Digital Documentation of Monuments

RTI and Photogrammetry in Emanu-El Cemetery, Victoria BC

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Introduction

For the past three years, the University of Victoria has been running a field course in the Emanu-El Congregation Cemetery in Victoria BC, teaching heritage archaeology and conservation.

The work being done has been based on learning opportunities for the students, as well as the wants of the community. Our goal is to help them document the monuments and help with conservation.

Cemetery History

Discovery of gold in the Fraser Valley in 1858 prompted immigration of Jewish settlers to Victoria (1). On February 5th 1860, the Emanu-El cemetery in Victoria B.C. was consecrated for use (2).

Following a fire in the cemetery in 1890, and the destruction of wooden monuments, marble and granite became popular, with marble eventually being phased out in favor of granite (1).

Research Questions

For this independent project, the goal was to continue documentation of gravestones with inscriptions that are either indecipherable to the naked eye, or those with inscriptions that are in danger of severe degradation in the near future.

• What is the difference in Reflectance Transformation Imaging (RTI) versus photogrammetry for ease of use?
• What aspects of monuments does each technique capture best?
• What are the challenges faced using these techniques in this cemetery?

Photogrammetry

What is photogrammetry?

• The use of a series of overlapping images measuring distances between features on surfaces, creating a 3D model (3).

Josh Althouse – Plot E15

*Several lines of Hebrew?*

In Memory

Of

JOSH

(Beloved Son of)

S & B2 ALHOUSE

Born (7)

April 30 1900

Died

July 4 1991

Son of Samuel and Betty Althouse, died at age 1 year, 2 months. Marble monument covered in pollution deposits, weathered and cracked – damaged from falling over, placed face up in a concrete body stone.

Lena Adelson – Plot E16

IN MEMORY OF

LENA

BELoved WIFE OF

A. ADELSON

DIED

AUG 17 1903

AGED 44 YEAR

Born in Russia in 1859. Marble monument, placed face up after damage from falling over. Severe weathering, pollution deposits and beginning growth of moss and lichen.

The Process Involves:

• Camera calibration: Capture the measurement distance calibration and lens focus.
• Image capture: 5-10 images per monument.
• Image processing: Images processed through Photoscan, Visual mapping completed Cloud Compare.
• Process time per monument: 1-2 hours.

RTI

What is Reflectance Transformation Imaging?

• Taking a series of photographs in a shape of a dome over the monument with a wireless flash (4).

Wolf Casper – Plot D10

In memory

Of

WOLF CASPER

Died

Oct 29 1907

Aged 86 Years

Marble monument, weathered, pollution deposits and broken into three sections from falling over. Placed face up. Surface normals of RTI abnormal.

Samuel S. Hyams – Plot E11

(In Loving Memory?)

Of

SAMUEL S HYAMS

Resident of ?

London (Eng-2)

Died

Oct 9 1894

Aged 53 Years

Large marble monument, two of four sides bear inscriptions, neither readable by naked eye. Monument sits on a base shared with a second monument. Second inscription possibly commemorating Solomon Samuel Hyams, though he is listed as buried in plot F27.

The Process Involves:

• Multiple Flash Images: 50-100+ photos are taken from different angles.
• Image Processing: RTI Builder used to condense images into a .ptm (Polynomial Texture Mapping) file.
• Visual Mapping: .ptm file opened in RTI Viewer, filters and light movement are applied to highlight inscriptions.
• Process time per monument: 3-5 hours.

Discussion

Differences Between RTI and Photogrammetry

• RTI was better capable of capturing inscriptions and minute details.
• Photogrammetry is better at capturing motifs and rendering the original shape of the monument.

How Can RTI and Photogrammetry Help Cemeteries

• Both technologies can be used to recover and restore inscriptions, motifs and the original shape of fallen and decayed monuments.
• They can contribute to the rediscivery of individuals buried in cemeteries.
• They can be used with other methods to restore lost histories.

Technological Challenges

• The equipment and software both are expensive, although the RTI software is open source.
• Elemental exposure remains complex.
• Both require expertise in setup and execution.
• Challenging for novice users in restoration projects.

Bibliography


Fig. 1. – Front gate to Emanu-El Cemetery.

Fig. 2. – In Loving Memory, plot D10.

Fig. 3. – In Loving Memory, plot E15.

Fig. 4. – In Loving Memory, plot E16.

Fig. 5. – In Loving Memory, plot E11.