

FOREWORD

I am pleased to issue this 2012 edition of the Code of Practice for Land Development (the Code) published by the Wellington City Council. The Code is a guide on the standards required by the Wellington City Council. The Code sets out the technical engineering criteria for approving the design and construction of developments. Whether the infrastructure will be vested with Council or be a private asset it is important that these assets are constructed to the Council's standards.

This 2012 Code of Practice for Land Development is a revision of the former Code of Practice for Land Development 1994. It has been updated and improved, and the key changes include encouraging environmentally sustainable design, strengthened sediment and erosion control and a new Open Spaces chapter.

The Code also incorporates the Regional Water Standard provisions for water and drainage assets; ensuring a consistent method of design and implementation of water services across the Wellington region. These standards must be met before the Council will allow a connection to the City's water supply and drainage systems.

Alternatives to the water supply and wastewater design and construction standards set out in this Code will not be permitted.

However, it is not the intention of the Council to stifle innovation and ingenuity of design. Where the outcome will be a better quality living environment, proposed alternative solutions for infrastructure design, other than for water supply and wastewater, should be negotiated with the Council to ensure that the Code's basic requirements are met.

Reference to this Code of Practice is contained in the Council's District Plan, including the Design Guidelines. The requirements of this Code of Practice are enforceable under the Resource Management Act 1991, the Building Act 2004 and the Wellington Consolidated Bylaw 1991.

The Code is updated from time to time by Council and new editions will be marked with the revised date issued on each occasion.



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RECORD OF AMENDMENTS

This copy of the Code has been updated as follows:

Amendment number	Date	Clauses amended	Signature
1			
2			
3			
4			
5			
6			

This Code is available electronically from the Council's web site: **www.Wellington.govt.nz**

NOTE: The Council will occasionally update the Code of Practice for Land Development it is the responsibility of the user to ensure they are referencing the latest version.

RELATED DOCUMENTS

The following documents are either referred to or have been used to produce this code.

NEW ZEALAND STANDARDS:

- AS1111:2000 – ISO metric hexagon bolts and screws
- AS 1112:2000 - ISO metric hexagon nuts
- AS 1397:2001 - Steel sheet and strip - Hot-dipped zinc-coated or aluminium / zinc-coated
- AS 1418:1996 - Cranes (including hoists and winches)
- AS 1627:1997 - Metal finishing - Preparation and pre-treatment of surfaces
- AS 4089:1993 - Priming paint for steel, single component, general purpose
- AS 3735:2001 - Concrete structures for retaining liquids
- AS 3828:1998 - Guidelines for erection of building steelwork
- AS NZS 1158: 1997 - Road lighting - Lighting for roads and public spaces
- AS NZS 1664:1997 - Aluminium structures - Limit state design
- AS NZS 1665:2004 - Welding of aluminium structures
- AS NZS 1734:1997 - Aluminium and aluminium alloys - Flat sheets, coiled sheet and plate
- AS NZS 2312:2002 - Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings
- AS NZS 3725:1989 - Loads on buried concrete pipes.
- AS NZS 3750 - Paints for steel structures
- AS NZS 4455:1997 - Masonry units and segmental pavers
- AS/NZS 4600:2005 - Cold-formed steel structures
- AS NZS 4680:2006 - Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
- AS.NZS 1554:2006 - Structural Steel Welding Set

- NZS 1170:2002 - Structural Design
- NZS 1254:2002 - PVC pipes and fittings for stormwater and surface water applications
- NZS 2280:2004 - Ductile iron pipes and fittings
- NZS 3101:1995 - Concrete structures standard - The design of concrete structures
- NZS 3103:1991 - Specification for sands for mortars and plasters
- NZS 3104:2003 - Specification for Concrete Production
- NZS 3105:2007 - Approval and test specification - Electrical portable outlet devices
- NZS 3107:1978 - Specification for precast concrete drainage and pressure pipes
- NZS 3109:1997 - Concrete construction
- NZS 3111:1986 - Methods of test for water and aggregate for concrete
- NZS 3112:1986 - Methods of test for concrete - Tests relating to fresh concrete
- NZS 3114:1987 - Specification for concrete surface finishes
- NZS 3121:1986 - Specification for water and aggregate for concrete
- NZS 3122:1995 - Specification for Portland and blended cements (General and special purpose)
- NZS 3404 1 & 2:1997 - Steel Structures Standard
- NZS 3501:1976 - Specification for copper tubes for water, gas, and sanitation
- NZS 3604:1999 - Timber Framed Buildings
- NZS 3607:1989 - Specification for round and part-round timber fence posts
- NZS 4158:2003 - Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
- NZS 4203:1992 - General structural design and design loadings for buildings
- NZS 4210:2001 - Masonry construction: Materials and workmanship

- NZS 4229:1999 - Concrete masonry buildings not requiring specific engineering design
- NZS 4230:2004 - Design of reinforced concrete masonry structures
- NZS 4402:1988 - Methods of testing soils for civil engineering purposes
- NZS 4404:2010 - Land development and subdivision engineering
- NZS 4431:1989 - Code of practice for earth fill for residential development
- NZS 4442:1988 - Welded steel pipes and fittings for water, sewage and medium pressure gas
- NZS 4501:1972 - Code of practice for the location marking of fire hydrants
- NZS 4671:2001 - Steel reinforcing materials
- NZS 4672:2007 - Steel pre-stressing materials
- NZS 4702:1982 - Metal-arc welding of grade 275 reinforcing bar
- NZS 4711:1984 - Qualification tests for metal-arc welders
- NZS 6701:1983 - Code of practice for road lighting
- NZS 6801:1999 - Acoustics - Measurement of sound
- NZS 6802:1991 - Assessment of environmental sound
- NZS 6803:1999 - Acoustics - Construction noise
- NZS 6803P:1984 - The measurement and assessment of noise from construction, maintenance and demolition work
- NZS 750:1984 - Specification for underground fire hydrants and surface box frames and covers
- NZS 7601:1978 - Specification for polyethylene pipe (Type 3) for cold water services
- NZS 8630:2004 - Tracks and outdoor visitor structures
- SNZ HB 44:2001 - Subdivision for people and the environment

- SNZ PAS 4509:2003 - New Zealand Fire Service Fire Fighting Water Supplies Code of Practice
- ISO 14713:1999 - Protection against corrosion of iron and steel in structures

BRITISH STANDARDS:

- BS 10:1962 - Specification for flanges and bolting for pipes, valves, and fittings
- BS 1010-2:1973 - Specification for draw-off taps and stop valves for water services (screw-down pattern). Draw-off tap and above-ground stop valves
- BS EN 1011.1:1998 & .2:2001 - Welding. Recommendations for welding of metallic materials.
- BS 1560-3.2:1989 - Circular flanges for pipes, valves and fittings (Class designated). Steel, cast iron and copper alloy flanges. Specification for cast iron flanges
- BS 5154:1991 - Specification for copper alloy globe, globe stop and check, check and gate valves
- BS 5896:1980 - Specification for high tensile steel wire and strand for the pre-stressing of concrete
- BS 6572:1985 - Specification for blue polyethylene pipes up to nominal size 63 for below ground use for potable water
- NZS/BS 5163:1986 - Specification for predominantly key-operated cast iron gate valves for waterworks purposes

NEW ZEALAND TRANSIT AGENCY SPECIFICATIONS:

- NRB/MANZ Code of Practice Design for Urban Streets
- NRB/NZ Counties Association: 1985 Guide to Geometric Standards for Rural Roads.
- TNZ Standard Specification F2:2000 - Subsoil drain construction.

- TNZ Standard Specification M1:2006 - Asphaltic Bitumen's
- TNZ Standard Specification M4:2006 - Basecourse Aggregate.
- TNZ Standard Specification M6:2004 - Sealing Chips.
- TNZ Standard Specification M10:2005 - Specification for Asphaltic Concrete
- TNZ Standard Specification P3:1995 - First Coat Sealing
- TNZ Standard Specification P4:1995 - Resealing.
- TNZ Standard Specification P9:1975 - Construction of Asphaltic Concrete Paving
- TNZ Standard Specification T1:1977 - Benkelman Beam Deflection Measurements
- Pavement Design- A guide to the structured Design of Road Pavements (Austroads 2004)
- NZ Supplement to the 2004 Austroads Pavement Design Guide Oct 2005
- Manual of Traffic Signs and Markings; Part 1 Traffic Signs; Transit New Zealand/ Ministry of Transport, 1992
- Manual of Traffic Signs and Markings; Part 2 Markings; Transit New Zealand/Land Transport Safety Authority, 1994
- TNZ Road Safety Audit Procedures for Projects Manual No. TFM9
- Austroads Guide to Traffic Engineering Practice AG- P11
- Austroads Pavement Design Manual – A guide to the Structural Design of road pavements AP-G17
- Clay Brick and Paver Institute Design Manual 1989

STATUTES:

- The Local Government Act 1974 and 2002
- The Resource Management Act 1991
- The Public Works Act 1981

- The Soil Conservation and Rivers Control Act 1941
- The Construction Contracts Act 2002
- The Plumbers Gasfitters and Drainlayer's Act 1976
- The Telecommunications Act 2001
- The Electricity Act 1992
- The Gas Act 1992
- The Building Act 2004
- The Health and Safety in Employment Act 1992
- The Environment Act 1986
- The Conservation Act 1987
- Climate Change Response Act 2002
- Energy Efficiency and Conservation Act 2000
- The Fencing Act 1978
- Land Drainage Act 1908
- Traffic Control Devices Rules 2004

OTHER DOCUMENTS:

- Wellington City Operative District Plan 27 July 2000
- Wellington Consolidated Bylaw
- Wellington City Council's Code of Practice for Working on the Road August 2006.
- Wellington City Council's Biodiversity Action Plan 2007
- Guide to Geometric Standards for Rural Roads, 1985, prepared by New Zealand Counties Association for the National Roads Board New Zealand.

- CBPI Design Manual 1, Clay segmental Pavements – A Design and Construction Guide for Sites Subjected to Vehicular and Pedestrian Traffic
- GWRC Publication Controlling problem weeds in riparian zones: Restore our riparian zones
- GWRC publication Fish-friendly culverts and rock ramps in small streams
- GWRC - Managing your bush block; a guide to looking after indigenous forest remnants in the Wellington region.
- Mark Davis & Colin Meurk Protecting and Restoring our natural heritage – a practical guide.
- Wellington City Council's Tree Preservation Guidelines
- Auckland Councils document TP131 Fish Passage Guidelines for the Auckland Region 2000.
- Department of Conservation 2000 Protecting and Restoring our natural heritage – a practical guide.
- Wellington City Council's Playgrounds Policy (December 2002)

DEFINITIONS

Unless the context indicates otherwise:

“ALTERNATIVE SOLUTIONS”	shall mean options that achieve the bottom line standards Council require. Council will consider alternative solutions that meet these bottom line standards and are fit for purpose. Previously these standards have been met with traditional techniques.
“APPROVED”	shall mean approved by the respective Council Representative.
“CHARTERED PROFESSIONAL ENGINEER”	shall mean a qualified Engineer registered as a current and competent practitioner within a specific field of engineering discipline under the Chartered Professional Engineers Act of New Zealand 2002.
“CONTRACTOR”	shall mean the party undertaking work for Council or the party whose quotation/tender has been accepted by the Council.
“COUNCIL”	shall mean the Wellington City Council.
“COUNCIL REPRESENTATIVE”	shall mean the delegated Council officer for that aspect of the development.
“DISTRICT PLAN”	shall mean the District Plan as defined by the Resource Management Act, 1991.
“EPHEMERAL STREAM”	a stream that flows only during and after rain events.
“INTERMITTENT STREAM”	a stream that runs above ground for only part of the year.
“RURAL” LAND	shall be defined by the District Plan.

“SUBDIVIDER”

shall mean either the person/s who are the registered proprietors of the land to be subdivided in terms of the Resource Management Act or in the case of development without subdivision shall mean the person/s who are the registered proprietors of the land in respect of which construction works are to be or a being undertaken.

“SUBDIVISION”

shall mean the Subdivision of land as defined in the Resource Management Act, Section 218.

“URBAN” LAND

shall be any land not defined as Rural.

PART A. GENERAL SUBDIVISION PRACTICE

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A.1 GENERAL

This Code provides a guide for development and subdivision in Wellington City. It integrates sustainable principles of land development intending to enhance water quality, minimise land disturbance, preserve native vegetation and minimise impervious surfaces.

The Council is committed to operating safe and efficient infrastructure systems. In line with our three-year priorities, we aim to increase the resilience of these systems to earthquakes and other natural disasters, including adapting to climate change. The Council's Wellington's Towards 2040 Strategy positions Wellington as an internationally competitive city with a strong and diverse economy, a high quality of life and healthy communities without compromising the environment. It will achieve the Towards Wellington 2040 Strategy goals through maintaining and developing smart and connected networks and by managing networks and resources prudently to ensure resilient and sustainable use. As such this Code contributes to achieve these goals through requiring engineering standards and best environmental practice for earthworks, open space, roading and stormwater.

This Code also incorporates the Regional Water Standard provisions for water and drainage assets; ensuring a consistent method of design and implementation of water services across the Wellington region.

Through requiring assets to be designed and built to engineering standards the Code provides the cornerstone of public health and safety. The provision of adequate potable water supplies and treatment and disposal of wastewater are not open to alternative solutions as these services must be compliant, as a minimum, with the following legislation;

- Resource Management Act 1991
- Building Act 1991
- Local Government Act 2002
- Land Drainage Act 1908
- Health Act 1956
- Soil Conservation and Rivers Control Act 1941
- Civil Defence Emergency Management Act 2002
- Health and Safety in Employment Act 1992

- Drinking Water Standards for New Zealand 2000

This Code has been written to complement the District Plan by providing more detailed technical standards necessary for the construction of subdivisions. Should there be a discrepancy between the District Plan and this Code; the District Plan shall take precedence.

The primary purpose of this Code is to provide a standard technical document for all users. It is intended for planners, designers and developers servicing the land development industry and for work done on behalf of the Council for asset construction, relocation, replacement and renewal.

The procedures and standards used for rural subdivisions shall be as for urban subdivisions, except as may be modified in the relevant chapters

An important component of the District Plan for subdivisions is the Subdivision Design Guide which provides guidelines for the design, layout and construction of subdivisions.

The intention of the Subdivision Design Guide is: to facilitate neighbourhoods that are liveable, sustainable, well-connected and safe, and that have a strong sense of place.

The Subdivision Design Guide promotes high quality living environments including the public settings and facilities which allow a sense of community to develop. It will promote implementation of low-impact, environmentally sustainable design, maintaining valued landscapes and natural features. It also aims to provide for walking and cycling and convenient access to local facilities including public transport.

Other guides that apply are the Residential Design Guide, the Centres and Business Area Design Guides, the Rural Area Design Guide and the various Central Area design guides. Not part of the District Plan, but also relevant are other design guides, such as including the Public Space Design Guide and Central City Framework.

The intention of the Rural Area Design Guide is to protect and enhancing rural character and amenity while also providing for sustainable rural living. It is intended that subdivisions and residential buildings will be:

- sensitive to the unique rural landscapes of Wellington
- environmentally sustainable
- attractive places to live, and
- efficiently integrated into the infrastructure networks

There may be instances where an objective can be best achieved by a means not anticipated by the Design Guides or this Code. In this situation, departure from the Design Guides or the Code is justifiable if it can be demonstrated that the proposed design solution better satisfies the associated design objective.

A.2 FEES AND DEPOSITS

Further to the financial contributions described in Section 3.4 of the District Plan, the Development Contributions Policy and the Resource Consent fees, the following fees are required in connection with the engineering development of the subdivision.

A.2.1 Inspection Fee

An inspection fee is required to cover the cost of Council inspections of the engineering plans, specifications and the works.

A.2.2 Extra Inspection / Supervision of Works

Where extra inspections may be desirable because of the magnitude of the works or where the Subdivider has not engaged the services of a Chartered Professional Engineer (civil or structural), or Registered Professional Surveyor, to supervise the work the Council may appoint and employ an Inspector for this purpose, and charge the costs of their services to the Subdivider.

A.2.3 Legal and Associated Costs

Any legal and associated costs in connection with the granting of drainage easements, caveats, the uplifting of same, dedication, laying off of under-width streets, declaration of public drains, etc.

A.2.4 Street Planting Costs

Where the Council are to plant a tree on behalf of the developer, the Council will require payment for provision, planting and maintenance of the street tree and/ or planting described in section C.4.1

A.2.5 Public Drainage Permit Fee

A Public Drainage permit fee is required where work is to be carried out on public drains (work on private drains is to be carried out under the Building Act).

A.2.6 Water Connection Fee

A water connection fee is required where a connection is required to a public water main.

A.2.7 Other Fees that may fall out of these machinations

Any and all other fees that may fall out of these machinations

A.3 QUALITY OF WORK

Plans and construction shall be designed, supervised and certified by suitably qualified persons in the related area of expertise.

The Council requires the design, construction and certification of any development to be overseen by a Chartered Professional Engineer (civil or structural), or Registered Professional Surveyor.

All drawings and plans submitted for approval must be in accordance with the current Wellington City Council Drawing and Asbuilt Specification.

A.3.1 Design Fieldwork

Although electronic data relating to Councils networks is available and is useful in the feasibility stage of a design, the final design shall be based on information confirmed by carrying out topographical surveys, levelling (in particular accurate manhole inverts) and field checks/investigation (i.e. manhole inspections).

A.4 ENGINEERING APPROVALS AND NOTIFICATIONS

The Approval and Notification of the appropriate Council Representatives is required at various stages of the subdivision.

The appropriate Council Representative and stages of the subdivision are summarised in Table 1.

Where notification is required, work on the next stage shall not commence until the Council Representative has been notified and had a 3 working day period to inspect the work.

Where an approval is required during the construction work an inspection will be made within 3 days, not including weekends or public holidays, or as soon thereafter as possible. On no account shall the next stage of construction commence until the work has been passed as being satisfactory.

Stage	Council Representative for:		
	<i>Roads and Earthworks</i>	<i>Drainage</i>	<i>Water</i>
Water right consent application		Approval required	
Proposed construction details	Approval required	Approval required	Approval required
Drainage permit		Approval required	
Initial commencement	Notification Required	Notification Required	Notification Required
Re-commencement (after a 6 month lapse of work)	Notification Required	Notification Required	Notification Required
Commencing Silt retention structures	Notification Required	-	-
Commencing Subsoil Drainage	Notification Required	-	-
Commencing earthworks	Notification Required	-	-
Obtain "Street Opening Notice" for trenching in existing road land	Notification Required	-	-
Completion of drains and water mains (prior to backfill)	-	Notification Required	Approval required
Completion of road subgrade	Notification Required	-	-
Completion of kerb and channel subgrade	Notification Required	-	-
Testing of drains / water mains	-	Approval required	Approval required
Connection to existing drains / water mains	-	Notification Required	Notification Required

Stage	Council Representative for:		
	<i>Roads and Earthworks</i>	<i>Drainage</i>	<i>Water</i>
Benkelman beam testing of basecourse	Approval required	-	-
Completion of footpath subgrade	Notification Required	-	-
Road surface preparation for sealing	Notification Required	-	-
Berm areas prior to soil and sowing	Notification Required	-	-
As Built Plans	Approval required	Approval required	Approval required
Final completion of subdivision	Approval required	Approval required	Approval required

Table 1: Summary of Engineering Approvals and Notifications.

A.5 DETAILS OF SUBDIVISION

Information to be submitted for the Resource Consent is covered in the District Plan Section 3.2.3. Details are also required prior to construction for Engineering approval and after construction for Council Asbuilt records.

A.5.1 Proposed Construction Details

As a minimum, the details required of any proposed construction are:

- a) Specifications for carrying out the work.
- b) Detailed calculations for pavement design, water main pipe size, stormwater and wastewater pipe sizes, together with associated supporting information where appropriate.
- c) The Name(s) and Employer(s) of the person(s) who will be supervising the construction work.
- d) An erosion and sediment control plan identifying sediment and erosion hazards and the proposed management controls during and post construction.
- e) A contact name and telephone number in case any emergencies arise in the course of the subdivision. Refer clause A.13.
- f) Sets of construction plans of the work as follows:

Roading plans	1
Earthworks plans	1
Drainage plans	2
Water supply plans	2
TOTAL NO. OF PLANS =	<u>6</u>

NOTE: Further construction requirements maybe required – refer to each chapter of this document.

For Earthworks, Roothing and Open Spaces: plans shall be drawn in accordance with the “Basic Plan Standards and Details” in Appendix A and shall include the following information:

- i) Earthworks – Extent and depth of cut and fill, surface and subsoil drainage, erosion and sediment control prior to, during and after construction.
- ii) Roothing – Formation, subgrade drainage, metalling, kerb and channelling, sealing, footpath construction, treatment of areas outside the carriageway.
- iii) Open space concepts including street tree planting proposal (individual trees or mass planted shrubs and trees) including plant species.
- iv) Vegetation and natural features – Any bush or other vegetation, landforms, outcrops, streams or other natural features
- v) Other Services – All power and telecommunication cables, lighting standards, gas mains and any of their ancillary works.
- vi) Existing services – All existing services (live and abandoned) not being altered shall be clearly shown by their location and depth.

For Drainage and Water requirements: refer to the Wellington City Council Design, Construction and As-built Documentation Specification.

A.5.2 Levels

Levels for all assets shall be in terms of the Wellington “New City Datum” (the same datum as Mean Sea Level (1953 Wellington Local Datum)¹). Levels shall be taken from an approved benchmark, unless written dispensation is granted by Council.

Approved benchmarks include the 94 Wellington City Council benchmarks and 250 LINZ survey marks (Survey Standards and Reference Marks), second order levelled, which can be used as approved benchmarks.

The applicant may apply to Council for a dispensation from use of an approved benchmark; where access to an approved benchmark is not possible or reasonable. In some instances the applicant may be required to establish a new benchmark – refer to Regional Standard for Water Services. If a written dispensation has been granted, levels may be taken from the invert of an existing drain, provided there is no significant drop in the manhole. The accuracy of any invert used under dispensation must be established before use.

Invert levels shall be calculated to at least two decimal places and shall be accurate to +/-20mm.

The Council requires the source of all data used for all designs and asbuilts to be documented on submitted plans and documents.

A.6 BASIC CONSTRUCTION PLAN STANDARDS AND DETAILS

A.6.1 Draughting standards: Earthworks and Roding

A.6.1.1 Drawing scales

The sheet size shall be A1, except a smaller size may be used for small jobs that fit on a single smaller size at the scales in Table 2.

¹ Tide levels listed in Tide Tables published by LINZ use a Wellington Standard Port zero datum equivalent to -0.915 m MSL or 3.002 m below bench mark K80/1 (LINZ code ABPB). The actual average measured sea level is currently measured at around 1.08 m above Wellington Standard Port datum or 0.17 m MSL (1953 Wellington Local Datum).

Plan Type	Plan Scales	Long section scales		Cross-section scales
		Horizontal	Vertical	
Proposed Earthworks Construction	1:500 or 1:200 or 1:100	-	-	-
Earthworks Asbuilt	1:500	-	-	-
Proposed Rooding Construction	1:500 or 1:200 or 1:100	1:200 or 1:100	1:50 or 1:20	1:200 or 1:100
Rooding Asbuilt	1:500	-	-	-

Table 2: Scales to be used in Plans

A.6.1.2 Line Sizes and Colour of Shading

Types of lines/and colour of shading to be used on plans are described in Table 3.

Feature	Line Type	Colour of Shading
Existing boundaries	Medium broken	
Proposed boundaries of new lots	Heavy continuous	
Existing 10m contour	Medium-fine continuous	
Existing 2m contour	Fine continuous	
Proposed 2m & 10m contours where formation is cut	Medium continuous	
Proposed 2m & 10m contour where formation is filled	Medium broken	
Perimeter of cut area	Fine dotted	Pale pink
Perimeter of filled area	Fine dotted	Pale blue

Table 3: Line sizes and colour of shading to be used

A.6.1.3 Plan Numbering

Plans shall be numbered and dated.

Amendments shall be numbered, dated and detailed.

Plans shall be clearly legible. Traditionally with hand drafting the minimum line/lettering thickness was 0.18 mm and the minimum height of lettering was 2.0 mm. Good modern printing systems can be legible with finer lines and lettering.

A.6.1.4 Plan Information

The following information is required on all plans:

- a) A North point.
- b) Existing and proposed boundaries.
- c) Positions and levels of control points or survey marks used in surveys shall be shown.
- d) Contours clearly showing the land formation. The contours shall be at appropriate vertical intervals (preferably not more than 2 m) covering all the land affected by the proposed subdivision. On small proposals, which do not involve earthworks, lesser topographic detail is acceptable.

A.6.2 Draughting standards: Drainage and Water

All drawings and plans submitted for approval must be in accordance with the current Wellington City Council – Drainage and Water Network Drawing and Asbuilt Specification.

A.7 AS-BUILT DETAILS

As-Built drawings are required prior to the issue of a Certificate of Practical Completion or a certificate under section 224(c) of the Resource Management Act.

Upon completion of work Council shall receive detailed As-Built drawings of all assets to be vested in Council, for water supply connections of any type to Council mains, cut and fill areas (including depths) and final land contours.

All drawings and plans submitted for approval must be in accordance with the Council's current Drawing and Asbuilt Specification.

As a minimum, the following items are required to be included on as-built plans:

- a) Council prefers documents to be submitted electronically.
- b) Full sized As-Built drawings can be supplied in AutoCAD (*.dxf or *.dwg), Microstation (*.dgn) or other agreed electronic format on CD.

c) There may be circumstances where hardcopy paper drawings can be supplied or desirable – prior approval will be required in these circumstances. In these situations drawings shall be completely legible, clean, unfolded and legible.

d) If not electronically submitted the number of paper plans of the As Built work required are as follows:

Roading plans	1
Earthworks plans	3
Drainage plans	2
Water supply plans	3
TOTAL NO. OF PLANS	<u>9</u>

e) Drawings are to be the following scales:

Roading: 1:500 scale

Drainage & Water: refer to Wellington City Council Drawing and Asbuilt Specification – Water & Drainage

f) General information to be shown on asbuilts includes:

- A north point
- Drawing title
- Property boundaries
- Plan scale(s) and date
- Lot numbers and house numbers
- Appropriate legend
- House / building locations - where appropriate
- Kerb lines
- Name of premises served – if known
- Name of company and person who prepared the asbuilt plans

g) All co-ordinates shall be in terms of New Zealand map grid, NZTM (New Zealand Transverse Mercator), to $\pm 0.1\text{m}$.

h) All levels are to originate from a city bench-mark.

i) Construction plans are not acceptable as as-built plans.

j) Long sections shall be drawn with the high point of the drain on the right side of the sheet.

- k) All horizontal distances from adjacent property boundaries are to be measured to ± 0.1 m.
- l) Each service or feature shall be distinguished by a different legend as shown on the Standard Engineering Detail Sheets.

Also to be submitted with the as-built plans are;

- Detailed drawings at appropriate scale of all structures requiring a drawing for the structure to be built. Examples are: headwalls, overflows structures, pump stations, valve chambers, secondary intakes, retaining walls. These drawings shall include reinforcing drawings if appropriate. Detail drawings may be a copy of the construction drawings amended as appropriate.
- All relevant design calculations.
- Comments/information about ground conditions encountered
- Digital photographs may be submitted with the as-built, cross referencing the position of the camera, date and photographers name.
- Date of installation or construction for all assets and their components.
- Maintenance manuals, plans and/or guarantees for assets and their components, particularly street furniture.

Where Roding, Drainage or Water Supply services have been constructed a certificate shall be supplied stating the following:

- The New Zealand map grid co-ordinates of all water and drainage service covers and survey marks: these shall be also shown on the plans.
- Existing services – All existing services (live and abandoned) shall be clearly shown by their location and depth.
- That all services have been constructed in accordance with Council's Code of Practice for Land Development.

The plans shall be drawn in accordance with the "Basic Plan Standards and Details" in Appendix A.

NOTE: Each section further details asbuilt requirements for each specific asset, under Asbuilt Requirements.

A.8 CERTIFICATION

A drainage permit will not be issued until construction plans have been approved. In the case of subdivisions, Section 223, 224C will not be given until asbuilts have been received and approved.

As-built drawings shall be certified as being accurate and within acceptable engineering and survey tolerances by a Chartered Professional Engineer or Registered Professional Surveyor. This certification will be required of all completed work.

The survey work and preparation of as-built plans shall be carried out by the subdivider.

The receipt and Council's acceptance of as-built plans does not absolve the developer of any responsibility for their accuracy. In the event of an asset detail not being provided or incorrect, or an asset not being in the position shown on the as-built plan, it shall be the responsibility of the developer to provide or locate the asset for the owner of the property. Any work initiated by Council to rectify problems arising will be at the expense of the developer.

For minor works associated with development, the Council will accept as-built plans, of suitable quality, from registered drain layers and /or technically qualified persons.

A.9 RESOURCE CONSENTS

There shall be no diversion or piping of watercourses / streams (including small and ephemeral streams) or discharge into them, or damming of them without resource consent as required in Greater Wellington Regional Council's Regional Freshwater Plan.

A.10 TESTING

All testing except for the water reticulation pipe line test shall be arranged and paid for by the Subdivider.

All work required to be tested and approved shall have been pre-tested by the Subdivider and proved to be satisfactory before the request is made for official testing.

A.11 CONNECTION TO EXISTING ROADS AND SERVICES

The connection to the existing water main will be carried out by the Council at the Subdivider's cost. In some instances the Council may allow the Subdivider to make the connection.

The Subdivider shall give the respective Council Representative five working days notice of their need to connect to any public drains or water mains. The connections will be permitted only after the new reticulation has passed the necessary testing.

Where the underground services extend into the existing road corridor the work must be carried out in accordance with the WCC Code of Practice for Working on the Road. This will require a Road Work Notice to be obtained and associated fees paid.

A.12 SURVEY MARKS

Survey marks shall be provided in the kerb. The distance between them not exceeding 50 metres.

The marks shall be galvanized iron bolts with a head diameter of 25 mm, and a minimum length of 100mm.

These survey marks are primarily for reference to underground services and to locate the kerb in terms of the New Zealand map grid co-ordinates; NZTM (New Zealand Transverse Mercator)

Care is to be taken to preserve or relocate all survey marks and height control bench marks.

A.13 RETICULATION OF UTILITY SERVICES

A suggested position for these services in road land is shown in drawing No.R-2-704 in Appendix C.

Where possible services shall not cross over lots other than the one served.

Further to the provision of wastewater and stormwater drainage and water reticulation services, arrangements shall be made to reticulate the power, gas and telecommunication, including ultra fast broadband, services of all interested Utility Operators to all lots created.

For road lighting power reticulation refer to Section C.4.2.

A.14 CONFIRMATION OF UTILITY SERVICES

All utility service authorities / owners shall be contacted at the start of the design process to establish the location of any / all services within the design area.

If a service authority has services in the design area, copies of their service plans are to be obtained. Any services near the proposed design area are to be shown on the proposal plan.

There shall be a minimum clearance of 300mm vertical and horizontal between a public drain and other services.

The accurate position of services which are potentially in conflict with the network shall be confirmed as part of the design process; by digging test holes and /or using ground penetrating radar, depth finding locators etc.

A.15 CONSULTATION WITH UTILITY AUTHORITIES

Prior to submitting a design to Council; utility authorities / owners, of services within the design area, are to have been consulted to gain their clearance. They may have requirements for working near their service or additional information.

If a conflict has been established there may need to be further consultation to discuss modifying or shifting of a service – this shall be carried out as part of the design process.

The consultation is to include the option of the service authority amending their utility service during construction.

A.16 DAMAGE

The Subdivider shall immediately make good any damage caused by their work whatsoever unless approved otherwise by the Council Representative.

A.17 INSURANCE

Where work is to be carried out on a dedicated road or other land not owned by the Subdivider, the following insurance provisions shall apply.

- a) The Subdivider shall be responsible to ensure that Public Liability insurance is arranged in the joint names of the Subdivider and the Council, for a minimum amount of \$2,000,000 indemnifying the parties in respect of any one claim or series of claims arising out of the same occurrence.
- b) The policy shall be extended to cover all insurable risks normally applicable to subdivision work and including vibration and removal of support.
- c) The policy shall have attached either:
 - i) A cross Liabilities/Joint Insured clause or,
 - ii) Appropriate wording which states that the policy will be construed as though a separate policy had been issued to each of the joint insurers.

A.18 EMERGENCY PROCEDURES

If during the course of construction works any situation arises where the security of public or private property, or the operation of any public facility is endangered, the Subdivider must take action to rectify the situation immediately.

A.19 SITE TIDY UP

Upon completion of the work, the Subdivider shall leave the site in a clean and tidy condition.

This includes the following:

- a) Carriageways and footpaths are to be swept clean of all loose material
- b) Kerb and channel and stormwater sumps are to be clean.

Any other incidental rubbish is to be removed from the site.

A.20 MAINTENANCE PERIOD

The Subdivider shall be responsible to repair any deficiencies that are due to the negligence of the Subdivider or their Contractors.

The Subdivider shall also be responsible to rectify any part of the water reticulation system that does not perform up to normal standards as described in this Code.

In addition to the above the Subdivider shall maintain the other aspects of the works for a period of 24 months. Except for street planting, which are subject to a 3 year maintenance period.

PART B. EARTHWORKS DESIGN AND CONSTRUCTION

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OBJECTIVES

Earthworks are the removal, relocation or deposit of earth (which includes any substance constituting the land such as soil, clay, sand and rock) from a natural or constructed land formation. Topsoil stripping, turf farming, ground cultivation and quarrying are excluded from the definition of earthworks.

The objective of this chapter of the code is to ensure the following criteria are achieved:

- stability of land,
- geotechnical soundness and resilience of any development,
- control of the sediment generated by the works,
- restriction of erosion and run off from the works,
- control of the amount of sediment entering receiving environments,
- control of surface water flows both during and after construction,
- no undue nuisance from silt, dust, noise or disposal of vegetation,
- preservation of the natural land form and its features.

Developers shall comply with the earthworks provisions in the District Plan and the provisions of the Subdivision Design Guide. It should be noted that this may have an impact on the extent of earthworks which may be permitted.

B.1 DESIGN BASIS

The design and construction of mass earthworks shall be in accordance with the requirements of NZS 4431:1989, "Code of Practice for Earth Fill for Residential Development" guided by, but not limited to NZS 4404:2010 Land Development and Subdivision Engineering and SNZ HB 44:2001, Subdivision for People and the Environment.

All works shall have regard for the following GWRC documents especially when watercourses and / or large scale earthwork are involved;

- Regional Freshwater Plan
- Regional Plan for Discharges to Land
- Regional Soil Plan
- Regional Air Quality Management Plan

B.2 SILT, SEDIMENT, EROSION AND STORMWATER CONTROL

Erosion and sedimentation are two related processes:

- Erosion is the wearing away of the land surface by running water, wind, ice, or other agents, including processes such as gravitational creep. Any reduction of erosion will reduce the quantity of sediment generated.
- Sedimentation is the settling of sediment out of the water column as a result of sediment entering waterways.

Erosion and sediment control measures are used to minimise the effects of earthworks on receiving environments.

Principles of Erosion and Sediment Control;

1. Appropriately integrate the development into the site.
2. Integrate erosion and sediment control issues into site and construction planning.
3. Develop effective and flexible Erosion and Sediment Control (ESC) Plans based on anticipated soil, weather and construction conditions.
4. Minimise the extent and duration of soil disturbance.
5. Control water movement through the site.
6. Minimise soil erosion.
7. Promptly stabilise disturbed areas.
8. Maximise sediment retention on the site.
9. Maintain all ESC measures in proper working order at all times.
10. Monitor the site and adjust ESC practices to maintain the required performance standard.

A significant reduction in erosion on a site will result in less sediment being generated, requiring treatment and/or lost through the control measures than if reliance is solely placed on sediment control.

The erosion of soil and sediment from vegetation and earthworks is a problem throughout the Wellington Region.

All projects involving land disturbance should incorporate erosion and sediment controls as an integral part of land development. Activities in waterbodies require a range of control measures.

Adequate approved erosion and sediment controls shall be in place before earthworks commence, be maintained during the construction and only be removed once the site is fully stabilised to protect it from erosion.

Due to the increased rate of runoff brought about by the removal of vegetation and earthworks particular care must be taken to control surface water including stormwater.

Muddy or dirty water must be captured and treated before it drains into any watercourse or stormwater system.

Silt and sediment entering a waterbody can cause problems several kilometres downstream. The most obvious being colour change. Sediment can change flow patterns, cause flooding and also affect the health of aquatic ecosystems by smothering insects and other creatures.

It is required that best management practices are in place during the construction period of the development, including at site entrances and exits, to control all dust, silt and sediment generated by the works as to not discharge and cause nuisance away from the site or enter a water body or to Councils stormwater system.

To reduce the risk of erosion, the maximum area of vegetation stripped land being earthworked at any one time (including both cut and fill areas) must be kept to a minimum.

Land must be stabilised be it through revegetation or sealed as soon as possible.

All earthworked surfaces must be hydro-seeded as soon as practicably possible. No bare earth shall be left exposed longer than absolutely necessary.

Appropriate controls must be in place to cope with anticipated run off when the land is exposed to erosion. This must include suitable controls over any stockpiled topsoil or other fill material.

Adequate measures must be taken during the construction period to prevent excessive water logging of surface materials yet to be worked and to prevent fill material from being eroded and re-deposited at lower levels.

Greater Wellington Regional Council's documents, "Erosion and Sediment Control Guidelines for the Wellington Region" (September 2002) and "Small Earthworks: Erosion and sediment control for small sites" (June 2006), shall be used as guidelines.

B.3 DUST CONTROL

All areas of major dust source including roads shall be kept damp during dry periods, or hydro-seeded in advance of anticipated dry periods, to minimise public nuisance from dust.

B.4 SITE PREPARATION

Reference must be made to Greater Wellington Regional Council's Erosion and Sediment Control Guidelines for the Wellington Region before any earthworks are commenced.

Before any earthworks commence Site Management Plans which include plan drawings, timelines and layouts must be produced to the satisfaction of the Council. These are to be updated regularly with the details of the controls that are in place, and must be available upon request. All areas of cut and fill should be clearly defined in the Site Management Plans and marked on site.

It is favoured that a combination of control measures are investigated and used for optimum management of erosion and siltation. Adequate provision should be made for the control of erosion, surface water runoff and siltation prior to, during and after construction, as covered in section B.2 "Silt, Sediment, Erosion and Stormwater Control".

Avoid earthworks during autumn and winter. Avoid vegetation clearance during wet periods (between May and August in Wellington)

Large projects shall be programmed for earthworks in self contained stages which can be largely completed within one earthworks season.

Adequate fencing or barriers should also be provided around trees or other features that are to be protected.

Earthworks shall only commence after permission is granted from Council.

The site is to be adequately fenced / barricaded to safeguard other persons and private (or public) property both above and / or below the site and to prevent sediment from leaving the site.

All rubbish, vegetation, debris etc., must be removed from earthwork areas prior to topsoil stripping.

All earthwork areas must be stripped of all topsoil and any soft or organic material.

Special care should be taken to ensure that organic materials and areas of old uncompacted fill are not overlain by other soils.

Stripping shall be carried out as a specific operation with areas being stripped in large enough increments to ensure that there is an adequate margin of stripped ground beyond any current cutting or filling operation.

All stripped material must be deposited in temporary stockpiles or permanent dumps, in locations where there is no possibility of these materials being unintentionally covered over or incorporated into structural fills.

Stockpiles and building materials must not be stored on the footpath or within the road reserve without permission from Council.

All temporary stockpiles must be covered with tarps or similar to minimise losses.

Stockpiles must not be located within an overland flow path.

B.5 SITE WATER MANAGEMENT

You can control surface water flows using swales, ponds, perimeter bunds, pipes or pumps.

Where possible, the permanent stormwater system should be designed so it can be constructed at an early stage in the project and be used to collect runoff from the site during construction in conjunction with silt and sediment control measures. This includes creating ponds for sediment control during construction which are used for on going stormwater quantity and quality control after development.

Where surface water could erode batters or affect their internal instability through soakage into the soil, open interceptor drains shall be constructed in permanent materials. Benches in batter faces shall be sloped back and graded longitudinally to reduce spillage of stormwater over the batter.

Water from stormwater systems shall not flow into a fill or onto ground near the toe or sides of fill or cut batters.

To prevent the problems of surface springs, scouring at the toe of fills, and saturated soil stability problems, it is essential that permanent subsoil drains be constructed in the valley floor and to other potential wet areas prior to fill being placed.

These drains shall be constructed as a public drain in accordance with Section D.

B.6 FILL BATTERS

All fill batters shall be not steeper than 2 horizontal to 1 vertical with a bench of a minimum width of 2 metres every 8 metres of vertical height, with a fall inwards of 1 in 10 and longitudinally along the bench of 1 in 100 minimum to 1 in 20 maximum discharging to a point clear of the filling in such a manner as to prevent scouring. The top or toe of the batter shall be at least 3 metres from a boundary or building. This is in accordance with NZS4431: 1989 Code of Practice For Earth Fill For Residential Development.

Fill batters steeper than this will require specific design, e.g. high strength rockfill, reinforced earth.

The top edge of batters shall also be at least 1 metre from the kerb face or back edge of sealed path or 2 metres where it is anticipated that individual paths will be cut down the batter. The total height of fill batters shall generally be not higher than 15 metres.

B.7 FILL MATERIAL

The quality of fill material shall be checked for suitability before the placing of fill commences.

The majority of soil types, other than organic materials, are potentially suitable for fillings under controlled conditions. However, because some clay soils are likely to undergo shrinkage and swelling when subjected to seasonal or other changes in water content, special examination of swelling and shrinkage characteristics shall be made in the case of highly plastic soils.

B.8 COMPACTION OF FILL

Fill shall be placed in a systematic and uniform manner with near horizontal layers of uniform thickness (not greater than 225 mm) of material being deposited and compacted progressively across the fill area.

Before any loose layer of fill is compacted, the water content shall be suitable for the compaction required and shall be as uniform as possible.

Fill batter faces should be compacted as a separate operation, or alternatively, overfilled and cut back.

Where testing shows that the compaction achieved is below the specified minimum, all material represented by the test shall be further compacted or removed as necessary and re-compacted, until the required standard has been met.

Any compacted layer which has deteriorated after an interruption in the earth moving operation shall be re-compacted before further material is placed over it.

The minimum acceptable dry densities shall be as shown in *Table 1: Minimum Acceptable Dry Densities*.

Position of fill	Minimum acceptable dry density (As a percentage of the Maximum Dry Density ²)
Within 0.6 metres (vertical measurement) of the road subgrade and extending to the outer edges of the footpaths.	100
Within 1 metre (vertical measurement) of the finished surface of all fill areas and within 3 metres (horizontal measurement) of all batter faces.	97
Elsewhere in the fill	95

Table 1: Minimum Acceptable Dry Densities

If cohesion-less soils are encountered and another test method would be more appropriate NZS 4431:1989 shall be used as a guide.

B.9 INSPECTION OF FILL

Visual inspections shall be made and documented for inclusion with the application for Council certification under the RMA.

Work is to be signed off by the Council at least at the following times:

- a) After any part of the existing ground has been finally stripped and prepared and before the placing of any fill on that ground,
- b) After any drain has been installed and before the drain is covered by fill,
- c) Such other times as the Engineer considers necessary to enable an assessment of the general standard of earthworks and to be reasonable satisfied that:

² The maximum dry density shall be determined by NZS 4402 Test 4.1.1 except that the soil water content shall be adjusted directly from the material water content to the compaction water content without prior drying.

- i) Fill is not placed over soft or organic material
- ii) All areas of existing ground showing seepage or potential seepage emission have relief drains provided
- iii) Unsuitable material is not incorporated into the fill
- iv) The compaction operations are systemic, the moisture content of the fill material appears on visual inspection to be suitable and the degree of compaction appears to be consistent and satisfactory.

B.10 TESTING OF FILL

Testing shall be carried out and documented with respect to the following considerations and in accordance with the following times:

- a) During the construction of earth fills some or all of the following quality control tests shall be made on the fill material:
 - i) Tests to determine whether the moisture content is suitable for the type of material being used to achieve optimum density
 - ii) In-situ density tests to determine whether the degree of compaction is up to the specific minimum
 - iii) Where appropriate, test to determine the maximum dry density for the soil tested in each in-situ field density test.

- b) Once the filling work is progressing as a steady and acceptable operation with uniform construction methods the minimum frequency of control testing shall generally be one in-situ density test (or equivalent) for each 2,000 m³ or 1.0 m lift of fill.

However, testing shall be more frequent under any of the following circumstances:

- i) During the first 4,000 m³ of filling carried out on the project
- ii) On the final layer of not less than 1.0 m depth
- ii) When soil type or conditions are variable
- iv) When there is any doubt about the adequacy of construction methods or soil properties

- v) When relatively small quantities of fills are concentrated in localised areas or placed discontinuously over a long period of time.
- c) The location of tests shall generally be in a random manner to cover the whole area of the fill.
- d) All field and laboratory test data shall be recorded in a systematic manner that will allow the results to be identified and allow the calculations to be checked at a later date, if necessary. All control tests results shall have recorded the time, date, location and reduced level. Test results relating to sections of fill that have been subsequently removed or reworked and recompacted shall be noted accordingly.
- e) All field and laboratory test data shall be provided with the application for Council certification.

B.11 CUTS

Cut batters shall be stable except for minor fretting and shall generally be not steeper than 1.0 horizontal to 1.5 vertical with a minimum width of 2.0 metres benching every 8 metres of vertical height. Steeper cut batters are generally not acceptable.

An area shall be provided at the top of cut batters that are steeper than 1 to 1 for the softer surface material to be cut back to a 1 to 1 batter.

The extent of this area shall be as follows:

- a) 1 m for batters up to 5 m in height
- b) 2 m for batters between 5 and 10 m in height
- c) 3 m for batters between 10 and 20 m in height

The top or toe of a cut batter shall be at least 2 metres from a boundary or building.

Buildings at the top of a cut batter shall be beyond a 45° line from the toe of the batter and buildings at the toe of a cut batter shall be beyond a 45° line from the top of the batter or side of the hill unless there is adequate walling or a qualified engineer certifies otherwise. The toe of a cut batter shall also be at least 0.3 metres from the kerb face or back edge of sealed footpath but additional allowance may be required for sight distance on a curve.

Cut batters shall generally be not higher than 20 metres, but if required, higher batters will be given special consideration and will require geological investigation.

B.12 WALLS

All walls will require specific approval of the Council before construction, whether or not a Building Consent is required for the work.

All wall structures shall be designed for a 50 year or indefinite life period. All wall structures shall meet the New Zealand Building Code requirements for their design life.

Any sea walls shall be designed and constructed with future sea level rise taken into consideration.

B.13 LOADING AND SPILLAGE

All loading shall be carried out on the Subdivider's land.

Special measures shall be taken to keep the streets safe and clear of mud and debris.

Adequate washing facilities or properly designed vehicle rumble pads shall be provided at all times on the construction site so that all vehicles are free from mud and debris when they pass onto the public streets. Where considered necessary properly formed, sealed or paved exit ways shall be constructed from the washing-down facilities to the public streets.

Any wash water, or other muddy water, must not be discharged to the stormwater system or waterbody without effective pre-treatment.

B.14 HOURS OF WORK

The normal working hours for the carrying out of the earthworks on the site and the transport of excavated material from the site, are to be limited to:

- Monday to Saturday 7:30am to 6pm

- Quiet setting up of site (not including running of plant or machinery) may start at 6.30am
- No work is to be carried out on Sundays or public holidays.

These hours are taken from NZS 6803:1984 Acoustics: Construction Control. The measurement and assessment of noise from construction, maintenance and demolition work, which will also apply.

Where the noise is unlikely to cause a nuisance the Council may give approval to extend the hours of work. This approval will lapse should a nuisance be caused.

B.15 DURATION OF EARTHWORKS

The work shall be programmed so that the duration of earthworks, between commencing and finishing, on any one stage/area shall not exceed six months.

B.16 PLANTING

Areas of fill including batters and areas of cut but not including cut batters shall be prepared with topsoil. Minimum depth for topsoil is 300mm. This will depend on soil and species to be planted.

Those areas along with any other areas that have been disturbed, including cut batter faces, shall then as a minimum be sown or preferably hydro-seeded with grass as soon as a satisfactory strike is achieved.

Ideally the site will also be planted with native species. See section F for guidance on this matter.

Weeds must be controlled in an appropriate manner. Advice must be sought from Council for the best methods of control. Any spraying should be kept to a minimum near stormwater treatment devices, water courses and riparian margins.

Specific planting may be required for certain locations e.g. riparian planting in drainage situations and adjacent to open space. See section F.1 for guidance on this matter.

B.17 CERTIFICATION OF SUITABILITY OF EARTH FILL

The Council requires certification of suitability of earth fill for residential development. Certification must be submitted and approved by the Council upon completion of the earthworks – refer to appendix B for a copy of certificate.

B.18 AS-BUILT REQUIREMENTS

Council requires the following information concerning earthworks construction.

- 1) Extent and depth of fill in the form of lines joining all points of equal depth of fill at appropriate vertical intervals of 1 metre or as appropriate.
- 2) Plans shall also show the type of fill material and any areas where buildings or foundations will require specific design together with any fill areas of low density not complying with this Code.
- 3) The position, type and size of all subsoil drains and their outlets shall also be shown.
- 4) Where earthworks have been carried out a certificate of land suitability for residential development shall be supplied along with a report of the inspections and testing carried out. A recommended form of the certificate, Standard Form A/1, is in Appendix A. The type of residential development that earth fills shall be capable of properly supporting are residential buildings of timber or concrete block work conforming with the requirements of NZS 3604 or NZS 4229.

Dimensions and other information relating to the earthworks shall be provided.

PART C. ROAD DESIGN AND CONSTRUCTION

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OBJECTIVES

The objectives of the Roothing chapter of this Code are:

- To achieve a sustainable, efficient, safe and appealing roading corridor which maximises the needs of road users, including cyclists, pedestrians, carriers of goods, adjoining property owners, utility companies and other service providers,
- To ensure transport routes are physically resilient to natural and major disasters,
- To increase public amenity through provision of landscaped street environments, and the provision of street furniture,
- To support the Council's operative Transport Strategy which aims to provide a highly efficient interconnected road and street system that is easy to use, cyclist and pedestrian-friendly while minimising any adverse environmental effects associated with the activity.

GENERAL PERFORMANCE CRITERIA

Any constructed road needs to:

- be appropriate for its position in the road hierarchy,
- be of sound structure,
- provide a suitable skid resistant, waterproof running surface for traffic,
- manage surface and subsoil water so that long term pavement performance is assured
- minimise the area of impermeable surfaces associated with roading.

Having regard for the following criteria:

- limit the on-going maintenance costs of assets,
- provide for stormwater drainage and utility services,
- be durable and robust.

Provided the previous criteria are met, alternative, low impact design solutions, including permeable paving and swale use, may be proposed with appropriate engineering detail that will enable the Council to assess the viability of the proposal.

The Council's operative Transport Strategy identifies the development of a Travel Demand Management (TDM) Plan as a key priority. The TDM Plan aims to control road congestion, improve the performance of the city's transport system and moderate road space demand at peak times. A combination of measures has been adopted, including improving public transport priority, improving walking and cycling networks and travel behaviour change initiatives.

Any development that links into or impacts on the Council's existing assets (roading, footpath, drainage etc) must not be based on the premise that the Council's assets can be reconfigured to satisfy the requirements of the development. It is essential that the developer surveys the lines, levels and other relevant characteristics of the Council's affected assets in the vicinity and determines how the development will best connect with these assets, without requiring alteration to the Council's assets.

Except where the Council has planned works for the area which will modify the existing assets configuration, the existing footpath, kerb, channel, and carriageway levels, lines, crossfalls and gradients will need to be measured and documented, and the development designed to accommodate them. Where the Council has plans which will alter the layout of its assets, then the developer shall collaborate with the Council to accommodate these plans.

It is unacceptable to expect users of the Council's assets to be compromised in the interests of the new development.

C.1 ROAD DESIGN

C.1.1 Road categories

There are two main classes of road:

- 1) **Primary roads** – roads where the through vehicular flow is dominant,

Primary roads include:

- Motorways and State Highways - refer to C.1.1.1
- Arterial Roads – refer to C.1.1.2
- Principal Roads : including Central City Streets, Suburban Shopping Streets and Central City Shopping – refer to C.1.1.3 and C.1.1.4

- 2) **Secondary roads** – roads where the vehicular distribution and access function dominates.

Secondary roads include:

- Collector roads, residential or industrial – refer to C.1.1.6,
- Sub-collector roads, residential or industrial – refer to C.1.1.7,
- Local roads, residential, rural or industrial; and cul-de-sacs – refer to C.1.1.8
- Service lanes – refer to C.1.1.9
- Private ways, including rights-of-way – refer to C.1.1.10 and C1.1.11
- Access paths and Amenity tracks – refer to C1.1.12 and C1.1.13
- Rural Roads – refer to C1.1.14

NOTE: The principle of the road classification is that no street should be directly connected to a street more than two levels above or below it.

C.1.1.1 Motorways and State Highways

Motorways and State Highways have not been included in this Code, as they require specific design.

C.1.1.2 Arterial Roads

A high standard road designed to carry long distance through traffic.

Access is generally restricted, and direct access to property and parking on the carriageway is discouraged.

Where parking is allowed this should be provided on separate parking lanes or adjacent service streets.

C.1.1.3 Principal Roads

Principal roads provide access to arterial roads and to motorways.

They have a dominant through vehicular movement and carry the major public transport routes.

Access to property may be restricted and rear serving facilities may be required. Long distance vehicular traffic should be channelled on to arterial roads.

Parking is provided on separate parking lanes.

C.1.1.4 Central City Streets

Golden Mile

The Golden Mile is the main central city shopping street providing the main bus route through the central city and is the area of maximum passenger demand.

Other traffic may use most of the route for servicing, parking access and local traffic circulation. High priority is given to pedestrian amenity.

Shopping Streets

Shopping streets are inner city streets, not the golden mile, providing a primary retail function.

Priority is given to pedestrian access, to parking and to local traffic circulation/servicing.

Business Streets

Business streets are inner city streets providing primarily a business/commercial function.

Priority is given to frontage parking and servicing where this cannot be provided off street.

Traffic function is important also, where the street is an arterial or principal road.

C.1.1.5 Suburban Shopping Streets

Suburban shopping streets are lengths of Suburban Street whose primary function is to provide frontage shopping facilities.

It may be located on a principal, collector or local road.

Priority is given to a safe and convenient pedestrian environment.

Street parking is maximised as far as practicable.

High standard facilities are to be provided for public transport where the shopping street is on a bus route.

The street should be appropriately calmed and through traffic speeds managed.

C.1.1.6 Collector Roads

Residential collector roads distribute the vehicular traffic between and within local areas and form a link between principal roads and secondary roads.

Residential collector roads are permitted to serve up to 500 household units for a journey to the Wellington CBD.

Where residential development continues in an area that requires a collector road to serve more than 500 household units (both existing households and the new development) then additional collector roads must be provided to access the residential area.

Industrial collector roads serve the same function in industrial and commercial areas.

C.1.1.7 Sub-collector Roads

Residential sub-collector roads distribute the vehicular traffic within the local areas and form the link between collector roads and local roads.

Residential sub-collector roads are permitted to serve up to 150 household units for a journey to the Wellington CBD.

Where residential development continues in an area that requires a sub-collector road to serve more than 150 household units (both existing households and the new development) then additional sub-collector roads must be provided to access the residential area.

Industrial sub-collector roads serve the same function in industrial and commercial areas.

C.1.1.8 Local Roads Including Cul-de-sacs

Local roads have the primary function of providing direct access to properties fronting the road and through which only traffic having origin or destination in that locality there will pass.

Pedestrian and local amenity values are predominant.

No provision for separate parking is made; traffic lanes may be shared with parked vehicles.

“Short cul-de-sacs” are up to 100m long. “Long cul-de-sacs” are generally between 100m and 200m long.

C.1.1.9 Service Lanes

Service lanes are for the purpose of providing side or rear access for vehicular traffic to any land from principal to sub-collector roads in industrial or commercial areas.

When their construction has been completed they may be made into private rights-of-way.

No parking or pedestrian facilities provided.

C.1.1.10 Private ways

Private ways include rights-of-way, access lots and private driveways; which provide access over private land to private property, are not in the ownership of the Council and to which the public does not have access.

Management and up keep are the responsibility of the owners.

C.1.1.11 Access Paths

Access paths are footpaths providing pedestrian access between two or more public streets or a high/low level footpath parallel to a public road.

It may service a number of properties along its length.

C.1.1.12 Amenity Tracks

Amenity tracks are pedestrian access ways that are predominantly for pedestrian access to reserve areas.

C.1.1.13 Rural Roads

Rural roads are within the area designated "rural" on the District Plan.

Primary function is to provide access to rural properties.

Parking provision, footpaths, and street lighting are not normally required if both residential areas are distant, and individual properties are few or large.

C.1.2 Road Widths

Carriageway and road reserve widths and gradients shall be provided in accordance with Table 1: Road Widths.

Design of all roadways and intersections shall allow for the safe movement of the design vehicle.

The minimum road and carriageway widths for different types of road are shown Table 1, below. The table also makes allowances for the widths required for cycle lanes.

All berms, kerb extensions and traffic islands shall have sufficient space to allow positioning of necessary signs and other street furniture for adequate vehicle clearance.

Alternative solutions which increase permeability of areas used for parking, without compromising widths prescribed in Table 1, will be considered.

Some variation in the road boundary to boundary width may be required to accommodate the street planting, increase permeability, allow filtration and increase retention time of road runoff. This will also increase pedestrian amenity.

Carriageways and footpaths shall be widened at local shopping areas where possible for additional parking and pedestrians respectively.

Carriageways shall also have a minimum width on bus routes, refer Section C.1.5.

Vehicle Category		No. of units served	Traffic volumes (vpd)	Design Speed (km/h)		Road reserve width(m)	Min carriageway width (m)					Footpath number and width (m)	Berm (m) ⁶	Min/max gradient	Normal camber	Max super elevation		
District Plan Classification	Infrastructure Classification			Flat or rolling	Hilly		Parking ³	Traffic	Cycles ¹	Bus lane	Total							
Primary	Motorway	Motorway	Specific design															
		State Highway																
	Arterial Road	Arterial	>500	>7000	50	50	33	2 x 2.5	1 x 2.0 ² 4 x 3.5	2 x 1.5		24	2 x 2.5	4 x 1.0	5% max. 0.4% min	3%	8%	
	Principal Road	Principal	>500	3000-7000	50	50	25	2 x 2.5	1 x 2.0 ² 2 x 3.5	2 x 1.5		17	2 x 2.0	4 x 1.0	6.7% max. 0.4% min	3%	8%	
	Principal	Central City Golden Mile											Specific design	2 x 5.0	Specific design			
		Central City Business												2 x 3.0				
		Suburban Shopping Street												2 x 4.0				
		Central City Shopping												2 x 4.0				
Secondary	Collector Road	Collector	Residential	150- 500	1000-3000	50	40	22	2 x 2.0	2 x 3.5	2 x 1.50		14	2 x 2.0	4 x 1.0	10% max 0.4% min	3%	8%
			Industrial/commercial	>40	>1000			22	2 x 2.50	2 x 4.50	0		14	2 x 2.0	4 x 1.0		3%	8%
	Sub-collector Road	Sub-Collector	Residential	75-150	500- 1000	40	40	18	2 x 2.0	2 x 3.5	0		11	2 x 1.5	4 x 1.0		3%	7%
			Industrial/commercial	-	200 -1000			19	2 x 2.50					12	2 x 2.0		2x1.0 2x0.5	3%
		Local	Residential	40-75	250 - 500	40	40	18	2 x 2.0	2 x 3.5	0	-	11	2 x 1.5	4 x 1.0	3%	7%	
			Industrial/commercial	20-40	200- 500			18						2 x 2.0	2 x 3.5	0	-	11
		Local Road	Residential cul de sac long (100-200m)	<40	<250	30	30	15	2 x 2.0	2 x 2.5	0	-	9	2 x 1.5	2x1.0 2x0.5	3%	6%	
			Residential cul de sac small (<100m)	<20	<100	20	20	11	1 x 2.0	1 x 3	0	-	5	2 x 1.5		10% max 0.4% min		3%
		Service Lane	Commercial (Parking Precinct)	-	<200	30	30	13.5 ³	1 x 2.5	2 x 3.0	0	-	8.5	2 x 1.5	2 x 1.0	10% max 0.4% min	2%	n/a
			Access only	-	n/a	n/a	n/a	7.0	0 ⁴	2 x 3.0	0	-	6.0	0	2 x 0.5		3%	
		Private Way	Small	1 to 3	n/a	n/a	n/a	3	0 ⁴	1 x 2.7	0	-	2.7	0	2 x 0.15	20% max. 0.4% min	3%	n/a
			Large	4 to 6	n/a	n/a	n/a	5.5	1 x 2.0	1 x 3	0	-	5	0	2 x 0.25		3%	n/a
		Rural 1	Rural Roads shall have a 20m road reserve width (all levels) and shall be designed and constructed in accordance with the requirements of NZS 4404: 2010															
	Rural 2																	
	Rural 3																	

Table 1: Road widths (refer to notes below)

Notes relating to Table 1: Road widths

- 1 Where Council gives approval to remove cycle lanes, each traffic lane shall be increased to width required by Council
- 2 Painted median occupies 2m of the traffic lane
- 3 Where Council gives approval, berm may be increased to accommodate parking bays
- 4 No parking both sides
- 5 Where tree planting areas or traffic calming measures significantly reduce parallel parking space, additional width for angle parking should be provided.
- 6 Planting and utilities services are to share the berm space with neither monopolising the space. Plans will need to demonstrate how planting and utilities will share the space for these requirements to be met.

C.1.3 Rooding Network Pattern

Public roads, private ways, service lanes and access ways, shall be laid out to fit in with the general rooding requirements of the locality and the topography/natural landform in which they are situated.

They shall conform to the operative District Plan which the Council has for the area and have character and appearance in keeping with that role.

Due regard shall also be made for any road widening or upgrading proposals which the Council may have.

Cut and fill shall be kept to a minimum to avoid earthworks altering the natural land form and removal of natural features, i.e. landform and vegetation.

Except for motorways, the design of all roads and intersections shall provide for the safe and convenient movement of pedestrians and cyclists.

All roads classified collector or above shall be suitable for use as a bus route.

Key aspects that should be considered in developing the rooding pattern are as follows:

1. The length of any single road segment that forms a cul-de-sac shall not exceed 200m, except that where topography absolutely precludes interconnection, this may be extended up to 400m with the approval of the Council,

2. The length of any combination of continuous local road segments with only a single exit shall not exceed 500m,
3. Streets that are approximately parallel with an average separation of 200m or less shall be connected by streets at intervals no greater than 600m,
4. Collector roads that provide access to the central city are permitted to serve no more than 500 household units each. Sub-collector roads that provide access to the central city are permitted to serve no more than 150 household units each.
5. Access paths of 2.1m minimum width shall connect approximately parallel streets (with an average separation of 200m or less) and cul-de-sac heads at intervals no greater than:
 - a) 200m where one street is or could be on a bus/train route, or
 - b) 300m in remaining cases.
6. Areas where residential subdivisions have aggregated to 150 household units or more shall be provided with a convenient and direct through route at least 11.0m in kerb to kerb width.

Where demand will be less, a narrower width may be acceptable.

This route should be located to ensure traffic does not unnecessarily divert to other residential streets when seeking to access the subdivision. Nor should the route be designed to be so attractive as to divert people from outside the immediate area to travel through the subdivision as a means to get to some other place.

This route should be designed to provide a highly accessible bus route for the subdivision where 90 percent of the subdivision's households lie within 400m walking distance of the route.

Other suburban facilities that are likely to attract significant groups of people (schools, shops etc.) should be sited on the route but certainly within 200m walking distance of the route.

7. All footpaths and walkways, where provided, shall apply the principles of "Crime Prevention through Environmental Design" (CPTED) to their design.

The Council may consider variations from the requirements in this section where it is satisfied that the variations are justified in terms of the following criteria:

- The need for pedestrians, cyclists, public transport and frontage activity is likely to be permanently lower than would normally be required,
- Design is constrained by topography or existing development,
- Where compromises are desirable in order to maintain integrity of the network, to establish effective connections or maintain continuity along a route.

C.1.4 Pedestrian Facilities

The Council has adopted a Walking Policy, a copy of which is available on the Council's website.

Care should be taken to ensure a street environment is designed for use by pedestrians. (Refer Traffic Calming Measures Section C.1.8).

Development of land in regard to the roading pattern should include a plan showing pedestrian movements related to key features such as bus stops, schools and shopping areas.

Footpath width, and the number of, shall be provided in accordance with Table 1, in section C.1.7

Berms of a suitable width and specification to provide for street tree planting allowing for future growth and health of the trees shall be provided in accordance with Table 1 (also see section C1.7 (berm width) and section C4.6 (berm specifications)).

Preferred road crossing locations should be identified in the plan.

To increase connectivity the number of crossings shall be maximised and at positions well-located for efficient and effective pedestrian movement. At a minimum, these locations should provide 60m unobstructed visibility in 50km/h roads, 105m in 70km/h roads and 190m in 100km/h roads. Road crossing locations should require no more than 10m of carriageway to be crossed by the pedestrian in any single situation.

The preferred design of a road crossing location would provide a median island of a minimum of 2.0m width with a maximum crossing distance of 5.0m of carriageway on either side of the road.

In the vicinity of high pedestrian trafficked areas such as schools, commercial centres, bus stops and hospitals, footpaths and crossings should be of a higher standard. In these locations, the minimum footpath width should be 3.5m.

C.1.5 Cyclist Facilities

The Council has adopted a Cycle Policy, a copy of which is available on the Council's website.

Where provision is to be made for cycle movement, reference shall be made to Table 1, in section C.1.

C.1.6 Public Transport

The design of the development of urban land must attempt to maximise the convenient access of public transport.

To achieve this requirement, in areas where residential subdivisions have aggregated to 150 household units or more are required to produce a plan to demonstrate public transport accessibility.

Elements in this plan will include the following:

1. The provision of a continuous through route classified as a collector road or higher, for public transport to use.

The use of streets classified as less than a collector may be approved by Council at the limits of a residential area.

This requirement may be varied in the case of the land development being located near a railway line.

The road shall have a minimum carriageway width of 11.0m (this includes an allowance of 2.0m on each side of the road for parking).

If no parking is allowed or parking is provided in indented bays then the carriageway width may be reduced to 7.0m.

The gradient shall be as specified in C.1.11.

2. High transport intensity land uses (such as schools, tertiary institutions, hospitals, medical facilities, shopping areas, retirement villages and community facilities) should be located with frontages along the public transport route.
3. Land development should be otherwise designed to maximize the number of sites within 400m walking distance of a designated public transport stop.

At least 90 percent of dwellings are to be within 400m of a proposed bus route.

4. Land development that does not have a frontage on the public transport route shall be provided with convenient access to that route.
Road or suitably designed walkways access shall be provided to the public transport route at intervals not exceeding 200m.

C.1.7 Tree Planting (Design)

Trees shall be planted in all public roads (except service lanes) to create a better environment for street users, residents and the travelling public.

In addition, the Council's Public Space Design Manual, the Residential Design Guide, and the Open Spaces Strategy for Wellington provide guidance on streetscape design and amenity and the importance of trees in the road reserve to Wellington city.

Trees and other planting shall be positioned to minimise obstruction of vehicular accessways and provide good visibility for the travelling public. Consideration shall also be given to positioning trees to avoid conflict with underground utilities, and overhead services such as street lighting, overhead cabling and street signs. Table 1 in section C1.2 and drawing R2-704 in appendix C provides guidance on adequate berm width and configuration to best avoid potential conflict with underground utilities.

During the planning and design phase, the Council's Parks and Gardens Unit shall be consulted to determine suitable species and agree a maintenance regime for the site (refer to C4.1.5 for minimum maintenance requirements).

All planting design proposals must be able to adhere to the Council's planting requirements outlined at section C4.0 and section C4.1.

Avenue planting or trees on one side of the road (as provided for by berm widths at Table 1, C1.7) is a minimum requirement but groups of trees and amenity planting and other forms or streetscape treatment may be suitable as part of comprehensive subdivision or

road design assessment that reflects or improves the existing environment and complements the development characteristics.

Any proposal different to avenue type planting must include details of non-standard berm widths and design, specifications and maintenance details.

Avenue type planting (trees in the grass berm) is a minimum requirement for all streets however special requirements and standards for streetscape planting may be required. For more information reference should be made to the Council's Subdivision Design Guide, other relevant District Plan provisions and similar plans that guide best practice roading design.

Median planting is dependant on the road's position in the vehicle network category (section C.1) and will be subject to the approval of the Council.

Road tree planting is not required for rural developments.

Species to be planted should be with the agreement of the Council arborist.

The centre of the trunk shall be at least 1.0m from the kerb.

Where topography and soils permit; rain gardens, soak pits or similar vegetated channels should be considered for tree planting and the retention and dissipation of storm water run-off.

Where topography and soils permit; permeable surfaces, rain gardens, soak pits or similar vegetated channels are required for street planting and the retention and dissipation of stormwater run-off and enhancement of biodiversity and amenity.

C.1.8 Water Quality and Quantity

Runoff from roads contains contaminants from vehicles (zinc, copper and alumiosilicates from tyres and brakes of vehicles and sulphur from the fuel) and PCB's from road materials and maintenance. Contaminants also come from paint, fuel, and other spillages on the road. Road run-off is also heavily influenced by surrounding landuse (especially unpainted galvanised iron rooves).and activities more than by variation and loadings in traffic. The sources of contaminants are diffuse.

In Wellington and Porirua Harbours there is data showing ecotoxic³ contaminants carried by stormwater in bottom sediments at concentrations that exceed guidelines for aquatic life.

³ Ecotoxic contaminants are substances that are capable of causing ill health, injury or death to any living organism – such as heavy metals, polycyclic aromatic hydrocarbons, organochlorine pesticides and antifouling compounds. Carried in

Roads are recipients and conveyors of stormwater and contaminants from adjacent and often extensive contributing areas. Roads, whilst not the sole source of contaminants, may be the most appropriate place to treat stormwater.

Sediment and associated contaminants in stormwater can be removed by a range of treatments, including directing runoff to vegetated swales and infiltration trenches along the road corridor, through to interceptor and treatment structures

The Council seeks to promote low impact design to both improve water quality and curb peak runoff volumes.

Permeable or porous paving, and retention and detention devices may be effective means for controlling peak flows of road runoff. These devices capture runoff and release it at slow rates to filter out contaminants at source and significantly reduce the effects of discharge into receiving environments. They allow suspended solids to settle, and in some instances, runoff to be absorbed (infiltrate) through to the ground, thereby reducing the risk of flooding.

Permeable and/or porous paving will be permitted (for parking areas, access ways and footpaths) where it complies with the following principles:

- The subbase of the paved area, and any adjacent paved area, must be water proofed and well drained to ensure against saturation compromise of the cohesive strength of the subbase.
- The gradient is to be less than 1:8 (12.5%), to prevent surface runoff as opposed to infiltration into the permeable paving.

Refer to the Drainage section for more detail where porous/semi-porous paving, soak pits or similar vegetated channels may be used.

The successful implementation of porous paving depends on individual circumstances; the final decision rests with the Council.

C.1.9 Traffic Calming Measures for Residential Areas

Roads shall comply with the following requirements:-

- Carriageway and alignment of traffic calming measures shall discourage motorists from travelling above the intended speed,

stormwater, ecotoxic contaminants can bind with sediment and accumulate where the sediment settles, on the seabed or the bed of a freshwater body, particularly in low energy aquatic receiving environments

- Local roads shall not provide routes which are more convenient for through traffic than roads higher in the network category.

The street design and environment should be designed to encourage a speed regime appropriate to the use of that street.

The design speed environment is related to the classification of that street and is presented in Table 1, in section C.1.

Street design and layout including bends, vertical curves and junctions are based on that speed being the maximum design speed.

The following design principles, C.1.8.1 to C.1.8.4, should be pursued to produce the desired street environment.

C.1.9.1 Control of Vehicle Speeds

Traffic calming measures may be required to ensure the design speed cannot be significantly exceeded and/ or to discourage through traffic.

Maximum vehicle speed reduction can be achieved using traffic calming devices which shift vehicle paths:

- laterally (slow points, bends, roundabouts, street narrowing, median islands), (Refer to drawing R-45-703 Central Islands, Kerb Extensions and Chicanes in Appendix C), or,
- vertically (humps, platform intersections, platform pedestrian crossings, school crossings, and bicycle crossings). (Refer to drawing R-45-702 Standard Speed Hump Details in Appendix C).

Slowing devices should be located at distances not exceeding those prescribed in Section C.1.3 and should be designed to ensure the correct speed environment is produced. Allowance for increased speeds due to a downhill gradient as shown in Section C.1.3 should be made.

Speed reduction can be assisted by involving the design of the whole street environment, including pedestrian amenity, planting, and street furniture in creating a visual environment conducive to lower speeds such as (but not limited to) the elements covered by section C.4.

The maximum carriageway gradient, on which speed humps are permitted, is 1 in 12 (8%).

C.1.9.2 Visibility Requirements

- i) Adequate critical site distances are to be provided such that in a potential conflict, evasive action can be taken by either party. The sight distances are determined by the design speed for the street and are stated in Table 2: *Minimum Stopping Distances*

Design speed (km/h)	Stopping sight distance (m)
10	10
20	20
30	30
40	45
50	60
60	80

Table 2: Minimum Stopping Distances

- ii) Night time visibility of street features must be adequate. Speed control devices particularly, should be well provided for in terms of street lighting,
- iii) All speed control devices shall be signposted (including the negotiation speed) and provided with appropriate lane marking.

C.1.9.3 Specific Design Details of Speed Control Parameters

Speed control devices shall be designed for their normal use by motor cars, but with provision (such as mountable kerbs) for larger vehicles.

Design of speed control devices shall comply with the following parameters:

- Speed at slow points of bends and length of street between slow points or bends – refer to Table: 3
- Effect of downhill gradient on speed – refer to Table: 4
- Radius of Slow Points (Bend to be 45° deflection or more) – refer to Table: 5

- Deflection Angle for Design Of 20 Km/h Bends – refer to Table:6
- Design of 20/Km/H Street Narrowing – refer to Table: 7
- Design of 20km/H Plateau Or Platform Areas – refer to Table: 8

Speed at slow point (km/h)	Length of street (m) to limit maximum speed to (km/h):					
	25	30	35	40	45	50
20	40	75	100	120	140	155
25	-	45	60	80	100	135
30	-	-	45	65	80	115
35	-	-	-	50	65	100
40	-	-	-	-	55	80
45	-	-	-	-	-	60

Table 3: Speed at slow points of bends and length of street between slow points or bends.

Gradient (%)	Increase in speed (Km/h)
< 5	0
5 - 10	5
> 10	10

Gradients should not exceed 20%

Table 4: Effect of downhill gradient on speed

Design speed (km/h)	Radius of continuous bend (m)	Radius of isolated bend or chicane (m)
20	15	10
25	20	15
30	30	20
35	50	30
40	90	40
45	105	50
50	120	60

Table 5: Radius of Slow Points (Bend to be 45° deflection or more)

Carriageway width (m)	Single bend	Chicane (two reverse bends)
3.5	60°	30°-30°
5.0 – 5.5	70°	45°-45°
6.0 – 6.5	80°	55°-55°
7.0 – 7.5	90°	60°-60°

Table 6: Deflection Angle for Design of 20 Km/h Bends

Number of lanes	Carriageway width (m)
Single lane	2.5
Two lanes	4.5 (over minimum length of 3 m)

Table 7: Design of 20/Km/H Street Narrowing

Height	Ramp Slope
75mm to 150mm	1 in 15 (6.7%).

Table 8: Design of 20km/H Plateau or Platform Areas

C.1.10 Intersections

Intersections within the residential areas should be primarily T-junctions for safety reasons. To improve connectivity, roundabouts or four-way intersections will be

considered if traffic volumes are sufficiently low and/or safety measures are included in the design. However these features are more difficult for pedestrians to navigate safely.

The preferred angle of intersection is 90°; the minimum angle of carriageway intersection should be 70°. Carriageway alignment may be offset from the road reserve alignment to improve the intersection angle. Two roads intersecting the same road (T-intersections) should be offset at least 40 m where practicable.

The kerb line radius at intersections should be kept as short as possible consistent with likely vehicle and pedestrian usage, but in any case shall not be less than 4.0m. Major intersections such as the junction of secondary roads with principal roads or greater, shall be specifically designed to provide for bus and heavy vehicle usage.

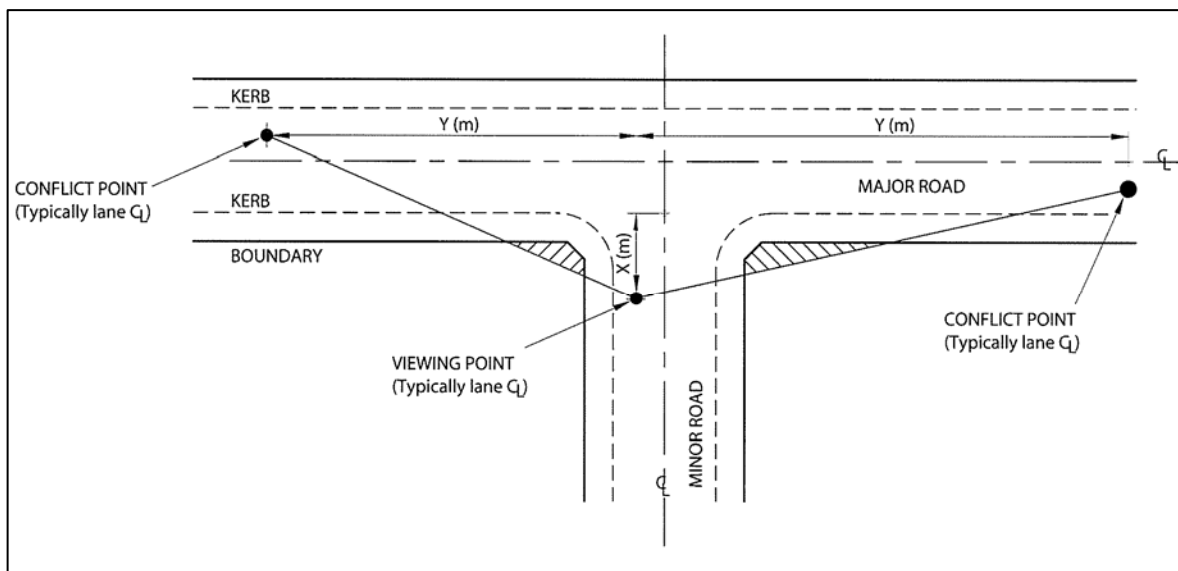
Where practical the gradient within 30m of intersections in local roads should not exceed 1 in 10 (10%) and should preferably be less than 1 in 33 (3%).

Also, where practical, intersections on all other roads should not exceed 1 in 50 (2%) and preferably be less than 1 in 100 (1%).

Grading at intersection approaches shall take into account the provisions of *Guide to Road Design – Part 4: Intersections and Crossings – General* (Austroads 2009a)

For minimum traffic sight lines at intersections refer to Figure 1 below and its corresponding table, Table 9: Traffic Sight Lines at Non-signalised Intersections

Figure 1: Traffic Sight Lines at Non-signalised Intersections



Major Road		Side Road Distance X (m)		
Design Speed (km/h)	Distance Y (m)	Principal to Sub-collector Road	Local Road Cul-de-sac Major Private Way	Service Lane Minor Private Way
100	170	7	5	2.5
70	70	7	5	2.5
50	40	7	5	2.5
40	30	7	5	2.5
30	20	7	5	2.5
20	12	7	5	2.5

Table 9: Traffic Sight Lines at Non-signalised Intersections

Note.1: Within the areas represented by the visibility splays, full visibility will be needed above a level of 1m above the level of the adjacent carriageway. For one way roads and dual carriageways, visibility will only be required in the direction of the approaching traffic.

Note.2: These dimensions are based on Austroads Guide to Traffic Engineering Practice Part 5, intersections at Grade, Page 24, Table 5.1. and AS/NZS2890.1:2004. Lower speed values have been extrapolated.

Standard wheelchair friendly kerb ramps must be provided at all road intersections, refer to drawing R-24-727 in Appendix C.

C.1.11 Turning Requirements

A turning facility shall be provided at the end of all no exit roads.

Turning circles at the end of residential cul-de-sacs shall have a minimum kerb radius of 7.0m, while industrial and commercial cul-de-sacs shall have a minimum kerb radius of 12.5m.

Turning areas of other shapes for difficult situations are acceptable if it can be shown they will work satisfactorily.

Examples of turning areas are given in drawings R-9-705, R-9-706 and R-9-707, in Appendix C.

C.1.12 Gradients

Gradients on the inside kerb shall be as shown in the Table 10: *Maximum Street Gradient*.

Street classification	Maximum gradient
Arterial	1 in 20 (5.0%)
Principal	1 in 15 (6.7%)
Collector	1 in 10 (10.0%)
Sub-collector	1 in 10 (10.0%)
Local	1 in 8 (12.5%)

Table 10: Maximum Street Gradient

NOTE: Gradients shall be not flatter than 1 in 200 (0.5%).

Gradients shall be minimised at intersections as described in Section C.1.9.

Bus route gradients shall be not steeper than an average of 1 in 15, (6.7%), measured over 200m; and an instantaneous maximum of 1 in 12, (8.3%). Approval may be considered for steeper gradients in special circumstances.

C.1.13 Horizontal Curves

Horizontal curves in 50km/h zones may be circular, with a minimum centreline radius of 80m for all industrial roads and for residential, sub-collector, collector and primary roads.

For local streets the radius may be reduced progressively to a minimum of 15m as the traffic volume decreases. Spiral transition curves shall be included in curves on primary roads with a speed limit greater than 50km/h.

Extra widening shall be provided in accordance with tables 11 & 12.

Radius (m)	Widening for a two lane pavement width of:		
	6.0 m	7.0 m	8.0 m
30-40	1.75	1.25	0.75
40-50	1.50	1.00	0.50
50-80	1.25	0.75	0.00
80-150	1.00	0.50	0.00
150-200	0.75	0.00	-

Table 11: Widening On Horizontal Curves for Primary, Collector and Sub-collector roads (50km/h design speeds)

Radius (m)	Widening for a two lane pavement width of:
	5.5m
15-20	2.00
20-25	1.60
25-30	1.30
30-40	1.10
40-50	0.80
50-60	0.70
60-80	0.60
80-100	0.40
100-200	0.20
200-200+	0.00

Table 12: Widening On Horizontal Curves for Local roads (less than 50km/h design speeds)

C.1.14 Vertical Curves

To ensure reasonable standards of comfort, appearance and visibility, vertical curves should be not shorter than those shown in table 13: *Vertical Curves*.

Curve length can be determined using the formula below:

Equation 1: $L = K \times A$

where:

L = the curve length in metres but not less than $0.815 \times V$ metres - where V is the design speed in km/h.

K = value from table13 below (dimensionless)
A = algebraic difference in grade (expressed as percentage)

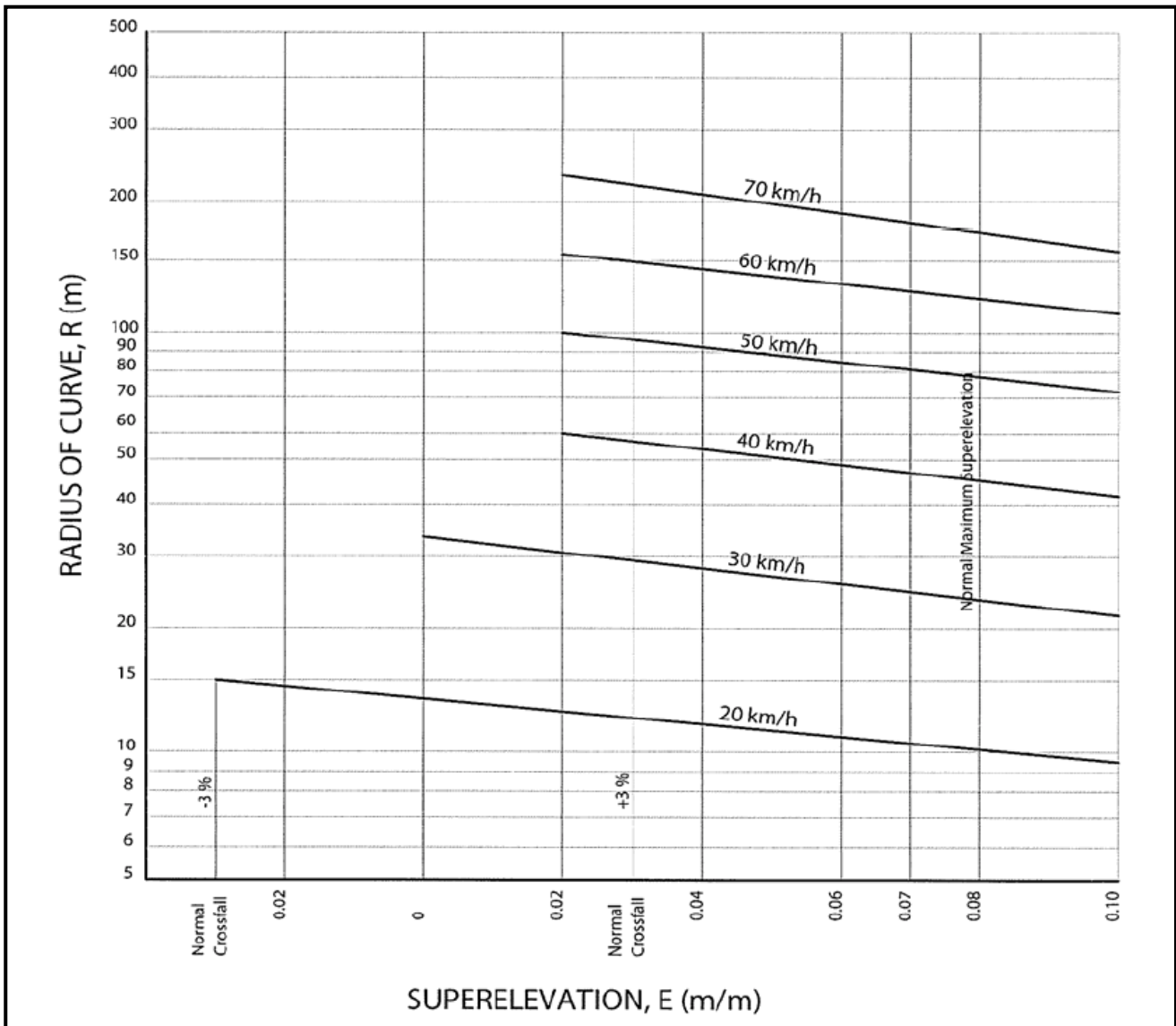
Design Speed V (km/h)	Standard K Values		Minimum K for Stopping and Comfort	Absolute minimum Curve Length, L(m)	Safe Stopping Distance (m)
10	0.5	1.2	0.5	8.0	7.0
20	1.9	4.0	1.7	16.0	16.0
30	4.0	6.0	3.0	25.0	25.0
40	7.0	9.0	5.0	30.0	40.0
50	10.0	12.0	7.0	40.0	60.0
60	14.0	15.0	9.0	45.0	75.0
70	18.0	18.0	11.0	50.0	95.0
80	23.0	21.0	13.0	60.0	120.0
90	28.0	24.0	15.0	70.0	140.0
100	33.0	27.0	18.0	80.0	170.0

Table 13: Vertical Curves

C.1.15 Superelevation

Superelevation and runoff lengths shall be derived from the following:

- Graph 1: *Radius of Curve vs. Superelevation*
- Equation 2: *calculating Radius of Curve*
- Table 14: *Determining friction factor(f), knowing Speed (V)*
- Table 15: *Superelevation Table*
- Equation 3: *Calculating Runoff length*
- Table 16 : *Deriving suitable values of G (%), knowing Speed*
- Table 17: *Runoff lengths for pavement widths up to 7m*



Graph 1: Radius of Curve vs. Superelevation

Radius of curve can be calculated using the following formula:

Equation 2:

$$R = \frac{V^2}{127(e + f)}$$

where:

- R** = Radius of curve (metres)
- V** = speed (km/h)
- e** = Superelevation rate (m/m) – from table 15
- f** = friction factor (dimensionless) – from table 14

NOTE: Negative crossfall should not be used where this is avoidable.

Speed - V (Km/h)	10	20	30	40	50	60	70
Friction factor (dimensionless)	0.26	0.24	0.22	0.20	0.18	0.16	0.15

Table 14: Determining friction factor (f), knowing Speed (V)

For circular curves used without transitions:

- Use 60% to 66% of the maximum Superelevation at the tangent points,
- Use 90% of the maximum Superelevation at the $\frac{1}{4}$ and $\frac{3}{4}$ points, and
- The maximum Superelevation at the $\frac{1}{2}$ point.

NOTE: Intended for use in urban roads. For higher speeds use NZTA guidelines which can be used for any design speed.

Radius R (m)	Principal Streets			Collector Streets					Local Streets						
	Super (e m/m)	Friction (f)	Speed (v km/h)	Super (e m/m)		Friction (f)		Speed (v km/h)		Super (e m/m)		Friction (f)		Speed (v km/h)	
15				0.07	0.12	0.14	0.09	20		0.06	0.12	0.15	0.09	20	
20				0.07	0.12	0.09	0.04	20		0.06	0.12	0.10	0.04	20	
25				0.07	0.12	0.21	0.16	30		0.06	0.12	0.22	0.16	30	
30	0.08	0.16	30	0.07	0.12	0.17	0.12	30		0.05	0.12	0.19	0.12	30	
35	0.08	0.12	30	0.07	0.12	0.13	0.08	30		0.05	0.12	0.15	0.08	30	
40	0.08	0.10	30	0.07	0.12	0.11	0.20	30	40	0.05	0.12	0.13	0.20	30	40
45	0.08	0.20	40	0.06	0.12	0.10	0.16	30	40	0.05	0.10	0.11	0.18	30	40
50	0.07	0.18	40	0.06	0.12	0.19	0.13	40		0.05	0.08	0.20	0.17	40	
60	0.07	0.14	40	0.06	0.12	0.15	0.09	40		0.04	0.06	0.17	0.15	40	
70	0.07	0.11	40	0.06	0.12	0.12	0.16	40	50	0.04	0.05	0.14	0.13	40	
80	0.07	0.18	50	0.05	0.12	0.11	0.13	40	50	0.04		0.12		50	
90	0.06	0.16	50	0.05	0.12	0.17	0.10	50		0.04		0.18		50	
100	0.06	0.14	50	0.05	0.12	0.15	0.16	50	60	0.03		0.17		50	
120	0.06	0.10	50	0.05	0.10	0.11	0.14	50	60	0.03		0.13		50	
140	0.05	0.15	60	0.04	0.10	0.16	0.10	60		0.03		0.11		50	
160	0.05	0.13	60	0.04	0.09	0.14	0.15	60	70	0.03		0.09		50	
180	0.05	0.11	60	0.04	0.06	0.12	0.15	60	70	0.03		0.08		50	
200	0.04	0.15	70	0.04		0.15		70		0.03		0.07		50	
250	0.04	0.12	70	0.03		0.13		70		Normal chamber		0.11 max		50	
300	0.03	0.14	80	0.03		0.10		70							
350	0.03	0.11	80	0.03		0.08		70							
400	0.03	0.10	80	0.03		0.07		70							
500	0.03	0.07	80	Normal Chamber		0.11 max		70							
600	Normal chamber	0.11 max	80					70							

Table 15: Superelevation

Note: Use 1st column of lower values of Superelevation in densely built up areas. Use 2nd column with sharp curves in hilly but more open spaces.

Runoff length can be calculated using the following formula:

Equation 3:

$$L = \frac{100We}{G}$$

where:

- L** = Runoff Length (metres)
- W** = Pavement Width (metres)
- e** = Superelevation rate (*m/m*) – from Table 15
- G** = Percentage Difference in Longitudinal Grade between the pavement edges – from Table 16

Speed Km/h	20	30	40	50	60	70	80
Suitable Values of G - %	1.95	1.80	1.65	1.50	1.35	1.20	1.10

Table 16: Deriving suitable values of G (%), knowing Speed

Or using table 17

Superelevation Rate (e m/m)	Minimum Runoff Length L metres for Speed (km/h) of:						
	20	30	40	50	60	70	80
0.06	22	23	25	28	31	35	38
0.07	25	27	30	33	36	41	45
0.08	29	31	34	37	42	47	51
0.09	32	35	38	42	47	53	57
0.10	36	39	42	47	52	58	64
0.12	43	47	51	56	62	70	76
Absolute Minimum	20	20	25	25	30	30	35

Table 17: Runoff lengths for pavement widths up to 7m

NOTE: For pavement widths 7m to 10m multiply the above runoff lengths by 1.2

For pavement widths 10m to 14m multiply the above runoff lengths by 1.5

Theoretical superelevation requirements may require adjustments to ensure flowing kerb profiles.

Generally the best results are obtained from a graphical plot of each kerb profile using a horizontal/vertical scale ratio of the order of 10 to 1. The ruling profile gradient is to be redeveloped along the shortest or inside kerb. Generally, superelevation is added to the inside kerb profile to obtain the profile of the outside kerb, and with the simple horizontal curves. Two-thirds of the maximum superelevation is applied at the tangent points.

For existing situations, superelevation on curves of arterial and principal roads shall be designed for the 85th percentile of the actual observed speed at the particular location (refer to the Austroads 'Guide to Road Design Part 3: Geometric Design').

Horizontal and vertical curves in the same direction may be connected with large radius curves in place of straights, with superelevation maintained around the curve combination.

Reverse curves are to be separated by a sufficient length of straight to allow for a satisfactory rate of superelevation reversal.

Alignment and profiles of kerbs at intersecting roads require detailing to permit the accurate location of stormwater sumps, and to check crossfalls.

C.1.16 Rural Road Curvature and Sight Distance

The table below states acceptable safe stopping sight distances for various speeds.

Design speed (km/h)	SSSD ⁴ (m)
50	60
70	96
80	115
100	170

Table18: Safe Stopping Sight Distances (SSSD)

⁴ The safe stopping sight distance is the desirable minimum sight distance in metres measured from driver's eye at 1m above road level to a point 150mm above road level situated in the centre of the same traffic lane.

In hilly terrain it is likely for low-volume roads that horizontal sight distances will govern over vertical sight distances. The designer should be prepared for this, especially on narrow roads. In such cases a single-lane width can be adopted in difficult situations as long as there is clear sight distance sufficient for opposing vehicles to see each other and stop. One can wait where width permits passing to let the other through.

If adequate sight distance cannot be provided, then there must be sufficient width provided to permit vehicles to pass safely.

A further point requiring particular attention in hilly areas is that the minimum radius of curvature should be sufficiently large that truck and trailer combinations can safely negotiate curves in one pass. Minimum radius curves will normally require extra widening because of the needs of such vehicles. Tracking curves for various classes of heavy vehicles are published on the NZTA website:

<http://www.nzta.govt.nz/resources/road-traffic-standards/rts-18.html>

Lane widths should provide additional width for clearances of at least 0.9m more than the appropriate tracking width.

C.1.17 Pavement Design

Pavement designs shall be determined in accordance with the procedures outlined in the Austroads 'Guide to Pavement Technology Part 2: Pavement Structural Design'.

This manual is broadly based and covers the assessment needed for the design of flexible and rigid pavements as well as overlays and gives guidance to the economic comparisons of alternative pavement designs.

Where existing roads are to be reconstructed, designs shall be based on the worst case scenario of the underlying subgrade.

Pavement composition shall be related to the availability of materials and knowledge of their performance.

C.1.18 Safety Audit

A safety audit shall be carried out for all roads to be vested in the Council except for service lanes.

As a minimum requirement a Stage 3 “Final Design” audit shall be carried out in accordance with the operable NZTA Road Safety Audit Procedures for Projects Manual. The Council reserves the right to also require a Stage 4 “Pre-opening” audit.

Members of the proposed safety audit team shall be qualified and experienced in safety audit work. The Council may also nominate an additional person as a member of the team.

A copy of the safety audit report shall be supplied to the Council, together with any comments on the report’s recommendations.

The Council will not accept roads for vesting until it is satisfied that all issues raised in the audit have been adequately resolved.

C.2 CARRIAGEWAY CONSTRUCTION

C.2.1 Crossfall

The normal camber or crossfall shall be 1 in 33 (3%).

C.2.2 Subgrade

CBR tests shall be carried out to confirm whether or not the subgrade is satisfactory.

Subject to correlation by laboratory tests, dynamic cone penetrometer tests (Scala- penetrometer) may be used to determine subgrade CBR values using industry standard correlation charts.

Soft areas shall be brought up to strength and retested.

Subsoil drains are required to drain any wet areas and also under the kerb and channel as indicated in C.2.4.

C.2.3 Basecourse Layer

Basecourse shall extend 300mm behind the kerb face (or 150mm behind the back of the kerb where a wider kerb profile is used).

All basecourse shall be to NZTA Standard Specification, M/04 or M/05 (Wellington 1) 1984.

Material used for choking the surface to obtain a clean stone mosaic surface shall be kept to a minimum and shall be free of clay.

C.2.4 Kerb and Channel

Kerb and channelling is required on both sides of sealed carriageways in order to achieve the following:

- Collection and control of roading stormwater run-off
- Demarcation between trafficked and non-trafficked areas within the road reserve

The Council's standard 135mm near vertical face kerb profile shall be used to achieve these outcomes.

However there are situations where mountable kerbs may be more appropriate. Situations include:

- Traffic islands that require vehicles to deviate
- Designated turning areas where larger vehicles need additional space
- High speed roads, greater than 70km/h, where a mountable kerb may be safer

For situations in which mountable kerbs are used, the following needs must be satisfied:

- Provision must be made to ensure all adjoining property stormwater is discharged to an approved stormwater system, not to the surface channels within the road reserve
- Street sumps shall have overflow capacity equivalent to the overflow capacity of conventional standard kerb sumps
- Critical sumps where overflow may discharge onto a private property must also have the same on-street storage capacity as standard kerb critical sumps
- Carriageway widths must be sufficient to accommodate on-street parking to avoid driver concern that vehicles will be side-swiped
- Footpath pavements alongside mountable kerbs must be constructed to the strength of heavy duty vehicle crossings to withstand vehicle use.
- Berm areas adjoining mountable kerbs should include trees or other physical features to discourage parking or manoeuvring on the berm
- Driveways must be clearly defined, without using carriageway or footpath markings, to allow compliance with parking regulations

RTS 14 (Guidelines for Facilities for Blind and Vision-impaired Pedestrians) highlights the importance of full height kerbs to vision impaired pedestrians. *“Overseas research has shown that the full vertical upstand of a kerb is the single most reliable cue for blind and vision-impaired people in detecting roads”*. Any use of mountable kerbs must take this into consideration.

The standard profiles for both the standard and the mountable kerbs are shown on drawing R-22-700.

Subsoil drains shall be placed under kerb and channel for a length of 15m from the sump on the high side. Where the sump is located in the valley position, the subsoil drains shall extend 15m on both sides. Refer to drawings R-39-749 and R-39-750, in Appendix C, for details of a subsoil drain.

The kerb and channel foundation shall be formed with a basecourse complying with C.2.3 above and shall be compacted in layers not exceeding 100mm in loose thickness to achieve a Clegg Impact Value, CIV, of not less than 25. Alternatively, compaction of the basecourse may be assessed using a Scala-Penetrometer and shall be considered satisfactory provided there is not less than 4 blows per 50mm of penetration.

Kerb and channelling shall be laid in one operation in accordance with the profile in drawing R-22-700, in Appendix C. Construction joints are required at 6.0m intervals maximum and shall comprise a shallow 20mm cut in the open face of the kerb and channel. Construction joints shall align with construction joints in adjacent surfaces (eg concrete footpaths).

Concrete shall have a minimum compressive strength of 20MPa at 28 days and shall be constructed in accordance with the requirements of NZS 3109: 1997.

In-situ, boxed and precast kerb and channelling to the profiles shown on drawing R-22-700, in Appendix C, may be used where it is not practical to slipform or extrude the concrete. Construction joints are required at 6.0m intervals maximum and shall comprise a shallow 20mm cut in the open face of the kerb and channel.

All kerbing around traffic islands shall be of a mountable type. Refer to drawing R-22-700, in Appendix C.

Standard disability and wheelchair friendly kerb ramps shall be provided at all road intersections. Refer to drawing R-24-727, in Appendix C.

For details on vehicle kerb crossings refer to Section C.5.1.

Where topography and soils permit, runoff shall be directed from the road surface or car park to soak pits or similar vegetated channels as specified in Section C.1.17.

Refer to the Drainage section for more detail where porous/semi-porous paving, soak pits or similar vegetated channels may be used.

C.2.5 Sumps

The Wellington City Council standard (single) sump has a design inlet capacity of 30litres/sec.

The Councils standard sump grate provides protection for the cyclist while at the same time delivering the design inlet flows.

Sumps, double sumps and half boxes shall be constructed in accordance with drawings R-41-740 to R-41-747 inclusive, in Appendix C.

The lead from a private sump will remain a private lead. The length of this lead from the sump to a public main should be as short as practical and shall not exceed 5.0m in length.

For maintenance and renewal purposes, the Council requires all sump grates and frames to be to the standard dimensions shown on the drawings.

Sumps shall be built so that the grating is 70mm below the line of the entry channel.

C.2.5.1 Sump Location in Carriageway

Sumps shall be located in carriageways at:

- 1) Intervals governed by the design contributory flows but not exceeding 100m
- 2) Intersections at the upstream tangent point (may have to be positioned further upstream to accommodate a pedestrian ramp),
- 3) Changes of direction, gradient, or superelevation in the channel where there could be a tendency for the water to leave the channel,

- 4) Where water would leave a public road and flow onto a private road or property,
- 5) Any other point required to eliminate surface ponding.

Sumps shall not be located in front of a property where the property's frontage is narrow. A minimum 4.0m length of standard kerb shall exist in front of every such property to provide for future kerb crossing purposes.

C.2.5.2 Discharge of Sumps

Public sumps shall discharge via a minimum 225mm diameter pipe into either:-

- 1) A stormwater manhole, or
- 2) A clearly defined open watercourse, with adequate erosion control and protection to prevent scour, or
- 3) In special circumstances, and provided that the lead does not exceed 3.0m in length, through a saddle into a pipe of diameter no less than the diameter of the sump lead. or
- 4) Where conditions allow, sumps may discharge to soak pits or similar vegetated channels as specified in section C1.17.

Note: Connections to a stormwater network (manhole or pipe) require a Public Drainage permit. Work near or in watercourses will require a consent from Greater Wellington Regional Council and/ or Wellington City Council.

Any connection other than a minimum 225mm diameter outlet pipe will be at the discretion of the Council's Drainage Engineer, or his nominee.

C.2.5.3 Connections to Sumps and Sump Leads

Connections into public sumps or public sump leads are not permitted.

C.2.5.4 Types of Sumps

The Council's standard single sump is detailed in drawing R-41-740, in Appendix C. A sump has one chamber, one baffle, one grating and one minimum 225mm diameter sump lead.

Attention is drawn to the necessity for providing adequate stormwater disposal at the end of cul-de-sacs where single sumps are frequently inadequate and there are often a large number of kerb crossings within a short distance. Kerb crossings immediately before or over a sump usually prevent the sump from operating as designed. In these situations double sumps may be more effective and should be provided.

High flow areas may require the use of new 'super sumps' – this would need to be discussed with the Council.

C.2.5.4.1 Duplicate Sumps

Two independent sumps and leads shall be provided in critical situations to provide surplus capacity in the event that one of the sumps (including its lead), becomes blocked. Such situations may include low spots where any concentration of runoff could cause flooding, especially of private property.

Each sump of a duplicate set shall have a minimum capacity of 30litres/sec.

C.2.5.4.2 Double Sumps

A double sump comprises, two single sumps back to back connected via a single minimum 225mm lead, with one of the sumps discharging via a 300mm lead to the outfall.

Double sumps (or duplicate sumps and leads) shall be provided:

- a) Where a single sump has insufficient intake capacity,
- b) On grades steeper than 1 in 12 (8.3%),
- c) Where two sub-catchments meet.

C.2.5.4.3 Deflector Sump Tops

On grades steeper than 1 in 20, a deflector sump top and a vane in the channel, drawing R-41-747, in Appendix C, shall be used on:

- a) Single sumps,
- b) The first sump of duplicate sumps,
- c) The first grating of double sumps.

C.2.5.5 Cleaning Eyes

Cleaning eyes are integral to Wellington City Council standard sumps. Cleaning eyes are detailed on drawing R-41-743, in Appendix C.

Any proposed alterations to the sewer and/or stormwater networks, including variations to the above clauses, shall be approved by the Council's Drainage Engineer.

C.2.6 Traffic Islands

All kerbing around traffic islands shall be of a mountable type. Refer to drawing R-22-700, in Appendix C.

Traffic islands shall be designed in accordance with the '*Guide to Road Design – Part 4: Intersections and Crossings – General*' (Austroads 2009a).

The minimum island widths shall be determined using Table 19.

Functional Requirement	Minimum width (m)
To shelter a crossing vehicle	7.0
Median with turn lane	3.0
Pedestrian refuge	2.5
Signal or lighting poles	2.0
Small sign	1.2

Table 19: Minimum Traffic Island Widths

The mountable face shall be painted white.

Traffic islands may be:

- Infilled with exposed aggregate,
- Surfaced in permanent materials, such as a concrete footpath type pavement, as specified in section C.3.6 and C.3.7,
- Approved as a planted area which must include soakage for runoff detention where conditions allow.

Refer to the Drainage section for more detail where porous/semi-porous paving, soak pits or similar vegetated channels may be used.

C.2.7 Acceptance of Pavement Prior to Sealing

Before sealing takes place the pavement shall be Benkelman Beam tested in accordance with NZTA T/01. The deflections shall not exceed:

Before sealing takes place the pavement shall be Benkelman Beam tested in accordance with NZTA T/01.

The deflections shall not exceed Table 20: Maximum Pavement Deflection.

Roadway	Maximum Deflection (mm)
Principal Roads	0.5 mm
Collector Roads	0.8 mm
Sub-collector Roads	0.8 mm
Local Roads	1.0 mm
Cul-de-sacs	1.0 mm
Service Lanes	1.0 mm
Private ways :	1.0 mm
Private ways on a proposed bus route	0.8 mm

Table 20: Maximum Pavement Deflection

A sample Benkelman Beam Test Record report form is included in Appendix C.

C.2.8 Sealing / Paving

C.2.8.1 General

All road surfaces shall be sealed with a grade 4 chip seal and overlaid with an asphaltic concrete surface unless approved otherwise by the Council's Roading Engineer.

C.2.8.2 Chip Seal

The basecourse surface must be inspected and passed by the Council's Roading Engineer prior to any first coat sealing being carried out.

A clean dry stone mosaic surface shall exist before the first coat seal is applied and if an adhesion agent is not used the seal should be applied only during warm dry settled weather between 1 October and 15 March. If a suitable adhesion agent is used, sealing may be carried out outside these dates.

On no account must sealing or paving or preparatory work be carried out if there is not to be warm (i.e. not less than 10°C) settled weather for the next 48 hours.

A sample Sealing Report is included in Appendix C.

First coat seal shall be applied using a bitumen cut-back binder at 1.8 - 2.0 L/m² covered with a grade 4 sealing chip.

Sealing shall be carried out in accordance with the NZTA specifications M/01, M/06, M/13, P/03, P/04 and Q/1.

Further to clause 26 of the NZTA specification P/03, the developer shall control traffic such that the full width of new seal is trafficked evenly.

The Polished Stone Value (PSV) shall be a minimum of 59 for all sealing chip.

C.2.8.3 Asphaltic Concrete

Asphaltic concrete paving shall be carried out in accordance with the NZTA specifications M/01, M/10, M/10D, P/09, and Q/2.

Asphaltic concrete mixes shall conform to the following mix type and design as stated in Table 21;

Mix	Application	Specified Marshall Flows	Air Voids %	Minimum Compaction Index	Minimum VMA (voids mineral aggregates)
10	Roads	75	3.0 – 4.0	0.09	16

Table 21: Roading Asphaltic Concrete Mix type and design

Immediately prior to the Asphaltic Concrete surface work:

- a strip 600mm wide and adjacent to each channel shall be sprayed with an approved ground sterilising weed killer at the manufacturer's recommended rate of application
- the chip seal surface must be clean and have a tack coat of 0.3L/m² of residual bitumen applied by spraying

Asphaltic concrete must be laid with a paving machine and compacted to a minimum depth of 40mm.

For private ways and residential cul-de-sacs and parking areas, excluding bus stops, the minimum depth of asphalt paving may be reduced to 30mm, using mix 10.

C.2.8.4 Additional Slurry Seal

Existing asphalt and concrete paved surfaces on roads, cul-de-sacs, service lanes and rights-of-way may be maintained by resurfacing with a slurry seal complying with the requirements of ISSA A143 (revised) January 1991, Recommended Performance Guidelines for Micro-Surfacing.

The slurry shall be an ISSA Type II or III and meet the following additional requirements:

- Minimum final compacted depth of slurry is to be determined using table 22.

Minimum Final Compacted Depth of Slurry	
Type II	7.5mm +/- 1mm
Type III	10.0mm +/- 1mm

Table 22: Minimum final compacted slurry depths

- Maximum break time of 30 minutes at air and ground temperature of 10 degrees Celsius,
- The slurry shall be designed to allow pedestrian traffic on the surface after a period of 15 minutes,
- Testing shall be carried out in accordance with procedures outlined in ISSA A143 (revised) January 1991.

C.2.9 Pavers

Interlocking Concrete Block Paving

The use of interlocking block paving may be approved on local roads, service lanes and private rights-of-way.

Paving shall be designed and constructed to the manufacturer's proven specifications and shall comply with NZS 3116:2002 'Concrete Segmental and Flagstone Paving'.

Blocks shall have a thickness not less than 80mm. Blocks shall have nominal thickness, strength characteristics, dimensional tolerances and skid resistance which comply with the guidelines in the NZS 3116: 2002 and shall be specific to the in-service situation in which they are used.

A water proofing membrane shall be applied over the road formation and subsoil drains installed to divert surface water penetration away from the carriageway into adjacent sumps or drainage structures.

Where interlocking block pavements are installed, 24 month maintenance periods shall be specified whereby the contractor shall be responsible for correcting all defects during this period.

NOTE: The use of clay brick paving for road surfaces will not be approved.

C.2.10 SPECIAL SURFACES

The roads of the CBD and suburban centres may have specific finishes required.

For further information and standards refer to the Council's operative Public Spaces Design Guide.

C.2.11 Rural Road Construction

Construction shall be as for urban roads except as may be indicated otherwise on the drawing R-9-708, in Appendix C, and as below.

For developments in which water tables, side drains and culverts are used for the collection and management of stormwater runoff, design calculations and a management plan showing how the water will be collected channelled/ dissipated, and discharged shall be submitted for the approval of the Council's Public Drainage Engineer.

Culvert inlets shall be identified with an off-set marker post as shown in drawing R-12-785 in Appendix C.

Sometimes it is customary to move fences in towards the carriageway from the road reserve boundary. This practice may be acceptable provided that pavement and drainage maintenance are not compromised.

As a minimum, fences should not be closer than:-

- 5m from the carriageway, or,
- 3m from roadside drains.

C.3 FOOTPATH CONSTRUCTION

C.3.1 General Requirements

Design and construction of all footpaths, pedestrian accessways, steps, footbridges and amenity tracks shall meet the following requirements:-

- All pedestrian facilities shall be durable and require a minimum of maintenance,

- All surfaces shall be adequately drained so as to prevent ponding, and designed and built so they do not cause runoff problems for adjoining properties,
- Lighting shall be provided for all walkways except amenity tracks,
- Wherever practical, security hazards for users shall be avoided. Accessways must be well lit and where possible should have a clear line-of-sight between streets,
- All walking surfaces must provide minimum in service slip resistance of not less than British Pendulum Value BPN 50 measured on a wet surface,
- Timber on footbridges, boardwalks and steps may be accepted by the Council provided the surfaces have securely fastened wire netting to provide slip resistance or some other approved treatment,
- Gravel surfaces may be accepted on amenity tracks.

C.3.2 Footpath design

Public footpaths shall where appropriate, accommodate the access and mobility requirements of AS/NZS 4121, Design for Access and Mobility – Buildings and Associated Facilities.

The Council has identified streets where special footpath surfaces are required. For more information on these surfaces reference should be made to the Council's operative Public Spaces Design Guide and similar Plans for the suburbs.

Footpaths are to be between two berms and level with the kerb. The width of the grassed strip shall be provided as per Table 1, in section C.1.

The Council may approve footpaths adjacent to the kerb where topography would make a footpath in the preferred position problematic. Where this occurs and it results in only one berm, provision must be made for both street planting and underground services to be appropriately accommodated. Additional footpath width shall be provided at locations where signs or other furniture need to be erected.

Footpaths shall generally be at least 100mm higher than the edge of the adjacent carriageway.

Two footpaths are required, one either side of the road. Where the topography is such as to preclude the construction of more than one, permission of the Council's Roading Engineer is required, in which case the path shall be located adjacent to walling or on the house side of the carriageway.

Consideration should be given to minimising the amount of impervious surfacing, whilst still meeting pedestrian demands.

Where practical, consideration should be given to pavements sloped in such a way that they drain to a pervious surface to allow the water to infiltrate.

C.3.3 Widths

The minimum public footpath width shall be as specified in Table 1, in section C.1, as measured from the back of the kerb.

Private ways footpath widths shall be as specified in Section C.5.2.

Footpaths are to be widened at shopping areas and at any other high pedestrian trafficked areas as per Table 1, in section C.1.

C.3.4 Gradients

Gradients shall be not steeper than 1 in 5 (20%) or with intermittent steps and then not steeper than 1 in 6 (16.7%) between flights of steps.

A handrail as per drawing R-19-760 in Appendix C is required on all footpaths steeper than 1 in 7 (14.3%).

C.3.5 Crossfall

The crossfall shall be between 1 in 50 (2%) and 1 in 33 (3%).

This crossfall shall be to the street kerb unless there is an alternative drainage facility such as a roadside swale or rain garden.

C.3.6 CONCRETE FOOTPATHS

Footpaths alongside new roads shall be constructed in concrete.

Concrete footpath foundations shall be formed with a compacted basecourse material with a minimum depth of 75mm and complying with NZTA Standard Specification, M/04: 1995 (Wellington 1) AP20 basecourse. The sub-base material shall be compacted to achieve a Clegg Impact value, CIV, of not less than 25.

Concrete shall have a minimum 28 day compressive strength of 20MPa and shall be given a light brush surface finish. The concrete shall be 150mm thick with 665 mesh in industrial streets, 115mm thick in residential cul-de-sac turning areas, and 100mm thick elsewhere. Transverse construction joints shall be formed at spacing not greater than 6.0m.

C.3.7 Other Footpath Materials

New footpaths are to be constructed in concrete however there may be circumstances in which asphalt or feature pavements are appropriate.

Construction of footpaths in materials other than concrete is subject to the approval of the Council's Roading Engineer.

In these situations, subject to adequate subgrade strength as approved by the Roading Engineer, asphalt footpaths shall be constructed as follows:-

- a) For principal, collector and sub-collector roads, local roads and cul-de-sacs asphalt footpath construction consists of a compacted AP20 basecourse depth of 75mm, and compacted asphalt depth of 25mm, finished level with the top of the kerb,
- b) Around residential turning areas and in industrial streets, asphalt footpath construction consists of a compacted AP40 basecourse depth of 150mm and 200mm respectively, and compacted asphalt depth of 25mm, finished level with the top of the kerb.

A tack coat of bitumen emulsion shall be applied to the compacted basecourse surface and all sloped/vertical faces to be in contact with the asphalt, at a residual bitumen rate of 0.3L/m² prior to the asphalt paving.

The asphaltic concrete shall be Mix 6.

Asphaltic concrete mixes for footpath construction shall comply with the NZTA specification P/09 "Construction of Asphaltic Concrete Paving" and conform to the mix design properties in Table 23:

Mix	Application	Specified Marshall Flows	Air Voids %	Minimum Compaction Index	Minimum VMA (voids mineral aggregates)
6	Footpaths	35	3.0 – 4.0	0.09	17

Table 23: Footpath Asphaltic Concrete mix and design

C.3.7.1 Interlocking Concrete Block Paving

Footpaths constructed in interlocking concrete block paving shall be designed and constructed to the manufacturer's proven specifications and shall comply with NZS 3116:2002 'Concrete Segmental and Flagstone Paving'.

Blocks shall:

- have a proven abrasion resistance,
- have a skid resistance not less than a British Pendulum Value of 50 using a RAPRA 4S rubber foot on a wet surface,
- have a thickness not less than 60mm, and not less than 80mm at heavy duty crossings, around residential turning areas and in industrial streets,
- be appropriate for the situation.

Where interlocking block pavements are installed, a 24 month maintenance period shall be specified whereby the contractor shall be responsible for correcting all defects during this period.

C.3.7.2 Clay Brick Paving

Clay brick paving is not to be used for new subdivision development. The use of clay brick paving will only be approved when upgrading existing clay brick paved footpaths.

In situations where clay brick paving may be used, such paving shall be designed in accordance with the requirements of the Australia Brick and Paving Institute's Design Manual 1, January 1989, shall satisfy all the requirements of the Institute's Clay Paver Note 1, July 1993 and with reference to CBPI publication *Design Manual 1, Clay Segmental Pavements – A Design and Construction Guide for Sites Subjected to Vehicular and Pedestrian Traffic*.

C.3.8 Steps

Concrete steps shall be constructed in accordance with drawing R-17-763, in Appendix C.

The maximum rise between landings shall not exceed 2.5m.

A stormwater channel shall be provided alongside steps and landings, which shall drain to a sump and thence by pipe to an approved discharge outlet.

C.3.9 Pedestrian Accessways and Amenity Tracks

Pedestrian accessways should be constructed where they would provide pedestrians with a significantly shorter route between different roading locations and where areas of interest are involved such as schools, shops, reserves and bus routes.

Such land is to be vested in the Council as either a pedestrian accessway or, in the case of an Amenity track, as a Reserve (refer section F.5.1).

Pedestrian accessways shall be constructed in concrete.

The minimum boundary to boundary width shall be 2.1m.

The gradients and construction shall be as for footpaths, Section C.3, except that the minimum surface width shall be 1.5m.

Where stormwater is likely to flow along the accessways an adjacent stormwater channel shall be provided, outside the 1.5m width, which shall drain to a sump and thence by pipe to an approved discharge outlet.

Both sides of a pedestrian accessway shall be bounded by a fence in accordance with the Council's standard, see drawing R-19-760 in Appendix C.

C.3.10 HANDRAILING

Handrailing is required on the outer edge of roads or footpaths where there is a:

- drop due to a retaining wall, or,
- drop due to a batter face greater than 2.0m vertical height and steeper than 1.5 horizontal to 1.0 vertical, or,
- footpath gradient steeper than 1 in 7 (14.3%).

Any constructed barrier needs to be compliant with the New Zealand Building Code Clause D1.

Designers should note that in some situations a more substantial barrier will be required to meet the requirements of the Building Act.

Handrailing shall be constructed in accordance with drawing R-19-760 in Appendix C.

Handrail posts shall be embedded at least 800mm into firm, stable and level ground, and backfilled with 500mm compacted basecourse capped with a 300mm concrete backfill.

Specific design is required where the ground is neither level, stable, nor firm, and for situations in which the handrail may be subjected to higher loads.

C.4 ROAD AMENITY AND BERM CONSTRUCTION

Road design shall provide a high standard of visual amenity. The design proposal shall include a landscaping plan which provides for vegetation, street furniture and road elements, and which takes into account the following:

- the desirability of a visually attractive and comfortable street environment,
- provision of street trees that will remain healthy and able to mature in the space and location provided
- safety for road users, with the avoidance of unnecessary visual and physical obstacles,
- security for pedestrians,
- the potential for roadside landscaping treatments to influence vehicle speeds,
- the need to minimise on-going maintenance requirements,
- protection of services.

When an existing street is extended into or through a new subdivision, its streetscape (road width, footpaths, street trees, etc.) should also be continued or improved.

The CBD and suburban centres have special requirements and standards for street furniture. For more information reference should be made to the Council's operative Public Spaces Design Guide.

Avenue type planting (trees in a grass berm) is a minimum requirement for all streets however special requirements and standards for streetscape planting may be required. For more information reference should be made to the Council's Subdivision Design Guide, other relevant District Plan provisions and similar plans that guide best practice roading design.

C.4.1 Berm Design

Berms provide a range of ecological and functional services;

- Provides, protects and maintains biodiversity and habitat
- Location for gas, electrical and telecommunication utilities
- Reduces the visual impact of the road as it softens hard surfaces

No utility, including planting, can monopolise the berm space. Preference for some services to be back against the boundary

Infrastructure and utility services should be planned at the same time as the street planting so tree and a garden planting does not, and is not, compromised by the provision of services.

Planting and utilities provision should be designed to respond to the local road geometry and road reserve design.

Berms must be adequately designed, constructed and prepared by the developer as outlined in Section C1.6 and Table C1.

Layout plans and locations of street planting provisions must be discussed with the Council in the planning stages prior to the lodging of finalised plans.

Appropriate planting shall be included in accordance with the Councils plans and policies.

Trees and other planting shall be positioned to minimise obstruction of vehicular accessways and provide good visibility for the travelling public.

In streets with retaining walls (those below the road in particular) there is likely to be limited space in the berm for utilities and trees. Alternative location and design proposals may be considered at the discretion of the Council.

Berms, tree pits swales and rain gardens will be sufficient width to allow for adequate growth of plants and ease of maintenance. It is important to provide adequate means for tree growth and on going tree health, at the same time allowing for the infiltration of water.

Street planting proposals and considerations will be assessed through the resource consent process.

Where slope, topography and soils permit, and where the pavement foundation will not be adversely affected by high water tables, vegetated open channels or retention swales should be located in the berm area to convey and dissipate stormwater. New Zealand Water and Environmental Research Foundation's (NZWERF) On-Site Stormwater Management Guideline provides the information needed to select and design appropriate on-site stormwater management devices for application in New Zealand.

The design guide SNZHB44:2001, Subdivision for People and the Environment promotes innovation in developments and provides alternative methods of compliance in on-site stormwater management.

As built plans are required for all street planting features, including tree pits, rain gardens and swales.

A 12 month maintenance period shall be specified whereby the contractor shall be responsible for ensuring an adequate grass strike, maintaining and mowing the berm, and correcting all defects during this period. Where trees or amenity planting is carried out in the berm, a 36 month maintenance period must be specified (refer Tree Planting (Construction) section below).

Street furniture must be robust and durable and meet the Council's standards and specifications where available.

C.4.2 Street Planting (Construction)

Trees will be planted in all public roads to create a better environment for neighbouring residents and road users and to provide wider environmental and social benefits.

The Council would rather carry out street tree planting on behalf of the developer but understands there are circumstances where developers

may wish to carry out the planting themselves. Where a developer carries out the planting a Council recommended contractor must be used.

Where the Council is to carry out the planting, a payment to the Council's Parks and Gardens unit will be required for tree planting to occur once the development has been completed (i.e. after all construction is finished) and to provide for ongoing maintenance for a three year establishment period. The payment will be a minimum based on an average of provision of one tree per allotment but final tree numbers planted will depend on practicality of planting and any designs details required by the Resource Consent Process or District Plan if relevant.

Planting of trees by developers is subject to prior approval by the Council. (refer to details below and section C1.6).

All road berm areas shall be top soiled to a lightly compacted minimum depth of 75mm, and sown with grass.

At tree planting locations, suitable topsoil depth will be provided (minimum 600mm, actual determined by tree type, size and soil condition) across the complete berm width and along the berm length twice the distance of the width. (i.e if the berm is 1.5m wide, topsoil to a suitable depth for tree planting will be provided that is 1.5m wide and 3m long).

All street planting shall be carried out in the following manner with appropriate detail provided to ensure:

- planting is well planned and integrated into the rest of the street environment in such a way that it can continue to mature without disturbance to other road infrastructure (both above and below ground) and minimum ongoing maintenance
- best practice planting specification are used (for example, the ground is properly prepared, plants are in good health etc)

A complete list of all landscaping in the road reserve (including for example tree species and numbers, irrigation equipment, tree stakes, square metre areas and species/numbers of any planting other than street trees such as amenity type planting or grass) must be provided to enable the Council to plan for ongoing service level requirements and maintenance costs.

C.4.2.1 Tree Sizes

Trees shall be between 1.0m and 1.5m in height (planted) and preferably in Pb 40 – Pb 95 containers at the time of planting.

C.4.2.2 Tree Types

Prior to purchase of plants, the Parks and Gardens Unit of the Council shall be consulted to determine suitable species.

C.4.2.3 Positioning of trees and other vegetation

Positioning will depend of street design detail. Table 1 in section C1.7 describes minimum berm widths for standard planting in the berm.

Trees will be located centrally within the berm width and appropriately spaced along the berm length depending on the species of tree used and street character desired.

Other types of planting will be positioned to ensure appropriate space for the plants to mature without interfering with the functioning of the street (i.e maintaining traffic site lines, avoiding pedestrian trip hazards etc) and to minimise ongoing maintenance requirements.

Where possible, trees and underground services should be located away from each other. Table 1 in section C1.7 outlines the ideal scenario of separation into two berms. Where two berms on each side of the road is not possible, then ducts must be provided.

C.4.2.4 Planting

Tree planting is to occur in a subdivision development after the houses are built.

Planting must take place from late autumn (May) – early spring (Sept).

Planting shall be carried out by a Council recommended horticultural supplier or contractor.

When planting, holes are to be dug at least twice the diameter and 100mm deeper than the height of the container the plant is supplied in. The plant shall be

positioned in the hole at the depth it was container grown, and backfilled with topsoil, progressively lightly compacted to surrounding finished soil level.

A proven root guard material for trees shall be placed to line the sides of the hole to a depth of 750mm. In areas of tree groups the root guard material may alternatively extend around the perimeter of the area.

The resident subsoil in the bottom of each hole is to be thoroughly broken up to a depth of 250mm to allow percolation of water.

The planting medium is to be high quality loam, free from roots, weeds and other rubbish and from gravel and stones greater than 20mm in diameter.

Low vegetation close to walkways or the street edge should be below the level of a driver's eye-line and not interrupt sightlines.

Generally when a high vegetation tree matures it should be at least 2.0m above ground level to maintain motorist and pedestrian sightlines.

C.4.2.5 Staking

Each tree shall have a minimum of two stakes (generally not less than 1.2m) located 50mm away from the base and driven securely into the ground with one on the prevailing windward side of the plant and the other opposite.

The stake shall protrude at least 600mm above ground.

An approved cloth tie shall be used to attach the stem to the stake. Stakes are to be removed once the tree is established or after three years (whichever is sooner).

C.4.2.6 Weed Control - (in cluster areas)

The entire planted area or tree pit area shall be covered with bark mulch to a depth not less than 100mm and across the berm width and length twice the distance of the width

C.4.2.5 Maintenance

A 36 month maintenance period is required for all trees and planting in the road reserve. During this period minimum requirements are:

- Plants shall be watered and cared for to ensure they are still healthy during and at the end of the maintenance period. A watering schedule shall be provided and implemented.
- Annual mulching
- Check and replace stakes as required
- Weeding if necessary
- If tree fails or dies, record death, replace tree and begin three year period again.
- Refer also to Section A.18.

C.4.3 Road Lighting

Lighting is required on public roads and pedestrian access ways. The lighting is to meet all requirements of the AS/NZS 1158 "Road Lighting" Standard, including design to an appropriate lighting category.

Street lighting equipment (poles, outreach arms and lanterns) is to be consistent with the types and sizes commonly in use by the Council.

Underground power supply reticulation is to be provided and must meet all the requirements of the network provider.

The Council does not supply power to, and does not maintain, lighting equipment on private ways. The developer is to make arrangements directly with an energy retailer for power supplies to lighting on private ways.

Lighting is not normally required for rural situations. However, road side delineator posts in accordance with the NZTA Manual of Traffic Signs and Markings (MOTSAM) are to be provided.

C.4.4 Road Name Signs

Road name signs shall be mounted on 60mm O.D. galvanized steel posts painted or finished in white.

Signs are to be manufactured and erected in accordance with drawing R-44-780 in Appendix C and the Council's Specification RT 600-010, Signs.

Road name signs shall be erected at all road intersections. "No Exit" signs shall accompany them if applicable.

For each T intersection, both a double sided name plate indicating the side road, and a single sided name plate indicating the through road, shall be mounted on a single pole in the berm of the through road and opposite the side road.

To minimise future maintenance obligations, entrance signs to subdivisions shall not be erected.

C.4.5 Trenching / Services

A suggested location for the services under the road is given on drawing R-2-704, in Appendix C.

Trenching work in legal road shall be carried out in accordance with the Council's operative Code of Practice for Working on the Road. This requires a "Road Works Notice" to be obtained and any associated fees paid.

C.4.6 Concrete Mowing Strips

All poles, sign posts, light standards, power transformers, boxes etc. set in the grass berm shall be surrounded with a concrete mowing strip.

The mowing strip shall be flush with the finished berm level and provide a 150mm wide concrete surround to the base of the item.

C.4.7 Road Markings

Road markings, including reflective raised pavement markers (RRPMs), if required, shall be installed in accordance with the following NZTA documents:

- Traffic Control Devices Rules Ministry of Transport 2004,
- Manual of Traffic Signs and Markings (MOTSAM); Part 1 Traffic Signs; NZTA/Ministry of Transport, 1992,
- Manual of Traffic Signs and Markings (MOTSAM); Part 2 Markings; NZTA/Land Transport Safety Authority, 1994,

All lines other than parking markings shall be reflectorised.

Road marking paint and its application shall be in accordance with the Council's Specification RT 800-003, Road Marking.

C.4.8 Bollards

Bollards, if required, shall be installed in accordance with the Council's standards.

C.4.9 Rubbish Bins

Rubbish bins, if required, shall be installed in accordance with the Council's standards.

C.4.10 Bus Stop Shelters

Bus Stop Shelters, if required, shall be installed in accordance with the Council's standards.

C.4.11 Seating

Seating, if required, shall be installed in accordance with the Council's standards.

C.4.12 Fencing

Fencing in the residential zoned areas shall be in accordance with the ruling in the current District Plan, and the Fencing Act 1978.

C.4.13 Traffic Signs

Traffic signs must be approved by Council Resolution and installed in accordance with the drawing R-44-782 in Appendix C and the Council's Specifications RT 600-010 Signs, and RT 600-011 Sign Poles.

C.5 PRIVATE WAYS

Private ways include rights-of-way, access lots and driveways.

Table 1, in section C.1 has been updated and now limits the number of household units a private way can serve. A private way is not allowed to serve more than 12 household units or 6 properties.

C.5.1 Entrance / Exit

The entrances/exits of private ways are to be positioned such that accident problems are not created. In this respect sight distances given in figure 1 and Table 9 in section C.1.9, shall be used as a guide.

For private ways where existing road geometry precludes the use of the data in table 9, then the Land Transport Safety Authority Guidelines for Visibility at Driveways RTS6 may be used.

Attention is also drawn to requirements in the District Plan controlling visibility and distances from intersections.

NOTE: The minimum distance for an entrance/exit from an intersection shall be determined using table 24. These determined distances are as measured at right angles from the projected property boundary of the intersecting road.

Classification of street which the access joins	Central City (m)	Other areas (m)
Arterial	20	20
Principal	20	20
Collector	20	15
Other streets	15	10

Table 24: Minimum Distance of Vehicle Access from Intersections

All entrances to private ways shall be constructed as a footpath crossing facility giving priority to pedestrians. This will require the vehicle crossing to:

- Be at a right angle to the footpath,
- Be as narrow as possible,
- Not affect the grade, crossfall, colour and texture of the footpath.

There are two types of vehicle crossing:

1. **Light duty vehicle crossing** : for up to two single residential properties or four dwelling units

2. **Heavy duty vehicle crossing** : for three or more residential properties or 6 or more dwelling units and any commercial or industrial properties

Vehicle crossings may be constructed either in conjunction with the original kerb and channel installation, or at a later stage once vehicle access locations have been determined, or as and when crossings require modifications.

Construction details for both light and heavy duty crossings are shown on plan number R-24-721. This plan allows for a number of options, depending on the extent of the works required, and whether the crossing is light duty or heavy duty. Where a grass berm separates the footpath from the kerb, the crossing ramp shall extend from the kerbline to the edge of the adjacent footpath, or 500mm, whichever is the greater.

The splay length along the kerbline, either side of the crossing, shall be 500mm.

In situations where excessive road camber, kerb height, or footpath crossfall exist, approval may be given for more extensive work to modify the surrounding features to achieve a functional vehicle crossing. Drawing R-24-720 "Vehicle scraping Mitigation" shall be used to identify such situations.

Modifications may include:

- Raising the channel (refer drawing R-24-722)
- Lowering the footpath (refer drawing R-24-723)

Note - Both these situations require detailed design and the approval of the Council's Roading Engineer.

C.5.2 Minimum Widths

The minimum widths shall be as follows except that additional width shall be provided to accommodate widening on horizontal curves.

C.5.2.1 Residential private ways:

For residential private ways minimum widths are determined by the number of properties served:

- i) Serving 1 to 3 properties (not more than 6 household units), 2.7m for carriageway, no footpath, 3.0m boundary to boundary.

More width may be needed when retaining walls are required. On curved sections of road, additional carriageway width is needed.

In situations where more than 1 housing unit uses a private way and where the private way is more than 50m long a passing bay shall be provided at least once every 50m.

Passing bays shall be positioned within those lengths to achieve a clear line of sight from the passing bay to the start and end of the private way or to the next passing bay.

The width of the carriageway at a passing bay shall be not less than 5.5m for a minimum 5.0m length with a further minimum 4.0m taper at each end.

- ii) Serving 4 to 6 properties (7 - 12 household units), 5.0m carriageway. This allows for a 3.0 metre carriageway and a 2.0 metre parking lane. Parking is not generally permitted in a right of way. An appropriate easement must then be used to allow for parking to be permitted.

More width may be needed when retaining walls are required. On curved sections of road, additional carriageway width is needed.

The minimum boundary to boundary width shall be 7.5m for the first 12m and 6.5m thereafter. The widening for the first 12m is for passing so as to minimise queuing on the road.

Where the private way is more than 50m long a passing bay shall be provided at least once in every 50m length. This is in addition to any parking lane. The legal width will need to be increased above the minimum width indicated in Table 1.

Passing bays shall be positioned within those lengths to achieve a clear line of sight from the passing bay to the start and end of the private way or to the next passing bay.

The width of the carriageway at a passing bay shall be not less than 5.5m for a minimum length 5.0m with a further minimum 4.0m taper at each end.

C.5.2.1 Non Residential private ways:

For non residential private ways minimum widths are determined by the number of lots served and estimated number of trips per day:

- i) Serving a single unit where the estimated number of trips/day does not exceed 100, 3.5m for carriageway, no footpath, 4.0m boundary to boundary.

Where the private way is more than 50m long a passing bay shall be provided at least once in every 50m length.

Passing bays shall be positioned within those lengths to achieve a clear line-of-sight from the passing bay to the start and end of the private way or to the next passing bay.

The width of the carriageway at a passing bay shall be not less than 6.0m for a minimum length 6.0m with a further minimum 4.0m taper at each end.

- ii) Serving more than one unit, or where the estimated number of trips/day exceeds 100, 5.5m for carriageway, 1.0m footpath, 7.0m boundary to boundary.

Note: For private ways some flexibility can be exercised in achieving physical separation of the footpath from the road with other techniques other than the standard kerb and channel detail. Any change will need prior approval.

C.5.3 Curves

Horizontal curves with an inside kerb radius of less than 4.0m on residential private ways, and 4.5m on non-residential private ways should be avoided where possible.

C.5.4 Gradients

The centre-line gradient shall generally be not steeper than 1 vertical in 5 horizontal (20%) except that in special circumstances a steeper gradient may be permitted subject to specific design and safety considerations.

A driveway serving 6 or fewer household units, a gradient of up to 25% (1 in 4) may be approved for the straight line or the inside of any curve on the driveway.

Transitional grades are required at both ends. At the street end the transition gradient shall not exceed 1 in 8 (12.5%) up (above the street) or, 1 in 12 (8.3%) down (below the street), for a length of at least 2m from the back of the footpath.

Note that the District Plan requires a gradient of 1 in 10 (10%) for the first 5.0m beyond a footpath. This is particularly important where driveways fall from the road. If a steeper gradient is used, resource consent will be required.

All trafficable surfaces shall comply with the ground clearance template in AS/NZS 2890.1 :2004 Parking Facilities Part 1: Off-street car parking Appendix C.

The preferred means of compliance is to insert transition grades as outlined in AS/NZS 2890.1 :2004 Parking Facilities Part 1: Off-street car parking, Section 2.5.3 (d).

C.5.5 Turning Areas

A turning area shall be provided in private ways where either:

- a) there are more than 2 properties (4 household units maximum) served, or,
- b) the sight distances at the entrance/exit are substandard or marginal compared to those in figure 1 and table 9 in section C.1.9, or,
- c) the private way is longer than 50m, or,
- d) the gradient of the driveway exceeds 1 in 5 (20%) uphill when exiting.

Turning areas shall generally be either a “Circular”, “Y”, or “T” shape. Examples are given in drawings R-9-705 to R-9-707 inclusive, in Appendix C.

The gradient on a turning area shall be not steeper than 1 in 10 (10%).

C.5.6 Crossfall

The crossfall shall be 1 in 33 (3%) to provide sufficient slope for stormwater discharge into the adjacent private way channel without ponding.

C.5.7 Kerb and Channel & Stormwater

Kerb and channel is used to confine stormwater runoff to the private way, and to protect the edge of the private way.

A standard kerb and channel shall be constructed on both sides (where stormwater outlets are on both sides) or standard kerb and channel on one side and standard kerb (or similar support edging) only on the other.

Suitable provision shall be made for the disposal of stormwater from the private way.

Stormwater may be directed across a public footpath only where the paved area of the private way is less than 30 square metres, and the public footpath has an impervious surface.

Private way stormwater control is required where the paved area exceeds 30 square metres (30m²).

No stormwater shall discharge onto neighbouring property (including legal road and other Council land), except as noted above.

In rural situations where the access to a private way crosses the street drainage channel a minimum 300mm internal diameter reinforced concrete pipe culvert shall be installed.

The culvert shall be laid with the invert level aligned with the design invert level of the drainage channel. (Also see section F.3 Streams).

C.5.8 Aggregate Depths

As a general guide for residential use:

- Serving up to two properties – compacted basecourse depth of 100mm.
- Serving three or more properties – compacted basecourse depth of 150mm.

These depths are based on the subgrade having a minimum soaked CBR strength of 7. Subgrade improvement may be necessary to achieve this strength.

Basecourse depths for non-residential use shall be determined by specific design.

C.5.9 Sealing / Paving

Rights-of-way and shared accessways must be sealed or paved for their entire lengths.

The carriageway may be surfaced with one of the following methods except that where a private way has a gradient steeper than 1 in 8 (12.5%) the carriageway shall not be surfaced in sealing chips:

- a) A suitable bitumen cut-back binder covered with Grade 4 sealing chip followed by a second coat seal, consisting of a suitable bitumen cut-back binder covered with grade 3 sealing chip. Both grades are to be in accordance with NZTA specification M/06.
- b) A minimum thickness of 25mm of asphaltic concrete on a basecourse primed with bitumen at a residual rate of 0.3L/m². The asphaltic concrete shall comply with NZTA specification M/10, Mix 10.
- c) An interlocking block paving designed and laid to manufacturer's specifications and in accordance with NZS 3116: 2002.
- d) Porous/semi-porous paving may be used where drainage is provided for and soils and slope allow. The successful implementation of porous paving depends on individual circumstances; the final decision rests with the Council's Roading Engineer.
- e) Residential private ways may be constructed in 100mm of reinforced concrete with a 28 day compressive strength of 20MPa. The reinforced concrete shall be placed on a 75mm compacted basecourse layer, or 150mm of unreinforced concrete on the same base.
- f) Non-residential private ways constructed in concrete shall be specifically designed.
- g) Residential private ways carrying more than an estimated 100 vehicle movements/day constructed in concrete shall be specifically designed.

In rural situations only, where the street carriageway is not sealed and is unlikely to be sealed in the near future, the private way may remain unsealed. Otherwise the first 15m of the private way shall be sealed.

In rural situations where the grade is greater than 1 in 8 (12.5%) the private way must be sealed for its entire length.

Sealing should be carried out only during warm dry settled weather between 1 October and 15 March. If a suitable adhesion or emulsion agent is used, sealing may be carried out outside these dates. On no account shall sealing or paving or preparatory work be carried out if there is not to be warm (i.e. not less than 10°C)

settled weather for the next 48 hours. A report shall be provided for each day's sealing activity. Refer sample proforma Sealing Report in Appendix C.

C.5.10 Guard Rail or Fence

A guard rail and / or fence are required where a danger or hazard would otherwise be presented for neighbours or to the public.

The barrier must be designed and of sufficient strength to resist the vehicle loads as indicated in standard AS/NZS1170:2002 Part 1 "Structural Design Actions" for vehicles for direct impact.

C.5.11 Parking Areas

A single car parking area shall have a minimum length of 5.4m and a minimum width of 2.4m, with an additional 300mm clearance on each side where there is an obstruction to vehicle door opening.

The gradient of the parking surface shall not exceed 1 in 20 (5%) in any one direction.

Where practical, the use of pervious materials for parking areas is encouraged, provided the strength of the underlying pavement is not compromised by the high water table and saturated foundation.

Where soils, topography and slope permit, runoff shall be directed from the parking area to rain gardens, soak pits or similar vegetated channels. The successful implementation of alternative solutions depends on individual circumstances; the final decision rests with the Council's Roading Engineer.

On no account shall material be permitted to be "tracked out" from unsealed roads to sealed roads.

C.6 AS-BUILT REQUIREMENTS

Council requires the following information concerning new road construction.

- Benkelman Beam test report prior to sealing the road pavement, refer to clause C.2.7
- Road pavement Sealing report, refer to clause C.2.8

- Certificates of the concrete strength of all concrete used in the footpaths.

Dimensions and other information relating to Transportation shall be provided for all assets within the road reserve, accessway or service lane:

- 1) Length, width and number of lanes within the carriageway section
- 2) Total area of parking bays and bus bays within the carriageway to the nearest 0.1m².
- 3) The total area at intersections less the area associated with length x width, to the nearest 0.1m².
- 4) The total area associated with the traffic islands within the carriageway section, to the nearest 0.1m².
- 5) Road names - of the road constructed and any other roads intersecting
- 6) Designated public transport stops, including location, bus routes, shelters, seats, bins, pads, timetables, signs, sign mounting, road marking, bus lanes, park and ride sites, and any pedestrian through paths leading to railway stations.
- 7) Pedestrian and cycle movements related to key features such as bus stops, schools and shopping areas. Road crossing locations should be identified in the plan including any median islands.
- 8) Traffic calming measures; showing street design and layout including; bends, vertical curves, junctions and the control of vehicle speeds both laterally (slow points, roundabouts, street narrowing, median islands), vertically (humps, platform intersections, platform pedestrian crossings, school crossings, and bicycle crossings), signposting (including the negotiation speed), and lane marking.
- 9) Footpaths, accessways, amenity tracks, kerb ramps for prams and disabled people, vehicle crossings, lighting, steps, safety rails.
- 10) All signage
- 11) Street furniture, including litter bins, bollards, sign posts, pedestrian and cycle movements, designated public transport stops and other lane markings, street and/or path lights, trees, signal areas paved area
- 12) Details of kerb and channel, subsoil drains, intakes, sumps (including capacity) and leads.
- 13) Gradients on the inside kerb, horizontal curves, vertical curves, and super-elevation

- 14)** Road reserves assets including, grass berms, rain gardens, soak pits or similar vegetated channels etc, mowing strips and Trenching/Services.

PART D. WASTEWATER AND STORMWATER NETWORK DESIGN

SEE REGIONAL STANDARD FOR WATER SERVICES IN APPENDIX

PART E. WATER SUPPLY DESIGN AND CONSTRUCTION

SEE REGIONAL STANDARD FOR WATER SERVICES IN APPENDIX

PART F. OPEN SPACES

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OBJECTIVES

The object of this section of the Code is to emphasise sustainable integrated management of the natural environment to ensure resilience to environmental changes.

The Council wants to promote the interrelationship between land and water. Working with, rather than against, nature. This means setting aside sufficient space for natural systems to function without the need for mitigation or costly remedies. Natural spaces including water bodies are indispensable to life and thus contribute to social values.

Focus is given to habitat protection - maintaining valued landscapes, ecosystems and habitats and natural features. This includes streams, watercourses and wetlands, and the protection of aquatic habitats and associated native vegetation.

Retention of landforms, streams –“their margins”- and habitats is important to sustainability, including the reduction of adverse effects of sedimentation. Retaining areas of bush and streams is for water quality and quantity reasons as well as ecological/biodiversity benefit. These areas have the ability to retain flows during storm event and also filter contaminants out of stormwater. These are the two aims of stormwater management - reducing flooding and enhancing water quality.

Communities are enhanced through access to open spaces. Refer to *Capital Spaces, Open Space Strategy for Wellington* (1998 and currently under review) for comprehensive information, values and management direction for Wellingtons open spaces.

Values associated with Open Spaces can be managed through the protection and enhancement of open space, natural areas, streams and the provision of parks close to and well connected with neighbourhood centres, in locations that are within close walking distance.

Please see below for further references to current operative Council policy, standards and documents that must be considered.

F.1 PLANTING

All planting must take place from late autumn (May) – early spring (Sept).

Minimum depth for topsoil is 300mm. This will depend on soil and species to be planted.

Minimum depth for mulch is 100mm. Mulch is to be of organic material and of composition that is unlikely to be blown away.

Plant stakes may be required depending on size, type and location of plants.

Any planting next to existing mown grass areas must be marked to avoid damage while it establishes.

All planting must be a minimum of 1m from existing track edges.

Any development near (i.e. within the drip line), or involving, an existing public tree must adhere to the Council's draft Working Around Trees document and must not be carried out without prior approval from councils Parks, Sports and Recreation business unit.

Failure to observe any of the rules will result in a substantial financial penalty that increases with each occurrence as per Tree Preservation Guidelines/ District Plan.

Weed control will be required for the first 36 months or until a closed canopy is established as per clause A.18 Maintenance Period.

Dead plants must be replaced throughout the maintenance period to maintain vegetation density and achieve canopy closure.

All planting must be supplied and carried out in accordance with horticultural best practice.

Plants must be eco-sourced from the Wellington area and species appropriate to the area being planted. Professional advice shall be taken where necessary.

Refer also to the Council Planting Standard (2012).

F.1.1 Street Planting

Refer to Section C of this Code.

F.1.2 Ornamental Planting

Ornamental planting is appropriate in some open spaces in Wellington as determined by parks purpose, use and management. The Open Spaces Strategy, the various Reserve Management Plans and specific park design or park entrances proposals will guide appropriate use of ornamental planting.

Any ornamental planting must not threaten indigenous biodiversity.

All planting will be carried out in accordance with horticultural best practice.

F.1.3 Revegetation

Wellington eco-sourced native plants must be used for all revegetation. These must come from a Council approved source.

Species will depend on the location and a species list will be approved as part of the landscape plan.

Native species likely to be required are:

- Toetoe (*Cortaderia fulvida*)
- Manuka (*Leptospermum scoparium*)
- Kanuka (*Kunzea ericoides*)
- Karamu (*Coprosma robusta*)
- Akiraho (*Olearia paniculata*)
- Ngaio (*Myoporum laetum*)
- Kohuhu (*Pittosporum tenuifolium*)
- Tarata (*Pittosporum eugenioides*)
- Wineberry (*Aristotelia serrata*)
- Koromiko (*Hebe stricta*)
- Mapou (*Myrsine australis*)
- Five finger (*Pseudopanax arboreus*)

For revegetation areas requiring fire resistant species ('buffer zones'), planting is likely to include:

- Putaputaweta (*Carpodetus serratus*)

- Kanono (*Coprosma grandifolia*)
- Taupata (*Coprosma repens*)
- Karamu (*Coprosma robusta*)
- Kotukutuku, Tree Fuchsia (*Fuchsia excorticata*)
- Hangehange (*Geniostoma ligustrifolium*)
- Papauma/Broadleaf (*Griselinia littoralis*)
- Kawakawa/Peppertree (*Macropiper excelsum*)
- Five Finger (*Pseudopanax arboreus*)
- Poroporo (*Solanum aviculare*)
- Flax (*Phormium tenax*; *P. cookianum*)

In-fill planting may be required throughout the maintenance period.

The Department of Conservation guide Protecting and Restoring our natural heritage – a practical guide, shall be referenced.

Guidance and approval on ground preparation and mulching must be sought from Council.

F.1.4 Turf

The type of grass planted will depend on the use of the area, soil or sand type, irrigated or not and shaded or not.

Guidance and approval on the varieties and situations in which to be used must be sought from Council.

F.1.5 Maintenance

In addition to the above the Subdivider shall maintain the following aspects of the works (as a minimum requirement) for a period of 36 months:

- a) Grassed areas are to be attended to obtain a good strike,
- b) Street trees and street planting – refer to Section C,

- c) Any massed areas of shrubs and trees are to be kept in a healthy state, which is weed free and the mulch is to be topped up to maintain the specified depth. Irrigation (temporary and/or permanent) may be required.
- d) Any planting is maintained as required by the conditions of a resource consent or any other agreement with Council.
- e) Any areas of revegetation or riparian buffer planting are to be kept weed free and the mulch is to be topped up to maintain the specified depth,
- f) Any plant failures/deaths must be replaced throughout the three year maintenance period. Only established vegetation will be considered compliant at the end of the three year period and a bond may be taken for newly planted 'replacement planting' to ensure establishment.

The above aspects will be inspected for compliance at the end of the 36 month period.

F.2 NATIVE FOREST AND SHRUBLAND PROTECTION

Developers will ensure that natural ecosystems are able to continue to function and are not degraded or lost as a result of the subdivision or development. Enhancement of existing natural ecosystems should be considered a priority as a form of mitigation.

Greater Wellington Regional Council's document "Managing your bush block; a guide to looking after indigenous forest remnants in the Wellington region" shall be used as a guide in this matter. Specifications contain clauses adequately covering this requirement.

Fencing, with approval and guidance from Council, should be constructed to exclude domestic stock. For small forest remnants, this fencing should be placed 5-6 m away from the forest edge and a protective buffer zone planted.

Pest animal control such as possum, rodent, mustelid, goat or pig control may be required. Seek advice from Council's Parks and Gardens unit about the best methods of control.

Weed control may be required if there is a substantial weed problem in the forest remnant and should be carried out prior to fencing and/or further planting.

Weeds must be carefully identified and advice sought from Council for the best methods of control.

Planting to seal off the forest edge may be required. Wellington eco-sourced native plants must be used from a Council approved source. Refer to section F1 for appropriate species.

In some cases where the forest has been severely fragmented and disturbed, enhancement planting may be required. This involves 'in-fill' planting of the forest. Eco-sourced natives must be used, and Council will advise of the appropriate species and locations for enhancement planting.

F.3 STREAMS

The Council's Biodiversity Action Plan (2007) states that the natural character of streams is to be retained wherever possible.

There shall be no piping, straightening or channelling of streams, including ephemeral streams, watercourses and wetlands unless no other options are available and Council permission is granted.

A resource consent from Greater Wellington is required in each case. Also a Council land use resource consent is required for work within 5m of a watercourse.

Developers can consider the 'day lighting' of streams that are now piped to enhance amenity values and improve water quality.

Ensuring that new culverts are laid below the level of the stream bed and as same width as channel of the stream.

A riparian native vegetated buffer system shall be created along all perennial and intermittent streams. The buffer should be clearly marked on plans.

Limits of disturbance of the buffer will be established during application, construction and post development stages.

F.3.1 Fish passage

The construction of structures such as dams, culverts, erosion control devices, and stream bed modifications prevent fish from accessing otherwise suitable habitats upstream.

Where obstructions including culverts and weirs are deemed necessary, fish passage must be built to allow fish to climb around the structure. The addition of concrete 'logs' in channelled or piped streams to create pools and resting places for fish swimming upstream must also be included.

Key requirements for fish friendly culverting is reduced water speed, sufficient water depth, and the prevention of erosion. These can be achieved by applying a minimum stream bed slope where the culvert is positioned so gradient and alignment are the same as the existing stream, and ensuring that the culvert is at least as wide as the stream bed during normal flows.

This will be carried out in accordance with Greater Wellington Regional Council's document "Fish-friendly culverts and rock ramps in small streams".

For guidance for the construction and retrofitting of in-stream structures to allow the upstream passage of fish, reference should be made to Auckland Regional Councils document "TP131 Fish Passage Guidelines for the Auckland Region 2000".

F.3.2 Riparian Buffers

Although reduction of contaminants is a widely recognised function of riparian buffers, they also contribute significantly to other aspects of water quality and physical habitat. Habitat alterations, especially channel straightening and removal of riparian vegetation, continue to impair the ecological health of streams more often and for longer time periods than contaminants.

Generally, the provision of a 10m minimum buffer width is recommended, with narrower or wider options being considered appropriate as indicated by site constraints or opportunities.

For small waterways (or where wider planting is not obtainable) a 5-6 m buffer is recommended.

- For small streams (3 m max width), low stature shrubs and grasses will be sufficient.
- For medium sized streams (6 m max width), small trees (2-4m) are be required
- For large streams/rivers (12 m max width) large trees (>4m) large trees are required.

Species planted must be Wellington eco-sourced natives or appropriate species from a Council approved source.

Riparian planting must occur from late autumn (May) to early spring (Sept).

When choosing plants, consideration must be given to the stream bank substrate and topography, as well as to the different parts of the stream bank e.g. *stream edge* (frequently damp, prone to erosion), *flood area* (stream flat and lower slope prone to regular flooding), *back wetland or spring* (areas wet for much of the year), *slope* (drier conditions).

Larger plants must be planted away from the stream edge. Shrubs, like manuka and hebe are suited to the mid bank area, and plants that can cope with wet soils and occasional flooding, like cabbage trees and toetoe, can be planted near the stream edge.

Plants should be spaced 0.9 m apart and be at least size PB3 or PB5 for planting next to stream edge.

Appropriate stream edge and flood plain plants (those that are able to lie flat when flood waters flow over them) include:

- Toetoe (*Cortaderia fulvida*)
- Pukio, sedge (*Carex secta*)
- Small swamp sedge (*Carex virgata*)
- Mahoe (*Meliccytus ramiflorus*)
- Cabbage tree (*Cordyline australis*)

Appropriate species to plant for wetland edges or spring areas and slope areas are:

- Manuka (*Leptospermum scoparium*)
- Karamu (*Coprosma robusta*)
- Harakeke (*Phormium tenax*)
- Makomako/wineberry (*Aristotelia serrata*)
- Kohuhu (*Pittosporum tenuifolium*)
- Akiraho (*Olearia paniculata*)
- Ngaio (*Myoporum laetum*)
- Toetoe (*Cortaderia fulvida*)
- Cabbage tree (*Cordyline australis*)

Weed control will be required for the first 24 months or until a closed canopy is established as per clause A.15 Maintenance Period. Weed control will be carried out in accordance with Greater Wellington Regional Council's document "Controlling problem weeds in riparian zones: Restore our riparian zones".

F.4 STORMWATER CONTROL

The Council seeks to promote low impact design concepts to stormwater management to both improve water quality and curb peak runoff volumes.

Sediment and associated contaminants in stormwater can be removed by a range of treatments, including directing runoff to vegetated swales and infiltration trenches, through to interceptor and treatment structures. These devices capture runoff and release it at slow rates to filter out contaminants at source and significantly reduce the effects of discharge into receiving environments. They allow suspended solids to settle, and in some instances, runoff to be absorbed (infiltrate) through to the ground, thereby reducing the risk of flooding.

Stormwater must not be discharged to the ground and/or to land sloping down to receiving waters in a manner that may cause or contribute to ground instability and erosion.

There are no adverse environmental effects from overland flow.

Consideration will be given to using playing fields and other public open spaces as retention ponds (dry or wet).

F.5 RESERVE TRACKS

These are pedestrian accessways that are predominantly for access to reserve areas, e.g. Town Belt and to create "green networks" for pedestrian connectivity (refer e.g. to Northern Growth Management Framework). The track network throughout Councils Parks and Open Spaces is extensive and varies in style dependent on use and park type, character and location.

The Wellington city council Open Space Access Plan (2008) should be referenced in all track proposals. Councils Capital Spaces Open Space Strategy for Wellington (1998) and various the Reserve Management Plans (e.g the Town Belt Management Plan and the Northern Reserves Management Plan) also refer to reserve tracks networks.

Tracks shall be designed and laid out in accordance with the Council Requirements specified in Councils tracks standards and NZ HB 8630:2004 Tracks and Outdoor Visitor Structures.

Any services in reserves must be buried and follow walking or access tracks except where otherwise agreed with Councils Parks, Sport and Recreation.

Open spaces including playing fields and reserves must allow for access for future maintenance.

Where soakage is available, and approval granted from the Drainage Engineer and Parks, Sport and Recreation, consideration should be given to constructing tracks with a camber so water is directed to vegetated channels.

Lighting will not normally be necessary

The minimum boundary to boundary width for reserve entrances shall be 10m.

F.6 CAR PARKING

Car parks provided in parks and reserves are to be compliant with Council's Roading Specification.

Where soils, topography and slope permit, run off must drain through permeable or porous paving or be directed from the car park to rain gardens, swales or similar vegetated channels. These channels with provisions for infiltration or detention can either:

- Percolate to the ground where capability is available and is satisfactory to the Drainage Engineer.
- Temporarily store run off and release at a slower rate to the public stormwater system

However overflows from the channel must drain to an approved outfall.

F.7 FENCING

Fencing shall be installed in accordance with approval and guidance from Council with regard for the Fencing Act 1978.

When adjacent to private property both sides of a pedestrian access track to a reserve shall be bounded by a fence in a way that retains visual permeability and to maintain overlook from residential properties. Where there is existing native vegetation at the boundary fencing may not be required and if required shall be designed and installed to minimise disturbance and enable vegetation survival and growth.

Gates and bollards will be required where there is vehicle access to reserves. Design and installation specifications can be obtained from Council Parks, Sports and Recreation.

F.8 PLAYGROUNDS

Playgrounds for public use shall be to the requirements of:

- NZS 5828:2004 Playground equipment and surfacing
- SNZ HB 5828.1:2006 General Playground Equipment and Surfacing Handbook
- SNZ HB 5828.2:2006 Supervised Early Childhood Facilities playground Equipment and Surfacing Handbook

All facilities, such as types and sizes of playground fittings, and associated equipment, are to be consistent with materials used by the Council and in accordance with the Council requirements detailed in the Parks and Gardens Specification and Council's Playground Policy (2002).

F.9 RESERVE FURNITURE

Reserves furniture must be robust, durable and functional.

All furniture location, design and installation must be consistent with the Council's Public Space Design Manual and be approved by the Council's Parks, Sports and Recreation unit.

F.9.1 Seats

All seats in parks and reserves are to be consistent with materials used by the Council and in accordance with the Council Requirements.

- The seats must be durable and robust
- Be weather and vandalism resistant
- Have a galvanised frame to minimise rust
- Be constructed from Macrocarpa timber so that when timber ages it blends naturally into the parks environment.

F.9.2 Reserve Signs

All Parks and Reserves Signage must be consistent with materials used by the Council and in accordance with the Council Requirements and standards.

F.9.3 Picnic Tables

All picnic tables in Parks and Reserves are to be consistent with materials used by the Council and in accordance with the Council Requirements.

F.9.4 Parks Bins

Bins in Council Parks and Gardens are to be AE Tilley Ltd Horizon Tilting Litter Bin.

Bins in inner-city parks are to be WCC eye-bins. Details of supplier are available from Councils' Parks, Sports and Recreation unit.

The bins must:

- Be lockable to prevent loss of inner sleeve
- Be galvanised for longevity – expectation that these assets will last 10 years.
- All parts of the bins are to be replaceable ensuring low cost maintenance
- be no greater than 50 litre capacity.

F.10 UTILITY SERVICES

All utility services, including reservoirs, shall be placed underground, except where it is not practicable to do so.

Utility services shall be located so as not to restrict areas useable for outdoor activities or required for future facilities or tree planting.

Any disturbance of the existing site during installation of a utility shall be made good immediately after completion.

Requirements of the Reserve Act 1977 and any relevant Wellington City Council Reserve Management Plan must be met when proposing or installing utilities and infrastructure services in a reserve.

APPENDIX B. EARTHWORKS DESIGN AND CONSTRUCTION

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FORM 1 Certificate of Suitability of Earth Fill for Residential Development

**CERTIFICATE OF SUITABILITY OF
EARTH FILL FOR RESIDENTIAL DEVELOPMENT**

SUBDIVISION:.....
(Description of land development/subdivision)

SUBDIVIDER:.....
(Owner / Developer)

LOCATION:.....
(Address)

ISSUED BY:.....
(Approved suitably qualified design professional)

COMPANY/FIRM:.....
.....
(Name and address of firm)

Hereby confirm that:

1. I am a Chartered Professional Engineer – Specialising in Geotec Engineering; and was retained by the Subdivider to supervise the earthworks on the above subdivision.
2. The attached plan/s No(s):.....show/s the extent of the fill and shows the Lot numbers:..... affected by the fill.
3. The earth fills shown have been placed in accordance with the Wellington City Council Code of Practice for Land Development, including NZS 4431:1989. The extent of my inspections during construction, and the results of all tests carried out are described in my report dated copy attached.
4. the filled ground is suitable for the erection thereon of residential buildings not requiring specific design in terms of NZS 3604 and NZS 4229 providing that:
 - 1)
 - 2)
 - 3)

This certification does not remove the necessity for the normal inspection and design of foundations as would be made in natural ground.

SIGNATURE:

DATE:

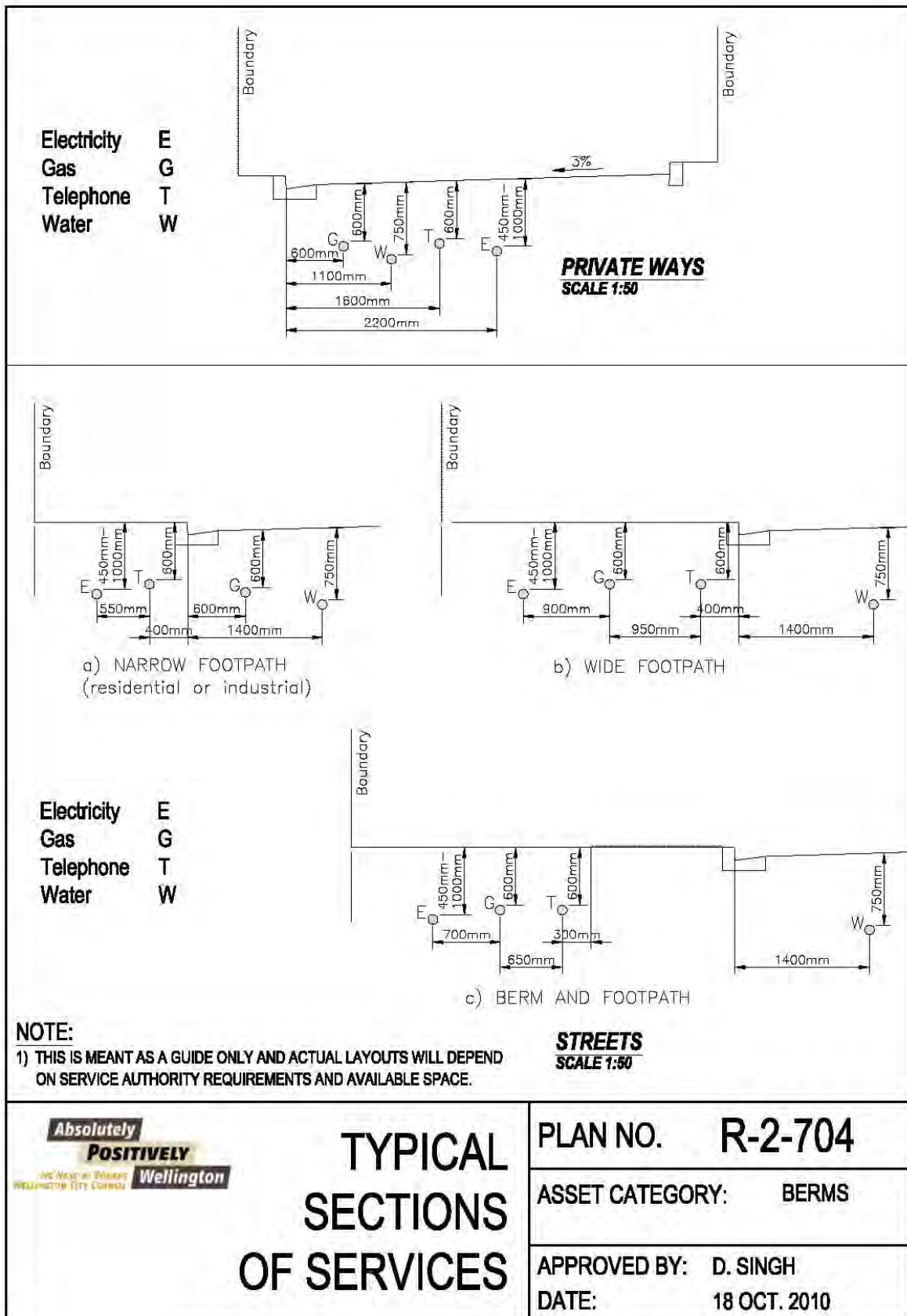
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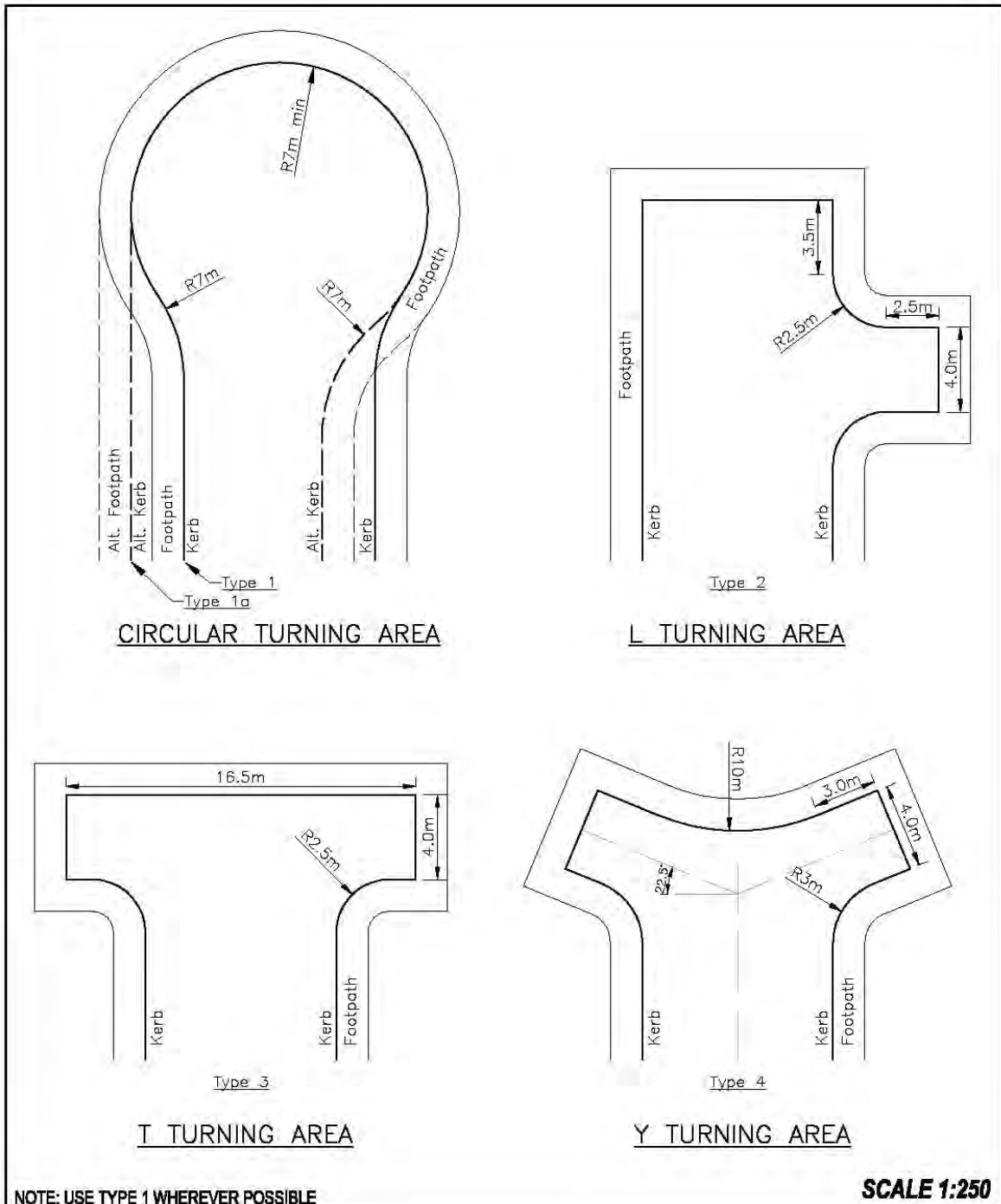
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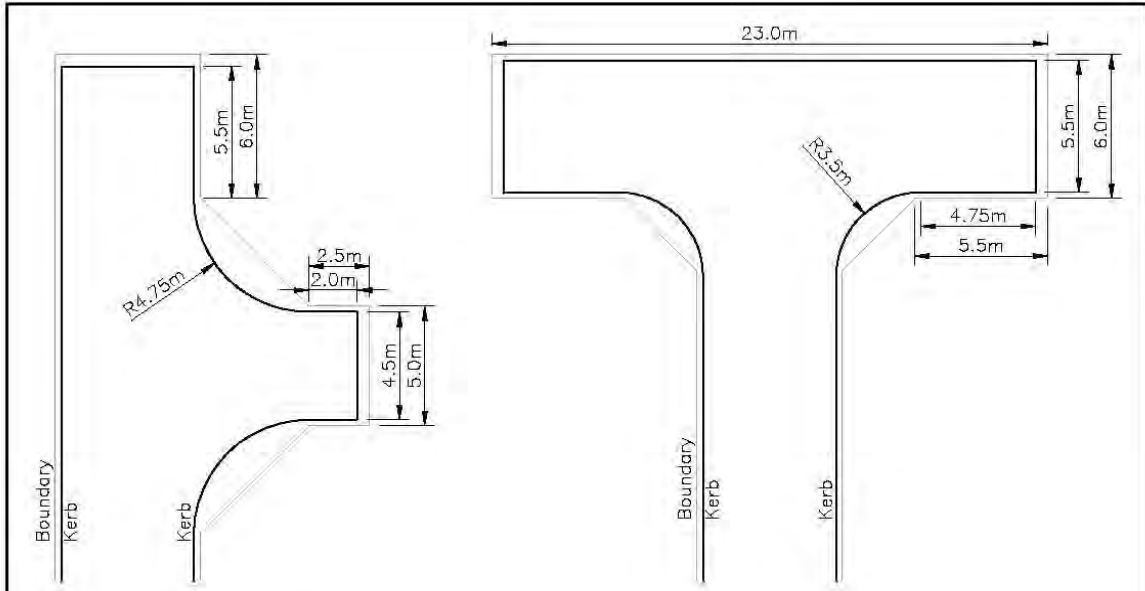


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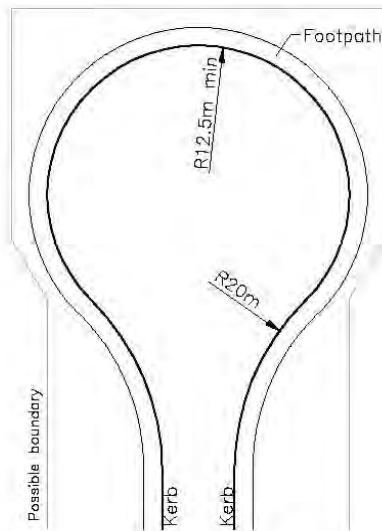
<p style="font-size: small; margin: 0;"> Absolutely POSITIVELY <small>THE PEOPLE OF WELLINGTON</small> Wellington </p> <p style="text-align: center; font-size: large; font-weight: bold; margin: 10px 0;"> STANDARD TURNING AREAS FOR RESIDENTIAL STREETS </p>	<p style="font-size: large; font-weight: bold; margin: 0;">PLAN NO. R-9-705</p>
	<p style="font-weight: bold; margin: 0;">ASSET CATEGORY: CARRIAGEWAYS</p>
	<p style="font-weight: bold; margin: 0;">APPROVED BY: D. SINGH</p> <p style="font-weight: bold; margin: 0;">DATE: 18 OCT. 2010</p>

Drwg R -9- 706 Standard Turning Areas for Industrial Streets and Right-of-ways



INDUSTRIAL RIGHTS OF WAY (OR SERVICE LANE)

Scale 1:250



INDUSTRIAL STREET

Scale 1:500



**STANDARD TURNING
AREAS FOR INDUSTRIAL
STREETS AND RIGHTS-OF-WAY**

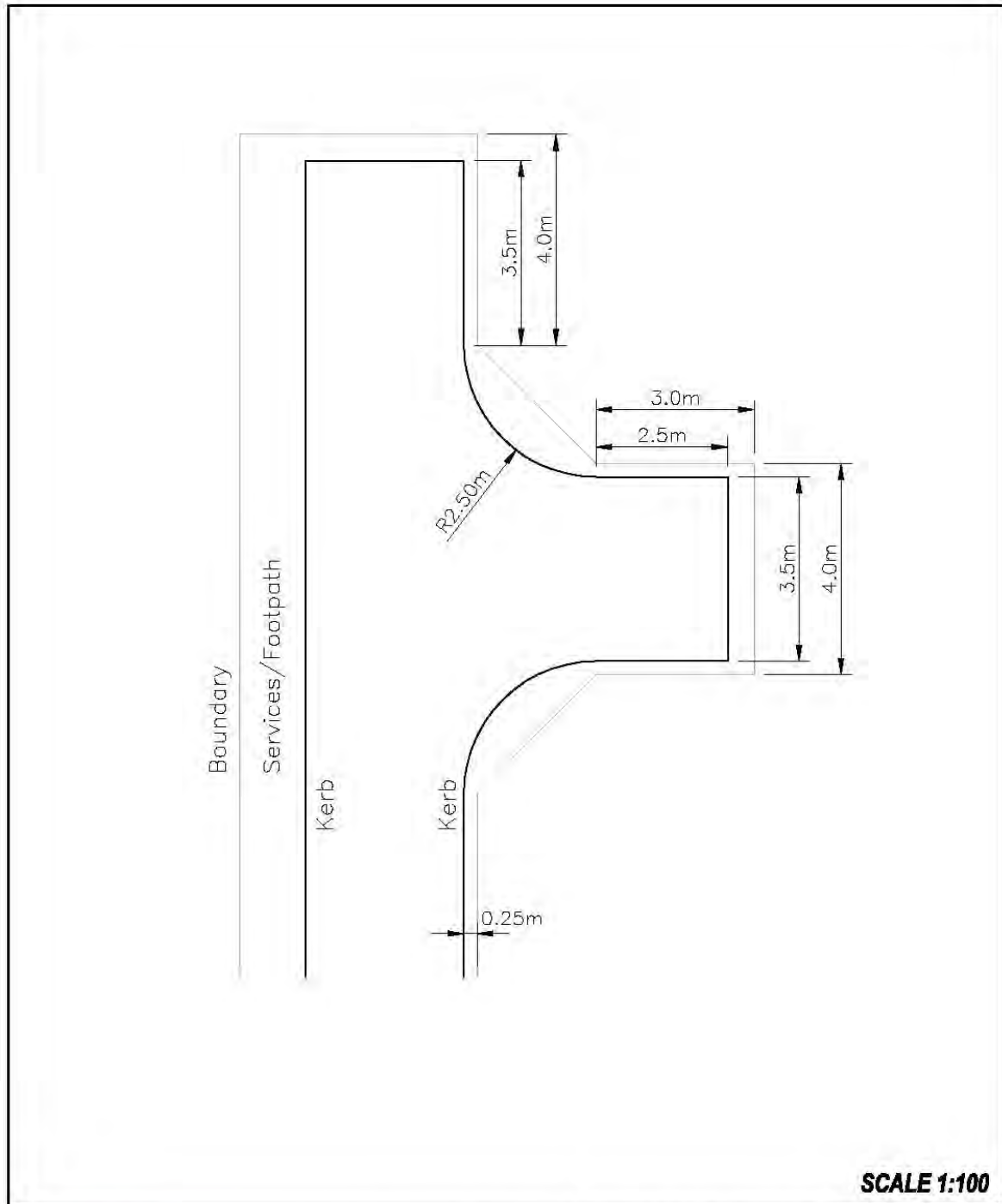
PLAN NO. R-9-706

ASSET CATEGORY: CARRIAGEWAYS

APPROVED BY: D. SINGH

DATE: 18 OCT. 2010

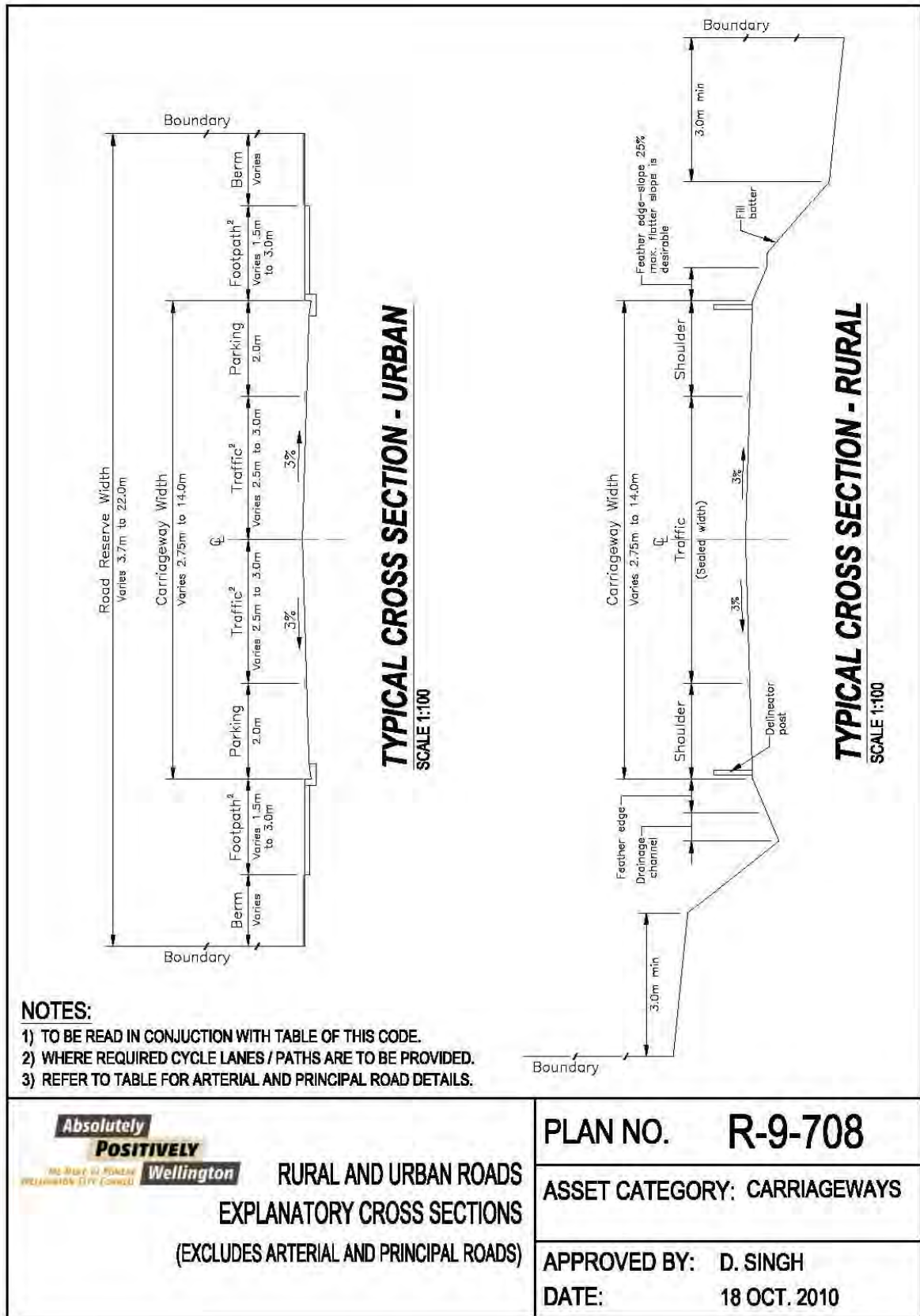
Drwg R -9- 707 Standard Turning Areas for Private Ways



SCALE 1:100

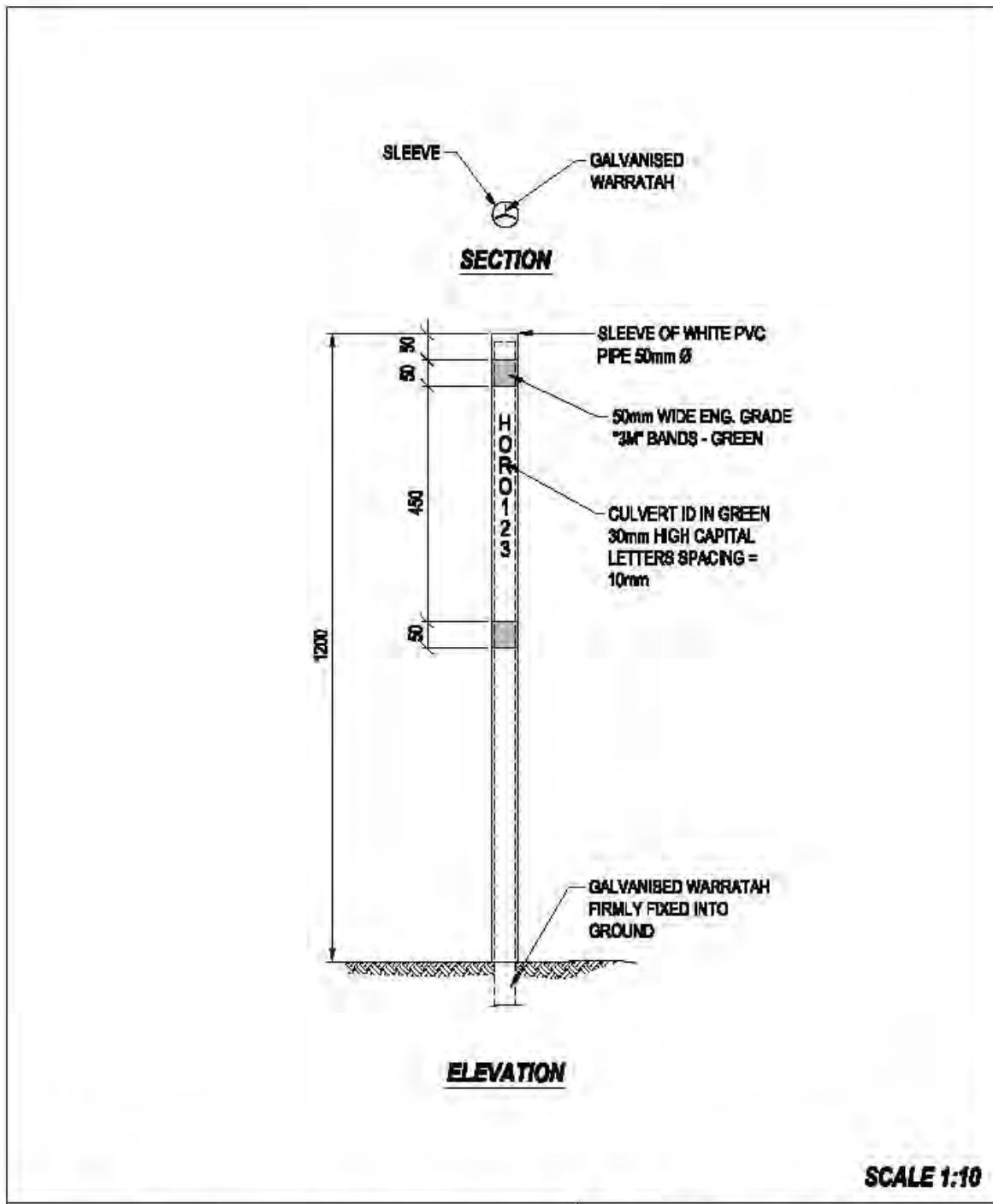
<p>STANDARD TURNING AREAS FOR PRIVATE WAYS</p>	<p>PLAN NO. R-9-707</p>
	<p>ASSET CATEGORY: CARRIAGEWAYS</p>
	<p>APPROVED BY: D. SINGH DATE: 18 OCT. 2010</p>

Drwg R -9- 708 Rural and Urban Roads Explanatory Cross-sections



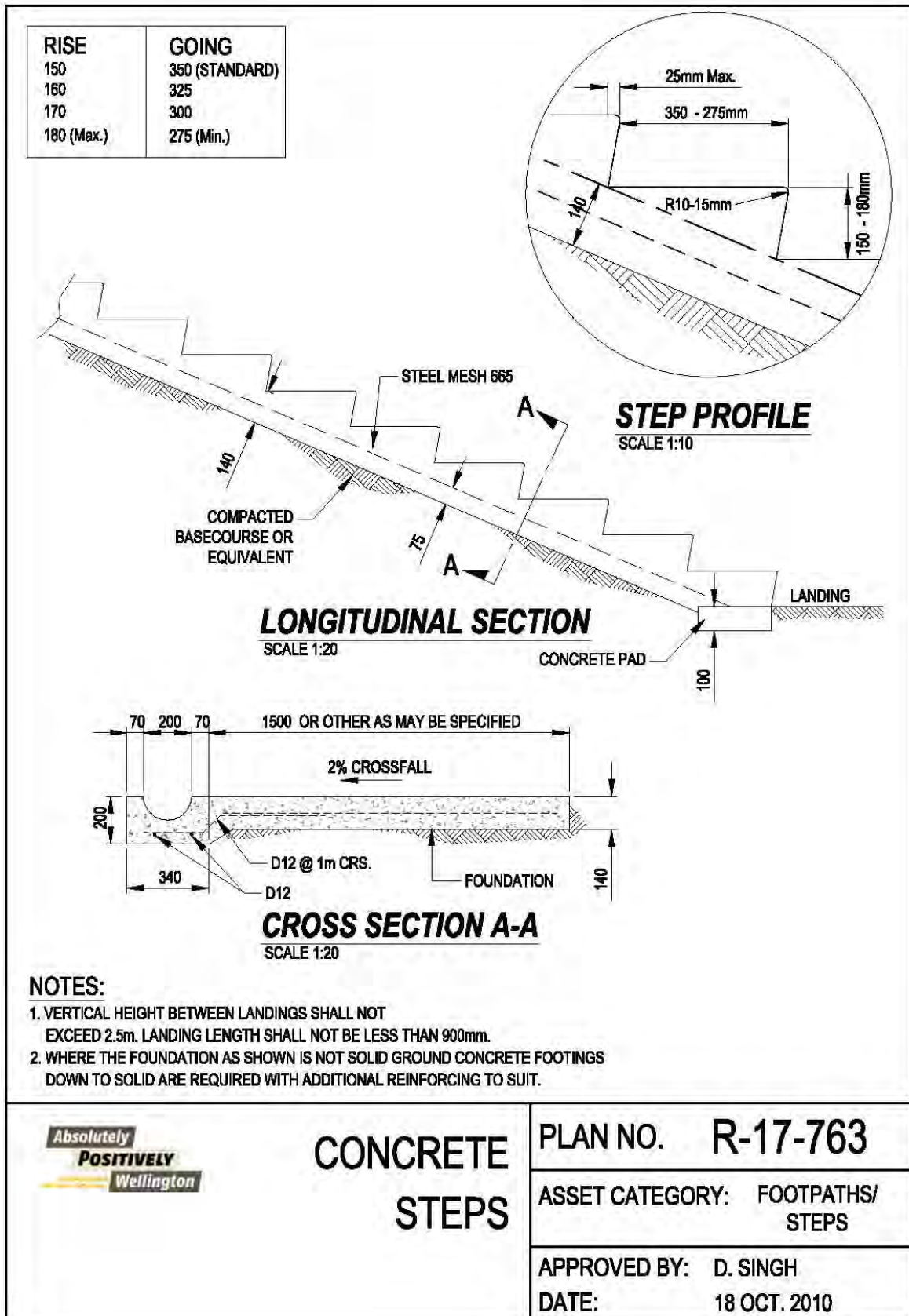
NOTE Variation in the boundary to boundary width will be required to accommodate minimum tree planting requirements.

Drwg R -12-785 Standard Culvert Marker

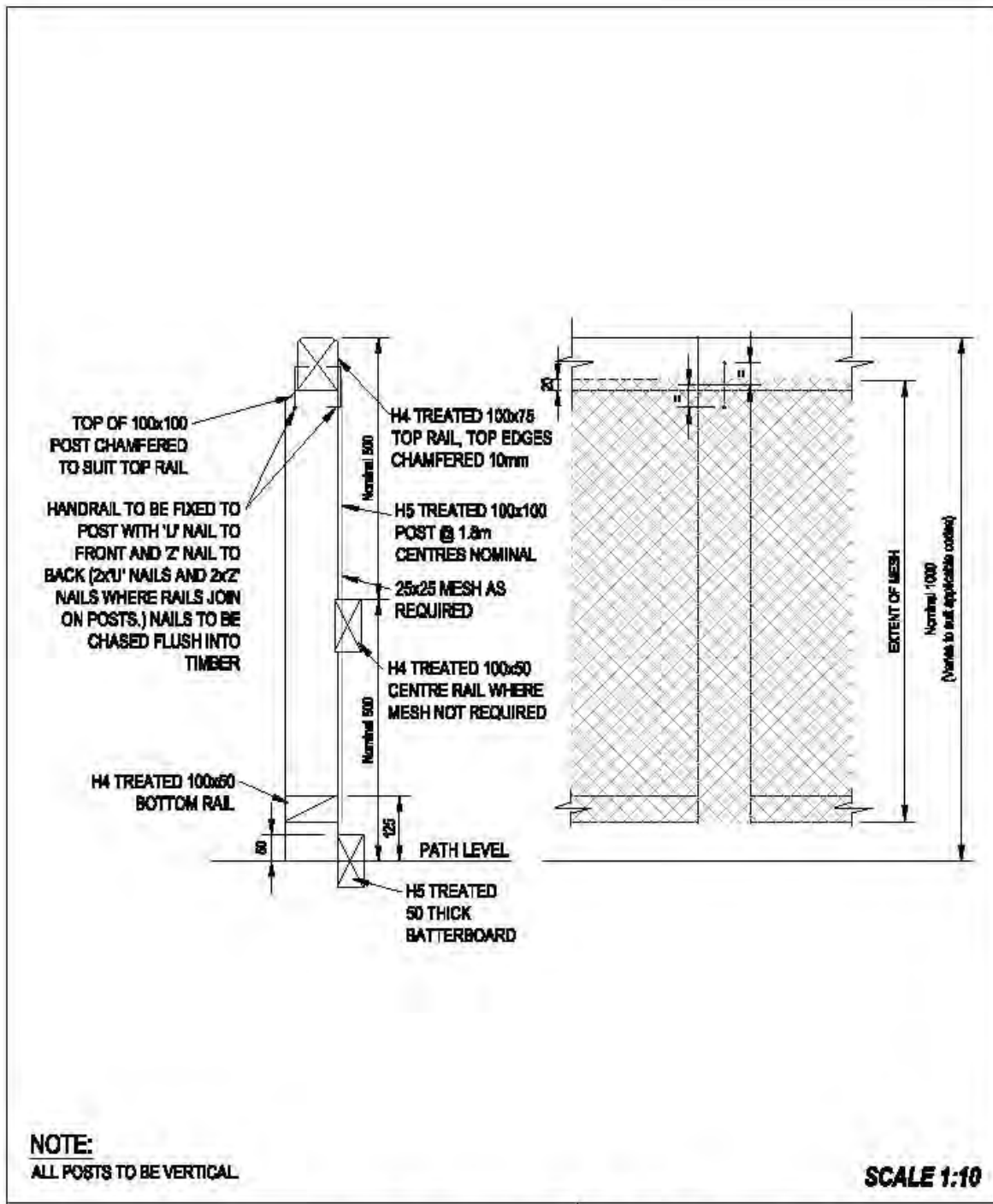



	<p>STANDARD CULVERT MARKER</p>	<p>PLAN NO. R-12-785</p>
		<p>ASSET CATEGORY: CULVERTS</p>
		<p>APPROVED BY: D. SINGH DATE: 14 DEC. 2007</p>

Drwg R –17-763 Concrete Steps

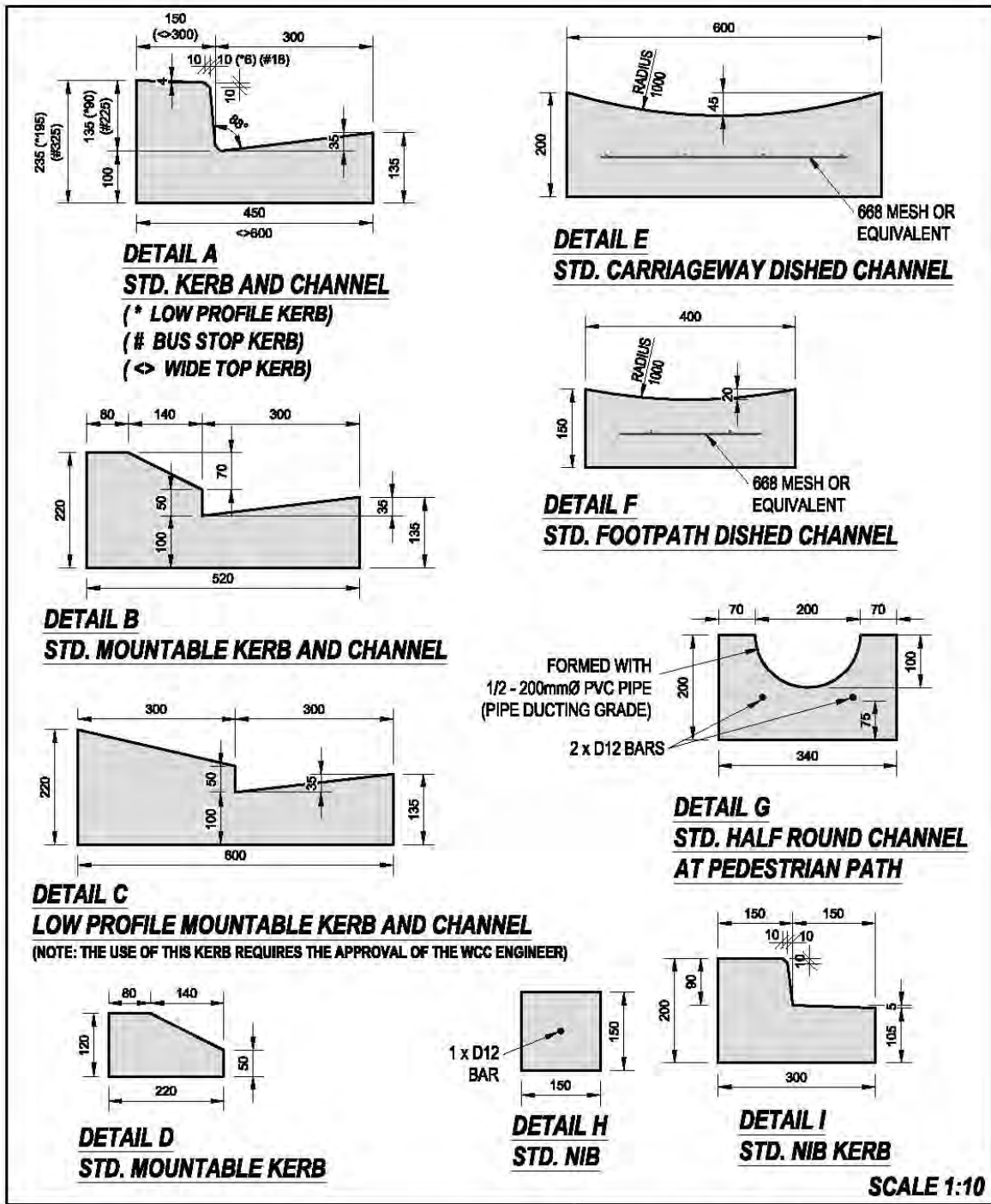


Drwg R –19-760 Standard Handrail



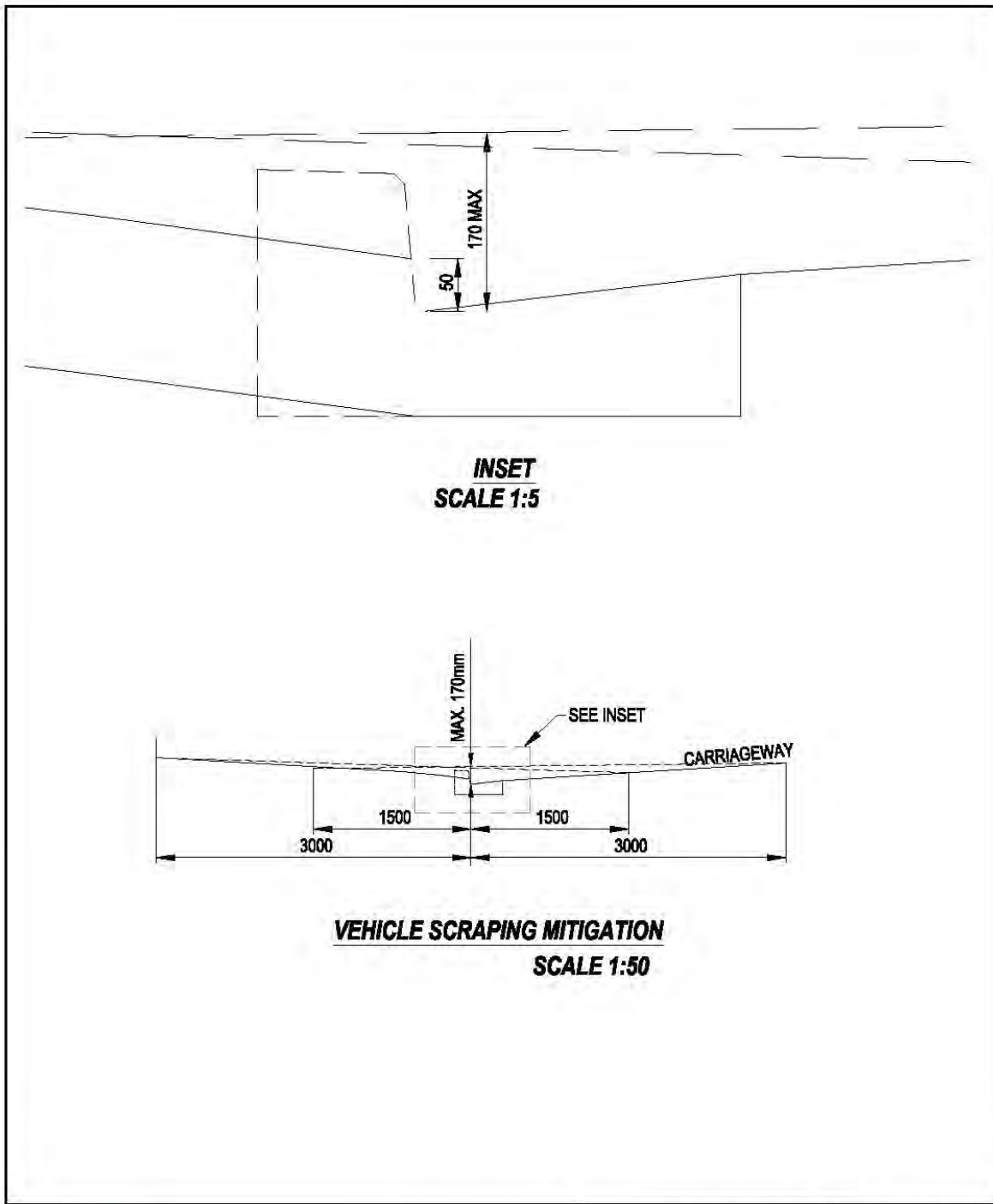
	<h1>STANDARD HANDRAIL</h1>	PLAN NO. R-19-760
		ASSET CATEGORY: HAND RAILS/ SAFETY FENCES
		APPROVED BY: D. SINGH DATE: 15 FEB. 2008

Drwg R -22-700 Standard Kerbs and Channels



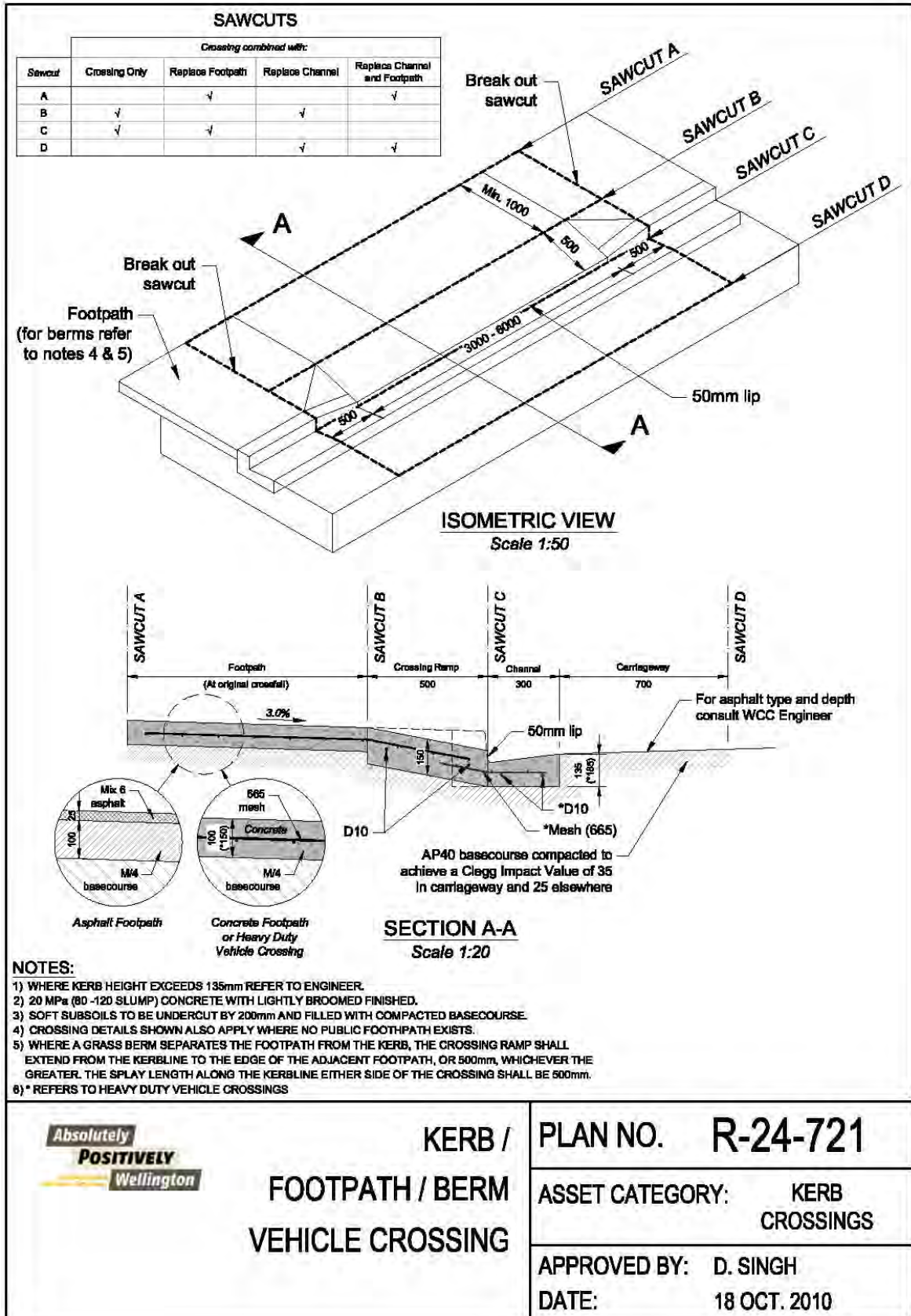
	<h1>STANDARD KERBS AND CHANNELS</h1>	PLAN NO. R-22-700
		ASSET CATEGORY: KERBS AND CHANNELS
		APPROVED BY: D. SINGH DATE: 18 OCT. 2010

Drwg R -24-720 Vehicle Scraping Mitigation

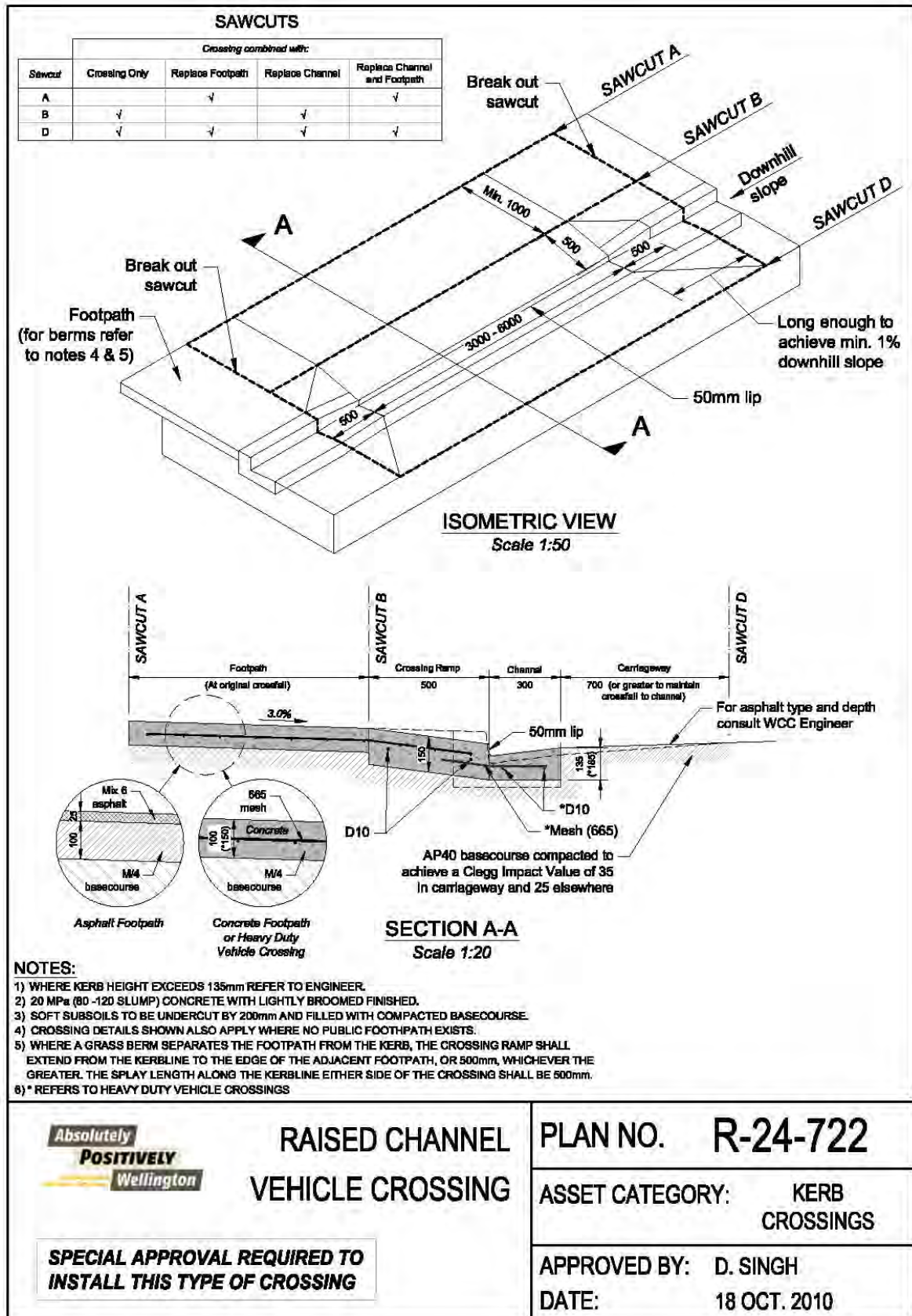


	<p>VEHICLE SCRAPING MITIGATION</p>	<p>PLAN NO. R-24-720</p>
		<p>ASSET CATEGORY: LIGHT DUTY KERB CROSSINGS</p>
		<p>APPROVED BY: D. SINGH DATE: 18 OCT. 2010</p>

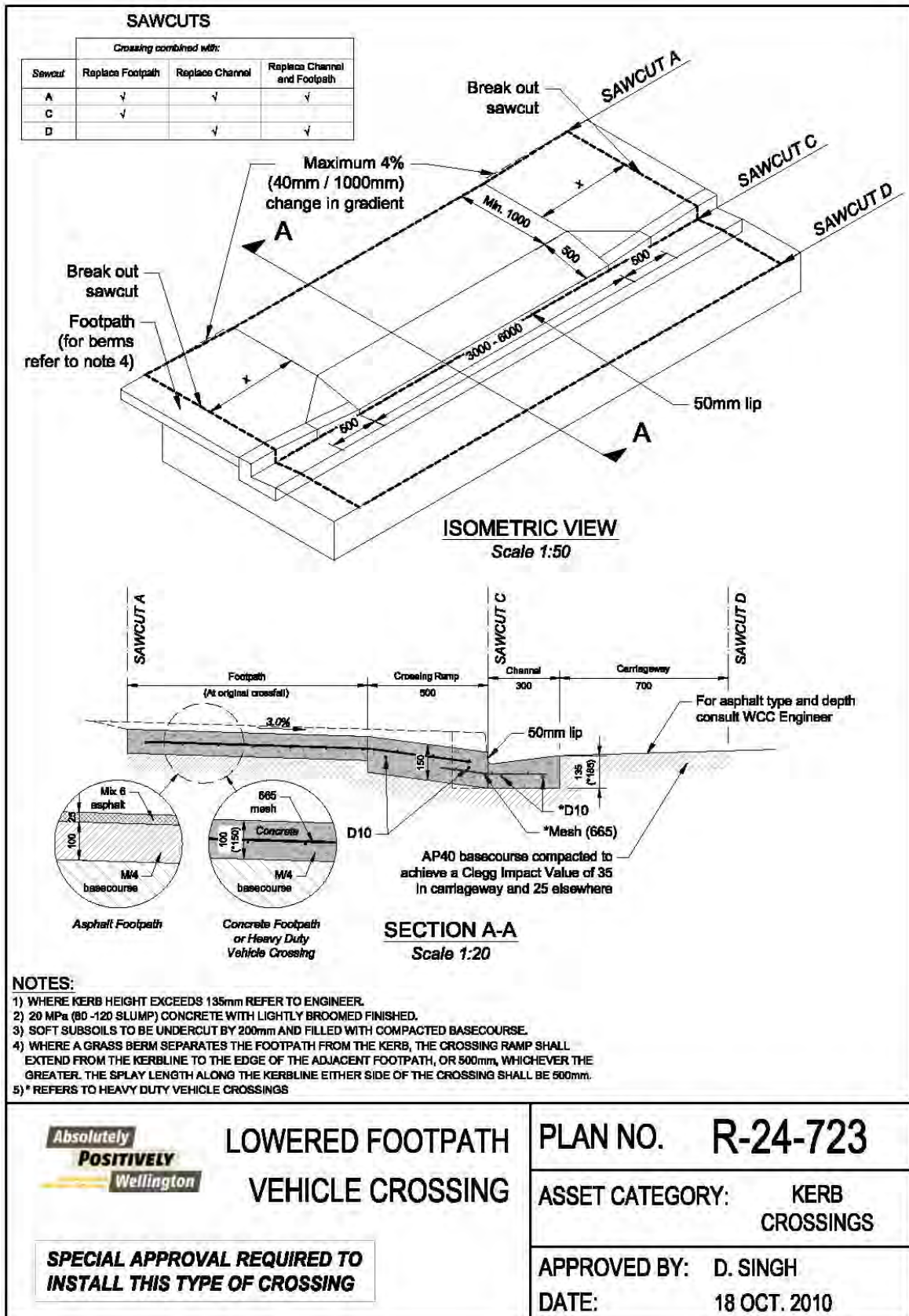
Drwg R -24-721 Kerb / Footpath / Berm Vehicle Crossing



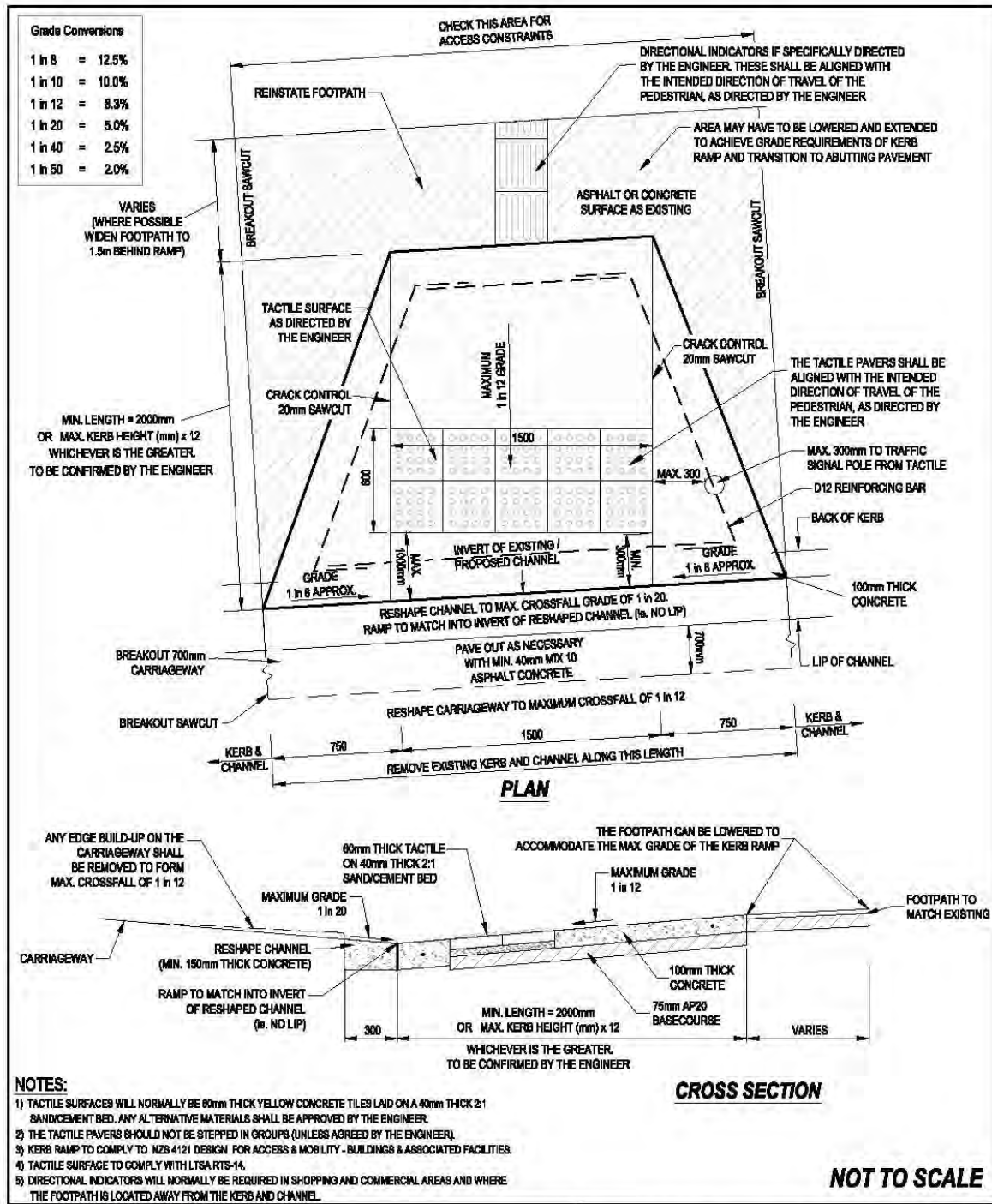
Drwg R -24-722 Raised Channel Vehicle Crossing



Drwg R -24-723 Lowered Footpath Vehicle Crossing



Drwg R -24-727 Pedestrian Ramp with Tactile Pavers

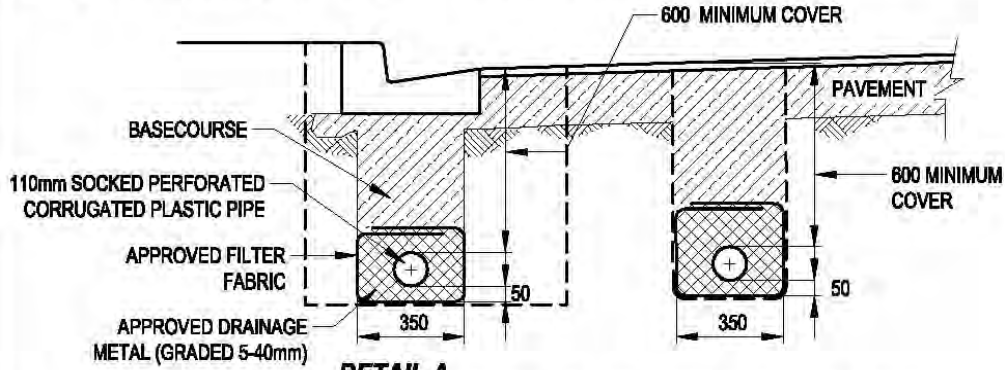


<h2 style="margin: 0;">PEDESTRIAN RAMP WITH TACTILE PAVERS</h2>	<p>PLAN NO. R-24-727</p>
	<p>ASSET CATEGORY: LIGHT DUTY KERB CROSSINGS</p>
	<p>APPROVED BY: D. SINGH DATE: 18 OCT. 2010</p>

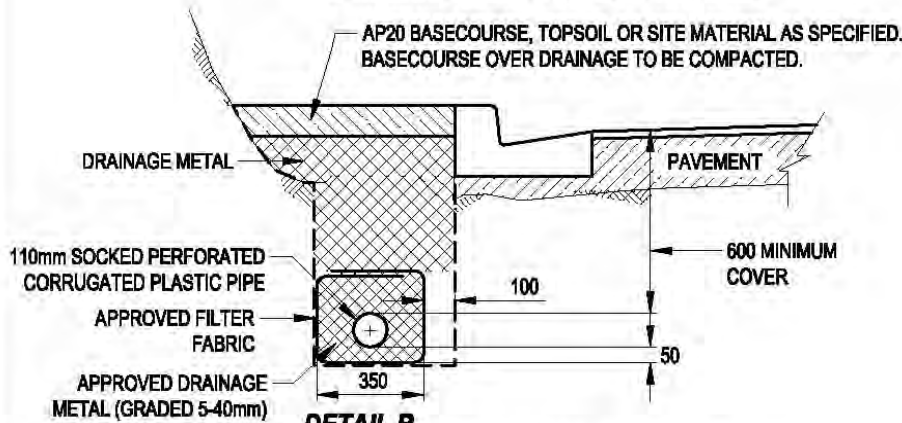
Drwg R –39-749 Pavement Subsoil Drains

NOTE:

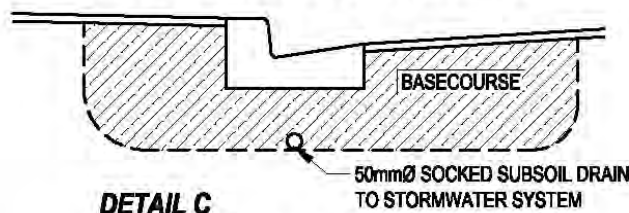
1. UNDER KERB SUBSOIL AND CARRIAGEWAY SUBSOIL DRAINS ARE NOT TO BE LAID IN THE SAME TRENCH.
2. STRIP DRAIN EQUIVALENT APPROVED BY THE ENGINEER MAY BE USED (REFER TO R-39-750).



DETAIL A
UNDERCHANNEL / CARRIAGEWAY SUBSOIL DRAINAGE
 USING SOCKED SUBSOIL PIPE AND FILTER FABRIC



DETAIL B
TOE OF BATTER SUBSOIL DRAINAGE
 USING SOCKED SUBSOIL PIPE AND FILTER FABRIC

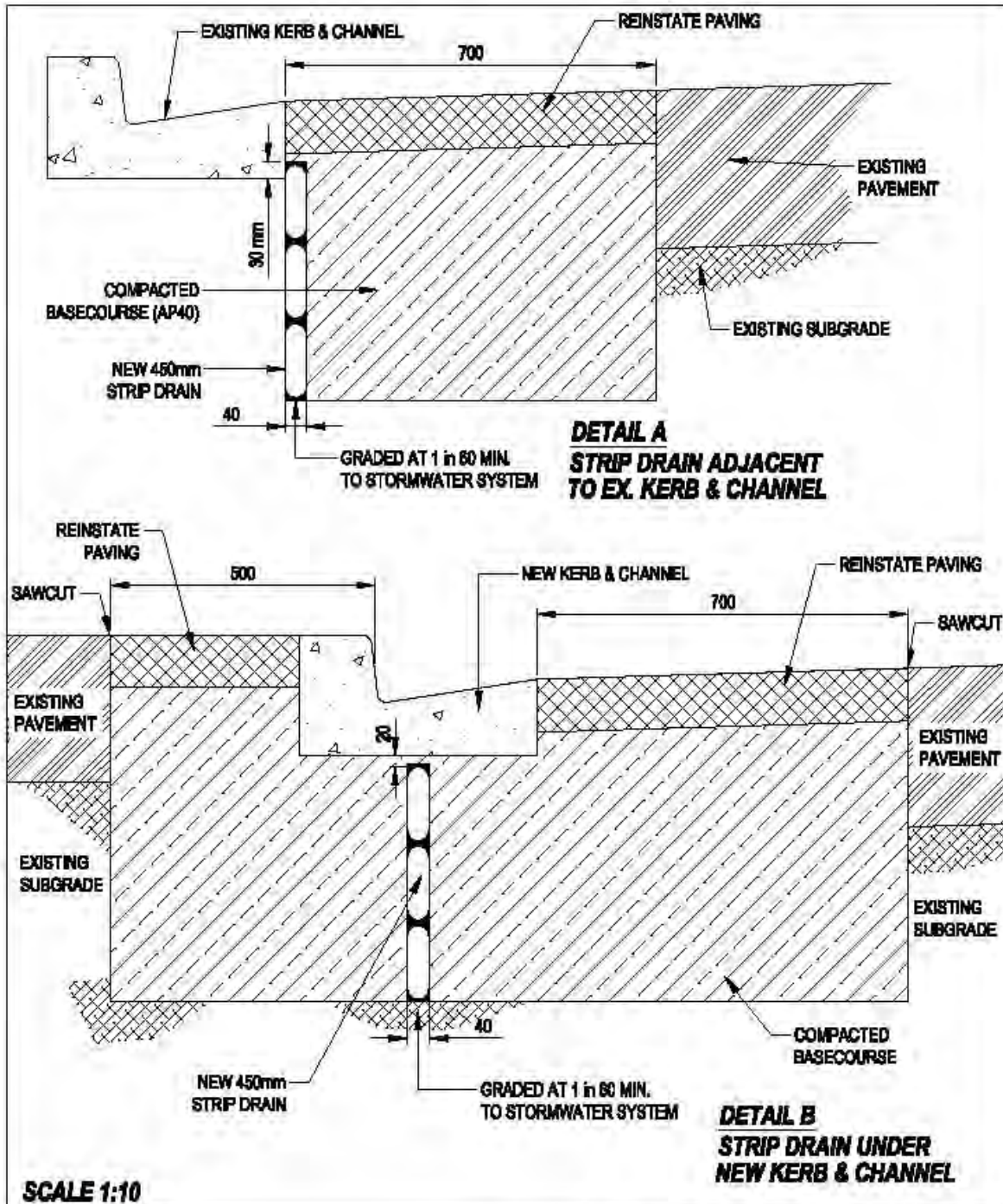


DETAIL C
50mmØ SUBSOIL DRAINAGE UNDER
RECONSTRUCTED KERB AND CHANNEL

SCALE 1:20

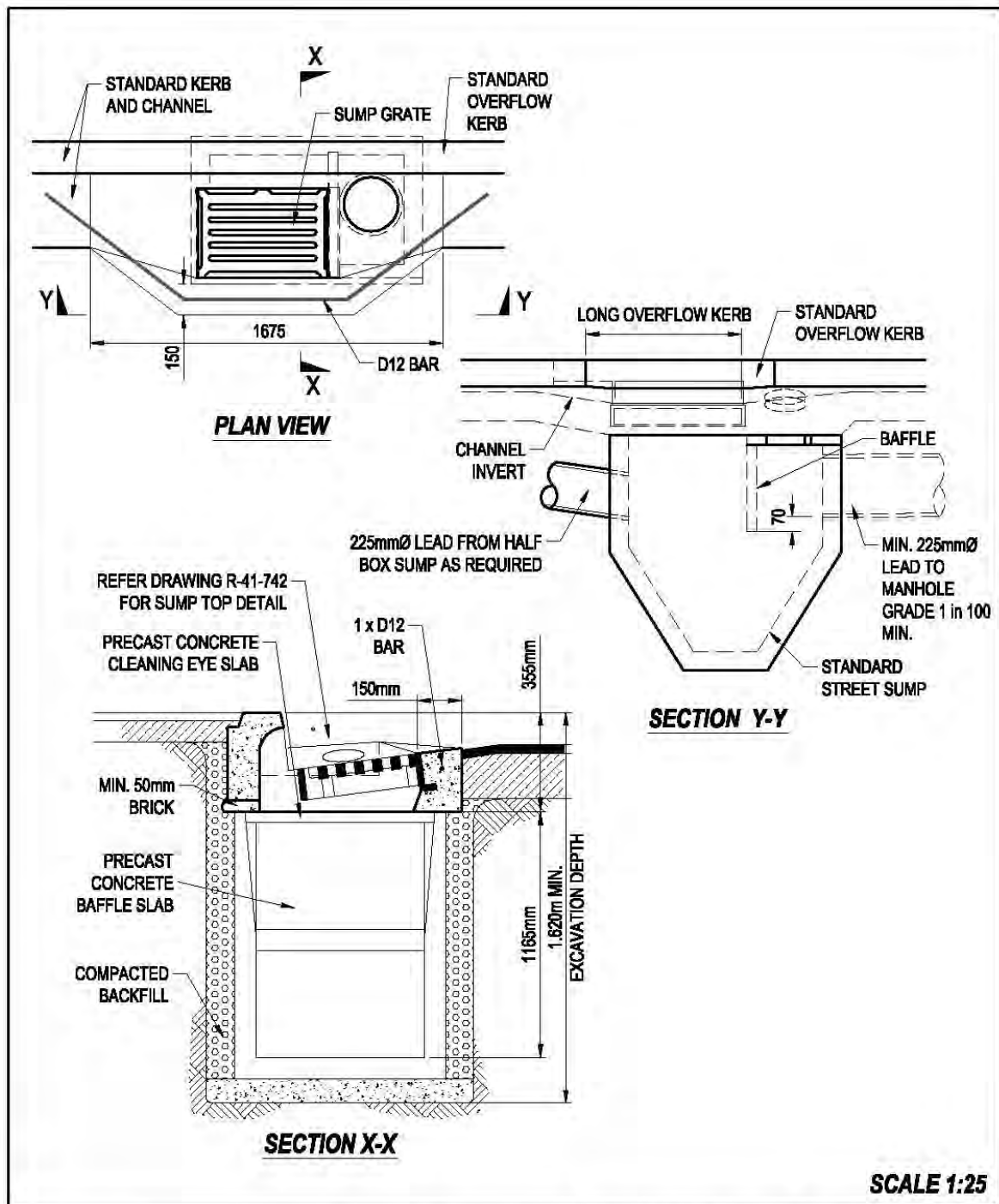
	<h1>PAVEMENT SUBSOIL DRAINS</h1>	PLAN NO. R-39-749
		ASSET CATEGORY: SUBSOIL DRAINS
		APPROVED BY: D. SINGH DATE: 18 OCT. 2010

Drwg R –39-750 Strip Drains



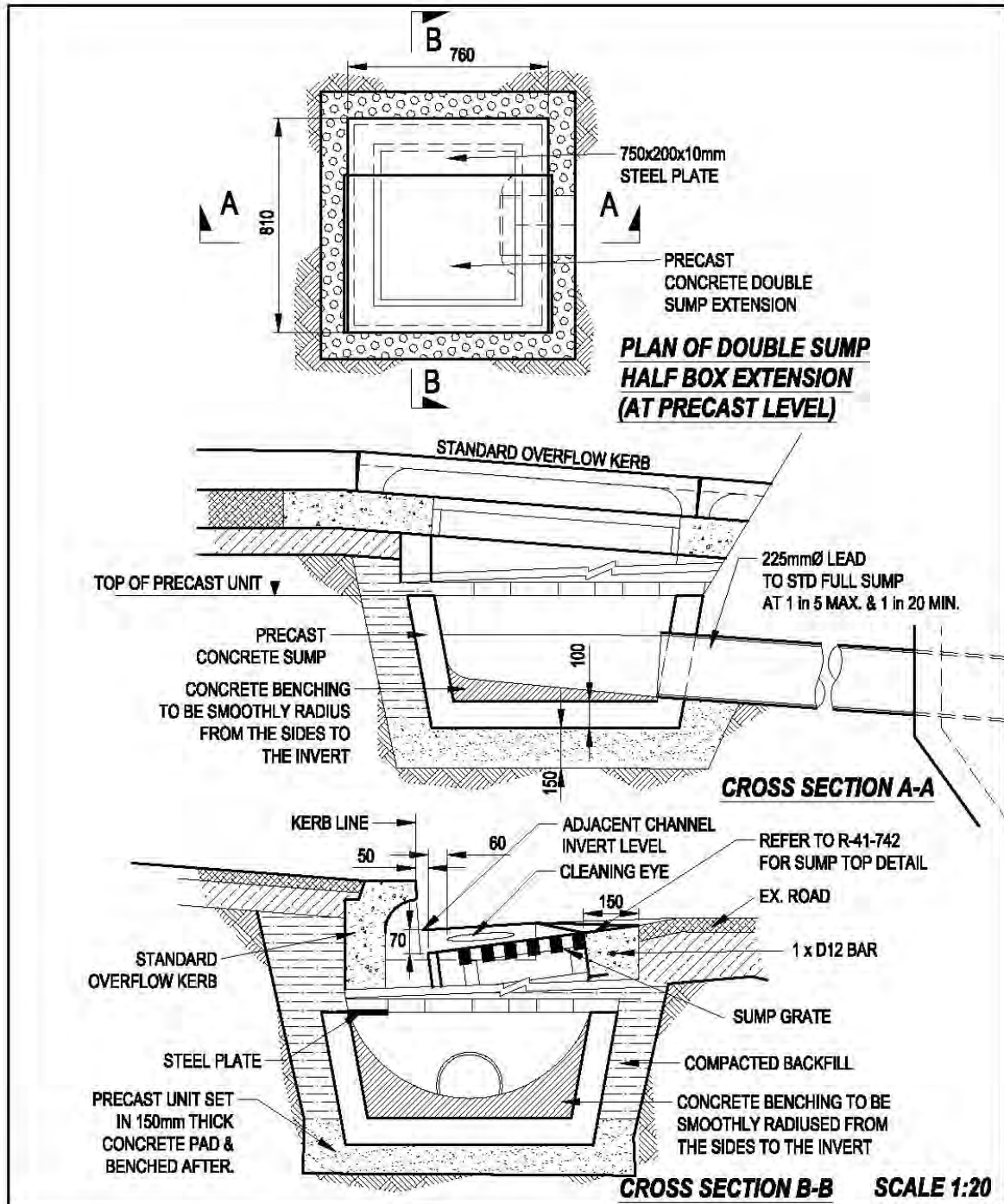
	<h1>STRIP DRAIN</h1>	PLAN NO. R-39-750
		ASSET CATEGORY: SUBSOIL DRAINS
		APPROVED BY: D. SINGH DATE: 14 DEC. 2007


Drwg R -41-740 Full Sump and Sections



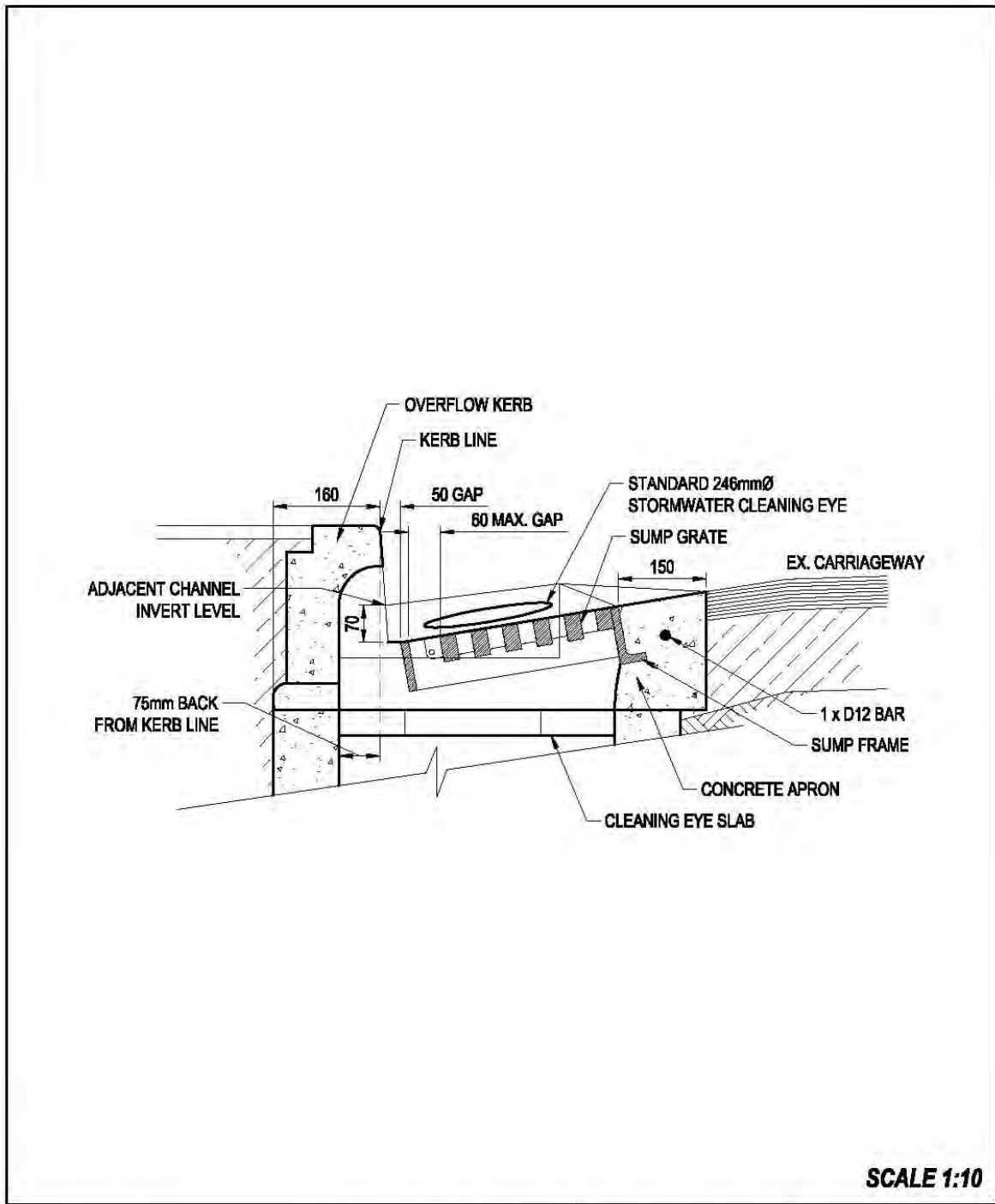
	<h1>FULL SUMP AND SECTIONS</h1>	PLAN NO. R-41-740
		ASSET CATEGORY: SUMPS AND LEADS
		APPROVED BY: D. SINGH DATE: 18 OCT. 2010


Drwg R -41-741 Half Box Extension and Sections



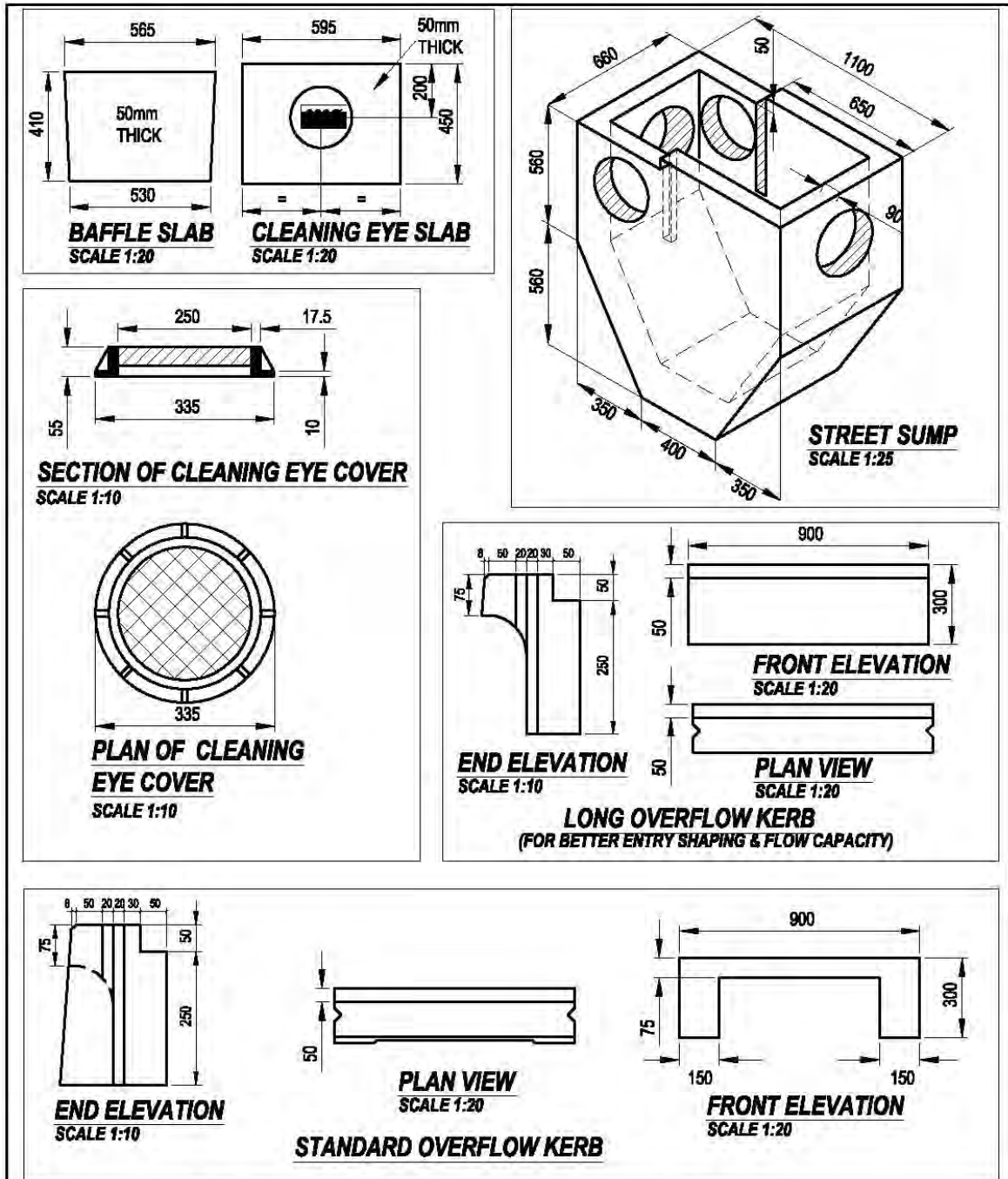
	<h1>HALF BOX EXTENSION AND SECTIONS</h1>	PLAN NO. R-41-741
		ASSET CATEGORY: SUMPS AND LEADS
		APPROVED BY: D. SINGH
		DATE: 18 OCT. 2010

Drwg R -41-742 Details of Top of Sump and Half Box




	<p>DETAILS OF TOP OF SUMP AND HALF BOX</p>	<p>PLAN NO. R-41-742</p>
		<p>ASSET CATEGORY: SUMPS AND LEADS</p>
		<p>APPROVED BY: D. SINGH DATE: 18 OCT. 2010</p>

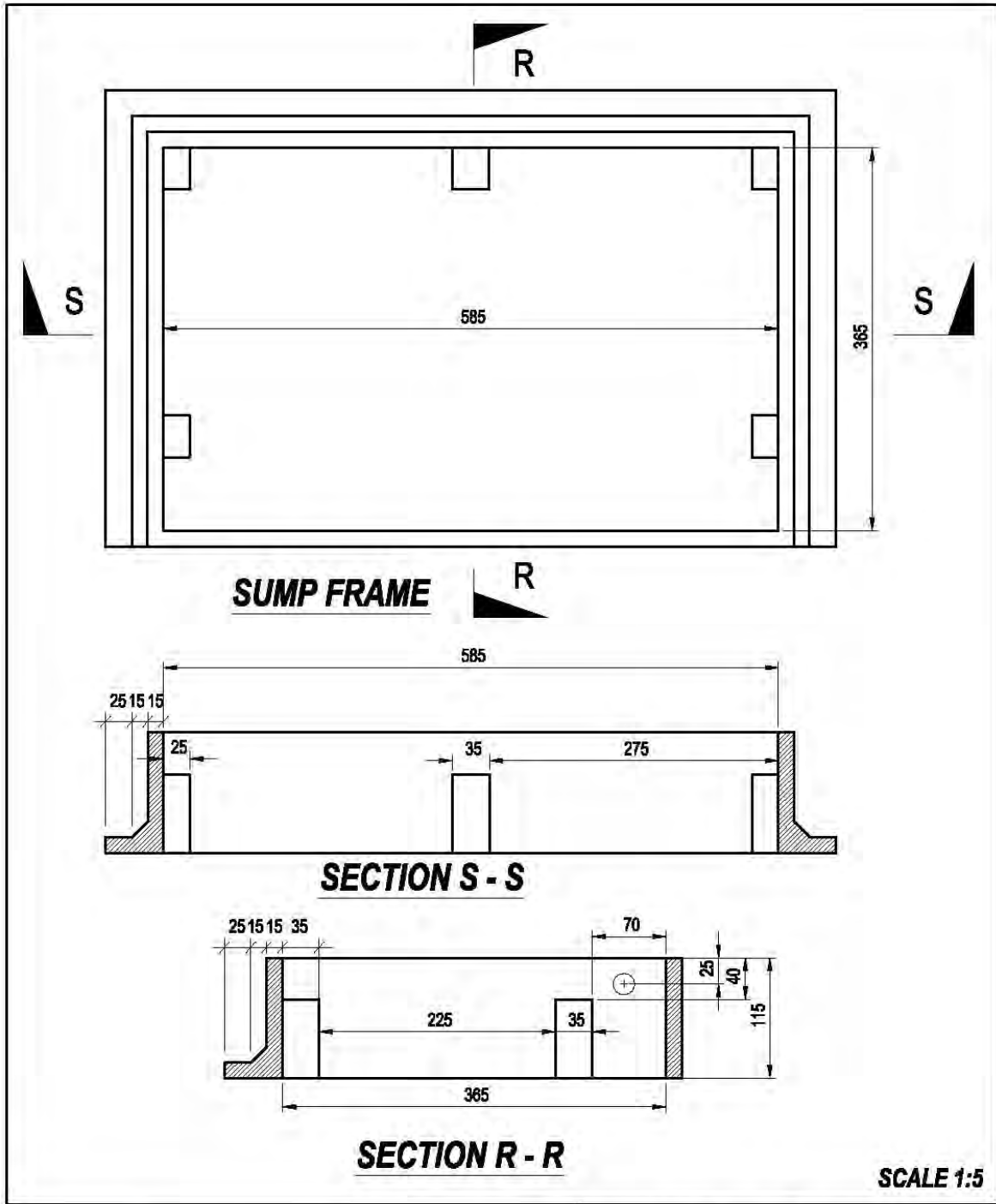
Drwg R -41-743 Overflow Kerb and Street Sump Details



NOTE: ALL CONCRETE UNITS TO BE MADE WITH 20 MPa AT 28 DAYS STRENGTH CONCRETE.

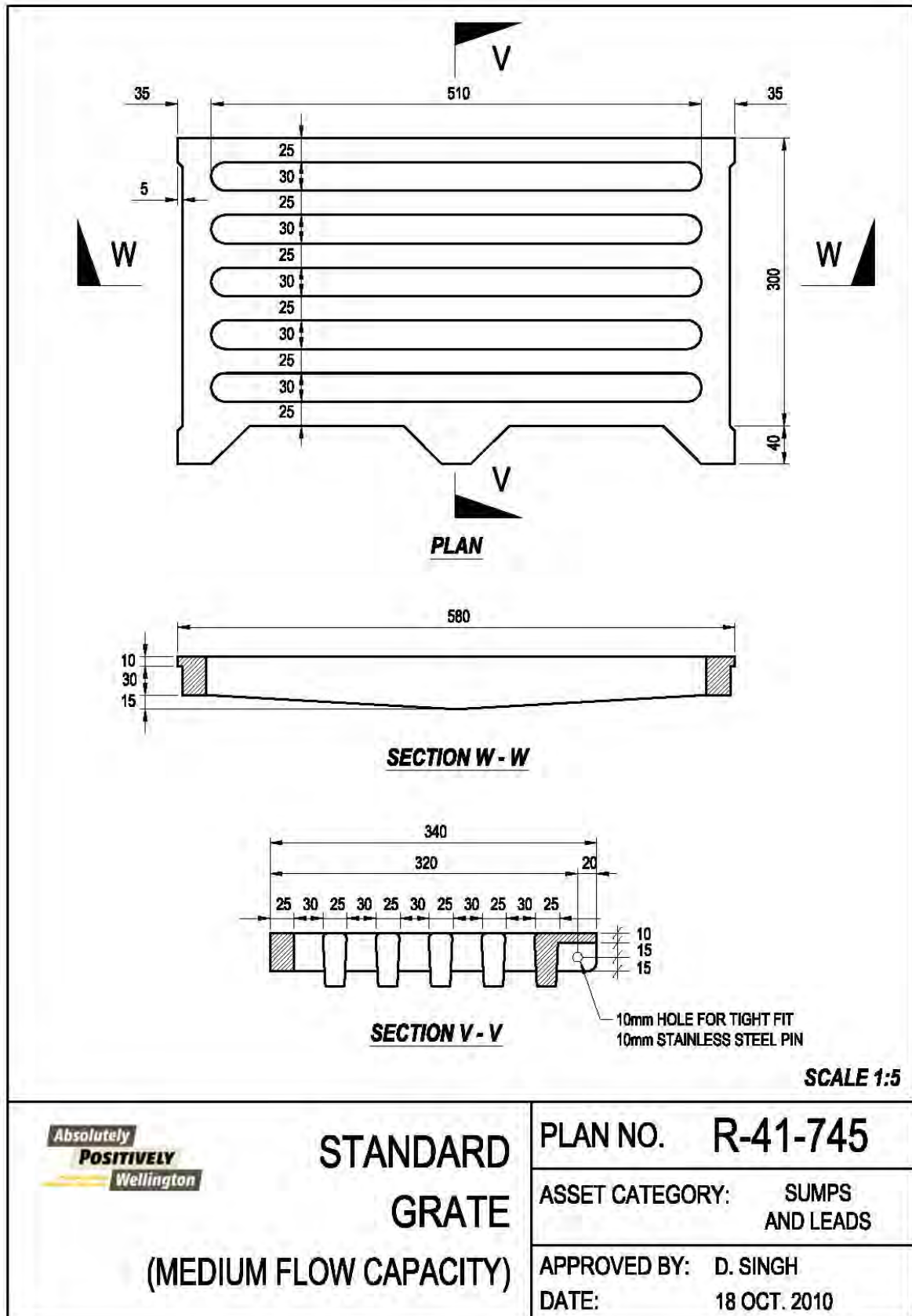
 <p>OVERFLOW KERB AND STREET SUMP DETAILS</p>	<p>PLAN NO. R-41-743</p>
	<p>ASSET CATEGORY: SUMPS AND LEADS</p>
	<p>APPROVED BY: D. SINGH DATE: 18 OCT. 2010</p>

Drwg R -41-744 Standard Street Sump Grate Frame

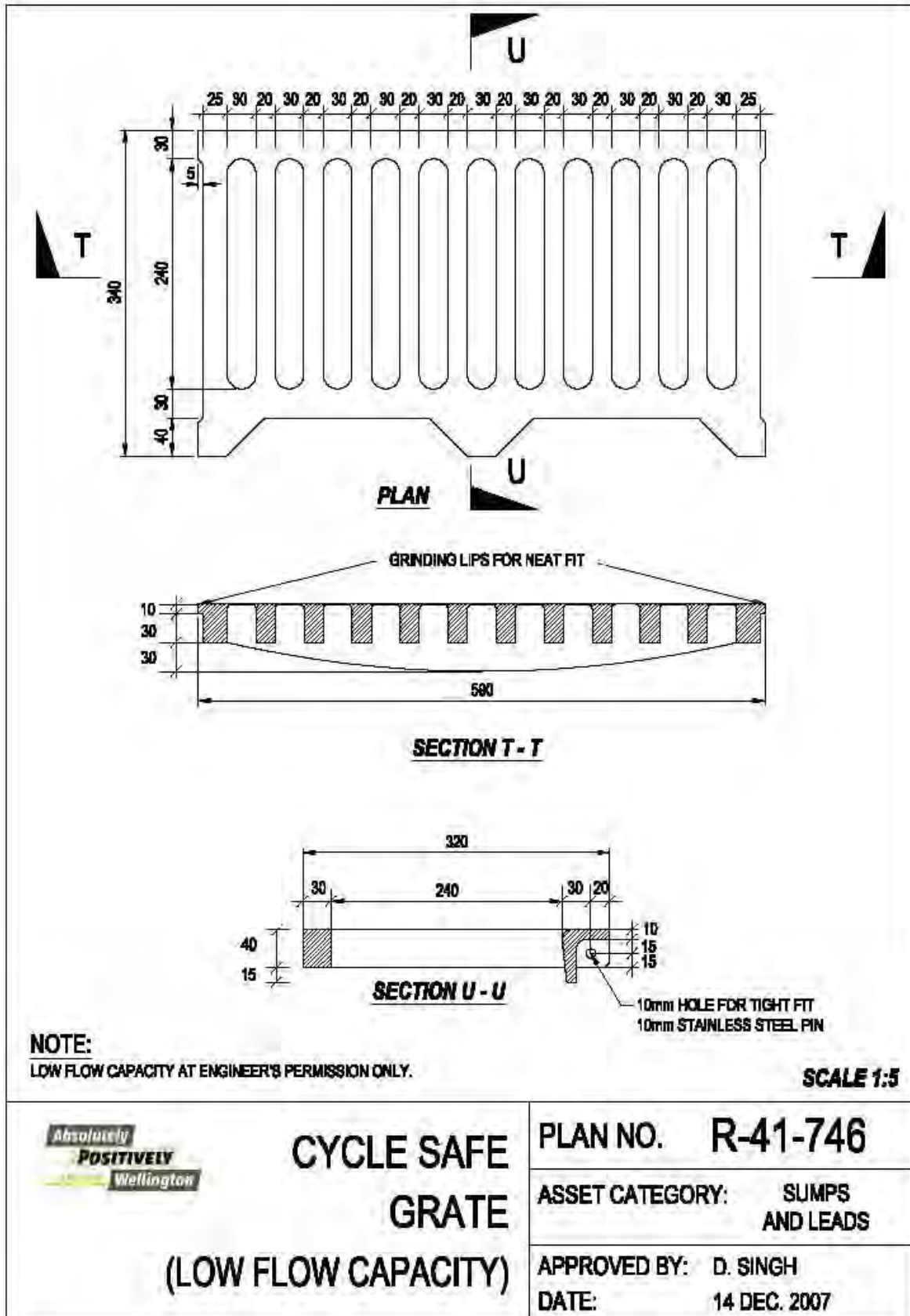


	<p>STANDARD STREET SUMP GRATE FRAME</p>	<p>PLAN NO. R-41-744</p>
		<p>ASSET CATEGORY: SUMPS AND LEADS</p>
		<p>APPROVED BY: D. SINGH DATE: 14 DEC. 2007</p>

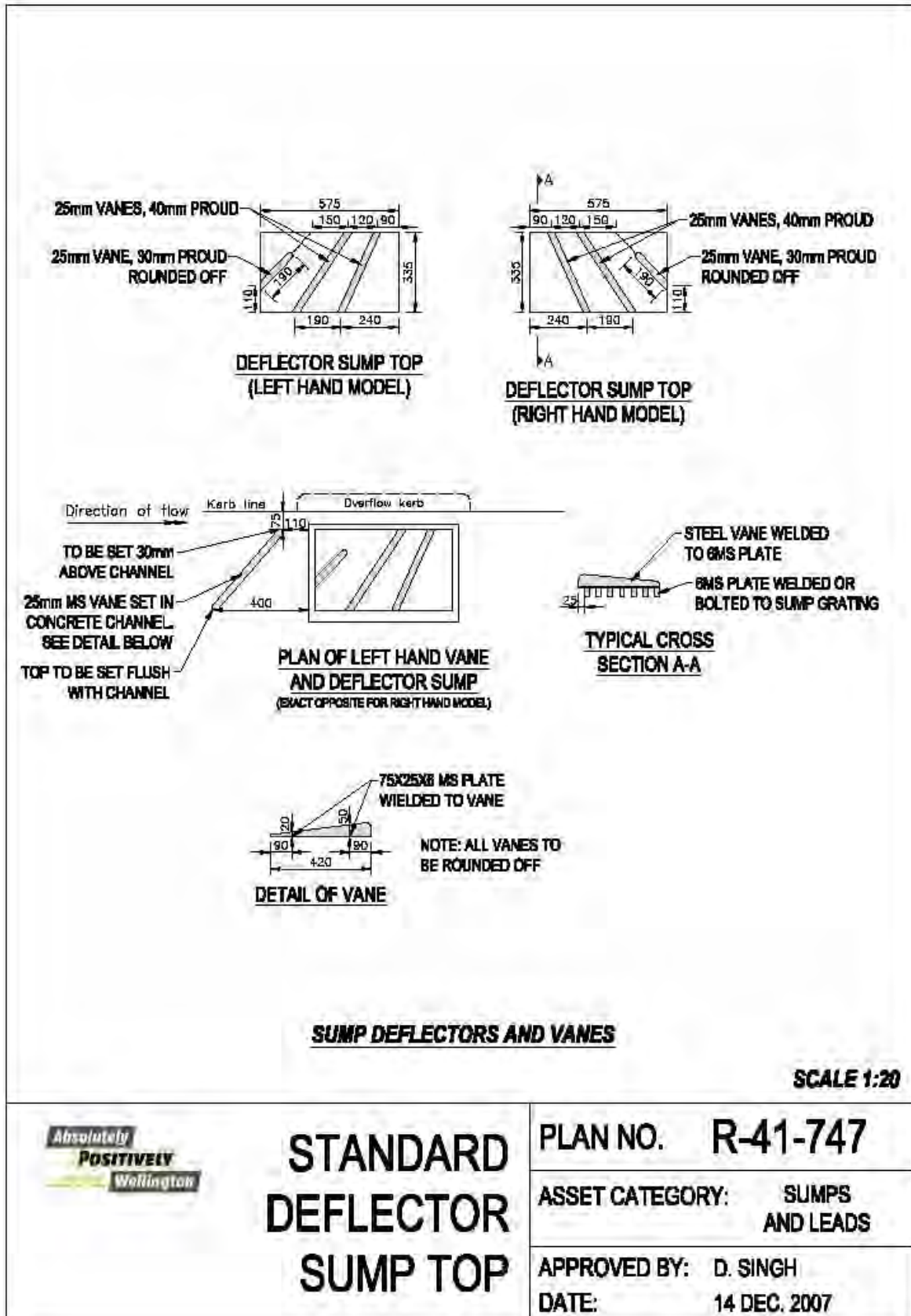
Drwg R -41-745 Standard Grate (Medium Flow Capacity)



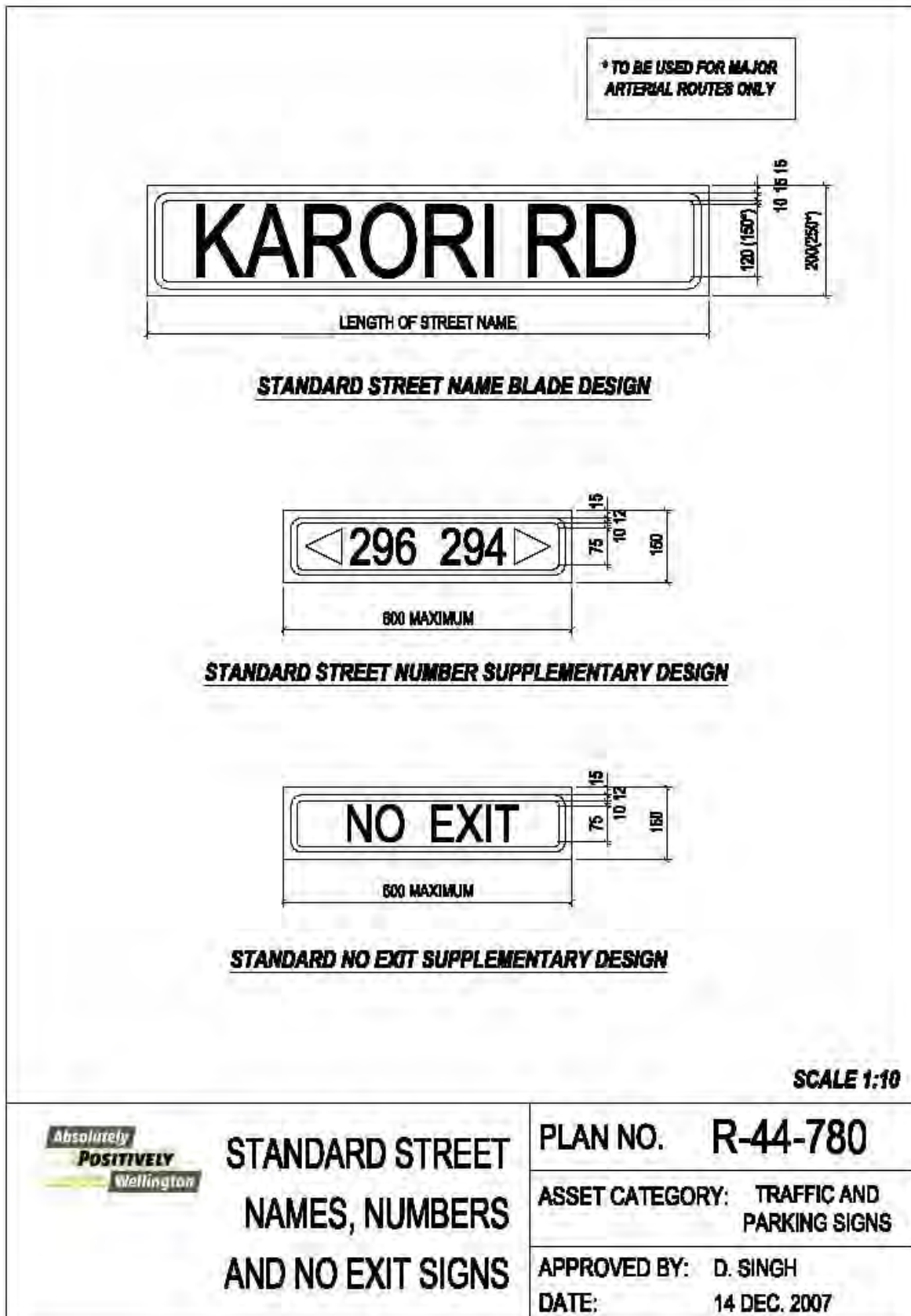
Drwg R -41-746 Cycle Safe Grate (Low Flow Capacity)



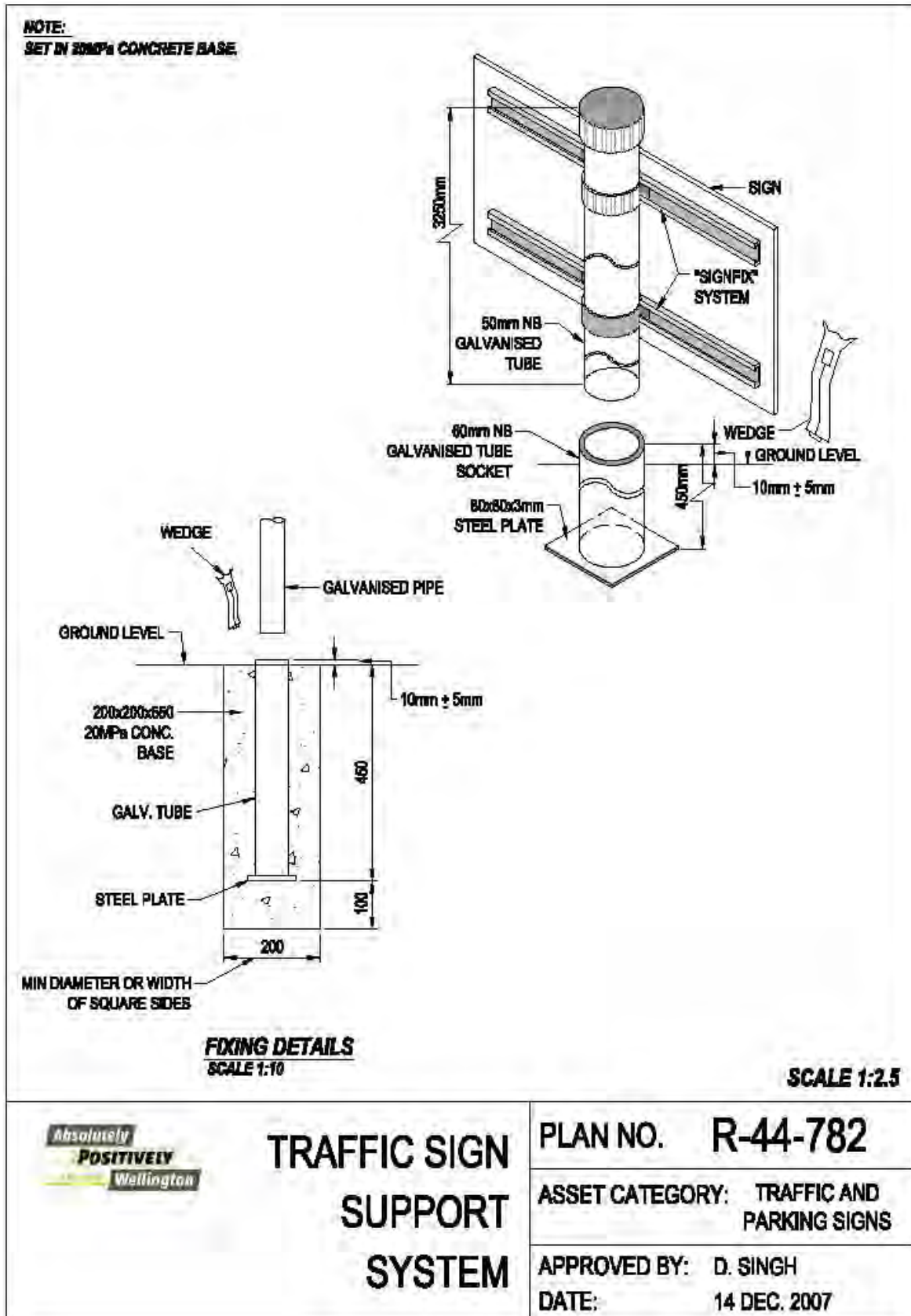
Drwg R -41-747 Standard Deflector Sump Top



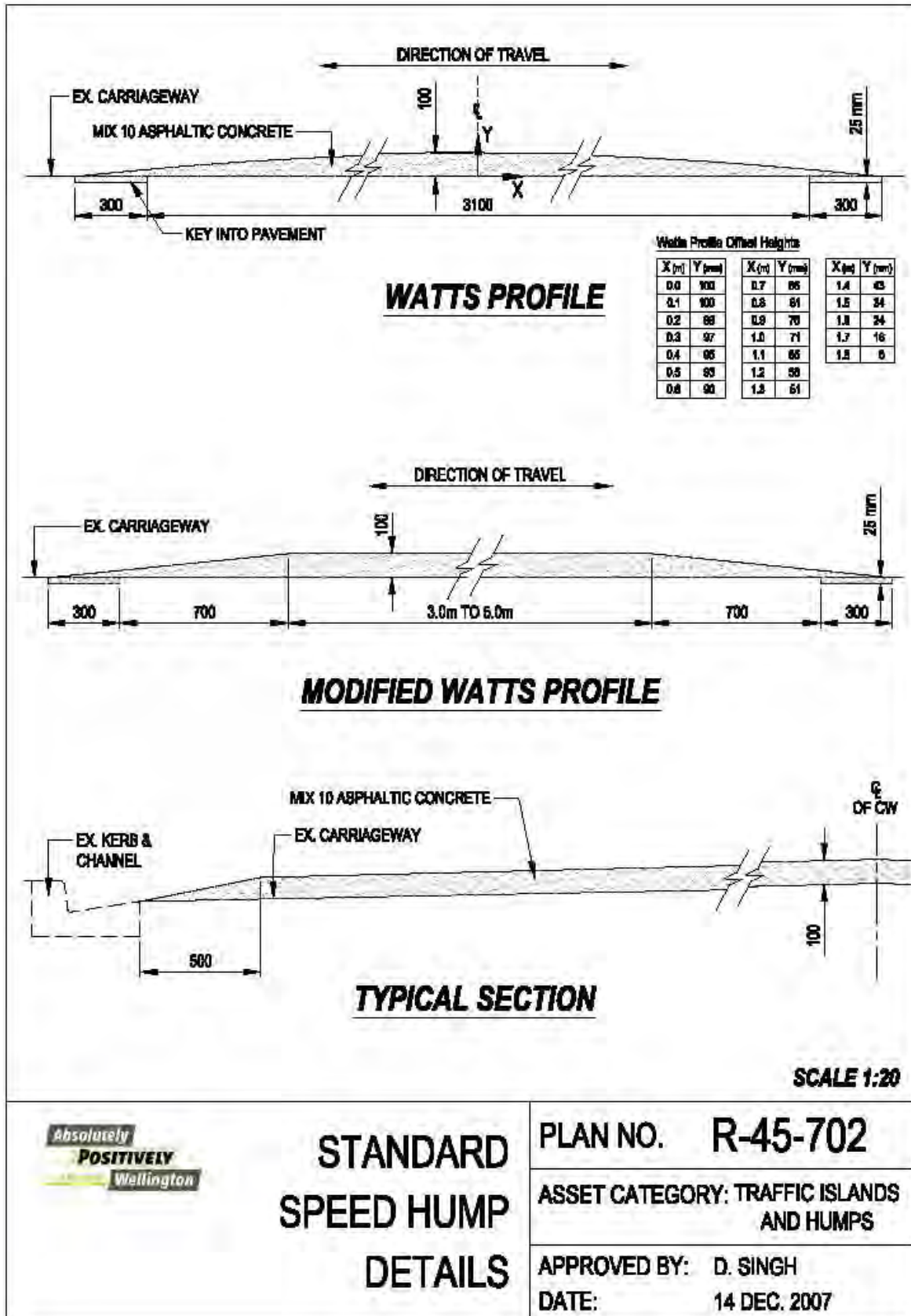
Drwg R –44-780 Standard Street Names, Numbers, and No Exit Signs



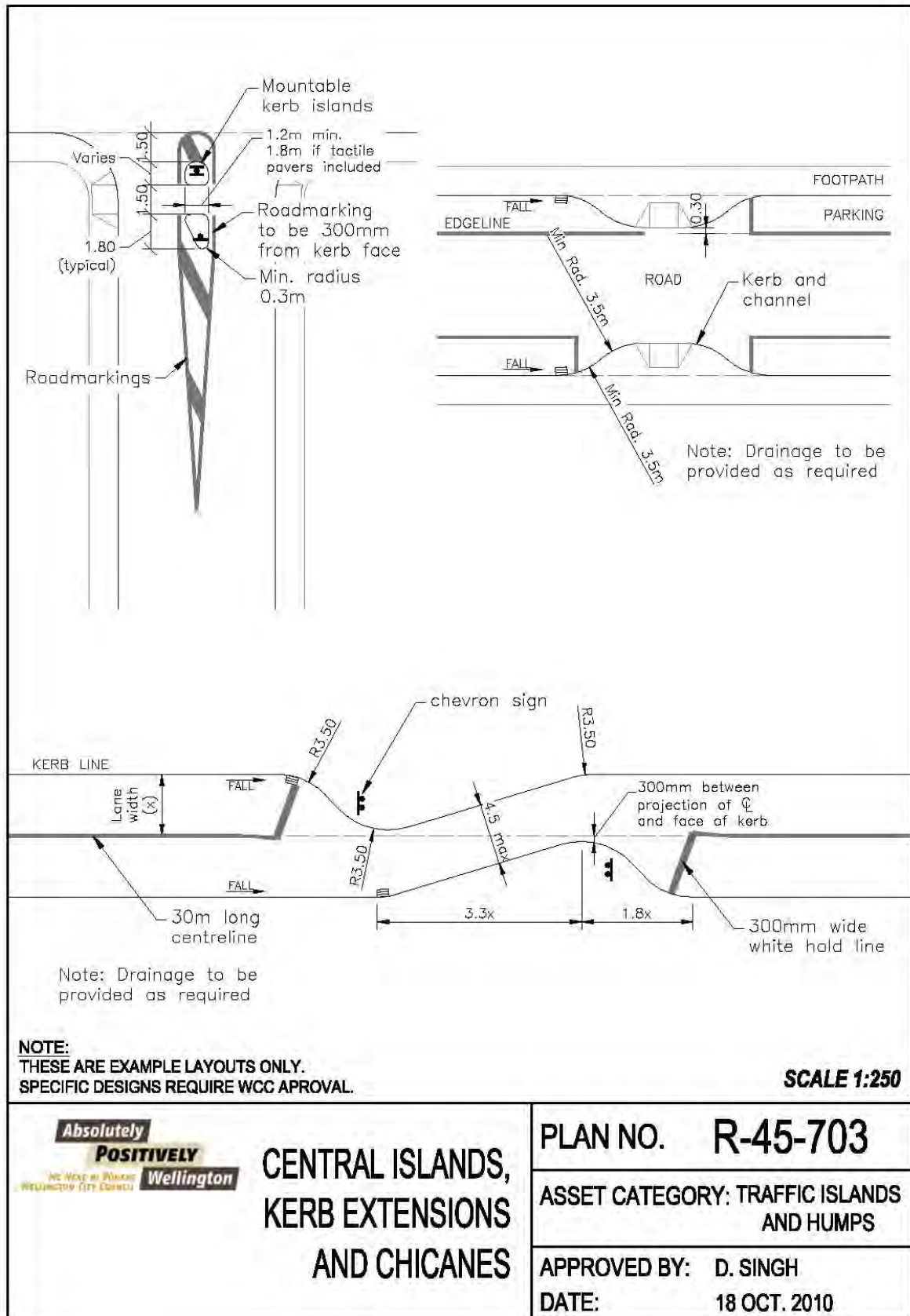
Drwg R –44-782 Traffic Sign Support System



Drwg R –45-702 Standard Speed Hump Details



Drwg R -45-703 Central Islands, Kerb Extensions and Chicanes



Sealing Report

Road and Location _____ Date _____

Air Temperature Start _____ Finish _____ Surface Condition _____

Starting Time _____ Finishing Time _____

Weather _____

Binder Type _____ AGO(%) _____ KERO(%) _____ Precoating: Yes/No

Additives _____ Chip Size _____ Source _____

Rolling Equipment _____

Details of Samples _____

Tank No	Distance			Width	Area	Tank Dip			Spray Rate		Spray Temp	Binder at 15°C
	From	To	Metres			Start	Finish	Total	Actual	Target		

Total Chips Used: _____ Comments _____

Benkelman Beam Test Record

Street and Location: _____

Date: _____ Test Load: _____ Tested By: _____

Pavement Temperature/Tyre Pressure: _____

(Details of location of test points and general information about the street are to be noted on the basis of this form).

Test Point	Lane	Distance from Kerb	Deflection Readings			Description of Test Point
			<i>Intermediate</i>	<i>Final</i>	<i>Difference</i>	

APPENDIX REGIONAL STANDARD FOR WATER SERVICES

CONTENTS

Regional Standard for Water Services