



20-E-0133 / DOC-6230602

23 March 2020

T Austen

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Dear Mr. Austen

Thank you for your Official Information Act request to the Department of Conservation, dated 26 February 2020. You requested the following:

*In your reply to my request of the 15th November 2019 you said, in part "the department is/has been upgrading tracks in accordance with technical specifications derived from the best available knowledge. These technical specifications have been shared across the programme partners."*

- 1. What are the technical specifications?*
- 2. Who are the programme partners?*

The information provided in this response is restricted to Public Conservation Land (PCL) and the Department of Conservation's decisions/opinions.

Your questions and our responses are listed below:

- 1. What are the technical specifications?*

The Department of Conservation Technical Specifications for Mitigation Measures were derived for the Department by Frame Group Ltd. and are specific to the work that the Department has been conducting.

Please find the Department of Conservation Technical Specifications for Mitigation Measures attached. I have decided to release this document in full for your information.

- 2. Who are the programme partners?*

Please refer to the following link for the official list of programme partners:  
<https://www.kauridieback.co.nz/programme-partners/>

Please note that this response will be published on the Department's website, however your name/ personal details will be withheld.

Yours sincerely



Ben Reddiex  
Director, National Operations Issues and Programmes



Department of Conservation  
*Te Papa Atawhai*

**KAURI DIEBACK PROJECT**

**TECHNICAL SPECIFICATION FOR  
MITIGATION MEASURES**

FGL 15/024/02

Rev L: 24/04/2018

Prepared by:



**Frame Group Limited**

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## 1.0 GENERAL

### 1.1. Scope

1.1.1. This specification covers the implementation of mitigation measures on sites that are affected, or at risk of being affected by Kauri Dieback, caused by *Phytophthora taxon agathidicida* (PA), a disease caused by infected spores that can kill New Zealand kauri trees of any age. The mitigation measures covered by this specification include:

- Track formation within Kauri Zone with aggregate or bark/aggregate, crowned or monoslope surfacing (drawing 01). (DOC CM 2973770).
- Cellular confined bark/aggregate track surfacing (drawing 02). (DOC CM 2973848).
- Timber boxed steps (drawing 03 and 08). (DOC CM 2973905 & 2975718)
- Pegged boardwalk, less than 0.5m high (drawing 04) (DOC CM 2975694).
- Low boardwalk, less than 1.0m high (drawing 05). (DOC CM 2975702).
- Raised boardwalk, up to 3.0m high, with barriers as necessary (drawing 06). (DOC CM 2975705).
- Track formation outside of Kauri Zone with aggregate or natural, crowned or monoslope surfacing (drawing 07). (DOC CM 2975713).
- Staircase details (drawings 09 and 10). (DOC CM 2975725 & 2975730).
- Timber fence details (drawing 11). (DOC CM 3217896).
- Cleaning stations (drawing 12).
- Other items indicated in Required Work Schedule.

1.1.2. The Contractor shall refer to the Required Work Schedules and the Schedule of Prices for the works to be completed under this works Contract.

### 1.2. Materials and Labour

1.2.1. The Contractor shall supply the whole of the materials, plant and labour necessary to carry out the works included in this contract. Work shall be carried out according to best trade practice, by skilled and experienced personnel to the standards hereinafter specified.

### 1.3. Design Variations

1.3.1. The Contractor shall obtain written authorisation for each and every variation before it is made.

1.3.2. Variations to the design made without the written approval of the Principal's Representative, may have detrimental effects on the site ecology, or may have the effect of invalidating any producer statement and preventing the issue of a Code Compliance Certificate.

1.3.3. The Principal may require any variation to the design made without prior approval of the Principal's Representative to be rectified at the Contractor's expense.

#### **1.4. Standards**

- 1.4.1. Each section of the Specification shall be read in conjunction with the principal standards listed therein and related documents. In the event of this Specification being at variance with a standard, the requirements of this Specification will take precedence.
- 1.4.2. Reference to any standard shall include any amendments to or substitution for that standard.

#### **1.5. Inspections**

- 1.5.1. Inspection of the work will be carried out by the Principal's Representative or an agent for the principal's representative. .
- 1.5.2. The Contractor shall provide at least 24 hours notice for inspection of items that the Principal's Representative has nominated as requiring inspection before being covered by subsequent work.
- 1.5.3. If the Contractor requests an inspection and on arrival for inspection, the Principal's Representative finds that the work is not yet ready for inspection, the Principal's Representative reserves the right to deduct the cost of time for that inspection from the contract price.
- 1.5.4. The Principal's Representative reserves the right to deduct from the contract price, the cost of time for re-inspection of the site after any 'Stop Work' notice. Extensions of time arising out of 'Stop Work' notices issued to the Contractor will not be considered.

#### **1.6. Public Access**

- 1.6.1. Each track covered by the contract works shall be closed to public access for the duration of work on that track. Where several tracks in an area are included in the contract, efforts shall be made to minimise the number of tracks closed at any one time.
- 1.6.2. The Contractor shall indicate in their work methodology the proposed work programme and dates and period that each individual track in the contract shall be closed. The track closure programme shall be subject to approval by the Principal's Representative.
- 1.6.3. The Contractor shall utilize temporary rigid barriers (minimum 1.0 metre height with solid top and bottom rail and with durable infill) to prevent members of the public from entering any work site or using structures until they are complete and certified for public use.
- 1.6.4. Any structures that are required to have a Building Consent shall remain closed with a barrier in place to prevent public access, even when complete. Closure shall continue until such time as a Code Compliance Certificate has been issued for the structure.
- 1.6.5. The Contractor shall install signs at all points of pedestrian access points to the section of track that are closed. The signs shall be formed from suitable durable materials and include the following text:

*"Track closed for Kauri Dieback Mitigation Works. No un-authorized entry. Trespassers will be reported to the Police."*

## **1.7. Producer Statements**

- 1.7.1. The Contractor shall, on completion of any structure building works, provide the Principal's Representative with a Producer Statement-Construction (PS3). The issuing of a Certificate of Practical Completion is subject to the receipt of the PS3.

## **1.8. Building Consent**

- 1.8.1. The Contractor shall comply with all conditions of any Building Consent relating to the construction of structures included in the work.
- 1.8.2. If inspections are required by the Building Consent Authority building inspectors, it shall be the Contractor's responsibility to ensure that the Building Consent Authority is kept informed and given sufficient notice as to when inspections are needed.
- 1.8.3. Work requiring Building Consent Authority inspection shall not be covered over until the required inspections have taken place.

## **1.9. Definitions**

- 1.9.1. BAM: Bark Aggregate Mix; a mixture of *Pinus radiata* wood bark and well graded GAP20 aggregate (usually 50/50 by volume) to be used where shown on the Required Work Schedule.
- 1.9.2. Cleaning Station: A bi-directional cleaning facility located at the boundary between two SHA's or at the total site entrance and exit.
- 1.9.3. Clean Area: A zone within a cleaning station that is to be managed to be free of potential contamination by PA.
- 1.9.4. FHS: Four Hygiene Step; a cleaning process to be applied to all footwear, hand tools, and equipment items each and every time an Active SHA boundary is crossed.
- 1.9.5. Geoweb: A HDPE cellular confinement matrix used to contain BAM or aggregate on track formation. This shall be either Geofabrics Geoweb or Cirtex HDPE.
- 1.9.6. Geoweb Effective Width: The minimum track width contained fully by complete filled Geoweb cells, and shall be no less than the required track width as shown on the Required Work Schedule.
- 1.9.7. Geoweb Overall Width: The maximum total width across filled cells of the extended Geoweb at its widest point.
- 1.9.8. Kauri Zone: The total area enclosed within a line that is 1.5m outside the dripline of any single or multiple kauri trees that are greater than 1.0m in height.

- 1.9.9. PA: *Phytophthora taxon agathidicida*; a disease caused by infected spores that can kill New Zealand kauri trees of any age.
- 1.9.10. Required Work Schedule: A table included in the contract documents which outlines the required works on each segment of each track in correlation to the route distance.
- 1.9.11. SHA: Specific Hygiene Area; an area which is a controlled isolation area identified in the contract documents on the Plan drawings.
- 1.9.12. Active SHA: A SHA where all hygiene requirements relating to a SHA are active and where the FHS shall be implemented. All SHA's shall be deemed Active until they are deemed otherwise in writing by the Principals Representative.
- 1.9.13. Passive SHA: A SHA that Principal's Representative has deemed in writing to be passive. Reduced hygiene requirements are acceptable at the boundaries of Passive SHA's, but remain as for Active SHA boundaries where a Passive SHA is adjacent to an Active SHA.

## **2.0 ENVIRONMENTAL AND HERITAGE ISSUES**

### **2.1. General**

- 2.1.1. While undertaking any works the Contractor shall at all times comply with the obligations, provisions and requirements of the Resource Management Act, Conservation Act and the Historic Places Act.

### **2.2. Protection and Reinstatement of Area**

- 2.2.1. The Contractor shall not disturb, modify or remove any items or materials at the site other than that necessary to carry out the work.
- 2.2.2. The Contractor is to take particular care not to damage any native vegetation, natural features or other structures at the site. Any damage as a result of the Contractor's work shall be rectified at the Contractor's expense.
- 2.2.3. The Contractor shall not bring any dog, cat or other animal on to the site without the express approval of the Principal's Representative.
- 2.2.4. The Contractor shall reinstate all land areas affected by the works, including the re-establishment of working areas, and road-side stockpile and storage sites to a condition at least equal to that at the commencement of the works. The Contractor shall obtain prior approval from the Principal's Representative of the proposed method of re-instatement method for each site that requires rehabilitation.
- 2.2.5. Any re-instatement shall be carried out in compliance with all specification clauses relating to limitations on movement of soil, hygiene requirements and any other specific requirements the Principal's Representative deems necessary in relation to the re-instatement. In general, the spreading or re-distribution of soil as a site re-instatement method will not be acceptable.

- 2.2.6. Reinstatement shall be finished within one week of the completion of works and all excess materials shall be removed from site.

### **2.3. Work Methodology**

- 2.3.1. The Contractor shall provide a proposed Work Methodology for each site, which shall be of sufficient detail to indicate the intended sequence of work within the site and the likely movement of materials and equipment. Work shall not commence on a site until the Contractors Work Methodology for the site has been approved by the Principal's Representative.
- 2.3.2. The Principal's Representative may waive certain hygiene requirements if the approved Work Methodology is such that the risks associated with spread of PA are satisfactorily mitigated by the appropriate sequencing of the work. Any such waiver shall be provided by the Principal's Representative in writing and shall apply to the approved methodology and site only, and is not to be taken as a basis for waiver of any hygiene requirements on other sites.
- 2.3.3. The Contractors activity shall be confined to the area of the walking track and immediately adjacent to it. Damage to vegetation or ground beyond the walkway shall be rectified at the Contractor's expense.
- 2.3.4. The Contractor shall not disturb, modify or remove any items or materials except where approved by the Principal's Representative.
- 2.3.5. The Contractor shall minimise the amount of foot passage on soil beside partially constructed boardwalks or track surfacing. The construction methodology shall be such that the need for foot travel along the track is minimised.
- 2.3.6. Where the work is located on tidal mud flats, wetland areas or over silty stream beds, the Contractor shall install temporary raised platforms for access and working during piling and construction to minimise disturbance of the ground and sedimentation.

### **2.4. Vegetation**

- 2.4.1. The trimming or cutting of kauri trees branches, foliage or roots is strictly prohibited.
- 2.4.2. The trimming of other trees and vegetation shall only be permitted where there is no other reasonable alternative.
- 2.4.3. The Contractor shall obtain specific approval from the Principal's Representative before cutting of any tree roots greater than 30mm in diameter, if the Contractor believes such root cutting is necessary to undertake the work.
- 2.4.4. Approval to cut roots or vegetation in any one location shall not be taken as approval to undertake similar cutting or trimming in other locations.



## **2.5. Mechanical Equipment**

- 2.5.1. Mechanical Equipment shall be defined as all motor powered equipment including excavators, power barrows, ATV's, compactors, motorised augers and any type of vehicle (wheeled and tracked). It shall not include hand tools or electrical tools.
- 2.5.2. The Contractor shall obtain specific approval for any proposed use of mechanical equipment on each site, before bringing these to the site. The Principal's Representative reserves the right to decline approval for use of certain mechanical equipment if the use of such equipment poses an unacceptable risk to the spread of PA.

## **2.6. Waterblast Requirements**

- 2.6.1. All mechanical equipment, excluding hand tools and electrical tools, shall be thoroughly hot water-blasted or steam cleaned at a temperature greater than 100 degrees centigrade prior to entering and after removal from each work site, to ensure that all soil, seeds and other undesirable materials are removed. A temperature of greater than 100 deg C is required to kill some seeds, hence general water-blasting is not sufficient and will not be accepted as an alternative means of cleaning.
- 2.6.2. Machinery shall remain on site for the duration of the work, or shall be hot water-blasted or steam cleaned after leaving the site and before being returned to site each and every time it is transported. Wheeled or tracked machinery, vehicles and ATVs are considered high risk and must be given special attention to ensure that they are free of any soil.
- 2.6.3. The Principal's Representative shall be given reasonable opportunity to inspect all mechanical machinery prior to it being transported onto each site.
- 2.6.4. Off-site hot waterblasting or steam cleaning shall be carried out at a suitable facility where wash water and soil is contained and appropriately disposed of. Roadside hot waterblasting or steam cleaning or cleaning in a facility that does not have appropriate control measures for potential presence of PA spores is not acceptable.

## **2.7. Kauri Zones**

- 2.7.1. Kauri Zones are defined as the total area enclosed by a line that is 1.5m outside the dripline of any single or multiple kauri trees that are greater than 1.0m in height.
- 2.7.2. The Contractor is responsible for identifying Kauri Zones on site and shall be familiar with the specific items outlined in this specification that are not permitted within Kauri Zones.

## **2.8. Kauri Dieback Hygiene Area Requirements**

- 2.8.1. Controlled areas to be known as Specific Hygiene Areas (SHA) shall be identified in the contract documents or shall be indicated on site by the Principal's Representative at each work site at the commencement of the contract work at any site.

- 2.8.2. SHA's shall be deemed Active or Passive as instructed by Principal's Representative.
- 2.8.3. At commencement of contract works all SHA's shall be Active. The Principal's Representative may deem one or more SHA to be Passive on completion to the works or prior of commencement to the works.
- 2.8.4. Any SHA not deemed Passive in writing by Principal's Representative shall be Active.
- 2.8.5. Each individual SHA is to be treated as a controlled area where the Contractor is required to take specific steps to minimise the risk of spreading of PA into, or within, or out the SHA.
- 2.8.6. The Contractor shall establish cleaning stations at each Active SHA boundary. Cleaning stations shall consist of a Clean Area between SHA's to prevent the cross contamination of soil.
- 2.8.7. Cleaning station minimum set-up for each location shall include and be as follows (Refer to specific drawing 15/024/02 number 12 for more detail):
- A raised dry mud free surface (for people to place their feet when they have removed footwear, or are cleaning footwear as well as cleaned tools and equipment).
  - Seating (bench or plastic chairs) that can be used when cleaning footwear or other materials.
  - Two sets of scrapers, putty knives, nails, etc that can be used to extract "dry" dirt/mud.
  - Two suitably sized waterproof containment trays that can be used to collect scraped mud before washing and that can hold water for final cleaning of footwear and other equipment in (all activity must be able to be carried out over and within the container so that material is not flicked about). Two containers are necessary, one each side of the Clean Area within each SHA
  - Two sets of brushes.
  - Clean water. The wash water may be collected from within the SHA that it is to be used, provided prior approval is obtained from the Principal's Representative. Wash water from one SHA must not be used in an adjacent SHA. If water is not available within the SHA, then it shall be obtained from an alternative approved source.
  - Spray bottles with 2% Sterigene disinfectant solution.
  - Plastic bags that can be used to line the collection boxes or used to transport collected materials for disposal if required.
- 2.8.8. The Contractor shall undertake the following Four Hygiene Step (FHS) process each and every time an Active SHA is entered, and prior to exiting any Active SHA, and prior to transferring from an Active SHA into any other SHA. The FHS shall apply every time any person, hand tool, footwear item or equipment is transferred across an Active SHA boundary.
- Step 1: Remove all loose caked soil from materials, footwear, tools, equipment and machinery using trowels, or scrapers and place in the container. Note that disinfectants will not kill PTA spores that

are embedded in soil; hence removal of all soil before treatment is essential.

- Step 2: Clean off all remaining soil from materials, footwear, tools, equipment and machinery using stiff brushes and water if necessary, and place in the container.
- Step 3: All excavated excess soil/water within the container shall be retained within the SHA and placed where it shall not be moved throughout the SHA during the course of the works, or shall, when specified by the Principal's Representative, be collected and removed for deep burial in an approved location.
- Step 4: Treat all ground contact surfaces of footwear, tools, equipment and machinery with 2% Sterigene disinfectant.

2.8.9. The Four Hygiene Step (FHS) process is not required when passing from a Passive SHA into another Passive SHA.

2.8.10. The use of removable footwear over-boots, or the changing of footwear at SHA boundaries is an acceptable alternative for avoiding the need to apply the FHS process to footwear, provided the over-boots and footwear remain within the SHA boundary in which they are used. On completion of the work within the SHA, over-boots shall be disposed of as per section 2.11, and boots used within the SHA shall be treated with the FHS process before removal.

2.8.11. Disinfectant for use in the FHS process will be supplied in concentrated form to the Contractor by the Principal, and the Principal's Representative shall provide instruction on the required standard of cleaning, ratio to water, and the application of disinfectant. The Contractor is responsible for providing all required spray bottles, brushes, etc. for cleaning.

2.8.12. The Contractor shall allow to complete the FHS before crossing an unbridged stream with water present, unless otherwise indicated by the Principal's Representative that the machinery or equipment proposed by the Contractor to cross the stream (or the condition of the stream) does not pose a PA risk.

2.8.13. New plastic ground sheets shall be used for storing all materials; including timber, aggregate, etc on the ground within each Active SHA.

2.8.14. If at any stage during the course of the works, the Principal's Representative observes activities or procedures which do not comply with Item 2.8 Kauri Dieback Hygiene Requirements, a 'Stop Work' notice may be issued to the Contractor.

## **2.9. Probing and Digging Tool Hygiene Requirements**

2.9.1. Where probing, digging or auguring within a Kauri Zone is necessary for pile or peg foundations for handrails, boardwalks or boxed steps; all probes, augurs or digging implements used shall be treated as follows after probing at each and every pile or peg location :

- Clean free of soil using water if necessary. All removed soil and wash water to be disposed of within 300mm of the probing or digging location.

- Spray implements with methylated spirits.
- Spray implements with 2% Sterigene solution and wait one minute before using the equipment again.

## **2.10. Materials brought onto Site**

- 2.10.1. All timber, aggregates or bark that are to be brought onto the site are to be from an approved source that can demonstrate the materials are free of PA spores, Argentine Ant, Rainbow Skink or weed contamination. Proof that the materials are from a pest free origin (such as a certificate) may be required from the supplier, quarry, etc.
- 2.10.2. The Contractor shall advise the Principal's Representative the details of the proposed supply source and nature of each material item at least two weeks before proposed delivery, and shall not commence delivery until specific approval in the form of a Material Hygiene Approval Certificate (*DOC CM 2871841*) for each material item is provided in writing by the Principal's Representative. This shall apply to all bark, aggregate and timber.
- 2.10.3. All materials including, but not limited to; timber, geotextiles and hardware are to be free of any soil, and shall be wrapped if necessary and transported in such a manner to ensure that soil does not accumulate on the materials during transport to the site or within the site.
- 2.10.4. Materials are to be stockpiled in approved places and all remnants removed from the site on the completion of the project, except where the Principal's Representative has approved that surplus materials may be left in stockpiles on the site.
- 2.10.5. All materials are to be contained on the approved stockpile sites on a plastic sheet to prevent spillage onto the site, and to prevent transfer of soil from the stockpile site onto materials.

## **2.11. Removal of Waste Material**

- 2.11.1. All waste materials and packaging being held at the site prior to removal is to be stored in such a fashion that it cannot be blown about by the wind or spread by vermin. No fires are permitted at the work site.
- 2.11.2. All timber off-cuts, surplus materials and any waste that is not approved for stockpiling permanently on site shall be encapsulated in suitable containers and removed from the site and disposed of at an appropriate disposal facility for PA contaminated material. The Principal's Representative shall provide a list of approved landfill sites for disposal, or alternatively the Contractor may seek approval for other disposal sites provided the following measures are implemented.
- All soil contaminated waste is to be deep buried at least 2m depth, upon arrival at the landfill.
  - After disposal of soil contaminants, trailers used to carry the soil and waste and all wheels of the truck/trailer units will be washed down with water before exiting the site using the wheel wash and wash down facilities at the site. (Where there are no wash-down facilities at the

landfill site, the Contractor shall carry out manual washing down of the truck/trailer units).

- 2.11.3. If any stockpiled materials removed from an SHA are intended for re-use elsewhere, they are to be subjected to the FHS process as for any other equipment to be transferred across an SHA boundary.

## 2.12. Silt Protection

- 2.12.1. Silt traps and silt fencing approved by the Principal's Representative are to be constructed wherever soil or silt may migrate within an SHA or off a work site in the event of heavy rainfall.
- 2.12.2. Particular care shall be taken to ensure that sediment is not lost from an SHA or into streams.
- 2.12.3. Silt fences shall be inspected and maintained once a week and after each significant rainfall. Maintenance shall consist of removing silt in over-laden areas and fixing or replacing fabric in damaged areas.
- 2.12.4. Any silt removed from silt fences shall be retained within the SHA in which it originated.
- 2.12.5. Any silt fencing used within a SHA shall be treated as contaminated and shall, if approved by the Principal's Representative, be left on site in an appropriate place, or shall be encapsulated and removed and disposed of in an appropriate disposal facility for PA contaminated material.

## 2.13. Archaeological Evidence

- 2.13.1. If any Archaeological evidence, including shell midden, hangi, or oven stones, pit depressions, defensive ditches, mining relics, artefact material and or human remains are exposed during construction then the following procedure shall apply:
- Immediately as it becomes apparent that archaeological evidence has been exposed, the Contractor shall cease all work in that particular area and notify the Principal's Representative.  
The Contractor shall secure the area in a way that ensures that any archaeological material, artefacts or remains are untouched.
  - The Principal's Representative will notify an appointed archaeologist, Heritage NZ and in the case of Human remains, Tangata Whenua and the Police, that an archaeological or traditional site has been exposed so that appropriate action can be taken.
- 2.13.2. Work in the vicinity where archaeological evidence is uncovered shall not re-commence until the Principal's Representative gives approval (after the Principal's Representative has received approval from Heritage NZ).
- 2.13.3. Damage to archaeological sites caused by the Contractor may be subject to prosecution under the Resource Management Act and/or the Historic Places Act.

## 2.14. Temporary Facilities

- 2.14.1. The Contractor shall make allowance in their price for the provision of all facilities required at the site for their own use. The position of these facilities shall be approved by the Principal's Representative and shall comply with Government and Local Authority requirements for health and safety.
- 2.14.2. The Contractor shall make allowance in their price for the provision of all site services they may require (e.g. communications, sanitation, water, electricity, etc).
- 2.14.3. Where existing facilities are not in place close to each site, the Contractor shall provide one portable chemical toilet facility on site for use by the Contractors personnel. Pit toilets shall not be permitted.

## 2.15. Communication

- 2.15.1. The Contractor shall provide the following means of communication.
- 24 hour radio, telephone or cellular phone contact.
  - A facsimile or email at the Contractors office (to be checked one a week as a minimum).

## 2.16. Programme

- 2.16.1. The Contractor shall be responsible for programming the whole of the works. Within five working days of acceptance of the contract the Contractor shall produce and forward to the Principal's Representative a construction programme showing when the work is to be undertaken. Due allowance is to be made for inclement weather.

## 2.17. Health and Safety

- 2.17.1. The Contractor shall at all times comply with the provisions of the Health and Safety at Work Act 2015. The Contractor shall take all necessary steps to ensure that the obligations placed on the "Principal" and the "Person who controls the place of work" under the provisions of the Act are complied with at all times and shall immediately advise the Principal or the Principal's Representative of any obligations not being fulfilled.
- 2.17.2. The Contractor shall prepare a Safety Plan, which shall identify all potential risks and hazards of all personnel on site. The plan shall include safety procedures, requirements for protective clothing and equipment, safety equipment, mitigation procedures, emergency procedures and any other requirements deemed necessary.
- 2.17.3. The Safety Plan shall be submitted to the Principal's Representative by the Contractor who shall confirm that the Safety Plan has been implemented and is operating on the site.
- 2.17.4. If at any stage during the course of the works, the Principal's Representative observes activities or procedures which do not comply with the Safety Plan, a 'Stop Work' notice may be issued to the Contractor.

2.17.5. Extensions of time arising out of 'Stop Work' notices issued to the Contractor due to non-compliance with the approved Safety Plan will not be considered.

2.17.6. The Contractor shall ensure that during the execution of the Contract there is no risk to the health and safety of other Contractors or the Principal's employees, or to members of the public that may be in the vicinity of the site.

2.17.7. The Contractors Safety Plan shall include particular procedures with respect to maintaining track closures during the works including use of appropriate signage, barriers and other protection deemed necessary.

## **2.18. Helicopter Operations**

2.18.1. The Contractor shall provide and pay for all helicopter services required to carry out any of the construction works.

2.18.2. Each and every helicopter operation is to be approved by the relevant DOC Operations Manager in the form of a Helicopter Operations Approval Certificate (*DOC CM 3013664*). To obtain this approval the Contractor shall complete and submit an Aircraft/Helicopter Flight Plan. It shall be considered a breach of Contract if helicopter operations are undertaken prior to the Helicopter Operations Approval Certificate being signed by the DOC Operations Manager.

2.18.3. Each time an aircraft is required on site for the project under the authority of a permit, the Operations Manager shall be notified by phone or radio by the pilot prior to the aircraft entering the area.

2.18.4. In the event of a Contractor engaging an operator who is not aware of the requirements, the onus shall be upon the Contractor to ensure that the DOC Operations Manager has been contacted, and a Helicopter Operations Approval Certificate issued prior to flying/landing in the area.

2.18.5. Any materials dropped by the helicopter operator either by accident or on purpose outside of approved sites must be reported to the Principal's Representative as soon as possible and any materials removed immediately.

2.18.6. Site restoration work must be carried out to the satisfaction of the Principal's Representative in the event of anything being damaged.

2.18.7. Fades used for transporting all materials into a SHA shall be used for one time use only.

2.18.8. Slinging of loads for helicopter lifting shall be carried out by appropriately qualified personnel and shall be in accordance with Worksafe Code of Practice for Load Lifting Rigging.

### 3.0 TRACK CONSTRUCTION

#### 3.1. General

- 3.1.1. All loose surface vegetation and leaf litter shall be removed from the immediate track formation corridor prior to placement of track formation or surfacing. Leaf litter shall be retained immediately adjacent to the track formation, minimising the distance of transport from its original location. Organic vegetation is a potential vector for PA spread, hence wide distribution of organic material from the track alignment shall be strictly prohibited.
- 3.1.2. Cut earthworks formation shall be prohibited in all Kauri Zones, except where approved in specific locations by the Principal's Representative.

#### 3.2. Setting out

- 3.2.1. The Contractor is responsible for setting out the construction works from the information provided in the Required Work Schedule and the reference markers on site, and shall seek approval from the Principal's Representative prior to commencing any construction works.
- 3.2.2. The track upgrade work follows the existing track alignment as noted on the Required Work Schedule, except where re-alignment is specifically indicated by the schedule.
- 3.2.3. The Required Work Schedule details the work for each track segment. Track segments cover a specified length of track based on route distance in metres.
- 3.2.4. Route distances shown in the Required Work Schedule are approximate only and these are for the purpose of providing the approximate location of items. The final location of culverts, etc. shall be determined on site so that these features best fit the requirements of the site topography.
- 3.2.5. The Required Work Schedule indicates what work is required on the track at each route distance. This includes the following:
- The required track or structure width.
  - The required track shape and surfacing type (monoslope or crowned, and aggregate or bark/aggregate).
    - Where boxed steps shall be installed.
    - Where boardwalk is to be installed and the type of boardwalk required (pegged, low or raised).
    - Where barriers are to be installed on the boardwalk
    - Where other items are required such as removals, fill, grade dips, etc.
- 3.2.6. Deviations from the existing track alignment are not permitted unless otherwise specified in the Required Work Schedule.
- 3.2.7. Where boxed steps or staircases are specified, the Contractor shall set out a string-line indicating the intended finished profile for inspection and approval by the Principal's Representative. This shall be completed prior to commencing the construction of any steps.



3.2.8. If the Contractor fails to provide satisfactory set-out for the Principal's Representative inspections, any subsequent adjustment that becomes necessary to fit the site, shall be carried out at the Contractor's expenses.

### 3.3. Formation

3.3.1. The track formation shall be shaped to achieve the required track width and to ensure the track longitudinal grade is within the required maximum limits.

3.3.2. The longitudinal maximum grade limits of the track shall not exceed the following:

- Track with Aggregate or Natural surfacing: 1 in 6 (17%).
- Track with 50/50 Bark/Aggregate surfacing: 1 in 10 (10%).
- Track with Geoweb Cellular confined surfacing: 1 in 4 (20%).
- Boardwalk: Short Walk - 1 in 12 (8.3%), Walking or Tramping Track - 1 in 10 (10%).

3.3.3. The required walking surface width shall be as specified in the schedule or as indicated by the Principal's Representative, or if not specified, shall be not less than as per the following table:

Track Category	Minimum Surface Width
Short Walk	1.2m
Walking Track	0.75m
Tramping Track	0.6m

3.3.4. Fill batter slopes shall not be steeper than typical 1.5m horizontal to 1.0m vertical, except where steeper batters have been approved by the Principal's Representative.

3.3.5. Where cut excavation is permitted outside of Kauri Zones, cut batter slopes shall be not steeper than 0.25 horizontal to 1.0 vertical.

3.3.6. In Kauri Zones, where the track is to be formed on a cross-slope of greater than 30%, an edge board, shall be used to retain the track fill where indicated in the Required Work Schedule. Alternatively, the Principal's Representative may provide an alternative track construction detail.

### 3.4. Fill

3.4.1. There shall be no leaf litter or vegetation other than buried live tree roots in any fill formation.

3.4.2. Fill material shall be placed in level layers not exceeding 250mm loose depth and shall be compacted using appropriate equipment. Rolling of fill material with tracked power barrows or excavators tracks shall not be considered adequate for the purpose of compaction of fill material that is to be part of the track formation.

3.4.3. Fill material shall be either sourced from approved borrow areas indicated by the Principal's Representative or Representatives Assistant on site or where indicated in the Required Work Schedule or shall be suitable clean imported

material. Within any SHA, any borrowed material must be obtained from an approved location within the same SHA.

3.4.4. Suitable imported fill material shall be either clean granular fill or bark as specified by the Principal's Representative. Fill shall be supplied from an approved weed free source. The Principal's Representative shall be given adequate notice of the source of any proposed imported fill material, and delivery shall not commence until approval is given.

3.4.5. Fill slopes shall be left in a tidy condition. It shall remain the Contractor's responsibility to make good any fill or cut batter slumping or minor subsidence which occurs during the period of this Contract up until the end of the Defects Liability Period.

### **3.5. Cellular Geoweb**

3.5.1. Cellular Geofabrics Geoweb or Cirtex-HDPE (Geoweb) with 75mm deep cells shall be expanded and installed to the required width as per the drawings.

3.5.2. The Geoweb shall be cut from full sheets to the correct orientation and width, and connected as necessary by the Contractor as shown on the detailed drawings.

3.5.3. Geoweb shall be placed and fixed in position with wire pins, ensuring the correct cell extension and the required width is maintained.

3.5.4. Care shall be taken to avoid crushing of the Geoweb cells from foot traffic or during placement of fill.

3.5.5. The Geoweb shall be partly filled with 50mm nominal thickness compacted BAM and then provided with a nominal 40mm thick GAP20 aggregate capping as per the drawings. Alternatively, where indicated in the required Work Schedule, the Geoweb shall be fully filled with GAP20 aggregate.

3.5.6. The final cellular surface of Geoweb shall be overfilled 20mm above the cells at the track centre and shaped to have a crowned profile with a 3% fall to each side from the centreline.

3.5.7. All zip ties used to join Geoweb panels or edge cells shall be black polyethylene ties (minimum 4mm thick).

### **3.6. Bark Aggregate Mix (BAM)**

3.6.1. Bark aggregate mix (BAM) shall consist of 50% by volume of granular *Pinus radiata* bark and 50% well graded GAP20.

3.6.2. Bark for use in manufacture of BAM shall be clean granular bark nuggets ranging from 20mm to 40mm in size with up to 20% finer particles.

3.6.3. The cambium quantity in the bark shall be less than 10% by volume. The Contractor shall be responsible for any additional screening that may be necessary to remove cambium or other foreign material necessary to meet this requirement.

- 3.6.4. All bark shall be heat treated at a minimum of 55degrees Celsius for at least a 48 hour time period. Temperature records shall be provided for the Principal to approve for each batch of bark produced.
- 3.6.5. Aggregate for BAM manufacture shall be well graded clean granular GAP20 aggregate with 5%-10% by weight fines.
- 3.6.6. BAM shall be mixed thoroughly on a clean hard surface to ensure an even distribution of bark through the aggregate. Care shall be taken after mixing to ensure the mix is not contaminated with seed, weeds or soil that may contain infected spores.
- 3.6.7. A 10L sample of BAM shall be provided to the Principal's Representative for approval at least 5 days prior to any BAM being imported on site.
- 3.6.8. After placement, BAM shall be compacted with firm tamping in each Geoweb cell, taking care not to deform the web structure, and ensuring that edge cells are firmly filled.
- 3.6.9. Spillage of BAM outside Geoweb shall be kept to a minimum.

### **3.7. Aggregate Surfacing and Capping**

- 3.7.1. Where specified in the Required Work Schedule, aggregate surfacing shall be provided as a nominal 50mm compacted thickness of well graded clean granular GAP20 aggregate, and aggregate capping shall be provided as a nominal 40mm thickness well grade clean granular GAP20 aggregate over BAM filled Geoweb.
- 3.7.2. The aggregate stone particles shall be durable with at least 50% broken faces. Rounded particle river gravels or beach gravels are not acceptable as a track surfacing aggregate unless these materials have been crushed and additional fines have been added.
- 3.7.3. All aggregate shall have a range of particle size distribution including a 5% - 10% by weight portion of clay content to facilitate binding the surface.
- 3.7.4. A 10L sample of aggregate shall be provided to the Principal's Representative for approval, at least 5 days prior to any aggregate being imported on site.
- 3.7.5. Methods used to place aggregate shall be such that segregation of the aggregate is avoided. Working of the placed aggregate with rakes shall be avoided as this causes segregation of particle sizes. Shovels or excavator buckets shall be used to move material if this is necessary.
- 3.7.6. The final surfacing layer shall be compacted after placement with a plate compactor or other suitable vibrating equipment.
- 3.7.7. Compaction will be deemed to be complete when a well bound pavement surface is achieved which is free of voids or loose stone. Water shall be sprayed onto the surface if necessary during compaction to ensure optimum compaction is achieved.

3.7.8. If additional surfacing is required after compaction to ensure the required layer thickness is achieved, the original aggregate layer shall be scarified before placing the additional aggregate.

3.7.9. The final track surface shall be shaped to one of the following as indicated on the Required Work Schedule:

- A crowned formation having a 3% fall to each side from the centreline in all areas where a side drain is present or where the ground slopes away to both sides.
- A monoslope formation having a 3% fall to one side in areas where no side drain is present and the ground slopes away to only one side.

### 3.8. Boxed Steps Construction

3.8.1. Boxed steps are to have consistent grade, riser height and tread going length within each flight between landings and shall be constructed as shown on the drawings or as directed by the Principal's Representative.

3.8.2. Boxed steps shall be constructed with a step width that matches the width of the adjacent track.

Track Category	Grade Range	Max. Riser Height Min. Going
Short Walk (SST)	Maximum step grade 37 deg Minimum step grade 18 deg	Maximum riser 190mm Minimum going 250mm
Walking Track (DV, tramping track, BCC and BCA)	Maximum step grade 33 deg Minimum step grade 18 deg	Maximum riser 200mm Minimum going 310mm

3.8.3. The maximum vertical rise of a flight of steps between landings shall be 2.5m (12 steps).

3.8.4. Landings between flights of steps shall be at least 1000mm long and have a grade not exceeding 3%.

3.8.5. The sections of track immediately adjacent to flights of steps for a distance of 300mm above and 300mm below the steps shall have a gradient not more than 3%.

3.8.6. Boxed steps shall be constructed so that the top of the stringers on both sides are above the adjacent ground so that water drainage onto the steps is prevented.

3.8.7. Boxed step timber construction shall be as per the timber section of this specification.

3.8.8. Boxed steps shall be surfaced with aggregate or BAM with aggregate capping as specified in the Required Work Schedule.

3.8.9. When compacted and finished, the tread surfacing of steps shall be level with the riser at the front of the step and have a fall of at least 1%, but not more than 3% toward the front of the step.

3.8.10. A handrail shall be provided on steps on Short Walk sites where indicated in the schedule or where indicated by the Principal's Representative.

### **3.9. Breaking up aggregate surface**

3.9.1. Where indicated in the Required Work Schedule, any existing track aggregate surface shall be broken up under new boardwalk and where geoweb is specified. Breaking up of the existing aggregate surfacing shall be carried out by breaking a line of the existing aggregate (loosened) to the full depth of the aggregate pavement layer, across the track at 1.0m intervals such that a continuous broken strip of aggregate extends from one edge of the track to the other on the fall line, so that water can percolate within the loosened aggregate layer from one side of the track to the other.

3.9.2. Between each broken line across the track, the track aggregate surface shall be broken in at least six places to loosen the full depth of aggregate layer in each location.

3.9.3. Breaking of lines and localized loosening of aggregate shall be carried with the use of a pointed steel bar up to 32mm diameter or a pick or pointed mattock.

3.9.4. Loosened material shall not be relocated during the breaking up process by more than 500mm from its original location.

3.9.5. The breaking up process shall not extend beyond the depth of the aggregate layer. Special care shall be taken to ensure breaking up or the tools used for breaking do not penetrate into the soil below the aggregate layer.

3.9.6. Bars, mattocks and any other tool used for breaking up shall be treated as follows after completing each 5.0m section of track being broken, before commencing the next 5.0m section, and before proceeding to any other section of track to be broken:

- Clean free of soil, using water if necessary.
  - All removed soil and wash water to be disposed of within 500mm of the breaking up location.
- Spray implements with 2% Sterigene solution and wait one minute before using the equipment again.

3.9.7. All human movement whilst breaking up the track surface shall be contained within the track footprint. Personnel shall not walk off the track footprint to the surrounding ground during the process.

3.9.8. After breaking up the track surface, foot access on the track shall be kept to an absolute minimum to prevent re-compaction. If the surface becomes re-compacted, the breaking up procedure shall be repeated.

### **3.10. Drainage**

3.10.1. Where shown on the Required Work Schedule, grade dips or cut out drains shall be formed as track drainage to divert surface water off any monosloped track surface. In Kauri Zones, grade dips shall be formed by filling with

imported aggregate surfacing material to create the necessary grade dip mound.

- 3.10.2. Outside Kauri Zones where the track surface is crowned and where shown on the Required Work Schedule, side drainage channels of at least 100mm depth shall be formed along the edge of the track where the ground rises beyond the edge of the track.
- 3.10.3. Side drains shall have a fall longitudinally of at least 1% toward side drain discharge points.
- 3.10.4. A side drain discharge point shall be formed in locations and as indicated in the Required Work Schedule. These may consist of grade dips, a cut out drain leading to lower ground or a flexible 150mm or 200mm diameter smooth walled culvert pipe under the track to direct water to lower ground on the opposite side of the track.
- 3.10.5. The Contractor shall ensure that discharge points shall be installed at all low points along the track profile.
- 3.10.6. Natural water channels and small streams that are not crossed by boardwalks or bridges shall be passed under the track through larger 225mm-1000mm diameter culverts that are sized as indicated in the Required Work Schedule.
- 3.10.7. Culvert pipes for side drain discharge shall be Nexuscoil or Maxiculvert brand, and larger culverts shall be Maxiculvert brand. Alternative brands may be used if approved by the Principal's Representative prior to installation.
- 3.10.8. Nexuscoil brand culverts shall have minimum 100mm cover to the track surface and Maxiculvert brand culverts shall have minimum 150mm cover to the track surface. All culvert pipes shall be installed with a minimum 3% fall to the outlet.
- 3.10.9. Culverts shall be of sufficient length to pass under the track and extend beyond any fill. Where indicated in the Required Work Schedule culvert outlets shall be extended in length to avoid directing water towards Kauri trees.
- 3.10.10. The outlets of culvert pipes shall discharge at ground level without a free fall from the end of the pipe. Where the outlet slope is on steep loose material, rock amour shall be provided to prevent scour.
- 3.10.11. All culverts shall be installed in the dry, during a period of fine weather. All excavated material shall be placed outside the flow path and subjected to appropriate sediment control measures.

## 4.0 BOARDWALK AND STAIRCASE FOUNDATIONS

### 4.1. Preparation for Pile Driving

- 4.1.1. Within Kauri Zones, all pile positions shall be probed with a 6mm or 8mm diameter steel bar probe with a rounded end, to check for the presence of tree roots or other obstructions that may affect driving of piles. If a tree root is encountered during probing, an adjacent alternative pile position shall be adopted.
- 4.1.2. Any tools used for probing or preparation for pile driving shall be cleaned and treated as per clause 2.9 after probing at each pile position, before probing at the next location.
- 4.1.3. If necessary to avoid tree roots or other obstructions, the location of pile foundations shall be adjusted within the limits of the maximum pile spacing shown on the drawings.
- 4.1.4. Piles and pegs shall be driven without any further ground preparation, unless it is not possible to drive the piles or pegs to the required depth without undertaking excavation or auguring.
- 4.1.5. The Principal's Representative shall provide details of where motorised augur pilot hole excavation is permitted if necessary, prior to pile driving. At all other locations, hand excavation only is permitted prior to driving of piles. Any tools used for hand excavation, and any hand or motorised augurs used shall be treated as per clause 2.9 at every pile hole location that has excavation work.
- 4.1.6. Where hand excavation is required, this shall be carried out by the use of a small trowel and/or an 80mm diameter hand auger. Hand excavation shall extend through the organic soil layer and beyond the surface root plate to ensure that tree roots are not damaged.
- 4.1.7. Where motorised auguring is permitted, any surface roots and soil shall be hand separated to a typical depth of 200mm before commencing motorised auguring. Auguring of a pilot hole with a drill up to 80mm diameter is permitted. If tree roots are detected during motorised auguring, drilling shall immediately cease and the hole checked for the presence and size of roots encountered. If roots of greater than 50mm diameter are encountered, an adjacent alternative pile location shall be adopted.
- 4.1.8. Hand or motorised auguring of pile holes shall extend to a depth from where driving of piles can achieve the minimum required embedment depth shown on the drawings.

### 4.2. Pile Driving

- 4.2.1. Pegged boardwalk pegs shall be driven with a suitable hammer to achieve the required embedment depth without peg breakage or damage.
- 4.2.2. Piles shall be pointed at an angle of approximately 45 degrees from horizontal to facilitate driving and minimise root damage.

- 4.2.3. Piles and pegs selected for driving shall be of sufficient length to achieve the required height for the structure being constructed, including allowance for trimming of the upper end to remove damaged caused during driving.
- 4.2.4. Low and raised boardwalk piles, and staircase piles shall be driven using a hand driver of sufficient weight to drive the piles to at least the required minimum depth into firm ground so that the piles can carry the expected loads with minimal subsequent settlement. Minimum hand driver weight shall be 40 kg.
- 4.2.5. For the purpose of determining the suitability of hand driving equipment, a design load per pile of 7.5kN shall be assumed.
- 4.2.6. Any pile that cannot be initially driven to at least the required depth below the surface shown on the drawings shall be either:
- Driven with a heavier weight driver or,
  - Withdrawn, and further pile preparation carried out as per section 4.1, followed by re-driving of the original pile or,
  - Left in position, cut off at ground level, and an adjacent alternative pile position selected and prepared for pile driving as per section 4.1.
- 4.2.7. Any pile that is of insufficient height above ground on completion of driving to firm ground shall be either:
- Left in position, cut off at ground level, and an adjacent alternative pile position selected and prepared for driving of a longer pile as per section 4.1 or,
  - Withdrawn and encapsulated for removal from the site as waste, and a new longer pile installed in the same hole or,
  - Extended by use of a splice, provided such pile splicing is specifically approved by the Principal's Representative for each location.

## 5.0 TIMBER

### 5.1. Scope

- 5.1.1. This section of the work shall consist of all carpentry work relating to the construction of boardwalks, staircases, barriers, edge boards and boxed steps, including the associated jointing brackets, cleats, bolts, nails etc. as shown on the drawings or specified herein.

### 5.2. Standards

- 5.2.1. The Principle Standards relevant to this Section are:

- NZS 3601 Metric Dimensions of Timber
- NZS 3603 Timber Structures
- NZS 3605 Timber Piles and Poles for use in Buildings
- NZS 3631 Timber Grading Rules
- NZS 3640 Timber Preservation



### 5.3. Timber

- 5.3.1. The species, grade, sizes, finish, treatment and moisture content of timber and wood based products shall comply with the requirements of this specification and relevant standards, at the time of enclosure or installation.
- 5.3.2. Copies of the timber grade certificates including date, sizes, package number and grade for the timber used for this contract shall be supplied to the Principal's Representative if requested.
- 5.3.3. Grade tags shall be left in place on all timbers installed as part of the work and shall be removed by the Contractor following Principal's Representative inspection.
- 5.3.4. The timber shall be clean, soil free, sound, well-seasoned and maintain figured dimensions.
- 5.3.5. The Contractor shall not use any portions of timber containing pith on the surface.
- 5.3.6. All timber shall be rough sawn to the sizes shown on the drawings unless specified otherwise.
- 5.3.7. Timber shall comply with the following, according to use and environment:

Location	Species	Grade	Treatment
Sawn timber for boxed step risers / stringers, edge boards and pegs	<i>Pinus radiata</i>	No 1 Framing	H5
Sawn timber for boardwalk /staircase and barriers / fences not in contact with ground or concrete	<i>Pinus radiata</i>	G8 or VSG8	H3.2
Sawn timber for boardwalk / staircase and barriers / fences in contact with (or within 150mm) of ground or concrete	<i>Pinus radiata</i>	G8 or VSG8	H5
Round piles in contact with ground or fresh water	<i>Pinus radiata</i>	NZS 3605	H5

- 5.3.8. Where indicated in the Required Work Schedule, timber may be recovered from existing boardwalk sections that are to be modified or replaced, provided the size, grade and treatment of the timber matches that specified for the replacement structures. The re-use of existing timber is subject to approval by the Principal's Representative. If the timber intended for re-use is deemed not suitable, the Contractor shall be entitled to a variation for supply of alternative timber.

### 5.4. Treatment

- 5.4.1. Treatment shall comply with the current requirements of the Timber Preservation Council. All treated timber shall be branded with the appropriate Woodmark. It is preferred that timbers be treated at least 2 months prior to installation.

- 5.4.2. Cut faces of timber sections greater than 50mm thick shall be treated with Metalex or similar field applied preservative treatment if cutting is carried out after preservative treatment.

## 5.5. Nails

- 5.5.1. All nails shall as per the following nailing schedule unless shown otherwise on the drawings. All nails shall be hot dipped galvanised steel, unless specified otherwise.

Use	Size	Type
General structural use	100 x 4.0mm	FH
45mm thick batten fixing	90 x 3.15mm	FH
'Z' nails		Stainless Steel

## 5.6. Proprietary Fixings

- 5.6.1. All proprietary "Lumberlok" thin gauge steel connectors (excluding bolted brackets) shall be stainless steel and of the specified type and thickness shown on the drawings. All fixings shall be made using the specified proprietary nails and be made fully in accordance with the manufacturer's instructions and recommendations. Alternative fixings may be used only if approval is given by the Principal's Representative prior to installation.

## 5.7. Bolts, Washers and Miscellaneous Brackets and Fittings

- 5.7.1. Bolts, washers, miscellaneous brackets and fittings shall be of the material shown in the following table for the appropriate BRANZ corrosion zone (The plan drawings shall indicate if a site is a Marine Spray zone and if Type 316 Stainless Steel fixings are required. On all other sites Hot Dip Galvanised fixings will be acceptable):

Location	Material Type	Protection
Corrosion Zones 1 to 4	Hot Dip Galvanised	GP Grease.
Marine Spray	Type 316 Stainless Steel	None

- 5.7.2. Bolts shall be engineers bolts of the diameters and sizes shown in the drawings and shall be fitted with square washers of the same material under the heads and nuts of all bolts.

- 5.7.3. Hot dip galvanised bolts shall be 4.6/S (metric, grade 4.6, Snug tight) bolts.

- 5.7.4. Stainless steel bolts, where required shall be metric grade 316 stainless steel.

- 5.7.5. Minimum bolt diameter for structural work shall be 12 mm.

5.7.6. Washers shall comply with the following minimum standards

Bolt Size	Galvanised Washers	Stainless Steel Washers
M12	50 x 50 x 5.0mm	50 x 50 x 3.0mm

5.7.7. Thread protrusion past the nut shall be a minimum of one thread pitch after tightening.

5.7.8. All galvanised bolts in contact with treated timber shall be protected using general purpose grease in pre-greased holes

5.7.9. All contact faces of galvanised fixings (brackets, washers, bolts etc) with treated timber shall be protected with general purpose grease.

5.7.10. Bolts may consist of hot dipped galvanised or stainless steel threaded rods cut to length on site, taking care to remove all sharp edges of cut faces.

5.7.11. All cut ends of galvanised threaded rod shall have zinc-rich coating applied for corrosion protection.

## 5.8. Workmanship

5.8.1. Work generally shall be in accordance with the best trade practice, and this shall be deemed to include those methods, practices and processes contained in current syllabuses for the NZQA courses in carpentry.

5.8.2. Details not shown on the drawings shall be formed according to the principles of NZS 3604. A thorough knowledge of the principles set out in "Builders Guide to NZS 3604" is recommended.

5.8.3. Accurately set out all work. Attend on other trades to provide cut outs penetrations, blocks, fillets etc. required by them.

5.8.4. Fix all members true to line.

## 5.9. Temporary Works

5.9.1. All temporary staging, scaffolding, etc. shall comply with the provisions of section F5 of the NZBC.

## 6.0 NON-SLIP MESH

### 6.1. General

6.1.1. Unless otherwise specified, non-slip mesh on timber decking or staircase treads shall be Tensar SS20, Duragrid 20/20 Geogrid or Dekgrip TGDG20-20 Geogrid.

6.1.2. The mesh shall cover the whole deck area and shall extend to within 50mm of the deck ends and edges.

## **6.2. Fixing**

- 6.2.1. Geogrid shall be neatly cut to fit timber decking and staircase treads.
- 6.2.2. Geogrid shall be fixed along the edges at 100mm maximum spacing and internally at 200mm maximum spacing.
- 6.2.3. Geogrid shall be fixed at every square at lap joints. Overlapping joints and gaps greater than 50mm are not acceptable.
- 6.2.4. Fixing staples shall be stainless steel and shall be at least 19mm long and shall straddle the mesh ribs, not penetrate them.
- 6.2.5. Geogrid netting shall be stretched tight during fixing so that there are no bulges or movement in the fixed mesh once in position.
- 6.2.6. Cuts shall be made cleanly with a sharp knife or snips to avoid unravelling of the mesh.

## **6.3. Alternative**

- 6.3.1. Where specified, alternative non-slip strips shall be installed on every deck plank to minimum 50mm to the end of each plank and fixed as per the manufactures instruction.

## **7.0 BASIS OF PAYMENT**

### **7.1. General**

- 7.1.1. The schedule of quantities consists of Lump Sum and Measure and Value items.
- 7.1.2. Lump sum items shall be paid during progress payments on a pro rata basis on an assessment of the portion of the item that is completed. On completion of the works, the full lump sum will be paid for the item.
- 7.1.3. Measure and value items will be paid at the tendered rates applied to the quantities measured.

### **7.2. Basis of Measurement**

- 7.2.1. Track formation work shall be measured on the basis of the measuring wheel length of formation completed, including grade dips and side drains where necessary.
- 7.2.2. Edge boards shall be measured on the basis of the actual length installed correctly and backfilled (per side).
- 7.2.3. Geoweb track shall be measured on the basis of the actual filled length installed correctly.
- 7.2.4. Boxed steps shall be measured on the basis of the stringer length of completed, filled and compacted boxed steps, including the intermediate landings and any retained portion above and below the step flights up to one

metre beyond the end of the steps. Payment for boxed steps shall exclude the supply, placement and compaction of surfacing.

7.2.5. Surfacing aggregate, bark/aggregate or imported fill shall be measured on the basis of loose measure of material that has been transported to site, spread on track and boxed steps at the required thickness and is properly compacted. The Contractor is required to provide helicopter load certificates in spreadsheet format to confirm the volume of each specific material (BAM, aggregate, etc.) transported to each site.

7.2.6. Culverts will be paid per item supplied and installed correctly.

7.2.7. Boardwalk shall be measured on the basis of the completed installed boardwalk length, including joists, decking and surface mesh.

7.2.8. Staircase and landings will be paid per item supplied and installed correctly as per the schedule.

7.2.9. Barriers, handrails and fencing shall be measured on the basis of length installed correctly including all fixings (per side).

