

# THE BREEZE

## 70<sup>th</sup> PROJECT SPECIAL ISSUE

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St. Michael's Association

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### Letter from the Editor

If you visit the school this autumn for the first time in a year, you will probably not notice much change in the façade of the school, except for maybe the nursery section which went through some refurbishment. However, the appearance is often deceiving, and we are happy to report that the school has gone through some extensive earthquake proofing over the summer to ensure the school building can withstand a significant earthquake. All this is part of the 70<sup>th</sup> Project, our way of celebrating the 70 years of creating tomorrow in Kobe, and ensuring that the legacy of St. Michael's will go on for the next 70 years and beyond.

In this issue, you will find an article from the chairs of the School Board and the Council who will describe the 70<sup>th</sup> Project in more detail. You will also find an article from the architect who project managed the retrofitting project. You will be interested to know some cutting-edge technologies were used to strengthen the school, while ensuring that the look-and-feel of the school is largely unchanged. Finally, we are announcing the 70<sup>th</sup> Anniversary Ball in these pages, and that will be a great excuse to come back to Kobe, if you haven't done so recently.

It is our job to let you know that the 70<sup>th</sup> Project has just begun, and the main focus of the school this year is the Capital Campaign, where we aim to raise 70m yen to allow further upgrades to the school facilities. Your hard work with St. Michael's Association (bazaar, merchandise, Annual get-together etc.) has allowed us to donate a small surplus from St. Michael's Association coffers, and I thank you for your enduring support.

You can help us by:

1. Spreading the word that the school is undertaking a Capital Campaign

Please talk to your ex-classmates, families, friends, or upload the information to social networking such as facebook or linkedin. For starters, we need everybody in the international community in Kansai to know that the school is raising funds, and that may lead to donations from unexpected sources.

## 2. Give to the school

The Johnsen family has already ensured that they are one of the first in the queue to give to the school. However, the Johnsen family is not expected to be the largest donor. We are hoping that many families from past and present will follow, ensuring the success of the capital campaign. The school does have the *tokuzo* status which allows tax advantage to the donors to the school.

We hope to keep you updated on the progress of the Capital Campaign, as the next stage of the school refurbishment will depend on how much we could raise in the Campaign.

Looking forward to the support of all of you.

Keyji Johnsen, *Editor*

## The 70<sup>th</sup> Project

With the motto *70 Years of Creating Tomorrow*, the coming year will be a celebration of the 70 years of St Michael's history since its birth amidst the Second World War devastation of Kobe.

We will reflect on the vision of Bishop Yashiro and Miss Leonora Lea in founding an institution that created tomorrows for so many: *your* tomorrows.

As we look back, remembering how the School developed from the rickety wooden shack in which some of our alumni were educated, how it survived typhoons and earthquakes and potential financial disaster, we also need to look forward. Only by doing so can we ensure St Michael's will continue creating tomorrows for the next 70 years.

Therefore, we are launching an ambitious anniversary capital campaign: the 70<sup>th</sup> Project – ¥70 million for 70 Years. Pupils today enjoy the legacy of previous benefactors but the current buildings were designed for a different era. Facilities now need upgrading to meet the technical demands of the coming decades and to match the high standards of teaching offered. This campaign is an opportunity to invest in the future and bequeath to generations to come a school that will endure for another 70 years and beyond. In this way, St Michael's will continue to occupy a position in the forefront of international education in Japan.

If you visit the School today, you will see the results of the first phase of a renovation project completed this summer. Anti-seismic strengthening has

been retro-fitted so that the buildings meet current safety standards; electrical infrastructure has been greatly improved and new air-conditioning installed. All this has been financed by careful budgeting, scrimping and saving.

The next phase of the renovation is planned for the summer of 2017 – *if we can raise the necessary funds*. The results of this phase will be more obvious to everyone visiting the School – an attractive hall with extended stage, windows that no longer leak, and suitable lighting. With further upgrading of the classrooms, we will have a School for the 21<sup>st</sup> century.

During this anniversary year there will be special fund-raising events, culminating in the anniversary gala ball at the Kobe Club on 5<sup>th</sup> November 2016. The website has been redesigned to facilitate donations by those who love the School and wish to give something back. Perhaps you would consider leaving a bequest in your will?

We invite you to join us at events in the coming year and ask you to share our vision for the next 70 years. By doing so, we will be honouring the vision of Bishop Yashiro and Miss Lea who took the brave first step to found St Michael's in 1946.

Satoru Hamada, *Chair of the Board*, and Peter J. Mallett, *Chair of the Council*

## **The Earthquake Retrofitting Project**

The School main building was built in the 1960`s and consists of one 3-storey and one 2-storey sections forming an L shape. A structural survey was completed in year 2010 and made evident that the building would not have the stability and resilience to sustain a violent earthquake.

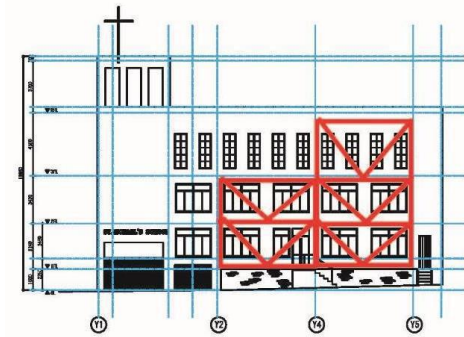
Points of action were identified as follows:

- 1) The steel reinforcing and concrete quality are in acceptable conditions, but it is necessary to repair and re-paint the outside wall to prevent water damage and preserve alkalinity of the conglomerate.
- 2) The building L shape is narrow and long (it is not symmetrical). This causes eccentricity in case of earthquake. This condition would cause high damage due to the torsional forces and needs to be corrected by shifting and balancing the structure with stiffening elements.
- 3) The structural elements for distribution and absorption of lateral forces

are not sufficient, especially the forces parallel to the north-south direction. Bearing walls or bracing elements should be implemented to increase the resistance to horizontal solicitations.

#### Reinforcing options:

- A) The first considerations were to create thick reinforced concrete stiffening walls inside the building and steel bracing on the external walls to preserve as much as possible the function of the windows.



The main disadvantages of this solution were the need to relocate the main entrance, the loss of natural light intake and the financial and time costs related to the interior works that the highly intrusive work would make necessary.

- B) Other solutions such as the backing-up of the external walls with concrete were discarded for the increase of weight of the structure and the drastic reduction of the openings facing Tor road.
- C) Then we examined the possibility of using carbon fibre to increase the rigidity and resilience of the columns and beams but the model was not suitable for the low-rise, asymmetrical building.
- D) The solution that was finally adopted was a new technology called JSPAC which aims at stiffening the column/beam joint using a combination of steel bars, steel plates, high density grout and FRP.

#### Objectives and results:

The structural calculation and simulations suggested that the reinforcing of the foundation/column/beam in 9 locations would efficiently absorb the horizontal thrust and would correct the eccentricity of the building when subject to horizontal stress. The locations to be reinforced are 8 columns on the long side of the building facing the playground (for the 1<sup>st</sup> storey only)

and 1 structure on the east wall of the playground (spanning the 3 floors.) For this reason, the total of the reinforced locations is 11 column/beam joints.

The chart below shows the structural parameters of the building, before and after the reinforcing. Note that the compound parameter “Is” is used to show the earthquake resistance. A structure is considered safe when “Is” is equal or greater than 0.6 ( $Is > 0.6$ )

#### BEFORE REINFORCING:

既存建築物の耐震診断結果一覧表															
方向		X						Y							
項目	階	終局時 累積強度 指数 $C_{TU}$	靱性 指数 $F_U$	保有性 能基本 指標 $E_0$	形状 指標 $S_n$	構造耐 震指標 $I_s$	累積強 度指標 $C_{TU} \cdot S_n$	判定	終局時 累積強度 指数 $C_{TU}$	靱性 指数 $F_U$	保有性 能基本 指標 $E_0$	形状 指標 $S_n$	構造耐 震指標 $I_s$	累積強 度指標 $C_{TU} \cdot S_n$	判定
	3	0.938	1.00	0.949	0.810	0.709	0.760	OK	0.691	1.00	0.702	0.810	0.525	0.560	NG
	2	1.022	1.00	1.030	0.900	0.856	0.920	OK	0.736	1.00	0.744	0.720	0.494	0.530	NG
	1	0.922	1.00	0.930	0.900	0.773	0.830	OK	0.445	1.00	0.482	0.650	0.289	0.310	NG
備考		経年指標 $T = 0.923$ 結果一覧表のIsは左右加力の内、低い値を示す。													

Since the building extends along the East-West direction (X axis) it was already stable in this direction (the green field at the left shows values of 0.773 for the 1<sup>st</sup> floor, 0.856 for the 2<sup>nd</sup> floor, 0.709 for the 3<sup>rd</sup> floor). On the other hand, the building was very weak on the North-South direction (Y axis) especially on the 1<sup>st</sup> floor. The Is parameter is well below the required 0.6 for all the three floors (the red field at the right shows values of 0.289 for the 1<sup>st</sup> floor, 0.494 for the 2<sup>nd</sup> floor, 0.525 for the 3<sup>rd</sup> floor).

#### AFTER REINFORCING:

既存建築物の耐震補強結果一覧表														
方向 階/項目	X							Y						
	$C_{TII}$	$F_U$	$E_0$	$S_n$	$I_s$	$C_{TII} \cdot S_n$	判定	$C_{TII}$	$F_U$	$E_0$	$S_n$	$I_s$	$C_{TII} \cdot S_n$	判定
3	2.126	1.00	1.001	0.381	0.749	0.810	OK	0.691	1.50	1.055	0.810	0.789	0.560	OK
2	1.022	1.00	1.030	0.900	0.856	0.920	OK	0.611	1.50	0.931	0.720	0.618	0.440	OK
1	1.100	1.00	1.101	0.900	0.914	0.990	OK	0.769	1.50	1.180	0.650	0.708	0.500	OK
備考	*補強時の診断に当っては既存耐震診断書の荷重条件を採用した。 経年指標 $T = 0.923$ 結果一覧表の $I_s$ は左右加力の内、低い値を示す。													

After the reinforcing, the building become even more resilient on the X axis (the green field at the left shows values of 0.914 for the 1<sup>st</sup> floor, 0.856 for the 2<sup>nd</sup> floor, 0.749 for the 3<sup>rd</sup> floor). Along the Y axis, the Is parameter is now in the safe zone, above 0.6 (the field at the right is now green and shows values of 0.708 for the 1<sup>st</sup> floor, 0.618 for the 2<sup>nd</sup> floor, 0.789 for the 3<sup>rd</sup> floor).

#### Notes about the JSPAC earthquake retrofitting system

The acronym stands for Japan association of Steel Plate and Aseismic fiber Composite. The concept is in a way similar to an open reduction and internal fixation (ORIF) surgery, used to treat a human bone fracture. The surgery uses metal screws, pins, rods, or plates to hold the bone in place in the correct position. Similarly, JSPAC would displace a three dimensional

grid or steel re-bars along the longitudinal and tangential planes of the column and beam. The structure is clad with custom made steel plates and fiber glass mesh which has two main functions:

- Operates as a surface reinforcing especially performant to contain compressional and torsional forces
- Constitutes a form for the subsequent pouring of the grout

Finally, the anchors, vertical re-bars and horizontal tie bars are made collaborate through a high density grout poured inside the form at high pressure in 3 different stages to ensure full-depth penetration in all interstices.

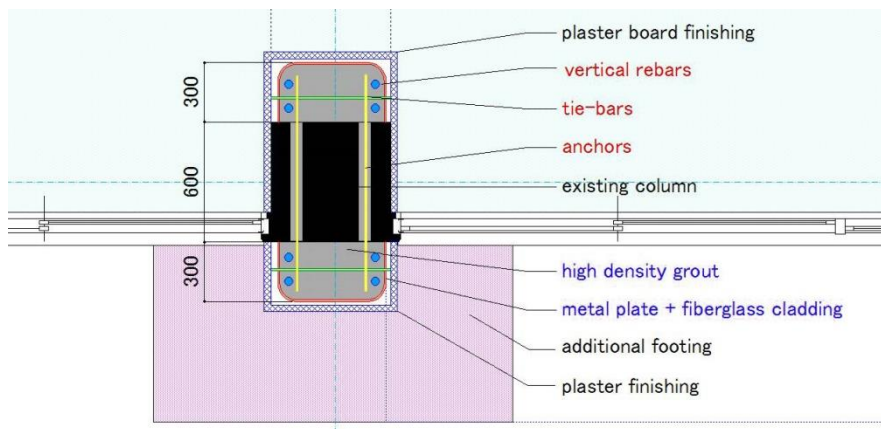
Here below is a visual scheme of the actions involved in the reinforcing



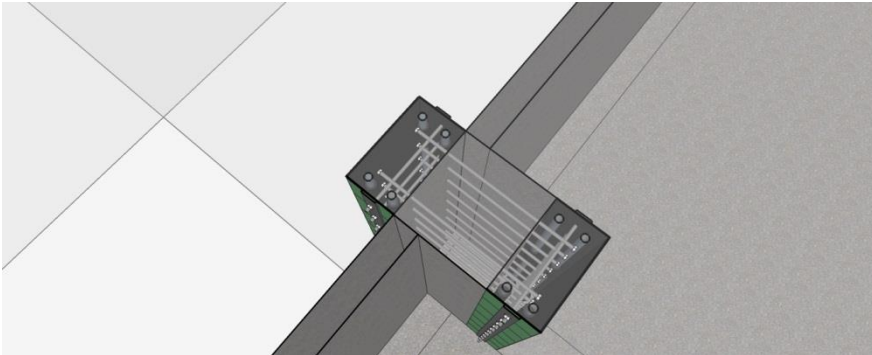
<ul style="list-style-type: none"> <li>• Insertion of anchors</li> <li>• vertical reinforcement</li> </ul>	<ul style="list-style-type: none"> <li>• steel plates installation</li> <li>• welding on site</li> </ul>	<ul style="list-style-type: none"> <li>• mesh / FRP cladding</li> <li>• placement of tie bars</li> </ul>	<ul style="list-style-type: none"> <li>• pouring of grout</li> <li>• finishing</li> </ul>
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Here below is a scheme of the JSPAC system applied to the school's structure. The elements shown in red and blue in the legend below are the core components of the reinforcing. Basically the intervention achieves three purposes:

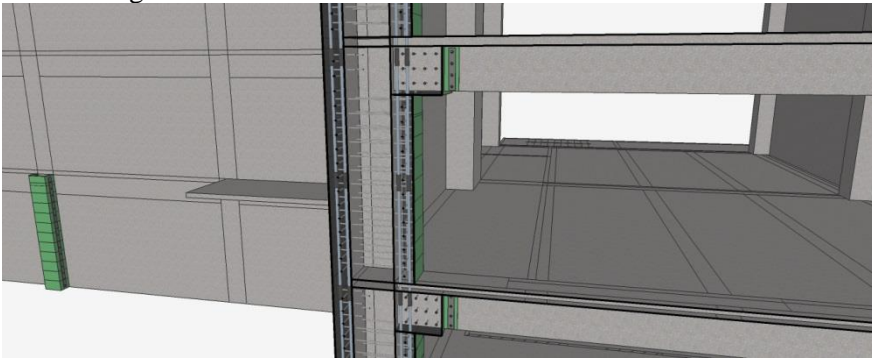
- increasing the section of the column from 600x600 to 600x1200mm
- increasing the resistance of the existing column (both compression and traction)
- increasing the rigidity of the column/beam joint



Here below is a three dimensional view of the column reinforcing from above:



This is a cross section of the structure spanning 3 stories on the east side of the building:



This view shows the extent of the reinforcing from inside the building (1<sup>st</sup> floor - early years).





Below is a sequence showing the different stages of the reinforcing work:

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## reinforcing



## forming



## grout pumping



## finishing



Structural reinforcing work implemented by Maverick Co. and Bright Corporation.  
General construction and mechanical equipment work managed by Nihon Kensetsu Co.  
Architectural design and construction site supervision by Studio dodici

### Conclusions:

During the summer of 2015, the school underwent a thorough refurbishment including the replacement of the lighting, air conditioning units, the installation of new ceilings, new doors, new fire alert system, deep restoration of the building wall and improvements in the layout of the 1<sup>st</sup> floor.

We can state that the school is safer, more energy efficient and is more comfortable and functional.

In this report we briefly explained the improvements to the structure and earthquake retrofitting. The increase of the performance is substantial: in particular, the 1<sup>st</sup> floor resistance against horizontal thrust passed from an evaluation of 0.289 (potential collapse) to 0.708 (usable as shelter). An improvement of more than 2.4 times. Another point of pride is that such a “muscular” reinforcing impacted minimally the layout and functionality of the school. The windows area have not been reduced and all the accesses and paths have been preserved. Actually, the reinforcing is almost invisible and probably if you did not see the pictures of the work phases you would not even notice the changes.

This is actually the reason that motivated the compilation of this report:

- firstly to reassure the community about the safety of the building
- secondly to offer some information to all of you curious about the details and the cutting-edge technology that was used in this project.

Like when dealing with people, when evaluating the value of a building, please do not stop at the aesthetic appearance. Functionality, safety, energy saving make the building healthy and beautiful.

We hope you will enjoy it.

Iacopo Torrini

## **Save the Date —70th Anniversary Gala— Saturday, 5th November 2016**

The 70<sup>th</sup> anniversary gala of St. Michael's will be held at the Kobe Club on Saturday, 5<sup>th</sup> November 2016. This will be an event to remember—especially because we only have this type of event once every 10 years! We wish to welcome as many who have helped make St. Michael's the great institution that it is today as possible.

The proceeds of this event will of course go towards the 70<sup>th</sup> project, and therefore your support would be invaluable.

This will be an ideal time to come back to Kobe and see how the city has changed over the years, and also to reflect on what has not changed in an ever-changing world.



So plan your next trip to Japan around the 70<sup>th</sup> Anniversary Gala—the organising committee looks forward to welcoming you.

## Donating to the capital campaign

The easiest way to donate is by bank transfer, however donations can be made in cash or by cheque. SMIS has special tax dispensation status (*tokuzo*) that allows us to issue tax receipts for gifts over ¥5,000. Gifts over ¥5,000 are now eligible for tax deductibility under the special designated tax status (*tokuzo*) that SMIS has received.

Download The 70th Project Gift Form and return electronically to [70thproject@smis-mail.org](mailto:70thproject@smis-mail.org) or direct to the school using the address below.

### *By Bank Transfer*

The following is the details of the bank transfer

Account name: Gaku Sei Mikaeru Kokusai Gakko

Bank Name and Branch: Mizuho Bank, Kobe Branch 490

Current Account: Futsu Koza

Account number: 1609993

### *By Cheque*

Cheques should be made in yen and payable to Gaku Sei Mikaeru Kokusai Gakko and sent by post to the following address:

St. Michael's International School

3-17-2 Nakayamate-dori Chuo-ku

Kobe 650-0004

Japan

## ST.MICHAEL'S INTERNATIONAL SCHOOL

17-2 NAKAYAMATE-DORI 3-CHOME CHUO-KU

KOBE 650-0004 JAPAN

<http://www.smis.org>

E-mail: [head@smis-mail.org](mailto:head@smis-mail.org)

TEL: (078) 231-8885 FAX : (078) 231-8899

