

**Kai Tak Development – Stage 2 Infrastructure Works at
North Apron Area of Kai Tak Airport
for Residential Development and Government Facilities**

啓德發展計劃 – 配合啓德機場北面停機坪住宅發展及政府設施的
第二期基建工程

Site Office for the Engineer's Representative
North Apron Area, Kai Tak Airport
Telephone : (852) 2716 0122 Facsimile : (852) 2716 0232

ARUP

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80 Tat Chee Avenue
Kowloon Tong
Kowloon
Hong Kong
China

www.arup.com

FAXED
DATE: 21 NOV 2011

BY FAX(2591 0558) & POST

Your ref (23) in Ax(13) to EP2/K19/S3/10 Pt.15
Our ref 23462/(KL/2010/03)/M45/100(0024)
Date 21 November 2011

Environmental Protection Department
Environmental Impact Assessment Ordinance Register Office
27/F Southern Centre
130 Hennessy Road
Wan Chai Hong Kong

For the attention of Mr KEUNG Pui Yun, Colin

Dear Sirs

**Contract No. KL/2010/03
Kai Tak Development - Stage 2 Infrastructure Works at
North Apron Area of Kai Tak Airport for
Residential Development and Government Facilities
Submission under Condition 2.11 of Environmental Permit No. EP-344/2009 Landscape
Mitigation Plan for SPS PS1A**

I refer to your letter ref. (23) in Ax(13) to EP2/K19/S3/10 Pt.15 dated 8 November 2011 regarding the Landscape Mitigation Plan for Sewage Pumping Station PS1A submitted under Condition 2.11 of Environmental Permit No. EP-344/2009.

I enclose, on behalf of my client, CEDD, three hard copies and one electronic copy (in CD Rom) of the revised Landscape Mitigation Plan for SPS PS1A pursuant to Condition 2.11 of the aforementioned Environmental Permit. Please be advised that the above submission were certified and verified by the ET Leader and IEC according to Condition 1.9 of the Environmental Permit. A copy of the certification letter and verification letter provided by the ET Leader and the IEC is enclosed for your record.

Should you have any queries or require any further information, please contact my RE Ms Gloria Kwok on 2716 0122.

Yours faithfully


Michael Chan
Engineer's Representative

cc CEDD - Mr Edmund Chau -w/e
The Engineer - Mr Fergal Whyte -w/e
EDMS - Mr Adi Lee -w/o (By Fax: 3007 8556)

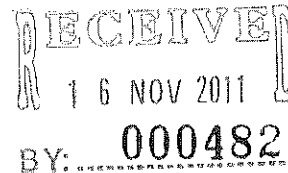
Response required : Nil
Date required : N/A
Attachments : Yes

MC/GK/mt

23462/O-00336



3D Visualisation
Environment & Energy
Information Technology



Ove Arup & Partners Hong Kong Limited
Site Office for the Engineer's Representative
North Apron Area
Kai Tak Airport

Your reference:

Our reference: HKCEDD03/50/100936

Date: 16 November 2011

Attn.: Mr Michael Chan, SRE

BY FAX & POST
(Fax no.: 2716 0232)

Dear Sirs

Contract No. KLN/2011/06

Independent Environmental Checker for "Contract No. KL/2010/03 Kai Tak Development – Stage 2 Infrastructure Works at North Apron Area of Kai Tak Airport for Residential Development and Government Facilities"

Verification of Revised Landscape Mitigation Plans for Sewage Pumping Station PS1A & Road D2 (part)

We refer to your transmittal (no. 23462/(KL/2010/03)/R10/100(0016) dated 11 November 2011) enclosing Revised Landscape Mitigation Plans for Sewage Pumping Station PS1A and Road D2 (part).

We have no comment and hereby verify the captioned documents in accordance with Clauses 2.11 and 2.12 of the Environmental Permits No. EP-344/2009 and No. EP-337/2009.

Please do not hesitate to contact the undersigned or our Mr. Adi Lee at 2869 6018 should you have any queries.

Yours faithfully
EDMS CONSULTING LTD

James Choi
Independent Environmental Checker

CPSJ/LYMA/jc

ARUP		File No.: 23462/(KL/2010/03)/R10/100(0016)	
		Folio No.: 0031	
KL/2010/03 Kai Tak Development Stage 2 Infrastructure Works at North Apron Area of Kai Tak Airport			
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Remarks			

EDMS Consulting Limited

1009 World Wide House, 19 Des Voeux Road Central, Central, Hong Kong
Tel: (852) 2869 6018 Fax: (852) 3007 8556
Email: info@edms.com.hk Web: www.edms.com.hk

Our Ref: CCL/MA11038/Corres/Out/jf11115

Ove Arup & Partners Hong Kong Limited
Site Office for the Engineer's Representatives
North Apron Area, Kai Tak Airport

Attn: Mr. Michael Chan

By Fax (2716 0232) & Mail

15 November 2011

Dear Sir,

Contract No. KL/2010/03

Kai Tak Development – Stage 2 Infrastructure Works at North Apron Area of Kai Tak Airport for

Residential Development and Government Facilities

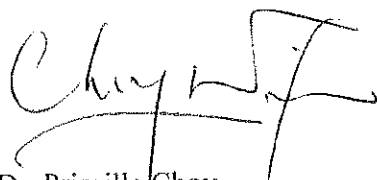
Certification of Design Drawing and Landscape Mitigation Plan for Road D2(part) and Sewage Pumping Station PS1A

We refer to your letter (Ref.: 23462/(KL/2010/03)/R10/100/(0015)) regarding the onward submission of Design Drawing and Landscape Mitigation Plan for Road D2(part) and Sewage Pumping Station PS1A.

We have no comment on the plan and hereby certify it in accordance with Clause 3.2 and 3.3 of EP no. EP-337/2009 and EP-344/2009.

If you have queries, please contact the undersigned at 2151 2089.

Yours faithfully,
Cinotech Consultants Limited



Dr. Priscilla Choy
Environmental Team Leader

1

Landscape Mitigation Plan

1a

Summary Table of Compliance of
Landscape Mitigation Plan with Landscape
and Visual Mitigation Measures in Section
3.8.11 of KTD EM&A Manual

Compliance of Landscape Mitigation Plan with Landscape and Visual Mitigation Measures in Section 3.8.11 of KTD EM&A Manual

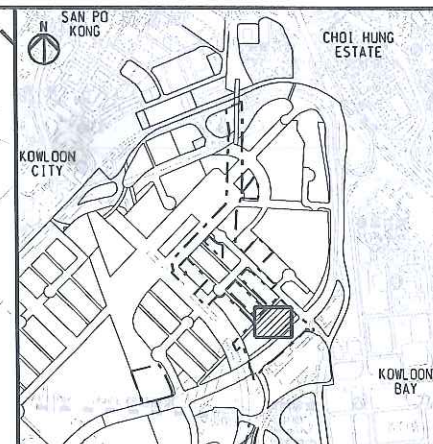
Suggested Landscape and Visual Mitigation Measures in Section 3.8.11 of KTD EM&A Manual	Landscape and Visual Mitigation Measures adopted in the Landscape Mitigation Plan
Landscape and Visual Mitigation Measures during Construction Phase	
• All existing trees should be carefully protected during construction (CM1). • Trees unavoidably affected by the works should be transplanted where practical. Detailed transplanting proposal will be submitted to relevant government departments for approval in accordance with ETWBC 2/2004 and 3/2006. Final locations of transplanted trees should be agreed prior to commencement of the work (CM2). • Control of night-time lighting (CM3). • Erection of decorative screen hoarding (CM4).	• No existing trees were identified within the site boundary of the proposed pumping station PS1A. • As above. • The working hour is from 08.00 to 18.00. No night-time work is allowed for the construction of pumping station PS1A. • Hoarding with beautification works were proposed along the site boundary of the Contract at certain locations facing sensitive receivers.
Landscape and Visual Mitigation Measures during Operation Phase	
• Compensatory tree planting should be incorporated into the proposed projects where trees are affected (OM1), • Tall buffer screen tree / shrub / climber planting should be incorporated to soften hard engineering structures and facilities (OM2),	• No existing trees were identified within the site boundary of the proposed pumping station PS1A, therefore no existing trees are affected. • Magnolia Grandiflora (荷花玉蘭) with height of 5m and spread of 3.5m were proposed along the building line of the pumping station PS1A, facing the pedestrian streets • The proposed pumping station PS1A was

• Aesthetically pleasing design as regard to the form, material and finishes should be incorporated to all buildings, engineering structures and associated infrastructure facilities (OM5).	designed in an interesting and elegant form with folded landscape that shaped to give a light feeling that break the image of heavy and massive pumping stations. The building, the landscape treatment, shape, fences, finishes, all elements could be understood as one whole. The design was submitted to the VCAB and approved in March 2011.
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1b

Landscape Design Drawings for Sewage
Pumping Station PS1A

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KEY PLAN

NOTES:

1. FOR SHRUB PLANTING PLAN REFER TO DRAWINGS NO. 23462/26002 AND 26003.
2. FOR TREE SCHEDULE, REFER TO DRAWING NO. 23462/26031.
3. FOR AGGREGATE POOL DETAIL, REFER TO ARCH. DRAWING.

LEGEND:

- SITE BOUNDARY
- PLANTING AREA
- HEAVY STANDARD TREE
- BAMBOO

Rev	Description	By	Date
A	TENDER ADDENDUM NO.2	SY	02/11
-	FOR TENDER	GK	01/11

Consultant
ARUP 奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

Project title
Contract No. KL/2010/03
Kai Tak Development - Stage 2
Infrastructure Works at North Apron
Area of Kai Tak Airport for Residential
Development and Government Facilities

Drawing title
**TREE PLANTING PLAN
FOR SEWAGE PUMPING
STATION PS1A**

Drawing no.	23462/26601	Rev.	A
Drawn	Date	Checked	Approved
WM	10/10	TL	FW
Scale	1:200 @A1	Status	CONTRACT

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Civil Engineering and
Development Department

Overall Greening Ratio: 53.5%
At-Grade Greening Ratio: 34%
Total Roof Area Greening Ratio: 65%

AGGREGATE POOL

7 NOS. MAG. GRA.

4 NOS. BRA. ACT.

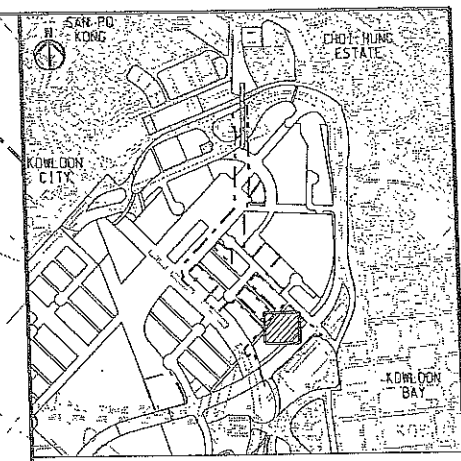
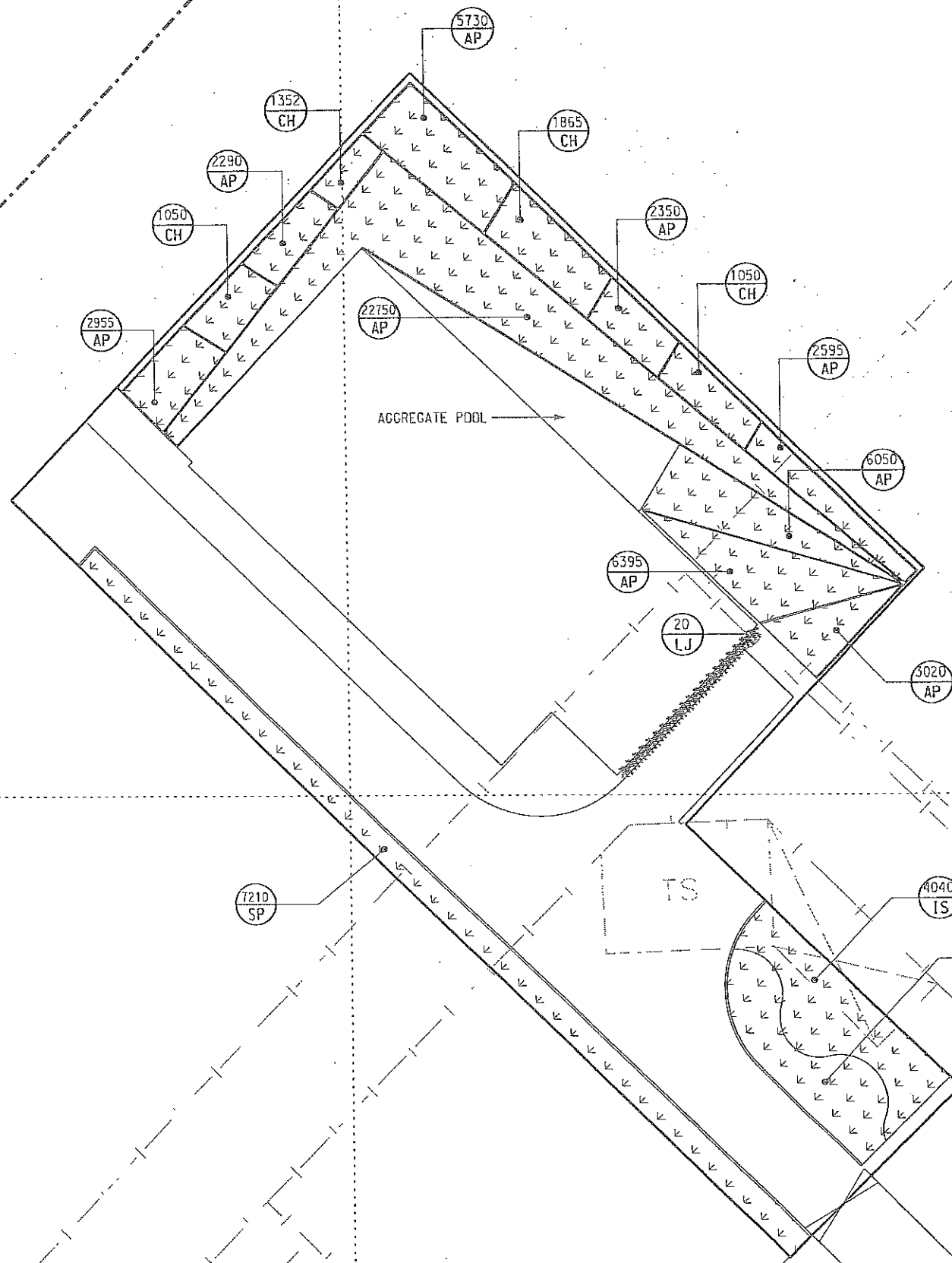
56 NOS. PHY. AUR.

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KEY PLAN

NOTES:

1. FOR TREE PLANTING PLAN REFER TO DRAWING NO. 23462/26601.
2. FOR SOFT LANDSCAPE WORKS SPECIFICATION REFER TO DRAWING NO. 23462/26601.
3. ALL PLANTER BEDS SHOULD BE OF GOOD DRAINAGE WITH MIN. SOIL DEPTH OF 1500mm IN OPEN GROUND.
4. FOR STAINLESS STEEL MESH PLANT SUPPORT SYSTEM, REFER TO DRAWING NO. 23462/26605. THE CLIMBER (LONICERA JAPONICA) 金銀花 SHOULD CLIMB UP THE MESH PLANT SUPPORT SYSTEM.
5. FOR AGGREGATE POOL DETAIL, REFER TO ARCH. DRAWING.

LEGEND:

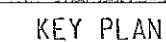
- SITE BOUNDARY
- ↓ ↓ ↓ PLANTING AREA
- ✻ CLIMBER

FOR CONSTRUCTION		CK	07/11
Rev	Description	By	Date
Consultant			
ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited			
Project title			
Contract No. KL/2010/03 Kai Tak Development - Stage 2 Infrastructure Works at North Apron Area of Kai Tak Airport for Residential Development and Government Facilities			
Drawing title			
SHRUB PLANTING PLAN FOR SEWAGE PUMPING STATION PS1A (GROUND FLOOR)			
Drawing no. 23462/26602		Rev. -	
Drawn	Date	Checked	Approved
TM	10/10	TL	FM
Scale	1:200 @A1	Status	WORKING

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Civil Engineering and
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1. FOR PITCHED GREEN ROOF SYSTEM
REFER TO DRAWING NO. 23462/26604.
2. FOR SHRUB SCHEDULE REFER TO
DRAWING NO. 26462/26131.
3. THE CONTRACTOR SHALL PROVIDE
SHOP DRAWINGS OF THE AUTOMATIC
SPRINKLER IRRIGATION SYSTEM FOR
THE PITCHED GREEN ROOF FOR THE
ER'S APPROVAL.
4. FOR LANDSCAPE IRRIGATION SYSTEM
SPECIFICATION, REFER TO P.S.
SECTION 29.

PITCHED GREEN ROOF

Consultant

ARUP 奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

Project title
Contract No. KL/2010/03
Kai Tak Development - Stage 2
Infrastructure Works at North Apron
Area of Kai Tak Airport for Residential
Development and Government Facilities

Drawing title

SHRUB PLANTING PLAN
FOR SEWAGE PUMPING
STATION PS1A (PITCHED ROOF)

Drawing no.		23462/26603		Rev.	→
Drawn WM	Date 10/10	Checked TL	Approved FW		
Scale 1:100 @A1		Status WORKING			

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Civil Engineering and
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SPECIFICATION OF PITCHED GREEN ROOF SYSTEM

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DETAILED DESIGN, PROVISION, INSTALLATION AND TESTING OF THE PROPRIETARY PITCHED GREEN ROOF SYSTEM. ALL INSTALLATION DETAILS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION, AND THE CONTRACTOR SHALL SUBMIT THE SHOP DRAWING AND METHOD STATEMENT OF THE PITCHED GREEN ROOF SYSTEM FOR THE E.R. APPROVAL. THE PITCHED GREEN ROOF SYSTEM COMPRISE THE FOLLOWING ITEMS:-

1. FILTER AND DRAINAGE LAYER
2. EROSION PROTECTION LAYER
3. EROSION PROTECTION PROFILE AND FIXING CLIPS
4. WATER RETENTION PANEL
5. 50mm TOP SOIL / SOIL MIX AS SPECIFIED IN G.S. 3.30
6. GROUND COVER AND SHRUB AS SPECIFIED IN G.S. 3.17 AND 3.18

1. FILTER AND DRAINAGE LAYER : NOPHADRAIN ND200 DRAINAGE COMPOSITE OR EQUIVALENT FOR APPROVAL

11mm HIGH CE MARKED IN ACCORDANCE WITH EN13252 DRAINAGE COMPOSITE CONSISTING OF A DIMPLED PERFORATED SHEET OF HIGH IMPACT POLYSTYRENE (HIPS) WITH A NON-WOVEN FILTER FABRIC BONDED TO EACH DIMPLE. THE ND200 DRAINAGE COMPOSITE COMPRISES THE FILTER LAYER, THE DRAINAGE LAYER AND THE SEPARATION AND PROTECTION LAYER AS ONE INTEGRATED UNIT. FILTER FABRIC HAS AN OVERLAPPED ON BOTH SIDES. THE MATERIAL IS DELIVERED ON ROLLS WITH 1.25M x 32M(L).

APPLICATION : EXTENSIVE GREEN ROOFS / INTENSIVE GREEN ROOFS / PLANTERS
DIMPLED SHEET : HIGH IMPACT POLYSTYRENE (HIPS)
FILTER FABRIC : NON-WOVEN POLYPROPYLENE (PP) > 125g/m²
THICKNESS : 11mm
WEIGHT : 900g/m²
COMPRESSIVE STRENGTH : > 700KN/m²

2. EROSION PROTECTION LAYER: NOPHADRAIN NO ESG-60/60 EROSION PROTECTION GRID OR EQUIVALENT FOR APPROVAL

APPLICATION : PITCH ROOF
MATERIAL : POLYPROPYLENE (PP)
GRID SIZE : APPROX. 6.5cm x 6.5cm
PULL STRENGTH : > 20KN/m²
WEIGHT : APPROX. 200G/m²

3. EROSION PROTECTION PROFILE AND FIXING CLIPS: NOPHADRAIN NO 450C EROSION PROTECTION PROFILE AND NO FIXING CLIPS OR EQUIVALENT FOR APPROVAL

NOPHADRAIN NO 450C EROSION PROTECTION PROFILE COMBINED WITH NOPHADRAIN NO ESG-60/60 EROSION PROTECTION GRID AND NO FIXING CLIPS TO FASTEN NOPHADRAIN NO WMS50 WATER RESERVOIR PANEL.

APPLICATION : PITCH ROOF
MATERIAL : POLYVINYL CHLORIDE (PVC)
COLOR : GREEN
PERFORATIONS : APPROX. EVERY 7.5cm

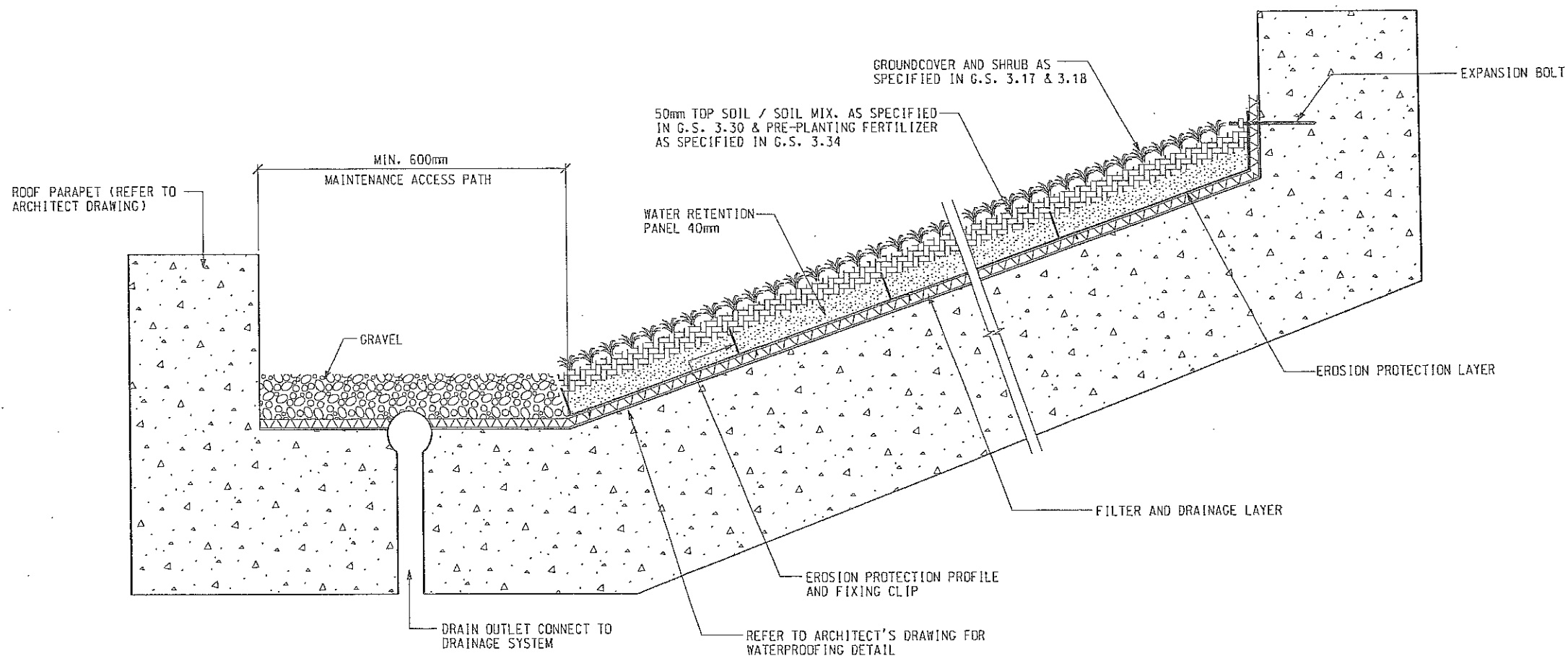
CLIP TO FASTEN THE NOPHADRAIN NO 450C EROSION PROTECTION PROFILE TO THE NOPHADRAIN NO ESG-60/60 EROSION PROTECTION GRID.

APPLICATION : PITCH ROOF
MATERIAL : STAINLESS STEEL
WEIGHT : APPROX. 15G

4. WATER RETENTION PANEL : GRODAN TT100/40 WATER RESERVOIR PANEL OR EQUIVALENT FOR APPROVAL

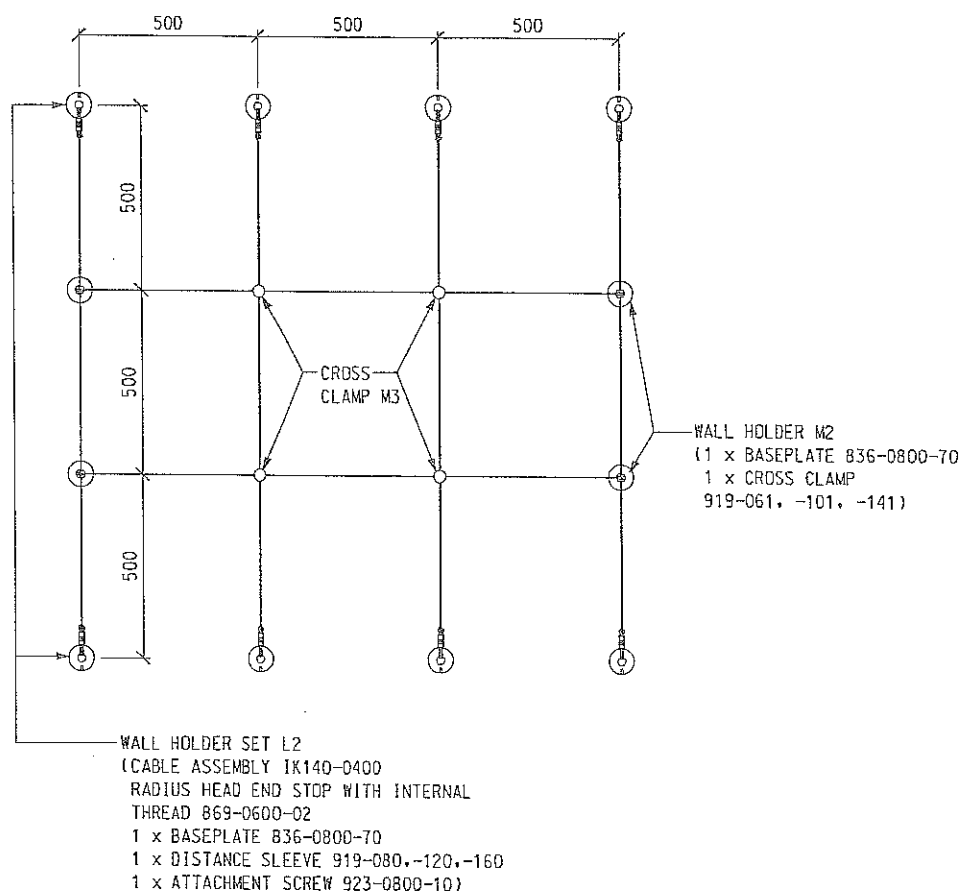
GRODAN TT100/40 WATER RESERVOIR PANEL, WATER ABSORBING MINERAL WOOL PANELS WITH A HIGH WATER RETENTION CAPACITY THAT ARE PLACED AS THE GROWING MEDIUM SUBSTITUTE WITHIN THE BUILD-UP OF GREEN ROOF.

APPLICATION : EXTENSIVE GREEN ROOFS / INTENSIVE GREEN ROOFS / PLANTERS
MATERIAL : HYDROPHILIC MINERAL WOOL
DENSITY : 100kg/m³
THICKNESS : 40mm
WATER RETENTION CAPACITY : 30 l/m² = 80VOL.%
AIR VOLUME : 16%
PH VALUE : 7-8
WEIGHT : DRY 4kg/m², SATURATED 35kg/m²



TYPICAL SECTION OF PITCHED ROOF SYSTEM

FOR CONSTRUCTION		GK	07/11
Rev	Description	By	Date
Consultant			
ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited			
Project title			
Contract No. KL/2010/03 Kai Tak Development - Stage 2 Infrastructure Works at North Apron Area of Kai Tak Airport for Residential Development and Government Facilities			
Drawing title			
PITCHED GREEN ROOF SYSTEM FOR SEWAGE PUMPING STATION PS1A			
Drawing no.		Rev.	
23462/26604		-	
Drawn	Date	Checked	Approved
KKL	08/10	TL	FW
Scale	Status		
N.T.S.	WORKING		
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FACADESCAPE BRAND STAINLESS STEEL
CABLE PLANT SUPPORT SYSTEM (TYPICAL)
SCALE 1:10

SPECIFICATION OF FACADE GREENERY SYSTEM

- The Contractor shall be responsible for the detailed design, provision, installation and testing of the proprietary facade greenery system for the sewage pumping station PS1A. All installation details should be in accordance with the manufacturer's recommendation, and the Contractor shall submit the shop drawing, method statement, manufacturer certificate, and certificate of origin of the FACADE GREENERY SYSTEM for the E.R. approval.
- Material for the sewage pumping station PS1A should be FACADESCAPE™ STAINLESS STEEL CABLE PLANT SUPPORT SYSTEM or equivalent for approval.
- The FACADE GREENERY SYSTEM comprise the following items:-
1/Clamps, Plant Supports and Cable: ASTM A492 Type 316 4mm Ø 4mm stainless steel 7x7 wire rope.
2/Fittings, Anchors, Hardware, and Accessories: AISI 316 or 316L stainless steel.
- Manufacturer of the Facade greenery system: Carl Stahl-DecorCable Innovations LLC
- Product of Origin: Germany
- Dimension of the FACADE GREENERY SYSTEM: 14000mm x 5000mm
- FITTINGS AND ACCESSORIES: Provide grommet, bushings, nuts, washers, turnbuckles, fittings and other components as required for system installation
- FABRICATION:
1/Stainless Steel Cables and Fittings shall be dimensioned and fabricated to specified size and labeled according to shop drawings and installer's specifications.
2/Preassemble items in shop to greatest extent practicable to minimize assembly at project site. Disassemble units only to extent necessary for clipping and handling limitations. Mark units for reassembly.
- FINISHES:
1/Clean and/or decale cables and fittings in accordance with ASTM A360.
2/Passivate in accord with ASTM B912, to provide the following finish: Exterior and Interior 330 grain satin finish (equiv. to #4 satin finish).
- MANUFACTURER'S INSTRUCTIONS: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

11. EXAMINATION

- Site Verification of Condition: Verify mounting condition of previously installed surfaces to ensure it is acceptable for product installation in accordance with manufacturer's instructions. Do not begin installation until backup surfaces are in satisfactory condition.

12. PREPARATION

- Supply items required to be cast into concrete or embedded in masonry with cutting templates, to appropriate sections.
- Take field measurements after permanent terminations are in place and prior to preparation of shop drawings and fabrication, to ensure fitting of work.

13. INSTALLATION

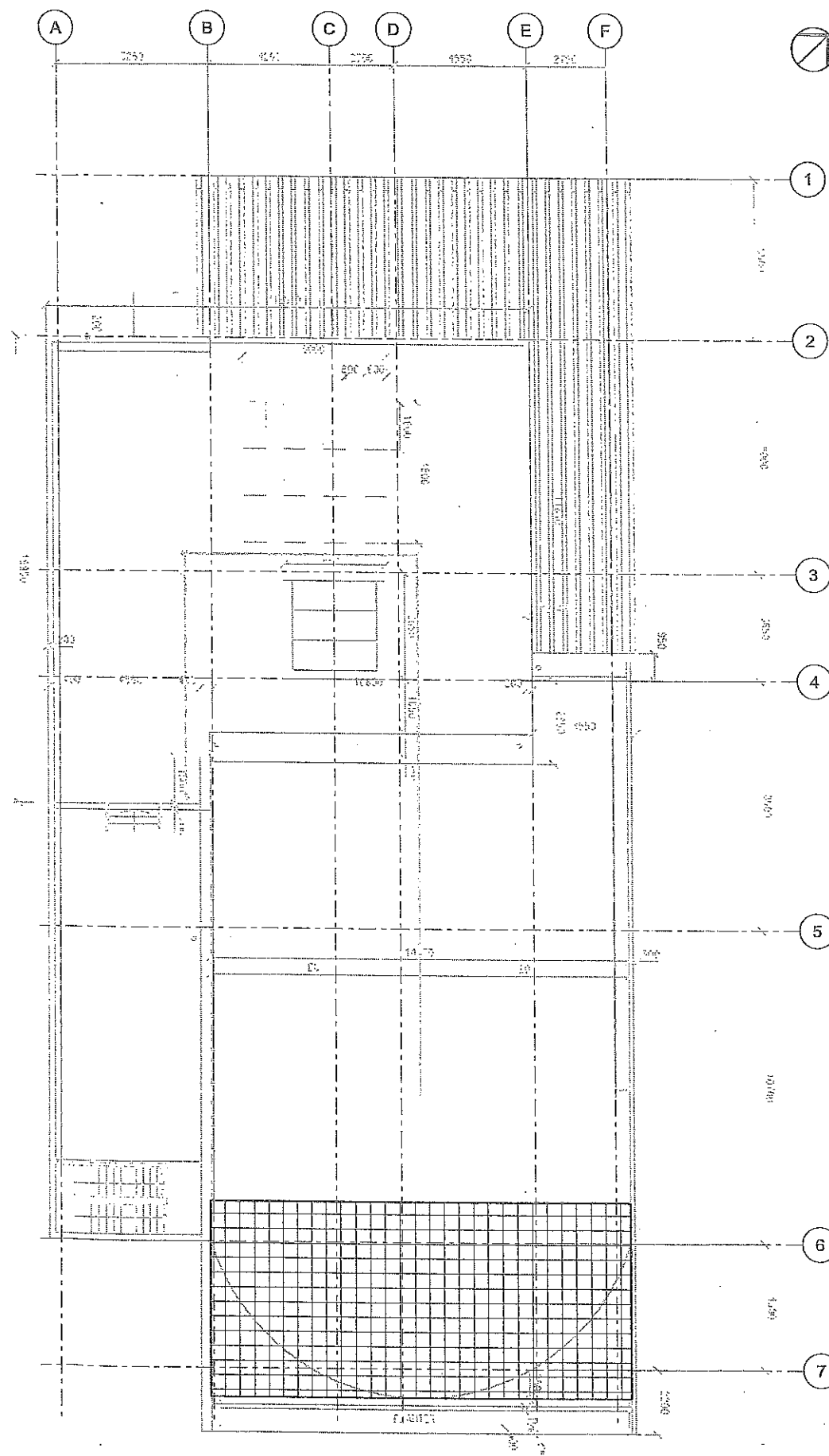
- Install cable plant support system in accordance with manufacturer's instructions and the approved shop drawings.
- Provide anchorage devices and fittings to secure to in-place construction; including threaded fittings for concrete inserts, toggle bolts and through-bolts. Install all rope assemblies plumb, level, square, and taut.
- Anchor system to mounting surfaces as indicated on the drawings.
- Separate dissimilar materials with bushings, grommets or washers to prevent electrolytic corrosion.
- Use manufacturer's supplied mounting hardware.
- Terminate and tension cable system in accordance with manufacturer's instructions.
- Ensure ropes are clean, and without kinks or snags.
- After final adjustment provide tamper resistant locktight materials on all fittings.

14. CLEANING

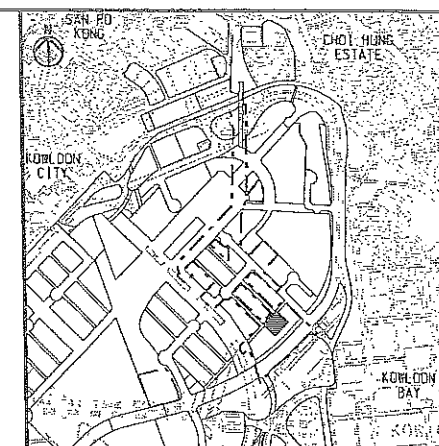
- Remove temporary coverings and protection of adjacent work areas.
- Clean installed products in accordance with manufacturer's instructions before owner's acceptance. Do not use chlorine-based or abrasive cleaners.

15. PROTECTION

- Remove from project site and legally dispose of construction debris associated with this work.
- Protection: Protect installed product from damage during subsequent construction activities.

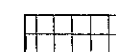


ROOF PLAN
SCALE 1:100



KEY PLAN

LEGEND:



FACADESCAPE STAINLESS
STEEL CABLE PLANT
SUPPORT SYSTEM

Rev	Description	By	Date
-	FOR CONSTRUCTION	GK	07/11

Consultant
ARUP 奧雅納工程顧問
Ove Arup & Partners Hong Kong Limited

Project Title
Contract No. KL/2010/03
Kai Tak Development - Stage 2
Infrastructure Works at North Apron
Area of Kai Tak Airport for Residential
Development and Government Facilities

Drawing Title
**FACADE GREENERY SYSTEM
FOR SEWAGE PUMPING
STATION PS1A**

Drawing no.	23462/26605	Rev.	-
Drawn	KKL	Checked	TL
Scale	AS SHOWN @A1	Status	WORKING

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Civil Engineering and
Development Department

1c

Aesthetic Design of Sewage Pumping Station PS1A



土木工程拓展署

Civil Engineering and Development Department

九龍拓展處

Kowloon Development Office

Supplemental Agreement No. 1 to Agreement No. CE 42/2000 (CE)

**South East Kowloon Development
Infrastructure at North Apron Area of Kai Tak Airport
Design & Construction**



**Aesthetic Design of Sewage Pumping Station PS1A
(Ref: 0179-01)**

December 2010

ARUP

Civil Engineering &
Development Department

Supplemental
Agreement No. 1 to
Agreement No. CE
42/2000 (CE)
South East Kowloon
Development
Infrastructure at North
Apron Area of Kai Tak
Airport – Design and
Construction

Aesthetic Design of
Sewage Pumping Station
PS1A

23462-REP-0179-01

Civil Engineering & Development Department
Supplemental Agreement No. 1 to Agreement No. CE 42/2000 (CE)

South East Kowloon Development
Infrastructure at North Apron Area of Kai Tak Airport
- Design and Construction

Aesthetic Design of Sewage Pumping Station PS1A

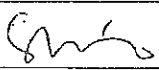
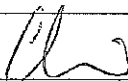
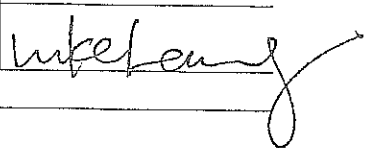
December 2010

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Tel +852 2528 3031 Fax +852 2268 3953
www.arup.com

Job number

23462

Job title	Supplemental Agreement No. 1 to Agreement No. CE 42/2000 (CE) South East Kowloon Development – Infrastructure at North Apron Area of Kai Tak Airport	Job number 23462
Document title	Aesthetic Design of Sewage Pumping Station PS1A	File reference 8.99
Document ref	23462-REP-0179-01	

Revision	Date	Filename	G:\23462\Supplementary Agreement No. 1\Report\0179-00 Aesthetic Design of Sewage Pumping Station PS1A\0179-00 Aesthetic Design of Sewage Pumping Station PS1A-20100930.docx		
1 st Issue	Sept 2010	Description	Aesthetic Design of Sewage Pumping Station PS1A (First Issue)		
			Prepared by	Checked by	Approved by
		Name	Various	Gloria Kwok	Luke Leung
		Signature			
2 nd Issue	Dec 2010	Filename			
		Description	2 nd Issue of the Aesthetic Design of Sewage Pumping Station PS1A incorporating comments from DSD.		
			Prepared by	Checked by	Approved by
		Name	Shirley Yeung	Gloria Kwok	Luke Leung
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			

Issue Document Verification with Document



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APPENDIX A

Checklist for the Aesthetic Design of Sewage Pumping Station

DRAWINGS

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1 PROJECT BACKGROUND

1.1 Project Background

1.1.1 In June 2008, Ove Arup & Partners Hong Kong Ltd (Arup) was commissioned by the Civil Engineering and Development Department (CEDD) to undertake the Design and Construction of Infrastructure at North Apron Area of Kai Tak Airport for the South East Kowloon Development under Supplemental Agreement No.1 to Agreement No. CE 42/2000(CE). The infrastructure works at the North Apron Area are being implemented by three stages under Package B – Phase 1 Housing Sites and Government Offices.

1.1.2 One major infrastructure development to be completed under Package B Stage 2 Works of the Supplemental Agreement No. 1 is to construct a Sewage Pumping Station PS1A and associated gravity sewers and rising mains.

1.1.3 The Sewage Pumping Station PS1A will be operated and maintained by the Drainage Services Department (DSD). In the pursuit of achieving DSD's commitment to deliver world class quality drainage and sewerage facilities to the public, Arup adopted an aesthetical approach to integrating sustainability into the pumping station design for a good balance in aesthetic, functional, environmental, economic, social and maintenance and operation performances. This design approach ensures that the proposed sewage pumping station building meets the needs of the DSD for management, operation and maintenance of the pumping station and at the same time beautifies the landscape of the area where the pumping station is located and obtain acceptance of the public for the existence of such building structure within their community.

1.2 Site Location

The proposed infrastructure development for Package B Stage 2 Works is located at the North Apron Area of the former Kai Tak Airport. It is bounded on the northeast and northwest by two pedestrian walking streets; the southeast by Road D2 and the southwest by site 1J-3. The Stage 2 infrastructure works at North Apron Area is shown on Drawing No. 23462/SK/1252 (Rev.A) and the location of PS1A is shown on Figure 1.

2 PRINCIPALS OF THE AESTHETIC DESIGN

2.1 Design Standards and Manuals

2.1.1 The design shall be carried out in accordance with the prevailing technical standards and specifications as listed below:

- DSD Guidelines on Aesthetic Design of Pumping Station Buildings;
- DSD TC No. 9/2006 Vetting Committee on Aesthetic Design of Pumping Station Building;
- ETWB TCW No. 16/2005 Adoption of Energy Efficient Features and Renewable Energy Technologies in Government Projects and Installations; and
- DB TC No. 5/2009 / EB Circular Memorandum No. 2/2009 Green Government Building

2.1.2 Based on the abovementioned design standards and guidelines, a checklist for aesthetic design of the proposed sewage pumping station contained in Appendix A was formulated as the design framework.

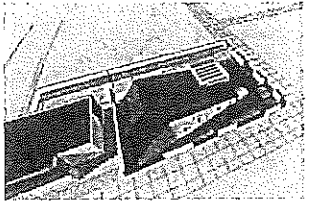
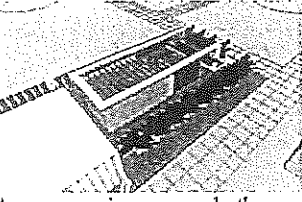
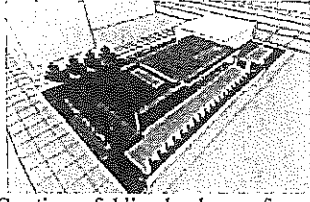
2.2 Holistic Strategy

2.2.1 In preparing the aesthetic design of new buildings, Arup have given holistic consideration to

the aesthetic design in order to minimise their visual impact in recognition that the Kai Tak Development is a core infrastructure project attracting high public attention. The location of the proposed sewage pumping station PS1A is dictated by the practical and functional drainage requirements and the pumping station is often regarded as visually intrusive by the general public. In order to make the sewage pumping station PS1A a “socially responsible development”, the following design strategies are to be adopted:

- Provision of amenities for general public;
- Adoption of landscaping works;
- Incorporation of sustainable design elements;
- Architectural Treatment;
- Incorporation art into structures; and
- Adoption of natural materials.

2.2.2 Three architectural design schemes were developed for the Sewage Pumping Station PS1A. The architectural layouts of the three schemes are shown in Figures 2 and 3 and their pros and cons are also summarised in the following table.

2.2.3	Scheme 1 "Folding Green"  The green at grade level is folding up to form the building mass, the building in the continuity with the landscape is perceived as a whole with its context	Scheme 2 "Screening"  A more passive approach, the architectural elements are used to visually shield the building from the surrounding environment from both street level and aerial level	Scheme 3 "Green Screening"  Creating a folding landscape from the building enclosure that covers the base of the rectangular box. The green and the metal structure creates a screening effect
PROS	• Interesting and elegant form • The building as a folded landscape become itself a landscape to be seen. • The shape give a more light feeling that break the image of heavy and massive pumping stations. • The green ratio is maximized. • The building, the landscape treatment, shape, the fences, all elements can be understood as one whole. • A skylight on the roof top allows natural lighting to penetrate in the building.	• The layering of materials on the facades break down the massive scale of the building. • The open space for the public is wide and clear.	• The layering of materials on the facades break down the massive scale of the building. • The green ratio is maximized. • As an alternative of scheme 2, this option introduces more green visually, that helps to break down the scale successfully when seen from the top. • The green folding form the boundary to cover the top of the building give it a dynamic movement that avoid a monotonous effect. • A skylight on the roof top allows natural lighting to penetrate in the building.
CONS	•	• The screening of horizontal louvers on the roof is increasing the total building height. • The idea of screening is overprotective and might reveal an even stronger impact of the building than if it was not there. • The building scale is still massive.	• Unlike scheme 1, here the green is folding from another direction which gives the building an important width at the place where the green covers the building. That makes the building look bulky from the pedestrian path. • It is hard to see the logic and the reason why the green is folding from the fence and does not seem to have a connection with the green at grade level unlike scheme 1.

2.2.4 Scheme 1 is proposed for the Sewage Pumping Station PS1A and the architectural design for this scheme is shown in Figures 4 to 10.

2.3 Amenities for General Public

2.3.1 The roof, walls and in particular boundary fences of the proposed Sewage Pumping Station PS1A may have a significant visual impact on the public in nearby high rise buildings, traffic running on adjacent roads at ground level and on elevated roads, passengers on helicopters, as well as pedestrians.

2.3.2 Roof Top Greening

As the proposed sewage pumping station PS1A is located in an urban environment, roof top greening is recommended to provide visual amenity to the occupants and residents of the nearby high rise commercial and residential buildings.

The roof garden will adopt perennial plants and ground covers to enhance greenery, pebble paths for maintenance and drainage, as well as an irrigation system to create an amenity area which provides visual relief to the community and improves the thermal insulation and energy saving performance of the building. Special consideration will be given to the roof top water-proofing system of the sewage pumping station building. It is suggested that routine maintenance of the roof garden should be carried out throughout the life cycle of the sewage pumping station building.

Sky window is a visually attractive and environmentally friendly feature that can be introduced and integrated into the roof garden design of the sewage pumping station building that allows the penetration of natural sun light into the building and reduce the energy demand.

2.3.3 Vertical Greening

In order to avoid visual obstruction created by the proposed Sewage Pumping Station PS1A, it is important to minimize the actual height of the building structure within practical constraints. It is also critical to reduce the apparent height of the structure using various techniques such as introducing creeper planting on climbing timber mesh; suspended planter trays; low level toe planters with vertical climbers; shrub plantings; and groundcover plantings. Vertical greening can help to soften the roof line and the building mass of the proposed sewage pumping station.

Thermal insulation provided by vegetation growing on the building façade can cool the building and help to reduce energy consumption.

Plant species, especially creepers on climbing mesh, may be changed from time to time to create long term variety which can further enrich the façade design.

2.3.4 Boundary Fence/ Wall Treatment

Visual diversity of the proposed sewage pumping station PS1A can be achieved by adopting one or more of the following treatments to the boundary fences/ walls:

- Create a wall layering effect by using different materials for different visual planes;
- Adopt materials, details and texture with visually recessive character which blend with the surrounding environment;
- Set back fences from site boundary to expose existing trees and allow screen plantings;
- Provide an opportunity for community art or historical theme; and
- Adopt terraced or raised planters.

Greening of the boundary fences/ walls can soften the structure itself and provide a harmonising effect. The boundary fences/ walls of the proposed sewage pumping station will have the greatest visual impact on the passers-by and the achievement of visual diversity is considered to be a crucial element of the aesthetic design of the sewage pumping station to

gain public acceptance.

2.4 Landscaping Works

- 2.4.1 The landscape design of sewage pumping station PS1A aims to give an impression of a garden but without affecting the operation and maintenance of the sewage pumping station. The landscape strategy will preserve existing mature trees as much as possible to minimise the need for tree felling and transplanting. Evergreen plants/ trees will be selected and automatic irrigation facilities will be provided for the landscape works to help maintaining the plants in good condition at all times.
- 2.4.2 The landscaping works will be carried out in phases such that some landscaping works can be established at early stages of the sewage pumping station construction to achieve gradual greening effects on the site.
- 2.4.3 In addition to maximising roadside landscaping, the greening of boundary fences/ walls will further enhance the pedestrians' experience. Trees with appropriate sizes will be selected to soften the monolithic effects of the buildings; fences; walls and associated structures.
- 2.4.4 The introduction of a roof garden will provide an enhanced visual amenity for the residents of adjacent high rise buildings. As the provision of a roof garden involves recurrent costs, it is suggested that a long-term commitment of the maintenance party is required. An agreement of the maintenance parties will need to be sought at the design stage for the future maintenance for the roof garden.

2.5 Sustainable Design Elements

- 2.5.1 By adopting an appropriate selection of the following design elements, the proposed sewage pumping station PS1A can become a sustainable development in the environmental, social and economic context:
- use of natural cross ventilation with low level louvers and roof ventilators;
 - provide natural lighting to reduce dependence on artificial lighting by incorporating more windows, glass blocks on walls and prismatic roof lights;
 - adopt roof and elevation greening to improve thermal insulation of the structure;
 - adopt photovoltaic or LED lights for outdoor illumination;
 - provide timer control, photo-sensor and bypass switches for external lighting where appropriate;
 - adopt occupancy sensors for indoor lighting and air-conditioning control;
 - use low energy consumption signs (e.g. exit signs, direction signs, occupancy signs etc.);
 - provide shading features to reduce heat gain;
 - use cladding/ painting/ finishes which have long lasting new appearance to reduce cleaning frequency;
 - use commonly available construction materials to facilitate future maintenance;
 - adopt automatic mechanical raked screens to reduce human resources required for maintenance and improve hygiene and safety at work;
 - reduce the generation of waste as much as possible at all stages of the pumping station's life cycle; and
 - encourage the use of certified environmentally sustainable building materials or those with high recyclable content.

2.6 Architectural Treatment

2.6.1 An appropriate selection of the following architectural treatments will be adopted to enhance the aesthetic appearance of the proposed Sewage Pumping Station PS1A:

- allow variation in structural forms to avoid a perception of a dull image by the public, if there is enough space;
- avoid installation of pipelines, ducts, conduits, cat-ladders, railings etc. on external walls of the building structure. These utility services and plumbing shall be accommodated inside the sewage pumping station as far as possible whilst external pipes and vents shall be concealed for better appearance;
- encourage the use of warm tone colours to avoid presenting a cold appearance of the building in the community;
- use a colour scheme which harmonizes with the surrounding environment;
- shield ventilation openings and air conditioners and provide screening facilities to screen parking spaces and handling vehicles through architectural features, landscaping or plantation;
- provide external lighting to improve the aesthetic effect on the exterior of the sewage pumping station during night time; and
- adopt appropriate direction of fall in the building structure which helps drain rainwater away to avoid staining problem caused by rainwater dripping along external surfaces.

2.7 Incorporating Art into Structures

2.7.1 There is an opportunity to incorporate art themes to the boundary fences/ walls to enhance the experience of the public passing by the proposed sewage pumping station PS1A:

- sculptures created by local famous artists or element of natural history could form the centrepiece to a fence/ wall of the sewage pumping station building;
- bas-relief depicting some historical scene or building relevant to the particular location where the sewage pumping station is located;
- graphics displaying information related to the site; and
- water features such as a waterfall wall could as well be introduced.

With regards to the introduction of art, enlisting the help of local schools, artists or poets will make the theme more suitable for to the local environment.

2.8 Adoption of Natural Materials

2.8.1 With the principle of minimising visual impact incurred by the proposed sewage pumping station PS1A on the surrounding environment, it is generally appropriate to use low-key materials with earthy tone for the external finishing of the sewage pumping station facade, which provide a suitable backdrop for vertical planting.

2.8.2 The use of the following natural materials is encouraged:

- Natural granite for external finishing for the sewage pumping station building façade and the boundary walls in colours such as grey, beige, fawn or light brown are preferred. Reconstructed granite tiles could be used as an alternative depending on the site location. Although these materials cost more than spray paint which is often used for DSD building structures, they are much more durable and can last for the whole life of the building with very limited maintenance requirement, and thus offer good long term value for money.

- Natural wood battens mounted on steel bars with various colours can be used to form boundary fences which allow a certain degree of visibility while maintain an appropriate level of security in the sewage pumping station. Another advantage of using natural wood battens fencing is that it blends in with adjoining street planting areas.
- Night time feature lighting is recommended for boundary fences/ walls to emphasise the rustic materials and lush planting.

3 DESIGN LAYOUT AND PERSPECTIVE

- 3.1 The general layout of the proposed sewage pumping station PS1A is shown in Drawings No.23462/29211 to 29213 and 23462/29221 to 29224.
- 3.2 The ventilation system of the proposed sewage pumping station PS1A is shown in Drawings No. 23462/28381 and 28382.
- 3.3 Colour perspectives of schemes for aesthetic design of the proposed sewage pumping station PS1A are shown in Figures 2 and 3.
- 3.4 Colour perspectives of the recommended scheme 1for aesthetic design of the proposed sewage pumping station are shown in Figures 4 to 9.

APPENDIX A

Checklist for the Aesthetic Design of Sewage Pumping Station

Checklist for the Aesthetic Design of Sewage Pumping Station

Item(s)	Consideration(s)	Items Applicable to the Proposed Sewage Pumping Station Building	Recommended Approach(es)
1) Site Context	a) Choose a location for the sewage pumping station not conflicting the site context. b) Identify a location for the sewage pumping station not contrasting prominently with other buildings.	✓	a) Not to locate sewage pumping station close to shrine, ancestral worshipping hall, etc. b) Sewage pumping station building should not be taller than +15mPD as stipulated in OZP SK22/2 and the surrounding buildings.
2) Structural Form	a) If space allows, variation in structural forms should be chosen to avoid dull image to the public.	✓	a) Avoid pragmatic structural form.
3) Facade	a) External elevations of the building should give aesthetic pleasing looks and match with the surrounding premises or environment. b) The facade should be designed to facilitate future maintenance and cleaning by ordinary means of access.	✓	a) Incorporate features, such as louvers, strips, windows, openings etc. b) By exposing structural elements of the building to create interesting geometrical / vivid effects.
4) Greening	a) Roof garden is encouraged. b) Vegetation should be provided to soften the building structure. c) Concern about inspection and maintenance of waterproofing on the roof.	✓	c) Avoid installing pipelines, ducts, conduits, cat-ladders, railings etc. on the external walls. a) Green vegetation and colourful flowers to give an impression of a garden on the roof of the sewage pumping station. b) Provision of trees and shrubs within the sewage pumping station compound or roof of the sewage pumping station. c) The use of potted plants may be an alternative to planting walls or in-situ tree-planting.
5) Choice of Material	a) Facilitate future maintenance.	✓	a) Commonly available construction materials should be used. b) Cladding / painting / finishes which have long lasting new appearance should be used to reduce cleaning frequency.
6) Colour	a) Owing to cultural preferences, some sensitive colours (such as blue, red and yellow) should be used with care. b) Colour scheme which gives harmony to the environment is mostly preferred.	✓	a) The use of warm tone colours to avoid presentation of the building a cold appearance of the building in the community.
7) Culture	a) Respect local culture and tradition in the design and construction of building in rural areas. b) Consult the concerned rural committees and local representatives as soon as the preliminary design of the sewage pumping station is completed.	✓	a) Consult the concerned local representatives for the aesthetic design of the sewage pumping station.
8) Scale and Proportion	a) All exterior elements such as facade, doors, sills, canopy, windows and louvers shall be proportionate to each other.	✓	a) All exterior elements shall be designed to proportionate to each other.

Item(s)	Consideration(s)	Items Applicable to the Proposed Sewage Pumping Station Building	Recommended Approach(es)
9) E&M Equipment	<u>Pumps</u>		
	a) The footprint of the sewage pumping station is normally determined by the types and number of pumps required.	✓	a) Adequate space will be provided for equipment installation and future operation and maintenance of the selected type of pumps.
	b) If available site area is severely limited, one should consider providing only one standby pump on site, and to store off-site, in a convenient location, the remaining standby pumps and all accessories including power cables.	✓	b) Excessive space and headroom allowance will be avoided in order not to unnecessarily increase the overall height of the plant room.
	c) A standby pump is essential and indispensable in the operation of sewage pumping station.	✓	c) Size and headroom of the sewage pumping station building will allow for lifting/transversing of the pumps for maintenance purpose.
	<u>Trash Screening and Removal</u>		
	a) Trash Screens are normally installed at the inlet of the sewage pumping station for screenings removal and to protect the pumps from damage and clogging by huge foreign objects.	✓	a) Adopt automatic mechanical raked screens to reduce human resources required for operation and maintenance and improve hygiene and safety at work.
	b) Properly design the plant room to comfortably accommodate the screens.	✓	b) Optimise the headroom and space requirements to provide the trash screening and removal facilities.
	c) Screenings removal facilities including the parking space for screenings handling vehicle should be located indoor, under cover, shielded or screened through architectural features, landscaping or plantation.	✓	
	d) If large volume of screenings is expected, equipment to wash screenings and to reduce screenings volume should be provided.	✓	
	<u>Lifting Appliances</u>		
	a) Lifting appliances such as mobile cranes will normally be installed in the sewage pump house to facilitate maintenance of heavy equipment.	✓	a) Select the type of lifting appliances, which require minimum vertical clearance, to facilitate the maintenance of E&M equipment.
	b) To improve the outlook and optimise the overall headroom of the plant room.	✓	b) Consider the provision of mobile elevated platform to access equipment installed at height to improve the outlook and optimize the overall headroom of the plant room.

Item(s)	Consideration(s)	Items Applicable to the Proposed Sewage Pumping Station Building	Recommended Approach(es)
	<u>Internal Lighting</u>		
	a) Excessive headroom will unavoidably be required to accommodate the high bay lighting.	✓	a) Consider using wall-mounted floodlight and fluorescent light tubes instead of high bay lighting to avoid the requirement of excessive headroom.
			b) Cabling for the lighting or other building services equipment should be installed in concealed conduit as far as practicable.
	<u>External Lighting</u>		
	a) In addition to normal external lighting such as street lighting for general illumination, special exterior lighting shall be provided.	✓	a) Consider providing external lighting for improving the aesthetic effect of the exterior of the sewage pumping station during night time.
			b) External lighting, especially floodlights, should be located and orientated to avoid inducing glare effects on the neighbourhood or nearby road users.
			c) Lighting for both security and particular O&M purposes should be provided.
			d) Timer control, remote control, photo-sensor and bypass switches for the external lighting should be provided where appropriate.
			e) Cabling for external lighting should be accommodated inside the building or concealed as far as possible.
	<u>Power Supply</u>		
	a) Dual-feed electricity supply is preferred to Diesel Generators for emergency electricity back-up for minimizing land intake requirements.	✓	a) Balance between the capital cost for provision of dual feed power supply; the benefits of minimizing the land intake requirements; benefits of the aesthetic appearance of the sewage pumping station; and the reliability of the dual power supply in the region where the sewage pumping station is to be built.
	b) However, if the capital cost is too high or the reliability of the dual power supply in the region where the sewage pumping station is to be built is low, an emergency generator should be chosen.	✓	b) Visual intrusion caused by the exhaust gas vent of the diesel engine and noise nuisance caused by operation of the diesel engine should be minimized if emergency generator is eventually selected.

Item(s)	Consideration(s)	Items Applicable to the Proposed Sewage Pumping Station Building	Recommended Approach(es)
	Ventilation and Air-conditioning		
	a) Any exposed ventilation fans and air conditioners should be provided with aesthetic features.	✓	a) Air ductwork should be located inside the pumping station.
			b) Air intake / exhaust of the ventilation system should be installed on the building faces / walls not facing the public. Otherwise, their shape and colour should be carefully chosen to tune down their intrusive effect.
			c) Silencers and louvers should be provided.
	Odour Treatment Facilities		
	a) Heights, footprint requirements and outlooks of different types of deodorizing equipment should be considered.	✓	a) Separate openings or outlets from sensitive receivers and incorporate ornamental features to lessen the visual effects of the openings on the public.
	b) Deodorizer should be located indoor, under cover, shielded or screened through architectural features, landscape work or plantation.	✓	
	c) Ventilation openings and outlets of odour treatment facilities should be oriented in a direction away from the sensitive receivers (e.g. residential premises and pedestrian walkways).	✓	
	d) Ornamental features should be provided for these ventilation openings to reduce their visual impact.	✓	
	Renewable Energy Equipment		
	a) Adoption of energy efficient features and installation of renewable energy equipment should be seriously considered (some examples include solar heating, Photovoltaic system and wind turbine).	✓	a) Adoption of energy efficient features and installation of renewable energy equipment would be considered in accordance with ETWB TCW No. 16/2005.

Item(s)	Consideration(s)	Items Applicable to the Proposed Sewage Pumping Station Building	Recommended Approach(es)
	b) Any use of PV panels or other renewable energy equipment mounted on the roof of the sewage pumping station should be screened / shielded.	✓	b) Careful planning for the installation of renewable energy equipment at the sewage pumping station to maintain the aesthetic design.
10) Civil and Structural Elements	Boundary Fences and Walls		
	a) Visually permeable fences such as metallic fencing with screen planting shall be used to screen the sewage pumping station.	✓	a) Solid boundary walls with suitable architectural features may be considered for the sewage pumping station where the operational activities may create environmental nuisance or are visually intrusive.
	b) Colour, material and architectural pattern of the main gate should match with the boundary fences or walls.	✓	b) Boundary walls and fences shall be located carefully to avoid impaling existing urban / rural landscape elements such as mature trees.
			c) Choices of materials, details and textures of the boundary walls and fences should be visually recessive and in a style that fits with the surrounding environment / buildings.
			d) If metallic fences are used, colour with low chromatic intensity shall be considered to reduce the contrast between the fences and their background.
			e) Glass block panels can be adopted to make the solid boundary walls look less massive, but should be avoided in the area where the sewage pumping station is prone to vandalism (e.g. remote area, unmanned sewage pumping station).
	Roof		
	a) Roof garden shall be implemented to reduce solar heat and soften the building mass. Alternatively, potted plants are also acceptable.	✓	a) Special consideration should be given to the roof water-proofing system and other maintenance requirements (advice from ArchSD on the design of the roof garden may be sought).
	b) Perennial plants are preferable for the unmanned sewage pumping station and better appearance in dry seasons.	✓	b) Sky window can introduce natural light into the interior of the sewage pumping station and could be an attractive feature when properly designed.
			c) Parapet walls of suitable height / size should be provided. It can also act as a safety protection for the maintenance personnel and visitors entering the roof garden.
			d) Cat ladder, which is considered to be visually intrusive, should be installed on the sewage pumping station roof garden.

Item(s)	Consideration(s)	Items Applicable to the Proposed Sewage Pumping Station Building	Recommended Approach(es)
	<u>Louvers, Window and Exterior Door</u>		
	a) All exterior openings shall be provided with the same rectangular ratio as the building.	✓	a) The colours of the louvers, windows and doors etc. should match with the overall colour scheme of the sewage pumping station.
	b) Exterior openings shall be located away from the local sensitive receivers (e.g. residential and commercial buildings etc.).	✓	
	c) Window guards instead of exterior security bars should be used for the windows at ground level.	✓	
11) Utility Services and Plumbing	a) Utility services and plumbing should be accommodated inside the sewage pumping station.	✓	a) External pipes and vents shall be concealed for better appearance.
			b) Provide reserve utility services ducts or conduits to cater for possible additional utility services at later stages.
12) Landscaping Works	a) Evergreen plants / trees shall be selected.	✓	a) Landscaping works should be carried out in phases such that some landscaping works can be established at early stages of the sewage pumping station construction to achieve gradual greening effects.
	b) Existing trees shall be reserved and protected.	✓	b) Medium size trees / shrubs, instead of seedlings, should be planted shortly after the completion of the construction stage.
	c) Automatic irrigation facilities shall be provided.	✓	c) Climbers, flower racks and other vertical greening should be provided to beautify the external walls of the sewage pumping station and to keep the building cool.
13) Architectural Treatment	a) Operations that may have negative visual impact on the public (e.g., handling of screenings) should be located indoor, under cover, shielded or screened through architectural features, landscaping or plantation.	✓	a) Any outdoor equipment should be under cover, shielded or screened.
	b) Staining problem caused by rainwater dripping along the external surface should be avoided by the appropriate direction of fall which helps drain the rainwater away.	✓	
14) Administrative Measures	a) The requirements in DSD TC No.9/2006 shall be followed for sewage pumping stations which are designed and built by others and taken over by DSD for operation and maintenance.	✓	a) All consultation exercises should be properly documented in order to avoid future disputes.
	b) The pumping station design should be forwarded to the ArchSD's Design Advisory Panel for advice.	✓	
	c) The requirements stated in EWTB TC(W) No. 9/2005 shall be followed.	✓	
	d) Any change in the disposition and aesthetic design of the sewage pumping station during construction may result in resubmissions under Environmental Impact Assessment Ordinance and Town Planning Ordinance.	✓	

Item(s)	Consideration(s)	Items Applicable to the Proposed Sewage Pumping Station Building	Recommended Approach(es)
	e) Design revisions that would affect the external appearance of the sewage pumping station should be vetted by Head of the Project Division before issuing the revised construction details to the contractor. f) Before aesthetic and landscaping designs of the pumping station are finalized, relevant parties (District Council, Rural Committee, local representatives, etc.) shall be consulted.	✓	
15) Green Building Rating	a) New pumping station with construction floor area larger than 10,000m² should aim to obtain the second highest grade or above under an internationally or locally recognized building environmental assessment system such as the Leadership in Energy and Environmental Design Green Building Rating System (LEED) or Hong Kong Building Environmental Assessment Method (BEAM), and in due course the assessment system to be developed by the Hong Kong Green Building Council which will soon be established.	N/A	
16) Energy Efficient Features	a) New sewage pumping station with construction floor area larger than 10,000m² should aim to outperform the Building Energy Codes issued by the Electrical and Mechanical Services Department by at least 10%.	N/A	
	<u>General Building Configuration</u>		
	a) Building Orientation to be carefully chosen.	N/A	
	b) Building fabric materials to be carefully chosen.	N/A	
	c) Low thermal conductivity materials for building envelope insulation.	N/A	
	<u>Building Energy Management System</u>		
	a) Adopt programmable on/off control for lighting and air-conditioning system.	N/A	
	b) Optimum control and scheduling of air-conditioning plants.	N/A	
	c) Recording of energy consumption trends for energy audit.	N/A	

Item(s)	Consideration(s)	Items Applicable to the Proposed Sewage Pumping Station Building	Recommended Approach(es)
	<u>Lighting Installation</u>		
	a) Install electronic ballasts for fluorescent lamps.	N/A	
	b) Adopt T5 (or better) fluorescent lamps for general lighting.	N/A	
	c) Adopt T5 (or better) fluorescent tubes with parabolic diffusers for tall headroom locations.	N/A	
	d) Use lamps with high efficacy.	N/A	
	e) Use low energy consumption signs (e.g. exit signs, direction signs, occupancy signs etc.).	N/A	
	f) Use photo-sensors for independent control of lighting.	N/A	
	g) Use timer-operated lighting.	N/A	
	h) Adopt occupancy sensors for lighting control.	N/A	
	<u>Air-conditioning Installation</u>		
	a) Connection to District Cooling System.	N/A	
	b) Use chillers with high coefficient-of-performance (COP).	N/A	
	c) Adopt heat recovery chillers for reclaiming waste heat.	N/A	
	d) Adopt seawater cooled condensers.	N/A	
	e) Adopt evaporative cooling towers using fresh water as a cooling media.	N/A	
	f) Use total heat wheel to reclaim energy from exhaust air.	N/A	
	g) Adopt variable speed drives.	N/A	
	h) Adopt multi-zone variable air volume (VAV) system.	N/A	
	i) Adopt free cooling using outdoor air.	N/A	
	j) Demand control of fresh air supply.	N/A	
	k) Adopt variable secondary chilled water flow.	N/A	
	l) Minimize pipe losses.	N/A	
	m) Room temperature sensing devices (such as thermostats) should be properly located to more accurately reflect room conditions.	N/A	
	n) Adopt occupancy sensor control, e.g. for office rooms.	N/A	
	o) Adopt computerized / programmable control for the air-conditioning system.	N/A	
	p) Control air leakage level (positive building pressure).	N/A	
	q) Adopt automatic condenser tube cleaning equipment.	N/A	
	r) Due consideration about chiller part-load efficiencies.	N/A	

Item(s)	Consideration(s)	Items Applicable to the Proposed Sewage Pumping Station Building	Recommended Approach(es)
17) Adoption of Renewable Energy Technologies	Adoption of Photovoltaic (PV) Technology a) For buildings with footprint area greater than 1,000m ² , photovoltaic (PV) panels should be installed where practicable with due consideration given to the shading effects caused by nearby buildings/structures. b) Building-integrated photovoltaic (BIPV) panels on facades should be adopted, provided it is allowed by the structural and architectural design of the building, and will not be shaded by nearby structures.	N/A	
	Adoption of Wind Turbine Technology a) For site of mean wind power density above 200W/m ² , without nearby obstructions to the flow of wind and having the advantage of height or exposure to the sea, wind turbines (e.g. rooftop turbines) should be installed where practicable with due consideration given to issues relating to noise, visual and safety.	N/A	
	Adoption of Bio-gas Electricity Generation Technology a) For sites with bio-gas source available, the use of bio-gas as a fuel for heating and electricity generation should be adopted where practicable with due consideration given to the health risk impacts caused by the emission of flue gases. a) New sewage pumping station with construction floor area larger than 10,000m ² should aim to achieve reduction in GHG emission through lowering energy consumption by at least 20% below the average consumption level (in terms of kWh/sq.m/year) for existing sewage pumping station. b) New sewage pumping station with construction floor area larger than 10,000m ² to be completed after end-2011 should aim to carry out carbon audit and report the findings in the DSD's annual Environmental Performance Report.	N/A	
18) Greenhouse Gas (GHG) Reduction			

Item(s)	Consideration(s)	Items Applicable to the Proposed Sewage Pumping Station Building	Recommended Approach(es)
19) Waste Reduction and Management	a) The generation of waste should be reduced as much as possible at all stages of the pumping station's life cycle.	✓	a) Use more durable, environmentally sustainable, recyclable, repairable and replaceable materials and adopt modular construction as far as possible.
	b) The use of materials on site should be maximized.	✓	
	c) The use of certified environmentally sustainable building materials or those with high recyclable content should be encouraged.	✓	

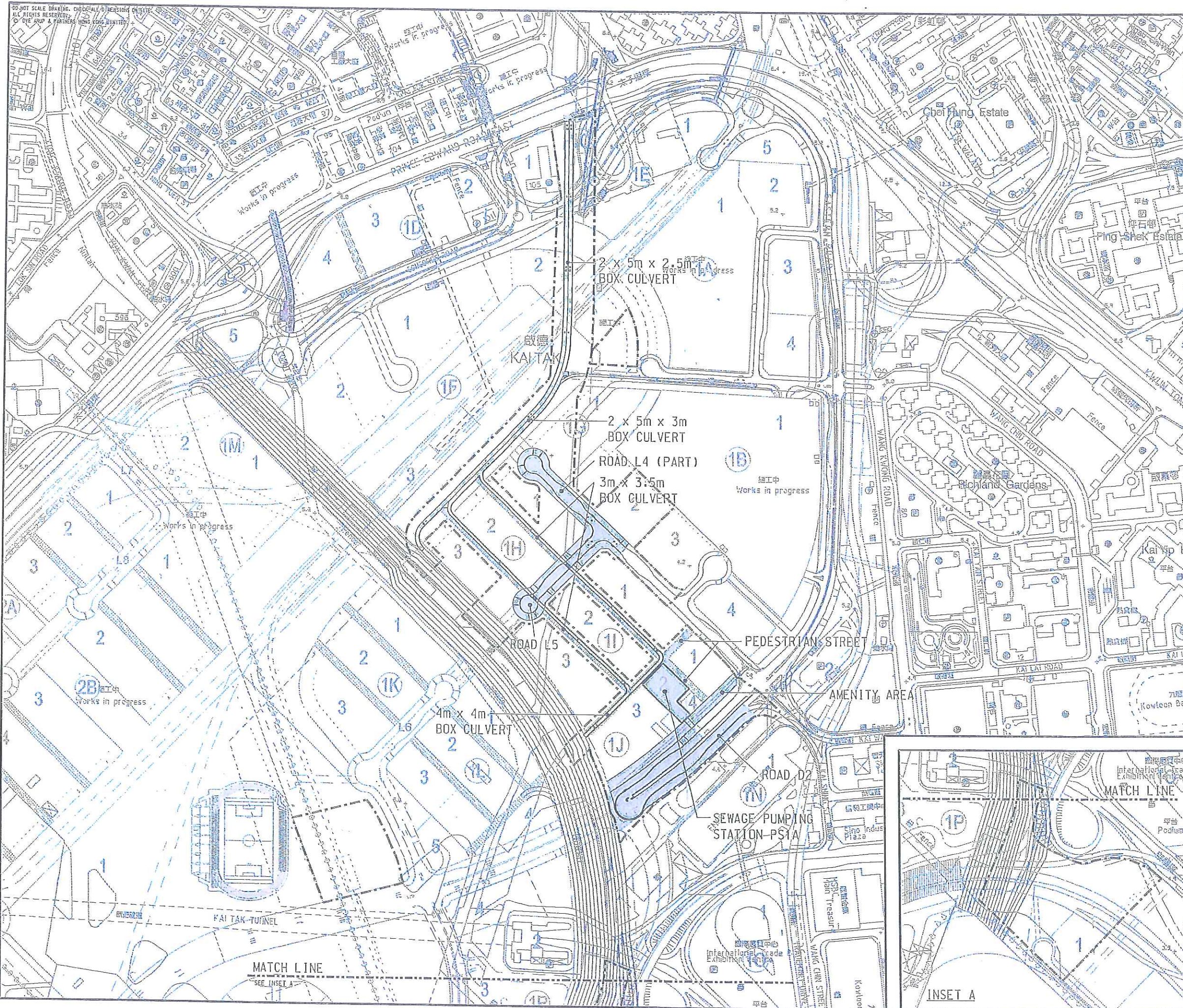
DRAWINGS

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STAGE 2

- CONSTRUCTION ELEMENTS:
- PART OF ROAD L4
 - ROAD L5
 - PART OF ROAD D2
 - PUMPING STATION PS1A
 - MODIFICATION OF 2.5m x 2.5m BOX CULVERT TO CONNECT WITH NEW 2x5m x 3m BOX CULVERT
 - 2x5m x 2.5m/3m BOX CULVERT
 - 2 NOS. 3m x 3.5m BOX CULVERT
 - 4m x 4m BOX CULVERT
 - CONSTRUCTION OF ULTIMATE PHASE DRAINAGE AND SEWERAGE SYSTEM
 - CONSTRUCTION OF ULTIMATE PHASE FRESH AND SALT SUPPLIES SYSTEM
 - AT GRADE FOOTPATHS ALONG NEWLY CONSTRUCTED ROADS
 - LANDSCAPING OF AMENITY AREAS

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A	GENERAL REVISION	GK	09/10

Consultant
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Kai Tak Development - Stage 2
Infrastructure Works at North Apron
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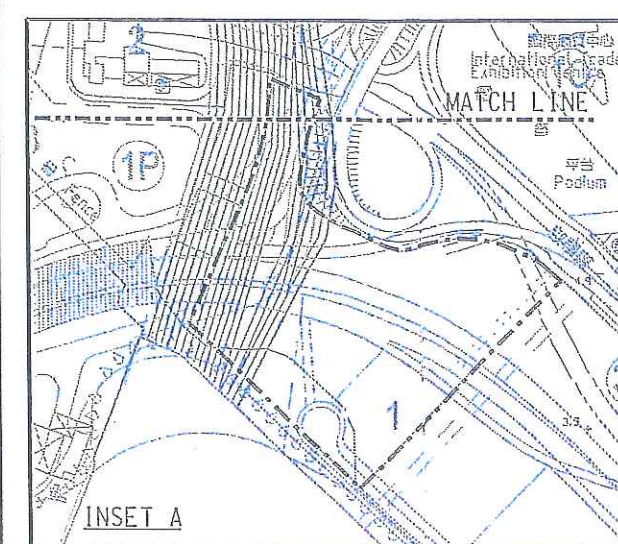
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**INFRASTRUCTURE WORKS
AT NORTH APRON PHASE 1,
STAGE 2**

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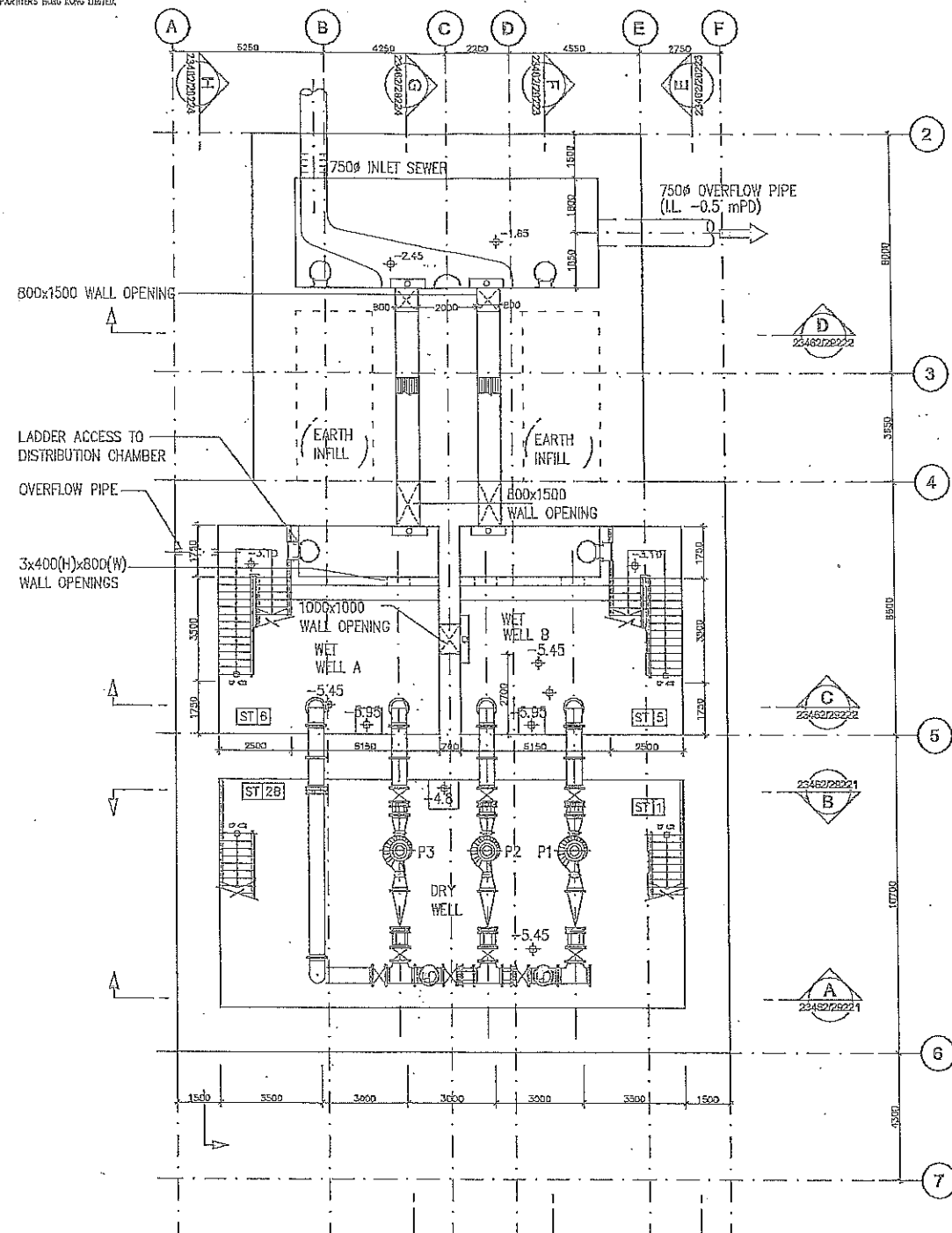
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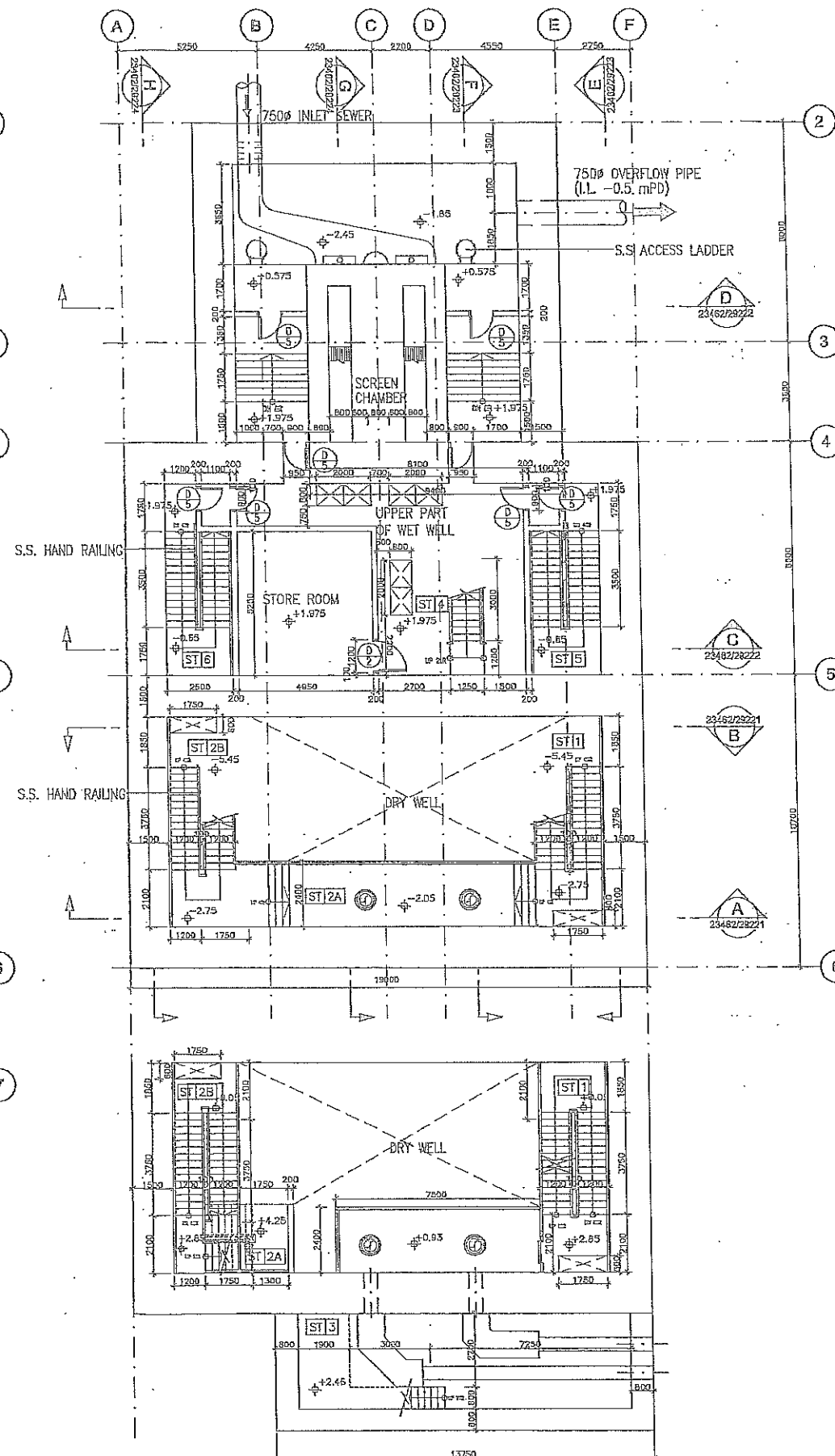
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1 BASEMENT FLOOR PLAN
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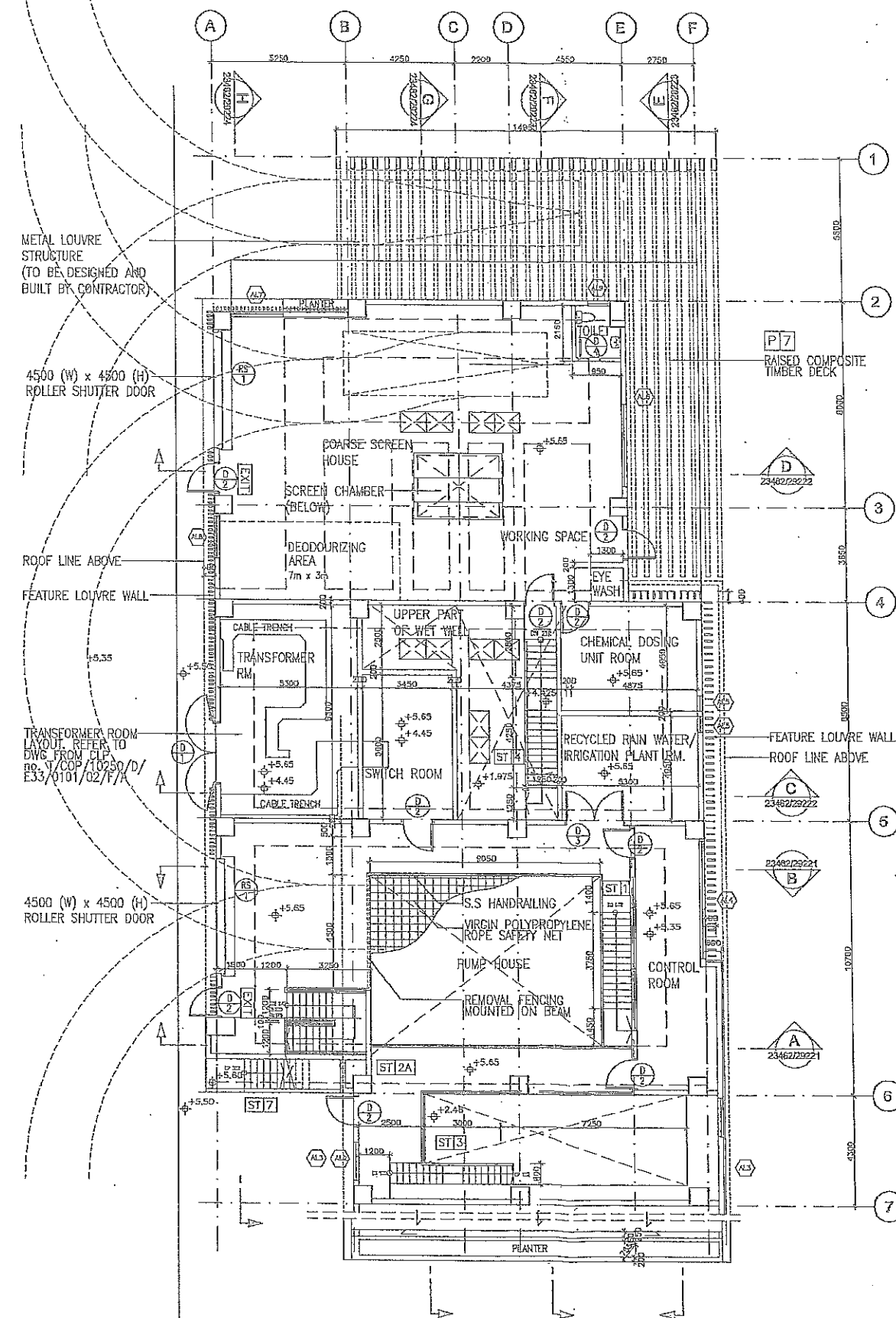
2 INTERMEDIATE FLOOR PLAN/ PART PLAN
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NOTES:

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2. LEVELS ARE IN METRES RELATIVE TO PRINCIPAL DATUM (P.D.)

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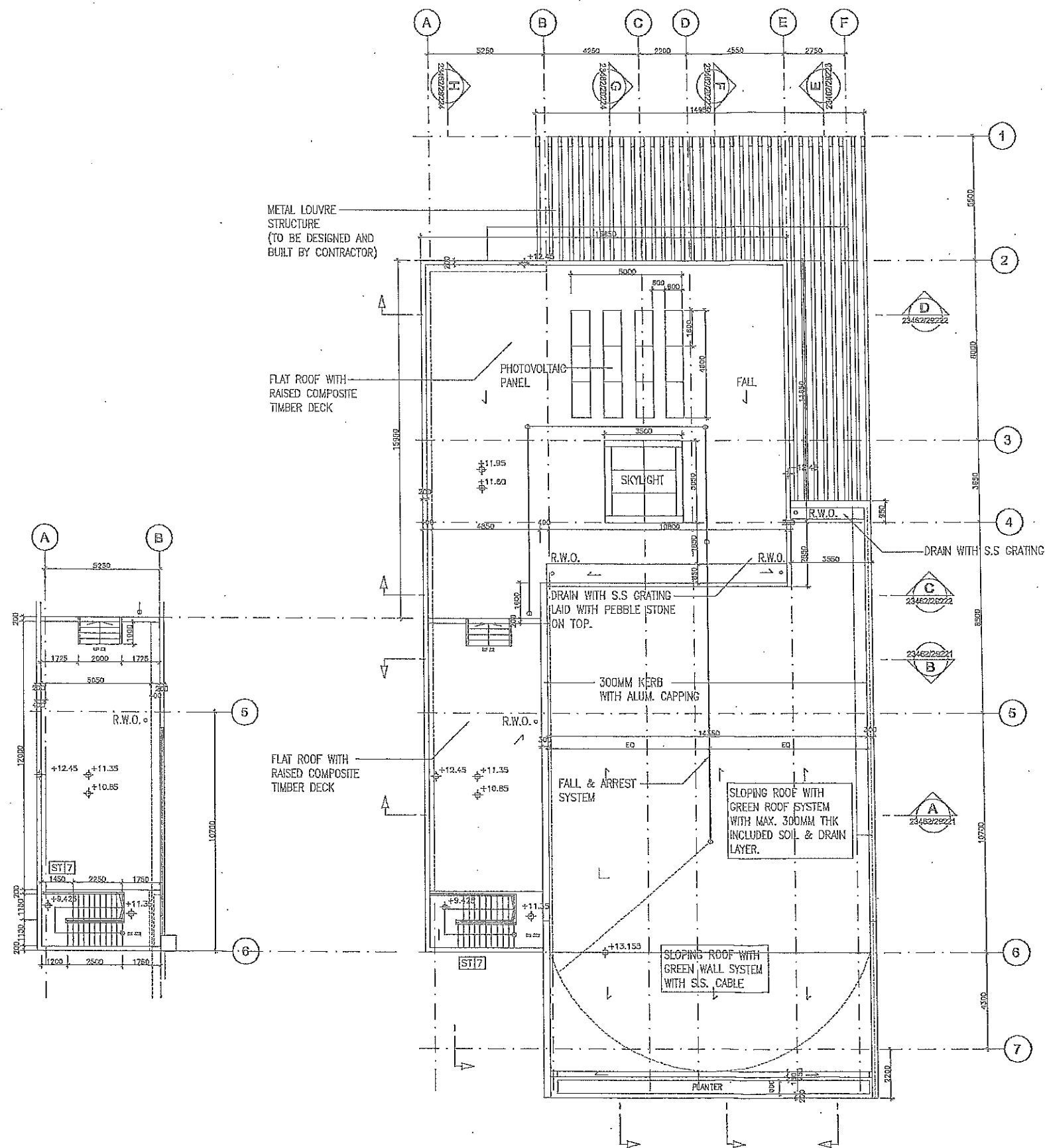
3 GROUND FLOOR PLAN
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4 ROOF PLAN/PART ROOF PLAN
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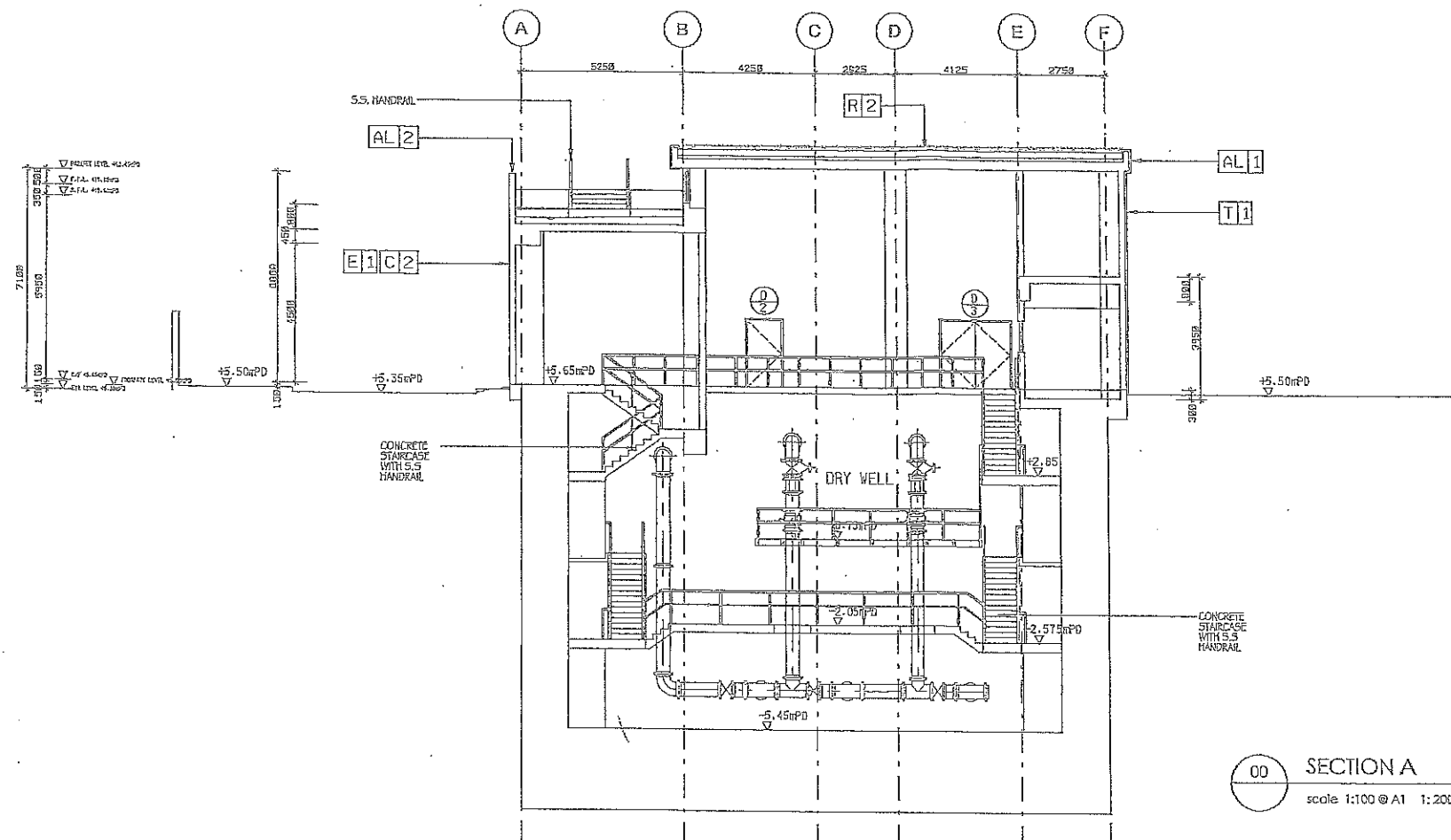
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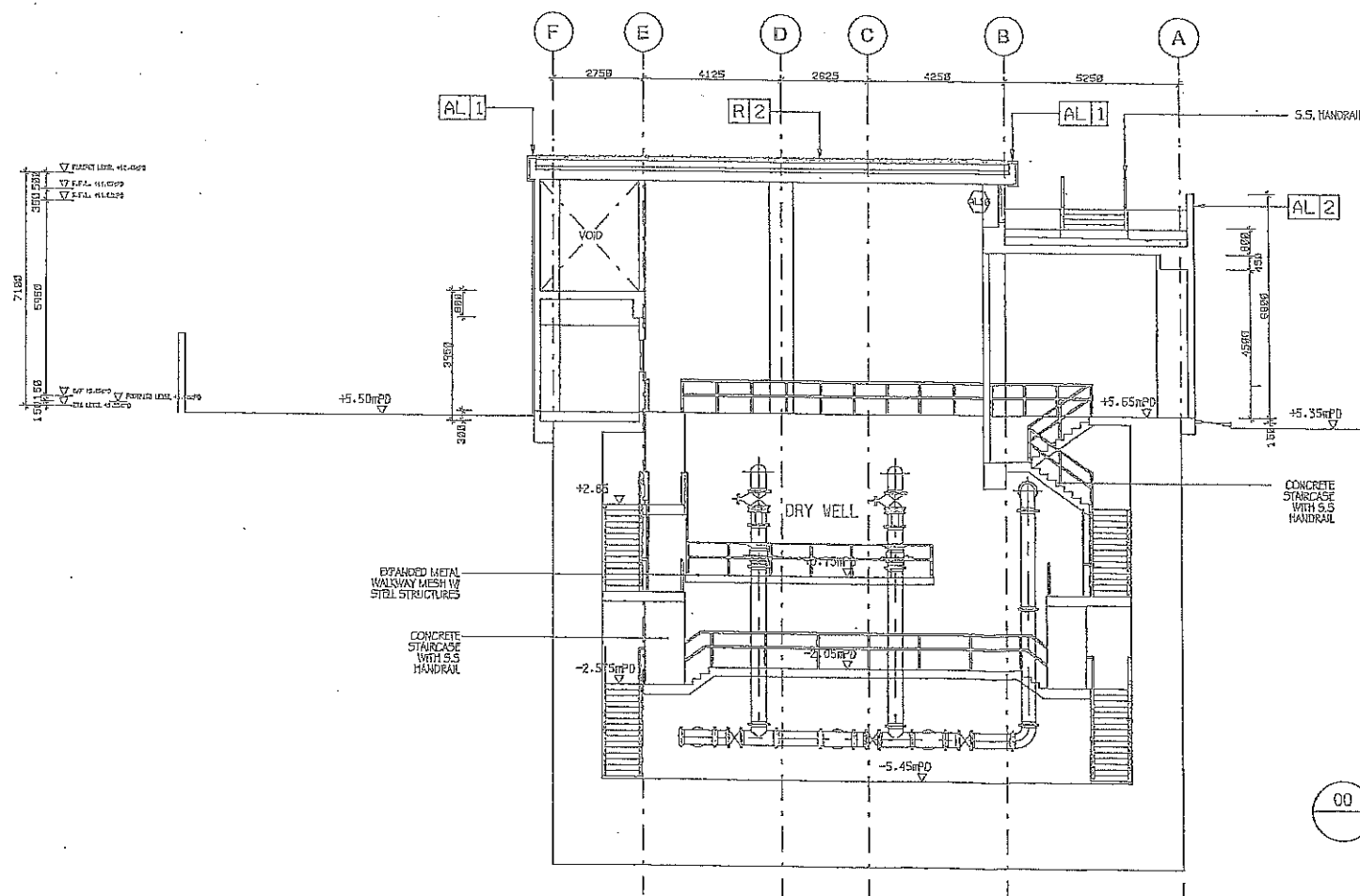


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00 SECTION B
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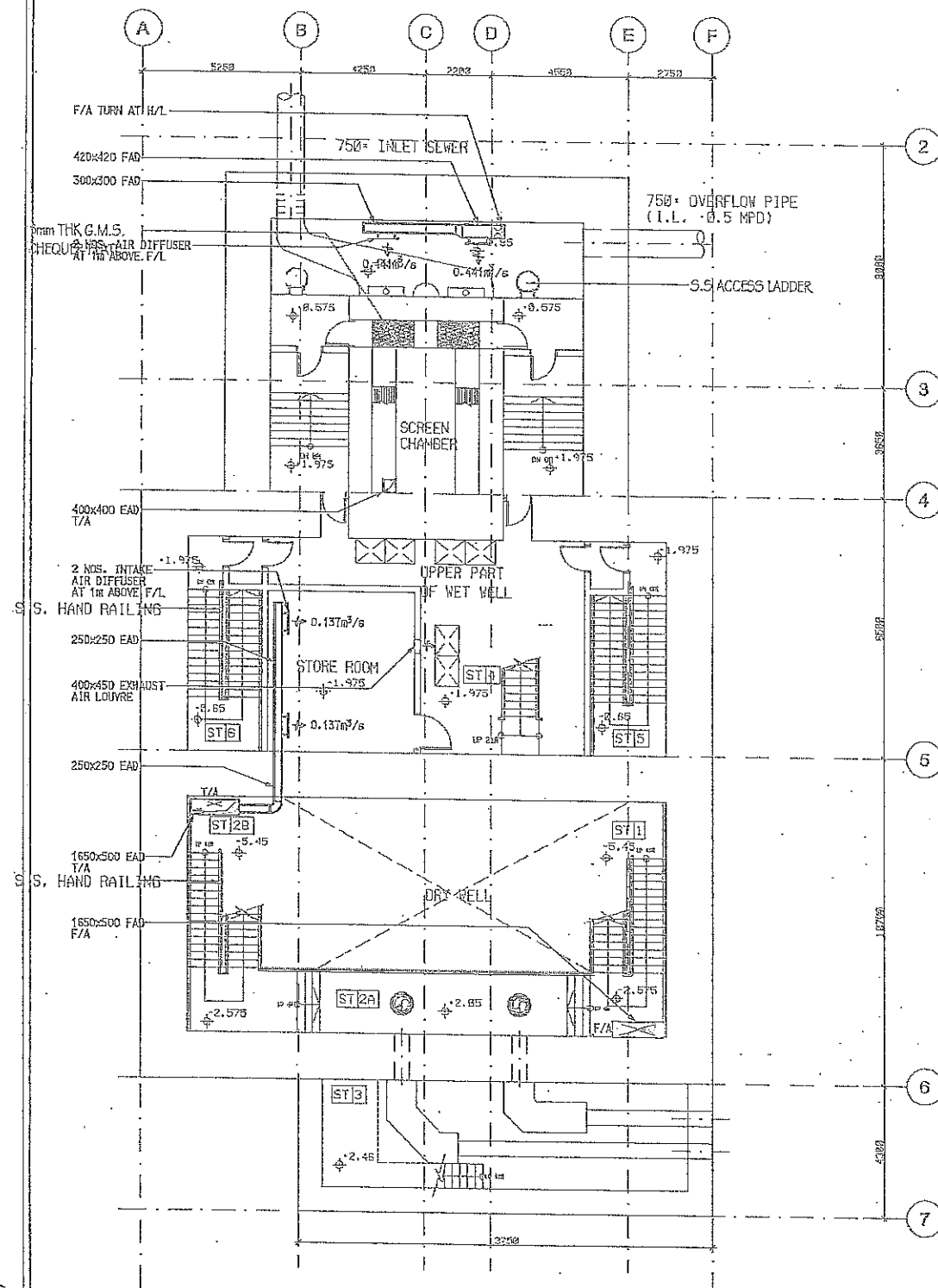
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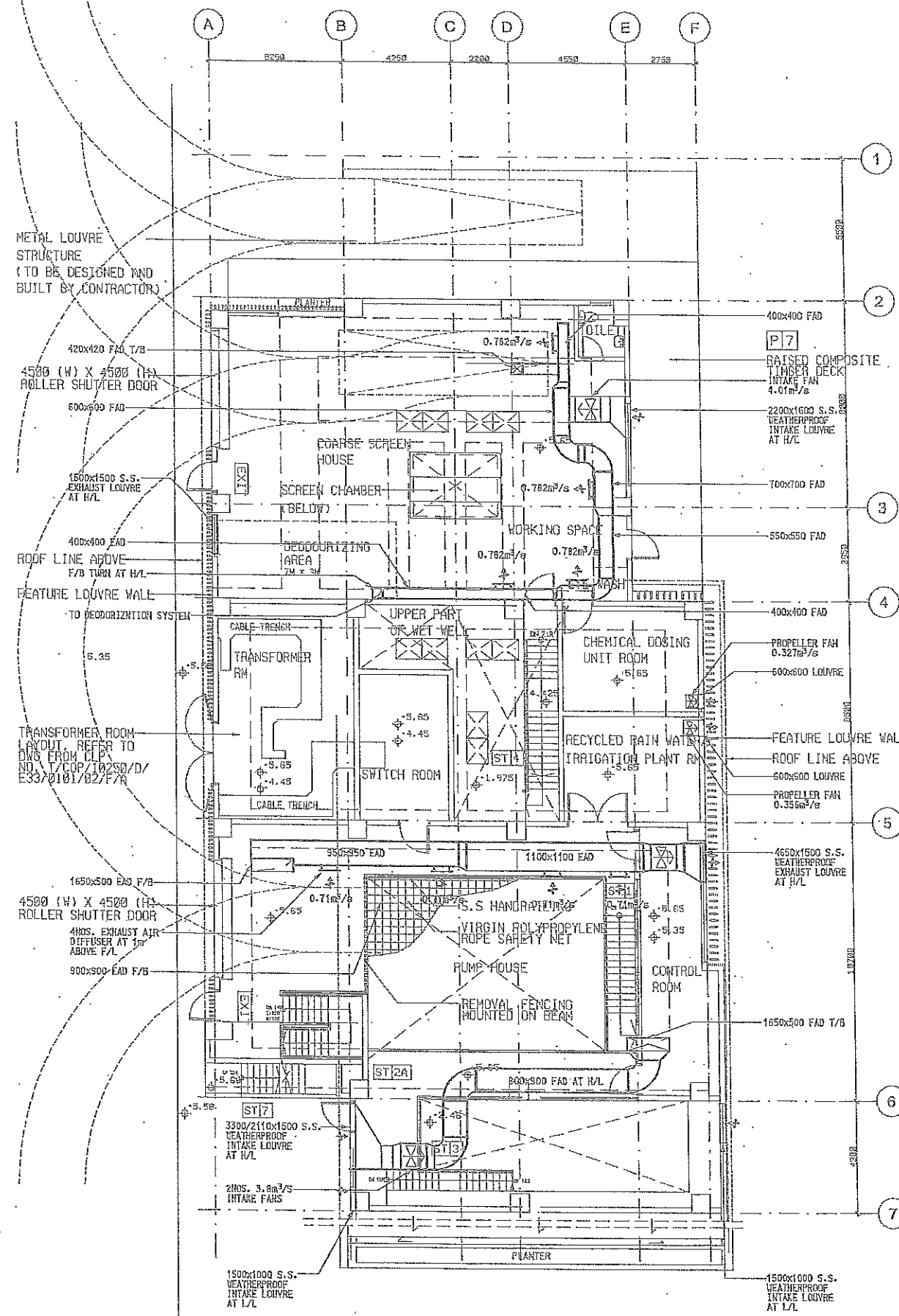


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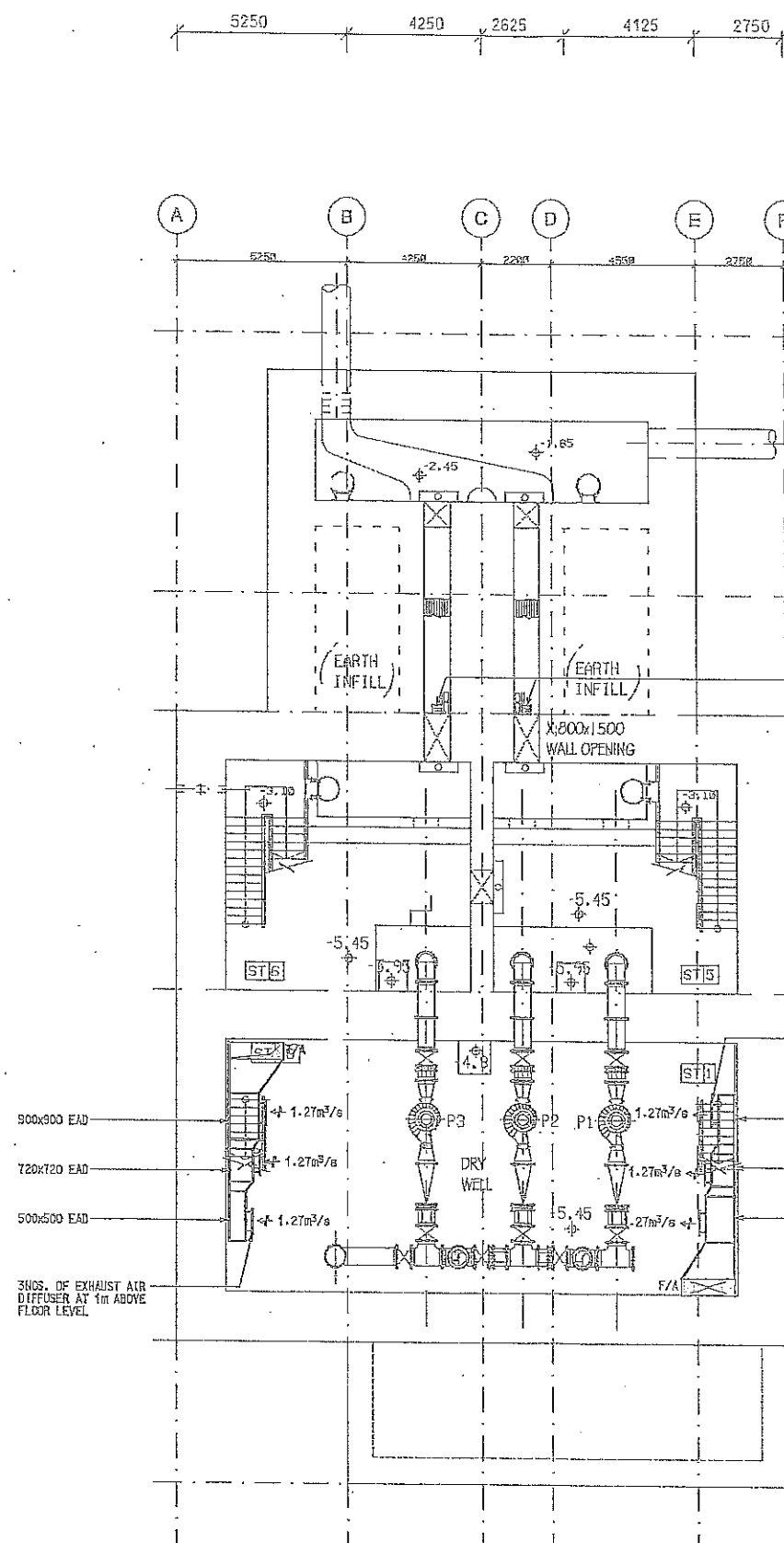
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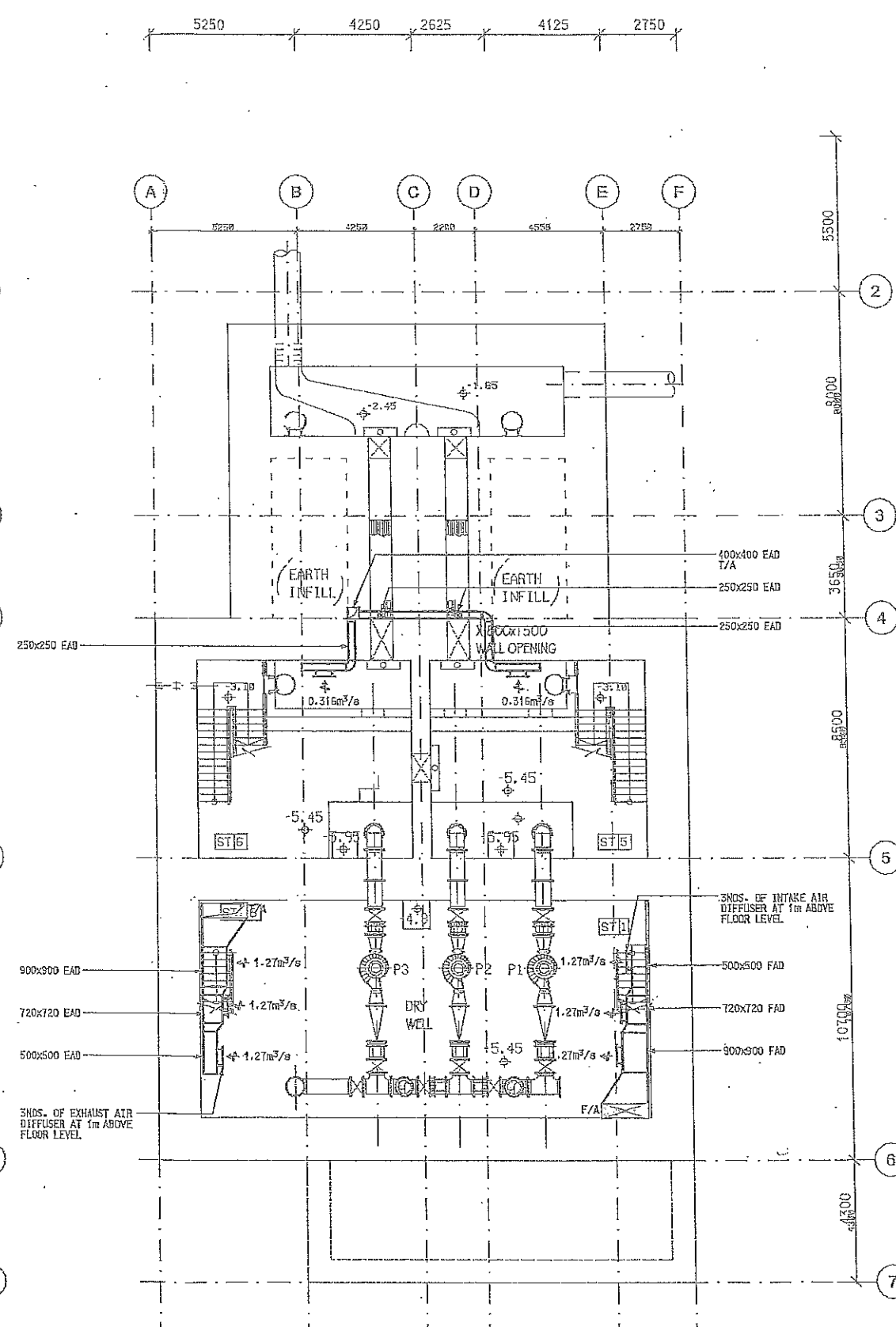
3 GROUND FLOOR PLAN
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1 BASEMENT FLOOR PLAN
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FIGURES

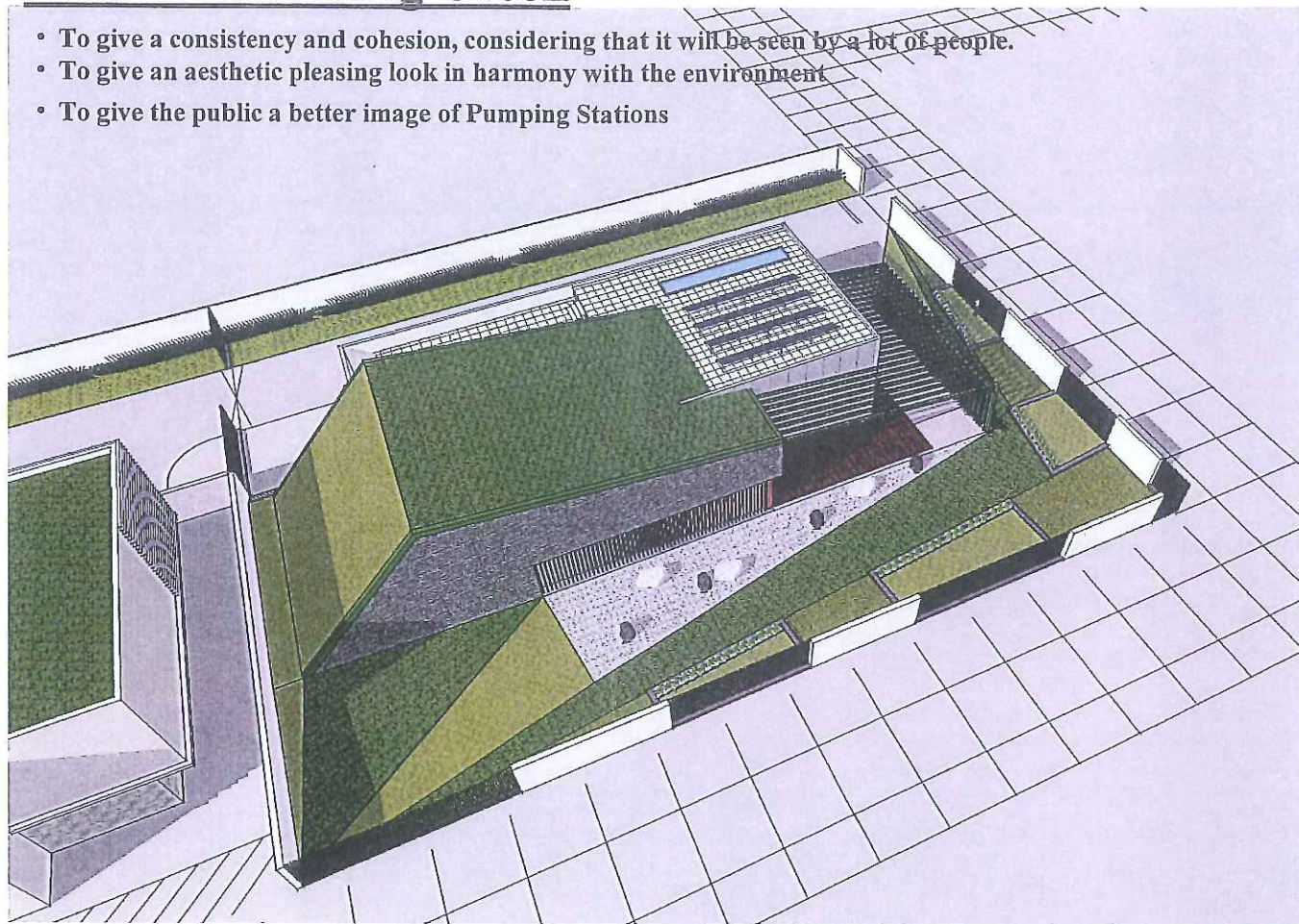


Kai Tak Master Layout Plan (North Apron Area)

Figure 1

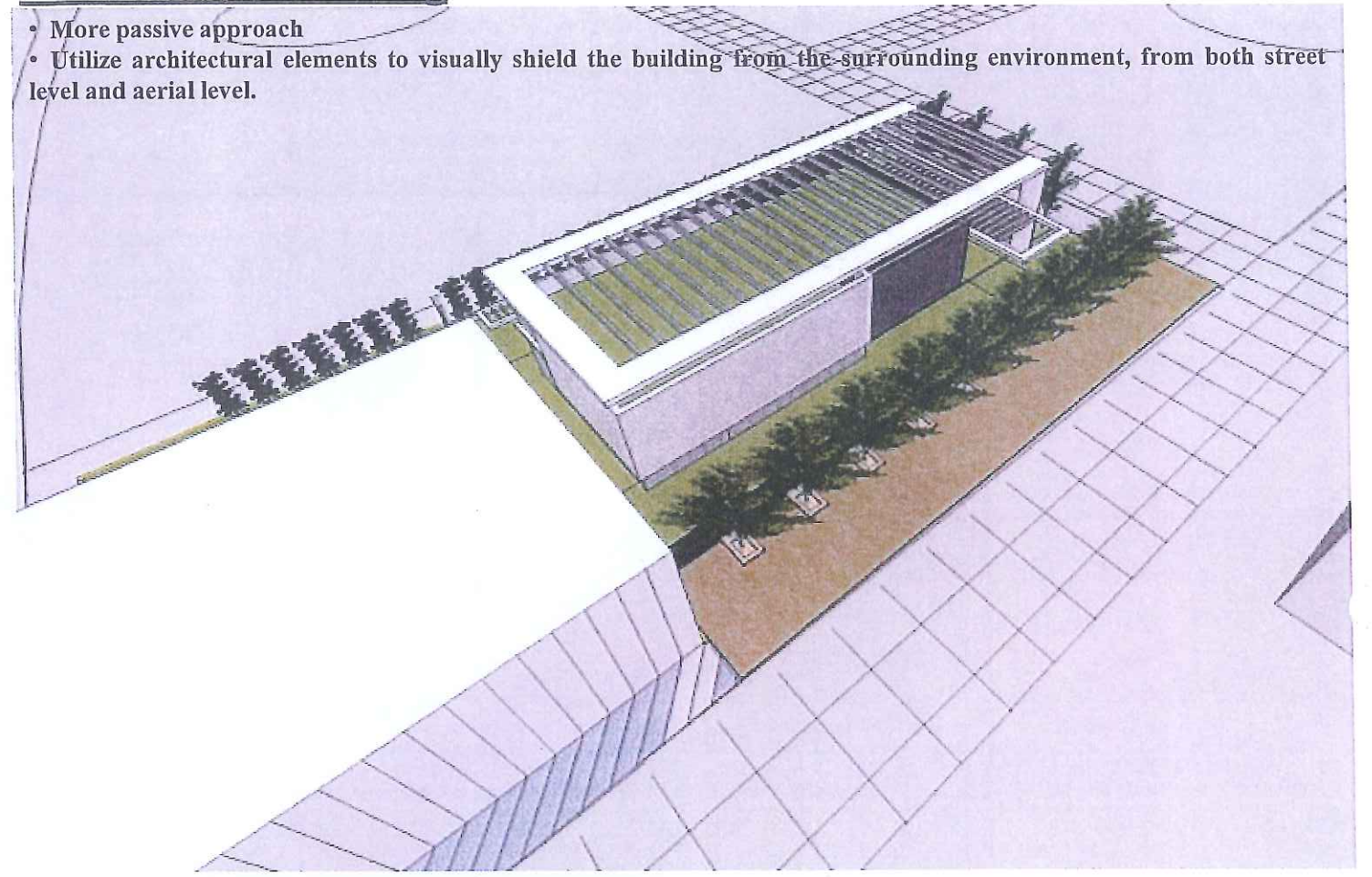
Scheme 1: Folding Green

- To give a consistency and cohesion, considering that it will be seen by a lot of people.
- To give an aesthetic pleasing look in harmony with the environment
- To give the public a better image of Pumping Stations



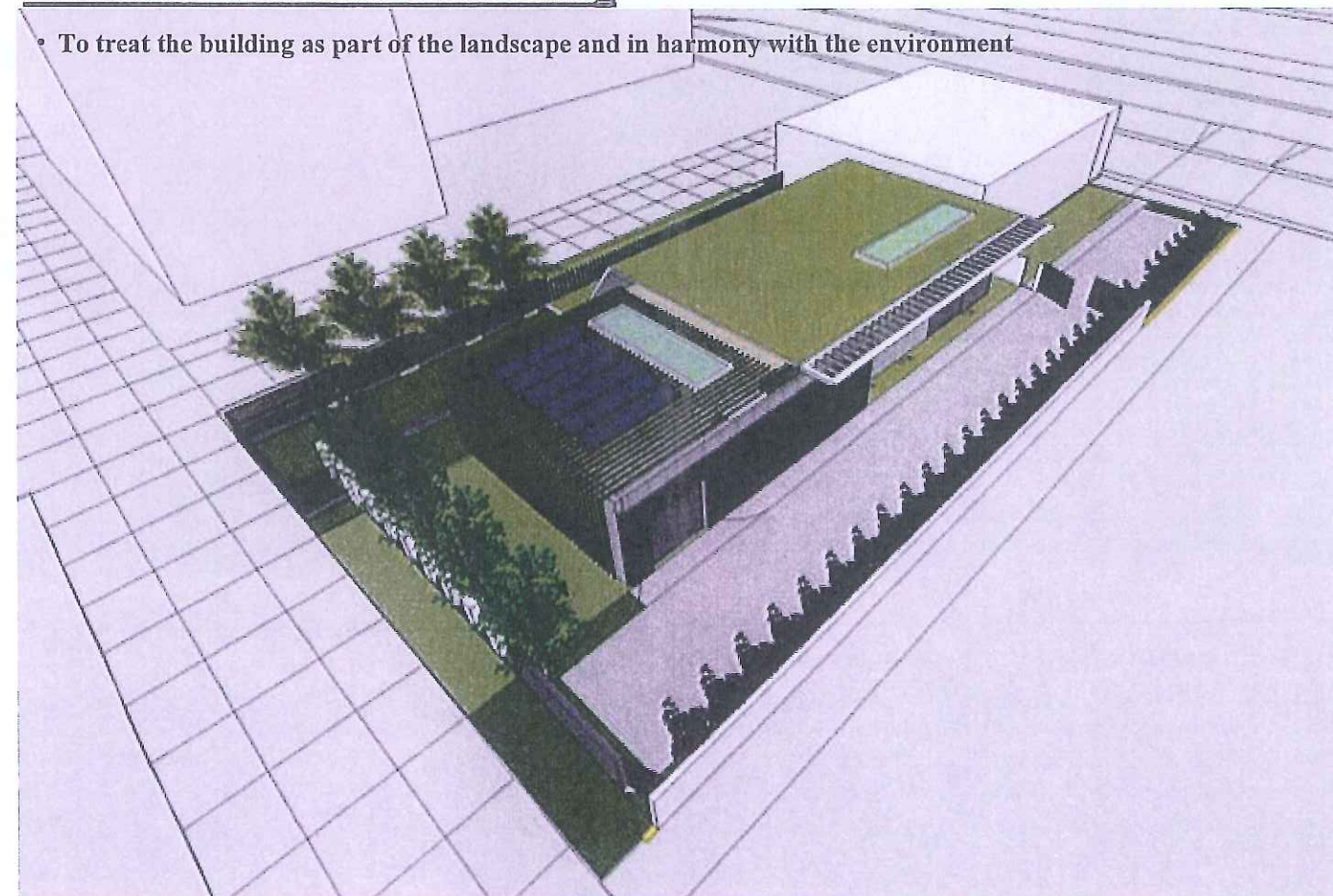
Scheme 2: Screening

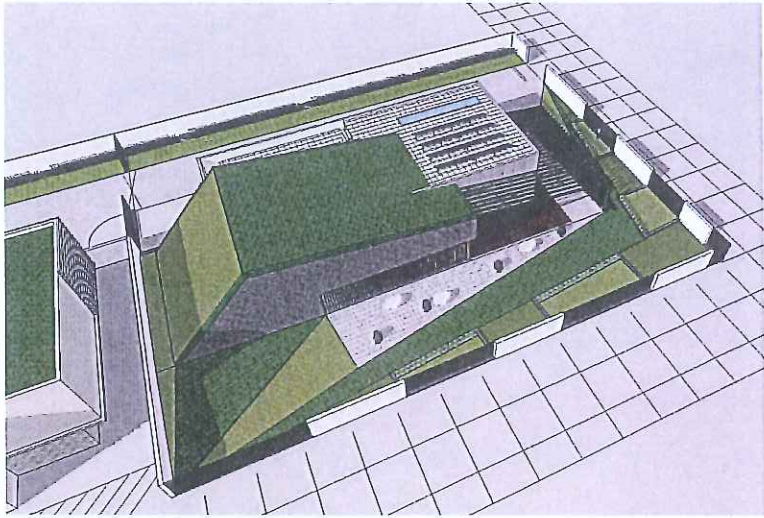
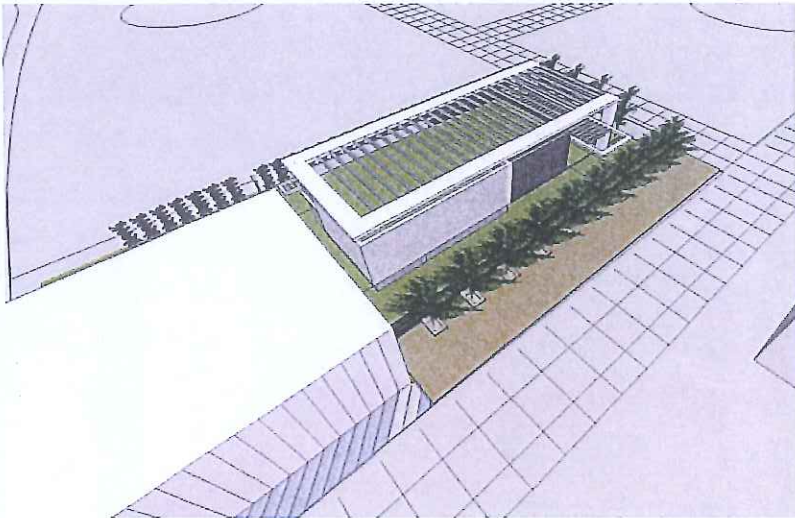
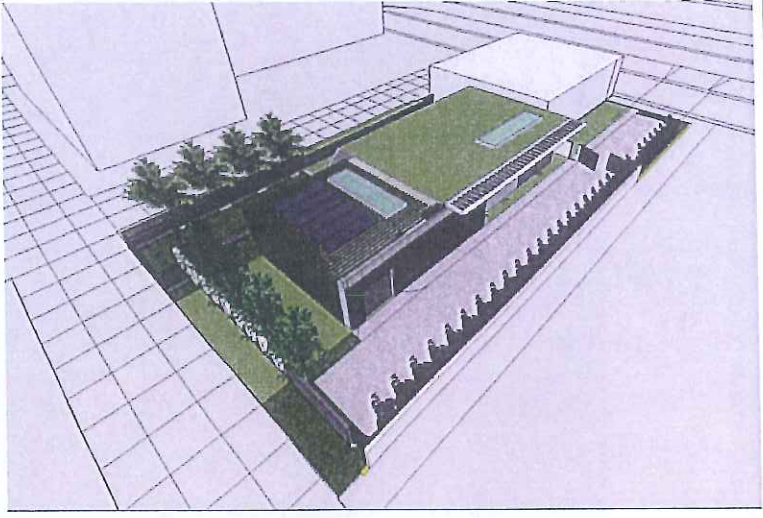
- More passive approach
- Utilize architectural elements to visually shield the building from the surrounding environment, from both street level and aerial level.



Scheme 3: Green Screening

- To treat the building as part of the landscape and in harmony with the environment



	Scheme 1 : Folding Green	Scheme 2 : Screening	Scheme 3 : Green Screening
			
PROS	• Interesting and elegant form. • The building as a folded landscape become itself a landscape to be seen. • The shape give a more light feeling that break the image of heavy and massive pumping stations. • The green ratio is maximized. • The building, the landscape treatment, shape, the fences, all elements can be understood as one whole. • A skylight on the roof top allows natural lighting to penetrate in the building.	• The layering of materials on the facades break down the massive scale of the building. • The open space for the public is wide and clear.	• The layering of materials on the facades break down the massive scale of the building. • The green ratio is maximized. • As an alternative of scheme 2, this option introduces more green visually, that helps to break down the scale successfully when seen from the top. • The green folding form the boundary to cover the top of the building give it a dynamic movement that avoid a monotonous effect. • A skylight on the roof top allows natural lighting to penetrate in the building.
CONS		• The screening of horizontal louvers on the roof is increasing the total building height. • The idea of screening is overprotective and might reveal an even stronger impact of the building than if it was not there. • The building scale is still massive.	• Unlike scheme1, here the green is folding from another direction which gives the building an important width at the place where the green covers the building. That makes the building look bulky from the pedestrian path. • It is hard to see the logic and the reason why the green is folding from the fence and does not seem to have a connection with the green at grade level unlike scheme 1.

Our preferred option is the scheme 1 ‘‘Folding Green’’. Its unusual shape give it its originality and a lightness that the two other schemes don’t have. The treatment of folding the green allows the building to become the landscape as a kind of natural sculpture. Thus it gives the most pleasing look when seen by pedestrians or from the buildings in the surroundings. Even if it might be the design option that stands out more compared to the others in terms of concept, it is still the option that blend in and fit the context the best. It has this contemporary, untraditional shape and still manage to be the most natural of the three. The issue of the security management in the public pockets areas can be solved in further developing the design.



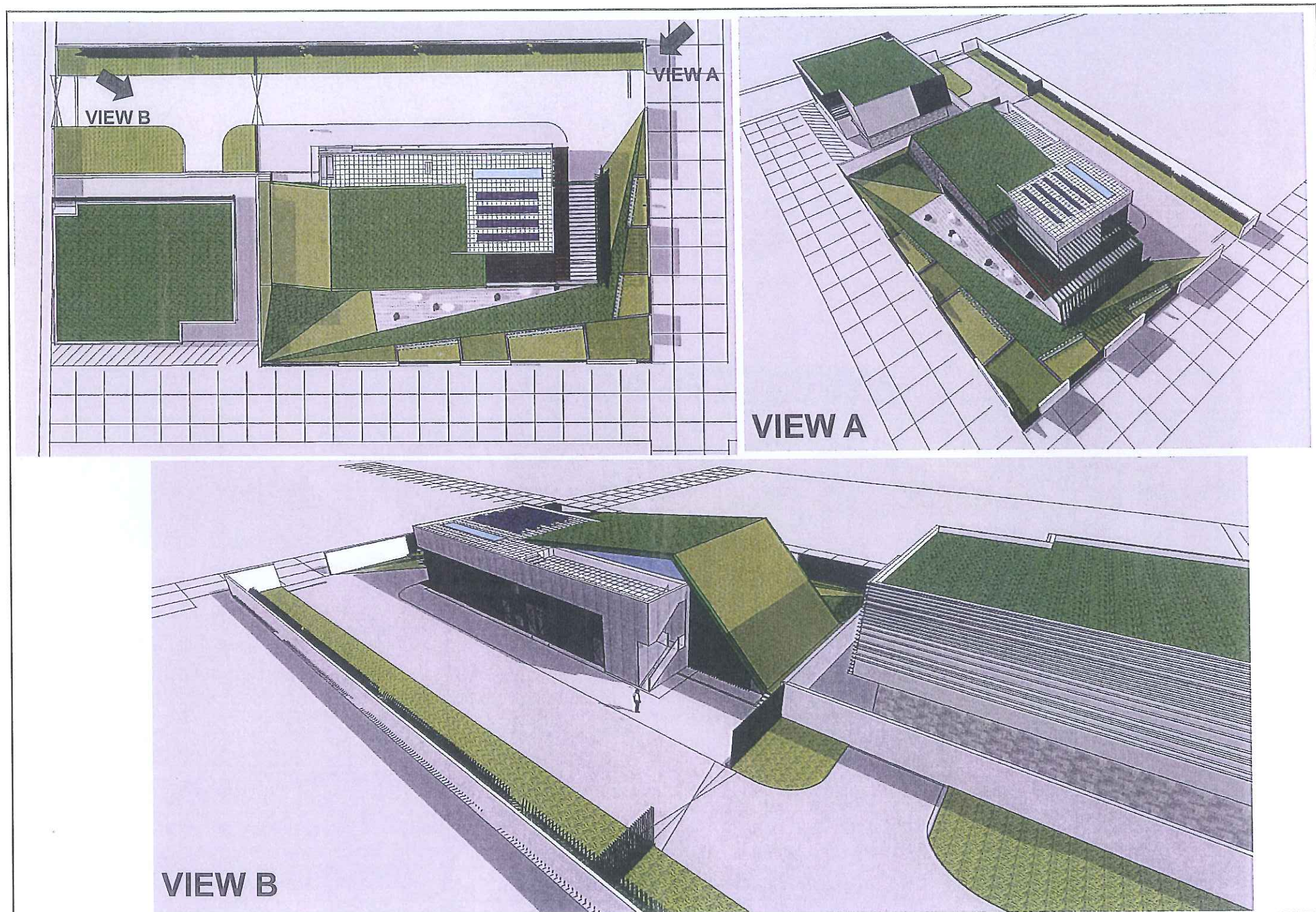
Site Layout Plan for Proposed Sewage Pumping Station PS1A (Sheet 1 of 2)

Figure 4



Site Layout Plan for Proposed Sewage Pumping Station PS1A (Sheet 1 of 2)

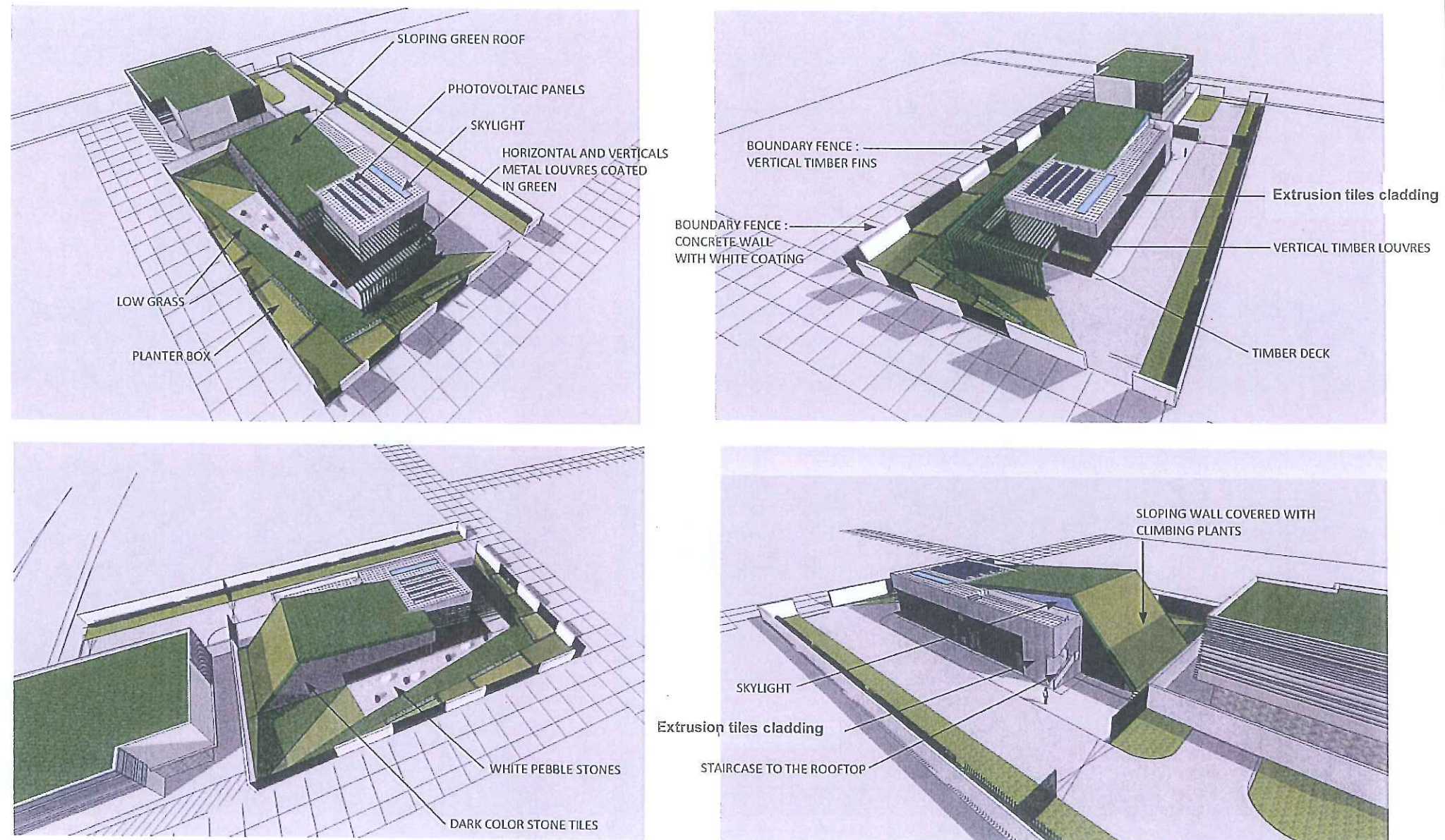
Figure 5



Layout and Perspective Views for Proposed Sewage Pumping Station PS1A

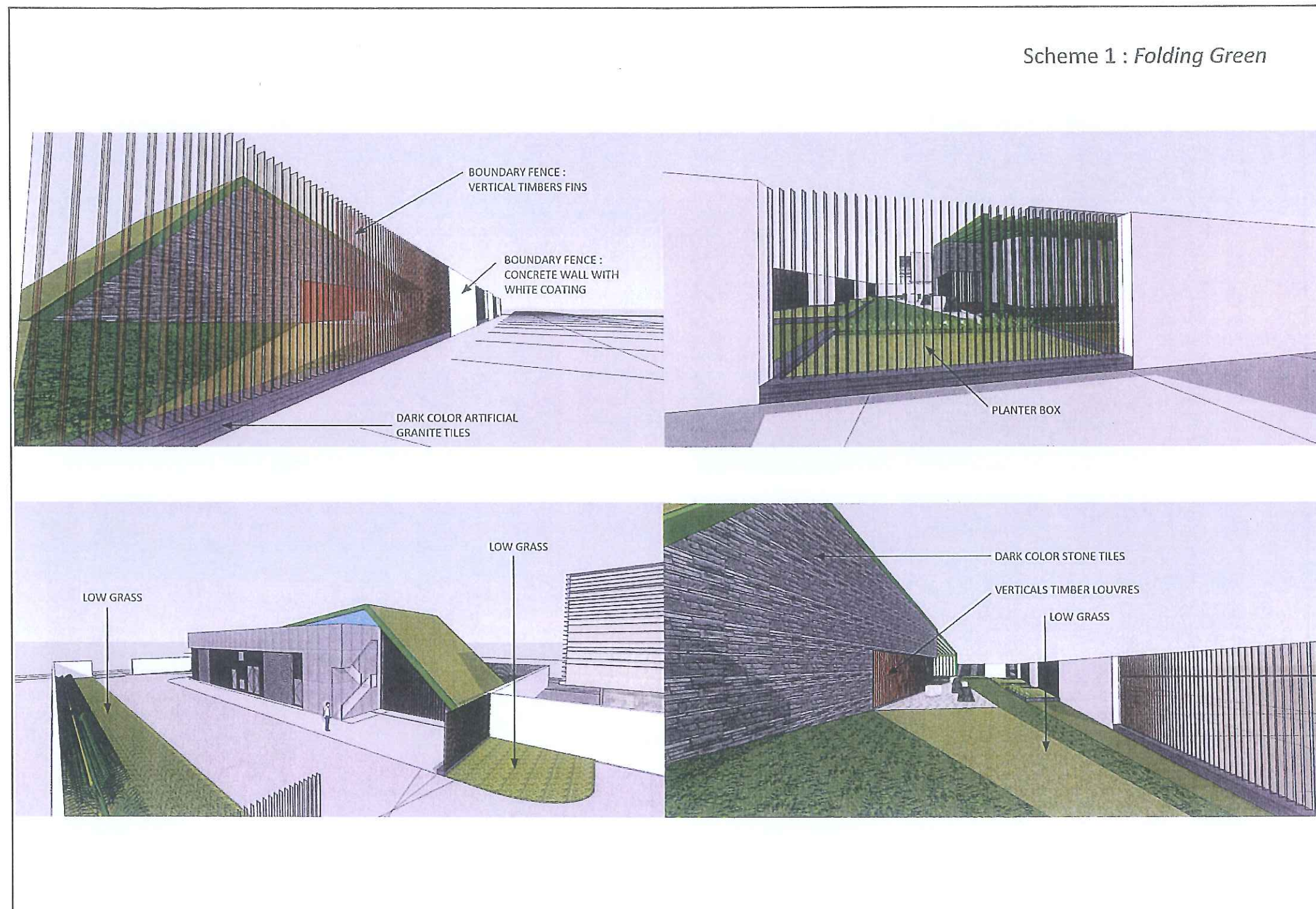
Figure 6

Scheme 1 : *Folding Green*



Proposed Scheme for Sewage Pumping Station PS1A (Sheet 1 of 3)

Figure 7

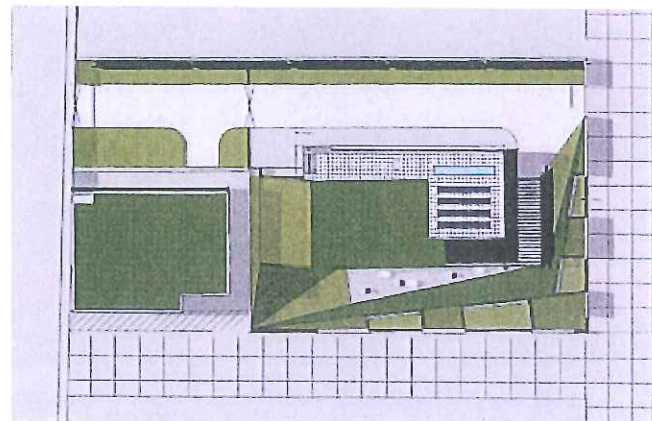
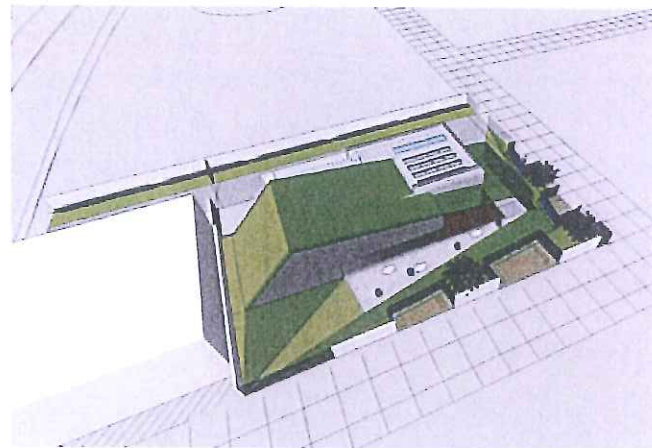


Proposed Scheme for Sewage Pumping Station PS1A (Sheet 2 of 3)

Figure 8

Design Concept and Materials Selection

The green at grade level is folding up to form the building mass, the building in the continuity with the landscape is understood as a whole with its context



Scheme 1 : *Folding Green*



Vertical Timber Louvers

Fair-face Concrete

Dark Color Stone Tiles



Vertical Timber Louver Fence

Timber Deck

Green Roof and Green Wall

Photovoltaic Panels



Climbing Plants

Different type of Low Grass

Japanese Like Stones

Round Pebble Stones



LED : Grazing Light on Façade

Recessed Floor Lighting to highlight the trees

Floor Light to highlight part of the landscape

Proposed Scheme for Sewage Pumping Station PS1A (Sheet 3 of 3)

Figure 9