

Name of Architect: Arshad Abdulla (late)
M/s Arshad Shahid Abdulla (Pvt) Ltd.

Name of Project: TCF Schools Project,
Address: various earth quake rural areas and squatter
arrangements of Azad Kashmir & North West
Frontier Province of Pakistan.

Name of Client: The Citizens Foundation.
Address: 7th floor, NIC building,
Abassi Shaheed Road, Karachi.

Photography: Atif Ashraf

Date of Commencement and Completion: 2007 – 27 schools completed to date.

Total covered area of Project: Primary school Unit: 6500 Sq.ft

Total Cost of Project (each unit): US\$: 130,000 to 150,000

The Citizen's Foundation is a professionally managed, not-for profit organization working to provide education to the underprivileged children of Pakistan. It has built over 650 school units in dense urban and remote areas spanning over the four provinces of Pakistan. These schools, categorized as primary and secondary units, are built within a limited budget. In 2006 after Earth Quake hit the northern areas of Pakistan, TCF decided to build seismic designed Earth Quake resistant schools in that part of Pakistan.

Common facilities include an administrative block, staff room, library, art room, a guardroom and separate washrooms for boys, girls and staff members. Provisions have been made for a canteen with separate playgrounds for children.

The primary school unit consists of 6 classrooms in a Ground &/or G+1 structures. Common spatial and design features listed below are conducive to children's requirements and link the school to its context:

- Patio based/open plan considering the climatic orientation with adequate circulation spaces.
- Rhythm of windows, c.c. grooves, chakwal stone cladding and strips ties the complex visually.
- Economical local materials such as chakwal stone, c.c. plain tiles and c.c. and mosaic flooring are used.
- External & Internal finish with wood fiber cement board. This board is a weather, fire resistant and is heat as well as sound insulation characteristics. It is also asbestos free. There is no health hazardous contents.
- Sheesham is used for classroom furniture. Windows and ventilators are made in local available wood.
- The color scheme throughout the complex is responsive to child psychology.
- Light Gauge steel structure framing, Aluzinc Coated steel roof & ceiling sheets along with expanded polystyrene sand-witched on walls & roof.

The Citizens Foundation (TCF) in Pakistan is one of Asia's largest educational organizations. It builds and runs primary and secondary schools. These are purpose-built facilities located in urban slums as well as rural areas. TCF also has a teacher training centre currently providing entry-level training to about 350 teachers annually and developmental training to about over 1,600 teachers during summer vacations. By 2015, TCF plans to set up 1,000 school units providing education to over 360,000 students.

All TCF schools built in earthquake affected areas are purpose-built structures with essential facilities like sewerage, electricity, play areas, etc. constructed according to the special quake resistant architecture approved by Earthquake Reconstruction and Rehabilitation Authority (ERRA). For this purpose, TCF arranged for a team of specialists comprising well known architects and engineers in Pakistan to design & prepare drawings for our schools in accordance with ERRA guidelines.

Local cultural values, topography and environmental concerns are given high consideration in the design with some simple technological improvements for thermal efficiency, earthquake resistance and affordability of the community. Deforestation is a major issue in the area. The two major causes of deforestation are use of wood for construction and fuel for heating. Therefore, TCF's design is based on minimum use of wood (only doors & windows) in construction.

The design of these schools is based on imported galvanized lipped C channels 89x41x12mm (hot dip galvanized steel) and clad internally & externally with imported wood fiber cement board. These boards are weather & fire resistant with heat and sound insulation. The exterior pre cut panels of these boards are fixed by over lapping an inch on each other to gain the aesthetic appearance and no paint coat is applied in order to make maintenance free exterior. These schools are properly insulated along the walls and roof with expanded polystyrene (2" thick), because of extremely cold weather in these areas. Roof cladding sheets i.e. Aluzinc Coated (45% Aluminium & 55% Zinc) Steel Sheets (0.45-0.5 TCT thickness) were used along with liner used as ceiling and sandwiched with expanded polystyrene (2" thick). Self drilling hex head hot dip Galvanized steel EPDM fastener with washer are used on roof sheets.

Special emphasis laid is on the foundation of the structure depending on the soil conditions. Earthquake resistant buildings require larger width of the foundation, use of proper materials like dressed stones or concrete blocks, greater depth of the foundations below existing ground level etc. The plinth masonry is preferably to be constructed using stone or blocks laid in cement mortar. Cement mortar or lime mortar is stronger than mud mortar in binding the stones or blocks in the wall together to resist earthquake forces. In areas that experience rainfall or snowfall, Damp Proof Course layer is also used at the plinth level before starting the construction of wall above the plinth to prevent runoff water that might wet walls or enter the foundation. Special attention is also given to plastering and painting in order to give protection and durability to the walls and the LGS roof. The light gauge structure (LGS) schools are designed considering upto 160Kph wind speed and 20lbs/sft snow load.

Due to the remoteness of these areas, where access is not easy, a lot of extra transportation, administration and skilled labour costs incurred. These skilled labor were transported to these areas and provided with accommodation in tents, since this is the most inexpensive option. For this purpose, TCF has arranged to provide training to local crafts people on earthquake resistant techniques that would be used in the construction.

Regards,
Atif Ashraf
(Project Architect)

Earthquake Resistant Schools

Pakistan various locations, Pakistan

Architects	Arshad Abdulla Karachi, Pakistan
Clients	Citizens Foundation Karachi, Pakistan
Commission	n.a.
Design	n.a.
Construction	2005
Occupancy	2007
Site	n.a.
Ground floor	n.a.
Total floor	604 m²
Costs	150,000 USD

Programme Following the 2006 earthquake in the north of Pakistan, The Citizens Foundation, a large educational non profit organisation, started a programme of building seismically sound school buildings in the region. Set on deep foundations of stone or concrete blocks set in cement or lime mortar the structures are built of imported galvanized steel C channels clad in wood fiber cement board that is fire resistant and has insulating properties. Economical local materials such as chakwal stone were also used. Since deforestation is a big issue in the area, wood was used only sparingly; and since skilled labour was in short supply, the project trained local craftsmen in earthquake resistant building technologies.

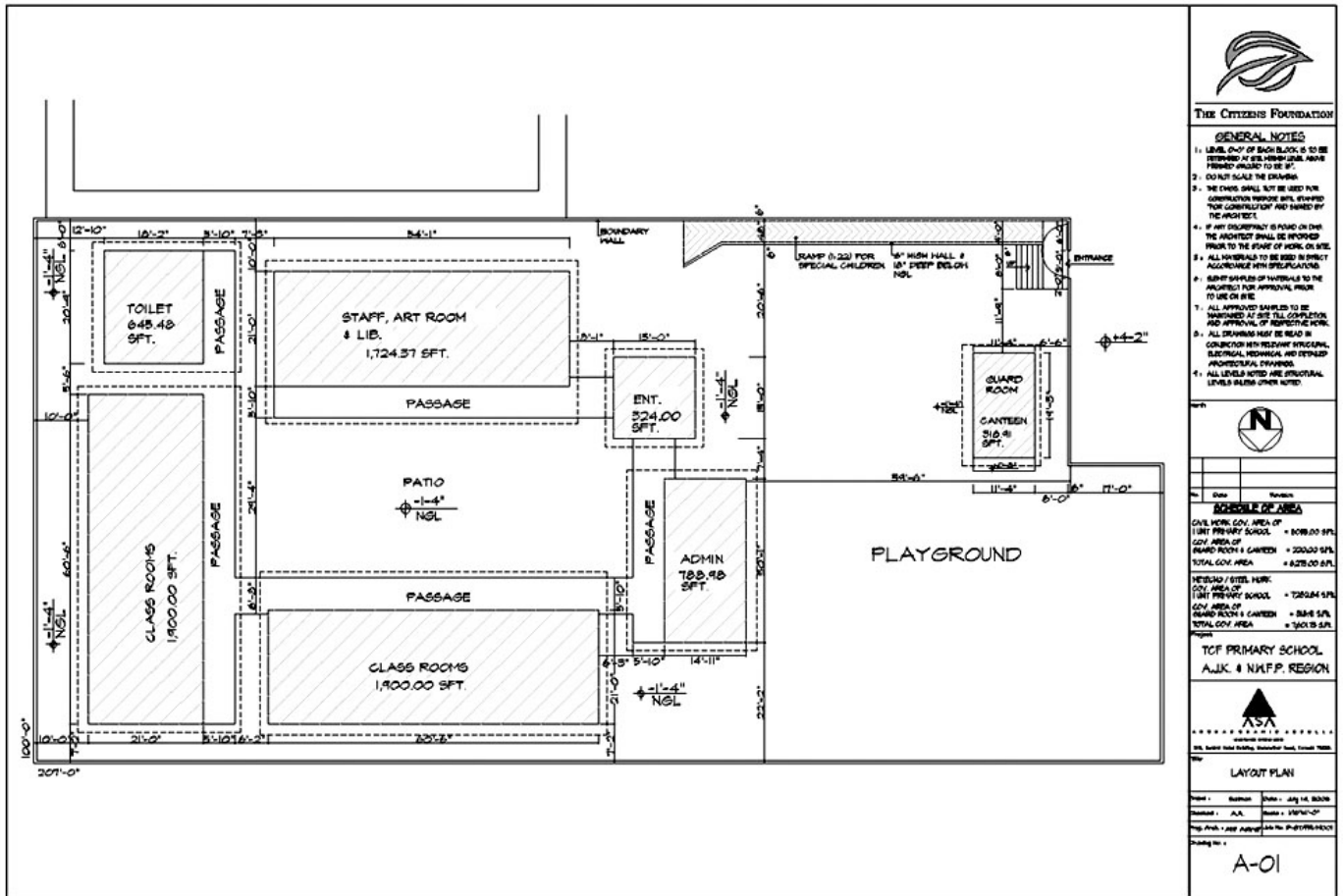


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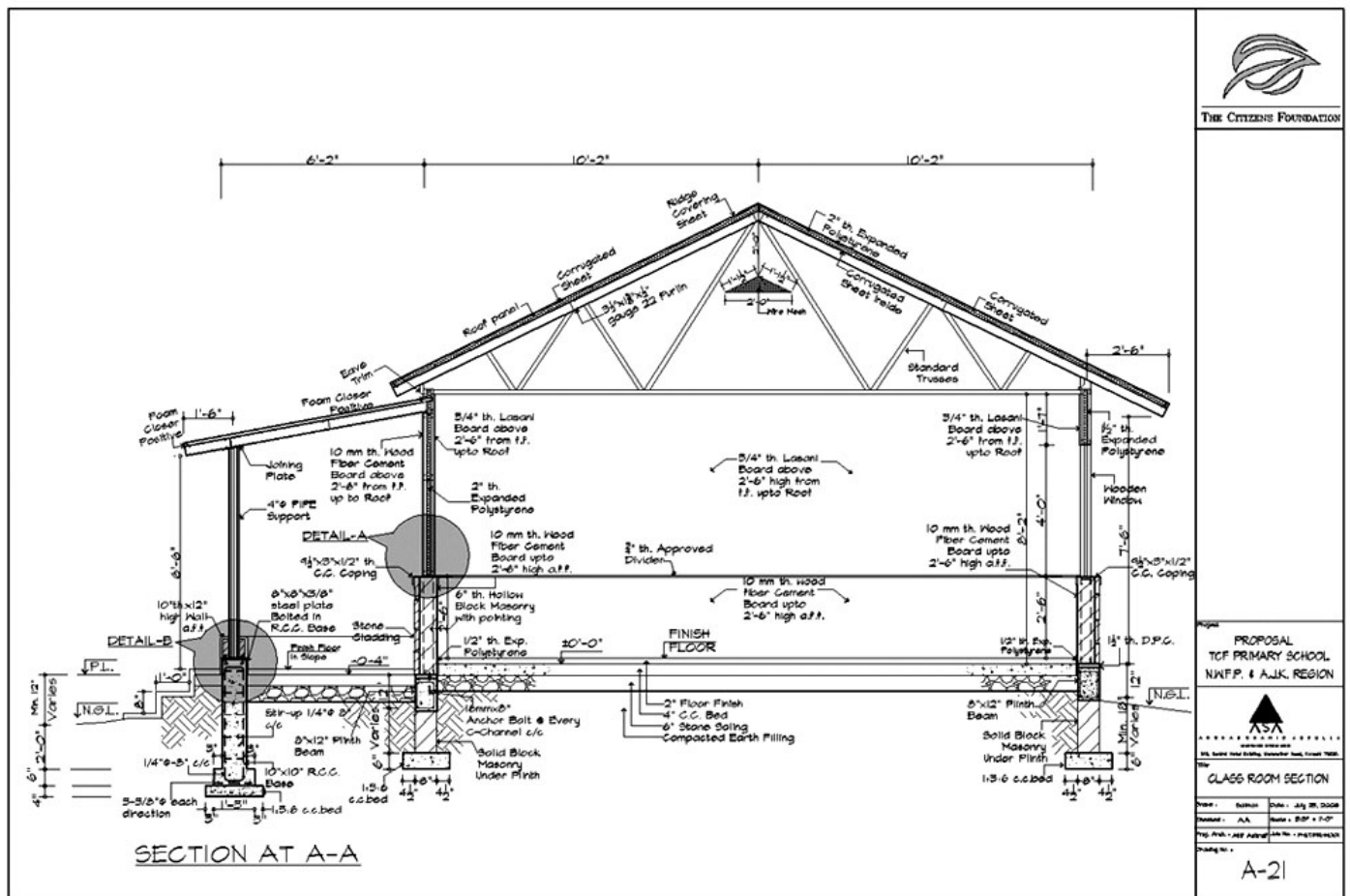




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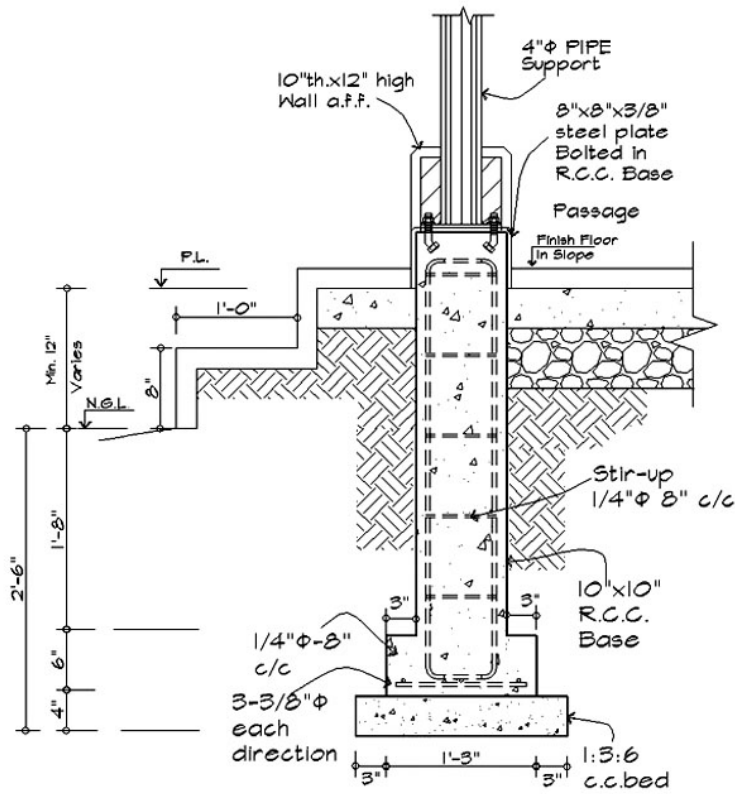
TCF SS School Layout.jpg




TCF SS School Section.jpg



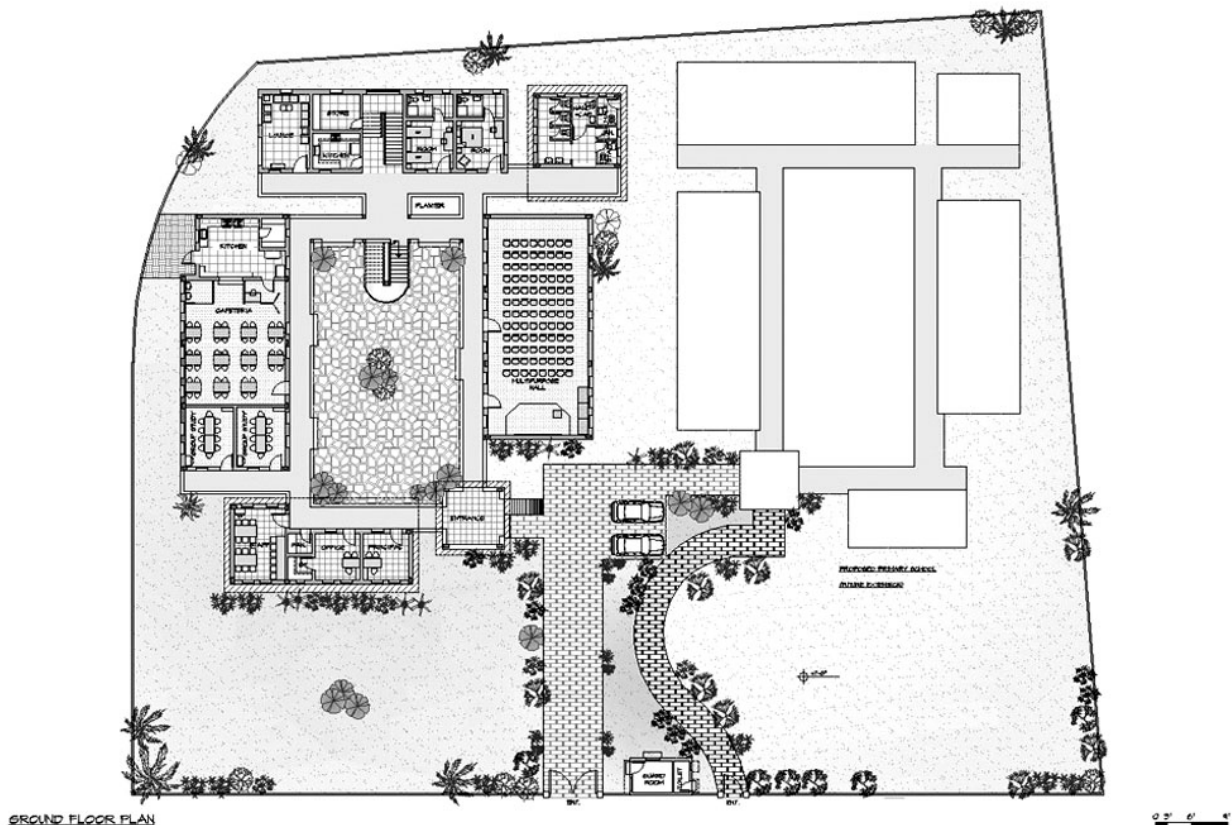
THE CITIZENS FOUNDATION



DETAIL - B

 ASA ARCHITECTURAL SERVICES ASSOCIATES P.O. Box 1000, F-7/1, Islamabad, Pakistan	
Project TCF PRIMARY SCHOOL NWFP, & A.J.K. REGION	
Title BASE DETAIL OF PIPE SUPPORT (Passage Column)	
Drawn : Salman	Date : July 25, 2006
Checked : A.A.	Scale : 1/4"=1'-0"
Proj. Arch. Asst. Asst.	Job No. : P-0001-0001
Drawing No. : <div style="text-align: center; font-size: 1.2em;">AD-02</div>	

TCF SS School Support detail.jpg



TCF - SAGER TEACHER CENTRE
MANSEHRA, NWFP



TTC Mansehra 01.jpg





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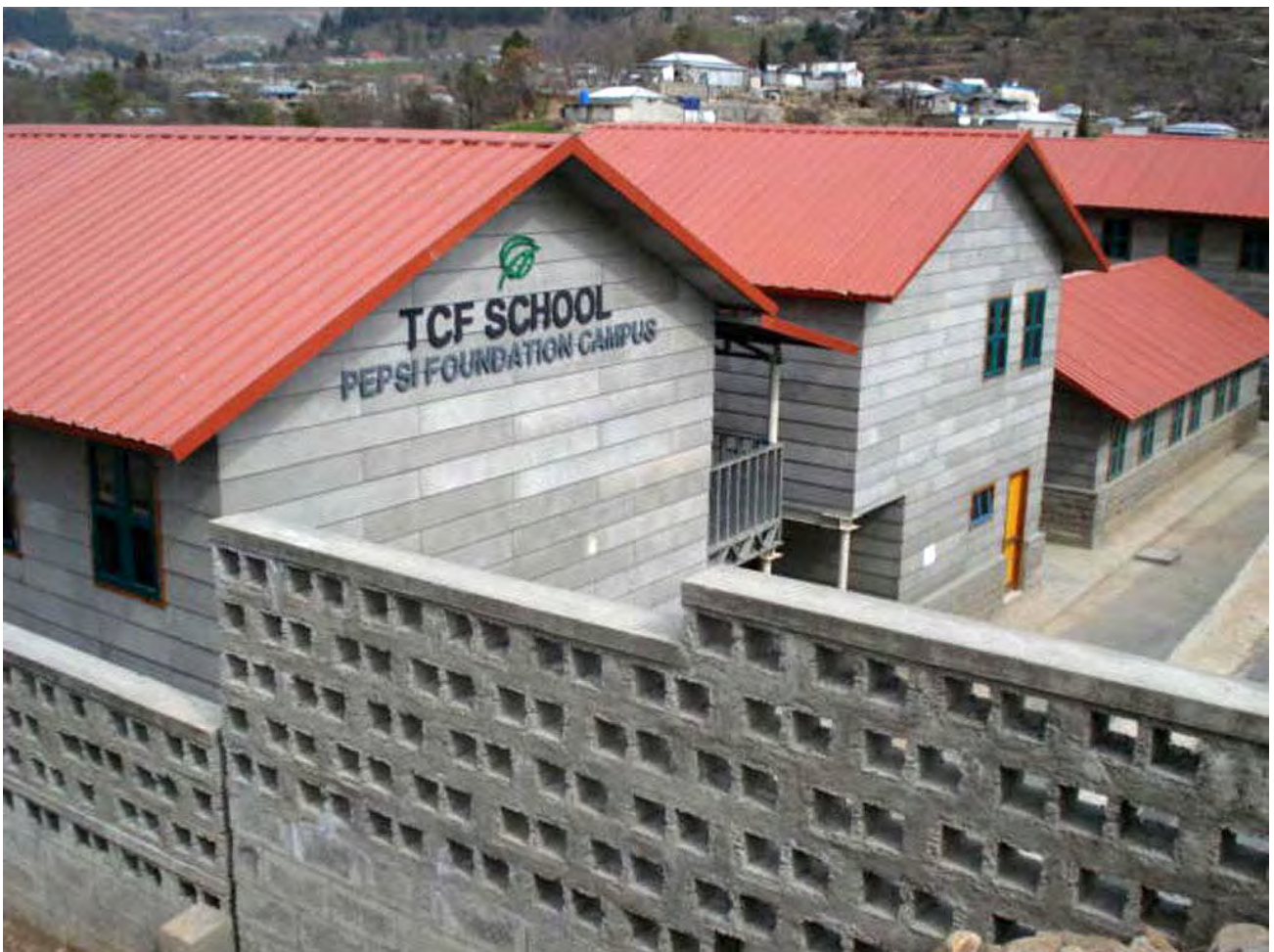
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TCF - SAGER TEACHER CENTRE
MANSEHRA, NWFP

VIEW



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