# Solution

1.

| | dd | mm | ss | | x (deg) | x (rad) | dd | mm | ss | | y (deg) | y (rad) | d(rad) | d (mi) | q | r | w | TC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NF | | | | | -44.6018 | -0.77845 | | | | | 16.38107 | 0.285904 | | | | | | 10,822.04 |
| Gainesville | 82 | 20 | 11 | W | -82.3364 | -1.43704 | 29 | 40 | 27 | N | 29.67417 | 0.517912 | 0.645389 | 2554.525 | 1 | 1.00 | 1.00 | 2,554.53 |
| Baghdad | 44 | 22 | | E | 44.36667 | 0.774344 | 33 | 14 | | N | 33.23333 | 0.580031 | 1.400971 | 5544.677 | 1 | 1.00 | 1.00 | 5,544.68 |
| Rio de Janeiro | 43 | 12 | | W | -43.2 | -0.75398 | 22 | 57 | | S | -22.95 | -0.40055 | 0.686874 | 2722.84 | 1 | 1.00 | 1.00 | 2,722.84 |

2.

| | x (mi mark) | d (mi) | f (ton/yr) | r ($/ton-mi) | w ($/yr-mi) | TC ($/yr) |
|---|---|---|---|---|---|---|
| NF | 190 | | | | | 3,620.00 |
| Asheville | 50 | 140 | 150 | 0.10 | 15.00 | 2,100.00 |
| Winston-Salem | 190 | 9E-07 | 120 | 0.10 | 12.00 | 0.00 |
| Durham | 270 | 80 | 75 | 0.10 | 7.50 | 600.00 |
| Wilmington | 420 | 230 | 40 | 0.10 | 4.00 | 920.00 |

3.

| | x (mi mark) | d (mi) | FG (tons) | BOM | f (ton/yr) | r ($/ton-mi) | w ($/mi) | TC ($/yr) | cum w | |
|---|---|---|---|---|---|---|---|---|---|---|
| NF | 190.002728 | | | | | | | 24105.5 | | |
| Asheville | 50 | 140.003 | 41 | | 41 | 1.00 | 41.00 | 5740.112 | 41.00 | |
| Asheville | 50 | 140.003 | | 0.5 | 90.5 | 0.20 | 18.10 | 2534.049 | 59.10 | |
| Statesville | 150 | 40.0027 | 28 | | 28 | 1.00 | 28.00 | 1120.076 | 87.10 | |
| Winston-Salem | 190 | 0.00273 | 40 | | 40 | 1.00 | 40.00 | 0.109106 | 127.10 | * |
| Durham | 270 | 79.9973 | 32 | | 32 | 1.00 | 32.00 | 2559.913 | 159.10 | |
| Raleigh | 295 | 104.997 | 22 | | 22 | 1.00 | 22.00 | 2309.94 | 181.10 | |
| Raleigh | 295 | 104.997 | | 1.5 | 271.5 | 0.20 | 54.30 | 5701.352 | 235.40 | |
| Wilmington | 420 | 229.997 | 18 | | 18 | 1.00 | 18.00 | 4139.951 | 253.40 | |
| Total | | | 181 | | | | 253.40 | | | |
| | | | | | | W/2= | 126.70 | | | |