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To: [REDACTED]
[REDACTED]
[REDACTED], OIEE Vertical Structures

From: [REDACTED] - Technical Lead

Date: December 11, 2011

Re: **WO-A-0083 Review of Sardar Girls High School Fire Doors**

INTRODUCTION

This technical memorandum presents an assessment and subsequent recommendation concerning the fire door submittal at Sardar Girls High School. Per request by USAID as outlined in the scope of work dated November 11, 2011, Tetra Tech (TT) is to review the submission, project specifications, and applicable standards to determine if the fire doors meet project specifications or the “standard of equivalency”.

BACKGROUND

The Sardar Girls High School is a project in Kabul, Afghanistan administered by the USAID - OIEE Vertical Structures group.

Specifications for this project were prepared by UNOPS. TT is in receipt of two documents from UNOPS that comprise the specification package (1) Project Specifications dated January 18, 2010 and (2) Project Schedules Revision 2 dated January 18, 2010.

Fire doors are addressed in Project Schedules: Section 4.4 - Steel Door Schedule and 4.5- Annealed Glasses Schedule. Fire doors are referred to in this document as “D4” and “D5”. Specific requirements of fire rated doors are listed in Section 4.4 – Steel Door Schedule and include:

- Doors are to be “entirely fire resistant” and comply with National Fire Protection Code NFPA 80;
- Steel panels are to be 1.5 mm sheet thickness. *Note*, ≥ 1.4 mm thickness is listed as a requirement in the Project Specifications;
- Ball bearing hinges;
- Rubber seals;
- Clear float, break-proof glass.



A copy of project specification, sections 4.4 and 4.5, is included with this memorandum.

TT is in receipt of the fire door submission package submitted by UNOPS, dated September 11, 2011, addressed to [REDACTED] at USAID. The package was comprised of essentially the same information submitted for Ghazi Boys High School fire doors.

The manufacturer of the submitted fire doors is Insutas Ltd. of Ankara, Turkey.

Information provided by Insutas as part of the submittal includes:

- Data and catalogue sheets from Pilkington, the glass manufacturer;
- A Certificate of Approval stating that Insutas has implemented a “Management System complying with the requirements of ISO 9001:2008;
- A document in Russian that appears to be a certificate, possibly pertaining to the steel used in the manufacture of the doors but otherwise indecipherable;
- A Registration Certificate stating that Q-Mark steel composite fire doors meet the requirements of BS EN 1634-1. *Note:* BS EN 1634-1 is the British and European-wide Standard for testing fire resistant doors;
- Test certificate from Chiltern International Fire stating that a fire resistance test per BS EN 1634-1 was conducted on Doorset B, a double leaf single acting steel doorset with glazing, on July 7, 2009. The test was terminated at 133 without achieving failure.

To aid in our review of the door submittal, on December 5, 2011 [REDACTED] and [REDACTED] of Tetra Tech met [REDACTED] of IRD at the Ghazi Boys High School to examine the current installations of the submitted fire doors manufactured by Insutas.

FIELD OBSERVATION and COMMENTS

The following was observed and noted:

- Doors and frames are steel and appear to be constructed of 1.4 to 1.5 mm thick plates;
- Neither doors or frames have a label;
- Glazing does not have a label;

- Panic hardware was damaged, and closer hardware observed to not work properly at some installations;
- Hinges appear to be lift-off type, not the specified ball bearing type;
- Glazing is welded wire. Clear float, “break-proof quality” is specified;
- Rubber door seals are specified. Non-rubber seals were observed.

GHAZI DOOR INSTALLATION SUMMARY

Noted during our site visit to Ghazi Boys H.S. were some installations where glazing exceeded that required by NFPA 80. Transom glazing is limited to a maximum area of 1296 in² (8361.3 cm²). Some installations clearly exceeded that amount. Glazing in door leafs also exceeds maximum required area of 100 in² (645.2 cm²). To exceed this amount, the doors with the exact amount of glass [in this case 950 in² (6129 cm²)], must be specifically tested for compliance. We find no record in the submission materials to suggest that this was done.

In addition to the excessive amount of glazing, the glazing used in the doorsets does not comply with project specifications. Clear float glass was specified, welded wire glass was provided.

Labels as required by NFPA 80 were absent. Door hinge hardware was not the type listed in the project specifications. Panic, door handle, and closer hardware appeared to be low quality (as evidenced by damage) and in some cases did not operate properly.

PROJECT SPECIFICATION COMMENTS

With respect to fire rated doors, NFPA 80 Section 4.1.1 Classification states that fire doors shall be classified by designating a required fire protection rating expressed in hours or fractions thereof. Project specification makes no mention of such rating. Fire and smoke separation doors that are used to delineate building fire areas and enclose stairways are typically rated 1 ½ hours. TT assumes that the doors for Ghazi and Sardar are to be 1 ½ hour rated.

A slight discrepancy in the listed thickness of the fire door base metal exists between the specification document and the schedules document (1.4 mm vs. 1.5 mm) as noted above.

CONCLUSION and RECOMMENDATIONS

Installed doorsets at Ghazi Boys H.S. do not comply with project specifications for Sardar Girls H.S. Per the manufacturer, the door was fabricated in compliance with



BS EN 1634-1. This is not what was specified but is a recognized European standard and likely similar to NFPA 80 (this standard was not available for review by TT prior to submission of this memorandum).

There appears to be a disconnect between what was installed and what was specified. This is not to suggest however that the manufacturer is incapable of providing acceptable fire doors. Regardless of the standard used for fabrication, the supplier appears to have adequate manufacturing capability. What is not clear is if they failed to follow direction or if proper direction was not provided to them for the fabrication of the doors.

The fire doorsets as manufactured and installed at Ghazi H.S. are not acceptable for installation at Sardar Girls H.S. It has been our experience with other projects in Afghanistan however that NFPA compliant fire doors are available in-country.

Our recommendation is to reject the current submittal and require resubmittal using a manufacturer that can supply doors that comply with project requirements. Insutas may be capable of providing such doors. Another supplier to consider is Vulcan Industries, LLC. from the UAE. Fire doors furnished by Vulcan Industries are installed at Kabul University. These units appear to be solidly built and of good quality. A label per NFPA 80 was not present on the units inspected however. This would need to be addressed and corrected to be in compliance with Sardar Girls H.S. specifications if this manufacturer is selected. Note: specifications for Kabul University fire doors were not reviewed.

4.4 DOORS AND DOOR HARDWARE

4.4.1 GENERAL

4.4.1.1 Interpretation

Definitions

For the purposes of this worksection the definitions given below apply.

Door frame: Includes door trims.

Doorset: An assembly comprising a door or doors and supporting frame, guides and tracks including the hardware and accessories necessary for operation.

Fire-doorset: A doorset which retains its strength and limits the spread of fire.

Smoke-doorset: A doorset which restricts the movement of smoke.

Flush door: A door leaf having two flat faces which entirely cover and conceal its structure. It includes doors with cellular and particleboard cores.

Joinery door: A door leaf having stiles and rails, framed together. A joinery door may also incorporate glazed panels.

Louvred door: A joinery door in which the panel spaces are filled in with louvre blades.

4.4.1.2 Inspection

Notice

Give sufficient notice so that inspection may be made of the following:

- Door frames standing in place before building in to brickwork.
- Door frames installed before fixing trim.

4.4.1.3 Submissions

Samples

Submit samples of all hardware items for approval by the Engineer before use in the works.

Subcontractors

Automatic sliding door assemblies: Submit names and contact details of proposed supplier and installer.

Product Warranties

Automatic sliding door assemblies: Submit a warranty from the supplier and installer for the system and its installation, for a period of at least twelve months from the date of completion.

Hardware: Submit the warranties offered by the manufacturer for the hardware items provided in the works.

Keys

Key codes: Submit the lock manufacturer's record of the key coding system showing each lock type, number and type of key supplied, key number for re-ordering, and name of supplier.

Keys: For locks keyed to differ and locks keyed alike, verify quantities against key records, and deliver all keys and records to the Engineer at completion.

4.4.2 PRODUCTS

4.4.2.1 Frames

Aluminium Frames

To be assembled from aluminium sections, including necessary accessories such as buffers, strike plates, fixing ties or brackets, and suitable for fixing specified hardware.

Timber Frames

To be constructed with best quality timber. Obtain approval from the Engineer for the timber selection before use. Construct as shown on the drawings and ensure that all joints are securely made to avoid distortion of the frame in use.

Steel Frames

To be folded from metallic-coated steel sheet sections, joints to be continuously welded, including necessary accessories such as buffers, strike plates, spreaders, fixing ties or brackets, and suitable for fixing specified hardware.

Finish: Grind the welds smooth, prepare and paint the welded joints with primer. Then prime the entire frame.

Hardware and accessories: Provide for fixing hardware including hinges and closers, using 4 mm backplates inside the frame. Screw fix the hinges into the back plates.

Base metal thickness:

- General: ≥ 1.1 mm.
- Fire rated doorsets: ≥ 1.4 mm.
- Security doorsets: ≥ 1.6 mm.

4.4.2.2 Doors

Flush Doors

Cellular core flush doors:

- Provide a subframe of 25 mm minimum width timber around openings for louvres and glazing.
- Provide additional material to take hardware and fastenings.
- Cut outs: If openings are required in flush doors (e.g. for louvres or glazing) make the cut outs not closer than 120 mm to the edges of the doors.

Solid core flush doors:

- Core of timber strips laid edge to edge, fully glued to each other and to facings each side of no less than two sheets of timber veneer.
- Single thickness of moisture resistant general purpose particleboard.

Refer to drawings and **Flush Doors** schedule for details.

Joinery Doors

Fabricate joinery doors as shown on the drawings and in the **Joinery Doors** schedule.

PVC Doors

Fabricate PVC doors as shown on the drawings and in the **PVC Doors** schedule.

Construction

Form rebates to suit standard rebated door hardware.

Louvre grilles: Construct by inserting the louvre blades into a louvre frame, and fix the frame into the door.

Double doors

Provide rebated meeting stiles unless the doors open in both directions. Chamfer square edged doors to prevent binding between the leaves.

4.4.2.3 Doorsets

Automatic Sliding Door Assemblies

Provide auto sliding door assemblies in accordance with the **Automatic door schedule**.

Toughened Glass Door Assemblies

Provide toughened glass door assemblies with matching concealed hinges and patch fittings as appropriate. Ensure that all glass edges are protected during installation and polish on completion.

Fire-Resistant Doorsets

Provide fire resistant doors and frames as matched sets for door openings required to have a fire rating. Refer to the **Fire and smoke resistant doorsets schedule** for details.

Provide copies of test certificates from recognised authorities proving the performance of the doorsets.

Smoke-Resistant Doorsets

Provide smoke resistant doors and frames as matched sets for door openings required to have a smoke stopping capability. Refer to the **Fire and Smoke Resistant Doorsets** schedule for details.

Provide copies of test certificates from recognised authorities proving the performance of the doorsets or seals to frames.

Security Screen Doorsets

Provide security screen doorsets in accordance with the **Security Screen Doors** schedule.

4.4.2.4 Ancillary materials

Nylon brush seals

To be dense nylon bristles locked into galvanized steel strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door

Pile weather strips

To be polypropylene or equivalent pile and backing, low friction silicone treated, ultra-violet stabilised.

Door Seals

To be proprietary items as identified in Schedules and to approval of Engineer.

4.4.2.5 Hinges

Butt hinge sizes

Refer to **Hinge Table A** and **Hinge Table B** in which length (l) is the dimension along the knuckles, and width (w) is the dimension across both hinge leaves when opened flat.

- Steel, stainless steel, brass, bronze butt hinges for timber doors in timber or steel frames: To **Hinge table A**.
- Aluminium hinges for aluminium doors, or for doors of other materials in aluminium frames: To **Hinge table B**.

Hinge materials

Aluminium hinges: High tensile aluminium with fixed stainless steel pins in nylon bushes, and with nylon washers to each knuckle joint.

Doors fitted with closers: Provide low friction bearing hinges.

Hinge Pins

Exterior or security doors opening out: Provide fixed pin hinges.

Hinge Table A

Nominal hinge size l x w x t (mm)	Door leaves not exceeding any of the following		
	Mass (kg)	Width (mm)	Thickness (mm)
70 x 50 x 1.6	16	620	30
85 x 60 x 1.6	20	820	35
100 x 75 x 1.6	30	920	40
100 x 75 x 2.5	50	920	50
100 x 75 x 3.2	70	1020	50
125 x 100 x 3.2	80	1220	50

Hinge Table B

Nominal hinge size l x w x t (mm)	Door leaf not exceeding mass (kg)	Minimum construction	
		Knuckles	Screws/hinge leaf
100 x 70 x 3	30	3	3
100 x 80 x 3.5	50	5	4

Number of Hinges

Provide 3 hinges for doors up to 2200 mm high, and 4 for door leaves between 2200 mm and 3000 mm high.

Wide Throw

If necessary, provide wide throw hinges to stop doors binding on obstacles such as nibs or deep reveals.

4.4.2.6 Door Hanging Systems

General

Provide sliding door tracks in conformance with the schedules.

4.4.2.7 Locks and Latches

General Door Hardware

Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use and climate and fabricated with fixed parts firmly joined.

Bolts

Provide bolts including barrel bolts and tower bolts with associated hardware, including lock plates, ferrules or floor sockets.

Furniture

Provide lock and latch furniture suitable for use with the lock or latch to which it is installed with the corresponding level of performance.

Strike Plates

Use strike plates provided with the locks or latches.

Fire Rated Door closers

Provide closers tested and certified for use as components of fire door assemblies.

Door Controllers Performance

Provide door controllers, including door closers, floor or head spring pivots which are suitable for the door type, size, weight and swings required and the operating conditions, including wind pressure.

4.4.3 EXECUTION

4.4.3.1 Frames

General

Install doors so that the frames:

- Are plumb, level and straight within acceptable building tolerances.
- Are fixed or anchored to the building structure to resist the wind loading.
- Will not carry any building loads, including loads caused by structural deflection.
- Allow for thermal movement.

Flashing and Weatherings

Install moulds, sealant and cement pointing as required so that water is prevented from penetrating the building between the door frame and the building structure.

Aluminium frames

Building in to masonry: Screw galvanized steel brackets twice to jambs and build in.

Fixing to masonry openings: Use proprietary expansion anchors and screw through jambs at each fixing.

Frame Fixing

Brackets: Metallic-coated steel:

- Width: ≥ 25 mm.
- Thickness: ≥ 1.5 mm.

Jamb fixing centres: ≤ 600 mm.

Fixing and Fasteners

Materials: Use materials compatible with the item being fixed and of sufficient strength, size and quality to perform their function.

Concealed fixings: Provide a corrosion resistant finish.

Exposed fixings: Match exposed fixings to the material being fixed.

Support: Provide appropriate back support (for example blocking and backing plates) for hardware fixings.

Packing: Pack behind fixing points with durable full width packing.

Prepared masonry openings: If fixing timber door frames into existing prepared openings with fastenings through the frame face, make the fastener heads finish below the surface and fill the hole for a smooth surface finish.

Joints

Make accurately fitted tight joints so that neither fasteners nor fixing devices such as pins, screws, adhesives and pressure indentations are visible on exposed surfaces.

Operation

Ensure moving parts operate freely and smoothly, without binding or sticking and are lubricated.

Supply

Deliver door hardware items, ready for installation, in individual complete sets for each door.

In a separate dust and moisture proof package labelled for the specific door.

Including the necessary templates, fixings and fixing instructions.

Refer to the drawings and **Flush doors, Joinery doors, PVC doors, Security screen doors, Fire and smoke resistant doorset** and **Automatic door schedules** for details of frames, doors and hardware.

4.4.4 COMPLETION

4.4.4.1 Cleaning

The Contractor is to clean all frames, doors, glass, hardware at completion. Any damage to frames and doors, or broken glass is to be repaired or replaced to the satisfaction of the Engineer.

4.4.4.2 Adjustment

Leave the hardware properly adjusted with working parts in working order and lubricated where appropriate.

4.5 GLAZING

4.5.1 GENERAL

4.5.1.1 Inspection

Notice

Inspection: Give sufficient notice so that inspection may be made of the following:

- Glass products before they are installed.

4.5.2 PRODUCTS

4.5.2.1 Glass

Glass and Glazing Materials

Glass and glazing materials generally: Free from defects which detract from appearance or interfere with performance under normal conditions of use.

Glazing plastics: Free from surface abrasions, and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Refer to **Annealed Glasses**, **Processed Glasses** and **Fabricated Glass Units** schedules for specific details for the works.

4.5.2.2 Glazing materials

General

Glazing materials (including putty, glazing compounds, sealants, gaskets, glazing tapes, spacers, setting blocks): Appropriate for the conditions of application and the required performance.

Jointing Materials

Provide recommended jointing and pointing materials which are compatible with each other and with the contact surfaces and non staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Pile Weather Strips

Materials: Polypropylene or equivalent pile and backing, low friction silicone treated, ultra violet stabilised.

Finned type: A pile weather seal with a central polypropylene fin bonded into the centre of the backing rod and raised above the pile level.

Extruded Gaskets and Seals

Type: Non cellular (solid) seals to exclude water from glass/frame junctions.

Material:

Rubber products to be neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber.

Flexible polyvinyl chloride (PVC)

Priming

Apply the recommended primer to the surfaces in contact with sealant materials.

Movement Joints

Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

Foamed materials (in compressible fillers and backing rods): Closed-cell or impregnated types which do not absorb water.

Bond breaking: Provide backing rods, and other back-up materials for sealants, which do not adhere to the sealant.

Glazing Films

Supply films identified in the schedules to approval of the Engineer. All films are to be proprietary products installed strictly in accordance with the manufacturers instructions.

4.5.2.3 Mirrors

Refer to **Mirrors** schedule for details.

Reflective surface

Type: Silver layer deposited on the glass or glazing plastic.

4.5.3 EXECUTION

4.5.3.1 Glass Processing

General

Perform required processes on glass, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access holes and speaking holes. Process exposed glass edges to a finish that will reduce the risk of injury.

4.5.3.2 Installation

General

Install the glass so that:

- Each piece is held firmly in place by permanent means which enable it to withstand the normal loadings and ambient conditions at its location without distortion or damage to glass and glazing materials.
- Building movements are not transferred to the glass.
- External glazing is watertight and airtight.

Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods which prevent the glass making direct contact with metals or other non-resilient materials.

Frameless installations: Join the vertical edges of adjacent glass panels with silicone jointing compound.

External timber framed glazing: Glaze with putty. Do not dry bead into timber frames.

4.5.3.3 Fixing mirrors

Screw fixing

Direct to wall plugs with dome-headed chromium-plated screws in each corner and at 900 mm maximum centres around perimeter. Provide polyethylene sleeves and washers to prevent contact between screw and glass. Do not over-tension the screws.

Frame fixing

Proprietary aluminium frames to mirror perimeter, corners mitred. Attach the frame to the wall with concealed screw fixings. Frames and finish to approval of the Engineer.

Bead fixing

Rebated timber beads to mirror perimeter, corners mitred. Screw fix the beads to the substrate.

4.5.3.4 Glazed Shower Screens

Type

Proprietary system comprising frames of extruded aluminium, stainless steel, or PVC, assembled around safety glass to form fixed panels and sliding, hinged or pivoted doors.

Water Shedding

Provide an assembly which sheds water to the inside without retaining it on the frame surfaces. Seal the edge of the frame to adjoining surfaces with a resilient strip.

Sliding Assemblies

Hanging: Hang the sliding sash on stainless steel or nylon sheaves on overhead channel track formed in the frame head, and fit nylon or equivalent bottom guides.

Hardware: Pull handles on both sides of sash, or of leading sash in multiple sash arrangements.

4.5.4 COMPLETION

4.5.4.1 Cleaning

Replace damaged glass and leave the work clean, polished, free from defects, and in good condition.
