# HART ROAD LIME KILN
# TOWN OF VIEW ROYAL
# CONSERVATION PLAN



JUNE 2012

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View from southeast

# 1.0 INTRODUCTION

**SUBJECT PROPERTY:** Hart Road Lime Kiln
**CONSTRUCTION DATE:** Circa 1908
**BUILDER:** Silica Brick & Lime Company Ltd.

The Hart Road Lime Kiln is situated along Hart Road in the Town of View Royal, on Vancouver Island near the City of Victoria. The kiln is located on a slight rise, thirty feet from the west side of the newly widened Hart Road, and set against a steep slope of rock outcrop.

The site and the kiln itself are currently covered in brush and trees. The surrounding larger property is under development. A new, black chain-link fence has been built on three sides of the kiln site, providing security for the kiln structure itself.

The kiln, constructed in the early 1900s, is a type known as a "vertical lime kiln." The kiln is formed of two distinct parts: a rubble stone base about 12 feet square, varying in height from 4 feet to 8 feet, and an upper circular brick chimney clad in sheet metal, approximately 14 feet in height.

The kiln was abandoned in the 1940s and is currently derelict and deteriorating. The heritage value of the lime kiln has been recognized by the Town of View Royal, which has acquired the site and planned for its preservation. The site is dedicated as parkland, as part of the larger surrounding development. The kiln will be conserved, and the history of the Hart Road Lime Kiln is to be interpreted. This Conservation Plan provides a framework for what can be undertaken at the site, including site development and interpretation.

The goal of the Heritage Conservation Plan, commissioned by the Town of View Royal, is to identify appropriate measures to preserve and stabilize the historic lime kiln and to propose an interpretation plan for public education and enjoyment. An interdisciplinary project team under the leadership of heritage consultant Donald Luxton & Associates Inc. was retained by the Town of View Royal to carry out historic research and site assessments in order to understand the historic evolution, heritage values, character-defining elements and physical condition of the structure. These investigations included structural assessments by Read Jones Christoffersen (RJC) Consulting Engineering, material examinations by GOAL Engineering Ltd., geotechnical assessments by Thurber Engineering Ltd., and ecological reviews by Dunster & Associates Ltd.

The consultant's assessment reports are included in this Heritage Conservation Plan. Conservation recommendations are based on Parks Canada's *Standards and Guidelines for the Conservation of Historic Places in Canada* (2010). This Heritage Conservation Plan can be used to establish support policies for the protection, preservation and interpretation of the historic Hart Road Lime Kiln.

Please note that for the purposes of this report, "project north" has been established as the northwest elevation.

# 2.0 DESCRIPTION OF THE SITE

## 2.1 HISTORY OF LIME

Lime refers to the end result of burned (calcined) limestone and includes commonly used products such as quicklime and hydrated lime. Limestone itself, mined throughout the world, is a naturally occurring rock and is comprised of high levels of calcium and/or magnesium carbonate. Lime and limestone products are among the oldest materials used by humans around the globe for a diverse range of applications, including the construction of buildings.

A major component of mortar, lime was one of the world's earliest and most essential components of the building process. Prior to the introduction of ordinary portland cement in the late 1800s, lime mortar was the primary binding agent used in the construction of masonry buildings. In Canada, the production of lime was an essential industry, which reached its peak between the 1840s and 1890s, before gradually declining in the 1920s and 1930s.

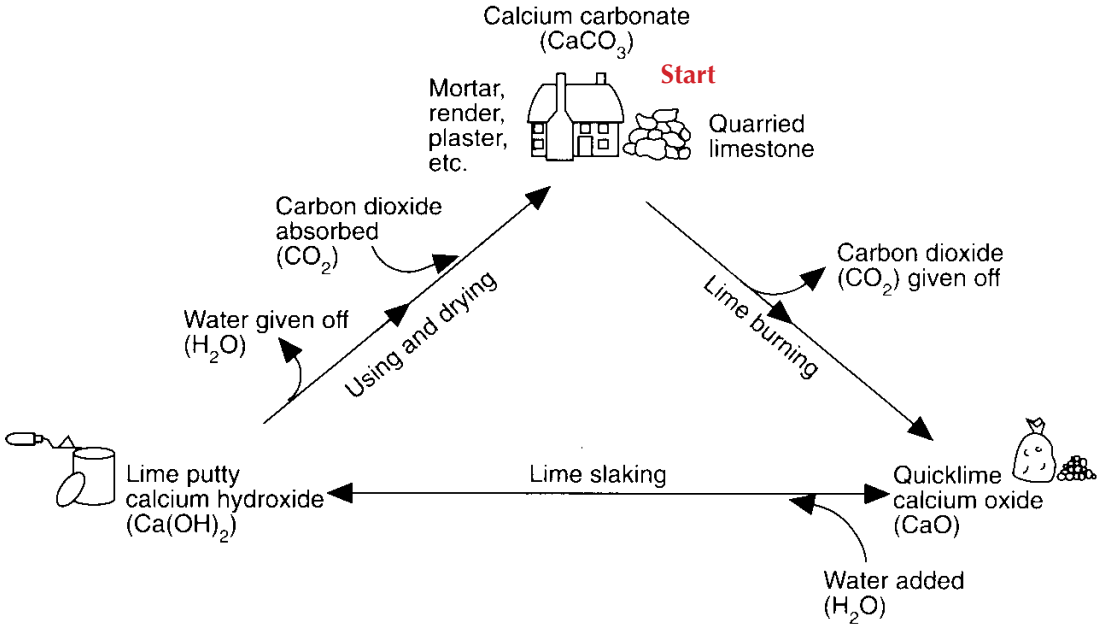
Lime is produced by heating crushed limestone to extreme temperatures within manmade kilns, such as the Hart Road Lime Kiln in View Royal. The heating process is known as calcination, which converts limestone to a powder, requiring temperatures at or above 1,000˚C. The calcination process creates quicklime, which is used for a variety of applications including the production of fibreglass, aluminum, pulp and paper, as well as for environmental applications such as flue gas desulferization (FGD), and as a steel fluxing agent. Quicklime can be converted into a powder, known as hydrated lime, by adding water; it is hydrated lime that was used commonly in the production of mortar, plasters, whitewash, limewash and stucco.

The production of lime for use in construction was an important and well-documented industry in Canada, established as an essential industry by 1841. Prior to this, plaster and whitewash was made from the crushing and burning of oyster and sea shells, as documented at the Hudson Bay Company Big House in Port Simpson, British Columbia.

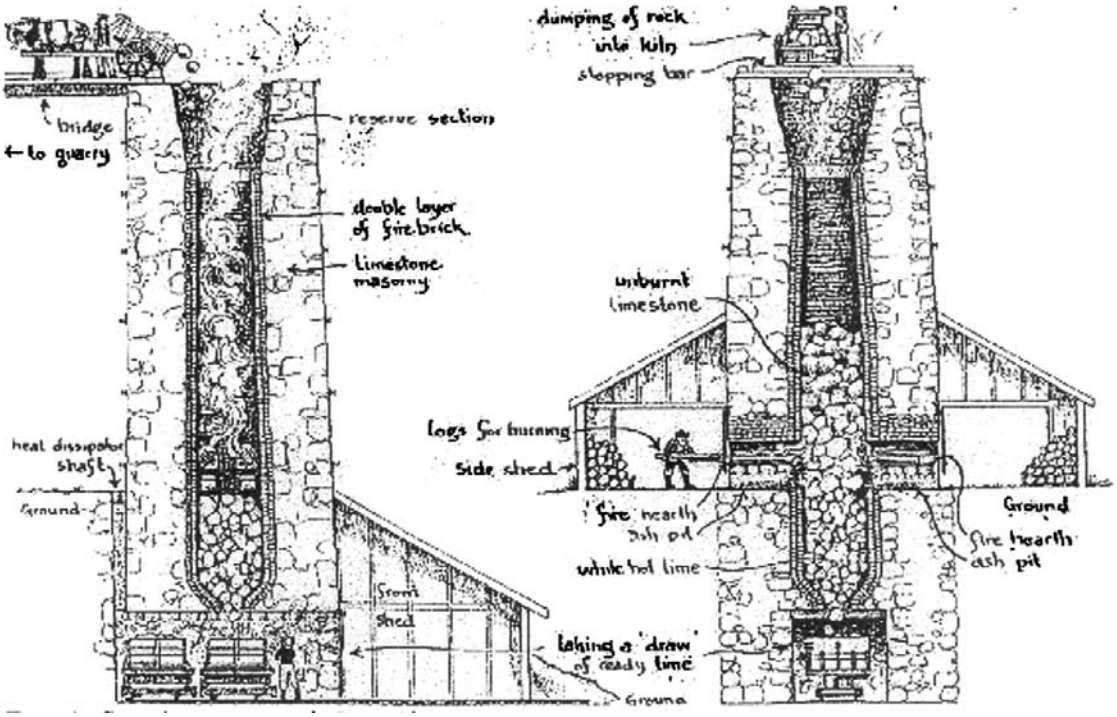
## 2.2 KILN DEVELOPMENT

The production of lime in Canada began in the 1800s, when crushed limestone was burned in batch-operated pot kilns. This process required six to seven days per batch of lime in order to complete the full process of filling the kiln, burning the stone, cooling the lime and then emptying the pot, in order to begin the production cycle over again. By the 1860s, the pot kiln was being replaced by the vertical draw kiln, which provided kilnsmen with the ability to burn 6 to 18 tonnes of lime per day. Once the limestone had been sufficiently burned, it would be removed from the kiln and transferred to a 'slaking shed'. Slaking was the most important part of the lime production process, as it was through slaking that hydrated lime was produced for use in the construction industry. Vertical draw kilns, such as the Hart Road Lime Kiln, were patterned after stack furnaces, which were used to reduce iron ore and other metals. Vertical draw kilns were constructed of non-refractory stone, which can withstand high temperatures, and refractory-stone, which will burn. Limestone, a non-refractory material, was used in the casings, walls and other supporting parts of the kiln, while a refractory stone, like sandstone, was used to line areas in immediate contact with the fuel and flame, such as the lining of the hearth. Most lime kilns were also constructed of some steel and/or timber components. Due to the use of both refractory and non-refractory materials, these components prevented the kiln bases from collapsing. For ease of production, kilns were traditionally built into the side of knolls with direct access to limestone. However, the arrival of the railway enabled the construction of kilns further from the limestone source and nearer to centres of industry and settlement.

# DESCRIPTION OF THE SITE




An Introduction to Lime, Jane Schofield, 1995




Cross-section sketch of a vertical draw lime kiln, www.limehousekilns.ca

## 2.3 THE ATKINS FAMILY

Thomas Atkins (1854-1934), originally from England, had been active on Vancouver Island beginning in the late 1800s when he and his brother established the Atkins Brothers Silica Lime Brick Company (later known as the Silica Brick & Lime Company Ltd.) on Atkins Road, seven miles from Victoria. Atkins was operating a lime quarry on Atkins Road, northwest of the location of the Hart Road Lime Kiln, when Isaiah Hodges, an old friend of the Atkins, arranged for the 1891 marriage between Thomas and Isaiah's daughter, Sarah Hodges (1874-1953). Following a visit back to their native England, Thomas and Sarah had six children, George (1896-1964), Grace (1898-1918), Effie (1900-1989), Edward (1902-1965), Victoria (1905-1995), and adopted Iris (1921-1988). Following the birth of his second son in 1902, Thomas Atkins established the Thomas Atkins & Sons Company, under which he formed several businesses. By 1899, the Atkins' lime and brick business had become so successful that it justified the construction of an Esquimalt & Nanaimo Railway (E&N Railway) spur from Atkins Road to aid in the transportation of their brick and lime products. The Atkins family extended their operations further in the community, establishing several limekilns at Rosebank.

In 1909, Atkins purchased land southwest of Parson's Bridge from the Crown in order to further his industrial efforts in the area. One of the earlier mentions of the Silica Brick & Lime Company Ltd. in the area of Hart Road near Parson's Bridge, which most likely referred to the Hart Road Lime Kiln, was an article published in the *Victoria Daily Colonist* on June 4, 1908. The following is an excerpt from that article:

> **MINING INDUSTRY ON VANCOUVER ISLAND**
> *Reports of the Officials of the Department Contained in Annual Bulletin*
> The annual report of the provincial mines department has the following from its officials upon Vancouver Island:
>
> VICTORIA MINING DIVISION
> Notes by the Provincial Mineralogist
> **Miscellaneous**

An industry new to the Province, viz.: the manufacture of so-called "Silica brick", has been started at Parson's Bridge, about six miles from Victoria, on the line of the E.&N. Railway, by the Silica Brick and Lime Company, Limited, a company composed of Victoria business men. As a new plan it would be deserving of mention, but as a new industry, which has a wide application, and might well be established at other parts of the Province, a more extended notice of the process seems desirable.

Silica brick, so-called, are made from sand and lime, and the product is a brick of absolutely standard dimensions, with sharp angles and corners and plane surfaces, filling the requirements of what is known in the east as a pressed "face brick", serving for the construction of ornamental fronts or faces of buildings, the uniform size and shape of the brick permitting of their being laid with almost imperceptible joints, and giving a smooth and uniform coloured front or face. The colour of the brick can be varied somewhat by the colour of the sand used in its manufacture, but those so far produced in Victoria are of a light grey colour. The brick, therefore, finds a market as a "face brick", competing successfully with imported brick of this class, and is, in British Columbia, sold at a much lower price, as the freight rate on imported brick is almost prohibitive. For all work where appearance is a factor in deciding the brick to be used, silica brick competes successfully with repressed clay brick, but for rough walls, where ordinary clay brick serves the purpose, it is not expected that, in the matter of cost per thousand, silica brick will compete with the common clay red brick, although it is claimed that the silica brick, being more regularly shaped, can be laid more quickly and cheaply than the irregular-shaped red brick. Whether silica brick will become a substitute for red brick is a question of cost rather than of quality, or durability, of the finished work.

The manufacture of silica-lime brick, while new in British Columbia, has been carried on extensively

# DESCRIPTION OF THE SITE

in Germany, the United States and Eastern Canada for 20 years, and the experience there obtained is that properly made silica-lime brick is quite as lasting as well burned clay bricks, with which we are familiar.

The Silica Brick & Lime company's plant, near Victoria, consists of: One Berg patent brick press; pressure, 1,700 tons; capacity, 18,000 to 20,000 bricks a day; 1 rotary sand dryer, 1 75-H.P. engine, 1 150-H.P. boiler, 2 60-ft. cylindrical retorts, 2 14-ft. mixers, 3 belt elevators, 1 pulverizer, 2 worm conveyors, 40 flat cars, 12 hydrating cars, 200 lime boxes, with necessary tram cars, turn-tables, etc. This plant is housed in suitable buildings, between which and the spur from the E.&N. railway is a large "dock" or platform for the storage of brick awaiting shipment/

The size of the manufactured brick is 8 1-4 by 4 by 2 3-8 inches thick. The raw materials for the brick-making are found immediately adjoining the plant and can be obtained at a minimum expense. The output of the plant up to December 31, 1907, was about 1,100,000 brick.

The following are among the important structures already built with silica brick: Victoria Transfer co., Victoria, 3 stories; St. Joseph Hospital, new extension, 5 stories; Brackman & Ker's warehouse, Victoria; Bakeries, Limited, Victoria West; David Spencer's new building, Vancouver, 8 stories.

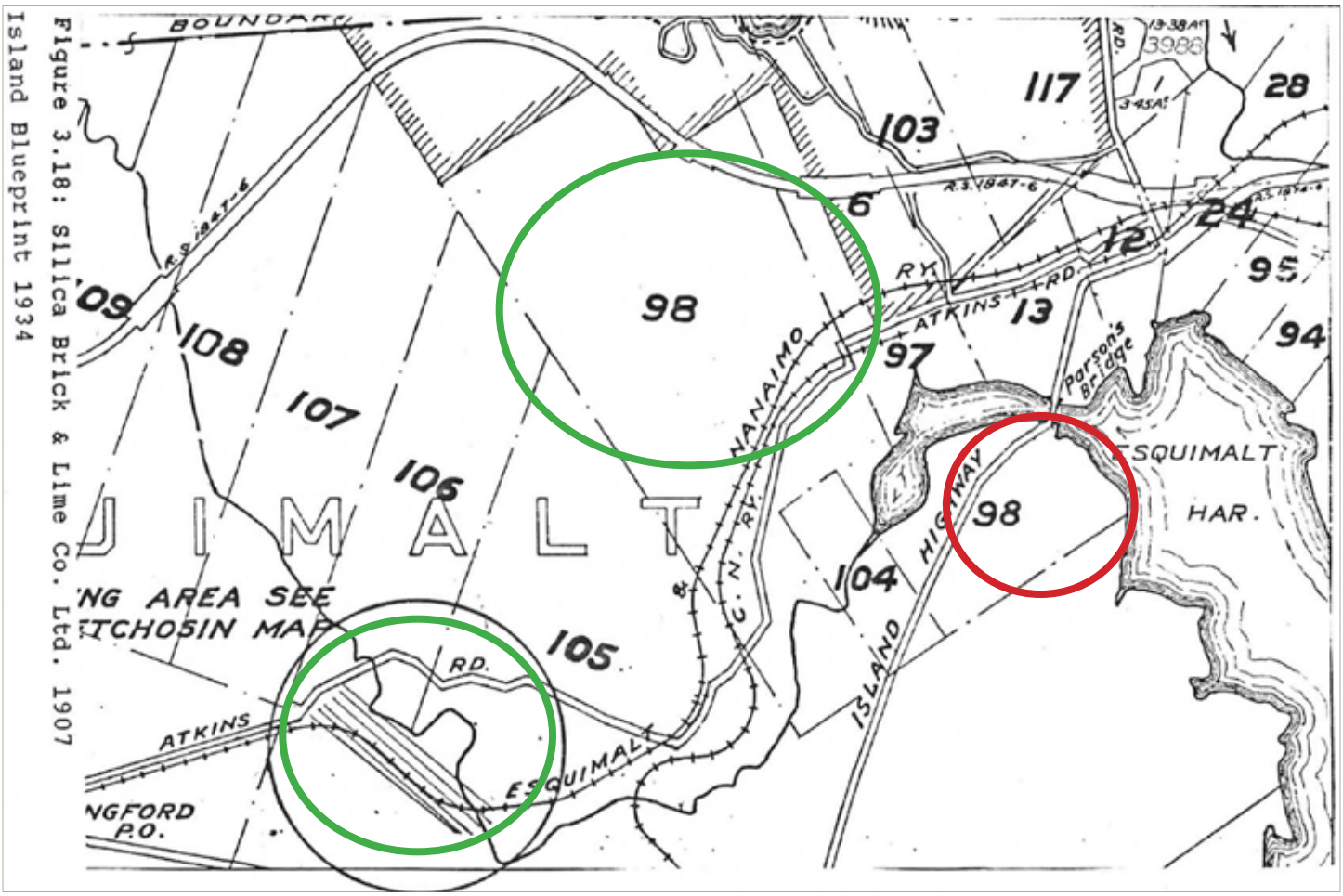
It is unclear whether or not the Hart Road Lime Kiln was constructed before the establishment of the Silica Brick & Lime Company Ltd.'s efforts near the Parson's Bridge (1907) or whether the Atkins family kilns at Rosebank were used to supply the lime until the Hart Road structure could be built (when Atkins took ownership of the land in 1909). The Hart Road Lime Kiln operated in an area known as the 'Parsons Bridge Deposit.' The following description for the deposit was included in the 1957 *Calcareous Deposits of Southwestern British Columbia*, by W.H. Mathews and J.W. McCammon:

*Location and Accessibility* – A limestone-deposit occurs on the northwestern slope of a knoll 0.2 mile south-west of Parsons Bridge at the head of Esquimalt Harbour. It is 6 miles by road from Victoria.

*Geology* – The deposit is at least 100 feet wide and 200 feet long. The limestone shows a distinct banding, probably related to stratification, which shows marked variations in attitude. Greenstone bodies are present within the limestone. A granitic intrusive limits the deposit on the southeast and east. Overburden is lacking on the upper part of the knoll but mantles the lower slopes where it covers the limestone deposit to the west and north.

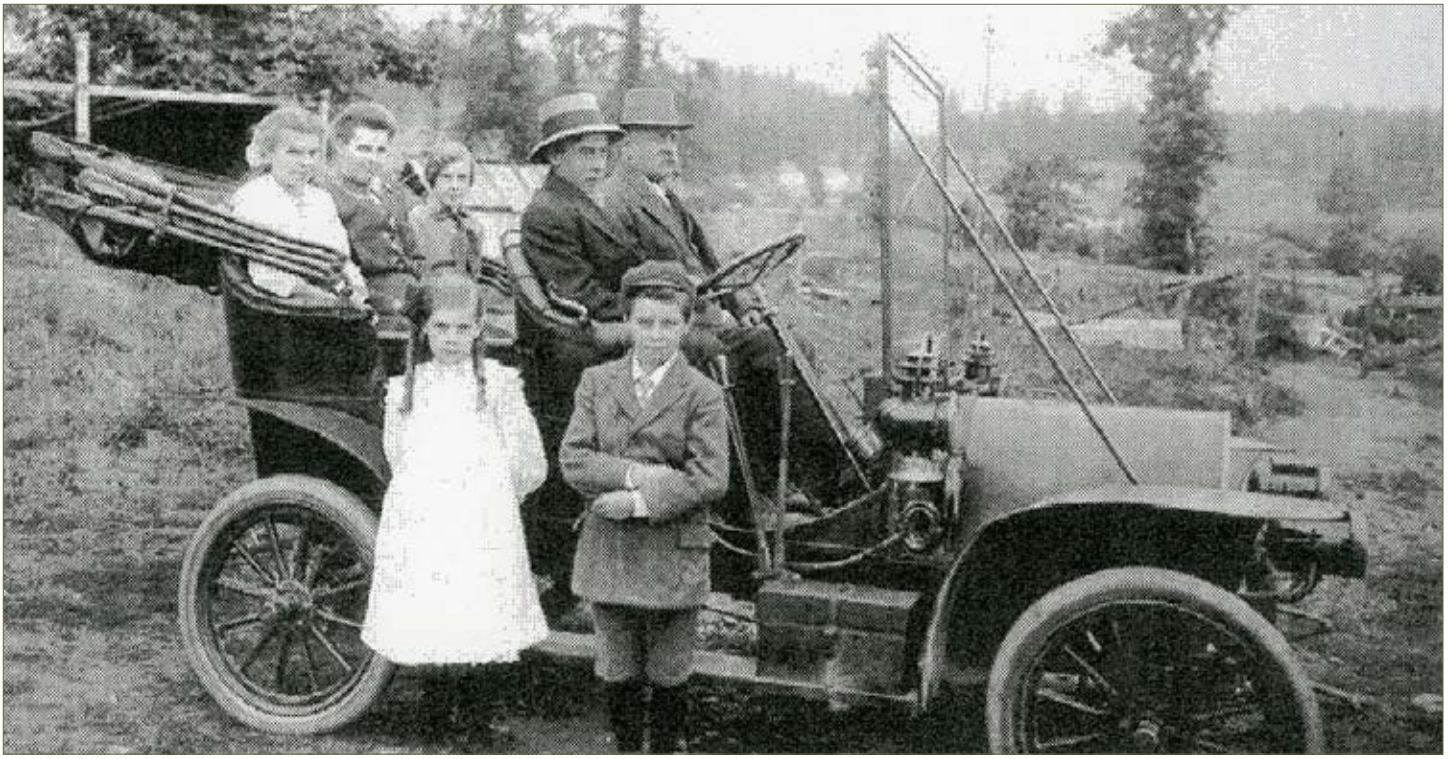
*Development and Operation* – The limestone of the deposit was originally quarried for flux by the Tyee Copper Company and later quarried and burned by the Victoria Lime Company for agricultural lime. The ruins of an old kiln stand beside the quarry.

Though it is known that, beginning in 1909, the Atkins family owned the land where the Hart Road Lime Kiln was constructed, and that they operated the Atkins Brothers Silica Lime Brick Company at the site, it is unclear as to whether they owned and operated the Tyee Copper Company. Both the copper and lime companies could have coexisted in the area, utilizing the same deposit of limestone. The Atkins family continued to operate their successful business through the First World War and interwar period before the demand for lime began to gradually decrease by the 1930s. It is likely that, upon Thomas' death in 1934, the land was leased to the Victoria Lime Company by the Atkins family for the production of agricultural lime; this initiative most likely continued through the Second World War. According to the 1947 report *Calcareous Deposits of the Georgia Strait Area*, "although the property was idle in the spring of 1946 the lime-burning plant was in operating condition". The Hart Road Lime Kiln remains the only physical reminder of the once thriving Atkins family brick and lime operations in the area.




Silica Brick & Lime Company Ltd., 1907 map, green circles show the location of Atkins operations in the area, while the red circle shows the location of the Hart Road Lime Kiln.

# DESCRIPTION OF THE SITE



The Atkins Family circa 1905, Thomas Atkins is pictured in the driver's seat

will be held at Board of Trade rooms, February 2nd, at 8 p. m.
Imperative that all should attend.
ED. MALLANDAINE JR.,
ja31 Secretary.

FOR SALE.

THE well-known Lime business known as the Colwood Lime, which contains two lime kilns having a capacity of 100 barrels a day. The property contains 44 acres. There are 20 acres of limestone, four acres of sand and 20 acres of wood land; also one fine new brick house, which contains 8 rooms, wood shed, stables for four horses and buggy house, also one cattle shed. All new. The E. & N. R.R. runs through the property, which is only seven miles from Victoria. This is a rare chance for men wanting to go into business, as the owners are leaving for England. For particulars, apply to Thomas Atkins & Sons, Colwood Lime Company. ja6-1m

NOTICE is hereby given that application will be made to the Legislature of British Columbia for an Act to amend the "Esquimalt Water Works Act, 1885," conferring on the company authority to direct and appropriate water from Goldstream River and its tributaries; and

Thomas and Sarah's trip to England, following their marriage, is evidenced in the *Victoria Daily Colonist*, January 31, 1892

SHORTHAND.

Pitman's System, taught in twenty-five lessons for $25. Proficiency Guaranteed. Apply C.D.S., 62 John St., Rock Bay. ap14

TENDERS.

Notice to Contractors and Builders.

ATKINS BROS. have now assumed their own business again, and are prepared to deliver LIME { to any part of the city at 50 cents per barrel. It has } LIME stood the test of 16 years as the best Lime in the Province. Office and Warehouse, No. 3 Pandora street, near Government street. mr4-2w

THE JAPANESE BAZAAR.

Advertisement for the Atkins Bros. Lime Kiln, *Victoria Daily Colonist*, Tuesday, March 13, 1894, page 2

# 3.0 STATEMENT OF SIGNIFICANCE

**Name of the Historic Place:** Hart Road Lime Kiln
**Location:** Along Hart Road, View Royal
**Date of Construction:** circa 1908

**Description of Historic Place**

The Hart Road Lime Kiln is situated along Hart Road in the Town of View Royal. Located on a slight rise, approximately thirty feet from the west side of the newly widened road, and set against a steep outcrop of limestone, the Hart Road Lime Kiln is characterized by its square rubble stone base and circular brick chimney stack, clad in metal. Though the site and the kiln itself are currently covered in brush and trees, the kiln remains the last physical structure of what was once a large and thriving industrial area.

**Heritage Significance**

The Hart Road Lime Kiln is significant as the only surviving remnant of a once prosperous industry, which was owned and operated by the local Atkins family. Constructed in the early 1900s, the Hart Road Lime Kiln is one of only a few early kilns remaining on Vancouver Island. Lime kilns had been established in greater Victoria as early as 1852 by Kenneth Mackenzie at Craigflower Farm. Others were established in Victoria Harbour, Esquimalt Harbour, and at Brentwood (now Butchart Gardens). The Atkins family themselves established a number of kilns in the area including several at nearby Rosebank, Atkins Road, and the Hart Road Lime Kiln at Parsons Bridge. By the late 1880s, the Atkins Brothers Silica Lime Brick Company (later known as the Silica Brick & Lime Company Ltd.), established by Thomas Atkins and his brother, had become a large operation, and included kilns, houses, slaking sheds, a brickmaking shed, and platforms at the front of the kilns where the lime and bricks were loaded onto wagons. Shipping of both the lime and bricks was expedited by the Rosebank and Hart Road kilns' easy access to nearby docks. The Hart Road Lime Kiln itself was used to burn limestone to make 'quicklime' (calcium oxide). After it cooled, the quicklime was drawn out of the base of the kiln through draw-holes, ground into a powder and then packed in barrels for sale, to be used as mortar and plaster and later, for agricultural lime.

The Hart Road Lime Kiln is additionally significant for its contribution to the early twentieth-century residential development of the surrounding area. Much of the earlier residential construction around the lime kiln was spurred by the kiln, as an economic generator in the area. The Hart Road Lime Kiln also had an impact on development throughout Greater Victoria throughout the first half of the twentieth century, as the materials extracted from the kiln were used in products that helped facilitate the construction of permanent brick and stone buildings and chimneys. The lime kiln remains today as a testament to a local industry that made a great impact on the construction and development of View Royal and Greater Victoria.

**Character-Defining Elements**

The heritage character-defining elements of the Hart Road Lime Kiln include its:

- location beside Hart Road, set close to a rocky hillside, and expressive of its relationship to the quarry above and the former shipping dock;
- industrial size and scale, as expressed in its square stone base and circular, metal-clad chimney
- construction materials of rubble stone, fire brick and sheet metal construction materials;
- vernacular industrial character as demonstrated by: the rubble stonework of the base of the kiln; three draw-holes in the stone base where the quicklime was extracted from the kiln; the visible draw hole openings through the base of the kiln; small, double metal doors on the main draw-hole; the evidence of other features indicated by metal brackets and supports; metal cladding on the upper brick parts of the kiln, and its method of construction, size of metal plates and rivets; the fire brick lining of the stone base and the chimney stack including the type, size and placement of the bricks; and
- remains of ash in the surrounding soil as an indication of the historic activity at the site.

# STATEMENT OF SIGNIFICANCE

North elevation

# 4.0 CONSERVATION GUIDELINES

## 4.1 DEFINITION AND VALUES OF INDUSTRIAL HERITAGE

The historic Hart Road Lime Kiln is identified as an industrial heritage site and a designated resource on the Town's Community Heritage Register. Industrial heritage consists of the remains of industrial culture, which are of historical, technological, social, architectural or scientific value. These remains can include buildings and machinery, workshops, mills and factories, mines and manufacturing sites among many other structures.

Generally industrial heritage assessments utilize interdisciplinary methods of studying all the evidence, material and immaterial, of documents, artifacts, stratigraphy and structures, human settlements and natural and urban landscapes, created for or by industrial processes. It makes use of those methods of investigation that are most suitable to increase understanding of the industrial past and present.

The industrial heritage is the evidence of activities, which had and continue to have profound historical consequences and it is of social value as part of the record of the lives of ordinary men and women, and as such it provides an important sense of identity. It is of technological and scientific value in the history of manufacturing, engineering, construction, and it may have considerable aesthetic value for the quality of its architecture, design or planning. These values are intrinsic to the site itself, its fabric, components, machinery and setting, in the industrial landscape, in written documentation, and also in the intangible records of industry contained in human memories and customs.

The Statement of Significance lists the inherent character-defining elements of the Hart Road Lime Kiln, which should be preserved and interpreted.

## 4.2 NATIONAL STANDARDS AND GUIDELINES

The Parks Canada *Standards and Guidelines for the Conservation of Historic Places in Canada* (2010) is the source used to assess the appropriate level of conservation, stabilization and interpretation of the Hart Road Lime Kiln. Under the guidelines, the work proposed for the Lime Kiln includes overall aspects of *preservation, restoration and rehabilitation*.

***Preservation:*** the action or process of protecting, maintaining, and/or stabilizing the existing materials, form, and integrity of a historic place or of an individual component, while protecting its heritage value.

***Restoration:*** the action or process of accurately revealing, recovering or representing the state of a historic place or of an individual component, as it appeared at a particular period in its history, while protecting its heritage value.

***Rehabilitation:*** the action or process of making possible a continuing or compatible contemporary use of a historic place or an individual component, through repair, alterations, and/or additions, while protecting is heritage value.

Interventions to the Lime Kiln will be based upon the Standards outlined in the *Standards and Guidelines*, which are conservation principles of best practice.

## 4.3 Guidelines for Industrial Heritage Sites

**General Guidelines** for the preservation and restoration of industrial heritage sites are listed in the Parks Canada *Standards and Guidelines for the Conservation of Historic Places in Canada* (2010) and shall be utilized at the historic Lime Kiln site:

# CONSERVATION GUIDELINES

**GUIDELINES**

1. **Understanding** the constructed element and how it contributes to the heritage value of the engineering work.

2. **Understanding** the construction history, theory, functional basis and design behind the constructed element.

3. **Documenting** the form, materials and condition of the constructed element before undertaking an intervention.

4. **Documenting** the operation and maintenance of constructed elements in sufficient detail to fully understand their operational characteristics. This can include obtaining an oral history of operation procedures, recording the machinery in operation or preserving records associated with the engineering work, and making these available for future research.

5. **Assessing** the overall condition of constructed elements early in the planning process so that the scope of work is based on current conditions.

6. **Determining** the appropriate level of investigation and analysis required to understand the overall condition of constructed elements, and analyzing the constructed elements in sufficient detail to fully understand their complexity and behaviour.

7. **Determining** the physical condition of constructed elements or their components, including the causes of distress, damage or deterioration through investigation, analysis, monitoring and minimally invasive or non-destructive testing techniques.

8. **Testing** constructed elements or their components in place to determine their characteristics, provided the appropriate precautions are taken to avoid their failure or destruction.

9. **Taking** into account the past performance and load history of constructed elements or their components when determining their present or future capacity.

10. **Protecting** constructed elements through appropriate and regular maintenance.

11. **Protecting** evidence of the evolution process or operation of constructed elements that contribute to the heritage value of the engineering work, including protecting patinas, soiling or debris, wear patterns and graffiti, resulting from the operation of the work or its associated machinery. For example, cleaning machinery just enough to reduce deterioration and danger to the public, rather than attempting to clean it to a “like new” condition.

12. **Preserving** the method of operation of an engineering work or its constructed elements that are important in defining the overall heritage value of the historic place. For example, continuing to hand-operate a canal lock gate mechanism, rather than switching to a motor.

13. **Imposing** limits on the acceptable use of constructed elements, based on their actual characteristics and capacities to protect them from damage. There is a need to balance present and anticipated usage demands with heritage value, and to avoid, if possible, any use that would damage or destroy the constructed elements.

14. **Balancing** the need to alter constructed elements to meet current safety codes and standards (to allow continued use) with the need to preserve the heritage value of the work’s functionality and operation.

15. **Retaining** sound constructed elements or deteriorated constructed elements of engineering works that can be repaired.

**16. Stabilizing** deteriorated constructed elements on an interim basis by structural reinforcement, weather protection, or correcting unsafe conditions, as required, until any additional work is undertaken.

**17. Adapting** interim stabilization interventions to the anticipated lifespan of the constructed element, so that they remain as reversible as possible.

**18. Repairing** deteriorated parts of constructed elements in a manner that is physically and visually compatible with the engineering work.

**19. Protecting** adjacent character-defining elements and components of constructed elements from accidental damage or exposure to damaging materials during maintenance or repair work.

**20. Replacing** in kind extensively deteriorated or missing parts of constructed elements using physical and documentary evidence as a model for reproduction. The new work should match the old as closely as possible in form, materials and detailing, and have adequate strength.

**21. Testing** proposed interventions to establish appropriate replacement materials, quality of workmanship and methodology. This can include reviewing samples, testing products, methods or assemblies, or creating a mock-up. Testing should be carried out under the same conditions as the proposed intervention.

**22. Operating** and using a functioning engineering work or its constructed elements appropriately and according to applicable codes, to preserve the functional purpose of the work that is important in defining the overall heritage value of the historic place. For example, maintaining a canal route open to navigation, or reinforcing a highway bridge so that it can remain in service.

**23. Documenting** all interventions that affect constructed elements, and ensuring that this documentation will be available to those responsible for future interventions.

**ADDITIONAL GUIDELINES FOR RESTORATION PROJECT**

**50. Repairing** constructed elements from the restoration period using a minimal intervention approach, such as patching, splicing, consolidating or otherwise reinforcing its materials and improving weather protection.

**51. Replacing** in kind an entire constructed element from the restoration period that is too deteriorated to repair using the physical evidence as a model to reproduce the element. The replacement should have the same form, appearance and material properties as the replaced element, and have adequate strength or load-bearing capabilities. The new work should be unobtrusively dated to guide future research and treatment.

**52. Removing** or altering a non character-defining constructed element or component from a period other than the restoration period.

**53. Recreating** a missing constructed element from the restoration period, based on physical or documentary evidence.

**54. Restoring** operation to an engineering work that is important in defining its heritage value.

**ADDITIONAL MATERIAL GUIDELINES FOR RESTORATION PROJECT**

**Masonry**

**22. Repairing**, stabilizing and securing masonry elements from the restoration period, using recognized conservation methods. Repairs should be physically and visually compatible and identifiable on close inspection for future research.

**23. Replacing** in kind a masonry element from the restoration period that is too deteriorated to repair, based on documentary and physical evidence. The new work should be well documented and unobtrusively dated to guide future research and treatment.

**Architectural and Structural Metals**

**20. Repairing**, stabilizing and conserving fragile metal elements from the restoration period, using well-tested consolidants when appropriate. Repairs should be physically and visually compatible and identifiable on close inspection for future research.

**21. Replacing** in kind a metal element from the restoration period that is too deteriorated to repair, based on documentary and physical evidence. The new work should be well documented and unobtrusively dated to guide future research and treatment.

## 4.4 GENERAL CONSERVATION STRATEGY

The primary intent is to preserve the existing lime kiln, with some aspects of restoration where necessary. No interventions should be allowed that compromise the historical integrity or the authenticity of the fabric except where interventions for the safeguarding of the structure and public safety are required. Generally "preservation *in situ* should always be given priority consideration when planning interventions to a heritage site. Dismantling and relocating a historic structure is only acceptable when the destruction of the site is required by overwhelming economic or social needs" (see Appendix B - *General Guidelines for the Maintenance and Conservation of Industrial Heritage* by The International Committee for the Conservation of the Industrial Heritage).

For this purpose, the evolution of the site was researched; the physical remnants of the historic structure photographically documented, sketches of the as-found structure prepared with references to supporting documentation; the lot and location of the kiln surveyed and measured; the existing materials, structural integrity, soil conditions and ecological environment assessed; and potential risks to the historic structure identified.

Based on these investigations the level and priorities of intervention were determined following best conservation principles to preserve the historic structure and allow safe public access to the site. The conservation strategy for the lime kiln includes stabilizing the structure, restoring missing features where sufficient documentation is available, and removing later additions that do not contribute to the heritage character of the kiln. Public awareness and appreciation are important elements in the conservation of the site and planning tools for the site interpretation are outlined in this report.

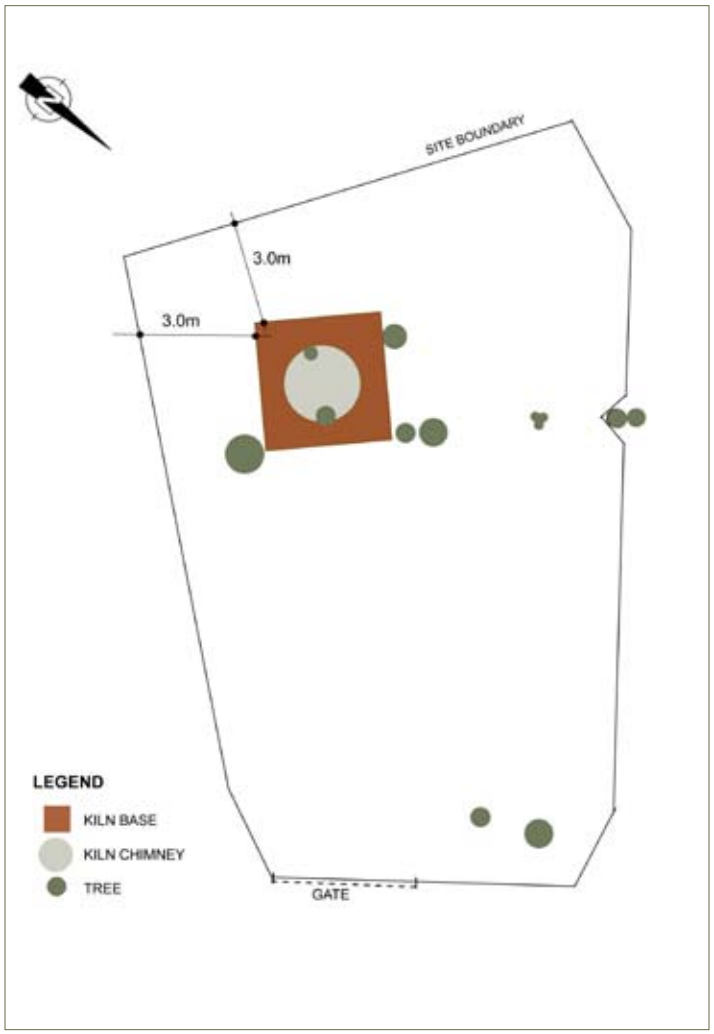
The *Standards and Guidelines* lists recommendations for new additions to historic places. Proposed structural stabilizations of the lime kiln and new infrastructure for visitors should follow the principle of designing an intervention in a manner that draws a clear distinction between what is historic and what is new.

Archival photo of the Hart-Road-Lime Kiln, photographer Robert Duffus, 1977

East face of whole kiln

# 5.0 CONDITION ASSESSMENT

View from the street

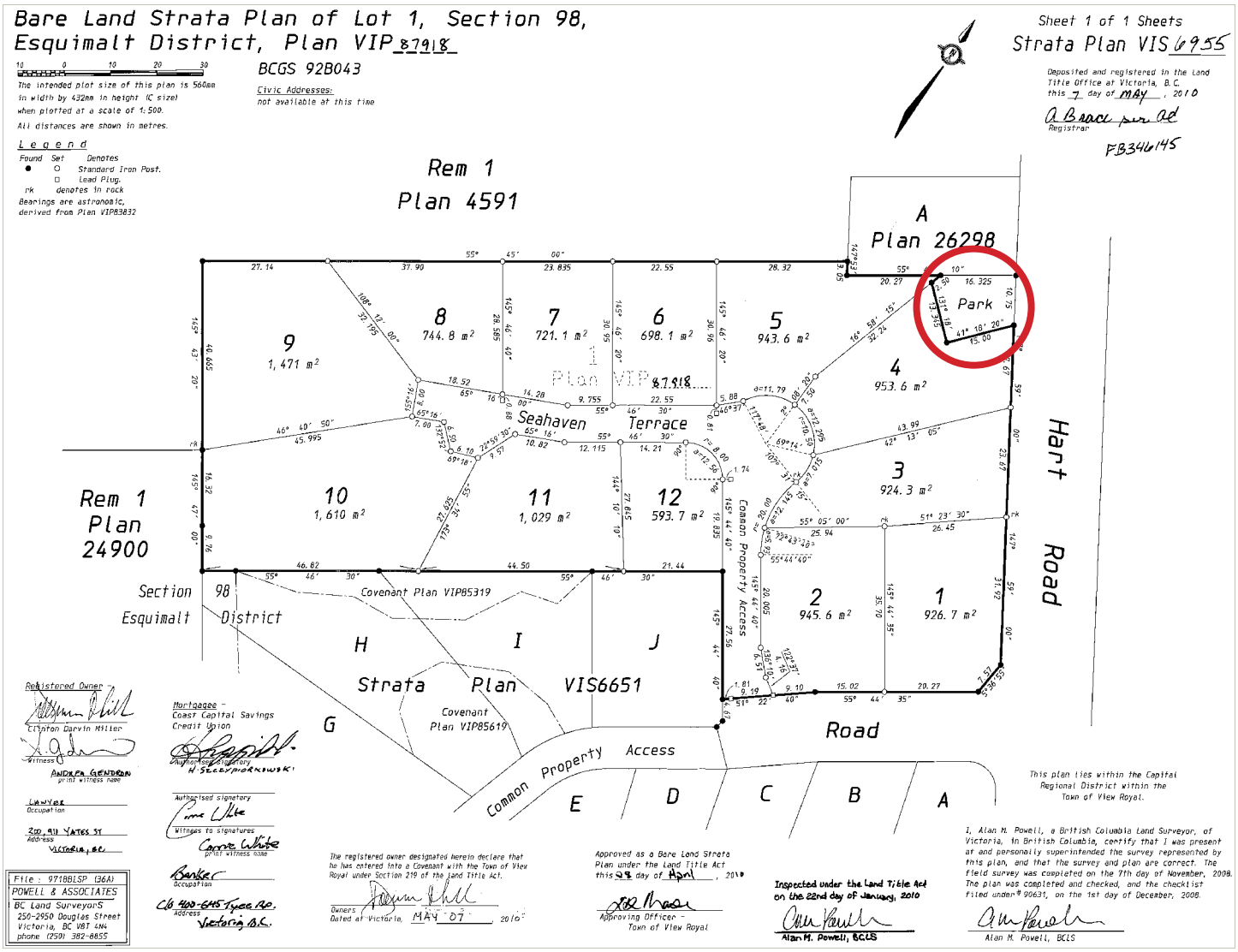



View Royal Lime Kiln Site Map

The visual assessment of the existing condition of the historic lime kiln was carried out during site visits in January 2012 by the consultant team, consisting of:

- Donald Luxton & Associates Inc., Project Management and Heritage Consultant
- RJC Read Jones Christoffersen, Structural Engineers
- GOAL Engineering, Materials Engineers
- Thurber Engineering Ltd., Geotechnical Engineers
- Dunster and Associates Ltd., Environmental Consultant

During the assessments the historic structure was visually examined from the ground, the exterior materials accessed by ladder, and the interior of the chimney stack reviewed. Non-destructive testing was carried out in localized areas and surrounding vegetation cleared to gain better access to the kiln. Approximate dimensions of the kiln and its location on the subject property were noted and mapped and the structure photographically documented. Appendix C contains the consultant team's technical reports.


Bare Land Strata Plan of Lot 1, Section 98, Esquimalt District, Plan VIP 87918
BCGS 92B043
Civic Addresses: not available at this time
Sheet 1 of 1 Sheets
Strata Plan VIS 6955
Deposited and registered in the Land Title Office at Victoria, B.C. this 7 day of MAY, 2010
A Brace per AD
Registrar
FB346145
Legend
Found Set Denotes
● ○ Standard Iron Post.
□ Lead Plug.
rk denotes in rock
Bearings are astronomic, derived from Plan VIP83832
Rem 1 Plan 4591
A Plan 26298
Park
Plan VIP 87918
Seahaven Terrace
Hart Road
Rem 1 Plan 24900
Section 98 Esquimalt District
Covenant Plan VIP85319
Strata Plan VIS6651
Covenant Plan VIP85619
Common Property Access
Road
1 926.7 m²
2 945.6 m²
3 924.3 m²
4 953.6 m²
5 943.6 m²
6 698.1 m²
7 721.1 m²
8 744.8 m²
9 1,471 m²
10 1,610 m²
11 1,029 m²
12 593.7 m²
A B C D E F G H I J
Registered Owner
Clinton Darvin Miller
Witness
ANDREA GENTDRON
print witness name
Lawyer
Occupation
200-911 Yates St
Victoria, BC
Address
File: 9718BLSP (36A)
POWELL & ASSOCIATES
BC Land SurveyorS
250-2950 Douglas Street
Victoria, BC V8T 4N4
phone (250) 382-8855
Mortgagee - Coast Capital Savings Credit Union
Authorised Signatory
Authorised Signatory
Witness to signatures
Carrie White
print witness name
Barker
Occupation
CB 400-645 Tyee Rd.
Victoria B.C.
Address
The registered owner designated herein declare that he has entered into a Covenant with the Town of View Royal under Section 219 of the Land Title Act.
Owners
Dated at Victoria, MAY 07 2010
Approved as a Bare Land Strata Plan under the Land Title Act this 28 day of April, 2010
Approving Officer - Town of View Royal
Inspected under the Land Title Act on the 22nd day of January, 2010
Alan M. Powell, BCLS
This plan lies within the Capital Regional District within the Town of View Royal.
I, Alan M. Powell, a British Columbia Land Surveyor, of Victoria, in British Columbia, certify that I was present at and personally superintended the survey represented by this plan, and that the survey and plan are correct. The field survey was completed on the 7th day of November, 2008. The plan was completed and checked, and the checklist filed under # 90631, on the 1st day of December, 2008.
Alan M. Powell, BCLS

Strata Plan

# CONDITION ASSESSMENT

## 5.1 SITE DESCRIPTION

The historic lime kiln is situated on Hart Road in the Wilfert Neighbourhood of the Town of View Royal. Wilfert is the smallest neighbourhood of the Town and dissected by the Island Highway, the Western Gateway Community Corridor and connector to Hart Road. Historically the location of the lime kiln was described as south of Parson's Bridge.

On the north and west side, the Wilfert Neighbourhood is bounded by Millstream Creek that leads to Esquimalt Harbour. This area, historically called Rosebank, was where the Atkins Brothers Silica Lime Brick Company operated the early industrial kiln site with related structures that have not survived, such as a quarry, wooden trestle, brick production shed, loading platform and dock. Part of the early industrial site is today located in the City of Colwood, to the south of Wilfert and the former Rosebank land purchased by the Department of National Defence in the 1930s.

The immediate surroundings of the lime kiln are characterized by newly-constructed detached and waterfront housing on Hart Road, which itself was recently widened with sidewalks. In 2009, the town initiated a rezoning of the vacant land to the west and south of the historic lime kiln and the area is currently divided into twelve subdivided lots (Town of View Royal *2009 Annual Report*, p. 8).

The subject lot boundaries are defined by Hart Road on the east side, which also provides the only access to the site. A residential home is situated on the north side, on the west and south sides are two vacant properties with steep slopes that are awaiting residential development. Presently the subject lot is fenced, and rezoned for use as a park.

For the initial site visit, some of the dense undergrowth was cleared, but there remains some dense vegetation including mature trees and shrubs. A significant amount of soil and organic material has accumulated on the south, west and north sides of the structure and partially buried the base of the kiln. Due to setback on the lot and the dense vegetation, the kiln is not clearly visible from the street. During a subsequent site visit some vegetation was cleared to provide better access, in order to assess the condition of the structure.

## 5.2 DESCRIPTION OF THE KILN

The lime kiln is situated in the rear of an east-sloping and densely vegetated lot of irregular shape of approximately 225 $m^2$. The lot is set against a steep rise of rock to the west and south. An almost square rubble masonry base of approximately 3.80m x 3.90m and a height of 2.50m was built with limestone blocks sourced from local quarries. The base was presumably constructed on native soil or bedrock as there are no visible structural foundations.

The base features on the east side a vertical lime pit draw hole on a lower level. It is approximately 1m wide and 1.40m high on the outside, tapering down on the interior side. Interestingly, three short flat-bottomed steel railway tracks were used at different levels as supporting beams above the draw hole, which is closed with an arched steel frame with hinged steel double doors.

Arched air intake openings exist on an upper level on the north and south elevations of the chamber and were presumably connected with a grating to the lower draw hole. The base of the chamber is presently built up with soil and could not be safely investigated. Two metal angles inserted to the full length of the masonry base on the east and west sides provided additional structural stabilization of the structure.

South elevation

West elevation

# CONDITION ASSESSMENT

Northeast elevation

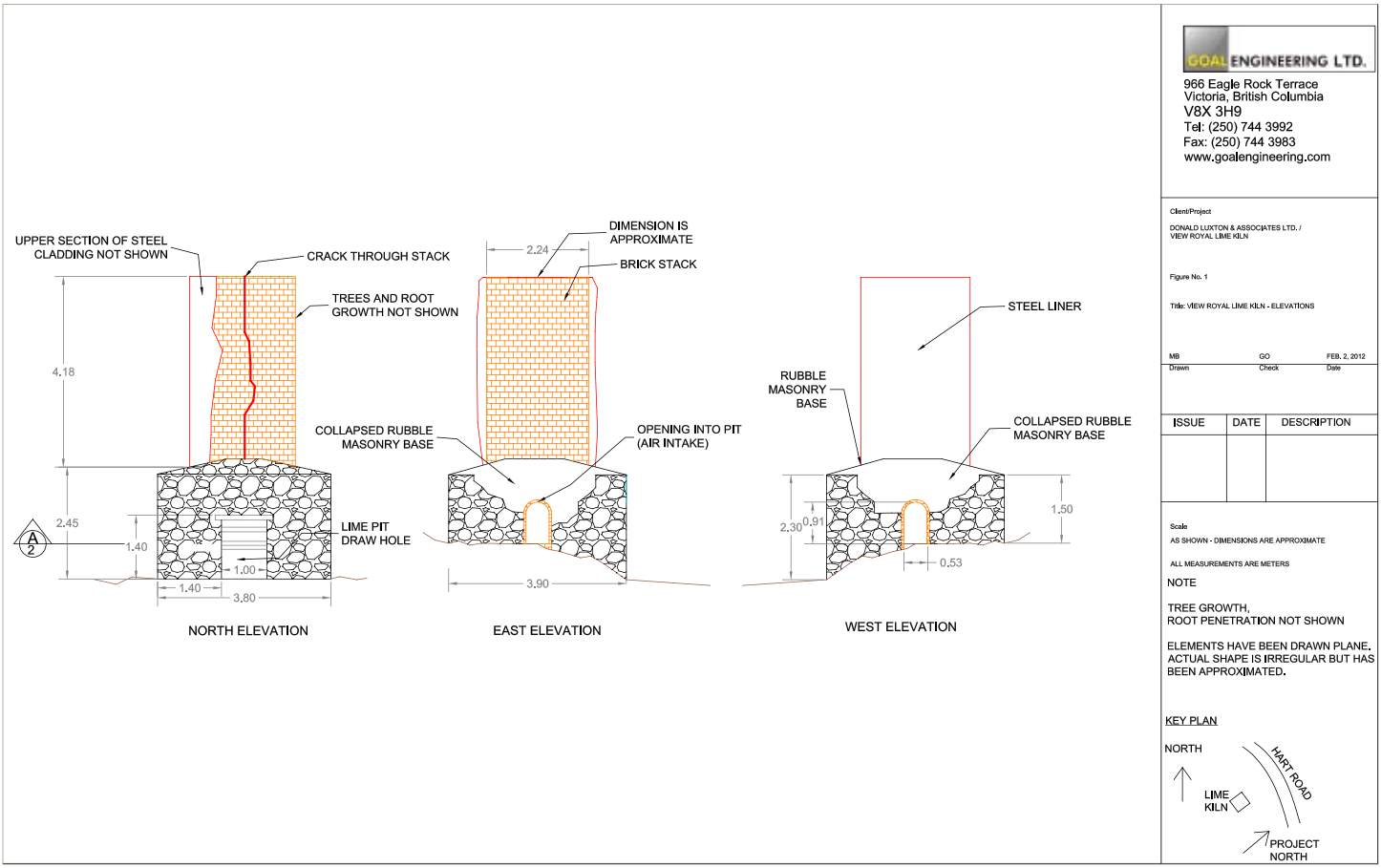
Above: View down flue
Below: Arched air intake, north side

The brick chamber is circular on plan with an internal diameter of approximately 1.34m at the base of the chimney shaft. It can be assumed that the shaft is wider at the bottom than at the top. The chamber has a height of approximately 4.18m and the thickness of the brick wall is approximately 45 cm.

The brick chimney was built with red bricks in random coursing pattern. The internal brick surface received a protective cementitious render due to the high temperatures and aggressive byproducts of the lime production process.

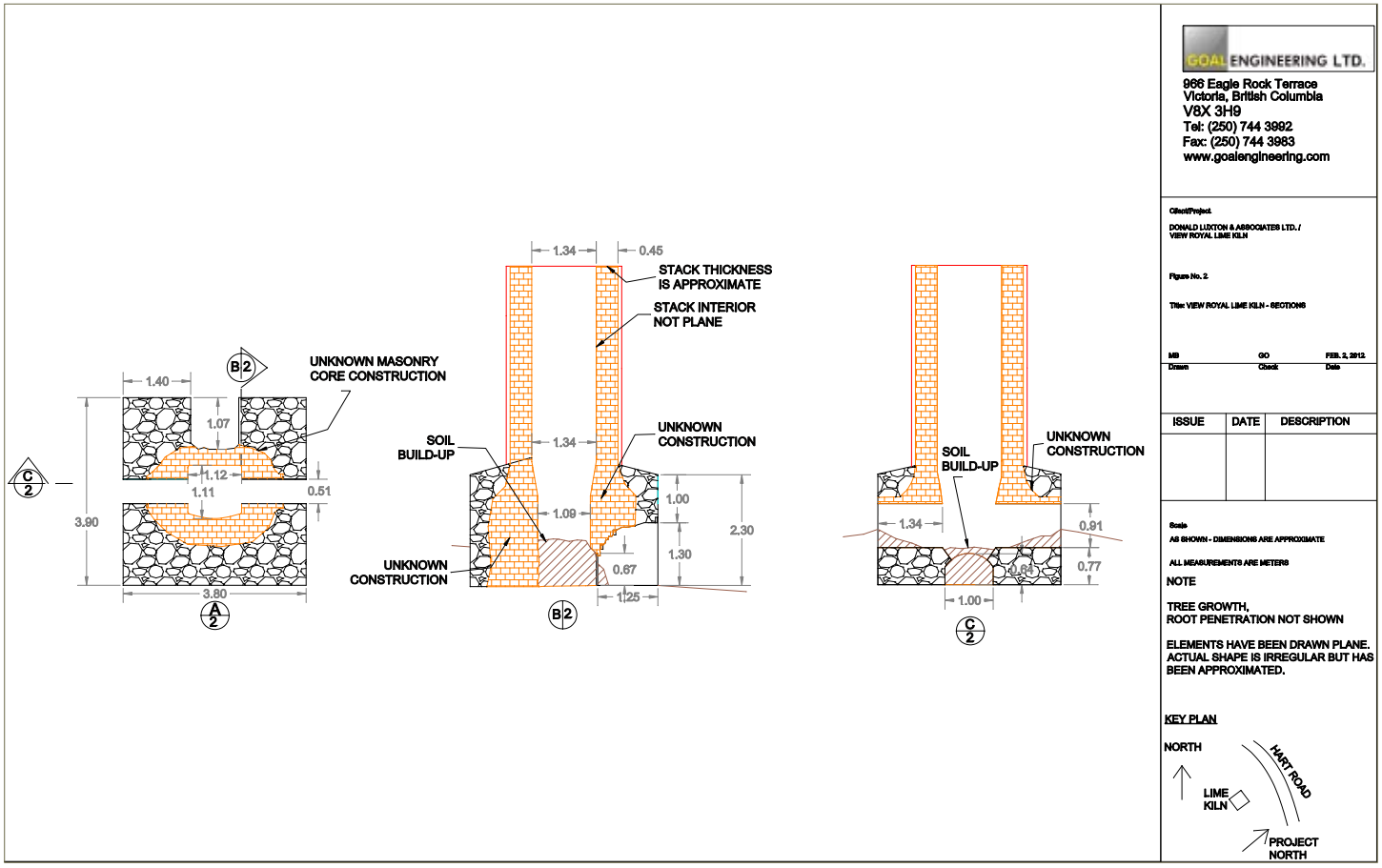
During the operation of the kiln additional lime residue deposited on the interior brick walls. The exact composition of the brick structure is unknown at this time as the hazardous nature of the site prevented full investigation, but there are areas where fire bricks have been installed, as described below.

On the exterior side the brick stack was fully mantled with a metal sleeve consisting of several panels of approximately 1.55 in width rivetted together. The tapered top section was fabricated and installed separately.




Elevation drawings by GOAL Engineering, annotated by DLA

# CONDITION ASSESSMENT




Sections by GOAL Engineering

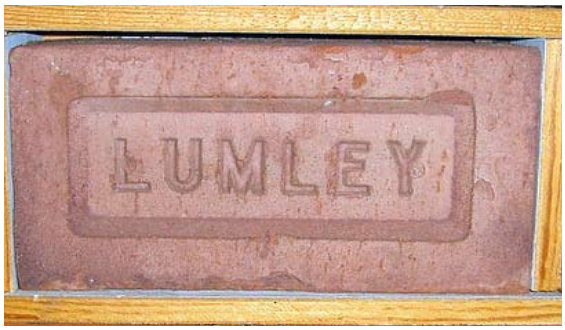
**FIRE BRICKS**

A damaged fire brick features a stamp reading "(L)UMLEY" and hints to the manufacturer. Historically, brick suppliers for construction sites in British Columbia could be local or even overseas in cases where bricks were used as ship's ballast and later recycled as building materials.

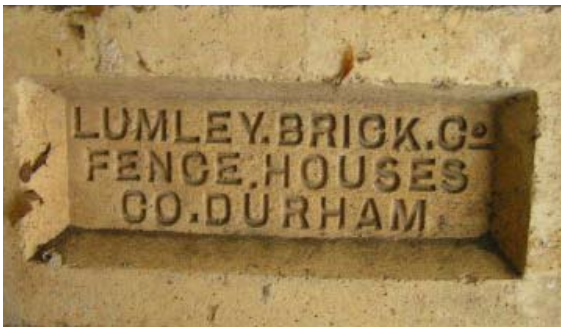
It can be assumed that some or all of the brick materials used for the kiln construction were originally from England. The Lumley Brick Works, located in Fencehouses, was part of a large industrial area known as Bournmoor Colliery northeast of Durham, which consisted of firebrick works, brick and tile works, and collieries. The mining site was opened in 1790 and closed in 1965.

(Sources: http://www.allthingsbournmoor.110mb.com, http://www.penmorfa.com/bricks/england14.html, retrieved 6 February 2012).

Lime Kiln brick with stamp "LUMLEY"




"Lumley Brick", Flickr




http://www.penmorfa.com/bricks/england14.html

## 5.3 MATERIAL ASSESSMENT

The following sections summarize the technical assessments undertaken by the project team and should be read in conjunction with each other. For more detailed information refer to Appendix C - Technical Reports.

Generally, the diagnosis of the condition of a historic masonry structure is commonly based on three components:

- Morphological characteristics
  - o Determination of the thickness of masonry structures, localization of metal parts, localization of internal interfaces/change of materials, localization of crack patterns, etc.,
- Mechanical characteristics
  - o Investigation of the state of stress, compressive strength, etc.,
- Moisture
  - o Localization of moisture content, cause of moisture damage, location and damage by biological growth, etc.

The Hart Road Lime Kiln was constructed with readily available materials, which comprise native limestone, red bricks, cementitious render, and several steel elements. Other elements such as the fire bricks were imported. During the site visit, observations were made with regards to the condition of the existing materials and are summarized below (for detailed information see Appendix C – Materials Report, Goal Engineering; Note: for the purposes of this report, “project north” has been established as the northwest elevation).

- Intact elements of the kiln are the eastern draw hole at the base, the lower section of the masonry shaft, and the arched ventilation holes on the north and south.
- The kiln is overgrown with vegetation at the base and masonry stack with damage of the limestone blocks and bricks as well as a significant crack on the interior side of the chimney.
- The west portion of the limestone base has collapsed.
- Stormwater runoff has washed out the exterior portions of the mortar of the base.
- Soil has built up around the kiln and inside the chamber.
- The brick of the internal firing chamber and the lower section of the internal brick liner received a cementituous render and is layered with lime residue.
- Corroded steel exists in four locations:
  - o external steel panels with severe rust, deteriorated connections to the brick chimney and partially detached from the stack;
  - o two sets of metal angles on the north and south side of the base with layered delamination, approximately 4.20m long each;
  - o three steel beams made of railway tracks, approximately 1.20m long each, at the east side above the lime pit draw hole; and
  - o arched metal double door and frame at draw hole, partially buried in accumulated soil.

The material assessment indicates that several components of the kiln are intact and can be preserved while other elements are damaged or deteriorated and require remediation.

Inside flue east face

Rivet spacing detail

Perforated steel shell

# CONDITION ASSESSMENT

Interior of air intake

Interior brick chamber

## 5.4 STRUCTURAL ASSESSMENT

A structural assessment of a historic site is carried out in close collaboration with the material examination and typically takes a conservative approach in response to in some instances. In the case of the Hart Road Lime Kiln, there is a lack of quantitative information and original design data to rely upon. Hence, diagnostic methods of identification of material deterioration and localized in-situ testing to understand the structural assembly, as well as future uses, have been used in determining structural conditions and deterioration of structural members, as well as informing design parameters for remediation and interventions.

The scope of this report comprises the appraisal of existing data and visual observations that could be carried out in a manner that provided the necessary information for a reliable conclusion in an expedient time frame. The preliminary visual review identified the structural integrity and capacity of the historic lime kiln, and ascertained the need for further in-depth investigations such as in-situ or off-site material testing or load testing as required.

The structural report notes that at the time of the kiln was constructed, no building codes were in place, and typical construction methods did not account for seismic load resistance, which would now be applied to new construction and the rehabilitation of heritage structures.

The visual assessment concludes that the kiln has sufficient apparent load capacity, considering that it withstood many years of weather exposure including storm, winds and snow, without collapsing. It is assumed that foundations are not extant, but undue settlement of the structure was not observed during the site visit. Nonetheless, the surviving kiln is from a structural viewpoint severely weakened, including partial collapse of the stone base, the corrosion of the metal sleeve covering the stack, and the badly deteriorated brick chimney, which has been degraded both by weathering and biological growth.


Steel track used as beam

# CONDITION ASSESSMENT

Draw hole on east side

Brick chimney

## 5.5 GEOTECHNICAL ASSESSMENT

In general, geotechnical engineering uses principles of soil and rock mechanics to investigate subsurface conditions and materials, evaluate stability of natural slopes, assess risks posed by site conditions and design erosion control and geotechnical stabilization methods. These techniques assist in the control of soil, wind and water erosion ranging from highly engineered solutions, such as capping or 'burial' of unexcavated sites, to simple techniques, such as the use of vegetation to control soil or wind erosion.

The review of the site geology of the Hart Road Lime Kiln determined that a large bedrock outcrop exists on the south and west sides of the kiln and bedrock has been excavated in the near vicinity of the kiln. The existing rocks are from the Upper Triassic age and belong to the Quatsino Formation that primarily consists of limestone with massive grey coarse-crystalline consistency. As the geotechnical report explains, a number of the limestone outcrops were quarried for lime and cement production during the late 19th and early 20th century. As aforementioned, the kiln base is built with limestone blocks presumably quarried from local excavation areas.

East elevation

North elevation

Base on south side with ventilation hole

View of kiln from southeast

Tree roots girdling chimney

## 5.6 ENVIRONMENTAL ASSESSMENT

A sensitive ecological restoration is an important process employed for the management and control of vegetation destructive to heritage structures. Severe plant overgrowth can cause significant damage to historic structures and materials above grade and extensive root systems of trees and shrubs can cause deterioration to the subsurface structure. Mature vegetation such as large trees or vines can also pose a direct risk to historic structures by shading the site and not allowing daylight to dry the materials, in addition to the potential threat of old trees falling onto historic structures.

An ecological assessment was carried out that focuses on the existing tree conditions on the subject property. The lot is densely vegetated with coniferous and deciduous trees and shrubs and the historic lime kiln is located in the rear of the property and was hardly visible from the street during the first site visit. In total, ten large trees are extant on the site including Douglas Fir, Western Red cedar, Dogwood and Maple trees. They are approximately 70 years old and generally in good health, though none are valuable trees that are worth preserving at the expense of conservation of the lime kiln, which is unique. Four trees are growing in very close vicinity to the kiln base and two additional trees are actually growing out of the structure itself. The roots of one of the trees growing out of the brick chimney have partially girdled on the outside of the stack with visible damage to the brick structure. Two tree roots near the base have moved into the limestone blocks presumably causing movement of the base. The management of the onsite vegetation will be an important aspect of the conservation of the lime kiln.

Due to the overall condition of the historic materials and compromised structural integrity, the lime kiln should only be accessible by authorized personnel. The recently installed fence and gate appear to be sufficient protective measures to prevent public access to the structure until conservation work on the kiln is completed. The following chapter outlines conservation recommendations for the preservation, restoration and rehabilitation of the Hart Road Lime Kiln.

Douglas Fir growing close to the base

Tree growing out of the base

# CONDITION ASSESSMENT

Inside flue east face at bottom

View down flue with trees

# 6.0 CONSERVATION RECOMMENDATIONS

## 6.1 OVERALL CONSERVATION STRATEGY

The historic Hart Road Lime Kiln is the only surviving kiln structure in the Town of View Royal. Very few kilns are extant today in the southern part of Vancouver Island and they are important industrial heritage sites that tell the story of the once thriving lime industry. The overall conservation strategy for the Hart Road Lime Kiln is for the safeguarding of the historic fabric, while planning for visitor access and interpretation of the historic site. The Parks Canada *Standards and Guidelines for the Conservation of Historic Places in Canada* (2010) have been used to assess the proposed conservation interventions at the Hart Road Lime Kiln.

This chapter will outline the technical conservation recommendations provided by the project team, and list overall Heritage Conservation Options for consideration by the Town of View Royal in future heritage planning for the kiln. Further ongoing maintenance is an important factor in keeping the historic structure in good repair, and Maintenance Guidelines have also been provided.

## 6.2 TECHNICAL RECOMMENDATIONS

As described above, the existing condition of the historic lime kiln ranges from poor to good and requires temporary and permanent measurements to conserve the structure. The following recommendations for structural, material, geotechnical and environmental remediation summarize preliminary considerations in conserving the historic lime kiln based on the site reviews undertaken earlier this year. These recommendations have to be read in conjunction with each other and may need to be verified by more detailed site investigations including minor destructive testing. At this stage, the technical reports provide general direction on risks and strategies from the respective engineering assessments and will be incorporated in overall heritage strategy outlined in Section **6.3 Heritage Conservation Options**.

### 6.2.1 STRUCTURAL STABILIZATION

Three conservation strategies can be envisioned from a structural perspective that would trigger different levels of intervention:

- Repair of the existing structure
  - All elements of the existing structure may be repaired to their original conditions, safely resisting snow and wind loads while overall resistance to lateral seismic loads would not meet applicable code requirements.

- Partial demolition/reconstruction and repair
  - The existing masonry chimney and steel cladding may be removed and the limestone rock base retained and repaired. A replicated steel cladding can be installed to match the original and to recreate the historic appearance from the exterior. These interventions would minimize seismic risk.
  - Reconstruction of the brick chimney would require the reconstruction of the base, with concealed steel or concrete bracing.

- Demolition and reconstruction
  - If the existing structure is completely rebuilt, a detailed review regarding the upgrading and strengthening for the stone base and brick chimney can be carried out.

### 6.2.2 MATERIAL REMEDIATION

The remediation of the existing materials is interwoven with the structural and ecological interventions. The recommendations include mandatory work for all conservation work and specific tasks for the stabilization and restoration options:

Option: Stabilization
1. Remove trees and vegetation from brick chimney.
2. Careful disassembly of ~ 3/4 of brick stack.

3. Remove steel shell from chimney exterior.
4. Remove soil and vegetation from top of rubble base to expose stone units and mortar.
5. Excavate soil from lime chamber.
6. Remove organics from draw hole.
7. Partial rebuilding and re-pointing of stack.
8. Reinforce load carrying capacity of steel members at draw hole. Replacement of structural steel members to be considered.
9. Provide fencing to keep public away from structure at a safe distance.

Option: Restoration
1. Remove trees and vegetation from brick chimney.
2. Carefully disassembly of ~ 3/4 of brick stack.
3. Remove steel shell from chimney exterior.
4. Remove soil and vegetation from top of rubble base to expose stone units and mortar.
5. Excavate soil from lime chamber.
6. Remove organics from draw hole.
7. Partial rebuilding and re-pointing of stack.
8. Partial re-instatement of steel liner.
9. Reinforce load carrying capacity of steel members at draw hole. Replacement of structural steel members to be considered.
10. Upgrade arch support of ventilation holes at sides of chimney.
11. Provide fencing to keep public away from structure at a safe distance.

**6.2.3 ECOLOGICAL RESTORATION**

In order to conserve the historic fabric of the lime kiln, at minimum seven trees need to be removed, which are growing out of the structure or are closely located near the base. Tree roots that are growing into the masonry base will likely have to be removed by hand while temporarily removing some limestone blocks. Two trees near the entrance should be removed to provide a better view of the kiln from the street. More questionable is a tree on the north side, which is probably located on the property line. If remediation is requested, this tree has to be further assessed.

If the existing brick chimney is to be retained in situ, the two trees growing out of the stack would need to be carefully removed while minimizing damage to the bricks. Removal or stabilization of the steel cladding is required for the tree removal process. The tapered top steel collar should be removed and salvaged for repair or replication. The strategy for the ecological restoration of the site needs thorough planning and execution to prevent collapse of the brick chimney.

**6.2.4 GEOTECHNICAL RECOMMENDATIONS**

The original limestone block foundation may have caused settlement in any overburden soils, however this would have ceased over the years and does not present a concern for future conservation work. Any reconstruction work, however, should not exceed the present loads on the existing base. In this case, there is only a small risk of significant additional settlement.

Future residential developments on the residential properties to the south and west may require blasting of the existing bedrock outcrop. If possible, vibrations should be designed to prevent or at least minimize damage to the historic lime kiln.

## 6.3 HERITAGE CONSERVATION OPTIONS

The overall heritage strategy of the historic lime kiln is for the preservation and restoration of the historic structure and its character-defining elements. As part of the industrial heritage of the region, special considerations may be applicable and will be incorporated in the conservation strategy,

Three Conservation Options have been developed based on the technical condition assessments and recommendations that range from low, medium, to high-impact interventions to the industrial heritage structure. It should be noted that the high impact option (Reconstruction) is not considered a conservation strategy according to the *Standards & Guidelines*.

### 6.3.1 OPTION 1: PRESERVATION

The least intrusive conservation strategy, with a high level of retention of original fabric, is the preservation of the existing structure in situ. This would comprise stabilizing the existing structure where necessary and consolidating the historic materials (stone, bricks, metal) that are at risk. Surrounding vegetation and accumulated soil should be cleared and trees and rootwork removed where necessary. The conservation work entailed in this option includes:

- Removal and salvage of exterior steel cladding of brick chimney.
- Some removal of vegetation only where absolutely necessary, leaving existing trees growing out of the brick stack.
- Removal of accumulated soil at eastern elevation and draw hole.
- Repointing of limestone base and brick chimney with mortar that matches original in composition, strength and colour.
- Installation of new steel collars to stabilize the brick chimney and possibly connect to interior support structure anchored into the ground. Additional structural and seismic interventions will not be carried out.
- Installation of a new metal cap at top of chimney to prevent water ingress; drain stormwater to the north side where it is not visible for visitors.
- Installation of a security fence.
- Minimal repairs only when necessary. A regular maintenance program will not be implemented.

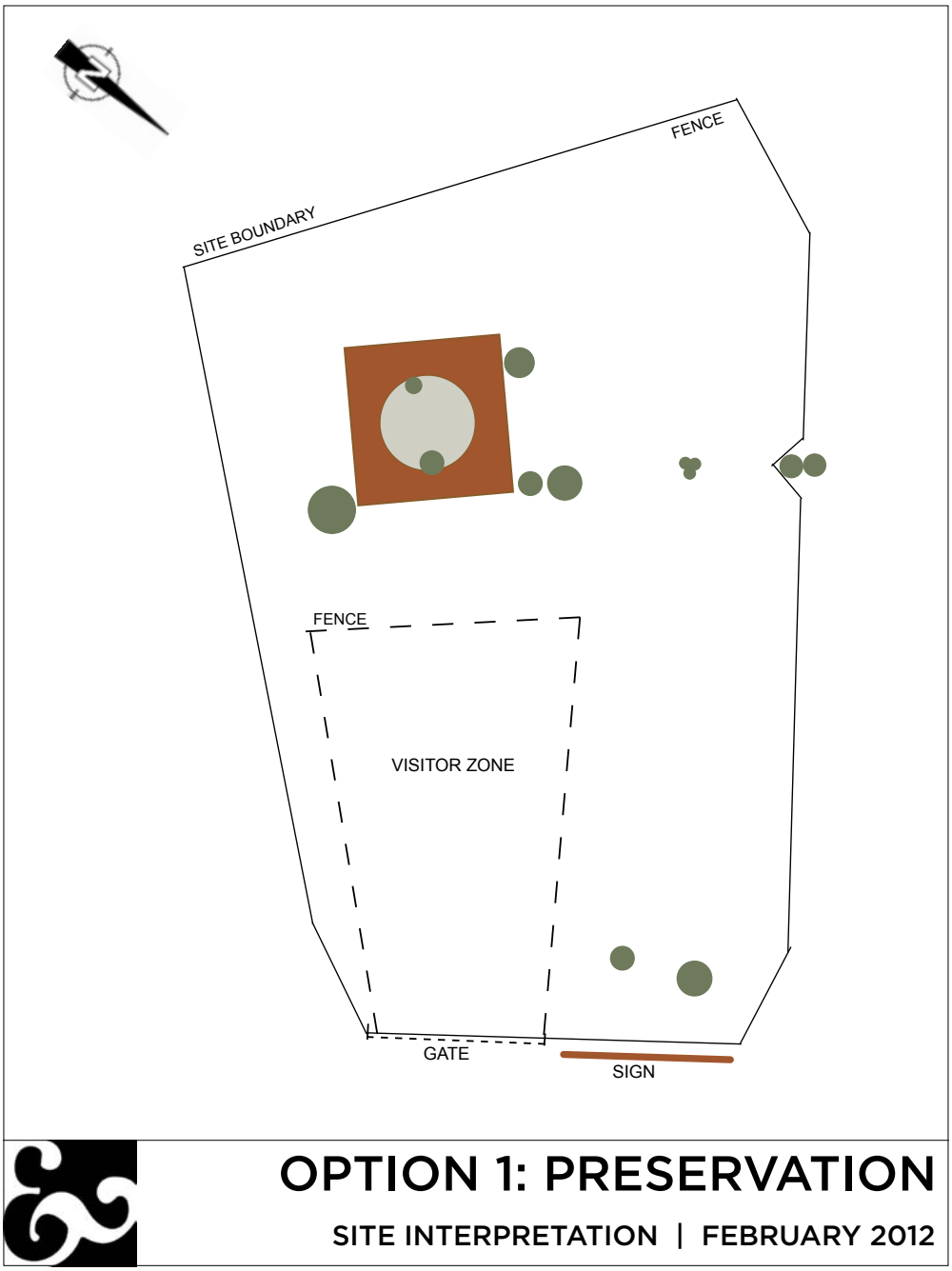
To protect the structure from accelerated physical deterioration through weathering, a protective roof may be designed for the kiln without obstructing the views. This would be a permanent installation and keep rainwater from penetrating into the structure and delete the above mentioned metal cap. This protective method would decelerate the weathering of the existing materials but not prevent the slow deterioration of the historic fabric in the long term.

Due to the compromised structural integrity, public access would be very restricted to prevent any harm to visitors by deteriorating materials accidentally falling off the kiln. Hence the historic structure would only be visible from the east side.

***Evaluation of Option 1:***

- Preserving and maintaining the lime kiln with minimal effort is the most cost effective approach but would result in the future loss of the historic structure due to slow deterioration caused by weather exposure.
- The unsafe condition and deficient structural integrity would result in limited presentation options of the structure and views of only one elevation (east) restricting the visitor experience. This would restrict the goal of raising public awareness of heritage conservation in general, and industrial heritage sites in Town of View Royal in particular.

# CONSERVATION RECOMMENDATIONS



### 6.3.2 OPTION 2: RESTORATION

Restoration of the historic lime kiln is the most reasonable level of heritage retention. This strategy would be a combined approach of retaining structurally sufficient elements and the replacement of unsound materials. This conservation strategy would allow the retention of intrinsic heritage values including the location and historic context, and some of the historic fabric, while replacing materials that are too deteriorated to be repaired. This conservation strategy would also allow adequate access to the structure by visitors that would provide a good understanding and experience of the historic site.

This strategy complies with the material guidelines (masonry, architectural and structural metal) for restoration projects outlined in the *Standards and Guidelines*. The recommended interventions for the restoration option would comprise the following conservation methods and should be reviewed by the relevant professionals. The sequence of work has to be established before conservation work commences.

Before work on the kiln commences the following documentation should be prepared for reference:

- Photographic record of the property showing all elevations and close-ups of details and interior surfaces if they can be safely accessed.
- Written description of the exterior and interior structure of the industrial heritage site.
- As-found drawings: surveyed site plan, to scale, showing the location of the resource on the property, and to the property lines, and elevations and sections to scale with dimensions.

**<u>Masonry Conservation</u>**

**General**

- Overall cleaning of the masonry walls shall only by carried out if necessary and not be done with abrasive methods that may damage the face of the brick or rock. In areas where masonry requires cleaning, use soft natural bristle brush and mild water rinse.
- Do not seal masonry walls as this will change the behaviour of the masonry and prevent the brick and rock from breathing, causing accelerated deterioration.
- Masonry conservation work should only be undertaken by skilled masons and reviewed by a Heritage Consultant.

**Base**

- Retain and repair the base with limestone blocks. Remove all trees and rootwork as outlined in the tree report. Clear all remaining vegetation and soil inside and outside the base to prevent moisture entrapment and to allow air and sun to dry the materials near the ground.
- Install structural reinforcement at the base with concealed steel or concrete bracing as per engineered drawings after the brick chimney has been partially dismantled.
- Repoint limestone base where necessary by raking out loose mortar material. Loose stone should be reset in its original location. Missing stone should be replaced to match original in colour.
- Repoint mortar joints of base with new mortar that matches existing in consistency, strength, colour and style.

# CONSERVATION RECOMMENDATIONS

**Brick Chimney**

- Remove trees at top of chimney while carefully dismantling and salvaging where necessary and reuse for reconstruction. Remove steel cladding first. Follow **Salvage Guidelines** for masonry restoration work:
- A *Salvage Plan* should be prepared prior to removal of unsound portions of the brick chimney that ensures that the least destructive method of deconstruction will be used.
- The removal of the historic bricks would need to undertaken by a Qualified Masonry Contractor. The work should be supervised by a Heritage Consultant.
- All salvaged elements to be salvaged should be carefully documented before removal, including photographs of details and measurements. Salvage intact bricks and carefully crate for storage. An inventory should be prepared that lists all salvaged elements.
- Storage should be in a safe, dry environment.
- When reinstallation occurs, the brick chimney should be carefully restored by a Qualified Restoration Contractor. The work should be supervised by a Heritage Consultant.
- If material is too deteriorated to be used or repaired, it should be replaced with in-kind material. New material should match the original in colour, size and strength.
- New mortar should match existing in colour, composition, strength, and absorption.
- Install new metal cap at the top of the chimney to prevent water ingress. Design and install cap so that it is not visible from the ground. Drainage of cap may be provided through interior of brick stack and continue below grade away from the structure, or alternatively drain on the back side of the chimney.

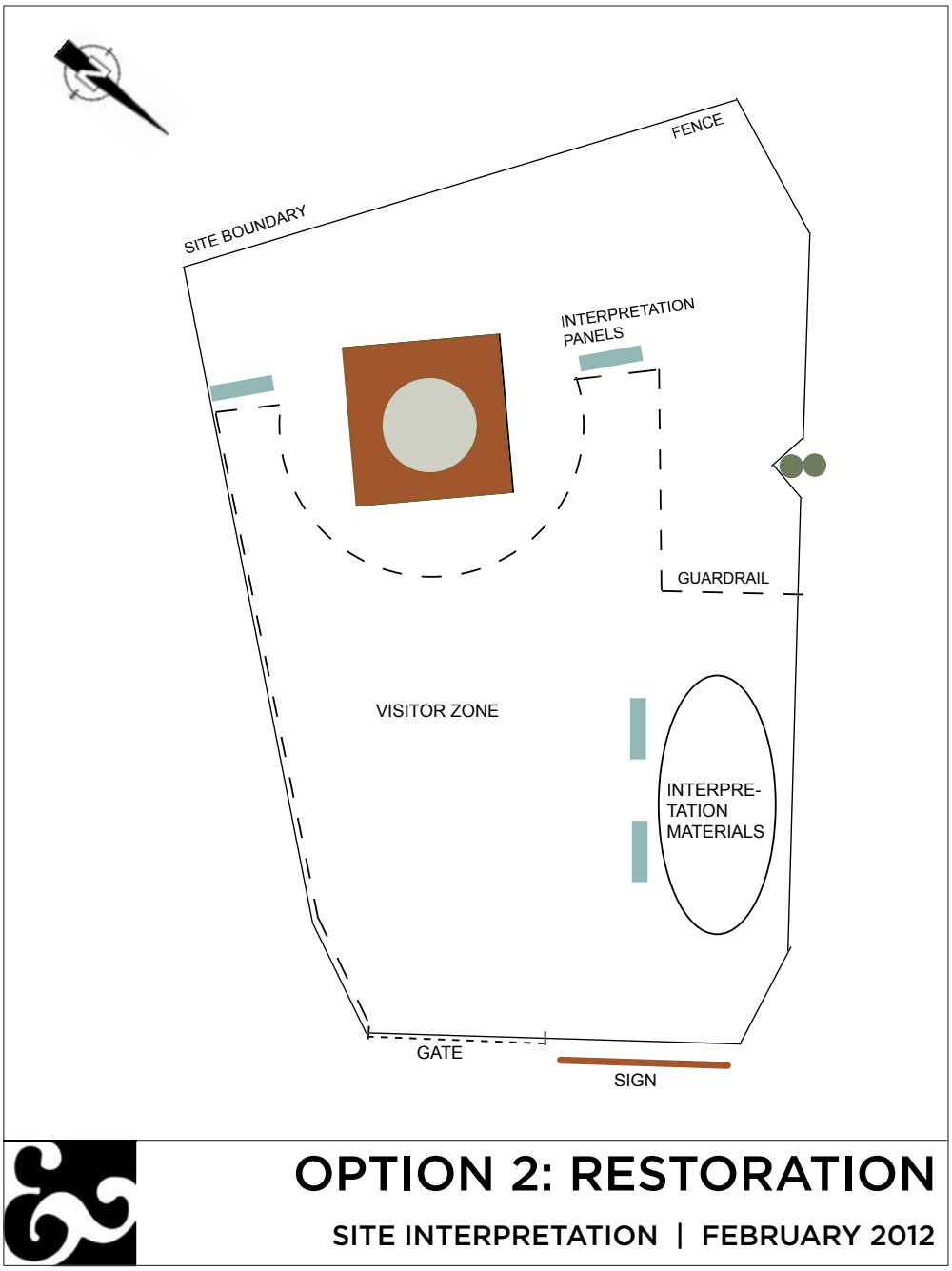
**Architectural and Structural Metals**

- The set of corroded steel angles and three beams at the base need to be removed to prevent further corrosion jacking. Replace with sufficient structural bracing (concrete or steel) as per engineered drawings.
- Retain original arched steel door at draw hole in place and refasten to surrounding base structure if necessary.
- Carefully remove all chimney steel cladding including the top sleeve. Document sizes, thickness and fastening methods.
- Store steel cladding in dry and secure place as a sample for replication and future use as interpretation material of the historic site.
- Replicate metal cladding with new metal that matches original in size and thickness. Replicate fastening method with solid rivets if possible or replace with tubular rivets that imitate the appearance with a button rivet head and straight neck.
- New metal cladding should be tied to a structural steel support system inside the chimney.
- Apply protective corrosion coating on all steel elements if necessary.

For better interpretation of the kiln assembly, portions of the metal cladding and brick chimney may be omitted to install an “interpretation window” that allows the view into the interior of the chimney.

***Evaluation of Option 2:***

- Restoration is a medium-level intervention and the preferred option as it balances safety considerations with the preservation of authentic elements.
- The finished work will require regular monitoring and a maintenance schedule.
- Visitors will be able to view the structure from three sides and experience the operational set-up of the kiln.




# OPTION 2: RESTORATION

**SITE INTERPRETATION | FEBRUARY 2012**

# CONSERVATION RECOMMENDATIONS

Trees growing out of chimney

### 6.3.3 OPTION 3: RECONSTRUCTION

The dismantling of the historic kiln and accurate reconstruction to match the historic appearance based on archival photographs and physical evidence achieves only a minimal level of heritage retention but would provide the opportunity to rebuild it to modern code requirements and seismic regulations. These considerations have to be balanced against each other.

If reconstruction is considered, the preferred strategy would be the reconstruction in its original location in order to preserve the historical context and heritage value of the lime kiln. This would particularly retain its geographical association: The close location to the limestone Quatsino Formation reflects the decisive factor for the original site selection along with the shoreline location near the historic Rosebank indicating the typical mode of transportation of lime products in those days.

If intact materials that are key heritage character-defining elements can be salvaged and reused for the reconstruction of the kiln on site, nominal retention of the heritage value can be achieved.

Prior to dismantling the entire structure and reconstruction on the subject property, the following documentation should be prepared.

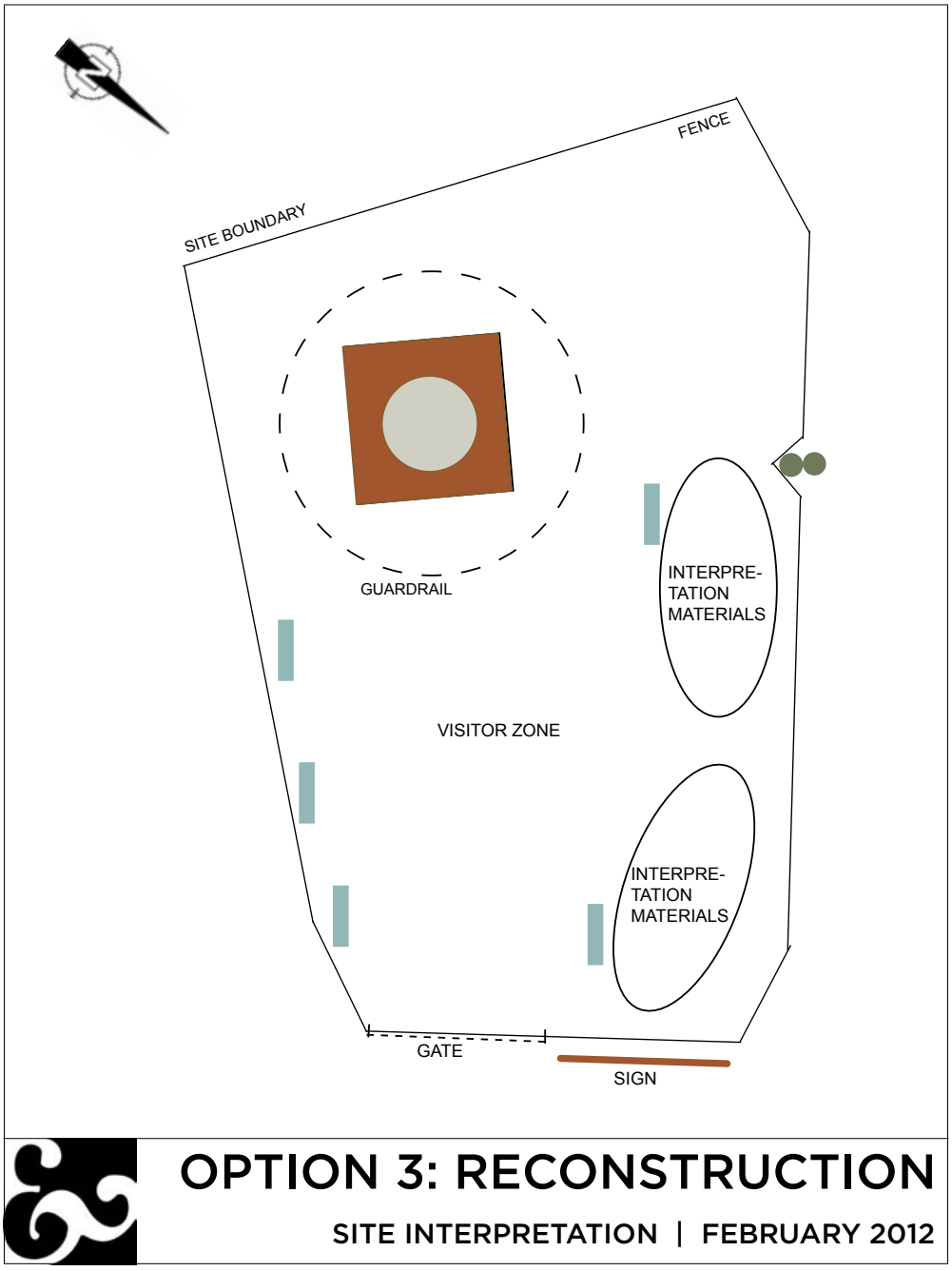
- Photographic record of the property showing all elevations and close-ups of details and interior surfaces if they can be safely accessed.
- Written description of the exterior and interior structure of the industrial heritage site.
- As-found drawings: surveyed site plan, to scale, showing the location of the resource proposed to be demolished on the property, and to the property lines, and elevations and sections to scale with dimensions.

The materials should be cleaned and sufficiently protected from weathering during storage before being utilized for reconstruction. Interpretive panels should chronicle the history of site and historical context, and explain the salvage and reconstruction process.

***Evaluation of Option 3:***

- The reconstruction of the historic structure would provide the opportunity to upgrade the kiln to meet current codes requirements with the lowest maintenance program.
- However, this plus would be outweighed by the loss of its authentic character and historic patina, which is the desirable material surface condition indicative of age for historic sites and artwork alike. Therefore the Parks Canada Standards and Guidelines do not consider reconstruction as a desirable conservation option for heritage structures.

# CONSERVATION RECOMMENDATIONS



## COMPARATIVE TABLE WITH CONSERVATION OPTIONS

| EVALUATION CRITERIA | LEVEL OF CONSERVATION | | |
|---|---|---|---|
| | **OPTION 1**<br>**Preservation**<br>**Minimal Intervention** | **OPTION 2**<br>**Restoration**<br>**Medium Intervention** | **OPTION 3**<br>**Rehabilitation**<br>**High-level Intervention** |
| **Intervention (summary)** | Retain structure as-is, stabilize only where necessary, leave trees in place, remove steel cladding, install secure fencing | Remove vegetation, retain and repair base, repair and partially rebuilt chimney, install structural support and drainage, install secure fencing | Document structure, remove and salvage materials, rebuild to match original appearance, replace materials where necessary, build to applicable codes, no fencing required |
| **Heritage Value** | Long-term loss of heritage resource due to disintegration of heritage fabric | Highest level of long-term retention of original heritage fabric | Highest level of structural integrity with salvaged and replaced materials while loosing original patina |
| **Heritage Interpretation** | Visitors at far distance due to hazardous condition of structure, view from one side only | Visitor access to three sides, much better than Option 1, but fencing still required | Close visitor access, no or close fencing, ventilation openings and draw holes secured to prevent access |
| **Costs** | | | |
| **- Capital** | Minimal repair work | Medium, presumably lower than Option 3 | Presumably higher than Option 2 |
| **- Maintenance (operational)** | No maintenance except intact fencing | Regular monitoring and repair work as necessary, intact fencing | Regular monitoring and repair work as necessary |
| **Construction Time** | Minimal | Medium (similar to Option 3) | Medium (similar to Option 2) |
| **Construction Complexity** | Minimal repair work | Medium: low at base, high at chimney (brick, new steel cladding) | Major salvage and reconstruction |
| **Recommendation** | + | +++ | ++ |

# CONSERVATION RECOMMENDATIONS

## 6.4 COST OF CONSERVATION OPTIONS

The cost of conservation options should ideally present an optimum balance between capital and maintenance (operational costs). The following table summarizes potential capital costs for each option. These are order of magnitude costs only, based on current unit costs, and would require further study to provide a higher degree of accuracy. This does, however, provide a range of costs for comparative purposes.

| ACTIVITY | COST OF CONSERVATION OPTIONS (ESTIMATED) | | |
|---|---|---|---|
| | **OPTION 1 Preservation Minimal Intervention** | **OPTION 2 Restoration Medium Intervention** | **OPTION 3 Rehabilitation High-level Intervention** |
| Removal of vegetation | $3,000 (minimal site clearing) | $8,000 (partial site clearing) | $10,000 (complete site clearing) |
| Dismantling and salvage: | | | |
| - steel cladding | $4,000 | $4,000 | $4,000 |
| - brick chimney | n/a | $20,000 | $30,000 |
| - limestone base | n/a | n/a | $25,000 |
| Repair masonry | $15,000 | $25,000 | $40,000 |
| Structural/seismic work | n/a | $15,000 | $50,000 |
| Cap & Drainage | $5,000 | $10,000 | $15,000 |
| Reconstruction | | | |
| - brick chimney | n/a | $10,000 | $20,000 |
| - limestone base | n/a | n/a | $15,000 |
| - steel cladding | n/a | $8,000 | $8,000 |
| Landscaping & Fencing | $5,000 | $20,000 | $25,000 |
| Interpretation (signs, website) | $10,000 | $20,000 | $30,000 |
| ***SUBTOTAL*** | ***$42,000*** | ***$140,000*** | ***$272,000*** |
| Contigency 15% | $6,000 | $21,000 | $41,000 |
| Soft Costs | $10,000 | $15,000 | $50,000 |
| **TOTAL** | **$58,000** | **$176,000** | **$363,000** |

**General Notes and Exclusion on Costing**

- The existence of hazardous materials has not yet been assessed. The cost of their removal is currently unknown.
- Reconstruction on the existing site is assumed for Option 3.
- Method of Construction Management unknown; Town may wish to retain a General Contractor or Construction Manger.
- Does not include permit costs, offsite storage if required or any site servicing requirements (e.g. power for lighting).

## 6.5 Maintenance Recommendations

A maintenance schedule should be formulated for the preservation of the historic fabric of the Lime Kiln that adheres to the *Standards and Guidelines for the Conservation of Historic Places in Canada* (2010). Routine maintenance aids in protecting all parts of the structure against accelerated deterioration. Regular inspections of the site assist in maintaining and preserving the historic fabric:

- Is the lot well drained?
- Do trees need pruning - are there dangerous dead limbs?
- Do plants hold water against the structure?
- Do trees overhang or touch the structure – rubbing damage?
- Can shrub and tree roots damage the structure?
- Are there creepers or vines on the structure – causing damage?
- Is organic debris, e.g. broken branches and soil, removed on a regular basis?
- Is the protective coating peeling?
- Is the site and pathway clean and free from litter?
- Are the protective fences in good repair?

**Cleaning**

Following the *Standards and Guidelines for the Conservation of Historic Places in Canada*, be mindful of the principle that recommends 'using the gentlest means possible'. Any cleaning procedures should be undertaken only when required, and should be undertaken with non-destructive methods using a soft, natural bristle brush, without water, to remove dirt and other material. If a more intense cleaning is required, this can be accomplished with warm water, mild detergent (such as Simple Green©) and a soft bristle brush. High-pressure washing, sandblasting or other abrasive methods should not be allowed.

Ongoing Repairs and Replacement of Deteriorated Materials
Interventions such as repairs and replacements must conform to the Standards and Guidelines for the Conservation of Historic Places in Canada. The kiln's character-defining elements – characteristics of the structure which contribute to its heritage value such as materials and form – must be conserved, referencing the following principals to guide interventions:

- An approach of minimal intervention must be adopted - where repairs and replacements are carried out as part of the maintenance program - it is by the least intrusive and most gentle means possible.
- Repair rather than replace character defining elements.
- Repair character defining elements using recognized conservation methods.
- Replace 'in kind' extensively deteriorated or missing parts of character defining elements.
- Make interventions physically and visually compatible with the historic place.

Additional recommendations for the maintenance of the site from a visitor management perspective are listed in Section **7.1 Site Access and Protection**.

# CONSERVATION RECOMMENDATIONS

View from southeast

# 7.0 SITE INTERPRETATION

## 7.1 SITE ACCESS AND PROTECTION

### 7.1.1 PUBLIC SITE ACCESS

Presently the heritage site is fenced and gated and public access is not permitted due to the partial dilapidated condition of the lime kiln. Once the structure and materials have been sufficiently stabilized and repaired, future site access can be provided from Hart Road, a recently widened residential street with sidewalks connecting the south portion of Wilfert with the Island Highway, classified as a *Major Road in the Transportation Master Plan* (2008). Visitors can reach the site with various modes of transportation including private cars and public transport. The Island Highway and Hart Road are not equipped with bike lanes and the historic site is not connected to existing bike routes. It can be anticipated that the number of daily visitors are in the smaller range and will not frequent the site for long hours. Therefore visitor parking on the residential Hart Road would be feasible and practical.

The subject property can be divided into a designated publicly accessible zone and a secured area. The public zone is an area surrounding the historic structure to which the public has access from the street. The secured area is established for the protection of the historic structure and visitors alike. This can be achieved with a guardrail or fence that ties into the perimeter fence to prevent trespassing onto neighbouring properties. The fence shall be equipped with a lockable gate and accessible only by authorized personnel. The fence design should respect the historic character of the site and maintain good visibility while being built of durable materials and respond to safety considerations. (For additional information refer to *Guidelines for Fences, Gates and Shutters*, City of Victoria, 2010). It may be possible to reuse the existing chain link fence rail.

### 7.1.2 SITE LANDSCAPING AND FURNITURE

A pedestrian pathway design leading from the existing sidewalk to the public zone shall negotiate the local terrain and accessible for disabled. The walkway can be build with natural limestone paving blocks or hot mix asphalt containing hydrated lime to commemorate the historic use of the lime kiln. Or the walkway surface can be finished with recycled permeable wood chips from shredded trees that were removed from the site. These strategies should be presented on panels for visitor information.

# SITE INTERPRETATION

A furnishing zone may be incorporated in the design to accommodate interpretation panels, a seating area (benches), etc. The following criteria should guide the design of site furniture:

- Durable material (e.g. solid hardwood)
- Sturdy design
- Anchored in place
- Low maintenance

The furniture should be well designed and enhance the experience of the visitors and appreciation of the historic site.

Above and below: Examples of limestone pavings

A good example of presenting a historic smokestack is the Pioneer Mill on Maui. It was constructed in 1928 as part of the Pioneer Mill Sugar Co., which closed in 1999.

Aerial photo of the 1928 Pioneer Mill Sugar Co. (www.historichawaii.org)

# SITE INTERPRETATION


As part of the interpretation historic materials used for the lime kiln production can be displayed on the site, such as limestone blocks.

### 7.1.3 SITE SAFETY AND PROTECTION

An integrated visitor management system considers the potential disturbance of the heritage site (incl. graffiti, vandalism) and site pollution (e.g. litter). Visitor management strategies to prevent degradation of the historic site should be implemented and monitored. Means of site protection may range from regular drive-buys by Town staff, limited site access during daytime via gated fence, and remote site surveillance via WebCam allowing online reactive monitoring. Illumination of the site is not required due to the daytime access only. Regular cleaning and upkeep of the immediate surroundings assist in attracting desirable visitor behaviour.

Minimizing impacts on the historic structures can also be supported by Visitor Guidelines:

- Respect all signage and fences; never climb, sit, or stand on the historic structure;
- Never remove anything from the heritage site.
- Don't leave anything on the site — carry all your belongings and trash away;
- Report vandalism at the site — [Town to provide contact information].

**Special Consideration: Geocaching**

In recent year the abandoned structure has been a popular location used by geocaching enthusiasts, in which participants use GPS or mobile devices to hide and seek containers (caches). Developed in 2000, geocaching grew to a popular outdoor leisure activity with over 1.5 million active participants worldwide and it can be presumed that this activity will continue after the Heritage Conservation Plan has been implemented. It is therefore advisable to proactively manage this activity at the subject site.

In 2007, Parks Canada published the *Visitor Activity Guidelines for Geocaching*, an activity that is generally embraced at cultural and natural heritage sites, but not permitted in all locations. Parks Canada recommends that where the activity is allowed, additional guidelines should be developed to meet site-specific needs. The following **Visitor Activity Guidelines for Geocaching** may be applied for the Lime Kiln site:

- Travel on pathway or in publicly accessible areas. All caches must be accessible from the trail or the public area. Searches are only allowed during daytime.
- Trade (in particular food) items are not permitted in caches. Instead, a message or story about the cache's specific location or about the historic site in general should be included. These messages will encourage a focus on the special cultural features of the cache location.
- Caches are to be placed so that they do not disturb cultural and natural resources. Hiding inside the structure is not permitted. Cache containers should be watertight, weather-resistant, and as small as possible.
- Geocachers are required to meet with Town of View Royal staff at the selected historic site to discuss the proposed location of their cache and to obtain an authorization seal prior to placing a cache.

## 7.2 SITE INTERPRETATION

### 7.2.1 GUIDELINES FOR GENERAL INTERPRETATION

Heritage interpretation involves communicating a site's history and significance, through various means, to visitors to the place. Heritage interpretation can be as simple as visitor signs explaining the history of the site, or as complex as landscape design to aid understanding of a site's layout, together with audio guides that visitor's listen to. With today's technology, heritage interpretation can also be provided via the internet for the 'remote' visitor (the cyberspace visitor).

# SITE INTERPRETATION

The reason why interpretation is required is that most people need extra information to understand heritage significance, and interpretation is a means of providing it. The significance of some heritage items is easy to understand, however, the significance of others is not obvious and it is these latter sites in particular which require heritage interpretation so that visitors can understand and enjoy the heritage site.

To be "interpretive," the communication process should be based on Freeman Tilden's (*Interpreting our Heritage*, 1957) **Interpretive Principles**. These principles state that interpretation must:

- *Catch* the attention or arouse the curiosity of the audience.
- *Relate* the message to the everyday life of the audience.
- *Reveal* the essence of the subject through a unique viewpoint.
- *Address the whole* by showing logical significance of an object to a higher-level concept or story line.
- *Strive for message* unity by use of a sufficient but varied repetition of cues to create and accentuate a particular mood, theme, aura, or atmosphere.

Interpretive signs to be used on site will:

- Use a combination of well-written text and professional graphics to convey a message.
- Increase visitor enjoyment through the appreciation and understanding of features, concepts, themes, and stories of the natural, cultural, created, managed, and historic environments.
- Explain the management of the Hart Road Lime Kiln as an industrial heritage site.
- Guide or modify visitor behavior to reduce visitor impacts to the heritage resource.

Heritage Interpretation is based on a thorough understanding of the site's history, values and role. This understanding forms the basis for any interpretation of a site. Understanding a site requires knowledge of:

- The physical site (its heritage fabric) and the relationship between the elements of the site;
- The site's use and how this has changed through time;
- The setting, landscape and views of the site;
- Associations of people (past and present) with the place;
- The meanings and values of the site to people; and
- Important related places and related objects.

Heritage interpretation can be undertaken in many forms. Importantly, heritage interpretation should not compromise either the value of the site, its elements or its setting. For example, introduced material (such as signs or landscape designs) should not interfere with, change the item, its context or put the item at risk.

An additional consideration for site interpretation is financial viability. Interpretation concepts should aim to be as financially viable as possible and should recognise the restricted budget that the Town operates within. Following this, interpretation should be prioritised with regards to the means of interpretation including the capital and operational costs.

### 7.2.2 HERITAGE INTERPRETATION OF THE LIME KILN

There is currently almost no heritage interpretation of the lime kiln itself. Interpretation to date has solely relied on the retention of the historic structure. Interpretive signs and information on site or off site are not available.

Due to the size of the structure and considering the operational costs of ongoing maintenance and upgrade of interpretation materials, the most viable strategy for this specific site is passive interpretation. This can be achieved by two target groups:

**A) On-Site Users**

Generally it is anticipated that visitation of the lime kiln will be low due to its unusual location. Hence, ad hoc users who will drive by during a weekend road trip will probably visit

Steel sleeve of lime kiln


Example of steel welcoming sign

the site for a limited time and an overflow of visitors is not expected. For this target group, passive interpretation can include the following elements:

- A welcome sign with name of the site, openings hours, contact, visitor guidelines;
- Interpretative signs describing the overall heritage significance of the site, history of the site, main operational elements of the structure;
- Landscape planning containing site related items such as limestone blocks and other features.

**B) Remote Users**

As well as providing on-site interpretation for visitors and users, remote (i.e. web based) interpretation is becoming more vital for heritage sites. Remote interpretation potentially allows more information about the site to be publicly available at a much lesser cost than on- site interpretation. It is also an ever increasing promotional tool in today's technological world; the ability to be 'found' or 'visible' on the internet is essential to increase public awareness and tempt people to visit a site.

A dedicated website to the site would allow for interpretation to those unable to physically visit the site and to those who wish for more information than is available on-site. The website could include detailed information on the lime kiln's history, development and significance, including copies of archival records, plans, photographs, heritage studies/reports etc. The website should also include practical visitor-information such as location, opening hours, on-site interpretation, etc.

# SITE INTERPRETATION

Archival photo of the Hart-Road-Lime Kiln, photographer Robert Duffus, 1977

# 8.0 PHASED IMPLEMENTATION PLAN

For the conservation of the historic Lime Kiln, Option no. 2: Restoration was the conservation strategy approved by City Council on May 8, 2012. The proposed **Phased Implementation Plan** outlined below is based on this option. This will serve as a tool to commence the preferred conservation strategy for the historic Lime Kiln. It will provide a foundation for sequencing the required conservation in short, medium, and long-term phases as funding becomes available.

## 8.1 PHASE 1: SHORT-TERM INTERVENTIONS

The goal of the first phase is to stabilize (preserve) the existing condition of the historic lime kiln and to provide a safer work environment for further assessments. The work would commence with immediate site work to provide better access to the historic kiln and to remove potentially hazardous materials and impediments. Once the site is cleared, further investigations by a consultant team can be carried out. This may include additional structural and arborist assessments under the leadership of a heritage consultant in order to explore intervention strategies in Phase 2.

We foresee the following scope of work for Phase 1:

- Halt the on-going deterioration of the historic fabric through partial site clearing.
- Remove and store the corroded sheet metal sleeve for possible reuse as a template for reconstruction and also as base material for a welcoming sign.
- Remove all other loose materials, document their original location, label, document and inventory each item, and store in dry location provided by municipality for possible future reinstatement.
- Remove organic debris on the site and excavate accumulated dirt inside and outside the kiln (particularly the overburden on the rear side).
- Photographically document the elevations of the kiln with close-ups of details and interior surface if they can be safely accessed.
- Prepare a written description of the exterior and interior structure.
- Prepare as-found drawings including surveyed site plan (to scale).
- Visually investigate the existing tree roots and use localized destructive testing to determine the best approach for root and tree removal while minimizing the damage to the historic fabric.
- Prepare arborist report, engineered drawings for reinforcement, conservation specifications, and salvage plan for chimney removal in Phase 2.
- Identify and remove those trees, including stumps and roots that can be safely taken away without disrupting the fabric of the lime kiln.

The costs of the above-listed scope of work will be in the range of approximately $25,000.

## 8.2 PHASE 2: MEDIUM-TERM INTERVENTIONS

During the second phase retaining structurally competent elements and replacing unsound materials will carry out the actual restoration work of the historic lime kiln. The scope of work follows a suggested sequence of steps to salvage, replace, reinforce and restore the physical fabric. The restoration work should be carried out by skilled masons and reviewed by a heritage consultant. All work shall follow the *Standards and Guidelines* and conservation recommendations listed in **6.3.2. Option 2: Restoration** of the Conservation Plan. The following work may be scheduled consecutively or concurrently as needed:

**Preparatory work**

- Carefully remove, salvage and store all remaining steel elements. Document sizes, thickness and fastening methods, including steel cladding. Store in dry and secure place as a sample for replication and future use as interpretation material of the historic site.
- Clear remaining trees, stumps and rootwork as per arborists report and dismantle chimney, salvage intact bricks, crate for storage on site for restoration work, protect salvaged bricks from weathering, create inventory with salvaged elements.
- Salvage and store mortar samples to provide information on consistency and colour for future reinstatement of brick chimney.

**Base**
- Install structural reinforcement at the base with concealed steel or concrete bracing as per engineer's drawings.
- Rake out loose mortar material at base.
- Reset loose stone in original location.
- Replace missing or damaged stone with new stone to match type, size and colour
- Repoint mortar joints of base with new mortar that matches existing in consistency, strength, colour and style.
- Replace corroded steel lintels above openings with new lintels.

**Brick Chimney**
- Rebuild chimney with salvaged bricks to match historic appearance of exterior while building reinforced interior shaft as per engineer's drawings
- If salvaged bricks are too deteriorated to be used, replace with in-kind material to match the original in colour, size and strength.
- New mortar should match existing in colour, composition, strength, and absorption.
- Design and install new metal cap at the top of the chimney to prevent water ingress and so that it is not visible from the ground. Drainage of cap may be provided through interior of brick stack and continue below grade away from the structure, or alternatively drain on the backside of the chimney.

**Architectural and Structural Metals**
- Remove set of set of corroded steel angles and three beams at the base and replace with new structural bracing (concrete or steel) as per engineer's drawings.
- Retain original arched steel door at draw hole in place and refasten to surrounding base structure if necessary. Temporary removal, repair and reinstatement if necessary.
- Replicate metal cladding with new metal that matches original in size and thickness. Replicate fastening method with solid rivets if possible or replace with tubular rivets that imitate the appearance with a button rivet head and straight neck.
- Tie new metal cladding to a structural steel support system inside the chimney.
- Apply protective corrosion coating on steel elements if necessary.
- For interpretative purposes, omit portions of the new metal cladding and reconstruction of brick chimney to install an "interpretive window" that allows the view into the interior of the chimney. Refer to engineer's drawings.

In order to preserve the restored lime kiln, a **Maintenance and Security Plan** should be created and implemented.

## 8.3 PHASE 3: LONG-TERM INTERVENTIONS

The final phase comprises the interpretation of the historic site and will involve the design of on-site and off-site informative materials and documents in collaboration with a heritage consultant.

On-site work consists of the interpretation of the historic lime kiln and site infrastructure for visitors. This includes the following elements:
- Safe access to the site including a lockable gate
- The installation of a guardrail to separate the visitor zone from the interpretive zone
- The design, sourcing, manufacturing and installation of
  - A welcoming sign possibly made of the salvaged metal sleeve of the historic chimney and encased in a protective clear cover
  - Interpretive panels and materials in the visitor zone including Visitor Guidelines
- Landscaping with pedestrian pathway and vegetation, and installation of benches and other furniture as desired
- Install remote monitoring system if possible

The second category involves off-site work including:
- Design and maintain interpretative website for the Hart Road Lime Kiln (can be accessed by QR code on-site)
- Revise Maintenance and Security Plan scheduling regular repair checks of furniture, signs, panels, etc.

# APPENDIX A - Research Summary

**HISTORIC TITLE SEARCH:**

**Original**: Crown

**1909**: Thomas Atkins from Crown, May 26, 1909

**1934**: Sarah Atkins

**1965**: Charles Edward Atkins and Effie Lloyd

**1969**: Effie Lloyd

**1987**: Elizabeth Durham

**1992**: Darvin Miller

**1997**: Clinton Darvin Miller

**PUBLICATIONS:**

*2009 Annual Report*, Town of View Royal.

*Building the West: The Early Architects of British Columbia*. Luxton, Donald (Ed.). Vancouver: Talonbooks. 2007.

*Guidelines for Fences, Gates and Shutters*, City of Victoria, 2010

*Interpreting our Heritage*, Freeman Tilden, 1957

*Visitor Activity Guidelines for Geocaching*, Parks Canada, 2007 http://www.pc.gc.ca/docs/pc/guide/geocache

# APPENDIX B - General Guidelines for the Maintenance and Conservation of Industrial Heritage

The *International Committee for the Conservation of the Industrial Heritage* (TICCIH), 17 July, 2003

1. Conservation of the industrial heritage depends on preserving functional integrity, and interventions to an industrial site should therefore aim to maintain this as far as possible. The value and authenticity of an industrial site may be greatly reduced if machinery or components are removed, or if subsidiary elements which form part of a whole site are destroyed.

2. The conservation of industrial sites requires a thorough knowledge of the purpose or purposes to which they were put, and of the various industrial processes which may have taken place there. These may have changed over time, but all former uses should be examined and assessed.

3. Preservation in situ should always be given priority consideration. Dismantling and relocating a building or structure are only acceptable when the destruction of the site is required by overwhelming economic or social needs.

4. The adaptation of an industrial site to a new use to ensure its conservation is usually acceptable except in the case of sites of especial historical significance. New uses should respect the significant material and maintain original patterns of circulation and activity, and should be compatible as much as possible with the original or principal use. An area that interprets the former use is recommended.

5. Interventions should be reversible and have a minimal impact. Any unavoidable changes should be documented and significant elements that are removed should be recorded and stored safely. Many industrial processes confer a patina that is integral to the integrity and interest of the site.

6. Reconstruction, or returning to a previous known state, should be considered an exceptional intervention and one, which is only appropriate if it benefits the integrity of the whole site, or in the case of the destruction of a major site by violence.

7. The human skills involved in many old or obsolete industrial processes are a critically important resource whose loss may be irreplaceable. They need to be carefully recorded and transmitted to younger generations.

8. Preservation of documentary records, company archives, building plans, as well as sample specimens of industrial products should be encouraged.

# APPENDIX C - Technical Reports

**Structural Review, RJC, January 2012**

**Material Assessment, GOAL Engineering, February 2012**

**Geotechnical Assessment, Thurber Engineering Ltd., January 2012**

**Tree Issues, Dunster & Associates Ltd, February 2012**

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www.rjc.ca

January 31, 2012

Donald Luxton
**Donald Luxton & Associates Inc.**
1030 - 470 Granville Street
Vancouver, BC V6C 1V5

Dear Don:

**RE: Hart Road Lime Kiln**
**Heritage Conservation Plan - Structural Review** **RJC No.: VIC.105789.P001**

As requested, we have performed a Structural Condition Assessment and review of the Structural Integrity of the Hart Road Lime Kiln in View Royal, BC. Our review is based on our observations and measurements on January 12, 2012 and the Terms of Reference supplied by the Town of View Royal.

## 1.0 STRUCTURE DESCRIPTION

This heritage structure was constructed in the late 1800s and was likely in use until the 1930s. The kiln consists of a rubble stone foundation and fire chamber, with steel lintels over the openings, and a clay masonry chimney with sheet-steel cladding. There is a significant grade change over the site, and soil height slopes approximately 1.2m down from the back of the rubble base to the front. There is no evidence of structural foundations, and the rubble base likely bears on native soil or bedrock.


Lime Kiln

## 2.0 STRUCTURAL CONDITION

The structure is in poor repair. The steel chimney cladding has rusted and is falling away from the masonry. The masonry chimney is deteriorating badly due to moisture and weather, and a large tree is growing out of its top, with the roots further damaging the masonry. Portions of the rubble base have collapsed, and the steel lintels are significantly rusted and deteriorated.

## 3.0 STRUCTURAL INTEGRITY AND CAPACITY

There were no Building Codes in place at the time this structure was built, and construction methods did not account for seismic load resistance. Given that the kiln has survived many winters and wind storms, the structural capacity of the kiln appears to have been sufficient to resist loads due to use, snow and wind over its lifetime. However, the significant deterioration observed has taken its toll on the kiln and the structure has been severely weakened. Portions of the stone base have collapsed, the steel chimney sleeve is rusted and falling away, and the masonry chimney itself is badly deteriorated and in danger of imminent collapse.

Foundations are not visible and therefore have not been evaluated. There does not appear to be evidence of undue settlement of the overall structure. Given the isolation and nature of the structure some future

settlement of the structure may be tolerable. If not, a Geotechnical Investigation could be undertaken to determine the bearing capacity of the existing foundations and subgrade.

Should all the portions of the structure be repaired back to their original condition, the structure would be sufficient to safely resist loads due to snow and wind, however the overall resistance to lateral seismic loads would be less than required by the current British Columbia Building Code (BCBC 2006). New construction of unreinforced masonry (URM) is not permitted by the current Code, however existing URM buildings may be reviewed and upgraded in accordance with the "Special Procedure for Evaluation of Unreinforced-Masonry Bearing-Wall Buildings" included in the National Research Council of Canada "Guidelines for Seismic Evaluation of Existing Buildings" (NRC Guidelines). The NRC Guidelines are specific to "standard" buildings and may not apply to this structure. If a complete re-build of the structure is considered, a detailed review could be performed, and an upgrading and strengthening program developed for the stone base and masonry chimney.

## 4.0 RECOMMENDATIONS

Structurally, the most favourable solution would be to demolish the masonry chimney, repair the stone base, and install a new steel chimney tube to match the existing steel sleeve. Existing steel lintels in the stone base should be evaluated and replaced or repaired as required. This would preserve the original appearance and greatly reduce the seismic risk and the possibility of additional settlement stone base. If a reconstructed masonry chimney is required, the chimney and base could be re-built and reinforced with concealed steel or concrete bracing.

We trust this meets your requirements at this time. Please let us know if you have any questions or comments, and we would be happy to schedule a meeting to review this report.

Yours truly,

**Read Jones Christoffersen Ltd.**

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
L. D. PLETT
# 33536
JAN 31/12

Leon Plett, P.Eng., LEED AP
Project Engineer

**Reviewed By:**

PROVINCE OF BRITISH COLUMBIA
B. L. JOHNSON
PROFESSIONAL ENGINEER
# 16344
DESIGNATED STRUCTURAL ENGINEER
JAN 31/12

Bruce Johnson, MIStructE., P.Eng., Struct.Eng.
Managing Principal

LP/rb

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GOAL ENGINEERING

Consulting Engineers
966 Eagle Rock Terrace
Victoria, B.C. V8X 3H9
Tel: (250) 744-3992 Fax: (250) 744-3983

February 3, 2012
Project No. 11-057

**Donald Luxton & Associates Ltd.**
1030-470 Granville Street
Vancouver, BC
V6C 1V5

**Attn:** Donald Luxton, MAIBC

**Re:** View Royal Lime Kiln

## PROJECT DESCRIPTION

The town of View Royal issued a request for proposals for a heritage conservation plan for the Hart Road Lime Kiln. The successful project team lead by Donald Luxton and Associates met on site on January 12, 2012 to discuss the work and to develop preliminary ideas relating to the preservation of the Lime Kiln structure.

This report provides a summary of the condition of the structure.

Photo 1 – Lime Kiln, 2 – North Face at Draw-hole

## OBSERVATIONS

The View Royal Lime Kiln is at present overgrown with vegetation. Several mature trees have grown out of the masonry base as well as the brick chimney stack. The west portion of the masonry base has collapsed and the external steel liner of the chimney has been severely corroded. The internal firing chamber is intact as well as the lower section of the internal brick liner. The following sections outline the condition of components of the Lime Kiln.

A drawing has been created showing the approximate dimensions of the Lime Kiln elements. A project north has been selected for the northeast elevation as shown on the appended drawing. The cardinal directions referred to in this document are based on the project north direction.

**RUBBLE MASONRY BASE**

The rubble masonry base is in varied conditions on the structure. The exterior portion of the base has collapsed on the east and west elevations as shown in the photographs. The kiln base was constructed with a mortar between masonry units as shown in photograph 7. The majority of the joints between the units is void of mortar on the exterior. Extensive vegetation growth, root wedging and water runoff has likely washed out the exterior portions of the mortar of the base.


Photo 3 – North Elevation of Base,

4- East Elevation of Base

The internal fire chamber structure which includes the arched vent / access holes on the west and east elevation have remained intact.


Photo 5 – South Elevation of Base,

6 – West Elevation of Base

Two sets of metal angles were located on the north and south elevations of the base. These are showing extensive corrosion which has resulted in layered delamination of the steel angle (see photo 8).

Photo 7 – Rubble Base with mortar,

8 – Corroding Metal Angle.

**CHIMNEY INTERNAL REFRACTORY LINER**

The brick chimney stack width has been approximated to be 0.45 meters by measuring the masonry base and the offsets of the chimney from the sides of the base. An internal diameter of 1.34 m has been measured at the base of the chimney shaft.

A cementitious render was noted on the internal surface of the brick chimney stack and lime chamber. This would have acted to protect the bricks from heat and the aggressive nature of the byproducts of the lime production process.
One large crack is evident through the north face of the stack. This was initiated by the tree growing from the top of the stack at this section.

Root wedging in the masonry is present on approximately the upper third of the chimney. This has made the upper section unstable and precautions will need to be taken when removing the trees from the top of the stack. The exposed brick on the exterior face of the stack is loose due to the deterioration of the mortar.



Photo 9 – Internal refractory liner. 10 – Top of Stack (courtesy of Dunster & Associates)

**CHIMNEY EXTERNAL STEEL SHELL & BRICK STACK**

The external steel liner on the outer face of the brick has rusted through in places as shown in photograph 11. Entire panels are missing and have fallen from the structure.
The curved steel panels are approximately 1.55 m in width and a 3.15 m in height and are connected by rivets that are approximately 19 mm (3/4 inch) in diameter and spaced at approximately 75 mm (3 inches) on center.

It is not known how the external steel shell was previously fastened to the brick or if a connection previously existed.

The tapered top section has become separated from the original steel cylinder and slumped down onto the vertical steel panels.

Extensive mortar erosion of the exposed brick face has occurred. The mortar has lost cohesiveness. The brick units are also showing degradation. Several units crumbled upon handling. The coursing of the stack is in a random pattern with tie bricks into the stack at irregular intervals.

Two mature trees have been found to be growing from the top of the brick chimney. The roots are evident on the exterior of the brick stack. It is not known how deep into the masonry the roots have grown. This has initiated a crack through the brick stack on the north section of the chimney.



Photo 11 – Exterior of Chimney showing masonry stack and steel liner, 12 – Close up of Brick.

**LIME CHAMBER**

The brick walls of the lime chamber appear to be intact. The chamber is accessible by the ventilation holes on the west and south elevations. The chamber is located at the base of the chimney.

Soil has built up at the base of the chamber and has blocked the access to the grating that is presumed to have originally been present at the base of the chamber which connects the chamber to the draw hole.


Photo 13 – Chamber.

**VENTILATION HOLES**

The east and west portions of the structure have partially collapsed above the arched brick section of the ventilation holes. The access/ventilation holes measure 500 mm (20 inches) in width and are 815 mm (32 inches) in depth. No cracking has been observed in the brick arch and walls of the tunnel section.

Photo 14 – West Ventilation Hole, 15 – West hole looking to East, 16- East Ventilation Hole.

**DRAW HOLE**

The draw hole on the north elevation of the structure is filled with debris. It is presumed that the soil fill inside the chamber extends through the original grating and into the draw-hole space. The steel I beams that support the brick and rubble masonry structure around the draw-hole are corroded. The load carrying capacity of these members has been affected. Complete section loss in the web of the lowest I beam has been observed.

Remedial work on the structure should consider replacing or upgrading the I beams in order to avoid collapse of the masonry around the draw hole.


Photo 17 – Draw-hole.

**SUMMARY**

The portions of the lime kiln that are still intact include the draw-hole at the north end of the kiln as well as the lower section of the masonry shaft and the arched brick structure that provide ventilation to the center of the kiln. It is recommended that these character defining elements be preserved at a minimum.

**RECOMMENDATIONS**

There are many approaches that may be employed to preserve or rehabilitate the Lime Kiln structure. The options range from partial disassembly to full reconstruction. The following lists describe the general procedures for these options.

Further investigative work would be required to identify the construction of the stack. At present the size and construction of the interior brick structure is unknown. The condition of the rubble base at depth is also not understood.

**General (All Options)**

1. Remove trees and vegetation from brick chimney.
2. Carefully disassembly of ~ ¾ of brick stack.
3. Remove steel shell from chimney exterior.
4. Remove soil and vegetation from top of rubble base to expose stone units and mortar.
5. Excavate soil from lime chamber.
6. Remove organics from draw hole.

**Option A - Disassembly**

1. Provide fencing to keep public away from structure at a safe distance.

**Option B - Stabilization**

1. Partial rebuilding and re-pointing of stack.
2. Reinforce load carrying capacity of steel members at draw hole. Replacement of structural steel members to be considered.
3. Provide fencing to keep public away from structure at a safe distance.

**Option C - Restoration**

1. Partial rebuilding and re-pointing of stack.
2. Partial re-instatement of steel liner.
3. Reinforce load carrying capacity of steel members at draw hole. Replacement of structural steel members to be considered.
4. Upgrade arch support of ventilation holes at sides of chimney.
5. Provide fencing to keep public away from structure at a safe distance.

Options which include re-building the stack with a steel liner supported on a steel frame should also be considered. This would require upgrading of the base to allow for anchorage of the steel frame.

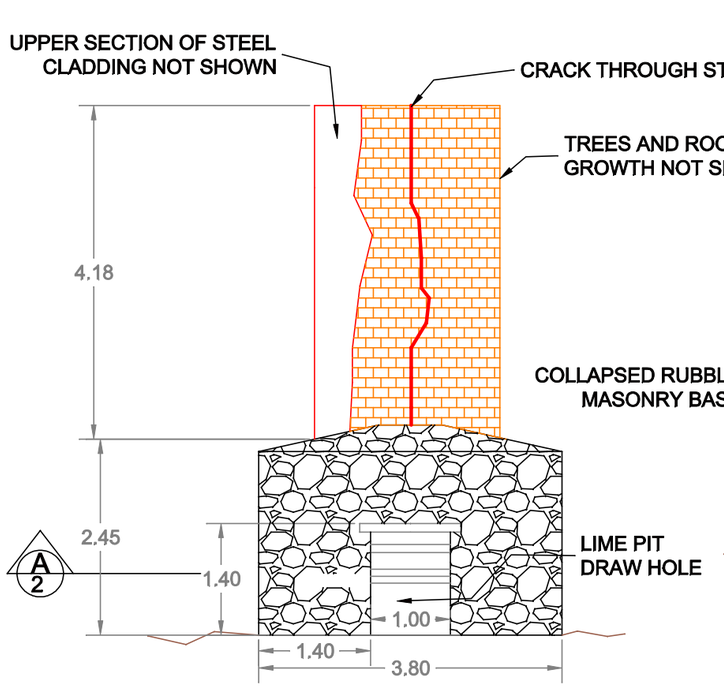
The scope of the restoration work will depend on the design concept chosen for preservation of the Lime Kiln and site.

We trust this information is sufficient. Please call if you have any questions.

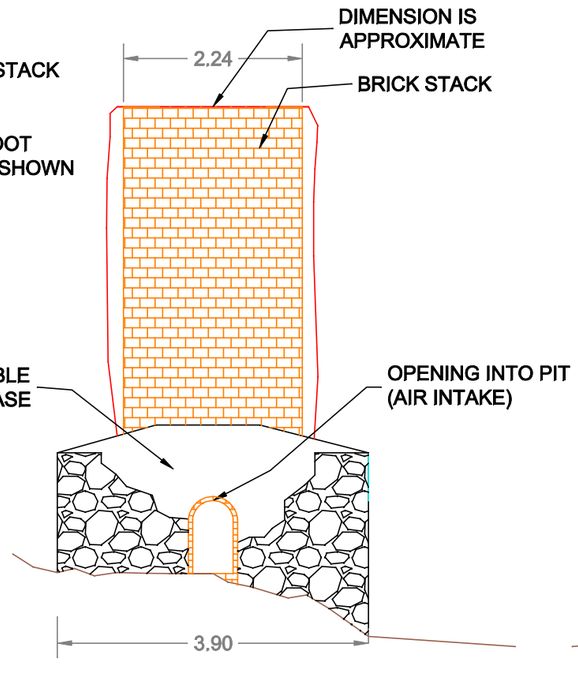
Sincerely,

Mark Byram, P.Eng.
Materials Engineer

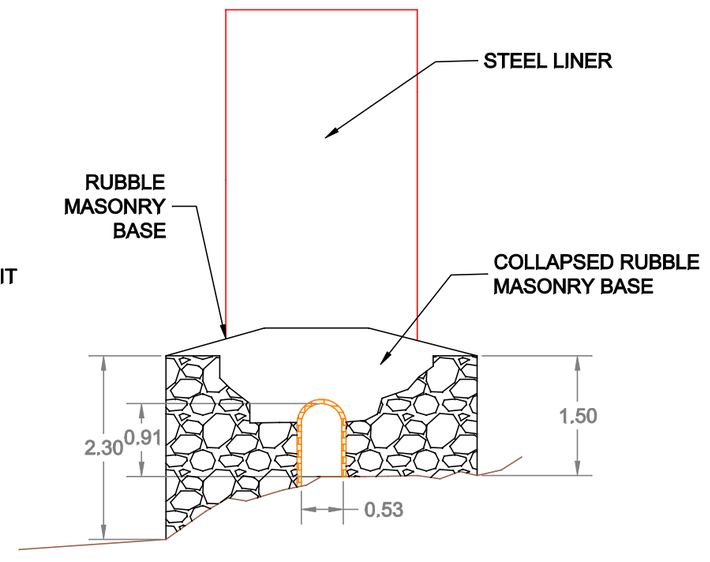
Greg Ovstaas, P.Eng.
Senior Materials Engineer




NORTH ELEVATION




EAST ELEVATION




WEST ELEVATION

GOAL ENGINEERING LTD.
966 Eagle Rock Terrace
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Fax: (250) 744 3983
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Client/Project

DONALD LUXTON & ASSOCIATES LTD. / VIEW ROYAL LIME KILN

Figure No. 1

Title: VIEW ROYAL LIME KILN - ELEVATIONS

| MB | GO | FEB. 2, 2012 |
|---|---|---|
| Drawn | Check | Date |

| ISSUE | DATE | DESCRIPTION |
|---|---|---|
| | | |

Scale

AS SHOWN - DIMENSIONS ARE APPROXIMATE

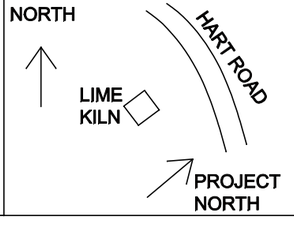
ALL MEASUREMENTS ARE METERS

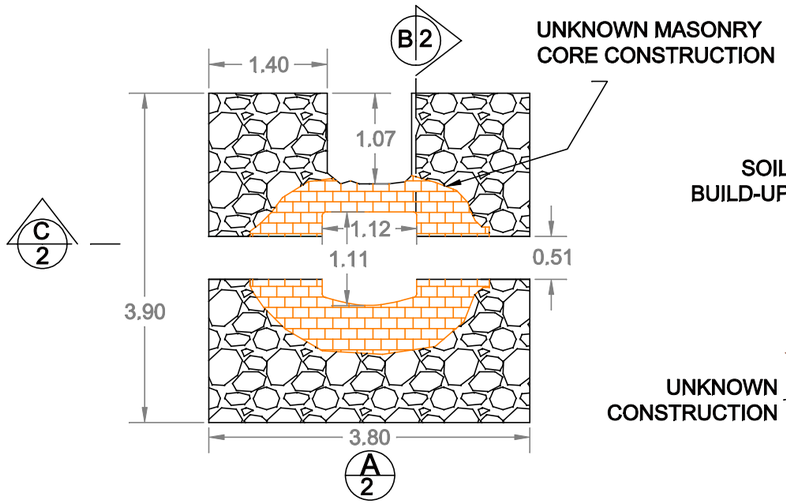
NOTE

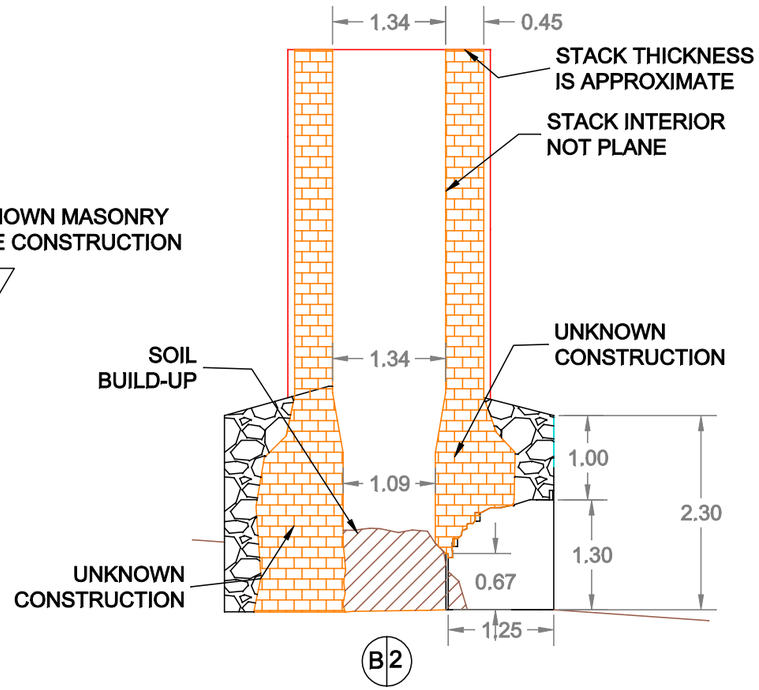
TREE GROWTH,
ROOT PENETRATION NOT SHOWN

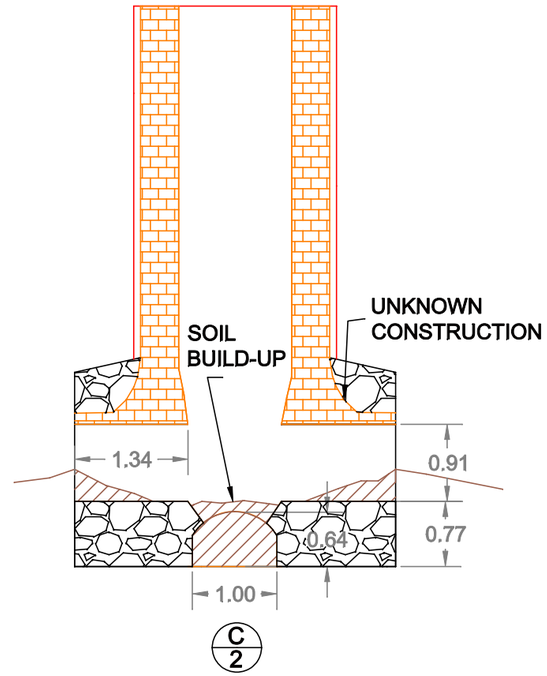
ELEMENTS HAVE BEEN DRAWN PLANE. ACTUAL SHAPE IS IRREGULAR BUT HAS BEEN APPROXIMATED.

KEY PLAN



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Client/Project

DONALD LUXTON & ASSOCIATES LTD. /
VIEW ROYAL LIME KILN

Figure No. 2

Title: VIEW ROYAL LIME KILN - SECTIONS

| MB | GO | FEB. 2, 2012 |
|---|---|---|
| Drawn | Check | Date |

| ISSUE | DATE | DESCRIPTION |
|---|---|---|
| | | |

Scale

AS SHOWN - DIMENSIONS ARE APPROXIMATE

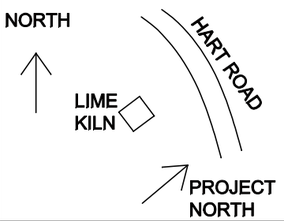
ALL MEASUREMENTS ARE METERS

NOTE

TREE GROWTH,
ROOT PENETRATION NOT SHOWN

ELEMENTS HAVE BEEN DRAWN PLANE.
ACTUAL SHAPE IS IRREGULAR BUT HAS
BEEN APPROXIMATED.

KEY PLAN



THURBER ENGINEERING LTD.

January 24, 2012 File: 19-5682-1

Donald Luxton & Associates Ltd.
1030 – 470 Granville Street
Vancouver, BC V6C 1V5

Attention: Christin Doeinghaus

**HART ROAD LIME KILN, VIEW ROYAL, BC**
**GEOTECHNICAL ASSESSMENT**

Dear Christin:

This letter provides our geotechnical assessment of the foundation support system for the existing historic lime kiln on Hart Road in View Royal, BC. Impacts of the proposed restoration of the kiln are also provided.

Use of this report is subject to the Statement of Limitations and Conditions, attached at the end of this letter.

## 1. BACKGROUND

The lime kiln is a historic structure located on Hart Road, south of Parsons Bridge, at the northwest edge of Esquimalt Harbour. The site is densely vegetated and slopes gently towards Hart Road.

The site has been recently zoned for use as a park that will be developed in the future by the Town of View Royal. It is proposed to preserve the lime kiln as a commemoration of the Town's early industrial history.

The kiln was constructed in the late 1880's and operated until the 1930's. The Hart Road lime kiln was constructed on a rubble stone foundation that varies in height up to about 2.5 m. The circular chamber above the base was constructed with bricks and clad with a metal liner. The kiln has been decaying and is now overgrown with vegetation.

## 2. SITE GEOLOGY

A large bedrock outcrop is present to the south and west of the site. Bedrock has also been excavated to the west of the property immediately north of the kiln site.

The bedrock in this area is mapped as a massive grey coarse-crystalline limestone typical of the Upper Triassic Age Quatsino Formation. In the greater Victoria area, the Quatsino Formation limestone outcrops as small isolated lenticular northwest-striking pockets within and adjacent to the more locally widespread Wark Gneiss.

The Quatsino Formation and Wark Gneiss are not conformable (not formed at the same time) but are separated by steeply dipping northwest-southeast trending faults. A number of the local Quatsino Formation limestone outcrops were quarried for lime and or cement production during the late 19th and into the 20th century. The previous limestone quarries at Bamberton in Saanich Inlet and at Todd Inlet (now the Butchart Gardens) are well known examples of limestone quarries in the area.

The rubble stone foundation for the kiln has been constructed with limestone blocks, likely obtained from local excavations in the area.

Overburden soils at the site are anticipated to be relatively thin (less than 1 or 2 m thick).

## 2. SITE INSPECTION AND INITIAL ENGINEERING ASSESSMENT

A site inspection was conducted with the design team members on January 12, 2012.

The rubble stone foundation consists of sizes generally in the order of 600 mm. It appears that the stone was originally mortared, however the mortar has eroded with time and the individual stones now generally form a rubble mound. The bricks and steel cladding above the rubble stone foundation are in poor condition. The attached Photos 1 and 2 taken by GOAL Engineering Ltd. show the rubble stone foundation.

It became evident during this site visit that preservation of the existing lime kiln would most likely consist of leaving the rubble stone foundation in place, and deconstructing the bricks and steel cladding above the foundation. From a geotechnical perspective, we agree with this approach.

The rubble stone foundation has been in place a long time and any settlement that may have occurred in the overburden soils (if present beneath the foundations) would have ceased a long time ago. Provided the reconstruction of the chamber above the rubble foundation does not result in any increase in load on the existing foundations, the risk of significant additional settlement is considered to be small.

## 3. BEDROCK BLASTING

A large bedrock outcrop is present to the south and west of the lime kiln site. Vibrations from blasting for future developments in this area should be controlled to reduce impacts on the kiln.

Blasts should be designed to limit peak particle velocities (ppv) to less than 15 mm/sec at the kiln. Depending on how close future blasting is carried out to the kiln, this may require the use of low weight of explosives per delay, and removal of rock in small areas at a time (shallow lifts).

The Town of View Royal should require submittal of blast plans for review prior to approving development plans in the immediate area. Blast plans should address how the blasting will be conducted to maintain vibration levels below specified criteria.

THURBER

## 4. CLOSURE

We trust the above provides the information you require at this time. If you have any questions regarding this assessment or require further information, please contact us at your earliest convenience.

Yours truly,
Thurber Engineering Ltd.
Stephen Bean, M.Eng., P.Eng.
Review Principal


Kevin Sterne, M.Sc., P.Eng.
Senior Geotechnical Engineer

Attachments

THURBER


**PHOTO 1:** East face of the rubble stone foundation.


**PHOTO 2:** Looking south-east towards lime kiln. Steel lined chamber on top of the rubble stone foundation.

THURBER

# STATEMENT OF LIMITATIONS AND CONDITIONS

## 1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

## 2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

## 3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this Report expressly addresses proposed development, design objectives and purposes, and then only to the extent there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation or to consider such representations, information and instructions.

## 4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS WE MAY EXPRESSLY APPROVE. The contents of the Report remain our copyright property. The Client may not give, lend or, sell the Report, or otherwise make the Report, or any portion thereof, available to any person without our prior written permission. Any use which a third party makes of the Report, are the sole responsibility of such third parties. Unless expressly permitted by us, no person other than the Client is entitled to rely on this Report. We accept no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without our express written permission.

## 5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and this report is delivered on the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

*(see over . . . . )*

INTERPRETATION OF THE REPORT *(continued . . . . )*

c) Design Services: The Report may form part of the design and construction documents for information purposes even though it may have been issued prior to the final design being completed. We should be retained to review the final design, project plans and documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the report recommendations and the final design detailed in the contract documents should be reported to us immediately so that we can address potential conflicts.

d) Construction Services: During construction we must be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

## 6. RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provision of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defence, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on the part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

## 7. SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client’s benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

## 8. CONTROL OF WORK AND JOBSITE SAFETY

We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

## 9. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on our interpretation of conditions revealed through limited investigation conducted within a defined scope of services. We cannot accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

DUNSTER & ASSOCIATES
Environmental Consultants Ltd.

# View Royal Lime Kiln Restoration Tree Issues.

February 2nd, 2012

Dr. Julian A. Dunster, R.P.F., M.C.I.P.,
ISA Certified Arborist,
ASCA Registered Consulting Arborist # 378,
PNWISA Certified Tree Risk Assessor # 1.

# View Royal Lime Kiln Restoration
# Tree Issues.

## Background

Dunster & Associates has been asked to review the tree issues at the abandoned Lime Kiln located at 224 Hart Road, in View Royal, British Columbia. The site was first visited with other consultants, on January 12th 2012. After some preliminary reconnaissance a second visit was made on January 26th 2012. On the second visit several trees were pruned back, and smaller trees around the base of the kiln were cut down to a stump. A third visit was made on February 2nd 2012 to create a small survey plan of the site.

Figure 1 shows the general location of the site in View Royal. Figure is a sketch plan with dimensions, showing the location of the site, and the trees and kiln within the fenced area.


Figure 1. Site location. (Google Earth image)

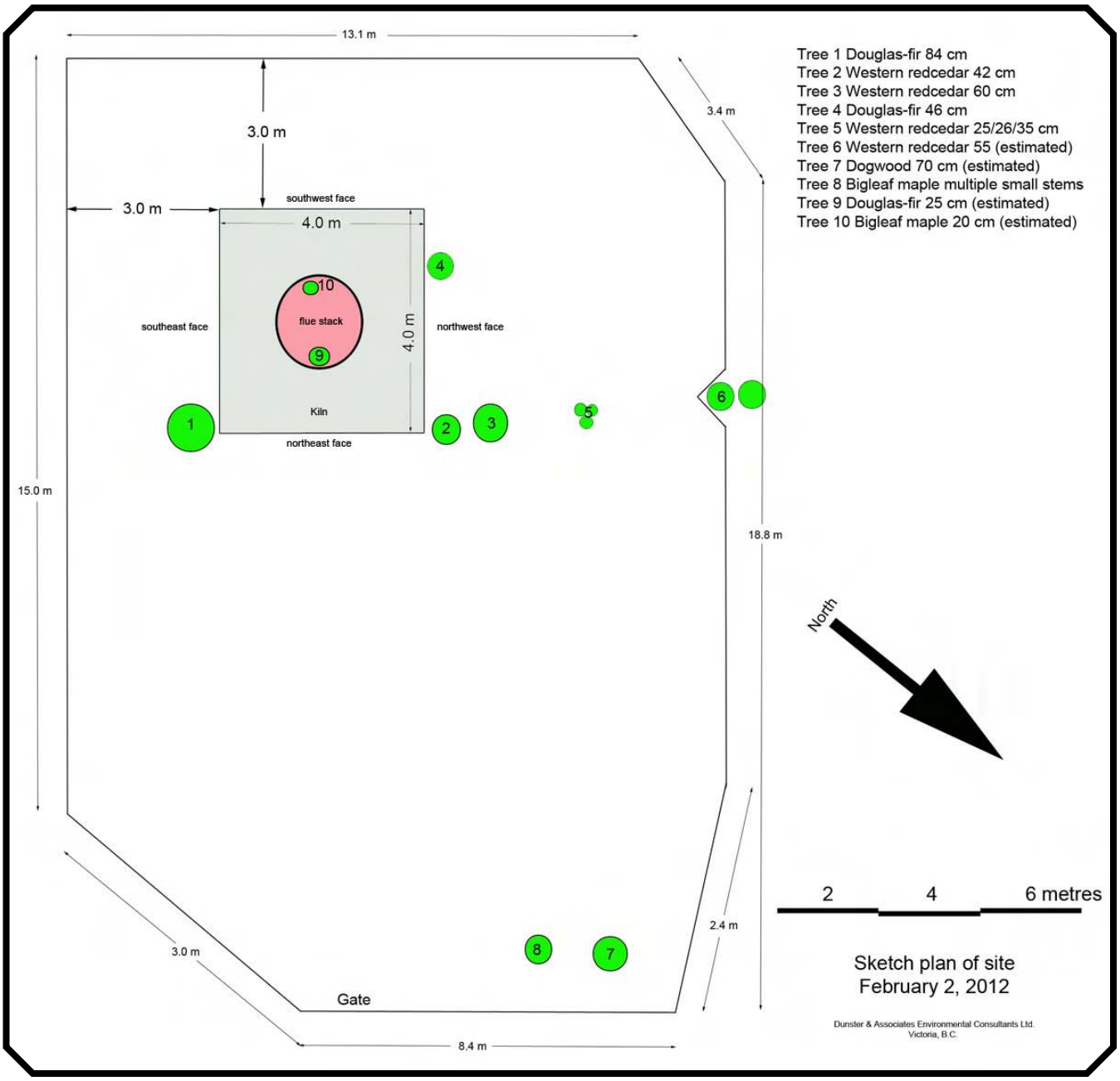



Figure 2. Sketch plan of site and features.

## Conditions on Site

The kiln sits in a fenced area. There are eight trees growing around the kiln and two growing out of the top of the flue stack. Two small maples were removed from the base of the kiln on the south east face close to tree # 1 (see Figure 3). The taller part of the stump has been retained as it appears to be the only thing holding up the steel frame around the flue stack. A second maple was removed on the southwest face near to tree # 4 (see Figure 4). The details tree by species and size are shown in Figure 2.

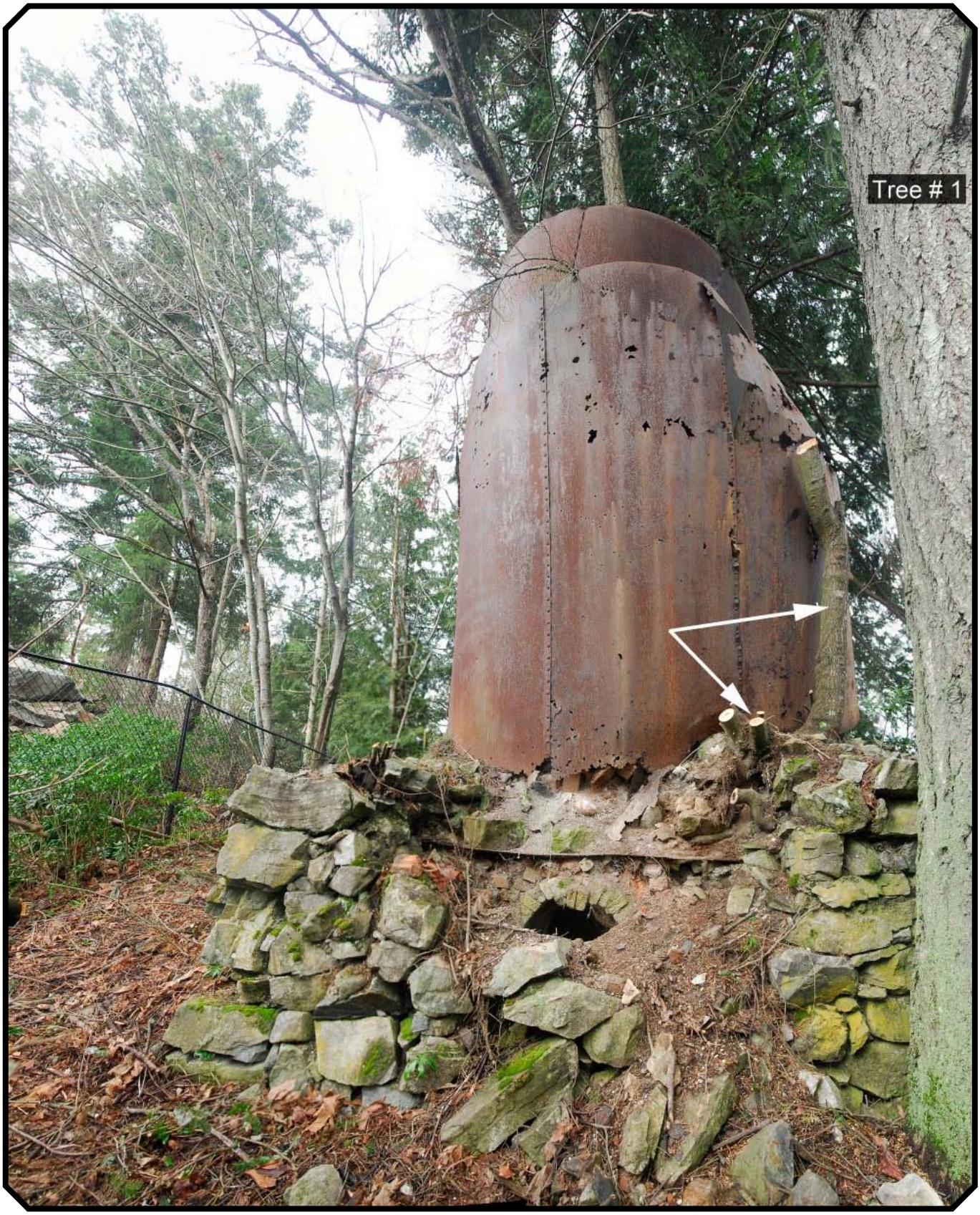



Figure 3. Southeast face. Small maple removed at right of image.


Figure 4. Southwest face.

Figure 5 is a view of the northwest face showing tree # 4. Figure 6 shows the northeast face.


Figure 5. Northwest face.


Figure 6. Northeast face.

Figure 7 is a view looking down the flue stack showing the base of trees 9 and 10. Figure 8 is a view looking up the flue stack at trees 9 and 10.

## Discussion

The trees around the kiln are estimated to be about seventy years old. Most are in good health. However, trees 1,2,3, and 4 are growing very close to the base of the kiln structure and I suspect their roots are, or soon will start to affect the integrity of the kiln. Trees 9 and 10 are growing from the top of the flue stack, along with a couple of small redcedar saplings (one live, one dead). The roots of tree 9, the Douglas-fir, have clearly girdled part of the brickwork on the outside of the stack, and are forcing off bricks on the inside of the stack. The two maples removed at the base have roots moving down into the stones and these too, will have caused some movement of the structure. Tree 5 has three small stems growing from 1 point. Right now the tree is reasonably low risk, but if trees 2 and 3 were removed, the stems would likely split apart. Tree 6 is on the property line and may be straddling it. Tree 7 is a dogwood that has previously been severely topped. It has little merit left as a tree. Tree 8 is a series of small bigleaf maple stems, probably arising from an old stump. It is not a particularly strong tree.

Figure 7. View down flue.

Figure 8. View up flue.

## Recommendations

If the kiln is to be retained in some form, then trees 1,2,3,4,5, 9, and 10 all need to be removed. Assuming that some new landscaping would be installed, I would also suggest removing trees 7 and 8. Tree 6 is close to or straddles the property line. It may be feasible to retain that tree, but it would require a further assessment once other trees have been removed, before I can evaluate its health and risk.

Removing trees 9 and 10 from the top of the flue stack will require considerable care and skill to avoid damaging the kiln structure, and ensure worker safety. I would be pleased to organise and supervise that work when it arises. All of the trees will need to be removed in pieces to avoid damaging the kiln. The roots of the small maples recently cut down will need to be removed by hand, although that may be simple enough if a few of the rocks can be simply moved and then replaced.

The flue stack is not very stable and is shedding bricks on the inside and outside. Likewise, the steel plates around the outer side of the stack are not well attached and largely held in place by the tall stump of the maple, near to tree # 1. Before any further work is done on site, the steel plates should be strapped up with one or two ropes so that a) they cannot fall off, and b) any loose materials such as bricks on the inside of the steel plates and outside of the stack, can also be held in place. I recommend that this step is implemented right away.

If the top steel collar of the flue stack is wanted for the restoration, or as a template for that, it may be wise to cut it off and move it out of the way after the lower steel has been strapped. Removal of the two trees on the top of the stack will require a slow and very safe approach because there is some chance that the entire stack could collapse. I don't think that is a big risk at the moment, but it does need to be considered.

Once the trees have been removed from the flue stack, and the other trees nearby have been cut down, then the steel plates can be removed and other work on the kiln can proceed as deemed necessary by the heritage team.

## Conclusions

There are ten trees documented on site, two of which grow from the top of the flue stack. If the Lime Kiln is to be retained and restored in some form, nine of the trees should be removed, with the tenth (tree # 6) being subject to review once other clearing is completed.

On Behalf of Dunster & Associates Environmental Consultants Ltd.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Date. February 2nd 2012

# APPENDIX D – ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Sites

| THE ICOMOS CHARTER FOR THE INTERPRETATION AND PRESENTATION OF CULTURAL HERITAGE SITES | CHARTE ICOMOS POUR L'INTERPRETATION ET LA PRESENTATION DES SITES CULTURELS PATRIMONIAUX |
|---|---|
| Prepared under the Auspices of the ICOMOS International Scientific Committee on Interpretation and Presentation of Cultural Heritage Sites<br><br>Ratified by the 16th General Assembly of ICOMOS, Québec (Canada), on 4 October 2008 | Préparée sous les auspices du Comité scientifique de l'ICOMOS sur l'interprétation et la présentation des sites patrimoniaux<br><br>Ratifiée par la 16e Assemblée Générale de l'ICOMOS, Québec (Canada), le 4 octobre 2008 |
| **PREAMBLE** | **PREAMBULE** |
| Since its establishment in 1965 as a worldwide organisation of heritage professionals dedicated to the study, documentation, and protection of cultural heritage sites, ICOMOS has striven to promote the conservation ethic in all its activities and to help enhance public appreciation of humanity's material heritage in all its forms and diversity. | Depuis sa création en 1965, en tant que association mondiale de professionnels du patrimoine qui se consacre à l'étude, la documentation et à la protection des sites du patrimoine culturel, ICOMOS se consacre à la promotion de l'éthique de la conservation dans toutes ses activités et à augmenter l'appréciation publique du patrimoine mondial dans toutes ses formes et diversité. |
| As noted in the Charter of Venice (1964) "It is essential that the principles guiding the preservation and restoration of ancient buildings should be agreed and be laid down on an international basis, with each country being responsible for applying the plan within the framework of its own culture and traditions." Subsequent ICOMOS charters have taken up that mission, establishing professional guidelines for specific conservation challenges and encouraging effective communication about the importance of heritage conservation in every region of the world. | Conformément à la Charte de Venise (1964) « Il est essentiel que les principes qui doivent présider à la conservation et à la restauration des monuments soient dégagés en commun et formulés sur un plan international, tout en laissant à chaque nation le soin d'en assurer l'application dans le cadre de sa propre culture et de ses traditions. » Les Chartes ICOMOS adoptées par la suite ont respecté cette mission, établissant des directives professionnelles destinées à faire face aux défis de la conservation et encourageant une communication efficace sur l'importance de la conservation du patrimoine au niveau mondial. |
| These earlier ICOMOS charters stress the importance of public communication as an essential part of the larger conservation process (variously describing it as "dissemination," "popularization," "presentation," and "interpretation"). They implicitly acknowledge that every act of heritage conservation—within all the world's cultural traditions - is by its nature a communicative act. | Ces Chartes soulignent l'importance de la communication vers le public en tant qu'élément essentiel du processus de conservation (on parlera indifféremment de «dissémination», «popularisation», «Présentation» et «interprétation»). Elles reconnaissent implicitement que chaque acte de conservation du patrimoine – parmi toutes les traditions culturelles du monde – est par nature, un acte de communication. |
| From the vast range of surviving material remains and intangible values of past communities and civilisations, the choice of what to preserve, how to preserve it, and how it is to be presented to the public are all elements of site interpretation. They represent every generation's vision of what is significant, what is important, and why material remains from the past should be passed on to generations yet to come. | Parmi la vaste gamme des vestiges des communautés et valeurs intangibles des civilisations du passé, les choix en matière de préservation, de modes de préservation et de présentation au public sont tous des éléments d'interprétation de sites. Ils représentent la vision de chaque génération de ce qui est significatif, de ce qui est important et de ce qui vaut d'être transmis aux générations futures. |
| The need for a clear rationale, standardised terminology, and accepted professional principles for Interpretation and Presentation* is evident. In recent years, the dramatic expansion of interpretive activities at many cultural heritage sites and the introduction of elaborate interpretive technologies and new economic strategies for the marketing and management of cultural heritage sites have created new complexities and aroused basic questions that | Le besoin d'une terminologie raisonnée et standardisée et de principes professionnels acceptés en matière d'Interprétation et de Présentation* est évident. Ces dernières années, l'expansion dramatique d'activités d'interprétation dans de nombreux sites patrimoniaux, l'introduction de technologies élaborées d'interprétation de même que de nouvelles stratégies économiques en matière de marketing et de gestion des sites patrimoniaux ont créé de nouvelles |

* See definitions on page 3.
* Voir les définitions en page 3

are central to the goals of both conservation and the public appreciation of cultural heritage sites throughout the world:

- What are the accepted and acceptable goals for the Interpretation and Presentation of cultural heritage sites?
- What principles should help determine which technical means and methods are appropriate in particular cultural and heritage contexts?
- What general ethical and professional considerations should help shape Interpretation and Presentation in light of its wide variety of specific forms and techniques?

The purpose of this Charter is therefore to define the basic principles of Interpretation and Presentation as essential components of heritage conservation efforts and as a means of enhancing public appreciation and understanding of cultural heritage sites*.

problématiques et soulevé des questions élémentaires de première importance quant aux finalités de la conservation et l'appréciation du public des sites patrimoniaux à travers le monde :

- Quels sont les objectifs acceptables et acceptés pour l'Interprétation et la

Présentation des sites patrimoniaux ?

- Quels principes devraient aider à déterminer quels moyens techniques et quelles méthodes sont appropriées dans des contextes culturels et patrimoniaux particuliers ?
- Quelles considérations éthiques et professionnelles pourraient aider à façonner l'interprétation et la présentation quelles que soient leurs formes et techniques spécifiques?

L'objectif de cette Charte est donc de définir les principes de base de l'interprétation et de la présentation en tant à la fois qu'éléments essentiels des efforts de conservation du patrimoine et outils essentiels à l'appréciation et à la compréhension par le public des sites culturels patrimoniaux.*

**DEFINITIONS**

For the purposes of the present Charter,

**Interpretation** refers to the full range of potential activities intended to heighten public awareness and enhance understanding of cultural heritage site. These can include print and electronic publications, public lectures, on-site and directly related off-site installations, educational programmes, community activities, and ongoing research, training, and evaluation of the interpretation process itself.

**Presentation** more specifically denotes the carefully planned communication of interpretive content through the arrangement of interpretive information, physical access, and interpretive infrastructure at a cultural heritage site. It can be conveyed through a variety of technical means, including, yet not requiring, such elements as informational panels, museum-type displays, formalized walking tours, lectures and guided tours, and multimedia applications and websites.

**Interpretive infrastructure** refers to physical installations, facilities, and areas at, or connected with a cultural heritage site that may be specifically utilised for the purposes of interpretation and presentation including those supporting interpretation via new and existing technologies.

**Site interpreters** refers to staff or volunteers at a cultural heritage site who are permanently or temporarily engaged in the public communication of information relating to the values and significance of the site.

**Cultural Heritage Site** refers to a place, locality, natural landscape, settlement area, architectural complex, archaeological site, or standing structure that is recognized and often legally protected as a place of historical and cultural significance.

**DEFINITIONS**

Pour la rédaction de la présente Charte,

**L'interprétation** renvoie à l'ensemble des activités potentielles destinées à augmenter la conscience publique et à renforcer sa compréhension du site culturel patrimonial. Ceci peut inclure des publications, des conférences, des installations sur site, des programmes éducatifs, des activités communautaires ainsi que la recherche, la formation et l'évaluation permanente du processus même d'interprétation.

**La présentation** concerne plus spécifiquement une communication planifiée du contenu interprétatif par l'agencement d'informations de même nature, au moyen d'un accès physique au site culturel patrimonial. Elle peut être transmise par une variété de moyens techniques, comprenant indifféremment des éléments tels que des panneaux informatifs, une présentation de type muséale, des sentiers fléchés, des conférences, des visites guidées et des applications multimédia.

**Les équipements et services d'interprétation** renvoient à toutes installations physiques, équipements et espaces du site culturel patrimonial qui peuvent être utilisés spécifiquement pour les besoins de l'interprétation et de la présentation.

**Les interprètes du site** renvoient au personnel ou aux volontaires œuvrant sur le site culturel patrimonial qu'ils soient engagés de façon permanente ou temporaire pour la communication au public d'information concernant la valeur et la signification du site.

**Un site culturel patrimonial** renvoie à une localité, un paysage, une aire d'établissement, un complexe architectural, un site archéologique, ou une structure existante, reconnus ou souvent protégés légalement en tant que site de signification historique et culturelle.

* Although the principles and objectives of this Charter may equally apply to off-site interpretation, its main focus is interpretation and presentation at, or in the immediate vicinity of, cultural heritage sites.

* Voir les définitions en page 3

## OBJECTIVES

In recognizing that interpretation and presentation are part of the overall process of cultural heritage conservation and management, this Charter seeks to establish seven cardinal principles, upon which Interpretation and Presentation—in whatever form or medium is deemed appropriate in specific circumstances—should be based.

**Principle 1: Access and Understanding**
**Principle 2: Information Sources**
**Principle 3: Attention to Setting and Context**
**Principle 4: Preservation of Authenticity**
**Principle 5: Planning for Sustainability**
**Principle 6: Concern for Inclusiveness**
**Principle 7: Importance of Research, Training, and Evaluation**

Following from these seven principles, the objectives of this Charter are to:

1. **Facilitate understanding and appreciation** of cultural heritage sites and foster public awareness and engagement in the need for their protection and conservation.

2. **Communicate the meaning** of cultural heritage sites to a range of audiences through careful, documented recognition of significance, through accepted scientific and scholarly methods as well as from living cultural traditions.

3. **Safeguard the tangible and intangible values** of cultural heritage sites in their natural and cultural settings and social contexts.

4. **Respect the authenticity** of cultural heritage sites, by communicating the significance of their historic fabric and cultural values and protecting them from the adverse impact of intrusive interpretive infrastructure, visitor pressure, inaccurate or inappropriate interpretation.

5. **Contribute to the sustainable conservation** of cultural heritage sites, through promoting public understanding of, and participation in, ongoing conservation efforts, ensuring long-term maintenance of the interpretive infrastructure and regular review of its interpretive contents.

6. **Encourage inclusiveness** in the interpretation of cultural heritage sites, by facilitating the involvement of stakeholders and associated communities in the development and implementation of interpretive programmes.

7. **Develop technical and professional guidelines** for heritage interpretation and presentation, including technologies, research, and training. Such guidelines must be appropriate and sustainable in their social contexts.

## OBJECTIFS

En reconnaissant que l'interprétation et la présentation sont partie intégrante du processus général de conservation et de gestion du patrimoine culturel, cette Charte vise à établir sept principes cardinaux sur lesquels l'interprétation et la présentation devraient être basés, quels que soient les moyens et formes les plus appropriés selon les circonstances.

**Principe 1 : Accès et compréhension**
**Principe 2 : Sources d'information**
**Principe 3 : Attention portée au contexte et à l'environnement**
**Principe 4 : Préservation de l'authenticité**
**Principe 5 : Organisation de la durabilité**
**Principe 6 : Attention portée à la participation**
**Principe 7: Importance de la recherche, de la formation et de l'évaluation**

Comme suite à ces sept principes, les objectifs de cette charte sont :

1. **Faciliter la compréhension et l'appréciation** des sites culturels patrimoniaux et promouvoir la prise de conscience publique et l'engagement de la nécessité de leur protection et de leur conservation.

2. **Communiquer le sens** des sites culturels patrimoniaux à des audiences diverses par une reconnaissance approfondie et bien documentée de la signification, au moyen de méthodes reconnues d'analyses scientifiques et les recherches ainsi que des traditions culturelles vivantes.

3. **Sauvegarder les valeurs matérielles et immatérielles** propres aux sites culturels patrimoniaux dans leur environnement culturel, naturel et leur contexte social.

4. **Respecter l'authenticité** des sites culturels patrimoniaux en communiquant l'importance de leurs matériaux historiques et la portée de leurs valeurs culturelles et en les protégeant contre les effets adverses d'infrastructures d'interprétation mal venues, des pressions venant du public, d'une interprétation imprécise et inadéquate.

5. **Contribuer à la conservation durable** des sites culturels patrimoniaux par la promotion de la compréhension et de la participation du public des efforts de conservation en cours, en assurant la maintenance à long terme des équipements et services d'interprétation et une révision régulière de son contenu interprétatif.

6. **Encourager la participation** dans l'interprétation des sites culturels patrimoniaux en facilitant l'implication active des acteurs et communautés associées dans le développement et l'implémentation de programmes d'interprétation.

7. **Développer des normes techniques et professionnelles** pour l'interprétation et la présentation du patrimoine, incluant les technologies, la recherche et la formation. De tels normes doivent être appropriées et durables dans leur contexte social.

| PRINCIPLES | PRINCIPES |
|---|---|
| **Principle 1:**<br>**Access and Understanding** | **Principe 1 :**<br>**Accès et Compréhension** |
| ***Interpretation and presentation programmes should facilitate physical and intellectual access by the public to cultural heritage sites.*** | ***Les programmes d'interprétation et de présentation devraient faciliter l'accès physique et intellectuel des sites culturels patrimoniaux auprès du public.*** |
| **1.** Effective interpretation and presentation should enhance personal experience, increase public respect and understanding, and communicate the importance of the conservation of cultural heritage sites. | **1.** Une interprétation et une présentation efficaces devraient enrichir l'expérience personnelle et accroître le respect et la compréhension du public et mettre en évidence l'importance de la bonne conservation du site culturel patrimonial. |
| **2.** Interpretation and presentation should encourage individuals and communities to reflect on their own perceptions of a site and assist them in establishing a meaningful connection to it. The aim should be to stimulate further interest, learning, experience, and exploration. | **2.** L'interprétation et la présentation devraient inciter les personnes individuelles et les communautés à réfléchir sur leurs propres perceptions du site et sur leur relation avec lui. Elle cherche à stimuler un prolongement de l'intérêt, de l'étude, de l'expérience et de l'exploration. |
| **3.** Interpretation and presentation programmes should identify and assess their audiences demographically and culturally. Every effort should be made to communicate the site's values and significance to its varied audiences. | **3.** Les programmes d'interprétation et de présentation devraient identifier et analyser leur public du point de vue démographique et culturel. Tous les efforts sont à déployer pour que l'interprétation et la présentation du patrimoine culturel communiquent effectivement avec les divers auditoires d'un site. |
| **4.** The diversity of language among visitors and associated communities connected with a heritage site should be taken into account in the interpretive infrastructure. | **4.** La diversité des langues parlées par les visiteurs et les communautés en relation avec le site patrimonial devrait être prise en considération dans les équipements et les services d'interprétation. |
| **5.** Interpretation and presentation activities should also be physically accessible to the public, in all its variety. | **5.** Les programmes d'interprétation et de présentation devraient être accessibles à un large public, dans toute sa diversité, y compris les personnes à mobilité réduite. |
| **6.** In cases where physical access to a cultural heritage site is restricted due to conservation concerns, cultural sensitivities, adaptive re-use, or safety issues, interpretation and presentation should be provided off-site. | **6.** Au cas où l'accès physique à un site culturel patrimonial est limité, pour des raisons de conservation, de sensibilités culturelles, d'aménagements adaptés ou d'exigences de sécurité, une interprétation et une présentation devraient être proposées en dehors du site. |
| **Principle 2:**<br>**Information Sources** | **Principe 2 :**<br>**Sources d'Information** |
| ***Interpretation and presentation should be based on evidence gathered through accepted scientific and scholarly methods as well as from living cultural traditions.*** | ***L'interprétation et la présentation devraient reposer sur les preuves recueillies par les méthodes scientifiques et de recherche communément admises ainsi que sur les traditions culturelles vivantes.*** |
| **1.** Interpretation should show the range of oral and written information, material remains, traditions, and meanings attributed to a site. The sources of this information should be documented, archived, and made accessible to the public. | **1.** L'interprétation devrait présenter l'éventail des informations orales et écrites, des vestiges matériels, des traditions et des sens attribués à un site. Les sources de cette information devraient être documentées, archivées, et rendues accessibles au public. |
| **2.** Interpretation should be based on a well researched, multidisciplinary study of the site and its surroundings. It should also acknowledge that meaningful interpretation necessarily includes reflection on alternative historical hypotheses, local traditions, and stories. | **2.** L'interprétation devrait être basée sur une étude multidisciplinaire approfondie du site et de son environnement. L'interprétation devrait également reconnaître et inclure les hypothèses historiques alternatives, les traditions et les histoires locales. |
| **3.** At cultural heritage sites where traditional storytelling or memories of historical participants provide an | **3.** Dans les sites patrimoniaux où des récits ou les souvenirs d'acteurs historiques fournissent une |

important source of information about the significance of the site, interpretive programmes should incorporate these oral testimonies—either indirectly, through the facilities of the interpretive infrastructure, or directly, through the active participation of members of associated communities as on-site interpreters.

**4.** Visual reconstructions, whether by artists, architects, or computer modelers, should be based upon detailed and systematic analysis of environmental, archaeological, architectural, and historical data, including analysis of written, oral and iconographic sources, and photography. The information sources on which such visual renderings are based should be clearly documented and alternative reconstructions based on the same evidence, when available, should be provided for comparison.

**5.** Interpretation and presentation programmes and activities should also be documented and archived for future reference and reflection.

**Principle 3:**
**Context and Setting**

***The Interpretation and Presentation of cultural heritage sites should relate to their wider social, cultural, historical, and natural contexts and settings.***

**1.** Interpretation should explore the significance of a site in its multi-faceted historical, political, spiritual, and artistic contexts. It should consider all aspects of the site's cultural, social, and environmental significance and values.

**2.** The public interpretation of a cultural heritage site should clearly distinguish and date the successive phases and influences in its evolution. The contributions of all periods to the significance of a site should be respected.

**3.** Interpretation should also take into account all groups that have contributed to the historical and cultural significance of the site.

**4.** The surrounding landscape, natural environment, and geographical setting are integral parts of a site's historical and cultural significance, and, as such, should be considered in its interpretation.

**5.** Intangible elements of a site's heritage such as cultural and spiritual traditions, stories, music, dance, theater, literature, visual arts, local customs and culinary heritage should be considered in its interpretation.

**6.** The cross-cultural significance of heritage sites, as well as the range of perspectives about them based on scholarly research, ancient records, and living traditions, should be considered in the formulation of interpretive programmes.

importante source d'information à propos de la signification du site, les programmes d'interprétation devraient inclure ces témoignages oraux, soit indirectement, dans les équipements et les services d'interprétation, soit directement, par la participation active de membres des communautés associées en tant que guides de sites.

**4.** Les reconstructions visuelles, par dessins d'artistes, par des architectes ou par ordinateur, devraient être basés sur une analyse détaillée et systématique des données environnementales, archéologiques, architecturales et historiques, en ce compris l'analyse des sources écrites, orales, iconographiques et photographiques. Ces sources d'information sur base desquelles les éléments visuels sont basés devraient être clairement documentées et les reconstructions alternatives basées sur les mêmes preuves, lorsqu'elles sont disponibles, devraient être fournies afin de permettre la comparaison.

**5.** Les programmes et les activités d'interprétation et de présentation devraient également être documentées et archivées pour servir de référence et de réflexion dans le futur.

**Principe 3 :**
**Le Contexte et l'Environnement**

***L'interprétation et la présentation des sites patrimoniaux devraient mettre en lumière la relation plus large des sites avec leur contexte et leur environnement social, culturel, historique et naturel.***

**1.** L'interprétation devrait explorer la signification d'un site sous tous ses aspects: historique, politique, spirituel et artistique. Elle devrait prendre en considération toutes les valeurs culturelles, sociales et environnementales du site.

**2.** L'interprétation publique d'un site culturel patrimonial devrait dater avec précision et faire la distinction entre les phases successives et les influences subies au cours de son évolution. Les différents apports historiques à la signification d'un site devraient être respectés.

**3.** L'interprétation devrait également prendre en considération tous les groupes qui ont contribué à la signification historique et culturelle du site.

**4.** Les paysages alentours, l'environnement naturel et le cadre géographique font partie intégrante des valeurs historiques et culturelles d'un site et, en tant que tels, devraient être pris en considération dans son interprétation.

**5.** Les éléments immatériels d'un site patrimonial, tels que les traditions culturelles et spirituelles, les récits, la musique, la danse, le théâtre, la littérature, les arts visuels, les coutumes locales et le patrimoine culinaire devraient être pris en compte dans son interprétation.

**6.** La signification transculturelle des sites patrimoniaux ainsi que la coexistence des différents points de vue qui s'appuient sur la recherche, des faits anciens ou sur des traditions vivantes devraient se retrouver dans la formulation des programmes interprétatifs.

**Principle 4:**
**Authenticity**

***The Interpretation and presentation of cultural heritage sites must respect the basic tenets of authenticity in the spirit of the Nara Document (1994).***

**1.** Authenticity is a concern relevant to human communities as well as material remains. The design of a heritage interpretation programme should respect the traditional social functions of the site and the cultural practices and dignity of local residents and associated communities.

**2.** Interpretation and presentation should contribute to the conservation of the authenticity of a cultural heritage site by communicating its significance without adversely impacting its cultural values or irreversibly altering its fabric.

**3.** All visible interpretive infrastructures (such as kiosks, walking paths, and information panels) must be sensitive to the character, setting and the cultural and natural significance of the site, while remaining easily identifiable.

**4.** On-site concerts, dramatic performances, and other interpretive programmes must be carefully planned to protect the significance and physical surroundings of the site and minimise disturbance to the local residents.

**Principe 4 :**
**Authenticité**

***L'interprétation et la présentation des sites patrimoniaux doivent respecter leur authenticité dans l'esprit de la Déclaration de Nara (1994)***

**1.** L'authenticité concerne aussi bien les communautés humaines que les vestiges matériels. La conception d'un programme d'interprétation patrimoniale devrait respecter les fonctions sociales traditionnelles d'un site, les pratiques culturelles et la dignité des résidents et des communautés associées.

**2.** L'interprétation et la présentation devraient contribuer à la conservation de l'authenticité d'un site culturel patrimonial par la communication de sa signification, sans avoir d'incidences adverses sur ses valeurs culturelles ou des altérations physiques irréversibles.

**3.** Tous les équipements et services d'interprétation visibles (tels que kiosques, sentiers, panneaux d'information) doivent s'intégrer harmonieusement dans le site, respecter son caractère, son environnement et ses valeurs culturelles et naturelles, tout en étant facilement repérables.

**4.** Les concerts *in situ*, les représentations théâtrales et autres programmes d'interprétation doivent être planifiés avec prudence pour protéger la signification du site et l'environnement physique et de minimiser les troubles à l'encontre des résidents voisins.

**Principle 5:**
**Sustainability**

***The interpretation plan for a cultural heritage site must be sensitive to its natural and cultural environment, with social, financial, and environmental sustainability among its central goals.***

**1.** The development and implementation of interpretation and presentation programmes should be an integral part of the overall planning, budgeting, and management process of cultural heritage sites.

**2.** The potential effect of interpretive infrastructure and visitor numbers on the cultural value, physical characteristics, integrity, and natural environment of the site must be fully considered in heritage impact assessment studies.

**3.** Interpretation and presentation should serve a wide range of conservation, educational and cultural objectives. The success of an interpretive programme should not be evaluated solely on the basis of visitor attendance figures or revenue.

**4.** Interpretation and presentation should be an integral part of the conservation process, enhancing the public's awareness of specific conservation problems encountered at the site and explaining the efforts being taken to protect the site's physical integrity and authenticity.

**5.** Any technical or technological elements selected to become a permanent part of a site's interpretive infrastructure should be designed and constructed in

**Principe 5 :**
**Caractère durable**

***Le plan d'interprétation d'un site patrimonial doit être attentif à son environnement culturel et naturel. Son caractère durable à long terme est un objectif majeur, aux plans sociaux, financiers et environnementaux.***

**1.** L'élaboration et la mise en œuvre d'un programme d'interprétation et de présentation devraient relever à part entière du plan général de programmation et de gestion d'un site patrimonial.

**2.** L'incidence possible d'un équipement d'interprétation et d'une fréquentation par de nombreux visiteurs sur les valeurs culturelles, les caractéristiques physiques, l'intégrité et l'environnement naturel d'un site fera l'objet d'études préalables approfondies.

**3.** L'interprétation et la présentation devraient servir un large éventail d'objectifs éducatifs et culturels. L'accroissement du nombre de visiteurs et des recettes de fréquentation ne devrait pas être le seul critère de succès d'un programme d'interprétation.

**4.** L'interprétation et la présentation devraient faire partie intégrante du processus de conservation, accroissant la conscience du public pour les problèmes de conservation rencontrés sur le site et expliquant les efforts faits pour protéger l'intégrité physique du site.

**5.** Tout élément technique ou technologique choisi pour être un élément permanent de l'infrastructure d'interprétation d'un site devrait être conceptualisé et construit de manière à assurer une maintenance

a manner that will ensure effective and regular maintenance.

**6.** Interpretive programmes should aim to provide equitable and sustainable economic, social, and cultural benefits to all stakeholders through education, training and employment opportunities in site interpretation programmes.

**Principle 6:**
**Inclusiveness**

***The Interpretation and Presentation of cultural heritage sites must be the result of meaningful collaboration between heritage professionals, host and associated communities, and other stakeholders.***

**1.** The multidisciplinary expertise of scholars, community members, conservation experts, governmental authorities, site managers and interpreters, tourism operators, and other professionals should be integrated in the formulation of interpretation and presentation programmes.

**2.** The traditional rights, responsibilities, and interests of property owners and host and associated communities should be noted and respected in the planning of site interpretation and presentation programmes.

**3.** Plans for expansion or revision of interpretation and presentation programmes should be open for public comment and involvement. It is the right and responsibility of all to make their opinions and perspectives known.

**4.** Because the question of intellectual property and traditional cultural rights is especially relevant to the interpretation process and its expression in various communication media (such as on-site multimedia presentations, digital media, and printed materials), legal ownership and right to use images, texts, and other interpretive materials should be discussed, clarified, and agreed in the planning process.

**Principle 7:**
**Research, Training, and Evaluation**

***Continuing research, training, and evaluation are essential components of the interpretation of a cultural heritage site.***

**1.** The interpretation of a cultural heritage site should not be considered to be completed with the completion of a specific interpretive infrastructure. Continuing research and consultation are important to furthering the understanding and appreciation of a site's significance. Regular review should be an integral element in every heritage interpretation programme.

**2.** The interpretive programme and infrastructure should be designed and constructed in a way that facilitates ongoing content revision and/or expansion.

**3.** Interpretation and presentation programmes and their physical impact on a site should be continuously

efficace et régulière.

**6.** Les programmes d'interprétation devraient chercher à apporter un bénéfice juste et durable aux acteurs à travers l'éducation, la formation et la création d'emploi dans des programmes d'interprétation de sites.

**Principe 6 :**
**Participation**

***L'interprétation et la présentation des sites culturels patrimoniaux doivent être le résultat d'une collaboration efficace entre professionnels du patrimoine, communautés associées et autres acteurs.***

**1.** L'expertise pluridisciplinaire des chercheurs, des experts en conservation, des autorités publiques, des gestionnaires et des interprètes de sites, des opérateurs touristiques et autres professionnels devraient être intégrée dans la formulation de programmes d'interprétation et de présentation.

**2.** Les droits traditionnels, les responsabilités et les intérêts des propriétaires et des communautés associées devraient être pris en compte et respectés dans l'élaboration des programmes d'interprétation et de présentation des sites.

**3.** Les projets d'expansion ou de révision des programmes d'interprétation et de présentation devraient être ouverts aux commentaires et à une implication du public. Chacun a le droit et la responsabilité de faire connaître ses opinions et ses perspectives.

**4.** En raison de l'importance de la propriété intellectuelle et des droits culturels traditionnels dans les démarches d'interprétation et du recours aux divers media (tels que les présentations multi media *in situ,* les supports électroniques et les imprimés), la propriété légale et le droit d'usage des images, textes et autres documents d'interprétation devraient être discutés, clarifiés et approuvés dans le processus de programmation.

**Principe 7 :**
**Recherche, Formation et Evaluation**

***L'interprétation des sites patrimoniaux est une entreprise progressive et évolutive de compréhension et d'explication, qui requiert des activités continues de recherche, de formation et d'évaluation.***

**1.** L'interprétation d'un site ne devrait pas être considérée comme aboutie au moment de la mise en fonction d'un équipement et de services d'interprétation spécifiques. Il importe qu'une recherche et des consultations continues fassent progresser la compréhension et l'appréciation des valeurs d'un site : elles devraient être des activités inhérentes à tout programme d'interprétation du patrimoine.

**2.** Les programmes et les équipements d'interprétation devraient être conçus et réalisés de manière à faciliter la révision de leur contenu et / ou leur expansion.

**3.** Un suivi permanent et une évaluation continue sont nécessaires pour analyser les programmes

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| monitored and evaluated, and periodic changes made on the basis of both scientific and scholarly analysis and public feedback. Visitors and members of associated communities as well as heritage professionals should be involved in this evaluation process. | d'interprétation et de présentation et leur incidence physique, sur base d'une analyse scientifique et des réactions du public. Les visiteurs et les membres des communautés associées, aussi bien que les professionnels du patrimoine, devraient être associés à ces démarches d'évaluation. |
| **4.** Every interpretation programme should be considered as an educational resource for people of all ages. Its design should take into account its possible uses in school curricula, informal and lifelong learning programmes, communications and information media, special activities, events, and seasonal volunteer involvement. | **4.** Chaque programme d'interprétation et de présentation devrait être considéré comme une ressource éducative pour personne de tout âge. Sa conception devrait être prise en considération dans son usage possible dans les programmes scolaires, dans des programmes d'études informelles et des programmes d'éducation et de formation tout au long de la vie dans les média de communication incluant l'Internet, les activités spécifiques, les événements et l'implication saisonnière des volontaires. |
| **5.** The training of qualified professionals in the specialised fields of heritage interpretation and presentation, such as content creation, management, technology, guiding, and education, is a crucial objective. In addition, basic academic conservation programmes should include a component on interpretation and presentation in their courses of study. | **5** La formation de professionnels qualifiés dans les domaines spécialisés de l'interprétation patrimoniale, comme la création de contenus, la gestion, les nouvelles technologies, les visites guidées et l'éducation, est un objectif essentiel. Par ailleurs, les programmes académiques de base en matière de conservation devraient inclure des modules de formation à l'interprétation et la présentation. |
| **6.** On-site training programmes and courses should be developed with the objective of updating and informing heritage and interpretation staff of all levels and associated and host communities of recent developments and innovations in the field. | **6** Des programmes de cours et de formation devraient être proposés, sur le site même, en vue de la formation continue et du perfectionnement du personnel chargé de la gestion du site et de son interprétation ainsi que des communautés associées et locales, ceci, afin de suivre les progrès et les innovations dans le domaine. |
| **7.** International cooperation and sharing of experience are essential to developing and maintaining standards in interpretation methods and technologies. To that end, international conferences, workshops and exchanges of professional staff as well as national and regional meetings should be encouraged. These will provide an opportunity for the regular sharing of information about the diversity of interpretive approaches and experiences in various regions and cultures. | **7.** La coopération internationale et le partage d'expérience sont essentiels à l'élaboration et au maintien de normes dans les méthodes et les techniques d'interprétation. A ces fins, il conviendrait d'encourager l'organisation de conférences internationales, d'ateliers, de réunions au niveau national et local et l'échange des professionnels. Ceci afin d'offrir la possibilité d'un partage régulier d'informations sur la diversité des approches et des expériences d'interprétation dans les diverses régions et cultures du monde. |

# APPENDIX E – Possible Sign Materials for Interpretive Signs

Following is a partial list of available materials to consider.

*Anodized aluminum*. Also known as Duratone, Dura-Etch, and Novalloy. Very expensive, but its long life and low maintenance costs make the product cost-efficient. Very susceptible to scratching, but impervious to weather. Finish is in gold, bronze, or silver tones. Recommended for use in high-visitor-use areas. It is also the media of choice for recognition plaques. Can use photos in the process at an extra cost.

*Embedded fiberglass*. Also known as Modulite and Fibrex, this is a process that produces a screen print substrate encapsulated into layers of fiberglass. Available in multiple colors. An attractive sign that is very resistant to shattering, weathering, fire, and graffiti and can be applied to virtually any surface. Available in 1/16- and 1/8-inch thicknesses.

*Photometal*. An aluminum alloy electronically treated to produce a colored corrosion- resistant surface. Available in various shades of aluminum, bronze, and gold. Excellent longevity. Weather resistant and relatively vandal resistant.

*Plexiglass*. Common plexiglass with the screened image on the reverse side. Fairly scratch resistant, but does become brittle with age and will shatter on point impact. Best suited for interior use.

*Polycarbonate*. Also known as Lexan and Tuffak, this is a clear material with impact strength about 250 times stronger than glass. It is ultraviolet stabilized and is available in a full range of colors. Comes in standard sheet sizes and 0.75 and 0.125 millimeter (mm) thicknesses. Similar to plexiglass but softer and does not shatter on point impact. A matte velvet finish must be ordered as the gloss finish is very susceptible to scratching. Suitable for either interior or exterior use. The thinner mm (10–23 mm) can be used on Masonite, metal, fiberglass, or other materials and is relatively inexpensive. Image is reverse silkscreened. Resolution of the graphics and text suffers slightly in comparison with fiberglass-embedment process but is considered a "star performer."

*Porcelain enamel*. Also known as Dura-Enamel and Enameltec. The process is a fired-on, opaque, glassy coating on metal. Infinite variety of colors as well as gloss, semi-gloss, pebbled, or mottled finishes are available. Guaranteed for 25 years. Used for interior or exterior in high visitation areas. It is very weather resistant and vandal proof but is easily shattered by bullets or excessive impact. One of the most attractive sign materials on the market. Cost is competitive with the rising costs of embedded fiberglass or metal signs. Requires little or no maintenance.

*Rigid vinyl*. Material comes in 10, 20, and 30 mm thicknesses. Durable, but best used inside as exposure to the elements and ultraviolet rays tends to crack and warp it. Costs are low. Multiple colors can be used.

*Screened sign board*. Direct screen printing on a prepared medium density overlay (MDO sign board). Signs must be primed and finish coated with exterior enamel, then sent to a screen printer along with camera-ready artwork. Sign is ready to mount on uprights without having to be attached to a board.

*High Density Urethane*. This material is a great answer to applications where sandblasted wood is desired. It does not crack, check, warp, decay or decompose as wood does. It is virtually permanent and waterproof. The final sign is stained or painted. Routed letters can be filled in with various vinyl

or specialized paint for desired effect. One product TC Resin, offers a wide variety of colors and is very durable. If designed and fabricated properly a casual observer will never guess it is not wood. Its logical use is for site and facility identification. It is used heavily in the advertising industry. Large format signs would need to have a backing of re-enforcement. Values of the material are the minimal amount of future maintenance and the economic initial cost.

*Extruded High Density Polyethylene (PolyCarve)*. Originally developed for the marine industry, the material is extremely durable as compared to wood alternative and offers virtually 0 maintenance. Up to three layers of polyethylene are bonded through an extrusion process called "A/B/A" format. The surface ("A") being one color with the contrasting core ("B") underneath. The blank can be routed out to expose a color underneath or the surface material can be routed away leaving a raised surface (letters or simple images) in another color. The logical and best application is for site and facility identification as well as travel management and trail markers. The material can accept blows and scratching over time without usually affecting readability of the sign. It will not crack, warp, oxidize, or suffer UV deterioration. Withstands temperatures as low as – 40degrees F and has the ability to repel graffiti. It has some flexible characteristics and as such may require metal or wood reinforcement for proper support. Plastic Lumber (posts) may be used for the support as well. A full set of International Recreation Logos is officered for varied applications.

*Cast Metal*. Good for commemorative plaques, title plaques, and historical markers. Provides tactile lettering accessible to people with limited vision. Fabricators make a mold of your design and fill it with molten aluminum, bronze, or iron to create a thick plate with raised letters and pictures. Can create textured backgrounds, fancy borders. Graphics limited to large letters and simple line drawings and limited color choices and as such is generally not a good choice for interpretive signing. Very costly, but durable, weatherproof, and vandal resistant. When cost is a factor and the effect of a plaque is still desired there are a number of plastic simulated bronze alternatives that may serve the purpose if properly protected.

*Stone Imagery*. Fabricators carve, etch, or sandblast marble, limestone, granite or other stone. Chemical etching requires a softer stone. Low contrast lettering, graphics are limited to line art and half tones. Moderately hard to mount. Usually needs commercial sign application. Very durable, resisting all influences except geologic time. Good subtle, native material for a short message. Great tactile elements for audience appeal and accessibility, and appropriate in parks and for industrial sites. A beautiful material that can set a strong identity for a site or facility and also has a great application for trailside labels for plants, landscape features or geological interpretation.