1.0 INTRODUCTION

This specification sets out minimum standards and guidelines for the engineering works required for developments within Cessnock City Council.

The engineering requirements for each development will be assessed and approved by the Director Works or his nominated representative.

The conditions for developments will be established with the development application. Any engineering requirements, detailed design and construction requirements will be based on this specification. Where there is no reference in this specification to specific design/construction details required for a development, the Director Works will determine the appropriate requirements. The areas covered in this specification (Chapters 1 to 11) include the design and construction of roads, drainage, pavement, bitumen sealing, concrete works, and soil erosion/sediment control, and environmental protection.

This specification sets out desirable and generally minimum standards, however Consultants are encouraged to consider equivalent alternatives.

For design and construction of the engineering works for the development, only suitably qualified and experienced consultants and contractors should be employed to ensure efficiency, provide cost effective design and construction, and reduce time delays.

No engineering works shall commence until the engineering plans have been received and approved by Council and approval granted to proceed.

The linen plan of subdivision will generally not be released until all engineering works (including Work as Executed plans) are completed and all other conditions of development consent are satisfied.

2.0 GENERAL

2.1 DISCUSSION OF REQUIREMENTS

It is recommended that the Consultant/Contractor make appointments with Council's Manager Engineering Development prior to commencement of design/construction to discuss requirements, local conditions, intended design and construction methods and materials in order to clarify any points in regard to the following specification.

2.2 PROJECT MANAGER

On all subdivisions and developments the owner or developer must nominate a specific person to act as Project Manager for the entire project. This person must be readily available and have sufficient authority and ability to discuss and resolve any operational problems that occur during the development.

2.3 DEFINITIONS

(a) Council's Engineer shall mean the Director Works or his appointed representative.

(b) The Developer shall be the owner or subdivider or his agent who has applied for the development consent or has been appointed to supervise construction of works to satisfy the consent conditions. The developer shall be represented by a nominated person with authority to make decisions.

(c) The Contractor shall be those engaged by the developer to carry out work for the developer to Council's requirements.

(d) All references to appropriate materials or treatments, either approved, required, suitable or the like, shall be determined by Council's Engineer or in accordance with the relevant standards.

2.4 DESIGN

Plans and specifications shall be prepared by suitably qualified and experienced consultants to satisfy the development conditions of consent and in accordance with this specification. These shall be submitted to Council for approval by the Director Works.

No work shall commence on the site until the plans, specifications and pavement designs have been approved in writing, bonds paid and the Development Engineer formally notified.

2.5 ENVIRONMENTAL PROTECTION/LANDSCAPE

Prior to development application, all aspects of the landscaping proposal should be investigated in order to incorporate the existing landscape and land forms with the proposed development. Once the development consent has been issued these opportunities will be restricted due to locations of roads, lot layouts, reserves etc. Some aspects to be considered are:-

(a) Tree preservation and removal of undesirable trees.

(b) Areas to be left undisturbed, i.e. wetlands, proposed public reserves, buffer strips etc.

(c) Natural landforms such as rock outcrops, steep land, tree stands etc. included in the areas to be left undisturbed.

It is important that all the relevant details of the landscape design be incorporated in the engineering plans. The landscape plan must be submitted to Council and approved prior to the release of the approved engineering plans.

Details of the landscape issues and suitable information will be required by Council and should be submitted together with lodgement of the development application.

2.6 CONTRACTORS & CONTRACT WORK

All work shall be carried out by appropriately trained and proficient contractors in a competent, workmanlike manner, and in accordance with the approved plan. No departure from the plan is to be made unless authorised in writing by Council's Engineer. This may require submission of a re-design for approval.

2.7 PERFORMANCE & QUALITY CONTROL INSPECTIONS & TESTING

It shall be the responsibility of the developer or his agent to produce or construct each element of the work to a standard complying with the approved plans and specification requirements herein. The developer is responsible for all facets of the developments, including day to day supervision.

Council's Engineer will not assume the role of supervisor during the construction phase. It shall be the developer's responsibility to present to Council completed works in accordance with the plans and specifications and any additional requirement advised in writing by Council's Engineer. The completed work must be capable of passing the required tests. These tests may be separately nominated within this specification, or the approved plans, or the appropriate Australian Standard, or shall be in accordance with the manufacturer's specification.

During progress of the work, uninterrupted access shall be given to Council's Engineer. Where necessary, the contractor's equipment or personnel are to be made available for the use of Council's Engineer for examination or testing purposes. Council's Engineer may instruct the removal or amendment of any such work or material considered to be unacceptable, whether fixed or not, and, in the event of dispute regarding material quality of completed work, the material concerned will be submitted for testing by an independent authority.

Requirement for testing, where not specified, shall be at the discretion of Council's Engineer and at the full cost of the developer.

2.8 MATERIALS

All materials used shall be in as new condition and of an approved standard, free of structural damage or defects, and if required, the contractor shall provide full information as to source of supply and mode and place of manufacture. Test results of the particular material proposed shall be submitted. Specific requirements are detailed in the relevant sections of this specification. Some suppliers have materials that are regularly tested and have been accepted by Council. Upon application, these materials may be accepted without further testing.

2.9 INITIAL CLEARING OF SITE

Initial under scrubbing of the site to enable survey set out will be permitted after Council's development approval. Council's requirements regarding tree preservation and soil erosion will be maintained to minimise disturbance to natural vegetation. Refer to Council's Tree Preservation Policy and Chapter 3 for specific details.

2.10 SETTING OUT

The developer shall be responsible for all pegging, levelling and setting out, and Council will not carry out any such work or accept responsibility for its accuracy. This will include the determination of all road and property boundaries.

2.11 TEMPORARY ROAD CLOSURE

No part of a public road shall be closed to traffic without the prior consent of the Director Works. Council has a statutory obligation under the Roads Act, 1993, to publicly notify road closures at least seven (7) days before works commence. Accordingly, the developer or contractor is to submit appropriate application, together with advertising fee as listed in Council's Fees and Charges, at least ten (10) days prior to the required closure.

2.12 FINAL CLEANING UP OF SITE

Upon completion of the works, all buildings, plant, excess and discarded material assembled or used for the development shall be removed and the site shall be left in a clean and tidy state.

2.13 PROTECTION OF PROPERTY

The developer shall take adequate precaution to prevent deterioration of or damage to private property, public roads and reserves during progress, and Council's Engineer may direct the provision of temporary works or measures considered necessary to provide such protection.

Where works or accesses may be necessary on other properties, the developer is responsible for gaining consent to enter and ensuring any damage/impact on other property is rectified.

2.14 HAULAGE ROUTE

For all developments, the route for haulage of materials to or from the development shall be subject to approval by Council's Engineer prior to the commencement of the haulage. The developer shall ensure these haulage routes are used. Damage to roads by trucks serving the development will be repaired at developers cost.

2.15 REPAIR OF DAMAGE

The developer shall restore to original condition, at his own expense, any property or roads altered or damaged by him during the course of construction, or caused as a direct consequence of the development.

2.16 DISRUPTION TO ACCESS & SERVICES TO EXISTING PROPERTIES

Where access or services to any property is interrupted by development works, the developer shall provide satisfactory alternative access for the duration of construction and suitable permanent access on completion. Written approval shall be gained from Council's Engineer.

2.17 STATE SURVEY MARKS

Adequate precaution is to be taken to protect and preserve any state survey marks relative to or affected by the development. The developer shall be responsible for the subsequent replacement by a Registered Surveyor prior to the commencement of construction. An appropriate plan of survey showing the relocated marks shall be provided by the surveyor and lodged with the Surveyor General's Office.

2.18 SAFETY

The developer shall be responsible for adequate safety precautions during progress of the works, including the provision and erection of any signs, lights and barricades necessary for pedestrian and traffic safety in public roads or places, and Council will not be held responsible for any consequence arising from developers failure to take such precaution, whether specifically instructed or not. Refer to Clause 5.1 for details.

2.19 WORKING HOURS & SUNDAY WORK

No work shall be performed outside the hours that apply under the Noise Pollution Act. No subdivision construction works shall be carried out on Sunday, by or on behalf of the developer, without the express approval of Council. Inspections outside normal working hours can be arranged, refer to Clause 2.39 for details.

2.20 PRACTICAL COMPLETION

Practical Completion shall be deemed that stage in the execution of the work when it is complete, except for minor omissions and minor defects:-

(a) Which do not prevent the works from being reasonably capable of being used for its intended purpose, and

(b) In relation to which there are reasonable grounds for not promptly rectifying them, and

(c) Rectification of which will not prejudice the convenient use of the works.

A maintenance period of six months shall commence from the date of practical completion.

It is essential that the developer gives Council at least 48 hours notice of the departure of a contractor from a section of work that is proposed for practical completion.

2.21 REMEDIAL WORK

If it becomes necessary for remedial work to be performed, the maintenance period for such remedial work shall commence on the day on which the remedial work is completed. The maintenance period on any remedial work shall be six months, unless otherwise approved by Council.

2.22 MAINTENANCE PERIOD & BOND

Prior to final written acceptance of satisfactory completion of works and release of linen plan, a Bank Guarantee or cash shall be lodged with Council to provide for maintenance and/or rectification of any work found to be faulty or suffering deterioration within a period of six months from the date of such acceptance. The rate for this maintenance bond is assessed in accordance with Council's Annual Fees and Charges.

To recover the bond it will be the responsibility of the developer to arrange a final inspection with Council's Engineer approximately one week before the end of the maintenance period. No monies will be refunded unless such an inspection has been carried out in the presence of the developer or his agent and all defects subsequently repaired.

2.23 RECTIFICATION OF DEFECTS

Rectification of defects shall be completed within one month of written notification or work will be carried out by Council and deducted from bond monies.

2.24 PROVISION OF OTHER SERVICES

Electricity, telephone and gas services shall be provided in accordance with the requirements of the relevant authorities and any conditions set by Council. Engineering design plans will not be approved until the service authorities have been provided with a copy. Receipt of lodgement will be required. The developer shall also be fully responsible for repairs to any damage caused by other authorities in providing electricity, telecom, gas or other services to the development.

It will also be the developers responsibility to ensure that all trenching is carried out to Council's requirements - refer to Clause 7.2 for details. Backfill shall be adequately compacted to prevent subsequent settlement or damage to the development's roads. Services shall be located in the allocated footpath areas in accordance with Council's standards, refer Drawing No. SD5. All works in public roads affecting other services shall be carried out in accordance with the Code of Engineering Practice for Street Openings - Public Utility Service Committee, 1989.

2.25 STORAGE OF MATERIALS

Storage of pipes, gravel and other materials in public roads or reserves will not be permitted unless the express approval of Council is obtained. All materials shall be stored in a safe and tidy manner and shall not cause a nuisance. It may be necessary to erect signposting and safety barriers.

2.26 ROAD OPENING PERMITS

Road crossings for services across existing roads shall require a road opening permit. The cost of the road opening permit is determined by the area of the trench and Council's schedule of fixed fees. The trench shall be backfilled in accordance with the Code for Backfilling Trenches as adopted by the Public Utility Committee, 1989. Permits will also be required where tunnelling or boring methods are used.

2.27 COUNCIL RESERVES

Reserves dedicated to Council shall be left in a safe and tidy condition, free from all hazard to public safety such as wells, shafts, dams, dangerous ruins or building remnants. The areas should be managed and protected as set out in the Environmental Protection Section. Specific requirements are to be detailed on Council's Engineering plans.

Where considered a fire hazard by the Fire Control Officer, necessary hazard reduction shall be incorporated in engineering works.

2.28 BONDS TO SECURE INCOMPLETE WORK

Generally, bonds will not be accepted to enable early release of the linen plan, but due consideration will be given in cases where major works are substantially complete and minor items are delayed by circumstances beyond the reasonable control of the contractor. However, all services to each allotment should be completed before any bonding will be considered. Reference should be made to Council's policy regarding bonding.

2.29 SUB-CONTRACTORS

Identity of sub-contractors and their proposed works are to be supplied to Council's Engineer prior to engagement, and Council reserves the right to preclude any such sub-contractor.

Council must be notified at least 48 hours prior to the departure of any sub-contractor from the site.

2.30 EXTRA WORK

Ancillary requirements, such as batter stabilisation, soil erosion and sediment control, benching, sub-soil drainage etc., shall be indicated on the plan. However, variation in procedure and extent of work may be identified during construction, and these works shall be completed as directed by Council's Engineer. Further designs and plans may also be required. Provisions should be made for possibility of such extras when preparing estimates.

2.31 EROSION PREVENTION

For developments requiring fill or regrading or projects where there is probability of dust or water erosion problems, the advice of the Department of Conservation and Land Management should be sought, and in such cases the requirements of that Authority will be endorsed by Council as the minimum requirement. The cost of implementing erosion control procedures is generally slight, but will be of benefit. The most efficient means of stabilisation will be recommended and work shall be protected from erosion during construction and the maintenance period.

2.32 ADJUSTMENT OF SERVICES

It will be the responsibility of the contractor to give adequate prior notice and information, and make satisfactory arrangements with the respective authorities for any necessary alteration or extension of existing services and installations. Any adjustments shall be completed at the full cost of the developer unless otherwise agreed by Council's Engineer.

2.33 INSURANCE

(a) Public Liability Insurance Policy - Contractors engaged on development or subdivisional works shall take out Public Liability Insurance to the value of $5 million before commencing work. The policy will include the interests of indemnifying Cessnock City Council.

(b) Workers Compensation - Contractors engaged on development or subdivisional works shall carry a current Workers Compensation Insurance on all employees as required by Statute.

2.34 OTHER AUTHORITIES

All work will be carried out in accordance with the provisions of relevant Authorities such as Department of Conservation and Land Management, Environmental Protection Authority, Board of Fire Commissioners and Work Cover Authority.

2.35 ENVIRONMENTAL PROTECTION

Environmental protection measures shall apply to all development works, and to all persons, contractor and sub-contractors, where the works involve any disturbance to vegetation, which shall include grasses, shrubs and trees.

2.36 BUSH FIRE PRECAUTIONS

Careful consideration must be given to the possible bush fire hazard associated with a subdivision. Generally, the subdivider should follow the various recommendations of the Bush Fire Council and the Department of Bush Fire Services in their publication "Planning for Bush Fire Protection", available from Council's Fire Control Office.

2.36.1 General

Where a subdivision will abut bushland in a bushfire prone area (as classified by Council), perimeter roads are to be located immediately between the created allotment and the bushland, with a minimum cleared width of six metres, and a minimum trafficable widith of four metres. Such roads are to be adequately drained to provide all weather access for fire fighting vehicles.

The perimeter road is to be contained within a nominated reservation (width to be determined by Council's Fire Control Officer) which borders those allotments abutting the bushfire prone area. Such a reserve will serve as a basis for fire protection measures to be undertaken and will not be considered as part of the public reserve dedication applicable to the subdivision. The developer may be required to identify and provide safe building zones within a designated development.

Access is to be provided from the above described reservation from the local road system at regular intervals (to be approved by Council's Fire Control Officer).

Provision of all sediment and erosion control measures must be undertaken during and after construction in accordance with Council's requirements.

For those subdivisions receiving reticulated water, fire hydrants are to be situated near where potential fire hazard areas exist as determined by Council's Fire Control Officer and as specified by the Hunter Water Corporation.

Where a potential bush fire hazard exists, applicants should also consult with Council's Fire Control Office prior to final preparation of engineering plans.

2.36.2 Bush Fire Emergency Access

In rural subdivisions of areas historically subject to bushfires or areas likely to experience an increase in fire hazard arising from development and increased public access, Council will require the provision of an alternate emergency means of vehicular access to the subdivision or development.

In this regard, the submission to Council or a relevant history of recorded incidence of bushfires in the area and a report from a suitably qualified Fire Officer will assist in determining the need or otherwise for the alternate means of vehicular access to the subdivisions.

2.37 INSPECTIONS/SUPERVISION

Will be required by Council's Engineer for the following items:-

(a) Erosion/sediment control & environmental/heritage protection measures.

(b) Clearing
- Before commencement of survey work.
- When completed.

(c) Road Formation
- At excavation to subgrade.
- Before filling.
- During progress.
- When completed.

(d) Subsoil Drainage
- Before placement of pipes.
- Before backfilling.

(e) Drainage pipes after bedding and before backfilling, and after as required for testing as specified.

(f) Subgrade before and after compaction.

Note:- Assessment is also required by a geotechnical engineer prior to compaction.

(g) Sub-base gravel when compacted.

(h) Base course gravel when compacted.

(i) Concrete work before and during pouring in formwork.

(j) Priming and sealing before commencing and during work.

(k) Upon completion of the work a final inspection.

(l) Other inspections as detailed in this specification or as required by Council's Engineer.

2.38 NOTICE FOR INSPECTIONS

Forty eight (48) hours notice (facsimile preferred) shall be given for any of the above inspections. Failure to notify the need for inspection may lead to the portion of the work not being approved by Council's Engineer.

It will be necessary for the developer's representative to meet Council's Inspector on the site at each inspection to receive written approval to proceed or instructions to amend any work.

2.39 INSPECTIONS OUTSIDE NORMAL COUNCIL HOURS

It may be possible to arrange inspections of work outside of Council's normal working hours. The cost of the inspection shall be borne by the developer or his contractor. This cost shall be determined by Council and must be paid to Council's cashier prior to the inspection.

2.40 WRITTEN STAGE APPROVAL FOR WORKS

Approval to proceed from stage to stage of the various components of works must be obtained in writing by the developer in order to receive approval to the completed subdivision. The developer is responsible for obtaining the written approval from Council's Engineer.

Approval to proceed from one stage to the next in no way absolves the developer from responsibility of defects or failure.

2.41 LIMITATION OF STAGE APPROVAL

During construction, stage approval of any work will be given in regard to structural standard only at the time of inspection, but does not absolve the developer of responsibility for any damage or deterioration occurring before final inspection and approval, or before expiry of maintenance period.

2.42 WORK AS EXECUTED PLANS

Prior to linen release, final inspection and written approval of overall development works to enter maintenance period, a Surveyor's statement and "Work as Executed Plans" will be required to verify that all work is constructed and located in accordance with the plan, especially in regard to line and level of kerb and guttering and level and location of piped and open drainage and fill levels. The "Work as Executed" plans shall be certified as correct by a registered surveyor and submitted on copies of the approved originals.

These copies are required to replace Council's originals, and as such will be retained by Council.

"Work as Executed" plans are to show all relevant engineering construction details, including variations to the pavement details from the original pavement report. Full details of the constructed pavement, including subgrade details, subgrade replacement details, stabilised subgrade areas, layer thicknesses, the number of layers, type and source of material, quantity and type of stabilising agent (if applicable) will be required. The size and accurate location of all subsoil drains is to be shown.

3.0 ENVIRONMENTAL/HERITAGE PROTECTION & EROSION/SEDIMENT CONTROL

3.1 INTRODUCTION

Environmental/heritage protection and erosion/sediment control requirements apply to all engineering works which entail the disturbance of the soil surface and vegetation, including grasses, shrubs and trees, and any relic, material, evidence of settlement etc., covered by the Heritage Act.

It will be necessary to install all environmental protection and erosion control measures prior to any development work (including initial clearing and under scrubbing) being carried out on site. All control works, plus the location of all trees and vegetation to be preserved, will be indicated on the environmental/revegetation protection plan.

All environmental protection works are to be carried out in accordance with the Department of Conservation and Land Management's "Urban Erosion and Sediment Control" Handbook, 1992, and the Department of Housing's "Soil and Water Management for Urban Development, 1993" as references.

In relation to trees, the following information is required in urban areas:-

(a) The location of all trees with a trunk diameter of 300mm or greater and indicate on the plans the diameter at 1m above ground level.

(b) Indicate the canopy spread of all individual trees shown, unless the tree forms part of a group planting, in which case show the group canopy spread.

Because circumstances may change during construction, the developer will be required to carry out such control works as Council's Engineer may consider necessary.

Such works shall be completed in accordance with the directions and time limits given by Council's Engineer and carried out by contractors experienced in such work.

It is Council's desire to retain as much native vegetation in new developments as possible.

Minimisation of soil disturbance will result in a reduction in restoration works because of less erosion, sediment deposition, siltation and better control of overland flow. Additionally, sediment controls will be more effective, require less maintenance, and may be less substantial in size requirements.

3.2 REQUIREMENTS PRIOR TO ANY SITE WORKS

(a) Prior to commencing any work on site, including underscrubbing and clearing, the developer must have development approval and have submitted engineering plans for approval.

(b) An application to remove trees in accordance with Council's Tree Preservation Order must be submitted to Council and approved in writing before clearing begins. Initial clearing shall be restricted to road reserves and service corridors and the type of machinery used shall be limited to rubber tyred plant to minimise site disturbance.

(c) A soil and water management plan shall be submitted as part of the engineering plans. This shall detail the works during the construction phase and stabilisation of the development site upon completion, and conservation measures for trees and vegetation.

(d) A performance bond in the form of a Bank Guarantee shall be lodged with Council to ensure effective environmental control measures are implemented. This bond will be required prior to the release of the approved engineering plans and will be released upon submission of the maintenance bond. The value of this bond will be in accordance with Council's Fees and Charges.

(e) Prior to the commencement of work the developer shall physically mark out, by fencing, the limits of the contract and any vegetation to be retained. Access outside or into these areas will not be permitted unless approved by Council. Fenced areas shall be clearly signposted "No Access Area".

(f) In the event of these control measures not being implemented prior to works, Council reserves the right to enter onto the land and carry out these measures.

(g) The cost of any such measures stated in (f) above shall be fully recouped from the developer prior to any further development works proceeding.

Where the value of the bond is insufficient to cover these costs, any outstanding costs must be paid prior to any further work proceeding.

3.3 DEVELOPER RESPONSIBILITIES

3.3.1 Heritage Conservation & Protection

Items of the built or natural environment which have heritage significance are protected by either the Heritage Act, 1977 (administered by the Heritage Council) or a Local Environmental Plan (administered by Cessnock City Council). Items of Aboriginal heritage are protected by the National Parks and Wildlife Act, 1974.

Where a known item or site is affected by or adjacent to a development, there will be specific conditions of consent which require protection measures during construction. These must be strictly adhered to or severe penalties (fines or imprisonment or both) may result from action under Section 156 of the Heritage Act, Section 125 of the Environmental Planning and Assessment Act, or Sections 86 and 90 of the National Parks and Wildlife Act.

Where in the course of undertaking development works, a person uncovers or discovers a relic (within the meaning of the Heritage Act) or Aboriginal relic or place, they shall:-

(a) Cease work on the site.

(b) Take appropriate measures to secure and protect the site or relic, including fencing.

(c) Contact the subdivision supervisor.

(d) Notify either the Heritage Council or the National Parks and Wildlife Service, as appropriate, of the discovery as required by Section 146 of the Heritage Act or Section 91 of the National Parks and Wildlife Act.

For the purposes of the Heritage Act, a relic is any object or material evidence of settlement of the area which is 50 or more years old, but specifically excluding aboriginal relics.

The purpose of these provisions is not to restrict development unnecessarily, but to ensure that valuable historical or cultural information or items are not lost or destroyed. In the majority of cases, work will be able to proceed once data on the item or place has been recorded or the relic excavated. There is therefore no advantage to be gained by ignoring the above provisions and proceeding with works which result in destruction of items or places of heritage significance.

In any event, failure to comply with the provisions of the Heritage Act or National Parks and Wildlife Act in this regard may result in severe penalties (fines or imprisonment or both).

3.3.2 Statutory Responsibility

The developer or owner is reminded of his statutory responsibilities under the Clean Waters Act, the Soil Conservation Act, Environmental Protection Act, and Environmental Planning and Assessment Act, various other regulations and ordinances, including the Local Government Act. The developer must be fully conversant of his responsibilities under such legislative requirements.

3.4 REPAIR OF DAMAGE

The developer shall restore to original conditions, at his own expense, any vegetation or property altered or damaged by him during the course of construction, or caused as a direct consequence of development works, including clearing of Council drains or gutter affected by siltation from the construction works. Any materials moved from drains or gutters must be disposed of to the site approved by Council's Engineer. The disposal of spoil on sites outside the area of the approved development require separate development approval. Enquiries should be made prior to disposal.

3.5 INSPECTIONS

Inspections for environmental control will be required by Council's Engineer for the following items:-

(a) Installation of environmental control works and their continued maintenance during the development.

(b) Clearing - before commencement.
- when completed.

(c) During each stage of construction works.

(d) Upon completion of the total development works - final inspection.

3.6 CLEARING/SLASHING

Underscrubbing shall be carried out with minimal site disturbance. Approved underscrubbing shall be carried out by rubber tyred machinery. All general clearing, i.e. removal of rubbish, vegetable matter, organic debris, scrub, timber, rubble and the like, shall be restricted to road pavement areas unless otherwise specified and approved by Council's Engineer.

3.7 ENVIRONMENTAL PROTECTION

3.7.1 Fire Protection

The developer shall comply with the relative statutory requirements and ordinances that prohibit the lighting of fires during gazetted fire restriction periods or where damage to the environment could result. Council's approval must be obtained prior to any on site burning, refer Clause 5.5.

3.7.2 Noise Control

The developer shall comply with the statutory regulations and take all practicable precautions to minimise noise levels from the development site. All construction equipment shall be fitted with the recommended noise suppressor in accordance with the statutory requirements.

3.7.3 Disposal of Refuse

The developer shall be responsible for the removal and proper disposal of all site refuse, including food scraps and the like, from the development. The refuse shall be handled in a manner so as to confine the material completely and prevent dust emission, vermin attraction etc.

3.7.4 Disposal of Contaminants

The developer shall properly dispose of all solids, liquids and gaseous contaminants in accordance with all statutory requirements.

3.7.5 Dust Control

The developer shall comply with the statutory regulations and shall restrict the dust levels caused by the development to the recommended levels. Necessary watering/dust reduction outside specified hours will require Council approval.

3.7.6 Transportation of Materials

Any conveying of soil, earth, sand, loose debris and any loose materials to or from the development site shall be in a manner that will prevent the dropping of material on surrounding streets. The developer shall ensure that the wheels, tracks and body surface of all vehicles and plant leaving the site are free of mud and that mud is not carried onto adjacent streets or other areas. Refer also to haul route detail, Clause 2.14.

3.7.7 Existing Flora

All areas of existing flora to be retained are to be properly fenced and protected from all construction operations. See Clause 3.2(e).

3.7.8 Trees

(a) Trees to be Removed - All removals in urban areas or large tracts of rural areas are to be approved by Council.

Trees to be removed in urban areas are to be clearly marked with a yellow painted "X" to correspond with those trees shown on the engineering plans.

Removal of trees is to be executed so that no damage occurs to trees to be retained. This may mean that precision felling by chainsaws is necessary instead of machine felling.

Council's Parks Manager may, if necessary, nominate an appropriate felling method where damage to trees is likely to occur during felling.

(b) Disposal of Trees & Stumps - Dispose of all tree wastes at the time of clearing by either:-

(i) Chipping on site at the time of clearing.
(ii) Pit burner under Environmental Planning & Assessment Licence.

(c) Work on Trees - If it is considered necessary to perform any work on trees, including trimming, pruning, root cutting, repair and removal, Council approval and instructions must be obtained. Any work permitted to be carried out on trees to be retained shall be performed by an approved arborist.

(d) Replacement - If so directed, the developer shall provide, plant and establish, at no cost to Council, a replacement tree of similar species and size or a tree of a species and size nominated by Council.

(e) Tree Enclosures - All trees and shrubs liable to damage during construction shall be properly protected by an approved protective enclosure as detailed at the end of this chapter. The tree enclosure shall be kept intact and in good repair during the construction period and removed at practical completion.

(f) Work Near Trees - It is essential to protect the trees to be retained from damage by ground works. Do not store, stockpile, dump or otherwise place under or near trees bulk materials and harmful materials, including oil, paint, waste concrete, clearings, boulders and the like. Do not place spoils from excavations against tree trunks, even for short periods.

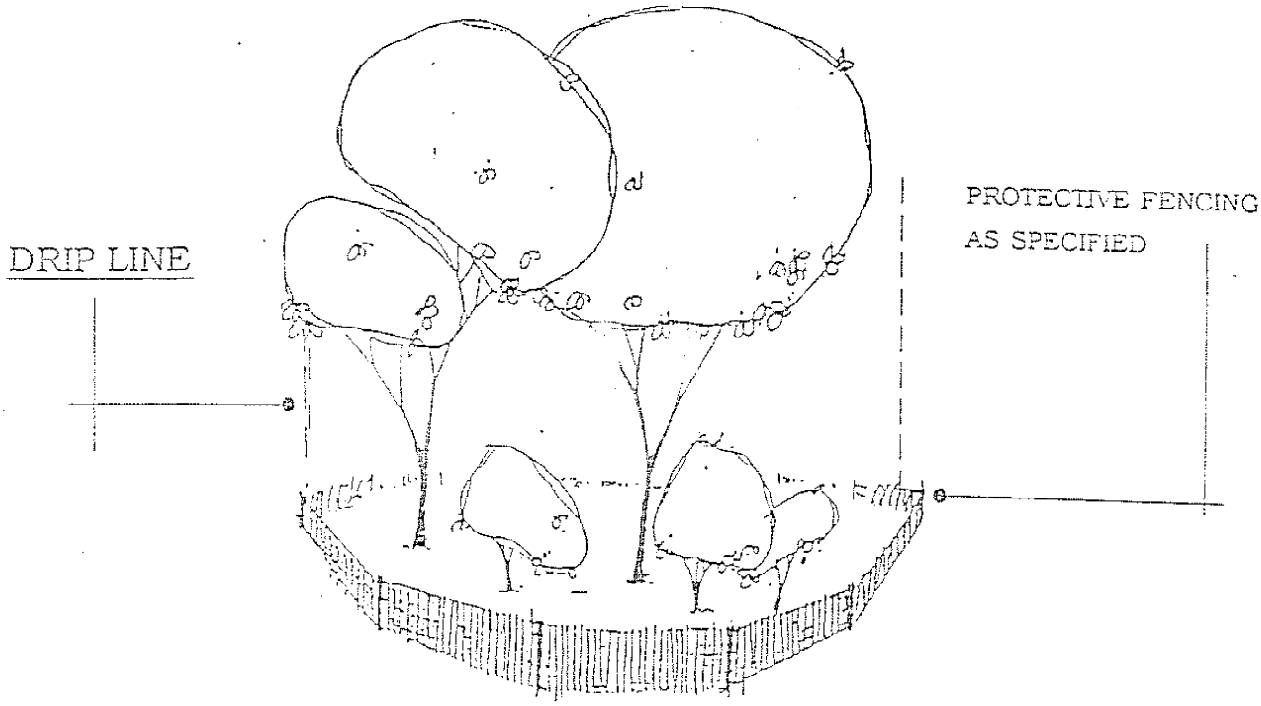
The developer shall prevent damage to tree bark, refer to protection details at the end of this chapter. Do not attach stays, guys and the like to trees. Do not remove topsoil from within the drip zone of a tree unless otherwise specified. Open excavations under the tree canopy must be for as short a period as possible. Do not cut tree roots exceeding 50mm diameter unless permitted by the Superintendent and Council's Engineer. Where it is necessary to cut a tree root, use a chainsaw or similar means such that the cutting does not unduly disturb the remaining root system. Any trenching or excavation near a tree which will remain exposed for a period longer than one month shall require the construction of a root curtain to stop the root system drying out. Details are available from Council. Avoid compaction of the ground under trees. Any compacted soil shall be loosened by coring.

(g) Penalties for Tree/Shrub Damage - In the event of damage to any existing tree or shrub, the developer shall notify the Superintendent immediately. All necessary remedial work shall be at the contractor's cost and any appropriate penalties for the destruction of trees and shrubs are as detailed in Council's Tree Preservation Order.

3.7.9 Storage on Site

(a) General - The location of materials and equipment stored on site shall be approved by Council in order to prevent damage to the site and minimise hazards to persons, materials and equipment.

(b) Equipment - All plant equipment and vehicles are not to be stored within the drip zone of any tree shown on the plans for retention. Approval may be obtained from Council if the appropriate ground treatment is provided.



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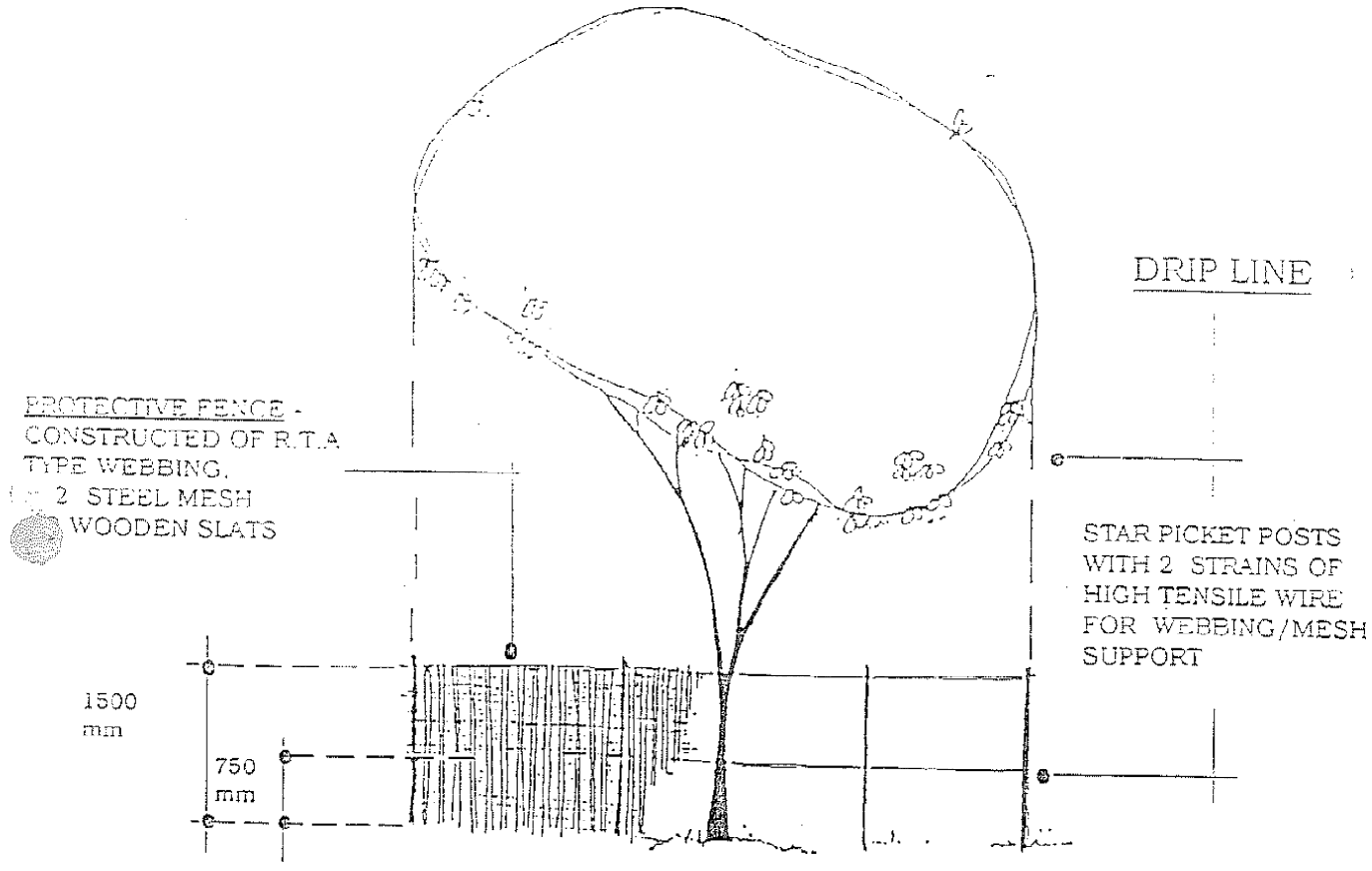


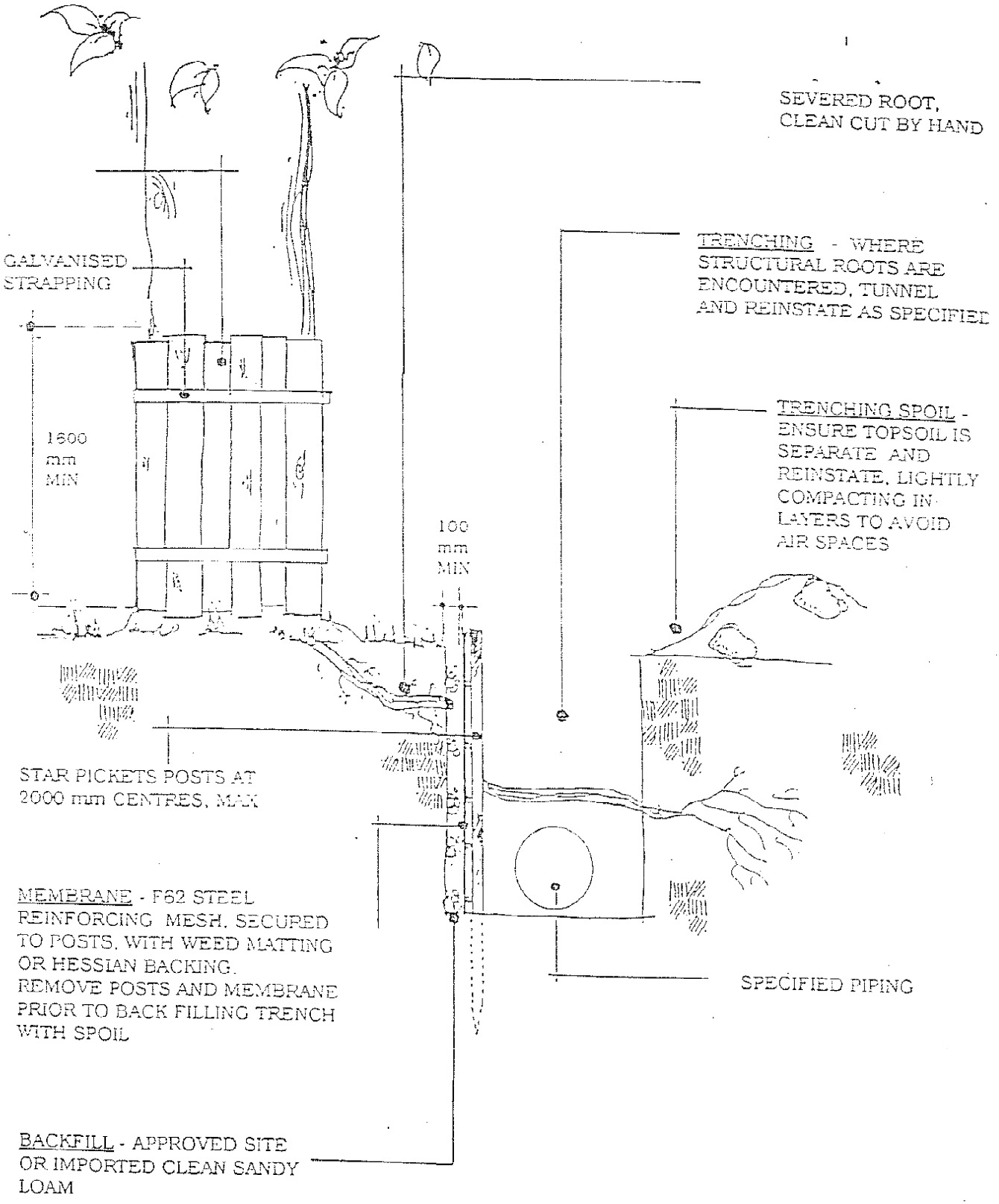
INDIVIDUAL

TREE PROTECTION DETAIL

No 1

FENCING

NOT TO SCALE

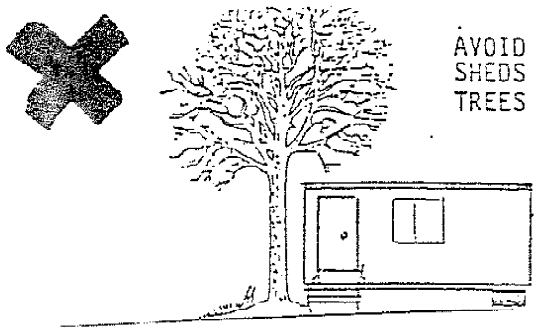


TREE PROTECTION DETAIL

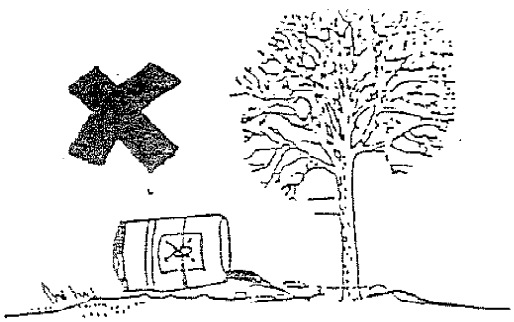
No 2

TRENCHING NEAR TREES

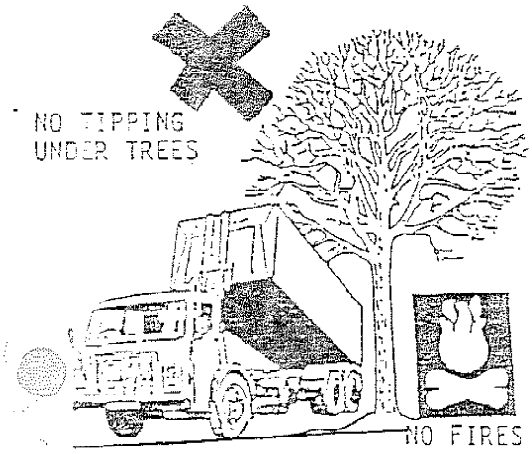
NOT TO SCALE



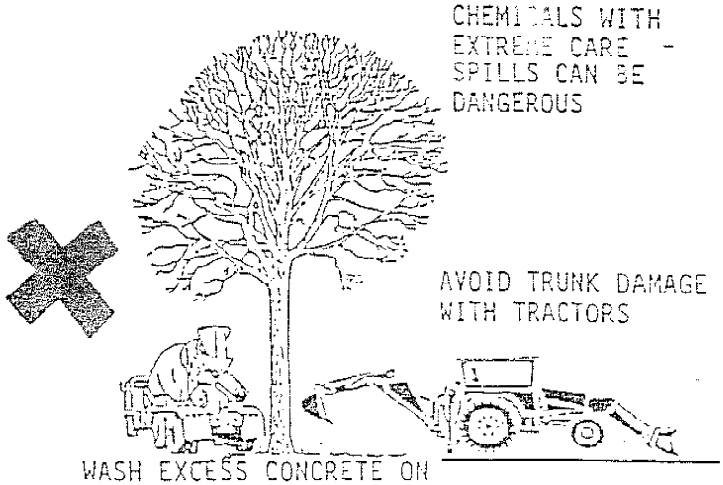
AVOID LOCATING SITE SHEDS DIRECTLY UNDER TREES



TREAT ALL TOXIC CHEMICALS WITH EXTREME CARE - SPILLS CAN BE DANGEROUS

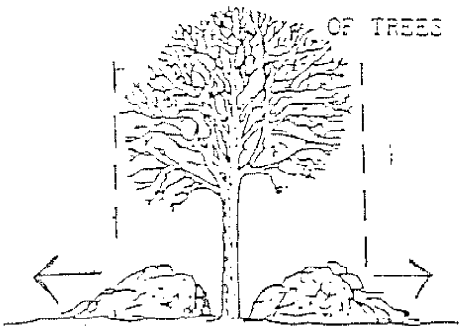


NO TIPPING UNDER TREES



AVOID TRUNK DAMAGE WITH TRACTORS

NO FIRES IN THE DRIP ZONE OF TREES

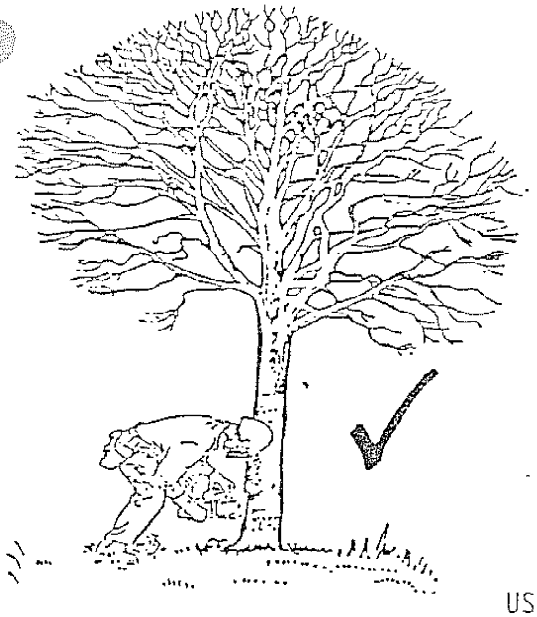


WASH EXCESS CONCRETE ON CONSTRUCTION SITE, NOT UNDER TREES

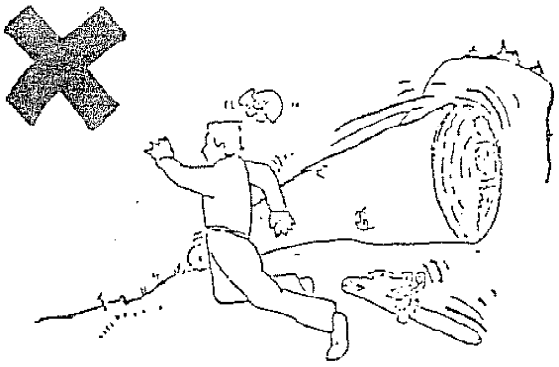
SOIL SHOULD NOT BE STOCKPILED UNDER TREES

KEEP STOCKPILES OUTSIDE THE DRIP ZONE

3. Employ properly trained and equipped persons on tree felling works.



MANY PLANT OPERATORS ARE INJURED WHEN ATTEMPTING TO FELL TREES BY PUSH/PULL WITH A MACHINE



USE PROPERLY TRAINED AND EQUIPPED PERSONNEL TO FELL TREES

3.8 EROSION/SEDIMENT CONTROL

3.8.1 Philosophy of Erosion & Sediment Control

Virtually all construction activity which requires the disturbance of the soil surface and the existing vegetation, naturally predisposes the construction site to erosion. This in turn leads to sediment loss in the resultant run-off water.

Since such soil disturbance is a necessary part of development, it is essential therefore to develop measures which reduce the erosion hazard of any particular construction activity. Having done that, run-off water must be controlled, which carries the sediment, in such a way as to reduce the amount of that sediment leaving the site.

Briefly, this is achieved by:-

(a) Limiting the amount of site disturbance.

(b) Control run-off and sediment movement at its point source rather than only at one final point.

(c) Progressive revegetation of the site, where possible, during on-going construction to reduce the area contributing sediment. This in turn increases the efficiency and effectiveness of the entire sediment control system.

(d) Construction of larger sediment trapping systems of a size relevant to the catchment of the site and soil structures.

(e) Filtering of the sediment in the trapped water prior to its release to the drainage system.

Minimum requirements are:-

(a) On site controls throughout the entire works to ensure minimum erosion and sediment loss.

(b) Ensure least disturbance to site. ("No Go Areas" refer Chapter 3).

(c) As each area is completed, that entire area is to be immediately/progressively seeded and fertilised. Silt fence, hay bales or other controls need to be provided until the site is stable. Should this approach not be practical, the progressive revegetation of individual areas will be required.

(d) After backfill behind kerb and gutter is completed, turf strips are to be placed behind kerb and gutter to an equivalent minimum width of 1.2 metres. Where the footpath is sloping, turf strips will need to be angled across the footpath and additional strip turfing may be required. Damaged or dead turf shall be replaced immediately.

(e) Where there is grade on other areas of the site that may lead to erosion, further turfing strips or other appropriate treatment is to be located to control erosion.

(f) The provision and maintenance of sediment traps (ponds, dams, basins) will be necessary for most developments during the construction phase and for future use. Such sediment basins must be accessed by a permanent, all weather road to enable cleaning operations to be done during periods of wet weather.

(g) Any sediment collected in gutters or other areas outside the site shall be immediately removed and the area restored (Refer Clause 3.4).

3.8.2 Revegetation

All areas disturbed during construction shall be revegetated as soon as possible after completion of the work or as directed by Council's Engineer. Council's Engineer may direct that temporary stockpiles or areas which are likely to be redisturbed may be temporarily stabilised by revegetation using a cereal such as black winter ryecorn or oats (autumn/winter) or Rhodes Grass (spring/summer) and the application of fertiliser.

3.8.3 Topsoil

All disturbed areas, including fill areas, must be top dressed with topsoil to a minimum depth of 50mm. Should Council's Engineer consider the topsoil material stockpiled on site is not suitable, he may direct the developer to import approved material as topsoil. Once topsoiled, the area must be sown with seed and fertilised as shown on the plan or as directed by Council's Engineer. Topsoil on batters shall be no deeper than 50mm and shall be placed over ripped or scarified ground.

3.8.4 Hydromulching (Hydroseeding)

All disturbed areas specified shall be sown with seed and fertiliser by the hydromulching technique using experienced personnel, at rates and materials specified below. This is to immediately follow completion of earthworks on each section of the works.

Seed and other materials shall be brought to the site in bags and mixed under the superintendent's supervision. 24 hours notice is to be given in writing prior to any hydromulching taking place. Mix is to be continuously agitated during spray operations. The superintendent will require samples of seeds for identification.

(a) Preparation - Where applicable, spread topsoil over area to provide a minimum thickness of 50mm, married into the subgrade by scarifying to a depth of 100mm. Elsewhere, scarify soil surface and hydroseed.

(b) Materials - Mulch to be of wood fibre applied at the rate of 2.5 tonnes/ha. Binder to be POLYMER BINDER applied at the rate of 250 litres/ha. Seed mixture and fertiliser as specified.

3.8.5 Hay Mulching Specification

(a) Surface Preparation - Where applicable, spread topsoil over the area to provide a minimum thickness of 50mm, married into the subgrade by scarifying to a depth of 100mm.

(b) Sow seed and fertiliser using the hydromulching technique and rates. Use wood pulp at 100kgs/ha only and omit polymer binder.

(c) Hay, to be applied, must be free of thistle or other woody species, must be of acceptable market quality and not affected by rain.

(d) Hay is to be applied at the rate of 5 tonnes/ha evenly over the soil surface. The hay is tacked with anionmic bitumen emulsion at the rate of 2,500 litres/ha.

3.8.6 Seed

(a) Spring/Summer - 8 kilograms per hectare of Perennial rye grass.
3 kilograms per hectare of Red Clover.
3 kilograms per hectare of White Clover.
5 kilograms per hectare of Hulled Couch.
5 kilograms per hectare of Rhodes Grass.
5 kilograms per hectare of Couch.

(b) Autumn/Winter - 15 kilograms per hectare of Oats.
10 kilograms per hectare of Wimmera rye grass.
5 kilograms per hectare of Red Clover.
5 kilograms per hectare of White Clover.

The above seed mixtures are appropriate for urban areas only. Where any 'bush' areas or reserves are to be seeded with native species, these will be determined by Council.

3.8.7 Fertiliser

'Starter 18' or similar at rate of 250 kilograms per hectare.

The use of gypsum, lime or equivalent products is required as part of the revegetation works to condition unsuitable soil strata.

3.8.8 Watering

The developer shall be responsible for the adequate watering of all revegetated areas to ensure its natural regrowth from the time of planting through to the end of the maintenance period.

3.8.9 Fill Areas

Runoff and sediment loss from the areas of fill must be controlled during and after construction before revegetation takes place using barriers such as silt fences or hay bales, diversion drains or other approved methods as directed by Council's Engineer to direct water from the disturbed areas. Other measures shall be carried out as directed by Council's Engineer and/or as shown on the plans.

Fill area MUST be stripped of topsoil and this topsoil removed from the area BEFORE any filling occurs.

3.8.10 Construction of Road Batters

Batters shall be cut in accordance with the batters given on the approved plans. All batters to lots shall commence 0.5 metres inside the block boundary. All cut and fill batters, except rock batters, are to be topsoiled with on site material to a depth of 50mm immediately following construction and before the batter surface becomes sealed over. Should the batter become sealed over Council's Engineer may require the surface to be disturbed to break such seal. The surface of cut batters should not be graded off to a shaved surface, but left untrimmed by the grader and topsoil applied immediately.

3.8.11 Drainage Construction

All drainage conduits and related structures, including energy dissipaters, wing walls for headwalls etc., or any other erosion and sediment control works as specified, must be fully completed before the conduit is commissioned to protect both the upstream and downstream ends of the drainage system from erosion.

Excavated material from the trench shall not be placed on the road or kerb and gutter. Refer to Chapter 7 also.

3.8.12 Backfilling of Trenches

When any trench is being opened up, the topsoil should be isolated. After installation, the backfill must be compacted and any overburden removed from site. The area disturbed during construction should then be topdressed with the topsoil previously isolated and seeded or turfed if required. Refer to Clause 3.8.2.

3.8.13 Open Drains

Permanent or temporary open concrete or earth drains are to be constructed as indicated on the plan or as directed by Council's Engineer for the protection of adjoining work or property during construction. These drains are to be constructed in accordance with standard practice. All open earth drains must be protected from scouring as indicated on the approved plans or as directed by Council's Engineer in a regular progressive manner during the works.

3.8.14 Stockpiles

Council's Engineer shall approve of the proposed location of the various stockpiles prior to commencement of works. Location of stockpiles shall be indicated on the approved engineering plans.

Site topsoil shall be isolated from subsoil material in separate stockpiles.

Stockpile sites shall be located away from existing or proposed drainage lines or areas likely to be disturbed during construction. Stockpile sites shall not be located within the drip zone of trees.

Stockpile sites must be protected from erosion and sediment loss by installation of diversion drains, revegetation of the pile using a cereal only seed mix (oats or black winter rye corn in autumn/winter and Japanese millet in spring/summer) or the use of silt fences/hay bales or other approved controls.

Various combinations of the use of fences and other materials to achieve sediment control are attached at the end of this chapter.

3.8.15 Sediment Traps/Ponds/Dams/Basins

These are temporary or permanent barriers or holding dams to trap sediment on the development site.

The location of the sediment traps must be shown on the engineering design plans, together with their proposed capacity. A capacity of $200m^3$/ha to $250m^3$/ha of disturbed site is required. Where upstream areas from developments are not disturbed, constant natural erosion takes place. An allowance in the sediment basin capacity of up to $50m^3$/ha is required if diversion banks are not used to direct upstream water away from construction areas (refer to Clause 3.9). This will be subject to the available space, the scope of the development, and the type of soil conditions at the site. This will be determined by Council Engineer.

Where it is considered a situation exists which constitutes a danger to the public, sediment traps must be adequately fenced, including lockable gates for maintenance access.

All sediment traps must be properly maintained to provide ongoing effectiveness and the traps must be pumped out at regular intervals or as directed by Council's Engineer.

Council's Engineer must inspect the trap prior to pumping out to ensure that the water quality is acceptable. The traps may require dosing with gypsum to flocculate suspended material and allow settlement.

3.8.16 Cleaning Sediment Control Structures

The developer shall empty and/or clean out the sediment control structures as required. Council's Engineer may direct such works whenever the trap has reached full water capacity or the accumulated sediment has reduced the capacity to below 70%. The removal of the sediment shall be done in such a manner so as not to damage the sedimentation structure.

Council's Engineer may also direct the cleaning out of sediment control structures immediately downstream of the construction site.

3.8.17 Maintenance of Existing Drains

Where construction work interferes with existing drains or gutters, these shall be immediately cleared and maintained to avoid sediment problems and potential flooding.

3.9 SOIL EROSION TECHNIQUES

3.9.1 Diversion Banks, Catch Drains, Table Drains

(a) Description - Diversion banks are channels, berms or ridges of soil. They may also be formed using sandbags.

(b) Usage - Diversion banks run across the slope intercepting, containing and directing runoff to stable outlets. They can also be used to:-

* Divert non-polluted runoff away from disturbed areas.
* Divert polluted runoff to sediment trapping devices.
* Reduce slope lengths, thereby creating less erosive segments.

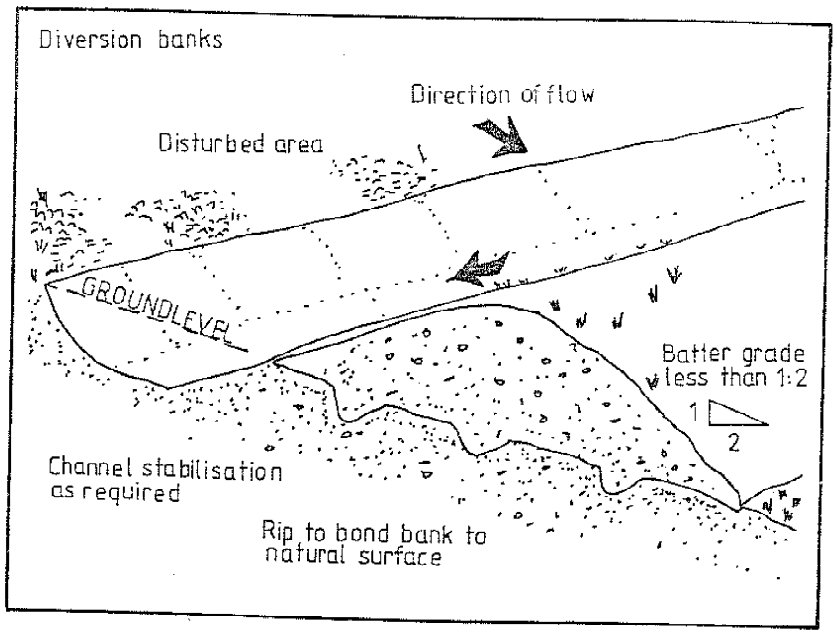
(c) Installation - Diversion banks are designed to carry peak flows at non-erosive velocities in bare soil or vegetated channels. They should be marked out by surveying the line. The base of the bank should be ripped parallel to the survey line to achieve a bond between the bank and the existing ground.

(d) Basic Design Criteria - The channel must be large enough to carry a one in ten year peak discharge for the catchment. The channel should be preferably dish shaped with batter grades of less than 1:2. The bank must drain to a stable outlet. See Type A below.

Generally, the channel should be lined with turf as per Council specification. However, where velocities are designed in excess of 2m per second, non-erosive linings such as concrete, grouted rock etc. are required. On slopes of 2% or less, the diversion bank can be constructed by placing the excavated material on the high side of the trench and using the existing vegetated area as the channel base. See Type A example.

Where the bank is of a temporary nature, the channel can be lined with a geotextile fabric.

(e) Maintenance - Diversion banks should always be inspected after rainfall. Sediment deposits should be removed to maintain freeboard. Channels and outlets should be cleared of obstructions.



TYPE A

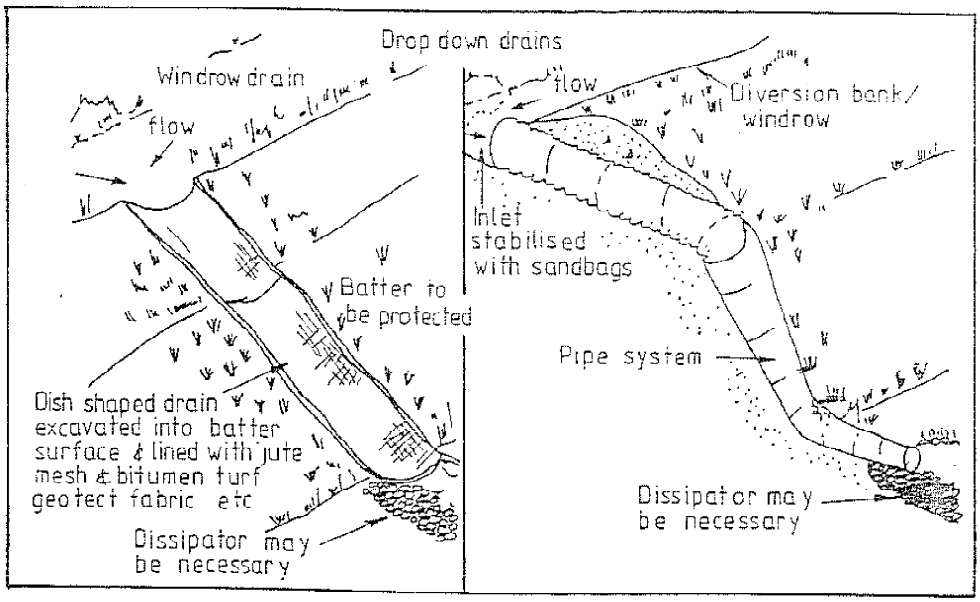
3.9.2 *Drop Down Drains*

(a) Description - These are drains which convey runoff from a road or extraneous catchment down slopes such as road batters without causing erosion. They may consist of a dished earth drain smoothly shaped and consolidated and lined with a number of materials such as turf, jute mesh and bitumen, geotextile fabric (temporary measure only) or concrete, rock and slurry, or a flexible/rigid pipe or half round pipes.

(b) Usage - Drop down drains consisting of rigid or flexible pipe are very effective as a temporary measure during road construction used in association with an earth windrow (or bund wall) along the top edge of the batter. Runoff flowing along the windrow is directed to the pipe by which water is conveyed down the batter. It is a simple matter to extend the pipe as the batter rises.

Drop down drains should be large enough to carry runoff without washing out. To prevent failure around the inlet, the soil should be compacted or the area stabilised using sand bags. Energy dissipaters may be required to reduce the flow velocity at the outlet.

(c) Maintenance - The inlet and outlet must be checked regularly to ensure they are not obstructed.



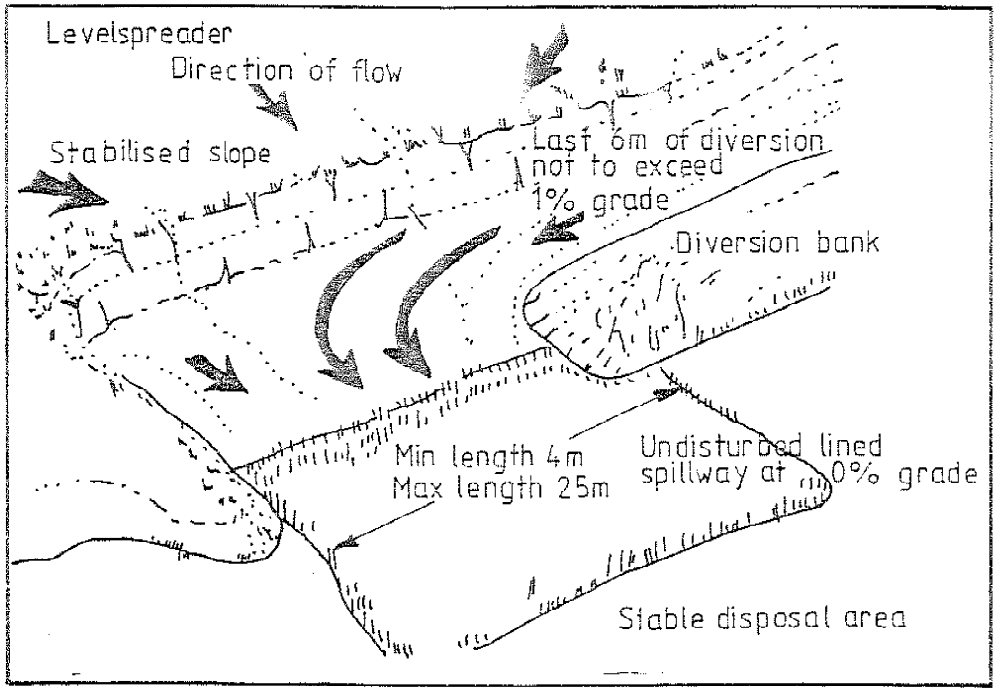
3.9.3 *Level Spreader*

(a) Description - Level spreaders are outlets or 'sills' having a level cross section. They convert erosive channel flow into non-erosion sheet flow.

(b) Usage - Level spreaders can only be used to dissipate flow from small catchments. The area below the outlet should be stable and of even cross section so that the water will not re-concentrate into channels.

(c) Installation - The outlet or 'sill' width depends on contributing catchment, slope and ground conditions. The minimum width should be four metres, and the maximum width 25 metres. Final discharge should be over a level surface, which may require stabilising by turfing or seeding and fertilising or perhaps lining with a geotextile fabric or similar.

(d) Maintenance - Spreaders should be checked periodically to ensure that they are not damaged. There should be no scouring of the sill or vegetation damage below the spreader.



3.9.4 Channel Stabilisation

(a) Description - Channels can be stabilised by providing a lining that withstands high flow velocities.

(b) Usage - Channels should be stabilised when high flow velocities will cause erosion and scouring of the channel base.

(c) General Requirements - The technique to be employed in stabilisation is dependent on the velocity of the flow which is expected, and the materials for stabilisation should be chosen accordingly. For example, for very high, fast flows, the channel must be lined with something such as concrete, rock and grouting, rock mattress etc., all of which will carry higher velocity flows than will a channel stabilised with turf only. However, such a grassed channel will carry a higher velocity than a bare earth channel.

Flow velocities may be further reduced by the use of grade stabilising structures (see later section).

(d) Techniques of Stabilisation -

* **Jute Mesh**

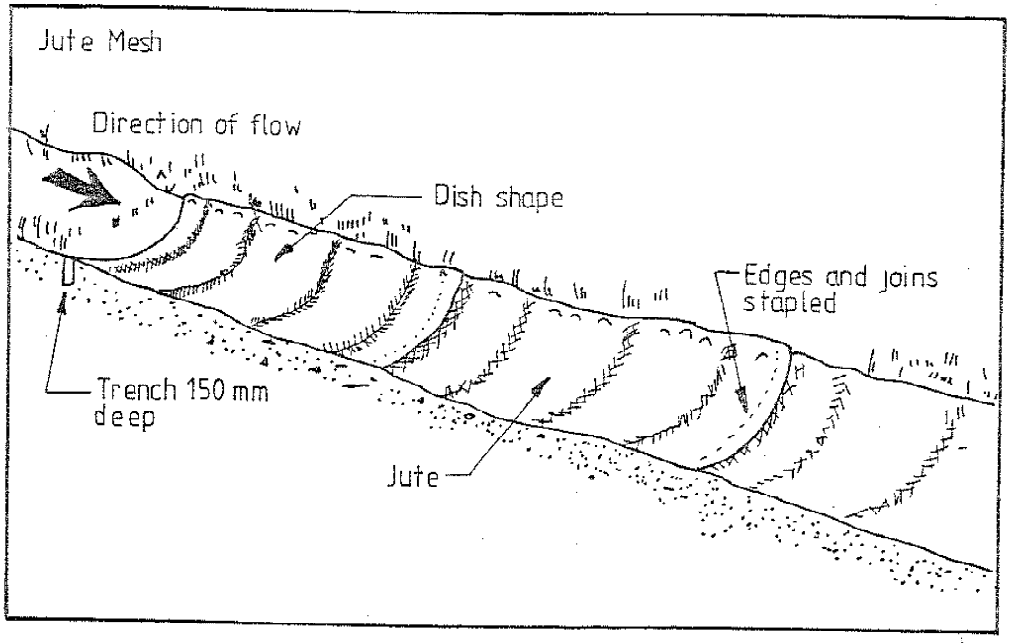
(i) Description - Jute mesh is suitable for channels of lower gradients. It can be used to line table, median, berm, drop down and other drains.

(ii) Installation - The mesh is laid after the channel has been formed by shaping, top soiling and compacting, and the area sown and fertilised. The area must be free from rocks and clods.

The top edge of each jute strip should be buried at least 150mm and secured with staples. When joining rolls of jute, the upstream roll should overlap the downstream roll by at least 100mm, and the overlay should be stapled.

Undiluted bitumen emulsion applied at the rate of 4.5 litres per linear metre of jute completes the protection.

Channels may be further stabilised and flow velocities reduced using grade stabilising structures.



(iii) Maintenance - After heavy rainfall, the channels should be inspected to ensure they have not been scoured. Any subsequent damage shall be reinstated in the approved manner.

* **Turf Laying**

(i) Description - Turf or grass sods should consist of 25mm of dense, well rooted, vigorous growth turf with 25mm of topsoil. The sods should be free of noxious weeds, soil pests and diseases. The sods shall be cut by an approved sod cutter in long lengths of uniform width of not less than 300mm and shall be in a sound unbroken condition.

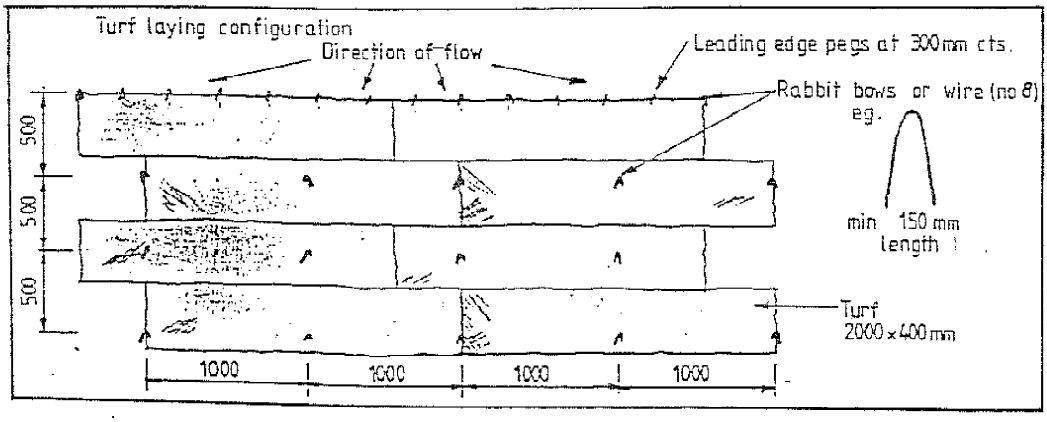
(ii) Installation - Turf sods shall butt hard against each other so that there are no gaps. The outside edge should be left staggered to form an uneven edge.

Turf should be watered regularly for at least a week after it has been laid to ensure maximum rate of establishment. After that, watering should be carried out as necessary for the duration of the work or contract.

Laying of turf should be scheduled so that each section is rolled or tramped immediately it has been laid to obtain a key with the underlying soil. All areas should be scarified and then topsoiled prior to the placement of turf. The turf section should be butted firmly together where strip turfing is not proposed. On batters it is essential that the turf sections be laid on the contour, while in drains turf sections should be laid across the drain at right angles to the direction of flow. The turf should be anchored with wire netting pinned with rabbit bows (or staples) approximately 150mm long, on steep sites or drains to ensure stability (see drawing).

The rabbit bows should be made from No. 8 wire or, if the soil profile is hard, making penetration difficult, lengths of reinforcing mesh, cut to size, should be used.

It is essential that these bows, or rods, pin the netting hard against the grass sods. It is better to shorten the bows etc. to achieve this than have the bows 'flatten out' where penetration to the depth of the bows cannot be achieved. Removal of netting and bows is required after establishment where later maintenance, such as mowing, will be carried out.



* **Use of Geotech Fabric Liner for Stabilisation of Temporary Earth Drains or Channels.**

(i) Description - Quite frequently a temporary dish shaped earth drain is required to divert water flow during construction of a subdivision or a building etc. Many times this drain becomes eroded and sediment is formed.

This problem can be overcome by lining the drain with a properly installed geotextile fabric.

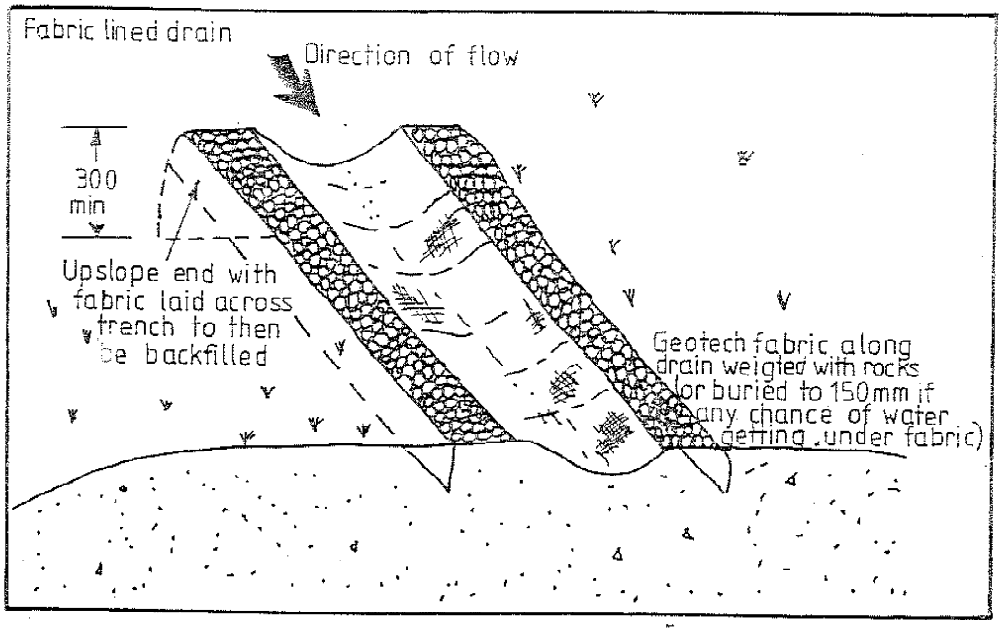
(ii) Installation -

1. Shape the drain to a smooth, compacted finish.

2. Dig a trench across the upslope end of the drain, lay the fabric flat on the floor of the trench, backfill and compact.

3. Lay the fabric along the drain and trim to size.

4. Hold down the outside edges of the fabric with rocks, or if there is any chance of run-on water getting under the sides of the fabric and creating possible erosion, then the sides of the fabric should be buried in a trench some 150mm or so deep. The backfill must be compacted.



* **'Plastic' Fabrics, Plastic/Natural Fabrics Etc.**

(i) Description - These are manufactured products consisting generally of a combination of natural and plastic fibres woven to form a mat.

Detailed information is available on each product from the manufacturer. It is up to the individual to determine the suitability of a particular product for their particular requirements.

(ii) Installation - Each manufacturer gives explicit directions for the installation of their product. It is essential for the successful use of any of those products that these directions are adhered to.

Brochures on some of these products are available from Council's offices or landscape and garden suppliers.

* **Concrete Linings, Rock/Rock Grouting, Rock Mattresses, Gabions Etc.**

(i) Description - These linings are well known and provide permanent scour protection for outlets.

(ii) Installation - For successful operation of such linings it is essential to ensure the lining cannot be undermined by runoff water getting under the lining, creating erosion. This can be achieved by:-

1. The construction of a cutoff wall at the upslope start of the lining. Also ensure that the capacity of and configuration of the channel itself will not allow water to go over the side of the lining and erode the soil beneath.

2. Line the floor of the channel or drain with geotextile fabric before installing rock mattresses or gabions. It is best for such fabric to be buried in a trench some 300mm deep at the upstream edge of the lined channel.

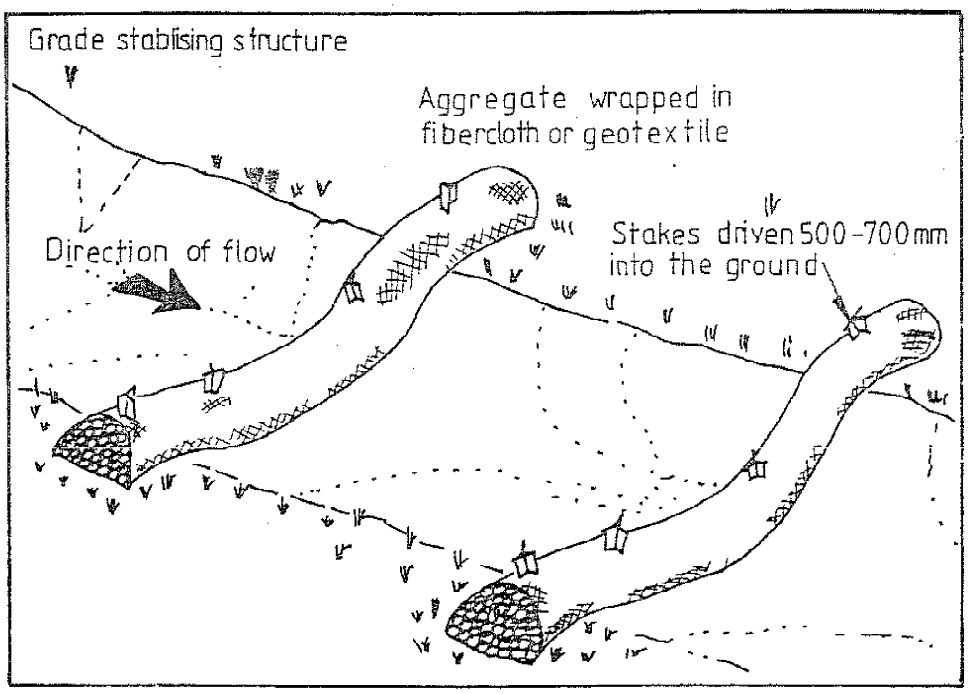
* **Grade Stabilising Structures**

(i) Description - Grade stabilising structures are erosion-resistant structures installed across a channel to promote non-erosive velocities in the downstream channel.

Spacing of the structures should be such as to ensure the crest of the downstream structure is the same level as the ground immediately below the next upstream structure.

(ii) Usage - Grade stabilising structures are generally built as overfalls or chutes and can be made from wood, concrete, sheetmetal piling's, gabions, bags filled with sand cement mix, or geotextile fabric sausages filled with blue metal. They must be constructed to ensure that runoff flow is retained in the channel and does not overflow around the edges of the structure. The channel itself must be protected from erosion.

(iii) Maintenance - Grade stabilisers should be regularly inspected for inlet and outlet damage, or obstruction and channel scouring.



3.9.5 Hay Bale Barriers

(a) Description - A temporary barrier of hay bales placed around the perimeter of a disturbed area.

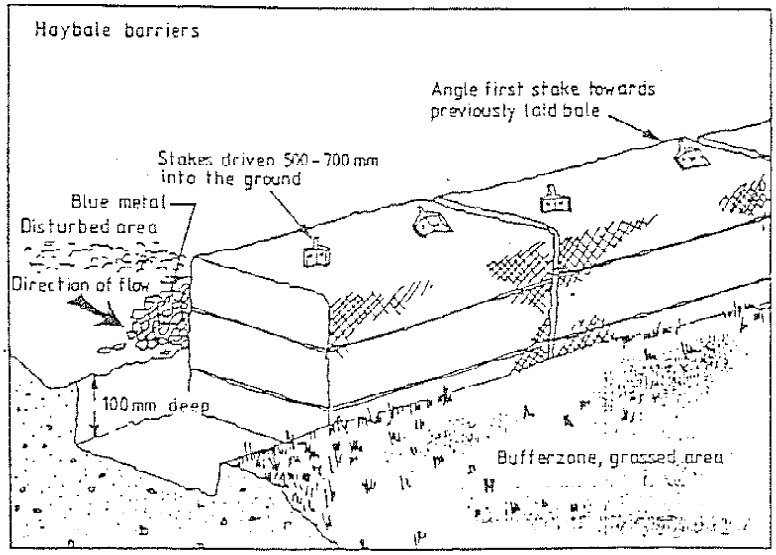
(b) Usage - Hay bale barriers are used to desilt contaminated water.

(c) Installation - Hay bales are only effective on sites of less than half a hectare. The bales should be placed lengthwise in 100mm deep trenches with their binding rope horizontal to the ground.

The bales should be connected and anchored to the ground by driving two star pickets or posts through each bale. The first stake must be driven towards the adjoining bale at a 45 degree angle to force the bales together.

(d) Maintenance - After rainfall, hay bale barriers should be inspected and sediment removed. Damaged bales should be repaired or replaced. Bales have a life expectance of three to six months.

(e) Alternatives - Blue metal of nominal size 25mm placed some 150-200mm deep against the upslope toe of the hay bale barrier greatly improves the efficiency of the system.



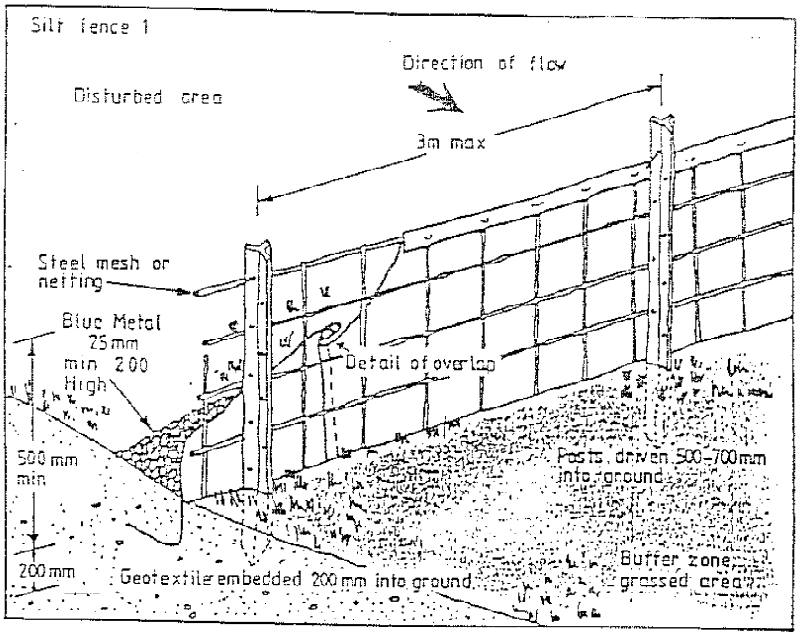
3.9.6 Silt Fences

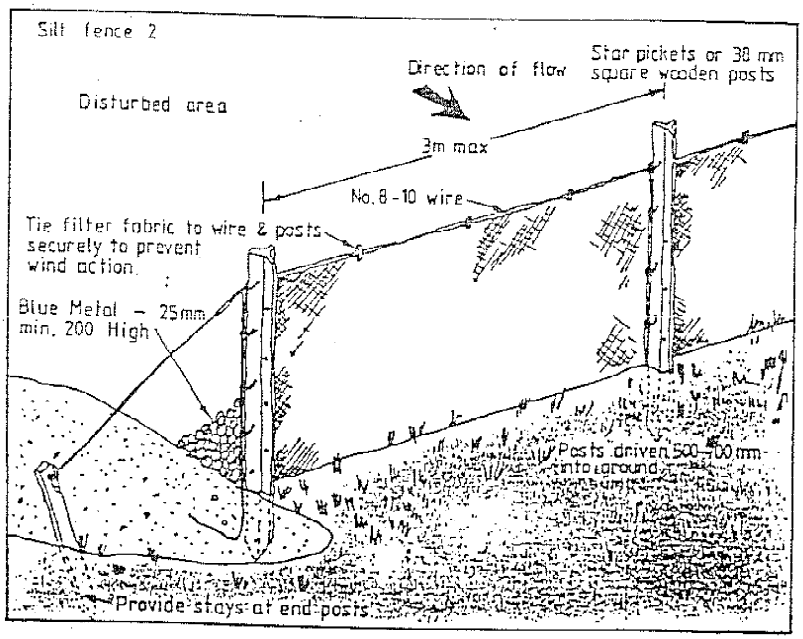
(a) Description - Silt fences are temporary barriers made from filter cloth, hay bales, blue metal or a combination of these.

(b) Usage - Silt fences filter runoff leaving the site, trapping the sediment and allowing clean filtered water to pass. Silt fences are normally placed on the contour or slightly convex to the contour. If on the contour, each end of the fence should be turned up to create a 'stilling pond' up slope of the fence. Where possible, a silt fence system should consist of a series of overlapping fences. Each fence should be NO longer than about 20 metres. They should not intercept large concentrated or channelised flows.

(c) Installation - The area below a silt fence must be undisturbed or stabilised. Silt fences should also have a stable outlet or overflow point in case the flow rates exceed the fence's capacity to filter water. The individual diagrams give specific requirements for each type of silt fence construction (see below for more information).

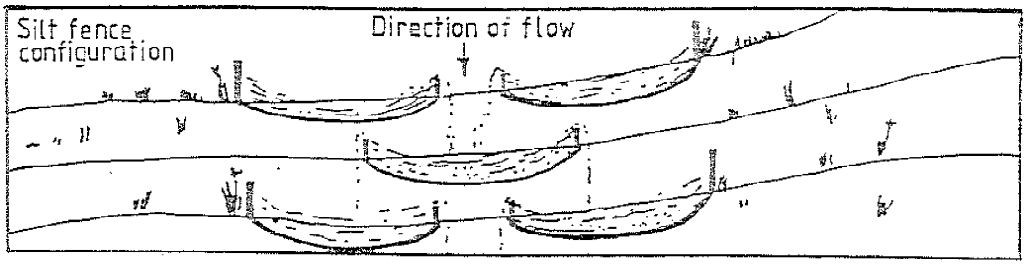
(d) Maintenance - Silt fences require regular maintenance. Trapped sediments should be removed, pickets straightened, filter cloth resecured and tightened, and blue metal replaced when heavily contaminated with silt.


Silt fence 1
Direction of flow
Disturbed area
3m max
Steel mesh or netting
Blue Metal 25mm min 200 High
Detail of overlap
500 mm min
200mm
Geotextile embedded 200 mm into ground
Posts driven 500-700mm into ground
Buffer zone grassed area


Silt fence 2
Direction of flow
Star pickets or 38 mm square wooden posts
Disturbed area
3m max
No. 8 - 10 wire
Tie filter fabric to wire & posts securely to prevent wind action.
Blue Metal - 25mm min. 200 High
Posts driven 500-700 mm into ground
Provide stays at end posts

* **Silt Fence Installation**

1. Dig a trench along the line of the intended fence. The trench is most effectively constructed using a ditch witch or similar machine. For preference, any length of fence should not exceed about 20 metres, and where a barrier is to be formed over any distance, the fence should consist of a series of overlapping fences, i.e.



The line of the fence should be slightly convex to the water flow and the ends turned up to create a stilling effect.

2. Lay out the silt fence fabric on the uphill side of the trench.

3. Drive 38mm square wooden pegs or star pickets along the downhill slope of the trench.

4. Stand the fence fabric against the posts and pull taut. Place bottom of silt fence fabric in the trench, backfill and compact. Ensure there is 150-200mm of the fabric in the trench at least.

5. Secure fabric to the fence using wire staples. If wooden posts are used, further support can be given to the fence by nailing a narrow wood strip through the fabric to the post.

If it is not possible to dig a trench, the posts should be driven along the line of the fence and the bottom 150mm or so of the fabric laid on the ground of the upslope side of the fence after all vegetation has been removed and any uneven surfaces have been levelled.

The tail should then be completely covered with blue metal at least 200mm deep. The use of blue metal with any silt fence system greatly improves the filtering capacity of the fence.

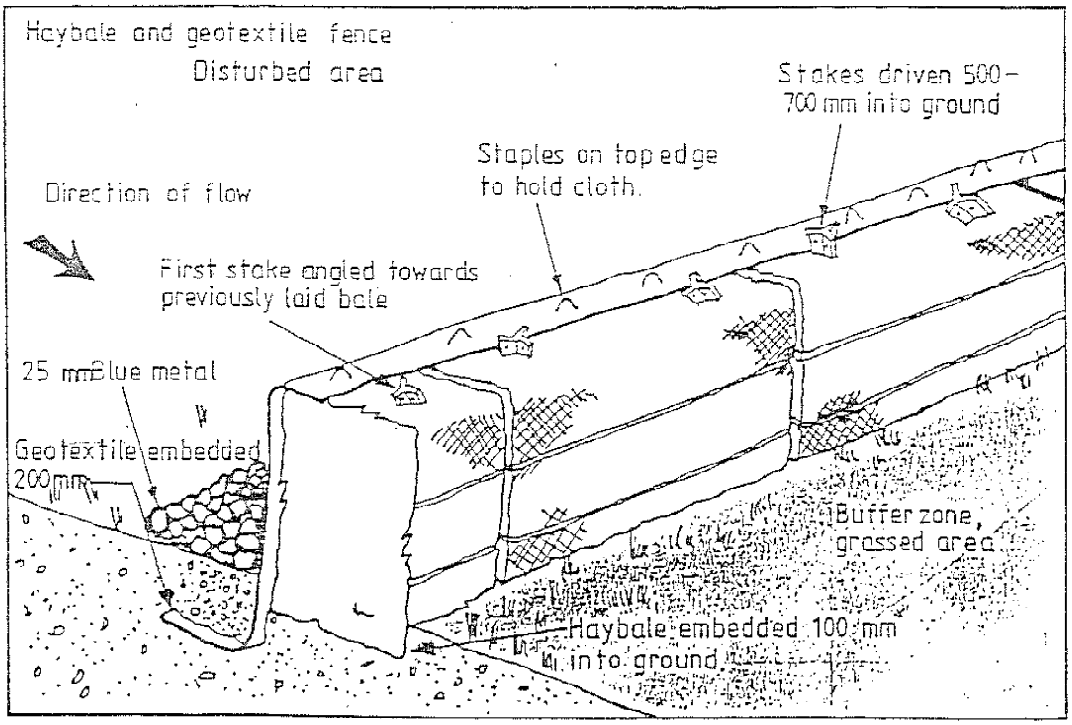
* **Sediment Traps for Minor Catchment Areas**

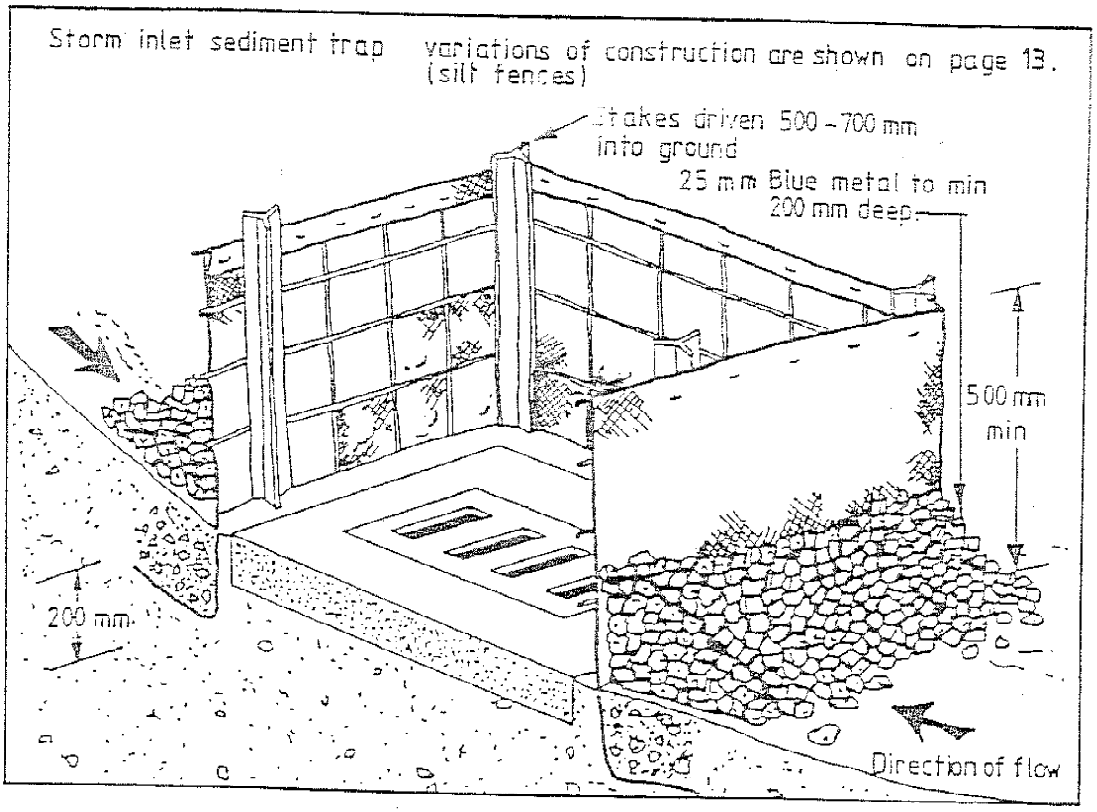
(a) Description - These are temporary de-silting structures.

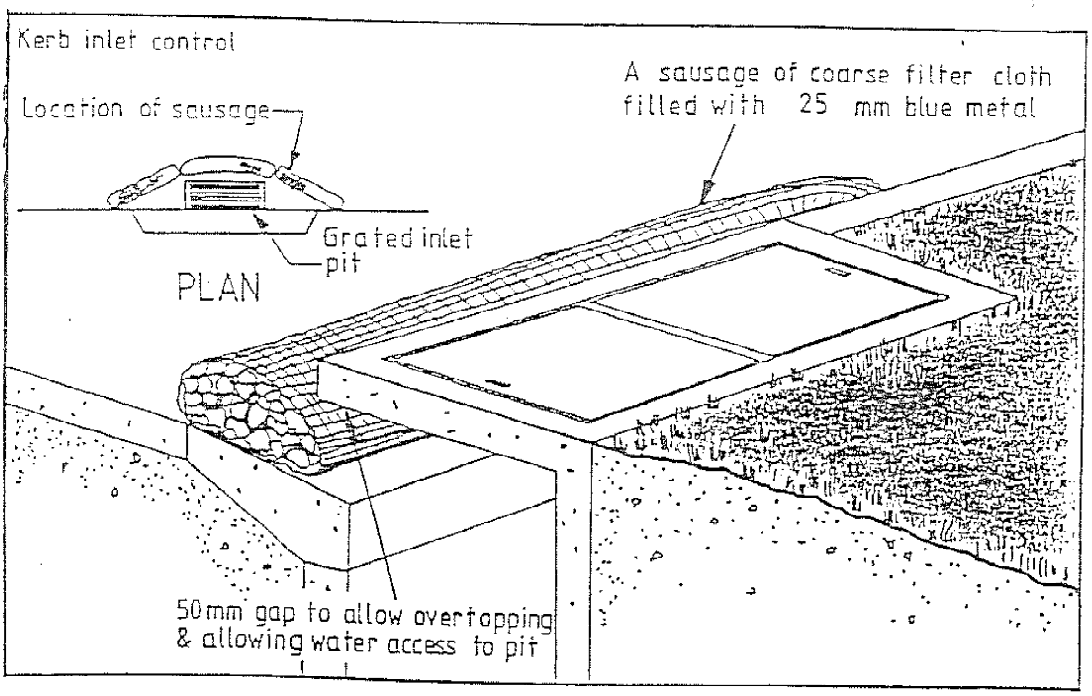
(b) Usage - Such sediment traps are used at stormwater inlets and outlets, culvert entries and points where runoff from disturbed catchments such as construction sites is discharged.

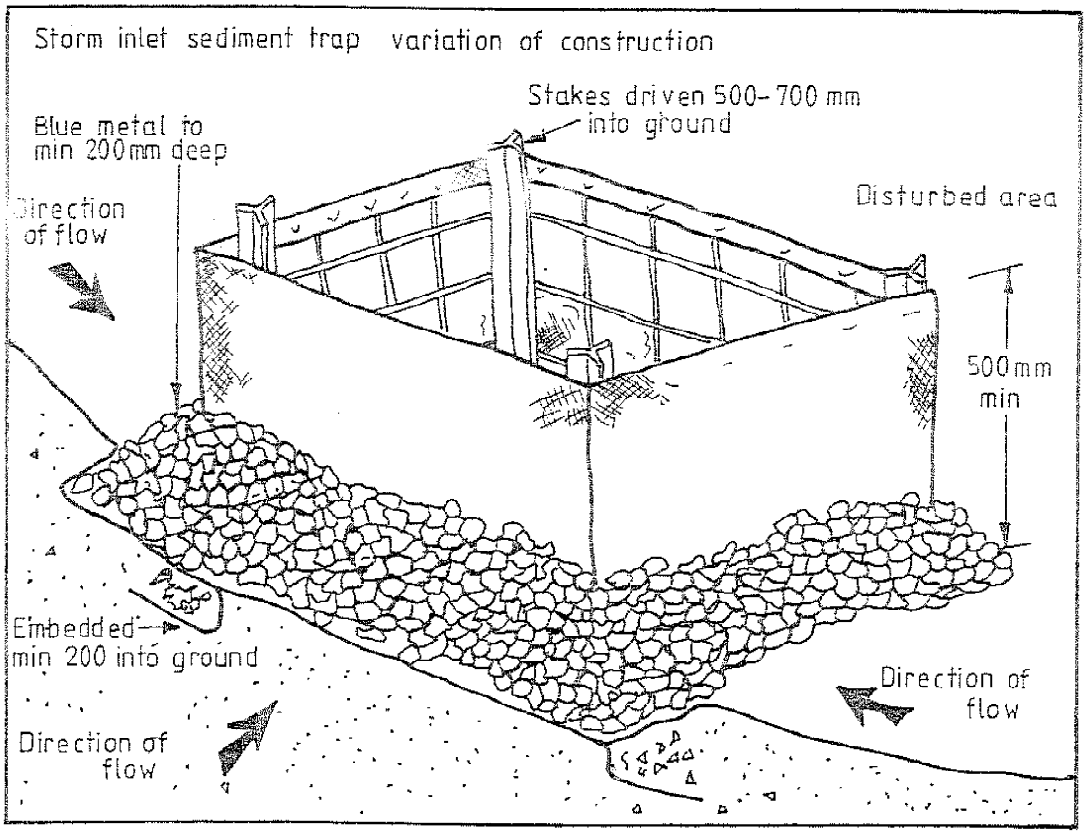
(c) General Requirements - Sediment traps are built from hay bales, washed gravel, gabions or sandbags (or sarlon type materials) filled with blue metal. The choice of material or type of structure depends on the size of the drainage area, and the physical structure surrounding the sediment trap.

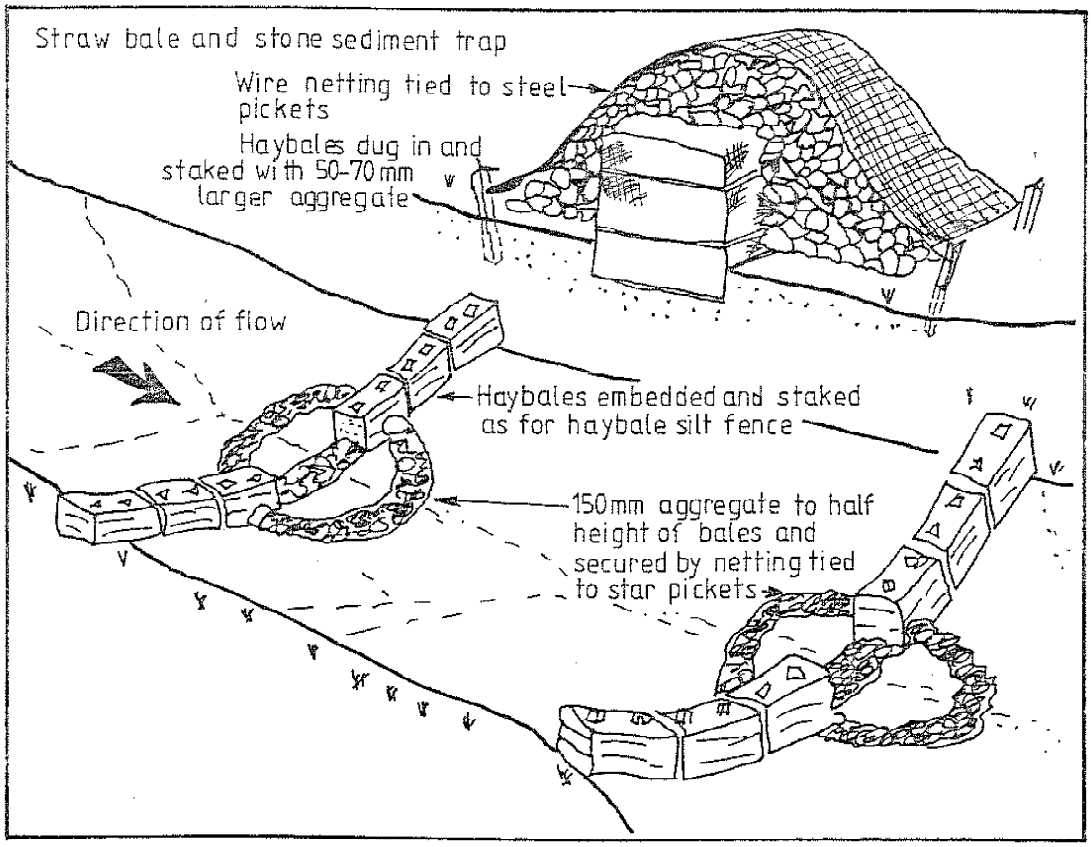
(d) Maintenance - Sediment traps should be regularly maintained and restored to their original dimensions when the sediment has accumulated to half of the designed capacity. The outlet should be constructed and maintained to ensure erosion does not occur.




Storm inlet sediment trap
(silt fences)
variations of construction are shown on page 13.
Stakes driven 500 - 700 mm into ground
25 mm Blue metal to min 200 mm deep
500 mm min
200 mm
Direction of flow


Kerb inlet control
Location of sausage
A sausage of coarse filter cloth filled with 25 mm blue metal
Grated inlet pit
PLAN
50mm gap to allow overtopping & allowing water access to pit


Storm inlet sediment trap variation of construction
Stakes driven 500-700 mm into ground
Blue metal to min 200mm deep
Direction of flow
Disturbed area
500mm min
Embedded min 200 into ground
Direction of flow
Direction of flow

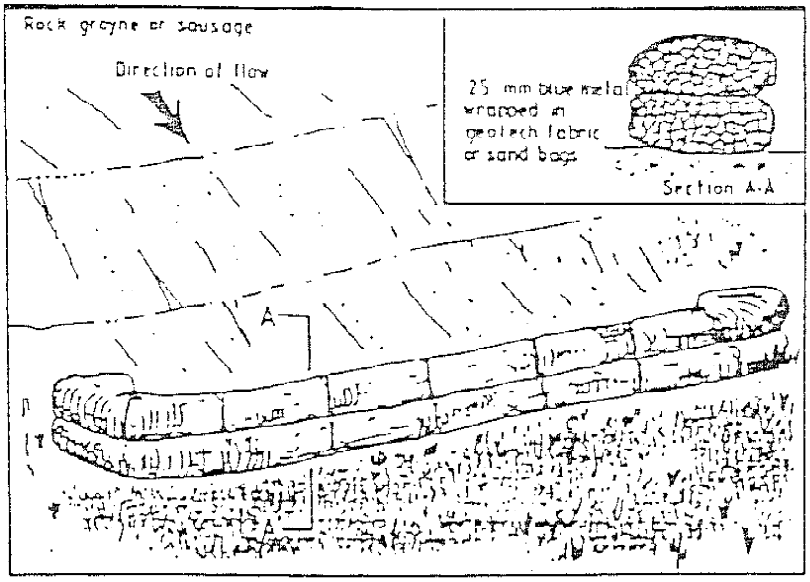

Straw bale and stone sediment trap
Wire netting tied to steel pickets
Haybales dug in and staked with 50-70mm larger aggregate
Direction of flow
Haybales embedded and staked as for haybale silt fence
150mm aggregate to half height of bales and secured by netting tied to star pickets

* **Rock/Blue Metal Groyne or 'Sausage'**

(a) Description - The groyne comprises a sausage of shade cloth or other pervious fabric, some 200mm diameter, filled with 25mm blue metal and closed both ends.

(b) Installation - The sausage is laid on the ground on the contour similar to a silt fence. Generally the sausage should be laid two high to obtain enough filter area.

The advantage of this type of sediment barrier, particularly on a building site, is its flexibility and ease of replacement following trenching or similar building/construction activity.



3.9.7 Sediment Traps (Sediment Ponds, Silt Traps, Sediment Control Structures - these are all synonymous)

(a) Description - Sediment traps are sediment control devices that intercept sediment and runoff usually at the final discharge point. They are formed by excavation and/or by building embankments, and they must be kept empty and treated as a dry basin by the provision of a low flow filtered outlet (where levels permit) or they are pumped out.

(b) Usage - Sediment basins are used when catchments are so large that other filtering devices cannot handle the anticipated runoff and sediment volume.

(c) General Requirements - The volume of a sediment trap measured at the crest of the outlet should be 150 cubic metres per hectare of disturbed area or as determined by Department of Conservation and Land Management specifications.

The primary outlet may be a vertical pipe or box type riser joined to a pipe extending through the embankment and discharging below the base of the embankment. These outlets allow automatic dewatering through the perforations in the pipe riser which, however, must be filtered using fabric and blue metal of 25mm size. However, on flat land where the capacity of the trap is below ground level, it is necessary to dewater the trap by pumping (or syphoning if possible) after the water has been deflocculated.

A secondary or emergency spillway must be built to prevent overtopping of the structure. The sediment trap should be surrounded by man-proof fence.

(d) Operation - Water levels in sediment traps should be kept as low as possible so they are always ready to run off from rainfall.

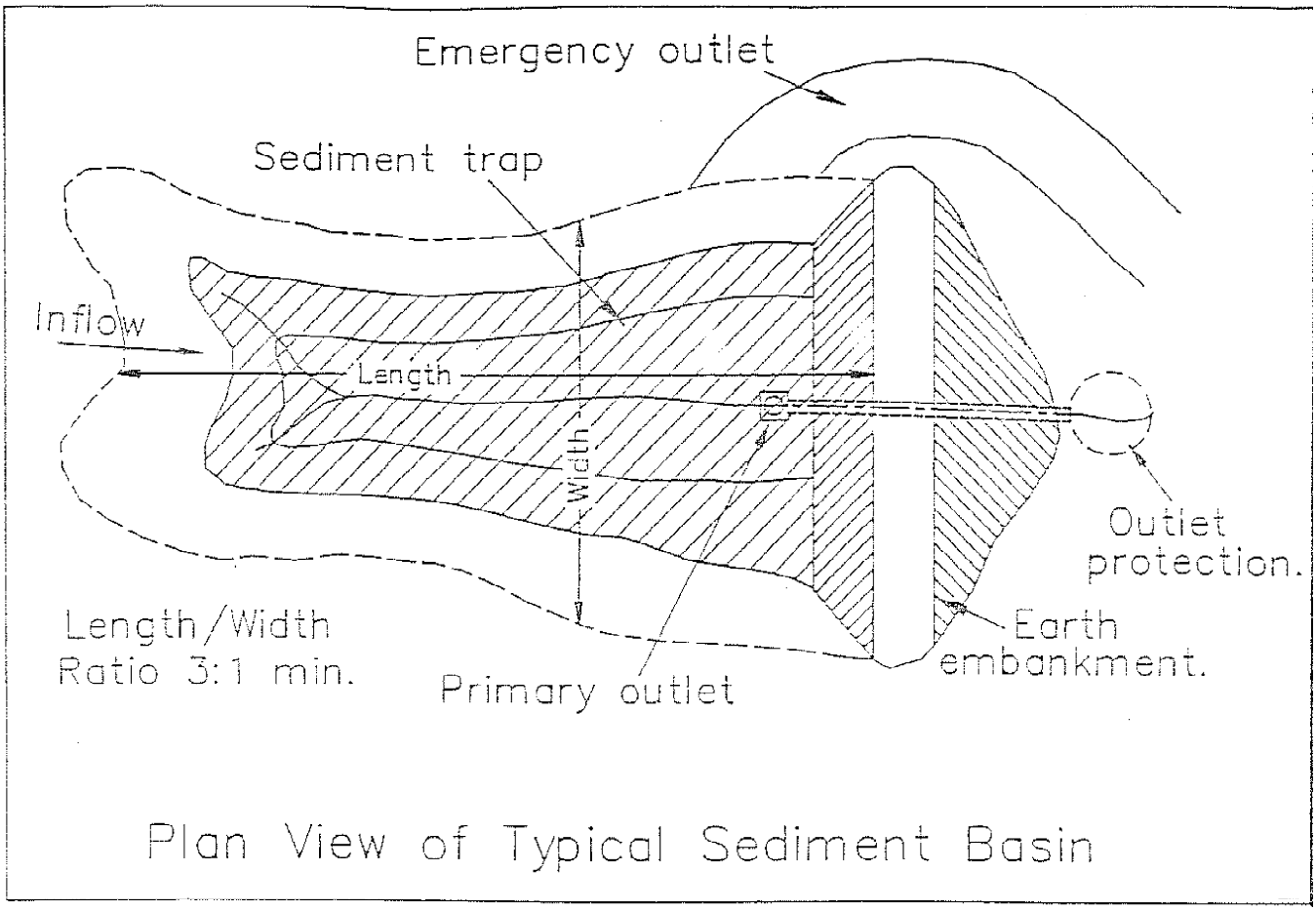
Silt traps must be discharged after each significant rainfall event or as directed by the Superintendent.

The invert level of the sediment trap outlet should be below or level to the invert of any pipe or drain system emptying in to the trap.

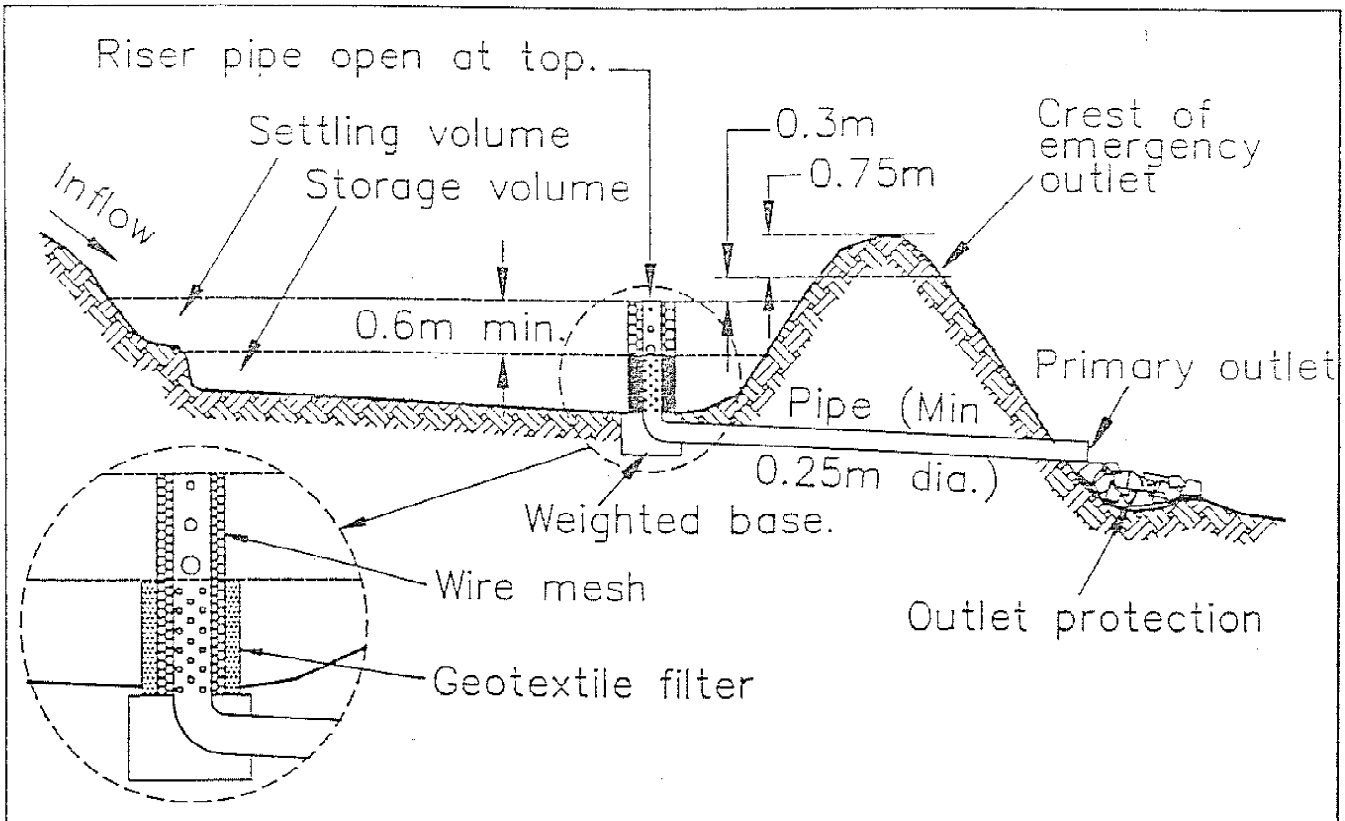
(e) General Specifications - Batter slopes should have a maximum grade of 1:3, a minimum top width of 2.5 metres, and a freeboard of 1 metre, unless the spillway size exceeds design capacity.

However, should the trap be a 'wet basin' or unfenced, at least three sides should have batter grades of approximately 1:8.

(f) Maintenance - Sediment basins should be inspected regularly, and scouring and damage to the inlet, outlet and spillway should be repaired and the vegetation on the embankment maintained. The basin shall be cleaned out (desilted) when the accumulated sediment has reduced the capacity to below 70%.



Plan View of Typical Sediment Basin



Cross Section of Typical Sediment Basin.

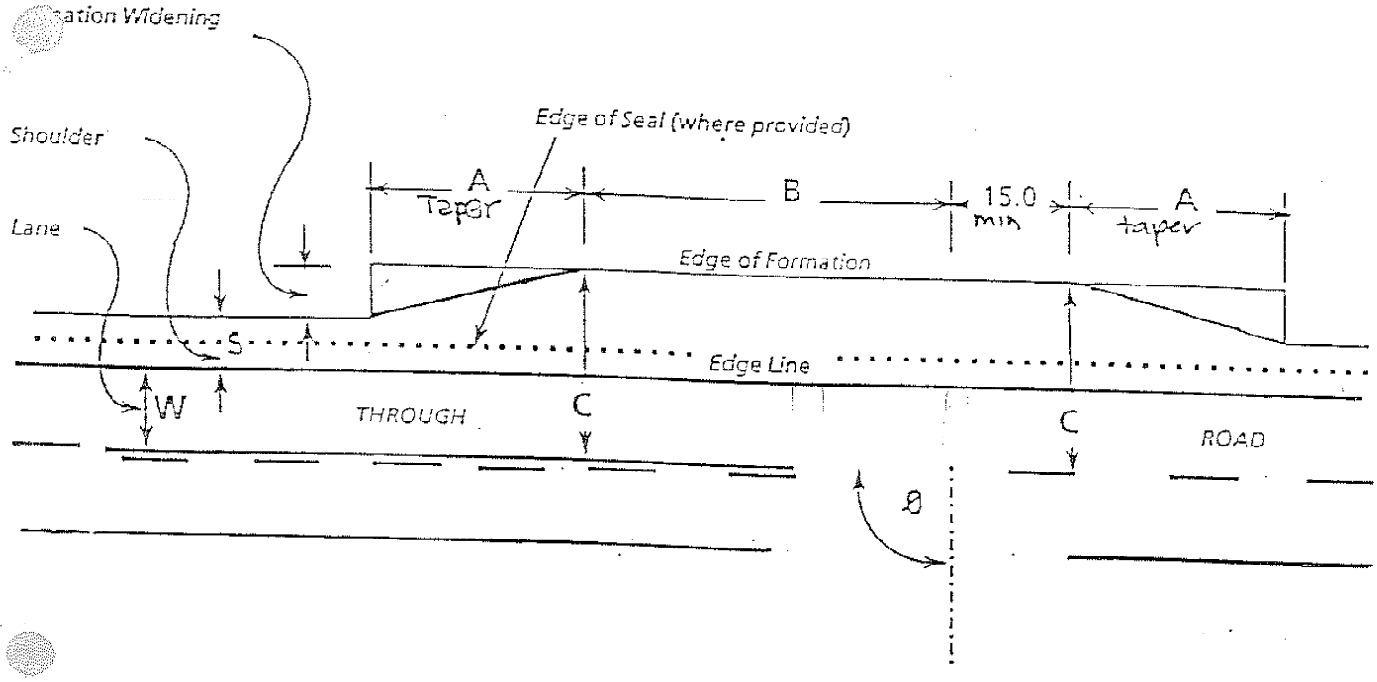
CESSNOCK CITY COUNCIL

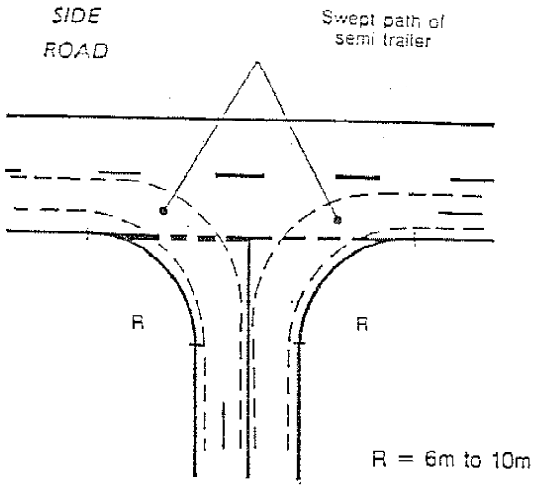
RIGHT TURN TREATMENT FOR RURAL ROAD CONDITIONS TO COMPLY WITH AUSTROADS STANDARD TYPE A.

PREPARED BY:- Road Safety Manager,
Cessnock City Council
Revised January 1993.

BASIC RIGHT TURN - MINIMUM TREATMENT

This is the minimum treatment for right turn movements from a through road to side roads and local access points. This treatment provides sufficient trafficable width for a heavy vehicle (17.5m long) to pass at a substantially reduced speed on the left of a stationary vehicle turning right.





Formation widening = C - W - S

A_T = $\frac{0.5 \times \text{Speed (km/h)} \times \text{formation widening}}{3.6}$

B - 28m @ 60kph

B - 39m @ 80kph

B - 42m @ 100kph

W - 3.0m (min) to 3.5m

S - 1.0m (min) to 3.0m (adjacent to barrier line)

C - (min on straight) = 6.0m

C - (min on curve) = 2 x 3.0 lane + corresponding widening for curve radius

Ø - (min angle 70°)

Ø - (max angle 110°)

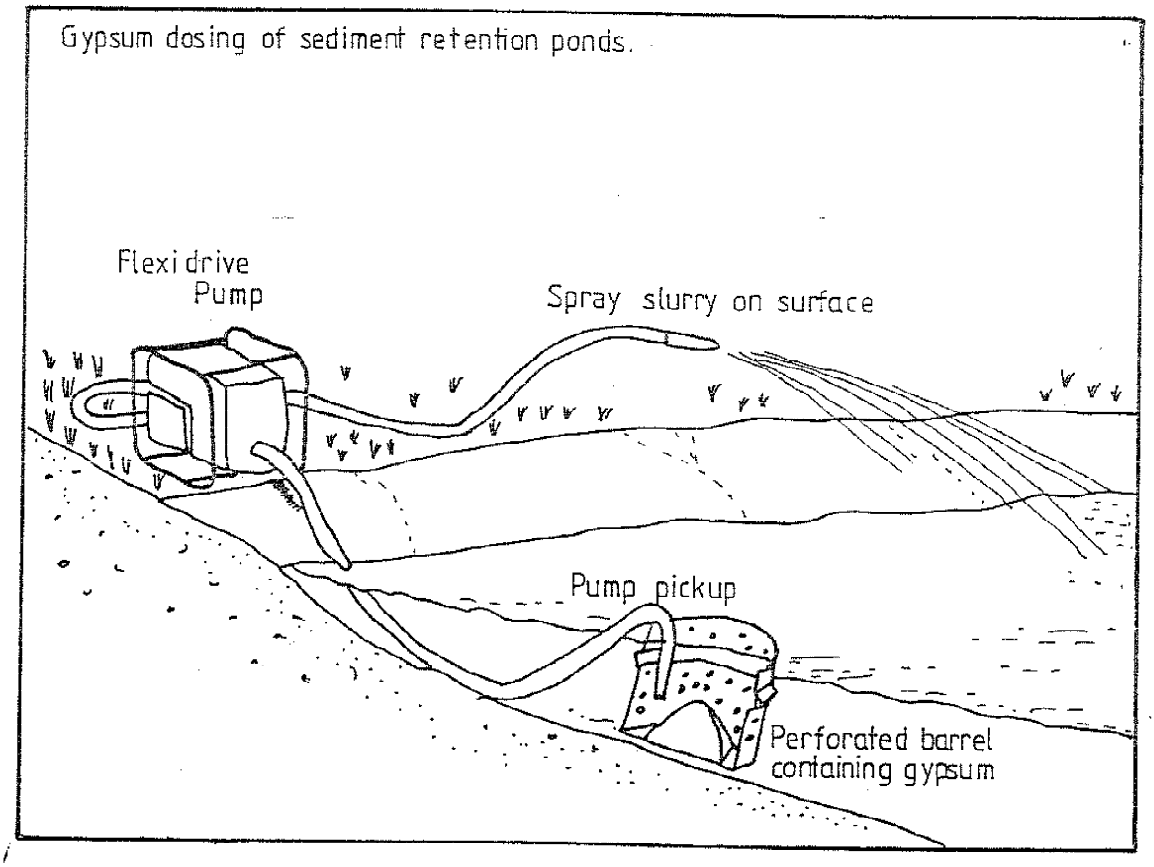
Should the through road be sealed, then the passing lane will be required to be sealed.

* **Discharge of Water**

Before discharge, the waters should be tested for suspended solids. A practical test adopted at this stage by Council to set a water standard for discharge is where it is possible to clearly see through to the other side of a bottled water sample. This is a very arbitrary test and initially it is necessary for the contractor/developer to have water sample standards approved by an officer of Council prior to any water discharge.

If the water does not meet the prescribed standards, it must be treated with gypsum to settle out suspended solids. In smaller capacity silt traps, the suspended solids in the impounded water can be settled out by broadcasting gypsum by hand over the entire water body surface. It is absolutely essential that the gypsum be broadcast evenly over the entire surface for this method to be successful.

The most effective treatment technique, particularly for larger structures, is to mix the gypsum into a slurry with water and then spray the slurry on the pond surface. Effective mixing is best achieved by continual movement of a flexidrive pump in the barrel of gypsum and water. To achieve the prescribed level of suspended solids within 24-36 hours, gypsum should be used at a rate no less than 32 kilograms per 100 cubic metres of water impounded. The water should be tested after this period in the method described, and if the standard is met, it may be discharged. If the water does not meet the standard, a longer settlement time may be required or the pond may need to be treated again.



3.9.8 *Stabilised Entrances to Construction Sites*

(a) Description - A bed of aggregate on filter cloth or a cattle grid located at any point where traffic enters or leaves a construction site. Stabilised entrances reduce or eliminate tracking of sediments onto public rights of way or streets.

(b) Usage - Stabilised construction entrances should be used at all points where construction vehicles enter or leave sites and enter existing roadways.

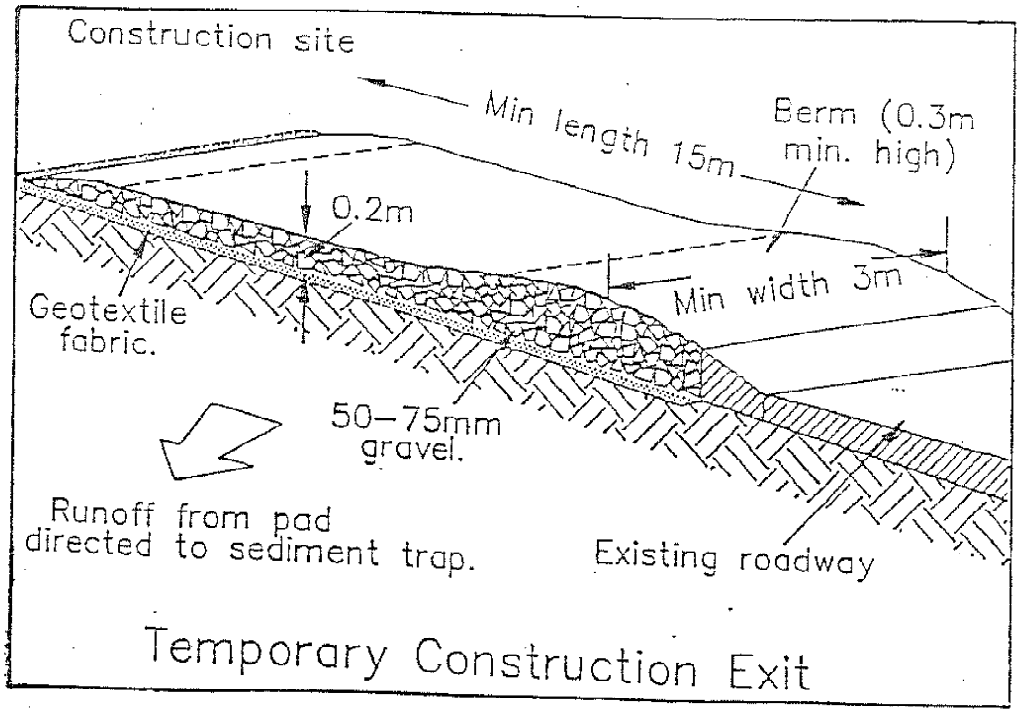
(c) Installation - Grade the entrance way so that it is at least 15 metres long with a minimum width of 3 metres for a one-way entrance and 6 metres for a two-way entrance.

Place a filter cloth over the entire area, and cover it with 150mm of 50mm aggregate, river gravel or a recycled or reclaimed concrete equivalent.

Surface water flowing to the entrance must be piped under the entrance, or a berm constructed to direct surface flow away from the road.

If a cattle grid is used, this should be so placed as to ensure the vehicles when crossing the grid have sufficient speed on to 'shake the mud' or other contaminants, such as gravel, from the vehicle. It must not be placed where the vehicle is slowing to enter a roadway.

The Contractor, under Section 16 of the Clean Waters Act, is liable for the deposition of any contaminants deposited on roadworks after leaving the construction site.



3.9.9 *Buffer Zones*

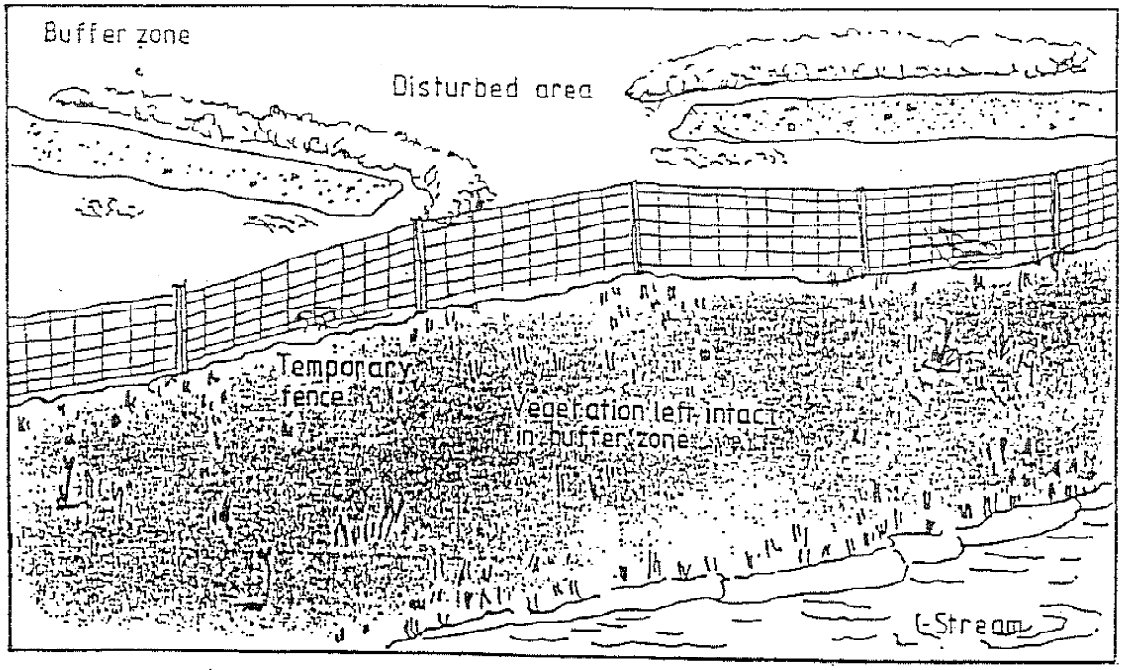
(a) Description - Buffer zones are corridors of vegetation adjacent to waterways or disturbed areas. The vegetation filters suspended solids and reduces the nutrient levels in runoff. Wetlands, streams and rivers adjacent to construction sites should be protected by buffer zones.

(b) Requirements - Buffer zone performance increases as catchment area and slope gradient decreases. Thirty metre wide buffer zones generally provide adequate protection.

Slope %	Buffer Length in Metres
2	15
4	20
6	30
8	40
10	50
12	60
14	70

Buffer zones can reduce the need for other erosion and sediment control measures. However, contaminated water in concentrated form will require treatment, both at its source point and final disposal.

(c) Maintenance - A fence should be used to exclude traffic from buffer zones to prevent damage to the vegetation, particularly during any construction phase.



REFERENCES & ACKNOWLEDGEMENTS

* CONSERVATION & LAND MANAGEMENT "URBAN EROSION & SEDIMENT CONTROL" HANDBOOK, 1992.

* GOLDRICK, D.A. (1992) "URBAN DEVELOPMENT - AN INTEGRATED APPROACH FOR EFFECTIVE EROSION AND SEDIMENT CONTROL", PROCEEDINGS INAUGURAL I.M.E.A. (N.S.W. DIVISION) CONFERENCE, PENRITH, N.S.W., pp.57-64.

* DEPARTMENT OF HOUSING "SOIL AND WATER MANAGEMENT FOR URBAN DEVELOPMENT", 1993.

4.0 ROAD DESIGN

4.1 INTRODUCTION

This section details the requirements for the design of roads and footpaths.

Engineering design plans and specifications are to be submitted to Council's Engineer for approval. These shall include details of geometric design, existing and proposed levels and gradients on the longitudinal sections, cross sections, kerb returns, existing services and structures, cut and fill, site regrading, intersection design and any other relevant details.

4.2 CONSULTATION

Design consultants are encouraged to seek Council's and other relevant Authorities advice prior to the preparation of detailed engineering designs.

4.3 GEOMETRIC DESIGN

4.3.1 Widths of Carriageways

Widths of carriageways, footpaths and road reserves are detailed in Council's Subdivision Code or relevant DCP and are generally established as part of the development consent. Variations, however, may be necessary as a result of engineering requirements.

4.3.2 Grades

1%	Desirable minimum
0.5%	Absolute minimum
16%	Desirable maximum
20%	Absolute maximum

The above will also depend on the length of such grade, traffic type and volume. Special consideration will be given to major routes and proposed bus routes.

4.3.3 Crossfalls and Superelevation

(a) Desirably, roads should be crowned in the centre. A standard 4% crossfall will apply to straight roads. Unsealed roads should have a minimum of 6% crossfall.

(b) The use of superelevation will only be permitted on major urban and rural roads with design speeds of 80kph or greater, unless otherwise advised by Council's Engineer.

(c) Superelevation and transitions will be provided in accordance with either the R.T.A. Road Design Manual 1992 or the current Austroads Guide to Traffic Engineering Practice.

4.3.4 Design Speed

(a) Generally the following design speeds are to be adopted for the design of subdivision roads:-

URBAN		RURAL	
Cul-de-sac Accessway	25kph	Cul-de-sac (Pending Length)	40-60kph
Local	40/50kph	Other	60/80/100kph
Collector	60kph		
Distributor	60/80kph		

These above design speeds should be verified with Council prior to detail design.

(b) Design speeds for industrial, commercial and main roads are to be determined by Council's Engineer.

(c) Difficult topography, intersection locations and other constraints may affect desirable design speeds. In such instances design speeds may be reduced or increased. Attention must be given to ensure that potentially hazardous situations are forewarned by providing adequate traffic engineering measures.

4.3.5 Horizontal Curves

(a) Such curves are generally established within the approved Development Plan.

(b) The minimum deflection for which a curve is necessary is 0.75 of a degree (45 minutes). This is subject to the location of the angle within the vertical plane.

(c) The minimum centreline radius for a proposed bus route is 60 metres.

(d) Horizontal curves on distributor or main urban and rural roads are to be in accordance with either the R.T.A. Road Design Manual 1992 or the current Austroads Guide to Traffic Engineering Practice.

4.3.6 Vertical Curves

(a) All vertical curves are to be designed for a minimum 60kph, stopping sight distance excepting urban accessways.

(b) Reaction times are to be 1.5 seconds for urban areas and 2.5 seconds for rural areas.

(c) Intersections, accesses and driveways are to be located to provide adequate stopping sight distance.

(d) Sag vertical curves are to be of a length to provide adequate riding comfort.

(e) Sag vertical curves will be designed to address the following:-

(i) Have an instantaneous grade greater than 0.1% for five (5) metres either side of the sag stormwater pit.

(ii) The provision of a formal overland flow path to cater for storms in excess of the piped system capacity to limit the depth of ponding to no greater than 0.2 metres.

(f) Points (a) to (d) are to be designed in accordance with the R.T.A. Road Design Manual 1992 or the current Austroads Guide to Traffic Engineering Practice.

4.3.7 Intersections

Are to be designed in accordance with the R.T.A. Road Design Manual 1992 or the current Austroads Guide to Traffic Engineering Practice, paying particular attention to the following requirements:-

(a) Adequate capacity for projected traffic volumes.

(b) Adequate stopping sight distance.

(c) Provision for future Service Authority requirements and intersection legs.

(d) Pedestrians.

(e) Single unit and semi-trailer turning paths.

(f) Adequate site specific designed street lighting.

(g) Intersections with R.T.A. classified roads are to be designed, approved and constructed in accordance with their requirements.

(h) Geometric adequacy of existing roads at the location of the proposed intersection.

(i) Signposting and pavement marking.

(j) Drainage aspects in accordance with road classifications.

(k) Minor intersections are to be designed to industry best practice standards. Such intersections will adequately cater for the turning paths of the appropriate design vehicle.

Desirable minimum kerb return radii will be 7.5 metres for urban residential areas and 10.0 metres for industrial areas.

(l) Commercial and industrial entry and exit access locations and widths are to be in accordance with the R.T.A. Guide to Traffic Generating Development Manual and to industry best practice standards.

4.3.8 Roundabouts

Roundabouts are to be generally designed in accordance with the current Austroads Guide to Traffic Engineering Practice, paying particular attention to the following requirements:-

(a) Adequate capacity for projected traffic volumes.

(b) Adequate sight distance for vehicles approaching and entering the roundabout and pedestrians.

(c) Provisions for Service Authorities future needs.

(d) Geometry to satisfy deflection and driver guidance requirements. It is preferable to attain deflection prior to entering the roundabout.

(e) Adequate drainage.

(f) Site specific designed street lighting.

(g) Signposting and pavement marking.

(h) Design vehicle turning paths.

(i) The provision of suitable landscaping.

(j) Designs adopting alternative criteria will be considered on their merits.

(k) Minor roundabouts for use as traffic calming devices in local roads are to be designed in accordance with Council's Engineer's requirements.

Roundabouts on R.T.A. classified roads are to be approved and constructed in accordance with their requirements.

4.3.9 Cul-de-sac and Hammer Head Facilities

The following minimum requirements will apply to turning facilities:-

(a) Cul-de-sacs:-

Urban Residential	8.5m radius to face of kerb
Rural Residential	8.5m radius to edge of seal with an additional 1.2m shoulder
Urban Industrial	13m radius to face of kerb
Rural Industrial	13.5m radius to edge of seal with an additional 1.2m shoulder

Where concrete dish gutters or similar are required in rural areas, the 1.2m shoulder width may be deleted.

(b) Hammer Heads - Variations of hammer head turning facilities will be permitted where circumstances warrant.

(c) Grades and Crossfalls - The following is to apply to all turning facilities:-

0.5%	Absolute Minimum
0.75%	Desirable Minimum
5%	Desirable Maximum
7%	Absolute Maximum

4.3.10 Traffic Control Devices

(a) Traffic control devices are to be provided to reduce travel speeds in accordance with design speeds generally where road geometry cannot provide this requirement.

(b) Such devices are to be designed and spaced generally in accordance with AMCORD or the current Austorads Guide to Traffic Engineering Practice recommendations and are to be approved by Council's Engineer.

(c) Control device design should generally cater for the following:-

(i) Design vehicle turning paths.
(ii) Pedestrians and cyclists.
(iii) Drainage.
(iv) Street lighting.
(v) Be part of an overall scheme (Local Area Traffic Management).
(vi) Special consideration for bus routes.
(vii) Sight distance.
(viii) Signposting and pavement marking.
(ix) Emergency vehicles.
(x) Private accesses.

4.3.11 Footpaths

Footpaths widths are to be determined in accordance with Council's road hierarchy.

Crossfalls are to be 3%. However, variations to this may be considered under special circumstances.

Generally longitudinal grades are to be the same as the adjacent roadway, being an absolute minimum of 0.5% and a desirable maximum of 16%.

Where grades exceed 10%, special consideration is to be given to provide for pedestrians. A small bank of steps, handrails and regrading of the footpath may be required. In such instances consideration is to be given to lot access and Service Authority requirements.

4.4 RURAL ROAD DESIGN

4.4.1 General

The following requirements apply to roads identified as being within rural areas.

4.4.2 Design Speed

Rural road design speeds are provided in Clause 4.3.4 and once established are generally used as the basic parameter for determining minimum design requirements for other elements.

4.4.3 *Design Criteria*

Generally rural roads are to be designed in accordance with the current Austroads Geometric Design of Rural Roads.

Intersections should generally be designed in accordance with the current Austroads Guide to Traffic Engineering Practice.

4.5 ANCILLARY REQUIREMENTS

4.5.1 *Signposting and Pavement Marking*

(a) Signposting and pavement marking should generally be provided to roads, intersections, traffic control devices, cycleways and carparks in accordance with Australian Standard 1742.1-13 and the R.T.A. Interim Guide to Signs and Markings.

(b) Street name plates are to be of the standard type throughout the Cessnock City area unless otherwise approved. Refer to Section 4.7.5 for street sign and location details.

"No Through Road" signs are to be placed in accordance with Council's requirements where roads do not continue. In the instance of staged constructions, the sign is to be relocated or removed to suit new works.

4.5.2 *Guardrail and Guideposts*

(a) Where there is a warrant, guardrails are to be provided in accordance with R.T.A. specification, where shown on the approved engineering plans or as directed by Council's Engineer.

(b) Guideposts are to be provided in accordance with R.T.A. requirements, where shown on the approved engineering plans or as directed by Council's Engineer.

4.5.3 *Cyclists*

Consideration is to be given for cyclists in all aspects of road design. Cycleways and other provisions are to be included in the design where specifically nominated in the consent, Council's Bicycle Plan or nominated by Council's Engineer.

Such works should generally comply with the requirements of the current Austroads Guide to Traffic Engineering Practice.

4.5.4 *Pathways*

(a) Concrete pathways are to be provided where shown on the approved engineering plans.

(b) Such pathways are generally used to link cul-de-sacs and also used as overland flow paths.

(c) The following should apply when designing pathways:-

(i) A minimum width of 1.2m.
(ii) A desirable crossfall of 3%.
(iii) Have an integral 150mm kerb on the low side.
(iv) Have sufficient capacity to carry the overland flow with nominated freeboard.
(v) Be provided with footpath barriers at either end at the property boundary line unless otherwise specified.
(vi) Have a minimum grade of 0.5% and maximum grade of 16%.
(vii) Where grades exceed 16% steps are required.

(d) Further details and acceptable variations can be discussed with Council's Manager Urban Roads.

4.5.5 Service Authorities

The developer must provide all Service Authorities with finished surface levels and/or up and down measurements from the top of kerb at the proposed property boundary and/or the proposed location of the Service Authorities pit, marker etc. to ensure that:-

(a) All Service Authority conduits etc. have correct cover.

(b) All Service Authority pits, markers etc. do not require future costly adjustments to suit driveways, footpaths etc.

It is advisable the developer liaise with Service Authorities at any early stage of the development process to ensure that engineering designs are compatible with Service Authority's requirements.

4.5.6 Batter Details

Cut or fill batters should generally comply to the following requirements unless otherwise advised by Geotechnical Engineers or requested by Council's Engineer.

(a) Fill Batters:-

Six horizontal to one vertical	Preferred
Four horizontal to one vertical	Desirable maximum
Two horizontal to one vertical	Absolute maximum

All fill batters to be stabilised in accordance with Section 3.8.2 and 3.8.3 Erosion and Sediment Control.

(b) Cut Batters:-

Six horizontal to one vertical	Preferred
Four horizontal to one vertical	Desirable maximum
Two horizontal to one vertical	Absolute maximum

All cut batters to be stabilised in accordance with Section 3.8.2 and 3.8.3 Erosion and Sediment Control.

Cuttings in rock may be steeper than 2 to 1, up to 1 to 4 only where geotechnical reports and in field testing proves the stable nature of the rock.

(c) Lot Batters & Accesses - All batters are to commence at the property boundary. Variations may be approved under special circumstances. Refer to Clause 4.3.11 Footpaths.

(d) Vehicle access must be obtainable to each lot within close proximity to the building line. Maximum vehicular access grade to be 25%. Refer to Drawing S.D.3.

(e) Batters are generally to intersect with the natural surface prior to the proposed building line.

4.5.7 Temporary Turning Facilities

(a) Bus Routes - When a proposed road being a designated bus route is constructed in stages and the accumulated or initial length warrants a bus service, a temporary turning facility is to be provided in accordance with this specification.

(b) Residential Streets - When there is the likelihood of a delay in the construction of a further stage of a subdivision which creates dead ends of minimum 90 metres in length, a temporary gravel turning facility is to be provided, preferably a hammer head or a turning circle in accordance with this specification. Refer to Clause 4.3.9.

4.5.8 Parking

(a) Generally parking areas should be designed in accordance with best industry practice and Council's Carparking Policy which refers to Australian Standard 2890, the current Austroads Guide to Traffic Engineering Practice and the R.T.A. Guidelines to Traffic Generating Developments.

(b) Particular attention should be made to the following design requirements:-

(i) Grades and crossfalls to be an absolute minimum of 1%, desirably 3%, and an absolute maximum of 5%.

(ii) Drainage aspects, especially where the carpark area is used for on site detention of stormwater.

(iii) Car space yield.

(iv) Circulation and aisle length.

(v) Ingress and egress requirements.

4.5.9 *Urban Roads - Carriageway Widths*

Street Type	Reserve Width	Maximum Traffic Volume	Dwellings Served	Carriageway Width Between Nominal Face Kerbs	Parking Provisions Within Street Reserve	Kerb Type	Footpath Requirements	Cul-de-Sac Radius
Access Place or Shared Way	10.5	100	Up to 20	3.5m	One (1) space per two (2) allocations	Rolled or layback	Min. 3.5m wide footpath	Shunt type head treatment or carriageway
Local Access Street	13 to 15	1000	20 to 120 and less than 1km in total length	5m to 8m	Indent parking bay or carriageway	Rolled layback or upright	Min. 3.5m footpath	Reserve - 12.0m Carriageway - 8.5m
Local Access Street	15	2000	120 to 360	6.5m to 9m	Indent parking or carriageway	Rolled layback or upright	Min. 3.5m footpath	Reserve - 12.0m Carriageway - 8.5m
Collector Road	18	3000	On Merits	7.9 7m to 11m	Carriage-way	Upright only	Min. 3.5m footpath	Reserve - 13.0m Carriageway - 9.0m
Collector Road with Bus Route or Cycle-way	20	3000	On Merits	13m	Carriage-way	Upright only	Min. 3.5m footpath	Reserve - 13.0m Carriageway - 10m
Trunk Collector Sub-Arterial Roads	23	6000	On Merits	2x3.5m travelling lanes 2x3m parking lane 3.0m median	Restricted carriageway	Upright only	Min. 3.5m footpath	

4.5.10 *Industrial Roads*

Street Type	Reserve Width	Maximum Traffic Volume	Lots Served	Carriageway Width Between Nominal Face Kerbs	Parking Provisions Within Street Reserve	Kerb Type	Footpath Requirements	Cul-de-Sac Radius
Industrial Subdivision Urban/Rural	20	-	-	14m	On Site	Upright	Min. 3.5m footpath	Reserve - 18.5m Carriageway - 15m Absolute minimum to face of kerb - 13.5m 13.5m road to edge of seal with an additional 1.2m shoulder

4.5.11 *Rural Roads*

Street Type	Reserve Width	Maximum Traffic Volume	Dwellings Served	Carriageway Width Between Nominal Face Kerbs	Edge Treatment	Footpath Requirements	Cul-de-Sac Radius
Rural Subdivision	20m	On Merits	On Merits	7.0m (2 x 3.5m travelling lanes) 2 x 1m shoulder	Grassed dish drain	Min. 3.5m footpath	Reserve - 12.0mR Carriageway - 8.5mR with an additional 1.0m shoulder
Semi Rural Roads Generally 1(c) zoned land	18-20m	On Merits	On Merits	6.0m min.	Concrete rolled kerb	Min. 3.5m footpath	Reserve - 12.0mR Carriageway - 8.5mR

The standard of road construction for rural roads will be assessed for each case. Where longitudinal grades exceed 6%, and depending upon soil types, it should be expected that roads shall be sealed and that concrete table drains will be necessary and will need to be protected against erosion.

4.5.12 Existing Rural Road Reserves

AADT	Pavement Width	Seal Width	Reserve Width
Less than 200	6.0m	-	18
200 to 500	8.0m	7.0m	20
500 to 1000	8.5m	7.5m	20
1000 to 2000	10.5m	7.5m	20
More than 2000	11.0m	9.0m	20

4.5.13 Minor Rural Access Roads - Generally existing tracks within Crown Reserve Roads & Not Maintained by Council

Category	Definition	Pavement Width	Shoulder	Formation	Road Reserve	Design/Construction Standard
Minor Rural Road (A)	Servicing 1 to 2 lots	3.0m	Passing bays at 200m intervals or closer where sight distance is limited. Passing bays shall be 7m x 2.5m.			All weather with 100mm compacted thickness of approved gravel
Minor Rural Road (B)	Servicing 3 to 5 lots	3.6m	1.2 x 2	6.0m	20m	Min. 150mm compacted thickness of approved gravel for full pavement formation
Rural Road (C)	Servicing 6 to 10 lots	6.2m	1.2 x 2	8.6m	20m	Min. design speed 80km/hr Full engineering design Gravel pavement in accordance with ARRB Special Report No. 41

4.6 ROAD PAVEMENT DESIGN

4.6.1 Evaluation of Subgrade Strength

Council will require investigation and testing by a qualified geotechnical engineer through a NATA registered laboratory of the anticipated subgrade material.

The geotechnical report will be subject to Council's approval and under no circumstances are any roadworks to commence prior to its approval.

Assessment of the strength of the supporting subgrade is to be in accordance with ARRB Special Report No. 41, Section 2.

4.6.2 Design Traffic Loadings in ESA's

The design traffic loading shall be calculated in accordance with Section 7 of Austroads (1992) and Section 3 of A.R.R.B. Special Report No. 41 for main and other roads respectively. Traffic loading calculations shall be submitted to Council for its records at the time of preliminary design plans.

Alternatively, the figures in the following table may be assumed. Council should be consulted to clarify road types.

Road Type	Design ESA's for Flexible Pavements
Urban Residential	
cul-de-sac/accessway	1×10^4
minor	6×10^4
local access	3×10^5
collector	1×10^6
distributor	2×10^6
Rural Residential	
cul-de-sac	1×10^4
other	3×10^5
Commercial & Industrial	5×10^6
Main Roads	Refer to Council

4.6.3 Public Road Pavements

Pavement thickness calculations shall be submitted to and approved of by Council before any earthworks commence on the site.

Pavement thickness calculations are subject to variation should changes in the subgrade become evident during construction.

Confirmation by a qualified geotechnical engineer of preliminary subgrade conditions will be required following initial excavation. In deep cuttings, deep fills or other instances where testing of subgrade is possible only at time of construction, a separate pavement design will be required during construction.

These pavement designs shall also be submitted to and approved by Council.

4.6.4 Flexible Pavements

(a) Evaluation of Pavement Thickness - Pavement thickness design shall be based on the assessed subgrade strength and in accordance with the following:-

* Figure 7 in A.R.R.B. Special Report No. 41 for urban residential streets that are expected to receive less than one million ESA load applications per lane.

* Figure 10 in A.R.R.B. Special Report No. 41 for rural residential streets that are expected to receive less than one million ESA load repetitions per lane.

* Figure 8.4 in Austroads (1992) for roads with design traffic loadings greater than 10^6 ESA/lane.

(b) Minimum Pavement Layer Thickness - The minimum thickness of any cement stabilised layer shall be 150mm. The minimum asphaltic concrete layer thickness shall be 2.5 times the maximum particle size. The minimum thickness of granular pavement layers shall be 100mm or 2.5 times the maximum particle size, whichever is the greater.

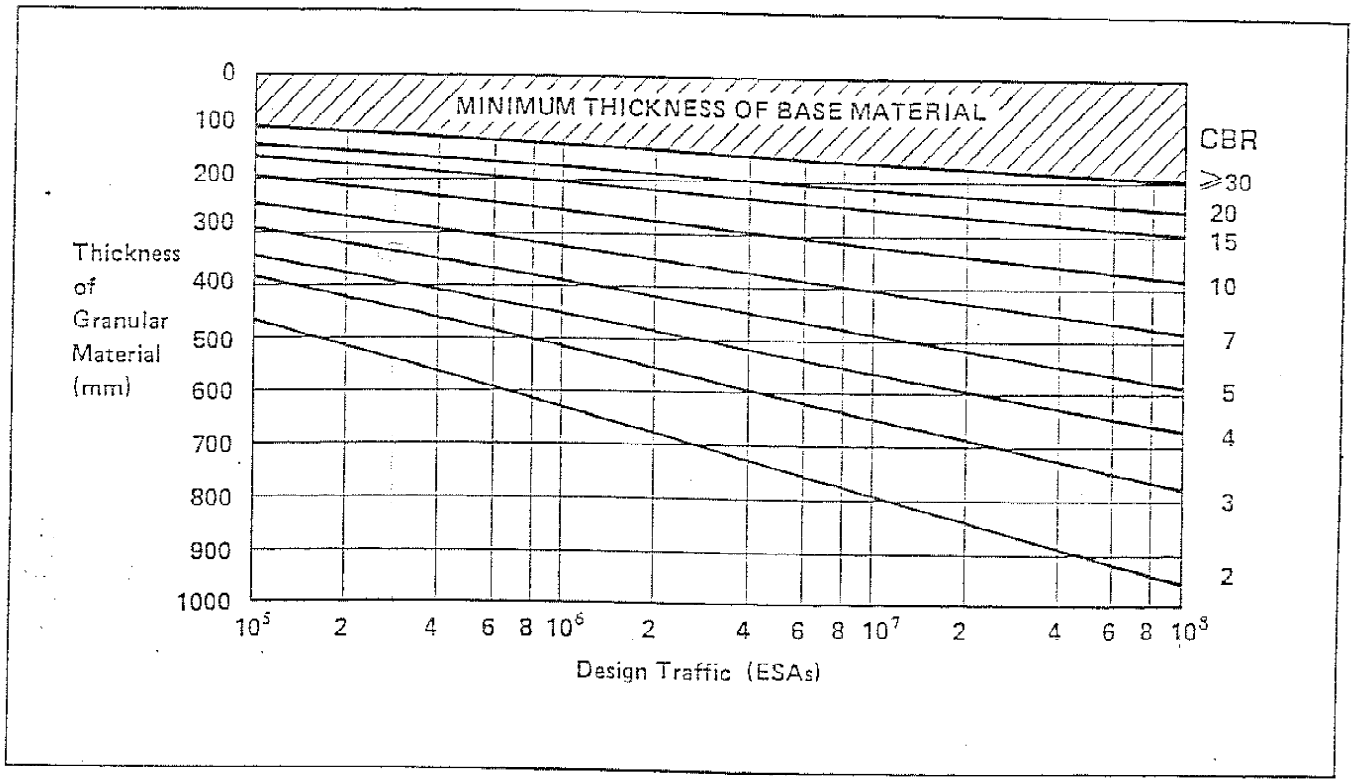


FIGURE 8.4 DESIGN CHART FOR GRANULAR PAVEMENTS WITH THIN BITUMINOUS SURFACING

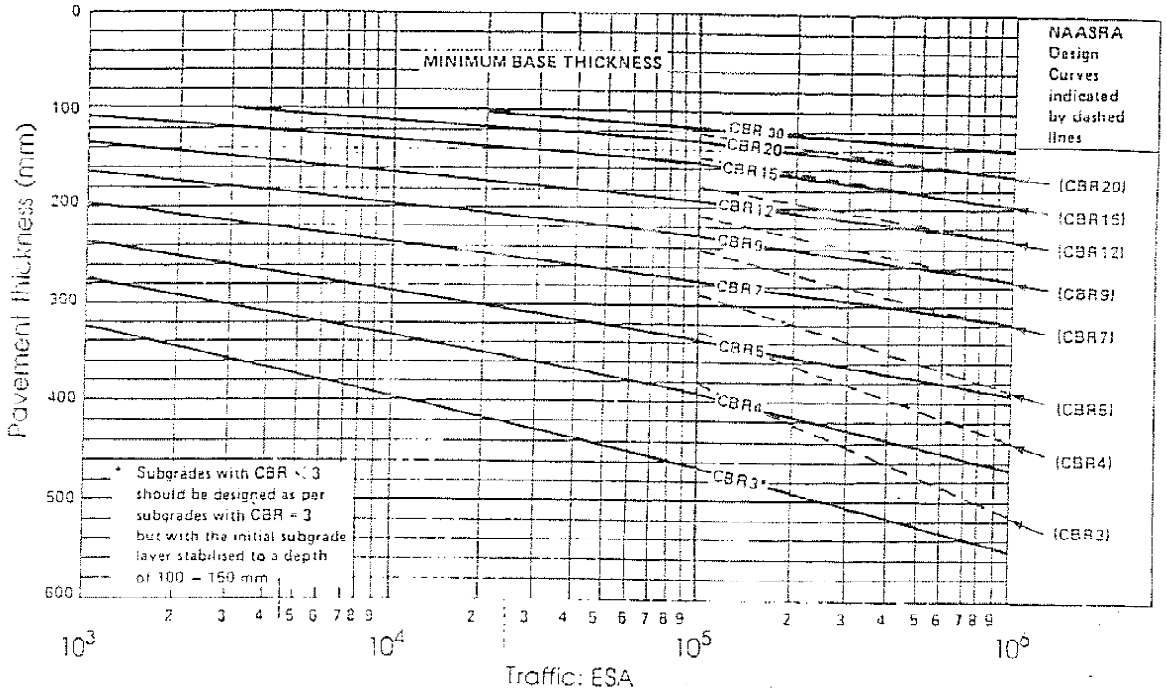


Fig. 7 - Interim thickness design curves for residential street pavements, based on a 95 per cent confidence limit (Mulholland 1986; Barnard 1986)

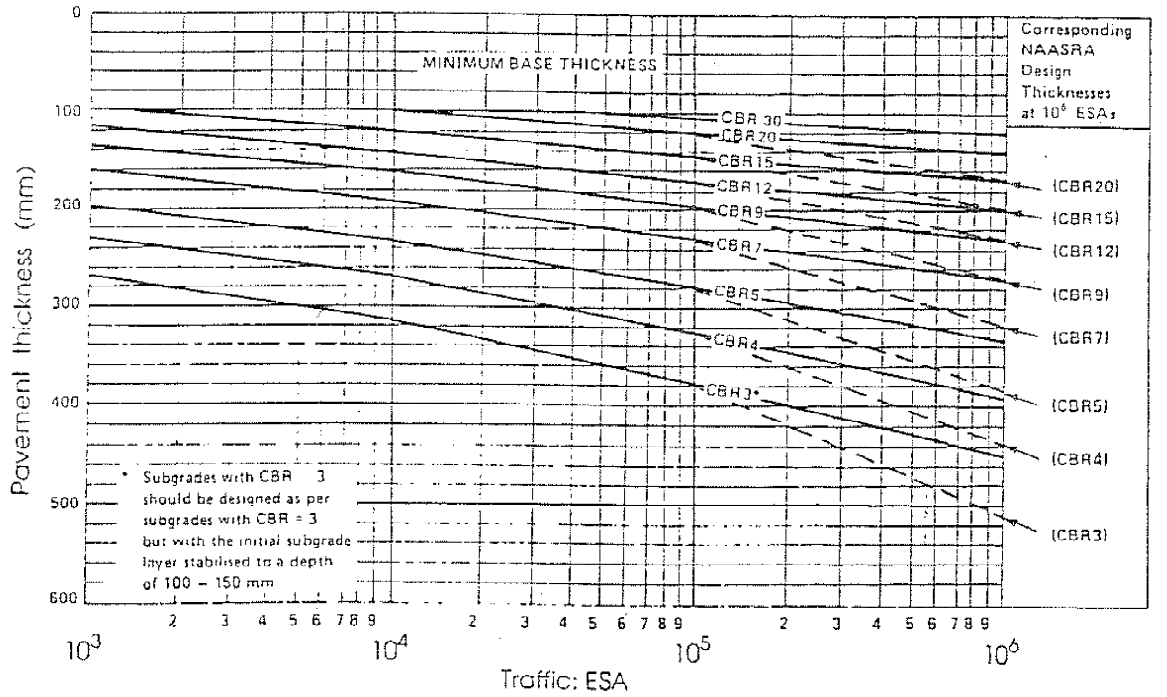


Fig. 10 - Interim thickness design curves for residential steel pavements, based on a 90 per cent confidence limit (Barnard 1986)

4.6.5 Rigid Pavements

(a) General - All rigid pavements on public roads shall be designed and constructed in accordance with the following documents:-

* Austroads Pavement Guide (1992).
* R.T.A. Form No. 76 (1992) (supplement to the Austroads Guide).
* R.T.A. Concrete Pavement Manual.

(b) Minimum Pavement Thickness & Layer Thickness - Notwithstanding subgrade testing and subsequent rigid pavement thickness design:-

* The minimum thickness of sub-base shall be 100mm.
* The minimum thickness of base course shall be 150mm.

4.6.6 Accessway Pavements

(a) General - Accessways by definition will serve up to 15 dwellings and may be constructed in full flexible pavement or rigid pavement. Requirements of Section 4.6.3 shall apply.

(b) Flexible Pavements for Individual Accesses - Thickness of flexible pavements for individual access driveways shall be determined from CSIRO "Bituminous Driveways" Construction Note.

(c) Decorative Pavements/Surface Treatments:-

* To be discussed with Council at preliminary design stage.

* Type of treatment to be considered/approved by Council.

* To be supported by relevant technical information/design manuals or manuals nominated by Council.

(d) Rigid Pavements - Design details shall be in accordance with the following Cement and Concrete Association of Australia documents:-

* For design - "Concrete Street & Parking Area Pavement Design" (1984).

* For construction - "Outline Guide for Construction of Concrete Road Pavements (TN50).

4.7 ROAD DELINEATION

Road delineation refers to components such as guardrail, guideposts, linemarking and pavement marking. Assessment for the need of these components will be determined by Council's Manager Traffic Engineering.

4.7.1 Guardrail

Shall be supplied and installed in accordance with R.T.A. specifications, delineators shall be of a type recommended by Council and installed to Council's requirements.

4.7.2 Guideposts

Shall be of a type preferred by Council and installed in accordance with Council and the manufacturers specifications. Guideposts shall be installed off the edge of the shoulder, being an absolute minimum of 1.0 metre from the edge of the traffic lane, otherwise between 2.0 and 3.0 metres, depending on shoulder widths. Guidepost spacing shall be in accordance with R.T.A. specifications.

4.7.3 Linemarking

Shall be in accordance with R.T.A. Specification, AS1742.2, and to the satisfaction of Council's Road Safety Manager.

4.7.4 Pavement Marking

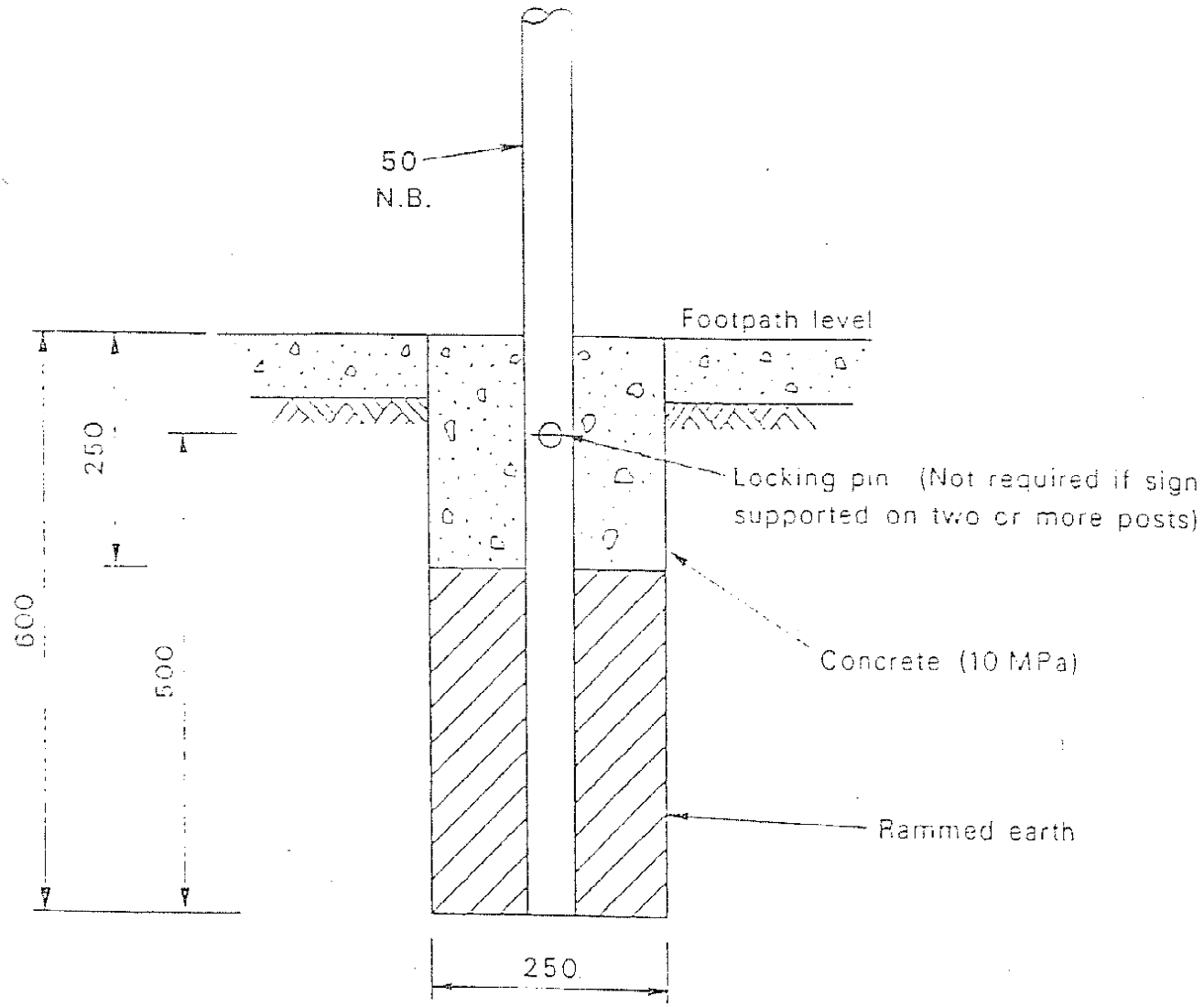
Shall be in accordance with R.T.A. Specification, AS1742.2. The type preferred and installation method shall be in accordance with Council's requirements.

4.7.5 Street Nameplates

Signs are to be of the standard type throughout the City. Posts shall be 50mm (2") I.D. galvanised pipe fitted with downe caps and clamp for sign. Details are as follows:-

* Blade	-	P.V.C. 6mm U.V. stabilised.
	-	125mm depth.
	-	Square ended for midblock/pointed blade for commencement of street.
* Lettering	-	Double sided.
	-	100mm series "C" lettering.
	-	Black vinyl.
* Background	-	White reflective Class 2-3M or equivalent.
* Posts	-	50mm N.B. gal. steel posts.
* Brackets	-	Aluminium to suit steel posts.
* Erection	-	By subdivider under Council supervision or by Council by arrangement and payment of the appropriate fee.

The post is to be set in concrete 600mm in the ground and the sign fitted 2.5 metres above ground level. For location of street signs refer to AS1742.5.



SIMPLE PIPE SUPPORT

5.0 ROAD CONSTRUCTION (Refer to Chapter 4 Also)

5.1 SIGNPOSTING OF ROADWORKS

Signposting of roadworks shall be undertaken to assist the safe passage of motorists through the work site. Signposting and control of the work site shall aim to separate motorists from the workmen and machinery wherever possible.

It is the developer's responsibility to ensure the provision and maintenance of all signposting and traffic control devices in accordance with AS1742.3 - 1985. All contractors working on site shall use safe work practices when engaged in traffic control and shall be certificated traffic controllers.

All workmen engaged on traffic control duties or working adjacent to traffic lanes shall wear safety vests of fluorescent colouring.

If a work area intrudes onto a traffic lane such that two way traffic is not possible, then detours or traffic control persons shall be used. In the event of works causing traffic delays and disruptions, at least 7 days prior notice shall be given to the Director Works where possible.

5.2 FOOTPATHS

Shall be constructed to plan cross sections and where no concrete is required, the full width is to be sown with grass. Refer to Clause 3.8.6 for grass seed mixtures. Establishment of grass is to be completed within the maintenance period. Turf strips to an equivalent width of 1.2 metres will be required behind kerb and gutter and concrete dish drains or similar structures and diagonally across footpaths to prevent soil erosion and assist silt control.

5.3 CLEARING

The full formation width is to be cleared of all timber, boulders etc., and in stable ground or where only minor filling is required, all trees and surface roots are to be grubbed to a depth of 0.3 metres, and the holes backfilled with sound and properly compacted material.

5.4 HAZARDOUS TREES

Any trees within the road reserve which are considered by Council's Engineer to be hazardous to traffic or installation are also to be removed or pruned as required. Refer to Chapter 3.

5.5 DISPOSAL BY BURNING

In areas where burning of timber is permitted by prevailing regulations, all cleared and fallen timber is to be stacked clear of work and completely burned in an approved burner with due observance of Council's current fire lighting and maintenance requirements and the E.P.A. requirements. Where excavation of trenches is required to facilitate burning, these are to be constructed outside of proposed lot boundaries, preferably within reserves or similar areas as approved by Council's Engineer.

5.6 DISPOSAL BY CHIPPING

Any approved cleared vegetation may be put through a chipper to reduce it to pieces not larger than 75 x 50 x 15mm. The chippings may be either spread over the site or stockpiles for re-use as mulch as directed by the Superintendent.

5.7 OTHER DISPOSAL

In areas where burning is prohibited by regulation, all cleared material shall be removed by the contractor to an authorised Council dumping area or otherwise disposed of as approved by Council's Engineer.

5.8 FILLING WITHIN THE ROAD RESERVE

5.8.1 General

Intended fill shall be approved by Council's Engineer and is to be sound free from any organic matter, rubbish etc. Fill is to be placed in layers not exceeding 150mm compacted in depth and spread evenly for the full width between batter pegs. Tipping of loose material over partly completed fill to obtain the necessary width will not be accepted. On locations where fill is carried up in benches, the adjoining batters are to be adequately bonded and compacted.

5.8.2 Compaction Tests

Tests will be carried out at the frequency specified in AS3798-1990 during filling of footpath areas and batters and a minimum compaction of 95% standard maximum dry density will be required.

5.8.3 Benching

Proper support benching is to be constructed as indicated on the plan for fill on side grades in excess of 25% and on lesser grades where considered necessary by Council's Engineer to improve stability. No fill is to be placed until benching has been inspected and approved.

5.9 CUTTINGS

Batter slopes are to be cut in accordance with the plan, unless instructed otherwise by Council's Engineer due to special circumstances.

5.9.1 *Batter Faces*

Batter faces are to be clean cut and free from loose or overhanging rocks etc. Care is to be taken that batters are correctly pegged and an even slope maintained for full depth so as to provide for full width shoulder and table drain construction.

5.9.2 *Stabilisation of Batters*

Batter faces are to be stabilised to the satisfaction of Council's Engineer. Refer to Erosion and Sediment Control Section - Chapter 3.

5.10 ROAD SUBGRADE

Overall subgrade is to be of sound material, compacted to 100% standard maximum dry density, and trimmed to the same crossfall as the surface course gravel. Any unsuitable material is to be removed, replaced with sound material and compacted to the required density as directed by Council's Engineer. Test results from a registered NATA laboratory shall be provided by the developer prior to approval of the subggrade by Council.

5.11 ROCK SUBGRADE

In the case of rock subgrade, the rock is to be thoroughly ripped to a depth of 300mm below subgrade surface with the ripping extending to the sides of formation and is to provide drainage away from the pavement base. Ripped material is to be compacted to form the subgrade construction layer. Compaction to 100% standard maximum dry density is required.

5.12 SUBSOIL DRAINAGE

Subsoil drainage is to be in accordance with the guidelines in A.R.R.B. Special Report No. 41 or as directed by Council. In all cases subgrade is to be prepared and shaped so as to allow free drainage to the edge of the formation. Sub-surface drains at a minimum depth of 600mm below finished subgrade level are to be provided at least on the uphill side of the road. The drains should be constructed as detailed in Clause 6.8 of these requirements.

5.13 DEAD END ROADS

At the end of all dead end roads an approved treated timber log barrier suitable for in ground use or similar is to be provided across the full width of the road reserve. On rural roads suitable chevron treatment will also be required to designate the end of the road. At "T" junctions an intersection sight screen chevron will be required. All dead end roads must have "No Through Road" signs installed. All signage shall be in accordance with AS1742 Pt. 2.

5.14 PAVEMENT CONSTRUCTION

5.14.1 Placement & Compaction of Pavement Materials

Pavements shall be placed and compacted in layers not in excess of 200mm or less than 100mm compacted in thickness. When placement of two or more layers of the same material occurs, the top of the current compacted layer shall be lightly scarified prior to placement and compaction of the following layer.

5.14.2 Construction Standards

Pavement Layer	Construction Tolerance	Shape
Subgrade	+15mm to -30mm	Show no signs of instability or deformation under proof rolling.
Sub-base	+20mm to -20mm	The surface of the sub-base should not deviate from a 3 metre straight-edge laid in any direction by more than 25mm.
Base Course	+10mm to -10mm	The surface of the base course should not deviate from a 3 metre straight-edge laid in any direction by more than 15mm
Pavement Surfacing/ Wearing Course	+10mm to -10mm	The finished surface should not deviate from a 3 metre straight-edge laid in any direction by more than 7mm.

Finished gravel pavement levels shall not be lower than the lip of the gutter in a flush seal application. Where an A.C. finish is applicable, a 25mm allowance is to be made.

Where new pavement construction joins to existing pavements, each of the existing pavement layers are to be benched a minimum of 300mm or as directed by Council's Engineer to effectively key-in the new pavement.

The compaction requirements are as follows:-

* **Compaction Control - Specification & Standards**

Layer	Compaction Requirement	Test Method
Subgrade	100% standard maximum dry density	AS1289.E1.1
Sub-base	95% modified maximum dry density	AS1289.E1.1
Base	98% modified maximum dry density	AS1289.E2.2
	Density in Place Test	AS1289.E3.1
	California Bearing Ratio (CBR) Test	AS1289.F1.1

5.15 TESTING OF PAVEMENT

Testing is to be undertaken by a NATA registered laboratory, at full cost of the developer, and forwarded directly to Council for approval. All layers will be tested to the full depth of the layer placed or a minimum of 150mm depth. An in situ density test will be required at the start of the work and thereafter at about 50 metre intervals, randomly located along the road as indicated by Council's Engineer, with a minimum of two tests for any road less than 50 metres in length. An additional test in cul-de-sacs will be required near the extremity. No pavement layer shall be covered by subsequent pavement layers until the results of the density tests have been delivered to and approved by Council's Engineer.

Laboratory determination of maximum dry density for pavement materials which have been modified with cement must be undertaken within four hours of the cement being added to the material. Materials tested outside this time will be subject to an adjustment as determined by Council to determine the correct maximum dry density. For either natural or modified material, the laboratory determination of maximum dry density shall be undertaken at a frequency of no less than one determination for each days production of material.

Benkelman beam tests to determine final surface deflections will be required to be carried out at the developer's cost. Acceptable final surface deflections will be determined by Council generally in accordance with A.R.R.B. Special Report No. 41, Figure 20, for design traffic up to 10^6 ESA's and NAASRA Design Guide Figure 10.3 for greater than 10^6 ESA's.

5.16 CONDUITS & ROAD CROSSINGS FOR SERVICES

In all cases, water services or accommodating conduits, sewer and watermains and telephone and electrical conduits or cables shall be placed across roads and backfilling thoroughly compacted at no later than base course gravel stage. The locations of all crossings shall be marked on the face of kerb and guttering, or alternatively with brass plates set in or glued to the face of the kerb by either stamped or impressed lettering.

Council will require density tests to be performed over the trench area to confirm specified densities of the trench have been achieved and shall be in accordance with AS3798-1990 which requires one test pit per two layers per 40 lineal metre length of trench. All backfilling shall be carried out in accordance with Council's Public Utilities Committee and Code of Engineering Practice for Street Openings.

5.17 QUALITY STANDARDS FOR PAVEMENT MATERIALS

5.17.1 Rigid Pavements

Material quality requirements for sub-base and base course concrete shall be as specified in R.T.A. Form No. 76 (1992) and the R.T.A. Concrete Pavement Manual, with the exception that for roundabouts the base course concrete shall be fibre steel concrete (fibrecrete). The fibrecrete shall be Grade F6/75.

5.17.2 Accessway Pavements

(a) Flexible Pavements - Requirements of Section 4.6.6 shall apply, with the exception that pavement materials for sub-base and base course shall comply with A.R.R.B. Special Report No. 41 Section 5, "Pavement Materials".

(b) Rigid Pavements - Construction details shall be in accordance with the following Cement & Concrete Association of Australia documents:-

* For design - "Concrete Street & Parking Area Pavement Design" (1984).

* For construction - "Outline Guide for Construction of Concrete Road Pavements" (TN50).

6.0 STORMWATER DRAINAGE DESIGN

6.1 DESIGN STANDARD

Stormwater drainage is to be in accordance with the Institution of Engineers Australia publication "Australian Rainfall and Runoff 1987" and "Department of Housing Road Manual 1987". Interallotment drainage is to conform to Department of Housing Road Manual (June 1987) and the following Council requirements.

The major/minor approach to street drainage design is to be adopted as outlined in Institution of Engineers Australia publication "Australian Rainfall and Runoff 1987, Chapter 14".

The minor system is the gutter and pipe network capable of carrying runoff from minor storms. The major system comprises the many planned and unplanned drainage routes which convey runoff from major storms to trunk drains.

All subdivisions are to be designed so as not to increase the limits of upstream and downstream flooding for all floods over the range of 1:1 to 1:100 year average recurrence interval storm.

6.1.1 Urban Residential Developments

In urban areas pipe capacities shall be calculated for pipes flowing full under gravity, with a minimum 5 year flooding frequency adopted for minor lines, and minimum 10 year flooding frequency for major lines replacing larger natural watercourses. However, allowance must be made for the flow of excess water when the capacity of any system is exceeded by maximum storms.

Minimum standards shall be:-

(a) Flows to be calculated for 1:5 year average recurrence intervals.

(b) Maximum width of flow in gutter to be 2.5 metres.

(c) Allowance is to be made to permit the average recurrence interval storm to be contained within designated easements and open channels without adversely impacting public safety.

(d) Pipes are to be self cleansing in the 1:6 month average recurrence interval storm.

(e) All urban streets to be used as floodways shall conform to the requirements contained in Figure 13.

6.1.2 *Industrial & Commercial Developments*

In industrial and commercial areas, pipe capacities shall be calculated for a minimum 10 year flooding frequency, with allowance for overland flow. This applies to both internal and road drainage. For industrial subdivisions the provision of a piped outlet (capacity Q10) from within each lot to the road drainage system will be required. This may be either an interallotment drainage system or separate connections to the road drainage..

6.1.3 *On-Site Stormwater Detention*

(a) For storage up to $100m^3$ it is acceptable to use "Evaluation of Simplified Methods for Design of Retarding Basins" by M.J. Boyd (Lecturer, Department of Civil Engineering, University of Wollongong).

For storages above $100m^3$ the detention structure will be required to be modelled by a reservoir routing model.

(b) Provision is to be made for 100 year average recurrence interval flows through the detention structure via an overflow spillway and/or overland flow path.

(c) Floor levels for commercial buildings are to be at least 500mm above the 100 year average recurrence interval water level.

(d) Floor levels for industrial buildings are to be at least at the level of the 1:100 year average recurrence interval storm.

6.1.4 *Rural Developments*

In rural areas generally a minimum flooding frequency of 10 years and a maximum of 50 years is to be used for drainage structures. The frequency will require finalisation prior to design and will be assessed for each individual subdivision on the basis of the extent of land expected to be flooded, the structure and its associated afflux, the importance of the watercourse, the importance of the road, and other relevant factors.

6.2 DRAINAGE DETAIL PLAN

Drainage plan shall show a complete stormwater management plan, including long-sections and typical cross-sections of permanent open drains with sufficient detail to concrete lining and batter treatment, inlet and outlet treatments, catchment areas etc.

6.3 STORMWATER DISCHARGE ONTO ADJOINING PROPERTY

Where stormwater discharge is concentrated onto adjoining property and/or works are necessary on the other property, it is the responsibility of the developer to make appropriate arrangements and provide Council with a copy of consent from the owner prior to the release of approved plans. This may necessitate the creation of a drainage easement through the adjoining property and all costs and compensations shall be borne by the developer.

6.4 DRAINAGE PITS

All drainage pits are to conform with Council's current standards, with the length of the kerb inlet to be shown on the engineering plans. Pits are to be located to prevent ponding at intersections and to restrict gutter flow to a maximum 2.5 metre width. Steps iron are to be provided in all pits deeper than 1.2 metres. The maximum spacing of pits in street gutters shall be 100 metres and pits shall be required in most instances on the upstream end of kerb returns and at the tangent points of sharp carriageway curves.

6.4.1 Gully & Junction Pits

Standard gully pits are to be constructed in accordance with Council's Plan No. SD11. Other pits are to be constructed in accordance with R.T.A. standards. Non-standard structures are to be constructed as detailed on the plan. Precast pits are to be installed as per manufacturer's specifications.

All pits are to be constructed on a sound bedding. For insitu pits the floors shall be poured first so that walls may be fully supported on the base slab. Walls are to be bonded to the floor by cement grout to form a tight joint. Minimum floor, wall and lid thickness for insitu pits shall be 125mm. Pits poured in multiple height sections shall require starter bars of minimum diameter 12mm.

Lids are to be adequately reinforced and provided with approved lifting eyes. The disturbed area around any pit is to be restored and shaped to suit the surrounding levels. A 50mm thick layer of topsoil and 300mm wide turf strip shall be provided around each pit.

6.4.2 Pit Entry Capacities

Pit entry capacities shall be determined from Figures 8 and 9 for 2.4, 3.0, 3.7 and 4.3 metre lintels and sag pits.

Unless design aspects require otherwise, drainage lines and structures are to provide minimal disturbance to flows with regard to the following measures.

6.4.3 Drainage Pits/Junction Boxes

Drainage pits and junction boxes are to be streamlined by infilling with concrete to a maximum of half outlet pipe diameter height, and shaping transitions from incoming pipes to the outlet pipe.

Changes in direction of drainage lines through pits being up to the maximum shown hereunder.

Pipe Diameter	Maximum Change in Direction
375	90 degrees
450-675	45 degrees
750-900	15 degrees

6.4.4 *Cover of Stormwater Pipes*

Cover of stormwater pipes in roads is to be in accordance with that prescribed by the manufacturer and shall be a minimum of 450mm below gutter level (current Australian Standard or Concrete Pipe Association of Australia "Concrete Pipe Guide").

6.4.5 *Junction Boxes*

The maximum spacing of junction boxes in continuous pipeline shall be 100 metres. Partial area effects are to be checked when determining flows. Other design criteria and calculation tabulation shall be as shown in Figures 10 and 11 (lintel lengths and depth of flow).

6.4.6 *Placing of Lintels*

Precast lintels shall be joined to pit walls by standard concrete mix. Steel lifting hooks shall be removed flush with concrete and effectively sealed.

6.4.7 *Grates*

Approved/standard bicycle safe grates or types approved by Council's Engineer are to be used for residential, and heavy duty type for industrial developments.

6.5 PIPE CULVERTS

6.5.1 *Size & Type*

All drainage pipes shall be a minimum 375mm diameter, of spigot and socket rubber ringed type and of class specified on the plans. Only pipes produced by approved manufacturers and conforming to AS4058 shall be used.

Bulkheads of approved materials are to be placed across and in line with the trench up to within 300mm of the underside of the kerb and gutter on both sides of the road.

6.5.2 *Design Velocities*

The maximum and minimum design velocities of flows in piped systems shall be 6m/sec. and 1m/sec. respectively.

6.5.3 *Design of Inlet Structures*

Particular attention is to be given to the design of inlet structures collecting water from catch drains and watercourses, and outlet structures discharging into earth drains or creeks. Entry and exit velocities are critical in this regard. (Erosion protection is to be provided on all outlets. Note: the discharge velocity into natural streams is to be limited to $1.7ms^{-1}$.)

6.5.4 *Drain Inlets*

Drain inlets are to be protected by temporary sediment interception devices until sealing is complete. Drain outlets are to incorporate velocity dissipaters and other measures to avoid downstream channel scour.

6.5.5 Outlets Under Pathways to Reserves

Drainage outlet pipes under pathways shall extend a minimum of 5 metres into Council's reserve. This is to allow both pedestrian and vehicular access where applicable.

The provision of an approved hand rail or treated timber log fencing suitable for in ground use will be required around the outlet headwall.

6.6 TRENCH DRAINAGE

6.6.1 Subsoil Spigot Pipes

At all downstream pit connections, a 3 metre length of approved subsoil drainage pipe shall be placed alongside the main pipe so as to enter the pit at the same invert level and provide adequate drainage of the main trench. The open end of the subsoil line is to be properly capped and sealed and the remainder covered with an approved filter material all round so as to prevent penetration by sand or silt. Type and size may be varied by Council's Engineer, dependent on site conditions.

6.7 CONCRETE BOX CULVERTS

6.7.1 Culvert Design

Recommended design procedures are detailed in the following manuals:-

(a) "Pipe and Culvert Hydraulics Manual" Rocla.

(b) Section 3 of the Concrete Pipe Association of Australia's publication "Hydraulics of Precast Concrete Conduits - Hydraulic Design Manual".

6.7.2 Standard Precast Units

Only precast units by established manufacturers are to be used, but the base and wingwalls must be poured insitu unless otherwise approved.

6.7.3 Standard for Cast Insitu Units

Cast insitu box culverts shall be constructed to conform to plan drawings and R.T.A. standards.

6.7.4 Procedure for Placing

All box culverts shall be placed inverted on a continuous reinforced concrete base slab in accordance with the approved plan. The use of fibrecrete in lieu of conventional reinforced concrete will be considered. Protruding steel lifting eyes or hooks shall be either sealed over with cement mortar or cut off and sealed over as directed by Council's Engineer.

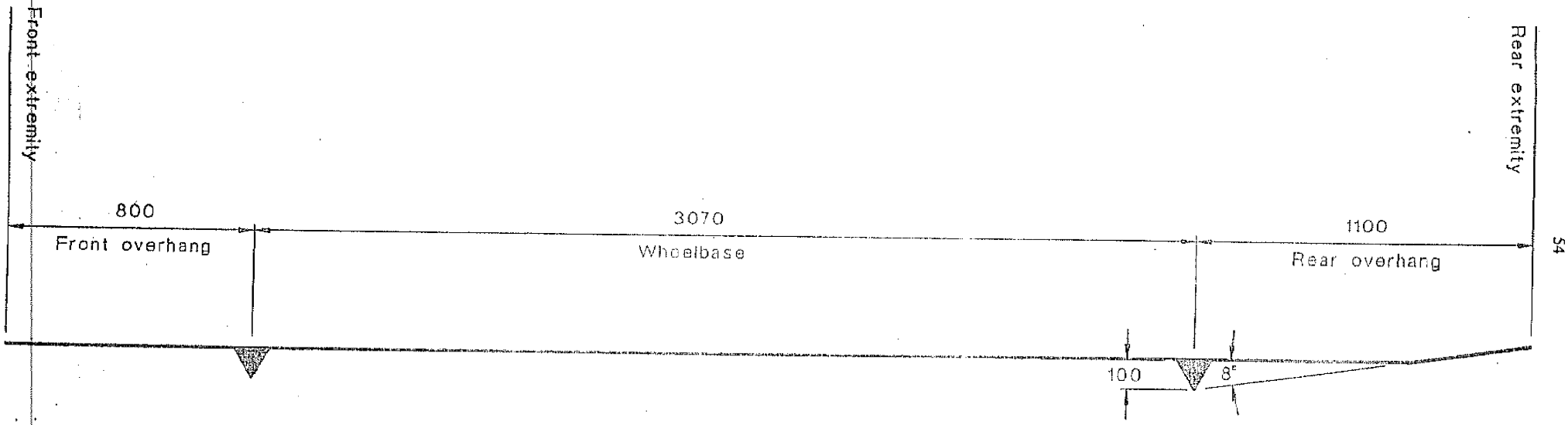


FIGURE GROUND CLEARANCE TEMPLATE

6.8 SUBSOIL DRAINAGE

Subsoil drainage shall be designed in accordance with both ARRB SP41 and Subsurface Drainage Report No. 35 or as directed by Council. Subsoil drainage shall be provided where indicated on the plan and at such other locations as may be considered necessary by Council's Engineer during construction. Type and diameter of pipe and location in all cases is to be approved by Council's Engineer prior to installation. Refer to Drawing No. SD17.

6.8.1 General Requirements

(a) Trench width to suit the size of pipe used - should be a minimum of 300mm wide, and 600mm deep below subgrade.

(b) (i) Pipe backfilled with filter sand. Sand and sock must conform to the R.T.A. Grading Specification for subsoil drains wrapped with approved sock.

or (ii) Pipe placed in trench, with single sized min. 10mm blue metal surround and trench lined with geotextile fabric.

Pipe shall be as follows:-

(a) Grades less than 1% - slotted U.P.V.C. or F.R.C.
(b) Grades 1% and greater - aggflow pipe.

Subsoil pipes shall be laid with a minimum grade of 0.5% and properly connected to main drainage pipes or pits.

6.8.2 Location

(a) Residential developments generally, under kerb and guttering, however, depending on the types of gravels used for pavement construction, the subsoil may have to be located in front of the kerb and guttering and carried through to the base course layer.

(b) (i) Rural developments, under kerb and guttering or concrete dish drain on the high side. Refer to Drawing No. SD16.

(ii) Where no concrete dish drain, place under shoulder 600mm from edge of bitumen.

(iii) At edge of other strategic locations as may be deemed necessary due to site conditions.

Flushing points to be provided every 80 metres. An approved standard R.T.A. subsoil access lid is to be provided flush with the surface, cast into concrete dish drain or cast into a concrete surround in shoulder where no concrete is provided.

6.8.3 Specific Requirements

Due to prevailing conditions at the time of construction, variation of the foregoing requirements, type of pipe required, and depth of placement may be necessary, and therefore no subsoil drainage is to be laid until advice is received of specific requirements from Council's Engineer.

6.9 DRAINAGE EASEMENTS

Where drainage easements are required, a minimum width of easement will generally be as follows:-

(a)	Interallotment drainage	-	1.5 metres
(b)	Pipes 375mm to 1200mm	-	3.0 metres
(c)	Pipes 1350mm to 2400mm	-	3.5 metres

500mm clearance to each side of pipes will be required for all easements.

6.9.1 Drainage Calculations

All calculations are to be based on the ultimate development of each catchment area and not necessarily the development of the area in existence at the time of development. All calculations are to be shown on the plan detailed in table form and set out in a concise manner indicating catchment areas contributing to each pit and drainage line.

6.9.2 Types of Materials

All concrete drainage pipes used in development construction shall be of spigot and socket type with flexible rubber ringed joints and this shall be clearly indicated on plans. The class of pipe used in relation to the available cover and ground conditions shall be in accordance with manufacturer's specifications.

6.10 MAJOR DRAINAGE SYSTEMS

The major system is to be designed for the 100 year average recurrence interval flow.

6.10.1 Drainage Reports

The following format is recommended for flood studies to be submitted to Council in conjunction with engineering plans:-

(a) Introduction:-

- (i) Catchment Description.
- (ii) Aim of Flood Study.

(b) Hydrology:-

- (i) Comments regarding analysis carried out.
- (ii) Summary tables providing flow comparisons.

(c) Hydraulics:-

(i) Details covering detention basin design.
(ii) Basin configuration, showing contours and drainage structures.
(iii) Tables showing stage/storage/discharge relationship.

(d) Conclusion:-

Appendices - providing summary of all computer runs.

6.10.2 Low Hazard Areas

In low hazard areas (for example roads, pathways, walking trails, recreational areas etc.) the system is to be designed:-

(a) Such that the product of depth (m) and velocity (m/s) is to be 0.4 or less.
(b) Flows shall be contained within road reserve and pathways.
(c) Using a pit blockage factor of 50% for all pits.

6.10.3 High Hazard Areas

In high hazard areas (for example creeks, concrete channels, major drainage channels, areas where the velocity exceeds 2m/sec. etc.) the system is to be designed:-

(a) Such that the product of depth (m) and velocity (m/s) is to be 1.0 or less.

(b) Including signposted with warning signs.

(c) To have adequate safety measures to reduce the risk of accidental entry, for example fencing, planting, moulding etc.

(d) To provide a free board of 200mm above the 1:100 year Average Recurrence Interval Storm, when the storm is contained wholly within a high hazard area.

6.10.4 Temporary Open Catch Drains

Are to be constructed as indicated on the plan or as considered necessary by Council's Engineer for protection of adjoining work or property during construction. Catch drains and table drains are to be constructed in accordance with standard practice and may require stone pitching or lining with filter fabric to prevent scouring where necessitated by grade or nature of soil.

6.10.5 Permanent Open Catch Drains

Shall be fully concrete lined and dimensioned according to the catchment area. Catch drain outlets may require a level spreader or provision of permanent scour protection. Details to be shown on engineering plans.

6.10.6 Permanent Open Drains/Channels

All permanent open drains/channels shall have a provision for low flows either by placement of a concrete dish or low flow pipe where practical.

The concrete dish or pipe is to be designed to carry 25% of the 1 year ARI storm.

Notwithstanding the above, where the flow velocity from the 5 year ARI storm exceeds 1m/second, concreting of the channel base will be required to contain the 5 year ARI storm volume and control erosion.

Wherever possible, it will be sought to incorporate open channels in landscaping for aesthetic purposes and possibly to utilise modified batter as active open space and/or stormwater retention basins where appropriate.

6.10.7 Concrete Table Drains

Shall be installed in rural developments where the grade is 3% or greater, less than 1% and all table drains downstream of these gradients. This will also be dependent on the size of catchment and the type of soil present.

Sealing of road shoulder will be required adjacent to the concrete drain or similar structure.

6.11 DRAINAGE INLETS/OUTLETS

6.11.1 Inlet/Outlet Protection

Adequate provision is to be made for scour protection at all drainage inlets/outlets. Energy dissipaters shall also be provided where appropriate. All outlets shall be provided with silt control measures in accordance with Chapter 3.

6.11.2 Headwalls

Aprons and cut-off walls shall be constructed in accordance with the relevant R.T.A. specifications or as shown on the plan, with due attention to workmanship and reinforcement and general requirements for concrete. In addition, handrails or other safety devices may be required by Council's Engineer.

6.11.3 Gabion & Reno Mattress Structures

Gabion or reno mattress structures are to be provided where permanent scour protection is required. These structures are to be constructed in accordance with manufacturers specifications. All structures are to be placed on a layer of geotextile fabric. Structures are to be filled with basalt rock, not sandstone or conglomerate based rock.

6.12 OVERLAND FLOW PATHS

6.12.1 Concrete Pathway

Where the concrete pathway is to act as an overland flow path, Council standard kerbed pathway is to be provided. Details of waterway calculations are to be provided to ensure that the 100 year event is contained within the pathway reserve.

6.13 TRUNK DRAINAGE

Trunk drainage systems shall be designed as "soft" systems, i.e. grass lined channels with low flow pipelines or concrete lined inverts. Design criteria shall be:-

6.13.1 Hydraulic Design

Open channels shall be designed using an appropriate analysis, e.g. backwater or unsteady flow.

6.13.2 Low Flow Pipelines/Lined Inverts

Low flow pipelines are to be a minimum size of 375mm diameter or as determined by Council's Engineer, sized using a flow of 3 litres/sec/hectare for residential land uses and 10 litres/sec/hectare for industrial land uses. Low flow pipelines are to be rubber ring jointed with no lifting holes. Lined low flow inverts (minimum width to be 2.0 metres) shall accommodate flows equivalent to those of the low flow pipelines.

6.13.3 Flow Velocities

Maximum flow velocities in grass-lined channels shall be 1.5m/sec. Grass lined channels are to be designed to operate in a sub-critical flow state. This may mean that measures have to be installed so that the grassed channel cannot operate at critical or super critical flow states.

6.13.4 Batter Slopes

Batter slopes of grassed waterways shall be a maximum of 1 (vertical) : 6 (horizontal).

6.13.5 Pipe Inlets

Must be designed using 50% blockage factor for the 1:100 year Average Recurrence Interval flow. All inlets are to incorporate trash racks where the clear spacing is to be 150mm and the clear surface area to be a minimum of twice the pipe cross-sectional area.

6.14 DETENTION BASINS

6.14.1 Hydraulic Analysis

Detention basins are to be designed so as not to increase the limits of upstream and downstream flooding for all floods over the range of 1:1 to 1:100 year Average Recurrence Interval storms.

6.14.2 Water Levels & Freeboard

The basin embankment is to be 500mm above the 100 year Average Recurrence Interval flood level.

6.14.3 Spillways

The spillway shall be designed to pass the Probable Maximum Flood without life threatening failure of the embankment.

Special consideration shall be given to erosion protection on the spillways and the techniques proposed shall require the approval of Council's Engineer prior to their final design.

6.14.4 Batters

Grassed internal batters shall be no steeper than 1 in 6. Grassed external batters shall be no steeper than 1 in 4. The minimum slope of the basin floor shall be 1%.

6.14.5 Basin Safety

The maximum depth of a detention basin for the 1:100 year Average Recurrence Interval flood should be 1.2 metres. For greater than 1.2 metres depths or ponding times in excess of 2 hours, the detention basin will be required to incorporate safety measures to prevent accidental entry.

Outlets must have debris and scour control, along with safety fence where applicable.

6.14.6 Basin Embankment

A typical section through the embankment wall is to be shown on engineering plans, indicating a clay core or cut off wall.

Filling is to be carried out in accordance with "Australian Standard 3798-1990 - Guidelines on Earthworks for Commercial and Residential Development, Level 1.

6.15 COMPUTER APPLICATION

The following programmes are acceptable. Other programmes which conform to "Australian Rainfall and Runoff, 1987" are also acceptable.

6.15.1 Ilsax

Urban Drainage Catchment Model

(a) Parameters suggested in area:-

Soil Type	3
Antecedent Moisture Content	3.5
Grassed Depression Storage	5mm
Paved Depression Storage	1mm

6.15.2 RORB

(a) Calibration - The model should be calibrated using the "Kc" factor (M=0.8) against a discharge calculated in accordance with Chapter 5, Australian Rainfall and Runoff, 1987, unless gauged stream flows are available.

(b) Runoff Coefficient - For rural catchments in the Cessnock City area C10 = 0.45.

(c) Loss Models - The loss model chosen during the analysis is to remain the same for the design. For 100 year Average Recurrence Interval storm, assume:-

* infiltration and storage losses = 0mm
* continuing loss = 2.5mm/hr.

(d) Fractions Impervious -

* Residential Development = 0.45
* Medium Density Development = 0.65
* Pavement areas such as roads, industrial & commercial sites = 0.85
* Parkland areas are impervious.

(e) Design & Analysis - Plan showing Rorb Nodal Layout and diskette copy of the RORB data file to be submitted to Council.

Sub-catchments not to be greater than 25% of total catchment.

The total catchment is recommended to be greater than 5km^2 with well defined water courses.

6.15.3 Kinematic Catchment Model

Programme using suggested parameter values in User Manual.

6.15.4 HEC2

Programme to determine water surface profiles. To be used in open channel design to calculate water levels.

6.16 INTER LOT DRAINAGE

6.16.1 Location

Inter lot drainage shall be constructed as shown on approved plans. All pipes shall be laid centrally within designated easements. In cases where sewer lines are located adjacent to boundaries, inter lot drainage must be situated between boundary and sewer line. Interallotment drainage easements shall be a minimum width of 1.5 metres.

6.16.2 Discharge of Stormwater from Existing Lots

In the event of existing lots discharging stormwater runoff onto the proposed development, an inter lot drainage system shall be provided to alleviate this runoff.

The development shall provide either:-

(a) An inter lot drainage system within the existing properties and inlet pits for each lot. This will necessitate the creation of a drainage easement through the existing lots, at full cost to the developer, or

(b) An inter lot drainage system within the proposed development and provision of pipe stubs into each adjoining lot.

6.16.3 Type of Pipe

All pipes shall be of U.P.V.C. (drainage pipe) or F.R.C. or R.C. of approved manufacture. Other types will be permitted only if specifically approved on engineering plans.

6.16.4 Size of Pipe

Pipe size shall be determined by drainage requirements. Minimum size pipe permitted is 150mm diameter and maximum of 300mm. If hydraulic assessment indicates pipe sizes in excess of 300mm are necessary, then those flows shall be dealt with in a public drainage easement.

6.16.5 Collection Points for Roof Water & Yard Water

Provision shall be made for collection of both roof and yard water at the low side of each lot.

Stormwater collection points shall be:-

(a) Cast insitu or precast surface inlet pit, minimum 450x450m.

Inspection pits shall be provided at:-

(a) Change of pipe grade, size or direction, and be a minimum size of 600x600mm precast or cast in situ.

Pits shall be covered by an approved grate to provide an adequate surface water inlet. Pit surrounds shall be turfed to a minimum width of 900mm to provide adequate scour protection.

Roof water connections shall be provided by setting a spigot of 150mm diameter pipe with screwed end cap into the side of the pit. All pits are to be streamlined.

6.16.6 Depth of Pipes

Pipes shall be laid with a minimum cover of 300mm.

6.16.7 Bedding & Backfilling of Pipes

Pipes shall be bedded on sand and backfilled with fine granular material, refer to Chapter 7 "Drainage Construction". In steep terrain, bulkheads are to be provided generally in accordance with standard practice for sewer mains.

6.16.8 Pipe Diameters

The following may be taken as a guide, however pipe sizing will be dependent upon catchment analysis:-

Pipe diameters	One House	- Only 0.15m diameter
	2-6 Houses	- 0.23m diameter
	7-13 Houses	- 0.30m diameter

7.0 DRAINAGE CONSTRUCTION

7.1 BEDDING OF PIPES

Pipes shall be laid on a straight line and even grade and bedded in a minimum of 150mm of approved sand, approved aggregate where there is ground water present or as directed by Council's Engineer.

When laying and jointing of a pipeline has been completed, and before backfilling is commenced, the developer shall request the Council's Engineer to inspect the pipeline.

No backfill shall be placed until these checks have been made.

7.2 BACKFILLING OF PIPES

7.2.1 General

Pipes shall be backfilled with fine granular material, to the manufacturers specifications, or to at least 150mm above the pipeline, and in accordance with the Concrete Pipe Association of Australia Concrete Pipe Selection & Installation" manual.

Thereafter, backfilling of pipelines from excavated material may be placed to within 150mm of the pipes. This selected backfill shall be free of gravel, stones, or hard nodules. In the case of cast iron, ductile iron and concrete pipes, a proportion of gravel and small stones may be permitted.

If, in the opinion of the Council's Engineer, insufficient select backfill is available from the adjacent excavated material additional imported selected backfill shall be arranged by the Developer and approved by the Council's Engineer.

7.2.2 Compaction

Compaction shall be by mechanical, flooding or other approved means.

Surplus excavated material shall be removed and disposed of to areas approved by Council at full cost to the developer.

Where compaction is ordered and the trench has been externally dewatered, the dewatering equipment shall be kept operating until the compaction of the trench has been completed. Water discharge from external dewatering equipment may be used for compaction by flooding.

All backfill shall be compacted to the approval of the Council's Engineer, by manual or mechanical tampers in layers of not more than 150mm thick to 95% of standard maximum dry density AS.1289 for cohesive materials and 60% density index determined in accordance with AS.1289 for non-cohesive material for pipelines not under roadways. Compaction densities of at least 100% standard maximum dry density are required for areas under roadways, refer Clause 7.2.3.

Water for compaction by flooding shall be introduced onto each 300mm layer of material placed so as to permeate downwards in order to obtain the highest possible density which can be obtained by this method of compaction.

Backfilling and compaction shall be carried out without damaging the pipe or its external coating or wrapping or producing any movement of the pipe.

7.2.3 Backfilling Pipes Under Roadways

For all trenches that are to be subject to vehicular traffic, or as directed by Council's Engineer, all backfill material shall be fully compacted in layers not more than 150mm thick to 100% of standard maximum dry density AS.1289 for cohesive materials and 65% density index determined in accordance with AS.1289 for non-cohesive material to the subgrade level of the road or the finished surface level as directed.

Backfill to the road surface level shall be an approved road base material to a minimum depth of 300mm. Compaction of the backfill material shall be by mechanical means, unless the backfill material is non-cohesive, in which case compaction by flooding, including mechanical assistance, may be used.

Prior to backfilling and compaction of vehicular trafficable trenches, bulkheads consisting of polyethylene bags or similar of minimum thickness of 0.25mm filled with clay or other approved material and sealed in an approved manner shall be constructed across the full width of the excavated trench directly behind the kerb to contain the compacted material. The bulkheads shall be recessed into the sides of the trench excavation a minimum of 100mm and shall be extended from the top of the pipe surround material to the underside of the kerb.

7.2.4 Restoration

All disturbed areas are to be restored as specified in Clause 3.8.3.

7.2.5 Bulkheads

Bulkheads shall be provided on all piped drainage where longitudinal grades are above 10%. Bulkheads shall be constructed as follows:-

Maximum Spacing Length	10m 500mm	150mm either side of trench 150mm below the trench 100mm above top of pipe

The provision of bulkheads shall be in accordance with AS3500.3.

8.0 EARTHWORKS

8.1 EROSION MITIGATION & SEDIMENT CONTROL & CLEARING

Prior to commencement of any work, details specified in Clause 3.2 and Section 3.8 need to be installed/completed.

8.2 GENERAL STANDARD OF LOTS

Special requirements will apply where necessary, but generally lots are to be cleared of low scrub, fallen timber, debris, stumps, large rocks and any trees which in the opinion of Council are approaching the end of their functional life or are dangerous or will be hazardous to normal use of the development. Prior consultation with Council's Community Services Department is necessary.

8.3 DISPOSAL OF CLEARED MATERIAL

All timber and other materials cleared from lots shall be removed from the site. All roots, loose timber etc., which may contribute to drain blockage, shall be removed.

8.4 IMPROVEMENT OF LOTS

All lots shall be graded and trimmed or filled as necessary to render them in a useable condition and avoid the necessity of future basic site improvement works and negate ponding of water.

8.5 FILLING IN AREAS WITH EXISTING TREES

In areas to be filled, allowance is to be made for clearing of all trees and replanting with a minimum of six (6) advanced suitable species to each lot, planting to be clear of probable future building location, and not to be commenced until filling has been completed and graded, with provision for watering and maintenance for duration of the contract.

8.6 PRESERVATION OF EXISTING TREES

Selected trees shall be preserved by approved means to prevent destruction normally caused by placement of conventional filling within the drip zone and by other earthworks. Refer to Clause 3.7.8.

8.7 EXPLOSIVES

Storage and use of explosives shall be in strict accordance with prevailing laws and regulations and where blasting is intended within fifty (50) metres of a public road or occupied building, a permit under the conditions of Local Government Ordinance No. 43 is to be first obtained from Council and the conditions thereon strictly adhered to.

8.8 INSPECTION PRIOR TO FILLING

No filling is to be placed until clearing of the area has been inspected and the proposed fill material certified by a geotechnical engineer and approved by Council. All vegetation and topsoil shall be stripped from the fill area. Any useable topsoil shall be stockpiled for use as topdressing. Immediate progressive revegetation is to take place as specified.

8.9 STANDARD OF FILL FOR LOTS

Filling is to be of sound clean material, reasonable standard and free from large rocks, stumps, organic matter and other debris.

Lot sizes shall comply with the shape and dimensions of the approved Development Plan. Amendments may be necessary due to engineering requirements identified during the processing of the development and the construction.

Where filling is proposed, provision is to be made to ensure that no water is ponded on any of the development lots or adjoining land. If filling is to be placed against adjoining property, provision is to be shown on the plan for the toe of fill batters to merge with the existing natural surface a minimum one (1) metre within the development, and for any necessary excavation within this unfilled strip to permit the free passage of water away from the adjoining land (e.g. catch drain or inter lot drainage).

Alternate methods of retaining fill may be submitted due to site or area restrictions and will be considered by Council.

All fill areas are to be topdressed with topsoil, seeded and fertilised as a minimum requirement. Minimum grade of fill is generally 1%. Turfing and/or erosion prevention control measures may be required in addition to topsoil/seeding.

Where it is proposed to fill any adjoining land, written proof of consent of affected landowners shall be supplied to Council prior to approval of the engineering plans.

The minimum height of filling will be governed by the 1% ARI top water level of the subject land, and will be finalised at preliminary design stage. In certain instances, where considered necessary by Council, a minimum floor level will be stipulated for any proposed or future dwellings.

Where it is considered from the grade and lie of the land that roof and/or natural surface run-off will create significant future inter-lot drainage problems, provision shall be made by piping and reshaping of the land for conveying such water to the nearest practical drainage line. Each lot in this instance shall be provided with a surface inlet pit at the lowest near corner of the property. Refer to Clause 6.16.

Where filling or reshaping of the lots is proposed, finished level contours of 0.5 metre intervals are to be shown on the engineering plans.

"Works as Executed" levels will be required on the original design contour plan and certified by a Registered Surveyor.

Filling is to be of sound clean material, reasonable standard and free from large rock, stumps, organic matter and other debris.

All work shall be in accordance with AS.3798-1990. Fill is to be placed in layers not exceeding 200mm compacted thickness. All fill is to be compacted to 95% standard maximum dry density. Maximum particle size shall be $^{2}/_{3}$ of the layer thickness.

8.10 TRENCHES

All trenches shall be excavated to a depth and width as per the manufacturers specification for the material being laid.

Depth will depend directly on the application and cover requirements as specified in the appropriate sections through this specification.

Excavated material from the trench shall not be placed on the road or kerb and gutter.

In the event of any trenching being left open for an extended period of time, i.e. longer than two (2) weeks, the developer will provide erosion control measures to ensure minimal soil disturbance and material loss off the site.

Control measures will include:-

(a) Provision of trench stops every 30 metres along a trench, with provision for overtopping to be directed to the kerb.

(b) Placement of blue metal bags along kerb and gutter at maximum 30 metre spacings.

(c) Placement of blue metal bags around downstream drainage pits.

(d) Construction of diversion banks to divert the uphill catchment from entering the trench.

Trench restoration shall be carried out in accordance with Section 8.15.4.

8.11 COMPACTION TESTING

Areas to be filled to a greater depth than 400mm are to be controlled by compaction testing which is to be carried out in accordance with AS.1289 for controlled filling.

Testing is to be carried out by a NATA registered laboratory, at the subdivider's expense.

Copies of the test certificate, clearly indicating the location of each test, and the laboratory's certificate covering the whole of the area tested, shall be forwarded to Council for approval.

Lot classifications in accordance with AS.2870-1987 (Residential Slab and Footings) will also be required prior to the release of the linen plan.

8.12 TOP DRESSING OF FILL

All areas where filling has been placed are to be dressed with clean arable topsoil, fertilised and sown with suitable grasses. Refer to Section 3.8.2.

8.13 RESTRICTED FILL MATERIALS

Fill comprising coal chitter or other industrial wastes or by-products will be accepted only in approved locations, and will be subject to specific requirements determined by prevailing conditions.

8.14 PRIOR APPROVAL OF RESTRICTED FILL MATERIAL

It is essential that prior advice be given of intended use of such materials. It should be noted that failure to obtain Council's approval may lead to an order for removal of any material considered by Council or other relevant authorities, such as the Environmental Protection Authority, as unsuitable or in any way unfit for filling.

8.15 RESTORATION OF SURFACES

8.15.1 General

Pavements, lawns and other improved areas shall be thoroughly cleaned and left in a similar order as they were at the commencement of the works.

8.15.2 Lawns

Lawns shall be restored with turf cut and set aside from the original surface or with turf imported from a source approved by Council's Engineer.

8.15.3 Pavements

Pavements shall be maintained with approved gravel or other suitable material, allowing for consolidation, and shall then be restored to a condition equivalent to that of the original pavement. (Refer to Clause 5.14).

8.15.4 Trenches

Backfill shall be placed sufficiently high to compensate for expected settlement and further backfilling shall be carried out or the original backfill trimmed in order that the surface of the completed trench may then conform with the adjacent surface level. Surplus material shall be disposed of to areas approved by Council and arranged by the contractor.

Immediately the backfilling of a trench excavated through a pavement has been completed, the pavement shall be temporarily restored. Where the trench crosses bitumen or concrete pavement, a pre-mixed asphaltic material shall be used for such temporary restoration. Temporary restoration shall be maintained by the contractor until final restoration is carried out. Final restoration of the pavement shall be carried out to restore the pavement and its sub-base to no less than the original condition. Final restoration may include, if required by Council's Engineer, the removal of temporary restoration.

Where, within public or private property, the reasonable convenience of persons will require such, the Council's Engineer may order trenches to be levelled off at the time of backfilling. The area disturbed during construction shall then be topsoiled and seeded, or turfed if required. Any subsequent settlement shall be made good by the Contractor.

Should the contractor elect to tunnel under paving, kerb and gutter or other improved surfaces in lieu of trenching, backfilling shall be carried out so as to restore full support to those surfaces. The contractor shall remain responsible for the repair of the improved surfaces, if subsequent damage occurs due to subsidence of the backfill, until the end of the maintenance period.

8.15.5 Maintenance

All restored surfaces shall be maintained in the condition to which they are restored until the expiry of the maintenance period (refer to Clause 2.22) applicable to those works, notwithstanding that any deterioration of the restored surfaces, and the need for their maintenance, may or may not be due to defects which became apparent or arise from events which occur during the maintenance period.

9.0 KERB & GUTTER WORKS - DESIGN & CONSTRUCTION

9.1 GRADING & ALIGNMENT

Kerb and guttering shall be graded and aligned in accordance with the plan. In cul-de-sacs or on internal roads, not to be later extended, minor variations of up to 20mm in line and 10mm in level over a distance of 5 metres will be accepted.

On through roads subject to future extension, variations greater than 10mm in line and level will not be accepted.

9.2 PLACEMENT & FINISHING

Concrete in kerb and guttering to be placed in accordance with the general requirements for concrete within this specification and shall have a minimum compression strength of 20MPa at 28 days. The finish is to be a smooth steel trowel type surface. All works shall comply with AS.2876-1987.

9.3 BASE MATERIAL

The kerb and guttering is to be laid on previously compacted approved gravel with no loose material beneath. Alternative construction options may be approved by prior arrangement with Council's Engineer.

9.4 JOINTS

Expansion joints shall be provided at junctions with accesses, pits and other structures, and shall comprise approved expansion jointing material placed through the entire cross sectional area of concrete, and finishing flush with exposed surfaces. Contraction joints consisting of a vertical cut to within 50mm of base shall be formed at a maximum of 6 metre intervals. Also refer to Chapter 11. All accesses are to be provided with expansion joints where the layback merges with the kerb.

9.5 ACCESS GUTTER CROSSINGS

Access gutter crossings are to be placed generally as shown on the engineering plans, to suit existing requirements or as directed by the developer and/or as determined by Council's Engineer.

Where gutter crossings are provided as part of the development, a concrete access slab from the kerb and gutter to the boundary, shall be required over the footpath area. This may occur at pre-determined laouts of developments and existing driveways.

9.5.1 *Heritage Kerb & Gutter*

Where sandstone kerb and gutter exists every effort shall be made to protect this asset. Developments should be designed to facilitate the retainment of heritage kerb and gutter. Where driveway accesses are required, the sandstone kerb can be temporarily removed and, if necessary, the stone may be delivered to Council's Depot for storage. The layback in the kerb is to be constructed in sandstone, however if sandstone is difficult to obtain, consideration will be given to alternative materials. All design measures shall be discussed with Council's Manager Engineering Development.

9.6 RESIDENTIAL CROSSINGS

Where a domestic vehicle access is to be provided, each kerb crossing shall be three (3) metres along the flat section with a 500mm kerb wing at each end, unless otherwise instructed. Refer Drawing SD2.

9.7 INDUSTRIAL/COMMERCIAL GUTTER CROSSINGS

In the case of industrial or commercial access, crossings shall be a minimum of six (6) metres along the flat section unless otherwise instructed, with a 1 metre wing, and are to be fully reinforced 30 MPa concrete with one layer of F.72 mesh. Refer Drawing SD2.

9.8 PRAM RAMPS

Pram ramps shall be constructed at all street intersections and at public reserves or other pedestrian crossings, in accordance with the approved plan. Refer Drawing SD4 for details.

9.9 SERVICE LOCATIONS

Where services cross road, face of kerb will be marked as scheduled below:-

SERVICE	MARK
Watermain	WM
Water service	W
Telecom	T
Electricity	E
State Survey Marker	SSM
Main Cock	MC

Marks shall be impression in green concrete kerb, formed with 6mm diameter rod bent to required letter shape.

9.10 MACHINE PLACED KERB & GUTTER

The foregoing general requirements for kerb and guttering shall apply, with the following additional requirements.

9.10.1 Type

Only "slurryless" type machine placed kerb and gutter of approved sections will be accepted.

9.10.2 Bedding

The approved gravel bedding is to be thoroughly dampened immediately prior to placement.

9.10.3 Joints

Shall be provided as specified in Clause 9.4. Expansion joint placement at junction with other work shall be as specified in Clause 9.4.

9.10.4 Joining of Work

The completed section is to be cut off cleanly, the residue concrete removed and expansion jointing placed before recommencement of work, so that the new work will be squarely butted to the existing concrete.

9.10.5 Protection

Newly placed concrete shall be protected from rain by P.V.C. sheeting.

9.10.6 Testing

If in the opinion of Council's Engineer, the concrete does not conform to the specified compressive strength of 20MPa at 28 days, tests will be conducted on core samples taken as directed by Council's Engineer and tested by an independent registered NATA laboratory at the contractor's cost.

9.10.7 Stormwater Pipe Outlets

In all kerbs, where connection of stormwater to a common drainage line is not provided, an outlet shall be provided through the kerb on each side of the lot approximately 1.0 metre in from the boundary. Outlets shall be constructed from nominal 127x64x4mm RHS hot dip galvanised and cut to the shape of the kerb.

9.10.8 Curing

Kerb and gutter concrete shall be cured by the use of an approved curing compound. Application shall be by hand lance at the rate of 0.3 lit/m^2 and immediately following completion of surface finishing.

10.0 CONCRETE & CONCRETE WORKS - DESIGN & CONSTRUCTION

10.1 READYMIX REQUIREMENT

Readymixed concrete shall be from an approved supplier, and shall in all ways conform to Australian Standard No. 1379-1991 for readymixed concrete. Minimum strength requirements will be based on the type of work to be undertaken.

10.2 ON-SITE MIXING REQUIREMENT

Concrete mixed on the site shall consist of 1 part cement, 2 parts clean sharp sand free from impurities and silt, and 3 parts crushed aggregate of maximum size of 18mm and mixed with sufficient water to give a slump not exceeding 100mm

10.3 FORMWORK

All formwork shall conform to AS3610-1990 and consist of timber or steel forms which are straight and true and to required dimensions, with no surface irregularities, and securely supported to prevent movement during pouring and curing. Formwork surfaces are to be coated with form oil for clean stripping of concrete.

10.4 PLACING

Concrete shall be placed on compacted material (minimum density ratio of 95% standard) having a smooth uniform surface, continually poured and either spade tamped or properly compacted by means of immersion vibrator, depending on requirement of structure.

10.5 JOINTING & FINISHING

Expansion and construction joints are to be provided where necessary and constructed in accordance with standard specified practice. Concrete finishes to conform to AS1510. Exposed concrete surfaces are to be approved non-slip finish and trimmed with steel edging tools unless otherwise specified by Council's Engineer. Minor imperfections in stripped concrete are to be plastered with a 3:1 cement mortar to give uniform appearance.

10.6 CURING

Provision is to be made for curing of concrete. Refer to Clause 9.10.8 for details.

10.7 REINFORCEMENT

10.7.1 Placing

Reinforcement shall be placed in accordance with AS3600 and as specified on the plan, or as may be directed by Council's Engineer subject to construction circumstances.

10.7.2 Reinforcement Standard

All reinforcement shall conform to AS1302 and be free of excessive rust, oil, grease or other deleterious matter.

10.7.3 Support & Tying

All steel is to be overlapped as specified and securely tied at joints to provide a rigid matrix and correct load transfer.

Steel is to be supported by "bar chairs" (and "supporting plates" if necessary - dependent on ground conditions) of the necessary height to provide the specified clearances at maximum 1.0 metre spacings.

10.8 TESTING

All tests to be in accordance with AS.1012. Council's Engineer may require the taking of core samples and testing by a registered testing laboratory at the developer's cost prior to approval of work.

10.9 FOOTPATH CROSSING SLABS (KERB TO BOUNDARY)

10.9.1 Residential Standard (refer Standard Diagram No. SD2)

Footpath crossing slabs shall be provided where there is existing kerb and gutter or where kerb and gutter is proposed.

(a) Thickness - Minimum 125mm thick with one layer of F-62 mesh with minimum 30mm cover from the top - 20mpa concrete. A minimum depth of 75mm of compacted gravel shall be placed under as a base.

(b) Dimensions - Minimum 3.0m at kerb to 2.9m at boundary.

(c) In streets where there is no existing kerb and gutter, the access crossing shall be constructed in a minimum thickness of 150mm compacted gravel and bitumen sealed with two coat emulsion seal, or alternatively, a 10mm aggregate. Council will construct the access crossing upon payment of the applicable fee.

10.9.2 Industrial/Commercial Standard (Refer Standard Diagram SD2)

(a) Thickness - Minimum 150mm thick with one layer F-72 mesh with minimum 50mm cover from the bottom - 20MPa concrete. A minimum depth of 100mm of compacted gravel shall be placed under as a base.

(b) Dimensions - Minimum width of 4.5m but dimensions to suit the widths and turning movements of vehicles using the development is required.

10.10 CONCRETE GUTTER CROSSINGS

To be similar thickness and dimension as per footpath crossing. Industrial/commercial gutter crossing will require one layer of F-72 mesh with minimum 50mm to bottom.

10.11 ACCESS TO BATTLE AXE BLOCKS (Refer to Clause 10.5 also)

10.11.1 Residential Areas

(a) A full width concrete driveway slab or alternative pavement surface treatment is required where the access is serving a battleaxe lot where kerb and gutter is proposed or existing in the street. Alternative treatments suitable to the future use and amenity of the lots will be considered on their merits and may include stencilled concrete, coloured concrete, driveway strips, paving blocks etc. The driveway shall extend for the full length of the battle axe handle. All driveway widths shall be a minimum of 2.9 metres wide and shall conform to AS2890.1-1993 and shall include a driveway crossing. See Clause 10.9.1.

(b) Thickness of all concrete accesses to be minimum of 125mm thick. Full width access will require one layer of F-72 mesh placed 50mm from the bottom and shall be bedded on a minimum of 50mm sand or compacted gravel sub-base.

Note:- In all cases the access slab across the footpath is to be of full width construction.

10.11.2 Industrial Commercial Areas

(a) A full width concrete access is required for all industrial/commercial accesses. Minimum width at the boundary is 6m, but should be designed to suit vehicular movements. Design levels of the driveway to suit future kerb and gutter are to be obtained from Council's Works Department.

(b) The minimum thickness is 150mm with one layer F-72 mesh placed 50mm from the bottom. See diagrams SD1, SD2 and SD3.

10.12 CONCRETE JOINTING

Grooved "dummy" joints shall be placed in footpaths, cycleways and driveway strips at an interval which will result in square slabs or in accordance with Council's Access Crossings, see Diagram SD2. Every third joint shall be an expansion joint. Concrete slabs across footpaths are to be expansion jointed at the kerb and at the boundary where the slab is placed separately to the access crossing.

Where access crossings are placed into existing kerb and gutter, the kerb is to be mechanically cut at right angles to the face of kerb and along the gutter line. The kerb section is to be completely removed vertically from the gutter line and the slab and access layback poured integrally. A joint is to be placed at the boundary only. A "dummy" joint is to be placed where the normal access expansion joint would be provided.

All expansion jointing material is to be placed to the full depth of the concrete section.

10.13 SERVICE CONDUITS

If the footpath slab is laid before service cables, conduits shall be installed in accordance with requirements of the relevant authorities.

10.14 CONCRETE FOOTPATHS

Concrete footpaths are to be constructed as detailed on the plan with due regard to general concrete requirements and finish. Minimum width is 1.2 metres. Minimum thickness is 75mm. Bedding in accordance with Clause 10.17.

10.15 CYCLEWAYS

Minimum width of concrete cycleway is to be 2.5 metres with a minimum thickness of 100mm and F72 mesh centrally placed. Bedding in accordance with Clause 10.17.

10.16 OVERLAND FLOW PATHWAYS

Where the concrete pathway is required to accommodate overland flow, a kerbed pathway is to be provided, details of which shall be submitted to Council for approval and shall include flow capacities. Thickening of pathway to be used as flow paths may be necessary and at the direction of Council's Engineer. Bedding is to be in accordance with Clause 10.17.

10.17 BEDDING

Bedding is to be a minimum 50mm sand overlying a firm, well compacted natural material.

10.18 CONCRETE STEPS

Shall conform to the dimension and particulars of the approved plan, be designed in accordance with the provisions of Part D2.13 of the Building Code of Australia, and be finished in accordance with the specifications for concrete.

10.18.1 Gradient

Where natural surface gradient exceeds 10%, concrete steps shall be provided to negotiate such excess grades, and any intermediate ramp section of pathway shall not exceed a longitudinal grade of 10% and shall be level in cross section. The number of steps required will be determined generally to fit ground profile. Where possible, continuous banks of steps will be broken by a short flat landing. Such landing shall be in accordance with the Building Code of Australia. Handrails will be required in excess of 10%.

10.18.2 Reinforcement

All banks of steps shall be reinforced over full width by a single layer of F-72 mesh.

10.18.3 Handrails

Handrails will generally be required where any bank of steps exceeds four in number or where any grade adjacent to the pathway poses a potential danger to pedestrians. Supporting posts shall be securely attached to concrete and evenly spaced at not more than 2.4m intervals.

11.0 BITUMEN SURFACING - DESIGN & CONSTRUCTION

11.1 SPRAYED SEALING

All aspects of design, material quality, and field procedures for sprayed sealing work shall be in accordance with the R.T.A. "Sprayed Sealing Guide" (1992). The submission of spray seal sheets and appropriate A.L.D. test results to Council for approval following sealing will be necessary.

The appropriate seal designs shall be submitted on appropriate forms (generally the R.T.A. spray seal form) to Council for approval at least 24 hours prior to commencement of sealing.

11.2 QUALIFICATION OF CONTRACTORS

Work shall be carried out by operators with established competence in hot bitumen sealing or asphalting as appropriate. Prior advice shall be given of proposed contractors for Council's approval.

11.3 MERGING WITH EXISTING WORK

All new roads shall be surfaced for the full extent as shown on plan and cross sections, and shall extend to merge with the existing seal of any adjoining or intersecting roads so as to form a trafficable junction.

Where shoulder flush sealing adjoins centre seals a splayed transition at a minimum 45^{o} angle is to be provided at both ends of the work and with a minimum overlap of between 300 to 500mm as directed.

11.4 FLUSH SEAL COMPOSITION

All flush seals shall comprise two coats of binder and two coats of aggregate.

11.5 WEARING SURFACE

Generally the recommended wearing surface will be as follows:-

Road Type	Surface Treatment	Aggregate
Residential streets	7mm or 10mm primer seal	1st coat 14mm 2nd coat 7mm
Rural streets	7mm or 10mm primer seal	1st coat 14mm 2nd coat 10mm
Main Roads	7mm or 10mm primer seal	1st coat 14mm 2nd coat 7mm
Commercial streets	7mm primer seal	Asphaltic concrete
Industrial streets	7mm primer seal	Asphaltic concrete

Appropriate time to allow the cutter to cure between coats will be necessary. Council's Engineer shall determine the appropriate time, generally a minimum of three (3) months, but will be dependent upon weather conditions.

Enquiries to determine Council's requirements should be made at the initial design stage. Variations to these requirements may be approved under special circumstances.

Information regarding approved sealing aggregates is readily available from Council's Works Department.

11.6 PRECOATING

Precoating of all sealing aggregate bigger than 7mm is mandatory.

11.7 ADHESION AGENT

All binders for sprayed sealing and asphalt work shall have added an approved adhesion agent dosed in accordance with the manufacturers specification.

11.8 ASPHALT

11.8.1 General

Asphalt wearing surfaces will be required in cul-de-sac turning circles and all industrial, commercial subdivision roads. Required thicknesses and asphalt type are as specified in Sections 4.6.3 and 4.6.4.

Asphalt may also be required at major road intersections in residential areas where a flush seal may not withstand heavy turning and braking movements by traffic. This requirement is to be assessed as part of the engineering design procedures.

Where asphalt is used in isolation (i.e. cul-de-sac turning circles, major intersections) requirements for base course remain the same as adjacent flush seal pavement. Where the developer adopts an asphalt wearing surface throughout (in lieu of flush seal) the base course will be required not to exhibit shrinkage cracking (in the case of modified base material in accordance with Sections 4.6.3 & 4.6.4).

11.8.2 Primer Seal

A 7mm primer seal is required under all sealing on flexible pavements and all asphalt other than cul-de-sac turning circles and major intersections where the asphalt will be applied over the two coat flush seal.

A minimum of 14 days in the case of a primer seal and two days in the case of a two coat flush seal will be required to elapse before application of the asphalt surface.

11.8.3 Asphalt Mix Design

In light to medium trafficked residential streets (design traffic up to approximately $3x10^5$ ESA's), the mix design shall be in accordance with the gap-graded mix in ARRB Special Report No. 41, Table XV, "Aggregate Composition of the ARRB Gap-Graded Mix".

In medium to heavily trafficked roads (design traffic greater than $3x10^5$ ESA's), the asphalt mix shall be designed in accordance with M.R. Form No. 612 (1985).

Asphalt mix designs shall be submitted to and approved by Council prior to placement of any asphalt work.

11.8.4 Asphalt Field Procedures

Construction practice for asphalt works shall be in accordance with M.R. Form No. 612, with the exception that Table 4 "Mix Laying Temperatures" shall be replaced by Table XVI "Asphalt Laying Temperatures Based on Research Information", from ARRB Special Report No. 41.

11.8.5 Adjustment of Flexible Pavement Thickness for Asphalt Wearing Surface

Where total pavement thickness and layer thickness is not determined by minimum requirements (as per Sections 4.6.3 and 4.6.4), the inclusion of asphalt wearing surface will allow a reduction of equivalent thickness in the sub-base layer thickness.

Where total pavement thickness and layer thickness is driven by minimum requirements, any asphalt thickness shall be additive to total pavement thickness and not reduce base course or sub-base minimum thickness requirements.

APPENDIX B

ENGINERING GUIDELINES FOR THE PREPARATION OF DEVELOPMENT DESIGN PLANS

(In Relation to Engineering Development Consent Conditions)

1.0 PLANS

Are to be presented in a professional manner on quality tracing paper with legible printing (min. height 2.5mm) suitable for microfilming. All drafting, printing or text to be in accordance with AS1100.

DXF files on either $3^1/_2$ or $5^1/_4$ discs of the approved subdivision layout (as per the lodged Deposited Plan) are to be provided to Council.

1.1 SIZE

All plans submitted for approval shall be drawn on standard A1 (full size metric) sheets, regardless of the extent of the work.

1.2 SCALES

(a) Plan - Road & Drainage - 1:500 (min) or as required for clarity.

Note:- Water and sewer plans to be separate and in accordance with the Hunter Water Corporation requirements. Plans to be submitted to Council for information only.

(b) Detail - As required for clarity and all necessary topographic detail.

(c) Long Sections - Generally 1:500 horizontal, 1:100 vertical. Vertical scale may vary in very flat or steep grades.

(d) Cross Sections - 1:100 or 1:200 Natural.

(e) Kerb Return - See kerb return profiles Section 1.8.

(f) Catchment Areas - Australian Standard 1100.

1.3 DRAWING TITLE

All sheets must show the following information in the title block:-

* Development Consent Number.
* Property Description.
* Owner/Developer.
* Surveyor/Engineer.
* Scale and Datum.
* Plan Number and Sheet Number.
* Description of Work on Sheets.

1.4 DETAILS TO BE SHOWN ON PLAN

Preferably general notes to be shown on the first sheet of plans, including:-

"All works to be carried out in accordance with Council's Engineering Requirements for Developments".

1.5 ROAD PLANS

(a) Site Location.

(b) Centre line chainages as pegged with position and RL of all recovery marks.

(c) The chainage are generally to be aligned with the longitudinal section and run left to right across the plan.

(d) North point to define orientation.

(e) The centre line bearing of straight sections and the radii of curves.

(f) Location, description and RL of bench marks.

(g) Detail of proposed sub-soil lines.

(h) Existing road names and proposed road number/names, property boundary and lot numbers.

(i) Proposed type and alignment of kerbs.

(j) The location and level of all existing services with construction notes relating to any necessary alterations.

(k) The location of proposed drainage structures with pits and headwalls numbered to correspond with drainage calculations and longitudinal section. For clarity drainage details may be shown on a separate drainage plan.

(l) The face of kerb radius of all kerbs.

(m) Existing drainage structures, including size, type and invert levels.

(n) Existing bitumen or existing kerb location and level for a distance either side of the new road location sufficient to determine design grades to the new work.

(o) Show proposed and existing contours at 0.5m intervals, together with any relevant topographical features over the whole site.

(p) The limits of cut and fill batters of significance.

(q) Existing and proposed road reserve boundaries.

(r) Major trees - 0.3 metre diameter and greater measured 1.0m above the ground.

(s) Linemarking plan for road intersections, including Austroads intersection requirements.

1.6 LONGITUDINAL SECTION ROAD WORKS

The chainage should run left to right across the page and the detail to be shown should include:-

(a) Chainages.

(b) Natural surface levels on the pegged centreline.

(c) Design surface level on the pegged centreline.

(d) Details of the vertical alignment.

(e) Grades, size of vertical curves and chainage, and chainage and RL of intersection points.

(f) Datum RL of longitudinal section.

(g) The chainage, size and level of Public Utility mains and services.

(h) Lip levels of the design kerb and gutter.

(i) In rural areas, a horizontal alignment line incorporating guide post locations and linemarking details.

1.7 CROSS SECTIONS

(a) Cross sections should be generally shown at no more than 20 metre intervals and at key points for design purposes, e.g. where access require special design, where cover requirements over services are critical or where superelevation is required at the relevant transition chainages.

(b) They should be placed such that the lowest chainage occupies the bottom left corner of the sheet and run sequentially up the sheet in progressive columns towards the right.

(c) Cross sections should extend for the full road reserve width or for a sufficient distance to detail the proposed method of satisfactorily matching the design and existing surfaces.

(d) Provide sufficient existing cross section profiles and cross falls to show transitions to proposed work where required.

(e) The details to be shown should include:-

* The road centreline chainage in bold print below each section.
* The offset chainage from the pegged centreline.
* The existing surface RL.
* The design surface RL.
* The design crossfall (%).
* The batter slopes (ratio).
* Access grades (%).
* The design centreline shift if applicable.
* The position, size and level of any public utility, mains and services affecting the work.
* Existing and proposed road reserve boundaries.

The above details may be shown on a typical cross section, except where the transitions, superelevation etc., occurs and the varying details must be shown.

1.8 KERB RETURN PROFILES

(a) Each profile should have a kerb return number (e.g. KR2) corresponding with a number shown on the plan view.

The profile should represent the view as looking from the road to the face of the kerb.

(b) The details to be shown include:-

* The horizontal and vertical scale. This scale should be selected to clearly show the convexity of the kerb profile.
* Chainage. The running face of kerb chainage related to the profile, together with the chainage related to the road centrelines.
* Design top of kerb RL.
* Existing top of kerb RL.
* The applicable road/street names/numbers leading into the profile.
* An extension of a minimum of 15 metres beyond the tangent points to ensure a smooth profile is practicable.

* Show location and number of proposed drainage structures.

* Datum RL of kerb return.

1.9 STORMWATER DESIGN

(a) Catchment calculations.

(b) Full catchment details are to be provided for checking with all stormwater drainage design. The extent of the catchment, including that outside the development, must be shown and accounted for in the calculations.

(c) Each pit sub-catchment shall have a reference number/letter which must be consistently used on the catchment plan, drainage calculations sheet, drainage longitudinal sections and kerb returns.

1.10 STORMWATER

(a) Plan.

(b) The stormwater plan may be incorporated on the road plan if space permits. If drawn on a separate plan, the plan view should be generally aligned with the longitudinal section with the chainages running from left to right.

(c) Details to be shown shall include:-

* North point.
* The pit/bend reference number/letter.
* The location of any public utility mains/services crossing influenced by the work.
* The location and centreline chainage of any applicable drainage structure.
* Note stating that all work is to be carried out in accordance with Council's "Engineering Requirements for Developments" and to the satisfaction of Council's Supervising Engineer.
* Location of existing or proposed drainage easements.
* Overland flowpaths, typical sections and capacities.

(d) Longitudinal Section - The longitudinal section shall be plotted on the sheet so that the chainages run left to right across the sheet starting at the downstream end of the system.

Details to be shown shall include:-

* Running chainage along the line, together with road centreline chainage where applicable.
* Pipe design invert level.
* Pipe grade.
* Existing surface level.

* Existing invert of drain where applicable.
* Finished surface level (where pipe crosses or is within roadworks, top of kerb design may be used and specified by 'TK').
* Pipe size, class and type.
* The location, size and level of any public utility main or service that may be affected by the work.
* The pit/bend reference number and type (to be shown above the section together with details of kerb inlet extensions).
* Datum RL of the longitudinal section.
* The hydraulic grade line.
* The velocity - capacity and design flow.
* The pit loss coefficient.
* Bulkhead locations, types and spacing required.

(e) All relevant references to standard drawings and structural details for non-standard drainage structures.

2.0 ENGINEERING SURVEY

2.1 GENERAL

Council's Engineering survey shall accurately show the landforms to facilitate the best possible design and construction of roadworks, drainage and services.

2.2 SITE DETAIL

Prior to any layout design, all physical features that may affect construction are to be located, levelled and plotted on the plan. These include:-

(a) Rock outcrops (including cliffs, caves etc.)

(b) The canopy spread of individual trees 0.3m diameter and larger measured 1.0m 1.0m above the ground unless the tree forms part of a group planting, in which case show the group canopy spread.

(c) Watercourses/ponds and dams.

(d) Man made structures (including existing road formation, kerb and gutter, fences, buildings and vehicle entrances).

(e) Existing drainage structures.

(f) Existing utilities and services.

(g) Contours at 0.5m spacing on normal terrain.

(h) Top and bottom of banks.

2.3 DATUM

Bench marks are to be established clear of any works with a maximum of 200 metres spacing and clearly shown on all working drawings.

They should be a conventional type and constructed according to good survey practice.

2.4 ROADWORKS PEGGING

(a) Centreline Marking - The centreline start chainage shall be the intersection of the centrelines of the new road and the road with which it intersects.

Where an existing road is to be extended, the start chainage should be the intersection of the subject road the last cross or side road.

If this is not practical, the start chainage should be squared off to a suitable property boundary (min. 60m).

The centreline should be marked and the chainage indicated at each cross section according to good survey practice.

Sufficient recovery pegs are to be placed to enable the Construction Overseer to replace the centreline after the earthworks have been completed. It is the surveyors responsibility to ensure that all survey marks are clearly in place at the commencement of construction.

2.5 CROSS SECTIONS

Cross sections are to be provided at 20 metre maximum spacing on straight sections and 15 metre maximum on curves.

A cross section is also to be provided at the tangent points of curves. If superelevation is required, cross sections are to be provided to the superelevation/widening transition development design standards.

The above spacings are a minimum requirement and extra cross sections may be required for the proper design of difficult accesses, culverts and in some cases, for the accurate calculation of earthworks.

The cross section is to be extended for the full width of the road reserve, or further in cases where extra information is necessary.

Cross sections shall be provided for a minimum of 60 metres along existing intersecting roads (in each direction of the intersection).

2.6 LONGITUDINAL SECTION

As for cross sections, the longitudinal sections are to be extended for a minimum of 60 metres along existing intersecting roads to enable proper extension of design.

The longitudinal section of cul-de-sacs shall be carried to the recovery peg on the prolongation of the centreline.

The longitudinal section of an offset cul-de-sac shall be curved to the centre of the turning circle and not in a straight line with an offset to the centre.

2.7 SOIL & WATER MANAGEMENT

These plans shall show kerblines, drainage, sewer and any other civil infrastructure that will require disturbance to the natural environment. The plans shall also show "NO GO AREAS" and proposed fencelines and types to ensure there is no disturbance outside the construction corridors. Other details to be included are as follows:-

(a) Drainage flow paths and physical constrains to development.

(b) Appropriate measures to overcome those constraints.

(c) Mitigation/control of on site soil erosion.

(d) Movement of water onto, through and off the site.

(e) Rehabilitation/maintenance of the works area.

The plan shall contain the best management practices:-

(a) That accord with the appropriate soil loss class.

(b) Are based upon the best available technology which is economically achievable.

2.8 EROSION & SEDIMENT CONTROL PLANS

These plans shall show the location, type and specific details of all sediment and erosion control devices.

Details of sediment basins showing capacity, batter slopes, maintenance access, fencing, spillway, pumping, dosing, stabilising etc. details. Proposed staging of works, revegetation or progressive revegetation details. Stockpile sites and treatments.

IFD ANALYSIS BASED ON AUSTRALIAN RAINFALL & RUNOFF (1987)

Site name: CESSNOCK

Site latitude = 32.50 degrees S
longitude = 151.34 degrees E
skewness = .05

2-year ARI, 1 hour intensity = 27.50 mm/hr
12 hour intensity = 5.76 mm/hr
72 hour intensity = 1.75 mm/hr

50-year ARI, 1 hour intensity = 50.00 mm/hr
12 hour intensity = 11.80 mm/hr
72 hour intensity = 3.50 mm/hr

IFD Table for Various ARIs and Durations

Duration	1 yr	2 yr	5 yr	10 yr	20 yr	50 yr	100 yr	200 yr	500 yr
5 min	70.78	90.87	117.26	132.83	153.44	180.66	201.56	222.91	251.97
6 min	66.28	85.04	109.55	123.98	143.11	168.35	187.73	207.50	234.40
10 min	54.12	69.29	88.79	100.20	115.39	135.38	150.69	166.29	187.48
12 min	49.99	63.96	81.78	92.20	106.07	124.32	138.29	152.50	171.80
15 min	46.14	57.70	73.58	82.84	95.19	111.42	123.82	136.44	153.54
18 min	41.37	52.84	67.23	75.59	86.77	101.45	112.66	124.05	139.48
20 min	39.28	50.14	63.71	71.58	82.12	95.94	106.50	117.21	131.73
24 min	35.81	45.68	57.89	64.96	74.45	86.88	96.35	105.97	118.99
30 min	31.85	40.58	51.27	57.44	65.74	76.60	84.86	93.25	104.58
45 min	25.48	32.39	40.69	45.44	51.87	60.26	66.64	73.09	81.79
1.0 hr	21.60	27.42	34.29	38.21	43.54	50.47	55.73	61.04	68.20
1.5 hr	16.80	21.39	26.96	30.16	34.48	40.13	44.43	48.78	54.66
2.0 hr	14.01	17.86	22.65	25.41	29.13	33.99	37.70	41.47	46.56
3.0 hr	10.81	13.82	17.66	19.91	22.90	26.83	29.84	32.90	37.05
4.5 hr	8.33	10.68	13.76	15.58	17.98	21.15	23.59	26.07	29.46
6.0 hr	6.92	8.90	11.53	13.09	15.15	17.87	19.97	22.11	25.03
9.0 hr	5.34	6.88	8.99	10.25	11.91	14.11	15.80	17.54	19.92
12.0 hr	4.44	5.74	7.54	8.62	10.04	11.93	13.39	14.89	16.94
18.0 hr	3.45	4.46	5.84	6.67	7.76	9.21	10.33	11.48	13.06
24.0 hr	2.88	3.71	4.86	5.55	6.45	7.65	8.58	9.53	10.83
30.0 hr	2.49	3.22	4.21	4.80	5.57	6.61	7.40	8.22	9.34
36.0 hr	2.21	2.85	3.73	4.25	4.93	5.84	6.55	7.27	8.26
48.0 hr	1.82	2.35	3.06	3.48	4.04	4.78	5.36	5.94	6.75
72.0 hr	1.35	1.74	2.27	2.58	2.99	3.54	3.96	4.39	4.97

FIG 1

IFD ANALYSIS BASED ON AUSTRALIAN RAINFALL & RUNOFF (1987)

Site name: BRANXTON

Site latitude = 32.67 degrees S
longitude = 151.33 degrees E
skewness = .10

2-year ARI, 1 hour intensity = 27.50 mm/hr
12 hour intensity = 5.60 mm/hr
72 hour intensity = 1.70 mm/hr

50-year ARI, 1 hour intensity = 51.00 mm/hr
12 hour intensity = 11.00 mm/hr
72 hour intensity = 3.50 mm/hr

IFD Table for Various ARIs and Durations

Duration	1 yr	2 yr	5 yr	10 yr	20 yr	50 yr	100 yr	200 yr	500 yr
5 min	70.60	90.50	117.58	133.93	155.57	184.51	207.00	230.19	262.09
6 min	66.12	84.70	109.88	125.05	145.15	172.02	192.89	214.39	243.96
10 min	53.97	69.03	89.12	101.17	117.18	138.54	155.09	172.11	195.49
12 min	49.86	63.72	82.11	93.12	107.77	127.29	142.41	157.95	179.27
15 min	45.02	57.49	73.91	83.71	96.77	114.16	127.61	141.43	160.38
18 min	41.26	52.65	67.55	76.42	88.26	104.01	116.19	128.69	145.81
20 min	39.17	49.96	64.02	72.38	83.56	98.41	109.88	121.65	137.77
24 min	35.71	45.52	58.20	65.72	75.79	89.16	99.48	110.07	124.55
30 min	31.76	40.44	51.56	58.15	66.98	78.68	87.70	96.95	109.59
45 min	25.40	32.29	40.95	46.05	52.92	62.00	68.99	76.13	85.88
1.0 hr	21.54	27.34	34.54	38.76	44.46	51.99	57.77	63.67	71.72
1.5 hr	16.70	21.23	26.92	30.27	34.78	40.75	45.34	50.03	56.44
2.0 hr	13.89	17.67	22.47	25.31	29.12	34.16	38.04	42.02	47.45
3.0 hr	10.68	13.61	17.38	19.61	22.60	26.57	29.63	32.76	37.05
4.5 hr	8.21	10.47	13.42	15.18	17.52	20.64	23.05	25.52	28.90
6.0 hr	6.81	8.69	11.17	12.65	14.63	17.26	19.29	21.37	24.24
9.0 hr	5.24	6.69	8.64	9.80	11.35	13.42	15.02	16.67	18.93
12.0 hr	4.35	5.56	7.20	8.18	9.49	11.23	12.58	13.97	15.88
18.0 hr	3.37	4.32	5.61	6.39	7.42	8.81	9.88	10.99	12.51
24.0 hr	2.80	3.60	4.69	5.35	6.22	7.39	8.30	9.24	10.54
30.0 hr	2.43	3.12	4.07	4.65	5.41	6.44	7.24	8.06	9.20
36.0 hr	2.15	2.76	3.62	4.14	4.82	5.74	6.45	7.19	8.21
48.0 hr	1.77	2.27	2.98	3.42	3.99	4.75	5.35	5.97	6.83
72.0 hr	1.31	1.69	2.23	2.56	2.99	3.58	4.03	4.51	5.16

FIG 2

IFD ANALYSIS BASED ON AUSTRALIAN RAINFALL & RUNOFF (1987)

Site name: GRETA

Site latitude = 32.68 degrees S
longitude = 151.38 degrees E
skewness = .07

2-year ARI, 1 hour intensity = 28.00 mm/hr
12 hour intensity = 5.70 mm/hr
72 hour intensity = 1.75 mm/hr

50-year ARI, 1 hour intensity = 52.30 mm/hr
12 hour intensity = 11.40 mm/hr
72 hour intensity = 3.60 mm/hr

IFD Table for Various ARIs and Durations

Duration	1 yr	2 yr	5 yr	10 yr	20 yr	50 yr	100 yr	200 yr	500 yr
5 min	71.76	92.14	119.51	135.85	157.43	186.12	208.28	231.00	262.11
6 min	67.20	86.25	111.71	126.89	146.96	173.63	194.21	215.31	244.18
10 min	54.86	70.31	90.69	102.79	118.83	140.09	156.48	173.25	196.17
12 min	50.68	64.91	83.59	94.66	109.35	128.81	143.80	159.14	180.07
15 min	45.77	58.57	75.27	85.14	98.27	115.63	129.00	142.66	161.31
18 min	41.95	53.65	68.82	77.77	89.68	105.44	117.55	129.94	146.81
20 min	39.82	50.91	65.24	73.68	84.93	99.80	111.23	122.90	138.81
24 min	36.31	46.39	59.33	66.94	77.10	90.51	100.80	111.32	125.64
30 min	32.29	41.22	52.60	59.27	68.19	79.95	88.97	98.18	110.71
45 min	25.84	32.92	41.81	47.00	53.97	63.13	70.15	77.30	87.01
1.0 hr	21.90	27.88	35.29	39.60	45.40	53.01	58.84	64.77	72.81
1.5 hr	16.98	21.65	27.52	30.96	35.56	41.62	46.27	51.00	57.43
2.0 hr	14.12	18.02	22.99	25.90	29.80	34.93	38.87	42.89	48.36
3.0 hr	10.86	13.88	17.79	20.09	23.16	27.21	30.33	33.52	37.86
4.5 hr	8.34	10.68	13.75	15.56	17.98	21.18	23.64	26.16	29.60
6.0 hr	6.91	8.87	11.45	12.99	15.03	17.73	19.81	21.94	24.86
9.0 hr	5.32	6.83	8.86	10.07	11.68	13.81	15.46	17.15	19.46
12.0 hr	4.41	5.67	7.39	8.41	9.77	11.57	12.96	14.40	16.36
18.0 hr	3.43	4.41	5.76	6.57	7.64	9.06	10.16	11.29	12.84
24.0 hr	2.86	3.69	4.82	5.50	6.40	7.59	8.52	9.48	10.79
30.0 hr	2.48	3.20	4.18	4.78	5.56	6.61	7.42	8.25	9.40
36.0 hr	2.20	2.84	3.72	4.25	4.95	5.88	6.61	7.35	8.38
48.0 hr	1.81	2.34	3.07	3.51	4.09	4.87	5.47	6.09	6.94
72.0 hr	1.35	1.74	2.29	2.63	3.07	3.66	4.11	4.58	5.23

FIG 3

IFD ANALYSIS BASED ON AUSTRALIAN RAINFALL & RUNOFF (1987)

Site name: KURRI KURRI

Site latitude = 32.80 degrees S
longitude = 151.50 degrees E
skewness = .05

2-year ARI, 1 hour intensity = 30.00 mm/hr
12 hour intensity = 6.20 mm/hr
72 hour intensity = 1.90 mm/hr

50-year ARI, 1 hour intensity = 57.00 mm/hr
12 hour intensity = 13.50 mm/hr
72 hour intensity = 4.00 mm/hr

IFD Table for Various ARIs and Durations

Duration	1 yr	2 yr	5 yr	10 yr	20 yr	50 yr	100 yr	200 yr	500 yr
5 min	76.41	98.08	126.53	143.31	165.52	194.86	217.39	240.39	271.70
6 min	71.57	91.84	118.40	134.05	154.78	182.15	203.16	224.61	353.80
10 min	58.47	74.97	96.43	109.06	125.80	147.89	164.82	182.10	205.60
12 min	54.02	69.25	89.00	100.60	116.01	136.31	151.88	167.76	189.34
15 min	48.80	62.53	80.27	90.69	104.52	122.75	136.72	150.96	170.32
18 min	44.74	57.30	73.50	82.99	95.61	112.23	124.96	137.94	155.57
20 min	42.48	54.40	69.73	78.72	90.67	106.40	118.45	130.73	147.40
24 min	38.74	49.60	63.51	71.66	82.50	96.76	107.69	118.81	133.92
30 min	34.47	44.11	56.41	63.60	73.18	85.79	95.43	105.25	118.57
45 min	27.59	35.28	45.01	50.68	58.26	68.21	75.81	83.55	94.04
1.0 hr	23.41	29.91	38.09	42.85	49.21	57.57	63.95	70.44	79.23
1.5 hr	18.16	23.28	29.91	33.81	38.98	45.80	51.03	56.36	63.61
2.0 hr	15.11	19.41	25.11	28.48	32.93	38.81	43.34	47.96	54.26
3.0 hr	11.63	14.99	19.56	22.30	25.89	30.65	34.33	38.10	43.26
4.5 hr	8.93	11.56	15.23	17.44	20.33	24.18	27.17	30.24	34.45
6.0 hr	7.41	9.61	12.75	14.65	17.13	20.44	23.02	25.67	29.31
9.0 hr	5.70	7.42	9.93	11.47	13.46	16.14	18.23	20.39	23.37
12.0 hr	4.74	6.18	8.32	9.65	11.35	13.66	15.46	17.32	19.90
18.0 hr	3.69	4.80	6.45	7.47	8.78	10.55	11.92	13.35	15.32
24.0 hr	3.08	4.01	5.38	6.21	7.30	8.76	9.89	11.07	12.69
30.0 hr	2.67	3.48	4.65	5.37	6.31	7.56	8.54	9.55	10.94
36.0 hr	2.37	3.09	4.12	4.76	5.58	6.69	7.55	8.44	9.66
48.0 hr	1.96	2.54	3.39	3.90	4.57	5.47	6.17	6.90	7.89
72.0 hr	1.46	1.89	2.52	2.89	3.39	4.05	4.56	5.09	5.81

FIG 4

IFD ANALYSIS BASED ON AUSTRALIAN RAINFALL & RUNOFF (1987)

Site name: MULBRING

Site latitude = 32.91 degrees S
longitude = 151.48 degrees E
skewness = .06

2-year ARI, 1 hour intensity = 30.50 mm/hr
12 hour intensity = 6.60 mm/hr
72 hour intensity = 2.20 mm/hr

50-year ARI, 1 hour intensity = 59.50 mm/hr
12 hour intensity = 14.00 mm/hr
72 hour intensity = 4.50 mm/hr

IFD Table for Various ARIs and Durations

Duration	1 yr	2 yr	5 yr	10 yr	20 yr	50 yr	100 yr	200 yr	500 yr
5 min	77.38	99.42	128.83	146.33	169.43	200.07	223.68	247.86	280.88
6 min	72.48	93.11	120.62	136.97	158.57	187.21	209.29	231.89	262.75
10 min	59.21	76.03	98.39	111.68	129.23	152.49	170.41	188.75	213.79
12 min	54.71	70.24	90.86	103.11	119.29	140.73	157.25	174.15	197.22
15 min	49.42	63.44	82.02	93.05	107.63	126.94	141.81	157.03	177.80
18 min	45.30	58.14	75.14	85.22	98.56	116.22	129.82	143.73	162.71
20 min	43.02	55.21	71.33	80.88	93.53	110.27	123.17	136.35	154.35
24 min	39.23	50.34	65.01	73.70	85.20	100.44	112.16	124.15	140.51
30 min	34.90	44.78	57.79	65.50	75.70	89.21	99.60	110.23	124.72
45 min	27.94	35.83	46.19	52.32	60.44	71.18	79.44	87.89	99.40
1.0 hr	23.70	30.38	39.14	44.31	51.17	60.24	67.21	74.34	84.05
1.5 hr	18.55	23.82	30.85	35.03	40.55	47.87	53.51	59.29	67.17
2.0 hr	15.53	19.97	25.97	29.55	34.27	40.53	45.37	50.33	57.11
3.0 hr	12.05	15.54	20.32	23.19	26.96	31.98	35.86	39.85	45.31
4.5 hr	9.35	12.07	15.88	18.17	21.18	25.20	28.31	31.52	35.91
6.0 hr	7.80	10.09	13.33	15.29	17.85	21.28	23.95	26.69	30.46
9.0 hr	6.06	7.85	10.43	12.00	14.04	16.79	18.92	21.13	24.17
12.0 hr	5.06	6.57	8.76	10.10	11.85	14.19	16.02	17.91	20.51
18.0 hr	4.01	5.20	6.92	7.96	9.32	11.15	12.57	14.04	16.06
24.0 hr	3.40	4.40	5.83	6.71	7.85	9.37	10.56	11.79	13.47
30.0 hr	2.98	3.85	5.10	5.86	6.85	8.17	9.20	10.26	11.72
36.0 hr	2.67	3.45	4.56	5.23	6.11	7.29	8.20	9.14	10.44
48.0 hr	2.23	2.88	3.80	4.35	5.08	6.05	6.80	7.57	8.64
72.0 hr	1.70	2.19	2.88	3.29	3.83	4.56	5.12	5.70	6.49

FIG 5

IFD ANALYSIS BASED ON AUSTRALIAN RAINFALL & RUNOFF (1987)

Site name: PAXTON

Site latitude = 32.91 degrees S
longitude = 151.29 degrees E
skewness = .07

2-year ARI, 1 hour intensity = 27.50 mm/hr
12 hour intensity = 5.90 mm/hr
72 hour intensity = 1.84 mm/hr

50-year ARI, 1 hour intensity = 49.80 mm/hr
12 hour intensity = 11.75 mm/hr
72 hour intensity = 3.80 mm/hr

IFD Table for Various ARIs and Durations

Duration	1 yr	2 yr	5 yr	10 yr	20 yr	50 yr	100 yr	200 yr	500 yr
5 min	70.68	90.58	116.86	132.46	153.15	180.57	201.70	223.34	252.90
6 min	66.20	84.79	109.19	123.65	142.84	168.27	187.85	207.90	235.25
10 min	54.06	69.11	88.51	99.95	115.19	135.32	150.79	166.60	188.13
12 min	49.95	63.80	81.54	91.97	105.89	124.27	138.37	152.78	172.38
15 min	45.11	57.57	73.37	82.64	95.03	111.37	123.90	136.68	154.06
18 min	41.35	52.72	67.04	75.41	86.63	101.41	112.73	124.26	139.94
20 min	39.26	50.03	63.53	71.41	81.99	95.90	106.56	117.41	132.16
24 min	35.80	45.58	57.74	64.82	74.33	86.84	96.41	106.15	119.36
30 min	31.85	40.51	51.15	57.32	65.64	76.57	84.91	93.40	104.90
45 min	25.49	32.35	40.60	45.35	51.80	60.24	66.67	73.20	82.03
1.0 hr	21.62	27.39	34.22	38.14	43.48	50.45	55.75	61.13	68.39
1.5 hr	16.89	21.44	26.96	30.15	34.46	40.12	44.43	48.80	54.73
2.0 hr	14.12	17.96	22.69	25.43	29.13	33.98	37.69	41.46	46.57
3.0 hr	10.94	13.95	17.74	19.95	22.91	26.82	29.81	32.86	37.00
4.5 hr	8.47	10.82	13.85	15.63	18.01	21.15	23.55	26.02	29.37
6.0 hr	7.07	9.04	11.62	13.15	15.18	17.87	19.93	22.05	24.93
9.0 hr	5.47	7.02	9.09	10.32	11.94	14.10	15.77	17.47	19.81
12.0 hr	4.57	5.87	7.63	8.69	10.08	11.92	13.35	14.82	16.83
18.0 hr	3.56	4.58	5.98	6.81	7.91	9.38	10.52	11.68	13.28
24.0 hr	2.98	3.84	5.01	5.72	6.65	7.90	8.86	9.85	11.21
30.0 hr	2.59	3.33	4.36	4.98	5.80	6.89	7.74	8.60	9.80
36.0 hr	2.30	2.96	3.89	4.44	5.17	6.15	6.91	7.69	8.76
48.0 hr	1.90	2.45	3.22	3.68	4.29	5.11	5.74	6.39	7.29
72.0 hr	1.42	1.83	2.42	2.77	3.24	3.86	4.34	4.84	5.53

FIG (

IFD ANALYSIS BASED ON AUSTRALIAN RAINFALL & RUNOFF (1987)

Site name: WOLLOMBI

Site latitude = 32.94 degrees S
longitude = 151.14 degrees E
skewness = .06

2-year ARI, 1 hour intensity = 27.30 mm/hr
12 hour intensity = 5.90 mm/hr
72 hour intensity = 1.75 mm/hr

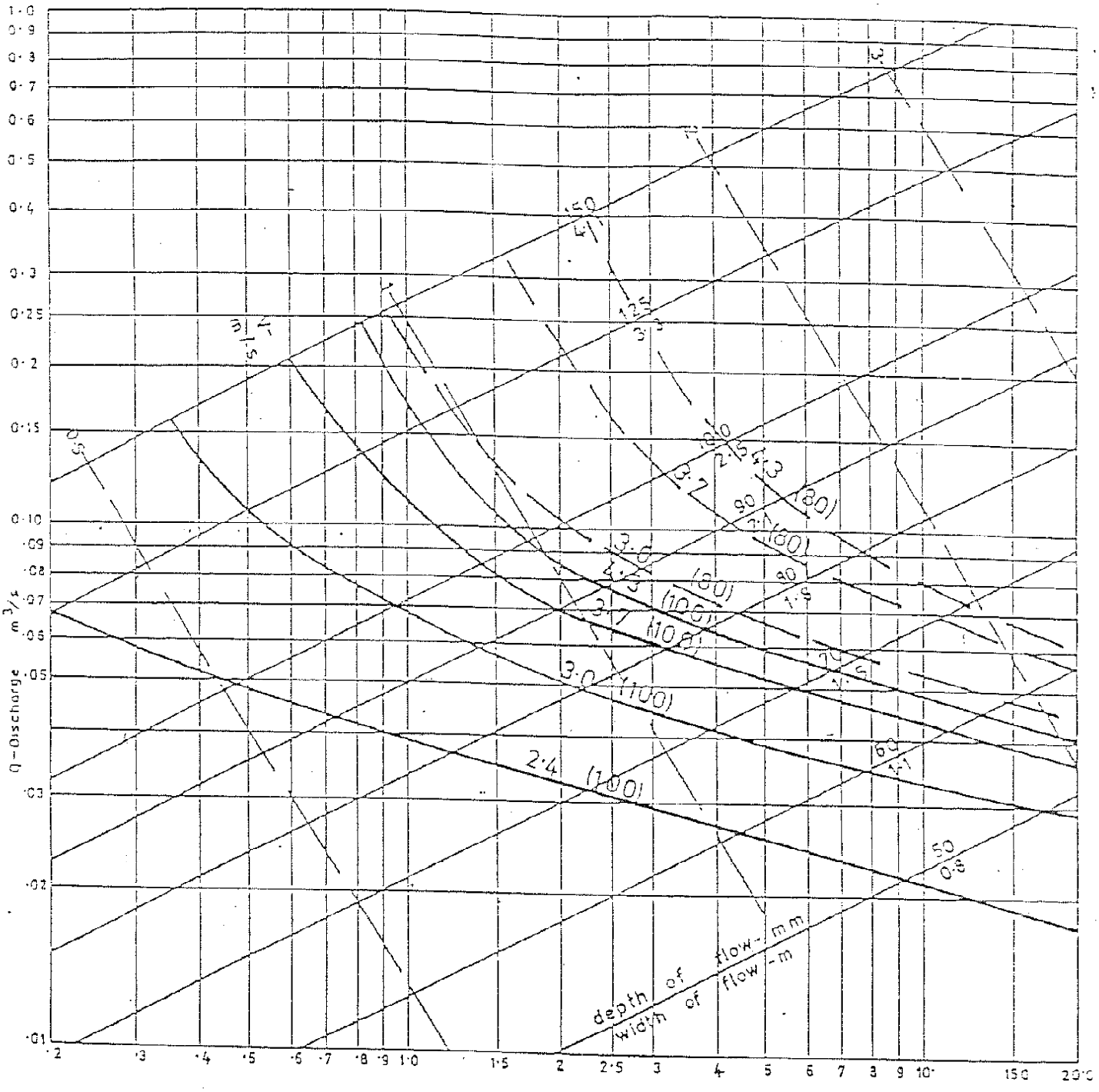
50-year ARI, 1 hour intensity = 49.70 mm/hr
12 hour intensity = 12.00 mm/hr
72 hour intensity = 3.65 mm/hr

IFD Table for Various ARIs and Durations

Duration	1 yr	2 yr	5 yr	10 yr	20 yr	50 yr	100 yr	200 yr	500 yr
5 min	70.17	90.05	116.30	131.86	152.46	179.72	200.71	222.18	251.47
6 min	65.72	84.28	108.66	123.09	142.21	167.49	186.94	206.83	233.94
10 min	53.66	68.69	88.09	99.50	114.68	134.72	150.09	165.78	187.14
12 min	49.58	63.41	81.15	91.56	105.43	123.72	137.74	152.04	171.49
15 min	44.77	57.21	73.02	82.27	94.62	110.89	123.34	136.04	153.29
18 min	41.04	52.39	66.72	75.08	86.26	100.97	112.23	123.70	139.26
20 min	38.96	49.72	63.23	71.10	81.64	95.50	106.10	116.88	131.52
24 min	35.53	45.29	57.45	64.53	74.02	86.48	96.00	105.68	118.80
30 min	31.60	40.24	50.90	57.07	65.37	76.25	84.56	93.00	104.43
45 min	25.29	32.13	40.40	45.16	51.59	60.01	66.41	72.90	81.68
1.0 hr	21.44	27.20	34.05	37.98	43.31	50.26	55.54	60.89	68.12
1.5 hr	16.76	21.32	26.89	30.10	34.44	40.11	44.44	48.83	54.77
2.0 hr	14.03	17.88	22.66	25.44	29.17	34.07	37.81	41.61	46.76
3.0 hr	10.88	13.90	17.76	20.01	23.02	26.99	30.03	33.13	37.33
4.5 hr	8.43	10.80	13.90	15.73	18.15	21.36	23.83	26.34	29.77
6.0 hr	7.03	9.03	11.68	13.26	15.34	18.10	20.22	22.40	25.36
9.0 hr	5.45	7.02	9.15	10.43	12.11	14.34	16.06	17.83	20.25
12.0 hr	4.56	5.88	7.70	8.80	10.24	12.16	13.64	15.17	17.26
18.0 hr	3.52	4.54	5.96	6.82	7.94	9.44	10.60	11.80	13.44
24.0 hr	2.92	3.77	4.96	5.68	6.62	7.87	8.84	9.85	11.22
30.0 hr	2.52	3.25	4.29	4.91	5.73	6.82	7.66	8.53	9.73
36.0 hr	2.23	2.88	3.80	4.35	5.08	6.05	6.80	7.58	8.64
48.0 hr	1.82	2.36	3.11	3.57	4.17	4.97	5.59	6.24	7.12
72.0 hr	1.35	1.74	2.31	2.65	3.10	3.70	4.17	4.65	5.31

FIG 7

COLLECTION CAPACITIES OF GRATED KERB INLET PITS WITH DEFLECTORS



NOTES: 1. K & G CAPACITY - MANNING FORMULA

2. CROSSFALL 3%

3. n = 0·015

4. CURVED LINES INDICATE LINTEL LENGTH IN METRES AND PERCENT COLLECTION OF GUTTER FLOW

FIG 8

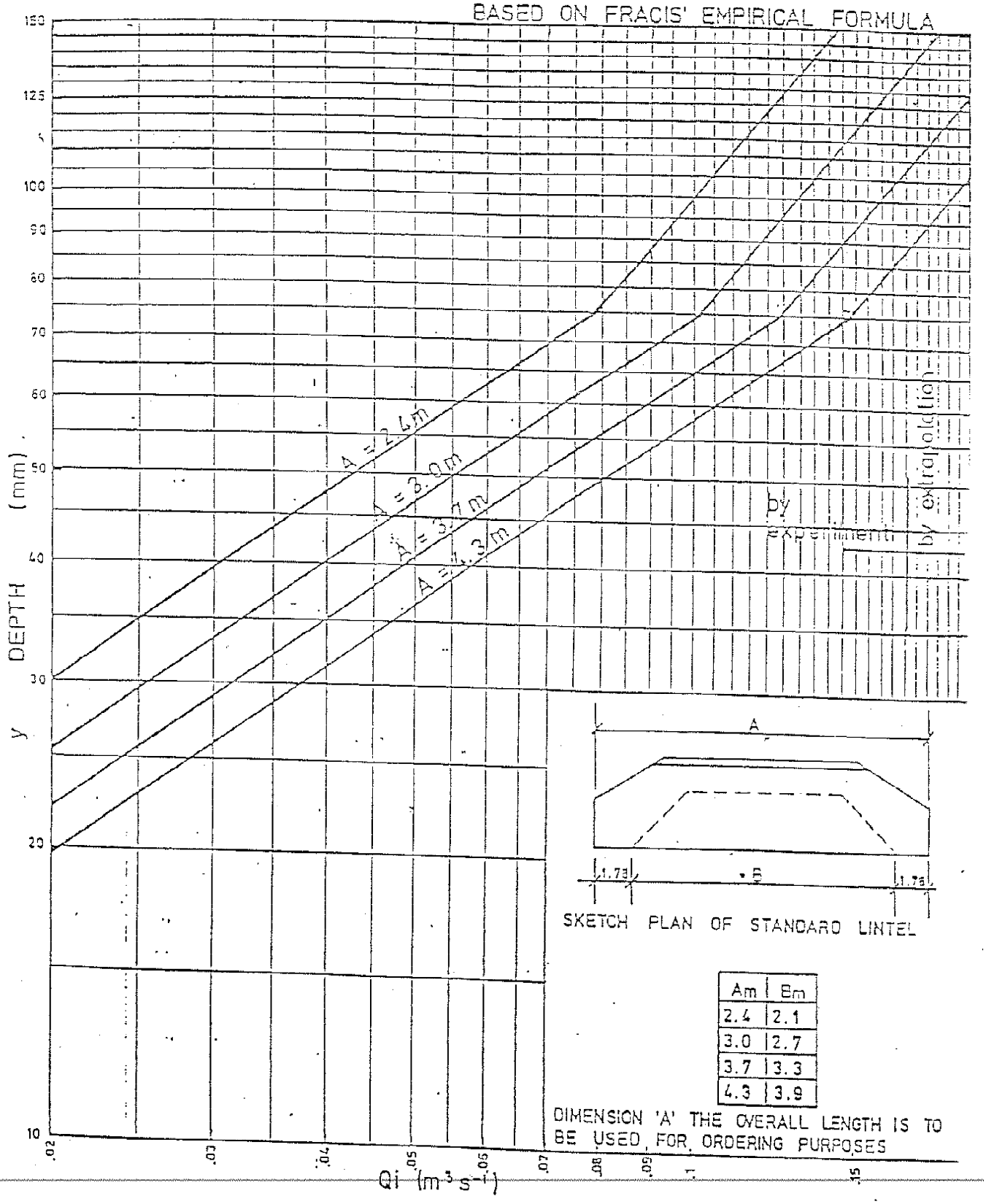
SAG INLET CAPACITIES — CROSSFALL 3 %

$Qi = \frac{2}{3} Cd\sqrt{2g}\,(B - 0.1nH_2)\,H_2^{3/2}$ FOR $H_2 \leq 0.075m$

$Qi = \frac{2}{3} Cd\sqrt{2g}\,B\,(H_2^{3/2} - H_1^{3/2})$ FOR $H_2 > 0.075m$

WHERE Qi = INLET CAPACITY ($m^3 s^{-1}$)
B = LINTEL OPENING (m)
n = No. OF END CONTRACTIONS = 2
H_2 = y DEPTH (m)
H_1 = $(H_2 - 0.075)$ (m)
Cd = 0.62

BASED ON FRACIS' EMPIRICAL FORMULA



SKETCH PLAN OF STANDARD LINTEL

Am	Bm
2.4	2.1
3.0	2.7
3.7	3.3
4.3	3.9

DIMENSION 'A' THE OVERALL LENGTH IS TO BE USED FOR ORDERING PURPOSES

FIG 9

TABLE 6.5

APPROXIMATE VALUES FOR COEFFICIENT K_w:
PIPES CONCURRENT OR AT RIGHT ANGLES

1. INTRODUCTION

Figure (a) represents a general, simple junction pit layout with upstream, lateral and grating inflows, Q_u, Q_l and Q_g respectively.

By assigning values to these parameters all possible simple junction pit configurations can be described. Figure (b) is an elevation section through the pit taken along the alignment of its discharge pipe, diameter D_o. The K_w values listed are based on the findings of Sangster et al (1958) known as 'Missouri Charts', de Groot and Boyd (1983), Black and Piggott (1983).

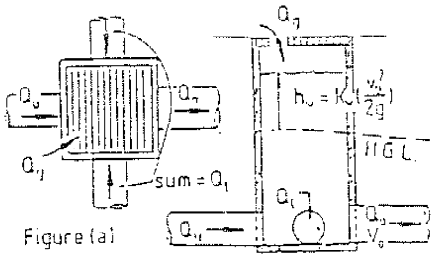


Figure (a)

Figure (b)

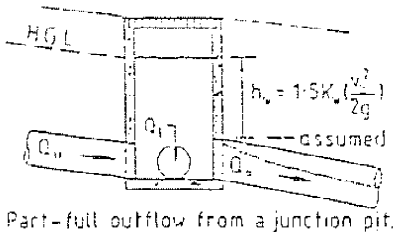
2. JUNCTION PITS WITHOUT GUTTER FLOW

CODE	DESCRIPTION	$Q_u \approx$	$Q_l \approx$	Q_g	$K_w =$
J-1	Junction pit on through pipeline, i.e. $Q_u = Q_o$	Q_o	-	-	0.2
	Junction pit on through pipe with lateral(s)				
J-2A	. $Q_u >> Q_l$	Q_o	some	-	0.5
J-2B	. $Q_u \approx Q_l$	$Q_o/2$	$Q_o/2$	-	1.0
J-2C	. $Q_u << Q_l$	some	Q_o	-	2.0
J-3	Junction pit on 'L' pipe junction, i.e. $Q_u = 0$	-	Q_o	-	2.0
	Junction pit on 'T' pipe junction, i.e. $Q_u = 0$				
J-3A	. opposed laterals	-	Q_o	-	2.5
J-3B	. offset laterals	-	Q_o	-	2.0

3. INLET/JUNCTION PITS WITH GUTTER FLOW

CODE	DESCRIPTION	$Q_u \approx$	$Q_l \approx$	$Q_g \approx$	$K_w =$
I-1	Inlet pit with single pipe outflow	-	-	Q_o	4.0
	Inlet on through pipeline				
I-2A	. $Q_u \approx Q_g$	$Q_o/2$	-	$Q_o/2$	2.0
I-2B	. $Q_u \approx Q_o$	Q_o	-	some	0.5
	Inlet on through pipe with lateral(s)				
I-3A	. $Q_u >> Q_l$	Q_o	some	some	0.5
I-3B	. $Q_u > Q_l$	$Q_o/2$	some	$Q_o/2$	1.5
I-3C	. $Q_u \approx Q_l$	$Q_o/2$	$Q_o/2$	some	1.5
I-3D	. $Q_u << Q_l$	some	Q_o	some	2.0
I-3E	. $Q_u < Q_l$	some	$Q_o/2$	$Q_o/2$	2.5
I-4	Inlet on 'L' pipe junction i.e. $Q_u = 0$	-	Q_o	some	2.5
	Inlet on 'T' pipe junction i.e. $Q_u = 0$	-			
I-5A	. opposed laterals	-	Q_o	some	3.0
I-5B	. offset laterals	-	Q_o	some	2.5

4. PART-FULL OUTFLOW FROM JUNCTION PITS



Part-full outflow from a junction pit.

Situations frequently arise, particularly in upper-basin catchments of moderate/steep grade, where pipes operate part-full. Water level build-up in pits supplying these pipes, is, typically above obvert level (see sketch). Bannigan and Morgan (1981) have suggested for such situations that the hydraulic grade line be set at (discharge) pipe obvert level and the height, h_w, fixed in the same manner as other cases considered in Tables 6.5 and 6.6. The value of V_o required in the calculation of h_w is given by $V_o = Q_o/A_o$ where A_o is discharge pipe full area.

No experimental or field validation of this has to date been presented. Results of a pilot study carried out at S.A. Institute of Technology show water level build-up can be significantly greater than $K_w (V_o^2/2g)$. It is therefore recommended that the Bannigan and Morgan approach be adopted with h_w fixed by:

$$h_w = 1.5 K_w \left[\frac{V_o^2}{2g}\right]$$

The results of current research will in time yield a more accurate relationship.

TABLE 6.6

APPROXIMATE VALUES FOR COEFFICIENT K_w: PIPES
NEITHER CONCURRENT NOR MEETING AT RIGHT ANGLES

1. JUNCTION PIT WITH SINGLE ENTRY/EXIT PIPES

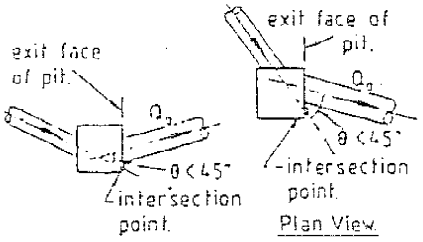
Hare's (1983) research on the hydraulics of single entry/exit pits with pipes neither concurrent nor meeting at 90 degrees, shows that the pit water level headloss coefficient, K_w, which should be applied to the hydraulic grade line at these structures is dependent on two main factors:

(i) the location of the entry pipe centreline (produced) intersection with pit walls; and

(ii) the magnitude of gutter flow, Q_g.

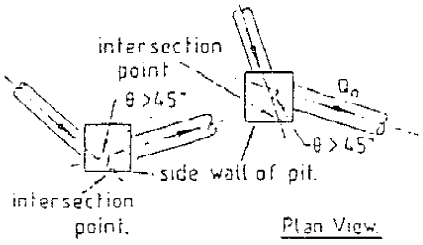
For deviation angle, $\theta < 45^\circ$:

Examples:



For deviation angle, $\theta > 45^\circ$:

Examples:



K_w values recommended are:

$\theta < 45^\circ$: $K_w = 0.5$ for $Q_g = 0$ or small quantity;

$K_w = 1.5$ for $Q_g \approx Q_o/2$

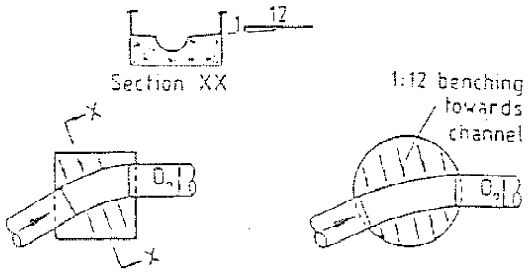
$\theta > 45^\circ$: $K_w = 2.5$ (with or without gutter flow)

Research suggests that hydraulic shaping of pits to assist the passage of flow from entry to exit can be effective.

Pit dimensions Small pits, generally, result in smaller headlosses than large pits.

Circular pits Results of unpublished research by R.G. Black and T.L. Piggot of Queensland Institute of Technology, when compared with the results of Hare (1983), show marginally improved performance for circular pits in situation which would otherwise, i.e. using rectangular pits, fall into the cases considered above.

Internal shaping 'Benching' of pits to provide a curved channel $D_o/2$ deep between entry and exit pipes (see sketch) can reduce K_w values obtained in $\theta > 45^\circ$ situations from 2.5 to about 1.5 (Archer et al 1978). It appears to make no significant improvement in $\theta < 45^\circ$ situations. Similar findings are reported in Dick and Marsalek (1985).



Benching in a rectangular junction pit

Benching in a circular junction pit

2. DROP JUNCTION PITS

It is often necessary in steep terrain or when an existing service (water main, electricity cable, etc.) must be avoided to construct junction pit entry and exit pipes at significantly different levels. Unpublished research by Black and Piggot (QIT) and Logan City Council (1983) suggests the following values for the pit water level headloss coefficient K_w:

$\theta < 45^\circ$ situations:

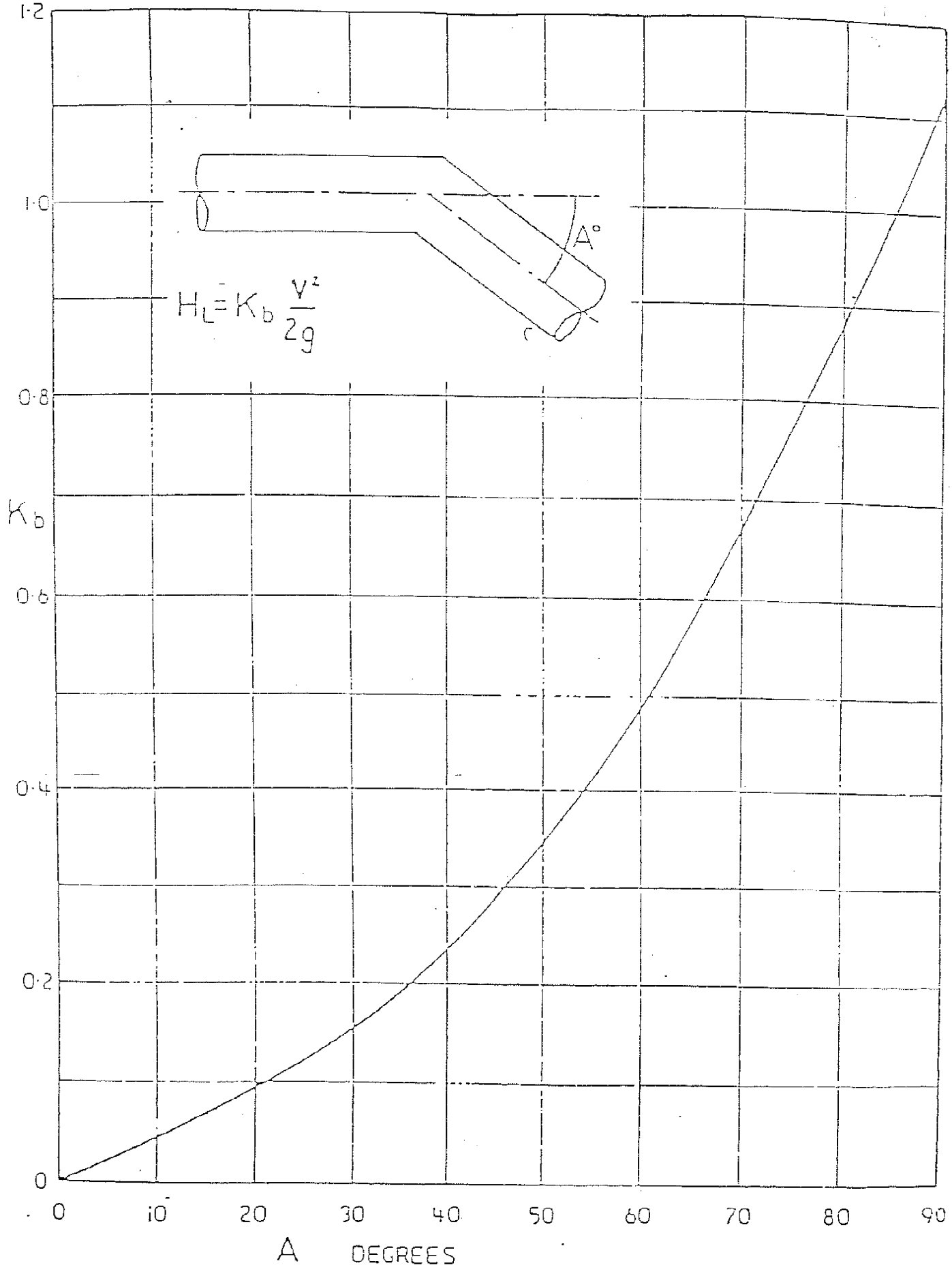
rectangular pits, $K_w = 2.0$;
circular pits, $K_w = 1.5$

$\theta > 45^\circ$ situations:

rectangular pits, $K_w = 2.5$;
circular pits, $K_w = 2.0$

Use of these values of K_w is restricted to installations in which both pipe obverts (entry and exit) are submerged under design flow conditions AND there is no gutter flow. It is considered unlikely that gutter flow, if present, will affect the listed values of K_w, but this is presently unresearched.

Some designers prefer to break vertical alignment and introduce a short length of steeply sloping pipe (slope, say, 1 vertical to 4 horizontal), if necessary, in preference to using a drop pit. They argue that the headloss thus introduced, although unknown, must be less than that occurring at a drop pit. Designers following this practice are entitled to use slightly reduced values for K_w.



LOSS COEFFICIENTS FOR MITER BENDS

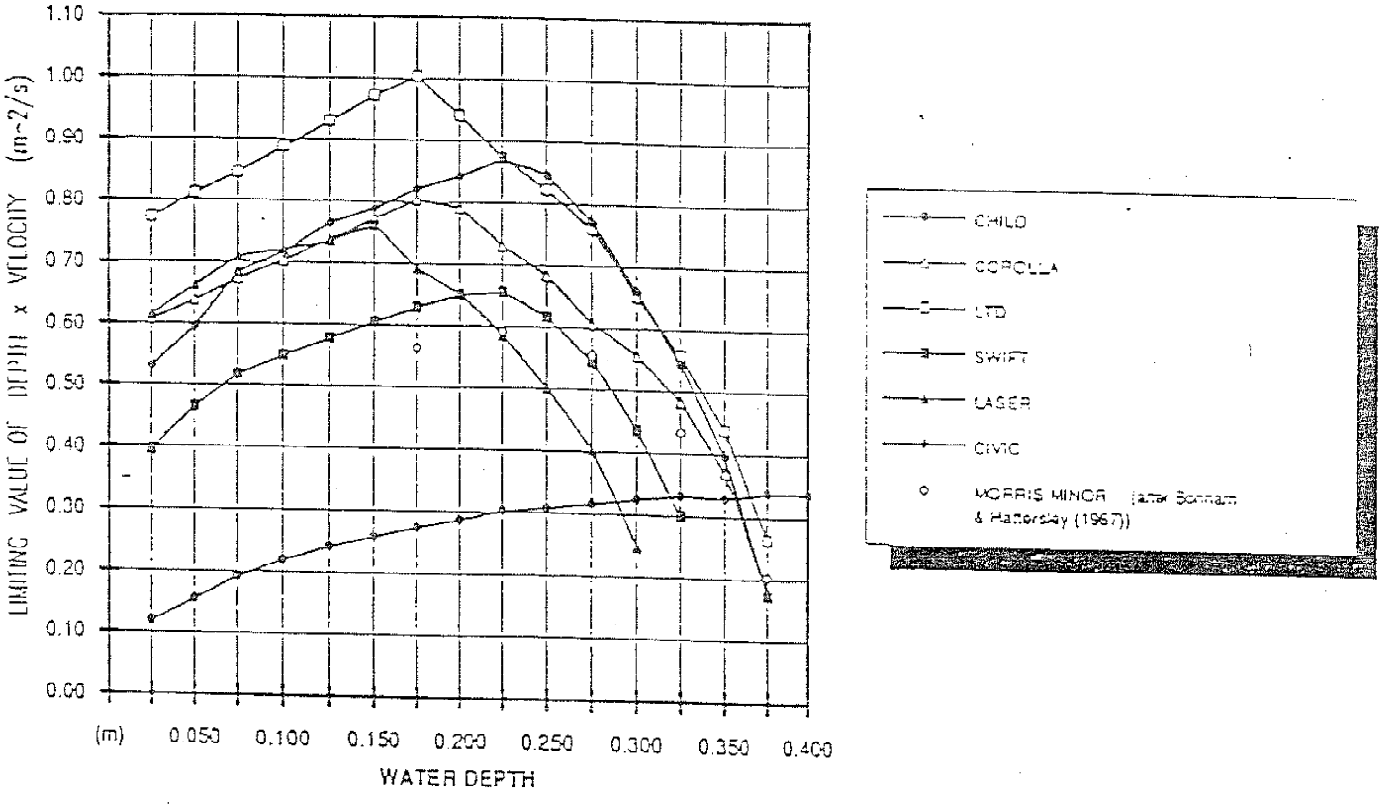
U.S. CORPS OF ENGINEERS

FIG 12

URBAN STREET AS A FLOODWAY

* In the design of an urban street as a floodway, the actual flow depth must be taken into account when establishing an appropriate design value of V x D. R.J. Keller and B.F. Mitsch, in their paper "Stability of Cars and Children in Flooded Streets" suggest appropriate values of V x D to be adopted in lieu of the 0.4 value given in Section 1 of AR & R.

The writers suggest that the use of a single value in isolation is inappropriate. They recommend that the design graph given below (Fig 12.1) be used as a rational design aid to determine safe values of V x D.

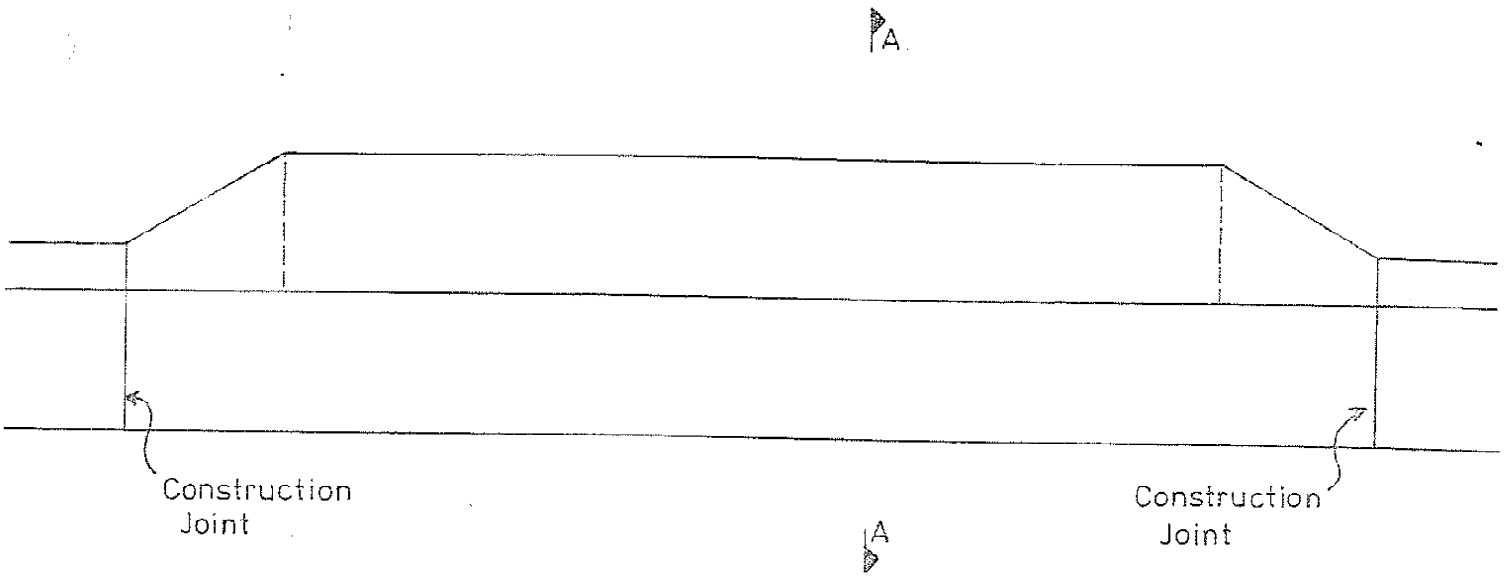


Composite Limiting Stability Diagram

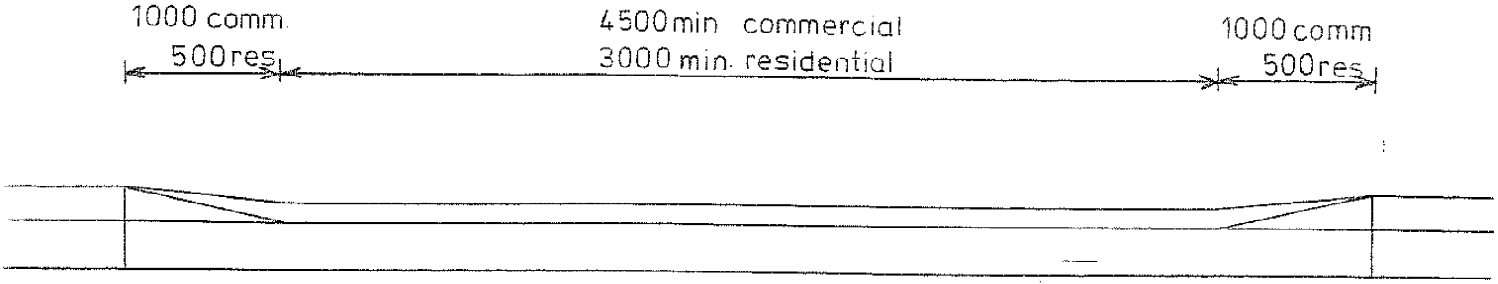
From paper by R.J. Keller and B.F. Mitsch
"Stability of Cars and Children in Flooded Streets"
International Symposium on Urban Stormwater Management February 1992.
Institution of Engineers, Australia.

Limiting Values of V x D

FIG 13

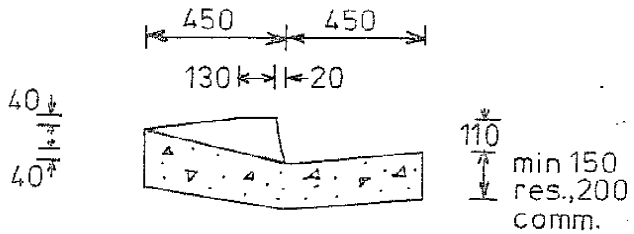


PLAN



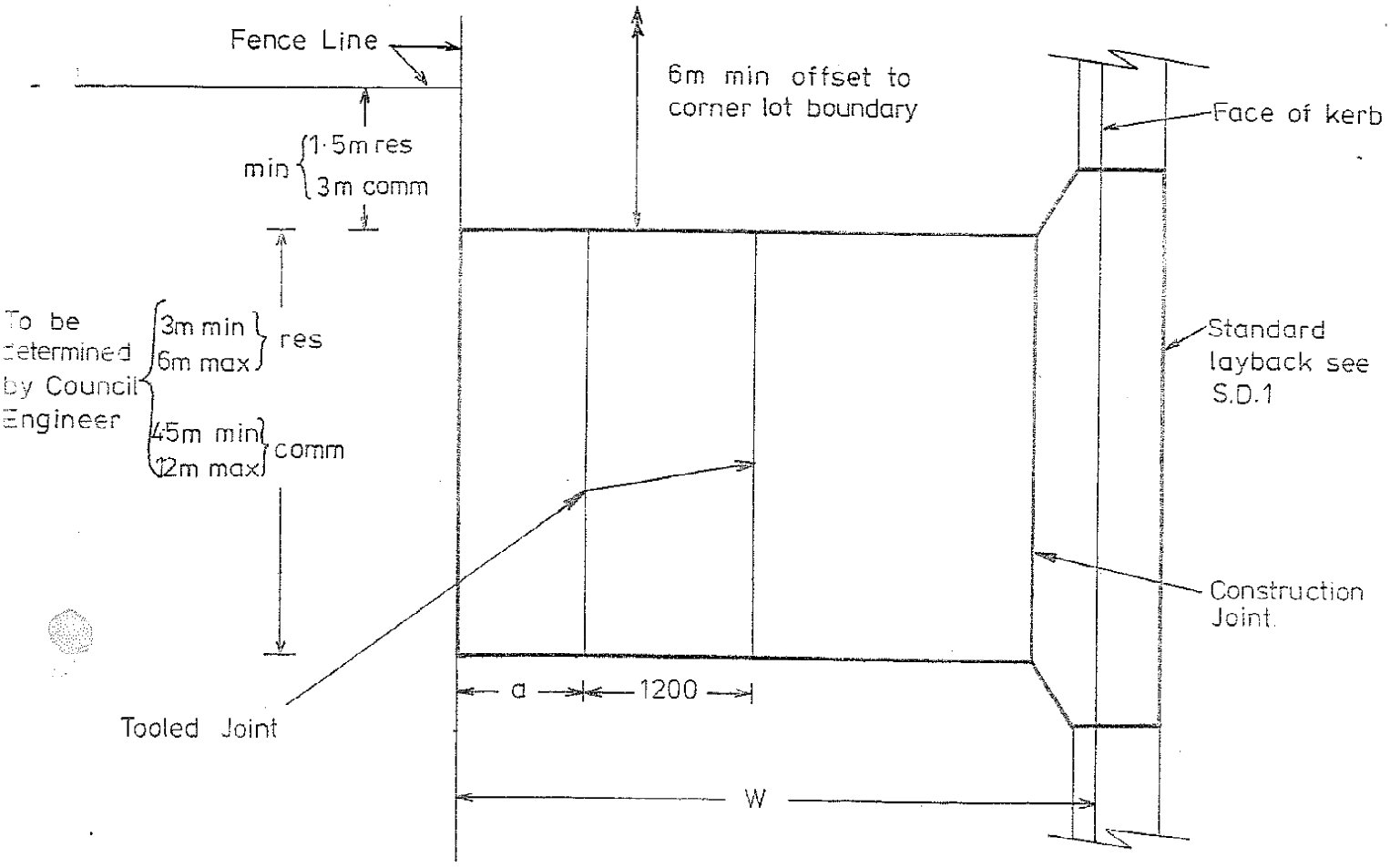
ELEVATION

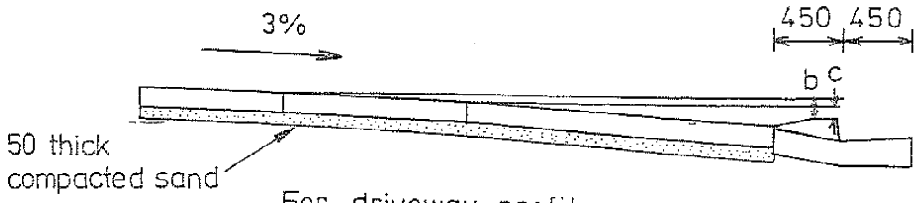
NOTE 1. For commercial entrances, two layers of F82 fabric are to be provided top and bottom with 50 cover.
2. Concrete is to have a compressive strength of 20MPa at 28 days.
3. All steel reinforcement is to have 50 cover.
4. All dimensions are shown in millimetres.



SECTION AA

CESSNOCK CITY COUNCIL	DRAWN DATE C.D. 10·2·86	S.D. 1
LAYBACK IN KERB AND GUTTER FOR VEHICULAR ENTRANCES	APPROVED G. Robinson	





For driveway profile see S.D.3

Residential Crossing

125 thick slab reinforced with F62 Fabric in top, 30 cover
Concrete compressive strength to be 20MPa at 28 days.

Commercial Crossing

150 thick slab reinforced with F72 Fabric in top, 50 cover
Concrete compressive strength to be 25MPa at 28 days

NOTE 1. Steel reinforcing shall not extend through construction joints.
2. All steel reinforcing to have 50 cover unless shown otherwise
3. All dimensions in millimetres unless shown otherwise

Heavy Duty Commercial Crossing

150 thick slab reinforced with F72 Fabric top and bottom, 50 cover
Concrete compressive strength to be 30MPa at 28 days.

W(mm)	* a(mm)	* b(mm)	* c(mm)
3500	900	110	40
3670	900	110	40
4500	900	140	70
5500	2100	170	70

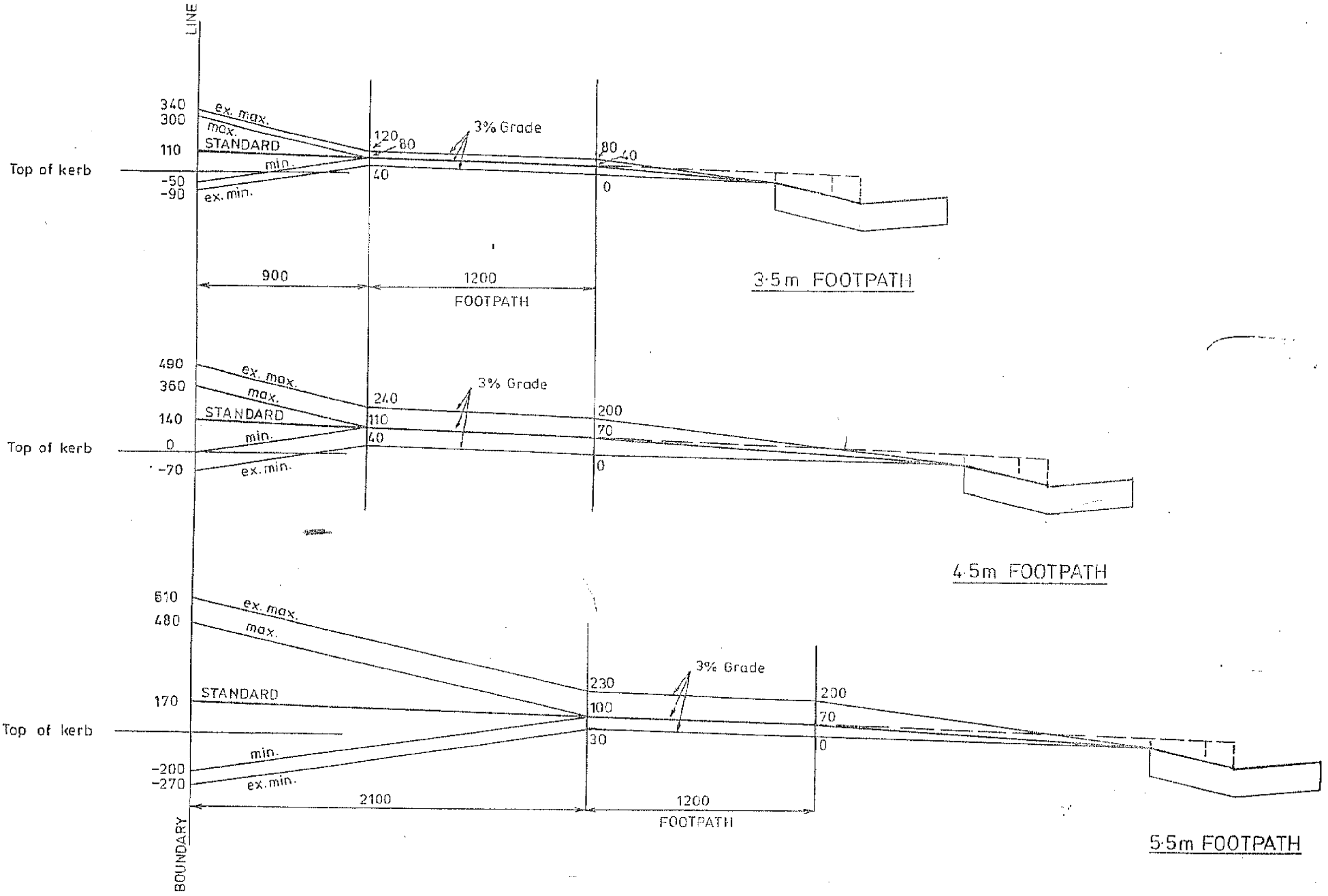
* May be varied by Council Engineer in special circumstances (See S.D.3)

CESSNOCK CITY COUNCIL

STANDARD FOOTPATH CROSSING

DRAWN	DATE
C.D.	13·2·86
APPROVED	
J. Robinson	

S.D. 2



NOTE:
1. All dimensions are above or below top of kerb.
2. Crossings between max. and ex. max., min. and ex. min. are sub standard and applicants should be informed that most modern cars should not incur difficulty, but the crossing is not guaranteed.

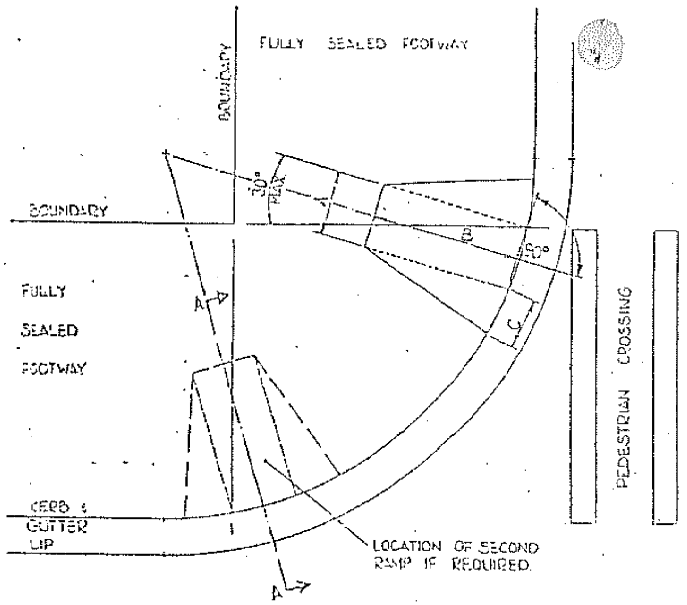
CESSNOCK CITY COUNCIL

STANDARD DRIVEWAY
PROFILES 1:20

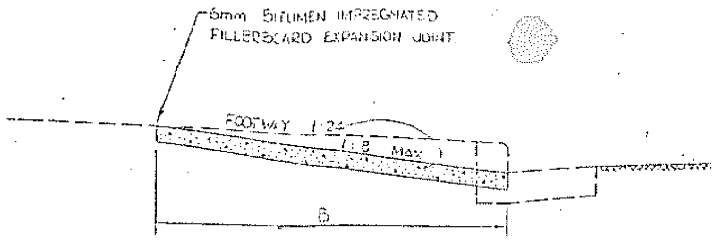
DRAWN	DATE
C D	22·2·85

APPROVED

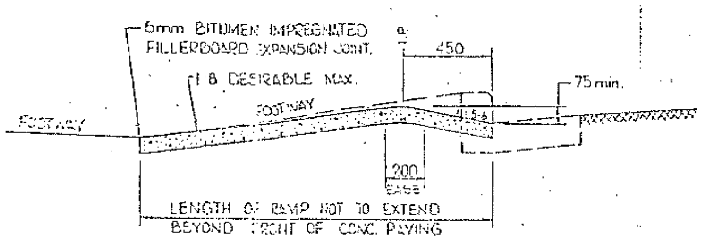
S.D. 3



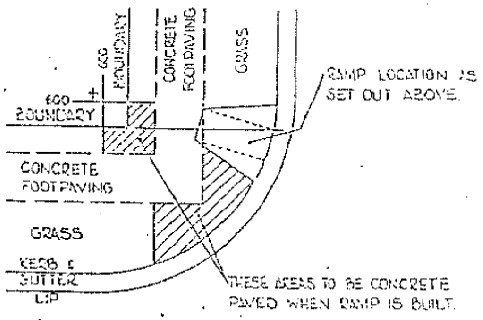
PREFERRED LOCATION OF KERB RAMPS AT KERB RETURNS



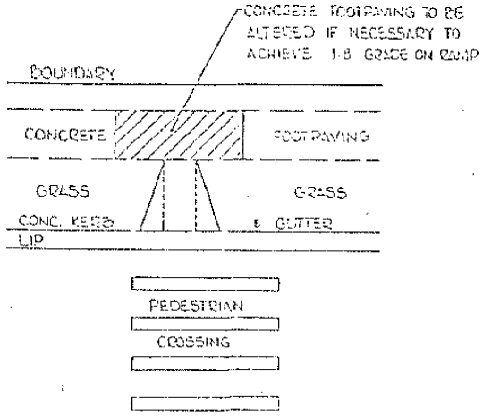
SECTION A-A
NORMAL LEVEL FOOTWAY



LOW LEVEL FOOTWAY



NOTE: CONCRETE FOOTPAVING AT CORNER TO BE LOWERED IF NECESSARY TO ACHIEVE A 1:8 GRADE ON RAMP.



RAMP DIMENSIONS (FOR 1:8 GRADE)

DIMENSION		INTEGRAL KERB & GUTTER	
		150 mm HIGH	200 mm HIGH
A	MINIMUM	800	800
	DESIRABLE	900	900
B		1800	2400 *
* C		600	800

LENGTH OF RAMP 'B' TO BE DETERMINED ON SITE - LENGTH WILL VARY FROM ABOVE TABLE DEPENDING ON KERB HEIGHT AND FOOTWAY GRADIENT. DIMENSION 'B' IN TABLE BASED ON NORMAL FOOTWAY CROSSFALL OF 1:24.

* WIDTH OF SPLAY TO BE DETERMINED ON SITE - RATIO OF KERB HEIGHT TO SPLAY WIDTH TO BE 1:4

ONLY PRACTICAL WHERE FOOTWAY IS 4.25m OR WIDER.

NOTES

1. WIDTH OF SPLAY MAY BE DECREASED IF NECESSARY TO CLEAR PUBLIC UTILITIES.
2. STREET NAME SIGNS, PARKING SIGNS ETC. TO BE RELOCATED IF NECESSARY.
3. LEVEL OF FIRE HYDRANTS, GAS SYPHONS ETC. TO BE ADJUSTED WHERE THEY OCCUR WITHIN RAMP AREA.
4. THE POSITION OF RAMPS MAY BE CHANGED FROM THE PREFERRED LOCATION WHERE THERE ARE MAJOR OBSTRUCTIONS (e.g. POWER POLES, TELECOM PITS, DRAINAGE PITS etc.).
5. WHERE IT IS IMPRACTICAL TO POSITION A RAMP SQUARE TO THE KERB & GUTTER IT MAY BE POSITIONED ON A SKEW WITH THE SHORTER SIDE HAVING A MAX. GRADE OF 1:8.
6. GENERALLY ONE RAMP TO BE PROVIDED AT EACH CORNER IN THE MAIN DIRECTION OF PEDESTRIAN MOVEMENT.
7. TWO RAMPS TO BE PROVIDED AT A CORNER ONLY IF CONSIDERED ESSENTIAL (e.g AT PEDESTRIAN CROSSINGS OR TRAFFIC LIGHTS).
8. WHERE POSSIBLE RAMPS ARE TO BE LOCATED DOWNSTREAM FROM ADJACENT SUMPS.
9. RAMPS ARE TO BE LOCATED WITHIN THE LIMITS OF PEDESTRIAN CROSSINGS.
10. CONCRETE IS TO BE A MINIMUM OF 20 MPa.
11. RAMP SHALL HAVE A WOOD FLOAT OR COVING TROWEL FINISH CARRIED TO THE EDGE OF ALL SLOPED SURFACES.
12. AT ACUTE ANGLE CORNERS WHERE IT IS IMPRACTICAL TO PROVIDE TWO SEPERATE RAMPS, CONSTRUCT ONE CENTRALLY LOCATED RAMP.
13. IN SOME HIGH AND LOW LEVEL FOOTWAY SITUATIONS THE DESIRABLE GRADIENT OF 1:8 MAY BE EXCEEDED.
14. LOW LEVEL FOOTWAY RAMPS WILL PRESENT PROBLEMS TO SOME USERS:
    i) LOW SET WHEELCHAIR FOOTRESTS COULD SCRAPE ON THE LAYBACK SECTION.
    ii) THE 1:5.6 GRADIENT OF THE LAYBACK MAY BE TOO STEEP FOR SOME USERS TO NEGOTIATE.
15. RAMPS ARE TO BE PROVIDED IN CONJUNCTION WITH NEW CONCRETE FOOTWAY PAVING OR NEW KERB AND GUTTER AT ALL INTERSECTIONS.

DRAWN : SURVEY :
CHECKED : DESIGN :
FILE No. :

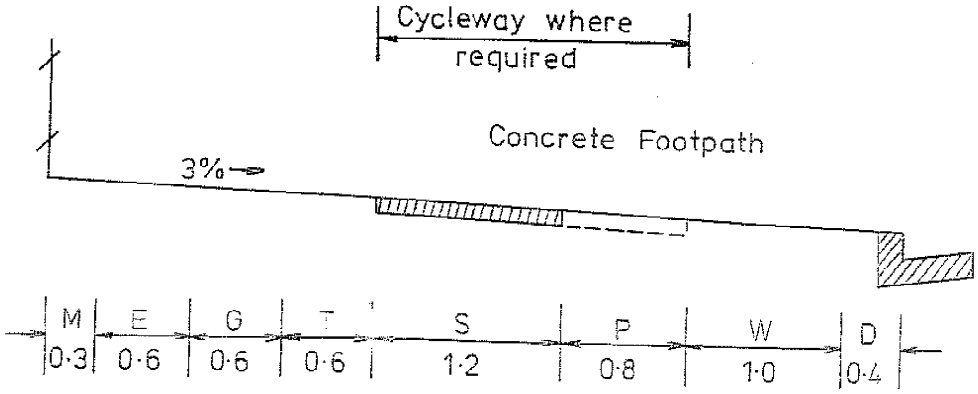
SCALE :

DATUM :

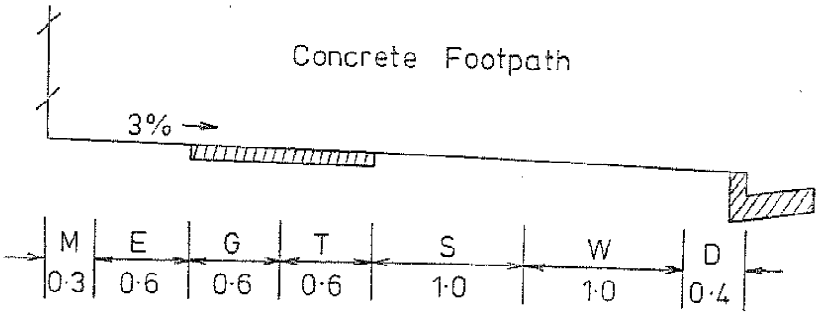
CESSNOCK CITY COUNCIL

FOOTWAY KERB RAMPS

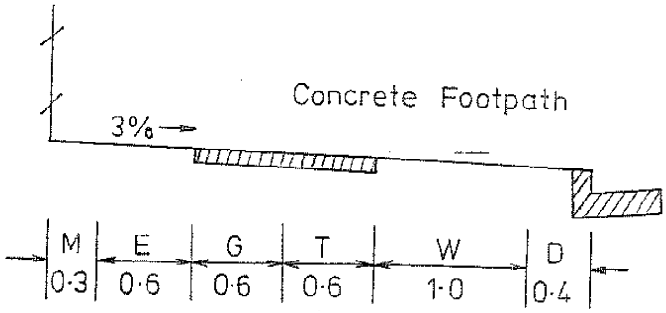
SD4



5·5m FOOTPATH



4·5m FOOTPATH



3·5m FOOTPATH

M Miscellaneous
E Electricity
G Gas
T Telecom
S Special services
W Water mains
D Drainage
P Poles & trees

NOTE: Cycleways only on 5·5m footpaths

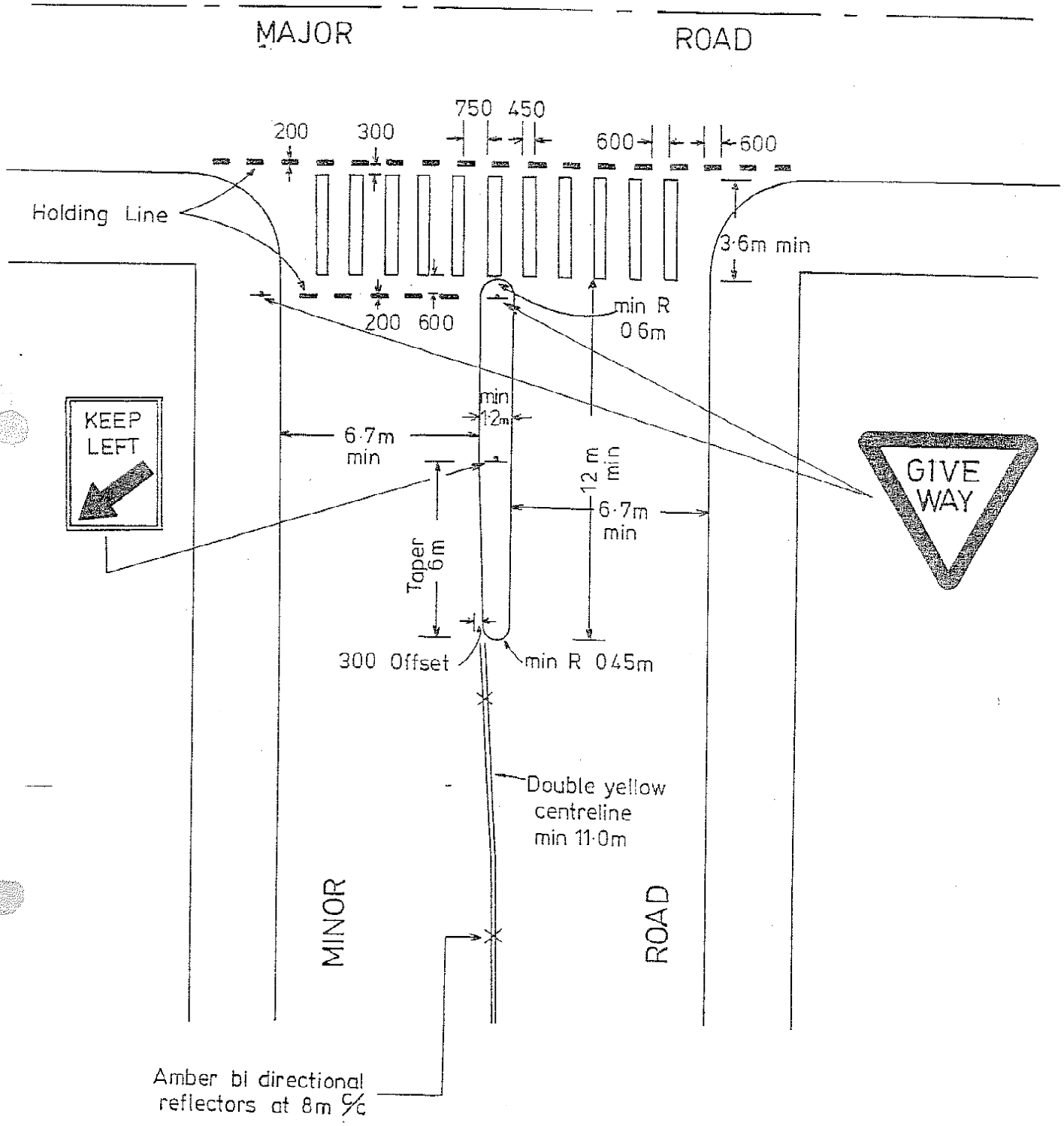
CESSNOCK CITY COUNCIL

STANDARD FOOTPATH SERVICE ALLOCATIONS

DRAWN DATE
C.D. 3·10·84

APPROVED
1/11/84

SD 5

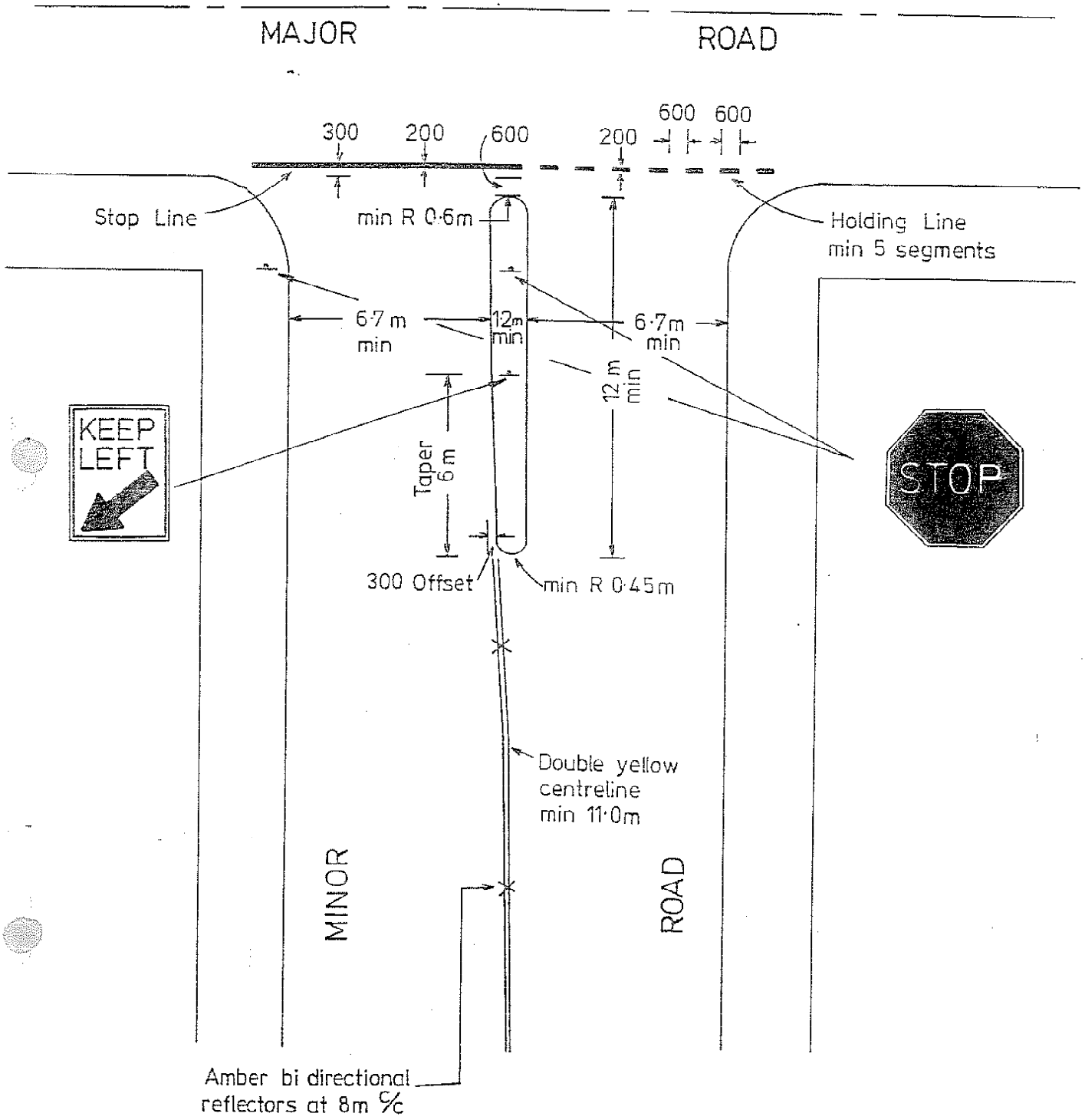


CESSNOCK CITY COUNCIL

TYPICAL TRAFFIC ISLAND LAYOUT FOR SIDE ROAD WITH GIVE WAY SIGN AND PEDESTRIAN CROSSING

DRAWN	DATE
C·D·	20·6·84
APPROVED	

SD 7



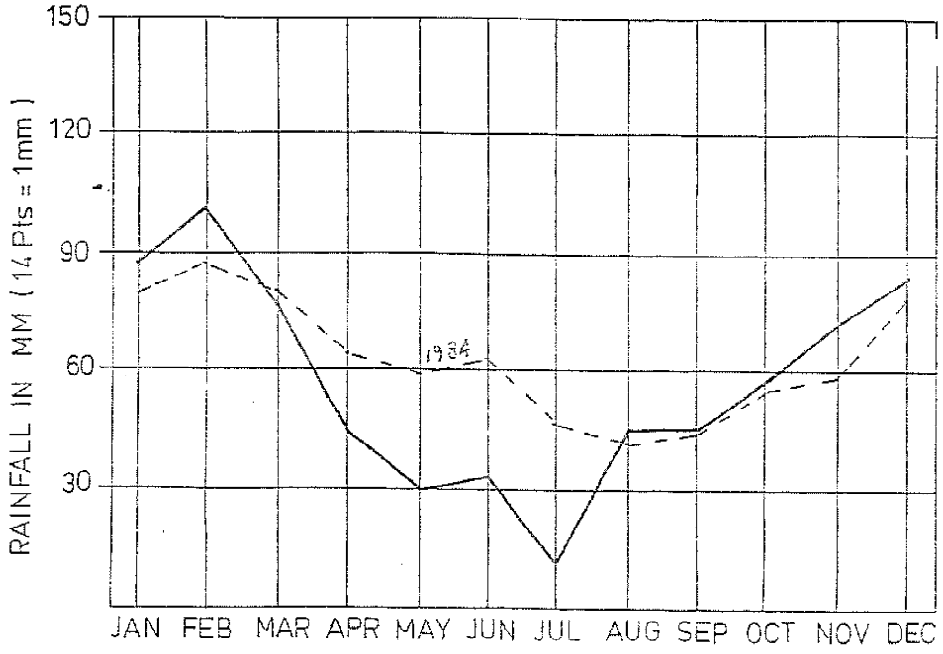
CESSNOCK CITY COUNCIL

TYPICAL TRAFFIC ISLAND LAYOUT
FOR SIDE ROAD WITH STOP SIGN

DRAWN	DATE
C·D·	20·6·84

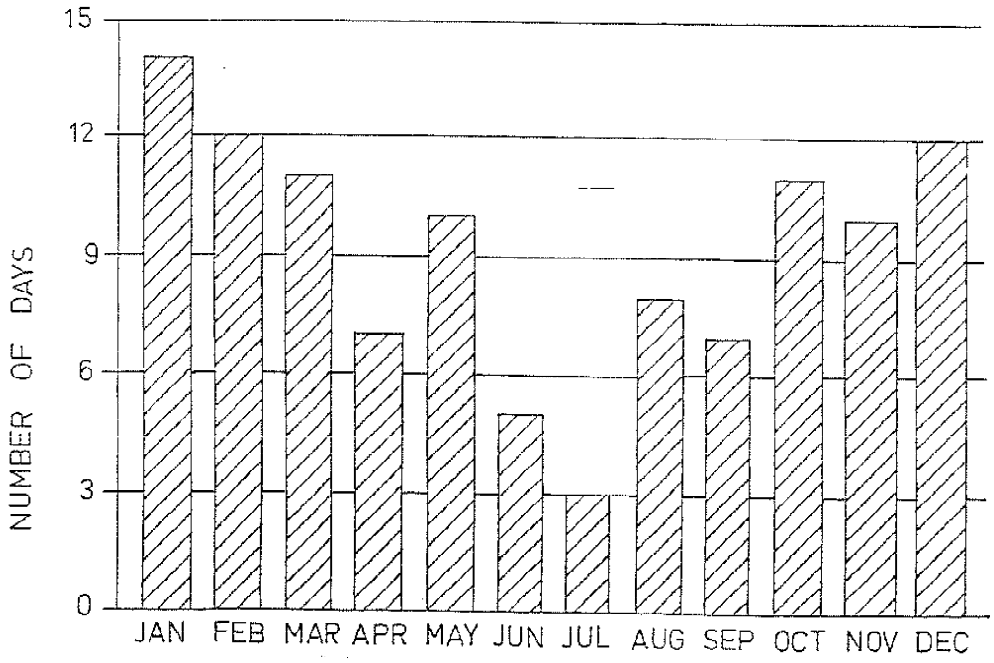
APPROVED 1/7/84

SD 8



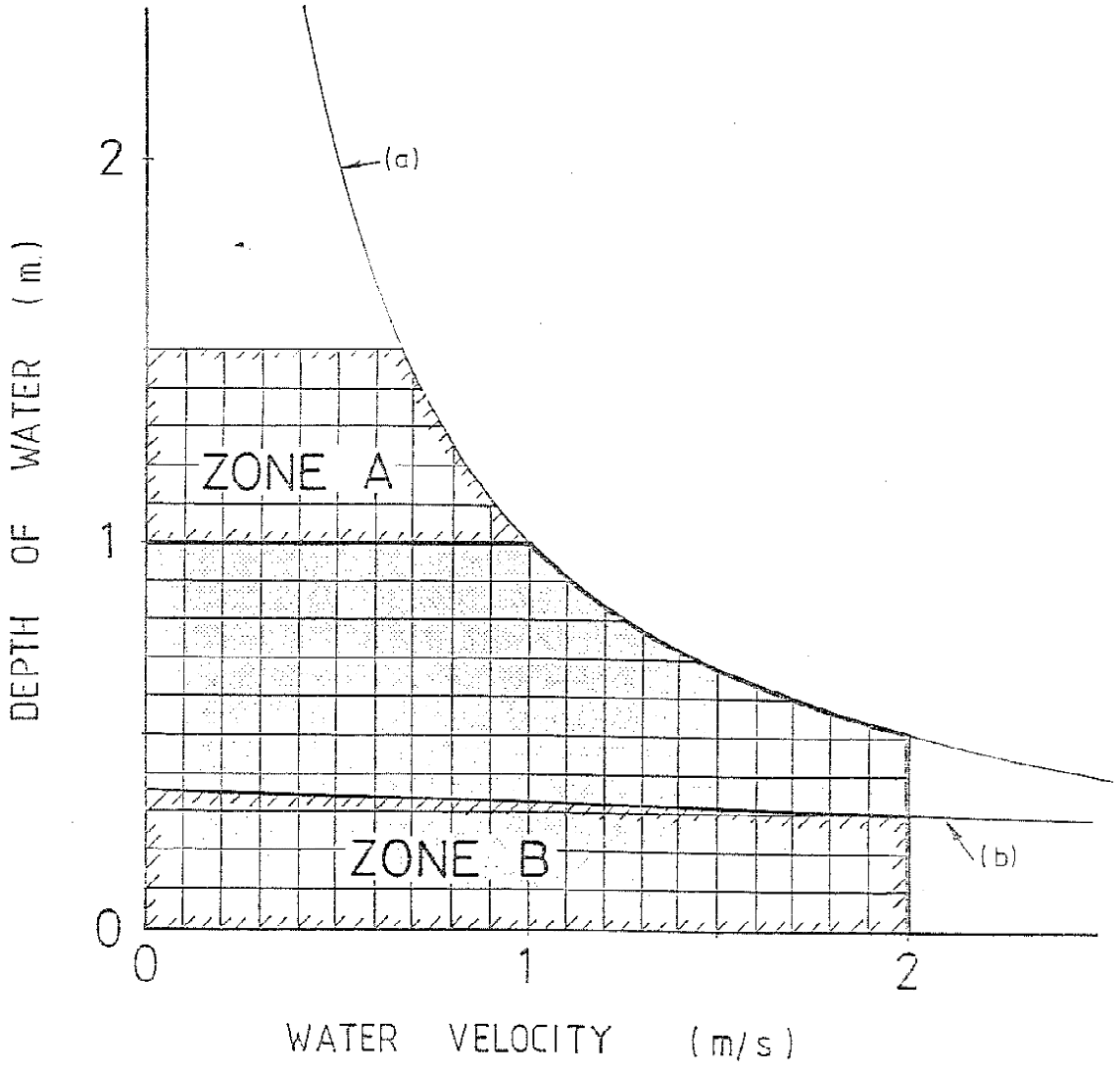
AVERAGE MONTHLY RAINFALL

AAR, 1984 750 mm



AVERAGE NUMBER OF WET DAYS PER MONTH

THE GREATER CESSNOCK CITY COUNCIL RAINFALL DATA	NOT TO SCALE
James B Croft & Associates.	SD 9



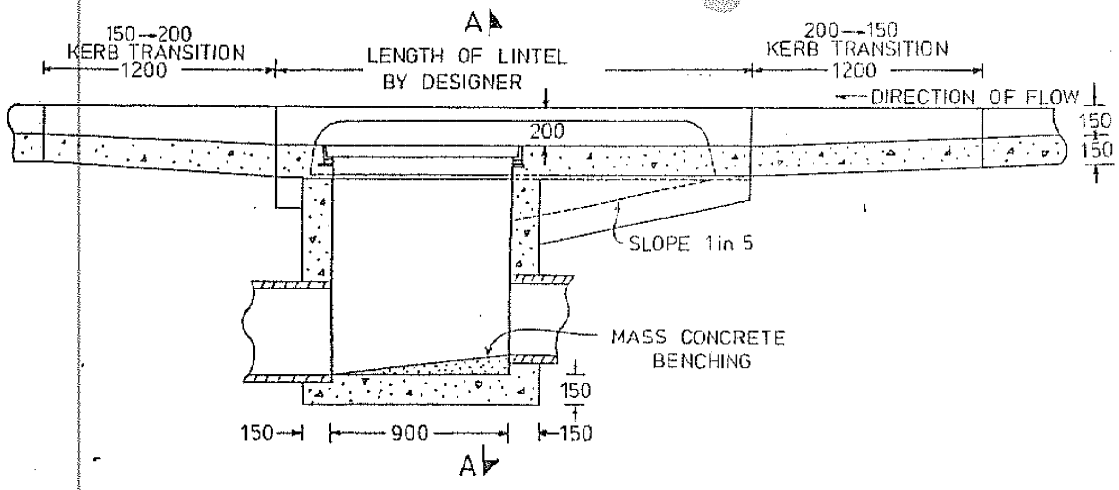
NOTE: 1. All open drainage structures are to have a water velocity - depth relationship within the shaded area. Exceptional cases may be allowed within Zone A.

2. Causeways and spillways are to have a water velocity - depth relationship within Zone B.

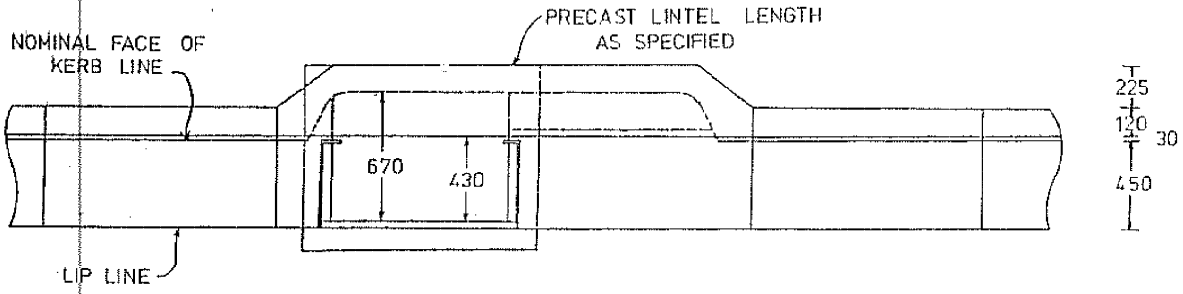
Ref. (a) Limiting criteria for light housing & safety, Velocity x depth = 1 m^2/s. (U.S. Corps of Engineers, U.S.A.)

(b) Approximate limit for safety of light vehicles on causeways. (Water Research Laboratory Report N° 100 - "Low Level Causeways" A.J. Bonham & R.T. Hattersley, - Aug. 1967)

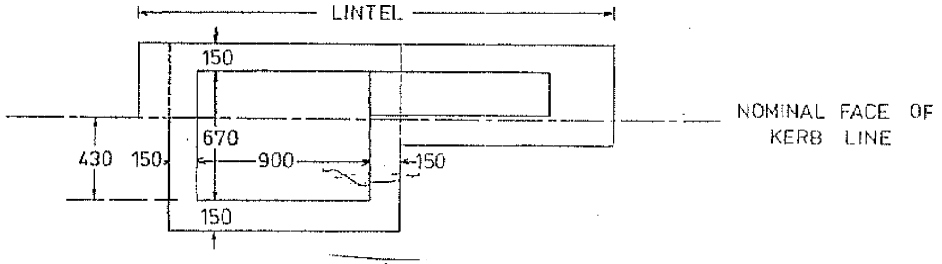
CESSNOCK CITY COUNCIL	Approved:	Scale:
SAFETY LIMITS FOR DESIGN OF FLOOD STRUCTURES.	Date: 1.7.84	SD 10



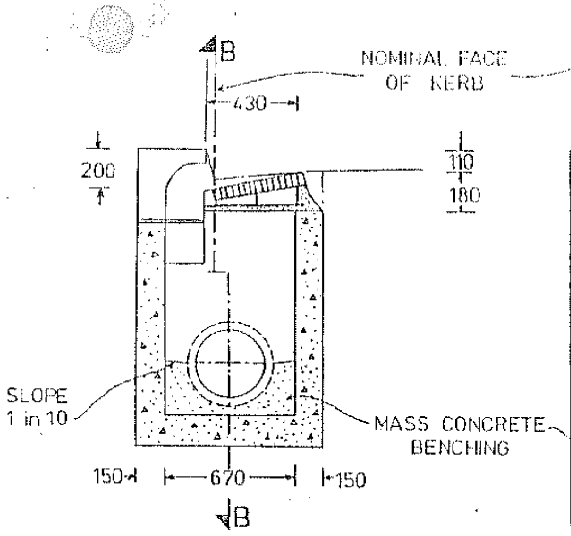
SECTION BB



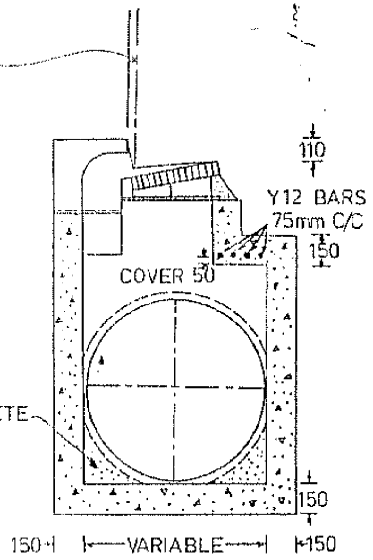
PLAN



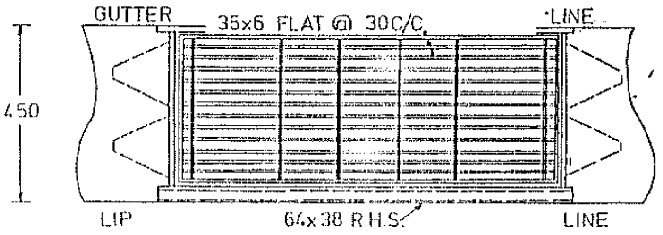
SETTING OUT DIAGRAM



SECTION AA
PIPE SIZE TO 675mm



SECTION AA
PIPE SIZES GREATER
THAN 675mm



GG78 51 WELDLOCK
GRATE DETAIL

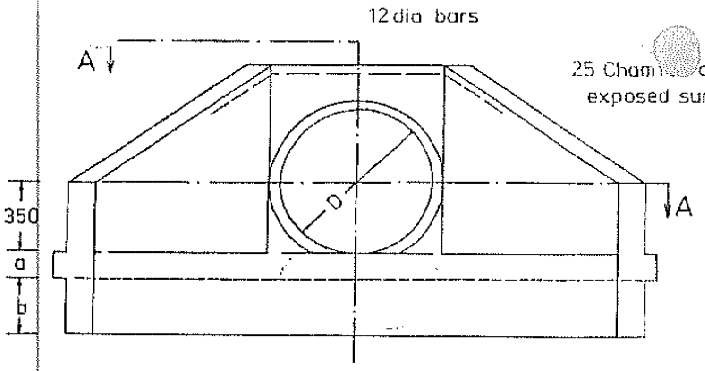
CESSNOCK CITY COUNCIL

STANDARD EKI GULLY PIT MODIFIED LANDCOM LD12 TO

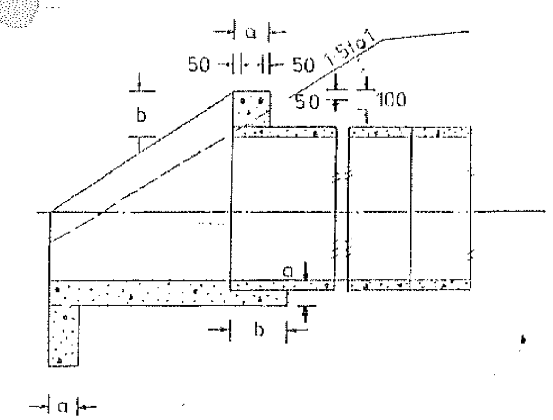
APPROVED	DATE	DRAWN	DATE
	1/6/84	C DAVIS	18·5·84

SCALE

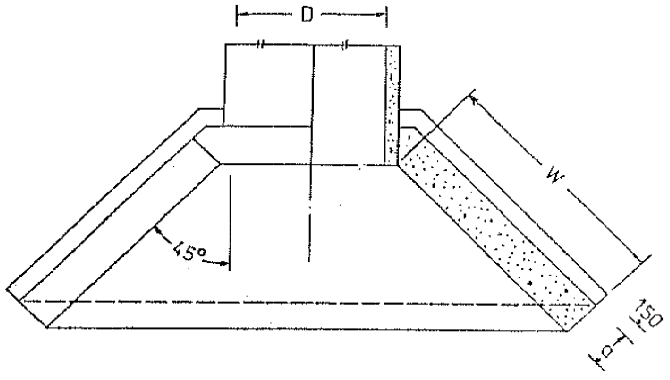
SD 11



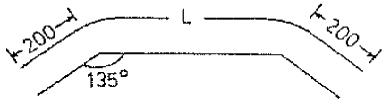
ELEVATION



LONGITUDINAL SECTION



PLAN SECTION AA



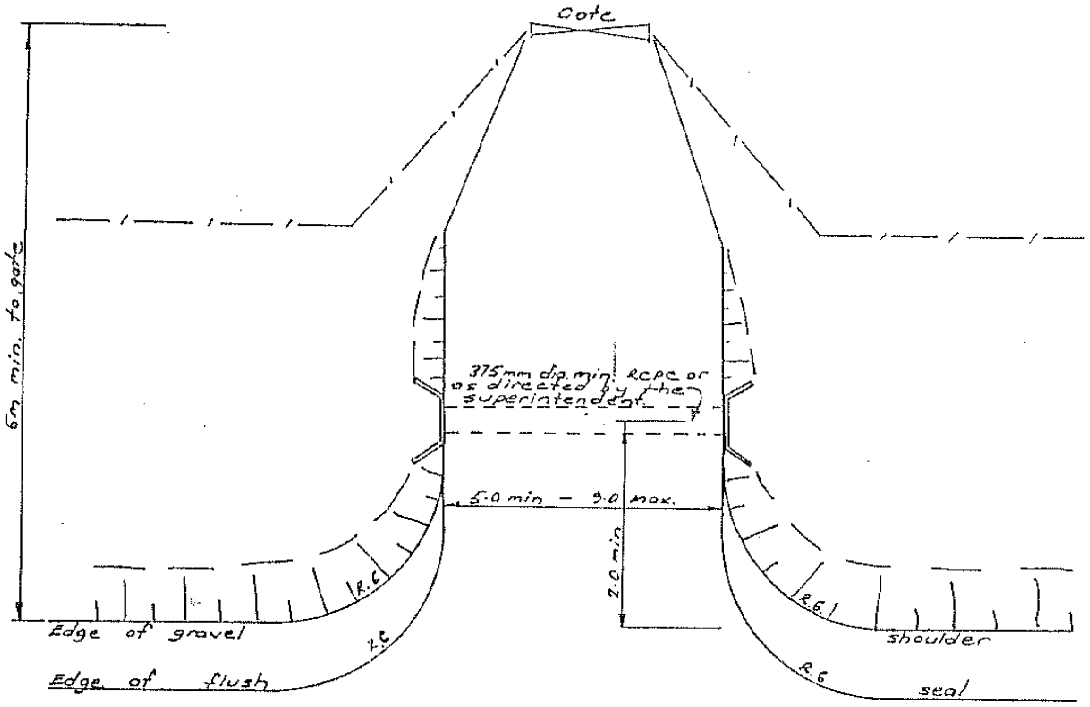
Y12 dia bars
2 required each headwall

D Pipe Diameter		(mm)	375	450	525	600	675	750	825	900
a		(mm)	150	150	150	180	200	210	220	230
b		(mm)	200	200	200	300	300	300	300	300
W		(mm)	690	840	990	1120	1320	1450	1620	1780
L		(mm)	850	900	1000	1100	1200	1250	1350	1400
Reinforcement dia		(mm)	12	12	12	12	12	12	12	12
Reinforcement in two headwalls	Length	(mm)	3400	3600	4000	4400	4800	5000	5400	5600
	Mass	(kg)	3·1	3·3	3·6	4·0	4·4	4·6	4·9	5·1
		(m^3)	0·68	0·88	1·10	1·73	2·23	2·94	3·28	4·37

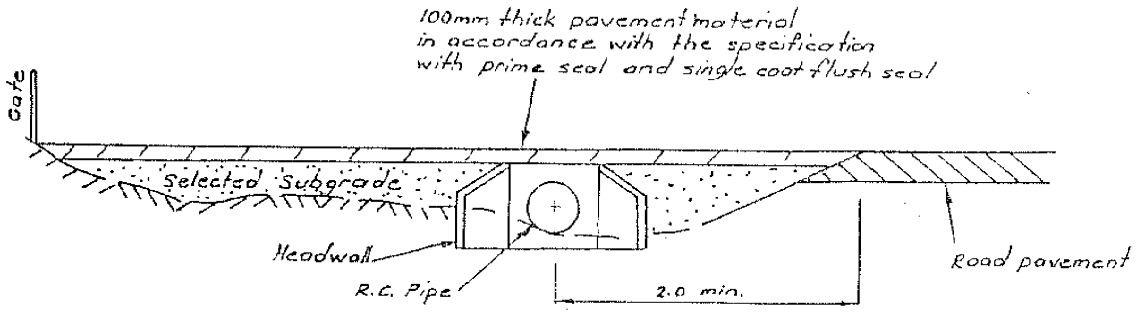
CESSNOCK CITY COUNCIL

CONCRETE HEADWALLS FOR
375 TO 900 DIAMETER PIPES

APPROVED	DATE	DRAWN	DATE	
	1/6/84	C. DAVIS	25·5·84	SD 12



PLAN



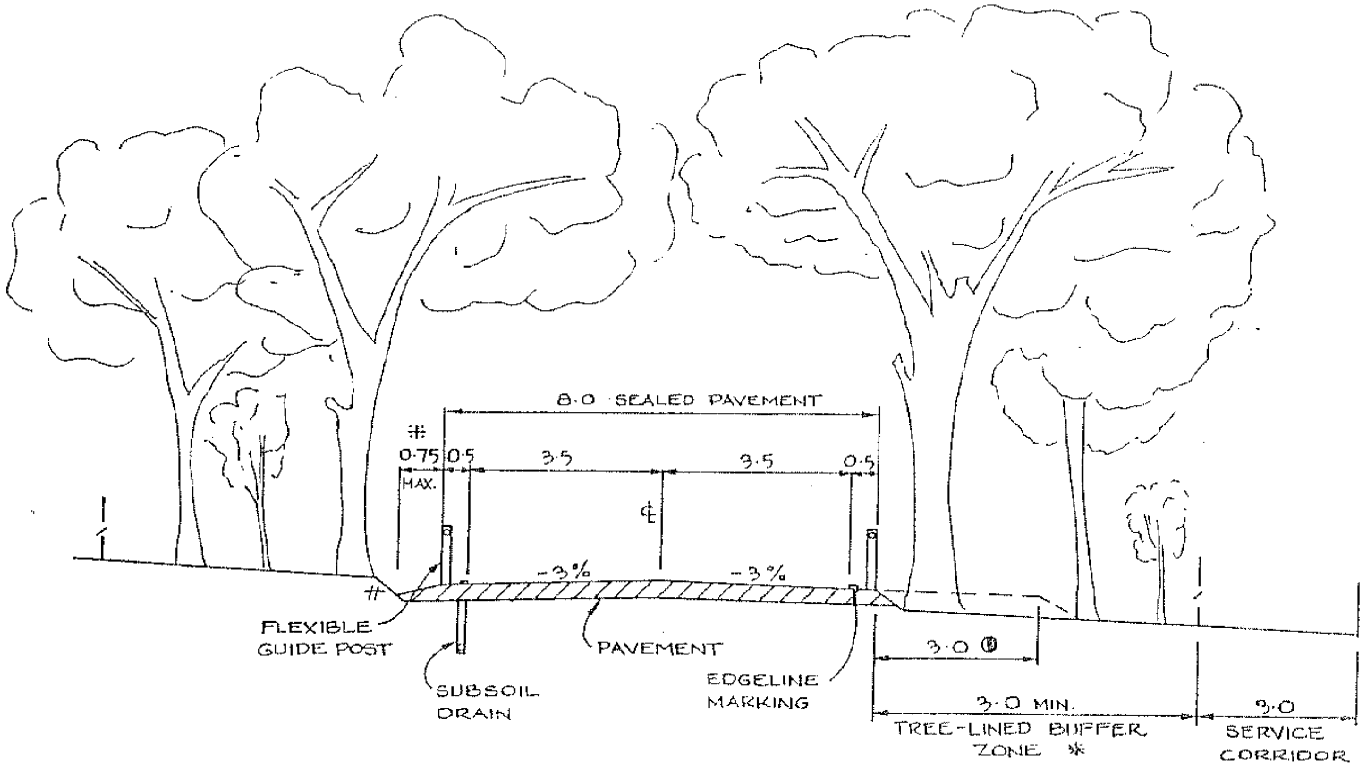
TYPICAL CROSS SECTION

ACCESS SPECIFICATION

1) Access width 5·0 m. min. to 9·0 m. max. as directed by the superintendent.
2) Batter slopes – cut & fill heights <1m. – 5:1
   ≥1m. – 2:1
3) The superintendent shall determine whether an RCP culvert is required.
4) Seal width — 5·0 m.
5) Max. seal length – to the gate or 10m. whichever is the lesser.
6) Seal – prime 5mm agg.
   flush 14mm agg.

SD 13

PLAN No.	CESSNOCK CITY COUNCIL
MR 93A	RURAL PROPERTY ACCESS



NOTES :

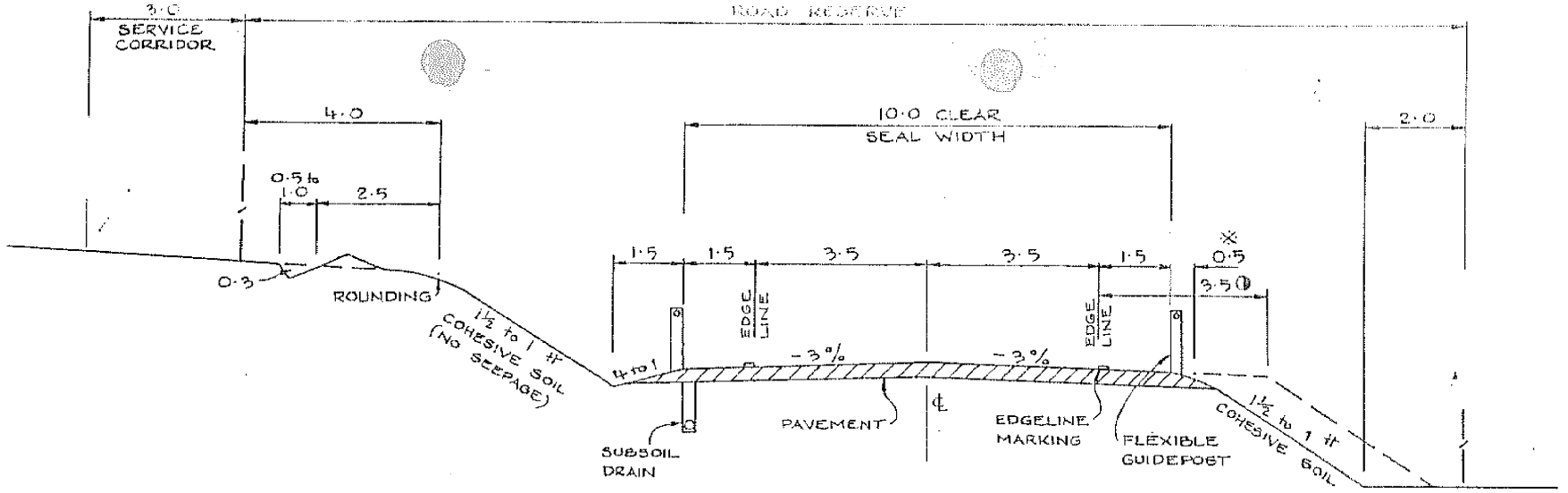
⁜ TABLE DRAIN 0.75 MAX. TO BE SEALED

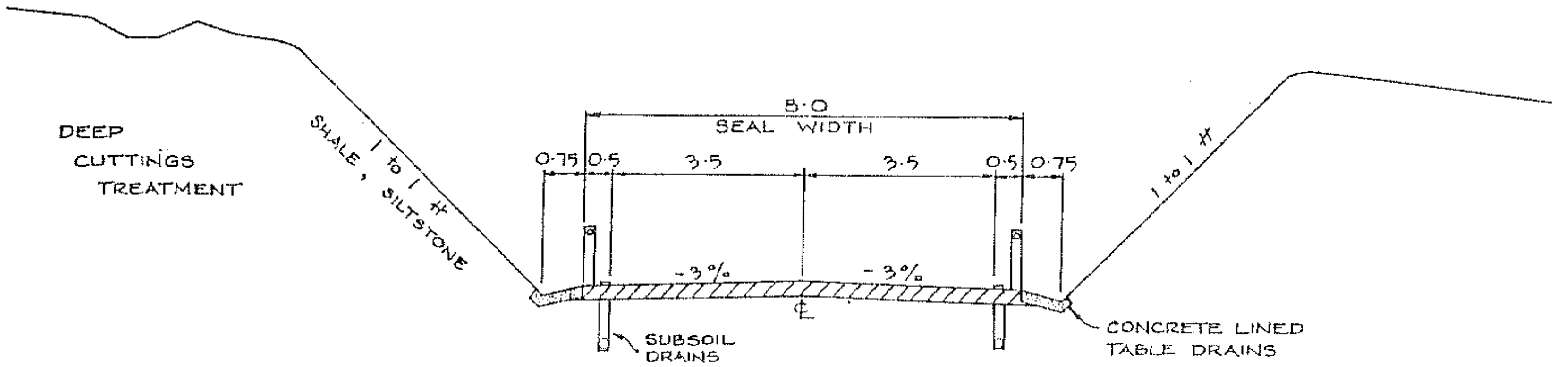
◑ PROVIDE LAYBYS AT APPROX. 500m INTERVALS ON ALTERNATE ROADSIDE : 15m APPROACH TAPER
10m PARKING
5m DEPARTURE TAPER

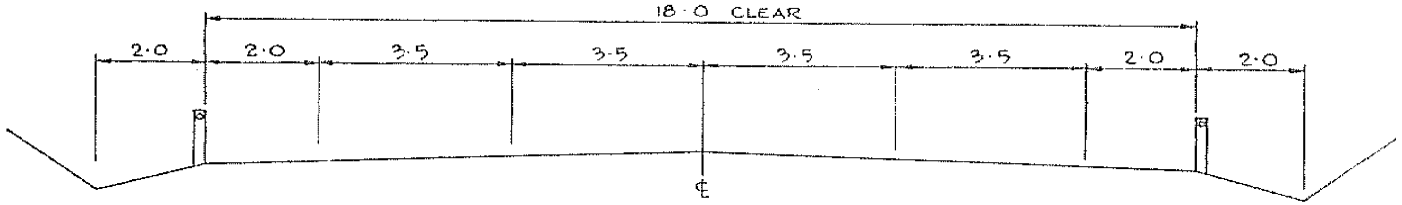
\# IN DEEP CUTTINGS BATTER SLOPES SHOULD BE 1:1 IN SHALE/SILTSTONE OR AS SPECIFIED IN RTA FORM 70

✻ TO BE UTILIZED FOR AUXILIARY TURNING LANES AT INTERSECTIONS

CESSNOCK CITY COUNCIL	DRAWN DATE C.S. 8-3-89	SD 14
TYPICAL CROSS-SECTION TREE-LINED TOURIST ROAD	10/3/89	







NOTES:

● PROVIDE LAYBYS AT APPROX. 500m INTERVALS ON ALTERNATING SIDES : 30m APPROACH TAPER
20m PARKING
10m DEPARTURE TAPER

BATTERS ARE VARIABLE DEPENDENT ON SOIL TYPES (SEE RTA FORM 70)

※ VERGE WIDTH 1·0m AT GUARDFENCE

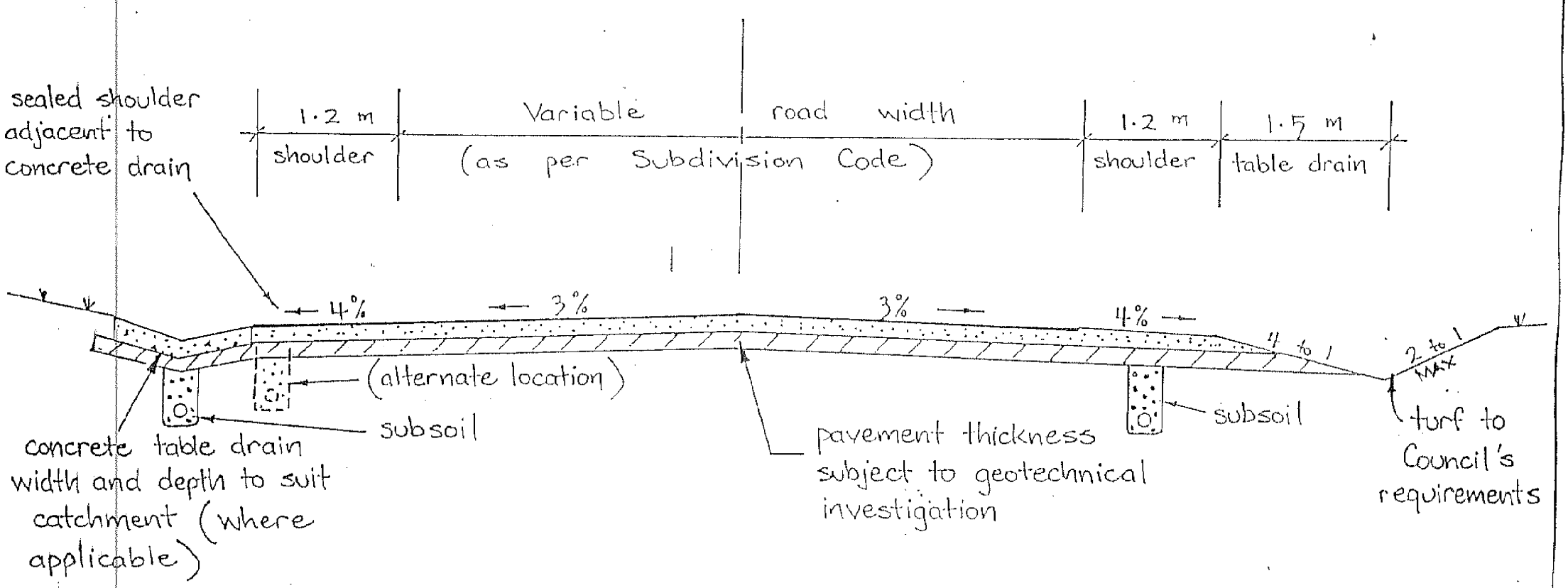
NAASRA TYPE C INTERSECTION

CESSNOCK CITY COUNCIL

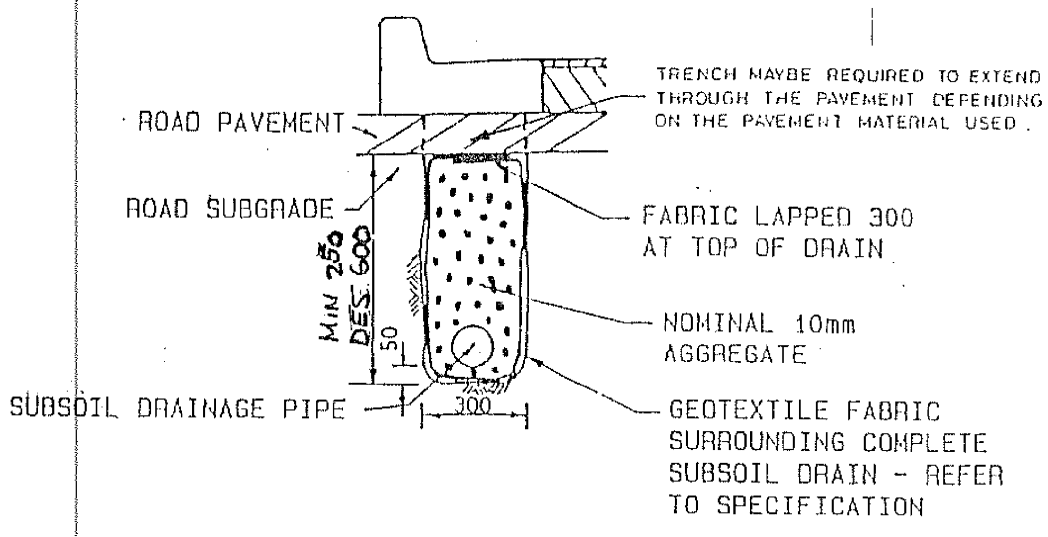
STANDARD CROSS-SECTION
RURAL SUB-ARTERIAL OR MAJOR COLLECTOR
ROADS WITH TRAFFIC GREATER THAN 1000 VPD

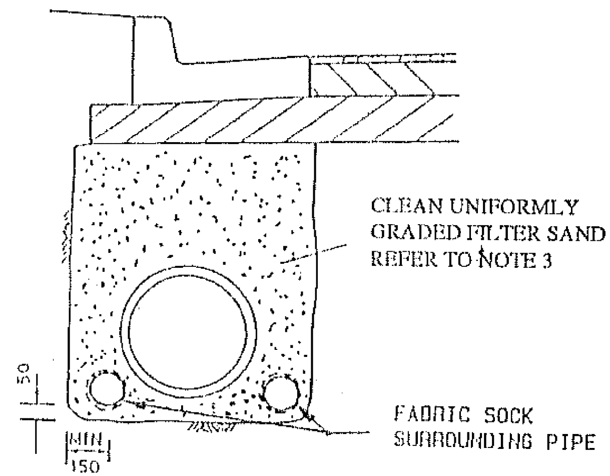
DRAWN DATE
C.S. 8-3-89
10/3/89

SD 15

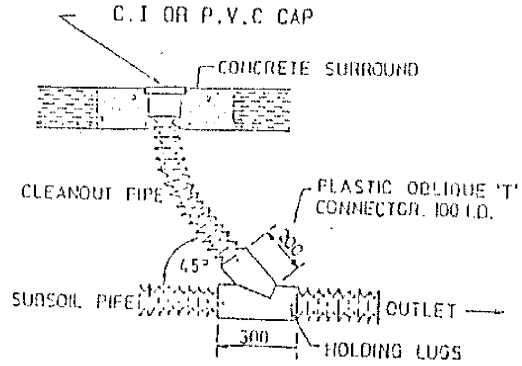


CESSNOCK CITY COUNCIL	DRAWN DATE C.S. 8-3-89	SD 16
RURAL SUBDIVISION		
TYPICAL ROAD SECTION	10/3/89	





SUBSOIL PIPE IN STORMWATER DRAINAGE TRENCH



ELEVATION OF CLEANOUT

1. SUBSOIL DRAINAGE FILTER DESIGN SHALL BE DESIGNED IN ACCORDANCE A.R.R.B. NOMINAL SIZE AGGREGATE (10mm MAXIMUM) IS TO BE USED FOR THE FILTER IN THE TYPE 1 DRAIN WHEN THE ABOVE DESIGN METHOD SHOWS THAT THE AGGREGATE IS COMPATIBLE WITH THE INSITU MATERIAL. THE FABRIC SOCK CAN BE OMITTED UNDER THESE CIRCUMSTANCES.

2. TYPE, LOCATION AND EXTENT OF SUB SOIL DRAINAGE WILL DIFFER DEPENDING ON PAVEMENT MATERIALS TO BE USED. PRIOR ADVICE SHOULD BE SOUGHT FROM COUNCIL.

3. A NOMINAL SIZE AGGREGATE (10mm MAXIMUM) IS TO BE USED FOR THE FILTER IN THE TYPE 1 DRAIN WHEN THE ABOVE DESIGN METHOD SHOWS THAT THE AGGREGATE IS COMPATIBLE WITH THE INSITU MATERIAL. THE FABRIC SOCK CAN BE OMITTED UNDER THESE CIRCUMSTANCES.

4. LOCATION OF SUBSOIL DRAINS TO BE DETERMINED ON SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION.

5. THE LOCATION OF SUBSOIL DRAINAGE LINES IS TO BE IN ACCORDANCE WITH A.R.R.B. 41 GIVEN THE SUBBASE AND BASE MATERIALS ARE SATISFACTORY.

~~6. Ma..Sn Post~~ ?)

SUBSOIL DRAIN DETAIL

Approved By	Date	Datum	Sheet No	Plan No
(signature)	4.12.94		1	S.D 17

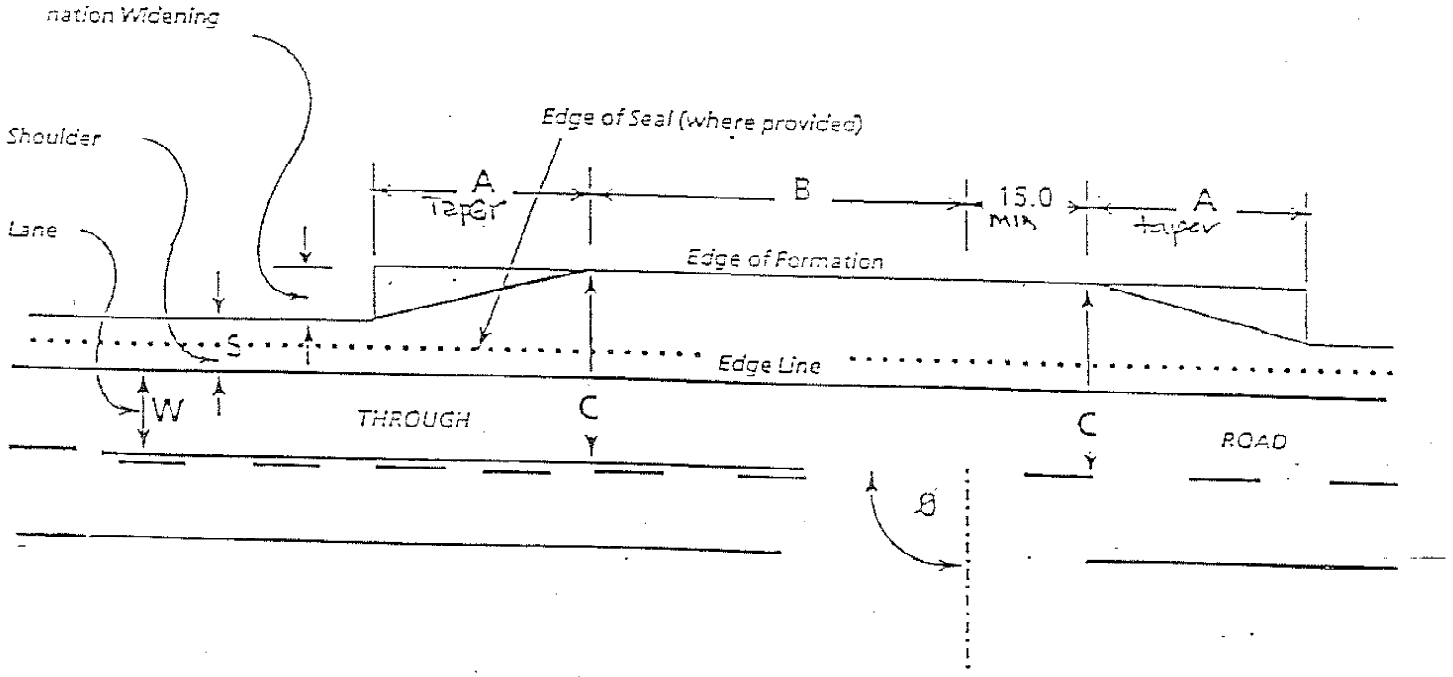
CESSNOCK CITY COUNCIL

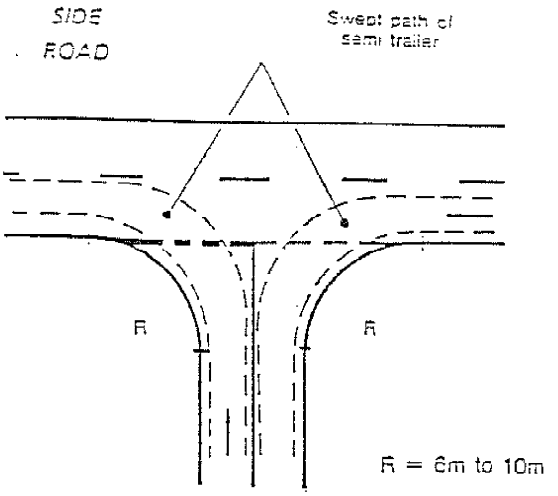
RIGHT TURN TREATMENT FOR RURAL ROAD CONDITIONS TO COMPLY WITH AUSTROADS STANDARD TYPE A.

PREPARED BY:- Road Safety Manager,
Cessnock City Council
Revised January 1993.

BASIC RIGHT TURN - MINIMUM TREATMENT

This is the minimum treatment for right turn movements from a through road to side roads and local access points. This treatment provides sufficient trafficable width for a heavy vehicle (17.5m long) to pass at a substantially reduced speed on the left of a stationary vehicle turning right.





Formation widening = C-W-S

$A = \frac{0.5 \times \text{Speed (km/h)} \times \text{formation widening}}{3.6}$

B - 28m @ 60kph

B - 39m @ 80kph

B - 42m @ 100kph

W - 3.0m (min) to 3.5m

S - 1.0m (min) to 3.0m (adjacent to barrier line)

C - (min on straight) = 6.0m

C - (min on curve) = 2 x 3.0 lane + corresponding widening for curve radius

Ø - (min angle 70°)

Ø - (max angle 110°)

Should the through road be sealed, then the passing lane will be required to be sealed.

CESSNOCK CITY COUNCIL

SIGNAGE TECHNICAL MANUAL

PREPARED BY: MOIR LANDSCAPE ARCHITECTURE
PREPARED FOR: CESSNOCK CITY COUNCIL
REVISION: H - 24 July 2018

This report was prepared by:

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www.moirla.com.au

Client: Cessnock City Council

Project No.: 1386

Document Control

Issue	Date	Author	Checked by
A	26.04.2017	DC	DM
B	02.11.2017	MS	
C	15.12.2017	CM, LD, MS	
D	30.01.2018	CM, LD, MS	
E	24.05.2018	CM, MS	
F	31.05.2018	CM, MS	
G	05.06.2018	CM, MS	DM
H	24.07.2018	GT	DM

Table of Contents

PART

1

INTRODUCTION

INTRODUCTION 1

1.1 Scope of Manual

The intent of the Cessnock City Council Signage Technical Manual is to provide an instrument which guides the design and placement of signs within the Cessnock City area. The Manual aims to provide a consistent and resilient wayfinding methodology that improves both pedestrian and vehicular wayfinding throughout the Cessnock region, whilst enhancing the branding opportunities to be found for Council within the public domain.

Residents, visitors and businesses within Cessnock will benefit alike from a high quality wayfinding system. Wayfinding is an important element within the streetscape contributing to people's understanding, experience and enjoyment of their surrounding environment. Legibility within the public domain is created through the use of consistent and recognisable graphics and sign placement to create a cohesive environment.

A comprehensive suite of signs has been developed in order to identify, direct and inform both motorists and pedestrians throughout the LGA. This hierarchy of signage types has been designed with not only design values in mind but also longevity, production economies, ease of installation and maintenance requirements.

1.2 Associated Documents

This Technical Manual is to be read in conjunction with the following documentation:

- Cessnock City Council LEP 2011
- Cessnock City Council DCP 2010
- Cessnock LGA Signage Strategy
- Australian Standards; AS1742-2010, AS 1743-2001 and AS2890-2009
- SEPP 65 - State Environmental Planning Policy No. 64 - Advertising and Signage
- Transport Corridor Outdoor Advertising and Signage Guidelines, 2007
- TASAC - Tourism Attraction Signposting Assessment Committee information

1.3 Signage Principles

High quality wayfinding both provides information about facilities and guides people to their destination. Whilst well designed signage interventions can have a positive effect on the environment, the inverse is also true of poorly executed signage. A comprehensive and robust wayfinding system is built upon clarity, legibility and consistency to assist both residents and visitors alike in navigating the built environment around them.

The key principles used to achieve these outcomes for Cessnock LGA are:

- **Hierarchy;** a systematic and sequential methodology for guiding people into and around the region, both at the pedestrian and vehicular scale;
- **Legibility;** signage must be recognisable as part of an identifiable system, and be used to reiterate the overall identity of the Cessnock LGA;
- **Context;** signage should positively contribute to the visual character of the surrounding area as well as drawing inspiration from the surrounding landscape, people and history; and
- **Content;** fonts, graphics and messages used on signs must be clear, accurate and easily understood from both a moving vehicle and on foot. Information should be at an appropriate scale as well as in braille and tactile format at the pedestrian scale to enable access by all users.

PART

2

SIGNAGE

POLICY AND PRINCIPLES 2

2.1 Ownership

TBC following CCC review of current contractual arrangements.
Moir to be advised.

2.2 Signage Types

There are two signage suits:
1. Cessnock City Council Local Government Area (LGA) and
2. Hunter Valley Wine Country (shared with Singleton Council).

The Cessnock City Council LGA signage system is comprised of the following 7 signage types:

1. **Gateway Entry Signs**
   Signs that welcome the motorist to Cessnock LGA at key access points for tourists and local residents.
   Signs are designated GE1.
2. **Suburb Entry Signs**
   Signs that welcome the motorist to a suburb within the LGA.
   Signs are designated SE1.
3. **Community Facility Entry Signs**
   Signs that welcome the pedestrian and motorist to a significant facility or location.
   Signs are designated CE1.
4. **Community Facility Information Signs**
   Signs that offer the pedestrian and motorist more detailed information about the access to local facilities and their proximity to other facilities, including key information in braille.
   Signs are designated CF1.
5. **Street Sign**
   Signs used to indicate street names. Variations allow for the location of key community facilities and attractions, including pictograms and names.
   Signs are designated SS.
6. **Town Centre Information Signs**
   Town centre signs are to be used in civic centres to provide map information with a pedestrian focus, to locate facilities such as public toilets and parks. Key information to be included in braille. Additionally they have provision for the inclusion of pictograms and directional markers to key points of interest.
   Signs are designated TI1 and TI2.
7. **Walkway/Cycleway Signs**
   These signs are to be used for lower-speed, closer proximity viewing, and give directional information for pedestrians and cyclists, highlighting key facilities and attractions at key decision making points.
   Signs are designated WC1.

The Hunter Valley Wine Country signage system is shared with the Singleton Council and is comprised of the following 7 signage types;

1. **Gateway Entry Signs**
   Signs that welcome the motorist to the Hunter Valley Wine Country at key access points for tourists and local residents.
   Signs are designated GE1 and GE2.
2. **Precinct Signs**
   Signs that welcome the motorist to a precinct within the Hunter Valley Wine Country. Signs are designated PS1.
3. **Street Sign**
   Signs used to indicate street names. Variations allow for the location of key community facilities and attractions, including pictograms and names.
   Signs are designated SS.
4. **Destination Marker**
   Signs are designated DM1.

2.3 Design Standards

All signage design and installation to meet legislative requirements current at the time of documentation/construction.

Relevant design standards include, but are not limited to:

- Disability Design Guidelines AS1428
- Road Sign Specifications AS1743
- Parking Facilities AS2890-2009
- SEPP 64 - State Environment Planning Policy No. 64

2.4 Sign Proliferation

In general signage should be kept to the minimum required to safely and effectively communicate information to the public and fulfill all current legislative requirements.

2.5 Locating Signs

All signs are to be located in accordance with all relevant legislation including, but not limited to, the associated documentation listed in Section 1.2.

Redundant Signage
Signs with out dated or redundant content shall be documented for removal. Examples of these signs may include; out dated map information, references to facilities that no longer exist, temporary signage that has not been removed or unauthorised commercial signage.

Consolidation of Signage
Repetition of signage is not only unnecessary but also reduces the legibility of the signage suite as a whole. Some existing signs may be incorporated into new sign installations in an effort to reduce clutter within the streetscape and provide homogeneous signage throughout the Cessnock City Council LGA.

Street Furniture
The relationship between street furniture and signage is key for the success of both. Signage should be placed ensuring that generous circulation space is maintained around street furniture and that key signage elements, such as maps or timetables, are not obscured.

Signs by Others
Other signage guidelines may be in effect under the jurisdiction of other agencies, such as RMS or Transport NSW. The placement of all new signs is to take these existing or proposed signage elements into account and ensure that information is not unnecessarily duplicated. New signs are to be placed in a manner that prevents these signage elements from being obscured.

Signage Placement
Generally new signs should be placed in accordance with the recommendations of AS1428.2 and SEPP 64 - Policy no. 64.

2.6 Sign Messages

The content of new signs should be both easy to read and interpret as well as being legible at an appropriate distance for the target audience. The fonts, graphics and messages selected must demonstrate all of the relevant information concisely. Important information, such as directions or place names, is to be included in braille and tactile format to ensure access for all members of the community.

Typeface
Selected fonts can be viewed in section 2.12 Fonts. Messages are to be written in lower case, with the exception of some main headings, which are to be in all upper case. Refer to section 4 for graphic designs.

Destination Order
Destinations are to be ordered based on their proximity to the sign rather than in alphabetical order. The closest destination is to be displayed at the top of the listed information with the farthest destination to be placed at the bottom.

Nomenclature
The naming of places and facilities is to be consistent across all signs.

Accessibility
The Building Code of Australia and the Disability Discrimination Act (1992) regulate the access and wayfinding needs of people with disabilities. Under the Disability Discrimination Act (1992) Council has an obligation to provide appropriate wayfinding formats for people with disabilities. Heights for critical information designed to be viewed by pedestrians shall comply with the recommendations AS1428.1.

2.7 Sign Register

The Sign Register is to be an active document maintained and updated by Council. The Sign Register is to be used in conjunction with the Sign Audit Register.
Refer Appendix B.

2.8 Advertising

The installation of advertising within, or visible from a transport corridor is prohibited, unless compliant with the requirements of SEPP 64.

2.9 Maintenance

The signage family detailed within this manual has been designed to minimise the need for ongoing maintenance. Periodically maintenance procedures will still be required, as listed below. Refer Appendix A for templates.

Audit System
Create and maintain a GIS register of all new signage, LGA-wide. Information recorded is to include the sign's location, type and installation date. The signs on this register are to be checked for damage, vandalism or removal no less than once per year.

Updating Signage Information
The information provided on tourist maps and directories is to be updated periodically to reflect changes in the captured information. It is recommended that maps and directories be checked bi-annually for currency, and amended accordingly.

Replacement Signage
Where signs are vandalised, removed or damaged they should be replaced promptly.

Safety
Where any damage poses a threat to the public it is to be removed immediately and reinstated as soon as practically possible.

2.10 Sign Graphics

Signage graphics should be consistent and easily legible to maximise usefulness and ensure that motorists are not unduly distracted from the road. Both pedestrian and vehicular signage are to use the same sign graphics, to RMS standards, and as shown below.

RMS TOURIST INFORMATION PICTOGRAMS

STANDARD TOURIST INFORMATION PICTOGRAMS

CUSTOM HUNTER VALLEY WINE COUNTRY PICTOGRAMS

(1): Example pictograms. All RMS and Standard Tourist Information pictograms are to be located and installed as per AS 1742.6 Tourist and Service Signs.

2.11 Sign Colours - Cessnock City Council

The chosen standard colours for the signage family are as follows:

Blue: CMYK: 83, 37, 6, 6
RGB: 65, 118, 162

Usage

- Background to SE1, CE1, CF1, TC1, TC2 and SS.

Grey: CMYK: 74, 66, 48, 16
RGB: 92, 83, 90

Usage

- Background to GE1, SE1, CE1, CF1, TC1, TC2, W1 and SS.
- Lettering to GE1

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

Usage

- Lettering and background to SE1, CE1, CF1, TC1, TC2, W1 and SS.

Steel panel. Paint finish colour: Pantone 5777CP

Usage

- GE1.

Steel panel. Paint finish colour: Pantone 7486CP

Usage

- GE1.

Please note that colours provided herein are a guide only. Pantone Matching System (PMS) codes are to be used rather than visual colour matching.

2.12 Sign Colours - Hunter Valley Wine Country

The chosen standard colours for the signage family are as follows:

Sign background and steel column: Colorbond Monument

Usage

- GE2, DM1, PS1 and all S-series street signs.

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

Usage

- Lettering and background to SE1, CE1, CF1, TC1, TC2, W1 and SS.

Bench slats
Modwood Sahara
(brushed finish) GE2, PS1

Please note that colours provided herein are a guide only. Pantone Matching System (PMS) codes are to be used rather than visual colour matching.

Precinct signage colour and logos as follows (to be confirmed):

Broke Fordwich
C:80 M:20 Y:100 K:7

Parish of Pokolbin
C:66 M:0 Y:11 K:0

Lovedale
C:100 M:88 Y:9 K:1

Mount View
C:31 M:1 Y:100 K:0

Branxton Greta
C:2 M:66 Y:99 K:0

Wollombi Valley
C:26 M:100 Y:100 K:19

Kurri Kurri
C:80 M:100 Y:3 K:0

Hermitage
C:0 M:100 Y:96 K:0

Central Pokolbin
C:2 M:8 Y:99 K:0

Please note that colours provided herein are a guide only. Pantone Matching System (PMS) codes are to be used rather than visual colour matching.

2.13 Sign Fonts - Cessnock City Council

The selected fonts have been chosen for legibility, design value and consistency across the Cessnock City Council LGA.

Main heading: “Cessnock” on GE1 signs:

ARIAL BLACK

Sub text: “Welcome to”on GE1 signs:

Palatino Italic Bold

Main headings such as suburbs for CE1, CF1, TC1, TC2:

Arial

‘HUNTER VALLEY’ for GE1, CE1, CF1, TC1 & TC2:

ARIAL BLACK

Community Facility Entry Heading for CE1:

ARIAL BLACK

Sub headings and body text:

Arial

2.14 Sign Fonts - Hunter Valley Wine Country

The selected fonts have been chosen for legibility, design value and consistency across the Hunter Valley Wine Country.

Main headings such as precinct names for GE2 and PS1:

Arial

Main headings, such as “Hunter Valley” on GE2 signs:

CENTURY GOTHIC

Main headings, such as “Hunter Valley” on PS1 signs:

ARIAL BOLD

Main headings, such as “Wine Country” on GE2 signs:

Didot LT Std Bold Italic (Modified)

All other text including sub headings and information:

Arial

2.15 Lighting

Lighting herein refers to artificial illumination of a sign, signage element or a sign's associated area. Design and assessment of illuminated signs should refer to SEPP 64, and the associated document *Transport Corridor Outdoor Advertising and Signage Guidelines* (2007).

TABLE 4: MAXIMUM ALLOWABLE DAYTIME LUMINANCE OF ILLUMINATED ADVERTISEMENTS

***Illuminated Area* (sq m)**	***Zone 1***	***Zone 2* (cd/sq m)**	***Zone 3* (cd/sq m)**	***Zone 4* (cd/sq m)**	***Zone 5***
up to 0.5	no limit	2900	2000	1000	no limit
0.5 to 2.0		2300	1600	800	
2.0 to 5.0		2000	1200	600	
5.0 to 10.0		1500	1000	600	
over 10.0		1200	800	400	

Luminance means the objective brightness of a surface as measured by a photometer, expressed in candelas per square meter.

Zone 1 covers areas with generally very high off-street ambient lighting, e.g. display centres similar to Kings Cross, central city locations

Zone 2 covers areas with generally high off-street ambient lighting eg. some major shopping/commercial centres with a significant number of off-street illuminated advertising devices and lights.

Zone 3 covers areas with generally medium off-street ambient lighting e.g. small to medium shopping/ commercial centres.

Zone 4 covers areas with generally low levels of off-street ambient lighting e.g. most rural areas, many residential areas.

Zone 5 covers areas within underground railway stations and areas fully contained within station buildings which are visible only from within the Rail Corridor.

(2): Maximum Allowable Daytime Luminance (NSW Department of Planning, 2007).

2.16 Sign Materials and Finishes

Further information regarding materials and finishes cane be found within Specifications for each sign type. The chosen standard materials and finishes for the signage family are as follows;

LAYERED COLOURED CONCRETE
- Coloured concrete

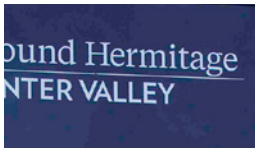
RAMMED EARTH

GALVANISED CIRCULAR HOLLOW SECTION (CHS)
- 50mm Galvanised. 2.9mm wall

STREET SIGN BLADES
- Digital printed Durst 3M UV ink

STAINLESS STEEL LETTERING

VINYL SIGNAGE



ALUMINIUM STEEL PANELS
- Painted

MILD STEEL PANELS
- Painted

200MM MILD STEEL UNIVERSAL BEAM
- Painted

HARDWOOD TIMBER

MODWOOD
- Sahara (brushed finish)

2.17 Anti-Graffiti

Anti-graffiti to be considered during fabrication and installation and to be confirmed by CCC.

2.18 Engineering Certification

Construction certification to be supplied by contractor prior to fabrication and installation.

2.19 Safety

Safety is a key component of any part of the public domain. Many factors influence the safe installation and use of signs within the landscape. All legislative requirements relating to the site and works to be completed shall be observed.

Prior to installation of new signs;

- Ensure that all staff members are made aware of any potential dangers or risks
- Provide staff with all relevant MSDS and SWMS prior to commencement of works
- Review location and ability to consolidate signage to reduce streetscape clutter

PART

3

SELECTION

SIGN SELECTION 3

3.1 Steps in Selecting and Obtaining Signs

Due to funding constraints it may not be possible to install the entire family of signs simultaneously. Prioritising installation with an implementation program for installing the signs is highly recommended. The following table provides a recommended guideline for the creation of this implementation programme.

HIGH PRIORITY
Indicates signage which is important for effective wayfinding and should be installed as quickly as possible. High priority should be given to signs which enhance the sense of arrival in Cessnock LGA and improve safety within the LGA.

MEDIUM PRIORITY
Signage that may be installed after high priority works have been completed or as replacement signs are installed on an as-needed basis. Medium priority should be given to upgrading street signs and improving pedestrian wayfinding in town centres.

LOWER PRIORITY
May be undertaken after the completion of medium priority works or on an as-needed basis. To get a proper idea about how the signs will look and function it is recommended that full size prototypes be developed where possible.

Signage Priority Hierarchy

Sign Type	Low Priority	Medium Priority	High Priority
GE1			
SE1			
TI1, TI2			
SS1, SS2, SS3, SS4			
CE1			
CI1			
WC1			

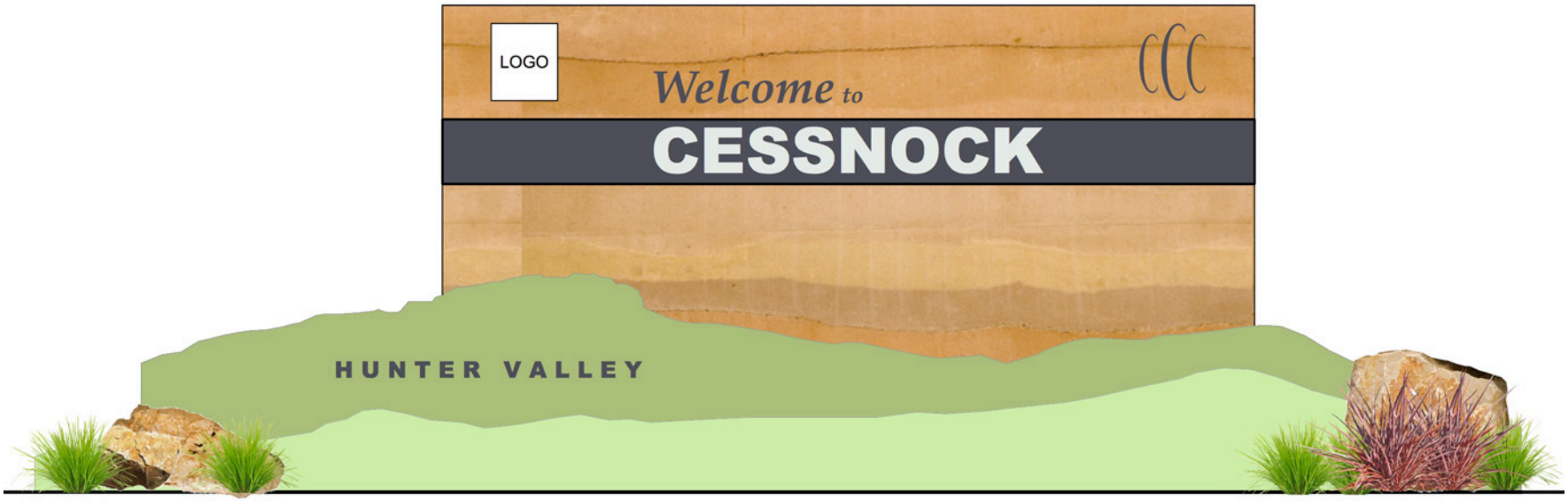
(3): Signage Priority Hierarchy

PART

4

SIGNAGE DETAILS Cessnock City Council

4.1 GE1 Entry Sign



01 GE1 Entry Sign
NTS

COLOURS:

Grey: CMYK: 74, 66, 48, 16
RGB: 92, 83, 90

Green:
CMYK: 83, 37, 6, 6
RGB: 65, 118, 162

Light green:
CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

LETTERING:

Welcome to: Palatino Italic Bold
Cessnock: Arial Black
Hunter Valley: Arial Black

4.1 GE1 Entry Sign - Signage Specification

1.0 STEEL
General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier

1.1 Durability
General: Provide steel products protected from corrosion to suit the conditions of use.

1.2 Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

1.3 Protective coatings
Environment: To AS/NZS 2312 clause 2.3.
Coating designation: To AS/NZS 2312.

Fasteners
Self drilling screws
Corrosion resistance: To AS 3566.2

Vapour barrier
Vapour barrier to slabs: To AS 2870 clause 5.3.3.
Minimum thickness: 0.2 mm.

1.4 Stainless steel
Bars: To ASTM A276/A276M.
Plate, sheet and strip: To ASTM A240/A240M.
Welded pipe (plumbing applications): To AS 1769.
Welded pipe (round, square, rectangular): To ASTM A554.

1.5 Steel
Sheet: To AS/NZS 1595.
Structural bars and sections: To AS/NZS 3679.1.
Structural hollow sections: To AS/NZS 1163.

1.6 Steel for prefinishes
Cold rolled bar: To AS 1443 - Bright.
Cold rolled sheet: To AS/NZS 1595.
Designation: CA2S-E.
Electric resistance welded tube: To AS 1450.

1.7 Metal separation
Incompatible sheet metals: Prevent direct contact between incompatible metals. Provide separation by one of the following:
- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
- Insert a concealed, non-metallic separation layer such as polyethylene film, adhesive tape, neoprene, nylon or bituminous felt.

Incompatible fixings: Do not use.
Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous or paper products.

1.8 Brazing
General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.
Butt joints: Do not use butt jointing for joints subject to load. If butt joints are used, do not rely on the filler metal fillet only.
Filler metal: To AS/NZS 1167.1.

1.9 Finishing
Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Make sure self-finished metals are without surface colour variations after jointing.

1.10 Preparation
General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.
Standard: To AS 1627 series.
Priming steel surfaces: If site painting is documented to otherwise uncoated mild steel or similar surfaces, prime as follows:
- After fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to unprimed surfaces.

1.11 Welding
Aluminium: To AS 1665.
Stainless steel: To AS/NZS 1554.6.
Steel: To AS/NZS 1554.1.

1.12 Stainless Steel Finishes
Requirement: Provide a surface finish to match the approved sample.
Pre-assembly: Mechanically polished and brushed finishes: Apply grit faced belts or fibre brushes that achieve uni-directional finishes with buffing.

Post-assembly pre-treatment:
Heat discolouration: Remove by pickling.
Welds: Grind excess material, brush, and polish to match the pre-assembly finish.

Post-assembly finish:
Brushed electropolish finish: Conform to the following:
- Pre-assembly finish: No. 4 brushed finish.
- Post-assembly finish: Provide an electro-chemical processed finish to achieve a No. 7 to No. 8 brushed finish.

4.1 GE1 Entry Sign - Signage Specification

Completion:
Cleaning: Clean and rinse to an acid free condition and allow to dry. Do not use carbon steel abrasives or materials containing chloride.
Protection: Secure packaging or strippable plastic sheet.

Anodising:
Standard: To AS 1231.
Thickness grade: To AS 1231 Table H1.

1.13 Mild Steel Lettering (Welcome to, HUNTER VALLEY and CCC logo)
General: Locate as per details.
Type: 6mm thick mild steel.
Fixing: 5-6mm threaded rod. Finished lettering is to be set level and plumb, protruding 25mm from finished concrete surface. Ensure all finishing of rammed earth wall is completed prior to installation.
Finish: paint (refer section 3.0). Colour as per drawings.

1.14 Stainless Steel Lettering (CESSNOCK)
General: Locate as per details.
Type: 6mm stainless steel lettering.
Fixing: 8mm threaded rod. 50mm stand off.
Finish: brushed.

1.15 Steel Plate
General: Locate as per details.
Type: 3mm mild steel. 400mm high x 1000mm depth.
Fixing: set into wall.
Finish: paint (refer section 3.0). Colour as per drawings.

1.16 Mild Steel Panel
General: Locate as per details.
Type: 6mm mild steel rolled and laser cut.
Fixing: As per engineers detail.
Finish: Paint colour PMS 7484 C.

1.17 Mild Steel Panel
General: Locate as per details.
Type: 6mm stainless steel rolled and laser cut.
Fixing: As per engineers detail.
Finish: paint (refer section 3.0). Colour as per drawings.

2.0 MONOLITHIC STABILISED EARTH WALLING
2.1 General
Provide monolithic stabilised earth walling that continues to perform satisfactorily for its design life of 50 years.

2.2 Samples
Provide 2 samples one month commencing works on site for designers approval.
Soil shall have sandstone and limestone blend.
Crushed Building Rubble Ex nominated quarry to suppliers standard.
Cement Content by volume shall be no less than 7%.
Proportion to be determined by Mix design and strength evaluation test.
Rammed Earth Wall to be sealed by approved stabilised earth wall water repellent.

2.3 Inspection
Give notice so that inspection may be made of the following:
- Sampling for field testing.
- Field testing.
- Damp-proof courses, in place.
- Termite protection measures in place.
- Forms in place.
- Commencement of rammed stabilised earth placing.
- Embedded pipes and conduits in position.
- Built-in items in place.
- Control joints, ready for joint filler.

2.4 Tests
Soil tests:
Particle size distribution: To AS 1289.3.6.1.
Mix design and strength evaluation tests.
Components: Submit details of components and mix design to achieve density and strength criteria.
Dry density/moisture content relation:
- Test report: Include the following additional material:
- Cement content by weight.
- Elapsed time between addition of cement and compaction.
- Date moulded.

Unconfined compressive strength: Prepare, test, evaluate and report in conformance with SAA HB 195.
Stabilised earth density test.
Method: To SAA HB 195.

2.5 Soil particle sizes
Clay: < 0.002 mm.
Silt: < 0.06 mm.
Sand: 0.06 – 2.0 mm.
Coarse aggregate:
- Gravel: 2.0 – 75 mm, ≤ 5% retained on a 37.5 mm sieve.
- Limestone: 19 mm.
- Sandstone: 19 mm.

4.1 GE1 Entry Sign - Signage Specification

2.6 Soil particle size distribution
Organic content: < 2%.
Clay and silt content: < 20%.
Sand content: ≥ 50%.
Coarse aggregate content: > 30%.
Water: Requirement: Clean, fresh, free from impurities.
Fixing: Finish: Paint colour.

2.7 Stabilising agent
Type: Cement.
Standard: To AS 3972.
Grade: GP.

2.8 Stabilised earth mix
Cement content (range): 6 – 10% by weight.
- Value: Determine using the Mix design and strength evaluation test.

Properties at placement:
- Characteristic adjusted compressive strength (minimum): 2.5 MPa.
- Moisture content (range): 8 – 16% by weight.

2.9 Damp-proof courses
Standard: To AS/NZS 2904.
Material: Polythene sheeting.

2.10 Structural fixings
Type: Chemical anchors.

2.11 Control joint infill
Material: 25 x 25 mm UV stable acrylic adhesive impregnated poly foam strip.
Steel components, including reinforcement.
Durability classification to AS 3700 (minimum): R2.
Reinforcement: Bar: To AS/NZS 4671.
Machine-welded mesh: To AS/NZS 4671.

2.12 Temporary formwork
Performance: Sufficiently robust to withstand the pressure of the compacted soil and to allow stripping without disturbance or adhesion.
Standard: To AS 3610.1.
Class: 3.
General: True and free from bulging in the wall surface.

2.13 Reinforcement
Refer to engineers drawings 4.1 GE1 Entry Sign - Foundation Specification page 31.

3.0 PAINTING
3.1 Products
Storage and handling:
Requirement: Handle, store, mix and apply all protective coatings in conformance with the manufacturer's recommendations.
Original containers: Deliver coating products to site in manufacturer's labelled and sealed containers.
Ambient temperature range for storage: 3°C to 30°C, or to manufacturer's recommendations.
Sunlight: Protect coating materials from direct sunlight before mixing or adding the converter (catalyst).
Use-by-date: Use products with limited shelf life before their use-by-date, unless written authorisation from the coating manufacturer's technical services section is provided.

Paint material:
Requirement: To AS/NZS 5131 clause 9.9.3.

Proprietary products:
Requirement: Provide all products from the one manufacturer's supply.
Product data sheets (PDS): Keep on site copies of all relevant manufacturer's PDS.
Safety data sheets (SDS): Keep on site copies of all relevant manufacturer's SDS.
Recording: To AS/NZS 5131 clause 9.9.5.

3.2 Surface Preparation
General: To AS/NZS 5131 Section 9 and the recommendations of AS/NZS 2312.1.

Treatment of welds:
Requirement: Clean welds to remove roughness, using power tools to AS 1627.2. Remove filings by vacuuming or compressed air.
Temporary welds: Grind flush any temporary welds.
Porous, skip or stitch welds: Not permitted.
Site welding: If possible, avoid site welding. If on site welding is required, prepare and treat the weld to AS/NZS 5131 clause 9.12.2.

Shop priming:
Requirement: Dust off and apply a coat of primer in conformance with the manufacturer's recommendations.

Site coating:
General: High pressure wash down all surfaces with clean water. Lightly sand down primer/ intermediate coats, which have been shop applied, before site application of next coat.

3.4 Preparation assessment
General: Assess all surfaces of each steel member for conformance with the documented preparation requirements.
Abrasive blast cleaning: To AS 1627.4 and AS 1627.9.
Mechanical cleaning: To AS 1627.9.
Surface profile: To AS 3894.5 Method A.

Surface dust from abrasion: To AS 3894.6 Method C.
Chloride level testing: Test: To AS 3894.6 Method A.
Maximum allowable chloride levels: 50 mg/m2 for critical applications (heavy condensation, fresh water ponding or immersion) or to manufacturer's recommendations.
Conformance: If the maximum allowable chloride is exceeded, rewash the affected surface area until the chloride level is within the acceptable limits using clean water or chloride neutralising solutions. Jet-washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.
Timing of testing: Early in the blasting work so that removal procedures can be started before the blasting is completed.

3.5 Mixing
General: To AS/NZS 5131 clause 9.9.6.
Powered agitators: Mix package sizes larger than 4 litres using powered agitators driven by air motors.
Multi-component coatings: Combine as whole pack units before application.
Thinners: If addition of thinners is proposed, conform to the coating manufacturer's recommendations for the documented product.
Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

3.6 Coating Application
General: Conform to AS/NZS 5131 clause 9.9 and the PDS.
Painting and coating colour: Verify all project finish colours with the retained samples.

Final surface preparation or coating application:
Limits: If the environmental/climatic/substrate conditions listed in AS/NZS 5131 clause 9.9.10 and the following are present do not apply coating:
- Ambient air temperature below 5°C or above 40°C.
- Substrate temperature below 5°C or above 35°C.
- Full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
- Surface preparation standard has not been achieved.
- Time between final surface preparation and the commencement of coating has exceed 4 hours.
- Visual tarnishing or black spots develop on the surface of the steel.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, providing the final surface preparation and all coating applications are undertaken under the limit conditions.
Pre-coating: Before the spray application of each coating, stripe coat by brush method all edges, welds, seams, rivets, bolts, bolt holes (including slots) and difficult to spray areas. Prime the underlying surfaces of replacement bolting, washers and nuts before installation.
Procedure: Conform to the coating order shown in SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS.
Subsequent coats: Before applying any subsequent coating layer, make sure the surface condition of the preceding coat conforms to SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS and is clean and free from defects.

Wet film thickness (WFT):
Method of measurement: To AS 3894.3 Appendix C using an approved wet film gauge continuously during application.

Dry film thickness (DFT):
Method of measurement: To AS 3894.3 clause 10.
Extent: Measure all surfaces at the completion of each prime, intermediate and finish coats, including areas of the element difficult to paint, masked by structure, or where double or light coating is likely.
Number of measurements: To AS 3894.3 clause 7.
Coatings with DFT 150 µm or less: If testing, deduct the effect of the measured surface profile from all DFT readings.
Single readings: Conform to the following:
- The average of 5 point readings for each 10 m2 area of coating surface to be within the documented coating thickness range.
- No single point reading in any 10 m2 to be less than 80% of the specified minimum coating thickness. If the average of three readings is used to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
- Check any single reading that is greater than 150% of the documented maximum DFT with three additional readings within 50 mm of the original reading. If the average of these three readings is not greater than 150% of the specified DFT, take the average reading as the point reading. If greater than 150%, reject the DFT for that area. If no maximum limit for DFT is documented, consult manufacturer.

Rectification and defects:
Rectification: Re-work areas rejected, using the same surface preparation, coatings and sequence as for the original work.
Defects (including under-thickness and over-thickness): Mark with dustless chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

3.7 Protection
Contamination:
Surfaces: Prevent contamination of coated surface, which are not yet dry, from blasting dust, abrasive or surface preparation debris and any other foreign matter.

Post application care:
General: Protect the coating against physical, chemical, or atmospheric damage until all components are fully cured.
Care: Stack and handle all coated items using fabric slings or padded chains. Use soft packaging, carpet strips or other deformable materials between all coated items.
Water ponding: Stack coated items to prevent water ponding.

3.8 Coating Repair
Repair of coating damage:
Preparation: Feather back by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edge.
Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.
Sequence: Apply the repair coating in the same sequence and manner as the original coating.
Areas damaged without exposing the primer: Wash with a proprietary detergent solution, rinse with clean water and abrade so that edges of sound paint are feathered. Coat the area with the appropriate intermediate and finishing coat materials.
Areas damaged exposing the primer or steel surface: Blast clean to the original standard.
Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Re-coat with the documented system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.
Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line.
Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.
Timing: Apply the protective coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

3.9 Completion
Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties
Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.
- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

3.10 Selections
Two-pack liquid coating:
Application to be 2-pack polyurethane or approved equivalent.
Application: Spray.
Finish: Full gloss.
Primer: Two pack epoxy primer to AS/NZS 3750.13.

Topcoat:
- External use: Proprietary polyurethane system.

Polyurethane – AS/NZS 2312.1 Categories C1 and C2 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/NZS 2312.1 PUR2	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm High Solids Polyurethane conforming to AS/NZS 3750.6	Nil

Polyurethane – AS/NZS 2312.1 Categories C3, C4 and C5 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/NZS 2312.1 PUR5	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO conforming to AS/NZS 3750.14	50 µm Polyurethane conforming to AS/NZS 3750.6 (Alternative: 75 µm High Solids Polyurethane)

4.0 LIGHTING
Allowances to be made for laying of conduit prior to construction. Refer Electrical Engineers Specification for installation details.

4.1 Uplight
General: To future design.
Type: TBC
Quantity: TBC

4.1 GE1 Entry Sign - Engineers Specification

GENERAL

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONSULTANT'S DRAWINGS.
G2. ALL DISCREPANCIES SHALL BE REFERRED TO THE PROJECT MANAGER AND RESOLVED BEFORE PROCEEDING WITH THE WORK.
G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. THESE STRUCTURAL DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
G4. ALL WORKMANSHIP, TESTING, MATERIALS AND SUPERVISION ARE TO BE IN ACCORDANCE WITH THESE SPECIFICATIONS, THE WORK HEALTH AND SAFETY ACT 2011. ENFORCED BY THE WORKCOVER AUTHORITY AND CURRENT RELEVANT AUSTRALIAN STANDARDS.
G5. THE DETERMINATION OF A SAFE WORK METHOD REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. ANY ELEMENT WHICH POSES AN UNACCEPTABLE LEVEL OF SAFETY RISK TO CONSTRUCT SHALL BE REFERRED TO THE STRUCTURAL ENGINEER. TEMPORARY BRACING AND SUPPORT OF STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
G6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL SERVICES IN THE VICINITY OF THE WORKS.
G7. THE STRUCTURAL COMPONENTS DETAILED ON THESE STRUCTURAL DRAWINGS ARE JOB SPECIFIC AND HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADS:

WIND LOADS:

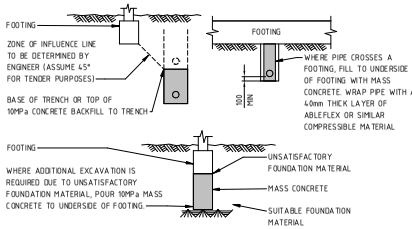
- IMPORTANCE LEVEL = 2
- REGION = A2
- ANNUAL PROBABILITY OF EXCEDENCE = 1/500
- REGIONAL WIND SPEED V_R = 45 m/s
- TERRAIN CATEGORY = TC2
- TERRAIN MULTIPLIER $M_{z,cat}$ = 0.91
- WIND DIRECTION MULTIPLIER M_d = 1
- SHIELDING MULTIPLIER M_s = 1
- TOPOGRAPHIC MULTIPLIER M_t = 1
- SITE WIND SPEED = 41 m/s

G8. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO SAFETY THE MATTER SHALL BE REFERRED TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
G9. NO CHANGES IN ANY STRUCTURAL ELEMENT SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM NORTHROP CONSULTING ENGINEERS. IF THERE IS A DISCREPANCY THEN FOR TENDER PURPOSES ALLOW FOR THE MOST EXPENSIVE OPTION. NORTHROP CONSULTING ENGINEERS SHALL BE CONTACTED TO CONFIRM PRIOR TO CONSTRUCTION.
G10. NORTHROP CONSULTING ENGINEERS ACCEPTS NO RESPONSIBILITY FOR ANY WORK NOT INSPECTED OR NOT APPROVED BY NORTHROP CONSULTING ENGINEERS DURING CONSTRUCTION.

FOUNDATIONS

F1. ASSUMED ALLOWABLE BEARING CAPACITY:
- FOOTINGS = 100kPa

F2. A GEOTECHNICAL REPORT HAS NOT BEEN CARRIED OUT. MINIMUM ASSUMED ALLOWABLE BEARING PRESSURES TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. IF MINIMUM BEARING PRESSURES NOT ACHIEVED, AN ALTERNATIVE DESIGN WILL BE REQUIRED.
F3. ENSURE STABILITY OF ADJACENT BUILDINGS AND PATHS IS MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
F4. THE UNDERSIDE OF FOUNDATIONS SHALL CONFORM TO THE FOLLOWING REGARDLESS OF NOMINATED LEVELS:



F5. FOOTINGS SHALL BE CENTRALLY LOCATED UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
F6. FOOTINGS SHALL BE EXCAVATED TO THE DETAILED DEPTH AND WIDTH. FOOTINGS SHALL BE INSPECTED AND FILLED WITH CONCRETE AS SOON AS POSSIBLE TO AVOID EITHER SOFTENING OF THE FOUNDATION MATERIAL OR DRYING OUT BY EXPOSURE.
F7. THE BASE OF ALL PIER HOLES SHALL BE FREE OF WATER AND CLEANED OF LOOSE MATERIAL OR DEBRIS PRIOR TO PLACEMENT OF CONCRETE. ALLOW TO PROVIDE TEMPORARY LINERS AS DEEMED NECESSARY.

CONCRETE

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2009 AND NATSPEC CONCRETE STANDARDS.
C2. CONCRETE PROPERTIES AND COVER TO REINFORCING :

COVER TO REINFORCEMENT			
ELEMENT	CONCRETE STRENGTH f'c (MPa)	MAXIMUM 56 DAY DRY SHRINKAGE	COVER (mm)
WALLS	25	1000 µm	60
FOOTINGS	25	1000 µm	60

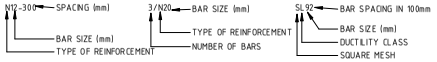
MAXIMUM AGGREGATE SIZE = 20mm U.N.O.
SLUMP DURING PLACING = 80mm ±10mm
EXPOSURE CLASSIFICATION = A2 (IN CONTACT WITH GROUND)
NO ADMIXTURES SHALL BE USED IN THE CONCRETE MIX UNLESS APPROVED BY NORTHROP CONSULTING ENGINEERS IN WRITING.

C3. SLABS USING MECHANICAL VIBRATORS.
C4. PLACE CONCRETE CONTINUOUSLY BETWEEN CONSTRUCTION JOINTS SHOWN ON PLAN. DO NOT BREAK OR INTERRUPT SUCCESSIVE POURS SUCH THAT COLD JOINTS OCCUR. ANY REVISIONS OR ADDITIONS TO CONSTRUCTION JOINTS SHOWN ON PLAN REQUIRE APPROVAL FROM THE NORTHROP CONSULTING ENGINEERS.
C5. REINFORCEMENT QUALITY AND NOTATION :

REINFORCEMENT NOTATION				
SYMBOL	BAR TYPE	STRENGTH GRADE (MPa)	DUCTILITY CLASS	TO COMPLY WITH AUSTRALIAN STANDARD
S	STRUCTURAL GRADE DEFORMED RIB BAR	250	NORMAL	AS/NZS 4671-2001
N	HOT ROLLED DEFORMED RIB BAR	500	NORMAL	AS/NZS 4671-2001
R	PLAIN ROUND BAR	250	NORMAL	AS/NZS 4671-2001
RL	RECTANGULAR MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
SL	SQUARE MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
L-TM	TRENCH MESH	500	LOW	AS/NZS 4671-2001

ALL REINFORCING BARS SHALL BE GRADE D500N TO AS/NZS 4671-2001 AND ALL MESH SHALL BE GRADE 500L TO AS/NZS 4671-2001. UNLESS NOTED OTHERWISE CLASS L REINFORCEMENT SHALL NOT BE USED.

REINFORCEMENT LABELS :



C6. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, AND NOT NECESSARILY IN TRUE PROJECTION. BARS SHOWN ARE INDICATIVE ONLY AND LENGTHS MAY VARY. BEAM ELEVATIONS TAKE PRECEDENCE OVER SECTIONS. SLAB PLANS TAKE PRECEDENCE OVER SECTIONS. REFER TO SECTIONS FOR EXTRA BARS THAT MAY BE REQUIRED.
C7. USE ONLY PLASTIC OR CONCRETE CHAIRS AT EXTERNAL SURFACES.
C8. SITE BENDING OF REINFORCEMENT BARS SHALL BE DONE WITHOUT HEATING USING A RE-BENDING TOOL. THE BARS SHALL BE RE-BENT AGAINST A FLAT SURFACE OR A PIN WITH A DIAMETER NOT LESS THAN THE MINIMUM PIN SIZE PRESCRIBED IN AS3600-2009.
C9. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN ON THE STRUCTURAL DRAWINGS OR IN POSITIONS OTHERWISE APPROVED IN WRITING BY NORTHROP CONSULTING ENGINEERS. LAPS SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND IN ACCORDANCE WITH AS3600-2009 SECTION 13.
C10. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY NORTHROP CONSULTING ENGINEERS.
C11. AT EXTERNALLY EXPOSED SURFACES NO METALLIC ITEMS INCLUDING FORM BOLTS, FORM SPACERS, METALLIC BAR CHAIRS AND TIE-WIRE ARE TO BE PLACED IN THE COVER ZONE.
C12. ALL REINFORCEMENT, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION AND INSPECTED BY A SUITABLY QUALIFIED ENGINEER PRIOR TO PLACING CONCRETE.
C13. ALL CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNISED TESTING LAB.
C14. FOR ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX, REFER TO CONCRETE - ELAPSED DELIVERY TIMES NOTE.

CONCRETE - ELAPSED DELIVERY TIMES

CE1. ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX AT THE SITE MUST NOT EXCEED THE CRITERIA IN THE ELAPSED DELIVERY TIMETABLE BELOW

ELAPSED DELIVERY TIME TABLE	
CONCRETE TEMPERATURE AT TIME OF DISCHARGE (°C)	MAXIMUM ELAPSED TIME (HOURS)
< 24	2.00
24 TO 27	1.50
27 TO 30	1.00
30 TO 32	0.75
32 TO 35	0.50

IF THE ELAPSED TIME IS LONGER THAN THE CORRESPONDING TIME IN THE TABLE ABOVE, OR THE TEMPERATURE IS GREATER THAN 35°C, THE CONCRETE MIX DESIGN ENGINEER IS TO BE CONTACTED TO CONFIRM WHETHER PLACEMENT IS TO PROCEED OR IF THE POUR IS TO BE STOPPED.

STEELWORK

S1. FABRICATE AND ERECT STRUCTURAL STEELWORK IN ACCORDANCE WITH AS4100-1998.
S2. PROVIDE HOLES, CLEATS AND FIXING FOR LIGHT STEEL/TIMBER FRAMING, FINISHES, ETC. SHOWN ON ARCHITECTURAL DRAWINGS.
S3. THESE DRAWINGS HAVE BEEN PREPARED TO INDICATE THE STRUCTURAL INTENT. THE SHOP DETAILER IS TO USE THESE DRAWINGS AS A BASIS FOR DIMENSIONAL COORDINATION WITH OTHER CONSULTANT'S DRAWINGS AND IS TO PREPARE DETAILED SHOP DRAWINGS. WHERE NECESSARY, THE SHOP DETAILER IS TO MAKE ASSUMPTIONS AND SUBMIT TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION. SHOP DETAILER IS TO ALLOW TO RE-WORK SHOP DRAWINGS AS NECESSARY. FABRICATOR SHALL PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE BUILDER FOR THEIR APPROVAL. BUILDER SHALL LODGE TWO COPIES OF APPROVED DRAWINGS TO NORTHROP CONSULTING ENGINEERS FOR REVIEW PRIOR TO FABRICATION, (ALLOW 5 WORKING DAYS FOR REVIEW).
S4. UNLESS NOTED OTHERWISE, USE:
- 6mm CONTINUOUS FILLET WELDS MADE WITH E4818 MILD STEEL ELECTRODES.
- ALL WELDS SP CATEGORY

S5. ALL BOLTS, SCREWS, HOLD DOWN BOLTS, MASONRY ANCHORS SHALL BE HOT DIP GALVANISED TO AS1214-1983, AS/NZS 4534-2006, AS/NZS 4680-2006 & AS/NZS 4792-2006. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED. ALL HOLES SHALL BE 2mm LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE.
S6. MINIMUM YELD STRESS:
- HOT ROLLED SECTIONS = 300MPa
- SQUARE HOLLOW SECTIONS = 350MPa
- RECTANGULAR HOLLOW SECTIONS = 350MPa
- CIRCULAR HOLLOW SECTION = 250MPa
- HOT ROLLED PLATE = 250MPa

S7. SURFACE TREATMENT UNLESS NOTED OTHERWISE:
- EXPOSED TO WEATHER (STRUCTURAL MEMBERS) = AS/NZS 2312-HDG600P3 or IZS3 (TIME TO FIRST MAINTENANCE TO BE 10 YEARS)
- BUILT INTO THE INTERNAL SKIN OF EXTERNAL WALLS = AS/NZS 2312-HDG600P3

S8. ALL BURIED STEELWORK TO BE PAINTED FIRST USING 'EXPOSED TO WEATHER' TREATMENT SYSTEM FOLLOWED BY THE APPLICATION OF A TWO PART EPOXY SUCH AS 'SIKAGUARD-63N' OR APPROVED EQUIVALENT, THEN CONCRETE ENCASE STEELWORK WITH MASS CONCRETE (MINIMUM 75mm COVER TO STEELWORK).
S9. STEELWORK TO BE CONCRETE ENCASED FOR FIRE RATING PURPOSES SHALL BE FREE FROM ALL LOOSE RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE, ETC. AND REINFORCED WITH SL41 FABRIC OR EQUIVALENT BLACK IRON WIRE, 3mm DIA.
S10. BOLT SYMBOLS:
- 4.6/S = GRADE 4.6 BOLT / SNUG TIGHTENED.
- 8.8/S = GRADE 8.8 BOLT / SNUG TIGHTENED.
- 8.8/TF = GRADE 8.8 BOLT / FULLY TENSIONED FRICTION TYPE (USE LOAD INDICATOR WASHERS)
- 8.8/TB - GRADE 8.8 BOLT / FULLY TENSIONED BEARING TYPE (USE LOAD INDICATOR WASHERS)

S11. THE CONTRACTOR SHALL SUPPLY WRITTEN CERTIFICATION TO THE STRUCTURAL ENGINEER PRIOR TO THE ERECTION OF ANY STRUCTURAL STEEL STATING THAT THE BOLTS PROPOSED TO BE USED COMPLY WITH AS/NZS 1252-1996. HIGH STRENGTH BOLTS (8.8) ARE NOT TO BE WELDED.
S12. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEEL WORK SHALL BE SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, IN ORDER TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
S13. ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS. SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.
S14. GROUT ALL STEEL BASES BY DRY PACKING USING GROUT WHICH IS NON-SHRINK AND HAS A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 40MPa
S15. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS ARE TO BE HOT DIP GALVANISED.
S16. THESE DRAWINGS MAY NOT IDENTIFY ALL SECONDARY STEELWORK ELEMENTS THAT ARE REQUIRED FOR SUPPORT, FIXING AND FINISHING OF GLAZING, CLADDING AND LINING. THE TENDERER IS RESPONSIBLE FOR THE INCLUSION OF SUCH STEELWORK ELEMENTS TO THE EXTENT REQUIRED ON THE ARCHITECT'S DRAWINGS.
S17. IMPORTED STRUCTURAL STEEL MATERIAL
ALL STRUCTURAL STEELWORK USED ON THIS PROJECT SHALL BE COMPLIANT WITH AS4100, AND IN PARTICULAR:
- CERTIFIED MILL TEST REPORTS, OR TEST CERTIFICATES SHALL BE PROVIDED AS EVIDENCE OF COMPLIANCE WITH THE STANDARDS REFERRED TO IN AS4100. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- PROVIDE TEST CERTIFICATED FOR COMPLIANCE FOR ALL FASTENERS. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- FOR COLD FORMED SECTIONS A "CERTIFICATE OF CONFORMITY TO AS1163-1991" SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- CERTIFICATES SHALL ONLY BE ACCEPTED FROM TESTING COMPANIES ACCREDITED BY A TESTING AUTHORITY RECOGNISED IN AUSTRALIA, EG NATA or JAS-ANZ CERTIFIED.
- UNIDENTIFIED STEEL ie. ANY STEEL THAT IS NOT ACCOMPANIED WITH EVIDENCE STATING COMPLIANCE WITH THE REQUIREMENT OF AS4100 SHALL ONLY BE USED STRICTLY IN ACCORDANCE WITH CLAUSE 2.2.3 OF AS4100. IF MATERIALS SUPPLIED AND INSTALLED ARE SUBSEQUENTLY PROVEN TO BE NON COMPLIANT WITH THE SPECIFIED AUSTRALIAN STANDARDS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND COST TO UNDERTAKE NATA OR EQUIVALENT CERTIFIED TESTING TO PROVE CONFORMANCE TO THE AUSTRALIAN STANDARDS AND DESIGN SPECIFICATIONS. SIMILARLY ANY RECTIFICATION WORKS THAT MAY SUBSEQUENTLY BE REQUIRED TO SATISFY AUSTRALIAN CODE REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

RAMMED EARTH

RE1. RAMMED EARTH WALLS SHALL CONFORM TO THE RELEVANT REQUIREMENTS OF AS3700, SAA HB 195, NZS4297, NZS4298 & NZS4299
RE2. THE CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH OF THE MASONRY UNITS SHALL BE A MINIMUM OF 2.5MPa. THE MINIMUM CEMENT CONTENT BY WEIGHT SHALL BE 6%.
RE3. SUBMIT THE FOLLOWING FOR APPROVAL TO THE SUPERINTENDENT PRIOR TO COMMENCING WORKS:
- MIX DESIGN TO ACHIEVE DENSITY AND STRENGTH REQUIREMENTS, INCLUDING CEMENT CONTENT BY WEIGHT, DENSITY TO BE ACHIEVED AND PARTICLE SIZE DISTRIBUTION
- TEST REPORTS INCLUDING CONFIRMATION OF INSITU UNCONFINED COMPRESSIVE STRENGTH AND ELAPSED TIME BETWEEN ADDITION OF CEMEMNT AND COMPACTION. UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF SAA HB 195

RE4. U.N.O. ALL ANCHORS INTO RAMMED EARTH SHALL BE HILTI HIT-HY70 INJECTION ANCHORS. ANCHORS ARE TO BE HOT DIP GALVANISED
RE5. THE MOISTURE CONTENT AT PLACEMENT SHALL BE BETWEEN 8-16% BY WEIGHT
RE6. FORMWORK SHALL BE DESIGNED BY A SUITABLY QUALIFIED ENGINEER, AND SHALL BE CAPABLE OF WITHSTANDING THE PRESSURE OF THE SOIL DURING COMPACTION. SUITABLE BOND BREAKERS SHALL BE USED TO ALLOW STRIPPING WITHOUT DISTURBANCE OF THE COMPACTED WALL.
RE7. PLACEMENT OF RAMMED EARTH SHALL NOT BE CARRIED OUT WHEN TEMPERATURE IS GREATER THAN 32 DEGREES CELSIUS.
RE8. MATERIAL SHALL BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 200mm THICK (WHEN UNCOMPACTED). MECHANICAL COMPACTION IS TO BE UNDERTAKEN USING PNEUMATIC RAMMERS. HAND RAMMING IS NOT TO BE USED.

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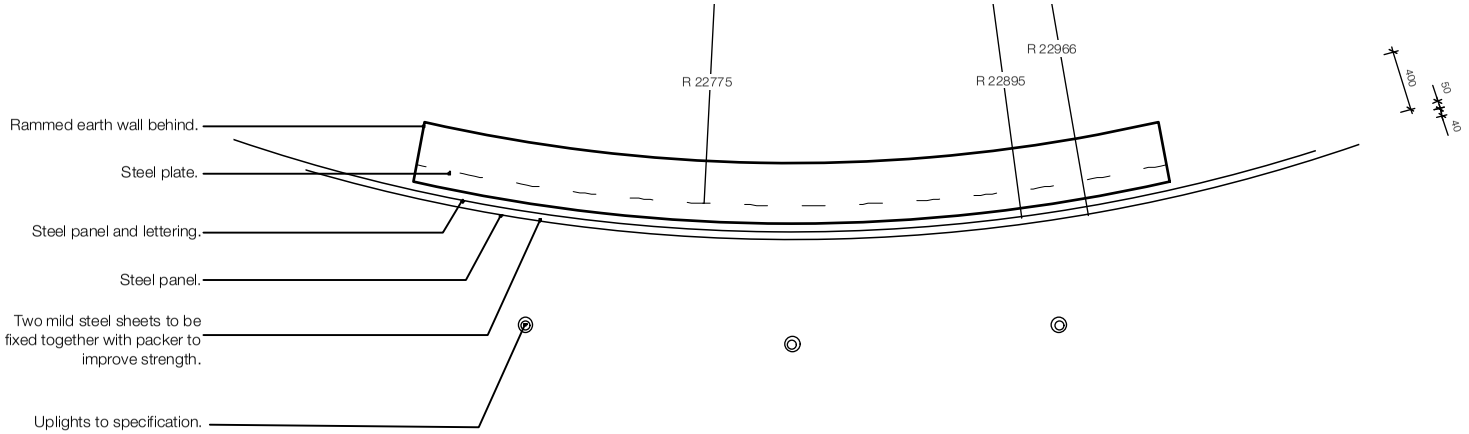
JOB NUMBER:	NL166682	DATE:	16/02/2018	REV. 2
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK20			

4.1 GE1 Entry Sign



02 GE1 Entry Sign - Plan
Scale: 1:50

General Notes:

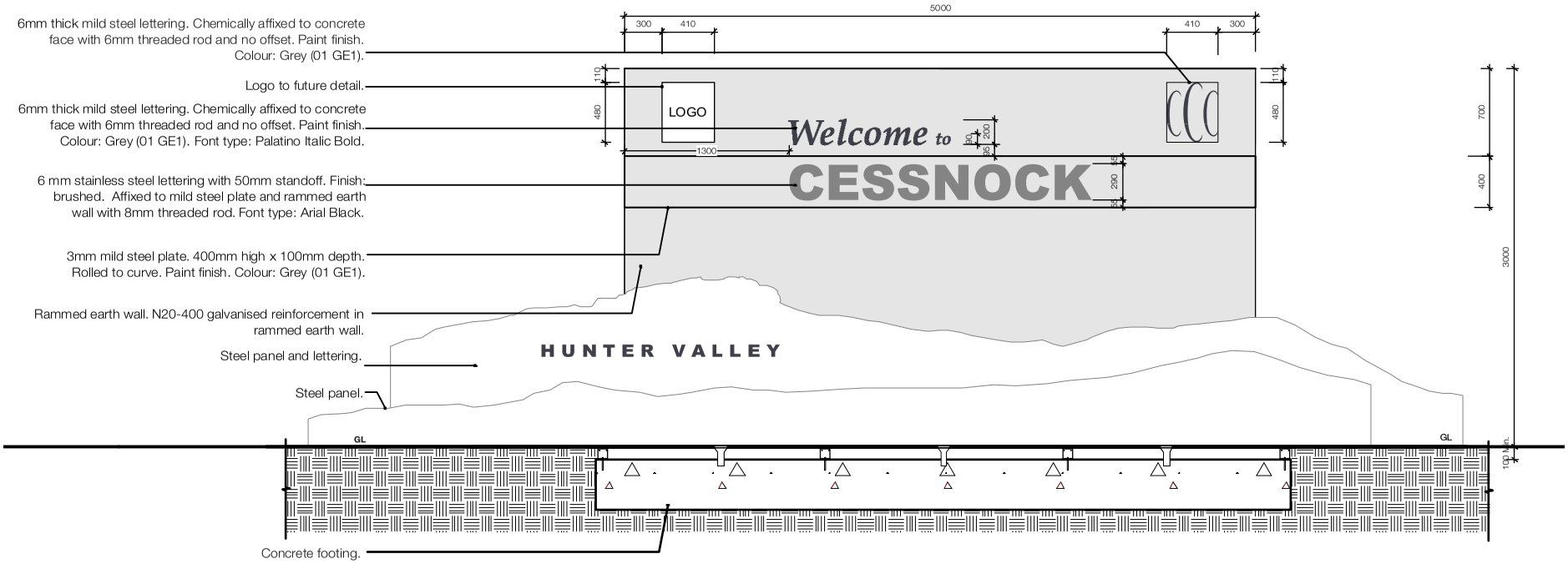
Refer to GE1 Entry Sign supporting drawings:

- 01 GE1 Entry Sign p.25
- 03 GE1 Entry Sign - Front Elevation p.33
- 04 GE1 Entry Sign - Steel Panels Front Elevation p.34
- 05 GE1 Entry Sign - Side Section p.35

Refer signage specification p.26-30.

Refer engineers specification page 31 and engineers drawing page 36.

4.1 GE1 Entry Sign



03 GE1 Entry Sign - Front Elevation
Scale: 1:50

General Notes:

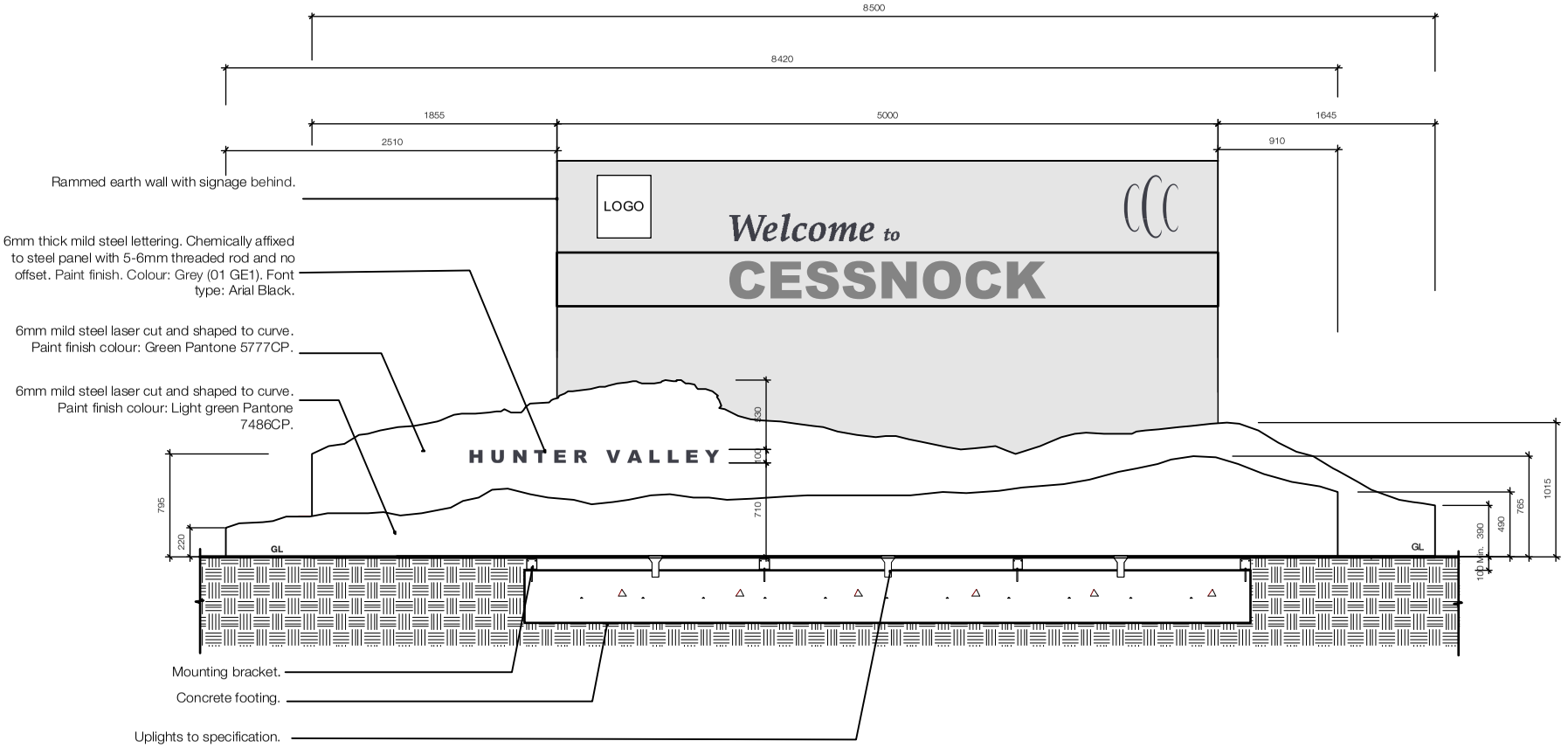
Refer to GE1 Entry Sign supporting drawings:

- 01 GE1 Entry Sign p.25
- 02 GE1 Entry Sign - Plan p.32
- 04 GE1 Entry Sign - Steel Panels Front Elevation p.34
- 05 GE1 Entry Sign - Side Section p.35

Refer signage specification p.26-30.

Refer engineers specification page 31 and engineers drawing page 36.

4.1 GE1 Entry Sign



04 GE1Entry Sign - Steel Panels Front Elevation
Scale: 1:50

General Notes:

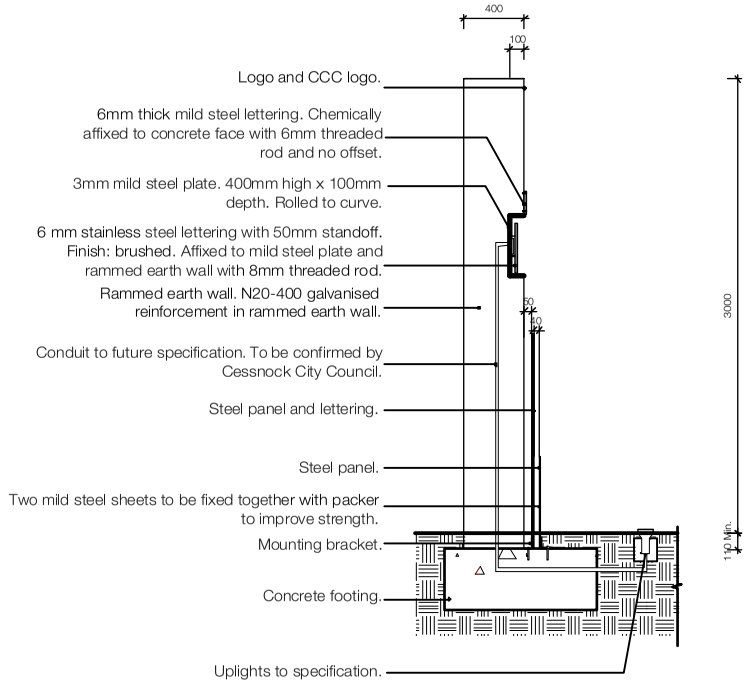
Refer to GE1 Entry Sign supporting drawings:

- 01 GE1 Entry Sign p.25
- 02 GE1 Entry Sign - Plan p.32
- 03 GE1 Entry Sign - Front Elevation p.33
- 05 GE1 Entry Sign - Side Section p.35

Refer signage specification p.26-30.

Refer engineers specification page 31 and engineers drawing page 36.

4.1 GE1 Entry Sign



05 GE1 Entry Sign - Side Section
Scale: 1:50

General Notes:

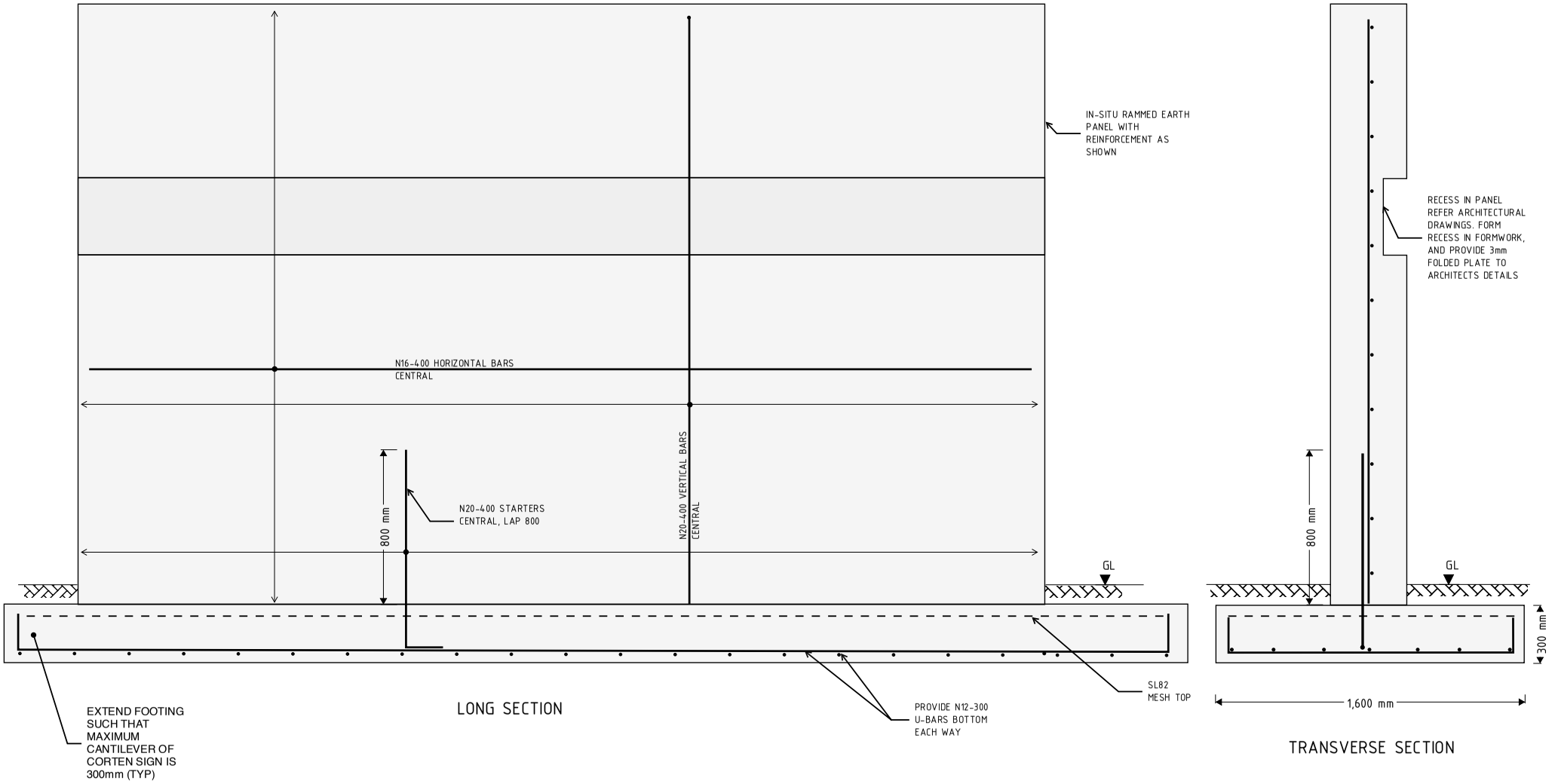
Refer to GE1 Entry Sign supporting drawings:

- 01 GE1 Entry Sign p.25
- 02 GE1 Entry Sign - Plan p.32
- 03 GE1 Entry Sign - Front Elevation p.33
- 04 GE1 Entry Sign - Steel Panels Front Elevation p.34

Refer signage specification p.26-30.

Refer engineers specification page 31 and engineers drawing page 36.

4.1 GE1 Entry Sign - Engineers Drawing



GE1 - ENTRY SIGN (3000h x 5000w)

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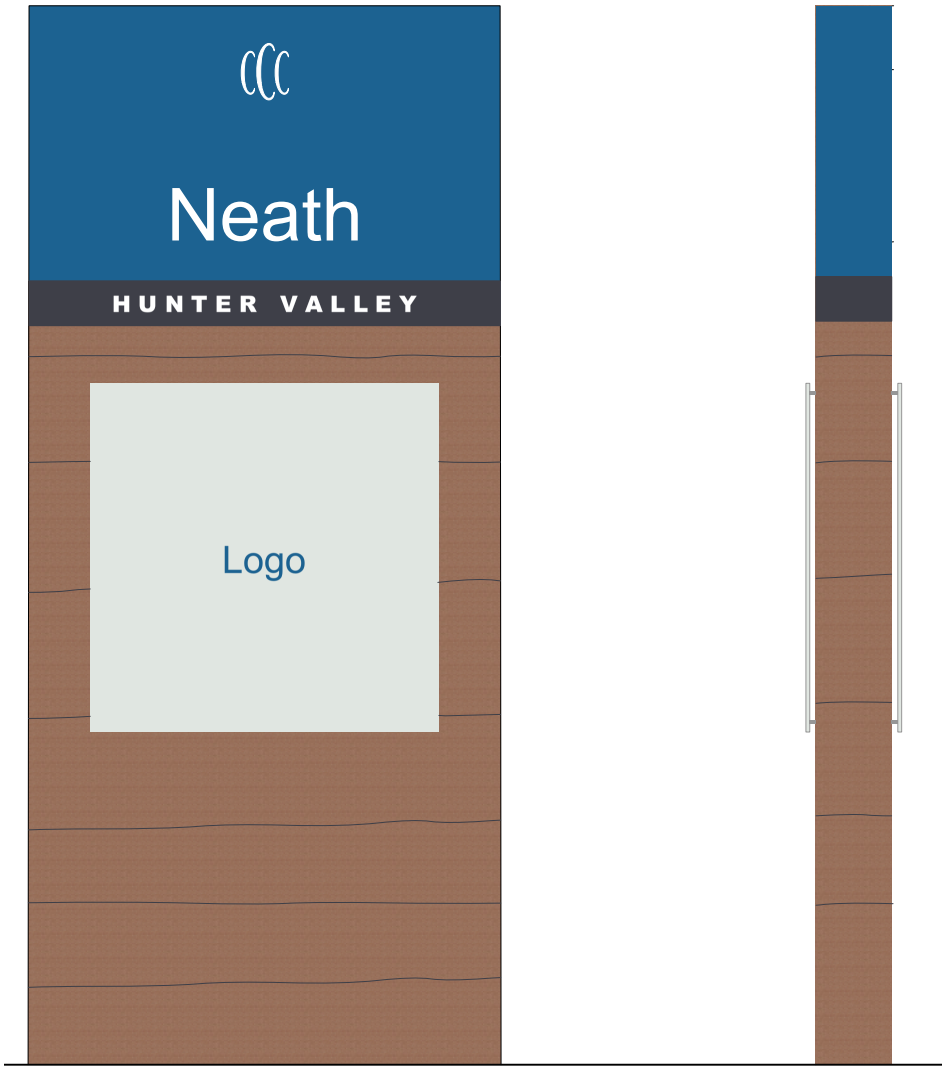
JOB NUMBER:	NL166682	DATE:	16/02/2018	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			1
DRAWING TITLE:	GE1 - ENTRY SIGN (SHALLOW PAD OPTION)			
DRAWING NUMBER:	NL166682_SK23			

NOTE:
MINIMUM ALLOWABLE BEARING PRESSURE OF 100KPa IS ASSUMED, AND IS TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE.
IF FOOTING NOT IN 100kPa MATERIAL, ALTERNATIVE DESIGN WILL BE REQUIRED

REFER TO SK20 FOR SPECIFICATIONS. ALL REINFORCEMENT WITHIN RAMMED EARTH WALLS TO BE GALVANISED

NOTE: FIX 10mm LASERCUT CORTEN SIGNS TO RAMMED EARTH WALL AT TOP USING M12 HILTI HIT-HY70 INJECTION ANCHORS (GALVANISED) WITH COUNTERSUNK HEADS. SEPERATE DISSIMILAR METALS USING NEOPRENE WASHERS. PROVIDE FIXINGS 50mm FROM TOP OF EACH SIGN @ 900 CTS, WITH SOLID STANDOFFS TO SUIT SPACING BETWEEN RAMMED EARTH AND CORTEN.

4.2 SE1 Suburb Entry Sign



01 SE1 Suburb Entry Sign

COLOURS:

Blue: CMYK: 83, 37, 6, 6
RGB: 65, 118, 162

Grey: CMYK: 74, 66, 48, 16
RGB: 92, 83, 90

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

LETTERING:

Suburb: Arial
Hunter Valley: Arial Black
Thank you for visiting: Arial

4.2 SE1 Suburb Entry Sign - Signage Specification

1.0 STEEL
General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier

1.1 Durability
General: Provide steel products protected from corrosion to suit the conditions of use.

1.2 Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

1.3 Protective coatings
Environment: To AS/NZS 2312 clause 2.3.
Coating designation: To AS/NZS 2312

Fasteners
Self drilling screws
Corrosion resistance: To AS 3566.2

Vapour barrier
Vapour barrier to slabs: To AS 2870 clause 5.3.3.
Minimum thickness: 0.2 mm.

1.4 Aluminium and aluminium alloys
Drawn pipe: To AS/NZS 1867.
Drawn rod, bar and strip: To AS/NZS 1865.
Extrusions: To AS/NZS 1866.
Plate and sheets: To AS/NZS 1734.

1.5 Coated steel
Electro-galvanised (zinc) coating on ferrous hollow and open sections: To AS 4750.
Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
- Ferrous open sections by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections by a continuous or specialised process: To AS/NZS 4792.
- Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.

Steel wire: To AS/NZS 4534.

1.6 Metal separation
Incompatible sheet metals: Prevent direct contact between incompatible metals. Provide separation by one of the following:
- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
- Insert a concealed, non-metallic separation layer such as polyethylene film, adhesive tape, neoprene, nylon or bituminous felt.

Incompatible fixings: Do not use.
Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous or paper products.

1.7 Brazing
General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.
Butt joints: Do not use butt jointing for joints subject to load. If butt joints are used, do not rely on the filler metal fillet only.
Filler metal: To AS/NZS 1167.1.

1.8 Finishing
Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Make sure self-finished metals are without surface colour variations after jointing.

1.9 Preparation
General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.
Standard: To AS 1627 series.
Priming steel surfaces: If site painting is documented to otherwise uncoated mild steel or similar surfaces, prime as follows:
- After fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to unprimed surfaces.

1.10 Welding
Aluminium: To AS 1665.
Stainless steel: To AS/NZS 1554.6.
Steel: To AS/NZS 1554.1.

1.11 Electroplated coatings
Chromium on metals: To AS 1192.
- Service condition number: At least 2.

Nickel on metals: To AS 1192.
- Service condition number: At least 2.

Zinc on iron or steel: To AS 1789.

1.12 Iluminium Steel Panels to form 'Box / Cladding'
General: Locate as per details.
Type: 6mm thick alluminium panels
Fixing: To be confirmed by shop drawings. Ensure all finishing of concrete wall is completed prior

to installation.
Finish: paint (refer section 3.0). Colour as per drawings.

1.13 Alluminium Steel Panels (fixed to concrete)
General: Locate as per details.
Type: 6mm thick alluminium panels
Fixing: 6-8mm threaded rod with 25mm stand off. Ensure all finishing of concrete wall is completed prior to installation.
Finish: paint (refer section 3.0). Colour as per drawings.

1.14 Galvanised SHS frame
General: Locate as per details.
Type: 50mm x 5mm galvanised SHS fully welded frame
Fixing: 10mm baseplate. Fix into M16 ferrile central. Ensure all finishing of concrete wall is completed prior to installation.
Finish: galvanised

2.0 CONCRETE
2.1 Off-form concrete wall
General: Timber ply layered off-form cast concrete wall. Hand mix in batches and pour in 200mm layers to achieve layered effect (similar to rammed earth).
Standard: Class 3 as per AS3610.
Colour to wall: CCS Gecko
Exposure: To AS3600 Table 4.3.
Aggregate: 8-10mm quartz aggregate.
Cement: natural grey portland.
Finish: 16mm custom orb off-form finish to Class 3 as per AS3610 and timber ply.
Refer to engineers specification for structural details and specification.

3.0 PAINTING
3.1 Products
Storage and handling:
Requirement: Handle, store, mix and apply all protective coatings in conformance with the manufacturer's recommendations.
Original containers: Deliver coating products to site in manufacturer's labelled and sealed containers.
Ambient temperature range for storage: 3°C to 30°C, or to manufacturer's recommendations.
Sunlight: Protect coating materials from direct sunlight before mixing or adding the converter (catalyst).
Use-by-date: Use products with limited shelf life before their use-by-date, unless written authorisation from the coating manufacturer's technical services section is provided.

Paint material:
Requirement: To AS/NZS 5131 clause 9.9.3.

Proprietary products:
Requirement: Provide all products from the one manufacturer's supply.
Product data sheets (PDS): Keep on site copies of all relevant manufacturer's PDS.
Safety data sheets (SDS): Keep on site copies of all relevant manufacturer's SDS.
Recording: To AS/NZS 5131 clause 9.9.5.

3.2 Surface Preparation
General: To AS/NZS 5131 Section 9 and the recommendations of AS/NZS 2312.1.
Galvanized, aluminium and zinc primed surfaces:
Requirement: Remove grease, oil and other solvent-soluble contaminants to AS 1627.1. Allow to dry and immediately proceed with the next operation.
Galvanized and aluminium surfaces: Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Treatment of welds:
Requirement: Clean welds to remove roughness, using power tools to AS 1627.2. Remove filings by vacuuming or compressed air.
Temporary welds: Grind flush any temporary welds.
Porous, skip or stitch welds: Not permitted.
Site welding: If possible, avoid site welding. If on site welding is required, prepare and treat the weld to AS/NZS 5131 clause 9.12.2.

Shop priming:
Requirement: Dust off and apply a coat of primer in conformance with the manufacturer's recommendations.

Site coating:
General: High pressure wash down all surfaces with clean water. Lightly sand down primer/ intermediate coats, which have been shop applied, before site application of next coat.

3.3 Preparation assessment
General: Assess all surfaces of each steel member for conformance with the documented preparation requirements.
Abrasive blast cleaning: To AS 1627.4 and AS 1627.9.
Mechanical cleaning: To AS 1627.9.
Surface profile: To AS 3894.5 Method A.
Surface dust from abrasion: To AS 3894.6 Method C.
Chloride level testing: Test: To AS 3894.6 Method A.
Maximum allowable chloride levels: 50 mg/m2 for critical applications (heavy condensation, fresh water ponding or immersion) or to manufacturer's recommendations.

Conformance: If the maximum allowable chloride is exceeded, rewash the affected surface area until the chloride level is within the acceptable limits using clean water or chloride neutralising solutions. Jet-washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.
Timing of testing: Early in the blasting work so that removal procedures can be started before the blasting is completed.

3.4 Mixing
General: To AS/NZS 5131 clause 9.9.6.
Powered agitators: Mix package sizes larger than 4 litres using powered agitators driven by air motors.
Multi-component coatings: Combine as whole pack units before application.
Thinners: If addition of thinners is proposed, conform to the coating manufacturer's recommendations for the documented product.
Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

3.5 Coating Application
General: Conform to AS/NZS 5131 clause 9.9 and the PDS.
Painting and coating colour: Verify all project finish colours with the retained samples.
Final surface preparation or coating application:
Limits: If the environmental/climatic/substrate conditions listed in AS/NZS 5131 clause 9.9.10 and the following are present do not apply coating:

- Ambient air temperature below 5°C or above 40°C.
- Substrate temperature below 5°C or above 35°C.
- Full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
- Surface preparation standard has not been achieved.
- Time between final surface preparation and the commencement of coating has exceed 4 hours.
- Visual tarnishing or black spots develop on the surface of the steel.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, providing the final surface preparation and all coating applications are undertaken under the limit conditions.
Pre-coating: Before the spray application of each coating, stripe coat by brush method all edges, welds, seams, rivets, bolts, bolt holes (including slots) and difficult to spray areas. Prime the underlying surfaces of replacement bolting, washers and nuts before installation.
Procedure: Conform to the coating order shown in SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS.
Subsequent coats: Before applying any subsequent coating layer, make sure the surface condition of the preceding coat conforms to SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS and is clean and free from defects.

Wet film thickness (WFT):
Method of measurement: To AS 3894.3 Appendix C using an approved wet film gauge continuously during application.

Dry film thickness (DFT):
Method of measurement: To AS 3894.3 clause 10.
Extent: Measure all surfaces at the completion of each prime, intermediate and finish coats, including areas of the element difficult to paint, masked by structure, or where double or light coating is likely.
Number of measurements: To AS 3894.3 clause 7.
Coatings with DFT 150 µm or less: If testing, deduct the effect of the measured surface profile from all DFT readings.
Single readings: Conform to the following:

- The average of 5 point readings for each 10 m2 area of coating surface to be within the documented coating thickness range.
- No single point reading in any 10 m2 to be less than 80% of the specified minimum coating thickness. If the average of three readings is used to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
- Check any single reading that is greater than 150% of the documented maximum DFT with three additional readings within 50 mm of the original reading. If the average of these three readings is not greater than 150% of the specified DFT, take the average reading as the point reading. If greater than 150%, reject the DFT for that area. If no maximum limit for DFT is documented, consult manufacturer.

Rectification and defects:
Rectification: Re-work areas rejected, using the same surface preparation, coatings and sequence as for the original work.
Defects (including under-thickness and over-thickness): Mark with dustless chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

3.6 Protection
Contamination:
Surfaces: Prevent contamination of coated surface, which are not yet dry, from blasting dust, abrasive or surface preparation debris and any other foreign matter.

Post application care:
General: Protect the coating against physical, chemical, or atmospheric damage until all components are fully cured.
Care: Stack and handle all coated items using fabric slings or padded chains. Use soft packaging, carpet strips or other deformable materials between all coated items.
Water ponding: Stack coated items to prevent water ponding.

3.7 Coating Repair
Repair of coating damage:
Preparation: Feather back by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edge.
Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.
Sequence: Apply the repair coating in the same sequence and manner as the original coating.
Areas damaged without exposing the primer: Wash with a proprietary detergent solution, rinse with clean water and abrade so that edges of sound paint are feathered. Coat the area with the appropriate intermediate and finishing coat materials.
Areas damaged exposing the primer or steel surface: Blast clean to the original standard.
Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Re-coat with the documented system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.
Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line.
Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.
Timing: Apply the protective coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

3.8 Completion
General:
Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties
Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.
- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

3.9 Selections
Two-pack liquid coating:
Application to be 2-pack polyurethane or approved equivalent.
Application: Spray.
Finish: Full gloss.
Primer: Two pack epoxy primer to AS/NZS 3750.13.

Topcoat:
- External use: Proprietary polyurethane system.

Polyurethane – AS/NZS 2312.1Categories C1 and C2 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/ NZS 2312.1 PUR2	75 µm Epoxy zinc phosphate con- forming to AS/NZS 3750.13	50 µm High Solids Polyurethane conforming to AS/ NZS 3750.6	Nil

Polyurethane – AS/NZS 2312.1 Categories C3, C4 and C5 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/ NZS 2312.1 PUR5	75 µm Zinc rich epoxy conforming to AS/ NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO con- forming to AS/NZS 3750.14	50 µm Polyurethane conforming to AS/ NZS 3750.6 (Alter- native: 75 µm High Solids Polyurethane)

4.0 VINYL SIGNAGE
Graphic set-out to be providex by Cessnock City Council.

All vinyl signage to be Eclipse 21 Series Self-Adhesive Polymeric Inkjet Vinyl. Vinyl to be 3mm thick with a UV stabilized over laminate in matte finish.
Solid colours are to be in Pantone colours and other imagery CMYK format.
To be installed in accordance with manufacturer's specifications.

4.2 SE1 Suburb Entry Sign - Engineers Specification

GENERAL

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONSULTANT'S DRAWINGS.
G2. ALL DISCREPANCIES SHALL BE REFERRED TO THE PROJECT MANAGER AND RESOLVED BEFORE PROCEEDING WITH THE WORK.
G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. THESE STRUCTURAL DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
G4. ALL WORKMANSHIP, TESTING, MATERIALS AND SUPERVISION ARE TO BE IN ACCORDANCE WITH THESE SPECIFICATIONS, THE WORK HEALTH AND SAFETY ACT 2011. ENFORCED BY THE WORKCOVER AUTHORITY AND CURRENT RELEVANT AUSTRALIAN STANDARDS.
G5. THE DETERMINATION OF A SAFE WORK METHOD REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. ANY ELEMENT WHICH POSES AN UNACCEPTABLE LEVEL OF SAFETY RISK TO CONSTRUCT SHALL BE REFERRED TO THE STRUCTURAL ENGINEER. TEMPORARY BRACING AND SUPPORT OF STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
G6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL SERVICES IN THE VICINITY OF THE WORKS.
G7. THE STRUCTURAL COMPONENTS DETAILED ON THESE STRUCTURAL DRAWINGS ARE JOB SPECIFIC AND HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADS:

WIND LOADS:

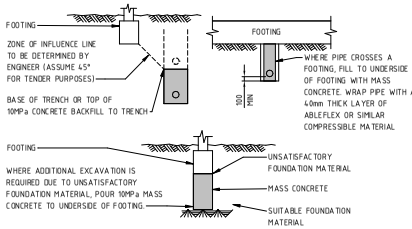
- IMPORTANCE LEVEL = 2
- REGION = A2
- ANNUAL PROBABILITY OF EXCEDENCE = 1/500
- REGIONAL WIND SPEED V_R = 45 m/s
- TERRAIN CATEGORY = TC2
- TERRAIN MULTIPLIER $M_{z,cat}$ = 0.91
- WIND DIRECTION MULTIPLIER M_d = 1
- SHIELDING MULTIPLIER M_s = 1
- TOPOGRAPHIC MULTIPLIER M_t = 1
- SITE WIND SPEED = 41 m/s

G8. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO SAFETY THE MATTER SHALL BE REFERRED TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
G9. NO CHANGES IN ANY STRUCTURAL ELEMENT SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM NORTHROP CONSULTING ENGINEERS. IF THERE IS A DISCREPANCY THEN FOR TENDER PURPOSES ALLOW FOR THE MOST EXPENSIVE OPTION. NORTHROP CONSULTING ENGINEERS SHALL BE CONTACTED TO CONFIRM PRIOR TO CONSTRUCTION.
G10. NORTHROP CONSULTING ENGINEERS ACCEPTS NO RESPONSIBILITY FOR ANY WORK NOT INSPECTED OR NOT APPROVED BY NORTHROP CONSULTING ENGINEERS DURING CONSTRUCTION.

FOUNDATIONS

F1. ASSUMED ALLOWABLE BEARING CAPACITY:
- FOOTINGS = 100kPa

F2. A GEOTECHNICAL REPORT HAS NOT BEEN CARRIED OUT. MINIMUM ASSUMED ALLOWABLE BEARING PRESSURES TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. IF MINIMUM BEARING PRESSURES NOT ACHIEVED, AN ALTERNATIVE DESIGN WILL BE REQUIRED.
F3. ENSURE STABILITY OF ADJACENT BUILDINGS AND PATHS IS MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
F4. THE UNDERSIDE OF FOUNDATIONS SHALL CONFORM TO THE FOLLOWING REGARDLESS OF NOMINATED LEVELS:



F5. FOOTINGS SHALL BE CENTRALLY LOCATED UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
F6. FOOTINGS SHALL BE EXCAVATED TO THE DETAILED DEPTH AND WIDTH. FOOTINGS SHALL BE INSPECTED AND FILLED WITH CONCRETE AS SOON AS POSSIBLE TO AVOID EITHER SOFTENING OF THE FOUNDATION MATERIAL OR DRYING OUT BY EXPOSURE.
F7. THE BASE OF ALL PIER HOLES SHALL BE FREE OF WATER AND CLEANED OF LOOSE MATERIAL OR DEBRIS PRIOR TO PLACEMENT OF CONCRETE. ALLOW TO PROVIDE TEMPORARY LINERS AS DEEMED NECESSARY.

CONCRETE

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2009 AND NATSPEC CONCRETE STANDARDS.
C2. CONCRETE PROPERTIES AND COVER TO REINFORCING :

COVER TO REINFORCEMENT			
ELEMENT	CONCRETE STRENGTH f'c (MPa)	MAXIMUM 56 DAY DRY SHRINKAGE	COVER (mm)
WALLS	25	1000 µm	60
FOOTINGS	25	1000 µm	60

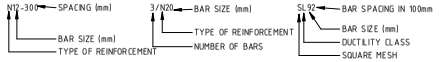
MAXIMUM AGGREGATE SIZE = 20mm U.N.O.
SLUMP DURING PLACING = 80mm ±10mm
EXPOSURE CLASSIFICATION = A2 (IN CONTACT WITH GROUND)
NO ADMIXTURES SHALL BE USED IN THE CONCRETE MIX UNLESS APPROVED BY NORTHROP CONSULTING ENGINEERS IN WRITING.

C3. SLABS USING MECHANICAL VIBRATORS.
C4. PLACE CONCRETE CONTINUOUSLY BETWEEN CONSTRUCTION JOINTS SHOWN ON PLAN. DO NOT BREAK OR INTERRUPT SUCCESSIVE POURS SUCH THAT COLD JOINTS OCCUR. ANY REVISIONS OR ADDITIONS TO CONSTRUCTION JOINTS SHOWN ON PLAN REQUIRE APPROVAL FROM THE NORTHROP CONSULTING ENGINEERS.
C5. REINFORCEMENT QUALITY AND NOTATION :

REINFORCEMENT NOTATION				
SYMBOL	BAR TYPE	STRENGTH GRADE (MPa)	DUCTILITY CLASS	TO COMPLY WITH AUSTRALIAN STANDARD
S	STRUCTURAL GRADE DEFORMED RIB BAR	250	NORMAL	AS/NZS 4671-2001
N	HOT ROLLED DEFORMED RIB BAR	500	NORMAL	AS/NZS 4671-2001
R	PLAIN ROUND BAR	250	NORMAL	AS/NZS 4671-2001
RL	RECTANGULAR MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
SL	SQUARE MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
L-TM	TRENCH MESH	500	LOW	AS/NZS 4671-2001

ALL REINFORCING BARS SHALL BE GRADE D500N TO AS/NZS 4671-2001 AND ALL MESH SHALL BE GRADE 500L TO AS/NZS 4671-2001. UNLESS NOTED OTHERWISE CLASS L REINFORCEMENT SHALL NOT BE USED.

REINFORCEMENT LABELS :



C6. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, AND NOT NECESSARILY IN TRUE PROJECTION. BARS SHOWN ARE INDICATIVE ONLY AND LENGTHS MAY VARY. BEAM ELEVATIONS TAKE PRECEDENCE OVER SECTIONS. SLAB PLANS TAKE PRECEDENCE OVER SECTIONS. REFER TO SECTIONS FOR EXTRA BARS THAT MAY BE REQUIRED.
C7. USE ONLY PLASTIC OR CONCRETE CHAIRS AT EXTERNAL SURFACES.
C8. SITE BENDING OF REINFORCEMENT BARS SHALL BE DONE WITHOUT HEATING USING A RE-BENDING TOOL. THE BARS SHALL BE RE-BENT AGAINST A FLAT SURFACE OR A PIN WITH A DIAMETER NOT LESS THAN THE MINIMUM PIN SIZE PRESCRIBED IN AS3600-2009.
C9. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN ON THE STRUCTURAL DRAWINGS OR IN POSITIONS OTHERWISE APPROVED IN WRITING BY NORTHROP CONSULTING ENGINEERS. LAPS SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND IN ACCORDANCE WITH AS3600-2009 SECTION 13.
C10. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY NORTHROP CONSULTING ENGINEERS.
C11. AT EXTERNALLY EXPOSED SURFACES NO METALLIC ITEMS INCLUDING FORM BOLTS, FORM SPACERS, METALLIC BAR CHAIRS AND TIE-WIRE ARE TO BE PLACED IN THE COVER ZONE.
C12. ALL REINFORCEMENT, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION AND INSPECTED BY A SUITABLY QUALIFIED ENGINEER PRIOR TO PLACING CONCRETE.
C13. ALL CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNISED TESTING LAB.
C14. FOR ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX, REFER TO CONCRETE - ELAPSED DELIVERY TIMES NOTE.

CONCRETE - ELAPSED DELIVERY TIMES

CE1. ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX AT THE SITE MUST NOT EXCEED THE CRITERIA IN THE ELAPSED DELIVERY TIMETABLE BELOW

ELAPSED DELIVERY TIME TABLE	
CONCRETE TEMPERATURE AT TIME OF DISCHARGE (°C)	MAXIMUM ELAPSED TIME (HOURS)
< 24	2.00
24 TO 27	1.50
27 TO 30	1.00
30 TO 32	0.75
32 TO 35	0.50

IF THE ELAPSED TIME IS LONGER THAN THE CORRESPONDING TIME IN THE TABLE ABOVE, OR THE TEMPERATURE IS GREATER THAN 35°C, THE CONCRETE MIX DESIGN ENGINEER IS TO BE CONTACTED TO CONFIRM WHETHER PLACEMENT IS TO PROCEED OR IF THE POUR IS TO BE STOPPED.

STEELWORK

S1. FABRICATE AND ERECT STRUCTURAL STEELWORK IN ACCORDANCE WITH AS4100-1998.
S2. PROVIDE HOLES, CLEATS AND FIXING FOR LIGHT STEEL/TIMBER FRAMING, FINISHES, ETC. SHOWN ON ARCHITECTURAL DRAWINGS.
S3. THESE DRAWINGS HAVE BEEN PREPARED TO INDICATE THE STRUCTURAL INTENT. THE SHOP DETAILER IS TO USE THESE DRAWINGS AS A BASIS FOR DIMENSIONAL COORDINATION WITH OTHER CONSULTANT'S DRAWINGS AND IS TO PREPARE DETAILED SHOP DRAWINGS. WHERE NECESSARY, THE SHOP DETAILER IS TO MAKE ASSUMPTIONS AND SUBMIT TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION. SHOP DETAILER IS TO ALLOW TO RE-WORK SHOP DRAWINGS AS NECESSARY. FABRICATOR SHALL PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE BUILDER FOR THEIR APPROVAL. BUILDER SHALL LODGE TWO COPIES OF APPROVED DRAWINGS TO NORTHROP CONSULTING ENGINEERS FOR REVIEW PRIOR TO FABRICATION, (ALLOW 5 WORKING DAYS FOR REVIEW).
S4. UNLESS NOTED OTHERWISE, USE:
- 6mm CONTINUOUS FILLET WELDS MADE WITH E4818 MILD STEEL ELECTRODES.
- ALL WELDS SP CATEGORY

S5. ALL BOLTS, SCREWS, HOLD DOWN BOLTS, MASONRY ANCHORS SHALL BE HOT DIP GALVANISED TO AS1214-1983, AS/NZS 4534-2006, AS/NZS 4680-2006 & AS/NZS 4792-2006. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED. ALL HOLES SHALL BE 2mm LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE.
S6. MINIMUM YELD STRESS:
- HOT ROLLED SECTIONS = 300MPa
- SQUARE HOLLOW SECTIONS = 350MPa
- RECTANGULAR HOLLOW SECTIONS = 350MPa
- CIRCULAR HOLLOW SECTION = 250MPa
- HOT ROLLED PLATE = 250MPa

S7. SURFACE TREATMENT UNLESS NOTED OTHERWISE:
- EXPOSED TO WEATHER (STRUCTURAL MEMBERS) = AS/NZS 2312-HDG600P3 or IZS3 (TIME TO FIRST MAINTENANCE TO BE 10 YEARS)
- BUILT INTO THE INTERNAL SKIN OF EXTERNAL WALLS = AS/NZS 2312-HDG600P3

S8. ALL BURIED STEELWORK TO BE PAINTED FIRST USING 'EXPOSED TO WEATHER' TREATMENT SYSTEM FOLLOWED BY THE APPLICATION OF A TWO PART EPOXY SUCH AS 'SIKAGUARD-63N' OR APPROVED EQUIVALENT, THEN CONCRETE ENCASE STEELWORK WITH MASS CONCRETE (MINIMUM 75mm COVER TO STEELWORK).
S9. STEELWORK TO BE CONCRETE ENCASED FOR FIRE RATING PURPOSES SHALL BE FREE FROM ALL LOOSE RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE, ETC. AND REINFORCED WITH SL41 FABRIC OR EQUIVALENT BLACK IRON WIRE, 3mm DIA.
S10. BOLT SYMBOLS:
- 4.6/S = GRADE 4.6 BOLT / SNUG TIGHTENED.
- 8.8/S = GRADE 8.8 BOLT / SNUG TIGHTENED.
- 8.8/TF = GRADE 8.8 BOLT / FULLY TENSIONED FRICTION TYPE (USE LOAD INDICATOR WASHERS)
- 8.8/TB - GRADE 8.8 BOLT / FULLY TENSIONED BEARING TYPE (USE LOAD INDICATOR WASHERS)

S11. THE CONTRACTOR SHALL SUPPLY WRITTEN CERTIFICATION TO THE STRUCTURAL ENGINEER PRIOR TO THE ERECTION OF ANY STRUCTURAL STEEL STATING THAT THE BOLTS PROPOSED TO BE USED COMPLY WITH AS/NZS 1252-1996. HIGH STRENGTH BOLTS (8.8) ARE NOT TO BE WELDED.
S12. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEEL WORK SHALL BE SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, IN ORDER TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
S13. ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS. SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.
S14. GROUT ALL STEEL BASES BY DRY PACKING USING GROUT WHICH IS NON-SHRINK AND HAS A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 40MPa
S15. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS ARE TO BE HOT DIP GALVANISED.
S16. THESE DRAWINGS MAY NOT IDENTIFY ALL SECONDARY STEELWORK ELEMENTS THAT ARE REQUIRED FOR SUPPORT, FIXING AND FINISHING OF GLAZING, CLADDING AND LINING. THE TENDERER IS RESPONSIBLE FOR THE INCLUSION OF SUCH STEELWORK ELEMENTS TO THE EXTENT REQUIRED ON THE ARCHITECT'S DRAWINGS.
S17. IMPORTED STRUCTURAL STEEL MATERIAL
ALL STRUCTURAL STEELWORK USED ON THIS PROJECT SHALL BE COMPLIANT WITH AS4100, AND IN PARTICULAR:
- CERTIFIED MILL TEST REPORTS, OR TEST CERTIFICATES SHALL BE PROVIDED AS EVIDENCE OF COMPLIANCE WITH THE STANDARDS REFERRED TO IN AS4100. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- PROVIDE TEST CERTIFICATED FOR COMPLIANCE FOR ALL FASTENERS. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- FOR COLD FORMED SECTIONS A "CERTIFICATE OF CONFORMITY TO AS1163-1991" SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- CERTIFICATES SHALL ONLY BE ACCEPTED FROM TESTING COMPANIES ACCREDITED BY A TESTING AUTHORITY RECOGNISED IN AUSTRALIA, EG NATA or JAS-ANZ CERTIFIED.
- UNIDENTIFIED STEEL ie. ANY STEEL THAT IS NOT ACCOMPANIED WITH EVIDENCE STATING COMPLIANCE WITH THE REQUIREMENT OF AS4100 SHALL ONLY BE USED STRICTLY IN ACCORDANCE WITH CLAUSE 2.2.3 OF AS4100. IF MATERIALS SUPPLIED AND INSTALLED ARE SUBSEQUENTLY PROVEN TO BE NON COMPLIANT WITH THE SPECIFIED AUSTRALIAN STANDARDS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND COST TO UNDERTAKE NATA OR EQUIVALENT CERTIFIED TESTING TO PROVE CONFORMANCE TO THE AUSTRALIAN STANDARDS AND DESIGN SPECIFICATIONS. SIMILARLY ANY RECTIFICATION WORKS THAT MAY SUBSEQUENTLY BE REQUIRED TO SATISFY AUSTRALIAN CODE REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

RAMMED EARTH

RE1. RAMMED EARTH WALLS SHALL CONFORM TO THE RELEVANT REQUIREMENTS OF AS3700, SAA HB 195, NZS4297, NZS4298 & NZS4299
RE2. THE CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH OF THE MASONRY UNITS SHALL BE A MINIMUM OF 2.5MPa. THE MINIMUM CEMENT CONTENT BY WEIGHT SHALL BE 6%.
RE3. SUBMIT THE FOLLOWING FOR APPROVAL TO THE SUPERINTENDENT PRIOR TO COMMENCING WORKS:
- MIX DESIGN TO ACHIEVE DENSITY AND STRENGTH REQUIREMENTS, INCLUDING CEMENT CONTENT BY WEIGHT, DENSITY TO BE ACHIEVED AND PARTICLE SIZE DISTRIBUTION
- TEST REPORTS INCLUDING CONFIRMATION OF INSITU UNCONFINED COMPRESSIVE STRENGTH AND ELAPSED TIME BETWEEN ADDITION OF CEMEMNT AND COMPACTION. UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF SAA HB 195

RE4. U.N.O. ALL ANCHORS INTO RAMMED EARTH SHALL BE HILTI HIT-HY70 INJECTION ANCHORS. ANCHORS ARE TO BE HOT DIP GALVANISED
RE5. THE MOISTURE CONTENT AT PLACEMENT SHALL BE BETWEEN 8-16% BY WEIGHT
RE6. FORMWORK SHALL BE DESIGNED BY A SUITABLY QUALIFIED ENGINEER, AND SHALL BE CAPABLE OF WITHSTANDING THE PRESSURE OF THE SOIL DURING COMPACTION. SUITABLE BOND BREAKERS SHALL BE USED TO ALLOW STRIPPING WITHOUT DISTURBANCE OF THE COMPACTED WALL.
RE7. PLACEMENT OF RAMMED EARTH SHALL NOT BE CARRIED OUT WHEN TEMPERATURE IS GREATER THAN 32 DEGREES CELSIUS.
RE8. MATERIAL SHALL BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 200mm THICK (WHEN UNCOMPACTED). MECHANICAL COMPACTION IS TO BE UNDERTAKEN USING PNEUMATIC RAMMERS. HAND RAMMING IS NOT TO BE USED.

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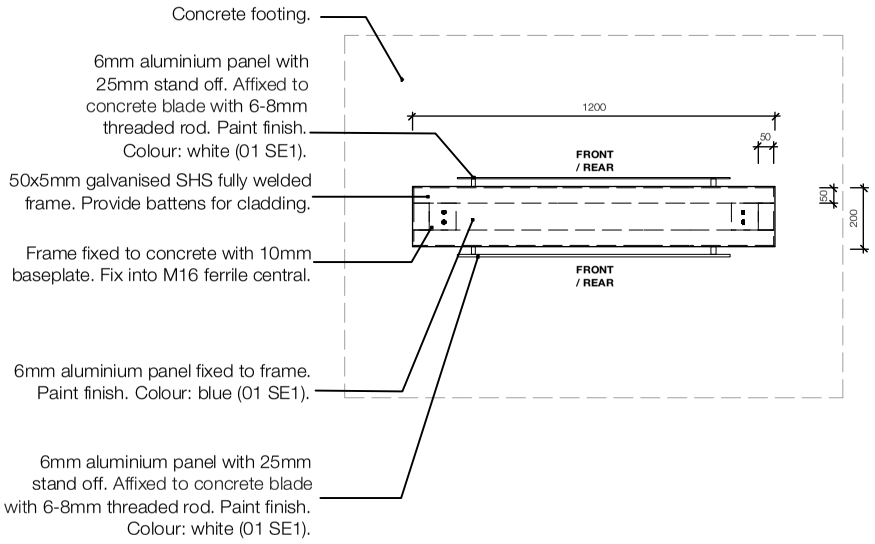
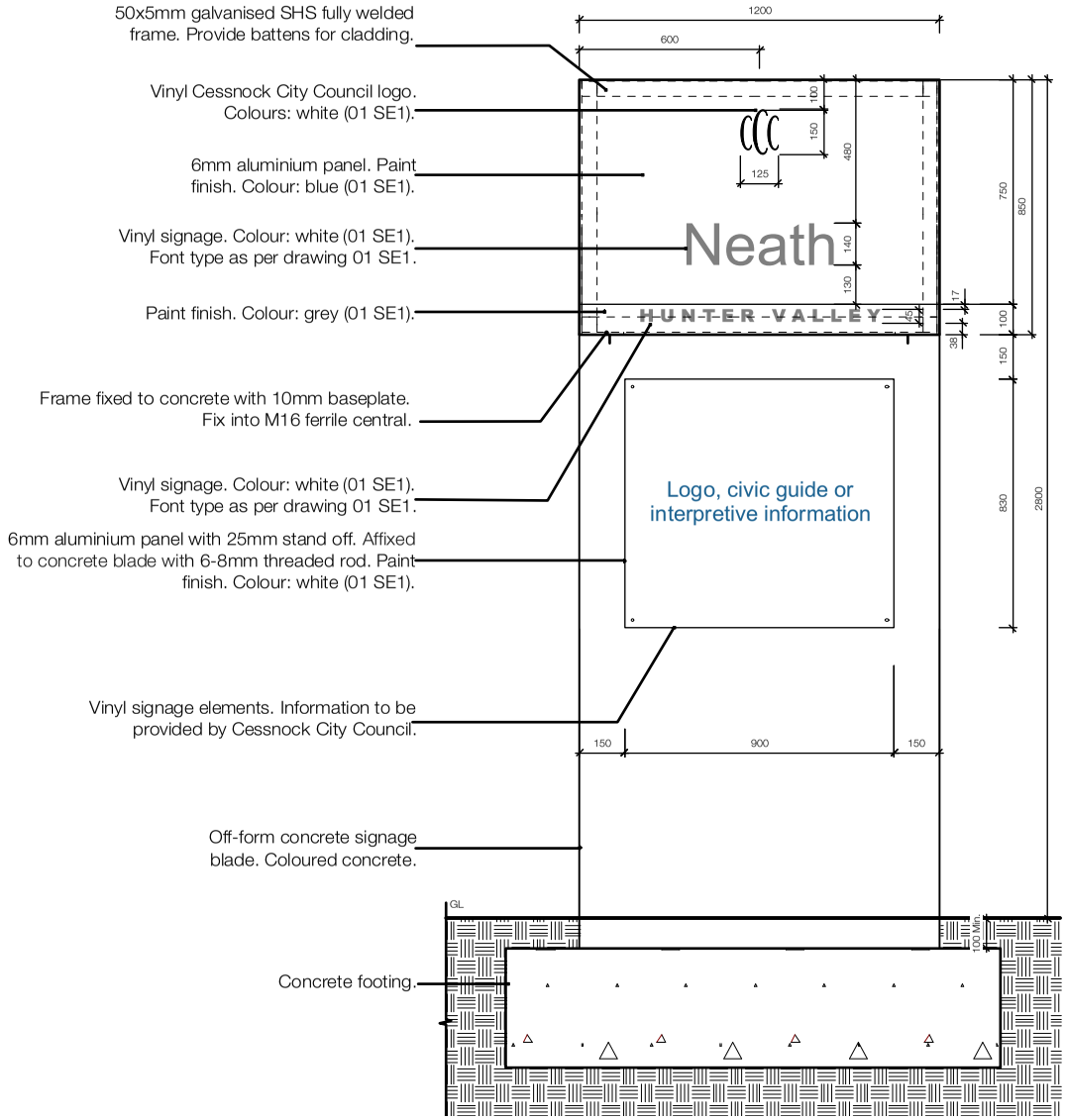
JOB NUMBER:	NL166682	DATE:	16/02/2018	REV. 2
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK20			

4.2 SE1 Suburb Entry Sign



02 SE1 Suburb Entry Sign - Plan
Scale 1:25



03 SE1 Suburb Entry Sign - Elevation (Front and Rear)
Scale 1:25

General Notes:

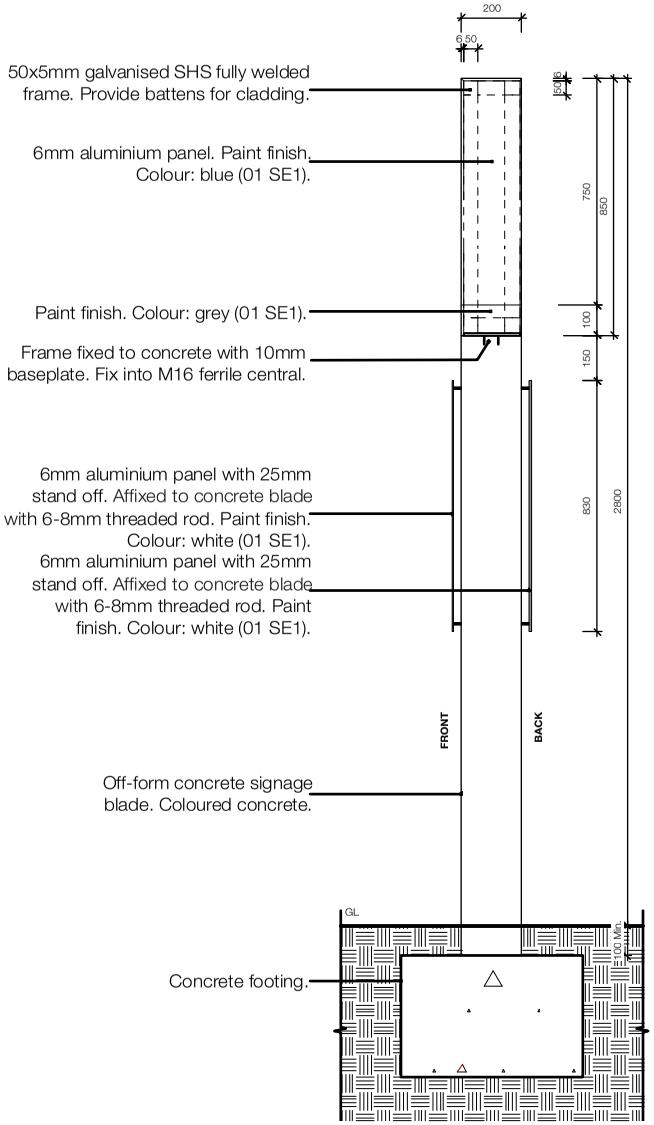
Refer to SE1 Suburb Entry Sign supporting drawings:

- 01 SE1 Suburb Entry Sign p.37
- 04 SE1 Suburb Entry Sign - Side Section p.44

Refer signage specification p.38-41.

Refer engineers specification page 42 and engineers drawing page 45.

4.2 SE1 Suburb Entry Sign



04 SE1 Suburb Entry Sign - Side Section
Scale: 1:25

General Notes:

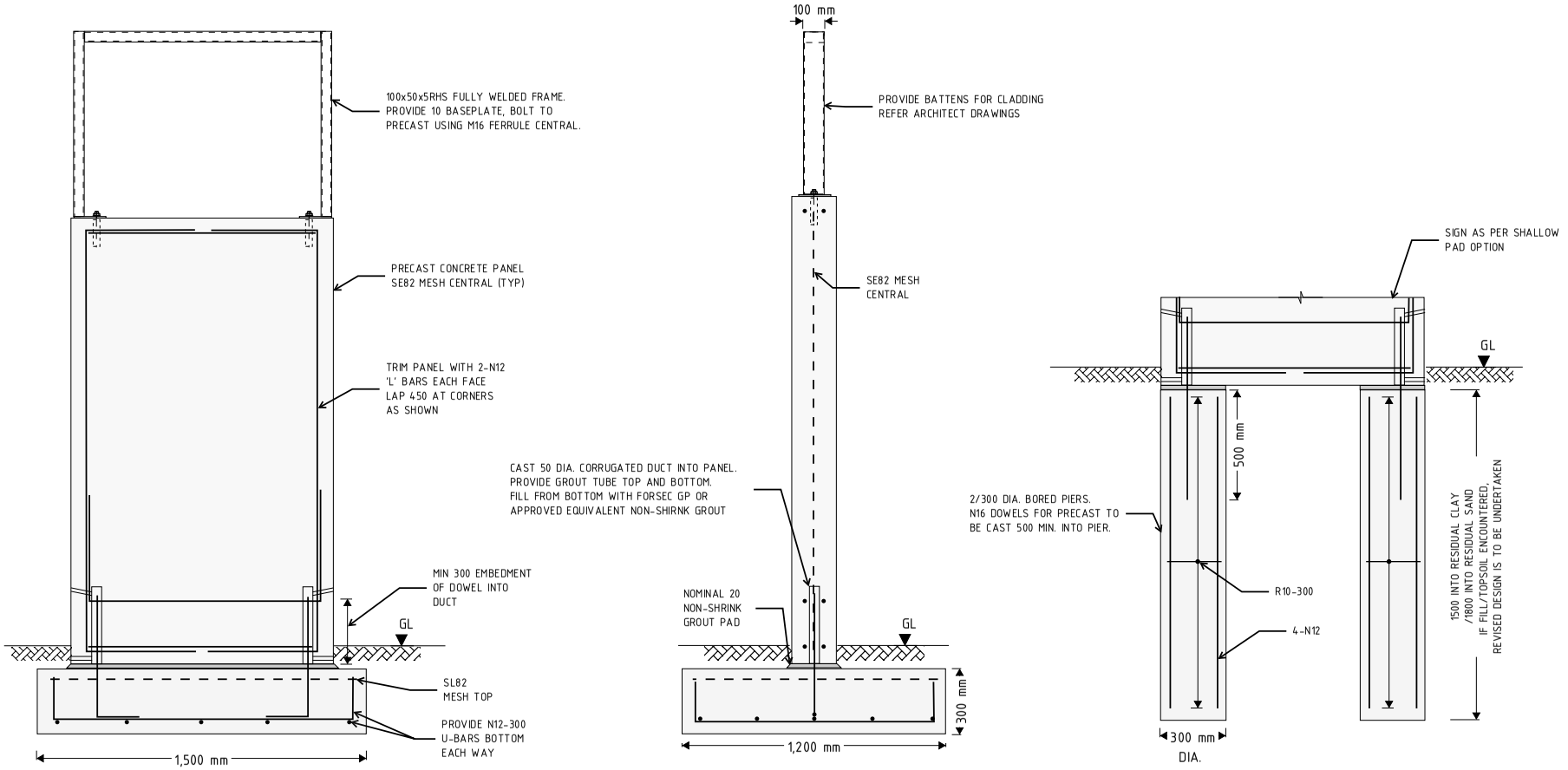
Refer to SE1 Suburb Entry Sign supporting drawings:

- 01 SE1 Suburb Entry Sign p.37
- 02 SE1 Suburb Entry Sign - Plan p.43
- 03 SE1 Suburb Entry Sign - Elevation (Front and Rear) p.43

Refer signage specification p.38-41.

Refer engineers specification page 42 and engineers drawing page 45.

4.2 SE1 Suburb Entry Sign - Engineers Drawing



LONG SECTION
(SHALLOW PAD OPTION)

TRANSVERSE SECTION
(SHALLOW PAD OPTION)

LONG SECTION
(BORED PILE OPTION)

NOTE:
MINIMUM ALLOWABLE BEARING PRESSURE OF 100KPa IS ASSUMED, AND IS TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE.
IF FOOTING NOT IN 100kPa MATERIAL, ALTERNATIVE DESIGN WILL BE REQUIRED

REFER TO SK20 FOR SPECIFICATIONS

CF1 - COMMUNITY FACILITY INFORMATION SIGN (2800h x 1200w)
SE1 - SUBURB ENTRY SIGN (2800h x 1250w) SIMILAR
TC1-TC2 - TOWN CENTRE INFORMATION SIGN (2800h x 900w) SIMILAR

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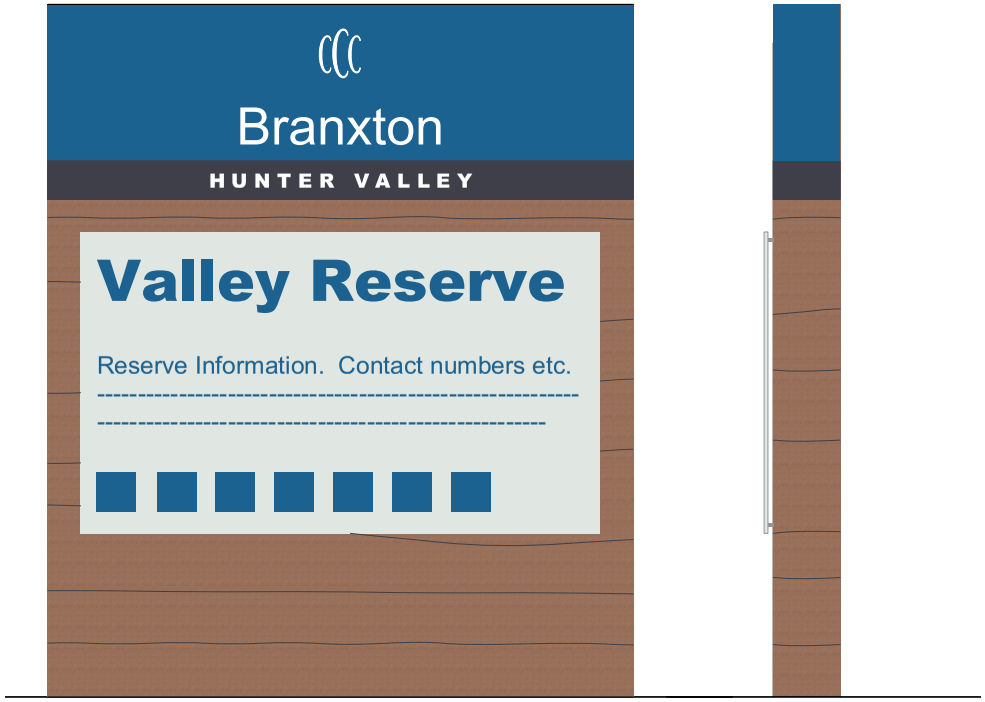
JOB NUMBER:	NL166682	DATE:	15/12/2017	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			1
DRAWING TITLE:	CF1, SE1 AND TC1-TC2 SIGNS			
DRAWING NUMBER:	NL166682_SK22			

4.3 CE1 Community Facility Entry Sign



01 CE1 Community Facility Entry Sign

COLOURS:

Blue: CMYK: 83, 37, 6, 6
RGB: 65, 118, 162

Grey: CMYK: 74, 66, 48, 16
RGB: 92, 83, 90

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

LETTERING:

Suburb: Arial
Hunter Valley: Arial Black
Valley Reserve: Arial Black
Reserve Information etc: Arial

4.3 CE1 Community Facility Entry Sign - Signage Specification

1.0 STEEL
General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier

1.1 Durability
General: Provide steel products protected from corrosion to suit the conditions of use.

1.2 Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

1.3 Protective coatings
Environment: To AS/NZS 2312 clause 2.3.
Coating designation: To AS/NZS 2312

Fasteners
Self drilling screws
Corrosion resistance: To AS 3566.2

Vapour barrier
Vapour barrier to slabs: To AS 2870 clause 5.3.3.
Minimum thickness: 0.2 mm.

1.4 Aluminium and aluminium alloys
Drawn pipe: To AS/NZS 1867.
Drawn rod, bar and strip: To AS/NZS 1865.
Extrusions: To AS/NZS 1866.
Plate and sheets: To AS/NZS 1734.

1.5 Coated steel
Electrogalvanized (zinc) coating on ferrous hollow and open sections: To AS 4750.
Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
- Ferrous open sections by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections by a continuous or specialised process: To AS/NZS 4792.
- Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.

Steel wire: To AS/NZS 4534.

1.6 Metal separation
Incompatible sheet metals: Prevent direct contact between incompatible metals. Provide separation by one of the following:
- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
- Insert a concealed, non-metallic separation layer such as polyethylene film, adhesive tape, neoprene, nylon or bituminous felt.

Incompatible fixings: Do not use.
Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous or paper products.

1.7 Brazing
General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.
Butt joints: Do not use butt jointing for joints subject to load. If butt joints are used, do not rely on the filler metal fillet only.
Filler metal: To AS/NZS 1167.1.

1.8 Finishing
Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Make sure self-finished metals are without surface colour variations after jointing.

1.9 Preparation
General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.
Standard: To AS 1627 series.
Priming steel surfaces: If site painting is documented to otherwise uncoated mild steel or similar surfaces, prime as follows:
- After fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to unprimed surfaces.

1.10 Welding
Aluminium: To AS 1665.
Stainless steel: To AS/NZS 1554.6.
Steel: To AS/NZS 1554.1.

1.11 Electroplated coatings
Chromium on metals: To AS 1192.
- Service condition number: At least 2.

Nickel on metals: To AS 1192.
- Service condition number: At least 2.

Zinc on iron or steel: To AS 1789.

1.12 Alluminium Steel Panels to form 'Box / Cladding'
General: Locate as per details.
Type: 6mm thick alluminium panels

Fixing: To be confirmed by shop drawings. Ensure all finishing of concrete wall is completed prior to installation.
Finish: paint (refer section 3.0). Colour as per drawings.

1.13 Alluminium Steel Panels (fixed to concrete)
General: Locate as per details.
Type: 6mm thick alluminium panels
Fixing: 6-8mm threaded rod with 25mm stand off. Ensure all finishing of concrete wall is completed prior to installation.
Finish: paint (refer section 3.0). Colour as per drawings.

1.14 Galvanised SHS frame
General: Locate as per details.
Type: 50mm x 5mm galvanised SHS fully welded frame
Fixing: 10mm baseplate. Fix into M16 ferrile central. Ensure all finishing of concrete wall is completed prior to installation.
Finish: galvanised.

2.0 CONCRETE
2.1 Off-form concrete wall
General: Timber ply layered off-form cast concrete wall. Hand mix in batches and pour in 200mm layers to achieve layered effect (similar to rammed earth).
Standard: Class 3 as per AS3610.
Colour to wall: CCS Gecko
Exposure: To AS3600 Table 4.3.
Aggregate: 8-10mm quartz aggregate.
Cement: natural grey portland.
Finish: 16mm custom orb off-form finish to Class 3 as per AS3610 and timber ply.
Refer to engineers specification for structural details and specification.

3.0 PAINTING
3.1 Products
Storage and handling:
Requirement: Handle, store, mix and apply all protective coatings in conformance with the manufacturer's recommendations.
Original containers: Deliver coating products to site in manufacturer's labelled and sealed containers.
Ambient temperature range for storage: 3°C to 30°C, or to manufacturer's recommendations.
Sunlight: Protect coating materials from direct sunlight before mixing or adding the converter (catalyst).
Use-by-date: Use products with limited shelf life before their use-by-date, unless written authorisation from the coating manufacturer's technical services section is provided.

Paint material:
Requirement: To AS/NZS 5131 clause 9.9.3.

Proprietary products:
Requirement: Provide all products from the one manufacturer's supply.
Product data sheets (PDS): Keep on site copies of all relevant manufacturer's PDS.
Safety data sheets (SDS): Keep on site copies of all relevant manufacturer's SDS.
Recording: To AS/NZS 5131 clause 9.9.5.

3.2 Surface Preparation
General: To AS/NZS 5131 Section 9 and the recommendations of AS/NZS 2312.1.

Galvanized, aluminium and zinc primed surfaces:
Requirement: Remove grease, oil and other solvent-soluble contaminants to AS 1627.1. Allow to dry and immediately proceed with the next operation.
Galvanized and aluminium surfaces: Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Treatment of welds:
Requirement: Clean welds to remove roughness, using power tools to AS 1627.2. Remove filings by vacuuming or compressed air.
Temporary welds: Grind flush any temporary welds.
Porous, skip or stitch welds: Not permitted.
Site welding: If possible, avoid site welding. If on site welding is required, prepare and treat the weld to AS/NZS 5131 clause 9.12.2.

Shop priming:
Requirement: Dust off and apply a coat of primer in conformance with the manufacturer's recommendations.

Site coating:
General: High pressure wash down all surfaces with clean water. Lightly sand down primer/ intermediate coats, which have been shop applied, before site application of next coat.

3.3 Preparation assessment
General: Assess all surfaces of each steel member for conformance with the documented preparation requirements.
Abrasive blast cleaning: To AS 1627.4 and AS 1627.9.
Mechanical cleaning: To AS 1627.9.
Surface profile: To AS 3894.5 Method A.
Surface dust from abrasion: To AS 3894.6 Method C.
Chloride level testing: Test: To AS 3894.6 Method A.

Maximum allowable chloride levels: 50 mg/m2 for critical applications (heavy condensation, fresh water ponding or immersion) or to manufacturer's recommendations.
Conformance: If the maximum allowable chloride is exceeded, rewash the affected surface area until the chloride level is within the acceptable limits using clean water or chloride neutralising solutions. Jet-washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.
Timing of testing: Early in the blasting work so that removal procedures can be started before the blasting is completed.

3.4 Mixing
General: To AS/NZS 5131 clause 9.9.6. Powered agitators: Mix package sizes larger than 4 litres using powered agitators driven by air motors.
Multi-component coatings: Combine as whole pack units before application.
Thinners: If addition of thinners is proposed, conform to the coating manufacturer's recommendations for the documented product.
Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

3.5 Coating Application
General: Conform to AS/NZS 5131 clause 9.9 and the PDS.
Painting and coating colour: Verify all project finish colours with the retained samples.

Final surface preparation or coating application:
Limits: If the environmental/climatic/substrate conditions listed in AS/NZS 5131 clause 9.9.10 and the following are present do not apply coating:
- Ambient air temperature below 5°C or above 40°C.
- Substrate temperature below 5°C or above 35°C.
- Full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
- Surface preparation standard has not been achieved.
- Time between final surface preparation and the commencement of coating has exceed 4 hours.
- Visual tarnishing or black spots develop on the surface of the steel.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, providing the final surface preparation and all coating applications are undertaken under the limit conditions.
Pre-coating: Before the spray application of each coating, stripe coat by brush method all edges, welds, seams, rivets, bolts, bolt holes (including slots) and difficult to spray areas. Prime the underlying surfaces of replacement bolting, washers and nuts before installation.
Procedure: Conform to the coating order shown in SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS.
Subsequent coats: Before applying any subsequent coating layer, make sure the surface condition of the preceding coat conforms to SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS and is clean and free from defects.

Wet film thickness (WFT):
Method of measurement: To AS 3894.3 Appendix C using an approved wet film gauge continuously during application.

Dry film thickness (DFT):
Method of measurement: To AS 3894.3 clause 10.
Extent: Measure all surfaces at the completion of each prime, intermediate and finish coats, including areas of the element difficult to paint, masked by structure, or where double or light coating is likely.
Number of measurements: To AS 3894.3 clause 7.
Coatings with DFT 150 µm or less: If testing, deduct the effect of the measured surface profile from all DFT readings.
Single readings: Conform to the following:
- The average of 5 point readings for each 10 m2 area of coating surface to be within the documented coating thickness range.
- No single point reading in any 10 m2 to be less than 80% of the specified minimum coating thickness. If the average of three readings is used to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
- Check any single reading that is greater than 150% of the documented maximum DFT with three additional readings within 50 mm of the original reading. If the average of these three readings is not greater than 150% of the specified DFT, take the average reading as the point reading. If greater than 150%, reject the DFT for that area. If no maximum limit for DFT is documented, consult manufacturer.

Rectification and defects:
Rectification: Re-work areas rejected, using the same surface preparation, coatings and sequence as for the original work.
Defects (including under-thickness and over-thickness): Mark with dustless chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

3.6 Protection
Contamination:
Surfaces: Prevent contamination of coated surface, which are not yet dry, from blasting dust, abrasive or surface preparation debris and any other foreign matter.

Post application care:
General: Protect the coating against physical, chemical, or atmospheric damage until all components are fully cured.
Care: Stack and handle all coated items using fabric slings or padded chains. Use soft packaging, carpet strips or other deformable materials between all coated items.
Water ponding: Stack coated items to prevent water ponding.

3.7 Coating Repair
Repair of coating damage:
Preparation: Feather back by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edge.
Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.
Sequence: Apply the repair coating in the same sequence and manner as the original coating.
Areas damaged without exposing the primer: Wash with a proprietary detergent solution, rinse with clean water and abrade so that edges of sound paint are feathered. Coat the area with the appropriate intermediate and finishing coat materials.
Areas damaged exposing the primer or steel surface: Blast clean to the original standard.
Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Re-coat with the documented system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.
Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line.
Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.
Timing: Apply the protective coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

3.8 Completion
General
Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties
Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.
- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

Selections
Two-pack liquid coating:
Application to be 2-pack polyurethane or approved equivalent.
Application: Spray.
Finish: Full gloss.
Primer: Two pack epoxy primer to AS/NZS 3750.13.

Topcoat:
- External use: Proprietary polyurethane system.

Polyurethane – AS/NZS 2312.1Categories C1 and C2 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/NZS 2312.1 PUR2	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm High Solids Polyurethane conforming to AS/NZS 3750.6	Nil

Polyurethane – AS/NZS 2312.1 Categories C3, C4 and C5 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/NZS 2312.1 PUR5	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO conforming to AS/NZS 3750.14	50 µm Polyurethane conforming to AS/NZS 3750.6 (Alternative: 75 µm High Solids Polyurethane)

4.0 VINYL SIGNAGE
Graphic set-out to be providex by Cessnock City Council.

All vinyl signage to be Eclipse 21 Series Self-Adhesive Polymeric Inkjet Vinyl. Vinyl to be 3mm thick with a UV stabilized over laminate in matte finish.
Solid colours are to be in Pantone colours and other imagery CMYK format.
To be installed in accordance with manufacturer's specifications.

4.3 CE1 Community Facility Entry Sign - Engineers Specification

GENERAL

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONSULTANT'S DRAWINGS.
G2. ALL DISCREPANCIES SHALL BE REFERRED TO THE PROJECT MANAGER AND RESOLVED BEFORE PROCEEDING WITH THE WORK.
G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. THESE STRUCTURAL DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
G4. ALL WORKMANSHIP, TESTING, MATERIALS AND SUPERVISION ARE TO BE IN ACCORDANCE WITH THESE SPECIFICATIONS, THE WORK HEALTH AND SAFETY ACT 2011 ENFORCED BY THE WORKCOVER AUTHORITY AND CURRENT RELEVANT AUSTRALIAN STANDARDS.
G5. THE DETERMINATION OF A SAFE WORK METHOD REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. ANY ELEMENT WHICH POSES AN UNACCEPTABLE LEVEL OF SAFETY RISK TO CONSTRUCT SHALL BE REFERRED TO THE STRUCTURAL ENGINEER. TEMPORARY BRACING AND SUPPORT OF STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
G6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL SERVICES IN THE VICINITY OF THE WORKS.
G7. THE STRUCTURAL COMPONENTS DETAILED ON THESE STRUCTURAL DRAWINGS ARE JOB SPECIFIC AND HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADS:

WIND LOADS:

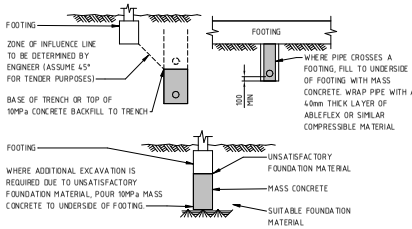
- IMPORTANCE LEVEL = 2
- REGION = A2
- ANNUAL PROBABILITY OF EXCEDENCE = 1/500
- REGIONAL WIND SPEED V_R = 45 m/s
- TERRAIN CATEGORY = TC2
- TERRAIN MULTIPLIER M_z,cat = 0.91
- WIND DIRECTION MULTIPLIER M_d = 1
- SHIELDING MULTIPLIER M_s = 1
- TOPOGRAPHIC MULTIPLIER M_t = 1
- SITE WIND SPEED = 41 m/s

G8. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO SAFETY THE MATTER SHALL BE REFERRED TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
G9. NO CHANGES IN ANY STRUCTURAL ELEMENT SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM NORTHROP CONSULTING ENGINEERS. IF THERE IS A DISCREPANCY THEN FOR TENDER PURPOSES ALLOW FOR THE MOST EXPENSIVE OPTION. NORTHROP CONSULTING ENGINEERS SHALL BE CONTACTED TO CONFIRM PRIOR TO CONSTRUCTION.
G10. NORTHROP CONSULTING ENGINEERS ACCEPTS NO RESPONSIBILITY FOR ANY WORK NOT INSPECTED OR NOT APPROVED BY NORTHROP CONSULTING ENGINEERS DURING CONSTRUCTION.

FOUNDATIONS

F1. ASSUMED ALLOWABLE BEARING CAPACITY:
- FOOTINGS = 100kPa

F2. A GEOTECHNICAL REPORT HAS NOT BEEN CARRIED OUT. MINIMUM ASSUMED ALLOWABLE BEARING PRESSURES TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. IF MINIMUM BEARING PRESSURES NOT ACHIEVED, AN ALTERNATIVE DESIGN WILL BE REQUIRED.
F3. ENSURE STABILITY OF ADJACENT BUILDINGS AND PATHS IS MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
F4. THE UNDERSIDE OF FOUNDATIONS SHALL CONFORM TO THE FOLLOWING REGARDLESS OF NOMINATED LEVELS:



F5. FOOTINGS SHALL BE CENTRALLY LOCATED UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
F6. FOOTINGS SHALL BE EXCAVATED TO THE DETAILED DEPTH AND WIDTH. FOOTINGS SHALL BE INSPECTED AND FILLED WITH CONCRETE AS SOON AS POSSIBLE TO AVOID EITHER SOFTENING OF THE FOUNDATION MATERIAL OR DRYING OUT BY EXPOSURE.
F7. THE BASE OF ALL PIER HOLES SHALL BE FREE OF WATER AND CLEANED OF LOOSE MATERIAL OR DEBRIS PRIOR TO PLACEMENT OF CONCRETE. ALLOW TO PROVIDE TEMPORARY LINERS AS DEEMED NECESSARY.

CONCRETE

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2009 AND NATSPEC CONCRETE STANDARDS.
C2. CONCRETE PROPERTIES AND COVER TO REINFORCING :

COVER TO REINFORCEMENT			
ELEMENT	CONCRETE STRENGTH f'c (MPa)	MAXIMUM 56 DAY DRY SHRINKAGE	COVER (mm)
WALLS	25	1000 µm	60
FOOTINGS	25	1000 µm	60

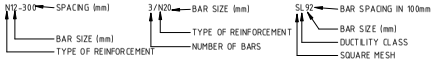
MAXIMUM AGGREGATE SIZE = 20mm U.N.O.
SLUMP DURING PLACING = 80mm ±10mm
EXPOSURE CLASSIFICATION = A2 (IN CONTACT WITH GROUND)
NO ADMIXTURES SHALL BE USED IN THE CONCRETE MIX UNLESS APPROVED BY NORTHROP CONSULTING ENGINEERS IN WRITING.

C3. SLABS USING MECHANICAL VIBRATORS.
C4. PLACE CONCRETE CONTINUOUSLY BETWEEN CONSTRUCTION JOINTS SHOWN ON PLAN. DO NOT BREAK OR INTERRUPT SUCCESSIVE POURS SUCH THAT COLD JOINTS OCCUR. ANY REVISIONS OR ADDITIONS TO CONSTRUCTION JOINTS SHOWN ON PLAN REQUIRE APPROVAL FROM THE NORTHROP CONSULTING ENGINEERS.
C5. REINFORCEMENT QUALITY AND NOTATION :

REINFORCEMENT NOTATION				
SYMBOL	BAR TYPE	STRENGTH GRADE (MPa)	DUCTILITY CLASS	TO COMPLY WITH AUSTRALIAN STANDARD
S	STRUCTURAL GRADE DEFORMED RIB BAR	250	NORMAL	AS/NZS 4671-2001
N	HOT ROLLED DEFORMED RIB BAR	500	NORMAL	AS/NZS 4671-2001
R	PLAIN ROUND BAR	250	NORMAL	AS/NZS 4671-2001
RL	RECTANGULAR MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
SL	SQUARE MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
L-TM	TRENCH MESH	500	LOW	AS/NZS 4671-2001

ALL REINFORCING BARS SHALL BE GRADE D500N TO AS/NZS 4671-2001 AND ALL MESH SHALL BE GRADE 500L TO AS/NZS 4671-2001. UNLESS NOTED OTHERWISE CLASS L REINFORCEMENT SHALL NOT BE USED.

REINFORCEMENT LABELS :



C6. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, AND NOT NECESSARILY IN TRUE PROJECTION. BARS SHOWN ARE INDICATIVE ONLY AND LENGTHS MAY VARY. BEAM ELEVATIONS TAKE PRECEDENCE OVER SECTIONS. SLAB PLANS TAKE PRECEDENCE OVER SECTIONS. REFER TO SECTIONS FOR EXTRA BARS THAT MAY BE REQUIRED.
C7. USE ONLY PLASTIC OR CONCRETE CHAIRS AT EXTERNAL SURFACES.
C8. SITE BENDING OF REINFORCEMENT BARS SHALL BE DONE WITHOUT HEATING USING A RE-BENDING TOOL. THE BARS SHALL BE RE-BENT AGAINST A FLAT SURFACE OR A PIN WITH A DIAMETER NOT LESS THAN THE MINIMUM PIN SIZE PRESCRIBED IN AS3600-2009.
C9. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN ON THE STRUCTURAL DRAWINGS OR IN POSITIONS OTHERWISE APPROVED IN WRITING BY NORTHROP CONSULTING ENGINEERS. LAPS SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND IN ACCORDANCE WITH AS3600-2009 SECTION 13.
C10. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY NORTHROP CONSULTING ENGINEERS.
C11. AT EXTERNALLY EXPOSED SURFACES NO METALLIC ITEMS INCLUDING FORM BOLTS, FORM SPACERS, METALLIC BAR CHAIRS AND TIE-WIRE ARE TO BE PLACED IN THE COVER ZONE.
C12. ALL REINFORCEMENT, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION AND INSPECTED BY A SUITABLY QUALIFIED ENGINEER PRIOR TO PLACING CONCRETE.
C13. ALL CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNISED TESTING LAB.
C14. FOR ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX, REFER TO CONCRETE - ELAPSED DELIVERY TIMES NOTE.

CONCRETE - ELAPSED DELIVERY TIMES

CE1. ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX AT THE SITE MUST NOT EXCEED THE CRITERIA IN THE ELAPSED DELIVERY TIMETABLE BELOW

ELAPSED DELIVERY TIME TABLE	
CONCRETE TEMPERATURE AT TIME OF DISCHARGE (°C)	MAXIMUM ELAPSED TIME (HOURS)
< 24	2.00
24 TO 27	1.50
27 TO 30	1.00
30 TO 32	0.75
32 TO 35	0.50

IF THE ELAPSED TIME IS LONGER THAN THE CORRESPONDING TIME IN THE TABLE ABOVE, OR THE TEMPERATURE IS GREATER THAN 35°C, THE CONCRETE MIX DESIGN ENGINEER IS TO BE CONTACTED TO CONFIRM WHETHER PLACEMENT IS TO PROCEED OR IF THE POUR IS TO BE STOPPED.

STEELWORK

S1. FABRICATE AND ERECT STRUCTURAL STEELWORK IN ACCORDANCE WITH AS4100-1998.
S2. PROVIDE HOLES, CLEATS AND FIXING FOR LIGHT STEEL/TIMBER FRAMING, FINISHES, ETC. SHOWN ON ARCHITECTURAL DRAWINGS.
S3. THESE DRAWINGS HAVE BEEN PREPARED TO INDICATE THE STRUCTURAL INTENT. THE SHOP DETAILER IS TO USE THESE DRAWINGS AS A BASIS FOR DIMENSIONAL COORDINATION WITH OTHER CONSULTANT'S DRAWINGS AND IS TO PREPARE DETAILED SHOP DRAWINGS. WHERE NECESSARY, THE SHOP DETAILER IS TO MAKE ASSUMPTIONS AND SUBMIT TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION. SHOP DETAILER IS TO ALLOW TO RE-WORK SHOP DRAWINGS AS NECESSARY. FABRICATOR SHALL PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE BUILDER FOR THEIR APPROVAL. BUILDER SHALL LODGE TWO COPIES OF APPROVED DRAWINGS TO NORTHROP CONSULTING ENGINEERS FOR REVIEW PRIOR TO FABRICATION, (ALLOW 5 WORKING DAYS FOR REVIEW).
S4. UNLESS NOTED OTHERWISE, USE:
- 6mm CONTINUOUS FILLET WELDS MADE WITH E4818 MILD STEEL ELECTRODES.
- ALL WELDS SP CATEGORY

S5. ALL BOLTS, SCREWS, HOLD DOWN BOLTS, MASONRY ANCHORS SHALL BE HOT DIP GALVANISED TO AS1214-1983, AS/NZS 4534-2006, AS/NZS 4680-2006 & AS/NZS 4792-2006. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED. ALL HOLES SHALL BE 2mm LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE.
S6. MINIMUM YELD STRESS:
- HOT ROLLED SECTIONS = 300MPa
- SQUARE HOLLOW SECTIONS = 350MPa
- RECTANGULAR HOLLOW SECTIONS = 350MPa
- CIRCULAR HOLLOW SECTION = 250MPa
- HOT ROLLED PLATE = 250MPa

S7. SURFACE TREATMENT UNLESS NOTED OTHERWISE:
- EXPOSED TO WEATHER (STRUCTURAL MEMBERS) = AS/NZS 2312-HDG600P3 or IZS3 (TIME TO FIRST MAINTENANCE TO BE 10 YEARS)
- BUILT INTO THE INTERNAL SKIN OF EXTERNAL WALLS = AS/NZS 2312-HDG600P3

S8. ALL BURIED STEELWORK TO BE PAINTED FIRST USING 'EXPOSED TO WEATHER' TREATMENT SYSTEM FOLLOWED BY THE APPLICATION OF A TWO PART EPOXY SUCH AS 'SIKAGUARD-63N' OR APPROVED EQUIVALENT, THEN CONCRETE ENCASE STEELWORK WITH MASS CONCRETE (MINIMUM 75mm COVER TO STEELWORK).
S9. STEELWORK TO BE CONCRETE ENCASED FOR FIRE RATING PURPOSES SHALL BE FREE FROM ALL LOOSE RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE, ETC. AND REINFORCED WITH SL41 FABRIC OR EQUIVALENT BLACK IRON WIRE, 3mm DIA.
S10. BOLT SYMBOLS:
- 4.6/S = GRADE 4.6 BOLT / SNUG TIGHTENED.
- 8.8/S = GRADE 8.8 BOLT / SNUG TIGHTENED.
- 8.8/TF = GRADE 8.8 BOLT / FULLY TENSIONED FRICTION TYPE (USE LOAD INDICATOR WASHERS)
- 8.8/TB - GRADE 8.8 BOLT / FULLY TENSIONED BEARING TYPE (USE LOAD INDICATOR WASHERS)

S11. THE CONTRACTOR SHALL SUPPLY WRITTEN CERTIFICATION TO THE STRUCTURAL ENGINEER PRIOR TO THE ERECTION OF ANY STRUCTURAL STEEL STATING THAT THE BOLTS PROPOSED TO BE USED COMPLY WITH AS/NZS 1252-1996. HIGH STRENGTH BOLTS (8.8) ARE NOT TO BE WELDED.
S12. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEEL WORK SHALL BE SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, IN ORDER TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
S13. ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS. SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.
S14. GROUT ALL STEEL BASES BY DRY PACKING USING GROUT WHICH IS NON-SHRINK AND HAS A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 40MPa
S15. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS ARE TO BE HOT DIP GALVANISED.
S16. THESE DRAWINGS MAY NOT IDENTIFY ALL SECONDARY STEELWORK ELEMENTS THAT ARE REQUIRED FOR SUPPORT, FIXING AND FINISHING OF GLAZING, CLADDING AND LINING. THE TENDERER IS RESPONSIBLE FOR THE INCLUSION OF SUCH STEELWORK ELEMENTS TO THE EXTENT REQUIRED ON THE ARCHITECT'S DRAWINGS.
S17. IMPORTED STRUCTURAL STEEL MATERIAL
ALL STRUCTURAL STEELWORK USED ON THIS PROJECT SHALL BE COMPLIANT WITH AS4100, AND IN PARTICULAR:
- CERTIFIED MILL TEST REPORTS, OR TEST CERTIFICATES SHALL BE PROVIDED AS EVIDENCE OF COMPLIANCE WITH THE STANDARDS REFERRED TO IN AS4100. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- PROVIDE TEST CERTIFICATED FOR COMPLIANCE FOR ALL FASTENERS. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- FOR COLD FORMED SECTIONS A "CERTIFICATE OF CONFORMITY TO AS1163-1991" SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- CERTIFICATES SHALL ONLY BE ACCEPTED FROM TESTING COMPANIES ACCREDITED BY A TESTING AUTHORITY RECOGNISED IN AUSTRALIA, EG NATA or JAS-ANZ CERTIFIED.
- UNIDENTIFIED STEEL ie. ANY STEEL THAT IS NOT ACCOMPANIED WITH EVIDENCE STATING COMPLIANCE WITH THE REQUIREMENT OF AS4100 SHALL ONLY BE USED STRICTLY IN ACCORDANCE WITH CLAUSE 2.2.3 OF AS4100. IF MATERIALS SUPPLIED AND INSTALLED ARE SUBSEQUENTLY PROVEN TO BE NON COMPLIANT WITH THE SPECIFIED AUSTRALIAN STANDARDS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND COST TO UNDERTAKE NATA OR EQUIVALENT CERTIFIED TESTING TO PROVE CONFORMANCE TO THE AUSTRALIAN STANDARDS AND DESIGN SPECIFICATIONS. SIMILARLY ANY RECTIFICATION WORKS THAT MAY SUBSEQUENTLY BE REQUIRED TO SATISFY AUSTRALIAN CODE REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

RAMMED EARTH

RE1. RAMMED EARTH WALLS SHALL CONFORM TO THE RELEVANT REQUIREMENTS OF AS3700, SAA HB 195, NZS4297, NZS4298 & NZS4299
RE2. THE CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH OF THE MASONRY UNITS SHALL BE A MINIMUM OF 2.5MPa. THE MINIMUM CEMENT CONTENT BY WEIGHT SHALL BE 6%.
RE3. SUBMIT THE FOLLOWING FOR APPROVAL TO THE SUPERINTENDENT PRIOR TO COMMENCING WORKS:
- MIX DESIGN TO ACHIEVE DENSITY AND STRENGTH REQUIREMENTS, INCLUDING CEMENT CONTENT BY WEIGHT, DENSITY TO BE ACHIEVED AND PARTICLE SIZE DISTRIBUTION
- TEST REPORTS INCLUDING CONFIRMATION OF INSITU UNCONFINED COMPRESSIVE STRENGTH AND ELAPSED TIME BETWEEN ADDITION OF CEMEMNT AND COMPACTION. UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF SAA HB 195

RE4. U.N.O. ALL ANCHORS INTO RAMMED EARTH SHALL BE HILTI HIT-HY70 INJECTION ANCHORS. ANCHORS ARE TO BE HOT DIP GALVANISED
RE5. THE MOISTURE CONTENT AT PLACEMENT SHALL BE BETWEEN 8-16% BY WEIGHT
RE6. FORMWORK SHALL BE DESIGNED BY A SUITABLY QUALIFIED ENGINEER, AND SHALL BE CAPABLE OF WITHSTANDING THE PRESSURE OF THE SOIL DURING COMPACTION. SUITABLE BOND BREAKERS SHALL BE USED TO ALLOW STRIPPING WITHOUT DISTURBANCE OF THE COMPACTED WALL.
RE7. PLACEMENT OF RAMMED EARTH SHALL NOT BE CARRIED OUT WHEN TEMPERATURE IS GREATER THAN 32 DEGREES CELSIUS.
RE8. MATERIAL SHALL BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 200mm THICK (WHEN UNCOMPACTED). MECHANICAL COMPACTION IS TO BE UNDERTAKEN USING PNEUMATIC RAMMERS. HAND RAMMING IS NOT TO BE USED.

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JOB NUMBER:	NL166682	DATE:	16/02/2018	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			2
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK20			

4.3 CE1 Community Facility Entry Sign

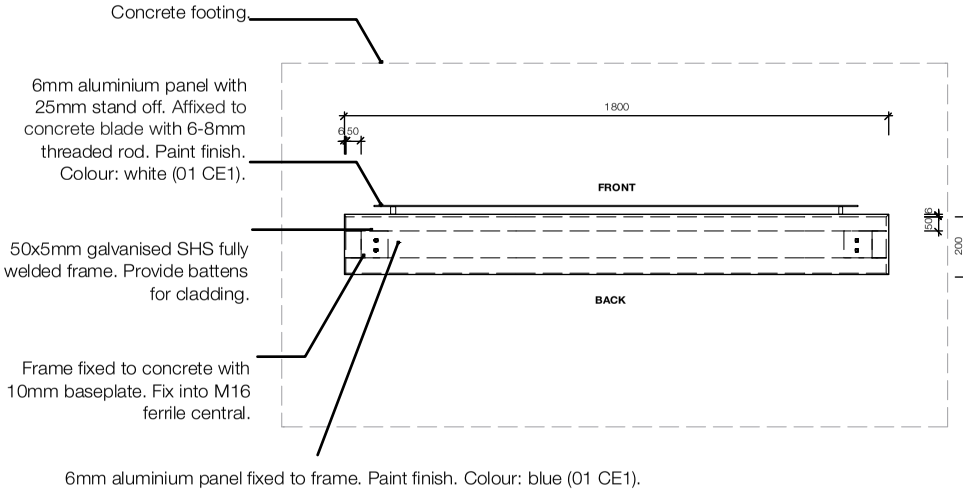
General Notes:

Refer to CE1 Community Facility Entry Sign supporting drawings:

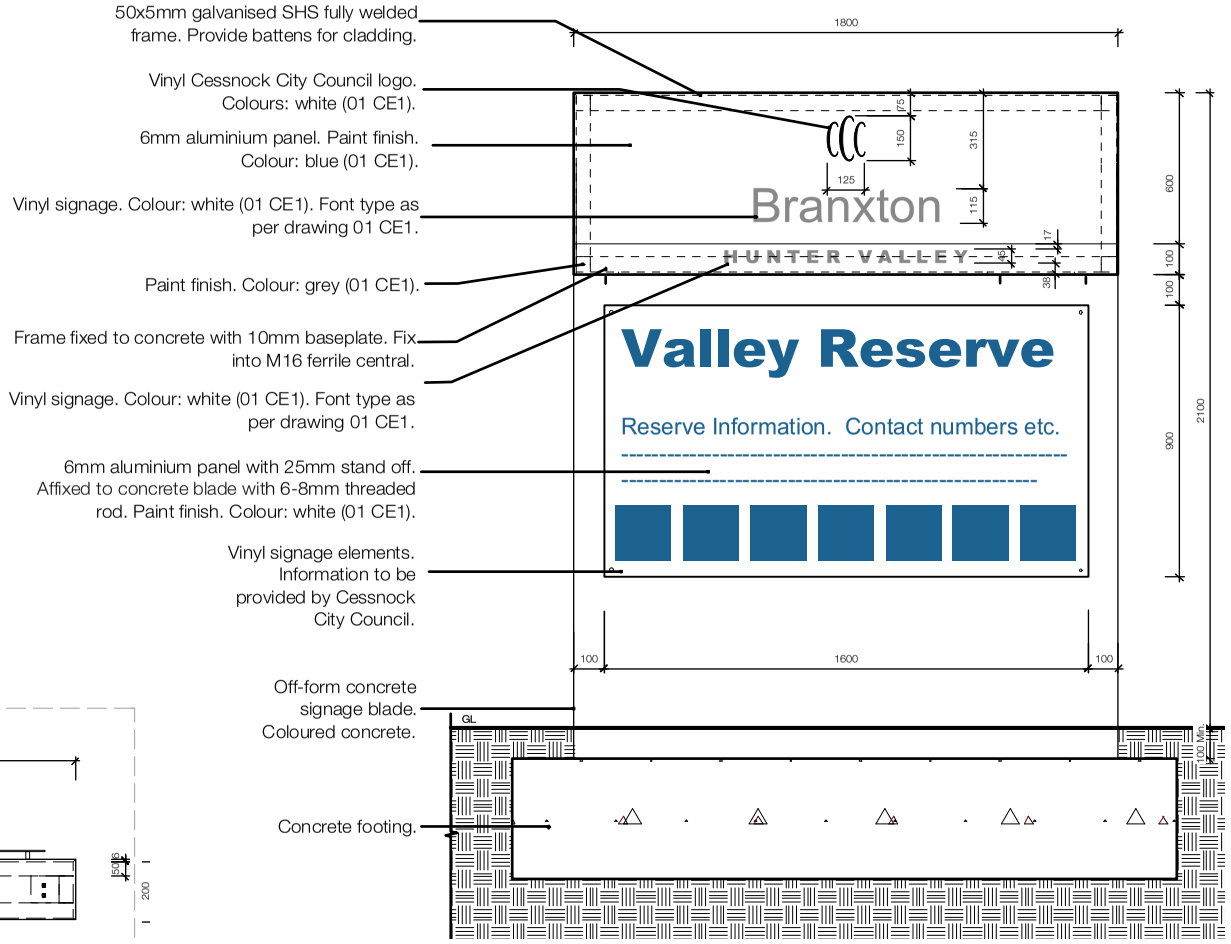
- 01 CE1 Community Facility Entry Sign p.46
- 04 CE1 Community Facility Entry Sign - Side Section p.53
- 05 CE1 Community Facility Entry Sign - Rear Elevation p.53

Refer signage specification p.47-50.

Refer engineers specification page 51 and engineers drawing page 54.

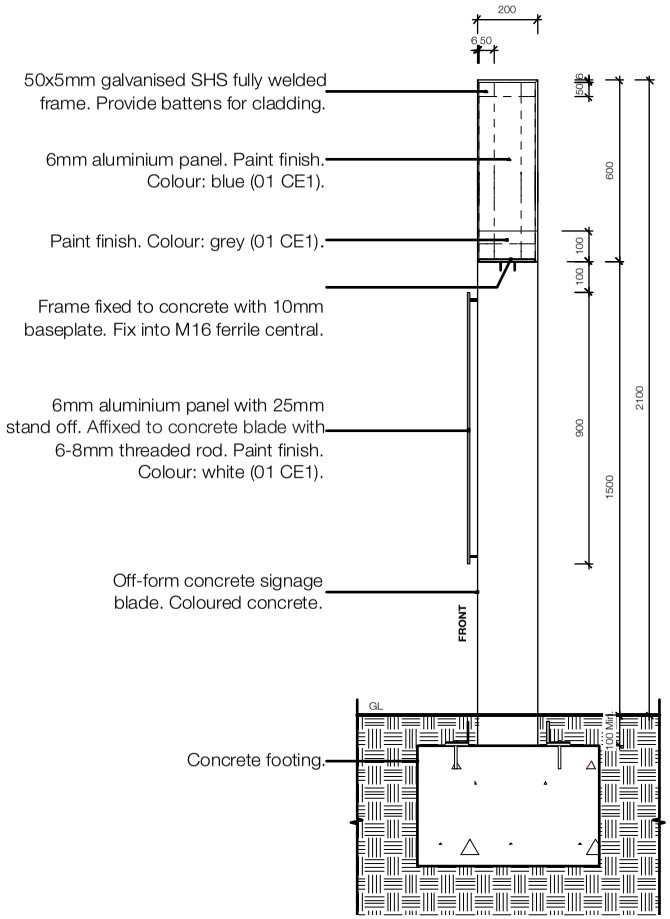


02 CE1 Community Facility Entry Sign - Plan
Scale: 1:25

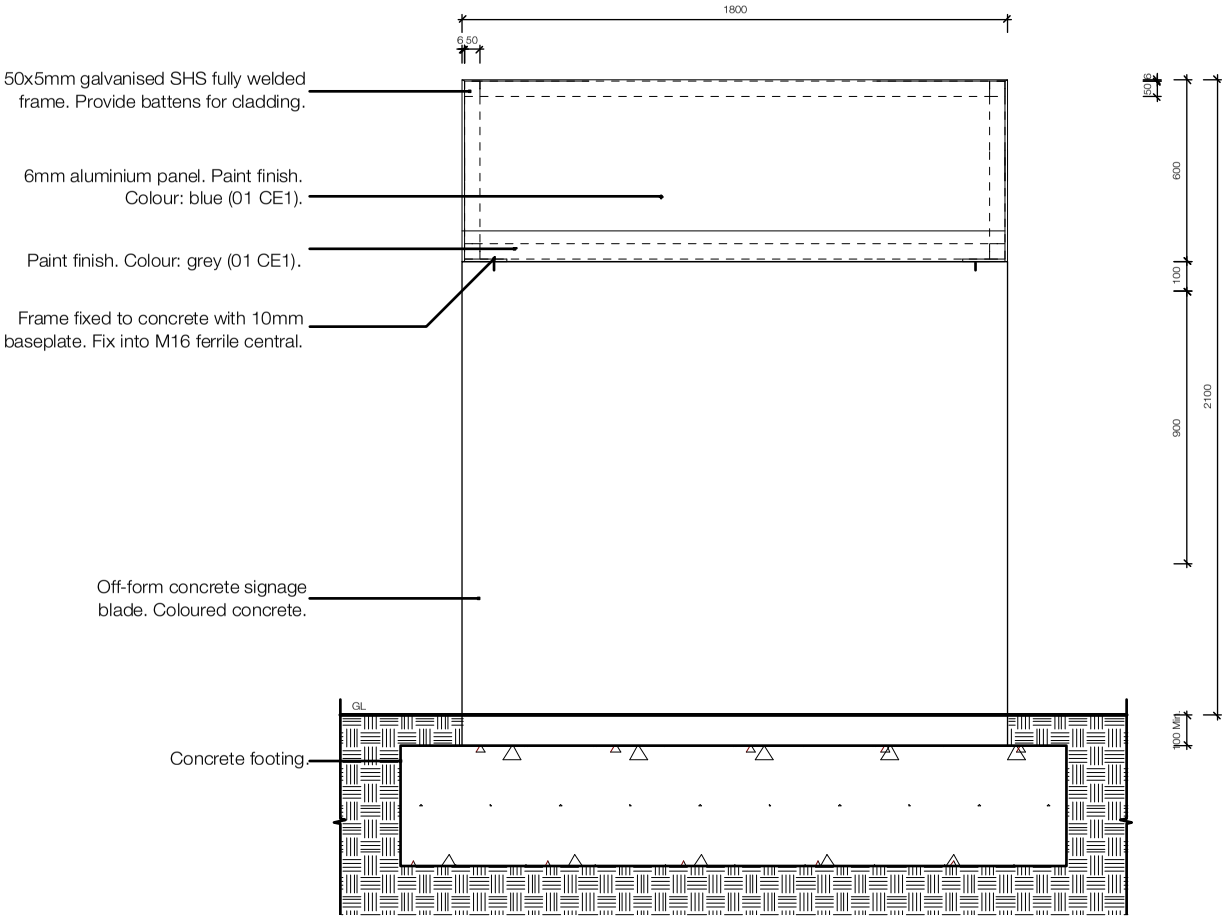


03 CE1 Community Facility Entry Sign - Front Elevation
Scale: 1:25

4.3 CE1 Community Facility Entry Sign



04 CE1 Community Facility Entry Sign - Side Section
Scale: 1:25



05 CE1 Community Facility - Rear Elevation
Scale: 1:25

General Notes:

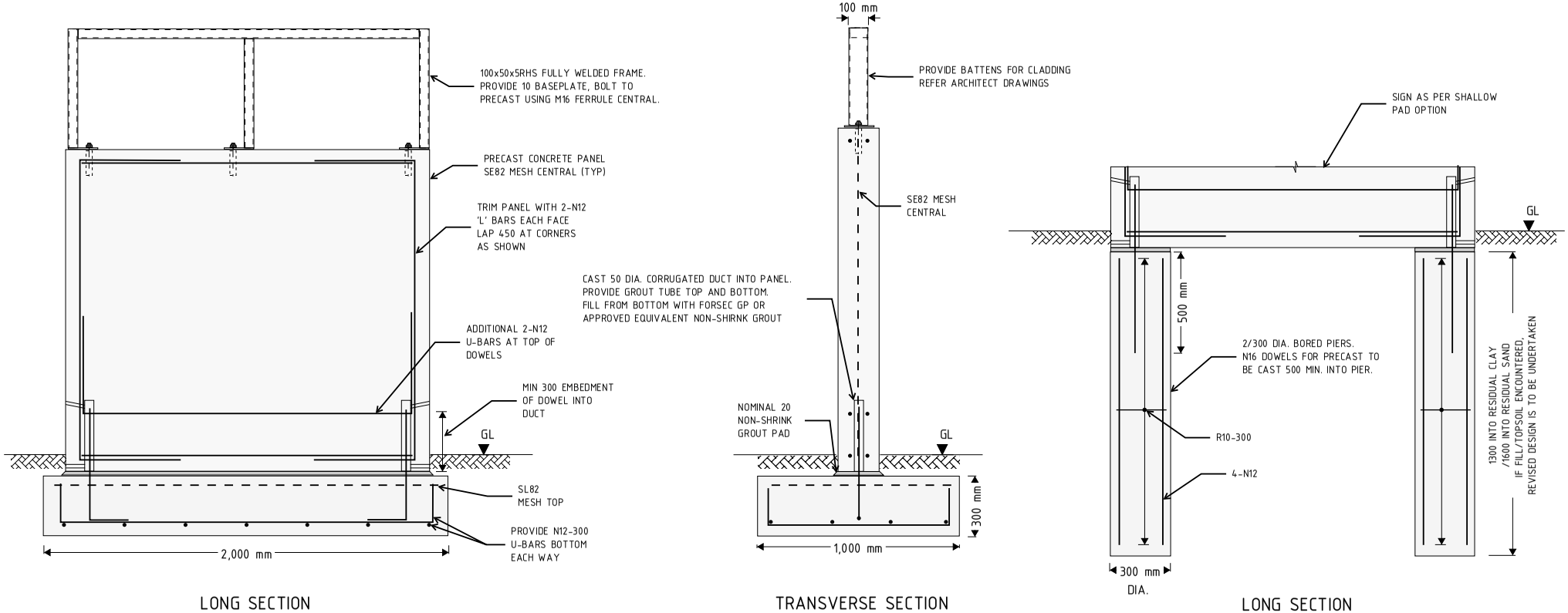
Refer to CE1 Community Facility Entry Sign supporting drawings:

- 01 CE1 Community Facility Entry Sign p.46
- 02 CE1 Community Facility Entry Sign - Plan p.52
- 03 CE1 Community Facility Entry Sign - Front Elevation p.52

Refer signage specification p.47-50.

Refer engineers specification page 51 and engineers drawing page 54.

4.3 CE1 Community Facility Entry Sign - Engineers Drawing



LONG SECTION
(SHALLOW PAD OPTION)

TRANSVERSE SECTION
(SHALLOW PAD OPTION)

LONG SECTION
(BORED PILE OPTION)

CE1 - COMMUNITY FACILITY ENTRY SIGN (2100h x 1800w)

NOTE:
MINIMUM ALLOWABLE BEARING PRESSURE OF 100KPa IS ASSUMED, AND IS TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE.
IF FOOTING NOT IN 100kPa MATERIAL, ALTERNATIVE DESIGN WILL BE REQUIRED

REFER TO SK20 FOR SPECIFICATIONS

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JOB NUMBER:	NL166682	DATE:	15/12/2017	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			1
DRAWING TITLE:	CE1 - COMMUNITY FACILITY ENTRY SIGN			
DRAWING NUMBER:	NL166682_SK21			

4.4 CF1 Community Facility Information Sign

COLOURS:

Blue: CMYK: 83, 37, 6, 6
RGB: 65, 118, 162

Grey: CMYK: 74, 66, 48, 16
RGB: 92, 83, 90

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

LETTERING:

Facility Heading: Arial
Hunter Valley: Arial Black
Reserve Information etc: Arial

01 CF1 Community Facility Information Sign

4.4 CF1 Community Facility Information Sign - Signage Specification

1.0 STEEL
General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier

1.1 Durability
General: Provide steel products protected from corrosion to suit the conditions of use.

1.2 Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

1.3 Protective coatings
Environment: To AS/NZS 2312 clause 2.3.
Coating designation: To AS/NZS 2312

Fasteners
Self drilling screws
Corrosion resistance: To AS 3566.2

Vapour barrier
Vapour barrier to slabs: To AS 2870 clause 5.3.3.
Minimum thickness: 0.2 mm.

1.4 Aluminium and aluminium alloys
Drawn pipe: To AS/NZS 1867.
Drawn rod, bar and strip: To AS/NZS 1865.
Extrusions: To AS/NZS 1866.
Plate and sheets: To AS/NZS 1734.

1.5 Coated steel
Electrogalvanized (zinc) coating on ferrous hollow and open sections: To AS 4750.
Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
- Ferrous open sections by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections by a continuous or specialised process: To AS/NZS 4792.
- Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.

Steel wire: To AS/NZS 4534.

1.5 Metal separation
Incompatible sheet metals: Prevent direct contact between incompatible metals. Provide separation by one of the following:
- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
- Insert a concealed, non-metallic separation layer such as polyethylene film, adhesive tape, neoprene, nylon or bituminous felt.

Incompatible fixings: Do not use.
Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous or paper products.

1.6 Brazing
General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.
Butt joints: Do not use butt jointing for joints subject to load. If butt joints are used, do not rely on the filler metal fillet only.
Filler metal: To AS/NZS 1167.1.

1.7 Finishing
Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Make sure self-finished metals are without surface colour variations after jointing.

1.8 Preparation
General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.
Standard: To AS 1627 series.
Priming steel surfaces: If site painting is documented to otherwise uncoated mild steel or similar surfaces, prime as follows:
- After fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to unprimed surfaces.

1.9 Welding
Aluminium: To AS 1665.
Stainless steel: To AS/NZS 1554.6.
Steel: To AS/NZS 1554.1.

1.10 Electroplated coatings
Chromium on metals: To AS 1192.
- Service condition number: At least 2.

Nickel on metals: To AS 1192.
- Service condition number: At least 2.

Zinc on iron or steel: To AS 1789.

1.11 Alluminium Steel Panels to form 'Box / Cladding'
General: Locate as per details.
Type: 6mm thick alluminium panels.

Fixing: To be confirmed by shop drawings. Ensure all finishing of concrete wall is completed prior to installation.
Finish: paint (refer section 3.0). Colour as per drawings.

1.12 Alluminium Steel Panels (fixed to concrete)
General: Locate as per details.
Type: 6mm thick alluminium panels
Fixing: 6-8mm threaded rod with 25mm stand off. Ensure all finishing of concrete wall is completed prior to installation.
Finish: paint (refer section 3.0). Colour as per drawings.

1.13 Galvanised SHS frame
General: Locate as per details.
Type: 50mm x 5mm galvanised SHS fully welded frame
Fixing: 10mm baseplate. Fix into M16 ferrile central. Ensure all finishing of concrete wall is completed prior to installation.
Finish: galvanised.

2.0 CONCRETE
2.1 Off-form concrete wall
General: Timber ply layered off-form cast concrete wall. Hand mix in batches and pour in 200mm layers to achieve layered effect (similar to rammed earth).
Standard: Class 3 as per AS3610.
Colour to wall: CCS Gecko
Exposure: To AS3600 Table 4.3.
Aggregate: 8-10mm quartz aggregate.
Cement: natural grey portland.
Finish: 16mm custom orb off-form finish to Class 3 as per AS3610 and timber ply.
Refer to engineers specification for structural details and specification.

3.0 PAINTING
3.1 Products
Storage and handling:
Requirement: Handle, store, mix and apply all protective coatings in conformance with the manufacturer's recommendations.
Original containers: Deliver coating products to site in manufacturer's labelled and sealed containers.
Ambient temperature range for storage: 3°C to 30°C, or to manufacturer's recommendations.
Sunlight: Protect coating materials from direct sunlight before mixing or adding the converter (catalyst).
Use-by-date: Use products with limited shelf life before their use-by-date, unless written authorisation from the coating manufacturer's technical services section is provided.

Paint material:
Requirement: To AS/NZS 5131 clause 9.9.3.

Proprietary products:
Requirement: Provide all products from the one manufacturer's supply.
Product data sheets (PDS): Keep on site copies of all relevant manufacturer's PDS.
Safety data sheets (SDS): Keep on site copies of all relevant manufacturer's SDS.
Recording: To AS/NZS 5131 clause 9.9.5.

3.2 Surface Preparation
General: To AS/NZS 5131 Section 9 and the recommendations of AS/NZS 2312.1.
Galvanized, aluminium and zinc primed surfaces:
Requirement: Remove grease, oil and other solvent-soluble contaminants to AS 1627.1. Allow to dry and immediately proceed with the next operation.
Galvanized and aluminium surfaces: Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Treatment of welds:
Requirement: Clean welds to remove roughness, using power tools to AS 1627.2. Remove filings by vacuuming or compressed air.
Temporary welds: Grind flush any temporary welds.
Porous, skip or stitch welds: Not permitted.
Site welding: If possible, avoid site welding. If on site welding is required, prepare and treat the weld to AS/NZS 5131 clause 9.12.2.

Shop priming:
Requirement: Dust off and apply a coat of primer in conformance with the manufacturer's recommendations.

Site coating:
General: High pressure wash down all surfaces with clean water. Lightly sand down primer/ intermediate coats, which have been shop applied, before site application of next coat.

3.3 Preparation assessment
General: Assess all surfaces of each steel member for conformance with the documented preparation requirements.
Abrasive blast cleaning: To AS 1627.4 and AS 1627.9.
Mechanical cleaning: To AS 1627.9.
Surface profile: To AS 3894.5 Method A.
Surface dust from abrasion: To AS 3894.6 Method C.
Chloride level testing: Test: To AS 3894.6 Method A.
Maximum allowable chloride levels: 50 mg/m2 for critical applications (heavy condensation, fresh water ponding or immersion) or to manufacturer's recommendations.

Conformance: If the maximum allowable chloride is exceeded, rewash the affected surface area until the chloride level is within the acceptable limits using clean water or chloride neutralising solutions. Jet-washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.
Timing of testing: Early in the blasting work so that removal procedures can be started before the blasting is completed.

3.4 Mixing
General: To AS/NZS 5131 clause 9.9.6.
Powered agitators: Mix package sizes larger than 4 litres using powered agitators driven by air motors.
Multi-component coatings: Combine as whole pack units before application.
Thinners: If addition of thinners is proposed, conform to the coating manufacturer's recommendations for the documented product.
Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

3.5 Coating Application
General: Conform to AS/NZS 5131 clause 9.9 and the PDS.
Painting and coating colour: Verify all project finish colours with the retained samples.
Final surface preparation or coating application:
Limits: If the environmental/climatic/substrate conditions listed in AS/NZS 5131 clause 9.9.10 and the following are present do not apply coating:

- Ambient air temperature below 5°C or above 40°C.
- Substrate temperature below 5°C or above 35°C.
- Full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
- Surface preparation standard has not been achieved.
- Time between final surface preparation and the commencement of coating has exceed 4 hours.
- Visual tarnishing or black spots develop on the surface of the steel.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, providing the final surface preparation and all coating applications are undertaken under the limit conditions.
Pre-coating: Before the spray application of each coating, stripe coat by brush method all edges, welds, seams, rivets, bolts, bolt holes (including slots) and difficult to spray areas. Prime the underlying surfaces of replacement bolting, washers and nuts before installation.
Procedure: Conform to the coating order shown in SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS.
Subsequent coats: Before applying any subsequent coating layer, make sure the surface condition of the preceding coat conforms to SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS and is clean and free from defects.

Wet film thickness (WFT):
Method of measurement: To AS 3894.3 Appendix C using an approved wet film gauge continuously during application.

Dry film thickness (DFT):
Method of measurement: To AS 3894.3 clause 10.
Extent: Measure all surfaces at the completion of each prime, intermediate and finish coats, including areas of the element difficult to paint, masked by structure, or where double or light coating is likely.
Number of measurements: To AS 3894.3 clause 7.
Coatings with DFT 150 µm or less: If testing, deduct the effect of the measured surface profile from all DFT readings.
Single readings: Conform to the following:

- The average of 5 point readings for each 10 m2 area of coating surface to be within the documented coating thickness range.
- No single point reading in any 10 m2 to be less than 80% of the specified minimum coating thickness. If the average of three readings is used to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
- Check any single reading that is greater than 150% of the documented maximum DFT with three additional readings within 50 mm of the original reading. If the average of these three readings is not greater than 150% of the specified DFT, take the average reading as the point reading. If greater than 150%, reject the DFT for that area. If no maximum limit for DFT is documented, consult manufacturer.

Rectification and defects:
Rectification: Re-work areas rejected, using the same surface preparation, coatings and sequence as for the original work.
Defects (including under-thickness and over-thickness): Mark with dustless chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

3.6 Protection
Contamination:
Surfaces: Prevent contamination of coated surface, which are not yet dry, from blasting dust, abrasive or surface preparation debris and any other foreign matter.

Post application care:
General: Protect the coating against physical, chemical, or atmospheric damage until all components are fully cured.
Care: Stack and handle all coated items using fabric slings or padded chains. Use soft packaging, carpet strips or other deformable materials between all coated items.
Water ponding: Stack coated items to prevent water ponding.

4.4 CF1 Community Facility Information Sign - Signage Specification

3.7 Coating Repair

Repair of coating damage:

Preparation: Feather back by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edge.

Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.

Sequence: Apply the repair coating in the same sequence and manner as the original coating.

Areas damaged without exposing the primer: Wash with a proprietary detergent solution, rinse with clean water and abrade so that edges of sound paint are feathered. Coat the area with the appropriate intermediate and finishing coat materials.

Areas damaged exposing the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Re-coat with the documented system to restore the film thickness and integrity over the whole prepared surface including the feathered zone. Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line.

Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.

Timing: Apply the protective coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

3.8 Completion

General:

Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties:

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

3.9 Selections

Two-pack liquid coating:

Application to be 2-pack polyurethane or approved equivalent.

Application: Spray.

Finish: Full gloss.

Primer: Two pack epoxy primer to AS/NZS 3750.13.

Topcoat:

- External use: Proprietary polyurethane system.

Polyurethane – AS/NZS 2312.1Categories C1 and C2 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/NZS 2312.1 PUR2	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm High Solids Polyurethane conforming to AS/NZS 3750.6	Nil

Polyurethane – AS/NZS 2312.1 Categories C3, C4 and C5 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/NZS 2312.1 PUR5	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO conforming to AS/NZS 3750.14	50 µm Polyurethane conforming to AS/NZS 3750.6 (Alternative: 75 µm High Solids Polyurethane)

4.0 VINYL SIGNAGE

Graphic set-out to be providex by Cessnock City Council.

All vinyl signage to be Eclipse 21 Series Self-Adhesive Polymeric Inkjet Vinyl. Vinyl to be 3mm thick with a UV stabilized over laminate in matte finish.

Solid colours are to be in Pantone colours and other imagery CMYK format.

To be installed in accordance with manufacturer's specifications.

4.4 CF1 Community Facility Information Sign - Engineers Specification

GENERAL

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONSULTANT'S DRAWINGS.
G2. ALL DISCREPANCIES SHALL BE REFERRED TO THE PROJECT MANAGER AND RESOLVED BEFORE PROCEEDING WITH THE WORK.
G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. THESE STRUCTURAL DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
G4. ALL WORKMANSHIP, TESTING, MATERIALS AND SUPERVISION ARE TO BE IN ACCORDANCE WITH THESE SPECIFICATIONS, THE WORK HEALTH AND SAFETY ACT 2011. ENFORCED BY THE WORKCOVER AUTHORITY AND CURRENT RELEVANT AUSTRALIAN STANDARDS.
G5. THE DETERMINATION OF A SAFE WORK METHOD REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. ANY ELEMENT WHICH POSES AN UNACCEPTABLE LEVEL OF SAFETY RISK TO CONSTRUCT SHALL BE REFERRED TO THE STRUCTURAL ENGINEER. TEMPORARY BRACING AND SUPPORT OF STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
G6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL SERVICES IN THE VICINITY OF THE WORKS.
G7. THE STRUCTURAL COMPONENTS DETAILED ON THESE STRUCTURAL DRAWINGS ARE JOB SPECIFIC AND HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADS:

WIND LOADS:

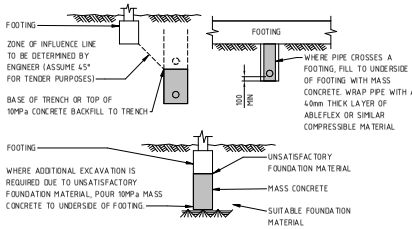
- IMPORTANCE LEVEL = 2
- REGION = A2
- ANNUAL PROBABILITY OF EXCEDENCE = 1/500
- REGIONAL WIND SPEED V_R = 45 m/s
- TERRAIN CATEGORY = TC2
- TERRAIN MULTIPLIER $M_{z,cat}$ = 0.91
- WIND DIRECTION MULTIPLIER M_d = 1
- SHIELDING MULTIPLIER M_s = 1
- TOPOGRAPHIC MULTIPLIER M_t = 1
- SITE WIND SPEED = 41 m/s

G8. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO SAFETY THE MATTER SHALL BE REFERRED TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
G9. NO CHANGES IN ANY STRUCTURAL ELEMENT SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM NORTHROP CONSULTING ENGINEERS. IF THERE IS A DISCREPANCY THEN FOR TENDER PURPOSES ALLOW FOR THE MOST EXPENSIVE OPTION. NORTHROP CONSULTING ENGINEERS SHALL BE CONTACTED TO CONFIRM PRIOR TO CONSTRUCTION.
G10. NORTHROP CONSULTING ENGINEERS ACCEPTS NO RESPONSIBILITY FOR ANY WORK NOT INSPECTED OR NOT APPROVED BY NORTHROP CONSULTING ENGINEERS DURING CONSTRUCTION.

FOUNDATIONS

F1. ASSUMED ALLOWABLE BEARING CAPACITY:
- FOOTINGS = 100kPa

F2. A GEOTECHNICAL REPORT HAS NOT BEEN CARRIED OUT. MINIMUM ASSUMED ALLOWABLE BEARING PRESSURES TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. IF MINIMUM BEARING PRESSURES NOT ACHIEVED, AN ALTERNATIVE DESIGN WILL BE REQUIRED.
F3. ENSURE STABILITY OF ADJACENT BUILDINGS AND PATHS IS MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
F4. THE UNDERSIDE OF FOUNDATIONS SHALL CONFORM TO THE FOLLOWING REGARDLESS OF NOMINATED LEVELS:



F5. FOOTINGS SHALL BE CENTRALLY LOCATED UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
F6. FOOTINGS SHALL BE EXCAVATED TO THE DETAILED DEPTH AND WIDTH. FOOTINGS SHALL BE INSPECTED AND FILLED WITH CONCRETE AS SOON AS POSSIBLE TO AVOID EITHER SOFTENING OF THE FOUNDATION MATERIAL OR DRYING OUT BY EXPOSURE.
F7. THE BASE OF ALL PIER HOLES SHALL BE FREE OF WATER AND CLEANED OF LOOSE MATERIAL OR DEBRIS PRIOR TO PLACEMENT OF CONCRETE. ALLOW TO PROVIDE TEMPORARY LINERS AS DEEMED NECESSARY.

CONCRETE

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2009 AND NATSPEC CONCRETE STANDARDS.
C2. CONCRETE PROPERTIES AND COVER TO REINFORCING :

COVER TO REINFORCEMENT			
ELEMENT	CONCRETE STRENGTH f'c (MPa)	MAXIMUM 56 DAY DRY SHRINKAGE	COVER (mm)
WALLS	25	1000 µm	60
FOOTINGS	25	1000 µm	60

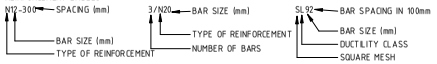
MAXIMUM AGGREGATE SIZE = 20mm U.N.O.
SLUMP DURING PLACING = 80mm ±10mm
EXPOSURE CLASSIFICATION = A2 (IN CONTACT WITH GROUND)
NO ADMIXTURES SHALL BE USED IN THE CONCRETE MIX UNLESS APPROVED BY NORTHROP CONSULTING ENGINEERS IN WRITING.

C3. SLABS USING MECHANICAL VIBRATORS.
C4. PLACE CONCRETE CONTINUOUSLY BETWEEN CONSTRUCTION JOINTS SHOWN ON PLAN. DO NOT BREAK OR INTERRUPT SUCCESSIVE POURS SUCH THAT COLD JOINTS OCCUR. ANY REVISIONS OR ADDITIONS TO CONSTRUCTION JOINTS SHOWN ON PLAN REQUIRE APPROVAL FROM THE NORTHROP CONSULTING ENGINEERS.
C5. REINFORCEMENT QUALITY AND NOTATION :

REINFORCEMENT NOTATION				
SYMBOL	BAR TYPE	STRENGTH GRADE (MPa)	DUCTILITY CLASS	TO COMPLY WITH AUSTRALIAN STANDARD
S	STRUCTURAL GRADE DEFORMED RIB BAR	250	NORMAL	AS/NZS 4671-2001
N	HOT ROLLED DEFORMED RIB BAR	500	NORMAL	AS/NZS 4671-2001
R	PLAIN ROUND BAR	250	NORMAL	AS/NZS 4671-2001
RL	RECTANGULAR MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
SL	SQUARE MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
L-TM	TRENCH MESH	500	LOW	AS/NZS 4671-2001

ALL REINFORCING BARS SHALL BE GRADE D500N TO AS/NZS 4671-2001 AND ALL MESH SHALL BE GRADE 500L TO AS/NZS 4671-2001. UNLESS NOTED OTHERWISE CLASS L REINFORCEMENT SHALL NOT BE USED.

REINFORCEMENT LABELS :



C6. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, AND NOT NECESSARILY IN TRUE PROJECTION. BARS SHOWN ARE INDICATIVE ONLY AND LENGTHS MAY VARY. BEAM ELEVATIONS TAKE PRECEDENCE OVER SECTIONS. SLAB PLANS TAKE PRECEDENCE OVER SECTIONS. REFER TO SECTIONS FOR EXTRA BARS THAT MAY BE REQUIRED.
C7. USE ONLY PLASTIC OR CONCRETE CHAIRS AT EXTERNAL SURFACES.
C8. SITE BENDING OF REINFORCEMENT BARS SHALL BE DONE WITHOUT HEATING USING A RE-BENDING TOOL. THE BARS SHALL BE RE-BENT AGAINST A FLAT SURFACE OR A PIN WITH A DIAMETER NOT LESS THAN THE MINIMUM PIN SIZE PRESCRIBED IN AS3600-2009.
C9. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN ON THE STRUCTURAL DRAWINGS OR IN POSITIONS OTHERWISE APPROVED IN WRITING BY NORTHROP CONSULTING ENGINEERS. LAPS SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND IN ACCORDANCE WITH AS3600-2009 SECTION 13.
C10. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY NORTHROP CONSULTING ENGINEERS.
C11. AT EXTERNALLY EXPOSED SURFACES NO METALLIC ITEMS INCLUDING FORM BOLTS, FORM SPACERS, METALLIC BAR CHAIRS AND TIE-WIRE ARE TO BE PLACED IN THE COVER ZONE.
C12. ALL REINFORCEMENT, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION AND INSPECTED BY A SUITABLY QUALIFIED ENGINEER PRIOR TO PLACING CONCRETE.
C13. ALL CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNISED TESTING LAB.
C14. FOR ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX, REFER TO CONCRETE - ELAPSED DELIVERY TIMES NOTE.

CONCRETE - ELAPSED DELIVERY TIMES

CE1. ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX AT THE SITE MUST NOT EXCEED THE CRITERIA IN THE ELAPSED DELIVERY TIMETABLE BELOW

ELAPSED DELIVERY TIME TABLE	
CONCRETE TEMPERATURE AT TIME OF DISCHARGE (°C)	MAXIMUM ELAPSED TIME (HOURS)
< 24	2.00
24 TO 27	1.50
27 TO 30	1.00
30 TO 32	0.75
32 TO 35	0.50

IF THE ELAPSED TIME IS LONGER THAN THE CORRESPONDING TIME IN THE TABLE ABOVE, OR THE TEMPERATURE IS GREATER THAN 35°C, THE CONCRETE MIX DESIGN ENGINEER IS TO BE CONTACTED TO CONFIRM WHETHER PLACEMENT IS TO PROCEED OR IF THE POUR IS TO BE STOPPED.

STEELWORK

S1. FABRICATE AND ERECT STRUCTURAL STEELWORK IN ACCORDANCE WITH AS4100-1998.
S2. PROVIDE HOLES, CLEATS AND FIXING FOR LIGHT STEEL/TIMBER FRAMING, FINISHES, ETC. SHOWN ON ARCHITECTURAL DRAWINGS.
S3. THESE DRAWINGS HAVE BEEN PREPARED TO INDICATE THE STRUCTURAL INTENT. THE SHOP DETAILER IS TO USE THESE DRAWINGS AS A BASIS FOR DIMENSIONAL COORDINATION WITH OTHER CONSULTANT'S DRAWINGS AND IS TO PREPARE DETAILED SHOP DRAWINGS. WHERE NECESSARY, THE SHOP DETAILER IS TO MAKE ASSUMPTIONS AND SUBMIT TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION. SHOP DETAILER IS TO ALLOW TO RE-WORK SHOP DRAWINGS AS NECESSARY. FABRICATOR SHALL PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE BUILDER FOR THEIR APPROVAL. BUILDER SHALL LODGE TWO COPIES OF APPROVED DRAWINGS TO NORTHROP CONSULTING ENGINEERS FOR REVIEW PRIOR TO FABRICATION, (ALLOW 5 WORKING DAYS FOR REVIEW).
S4. UNLESS NOTED OTHERWISE, USE:
- 6mm CONTINUOUS FILLET WELDS MADE WITH E4818 MILD STEEL ELECTRODES.
- ALL WELDS SP CATEGORY

S5. ALL BOLTS, SCREWS, HOLD DOWN BOLTS, MASONRY ANCHORS SHALL BE HOT DIP GALVANISED TO AS1214-1983, AS/NZS 4534-2006, AS/NZS 4680-2006 & AS/NZS 4792-2006. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED. ALL HOLES SHALL BE 2mm LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE.
S6. MINIMUM YELD STRESS:
- HOT ROLLED SECTIONS = 300MPa
- SQUARE HOLLOW SECTIONS = 350MPa
- RECTANGULAR HOLLOW SECTIONS = 350MPa
- CIRCULAR HOLLOW SECTION = 250MPa
- HOT ROLLED PLATE = 250MPa

S7. SURFACE TREATMENT UNLESS NOTED OTHERWISE:
- EXPOSED TO WEATHER (STRUCTURAL MEMBERS) = AS/NZS 2312-HDG600P3 or IZS3 (TIME TO FIRST MAINTENANCE TO BE 10 YEARS)
- BUILT INTO THE INTERNAL SKIN OF EXTERNAL WALLS = AS/NZS 2312-HDG600P3

S8. ALL BURIED STEELWORK TO BE PAINTED FIRST USING 'EXPOSED TO WEATHER' TREATMENT SYSTEM FOLLOWED BY THE APPLICATION OF A TWO PART EPOXY SUCH AS 'SIKAGUARD-63N' OR APPROVED EQUIVALENT, THEN CONCRETE ENCASE STEELWORK WITH MASS CONCRETE (MINIMUM 75mm COVER TO STEELWORK).
S9. STEELWORK TO BE CONCRETE ENCASED FOR FIRE RATING PURPOSES SHALL BE FREE FROM ALL LOOSE RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE, ETC. AND REINFORCED WITH SL41 FABRIC OR EQUIVALENT BLACK IRON WIRE, 3mm DIA.
S10. BOLT SYMBOLS:
- 4.6/S = GRADE 4.6 BOLT / SNUG TIGHTENED.
- 8.8/S = GRADE 8.8 BOLT / SNUG TIGHTENED.
- 8.8/TF = GRADE 8.8 BOLT / FULLY TENSIONED FRICTION TYPE (USE LOAD INDICATOR WASHERS)
- 8.8/TB - GRADE 8.8 BOLT / FULLY TENSIONED BEARING TYPE (USE LOAD INDICATOR WASHERS)

S11. THE CONTRACTOR SHALL SUPPLY WRITTEN CERTIFICATION TO THE STRUCTURAL ENGINEER PRIOR TO THE ERECTION OF ANY STRUCTURAL STEEL STATING THAT THE BOLTS PROPOSED TO BE USED COMPLY WITH AS/NZS 1252-1996. HIGH STRENGTH BOLTS (8.8) ARE NOT TO BE WELDED.
S12. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEEL WORK SHALL BE SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, IN ORDER TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
S13. ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS. SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.
S14. GROUT ALL STEEL BASES BY DRY PACKING USING GROUT WHICH IS NON-SHRINK AND HAS A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 40MPa
S15. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS ARE TO BE HOT DIP GALVANISED.
S16. THESE DRAWINGS MAY NOT IDENTIFY ALL SECONDARY STEELWORK ELEMENTS THAT ARE REQUIRED FOR SUPPORT, FIXING AND FINISHING OF GLAZING, CLADDING AND LINING. THE TENDERER IS RESPONSIBLE FOR THE INCLUSION OF SUCH STEELWORK ELEMENTS TO THE EXTENT REQUIRED ON THE ARCHITECT'S DRAWINGS.
S17. IMPORTED STRUCTURAL STEEL MATERIAL
ALL STRUCTURAL STEELWORK USED ON THIS PROJECT SHALL BE COMPLIANT WITH AS4100, AND IN PARTICULAR:
- CERTIFIED MILL TEST REPORTS, OR TEST CERTIFICATES SHALL BE PROVIDED AS EVIDENCE OF COMPLIANCE WITH THE STANDARDS REFERRED TO IN AS4100. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- PROVIDE TEST CERTIFICATED FOR COMPLIANCE FOR ALL FASTENERS. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- FOR COLD FORMED SECTIONS A "CERTIFICATE OF CONFORMITY TO AS1163-1991" SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- CERTIFICATES SHALL ONLY BE ACCEPTED FROM TESTING COMPANIES ACCREDITED BY A TESTING AUTHORITY RECOGNISED IN AUSTRALIA, EG NATA or JAS-ANZ CERTIFIED.
- UNIDENTIFIED STEEL ie. ANY STEEL THAT IS NOT ACCOMPANIED WITH EVIDENCE STATING COMPLIANCE WITH THE REQUIREMENT OF AS4100 SHALL ONLY BE USED STRICTLY IN ACCORDANCE WITH CLAUSE 2.2.3 OF AS4100. IF MATERIALS SUPPLIED AND INSTALLED ARE SUBSEQUENTLY PROVEN TO BE NON COMPLIANT WITH THE SPECIFIED AUSTRALIAN STANDARDS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND COST TO UNDERTAKE NATA OR EQUIVALENT CERTIFIED TESTING TO PROVE CONFORMANCE TO THE AUSTRALIAN STANDARDS AND DESIGN SPECIFICATIONS. SIMILARLY ANY RECTIFICATION WORKS THAT MAY SUBSEQUENTLY BE REQUIRED TO SATISFY AUSTRALIAN CODE REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

RAMMED EARTH

RE1. RAMMED EARTH WALLS SHALL CONFORM TO THE RELEVANT REQUIREMENTS OF AS3700, SAA HB 195, NZS4297, NZS4298 & NZS4299
RE2. THE CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH OF THE MASONRY UNITS SHALL BE A MINIMUM OF 2.5MPa. THE MINIMUM CEMENT CONTENT BY WEIGHT SHALL BE 6%.
RE3. SUBMIT THE FOLLOWING FOR APPROVAL TO THE SUPERINTENDENT PRIOR TO COMMENCING WORKS:
- MIX DESIGN TO ACHIEVE DENSITY AND STRENGTH REQUIREMENTS, INCLUDING CEMENT CONTENT BY WEIGHT, DENSITY TO BE ACHIEVED AND PARTICLE SIZE DISTRIBUTION
- TEST REPORTS INCLUDING CONFIRMATION OF INSITU UNCONFINED COMPRESSIVE STRENGTH AND ELAPSED TIME BETWEEN ADDITION OF CEMEMNT AND COMPACTION. UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF SAA HB 195

RE4. U.N.O. ALL ANCHORS INTO RAMMED EARTH SHALL BE HILTI HIT-HY70 INJECTION ANCHORS. ANCHORS ARE TO BE HOT DIP GALVANISED
RE5. THE MOISTURE CONTENT AT PLACEMENT SHALL BE BETWEEN 8-16% BY WEIGHT
RE6. FORMWORK SHALL BE DESIGNED BY A SUITABLY QUALIFIED ENGINEER, AND SHALL BE CAPABLE OF WITHSTANDING THE PRESSURE OF THE SOIL DURING COMPACTION. SUITABLE BOND BREAKERS SHALL BE USED TO ALLOW STRIPPING WITHOUT DISTURBANCE OF THE COMPACTED WALL.
RE7. PLACEMENT OF RAMMED EARTH SHALL NOT BE CARRIED OUT WHEN TEMPERATURE IS GREATER THAN 32 DEGREES CELSIUS.
RE8. MATERIAL SHALL BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 200mm THICK (WHEN UNCOMPACTED). MECHANICAL COMPACTION IS TO BE UNDERTAKEN USING PNEUMATIC RAMMERS. HAND RAMMING IS NOT TO BE USED.

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JOB NUMBER:	NL166682	DATE:	16/02/2018	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			2
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK20			

4.4 CF1 Community Facility Information Sign

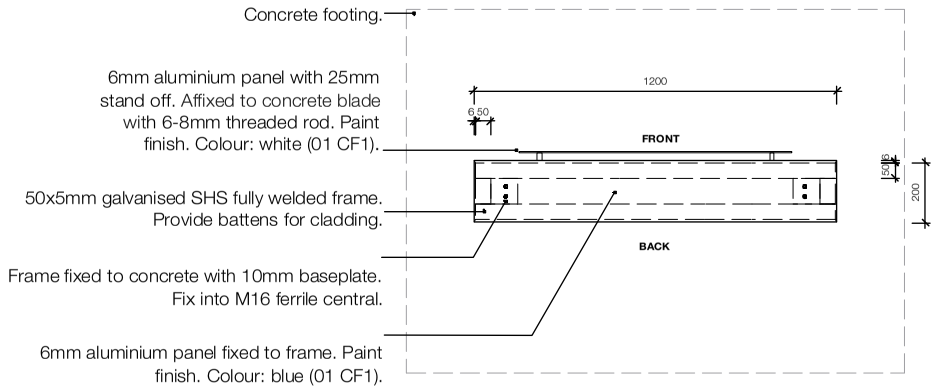
General Notes:

Refer to CF1 Community Facility Information Sign supporting drawings:

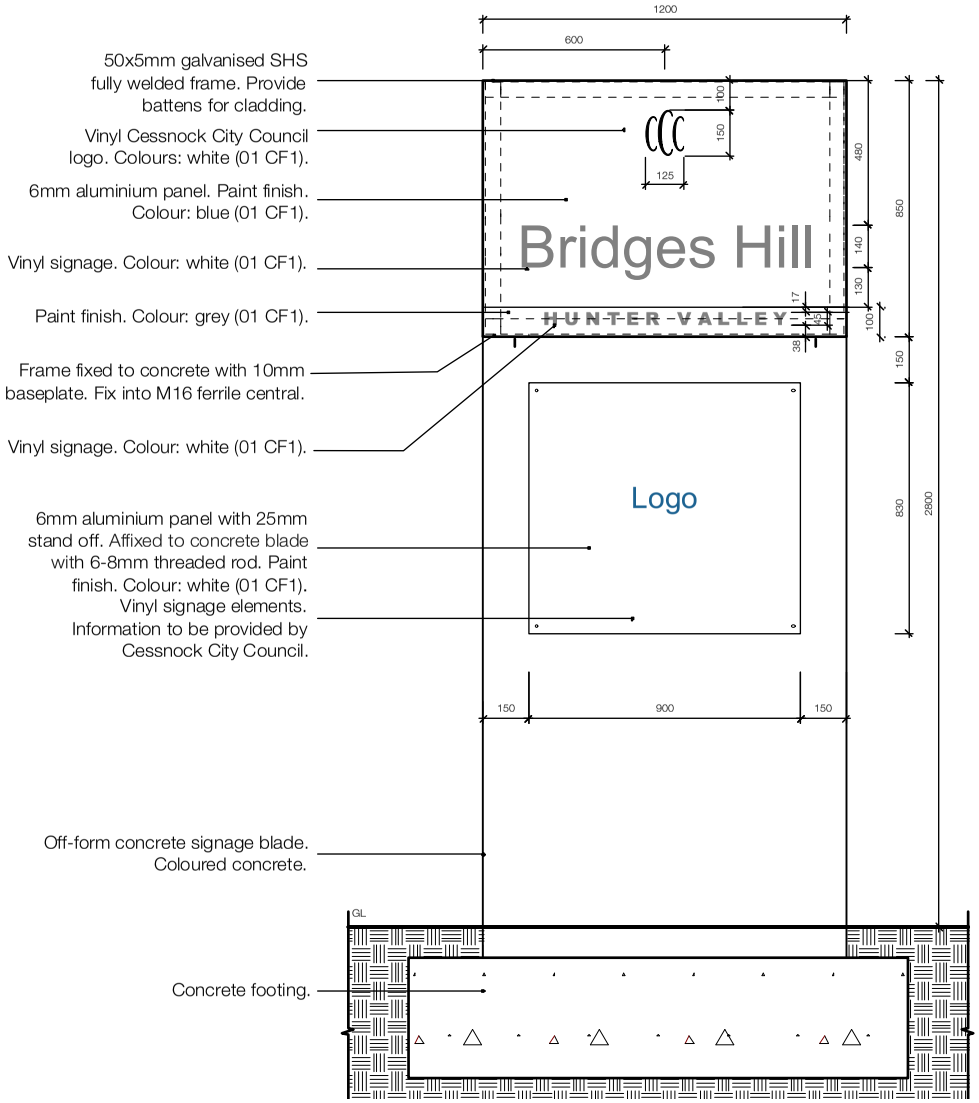
- 01 CF1 Community Facility Information Sign p.55
- 04 CF1 Community Facility Information Sign - Side Section p.62
- 05 CF1 Community Facility Information Sign - Rear Elevation p.62

Refer signage specification p.56-59.

Refer engineers specification page 60 and engineers drawing page 63.



02 CF1 Community Facility Information Sign - Plan
Scale: 1:25



03 CF1 Community Facility Information Sign - Front Elevation
Scale: 1:25

4.4 CF1 Community Facility Information Sign

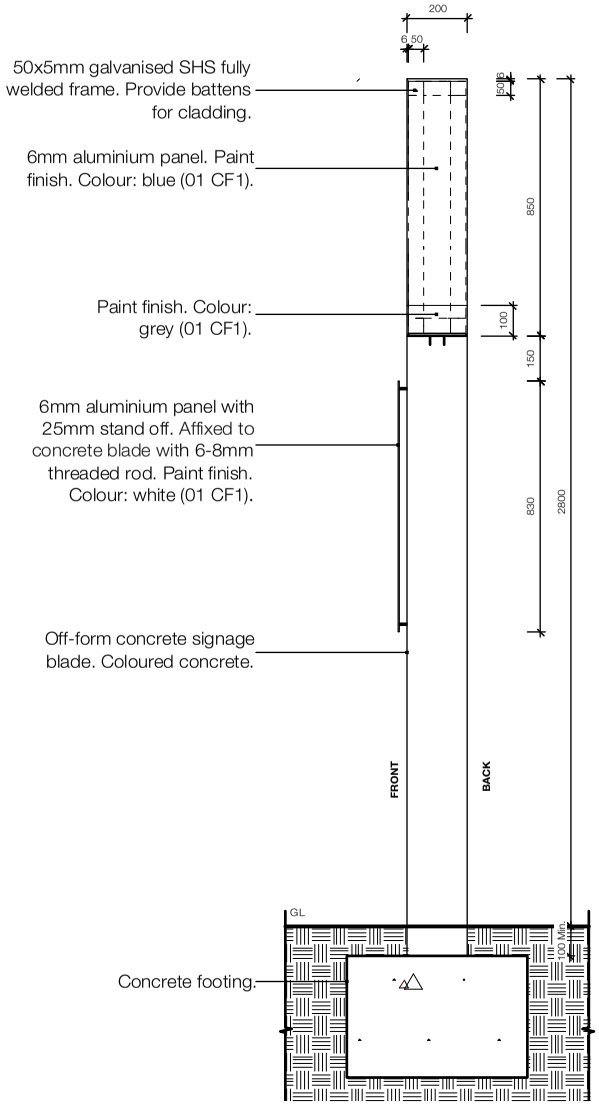
General Notes:

Refer to CF1 Community Facility Information Sign supporting drawings:

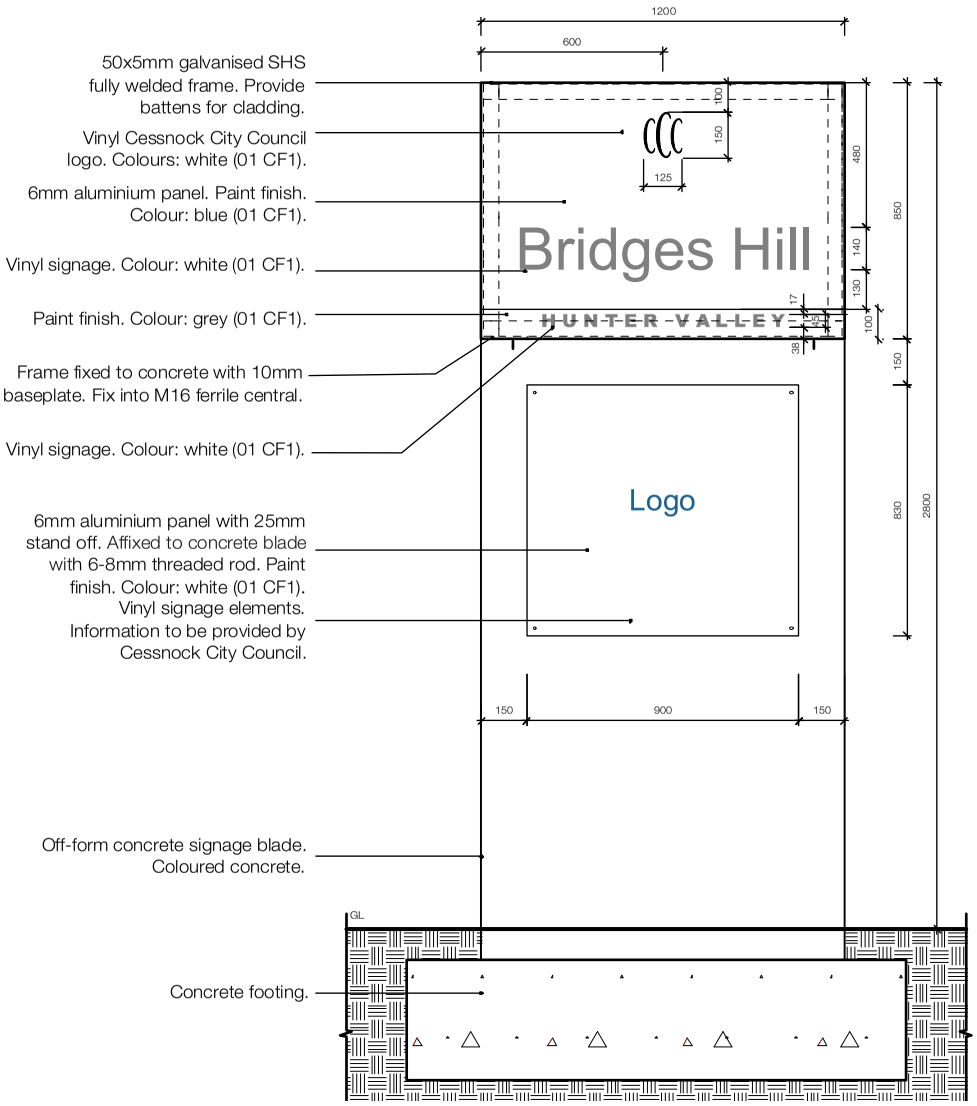
- 01 CF1 Community Facility Information Sign p.55
- 02 CF1 Community Facility Information Sign - Plan p.61
- 03 CF1 Community Facility Information Sign - Front Elevation p.61

Refer signage specification p.56-59.

Refer engineers specification page 60 and engineers drawing page 63.

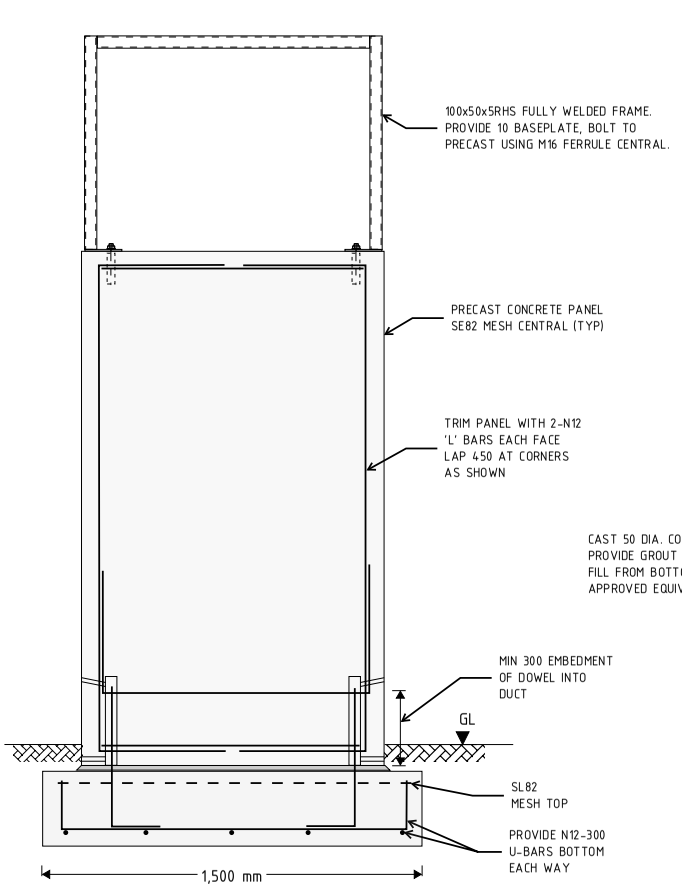


04 CF1 Community Facility Information Sign - Side Section
Scale 1:25

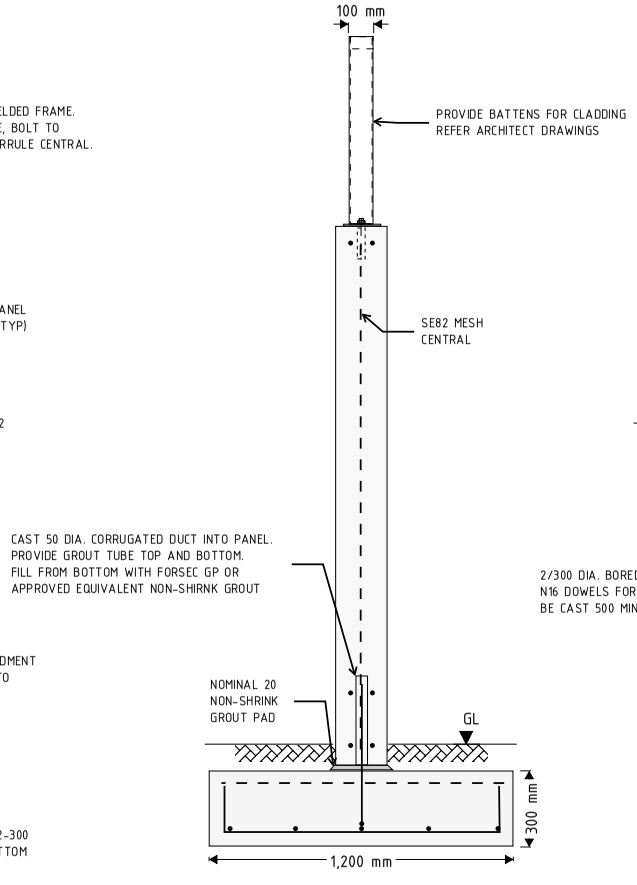


05 CF1 Community Facility Information - Rear Elevation
Scale 1:25

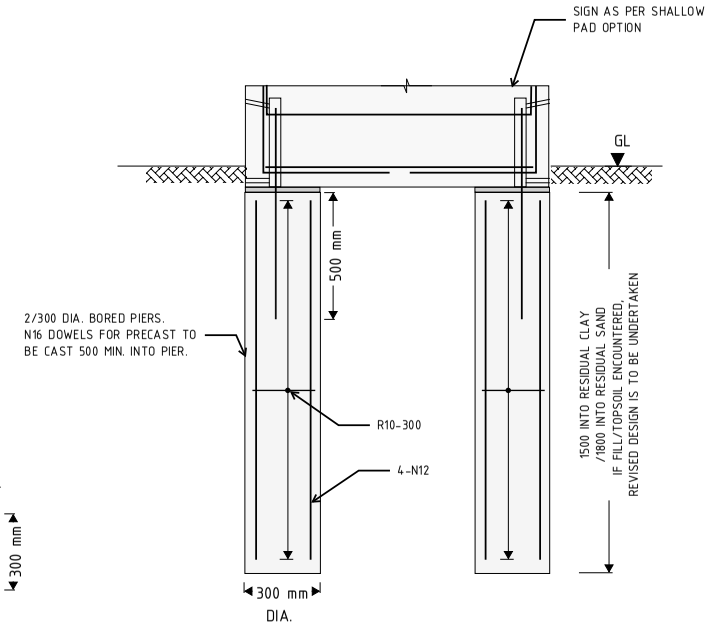
4.4 CF1 Community Facility Information Sign - Engineers Drawing



LONG SECTION
(SHALLOW PAD OPTION)



TRANSVERSE SECTION
(SHALLOW PAD OPTION)



LONG SECTION
(BORED PILE OPTION)

NOTE:
MINIMUM ALLOWABLE BEARING PRESSURE OF 100KPa IS ASSUMED, AND IS TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE.
IF FOOTING NOT IN 100kPa MATERIAL, ALTERNATIVE DESIGN WILL BE REQUIRED

REFER TO SK20 FOR SPECIFICATIONS

CF1 - COMMUNITY FACILITY INFORMATION SIGN (2800h x 1200w)
SE1 - SUBURB ENTRY SIGN (2800h x 1250w) SIMILAR
TC1-TC2 - TOWN CENTRE INFORMATION SIGN (2800h x 900w) SIMILAR

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JOB NUMBER:	NL166682	DATE:	15/12/2017	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			1
DRAWING TITLE:	CF1, SE1 AND TC1-TC2 SIGNS			
DRAWING NUMBER:	NL166682_SK22			

4.5 SS Street Signs - Family

01 Standard Street Blade

02 Community Facilities Blade

03 Precinct Pictogram Blade

04 Pictogram Blade

05 Standard Street Blade
Urban NO THROUGH ROAD

06 Standard Street Blade
Private Road

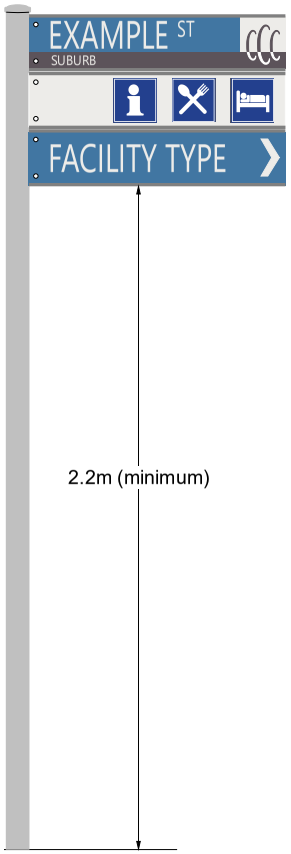
07 Suburb Sign Secondary Road

08 Suburb Directional Blade

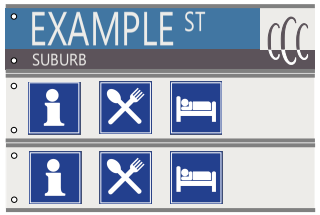
09 G5-10: Rural NO THROUGH ROAD

10 Bus Stop

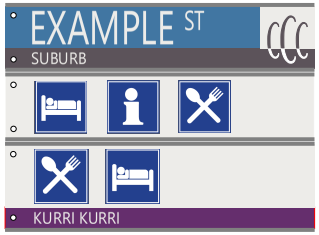
4.5 SS Street Signs - Family - Combination Examples



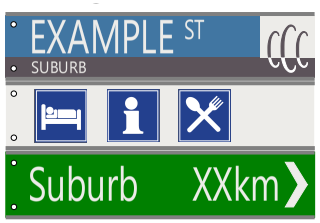
11 Sign Combination and Post



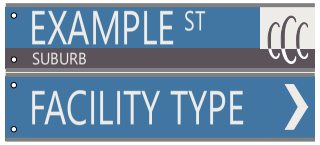
12 Sign Combination - Standard Street Blade and Pictogram Blade



13 Sign Combination - Standard Street Blade and Pictogram Blade (Precinct)



14 Sign Combination - Standard Street Blade, Pictogram Blade and Suburb Directional Blade



15 Sign Combination - Standard Street Blade and Community Facility Blade

4.5 SS Street Signs - Colours

COLOURS:

Blue: CMYK: 83, 37, 6, 6
RGB: 65, 118, 162

Grey: CMYK: 74, 66, 48, 16
RGB: 92, 83, 90

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

PRECINCT COLOURS:

Kurri Kurri: CMYK: 80, 100, 3, 0. RGB: 101, 46, 119

Branxton Greta: CMYK: 2, 66, 99, 0. RGB: 233, 115, 46

Parish of Pokolbin
C:66 M:0 Y:11 K:0

Broke Fordwich
C:80 M:20 Y:100 K:7

Lovedale
C:100 M:88 Y:9 K:1

Mount View
C:31 M:1 Y:100 K:0

Central Pokolbin
C:2 M:8 Y:99 K:0

Wollombi Valley
C:26 M:100 Y:100 K:19

Hermitage
C:0 M:100 Y:96 K:0

PRECINCT TEXT COLOURS:

Kurri Kurri, Lovedale, Wollombi Valley, Broke Fordwich, Hermitage:
White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

Branxton Greta, Parish of Pokolbin, Mount View, Central Pokolbin:
Black

4.5 SS Street Signs - Signage Specification

LETTERING:

Street Blades
Digital printed Durst 3M UV ink.
Street Name: 100mm AS1744 Series C. Note 100mm Series B to be substituted for long street names if required.
ST, AV, RD etc: 60mm AS1744 Series C.
Suburb Name: 35mm AS1744 Series D.

Bus Stop
BUS STOP: 50mm AS1744 Series C.
Suburb Name: 35mm AS1744 Series D.

Suburb Directional Blade
Suburb Name and Distance: 100mm AS1744 Series C.

Suburb Sign
Suburb Name: 180mm AS1744 Series C.
LGA Name: 80mm AS1744 Series D.

Precinct Pictogram Blade
Digital printed Durst 3M UV ink.
Precinct Name: 35mm AS1744 Series D.

Rural NO THROUGH ROAD
NO: 120mm AS1744 Series E.
THROUGH ROAD: 60mm AS1744 Series E.

BLADE LENGTH:

600mm - 900mm (length to suit)
900mm- 1200mm (to be used only after consultation with Council Staff.

BLADE MATERIAL:

200mm Aluminium Street Blade Extrusion.
3M ECF 1170 clear over-laminate.

BLADE BRACKETS:

1 Way: AL1-8
2 Way: AL2-8
3 Way: AL3-8

POSTS:

50mm Galvanised. 2.9mm wall

4.5 SS Street Signs - Engineers Specification

GENERAL

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONSULTANT'S DRAWINGS.
G2. ALL DISCREPANCIES SHALL BE REFERRED TO THE PROJECT MANAGER AND RESOLVED BEFORE PROCEEDING WITH THE WORK.
G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. THESE STRUCTURAL DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
G4. ALL WORKMANSHIP, TESTING, MATERIALS AND SUPERVISION ARE TO BE IN ACCORDANCE WITH THESE SPECIFICATIONS, THE WORK HEALTH AND SAFETY ACT 2011. ENFORCED BY THE WORKCOVER AUTHORITY AND CURRENT RELEVANT AUSTRALIAN STANDARDS.
G5. THE DETERMINATION OF A SAFE WORK METHOD REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. ANY ELEMENT WHICH POSES AN UNACCEPTABLE LEVEL OF SAFETY RISK TO CONSTRUCT SHALL BE REFERRED TO THE STRUCTURAL ENGINEER. TEMPORARY BRACING AND SUPPORT OF STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
G6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL SERVICES IN THE VICINITY OF THE WORKS.
G7. THE STRUCTURAL COMPONENTS DETAILED ON THESE STRUCTURAL DRAWINGS ARE JOB SPECIFIC AND HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADS:

WIND LOADS:

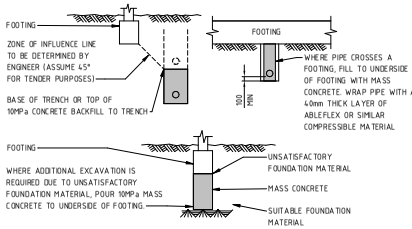
- IMPORTANCE LEVEL = 2
- REGION = A2
- ANNUAL PROBABILITY OF EXCEDENCE = 1/500
- REGIONAL WIND SPEED V_R = 45 m/s
- TERRAIN CATEGORY = TC2
- TERRAIN MULTIPLIER M_z,cat = 0.91
- WIND DIRECTION MULTIPLIER M_d = 1
- SHIELDING MULTIPLIER M_s = 1
- TOPOGRAPHIC MULTIPLIER M_t = 1
- SITE WIND SPEED = 41 m/s

G8. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO SAFETY THE MATTER SHALL BE REFERRED TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
G9. NO CHANGES IN ANY STRUCTURAL ELEMENT SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM NORTHROP CONSULTING ENGINEERS. IF THERE IS A DISCREPANCY THEN FOR TENDER PURPOSES ALLOW FOR THE MOST EXPENSIVE OPTION. NORTHROP CONSULTING ENGINEERS SHALL BE CONTACTED TO CONFIRM PRIOR TO CONSTRUCTION.
G10. NORTHROP CONSULTING ENGINEERS ACCEPTS NO RESPONSIBILITY FOR ANY WORK NOT INSPECTED OR NOT APPROVED BY NORTHROP CONSULTING ENGINEERS DURING CONSTRUCTION.

FOUNDATIONS

F1. ASSUMED ALLOWABLE BEARING CAPACITY:
- FOOTINGS = 100kPa

F2. A GEOTECHNICAL REPORT HAS NOT BEEN CARRIED OUT. MINIMUM ASSUMED ALLOWABLE BEARING PRESSURES TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. IF MINIMUM BEARING PRESSURES NOT ACHIEVED, AN ALTERNATIVE DESIGN WILL BE REQUIRED.
F3. ENSURE STABILITY OF ADJACENT BUILDINGS AND PATHS IS MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
F4. THE UNDERSIDE OF FOUNDATIONS SHALL CONFORM TO THE FOLLOWING REGARDLESS OF NOMINATED LEVELS:



F5. FOOTINGS SHALL BE CENTRALLY LOCATED UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
F6. FOOTINGS SHALL BE EXCAVATED TO THE DETAILED DEPTH AND WIDTH. FOOTINGS SHALL BE INSPECTED AND FILLED WITH CONCRETE AS SOON AS POSSIBLE TO AVOID EITHER SOFTENING OF THE FOUNDATION MATERIAL OR DRYING OUT BY EXPOSURE.
F7. THE BASE OF ALL PIER HOLES SHALL BE FREE OF WATER AND CLEANED OF LOOSE MATERIAL OR DEBRIS PRIOR TO PLACEMENT OF CONCRETE. ALLOW TO PROVIDE TEMPORARY LINERS AS DEEMED NECESSARY.

CONCRETE

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2009 AND NATSPEC CONCRETE STANDARDS.
C2. CONCRETE PROPERTIES AND COVER TO REINFORCING :

COVER TO REINFORCEMENT			
ELEMENT	CONCRETE STRENGTH f'c (MPa)	MAXIMUM 56 DAY DRY SHRINKAGE	COVER (mm)
WALLS	25	1000 µm	60
FOOTINGS	25	1000 µm	60

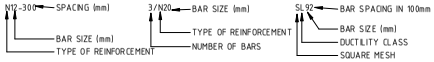
MAXIMUM AGGREGATE SIZE = 20mm U.N.O.
SLUMP DURING PLACING = 80mm ±10mm
EXPOSURE CLASSIFICATION = A2 (IN CONTACT WITH GROUND)
NO ADMIXTURES SHALL BE USED IN THE CONCRETE MIX UNLESS APPROVED BY NORTHROP CONSULTING ENGINEERS IN WRITING.

C3. SLABS USING MECHANICAL VIBRATORS.
C4. PLACE CONCRETE CONTINUOUSLY BETWEEN CONSTRUCTION JOINTS SHOWN ON PLAN. DO NOT BREAK OR INTERRUPT SUCCESSIVE POURS SUCH THAT COLD JOINTS OCCUR. ANY REVISIONS OR ADDITIONS TO CONSTRUCTION JOINTS SHOWN ON PLAN REQUIRE APPROVAL FROM THE NORTHROP CONSULTING ENGINEERS.
C5. REINFORCEMENT QUALITY AND NOTATION :

REINFORCEMENT NOTATION				
SYMBOL	BAR TYPE	STRENGTH GRADE (MPa)	DUCTILITY CLASS	TO COMPLY WITH AUSTRALIAN STANDARD
S	STRUCTURAL GRADE DEFORMED RIB BAR	250	NORMAL	AS/NZS 4671-2001
N	HOT ROLLED DEFORMED RIB BAR	500	NORMAL	AS/NZS 4671-2001
R	PLAIN ROUND BAR	250	NORMAL	AS/NZS 4671-2001
RL	RECTANGULAR MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
SL	SQUARE MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
L-TM	TRENCH MESH	500	LOW	AS/NZS 4671-2001

ALL REINFORCING BARS SHALL BE GRADE D500N TO AS/NZS 4671-2001 AND ALL MESH SHALL BE GRADE 500L TO AS/NZS 4671-2001. UNLESS NOTED OTHERWISE CLASS L REINFORCEMENT SHALL NOT BE USED.

REINFORCEMENT LABELS :



C6. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, AND NOT NECESSARILY IN TRUE PROJECTION. BARS SHOWN ARE INDICATIVE ONLY AND LENGTHS MAY VARY. BEAM ELEVATIONS TAKE PRECEDENCE OVER SECTIONS. SLAB PLANS TAKE PRECEDENCE OVER SECTIONS. REFER TO SECTIONS FOR EXTRA BARS THAT MAY BE REQUIRED.
C7. USE ONLY PLASTIC OR CONCRETE CHAIRS AT EXTERNAL SURFACES.
C8. SITE BENDING OF REINFORCEMENT BARS SHALL BE DONE WITHOUT HEATING USING A RE-BENDING TOOL. THE BARS SHALL BE RE-BENT AGAINST A FLAT SURFACE OR A PIN WITH A DIAMETER NOT LESS THAN THE MINIMUM PIN SIZE PRESCRIBED IN AS3600-2009.
C9. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN ON THE STRUCTURAL DRAWINGS OR IN POSITIONS OTHERWISE APPROVED IN WRITING BY NORTHROP CONSULTING ENGINEERS. LAPS SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND IN ACCORDANCE WITH AS3600-2009 SECTION 13.
C10. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY NORTHROP CONSULTING ENGINEERS.
C11. AT EXTERNALLY EXPOSED SURFACES NO METALLIC ITEMS INCLUDING FORM BOLTS, FORM SPACERS, METALLIC BAR CHAIRS AND TIE-WIRE ARE TO BE PLACED IN THE COVER ZONE.
C12. ALL REINFORCEMENT, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION AND INSPECTED BY A SUITABLY QUALIFIED ENGINEER PRIOR TO PLACING CONCRETE.
C13. ALL CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNISED TESTING LAB.
C14. FOR ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX, REFER TO CONCRETE - ELAPSED DELIVERY TIMES NOTE.

CONCRETE - ELAPSED DELIVERY TIMES

CE1. ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX AT THE SITE MUST NOT EXCEED THE CRITERIA IN THE ELAPSED DELIVERY TIMETABLE BELOW

ELAPSED DELIVERY TIME TABLE	
CONCRETE TEMPERATURE AT TIME OF DISCHARGE (°C)	MAXIMUM ELAPSED TIME (HOURS)
< 24	2.00
24 TO 27	1.50
27 TO 30	1.00
30 TO 32	0.75
32 TO 35	0.50

IF THE ELAPSED TIME IS LONGER THAN THE CORRESPONDING TIME IN THE TABLE ABOVE, OR THE TEMPERATURE IS GREATER THAN 35°C, THE CONCRETE MIX DESIGN ENGINEER IS TO BE CONTACTED TO CONFIRM WHETHER PLACEMENT IS TO PROCEED OR IF THE POUR IS TO BE STOPPED.

STEELWORK

S1. FABRICATE AND ERECT STRUCTURAL STEELWORK IN ACCORDANCE WITH AS4100-1998.
S2. PROVIDE HOLES, CLEATS AND FIXING FOR LIGHT STEEL/TIMBER FRAMING, FINISHES, ETC. SHOWN ON ARCHITECTURAL DRAWINGS.
S3. THESE DRAWINGS HAVE BEEN PREPARED TO INDICATE THE STRUCTURAL INTENT. THE SHOP DETAILER IS TO USE THESE DRAWINGS AS A BASIS FOR DIMENSIONAL COORDINATION WITH OTHER CONSULTANT'S DRAWINGS AND IS TO PREPARE DETAILED SHOP DRAWINGS. WHERE NECESSARY, THE SHOP DETAILER IS TO MAKE ASSUMPTIONS AND SUBMIT TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION. SHOP DETAILER IS TO ALLOW TO RE-WORK SHOP DRAWINGS AS NECESSARY. FABRICATOR SHALL PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE BUILDER FOR THEIR APPROVAL. BUILDER SHALL LODGE TWO COPIES OF APPROVED DRAWINGS TO NORTHROP CONSULTING ENGINEERS FOR REVIEW PRIOR TO FABRICATION, (ALLOW 5 WORKING DAYS FOR REVIEW).
S4. UNLESS NOTED OTHERWISE, USE:
- 6mm CONTINUOUS FILLET WELDS MADE WITH E4818 MILD STEEL ELECTRODES.
- ALL WELDS SP CATEGORY

S5. ALL BOLTS, SCREWS, HOLD DOWN BOLTS, MASONRY ANCHORS SHALL BE HOT DIP GALVANISED TO AS1214-1983, AS/NZS 4534-2006, AS/NZS 4680-2006 & AS/NZS 4792-2006. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED. ALL HOLES SHALL BE 2mm LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE.
S6. MINIMUM YELD STRESS:
- HOT ROLLED SECTIONS = 300MPa
- SQUARE HOLLOW SECTIONS = 350MPa
- RECTANGULAR HOLLOW SECTIONS = 350MPa
- CIRCULAR HOLLOW SECTION = 250MPa
- HOT ROLLED PLATE = 250MPa

S7. SURFACE TREATMENT UNLESS NOTED OTHERWISE:
- EXPOSED TO WEATHER (STRUCTURAL MEMBERS) (TIME TO FIRST MAINTENANCE TO BE 10 YEARS) = AS/NZS 2312-HDG600P3 or IZS3
- BUILT INTO THE INTERNAL SKIN OF EXTERNAL WALLS = AS/NZS 2312-HDG600P3

S8. ALL BURIED STEELWORK TO BE PAINTED FIRST USING 'EXPOSED TO WEATHER' TREATMENT SYSTEM FOLLOWED BY THE APPLICATION OF A TWO PART EPOXY SUCH AS 'SIKAGUARD-63N' OR APPROVED EQUIVALENT, THEN CONCRETE ENCASE STEELWORK WITH MASS CONCRETE (MINIMUM 75mm COVER TO STEELWORK).
S9. STEELWORK TO BE CONCRETE ENCASED FOR FIRE RATING PURPOSES SHALL BE FREE FROM ALL LOOSE RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE, ETC. AND REINFORCED WITH SL41 FABRIC OR EQUIVALENT BLACK IRON WIRE, 3mm DIA.
S10. BOLT SYMBOLS:
- 4.6/S = GRADE 4.6 BOLT / SNUG TIGHTENED.
- 8.8/S = GRADE 8.8 BOLT / SNUG TIGHTENED.
- 8.8/TF = GRADE 8.8 BOLT / FULLY TENSIONED FRICTION TYPE (USE LOAD INDICATOR WASHERS)
- 8.8/TB - GRADE 8.8 BOLT / FULLY TENSIONED BEARING TYPE (USE LOAD INDICATOR WASHERS)

S11. THE CONTRACTOR SHALL SUPPLY WRITTEN CERTIFICATION TO THE STRUCTURAL ENGINEER PRIOR TO THE ERECTION OF ANY STRUCTURAL STEEL STATING THAT THE BOLTS PROPOSED TO BE USED COMPLY WITH AS/NZS 1252-1996. HIGH STRENGTH BOLTS (8.8) ARE NOT TO BE WELDED.
S12. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEEL WORK SHALL BE SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, IN ORDER TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
S13. ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS. SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.
S14. GROUT ALL STEEL BASES BY DRY PACKING USING GROUT WHICH IS NON-SHRINK AND HAS A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 40MPa
S15. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS ARE TO BE HOT DIP GALVANISED.
S16. THESE DRAWINGS MAY NOT IDENTIFY ALL SECONDARY STEELWORK ELEMENTS THAT ARE REQUIRED FOR SUPPORT, FIXING AND FINISHING OF GLAZING, CLADDING AND LINING. THE TENDERER IS RESPONSIBLE FOR THE INCLUSION OF SUCH STEELWORK ELEMENTS TO THE EXTENT REQUIRED ON THE ARCHITECT'S DRAWINGS.
S17. IMPORTED STRUCTURAL STEEL MATERIAL
ALL STRUCTURAL STEELWORK USED ON THIS PROJECT SHALL BE COMPLIANT WITH AS4100, AND IN PARTICULAR:
- CERTIFIED MILL TEST REPORTS, OR TEST CERTIFICATES SHALL BE PROVIDED AS EVIDENCE OF COMPLIANCE WITH THE STANDARDS REFERRED TO IN AS4100. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- PROVIDE TEST CERTIFICATED FOR COMPLIANCE FOR ALL FASTENERS. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- FOR COLD FORMED SECTIONS A "CERTIFICATE OF CONFORMITY TO AS1163-1991" SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- CERTIFICATES SHALL ONLY BE ACCEPTED FROM TESTING COMPANIES ACCREDITED BY A TESTING AUTHORITY RECOGNISED IN AUSTRALIA, EG NATA or JAS-ANZ CERTIFIED.
- UNIDENTIFIED STEEL ie. ANY STEEL THAT IS NOT ACCOMPANIED WITH EVIDENCE STATING COMPLIANCE WITH THE REQUIREMENT OF AS4100 SHALL ONLY BE USED STRICTLY IN ACCORDANCE WITH CLAUSE 2.2.3 OF AS4100. IF MATERIALS SUPPLIED AND INSTALLED ARE SUBSEQUENTLY PROVEN TO BE NON COMPLIANT WITH THE SPECIFIED AUSTRALIAN STANDARDS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND COST TO UNDERTAKE NATA OR EQUIVALENT CERTIFIED TESTING TO PROVE CONFORMANCE TO THE AUSTRALIAN STANDARDS AND DESIGN SPECIFICATIONS. SIMILARLY ANY RECTIFICATION WORKS THAT MAY SUBSEQUENTLY BE REQUIRED TO SATISFY AUSTRALIAN CODE REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

RAMMED EARTH

RE1. RAMMED EARTH WALLS SHALL CONFORM TO THE RELEVANT REQUIREMENTS OF AS3700, SAA HB 195, NZS4297, NZS4298 & NZS4299
RE2. THE CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH OF THE MASONRY UNITS SHALL BE A MINIMUM OF 2.5MPa. THE MINIMUM CEMENT CONTENT BY WEIGHT SHALL BE 6%.
RE3. SUBMIT THE FOLLOWING FOR APPROVAL TO THE SUPERINTENDENT PRIOR TO COMMENCING WORKS:
- MIX DESIGN TO ACHIEVE DENSITY AND STRENGTH REQUIREMENTS, INCLUDING CEMENT CONTENT BY WEIGHT, DENSITY TO BE ACHIEVED AND PARTICLE SIZE DISTRIBUTION
- TEST REPORTS INCLUDING CONFIRMATION OF INSITU UNCONFINED COMPRESSIVE STRENGTH AND ELAPSED TIME BETWEEN ADDITION OF CEMEMNT AND COMPACTION. UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF SAA HB 195

RE4. U.N.O. ALL ANCHORS INTO RAMMED EARTH SHALL BE HILTI HIT-HY70 INJECTION ANCHORS. ANCHORS ARE TO BE HOT DIP GALVANISED
RE5. THE MOISTURE CONTENT AT PLACEMENT SHALL BE BETWEEN 8-16% BY WEIGHT
RE6. FORMWORK SHALL BE DESIGNED BY A SUITABLY QUALIFIED ENGINEER, AND SHALL BE CAPABLE OF WITHSTANDING THE PRESSURE OF THE SOIL DURING COMPACTION. SUITABLE BOND BREAKERS SHALL BE USED TO ALLOW STRIPPING WITHOUT DISTURBANCE OF THE COMPACTED WALL.
RE7. PLACEMENT OF RAMMED EARTH SHALL NOT BE CARRIED OUT WHEN TEMPERATURE IS GREATER THAN 32 DEGREES CELSIUS.
RE8. MATERIAL SHALL BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 200mm THICK (WHEN UNCOMPACTED). MECHANICAL COMPACTION IS TO BE UNDERTAKEN USING PNEUMATIC RAMMERS. HAND RAMMING IS NOT TO BE USED.

NORTHROP
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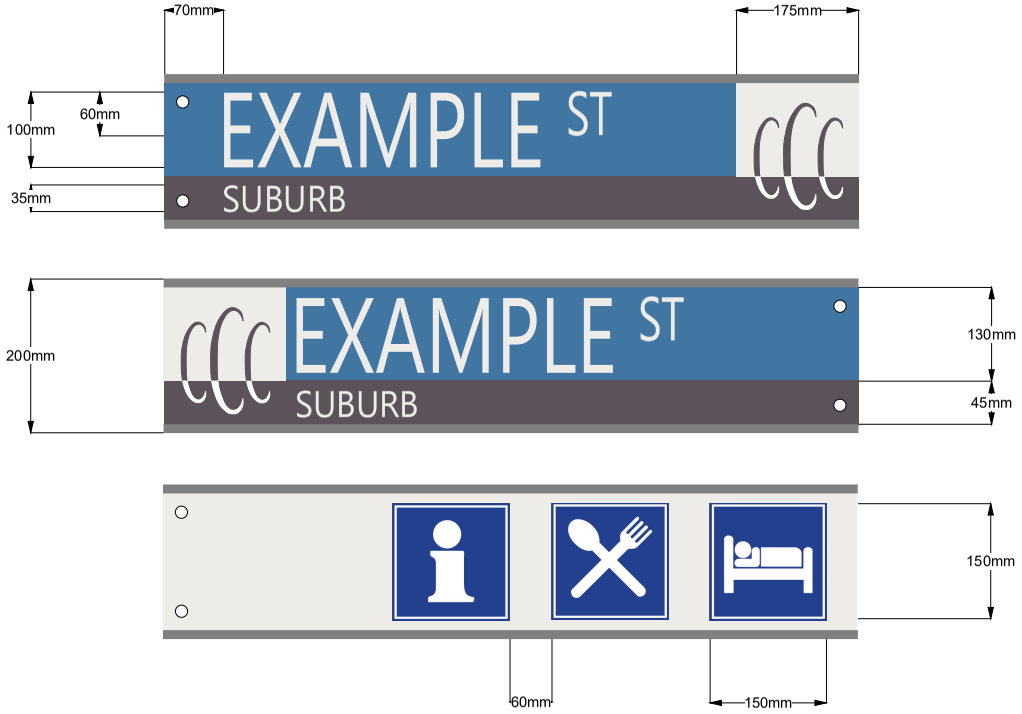
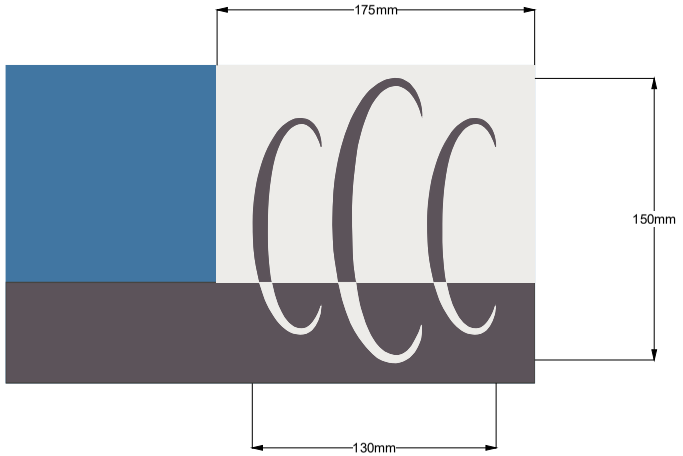
Email newcastle@northrop.com.au ABN 81 094 433 100

JOB NUMBER:	NL166682	DATE:	16/02/2018	REV. 2
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK20			

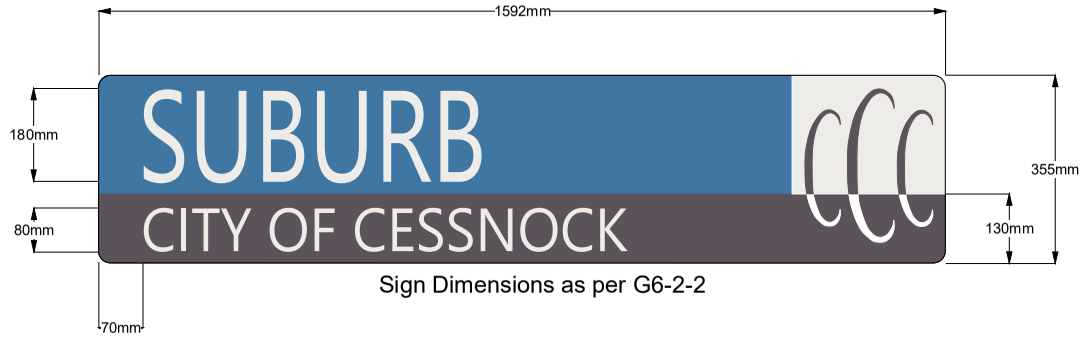
4.5 SS Street Signs - Dimensions



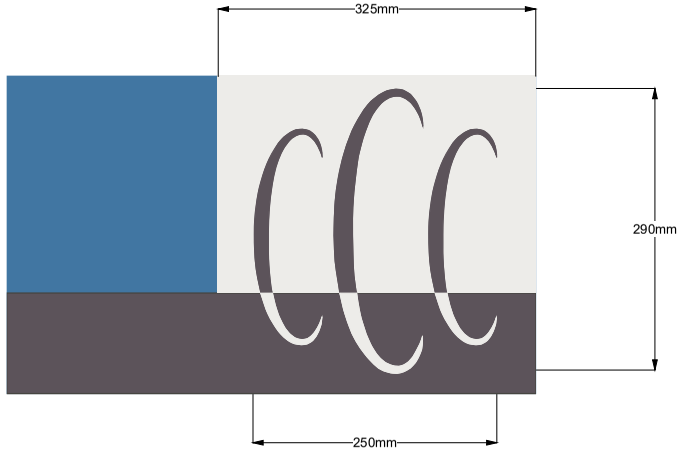
16 Standard Street Blade



17 Council Logo - Standard Street Blade

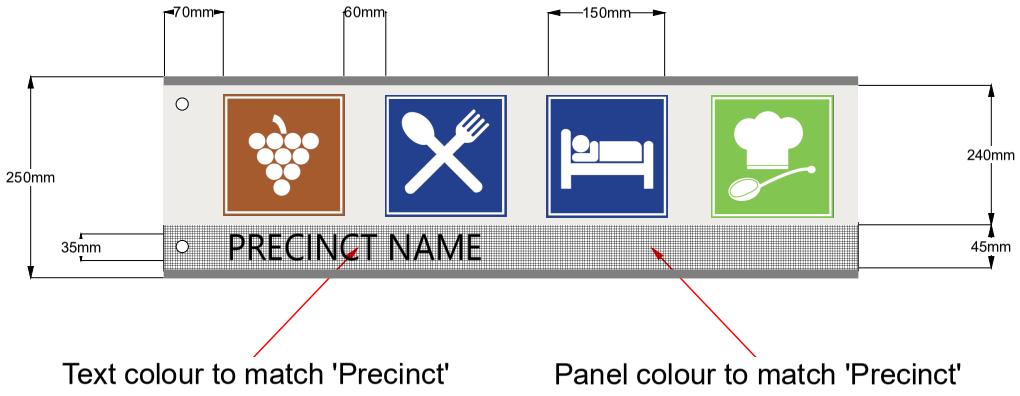


18 Suburb Sign Secondary Roads

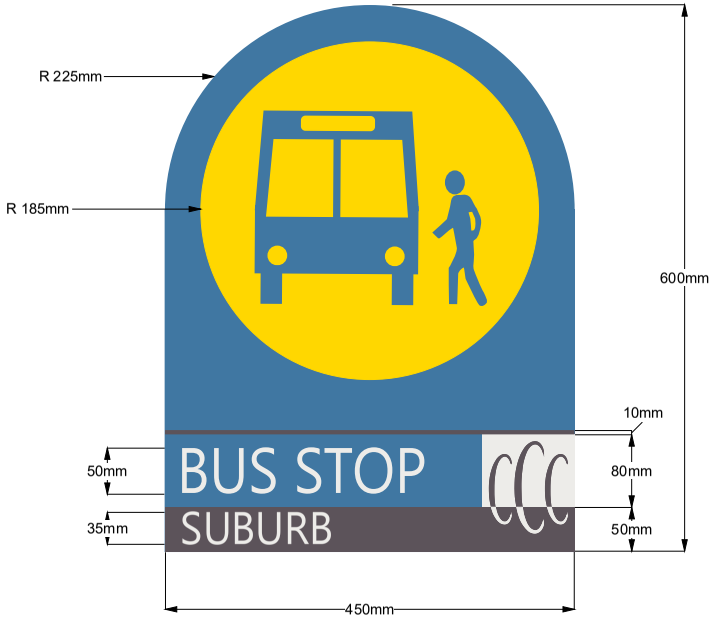


19 Council Logo - Suburb Sign Secondary Roads

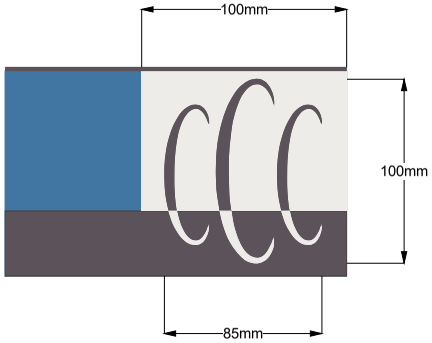
4.5 SS Street Signs - Dimensions



20 Precinct Pictogram Blade

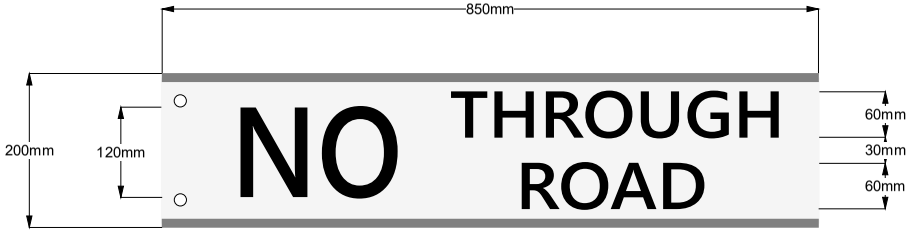


21 Bus Stop



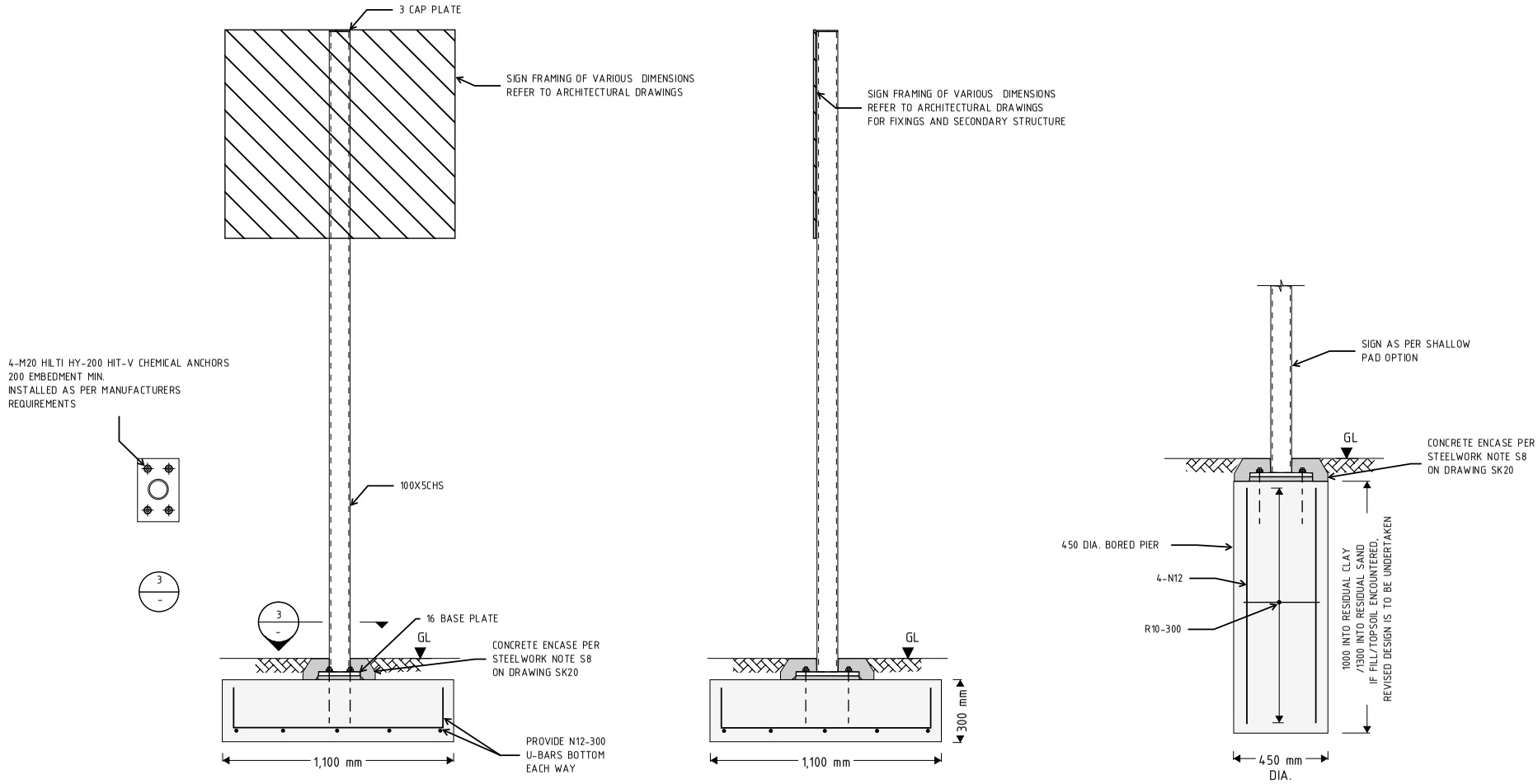
22 Logo Dimensions Bus Stop

23 Suburb Directional Blade



24 Rural No Through Road

4.5 SS Street Signs - Engineers Drawing



SS1-SS6 STREET SIGNS (TYP.) (100CHS, 3000h MAX.)

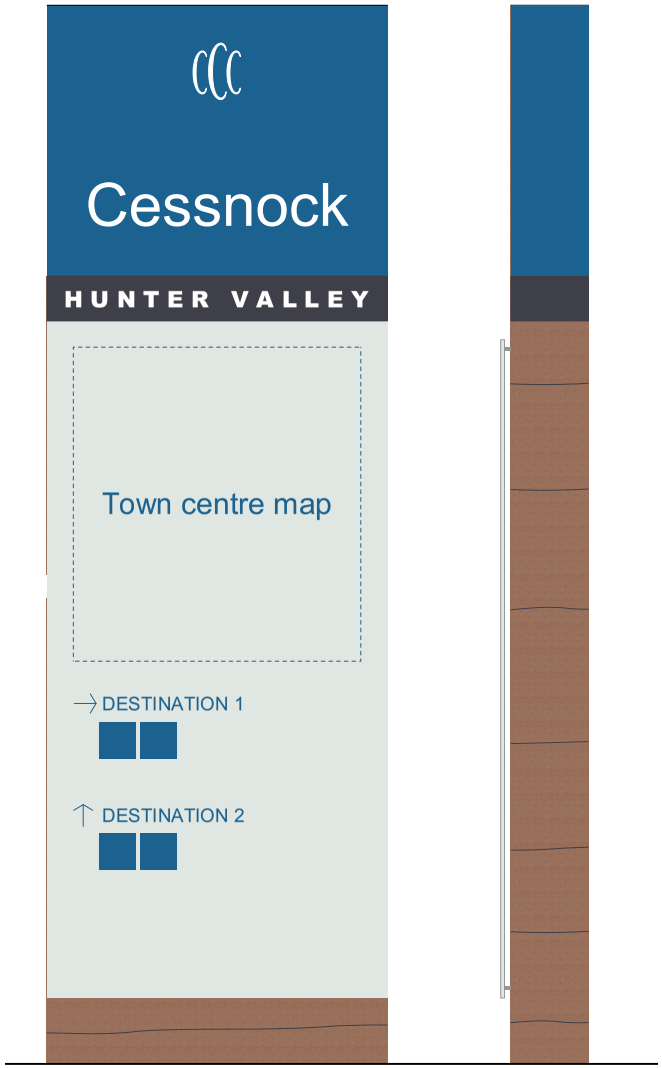
NORTHROP
Newcastle
Suite 4, 215 Pacific Hwy, Charlestown NSW 2290
P.O. Box 180, Charlestown NSW 2290
Ph (02) 4943 1777 Fax (02) 4943 1577
Email newcastle@northrop.com.au ABN 81 094 433 100

JOB NUMBER:	NL166682	DATE:	15/12/2017	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			1
DRAWING TITLE:	SS1-SS6 STREET SIGNS (TYP.)			
DRAWING NUMBER:	NL166682_SK26			

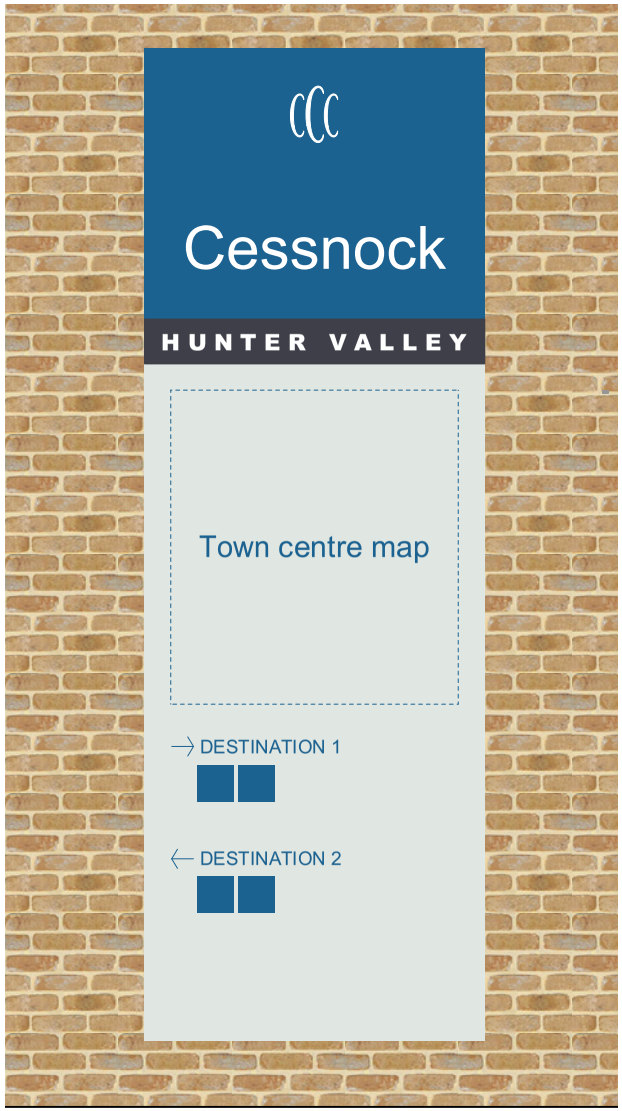
NOTE:
MINIMUM ALLOWABLE BEARING PRESSURE OF 100KPa IS ASSUMED, AND IS TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE.
IF FOOTING NOT IN 100kPa MATERIAL, ALTERNATIVE DESIGN WILL BE REQUIRED

REFER TO SK20 FOR SPECIFICATIONS

4.6 TC1-TC2 Town Centre Information Sign



01 TC1 Town Centre Information Sign - Freestanding



02 TC2 Town Centre Information Sign - Wall Mounted

COLOURS:

Blue: CMYK: 83, 37, 6, 6
RGB: 65, 118, 162

Grey: CMYK: 74, 66, 48, 16
RGB: 92, 83, 90

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

LETTERING:

Cessnock: Arial
Hunter Valley: Arial Black
Town Centre Information etc: Arial

4.6 TC1-TC2 Town Centre Information Sign - Signage Specification

1.0 STEEL
General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier

1.1 Durability
General: Provide steel products protected from corrosion to suit the conditions of use.

1.2 Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

1.3 Protective coatings
Environment: To AS/NZS 2312 clause 2.3.
Coating designation: To AS/NZS 2312

Fasteners
Self drilling screws
Corrosion resistance: To AS 3566.2

Vapour barrier
Vapour barrier to slabs: To AS 2870 clause 5.3.3.
Minimum thickness: 0.2 mm.

1.4 Aluminium and aluminium alloys
Drawn pipe: To AS/NZS 1867.
Drawn rod, bar and strip: To AS/NZS 1865.
Extrusions: To AS/NZS 1866.
Plate and sheets: To AS/NZS 1734.

1.5 Coated steel
Electrogalvanized (zinc) coating on ferrous hollow and open sections: To AS 4750.
Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
- Ferrous open sections by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections by a continuous or specialised process: To AS/NZS 4792.
- Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.

Steel wire: To AS/NZS 4534.

1.6 Metal separation
Incompatible sheet metals: Prevent direct contact between incompatible metals. Provide separation by one of the following:
- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
- Insert a concealed, non-metallic separation layer such as polyethylene film, adhesive tape, neoprene, nylon or bituminous felt.

Incompatible fixings: Do not use.
Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous or paper products.

1.7 Brazing
General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.
Butt joints: Do not use butt jointing for joints subject to load. If butt joints are used, do not rely on the filler metal fillet only.
Filler metal: To AS/NZS 1167.1.

1.8 Finishing
Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Make sure self-finished metals are without surface colour variations after jointing.

1.9 Preparation
General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.
Standard: To AS 1627 series.
Priming steel surfaces: If site painting is documented to otherwise uncoated mild steel or similar surfaces, prime as follows:
- After fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to unprimed surfaces.

1.10 Welding
Aluminium: To AS 1665.
Stainless steel: To AS/NZS 1554.6.
Steel: To AS/NZS 1554.1.

1.11 Electroplated coatings
Chromium on metals: To AS 1192.
- Service condition number: At least 2.

Nickel on metals: To AS 1192.
- Service condition number: At least 2.

Zinc on iron or steel: To AS 1789.

1.12 Alluminium Steel Panels to form 'Box / Cladding'
General: Locate as per details.
Type: 6mm thick alluminium panels.

4.6 TC1-TC2 Town Centre Information Sign - Signage Specification

Fixing: To be confirmed by shop drawings. Ensure all finishing of concrete wall is completed prior to installation.
Finish: paint (refer section 3.0). Colour as per drawings.

1.13 Alluminium Steel Panels (fixed to concrete)
General: Locate as per details.
Type: 6mm thick alluminium panels
Fixing: 6-8mm threaded rod with 25mm stand off. Ensure all finishing of concrete wall is completed prior to installation.
Finish: paint (refer section 3.0). Colour as per drawings.

1.14 Galvanised SHS frame
General: Locate as per details.
Type: 50mm x 5mm galvanised SHS fully welded frame
Fixing: 10mm baseplate. Fix into M16 ferrile central. Ensure all finishing of concrete wall is completed prior to installation.
Finish: galvanised.

2.0 CONCRETE
2.1 Off-form concrete wall
General: Timber ply layered off-form cast concrete wall. Hand mix in batches and pour in 200mm layers to achieve layered effect (similar to rammed earth).
Standard: Class 3 as per AS3610.
Colour to wall: CCS Gecko
Exposure: To AS3600 Table 4.3.
Aggregate: 8-10mm quartz aggregate.
Cement: natural grey portland.
Finish: 16mm custom orb off-form finish to Class 3 as per AS3610 and timber ply.
Refer to engineers specification for structural details and specification.

3.0 PAINTING
3.1 Products
Storage and handling:
Requirement: Handle, store, mix and apply all protective coatings in conformance with the manufacturer's recommendations.
Original containers: Deliver coating products to site in manufacturer's labelled and sealed containers.
Ambient temperature range for storage: 3°C to 30°C, or to manufacturer's recommendations.
Sunlight: Protect coating materials from direct sunlight before mixing or adding the converter (catalyst).
Use-by-date: Use products with limited shelf life before their use-by-date, unless written authorisation from the coating manufacturer's technical services section is provided.

Paint material:
Requirement: To AS/NZS 5131 clause 9.9.3.

Proprietary products:
Requirement: Provide all products from the one manufacturer's supply.
Product data sheets (PDS): Keep on site copies of all relevant manufacturer's PDS.
Safety data sheets (SDS): Keep on site copies of all relevant manufacturer's SDS.
Recording: To AS/NZS 5131 clause 9.9.5.

3.2 Surface Preparation
General: To AS/NZS 5131 Section 9 and the recommendations of AS/NZS 2312.1.
Galvanized, aluminium and zinc primed surfaces:
Requirement: Remove grease, oil and other solvent-soluble contaminants to AS 1627.1. Allow to dry and immediately proceed with the next operation.
Galvanized and aluminium surfaces: Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Treatment of welds:
Requirement: Clean welds to remove roughness, using power tools to AS 1627.2. Remove filings by vacuuming or compressed air.
Temporary welds: Grind flush any temporary welds.
Porous, skip or stitch welds: Not permitted.
Site welding: If possible, avoid site welding. If on site welding is required, prepare and treat the weld to AS/NZS 5131 clause 9.12.2.

Shop priming:
Requirement: Dust off and apply a coat of primer in conformance with the manufacturer's recommendations.

Site coating:
General: High pressure wash down all surfaces with clean water. Lightly sand down primer/ intermediate coats, which have been shop applied, before site application of next coat.

3.3 Preparation assessment
General: Assess all surfaces of each steel member for conformance with the documented preparation requirements.
Abrasive blast cleaning: To AS 1627.4 and AS 1627.9.
Mechanical cleaning: To AS 1627.9.
Surface profile: To AS 3894.5 Method A.
Surface dust from abrasion: To AS 3894.6 Method C.
Chloride level testing: Test: To AS 3894.6 Method A.

Maximum allowable chloride levels: 50 mg/m2 for critical applications (heavy condensation, fresh water ponding or immersion) or to manufacturer's recommendations.
Conformance: If the maximum allowable chloride is exceeded, rewash the affected surface area until the chloride level is within the acceptable limits using clean water or chloride neutralising solutions. Jet-washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.
Timing of testing: Early in the blasting work so that removal procedures can be started before the blasting is completed.

3.4 Mixing
General: To AS/NZS 5131 clause 9.9.6.
Powered agitators: Mix package sizes larger than 4 litres using powered agitators driven by air motors.
Multi-component coatings: Combine as whole pack units before application.
Thinners: If addition of thinners is proposed, conform to the coating manufacturer's recommendations for the documented product.
Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

3.5 Coating Application
General: Conform to AS/NZS 5131 clause 9.9 and the PDS.
Painting and coating colour: Verify all project finish colours with the retained samples.
Final surface preparation or coating application:
Limits: If the environmental/climatic/substrate conditions listed in AS/NZS 5131 clause 9.9.10 and the following are present do not apply coating:

- Ambient air temperature below 5°C or above 40°C.
- Substrate temperature below 5°C or above 35°C.
- Full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
- Surface preparation standard has not been achieved.
- Time between final surface preparation and the commencement of coating has exceed 4 hours.
- Visual tarnishing or black spots develop on the surface of the steel.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, providing the final surface preparation and all coating applications are undertaken under the limit conditions.
Pre-coating: Before the spray application of each coating, stripe coat by brush method all edges, welds, seams, rivets, bolts, bolt holes (including slots) and difficult to spray areas. Prime the underlying surfaces of replacement bolting, washers and nuts before installation.
Procedure: Conform to the coating order shown in SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS.
Subsequent coats: Before applying any subsequent coating layer, make sure the surface condition of the preceding coat conforms to SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS and is clean and free from defects.

Wet film thickness (WFT):
Method of measurement: To AS 3894.3 Appendix C using an approved wet film gauge continuously during application.

Dry film thickness (DFT):
Method of measurement: To AS 3894.3 clause 10.
Extent: Measure all surfaces at the completion of each prime, intermediate and finish coats, including areas of the element difficult to paint, masked by structure, or where double or light coating is likely.
Number of measurements: To AS 3894.3 clause 7.
Coatings with DFT 150 µm or less: If testing, deduct the effect of the measured surface profile from all DFT readings.
Single readings: Conform to the following:

- The average of 5 point readings for each 10 m2 area of coating surface to be within the documented coating thickness range.
- No single point reading in any 10 m2 to be less than 80% of the specified minimum coating thickness. If the average of three readings is used to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
- Check any single reading that is greater than 150% of the documented maximum DFT with three additional readings within 50 mm of the original reading. If the average of these three readings is not greater than 150% of the specified DFT, take the average reading as the point reading. If greater than 150%, reject the DFT for that area. If no maximum limit for DFT is documented, consult manufacturer.

Rectification and defects:
Rectification: Re-work areas rejected, using the same surface preparation, coatings and sequence as for the original work.
Defects (including under-thickness and over-thickness): Mark with dustless chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

3.6 Protection
Contamination:
Surfaces: Prevent contamination of coated surface, which are not yet dry, from blasting dust, abrasive or surface preparation debris and any other foreign matter.
Post application care:
General: Protect the coating against physical, chemical, or atmospheric damage until all components are fully cured.
Care: Stack and handle all coated items using fabric slings or padded chains. Use soft packaging, carpet strips or other deformable materials between all coated items.
Water ponding: Stack coated items to prevent water ponding.

4.6 TC1-TC2 Town Centre Information Sign - Signage Specification

3.7 Coating Repair
Repair of coating damage:
Preparation: Feather back by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edge.
Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.
Sequence: Apply the repair coating in the same sequence and manner as the original coating.
Areas damaged without exposing the primer: Wash with a proprietary detergent solution, rinse with clean water and abrade so that edges of sound paint are feathered. Coat the area with the appropriate intermediate and finishing coat materials.
Areas damaged exposing the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm.
Re-coat with the documented system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.
Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line. Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.
Timing: Apply the protective coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

3.8 Completion
General:
Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties:
Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.
- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

3.9 Selections
Two-pack liquid coating:
Application to be 2-pack polyurethane or approved equivalent.
Application: Spray.
Finish: Full gloss.
Primer: Two pack epoxy primer to AS/NZS 3750.13.

Topcoat:
- External use: Proprietary polyurethane system.

Polyurethane – AS/NZS 2312.1Categories C1 and C2 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/NZS 2312.1 PUR2	75 µm Epoxy zinc phosphate conforming to AS/NZS 3750.13	50 µm High Solids Polyurethane conforming to AS/NZS 3750.6	Nil

Polyurethane – AS/NZS 2312.1 Categories C3, C4 and C5 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/NZS 2312.1 PUR5	75 µm Zinc rich epoxy conforming to AS/NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO conforming to AS/NZS 3750.14	50 µm Polyurethane conforming to AS/NZS 3750.6 (Alternative: 75 µm High Solids Polyurethane)

4.0 VINYL SIGNAGE
Graphic set-out to be providex by Cessnock City Council.

All vinyl signage to be Eclipse 21 Series Self-Adhesive Polymeric Inkjet Vinyl. Vinyl to be 3mm thick with a UV stabilized over laminate in matte finish.
Solid colours are to be in Pantone colours and other imagery CMYK format.
To be installed in accordance with manufacturer's specifications.

4.6 TC1-TC2 Town Centre Information Sign - Engineers Specification

GENERAL

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONSULTANT'S DRAWINGS.
G2. ALL DISCREPANCIES SHALL BE REFERRED TO THE PROJECT MANAGER AND RESOLVED BEFORE PROCEEDING WITH THE WORK.
G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. THESE STRUCTURAL DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
G4. ALL WORKMANSHIP, TESTING, MATERIALS AND SUPERVISION ARE TO BE IN ACCORDANCE WITH THESE SPECIFICATIONS, THE WORK HEALTH AND SAFETY ACT 2011 ENFORCED BY THE WORKCOVER AUTHORITY AND CURRENT RELEVANT AUSTRALIAN STANDARDS.
G5. THE DETERMINATION OF A SAFE WORK METHOD REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. ANY ELEMENT WHICH POSES AN UNACCEPTABLE LEVEL OF SAFETY RISK TO CONSTRUCT SHALL BE REFERRED TO THE STRUCTURAL ENGINEER. TEMPORARY BRACING AND SUPPORT OF STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
G6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL SERVICES IN THE VICINITY OF THE WORKS.
G7. THE STRUCTURAL COMPONENTS DETAILED ON THESE STRUCTURAL DRAWINGS ARE JOB SPECIFIC AND HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADS:

WIND LOADS:

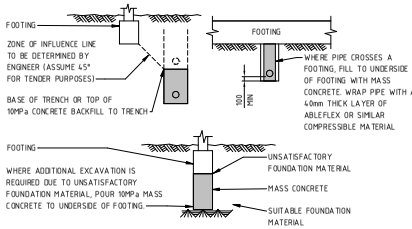
- IMPORTANCE LEVEL = 2
- REGION = A2
- ANNUAL PROBABILITY OF EXCEDENCE = 1/500
- REGIONAL WIND SPEED V_R = 45 m/s
- TERRAIN CATEGORY = TC2
- TERRAIN MULTIPLIER $M_{z,cat}$ = 0.91
- WIND DIRECTION MULTIPLIER M_d = 1
- SHIELDING MULTIPLIER M_s = 1
- TOPOGRAPHIC MULTIPLIER M_t = 1
- SITE WIND SPEED = 41 m/s

G8. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO SAFETY THE MATTER SHALL BE REFERRED TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
G9. NO CHANGES IN ANY STRUCTURAL ELEMENT SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM NORTHROP CONSULTING ENGINEERS. IF THERE IS A DISCREPANCY THEN FOR TENDER PURPOSES ALLOW FOR THE MOST EXPENSIVE OPTION. NORTHROP CONSULTING ENGINEERS SHALL BE CONTACTED TO CONFIRM PRIOR TO CONSTRUCTION.
G10. NORTHROP CONSULTING ENGINEERS ACCEPTS NO RESPONSIBILITY FOR ANY WORK NOT INSPECTED OR NOT APPROVED BY NORTHROP CONSULTING ENGINEERS DURING CONSTRUCTION.

FOUNDATIONS

F1. ASSUMED ALLOWABLE BEARING CAPACITY:
- FOOTINGS = 100kPa

F2. A GEOTECHNICAL REPORT HAS NOT BEEN CARRIED OUT. MINIMUM ASSUMED ALLOWABLE BEARING PRESSURES TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. IF MINIMUM BEARING PRESSURES NOT ACHIEVED, AN ALTERNATIVE DESIGN WILL BE REQUIRED.
F3. ENSURE STABILITY OF ADJACENT BUILDINGS AND PATHS IS MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
F4. THE UNDERSIDE OF FOUNDATIONS SHALL CONFORM TO THE FOLLOWING REGARDLESS OF NOMINATED LEVELS:



F5. FOOTINGS SHALL BE CENTRALLY LOCATED UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
F6. FOOTINGS SHALL BE EXCAVATED TO THE DETAILED DEPTH AND WIDTH. FOOTINGS SHALL BE INSPECTED AND FILLED WITH CONCRETE AS SOON AS POSSIBLE TO AVOID EITHER SOFTENING OF THE FOUNDATION MATERIAL OR DRYING OUT BY EXPOSURE.
F7. THE BASE OF ALL PIER HOLES SHALL BE FREE OF WATER AND CLEANED OF LOOSE MATERIAL OR DEBRIS PRIOR TO PLACEMENT OF CONCRETE. ALLOW TO PROVIDE TEMPORARY LINERS AS DEEMED NECESSARY.

CONCRETE

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2009 AND NATSPEC CONCRETE STANDARDS.
C2. CONCRETE PROPERTIES AND COVER TO REINFORCING :

COVER TO REINFORCEMENT			
ELEMENT	CONCRETE STRENGTH f'c (MPa)	MAXIMUM 56 DAY DRY SHRINKAGE	COVER (mm)
WALLS	25	1000 µm	60
FOOTINGS	25	1000 µm	60

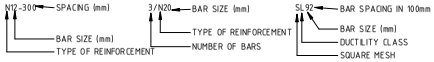
MAXIMUM AGGREGATE SIZE = 20mm U.N.O.
SLUMP DURING PLACING = 80mm ±10mm
EXPOSURE CLASSIFICATION = A2 (IN CONTACT WITH GROUND)
NO ADMIXTURES SHALL BE USED IN THE CONCRETE MIX UNLESS APPROVED BY NORTHROP CONSULTING ENGINEERS IN WRITING.

C3. SLABS USING MECHANICAL VIBRATORS.
C4. PLACE CONCRETE CONTINUOUSLY BETWEEN CONSTRUCTION JOINTS SHOWN ON PLAN. DO NOT BREAK OR INTERRUPT SUCCESSIVE POURS SUCH THAT COLD JOINTS OCCUR. ANY REVISIONS OR ADDITIONS TO CONSTRUCTION JOINTS SHOWN ON PLAN REQUIRE APPROVAL FROM THE NORTHROP CONSULTING ENGINEERS.
C5. REINFORCEMENT QUALITY AND NOTATION :

REINFORCEMENT NOTATION				
SYMBOL	BAR TYPE	STRENGTH GRADE (MPa)	DUCTILITY CLASS	TO COMPLY WITH AUSTRALIAN STANDARD
S	STRUCTURAL GRADE DEFORMED RIB BAR	250	NORMAL	AS/NZS 4671-2001
N	HOT ROLLED DEFORMED RIB BAR	500	NORMAL	AS/NZS 4671-2001
R	PLAIN ROUND BAR	250	NORMAL	AS/NZS 4671-2001
RL	RECTANGULAR MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
SL	SQUARE MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
L-TM	TRENCH MESH	500	LOW	AS/NZS 4671-2001

ALL REINFORCING BARS SHALL BE GRADE D500N TO AS/NZS 4671-2001 AND ALL MESH SHALL BE GRADE 500L TO AS/NZS 4671-2001. UNLESS NOTED OTHERWISE CLASS L REINFORCEMENT SHALL NOT BE USED.

REINFORCEMENT LABELS :



C6. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, AND NOT NECESSARILY IN TRUE PROJECTION. BARS SHOWN ARE INDICATIVE ONLY AND LENGTHS MAY VARY. BEAM ELEVATIONS TAKE PRECEDENCE OVER SECTIONS. SLAB PLANS TAKE PRECEDENCE OVER SECTIONS. REFER TO SECTIONS FOR EXTRA BARS THAT MAY BE REQUIRED.
C7. USE ONLY PLASTIC OR CONCRETE CHAIRS AT EXTERNAL SURFACES.
C8. SITE BENDING OF REINFORCEMENT BARS SHALL BE DONE WITHOUT HEATING USING A RE-BENDING TOOL. THE BARS SHALL BE RE-BENT AGAINST A FLAT SURFACE OR A PIN WITH A DIAMETER NOT LESS THAN THE MINIMUM PIN SIZE PRESCRIBED IN AS3600-2009.
C9. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN ON THE STRUCTURAL DRAWINGS OR IN POSITIONS OTHERWISE APPROVED IN WRITING BY NORTHROP CONSULTING ENGINEERS. LAPS SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND IN ACCORDANCE WITH AS3600-2009 SECTION 13.
C10. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY NORTHROP CONSULTING ENGINEERS.
C11. AT EXTERNALLY EXPOSED SURFACES NO METALLIC ITEMS INCLUDING FORM BOLTS, FORM SPACERS, METALLIC BAR CHAIRS AND TIE-WIRE ARE TO BE PLACED IN THE COVER ZONE.
C12. ALL REINFORCEMENT, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION AND INSPECTED BY A SUITABLY QUALIFIED ENGINEER PRIOR TO PLACING CONCRETE.
C13. ALL CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNISED TESTING LAB.
C14. FOR ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX, REFER TO CONCRETE - ELAPSED DELIVERY TIMES NOTE.

CONCRETE - ELAPSED DELIVERY TIMES

CE1. ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX AT THE SITE MUST NOT EXCEED THE CRITERIA IN THE ELAPSED DELIVERY TIMETABLE BELOW

ELAPSED DELIVERY TIME TABLE	
CONCRETE TEMPERATURE AT TIME OF DISCHARGE (°C)	MAXIMUM ELAPSED TIME (HOURS)
< 24	2.00
24 TO 27	1.50
27 TO 30	1.00
30 TO 32	0.75
32 TO 35	0.50

IF THE ELAPSED TIME IS LONGER THAN THE CORRESPONDING TIME IN THE TABLE ABOVE, OR THE TEMPERATURE IS GREATER THAN 35°C, THE CONCRETE MIX DESIGN ENGINEER IS TO BE CONTACTED TO CONFIRM WHETHER PLACEMENT IS TO PROCEED OR IF THE POUR IS TO BE STOPPED.

STEELWORK

S1. FABRICATE AND ERECT STRUCTURAL STEELWORK IN ACCORDANCE WITH AS4100-1998.
S2. PROVIDE HOLES, CLEATS AND FIXING FOR LIGHT STEEL/TIMBER FRAMING, FINISHES, ETC. SHOWN ON ARCHITECTURAL DRAWINGS.
S3. THESE DRAWINGS HAVE BEEN PREPARED TO INDICATE THE STRUCTURAL INTENT. THE SHOP DETAILER IS TO USE THESE DRAWINGS AS A BASIS FOR DIMENSIONAL COORDINATION WITH OTHER CONSULTANT'S DRAWINGS AND IS TO PREPARE DETAILED SHOP DRAWINGS. WHERE NECESSARY, THE SHOP DETAILER IS TO MAKE ASSUMPTIONS AND SUBMIT TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION. SHOP DETAILER IS TO ALLOW TO RE-WORK SHOP DRAWINGS AS NECESSARY. FABRICATOR SHALL PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE BUILDER FOR THEIR APPROVAL. BUILDER SHALL LODGE TWO COPIES OF APPROVED DRAWINGS TO NORTHROP CONSULTING ENGINEERS FOR REVIEW PRIOR TO FABRICATION, (ALLOW 5 WORKING DAYS FOR REVIEW).
S4. UNLESS NOTED OTHERWISE, USE:
- 6mm CONTINUOUS FILLET WELDS MADE WITH E4818 MILD STEEL ELECTRODES.
- ALL WELDS SP CATEGORY

S5. ALL BOLTS, SCREWS, HOLD DOWN BOLTS, MASONRY ANCHORS SHALL BE HOT DIP GALVANISED TO AS1214-1983, AS/NZS 4534-2006, AS/NZS 4680-2006 & AS/NZS 4792-2006. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED. ALL HOLES SHALL BE 2mm LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE.
S6. MINIMUM YELD STRESS:
- HOT ROLLED SECTIONS = 300MPa
- SQUARE HOLLOW SECTIONS = 350MPa
- RECTANGULAR HOLLOW SECTIONS = 350MPa
- CIRCULAR HOLLOW SECTION = 250MPa
- HOT ROLLED PLATE = 250MPa

S7. SURFACE TREATMENT UNLESS NOTED OTHERWISE:
- EXPOSED TO WEATHER (STRUCTURAL MEMBERS) = AS/NZS 2312-HDG600P3 or IZS3 (TIME TO FIRST MAINTENANCE TO BE 10 YEARS)
- BUILT INTO THE INTERNAL SKIN OF EXTERNAL WALLS = AS/NZS 2312-HDG600P3

S8. ALL BURIED STEELWORK TO BE PAINTED FIRST USING 'EXPOSED TO WEATHER' TREATMENT SYSTEM FOLLOWED BY THE APPLICATION OF A TWO PART EPOXY SUCH AS 'SIKAGUARD-63N' OR APPROVED EQUIVALENT, THEN CONCRETE ENCASE STEELWORK WITH MASS CONCRETE (MINIMUM 75mm COVER TO STEELWORK).
S9. STEELWORK TO BE CONCRETE ENCASED FOR FIRE RATING PURPOSES SHALL BE FREE FROM ALL LOOSE RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE, ETC. AND REINFORCED WITH SL41 FABRIC OR EQUIVALENT BLACK IRON WIRE, 3mm DIA.
S10. BOLT SYMBOLS:
- 4.6/S = GRADE 4.6 BOLT / SNUG TIGHTENED.
- 8.8/S = GRADE 8.8 BOLT / SNUG TIGHTENED.
- 8.8/TF = GRADE 8.8 BOLT / FULLY TENSIONED FRICTION TYPE (USE LOAD INDICATOR WASHERS)
- 8.8/TB - GRADE 8.8 BOLT / FULLY TENSIONED BEARING TYPE (USE LOAD INDICATOR WASHERS)

S11. THE CONTRACTOR SHALL SUPPLY WRITTEN CERTIFICATION TO THE STRUCTURAL ENGINEER PRIOR TO THE ERECTION OF ANY STRUCTURAL STEEL STATING THAT THE BOLTS PROPOSED TO BE USED COMPLY WITH AS/NZS 1252-1996. HIGH STRENGTH BOLTS (8.8) ARE NOT TO BE WELDED.
S12. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEEL WORK SHALL BE SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, IN ORDER TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
S13. ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS. SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.
S14. GROUT ALL STEEL BASES BY DRY PACKING USING GROUT WHICH IS NON-SHRINK AND HAS A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 40MPa
S15. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS ARE TO BE HOT DIP GALVANISED.
S16. THESE DRAWINGS MAY NOT IDENTIFY ALL SECONDARY STEELWORK ELEMENTS THAT ARE REQUIRED FOR SUPPORT, FIXING AND FINISHING OF GLAZING, CLADDING AND LINING. THE TENDERER IS RESPONSIBLE FOR THE INCLUSION OF SUCH STEELWORK ELEMENTS TO THE EXTENT REQUIRED ON THE ARCHITECT'S DRAWINGS.
S17. IMPORTED STRUCTURAL STEEL MATERIAL
ALL STRUCTURAL STEELWORK USED ON THIS PROJECT SHALL BE COMPLIANT WITH AS4100, AND IN PARTICULAR:
- CERTIFIED MILL TEST REPORTS, OR TEST CERTIFICATES SHALL BE PROVIDED AS EVIDENCE OF COMPLIANCE WITH THE STANDARDS REFERRED TO IN AS4100. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- PROVIDE TEST CERTIFICATED FOR COMPLIANCE FOR ALL FASTENERS. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- FOR COLD FORMED SECTIONS A "CERTIFICATE OF CONFORMITY TO AS1163-1991" SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- CERTIFICATES SHALL ONLY BE ACCEPTED FROM TESTING COMPANIES ACCREDITED BY A TESTING AUTHORITY RECOGNISED IN AUSTRALIA, EG NATA or JAS-ANZ CERTIFIED.
- UNIDENTIFIED STEEL ie. ANY STEEL THAT IS NOT ACCOMPANIED WITH EVIDENCE STATING COMPLIANCE WITH THE REQUIREMENT OF AS4100 SHALL ONLY BE USED STRICTLY IN ACCORDANCE WITH CLAUSE 2.2.3 OF AS4100. IF MATERIALS SUPPLIED AND INSTALLED ARE SUBSEQUENTLY PROVEN TO BE NON COMPLIANT WITH THE SPECIFIED AUSTRALIAN STANDARDS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND COST TO UNDERTAKE NATA OR EQUIVALENT CERTIFIED TESTING TO PROVE CONFORMANCE TO THE AUSTRALIAN STANDARDS AND DESIGN SPECIFICATIONS. SIMILARLY ANY RECTIFICATION WORKS THAT MAY SUBSEQUENTLY BE REQUIRED TO SATISFY AUSTRALIAN CODE REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

RAMMED EARTH

RE1. RAMMED EARTH WALLS SHALL CONFORM TO THE RELEVANT REQUIREMENTS OF AS3700, SAA HB 195, NZS4297, NZS4298 & NZS4299
RE2. THE CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH OF THE MASONRY UNITS SHALL BE A MINIMUM OF 2.5MPa. THE MINIMUM CEMENT CONTENT BY WEIGHT SHALL BE 6%.
RE3. SUBMIT THE FOLLOWING FOR APPROVAL TO THE SUPERINTENDENT PRIOR TO COMMENCING WORKS:
- MIX DESIGN TO ACHIEVE DENSITY AND STRENGTH REQUIREMENTS, INCLUDING CEMENT CONTENT BY WEIGHT, DENSITY TO BE ACHIEVED AND PARTICLE SIZE DISTRIBUTION
- TEST REPORTS INCLUDING CONFIRMATION OF INSITU UNCONFINED COMPRESSIVE STRENGTH AND ELAPSED TIME BETWEEN ADDITION OF CEMEMNT AND COMPACTION. UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF SAA HB 195

RE4. U.N.O. ALL ANCHORS INTO RAMMED EARTH SHALL BE HILTI HIT-HY70 INJECTION ANCHORS. ANCHORS ARE TO BE HOT DIP GALVANISED
RE5. THE MOISTURE CONTENT AT PLACEMENT SHALL BE BETWEEN 8-16% BY WEIGHT
RE6. FORMWORK SHALL BE DESIGNED BY A SUITABLY QUALIFIED ENGINEER, AND SHALL BE CAPABLE OF WITHSTANDING THE PRESSURE OF THE SOIL DURING COMPACTION. SUITABLE BOND BREAKERS SHALL BE USED TO ALLOW STRIPPING WITHOUT DISTURBANCE OF THE COMPACTED WALL.
RE7. PLACEMENT OF RAMMED EARTH SHALL NOT BE CARRIED OUT WHEN TEMPERATURE IS GREATER THAN 32 DEGREES CELSIUS.
RE8. MATERIAL SHALL BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 200mm THICK (WHEN UNCOMPACTED). MECHANICAL COMPACTION IS TO BE UNDERTAKEN USING PNEUMATIC RAMMERS. HAND RAMMING IS NOT TO BE USED.

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JOB NUMBER:	NL166682	DATE:	16/02/2018	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			2
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK20			

4.6 TC1 Town Centre Information Sign - Freestanding

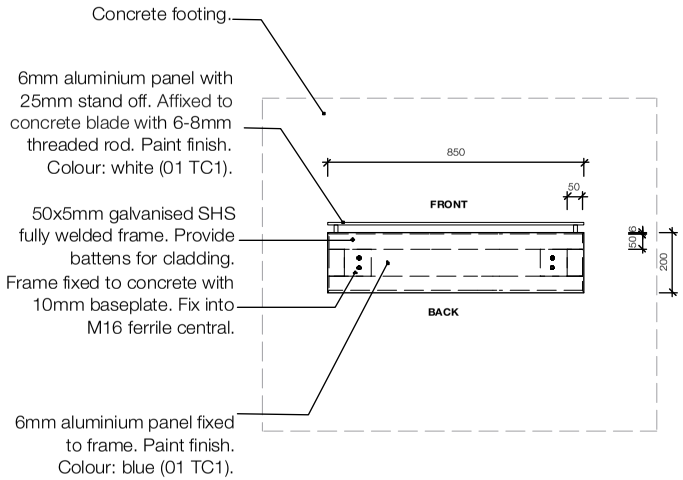
General Notes:

Refer to TC1-TC2 Town Centre Information Sign supporting drawings:

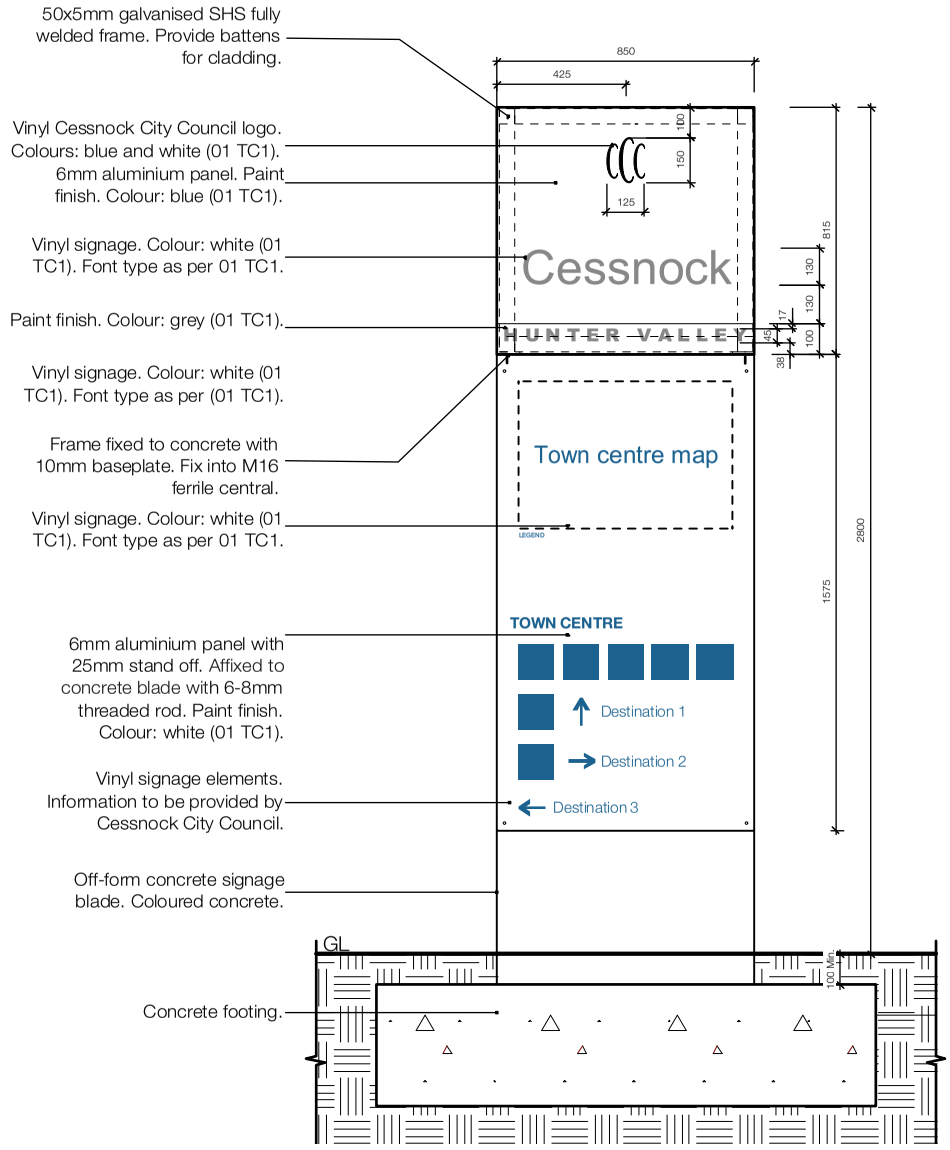
- 01 TC1 Town Centre Information Sign p.73
- 02 TC2 Town Centre Information Sign p.73
- 05 TC1 Town Centre Information Sign (Freestanding) - Side Section p.80
- 06 TC2 Town Centre Information Sign (Wall Mounted) - Front Elevation p.81
- 07 TC2 Town Centre Information Sign (Wall Mounted) - Side Section p.81

Refer signage specification p.74-77.

Refer engineers specification page 78 and engineers drawing page 82.

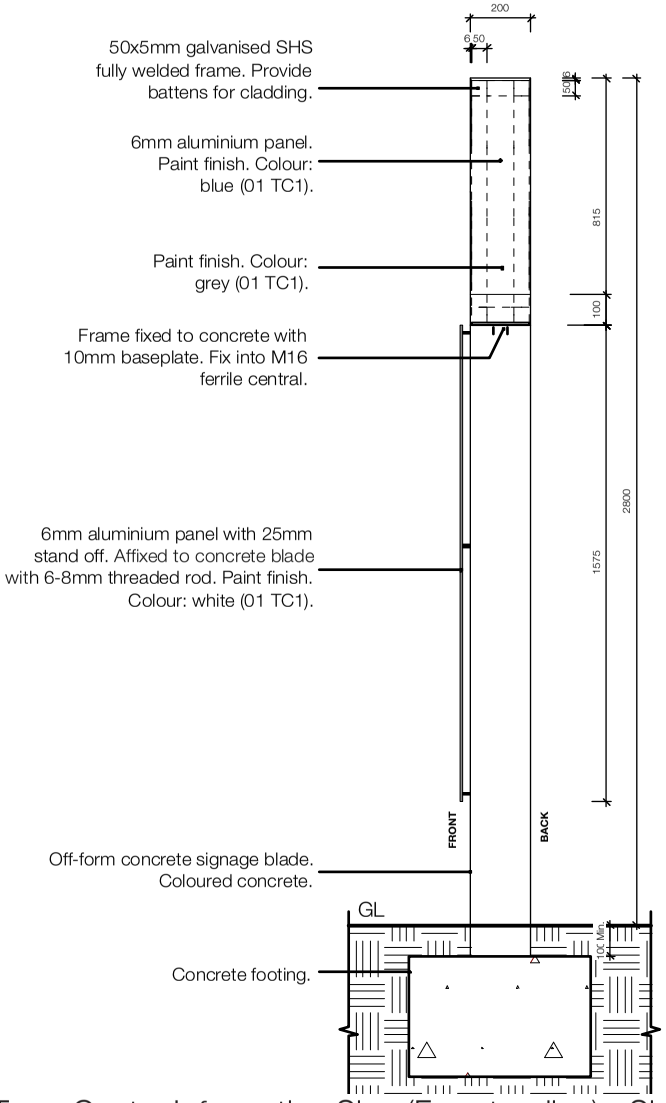


03 TC1 Town Centre Information Sign (Freestanding) - Plan
Scale 1:25



04 TC1 Town Centre Information Sign (Freestanding) - Front Elevation
Scale 1:25

4.6 TC1 Town Centre Information Sign - Freestanding



05 TC1 Town Centre Information Sign (Freestanding) - Side Section
Scale 1:25

General Notes:

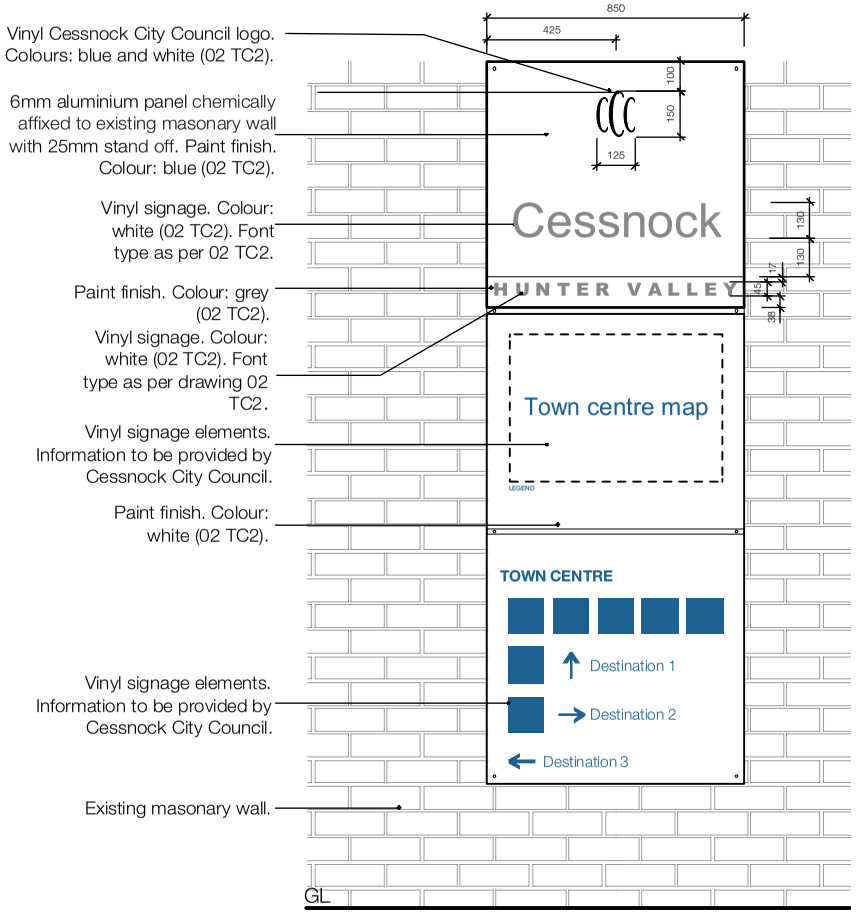
Refer to TC1-TC2 Town Centre Information Sign supporting drawings:

- 01 TC1 Town Centre Information Sign p.73
- 02 TC2 Town Centre Information Sign p.73
- 03 TC1 Town Centre Information Sign (Freestanding) - Plan p.79
- 04 TC1 Town Centre Information Sign (Freestanding) - Front Elevation p.79
- 06 TC2 Town Centre Information Sign (Wall Mounted) - Front Elevation p.81
- 07 TC2 Town Centre Information Sign (Wall Mounted) - Side Section p.81

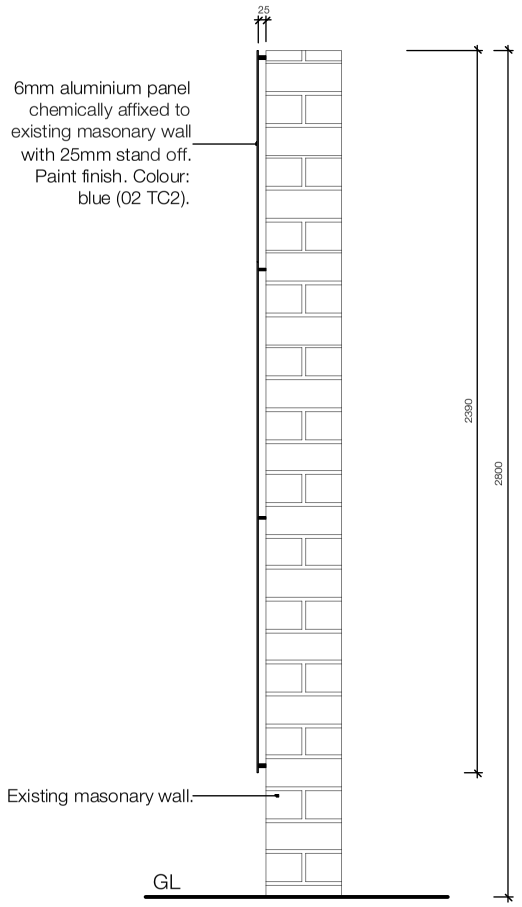
Refer signage specification p.74-77.

Refer engineers specification page 78 and engineers drawing page 82.

4.6 TC2 Town Centre Information Sign - Wall Mounted



06 TC2 Town Centre Information Sign (Wall Mounted) - Front Elevation
Scale 1:25



07 TC2 Town Centre Information Sign (Wall Mounted) - Side Section
Scale 1:25

General Notes:

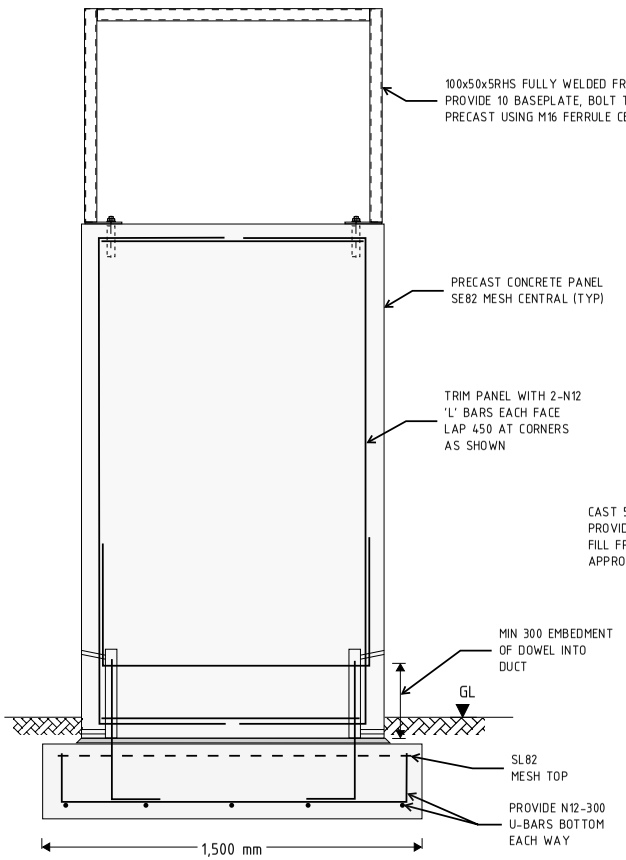
Refer to TC1-TC2 Town Centre Information Sign supporting drawings:

- 01 TC1 Town Centre Information Sign p.73
- 02 TC2 Town Centre Information Sign p.73
- 03 TC1 Town Centre Information Sign (Freestanding) - Plan p.79
- 04 TC1 Town Centre Information Sign (Freestanding) - Front Elevation p.79
- 05 TC1 Town Centre Information Sign (Freestanding) - Side Section p.80

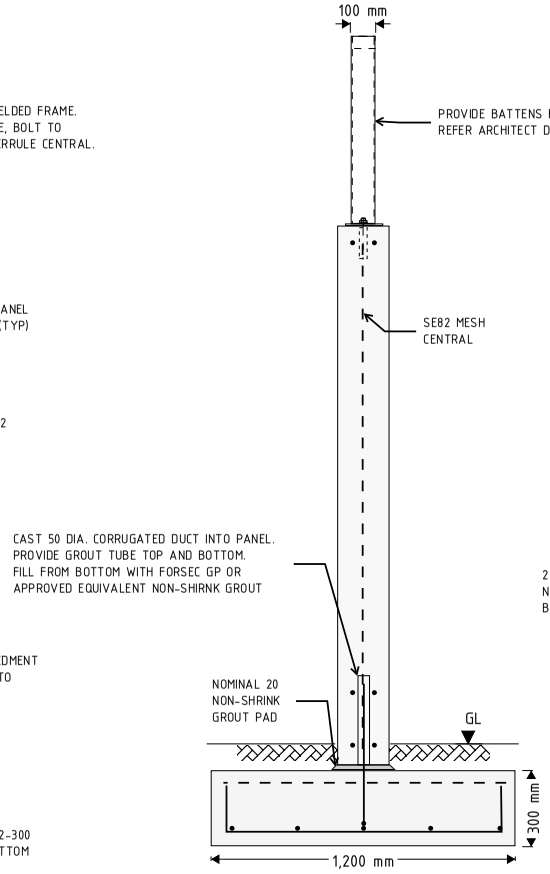
Refer signage specification p.74-77.

Refer engineers specification page 78 and engineers drawing page 82.

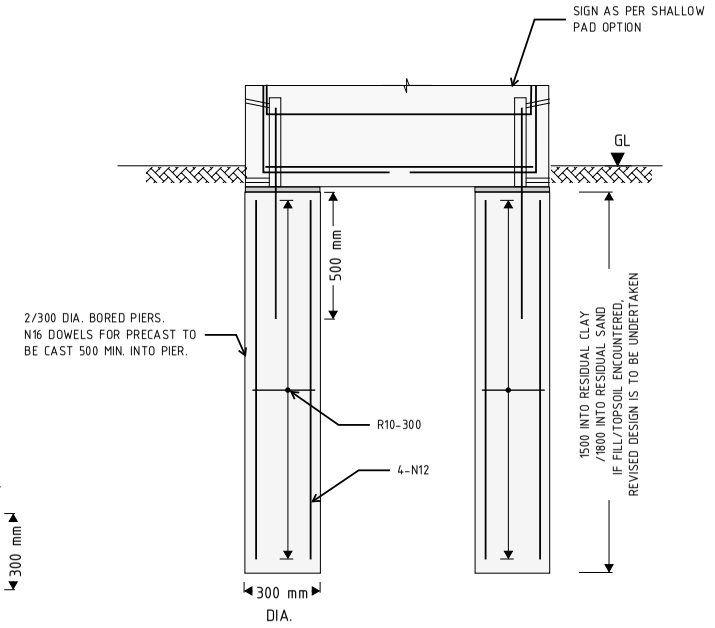
4.6 TC2 Town Centre Information Sign - Engineers Drawing



LONG SECTION
(SHALLOW PAD OPTION)



TRANSVERSE SECTION
(SHALLOW PAD OPTION)



LONG SECTION
(BORED PILE OPTION)

NOTE:
MINIMUM ALLOWABLE BEARING PRESSURE OF 100KPa IS ASSUMED, AND IS TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE.
IF FOOTING NOT IN 100kPa MATERIAL, ALTERNATIVE DESIGN WILL BE REQUIRED

REFER TO SK20 FOR SPECIFICATIONS

CF1 - COMMUNITY FACILITY INFORMATION SIGN (2800h x 1200w)
SE1 - SUBURB ENTRY SIGN (2800h x 1250w) SIMILAR
TC1-TC2 - TOWN CENTRE INFORMATION SIGN (2800h x 900w) SIMILAR

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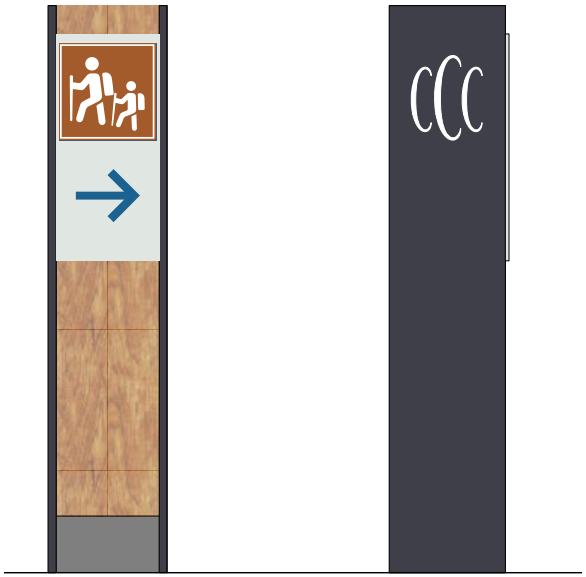
JOB NUMBER:	NL166682	DATE:	15/12/2017	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			1
DRAWING TITLE:	CF1, SE1 AND TC1-TC2 SIGNS			
DRAWING NUMBER:	NL166682_SK22			

4.7 WC1 Walkway/Cycleway Sign



01 WC1 Walkway/Cycleway Sign

COLOURS:

Blue: CMYK: 83, 37, 6, 6
RGB: 65, 118, 162

Grey: CMYK: 74, 66, 48, 16
RGB: 92, 83, 90

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

HARDWOOD TIMBER:

Hardwood Timber

4.7 WC1 Walkway/Cycleway Sign - Signage Specification

1.0 STEEL
General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier

1.1 Durability
General: Provide steel products protected from corrosion to suit the conditions of use.

1.2 Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

1.3 Protective coatings
Environment: To AS/NZS 2312 clause 2.3.
Coating designation: To AS/NZS 2312

Fasteners
Self drilling screws
Corrosion resistance: To AS 3566.2

Vapour barrier
Vapour barrier to slabs: To AS 2870 clause 5.3.3.
Minimum thickness: 0.2 mm.

1.4 Aluminium and aluminium alloys
Drawn pipe: To AS/NZS 1867.
Drawn rod, bar and strip: To AS/NZS 1865.
Extrusions: To AS/NZS 1866.
Plate and sheets: To AS/NZS 1734.

1.5 Coated steel
Electrogalvanized (zinc) coating on ferrous hollow and open sections: To AS 4750.
Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
- Ferrous open sections by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections by a continuous or specialised process: To AS/NZS 4792.
- Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.

Steel wire: To AS/NZS 4534.

1.6 Metal separation
Incompatible sheet metals: Prevent direct contact between incompatible metals. Provide separation by one of the following:
- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
- Insert a concealed, non-metallic separation layer such as polyethylene film, adhesive tape, neoprene, nylon or bituminous felt.

Incompatible fixings: Do not use.
Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous or paper products.

1.7 Brazing
General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.
Butt joints: Do not use butt jointing for joints subject to load. If butt joints are used, do not rely on the filler metal fillet only.
Filler metal: To AS/NZS 1167.1.

1.8 Finishing
Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Make sure self-finished metals are without surface colour variations after jointing.

1.9 Preparation
General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.
Standard: To AS 1627 series.
Priming steel surfaces: If site painting is documented to otherwise uncoated mild steel or similar surfaces, prime as follows:
- After fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to unprimed surfaces.

1.10 Welding
Aluminium: To AS 1665.
Stainless steel: To AS/NZS 1554.6.
Steel: To AS/NZS 1554.1.

1.11 Electroplated coatings
Chromium on metals: To AS 1192.
- Service condition number: At least 2.

Nickel on metals: To AS 1192.
- Service condition number: At least 2.

Zinc on iron or steel: To AS 1789.

1.12 Alluminium Steel Panels (fixed to timber)
General: Locate as per details.
Type: 2mm thick alluminium panels.

Fixing: Screw fixed to timber.
Finish: paint (refer section 3.0). Colour as per drawings.

1.13 Mild Steel Universal Beam
General: Locate as per details.
Type: 200mm mild steel UB22
Fixing: Base plate as per engineers drawings
Finish: paint (refer section 3.0). Colour as per drawings.

1.14 Mild Steel Plate
General: Locate as per details.
Type: 10mm mild steel plate
Fixing: Weld to UB
Finish: paint (refer section 3.0). Colour as per drawings.

2.0 TIMBER
2.1 Durability
Requirement: Provide timbers with natural durability appropriate to the conditions of use, or preservative-treated timber of equivalent durability.
Natural durability class: To AS 5604.
Obtain durability: By chemical impregnation, natural durability or both.
Timber quality: Free of core wood (material within 50 mm of the tree's centre) and free of splits, checks, loose knots and cavities. Free of sapwood (lighter coloured wood found on the outer layer of the tree).
Lyctid susceptible timbers: Do not provide untreated timbers containing Lyctid susceptible sapwood.
Naturally termite-resistant timbers: To AS 3660.1 Appendix C.

2.2 Moisture content
Moisture content: Structural and seasoned timbers shall have a moisture content of not less than 10% and not more than 15%.
Test: Methods as follows:
- Timber: To AS/NZS 1080.1.

Protection: Protect timber and timber products stored on site from moisture and weather. For milled, prefinished, prefabricated and similar elements which are to be protected in the final structure, provide temporary weather protection until the permanent covering is in place.

2.3 Selection
Type: Hardwood timber infill panel
Class: Class 1 Timber
Size: 182mm x 38mm
Finish: To be free of all splinters and loose materials. Sanded to a minimum of 120 grit. Lanotec "Timber Sealer" applied as per manufacturers specification.
Fixings: Countersunk screw fixings.
Certification: Provide evidence to the relevant parts of the AS 4685 series.

3.0 PAINTING
3.1 Products
Storage and handling:
Requirement: Handle, store, mix and apply all protective coatings in conformance with the manufacturer's recommendations.
Original containers: Deliver coating products to site in manufacturer's labelled and sealed containers.
Ambient temperature range for storage: 3°C to 30°C, or to manufacturer's recommendations.
Sunlight: Protect coating materials from direct sunlight before mixing or adding the converter (catalyst).
Use-by-date: Use products with limited shelf life before their use-by-date, unless written authorisation from the coating manufacturer's technical services section is provided.

Paint material:
Requirement: To AS/NZS 5131 clause 9.9.3.

Proprietary products:
Requirement: Provide all products from the one manufacturer's supply.
Product data sheets (PDS): Keep on site copies of all relevant manufacturer's PDS.
Safety data sheets (SDS): Keep on site copies of all relevant manufacturer's SDS.
Recording: To AS/NZS 5131 clause 9.9.5.

3.2 Surface Preparation
General: To AS/NZS 5131 Section 9 and the recommendations of AS/NZS 2312.1.
Galvanized, aluminium and zinc primed surfaces:
Requirement: Remove grease, oil and other solvent-soluble contaminants to AS 1627.1. Allow to dry and immediately proceed with the next operation.
Galvanized and aluminium surfaces: Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Treatment of welds:
Requirement: Clean welds to remove roughness, using power tools to AS 1627.2. Remove filings by vacuuming or compressed air.
Temporary welds: Grind flush any temporary welds.
Porous, skip or stitch welds: Not permitted.
Site welding: If possible, avoid site welding. If on site welding is required, prepare and treat the weld to AS/NZS 5131 clause 9.12.2.

4.7 WC1 Walkway/Cycleway Sign - Signage Specification

Shop priming:
Requirement: Dust off and apply a coat of primer in conformance with the manufacturer's recommendations.

Site coating:
General: High pressure wash down all surfaces with clean water. Lightly sand down primer/ intermediate coats, which have been shop applied, before site application of next coat.

3.3 Preparation assessment
General: Assess all surfaces of each steel member for conformance with the documented preparation requirements.
Abrasive blast cleaning: To AS 1627.4 and AS 1627.9.
Mechanical cleaning: To AS 1627.9.
Surface profile: To AS 3894.5 Method A.
Surface dust from abrasion: To AS 3894.6 Method C.
Chloride level testing: Test: To AS 3894.6 Method A.
Maximum allowable chloride levels: 50 mg/m2 for critical applications (heavy condensation, fresh water ponding or immersion) or to manufacturer's recommendations.
Conformance: If the maximum allowable chloride is exceeded, rewash the affected surface area until the chloride level is within the acceptable limits using clean water or chloride neutralising solutions. Jet-washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.
Timing of testing: Early in the blasting work so that removal procedures can be started before the blasting is completed.

3.4 Mixing
General: To AS/NZS 5131 clause 9.9.6.
Powered agitators: Mix package sizes larger than 4 litres using powered agitators driven by air motors.
Multi-component coatings: Combine as whole pack units before application.
Thinners: If addition of thinners is proposed, conform to the coating manufacturer's recommendations for the documented product.
Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

3.5 Coating Application
General: Conform to AS/NZS 5131 clause 9.9 and the PDS.
Painting and coating colour: Verify all project finish colours with the retained samples.
Final surface preparation or coating application:
Limits: If the environmental/climatic/substrate conditions listed in AS/NZS 5131 clause 9.9.10 and the following are present do not apply coating:

- Ambient air temperature below 5°C or above 40°C.
- Substrate temperature below 5°C or above 35°C.
- Full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
- Surface preparation standard has not been achieved.
- Time between final surface preparation and the commencement of coating has exceed 4 hours.
- Visual tarnishing or black spots develop on the surface of the steel.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, providing the final surface preparation and all coating applications are undertaken under the limit conditions.
Pre-coating: Before the spray application of each coating, stripe coat by brush method all edges, welds, seams, rivets, bolts, bolt holes (including slots) and difficult to spray areas. Prime the underlying surfaces of replacement bolting, washers and nuts before installation.
Procedure: Conform to the coating order shown in SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS.
Subsequent coats: Before applying any subsequent coating layer, make sure the surface condition of the preceding coat conforms to SELECTIONS, PROTECTIVE PAINT COATING SYSTEMS and is clean and free from defects.

Wet film thickness (WFT):
Method of measurement: To AS 3894.3 Appendix C using an approved wet film gauge continuously during application.

Dry film thickness (DFT):
Method of measurement: To AS 3894.3 clause 10.
Extent: Measure all surfaces at the completion of each prime, intermediate and finish coats, including areas of the element difficult to paint, masked by structure, or where double or light coating is likely.
Number of measurements: To AS 3894.3 clause 7.
Coatings with DFT 150 µm or less: If testing, deduct the effect of the measured surface profile from all DFT readings.
Single readings: Conform to the following:

- The average of 5 point readings for each 10 m2 area of coating surface to be within the documented coating thickness range.
- No single point reading in any 10 m2 to be less than 80% of the specified minimum coating thickness. If the average of three readings is used to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
- Check any single reading that is greater than 150% of the documented maximum DFT with three additional readings within 50 mm of the original reading. If the average of these three readings is not greater than 150% of the specified DFT, take the average reading as the point reading. If greater than 150%, reject the DFT for that area. If no maximum limit for DFT is documented, consult manufacturer.

4.7 WC1 Walkway/Cycleway Sign - Signage Specification

Rectification and defects:
Rectification: Re-work areas rejected, using the same surface preparation, coatings and sequence as for the original work.
Defects (including under-thickness and over-thickness): Mark with dustless chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

3.6 Protection
Contamination:
Surfaces: Prevent contamination of coated surface, which are not yet dry, from blasting dust, abrasive or surface preparation debris and any other foreign matter.

Post application care:
General: Protect the coating against physical, chemical, or atmospheric damage until all components are fully cured.
Care: Stack and handle all coated items using fabric slings or padded chains. Use soft packaging, carpet strips or other deformable materials between all coated items.
Water ponding: Stack coated items to prevent water ponding.

3.7 Coating Repair
Repair of coating damage:
Preparation: Feather back by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edge.
Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.
Sequence: Apply the repair coating in the same sequence and manner as the original coating.
Areas damaged without exposing the primer: Wash with a proprietary detergent solution, rinse with clean water and abrade so that edges of sound paint are feathered. Coat the area with the appropriate intermediate and finishing coat materials.
Areas damaged exposing the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Re-coat with the documented system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.
Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line. Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.
Timing: Apply the protective coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

3.8 Completion
General:
Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties
Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.
- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

3.9 Selections
Two-pack liquid coating:
Application to be 2-pack polyurethane or approved equivalent.
Application: Spray.
Finish: Full gloss.
Primer: Two pack epoxy primer to AS/NZS 3750.13.

Topcoat:
- External use: Proprietary polyurethane system.

Polyurethane – AS/NZS 2312.1Categories C1 and C2 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/ NZS 2312.1 PUR2	75 µm Epoxy zinc phosphate con- forming to AS/NZS 3750.13	50 µm High Solids Polyurethane conforming to AS/ NZS 3750.6	Nil

Polyurethane – AS/NZS 2312.1 Categories C3, C4 and C5 table

Location	Primer	Second Coat	Third Coat
External decorative conforming to AS/ NZS 2312.1 PUR5	75 µm Zinc rich epoxy conforming to AS/ NZS 3750.9 Type 2	200 µm High-Build Epoxy MIO con- forming to AS/NZS 3750.14	50 µm Polyurethane conforming to AS/ NZS 3750.6 (Alter- native: 75 µm High Solids Polyurethane)

4.0 VINYL SIGNAGE
Graphic set-out to be providex by Cessnock City Council.

All vinyl signage to be Eclipse 21 Series Self-Adhesive Polymeric Inkjet Vinyl. Vinyl to be 3mm thick with a UV stabilized over laminate in matte finish.
Solid colours are to be in Pantone colours and other imagery CMYK format.
To be installed in accordance with manufacturer's specifications.

4.7 WC1 Walkway/Cycleway Sign - Engineers Specification

GENERAL

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONSULTANT'S DRAWINGS.
G2. ALL DISCREPANCIES SHALL BE REFERRED TO THE PROJECT MANAGER AND RESOLVED BEFORE PROCEEDING WITH THE WORK.
G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. THESE STRUCTURAL DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
G4. ALL WORKMANSHIP, TESTING, MATERIALS AND SUPERVISION ARE TO BE IN ACCORDANCE WITH THESE SPECIFICATIONS, THE WORK HEALTH AND SAFETY ACT 2011 ENFORCED BY THE WORKCOVER AUTHORITY AND CURRENT RELEVANT AUSTRALIAN STANDARDS.
G5. THE DETERMINATION OF A SAFE WORK METHOD REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. ANY ELEMENT WHICH POSES AN UNACCEPTABLE LEVEL OF SAFETY RISK TO CONSTRUCT SHALL BE REFERRED TO THE STRUCTURAL ENGINEER. TEMPORARY BRACING AND SUPPORT OF STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
G6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL SERVICES IN THE VICINITY OF THE WORKS.
G7. THE STRUCTURAL COMPONENTS DETAILED ON THESE STRUCTURAL DRAWINGS ARE JOB SPECIFIC AND HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADS:

WIND LOADS:

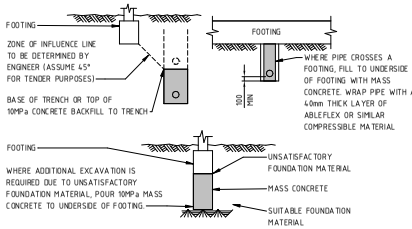
- IMPORTANCE LEVEL = 2
- REGION = A2
- ANNUAL PROBABILITY OF EXCEDENCE = 1/500
- REGIONAL WIND SPEED V_R = 45 m/s
- TERRAIN CATEGORY = TC2
- TERRAIN MULTIPLIER M_z,cat = 0.91
- WIND DIRECTION MULTIPLIER M_d = 1
- SHIELDING MULTIPLIER M_s = 1
- TOPOGRAPHIC MULTIPLIER M_t = 1
- SITE WIND SPEED = 41 m/s

G8. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO SAFETY THE MATTER SHALL BE REFERRED TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
G9. NO CHANGES IN ANY STRUCTURAL ELEMENT SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM NORTHROP CONSULTING ENGINEERS. IF THERE IS A DISCREPANCY THEN FOR TENDER PURPOSES ALLOW FOR THE MOST EXPENSIVE OPTION. NORTHROP CONSULTING ENGINEERS SHALL BE CONTACTED TO CONFIRM PRIOR TO CONSTRUCTION.
G10. NORTHROP CONSULTING ENGINEERS ACCEPTS NO RESPONSIBILITY FOR ANY WORK NOT INSPECTED OR NOT APPROVED BY NORTHROP CONSULTING ENGINEERS DURING CONSTRUCTION.

FOUNDATIONS

F1. ASSUMED ALLOWABLE BEARING CAPACITY:
- FOOTINGS = 100kPa

F2. A GEOTECHNICAL REPORT HAS NOT BEEN CARRIED OUT. MINIMUM ASSUMED ALLOWABLE BEARING PRESSURES TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. IF MINIMUM BEARING PRESSURES NOT ACHIEVED, AN ALTERNATIVE DESIGN WILL BE REQUIRED.
F3. ENSURE STABILITY OF ADJACENT BUILDINGS AND PATHS IS MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
F4. THE UNDERSIDE OF FOUNDATIONS SHALL CONFORM TO THE FOLLOWING REGARDLESS OF NOMINATED LEVELS:



F5. FOOTINGS SHALL BE CENTRALLY LOCATED UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
F6. FOOTINGS SHALL BE EXCAVATED TO THE DETAILED DEPTH AND WIDTH. FOOTINGS SHALL BE INSPECTED AND FILLED WITH CONCRETE AS SOON AS POSSIBLE TO AVOID EITHER SOFTENING OF THE FOUNDATION MATERIAL OR DRYING OUT BY EXPOSURE.
F7. THE BASE OF ALL PIER HOLES SHALL BE FREE OF WATER AND CLEANED OF LOOSE MATERIAL OR DEBRIS PRIOR TO PLACEMENT OF CONCRETE. ALLOW TO PROVIDE TEMPORARY LINERS AS DEEMED NECESSARY.

CONCRETE

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2009 AND NATSPEC CONCRETE STANDARDS.
C2. CONCRETE PROPERTIES AND COVER TO REINFORCING :

COVER TO REINFORCEMENT			
ELEMENT	CONCRETE STRENGTH f'c (MPa)	MAXIMUM 56 DAY DRY SHRINKAGE	COVER (mm)
WALLS	25	1000 µm	60
FOOTINGS	25	1000 µm	60

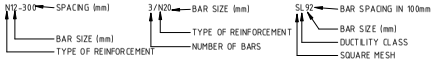
MAXIMUM AGGREGATE SIZE = 20mm U.N.O.
SLUMP DURING PLACING = 80mm ±10mm
EXPOSURE CLASSIFICATION = A2 (IN CONTACT WITH GROUND)
NO ADMIXTURES SHALL BE USED IN THE CONCRETE MIX UNLESS APPROVED BY NORTHROP CONSULTING ENGINEERS IN WRITING.

C3. SLABS USING MECHANICAL VIBRATORS.
C4. PLACE CONCRETE CONTINUOUSLY BETWEEN CONSTRUCTION JOINTS SHOWN ON PLAN. DO NOT BREAK OR INTERRUPT SUCCESSIVE POURS SUCH THAT COLD JOINTS OCCUR. ANY REVISIONS OR ADDITIONS TO CONSTRUCTION JOINTS SHOWN ON PLAN REQUIRE APPROVAL FROM THE NORTHROP CONSULTING ENGINEERS.
C5. REINFORCEMENT QUALITY AND NOTATION :

REINFORCEMENT NOTATION				
SYMBOL	BAR TYPE	STRENGTH GRADE (MPa)	DUCTILITY CLASS	TO COMPLY WITH AUSTRALIAN STANDARD
S	STRUCTURAL GRADE DEFORMED RIB BAR	250	NORMAL	AS/NZS 4671-2001
N	HOT ROLLED DEFORMED RIB BAR	500	NORMAL	AS/NZS 4671-2001
R	PLAIN ROUND BAR	250	NORMAL	AS/NZS 4671-2001
RL	RECTANGULAR MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
SL	SQUARE MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
L-TM	TRENCH MESH	500	LOW	AS/NZS 4671-2001

ALL REINFORCING BARS SHALL BE GRADE D500N TO AS/NZS 4671-2001 AND ALL MESH SHALL BE GRADE 500L TO AS/NZS 4671-2001. UNLESS NOTED OTHERWISE CLASS L REINFORCEMENT SHALL NOT BE USED.

REINFORCEMENT LABELS :



C6. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, AND NOT NECESSARILY IN TRUE PROJECTION. BARS SHOWN ARE INDICATIVE ONLY AND LENGTHS MAY VARY. BEAM ELEVATIONS TAKE PRECEDENCE OVER SECTIONS. SLAB PLANS TAKE PRECEDENCE OVER SECTIONS. REFER TO SECTIONS FOR EXTRA BARS THAT MAY BE REQUIRED.
C7. USE ONLY PLASTIC OR CONCRETE CHAIRS AT EXTERNAL SURFACES.
C8. SITE BENDING OF REINFORCEMENT BARS SHALL BE DONE WITHOUT HEATING USING A RE-BENDING TOOL. THE BARS SHALL BE RE-BENT AGAINST A FLAT SURFACE OR A PIN WITH A DIAMETER NOT LESS THAN THE MINIMUM PIN SIZE PRESCRIBED IN AS3600-2009.
C9. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN ON THE STRUCTURAL DRAWINGS OR IN POSITIONS OTHERWISE APPROVED IN WRITING BY NORTHROP CONSULTING ENGINEERS. LAPS SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND IN ACCORDANCE WITH AS3600-2009 SECTION 13.
C10. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY NORTHROP CONSULTING ENGINEERS.
C11. AT EXTERNALLY EXPOSED SURFACES NO METALLIC ITEMS INCLUDING FORM BOLTS, FORM SPACERS, METALLIC BAR CHAIRS AND TIE-WIRE ARE TO BE PLACED IN THE COVER ZONE.
C12. ALL REINFORCEMENT, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION AND INSPECTED BY A SUITABLY QUALIFIED ENGINEER PRIOR TO PLACING CONCRETE.
C13. ALL CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNISED TESTING LAB.
C14. FOR ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX, REFER TO CONCRETE - ELAPSED DELIVERY TIMES NOTE.

CONCRETE - ELAPSED DELIVERY TIMES

CE1. ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX AT THE SITE MUST NOT EXCEED THE CRITERIA IN THE ELAPSED DELIVERY TIMETABLE BELOW

ELAPSED DELIVERY TIME TABLE	
CONCRETE TEMPERATURE AT TIME OF DISCHARGE (°C)	MAXIMUM ELAPSED TIME (HOURS)
< 24	2.00
24 TO 27	1.50
27 TO 30	1.00
30 TO 32	0.75
32 TO 35	0.50

IF THE ELAPSED TIME IS LONGER THAN THE CORRESPONDING TIME IN THE TABLE ABOVE, OR THE TEMPERATURE IS GREATER THAN 35°C, THE CONCRETE MIX DESIGN ENGINEER IS TO BE CONTACTED TO CONFIRM WHETHER PLACEMENT IS TO PROCEED OR IF THE POUR IS TO BE STOPPED.

STEELWORK

S1. FABRICATE AND ERECT STRUCTURAL STEELWORK IN ACCORDANCE WITH AS4100-1998.
S2. PROVIDE HOLES, CLEATS AND FIXING FOR LIGHT STEEL/TIMBER FRAMING, FINISHES, ETC. SHOWN ON ARCHITECTURAL DRAWINGS.
S3. THESE DRAWINGS HAVE BEEN PREPARED TO INDICATE THE STRUCTURAL INTENT. THE SHOP DETAILER IS TO USE THESE DRAWINGS AS A BASIS FOR DIMENSIONAL COORDINATION WITH OTHER CONSULTANT'S DRAWINGS AND IS TO PREPARE DETAILED SHOP DRAWINGS. WHERE NECESSARY, THE SHOP DETAILER IS TO MAKE ASSUMPTIONS AND SUBMIT TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION. SHOP DETAILER IS TO ALLOW TO RE-WORK SHOP DRAWINGS AS NECESSARY. FABRICATOR SHALL PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE BUILDER FOR THEIR APPROVAL. BUILDER SHALL LODGE TWO COPIES OF APPROVED DRAWINGS TO NORTHROP CONSULTING ENGINEERS FOR REVIEW PRIOR TO FABRICATION, (ALLOW 5 WORKING DAYS FOR REVIEW).
S4. UNLESS NOTED OTHERWISE, USE:
- 6mm CONTINUOUS FILLET WELDS MADE WITH E4818 MILD STEEL ELECTRODES.
- ALL WELDS SP CATEGORY

S5. ALL BOLTS, SCREWS, HOLD DOWN BOLTS, MASONRY ANCHORS SHALL BE HOT DIP GALVANISED TO AS1214-1983, AS/NZS 4534-2006, AS/NZS 4680-2006 & AS/NZS 4792-2006. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED. ALL HOLES SHALL BE 2mm LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE.
S6. MINIMUM YELD STRESS:
- HOT ROLLED SECTIONS = 300MPa
- SQUARE HOLLOW SECTIONS = 350MPa
- RECTANGULAR HOLLOW SECTIONS = 350MPa
- CIRCULAR HOLLOW SECTION = 250MPa
- HOT ROLLED PLATE = 250MPa

S7. SURFACE TREATMENT UNLESS NOTED OTHERWISE:
- EXPOSED TO WEATHER (STRUCTURAL MEMBERS) (TIME TO FIRST MAINTENANCE TO BE 10 YEARS) = AS/NZS 2312-HDG600P3 or IZS3
- BUILT INTO THE INTERNAL SKIN OF EXTERNAL WALLS = AS/NZS 2312-HDG600P3

S8. ALL BURIED STEELWORK TO BE PAINTED FIRST USING 'EXPOSED TO WEATHER' TREATMENT SYSTEM FOLLOWED BY THE APPLICATION OF A TWO PART EPOXY SUCH AS 'SIKAGUARD-63N' OR APPROVED EQUIVALENT, THEN CONCRETE ENCASE STEELWORK WITH MASS CONCRETE (MINIMUM 75mm COVER TO STEELWORK).
S9. STEELWORK TO BE CONCRETE ENCASED FOR FIRE RATING PURPOSES SHALL BE FREE FROM ALL LOOSE RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE, ETC. AND REINFORCED WITH SL41 FABRIC OR EQUIVALENT BLACK IRON WIRE, 3mm DIA.
S10. BOLT SYMBOLS:
- 4.6/S = GRADE 4.6 BOLT / SNUG TIGHTENED.
- 8.8/S = GRADE 8.8 BOLT / SNUG TIGHTENED.
- 8.8/TF = GRADE 8.8 BOLT / FULLY TENSIONED FRICTION TYPE (USE LOAD INDICATOR WASHERS)
- 8.8/TB - GRADE 8.8 BOLT / FULLY TENSIONED BEARING TYPE (USE LOAD INDICATOR WASHERS)

S11. THE CONTRACTOR SHALL SUPPLY WRITTEN CERTIFICATION TO THE STRUCTURAL ENGINEER PRIOR TO THE ERECTION OF ANY STRUCTURAL STEEL STATING THAT THE BOLTS PROPOSED TO BE USED COMPLY WITH AS/NZS 1252-1996. HIGH STRENGTH BOLTS (8.8) ARE NOT TO BE WELDED.
S12. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEEL WORK SHALL BE SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, IN ORDER TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
S13. ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS. SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.
S14. GROUT ALL STEEL BASES BY DRY PACKING USING GROUT WHICH IS NON-SHRINK AND HAS A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 40MPa
S15. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS ARE TO BE HOT DIP GALVANISED.
S16. THESE DRAWINGS MAY NOT IDENTIFY ALL SECONDARY STEELWORK ELEMENTS THAT ARE REQUIRED FOR SUPPORT, FIXING AND FINISHING OF GLAZING, CLADDING AND LINING. THE TENDERER IS RESPONSIBLE FOR THE INCLUSION OF SUCH STEELWORK ELEMENTS TO THE EXTENT REQUIRED ON THE ARCHITECT'S DRAWINGS.
S17. IMPORTED STRUCTURAL STEEL MATERIAL
ALL STRUCTURAL STEELWORK USED ON THIS PROJECT SHALL BE COMPLIANT WITH AS4100, AND IN PARTICULAR:
- CERTIFIED MILL TEST REPORTS, OR TEST CERTIFICATES SHALL BE PROVIDED AS EVIDENCE OF COMPLIANCE WITH THE STANDARDS REFERRED TO IN AS4100. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- PROVIDE TEST CERTIFICATED FOR COMPLIANCE FOR ALL FASTENERS. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- FOR COLD FORMED SECTIONS A "CERTIFICATE OF CONFORMITY TO AS1163-1991" SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- CERTIFICATES SHALL ONLY BE ACCEPTED FROM TESTING COMPANIES ACCREDITED BY A TESTING AUTHORITY RECOGNISED IN AUSTRALIA, EG NATA or JAS-ANZ CERTIFIED.
- UNIDENTIFIED STEEL ie. ANY STEEL THAT IS NOT ACCOMPANIED WITH EVIDENCE STATING COMPLIANCE WITH THE REQUIREMENT OF AS4100 SHALL ONLY BE USED STRICTLY IN ACCORDANCE WITH CLAUSE 2.2.3 OF AS4100.

IF MATERIALS SUPPLIED AND INSTALLED ARE SUBSEQUENTLY PROVEN TO BE NON COMPLIANT WITH THE SPECIFIED AUSTRALIAN STANDARDS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND COST TO UNDERTAKE NATA OR EQUIVALENT CERTIFIED TESTING TO PROVE CONFORMANCE TO THE AUSTRALIAN STANDARDS AND DESIGN SPECIFICATIONS. SIMILARLY ANY RECTIFICATION WORKS THAT MAY SUBSEQUENTLY BE REQUIRED TO SATISFY AUSTRALIAN CODE REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

RAMMED EARTH

RE1. RAMMED EARTH WALLS SHALL CONFORM TO THE RELEVANT REQUIREMENTS OF AS3700, SAA HB 195, NZS4297, NZS4298 & NZS4299
RE2. THE CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH OF THE MASONRY UNITS SHALL BE A MINIMUM OF 2.5MPa. THE MINIMUM CEMENT CONTENT BY WEIGHT SHALL BE 6%.
RE3. SUBMIT THE FOLLOWING FOR APPROVAL TO THE SUPERINTENDENT PRIOR TO COMMENCING WORKS:
- MIX DESIGN TO ACHIEVE DENSITY AND STRENGTH REQUIREMENTS, INCLUDING CEMENT CONTENT BY WEIGHT, DENSITY TO BE ACHIEVED AND PARTICLE SIZE DISTRIBUTION
- TEST REPORTS INCLUDING CONFIRMATION OF INSITU UNCONFINED COMPRESSIVE STRENGTH AND ELAPSED TIME BETWEEN ADDITION OF CEMEMNT AND COMPACTION. UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF SAA HB 195

RE4. U.N.O. ALL ANCHORS INTO RAMMED EARTH SHALL BE HILTI HIT-HY70 INJECTION ANCHORS. ANCHORS ARE TO BE HOT DIP GALVANISED
RE5. THE MOISTURE CONTENT AT PLACEMENT SHALL BE BETWEEN 8-16% BY WEIGHT
RE6. FORMWORK SHALL BE DESIGNED BY A SUITABLY QUALIFIED ENGINEER, AND SHALL BE CAPABLE OF WITHSTANDING THE PRESSURE OF THE SOIL DURING COMPACTION. SUITABLE BOND BREAKERS SHALL BE USED TO ALLOW STRIPPING WITHOUT DISTURBANCE OF THE COMPACTED WALL.
RE7. PLACEMENT OF RAMMED EARTH SHALL NOT BE CARRIED OUT WHEN TEMPERATURE IS GREATER THAN 32 DEGREES CELSIUS.
RE8. MATERIAL SHALL BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 200mm THICK (WHEN UNCOMPACTED). MECHANICAL COMPACTION IS TO BE UNDERTAKEN USING PNEUMATIC RAMMERS. HAND RAMMING IS NOT TO BE USED.

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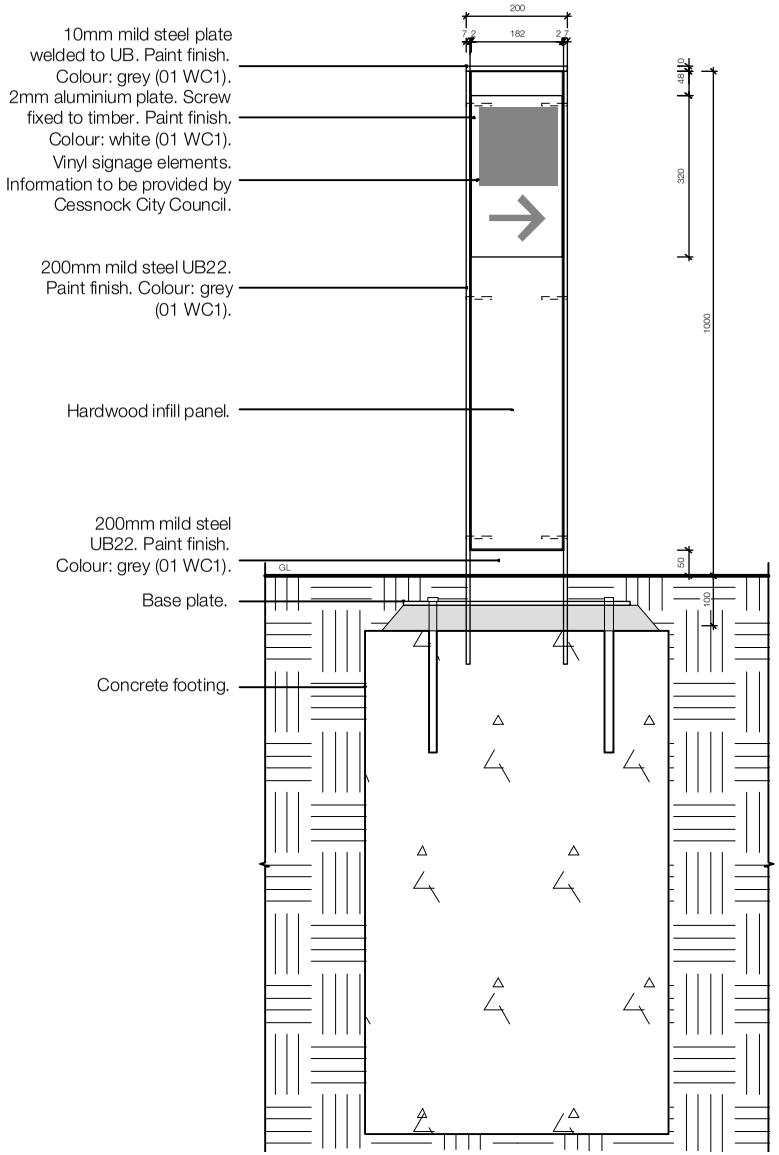
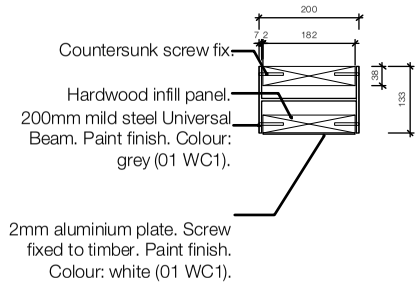
JOB NUMBER:	NL166682	DATE:	16/02/2018	REV. 2
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK20			

4.7 WC1 Walkway/Cycleway Signs



03 Typical WC1 Walkway/Cycleway Sign - Front Elevation
Scale 1:15



02 Typical WC1 Walkway/Cycleway Sign - Plan
Scale 1:15

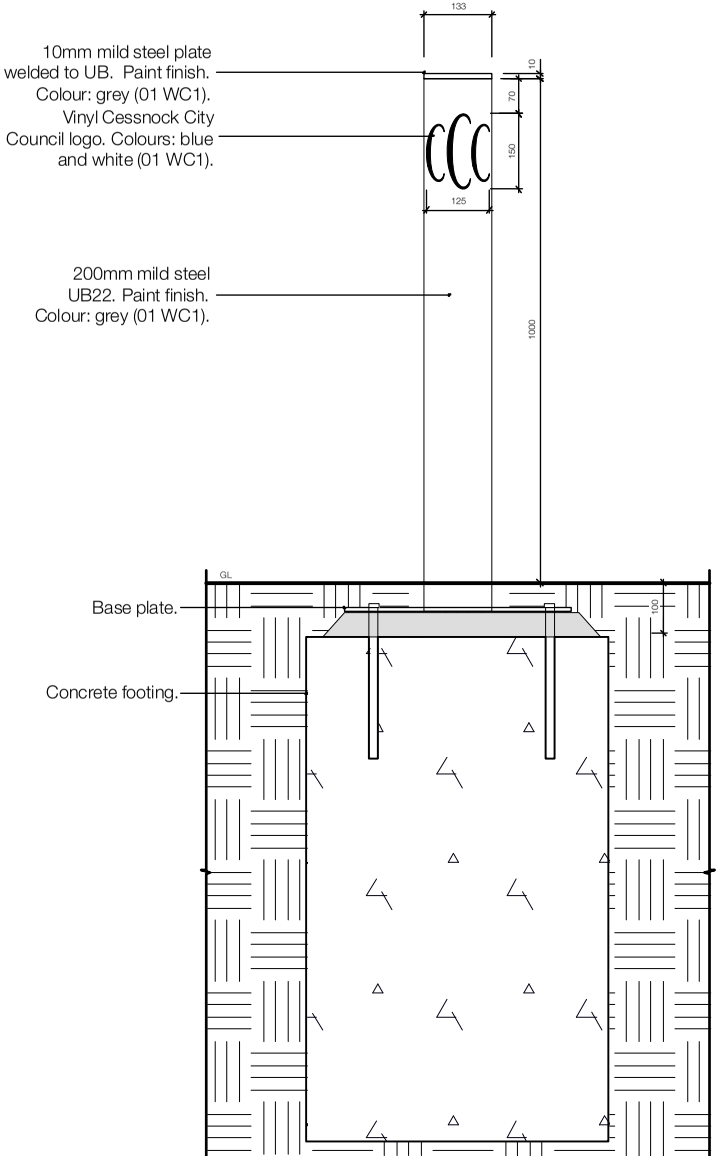
General Notes:

Refer to WC1 Walkway/Cycleway Sign supporting drawings:

- 01 WC1 Walkway/Cycleway Sign p.83

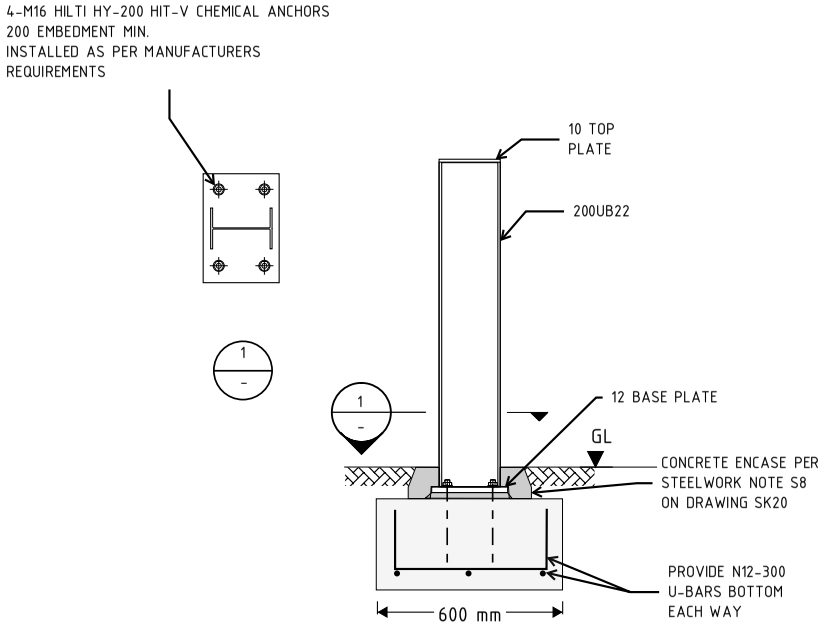
Refer signage specification p.84-87.

Refer engineers specification page 88 and engineers drawing page 90.

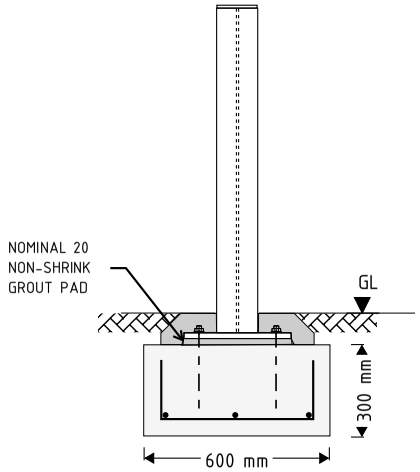


04 Typical WC1 Walkway/Cycleway - Side Section
Scale 1:15

4.7 WC1 Walkway/Cycleway Signs - Engineers Drawing



LONG SECTION
(SHALLOW PAD OPTION)



TRANSVERSE SECTION
(SHALLOW PAD OPTION)

WC1 WALKWAY/CYCLEWAY SIGN (200UB, 1000h)

NOTE:
MINIMUM ALLOWABLE BEARING PRESSURE OF 100KPa IS ASSUMED, AND IS TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE.
IF FOOTING NOT IN 100kPa MATERIAL, ALTERNATIVE DESIGN WILL BE REQUIRED

REFER TO SK20 FOR SPECIFICATIONS

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JOB NUMBER:	NL166682	DATE:	15/12/2017	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			1
DRAWING TITLE:	WC1 WALKWAY/CYCLEWAY SIGN			
DRAWING NUMBER:	NL166682_SK24			

PART

5

SIGNAGE DETAILS
Hunter Valley
Wine Country

5.1 GE2 Wine Country Information Bay

COLOURS:

Background and steel: Colorbond Monument

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

Modwood Panelling
Modwood Sahara (brushed finish)

PRECINCT COLOURS:

Kurri Kurri: CMYK: 80, 100, 3, 0. RGB: 101, 46, 119

Broke Fordwich
C:80 M:20 Y:100 K:7

Central Pokolbin
C:2 M:8 Y:99 K:0

Branxton Greta: CMYK: 2, 66, 99, 0. RGB: 233, 115, 46

Lovedale
C:100 M:88 Y:9 K:1

Parish of Pokolbin
C:66 M:0 Y:11 K:0

Mount View
C:31 M:1 Y:100 K:0

Hermitage
C:0 M:100 Y:96 K:0

Wollombi Valley
C:26 M:100 Y:100 K:19

LETTERING:

Precinct Names: Arial
Hunter Valley: Century Gothic
Wine Country: Didot LT Std Bold Italic (Modified)
Information bay information etc: Arial

01 GE2 Wine Country Information Bay

5.1 GE2 Wine Country Information Bay - Signage Specification

1.0 STEEL
General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier

1.1 Durability
General: Provide steel products protected from corrosion to suit the conditions of use.

1.2 Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

1.3 Protective coatings
Environment: To AS/NZS 2312 clause 2.3.
Coating designation: To AS/NZS 2312.

Fasteners
Self drilling screws
Corrosion resistance: To AS 3566.2

Vapour barrier
Vapour barrier to slabs: To AS 2870 clause 5.3.3.
Minimum thickness: 0.2 mm.

1.4 Stainless steel
Bars: To ASTM A276/A276M.
Plate, sheet and strip: To ASTM A240/A240M.
Welded pipe (plumbing applications): To AS 1769.
Welded pipe (round, square, rectangular): To ASTM A554.

1.5 Aluminium and aluminium alloys
Drawn pipe: To AS/NZS 1867.
Drawn rod, bar and strip: To AS/NZS 1865.
Extrusions: To AS/NZS 1866.
Plate and sheets: To AS/NZS 1734.

1.6 Steel
Sheet: To AS/NZS 1595.
Structural bars and sections: To AS/NZS 3679.1.
Structural hollow sections: To AS/NZS 1163.

1.7 Steel for prefinishes
Cold rolled bar: To AS 1443 - Bright.
Cold rolled sheet: To AS/NZS 1595.
-Designation: CA2S-E.
Electric resistance welded tube: To AS 1450.

1.8 Metal separation
Incompatible sheet metals: Prevent direct contact between incompatible metals. Provide separation by one of the following:
-Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
-Insert a concealed, non-metallic separation layer such as polyethylene film, adhesive tape, neoprene, nylon or bituminous felt.
Incompatible fixings: Do not use.
Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous or paper products.

1.9 Brazing
General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.
Butt joints: Do not use butt jointing for joints subject to load. If butt joints are used, do not rely on the filler metal fillet only.
Filler metal: To AS/NZS 1167.1.

1.10 Finishing
Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Make sure self-finished metals are without surface colour variations after jointing.

1.11 Preparation
General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.
Standard: To AS 1627 series.
Priming steel surfaces: If site painting is documented to otherwise uncoated mild steel or similar surfaces, prime as follows:
-After fabrication and before delivery to the works.
-After installation, repair damaged priming and complete the coverage to unprimed surfaces.

1.12 Welding
Aluminium: To AS 1665.
Stainless steel: To AS/NZS 1554.6.
Steel: To AS/NZS 1554.1.

5.1 GE2 Wine Country Information Bay - Signage Specification

1.13 Stainless Steel Finishes
Requirement: Provide a surface finish to match the approved sample.
Pre-assembly: Mechanically polished and brushed finishes: Apply grit faced belts or fibre brushes that achieve uni-directional finishes with buffing.

Post-assembly pre-treatment:
Heat discolouration: Remove by pickling.
Welds: Grind excess material, brush, and polish to match the pre-assembly finish.

Post-assembly finish:
Brushed electropolish finish: Conform to the following:
-Pre-assembly finish: No. 4 brushed finish.
-Post-assembly finish: Provide an electro-chemical processed finish to achieve a No. 7 to No. 8 brushed finish.

Completion:
Cleaning: Clean and rinse to an acid free condition and allow to dry. Do not use carbon steel abrasives or materials containing chloride.
Protection: Secure packaging or strippable plastic sheet.

Anodising:
Standard: To AS 1231.
Thickness grade: To AS 1231 Table H1.

2.0 MONOLITHIC STABILISED EARTH WALLING
2.1 General
Provide monolithic stabilised earth walling that continues to perform satisfactorily for its design life of 50 years.

2.2 Samples
Provide 2 samples one month commencing works on site for designers approval
Soil shall have sandstone and limestone blend
Crushed Building Rubble Ex nominated quarry to suppliers standard
Cement Content by volume shall be no less than 7%
Proportion to be determined by Mix design and strength evaluation test
Rammed Earth Wall to be sealed by approved stabilised earth wall water repellent

2.3 Inspection
Give notice so that inspection may be made of the following:
-Sampling for field testing.
-Field testing.
-Damp-proof courses, in place.
-Termite protection measures in place.
-Forms in place.
-Commencement of rammed stabilised earth placing.
-Embedded pipes and conduits in position.
-Built-in items in place.
-Control joints, ready for joint filler.

2.4Tests
Soil tests:
Particle size distribution: To AS 1289.3.6.1.
Mix design and strength evaluation tests
Components: Submit details of components and mix design to achieve density and strength criteria.
Dry density/moisture content relation:
-Test report: Include the following additional material:
-Cement content by weight.
-Elapsed time between addition of cement and compaction.
-Date moulded.
Unconfined compressive strength: Prepare, test, evaluate and report in conformance with SAA HB 195
Stabilised earth density test
Method: To SAA HB 195 .

2.5 Soil particle sizes
Clay: < 0.002 mm.
Silt: < 0.06 mm.
Sand: 0.06 – 2.0 mm.
Coarse aggregate:
-Gravel: 2.0 – 75 mm, ≤ 5% retained on a 37.5 mm sieve.
-Limestone: 19 mm.
-Sandstone: 19 mm.

2.6 Soil particle size distribution
Organic content: < 2%.
Clay and silt content: < 20%.
Sand content: ≥ 50%.
Coarse aggregate content: > 30%.
Water
Requirement: Clean, fresh, free from impurities.
Fixing: Finish: Paint colour.

2.7 Stabilising agent
Type: Cement.
Standard: To AS 3972.
Grade: GP.

2.8 Stabilised earth mix
Cement content (range): 6 – 10% by weight.
- Value: Determine using the Mix design and strength evaluation test.

Properties at placement:
- Characteristic adjusted compressive strength (minimum): 2.5 MPa.
- Moisture content (range): 8 – 16% by weight.

2.9 Damp-proof courses
Standard: To AS/NZS 2904.
Material: Polythene sheeting.

2.10 Structural fixings
Type: Chemical anchors.

2.11 Control joint infill
Material: 25 x 25 mm UV stable acrylic adhesive impregnated poly foam strip.
Steel components, including reinforcement.
Durability classification to AS 3700 (minimum): R2.

Reinforcement:
Bar: To AS/NZS 4671.
Machine-welded mesh: To AS/NZS 4671.

2.12 Temporary formwork
Performance: Sufficiently robust to withstand the pressure of the compacted soil and to allow stripping without disturbance or adhesion.
Standard: To AS 3610.1.
Class: 3.
General: True and free from bulging in the wall surface.

2.13 Reinforcement
Refer engineers drawings.

3.0 PAINTING DULUX PROTECTIVE PAINT COATINGS
3.1 Contact:
DuluxGroup/Dulux technical contacts
Architects and Specifiers' Hotline: 13 23 77.
Website: www.duluxprotectivecoatings.com.au/contact-us.

3.1 Products
Storage and handling:
Care: Handle, store, mix and apply all protective coatings in conformance with Dulux recommendations.
Original containers: Deliver coating products to site in the manufacturer's labelled and sealed containers.
Ambient temperature range for storage: 15°C to 25°C.
Use-by-date: Use products with limited shelf life before their use-by-date unless written authorisation from the coating manufacturer's technical services section is provided.

Safety data sheets (SDS):
Requirement: Keep on site copies of all relevant Dulux SDS's and technical datasheets.

Proprietary products:
Substitution: Dulux paint products and specified coatings systems have been selected for this project and unauthorised product substitution will jeopardise or void the Warranties.

3.2 Surface Preparation
General:
Defects: Remove all surface defects, including cracks, laminations, deep pitting, weld spatter slag, burrs, fins, sharp edges and other defects before the preparation of the surface to be coated.
Temporary welds: Grind flush temporary welds.
Site welding: Where possible avoid site welding.
Porous, skip or stitch welds: Not acceptable.
Edges: De-burr and round all edges to a 2 mm radius.
Surface contaminants: Remove surface contaminants such as oil, grease, dirt and loose particles, using an alkaline oil emulsifier/ degreaser to AS 1627.1.
Surface preparation: Prepare surfaces to the required finish to AS 1627.1, AS 1627.2, AS 1627.4, AS 1627.5, AS 1627.6 and AS 1627.9.
Surface cleaning: Remove spent abrasive from the surface by blowing with clean, dry air and/or by vacuum cleaning.
Bolts: Provide washers at heads and nuts at replacement bolts.
Surface preparation for atmospheric steel:
General: Conform to the following requirements:
-Wash and degrease all surfaces to be coated in conformance with AS 1627.1 with a free-rinsing, alkaline detergent, such as Gibson F310B or Gamlen CA No. 1 in conformance with the manufacturer's written instructions and all safety warnings.
-Wash with fresh potable water and remove all soluble salts are in conformance with AS 3894.6 Methods A and D.
-Grind all sharp edges with a power tool to a minimum radius of 2 mm.

-Power tool clean welds to AS 1627.2 Class 2 to remove roughness. Remove filings, preferably by vacuum or compressed air.
-Abrasive blast clean all steel surfaces to be painted in conformance with AS 1627.4 to visual standard AS 1627.9 Class 2.5 (equivalent to ISO 8501-1, Sa 2.5: Very Thorough Blast-Cleaning). Use a non-metallic medium that will generate a surface profile of 35 to 65 µm, as tested to AS 3894.5 Method A.
-Commence application within 4 hours of abrasive blast cleaning or before surface becomes contaminated, otherwise repeat abrasive blasting step.
-Stripe coat welds, bolts, bolt holes and all edges with primer before application of full primer coat nominated in PROTECTIVE PAINT COATING SYSTEMS.
-Before application, make sure that the surface is free of contaminants including oil, grease, dirt, dust, salt and any other deleterious materials that will interfere with coating performance.

Treatment of on-site welding
On-site welding: If on site welding is performed, adopt the following procedure:
-Remove weld spatter.
-Power tool clean welds to AS 1627.2 Class 2 to remove roughness. Remove filings, preferably by vacuum or compressed air.
-Prime welds immediately with the nominated primer before contamination can re-occur. Make sure that the primer overlaps the sound adjacent coating by between 25 mm and 50 mm.
-Apply intermediate and topcoats over the primed welds to match the surrounding coating system, overlapping the sound adjacent coating by between 25 mm and 50 mm.

Preparing galvanized and aluminium surfaces:
Remove grease, oil and other solvent-soluble contaminants by wiping with mineral turpentine or white spirit. Finally wipe with a clean solvent. Allow to dry and proceed with the next operation immediately. Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Preparing zinc primed surfaces:
If present, remove zinc salts from zinc primers. Remove grease, oil and other solvent-soluble contaminants by wiping with mineral turpentine or white spirit. Finally wipe with a clean solvent. Allow to dry and proceed with the next operation immediately.

Shop priming:
Dust off and apply a coat of primer, according to the technical specification.

Site coating:
General: High pressure fresh water wash down all surfaces. Lightly sand down primer/ intermediate coats, which have been shop applied, before site application of next coat.

3.3 Preparation assessment
Conformance: All areas of any item must meet the required cleanliness standard.
Abrasive blast cleaning: Assessment: To AS 1627.4 and ISO 8501-1.
-Class 2.5.
Power tool cleaning: Assessment: To AS 1627.2 and ISO 8501-2.
-Class 2.

Hand tool cleaning:
Visual assessment: To ISO 8501-2.
-Class 1.
Surface profile: General: To AS 3894.5.
Profile grade: To AS 3894.5 Method A.

Surface dust from abrasion:
General: To AS 3894.6 Method C.
Chloride level testing
Test: To AS 3894.6 Method A.
Maximum allowable chloride levels: 50 mg/m2.
Conformance: If this level is exceeded, rewash the affected surface area using fresh water until the chloride level is within acceptable limits. Pressure washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.
Timing of testing: Early in the blasting work so that removal procedures can be initiated before the blasting is completed.
Wet film thickness: Method of measurement: To AS 3894.3, Appendix C using an approved wet film gauge continuously during application.
Dry film thickness: Method of measurement: To AS 3894.3, clause 10.
Extent: All surfaces at the completion of each of the prime, intermediate and finish coats, in particular include areas of the structure which are difficult to paint, are masked by structure, or areas where double coating or light coating is likely due to the shape of the substrate.
Number of measurements: Perform a sufficient number of readings to make sure a representative account for the DFT compliance of the coated areas tested.
Deduction: If testing the DFT of coatings 150 µm and less, deduct the effect of the measured surface profile from all DFT readings.
Single readings: Single reading requirements are as follows:
-The average of 5 point readings for each 10 m2 area of coating surface should not be outside the specified coating thickness range.
-No single point reading in any 10 m2 should be less than 80% of the specified minimum coating thickness. However, where three readings are averaged to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
-Check any single reading that is greater than 150% of the specified DFT with three additional readings within 50 mm of the original reading. If these three readings average not greater than 150% of the specified DFT, take the averaged readings as the point reading. If greater than 150%, reject the DFT in that area.

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Rectification: Re-work areas rejected, using surface preparation and coatings in the same manner and order as the original work.
Defects including under thickness and over thickness: Mark with school grade chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

3.4 Mixing
General:
Mixing: Mix coatings thoroughly. All containers larger than 4 litres are to be mixed using powered agitators driven by air motors.
Multi-component coatings: Combine multi-component coatings as whole pack units. If partial mixing is proposed, submit details.
Thinners: If addition of thinners is proposed, conform to the Dulux product data sheet for the specified product.
Colour consistency: If colour consistency is required, before the addition of the curing agent or converter and before coating application, pre-mix the components of coating products that have been tinted to make sure colour uniformity.
Thinners: If addition of thinners is proposed, conform to the coating manufacturer's recommendations for the documented product.
Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

3.5 Coating Application
General: Conform to the Dulux product data sheets and the Dulux specification.
Painting and coating colour: Verify all project finish colours with the retained samples.
Final surface preparation or coating application
Limits: If the following climatic/substrate conditions are present do not apply coating:
-The relative humidity is above 85%.
-The substrate temperature is less than 3°C above the dew point.
-The ambient air temperature is below 5°C or above 40°C.
-The substrate temperature is below 10°C or above 45°C.
-The surface to be coated is wet or damp.
-Where the full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
-For external or site applied coatings:
-The weather is clearly deteriorating or unfavourable for application or curing.
-High wind conditions.
-The surface preparation standard has not been achieved.
-The time between surface blast cleaning and the commencement of coating exceed 4 hours.
-Visual tarnishing or black spots develop on the surface of the metal.
Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, provided the final surface preparation and all coating applications are undertaken under the limited conditions.
Prior coating: Before the spray application of each coating stripe coat by brush method all edges, welds, seams, rivets bolts and bolt holes (including slots). Prime the underlying surfaces of replacement bolting, washers and nuts before installation.
Procedure: Conform to the order shown in PROTECTIVE PAINT COATING SYSTEMS.
Timing: Conform to the minimum and maximum re-coat intervals and curing times.
Detail: Stripe coat all welds, bolt holes, corners and difficult to spray areas by brushing in with the prime coat and intermediate coat material before the full coating application.
Subsequent coats: Make sure that before any subsequent coating layer is applied, the surface condition of the preceding coat is complete and correct in all respects, including its DFT achievement, cleanliness, freedom from defects. These are detailed on the Dulux Protective Coating specification. Depending on the applicators chosen method additional coats may be required to achieve the nominated minimum DFT.
Conformance: To AS/NZS 2312.1 for the specified film thickness of individual coats.
Correction: Correct any defect in a coating layer before the subsequent coating layer is applied.

Protection:
General: Perform all painting under cover and/or protected from rain, condensation, dew, excessive wind, overspray or wind-blown dust.
Period: Continue protection where any of these conditions exist before the coating has cured to a sufficient degree so as to be unaffected.

3.6 Coating Repair
Repair of coating damage:
Preparation: Feather back by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edges.
Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.
Sequence: Apply the repair coating in the same sequence and manner as the original coating.
Areas damaged without exposing the primer: Wash with a proprietary detergent solution and rinse with fresh water, followed by abrading and ensuring that edges of sound paint are feathered. Then coat the area with the appropriate intermediate and finishing coat materials.
Areas damaged to the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Re-coat with the specified system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.
Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line.
Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.
Timing: Apply the Dulux Protective Coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

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Cleaning: Provide, at no additional cost, surface treatment as follows:
-Surfaces left longer than four hours: Re-blast cleaning before coating.
-Surfaces that develop visual tarnishing (red rust or black spots) at any time before coating: Wash down with fresh potable water then blast clean before coating. There are commercially available chloride reducing solutions that may assist.

3.7 Completion
General:
Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties:
Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.
- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

3.8 Selections
There are decorative finish options for architectural and structural steel. The most common coating types are:

Epoxy acrylic
Inland AS/NZS 2312.1 Categories C1 and C2: Epoxy acrylic

Location	Primer	Second Coat	Third Coat	Duspec No
Exterior decorative equivalent to AS/NZS 2312.1 ACC2	75 µm DULUX Durepon P14 DI1117	50 µm DULUX Acrathane IF DI1102	Nil	SI1433

Coastal AS/NZS 2312.1 Categories C3, C4 and C5: Epoxy acrylic

Location	Primer	Second Coat	Third Coat	Duspec No
Exterior decorative equivalent to AS/NZS 2312.1 ACC6	75 µm DULUX Zinc-anode 402 DI0539	00 µm DULUX Duremax GPE DI1115	50 µm DULUX Acrathane IF DI1102	SI1399

4.0 VINYL SIGNAGE
Graphic set-out to be providex by Cessnock City Council. All vinyl signage to be Eclipse 21 Series Self-Adhesive Polymeric Inkjet Vinyl. Vinyl to be 3mm thick with a UV stabilized over laminate in matte finish. Solid colours are to be in Pantone colours and other imagery CMYK format. To be installed in accordance with manufacturer's specifications.

5.0 ROOFING
5.1 Fasteners
Finish: Prefinish exposed fasteners with an oven baked polymer coating to match the roofing material.

5.2 Materials
Sheet metal roofing
Standard: To AS 1562.1.
Prepainted and organic film/metal laminate products: To AS/NZS 2728.
Corrosion protection: To BCA Table 3.5.1.1.a.

6.0 MODWOOD
Size: 65x23mm ModWood. Colour: 'Sahara' Finish: Brushed. Fixings: As per Architects drawings. Coatings with DFT 150 µm or less: If testing, deduct the effect of the measured surface profile from all DFT readings.
Single readings: Conform to the following:
-The average of 5 point readings for each 10 m2 area of coating surface to be within the documented coating thickness range.
-No single point reading in any 10 m2 to be less than 80% of the specified minimum coating thickness. If the average of three readings is used to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
-Check any single reading that is greater than 150% of the documented maximum DFT with three additional readings within 50 mm of the original reading. If the average of these three readings is not greater than 150% of the specified DFT, take the average reading as the point reading. If greater than 150%, reject the DFT for that area. If no maximum limit for DFT is documented, consult manufacturer.
Rectification and defects: Rectification: Re-work areas rejected, using the same surface preparation, coatings and sequence as for the original work.
Defects (including under-thickness and over-thickness): Mark with dustless chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

5.1 GE2 Wine Country Information Bay - Engineers Specification

GENERAL

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONSULTANT'S DRAWINGS.
G2. ALL DISCREPANCIES SHALL BE REFERRED TO THE PROJECT MANAGER AND RESOLVED BEFORE PROCEEDING WITH THE WORK.
G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. THESE STRUCTURAL DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
G4. ALL WORKMANSHIP, TESTING, MATERIALS AND SUPERVISION ARE TO BE IN ACCORDANCE WITH THESE SPECIFICATIONS, THE WORK HEALTH AND SAFETY ACT 2011. ENFORCED BY THE WORKCOVER AUTHORITY AND CURRENT RELEVANT AUSTRALIAN STANDARDS.
G5. THE DETERMINATION OF A SAFE WORK METHOD REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. ANY ELEMENT WHICH POSES AN UNACCEPTABLE LEVEL OF SAFETY RISK TO CONSTRUCT SHALL BE REFERRED TO THE STRUCTURAL ENGINEER. TEMPORARY BRACING AND SUPPORT OF STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
G6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL SERVICES IN THE VICINITY OF THE WORKS.
G7. THE STRUCTURAL COMPONENTS DETAILED ON THESE STRUCTURAL DRAWINGS ARE JOB SPECIFIC AND HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADS:

WIND LOADS:

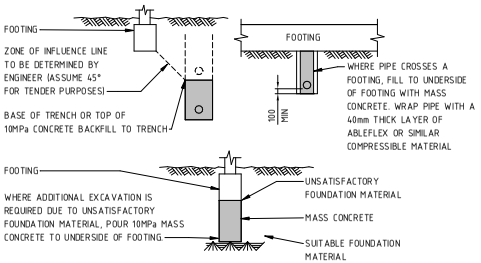
- IMPORTANCE LEVEL = 2
- REGION = A2
- ANNUAL PROBABILITY OF EXCEDENCE = 1/500
- REGIONAL WIND SPEED V^r = 45 m/s
- TERRAIN CATEGORY = TC2
- TERRAIN MULTIPLIER M^z,cat = 0.91
- WIND DIRECTION MULTIPLIER M^d = 1
- SHIELDING MULTIPLIER M^s = 1
- TOPOGRAPHIC MULTIPLIER M^t = 1
- SITE WIND SPEED = 41 m/s

G8. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO SAFETY THE MATTER SHALL BE REFERRED TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
G9. NO CHANGES IN ANY STRUCTURAL ELEMENT SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM NORTHROP CONSULTING ENGINEERS. IF THERE IS A DISCREPANCY THEN FOR TENDER PURPOSES ALLOW FOR THE MOST EXPENSIVE OPTION. NORTHROP CONSULTING ENGINEERS SHALL BE CONTACTED TO CONFIRM PRIOR TO CONSTRUCTION.
G10. NORTHROP CONSULTING ENGINEERS ACCEPTS NO RESPONSIBILITY FOR ANY WORK NOT INSPECTED OR NOT APPROVED BY NORTHROP CONSULTING ENGINEERS DURING CONSTRUCTION.

FOUNDATIONS

F1. ASSUMED ALLOWABLE BEARING CAPACITY:
- STRIP FOOTINGS = 150kPa
- SLABS ON GROUND = 150kPa

F2. A GEOTECHNICAL REPORT HAS NOT BEEN CARRIED OUT. MINIMUM ASSUMED ALLOWABLE BEARING PRESSURES TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. IF MINIMUM BEARING PRESSURES NOT ACHIEVED, AN ALTERNATIVE DESIGN WILL BE REQUIRED.
F3. ENSURE STABILITY OF ADJACENT BUILDINGS AND PATHS IS MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
F4. THE UNDERSIDE OF FOUNDATIONS SHALL CONFORM TO THE FOLLOWING REGARDLESS OF NOMINATED LEVELS:



F5. FOOTINGS SHALL BE CENTRALLY LOCATED UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
F6. FOOTINGS SHALL BE EXCAVATED TO THE DETAILED DEPTH AND WIDTH. FOOTINGS SHALL BE INSPECTED AND FILLED WITH CONCRETE AS SOON AS POSSIBLE TO AVOID EITHER SOFTENING OF THE FOUNDATION MATERIAL OR DRYING OUT BY EXPOSURE.
F7. THE BASE OF ALL PIER HOLES SHALL BE FREE OF WATER AND CLEANED OF LOOSE MATERIAL OR DEBRIS PRIOR TO PLACEMENT OF CONCRETE. ALLOW TO PROVIDE TEMPORARY LINERS AS DEEMED NECESSARY.

CONCRETE

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2009 AND NATSPEC CONCRETE STANDARDS.
C2. CONCRETE PROPERTIES AND COVER TO REINFORCING :

COVER TO REINFORCEMENT					
ELEMENT		CONCRETE STRENGTH f'c (MPa)	MAXIMUM 56 DAY DRY SHRINKAGE	COVER (mm)	
SLABS ON GROUND	EXTERNAL	25	1000 µm	TOP 30	BTM 60
STRIP FOOTINGS		25	1000 µm	60	
PAD FOOTINGS		25	1000 µm	60	

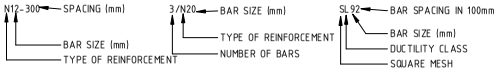
MAXIMUM AGGREGATE SIZE = 20mm U.N.O.
SLUMP DURING PLACING = 80mm ±10mm
EXPOSURE CLASSIFICATION = A2 (IN CONTACT WITH GROUND)
NO ADMIXTURES SHALL BE USED IN THE CONCRETE MIX UNLESS APPROVED BY NORTHROP CONSULTING ENGINEERS IN WRITING.

C3. SLABS USING MECHANICAL VIBRATORS.
C4. PLACE CONCRETE CONTINUOUSLY BETWEEN CONSTRUCTION JOINTS SHOWN ON PLAN. DO NOT BREAK OR INTERRUPT SUCCESSIVE POURS SUCH THAT COLD JOINTS OCCUR. ANY REVISIONS OR ADDITIONS TO CONSTRUCTION JOINTS SHOWN ON PLAN REQUIRE APPROVAL FROM THE NORTHROP CONSULTING ENGINEERS.
C5. REINFORCEMENT QUALITY AND NOTATION :

REINFORCEMENT NOTATION				
SYMBOL	BAR TYPE	STRENGTH GRADE (MPa)	DUCTILITY CLASS	TO COMPLY WITH AUSTRALIAN STANDARD
S	STRUCTURAL GRADE DEFORMED RIB BAR	250	NORMAL	AS/NZS 4671-2001
N	HOT ROLLED DEFORMED RIB BAR	500	NORMAL	AS/NZS 4671-2001
R	PLAIN ROUND BAR	250	NORMAL	AS/NZS 4671-2001
RL	RECTANGULAR MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
SL	SQUARE MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
L-TM	TRENCH MESH	500	LOW	AS/NZS 4671-2001

ALL REINFORCING BARS SHALL BE GRADE D500N TO AS/NZS 4671-2001 AND ALL MESH SHALL BE GRADE 500L TO AS/NZS 4671-2001. UNLESS NOTED OTHERWISE CLASS L REINFORCEMENT SHALL NOT BE USED.

REINFORCEMENT LABELS :



C6. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, AND NOT NECESSARILY IN TRUE PROJECTION. BARS SHOWN ARE INDICATIVE ONLY AND LENGTHS MAY VARY. BEAM ELEVATIONS TAKE PRECEDENCE OVER SECTIONS. SLAB PLANS TAKE PRECEDENCE OVER SECTIONS. REFER TO SECTIONS FOR EXTRA BARS THAT MAY BE REQUIRED.
C7. USE ONLY PLASTIC OR CONCRETE CHAIRS AT EXTERNAL SURFACES.
C8. SITE BENDING OF REINFORCEMENT BARS SHALL BE DONE WITHOUT HEATING USING A RE-BENDING TOOL. THE BARS SHALL BE RE-BENT AGAINST A FLAT SURFACE OR A PIN WITH A DIAMETER NOT LESS THAN THE MINIMUM PIN SIZE PRESCRIBED IN AS3600-2009.
C9. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN ON THE STRUCTURAL DRAWINGS OR IN POSITIONS OTHERWISE APPROVED IN WRITING BY NORTHROP CONSULTING ENGINEERS. LAPS SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND IN ACCORDANCE WITH AS3600-2009 SECTION 13.
C10. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY NORTHROP CONSULTING ENGINEERS.
C11. AT EXTERNALLY EXPOSED SURFACES NO METALLIC ITEMS INCLUDING FORM BOLTS, FORM SPACERS, METALLIC BAR CHAIRS AND TIE-WIRE ARE TO BE PLACED IN THE COVER ZONE.
C12. ALL REINFORCEMENT, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION AND INSPECTED BY A SUITABLY QUALIFIED ENGINEER PRIOR TO PLACING CONCRETE.
C13. ALL CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNISED TESTING LAB.
C14. FOR ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX, REFER TO CONCRETE - ELAPSED DELIVERY TIMES NOTE.

CONCRETE - ELAPSED DELIVERY TIMES

CE1. ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX AT THE SITE MUST NOT EXCEED THE CRITERIA IN THE ELAPSED DELIVERY TIMETABLE BELOW

ELAPSED DELIVERY TIME TABLE	
CONCRETE TEMPERATURE AT TIME OF DISCHARGE (°C)	MAXIMUM ELAPSED TIME (HOURS)
< 24	2.00
24 TO 27	1.50
27 TO 30	1.00
30 TO 32	0.75
32 TO 35	0.50

IF THE ELAPSED TIME IS LONGER THAN THE CORRESPONDING TIME IN THE TABLE ABOVE, OR THE TEMPERATURE IS GREATER THAN 35°C, THE CONCRETE MIX DESIGN ENGINEER IS TO BE CONTACTED TO CONFIRM WHETHER PLACEMENT IS TO PROCEED OR IF THE POUR IS TO BE STOPPED.

STEELWORK

S1. FABRICATE AND ERECT STRUCTURAL STEELWORK IN ACCORDANCE WITH AS4100-1998.
S2. PROVIDE HOLES, CLEATS AND FIXING FOR LIGHT STEEL/TIMBER FRAMING, FINISHES, ETC. SHOWN ON ARCHITECTURAL DRAWINGS.
S3. THESE DRAWINGS HAVE BEEN PREPARED TO INDICATE THE STRUCTURAL INTENT. THE SHOP DETAILER IS TO USE THESE DRAWINGS AS A BASIS FOR DIMENSIONAL COORDINATION WITH OTHER CONSULTANT'S DRAWINGS AND IS TO PREPARE DETAILED SHOP DRAWINGS. WHERE NECESSARY, THE SHOP DETAILER IS TO MAKE ASSUMPTIONS AND SUBMIT TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION. SHOP DETAILER IS TO ALLOW TO RE-WORK SHOP DRAWINGS AS NECESSARY. FABRICATOR SHALL PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE BUILDER FOR THEIR APPROVAL. BUILDER SHALL LODGE TWO COPIES OF APPROVED DRAWINGS TO NORTHROP CONSULTING ENGINEERS FOR REVIEW PRIOR TO FABRICATION, (ALLOW 5 WORKING DAYS FOR REVIEW).
S4. UNLESS NOTED OTHERWISE, USE:
- 6mm CONTINUOUS FILLET WELDS MADE WITH E4818 MILD STEEL ELECTRODES.
- ALL WELDS SP CATEGORY

S5. ALL BOLTS, SCREWS, HOLD DOWN BOLTS, MASONRY ANCHORS SHALL BE HOT DIP GALVANISED TO AS1214-1983, AS/NZS 4534-2006, AS/NZS 4680-2006 & AS/NZS 4792-2006. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED. ALL HOLES SHALL BE 2mm LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE.
S6. MINIMUM YIELD STRESS:
- HOT ROLLED SECTIONS = 300MPa
- SQUARE HOLLOW SECTIONS = 350MPa
- RECTANGULAR HOLLOW SECTIONS = 350MPa
- CIRCULAR HOLLOW SECTION = 250MPa
- HOT ROLLED PLATE = 250MPa

S7. SURFACE TREATMENT UNLESS NOTED OTHERWISE:
- EXPOSED TO WEATHER (STRUCTURAL MEMBERS) = AS/NZS 2312-HDG600P3 or IZS3 (TIME TO FIRST MAINTENANCE TO BE 10 YEARS)
- BUILT INTO THE INTERNAL SKIN OF EXTERNAL WALLS = AS/NZS 2312-HDG600P3

S8. ALL BURIED STEELWORK TO BE PAINTED FIRST USING 'EXPOSED TO WEATHER' TREATMENT SYSTEM FOLLOWED BY THE APPLICATION OF A TWO PART EPOXY SUCH AS 'SIKAGUARD-63N' OR APPROVED EQUIVALENT, THEN CONCRETE ENCASE STEELWORK WITH MASS CONCRETE (MINIMUM 75mm COVER TO STEELWORK).
S9. STEELWORK TO BE CONCRETE ENCASED FOR FIRE RATING PURPOSES SHALL BE FREE FROM ALL LOOSE RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE, ETC. AND REINFORCED WITH SL41 FABRIC OR EQUIVALENT BLACK IRON WIRE, 3mm DIA.
S10. BOLT SYMBOLS:
- 4.6/S = GRADE 4.6 BOLT / SNUG TIGHTENED.
- 8.8/S = GRADE 8.8 BOLT / SNUG TIGHTENED.
- 8.8/TF = GRADE 8.8 BOLT / FULLY TENSIONED FRICTION TYPE (USE LOAD INDICATOR WASHERS)
- 8.8/TB - GRADE 8.8 BOLT / FULLY TENSIONED BEARING TYPE (USE LOAD INDICATOR WASHERS)

S11. THE CONTRACTOR SHALL SUPPLY WRITTEN CERTIFICATION TO THE STRUCTURAL ENGINEER PRIOR TO THE ERECTION OF ANY STRUCTURAL STEEL STATING THAT THE BOLTS PROPOSED TO BE USED COMPLY WITH AS/NZS 1252-1996. HIGH STRENGTH BOLTS (8.8) ARE NOT TO BE WELDED.
S12. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEEL WORK SHALL BE SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, IN ORDER TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
S13. ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS. SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.
S14. GROUT ALL STEEL BASES BY DRY PACKING USING GROUT WHICH IS NON-SHRINK AND HAS A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 40MPa
S15. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS ARE TO BE HOT DIP GALVANISED.
S16. THESE DRAWINGS MAY NOT IDENTIFY ALL SECONDARY STEELWORK ELEMENTS THAT ARE REQUIRED FOR SUPPORT, FIXING AND FINISHING OF GLAZING, CLADDING AND LINING. THE TENDERER IS RESPONSIBLE FOR THE INCLUSION OF SUCH STEELWORK ELEMENTS TO THE EXTENT REQUIRED ON THE ARCHITECT'S DRAWINGS.
S17. IMPORTED STRUCTURAL STEEL MATERIAL
ALL STRUCTURAL STEELWORK USED ON THIS PROJECT SHALL BE COMPLIANT WITH AS4100, AND IN PARTICULAR:
- CERTIFIED MILL TEST REPORTS, OR TEST CERTIFICATES SHALL BE PROVIDED AS EVIDENCE OF COMPLIANCE WITH THE STANDARDS REFERRED TO IN AS4100. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- PROVIDE TEST CERTIFICATED FOR COMPLIANCE FOR ALL FASTENERS. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- FOR COLD FORMED SECTIONS A "CERTIFICATE OF CONFORMITY TO AS1163-1991" SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- CERTIFICATES SHALL ONLY BE ACCEPTED FROM TESTING COMPANIES ACCREDITED BY A TESTING AUTHORITY RECOGNISED IN AUSTRALIA, EG NATA or JAS-ANZ CERTIFIED.
- UNIDENTIFIED STEEL ie. ANY STEEL THAT IS NOT ACCOMPANIED WITH EVIDENCE STATING COMPLIANCE WITH THE REQUIREMENT OF AS4100 SHALL ONLY BE USED STRICTLY IN ACCORDANCE WITH CLAUSE 2.2.3 OF AS4100. IF MATERIALS SUPPLIED AND INSTALLED ARE SUBSEQUENTLY PROVEN TO BE NON COMPLIANT WITH THE SPECIFIED AUSTRALIAN STANDARDS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND COST TO UNDERTAKE NATA OR EQUIVALENT CERTIFIED TESTING TO PROVE CONFORMANCE TO THE AUSTRALIAN STANDARDS AND DESIGN SPECIFICATIONS. SIMILARLY ANY RECTIFICATION WORKS THAT MAY SUBSEQUENTLY BE REQUIRED TO SATISFY AUSTRALIAN CODE REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

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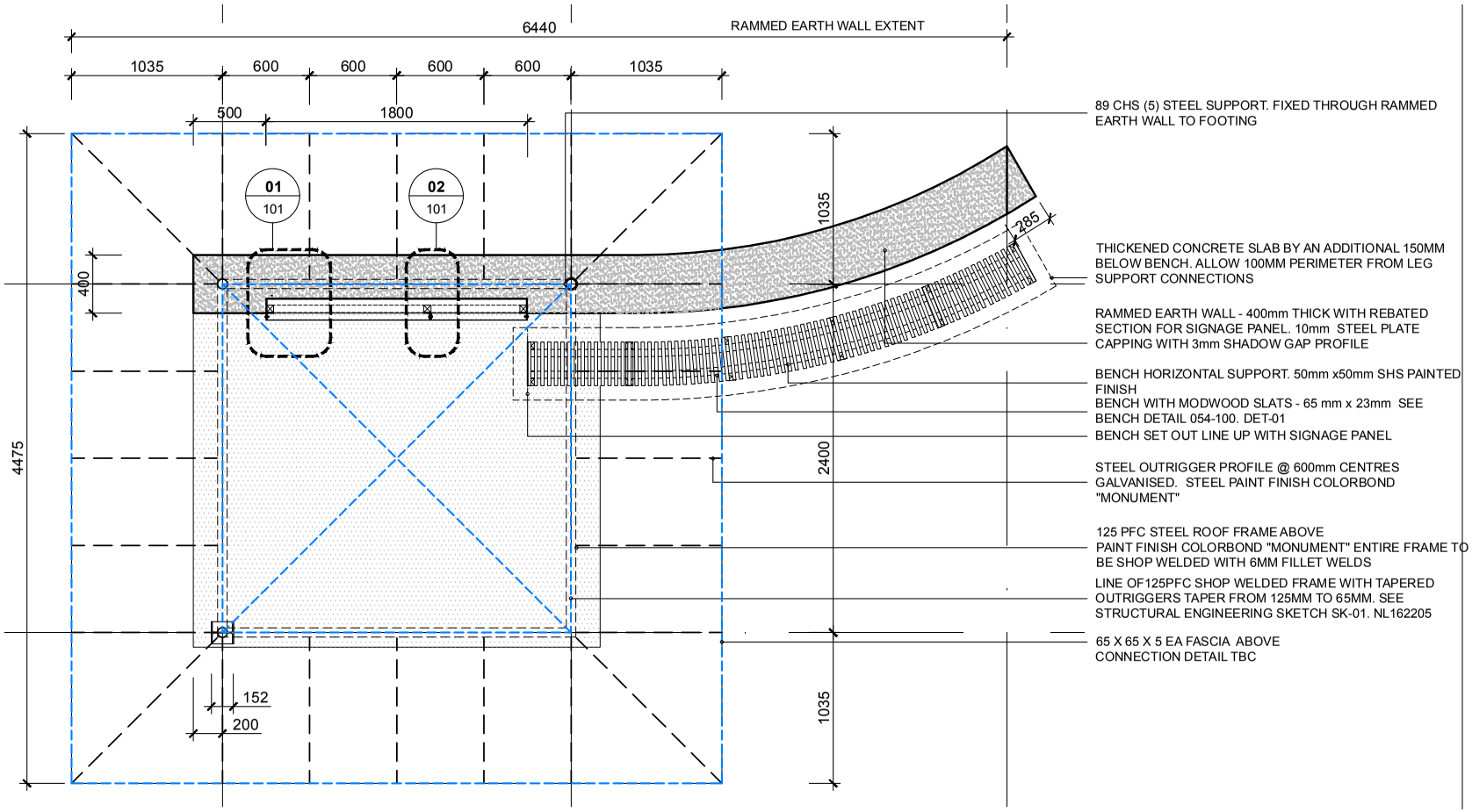
JOB NUMBER:	NL166682	DATE:	30/11/2017
PROJECT:	CESSNOCK TYPICAL SIGNAGE BAY		
DRAWING TITLE:	JOB NOTES		
DRAWING NUMBER:	NL166682_SK10		

F

5.1 GE2 Wine Country Information Bay



02 GE2 Wine County Information Bay - Plan

General Notes:

Refer to GE2 Wine Country Information Bay supporting drawings:

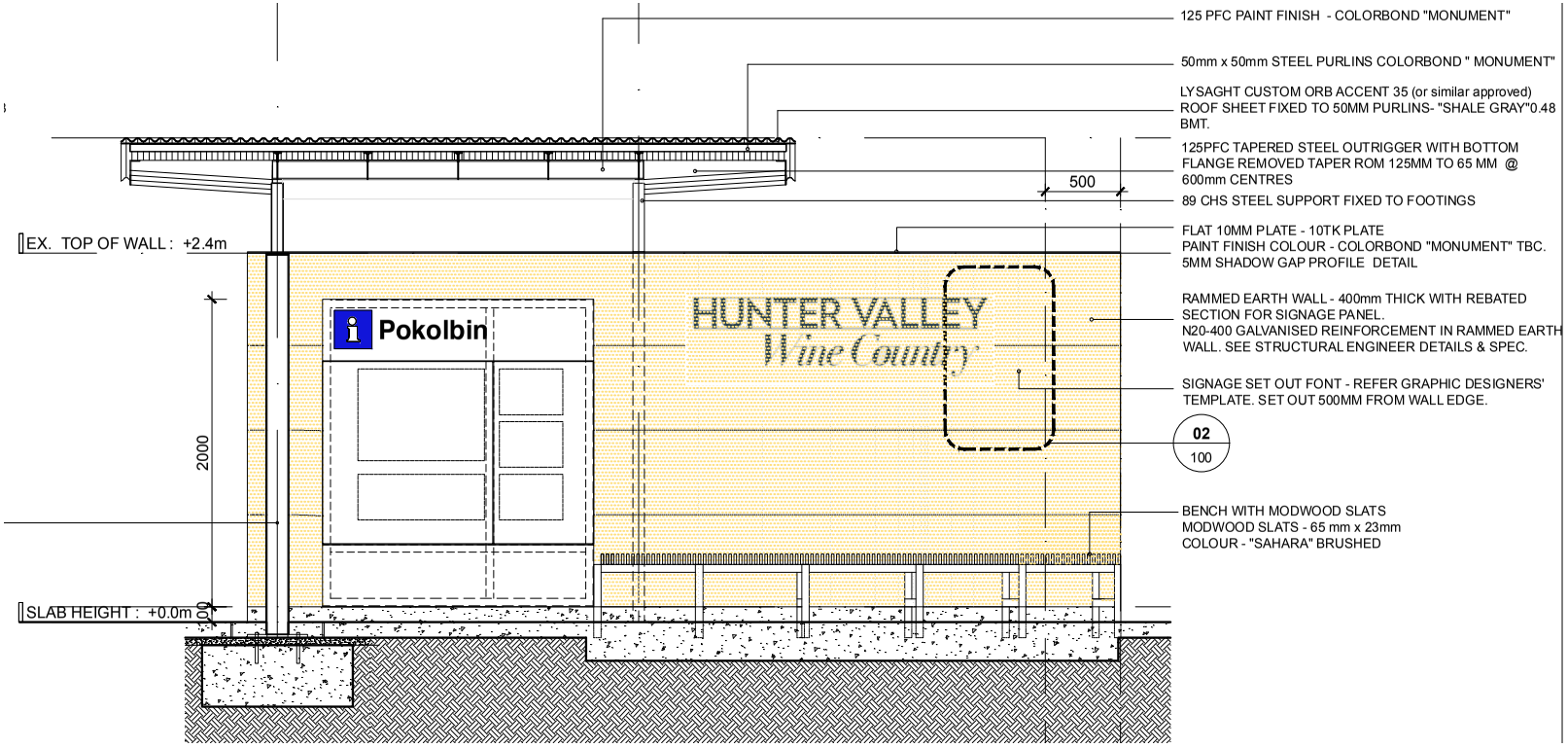
- 01 GE2 Wine Country Information Bay p.92
- 03 GE2 Wine Country Information Bay - Lettering p.101
- 04 GE2 Wine Country Information Bay - Front Elevation p.101
- 05 GE2 Wine Country Information Bay - Side Section p.102
- 06 GE2 Wine Country Information Bay - Bench Detail p.103

Refer signage specification p.93-98.

Refer engineers specification page 99 and engineers drawing page 104-106.

5.1 GE2 Wine Country Information Bay

03 GE2 Wine County Information Bay - Lettering
NTS



04 GE2 Wine County Information Bay - Front Elevation
NTS

General Notes:

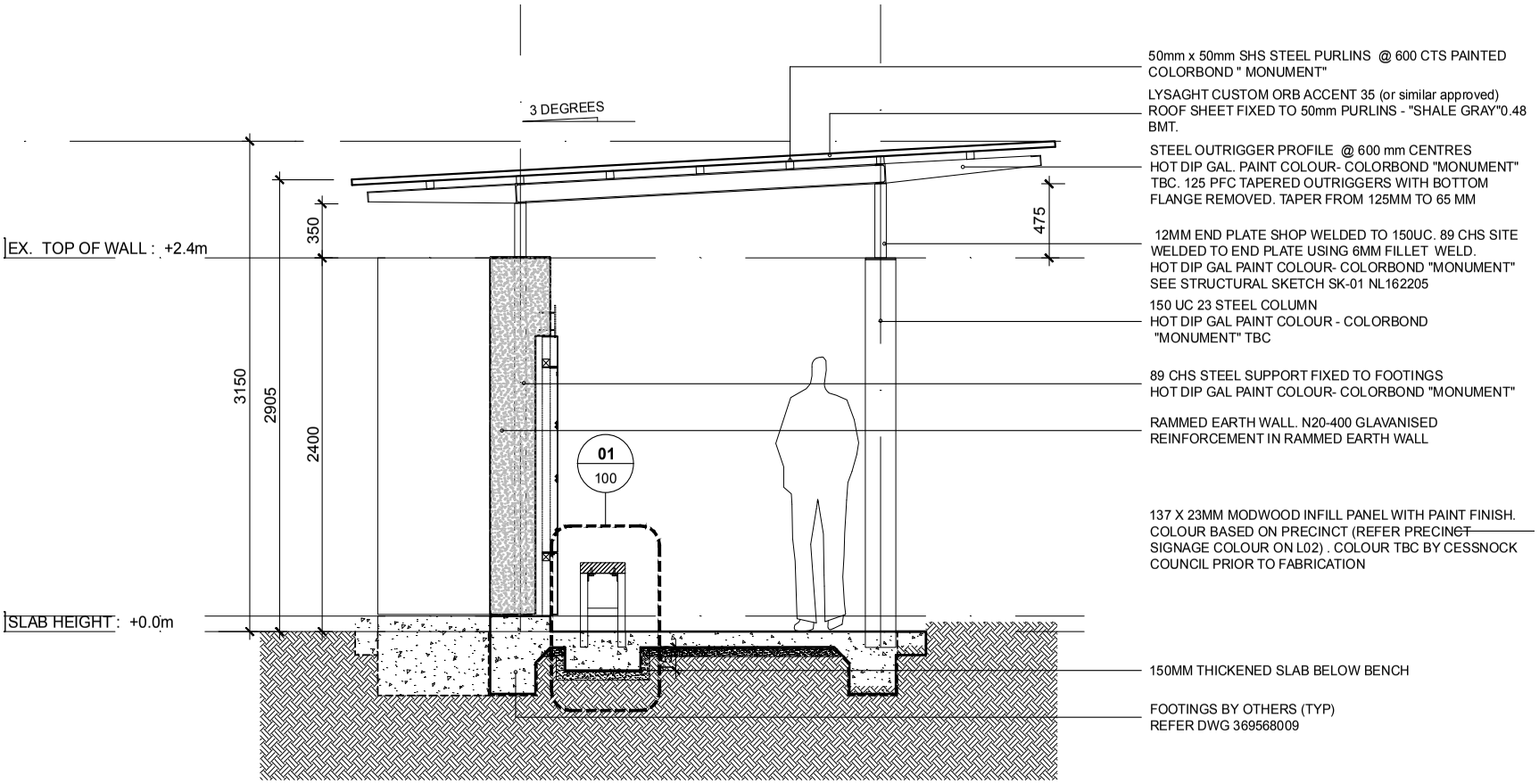
Refer to GE2 Wine Country Information Bay supporting drawings:

- 01 GE2 Wine Country Information Bay p.92
- 02 GE2 Wine Country Information Bay - Plan p.100
- 05 GE2 Wine Country Information Bay - Side Section p.102
- 06 GE2 Wine Country Information Bay - Bench Detail p.103

Refer signage specification p.93-98.

Refer engineers specification page 99 and engineers drawing page 104-106.

5.1 GE2 Wine Country Information Bay



05 GE2 Wine Country Information Bay - Side Section
NTS

General Notes:

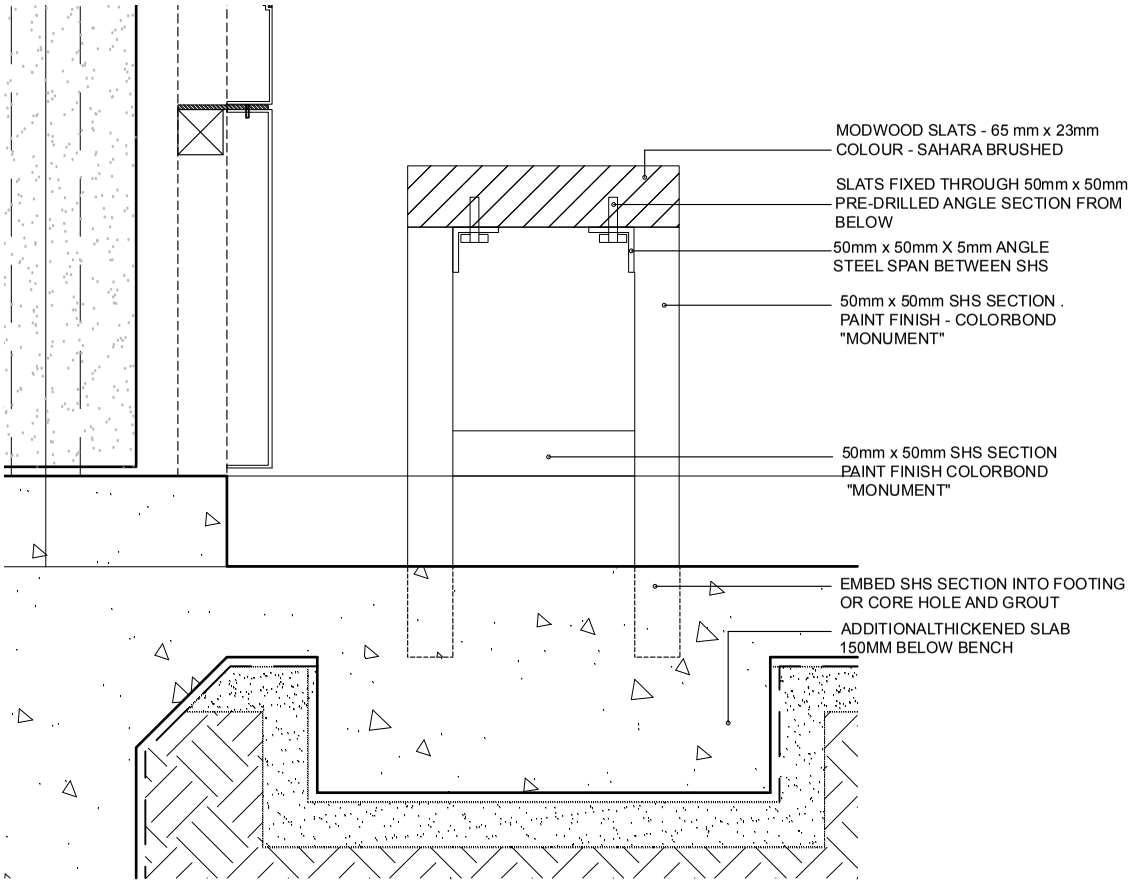
Refer to GE2 Wine Country Information Bay supporting drawings:

- 01 GE2 Wine Country Information Bay p.92
- 02 GE2 Wine Country Information Bay - Plan p.100
- 03 GE2 Wine Country Information Bay - Lettering p.101
- 04 GE2 Wine Country Information Bay - Front Elevation p.101
- 06 GE2 Wine Country Information Bay - Bench Detail p.103

Refer signage specification p.93-98.

Refer engineers specification page 99 and engineers drawing page 104-106.

5.1 GE2 Wine Country Information Bay



06 GE2 Wine Country Information Bay - Bench Detail
NTS

General Notes:

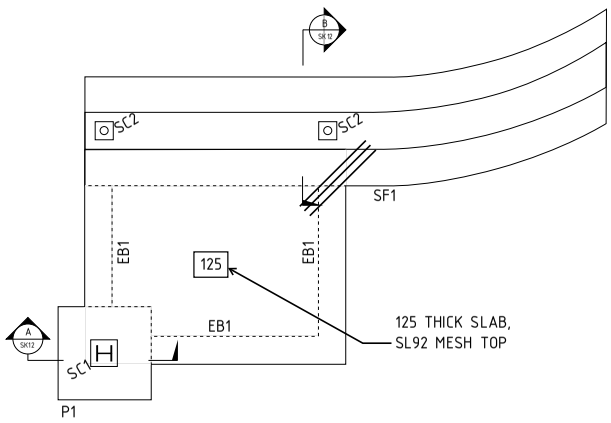
Refer to GE2 Wine Country Information Bay supporting drawings:

- 01 GE2 Wine Country Information Bay p.92
- 02 GE2 Wine Country Information Bay - Plan p.100
- 03 GE2 Wine Country Information Bay - Lettering p.101
- 04 GE2 Wine Country Information Bay - Front Elevation p.101
- 05 GE2 Wine Country Information Bay - Side Section p.102

Refer signage specification p.93-98.

Refer engineers specification page 99 and engineers drawing page 104-106.

5.1 GE2 Wine Country Information Bay - Engineers Drawing



FOUNDATIONS PLAN

MEMBER SCHEDULE:

STEEL
SC1 = 150UC23
SC2 = 89X5CHS

FOUNDATIONS
EB1 = 300w x 400d EDGE BEAM. 3-L11TM BOTTOM

SF1 = 1200w x 600d STRIP FOOTING. N16-200 TOP AND BOTTOM. N12-300 TIES

P1 = 1000sq x 500d PAD FOOTING. 5-N16 U-BARS TOP AND BOTTOM EACH WAY

125 DENOTES SLAB THICKNESS

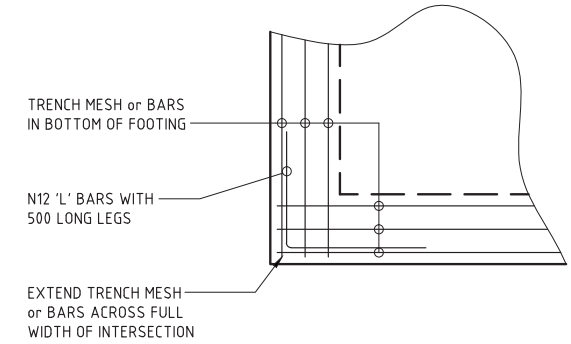
ALL SLABS (UNLESS NOTED OTHERWISE) TO BE 125mm THICK, REINFORCED WITH SL92 MESH TOP. CAST SLABS ON 0.2mm POLYTHENE MEMBRANE LAID OVER A NOMINAL LEVELLING LAYER OF SAND ON FIRM NATURAL GROUND WHICH ACHIEVES 150kPa BEARING CAPACITY. IF FILL IS REQUIRED, OR UNCONTROLLED FILL IS ENCOUNTERED, DETAILED FOOTING DESIGN IS TO BE UNDERTAKEN.

DESIGNED IN ACCORDANCE WITH AS2870 FOR CLASS M SITE FOR ARTICULATED MASONRY VENEER.

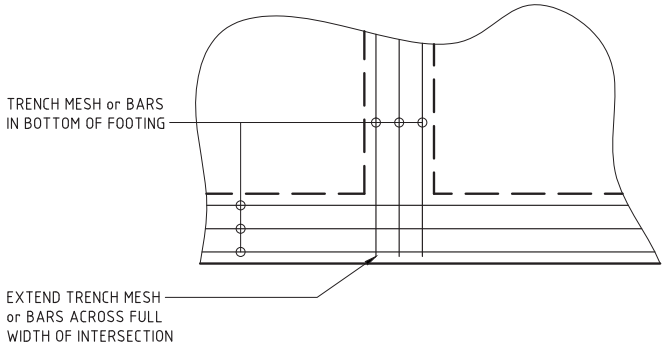
THE BUILDER IS TO ENGAGE A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER TO CONFIRM THAT FOUNDING MATERIALS MEET THE FOLLOWING REQUIREMENTS PRIOR TO PLACING OF REINFORCEMENT:
- SITE CLASSIFICATION = CLASS M
- BEARING CAPACITY OF FOUNDING MATERIAL = 150kPa

DENOTES 3/N12 or 3-L11TM, 2000 LONG TRIMMER BARS TIED TO UNDERSIDE OF MESH AT ALL RE-ENTRANT CORNERS.

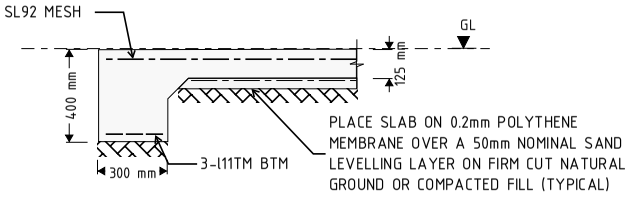
NOTE: SLAB ON GROUND SURFACE TREATMENT TO ARCHITECTS SPECIFICATION



TYPICAL SLAB 'L' INTERSECTION CORNER DETAIL



TYPICAL SLAB 'T' INTERSECTION CORNER DETAIL



SECTION B - TYPICAL SLAB EDGE DETAIL

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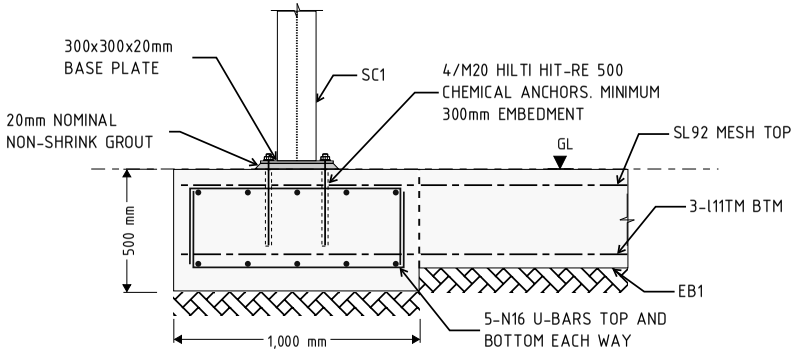
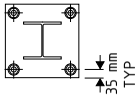
JOB NUMBER:	NL166682	DATE:	30/11/2017	REV.
PROJECT:	CESSNOCK TYPICAL SIGNAGE BAY			1
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK11			

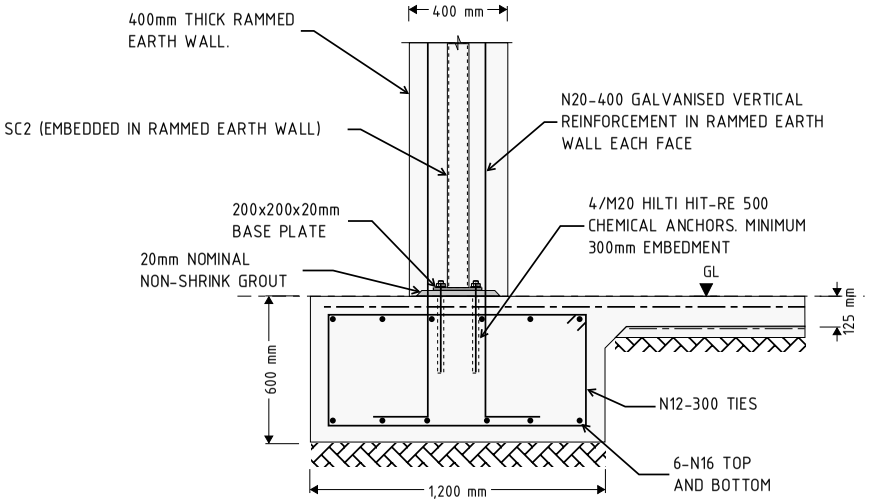
5.1 GE2 Wine Country Information Bay - Engineers Drawing



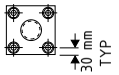
SECTION A - THROUGH PF1



SC1 BASE PLATE DETAIL



SECTION B - THROUGH SF1



SC2 BASE PLATE DETAIL

MEMBER SCHEDULE:

STEEL
SC1 = 150UC23
SC2 = 89X5CHS

FOUNDATIONS
EB1 = 300w x 400d EDGE BEAM. 3-L11TM BOTTOM

SF1 = 1200w x 600d STRIP FOOTING. N16-200 TOP AND BOTTOM. N12-300 TIES

P1 = 1000sq x 500d PAD FOOTING. 5-N16 U-BARS TOP AND BOTTOM EACH WAY

125 DENOTES SLAB THICKNESS

ALL SLABS (UNLESS NOTED OTHERWISE) TO BE 125mm THICK, REINFORCED WITH SL92 MESH TOP. CAST SLABS ON 0.2mm POLYTHENE MEMBRANE LAID OVER A NOMINAL LEVELLING LAYER OF SAND ON FIRM NATURAL GROUND WHICH ACHIEVES 150kPa BEARING CAPACITY. IF FILL IS REQUIRED, OR UNCONTROLLED FILL IS ENCOUNTERED, DETAILED FOOTING DESIGN IS TO BE UNDERTAKEN.

DESIGNED IN ACCORDANCE WITH AS2870 FOR CLASS M SITE FOR ARTICULATED MASONRY VENEER.

THE BUILDER IS TO ENGAGE A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER TO CONFIRM THAT FOUNDING MATERIALS MEET THE FOLLOWING REQUIREMENTS PRIOR TO PLACING OF REINFORCEMENT:
- SITE CLASSIFICATION = CLASS M
- BEARING CAPACITY OF FOUNDING MATERIAL = 150kPa

DENOTES 3/N12 or 3-L11TM, 2000 LONG TRIMMER BARS TIED TO UNDERSIDE OF MESH AT ALL RE-ENTRANT CORNERS.

NOTE: SLAB ON GROUND SURFACE TREATMENT TO ARCHITECTS SPECIFICATION

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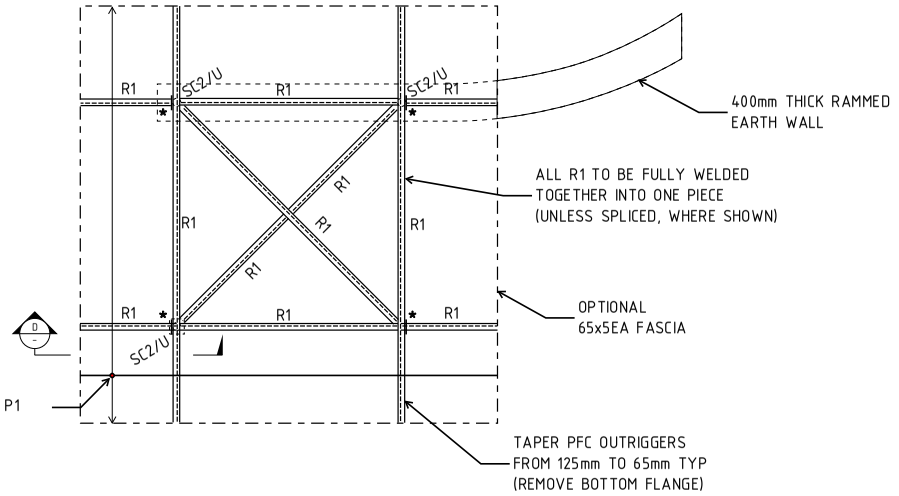
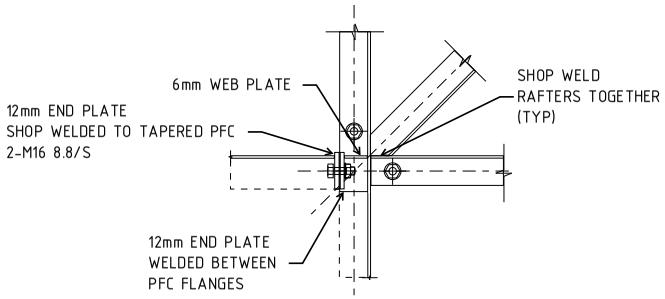
JOB NUMBER:	NL166682	DATE:	30/11/2017	REV.
PROJECT:	CESSNOCK TYPICAL SIGNAGE BAY			1
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK12			

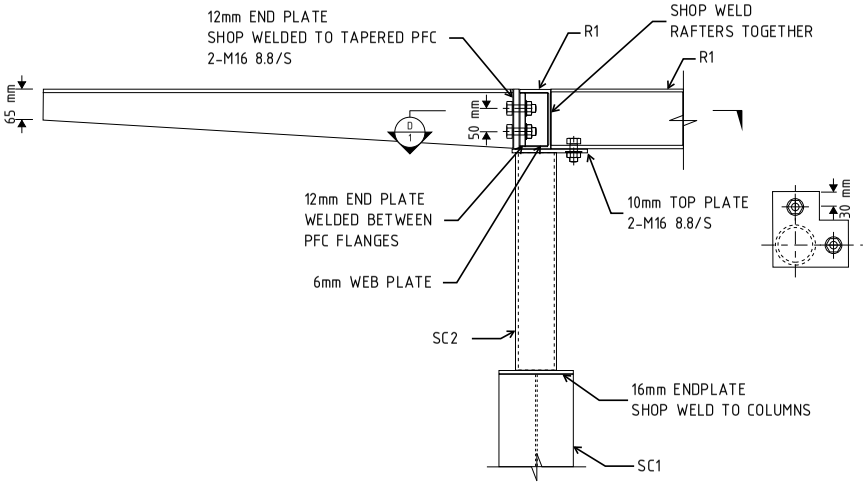
5.1 GE2 Wine Country Information Bay



ROOF PLAN



SECTION D1 - PLAN SECTION OF RAFTER CONNECTION



SECTION D - TYPICAL RAFTER CONNECTION

MEMBER SCHEDULE:

STEEL
SC1 = 150UC23
SC2 = 89X5CHS

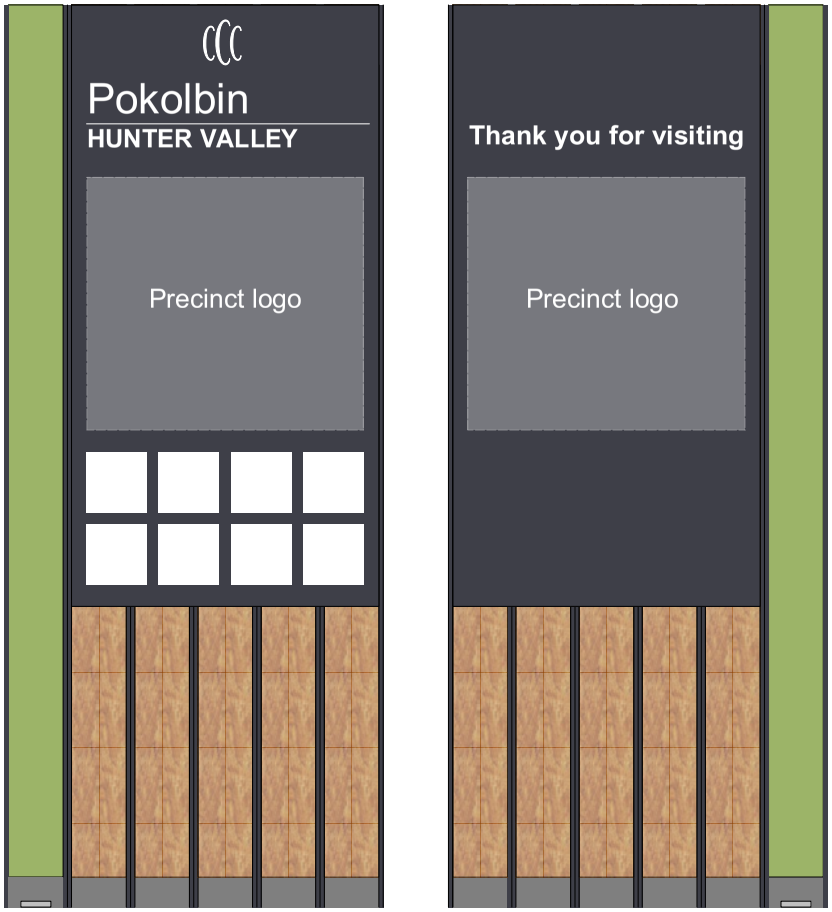
R1 = 125PFC

P1 = 50X4SHS AT 600CTS

* DENOTES BOLTED SPLICE

NORTHROP Newcastle Suite 4, 215 Pacific Hwy, Charlestown NSW 2290 P.O. Box 180, Charlestown NSW 2290 Ph (02) 4943 1777 Fax (02) 4943 1577 Email newcastle@northrop.com.au ABN 81 094 433 100	JOB NUMBER:	NL166682	DATE: 30/11/2017	REV.
	PROJECT:	CESSNOCK TYPICAL SIGNAGE BAY		1
	DRAWING TITLE:	JOB NOTES		
	DRAWING NUMBER:	NL166682_SK13		

5.2 PS1 Precinct Sign



01 PS1 Precinct Sign

COLOURS:

Background and steel column: Colorbond Monument

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

Modwood Panelling
Modwood Sahara (brushed finish)

PRECINCT COLOURS:

Kurri Kurri: CMYK: 80, 100, 3, 0. RGB: 101, 46, 119

Parish of Pokolbin
C:66 M:0 Y:11 K:0

Broke Fordwich
C:80 M:20 Y:100 K:7

Mount View
C:31 M:1 Y:100 K:0

Central Pokolbin
C:2 M:8 Y:99 K:0

Hermitage
C:0 M:100 Y:96 K:0

Branxton Greta: CMYK: 2, 66, 99, 0. RGB: 233, 115, 46

Wollombi Valley
C:26 M:100 Y:100 K:19

Lovedale
C:100 M:88 Y:9 K:1

LETTERING:

Precinct Names: Arial
Hunter Valley: Arial Bold
Thank You: Arial

5.2 PS1 Precinct Sign - Signage Specification

1.0 STEEL
General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier

1.1 Durability
General: Provide steel products protected from corrosion to suit the conditions of use.

1.2 Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

1.3 Protective coatings
Environment: To AS/NZS 2312 clause 2.3.
Coating designation: To AS/NZS 2312.

Fasteners
Self drilling screws
Corrosion resistance: To AS 3566.2.

Vapour barrier
Vapour barrier to slabs: To AS 2870 clause 5.3.3.
Minimum thickness: 0.2 mm.

1.4 Aluminium and aluminium alloys
Drawn pipe: To AS/NZS 1867.
Drawn rod, bar and strip: To AS/NZS 1865.
Extrusions: To AS/NZS 1866.
Plate and sheets: To AS/NZS 1734.

1.5 Coated steel
Electrogalvanized (zinc) coating on ferrous hollow and open sections: To AS 4750.
Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
- Ferrous open sections by an in-line process: To AS/NZS 4791.
- Ferrous hollow sections by a continuous or specialised process: To AS/NZS 4792.
- Metallic-coated steel sheet: To AS 1397. Metal thicknesses specified are base metal thicknesses.

Steel wire: To AS/NZS 4534.

1.6 Metal separation
Incompatible sheet metals: Prevent direct contact between incompatible metals. Provide separation by one of the following:
- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
- Insert a concealed, non-metallic separation layer such as polyethylene film, adhesive tape, neoprene, nylon or bituminous felt.

Incompatible fixings: Do not use.
Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous or paper products.

1.7 Brazing
General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.
Butt joints: Do not use butt jointing for joints subject to load. If butt joints are used, do not rely on the filler metal fillet only.
Filler metal: To AS/NZS 1167.1.

1.8 Finishing
Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Make sure self-finished metals are without surface colour variations after jointing.

1.9 Preparation
General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.
Standard: To AS 1627 series.
Priming steel surfaces: If site painting is documented to otherwise uncoated mild steel or similar surfaces, prime as follows:
- After fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to unprimed surfaces.

1.10 Welding
Aluminium: To AS 1665.
Stainless steel: To AS/NZS 1554.6.
Steel: To AS/NZS 1554.1.

1.11 Electroplated coatings
Chromium on metals: To AS 1192.
- Service condition number: At least 2.

Nickel on metals: To AS 1192.
- Service condition number: At least 2.

Zinc on iron or steel: To AS 1789.

2.0 MODWOOD
Size: 65x23mm ModWood.
Colour: ‘Sahara’ Finish: Brushed
Fixings: As per details.

3.0 PAINTING DULUX PROTECTIVE PAINT COATINGS
Contact:
DuluxGroup/Dulux technical contacts
Architects and Specifiers' Hotline: 13 23 77.
Website: www.duluxprotectivecoatings.com.au/contact-us.

3.1 Products
Storage and handling: Care: Handle, store, mix and apply all protective coatings in conformance with Dulux recommendations.
Original containers: Deliver coating products to site in the manufacturer's labelled and sealed containers.
Ambient temperature range for storage: 15°C to 25°C.
Use-by-date: Use products with limited shelf life before their use-by-date unless written authorisation from the coating manufacturer's technical services section is provided.
Safety data sheets (SDS):Requirement: Keep on site copies of all relevant Dulux SDS's and technical datasheets.
Proprietary products: Substitution: Dulux paint products and specified coatings systems have been selected for this project and unauthorised product substitution will jeopardise or void the Warranties.

3.2 Surface Preparation
Defects: Remove all surface defects, including cracks, laminations, deep pitting, weld spatter slag, burrs, fins, sharp edges and other defects before the preparation of the surface to be coated.
Temporary welds: Grind flush temporary welds.
Site welding: Where possible avoid site welding.
Porous, skip or stitch welds: Not acceptable.
Edges: De-burr and round all edges to a 2 mm radius.
Surface contaminants: Remove surface contaminants such as oil, grease, dirt and loose particles, using an alkaline oil emulsifier/ degreaser to AS 1627.1.
Surface preparation: Prepare surfaces to the required finish to AS 1627.1, AS 1627.2, AS 1627.4, AS 1627.5, AS 1627.6 and AS 1627.9.
Surface cleaning: Remove spent abrasive from the surface by blowing with clean, dry air and/or by vacuum cleaning.
Bolts: Provide washers at heads and nuts at replacement bolts.
Surface preparation for atmospheric steel:
General: Conform to the following requirements:
-Wash and degrease all surfaces to be coated in conformance with AS 1627.1 with a free-rinsing, alkaline detergent, such as Gibson F310B or Gamlen CA No. 1 in conformance with the manufacturer's written instructions and all safety warnings.
-Wash with fresh potable water and remove all soluble salts are in conformance with AS 3894.6 Methods A and D.
-Grind all sharp edges with a power tool to a minimum radius of 2 mm.
-Power tool clean welds to AS 1627.2 Class 2 to remove roughness. Remove filings, preferably by vacuum or compressed air.
-Abrasive blast clean all steel surfaces to be painted in conformance with AS 1627.4 to visual standard AS 1627.9 Class 2.5 (equivalent to ISO 8501-1, Sa 2.5: Very Thorough Blast-Cleaning). Use a non-metallic medium that will generate a surface profile of 35 to 65 µm, as tested to AS 3894.5 Method A.
-Commence application within 4 hours of abrasive blast cleaning or before surface becomes contaminated, otherwise repeat abrasive blasting step.
-Stripe coat welds, bolts, bolt holes and all edges with primer before application of full primer coat nominated in PROTECTIVE PAINT COATING SYSTEMS.
-Before application, make sure that the surface is free of contaminants including oil, grease, dirt, dust, salt and any other deleterious materials that will interfere with coating performance.

Treatment of on-site welding:
On-site welding: If on site welding is performed, adopt the following procedure:
-Remove weld spatter.
-Power tool clean welds to AS 1627.2 Class 2 to remove roughness. Remove filings, preferably by vacuum or compressed air.
-Prime welds immediately with the nominated primer before contamination can re-occur. Make sure that the primer overlaps the sound adjacent coating by between 25 mm and 50 mm.
-Apply intermediate and topcoats over the primed welds to match the surrounding coating system, overlapping the sound adjacent coating by between 25 mm and 50 mm.

Preparing galvanized and aluminium surfaces:
Remove grease, oil and other solvent-soluble contaminants by wiping with mineral turpentine or white spirit. Finally wipe with a clean solvent. Allow to dry and proceed with the next operation immediately. Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Preparing zinc primed surfaces:
If present, remove zinc salts from zinc primers. Remove grease, oil and other solvent-soluble contaminants by wiping with mineral turpentine or white spirit. Finally wipe with a clean solvent. Allow to dry and proceed with the next operation immediately.

Shop priming
Dust off and apply a coat of primer, according to the technical specification.
Site coating
General: High pressure fresh water wash down all surfaces. Lightly sand down primer/ intermediate coats, which have been shop applied, before site application of next coat.

3.3 Preparation assessment
Conformance: All areas of any item must meet the required cleanliness standard.
Abrasive blast cleaning: Assessment: To AS 1627.4 and ISO 8501-1.
-Class 2.5.

5.2 PS1 Precinct Sign - Signage Specification

Power tool cleaning: Assessment: To AS 1627.2 and ISO 8501-2.
-Class 2.
Hand tool cleaning
Visual assessment: To ISO 8501-2.
-Class 1.
Surface profile: General: To AS 3894.5.
Profile grade: To AS 3894.5 Method A.
Surface dust from abrasion
General: To AS 3894.6 Method C.
Chloride level testing: Test: To AS 3894.6 Method A.
Maximum allowable chloride levels: 50 mg/m2.
Conformance: If this level is exceeded, rewash the affected surface area using fresh water until the chloride level is within acceptable limits. Pressure washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.
Timing of testing: Early in the blasting work so that removal procedures can be initiated before the blasting is completed.
Wet film thickness: Method of measurement: To AS 3894.3, Appendix C using an approved wet film gauge continuously during application.
Dry film thickness: Method of measurement: To AS 3894.3, clause 10.
Extent: All surfaces at the completion of each of the prime, intermediate and finish coats, in particular include areas of the structure which are difficult to paint, are masked by structure, or areas where double coating or light coating is likely due to the shape of the substrate.
Number of measurements: Perform a sufficient number of readings to make sure a representative account for the DFT compliance of the coated areas tested.
Deduction: If testing the DFT of coatings 150 µm and less, deduct the effect of the measured surface profile from all DFT readings.
Single readings: Single reading requirements are as follows:
-The average of 5 point readings for each 10 m2 area of coating surface should not be outside the specified coating thickness range.
-No single point reading in any 10 m2 should be less than 80% of the specified minimum coating thickness. However, where three readings are averaged to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
-Check any single reading that is greater than 150% of the specified DFT with three additional readings within 50 mm of the original reading. If these three readings average not greater than 150% of the specified DFT, take the averaged readings as the point reading. If greater than 150%, reject the DFT in that area.
Rectification: Re-work areas rejected, using surface preparation and coatings in the same manner and order as the original work.
Defects including under thickness and over thickness: Mark with school grade chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

3.4 Mixing
Mixing: Mix coatings thoroughly. All containers larger than 4 litres are to be mixed using powered agitators driven by air motors.
Multi-component coatings: Combine multi-component coatings as whole pack units. If partial mixing is proposed, submit details.
Thinners: If addition of thinners is proposed, conform to the Dulux product data sheet for the specified product.
Colour consistency: If colour consistency is required, before the addition of the curing agent or converter and before coating application, pre-mix the components of coating products that have been tinted to make sure colour uniformity.
Thinners: If addition of thinners is proposed, conform to the coating manufacturer's recommendations for the documented product.
Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

3.5 Coating Application
General: Conform to the Dulux product data sheets and the Dulux specification.
Painting and coating colour: Verify all project finish colours with the retained samples.

Final surface preparation or coating application:
Limits: If the following climatic/substrate conditions are present do not apply coating:
-The relative humidity is above 85%.
-The substrate temperature is less than 3°C above the dew point.
-The ambient air temperature is below 5°C or above 40°C.
-The substrate temperature is below 10°C or above 45°C.
-The surface to be coated is wet or damp.
-Where the full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
-For external or site applied coatings:
-The weather is clearly deteriorating or unfavourable for application or curing.
-High wind conditions.
-The surface preparation standard has not been achieved.
-The time between surface blast cleaning and the commencement of coating exceed 4 hours.
-Visual tarnishing or black spots develop on the surface of the metal.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, provided the final surface preparation and all coating applications are undertaken under the limited conditions.
Prior coating: Before the spray application of each coating stripe coat by brush method all edges, welds, seams, rivets bolts and bolt holes (including slots). Prime the underlying surfaces of replacement bolting, washers and nuts before installation.
Procedure: Conform to the order shown in PROTECTIVE PAINT COATING SYSTEMS.
Timing: Conform to the minimum and maximum re-coat intervals and curing times.
Detail: Stripe coat all welds, bolt holes, corners and difficult to spray areas by brushing in with the prime coat and intermediate coat material before the full coating application.

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Subsequent coats: Make sure that before any subsequent coating layer is applied, the surface condition of the preceding coat is complete and correct in all respects, including its DFT achievement, cleanliness, freedom from defects. These are detailed on the Dulux Protective Coating specification. Depending on the applicators chosen method additional coats may be required to achieve the nominated minimum DFT.
Conformance: To AS/NZS 2312.1 for the specified film thickness of individual coats.
Correction: Correct any defect in a coating layer before the subsequent coating layer is applied.
Protection
General: Perform all painting under cover and/or protected from rain, condensation, dew, excessive wind, overspray or wind-blown dust.
Period: Continue protection where any of these conditions exist before the coating has cured to a sufficient degree so as to be unaffected.

3.6 Coating Repair
Repair of coating damage:
Preparation: Feather back by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edges.
Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.
Sequence: Apply the repair coating in the same sequence and manner as the original coating.
Areas damaged without exposing the primer: Wash with a proprietary detergent solution and rinse with fresh water, followed by abrading and ensuring that edges of sound paint are feathered. Then coat the area with the appropriate intermediate and finishing coat materials.
Areas damaged to the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Re-coat with the specified system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.
Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line.
Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.
Timing: Apply the Dulux Protective Coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.
Cleaning: Provide, at no additional cost, surface treatment as follows:
- Surfaces left longer than four hours: Re-blast cleaning before coating.
- Surfaces that develop visual tarnishing (red rust or black spots) at any time before coating: Wash down with fresh potable water then blast clean before coating. There are commercially available chloride reducing solutions that may assist.

3.7 Completion
General: Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties:
Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.
- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

3.8 Selections
There are decorative finish options for architectural and structural steel. The most common coating types are:

Epoxy acrylic
Inland AS/NZS 2312.1 Categories C1 and C2: Epoxy acrylic

Location	Primer	Second Coat	Third Coat	Duspec No
Exterior decorative equivalent to AS/NZS 2312.1 ACC2	75 µm DULUX Durepon P14 DI1117	50 µm DULUX Acrathane IF DI1102	Nil	SI1433

Coastal AS/NZS 2312.1 Categories C3, C4 and C5: Epoxy acrylic

Location	Primer	Second Coat	Third Coat	Duspec No
Exterior decorative equivalent to AS/NZS 2312.1 ACC6	75 µm DULUX Zinc-anode 402 DI0539	00 µm DULUX Duremax GPE DI1115	50 µm DULUX Acrathane IF DI1102	SI1399

4.0 VINYL SIGNAGE
Graphic set-out to be providex by Cessnock City Council.

All vinyl signage to be Eclipse 21 Series Self-Adhesive Polymeric Inkjet Vinyl. Vinyl to be 3mm thick with a UV stabilized over laminate in matte finish.
Solid colours are to be in Pantone colours and other imagery CMYK format.
To be installed in accordance with manufacturer's specifications.

5.2 PS1 Precinct Sign - Engineers Specification

GENERAL

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONSULTANT'S DRAWINGS.
G2. ALL DISCREPANCIES SHALL BE REFERRED TO THE PROJECT MANAGER AND RESOLVED BEFORE PROCEEDING WITH THE WORK.
G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. THESE STRUCTURAL DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
G4. ALL WORKMANSHIP, TESTING, MATERIALS AND SUPERVISION ARE TO BE IN ACCORDANCE WITH THESE SPECIFICATIONS, THE WORK HEALTH AND SAFETY ACT 2011. ENFORCED BY THE WORKCOVER AUTHORITY AND CURRENT RELEVANT AUSTRALIAN STANDARDS.
G5. THE DETERMINATION OF A SAFE WORK METHOD REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. ANY ELEMENT WHICH POSES AN UNACCEPTABLE LEVEL OF SAFETY RISK TO CONSTRUCT SHALL BE REFERRED TO THE STRUCTURAL ENGINEER. TEMPORARY BRACING AND SUPPORT OF STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
G6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL SERVICES IN THE VICINITY OF THE WORKS.
G7. THE STRUCTURAL COMPONENTS DETAILED ON THESE STRUCTURAL DRAWINGS ARE JOB SPECIFIC AND HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADS:

WIND LOADS:

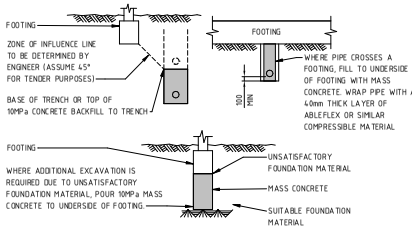
- IMPORTANCE LEVEL = 2
- REGION = A2
- ANNUAL PROBABILITY OF EXCEDENCE = 1/500
- REGIONAL WIND SPEED V_R = 45 m/s
- TERRAIN CATEGORY = TC2
- TERRAIN MULTIPLIER M_z,cat = 0.91
- WIND DIRECTION MULTIPLIER M_d = 1
- SHIELDING MULTIPLIER M_s = 1
- TOPOGRAPHIC MULTIPLIER M_t = 1
- SITE WIND SPEED = 41 m/s

G8. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO SAFETY THE MATTER SHALL BE REFERRED TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
G9. NO CHANGES IN ANY STRUCTURAL ELEMENT SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM NORTHROP CONSULTING ENGINEERS. IF THERE IS A DISCREPANCY THEN FOR TENDER PURPOSES ALLOW FOR THE MOST EXPENSIVE OPTION. NORTHROP CONSULTING ENGINEERS SHALL BE CONTACTED TO CONFIRM PRIOR TO CONSTRUCTION.
G10. NORTHROP CONSULTING ENGINEERS ACCEPTS NO RESPONSIBILITY FOR ANY WORK NOT INSPECTED OR NOT APPROVED BY NORTHROP CONSULTING ENGINEERS DURING CONSTRUCTION.

FOUNDATIONS

F1. ASSUMED ALLOWABLE BEARING CAPACITY:
- FOOTINGS = 100kPa

F2. A GEOTECHNICAL REPORT HAS NOT BEEN CARRIED OUT. MINIMUM ASSUMED ALLOWABLE BEARING PRESSURES TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. IF MINIMUM BEARING PRESSURES NOT ACHIEVED, AN ALTERNATIVE DESIGN WILL BE REQUIRED.
F3. ENSURE STABILITY OF ADJACENT BUILDINGS AND PATHS IS MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
F4. THE UNDERSIDE OF FOUNDATIONS SHALL CONFORM TO THE FOLLOWING REGARDLESS OF NOMINATED LEVELS:



F5. FOOTINGS SHALL BE CENTRALLY LOCATED UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
F6. FOOTINGS SHALL BE EXCAVATED TO THE DETAILED DEPTH AND WIDTH. FOOTINGS SHALL BE INSPECTED AND FILLED WITH CONCRETE AS SOON AS POSSIBLE TO AVOID EITHER SOFTENING OF THE FOUNDATION MATERIAL OR DRYING OUT BY EXPOSURE.
F7. THE BASE OF ALL PIER HOLES SHALL BE FREE OF WATER AND CLEANED OF LOOSE MATERIAL OR DEBRIS PRIOR TO PLACEMENT OF CONCRETE. ALLOW TO PROVIDE TEMPORARY LINERS AS DEEMED NECESSARY.

CONCRETE

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2009 AND NATSPEC CONCRETE STANDARDS.
C2. CONCRETE PROPERTIES AND COVER TO REINFORCING :

COVER TO REINFORCEMENT			
ELEMENT	CONCRETE STRENGTH f'c (MPa)	MAXIMUM 56 DAY DRY SHRINKAGE	COVER (mm)
WALLS	25	1000 µm	60
FOOTINGS	25	1000 µm	60

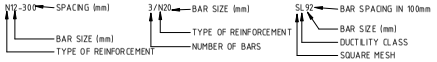
MAXIMUM AGGREGATE SIZE = 20mm U.N.O.
SLUMP DURING PLACING = 80mm ±10mm
EXPOSURE CLASSIFICATION = A2 (IN CONTACT WITH GROUND)
NO ADMIXTURES SHALL BE USED IN THE CONCRETE MIX UNLESS APPROVED BY NORTHROP CONSULTING ENGINEERS IN WRITING.

C3. SLABS USING MECHANICAL VIBRATORS.
C4. PLACE CONCRETE CONTINUOUSLY BETWEEN CONSTRUCTION JOINTS SHOWN ON PLAN. DO NOT BREAK OR INTERRUPT SUCCESSIVE POURS SUCH THAT COLD JOINTS OCCUR. ANY REVISIONS OR ADDITIONS TO CONSTRUCTION JOINTS SHOWN ON PLAN REQUIRE APPROVAL FROM THE NORTHROP CONSULTING ENGINEERS.
C5. REINFORCEMENT QUALITY AND NOTATION :

REINFORCEMENT NOTATION				
SYMBOL	BAR TYPE	STRENGTH GRADE (MPa)	DUCTILITY CLASS	TO COMPLY WITH AUSTRALIAN STANDARD
S	STRUCTURAL GRADE DEFORMED RIB BAR	250	NORMAL	AS/NZS 4671-2001
N	HOT ROLLED DEFORMED RIB BAR	500	NORMAL	AS/NZS 4671-2001
R	PLAIN ROUND BAR	250	NORMAL	AS/NZS 4671-2001
RL	RECTANGULAR MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
SL	SQUARE MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
L-TM	TRENCH MESH	500	LOW	AS/NZS 4671-2001

ALL REINFORCING BARS SHALL BE GRADE D500N TO AS/NZS 4671-2001 AND ALL MESH SHALL BE GRADE 500L TO AS/NZS 4671-2001. UNLESS NOTED OTHERWISE CLASS L REINFORCEMENT SHALL NOT BE USED.

REINFORCEMENT LABELS :



C6. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, AND NOT NECESSARILY IN TRUE PROJECTION. BARS SHOWN ARE INDICATIVE ONLY AND LENGTHS MAY VARY. BEAM ELEVATIONS TAKE PRECEDENCE OVER SECTIONS. SLAB PLANS TAKE PRECEDENCE OVER SECTIONS. REFER TO SECTIONS FOR EXTRA BARS THAT MAY BE REQUIRED.
C7. USE ONLY PLASTIC OR CONCRETE CHAIRS AT EXTERNAL SURFACES.
C8. SITE BENDING OF REINFORCEMENT BARS SHALL BE DONE WITHOUT HEATING USING A RE-BENDING TOOL. THE BARS SHALL BE RE-BENT AGAINST A FLAT SURFACE OR A PIN WITH A DIAMETER NOT LESS THAN THE MINIMUM PIN SIZE PRESCRIBED IN AS3600-2009.
C9. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN ON THE STRUCTURAL DRAWINGS OR IN POSITIONS OTHERWISE APPROVED IN WRITING BY NORTHROP CONSULTING ENGINEERS. LAPS SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND IN ACCORDANCE WITH AS3600-2009 SECTION 13.
C10. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY NORTHROP CONSULTING ENGINEERS.
C11. AT EXTERNALLY EXPOSED SURFACES NO METALLIC ITEMS INCLUDING FORM BOLTS, FORM SPACERS, METALLIC BAR CHAIRS AND TIE-WIRE ARE TO BE PLACED IN THE COVER ZONE.
C12. ALL REINFORCEMENT, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION AND INSPECTED BY A SUITABLY QUALIFIED ENGINEER PRIOR TO PLACING CONCRETE.
C13. ALL CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNISED TESTING LAB.
C14. FOR ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX, REFER TO CONCRETE - ELAPSED DELIVERY TIMES NOTE.

CONCRETE - ELAPSED DELIVERY TIMES

CE1. ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX AT THE SITE MUST NOT EXCEED THE CRITERIA IN THE ELAPSED DELIVERY TIMETABLE BELOW

ELAPSED DELIVERY TIME TABLE	
CONCRETE TEMPERATURE AT TIME OF DISCHARGE (°C)	MAXIMUM ELAPSED TIME (HOURS)
< 24	2.00
24 TO 27	1.50
27 TO 30	1.00
30 TO 32	0.75
32 TO 35	0.50

IF THE ELAPSED TIME IS LONGER THAN THE CORRESPONDING TIME IN THE TABLE ABOVE, OR THE TEMPERATURE IS GREATER THAN 35°C, THE CONCRETE MIX DESIGN ENGINEER IS TO BE CONTACTED TO CONFIRM WHETHER PLACEMENT IS TO PROCEED OR IF THE POUR IS TO BE STOPPED.

STEELWORK

S1. FABRICATE AND ERECT STRUCTURAL STEELWORK IN ACCORDANCE WITH AS4100-1998.
S2. PROVIDE HOLES, CLEATS AND FIXING FOR LIGHT STEEL/TIMBER FRAMING, FINISHES, ETC. SHOWN ON ARCHITECTURAL DRAWINGS.
S3. THESE DRAWINGS HAVE BEEN PREPARED TO INDICATE THE STRUCTURAL INTENT. THE SHOP DETAILER IS TO USE THESE DRAWINGS AS A BASIS FOR DIMENSIONAL COORDINATION WITH OTHER CONSULTANT'S DRAWINGS AND IS TO PREPARE DETAILED SHOP DRAWINGS. WHERE NECESSARY, THE SHOP DETAILER IS TO MAKE ASSUMPTIONS AND SUBMIT TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION. SHOP DETAILER IS TO ALLOW TO RE-WORK SHOP DRAWINGS AS NECESSARY. FABRICATOR SHALL PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE BUILDER FOR THEIR APPROVAL. BUILDER SHALL LODGE TWO COPIES OF APPROVED DRAWINGS TO NORTHROP CONSULTING ENGINEERS FOR REVIEW PRIOR TO FABRICATION, (ALLOW 5 WORKING DAYS FOR REVIEW).
S4. UNLESS NOTED OTHERWISE, USE:
- 6mm CONTINUOUS FILLET WELDS MADE WITH E4818 MILD STEEL ELECTRODES.
- ALL WELDS SP CATEGORY

S5. ALL BOLTS, SCREWS, HOLD DOWN BOLTS, MASONRY ANCHORS SHALL BE HOT DIP GALVANISED TO AS1214-1983, AS/NZS 4534-2006, AS/NZS 4680-2006 & AS/NZS 4792-2006. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED. ALL HOLES SHALL BE 2mm LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE.
S6. MINIMUM YELD STRESS:
- HOT ROLLED SECTIONS = 300MPa
- SQUARE HOLLOW SECTIONS = 350MPa
- RECTANGULAR HOLLOW SECTIONS = 350MPa
- CIRCULAR HOLLOW SECTION = 250MPa
- HOT ROLLED PLATE = 250MPa

S7. SURFACE TREATMENT UNLESS NOTED OTHERWISE:
- EXPOSED TO WEATHER (STRUCTURAL MEMBERS) (TIME TO FIRST MAINTENANCE TO BE 10 YEARS) = AS/NZS 2312-HDG600P3 or IZS3
- BUILT INTO THE INTERNAL SKIN OF EXTERNAL WALLS = AS/NZS 2312-HDG600P3

S8. ALL BURIED STEELWORK TO BE PAINTED FIRST USING 'EXPOSED TO WEATHER' TREATMENT SYSTEM FOLLOWED BY THE APPLICATION OF A TWO PART EPOXY SUCH AS 'SIKAGUARD-63N' OR APPROVED EQUIVALENT, THEN CONCRETE ENCASE STEELWORK WITH MASS CONCRETE (MINIMUM 75mm COVER TO STEELWORK).
S9. STEELWORK TO BE CONCRETE ENCASED FOR FIRE RATING PURPOSES SHALL BE FREE FROM ALL LOOSE RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE, ETC. AND REINFORCED WITH SL41 FABRIC OR EQUIVALENT BLACK IRON WIRE, 3mm DIA.
S10. BOLT SYMBOLS:
- 4.6/S = GRADE 4.6 BOLT / SNUG TIGHTENED.
- 8.8/S = GRADE 8.8 BOLT / SNUG TIGHTENED.
- 8.8/TF = GRADE 8.8 BOLT / FULLY TENSIONED FRICTION TYPE (USE LOAD INDICATOR WASHERS)
- 8.8/TB - GRADE 8.8 BOLT / FULLY TENSIONED BEARING TYPE (USE LOAD INDICATOR WASHERS)

S11. THE CONTRACTOR SHALL SUPPLY WRITTEN CERTIFICATION TO THE STRUCTURAL ENGINEER PRIOR TO THE ERECTION OF ANY STRUCTURAL STEEL STATING THAT THE BOLTS PROPOSED TO BE USED COMPLY WITH AS/NZS 1252-1996. HIGH STRENGTH BOLTS (8.8) ARE NOT TO BE WELDED.
S12. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEEL WORK SHALL BE SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, IN ORDER TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
S13. ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS. SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.
S14. GROUT ALL STEEL BASES BY DRY PACKING USING GROUT WHICH IS NON-SHRINK AND HAS A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 40MPa
S15. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS ARE TO BE HOT DIP GALVANISED.
S16. THESE DRAWINGS MAY NOT IDENTIFY ALL SECONDARY STEELWORK ELEMENTS THAT ARE REQUIRED FOR SUPPORT, FIXING AND FINISHING OF GLAZING, CLADDING AND LINING. THE TENDERER IS RESPONSIBLE FOR THE INCLUSION OF SUCH STEELWORK ELEMENTS TO THE EXTENT REQUIRED ON THE ARCHITECT'S DRAWINGS.
S17. IMPORTED STRUCTURAL STEEL MATERIAL
ALL STRUCTURAL STEELWORK USED ON THIS PROJECT SHALL BE COMPLIANT WITH AS4100, AND IN PARTICULAR:
- CERTIFIED MILL TEST REPORTS, OR TEST CERTIFICATES SHALL BE PROVIDED AS EVIDENCE OF COMPLIANCE WITH THE STANDARDS REFERRED TO IN AS4100. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- PROVIDE TEST CERTIFICATED FOR COMPLIANCE FOR ALL FASTENERS. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- FOR COLD FORMED SECTIONS A "CERTIFICATE OF CONFORMITY TO AS1163-1991" SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- CERTIFICATES SHALL ONLY BE ACCEPTED FROM TESTING COMPANIES ACCREDITED BY A TESTING AUTHORITY RECOGNISED IN AUSTRALIA, EG NATA or JAS-ANZ CERTIFIED.
- UNIDENTIFIED STEEL ie. ANY STEEL THAT IS NOT ACCOMPANIED WITH EVIDENCE STATING COMPLIANCE WITH THE REQUIREMENT OF AS4100 SHALL ONLY BE USED STRICTLY IN ACCORDANCE WITH CLAUSE 2.2.3 OF AS4100. IF MATERIALS SUPPLIED AND INSTALLED ARE SUBSEQUENTLY PROVEN TO BE NON COMPLIANT WITH THE SPECIFIED AUSTRALIAN STANDARDS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND COST TO UNDERTAKE NATA OR EQUIVALENT CERTIFIED TESTING TO PROVE CONFORMANCE TO THE AUSTRALIAN STANDARDS AND DESIGN SPECIFICATIONS. SIMILARLY ANY RECTIFICATION WORKS THAT MAY SUBSEQUENTLY BE REQUIRED TO SATISFY AUSTRALIAN CODE REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

RAMMED EARTH

RE1. RAMMED EARTH WALLS SHALL CONFORM TO THE RELEVANT REQUIREMENTS OF AS3700, SAA HB 195, NZS4297, NZS4298 & NZS4299
RE2. THE CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH OF THE MASONRY UNITS SHALL BE A MINIMUM OF 2.5MPa. THE MINIMUM CEMENT CONTENT BY WEIGHT SHALL BE 6%.
RE3. SUBMIT THE FOLLOWING FOR APPROVAL TO THE SUPERINTENDENT PRIOR TO COMMENCING WORKS:
- MIX DESIGN TO ACHIEVE DENSITY AND STRENGTH REQUIREMENTS, INCLUDING CEMENT CONTENT BY WEIGHT, DENSITY TO BE ACHIEVED AND PARTICLE SIZE DISTRIBUTION
- TEST REPORTS INCLUDING CONFIRMATION OF INSITU UNCONFINED COMPRESSIVE STRENGTH AND ELAPSED TIME BETWEEN ADDITION OF CEMEMNT AND COMPACTION. UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF SAA HB 195

RE4. U.N.O. ALL ANCHORS INTO RAMMED EARTH SHALL BE HILTI HIT-HY70 INJECTION ANCHORS. ANCHORS ARE TO BE HOT DIP GALVANISED
RE5. THE MOISTURE CONTENT AT PLACEMENT SHALL BE BETWEEN 8-16% BY WEIGHT
RE6. FORMWORK SHALL BE DESIGNED BY A SUITABLY QUALIFIED ENGINEER, AND SHALL BE CAPABLE OF WITHSTANDING THE PRESSURE OF THE SOIL DURING COMPACTION. SUITABLE BOND BREAKERS SHALL BE USED TO ALLOW STRIPPING WITHOUT DISTURBANCE OF THE COMPACTED WALL.
RE7. PLACEMENT OF RAMMED EARTH SHALL NOT BE CARRIED OUT WHEN TEMPERATURE IS GREATER THAN 32 DEGREES CELSIUS.
RE8. MATERIAL SHALL BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 200mm THICK (WHEN UNCOMPACTED). MECHANICAL COMPACTION IS TO BE UNDERTAKEN USING PNEUMATIC RAMMERS. HAND RAMMING IS NOT TO BE USED.

NORTHROP
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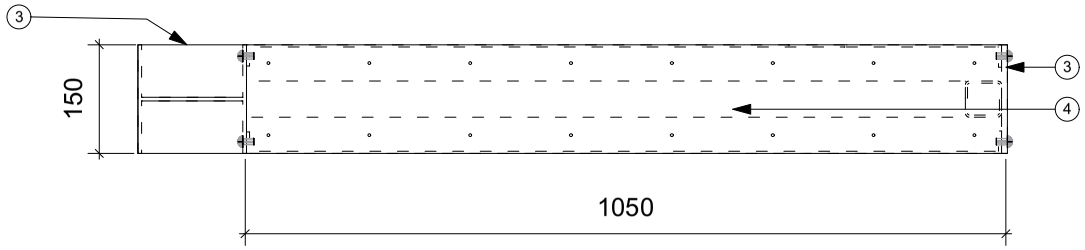
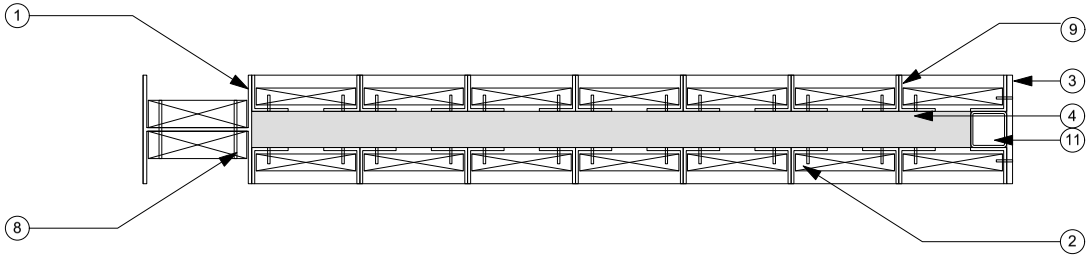
JOB NUMBER:	NL166682	DATE:	16/02/2018	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			2
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK20			

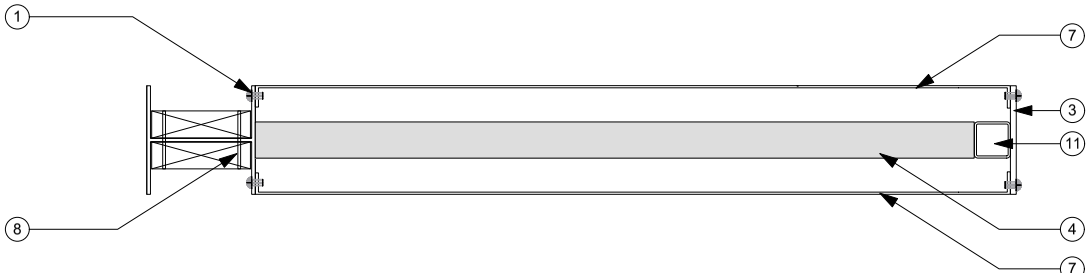
5.2 PS1 Precinct Sign



02 PS1 Precinct Sign - Top View
NTS



03 PS1 Precinct Sign - Section A
NTS



04 PS1 Precinct Sign - Section B
NTS

NOTES

1. 150mm steel Universal Channel post. Paint finish colourbond 'Monument'. Refer specification.
2. 137x23mm ModWood infill panel in "Sahara" - Brushed Finish, with concealed fixings. Refer specification.
3. 10mm mild steel plate surround welded to frame. Paint finish 'Monument'. Refer specification.
4. Fabricated galvanised SHS frame to AS4100-1998. Nominal 50x4mm SHS welded to posts. Refer specification.
7. 3mm thick galvanised HDG600 signage panel. Paint finish colourbond 'Monument'. Refer specification.
8. 137x35mm ModWood infill panel with paint finish. Colour based on Precinct (refer precinct signage colours). Colour to be confirmed by Cessnock Council prior to manufacture. Refer specification.
9. 50x50x4mm angle steel frame all round with paint finish Colorbond 'Monument'. Refer specification.
11. 50x6mm galvanised SHS structural post. Refer specification.

General Notes:

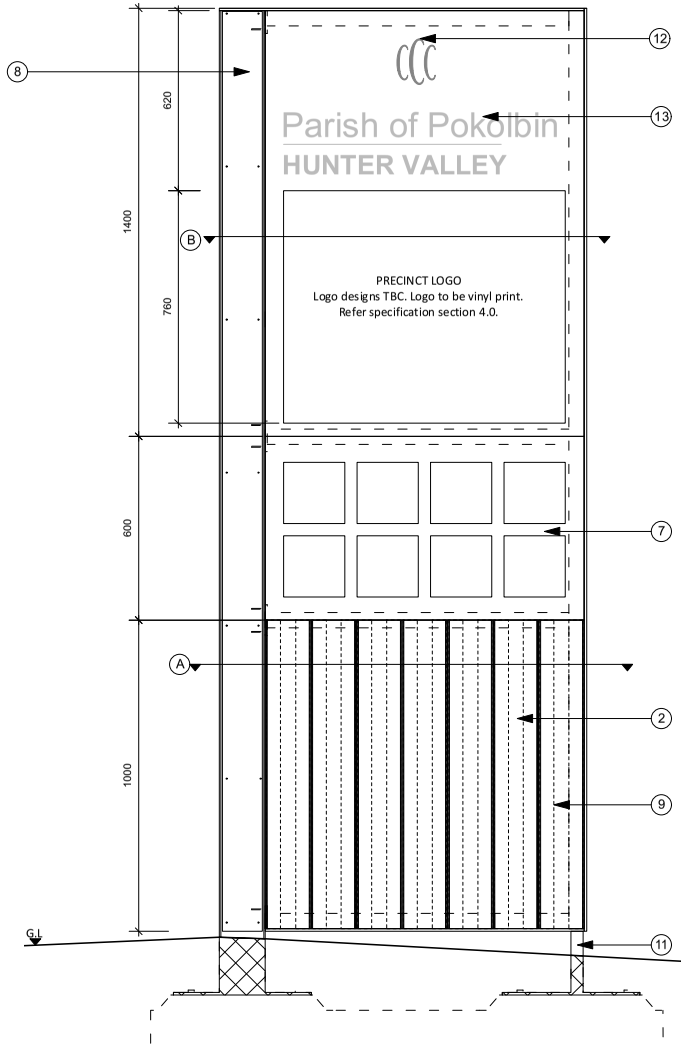
Refer to PS1 Precinct Sign supporting drawings:

- 01 PS1 Precinct Sign p. 107
- 05 PS1 Precinct Sign - Front Elevation p.114
- 06 PS1 Precinct Sign - Rear Elevation p.114
- 07 PS1 Precinct Plan - Framing Detail p.115

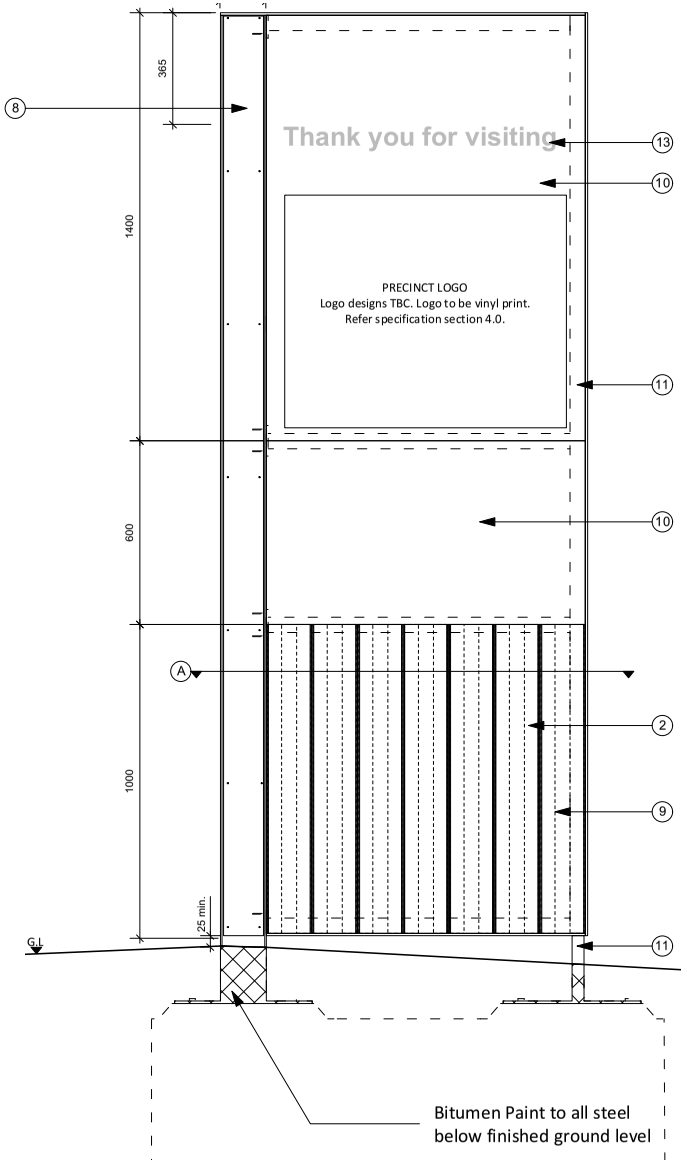
Refer signage specification p.108-111.

Refer engineers specification page 112 and engineers drawing page 104-106.

5.2 PS1 Precinct Sign



05 PS1 Precinct Sign - Front Elevation
NTS



06 PS1 Precinct Sign - Rear Elevation
NTS

NOTES

1. 150mm steel Universal Channel post. Paint finish colourbond 'Monument'. Refer specification.
2. 137x23mm ModWood infill panel in "Sahara" - Brushed Finish, with concealed fixings. Refer specification.
3. 10mm mild steel plate surround welded to frame. Paint finish 'Monument'. Refer specification.
4. Fabricated galvanised SHS frame to AS4100-1998. Nominal 50x4mm SHS welded to posts. Refer specification.
5. Concrete footing. Refer Engineers Drawings.
6. Baseplate. Refer Engineers Drawings. Bitumen paint to steel below ground level. Refer specification
7. 3mm thick galvanised HDG600 signage panel. Paint finish colourbond 'Monument' with 200mm x 200mm vinyl signage elements. Information to be provided by Cessnock City Council. Refer specification.
8. 137x35mm ModWood infill panel with paint finish. Colour based on Precinct (refer precinct signage colours). Colour to be confirmed by Cessnock Council prior to manufacture. Refer specification .
9. 50x50x4mm angle steel frame all round with paint finish Colorbond 'Monument'. Refer specification.
10. 3mm thick galvanised HDG600 signage panel. Paint finish colourbond 'Monument'. Information to be provided by Cessnock City Council. Refer specification.
11. 50x6mm galvanised SHS structural post. Refer specification .
12. Vinyl Cessnock City Council logo. White as per drawing 01. Refer specification.
13. Vinyl Signage. White as per drawing 01. Refer to drawing 01 for font types. Refer specification.

General Notes:

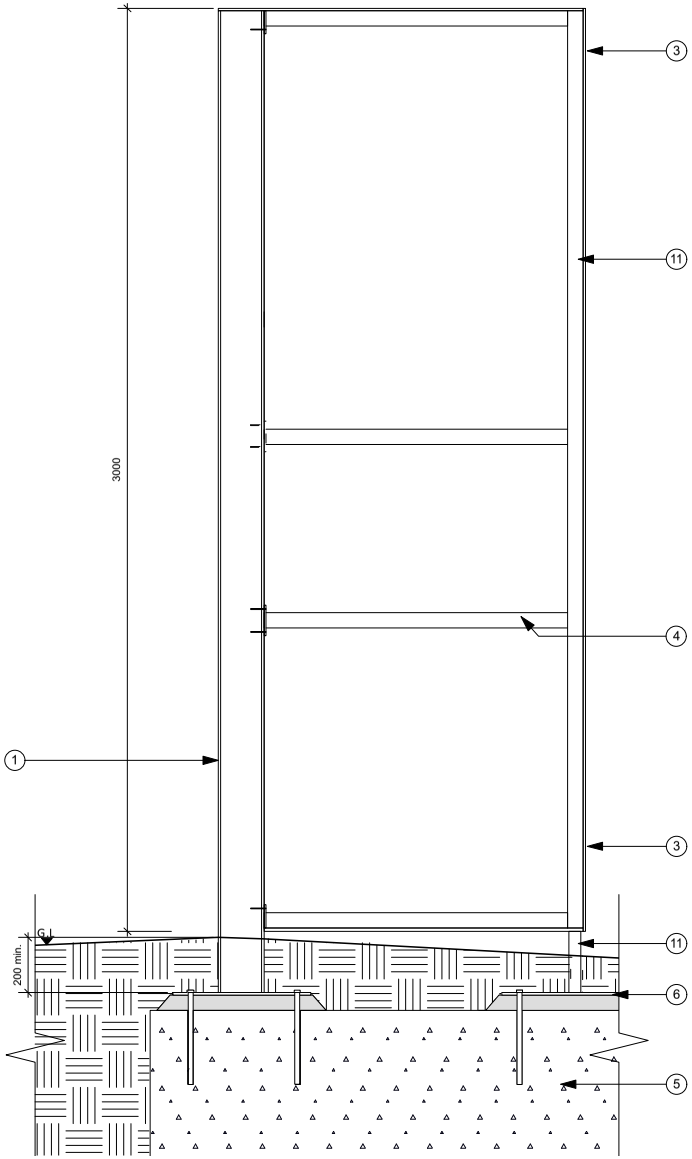
Refer to PS1 Precinct Sign supporting drawings:

- 01 PS1 Precinct Sign p. 107
- 02 PS1 Precinct Sign - Top View p.113
- 03 PS1 Precinct Sign - Section A p.113
- 04 PS1 Precinct Sign - Section B p.113
- 07 PS1 Precinct Plan - Framing Detail p.115

Refer signage specification p.108-111.

Refer engineers specification page 112 and engineers drawing page 104-106.

5.2 PS1 Precinct Sign



07 PS1 Precinct Sign - Framing Detail
NTS

NOTES

1. 150mm steel Universal Channel post. Paint finish colourbond 'Monument'. Refer specification.
2. 137x23mm ModWood infill panel in "Sahara" - Brushed Finish, with concealed fixings. Refer specification.
3. 10mm mild steel plate surround welded to frame. Paint finish 'Monument'. Refer specification.
4. Fabricated galvanised SHS frame to AS4100-1998. Nominal 50x4mm SHS welded to posts. Refer specification.
5. Concrete footing. Refer Engineers Drawings.
6. Baseplate. Refer Engineers Drawings. Bitumen paint to steel below ground level. Refer specification
7. 3mm thick galvanised HDG600 signage panel. Paint finish colourbond 'Monument' with 200mm x 200mm vinyl signage elements. Information to be provided by Cessnock City Council. Refer specification.
8. 137x35mm ModWood infill panel with paint finish. Colour based on Precinct (refer precinct signage colours). Colour to be confirmed by Cessnock Council prior to manufacture. Refer specification .
9. 50x50x4mm angle steel frame all round with paint finish Colorbond 'Monument'. Refer specification.
10. 3mm thick galvanised HDG600 signage panel. Paint finish colourbond 'Monument'. Information to be provided by Cessnock City Council. Refer specification.
11. 50x6mm galvanised SHS structural post. Refer specification .
12. Vinyl Cessnock City Council logo. White as per drawing 01. Refer specification.
13. Vinyl Signage. White as per drawing 01. Refer to drawing 01 for font types. Refer specification.

General Notes:

Refer to PS1 Precinct Sign supporting drawings:

- 01 PS1 Precinct Sign p. 107
- 02 PS1 Precinct Sign - Top View p.113
- 03 PS1 Precinct Sign - Section A p.113
- 04 PS1 Precinct Sign - Section B p.113
- 05 PS1 Precinct Sign - Front Elevation p.114
- 06 PS1 Precinct Sign - Rear Elevation p.114

Refer signage specification p.108-111.

Refer engineers specification page 112 and engineers drawing page 104-106.

5.3 SS Street Signs - Family and Colours

01 Standard Street Blade

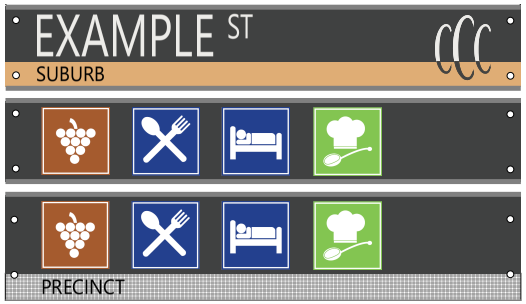
02 Precinct Pictogram Blade

03 Pictogram Blade

04 Standard Street Blade Private Road

05 Suburb Directional Blade

06 G5-10: Rural NO THROUGH ROAD



07 Precinct Pictogram Reassurance Blade

COLOURS:

Monument: CMYK: 11, 11, 11, 80. RGB: 64, 65, 65

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

Light Brown: CMYK: 11, 30, 58, 0
RGB: 223, 173, 117

PRECINCT COLOURS:

Kurri Kurri: CMYK: 80, 100, 3, 0. RGB: 101, 46, 119

Broke Fordwich
C:80 M:20 Y:100 K:7

Central Pokolbin
C:2 M:8 Y:99 K:0

Branxton Greta: CMYK: 2, 66, 99, 0. RGB: 233, 115, 46

Lovedale
C:100 M:88 Y:9 K:1

Parish of Pokolbin
C:66 M:0 Y:11 K:0

Mount View
C:31 M:1 Y:100 K:0

Hermitage
C:0 M:100 Y:96 K:0

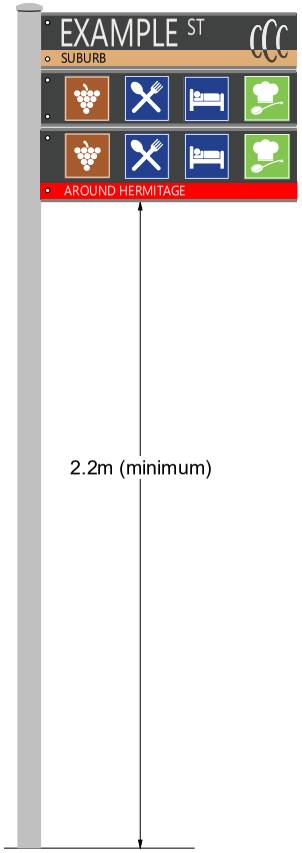
Wollombi Valley
C:26 M:100 Y:100 K:19

PRECINCT TEXT COLOURS:

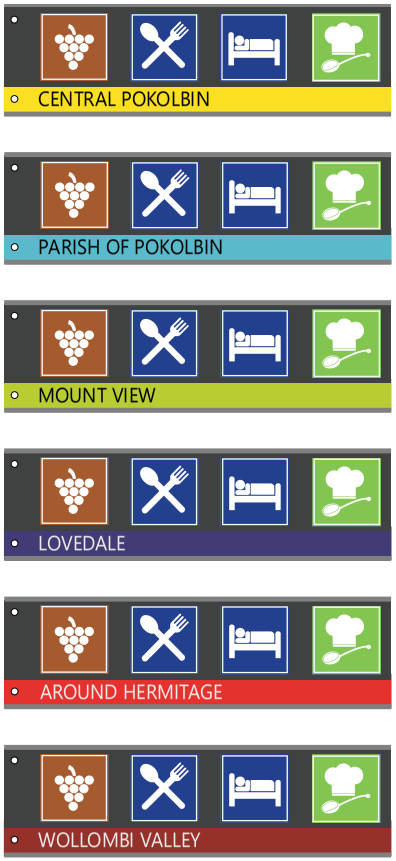
Kurri Kurri, Lovedale, Wollombi Valley, Broke Fordwich, Hermitage:
White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

Branxton Greta, Parish of Pokolbin, Mount View, Central Pokolbin:
Black

5.3 SS Street Signs - Family - Combination Examples



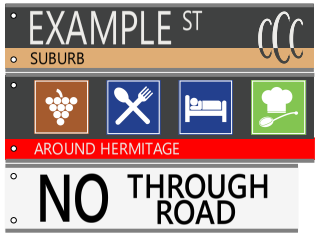
08 Sign Combination and Post

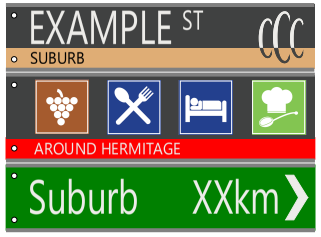


09 Precinct Pictogram Blades

10 Pictogram Blades

11 Pictogram Blade





12 Pictogram Blade & 1 Additional

13 Reassurance - 2 Pictogram Blades

14 Reassurance - 1 Pictogram Blade

5.3 SS Street Signs - Signage Specification

LETTERING:

Street Blades
Digital printed Durst 3M UV ink.
Street Name: 100mm AS1744 Series C. Note 100mm Series B to be substituted for long street names if required.
ST, AV, RD etc: 60mm AS1744 Series C.
Suburb Name: 35mm AS1744 Series D.

Precinct Pictogram Blade
Digital printed Durst 3M UV ink.
Precinct Name: 35mm AS1744 Series D.

Suburb Directional Blade
Suburb Name and Distance: 100mm AS1744 Series C.

Suburb Sign
Suburb Name: 180mm AS1744 Series C.
LGA Name: 80mm AS1744 Series D.

Rural NO THROUGH ROAD
NO: 120mm AS1744 Series E.
THROUGH ROAD: 60mm AS1744 Series E.

BLADE LENGTH:

600mm - 900mm (length to suit)
900mm- 1200mm (to be used only after consultation with Council Staff.
Precinct Pictogram Reassurance Blades: 1200mm (on two posts)

BLADE MATERIAL:

200mm Aluminium Street Blade Extrusion.
3M ECF 1170 clear over-laminate.

BLADE BRACKETS:

1 Way: AL1-8
2 Way: AL2-8
3 Way: AL3-8

POSTS:

50mm Galvanised. 2.9mm wall

5.3 SS Street Signs - Engineers Specification

GENERAL

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONSULTANT'S DRAWINGS.
G2. ALL DISCREPANCIES SHALL BE REFERRED TO THE PROJECT MANAGER AND RESOLVED BEFORE PROCEEDING WITH THE WORK.
G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. THESE STRUCTURAL DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
G4. ALL WORKMANSHIP, TESTING, MATERIALS AND SUPERVISION ARE TO BE IN ACCORDANCE WITH THESE SPECIFICATIONS, THE WORK HEALTH AND SAFETY ACT 2011. ENFORCED BY THE WORKCOVER AUTHORITY AND CURRENT RELEVANT AUSTRALIAN STANDARDS.
G5. THE DETERMINATION OF A SAFE WORK METHOD REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. ANY ELEMENT WHICH POSES AN UNACCEPTABLE LEVEL OF SAFETY RISK TO CONSTRUCT SHALL BE REFERRED TO THE STRUCTURAL ENGINEER. TEMPORARY BRACING AND SUPPORT OF STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
G6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL SERVICES IN THE VICINITY OF THE WORKS.
G7. THE STRUCTURAL COMPONENTS DETAILED ON THESE STRUCTURAL DRAWINGS ARE JOB SPECIFIC AND HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADS:

WIND LOADS:

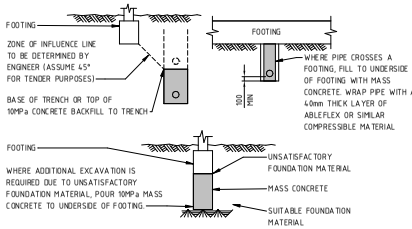
- IMPORTANCE LEVEL = 2
- REGION = A2
- ANNUAL PROBABILITY OF EXCEDENCE = 1/500
- REGIONAL WIND SPEED V_R = 45 m/s
- TERRAIN CATEGORY = TC2
- TERRAIN MULTIPLIER $M_{z,cat}$ = 0.91
- WIND DIRECTION MULTIPLIER M_d = 1
- SHIELDING MULTIPLIER M_s = 1
- TOPOGRAPHIC MULTIPLIER M_t = 1
- SITE WIND SPEED = 41 m/s

G8. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO SAFETY THE MATTER SHALL BE REFERRED TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
G9. NO CHANGES IN ANY STRUCTURAL ELEMENT SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM NORTHROP CONSULTING ENGINEERS. IF THERE IS A DISCREPANCY THEN FOR TENDER PURPOSES ALLOW FOR THE MOST EXPENSIVE OPTION. NORTHROP CONSULTING ENGINEERS SHALL BE CONTACTED TO CONFIRM PRIOR TO CONSTRUCTION.
G10. NORTHROP CONSULTING ENGINEERS ACCEPTS NO RESPONSIBILITY FOR ANY WORK NOT INSPECTED OR NOT APPROVED BY NORTHROP CONSULTING ENGINEERS DURING CONSTRUCTION.

FOUNDATIONS

F1. ASSUMED ALLOWABLE BEARING CAPACITY:
- FOOTINGS = 100kPa

F2. A GEOTECHNICAL REPORT HAS NOT BEEN CARRIED OUT. MINIMUM ASSUMED ALLOWABLE BEARING PRESSURES TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. IF MINIMUM BEARING PRESSURES NOT ACHIEVED, AN ALTERNATIVE DESIGN WILL BE REQUIRED.
F3. ENSURE STABILITY OF ADJACENT BUILDINGS AND PATHS IS MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
F4. THE UNDERSIDE OF FOUNDATIONS SHALL CONFORM TO THE FOLLOWING REGARDLESS OF NOMINATED LEVELS:



F5. FOOTINGS SHALL BE CENTRALLY LOCATED UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
F6. FOOTINGS SHALL BE EXCAVATED TO THE DETAILED DEPTH AND WIDTH. FOOTINGS SHALL BE INSPECTED AND FILLED WITH CONCRETE AS SOON AS POSSIBLE TO AVOID EITHER SOFTENING OF THE FOUNDATION MATERIAL OR DRYING OUT BY EXPOSURE.
F7. THE BASE OF ALL PIER HOLES SHALL BE FREE OF WATER AND CLEANED OF LOOSE MATERIAL OR DEBRIS PRIOR TO PLACEMENT OF CONCRETE. ALLOW TO PROVIDE TEMPORARY LINERS AS DEEMED NECESSARY.

CONCRETE

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2009 AND NATSPEC CONCRETE STANDARDS.
C2. CONCRETE PROPERTIES AND COVER TO REINFORCING :

COVER TO REINFORCEMENT			
ELEMENT	CONCRETE STRENGTH f'c (MPa)	MAXIMUM 56 DAY DRY SHRINKAGE	COVER (mm)
WALLS	25	1000 µm	60
FOOTINGS	25	1000 µm	60

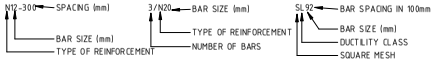
MAXIMUM AGGREGATE SIZE = 20mm U.N.O.
SLUMP DURING PLACING = 80mm ±10mm
EXPOSURE CLASSIFICATION = A2 (IN CONTACT WITH GROUND)
NO ADMIXTURES SHALL BE USED IN THE CONCRETE MIX UNLESS APPROVED BY NORTHROP CONSULTING ENGINEERS IN WRITING.

C3. SLABS USING MECHANICAL VIBRATORS.
C4. PLACE CONCRETE CONTINUOUSLY BETWEEN CONSTRUCTION JOINTS SHOWN ON PLAN. DO NOT BREAK OR INTERRUPT SUCCESSIVE POURS SUCH THAT COLD JOINTS OCCUR. ANY REVISIONS OR ADDITIONS TO CONSTRUCTION JOINTS SHOWN ON PLAN REQUIRE APPROVAL FROM THE NORTHROP CONSULTING ENGINEERS.
C5. REINFORCEMENT QUALITY AND NOTATION :

REINFORCEMENT NOTATION				
SYMBOL	BAR TYPE	STRENGTH GRADE (MPa)	DUCTILITY CLASS	TO COMPLY WITH AUSTRALIAN STANDARD
S	STRUCTURAL GRADE DEFORMED RIB BAR	250	NORMAL	AS/NZS 4671-2001
N	HOT ROLLED DEFORMED RIB BAR	500	NORMAL	AS/NZS 4671-2001
R	PLAIN ROUND BAR	250	NORMAL	AS/NZS 4671-2001
RL	RECTANGULAR MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
SL	SQUARE MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
L-TM	TRENCH MESH	500	LOW	AS/NZS 4671-2001

ALL REINFORCING BARS SHALL BE GRADE D500N TO AS/NZS 4671-2001 AND ALL MESH SHALL BE GRADE 500L TO AS/NZS 4671-2001. UNLESS NOTED OTHERWISE CLASS L REINFORCEMENT SHALL NOT BE USED.

REINFORCEMENT LABELS :



C6. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, AND NOT NECESSARILY IN TRUE PROJECTION. BARS SHOWN ARE INDICATIVE ONLY AND LENGTHS MAY VARY. BEAM ELEVATIONS TAKE PRECEDENCE OVER SECTIONS. SLAB PLANS TAKE PRECEDENCE OVER SECTIONS. REFER TO SECTIONS FOR EXTRA BARS THAT MAY BE REQUIRED.
C7. USE ONLY PLASTIC OR CONCRETE CHAIRS AT EXTERNAL SURFACES.
C8. SITE BENDING OF REINFORCEMENT BARS SHALL BE DONE WITHOUT HEATING USING A RE-BENDING TOOL. THE BARS SHALL BE RE-BENT AGAINST A FLAT SURFACE OR A PIN WITH A DIAMETER NOT LESS THAN THE MINIMUM PIN SIZE PRESCRIBED IN AS3600-2009.
C9. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN ON THE STRUCTURAL DRAWINGS OR IN POSITIONS OTHERWISE APPROVED IN WRITING BY NORTHROP CONSULTING ENGINEERS. LAPS SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND IN ACCORDANCE WITH AS3600-2009 SECTION 13.
C10. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY NORTHROP CONSULTING ENGINEERS.
C11. AT EXTERNALLY EXPOSED SURFACES NO METALLIC ITEMS INCLUDING FORM BOLTS, FORM SPACERS, METALLIC BAR CHAIRS AND TIE-WIRE ARE TO BE PLACED IN THE COVER ZONE.
C12. ALL REINFORCEMENT, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION AND INSPECTED BY A SUITABLY QUALIFIED ENGINEER PRIOR TO PLACING CONCRETE.
C13. ALL CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNISED TESTING LAB.
C14. FOR ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX, REFER TO CONCRETE - ELAPSED DELIVERY TIMES NOTE.

CONCRETE - ELAPSED DELIVERY TIMES

CE1. ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX AT THE SITE MUST NOT EXCEED THE CRITERIA IN THE ELAPSED DELIVERY TIMETABLE BELOW

ELAPSED DELIVERY TIME TABLE	
CONCRETE TEMPERATURE AT TIME OF DISCHARGE (°C)	MAXIMUM ELAPSED TIME (HOURS)
< 24	2.00
24 TO 27	1.50
27 TO 30	1.00
30 TO 32	0.75
32 TO 35	0.50

IF THE ELAPSED TIME IS LONGER THAN THE CORRESPONDING TIME IN THE TABLE ABOVE, OR THE TEMPERATURE IS GREATER THAN 35°C, THE CONCRETE MIX DESIGN ENGINEER IS TO BE CONTACTED TO CONFIRM WHETHER PLACEMENT IS TO PROCEED OR IF THE POUR IS TO BE STOPPED.

STEELWORK

S1. FABRICATE AND ERECT STRUCTURAL STEELWORK IN ACCORDANCE WITH AS4100-1998.
S2. PROVIDE HOLES, CLEATS AND FIXING FOR LIGHT STEEL/TIMBER FRAMING, FINISHES, ETC. SHOWN ON ARCHITECTURAL DRAWINGS.
S3. THESE DRAWINGS HAVE BEEN PREPARED TO INDICATE THE STRUCTURAL INTENT. THE SHOP DETAILER IS TO USE THESE DRAWINGS AS A BASIS FOR DIMENSIONAL COORDINATION WITH OTHER CONSULTANT'S DRAWINGS AND IS TO PREPARE DETAILED SHOP DRAWINGS. WHERE NECESSARY, THE SHOP DETAILER IS TO MAKE ASSUMPTIONS AND SUBMIT TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION. SHOP DETAILER IS TO ALLOW TO RE-WORK SHOP DRAWINGS AS NECESSARY. FABRICATOR SHALL PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE BUILDER FOR THEIR APPROVAL. BUILDER SHALL LODGE TWO COPIES OF APPROVED DRAWINGS TO NORTHROP CONSULTING ENGINEERS FOR REVIEW PRIOR TO FABRICATION, (ALLOW 5 WORKING DAYS FOR REVIEW).
S4. UNLESS NOTED OTHERWISE, USE:
- 6mm CONTINUOUS FILLET WELDS MADE WITH E4818 MILD STEEL ELECTRODES.
- ALL WELDS SP CATEGORY

S5. ALL BOLTS, SCREWS, HOLD DOWN BOLTS, MASONRY ANCHORS SHALL BE HOT DIP GALVANISED TO AS1214-1983, AS/NZS 4534-2006, AS/NZS 4680-2006 & AS/NZS 4792-2006. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED. ALL HOLES SHALL BE 2mm LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE.
S6. MINIMUM YELD STRESS:
- HOT ROLLED SECTIONS = 300MPa
- SQUARE HOLLOW SECTIONS = 350MPa
- RECTANGULAR HOLLOW SECTIONS = 350MPa
- CIRCULAR HOLLOW SECTION = 250MPa
- HOT ROLLED PLATE = 250MPa

S7. SURFACE TREATMENT UNLESS NOTED OTHERWISE:
- EXPOSED TO WEATHER (STRUCTURAL MEMBERS) (TIME TO FIRST MAINTENANCE TO BE 10 YEARS) = AS/NZS 2312-HDG600P3 or IZS3
- BUILT INTO THE INTERNAL SKIN OF EXTERNAL WALLS = AS/NZS 2312-HDG600P3

S8. ALL BURIED STEELWORK TO BE PAINTED FIRST USING 'EXPOSED TO WEATHER' TREATMENT SYSTEM FOLLOWED BY THE APPLICATION OF A TWO PART EPOXY SUCH AS 'SIKAGUARD-63N' OR APPROVED EQUIVALENT, THEN CONCRETE ENCASE STEELWORK WITH MASS CONCRETE (MINIMUM 75mm COVER TO STEELWORK).
S9. STEELWORK TO BE CONCRETE ENCASED FOR FIRE RATING PURPOSES SHALL BE FREE FROM ALL LOOSE RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE, ETC. AND REINFORCED WITH SL41 FABRIC OR EQUIVALENT BLACK IRON WIRE, 3mm DIA.
S10. BOLT SYMBOLS:
- 4.6/S = GRADE 4.6 BOLT / SNUG TIGHTENED.
- 8.8/S = GRADE 8.8 BOLT / SNUG TIGHTENED.
- 8.8/TF = GRADE 8.8 BOLT / FULLY TENSIONED FRICTION TYPE (USE LOAD INDICATOR WASHERS)
- 8.8/TB - GRADE 8.8 BOLT / FULLY TENSIONED BEARING TYPE (USE LOAD INDICATOR WASHERS)

S11. THE CONTRACTOR SHALL SUPPLY WRITTEN CERTIFICATION TO THE STRUCTURAL ENGINEER PRIOR TO THE ERECTION OF ANY STRUCTURAL STEEL STATING THAT THE BOLTS PROPOSED TO BE USED COMPLY WITH AS/NZS 1252-1996. HIGH STRENGTH BOLTS (8.8) ARE NOT TO BE WELDED.
S12. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEEL WORK SHALL BE SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, IN ORDER TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
S13. ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS. SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.
S14. GROUT ALL STEEL BASES BY DRY PACKING USING GROUT WHICH IS NON-SHRINK AND HAS A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 40MPa
S15. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS ARE TO BE HOT DIP GALVANISED.
S16. THESE DRAWINGS MAY NOT IDENTIFY ALL SECONDARY STEELWORK ELEMENTS THAT ARE REQUIRED FOR SUPPORT, FIXING AND FINISHING OF GLAZING, CLADDING AND LINING. THE TENDERER IS RESPONSIBLE FOR THE INCLUSION OF SUCH STEELWORK ELEMENTS TO THE EXTENT REQUIRED ON THE ARCHITECT'S DRAWINGS.
S17. IMPORTED STRUCTURAL STEEL MATERIAL
ALL STRUCTURAL STEELWORK USED ON THIS PROJECT SHALL BE COMPLIANT WITH AS4100, AND IN PARTICULAR:
- CERTIFIED MILL TEST REPORTS, OR TEST CERTIFICATES SHALL BE PROVIDED AS EVIDENCE OF COMPLIANCE WITH THE STANDARDS REFERRED TO IN AS4100. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- PROVIDE TEST CERTIFICATED FOR COMPLIANCE FOR ALL FASTENERS. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- FOR COLD FORMED SECTIONS A "CERTIFICATE OF CONFORMITY TO AS1163-1991" SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- CERTIFICATES SHALL ONLY BE ACCEPTED FROM TESTING COMPANIES ACCREDITED BY A TESTING AUTHORITY RECOGNISED IN AUSTRALIA, EG NATA or JAS-ANZ CERTIFIED.
- UNIDENTIFIED STEEL ie. ANY STEEL THAT IS NOT ACCOMPANIED WITH EVIDENCE STATING COMPLIANCE WITH THE REQUIREMENT OF AS4100 SHALL ONLY BE USED STRICTLY IN ACCORDANCE WITH CLAUSE 2.2.3 OF AS4100. IF MATERIALS SUPPLIED AND INSTALLED ARE SUBSEQUENTLY PROVEN TO BE NON COMPLIANT WITH THE SPECIFIED AUSTRALIAN STANDARDS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND COST TO UNDERTAKE NATA OR EQUIVALENT CERTIFIED TESTING TO PROVE CONFORMANCE TO THE AUSTRALIAN STANDARDS AND DESIGN SPECIFICATIONS. SIMILARLY ANY RECTIFICATION WORKS THAT MAY SUBSEQUENTLY BE REQUIRED TO SATISFY AUSTRALIAN CODE REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

RAMMED EARTH

RE1. RAMMED EARTH WALLS SHALL CONFORM TO THE RELEVANT REQUIREMENTS OF AS3700, SAA HB 195, NZS4297, NZS4298 & NZS4299
RE2. THE CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH OF THE MASONRY UNITS SHALL BE A MINIMUM OF 2.5MPa. THE MINIMUM CEMENT CONTENT BY WEIGHT SHALL BE 6%.
RE3. SUBMIT THE FOLLOWING FOR APPROVAL TO THE SUPERINTENDENT PRIOR TO COMMENCING WORKS:
- MIX DESIGN TO ACHIEVE DENSITY AND STRENGTH REQUIREMENTS, INCLUDING CEMENT CONTENT BY WEIGHT, DENSITY TO BE ACHIEVED AND PARTICLE SIZE DISTRIBUTION
- TEST REPORTS INCLUDING CONFIRMATION OF INSITU UNCONFINED COMPRESSIVE STRENGTH AND ELAPSED TIME BETWEEN ADDITION OF CEMEMNT AND COMPACTION. UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF SAA HB 195

RE4. U.N.O. ALL ANCHORS INTO RAMMED EARTH SHALL BE HILTI HIT-HY70 INJECTION ANCHORS. ANCHORS ARE TO BE HOT DIP GALVANISED
RE5. THE MOISTURE CONTENT AT PLACEMENT SHALL BE BETWEEN 8-16% BY WEIGHT
RE6. FORMWORK SHALL BE DESIGNED BY A SUITABLY QUALIFIED ENGINEER, AND SHALL BE CAPABLE OF WITHSTANDING THE PRESSURE OF THE SOIL DURING COMPACTION. SUITABLE BOND BREAKERS SHALL BE USED TO ALLOW STRIPPING WITHOUT DISTURBANCE OF THE COMPACTED WALL.
RE7. PLACEMENT OF RAMMED EARTH SHALL NOT BE CARRIED OUT WHEN TEMPERATURE IS GREATER THAN 32 DEGREES CELSIUS.
RE8. MATERIAL SHALL BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 200mm THICK (WHEN UNCOMPACTED). MECHANICAL COMPACTION IS TO BE UNDERTAKEN USING PNEUMATIC RAMMERS. HAND RAMMING IS NOT TO BE USED.

NORTHROP
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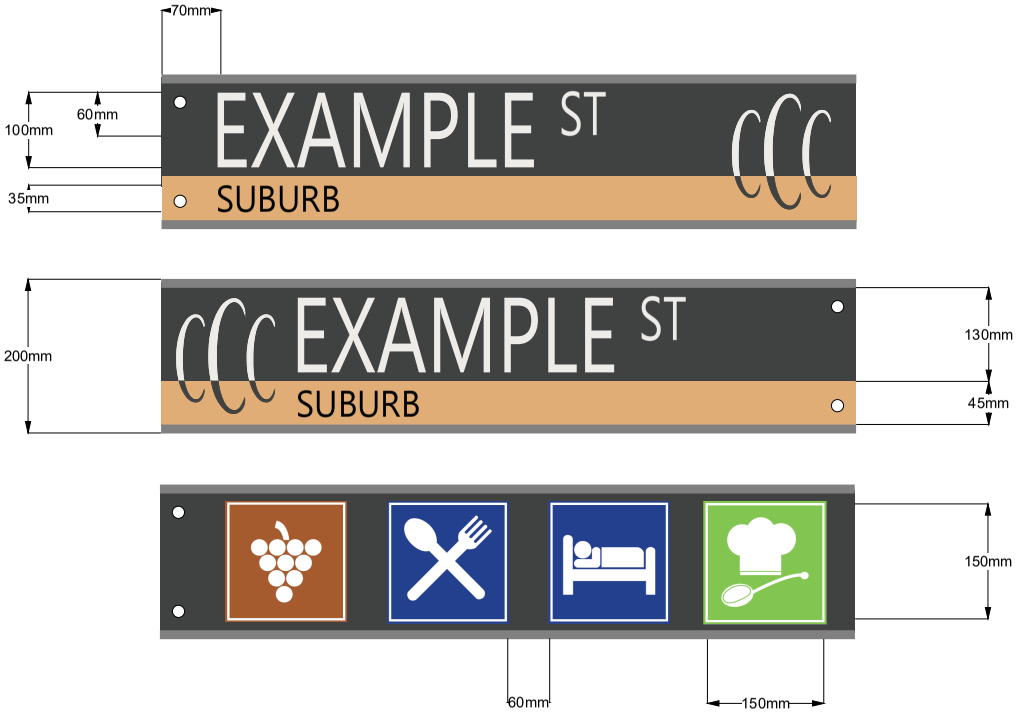
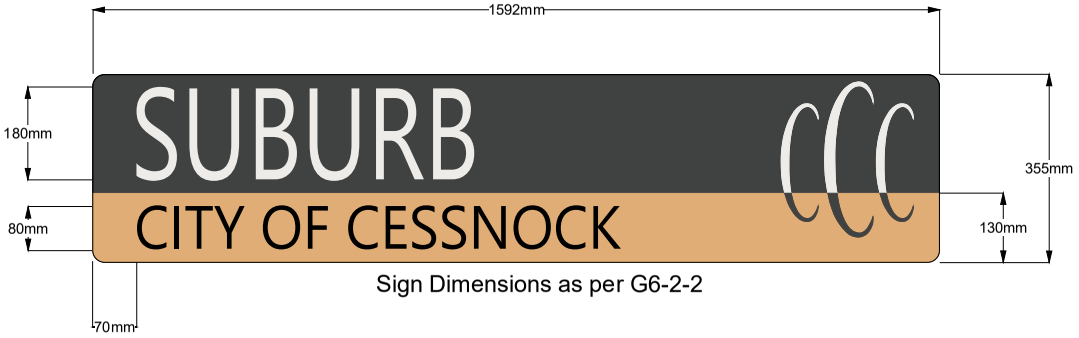
JOB NUMBER:	NL166682	DATE:	16/02/2018	REV. 2
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK20			

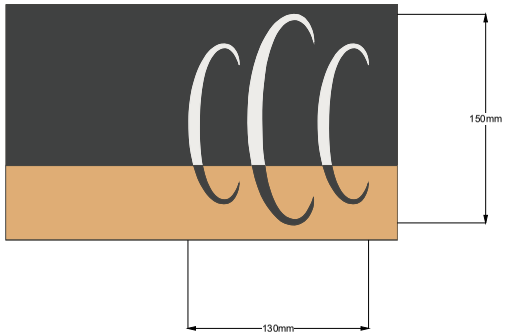
5.3 SS Street Signs - Dimensions



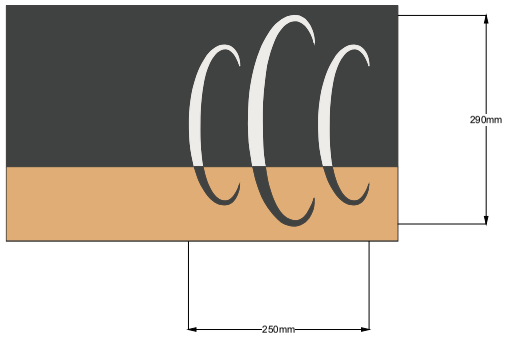
15 Standard Street Blade



17 Suburb Sign Secondary Roads

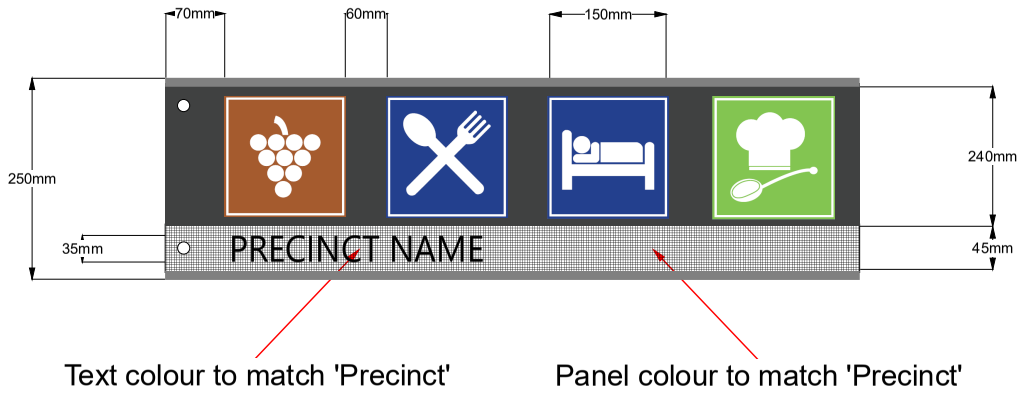


16 Council Logo - Standard Street Blade

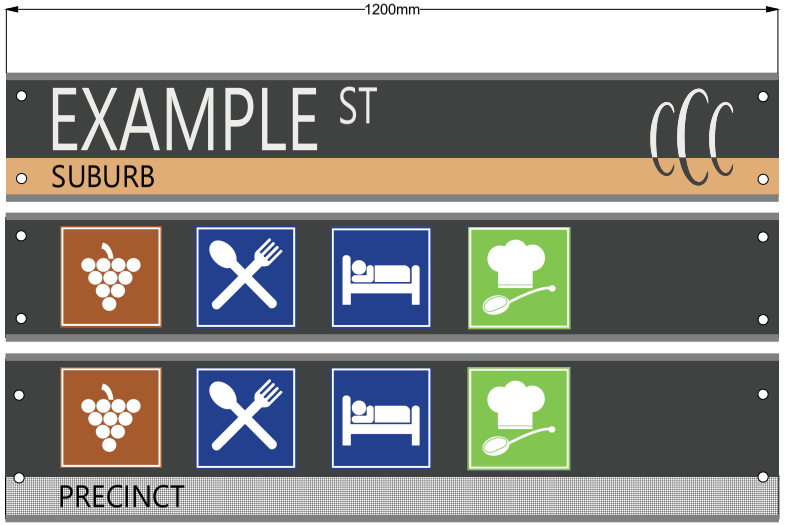


18 Council Logo - Suburb Sign Secondary Roads

5.3 SS Street Signs - Dimensions

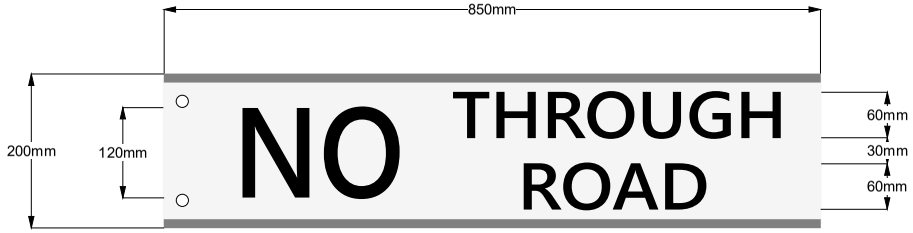


19 Precinct Pictogram Blade



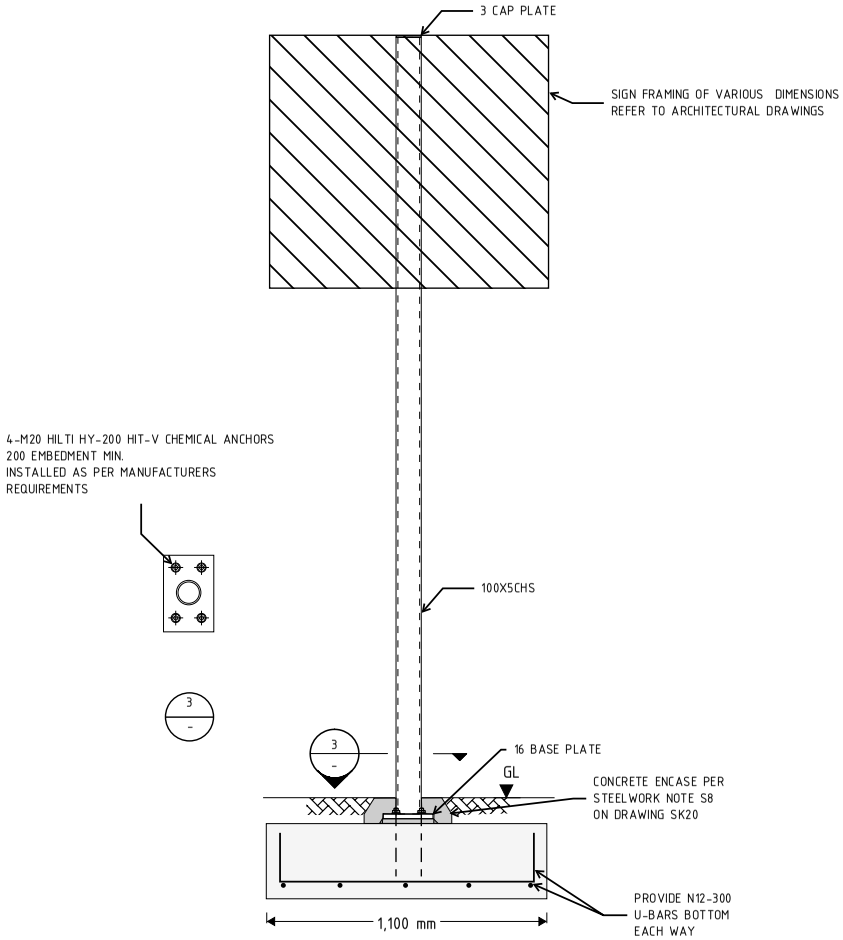
20 Precinct Pictogram Reassurance Blades (on two posts)

21 Suburb Directional Blade

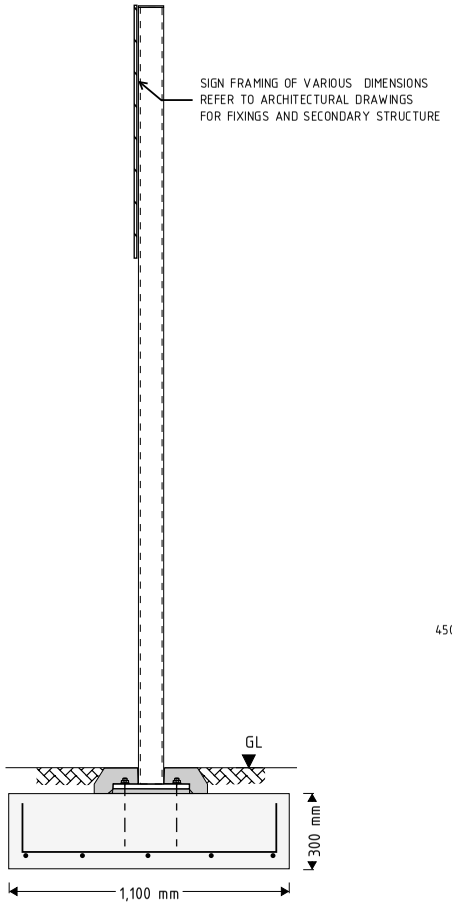


22 Rural No Through Road

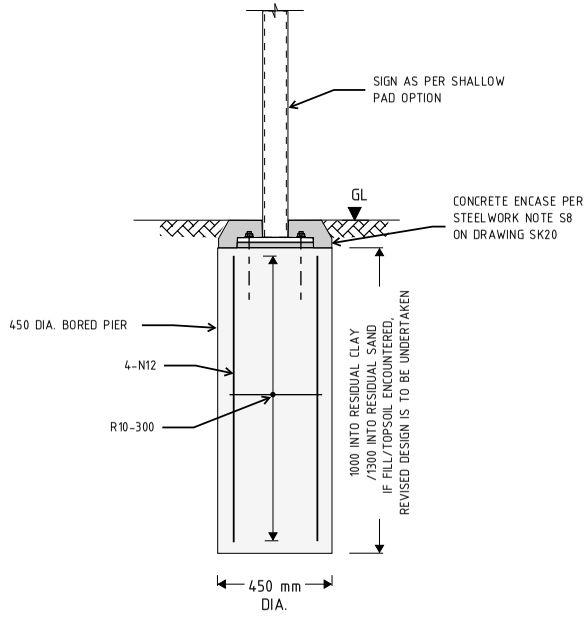
5.3 SS Street Signs - Engineers Drawing



LONG SECTION
(SHALLOW PAD OPTION)



TRANSVERSE SECTION
(SHALLOW PAD OPTION)



LONG SECTION
(BORED PILE OPTION)

SS1-SS6 STREET SIGNS (TYP.) (100CHS, 3000h MAX.)

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				REV.
JOB NUMBER:	NL166682	DATE:	15/12/2017	1
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			
DRAWING TITLE:	SS1-SS6 STREET SIGNS (TYP.)			
DRAWING NUMBER:	NL166682_SK26			

NOTE:
MINIMUM ALLOWABLE BEARING PRESSURE OF 100KPa IS ASSUMED, AND IS TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE.
IF FOOTING NOT IN 100kPa MATERIAL, ALTERNATIVE DESIGN WILL BE REQUIRED

REFER TO SK20 FOR SPECIFICATIONS

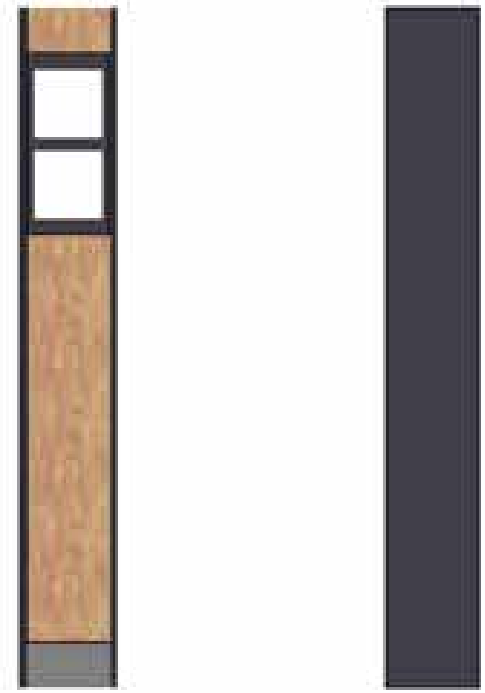
5.4 DM1 Destination Marker

COLOURS:

Steel column: Colorbond
Monument

White: CMYK: 8, 4, 5, 0
RGB: 237, 236, 233

Modwood Panelling
Modwood Sahara
(brushed finish)



01 Destination Marker

5.4 DM1 Destination Marker - Signage Specification

1.0 STEEL
General: Provide and select, if no selection is given, transport, deliver, store, handle, protect, finish, adjust and prepare for use the manufactured items in accordance with the current written recommendations and instructions of the manufacturer or supplier

1.1 Durability
General: Provide steel products protected from corrosion to suit the conditions of use.

1.2 Corrosion resistance
General: Conform to the following atmospheric corrosivity category as defined in AS/NZS 2312.

1.3 Protective coatings
Environment: To AS/NZS 2312 clause 2.3.
Coating designation: To AS/NZS 2312
Fasteners
Self drilling screws
Corrosion resistance: To AS 3566.2
Vapour barrier
Vapour barrier to slabs: To AS 2870 clause 5.3.3.
Minimum thickness: 0.2 mm.

1.4 Aluminium and aluminium alloys
Drawn pipe: To AS/NZS 1867.
Drawn rod, bar and strip: To AS/NZS 1865.
Extrusions: To AS/NZS 1866.
Plate and sheets: To AS/NZS 1734.

1.5 Metal separation
Incompatible sheet metals: Prevent direct contact between incompatible metals. Provide separation by one of the following:
- Apply an anti-corrosion low moisture transmission coating such as alkyd zinc phosphate primer or aluminium pigmented bituminous paint to contact surfaces.
- Insert a concealed, non-metallic separation layer such as polyethylene film, adhesive tape, neoprene, nylon or bituminous felt.

Incompatible fixings: Do not use.
Incompatible service pipes: Install lagging or grommets. Do not use absorbent, fibrous or paper products.

1.6 Brazing
General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.
Butt joints: Do not use butt jointing for joints subject to load. If butt joints are used, do not rely on the filler metal fillet only.
Filler metal: To AS/NZS 1167.1.

1.7 Finishing
Visible joints: Finish visible joints made by welding, brazing or soldering using methods appropriate to the class of work (including grinding or buffing) before further treatment such as painting, galvanizing or electroplating. Make sure self-finished metals are without surface colour variations after jointing.

1.8 Preparation
General: Before applying decorative or protective prefinishes to metal components, complete welding, cutting, drilling and other fabrication, and prepare the surface using a suitable method.
Standard: To AS 1627 series.
Priming steel surfaces: If site painting is documented to otherwise uncoated mild steel or similar surfaces, prime as follows:
- After fabrication and before delivery to the works.
- After installation, repair damaged priming and complete the coverage to unprimed surfaces.

1.9 Welding
Aluminium: To AS 1665.
Stainless steel: To AS/NZS 1554.6.
Steel: To AS/NZS 1554.1.

2.0 MODWOOD
Size: 65x23mm ModWood .
Colour: ‘Sahara’
Finish: Brushed
Fixings: As per details.

3.0 PAINTING DULUX PROTECTIVE PAINT COATINGS
Contact:
DuluxGroup/Dulux technical contacts
Architects and Specifiers’ Hotline: 13 23 77.
Website: www.duluxprotectivecoatings.com.au/contact-us.

3.1 Products
Storage and handling:
Care: Handle, store, mix and apply all protective coatings in conformance with Dulux recommendations.
Original containers: Deliver coating products to site in the manufacturer’s labelled and sealed containers.
Ambient temperature range for storage: 15°C to 25°C.
Use-by-date: Use products with limited shelf life before their use-by-date unless written authorisation from the coating manufacturer’s technical services section is provided.
Safety data sheets (SDS):

5.4 DM1 Destination Marker - Signage Specification

Requirement: Keep on site copies of all relevant Dulux SDS's and technical datasheets.
Proprietary products
Substitution: Dulux paint products and specified coatings systems have been selected for this project and unauthorised product substitution will jeopardise or void the Warranties.

3.2 Surface Preparation
General:
Defects: Remove all surface defects, including cracks, laminations, deep pitting, weld spatter slag, burrs, fins, sharp edges and other defects before the preparation of the surface to be coated.
Temporary welds: Grind flush temporary welds.
Site welding: Where possible avoid site welding.
Porous, skip or stitch welds: Not acceptable.
Edges: De-burr and round all edges to a 2 mm radius.
Surface contaminants: Remove surface contaminants such as oil, grease, dirt and loose particles, using an alkaline oil emulsifier/ degreaser to AS 1627.1.
Surface preparation: Prepare surfaces to the required finish to AS 1627.1, AS 1627.2, AS 1627.4, AS 1627.5, AS 1627.6 and AS 1627.9.
Surface cleaning: Remove spent abrasive from the surface by blowing with clean, dry air and/or by vacuum cleaning.
Bolts: Provide washers at heads and nuts at replacement bolts.

Surface preparation for atmospheric steel:
General: Conform to the following requirements:
-Wash and degrease all surfaces to be coated in conformance with AS 1627.1 with a free-rinsing, alkaline detergent, such as Gibson F310B or Gamlen CA No. 1 in conformance with the manufacturer's written instructions and all safety warnings.
-Wash with fresh potable water and remove all soluble salts are in conformance with AS 3894.6 Methods A and D.
-Grind all sharp edges with a power tool to a minimum radius of 2 mm.
-Power tool clean welds to AS 1627.2 Class 2 to remove roughness. Remove filings, preferably by vacuum or compressed air.
-Abrasive blast clean all steel surfaces to be painted in conformance with AS 1627.4 to visual standard AS 1627.9 Class 2.5 (equivalent to ISO 8501-1, Sa 2.5: Very Thorough Blast-Cleaning). Use a non-metallic medium that will generate a surface profile of 35 to 65 µm, as tested to AS 3894.5 Method A.
-Commence application within 4 hours of abrasive blast cleaning or before surface becomes contaminated, otherwise repeat abrasive blasting step.
-Stripe coat welds, bolts, bolt holes and all edges with primer before application of full primer coat nominated in PROTECTIVE PAINT COATING SYSTEMS.
-Before application, make sure that the surface is free of contaminants including oil, grease, dirt, dust, salt and any other deleterious materials that will interfere with coating performance.

Treatment of on-site welding:
On-site welding: If on site welding is performed, adopt the following procedure:
-Remove weld spatter.
-Power tool clean welds to AS 1627.2 Class 2 to remove roughness. Remove filings, preferably by vacuum or compressed air.
-Prime welds immediately with the nominated primer before contamination can re-occur. Make sure that the primer overlaps the sound adjacent coating by between 25 mm and 50 mm.
-Apply intermediate and topcoats over the primed welds to match the surrounding coating system, overlapping the sound adjacent coating by between 25 mm and 50 mm.

Preparing galvanized and aluminium surfaces:
Remove grease, oil and other solvent-soluble contaminants by wiping with mineral turpentine or white spirit. Finally wipe with a clean solvent. Allow to dry and proceed with the next operation immediately. Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Preparing zinc primed surfaces:
If present, remove zinc salts from zinc primers. Remove grease, oil and other solvent-soluble contaminants by wiping with mineral turpentine or white spirit. Finally wipe with a clean solvent. Allow to dry and proceed with the next operation immediately.

Shop priming:
Dust off and apply a coat of primer, according to the technical specification.

Site coating:
General: High pressure fresh water wash down all surfaces. Lightly sand down primer/ intermediate coats, which have been shop applied, before site application of next coat.

3.3 Preparation assessment
Conformance: All areas of any item must meet the required cleanliness standard.
Abrasive blast cleaning: Assessment: To AS 1627.4 and ISO 8501-1.
-Class 2.5.
Power tool cleaning: Assessment: To AS 1627.2 and ISO 8501-2.
-Class 2.
Hand tool cleaning
Visual assessment: To ISO 8501-2.
-Class 1.
Surface profile: General: To AS 3894.5.
Profile grade: To AS 3894.5 Method A.

Surface dust from abrasion:
General: To AS 3894.6 Method C.

5.4 DM1 Destination Marker - Signage Specification

Chloride level testing:
Test: To AS 3894.6 Method A.
Maximum allowable chloride levels: 50 mg/m2.
Conformance: If this level is exceeded, rewash the affected surface area using fresh water until the chloride level is within acceptable limits. Pressure washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.
Timing of testing: Early in the blasting work so that removal procedures can be initiated before the blasting is completed.
Wet film thickness: Method of measurement: To AS 3894.3, Appendix C using an approved wet film gauge continuously during application.
Dry film thickness: Method of measurement: To AS 3894.3, clause 10.
Extent: All surfaces at the completion of each of the prime, intermediate and finish coats, in particular include areas of the structure which are difficult to paint, are masked by structure, or areas where double coating or light coating is likely due to the shape of the substrate.
Number of measurements: Perform a sufficient number of readings to make sure a representative account for the DFT compliance of the coated areas tested.
Deduction: If testing the DFT of coatings 150 µm and less, deduct the effect of the measured surface profile from all DFT readings.
Single readings: Single reading requirements are as follows:
- The average of 5 point readings for each 10 m2 area of coating surface should not be outside the specified coating thickness range.
- No single point reading in any 10 m2 should be less than 80% of the specified minimum coating thickness. However, where three readings are averaged to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
- Check any single reading that is greater than 150% of the specified DFT with three additional readings within 50 mm of the original reading. If these three readings average not greater than 150% of the specified DFT, take the averaged readings as the point reading. If greater than 150%, reject the DFT in that area.

Rectification: Re-work areas rejected, using surface preparation and coatings in the same manner and order as the original work.
Defects including under thickness and over thickness: Mark with school grade chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

3.4 Mixing
General: Mixing: Mix coatings thoroughly. All containers larger than 4 litres are to be mixed using powered agitators driven by air motors.
Multi-component coatings: Combine multi-component coatings as whole pack units. If partial mixing is proposed, submit details.
Thinners: If addition of thinners is proposed, conform to the Dulux product data sheet for the specified product.
Colour consistency: If colour consistency is required, before the addition of the curing agent or converter and before coating application, pre-mix the components of coating products that have been tinted to make sure colour uniformity.
Thinners: If addition of thinners is proposed, conform to the coating manufacturer's recommendations for the documented product.
Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

3.5 Coating Application
General: Conform to the Dulux product data sheets and the Dulux specification.
Painting and coating colour: Verify all project finish colours with the retained samples.
Final surface preparation or coating application
Limits: If the following climatic/substrate conditions are present do not apply coating:
-The relative humidity is above 85%.
-The substrate temperature is less than 3°C above the dew point.
-The ambient air temperature is below 5°C or above 40°C.
-The substrate temperature is below 10°C or above 45°C.
-The surface to be coated is wet or damp.
-Where the full prime coat application cannot be carried out before the specified cleanliness of the surface deteriorates.
-For external or site applied coatings:
-The weather is clearly deteriorating or unfavourable for application or curing.
-High wind conditions.
-The surface preparation standard has not been achieved.
-The time between surface blast cleaning and the commencement of coating exceed 4 hours.
-Visual tarnishing or black spots develop on the surface of the metal.
Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, provided the final surface preparation and all coating applications are undertaken under the limited conditions.
Prior coating: Before the spray application of each coating stripe coat by brush method all edges, welds, seams, rivets bolts and bolt holes (including slots). Prime the underlying surfaces of replacement bolting, washers and nuts before installation.
Procedure: Conform to the order shown in PROTECTIVE PAINT COATING SYSTEMS.
Timing: Conform to the minimum and maximum re-coat intervals and curing times.
Detail: Stripe coat all welds, bolt holes, corners and difficult to spray areas by brushing in with the prime coat and intermediate coat material before the full coating application.
Subsequent coats: Make sure that before any subsequent coating layer is applied, the surface condition of the preceding coat is complete and correct in all respects, including its DFT achievement, cleanliness, freedom from defects. These are detailed on the Dulux Protective Coating specification. Depending on the applicators chosen method additional coats may be required to achieve the nominated minimum DFT.
Conformance: To AS/NZS 2312.1 for the specified film thickness of individual coats.
Correction: Correct any defect in a coating layer before the subsequent coating layer is applied.

Protection
General: Perform all painting under cover and/or protected from rain, condensation, dew,

excessive wind, overspray or wind-blown dust.
Period: Continue protection where any of these conditions exist before the coating has cured to a sufficient degree so as to be unaffected.

3.6 Coating Repair
Repair of coating damage:
Preparation: Feather back by hand or machine sanding all leading edges of intact coating adjacent to the repair, to remove any sharp edges.
Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.
Sequence: Apply the repair coating in the same sequence and manner as the original coating.
Areas damaged without exposing the primer: Wash with a proprietary detergent solution and rinse with fresh water, followed by abrading and ensuring that edges of sound paint are feathered. Then coat the area with the appropriate intermediate and finishing coat materials.
Areas damaged to the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Re-coat with the specified system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.
Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line.
Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.
Timing: Apply the Dulux Protective Coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.
Cleaning: Provide, at no additional cost, surface treatment as follows:
-Surfaces left longer than four hours: Re-blast cleaning before coating.
-Surfaces that develop visual tarnishing (red rust or black spots) at any time before coating: Wash down with fresh potable water then blast clean before coating. There are commercially available chloride reducing solutions that may assist.

3.7 Completion
General: Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties:
Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.
- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier.

3.8 Selections
There are decorative finish options for architectural and structural steel. The most common coating types are:

Epoxy acrylic
Inland AS/NZS 2312.1 Categories C1 and C2: Epoxy acrylic

Location	Primer	Second Coat	Third Coat	Duspec No
Exterior decorative equivalent to AS/NZS 2312.1 ACC2	75 µm DULUX Durepon P14 DI1117	50 µm DULUX Acrathane IF DI1102	Nil	SI1433

Coastal AS/NZS 2312.1 Categories C3, C4 and C5: Epoxy acrylic

Location	Primer	Second Coat	Third Coat	Duspec No
Exterior decorative equivalent to AS/NZS 2312.1 ACC6	75 µm DULUX Zinc-anode 402 DI0539	00 µm DULUX Duremax GPE DI1115	50 µm DULUX Acrathane IF DI1102	SI1399

4.0 VINYL SIGNAGE
Graphic set-out to be providex by Cessnock City Council.

All vinyl signage to be Eclipse 21 Series Self-Adhesive Polymeric Inkjet Vinyl. Vinyl to be 3mm thick with a UV stabilized over laminate in matte finish.
Solid colours are to be in Pantone colours and other imagery CMYK format.
To be installed in accordance with manufacturer's specifications.

5.4 DM1 Destination Marker - Engineers Specification

GENERAL

G1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH SPECIFICATIONS AND OTHER CONSULTANT'S DRAWINGS.
G2. ALL DISCREPANCIES SHALL BE REFERRED TO THE PROJECT MANAGER AND RESOLVED BEFORE PROCEEDING WITH THE WORK.
G3. ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. THESE STRUCTURAL DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
G4. ALL WORKMANSHIP, TESTING, MATERIALS AND SUPERVISION ARE TO BE IN ACCORDANCE WITH THESE SPECIFICATIONS, THE WORK HEALTH AND SAFETY ACT 2011. ENFORCED BY THE WORKCOVER AUTHORITY AND CURRENT RELEVANT AUSTRALIAN STANDARDS.
G5. THE DETERMINATION OF A SAFE WORK METHOD REMAINS THE RESPONSIBILITY OF THE CONTRACTOR. ANY ELEMENT WHICH POSES AN UNACCEPTABLE LEVEL OF SAFETY RISK TO CONSTRUCT SHALL BE REFERRED TO THE STRUCTURAL ENGINEER. TEMPORARY BRACING AND SUPPORT OF STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
G6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL SERVICES IN THE VICINITY OF THE WORKS.
G7. THE STRUCTURAL COMPONENTS DETAILED ON THESE STRUCTURAL DRAWINGS ARE JOB SPECIFIC AND HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARDS AND BUILDING CODE OF AUSTRALIA FOR THE FOLLOWING LOADS:

WIND LOADS:

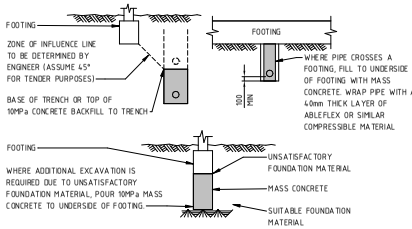
- IMPORTANCE LEVEL = 2
- REGION = A2
- ANNUAL PROBABILITY OF EXCEDENCE = 1/500
- REGIONAL WIND SPEED V_R = 45 m/s
- TERRAIN CATEGORY = TC2
- TERRAIN MULTIPLIER M_z,cat = 0.91
- WIND DIRECTION MULTIPLIER M_d = 1
- SHIELDING MULTIPLIER M_s = 1
- TOPOGRAPHIC MULTIPLIER M_t = 1
- SITE WIND SPEED = 41 m/s

G8. THE METHOD OF CONSTRUCTION AND THE MAINTENANCE OF SAFETY DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE BUILDER. IF ANY STRUCTURAL ELEMENT PRESENTS DIFFICULTY IN RESPECT TO SAFETY THE MATTER SHALL BE REFERRED TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION BEFORE PROCEEDING WITH THE WORK.
G9. NO CHANGES IN ANY STRUCTURAL ELEMENT SHALL BE MADE WITHOUT WRITTEN APPROVAL FROM NORTHROP CONSULTING ENGINEERS. IF THERE IS A DISCREPANCY THEN FOR TENDER PURPOSES ALLOW FOR THE MOST EXPENSIVE OPTION. NORTHROP CONSULTING ENGINEERS SHALL BE CONTACTED TO CONFIRM PRIOR TO CONSTRUCTION.
G10. NORTHROP CONSULTING ENGINEERS ACCEPTS NO RESPONSIBILITY FOR ANY WORK NOT INSPECTED OR NOT APPROVED BY NORTHROP CONSULTING ENGINEERS DURING CONSTRUCTION.

FOUNDATIONS

F1. ASSUMED ALLOWABLE BEARING CAPACITY:
- FOOTINGS = 100kPa

F2. A GEOTECHNICAL REPORT HAS NOT BEEN CARRIED OUT. MINIMUM ASSUMED ALLOWABLE BEARING PRESSURES TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE. IF MINIMUM BEARING PRESSURES NOT ACHIEVED, AN ALTERNATIVE DESIGN WILL BE REQUIRED.
F3. ENSURE STABILITY OF ADJACENT BUILDINGS AND PATHS IS MAINTAINED DURING ALL STAGES OF CONSTRUCTION.
F4. THE UNDERSIDE OF FOUNDATIONS SHALL CONFORM TO THE FOLLOWING REGARDLESS OF NOMINATED LEVELS:



F5. FOOTINGS SHALL BE CENTRALLY LOCATED UNDER WALLS AND COLUMNS UNLESS NOTED OTHERWISE ON THE STRUCTURAL DRAWINGS.
F6. FOOTINGS SHALL BE EXCAVATED TO THE DETAILED DEPTH AND WIDTH. FOOTINGS SHALL BE INSPECTED AND FILLED WITH CONCRETE AS SOON AS POSSIBLE TO AVOID EITHER SOFTENING OF THE FOUNDATION MATERIAL OR DRYING OUT BY EXPOSURE.
F7. THE BASE OF ALL PIER HOLES SHALL BE FREE OF WATER AND CLEANED OF LOOSE MATERIAL OR DEBRIS PRIOR TO PLACEMENT OF CONCRETE. ALLOW TO PROVIDE TEMPORARY LINERS AS DEEMED NECESSARY.

CONCRETE

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2009 AND NATSPEC CONCRETE STANDARDS.
C2. CONCRETE PROPERTIES AND COVER TO REINFORCING :

COVER TO REINFORCEMENT			
ELEMENT	CONCRETE STRENGTH f'c (MPa)	MAXIMUM 56 DAY DRY SHRINKAGE	COVER (mm)
WALLS	25	1000 µm	60
FOOTINGS	25	1000 µm	60

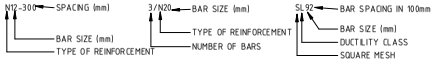
MAXIMUM AGGREGATE SIZE = 20mm U.N.O.
SLUMP DURING PLACING = 80mm ±10mm
EXPOSURE CLASSIFICATION = A2 (IN CONTACT WITH GROUND)
NO ADMIXTURES SHALL BE USED IN THE CONCRETE MIX UNLESS APPROVED BY NORTHROP CONSULTING ENGINEERS IN WRITING.

C3. SLABS USING MECHANICAL VIBRATORS.
C4. PLACE CONCRETE CONTINUOUSLY BETWEEN CONSTRUCTION JOINTS SHOWN ON PLAN. DO NOT BREAK OR INTERRUPT SUCCESSIVE POURS SUCH THAT COLD JOINTS OCCUR. ANY REVISIONS OR ADDITIONS TO CONSTRUCTION JOINTS SHOWN ON PLAN REQUIRE APPROVAL FROM THE NORTHROP CONSULTING ENGINEERS.
C5. REINFORCEMENT QUALITY AND NOTATION :

REINFORCEMENT NOTATION				
SYMBOL	BAR TYPE	STRENGTH GRADE (MPa)	DUCTILITY CLASS	TO COMPLY WITH AUSTRALIAN STANDARD
S	STRUCTURAL GRADE DEFORMED RIB BAR	250	NORMAL	AS/NZS 4671-2001
N	HOT ROLLED DEFORMED RIB BAR	500	NORMAL	AS/NZS 4671-2001
R	PLAIN ROUND BAR	250	NORMAL	AS/NZS 4671-2001
RL	RECTANGULAR MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
SL	SQUARE MESH OF DEFORMED RIB BAR	500	LOW	AS/NZS 4671-2001
L-TM	TRENCH MESH	500	LOW	AS/NZS 4671-2001

ALL REINFORCING BARS SHALL BE GRADE D500N TO AS/NZS 4671-2001 AND ALL MESH SHALL BE GRADE 500L TO AS/NZS 4671-2001. UNLESS NOTED OTHERWISE CLASS L REINFORCEMENT SHALL NOT BE USED.

REINFORCEMENT LABELS :



C6. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY, AND NOT NECESSARILY IN TRUE PROJECTION. BARS SHOWN ARE INDICATIVE ONLY AND LENGTHS MAY VARY. BEAM ELEVATIONS TAKE PRECEDENCE OVER SECTIONS. SLAB PLANS TAKE PRECEDENCE OVER SECTIONS. REFER TO SECTIONS FOR EXTRA BARS THAT MAY BE REQUIRED.
C7. USE ONLY PLASTIC OR CONCRETE CHAIRS AT EXTERNAL SURFACES.
C8. SITE BENDING OF REINFORCEMENT BARS SHALL BE DONE WITHOUT HEATING USING A RE-BENDING TOOL. THE BARS SHALL BE RE-BENT AGAINST A FLAT SURFACE OR A PIN WITH A DIAMETER NOT LESS THAN THE MINIMUM PIN SIZE PRESCRIBED IN AS3600-2009.
C9. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN ON THE STRUCTURAL DRAWINGS OR IN POSITIONS OTHERWISE APPROVED IN WRITING BY NORTHROP CONSULTING ENGINEERS. LAPS SHALL NOT BE LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND IN ACCORDANCE WITH AS3600-2009 SECTION 13.
C10. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY NORTHROP CONSULTING ENGINEERS.
C11. AT EXTERNALLY EXPOSED SURFACES NO METALLIC ITEMS INCLUDING FORM BOLTS, FORM SPACERS, METALLIC BAR CHAIRS AND TIE-WIRE ARE TO BE PLACED IN THE COVER ZONE.
C12. ALL REINFORCEMENT, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION AND INSPECTED BY A SUITABLY QUALIFIED ENGINEER PRIOR TO PLACING CONCRETE.
C13. ALL CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNISED TESTING LAB.
C14. FOR ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX, REFER TO CONCRETE - ELAPSED DELIVERY TIMES NOTE.

CONCRETE - ELAPSED DELIVERY TIMES

CE1. ELAPSED TIME BETWEEN THE WETTING OF THE MIX AND THE DISCHARGE OF THE MIX AT THE SITE MUST NOT EXCEED THE CRITERIA IN THE ELAPSED DELIVERY TIMETABLE BELOW

ELAPSED DELIVERY TIME TABLE	
CONCRETE TEMPERATURE AT TIME OF DISCHARGE (°C)	MAXIMUM ELAPSED TIME (HOURS)
< 24	2.00
24 TO 27	1.50
27 TO 30	1.00
30 TO 32	0.75
32 TO 35	0.50

IF THE ELAPSED TIME IS LONGER THAN THE CORRESPONDING TIME IN THE TABLE ABOVE, OR THE TEMPERATURE IS GREATER THAN 35°C, THE CONCRETE MIX DESIGN ENGINEER IS TO BE CONTACTED TO CONFIRM WHETHER PLACEMENT IS TO PROCEED OR IF THE POUR IS TO BE STOPPED.

STEELWORK

S1. FABRICATE AND ERECT STRUCTURAL STEELWORK IN ACCORDANCE WITH AS4100-1998.
S2. PROVIDE HOLES, CLEATS AND FIXING FOR LIGHT STEEL/TIMBER FRAMING, FINISHES, ETC. SHOWN ON ARCHITECTURAL DRAWINGS.
S3. THESE DRAWINGS HAVE BEEN PREPARED TO INDICATE THE STRUCTURAL INTENT. THE SHOP DETAILER IS TO USE THESE DRAWINGS AS A BASIS FOR DIMENSIONAL COORDINATION WITH OTHER CONSULTANT'S DRAWINGS AND IS TO PREPARE DETAILED SHOP DRAWINGS. WHERE NECESSARY, THE SHOP DETAILER IS TO MAKE ASSUMPTIONS AND SUBMIT TO NORTHROP CONSULTING ENGINEERS FOR RESOLUTION. SHOP DETAILER IS TO ALLOW TO RE-WORK SHOP DRAWINGS AS NECESSARY. FABRICATOR SHALL PREPARE SHOP DRAWINGS AND SUBMIT THEM TO THE BUILDER FOR THEIR APPROVAL. BUILDER SHALL LODGE TWO COPIES OF APPROVED DRAWINGS TO NORTHROP CONSULTING ENGINEERS FOR REVIEW PRIOR TO FABRICATION, (ALLOW 5 WORKING DAYS FOR REVIEW).
S4. UNLESS NOTED OTHERWISE, USE:
- 6mm CONTINUOUS FILLET WELDS MADE WITH E4818 MILD STEEL ELECTRODES.
- ALL WELDS SP CATEGORY

S5. ALL BOLTS, SCREWS, HOLD DOWN BOLTS, MASONRY ANCHORS SHALL BE HOT DIP GALVANISED TO AS1214-1983, AS/NZS 4534-2006, AS/NZS 4680-2006 & AS/NZS 4792-2006. NO CONNECTION SHALL HAVE LESS THAN 2 BOLTS. ALL BOLTS AND WASHERS SHALL BE GALVANISED. ALL HOLES SHALL BE 2mm LARGER THAN THE BOLT DIAMETER UNLESS NOTED OTHERWISE.
S6. MINIMUM YELD STRESS:
- HOT ROLLED SECTIONS = 300MPa
- SQUARE HOLLOW SECTIONS = 350MPa
- RECTANGULAR HOLLOW SECTIONS = 350MPa
- CIRCULAR HOLLOW SECTION = 250MPa
- HOT ROLLED PLATE = 250MPa

S7. SURFACE TREATMENT UNLESS NOTED OTHERWISE:
- EXPOSED TO WEATHER (STRUCTURAL MEMBERS) = AS/NZS 2312-HDG600P3 or IZS3 (TIME TO FIRST MAINTENANCE TO BE 10 YEARS)
- BUILT INTO THE INTERNAL SKIN OF EXTERNAL WALLS = AS/NZS 2312-HDG600P3

S8. ALL BURIED STEELWORK TO BE PAINTED FIRST USING 'EXPOSED TO WEATHER' TREATMENT SYSTEM FOLLOWED BY THE APPLICATION OF A TWO PART EPOXY SUCH AS 'SIKAGUARD-63N' OR APPROVED EQUIVALENT, THEN CONCRETE ENCASE STEELWORK WITH MASS CONCRETE (MINIMUM 75mm COVER TO STEELWORK).
S9. STEELWORK TO BE CONCRETE ENCASED FOR FIRE RATING PURPOSES SHALL BE FREE FROM ALL LOOSE RUST, LOOSE MILL SCALE, DIRT, OIL, GREASE, ETC. AND REINFORCED WITH SL41 FABRIC OR EQUIVALENT BLACK IRON WIRE, 3mm DIA.
S10. BOLT SYMBOLS:
- 4.6/S = GRADE 4.6 BOLT / SNUG TIGHTENED.
- 8.8/S = GRADE 8.8 BOLT / SNUG TIGHTENED.
- 8.8/TF = GRADE 8.8 BOLT / FULLY TENSIONED FRICTION TYPE (USE LOAD INDICATOR WASHERS)
- 8.8/TB - GRADE 8.8 BOLT / FULLY TENSIONED BEARING TYPE (USE LOAD INDICATOR WASHERS)

S11. THE CONTRACTOR SHALL SUPPLY WRITTEN CERTIFICATION TO THE STRUCTURAL ENGINEER PRIOR TO THE ERECTION OF ANY STRUCTURAL STEEL STATING THAT THE BOLTS PROPOSED TO BE USED COMPLY WITH AS/NZS 1252-1996. HIGH STRENGTH BOLTS (8.8) ARE NOT TO BE WELDED.
S12. THE FABRICATION AND ERECTION OF THE STRUCTURAL STEEL WORK SHALL BE SUPERVISED BY A QUALIFIED PERSON EXPERIENCED IN SUCH SUPERVISION, IN ORDER TO ENSURE THAT ALL REQUIREMENTS OF THE DESIGN ARE MET.
S13. ALL MEMBERS SHALL BE SUPPLIED IN SINGLE LENGTHS. SPLICES SHALL ONLY BE PERMITTED IN LOCATIONS SHOWN ON THE STRUCTURAL DRAWINGS.
S14. GROUT ALL STEEL BASES BY DRY PACKING USING GROUT WHICH IS NON-SHRINK AND HAS A MINIMUM COMPRESSIVE STRENGTH AT 7 DAYS OF 40MPa
S15. PROVIDE SEAL PLATES TO THE ENDS OF ALL HOLLOW SECTIONS, WITH 'BREATHER' HOLES IF MEMBERS ARE TO BE HOT DIP GALVANISED.
S16. THESE DRAWINGS MAY NOT IDENTIFY ALL SECONDARY STEELWORK ELEMENTS THAT ARE REQUIRED FOR SUPPORT, FIXING AND FINISHING OF GLAZING, CLADDING AND LINING. THE TENDERER IS RESPONSIBLE FOR THE INCLUSION OF SUCH STEELWORK ELEMENTS TO THE EXTENT REQUIRED ON THE ARCHITECT'S DRAWINGS.
S17. IMPORTED STRUCTURAL STEEL MATERIAL
ALL STRUCTURAL STEELWORK USED ON THIS PROJECT SHALL BE COMPLIANT WITH AS4100, AND IN PARTICULAR:
- CERTIFIED MILL TEST REPORTS, OR TEST CERTIFICATES SHALL BE PROVIDED AS EVIDENCE OF COMPLIANCE WITH THE STANDARDS REFERRED TO IN AS4100. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
- PROVIDE TEST CERTIFICATED FOR COMPLIANCE FOR ALL FASTENERS. THESE CERTIFICATES SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- FOR COLD FORMED SECTIONS A "CERTIFICATE OF CONFORMITY TO AS1163-1991" SHALL BE SUBMITTED TO NORTHROP CONSULTING ENGINEERS FOR APPROVAL PRIOR TO FABRICATION.
- CERTIFICATES SHALL ONLY BE ACCEPTED FROM TESTING COMPANIES ACCREDITED BY A TESTING AUTHORITY RECOGNISED IN AUSTRALIA, EG NATA or JAS-ANZ CERTIFIED.
- UNIDENTIFIED STEEL ie. ANY STEEL THAT IS NOT ACCOMPANIED WITH EVIDENCE STATING COMPLIANCE WITH THE REQUIREMENT OF AS4100 SHALL ONLY BE USED STRICTLY IN ACCORDANCE WITH CLAUSE 2.2.3 OF AS4100.

IF MATERIALS SUPPLIED AND INSTALLED ARE SUBSEQUENTLY PROVEN TO BE NON COMPLIANT WITH THE SPECIFIED AUSTRALIAN STANDARDS IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND COST TO UNDERTAKE NATA OR EQUIVALENT CERTIFIED TESTING TO PROVE CONFORMANCE TO THE AUSTRALIAN STANDARDS AND DESIGN SPECIFICATIONS. SIMILARLY ANY RECTIFICATION WORKS THAT MAY SUBSEQUENTLY BE REQUIRED TO SATISFY AUSTRALIAN CODE REQUIREMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

RAMMED EARTH

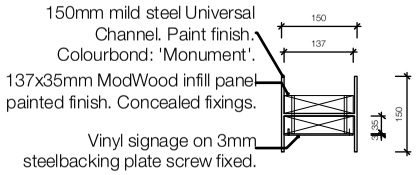
RE1. RAMMED EARTH WALLS SHALL CONFORM TO THE RELEVANT REQUIREMENTS OF AS3700, SAA HB 195, NZS4297, NZS4298 & NZS4299
RE2. THE CHARACTERISTIC UNCONFINED COMPRESSIVE STRENGTH OF THE MASONRY UNITS SHALL BE A MINIMUM OF 2.5MPa. THE MINIMUM CEMENT CONTENT BY WEIGHT SHALL BE 6%.
RE3. SUBMIT THE FOLLOWING FOR APPROVAL TO THE SUPERINTENDENT PRIOR TO COMMENCING WORKS:
- MIX DESIGN TO ACHIEVE DENSITY AND STRENGTH REQUIREMENTS, INCLUDING CEMENT CONTENT BY WEIGHT, DENSITY TO BE ACHIEVED AND PARTICLE SIZE DISTRIBUTION
- TEST REPORTS INCLUDING CONFIRMATION OF INSITU UNCONFINED COMPRESSIVE STRENGTH AND ELAPSED TIME BETWEEN ADDITION OF CEMEMNT AND COMPACTION. UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF SAA HB 195

RE4. U.N.O. ALL ANCHORS INTO RAMMED EARTH SHALL BE HILTI HIT-HY70 INJECTION ANCHORS. ANCHORS ARE TO BE HOT DIP GALVANISED
RE5. THE MOISTURE CONTENT AT PLACEMENT SHALL BE BETWEEN 8-16% BY WEIGHT
RE6. FORMWORK SHALL BE DESIGNED BY A SUITABLY QUALIFIED ENGINEER, AND SHALL BE CAPABLE OF WITHSTANDING THE PRESSURE OF THE SOIL DURING COMPACTION. SUITABLE BOND BREAKERS SHALL BE USED TO ALLOW STRIPPING WITHOUT DISTURBANCE OF THE COMPACTED WALL.
RE7. PLACEMENT OF RAMMED EARTH SHALL NOT BE CARRIED OUT WHEN TEMPERATURE IS GREATER THAN 32 DEGREES CELSIUS.
RE8. MATERIAL SHALL BE PLACED AND COMPACTED IN LAYERS NOT MORE THAN 200mm THICK (WHEN UNCOMPACTED). MECHANICAL COMPACTION IS TO BE UNDERTAKEN USING PNEUMATIC RAMMERS. HAND RAMMING IS NOT TO BE USED.

NORTHROP
Newcastle
Suite 4, 215 Pacific Hwy, Charlestown NSW 2290
P.O. Box 180, Charlestown NSW 2290
Ph (02) 4943 1777 Fax (02) 4943 1577
Email newcastle@northrop.com.au ABN 81 094 433 100

JOB NUMBER:	NL166682	DATE:	16/02/2018	REV. 2
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			
DRAWING TITLE:	JOB NOTES			
DRAWING NUMBER:	NL166682_SK20			

5.4 DM1 Destination Marker



02 DM1Destination Marker - Plan
1:15

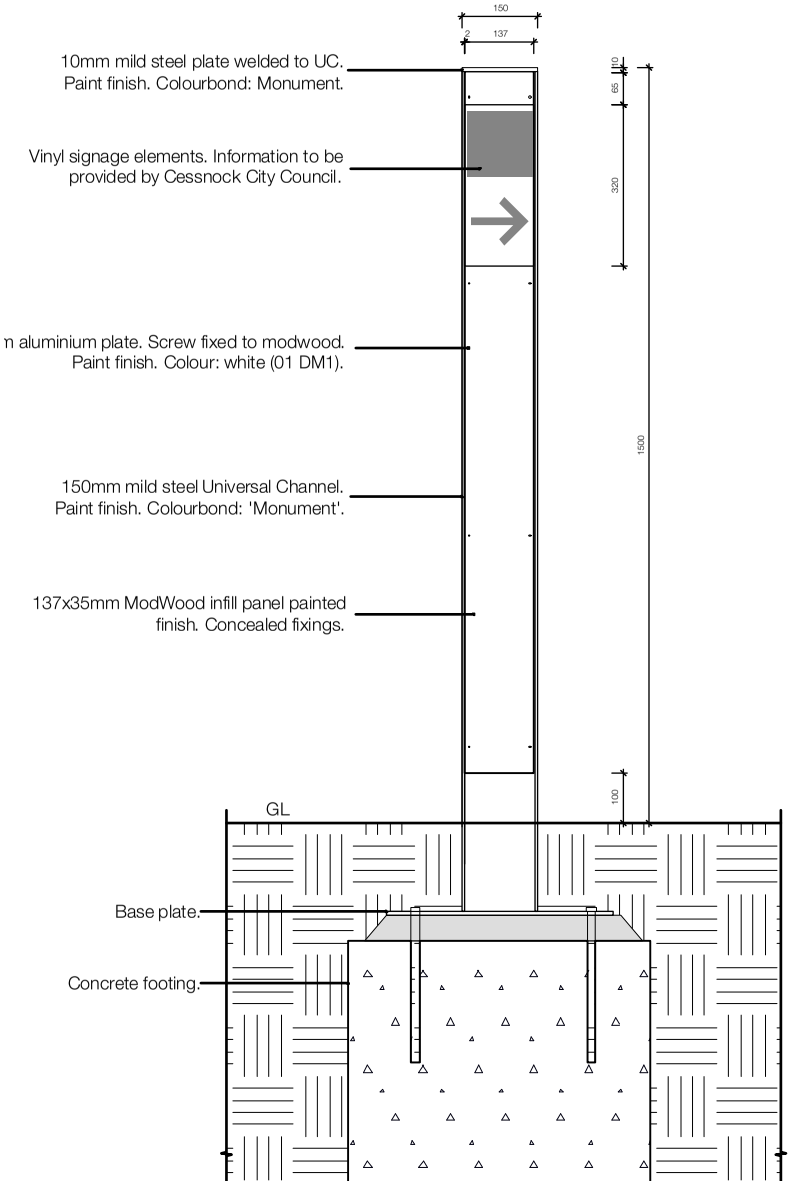
General Notes:

Refer to DM1 Destination Marker supporting drawings:

- 01 DM1 Destination Marker p. 123

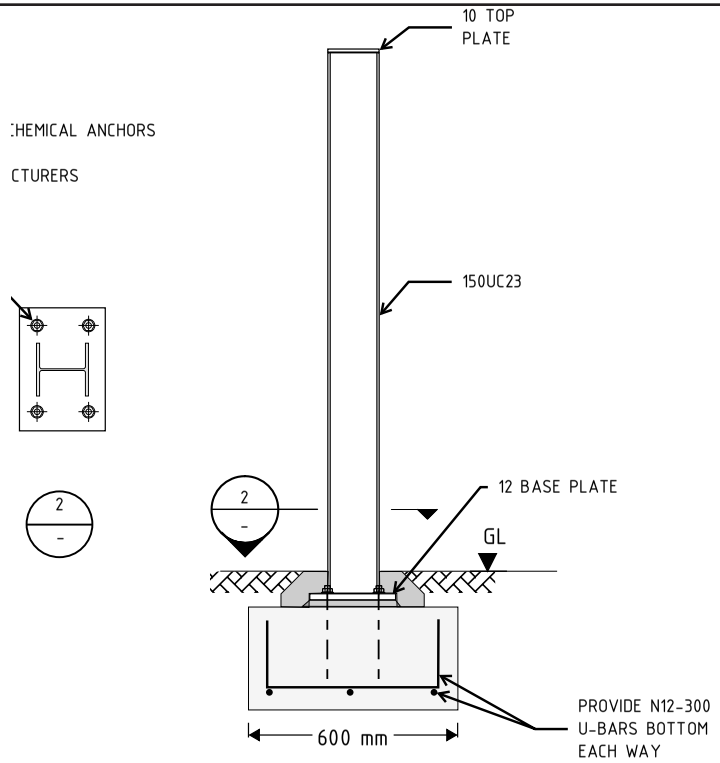
Refer signage specification p.124-127.

Refer engineers specification page 128 and engineers drawing page 130.

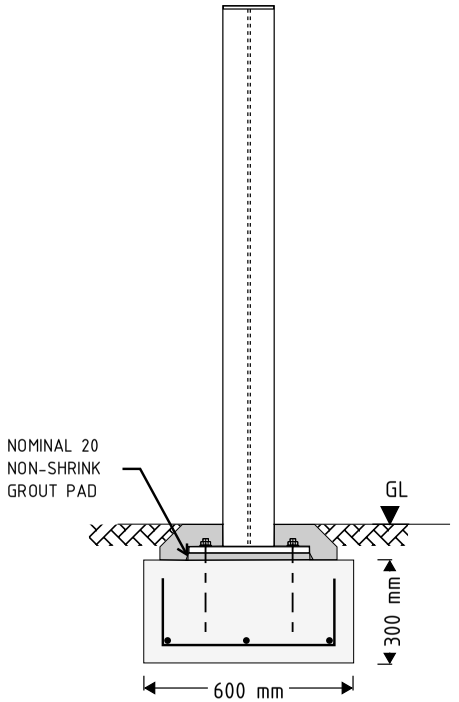


03 DM1 Destination Marker - Front Elevation
1:15

5.4 DM1 Destination Marker - Engineers Drawing



LONG SECTION
(SHALLOW PAD OPTION)



TRANSVERSE SECTION
(SHALLOW PAD OPTION)

NOTE:
MINIMUM ALLOWABLE BEARING PRESSURE OF 100KPa IS ASSUMED, AND IS TO BE CONFIRMED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER PRIOR TO POURING CONCRETE.
IF FOOTING NOT IN 100kPa MATERIAL, ALTERNATIVE DESIGN WILL BE REQUIRED

REFER TO SK20 FOR SPECIFICATIONS

DM1 - DESTINATION MARKER (150UC, 1500h)

NORTHROP
Newcastle
Suite 4, 215 Pacific Hwy, Charlestown NSW 2290
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Ph (02) 4943 1777 Fax (02) 4943 1577
Email newcastle@northrop.com.au ABN 81 094 433 100

JOB NUMBER:	NL166682	DATE:	15/12/2017	REV.
PROJECT:	HUNTER VALLEY WAYFINDING SIGNAGE			1
DRAWING TITLE:	DM1 - DESTINATION MARKER			
DRAWING NUMBER:	NL166682_SK25			

APPENDIX

6.1 Sign Audit Register

Sign Audit Register - DRAFT

Date of Installation	Sign Code	Sign Location (Address and Coordinates)	Assessment Notes	Prev. Audit Date	Audit Date	Assessor (Initial)	Action Required (Tick if yes)
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							☐
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DRAFT

6.2 Sign Register

Sign Register - DRAFT

Date of Installation	Sign Code	Sign Location (Address and Coordinates)	Installed by	Added to GIS (Tick if yes)
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