TRANSIT ROUTE PLANNING CAI COURSE

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GENERAL INSTRUCTIONS

The course can be successfully run from a floppy drive. If desired, all the files may be copied to a directory (folder) on your hard drive.

Initiate the course by double-clicking the “T” icon in Windows Explorer or by double-clicking the name Caitran.exe in the File Manager (Windows 3.1). Alternatively, enter a:\Caitran.exe on the Run dialog box from either the Start Menu (Windows 95) or the Program Manager (Windows 3.1). Once initiated, chose a module by first selecting File Open from the course’s main menu.

Additional instructions are included within the modules.
Exhibits for Modules 1 and 2

EXHIBIT A

SOME TIME DEFINITIONS

layover
deadhead
pull-in
pull-out
revenue service

vehicle time
overtime
guarantee time
spread time

Revenue Hours

Platform Hours

Pay Hours
EXHIBIT B

CYCLE AND ROUND-TRIP TIME RELATIONSHIPS

\[ \begin{align*}
  RT & = \text{Round-trip time (minutes)} \\
  CT & = \text{Cycle time (minutes)} \\
  A & = \text{Layover as a fraction of round-trip time} \\
  LT & = \text{Layover time (minutes)} \\
  LT & = RT \times A \\
  A & = \frac{CT}{RT} - 1 \\
  RT & = \frac{CT}{1 + A} \\
  CT & = RT \times (1 + A)
\end{align*} \]

EXHIBIT C

INTERESTING RELATIONSHIPS

\[ \begin{align*}
  CT & = \text{Cycle time (minutes)} \\
  L & = \text{Length of route (route)} \\
  S & = \text{Average bus speed (miles per hour)} \\
  LT & = \text{Layover time (minutes)} \\
  PDH & = \text{Peak demand headway (minutes)} \\
  PPD & = \text{Peak point demand (riders)} \\
  LF & = \text{Maximum load factor} \\
  SC & = \text{Seating capacity (riders)} \\
  VC & = \text{Total vehicle capacity (riders)} \\
  NV & = \text{Number of vehicles} \\
  RC & = \text{Route capacity (riders)}
\end{align*} \]

\[ \begin{align*}
  NV & = \frac{CT}{H} \\
  CT & = (120 \times L/S) + LT \\
  PDH & = 60 \times LF \times SC \div PPD \\
  RC & = 60 \times VC \times NV \div CT
\end{align*} \]
EXHIBIT D

PERCEIVED TRAVEL TIMES

ACTIVITY

Time riding while sitting \( \times 1.0 \text{ minutes per actual minute} \)
Time riding while standing \( \times 3.0 \text{ minutes per actual minute} \)
Time walking \( \times 1.3 \text{ minutes per actual minute} \)
Time waiting \( \times 1.9 \text{ minutes per actual minute} \)
Time transferring \( \times 1.6 \text{ minutes per actual minute} \)
Initial wait \(+ 8.0 \text{ minutes penalty in addition to wait time} \)
Each transfer (regular) \(+ 24.0 \text{ minutes penalty in addition to transfer time} \)
Each transfer (timed) \(+ 10.0 \text{ minutes penalty in addition to transfer time} \)

EXHIBIT E

RUNNING TIME FORMULA

Bus time = automobile time
   \(+ \text{ number of stops} \times \frac{5}{12} \)
   \(+ \text{ number of riders} \div 12 \)

Note: Only count places where the bus actually stops.
Exhibits for Module 3

EXHIBIT A

COMMON FARE ELASTICITIES

<table>
<thead>
<tr>
<th>FARE CHANGE</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>FARE INCREASE</td>
<td>-0.34</td>
</tr>
<tr>
<td>FARE DECREASE</td>
<td>-0.37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CITY SIZE</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>POPULATION GREATER THAN 1 MILLION</td>
<td>-0.24</td>
</tr>
<tr>
<td>POPULATION 500,000 TO 1 MILLION</td>
<td>-0.30</td>
</tr>
<tr>
<td>POPULATION LESS THAN 500,000</td>
<td>-0.35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRANSIT MODE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS</td>
<td>-0.35</td>
</tr>
<tr>
<td>RAPID RAIL</td>
<td>-0.17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TIME PERIOD</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PEAK</td>
<td>-0.17</td>
</tr>
<tr>
<td>OFF-PEAK</td>
<td>-0.40</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>INCOME GROUP</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>LESS THAN $5,000 PER YEAR</td>
<td>-0.19</td>
</tr>
<tr>
<td>$5,000 TO $14,999 PER YEAR</td>
<td>-0.25</td>
</tr>
<tr>
<td>MORE THAN $15,000 PER YEAR</td>
<td>-0.28</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>AGE GROUP</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1 - 16 YEARS</td>
<td>-0.32</td>
</tr>
<tr>
<td>17-24 YEARS</td>
<td>-0.27</td>
</tr>
<tr>
<td>25-44 YEARS</td>
<td>-0.18</td>
</tr>
<tr>
<td>45-64 YEARS</td>
<td>-0.15</td>
</tr>
<tr>
<td>MORE THAN 65 YEARS</td>
<td>-0.14</td>
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</table>

<table>
<thead>
<tr>
<th>TRIP PURPOSE</th>
<th></th>
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<tbody>
<tr>
<td>WORK</td>
<td>-0.10</td>
</tr>
<tr>
<td>SCHOOL</td>
<td>-0.19</td>
</tr>
<tr>
<td>SHOPPING</td>
<td>-0.23</td>
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</tbody>
</table>
EXHIBIT B

ELASTICITY DEFINITIONS

SYMBOLS:

<table>
<thead>
<tr>
<th></th>
<th>CURRENT</th>
<th>FUTURE</th>
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</thead>
<tbody>
<tr>
<td>FARE</td>
<td>F1</td>
<td>F2</td>
</tr>
<tr>
<td>RIDERSHIP</td>
<td>R1</td>
<td>R2</td>
</tr>
</tbody>
</table>

POINT ELASTICITY, E:

E = \frac{(R_2 - R_1)/R_1}{(F_2 - F_1)/F_1}

ARC ELASTICITY, A:

A = \frac{(R_2 - R_1)/(R_1+R_2)/2}{(F_2 - F_1)/(F_1+F_2)/2}
EXHIBIT C

REGRESSION ANALYSIS

VERTICAL AXIS IS THE Y-AXIS; HORIZONTAL AXIS IS THE X-AXIS

Y = F(X)  (Y IS A FUNCTION OF X)

THAT IS, THE VALUE OF Y DEPENDS ON THE VALUE OF X

(● IS A DATA POINT, GRAPHED LINES REPRESENT TESTED EQUATIONS)

PEARSON CORRELATION COEFFICIENT, r:

\[ r = +1.0 \]

\[ r = +0.1 \]

\[ r = -1.0 \]

\[ r = -0.1 \]

R-SQUARE, \( R^2 \)

\[ R^2 = 1.0 \]

\[ R^2 = 0.01 \]