

PARTICULAR SPECIFICATION LS-01

Landscape Hardworks, Softworks and Establishment Works

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PARTICULAR SPECIFICATION**SECTION PS (LS)-1-PARTICULAR SPECIFICATION FOR LANDSCAPE WORKS AND ESTABLISHMENT WORKS****1.0 GENERAL****1.1 General and Particular Specification**

The specification for the building works shall be the General Specification for Building by Architectural Services Department (2007 edition) and all current amendment thereto.

All clauses of the Specification shall be applicable to this Contract unless expressly stated in this Particular Specification. Provided where there are any discrepancies between the Specification and Particular Specification, the latter shall take precedence over the former.

This section should be for both soft and hard landscape works in outdoor areas.

1.2 Equivalent Product

The Contractor is allowed to use the proprietary products mentioned in the specification or other products having equivalent functions or performance. If the Contractor intends to use the intellectual property rights of another party in performing his obligations under the Contract, appropriate license should be obtained from the relevant owners.

1.3 Spare Materials

The Contractor is to allow for materials 5% spare materials including all paving materials. The contractor is required to furnish the architect and client a list of spare materials during the handover of the site upon completion.

1.4 Reference with Architectural Works

The Particular Specification for Landscape Works should be read in conjunction with that for Architectural Works.

2.0 Paving Material

2.1 Scope of Work

The construction works involve the provision of local open space at Chung Yee Street, Kowloon City District, Kowloon

The contractor is required to address and make good of the adjoining areas outside the site up to the agreed boundary line. For some area which has a connection to some of the existing adjacent areas and/or facilities, the contractor is also required to address the details and design of the connection. Section 3.0 also outlines the special requirements for details.

2.2 Types of Paving

Precast pebbles paving in recycled rubber/plastic material for foot massage path. Supply and lay the recycled rubber/plastic pebbles paving with pattern strictly in accordance with the Drawings and in accordance with the relevant manufacturer's recommendations. The pebble shall be as shown on tender drawing AB/2263/EW008. Colour of pebble should be grey and to provide varying sets of difficulties – location to be specified on site. The paving should be constructed with recycled rubber/plastic powder, formed into high-density mat by thermal-pressure molding, the coloring should be UV resistant, non porous & non-toxic, and should also be ISO 9001 certified.

Clay paving blocks paving – supply and lay clay paving blocks with paving pattern strictly in accordance with the Drawings and in accordance with the relevant manufacturer's recommendations. The paving should include the colours beige, grey and brown and the size of the paving block should be 200mm (L) x 100mm (W) or approved equivalent. Details should be in strict compliance with the requirements of relevant Highways Department Standard drawings for clay paving.

Recycled Plastic Wood Decking floor finish –supply and lay recycled plastic wood decking strictly in accordance with the contract drawings and in accordance with the relevant manufacturer's recommendations. The recycled plastic wood deck should be the proprietary recycled plastic wood decking in dark brown colour 30mm thick, 100mm wide and in random length of 1000mm to 2000mm (or other timber types as approved by architect with conditions to match Architectural Specifications PS (A)-01 Clause 7.13 and Clause 7.16) material and should be provided with groove in surface for all kinds of outdoor application. The material shall be able to stand the following tests:

Static Coefficient of Friction:	ASTM C1028-96, minimum 0.65 Kgf
Water Absorption and Thickness Swell Test:	ASTM D1037-96a, minimum 1.88%
Thickness Swell Test:	ASTM D1037-96a, minimum 0.22%
Linear Thermal Expansion Coefficient:	ASTM D696-98, minimum $6.32 \times 10^{-5} \text{ } ^\circ\text{C}$
Hardness Test (Shore D):	ASTM D2240, minimum 71
Compression Strength:	ASTM D695-91, minimum 24.44 Mpa
Flexural Strength:	ASTM D790-03, minimum 25.99 Mpa
Flexural Modulus:	ASTM D790-03, minimum 3700 Mpa
Tensile Strength:	ASTM D638-08, minimum 15.64 Mpa
Elastic Modulus:	ASTM D638-08, minimum 4149 Mpa
Elongation at break:	ASTM D638-08, minimum 0.58%
Specific Gravity:	ASTM D792-98, minimum 1178 Kg/m ³
Flammability test:	EN71:Part2:1993 General, non-inflammable
Flexural creep test	ASTM D6112-97, <1.09% Strain in the Outer Fiber at the Mid-span

All fixing like screws or nails should not be exposed or visible from the users or these fixing be shielded with architect's approved plug of same material and colour. Runners underneath the decking should be in the same recycled plastic wood material with minimum dimension of 45mm x 45mm and 450mm c/c spacing (subject to contractor's supporting calculations and final verification on site). Support of the decking should be constructed of minimum 120mm

dia. High density rubber and with epoxy adhesive at bottom. (Or other approved equivalent construction method. The products should be made from recycled resources and should be provided with relevant certificate & supporting documents.

Proprietary stamp on pattern concrete paving– supply and lay proprietary paving stamp on pattern concrete paving strictly in accordance with the Drawings and in accordance with the relevant manufacturer’s recommendations. The paving pattern should follow the paving pattern plan in the Landscape Tender Drawing Set. The complete system provided by the contractor should include the entire concrete paving layer, associated substrate(s) to be 75mm thick, pigment surface layer to be 10mm thick, sealers, hardener, bond-breaker, finishing aid, stain, coating, concrete dye, concrete overlay and others that is necessary for the completion of the system.

Natural stone close joint paving –supply and lay natural stone close joint paving pattern strictly in accordance with the Drawings and in accordance with the relevant manufacturer’s recommendations. The paving pattern should be in natural granite stone in flamed finish or other appropriate finishes surface as specified in the working drawing. The paving should be laid in close joint and applied with proper sealers.

2.3 Manhole Cover

All manhole covers should be finished with the same paving as the adjacent paving materials to the channel and manhole covers in accordance with the design intention as shown in the drawings, paving pattern to match adjacent pattern. The contractor is required to provide and install manhole covers in compliance with the requirements of relevant Highways Department standard and contract drawings. Architect’s approval for shop drawings and samples are also required before the contractor is allowed to fabricate the products in large quantity. Samples of plastic plugs for keyholes shall be supplied for approval by architect.

2.4 Shop Drawings

Submit shop drawings and schedule for approval by the Architect showing the applications, any provisions to be allowed for by other trades, suppliers and / or fabricators, all for the proper co-ordination and finishing of the installations. No fabrication could be commenced until all shop drawings and schedule have been approved by the Architect.

2.5 Samples

Contractor to submit samples of all specified materials with full color range for the Architect’s selection and obtain approval. Wherever sizes of the actual paving materials differ from those stated on the Drawings or in the specifications, the Main Contractor is required to bring this to the attention of the Architect. The Architect shall have the right to revise the paving layout and/or pattern to match deviations proposed by Contractor, and in such case, the Contractor shall allow sufficient time for such revisions and lay the paving accordingly. No additional cost to the Contract Sum or time extension is to be involved due to such revisions.

The Main Contractor shall submit paving samples properly mounted on sample boards for the Architect’s approval within six weeks of the contract award. Samples of paving are to be 2 meters by 2 meters as a mock-up on site.

Samples shall be submitted for approval prior to any delivery in bulk. All materials to comply with manufacture specifications. Any material that does not tally with the sample and specification will be rejected and the Main Contractor shall replace the material immediately at his own expense.

Claim for delay to the contract programme will not be accepted as a result of any material failing to meet the approved standard.

All samples must be submitted undamaged and in good condition.

3.0 Landscape Furniture

3.1 General

The contractor is required to supply and install the following landscape furniture as described in the drawings and specification:

- a. Benches –proprietary recycled plastic products and should be provided with back rest. Proper anchoring onto the ground is required. Additional arm rest divider is required whenever the benches is longer than 1.2 meter in length. Refer to PSA-01 for further specifications.
- b. Litter bin and recycled bin – Proprietary products of litter bins should not exceed 1.1 meters high by 0.45 meters wide and be provided with a lid on top and the replacement of the litter basket should be accessed on side of the litter bin. There are two types of proprietary bins- ordinary litter bins and recycled bins. Recycled bin dimensions should not exceed 1.65 meters length and 1.1 meters tall. Refer to PSA-01 for further specifications.
- c. Water point shall be fair face concrete finish, with installation of the correct dimensions as seen on detail drawings.
- d. Chess Table and Seat – made of steel and recycled plastic planks with stainless steel chess marking plate. The marking will be etched with colour infill on the said plate.
- e. Plant labels- Acrylic trees and shrubs labels are provided in accordance with the drawings.

Landscape furniture items	Quantity
Benches	61
Water points	7
Litter bins	10
Chess Table & Seats	3 tables & 6 seats
Recycled bin combination sets	3 sets
Plant labels	Approximate 40 nos.

All specification for electricity connection and wiring should be referred to E/M specification.

The contractor shall submit shop drawings for all site furniture with exact dimensions (refer to figures seen in Landscape furniture items table seen above). The tender price is deemed to include all the furniture required. The contractor is also reminded that it should be read in conjunction with the contract drawings of relevant trade(s) to ascertain the number and details of the landscape furniture.

3.2 Details of the Landscape Furniture

(A) The landscape furniture items as shown and listed in the Landscape Material schedule and Furniture Plan drawing of the tender drawings shall be supplied and installed at the expense of the Main Contractor by a Specialist Contractor to be approved by the Architect. Colors, finishes, profiles, etc. shall be selected by the Architect. The Specialist Contractor must prove his capacity and have relevant experience(s) in satisfactory installation of the specified landscape furniture system in Government open space or recreational projects.

(B) Shop Drawings

Submit shop drawings and schedule for all landscape furniture showing the applications and installation of the selected landscape furniture, any provisions to be allowed for by other trades, suppliers and / or fabricators, all for the proper co-ordination and finishing of the installations for approval by the Architect. No fabrication could be commenced until all shop drawings and schedule have been approved by the Architect.

(C) Samples

Submit full size samples for each furniture item complete with all necessary accessories in accordance with the approved shop drawings and specification for approval by the Architect. No fabrication could be commenced until all samples have been approved by the Architect.

- (D) Manufacturer's product data sheets, catalogue and full specification for surface preparation and method of application shall be submitted for approval by the Architect; and supporting laboratory test data / performance test reports by an approved laboratory shall also be submitted to the Architect for checking prior to signing of the sale contract.
- (E) Surfaces to receive landscape furniture systems shall be examined and installation of furniture works shall not be started until all defects have been corrected.
- (F) The Specialist Contractor shall notify the Main Contractor in writing of any and all conditions which, in his opinion, will affect the satisfactory execution of his works or endanger its permanence. It is the responsibility of the Main Contractor to rectify all such conditions.
- (G) Commencement of installation of furniture systems shall constitute acceptance by the Specialist Contractor that the surface & structural works is in proper condition to receive the installation of furniture works.
- (H) After such acceptance, the Specialist Contractor shall be liable for correcting all works and materials which produce an unsatisfactory installation of furniture systems.

3.3 Planter walls and Kerb Planters

All planters shall be built and finished to the style as illustrated in the drawings unless otherwise specified in the Contract. Materials for planters shall be those as illustrated in the detail drawings and/ or specified in the Materials Schedule.

3.4 Submission of Sample Materials for Planters

The Contractor shall submit samples of materials with the colour, veining, surface texture and general characteristics of the appearance to the approval of Architect.

The following particulars of the proposed materials and method of construction for the paving and wall finishes shall be submitted to the Architect:

- (a) name and address of the manufacturer,
- (b) A certificate from the manufacturer of the name and the location of the quarry and a declaration if the product has been subjected to a chemical treatment to the surface and to the whole and the type of treatment.
- (c) a certificate from the manufacturer showing the manufacturer's name and the date and place of manufacture and including results of tests for:
- the compressive strength,
 - slip/ skid resistance,
 - water absorption, and
 - dimensions

The particulars shall be submitted to the Architect for approval at least one month prior to the ordering of the materials for installation.

Following acceptance of the approved samples and test results, the Contractor shall ensure the materials are consistent throughout the contract works. From each lot of supplied materials, a reference material shall be submitted to the Architect for approval and retention for later inspection.

Sample of each type of materials shall be submitted to the Architect for approval of the source and type of each material at the same time as particulars of the materials are submitted.

The Contractor shall submit a mock up panel for the materials in sufficient size or to the size as specified which will be a benchmark for the standards of laying and installation.

3.5 Waterproofing in Planter walls

Whenever the planter wall is above ground, internal side of the planter wall should be applied with a layer of architect's approved waterproofing layer product. All planters should be built as open bottom type to facilitate proper drainage performance unless otherwise specified.

4.0 SOFT LANDSCAPE WORK

The contractor is required to carry out soft landscape works in accordance with approved tree felling and transplanting report, drawings and specifications and in accordance with the ArchSD General Specification for Buildings (2007 Edition). All soft landscape works should be carried out by an approved competent landscape specialist sub- contractor.

4.1 Tree Risk Assessment

The contractor shall conduct and submit a tree risk assessment annually during construction period until the end of the Establishment Period or as requested. Submission format and detail of Tree Risk Assessment shall conform to Section 8.0 of this Particular Specification or the latest specifications issued by DEVB.

5.0 Elderly Fitness Equipments

5.1 General Requirements for Elderly Fitness Equipments

The general requirement for the equipments are as follows:

- The design of the fitness equipments shall comply with the proposal as indicated in Drawings and Specification or any approved equivalent. The Contractor shall provide 3 separate proposals from supplier / manufacturers for approval by Architect.
- The design, installation, maintenance and operation of the equipment should be complied with the safety standard equipments.
- The proposed equipment shall cater for elderly people with disabilities as per pertinent requirements such as
 - -Building Department's Design Manual on 'Barrier Free Access, 2008',
 - -ASTM F1487
- The material and structure of the equipment should be low maintenance cost, durable, vandal proof and easily cleansed. It is recommended that, where possible, products shall be recyclable, and/or made from recycled materials.
- Footing of component post must be ground fixing according to the manufacturer's recommendation.
- Written statement on the maximum "free height of fall" (as defined by BS EN 1177) or the maximum "fall height" (as defined by ASTM F1487) from the manufacturer on the selected play equipment (inclusive of each component of a composite/modular equipment) shall be provided by the Contractor,
- Document and Certificates issued by an accredited international testing laboratory to prove that all the equipment and safety matting are in compliance with the recognized international standards should be submitted before installation.
- The diameter of the handgrip of rings, stairs and platforms, according to ASTM and EN standard, should between 24-39mm and 16-45mm respectively.
- Warning signage shall be ground fixing with 50mm stainless steel tube for frame and 3mm stainless steel plate for wording or approved equivalent. Appropriate warning signs shall be submitted with proposed layout and construction details.
- Adequate drainage is vital for the future maintenance of the equipment and the proposed drainage details shall be submitted by the Contractor.
- Safety margin to match current LCSD standard

5.2 Requirements for Elderly Fitness Equipments

Elderly Fitness Equipments Area: located in the site

Components :

- A. 6 sets of fitness equipments.
- B. The theme of the elderly fitness equipment area should be in line with the theme of the open space and harmony theme.
- C. Design, installation, maintenance and operation of the equipments shall be approved by LCSD and should be complied with relevant safety requirement.
- D. The material and structure of the equipments should be of low maintenance cost, durable, vandal proof and easily cleansed.
- E. More detailed description of elderly fitness equipments in the item 5.3 and 5.4

* All areas in above shall include appropriate safety mats and warning and instruction signs.

Other Requirement

- A. The design, manufacturing and installation of equipment and safety mats should comply with latest international safety standards EN1176, EN1177, ASTM F1487 or equivalent for all aspects including safety margin, critical fall height, separation of age group, use of material, protrusion avoidance and signage etc.
- B. Document and Certificates issued by an accredited international testing laboratory to prove that the equipment and safety mats are in compliance with the recognized international standards should be submitted.
- C. Free warranty for maintenance of equipment and safety mats for five years is required. The warranty should cover rectification, and/or replacement of materials/components which show defects on structural stability, material performance, shrinkage, de-coloring and/or reduction in safety mats size, thickness during warranty period.
- D. All equipment should rest on new footings, and surface-mounted on concrete base is not allowed. Each footing should be 600mm deep minimum and its size and design should be approved by a Registered Structural Engineer engaged by contractor office.
- E. Warranty to all equipment and safety mats are required. Certificate should be submitted on completion of works.
- F. Updated certificate of laboratory report of safety surfacing tiles should be submitted.
- G. All fixing screw of the elderly fitness equipments should be in stainless steel.

5.3 Requirements for Elderly Fitness Equipment

Components :

6 sets such as Rider, Twister, Tai Chi Wheels and etc. as proposed by the supplier.

Design Requirements

- Theme should be in line with the entire theme of the open space design.
- 1 no. signage for 'Fitness Corner for the Elderly – A Guide to Fitness Exercise', at a size of 1600mm x 1000 mm x 2000mm(H) with acid etched letter including LCSD logo in stainless steel plate with frame fixed by welding.

5.4 Proposed List for the Equipments

The Elderly Fitness Equipments and the Fitness Equipments should be the same as one of the options as the following specialized equipments or the equivalent. Please note that the final decision of the chosen option is based on the Architect and the contractor is not entitled to claim additional cost and time due to the selection and the final decision made by the Architect.

The contractor is also required to provide sufficient information not limited to photos, catalogues, samples, other relevant documents and etc. that facilitate the selection process of the Architect.

Elderly Fitness Equipment (Option 1)

1. Color: Deep Chocolate with Copper Accents
Fixing: Ground Fixed

Each Wellness Station is comprised of three sides. Two sides offer activities with two different levels of challenge. The third side can be either a standard informational panel or a wheel chair/ADA accessible activity panel.

The instruction sign (dimension: 570mmW x 1330mmH) in Chinese, English with illustration as instruction.

Material Specification

- **Hardware:** All exposed fasteners shall be 18-8 grade stainless steel. (300 series) capped lock nuts, which cover bolts ends, shall be included. Tamper-resistant hardware is utilized on principle clamping mechanisms. Clamp connection disassembly and using drive rivets eliminates slippage. Physical locking devices are used on all exposed and accessible connection points, such as lock nuts. A nylon thread-locking patch is applied to certain hardware. Liquid thread-lock is also used to hinder fastener removal.
- **Tubing:** Tubing shall be cold rolled, electric resistance welded tubing. Tubing shall be triple coated for maximum exterior protection: Hot-dipped uniform zinc galvanized coating. Chromate conversion coating. Clear polymer coating. Tubing shall have a corrosion resistance zinc-rich paint interior coating.
- **Super durable Polyester Powder Coat Finish:** Powder coating is electrostatically applied at a thickness of 2 to 5 mils (.002 - .005) prior to finishing. Finish quality conforms to ASTM Specifications: B-117 (Salt spray Resistance Test), D-2794 (Impact Resistance Test), D-1734 (Mandrel Flexibility Test), D-2247 (Humidity Resistance Test), D-822 (Weatherability Test), D-3363 (Pencil Hardness Test), D-3359-B (Crosshatch Adhesion Test), and D-2454 (Overbake Resistance Test) D-522 (Conical Mandrel), D-523 (Gloss - 60°).
- **Rotationally Molded Plastic Parts:** Shall be rotationally molded from color-compounded, linear low density, Exxon CP-812 polyethylene. Polyethylene shall be ultraviolet (UV) stabilized to UV-8. Cross sectional design shall be .25” (6mm) nominal thickness, double wall construction. ASTM Specifications: D-1238 (Melt Index), D-1505 (Material Density), D-638 (Tensile Strength), D-648 (Heat Distortion Temperature) D-790 (Flexural Modulus), D-1693 (Environmental Stress Crack Resistance), D-2565 (Ultraviolet).

1.1 Station 1- 1set

1 Main Components:

- **Upper Body Stretch & Strengthen – Wheelchair Users:** To increase strength of upper body; by utilizing spring-controlled handles with smooth resistance; provide instruction of stretch to prepare users for the exercise; the height of the exercise equipment is 1100mmH to suit users in a wheelchair
- **Upper Body Warm-Up – Arm Pedaling:** To increase body temperature and heart rate, prepares upper body for further exercise; provide an arm pedaling exercise utilizing a magnetic resistance mechanism and with a dial for adjusting the resistance
- **Standing Push-Up:** To strengthen arm and chest muscles; by providing inclining 2 nos. of handrail (1200mmL) place vertically in front of the users for stabilization; provide instruction for 2 different levels of challenge for users of different capabilities

1.2 Station 2- 1 set

Main Components:

- **Lower Body Stretch – Calf Stretch:** To increase range of motion for lower legs; by utilizing foot ramps with anti-skid standing surface; with 2 different height of ramps for users with different capabilities and with 2 nos. of handrail (1200mmL) place vertically in front of the users to provide stabilization
- **Pull-Up – Wheelchair Users:** To strengthen arm and chest muscles; by providing a pair of lifting bars for exercise and stabilization

- **Bench Stepper – Standard User:** To increase lower body strength and balance, by utilizing a stepping platform with 330W x 457mmL and place at 154mm height level. The platform is made of skid resistance stepping surface and with 2 nos. of handrail (1200mmL) place vertically in front of the users to provide stabilization for users.

2. EPDM Safety Matting without Graphic (Area to be referred to the drawings)

Color: Dark green, green and beige

PU bound selected EPDM granule with 4 nos. 15mm wide and 10mm deep semi-circular grooves moulded into the base surface for drainage.

Dimensions: 500 x 500 x 50mmThick

1. **Elderly Fitness Equipment (option 2)**

Color: Deep Chocolate with Copper Accents

Fixing: Ground Fixed

Each Wellness Station is comprised of three sides. Two sides offer activities with two different levels of challenge. The third side can be either a standard informational panel or a wheel chair/ADA accessible activity panel.

The instruction sign (dimension: 570mmW x 1330mmH) in Chinese, English with illustration as instruction.

Material Specification

- **Hardware:** All exposed fasteners shall be 18-8 grade stainless steel. (300 series) capped lock nuts, which cover bolts ends, shall be included. Tamper-resistant hardware is utilized on principle clamping mechanisms. Clamp connection disassembly and using drive rivets eliminates slippage. Physical locking devices are used on all exposed and accessible connection points, such as lock nuts. A nylon thread-locking patch is applied to certain hardware. Liquid thread-lock is also used to hinder fastener removal.
- **Tubing:** Tubing shall be cold rolled, electric resistance welded tubing. Tubing shall be triple coated for maximum exterior protection: Hot-dipped uniform zinc galvanized coating. Chromate conversion coating. Clear polymer coating. Tubing shall have a corrosion resistance zinc-rich paint interior coating.
- **Superdurable Polyester Powder Coat Finish:** Powder coating is electrostatically applied at a thickness of 2 to 5 mils (.002 - .005) prior to finishing. Finish quality conforms to ASTM Specifications: B-117 (Salt spray Resistance Test), D-2794 (Impact Resistance Test), D-1734 (Mandrel Flexibility Test), D-2247 (Humidity Resistance Test), D-822 (Weatherability Test), D-3363 (Pencil Hardness Test), D-3359-B (Crosshatch Adhesion Test), and D-2454 (Overbake Resistance Test) D-522 (Conical Mandrel), D-523 (Gloss - 60°).
- **Rotationally Molded Plastic Parts:** Shall be rotationally molded from color-compounded, linear low density, Exxon CP-812 polyethylene. Polyethylene shall be ultraviolet (UV) stabilized to UV-8. Cross sectional design shall be .25” (6mm) nominal thickness, double wall construction. ASTM Specifications: D-1238 (Melt Index), D-1505 (Material Density), D-638 (Tensile Strength), D-648 (Heat Distortion Temperature) D-790 (Flexural Modulus), D-1693 (Environmental Stress Crack Resistance), D-2565 (Ultraviolet).

1.1 Station 1- 1set

1

Main Components:

- **Upper Body Warm-Up – Wheelchair Users:** To increase body temperature and heart rate, prepares upper body for further exercise; provide an arm pedaling exercise utilizing a magnetic resistance mechanism and with a dial for adjusting the

resistance; the height of the arm pedaling mechanism is 900mmH to suit users in a wheelchair

- **Upper Body Stretch & Strengthen – Advanced Users:** To increase strength of upper body; by utilizing spring-controlled handles with smooth resistance; provide instruction of stretch to prepare users for the exercise and have an statement advising beginners to do exercise at the “standard user version first”
- **Balance – Partial Lunge:** To increase sense of balance and with 2 nos. of handrail (1200mmL) place at a sloping level allowing users to simulate a partial lunge while provide stabilization

1.2 Station 2- 1 set 1

Main Components:

- **Bench Stepper – Standard User:** To increase lower body strength and balance, by utilizing a stepping platform with 330W x 457mmL and place at 154mm height level. The platform is made of skid resistance stepping surface and with 2 nos. of handrail (1200mmL) place vertically in front of the users to provide stabilization for users.
- **Balance – Single Leg Balance:** To increase sense of balance and to build foot and leg strength and with 2 nos. of handrail (1200mmL) place vertically in front of the users to provide stabilization for users
- **Lower Body Stretch – Hamstring Stretch:** To increase hamstring flexibility; by utilizing 2 stools of different height is 457mmH and 406mmH. The stools have areas of 388mmW x 431mmL and with 2 nos. of handrail (1200mmL) place vertically in front of the users to provide stabilization’

2. EPDM Safety Matting without Graphic (Area to be referred to the drawings)

Color: Dark green, green and beige

PU bound selected EPDM granule with 4 nos. 15mm wide and 10mm deep semi-circular grooves moulded into the base surface for drainage.

Dimensions: 500 x 500 x 50mmThick

1. **Elderly Fitness Equipment (Option 3)**

Color: Deep Chocolate with Copper Accents

Fixing: Ground Fixed

Each Wellness Station is comprised of three sides. Two sides offer activities with two different levels of challenge. The third side can be either a standard informational panel or a wheel chair/ADA accessible activity panel.

The instruction sign (dimension: 570mmW x 1330mmH) in Chinese, English with illustration as instruction.

Material Specification

- **Hardware:** All exposed fasteners shall be 18-8 grade stainless steel. (300 series) capped lock nuts, which cover bolts ends, shall be included. Tamper-resistant hardware is utilized on principle clamping mechanisms. Clamp connection disassembly and using drive rivets eliminates slippage. Physical locking devices are used on all exposed and accessible connection points, such as lock nuts. A nylon thread-locking patch is applied to certain hardware. Liquid thread-lock is also used to hinder fastener removal.
- **Tubing:** Tubing shall be cold rolled, electric resistance welded tubing. Tubing shall be triple coated for maximum exterior protection: Hot-dipped uniform zinc galvanized coating. Chromate conversion coating. Clear polymer coating. Tubing shall have a corrosion resistance zinc-rich paint interior coating.

- **Superdurable Polyester Powder Coat Finish:** Powder coating is electrostatically applied at a thickness of 2 to 5 mils (.002 - .005) prior to finishing. Finish quality conforms to ASTM Specifications: B-117 (Salt spray Resistance Test), D-2794 (Impact Resistance Test), D-1734 (Mandrel Flexibility Test), D-2247 (Humidity Resistance Test), D-822 (Weatherability Test), D-3363 (Pencil Hardness Test), D-3359-B (Crosshatch Adhesion Test), and D-2454 (Overbake Resistance Test) D-522 (Conical Mandrel), D-523 (Gloss - 60°).
- **Rotationally Molded Plastic Parts:** Shall be rotationally molded from color-compounded, linear low density, Exxon CP-812 polyethylene. Polyethylene shall be ultraviolet (UV) stabilized to UV-8. Cross sectional design shall be .25” (6mm) nominal thickness, double wall construction. ASTM Specifications: D-1238 (Melt Index), D-1505 (Material Density), D-638 (Tensile Strength), D-648 (Heat Distortion Temperature) D-790 (Flexural Modulus), D-1693 (Environmental Stress Crack Resistance), D-2565 (Ultraviolet).

1.1 Station 1- 1set 1

Main Components:

- **Upper Body Warm-Up – Wheelchair Users:** To increase body temperature and heart rate, prepares upper body for further exercise; provide an arm pedaling exercise utilizing a magnetic resistance mechanism and with a dial for adjusting the resistance; the height of the arm pedaling mechanism is 900mmH to suit users in a wheelchair
- **Balance – Partial Lunge:** To increase sense of balance and with 2 nos. of handrail (1200mmL) place at a sloping level allowing users to simulate a partial lunge while provide stabilization
- **Bench Stepper – Standard User:** To increase lower body strength and balance, by utilizing a stepping platform with 330W x 457mmL and place at 154mm height level. The platform is made of skid resistance stepping surface and with 2 nos. of handrail (1200mmL) place vertically in front of the users to provide stabilization for users.

1.2 Station 2- 1 set 1

Main Components:

- **Back Strengthening:** To strengthen muscles along the spine; provide 2 nos. of handrail (1200mmL) place vertically in front of the users to provide stabilization for users.
- **Upper Body Stretch & Strengthen – Wheelchair Users:** To increase strength of upper body; by utilizing spring-controlled handles with smooth resistance; provide instruction of stretch to prepare users for the exercise; the height of the exercise equipment is 1100mmH to suit users in a wheelchair
- **Bench Stepper – Advance Users:** To increase lower body strength and balance, by utilizing a stepping platform with 330W x 457mmL and place at 230mm height level. The platform is made of skid resistance stepping surface and with 2 nos. of handrail (1200mmL) place vertically in front of the users to provide stabilization for users.

2. EPDM Safety Matting without Graphic (Area to be referred to the drawings)

Color: Dark green, green and beige

PU bound selected EPDM granule with 4 nos. 15mm wide and 10mm deep semi-circular grooves moulded into the base surface for drainage.

Dimensions: 500 x 500 x 50mmThick

1	Safety Matting (pattern to be submitted for architect's approval)	Area to be referred to the drawings
2	Upper body Warm up for wheelchair user	1 no
3	Partial Lunge (Standard)	1 no
4	Bench Stepper (Standard)	1 no
5	Back Strengthening	1 no
6	Upper body Stretch and Strengthening for wheelchair user	1 no
7	Bench Stepper (advanced)	1 no

Elderly Fitness Area (optional choice)

1	Safety Matting (pattern to be submitted for architect's approval)	Area to be referred to the drawings
2	Upper body Warm up (Standard)	1 no
3	Standard Push up	1 no
4	Bench Stepper (Standard)	1 no
5	Calf Stretch	1 no
6	Upper body Stretch and Strengthening for wheelchair user	1 no
7	Pull up for wheelchair user	1 no

6.0 Fence

6.1 General Requirements

Boundary Fence Features- 1300 mm high fence wall:

Supply and Construct 1300 mm high fence wall and 2000 mm high gate (or other specified height approved by architect) along the entire boundary of the site. Gates should be provided in accordance with the drawing. All the boundary fence wall design should be made of GMS rectangular hollow sections and/or the relevant GMS members (plate or rod or etc.) in PU factory sprayed paint on appropriate etching primer.

6.2 Shop Drawings

Submit shop drawings and schedule for approval by the Architect showing the applications, any provisions to be allowed for by other trades, suppliers and / or fabricators, all for the proper co-ordination and finishing of the installations. No fabrication could be commenced until all shop drawings and schedule have been approved by the Architect.

7.0 Tree Risk Assessment

The Contractor shall comply with ArchSD's Particular Specification for Tree Risk Assessment attached below:

Notes:

1. This Particular Specification (PS) shall be read in conjunction with
 - General Specification for Building 2007 Edition (GS2007), or
 - General Specification for Building 2003 Edition (GS2003) together with Particular Specification for Preservation and Protection of Existing Trees (PS 2003) (promulgated by the then Environment, Transport and Works Bureau for use in government works contracts).
2. This sample PS is developed based on the requirements in the 'Guidelines for Tree Risk Assessment & Management Arrangement on an "Area Basis" and on a "Tree Basis" (Issue Date: 15 December 2011)' promulgated by the Development Bureau (DEVB) and is for general reference only. Project officers may make necessary amendments including additions or deletions to the PS to suit the specific needs of their projects so long as the requirements in DEVB's guidelines are complied with.
3. DEVB has agreed that the ArchSD contracts which have been awarded or those for which tenders have been invited at the time of promulgation of the 2012 Guidelines (i.e. 15 December 2011) could be exempted from the new requirements of the Inspection Officers and the Endorsement Officers (for Forms 1 and 2) stipulated in the 2012 Guidelines.
4. For the stonewall trees under ArchSD's purview (i.e. those on ArchSD-maintained SIMAR features or within ArchSD's construction sites of new works projects), Clause D of this PS is to be replaced by the tree risk assessment methodology including the inspection form developed by Prof. C Y Jim specifically for stone wall trees.

Sample Particular Specification for Tree Risk Assessment (PS):

TREE RISK ASSESSMENT

Tree risk assessment arrangement A

- 1 When instructed by the Architect, the Contractor shall carry out tree risk assessment in accordance with this PS. For the purpose of tree risk assessment,
 - 1.1 "tree" is defined as any plant, which can be newly planted plant, or existing plant preserved at its existing location or to be transplanted to other location or transplanted from other location, with the diameter of the trunk of the plant measuring 95 mm or more at a height of 1.3 m above ground level and shall be subject to the tree risk assessment arrangement; and
 - 1.2 "Target" is defined as any person or property that would likely be affected by the failure of a tree.
- 2 Tree risk assessment arrangement shall be carried out with reference to the following –
 - 2.1 The flowchart showing the concept of tree risk assessment arrangement in **Appendix A**; and
 - 2.2 The 'Guidelines for Tree Risk Assessment & Management Arrangement on an "Area Basis" and on a "Tree Basis" (Issue Date: 15 December 2011)' promulgated by the Development Bureau (DEVB) in **Appendix B**.
- 3 Updated versions of Form 1 (Tree Group Inspection Form) referred to in Clause C of this PS and Form 2 (Tree Risk Assessment Form) referred to in Clause D of this PS are shown

PARTICULAR SPECIFICATION PS.LS-01 in **Annex A** and **Annex B** respectively in **Appendix B**. For the purpose of this PS, “Last Inspection Date” in Form 1 (Tree Group Inspection Form) and Form 2 (Tree Risk Assessment Form) refers to the date of last inspection specifically for tree risk assessment.

4 The provisions contained in this PS shall prevail over the provisions contained in the document in **Appendix B**.

**“Area Basis”
assessment**

B

- 1 When instructed by the Architect, the Contractor shall carry out “Area Basis” assessment in the assessment areas as specified.
- 2 The “Area Basis” assessment shall be carried out by an Inspection Officer who shall have at least 2 years’ site working experience in tree care, have received training on tree risk management or supervision of tree works and be familiar with the tree risk management and assessment arrangement as detailed in **Appendix B** to this PS.
- 3 The name, qualifications, working experience and other personal particulars of the Inspection Officer for “Area Basis” assessment shall be submitted to the Architect before commencement of the “Area Basis” assessment.
- 4 The Inspection Officer for “Area Basis” assessment shall provide all necessary tools, equipment and transportation for carrying out the “Area Basis” assessment.
- 5 The “Area Basis” assessment shall include categorization of all areas within the assessment area into different tree risk management zones in accordance with the following table and submission of the “Area Basis” assessment report as referred to sub-clause 7 of this clause:

Use of influence area by target	Probability of risk	Tree risk management zone
<u>Intensive use</u> Areas of high traffic flow and high pedestrian flow such as public park, playground, crowded street, busy carriageway, school, etc.	High	Category I
<u>Infrequent use</u> Areas of low traffic flow and low pedestrian flow such as road verge of limited access, countryside road, village footpath, etc.	Medium	Category II
<u>Rare use</u> Areas of very rare access such as inaccessible area, remote countryside slope, dense woodland, maintenance access with no public access, etc.	Low	Category III

6 Before commencement of the “Area Basis” assessment, the Contractor shall submit a programme showing the phasing of the categorization of all areas within the assessment area into different tree risk management zones and the submission of the “Area Basis” assessment report as referred to sub-clause 7 of this clause, to the Architect. The Contractor shall submit the revised programme when instructed by the Architect.

- 7 The Contractor shall submit the “Area Basis” assessment report comprising a plan showing the following:
- 7.1 the boundary of the assessment area and the demarcation of the assessment area into different tree risk assessment zones as referred to in sub-clause 5 of this clause, using different colours / legends / annotations; and
- 7.2 The location of all trees within each of the tree risk assessment zones.
- 8 The “Area Basis” assessment report referred to in sub-clause 7 of this clause shall be in the form of an A4-sized, bound report which shall bear a report cover indicating the Contract number, the Contract title, the date of the report, and that the report is prepared by the Inspector Officer for “Area Basis” assessment. The format of the report shall be agreed by the Architect prior to submission of the report.
- 9 The Contractor shall submit two copies of the draft “Area Basis” assessment report according to the programme referred to in sub-clause 6 of this clause, to the Architect for comment. The Architect shall provide comment(s) to the Contractor within 14 days of receipt of the draft “Area Basis” assessment report, and the Contractor shall submit the final “Area Basis” assessment report with all received comments duly incorporated within seven days of receipt of the Architect’s comments to the Architect.

***Tree Group
Inspection
(Completion of Form
1)***

C

1. When instructed by the Architect after completion of the “Area Basis” assessment referred to in Clause B of this PS, the Contractor shall carry out Tree Group Inspection of the “Tree Basis” assessment in the Category I tree risk management zone as demarcated in the final “Area Basis” assessment report.
2. The Tree Group Inspection of the “Tree Basis” assessment shall be carried out by an Inspection Officer who shall meet both of the requirements stipulated in sub-clauses 2.1 and 2.2 of this clause below –
 - 2.1 one of the training / qualification requirements stipulated in sub-clauses (a), (b), (c), and (d) of this clause below –
 - (a) have attended and completed either one of the following training courses organised by the Tree Management Office (TMO) of DEVB –
 - (i) the 2-day 2012 Comprehensive Tree Risk Assessment and Management Training Course with assessment organised, or
 - (ii) the 1.5-day Comprehensive Tree Risk Assessment and Management Training Course (2010 or 2011) and the half-day Refresher Course with assessment; or

- (b) have undertaken equivalent departmental training recognised by TMO; or
- (c) have successfully undertaken training programmes recognised by TMO, such as Tree Risk Assessment Course and Examination (TRACE) organised by the Pacific Northwest Chapter of the International Society of Arboriculture (ISA) or Professional Tree Inspection by LANTRA Awards; or
- (d) have valid qualifications or certifications awarded by recognised institution or industry organisation on arboriculture, such as Certified Arborist of ISA, Technician or Professional Member or Fellow of the Arboricultural Association of the United Kingdom, etc.; and

2.2 Have at least two years of working experience in tree care and be familiar with the tree risk assessment and management arrangement as detailed in **Appendix B** to this PS.

- 3. The name, qualifications, working experience and other personal particulars of the Inspection Officer for Tree Group Inspection of the “Tree Basis” assessment shall be submitted to the Architect before commencement of Tree Group Inspection of the “Tree Basis” assessment.
- 4. The Inspection Officer for Tree Group Inspection of the “Tree Basis” assessment shall provide all necessary tools, equipment and transportation for carrying out the Tree Group Inspection.
- 5. The Tree Group Inspection of the “Tree Basis” assessment shall include inspection of the trees in the Category I tree risk management zone as demarcated in the final “Area Basis” assessment report, carrying out of any tests to the trees necessary for identifying trees for remedial action or detailed tree risk assessment, completion of Form(s) 1 (Tree Group Inspection Form) referred to in Clause A3 of this PS, and submission of the Tree Group Inspection report referred to in sub-clause 10 of this clause.
- 6. Form(s) 1 (Tree Group Inspection Form) shall be completed by the Inspection Officer (for Tree Group Inspection) referred to in sub-clause 2 of this clause and endorsed by the Endorsement Officer referred to in sub-clause 7 of this clause. To safeguard the quality of the Tree Group Inspection, the Inspection Officer (for Tree Group Inspection) shall duly consider the limitations of visual tree assessment when devising the number of trees in and the areal coverage of the tree group to be covered by each Form 1, to ensure that the tree group to be covered by each Form 1 will not be excessively large. To suit specific site situation, the trees in the Category I tree risk management zone as demarcated in the final “Area Basis” assessment report could be inspected using more than one Form 1.

7. The Endorsement Officer for endorsing the completed Form 1 (Tree Group Inspection Form) shall be the managerial staff of the Contractor responsible for monitoring the tree risk assessment arrangement and shall meet one of the training / qualification requirements stipulated in sub-clauses 7.1, 7.2, 7.3 and 7.4 of this clause below –
- 7.1 have attended and completed either one of the following training courses organised by TMO –
- (a) the 2-day 2012 Comprehensive Tree Risk Assessment and Management Training Course with assessment organised, or
 - (b) the 1.5-day Comprehensive Tree Risk Assessment and Management Training Course (2010 or 2011) and the half-day Refresher Course with assessment, or
 - (c) the half-day Tree Risk Management Training Course with assessment; or
- 7.2 have undertaken equivalent departmental training recognised by TMO; or
- 7.3 have successfully undertaken training programmes recognised by TMO, such as TRACE organised by the Pacific Northwest Chapter of ISA or Professional Tree Inspection by LANTRA Awards; or
- 7.4 Have valid qualifications or certifications awarded by recognised institution or industry organisation on arboriculture, such as Certified Arborist of ISA, Technician or Professional Member or Fellow of the Arboricultural Association of the United Kingdom, etc.
8. The name, qualifications, working experience and other personal particulars of the Endorsement Officer for Tree Group Inspection of the “Tree Basis” assessment shall be submitted to the Architect before commencement of Tree Group Inspection of the “Tree Basis” assessment.
9. Before commencement of the Tree Group Inspection of the “Tree Basis” assessment, the Contractor shall submit a programme showing the phasing of inspection of the trees in the Category I tree risk management zone as demarcated in the final “Area Basis” assessment report, carrying out of any tests to the trees necessary for identifying trees for remedial action or detailed tree risk assessment, completion of Form 1 (Tree Group Inspection Form) referred to in Clause A3 of this PS, and submission of the Tree Group Inspection report referred to in sub-clause 10 of this clause, to the Architect. The Contractor shall submit the revised programme when instructed by the Architect.

10. The Contractor shall submit the Tree Group Inspection report comprising the following to the Architect –
 - 10.1 the completed and endorsed Form(s) 1 (Tree Group Inspection Form);
 - 10.2 the associated attachments including the following for each of the completed Form(s) 1 (Tree Group Inspection Form) –
 - (a) site plan(s) showing the locations of the trees within Category I tree risk management zone,
 - (b) photo record(s) of the trees, and
 - (c) other documents specified to be attached in the completed Form 1 (Tree Group Inspection Form) such as any updated tree survey record(s) on the preserved trees and updated planting schedule(s) on the newly-planted trees as may be referred to under the “General Tree Information” of Form 1 and any test reports on the trees necessary for identifying trees for remedial action or detailed tree risk assessment;
 - 10.3 a list of the trees that are recommended with remedial actions for each of the six criteria in Form 1 (Tree Group Inspection Form), with the recommended remedial action(s), and the anticipated date of completion (if not yet completed) or the actual date of completion (if already completed) of each of the remedial action(s) for each of the trees shown ; and
 - 10.4 A list of the trees that are recommended for completion of Form 2 (Detailed Tree Risk Assessment Form) for each of the six criteria in Form 1 (Tree Group Inspection Form).
11. In taking photo records of the trees, the Inspection Officer shall refer to the “Guidelines on Photo-Taking of Tree Conditions in the Process of Tree Risk Assessment” in **Annex D** to **Appendix B** of this PS.
12. The Tree Group Inspection report referred to in sub-clause 10 of this clause shall be in the form of an A4-sized, bound report which shall bear a report cover indicating the Contract number, the Contract title, the Works Order number [*to be deleted if inappropriate*], the date of the report, and that the report is prepared by the Inspector Officer and endorsed by the Endorsement Officer (for Tree Group Inspection). The format of the report shall be agreed by the Architect prior to submission of the report.

13. The Contractor shall submit two copies of the draft Tree Group Inspection report according to the programme referred to in sub-clause 9 of this clause, to the Architect for comment. The Architect shall provide comment(s) to the Contractor within 14 days of receipt of the draft Tree Group Inspection report, and the Contractor shall submit the final Tree Group Inspection report with all received comments duly incorporated within seven days of receipt of the Architect's comments to the Architect.

***Individual Tree Risk Assessment
(Completion of Form 2)*** D

1. When instructed by the Architect after completion of the Tree Group Inspection of the "Tree Basis" assessment referred to in Clause C of this PS, the Contractor shall carry out Individual Tree Risk Assessment of the "Tree Basis" assessment for the trees recommended for such assessment in the final Tree Group Inspection report.
2. The Individual Tree Risk Assessment of the "Tree Basis" assessment shall be carried out by an Inspection Officer who shall meet all the requirements stipulated in sub-clauses 2.1, 2.2, and 2.3 of this clause below –
 - 2.1 One of the training requirements stipulated in sub-clauses (a), (b), and (c) of this clause below –
 - (a) have attended and completed either one of the following training courses organised by TMO –
 - (i) the 2-day 2012 Comprehensive Tree Risk Assessment and Management Training Course with assessment organised, or
 - (ii) the 1.5-day Comprehensive Tree Risk Assessment and Management Training Course (2010 or 2011) and the half-day Refresher Course with assessment; or
 - (b) have undertaken equivalent departmental training recognised by TMO; or
 - (c) have successfully undertaken training programmes recognised by TMO, such as TRACE organised by the Pacific Northwest Chapter of ISA or Professional Tree Inspection by LANTRA Awards; and
 - 2.2 Have valid qualifications or certifications awarded by recognised institution or industry organisation on arboriculture, such as Certified Arborist of ISA, Technician or Professional Member or Fellow of the Arboricultural Association of the United Kingdom, etc.; and
 - 2.3 Have at least two years of working experience in tree care and be familiar with the tree risk assessment and management arrangement as detailed in **Appendix B** to this PS.

3. The name, qualifications, working experience and other personal particulars of the Inspection Officer for Individual Tree Risk Assessment of the “Tree Basis” assessment shall be submitted to the Architect before commencement of Individual Tree Risk Assessment of the “Tree Basis” assessment.
4. The Inspection Officer for Individual Tree Risk Assessment of the “Tree Basis” assessment shall provide all necessary tools, equipment and transportation for carrying out the Individual Tree Risk Assessment.
5. The Individual Tree Risk Assessment of the “Tree Basis” assessment shall include inspection of the trees recommended for such assessment in the final Tree Group Inspection report, carrying out of any tests to the trees necessary for further investigating the suspected defects to facilitate assessment of the tree condition and the tree failure potential, completion of Form 2 (Tree Risk Assessment Form) referred to in Clause A3 of this PS, and submission of the Individual Tree Risk Assessment report referred to in sub-clause 9 of this clause.
6. Form 2 (Tree Risk Assessment Form) shall be completed by the Inspection Officer (for Individual Tree Risk Assessment) referred to in sub-clause 2 of this clause and endorsed by the Endorsement Officer referred to in sub-clause 7 of this clause.
7. The Endorsement Officer for endorsing the completed Form 2 (Tree Risk Assessment Form) shall be the managerial staff of the Contractor responsible for monitoring the tree risk assessment arrangement and shall meet the same training / qualification requirements for the Endorsement Officer for Tree Group Inspection of the “Tree Basis” assessment, as specified in Clause C7 of this PS.
8. The name, qualifications, working experience and other personal particulars of the Endorsement Officer for Individual Tree Risk Assessment of the “Tree Basis” assessment shall be submitted to the Architect before commencement of Individual Tree Risk Assessment of the “Tree Basis” assessment.
9. Before commencement of the Individual Tree Risk Assessment of the “Tree Basis” assessment, the Contractor shall submit a programme showing the phasing of inspection of the trees recommended for such assessment in the final Tree Group Inspection report, carrying out of any tests to the trees necessary for further investigating the suspected defects to facilitate assessment of the tree condition and the tree failure potential, completion of Form(s) 2 (Tree Risk Assessment Form) referred to in Clause A3 of this PS, and submission of the Individual Tree Risk Assessment report referred to in sub-clause 10 of this clause, to the Architect. The Contractor shall submit the revised programme when instructed by the Architect.
10. The Contractor shall submit the Individual Tree Risk

Assessment report comprising the following to the Architect –

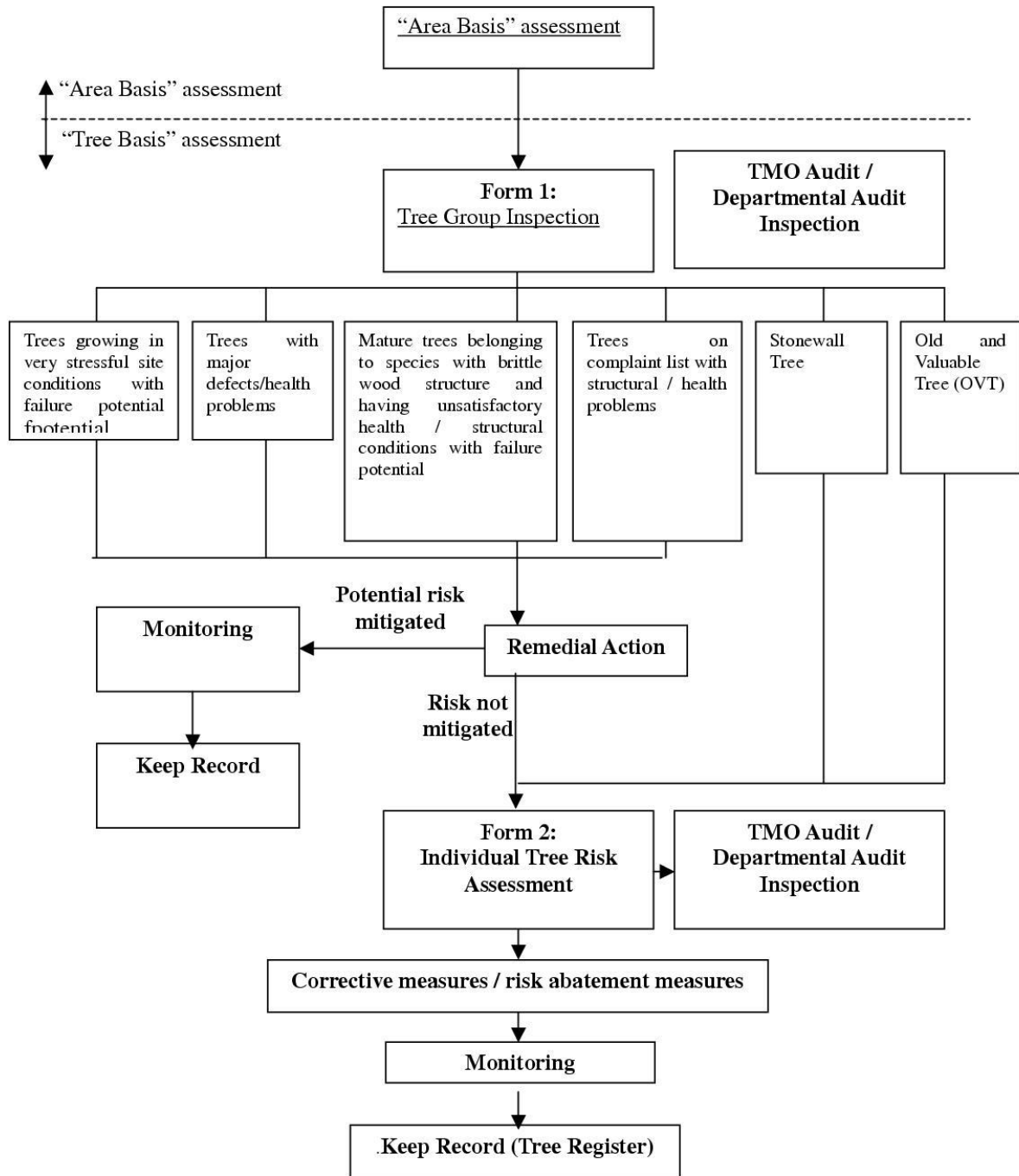
- 10.1 the completed and endorsed Form(s) 2 (Tree Risk Assessment Form);
 - 10.2 the associated attachments including the following for each of the completed Form(s) 2 (Tree Risk Assessment Form) –
 - (a) site plan(s) showing the location of the tree,
 - (b) photo record(s) of the tree, and
 - (c) other documents specified to be attached in the completed Form 2 (Tree Risk Assessment Form) such as any test reports on the trees necessary for further investigating the suspected defects to facilitate assessment of the tree condition and the tree failure potential;
 - 10.3 a list of trees that are assessed with hazard rating greater than 9 in the completed Form 2 (Tree Risk Assessment Form);
 - 10.4 a list of the trees that are recommended with mitigation measures in Form 2 (Tree Risk Assessment Form), with the recommended mitigation measure(s), and the anticipated date of completion (if not yet completed) or the actual date of completion (if already completed) of each of the recommended mitigation measure(s) for each of the trees shown ; and
 - 10.5 a list of the trees that are recommended for further inspection in Form 2 (Tree Risk Assessment Form), with the time frame within which further inspection should be carried out for each of the trees shown.
11. In taking photo records of the trees, the Inspection Officer shall refer to the “Guidelines on Photo-Taking of Tree Conditions in the Process of Tree Risk Assessment” in **Annex D** to **Appendix B** of this PS.
 12. The Individual Tree Risk Assessment report referred to in sub-clause 10 of this clause shall be in the form of an A4-sized, bound report which shall bear a report cover indicating the Contract number, the Contract title, the date of the report, and that the report is prepared by the Inspector Officer and endorsed by the Endorsement Officer (for Individual Tree Risk Assessment). The format of the report shall be agreed by the Architect prior to submission of the report.
 13. The Contractor shall submit two copies of the draft Individual

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Tree Risk Assessment report according to the programme referred to in sub-clause 9 of this clause, to the Architect for comment. The Architect shall provide comment(s) to the Contractor within 14 days of receipt of the draft Individual Tree Risk Assessment report, and the Contractor shall submit the final Individual Tree Risk Assessment report with all received comments duly incorporated within seven days of receipt of the Architect's comments to the Architect.

Appendix A to the Particular Specification

Tree Risk Assessment Arrangement



Appendix B to the Particular Specification

**Guidelines For Tree Risk Assessment & Management Arrangement On An Area Basis And On
A Tree Basis**

FORM 1: TREE GROUP INSPECTION FORM**表格 1: 樹群檢查表格****General Information 基本資料**

Department 部門:	Inspection officer 巡查人員:	Post 職位:
File Ref. 檔案編號:	Endorsement Officer 覆核人員:	Post 職位:
Date of Inspection 巡查日期:	Last Inspection Date 上次巡查日期:	
Project/Contract No. 合約/工程編號:		
Inspection Frequency 巡查週期:		

Location Information 位置資料

Location 地點:	Nearby Utility Post No. 就近公用設施編號:
Location Types 地點類別: (multiple answers allowed 可選多於一項)	<input type="checkbox"/> Roadside Landscaped Area 路旁綠化地區 <input type="checkbox"/> Central divider 中央分隔帶 <input type="checkbox"/> Tree pit 樹穴 <input type="checkbox"/> Village environs 鄉村範圍 <input type="checkbox"/> Public Park/Recreation Venue 公園/康樂場地 <input type="checkbox"/> Unallocated Government Land 未撥用的政府土地 <input type="checkbox"/> Remote countryside 偏遠郊區 <input type="checkbox"/> Recreational site/facilities inside country park 郊野公園內康樂用地或設施 <input type="checkbox"/> Vacant Government land 政府空置土地 <input type="checkbox"/> SIMAR slopes 系統性鑑辨維修責任的斜坡 <input type="checkbox"/> Others (please specify) 其他 (請說明):

General Tree Information 樹木基本資料

The size of a tree group should be defined by location types, such as public park, SIMAR slopes, tree pits, etc. with due consideration given to the limitations of visual tree assessment. 在決定樹群的大小時，應參照地點類別，如公園、系統性鑑辨維修責任的斜坡、樹槽等，並需考慮目測法的局限。

Main tree species in the group (DBH ≥ 95 mm) and minority tree species of significant size (i.e. approx. DBH ≥ 300 mm) (see Note 2) 在群組內的主要樹種(胸徑 ≥ 95 毫米)及樹幹胸徑或高度或樹冠範圍較大的樹種(即胸徑約 ≥ 300 毫米)(見備註 2)	Approx. number of trees in the relevant species 該樹種在樹群內的大概數目	Range of tree height (m) 該樹種的高度範圍	Overall health condition 整體健康狀況 (good, fair, poor 好, 一般, 差)	Overall structural condition 整體結構狀況 (good, fair, poor 好, 一般, 差)	Other remarks (Any special tree condition, e.g. dying/dead, pest/disease problem and structural defects; and soil condition 其他評語 (樹木狀況例如: 凋謝/枯樹/有病蟲害或結構問題; 及泥土狀況)

* Delete as appropriate 請刪去不適用者

Target 目標物

TARGET (people or property potentially affected by tree/branch failure) 目標 (因樹木倒塌或枝條斷裂而受影響的人或財產)
Does target exist? 目標物是否存在? <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否
Can target be moved? 能否移除目標物? <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否
Can the use of site be restricted? 可否限制場地的使用? <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否
Frequency of use of location 使用該地點的頻密程度: <input type="checkbox"/> Occasional use 偶爾使用 <input type="checkbox"/> Intermittent use 間歇使用 <input type="checkbox"/> Frequent use 經常使用 <input type="checkbox"/> Constant use 恆常使用

Identification of Trees for Remedial Action or Detailed Tree Risk Assessment (Form 2)

識別樹木以採取風險緩減措施或進行詳細樹木風險評估(表格 2)

Trees falling under the following criteria 樹木屬於以下任何一項或多於一項類別	Number of trees 樹木數量	Remedial action or detailed tree risk assessment (Form 2) 緩減措施或詳細的樹木風險評估(表格 2)	Anticipated date of completion 預計完工日期	Date of completion 完工日期
(1) Old and Valuable Tree (OVT) 古樹名木 (use Form 2)(使用表格 2)				
(2) Stonewall tree 石牆樹 (use Form 2)(使用表格 2)				
(3) Trees on complaint list with structural or health problems 投訴個案中有結構或健康問題的樹木 (see Note 1)(見備註 1)				
(4) Mature trees belonging to species with brittle wood structure and having unsatisfactory health or structural conditions with failure potential 屬木質脆弱品種並已屆成熟樹齡而健康或結構欠佳的樹木 (see Note 1)(見備註 1)				
(5) Tree with major defects or health problems 有明顯缺陷或健康問題的樹木 (see Note 1)(見備註 1)				
(6) Trees growing in very stressful site conditions with failure potential (see Note 1) 生長於非常擠壓環境的樹木並有樹枝或樹幹倒塌風險(見備註 1)				

Attached Information 附夾資料

- Site plan 場地平面圖
- Photo record 相片紀錄
- Others 其他 (*please specify 請說明*)

Note 1: If remedial action (such as pruning) undertaken cannot mitigate the potential risk of tree or branch failure, detailed tree risk assessment (using Form 2) should be carried out.

備註 1: 若風險緩減措施(如修剪枝幹)仍未解決倒塌或枝條斷裂的潛在風險, 應為該樹進行詳細的樹木風險評估(表格 2)。

Note 2: Please read in conjunction with TMO's Guidelines on Tree Risk Assessment and Management Arrangement (Para. 4.3. Refers.)

備註 2: 請參閱樹木管理辦事處的樹木風險評估安排及管理指引(第 4.3 段)

FORM 2: TREE RISK ASSESSMENT FORM**表格 2: 樹木風險評估表格****General Information 基本資料**

Department 部門:	Inspection officer 巡查人員:	Post 職位:
File Ref. 檔案編號:	Endorsement Officer 覆核人員:	Post 職位:
Date of Inspection 巡查日期:	Last Inspection Date 上次巡查日期:	
Project/Contract No 合約/工程編號:		
Inspection Frequency 巡查週期:		

Location Information 位置資料

Tree ID 樹木編號:	Tree Species 樹木品種:	Nearby Utility Post No 就近公用設施編號:												
Location 地點:	<input type="checkbox"/> Roadside Landscaped Area 路旁綠化地區 <input type="checkbox"/> Public Park/Recreation Venue 公園/康樂場地 <input type="checkbox"/> Remote countryside 偏遠郊區 <input type="checkbox"/> Vacant Government land 政府空置土地 <input type="checkbox"/> Others (please specify) 其他 (請說明):													
Location Types 地點類別: (multiple answers allowed 可選多於一項):	<input type="checkbox"/> Central divider 中央分隔帶 <input type="checkbox"/> Tree pit 樹穴 <input type="checkbox"/> Village environs 鄉村範圍 <input type="checkbox"/> Unallocated Government Land 未撥用的政府土地 <input type="checkbox"/> Recreational site/facilities inside country park 郊野公園內康樂用地或設施 <input type="checkbox"/> SIMAR slopes 系統性籃網維修責任的斜坡													
No(s). of Trunk(s) (#) 主幹數目(#):	DBH of tree trunk(s) (mm) (1.3m above soil level) 胸徑離地面 1.3 米(毫米):	<table border="1"> <tr> <th>#1</th> <th>#2</th> <th>#3</th> <th>#4</th> <th>#5</th> <th>Aggregated DBH (mm) 總胸徑(毫米):</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>(see note 2 見附註二)</td> </tr> </table>	#1	#2	#3	#4	#5	Aggregated DBH (mm) 總胸徑(毫米):						(see note 2 見附註二)
#1	#2	#3	#4	#5	Aggregated DBH (mm) 總胸徑(毫米):									
					(see note 2 見附註二)									
Tree Height(m) 樹高(米):	Tree Spread(m) 樹冠闊度(米):													
Age class 樹齡組別:	<input type="checkbox"/> young 幼 <input type="checkbox"/> mature 成熟 <input type="checkbox"/> senescent 衰老													

GENERAL CONDITION 基本狀況
Foliage density 葉片密度: <input type="checkbox"/> Normal 正常 <input type="checkbox"/> Sparse 稀疏
Foliage colour 葉片顏色 <input type="checkbox"/> Normal 正常 <input type="checkbox"/> Chlorotic 萎黃 <input type="checkbox"/> Brown (signs of wilting) 褐色 (呈現枯萎徵狀)
Leaf Size 葉片大小 <input type="checkbox"/> Normal 正常 <input type="checkbox"/> Abnormal 不正常
Epithormites 水橫枝: <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否 (please specify the location and severity 請說明位置及嚴重程度) (see note 1 見附註一)
Tree vigor 茁壯程度: <input type="checkbox"/> Good 好 <input type="checkbox"/> Average 良 <input type="checkbox"/> Poor 差
Lean 傾斜 <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否 Degree from vertical 傾斜角度: _____ ° <input type="checkbox"/> Natural due to phototropism/self-corrected 趨光性或已自然修正 <input type="checkbox"/> Recently tilted/Unstable root-plate 新近傾斜/根基不穩
Soil cracks or cracks in structure(s) behind lean 有土壤裂縫或裂縫處於傾斜部位背後: <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否

CROWN CONDITION 樹冠狀況	Severity of Defects 嚴重程度: (see note 1 見附註一)
Heavy crown load 樹冠負荷太重: <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否	
Live crown ratio 活冠比: (foliage canopy / total height of tree) 有葉的樹冠 / 樹高 <input type="checkbox"/> Low 低 < 40% <input type="checkbox"/> Medium 中 40 - 70% <input type="checkbox"/> High 高 > 70%	
Dieback twigs 枯枝: <input type="checkbox"/> <5% crown 樹冠 <input type="checkbox"/> 5 - 20% crown 樹冠 <input type="checkbox"/> 21 - 50% crown 樹冠 <input type="checkbox"/> >50% crown 樹冠	
Crown reduced/excessively thinned/ topped/ pollarded: 樹冠大幅減少 或削頂 或截頭 <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否	
Asymmetric tree canopy 樹冠不對稱: <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否	
Signs of pests and disease 呈現病蟲害徵狀: <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否 (If yes please specify type 如有請說明種類)	
<input type="checkbox"/> Others (please specify): 其他 (請說明)	

BRANCH CONDITION 枝幹狀況 (multiple answers allowed 可選多於一項):	Severity of Defects 嚴重程度: (see note 1 見附註一)
<input type="checkbox"/> Co-dominant branches 等勢枝	
<input type="checkbox"/> Included bark 內夾樹皮	
<input type="checkbox"/> Cavities 樹洞	
<input type="checkbox"/> Cracks/splits 裂縫/裂開	
<input type="checkbox"/> Wounds/Mechanical injury 明顯傷痕/機械破損	
<input type="checkbox"/> Dead branches/Hangers 枯死/懸吊斷枝	
<input type="checkbox"/> Crooks/abrupt bends 不常規彎曲	
<input type="checkbox"/> Cross branches 疊枝	
<input type="checkbox"/> Heavy lateral limb 重側枝	
<input type="checkbox"/> Lion's tailing 獅尾 (excessive end weight on branch 枝端過重)	
<input type="checkbox"/> Bleeding/sap flow 滲液	
Parasitic/Epiphytic plants 寄生/附生植物 <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否 (If yes please specify type 如有請說明種類)	
Signs of pests and disease 呈現病蟲害徵狀: <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否 (If yes please specify type 如有請說明種類)	
<input type="checkbox"/> Others (please specify): 其他 (請說明)	

TRUNK CONDITION 主幹狀況 <i>(multiple answers allowed 可選多於一項):</i>	Severity of Defects 嚴重程度: <i>(see note 1 見附註一)</i>	ROOT CONDITION 根部狀況 <i>(multiple answers allowed 可選多於一項):</i>	Severity of Defects 嚴重程度: <i>(see note 1 見附註一)</i>	SITE CONDITION 樹木生長環境 <i>(multiple answers allowed 可選多於一項):</i>
<input type="checkbox"/> #1 Decay/Cavity 腐爛/樹洞(open 可見的) Length 高: _____ (mm) Width 闊: _____ (mm) Depth 深: _____ (mm)		<input type="checkbox"/> Root flare/collar not visible 根脊不現		Site disturbed by construction activities 鄰近環境受工程影響:
<input type="checkbox"/> #2 Decay/Cavity 腐爛/樹洞(open 可見的) Length 高: _____ (mm) Width 闊: _____ (mm) Depth 深: _____ (mm)		<input type="checkbox"/> Root rot 根部腐壞 <input type="checkbox"/> Cracks/splits 裂縫或裂開 <input type="checkbox"/> Cut/pruned roots 根部經切割或截根		<input type="checkbox"/> Road widening 道路擴寬 <input type="checkbox"/> Drain replacement 渠道重鋪 <input type="checkbox"/> Soil grade reduce/ increase 地表上升或下降
<input type="checkbox"/> #3 Decay/Cavity 腐爛/樹洞(open 可見的) Length 高: _____ (mm) Width 闊: _____ (mm) Depth 深: _____ (mm)		<input type="checkbox"/> Fungal fruiting bodies 呈現菌類子實體 <input type="checkbox"/> Dead surface roots 根部枯萎 <input type="checkbox"/> Exposed root 根部外露 <input type="checkbox"/> Mechanical injury 機械破損		<input type="checkbox"/> Site clearing 地盤平整活動 <input type="checkbox"/> Soil heaving 土壤脹起 <input type="checkbox"/> Laying of new footpath 鋪設行人道 <input type="checkbox"/> Laying of underground utilities 鋪設地下設施
<input type="checkbox"/> Poor taper 不良漸尖生長 <input type="checkbox"/> Codominant trunks 等勢幹 <input type="checkbox"/> Included bark 內夾樹皮 <input type="checkbox"/> Cracks/splits 裂縫或裂開 <input type="checkbox"/> Abnormal bark crack 不尋常樹皮裂縫 <input type="checkbox"/> Bulge 腫脹 <input type="checkbox"/> Fungal fruiting bodies 呈現菌類子實體 <input type="checkbox"/> Exposed dead wood 枯幹外露 <input type="checkbox"/> Wounds/Mechanical injury 明顯傷痕/機械破損 <input type="checkbox"/> Large wound/ crack/ decay on circumference 大範圍破損或裂縫或腐爛 <input type="checkbox"/> Bleeding/sap flow 滲液		<input type="checkbox"/> Termites/borers injury 白蟻或蛀心蟲蛀蝕 <input type="checkbox"/> Root-plate movement 根基移位 <input type="checkbox"/> Girdling roots 纏繞根 Rooting area restricted 根部伸展範圍受限制: <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否 <i>(If yes please specify 如有請說明)</i>		<input type="checkbox"/> New flower beds/ new lawn below tree 在樹下加建花園/草坪 <input type="checkbox"/> Others <i>(please specify)</i> 其他 <i>(請說明)</i>
<input type="checkbox"/> Signs of pests and disease 呈現病蟲害徵狀: <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否 <i>(If yes, please specify type 如有, 請說明種類)</i>		<input type="checkbox"/> Drain 渠道 <input type="checkbox"/> Footpath/pavement 行人道 <input type="checkbox"/> Road curb 路肩 <input type="checkbox"/> Retaining structure 護土結構 <input type="checkbox"/> Footings or railings 地基或欄杆 <input type="checkbox"/> Others <i>(please specify):</i> 其他 <i>(請說明)</i>		Soil condition 土壤情況 <input type="checkbox"/> Sandy 沙質 <input type="checkbox"/> Clay 黏土 <input type="checkbox"/> Water logging 積水 <input type="checkbox"/> Soil compaction 土壤被擠壓
<input type="checkbox"/> Others <i>(please specify):</i> 其他 <i>(請說明)</i>		Signs of pests and disease 呈現病蟲害徵狀 <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否 <i>(If yes, please specify type 如有, 請說明種類)</i>		Restricted root growth area inside dripline 於滴水線範圍內有障礙物限制根部生長 <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否 <input type="checkbox"/> < 25% 26-50% <input type="checkbox"/> 51-75% <input type="checkbox"/> >75%
		<input type="checkbox"/> Others <i>(please specify):</i> 其他 <i>(請說明)</i>		Width of Planting area 種植面範圍 <input type="checkbox"/> < 1.2m <input type="checkbox"/> 1.3-2m <input type="checkbox"/> 2.1- 3m <input type="checkbox"/> 3.1- 4m <input type="checkbox"/> > 4m

TARGET <i>(people or property potentially affected by tree/branch failure)</i> 目標 <i>(因樹枝/枝幹倒下而致可能受影響的人或財產):</i>	
Use under tree 在樹下之用途: <i>(multiple answers allowed 可選多於一項):</i> <input type="checkbox"/> Building 建築物 <input type="checkbox"/> Parking 停車位 <input type="checkbox"/> Traffic 交通 <input type="checkbox"/> Recreation 康樂 <input type="checkbox"/> Gathering point 聚集地點 <input type="checkbox"/> Pedestrians 行人道 <input type="checkbox"/> Hardscape 園藝景觀裝置 <input type="checkbox"/> Others 其他 <i>(please specify 請說明):</i>	
Can target be moved 能否移除目標? <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否	
Can use of site be restricted 可否限制場地的使用? <input type="checkbox"/> Yes 是 <input type="checkbox"/> No 否	
Frequency of use of location 使用該地點的頻密程度: <input type="checkbox"/> Occasional use 偶爾使用 <input type="checkbox"/> Intermittent use 間歇使用 <input type="checkbox"/> Frequent use 經常使用 <input type="checkbox"/> Constant use 恆常使用	

HAZARD RATING 危害評估:	
Tree or part likely to fall 樹木或枝條有可能倒下: <input type="checkbox"/> Trunk 樹幹 <input type="checkbox"/> Branch/limb 枝幹 <input type="checkbox"/> Whole 整棵	Failure potential 倒下的可能性: <input type="checkbox"/> 1=low 低 <input type="checkbox"/> 2=medium 中 <input type="checkbox"/> 3=high 高 <input type="checkbox"/> 4=severe 極高
Failure Potential + Size of Part + Target Rating = Hazard Rating 倒塌可能 + 部位大小 + 目標評估 = 危害評估 _____ + _____ + _____ = _____	Size of part 部位大小: <input type="checkbox"/> 1= < 150mm <input type="checkbox"/> 2= 150 - 450mm <input type="checkbox"/> 3= 451 - 750mm <input type="checkbox"/> 4= > 750mm Target rating 目標評估: <input type="checkbox"/> 1 – occasional use 偶爾使用 <input type="checkbox"/> 2 – intermittent use 間歇使用 <input type="checkbox"/> 3 – frequent use 經常使用 <input type="checkbox"/> 4 – constant use 恆常使用

REMEDIAL/RISK MITIGATION MEASURES															
風險緩減措施 (can tick more than one 可選多於一項)*: <input type="checkbox"/> Remedial/Risk Mitigation measures taken. 已施行的風險緩減措施 (please specify 請說明):															
<input type="checkbox"/> Remedial/Risk Mitigation measures proposed to be taken as specified below: 將會施行以下所指明的風險緩減措施:	<table border="1"> <thead> <tr> <th>Anticipated Date of Completion 預計完成日期</th> <th>Date of Completion 完成日期</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	Anticipated Date of Completion 預計完成日期	Date of Completion 完成日期												
Anticipated Date of Completion 預計完成日期	Date of Completion 完成日期														
<input type="checkbox"/> Pruning 修剪: <input type="checkbox"/> Remove defective parts 移去有缺陷部份 <input type="checkbox"/> Crown thinning 疏減樹冠 <input type="checkbox"/> Remove stub 移去殘端部份 <input type="checkbox"/> Crown raising 提升樹冠 <input type="checkbox"/> Crown reduction 縮減樹冠	Date: _____ Date: _____ Date: _____ Date: _____ Date: _____														
<input type="checkbox"/> Tree Removal 移除樹木: <input type="checkbox"/> Cabling/Bracing/Propping 安裝纜索或支撐物: <input type="checkbox"/> Move Target 移走目標: <input type="checkbox"/> Restrict use within tree fall zone 限制可能發生樹木倒下或枝條斷裂的範圍使用 <input type="checkbox"/> Pest/ disease control 控制病蟲害: <input type="checkbox"/> Needs further inspection within _____ months 需於 _____ 個月內再次檢查樹木 (please specify 請說明): _____ Comments 評註: _____	Date: _____ Date: _____ Date: _____ Date: _____ Date: _____														

ATTACHED INFORMATION 附夾資料:	
<input type="checkbox"/> Site plans 場地平面圖	<input type="checkbox"/> Tree photos 樹木相片
<input type="checkbox"/> Resistograph 微鑽阻力測試	<input type="checkbox"/> Tomography 聲納圖像
<input type="checkbox"/> Others 其他 (please specify 請說明)	

Attention Please 請注意:

- Please submit information on the condition of the tree under assessment and the mitigation measures undertaken/proposed to be undertaken to the Tree Management Office in a timely manner for uploading onto the Tree Register at www.trees.gov.hk. 請將有關樹木評估狀況和緩減措施資料適時遞交樹木管理辦事處以便上載有關資料於樹木管理辦事處網頁 www.trees.gov.hk。
- Please read in conjunction with TMO's Guidelines on Tree Risk Assessment and Management Arrangement (Para. 4.4 refers.) 請參閱樹木管理辦事處的樹木風險評估安排及管理指引(第 4.4 節)。

(Form 2 12/2011)

**Guidelines on photo-taking of tree conditions
in the process of Tree Risk Assessment**

Item* <i>(Please see the notes)</i>	Photo records should cover the following:-
(1) Overall tree profile and site condition	<ul style="list-style-type: none"> • Overview of the tree inspection site and the tree group inspected; • Overall tree form and canopy; • Leave pattern/size with reference scale; • Foliage color; • Sign of leaning; • If the tree species cannot be identified on site, the inspection officer should take photos of the overall tree form, tree trunk, foliage, fruits and flower for seeking professional assistance after the site inspection. If possible, plant specimens should be collected for verification.
(2) Conditions of tree trunk and branches	<ul style="list-style-type: none"> • Any trunk or limb defects, such as large external cavities, extensive external sap flow, co-dominant stems, included bark or other weak attachments in the main trunk or branch(es), large cracks or splits; • Close-up photos of possible failure point(s), woundwood formation, any pruning cuts/wound, and sign/presence of pest or disease.
(3) Conditions of lower trunk and root	<ul style="list-style-type: none"> • Stressful site conditions, including construction activities within the critical root zone and any other activities or restrictions that may damage the roots system and the overall structural stability of the tree; • Physical/human damage/disturbance to the root zone, root collar and root crown; • Close-up photos of exposed roots, root zone and the root collar.

*Notes: Tree Group Assessment (Form 1), photos shall cover details in item (1) Tree Risk Assessment (Form 2), photos shall cover details in items (1), (2) and (3)

8.0 Maintenance Schedule for Soft Landscape Works

Maintenance Schedule during Maintenance Period

Operations	Rainy Season												Remarks
	Growing Season												
Month	3	4	5	6	7	8	9	10	11	12	1	2	
1. Irrigation	D	D	D	D	D	D	D	D	D	D	D	D	Early morning / late afternoon.
2. Weeding	R	M	M	M	M	M	M	M	M	R	R	R	Once every month during growing season. Once every 3 months during non-growing season.
3. Fertilizing	O							O					Two applications.
4. Mulching	O								O				Two applications.
5. Grass Cutting a. Turf areas	M	bW	bW	bW	bW	bW	M	M					Early morning/ late afternoon
b. Hydoseed areas	bM		bM	bM	bM	bM	bM	bM	bM				Use grass sward length as a guide
6. Pruning	bM		bM	bM	bM	bM	R	R					(see Item 7.0)
7. Thinning	O						O						(see Item 8.0)
8. Firming-up Support	R												Extra inspection after storms.
9. Disease Control	R	M	M	M	M	M	M	R	R	R	R	R	Immediate treatment after detection; weekly inspection thereafter.
10. Replacement	O			O			O			O			
11. Protection	M												

Legend:

D = daily
W = weekly
M = monthly

bW = bi-weekly
bM = bi-monthly

R = regular intervals
O = once

8.1 General Scope

8.1.1 Planting maintenance shall include all necessary tasks as:

- a. Watering.
- b. Leaf cleaning.
- c. Cultivation.
- d. Weeding.
- e. Pruning.
- f. Wound dressing.
- g. Disease and insect control.
- h. Protective spraying.
- i. Replacement of unacceptable material.
- j. Straightening plants which lean or sag.
- k. Adjustment of plants which settle or are planted too low.

8.1.2 Any other procedure consistent with good horticultural practice necessary to ensure normal, vigorous and healthy growth of all plants under this contract shall be applied.

8.1.3 Landscape Maintenance Personnel shall rotate and replace plants as necessary to ensure normal, vigorous and healthy growth of all plants.

8.2 Irrigation

8.2.1 Water all planting areas as often as is required to keep the soil moist up to a minimum of 200mm deep from surface.

8.2.2 In general, watering to all planting areas shall be carried out every day, except for occasions when rainfall in the previous day exceeded 20mm, or rainfall during the day exceeds 5mm.

8.2.3 Watering shall be more frequent for planting areas exposed to wind and sun.

8.2.4 Watering shall be done in the early morning or evening.

8.2.5 In dry weather and in the dry season (November to February), watering frequency shall be adjusted to ensure the above condition is achieved.

8.3 Weeding

- 8.3.1 Hoe and weed all planting areas at least once every month during the growing season and every 3 months otherwise, to maintain them in a weed-free condition.
- 8.3.2 Weeding must also be carried out prior to fertilization.
- 8.3.3 Remove weeds and litter from site.
- 8.3.4 Any mulch or soil disturbed or removed during weeding operation shall be replaced.

8.4 Fertilization

- 8.4.1 Fertilize all plants once every six to eight months.
- 8.4.2 Use a slow release fertilizer with a minimum of four month release period at 32 degrees Celsius.
- 8.4.3 A granular compound in the ratio 16:10:14:2 for N:P:K:MgO plus trace elements shall be applied at the following rates per plant:-

- Trees	500g (Semi Mature Standard)
	250g (Heavy Standard)
	200g (Standard)
- Palms	100g (3m height from soil level to 1 st frond at time of planting)
	2000g (over 3m height from soil level to 1 st frond at time of planting)
- Shrubs	75g
- Climbers	50g
- Ground covers	25g per sq m

- 8.4.4 Fertilizer shall be applied to all planting areas once annually, preferably in March.
- 8.4.5 Repeat application in autumn if plants show signs of poor health due to lack of nutrition after the summer days.

8.5 Mulching

- 8.5.1 Planting areas showing exposed soil shall be topped up with a 30mm thick layer of mulch to suppress weeds and condition the soil.
- 8.5.2 Organic materials such as decomposed leaf litter, tree bark, small wood-shavings, wood chips, chopped tree fern, may be used.
- 8.5.3 Where it is used to supplement an existing area of mulch, similar type shall be used.
- 8.5.4 Topping up shall occur at yearly intervals or following run off caused by heavy rainstorm.
- 8.5.5 Any retrievable mulch displaced by runoff shall be collected and placed in its original position.

8.6 Pruning

- 8.6.1 Pruning shall be carried out after the flowering period for flowering trees and shrubs and in late autumn or early spring for non-flowering species.
- 8.6.2 Pruning of trees shall also aim to encourage a straight and upward trunk growth, while maintaining a symmetrical crown that is not less than one third of the overall height.
- 8.6.3 Pruning of ground covers or low shrubs shall be implemented as necessary when they begin to extend over seat walls or adjacent benches.
- 8.6.4 Pruning shall include the removal of wilted flower heads and dead, damaged or crossing branches.
- 8.6.5 They shall be pruned back to the main stem with the cut flushed with the stem, sloping away from ragged edges.
- 8.6.6 A manual or chain saw shall be used on branches larger than 30mm diameter.

8.7 Thinning

- 8.7.1 All planting should be checked at the end of the first year for overcrowding conditions leading to unhealthy growth. Inspection should be carried out bi-annually thereafter.
- 8.7.2 The purpose of thinning is to encourage bushy growth in shrubs.
- 8.7.3 If groups of shrub or groundcovers are becoming “leggy” with a predominance of woody stems and a relatively thin crown, plants shall be removed evenly throughout.
- 8.7.4 The number of plants to be removed will depend on species and planting density.
- 8.7.5 If trees were planted too close resulting in distorted forms, individual trees shall be selectively removed and transplanted elsewhere within site.

- 8.7.6 In the event of poor performance of under storied planting beneath a shade tree, the plant material shall be replaced with a more shade - tolerant species, or top-soil and mulch shall be applied after removal of the under storied planting.

8.8 Firming Up Supports

- 8.8.1 Tree ties shall be checked regularly.
- 8.8.2 The ties shall be loosened to avoid bark chafing.
- 8.8.3 The tree trunk shall be allowed growing space within its ties.
- 8.8.4 All tree stakes and ties shall be inspected at least every six months and particularly after a typhoon.
- 8.8.5 Wobbling tree stakes shall be firmed up by tamping down loose soil around the stake or diving the stake in deeper if necessary, taking care not to damage tree roots.
- 8.8.6 Firming up of plants shall be undertaken from time to time, particularly after a heavy rainstorm or typhoon, by tamping down or compacting loose soil around the root ball.
- 8.8.7 Tree stakes and ties shall be removed once the tree is established. This means the tree has reached a caliper of not less than 80mm, measured 1200mm above finished ground level, if the tree was planted either as light standard or standard size.
- 8.8.8 Tree stakes supporting a heavy standard tree shall be removed 8-18 months from planting.

8.9 Disease Control

- 8.9.1 Plants shall be checked monthly or bi-monthly for fungus infestation or insect attack during known periods of activity, particularly during the rainy season.
- 8.9.2 If insects or fungus are detected, remedial measures shall be performed by spraying of an approved insecticide or fungicide in strict accordance with the manufacturer's instructions.
- 8.9.3 Spraying operation shall be carried out with due regard for safety and convenience of the general public.
- 8.9.4 Spraying shall be carefully controlled to avoid unnecessary dispersion.
- 8.9.5 Spraying operation shall be carried out by a qualified horticulturist or personnel upon approval of the Landscape Architect.
- 8.9.6 After the first treatment, weekly inspections shall be carried out and spraying repeated if necessary.
- 8.9.7 If eradication of fungus and insect infestations proves unsuccessful after six weekly treatments, the infected plants shall be removed and burnt off site.
- 8.9.8 When dead or nearly dead plants are discovered at first inspection, they shall be removed in the same manner and replaced.

8.9.9 The cause of death shall be determined and appropriate preventive measures shall be taken for adjacent vegetation.

8.10 Replacement

8.10.1 Dead and dying plants shall be replaced as often as required (not to exceed a period of one month from date of diagnosis), to ensure that the planting scheme remains substantially the same as shown on the original drawings.

8.10.2 If the same species cannot be found, a substitute with equivalent form, colour, size and texture may be used upon Landscape Architect's approval.

8.10.3 The original design intent should be maintained as far as possible.

8.11 Protection

8.11.1 Protective fencing, tree grates and guards shall be checked monthly.

8.11.2 All necessary repairs or adjustments shall be carried-out immediately to ensure that they are maintained in good conditions at all times.

8.11.3 Any temporary protective fencing that remains on site after planting is established may be removed one month later, if no evidence of vandalism is found.

8.11.4 Post holes shall be filled in and appropriately compacted.

8.11.5 Where plants have been vandalized, replacement shall be carried out and a protective fence shall be erected until plants are established.

8.11.6 Tree guards used for decorative purposes shall be maintained until the trunk is a minimum of 100mm from the guard, after which the guard shall be removed.

8.11.7 A more substantial guard may be erected if vandalism is found to be a significant problem.

8.11.8 Where trees without guards have been vandalized repeatedly, a heavy gauge mesh guard shall be installed.

8.12 Protection and Damage

8.12.1 Planting area and plants shall be protected at all times against trespassing and damage of any kind.

8.12.2 Harmful or objectionable branches or twigs shall be pruned to prevent potential hazard while the natural character of the plant shall be pruned to maintain or improve its appearance.

8.12.3 Damages to plants resulting from settling or other causes shall be rectified by improving the planting condition by adding topsoil and replanted.

8.12.4 All plant material found to be dead or unhealthy shall be replaced with the same species and, if possible, of similar size as originally planted at a time conducive to good horticultural practices.

8.13 Clean Up

8.13.1 A final cleaning shall be undertaken at completion of the planting works.

9.0. Signage

9.1 Description

9.1.1 Design, supply, fabricate, assemble and install non-illuminated and illuminated signage in accordance with the design intent shown in the Drawings and/or as instructed by the Architect, and in accordance with the requirements of this Particular Specification. The works shall include signage base, supports and sub-frames, footing, casing, fixings and anchors, graphics and messages, and all necessary components and accessories.

9.1.2 The types of non-illuminated signage include the following:

- (a) Directional, advice and warning signs;
- (b) Statutory signs (including Braille and tactile signs);
- (c) Name signs; and
- (d) Room signs.

9.1.3 The types of illuminated signage include the following:

- (a) Stainless steel name signs with LED found at main and lift entrance of park.

9.1.4 The signage shall be designed, supplied, fabricated, assembled and installed by a specialist sub-contractor with proven experience in the past 5 years and capacity to conduct, manage and carry out works of similar size, nature and complexity. Submit the company profile, job reference in Hong Kong in the past 5 years for the Architect's approval prior to commencement of the works.

9.2 Design and Performance Criteria

9.2.1 General

- (a) The contractor shall be responsible for final selection of materials, sizes, thickness, types and locations of fixings, all in accordance with the requirements in this Particular Specification.
- (b) The signage shall be designed to accommodate all performance requirements in conjunction with movements and tolerances and to be compatible with the primary structure.
- (c) The contractor shall not use any material, equipment or practice that may adversely affect the function, appearance and durability of the completed signage and related construction. All works shall be executed in strict compliance with the specified criteria without undulating of surfaces or other harmful effects.
- (d) All materials shall match each other to provide continuity of line, texture and colour. All materials and components incorporated in the works shall be delivered, stored, handled and installed in strict compliance with the manufacturer's standards and procedure.
- (e) Signs located in uncontrolled environmental conditions shall be capable of withstanding wind loading, ultraviolet and ozone exposure, high humidity and temperature, vandalism, and pest infestation without deleterious effects.

Condensation shall not take place either on the internal surfaces or within the material skin.

- (f) The signage design shall be based on extensive use of standardized Components and ensure that the signs can be installed using the simplest Possible

9.2.2 Codes and standards

Comply with the following standards and codes of practice, all latest editions:

BS 476: Part 7	Fire tests on building materials and structures. Method of test to determine the classification of the surface of flame of products
BS 8442	Miscellaneous road traffic signs and devices. Requirements and test method
BS EN 12899-1	Fixed, vertical road traffic signs. Fixed signs.
BS 5499-1	Graphical symbols and signs. Safety signs, including fire safety signs
BS 5499-2	Fire safety signs, notices and graphic symbols. Specification for self-luminous fire safety signs
BS EN 60529	Specification for degrees of protection provided by enclosures (IP code)
DIN 5036	Standard measurements of reflectance
DIN 53436	Toxic smoke release due to fire
ASTM D638M	Standard test method for tensile properties of plastics
ASTM D671	Standard test method for flexural fatigue of plastics by constant-amplitude-of-force
ASTM D695	Standard test method for compressive properties of rigid plastics
ASTM D696	Standard test method for coefficient of linear thermal expansion of plastics between -30°C and 30°C with a vitreous silica dilatometer
ASTM D785	Standard test method for Rockwell hardness of plastics and electrical insulating mater
ASTM D790	Standard test methods for flexural properties of unreinforced and reinforced plastics and electrical insulating materials

Code of Practice for the Provision of Means of Escape in Case of Fire

Code of Practice for Means of Access for Firefighting and Rescue

Code of Practice on Wind Effects Hong Kong

Design Manual: Barrier Free Access 2008

Highways Department Standard Drawings

Road Traffic (Traffic Control) Regulations

Code of Practice for Private Road, Transport Department

IEE Regulations

Hong Kong Blind Union

9.2.3 Movements

- (a) The Contractor shall design and construct the signage to withstand movements of the primary structure and/or substrate under all design loads or combination of loads,

without damage or any reduction in the performance of the signage.

- (b) All fixings shall be capable of providing adequate adjustment with the minimal use of packing shims.
- (c) The signage shall not deflect under loading in any way that has a detrimental effect on any element of the Works, adjacent structural or building elements.
- (d) The Contractor shall design and install all components and fixings such that they are capable of accommodating all of the above deflection without distortion, deformation or failure.

9.2.4 Loading Criteria

The complete signage with structural supports and/or sub-frames shall accommodate the following loading criteria without loss of structural integrity, permanent deformation, or reduction in its performance:

Load type	
Dead load	Self-weight.
Live load from maintenance	The most stringent of 1.0kN/m ² uniformly distributed; or 0.5kN normal onto an area of 300x300mm anywhere on the sign.
Live load from crowd where signs within 1.5m of finished floor level	0.75kN/m uniformly distributed load applied at a height of 1100mm above finished floor level; 0.5kN concentrated load applied on any part of the sign between floor and 1100mm above finished floor level.
Impact load-where signs are within 0.7m of finished floor level	100kg applied at a height 0.7m above finished floor level at a speed of 1 m/s
Thermal load	Load resulting from temperature difference of 32°C
Wind load	In accordance with the Code of Practice on the Wind Effects Hong Kong
Safety factor	As applied for load combinations in accordance with the relevant code of practice and referenced standards.

9.2.5 Lighting and Electrical Components

- (a) The Contractor shall design, select, supply and install light fittings, control gear and associated electrical components and wiring for illuminated signs to suit the signage design.
- (b) Comply with the General Specification and Particular Specification for Electrical Installation.

9.2.6 Other Performance Requirements

The signage shall satisfy the following performance requirements to the referenced standards:

Performance	Description	Requirement
Flame spread	Ability to limit spread of fire	Min. Class 1
Deflection	Deflection under design loads	No visible deflection, warpage, sag or oil-canning
Robustness	Rattling under load	No rattling or dislodgement.
Electromagnetic compatibility	Acceptance level of emission	Shall demonstrably not affect other installations
Moveable parts	Mechanisms and moveable assemblies	To be fail-safe to prevent accidental dislodgement during maintenance and to remain secure during operations.
Equipotential bonding	Electrical safety	In accordance with IEE Regulations.

9.2.7 Performance Requirements of Illuminated Signs

In addition to clause 2.6 above, the illuminated signage shall also satisfy the following performance requirements to the referenced standards:

Illumination requirements:

Performance	Description	Requirement
Uniformity	Ratio of min to max. illumination	Max. 1 to 3
Brightness	Average brightness of display medium	Min. 1000 candela/m ²

Performance requirements of sign casing:

Performance	Description	Requirement
Total reflectance	Surface ability to reflect light	Min. 85%
Smoke release	Resistance to smoke generation in fire	Max. LC50
Operating temperature	Operating temperature inside casing	Less than 80°C
Protection by enclosure	Protection from water and dust ingress	Min. IP65

9.2.8 Performance Requirements of Polycarbonate

The completed polycarbonate display medium shall satisfy the following performance requirements to the referenced standards:

Performance	Description	Requirement
Flame spread	Ability to limit spread of fire	Min. Class 1
Smoke released	Resistance to smoke generation in fire	Max. LC50
Deflection	Deflection under design load	No visible deflection, warpage, sag or oil-canning
Tensile strength	Strength in tension	Ultimate failure at 9500Psi

Flexural endurance	Resistance to breakage after continuous flexing of 1800 cycles/min.	Ultimate failure at 1000Psi
Compressive strength	Strength in compression	12500Psi
Coefficient of thermal expansion	Expansion when subjected to heat	3.75×10^{-5} in/in/°F
Hardness	Resistance to impact	Min. 1.20
Flexural strength	Resistance to breakage under bending	Ultimate failure at 10500Psi
Deflection	Allow deflection under load	Max. 2mm

9.2.9 Demountability

- (a) Elements of the signage shall be removable and re-mountable ensuring access for maintenance and/or replacement in the event of breakage.
- (b) All demountable components and accessories shall be capable of being re-erected in accordance with the original setting-out alignment.
- (c) Such removal shall not affect the performance of adjacent or any other part of the signage or any adjoining works.

9.3 Materials and Products

9.3.1 Generally

- (a) All materials and components shall be durable, and to the minimum standards set out in the Specification and the relevant standards.
- (b) For each materials or component, the Contractor shall obtain the total quantity from the same supplier unless otherwise agreed with the Architect.
- (c) All fixing brackets and cleats shall be manufactures\d from an appropriate grade of steel/ aluminium to the requirements of relevant standards.
- (d) All materials and components, shall not be liable to infestation attack by micro-organisms, fungi, insects or other vermin, nor provide harbourage for same.
- (e) Materials shall be compatible with each other in the proposed applications to avoid degradation and meet the current requirements of the Specification, relevant standards, codes of practice and the Building (Construction) Regulations.

9.3.2 Sign Plate

Sign plate shall be custom fabricated plate to the specified size and complying with the following:

- (a) Material: Grade 316 stainless, stain finish.
- (c) Thickness: Minimum 2mm
- (d) Fixing method: Mechanical fastened to wall or sign support

- (e) Graphics: Silk-screening acid-etched graphics printed onto plate surface in the specified colours.

9.3.3 Braille Signs

- (a) Braille sign shall be custom fabricated stainless steel sheet with embossed tactile symbols and Braille information as specified or required under the Design Manual: Barrier Free Access 2008.
- (b) The Braille sign on handrails shall be pressed to a curved profile for close contact with tubular handrails, without sharp edges or deformations after installation.
- (c) The tactile symbols and Braille information embossed on the Braille sign shall be verified by the Hong Kong Society for the Blind or equivalent.

9.3.4 Proprietary Room Signs

Room signs shall be proprietary-made extruded profile with interlocking dovetails and in a modular system capable of interchanging and complying with the following:

- (a) Materials: Aluminium, polyester powder coated.
- (b) Thickness: Maximum 10mm total
- (c) Base plate: Capable of being mechanically fastened to wall, partition or door. Edges shall be flush with the face plate with the outward edges chamfered.
- (d) Graphics: Silk-screening acid-etched graphics printed onto face plate surface in the specified colours.
- (e) All edges shall be chamfered.
- (f) All fixings shall be concealed.

9.3.5 LED Name Signs

LED name signs shall be custom fabricated signs complying with the following requirements:

- (a) Casing material: Aluminium of minimum 3mm thick or more as required to fulfill the performance requirements.
- (b) Casing finish: PVF2, external surfaces in colour as specified in the Drawings, Internal surfaces in matt white to achieve the specified reflectance.
- (c) Display medium Polycarbonate, semi-transparent in opal colour, matt finish.
- (d) Shape: Fabricated to form character as shown on the Drawings.
- (e) All fixings shall be corrosion resistant and shall be concealed,
- (f) Adequate ventilation or heat-dissipating elements shall be incorporated to maintain the temperature of the sign surface below 65°C at ambient temperature of 40°C, and such that the function and durability of the sign elements is not affected.

9.3.6 Polycarbonate

Polycarbonate shall be proprietary-made, high performance modified acrylic sheets designed for the purpose of backlit displays complying with the following requirements:

- (a) Sheets shall be non-yellowing throughout the services life.
- (b) Sheets shall be free from bubbles, smoke waves, air holes, scratches and other defects. In cutting sheet, proper allowance shall be made for expansion. Edges shall be polished.
- (c) Sheet sizes and types shall be as shown in the Drawings. Thickness shall be minimum 3mm or more as required to fulfill the performance requirements.

9.3.7 Sign Support

- (a) Sign support shall be custom fabricated, grade 316 stainless steel, satin finish support frame. Members shall be hollow sections to the specified profile and size. Thickness of metal shall be as required for structural integrity. Include base plates and fasteners for anchorage into substrate.
- (b) Pole for mounting traffic sign/EVA sign shall be hot dip galvanized circular steel section finished with polyurethane paint.
- (c) Comply with section 17 of the General Specification.

9.3.8 Fixings

- (a) All fixings shall comply with the performance requirements stated in this Particular Specification, and shall conform to the statutory requirements in respect of strength and type.
- (b) All bolts, screws, nuts and anchors shall be of strength adequate for their designed purpose and be manufactured from stainless steel of no inferior to grade 316.
- (c) All visible fixings shall be grade 316 stainless steel countersunk allen key type. Where countersunk fixings cannot be used grade 316 stainless steel flat headed "pig nose" fixings shall be used, subject to the Architect's approval
- (d) Adequate measures shall be taken to prevent bi-metallic corrosion between dissimilar metals, and to this end attention is drawn to BSI publication PD 6484 'Commentary on Corrosion at Bi-Metallic Contacts and its Alleviation'.
- (e) Aluminium components shall be isolated from cementitious surfaces.

9.4 Submissions

9.4.1 Submit the following to the Architect for approval:

- (a) Technical Information
 - (i) Manufacturer's product data, and installation instructions;
 - (ii) Job reference in Hong Kong in the past 5 years;
 - (iii) Calculations, certified by a registered structural engineer, demonstrating that the

signage with sign support is designed to satisfy the specified design and performance criteria;

- (iv) Certificates and test reports prepared by a HOKLAS accredited or internationally recognized laboratory substantiating that the offered materials and products comply with the specified design and performance criteria as well as relevant standards and codes of practice; and
- (v) Method statement of assembly and installation;

(b) Shop Drawings

- (i) Shop drawings showing the fabrication, construction, assembly and Fixing details of all elements and components of the signage system and associated sign support and footing, light fittings, control gears and electrical components and wiring, provisions of tolerances, and interfacing details with the adjacent works; and
- (ii) Signage schedule showing the locations, setting-out, dimensions, graphics and messages, materials, finishes and colour, type of fixings and supports, type of light fittings and control, and accessories of all signs.

(c) Samples

- (i) Sign plate : 1 piece of for each type, size, finish and colour;
- (ii) Sign support : 1 piece of minimum 300mm long for each type, finish and thickness;
- (iii) Polycarbonate : 1 piece of 300 x 300mm for each type, finish and colour;
- (iv) Fixings : 1 piece for each type;
- (v) Light fittings : 1 no. for each type;
- (vi) Fabricated sample assembly : 1 piece for each type of sign; and
- (vii) True size coloured paper mock-up signs: 1 no. for each type of sign as selected by the Architect.

9.5 Workmanship

9.5.1 Generally

- (a) The signage shall have continuous profiles, which shall be free from arks, defects, flaws, step, waves, or damage of any nature.
- (b) Where elements and components are stored on Site, the Contractor shall protect them from damage, distortion or uneven weathering.
- (c) Install all fixings in accordance with the manufacturer's recommended procedures.
- (d) The Contractor shall obtain consent from the Architect before drilling or cutting parts of the substrate.

- (e) Use isolating tape, plastic washers, or other suitable means to prevent bi-metallic corrosion between dissimilar metals.
- (f) The completed signage shall be square, regular, true to line, level, and plane.

9.5.2 Coordination

The Contractor shall coordinate with all works trades interfacing and nearby the signage. In particular, he shall ensure that the installed sign shall not be obstructed or prone to be damaged by other works/ installations.

9.5.3 Storage

- (a) Protect all materials and products during storage and handling in compliance with the manufacturer's directions and prevent damages to the materials from effects of moisture, condensation, temperature changes, direct exposure to sun, exposure to subsequent construction activities and from any other causes.
- (b) Ensure that all finished components are packed in stillages or crates such that they are suitably separated and protected to prevent scratching, scuffing, or other surface damage.

9.5.4 Preparation

- (a) Mount paper mock-up signs and adjust the locations on Site as directed by the Architect. Seek the Architect's approval of the location and height of the paper mock-up signs prior to installation of the permanent signs.
- (b) Verify the site conditions, locations and dimensions prior to installation.

9.5.5 Examination

Measure and inspect the substrates for the areas to receive the signage. Inform the Architect of deficiencies that will interfere with proper installation of the signage. Do not proceed with the installation until all deficiencies have been satisfactorily corrected.

9.5.6 Installation

- (a) Install signs in accordance with the approved installation instructions at the locations of paper mock-up signs approved by the Architect.
- (b) Snap engaged trims and components shall not disengage when subjected to direct force, and shall be mechanically secured against vertical and horizontal movement without exposed fixings. Joints in continuous snap-on trims and components shall have splice sleeves in matching materials and finish.
- (c) Make exposed joints flush and aligned. Install items and components plumb and level, accurately fitted, free from distortion and defects.
- (d) Holes, cut-out openings, etc. required for surface-mounted items and services passing through signs shall be completed prior to applying finish coating to the signs. Drilling or cutting of signs after finish coating is not permitted.

9.5.7 Tolerances Generally

- (a) Maintain a very high degree of accuracy in the fabrication and installation of the signage to ensure that the specified tolerances are achieved.
- (b) Ensure that the Contractor's design of the signage allows for sufficient design, manufacture and installation tolerances of all interfacing conditions, to include allowances for any movement arising from differential superimposed loads, dead loads, self weight, the presence or absence of water, variations in moisture conditions, thermal expansion and contraction, deflection from external forces and torsional load, traffic vibration settlement, deflection, deflection from excessive temporary loads during construction and stacking of materials, positive and negative wind loads and all other relevant forces.
- (c) Submit for the Architect's review a method statement detailing proposals to achieve the specified tolerances. This method statement shall demonstrate that the Contractor has a clear understanding of the construction programme, the effects of adjoining works, and the fabrication method of the signage components.
- (d) Submit for the Architect's review a detailed list of tolerances to which the signage shall be fabricated within the requirements of this Particular Specification for the overall geometric requirements. As a minimum the Contractor's statement of tolerances shall include the following:
- (i) Position on plan;
 - (ii) Levels;
 - (iii) Alignment;
 - (iv) Joints between panel;
 - (v) Diagonal;
 - (vi) Eccentricity; and
 - (vii) Inclination.
- (e) Carry out an analysis of the erection sequence in order to satisfy himself and the Architect that the installation tolerances stated in this Particular Specification are met.
- (f) The Contractor's shop drawings shall show the dimensional and detailed provisions intended to accommodate the construction tolerances of surrounding elements in order to ensure that all aspects of the signage relate satisfactorily to the Works as a whole.

9.5.8 Manufacture/ Fabrication Tolerances

- (a) Non-proprietary items shall be fabricated to meet the following tolerances:

Tolerance	Description	Requirement
Length	Acceptable deviation of average size from work size length for length \leq 600mm	Max. +0mm, -0.3mm
	Acceptable deviation of average size from work size length for length $>$ 600mm	Max. +0mm, -0.5mm

Width	Acceptable deviation of average size from work size width	Max. +0mm, -0.3mm
Flatness	Acceptable face deflection for panel with length \leq 600mm	Max. 0mm concave; Max. 3mm convex
Thickness	Acceptable deviation of average thickness from work size	Max. \pm 0.1mm
Rectangularity	Acceptable deviation from 90° for corner and edge	Max. 0.15mm per 600mm length
Radius	Acceptable deviation from intended radius	Max. \pm 0.2 mm

(b) Sign casing shall be fabricated to meet the following tolerances:

Tolerance	Description	Requirement
Metal thickness	Acceptable difference in thickness within single piece	Max. \pm 0.5mm
Dimension	Acceptable deviation from stated dimension	Max. \pm 1mm
Bow	Acceptable allowance in bow, measured as % of diagonal	Max. 0.2%
Squareness	Acceptable deviation from a straight edge across longest dimension	Max. \pm 1mm
Surface flatness	Acceptable deviation from a straight edge across longest dimension	Max. \pm 1 mm
Joint width	Acceptable deviation from specified joint width	Max. \pm 0.5mm

(c) Polycarbonate sheets shall be manufactured to meet the following tolerances:

Tolerance	Description	Requirement
Thickness	Acceptable difference in thickness within one sheet	Max. \pm 0.5mm
Dimension	Acceptable deviation from nominal	Max. \pm 1mm
Bow	Acceptable allowance in bow, measured as % of diagonal	Max. 0.1 %
Squareness	Acceptable difference in measurement of diagonals	Max. \pm 3mm

9.5.9 Installation Tolerances

Signage shall be installed to meet the following tolerances:

Tolerance	Description	Requirement
Datum	Acceptable deviation from true level or slope	Max. \pm 1.5mm
Lipping	Acceptable deviation in plane between adjacent surfaces	Max. 1mm
Plumb	Acceptable deviation from true vertical	Max. \pm 1.5mm
Alignment	Acceptable deviation in alignment between adjacent and adjoining elements	Max. \pm 1.5mm

Linear building line	Acceptable deviation from theoretical position shown in Drawings	Max. \pm 1.5mm
Joint width consistency	Acceptable variation in widths along length of joint	Max $\frac{1}{4}$ of the specified joint width, for joint width \leq 4mm; Max. \pm 1mm of the specified joint width, for joint width $>$ 4mm

9.5.10 Remedial

- (a) No form of making good or restoration shall be permitted, unless the damage is considered by the Architect to be minor and repairs can be carried out by an approved method with no evidence remains of the correction work.
- (b) If the method of repairs is not acceptable as judged by the Architect, the Contractor shall remove the damaged units. The new units shall be identical to the other components to eliminate evidence of replacement.

9.5.11 Protection and Cleaning

- (a) Provide final protection and maintain conditions to ensure that the final installed signage are without damage and deterioration at time of completion.
- (b) Clean signs thoroughly without damaging the exposed surfaces.
- (c) Protective coverings shall be retained intact and restored if damaged. Allow for temporary removal and subsequent reinstatement of the protective coverings for the inspections by the Architectural and his Representative.
- (d) Upon completion of the signage, remove all protective coverings simultaneously from similar finished items to prevent non-uniform discoloration.