STANDARD SPECIFICATION FOR URBAN INFRASTRUCTURE WORKS

STREET LIGHTING SECTION 14

CONTENTS

14 STREET LIGHTING

14.1 SCOPE

This Specification sets out the minimum requirements for the supply, installation and commissioning of Category V and Category P streetlighting within the ACT in compliance with AS/NZS 1158.

Should a designer propose to use an 'equivalent' manufacturer from those listed in this Standard Specification or that shown in the TAMS Design Standards for Urban Infrastructure Section 12 Streetlighting, that proposal requires a specific approval request by the designer to TAMS at design stage. Note Proposals for 'equivalents' at construction stage will not be entertained.

14.2 REVISION HISTORY

Edition	Revision	Description
1	1	Rewritten to reflect current standards and practice Maintenance guidelines added

14.3 REFERENCE DOCUMENTS

The installation shall comply with the requirements and recommendations of the following standards, codes and regulations:

14.3.1 Australian Standards

AS/NZS 1158 Lighting for roads and public spaces

AS 1170.2 Minimum design loads on Structures - wind loads

AS 1214 Hot dip galvanized coatings on threaded fasteners

AS 1379 The specification and manufacture of concrete

AS 1538 Cold formed steel structures code

AS 1554.1 Structural steel welding - Welding of steel structures

AS 1627.1 Metal finishing - Preparation and pretreatment of surfaces - Cleaning using liquid solvents and alkaline solutions

AS 1627.4 Metal finishing - Preparation and pretreatment of surfaces - Abrasive blast cleaning

AS 1650 Hot-dipped galvanized coatings on ferrous articles

AS 1798 Lighting poles and bracket arms

AS 2053 Non-metallic conduits and fittings

AS/NZS 3000 Wiring Rules

AS 3600 Concrete structures

AS 4100 Steel structures

AS/NZS 4677 Steel utility services poles

AS 4791 Hot-dip galvanised (zinc) coatings on ferrous open sections, applied by an inline process

AS 4792 Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or specialised process

AS/NZS 4676 Structural design requirements for utility service poles

AS 4251.1 Electromagnetic compatibility – Generic Emission Standard – Part 1: Residential, commercial and light industry

14.3.2 Authority Guidelines

Standard Specification for Urban Infrastructure Works – Earthworks Section 2

Standard Specification for Urban Infrastructure Works – Underground Services Section 3

Electrical Note 2 *Electrical Installation of Street Lights, Traffic Lights, Combination Street and Traffic Lights and Street Area Lighting – ACT Government Planning and Land Management.*

Ref http://www.actpla.act.gov.au/bepcon/elect/elect.htm

14.4 QUALIFICATIONS OF PERSONNEL

The street light network is protected under the ACT Utilities Act.

Only “Authorised Streetlighting Personnel” as defined in the Utilities Act shall carry out work on the electrical streetlighting network.

Where ACTPLA have set up a license category of Authorised Streetlighting Personnel then those persons within that category shall have obtained a license from ACTPLA.

Where ACTPLA have not set up a category of Authorised Streetlighting Personnel then those persons within that category shall hold a current Network Awareness Training certificate from ActewAGL plus certificates for working on or with relevant equipment.

14.5 MATERIALS

14.5.1 Conduits

Conduits and conduit fittings shall be used for all cabling and shall be Class 12 orange heavy duty rigid UPVC manufactured in accordance with AS 2053 with solvent welded joints. All the conduits shall be of the sizes shown on the Drawings.

14.5.2 Cabling

All cables shall be insulated and sheathed copper core cables, and shall have stranded copper conductors. They shall be 10mm^2 XLPE insulated HDPE/PVC sheathed for control point operated cabling and stranded copper 4 core 16mm^2, XLPE insulated HDPE/PVC sheathed for all other under ground work.

Overhead conductors shall be hard drawn stranded 2 core 16mm^2 twisted service cable or aluminium 2 core 25mm^2 LV ABC. Active overhead cable conductors shall be identifiable by ribbing or other methods. No colour identification is permitted on overhead insulated cabling. Each individual neutral conductor shall be identified with a suitable UV stabilised neutral tag.

Decorative lighting cabling shall be suitable for extra low voltage applications (less than 50w DC) and be UV stabilised PVC or XLPE insulation suitable for catenary or tree branch mounting. LED and fibre optic cabling must be installed inside a weather proof enclosure (IP65 or better) or installed in Class 12 orange heavy duty rigid UPVC manufactured in accordance with AS 2053 with solvent welded joints of suitable dimension and terminated in a water proof enclosure. All cabling and conduit work shall be installed in accordance with AS/NZS 3000 as amended. Where shared trench arrangements are to be undertaken all streetlight cables shall be installed in conduit.

All cables shall have a minimum of V90 insulation. The insulation of cables shall be coloured as shown in Table 14.1:

Table 14.1

Circuit	***Object***	***Colour***
Three phase circuits	Active:	Red, White, Blue
	Neutral:	Black
Single Phase	Neutral	Black
	Active	Red
Earth Conductors		Green/Yellow

14.5.3 Columns

The columns shall present a smooth appearance overall, with particular attention to the junction of the outreach and vertical sections. Bends shall be a true radius, smooth and fee of kinks. The maximum deviation from the true shape at any point on the curve shall be checked by means of an internal template, which allows for the diametrical taper of the outreach. When placed against the inside of the outreach any gaps between the outreach and the template shall not exceed 1% of the radius and the rate of gap increase shall not exceed 1 in 50.

Any cross section of a column measured normal to the axis of the vertical component shall have a tolerance of ±2% of outside dimension.

On the outreach this tolerance shall be ±5% of the nominal outside diameter of the cross section at that point. Out-of-round in excess of this tolerance shall be grounds of rejection of the columns.

The outreach arms shall be secured to the column in such a manner so as to prevent torsional movement of the outreach arm. Grub screws or similar are unacceptable.

The methods of construction of the columns shall be such as to ensure that the vertical axis is perfectly straight and perpendicular to the base plate and the outreach is set in the plane of the vertical axis. One side of the square base plate shall be at right angles to the outreach. All burrs and blemishes shall be removed from the edges of the materials used. All sharp corners shall be removed from exposed edges, holes and openings provided for cables and for access to electrical equipment.

Welding shall be deposited in runs of sound, clean metal, free from slag inclusions, porosity and undercutting. Good fusion with parent material shall be obtained. Excess material shall be deposited and subsequently ground off flush to give a smooth surface and neat finish. All weld splatter shall be removed. All steel columns shall be galvanising to a minimum thickness of 600g/m².

All decorative steel columns shall be galvanised to a minimum thickness of 600g/m² in accordance with the requirements of AS 4792 and then painted with a two pack acrylic paint. All galvanised direct buried columns are to be treated with Dulux Durabuild STE epoxy mastic paint, or equivalent, 300mm from base of the column to 200mm above ground level. The first 300mm shall remain galvanised and is not to be painted or treated due to pole earthing requirements.

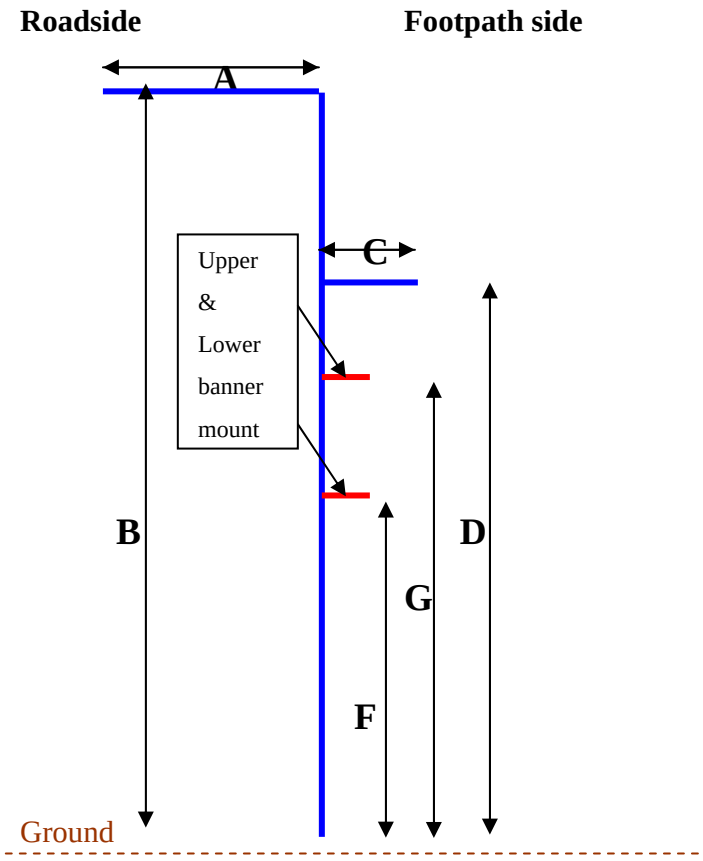
Colour types for columns and outreach arms either

Dulux application purpose	Description	Dulux Number
Decorative	Charcoal	32999
Decorative	Anotec XT Silver Grey	51272
Decorative	Heritage Green	50068
Protective	Durabuild STE epoxy mastic	

(Aust std 2700 no G11).

Surface preparation shall be by etching and priming the galvanising. Application shall be in a two pack acrylic finish in accordance with AS3887 category '*long term*'.

Streetlight Pole - Dimension limits



Description	Dimension	Outreach Arm	Height	Condition	Design Spec. clause reference
Roadside column	**A**	1.5, 3, 4.5			12.3.2
"	**B**		4, 6.5, 9, 10.5, 12, 15		12.3.1
Pedestrian side column	**C**	0.5, 1.5			12.3.2
"	**D**		4, 6.5, 9, 10.5, 12, 15		12.3.1
Banner	**E**	0.5, 1.5		Only on poles > 9 metres in height & designed to withstand wind loadings	12.3.1, 12.3.3
"	**F**		2.4 minimum	"	12.3.1
"	**G**		6.0 maximum	"	12.3.1

Note Column Heights in Parks, Cycleways, Walkways, Adjacent Underpasses & Adjacent Shopping Centers shall be a minimum of 6.5 Meters (12.3.1)

14.5.3.1 Heritage listed areas.

Where columns are required in Heritage listed areas they shall comply with the Urban Infrastructure Design Standards **12.12 Appendix A,** 'Heritage ACT street lighting design and maintenance requirements'.

14.5.3.2 Luminare Outreach Arms

All outreach arms shall be secured to the column so that the outreach arm cannot be displaced from its intended position. In plan the orientation of the outreach arm shall be at right angles to the traffic lane unless otherwise directed, or 90° to the tangent point of the curve.

14.5.3.3 Banner mounting

Banner installation is to be provided only on columns that are 9m or above. Banners shall have a quick release mechanism on the lower mounting that will 'collapsible' should the wind load exceed the design parameters as specified in **TAMS Design Standards for Urban Infrastructure Section 12 Streetlighting, 12.3.3**.

14.5.3.4 Service Aperture

Provide an aperture in the base portion of each column for access to control gear. For maintenance personnel safety, column access hatches shall be placed either facing away from the road or to the side facing away from the oncoming traffic. The minimum clear dimensions of the aperture for Cat V poles shall be 670mm x 150mm for columns with a double outreach and 570mm x 150mm for columns with a single outreach, and for Cat P poles shall be 250mm x 100mm. Mount terminals and luminaire circuit breaker protection behind the aperture. The lower end of the aperture shall be no less than 450mm above ground level.

Provide adequate stiffening around the aperture. Provide a lift-out cover over each aperture and fix with tamper proof screws. Make the cover weatherproof to fit flush or semi-flush with the face of the column. Semi-flush covers shall not project more than 2mm from the face of the column. Treat the surface of the steel prior to galvanising so that it is completely free from rust and mill scale and is suitable for hot dip galvanising. Steel aperture covers shall have a minimum thickness of galvanising of 600gm/m² and a finish surface free from white rust and stains.
No further coating shall be applied to the external surface of the galvanised steel unless the column is of a decorative nature.

14.5.3.5 Assembly

Where it is intended to assemble lighting columns on site, subject always to approval by the Superintendent, submit a detailed procedure for assembly at least three (3) working days prior to commencement of work. Allow to discontinue site assembly during adverse weather conditions that in the opinion of the Superintendent would be detrimental to the condition of the completed column, or at such other times as the Superintendent may direct. The transport and storage of galvanised steel lighting columns shall be in accordance with Appendix G of AS 1650.

14.5.4 Luminaires

Luminaires shall comply with the requirements of AS 1158.6. They shall be integral control gear type, power factor corrected to 0.9pf and have integral photo-electric cell control capabilities. Luminaires shall have individual circuit breaker protection inside the column. Control gear shall be of the reactive type and not constant wattage. Stepped switching and voltage regulation optioned luminaires are required in Cat V road luminaires for metal halide and high pressure sodium luminaries. Luminaires used for post-top installation may utilise external control equipment. As many luminaries have also been selected for their form as well as function, luminaire types are restricted to those listed.

Approved Luminares

This schedule lists luminares that may be used in accordance with locations & conditions as specified in TAMS Design Standards for Urban Infrastructure Section 12 Streetlighting.

Bega 8081
Bega 8082
Colonial Lighting ALN 440
Colonial Lighting Waverly
Kim Archetype
Louis Polsen Kipp
MV Technology Sky-Gen 7001
MV Technology Sky-Gen Pro
Rexel Darwin (ACT)
Rexel Optispan Major
Rexel Optispan Minor
Rexel Sentry PX
Shreder Alura
Slyvania Slyproof Stainless
Sylvania B2001 (ACT)
Sylvania Burkehill 'Clasical' Mod A
Sylvania Clip 28
Sylvania Clip 34
Sylvania Condor S33306
Sylvania Nightstar Compact
Sylvania Parkville 'Clasical' Mod A
Sylvania Roadster IP66 Optical Chamber

Sylvania Sylflood AS
Sylvania Sylmaster
Sylvania Urban
Versalight Rhino

14.5.5 Electromagnetic Compatibility (EMC)

All new and replacement luminaires and control equipment covered by this specification shall comply with all relevant requirements of the Australian Communications Authority (ACA) for EMC and the requirements of AS4251.1 Electromagnetic compatibility – Generic Emission Standard – Part 1: Residential, commercial and light industry.

14.5.6 Lamps

Lamp types shall be as nominated on the drawings. The lamps shall be suitable for use in the type of luminaire installed and shall have a guaranteed minimum life as listed in the following table. Self igniting lamps shall not be used. 250W and 400W lamps shall be capable of being incorporated with voltage regulation and stepped switching devices.

LAMP TYPE	Wattage	Min Mean Lumen output (@100hrs)	Type	Base	Life #1 Expectancy	Colour Temperature	Survival at life expectancy	Lumen depreciation at life expectancy
High Pressure Sodium Vapour. For use:- within 5km of Mt Stromlo observatory. Twin Arc lamps shall be used in all Cat V lighting designs.	70	6,000	Elliptical Coated	E27	6 yrs	2000k	80%	80%
	150	17,000	Tubular clear	E40				
	250	32,000	Tubular clear	E40				
	400	55,000	Tubular clear	E40				
Metal Halide To be used in all Category P lighting schemes and all designated NCA areas including Cat V designs and Optical fibre decorative lighting driver units	70	5,500	Elliptical Coated	E27	4 yrs	4000k	70%	50%
	150	13,000	Tubular Clear	E27				
	250	21,000	Tubular Clear	E40				
	400	42,000	Tubular Clear	E40				
Post top luminaire lamps	70	6,000	Ceramic tubular	G12				
	150	13,000	Ceramic tubular	G12				
Fluorescent	24 - 42	20,000	Ceramic tubular	GX24q-4	4 yrs	4000k	70%	50%
Induction#2	23- 50		Elliptical Coated	E27	8yrs	4000k	70%	50%
24 volt LED Decorative lighting#2	0.72(typical)	20,000			10 yrs			

#1 The superintendent may require the contractor to provide a manufacturers certification that the Life Expectancy meets the required period.

#2 Lamps marked are for trial purpose only. Permission in writing must be granted by the Territory and Municipal Services before any of these types of lamps are installed.

Mercury vapour, low pressure sodium vapour, compact fluorescent, incandescent, quartz halogen, are not permitted to be installed in streetlighting or decorative lighting in the ACT. Where these types of lamps are currently installed they maybe maintained until such time as the luminaire requires replacement. When this occurs only standard lamps from this table shall be used.

14.5.7 Photo Electric Cells (PE Cells)

PE cells shall be integral with the luminaire. Where the installation is an extension to the existing streetlight network and is centrally controlled, a bridging plug shall be provided in lieu of the PE cell. PE cells shall have the following characteristics:

NEMA Based

Rated voltage	220 – 270 Vac
Rated load	2 x 400W HPS
Lux on setting	15 Lux ± 20%
Lux off setting	30 Lux ± 20%
Enclosure	IP65 minimum
Sensor	Filtered silicon photodiode
Sensor drift	Zero over five years
Guarantee Period	6 years minimum
Power consumption	Less than 0.5 Watt

D2 based

Rated voltage	220 – 270 Vac
Rated load	2 x 400W HPS
Lux on setting	15 Lux ± 20%
Lux off setting	30 Lux ± 20%
Enclosure	IP65 minimum
Sensor	Filtered silicon photodiode
Sensor drift	Zero over five years
Guarantee Period	6 years minimum
Power consumption	Less than 0.5 Watt

14.5.8 Asset Numbers

Asset numbers in accordance with AS/NZS 4677 shall be supplied to the superintendent, at the contractor's expense, by the power supply utility upon their connection point approval. Mount asset numbers at 2.4m above the finished surface facing the roadway, into the open area or towards the pathway when there is no roadway present. Attach asset numbers at two points on steel and aluminium columns with suitable pop rivets. Use screws or nails for wooden poles. Asset numbers on concrete columns shall be affixed with an adhesive fit for purpose. Decorative lighting arrangements shall have the asset number placed on the first catenary column or on the optical driver control point access cover plate.

14.5.9 Connections

In all cases the supply of the initial protection equipment, (Circuit breaker or service fuse) and final connection to the distribution network shall be the responsibility of the Power Supply Authority. All costs for this work will be the responsibility of the contractor. **The ACT Government is not responsible for this cost.**

For Category V and non-residential Category P installations, main conductors shall loop in and out of large (suitable for 4 core 16mm^2 conductors minimum) terminal links provided in the base of each column. Connection of such networks will be via a common control point arrangement.
When slip base columns are used provision shall be made for disconnect plugs and flex assemblies in the base of each column in accordance with Drawing DS12 Category 01
When high speed impact absorbing columns are used electrical installation shall incorporate a service pit adjacent to the base of each column in accordance with Drawing DS12 Category 01

For Category P residential lighting columns are to be supplied from the closest power supply point eg mini-pillar.

Where proposed category P streetlighting is to be installed in an existing overhead supply area the streetlights shall be connected directly to the distribution network utilising PE cells for individual luminaire control. Final connection shall be the responsibility of the supply authority or supply authority approved contractors. Cost for this work will be the responsibility of the contractor.

Connections made in cable pits shall be designed for full submersion. All connectors used for aluminum cable shall be the fully sealed insulation piercing connector (IPC) type. Where insulated cables terminate in an outdoor open air environment (e.g. pole top) weather loops shall be adopted to prevent water ingress.

14.5.10 Control Points

Free standing ground mounted control points shall be installed in accordance with Drawing DS12 Category 01. Control points shall be used on all Category V lighting installations, major collector roads and where there is large open area lighting. Luminaire control shall be via individual PE cell control

14.5.11 Foundation Bolts

Foundation bolt assemblies for lighting columns shall be fabricated to the dimensions specified by the column manufacturer.
All welding shall be in accordance with the requirements of AS 1554.1 Category GP.

Treat foundation bolt assemblies by the hot dip galvanising process in accordance with AS 1650 to provide a minimum thickness of 800gm/m² and a bright finished appearance free from all galvanising defects. Prior to galvanizing, treat the surface in accordance with AS 1627.1 and AS 1627.4 (Class 2½ Blast).

Galvanise bolts, nuts and washers in accordance with AS 1214. Installation shall be in accordance with the specific column manufacturers requirements. The 'Design Standards For Urban Infrastructure Streetlighting, Section 12 Drawings Section **DS12-02'** provide a guide to foundation bolt installation.

Hold Point 14.1

Process Held:	Placement of material orders.
Submission Detail:	**Confirmation that all materials to be used in the installation of street or decorative lighting meet the requirements of the Territory and Municipal Services Design Standards.**
Release of Hold Point:	The Superintendent will consider the submitted evidence and document approval prior to releasing of the Hold Point.

14.6 PLINTHS FOR LIGHT COLUMNS

The Contractor shall construct concrete plinths at the locations for light columns shown on the Drawings.

Excavation for plinths shall be neatly cut from solid material. Widen fill locally as necessary where light columns are located on fill to support the plinth. Solid material and fill shall comply with **Standard Specification for Urban Infrastructure Works – Earthworks Section 2.** The ground conditions are to be confirmed as adequate in accordance with the design by a structural engineer where necessary. Excavated material shall be disposed of at locations acceptable to the Superintendent.

Construct plinths to the dimensions and with the embedment required. Design and construct forms true to line, braced in a substantial and unyielding manner and so they can be removed without damaging the concrete,. Forms shall be mortar tight. Where necessary, thoroughly soak timber forms with water to close cracks due to shrinkage. Lightly oil the interior surface to ensure non-adhesion of the concrete. Take care not to stain the surface of concrete which will be exposed. The material used for forms shall be such as to give a smooth and even surface to the concrete. The anchor bolt assembly shall be accurately placed and firmly supported.

Hold Point 14.2	
Process Held:	Placement of concrete for lighting columns plinth construction.
Submission Detail:	**A copy of the drawing(s) in each case certifying the plinth locations reference levels, dimensions and ground conditions are in accordance with the design and adequate for the installation.**
Release of Hold Point:	The Superintendent will consider the submitted drawings and certification prior to releasing of the Hold Point.

Concrete placed in plinths shall be normal class concrete with strength grade N20 in accordance with AS 3600 with 20mm maximum nominal aggregate size. If ready mixed concrete is used, the concrete shall be mixed and delivered in accordance with AS 1379.

The concrete shall be deposited in the forms, without segregation of the components. Concrete shall not be dropped freely from a height greater than 1 metre or be deposited in large quantities at any point and moved or worked along the forms. Care shall be taken to fill every part of the forms. The freshly placed concrete shall be compacted by approved vibrator units. Vibrators shall not be permitted to rest on foundation bolt assemblies. Foundation bolt assemblies shall stop below the finished pavement level.

Exposed surfaces of the concrete shall be struck off and finished with a wooden float. All exposed edges shall be neatly rounded to a 5mm radius. All conduits are to be capped at the time of pour to ensure conduits are free from grit.

14.7 ERECTION AND INSTALLATION

14.7.1 General

The whole of the work shall be carried out in accordance with AS 3000 SAA Wiring Rules and the Service and Installation Rules of the local Supply Authority. The Contractor shall complete all necessary notices, pay all fees and charges and arrange for all inspections and tests required by the Supply Authority, streetlight maintenance contractor, ACTPLA, Territory and Municipal Services, Parks and Places, and NCA as required. Damage caused to the columns, poles, fittings or cabling during relocation shall be made good by the Contractor at no cost to the Principal.

14.7.2 Earthing

Earthing shall be provided to meet the requirements of the Electricity Supply Authority, ACTPLA and TAMS Design Standard 12.

14.7.3 Laying of Conduit

Conduits shall be installed in accordance with AS 3000 and ACTPLA requirements.

14.7.3.1 Minimum Invert Levels

Conduits shall be installed in accordance with AS/NZS 3000 to a minimum cover of 600mm from the finished surface. Where this is impracticable, as approved by the superintendent, a minimum depth of 300mm maybe employed in conjunction with a continuous pour of concrete having a minimum strength of 5MPa. Electrical warning tape shall be installed 200mm above all conduit runs

and for shallow conduit placement directly on top of the continuous concrete pour. Any conduits laid to minimum depth need approval from the superintendent, and are to be marked on the WAE drawings.

14.7.3.2 Conduits under roadways

Conduits under roadways shall project at least 1000mm beyond the kerb or edge of shoulder and / or obstructions. Obstructions include but are not limited to all gas lines, Telstra plant, water-mains, stormwater mains, pram crossings and footpaths.

14.7.3.3 Conduit Marking

Where conduits are laid under existing kerbed roads, their location shall be marked by means of Ramset nail driven into the kerb face directly above the centre of the conduit(s) with a disc or plate with "E" stamped on it.

Conduits laid under new roads shall have their location marked by means of a 100mm high "E" stamped into the kerb face directly above the centre of the conduit(s).

Conduits laid that terminate at a property line or in open spaces, shall have a marker peg provided to indicate the end of the conduit. This peg shall be labelled clearly with the letter "E". Prior to the installation of underground cables, the Contractor may be required to expose the conduit ends.

14.7.3.4 Conduit Inspection

The contractor shall be responsible for the installation of conduits in accordance with the drawings and shall not backfill the conduit trenches until the Superintendent has inspected the conduit in the trenches.

Hold Point 14.3	
Process Held:	Backfilling of conduit trenches
Submission Details:	**Provide at least one working days notice of readiness for inspection of conduit trenches**
Release of Hold Point:	The Superintendent shall inspect the conduits prior to backfilling and document the findings prior to releasing this hold point. WAE information shall be updated at this point.

Backfilling of trenches for conduits in areas that do not require a Road Opening Permit shall be general fill compacted as per **Standard Specification for Urban Infrastructure Works – Earthworks Section 2**

Backfilling shall be carried out in layers not exceeding 150 mm maximum thickness after compaction.

The Contractor shall be responsible for all necessary permits and fees associated with completion of the works. The existing road or path pavement shall be matched, ie each layer of pavement material shall be replaced with identical materials, including asphalt layers where present. Pavement shall be stepped at edges. Where concrete is removed it shall be taken back to the next weakened plane joint or expansion joint. Work to be as per *Standard Specification for Urban Infrastructure Works – Underground Services Section 3*

14.7.4 Cable Pits

Cable pits shall be installed wherever there is more than one 90 degree or greater change in direction in any single conduit run which is not occurring at a street light column. Cable pits shall be installed on long straight runs exceeding 95 metres and at other locations shown on the drawings.

All cable pits shall be installed firmly in the ground with the top flush with the finished surface away from paths and driveways on a drainage bed of 5 mm nominal size screened aggregate of minimum thickness 150 mm. All pits shall be of sufficient size to accommodate the minimum bending radius of the installed cable. All conduit connections to cable pits shall be made waterproof by bitumastic sealant or other method authorised by the superintendent. All cable pits shall have their lids marked with the word “ELECTRICAL”.

14.7.5 Cabling

Cabling shall be installed in one single run from the control point or mini-pillar to column, column to column, column to pit without inline joints. Do not install cables where undue physical stress is placed on the electrical connections. Cable entering or leaving columns or other assets shall be guarded from sharp protrusions. Cables mounted on the exterior of poles or columns shall exit on the pathway side or off traffic side of columns and shall be protected from damage by metallic cable

guards from 200mm below ground to a minimum height of 2.4m above the finished ground level. The Contractor shall supply and install cabling as specified in Clause 14.5.2.

14.7.6 Installation of Lighting Columns

Columns shall be of the make and type as described in **Design Standards for Urban Infrastructure Section 12 – Streetlighting.** Lighting columns shall be erected on the concrete plinths or direct buried and the electrical equipment installed and connected in accordance with the details shown on the drawings. The outreach and column shall be pulled together tightly as recommended by the pole manufacturer using a winch (eg Tirfor) to prevent rotation of the outreach under wind loads.

All lighting columns shall be mounted for true vertical alignment (+/- 0.5 degree). Columns mounted on concrete plinths maybe straightened by means of leveling nuts under the mounting base and then secured tightly in place by means of the nuts on top of the mounting base. The Contractor shall also supply and install a 20mm diameter plastic drainage tube under the mounting base. The gap under the mounting base shall be completely filled with cement mortar and exposed edges neatly chamfered.

With slip base columns the plug and flex assembly shall be clamped to the bottom of the control gear tray and installed so that there is no slack present in the lead. The use of cable ties is not an acceptable clamp. Slip base columns shall be installed for correct operation. Particular attention shall be drawn to the height of the slip-base, baseplate from the finished surface level and the correct tensioning of the hold down bolts. See **drawing DS12 Category 02**.

Use a minimum of 2.5mm² twin and earth TPS cable through the column to connect the luminaire to the lamp control gear unit. The luminaire shall be end mounted onto the lighting spigot on the column, securely locked in position and weatherproofed at the point of entry of the spigot. The alignment of the outreach arm shall be normal, (ie, at right angles) to the traffic lane or tangent point of the curve in the roadway. The specified lamp shall be fitted into the luminaire.

The luminaire column and equipment shall be fully earthed as specified in Drawing DS12 Category 01, AS 3000 and ACTPLA requirements.

For maintenance personnel safety column access hatches shall be placed either facing away from the road or to the side facing away from the oncoming traffic.

Hold Point 14.4	
Process Held:	Installation of columns, cables, pits, wiring, control points, luminaires etc.
Submission Detail:	**The Superintendent shall ensure compliance with Territory and Municipal Services relevant design and specification requirements.**
Release of Hold Point:	WAE information shall be updated at this point.

14.7.7 Commissioning and Testing

On completion of each section of streetlighting the Contractor shall test and commission the streetlighting circuits and associated control equipment.

Evidence of submission of a Notice of Electrical Work to ACTPLA is to be provided with the WAE information on completion of the commissioning and testing.

The Supply Authority, (ActewAGL), shall be informed of the proposed connection and may elect to inspect the street light circuits prior to connection to the streetlight or distribution network.

Hold Point 14.5	
Process Held:	Commissioning and Testing
Submission Detail:	**The Superintendent shall be supplied with evidence of compliance with section 14.7.7 of this specification.**
Release of Hold Point:	Successful provision of WAE information to Territory and Municipal Services asset acceptance

14.7.8 Access Prior to Practical Completion

Where road network or public area access lighting is required prior to practical completion the contractor shall employ one of the options below. The choice of option will be the responsibility of the Contractor and will include meeting all associated costs including connection, disconnection, energy and plant hire.

14.7.8.1.1 Provide Temporary Power Source

Provide compliant temporary lighting until the WAE information is submitted as per clause **14.7.10** (eg generator)

14.7.8.1.2 Provide Temporary Metering

Where necessary, arrange with the Power Supply Authority to install a temporary metered point of supply until a compliant WAE information is submitted as per clause **14.7.10**.

14.7.9 Relocation or removal of existing columns.

All relocated or removed columns shall be recorded on a WAE drawing and submitted to Asset Acceptance to enable the spatial mapping to be updated and the energy billing to be adjusted where necessary.
Where the removal is temporary, suitable alternative lighting shall be installed to compensate

No columns or fittings shall be reused, unless specific approval for their reuse is obtained at design stage from TAMS.

14.7.10 Works as Executed Drawings

All work shall be commissioned and tested as per **clause 14.7.7.**
The contractor shall supply the Work As Executed (WAE) documents to the superintendent, who on certifying will lodge them with TAMS Asset Acceptance.

The WAE drawings are to show, with dimensioned set out, all columns and underground cabling together with total circuit loading. Drawings shall be prepared in accordance with **TAMS document Ref-08 WAE Quality Records.** Evidence of completed Superintendent hold point inspections shall be provided with the WAE documents.

Hold Point 14.6	
Process Held:	Connection of Power Supply
Submission Detail:	**Works-as-Executed drawings showing dimensions setouts of columns and conduits, maximum demand of connected load and voltage drop, fault loop impedance, to the furthest luminaire and all depth and offset information of cabling conduit, columns etc**
Release of Hold Point:	Approval by Territory and Municipal Services Asset Acceptance and Electricity Supply Authority where applicable.

14.7.11 Request for Energisation of Works

Energisation shall not occur until compliant WAE plans have been received and accepted by TAMS. At least five working days shall be allowed for WAE acceptance and transfer of the WAE information to the power supply utility. A longer time frame is likely to be required when non-conforming WAE documents are submitted.

The contractor shall pay all costs associated with, and arrange the energisation of the streetlight circuits through the power supply utility as applicable.

14.8 MEASUREMENTS AND PAYMENT

Payment shall be made for all activities associated with completing the work detailed in this Specification in accordance with Pay Item 14 P1-8 inclusive.

If any pay item for which a quantity of work is listed in the Contract has not been priced by the Contractor, it shall be understood that due allowance has been made in the prices of other pay items for the cost of the activity which has not been priced.

The Contractor shall allow in the pay items generally for the costs associated with all testing required to prove conformance of the works as specified.

14.8.1 Pay Item 14 P1 Lighting Columns

The unit of measurement shall be per lighting column installed of each height as listed in the sub items.

This pay item shall be inclusive of all work and materials required for the installation of the columns of each height, including the column, outreach arm, cable terminations, electrical components and erection.

A separate pay item shall be included in the Contract for each lighting column height.

14 P1.1 Less than 6m Column height

14 P1.2 6.5m Column height

14 P1.3 9.0m Column height

14 P1.4 10.5m Column height

14 P1.5 12.0m Column height

14 P1.6 15.0m Column height

14 P1.7 Greater than 15.0m Column height

14.8.2 Pay Item 14 P2 Lightings and Light Fittings – Watts

The unit of measurement shall be per lighting and/or light fitting installed.

14 P2.1 70w

14 P2.2 150w

14 P2.3 250w

This pay item shall be inclusive of all work and materials required for the installation including the lighting or fitting, lamps, lamp control gear units, electrical components, cabling and erection.

14.8.3 Pay Item 14 P3 Relocated Lighting Columns

The unit of measurement shall be per lighting column of each height relocated.

This pay item shall be inclusive of all work and materials required for the removal and re-installation of the columns including the removal, cabling and re-erection.

A separate pay item shall be included in the Contract for relocated column height.

R14 P3.1 Less than 6m Column height
R14 P3.2 6.5m Column height
R14 P3.3 9.0m Column height
R14 P3.4 10.5m Column height
R14 P3.5 12.0m Column height
R14 P3.6 15.0m Column height
R14 P3.7 Greater than 15.0m Column height

14.8.4 Pay Item 14 P4 Streetlighting Fees and Co-Ordination Costs

This shall be a Lump Sum item.

This pay item shall include all fees and charges payable to the Territory and Municipal Services streetlight maintenance contractor, Supply Authority and ACTPLA, co-ordination costs, costs associated with the delivery of Works-as-Executed drawings and other costs not included in other items.

14.8.5 Pay Item 14 P5 Supply and Lay Conduit

The unit of measurement shall be per lineal metre of conduit installed.

This pay item shall be inclusive of the supply of the conduits and required bends, trenching, laying of conduit in trench or structure, backfilling and the provision of draw wire.

14.8.6 Pay Item 14 P6 Supply and Lay Cable

The unit of measurement shall be per lineal metre of cable installed.

This pay item shall be inclusive of the supply of the cable and installation of the cable in the conduits. Ie from power source to column base.

14.8.7 Pay Item 14 P7 Cable Pits

The unit of measurement shall be per pit installed.

This pay item shall be inclusive of the supply of cable pits, excavation and installation.

14.8.8 Pay Item 14 P8 Concrete Plinth for Lighting Column

The unit of measurement shall be per plinth installed.

This pay item shall be inclusive of all work and materials required for the construction of the plinth including excavation, concrete, anchor bolts assembly, conduits and cable jointing pit.

14.9 SCHEDULE OF HOLD POINTS. INSTALLATION TEST PROCEDURE (ITP) EXAMPLE.

An ITP or similar document to this example shall be provided to Territory and Municipal Services Asset Acceptance immediately following the energisation of the works. The inspection percentages shown in the table below shall be regarded as the minimum inspections required for compliance with Territory and Municipal Services Specifications and Standards.

Location (per column)		Material 100%#	Plinth installation 50% #	Trench 25%#	Column /luminaire Installation 25%#	Testing and Commissioning 100% #	Connection of Power 100% #	Comments
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Initials of Superintendent completing QA check shall be placed in the spaces below.

Signature of designer:_____ _____Signature of installer:_____Signature of Superintendent:_____

Print Name: _____Print Name: _____Print Name: _____

Date: ____ ____ ____ Date: ____ ____ ____ Date: ____ ____ ____

ITP page __ of __