```
 1 import pandas as pd
 2 import numpy as np
 3 from scipy.stats.mstats import hmean
 4
 5 data_frame = pd.read_csv('/Users/
   artyomkholodkov/Downloads/1015/
   cleaned_data_1015.csv')
 6 data_frame = data_frame.drop(['Unnamed: 0'],
   axis=1)
 7
 8 def speed_resampler(array):
 9     return hmean(array)
10
11 def headway_resampler(array):
12     return np.mean(array)/1000 #in seconds
13
14 data_frame.DIRECTION = pd.Categorical(
   data_frame.DIRECTION,categories=['WESTBOUND',
    'EASTBOUND'], ordered=True)
15 df = data_frame.rename_axis('IDX').
   sort_values(by=['DIRECTION', 'IDX'])
16
17 df_westbound = df[df['DIRECTION'] == '
   WESTBOUND']
18 df_eastbound = df[df['DIRECTION'] == '
   EASTBOUND']
19
20 time_west = pd.to_datetime(df_westbound['TIME
   '])
21 time_east = pd.to_datetime(df_eastbound['TIME
   '])
22
23 #WEST
24 aggr_5_speed_west = pd.Series(df_westbound['
   SPEED'].values, index=time_west).resample('
   5Min').apply(speed_resampler)
25
26 aggr_headway_5_west = pd.Series(df_westbound[
   'HEADWAY'].values, index=time_west).resample(
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```
'5Min').apply(headway_resampler)

#west 5 min
final_data_5_west = pd.concat([aggr_5_speed_west, aggr_headway_5_west], axis=1)
final_data_5_west.columns = ['SPEED(km/h)', 'TEMPORAL_HEADWAY(s)']
final_data_5_west['SPACE_HEADWAY(m)'] = final_data_5_west['SPEED(km/h)'] / 3.6 * final_data_5_west['TEMPORAL_HEADWAY(s)']
final_data_5_west['DENSITY(veh/km)'] = 1000 / final_data_5_west['SPACE_HEADWAY(m)']
final_data_5_west['FLOW(veh/h)'] = final_data_5_west['DENSITY(veh/km)'] * final_data_5_west['SPEED(km/h)']
final_data_5_west.to_csv('aggregated_1015_west_5.csv')

#EAST
aggr_5_speed_east = pd.Series(df_eastbound['SPEED'].values, index=time_east).resample('5Min').apply(speed_resampler)

aggr_headway_5_east = pd.Series(df_eastbound['HEADWAY'].values, index=time_east).resample('5Min').apply(headway_resampler)

#west 5 min
final_data_5_east = pd.concat([aggr_5_speed_east, aggr_headway_5_east], axis=1)
final_data_5_east.columns = ['SPEED(km/h)', 'TEMPORAL_HEADWAY(s)']
final_data_5_east['SPACE_HEADWAY(m)'] = final_data_5_east['SPEED(km/h)'] / 3.6 * final_data_5_east['TEMPORAL_HEADWAY(s)']
final_data_5_east['DENSITY(veh/km)'] = 1000 / final_data_5_east['SPACE_HEADWAY(m)']
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```
46 final_data_5_east['FLOW(veh/h)'] =
   final_data_5_east['DENSITY(veh/km)'] *
   final_data_5_east['SPEED(km/h)']
47 final_data_5_east.to_csv('
   aggregated_1015_east_5.csv')
48
```