Introduction
A Colombian nonprofit organization approached our university to develop a design for a shelter that would house about 40 at-risk children and protect them from a widespread cycle of poverty and crime. The project was assigned to a civil engineering capstone team.

The client provided a sketch of the vision of the shelter
- Two story structure with about 400 sq.m/ floor
- Optional basement with laundry/storage facilities

Knowledge and Skills Gained
- Technical expertise
  - Working knowledge of American Concrete Institute 318 code, Colombian building code NRS-10.
  - Effective use of various design software: SAP2000®, spcolumn®, Autodesk Revit®.
- Communication and Collaboration
  - Honing Public speaking and technical writing skills.
  - Interpersonal communication with an international client, professional engineers, architect.
  - Working in a virtual environment.
- Professional skills
  - Project Management skills: running meetings, preparing meeting agenda, following up on action items, scheduling and professional responsibility.
  - Ability to be team players.
  - Exposure to economic and social issues .
  - Appreciation for human-centered engineering, public safety and welfare.

Design Approach and Deliverables

Phase 1: Team met with a US architect to refine the client’s vision so the facility could meet all functional requirements; the team developed architectural drawings and renderings using the software Autodesk Revit®

Phase 2: Team researched applicable design codes/standards as well as construction materials and practices in Colombia.
- Reinforced concrete frames with masonry infills is local practice.
- Design to withstand earthquake forces.
- Design to follow Colombian and US design codes.

Phase 3: Team selected concrete moment resisting frames for consistency with local practice; they calculated gravity and earthquake forces; carried out structural analyses and developed engineering design which consisted of sizing structural members and reinforcement requirements and details.

Phase 4: Team recommended sustainable features for the shelter based on favorable environmental conditions: solar panels, wind turbine, rainwater harvesting; prepared a fly-through video of the shelter for marketing use.

Safety, Health and Welfare
- Goal is to provide a safe haven for at-risk children who are victims of a humanitarian crisis.
- Located in a region of intermediate seismic risk, shelter had to be earthquake resistant.
- In case of emergency, building had to have proper entry and egress, and also provide a minimum 1-hour fire rating.

Benefit to Owner
Drawings and Flythrough video will be helpful for fundraising efforts for the shelter.