



**ERB**

# EngineersNewsbrief

Promoting Professionalism and Excellence in Engineering

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*The Kigamboni Bridge project , Dar es Salaam*

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The views expressed herein do not necessarily reflect the official views of the Engineers Registration Board or those of its individual officers.

## An ethical issue: Should one quit or turn a blind eye to corruption?

We have come to know that during SEAP monitoring visits in the Lake Zone recently, the Board met some employers who were complaining that “most trainees have no engineering ethics on how to behave.” We also know that the Registrar urged those trainees “to avoid any corrupt practices.” No doubt the trainees have formidable challenges but we believe they are not alone in this: Ethical issues are commonplace, according *Work Ethic*, a twice-monthly column on *BBC Capital*, which considers ethical dilemmas that workers face around the world. It would help to deliberate with the SEAP trainees the following dilemma and the possible options of dealing with it.

**Question:** *I work for a government-owned enterprise. As a citizen, I feel this company belongs in part to me, and I have a strong desire for it to succeed. However, I see unethical behaviour going on around me. The logical path is to quit, but I don't want to give up on the company. What can I do?*

**Answer from an expert:** This is a patriot's dilemma: how best to serve your country without becoming a part of actions you don't condone. As you note, the easiest way to get away from problematic conduct at work is to quit and get another job where you don't find yourself in troubling situations. But you don't want to do that, because you feel there's a higher ethical value in working to build the institution.

Refusing to run from the problem is admirable, but solving it can be tough.

If you're staying, you have several options, notes Amy Wrzesniewski, an associate professor of organisational behaviour at the Yale University School of Management. “The most direct path to addressing the unethical behaviour you see is to figure out a way to bring attention to it so that change might happen,” she says.

But doing this without getting fired is easier said than done. Check to see if your country has well-enforced whistleblower protection laws, Wrzesniewski suggests. Within the institution, you will have better luck getting your message to the top if

you have a sponsor at work, “a personal champion in the system who is willing to support you and back you up as you raise the issues you see,” she says. If you have this legal protection available, and you feel comfortable approaching your sponsor with your concerns, that's the most direct approach.

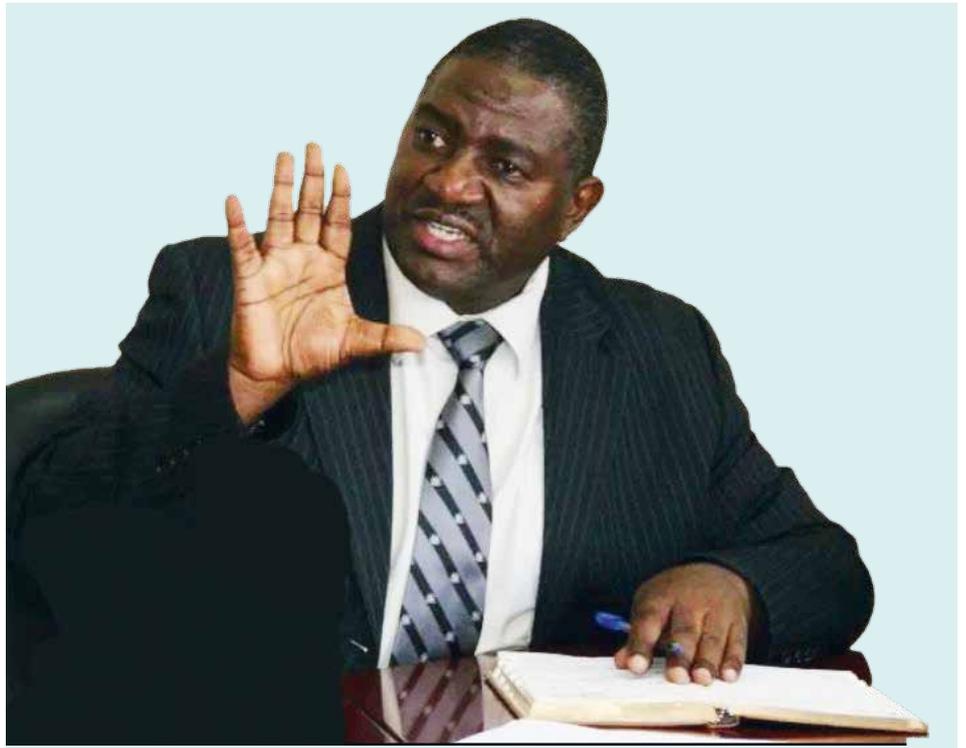
If not, you'll have to take the covert route. Wrzesniewski suggests coming up with a new idea for an old problem that could subtly replace corrupt practices. Sometimes, a new approach can be “demonstrably more efficient, simpler, or data-driven, while also being far less open to gaming or unethical behavior,” she says. For instance, if you're witnessing contracts awarded to the vendor who pays the highest kickbacks, you could suggest moving the bidding and award process to an online system that has greater transparency. Or if you're seeing discriminatory hiring practices, consider asking if the institution can create a database that tracks hiring by applicant characteristics. This would make it clear who's being hired and why.

“By proposing changes that undermine unethical behavior — directly or indirectly — you will learn quickly how interested the institution is in changing,” Wrzesniewski says.

You can also look for like-minded people and institute small changes with them. Some colleagues may think that corruption and government go hand-in-hand. Such attitudes can be deeply ingrained, and you may not be able to change colleagues' minds. But there are likely a few people who share the same beliefs about civic responsibility within a state-owned enterprise. If you've found a compatriot, you can brainstorm ideas for new procedures that cut out the possibility for corruption.

If there's little appetite for change on either a grassroots or an official level, you are once again faced with the same choice: stick with being an ethical person in an unethical environment, or quit!

Source: [workethic@bbc.com](mailto:workethic@bbc.com)



Dear Readers,

As you are all aware, the Board has been administering the Structured Engineers Apprenticeship Program (SEAP) since 2003. The program has been very successful and a total of 3148 graduate engineers have benefited. In administering the program, the Board got support from individual engineers, engineering consulting firms, contractors, industries, government ministries, government institutions etc of which we are very thankful. Also in the year 2010, we got a strong support from the Royal Norwegian Embassy for female graduate engineers.

On 5th May 2010 an agreement was signed between the Royal Norwegian Embassy in Dar es Salaam and the Engineers Registration Board; in which the Norwegian Government agreed to provide funds approximately 2 million USD for over 5 years to ERB. The funds were provided to support female graduate engineers to participate in the programme, acquire professional competence and register as professional engineers. The support was also provided for capacity building of mentors and support to professional associations of female engineers.

It is now five years and I would like to report on the achievement made as a result of that support, which has enabled more than 200 female engineers to participate in the programme over five years since 2010 and 143 trainees are already registered as Professional Engineers. This is a big achievement as the support has increased the number of professional engineers from 96 to 297. Before the

Norwegian support, the ratio of female to male engineers was 1:24. After the support the ratio is now 1:14. This is an increase of almost 200 percent and we have seen the performance of women engineers in various engineering organizations being impressive.

On March 11, 2016 the Norwegian Deputy Minister of Foreign Affairs Hon. Tone Skogen visited Engineers Registration Board (ERB) in Dar es Salaam and signed a Letter of Intent with ERB with the intention to prolong the existing partnership and support for another period of 5 years from 2016 to 2020.

During the signing Ms Skogen said that her government was very satisfied with the results they have seen so far and that they are happy about the way the Engineers Registration Board has managed the cooperation.

On behalf of the Board, I take this opportunity to thank the Government of Norway for the support that it has provided to ERB and further support that will be provided in the near future. Also, I thank the public and private sector that has been supporting the SEAP trainees to get their professional training using their facilities and time.

Thank you so much.  
Eng. Steven Mlote  
Registrar

**ERB recruits new staff**



Mr. Christian Kiwelu (GE) graduated with B.E in Civil Engineering, at St. Joseph University in Tanzania (SJUT) in 2013. Mr. Christian joined the board since January 2016, as Enforcement officer II responsible for performing site audits, site visits and all monitoring activities.



Mr. Erick Nestory (GE) graduated with Bsc in Civil and Transportation Engineering, at the University of Dar es Salaam in 2010. Mr. Nestory joined the board since January 2016, as Enforcement officer II responsible for performing site audits, site visits and all monitoring activities.



Ms. Elizabeth Mark (GE) who joined ERB in Jan 2016 as SEAP - Programme Officer, graduated with Bachelor degree in Telecommunications Engineering at University of Dar es Salaam in 2014. She has also attended several telecommunications trainings to upgrade her registration status of being professional engineer. Ms. Mark is responsible for identifying, organizing and coordinating SEAP training induction and orientation programmes, preparation of SEAP programme for trainee engineers, maintaining and keep SEAP records



Mr. Andrea B. Chambo graduated with Bachelor degree of Engineering in Electronics and Communication Engineering at St. Joseph College of Engineering and Technology in 2013. He joined ERB in 2016 as SEAP – Program Officer responsible for identifying, organizing and coordinating SEAP training induction and orientation programmes, preparation of SEAP programme for trainee engineers, maintaining and keep SEAP records



Ms. Magdalena Venance is a graduate with a Degree of Bachelor of Arts (Political Science and Public Administration) at the University of Dar es Salaam in 2006. She joined ERB early this year 2016 as a Human Resource and Administrative Officer responsible for allocating manpower; planning training, coordinating performance appraisal and making sure that the workplace environment are conducive.

**RATES FOR ADVERTISEMENTS**

Full page:	400,000/-
Half page:	250,000/-
Back page:	600,000/-

## ERB conducts 13th Annual Engineers Day

Last year's Annual Engineers Day, which was under the theme "Implementation of the Tanzania Development Vision 2025: The Engineering Perspective", took place on 3 and 4 September at the Mlimani City Conference Centre, Dar es Salaam.

The event, which was officially opened by the Chief Secretary, Ambassador Ombeni Y. Sefue and closed by Dr. John Pombe Magufuli who was by then Minister for Works, featured many major activities

including a learned discourse, awarding best graduating engineering students and commercial/technical exhibitions.

The discourse was spearheaded by eight papers, which were presented by Ambassador Ombeni Sefue who delivered a keynote address, Mr. Bernard Mchomvu who presented on infrastructure development) and Prof. Andrew Temu on agriculture development. Other presenters were Eng. Prof. Matthew

Luhanga on human capacity development, Eng. Ngosi Mwhava on extractive industry, Eng. Col.(rtd) Joseph Simbakalia on industry development and Eng. Dr. Ramadhan Mlinga on public/ private sector partnership.

The two-day event was attended by 59 distinguished guests as well as 1983 participants, including 10 foreign delegates from Nigeria, Kenya, South Africa and Malawi.

## TRANSITION

The Engineers Newsbrief is sad to report that the engineering fraternity lost the services of the following engineers who have passed away since the last issue:

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Dr. Robert Ntakamulenga<br/>-NEMC passed away on April 20, 2015</li> <li>2. Mr. Sefu Mwenguvu (GEng.2015)<br/>-Conso Hydro Systems passed away in 2012</li> <li>3. Robert A. Nyakitebe (PEng.3080)<br/>-TRL passed away January 23, 2015</li> <li>4. Eng. Godwin Matovelo (CEng.177)<br/>-GOCH Consult passed away on June 1, 2015</li> <li>5. Eng. Monica Kebara (PEng.2101)<br/>-TANESCO-Tabora RM, passed away on May 28, 2015</li> <li>6. Mr. Lazaro Elias (GEng)<br/>-Mufindi DC passed away on April 12, 2015</li> <li>7. Mr. Omary Said Matitu (GEng. 6051)<br/>- Bukombe District Council, passed away in July 2015</li> <li>8. Eng. Herbert Mshiu PEng. 3227<br/>- Contractor</li> </ol> | <ol style="list-style-type: none"> <li>9. Eng. Albert Mboma CEng.<br/>-Melconsult passed away on October 19, 2015</li> <li>10. Eng. Hassan S. Matimbe, PEng.1427<br/>-Ministry of Works, Sept 30, 2015</li> <li>11. Eng. Obadia E. Kabwogi, PEng. 1429<br/>-Data Consult Ltd, January 13, 2016</li> <li>12. Eng. Suleiman S. Suleiman, PEng 1616<br/>-TAA, January 18, 2016</li> <li>13. Eng. Dr. Ladislaus Lwambuka, PEng.935<br/>-CoET, January 25, 2016</li> <li>14. Eng. Juliana J. Msaghaa, PEng.3606<br/>-Bagamoyo District Council, March 21, 2016</li> <li>15. Eng. Respich Z. Mvukiye, PEng.1392<br/>-Ministry of Works, Transport and Commun, March 22, 2016</li> </ol> |
|---|---|

## NOTICE

### PAYMENT THROUGH BANK AND M-PESA



The Board would like to inform you that, starting from January 01, 2016, all payments for the Board will be made through our bank accounts No. 01J1042970100 (LOCAL) or 02J1042970100 (FOREX-USD) CRDB Bank, Tower Branch and 011103007180 (TZS) at NBC LTD Corporate Branch. Also payments can be made through M-PESA ERB Company Number M-PESA 700800. Payment for Project Registration to be made after the Board has verified all submitted documents and approved the amount to be paid for the particular service. Stickers and Site instruction Books will be issued upon presentation of original Bank pay in slips whereby acknowledgement receipt for all payments made including fees and other statutory payments will be issued by cashier. We thank you for your co-operation.

For more Information please contact the undersigned;  
Registrar,  
ERB, Box 14942, Dar-es-salaam | 0757-338087 | registrar@erb.go.tz

## Norway to continue supporting Tanzania's female graduate engineers

The Engineers Registration Board (ERB) through its Structured Engineers Apprenticeship Programme (SEAP) has been receiving financial support from the Norwegian Government to support female engineers to participate in the programme, acquire professional competence and register as professional engineers. The Norwegian Government provided a 5 year support (2010 – 2015).

On 11 March 2016, Norwegian Deputy Minister of Foreign Affairs, Ms. Tone Skogen and ERB Chairman Eng. Prof. Ninatubu Lema signed a letter of intent as an expression of both parties to continue the cooperation by entering into a new grant agreement regarding the Programme. The Norwegian government, through its Ministry of Foreign Affairs intends to further provide financial support to

the programme. Therefore the signing ceremony signifies the continued cooperation between ERB and Norway.

Introducing the SEAP programme, the Registrar of ERB, Eng. Steven Mlote, said the support has improved the ratio of professional female to male engineers in Tanzania from 1:27 before the support to 1:14 after the support; which is an increase of about 100 percent. The Chairman of ERB assured the Deputy Foreign Minister that the funds would further be used appropriately so as to achieve the desired objectives.

Ms. Tone Skogen said that the Norwegian Government was very satisfied with the results of ERB in increasing the number of women engineers. "We will continue to prioritize support to improve women's living conditions and status in society. Norway sees the need for continued support to the female engineers of Tanzania to make sure the positive development continues. We therefore intend to enter a new agreement with ERB with support to the female engineers, now with a stronger emphasis on the gas sector", said the Deputy Foreign Minister.



*The signing ceremony was witnessed by Tanzania's Deputy Minister for Works, Transport and Communication, Eng. Edwin Ngonyani and the Ambassador of Norway to Tanzania, Hanne-Marie Kaarstad.*

## SEAP monitoring visits reveal low number of female engineers in Tanzania

Recently the Engineers Registration Board (ERB) conducted monitoring visits to East & Southern Regions (Coast, Lindi and Mtwara) and Lake Zone (Tabora, Kigoma, Geita, Shinyanga, Simiyu, Mara and Kagera Regions).

The Board visited 126 engineers in the Coast and Southern Regions, of which only 29 were female engineers; and 307 engineers in the Lake Zone, of which only 67 were female engineers and held workshops with female engineers in both zones whereby the Board presented a paper on the SEAP general overview, opportunities, achievements and challenges facing women engineers.

The statistics reveal that the number of

female engineers is still low compared to male engineers. One of the reasons why female engineers quit the SEAP training is attributed to lack of funds to support them during the training.

The Norwegian Government has been supporting financially the development of women engineers in recent years but the support was not enough to cater for all female graduate engineers in the country. However, on March 11, 2016, the



*Female SEAP trainees from Coast, Lindi and Mtwara regions who attended the workshop in Mtwara.*

Board signed a letter of intent with the Norwegian , of which the later has shown interest to continue support women engineers in SEAP.



*Female engineers in the Lake zone who attended the workshop in Mwanza listening to a presentation by Eng. Benedict Mukama.*

## ENGINEERS FORUM

### Board monitors construction, discovers shortcomings

The Board recently conducted monitoring of construction in various parts in the country. During monitoring visits in the Coastal regions was conducted from 27th to 29th January, 2016, and in Lake Zone from 17th to 27th February this year, several defaults were observed, such as displaying names of engineering consulting firms as Structural or Service Consulting Engineer on project signboard without firms' owners consent and involvement, Foreign engineers offering engineering services in construction projects without being registered by the Board. In addition, most of the clients were found implementing multistorey structures without appointing services consulting engineers for projects supervision.

Several defaults were observed, which include supervision of Structural projects by consulting firms, without projects being registered by the Board (42%), execution of Service works without projects registration with the Board (89.9%). The table below summarizes the observations made by the monitoring team during the visits in the lake zone.

**Table 1: Projects Registration Status**

Regions Visited	Unregistered Structural works (%)	Unregistered Service Works (%)	Unregistered Road Projects (%)	Unregistered Water projects (%)
Singida	-	5.8	-	-
Shinyanga	8.4	8.7	25	-
Mwanza	16.8	46.4	-	-
Kagera	14	17.4	-	-
Geita	2.8	11.6	25	-
<b>Total</b>	<b>42</b>	<b>89.9</b>	<b>50</b>	<b>-</b>

## REMINDER: ENGINEERS PROJECTS REGISTRATION STICKERS

The Engineers Registration Act No.15 requires that all engineering works or services that require consultancy services be undertaken by consulting engineers or engineering consulting firms. It is the responsibility of the client, financier, promoter and developer, of any engineering work or services to provide evidence of having engaged the services of an engineering consulting firm.

Any engineering consulting firm intending to supervise construction projects should apply for Board's Sticker and Site Instruction Book by filling relevant prescribed forms for building projects and engineering projects. Duly filled forms accompanied by the required attachments, upon submission to the Board are assessed and upon payment of the appropriate registration fees, the project registration sticker and site instruction book are issued in the same day.

Experience has shown that some of sticker application forms, filled and submitted by consulting engineers are being rejected because of being incompletely filled.

Here below is a checklist to documents which need to be submitted with the application forms:

Project Name \_\_\_\_\_

Location \_\_\_\_\_

Engineering Consulting Firm \_\_\_\_\_

SNo	Particulars	Please tick
1	Brief description on the Project. Include project type, nature, size and project progress stage.	
2	Copy of Building Permit.	
3	Copy Commemorative notice.	
4	Agreement (design/supervision) between client and Engineering Consulting Firm showing fee schedule, scope of works and signatures of parties to the contract	
5	Submit Cost of project as per "QS" official stamped estimates.	
6	Name of Main Contractor, Class of Registration	
7	Name of Sub-Contractors ( <i>Electr, Mech, etc.</i> )	
8	Evidence of engagement of the Site Engineer from the Contractor (PEng. Stamp/letter of assignment)	
9	Evidence of the Pre-contract agreement indicating design engineer OR Note of approval of the design by Supervising Consultant (where applicable)	
10	Submit design calculations and drawings approved/Stamped by Local Government Authority Council	
11	Evidence of engagement of project engineer for the Engineering Consulting Firm. ( <i>Please note that instructions are issued by Consulting Engineer or designated Professional Engineer</i> )	
12	List of drawings adopted for supervision ( <i>where applicable</i> )	

### ANNUAL ENGINEERS DAY 2016

The Engineers Registration Board has organized the 14th Annual Engineers Day (AED 2016), scheduled on September 1-2, 2016 at Mlimani City Conference Centre, to discuss "Transforming Tanzania Towards Becoming a Middle Income Economy Country Through Industrialization: The Role of Engineers. A total of 6 technical papers will be delivered on structural transformation that Tanzania requires to attain middle income status in the development and promotion of industries, research, agriculture, natural resources, energy and infrastructure. Also considerations of environmental issues, good governance and capacity development for attaining the goal will be discussed.

All Engineers are encouraged to attend.

## Registration Statistics of Registered Engineers by Disciplines for the Period 1968-2015 as of December 31, 2015

Discipline	Category							Total	%
	GIE	GE	IE	PE	TPE	CE	TCE		
Civil	225	3,116	149	2,299	954	255	86	7,084	46%
Mechanical/industrial/Automobile	135	980	78	718	142	36	7	2,096	14%
Electrical	146	1,441	143	689	161	35	7	2,622	16%
Electronics & Telecommunications	166	1,005	38	145	51	9	-	1,414	6%
Environmental	27	450	22	142	6	12	2	661	4.3%
Mining/Mineral Processing/ Petroleum/Gas	-	397	2	113	54	3	1	570	3.5%
Aeronautical	-	2	-	6	-	-	-	8	0.1%
Agricultural/Irrigation	2	232	-	75	5	3	1	318	2.0%
Chemical & Process	1	441	2	104	13	3	-	564	3.8%
Marine	12	8	4	23	2	-	-	49	0.4%
Computer & IT	-	390	-	34	-	-	-	424	2.5%
Textile	-	2	-	2	1	-	-	5	0.04%
Geotechnical	-	21	-	9	8	5	1	44	0.3%
Food and Biochemical	-	34	-	6	-	-	-	40	0.2%
Electromechanical	-	104	-	23	2	4	-	133	0.7%
<b>TOTAL</b>	<b>714</b>	<b>8,623</b>	<b>438</b>	<b>4,388</b>	<b>1,402</b>	<b>362</b>	<b>105</b>	<b>16,032</b>	<b>100%</b>

### Legend

**GIE:** Graduate Incorporated Engineers, **GE:** Graduate Engineers, **IE:** Incorporated Engineers

**PE:** Professional Engineers, **TPE:** Temporary Professional Engineers, **CE:** Consulting Engineers

**TCE:** Temporary Consulting Engineers

## REGISTRATION STATISTICS (1968-2015) AS OF DECEMBER 31, 2015

Category	Total Cumulative Registration as of December 31, 2015	Upgraded status	Deleted	Re-Registered	Left the country	Deceased	Current Actual (Active) as of December 31, 2015
GIE	714	131	5	-	N/A	6	572
GE	8,623	1,449	-	-	-	57	7,117
IE	438	139	-	-	-	22	277
PE	4,388	358	164	10	-	238	3,638
TPE	1,402	105	137	6	54	8	1,104
CE	362	N/A	4	1	-	37	322
TCE	105	N/A	22	-	-	3	80
<b>TOTAL</b>	<b>16,032</b>	<b>2,219</b>	<b>330</b>	<b>17</b>	<b>54</b>	<b>371</b>	<b>13,075</b>
LECF	203	N/A	18	1	-	N/A	186
FECF	80	N/A	19	-	-	N/A	61
<b>TOTAL</b>	<b>283</b>	<b>-</b>	<b>37</b>	<b>1</b>	<b>-</b>		<b>247</b>

**Legend**GIE: Graduate Incorporated Engineers, GE: Graduate Engineers, IE: Incorporated Engineers

PE: Professional Engineers, TPE: Temporary Professional Engineers, CE: Consulting Engineers

TCE: Temporary Consulting Engineers, LECF: Local Engineering Consulting Firm

FECF: Foreign Engineering Consulting Firm

## Kigamboni Bridge Project: Facts, figures - and lessons learnt

The Kigamboni Bridge project is a cable-stayed bridge and its approach roads at Kurasini Creek in Tembeke Municipality, Dar es Salaam and is being undertaken by China Railway Construction Engineering Group in joint venture with Major Bridge Engineering Company (CRCEG-MBEC JV), while the Project Engineer is Arab Consulting Engineers from Egypt.

Financing of the USD 136 million project is done jointly between the National Social Security Fund (NSSF) whose contribution is 60% and the Government of the United Republic of Tanzania contributes 40% of the total contract sum. The NSSF contribution is in terms of long term loan to the Government, and shall recoup its money plus profit through road toll to be collected from all motorized vehicles crossing the bridge.

The facility includes, among others, approach roads on both sides of the bridge i.e. the Kurasini side and the Kigamboni (Vijibweni) side. The bridge, and the Approach Roads carry 6 lanes dual carriage way crossing at the Kurasini Creek ([6°51'33"S 39°17'59.14"E](#)) in Dar es Salaam.

### The Bridge

The Cable-stayed Bridge runs a total length of 680m, whereby 400m are cable-stayed main bridge, and the approach bridges constitute 140m on each side. The effective width of the bridge is 27.5m. The bridge deck rests on 13 piers across its entire length. Each of the piers no. 7 and no. 8 (the middle piers), consist of pylons 54m tall the top of the bridge deck, each holding 9 cables on each side. The pylon and their respective cables support a total length of 400m of the bridge span. The spacing between the two pylons is 200m.

### CHALLENGES MET AND LESSONS LEARNT

The project commenced way back in 01<sup>st</sup> February 2012 and was earlier scheduled to be completed in 36 months. The project started however, with the Bridge Section only, while the Approach Roads commenced in October 2013. The reasons for late commencement of the Road Section and late completion of the project are as follows:

#### Bottleneck of the Connecting Roads

Completion of the Kigamboni Bridge will provide additional link to the Kigamboni Peninsula, and thus improve traffic flow and boost development on that part of Dar es Salaam City. However, the effectiveness of the traffic flow to and from Kigamboni may not be fully realized if the Government does not make initiatives to improve all the connecting roads to the Bridge. For instance, there will be six lanes on the Bridge and its Approach Roads, but the connecting Mandela road in Kurasini side has only four lanes. Furthermore, the at-grade intersection at the Dar es Salaam

College of Business Education (CBE) has to be improved to a flyover intersection. Also, the Rangitatu - KAMATA road should also be improved from the current two lanes to six lanes. Likewise, the Kigamboni link road (Ferry – Kibada) is only two lane road. It is not until the connecting roads are equally improved, will the project realize its full potential.

#### Unforeseen Technical Problems

##### Cavity under the Sea bed at the Pylon No. 8

The Contractor observed a cavity when the piling works were on progress at the above mentioned location. Further geotechnical study had to be carried out to verify the extent of the cavity and its effects to the design of the pile foundation. The study led to the redesign of the piles, extending the same to between 70 to 84m below the Sea bed. The process delayed the project for a considerable period of time.

#### In a nutshell: Basic facts about Kigamboni Bridge and its approach Roads

- Construction of 680m bridge connecting Kigamboni side of Dar es Salaam and Kurasini side. The bridge will have 400m cable stayed bridge (bridge whose weight and the load on it is supported by cables). The other 280m will be the box girder supported on columns.
- Construction of 2.5 km approach roads. 1km will be on Kurasini side and 1.5 Km will be on Kigamboni side. The road will join the Mandela expressway through elevated free interchange to separate traffic approaching and leaving the junction.
- The Consultants for this project are M/s Arab Consulting Engineers from Egypt. The Contractors are a joint venture of two companies which are China Railway Major Bridges Engineering Construction Limited and China Railway Construction Engineering Group.
- The Project started in February 2012 and was planned to be completed in January 2015. However due to some challenges, the Project is expected to be completed in March 2016.
- The bridge will have six lanes (three on each direction) and two pedestrians/cyclists lanes with width of 2.5 meters (one on each side). total width of the bridge is 32 metres from end to end.
- There is going to be a toll plaza for controlling and charging of vehicles passing through the bridge. A total of 14 controlled lanes are going to be in this area (seven for each of the two direction).
- For management of operations of the bridge, a total of 7 building structures are going to be built adjacent to the toll plaza these are:
  - Administration building;
  - Ambulance, Police and Fire Station;

- Laboratories;
- Generator Room 1;
- Generator Room 2;
- Weight Bridge Control Room; and
- Toll Station.
- The layout/profile of the project from Kurasini side to Kigamboni
  - Free interchange above Mandela Road sloping to the level of existing road on each direction;
  - Ramps sloping towards the TAZARA Railway Bridge passing under it;
  - Road embankment from TAZARA bridge to the Kigamboni Bridge Abutment on Kurasini side;
  - The bridge;
  - Road embankment from Bridge abutment on Kigamboni side to toll plaza;
  - Toll Plaza and the Buildings; and
  - Road embankment from toll plaza to the end of the road.
- The Contract sum is Tshs. 214,639,445,523/80. Payment arrangement per contract is 25% (Tshs 53,639,861,380/95) to be paid in Tshs. and 75% (Tshs. 160,975,584,142/87) to be paid in USD at exchange rate of 1 USD=1,590 Tshs. (or USD 101,245,021/47)
- A total of Tshs. 47,841,066,392 and USD 87,008,728/31 has been paid to date equivalent to Tshs. 186,184,944,405 as per contract (86.7% of contract sum).



## NEWS

### Tazara flyover project takes off with signing

Tanzania National Roads Agency (TANROADS) and Sumitomo Mitsui Construction Company (SMCC), on 15 October 2015 signed an agreement for the construction of a flyover at Tazara Junction in Dar es Salaam worth 101.6bn/-.

According to the Daily News of 16 October, 2015 the Minister of Works Dr. John Pombe Magufuli said during the signing ceremony in Dar Es Salaam that the project's implementation was important for the country, as it will lead to road traffic decongestion in Dar es Salaam and contribute to the city's development.

Minister Magufuli further acknowledged support of the government of Japan which provided a grant of 93.438bn/- . and stressed that a further 8.26bn/- will be contributed by the government of Tanzania. Dr. Magufuli also pointed out that construction work on the project will take 35 months.

He further noted that the project has continued to cement the good relations which have existed for a long time between the government of Tanzania and that of Japan.



*The signing ceremony of the TAZARA flyover between Eng. Patrick Mfuhale (CEO – TANROADS) and Mr. Ichiro Aoki (Contractor - Sumitomo Mitsui Construction Co. Ltd of Japan). The signing ceremony was witnessed by Hon. Dr. John Pombe Magufuli, now President of the United Republic of Tanzania*

# An Experience of Demolition Works on Multi-Storey Building along Indira Gandhi/Asia Street, Dar es Salaam

## An Experience of Demolition Works on Multi-Storey Building on at Indira Gandhi/Asia Street, Dar es Salaam

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### Back-ground

The building on Plot No. 1662/75 Indira Gandhi/Asia Streets; jointly owned by a Dar es Salaam-based businessman Raza Husein Damji and the National Housing Corporation (NHC), came under a demolition order over safety concerns. The demolition order came a few days after a sixteen-storey tower, owned by the same businessman and located close to the condemned building, collapsed in on the 29th March 2013, killing at least 36 people and injuring dozens.

The government, through the ministry of Lands, ordered the pulling down of the 16-storey building after construction experts recommended that it be immediately demolished to prevent an impending catastrophe. However, nearly two years (August 2015) after the tragedy that shocked the nation, the condemned building was still standing in the busy city area.

On Monday August 24th, 2015, it was reported that China Railway Jianchang Engineering Company (I) Ltd (CRJE) who were awarded the demolition works had pulled out of the contract and surrendered to do the job. In what seems to be lack of expertise and inability to perform, the contractor went outside the country to look for more experts to help do the job, but had never come back, an aspect that ushered failure to execute the job bearing the time-frame set for doing the job was over.

The government through the Lands Ministry sought and floated Tender to South African engineering experts, inviting companies with the required expertise to bid for the contract to tear down the 16-storey building. The Minister for Lands, Housing and Human Settlements Development, Mr William Lukuvi, said the government had extended its search to South Africa after failing to get demolition experts with the required technology and expertise in East Africa to carry out the work.

### Abstract

*On the 1st February, 2016, the Dar-es-Salaam Regional Commissioner said the tender to demolish the targeted structure had been issued to Patty Interplan Limited and that he had summoned the contractor to the Regional Defence and Security Committee meeting that will be held today to brief the committee on the technology to be used, the technology must guarantee the safety of people and their properties.*

*During negotiations, the Contractor raised a concern that the Project was set to run without a Consultant. Ilala Municipal Council gave the Contractor a mandate to come with a Consultant. ANSWISA Consult Limited represented by its Managing Director, Eng. Swithurn M. Mgaya was brought before the Dar-es-Salaam Regional Defence and Security Committee and made the presentation on the following lines:*

- Proper Demolition Methodology
- Project Execution Plan
- Environmental Health and Safety Plan
- Risk Management Plan
- Key Milestones

*This paper discusses the above listed issues, among others; and winds up with recommendations for future demolition works.*

## Proper Demolition Methodologies

### Introduction

Demolition means dismantling, razing, destroying or wrecking any building or structure or any part by pre-planned and controlled methods. Demolition is the tearing-down of buildings and other structures. The Methodology herein describes common ways of bringing down the building, and includes safety procedures. In practice, more than one method can be used to demolish a building. Some common methods are herein presented. The recommendations are presented at the end.

### Demolition methods

#### Demolition by hand (Manual Method)

- i. Hand demolition is not a quick method, because only hand tools are used. However, cranes and shear legs may be used to hold or lower beams during cutting. Chutes, or crane-and-skip are usually used to get debris safely from the upper stories to the ground.
- ii. Manual methods are carried out top down, proceeding, in general, from the roof to ground. The sequence of demolition may vary, depending on site conditions and structural elements to be demolished.
- iii. For reinforced concrete buildings, jack hammers are commonly used to break down the concrete. Oxy-acetylene torch could be used to cut the reinforcements. The reinforcements shall remain until all the concrete connecting to or supported by the reinforcement is broken away or when its support is no longer required. In congested areas, these features could have critical impact on the safety.
- iv. Safe access must be provided. If work cannot be carried out safely on the building, a scaffold or machine-lifted platform should be used.
- v. Demolish only one storey at a time. It is usually safest to demolish the building in the reverse order to building it, so the roof should go first. Next, part of each floor is taken out so that the debris can fall through. On some jobs, the debris can be dropped down the lift shaft, in which case, guardrails must be provided around openings.
- vi. Debris must be removed regularly and not allowed to pile up on floors. An overloaded floor could collapse onto the floor below, which in turn, could collapse on the floor below it. Without propping from the floors, the walls of the building could collapse. Walls could also collapse if debris is piled against them.

vii. If people have to work in a place with a fall risk without guardrails or barriers to isolate them from a fall, other protective measures must be implemented, including wearing a properly anchored safety harness. Harnesses are only to be implemented if all other controls cannot be used. The employer shall need to undertake a hazard assessment to effectively determine the appropriate controls beforehand. All persons using any fall arrest systems must be fully trained in the correct and safe use of this equipment. Refer to section 5.6.4 for further information.

viii. At the end of each day, make sure the building is safe. Guying or propping may be necessary to avoid hazards from wind or vibration. If only part of the building is knocked down, make sure that what is left can stand safely.

Other methods include, demolition with the ball, demolition by pusher arm, demolition by deliberate collapse, demolition by wire rope pulling and demolition by explosives.

### Recommendations

Having gone through all the practical methods, considering the location of the building and the safety of the adjacent buildings, the Manual Method or the Demolition by Hand Method is the most appropriate, and hence the one to be adopted after the consent of the Client.

### Project Execution Plan

- a. Prior to starting work, necessary approvals shall be made from the relevant Professional Boards and or other relevant authorities.
- b. A detailed survey shall be conducted to ensure the identification of any structural problems and risks associated with flammable substances and hazardous substances to health. The survey shall take into account any adjoining properties likely to be affected by the demolition works.
- c. Consideration shall be given to the location of premises containing sensitive equipments, machineries, etc. so that restrictions shall be made for falling of materials, vibrations and dust protection during demolition. Similar considerations shall be made in relation of noise. Vehicles and plants shall be effectively immobilized and gas and electricity supplies shall be isolated. Wherever necessary, surface protection shall be given to existing structures.
- d. Hand demolition which we have selected to be used in this assignment is not a quick method, because only hand tools are used; however it is the most safe. Demolition shall be carried

out top down, proceeding, in general, from the roof to ground. The sequence of demolition may be varied during execution, depending on site conditions and structural elements to be demolished.

- e. Jack hammers shall be used to break down the concrete. Oxy-acetylene torch shall be used to cut the reinforcements. The reinforcements shall remain until all the concrete connecting to or supported by the reinforcement is broken away or when its support is no longer required. In congested areas, these features could have critical impact on the safety.
- f. Safe access shall always be provided. Where work cannot be carried out safely on the building, a scaffold or machine-lifted platform shall be used.
- g. Only one storey shall be demolished at a time. The roof shall go first. Next, part of each floor is taken out so that the debris can fall through. On some incidences, the debris shall be dropped down the lift shaft, in which case, guardrails shall be provided around openings.
- h. Debris shall be removed regularly and not allowed to pile up on floors. An overloaded floor could collapse onto the floor below, which in turn, could collapse on the floor below it. Without propping from the floors, the walls of the building could collapse. Walls could also collapse if debris is piled against them.

#### **Environmental Health and Safety Plan**

We have the National Environment Management Council (NEMC) and the Occupational Safety and Health Act (OSHA) which set Laws, govern and regulate the Environmental Health and Safety at work place. The law says that all demolition, dismantling and structural alteration must be carefully planned and carried out in a way that prevents danger by practitioners with the relevant skills, knowledge and experience. Key issues are:

- Falls from height
- Injury from falling materials
- Uncontrolled collapse
- Risks from connected services
- Traffic management
- Hazardous materials
- Noise and vibration
- Fire
- Worker involvement

Consideration in this assignment shall be

- o Temporary electrical services required for the demolition works shall be made in accordance with HSE rules and regulations.

- o Demolition survey shall note the location of all known services on and adjacent to the site whether they are overhung or underground.
- o During demolition, a horizontal distance of 6 m from the building shall be kept as a restricted area to allow the fall of debris.
- o Where work cannot be done safely from the ground level, adequate scaffolding shall be erected and shall be maintained in safe condition.
- o Outside the working hours, ladders providing access from ground to first landing shall be removed and stored in a secured area.
- o Assurance shall be made that all debris shall be cleaned out on sequential basis

An Environmentalist cum Geotechnical and a Civil/Structural Consultant shall form part of the team and shall work out the Structural integrity of the building in relation to the force exerted by the demolition team and their tools and/or equipment.

#### **Risk Management Plan (Risk Mitigation Plan)**

1. All roads leading to the work place shall be closed during the time of excavation except the Project vehicles.
2. Warning signs shall be posted on the peripheral of the working area to alert by-passers that they are approaching a danger zone whose entry require permit.
3. Residents around the Project area shall be educated during meetings to be held by the Environment and Social Impact Assessors and each resident shall sign acknowledging that he has been educated, informed and understood the impact of the demolition works and the necessary health and safety measures to be taken.
- 4 Each staff and demolition team shall be taught and reminded on daily basis during tool-box meetings of the dangers and risks involved at their work place and how to avoid them so that each goes back to his family everyday healthy and safe. Each staff and demolition team member shall sign daily acknowledging that he has been instructed on safe working procedures and that he shall abide by them and to the contrary bear the responsibility and accompanying penalties.
- 5 Each staff and member of the demolition team shall be provided with the necessary personal protective equipments or gears, and shall sign that he has been provided by such gears

and that he shall use them to protect himself and others; and failure to do so, he shall bear the consequences including but not limited to the required penalties.

At any time an ambulance shall be stationed at the work-place area, being on stand-by and alert, fully equipped with the necessary medication and professionals to handle accidents when the inevitable comes.

7. Visitors shall have special permissions to visit the site and shall not be allowed to enter the site without the necessary protective gears. A set of five spare ppes shall be stored at the site for visitors.
8. The demolition team and staff shall carry out medical check up at the beginning of the Project and at the end of the Project to cater for claims of possible work related health effects.
9. As the structure is towering above other structures, it is easy for the building to act as lightening arrester. The meteorological team shall brief the demolition team of such weather so as to stop working at height.
10. Insurance for the staff and demolition team, working tools and equipment and neighbourhood shall be active until handover.

### **Project Administration**

#### **The Contract**

The Ilala Municipal Council signed the Contract with Patty Interplan Limited on the 1st February, 2016. While during tendering, Project duration was three months, the duration was cut down to 51 days during negotiations (14 days mobilization, 36 days demolition works and 1 day demobilization). The Contract sum was 987,700,000 Tanzanian shillings.

The very fact that the Regional Defence and Security Committee handled the project in interviewing and granting authority to go ahead, it implies it was an emergency Contract. The demolition order has been pending for 3 years, “what prompted the emergency now?”, you may ask. We can only speculate that it is the action of the “Magufuli” Government – Hapa Kazi tu..

#### **Occupational Safety and Health Authority (OSHA)**

They took trouble to train all the staff and issued them with certificates. One of the issues addressed, among others, was dehydration. They brought awareness to our team that exhaustion arising from lack of water (fluids) in the body and bring about dizziness and ultimately possible accidents.

Other training involved the need for vaccination against occupational diseases. According to the nature of work (demolition), tetanus, silicosis and asbestosis, the former arising

from the handling of steel and the rest arising from dust. OSHA vaccinated all our staff involved in the Project against these identified possible occupational diseases.

#### **Safety Measures taken**

- All operation staff numbering over 100 (including gang leaders) were trained vaccinated and certified by OSHA.
- All electrical lines, poles and transformers in the area were removed in anticipation of heavy destructive debris fall.
- Remove all 50 families living within the distance of H/2 from the edge of the building .
- Hoarding was erected at a distance greater than H/2 where H is the height of the building.
- The requirement of double layer scaffolding, screens and working platforms for retaining dust and flying debris if the method used and site conditions warrant. CP e2004 .
- Hired security guards to protect the public from tempering in the Project area for 24 hours and during all the days of the Project.
- The demolition work was done manually top to bottom, a gang of 25 operating per shift.
- The ambulance and specialized staff on occupational diseases and injuries were deployed at the site daily.

Considering the aforementioned safety measures in position, this Site can be graded as one of the safest workplace in the nation

#### **Precautions**

##### **Danger of lightening**

On the 10th February, 2016 there was thunder storm and lightening. I had to rush to the site early in the morning and stopped the demolition work. I briefed the team on the team that lightening is electricity in the air and usually strike the highest points in the area. By then, the building under demolition was the highest in the area. With steel reinforcement exposed, they were likely to act as lightening arrestors – conducting electricity to the ground (earthing)

##### **Termination of Services**

A number of gang members were terminated due to persistently violating safety regulations (human behaviour) as a good lesson to other gang members to adhere.

## Execution

It all started at a small rate demolishing one floor in three days, being cautious of possible sudden collapse of the building due to failure caused by overload of any slab. After we had demolished five floors, then the speed picked up – we could demolish one floor per day until we reached the 7th floor where we took 2 days. The 6th floor and the 5th floor also took 2 days for each floor.

At the 4th floor, the demolition team started complaining of the difficulties in demolition and submitted their request for negotiations of the terms and remunerations. We told the gang that it was not a big deal as we could proceed with machinery. We stopped the work, not because we were giving room for negotiations, but because of lack of funds. This was the second stoppage. The third stoppage for the same reason came as we reached the 2nd floor. While the progress of work is at 80%, funds released for the Project stand at 20%. Had the cash flow been timely, we could be talking of “a handed” over Project by now.

## Remarks

### A Code of Practice

Code is a set of rules which are accepted as general principles, or a set of written rules which state how people in a particular organization or country should behave. In this assignment, I realized how demolition works have no set of rules or accepted principles or putting it right; No code of practice. In these Remarks, I am putting down ideas which can lead to policy formulation that can allow us to set a Code of Practice for demolition. (Policy is a set of ideas or plan of what to do in a particular situation).

The absence of the Code of Practice on demolition led to some stakeholders in this Project to apply Construction codes of Practice which brought confusion in some respects.

### Monitoring of Structures

Structures can be built with the best design based on an excellent geotechnical report, quality materials and the best workmanship, and yet fail. With time, there is change in the soil conditions particularly when pumping of ground water is not controlled as is the case with Dar-es-Salaam. Monitoring of buildings gives data which send an early warning to evacuate and leave the building to be demolished willingly without causing harm to people and property.

### Coordination of Technical Teams

As noted above, there have been a number of teams involved in the Project and each team had a legal mandate to intervene. When these legalities are in conflict, that is when the need for an independent party arises. I know National Construction Council in many cases come in picture when disputes arise and usually this comes at an advanced stage. I observed this vacuum as detailed below.

Construction Registration Board was so much concerned with the success of the Project to an extend of making a checklist to

identify if all the necessary legal entities are involved in the Project. At this juncture, I thought, right as CRB had to know, another party had to do that assignment and I thought of National Construction Council (someone my say National Demolition Council??)

### Registration of Demolition Contractors

As a nation develops, demolition activities shall be progressive. I would propose the Contractors Registration Board to come up with conditions and qualifications to register for such Contractors. I propose OSHA should be involved in one way or another or in all aspects or if the Law allows, OSHA can be the registering agent. May be I am biased because of their impression on the project

### Role of Politicians

In this Project, the role of politicians was predominant and everyone giving instructions and time frames. At one meeting with CRB caution was aired that instructions which are not documented can always fire back. It is my understanding that politicians are policy makers and not implementers; however, in this project they made things move, but this should not continue to be the order of the day.



*The photo of demolished building*