

**Heritage Impact Assessment on Duddell Street Steps and Gas Lamps**

**BACKGROUND**

Under Agreement No. CE32/2004(GE) for the Upgrading / Improvement (U/I) of Roadside Slope / Retaining Walls on Hong Kong Island (2005-2008 Programme) – Investigation, Design and Construction, Highways Department (HyD) has proposed to upgrade and enhance the stability of an existing retaining wall (Feature No. 11SW-B/R93 sub-division 1) located adjacent to a declared monument – the Duddell Street Steps and Gas Lamps (the Monument), which are situated at the end of Duddell Street and between Nos. 20-22 Ice House Street, to meet current safety standard.

2. Ove Arup & Partners Hong Kong Ltd (Arup) is assigned under this Agreement as the project consultant responsible for the site investigation, detailed design and supervision of the construction works. The proposed U/I works involve installation of soil nails, construction of skin walls, installation of masonry facing and landscaping works for the retaining wall. All possible direct and indirect impacts during the construction and operation periods to the heritage site will be identified in the Heritage Impact Assessment (HIA) with appropriate mitigation measures.

**STATEMENT OF CULTURAL VALUE**

3. The Duddell Street Steps and Gas Lamps were declared as a monument in 1979. It is believed that the Duddell Street Steps and Gas Lamps were built between 1875 and 1889. The gas lamps in two-light Rochester models constructed on lanterns shape balusters fully demonstrate the adaptation of a western construction style to Hong Kong's local culture and climate.

**Social Significance**

4. As the only working gas lamps still exist in Hong Kong, the gas lamps on Duddell Street, constructed in two-light Rochester models, have lit the Central districts every night for over a century and symbolised the unique social significance and collective memories of the Hong Kong people. The romantic atmosphere generated by the gas lamps every evening has attracted many visitors, movies and television programmes producers to take

photography scene at the classical stone steps and the ancient gas lamps. The Monument has become one of the famous points of interests in Hong Kong.

### **Historical Significance**

5. The Duddell Street Steps and Gas Lamps, which are located in the Central district, have been serving the society for more than 100 years as a linkage between the mid-levels and the Central. The Hong Kong SAR Government has once proposed to conserve the 4 numbers of gas lamps in the Hong Kong Museum of History but for historical interest, these gas lamps were retained at their original locations and maintained by the Hong Kong and China Gas Company. The Duddell Street Steps and Gas Lamps, declared as monuments in 1979, have symbolised the historical significances of fabric construction in the early days and acted as the witness of time changes in Hong Kong.

### **Architectural and Aesthetic Significance**

6. Back in 1842, the Central district was zoned for Westerners only, and Chinese residents had resided in Sheung Wan district. Many “Western-style buildings” were built at the Central district. Built in the 18<sup>th</sup> century, the Duddell Street Steps and Gas Lamps have adopted the western construction styles which can be reflected in both the patterns of lantern shape balustrades and golden colour lamp posts. The architectural and aesthetic significance can also be seen through the construction details of the arch lintel at both storeroom entrances.

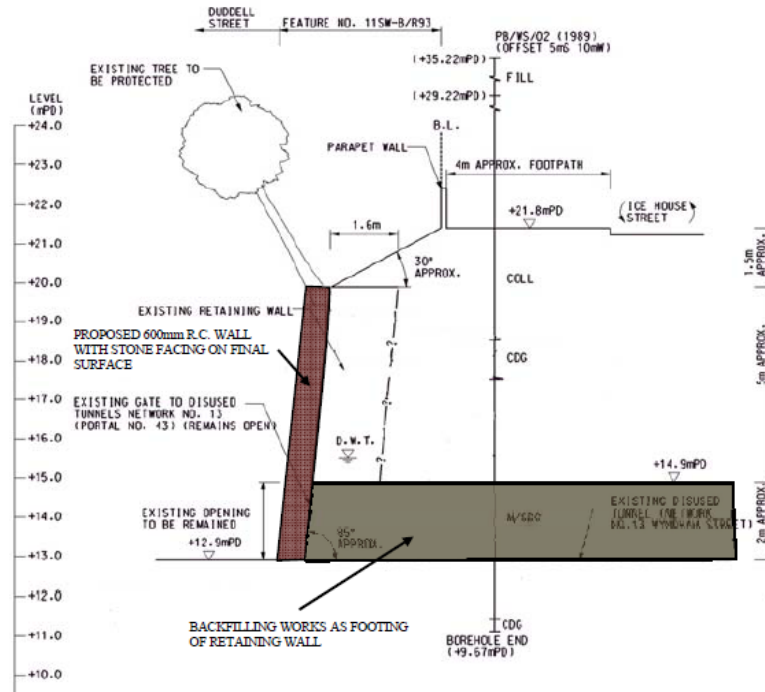
## **CURRENT STATUS OF THE DECLARED MONUMENT**

7. The Duddell Street Steps and Gas Lamps are open to public and served as a connection between Ice House Street and Duddell Street. The storerooms located underneath the stone steps are locked by the Food and Environmental Hygiene Department for other purposes. HyD has taken up the maintenance responsibilities of the four gas lamps and the stone steps since 2009.

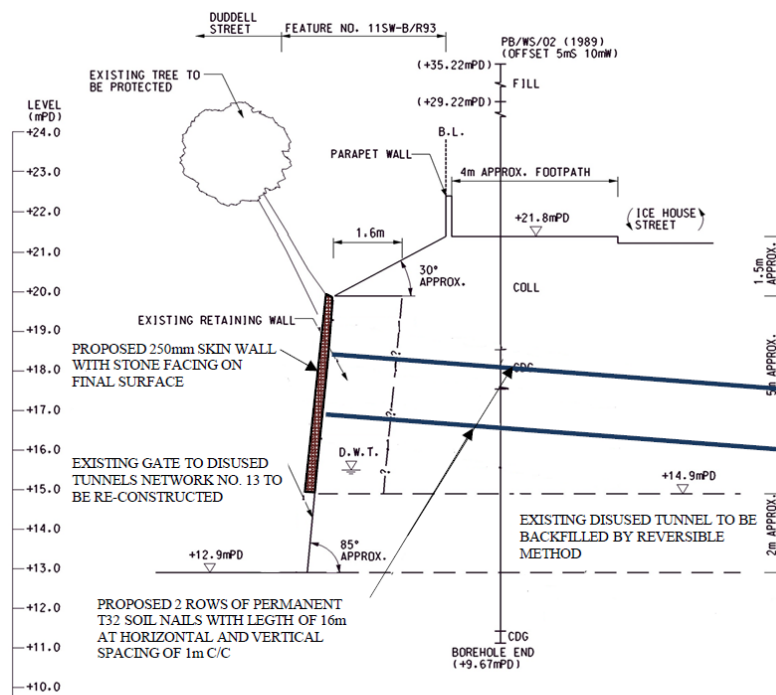
## **THE PROPOSED U/I WORKS OPTIONS**

8. Four options proposed to upgrade the retaining wall have been considered in the HIA:

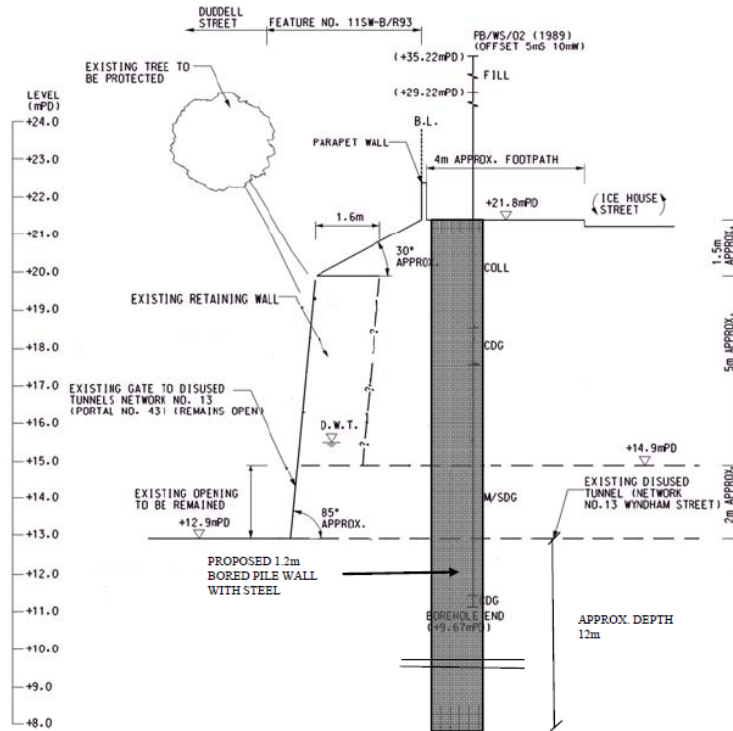
- Option 1 Construction of a 600mm thick reinforced concrete (RC) wall with stone facing in front of the existing retaining wall and backfilling works by mass concrete acting as the footing of the RC wall.



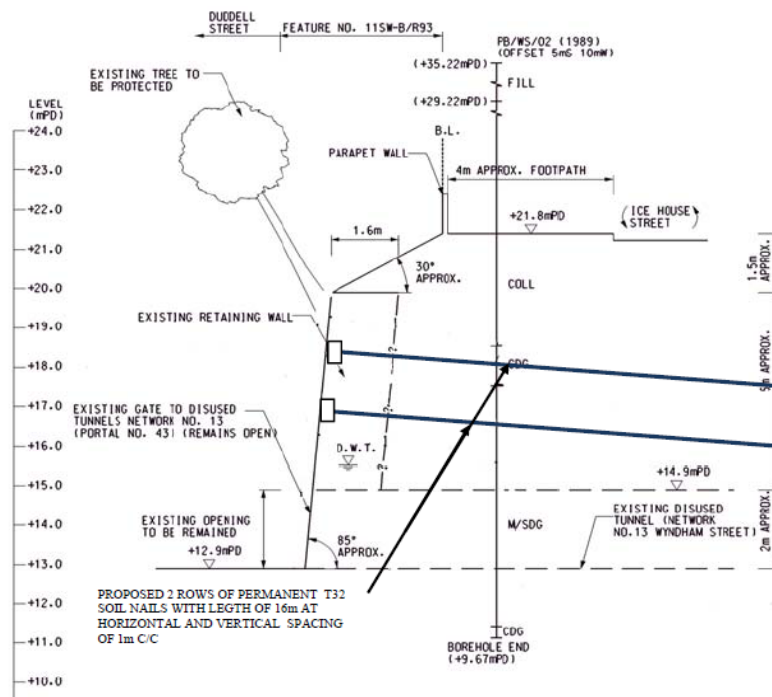
- Option 2 Installation of soil nails of approximately 16m long at 1m c/c horizontal and vertical grid pattern and construction of a 250mm thick skin wall with stone facing 300mm in front of the existing retaining wall.



Option 3 Installation of about 7 numbers of 18m long, 1.2m diameter bored pile wall with 1.8m c/c spacing along the crest of the retaining wall.



Option 4 Installation of soil nails of approximately 16m long at 1m c/c stagger pattern. The original masonry blocks will be replaced by masonry facings of similar colour.



**RECOMMENDATION FOR U/I WORKS**

9. In consideration of the existing site environment, traffic conditions, construction cost, tree preservation feasibilities, possible impacts to the Monument (including vision impacts and nuisance to visitors), Option 2 is recommended as the proposed U/I works for the retaining wall.

10. Option 1, 3 and 4 are not recommended for the proposed U/I works in view of the following reasons:

Option 1: Construction of a RC wall (600mm thick) will visually cover half of the granite arches of the store room #1 which located at both sides of the Duddell Street Steps. From the heritage preservation point of view, it is not recommended.

Option 3: Installation of bored pile wall along the crest of the retaining wall may have the least visual impact to the Monument but the risk of direct impact to the Monument and brittle failure of the masonry wall will be larger during construction. Also, the traffic condition of Ice House Street will be seriously affected. From both the heritage preservation and engineering point of views, Option 3 is not recommended.

Option 4: Installation of soil nails without skin wall may have less visual impact to the Monument. However, the brittle failure of the masonry wall cannot be solely overcome by soil nails. It cannot meet the current safety standard required by GEO therefore this option is not recommended.

11. On the other hand, Option 2 has given due consideration to the abovementioned constraints and is recommended as the preferred design option. Moreover, installation of soil nails is less sensitive to undetected adverse geological features, and thus it is more robust and reliable than other slope upgrading methods. All soil nails will be installed 4 m below the existing ground level (Ice House Street) in order to minimize the damage of existing utilities including the gas pipes.

12. The main purpose of the proposed skin wall is to enhance the structural stability by connecting all the proposed soil nails together to form a complete structure and prevent the weak brittle failure of the existing masonry wall. The 300 mm gap between the proposed skin wall and the existing retaining wall will be filled with aggregates for the existing tree roots. The proposed

skin wall will be covered by masonry facing which matches with the surrounding.

13. None of the fabric of the Monument, including the stone steps and gas lamps, will be disturbed during and after the proposed construction works. The existing accesses to the storerooms will not be blocked after the proposed U/I works. In addition, for structural stability reasons, backfilling the concerned disused tunnels in reversible methods, such as rock fill material or the like which can be removed from the tunnels by others if necessary, is also adopted in the design of Option 2. For security reasons and to bring the design into harmony, new doors matching the surrounding atmosphere will be provided and installed in front of the portals after the proposed U/I works. Photomontages and location plan showing the walls before and after the proposed U/I works are attached in **Appendix A** for reference.

14. In the design of the U/I works, the condition of the existing wall trees (*Ficus virens* var. *sublanceolata*) growing on the retaining wall has been considered. A gap of approximately 300 mm thick filled with aggregates will be reserved between the existing masonry wall and the back of the proposed skin wall in order to allow sufficient air circulation and prevent suffocating the tree roots. Similar design has been successfully adopted at Feature No. 11SW-C/R307 at the Bethanie in Pokfulam. Photos showing the Feature No. 11SW-C/R307 are attached in **Appendix B** for reference. During Construction, the wall trees will be closely monitored by certified arborist, and tree protection measures (such as covering the tree stems and roots by hessian bags) will be implemented.

## **CONSERVING THE CHARACTER DEFINING ELEMENTS**

15. The following conservation principles will be adopted for the Monument:

- (a) to retain the essential design,
- (b) to ensure the stability and longevity of the fabric, and
- (c) to retain all elements of the Monument which are considered to have cultural, historical, social, architectural and aesthetic significance while implementing the proposed U/I works.

16. The following individual elements shall be conserved as they form an integral part of the Monument, and serve as character defining elements of the place with different levels of significance:

<b>Significant Features</b>		<b>Levels of Significance</b>
<b>Stone Steps</b>		
<ul style="list-style-type: none"> <li>▪ Parapet Walls</li> <li>▪ Box newels</li> <li>▪ Granite stone staircase including the two landings and 56 treads</li> <li>▪ Granite stone handrailing including all original and imitation balusters</li> <li>▪ Granite masonry blocks on the sidewalls of the staircase and their patterns</li> </ul>		High
<b>Gas Lamps</b>		
<ul style="list-style-type: none"> <li>▪ 4 gas lamps including the lamp posts and lampshades</li> </ul>		High
<b>Storerooms underneath the Staircase</b>		
<ul style="list-style-type: none"> <li>▪ Storeroom with a granite arch lintel above a wooden door (Storeroom #1)</li> <li>▪ The arch ceiling in Storeroom #1</li> <li>▪ The black wooden door and transparent glass window at the southern side of Storeroom #1</li> <li>▪ The brick transom window with steel frame at the northern side of Storeroom #1</li> <li>▪ The granite beams at the ceiling of Storeroom #2</li> </ul>		High

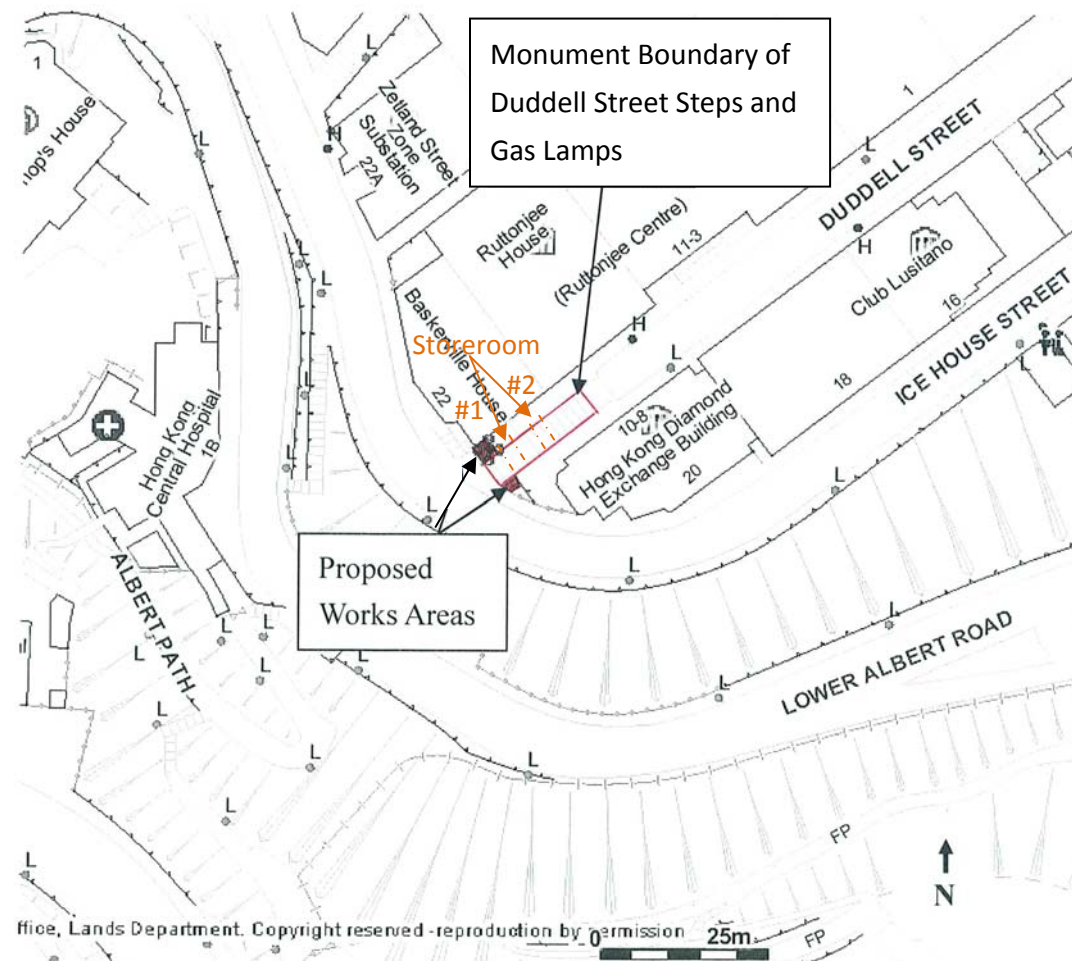
## **POTENTIAL IMPACTS AND MITIGATION MEASURES**

17. It is anticipated that minimal adverse impacts will be induced to the Monument and the surrounding fabrics. The potential impacts are shown below for reference :

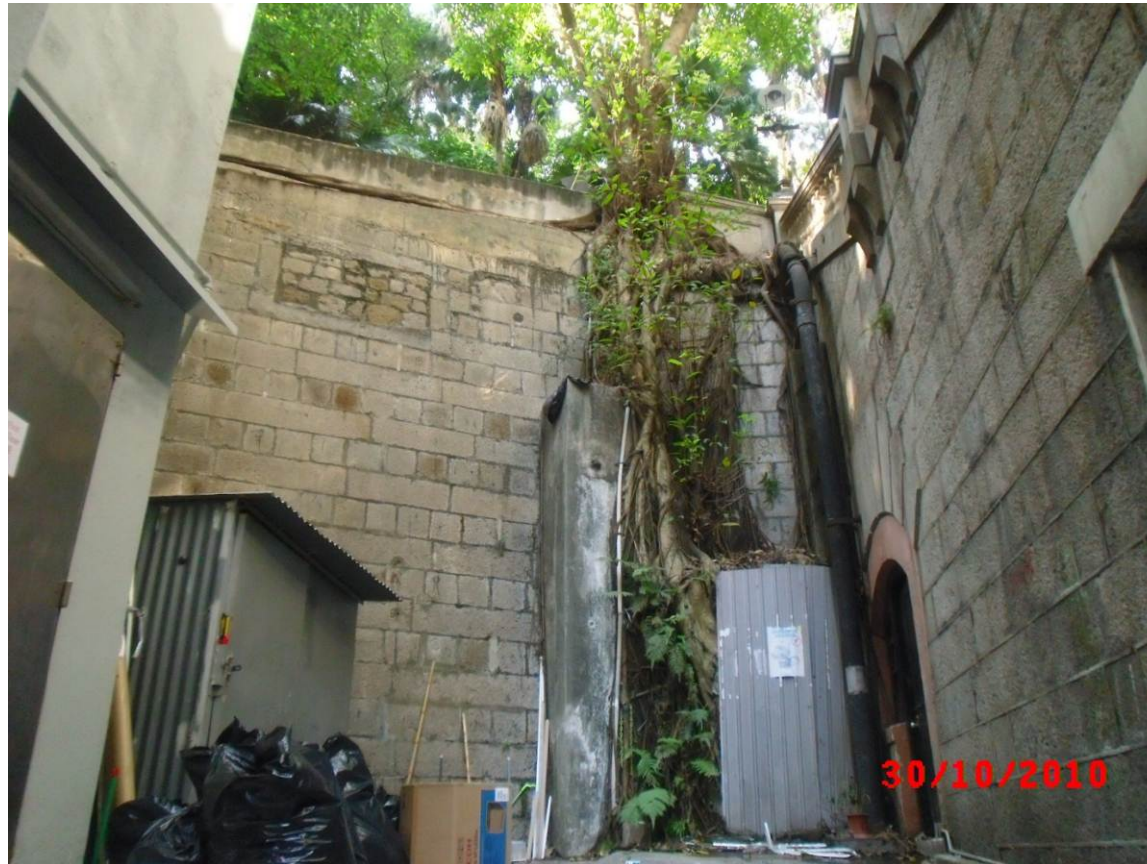
**Potential Impact during the installation of soil nails and skin walls**

<b>Affected Elements</b>	<b>Mitigation/ Precaution Measures</b>
Impact on the Stone Steps and Gas Lamps on Duddell Street	The historical fabric of the Monument will not be disturbed by the U/I works. The design of the skin wall will be in harmony with the Monument. Temporary protection as well as vibration and settlement monitoring will be carried out during the construction works period to ensure that no adverse effects will be induced to the Monument.
Impact on the retaining wall	The final wall finish will be covered by masonry facings.
Impact on underground utilities	All soil nails will be installed 4 m below the existing ground level of Ice House Street.
Impact on the health of existing trees	The tree condition will be closely monitored by certified arborist and tree preservation reports will be prepared every 2 months. A gap of approximately 300 mm will be reserved between the face of the existing masonry face and the back of the proposed skin wall. Aggregates will be placed inside the gap to provide a better environment for the roots of the existing wall trees to grow.





## Location Plan of the Duddell Street Steps and Gas Lamps and the Proposed Works Areas



**General View of Feature No. 11SW-B/R93 (Portal 44) before the Proposed U/I Works**

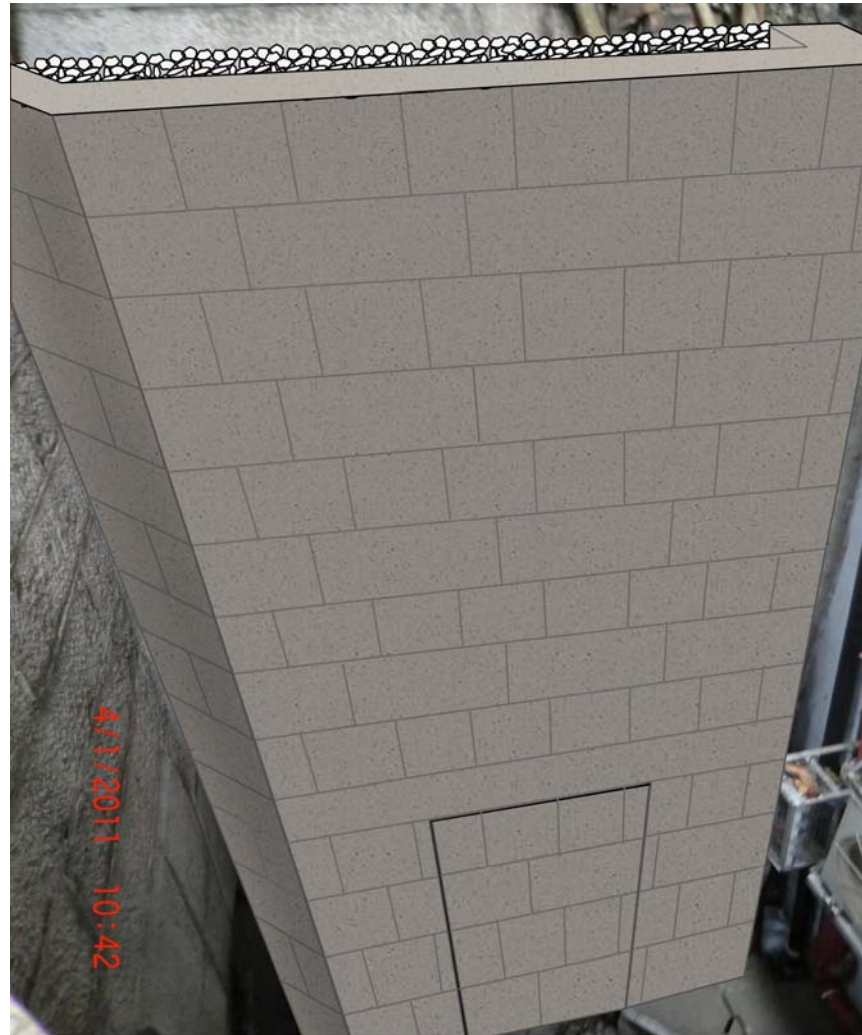


**Photomontage of Feature No. 11SW-B/R93 (Portal 44) after the Proposed U/I Works**









**General View of Feature No. 11SW-B/R93 (Portal 43) before the Proposed U/I Works**





**Photomontage of Feature No. 11SW-B/R93 (Portal 43) after the Proposed U/I Works**

Job title	Contract No. HY/2008/18			Job number:	24506
Location	Bethanie, Pokfulam				
					
Subject	Feature No. 11SW-C/R307 (Plate 1)		Date photograph taken	30-Apr-03	
Description	General view of the feature before upgrading works				
					
Subject	Feature No. 11SW-C/R307 (Plate 2)		Date photograph taken	1-Dec-05	
Description	Formwork erection for the gap between the proposed mass concrete wall and existing masonry wall				



Job title	Contract No. HY/2008/18			Job number:	24506
Location	Bethanie, Pokfulam				
					
Subject	Feature No. 11SW-C/R307 (Plate 3)			Date photograph taken	30-Nov-05
Description	View showing concreting works				
					
Subject	Feature No. 11SW-C/R307 (Plate 4)			Date photograph taken	20-Dec-05
Description	Mass concrete wall with masonry facing				

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Job title	Contract No. HY/2008/18			Job number:	24506
Location	Bethanie, Pokfulam				
					
Subject	Feature No. 11SW-C/R307 (Plate 5)			Date photograph taken	7-Jan-06
Description	Aggregates were filled in the gap for the existing tree roots				
					
Subject	Feature No. 11SW-C/R307 (Plate 6)			Date photograph taken	9-Feb-06
Description	Aggregates were filled in the gap for the existing tree roots				



