



• EDINBURGH •
THE CITY OF EDINBURGH COUNCIL

EDINBURGH TRAM DESIGN MANUAL



APPROVED 1 DECEMBER 2005 (AMENDED 12 JANUARY 2006)

愛丁堡電車設計手冊

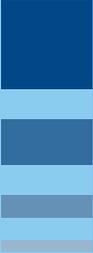
এডিনবরা ট্রাম পরিকল্পনা সম্বন্ধে লিখিত বর্ণনা

ایڈنبرا کیلئے ٹریم کے ڈیزائن کا ہدایت نامہ

دلیل استخدام تصامیم فریق اینبرہ

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CCTV	Closed Circuit Television	NPV	Net Present Value - the value of an investment based on an analysis of all life cycle costs and revenues adjusted to reflect present day prices. A positive net present value demonstrates that the investment will be profitable and the higher the figure, the more profitable it will be.
CEC	City of Edinburgh Council	OLE	Overhead Line Equipment ie wires and insulators, support poles and fixings to buildings to support wires.
DDA	Disability Discrimination Act	S75 Agreement	A legal agreement under s75 of the Town and Country Planning (Scotland) Act 1997 between a land/property owner and the Planning Authority to restrict the use of land/property or make a contribution of some kind.
LOD	Limit of Deviation – Area within which the tram project may be constructed – as defined in the Parliamentary Plans lodged with the Tram Bills	tie	Transport Initiatives Edinburgh Limited
LLAU	Limit of Land to be Acquired or Used- Area which can be used temporarily or permanently for specified purposes connected with the tram project (eg temporary construction compounds) but not for the tram tracks – as defined in the Parliamentary Plans lodged with the Bills.	TSAO	Tram System Aspirational Objectives - these are the Council's aspirations for the type of tram system that will be delivered
LTS	Local Transport Strategy 2004-2007 as approved by the City Council in March 2004		



Part 2

Detailed Design Requirements

5(a) Tram Identity

5(b) Tramway Alignment and Integration

ALIGNMENT

GUIDANCE

Limits of Deviation

- 5.78 The general route of the proposed tramways has already been set out. The “Limits of Deviation” shown in the plans submitted to Parliament refer to a clearly defined area within which the tram route, associated infrastructure and any mitigation required can be built. In addition to these, there are also Limits of Land to be Acquired or Used – additional land which is needed for construction work.
- 5.79 Within the urban environment, the Limits of Deviation are generally set from building line to building line. This allows for maximum flexibility when coming to design the alignment in detail.

Detailed Route Alignment

- 5.80 The adoption of a coherent/holistic design approach to determining the exact alignment of the tram route, assessing the streetscape in its entirety, will minimise unnecessary visual/physical intrusion.
- 5.81 Segregated running will be sought wherever possible. This gives faster journey times and also opens up the potential to create a new type of public realm. Segregated tramways add to the overall amount of public realm space and enhance connections between different parts of the city. They increase the visibility of the tram and also its attractiveness to users. Opportunities should be taken to use the tram as a catalyst for regeneration or enhancement.
- 5.82 The detailed alignment of the tram line will require many different and sometimes conflicting pressures and constraints to be assessed: safety, environmental, transport, engineering, aesthetic, financial, political and operational.
- 5.83 The final alignment should, therefore, provide an equitable balance between the users’ needs (i.e., those who live, work, visit and socialise in the city), operational requirements and the city’s urban form. An effective and attractive tram system not only provides a transport service but also has the potential to enhance the urban environment for pedestrians by reducing private vehicular traffic. The tram scheme is a key element within the Council’s Integrated Transport Initiative and is promoted as a quality alternative to the car for many urban trips. The aim is to reduce congestion within the city and, therefore, improve the quality of its public spaces.



ALIGNMENT (CONT.)

Taking Account of Urban Context

- 5.84 The detailed alignment should complement the existing urban form in a sensitive, considered and positive way, reflecting the different character of conservation areas such as the geometry of the New Town, the medieval form of the Old Town, and the tight spaces within Leith and Trinity. It should avoid unnatural changes in direction or contrived curved deviations, facilitating ease of installation. This will also help to secure fast journey times. Edinburgh is also under significant development pressure and requires carefully considered, high quality solutions for more modern environments to encourage the successful and sustainable development of buildings and transportation networks.

Different Character Zones

- 5.85 The proposed routes for Line 1 and Line 2 pass through different character zones, presenting different design challenges. For instance, Edinburgh's historic core must be preserved aesthetically and does not have the physical capacity to incorporate dramatic change. Care must be taken to ensure that the alignment of the tram route complements existing buildings and the current spatial use of the public realm. Generally speaking, the tram line should run parallel to the predominant building line with care being taken to ensure that important visual axes are not broken. A set of Principles was devised for Princes Street (see Appendix).
- 5.86 In less intensively developed sectors of the city and adjacent to important open green spaces, the alignment of the tram line should be guided by strong visual lines in the landscape, such as fields, avenues of trees or natural variations in contours.
- 5.87 In more rural or remote locations, the subtle integration of the tram route is essential, in order to ensure that it does not stand out as an unnatural/alien feature. Utilising existing transport corridors and natural landscape features may help to provide a "fit" with the existing landscape. In many situations, it is not possible to screen the tram's associated infrastructure.

Other Relevant Documents

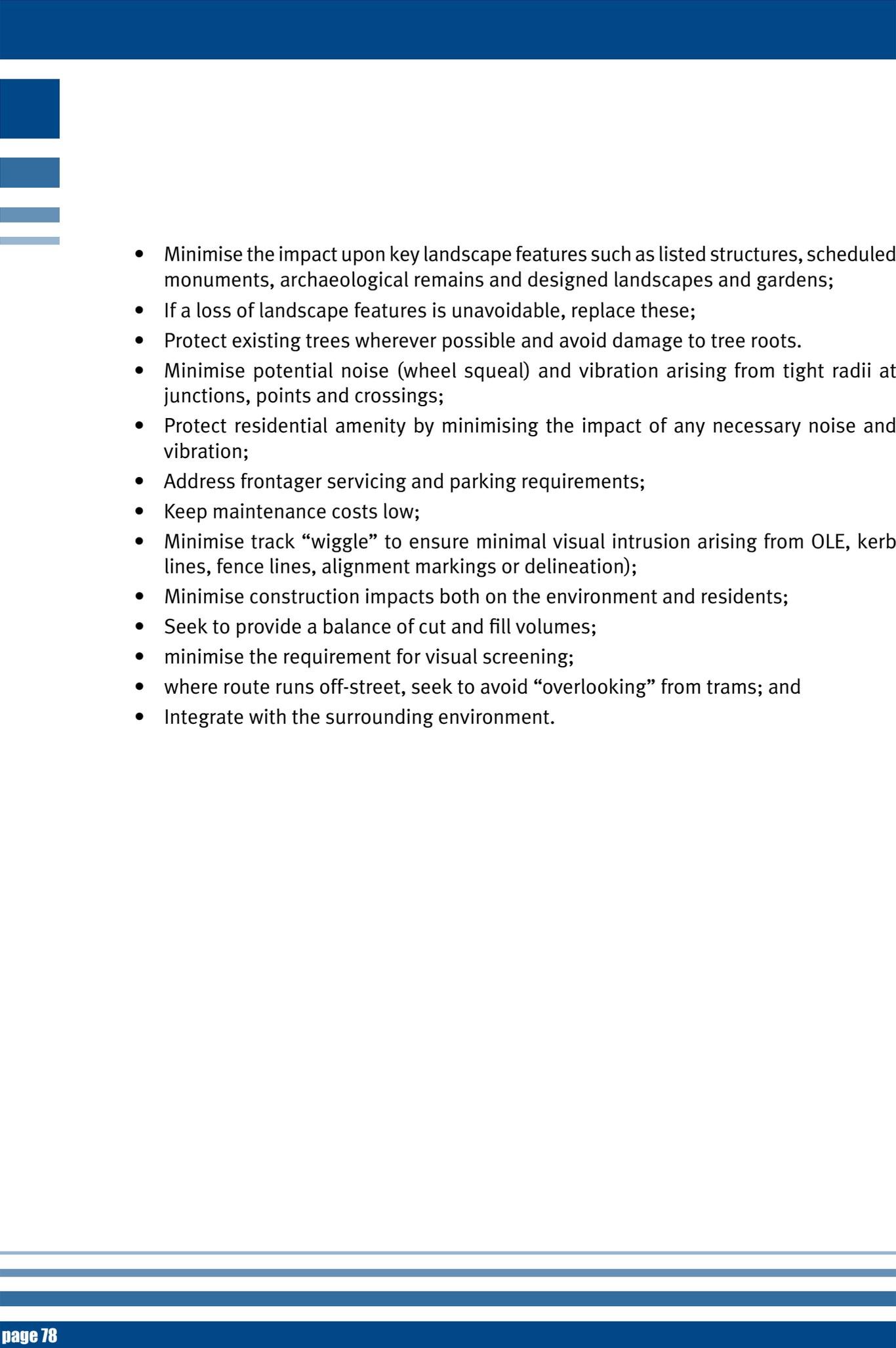
The design of the alignment should be consistent with the emerging guidance in “Edinburgh Standards for Streets” and the requirements of HMRI RSPG Part 2, Section G, Tramways.

Consideration should also be given to:

- Conservation Area Character Appraisals
- The World Heritage Trust Management Plan
- The Memorandum of Guidance for Listed Buildings and Conservation Areas

DESIGN GUIDANCE AND CHECKLIST

- 5.88 The detailed design requirements which follow set how the design principles are to be achieved to comply with this guidance.
- 5.89 The detailed alignment of rails and surfaces should take account of the following requirements:
- Tram lines should run parallel to the predominant building line, and important visual axes (existing or proposed);
 - Take due cognisance of the particular sensitivities within the WHS and Conservation Areas;
 - Mitigate the impacts on the setting of listed and prominent buildings;
 - Maintain important vistas either by running parallel to them or crossing them with minimum intrusion;
 - In rural areas and through large open spaces, alignment should follow existing features in the landscape, such as field boundaries or avenues of trees;
 - At junctions, the alignment should be as simple as possible, avoiding fragmented spaces and retaining ease of pedestrian movement;
 - Minimise land and property severance or isolation;
 - Minimise property take and demolition;
 - Maximise the space for pedestrians;

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- Minimise the impact upon key landscape features such as listed structures, scheduled monuments, archaeological remains and designed landscapes and gardens;
 - If a loss of landscape features is unavoidable, replace these;
 - Protect existing trees wherever possible and avoid damage to tree roots.
 - Minimise potential noise (wheel squeal) and vibration arising from tight radii at junctions, points and crossings;
 - Protect residential amenity by minimising the impact of any necessary noise and vibration;
 - Address frontager servicing and parking requirements;
 - Keep maintenance costs low;
 - Minimise track “wobble” to ensure minimal visual intrusion arising from OLE, kerb lines, fence lines, alignment markings or delineation);
 - Minimise construction impacts both on the environment and residents;
 - Seek to provide a balance of cut and fill volumes;
 - minimise the requirement for visual screening;
 - where route runs off-street, seek to avoid “overlooking” from trams; and
 - Integrate with the surrounding environment.

OVERHEAD LINE EQUIPMENT

- 5.90 The Council's preference is for a wire free system in the World Heritage Site and other sensitive locations. However, it has been accepted that this is not currently feasible and the following guidance therefore applies.

GENERAL DESCRIPTION FOR OVERHEAD LINE EQUIPMENT (OLE)

5.91 **Elements:**

- **Poles**

Poles may take a number of standard forms e.g. hollow circular; hollow circular and stepped; universal columns; hollow square (special fabrication). Circular options are generally preferred and allow easier attachment of equipment at different angles. The top of the pole needs a cap to prevent water ingress. This may be a decorative finial if required. The height of poles is dependent on the location and there is a preference to adopt a limited number of standard lengths of pole. Higher poles are generally of larger diameter/width and there are again a limited number of standard options available.

- **Pole foundations and mounting**

There are a number of alternative foundation options for poles. Some require the base of the pole to be bolted onto the foundation, which has advantages for future replacement. Disguise or treatment at the base must be addressed.

- **Rationalisation of Poles with street lighting etc**

For safety reasons, OLE poles are not frangible, unlike street-lighting columns. Because of this, OLE cannot be mounted onto existing columns, therefore consideration should be given to rationalisation of other elements onto the new OLE columns. The principal implication of this is for street lighting, requiring electrical safety and maintenance principles to be established. Signage may also be considered.

- **Location of poles**

Poles may be placed centrally between tracks or to the side of a single track or of double track. Where poles are close to the track, rigid cantilever arms are normally used to support the contact wires. With central poles, the cantilevers are balanced to either side and pole height can be minimised. Cantilevers can be used over two tracks from a side pole, although there is an effect on the height of the pole due to the greater length.

OVERHEAD LINE EQUIPMENT (CONT.)

- **Building Fixings**

In all normal circumstances these will take the form of a stainless steel eye-bolt.

- **Contact Wires**

A standard size single wire is expected to be used throughout the system. There is some variation in cross-sectional area available as standard and the selection will primarily be made on the overall traction power network design (There is a balance to be determined between cross-section, load requirements and substation location and spacing). In order to achieve a single contact wire, a parallel feeder cable is likely to be required. This would be laid in an underground duct and linked to the contact wire at intervals. Alternatively, solutions using twin contact wires, closely spaced, or catenary are required to give the required cross-section of copper along the route as part of the electrical design. The contact wires are suspended from cross spans of cantilever arms by smaller arms. The contact wire is divided into sections (typically 1200-1500m) which must be terminated off the line of the track to poles or other supports. An overlap to the next section is provided to ensure continuity of contact with the tram's pantograph. The contact wire is normally staggered from side to side along the length of the route (by typically +/- 300mm) to promote even wear on the pantograph.

- **Catenary**

An option for off-street sections may be the adoption of a simple catenary system with the contact wire suspended from a messenger wire (that takes the general form of a catenary and gives its name to the arrangement). This would allow significantly increased pole spacing on straight or gently-curved sections.

- **Tensioning**

The contact wire is normally longitudinally tensioned, usually by weights. For tramway applications, these are usually contained within poles of larger diameter. In some locations, it is possible that fixed termination equipment may be used, without tensioning. Operating speeds are limited without tensioning and supports must be spaced closer together.



- **Support Wiring**

The contact wire is suspended from the pole cantilevers or from support wiring between poles and/or other support locations. Where necessary, the contact wire must be restrained or tensioned laterally to follow the alignment of the tracks within relatively small dimensional limits. This is to ensure that the pantograph retains contact without the risk of losing contact sideways due to movement of the contact wire in wind or due to variations in temperature. This is the reason for the increased number of support positions required on horizontal curves, more being required the sharper the curve. Similar requirements are also present in locations of vertical curvature, and are compounded where combinations of horizontal and vertical curvature are present. Components to allow adjustment of the network of support wiring are included in the complete layout design.

- **Insulation**

Insulators must be placed in the support wiring and a system of double insulation is required by HMRI. In general, placing of the insulation as close as possible to the contact wires is preferred in order to minimise the amount of the total OLE network that must be considered as “live” in relation to safety considerations and arrangements for maintenance of both the tramway and adjacent properties. A variety of approaches to the insulating components is available. The aim must be to minimise visual intrusion.

- **Feeder Cabling (Insulated cables)**

Electrical power is supplied to the contact wire through cables from substations and additional trackside isolator cabinets (where necessary to provide electrical sectioning away from substation locations). Additional feeding cables are required to link periodically the parallel supply cable with the contact wires. Electrical sectioning is required in a limited number of locations, usually related to the positions of track crossovers to allow for the temporary suspension of services over sections of the route due to emergencies requiring OLE isolation, or planned or unexpected track blockages.

- **Materials**

To reduce maintenance, components are to be made from non-corroding materials such as stainless steel, or should be galvanised, and, for insulators, plastics or GRP. Poles are usually mild steel with galvanising. Painting (using an appropriate system) can be applied, although this would remain a maintenance liability. An alternative material for support wiring and related components is a synthetic rope. This has a black sheath and is of larger diameter than a stainless steel equivalent.

- A standard set of components from which the complete OLE system is assembled will be provided.
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OVERHEAD LINE EQUIPMENT (CONT.)

GUIDANCE

- 5.92 In any length of street or section of route, a number of factors have to be considered to achieve an overall balance of visual appearance. Issues to be addressed in achieving this balance include:
- Availability and suitability of buildings for the application of building fixings from both a technical, aesthetic, and architectural/historic sensitivity point of view.
 - Numbers and sizes of poles. A greater number of smaller poles may well be preferable to a smaller number of larger poles.
 - Position of poles in respect of highway safety (with consequential protection requirements) and rationalisation of street clutter.
 - In areas of curvature there are likely to be trade-offs between the numbers of supports (poles and/or building fixings) and the quantity of support wiring. There may be more flexibility in areas of horizontal curvature than in areas of vertical curvature.
 - To achieve maximum integration with street lighting, but typical spacing is usually different for the two requirements and height of street lighting must be considered in the visual impact of pole design.
 - Colour and design. The selection of colour and design of both poles and lines should be consistent with other street furniture and should consider the visual appearance.
 - Ancillary wires and other features should be co-ordinated and their effects considered holistically along with other trackside equipment

Other Relevant Documents

The design of elements required for Overhead Line Equipment should be consistent with the provisions of the “Edinburgh Standards for Streets” currently in preparation.

Other relevant planning guidance is contained in the following Development Quality Guidelines:

- Historic Buildings Repairs
- Development Affecting the Setting of Listed Buildings

The requirements of HMRI RSPG Part 2, Section G, Tramways also apply.

Consideration should also be given to:

- Conservation Area Character Appraisals
- The World Heritage Trust Management Plan
- The Memorandum of Guidance for Listed Buildings and Conservation Areas

DESIGN GUIDANCE CHECKLIST

- 5.93
- Need for early discussion with the Planning Authority regarding suitable approach for particular streets or sections of streets
 - Cross refer to Princes Street Guidelines and any other public realm/ townscape guidance.
- 5.94 Where poles are accepted as the appropriate solution
- the alignment of poles should run parallel to the predominant building facade.
 - the intervals between poles should be consistent and the locations must take cognisance of adjacent building fenestration and entrances.
 - Poles should be spaced to maintain clear visual axis across bisecting streets.
 - Where there is a strong visual axis along the full length of a street, the rhythm of the poles should be considered for the street as an entity.
 - The effect of colour of the poles and OLE should be considered and a consistent colour chosen in accordance with “Edinburgh Standards for Streets”.
 - The design (shape and height) should take reference from other street features and be consistently applied. Height of poles should be consistent throughout each section of the route.
- 5.95 Where building fixings are to be used
- Evidence of structural suitability to be provided
 - Building fixing positions must in each case respect the building features, e.g. fenestration and ornamentation.
 - Fixings should be discreet in terms of position and actual fixing design
 - All building fixings must be stainless steel or other suitable corrosion-resistant material.

SURFACING

GUIDANCE

- 5.96 Materials will need to comply with the provisions of the Edinburgh Standards for Streets document.
- 5.97 General requirements for tram surfacing are driven more by the requirements of other road traffic and pedestrians than by tramway-specific requirements.
- 5.98 Within existing streets, track construction in street will be developed to allow a variety of possible surface finishes to be applied. Surface finishes should be in line with those described in the Edinburgh Standards for Streets, or developed in consultation with the Council. The in-street track construction and possible surfacing options may include specific requirements when there is general traffic running along the track, or across the track. A similar approach will be adopted off street.
- 5.99 One additional general principle is to avoid excessive areas of metalwork (comprising rails, especially at pointwork, and manholes or equipment access covers) in trafficked carriageways.

Other Relevant Documents

Surfacing should be consistent with the provisions of the emerging guidance in “Edinburgh Standards for Streets”.

Refer also to the Council’s Development Quality Guideline on:

- **Sett Paved Roads**

Guidance in the HMRI RSPG Part 2, Section G, Tramways also applies.

DESIGN GUIDANCE CHECKLIST

General

- 5.100
- Surfacing should be simple and respond to the local context.
 - Only a limited palette of materials should be used, reflecting the Council's emerging guidance 'Edinburgh Standards for Streets'.
 - Road design standards must be satisfied in the context of the Edinburgh Standards.
 - All materials should be capable of being laid to tolerances to provide free flow of drainage.
 - The direction of movement or segregation should be clearly delineated/or protected within pedestrian zones.
 - The need for physical barriers should be designed out where appropriate by the selection of appropriate materials.
 - Physical control measures will only be considered where there is a risk that vehicles could cross the tramway.
 - The selection of the most appropriate trackform and finish for each location depends on a number of factors and will be determined after detailed consideration.

Noise

- 5.101
- The construction of the trackslab must be designed to reduce ground-borne vibration or noise, particularly to adjacent properties.
 - An acceptable balance must be reached between technical requirements for noise reduction and aesthetic requirements within sensitive areas of townscape, particularly in the WHS and conservation areas.

Definition of Tramway Path

- 5.102
- Final alignment of the tramway should take cognisance of potential visual impact at junctions/changes in direction.
 - The lines and fine curves (ellipses) associated with Edinburgh's street grids and layouts must be respected and reflected in the proposed track alignment.

SURFACING (CONT.)

Workmanship and Maintenance

- 5.103
- Establish a co-ordinated, public/private sector partnership to address issues of public realm management and maintenance.
 - Design out potential maintenance problems with particular regard to the layout of elements of street furniture and avoiding the creation of litter traps.
 - Ensure the Council's preferred method of street cleaning can be accommodated, (for example, access for mechanised street cleaners).
 - Ensure that paving surfaces, material and construction can withstand the potential eroding or corrosive effects of the preferred cleaning methods.
 - Ensure that new paving is finished off to marry neatly with existing areas and that specifications for workmanship follow council requirements.

Surfaces

- 5.104
- The finish between the tracks should be the same as that of the carriageway material. However in a street environment consideration should be given to differentiating the tram lane (HMRI Requirement).
 - The finish of platforms/ramps should mimic that of existing pavements, creating distinction between pedestrian and vehicular routes.
 - Continuity of surface material is paramount, however paving size and layout may be adapted to fit a specific area, such as platforms although differentiation may need to be accommodated (HMRI Requirement).
 - Where required, cycle lanes should only be segregated from pedestrian circulation through change in ground surface material or surface features instead of physical barriers.
 - The design of pavement/platform kerbs should create contrast for ease of use by those visually impaired and fit with the "Edinburgh Standards for Streets".
 - Pedestrian crossings should comply with Edinburgh's guidance with regard to surface treatment at crossing points.
 - Where the tram runs through amenity grass the finish between the tracks should be low-maintenance, fine textured grass, unless otherwise agreed.
 - In selecting grass track finish, consideration needs to be given to any unwanted effects such as pedestrian use.

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- Ballast should be implemented in depot areas, industrial areas and less sensitive or visually unobtrusive locations. The ground treatment will provide a well-drained solution.
 - Easy access for grass cutting and maintenance is required along the track and, depending on layout, two metres either side, cutting twice a year (minimum).
 - Where vehicle over-run of grass track is foreseen, a plastic reinforcement grid system, or similar, should be included.
 - Where pedestrian/cycle paths cross the track, the surfacing and edging of these will continue across the track infill.
 - In low maintenance grass areas the finish between the tracks could be a wildflower mix of low-growing fine grasses and low-growing native wildflowers, sown on low-fertility topsoil, cutting twice a year (minimum).
 - Where dirt tracks cross the track, wet rolled, bound-gravel construction, which will be restrained by pegged, treated timber will be implemented for the 1.5m minimum wide path, 3m either side of the outside rails.
 - Consideration should be given to Sustainable Urban Drainage Systems (SUDS) requirements.

ACCESS FOR ALL

GUIDANCE

- 5.105 Care must be taken to ensure that all the statutory obligations are met with regard to access in the public realm and in relation to the tram system.
- 5.106 In order to achieve a high standard of accessibility throughout the tram system, consultation with representatives from each of the identified user groups will be necessary at key stages throughout the design process.
- 5.107 Reference should also be made to the sections on Stops (see page 46) and Surfacing (see pages 84-87).

Other Relevant Documents

The design should be consistent with the emerging guidance in “Edinburgh Standards for Streets”.

Refer also to the requirements of the Council’s Development Quality Guideline on:

- Access to the Built Environment
- Community Safety

The provisions of the Department for Transport Inclusive Mobility Guide to Best Practice on Access to Pedestrian and Transport Infrastructure and the Disability Discrimination Act 2005 (DDA) and the Rail Vehicle Accessibility Regulations must also be complied with.

DESIGN GUIDANCE CHECKLIST

- The accessibility requirements of different user groups must be satisfied with regard to each element of the tram system.
- Address any necessary changes in level as an integrated, positive design feature.
- Crossings should be designed to prevent wheelchairs and prams being caught in the rails.
- In all instances, it is proposed that any street furniture located within active or passive pedestrian spaces should be minimised, if absolutely necessary. This reduces the potential number of hazards, not only to wheelchair and pram users and the partially sighted, but to pedestrians in general.
- All necessary trackside equipment should be set out in a logical and considered way to avoid creating potential hazards.

PEDESTRIANS & CYCLISTS

GUIDANCE

- 5.108 To maximise the use of the tram system by pedestrians and cyclists, access for these user groups to tram stops must be easy, recognisable, direct and safe. Footways/footpaths and cycle tracks should be well defined and aligned with the tram track, only merging with each other at tram stops if no other design solution can be implemented.
- 5.109 Consideration is required in the design and delineation of footways/footpaths and cycle tracks alongside tram tracks to ensure that existing widths are maintained and, if possible, extended. This is particularly important in areas of heavy pedestrian or cycle movements. An important part of the design will relate to the detailing of pedestrian, cycle and tram intersection points at tram stops and crossings, to ensure safe and direct access to the tram system.

Other Relevant Documents

Design should be consistent with the “Edinburgh Standards for Streets” document.

Access arrangements shall also comply with the Disability Discrimination Act (DDA) and the Council’s “Movement and Development” guidelines for adoptable roads and its “Cycle Friendly Design Guide” document

DESIGN GUIDANCE CHECKLIST

- 5.110 The following design requirements must be satisfied.
- Pedestrians and cyclists should be given priority by providing appropriate circulation space adjacent to the tram route.
 - The tram should either connect with existing pedestrian and cycle links, where practical, or give rise to new routes, creating a higher level of accessibility
 - Tram stops should connect with existing and proposed pedestrian links
 - Safe and appealing pedestrian paths must be created through careful delineation and use of changes in level or surfacing in preference to physical barriers.
 - Physical barriers should be avoided where possible as they create unused or unsafe routes. However they may be needed in particular locations to promote safety for pedestrians or cyclists.

PEDESTRIANS & CYCLISTS (CONT.)

- There must be a minimum of one crossing point at any on-street tram stop, appropriately designed to create directness and ease of use. At off-street tram stops, two crossing points should be provided.
- Where a tram stop platform is integrated into the footway, the needs of pedestrians proceeding past the platform must be accommodated, including access to premises along the section of the footway that is also used as the platform
- Dropped kerbs and flush crossing of tram lines should be provided.
- Crossings should, ideally, be at right angles to the tram track or the street, with minimal physical barriers surrounding them.
- Crossings should be sufficiently illuminated to enhance the visibility of pedestrians and cyclists by other road users.
- Crossing points should be provided at frequent intervals along the tram route and provide easy access for all users, including those with prams and wheelchairs etc.
- Sufficient ambient lighting must be incorporated along pedestrian and cycle routes.
- Cycle/pedestrian routes are to be provided alongside the tram track on those sections where the tram route follows a corridor currently occupied by a cycle/pedestrian path only.
- Where space allows, cycle/pedestrian paths should be separated from the tram track by a grass verge, with 2m desirable optimum.
- For on-street sections, cycle lanes should be implemented where possible, to encourage segregation from the tram tracks.
- Cycling on platforms will not be accepted and should be designed out.
- Cycle parking, in the form of cycle stands and/or secure lockers, should be sited close to or on platforms as an integral part of the tram stop, where appropriate. The number of spaces should relate to tram stop location and anticipated demand.
- If possible, cycle parking should be in locations able to be overlooked by CCTV.
- Cycle stands should be secure and sheltered from external elements. Materials used should be robust, vandal resistant, easily maintained and to conform to the tram identity.
- Cycle routes should be fluent throughout the tram route, avoiding interaction with both trams and other vehicles, such as parked cars or unloading areas, and be designed so as to minimise the crossing of the tracks.
- Where there is restricted space and cycle routes cannot be implemented safely, they should merge with pedestrian routes rather than tram or vehicular paths.

DESIGN ELEMENTS OF ENVIRONMENTAL MITIGATION

GUIDANCE

- 5.111 It is important that the environmental impact of the tram is minimised and that this is a major consideration in the design process. All environmental mitigation measures must be well designed and long-lasting. Careful consideration must be given to the diversity and character of the areas through which the tram route passes. This includes the World Heritage Site, various Conservation Areas, seafront areas including the Firth of Forth SSSI / SPA, Sites of Importance for Nature Conservation, rural and semi-rural settings, and the Green Belt. Assessment of these and any other areas of interest together with survey work to identify essential and desirable mitigation to be incorporated into the overall landscape design will be undertaken. The survey work will be carried out by a qualified ecologist and will identify the requirements for complying with all protected species and habitat legislation.

The design, implementation and subsequent management of mitigation measures must respect not only the character of these various areas but their full environmental, ecological and cultural context. This work should be carried out in consultation with CEC and other relevant bodies such as Scottish Natural Heritage.

Other Relevant Documents

The design and construction of environmental mitigation measures must be consistent with the following:

- The relevant Environmental Statement
- Edinburgh Biodiversity Action Plan
- The Landscape and Habitat Management Plan
- The Noise and Vibration Policy
- The Code of Construction Practice
- Control of Substances Hazardous to Health (COSHH)
- Health and Safety Regulations
- BS 5837:2005 Trees in Relation to Construction
- BS 3998:1989 Recommendations for Tree Work

DESIGN ELEMENTS OF ENVIRONMENTAL MITIGATION (CONT.)

Consideration should also be given to:

- Conservation Area Character Appraisals
- The World Heritage Trust Management Plan
- The Memorandum of Guidance for Listed Buildings and Conservation Areas

The design of measures of environmental mitigation should also take account of the Council's Development Quality Guidelines including:

- Quality of Landscaping in New Developments
- Biodiversity
- Tree Protection
- Urban Forestry

DESIGN GUIDANCE AND CHECKLIST - GENERAL

5.112 Reducing the environmental impact of the tram and providing suitable mitigation should be central to the design process. The following design requirements should be considered:

- Refer to the relevant Environmental Statement.
- Comply with performance criteria set out by the CEC and other requirements (as identified above).
- Mitigation measures must be designed to take account of the full context of the area where they are to be introduced and be carefully related to the design of other elements of the tram infrastructure.
- Mitigation measures must be designed to create a positive visual impact.

DESIGN GUIDANCE AND CHECKLIST - TREE WORKS/MANAGEMENT

5.113 There will be a presumption against the felling and pruning of existing semi-mature and mature trees unless this can be proved to be absolutely necessary for engineering or health and safety reasons. The trees which are expected to be felled or pruned are those already identified in the Environmental Statements. A qualified arboriculturalist will be appointed to prepare a tree report prior to any works commencing. This report will set out clearly baseline tree conditions (location, species, condition, height, spread and diameter, each tree being identified by numbering and tagging) within the Limits of Deviation of the corridor; trees to be felled and justification for this; trees requiring pruning or other arboriculture work; and continued tree management required. Notice of tree works should be given to:

- Third parties indirectly affected by tree work proposals;
- The local roads authority if traffic restrictions are required or where works are to take place within, or adjacent to, public spaces;
- The local parks authority if pedestrian restrictions are required in parks or where works are to take place within, or adjacent to, public urban green-spaces;
- Local councillors;
- The Forestry Authority, to ascertain if a felling licence is required; and
- The general public, by means of advanced notices/ publicity.

5.114 Consideration should be given to the following design requirements:

- All trees, woodlands and hedgerows, irrespective of Tree Preservation Order (TPO's) or Conservation Area (CA) protection, are to be retained unless engineering or health and safety reasons dictate felling.
- If retention of existing trees, woodlands and hedgerows is not possible, then new planting on a similar scale to that which is to be lost must be designed.
- All trees, woodlands and hedgerows not to be felled must be clearly marked and protection measures put in place prior to site work commencing.
- Such work will take due account of season especially with regard to bat roosting and bird nesting (see above).
- All tree work will be carried out as per the Tree Report and will be in compliance with current best practice (see above).
- Timber will be disposed of in a sustainable manner, with alternative end uses to be found wherever possible, and will not be burnt on or off site.

DESIGN ELEMENTS OF ENVIRONMENTAL MITIGATION (CONT.)

- The relocation or location of utilities from ‘soft’ areas into shared conduits under ‘hard’ areas to protect existing trees and to maximise the potential for new planting.
- Proximity of track/OLE poles to existing trees to be retained and the relocation of poles to avoid tree removal;
- Minimisation of root severance to ensure tree longevity by employing hand digging around base of tree below canopy
- Finished levels of made-up ground in relation to root collar and root depth; and
- If retaining walls are required near trees, underground-bridging lintels should be used, in order to retain primary roots.
- Construction around trees will take full cognisance of current best practice (see above).

DESIGN GUIDANCE AND CHECKLIST - PLANTING

5.115 The design and choice of planting is vital to the successful integration of the tram into both urban and rural settings. Consideration should be given to the following design requirements:

- Retention of existing trees and hedgerows wherever possible, where they are in good health and tie in with new planting proposals;
- Provide a comfortable ‘fit’ with the adjacent context. Mitigation measures must not create visual intrusion in themselves;
- Avoidance of contained linear forms of planting such as hedgerows where the route crosses naturally open tracts of land, unless such planting is required for essential screening;
- Replanting of trees that are lost to the tram system construction;
- In principle all planting will be based on the use of native species proven to be locally hardy by established presence within the area.
- There will be a concentration on the use of young stock, which will more readily establish in these conditions, although larger plants may be used for initial impact in specific high-profile locations.
- Broadleaved woodland planting comprising a mix of transplants, whips and feathered trees with associated understorey species should be used to create multi-layered woodland with a mix dominated by native deciduous trees, comprising large woodland species and with oak and ash as the principal climax community.

- Mixed woodland planting comprising a combination of transplants, whips and feathered trees with associated understorey species should be used to provide mature multi-layered woodland with an appropriate mix of native deciduous, coniferous and evergreen species. Key species will include oak, ash and Scots pine. The balance between deciduous and evergreen species will be varied to suit desirable density of year-round screening and reflect local planting and landscape character.
- Enhancement and creation of habitat diversity, for example, the establishment of semi-natural grassland, scrub, freshwater and marginal habitats within severed areas, left-over corners or damp hollows immediately adjacent to the corridor.
- Compensation for loss of existing hedgerows and reinforcement of the existing hedgerow structure to enhance local landscape and ecological interests. Hedgerow trees and hedging species should be introduced in locations consistent with local landscape character and should be planted in a double staggered row.
- Use of mass planting at tram junctions, bridges and other structures to help assimilate the new arrangements into the surrounding landscape;
- There will be particular areas, such as in higher-profile urban and suburban areas and business parks, where the proposals will include amenity shrub and groundcover planting, with specimen trees and shrubs and feature hedges. These will normally be planted at a higher density and to a more robust specification than in more rural situations, in order to withstand the higher degree of wear-and-tear and vandalism to which they may be subjected.
- Planting to screen or reduce potential visual impact for identified receptors;
- Planting of severed field corners and landlocked areas where appropriate; and
- Introduction of local focal points of planting, where appropriate.
- In rural areas and wildlife corridors planting species should be native. In urban areas ornamental species appropriate to context may be considered. Final selection will be governed by context and the requirement to 'fit' into the existing environment.
- Cognisance should be taken of the Edinburgh Biodiversity Action Plan.
- Boundary treatments must reflect the existing context.
- In key locations 'one-off' designs should be considered to provide a high-quality design statement.
- Three forms of seeding will be used throughout the substantial part of the design. A verge and track infill mix suited to low levels of annual maintenance and with the potential to develop semi-natural characteristics will be the principal mix. Where areas are to be returned to agriculture, appropriate seed mixes will be selected after consultation with the Scottish Executive Environment and Rural Affairs Department (SEERAD). For informal, low- maintenance areas, often in association with scrub and



DESIGN ELEMENTS OF ENVIRONMENTAL MITIGATION (CONT.)

also for rural track infill, a rough grass mix is proposed, comprising native, non-invasive grass species and wild flowers.

- A landscape management plan should be put in place to ensure establishment of all new habitats and planting.

DESIGN GUIDANCE AND CHECKLIST - NEW CUTTINGS AND EMBANKMENTS

5.116 Consideration should be given to the following:

- Cross-sections on cuttings and embankments should be natural-looking and rounded with smooth curves grading into adjacent contours.
- In rural and urban-fringe settings should grade out to a shallow gradient suitable for return to agricultural.
- Retaining walls are only appropriate in urban or suburban areas where space is constrained.
- Retaining walls may utilise natural stone that provides a visual 'fit' with the surrounding townscape. There may be other means of achieving an appropriate visual fit.

DESIGN GUIDANCE AND CHECKLIST - ACOUSTIC BARRIERS

5.117 Consideration should be given to the following:

- Acoustic barriers where required must meet the noise attenuation performance criteria required for each specific location.
- Where acoustic barriers are a requirement, their design should be aesthetically pleasing and sympathetic to the character of the local area.
- Adverse visual impact disproportionate to the benefits of noise impact mitigation must be avoided.
- The design of acoustic barriers should take account of available space, topography, maintenance and cost.
- Planting will of itself not be used as an acoustic barrier although it should be considered as a means of positively assimilating the barrier with its setting.

DESIGN GUIDANCE AND CHECKLIST - FENCES, RAILINGS AND WALLS

5.118 Fences, railings and walls may be required for security, safety or aesthetic reasons. Consideration should be given to use of such structures in the following circumstances:

- Where it is desirable for the public to be kept away from the track in rural or semi-rural situations, for example, within Green Belt areas;
- In urban areas where existing boundaries are severed or there is a need to tie into existing boundaries;
- In rural areas where existing boundaries or hedgerows are severed, where stock proofing is required or there is a need to change or tie into existing boundaries;
- Where an acoustic barrier is required, acting both as a boundary and as a noise mitigation measure; and
- In other locations as may be agreed as necessary with the City Council Planning Authority.
- The design of any boundary structure must be in harmony with local townscape and landscape character, for example rural areas, seascapes, watercourses and be sympathetic to designations such as Conservation Areas or Wildlife Corridors.
- There may be situations where a design statement is provided if innovative or specific design solutions are required.

DESIGN GUIDANCE AND CHECKLIST – ARCHAEOLOGY AND HISTORIC BUILT ENVIRONMENT

5.119 Consideration should be given to the following:

- Refer to the relevant Environmental Statement.
- Adverse physical impact upon archaeological sites and monuments must be avoided where possible.
- Designs must minimise their impact upon the settings of historic monuments and upon historic landscapes and designed gardens.

You can get this document on tape, in Braille, large print and various computer formats if you ask us. Please contact ITS on 0131 242 8181 and quote ref 06060. ITS can also give information on community language translations. You can get more copies of this document by calling David Morgan (Customer Services Team Leader) on 0131 529 3900.

遠設計手冊解說要在愛丁堡電車計劃中遠致優質設計所需要具備的內容、要求及結構。愛丁堡市議會作為「規劃當局」在評估建議書時，會以此為參照，同時，設計手冊在採購過程中是重要的部份。欲查詢本文件的翻譯資料，請致電愛丁堡市議會傳譯及翻譯服務部(ITS)，電話0131 242 8181並說明檔案編號06060。

یہ ڈیزائن مینیل (ہدایت نامہ) ایڈ میرا کے ٹرم کے پراجیکٹ کے میڈیٹا برائیں کے حصول کیلئے اس کے مضمون، اصطلاحات اور طریق عمل کی مجموعی پیش کرتا ہے۔ یہ ایک ریفرنس پوائنٹ کی طرح کام کرتا ہے جس کے تحت سنی آف ایڈ میرا ٹولس کو بحیثیت پائلٹ قدرتی اجازت کی کمی تجاویز کا جائزہ لیا جائے گا۔ اس کے علاوہ حصول کے طریقہ کار میں کلیہ کی کردار ادا کرتا ہے۔ اپنی کمیونٹی میں بولنے والے زبان میں اس دستہ کے ترجمے کے حقیقی معنوں کیلئے برائے مہربانی ایئر پرائیوٹس ایڈز ٹرانسلیشن سروس (ITS) کو 0131 242 8181 پر ٹیلیفون کریں اور ریفرنس نمبر 06060 کا حوالہ دیں۔

شرح دلیل استخدام التصاميم السياقي والمتطلبات والاليات لتحقيق التصاميم ذات النوعية لخدمة لمشروع فريق إدنبورج، وسيكون نقطة مرجع تقييم على أساسه الطلبات التي يتم رفعها لمجلس بلدية مدينة إدنبورج باعتبارها "سنة التخطيط" كما سينصب دورا مهما في عملية الحصول على المشروبات. للمعلومات حول ترجمة هذه الوثيقة إلى لغة جابتك الرجاء الاتصال مكتب خدمة الترجمة الفورية والتحريرية على رقم الهاتف 0131 242 8181 وذكر الإشارة رقم 06060

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