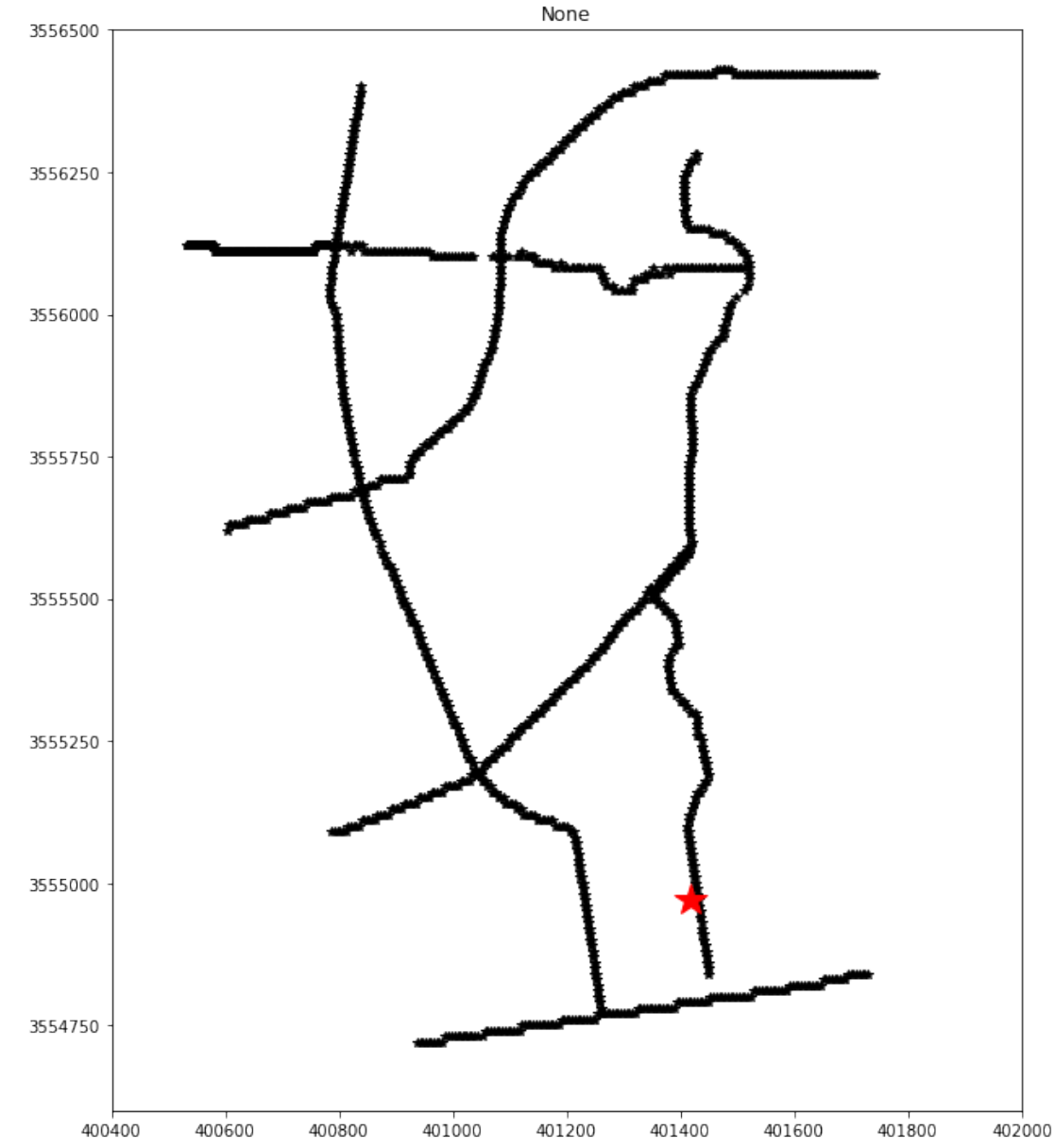
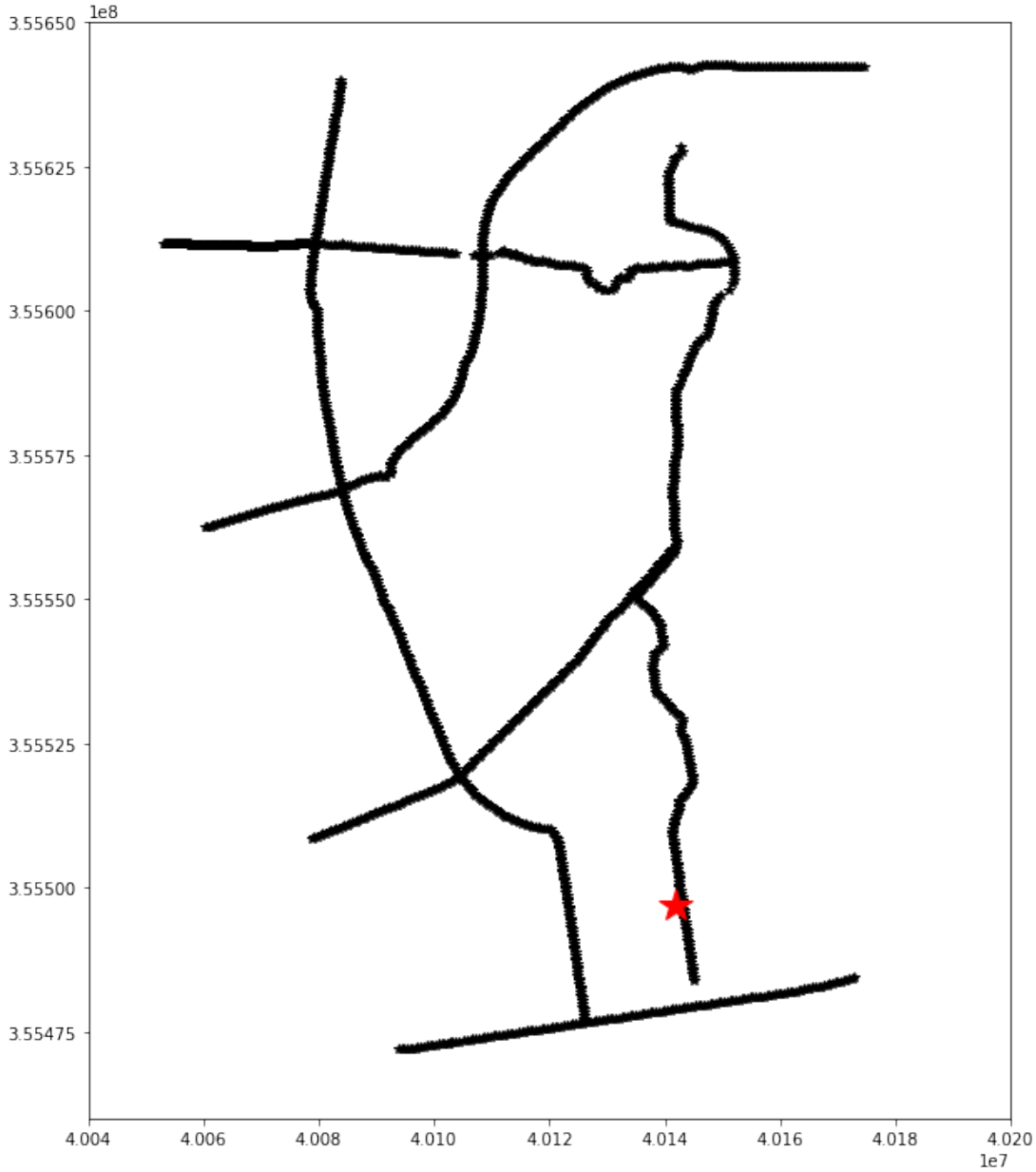
In [136]:
```
pos = []
for tr in obs:
    pos.append([tr.stats.su.trace_header.group_coordinate_y, tr.stats.su.trace_header.group_coordinate_x])
pos = np.array(pos)
```

In [129]:
```
st = []
for ar in np.genfromtxt('/Users/niyiyu/Desktop/NJU/TransNJU/SPECFEM3D/DATA/STATIONS'):
    st.append([ar[2],ar[3]])
st = np.array(st)
```

In [137]:
```
pos = pos[np.lexsort(pos[:,::-1].T)]
st = st[np.lexsort(st[:,::-1].T)]
for a in zip(pos[4:], st):
    print(a)
    #Left: position read from written observed SU file (after running SEM3D)
    #Right: position written into STATION file (to be read by SEM3D)
```

```
(array([ 400532, 3556120]), array([  400532.09,  3556117.  ]))
(array([ 400533, 3556120]), array([  400533.09,  3556117.  ]))
(array([ 400534, 3556120]), array([  400534.09,  3556117.  ]))
(array([ 400535, 3556120]), array([  400535.13,  3556117.  ]))
(array([ 400536, 3556120]), array([  400536.13,  3556117.  ]))
(array([ 400537, 3556120]), array([  400537.13,  3556117.  ]))
(array([ 400538, 3556120]), array([  400538.13,  3556117.  ]))
(array([ 400539, 3556120]), array([  400539.13,  3556117.  ]))
(array([ 400540, 3556120]), array([  400540.13,  3556117.  ]))
(array([ 400541, 3556120]), array([  400541.13,  3556116.75]))
(array([ 400542, 3556120]), array([  400542.13,  3556116.75]))
(array([ 400543, 3556120]), array([  400543.13,  3556116.75]))
(array([ 400544, 3556120]), array([  400544.16,  3556116.75]))
(array([ 400545, 3556120]), array([  400545.16,  3556116.75]))
(array([ 400546, 3556120]), array([  400546.16,  3556116.75]))
(array([ 400547, 3556120]), array([  400547.16,  3556116.75]))
(array([ 400548, 3556120]), array([  400548.16,  3556116.75]))
(array([ 400549, 3556120]), array([  400549.16,  3556116.75]))
(array([ 400550, 3556120]), array([  400550.16,  3556116.75]))
```


None
3556500
3556250
3556000
3555750
3555500
3555250
3555000
3554750
400400
400600
400800
401000
401200
401400
401600
401800
402000


1e8
3.55650
3.55625
3.55600
3.55575
3.55550
3.55525
3.55500
3.55475
4.004
4.006
4.008
4.010
4.012
4.014
4.016
4.018
4.020
1e7

STATIONS_FILTER

User input STATIONS

```
[qwang@c01n01 DATA]$ paste STATIONS_FILTERED STATIONS
        N0          CE      0.401450E+06      0.355484E+07      0.000000E+00      0.000000E+00   N0  CE  401450.03 3554840.5 0 0
        N1          CE      0.401449E+06      0.355485E+07      0.000000E+00      0.000000E+00   N1  CE  401449.28 3554845.5 0 0
        N2          CE      0.401448E+06      0.355485E+07      0.000000E+00      0.000000E+00   N2  CE  401448.5 3554850.5 0 0
        N3          CE      0.401448E+06      0.355486E+07      0.000000E+00      0.000000E+00   N3  CE  401447.75 3554855.25 0 0
        N4          CE      0.401447E+06      0.355486E+07      0.000000E+00      0.000000E+00   N4  CE  401447.0 3554860.25 0 0
        N5          CE      0.401446E+06      0.355487E+07      0.000000E+00      0.000000E+00   N5  CE  401446.19 3554865.5 0 0
        N6          CE      0.401445E+06      0.355487E+07      0.000000E+00      0.000000E+00   N6  CE  401445.38 3554870.5 0 0
        N7          CE      0.401445E+06      0.355488E+07      0.000000E+00      0.000000E+00   N7  CE  401444.53 3554875.5 0 0
        N8          CE      0.401444E+06      0.355488E+07      0.000000E+00      0.000000E+00   N8  CE  401443.72 3554880.75 0 0
        N9          CE      0.401443E+06      0.355489E+07      0.000000E+00      0.000000E+00   N9  CE  401443.16 3554885.5 0 0
       N10          CE      0.401443E+06      0.355489E+07      0.000000E+00      0.000000E+00   N10  CE  401442.59 3554890.25 0 0
       N11          CE      0.401442E+06      0.355490E+07      0.000000E+00      0.000000E+00   N11  CE  401442.03 3554895.0 0 0
       N12          CE      0.401441E+06      0.355490E+07      0.000000E+00      0.000000E+00   N12  CE  401441.47 3554899.75 0 0
       N13          CE      0.401441E+06      0.355490E+07      0.000000E+00      0.000000E+00   N13  CE  401440.75 3554904.75 0 0
       N14          CE      0.401440E+06      0.355491E+07      0.000000E+00      0.000000E+00   N14  CE  401440.03 3554909.75 0 0
       N15          CE      0.401439E+06      0.355491E+07      0.000000E+00      0.000000E+00   N15  CE  401439.31 3554914.75 0 0
       N16          CE      0.401439E+06      0.355492E+07      0.000000E+00      0.000000E+00   N16  CE  401438.59 3554919.5 0 0
       N17          CE      0.401438E+06      0.355492E+07      0.000000E+00      0.000000E+00   N17  CE  401437.78 3554924.75 0 0
       N18          CE      0.401437E+06      0.355493E+07      0.000000E+00      0.000000E+00   N18  CE  401436.94 3554930.25 0 0
       N19          CE      0.401436E+06      0.355494E+07      0.000000E+00      0.000000E+00   N19  CE  401436.13 3554935.5 0 0
       N20          CE      0.401435E+06      0.355494E+07      0.000000E+00      0.000000E+00   N20  CE  401435.28 3554940.75 0 0
       N21          CE      0.401434E+06      0.355495E+07      0.000000E+00      0.000000E+00   N21  CE  401434.44 3554945.5 0 0
       N22          CE      0.401434E+06      0.355495E+07      0.000000E+00      0.000000E+00   N22  CE  401433.59 3554950.5 0 0
```

generate_databases.f90 | generate_databases_par.F90 | station_filter.f90

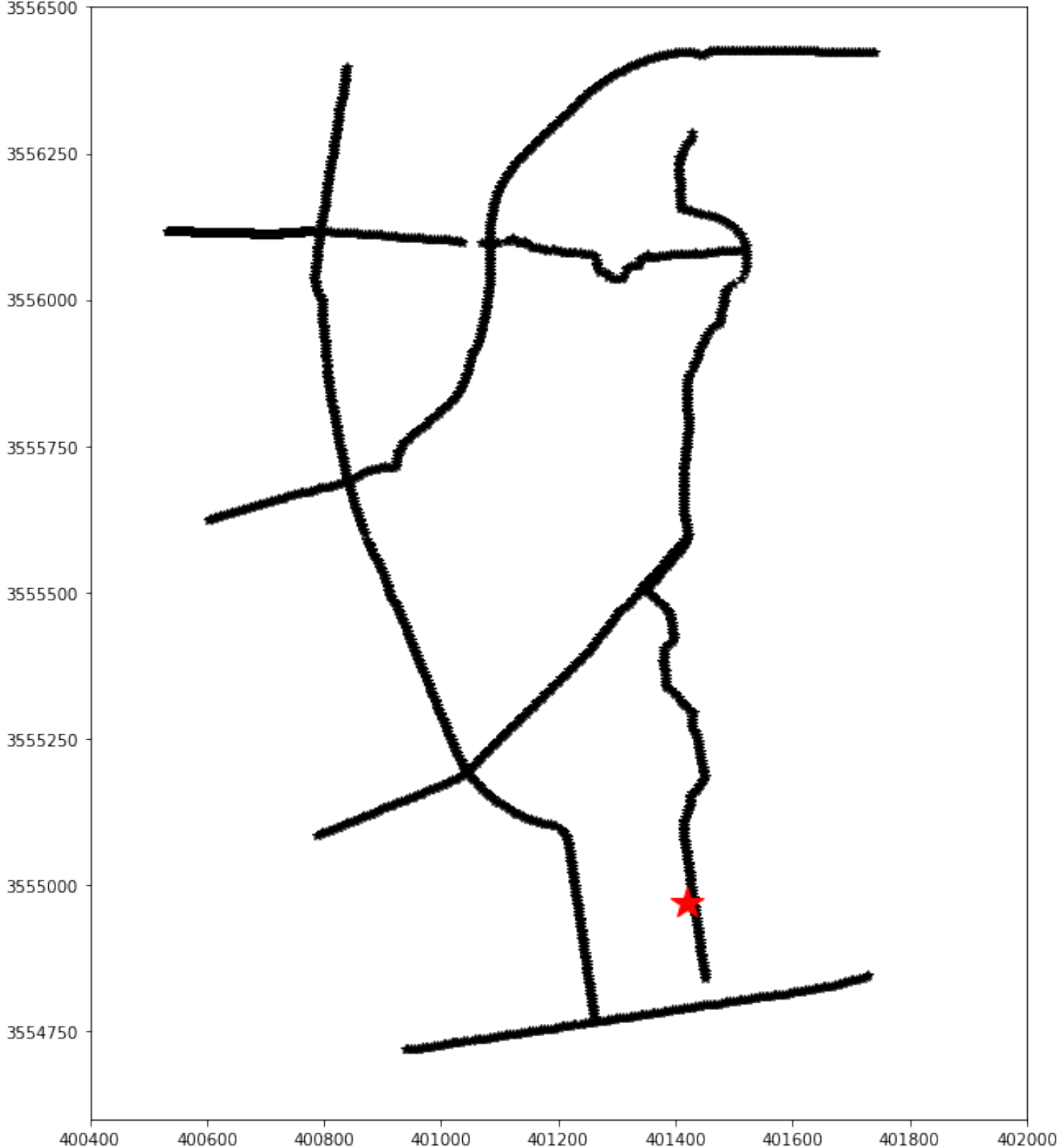
specfem3D > station_filter.f90

```
97                  nrec_filtered(1) = nrec_filtered(1) + 1
98                  ! with specific format
99                  write(IOUT,'(a10,1x,a10,4e18.8)') &
100                                 trim(station_name),trim(network_name), &
101                                 sngl(stlat),sngl(stlon),sngl(stele),sngl(stbur)
102               endif
103             endif
104           enddo
```

STATIONS_FILTER

User input STATIONS

```
[qwang@c01n01 DATA]$ paste STATIONS_FILTERED STATIONS
       N0          CE   0.401450031E+06   0.355484050E+07   0.000000000E+00   0.000000000E+00   N0  CE  401450.03 3554840.5 0 0
       N1          CE   0.401449281E+06   0.355484550E+07   0.000000000E+00   0.000000000E+00   N1  CE  401449.28 3554845.5 0 0
       N2          CE   0.401448500E+06   0.355485050E+07   0.000000000E+00   0.000000000E+00   N2  CE  401448.5 3554850.5 0 0
       N3          CE   0.401447750E+06   0.355485525E+07   0.000000000E+00   0.000000000E+00   N3  CE  401447.75 3554855.25 0 0
       N4          CE   0.401447000E+06   0.355486025E+07   0.000000000E+00   0.000000000E+00   N4  CE  401447.0 3554860.25 0 0
       N5          CE   0.401446188E+06   0.355486550E+07   0.000000000E+00   0.000000000E+00   N5  CE  401446.19 3554865.5 0 0
       N6          CE   0.401445375E+06   0.355487050E+07   0.000000000E+00   0.000000000E+00   N6  CE  401445.38 3554870.5 0 0
       N7          CE   0.401444531E+06   0.355487550E+07   0.000000000E+00   0.000000000E+00   N7  CE  401444.53 3554875.5 0 0
       N8          CE   0.401443719E+06   0.355488075E+07   0.000000000E+00   0.000000000E+00   N8  CE  401443.72 3554880.75 0 0
       N9          CE   0.401443156E+06   0.355488550E+07   0.000000000E+00   0.000000000E+00   N9  CE  401443.16 3554885.5 0 0
      N10          CE   0.401442594E+06   0.355489025E+07   0.000000000E+00   0.000000000E+00   N10  CE  401442.59 3554890.25 0 0
      N11          CE   0.401442031E+06   0.355489500E+07   0.000000000E+00   0.000000000E+00   N11  CE  401442.03 3554895.0 0 0
      N12          CE   0.401441469E+06   0.355489975E+07   0.000000000E+00   0.000000000E+00   N12  CE  401441.47 3554899.75 0 0
      N13          CE   0.401440750E+06   0.355490475E+07   0.000000000E+00   0.000000000E+00   N13  CE  401440.75 3554904.75 0 0
      N14          CE   0.401440031E+06   0.355490975E+07   0.000000000E+00   0.000000000E+00   N14  CE  401440.03 3554909.75 0 0
      N15          CE   0.401439312E+06   0.355491475E+07   0.000000000E+00   0.000000000E+00   N15  CE  401439.31 3554914.75 0 0
      N16          CE   0.401438594E+06   0.355491950E+07   0.000000000E+00   0.000000000E+00   N16  CE  401438.59 3554919.5 0 0
      N17          CE   0.401437781E+06   0.355492475E+07   0.000000000E+00   0.000000000E+00   N17  CE  401437.78 3554924.75 0 0
      N18          CE   0.401436938E+06   0.355493025E+07   0.000000000E+00   0.000000000E+00   N18  CE  401436.94 3554930.25 0 0
      N19          CE   0.401436125E+06   0.355493550E+07   0.000000000E+00   0.000000000E+00   N19  CE  401436.13 3554935.5 0 0
      N20          CE   0.401435281E+06   0.355494075E+07   0.000000000E+00   0.000000000E+00   N20  CE  401435.28 3554940.75 0 0
      N21          CE   0.401434438E+06   0.355494550E+07   0.000000000E+00   0.000000000E+00   N21  CE  401434.44 3554945.5 0 0
      N22          CE   0.401433594E+06   0.355495050E+07   0.000000000E+00   0.000000000E+00   N22  CE  401433.59 3554950.5 0 0
      N23          CE   0.401432750E+06   0.355495550E+07   0.000000000E+00   0.000000000E+00   N23  CE  401432.75 3554955.5 0 0
      N24          CE   0.401431906E+06   0.355496050E+07   0.000000000E+00   0.000000000E+00   N24  CE  401431.91 3554960.5 0 0
      N25          CE   0.401431375E+06   0.355496500E+07   0.000000000E+00   0.000000000E+00   N25  CE  401431.38 3554965.0 0 0
      N26          CE   0.401430844E+06   0.355496975E+07   0.000000000E+00   0.000000000E+00   N26  CE  401430.84 3554969.75 0 0
      N27          CE   0.401430344E+06   0.355497425E+07   0.000000000E+00   0.000000000E+00   N27  CE  401430.34 3554974.25 0 0
      N28          CE   0.401429812E+06   0.355497875E+07   0.000000000E+00   0.000000000E+00   N28  CE  401429.81 3554978.75 0 0
      N29          CE   0.401428781E+06   0.355498400E+07   0.000000000E+00   0.000000000E+00   N29  CE  401428.78 3554984.0 0 0
      N30          CE   0.401427750E+06   0.355498925E+07   0.000000000E+00   0.000000000E+00   N30  CE  401427.75 3554989.25 0 0
```


3556500
3556250
3556000
3555750
3555500
3555250
3555000
3554750
400400
400600
400800
401000
401200
401400
401600
401800
402000