designing affordable housing out of shipping containers for cuidad juarez, mexico
maquiladoras + Cuidad Juarez

- lack of housing and facilities
- 40% in poverty

MAQUILA EMPLOYMENT

<table>
<thead>
<tr>
<th>BORDER CITY (N° MAQUILA JOBS)</th>
<th>MAQUILAS</th>
<th>JOBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tijuana (159,092)</td>
<td>914</td>
<td>252,922</td>
</tr>
<tr>
<td>Mexical (54,747)</td>
<td>409</td>
<td>311,187</td>
</tr>
<tr>
<td>Cd. Juarez (1,416)</td>
<td>217</td>
<td>93,852</td>
</tr>
<tr>
<td>Nogales (30,437)</td>
<td>273</td>
<td>125,587</td>
</tr>
<tr>
<td>Laredo (20,729)</td>
<td>860</td>
<td>377,907</td>
</tr>
<tr>
<td>Matamoros (52,581)</td>
<td>158</td>
<td>56,592</td>
</tr>
</tbody>
</table>

SOURCE: TWIN PLANT NEWS 1996
shipping containers

- 17 million empty containers worldwide
- 700,000 empty containers in the U.S.
goals + objectives

• improve the standard of living of *maquiladoras* workers in Ciudad Juárez by providing an affordable and desirable housing

• create a safe and pleasant community

• provide dignity and choice to residents of the community

• create a sense of pride and ownership for residents of the community

• provide comfortable living spaces that protect the inhabitants from the harsh environment
methodology

research sub-groups
- site planning
- space planning

design sub-groups
- structural
- civil
- mechanical/
- electrical/
- plumbing
- sociology
- marketing
- cost analysis

final solution
- east site
- north site
- west site
- south site
- 200 m x 300 m site study
West + South site studies

- to create courtyard spaces that would allow each unit to have access to more private outdoor space
- Provide a variety of different sized housing options
- Create an aesthetic that disguises the idea of ‘shipping containers’

West site: 4 unit types, 130 Units, 530 people

South site: 2 unit types, 352 units, 1408 people
north + east site studies

• Vehicular corridors restrained to site’s perimeter
• Security gained by visibility
• Maximum of four containers tall
• Incorporation of potential commercial activity within site
• Adaptability to similar situations around the world
• Accommodation of culture in the physical environment

East site: 100m x 100m, 3 unit types,
111 Units, 555 people, 555 people/ hectare

North site: 100m x 100m, 2 unit types,
512 units, 2,560 people, 2,560 people / hectare
Final site: 200m x 300m, 3 unit types,
1,773 units, 8,865 people, 1,478 people / hectare
unit types

Proposed Unit Plan A
shell: 8 ft. x 40 ft. modified shipping container

Proposed Unit Plan B
shell: 8 ft. x 40 ft. modified shipping container
Proposed double-unit plan

shell: 2 - 8 ft. x 40 ft. modified shipping containers
cost
shipping container as structure

- Rigid steel frame, primary load bearing component
- Concrete foundations required
cob as thermal insulation

- Low thermal conductivity (0.6 W/m*K) compared to steel (50 W/m*K)
- High thermal mass
- A natural resource
mechanical system

- Heating and Cooling loads:

<table>
<thead>
<tr>
<th>Building Orientation</th>
<th>Cooling Load (Btu/hr)</th>
<th>Heating Load (Btu/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North-South</td>
<td>10,000</td>
<td>15,000</td>
</tr>
<tr>
<td>East-West</td>
<td>15,000</td>
<td>15,000</td>
</tr>
</tbody>
</table>

- PTAC, heats and cools
mechanical system

PROPOSED MEP DISTRIBUTION

MECHANICAL
INDIVIDUALLY CONTROLLED HEAT & A. C.

ELECTRICAL
COMMON RISER SYSTEM WITH BRANCH CIRCUIT SYSTEM

PLUMBING
COMMON SHARED RISER SYSTEM FOR WATER, WASTE AND VENTS
addressing the cultural needs

- Provide recreational, spiritual and practical areas
- Tailor cost to the average income
- Keep safety and security in mind
questions?