Overview

Information from the 1996 Juarez travel survey has been stored in four main databases:

1. On-board transit count
2. Household survey
3. Workplace/special generator survey
4. External station survey

The present Tech Memo summarizes the procedures developed for data editing and preliminary analysis of the External Station survey database.

Background

The purpose of the external station travel survey is to obtain information on travel behavior in and out of the transportation study area. External trips are those with an origin or destination or both outside the transportation study area, but that in a given moment are within the study area. External trips can be further characterized as external-local if either origin or destination is inside the study area, or external-external if both trip ends are outside, but passed through the study area. The external stations are the control points at which access roadways cross the study area boundary.

Under the current project, the study area was considered to be the Juarez urban area, and for practical modeling purposes only ground surface transportation was accounted as external travel.

The external station travel survey was conducted on weekdays (Tuesdays, Wednesdays and Thursdays) during the month of November of 1996, with the help of eight trained interviewers. The following describes the methodology used for the survey.

Survey procedure

Overall, the external station survey consisted in interviewing the driver of every \(i\)th passenger (or non-commercial) vehicle and every \(j\)th commercial vehicle passing through each external station, as well as every \(k\)th pedestrian if the external station happened to be an international crossing. Thus, three specific survey-forms were separately designed and used for each of these transportation modes.

At each external station, the selected vehicles (and pedestrians in the case of international crossings) where stopped briefly, to have a trained interviewer ask the survey questions and record the answers in the specially designed forms. Samples were drawn from both inbound and outbound directions of travel.

Due to budget and security constraints, the sampling was conducted only during a 12-hour period of the day (normally from 7:00AM to 7:00PM), along two days at each external station. Yet all external stations were surveyed. The target was that at least 10 samples per hour per direction should be obtained for each of the three generic transportation modes, and from each external station.

With the exception at international crossings, 24-hour vehicle counts were taken at the rest of the external stations in order to expand the data. Also manual vehicle classification counts were conducted at
these points to establish the percentage of vehicles by type entering and leaving the study area. Regarding the international crossings, it was decided that information on total traffic by mode could be obtained from border authorities of both countries.

External stations

External stations were located at each international crossing, as well as every highway with access to the city. The following 7 external stations were evaluated:

<table>
<thead>
<tr>
<th>External Station</th>
<th>Direction</th>
<th>Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Paso del Norte bridge</td>
<td>Outbound movement</td>
<td>Passenger vehicles, Pedestrians</td>
</tr>
<tr>
<td>2. Stanton bridge</td>
<td>Inbound movement</td>
<td>Passenger vehicles, Pedestrians</td>
</tr>
<tr>
<td>3. Bridge of the Americas</td>
<td>Both</td>
<td>All</td>
</tr>
<tr>
<td>4. Zaragoza Bridge</td>
<td>Both</td>
<td>All</td>
</tr>
<tr>
<td>5. Casas Grandes highway</td>
<td>Both</td>
<td>Vehicular traffic only</td>
</tr>
<tr>
<td>6. Chihuahua highway</td>
<td>Both</td>
<td>Vehicular traffic only</td>
</tr>
<tr>
<td>7. Porvenir highway</td>
<td>Both</td>
<td>Vehicular traffic only</td>
</tr>
</tbody>
</table>

Figure 1 shows the geographic location of the 7 external stations.

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1 Due to structural repairs, in 1996 commercial vehicles were allowed to use the Bridge of the Americas only if their total weight was less than 20 tons.
In an initial validation process, many of the surveys were found to be unusable due to missing or inconsistent information. But at the end 5,629 surveys at all external stations were approved for data entry, which included 1,635 pedestrians, 2,625 passenger vehicles, and 1,369 commercial trucks.

Database design

The external station database has the simplest design of those developed for the 1996 Juarez travel survey. Its base layout is formed just by a sole table named (Encuesta V_E), which includes 20 fields. As in the case of the other databases, the (Interseccion) table was added to provide details on geocode information. A general layout of the database and its fields is shown in Figure 2. A description of each of the fields is given in Appendix A.

![Database Layout](image)

Figure 2. External station survey database layout

The georeference information table is related to the survey table through the field int_int.

Edit checks

To identify logical or numerical errors or inconsistencies in the external station survey database, twenty-three different checks were developed using the powerful query capabilities of MS-Access. Table 1 provides a description of these checks. The checks were designed to run in 3 separate groups or stages to avoid excessive repetition of error detection. Queries for one group at a time were programmed, and until the detected records were edited, the next group queries were generated.
<table>
<thead>
<tr>
<th>Group</th>
<th>Serial</th>
<th>Description</th>
<th>Records detected</th>
<th>Records modified</th>
<th>Surveys erased</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ES-01</td>
<td>Surveys entered with invalid or unusual unique code.</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ES-02</td>
<td>Surveys entered with invalid or unusual date.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-03</td>
<td>Surveys entered with invalid or unusual station code.</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-04</td>
<td>Surveys entered with invalid or unusual direction code.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>ES-05</td>
<td>Surveys where origin intersection geocode appears in (Encuesta V_E) table, but in (Interseccion) table.</td>
<td>49</td>
<td>49</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-06</td>
<td>Surveys entered with invalid code for origin activity.</td>
<td>11</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-07</td>
<td>Surveys where destin intersection geocode appears in (Encuesta V_E) table, but not in (Interseccion) table.</td>
<td>14</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-08</td>
<td>Surveys entered with invalid or unusual trip purpose to destination.</td>
<td>18</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-09</td>
<td>Surveys entered with invalid or unusual vehicle model year.</td>
<td>13</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-10</td>
<td>Surveys entered with blank record for vehicle make.</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-11</td>
<td>Surveys with invalid or unusual code for fuel type.</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-12</td>
<td>Surveys with invalid or unusual code for vehicle classification.</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-13</td>
<td>Surveys with blank record for U.S. state license plates.</td>
<td>56</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-14</td>
<td>Surveys with invalid or unusual record for number of occupants in vehicle.</td>
<td>55</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-15</td>
<td>Surveys with invalid or unusual code for mode of transportation to border crossing (only pedestrians).</td>
<td>9</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-16</td>
<td>Surveys with invalid or unusual code for mode of transportation from border crossing (only pedestrians).</td>
<td>12</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-17</td>
<td>Surveys with invalid or unusual code for international bridge used to cross into Mexico.</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-18</td>
<td>Surveys with invalid or unusual code for the international bridge to be used to cross into the U.S.</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>ES-19</td>
<td>Surveys of commercial vehicles with illogical code for trip purpose.</td>
<td>24</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-20</td>
<td>Surveys of non-commercial vehicles or pedestrians with illogical code for trip purpose.</td>
<td>118</td>
<td>118</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-21</td>
<td>Surveys that were made outside the designated time (7:00 am – 7:00 pm).</td>
<td>214</td>
<td>81</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-22</td>
<td>Surveys with null time.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ES-23</td>
<td>Surveys with invalid code for mode.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Using these queries, the errors and inconsistencies detected were corrected. Quite similar to the workplace survey, many of the errors were originated at the time of electronic data entry (input typos) where the system did not have a validation rule from its design, and very few of the errors detected were inconsistencies registered in the field. Again this was probably the result of having a team of trained personnel conducting the travel interviews, instead of school children.
Preliminary summary of travel behavior

Table 2 presents the resulting surveys and total daily traffic obtained under each external station and for each mode. As previously mentioned, traffic data at the bridges was originally scheduled to be obtained from border authorities of both countries. After several failed attempts to acquire this information from them, the IMIP team had to rely on annual traffic data provided by the MPO in El Paso, and shown in detail in Appendix B. This information was then converted to average daily traffic. The traffic data at access highways was obtained through actual 24-hour counts.

Table 2. General survey distribution at external stations

<table>
<thead>
<tr>
<th>Station No.</th>
<th>Facility</th>
<th>Mode</th>
<th>Direction</th>
<th>24-Hr vol data source</th>
<th>24-Hr Volume</th>
<th>Usable Surveys</th>
<th>Percent Surveyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Paso del Norte International Bridge</td>
<td>Pedestrians</td>
<td>Outbound</td>
<td>MPO</td>
<td>9,501</td>
<td>293</td>
<td>3.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>MPO</td>
<td>IMIP estimation</td>
<td>5,900</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passenger</td>
<td>Outbound</td>
<td>MPO</td>
<td>11,931</td>
<td>80</td>
<td>0.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>Not allowed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commercial</td>
<td>Outbound</td>
<td>Not allowed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inbound</td>
<td>Not allowed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Stanton International Bridge</td>
<td>Pedestrians</td>
<td>Outbound</td>
<td>Not allowed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>MPO</td>
<td>3,602</td>
<td>288</td>
<td>8.0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passenger</td>
<td>Outbound</td>
<td>Not allowed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>MPO</td>
<td>6,138</td>
<td>330</td>
<td>5.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commercial</td>
<td>Outbound</td>
<td>Not allowed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inbound</td>
<td>Not allowed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bridge of the Americas</td>
<td>Pedestrians</td>
<td>Outbound</td>
<td>MPO</td>
<td>1,936</td>
<td>300</td>
<td>15.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>MPO</td>
<td>IMIP estimation</td>
<td>2,658</td>
<td>209</td>
<td>7.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passenger</td>
<td>Outbound</td>
<td>MPO</td>
<td>21,550</td>
<td>471</td>
<td>2.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>IMIP estimation</td>
<td>28,200</td>
<td>342</td>
<td>1.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commercial</td>
<td>Outbound</td>
<td>MPO</td>
<td>868</td>
<td>291</td>
<td>43.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inbound</td>
<td>IMIP estimation</td>
<td>842</td>
<td>164</td>
<td>19.5%</td>
</tr>
<tr>
<td>4</td>
<td>Zaragoza International Bridge</td>
<td>Pedestrians</td>
<td>Outbound</td>
<td>MPO</td>
<td>921</td>
<td>276</td>
<td>30.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>MPO</td>
<td>199</td>
<td>269</td>
<td>135.2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passenger</td>
<td>Outbound</td>
<td>MPO</td>
<td>7,891</td>
<td>174</td>
<td>2.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>MPO</td>
<td>7,034</td>
<td>358</td>
<td>5.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commercial</td>
<td>Outbound</td>
<td>MPO</td>
<td>952</td>
<td>279</td>
<td>29.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inbound</td>
<td>MPO</td>
<td>778</td>
<td>265</td>
<td>34.1%</td>
</tr>
<tr>
<td>5</td>
<td>Casas Grandes Highway</td>
<td>Passenger</td>
<td>Outbound</td>
<td>site count</td>
<td>824</td>
<td>110</td>
<td>13.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>site count</td>
<td>569</td>
<td>127</td>
<td>22.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Commercial</td>
<td>site count</td>
<td>217</td>
<td>87</td>
<td>40.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inbound</td>
<td>119</td>
<td>34</td>
<td>28.6%</td>
</tr>
<tr>
<td>6</td>
<td>Chihuahua Highway</td>
<td>Passenger</td>
<td>Outbound</td>
<td>site count</td>
<td>2,873</td>
<td>110</td>
<td>3.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>site count</td>
<td>2,071</td>
<td>177</td>
<td>8.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Commercial</td>
<td>site count</td>
<td>800</td>
<td>72</td>
<td>9.0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inbound</td>
<td>site count</td>
<td>683</td>
<td>109</td>
<td>16.0%</td>
</tr>
<tr>
<td>7</td>
<td>Porvenir Highway</td>
<td>Passenger</td>
<td>Outbound</td>
<td>site count</td>
<td>4,110</td>
<td>159</td>
<td>3.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>site count</td>
<td>3,936</td>
<td>187</td>
<td>4.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Commercial</td>
<td>site count</td>
<td>392</td>
<td>19</td>
<td>4.8%</td>
</tr>
</tbody>
</table>

To establish if the trips at the external stations were local or through, trip ends outside of the study area were geocoded as follows:

- External trip end (within El Paso area)  
  - Trip end geocode
  - El Paso/Northwest area 15726
  - El Paso/North area 15727
  - El Paso/Central area 15728
  - El Paso/East area 15729
  - El Paso/Southeast area 15730
Thus, Table 3 shows the resulting percentage of External-Local and External-External trips identified from the survey at each station. In addition, the table disaggregates by mode, and by direction of traffic flow.

Table 3. Estimated percentage of External-Local and External-External Trips by Stations

<table>
<thead>
<tr>
<th>Station No.</th>
<th>Facility</th>
<th>Mode</th>
<th>Direction</th>
<th>% E-L</th>
<th>% E-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Paso del Norte International Bridge</td>
<td>Pedestrians</td>
<td>Outbound</td>
<td>79.9%</td>
<td>20.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inbound</td>
<td>no surveys</td>
<td>no surveys</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passenger Vehicles</td>
<td>Outbound</td>
<td>97.5%</td>
<td>2.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commercial Vehicles</td>
<td>Outbound</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Stanton International Bridge</td>
<td>Pedestrians</td>
<td>Outbound</td>
<td>98.6%</td>
<td>1.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>98.6%</td>
<td>1.4%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passenger Vehicles</td>
<td>Outbound</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>95.8%</td>
<td>4.2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commercial Vehicles</td>
<td>Outbound</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bridge of the Americas</td>
<td>Pedestrians</td>
<td>Outbound</td>
<td>91.7%</td>
<td>8.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>97.6%</td>
<td>2.4%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passenger Vehicles</td>
<td>Outbound</td>
<td>90.9%</td>
<td>9.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>86.0%</td>
<td>14.0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commercial Vehicles</td>
<td>Outbound</td>
<td>97.6%</td>
<td>2.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>91.5%</td>
<td>8.5%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Zaragoza International Bridge</td>
<td>Pedestrians</td>
<td>Outbound</td>
<td>87.3%</td>
<td>12.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>97.0%</td>
<td>3.0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passenger Vehicles</td>
<td>Outbound</td>
<td>94.8%</td>
<td>5.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>91.3%</td>
<td>8.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commercial Vehicles</td>
<td>Outbound</td>
<td>82.4%</td>
<td>17.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>78.9%</td>
<td>21.1%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Casas Grandes Highway</td>
<td>Passenger Vehicles</td>
<td>Outbound</td>
<td>87.3%</td>
<td>12.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>83.5%</td>
<td>16.5%</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Commercial Vehicles</td>
<td>Outbound</td>
<td>72.4%</td>
<td>27.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>88.2%</td>
<td>11.8%</td>
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</tr>
<tr>
<td>6</td>
<td>Chihuahua Highway</td>
<td>Passenger Vehicles</td>
<td>Outbound</td>
<td>76.4%</td>
<td>23.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>73.4%</td>
<td>26.6%</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Commercial Vehicles</td>
<td>Outbound</td>
<td>77.8%</td>
<td>22.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>78.9%</td>
<td>21.1%</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Porvenir Highway</td>
<td>Passenger Vehicles</td>
<td>Outbound</td>
<td>93.1%</td>
<td>6.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>92.0%</td>
<td>8.0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commercial Vehicles</td>
<td>Outbound</td>
<td>94.7%</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inbound</td>
<td>93.9%</td>
<td>6.1%</td>
<td></td>
</tr>
</tbody>
</table>
By expanding the survey data to the total daily traffic volume, Table 4 summarizes the estimated total daily trips passing through each external station, characterized as External-Local and External-External. Vehicle occupancy was established also from the survey information in order to convert vehicle trips to person trips. Unfortunately due to a form design error, the surveys for commercial vehicles failed to ask for number of occupants on the vehicle, thus an additional sample of trucks at two of the external stations was recently taken just to establish their overall vehicle occupancy. As a result, all commercial vehicles at all external stations show the same value of 1.100 (in red) for vehicle occupancy.

Table 4. Estimated External-Local and External-External Daily Trips by Stations

<table>
<thead>
<tr>
<th>Station No.</th>
<th>Facility</th>
<th>Mode</th>
<th>Direction</th>
<th>VEHICLE TRIPS</th>
<th>VEHICLE OCCUPANCY</th>
<th>PERSON TRIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E-L</td>
<td>E-E</td>
<td>E-L</td>
</tr>
<tr>
<td>1</td>
<td>Paso del Norte</td>
<td>Pedestrians</td>
<td>Outbound</td>
<td></td>
<td></td>
<td>7,588</td>
</tr>
<tr>
<td></td>
<td>International Bridge</td>
<td>Inbound</td>
<td></td>
<td></td>
<td></td>
<td>4,712</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passenger</td>
<td>Outbound</td>
<td></td>
<td></td>
<td>11,633</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>N/A</td>
<td>N/A</td>
<td>2,128</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>24,754</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commercial</td>
<td>Outbound</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Stanton</td>
<td>Pedestrians</td>
<td>Outbound</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>International Bridge</td>
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<td></td>
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<td>3,552</td>
</tr>
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<td></td>
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<td>Vehicles</td>
<td>Inbound</td>
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<td>12,948</td>
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<tr>
<td></td>
<td></td>
<td>Commercial</td>
<td>Outbound</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Bridge of the</td>
<td>Pedestrians</td>
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<tr>
<td></td>
<td>Americas</td>
<td>Inbound</td>
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<td></td>
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<td>1,734</td>
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<td>Passenger</td>
<td>Outbound</td>
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<td></td>
<td>24,242</td>
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<td>Vehicles</td>
<td>Inbound</td>
<td>1,833</td>
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<td></td>
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<td>44,436</td>
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<tr>
<td></td>
<td></td>
<td>Commercial</td>
<td>Outbound</td>
<td>652</td>
<td>16</td>
<td>1,100</td>
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<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>770</td>
<td>72</td>
<td>1,100</td>
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<tr>
<td></td>
<td>Zaragoza</td>
<td>Pedestrians</td>
<td>Outbound</td>
<td></td>
<td></td>
<td>7,483</td>
</tr>
<tr>
<td></td>
<td>International Bridge</td>
<td>Inbound</td>
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<td></td>
<td></td>
<td>1,800</td>
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<td>Passenger</td>
<td>Outbound</td>
<td></td>
<td></td>
<td>6,425</td>
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<tr>
<td></td>
<td></td>
<td>Vehicles</td>
<td>Inbound</td>
<td>1,960</td>
<td>3,032</td>
<td>12,933</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>12,933</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commercial</td>
<td>Outbound</td>
<td>785</td>
<td>167</td>
<td>1,100</td>
</tr>
<tr>
<td></td>
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<td>Vehicles</td>
<td>Inbound</td>
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<tr>
<td></td>
<td>Casas Grandes</td>
<td>Pedestrians</td>
<td>Outbound</td>
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<td>Highway</td>
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<td>Inbound</td>
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<td>14</td>
<td>1,100</td>
</tr>
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<td></td>
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<td></td>
<td>6,086</td>
</tr>
<tr>
<td></td>
<td>Porvenir</td>
<td>Pedestrians</td>
<td>Outbound</td>
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<td>3,826</td>
</tr>
<tr>
<td></td>
<td>Highway</td>
<td>Inbound</td>
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<td></td>
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<td>2,020</td>
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<td>Outbound</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Daily trips at</td>
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</tr>
<tr>
<td></td>
<td>international crossings</td>
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</tr>
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<td>1,861</td>
</tr>
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<td>166,477</td>
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<td>Daily trips at</td>
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</tr>
<tr>
<td></td>
<td>highways</td>
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<td>Total daily trips at</td>
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</tr>
<tr>
<td></td>
<td>external stations</td>
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<td>1,898</td>
</tr>
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<td></td>
<td></td>
<td>196,683</td>
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</tbody>
</table>

Concluding remarks

A couple of quick observations can be made from these tables. The first one is that people movement tends to be more intense at the international crossings than at the highways. More so at those crossings near
the central cores of both Juarez and El Paso (Paso del Norte, Stanton, and Americas bridges). Combined, person travel at the international crossings is more than five times the person travel at the highways. This is not totally new based on previous counts. Besides, the proximity of the border cities intuitively would appear to have travel patterns between them of more of an urban nature. The interesting result though is the proportion of external-local trips to through trips of about six times, which was previously unknown or at least undocumented.

Finally, according to the preliminary results obtained from the household survey, external trips represent between 10 and 15% of the total daily person travel taking place in study area. Again, most of it occurring at the international crossings. Since most of the external trips at the international crossings are in fact trips to or from the El Paso urban area, further research should consider both El Paso and Juarez together as a broader study area for regional transportation analyses, and to characterize the travel interaction between the two border cities.
Appendix A

External Station Survey database. Component tables and description of fields.
<table>
<thead>
<tr>
<th>NO.</th>
<th>ENCUENTRA V_E</th>
<th>MODE</th>
<th>FECHA</th>
<th>ESTACION</th>
<th>SENTIDO</th>
<th>HORA</th>
<th>VEH CARGA</th>
<th>GAS</th>
<th>MARCA</th>
<th>AÑO</th>
<th>OCUP AUTO</th>
<th>INT ORI</th>
<th>ACT ORI</th>
<th>MODE ORI</th>
<th>INT DES</th>
<th>ACT DES</th>
<th>MODE DES</th>
<th>PLACAS</th>
<th>PTE USO</th>
<th>PTE_USARA</th>
<th>RELATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Encuesta V_E</td>
<td>MODE</td>
<td>FECHA</td>
<td>ESTACION</td>
<td>SENTIDO</td>
<td>HORA</td>
<td>VEH CARGA</td>
<td>GAS</td>
<td>MARCA</td>
<td>AÑO</td>
<td>OCUP AUTO</td>
<td>INT ORI</td>
<td>ACT ORI</td>
<td>MODE ORI</td>
<td>INT DES</td>
<td>ACT DES</td>
<td>MODE DES</td>
<td>PLACAS</td>
<td>PTE USO</td>
<td>PTE_USARA</td>
<td>Int_Int (Tbl Interseccion)</td>
</tr>
<tr>
<td>2</td>
<td>Int_Calle1</td>
<td>Int_Calle1 Name of street 1</td>
<td>Int_Calle2 Name of street 2 (intersecting street 1)</td>
<td>AGENB AGENB (census zone) where the intersection is located</td>
<td>int_clavenodo Transcad node code for the intersection</td>
<td>int_coloniia Subdivision where the intersection is located</td>
<td>Int Int (Tbl Encuesta V_E)</td>
<td>Int Ori Int Des (Tbl Encuesta V_E)</td>
<td>Int_Int (Tbl Interseccion)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Appendix B

### 1996 northbound crossings (source: MPO)

<table>
<thead>
<tr>
<th>International bridge</th>
<th>Pedestrians</th>
<th>Pax vehicles</th>
<th>Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paso del Norte</td>
<td>3,467,912</td>
<td>4,354,826</td>
<td>-</td>
</tr>
<tr>
<td>Stanton</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bridge of the Americas</td>
<td>706,702</td>
<td>7,865,798</td>
<td>243,744</td>
</tr>
<tr>
<td>Zaragoza</td>
<td>336,086</td>
<td>2,880,218</td>
<td>347,562</td>
</tr>
</tbody>
</table>

**ALL BRIDGES: 4,510,700 15,100,842 591,306**

### 1996 southbound crossings (source: MPO)

<table>
<thead>
<tr>
<th>International bridge</th>
<th>Pedestrians</th>
<th>Pax vehicles</th>
<th>Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paso del Norte</td>
<td>not available</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stanton</td>
<td>1,314,558</td>
<td>2,240,567</td>
<td>-</td>
</tr>
<tr>
<td>Bridge of the Americas</td>
<td>not available</td>
<td>not available</td>
<td>not available</td>
</tr>
<tr>
<td>Zaragoza</td>
<td>72,751</td>
<td>2,567,362</td>
<td>284,019</td>
</tr>
</tbody>
</table>

**ALL BRIDGES: Not available, but assumed equal to northbound traffic**

### Estimated 1996 southbound crossings *

<table>
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<th>International bridge</th>
<th>Pedestrians</th>
<th>Pax vehicles</th>
<th>Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paso del Norte**</td>
<td>2,153,354</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stanton</td>
<td>1,314,558</td>
<td>2,240,567</td>
<td>-</td>
</tr>
<tr>
<td>Bridge of the Americas</td>
<td>970,037</td>
<td>10,292,913</td>
<td>307,287</td>
</tr>
<tr>
<td>Zaragoza</td>
<td>72,751</td>
<td>2,567,362</td>
<td>284,019</td>
</tr>
</tbody>
</table>

**ALL BRIDGES: 4,510,700 15,100,842 591,306**

* Estimated traffic volumes in red.
** Difference of Paso del Norte Northbound - Stanton Southbound.