groupby(['FIPS.1 County',
'Survey Date', 'County Name'])['1-unit rep Units'].sum().reset index()
# Pivot the DataFrame to have years as columns
pivot df1county = grouped df1county.pivot table(index=['FIPS.1
County', 'County Name'], columns='Survey Date', values='1-unit rep
Units', fill_value=0)
# Reset the index to have 'FIPS.1 County' and 'County Name' as columns
pivot df1county.reset index(inplace=True)
# Rename the columns
pivot df1county.columns = ['FIPS.1 County', 'County Name', '2015',
'2016', '2017', '2018', '2019']
# Display the pivot DataFrame
print(pivot df1county)
     FIPS.1 County
                                       County Name 2015
                                                            2016
                                                                   2017
2018
     /
               000
                    Maine Unorganized Territory
                                                       0
                                                                    0.0
                                                             0.0
0
0.0
               000
                    Michigan Balance of State
                                                      51
                                                             0.0
                                                                    0.0
1
0.0
2
               000
                    Montana Balance of State
                                                       0
                                                             0.0
                                                                    0.0
0.0
3
               000
                    New Mexico Balance of State
                                                      168
                                                             0.0
                                                                    0.0
0.0
               000 Oregon Balance of State
                                                      49
                                                             0.0 162.0
4
7.0
. . .
. . .
2918
                    Suffolk (Independent City)
                                                     362 395.0
               800
                                                                  514.0
501.0
2919
                    Virginia Beach (Independent Ci
                                                          768.0
               810
                                                      696
                                                                  646.0
534.0
2920
               820
                    Waynesboro (Independent City)
                                                      43
                                                            22.0
                                                                  31.0
30.0
2921
               830
                    Williamsburg (Independent City
                                                      20
                                                            49.0
                                                                   43.0
25.0
2922
               840
                   Winchester (Independent City)
                                                      13
                                                           25.0
                                                                   18.0
0.0
       2019
0
        0.0
1
        0.0
2
        0.0
3
        0.0
4
      402.0
        . . .
```

```
2918
     500.0
2919 667.0
2920
      100.0
2921
       29.0
2922
       37.0
[2923 rows x 7 columns]
# Group by 'FIPS.1 County', 'Survey Date', 'County Name', and sum '1-
unit rep Units'
grouped dflcounty = extracted datacounty[['FIPS.1 County', 'Survey
Date', 'County Name', '1-unit rep Units']].groupby(['FIPS.1 County',
'Survey Date', 'County Name'])['1-unit rep Units'].sum().reset index()
# Pivot the DataFrame to have years as columns
pivot df1county = grouped df1county.pivot table(index=['FIPS.1
County', 'County Name'], columns='Survey Date', values='1-unit rep
Units', fill_value=0)
# Reset the index to have 'FIPS.1 County' and 'County Name' as columns
pivot df1county.reset index(inplace=True)
# Rename the columns
pivot df1county.columns = ['FIPS.1 County', 'County Name', '2015',
'2016', '2017', '2018', '2019']
# Display the pivot DataFrame
print(pivot df1county)
     FIPS.1 County
                                       County Name 2015
                                                           2016
                                                                  2017
2018
                                                            0.0
               000
                    Maine Unorganized Territory
                                                                   0.0
0
0.0
1
               000
                    Michigan Balance of State
                                                      51
                                                            0.0
                                                                   0.0
0.0
2
               000
                    Montana Balance of State
                                                            0.0
                                                                   0.0
0.0
3
               000
                    New Mexico Balance of State
                                                                   0.0
                                                     168
                                                            0.0
0.0
                    Oregon Balance of State
               000
                                                      49
                                                            0.0 162.0
7.0
. . .
. . .
               800 Suffolk (Independent City)
                                                     362
                                                          395.0
                                                                 514.0
2918
501.0
2919
               810 Virginia Beach (Independent Ci
                                                     696 768.0
                                                                 646.0
534.0
2920
               820
                    Waynesboro (Independent City)
                                                      43
                                                           22.0
                                                                  31.0
```

30.0 2921 830 Williamsburg (Independent City 20 49.0 43.0 25.0 2922 840 Winchester (Independent City) 13 25.0 18.0 0.0 2019 0 0.0 1 0.0 2 0.0 3 0.0 4 402.0 2918 500.0 2919 667.0 2920 100.0 2921 29.0 2921 37.0 [2923 rows x 7 columns]						
25.0 2922 840 Winchester (Independent City) 13 25.0 18.0 0.0 2019 0 0.0 1 0.0 2 0.0 3 0.0 4 402.0 2918 500.0 2919 667.0 2920 100.0 2921 29.0 2922 37.0						
2922 840 Winchester (Independent City) 13 25.0 18.0 0.0 2019		830	Williamsburg (Independent City	20	49.0	43.0
0.0 2019 0 0.0 1 0.0 2 0.0 3 0.0 4 402.0 2918 500.0 2919 667.0 2920 100.0 2921 29.0 2922 37.0	25.0					
2019 0 0.0 1 0.0 2 0.0 3 0.0 4 402.0 2918 500.0 2919 667.0 2920 100.0 2921 29.0 2922 37.0		840	Winchester (Independent City)	13	25.0	18.0
0 0.0 1 0.0 2 0.0 3 0.0 4 402.0 2918 500.0 2919 667.0 2920 100.0 2921 29.0 2922 37.0	0.0					
0 0.0 1 0.0 2 0.0 3 0.0 4 402.0 2918 500.0 2919 667.0 2920 100.0 2921 29.0 2922 37.0	2010					
1 0.0 2 0.0 3 0.0 4 402.0 2918 500.0 2919 667.0 2920 100.0 2921 29.0 2922 37.0						
4 402.0 2918 500.0 2919 667.0 2920 100.0 2921 29.0 2922 37.0	0.0					
4 402.0 2918 500.0 2919 667.0 2920 100.0 2921 29.0 2922 37.0	1 0.0					
4 402.0 2918 500.0 2919 667.0 2920 100.0 2921 29.0 2922 37.0	2 0.0					
2918 500.0 2919 667.0 2920 100.0 2921 29.0 2922 37.0	3 0.0					
2918 500.0 2919 667.0 2920 100.0 2921 29.0 2922 37.0	4 402.0					
2919 667.0 2920 100.0 2921 29.0 2922 37.0						
2920 100.0 2921 29.0 2922 37.0	2918 500.0					
2920 100.0 2921 29.0 2922 37.0	2919 667.0					
2921 29.0 2922 37.0						
2922 37.0						
[2923 rows x 7 columns]	2322 3710					
	[2923 rows x 7	colu	mns]			

County single units

The Building permits for fips county code for all counties for single units from 2015-2019 and csv file for it

pivot_df1county				
FIPS.1 County 2018 \	County Name	2015	2016	2017
0 000	Maine Unorganized Territory	Θ	0.0	0.0
1 000	Michigan Balance of State	51	0.0	0.0
2 000	Montana Balance of State	0	0.0	0.0
3 000	New Mexico Balance of State	168	0.0	0.0
4 000 7.0	Oregon Balance of State	49	0.0	162.0
2918 800	Suffolk (Independent City)	362	395.0	514.0

```
501.0
               810 Virginia Beach (Independent Ci
                                                     696 768.0 646.0
2919
534.0
2920
               820
                   Waynesboro (Independent City)
                                                      43
                                                           22.0
                                                                  31.0
30.0
2921
               830 Williamsburg (Independent City
                                                      20
                                                           49.0
                                                                  43.0
25.0
2922
               840 Winchester (Independent City)
                                                      13
                                                           25.0
                                                                  18.0
0.0
       2019
        0.0
0
1
        0.0
2
        0.0
3
        0.0
4
      402.0
        . . .
2918
      500.0
2919
      667.0
     100.0
2920
2921
       29.0
2922 37.0
[2923 rows x 7 columns]
# Save the pivot DataFrame to a CSV file
pivot dflcounty.to csv('3building permitssingleunitcounty grouped 2015
-2019.csv', index=False)
import pandas as pd
datacounty2 = vertical concatcounty
# Select the columns of interest
selected_columnscounty2 = ['FIPS.1 County', 'Survey Date', 'County
Name', '2-units rep Units', '3-4 units rep Units', '5+units rep Units']
# Extract the desired data
extracted datamcounty2 = datacounty2[selected columnscounty2]
extracted datamcounty2
      FIPS.1 County Survey Date
                                                    County Name \
                           2015
                                 Autauga County
0
                001
1
                003
                           2015
                                 Baldwin County
2
                005
                           2015
                                 Barbour County
3
                           2015
                                 Bibb County
                007
4
                009
                           2015 Blount County
15189
                           2019 Sweetwater County
                037
```

```
15190
                039
                                  Teton County
                            2019
                            2019
15191
                041
                                  Uinta County
15192
                043
                            2019
                                  Washakie County
15193
                045
                            2019 Weston County
      2-units rep Units 3-4 units rep Units 5+units rep Units
0
1
                      22
                                          109
                                                             450
2
                       0
                                            0
                                                               0
3
                       0
                                            0
                                                               0
4
                       0
                                            0
                                                              40
                                                             . . .
15189
                       0
                                            0
                                                               0
                       0
                                            0
                                                               0
15190
                       0
                                            0
                                                               0
15191
15192
                       0
                                            0
                                                               0
                                            0
                                                               0
15193
                       0
[15194 rows \times 6 columns]
# Group by 'Zip Code,' 'FIPS Place Code,' 'Place Name,' and 'Survey
Date,' and sum the units columns
grouped dfmcounty = extracted datamcounty2.groupby(['FIPS.1 County',
'Survey Date', 'County Name', ]).agg({
    '2-units rep Units': 'sum',
    '3-4 units rep Units': 'sum',
    '5+units rep Units': 'sum'
}).reset index()
# Create a new column 'multi unit' by summing the '2-units rep Units,'
'3-4 units rep Units,' and '5+ units rep Units'
grouped dfmcounty['multi unit'] = grouped dfmcounty['2-units rep
Units'] + grouped dfmcounty['3-4 units rep Units'] +
grouped dfmcounty['5+units rep Units']
# Display the grouped DataFrame
print(grouped dfmcounty)
      FIPS.1 County Survey Date
                                                      County Name \
0
                                  Maine Unorganized Territory
                000
                            2015
1
                000
                            2015
                                  Michigan Balance of State
2
                            2015
                000
                                  Montana Balance of State
3
                000
                            2015
                                  New Mexico Balance of State
4
                            2015
                                  Oregon Balance of State
                000
                 . . .
                            2015
                                  Winchester (Independent City)
14574
                840
                840
                            2016
                                  Winchester (Independent City)
14575
                                  Winchester (Independent City)
14576
                840
                            2017
14577
                840
                            2018
                                  Winchester (Independent City)
```

14578		840	2019	Winchester	(Indeper	ndent City)
unit	2-units	rep Units 3	3-4 units	rep Units	5+units	rep Units multi
0		0		0		0
000 1		Θ		0		0
000 2		0		0		Θ
000						
3 000		0		0		0
4 000		0		0		0
14574		0		0		0
000 14575		0		0		5
005 14576		0		8		144
08144		0				
14577 000				0		Θ
14578 000		0		0		0
[14579	orows x	7 columns]				
pivot_ County	_dfmcount	ataFrame to sy = grouped aty Name'],	l_dfmcour	nty.pivot_ta	able(inde	ex=['FIPS.1 ues='multi unit',
Name'	as colun				Place Co	ode', and 'Place
pivot	<pre># Rename the columns pivot_dfmcounty.columns = ['FIPS.1 County', 'County Name', '2015', '2016', '2017', '2018', '2019']</pre>					
pivot_	_dfmcount	vot DataFram y.to_csv('4 lex= <mark>False</mark>)			untymult:	i_grouped_2015-
		<i>pivot DataF</i> mcounty)	rame			

	1 County	County Name	2015	2016
2017 \ 0 0.0	000	Maine Unorganized Territory	0.0	0.0
1	000	Michigan Balance of State	0.0	0.0
2	000	Montana Balance of State	0.0	0.0
0.0	000	New Mexico Balance of State	0.0	0.0
0.0	000	Oregon Balance of State	0.0	0.0
0.0				
2918	800	Suffolk (Independent City)	436.0	312.0
48.0 2919	810	Virginia Beach (Independent Ci	12785.0	815.0
877.0 2920	820	Waynesboro (Independent City)	0.0	0.0
0.0 2921	830	Williamsburg (Independent City	0.0	0.0
0.0 2922	840	Winchester (Independent City)	0.0	5.0
8144.0				
201 0 0.				
1 0.				
2 0.				
3 0. 4 0.				
4 0.				
2918 216.				
2919 245.				
2920 276.				
2921 0. 2922 0.				
[2923 rows	x / cotu	IIII15 J		

The Building permits for fips county code for all counties for multiple units from 2015-2019 and csv file for it

pivot_dfmcounty

		County	County Name	2015	2016
2017	\	000	Maine Unorganized Territory	0.0	0.0
0.0		000	Michigan Balance of State	0.0	0.0
0.0		000	Montana Balance of State	0.0	0.0
0.0		000	New Mexico Balance of State	0.0	0.0
0.0		000	Oregon Balance of State	0.0	0.0
0.0					
2918 48.0		800	Suffolk (Independent City)	436.0	312.0
2919 877.0		810	Virginia Beach (Independent Ci	12785.0	815.0
2920 0.0		820	Waynesboro (Independent City)	0.0	0.0
2921 0.0		830	Williamsburg (Independent City	0.0	0.0
2922 8144.	A	840	Winchester (Independent City)	0.0	5.0
	2018 0.0	201			
0 1 2 3 4	0.0 0.0 0.0 0.0	0.0 0.0 0.0	9 9 9		
2918 2919 2920 2921 2922	216.0 245.0 276.0 0.0 0.0	195.0 683.0 20120.0 0.0	0 0 0 0		
[2923	rows	<pre>7 colui</pre>	mns]		