Chengdu-Nanchong Expressway
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Overview

• Magnitudes & Project Description
  – Specifications
• Project Cost and Financing
  – Toll Fees
• Technical Issues and Innovations
• Social Problems and Policy Challenges
• Social and Economic Benefits
• Current Status of Expressway
Magnitudes

- **Location**: Sichuan province, China
- **4 lane highway**: links the provincial capital, Chengdu to Nanchong, a major commercial center
- **Length**: 215 kilometer (208 km)
- **Timescale**: Built from January 11, 1999 to December 23, 2002
  - Opened in December 2002, 6 months ahead of schedule
Location

Chengdu

Nanchong
Consists of...

- 18 km - six lane expressway
- 190 km - 4 lane expressway
- 41 large bridges
- 134 medium-small bridges
- 14 interchanges
- 1069 culverts & underpasses
- 2 tunnels
- 85 pedestrian overpasses
## Project Cost & Financing Plan

### Cost Estimates

<table>
<thead>
<tr>
<th>Item</th>
<th>Foreign</th>
<th>Local</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exchange</td>
<td>Currency</td>
<td>Cost</td>
</tr>
<tr>
<td><strong>A. Base Cost</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Expressway Civil Works</td>
<td>211.0</td>
<td>235.5</td>
<td>446.5</td>
</tr>
<tr>
<td>2. Expressway Equipment</td>
<td>24.0</td>
<td>-</td>
<td>24.0</td>
</tr>
<tr>
<td>3. County and Village Access Roads</td>
<td>9.0</td>
<td>21.0</td>
<td>30.0</td>
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<tr>
<td>4. Land Acquisition and Resettlement</td>
<td>-</td>
<td>32.2</td>
<td>32.2</td>
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<tr>
<td>5. Consulting Services and Training</td>
<td>1.2</td>
<td>6.6</td>
<td>7.8</td>
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<tr>
<td><strong>Subtotal (A)</strong></td>
<td>245.2</td>
<td>295.3</td>
<td>540.5</td>
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<tr>
<td><strong>B. Contingencies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Physical Contingencies</td>
<td>19.5</td>
<td>23.7</td>
<td>43.3</td>
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<tr>
<td>2. Price Escalation</td>
<td>19.2</td>
<td>21.9</td>
<td>41.1</td>
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<tr>
<td><strong>Subtotal (B)</strong></td>
<td>38.8</td>
<td>45.6</td>
<td>84.4</td>
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<td><strong>C. Interest During Construction</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>317.0</td>
<td>350.2</td>
<td><strong>667.2</strong></td>
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</tbody>
</table>

### Financing Plan

<table>
<thead>
<tr>
<th>Source</th>
<th>Foreign</th>
<th>Local</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
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<td>Exchange</td>
<td>Currency</td>
<td>Cost</td>
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<tr>
<td>Bank</td>
<td>250.0</td>
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<td>250.0</td>
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<tr>
<td>MOC</td>
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<td>180.0</td>
<td>180.0</td>
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<tr>
<td>SDB</td>
<td>-</td>
<td>60.0</td>
<td>60.0</td>
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<tr>
<td>SPG</td>
<td>67.0</td>
<td>110.2</td>
<td>177.2</td>
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<tr>
<td><strong>Total</strong></td>
<td>317.0</td>
<td>350.2</td>
<td><strong>667.2</strong></td>
</tr>
</tbody>
</table>

MOC=Ministry of Communications; SDB=State Development Bank; SPG = Sichuan Provincial Government
Project Cost & Financing Plan

• Project Cost: $772.2 million
  – (Estimate $667.2 million increase 15.7%)
    • Asian Development Bank: 250 million
    • Ministry of communication: 141 million
    • China Development Bank: 69 million
    • China Construction Bank: 97 million
    • Sichuan Provincial Government: 215.2 million
Public Private Partnership

- Owner: Sichuan Chengnan Expressway co,. Ltd & Government
- 30 years toll free
- $0.05 /ton-kilometer,
  ~$360,000/day
- 9,750 vehicles /day 2008
- 34,600 vehicles /day 2023
- Annual maintenance: 10 million
Technical Issues/Innovations

- Rock Slope Stability
  - Landslides
  - 175 small to large bridges.
  - Reduction of earth pressure and horizontal displacement of abutment with reinforcement filling.
  - Geo grid reinforcement and filling.
  - In-situ stress studies.
Technical Issues/Innovations cont.

Fengdian High Cutting Slope
- 78.5 meters high and 320 meters long
- Mix of purplish red mudstone and grey-brown sandstone
- Stability and support method critical to success of expressway.
- Layers of stone creates possibility of sliding and shearing.
- Retainage at foot with anchoring and bolting at top.
Technical Issues/Innovations cont.

- **Stone Matrix Asphalt (SMA)**
  - Stone on Stone contact to reduce deformation.
  - Better-defined large aggregate skeleton
  - Used in high volume interstates.
  - Higher deformation (rutting) resistance.
  - Higher wet weather friction.
  - Lower tire noise.
  - Designed to last 15 years.
  - Temp. (-3.8°C-37.5°C).
  - Rain (890-10000mm).
  - Initially more expensive but cost-effective in long run.
Social Problems

- Projected increase in traffic along expressway
- Relocation of 17,500 people
- Risk of socially transmitted diseases
Policy Challenges

- **Land acquisition and resettlement**
  - 17,500 people along expressway relocated
  - 188,000 people experienced secondary relocation
  - SPCD to ensure standards of living of relocated people is the same
Policy Challenges

- Wanted to make tolls as high as possible but...
  - Needed to go through:
    - Price Bureau
    - Finance Department
    - SPCD (Sichuan Provincial Communications Department)
  - Criteria for decision:
    - Standard of road
    - Total construction and maintenance costs
    - Traffic volumes
    - Social impact (affordability of toll rates)
  - Tolls are high in relation to nearby expressways

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Chengdu-Nanchong Expressway ( \approx ) 0.04</th>
<th>Chengdu-Mianyang Expressway ( \approx ) 0.09</th>
<th>Chengdu-Chongqing Expressway ( \approx ) 0.28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Passenger Vehicle</td>
<td>0.35</td>
<td>0.30</td>
<td>0.32</td>
</tr>
<tr>
<td>Medium Passenger Vehicle</td>
<td>0.70 ( \approx ) 0.09</td>
<td>0.60</td>
<td>0.64</td>
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<tr>
<td>Large Passenger Vehicle/Small Truck</td>
<td>1.20 ( \approx ) 0.15</td>
<td>1.08</td>
<td>1.28</td>
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<tr>
<td>Medium Truck</td>
<td>2.30 ( \approx ) 0.28</td>
<td>2.02</td>
<td>2.40</td>
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<tr>
<td>Large Truck</td>
<td>3.80 ( \approx ) 0.46</td>
<td>3.19</td>
<td>4.00</td>
</tr>
<tr>
<td>Trailer</td>
<td>4.80 ( \approx ) 0.58</td>
<td>4.46</td>
<td>5.00</td>
</tr>
</tbody>
</table>

USD

Some of the tolls by vehicle type are not directly equivalent as these are based on slightly different vehicle categories.

Proposed toll rates in 1998 prices.

Expected to be reviewed by 31 December 1998.
Social Benefits

• Reduce poverty in Nanchhong
  → residents benefit from improved access to markets and social services
• Lowered cost of road transport
• Less traffic congestion
  → Saves time
  → Saves on vehicle operating costs for existing and generated traffic
  → Less accidents
• Shorter route (2 hours compared with 6 hours before)
  → Transport operators and bus passengers who travelled the expressway
  → inhabitants of villages and townships along the county road
Economic Benefits

• An economic growth project

• Previously: 1.7 million poor in Nanchong

• Reduce poverty in inland Sichuan provinces
  – Road infrastructure in Chengdu-Nanchong area
  – Access to poor communities and disadvantaged areas
  – Strengthened institutions for:
    • Highway operation & maintenance
    • Traffic safety
    • Quality assurance
    • Enterprise reform
    • Social impact evaluation
    • Environmental monitoring and mitigation measures
Economic Benefits

• Company advertisements on road makes $

• Expressway opening impacted Nanchong by:
  – urban development:
    • Total number of urban citizens increased from 0.84 million in 1997 to 1.51 million in 2004
  – investment increased:
    • 1,230 projects financed by external funds in 2003
    • Fixed-asset investment increased from CNY1.22 bill ≈ USD 147.4 mill in 1997 to CNY11.5 billion ≈ USD 1.39 bill in 2004
  – tourism developed rapidly:
    • 3.98 million tourists visited Nanchong in 2004, 22% more than the previous year
Current Status of Expressway

- The condition of the expressway as of 2005 was good
- The pavement did not deteriorate, drainage is worked well, and structures were sound
- An adequate maintenance plan is in effect and safety measures are adequate
- Project is rated **successful** (close to lower limit of the highly successful rating). It is assessed as:
  - highly relevant, effective, efficient
  - and likely to be sustainable
- No issues that could downgrade the project assessment are foreseen