

**Requirements for RAMM Inventory Updates**

Version 1.1 - 22 September 2011

TRIM Reference 11/503048

**CONTENTS**

[1 General 3](#_Toc455046387)

[1.1 Measurement Method 3](#_Toc455046388)

[2 LINEAR Assets 3](#_Toc455046389)

[2.1 Surface Water Channels Table 3](#_Toc455046390)

[2.2 Footpaths 4](#_Toc455046391)

[2.3 Off-Road Cycle Paths 6](#_Toc455046392)

[2.4 Berm 6](#_Toc455046393)

[2.5 Carriageway Surfacing Table 7](#_Toc455046394)

[2.6 Pavement Layer Table 8](#_Toc455046395)

[2.7 Marking Table 9](#_Toc455046396)

[3 Point Assets 9](#_Toc455046397)

[3.1 Drainage table 10](#_Toc455046398)

[3.2 Signs Table 10](#_Toc455046399)

[3.3 Street Furniture (Minor Structure) 13](#_Toc455046400)

[3.4 Retaining Wall 14](#_Toc455046401)

[4 DATA COLLECTION FORMS 14](#_Toc455046402)

[New Road - RAMM Data Collection Form 16](#_Toc455046403)

[Update/Add - Surface Water Channels (SWC) Table 17](#_Toc455046404)

[Update/Add - Marking Table 18](#_Toc455046405)

[Update/Add - Off Road Cycleway Table 19](#_Toc455046406)

[Update/Add - Footpath Table 20](#_Toc455046407)

[Update/Add - Signs Table 21](#_Toc455046408)

[Update/Add - Road Features Table 22](#_Toc455046409)

[Update/Add - Drainage Table 23](#_Toc455046410)

[Update/Add - Minor Structures Table 24](#_Toc455046411)

[Update/Add - Berm Table 25](#_Toc455046412)

[Update/Add - Pavement Layer and Rehabilitation Table 26](#_Toc455046413)

[Update/Add - Carriageway Surfacing Table 27](#_Toc455046414)

# General

Field surveys for the various RAMM tables are to be updated for Christchurch City Council's RAMM Database as a result of construction or maintenance works.

RAMM Computer User’s Manual and the latest revision of NZTA State Highway Database Operation Manual (SMO50) May 2009 are to be used as the basis for the collection of all data for this work. All the point assets shall be recorded with GPS locations as Northing & Easting defined by NZ map grid co-ordinates. The start and end coordinates for GPS locations for linear assets are highly desirable.

The database must be up to date by 30 June each year for running the NZTA annual statistics and the reports.

## Measurement Method

All distance measurement shall be made using an odometer properly calibrated with a maximum error of +/- 1m for 1km or alternatively by an accurate measuring wheel which has a wheel diameter of 300mm.

Northing and Easting coordinates shall use the NZTM system and the accuracy shall be within the same limit as above.

All offsets and widths shall be measured to the nearest 0.1m using an accurate tape measure or measuring wheel.

Odometer calibration strip will be a straight 2km long piece of road and should be properly marked. The calibration of the odometer shall be checked regularly or immediately after the tyre pressures of the vehicle have been altered in any way.

All inventory staff shall as a minimum safety measure comply with the Health and Safety Act, COPTTM and the Working on Road Guidelines issued by Christchurch City Council.

CCC RAMM uses the road origin as the zero point so all the Reference Points (RPs) for all assets are recorded with reference to the origin.

# LINEAR Assets

SMO50 defines assets with start and end metres as “linear” assets.

The following tables are “linear” assets:

* Surface water Channels
* Carriageway Surfacing
* Pavement Layer
* Railings and Retaining walls
* Markings (including on road cycle lanes and bus lanes)
* Minor Structures
* Footpaths
* Berms
* Off Road Cycle Path

## Surface Water Channels Table

Kerb and channel renewal greater than 30m in length are to be included as an inventory update.

***Start and end displacement***

To be measured within each carriageway section. These are to be measured from the midpoint of the quadrant formed as the channel turns from one road to the next.

***The Length of surface water channel***

The difference between start and end displacement. When the channel does not run in a straight line, the extra length must be measured and added as a length adjustment. This extra length is to be noted in a separate column.

***Side***

The side of the carriageway on which the surface channel is located. The channel along small median islands can be recorded as either on left or right with an offset from the kerb face. For kerb and channel that runs parallel to the carriageway the distance to edge of seal can be set to 0. When the kerb and channel is offset from the edge of the seal, this must be measured.

***Channel Types Standard Code***

KCC Kerb & Channel (Concrete)

KDC Kerb and Dished Channel (Concrete)

DC Dished Channel (Concrete)

DS Dished Channel (Sealed)

DP Dished Channel (Half Pipe)

DA Dished Channel (Asphalt)

KC Kerb Only (Concrete)

KS Kerb Only (Stone)

MK Mountable Kerb Only (Concrete)

MKC Mountable Kerb and Channel (Concrete)

SLTC Slot Channels (Concrete)

SWCD Earth Surface Water Channel (Deep) (>200mm deep)

SWCS Earth Surface Water Channel (Shallow) (<200mm deep)

OTHER Other Types of Channels

***Construction Date***

Other important information to be recorded in RAMM are the contract details and the date when the channel is completed.

## Footpaths

All footpath resurfacing greater than 30m in length for full width shall be recorded in the footpath resurfacing table of RAMM.

***Start and end displacement***

To be measured within each carriageway section. These are to be measured from the midpoint of the quadrant formed as the footpath turns from one road to the next

***The Length of Footpath***

The difference between start and end displacement. When the footpath does not run in a straight line, the extra length must be measured and added as length adjustment. This extra length is to be noted in a separate column.

***Side*** is the side of the road where footpath is on.

***Width of footpath***

Width is an average value for the length of the footpath. A new record may be entered when the width changes by more than 20mm or footpath position changes for more than 30m. Bus stop area and other monuments area is to be recorded as an extra area. Any extra area of footpath is to be measured in square metres.

***Footpath Position (related to berm)***

B Boundary

K Kerb

M Middle

R Remote from road

J Accessway (ends away from the road)

E Accessway (Joins another road)

W Whole Width (no berm)

When recording footpaths remote from roads the extra information related to “other road” field like name and displacements is to be recorded separately.

***Footpath Use***

1. Low Residential (local roads & cul de sacs)

2. Low/Medium Residential with higher pedestrian’s number

3. Medium Servicing schools/shops/churches/community halls etc.

4. Medium/High Minor Retail Centres

5. High Major Retail Centres

***Footpath Surfacing***

The start of footpath with reference to origin and ends when there is change in surfacing type, material or age.

***Surfacing Date and Construction Date***

The contractor or consultant shall provide actual construction dates and if it is a completely new footpath. In this case the surfacing date may be the same or a little bit later. If it is resurfacing work the construction date is obtained from RAMM.

***Surfacing Material***

The standard surfacing codes are as follows:

AC Asphaltic Concrete

C Concrete

IB Interlocking Block

M Metal

S Seal

T Timber

SL Slurry Seal

UN Unknown

***Surface Depth***

The standard depth of footpath base and surface are both well defined in CSS. In order to filter the footpath for renewal, maintenance or new subdivision we have used the following surface depths in CCC RAMM Database - they are not the actual depth just numbers.

Overlays or resurfacing 12mm

New Subdivision 19mm

Reconstruction 18mm

Maintenance 20mm

Binder type must be recorded for future use. Choose from the following list.

B180

B130

B60

B80

E180

E80

PORT

WATER

UNKN

## Off-Road Cycle Paths

All off-road cycle way information is to be collected, including cycle ways that are remote from the road. It has to be assessed whether it is a shared path.

***Start and End Displacements***

The displacement in metres from the road origin at which the cycle way is located.

***The length***

The difference between the start and end displacements, except where the cycle way does not approximate a straight line. In this case the extra lengths must be measured and added to the length and the value entered on the data collection sheets. Alternatively where the cycle path is remote from the road the actual location shall be captured.

***Width***

This is to be an average value for the length of the cycle way. A new cycle way record should be made if the width varies by more than 500mm for more than 50m, or if the cycle way position changes for more than 50m. Localised widening (e.g. at bus stops) should be recorded in the extra area field.

*Surfacing Date*

The date when the cycleway is resurfaced

***Surfacing Material***

AB Asphaltic Concrete (Black)

AR Asphaltic Concrete (Red)

C Concrete

CB Concrete (Black)

CR Concrete (Red)

IB Interlocking Blocks

M Metal

S Seal

T Timber

Chip Chip Seal

## Berm

The grass area within the road reserve adjacent to the footpath is also recorded as roading asset.

***Start and End Displacements***

To be measured within each carriageway section. The cover type is to be recorded in a separate column. Berm section changes with the change in cover types or the change in width. The location of streetscape is recorded in RAMM whereas the details about Streetscape data or the garden area may be recorded in a separate database managed by Parks & Greenspace Team. Normally the length of the berm is the difference in end and start displacements.

***Side***

The side of the road that berm is on.

***Width***

The width of the berm is to be recorded. If there is a path in the middle of the grass berm the combined width of the grassed area on either side of the footpath is recorded. The smaller service strip area on the road reserve at the property boundary about 40cm or less are not recorded as berm.

Number of trees counted on a berm is also recorded in one separate column.

***Berm Type: Level or Banks***

***Plant Cover***

G Grass

GS Grass, Shrubs

GC Grass, Cover

GCS Grass, Cover, shrubs

GF Grass, Flower

SC Grass, Flower, Shrubs, Cover

C Cover

CS Cover, Shrubs

P Plants

F Flowers

FC Flower, Cover

FCS Flowers, Cover, Shrubs

ST Stone

## Carriageway Surfacing Table

Some information is ascertained from a field inspection and other information is to be provided by the sealing crew.

All surfacing work greater than 30m in length and 2m wide shall be recorded in the RAMM carriageway surface table in the same way as recording normal surfacing items. However the expected life and the reason for surfacing is to be noted (eg make-safe work).

***Start and End Displacements***

The displacement at each seal join is to be recorded. The readings become the start and end displacement of respective seal sections.

***Width***

This shall be recorded if the surface is not the full width of the carriageway. In case of full width just tick the full width flag.

***Offset***

Record zero where surfacing is full width. If it is not the full width measure the offset to the edge of the surface from the LHS carriageway edge or kerb face.

The start and end names can be very useful for locating the sections physically. References like seal join/ end of seal, xx m from intersection, street address or any other permanent reference are the common start and end descriptions.

***Surfacing Date***

This is the date when the surfacing was placed.

***Contract Details***

Useful information includes Contract Number, Contractor’s Name and the Specification Type. Example of specification type is P9, P23, P11, P17 etc.

***Design Life***

The design life of the seal.

***Surfacing Material***

AC Asphaltic Concrete

OGPA Open Graded Porous Asphalt

INBLK Interlocking Blocks

1CHIP Single Coat Seal

2 CHIP Two Coat Seal

SLRY Slurry Seal

SMA Stone Mastic Asphalt

VFILL Void Fill

CONC Exposed Aggregates

METAL Metal Running Course

LOCK Locking Coat Seal

B/S Bicouche/Sandwich

TEXT Texturising Seal

OTHER Other Material type

***Sizes of Aggregate***

This has to be supplied by the sealing crews. Chip seal grades to be used range from 2 to 6, with grade 2 being the largest chip and grade 6 the smallest. Polished stone values, average dimension (ALD), and the source of aggregates (quarry) are other key information required for complete data update.

For two coat chip seal the second chip size is also recorded.

***Binder type***

B180 Bitumen 180/200

B130 Bitumen 130/150

B60 Bitumen 60/70

B80 Bitumen 80/100

E180 Emulsion 180/200

E80 Emulsion 80/100

PORT Portland Cement

WATR Water

UNKN Unknown

Other associated information for the binder that the contractor/consultant should provide is:

1. Type of **Adhesion** Agent used and the amount in binder.

2. Type of Polymer **Additive** used and the amount in binder.

3. **Cutter** Type and the Quantity

4. Amount of **Flux** in Binder

5. **Application rate** (spray rate) in litre/sqm or % binder content in mix.

## Pavement Layer Table

This table is used to store information related to structural pavement including the sub-grade beneath the pavement. Since it is not possible to check after the road is sealed it is critical that this information is recorded at the time of construction.

This information is extremely important and is used for calculating the pavement strength and the development of pavement deterioration model (dTIMS).

The key information in this table includes:

* Start and end locations of the pavement layer.
* Length, width, thickness and offset
* Type, source, and strength of each layer.
* Date constructed, reconstructed or removed
* Stabilisation agents if used.
* Sub-grade CBR values.

All pavement reconstruction or repair work greater than 30m in length and 2m wide shall be recorded in the RAMM pavement layer table.

## Marking Table

Marking Table is used for entering the types, locations, and specifications for painted pavement marking.

***Marking Types***

Centrelines

No Overtaking Lines

Reflectorized Road Pavement Markers

Lane Line

Edge Lines

Painted Shoulders & Island

Regulatory Markings

Crossings and Intersection Warnings

Speed Circles

Parking Areas and Stands

Loading Zones

School Areas

Designated Lanes (Bus/Cycle)

Destination Legend

The details for the code and the description can be obtained from SMO50.

***Marking Materials***

CP Cold Applied Plastic Line Marking

EP Epoxy Resin (for coloured surfacing)

PM Raised Pavement Marker

RD Red Designer Pavement

RS Red Street Bond

PT Paint (inactive)

RP Reflectorized Paint

RA Red Asphalt

TC Thermoplastic – Cold

TH Thermoplastic – Hot

***Marking Colour***

BK Black out Paint

BU Blue

GR Green

RE Red

WH White

YE Yellow

UN Unknown

# Point Assets

Point assets include:

Drainage

Signs

Features

Vehicle Crossings

Street Lights

## Drainage table

Data is to be captured for sumps and culverts,

***Sump Type***

SS Single Sump

DS Double Sump

TS Triple Sump

DCHM Drop Chamber

SE Side Entry Sump (no grate in channel)

SEG Side Entry with grate

SP Soak Pit

***Displacement***

The distance in metres from the road origin to the point where the sump is located. If a sump is at the mid-point of the quadrant from one road to another, it is normally recorded in the major road.

***Offset***

The distance between the road centrelines and the sump grate in metres. This will usually be half the carriageway width if the width is uniform.

***Side***

The side of the carriageway where the sump is located.

***GPS Coordinates***

Northing and Easting coordinates to be recorded using a hand held device.

## Signs Table

Signs shall be recorded using MOTSAM codes and listed under one of the following groups:

Hazard signs

Information Signs

Information General Signs

Information Miscellaneous Signs

Permanent Warning Signs

Regulatory General Signs

Regulatory Heavy Vehicle Signs

Regulatory Parking Signs

Warning Miscellaneous

Miscellaneous

Guide Signs

Motorist Services Signs

Tourist Signs

Street Name Plates

***Sign Grouping***

If a sign post holds more than one sign then the highest sign should be detailed first and post details should only be detailed for the highest sign (i.e. post details should not be duplicated). Other signs will be recorded as parasites.

***Displacement***

The displacement in metres from the road origin to the sign location is to be recorded. For finger boards and street name plates where it is difficult to determine the road in which the sign is to be recorded, the sign shall be recorded in the more major road.

***Position***

All signs should have NZTM coordinates for Northing and Easting.to +/- 1m accuracy. Typically using Pocket RAMM with a suitable hand held GPS unit the offsets can be generated out of RAMM Map and there is no need to measure them separately. Displacement for a sign is also automatically generated while using RAMM Map for recording the assets.

***Side***

The side of the road on which the sign is placed Left, Right, or Centre.

If applicable the street number of the property adjacent to the sign should be recorded.

***Offset from Centreline***

The distance from the road centreline to the post closest to the centreline. If the feature is within the carriageway i.e. between the kerb and channels, an offset from the centre line is required. For features outside the carriageway the offset from the centre line will be calculated using existing RAMM carriageway width data.

***Offset from Kerb line***

Offset from the kerb line to Post is the distance from the kerb line to the post closest to the kerb line. Where no kerb is present, the offset shall be measured from the edge of seal.

***Offset from Kerb line to Edge of Sign***

The distance from the kerb line to the edge of sign closest to the kerb line, where no kerb is present the offset is from the edge of seal.

***Legend***

Any variable on the road sign is to be entered in this field (e.g. kilometres, metres, road or place names, kilometres per hour etc).

***Reverse Side***

An entry is required for all double-sided signs (e.g. when an RG1-50 has an RG1-70 on the reverse side of it, the RG1-70 is entered in this field). This includes all signs that are duplicated on the reverse side. The reverse side is the side not visible when travelling in the direction of traffic lane.

***Sign Width***

The height of the sign in millimetres e.g. 750mm

***Sign Height***

The height of the sign in millimetres e.g. 750mm

***Direction***

Direction indicated by the sign.

***Ground Height***

The height from the ground to the bottom of the sign in metres to one decimal place e.g. 2.3

***Legend Material.***

NR Non-Reflective

EG Engineering Grade (no pattern)

HI High Intensity (honey comb type pattern)

DG Diamond Grade (diamond shape pattern)

***Legend Colour***

BK Black

BR Brown

BU Blue

GR Green

GY Grey

LI Lime Green

RE Red

UP Unpainted

WH White

YE Yellow

OR Orange

GO Gold

The material of the background on the sign is from Legend Material for a list of entries.

***Background Colour***

The colour of the background on the sign must be different to the legend colour. Refer to the legend colour above for a list of entries.

***Substrate***

The material from which the sign is made

AL Aluminium

TI Timber (to include combination materials)

PL Plastic

ST Steel

***Support***

Support shall only be detailed once, for example if there is more than one sign on a support, the highest sign should be taken to have the support and be detailed first. Also put the word stack in the shaded Group column.

The type of support that the sign is fixed to is coded as follows:

BO Bollard

BR Bridge end

BU Building

CS Cycle Stand

FE Fence

GR Guard rail

GT Gantry

NA Not Applicable (i.e. Purpose built sign post or gantry)

OB Overbridge

PL Planter

PM Parking meter

RA Railing

SR Sight rail

TR Tree

TS Traffic Signal pole

UT Utility pole

WA Wall

SL Street Light Pole

ST Standalone

***Owner of Support***

STR Streets

PW Orion

CPK Carpark

MIS Miscellaneous

P&R Parks & Reserves

ML Shopping Mall

TEL Telecom

NZTA New Zealand Transport Agency

***Post Type***

GT Gantry

SA Standalone

SU Supported (i.e. post strapped to another post)

PA Parasite (i.e. has support type other than NA from above therefore next 3 items do not apply)

***Post Numbers***

The number of posts that support the sign.

***Post Material***

The post material is coded as follows:

AL Aluminium

FG Fibreglass

PL Plastic

ST Steel

TI Timber

***Post Shape***

The post shape is coded as follows:

S Square

C Circular

***Bracket Type***

The bracket type is coded as follows:

C Clamp Fix or Strapped

B Bolted / Nailed

T Top Mounted

O Other

The Frame on the sign is F for Framed and N for Not Framed

The photograph reference where applicable. The photographs can be attached as a media file while using RAMM or Pocket RAMM.

## Street Furniture (Minor Structure)

In the Council’s RAMM system the information related to street furniture is either stored under ***Minor Structure*** or ***Features***. In Minor Structure Table the asset is treated as a linear asset and Features table represents a point asset.

The basic information is the same as the Signs assets i.e. displacement, offset, side, height, quantity and GPS coordinates, construction date and the street address.

***Length***

Calculated as the difference between the start and end displacements if the furniture runs parallel to the road.

***Street furniture type***

BO Bollard

BS Bus/tram shelter

FE Fence

FO Fountain

GL Gas Lamp

PL Planter

MM Monuments and memorials, including plaques and statues.

SE Seats

TP Tram Pole

WS Wheel stops

***Material***

AL Aluminium

CA Cast Iron (decorative)

CO Concrete

CS Concrete and Steel

CG Concrete and Galvanised Steel

GS Galvanised Steel

PS Power Coated Steel

FI Fibreglass

RU High Density Rubber

PL Plastic

ST Steel

TI Timber

SN Stone

BR Bronze

FI Fibre Glass

GR Granite

MA Marble

***Surface Treatment***

G Galvanized

P Painted

U Unpainted

***Colour***

BK Black

BR Brown

BU Blue

GR Green

RE Red

UP Unpainted

WH White

YE Yellow

***Style***

A feature can be vertical, angled, horizontal or lattice

## Retaining Wall

This table can be used for entering dimension and material of retaining walls. A great deal of information for each retaining wall can be entered but as a minimum the following attributes must be entered:

Start & End Displacement or RPs from the road origin

Start and End GPS Coordinates

Type

Quantity

Dimension

Side of Road

Material

Above/Below Road

## Street Lighting

This table can be used for entering details of street lighting assets. Street lighting table in RAMM consists of three tables, Poles, Brackets (outreach arms) and Lights. wall can be entered but as a minimum the following attributes must be entered:

The following data is required;

***Poles***

Pole ID Number generated by RAMM when new asset loaded. Not if required poles not already in RAMM.

Pole number Unique pole number from as-built drawing

Road ID RAMM Road Identification number

Road name RAMM road name

Pole material Concrete

Fibreglass

Steel

Wood

Pole shape Circular

Hexagonal

Lattice

Octagonal

Rectangular

Square

Triangular

Other – provide details

Pole make Manufacturer name

Pole type Model or description of pole

Pole mount Bridge

Building

Flange mounted

Ground plant

Hinge Mounted

Shear Base

Wall Mounted

Pole purpose Anchor Pole

Distribution

Lighting unit

Switch gear

Trolley/Tram Bus pole

Earthing type Driven Earth Rod

Bonded to Earth Mat

Connected to Earth Conductor

Other - provide details

Pole Owner Car Parks

Facilities

Orion

Social Housing

Telecom

Parks

Streets

Other - provide details

Coating Galvanised

No Paint

Paint

Powder Coated

Install date dd/mm/yyyy

Replace date dd/mm/yyyy

Replace reason Reason pole was replaced

Pole control CMS

Photocell

Relay

Timeswitch

Street Lighting

Other - provide details

Use height Height of highest point for mounting a light (m)

Pole Attachment Type of attachment on pole, other than brackaet/light eg;

Arc attachment

Traffic Signal

Vodafone / Telecom cell-site

Banner arm

Pedestrian crossing disc

Other - provide details

Power Company Orion or Mainpower

Date tightened Date the foundation bolts were tightened dd/mm/yyyy

Cable owner Owner of the cable supplying power to the street light, ie Orion or CCC. If CCC is the cable owner then cable data will need to be provided.

GPS date Date GPS data was collected

GPS by Name of person collecting GPS data

Northing GPS coordinate

Easting GPS coordinate

***Bracket***

Bracket ID Number generated by RAMM when new asset loaded. Not if required poles not already in RAMM.

Pole ID/number RAMM Pole ID or unique number that the bracket for pole that the bracket is attached (from as-built drawing)

Bracket type Model or description of bracket

Bracket angle Angle in degrees clockwise from normal position (ie at 0 degrees bracket is pointing across road at right angle to kerb)

Bracket height Height of bracket (ie luminaire mounting point) from ground at base of pole (m)

Height indicator Height is “Estimate” or “Measured”

Outreach outreach of bracket arm from centre of pole (m)

Install date Date bracket was installed (dd/mm/yyyy)

Replace date Date bracket was replaced (dd/mm/yyyy)

Replace reason Reason bracket was replaced

***Light***

Light ID Number generated by RAMM when new asset loaded. Not if required poles not already in RAMM.

Bracket ID/number RAMM Bracket ID or unique number that the bracket for pole that the bracket is attached (from as-built drawing)

Bracket height Use where Bracket ID is not included

Light make AEC

Betacom

Iguzzini

Philips

Weef

Windsor

Orange Tek

Led Roadway Lighting

Cree

Schreder

Other - provide details

Lights Model Manufacturers model number

Light install date Date light was replaced dd/mm/yyyy

Light replace date Date light was replaced dd/mm/yyyy

Light replace reason Reason light was replaced

Light last tested Date safety tests were carried out including pole, bracket, light (dd/mm/yyyy)

Optic Luminaire optic reference

Lamp make LED chip manufacturers name

Lamp model FF Fluorescent

HPS High pressure sodium

INC Incandescent

LED Light emitting diode

MH Metal halide

MV Mercury vapour

Light tilt Actual Tilt of luminaire including Bracket tilt (degrees, above horizontal is positive)

Supply point OH Overhead

UG Underground

Lamp Wattage System Wattage of luminaire (i.e. includes control gear)

Gear make Manufacturer of driver

Gear Model Driver model number

Gear wattage Driver current setting

Gear install date Date driver was replaced dd/mm/yyyy

Gear replace date Date driver was replaced dd/mm/yyyy

Gear replace reason Reason driver was replaced

Number of LEDs Number of LEDs

Colour Temperature Colour Temperature of LEDs (in degrees Kelvin eg 3000, 4000)

Warranty Period Warranty period of luminaire in months

Owner Car Parks

Facilities

Social Housing

Parks

Streets

NZTA

Other - provide details

Lamp install date dd/mm/yyyy

Lamp replace date Date lamp or LED module was replaced dd/mm/yyyy

Lamp replace reason Reason lamp or LED module was replaced

***Luminaire Controller (LC)***

Council has recently installed a control system to manage and control the Street Lights.

The Outdoor Lighting Network (**OLN**) is an Itron Network Solutions (formerly Silver Spring Networks) mesh network.

The Central Management System (**CMS**) consists of:

* Outdoor Lighting Network (**OLN**) - the mesh network that is formed **between endpoint devices (Luminaire Controllers) and the Gateways** (or Access Points APs) using 900MHz technology.
* Central Management System Software (**CMSS**) - the backhaul network from Gateways to the Itron back office where the software is hosted. The CMSS is Street Light Vision (**SLV**).

Below is a diagram that provides an overview of a Mesh Network which Council has installed. It consists of 10 Gateways, and Luminaire Controllers on each light.

As Street Lights are converted to the CMS they will only have power on at night. It is envisaged that when all Street Lights on a circuit are converted to the CMS the circuit can be converted to a 24-hour supply.

The Contractor is required to provide data that can be uploaded into SLV and RAMM as changes to the network occur.

The LC has a MAC ID which is a unique identifier for that controller. When a LC has been installed the MAC ID shall be captured accurately to enable it to be added to RAMM and SLV. If not captured correctly, a return visit may be required to recapture this information.

Luminaire Controller and CSM data

LC Type Type of device e.g. Gateway, Luminaire Controller (LC), Repeater, Other (provide details)

LC model Luminaire Controller manufacturer name model

LC MAC ID Unique identifier for the Luminaire Controller (LC). Located on the side of the LC is a scanable code that (i.e. QR or bar code)

LC Warranty Period Warranty period of LC in months

LC install date dd/mm/yyyy

LC replace date Date Luminaire Controller was replaced dd/mm/yyyy

LC replace reason Reason Luminaire Controller was replaced

**CENTRAL MANAGEMENT SYSTEM (CMS)**

**Luminaire Controller (LC)**  
A device installed at the light that sends and receives data to/from the CMSS via Gateway

**Gateway** (or Access Point)  
Collects/sends data to and from Luminaire controller and SMSS

**Central Management System Software (CMSS)**  
A system (including the software) that communicates with Luminaire Controllers via the Outdoor Lighting Network to enable remote configuration, operation and management of the Luminaire Controller

**OUTDOOR LIGHTING NETWORK (OLN)**

# DATA COLLECTION FORMS

The forms in the pages following are to assist with data collection. These forms are available on request in Excel Spreadsheet format from:

Binaya Sharma

Asset Engineer (Planning Information)

Asset Management Team

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The attached forms show the details of information held in RAMM. On request the Council will supply the Excel Templates (TRIM ref 11/622748) electronically to the consultant or the contractors involved in collecting as built data.

|  |  |  |  |  |  |  |  |
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| New Road - RAMM Data Collection Form | | | | | | | |
| **Surveyed By:** | |  |  | **Date:** |  |  |  |
|  |  |  |  | **Form No:** |  |  |  |
| **SECTION** | | | | | | | |
| **Road** |  | **Start (m)** |  | **Start Road:** |  |  |  |
|  |  | **End (m)** |  | **End Road:** |  |  |  |
|  |  | **Area** |  | **Sub Area:** |  |  |  |
| **CARRIAGEWAY MISCELLANEOUS** | | | | | | | |
| **Length (m)** |  | **Width (m)** |  | **Res Width (m)** |  |  |  |
| **Hierarchy** |  | **Parking Bays(m2)** |  | **Islands (m2)** |  |  |  |
| **Lanes** |  | **Intersection(m2)** |  | **Other Areas(m2)** |  |  |  |
| **Reg/Irregular** |  | **Bus Bays (m2)** |  |  |  |  |  |
| **SURFACE WATER CHANNEL/LHS** | | | | | | | |
| **Start (m)** |  |  |  |  |  |  |  |
| **End (m)** |  |  |  |  |  |  |  |
| **Length** |  |  |  |  |  |  |  |
| **Type** |  |  |  |  |  |  |  |
| **SURFACE WATER CHANNEL/RHS** | | | | | | | |
| **Start (m)** |  |  |  |  |  |  |  |
| **End (m)** |  |  |  |  |  |  |  |
| **Length** |  |  |  |  |  |  |  |
| **Type** |  |  |  |  |  |  |  |
| **FOOTPATH/LHS** | | | | | | | |
| **Start (m)** |  |  |  |  |  |  |  |
| **End (m)** |  |  |  |  |  |  |  |
| **Length** |  |  |  |  |  |  |  |
| **Position** |  |  |  |  |  |  |  |
| **Width** |  |  |  |  |  |  |  |
| **Use** |  |  |  |  |  |  |  |
| **FOOTPATH/RHS** | | | | | | | |
| **Start (m)** |  |  |  |  |  |  |  |
| **End (m)** |  |  |  |  |  |  |  |
| **Length** |  |  |  |  |  |  |  |
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| **Width** |  |  |  |  |  |  |  |
| **Use** |  |  |  |  |  |  |  |
| **BERMS/LHS** | | | | | | | |
| **Start (m)** |  |  |  |  |  |  |  |
| **End (m)** |  |  |  |  |  |  |  |
| **Length** |  |  |  |  |  |  |  |
| **Width** |  |  |  |  |  |  |  |
| **Cover** |  |  |  |  |  |  |  |
| **BERMS/RHS** | | | | | | | |
| **Start (m)** |  |  |  |  |  |  |  |
| **End (m)** |  |  |  |  |  |  |  |
| **Length** |  |  |  |  |  |  |  |
| **Width** |  |  |  |  |  |  |  |
| **Cover** |  |  |  |  |  |  |  |
| **Comments/Notes:** | |  |  |  |  |  |  |
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| Update/Add - Surface Water Channels (SWC) Table | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Road/Section Information | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Road Id: | | |  | |  | | Name: | | | | |  | | |  | | | | | | | | |  | | | |  |  |  |  |
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| Start Displacement: | | |  | | m | | Start Name: | | | | |  | | |  | | | | | | | | |  | | | |  |  |  |  |
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| End Displacement: | | |  | | m | | End Name: | | | | |  | | |  | | | | | | | | |  | | | |  |  |  |  |
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| **Surface Water Channel Information** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Start Displacement | | |  | | m | |  | | | | |  | | |  | | | | | | | | |  | | | |  |  |  |  |
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| End Displacement: | | |  | | m | |  | | | | |  | | |  | | | | | | | | |  | | | |  |  |  |  |
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| Extra Length: | | |  | | m | |  | | | | |  | | |  | | | | | | | | |  | | | |  |  |  |  |
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| Distance to Seal: | | |  | | m | |  | | | | |  | | |  | | | | | | | | |  | | | |  |  |  |  |
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| Offset: | | |  | | m | | OR | | | | | GPS Coordinates | | | | | | | | | | | |  | | | |  |  |  |  |
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| Type: | | |  | | Refer Document | |  | | | | |  | | |  | | | | | | | | |  | | | |  |  |  |  |
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| Contracts Detail: | | |  | |  | |  | | | | |  | | |  | | | | | | | | |  | | | |  |  |  |  |
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| Construction Date: | | |  | | Days/Mo/Yr | |  | | | | |  | | |  | | | | | | | | |  | | | |  |  |  |  |
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| Notes/Comments: | | |  | |  | |  | | | | |  | | |  | | | | | | | | |  | | | |  |  |  |  |
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| Update/Add - Marking Table | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Road/Section Information | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Road Id: |  |  | | | | Name: | |  | | |  | | | | | |  | |  | |  | | | |  | |
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| Start Displacement: |  | m | | | | Start Name: | |  | | |  | | | | | |  | |  | |  | | | |  | |
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| End Displacement: |  | m | | | | End Name: | |  | | |  | | | | | |  | |  | |  | | | |  | |
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| **Marking Information** | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Marking ID |  |  | | | | Length: | |  | | | m | | | | | |  | |  | |  | | | |  | |
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| Start Displacement: |  | m | | | | Side: | |  | | | L/R/M/NA | | | | | |  | |  | |  | | | |  | |
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| End Displacement: |  | m | | | | Offset: | |  | | |  | | | | | |  | |  | |  | | | |  | |
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| Date Painted |  | Days/Mo/Yr | | | | Type: | |  | | |  | | | | | |  | |  | |  | | | |  | |
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| GPS Coordinates |  |  | | | |  | |  | | |  | | | | | |  | |  | |  | | | |  | |
| Start: |  | Northing: | | | |  | | Easting: | | |  | | | | | |  | |  | |  | | | |  | |
| End: |  | Northing: | | | |  | | Easting: | | |  | | | | | |  | |  | |  | | | |  | |
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| GPS Date: |  | Days/Mo/Yr | | | |  | |  | | |  | | | | | |  | |  | |  | | | |  | |
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| Material: |  |  | | | |  | |  | | |  | | | | | |  | |  | |  | | | |  | |
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| Make: |  |  | | | |  | |  | | |  | | | | | |  | |  | |  | | | |  | |
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| Brand Name: |  |  | | | |  | |  | | |  | | | | | |  | |  | |  | | | |  | |
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| Notes/Comments: |  |  | | | |  | |  | | |  | | | | | |  | |  | |  | | | |  | |
| Update/Add - Off Road Cycleway Table | | | | | | | | | | | | | | | | | | | | | |
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| **Cycleway Section Information** | | | | | | | | | | | | | | | | | | | | | |
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| Road/Cway ID | | |  |  | | | | |  | Name: | | |  |  | |  | |  |  |  | | |  | | |
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| Start Displacement: | | |  |  | | | | |  | Start Name: | | |  |  | |  | |  |  |  | | |  | | |
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| End Displacement: | | |  |  | | | | |  | End Name: | | |  |  | |  | |  |  |  | | |  | | |
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| **Cycleway Surface** | | | | | | | | | | | | | | | | | | | | | |
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| Res Width: | | |  |  | | | | |  |  | | |  |  | |  | |  |  |  | | |  | | |
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| Extra Areas: | | |  |  | | | | |  |  | | |  |  | |  | |  |  |  | | |  | | |
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| Surface Material: | | |  |  | | | | |  |  | | |  |  | |  | |  |  |  | | |  | | |
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| Use: | | |  | CYWAY/Shared | | | | |  |  | | |  |  | |  | |  |  |  | | |  | | |
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| Owner: | | |  |  | | | | |  |  | | |  |  | |  | |  |  |  | | |  | | |
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| Local Area: | | |  |  | | | | |  |  | | |  |  | |  | |  |  |  | | |  | | |
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| Photo/Reference: | | |  |  | | | | |  |  | | |  |  | |  | |  |  |  | | |  | | |
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| Date: | | |  |  | | | | |  |  | | |  |  | |  | |  |  |  | | |  | | |
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| Comments/Notes: | | |  |  | | | | |  |  | | |  |  | |  | |  |  |  | | |  | | |

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| Update/Add - Footpath Table | | | | | | | | | | | | | | | | | |
| Road/Section Information | | | | | | | | | | | | | | | | | |
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| Road Id: | | | | |  |  | | | Name: | | |  | |  |  |  |  |
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| Start Displacement: | | | | |  | m | | | Start Name: | | |  | |  |  |  |  |
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| End Displacement: | | | | |  | m | | | End Name: | | |  | |  |  |  |  |
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| **Footpath Information** | | | | | | | | | | | | | | | | | |
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| Side: | | | | |  | L/R/M/NA | | |  | | |  | |  |  |  |  |
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| Position | | | | |  | K/M/B/W/R | | |  | | |  | |  |  |  |  |
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| Start Displacement: | | | | |  | m | | |  | | |  | |  |  |  |  |
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| End Displacement: | | | | |  | m | | |  | | |  | |  |  |  |  |
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| Length (Including Adjustment) | | | | |  | m | | |  | | |  | |  |  |  |  |
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| Use: | | | | |  | Ped/Shared/Cyc | | |  | | |  | |  |  |  |  |
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| Extra Area: | | | | |  | Sqm | | |  | | |  | |  |  |  |  |
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| Surfacing Date: | | | | |  | Days/Mo/Year | | |  | | |  | |  |  |  |  |
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| Material | | | | |  | AB/C/IB/S/OTH | | |  | | |  | |  |  |  |  |
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| Contracts Detail: | | | | |  |  | | |  | | |  | |  |  |  |  |
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| Notes/Comment: | | | | |  |  | | |  | | |  | |  |  |  |  |
| Update/Add - Signs Table | | | | | | | | | | | | | | | | | | |
| **Road/Sections Information** | | | | | | | | | | | | | | | | | | |
| Road ID |  |  |  | Road Name: | | |  |  | |  |  | |  | | | | | |
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| Start Displacement |  |  |  | Start Name: | | |  |  | |  |  | |  | | | | | |
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| End Displacement |  |  |  | End Name: | | |  |  | |  |  | |  | | | | | |
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| **Signs** |  |  |  |  | | |  |  | |  | **Post** | |  | | | | | |
|  |  |  |  |  | | |  |  | |  |  | |  | | | | | |
| Sign ID |  |  | Height: |  | | | mm | **Installation** | |  | Support ID | |  | | | | | |
|  |  |  |  |  | | |  |  | |  |  | |  | | | | | |
| Type: |  |  | width: |  | | | mm | Installed: | |  | Owner | |  | | | | | |
|  |  |  |  |  | | |  |  | |  |  | |  | | | | | |
| Group: |  |  | Height From Ground: |  | | | mm | Dispatch ID: | |  | Description | |  | | | | | |
|  |  |  |  |  | | |  |  | |  |  | |  | | | | | |
| Quantity: |  |  | Angle: |  | | |  | Reason: | |  | Installed: | |  | | | | | |
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| Displacement |  |  | Direction: |  | | |  | **Replacement** | |  | Replaced: | |  | | | | | |
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| Side: |  |  | Photo Ref: |  | | |  | Replaced: | |  | Post Type: | |  | | | | | |
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| Offset: |  |  | **Material** |  | | |  | Dispatch ID: | |  | Shape: | |  | | | | | |
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| GPS Coordinates: |  |  | Legend: |  | | |  | Reason: | |  | Material: | |  | | | | | |
| Northing |  |  |  |  | | |  |  | |  |  | |  | | | | | |
| Easting |  |  | Background: |  | | |  |  | |  | Make | |  | | | | | |
|  |  |  |  |  | | |  |  | |  |  | |  | | | | | |
| House No: |  |  | Substrate: |  | | |  |  | |  | Model: | |  | | | | | |
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| Legend: |  |  | Frame: |  | | |  |  | |  | Mount: | |  | | | | | |
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| Reverse Side |  |  |  |  | | |  |  | |  | Bracket Type: | |  | | | | | |
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| Notes/Comments |  |  |  |  | | |  |  | |  | Number: | |  | | | | | |

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| Update/Add - Road Features Table | | | | | | | | | | | | |
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| **Road/ Section Information** | | | | | | | | | | | | |
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| Road ID: |  |  |  | Name: |  |  |  |  |  |  |  |  |
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| Start Displacement: |  |  |  | Start Name: |  |  |  |  |  |  |  |  |
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| End Displacement: |  |  |  | End Name: |  |  |  |  |  |  |  |  |
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| **Road Features Information** | | | | | | | | | | | |  |
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| GPS Coordinats: |  |  |  |  |  |  |  |  |  |  |  |  |
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| Notes/Comments: |  |  |  |  |  |  |  |  |  |  |  |  |

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| Update/Add - Drainage Table | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Road/Section Information | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Road Id: |  | |  | | | | | | | |  | Name: | | | | | | | |  |  | | |  |  | |  | | |  | |  | | |
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| Start Displacement: |  | |  | | | | | | | |  | Start Name: | | | | | | | |  |  | | |  |  | |  | | |  | |  | | |
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| End Displacement: |  | |  | | | | | | | |  | End Name: | | | | | | | |  |  | | |  |  | |  | | |  | |  | | |
| **Drainage(Sumps) Information** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Type: |  | |  | | | | | | | |  | Shape: | | | | | | | |  |  | | |  |  | |  | | |  | |  | | |
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| Date: |  | | DY/MO/YR | | | | | | | |  | Size:( Dia/Height) | | | | | | | |  | mm | | |  |  | |  | | |  | |  | | |
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| Displacement: |  | | m | | | | | | | |  | Inlet: | | | | | | | |  | Yes/No | | |  |  | |  | | |  | |  | | |
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| Offset: |  | | m | | | | | | | |  | Outlet: | | | | | | | |  | Yes/No | | |  |  | |  | | |  | |  | | |
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| Side: |  | | L/R/M/UN | | | | | | | |  | Material: | | | | | | | |  |  | | |  |  | |  | | |  | |  | | |
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| GPS Coordinates: |  | |  | | | | | | | |  | Fish passage: | | | | | | | |  | Yes/No | | |  |  | |  | | |  | |  | | |
| Northing |  | |  | | | | | | | |  |  | | | | | | | |  |  | | |  |  | |  | | |  | |  | | |
| Easting |  | |  | | | | | | | |  | Length: | | | | | | | |  | m | | |  |  | |  | | |  | |  | | |
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| **Culvert Data:** |  | |  | | | | | | | |  |  | | | | | | | |  |  | | |  |  | |  | | |  | |  | | |
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| Type: |  | |  | | | | | | | |  | Waterway Name: | | | | | | | |  |  | | |  |  | |  | | |  | |  | | |
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| Comments/Notes: |  | |  | | | | | | | |  |  | | | | | | | |  |  | | |  |  | |  | | |  | |  | | |
| Update/Add - Minor Structures Table | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Road/Section Information | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Road Id: | | | | | | |  | |  | Name: | | | | | | |  | |  | | | | | | | | |  | | | | |  | | | | |  | |  | |  | | |
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| Start Displacement: | | | | | | |  | | m | Start Name: | | | | | | |  | |  | | | | | | | | |  | | | | |  | | | | |  | |  | |  | | |
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| **Minor Structure Information** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Type: | | | | | | |  | |  |  | | | | | | |  | | GPS Coordinates | | | | | | | | | | | | | |  | | | | |  | |  | |  | | |
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| Material | | | | | | |  | |  |  | | | | | | |  | | Easting | | | | | | | | |  | | | | |  | | | | |  | |  | |  | | |
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| Notes/Comments: | | | | | | |  | |  |  | | | | | | |  | |  | | | | | | | | |  | | | | |  | | | | |  | |  | |  | | |
| Update/Add - Berm Table | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Road/Section Information | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Road Id: | | | | | |  | |  | | | | | | Name: | | | | | | | | |  | | |  | | |  | | | |  | | | |  | |  | |  | | |
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| Start Displacement: | | | | | |  | | m | | | | | | Start Name: | | | | | | | | |  | | |  | | |  | | | |  | | | |  | |  | |  | | |
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| End Displacement: | | | | | |  | | m | | | | | | End Name: | | | | | | | | |  | | |  | | |  | | | |  | | | |  | |  | |  | | |
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| **Berm Information** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Type: | | | | | |  | | L/B/UN | | | | | |  | | | | | | | | |  | | |  | | |  | | | |  | | | |  | |  | |  | | |
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| Trees | | | | | |  | | Nos | | | | | |  | | | | | | | | |  | | |  | | |  | | | |  | | | |  | |  | |  | | |
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| Contracts Detail: | | | | | |  | |  | | | | | |  | | | | | | | | |  | | |  | | |  | | | |  | | | |  | |  | |  | | |
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| Construction Date: | | | | | |  | | Days/Mo/Yr | | | | | |  | | | | | | | | |  | | |  | | |  | | | |  | | | |  | |  | |  | | |
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| Notes/Comments: | | | | | |  | |  | | | | | |  | | | | | | | | |  | | |  | | |  | | | |  | | | |  | |  | |  | | |
| Update/Add - Pavement Layer and Rehabilitation Table | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **Road Information** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Road Id | |  | |  | Road Name: | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
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| Start Displacement | |  | |  | Start Name | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
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| End Displacement | |  | |  | End Name | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
| **Pavement Layer/Subgrade Information** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Start Displacement: | |  | | m | Start Name: | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
|  | |  | |  |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
| End Displacement: | |  | | m | End Name: | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
|  | |  | |  |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
| Offset: | |  | | m |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
|  | |  | |  |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
| Width | |  | | m |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | |
| **Subgrade:** | |  | |  |  | | | | | | | | **Pav Layer 1:** | |  |  | |  | | | | **Pav Layer 2:** | | | | | | | | |  | | |  | |  | | | | | | |
|  | |  | |  |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
| Material: | |  | |  |  | | | | | | | | Material: | |  |  | |  | | | | Material: | | | | | | | | |  | | |  | |  | | | | | | |
|  | |  | |  |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
| CBR: | |  | | % |  | | | | | | | | Depth: | |  |  | | mm | | | | Depth: | | | | | | | | |  | | |  | | mm | | | | | | |
|  | |  | |  |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
|  | |  | |  |  | | | | | | | | Source: | |  |  | |  | | | | Source: | | | | | | | | |  | | |  | |  | | | | | | |
|  | |  | |  |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
|  | |  | |  |  | | | | | | | | Date: | |  |  | |  | | | | Date: | | | | | | | | |  | | |  | |  | | | | | | |
|  | |  | |  |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
|  | |  | |  |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |
| Notes/Comments: | |  | |  |  | | | | | | | |  | |  |  | |  | | | |  | | | | | | | | |  | | |  | |  | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Update/Add - Carriageway Surfacing Table | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Pavement Surfacing Information** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| Road Id |  | m | Road Name: |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Start Displacement |  | m | Start Name: |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| End Displacement |  | m | End Name: |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **General** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| Surfacing Date: |  | Dy/Mo/Yr | Material: |  |  |  | Size/Grade: |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Width: |  | m | Depth: |  |  |  | Source: |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Full Width: |  | Yes/No |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Offset: |  | m | Function: |  |  | 1/2/RS/NA | Sealed By: |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Contract Details: |  |  | Design Life: |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Binder** | | | | | | | | | | |
| **Quantities:** |  |  |  | **Types:** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Cutter: |  | pph |  | Cutter: |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Adhesion: |  | pph |  | Adhesion: |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Additive: |  | pph |  | Additive: |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Flux: |  |  |  | Binder: |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| Application Rate: |  | l/sqm |  | Comments/Notes: | |  |  |  |  |  |