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Editorial Board

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Editorial

The Military and Land Surveying

A recent discovery by a team from the University of Hong Kong's Department of Real Estate and Construction brilliantly illustrates the relationship between the military and land surveying in Hong Kong. It also incidentally highlights the relationship between surveying and both natural and built heritage.

In the course of pursuing an ongoing programme of work on Hong Kong's sorely neglected, colonial period military structures from the first half of the twentieth century, the HKU team turned their attention to the much-neglected Saiwan Redoubt. Part of this structure has been badly damaged by the installation of a television service transposer in its south-east corner. Much of the rest of it has also been greatly – and bafflingly – changed by subsequent adaptations.

To try to help understand what the team was seeing, one member sourced the original plan of the Redoubt from the National Archives in the United Kingdom.

The plan was revelatory in many ways, but one particular element was particularly interesting. On the highest point of the Redoubt a small symbol was marked on the map labeled "W.D. Boundary Stone marked B.O. No.4" with, beside it, a spot height of 655.35 (feet) "top of stone". Accordingly, in case despite the ravages of time and extensive alteration anything of this intriguing marker remained, the team searched the location where it was shown on the plan.

To the astonishment of all, the entire stone was still extant, if somewhat damaged. Research indicated that it bore no resemblance to any known Hong Kong boundary stone for any military or other lot. Further research by the team member – on which a fuller report will appear in the next *Surveying and the Built Environment* – revealed the high probability that what had been located was the only known example of a trigonometric survey marker from the first ever systematic land survey of Hong Kong Island.

It is this that makes our point. Lieutenant Thomas Bernard Collinson, Royal Engineers carried out that first survey between 1843 and 1845 (Collinson's survey 1843-1845), whilst his naval brother, Captain Richard

Collinson RN, was simultaneously updating Commander Belcher's 1841 survey of Hong Kong's waters. In both cases the critical early surveying of the entire territory was the responsibility of the British armed forces. So it was within that larger cartographical picture that the more detailed civilian surveys under the first Surveyors General, A.T. Gordon (1841-1845) and Charles St. George Cleverly (1845-1865), were framed.

Hong Kong was following an established pattern found in many organized and sophisticated societies; specifically in this case that of Great Britain and its Empire. The first surveyors to begin their work in newly acquired territory were those of the military. Only later came the civilians with their work assisting government in its tasks of regulation, registration and taxation.

The history of surveying is much coloured by these two disparate roots. In the case with which we began this is elegantly illustrated by the stone the HKU team had found. Far from having a civilian inspired marking related to government land lot allocation – normally in Hong Kong 'WD' for War Department, an anchor for Naval land, or 'DL' for Defence Lot – the marker described on the 1895 map as a "W.D. Boundary Stone" was nothing of the sort.

Rather it took us back to before 1855 and to the origins of nationally systematic land surveying in Britain: to the work of the Board of Ordnance under the Master-General of the Ordnance. This military office, which dated from 1415 (as Master of the Ordnance), handled all matters related to artillery, fortifications, engineers, military supplies and much else except food, animal fodder and equipment, which was the business of the civilian Commissary.

Under the Master General were four departments one of which was headed by the Surveyor-General of the Ordnance, an office dating back to 1538, whose responsibilities included mapping fortifications and creating maps for battlefield use. In the mid-18th century he was given the task of mapping Scotland – a matter of the effective prosecution of a military campaign. The skills exhibited led to the principal officers – members of the Corps of Sappers and Miners (later the Royal Engineers) being charged with the Principal Triangulation of Great Britain in 1783. And that led to the creation of the Ordnance Survey in June 1791, which became a separate office within the Board of Ordnance in 1841.

As a result of the logistical calamity of the Crimean War (1853-1856), the Board of Ordnance and the office of the Master-General of the Ordnance were abolished. It followed that from that point the use of the Board of Ordnance mark B.O ceased, although the ancient board of ordnance

symbol, known as the 'broad arrow' but technically a pheon,[1] continued for all British government property, including Ordnance Survey bench marks.

Thus when Lt Collinson began his survey of Hong Kong in the early 1840s with his 2636' baseline at Shek O, he was doing so under the authority of the Board of Ordnance. Which is why the marker he left behind on Saiwan Hill, one of just thirty-four, twenty-seven on Hong Kong Island and one – illegally – in Tsim Sha Tsui, has B.O. on it. However, uncertainties about Mean Sea Level continued until well into the 20th century, so instead of the 655.35' of the 1895 re-survey, Collinson's map shows a spot height of 657'.

Board of Ordnance. So not a lot boundary marker. Rather one in a sequence of trig point marker stones in the first systematic survey of Hong Kong. Now it is a 170+ year-old relic of the role of the military in surveying in Hong Kong…and in much of the world. And very much part of Hong Kong's heritage.

Stephen N.G. Davies

10 October 2015

B.O. No.4 discovered inside
Sai Wan Fort.

[1] The pheon, a term in heraldry, was the main motif in the armorial bearings of Sir Philip Sydney, Joint Master of Ordnance, 1585-1586.

Surveying & Built Environment

Repeated Planning Applications by Developers under Statutory Zoning: a Technical Note on Delays in Private Residential Development Process

Lawrence W.C. Lai*, Daniel, C.W. Ho**, K.W. Chau***, Mark H. Chua+, and Ronald K.K. Yu++

ABSTRACT

This technical note reports on the key findings of a study of the pattern of repeated planning applications for each of the 355 projects on sites zoned 'Comprehensive Development Area' for a period of almost 25 years from 1 January 1990 to 31 October 2014. The study is based on research and analysis of publicly available statistics and interpretation of flowcharts of all applications drawn according to data collected. Directions in reforms of planning practice are suggested.

KEYWORDS

Comprehensive Development Area Zone, delay, master layout plan

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BACKGROUND

*The First CEO of the HKSAR announced in 1997 an annual housing production target of 85,000 units for Hong Kong. Half of this target was to fall on the shoulders of developers.

*The typical land sale agreement stipulates a building covenant of three years for the land purchaser to complete building development.

In Hong Kong, the development process of a building project for a certain use starts with obtaining planning permission from the Town Planning Board (TPB). By law, the Board must consider a valid application within two months upon its receipt. The outcome may be to "defer" decision (D in Appendix 1(b)) instead of granting or refusing permission. Any approval may be unconditional, with conditions on a permanent basis or with conditions applied temporarily (respectively A, C and T in Appendix 1(b)). There is a need to get planning permission unless there is no statutory town plan under the Town Planning Ordinance (the Ordinance),[1] or where the use is always permitted or exempted under the town plan. This is followed by lease modifications unless the use and built form are not precluded by the Government Lease (or Free Building Licences are granted in case the development is for New Territories exempted houses (NTEHs)). Finally building permission is obtained from the Building Authority (BA). Once the building is completed it cannot be occupied until the BA issues an Occupation Permit (OP) (or Lands Department issues a Certificate of Exemption (CE)).

Considering this process, the question arises as to whether a long process or delay in obtaining development approvals, a regular complaint by developers, is the major reason for shortages in private housing. Such delays may have two possible causes. The first, and quite normal, is that developers fail to obtain planning permission under s.16 and/or s.17 (1) of the Ordinance on first application (i.e., the TPB decision is "rejected", assuming that the application is not declared "invalid" or "dismissed" by the Board or "withdrawn" or "abandoned" by the applicant (respectively R, V, M, W and B in Appendix 1(b)). They then apply again and, if again rejected, make further re-applications. The second is those frequent cases where after planning permission has been given, a developer does not proceed to develop, but instead makes new applications. Which, then, is the key cause of delay?

Funded by a Public Policy Research Grant of the Central Policy Unit, a University of Hong Kong research team sought to find the answer to this question by looking at major development projects under Comprehensive Development Area (CDA) zoning, for which master layout plans (MLPs)[2] are mandatorily required and must be submitted for approval by the TPB under the Ordinance.

[1] Chapter 131, Laws of Hong Kong.
[2] A master layout plan can also be required contractually in a Government Lease.

Let us start by describing the normal process.

When a developer makes a submission for development in a CDA zone, it must submit a MLP together with various technical assessments (like Environmental Impact, Traffic Impact, Drainage Impact, and Heritage Impact Assessments). If the TPB grants a conditional approval, there are often directions, as planning conditions, for the amendment to the MLP and resubmission of better technical assessments to support the revised MLP to the satisfaction of various government departments. If a developer does not get the required satisfaction letters, he/she is not considered to be in compliance of the planning conditions and hence cannot proceed to get lease modification or building approvals. A MLP, once approved by the TPB, cannot be varied unless approved in a new planning application. Indeed any application for variation that exceeds ten per cent of the original layout, must be backed by an entirely new set of technical assessments. Any application for variation that exceeds five per cent (Class B Amendment) must be considered by the TPB, although one less than five per cent can be considered by the Director of Planning under delegated authority from the TPB.

Planning permission given under s.16 or s. 17(1) has a limited time span of 3 to 4 years. An application for an "extension of time" (EOT) is required if a developer does not or is not able to start the building development before the time limit expires.

Finally, the public has also been given a new statutory right under the Town Planning (Amendment) Ordinance of 2005 to make comments on planning applications. This took effect after 9 June 2005. So a further question is whether this additional process is a new and significant cause in delays to private housing projects.

POLICY SIGNIFICANCE

This research is the first systematic attempt to examine two possibilities. Whether the apparently long time period taken for developers to obtain statutory planning permissions for major development projects[3] under CDA zoning is due to a failure to obtain TPB approvals/TPB rejections. Or whether the culprit is a developers' strategy of hoarding land for the better timing of the sale of property units and/or in order to improve building design. In addition, attention is paid to the possible delays caused by the post-2005 public right to make comments on planning applications.

THEORETICAL CONCERNS

The government is often blamed for delaying development, and hence adding to the costs of development, by setting too many and too complicated hurdles for developers to get development approvals. This

[3] The period is also very long for house development in Green Belt zones. It may take about eight years to get through the whole process.

study investigates whether developers contribute to undue prolongation of the development process and whether the new statutory right of the public to comment on planning applications is a key factor affecting the pattern of planning applications.

Assuming that business innovations can enhance the environment through improvements to master layout planning, the research team gave developers the benefit of the doubt in considering this question, since theirs is the most obvious potential contribution to that end.

DATA AND METHODOLOGY

Publicly available Town Planning Board data, property transaction records kept by the Land Registry, property market statistics released by the Rating and Valuation Department, and macro-economic data from the Census and Statistics Department were used to test various refutable empirical hypotheses.

The basic method was to collect all disaggregate data released by the government bodies mentioned above and tabulate them as Excel records. For each project we tabulated the unique lot number, development parameters (such as gross site area, gross floor area, and number of residential units), date of the execution of the land lease and date of the first domestic occupation permit. This was followed by a study of the changes in the approved MLPs deposited in the public enquiry counter of the Planning Department.

KEY FINDINGS

The University team identified a total of 261 property development projects, including those for residential use, within CDA zones, for which the first planning applications were made before 10 June 2005 (the old system), and 94 projects for which first applications were made on or after 10 June 2005 (the new system), the day the public were given the right to comment on development applications under the Town Planning (Amendment) Ordinance. The cut-off date for the project data used was 31 October 2014. Of the 261 cases, 248 involved multiple applications and only 13 involved just one application each. Only 65 projects had been completed (and issued with OPs) by 31 October 2014. Sixty-two of these first applications for planning permission were made on or before 10 June 2005 and three afterwards.

Table 1 presents the total number of s.16 applications and successful planning s.16 applications (both include all those that applied for an extension of time). The 261 cases involved 1,758 s.16 applications up to the 31 October 2014 study cutoff date. The 62 pre-June 2005 completed cases involved 572 s.16 applications. They also involved, respectively, 1,245 and 426 *successful* applications (up to 31 October 2014). In each cell in **Table 1**, there is a multiplier (found by dividing the number of a certain type of application by the number of projects) greater than 1, which means that multiple applications were the norm for CDA development during the study period. The multipliers for the 62

Table 1: Multiple planning applications up to 31 October 2014 for projects with first applications made before 10 June 2005 under "Comprehensive Development Area Zones" permitted by the Town Planning Board

CDA Projects	**Number of s.16 applications involved= Total x multiplier**	**Number of successful s.16 applications involved= Total x multiplier**	**Number of reviews= Total x multiplier**	**Number of EOT= Total x multiplier**
Total: 261	1,758 = 261 x 6.7	1,245 = 261 x 4.8	165 = 261 x 0.63	159 = 261 x 0.61
Completed and occupied: 62 (pre-2005 TPO)	572= 62 x 9.2	426= 62 x 6.9	27= 62 x 0.4	18= 62 x 0.3

pre-2005 completed cases were greater than the average of the number of s.16 applications.

The length of time involved in planning applications and reapplications (i.e. applications that start again at the beginning) for these projects, whether they were completed or not, was calculated. **Appendix 1** shows diagrammatically the history of the applications in the 261 cases in descending order of duration, from the first to the last planning application (up to 31 October 2014). In each case this is given in the form of a graph and an application "tree diagram" for all 261 cases.

The mean number of months between the first unsuccessful and first successful application of a CDA project under the old system was 26. However, that between the dates of the first successful and last made applications for a CDA project before the amendments to the TPO in 2005 was as long as 60 months or five years, which suggested that there might be complications in the implementation of the projects. Were some such delays self-induced? **Table 2** shows the aggregate details.

For the 94 projects for which first planning applications were made after 9 June 2005, the mean number of months between the first unsuccessful and first successful application under the new system was 31.9, while that between the dates of first successful and last made applications was 43.8. This meant that there were indeed signs of "induced delay", but no strong evidence that the amendment to the TPO, and the associated public participation in commenting on applications, caused longer delays. **Table 3** shows the aggregate details.

Regarding those CDA projects with residential use that were completed and issued with "Occupation Permits" (OPs), the key findings were:

Table 2: Multiple planning applications for projects under "Comprehensive Development Area Zones" permitted by the Town Planning Board made under the old system from first planning applications since 1 January 1990 to first cut-off date 9 June 2005

All 261 Projects	**Mean**	**Mode**	**Median**	**Range**	**Remarks**
Number of Previous Unsuccessful Applications before the First Successful Application	1.51	1	1	1~4	53 of 261 cases have unsuccessful applications prior to the first successful
Number of Months Lapsed between the Dates of the First Successful and Last Made Applications before 10 June 2005	59.78	31	52	3~172	From first successful application, 182 of 261 cases took a month or more until the last application
Number of Months between the Dates of the First and Last Successful Applications before 10 June 2005	59.47	31	54	3~172	177 of 261 cases took a month more between the first and last successful applications
Number of Months between the First Unsuccessful and First Successful Applications	26.25	4	19	2~155	95 of 261 cases took a month or more for a successful application after the first unsuccessful one
Total Number of Planning Applications Made after the First Successful Application	4.18	2	3	1~22	165 of 261 made applications after the first successful

(a) Sixty-two projects first applied for before 10 June 2005 were completed, but only three thereafter. Therefore, only the projects initially approved under the old system added substantially to the housing supply. (The 2005 amendment to the TPO was insignificant in affecting housing supply in this regard.)

(b) Most changes in the MLPs following new applications were of minor design significance, which reflected changes in market conditions more than perceptible planning innovations. (This would likely relate to the avoidance of new technical assessments for major changes.)

Table 3: Multiple planning applications for projects under "Comprehensive Development Area Zones" permitted by the Town Planning Board for first planning applications made under the new system from 10 June 2005 to final cut-off date 31 October 2014

All 94 Projects	**Mean**	**Mode**	**Median**	**Range**	**Remarks**
Number of Previous Unsuccessful Applications before the First Successful Application	1.00	1	1	1	Only 5 of 94 projects have unsuccessful applications prior to the first successful one
Number of Months Lapsed between the Dates of the First Successful and Last Made Applications	43.88	48	43	5~106	41 of 94 cases made applications after the first successful one
Number of Months between the Dates of the First and Last Successful Applications	43.17	48	41	5~106	40 of 94 cases took a month or more between the first and last successful applications
Number of Months between the First Unsuccessful and First Successful Applications	31.91	5	22	5~77	Only 11 of 94 cases took a month or more to get a successful application after the first unsuccessful one
Total Number of Planning Applications Made after the First Successful Application	6.42	1	3	1~26	41 of 94 made applications after the first successful application

(c) The global net change (for the 65 projects) involved a **reduction** in recorded GSA from 278 to 224 hectares and the number of domestic units from 108,401 initially planned to 102,313[4] actually built. Although later MLPs did propose even more units (as many as 116,619 units), these units generally were smaller in area and were not all built.

(d) The total number of private residential units completed/with OPs in Hong Kong was 602,390[5] from 1990 until 2014: the completed CDA sites are about 17% of the total territorial new residential unit supply.

Preliminary statistical analysis conducted by the research team on a sample of the 65 occupied CDA projects with their comparables[6] affirmed that units of the completed CDA projects are valued more than those in neighbouring non-CDA housing development. Using the hedonic model regression of 48,310 property transactions, it was found that the 15 selected CDA sites are priced 6.5% higher than their comparables. This, the subject of a separate paper, shows that consumers were willing to pay a premium for the former and this qualifies the previous works of **Lai (1996)** and **Lai et al. (2009)**.

A summary of the total private housing supply implications of the CDA projects is provided in **Table 4**.

The research team also examined the time that elapsed from the first successful planning application to the date of the first domestic OP for each of the 65 completed projects. The longest recorded period was 190 months.

POLICY IMPLICATIONS AND A POSSIBLE DIRECTION FOR REFORM

Whatever the true reasons for the delays, whether the statutory requirement that any amendment to the MLP necessitates a new application, the requirement for a new set of technical assessments where the amendment exceeds 10%, or complications in lease modifications, the apparent long delays, and the phenomenon of repeated applications after development permissions have already been obtained, even in the absence of the public scrutiny of applications, suggest the need for a major policy change to facilitate land conversion. **Appendix 2** shows some evidence of lease modifications as a cause of the lengthy development process. This is because the average time since the first successful planning application to the date of the new lease after lease modification, where that was required, was about five years. This is more than four times the norm of about 340 days for a straight forward case **(Lai et al 2010, p.73)**. This is an important policy area that merits investigation.

[4] Information of Centadata Company Limited.
[5] Based on figures in Hong Kong Annual Report and/or Buildings Department website "BRAVO": https://bravo.bd.gov.hk.
[6] A term used by estate surveyors in valuation of properties.

Table 4: A summary of the number of private housing units within in all Comprehensive Development Area projects approved by the Town Planning Board from 1 January 1990 to 31 October 2014

	1 January 1990 to 9 June 2005 **(old system)** **[approved units of private housing]**	**10 June 2005 to 31 October 2014** **(new system)** **[approved units of private housing]**	**1 January 1990 to 31 October 2014** **(whole study period: All years)** **[approved units of private housing]**
CDA projects (all: whether Residential or others)	261 [~170,000]	94 [~21,000]	355 [~200,000]
CDA projects with domestic GFA applied for (whether built or not yet built)	124 [~170,000] Average project size ~1370 units/ project	22 [~21,000] Average project size ~960 units/ project	146 [~200,000]
Residential CDA built and occupied (i.e. those projects above and built)	62	3	65 (<45% of 146) [~100,000 or around 50% of total approved]

Some possible solutions for reducing the transaction costs of delays in housing production are:

(a) Increase the statutory toleration of the percentage of change to reduce the need for "Class B amendments".
(b) Implementation of a levy[7] on MLP submissions — unless such submissions were forced by the government and could bring obvious and significant planning gains to the society.
(c) Standardize and simplify requirements for developers' proposal statements and MLPs to a mandatory Town Planning Board template.

CONCLUSION

To recapitulate, what are the main theoretical lessons of this study? The research team found no direct evidence of deliberate delays or hoarding.

[7] The TPO has such provision but this is pending Legislative Council permission.

Difficulties in land assembly and uncertainty of the property markets are the usual reasons given by practitioners we consulted as the most decisive factors in the lengthy process of development. These factors, which involved commercial secrets and decisions, were beyond the confines of this study and are not something that can be easily and independently verified. However the team can affirm that although there were no difficulties for developers in getting planning permission in CDA zones, they made many fresh applications that changed only minor details to the MLPs. We also found that these applications were by and large unaffected by public participation, contrary to what one might suspect. Finally, we found that the time taken to modify a Government Lease was very long. A supplementary but important finding was also that only 65 projects actually completed to contribute new housing supply.

Obviously much time was absorbed in the planning process for an average project. Much housing supply was frozen. The Town Planning Board-approved CDA private housing units during the approximately 25-year study period were about 200,000 units but by October 2014, only about 102,313[8] or around 50% of the potential was exploited. Granted that the property values of units of development under this system are *higher* than those not controlled by CDA zoning, the question is whether the transaction costs involved are justified in the eyes of the public.

Policywise the complicated processes REDUCED the resulting housing supply by about 6,000 units[9]. Although CDA projects constituted only about 17% of Hong Kong's private housing supply during the study period[10], as new products they played an important role in setting prices for the property market. The government should help smooth the development approval process and remove unnecessary barriers to private development and real innovation.

ACKNOWLEDGEMENTS

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[8] Consisting of 100,336 units from 62 pre-10 June 2005 projects sites and 1,977 units from two post-10 June 2005 projects.

[9] The difference between 108,401 units in all first approved MLPs and actual units recorded by Centadata 102,313 units.

[10] The total private housing unit supply from 1991 to 2005 as obtained from Hong Kong Annual Reports, various years, was 471,830 units. Around 104,100 private units were added from 2006 until 2014.

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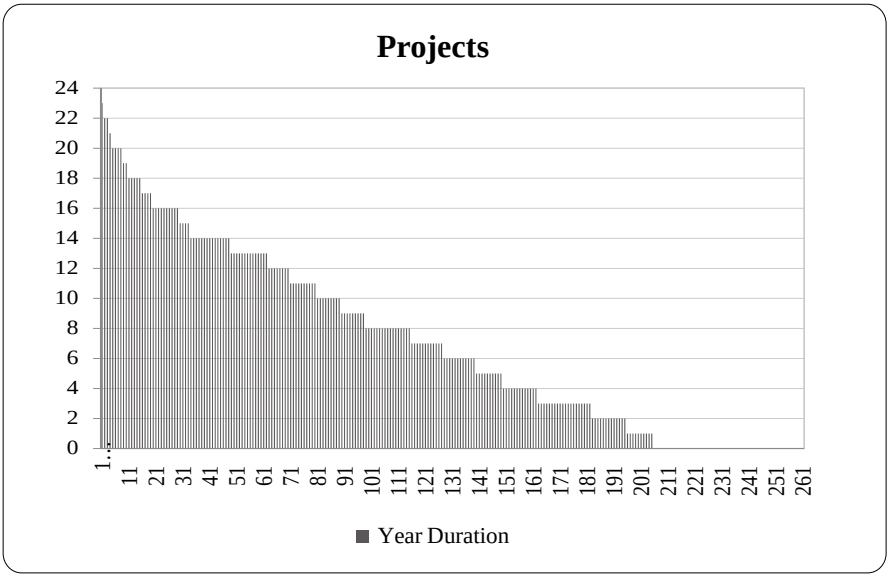
APPENDIX 1

(a) The distribution of the duration (in years) from the first to the last planning application for 261 CDA projects studied



Year Duration	23	22	21	20	19	18	17	16	15	14	13	12
No. of Projects	1	2	1	4	2	5	4	10	4	15	14	8

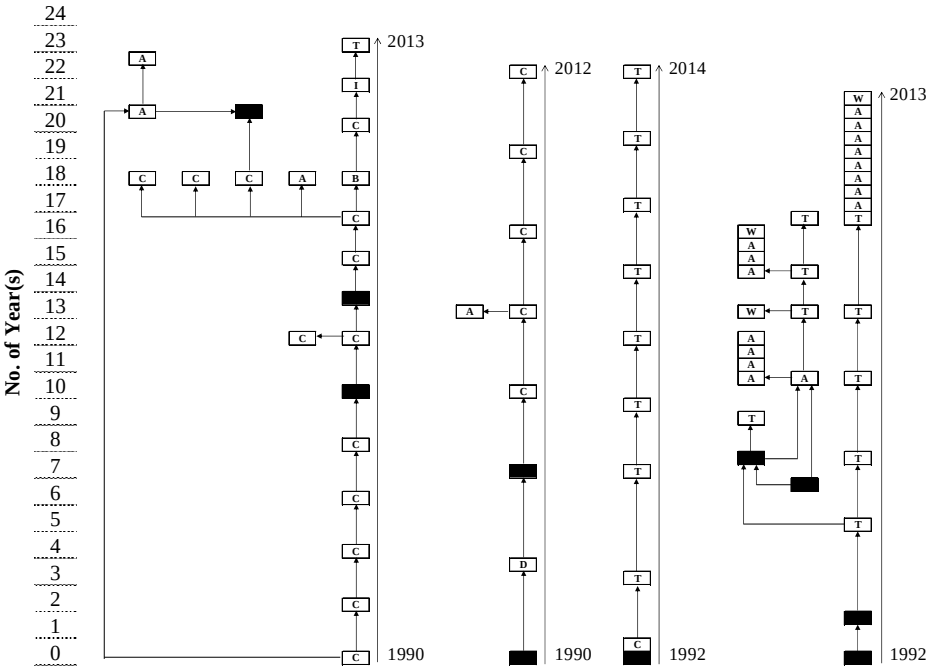
Year Duration	11	10	9	8	7	6	5	4	3	2	1	0
No. of Projects	10	9	9	17	12	12	10	13	20	13	10	56

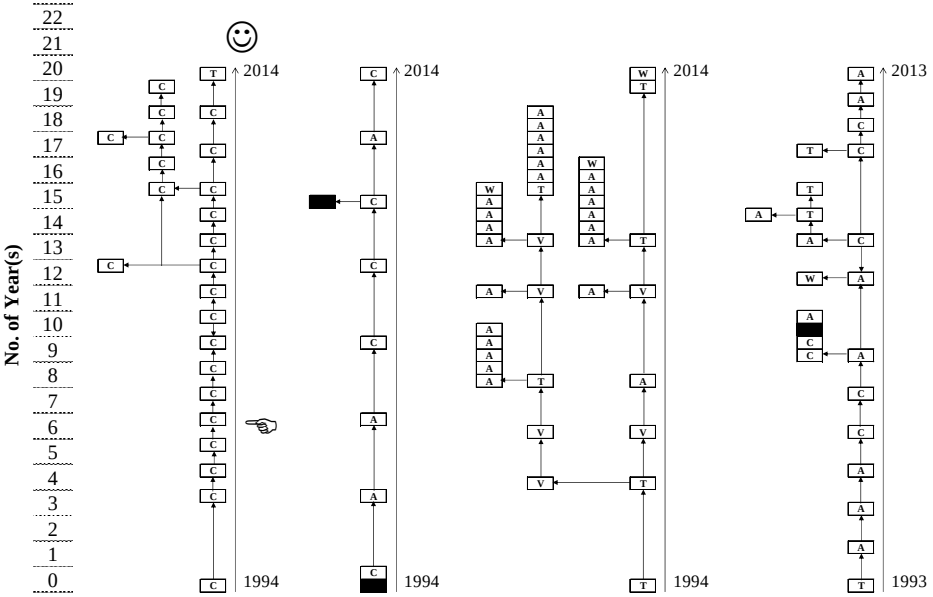
(b) Application "tree diagrams" of 261 CDA projects

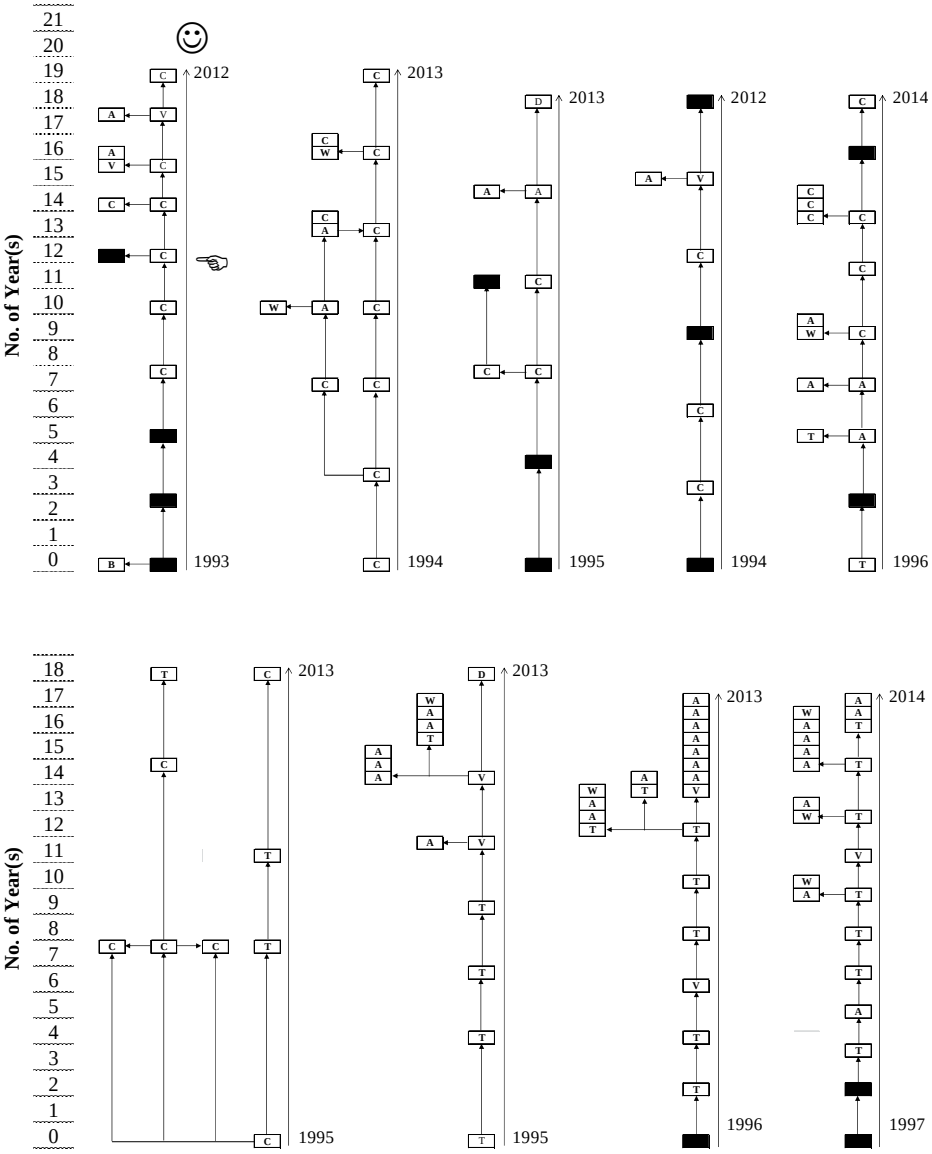
LEGEND

- A Approved
- C Approved with condition(s)
- T Approved with condition(s) on a temporary basis
- B Abandoned by appellant
- V Revoked
- ■ Rejected
- ☺ Occupation Permit Issued
- ☞ Execution of a New/Modified Government Lease/Conditions
- W Withdrawn
- D Deferred
- I Invalid
- O No Detail
- M Dismissed
- N Not considered

Each block represents one application case



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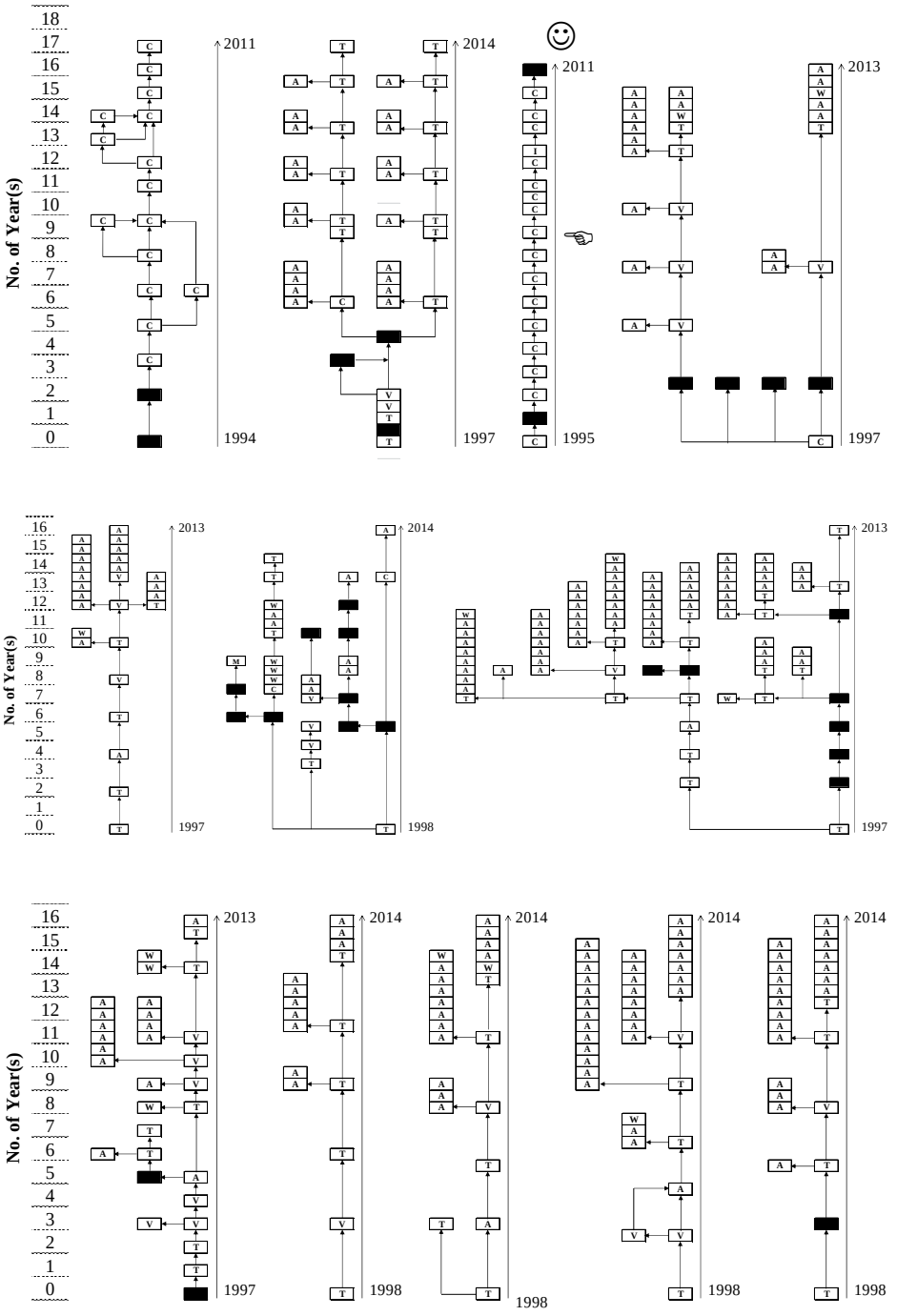
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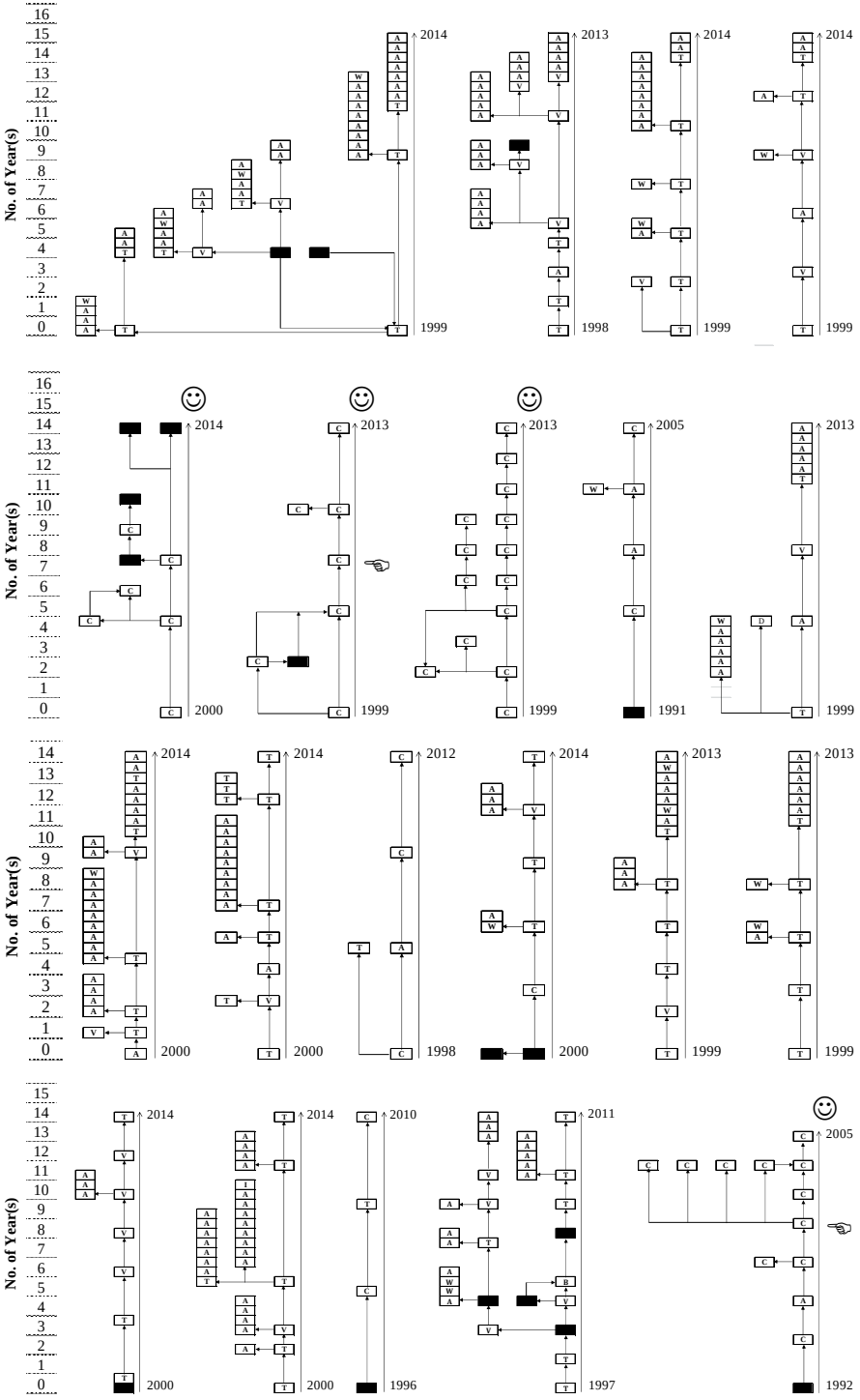
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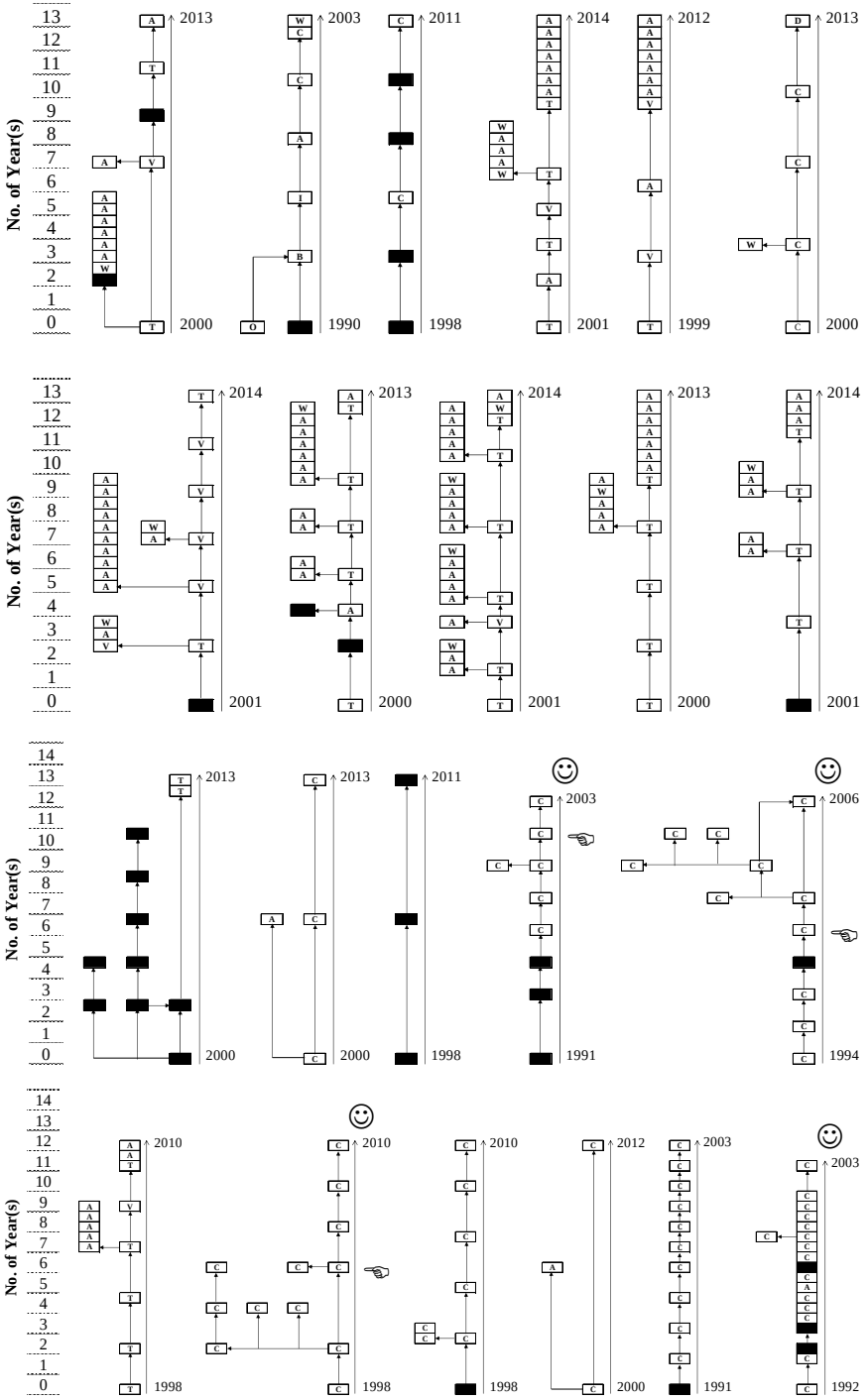
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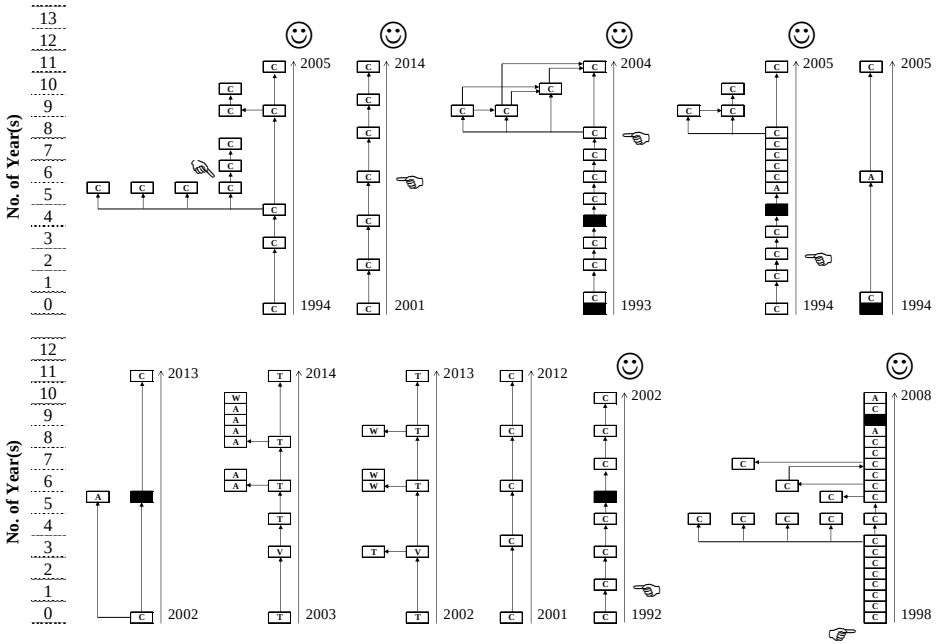
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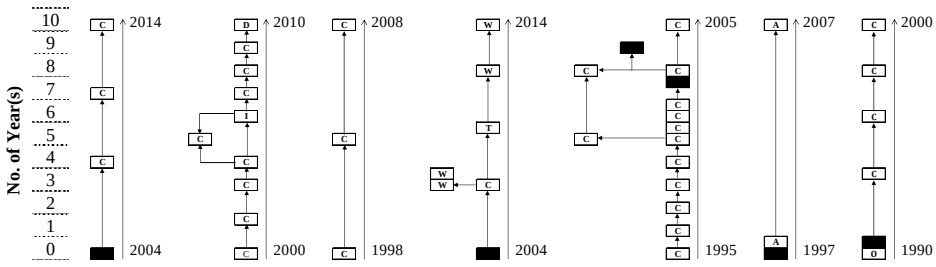
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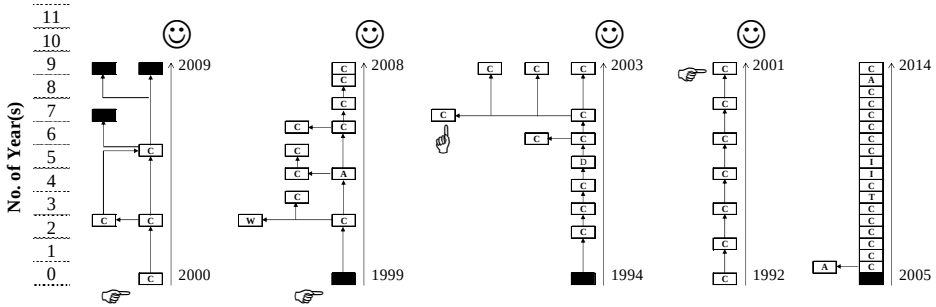
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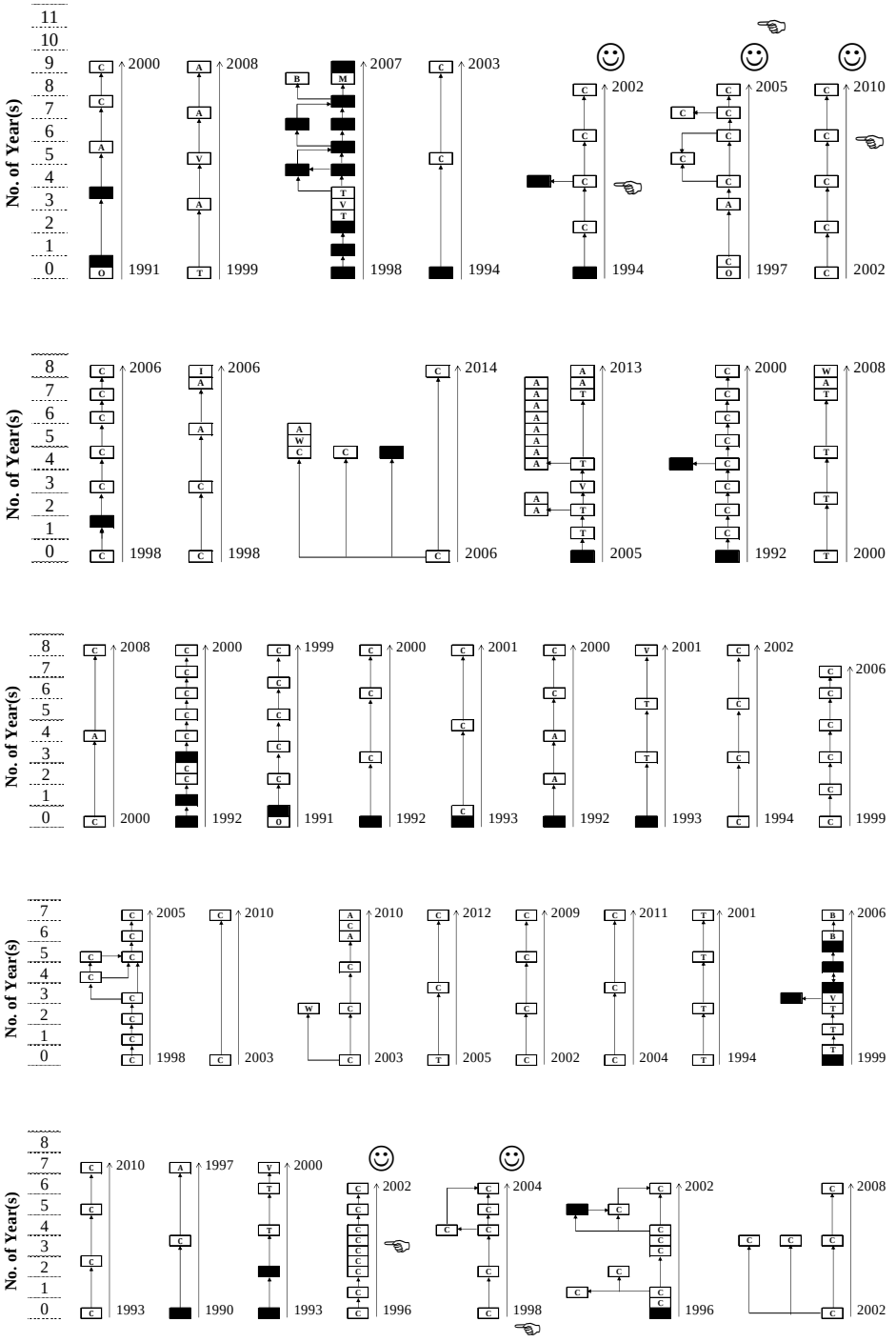
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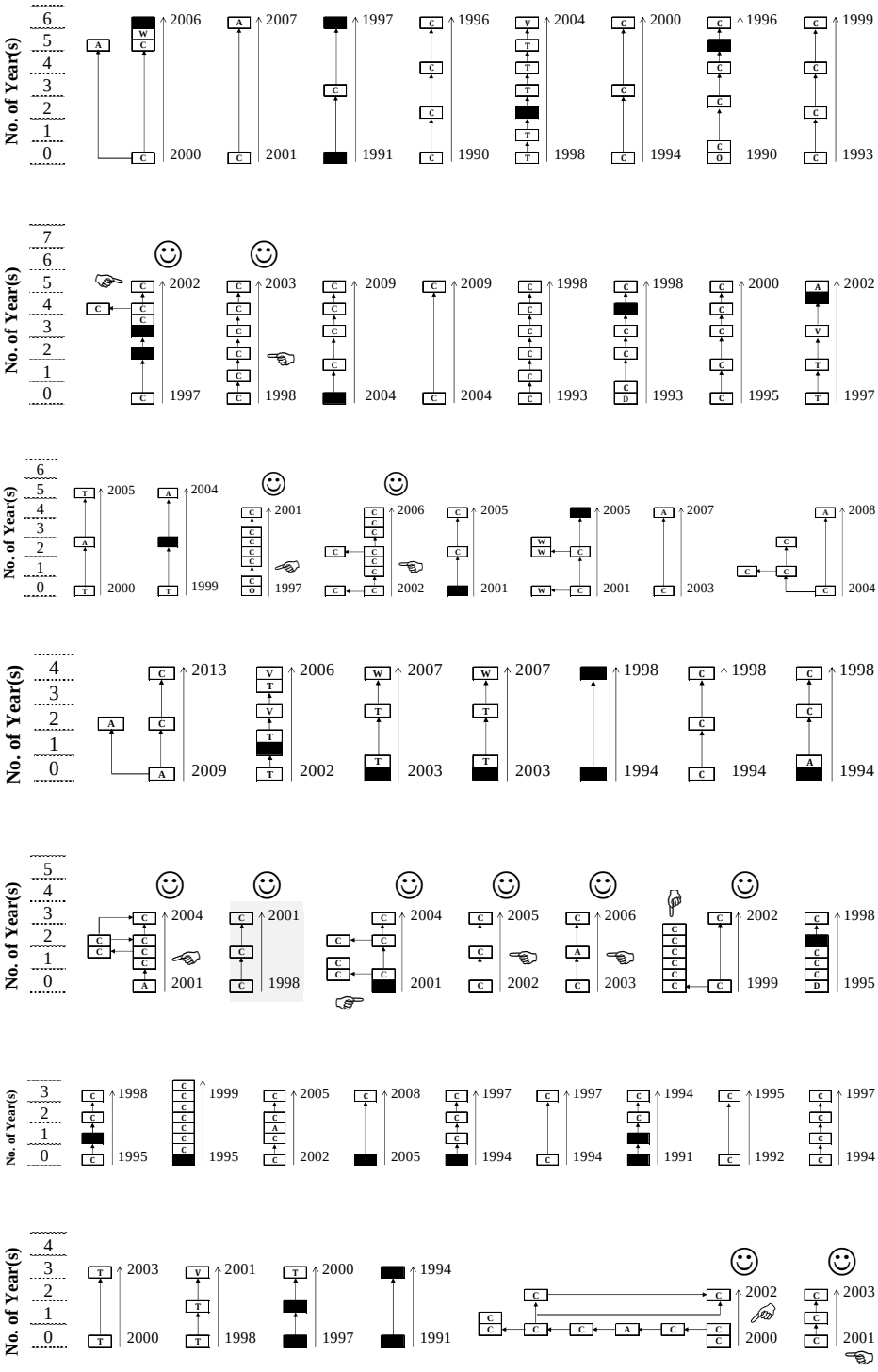
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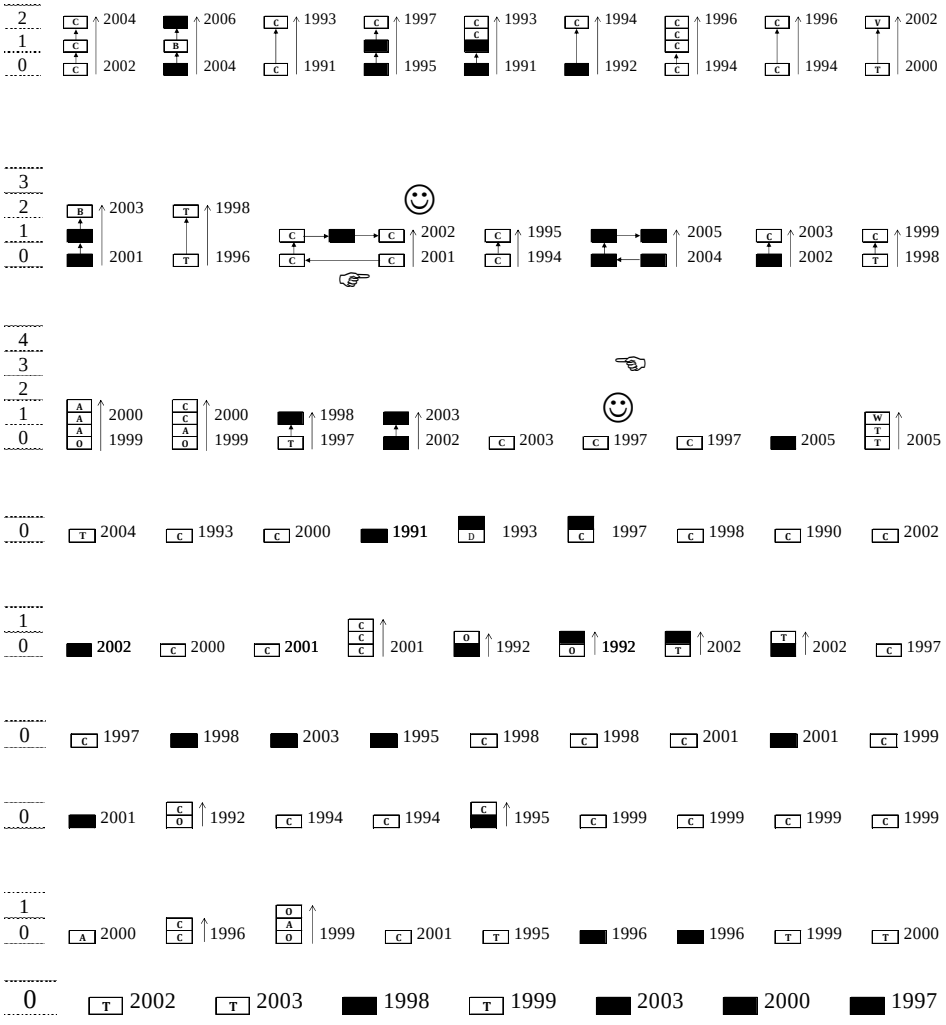
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APPENDIX 2: Features of completed CDA sites

Sites	Time from first application to date of OP (Months)	Time from first successful application to date of OP (Months)	Gross Floor Area (Hectares)	Gross site area in first approved MLP (hectares)	Gross site area in last approved MLP (hectares)	Number of flats in earlier approved MLP	Number of flats in last approved MLP available	Date of first application Considered	Date of First OP	Date of Lease /Conditions	Date of first successful application	Date of last successful application	Time from Date of first successful application until Date of Lease /Condition (Years)
1	192	190	0.6	0.3	0.2	34	36	25-09-1998	12-09-2014	18-04-2008	27-11-1998	20-11-2002	9.4
2	209	188	5.0	1.7	1.6	772	822	07-01-1994	31-05-2011	12-05-2005	13-10-1995	05-04-2012	9.6
3	181	181	20.4	3.9	3.6	2368	2600	19-05-1995	15-06-2010	03-06-2004	19-05-1995	02-11-2007	9.0
4	178	169	4.1	10.3	1.0	297	265	19-06-1998	19-04-2013	07-09-2009	12-03-1999	15-04-2011	10.5
5	180	164	8.4	2.0	2.0	1904	1466	20-03-1992	16-03-2007	04-12-2002	23-07-1993	04-07-2005	9.4
6	166	163	11.8	18.4	18.4	1819	1860	19-05-2000	10-03-2014	09-08-2007	11-08-2000	18-08-2004	7.0
7	166	162	7.5	0.8	0.8	896	924	20-09-1993	10-07-2007	04-06-2002	28-01-1994	01-12-2004	8.4
8	158	158	13.2	5.0	5.0	662	662	16-05-2001	09-08-1999	14-02-1997	16-05-2001	28-08-2002	
9	157	157	12.5	2.4	2.4	1776	1720	17-08-2001	19-09-2014	23-12-2008	17-08-2001	06-07-2012	7.4

18	17	16	15	14	13	12	11	10	Sites
119	126	134	130	133	135	136	136	153	**Time from first application to date of OP (Months)**
119	124	126	129	129	135	136	136	153	**Time from first successful application to date of OP (Months)**
6.7	9.1	6.2	165.3	8.7	0.8	9.1	5.4	10.3	**Gross Floor Area (Hectares)**
0.9	1.8	4.7	34.8	3.8	1.3	0.8	0.6	1.0	**Gross site area in first approved MLP (hectares)**
0.7	1.8	4.7	34.8	3.8	1.3	0.8	0.2	1.0	**Gross site area in last approved MLP (hectares)**
800	1240	992	21500	1216	50	N/A	1412	1748	**Number of flats in earlier approved MLP**
1148	981	992	21500	1264	87	N/A	1400	1748	**Number of flats in last approved MLP available**
18-09-1992	31-05-2002	02-02-2001	16-04-1999	10-04-1992	07-10-1994	05-09-1997	02-04-1994	18-09-1992	**Date of first application Considered**
16-08-2002	28-09-2012	08-08-2011	29-01-2010	17-05-2003	23-12-2005	22-01-2009	01-08-2005	10-06-2005	**Date of First OP**
17-09-2001	22-07-2008	29-06-2005	16-05-2002	10-05-1999	18-03-2002	23-04-2007	12-09-2002	06-05-2000	**Date of Lease /Conditions**
18-09-1992	31-05-2002	02-02-2001	16-04-1999	14-08-1992	07-10-1994	05-09-1997	02-04-1994	18-09-1992	**Date of first successful application**
21-11-2001	16-07-2010	20-04-2012	19-08-2013	22-06-2000	13-12-2002	02-06-2005	13-05-2005	09-12-2003	**Date of last successful application**
9.0	6.1	4.4	3.1	6.7	7.4	9.6	8.4	7.6	**Time from Date of first successful application until Date of Lease /Condition (Years)**

27	26	25	24	23	22	21	20	19	Sites
107	154	98	124	99	137	115	145	110	**Time from first application to date of OP (Months)**
95	95	98	99	99	100	106	106	110	**Time from first successful application to date of OP (Months)**
31.6	3.1	85.4	6.4	28.0	18.1	2.6	13.5	20.9	**Gross Floor Area (Hectares)**
12.7	1.5	22.5	0.4	20.8	3.8	0.3	1.3	4.2	**Gross site area in first approved MLP (hectares)**
12.7	1.4	N/A	0.4	21.2	3.8	0.3	1.3	4.2	**Gross site area in last approved MLP (hectares)**
3800	750	10716	N/A	3700	1248	342	1000	N/A	**Number of flats in earlier approved MLP**
4000	800	12464	576	5289	1576	420	1136	2824	**Number of flats in last approved MLP available**
14-05-2004	23-08-1991	15-07-1994	22-03-1996	06-05-1994	15-10-1993	10-09-1999	04-11-1994	24-01-1992	**Date of first application Considered**
17-04-2013	28-06-2004	15-11-1999	09-06-2004	07-08-2002	14-03-2005	25-07-2008	12-12-2006	30-03-2001	**Date of First OP**
04-02-2010	01-03-2002	26-06-1997	04-03-2002	23-06-1997	18-02-2002	05-12-1972	unrestricted	10-06-1993	**Date of Lease /Conditions**
20-05-2005	26-07-1996	15-07-1994	22-03-1996	06-05-1994	15-11-1996	10-09-1999	06-02-1998	24-01-1992	**Date of first successful application**
08-08-2014	25-09-2003	23-05-2014	02-08-2003	21-07-2006	01-06-2012	07-04-2008	22-07-2011	16-05-2002	**Date of last successful application**
4.7	5.6	2.9	6.0	3.1	5.3			1.4	**Time from Date of first successful application until Date of Lease /Condition (Years)**

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36	35	34	33	32	31	30	29	28	Sites
77	89	80	85	87	83	87	91	98	**Time from first application to date of OP (Months)**
77	78	80	81	81	83	87	91	93	**Time from first successful application to date of OP (Months)**
7.8	62.8	5.0	6.8	1.8	1.8	6.7	8.2	4.0	**Gross Floor Area (Hectares)**
0.6	16.9	0.7	0.9	0.6	0.6	2.2	0.9	0.4	**Gross site area in first approved MLP (hectares)**
0.6	1.7	0.7	0.9	0.6	0.6	2.2	0.9	0.4	**Gross site area in last approved MLP (hectares)**
393	5250	856	1313	139	312	1099	624	532	**Number of flats in earlier approved MLP**
904	1526	792	1313	126	320	2356	658	550	**Number of flats in last approved MLP available**
16-01-1998	19-08-1994	06-03-1994	09-02-2007	19-03-1993	16-01-1998	24-01-1997	09-06-1995	23-08-1991	**Date of first application Considered**
08-06-2004	21-02-2001	16-11-2000	01-03-2014	30-06-2000	31-12-2004	08-04-2004	24-12-2002	22-10-1999	**Date of First OP**
09-06-2003	10-01-1997	NA	25-02-2010	22-02-2000	05-03-2001	16-06-1997	29-01-2001	25-02-1991	**Date of Lease /Conditions**
16-01-1998	19-08-1994	06-03-1994	22-05-2007	20-09-1993	16-01-1998	24-01-1997	09-06-1995	31-01-1992	**Date of first successful application**
30-03-2010	29-01-2005	17-07-1998	22-05-2007	23-01-1998	17-07-2004	09-12-2002	28-09-2000	08-12-1999	**Date of last successful application**
5.4	2.4		2.8	6.4	3.1	0.4	5.6		**Time from Date of first successful application until Date of Lease /Condition (Years)**

45	44	43	42	41	40	39	38	37	Sites
67	68	75	92	95	73	82	74	75	**Time from first application to date of OP (Months)**
67	68	70	71	72	72	74	74	75	**Time from first successful application to date of OP (Months)**
9.9	7.0	25.4	2.3	5.0	3.6	1.0	3.5	0.9	**Gross Floor Area (Hectares)**
3.3	0.6	5.0	0.4	4.5	0.4	0.2	0.5	0.5	**Gross site area in first approved MLP (hectares)**
3.1	0.6	5.0	0.3	4.3	0.4	0.2	0.5	0.5	**Gross site area in last approved MLP (hectares)**
1400	1320	-	352	4040	600	173	606	70	**Number of flats in earlier approved MLP**
1618	1320	-	352	4130	600	170	540	82	**Number of flats in last approved MLP available**
06-09-1996	12-03-1999	18-01-1991	12-04-1991	28-06-1996	10-10-2003	14-05-2004	16-08-2002	13-01-1995	**Date of first application Considered**
30-04-2002	24-11-2004	11-04-1997	16-12-1998	28-06-2002	30-10-2009	21-03-2011	09-10-2008	29-03-2001	**Date of First OP**
29-09-1999	29-01-2002	23-06-1997	NA	17-07-1998	09-12-2005	12-09-2008	14-12-2004	10-02-2000	**Date of Lease /Conditions**
06-09-1996	12-03-1999	07-06-1991	08-01-1993	28-06-1996	10-10-2003	28-01-2005	16-08-2002	13-01-1995	**Date of first successful application**
15-03-2002	23-10-2002	19-02-1993	11-08-1995	22-03-2002	15-09-2006	09-01-2009	27-05-2005	11-12-1998	**Date of last successful application**
3.1	2.9	6.0		2.1	2.2	3.6	2.3	5.1	**Time from Date of first successful application until Date of Lease /Condition (Years)**

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54	53	52	51	50	49	48	47	46	Sites
55	62	60	60	60	124	62	65	69	**Time from first application to date of OP (Months)**
55	56	58	59	60	63	64	65	66	**Time from first successful application to date of OP (Months)**
23.4	19.1	7.2	2.0	7.7	8.8	2.5	12.6	38.1	**Gross Floor Area (Hectares)**
4.6	2.1	4.2	0.2	2.9	0.9	0.3	4.2	6.5	**Gross site area in first approved MLP (hectares)**
5.3	2.1	4.2	0.2	2.9	0.9	0.3	4.2	6.4	**Gross site area in last approved MLP (hectares)**
2558	3288	604	344	880	560	384	1248	4735	**Number of flats in earlier approved MLP**
3302	3520	604	400	816	560	402	1624	4735	**Number of flats in last approved MLP available**
06-06-1997	03-10-1997	03-12-1999	13-09-2002	15-07-1994	17-08-1990	07-12-2007	04-04-1997	19-06-1992	**Date of first application Considered**
11-01-2002	07-12-2002	09-12-2004	31-08-2007	19-07-1999	30-12-2000	25-09-2002	06-09-2002	06-03-1998	**Date of First OP**
07-09-2001	28-08-1999	30-06-1999	13-07-2004	25-03-1997	25-03-1997	16-03-2010	23-11-1996	04-04-1995	**Date of Lease /Conditions**
06-06-1997	03-04-1998	28-01-2000	13-09-2002	15-07-1994	06-10-1995	25-01-2008	04-04-1997	18-09-1992	**Date of first successful application**
25-07-2002	06-06-2003	28-01-2000	30-04-2005	16-05-1997	24-01-1997	25-01-2008	20-04-2001	14-03-2000	**Date of last successful application**
4.3	1.4		1.8	2.7	1.5	2.1		2.5	**Time from Date of first successful application until Date of Lease /Condition (Years)**

63	62	61	60	59	58	57	56	55	Sites
37	48	52	50	52	64	52	55	56	**Time from first application to date of OP (Months)**
37	47	48	50	51	52	52	54	55	**Time from first successful application to date of OP (Months)**
0.6	0.1	2.2	6.0	14.1	38.8	2.8	0.3	34.6	**Gross Floor Area (Hectares)**
0.7	1.2	1.6	18.3	1.5	5.4	0.4	0.3	3.8	**Gross site area in first approved MLP (hectares)**
0.6	1.2	1.7	18.3	1.5	5.4	0.4	0.3	1.9	**Gross site area in last approved MLP (hectares)**
48	1	68	397	518	3500	300	49	3540	**Number of flats in earlier approved MLP**
48	1	128	397	532	3500	300	49	2528	**Number of flats in last approved MLP available**
18-05-2001	16/10/1998	06-10-1995	03-06-1994	9-8-1996	20-09-1993	05-12-2008	15-03-2002	27-11-1998	**Date of first application Considered**
23-06-2004	02-10-2002	26-01-2000	14-08-1998	14-12-2000	08-01-1999	08-07-2014	11-10-2006	09-06-2003	**Date of First OP**
12-03-1999	NA	30-03-1995	Unknown in 1993	NA	07-03-1996	10-10-1958	14-07-2004	07-12-1957	**Date of Lease /Conditions**
18-05-2001	13-11-1998	12-01-1996	03-06-1994	20-09-1996	02-09-1994	05-12-2008	12-04-2002	27-11-1998	**Date of first successful application**
25-07-2003	20-07-2001	25-09-1998	02-06-2000	23-04-1999	26-07-1996	09-03-2011	10-11-2004	23-07-2004	**Date of last successful application**
					1.5		2.3		**Time from Date of first successful application until Date of Lease /Condition (Years)**

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Sites	Time from first application to date of OP (Months)	Time from first successful application to date of OP (Months)	Gross Floor Area (Hectares)	Gross site area in first approved MLP (hectares)	Gross site area in last approved MLP (hectares)	Number of flats in earlier approved MLP	Number of flats in last approved MLP available	Date of first application Considered	Date of First OP	Date of Lease /Conditions	Date of first successful application	Date of last successful application	Time from Date of first successful application until Date of Lease /Condition (Years)
64	33	30	8.8	3.6	3.6	700	700	4/5/2001	13-02-2004	29-06-2000	24-08-2001	24-03-2004	
65	26	26	109.0	14.0	9.9	4558	6556	17-07-1998	30-09-2000	08-07-1996	17-07-1998	28-06-2010	

Time from Date of first successful application until Date of Lease /Condition (in Years)

Mean	4.9
Maximum	10.5
Median	4.6

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Redevelopment of Bus Depots upon Lease Modifications: a Valuation Analysis

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RESEARCH BACKGROUND

In the last issue of this journal, Lai and Kwong (2015) found that there was valuation or documentary evidence showing that there was no evidence of any government concession to franchised bus companies (CMB and KMB) in terms of lease restrictions or land premia in land allocation. This short technical paper shows that there is no evidence of concessions in assessment of premia for lease modification for change in use of land approved by the Town Planning Board, whether by way of modification letter or surrender and exchange, of the former bus depot's land for industrial or non-industrial use based on a valuation study of three sites. This finding completes Stage II of the research project undertaken by the first author. The results are discussed in terms of the landscape of the franchised bus industry of Hong Kong and broader economic theorization of the role of the state.

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ASSESSMENT OF THE BEFORE AND AFTER VALUES OF FOUR BUS DEPOT SITES

This exercise involved four bus depots: Inland Lot No.8849 (IL8849) and Inland Lot No.7550 (IL7550) in North Point owned by CMB; and Kwun Tong Inland Lot No.733 (KTIL733) and Kwai Chung Town Lot No.215 (KCTL 215) owned by KMB.

IL8849 was re-granted in exchange for the surrender of IL 5532 and IL7178, while KTIL733 was re-granted upon the surrender of KTIL 192. The leases of the other two land parcels were modified with letters of modification.

To ascertain if the actual modification premia for these four depots, as shown on the Conditions of Exchange or Modification Letters, were reasonable, the authors assessed their "before values" and "after values".

For IL8899, IL7550, and KCTL215, a direct accommodation value (AV) comparison method was adopted to ascertain their before values and after values. A total of 13 sales comparables comprising five office/non-industrial sites, five industrial sites, and three residential sites were obtained from public records, which can be found at the Land Registry. Amongst the 13 sites, ten were situated on Hong Kong Island and Kowloon. They changed hands on the private land market between 1993 and 1997. The remaining three sites were sold via public auction by the government to developers during the same period.

As for a premium assessment of KTIL 733, owing to a lack of site comparables, a residual approach was employed to ascertain its market value.

The before and after values of the three depot sites, assessed by the said means, were used as benchmarks to evaluate if their actual premia were reasonable. The findings are summarised in **Table 1** below.

CONCLUSION AND DISCUSSION

As the differences between our assessed premia and actual premia were less than 10% or so, our conclusion is that the premia charged by government for modifying the lease to allow redevelopment of the former depot sites did reflect the market price level. Put another way, there is no evidence of concession in favour of the landowners.

The franchised bus industry in Hong Kong is a rare successful global example in that the operators are private business firms receiving no direct government subsidy (Lai et al 2011) and enjoying economies of scale (Lai et al 2012). Though their operations are protected legally by franchise licences, they have been highly innovative in a Schumpeterian sense (Lorne and Lai 2011, Lai and Lorne 2012). The findings of this technical note complete a study of whether there was any indirect state subsidy to the operators, other than provision of free and well-planned bus terminals (Lai et al 2011), in the form of concessions in premia of leasehold land for depot uses. Lai et al (2013) and Lai and Kwong (2015)

Table 1: A comparison of the assessed and actual premia

Lot Number (Bus company)	**IL8849 (CMB)**	**IL 7550 (CMB)**	**KTIL733 (KMB)**	**KCTL215 (KMB)**
(1) Actual Premium	$887,000,000 (per Conditions of Exchange dated 22/6/1995) (Surrendered lots: IL5532 and IL7178)	$430,350,000 (per Modification Letter dated 13/3/1997)	$464,000,000 (per Conditions of Exchange executed on 19/11/1996) (Surrendered lot: KTIL 192)	$186,550,000 (per Modification Letter dated 23/4/1996)
(2) Assessed before value	$3,025,569,000 (as at 22/6/1995)	$382,500,000 (as at 13/3/1997)	$1,141,240,000 (as at 19/11/1996)	$1,376,769,000 (as at 23/4/1996)
(3) Assessed after value	$3,936,480,000 (as at 22/6/1995)	$808,500,500 (as at 13/3/1997)	$682,270,000 (as at 19/11/1996)	$1,556,207,490 (as at 23/4/1996)
(4)Assessed premium (3)-(2)	$910,911,000 (as at 22/6/1995)	$426,000,000 (as at 13/3/1997)	$458,970,000 (as at 19/11/1996)	$179,438,490 (as at 23/4/1996)
(5) Difference between the actual premium and the assessed premium (1)-(4)	-$23,911,000 (as at 22/6/1995) [-2.7%]	$4,350,000 (as at 13/3/1997) [+10.2%]	$5,030,000 (as at 19/11/1996) [+1.1%]	$7,111,510 (as at 23/4/1996) [+3.8%]
Is the actual premium fair and reasonable?	Yes	Yes	Yes	Yes

confirmed that there was none at the stage bus depots were acquired from the government. This note shows valuation evidence that nor was there any subsidy when the leases of these depots were redeveloped. In terms of wider Coasian economics reasoning, there is adequate empirical evidence based on the aforesaid research that the regulatory rules of the state can enlarge a market, which Lai and Lorne (2015) generalised into a "Fourth Coase Theorem". State franchising of public transport in Hong Kong is not the same as state provision of transport services but akin to Crown franchising rights to lighthouse merchants to build and manage private lighthouses in England and Wales (Coase 1974, Lai et al. 2008a, 2008b, Lai forthcoming).

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Measuring Building Performance for Sustainable Built Heritage

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ABSTRACT

Despite a number of currently available building assessment methods, relatively little has been done on the assessment for sustainability of heritage buildings. It is important to measure the performance of a heritage building in achieving sustainability. The grading process often focuses on historical interest, architectural merits and social merits; and generally ignores the significance of environmental and economic impacts. There are also building assessment methods which focus on environmental sustainability only. This paper aims to develop a hierarchy to measure building performance of the built heritage from the three pillars of sustainability. A Heritage Building Sustainability Index (HBSI) would be described which incorporated a total of 19 indicators to benchmark performance in sustainability. Building owners, managers, government, and policymakers should make reference to these measurement metrics in order to move towards sustainability. These indicators will be useful for formulation of strategies for building restoration or adaptive re-use of heritage buildings.

KEYWORDS

indicators; sustainability; building performance; built heritage; building assessment method

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INTRODUCTION

The deteriorating state of our historic monuments has alarmed us of the loss of heritage, prompting many local authorities to enhance the scope and qualities of built heritage conservation. In Hong Kong, for instance, the number of graded historic monuments has been augmented to 1,457 (as of 20 February 2013) since the call for heritage conservation in the government 2007-2008 Policy Address. Contrary to this move, some privately-owned heritage buildings were demolished due to redevelopment or to avoid high maintenance costs. This is a loss of the valuable historical, social and cultural asset. Furthermore, building demolition increases construction waste and energy consumption when the new building is completed. This is contradictory to the concept of sustainable development. Fundamentally, heritage conservation and sustainability share some common topic of inheritance as they both concern about the continuity of resources and future integrity (Pollock-Ellwand 2011). Rodwell (2003, p.59) highlights the relationship between heritage conservation and sustainability in which *"sustainability is about prolonging the life of a building in order to contribute to a saving of energy, money and materials; and conservation is about preserving our heritage in order to make the best use of it"*. Stakeholders should put continuous effort to keep a built heritage sustainable even it has been graded as a historic monument. Owners are faced with the escalating expenses to conserve those buildings, such as an increase of electricity usage due to heavy reliance on air conditioning system, the cost for frequent maintenance and repair works as the building gets older, etc. These owners may not have sufficient resources to cover the current operating expenses and future restoration. Some owners may just leave these buildings unmanaged, which is contrary to the sustainability principles.

To be sustainable built heritage, there is a need to measure its building performance. Most of the building assessment methods currently in use focus on environmental sustainability, such as the UK's Building Research Establishment Environmental Assessment Method (BREEAM), the US's Leadership in energy and Environmental Design (LEED), the Australian's Green Star and the Hong Kong's Building Environmental Assessment Method (BEAM) Plus. These building environmental assessment methods are insufficient in the context of the three pillars of sustainability (Cole 1998 & 2005). This view is strengthened by Kohler (1999) that a sustainable building should include environmental sustainability (resources and ecosystem protection), economic sustainability (long-term resource productivity and low use costs) and social and cultural sustainability (protection of health and comfort and preservation of social and cultural values).

The importance of sustainability has stimulated a number of discussions in the heritage sector, such as the sustainability of coastal cultural heritage (Pinder 2003); the

effectiveness of land use policy in heritage sustainability (Stubbs 2004); the importance of the community commitment in conservation to the heritage sustainability (Kato 2006); the use of multi-criteria decision making for grading heritage sites (Dutta and Husain 2009); the conservation-led regeneration of historic urban space and sustainability (Al-Akkam 2013), etc. In particular Stubbs (2004) proposes a set of indicators for historic sustainability. Extending the framework of Kohler (1999) on sustainable building and with reference to the framework of Stubbs (2004) on historic sustainability, and the relevant chapters of Agenda 21, this paper attempts to develop a set of indicators in an assessment framework to measure the progress of heritage buildings towards sustainability. These will be arranged in an hierarchy known as a Heritage Building Sustainability Index (HBSI) which is expected to facilitate the stakeholders to understand the current state of the heritage buildings from each of the three sustainability dimensions, namely environmental, social and economic aspects.

HERITAGE AND SUSTAINABILITY

Heritage is something passed across the generations, informing us about our identity and the development of our society over time. The need to protect our heritage was acknowledged in the World Heritage Convention in November 1972 (Glantz and Figueroa 1997). In today's modern civilization, heritage has secured a high profile in the society (Pinder 2003). The international communities and local governments have been encouraged to manage the heritage in a sustainable manner that ensures conservation and rehabilitation (Pickard 2002). Despite preserving a historic monument or group of buildings, the UNESCO has recently called for a holistic approach in managing historic urban landscape, which is not only preserving the physical environment, but also concentrates on the tangible and intangible urban heritage (UNESCO 2013). However, there is a large number of conservation works which can only be accomplished at the municipal level. An individual owner of the built heritage may not be able to cope with the tangible and intangible urban heritage. What an individual owner or a building manager should know is whether or not the conserved building is sustainable and the way to manage a sustainable heritage building.

The concept of sustainable development emerged in the late 20th century. It was coined in the World Convention Strategy of the 1980s and later defined in the Brundtland Report as developments that "meet the needs of the present generation without compromising the ability of future generations to meet their own needs" (WCED 1987). Owing to global warming, nations around the world have been urged to maintain or sustain something to save the mankind. Accordingly, the word "sustainability" has been extensively used to solve the problem in the environmental dimension. In fact, sustainability is an integrated concept (Hansmann et al.

2012) and can be applied in various disciplines. It has no single definition as people live in different environments and social and economic conditions (Bell and Morse 2008). In the building context, sustainability requires a holistic approach that integrates all dimensions of a building, which not only strengthens environmental capacity, but also includes the economic and social issues underlying the building itself.

Research on the link between heritage and sustainability began in the mid-1990 (Stubbs 2004). A number of studies investigating heritage and sustainability point out that heritage conservation has a positive impact on sustainable environmental, social and economic development (Vileniske 2008). However, the three dimensions of sustainability have been separately discussed. Examples are the link between heritage conservation and environmental sustainability (Gilderbloom et al. 2009); historic building conservation and social sustainability (Yung et al. 2011); and heritage conservation and sustainable economic development (Chan and Ma 2004). In fact, sustainability within the context of built heritage deals with complex issues. The conservation of a century-old building may have a negative impact on the environment as it may consume higher energy in anticipation of building dilapidation. The frequent maintenance and repairs of a historic monument are costly and, on the other hand, such building may not able to generate sufficient income. Unmaintained built heritage may pose threats to the occupants or visitors. This complexity prompts the need to measure the building performance of built heritage from the three pillars of sustainability.

BUILDING ASSESSMENT METHODS

In a number of countries, the energy used for heating, ventilation, cooling and lighting in buildings engages approximately 40% of primary energy (Kua and Lee 2002). Environmental responsibility leads the stakeholders in the real estate industry to pay more attention to environmental performance and building quality, such as construction waste handling and energy efficiency in residential and commercial buildings. A number of building assessment methods have been developed to ease the global warming potential. The UK's BREEAM was the first commercially available building assessment tool introduced in 1990 to assess the wide-ranging environmental issues in a building (Ho et al. 2013). Other assessment methods, to name a few, include the LEED in the US and Canada, Green Star in Australia, Eco-Quantum in the Netherlands, GB/Tool in China, Comprehensive Assessment System for Built Environment Efficiency (CASBEE) in Japan, Building And Construction (BCA) Green Mark in Singapore and BEAM Plus in Hong Kong. These assessment methods are not really applicable in measuring building performance for sustainable built heritage. Such tools incline towards technical aspects, such as energy consumption, carbon emission and waste management (Tweed and Sutherland 2007). The United Nations

Industrial Development Organization (UNIDO) (2011) also highlights that the past two decades saw the weight being placed on environmental sustainability. Cole (1998) argues that building environmental assessment methods focusing on technical issues are inadequate in the context of sustainability, as they should also include the social and economic dimensions. Elghali et al. (2007) suggests that three sets of criteria should be met to examine sustainability, namely economic viability, environmental performance and social acceptability.

Since the call for the development of indicators for sustainable development in the 1992 Earth Summit, there has been a growing literature concerned with sustainability indicators. They are regarded as one of the most significant factors for applying a sustainable development policy in some nations (Bouni 1998). The importance of preserving the world's ecology prompts the development of sustainability indicators in the agricultural sector (Pannel and Glenn 2000), marine ecosystems (Bell and Morse 2008), mining and minerals (Azapagic 2004), etc. Sustainability indicators are also developed for a city, such as Norwich in the UK (Norwich 21, 1997) and cities in Malaysia (Choon et al. 2011). Hundreds of sustainability indicators are developed in different sectors (Fredericks 2012). Examples of some prominent indicators are Ecological Footprint, Dashboard of Sustainability, Environmental Sustainability Index, Well-being Index (barometer of sustainability) and Environmental Vulnerability Index (Mori and Christodoulou 2012). Despite the various indicators, Moldan and Dahl (2007) comment that the challenge of Agenda 21 to develop sustainability indicators is still far from satisfactory as none of them has been widely implemented.

Another approach to measure sustainability is the use of a multi-criteria decision-making method (Munda 2005). A set of multi-dimensional indicators can summarize information for the purpose of decision-making (Walmsley 2002). Research studies of indicator systems include those measuring urban sustainability (Huang et al. 1998), sustainable development in catchment systems (Walmsley 2002), sustainability in historic environments (Stubbs 2004), environmental indicators for sustainable industrial building (San-Jose et al. 2007), sustainable supply chain management (Erol et al. 2011), sustainable urban conservation (Zancheti and Hidaka 2012; Al-Akkam 2013), and etc. The emerging research on the importance of heritage fosters the need for further development of heritage sustainability indicators to meet sustainable development challenges (Stubbs 2004).

SUSTAINABLE BUILT HERITAGE

Built heritage normally refers to historic buildings and structures (Nuryanti 1996) and is protected by legislation due to special merit worth conserving (Herbert 1989). Built heritage can

facilitate community learning, which helps to increase social value in the community. It can also expedite economic growth through tourism and real estate development, helping to promote socio-economic development (Wang and Bramwell 2012). Further, it benefits the environment as it minimizes construction waste due to unnecessary demolition as well as encouraging the re-use of materials.

Research on built heritage has been wide-ranging, from the effective management of built heritage (Moscardo 1996) to the legal framework for built heritage conservation (Hudson and James 2007), and from the use of a microeconomic applied perspective in determining the value of built heritage (Mazzanti 2003) to the consideration of the contribution of built heritage to social inclusion (Pendlebury et al. 2004). The increasing importance of built heritage to society has urged local authorities to make significant conservation efforts.

Conservation of a physical structure, which is connected to human (socio-economic) and physical (environmental) systems (Brandon and Lombardi 2011), is an important element of sustainable development. The decision to preserve built heritage is normally based on its cultural and architectural values. Many studies in the past have attempted to grade heritage using various methods, such as a multi-criteria decision making method which includes historical value, architectural value, socio-cultural value, integrity, accessibility, signs of deterioration, usability, public opinion and local response (Dutta and Husain 2009); a system of key performance indicators which include the significance, integrity and authenticity of built heritage (Zancheti and Hidaka 2012). A sustainable built heritage not only takes into account the welfare of the people (social sustainability), but also its effect on planetary health and economic growth. It is therefore important to develop indicators which capture the environmental benefit and economic sustainability of the built heritage.

INDICATORS FOR HERITAGE BUILDING PERFORMANCE

In Hong Kong, the Antiquities and Monuments Office (AMO) developed six criteria for grading historic monuments, which include historical interest, local interest, architectural merit, authenticity, rarity, group value and social value (AMO, 2013). After grading by the Antiquities Advisory Board (AAB), and depending on the grade, development potential is restricted to different degrees. The high maintenance costs and inability of the remaining structure and use to generate income has caused owners a dilemma: demolish the building or leave it in a state of disrepair. This is contradictory to the concept of sustainable development. There is a need to assess the degree to which a building, after grading, should continue to function in a sustainable manner.

Despite the call to develop indicators for sustainable development in Agenda 21, not all chapters are pertinent to

buildings, particularly built heritage. These indicators may be practical for assessing the sustainability of a country or a city, but not for an individual building. The United Nations (UN) working list of sustainability indicators in June 1992 adopted 24 chapters (Bell and Morse 2008) (See **Table 1**). The Brazilian Ministry of Environment and the Norwich City Council only implemented nine chapters in their lists of sustainability indicators (Bell

Table 1. The United Nations working list of sustainability indicators based on Agenda 21

Categories	**Main chapter headings**	**Chapter Number**
Social	Combating poverty	3
	Demographic dynamics and sustainability	5
	Promoting education, public awareness and training	36
	Protecting and promoting human health	6
	Promoting sustainable human settlement development	7
Economic	Changing consumption patterns	4
	Financial resources and mechanisms	33
Environ-mental	Promoting sustainable agriculture and rural development	14
	Combating deforestation	11
	Conservation of biological diversity	15
	Protection of the atmosphere	9
	Environmentally sound management of biotechnology	16
Institutional	Science for sustainable development	35
	Information for decision-making	40
	Strengthening the role of major groups – Preamble	23
	Global action for women towards sustainable and equitable development	24
	Children and youth in sustainable development	25
	Recognizing and strengthening the role of indigenous people and their communities	26
	Strengthening the role of non-governmental organizations: partners for sustainable development	27
	Local authorities' initiatives in support of Agenda 21	28
	Strengthening the role of workers and their trade unions	29
	Strengthening the role of business and industry	30
	Scientific and technological community	31
	Strengthening the role of farmers	32

Source: Bell and Morse (2008), p. 30.

and Morse, 2008; de Araujo and Rizzo, 1997). Chapters which relate to measuring building performance of built heritage include chapter 6 (protecting and promoting human health), chapter 9 (protection of the atmosphere), chapter 18 (protection of the quality and supply of freshwater resources), chapter 21 (environmentally sound management of solid wastes and sewage-related issues), chapter 33 (financial resources and mechanisms) and chapter 36 (promoting education, public awareness and training). Combined with Kohler's (1999) and Stubbs' (2004) framework, the above-mentioned chapters are here studied to develop a set of indicators from the perspective of three pillars of sustainability **(Table 2).**

Our framework has been devised mainly for heritage building in a city. Adapting from Ho et al. (2004), some principles taken into consideration in developing the hierarchy include generality (the capability of the hierarchy to be applied

Table 2. Indicators for measuring building performance of the built heritage

	Dimensions	**Category**	**Indicators**	**UN chapter**
Heritage Building Sustainability Index	Environmental sustainability	Resources protection	Measurement of energy consumption	9
			Presence of on-site renewable energy systems	-
			Ability to adapt due to climate change	-
			Protection of freshwater resources	18
			Availability of public transport	-
		Ecosystems protection	Consumption of ozone-depleting substances	9
			Waste management	21
	Social sustainability	Protection of safety and comfort	Compliance with building standards	6
			Thermal comfort	6
		Preservation of social and cultural value	Strengthening sense of place	-
			Ability to engender skills	-
			Links to education	36
			Promotion of leisure program in the building	36
			Accessibility of use	-
	Economic sustainability	Long-term resource productivity	Employment opportunities	-
			Boosting local economy	-
			Ability to generate resources for operating expenses	-
			Sufficient resources for future restoration	33
		Low use costs	Low costs for daily operation and future renovation	-

to most heritage buildings), objectivity (the measurability and verification of the factors to be gauged), practicability (the simple and easy acquisition of the factors to be assessed) and relevance to heritage building performance (the relatedness of the factors to heritage buildings). After considering these principles, 19 indicators have been incorporated into a hierarchy. These indicators are the fundamental attributes important to the sustainability of heritage building and are expected to facilitate stakeholders' identification of the extent to which any heritage building contributes to environmental, social and economic sustainability. The assessment will be used to compare and benchmark existing buildings. The generic area of Stubbs (2004) is excluded as this dimension is too general and more relevant to the heritage sector of a city rather than an individual heritage project.

Measurement of energy consumption

Severe climate change has prompted international communities to pay attention to carbon emissions and energy consumption (UNESCO 2007; Yung and Chan 2012). The reduction in carbon emissions or savings on energy consumption help to protect the atmosphere and natural resources. Electricity use due to heating, lighting, ventilation and air conditioning has a significant impact on the energy consumption of a building. Currently, there is no benchmark for the acceptable level of energy consumption in heritage buildings. Nevertheless, a heritage building's main energy consumption is electricity, which can be measured by electricity bills or meters. Heritage buildings that reduce electricity use make a positive contribution to environmental sustainability. This has been a great challenge to the owners or property managers of built heritage due to growing reliance on air-conditioning for indoor thermal comfort and dilapidation prevention of old buildings as a result of the rising ambient temperatures. A balance is needed between energy savings, thermal comfort and building dilapidation to achieve the goal of sustainability.

Presence of on-site renewable energy systems

One of the techniques to respond to higher energy consumption is for a building to produce its own energy. This can be generated by the presence of an on-site renewable energy system. The installation of this system, such as roof PV panels, can help a heritage building move towards environmental sustainability. This system has been relatively popular among residential and commercial buildings. The government in some countries like the UK and Australia has given support or incentives to local communities such installations. Nevertheless, it remains unpopular in many countries due to high installation costs. A heritage building has undeniable challenges for the installation of on-site renewable energy due to the constraint of building design and structure. It is particularly difficult to adapt a new technology into a-century-old buildings. Nevertheless,

if the stakeholders successfully install on-site renewable energy systems, it will help reduce its reliance on power plant using fossil fuels. This in the end will contribute to environmental sustainability.

Ability to adapt due to climate change

Climate change has raised the issue of building adaptation (Stubbs 2004) in the light of growing concern about the harmful impact of climate change on World Heritage sites (UNESCO 2007). Compared to modern buildings that are more vulnerable to climate change, pre-1940s buildings are likely to be more resilient and adaptive, due to their typical characteristics of high ceilings, tall and narrow windows and high thermal mass (Steemers 2003). However, the current phenomenon shows that a growing number of pre-1940s buildings face an accelerated speed of deterioration due to global warming. The hotter temperature and higher humidity of our planet prompts the installation of air-conditioning and dehumidifiers to delay building decay, which causes an upsurge in energy consumption. A heritage building which can still adapt to the climate change without any reliance on air-conditioning or dehumidifier will be advantageous to the environment and this will be a plus point to its building performance. This indicator should be included in the measurement of building performance to facilitate owners or building managers to identify its ability to adapt to climate change.

Protection of freshwater resources

The rising world population demand increasing quantities of freshwater. On the other hand, freshwater supplies are declining either because climate change causes less rainfall in some countries or economic growth causes water pollution in others. A number of countries are facing a water crisis requiring governments to encourage building owners to incorporate sustainability features to meet water targets. The installation of water saving sustainability features can be easily found in new residential and commercial buildings. However, most owners of existing buildings are not enthusiastic about installing water savings features due to the cost involved. The owners of built heritage are even less keen because of design constraints. Although potable water usage in heritage buildings is far less than in the agriculture or manufacturing sectors, some minor effort can be undertaken for water savings in built heritage by installing automatic sensor taps and warning notices encouraging water economy. A heritage building focused on protecting freshwater supplies will be beneficial to environmental sustainability and thus this indicator is needed in the performance measurement.

Availability of public transport

The availability of public transport to reach a heritage building will bring less traffic, helping reduce air pollution with a positive impact on environmental

sustainability. The management of some heritage sites has encouraged visitors to use public transport rather than private cars or taxis. It would be ideal if owners or building managers work with transport departments or bus companies to improve public transport services. Bus companies can provide a 'jump on/off' circular tourist buses; while the management can discourage private cars by reducing parking possibilities. Discounted entry vouchers to heritage sites linked to public transport tickets can be an incentive (Stubbs 2004). The 'jump on/off' circular tourist bus is in fact available in a number of countries. In Hong Kong, for example, the 'hop on/off' bus is available for both heritage and shopping routes. However, the heritage route only serves historical buildings in Central and Western District of Hong Kong Island, which is famous for its blend of old Hong Kong culture and colonial lifestyle. Besides the availability of public transport within walking distance of a heritage site, any incentives encouraging visitors to use public transport can be an additional score to help sustainable building performance.

Consumption of ozone-depleting substances

The consumption of ozone-depleting substances harms the ozone layers. These materials were widely used in the past, triggering the call to gauge the consumption of these substances to protect the earth's atmosphere as mentioned in chapter 9 of Agenda 21. A large number of refrigerators and air conditioning systems used refrigerants containing compounds of chlorine, which decomposes leaving free chlorine atoms that destroy ozone. This awareness has prompted the people around the world to use air conditioning containing no Chlorofluorocarbons (CFCs) or Hydroclorofluorocarbons (HCFCs). More and more air conditioning systems built nowadays have eliminated chlorine based refrigerants. Heritage buildings relying on air conditioning must avoid such substances to avoid underperformance in terms of environmental sustainability benchmarks. Buildings that have an opportunity to undergo restoration or revitalization are encouraged to replace obsolete air conditioning systems.

Waste management

Several chapters of Agenda 21 concern sound environmental management of different wastes, such as toxic chemicals (Chapter 19), hazardous wastes (Chapter 20), solid wastes and sewage-related problems (Chapter 21) and radioactive wastes (Chapter 22). The improper treatment of these wastes can harm the ecosystem. It is thus important to promote the waste management in every industry. Waste management can be in the form of waste prevention, minimization, re-use and recycling (Desmond 2009). Unlike industries producing toxic chemicals, hazardous materials and radioactive waste, waste produced by built heritage is relatively straightforward, mainly being solid and sewage-related waste. People naturally produces waste so heritage buildings, mainly occupied by people as users or visitors, do have a

waste disposal problem best solved by sound waste water management and, where possible, re-use and re-cycling policies.

Compliance with building standards

Social sustainability concerns people's quality of life and welfare. Feelings of safety and comfort play a significant role in the quality of life, and heritage buildings should meet these needs. Users will stay away if they either feel unsafe or that their health is threatened Ho et al. (2008) defined a healthy building as one that reduces occupants' physical and mental health risk. A safe building is similarly one that lessens occupants' risk of physical injury and death. The basic requirement to achieve these goals is that a heritage building complies with building standards. By definition old buildings do not meet modern building standards, past times having different attitudes and understandings. However, as society has matured, the health and safety of buildings become a crucial factor to social sustainability. Because old buildings do not meet modern standards, heritage buildings undertaking Alteration and Addition (A&A) works have to be brought up to date according to local provisions, such as, in Hong Kong, in terms of structural safety (Buildings Ordinance), fire safety (the Fire Safety Ordinance), protective barriers, barrier free access (for users with disabilities, families with young children and the elderly) and sanitary fitments, etc. Any building that does not comply with the required standards has a reduced sustainability rating.

Thermal comfort

The internal thermal comfort is a key concern for occupants of built heritage (Ge et al. 2012). Productivity and wellbeing are enhanced when occupants are thermally comfortable. An increase in temperature beyond the comfort zone may make an individual tired and sleepy, while a decrease can cause agitation and loss of focus (Sarambekar et al. 2010). Psychological and physiological reactions to thermal discomfort vary among individuals depending on their activities and clothing. Because thermal comfort requirements vary by climate and location there can be no universal standards. In the case of heritage buildings, the optimal combination of the three key thermal variables (temperature, humidity and air movement) to meet comfort requirements is necessary both for human users and to mitigate building decay.

Strengthening sense of place

A sense of place is a feedback response between human users and their built environment. In general, a typical new housing estate does not normally generate any immediate sense of place. By contrast built heritage often helps strengthen a sense of place through providing a unique identity to a neighborhood. A building is generally regarded as heritage when it is old enough (more than 50 years old) and has, or is believed to have historical value through inhering memories, particularly for the elderly that recall

childhood or previous generations' experiences. As a physical reminder of the past, heritage buildings play a pertinent role in a sense of attachment (Yung et al. 2011).

Heritage development depends on a sense of place in sustaining civic pride in local communities (Pinder 2003). A strong sense of place can be observed when local inhabitants and visitors have profound feeling of loss in cases of demolition. Built heritage often contributes to both individual and social satisfaction (Tweed and Sutherland 2007). However, the bustle and hustle of city life can distract local inhabitants' so that their interest in local heritage fades and their relationship with neighbourhood heritage is attenuated. It is thus important to observe how local inhabitants interact with built heritage in order to encourage sustainable interaction between them and their built heritage. The socially sustainable ideal is where built heritage strengthens local inhabitants' sense of place and local inhabitants anchor that sense of place in built heritage.

Ability to engender skills

People's welfare can be improved through skills development. The maintenance or repair of heritage buildings require special technical skills that have been in decline. Detailed knowledge is needed for the effective restoration of historic buildings (Hyslop et al. 2010). In Hong Kong, for example, special skills are required to repair some parts of old historic monuments and because such skills are now locally scarce imported workers are sometimes required for major work. Working together with imported specialists, local people can be trained and their self-esteem thereby enhanced (Yung et al. 2011). This increases social value. The ability of a heritage building to engender skills should be examined to understand its contribution to social sustainability, and thus should be included in the indicators for building performance measurement. The building owner or manager should also encourage the local community to participate in training for heritage building maintenance.

Links to education

The existence of heritage buildings can be linked to formal education and utilized as a tool to promote community learning. It can facilitate experiential learning, offering students and the community pictures of the past, rather than history learned solely from books. It can also communicate architectural and aesthetic values (Brandon and Lombardi 2011).

Urban redevelopment has modified cityscapes in the process demolishing a large number of old and very old buildings. Today's people have difficulty appreciating the way of life of past generations. For example, the existence of Sam Tung Uk Village, built 229 years ago in Hong Kong, can help students and the community understand the life of Hakka people in Hong Kong centuries ago. Strictly speaking, the most important way to understand built heritage is to visit a physical building

(Young, 2005), the real presence of which enhances the learning experience (Stubbs, 2004). Arranging school visits using group tour facilities can improve a society's awareness of its past. This can help to preserve social and cultural values and improve the quality of life of local communities.

Promotion of leisure program in the building

Despite growing interest in heritage conservation, a busy urban life has detracted from local inhabitants' appreciation of the historic monuments in their neighborhood. Uninteresting exhibits and old-fashioned adaptive re-use into museums may be other reasons why some heritage buildings have faced difficulties in attracting visitors, with the risk that attachment to a building may fade away. Promotion of leisure programs (such as art-based program) or community events (such as various festival celebrations) in a building may boost understanding of its existence (Measham 2006). During such events, people can share experiences and memories of the past related to the building ultimately strengthening their sense of belonging. People who did not even know that a building existed can be made aware of it by the same means. A building owner or manager may work with the local government to disseminate the promotion strategy through their tourism schemes. A society that values heritage will be more sustainable, so measuring building management initiatives in promoting leisure programs is a key sustainability management tool.

Accessibility of use

Social sustainability also concerns social equality and social inclusion. People should have equal and fair access to resources including built heritage (Tweed and Sutherland 2007). Accessibility can be categorized into physical and financial access (Pendlebury et al. 2004). Everyone should be able to physically access a building, whether disabled, elderly or families with baby strollers. This issue had no salience decades or centuries ago and so most heritage buildings 'as built' have accessibility problems. It follows that restoration or major maintenance of heritage buildings should include the provision of barrier free, that is universal access, which necessarily includes access to all genders and creeds.

Financial access to heritage building is another major concern. In the past, heritage visiting was mainly an elite activity because only such people had the free time, the admission cost,and the transportation needed (Young 2005). Even though today most people are able to visit and enjoy built heritage, some poor people may be discouraged by entrance fees. Building owner or managers should offer schemes to mitigate such problems, such as free admission days or discount schemes. Virtual access via the Internet is another stratagem to increase access by permitting virtual building visits for those in other countries, or who do not have the time or money for a physical visit.

Some privately owned heritage buildings only open to a restricted audience rather than the general public, which is necessarily exclusive. Governments should actively work with the building owner, or vice versa, to allow public to access the building on certain dates under certain schemes. When everyone has equal rights and access to built heritage general welfare can be enhanced, resulting in social sustainability.

Employment opportunities

Heritage is labor-intensive (McLoughlin et al., 2006). The need to manage and maintain built heritage creates employment opportunities, whether administrative staff for daily operations or repairmen for maintenance. Specialist conservation architects are also needed for rehabilitation or adaptive re-use projects. This contrasts with industry in which human labour can be replaced by machinery The conservation and repair of the Grainger Town Project (in Newcastle, UK), for example, created 1,900 jobs, contributing to the national economy (Pickard, 2002).

Today's adaptive re-use efforts in converting an old historical building into a more suitable use for the public to enjoy, such as from an old police station into heritage hotel, from a Chinese style private residence into a Chinese medicine shop, from an old housing estate into a youth hostel, etc., has increased employment opportunities. Such projects can have long-term resource-use and productivity benefits, thereby contributing to economic sustainability.

Boosting local economy

Economic growth remains the highest priority for most states. Many governments continue to focus on their countries' economic viability, not seeing heritage conservation as contributory to that goal. Yet, some studies reveal that built heritage brings positive impact to neighborhood business. Interesting built heritage attracts tourists, boosting both local and national economy (Tweed and Sutherland, 2007). Any business located in the surrounding area may gain advantages from built heritage users (McLoughlin et al., 2006). When local tourism improves, it will attract more related businesses, such as restaurants, entertainment venues, transportation providers, etc. (Ge et al., 2012). A number of countries that are relatively popular with heritage tourism include many in the European Union. Their heritage sector is often a large contributor to the countries' GDP. Another example is the Historic Centre of Macao that continues to attract tourists, who help to boost the local economy.

However, heritage in some regions is still in its infancy and is not popular tourist attraction. Historic monuments face difficulty attracting visitors. In such neighborhoods businesses cannot rely on the presence of heritage buildings. It is thus pertinent to include the performance of the local economy in performance measurement to understand whether any heritage building has a positive impact and what kind of steps should be taken if no positive local economic impact is found.

Ability to generate resources for operating expenses

Economic sustainability has been a challenge for the preservation of built heritage. The old-fashioned approach of converting a historic building into a museum is often ineffective. The income generated from ticket selling is often insufficient to cover operating expenses. The expenditures of government-owned Dr. Sun Yat-sen Museum (a declared monument) in Hong Kong, for example, are approximately US$1.2 million a year; while the revenue is about US$ 71,000 a year (Dr Sun Yat-sen Museum 2013). The deficit is made up by tax-payers. Such heritage museums heavily rely on government funding, bringing a negative message to the government and policymakers. Reflecting on such past failures, a number of governments have been working closely with any willing organizations on adaptive re-use as a new alternative for revitalization to help heritage buildings to survive without any government funding. For economic sustainability, a preserved heritage building should be able to generate its own income from its operating expenses.

Sufficient resources for future restoration

The repair and restoration works of heritage buildings are costly due to scarcity of skills and technology (Ge et al. 2012). Whatever may be the annual operating expenses and income generated from tickets and other revenue sources, the result may not be sufficient for extensive restoration or even comprehensive maintenance. Owners or building managements are therefore faced with the challenge of finding additional funding for such purposes. The same is true with government funding which may not be easily available due to alternative demands and less visible benefits. These issues render heritage conservation even more challenging. The low capacity for generating its own income for future restoration is likely to have a negative impact on the economic sustainability of built heritage.

Low costs for daily operation and future renovation

To be economically sustainable operational costs should be kept low. However, old heritage buildings require constant maintenance with scarce special skills and technology needed for repairs, prompting soaring daily operational costs. For example water leakage is often observed in old buildings, particularly during the wet season, for which urgent repair is vital. In like manner, most buildings from centuries ago were designed without considering future renovation costs or sustainability. Their designs and materials reflect the technology available at the time. New technology is sometimes costlier, especially when fitted to fabric not designed for it. These are major challenges to building management. It is thus important to include this indicator in the performance measurement to aim to reduce daily operational costs and the costs of future renovation.

CONCLUSIONS

Many local authorities are merely aware of historical interest, authenticity, architectural merit and social value in grading the historic monuments without considering the need for a holistic approach for sustainable built heritage. This has sometimes ended up with building demolition thanks to high maintenance costs and clear and exigent redevelopment intentions. After being graded as historic monuments, it is important to measure building performance as some dimensions or elements of the buildings may be problematic and require special attention to achieve sustainability. The combined environmental, social and economic sustainability of heritage buildings has been a huge challenge to the building owners or managers.

Our study therefore develops a set of indicators to facilitate stakeholders' understanding of the current state of their heritage buildings. The 19 indicators not only focus on environmental sustainability, but also take social and economic sustainability into consideration as the three dimensions are equally important in the sustainability of heritage building. It is important to separate the dimensions into indicators to understand which particular indicator needs to be enhanced. These indicators can be further weighted using either the Delphi method or the Analytic Hierarchy Process (AHP) technique developed by Saaty (1980) to arrive at a single index. The final outcome of the aggregate of all indicators, categories and dimensions is the Heritage Building Sustainability Index (HBSI). This index can help policymakers make an informed judgment about measures to be taken and progress towards heritage building sustainability. A heritage building with satisfactory performance on the three dimensions can be deemed sustainable. For those buildings with poor performance careful analysis of indicators with lower ratings should indicate appropriate further action to be taken. Strategies to improve the building performance include small renovation, building restoration, revitalization or even adaptive re-use of the respective heritage. This framework is expected to be applied in some case studies for further study. Despite the indicators mainly for local heritage building, it is hopefully also applicable at regional or national level.

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Field Study of Five "paradises" within Kam Shan Country Park

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ABSTRACT

Communities of early morning walkers in Hong Kong have built private gardens and recreational facilities in the countryside, which was Crown property, before these were designated as Country Parks in 1977. There are signs showing morning walkers' persistent occupation of the land they have enclosed which they call "paradise." Using aerial photos, oral histories, and documentaries, this report provides information about the basic features of five of these paradises found in Kam Shan Country Park and of the communities of early morning walkers who built them. The Kirznerian-Foss theories of entrepreneurship and some basic property rights theories are used to structure the discussion. The aim of the report is to stimulate interest in the issue, which has never been systematically studied, as well as provoke further research on planning innovations with regard to recreational squatting by early morning walkers, and possibly their participation in military heritage conservation, provided the necessary conditions and innovative solutions are available.

KEYWORDS

Paradise; (early) morning walker; recreational squatting; entrepreneurship; military heritage; Kam Shan Country Park

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INTRODUCTION

This is the first of a series of field study reports on the so-called 'paradises[1]' built by communities of morning walkers[2] in a northern part of Kowloon before it was designated as Kam Shan Country Park. Communities of early morning walkers occupied small pockets of land in the countryside, and adapted them as sitting out areas for recreational use. Legally speaking, these structures built on Crown Land are squatter structures. The Collins English Dictionary **(Collins 2015)** defines "to squat" as "to occupy land or property to which the occupant has no legal title." The morning walkers are therefore squatting on government land for the purpose of recreation and they often call their enclosed land "paradises." In this report, this phenomenon will be referred to as 'recreational squatting.'

In a recent study by **Lai, Chua and Lorne (2014)** about squatting in colonial Hong Kong, a distinction between inefficient Type A and efficient Type B squatting was made. It is likely the paradises in question are efficient due to their small size relative to the park and decent management.

The phenomenon of recreational squatting in Hong Kong is in some ways similar to that of 'guerrilla gardening' observed in countries like Australia **(Adams, Hardman and Larkman 2015)**, the United Kingdom **(Adams, Scott and Hardman 2013)** and Canada **(Crane, Viswanathan and Whitelaw 2013).** In its simplest form, the definition of guerrilla gardening is "the illegal cultivation of someone else's land" **(Reynolds, 2008: 16** in **Adams, Hardman and Larkham 2015: 1232). Flores (2006 in Adams and Hardman, 2014: 1103-04)** offer a more qualified definition of guerrilla gardeners as "volunteers who, without permission, operate either individually or collectively to target public and private spaces of neglect and unlawfully transform the environment through the planting of flora without the landowner's consent." Guerrilla gardening violates property rights laws. Guerilla gardeners are variously motivated and when asked offer reasons such as 'to beautify space' or 'increase biodiversity' in areas which they think have been abandoned or neglected, or, to grow crops. **Adams, Hardman and Larkham (2015: 1233)** note that in New York City guerrilla gardeners aim at educating "residents about the benefits of community gardening." The early morning walkers studied in this paper are in some ways **similar** to guerrilla gardeners in the sense that they also cultivate private gardens on land that does not belong to them. However, there is a great difference because the 'guerilla gardeners' have largely

[1] From the Greek term 'paradeisos' meaning enclosed park. In the Greek translation of the Bible the term is used to refer to the Garden of Eden where "God and man are friends; there is no such thing as evil or death. The garden is described as a leafy oasis…Out of the garden flow the four rivers…; these water the entire earth and make it fertile" **(The Navarre Bible 1999: 47).** These features describe a place where those who live in it are happy, enjoy life and God's goodness. In Chinese, the term paradise is translated as *leyuan* (樂園) meaning happy garden.

[2] In Hong Kong a 'morning *walker*' or 'early morning walker' is someone who visits a park, open space or an area of open land, early in the morning to take the air and, in many cases, engage in morning exercises.

become subject to state regulation, whereas Hong Kong 'morning walkers' cultivate 'private' gardens in the countryside on hillsides or mountain knolls which make law enforcement costly and difficult. Moreover, they not only cultivate gardens but also install other structures for recreational use.

Aerial photos from the Survey and Mapping Office were inspected and interpreted to locate the relevant paradises in the Country Park and to sketch the layouts of the two relatively largest. Site visits and semi-structured interviews were conducted from April to June 2015. The information provided in this report was mainly based on oral history and some documentaries.

SIGNIFICANCE

Based on a literature search, it can be confidently ascertained that the phenomenon of non-commercial gardening by members of the public on government land in Hong Kong has never been systematically studied. The primary aim of this paper is to report basic attributes of the communities of early morning walkers and the corresponding five paradises they built in Kam Shan Country Park. Other paradises will be reported in future field study reports. This exploratory study also lays the groundwork for further research as it identifies important attributes of a resource that are useful and relevant for any debate and thinking about the kind of innovations, such as appropriate property rights arrangements, uses, functions or structures, to address the issue of recreational squatting in Country Park land in Hong Kong. It is important to note that while this paper does not suggest that morning walkers can competently participate in military heritage conservation, the conditions that could possibly empower them to do so can be identified facilitated by **Ostrom's (2007)** diagnostic framework for thinking of innovative solutions to address the problem of rent dissipation of common pool resources, which is the subject of a separate study currently under review. Innovation requires entrepreneurship[3] particularly on the part of the resource owner.

COUNTRY PARKS SYSTEM IN HONG KONG

At the time of writing, there are twenty-four Country Parks in Hong Kong, covering a total area of 443 square kilometers which is about forty percent of the total land area of Hong Kong. These country parks have been designated under Cap 208, Country Parks Ordinance (the Ordinance) for the purposes of nature conservation, recreation, and outdoor education. The Ordinance was enacted in 1976, following years of study and consultations that began in the early 1960s when a group of forestry officials, academics and conservationists expressed the need for a country park system in order to protect the countryside from further encroachment due to rapid development and to address the increasing demands for outdoor recreation. **(Jim 1986)** The various studies and consultations made all resulted in strong recommendations for a country parks scheme. Even the

Commission of Inquiry established for the purpose of investigating the causes of the 1966 and 1967 civil disturbances in Hong Kong, in which a great majority of those who took part were young people, suggested the urgent need for the creation of country parks as one of the recreational outlets for youth as one of the means to avoid recurrence of such unrest in the future. The great success of the first pilot scheme that was implemented in 1971 led to the approval of the first five-year country park development (1972-1978), which was enthusiastically support by the then Governor Sir Murray MacLehose (1971-1982) who was an avid hiker. In June 1977, the first three country parks were designated. By 1979, 21 country parks had been delineated. Three additional country parks were established later on. All Country Parks are governed by this Ordinance.

With the enactment of the Ordinance, the Director of the Agriculture and Fisheries Department (now called Agriculture, Fisheries and Conservation Department (AFCD)) was appointed as the Country Parks Authority (hereinafter "Authority"), advised by a Country Parks Board. The management of Country Parks is AFCD's responsibility, involving the provision of "facilities and services for the public enjoyment of country parks" (cf. CPO Section 4c, iv), such as fitness and jogging trails, barbecue sites, camp sites, and shelters. AFCD is "responsible for tree planting, plantation enhancement, conservation education, fire prevention and fighting, keeping country parks clean, development control and provision of recreation and

[3] **Kirzner (1973)** argues that the market has two elements, namely, the economizing element and the *entrepreneurial* element. These two elements are important for understanding fully how the market behaves. The focus of the economizing element is on maximizing efficiency, and it operates within an allocative, means-end framework where scarce means are manipulated and allocated among a hierarchy of competing ends. On the other hand, the *entrepreneurial* element stresses alertness and drive to possibly newly worthwhile goals and to possibly newly available means. As Kirzner (1973: 35) puts it "...human decision cannot be explained purely in terms of maximization, of "passive" reaction that takes the form of adopting the "best" course of action as marked out by the circumstances..." Change in human decisions can be a product of active response to new information or the "outcome of a learning process generated by the unfolding experience of the decisions themselves" (Kirzner 1973: 36). While this study involves possibly worthwhile goals for which perhaps the means are not yet available, it is argued that innovation also involves the task of creating the conditions in which the achievement of the goals can be facilitated. The paradise is not a market but can shed light on entrepreneurship.
Foss *et al* (2007) offer a definition of entrepreneurship in line with property rights theory. In the neo-institutional economics, property rights refer to the bundle of rights consisting of the right to use the resource, the right to derive income from the resource, and the right to alienate or to transfer the resource to others. It is essential for these rights to be socially and legally recognized, because physical possession of a good does not sufficiently constitute a property right. Its ownership must be recognized by others, in order for that ownership to constitute a right. **(Alchian and Demetz 1973)** Moreover, property rights are exclusive rights in that they can only be exercised by the individual or community that is the rightful owner. This aspect of property rights depends, of course, on the rightful owner's ability to enforce his or her property rights effectively, for example, to restrict physical access to one's property. The lack of effective enforcement of *de jure* property rights in terms of access is taken up by **Lai and Ho (2015)** in a study of military heritage in a state of disrepair on *de jure* government land with *de facto* open access. They point out however that effective access restriction alone cannot improve the conservation of war-time heritage structures in Hong Kong, but rather more innovative solutions that go beyond effective enforcement of access restrictions.

education facilities" (AFCD 2014). Additionally, it is the duty of the Authority "to protect the vegetation and wild life inside country parks…" and "to preserve and maintain buildings and sites of historic or cultural significance within country parks and special areas but without prejudice to the Antiquities and Monuments Ordinance" (cf. Cap 208 Section 4, c, ii & iii). Country parks are traversed by major hiking trails such as the MacLehose Trail (100 kilometers), opened in 1979, which runs from Sai Kung in the east to Tuen Mun in the west and the Wilson Trail (78 kilometers), opened in 1996, from Stanley in the south of Hong Kong Island to Nam Chung in the north-east of the New Territories.

KAM SHAN COUNTRY PARK

One of the twenty-four Country Parks in Hong Kong is Kam Shan Country Park with an area of 339 hectares located in north Kowloon **(Thrower 1984)**.[4] It was one of the first designated Country Parks in 1977. Kam Shan Country Park is surrounded by two other country parks, Shing Mun Country Park to the north and Lion Rock Country Park to the east. Kam Shan Country Park is home to four reservoirs, namely, Kowloon Reservoir, the first reservoir built in the New Territories (completed in 1910), Shek Lei Pui Reservoir (completed in 1925), Kowloon Reception Reservoir (completed in 1926) and Kowloon By-wash Reservoir (completed in 1931). The facilities related to Kowloon Reservoir are declared monuments. Those of the other three reservoirs are Grade Two heritage sites. Kam Shan Country Park was a World War II battlefield rich in military heritage including a part of the Shing Mun Redoubt, which is the only structure currently graded. Aside from a Nature Trail and a Family Walk, Kam Shan Country Park is traversed by major hiking trails as noted.

RECREATIONAL SQUATTING IN KAM SHAN COUNTRY PARK

A product of a serendipitous discovery while conducting a research study on early morning walkers' participation in military heritage conservation, Table 1 below summarizes the basic attributes of five paradises within Kam Shan Country Park. These enclaves are Spiritual Paradise, Immortal Stone Valley Paradise, Happy Woods Paradise, and Health Paradise (see Table 1). The twelve basic questions answered are: When was the paradise established? Where in the Country Park is it located? What is the approximate size of the area it occupies? How many morning walkers frequented the paradise in the past? What age and profession? What was then the proportion between men and women?

[4] The area was named after "Golden Hill," an English name for the highest hill in the park, which appears on maps produced before and after the Second World War. Its Cantonese name, Kam Shan (金山) entered into official use in the 1970s with the passing of the Cap 5, Official Languages Ordinance in 1974. The area is also famously known as Monkey Hill because the area is famous for its population of macaque monkeys.

What recreational or social activities were then done in the paradise? How many of the morning walkers from the original community still come? How many more junior morning walkers are coming? What age and profession? What is the proportion between men and women? What are the current recreational or social activities done in the paradise? What are the existing facilities in the paradise? Figure 1 shows the approximate location of the five paradises and the military heritage installations within Kam Shan Country Park.

Before the Country Park system was implemented in Hong Kong in 1977, people went to the countryside to escape from the crowded and harsh city environment (***Overseas Chinese Daily,* January 23, 1977**). High density living conditions, high-rise buildings, and vehicular pollution all contributed to the poor air quality in urban areas. Encouraged by the advice of health experts of the benefits of fresh air to health, urban inhabitants went for early morning walks and morning exercises in the countryside which were mostly made up of hilly slopes access to which was virtually unrestricted.

These walkers eventually formed themselves into small communities, like social clubs, and built their own base in the mountains that served as their “club houses” which morning walkers in enclaves called “paradises” or “gardens.” We have found several paradises within the Kam Shan Country Park area, each built on a knoll, next to a stream, close to a cliff edge, or beside a saddle, mostly in isolated areas of

Table 1: Basic information about the five “paradises” developed by morning walkers

Name translated from actual Chinese name	**Fool’s Paradise (傻人樂園)**	**Spiritual Paradise (精神樂園)**	**Immortal Stone Valley Paradise (age) (石仙谷樂園)**	**Happy Woods Paradise (快活林樂園)**	**Healthy Paradise (康樂園)**
Establishment yr/date	Dec 24, 1970 (written on cement plaque)	1970’s (oral history)	June 6, 1966 (written on cement plaque)	1967 (oral history)	1969 (oral history); 1972 (written on cement plaque)
Location (Estimated Google Maps coordinates)	On a knoll in the northern part of Kam Shan Country Park (22°21’58.3”N 114°09’07.0”E)	Next to a military heritage structure (Pillbox 313) (22°21’41.5”N 114°09’12.4”E)	Next to a dam and stream; within 100-150 m from a military heritage structure (PB 314) (22°21’36.9”N 114°08’57.9”E)	Next to a stream; within 100-150 m from a military heritage structure (PB 314) (22°21’43.0”N 114°08’58.6”E)	On a knoll; northwest of Shek Lei Pui Reservoir (22°21’23.6”N 114°08’48.8”E)
Est. area size	3,500 sq m (nearly one acre)	270 sq m	204 sq m	653 sq m	1,025 sq m (a quarter of an acre)

PAST					
How many used to come?	Dozens	<10	30+	Around 15	60+
Basic profile (age, male : female, profession)	30-40; 1:1 (male : female) station commander of HK Fire Services Department; airplane engineer; Chinese & Western medicine doctor; lawyer; owner of stationery company (Brand: "Eagle"); housewives	40+	30+ to 60+ 1:1 (male : female); factory workers, temporary or casual workers; housewives	30+ to 60+; 1:4 (male : female) policemen; mostly businessmen; housewives	30+ to 60+; 1:1 (male : female); electrician, owner of hardware store; real estate; housewives
Recreational and social activities	Luk Tung Kuen; sword dance; Tai Chi; *mahjong*; Mid-Autumn Festival; celebrate birthday of Fool's Paradise	Drinking tea; chat; play *mahjong*	After taking a walk, drink tea	Drinking tea; planting	*mahjong*; drinking tea; doing exercise
CURRENT					
How many of early members are still coming?	4-5	Abandoned (around 2004)	Abandoned (1980s)	2	Around 10
How many 'newer' ones coming?	5	N.A.	N.A.	1	Less than 10
Basic profile (age, male : female, profession)	60s and 70s; women; housewives	N.A.	N.A.	60+; male; scaffolding	60+
Recreational and social activities (present)	Walking; exercise; badminton; drink tea; chit chat; listen to music; write artistic characters; gardening; birthday of Fool's Paradise	N.A.	N.A.	Drinking tea; planting	*mahjong*; drinking tea
Existing facilities	Pavilions (fixed); gardens; chin-up & parallel bars; wall with poems; stove; storage; chairs & tables; benches; plastic drums to collect water for gardening	Demolished; ruins	Demolished; ruins	Tent; stove; storage room (big); chairs; gardens; pond for collecting water	Tent; gardens; chairs & tables; stove
Aerial photo	17988 (25.3.1977)	56539 (20.10.1984)	8304 (28.2.1974)	Vegetation too thick to be seen from air	18114 (6.5.1977)
Layout	√	X	X	X	√

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the Country Park accessible only on foot. The morning walkers contributed money to build and maintain their paradises, which functioned as places for such recreational activities as gardening, drinking tea, cooking food, playing *mahjong*, singing, and doing physical exercises. They have various facilities such as a tent or fixed pavilion, fixed or movable *mahjong* tables, some exercise equipment, and a stove for boiling tea. Over the years, the number of morning walkers who built these paradises diminished due to emigration, death, and old age. According to morning walkers interviewed, very few new ones came because there are more urban parks where people prefer to go to for their exercise and the recreational activities of the younger generations differ from theirs. Two of these paradises have already been demolished by the government after the early morning walkers who built them stopped visiting them.

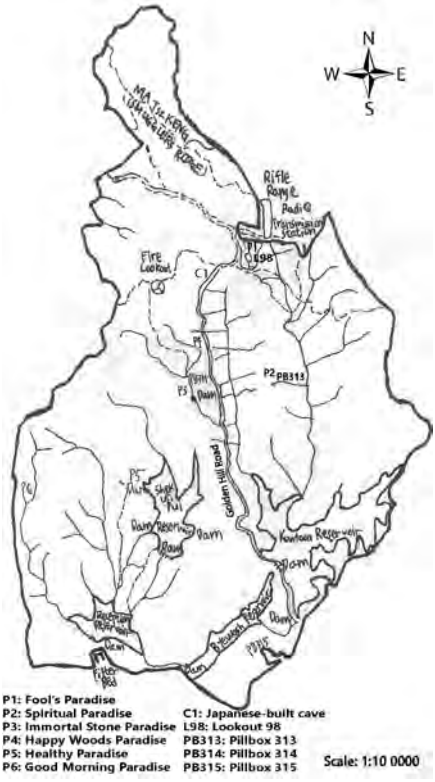

Figure 1: Map of Kam Shan Country Park (Drawn by Fritz Kelu Craven).

As these paradises are situated on government land, they are, technically speaking, considered as recreational squatting and therefore unlawful as defined above. People squat for a variety of reasons including poverty and needing a place to live, fish culture (marine squatting), protest (for example, Occupy Wall Street in New York or Occupy Central in Hong Kong) and recreation. It is important to note however that all "private" land in Hong Kong, except St John's Cathedral, is leasehold land. Under the Limitation Ordinance (Cap. 347) possessory title of adverse possession cannot be established against the government unless 60 years of adverse possession can be established (Cap. 347, Section 7 (1)). The period is only twelve years for private land (Cap. 347, Section 7 (2)). Before 1977, these paradises occupied open access Crown property. According to an official of the Agriculture, Fisheries and Conservation Department (AFCD) we have spoken to, before 1977 government accepted private gardens in the mountains.

Morning walkers do not have property rights over the areas where they built their paradises. Under the Country Parks system, existing paradises had to be registered, otherwise they would be

demolished, and the establishment of new paradises was strictly prohibited. A successful registration does not involve any allocation of leasehold rights or license but only a verbal permission allowing the morning walkers to keep their paradises for an unspecified period of time. Moreover, certain restrictions have been imposed on early morning walkers' activities in paradises, such as not making fire, extending existing facilities, or building new facilities. AFCD officials conduct regular inspections to ensure compliance with the arrangement.

Additional details of each paradise are provided below.

FOOL'S PARADISE

Fool's Paradise (Figure 2) has the largest area size (Figure 3). It incorporates within its area two heritage structures, first, a stone marker built by the Kowloon Waterworks in 1902 (K.W.W. No. 19) (Figure 4); second, Lookout 98 with a military trench, part of an eleven-mile defense line called the Gin Drinker's Line built in the 1930s to defend Hong Kong from any Japanese invasion (Lai *et al.* 2009). A 1964 aerial photo shows Lookout 98 and a trench (Figure 5), both beside a 1963 traditional Chinese grave. In a 1974 aerial photo, the trench appears filled in and converted into a well-cultivated private garden (Figures 6a and b). However, the morning walkers of Fool's Paradise are not aware of the existence of the trench. The paradise is criss-crossed by concrete stairs and footpaths connecting different facilities. Walls of rock in and around the pavilion are decorated with poems in classical Chinese (Figure 7). The years in which the poems were written and rewritten are indicated. One set of poems was first written in 1984 and retouched in two occasions, one in 1995 and another in 2004. Another set of poems was written in 2003. A government-built pavilion near Fool's Paradise appears in a 1976 aerial photo. According to morning walkers, the pavilion was originally made of timber, but later rebuilt using concrete and tiles. According to a

Figure 2: Main entrance to Fool's Paradise.

Figure 3: Fool's Paradise. (17988_1977: The aerial photo reproduced with permission of the Director of Lands. © The Government of the HKSAR. License No. 89/2015.) Layout of Fool's Paradise drawn by Davis Chan.

newspaper article written in 1982, this paradise got its name from what other morning walkers called those who built the paradise (N.A., **Evening News, 1982**). Although the term 'fools' has a negative connotation, for them the word aptly describes them as being able to accomplish something difficult but which other walkers thought was foolish. Fool's Paradise has been mentioned several times in newspaper announcements from 2003 to 2012 of hiking activities including archaeological trips to visit military remains around the area, particularly the Shing Mun Redoubt, which falls partly inside Kam Sham Country Park. The paradise was described as a place with good facilities and a quiet environment, where walkers would be taking a break before they continued their hike. They offered tea boiled with mountain water to walkers who came to the paradise to rest.

Figure 4: Kowloon Waterworks stone marker – No. 19, 1902.

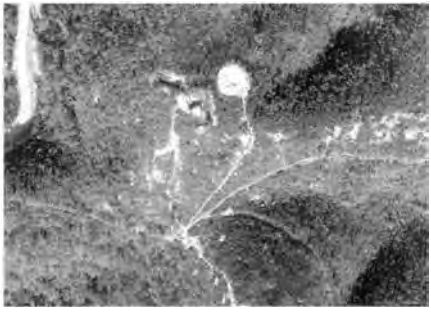

Figure 5: Lookout 98 and trench near. (4923_1964: The aerial photo reproduced with permission of the Director of Lands. © The Government of the HKSAR. License No. 89/2015.)

Figures 6a and 6b: Private garden in a former military trench.

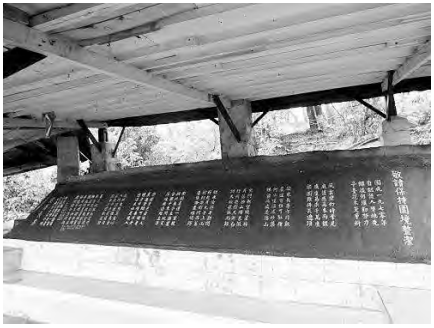

Figure 7: Chinese poems.

SPIRITUAL PARADISE

Spiritual Paradise (Figure 8) was built by morning walkers associated with Fool's Paradise. This paradise is situated right above an underground military heritage, that is, Pillbox 313. The paradise is right outside its entry tunnel. (Figure 9) Morning walkers recall that they used to store some of their things inside the pillbox. However, after an unhappy experience of robbery and the fear of its recurrence, they decided to desert it and go to Fool's Paradise. The paradise was abandoned sometime around 2004. Subsequently, it was demolished by the government. The ruins are still clearly visible on ground (Figures 10-11). A 1984 aerial photo clearly shows the paradise located beside Pillbox 313 (Figure 12).

Figure 8: Spiritual Paradise.

Figure 9: Entrance to tunnel of PB 313.

Figure 10: Remnants of a garden.

Figure 11: A plastic tube implanted on the ground which was part of the tent's structure.

Figure 12: Spiritual Paradise shown here in this 1984 aerial photo right beside PB 313.
(56539_1984: The aerial photo reproduced with permission of the Director of Lands. © The Government of the HKSAR. License No. 89/2015.)

IMMORTAL STONE VALLEY PARADISE

Immortal Stone Valley Paradise occupied both sides of a stream, along a mountain trail (Figures 13a and 13b). The number of morning walkers who visited the place was at its peak in the 1970s, and began to dwindle in the 1980s due to various reasons such as emigration. A 1974 aerial photo shows Immortal Stone Valley Paradise, Pillbox 314, and a small dam nearby (Figure 14). Some artistic characters written in classic Chinese decorate the

Figure 13a: Immortal Stone Valley Paradise.

Figure 13b: Date of establishment, 6.6.1966.

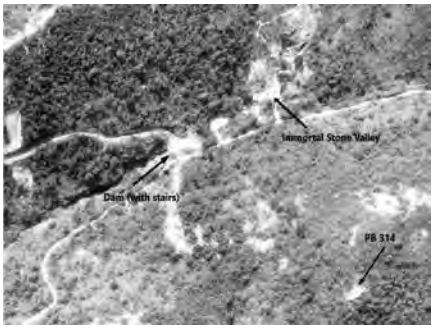

Figure 14: Immortal Stone Valley Paradise, PB314, and dam. (8304_1974: The aerial photo reproduced with permission of the Director of Lands. © The Government of the HKSAR. License No. 89/2015.)

Figures 15: Characters written in classical style ("Stone Dragon Spring").

Figures 16 and 17: Ruins of Immortal Stone Valley Paradise.

Figure 18: A *mahjong* piece in Immortal Stone Valley Paradise.

paradise (Figure 15). The paradise was demolished by the government after it was abandoned, but its ruins are still clearly visible (Figures 16-17). We found a *mahjong* piece among the ruins in one of the site visits, which provides evidence of one of the recreational activities carried out in the paradise (Figure 18).

HAPPY WOODS PARADISE

Happy Woods Paradise is situated near Immortal Stone Valley Paradise, in an area less travelled by hikers. According to a morning walker, the area was chosen to build the paradise because it provided more privacy. The paradise occupies both sides of a stream. Among the existing paradises, Happy Woods Paradise (Figures 19-24) is the only one that does not have its name written anywhere within its area. However, various years and dates were written all over the place, of which the earliest we found was '1970' and the latest '2015.' One date refers to the year of the return of Hong Kong's sovereignty to China (1 July 1997); another date refers to the day when one of the morning walkers

Figure 19: Happy Woods Paradise.

Figure 20: Pond.

Figure 21: Pails to collect water.

Figure 22: Years embedded on a paved footpath.

Figure 23: Plants.

Figure 24: Storage room.

who built the paradise retired from the Royal Hong Kong Police (15 July 1976). This morning walker continues to come to this day.

HEALTHY PARADISE

Healthy Paradise is second to Fool's Paradise in terms of size (Figure 25). A framed paper printed photo hangs inside the pavilion showing a ribbon cutting ceremony to inaugurate the establishment of the paradise in 1972. It shows a man dressed in formal attire cutting the ribbon who, according to the morning walkers, was an Inspector in the Royal Hong Kong Police. (Figures 26 and 27) An artistic image of a dragon can be seen in Figure 28 and artistic characters written on red wood decorate the paradise in Figure 29.

Figure 25: Health Paradise. (18114_1977: The aerial photo reproduced with permission of the Director of Lands. C The Government of the HKSAR. License No. 89/2015.) Layout of Health Paradise drawn by Davis Chan.

Figure 26: Establishment year of Healthy Paradise, 1972.

Figure 27: Photo of the establishment day.

Figure 28:An artistic image of a dragon.

Figure 29:artistic characters written on red wood decorate the paradise.

DISCUSSION

While the relevant communities of morning walkers are similar to guerrilla gardeners, it is important to note that the spaces illegally occupied by the former have not only "private" gardens, but also built structures for recreational purposes. They may have motivations different from those of guerrilla gardeners, a subject which is worth investigating but is well beyond the scope of this paper.

Based on **Foss *et al's* (2007)** economic framework, the relevant paradises can be considered a heterogeneous capital in terms of the legal, actual, and perceived uses. The paradises are assets with several attributes. In terms of legal use and function, these are part of Country Park land used for recreation; any such garden remains open access. However, its actual use is a haven used by communities of morning walkers for their gardening and recreational and social activities. The perceived use and function, as far as the entrepreneur is concerned, which in this case is *assumed to be* the state, is the private leisure of the users.

However, paradises are containers of military heritage structures and could also be heritage spots for education and heritage tourism. Preferring to avoid the high transaction cost, especially of exploring and creating future possible attributes of assets, the state could opt to entrust the management and conservation of military heritage located in isolated areas to other willing parties. This of course requires an element of entrepreneurship on the part of the state, the landowner, who undertakes experimentation by assigning the relevant piece of property by license or lease to parties such as a community of morning walkers and NGOs which are entrusted with the task of implementing state decisions incorporated into the lease conditions.

Given the characteristics of the relevant asset, this type of experimental entrepreneurship applied to military heritage conservation is about the avoidance of high transaction costs

on the part of the state, and the sense of stability over the existence of their paradise, on the part of morning walkers, rather than the derivation of monetary income from the property by either party. It is suggested here that the state can find incentive in the avoidance of the high transaction cost of preserving heritage through the allocation of some property rights to those who are willing to cooperate in exploring and creating new attributes in the relevant properties. As **Foss *et al* (2007: 1172)** argue, "…ownership is a low-cost means of allocating the rights to attributes of assets that are created or discovered by the entrepreneur-owner." The Hong Kong Government in particular has in fact carried out such innovation in the case of the Central Ordnance Depot, a number of military bunkers used as a magazine on Shouson Hill, built in the 1930s, which has been allocated to Crown Wine Cellars through a short term tenancy (STT) agreement. **Kirzner (1973)** stresses innovative solutions resulting from the entrepreneur's decision to take advantage of newly worthwhile goals and newly worthwhile information. But even though the means may not yet be available, taking concrete policy measures to create the conditions can lead to innovative solutions to problems such as the rent dissipation of war heritage ruins. For example, the state can foster the role of conservationist NGOs, which currently is limited due to the lack of openness in the policy-making process (Hung 2015), by providing incentives for them to expand their scope of interest and work to historic structures within Country Parks (cf. CPO, Section 4c, iii) and to provide education and heritage awareness to morning walkers.

The removal of the uncertainty over the existence of their paradise through lease or license and the availability of NGO assistance could perhaps be a sufficiently powerful incentive for morning walkers to cooperate with the state in creating new attributes, that is, to fulfill the lease conditions particularly those which require their involvement in military heritage conservation. As **Barzel (1989)** points out, restrictions do not necessarily attenuate rights, but instead enhance them.

While two of the paradises reported in this paper have been abandoned by their morning walkers and subsequently demolished by the government, there are several signs of morning walkers' 'sense of ownership' and persistent occupation of existing paradises.

First, the communities of morning walkers of the existing paradises have a common wish that the government does not demolish their paradises but even helps them maintain the place and its facilities. For example, morning walkers of Healthy Paradise wish that the government would help them repair the eroded steps made of cement and timber leading up to their paradise. The morning walkers of Fool's Paradise wish that the government install additional exercise equipment, that is, an arm and shoulder rotation wheel.

Second, these communities of morning walkers are different from ordinary morning walkers. They have spent and continue to spend money and time for the upkeep of their paradise. They come

every day. For example, the morning walkers of Fool's Paradise said that they come even when there is a storm.

Third, morning walkers put up signs to remind other users or walkers to keep the place clean, which shows some sense of ownership.

Fourth, these morning walkers, specifically those of Fool's Paradise and Happy Woods Paradise have written the dates, but mostly only years, all over the paradise, perhaps to indicate uninterrupted occupation of the area up to present.

Last but not least, they have a common wish that more junior morning walkers would come and maintain the paradise. New morning walkers are very few in number, which current morning walkers partly attribute to the proliferation of urban parks. Nevertheless, judging from the current number of morning walkers the risk of their losing their paradise does not seem to be dependent on numbers provided they do not completely abandon them. As noted earlier, Spiritual Paradise and Immortal Stone Valley Paradise were demolished by the government only after these have been completely abandoned by the morning walkers. Since then, subsequent gardening or building of paradise has been prohibited as well.

Junior morning walkers are considered "members" of the community through acceptance by the older morning walkers, which can be won through friendship and in helping to keep the place clean. Even now morning walkers continue to invest time and money for the upkeep of existing facilities, and they would have wanted to invest more on installing exercise equipments and repairing slopes or staircases, which officials prohibit.

Provided the necessary conditions and innovative solutions are available, recreational squatting can be considered as Type B squatting because it can attract private investment (**Lai, Chua and Lorne 2014**). Morning walkers could thus derive an important intangible benefit, particularly the sense of security, which they lack as squatters (**Barzel 1989**). The assumption here is that the idea that they would accept property rights assignment with conditions, such as those related to their involvement in military heritage conservation, in exchange for security is not too far-fetched.

The continued existence of the paradise could allow Country Park visitors to enjoy the artistic value they have added to the paradise, perpetuating the memories of those who built the paradise. Morning walkers have and are

[5] Luk Tung Kuen, an exercise consisting of movements with patterns, was extremely popular in Fool's Paradise in the 1970s. It was created by Master Ha Kihn who started teaching it to her friends in 1963 in Shek Lei Pui Reservoir in what is now called Kam Shan Country Park. Master Ha Kihn used to attend the annual celebration of the birthday of Fool's Paradise on December 24. (Source: http://www.luktungkuen.org/, Retrieved on June 6, 2015). The English expression "Fool's Paradise" originates from Shakespeare's *Romeo and Juliet*, borrowed from The Paston Letters (1422-1509) where the expression first appeared/used. However, obviously the reason for using the name for their paradise was different, as mentioned earlier.

making two actual contributions. First, scenic and heritage sites are often the product of human acts, usually made by learned folks, effecting on nature, such as engravings on stones with artistic characters like the thirteenth century engravings of the three characters "Sung Wong Toi" (meaning Terrace of the Sung Emperor) on a boulder currently located in Sung Wong Toi Garden close to its original place on Sacred Hill, Kowloon. As seen earlier, some of the paradises studied in the report are decorated with poems and artistic characters and images. In addition, Fool's Paradise was one of the first sites where Luk Tung Kuen (六通拳)[5], whose practice has spread to other places as well, was taught and practiced. The morning walkers of Fool's Paradise have very fond memories of Master Ha Kihn (何 琼), the founder of this Chinese form of exercise. Second, further research is necessary to determine the reasons why and how early morning walkers selected the area to build their paradises. However, judging from the location of the paradise, they have in effect helped the government to identify isolated areas within the Country Park, which offer good sights and places for other morning walkers to enjoy.

The conversion from *de facto* open access to *de jure* exclusive property rights would eliminate "competitors," that is, other users of Country Parks, and lead to reduction of resources and time spent particularly in keeping the paradise clean and maintaining facilities. In addition to these, if available the assistance and education provided by interested NGOs could serve as incentives and stimulation for morning walkers to participate in heritage conservation incorporated into the license agreement between the government as one party and a community of morning walkers registered as a legal entity (for example, Society under the Societies Ordinance) and a selected NGO, as the other contracting party.

There is, of course, the possibility that early morning walkers may not sufficiently appreciate the value of the heritage structure within or near their paradise and thus easily neglect their role as heritage guardians. This is the main reason why the initial assignment of property rights should involve one that is characterized as communal-private, which allows for continuous heritage education provided by the NGO. In addition, license renewal could be made contingent on fulfillment of the conditions set out in the agreement.

In addition, once a legal entity, membership of the community of morning walkers can also be formalized by formulating members' rights (for example, access and use of the paradise) and duties (for example, management and access control of relevant heritage sites). These rights provide the incentives; the duties can address the issue of accountability to taxpayers which is a concern rightly pointed out by **Lai, Chua and Lorne (2014)** when it comes to the state assigning property rights to squatters. Of course, this does not mean to say that community of early morning walkers therefore have secured any 'exclusive' rights to the use of facilities within the paradise. Other

users of the Country Park will continue to have access, albeit on a restricted basis, to the facilities and heritage structures under the responsibility of the community and NGO. After all, the objective is to prevent the dissipation of the value of relevant military heritage structures. Better managed heritage sites could increase visitors to Country Parks and enhance heritage tourism. The facilities offered in paradises can also increase the value of Country Parks as places for recreation and tourism (cf. CPO, Section 4c, i).

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Size Does Matter: The "Order of Focus" Approach for Conserving and Exhibiting Large-scale Military Artefacts in Military Museums

Lee Ho Yin*

ABSTRACT

The conservation of military heritage in Hong Kong is architecturally-oriented, focusing on buildings and structures of military sites. However, the conservation of military heritage should not be limited to architecture, and must extend to "large-scale military artefacts." These are large pieces of military hardware that can capture the attention and imagination of visitors by their *significant physical presence* and *significant historic associations.* Through these artefacts, stories of conflicts in the past, and hopefully lessons for the future, can be more readily articulated and in greater scope. Examples of such artefacts are warships, airplanes and armoured vehicles. Using successful cases of military museums, this paper proposes an approach in prioritising the order of display of military artefacts, in which large-scale military artefacts should be the main focus, with small-scale military artefacts playing a supporting role. Naming it the "Order of Focus" approach, the paper applies the approach to the Hong Kong Museum of Coastal Defence to see how it could tap into one of its potential star attractions – the Comet tank – to increase visitor numbers and create opportunities for financial sustainability.

KEYWORDS

Military heritage, adaptive reuse, military museum, large-scale military artefacts, order of focus approach, financial sustainability.

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FROM MONUMENTS TO ADAPTIVE REUSE: THE CONSERVATION OF MILITARY HERITAGE SITES IN HONG KONG

Prior to 2000, military buildings and structures in Hong Kong, if conserved at all, tended to be treated as monuments and archaeological sites. Such an approach applies well to buildings and structures that are of monumental or archeological importance, a good example of the former being the fortifications of the Maginot Line in France, while that of the latter being the First World War Trenches at Vimy Memorial Park also in France. However, military heritage in Hong Kong consists mainly of two forms, the first being military installations, such as barrack buildings and storage bunkers, that exist in relative abundance, and the other being fortifications, such as pillboxes and gun emplacement structures, that exist in relative scarcity. The problem is that these relics of war are not of such architectural quality or historic importance as justifies the expense to turn them into the picturesque monuments or archaeological ruins that they simply are not **(Figure 1).** For this reason, little effort and few resources have been invested in the conservation of Hong Kong's military heritage.

The year 2000 coincided with the establishment of the Architectural Conservation Programmes (ACP) at

Figure 1: Pinewood Battery, an example of Hong Kong's military built-heritage – picturesque monument or archaeological ruin it is not. (Photo credit: Lee Ho Yin)

The University of Hong Kong, which offered China's first Master of Science and Postgraduate Diploma programmes in conservation.[1] ACP's early years drew a number of heritage experts for guest lectures, including Jason Wordie, a historian, former soldier and pioneering military heritage expert, who had co-authored with another local historian and military heritage expert, Tim Ko, the first-ever English-language book detailing Hong Kong's war heritage sites.[2] As Wordie pointed out in his lecture for ACP in 2000, many of Hong Kong's military heritage sites have been neglected and left to decay since they fell into disuse after the Second World War. Indeed, prior to 2000, military heritage was, at best, a niche interest advocated by a tiny circle of dedicated enthusiasts, the most well-known of whom were the retired government surveyor Robert Horsnell, and the aforementioned historians Tim Ko and Jason Wordie. After

[1] On 1 July 2015, ACP was elevated as a Division in the Faculty of Architecture, The University of Hong Kong. ACP Division is affiliated with the Department of Real Estate and Construction at HKU.
[2] Ko and Wordie, 1996.

2000, military heritage in Hong Kong gradually gained official recognition in two ways: the first by means of adaptive reuse, and the second by means of administrative protection through heritage grading, which will be elaborated on in the next two sections.

THE ADAPTIVE REUSE OF MILITARY HERITAGE SITES IN HONG KONG

"Revitalization" is a term coined by the Hong Kong Government and formalized in the 2007 Conservation Policy to mean "good adaptive reuse of historic buildings... [to] give these buildings a new lease of life for the enjoyment of the public."[3] It compares uncannily well with the term "constructive conservation," which was coined by English Heritage and formalized in the organization's 2008 publication, *Constructive Conservation in Practice.* The term is defined as a conservation approach that aims to "recognise and reinforce the historic significance of [heritage] places, while accommodating the changes necessary to make sure that people can continue to use and enjoy them."[4] As explained by English Heritage (now renamed Historic England),

> The conservation movement has evolved from a reactive process, focusing on preventing change, into a flexible process of helping people to understand their historic environment and through that understanding, to manage change to it in the most appropriate way.
>
> The best way to save a building is to find a new use for it. Even recently restored buildings that are vacant will soon start to degenerate again. An unreasonable, inflexible

Figure 2: The Lei Yue Mun Redoubt before and after "revitalisation" as the Hong Kong Museum of Coastal Defence. (Photo credit: Architectural Services Department)

[3] The definition is given on the website of the HKSAR Commissioner for Heritage's Office at: http://www.heritage.gov.hk/en/rhbtp/about.htm.

[4] See: English Heritage 2008: 7.

> approach will prevent action that could have given a building new life.[5]

The quotation from English Heritage describes the experience of Hong Kong's experimentation with adaptive reuse in the 2000s and eventual formal adoption of the conservation approach in the Revitalization Schemes that were launched in 2007.

In Hong Kong, a breakthrough in the conservation of military heritage sites came in 2000, when the century-old Former Lei Yue Mun Redoubt (now referred to as the Lei Yue Mun Fort) reopened as the Hong Kong Museum of Coastal Defence after three year's conservation and adaptive reuse work **(Figure 2).** The project went on to win the top architectural award in the 2000 Hong Kong Institute of Architects (HKIA) Annual Awards.[6] This HK$ 300 million museum project was significant for being the first ex-military building or structure in Hong Kong to publicized[7] to have undergone adaptive reuse, or "revitalization" in the current government nomenclature.

The success of the adaptive reuse of the Lei Yu Mun Redoubt has led to further adaptive reuse of disused military buildings and structures. An example is the Former Central Ordnance Munitions Depot. Consisting of a series of unassuming fortified tunnels built into a hill slope, it was difficult to justify its conservation as a monument or archeological site of importance. The remote location of the site made it unviable as a museum that could be readily accessed by the general public. However, using the approach of adaptive reuse, the bunkers were revitalized as members-only commercial wine cellars. The success of the project was acknowledged when the project won an Award of Merit in the 2007 UNESCO Asia-Pacific Awards for Cultural Heritage Conservation.[8] Another example is the adaptive reuse of the Former Explosives Magazine structures as a new cultural centre with exhibition areas operated by Asia Society Hong Kong Center **(Figure 3)**.[9]

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[5] The original English Heritage webpage that carries this quotation is no longer available (as of 8 September 2015), but it has been requoted elsewhere, such as: www.thenbs.com/topics/designspecification/articles/newLightOldWindows.asp.

[6] The list of past award winners of the HKIA Annual Awards can be found on the institute's website at: http://www.hkia.net/en/pdf/annual_report_2006/Past_Annual_awards.pdf.

[7] Flagstaff House was turned into the Museum of Teaware in 1984, Blocks S61 and S62 of the old Whitfield Barracks were converted into the Museum of History 1983-1998, the old Lei Yue Mun Barracks were turned into the Lei Yue Mun Park and Holiday Village in the late 1980s, and the old Cassels Block was converted into the Visual Arts Centre and opened in 1992.

[8] The project and award are reported in item 27 of the "Discussion Paper for the Legislative Council Panel on Development," dated 19 December 2008, accessible at: http://www.legco.gov.hk/yr08-09/english/panels/dev/papers/dev1219cb1-396-3-e.pdf; further details of the award can be found on the UNESCO Awards website at: http://www.unescobkk.org/culture/world-heritage-and-immovable-heritage/asia-pacific-heritage-awards-for-culture-heritage-conservation/.

[9] A detailed description of this revitalization project is given in this formal reply by the Secretary of Home Affairs to a question raised by a Legislative Council Member during a Legislative Council Session on 2 March 2005: http://www.hab.gov.hk/file_manager/en/documents/publications_and_press_releases/20050302q2_e.pdf.

Figure 3: The two explosives magazines before they were adapted as part of the cultural facilities of Asia Society Hong Kong Center. (Photo credit: Lee Ho Yin)

THE GRADING OF MILITARY HERITAGE SITES IN HONG KONG

In addition to these current or completed conservation projects, the future conservation of selected military heritage sites has been encouraged through their official recognition as "Graded Historic Buildings" (a term that covers not only buildings, but also structures and sites). Even though the grading system of Grade I, II and III offers no statutory protection, the graded buildings and structures are accorded some degree of protection through more layers of government scrutiny – first by the Town Planning Board, followed by the Antiquities Advisory Board and the Antiquities and Monuments Office – if these graded items are affected by development. Additional scrutiny is also carried out under the watchful eyes of the mass media and the general public, as the full list of graded buildings and structures was made available online in 2009 under the then new Chairman of the Antiquities Advisory Board, Mr. Bernard Chan.

Within the list is a substantial number of military heritage sites, including 58 buildings and structures on Stanley Peninsula, Stonecutters Island and Gun Club Hill that have been variously classified Grade I to III. It is significant that grading was still able to be carried out even though these military sites have always been off-limits to the general public as they were previously occupied by the British Forces and now by the People's Liberation Army. Also included are such military structures as the early 20th-century British fortifications on Devil's Peak (Grade II), the system of World-War-II Japanese underground pillboxes at Luk Keng (Grade II), and the isolated Second World War Japanese pillbox on the site of the former Tai Hom Village in Diamond Hill (Grade III).

SHIFTING THE FOCUS FROM MILITARY ARCHITECTURE TO LARGE-SCALE MILITARY ARTEFACTS

As can be seen, the conservation of military heritage in Hong Kong is very

much architecturally-oriented, focusing on buildings and structures of military sites. However, as the author argues, the conservation of military heritage should not be limited to architecture, and must extend to what the author refers to as "large-scale military artefacts." These are large pieces of military hardware that can capture the attention and imagination of visitors by their *significant physical presence* and *significant historic associations*. Through these artefacts, stories of conflicts in the past, and hopefully lessons for the future, can be more readily articulated and in greater scope. The most common examples of such artefacts are historic warships, a number of which have become museums in their own right **(Figure 4).** These include Battleship *Missouri* at Pearl Harbour, Hawaii, USA (significant as the venue for Japan's surrender ceremony in Tokyo Bay on 2 September 1945), Battleship *Mikasa* at Yokosuka Bay, Kanagawa prefecture, Japan (significant as the flagship of the Russo-Japanese War, in which Japan emerged victorious and as a world power) and

Figure 4: The museum *Battleship Mikasa* at Yokosuka Bay in Japan. (Photo credit: Nesnad at Wikimedia Commons)

Figure 5: Zhongshan Warship Museum, built around a salvaged warship. (Photo credit: Howchou at Wikimedia Commons)

the *Zhongshan* Warship Museum (中山艦博物館) in Wuhan city, Hubei province, China (significant for its association with political events in Republican China).

Warships, by their physical size and the nationalistic sentiments aroused by associated historic events, can subtly or overtly serve as an instrument of national education. An obvious case is the *Zhongshan* Warship Museum, which is built around a salvaged early 20th-century warship **(Figure 5)**. The museum has been designated in accordance with China's National Defense Education Law a "National Defense Education Base" (國防教育基地) that "offer(s) national defense education to students by combining the in-class teaching with extracurricular activities" for the purpose of "developing patriotic spirits, promoting

the construction of national defense and socialist spiritual civilization."[10]

Besides naval vessels, combat aircraft and armoured fighting vehicles are other large-scale military artefacts that stand out in military exhibitions as main attractions **(Figure 6).** The enormous appeal of such large-scale military artefacts to visitors, who usually pay no entry fees, is seen in the visitor statistics of the Smithsonian National Air and Space Museum in Washington D.C., USA, which drew 3.6 million visitors in the first half of 2011 alone.[11] While the museum building is a huge, non-descript functional box, few visitors will leave the museum without a lasting impression of the vast aircraft collection on display.

Figure 6: Large-scale military artefact, such as tanks, stand out in military exhibitions and possess enormous appeal to visitors. (Photo credit: Lee Ho Yin)

Similarly, armoured fighting vehicles, particularly tanks, are perhaps the pet fascination of many military enthusiasts all over the world, as demonstrated by the popularity of two British military museums that have a significant collection of battle tanks. The Tank Museum at Bovington is housed mostly in a complex of undistinguished hangar-like structures that were used for the maintenance and storage of tanks when the site was a training camp for tank crews (it was the first of such military facilities in the world). In spite of the undistinguished architecture, the historical association of the site complements the museum collection, and the spaciousness of the structures provides an environment for the effective presentation of the museum's impressive collection of battle tanks. This successful combination of effective adaption of the buildings and an attractive collection of large-scale military artefacts has enabled the museum to consistently attract well over 100,000 visitors every year since 1986.[12]

The building of the popular Imperial War Museum is even more incongruous as it was originally a 19th-century hospital for the insane (although one could argue that war and insanity are a perfect complement). In the late 1980s, the interior of the building was extensively modified and upgraded to

[10] Quoted from Article 1 and Article 14 of the National Defence Education Law (中華人民共和國國防教育法).

[11] Visitor numbers for the Smithsonian National Air and Space Museum are given on the website of the Smithsonian Newsdesk: Newsroom of the Smithsonian Institute at: http://newsdesk.si.edu/about/stats.

[12] Visitor numbers from 1986 to 2009 for The Tank Museum are from a presentation by the Association for Heritage Interpretation, located on-line at: http://www.ahi.org.uk/include/pdf/AHI%20documents/2010%20conference%20papers/Richard%20Smith_Tank%20Museum%20development.pdf.

create a modern exhibition environment **(Figure 7).** The focus on the museum's main exhibition of battle tanks, warplanes, artillery and other large-scale military artefacts (which the museum refers to as "large exhibits") has resulted in an astounding visitor number of over one million in 2010.[13]

Figure 7: The interior of the Imperial War Museum, a modern exhibition environment for the display of large-scale military artefacts. (Photo credit: Lee Ho Yin)

THE ORDER OF FOCUS APPROACH FOR DISPLAYING LARGE-SCALE MILITARY ARTEFACTS

The successful cases of military museums discussed above suggests that there is an order in the way artefacts are displayed – large-scale military artefacts should be the main focus, and small-scale military artefacts playing a supporting role. The author would like to propose this approach in prioritising the order of display of military artefacts as the "Order of Focus" approach. The viability of this approach has in fact been demonstrated in a successful non-military museum in Hong Kong. Between 2004 and 2006, a number of students and graduates from the Architectural Conservation Programmes (ACP) of The University of Hong Kong contributed to the conservation and display strategies of a museum fireboat known as the Fireboat *Alexander Grantham* (葛量洪號滅火輪) in Hong Kong's Quarry Bay Park.[14]

Opened in 2007, the museum is built around a single large-scale artefact – the 1953-launched, 500-plus-tonne decommissioned firefighting vessel *Alexander Grantham* **(Figure 8).** Prominently mounted on land for outdoor display, visitors normally go on board the boat before they proceed to an inconspicuous exhibition gallery (designed to blend in with the boat's mounting structure), where they see related small-scale artefacts (such as marine rescue and navigation equipment) and read related historical information. This Order of Focus approach enables visitors to progressively appreciate the technical and historical aspects of the fireboat. As in the case of museum warships that

[13] Visitor numbers for the Imperial War Museum are given on the website of the Association of Leading Visitor Attractions (ALVA) at: http://www.alva.org.uk/visitor_statistics/.

[14] The conservation and display of Fireboat Alexander Grantham are detailed on the website of the Central Conservation Section, Leisure and Cultural Services Department, at: http://www.lcsd.gov.hk/CE/Museum/Conservation/eng/Preservation%20Programme/fireboat.htm.

Figure 8: The museum fireboat *Alexander Grantham.*
(Photo credit: Suguru@Musashi at Wikimedia Commons)

carry a national-education agenda, the Hong Kong-built fireboat has served well in public education by conveying the firefighting and past shipbuilding excellence of Hong Kong, thereby helping to foster a sense of pride and identity for Hongkongers.

The Order of Focus approach can be applied to the Hong Kong Museum of Coastal Defence to further test its validity. For this museum, the former redoubt has been successfully adapted as an indoor exhibition area, and there is a sizable collection of potentially visitor-appealing large-scale military artefacts – namely, the collection of armoured fighting vehicles from the Second World War to more recent times. Yet, the museum does not seem to enjoy the success that it deserves in terms of visitor numbers. Why is this so? Locational disadvantages are certainly one factor. Another probable factor is that the museum has reversed the Order of Focus– the small-scale military artefacts concentrated in the adapted redoubt are the primary exhibits, while the large-scale military artefacts are relegated as secondary exhibits scattered in outdoor display areas. This unintended reversal of the Order of Focus approach has neglected the crowd-drawing potential of large-scale military artefacts. The "star" of these large-scale military artefacts is arguably the Second World War-era Comet tank, the only of its kind in Hong Kong. As a 30-plus-tonne cruiser tank, it certainly has *significant physical presence*, and it derives its *significant historic associations* from its historical connection with the Second World War and the defence of Hong Kong during the Cold War (see the paragraph after next).

In June 2006, the author was invited by the museum to give a public lecture on the said tank, which is on outdoor display near the museum entrance **(Figure 9).**[15] The invitation gave the author an opportunity to investigate the history behind this particular vehicle. Comparing photographs of identical tank models, the author noticed that the gun on the museum tank is noticeably longer and more slender. The question that immediately came to mind was: why? None of the museum curators could answer the question, but they were equally keen to find out the answer. A search through the *South China Morning Post* archives turned up two 1995 articles which cleared up the mystery and revealed an amusing

[15] Description of the Comet tank at the Hong Kong Museum of Coastal Defence is given on the museum's website at: http://www.lcsd.gov.hk/CE/Museum/Coastal/en/section4-6.php.

Figure 9: The last Comet tank in Hong Kong, displayed at the Hong Kong Museum of Coastal Defence. (Photo credit: Lee Ho Yin)

story.[16] As told in the next paragraph, the anecdote relating to the tank is the kind of historical information that enhances the appeal of Hong Kong's own example of the Comet tank by establishing its most unique character-defining element.

The British Comet tanks, considered one the most advanced tanks when they first appeared in 1944 on European battlefields, arrived in Hong Kong in 1949 as China became a People's Republic allied with the Communist bloc. It was during this Cold War climate that Comet tanks were deployed in the Crown Colony as a strategic weapon of deterrence. In 1959, after a decade of continuous deployment, the Comet tanks in Hong Kong were retired, and all but two tanks were shipped back to the U.K. for disposal. In 1966, the British military had to decide what to do with the two remaining obsolete tanks. Instead of shipping them home, the salvageable parts of the two useless tanks were combined to produce a striking monument at the gate of the Malaya Lines of Shek Kong Barracks. However, the amalgamated vehicle was missing one key component – the gun. Someone came up with the clever idea of using an expedient replacement that would reasonably pass off as a real gun – a regular government-standard Hong Kong street lamppost. Hence, the Comet tank currently displayed at the Hong Kong Coastal Defence Museum is one of a kind in the world.

"IN THE THICK OF IT": FUNDING AND FINANCIAL SUSTAINABILITY OF THE ORDER OF FOCUS APPROACH

Given the significant cost for restoring and maintaining a large-scale artefact, and even more for building a dedicated exhibition venue, one can understand why the Comet tank at the Hong Kong Museum of Coastal Museum has been given little attention, and left outside in the open. Take for example the star attraction of The Tank Museum at Bovington, a Second World War German heavy tank, the Tiger I No. 131 tank, a legendary vehic le noted for its rarity and near-mythical aura. Efforts to restore this single vehicle since the 1990s cost £100,000 (about HK$1.2 million), and the final two-year restoration from 2010 to 2012 to bring it back to its original wartime standard cost another £80,000 (almost HK$1 million).[17] This project would not have

[16] The two South China Morning Post articles are: SCMP 1995 and Gilbert 1995; additional information from the Internet article, David 2009.
[17] The Telegraph 2012.

been possible if not for a heritage-earmarked funding source, the Heritage Lottery Fund. In 2012, the Fund also granted The Tank Museum £2.5 million (almost HK$30 million) to build a new Vehicle Conservation Centre so that the entire museum collection of tanks could be housed in a protected indoor environment with quality display space.[18]

Compared with Bovington's Tiger I 131 tank, Hong Kong's Comet tank is less remarkable in terms of rarity and reputation and therefore it is unlikely to warrant the same degree of protection as the Tiger. The tank's relatively good cosmetic condition also imposes less demand on maintenance. Nevertheless, putting the tank in the open, exposed to the elements, is not the best option for maintenance and display. The long-term solution will be a dedicated shelter that will protect the vehicle and exhibit it in a way that can fully tap into its crowd-pulling potential. As a government-funded museum, the funding for such an undertaking is a matter of prioritising the government's financial resources. There are also other possible funding sources, such as the Hong Kong Jockey Club Charities Trust and the future built heritage conservation fund that the Hong Kong SAR Government has committed to set up.[19]

However, the above funding would be one-off and not sustainable in nature. In this regard, The Tank Museum, a privately run museum and a registered charity, provides a good example of funding. First, it tapped into a related industry for capital funds to construct a new building – Tamiya Incorporated, one of the world's biggest manufacturers of plastic military model kits. The corporation became a willing donor as the museum had long been a research source for the manufacturer.[20] The result is the Tamiya Hall, which opened in 1991 and became not only an exhibition hall but a novel rental venue that helps sustain the museum operation. The Tamiya Hall is now a popular tank-filled place "to hold larger events ranging from lectures and black tie award ceremonies to dinner dances and concerts."[21] Showing creative business savviness, the venue is advertised on the museum's website as:

Surrounded by a collection of cold war tanks situated next to the Battlegroup Afghanistan exhibition and with large windows that overlook the neighbouring military base, your guests will be positioned 'in the thick of it'.[22]

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[18] HLF 2012.
[19] The establishment of a built heritage conservation fund was announced in the 2015 Policy Address, paragraph 185: http://www.policyaddress.gov.hk/2015/eng/p178.html.
[20] Tamiya 2001: 109-110.
[21] The Tank Museum 2015.
[22] *Ibid.*

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The Japanese Assault on Pillbox 3

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ABSTRACT

This technical note reports on a study of the bullet strike marks on the inner wall and other parts of Pillbox No.3 at Wong Nai Chung Gap. GIS techniques and field examinations were used for the study, which raises three technical points for clarification. The study concludes that evidence of impact by anti-tank gun rounds is slight, that the most probable causes were machine gun or rifle fire and that any fighting around PB3 was short-lived.

KEYWORDS

Battle of Hong Kong, time zones, location, battle damage, Wong Nai Chung Gap, Pillbox, GIS, Japanese Type 94 37mm gun,

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BACKGROUND OF THIS NOTE

Since the publication of the excellent work of **Banham (2005)**, research on the Battle of Hong Kong, fought from 8 December to 25 December 1941, has moved beyond mere reliance on written documents and has been augmented by land surveying and archaeological information.

Kwong and Tsoi (2015) agreed with a Japanese war diary's description of the Japanese assault on Pillbox 3 (PB3) at Wong Nai Chung Gap on the morning of 19 December 1941 following 9th Coy 230th Regiment (9/230) being "fired upon by a pillbox 60m (米) away to the left". This held that "as the assault of the 9th Coy was effectively blocked, the Ito section (Sergeant Ito Kinichi) started to fire at the left embrasure of Position Two (PB3), which was suddenly silenced at around 06:00. Seizing the opportunity, 9th Coy moved forward and captured Position One (Police Station Knoll)."

Sergeant Ito Kinichi commanded one of the guns of the two deployed by 3rd Company 5th Independent Rapid-firing Gun Battalion (3/5 IRGB) which used the Type 94, 37mm anti-tank gun (see **United States War Department 1995: 217-218**) The deployment position of 3/5 IRGB is given as 20m to the right of 9/230, which was beginning to deploy at the south end of Sir Cecil's Ride to mount an attack on Police Station Knoll. The latter was so named because of the police station located there during the war, now No.1 Repulse Bay Road.

Kwong & Tsoi concluded the position of the two guns of 3/5 IRGB was "along Sir Cecil's Ride, slightly north of the Wong Nai Chung end" such that Police Station Knoll was "largely half way between the guns and PB3".

The authors supported their opinion as to 37mm round impact damage on PB3 based on the facts found by **Lai et al. (2011)** that the beaten zone of one of PB3's three loopholes (the "subject loophole," which faced Stanley Gap) could cover 3/5 IRGB's position and the forming up positions of the rifle troops of 9/230 as well as Police Station Knoll, the upper reaches of Stanley Gap Road and the Repulse Bay Road area in the direction of a house called Postbridge.

The case Kwong & Tsoi make was based on a Japanese handwritten sketch-map of the battlefield, which stated that it (PB3) was "suddenly silenced at around 06:00." Police Station Knoll was subsequently taken by 9/230 at around 06:40.

To corroborate their claim as to the hitting of PB3 by at least two 37mm rounds the article by Kwong & Tsoi presented: (a) a photo taken from outside PB3 of a hit mark on the embrasure of the subject loophole as evidence of the use of a 37mm anti-tank gun; (b) a photo taken from within PB3 of the ruins of a Vickers machine gun mounting, which might have been destroyed by a gun hit; and (c) a photo of a hit mark on the western wall of PB3 facing the subject loophole as evidence of the use of a 37mm gun. There are a number of problems that arise from

an analysis of the terrain, the Japanese account, the locations of the Japanese sub-units involved, the exact timing of the incident, the visible damage and Kwong & Tsoi's evaluation.

In their discussion, **Kwong and Tsoi (2015)** did not clearly establish the positions of the Japanese sub-units involved in relation to the various topographical features of the terrain that would have governed any Japanese fire directed at PB3. Nor did they discuss the angle of elevation of any 37mm gun fired at PB3, or the azimuth of the fire in relation to the SE face of PB3 and its embrasure, or the muzzle velocity, projectile weight and resultant kinetic energy of the projectiles of the type of weapon in question in the context of the impact damage they were discussing. Finally, they did not address the issue of the available light for target identification, aiming and evaluation of the results.

No clear record of who, if anyone, was holding PB3 has hitherto been found. The Japanese war diary used by **Kwong and Tsoi (2015)** held that PB3 shot at them, but Major Stewart **(Lai et al. 2011)** had no such recollection. **Li (2002: 71)** referred to Captain Philip of D Company of the Winnipeg Grenadiers, who guarded "the machine gun pillbox next to the Brigade HQ," who held out gallantly with 11 others until 22 December **(Banham 2005).** However, **Li** likely referred to the shelters along the upper segment of Blue Pool Road, not PB3. There is no battle damage to PB3 that would be in any way consistent with 'the machine gun pillbox' next to the Brigade Headquarters that held out against attack for almost 72 hours.

Our Study

Our consideration of Kwong and Tsoi's valuable work and their presentation of the timely new evidence from Japanese sources is intended to make clearer exactly what those sources are telling us about the Battle of Wong Nai Chung Gap.

To begin with, let us clarify the issues that arise from **Kwong and Tsoi** not noting potential difficulties with the Japanese account. These would include exactly where the various Japanese sub-units were located, the possibility that the firing recorded as coming from PB3 may have come from the close area of the pillbox rather than from PB3 itself – an easy enough confusion in the heat of the battle – and the conditions of light in which all this happened. PB3 is in a commanding position and, like PB 1, PB2, PB45 and others, would have had Alternate Positions (weapons pits for the machine guns) immediately beside it covering roughly the same arcs of fire of the main pillbox loopholes, which opens the possibility in the half-light that the firing did not come from the pillbox itself. Evidence that all was not clear can be found in the Japanese description that notes, in relation to Sergeant Ito Kinichi's gun silencing PB3, "Ito section (Sergeant Ito Kinichi) started to fire at the left embrasure of Position Two". The problem here being that there is NO left embrasure on the SE face of PB3 facing 3/5IRGB's guns. There is only one embrasure.

I: Timing

Initially problematic is the matter of time. In **Kwong & Tsoi (2014: 171)**, an excellent military history of Hong Kong, there is a clear and useful guide to the time zones in terms of which battle narratives of the various protagonists were couched. In general the Japanese reports used *Chūō Hyōjunji* (Central Standard Time - in western military notation +9), the British used Singapore Time (+7.5) and non-military (and some volunteer military) Hong Kong sources Hong Kong Winter Time (+8.5). What is not clear from **Kwong & Tsoi (2015)**, with their timing of the commencement of action at 0540 and the exchange of fire with PB3 at c.0600, is which time reference is being used.

If the reference is to 0540 (+9), then the entire action would have taken place in the dark, since dawn (first light) was not until 0702 (+9) and sunrise not until 0755 (+9) (**Table 1** clarifies).

It is possible, though very unlikely that the Japanese forces involved, having fought and moved through the night since their landing at Lei Yue Mun at c.2030 (+8.5) on the evening of 18th December, would have able to distinguish PB3 in the dark as a result of muzzle flashes when fire was opened from the PB3 direction. However, an hour and more before even first light it would not have been possible to identify the almost buried PB3 against the hillside and dark sky behind it, leave alone target a specific embrasure and it is doubtful if any occupants of PB3 or its surrounds would have been able to see the Japanese forces.

So what time does the Japanese battle diary refer to? **Kwong and Tsoi (2015)** does not tell us if the times used throughout their narrative have been standardized to one of the time zones noted. However, their footnote 14 (p.83) states "the sunrise time on 19 December was 0627" therefore suggesting, given Table 1, that the battle diary times must be read as having been corrected to +7.5, which allows us to cross-correlate with other sources such as Banham (2005) and the Canadian official history **(Stacey, 1955).** This makes it clear that the action took place at and shortly after first light, enabling whoever was in the PB3 area to see and open fire on the massing Japanese forces and for the gunners of 3/5 IRGB to sight PB3 and to engage it with aimed fire.

II. Positions

To evaluate the conclusion of **Kwong and Tsoi (2015)** that the damage to PB3 was caused by a 37mm shell from a Type 94 anti-tank gun, we must now move on to where the guns were sited. This is by far the most difficult problem since the sketch maps used to evaluate the battle, whether that of 9/230 **(Kwong and Tsoi (2015): 79),** 3/5 IRGB **(Kwong and Tsoi (2015): 84 & 85)** or 3 Company Hong Kong Volunteer Defence Force (3/HKVDC) **(Kwong and Tsoi (2015): 80),** are hard to reconcile to topographically exact maps.

The possible sequence of movements of the Japanese forces (all times +8.5) was:

A. c.0640 (+8.5) the halting, briefing and deployment of the two battalions of 9/230 towards the western end of Sir Cecil's Ride:

   a. on the LEFT (i.e. furthest south and west) 3rd Battalion 9/230 (3/9/230) forming up to pivot for an assault back UP and EAST towards Jardine's Lookout/ Stanley Gap

   b. on the RIGHT (i.e. furthest north and east closest to I/3/5 IRGB) 9th Battalion 9/230 (9/9/230) forming up to assault Police Station Knoll and West Brigade HQ

B. the halting and deployment of 3/5 IRGB to the RIGHT (i.e. north and east) of 9/9/230 with:

   a. on the RIGHT (i.e. north and east) the Yamanaka section (Y/3/5 IRGB), exposed to fire from D Coy Winnipeg Grenadiers (D WG) at the south end of Blue Pool Road, West Brigade HQ area at the foot of Mt Nicholson and, as we shall see problematically, PB1

   b. on the LEFT (by implication NOT in the direct sight of the three sources of fire attacking the Yamanaka section) the Ito section (I/3/5 IRGB)

C. c. 0600 (+8.5) the advance to contact of 9/9/230 on TWO fronts. One to the RIGHT which at c.0630 (+8.5) attacked HQ WG "from the bed of the stream", being held up for 30 minutes by Cpl M.S. Lau, 8 Platoon, 3 (Eurasian) HKVDC, **(Banham (2005): 128)** and the other from the LEFT, also heading uphill from the stream bed area, which came under fire from PB3 at just before c.0700 (+8.5).

D. the silencing of PB3 with aimed fire by I/3/5 IRGB at c.0700

E. the successful assault on Police Station Knoll by the RIGHT element of 9/9/230 completed by c.0740 (+8.5)

This analysis supposes that the description of 9/9/230 coming under fire only makes sense, given the 3/5 IRGB description of PB3 being "60m (米) away to the left", if it locates PB3 in relation to the position of 9/9/230's LEFT FLANK lead elements targeting the Police Station and NOT the position of I/3/5 IRGB.

The remaining problem, however, is the position of Y/3/5 IRGB since there is nowhere along Sir Cecil's Ride that lies within the beaten zone of PB1 until the north tending final segment that linked to the upper end of Blue Pool Road. There are only two possible solutions. One is that some of PB1's defenders were able to operate outside PB1. Consonant with the above analysis of PB3, it is probable that there were Alternate Positions for PB1 from which a wider field of fire may have been possible and from which the fire directed at Y/3/5 IRGB may have come. However, it should be noted that this does not fit battle accounts. The other, and the more probable, is therefore that this is a misidentification in the Japanese war diaries and what

may be being referred to is not fire from a pillbox on Jardine's Lookout, but any of fire from A/WG on the west flanks of Jardine's Lookout or elements of 3 HKVDC, either Cpl Lau's section or the two sections under Lt D.J. Anderson up near the Stanley Gap HAA position. This conundrum is probably unresolvable.

The rest of the action need not at this stage concern us since what we have enables us to use GIS techniques and field examination to narrow down the positions on the ground of the various Japanese sub-units and, hence, their relationship to PB3. This in turn, along with field analysis, enables us to identify the possible sources, nature and timing of the damage from incoming fire that PB3 can be seen to have sustained. And it allows us to evaluate whether the firing reported by 9/9/230 and 3/5 IRGB indeed came from PB3, or only from its general area.

III. Damage

To evaluate the damage to PB3 and identify both the location of its source and the possible weapon or weapons involved we have:

(1) plotted vertical and horizontal profiles from PB3 projected from the perimeter of the hit mark on the wall through the SE embrasure clearing the sides, top and bottom and outwards to indicate the only possible sector from which the fire that caused the damage could have come **(Figure 1a and 1b);**

(2) examined the internal and external conditions of some other hillside pillboxes on Hong Kong that did not witness any fighting **(Figure 2);**

(3) examined the hit marks on Pillbox 1 (PB1) above a catchwater on Jardine's Lookout **(Figure 3);**

(4) examined other likely hit marks within PB3 **(Figure 4);** and

(5) considered ammunition data with respect to ammunition provision for the Type 94, 37mm anti-tank gun as well as standard Japanese infantry weapons. **(Table 2)**

To the best of our judgment, the following can be stated, beginning with PB3, the beaten zone of the subject firing embrasure and the known impact marks of incoming fire that can be discerned.

First, the beaten zone as shown in **Lai et al (2011)** does not cover the probable point where I/3/5 IRGB deployed or the forming up area of 9/9/230th. Both these areas lie to the north of the northern bound of the arc of fire of the relevant PB3 embrasure. Only when 9/9/230 was in the final phases of its assault on Police Station Knoll did it come within the embrasure's firing arcs. If the fire was experienced early in the assault, it is possible that it came from outside PB3. Only if the fire was laid down in the final few metres, given that the assault is shown in the sketch maps as coming up hill from the north east, could the fire have come from an embrasure.

Table 1: First light and sunrise, 19th December 1941

1941/12/19	Time (+7.5)	Time (+8.5)	Time (+9)
Dawn/First light	05:32:52	06:32:52	07:02:52
Sun Rise	06:25:12	07:25:12	07:55:12

This leaves the Japanese report that the fire came from an automatic weapon. Battle narrative evidence suggests that no unmanned pillbox in the Wong Nai Chung Gap area had any Vickers machine guns. PB3 was reported as unmanned and therefore the fire experienced by 9/9/230 could only have been from an infantry weapon, either a Bren gun, a Lewis gun or, most improbably since it had a low muzzle velocity and was short range, a Thomson sub-machine gun. The use of a Lewis or Bren gun is consistent with the fire being aimed either from a position outside, but close to PB3 or from the south east-facing embrasure. It can be noted that pillboxes were equipped with an adaptor for the Vickers mounts that enabled a Bren gun to be substituted.[1]

Second, inspection of PB3 shows two and only two significant signs of battle damage. The first signs are one or possibly two significant impact marks on the lintel and the sill of the east facing embrasure. The upper of these has penetrated to the reinforcement bars and blown away large chunks of concrete. The lower has gouged a trough through the sill. There is also a conspicuous impact mark on the interior, western wall. All are discussed by **Kwong and Tsoi.**

The question is, does the evidence as described by **Kwong and Tsoi** – the hit on the embrasure, an apparently destroyed Vickers machine gun mount and the interior impact mark – support their conclusion of an assault by a Type 94 37mm anti-tank gun?

Finding 1: A close inspection of the impact mark **(Figure 4)** on the exterior leaves open what caused the mark. A Type 94 37mm gun fired a 0.64kg armour piercing (AP) or High Explosive (HE) round with a muzzle velocity of 700 metres/sec, an effective range of 2.87 km and a maximum range of 4.5km. On **Kwong and Tsoi's** account I/3/5 IRGB opened fire at a range of under 200m. It follows that the kinetic energy of the round, with an expected ability to penetrate 24mm of solid steel angled at 30^0 to the horizontal at 1000 yards (914.4m) and 32mm of steel at 500 yards (457.2m) was massive **(Table 2).** It must therefore be asked whether the relatively slight impact damage observed is consonant with the weapon identified as causing it? Pillboxes damaged by close range Japanese light artillery fire during the contemporary Malay Peninsula campaign show COMPLETE PENETRATION of the exterior wall of a similarly designed British pillbox constructed of steel

[1] Personal information from Mr. Rob Weir citing National Archives (UK), WO 106/2379.

reinforced concrete[2]. A description of damage to a pillbox from a high velocity gun fired across the narrows of Victoria Harbour from Tsim Sha Tsui to the north shore of Hong Kong Island has rounds passing right through both sides. It follows that the damage we perceive on the outside of PB3 is not consistent with a hit at close range, leave alone point blank range, from a Type 94.

What is not known is whether any element of 9/9/230 carried a Type 97 20mm A/T Rifle. This was a standard issue Japanese infantry weapon for the heavy weapons platoon of a company in a Type A formation, which had two 20mm Type 97's **(US War Department (1995), Ch. III: 41).** However, even with a 20mm Type 97 hit, since this had a 30mm steel armour penetration at 250m with a hit at 90^0 **(http://www.forgottenweapons.com/japanese-type-97-20mm-anti-tank-rifle/ accessed 11.9.2015),** the damage seen seems too slight.

Finding 2: Close inspection of the impact marks **(Figure 4)** on the interior west wall, including penetration of a single reinforcement bar by a round, reveals this is not a single impact mark – as with a single anti-tank shell. It is rather a compound mark caused by up to twelve hits typical of small arms fire such as the standard Japanese infantry 6.5mm rifle and light machine gun, or the 7.7mm medium/heavy machine gun round. In any case, given the 37mm and 20mm guns' flat trajectory, neither they nor any other similar weapon positioned anywhere other than in the narrow cone identified in **Figures 1a and 1b** could have made the hit mark on the western interior wall of PB3. The implied trajectory is in any case inconsistent with the placement of I/3/5 IRGB's guns as given by **Kwong and Tsoi** and analysed above. In addition, the very high kinetic energy of both the 37mm and 20mm rounds noted in Finding 1 above, whether AP or HE, would have ensured penetration of the west wall. The mark was probably made by rifle or machine gun fire **(see Table 1)** from within the cone identified in **Figure 1.**

Finding 3: It is questionable whether there is any identifiable battle damage to the remains of the machine gun mount. Inspection shows that the mount lacks its vertical mounting tube. There is anecdotal evidence from the period of the battle suggesting that, when manned before the battle began and before it was abandoned, PB3 may have been armed with Lewis guns. It is possible that the Vickers' mounting tube was removed for that reason. In any case, there is no evidence that the tube was destroyed by the impact of a high-velocity anti-tank round. The legs of the mount are intact, in no way distorted or twisted as would have occurred had a high velocity round smashed the upper part of the mount. Nor would the legs still be attached to the base area, as they are and as are those at the other two embrasures. In general the condition of the mounts is sufficiently similar to those of pillboxes elsewhere on Hong

2 https://www.youtube.com/watch?v=Z5bMga78pRA; https://www.youtube.com/watch?v=B-cOD4xerho

Table 2: Japanese rifled weapons in use in the Battle of Wong Nai Chung Gap

Weapon	Calibre	Weight of round	Muzzle velocity	Types of ammunition	Material	Kinetic energy
Model 94 A/T gun	37mm	0.64 kg	700 m/s	AP, HE	Cupro-nickel	156,800 kilojoules
Model 97 A/T Rifle	20mm	142gm	750 m/s	AP, HE, Tracer, Incendiary	Cupro-nickel	50,000 kilojoules
Model 97 HMG	7.7mm	11 gm	724 m/s	Ball, AP, HE, Tracer, Incendiary	Cupro-nickel	3,136 kilojoules
Model 96 LMG	6.5mm	10.4 gm	770 m/s	Ball	Cupro-nickel	2,615 kilojoules
Model 99 Rifle	7.7mm	11 gm	730 m/s	Ball, AP, HE, Tracer, Incendiary	Cupro-nickel	3,136 kilojoules
Model 38 Rifle	6.5mm	10.4 gm	770 m/s	Ball	Cupro-nickel	2,615 kilojoules

Kong Island that were not attacked for it to be very questionable, whether any battle damage was incurred **(Figure 2)**. The apparent degradation of the gun mount could be due to rust and other corrosion over the intervening 70 years. The gun mount of the pillbox in Tai Tam Gap **(Figure 2)** was also "damaged" in a similar manner, but there is no record of a struggle for this pillbox.

Finding 4: The Police Station Knoll-facing façade of PB3 did not have as many hit marks as those on PB1 (**Figure 3** shows many circular dents some with bullet heads remaining upon closer inspection). Indeed the only marks, including on the protruding commander's cupola and ventilation shaft, are the two at top and bottom of the east facing embrasure. This suggests whatever action took place around PB3 was both brief and definitive, possibly finished and ended by the firing of the 37mm or 20mm anti-tank round at around 06:00 and forty minutes before Police Station Knoll was initially taken.

Finding 5: The damage to a reinforcement bar on the west wall of PB3 **(Figure 4)** was likely done by bullets of small-caliber, high velocity weapons, either the standard Imperial Japanese Army Type 38 or Type 99 rifle or a machine gun **(United States War Department 1995: 190, 195** and **Table 2)**. Close analysis of the impact zone suggests hits by up to twelve shots, possibly in bursts of 2-4 rounds. The reasoning here is:

A: that the near severing of the reinforcement bar would have been unlikely had the bullet already penetrated the covering of concrete, thus arguing a bullet strike after the outer layer of concrete had been destroyed.

B: that for a rifle or machine gun round to have retained sufficient kinetic energy to penetrate a steel reinforcement bar, it is likely to have been fired from close range – i.e. the Police Station Knoll, not the position farther back near Wong Nai Chung Reservoir as shown in **Figures 1a and 1b.**

C: that for the impact zone to show the shape and pattern that it does, an explanation of short, burst fire from an LMG or HMG is most plausible.

D: that the damage was rather minor compared to the penetration of the (thinner) wall of the search light shelter of PB20 as shown in **Figure 5.**

Figure 1a: Horizontal cone showing only possible firing position zones for rear wall hit marks.

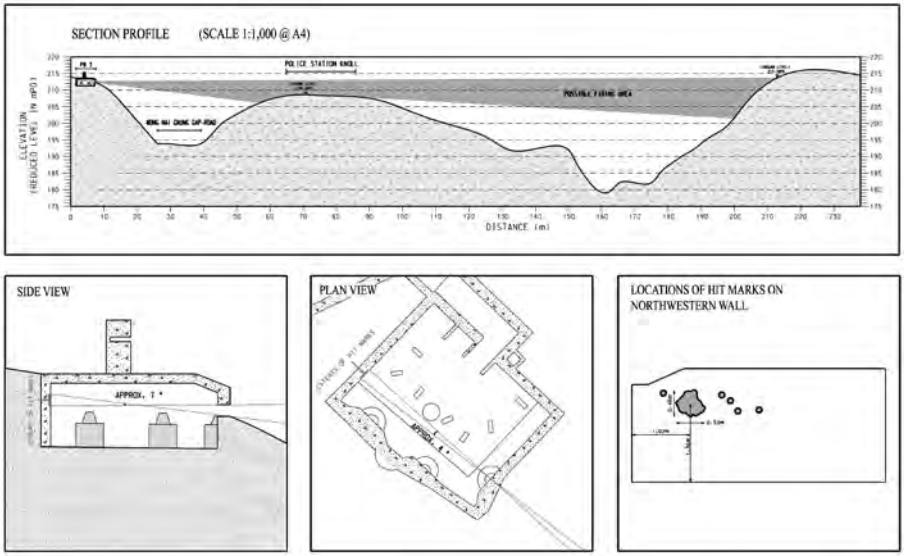

Fig 1b: Vertical cone showing only possible firing position zones for rear wall hit marks. Vertical and horizontal cone derivations and hit mark extent.

Finding 6: The interior hit marks are sufficiently numerous and tightly grouped as to suggest that they were fired by a gunner not himself either exposed to or subject to incoming hostile fire and therefore capable of controlled, accurate fire. Hence this damage may have been caused by bullets fired AFTER but not during the taking of Police Station Knoll or during the see-saw battle against counter-attacks from the Black's Link-Mount Cameron direction that took place later on 19th December.

Fig 2: The undamaged interior of a Hong Kong Island pillbox never engaged in any fighting.

Fig 3: The heavily bullet scarred exterior of PB1 after a fierce engagement during the early phases of the Battle for Wong Nai Chung Gap.

Fig 4: The almost severed reinforcement bar in the interior hit mark area. Note dimension c.6.5mm – the same as Japanese Model 96 LMG and Model 38 Rifle.

Fig 5: Penetrating hit mark on exterior of PB20's searchlight shelter on Hong Kong Island.

CONCLUSIONS

To the best of our analysis, with the possible exception of the external damage to the upper and lower parts of the embrasure of the subject loophole, which did not affect the structural integrity of PB3 or its gun mount, there is no evidence of any hit on PB3 by a 37mm gun, 20mm anti-tank rifle or other light artillery weapon. As a result of post-war vegetation growth, we have NOT been able to evaluate the ground immediately around and in front of PB3 and we recognize that this may bear evidence of shell impacts from the gun of I/3/5 IRGB that may have caused the evacuation of any residual defenders from PB3.

Whether or not PB3 was empty during the shooting is a separate issue, but it was unlikely that the shooting by the Japanese was prolonged, as the number of likely hit marks is very small. Our scenario for PB3 is that any defender stationed there would have fired at the Japanese, who were in the final stages of their attack on the Police Station Knoll. This drew return fire. PB3's approaches and the whole of the approaches to the location of D WG and West Brigade HQ were covered by PB1. This took a deadly toll of attacking Japanese troops starting at 6:20 AM, with the battalion colonel, Colonel Shoji Toshishige reporting some 800 casualties, or between 80% and 100% of his strength.

Standing as it does at the top of a relatively steep slope up from Wong Nai Chung Gap, for at least one hour until 7:30 AM PB3 could not have

been easily closely probed or encircled by the Japanese on the morning of 19 December. Meanwhile, the Japanese forces shot at the subject loophole or alternative position from advantageous locations.

It follows:

1. From Japanese documentary evidence AT LEAST one Type 94 gun fired AT LEAST one round at PB3. We do NOT know whether this/these hit PB3 or merely landed extremely close.

2. There is a hit mark on the upper side of the SE facing embrasure of PB3. This MAY have been occasioned by a hit from a Type 94 gun but MAY NOT have been. It may also have been a hit from a 20mm Type 97 anti-tank rifle if 9/9/230 had a heavy weapons platoon.

3. A NON-EXPERT IMPRESSION is that the impact on the upper side of the SE facing embrasure was from an arc of up to 20 degrees either side of an impact at right angles to the plane surface. This is consonant with I/3/5 IRGB's firing point on Sir Cecil's Ride but INCONSISTENT with the impact mark on the interior west wall.

4. The group of hit marks on the rear interior wall of PB3 was not due to any light artillery round of any kind, but to EITHER a machine gun/guns OR a rifle/rifles fired from the Police Station Knoll.

5. The tight grouping of the interior hit marks suggests fire from an UNOPPOSED position NOT under threat from interdiction fire from the area of PB3 or, possibly, PB1. Therefore NO conclusions as to WHEN the firing that caused the hit marks took place can be come upon save that it was probably not at the height of the battle or subsequent counter-attacks.

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Where is the Strand Palace Hotel?

Y K Tan*

EDITOR'S ABSTRACT

The Shing Mun Redoubt is noted for the widespread use of place names from London, the capital city of the British Empire. Although no official *pre-war* maps or drawings of the Redoubt have survived, post-war research has identified most of the names known to have been used and identified where in the Redoubt each location is to be found. The missing part of the jigsaw, however, is the Strand Palace Hotel. The name appears in battle narratives from 1941. But exactly where in the Redoubt complex the specific location is to be found and what purpose it served have yet to be clarified. This essay presents a solution.

KEYWORDS

Royal Scots, Battle of Hong Kong, Shing Mun Redoubt, Strand Palace Hotel, cable

Figure 1: The original Strand Palace Hotel in London.

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PREAMBLE

This technical note serves the main purpose of showing the major operational centres in the Shing Mun Redoubt (as mapped in **Lai et al 2011**) and some conjectures are made about the function of two structures X and Y identified. Further research on the communications systems used between the Redoubt and area command centres and within the Redoubt and between the Redoubt and the OP and HQ may help resolve these matters. This research is ongoing.

REGENT PALACE HOTEL IN SHING MUN REDOUBT

Inside the Shing Mun Redoubt tunnel near the junction of Piccadilly and Haymarket is a short tunnel spur that connects to an entrance to the redoubt. This tunnel is almost completely filled by mud that has been seeping in from holes along the tunnel wall. Near a corner an entrance is blocked by mud. A bigger hole on the tunnel wall that looks like another damaged opening is behind this entrance, although it is unlikely that the British would build two entrances so close to each other. This suggests that both openings are connected to an underground space that was completely filled in by mud or a roof collapse that has prevented further investigation.

The name, "Regent Palace Hotel," is marked on the outside of the tunnel entrance. Unlike other tunnels that have street names, this entrance is named after a hotel in London **(Figure 1),** which suggests that there was an underground structure inside with some sort of accommodation. A lot of concrete debris found in the area indicated that the structure was probably destroyed. The remains of the structure have also been completely covered by mud and rubble, possibly from a collapsed roof or an unknown opening.

Figure 2: Entrance to the Telephone Exchange/Platoon HQ/Regent Palace Hotel in a tunnel.

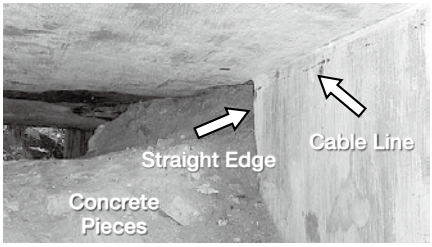


Figure 3: Another opening behind the entrance in Figure 2.

Another opening can be seen behind the aforementioned entrance **(Figure 3).** Note the vertical straight edge near the tunnel roof and black line marked "cable line" going into the opening.

The conformity indicates an underground structure. Although it is not possible to measure the dimension of the covered structures, by careful study of the survey map of the tunnels the structure is around 11 meters (36ft) long. What is not clear from sketch maps and battle narratives is whether the **Regent Palace Hotel** is what is identified as a Telephone Exchange or the Platoon Headquarters on the sketch map in the Muir-Kirby file supplied to the post war Cabinet inquiry **(Latham 1958).** As we shall see in the conclusion, the probabilities suggest the latter.

STRUCTURE X

A short distance beyond the entrance to Shaftesbury Avenue is a buttress-like bulge on the right wall. **(Figure 5)** It looks like a support for something. An opening found next to it connected to a structure outside the tunnel. After the opening was a tunnel branch that connected to Oxford Street. Another opening along the tunnel wall on the other side of the corner indicated a structure outside the tunnel. Going straight along Shaftesbury Avenue, passing the tunnel branch will bring one to another structure similar to the previous example. The second structure looks like a mirror image of the first. These two structures were completely separated by the tunnel.

Two openings can be found along the tunnel corner connecting to the outside. **(Figure 6)** The right side is the entrance to Shaftesbury Avenue. The left side is the tunnel branch to Oxford Street.

A bulge and opening can be found along the tunnel wall in Shaftesbury Avenue. **(Figure 5)** The mirror image structure on the other side of Shaftesbury Avenue is separated by the tunnel branch.

Figures 4A and 4B show the views of a tunnel entrance with the name "Regent Palace Hotel marked on the top".

Figure 5: Bulge and opening along the tunnel wall in Shaftesbury Avenue. Note: The tunnel to Oxford Street is on the right side below the air vent opening.

Figure 6: Two openings along the tunnel corner connecting to the outside.

Figure 7: The mirror image structure on the other side of Shaftesbury Avenue as separated by the tunnel branch. Note: The right side is the tunnel branch to Oxford Street.

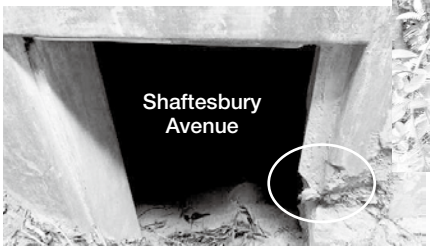
(Figure 7) Figures 8 and 9 show some details of the entrance to this tunnel. Outside the tunnel **(Figure 8),** one can find a hole covered by a landslide. A close check found two walls that extended from the tunnel wall and formed a closed square space around the tunnel corner. Concrete remains on top of the walls indicate a roof that had been located there. The remains indicated two underground concrete chambers that were originally built outside the tunnel on both sides of the corner. These underground structures were connected to the tunnel and may be similar to the construction around the previous Telephone Exchange/Platoon HQ/Regent Place Hotel location. The tunnel walls around the structure were 30cm thick. However, the redoubt's tunnel walls were normally 20cm thick. This indicated that both rooms were better protected than the rest of the redoubt. Building two structures separated by a tunnel also reduced the risk of destruction by a single hit.

Figure 9: The entrance to the tunnel. Note: Note the damaged part on top of the wall indicating where a steel rebar inside the wall was removed.

These structures are thought possibly to be well-protected shelters. Their roofs have gone. **(Figures 11 and 12)**

The damage around the door join shown in **Figure 10** might have been caused by people attempting to dig out metal parts from the wall.

Figure 10: Details of the entrance to the tunnel. Note: The remains of a door join is circled.



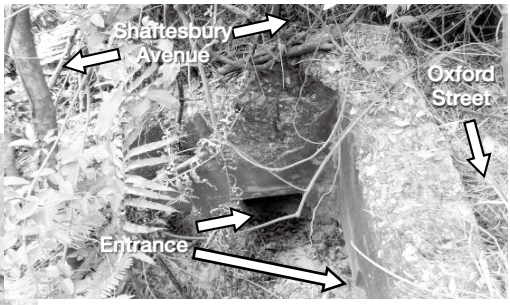


Figure 11: Looking from top of the roofless structure to show how it is connected to Shaftesbury Avenue and Oxford Street.

A detailed plan of Structure X **(Figure 13)** shows two square shelters built on different sides of the tunnel. The dimension of each shelter is 2.8 x 3.7 meters (9X12ft) and the height is 2 meters. The two entrances to the tunnel junction faced different directions. This design ensures that one entrance can be used if the other one is blocked.

The bulge is used to support the reinforced beam across the center of the ceiling. A thick steel rebar inside the concrete beam further enhanced the roof support. A ventilation duct was built at the junction of the tunnels.

Structure Y

By following Oxford Street from Structure X, one finds a similar structure not far away with a similar bulge along its tunnel wall. There is more than one entrance along the tunnel wall's short extension **(Figure 14).**

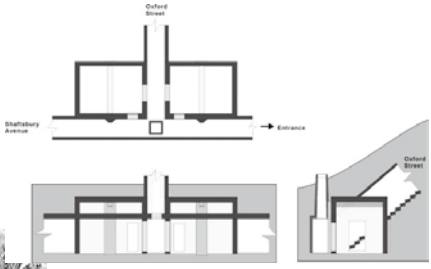


Figure 13: Measured section drawings of Structure X.

Figure 12: Looking from top of Oxford Street show the left and right side of the roofless structure. The top line of original roof is still visible.

Figure 14: A short extension of the tunnel built to separate the two shelters and used as an entrance.

Figures 15A and 15B: The damaged bulge along the tunnel wall of Structure Y. Note the hole in the middle used to support the end of the steel rebar of the ceiling support beam.

The bulge along the tunnel wall of Structure Y was damaged **(Figures 15A and 15B).** The damage shows someone has dug out the steel rebars in both bulge and ceiling beam. It also shows how much effort was required to remove the steel there. This may be the reason why only this example was dug out: the diggers learned the hard way.

The damage to the tunnel roof **(Figure 16)** might have been caused by people digging out the steel rebar in the bulge, though it is also consistent with a hit by a shell which we know may have been the case because of the friendly fire onto the Redoubt from British guns called in as fire support during the battle. If this is evidence of post-war

Figure 16: Damage to the tunnel roof.

Figure 17: The shelter is almost completely filled by mud.

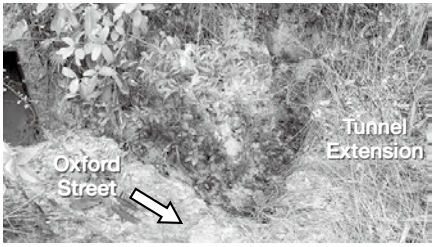


Figure 18: Ruins of Structure Y.

scavenging, it shows how much work was required to extract the rebar.

The shelter is almost completely filled with mud **(Figure 17).** Only some of the wall above the entry opening is exposed. Just as with Structure X, the roof has been removed. The other side of Structure Y still retains three sides of its wall. The missing side wall is covered by earth. **(Figure 18)**

There is a ventilation duct at about the tunnel junction between the two shelters. **(Figure 19)** The top of the duct was damaged, where a metal cover might have been installed for protection. Some sources mention that soldiers could seal the ventilation duct from inside the tunnel when under attack.

The dimensions of Structure Y are same as Structure X: 2.8 x 3.7 meters and 2 meters high. **(Figure 20)**

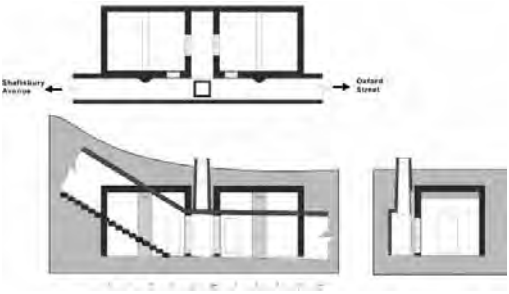


Figure 20: Measured section drawings of Structure Y in Shaftesbury Avenue.

Figure 21: The emergency exit (?) from the inside.

Figure 19: Ventilation shaft near Structures X and Y.

Figure 22: The emergency exit (?) on the outside.

On the route towards PB400 from Structure Y is an opening along the tunnel wall. The lower half of the opening is blocked by a concrete wall. This might have been an emergency exit for the tunnel **(Figures 21 and 22)**. The upper section might have been covered so it could not be seen from the outside. Anyone could open it from the inside when needing to exit.

Going farther into the tunnel and passing the spur to PB400, one will see two metal gate hinge pins set into the wall. **(Figure 23)** A hole for a securing bolt is located on the other side of the wall. This indicates the presence of a gate in the past.

The gate and emergency exit suggest that this section of the tunnel was an important part of the Redoubt.

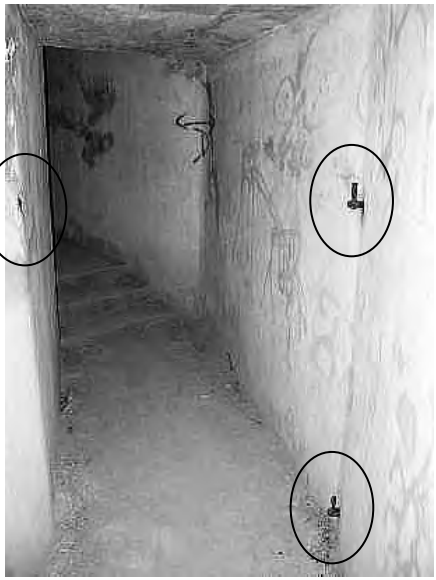


Figure 23: the Gate to PB400.

The headquarters were below the Artillery Observation Post (OP). It had two underground rooms with the same layout. The presence of structures to hold cooking ranges, a water tank, and storage racks **(Figures 24 and 25)** indicated that this was a kitchen. There was no communications equipment or a place for officers to work. The OP is not thought to have been originally designed to be the headquarters, but to have been improvised as one during the battle.

Figure 24: View of a kitchen of the popularly known Strand Palace Hotel.

Figure 25: View of another kitchen of what is popularly (and perhaps mistakenly) known as the Strand Palace Hotel: the steps lead up to the Artillery Observation Post.

Damage to the roof's supporting column shows that the rebar inside was removed **(Figure 26)**. The imprint on the damaged concrete indicates where the two thick rebars were previously located. The remains of the steel rebar are still visible at the end of the column. It was too difficult to dig them out, so the exposed rebar was cut away leaving the remainder in place.

Figure 26: Roof of a kitchen in the "Strand Palace Hotel".

ANOTHER STRAND PALACE HOTEL?

The "kitchen" below the OP is called the Strand Palace Hotel by many references on the redoubt. However, I have not seen any British record that called this structure the Strand Palace Hotel. Map 3 of the Cabinet Report (Latham 1958) puts a question mark after "OP/Hotel" in this place. The only place within the redoubt where the name was visible is at the entrance to Shaftesbury Avenue from the open firing bay. The text, **"TO O.P./ STRAND PALACE HOTEL,"** is engraved at the tunnel entrance wall (along Trench "T7" in **Lai et al 2011) (Figures 27 and 28)** and the arrow below points in the OP's direction. This may also be why people have taken the "kitchen" area to be the Strand Palace Hotel, as the name was placed with the OP. Following the tunnel from

Figure 27: "TO O.P./STRAND PALACE HOTEL".

Figure 28: The engraving inside Shaftesbury Avenue near its entrance as seen in Figure 27 above: "TO O.P./ STRAND PALACE HOTEL".

there, one will pass Structure X and can branch off to Structure Y before reaching the OP.

By further studying the layout of the redoubt, one can see that all of its major structures were built underground. The pillboxes were built into ground, recessed into the hillside with their tops back-covered to defend the redoubt. The tunnels linked all pillboxes to the heart of the redoubt. Open-firing bays built around the hill served as the redoubt's Alternate Positions for use during night and poor visibility. Structures X and Y are located in the center of the redoubt in the heart of the Redoubt's defensive systems, hence optimally protected and away from the enemy's expected direction of attack. **(Figure 29)** Their locations are shielded by the surrounding hills. Structure Y is almost identical to Structure X, but was built on the opposite side of the hill. This meant that an attack from any direction could not destroy both structures. Structures X and Y could accommodate approximately 36 personnel in cots. This is approximately the size of an infantry platoon. The Redoubt was intended to be manned by a full company of three rifle platoons (each 1 officer and 36 other ranks) and a headquarters (2 officers and 11 other ranks). This would have operated in action with two platoons manning pillboxes or Alternate Positions and one platoon on stand-by. It follows that Structures X and Y would have provided accommodation for the stand-by platoon. Whatever their actual purposes, would these structures have been what the British referred to as the Strand Palace Hotel? This is possible but, as we shall see in the conclusion, there is another interpretation, consistent with what has become the accepted understanding that is more probable.

CONCLUSION

The name "Hotel" is a typically joking British military description of a field structure used for living and sleeping. There is no sleeping bed in the kitchen near the OP, often supposed to be the Strand Palace Hotel, so it may not be what the sign was directing personnel to. An alternative explanation would

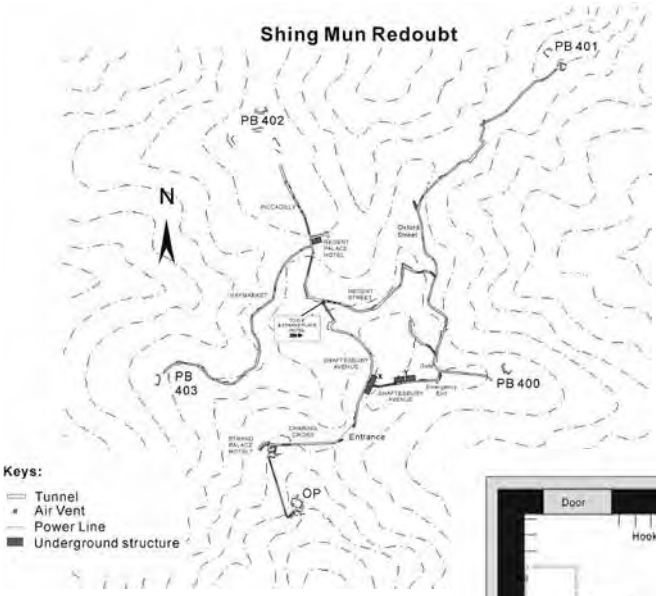


Figure 29: Location of Structures X and Y.

take the joking mentality and add it to a form of simple subterfuge or code. This would see the 'H' in 'Hotel' as having not its literal meaning – a place of accommodation – but a code meaning 'Headquarters'.

This first takes us back to the Regent Palace Hotel with which we began. If 'H' was code for Headquarters, then the smaller structure labeled as the Regent Palace Hotel in the Redoubt complex is most probably the Platoon Headquarters that is labeled as such on the 2nd Royal Scots sketch map.

With structures X & Y the dimensions are the same as the British 'A' Type Splinter Proof Shelter commonly found on Hong Kong Island. This type of shelter was used as a living and sleeping place by the British in the Battle of Hong Kong. It can allow up to 9 soldiers to sleep inside safely. 'A' Type Splinter Proof Shelters were

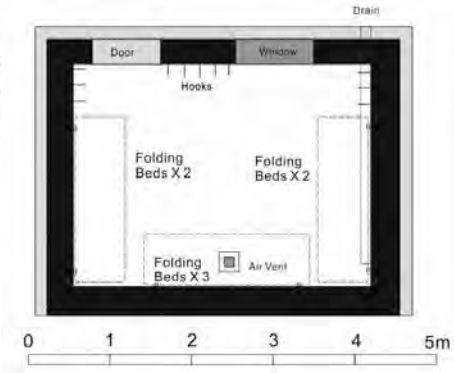


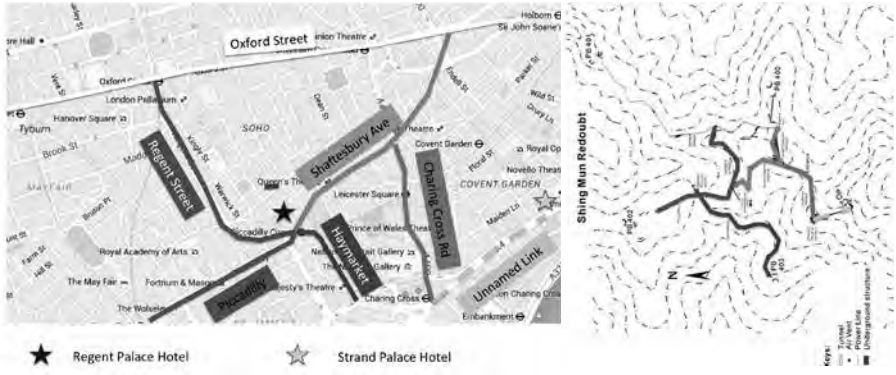
Figure 30: British 'A' Type Splinter Proof Shelter.

normally built into hillsides above ground, though with three walls and at least some of the roof protected by the surrounding hillside. The front side, which is without protection, was vulnerable to direct fire from heavy weapons. The structures X & Y, by contrast, are built completely underground, so with much better protection. This indicates they were important structures in the Redoubt that have hitherto been overlooked. Identifying them reveals the manner in which the Redoubt could have been operated.

Figure 31: Four 'A' Type Splinter Proof Shelters at Tai Tam Tuk Reservoir. This is possibly a location of company headquarters in the wartime.

WWII British company headquarters were normally formed by four 'A' Type Splinter Proof shelters with other supporting shelters. **(Figures 30 and 31)** Structure X & Y also comprise 4 separated underground shelters just as does the general company headquarters arrangement. However, the location of these shelters entirely within the Redoubt with no immediate possibility for observing terrain poses the question of whether the four structures X and Y were a company headquarters or a protected rest station for an off watch platoon. Further research will be needed to try to clarify this difficult issue.

However, some possible light may be cast by considering more fully than hitherto the names used in the Redoubt. Apart from mimicking an established British practice, familiar from narratives of the Western Front in the First World War, the names may also be



Figs 32a and 32b: The streets of central London with names used in the Shing Mun Redoubt colour coded and the Shing Mun Redoubt map, rotated east up, with the same colour coding.

a useful indication of the location of the elements of the structure. Figure 32a shows the actual layout of the streets of London used in the toponymy of the Redoubt with the relevant street names shown and the line of the streets named in the Redoubt colour-coded. Figure 32b, with the map of the Redoubt in Figure 29 above rotated ninety degrees to the left, has the same colour coding for the named streets. On Figure 32a the locations of the actual Regent Palace and Strand Palace Hotels in London are shown.

It is suggested here that 'Charing Cross', since it clearly refers to a linear tunnel section, may be shorthand for Charing Cross Road rather than for the single location whilst also, again jokingly, perhaps referring to the open air 'crossing' that had to be negotiated to move from the Redoubt to the OP and HQ section of the complex.

It can be seen comparing **Figures 32a and 32b** that there is a loose but clear resemblance between the layout of the streets in the Redoubt and their real life exemplars. Piccadilly runs towards the junction of Regent St and Shaftesbury Avenue with Haymarket branching off to the right. Shaftesbury Avenue runs off in a curve from the junction to reach one end of Oxford Street, which runs in from the left across the top of Regent St. From along Shaftesbury Avenue there is a right branch into Charing Cross Road.

From that congruence, we may seek to identify the 'hotels'. It can be seen that in London the Regent Palace Hotel lay on the western edge of Soho, London's red light district, close to the junction of Piccadilly, Regent Street and Shaftesbury Avenue. Of the two hotels it was the more down-market. This location, when cross-compared with the Shing Mun Redoubt layout leaves it uncertain whether Regent Palace Hotel was the Telephone Exchange/ Platoon HQ structure identified above, or whether it was Structures X and Y. Further analysis is needed but the probability, explained more fully below, is that the Regent Palace Hotel was the Platoon HQ. This leaves a question mark hanging over the location of the telephone exchange, but this could have been one of the roles of Structures X and Y.

However, the London map, with the very distinct topographical distancing of the Strand Palace Hotel from the end of Charing Cross Road does suggest that the traditional identification of the OP/HQ area with the Strand Palace Hotel is probably correct. To make the potential parallel clearer, one notes that the Strand Palace Hotel in reality is offset up The Strand to the right of the end of Charing Cross Rd. One can also remark that in the hotel 'pecking order' the Strand Palace Hotel was more up-market and in a 'posher' area of town. Further, Charing Cross (Road) in the Redoubt ends at the kitchen area, leaving open the possibility that the uphill staircase to the OP/HQ was a 'The Strand Equivalent' leading to the 'Strand Palace Hotel' and that therefore, contrary to what has hitherto been believed, from early on it may be that both the Company HQ and the OP were in the same location. If the 'H' in 'Hotel' is to be understood as coding for 'Headquarters', this would be consonant both with the recollection of the layout

of London in how the Redoubt was understood and with the comparative statuses of the two 'Hotels'. British soldiery may have had a rough sense of humour, but it was seldom one that did entire violence to the actualities of the homeland they were nostalgically remembering.

It is possible that further research on communications systems, at present ongoing, will help resolve the ambiguities in the above analysis.

ACKNOWLEDGEMENTS

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