
BELFAST RAPID TRANSIT SYSTEM
EWAY ROUTE 2 – Comber Greenway and
Ballymacarrett Walkway

**SPECIFICATION FOR
TOPOGRAPHICAL
SURVEY**

June 2009

CENTRAL PROCUREMENT DIRECTORATE

Works Procurement Division

Survey Specification

Job Title: Rapid Transit System Belfast – EWAY Route 2



Scope of Works

A detailed topographical survey is required to facilitate the design of a Rapid Transit System on this route. Particular accuracy in recording levels, geometry and street furniture is required due to the sensitivity of drainage, gradients and carriageway dimensions. The route is shown on the attached drawings DRD-RTD-EWAY-TOPO-004 and DRD-RTD-EWAY-TOPO-005 (Shaded area represents area to be surveyed).

Two digital copies of the plans, one 2D & one 3D, in **AutoCAD 2007 DWG** format with longitudinal sections and cross-sections are required on compact disc. In addition, a data file of the survey data compatible with Microsoft Excel is required. Five hard copies are also required.

Please note that this survey will be subject to CPD undertaking independent checks on accuracy.

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SURVEY SPECIFICATION

1.0 Project Information

The information given in the following clauses provides essential information needed for the Project.

1.1 Project Designation

Name: Rapid Transit System – Topographical Survey

Reference No.: (TBC by CPD)

1.1.1 Purpose of Project

The Project Objective is to provide information to enable the client to assess the feasibility of a dedicated rapid transit bus network

1.1.2 End Product

The client requires an accurate topographical survey of the areas as indicated in the accompanying drawings.

Processing of the survey data producing the specified survey report and survey data, 2D and 3D CAD drawings of the ground model plan (AutoCAD 2007 compatible DWG), long sections and cross sections of the roads in the survey area.

See Clause 3.0 for more detail.

The survey **must be carried out within 4 weeks of appointment**. It is anticipated that the contract will be appointed circa end June. A further two weeks will be allowed after completion for processing of survey data

1.1.3 Project Scale

The nominal survey scale for information provided under this Project will be 1:200

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1.2 Survey Summary

1.2.1 Area/Extent of Survey

The area and extent of the survey is shown on Drawings No:

- DRD-RTD-EWAY-TOPO-004
- DRD-RTD-EWAY-TOPO-005

1.2.3 Scale of Plans Required

Where hard copy plans are specified for this Project then the following scales will be required:

- 1:200 for the ground model plan
- 1:200 horizontal, 1:50 vertical for the longitudinal sections
- 1:200 horizontal, 1:50 vertical for the cross sections

1.2.4 Digital Data Required

Digital data is specified for this Project as per clause 3.4.

1.2.5 Agreed Entry to Site

The Surveyor will be required to inform the site owners/occupiers of the specific access dates required and a list and plan will be supplied by the Client when requested by the Surveyor.

Annexes

- A - Permanent Ground Markers
- B - Planimetric Features
- C - Additional Spot Levels

1.3 Survey Records

The Surveyor shall make available to the Client for inspection, on request, all survey data including that obtained from other sources.

The Surveyor shall retain the same for a period of 5 years.

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2.0 Land Surveys

2.1 Metric Measurements

All dimensions and measurements shall be metric

Planimetric Control

2.2 Control Network

The Contractor shall establish control throughout the route at a density to achieve the specified accuracy. The contractor shall advise on appropriate control arrangements and submit details to the employer's agent for approval.

2.2.1 Permanent Ground Markers

The main survey stations shall be of stable construction. Standard forms of markers are shown in Annex A and, unless otherwise specified within the accompanying documents, the Contractor should choose the most appropriate marker for each location from this selection.

The maximum distance between adjacent permanent survey stations shall be 150m.

2.2.2 Survey Grid

The survey shall be related to the Irish Grid 1975, post processed using Grid Inquest Transformation as applied online by Ordnance Survey Ireland. No reference shall be made to Ordnance Survey Ireland Trig Stations and Bench Marks

A description of the grid system used shall be quoted on each survey plan or upon the index plan.

2.2.3 Accuracy

The maximum error between permanent survey control stations shall not, when checked, exceed 1 part in 30,000 for distances exceeding 150 metres. For shorter distances the maximum error shall not be greater than ± 5 mm. (Relative Accuracy)

The maximum error between any permanent survey control station and the Survey Grid, as specified in clause 2.2.2 shall not, when checked, exceed 25mm. (Absolute Accuracy)

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Documentation

2.2.4 Schedule of Permanent Control Stations

A schedule shall be prepared giving the following information:

- Station designation
- Plan co-ordinates
- Level value
- Description.

2.2.5 Location Diagrams of Permanent Control Stations

A diagram and photograph shall be prepared for each permanent control station showing its general location with dimensions to minimum 3 easily recognisable and durable points, to enable the station to be easily found. The diagram shall include a description of the type of marker used and its designation.

2.2.6 Diagram of Permanent Control Network

For all but the simplest (two station) surveys a control network diagram shall be prepared. The control network diagram shall show the connections, together with the accepted distances and bearings of each observed line in the network.

2.2.7 Survey Report

Items detailed in clauses 2.2.4 to 2.2.6 are to be combined in the form of a survey report, also incorporating details of the Height Control.

Height Control

2.3 Level Network

The Contractor shall advise on appropriate control arrangements and submit details to the Employer for approval.

2.3.1 Level Datum

All levels shall be related to Ordnance Datum Malin Head, using GPS related to the Irish Grid 1975, post processed using Grid Inquest Transformation as applied online by Ordnance Survey Ireland. No reference shall be made to Ordnance Survey Ireland Trig Stations and Bench Marks.

2.3.2 Site Bench Marks

Bench marks shall consist of the permanent control stations and shall be established by double run levelling.

2.3.3 Accuracy

The height difference between any two points used as permanent bench marks shall not, when checked, be in error by more than $\pm 10 \times k$ mm, where k is the square root of the distance in kilometres between the points being considered, or ± 5 mm, whichever is the greater.

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Documentation

2.3.4 Schedule of Bench Marks

A schedule shall be prepared giving the following information:

- Bench mark designation
- Level value
- Description.

2.3.5 Location Diagrams of Bench Marks

A diagram and photograph shall be prepared for each site bench mark showing its general location with sufficient dimensions to minimum 3 easily recognisable and durable points to enable the bench mark to be easily found. The diagram shall include a description of the bench mark used and its designation.

2.3.6 Diagram of Level Control Network

When bench marks are located on other than permanent control stations a level control network diagram shall be prepared. The control network diagram shall show the connections between the site bench marks (including the permanent control stations where relevant).

2.3.7 Survey Report

Items detailed in clauses 2.3.4 to 2.3.6 are to be combined in the form of a survey report, also incorporating details of the Planimetric Control.

Detail to be Surveyed

2.4 Planimetric Information

The following general categories of detail shall be surveyed:

- Permanent buildings/structures
- Temporary/mobile buildings
- Visible boundary features: walls, fences, hedges
- Roads, tracks, footways, paths
- Street furniture
- Statutory Authorities' plant and service covers where visible
- Changes of surface
- Isolated trees/wooded areas/limits of vegetation
- Pitches/recreation
- Private gardens or grounds (off-site areas)
- Water features
- Earth works
- Industrial features
- Railway features with arranged access
- Any other permanent or semi permanent objects other than those specified

A comprehensive list of the standard planimetric features to be surveyed is shown in Annex B. The Contractor shall visit the site before submitting his tender to identify what categories and features are applicable to the survey area.

2.4.1 Accuracy

The horizontal accuracy of surveyed features shall meet the tolerance specified as statistically based root mean square errors (r.m.s.e) and shall satisfy the following conditions:

- At least 67% of all co-ordinates shall be correct to or better than the r.m.s.e.
- At least 90% of all co-ordinates shall be correct to or better than 1.65 times r.m.s.e.
- All co-ordinates must be correct to or better than 3 times the r.m.s.e.

The plan position of hard detail and well defined features shall, when a representative sample of check measurements are compared with the co-ordinates held be correct to within 25mm r.m.s.e.

The plan position of soft, less well defined features and vegetation shall, when a representative sample of check measurements are compared with the co-ordinates held be correct to within 50mm r.m.s.e.

2.4.2 Obscured Ground

Detail which cannot be surveyed to the specified accuracy without extensive clearing shall be surveyed approximately and annotated accordingly.

2.5 Height Information

Height information shall be provided by spot heights to detail specified in Annex C, and also to detail specified in Annex B.

The Contractor shall mark out clearly a spacing of 10m, parallel to the road centreline or road crown, on the channel line and use this spacing to establish cross sections at 10m intervals. The road centreline or road crown shall form the chainage line on which the survey for each road is based. The position of the chainage line and of Chainage 0.000m for each survey area shall be agreed in advance with the Employer.

Chainage Point 0.000m and chainage points at intervals of 10m shall be clearly marked on site subject to the approval of the Employer.

The Contractor shall establish cross section lines perpendicular to the chainage line commencing at Chainage 0.000m and at intervals of 10m for the full length of each section as detailed on drawings.

At each cross section, the survey shall indicate any abrupt change in level and spot levels shall be taken at the following positions at each section:

- (1) On top of first step of thresholds and building entrances
- (2) Boundary and building walls
- (3) Back of path
- (4) Footpath edge or change in surface
- (5) Top of kerb (on edge facing road)
- (6) Channel level at kerb
- (7) Channel (mastic or concrete) edge
- (8) Road marking lines on carriageway
- (9) Crown of carriageway

Sufficient levels shall be surveyed such that the ground configuration, including all discontinuities, is represented on the survey plan. In open areas, spot levels should be taken on a standard 10m grid.

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The Contractor is to ensure that all points required to create a 3 dimensional (3D) ground model that represents the surveyed area surface fully are surveyed. Extra points that are required to represent a 3D surface fully e.g. steps, walls, traffic ramps, kerbs with small radii, traffic islands etc shall be included in the survey. The Contractor shall curve fit small radii on kerbs, traffic islands, and walls etc

All levels shall be indicated on the drawings to the nearest millimetre.

2.5.1 Spot Heights

The maximum distance between adjacent spot levels shall be 10 metres. Ground survey spot levels on hard surfaces shall be correct to ± 5 mm r.m.s.e. and elsewhere to ± 10 mm r.m.s.e (root mean square errors)., except on ploughed or otherwise broken surfaces.

2.5.2 Land Use

The Contractor shall record details of ground floor land use for all properties fronting onto the route.

2.5.2 Corrections to Levels

All level readings which do not comply with the requirements of clauses 2.3.3 and 2.5.1 shall be corrected by the Contractor at his own expense.

3.0 Presentation of Results

Graphical Data

3.1 Style of Drawing

Drawings produced shall be in colour and to a consistent style and all the features specified shall be presented on the final plan or data set to a neat and legible standard.

3.1.1 Style Guide

Conventional symbols and abbreviations shall be used. Suitable line types and colours should be used and detailed in an appropriate key.

The proposed sheet border and title block shall be agreed between the Employer and the Contractor.

3.1.2 Sheet Size and Layout

The final plans shall be produced on standard A1 size sheets at the following scales:

1:200 for the plan layout of the survey

1:200 horizontal, 1:50 vertical for the longitudinal sections

1:200 horizontal, 1:50 vertical for the cross sections

Adjoining sheets shall be overlapped.

The sheet layouts shall be submitted by the Contractor for approval.

3.2 Drawing Content

3.2.1 Detail

All specified features shall be represented on the final drawings in accordance with the style specified in clause 3.1.1 and annotated appropriately. The road centrelines created for generating long sections and cross sections of the survey area shall be shown on the ground model drawings together with cross section lines and chainages at each cross section.

3.2.2 Reference Information

Location plans and diagrams may be located within the information margins of the main drawings or may be placed on a separate drawing of the same style.

The Contractor will provide as part of the final product the following items:

- Location plan required.
- Sheet layout diagram with cross references to overlays
- Survey Report (clauses 2.2.7 and 2.3.7).

3.3 Final Drawings

3.3.1 Proof Copies

Two sets of hard copies of the final drawings shall be submitted to the Employer for approval before delivery of the final copies.

The Employer shall return one set within 10 working days with any amendments to be incorporated in the final copies. Five final hard copies of drawings and survey report shall be supplied.

3.3.2 Final Copies

Five copies of each sheet shall be submitted to the Employer after approval of the proof copies.

Digital Data

3.4 Supply of Digital Data

3.4.1 Standards of Accuracy

All digital data supplied shall conform to the same standards of accuracy specified in Section 2 for each type of data.

3.4.2 Proof and Final Digital Data and Files

The Contractor shall submit one set of all digital data and files in this specification as a proof copy on compact disc to the Employer for approval before delivery of the final digital data and files on compact disc. The Employer shall request any amendments that are not to specification within 10 working days of submission.

After approval of the proof digital data and files, the Contractor shall submit 2 sets of all digital data as final copies on compact disc to the Employer.

3.4.3 Computer Compact Discs

It is the responsibility of the Contractor to ensure that any compact discs associated with the contract are supplied in good working order. If discs have to be resubmitted, they shall be resubmitted at the Contractor's expense.

3.4.4 Level Records

The Contractor shall submit records of all points levelled under the contract. The records shall detail the derivation of the levels using the "height of collimation" format. This data shall be submitted in the form of a Microsoft Excel file on compact disc.

3.4.5 Digital Drawings

The Contractor shall supply **2D** and **3D** AutoCAD 2007 compatible DWG format files of the ground model of the surveyed area to a scale of 1:200.

Where more than one sheet is required to cover the street or road, a map shall be provided showing the extent of each sheet, its overlap and orientation.

The Contractor shall supply 2D AutoCAD 2007 compatible DWG format files, showing the reduced levels along the longitudinal sections of each road crown or centreline. The chainage location of all spot levels and the numerical value of all spot levels shall be clearly identifiable on the print. The longitudinal sections shall be plotted to a scale of 1:200 horizontally and 1:50 vertically.

The Contractor shall supply digital drawings, AutoCAD 2007 compatible DWG format files, showing the reduced levels along cross sections at 10m intervals extending across the full width of survey area. The chainage location of each cross section and the numerical values of all spot levels shall be clearly identifiable on the print. The cross sections shall be plotted to a scale of 1:200 horizontally and 1:50 vertically.

It is the responsibility of the Contractor to organise vector data coherently and to maintain a reasonable file size (< 5 mb).

All data supplied must be free of copyrighted material.

All spatial data will be required to be geo-referenced to the Irish National Grid as defined by Ordnance Survey Ireland

Responsibility for compliance with these requirements, including any costs, lies with the Contractor or his nominees.

3.4.7 CAD Level Descriptions

All CAD files shall be executed using the same CAD level/layer structure as proposed by the contractor

3.4.8 ASCII file

The Contractor shall supply the survey data in the form of a comma delineated ASCII data file. Each record shall consist of a minimum of four fields -easting, northing, reduced level and record description. A fifth field dimensions -shall be added where appropriate for surface features such as covers, gratings, etc.

The easting and northing shall be to the Irish Grid 1975 Co-ordinates as per clause 2.2.2. It is a requirement that the data file shall be capable of inputting directly to Microsoft Excel.

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Compliance with Specification

4.1 Compliance with Specification

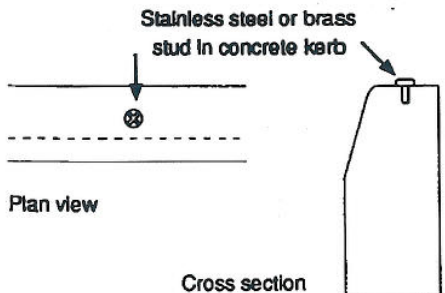
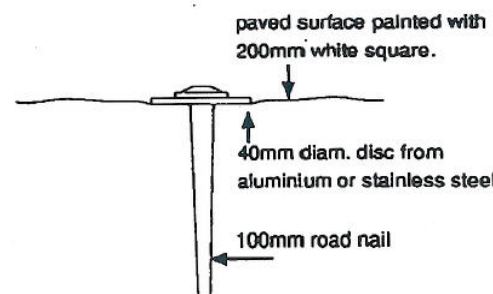
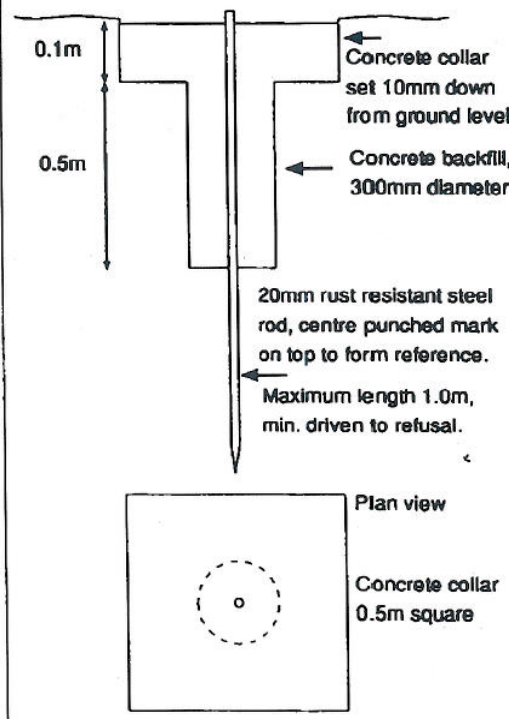
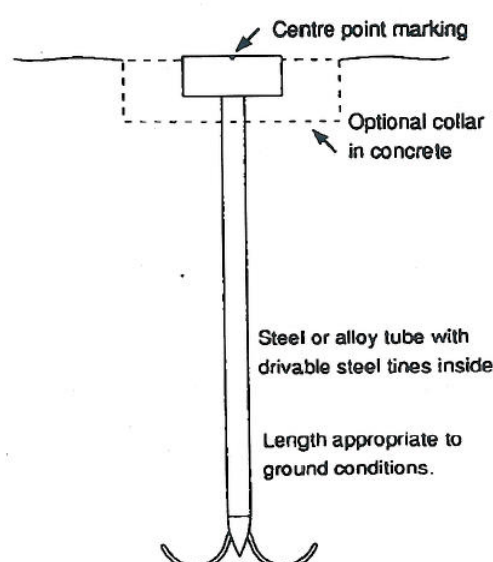
The Employer shall examine the CAD drawings at submission before final acceptance of the Work.

The acceptance of the survey by the Employer will be subject to an independent check.

The Employer will, at his discretion, appoint an independent survey company to check the survey for accuracies and compliance with the specification.

The Contractor shall be fully responsible at no extra charge for making corrections and supplying missing survey information to comply with this specification.

Annex A - Permanent Ground Markers

<p style="text-align: center;">Rivet Marker</p>  <p>Stainless steel or brass stud in concrete kerb</p> <p>Plan view</p> <p>Cross section</p> <p>Used in concrete or stone formed surfaces</p>	<p style="text-align: center;">Type 1 Marker</p>  <p>paved surface painted with 200mm white square.</p> <p>40mm diam. disc from aluminium or stainless steel</p> <p>100mm road nail</p> <p>Used in dense, very stable paved surfaces</p>
<p style="text-align: center;">Type 2 Marker</p>  <p>0.1m</p> <p>0.5m</p> <p>Concrete collar set 10mm down from ground level</p> <p>Concrete backfill, 300mm diameter</p> <p>20mm rust resistant steel rod, centre punched mark on top to form reference.</p> <p>Maximum length 1.0m, min. driven to refusal.</p> <p>Plan view</p> <p>Concrete collar 0.5m square</p> <p>Used for non-agricultural sites and unpaved surfaces</p>	<p style="text-align: center;">Type 4 Marker</p>  <p>Centre point marking</p> <p>Optional collar in concrete</p> <p>Steel or alloy tube with drivable steel lines inside.</p> <p>Length appropriate to ground conditions.</p> <p>This illustration is indicative only - various types of proprietary marker are available in one piece or extendable units.</p> <p>Used for soft surfaces</p>

Annex B - Planimetric Features

At each increase in scale more details can be shown and more detail can be plotted to true scale instead of conventionally. As a general rule those features whose plotted size is less than 1mm on the plan will be shown conventionally, if at all.

(†) Features usually shown only at 1:500 scale and above.

(‡) Features usually shown only at 1:100 scale and above.

1 Permanent buildings/structures

- Archways, underpasses, culverts
- Bridge over, bridge under
- Buildings detailed at plinth line
- Foundations
- Overhead features, canopies, porches, etc.
- Ramps, loading bays
- Ruins
- Steps: steps generalised, (‡) Steps individual
- Structures detailed at plinth line
- Threshold levels
- (†) Gullies
- (†) Rain water down pipes
- (†) Rodding eyes
- (‡) Waste pipes

2 Temporary/mobile buildings

- Garden sheds, greenhouses
- Mobile buildings
- Overhead features, canopies, porches, etc.
- Temporary buildings or structures

3 Visible boundary features -walls, fences, hedges

- Fences: with type, with height
- Gate: (†) direction of opening shown
- Hedges, conventionalised below 0.5m width, (‡) to scale
- (‡) Walls, piers and widths fully surveyed

4 Roads, tracks, footways, paths

- Channel line -road
- Centre line -road
- Camber line on roundabouts
- Carriageway edge
- Channel edge
- Drop kerbs
- Top of kerb (On edge facing road)
- Crash barriers

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- Gullies, kerb outlets
- Pedestrian barriers
- Pedestrian crossings *
- Road markings, e.g. all road markings as specified in Traffic Signs Regulations (Northern Ireland) 1997 **
- Traffic ramps
- Traffic islands, (†) details
- Other road features, e.g. vehicle sensors
- Back edge of footway
- Paving pattern details
- Unmade tracks and paths, centre only, (†) sides

* Crossing widths to be surveyed as defined by the width of the stripes for Zebra crossings and road studs for all other crossings.

** Lane arrows to be presented on final copy as per Schedule 6 of the Traffic Signs Regulations (Northern Ireland) 1997.

5 Street furniture

- Belisha Beacons
- Barriers
- Bollards
- Bus stops, bus shelters
- Control boxes
- Hoardings
- Lamp posts
- Mile posts
- Notice boards
- Post boxes
- Posts
- Road signs
- Street name plates, (†) wall mounted
- Ticket machines
- Traffic signals
- Troughs
- Vent pipes
- (†) Drainage channels
- (†) Cellar hatches and pavement lights
- (†) Coal holes
- (†) Cycle racks
- (†) Litter bins
- (†) Reflector posts
- (†) Salt/grit bins
- (†) Seats

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6 Statutory Authorities' plant and service covers where visible

- Air valves
- (±) Cable TV house points
- Cable TV inspection covers
- Cabinets (identified)
- Electric covers
- Electric poles
- Fire hydrants, (†) shown to scale
- Gas/water stop valves and stop cocks (cover)
- Inspection covers with level
- Lamp holes
- Marker posts
- Over head wires, (†) building connections to be shown
- (†) Pole stay wires
- Surveillance cameras
- Telecommunications inspection covers
- Telegraph poles
- Telephone call boxes
- (†) Water meter or gas meter covers (distinguished from valve)

7 Changes of surface

HARD SURFACES

- Brick
- Concrete
- Metalled (†)
- Paving
- Setts
- Bituminous Material
- Tactile Paving

SOFT SURFACES

- Cultivated
- Grassed
- Planted
- Rough ground

8 Isolated trees, wooded areas, limits of vegetation

- Bushes/shrubs above 2m diameter
- Isolated trees above 0.15m trunk diameter, (±) above 0.1m
- Ornamental/road side trees, (±) planting box shown
- (±) Staked saplings (individual)
- Areas of saplings/young trees
- Edge of vegetation
- Woodlands perimeter trees/tree canopy only
- Tree/bush details required on the drawing or on schedule
- Trunk diameter/circumference/(girth) at 1.2m above ground
- Species

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- Height ... estimated *
- Height ... measured *
- Spread ... (canopy diameter) *
- Clearance height of overhanging branches *

* The last four points are important to ensure full awareness of constraints when designing both on road and off road aspects of the system.

9 Pitches/recreation

- Pitch/playground limits only
- (†) Pitch markings, goal posts
- (†) Play ground apparatus

10 Private gardens or grounds (off-site areas)

This section relates to areas outside the main site.

- Buildings, surveyed in detail
- Buildings, generalised
- Inspection covers in domestic property
- (†) Door openings
- (†) Garden paths, patios, retaining walls

11 Water features

Water features surveyed in outline only, (†) surveyed in detail.

- Fountain
- High water mark
- Lock, perimeter and gates
- Outfall pipes
- Pond/lake
- Pond/lake, top of bank
- Pond/lake, bottom of bank
- Pond/lake, water level
- Pond/lake, bed level
- Pumps
- River, top of bank
- River, bottom of bank
- River, water level
- River, direction of flow
- River, bed level
- Streams and ditches, top of bank
- Streams and ditches, bottom of bank
- Streams and ditches, water level
- Streams and ditches, direction of flow
- Streams and ditches, bed level
- Weirs/waterfalls, indicative features surveyed from the bank

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12 Earth works

- Bank bottom
- Bank top
- Mounds, spoil heaps
- Quarries, pits and mineral workings (limit only)
- Retaining wall, base
- Retaining wall, top
- Sloping masonry, bottom
- Sloping masonry, top
- Terraces

13 Industrial features

- Electric sub stations or transformers (perimeter fence only)
- Inspection pits
- Overhead pipes/cables, (†) height required
- (‡) Overhead line tower/freestanding mast or pylon, bases shown
- Tanks by bund walls or perimeter only
- (†) Flood lights
- (†) Water taps/Stand pipes/Troughs
- (‡) Earth rods

14 Railway features (with arranged access)

- Ballast shoulder
- Buffers/stop blocks
- Cabinets, switch boxes
- Catchpits
- Electrified rails (indicative only)
- Gentries
- Huts
- Mile posts
- Platform furniture
- Platforms
- Points and crossovers
- Power masts
- Rails (gauge faces)
- Signals
- Signal boxes
- Signs
- Telephones
- TV monitors/cameras

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15 Other -Special requirements or special areas

At major road junctions the survey should extend a minimum of 50m into the adjoining street. At minor junctions the survey should extend a minimum of 25m into the adjoining street. The survey should extend into adjoining streets sufficiently so as to detail kerb alignment, positions of buildings and street furniture.

Where the survey boundary is not defined by buildings, the extents of the survey are to be identified. If this is not possible an annotation is required i.e. "Public Square".

Along the Comber Greenway (6 km long) and Ballymacarrett Walkway accurate 3D models are required to aid design of a potential bus way. In particular, refer to Annex B, Clause 4 Roads, tracks, footways, paths and Annex B, Clause 12 Earth works.

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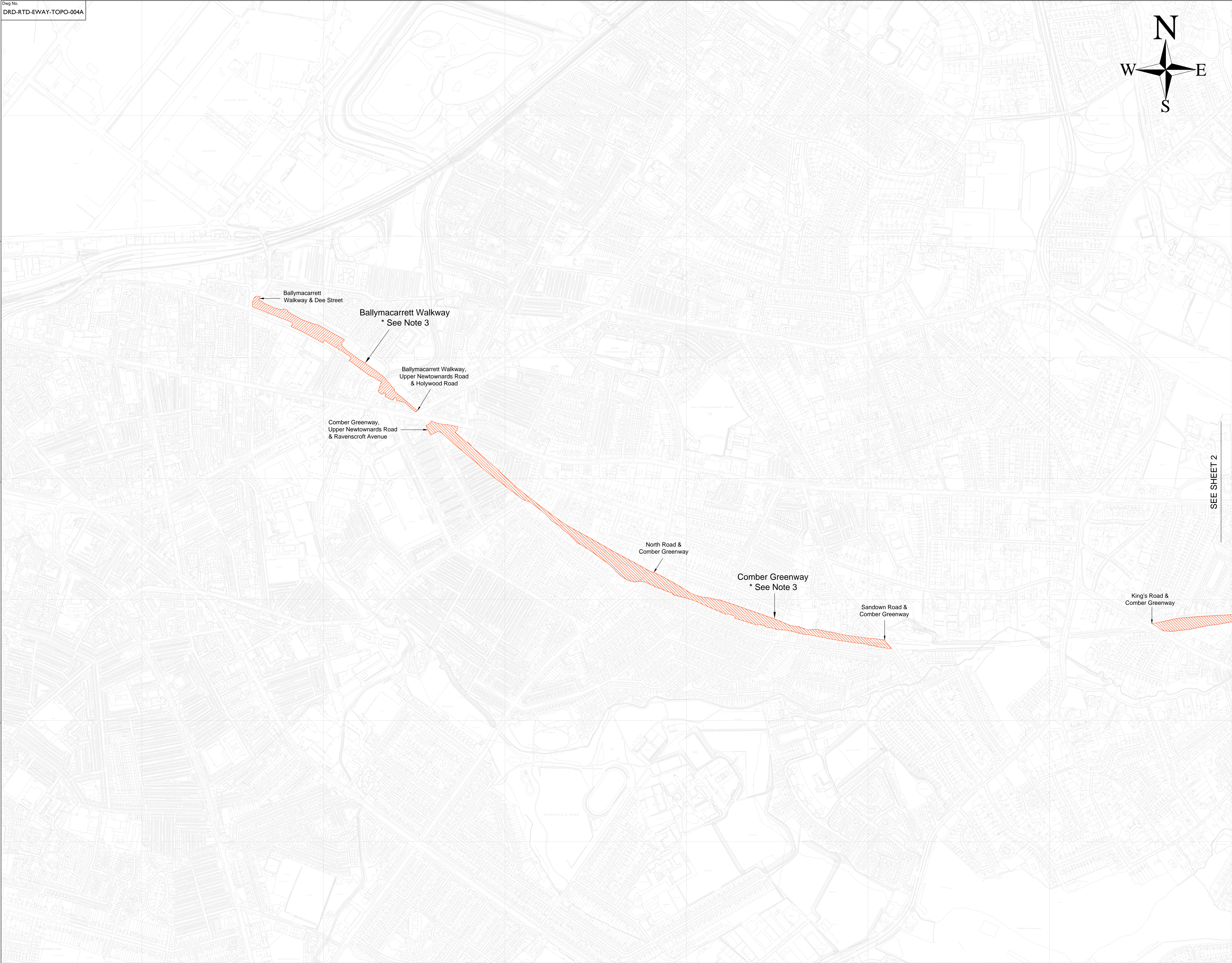
Annex C - Additional Spot Levels

Spot levels are required at the following locations, in addition to general spot levels, or to supplement information given by contours. Spot levels are also required for all the items listed in Annex B.

- Banks, top and bottom at 10 m intervals
- Building/structure corners
- Ditches, streams, drains -sections at 10 m intervals
- Floor/threshold levels
- Hilltops, depressions and saddles
- Inspection covers, gullies, ducts and conduits
- Railway lines, both rails/low rail/high rail at 10 m intervals
- Road centreline, channel, kerb, pavement at 10 m intervals
- Steps and ramps, top and bottom
- Water levels (with date of survey) to rivers, streams, ponds, etc.
- Weirs, outfalls
- Other locations (Extra points on curves of small radii of channels, kerbs, traffic islands etc., and all points on steps, walls, traffic ramps etc.)



- NOTE:**
1. The area outlined on the drawing is indicative only, the survey should comply with the specification.
 2. The survey should extend 50m into adjoining major junctions and a minimum of 25m into minor junctions so as to detail kerb lines, buildings and any other objects as detailed in the specification.
 3. For the Comber Greenway & Ballymacarrett Walkway refer to Annex B, Clause 15 of the Specification.



SEE SHEET 2

A	Section between Sandown and King's Roads removed			10/07/2009
REV.	DESCRIPTION			DATE

PROJECT

Department for Regional Development
Rapid Transit Division
Bus-based Rapid Transit System

TITLE

EWAY Route 2
Topographical Survey Extents
Comber Greenway & Ballymacarrett
Walkway - Sheet 1 of 2

File No.		Designed		Date	23/06/2009
Drawn	JM	Checked	PR	Date	
Traced		Approved		Date	

Drawing No.
DRD-RTD-EWAY-TOPO-004

REVISION A

Drawing Status

INFORMATION

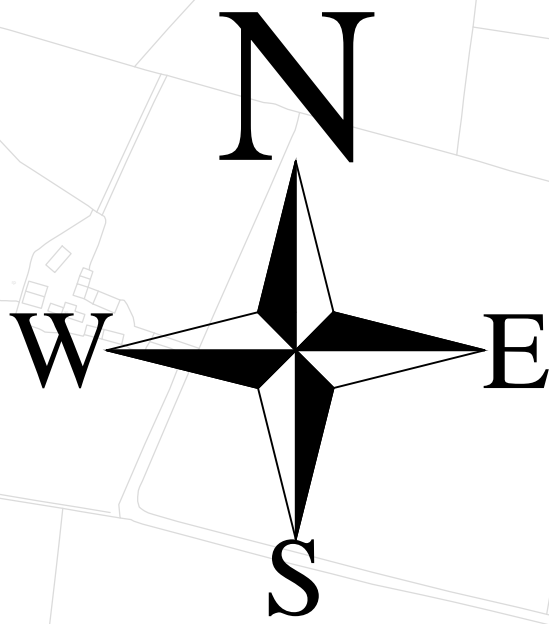
SCALE 1:4000 @ A0

**Rapid
Transit
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NOTE:

1. The area outlined on the drawing is indicative only, the survey should comply with the specification.
2. The survey should extend 50m into adjoining major junctions and a minimum of 25m into minor junctions so as to detail kerb lines, buildings and any other objects as detailed in the specification.
3. For the Comber Greenway refer to Annex B, Clause 15 of the Specification.

SEE SHEET 1

King's Road &
Comber Greenway

Comber Greenway
* See Note 3

East Link Road &
Comber Greenway

Comber Road & Comber
Greenway

REV.	DESCRIPTION	DATE
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PROJECT
Department for Regional Development
Rapid Transit Division
Bus-based Rapid Transit System

TITLE
EWAY Route 2
Topographical Survey Extents
Comber Greenway & Ballymacarrett
Walkway - Sheet 2 of 2

File No.	Designed	Date	23/06/2009
Drawn	JM	Checked	PR
Traced	Approved	Date	
Drawing No.	DRD-RTD-EWAY-TOPO-005	REVISION	A

Drawing Status	INFORMATION
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