

Territory Development Department
The Government of Hong Kong Special
Administrative Region

Agreement No. CE 71/95

***Texaco Road Improvement between Texaco Road
Interchange and Tsuen Tsing Interchange***
Environmental and Engineering Investigation

***Final Environmental Impact Assessment
Report Executive Summary***

Mouchel Asia Environmental

in association with

Aspinwall Clouston
and
MVA Asia

March 1998

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and Tsuen Tsing Interchange
Environmental and Engineering Investigation***

***Final Environmental Impact Assessment Report
Executive Summary***

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Checked by	S. V. Jones	Project Manager	<i>S. V. Jones</i>	31/3/98
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1.0 INTRODUCTION

1.1 Background

The findings of the Completion of Texaco Road/Tsuen Wan Bypass Interchange and Improvements to Texaco Road : Final Report, issued in 1986, concluded that the Texaco Road improvements should be divided into three work packages; the initial, intermediate and ultimate schemes. The initial and intermediate scheme works were completed in 1993 and 1995 respectively. The 'ultimate' scheme comprises two broad elements; a single two-lane flyover from Castle Peak Road/Texaco Road Interchange to Tsuen Tsing Interchange, approximately 700m in length, and the realignment of Tai Wo Hau Road.

Mouchel Asia Limited, in association with MVA and Aspinwall Clouston, were commissioned in January 1997 to undertake an environmental and engineering investigation of the ultimate scheme proposed during the feasibility stage. The layout of the project is shown in Drawing 1.

The traffic and transportation study, undertaken as an integral part of this project, has concluded that in order to avoid the Texaco Road flyover reaching its capacity and causing significant problems to the road users, it would be appropriate to implement the ultimate scheme works as soon after 2001 as possible. The current developed implementation programme has indicated that commissioning of the project should be attainable by mid-2003, depending upon the achievement of the interim programme milestones, with construction starting at the end of the year 2000.

1.2 The Environmental Impact Assessment

The Environmental Impact Assessment (EIA) identifies sensitive receivers within the study area, defines environmental parameters and features likely to be affected by the proposed project and sets out the criteria and methodology on which noise, air quality and landscape and visual impacts assessments have been based. The EIA has evaluated impacts during both the construction and operational phases.

Future year traffic flow predictions, developed by the traffic and transportation study and approved by the Transport Department, have been utilised in the assessment of operational air and noise impacts. Air quality and noise impact assessments have been based on the worst case scenario in the design year.

Mitigation measures have been recommended for predicted environmental impacts arising from the proposed improvement works where these exceed the relevant standards and guidelines.

This Executive Summary presents a precis of the findings of the EIA.

2.0 IDENTIFICATION OF SENSITIVE RECEIVERS

2.1 Air and Noise Sensitive Receivers

Sensitive receivers along the existing Texaco Road and Tai Wo Hau Road have been identified in accordance with the Hong Kong Planning Standards and Guidelines. The study area accommodates a variety of sensitive landuses but consists largely of high rise residential developments. The majority of sensitive receivers are located in Texaco Road itself, although representative locations on Tsuen Fu Street, Tai Wo Hau Road, Tai Ha Street and Shek Tau Street have also been selected. These areas can be seen on the project area plan in Drawing 1.

A future development at the Kwai Lok Temporary Housing Area has also been included in the assessment. In addition, the Crown of Thorns Church will have to be demolished in order for the improvement works to be completed but as the timescale for demolition and whether the property will be reconstructed on the original site is not known, it has been assumed, for the purposes of the EIA, the existing church and a proposed new church building could be affected by both the construction and operational noise impact assessments, respectively.

2.2 Landscape and Visual Sensitive Receivers

Existing landscape features such as vegetation, topography, open space and recreation facilities as well as buildings and structures have been included in the assessment of the landscape impact. Visually sensitive receivers (VSRs) are those areas within the study area, which has been confined to the limit of works and immediately adjacent properties, with clear views of the affected area and may suffer adverse visual intrusion as a consequence of the works. This comprises all residential developments but also includes public areas such as sitting out areas.

3.0 CONSTRUCTION PHASE IMPACTS

3.1 Environmental Monitoring and Audit

Construction phase impacts will be regulated by an Environmental Monitoring and Audit (EM&A) programme which will monitor noise and air quality impacts. An EM&A Manual has been summarised in the EIA Report and issued under separate cover and defines the monitoring requirements of the programme.

3.2 Noise Impacts

Three broad construction activities have been identified as having the potential to generate noise impacts at nearby NSRs and these are excavation; filling; and construction, the latter being further subdivided into various operations associated with at-grade roads and viaducts. Due to the close proximity of the sensitive receivers and the confined nature of the works area, exceedances of the recommended daytime construction noise limit of 75 dB(A) have been predicted from these operations.

Appropriate mitigation measures have been recommended in the EIA and include the incorporation of silencers on exhaust pipes, the use of mufflers and construction of temporary noise barriers and enclosures. The application of these measures has been shown to reduce noise levels to acceptable levels and thus, predicted mitigated noise levels will meet the daytime construction noise criteria of 75 dB(A).

3.3 Construction Dust Impacts

With the adoption of general control measures both the predicted 1-hour and 24-hour dust concentrations at the representative sensitive receivers are consistently below their relevant Air Quality Objectives. The following general control measures will be applied to ensure that acceptable dust levels are maintained:

- watering of unpaved roads and dusty activities;
- watering of exposed areas every 1.5 hours;
- limit dropping heights for excavated materials during handling and loading/unloading operations;
- dampen or cover material during transportation;
- do not load material to a level higher than the side and tail boards during transportation; and
- all stockpiles of aggregate or spoil should be covered and watered.

3.4 Landscape Impacts

Landscape elements which will be affected during the construction stage include the parks, landscaped amenity areas and sitting out areas. The Circular Park under the Interchange may be slightly affected by slip road demolition works at the Texaco Road Interchange and some plant loss may occur due to the need for site hoarding. A landscaped area at the side of Jade Court will have to be removed to provide emergency vehicular access for the building.

Existing amenity planting under the existing flyover will need to be removed in order to allow the construction of the new road, producing a permanent loss of roadside amenity. This currently provides visual relief at ground level for pedestrians and the loss of this planting will be important reduction of the baseline condition. In addition, Tai Wo Hau Road is currently an interesting streetscape of high local value and very sensitive to change. Construction works will require the felling of a large stand of mature trees and the demolition of the sitting out area outside Fu Keung House and the permanent loss of these trees is considered to have an adverse impact.

Measures to mitigation these impacts have been recommended and include:

- screen planted areas from the works site by temporary fencing or hoarding;

- transplant notable plant species prior to the commencement of construction; and
- provide new amenity areas nearby.

Assuming these measures are incorporated the residual landscape impacts of the project should be minimised in the long term. A Landscape Master Plan has been prepared and the residual impacts will be acceptable.

3.5 Visual Impacts

Construction between Tai Wo Hau Road and Texaco Interchange will occur between 'walls' of existing buildings and thus many residential properties will overlook the construction site. The working area will be tightly constrained and pedestrian circulation, public amenity and views from the adjacent VSRs will be severely disrupted and the baseline condition will be substantially reduced.

The construction works are predicted to present a substantial visual intrusion at the school and a high intrusion at the Circle Park, Crown of Thorns Church, if the property has not been demolished prior to the commencement of the construction activities, and the Tai Tak and Wang Wah buildings.

Recommended mitigation for the impacts include the reduction of the construction period to the absolute minimum and, wherever possible, provide hoarding which will screen off views of construction.

Landscape impacts will be both temporary and permanent in nature. Temporary residual impacts are not anticipated to be significant while the mitigation measures for the permanent impacts are outlined in Section 4.3.

4.0 OPERATIONAL IMPACTS

4.1 Noise Impacts

The traffic noise assessment was based upon predicted peak hour traffic flows at 15 years after the anticipated commissioning of the scheme.

Due to the constraints of the site area, there are no real options for aligning the road away from the sensitive receivers. Thus, as these receivers are so close to the proposed scheme, predicted noise levels during the operation of the scheme will exceed the 70 dB(A) criteria at the majority of representative sensitive receivers and extensive mitigation measures are required.

Direct mitigation has been evaluated prior to assessing the eligibility of indirect technical remedies in the form of insulation and air conditioning systems. The opportunity for direct technical remedies has been limited by the need to allow emergency vehicular access (EVA) to the adjacent buildings. Thus, the majority of direct mitigation along the southbound carriageway of Texaco Road, between the interchange and the existing Tai Wo Hau Road, has been rejected on these grounds.

The recommended mitigation scenario comprises a combination of 7 top-bent barriers, all 5.5m in height with overhang widths varying between 1.0m and 8.0m. These represent the maximum practicable direct mitigation measures that can be applied within the constraints imposed by the need to provide EVA to the properties adjacent to Texaco Road and engineering feasibility. The direct mitigation measures do provide attenuation of the operational noise levels but not to within the acceptable standard at most dwellings. The locations of the noise mitigation structures are shown on Drawing 2 and cross-sections of the barriers detailed in Drawings 3a, 3b and 3c.

In respect of dwellings that are exposed to future residual traffic noise levels exceeding the limits recommended in the HKPSG of 70dB(A), or 65dB(A) for the schools, after all direct technical remedies have been applied, eligibility for indirect technical remedies in terms of acoustic insulation and air conditioners has been assessed.

In total, approximately 1400 dwellings are eligible for consideration for indirect technical remedies, subject to ExCo approval.

4.2 Air Quality Impacts

The worst case year for traffic flows and emission factors was determined to be 2011 for the air quality impact assessment. Determination of carbon monoxide, respirable particulates and nitrogen dioxide levels was undertaken to assess the operational air quality impacts resulting from the improvement works and the inclusion of the direct mitigation measures discussed above.

The predicted levels obtained showed that, both with and without the direct mitigation in place, levels of CO, RSP and NO₂ would be within their relevant Air Quality Objectives. Thus, no operational air quality mitigation is required.

4.3 Landscape Impacts

No additional landscape impacts are expected during the operational phase. However, measures to mitigate the long-term landscape effects caused during the construction phase include:

- existing trees will be preserved as far as possible. At the detailed design stage, a tree survey will be carried out to supplement the survey undertaken for inclusion in this EIA, which will include plotting the exact location and level of the existing trees. Such information will be used to check against the proposed road alignment, with the objective of preserving them within the road median, sidewalk or roadside amenity area;
- incorporate new planting and innovative hardworks under viaduct streetscape;
- as far as possible, felled trees will be compensated by new healthy trees of the original quality and quantity (subject to commercial availability and site constraints), or at least able to grow into mature trees of the original quality and quantity;

- provide new landscape buffer between Fu Keung House and Tai Wo Hau Road;
- provide street tree and roadside planting;
- incorporate new planting onto new slopeworks; and
- reinstate any amenity areas with species which can tolerate overshadowing.

4.4 Visual Impacts

The new flyover structure and noise mitigation measures will create a substantial change in the visual baseline for most sensitive receivers, particularly those along the northern end of Texaco Road and Tai Wo Hau Road.

In order to mitigate the operational visual effects of the scheme a key element will be the design of noise mitigation structures. It is recommended that a steel frame is used together with Plexiglas reflective material to appear as lightweight and transparent as possible for the non-absorptive sections and should have an architectural colour scheme to unify the variety of structures to be included. The appearance of the absorptive walls should be sensitively designed to avoid any unattractive tunnel like streetscape. Texture, colour and patterns should be included on the outside of the absorptive panels. The flyover structures should be designed to compliment the existing structure and ensure visual consistency. In addition, the design of the new flyover and the noise barriers should be integrated in to minimise the visual impact of columns at ground level.

Other measures to reduce the residual visual impacts will involve framing the at-grade roads with trees and shrubs, transplant any exemplary species to alternative locations, provision of new open space and use sculptural hard landscape elements under the new flyover structure. These should be extended to include paving, lighting, and the design of columns and parapets.



- Legend:
- Proposed Flyover
 - Proposed at Grade Works

Rev	Issue Stat	Amendment	By	App	Date
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Client: TERRITORY DEVELOPMENT DEPARTMENT, HONG KONG
TSUEN WAN DEVELOPMENT OFFICE

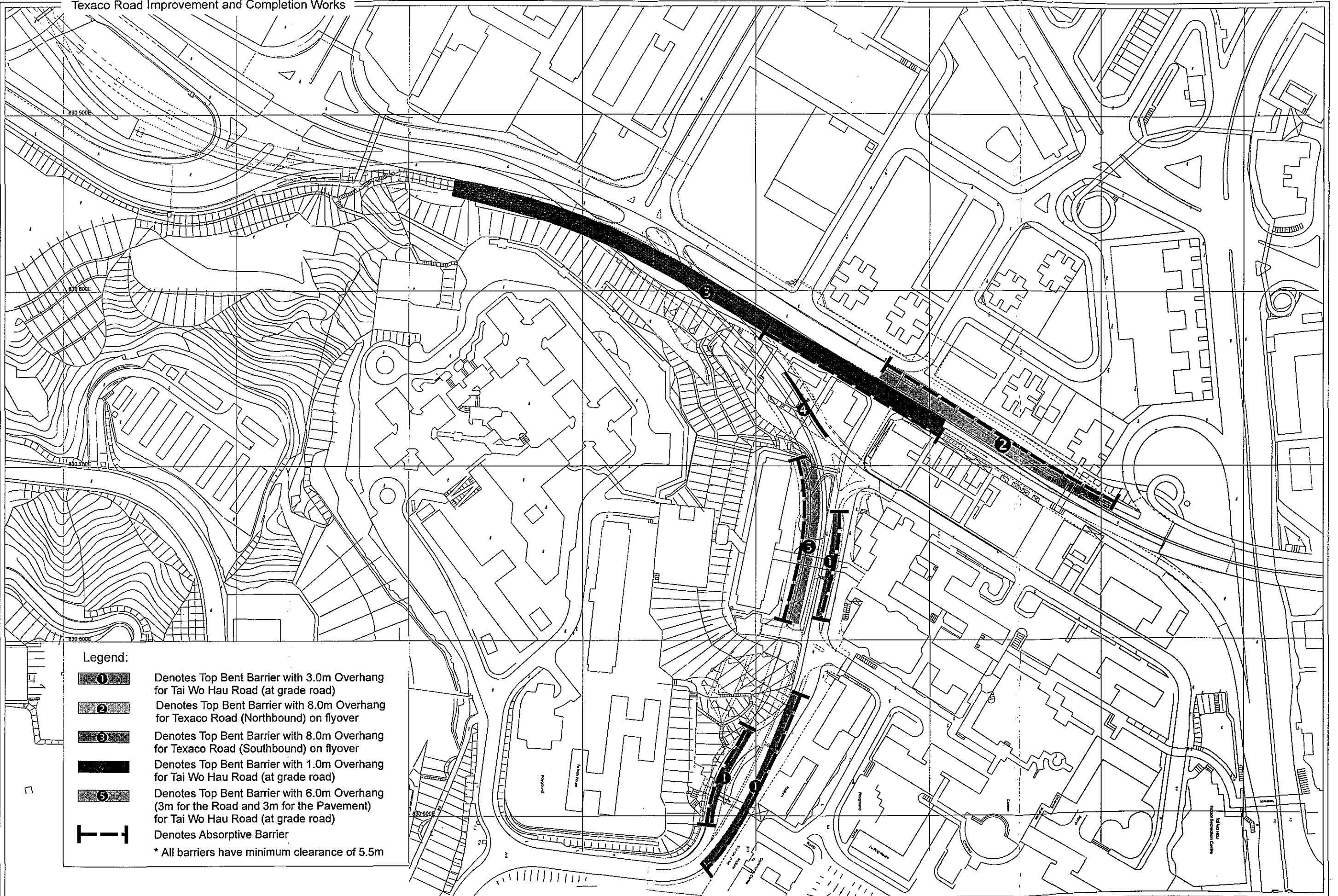
Project: **Mouchel Asia Limited**
Sub-Consultants
MVA Asia Ltd, Aspinwall Clouston.

Project: **Completion of Texaco Road/Tsuen Wan By-Pass Interchange and Improvements at Texaco Road, Remaining Works**







Title: **Site Layout and Study Area**

Drawn	DW	Checked	Approved
Scale: 1:2000	①A1	CAD File No.	Date
1:2000	②A3	FIG21	22.12.97
Date Issued	Drawing No.		Rev
22.12.97	1		

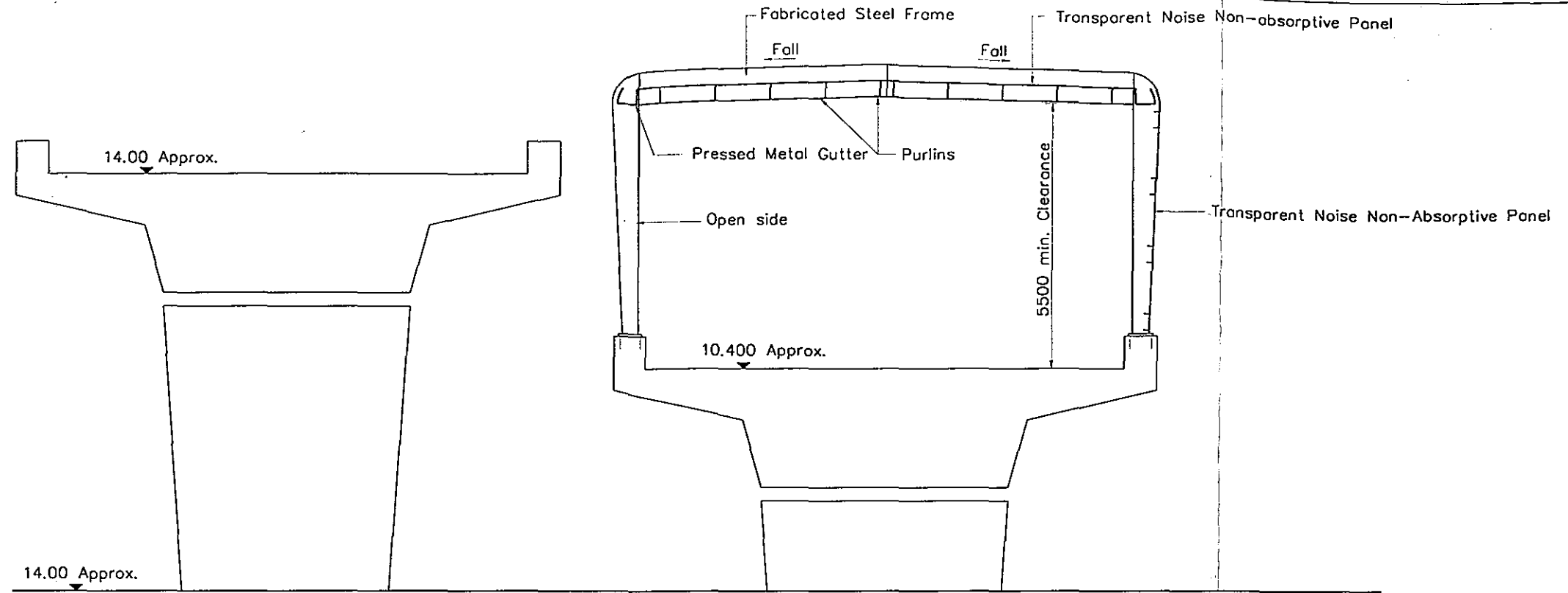




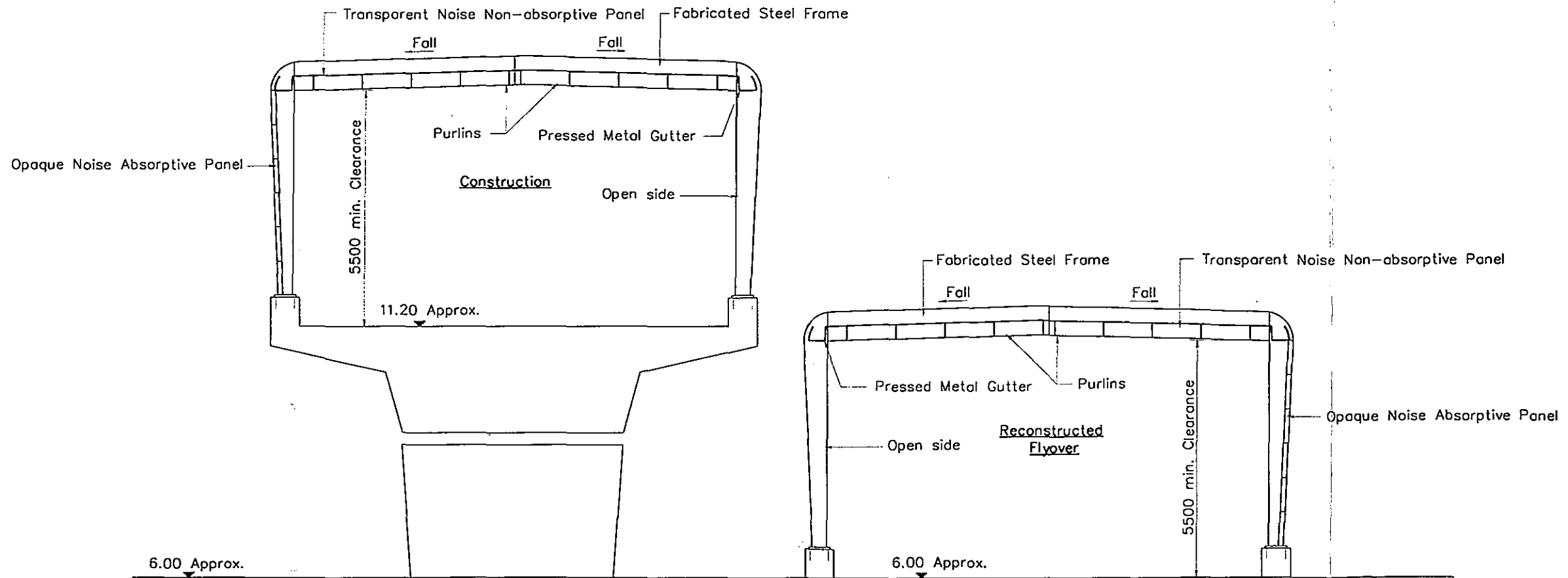
Legend:

-  Denotes Top Bent Barrier with 3.0m Overhang for Tai Wo Hau Road (at grade road)
 -  Denotes Top Bent Barrier with 8.0m Overhang for Texaco Road (Northbound) on flyover
 -  Denotes Top Bent Barrier with 8.0m Overhang for Texaco Road (Southbound) on flyover
 -  Denotes Top Bent Barrier with 1.0m Overhang for Tai Wo Hau Road (at grade road)
 -  Denotes Top Bent Barrier with 6.0m Overhang (3m for the Road and 3m for the Pavement) for Tai Wo Hau Road (at grade road)
 -  Denotes Absorptive Barrier
- * All barriers have minimum clearance of 5.5m

Proposed Direct Noise Mitigation Measures



Section A-A
1:100

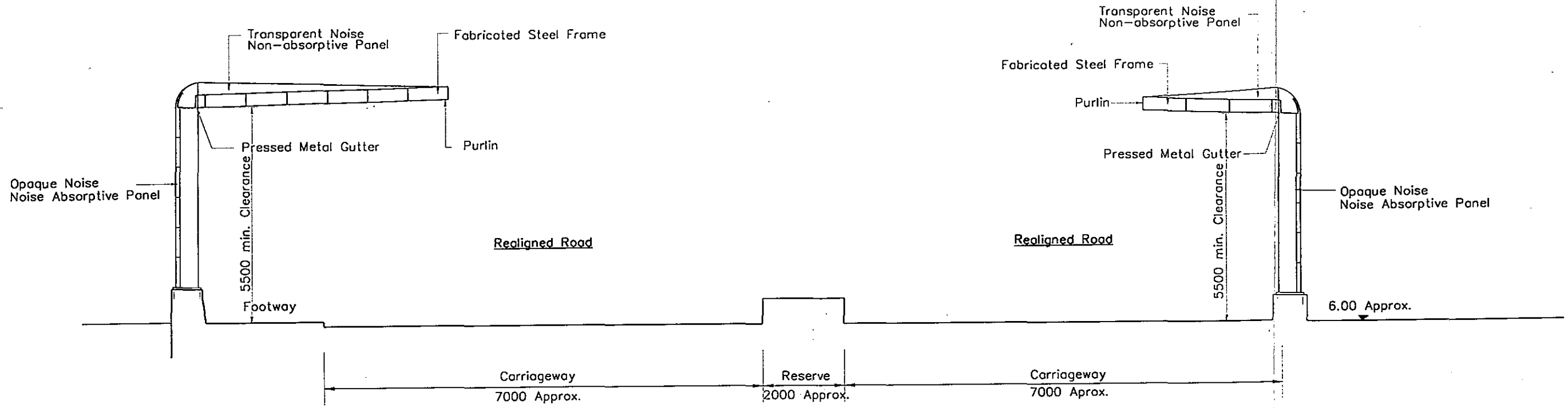


Section B-B
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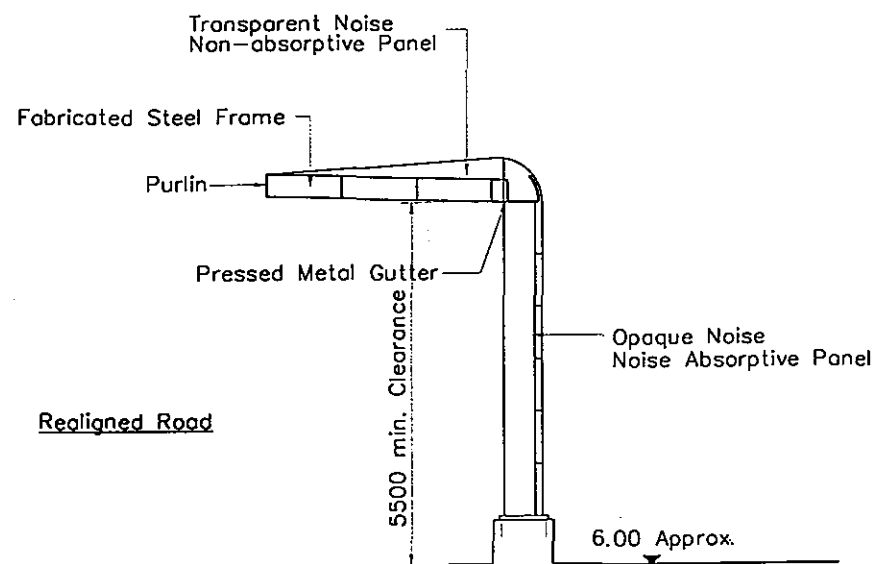
Typical Sections of Noise Mitigation Measures

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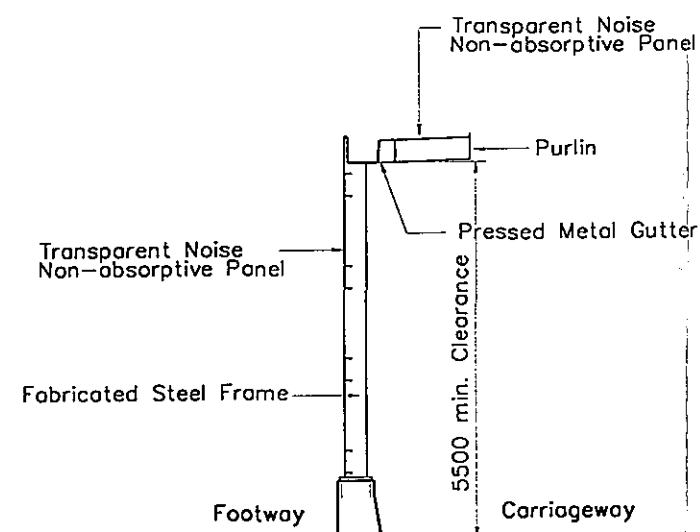
Drawing No. 3a



Section C-C
1:100



Typical Section for Barrier 1
1:100

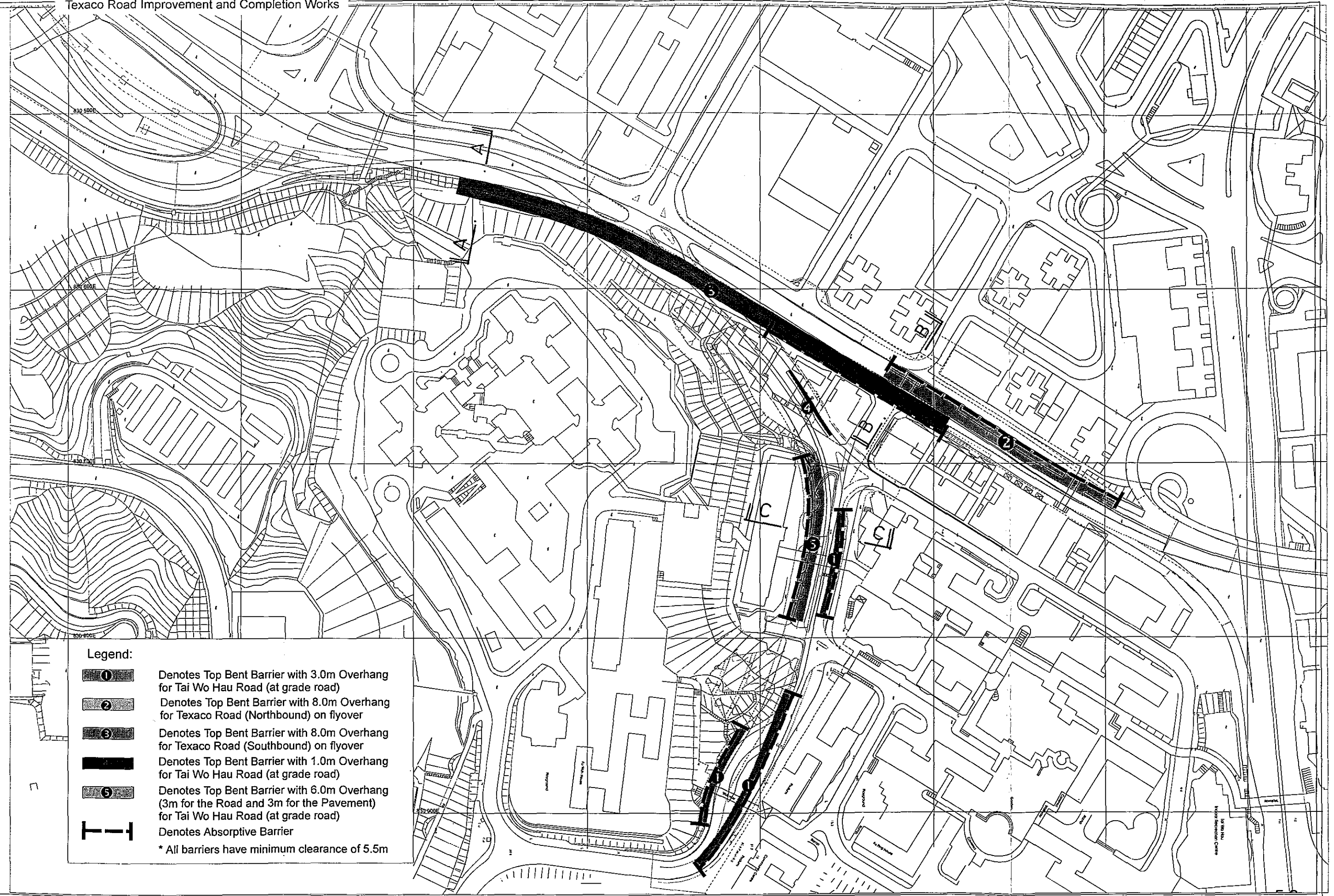


Typical Section for Barrier 4
1:100

Typical Sections of Noise Mitigation Measures

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Drawing No. 3b



- Legend:**
- ① Denotes Top Bent Barrier with 3.0m Overhang for Tai Wo Hau Road (at grade road)
 - ② Denotes Top Bent Barrier with 8.0m Overhang for Texaco Road (Northbound) on flyover
 - ③ Denotes Top Bent Barrier with 8.0m Overhang for Texaco Road (Southbound) on flyover
 - ④ Denotes Top Bent Barrier with 1.0m Overhang for Tai Wo Hau Road (at grade road)
 - ⑤ Denotes Top Bent Barrier with 6.0m Overhang (3m for the Road and 3m for the Pavement) for Tai Wo Hau Road (at grade road)
 - ⊥ Denotes Absorptive Barrier
- * All barriers have minimum clearance of 5.5m

Location of Noise Mitigation Section